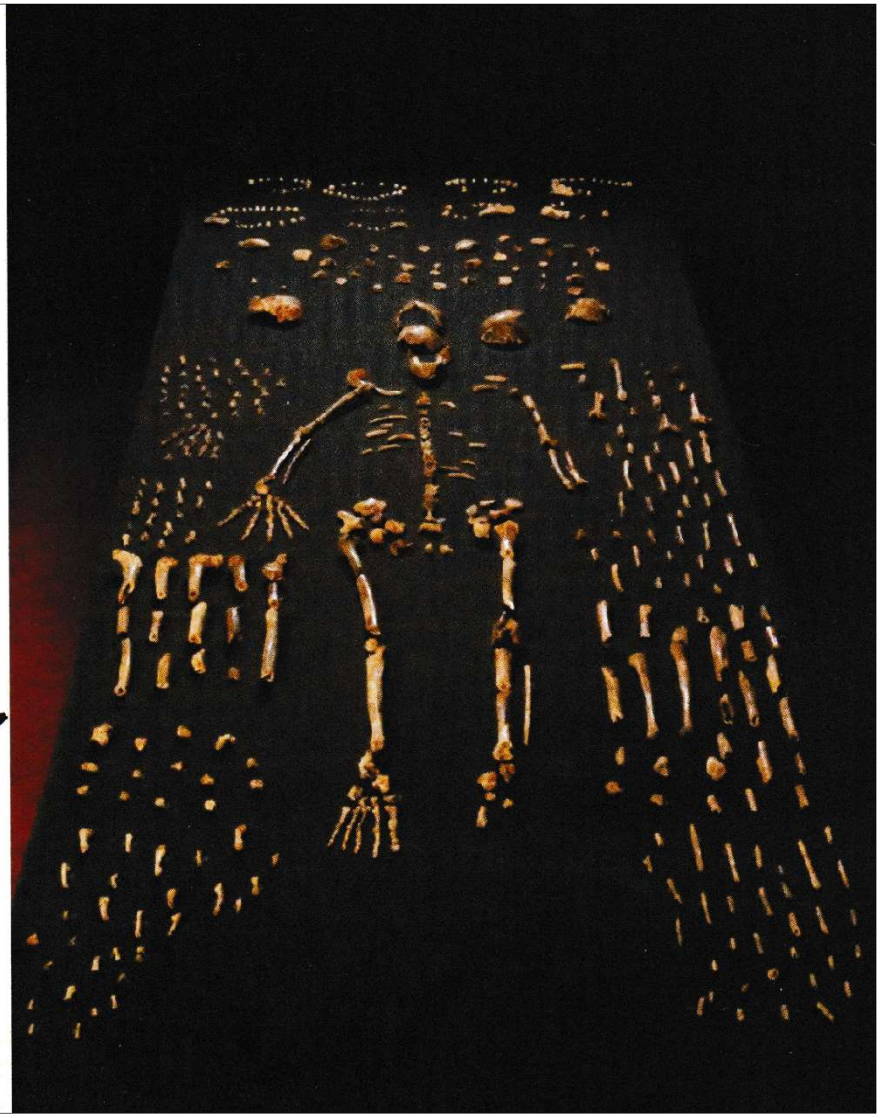
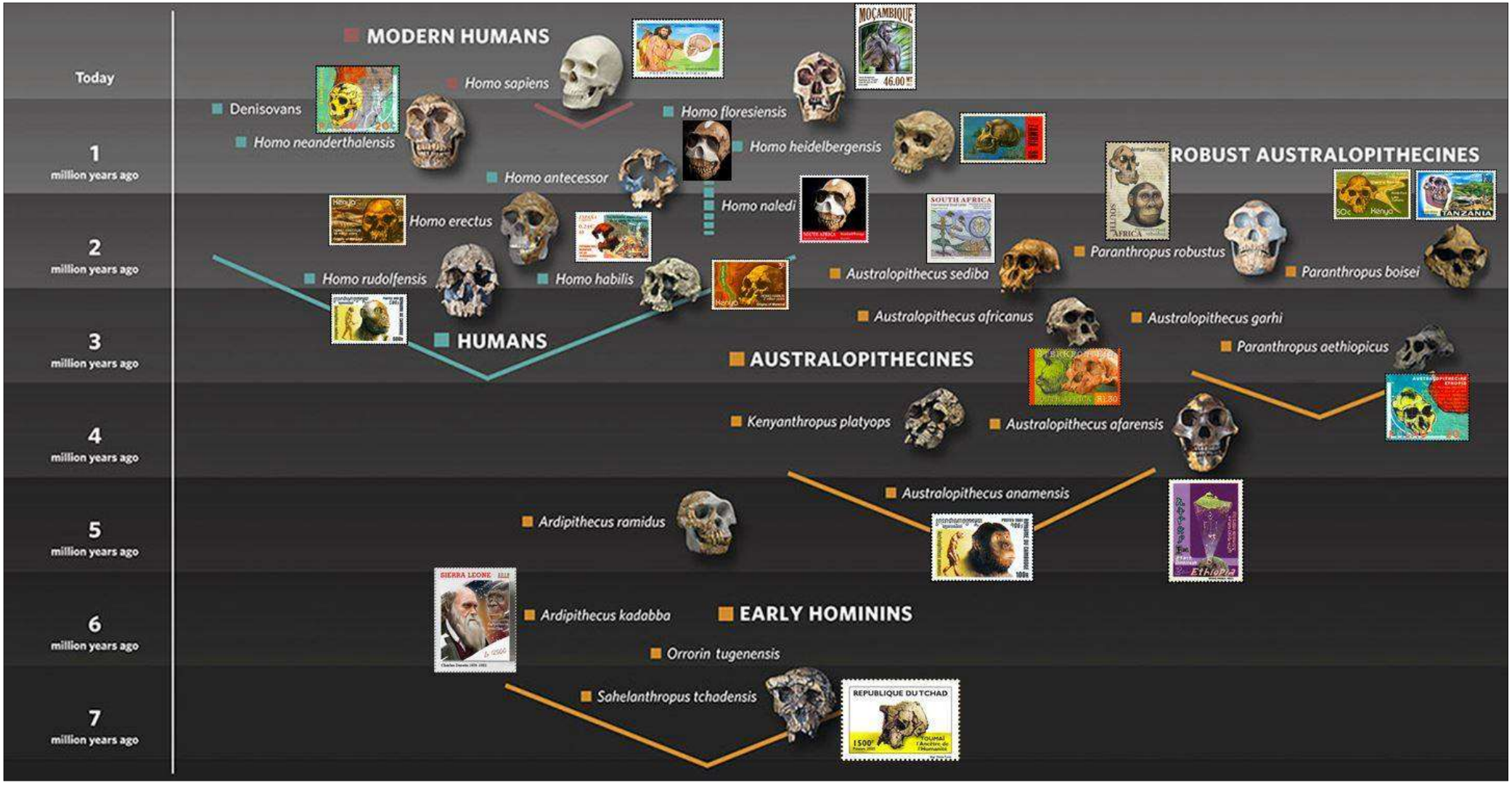
John Hawks in the mirror of philately

John Hawks



John Hawks is an associate professor of paleoanthropology at the University of Wisconsin–Madison.

Evolution of mankind and Philately



Version 15/01. – 20.06.2021

Sts 5
Au. africanus

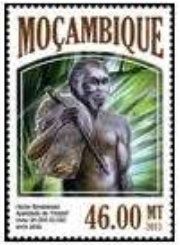
MH1
Au. sediba

KNM-ER 1470
H. rudolfensis

O.H. 24
H. habilis

KNM-ER 1813
H. habilis

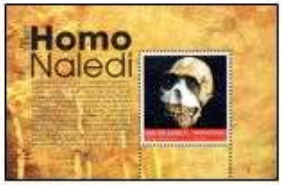
LB1
H. floresiensis



DH1
H. naledi

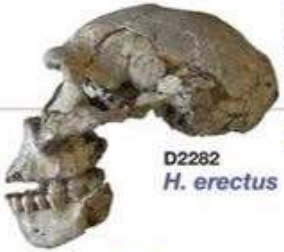
LES1
H. naledi

DH3
H. naledi



10 cm

Sangiran 17
H. erectus



D2282
H. erectus

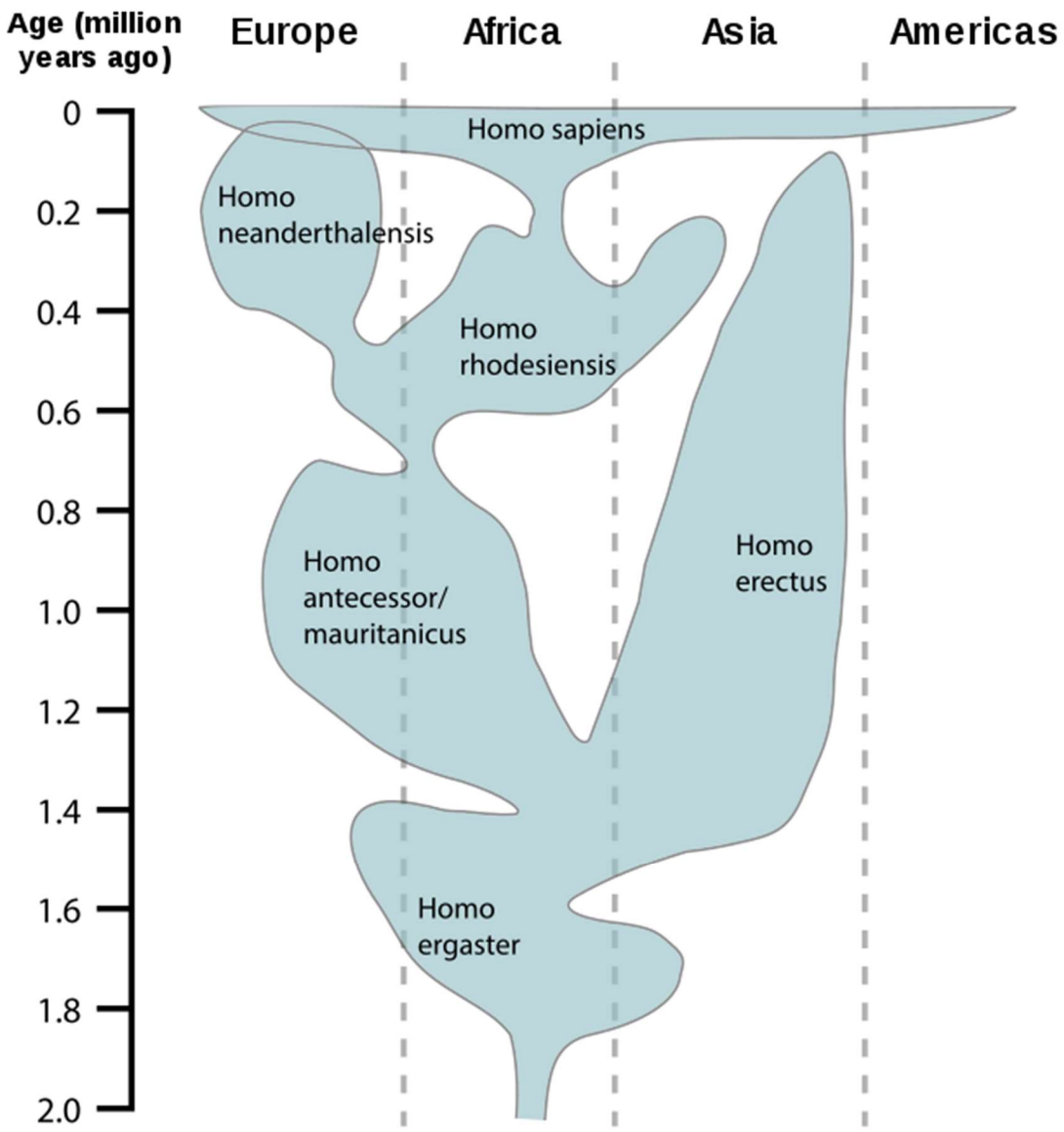
KNM-ER 42700
H. erectus

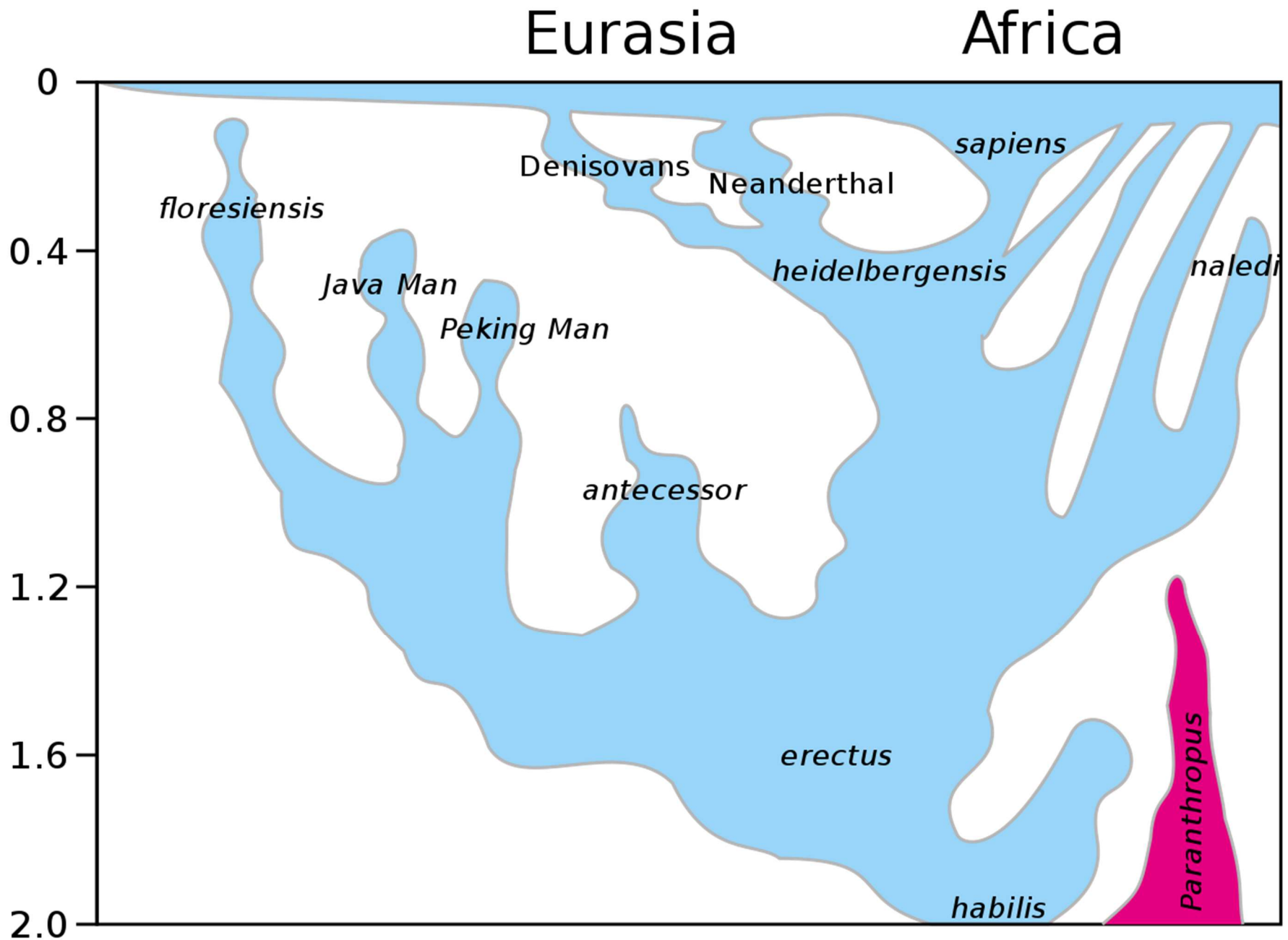
ZKD L2
H. erectus

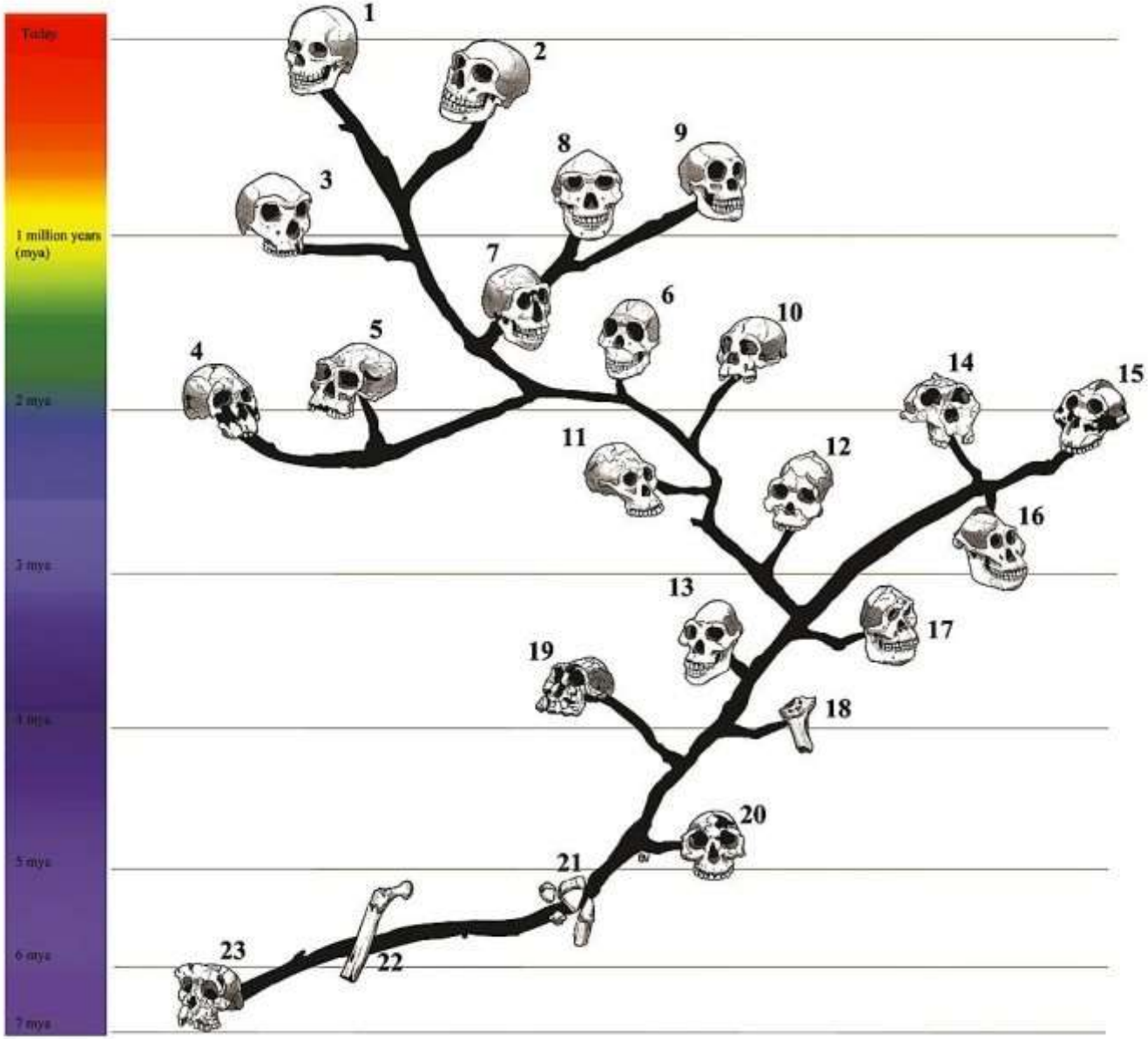
Kabwe
archaic human

Omo 2
modern human

Worldwide


Age (million years ago)
Europe
Africa
Asia
Americas
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Homo sapiens
Homo neanderthalensis
Homo rhodesiensis
Homo antecessor/ mauritanicus
Homo erectus
Homo ergaster


Eurasia
Africa
0
0.4
0.8
1.2
1.6
2.0
floresiensis
Denisovans
Neanderthal
sapiens
heidelbergensis
naledi
Java Man
Peking Man
antecessor
erectus
habilis
Paranthropus



1. *Homo sapiens*
2. *Homo neanderthalensis*
3. *Homo heidelbergensis*
4. *Homo rudolfensis*
5. *Homo habilis*
6. *Homo naledi*
7. *Homo ergaster*
8. *Homo erectus*
9. *Homo floresiensis*
10. *Australopithecus sediba*
11. *Australopithecus africanus*
12. *Australopithecus garhi*
13. *Australopithecus afarensis*
14. *Australopithecus robustus*
15. *Paranthropus boisei*
16. *Paranthropus aethiopicus*
17. *Australopithecus prometheus*
18. *Australopithecus anamensis*
19. *Kenyanthropus platyops*
20. *Ardipithecus ramidus*
21. *Ardipithecus kadabba*
22. *Orrorin tugenensis*
23. *Sahelanthropus tchadensis*

Africa

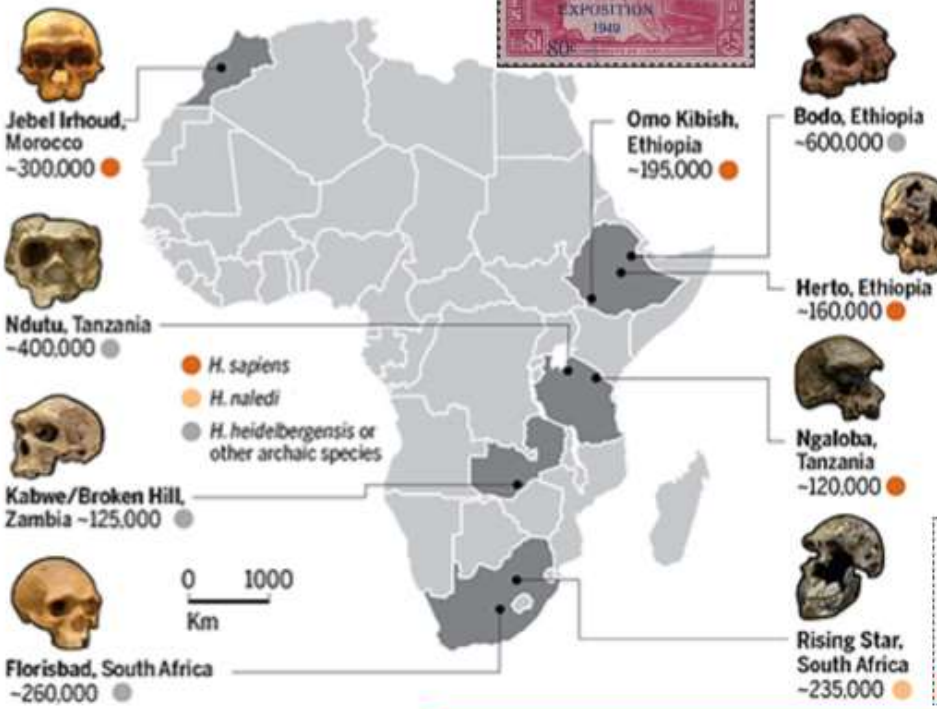

Tighenif
Ain Hanech
Sala
Rabat
Thomas-Steinbruch
Jebel Irhoud
Sidi Abderrahman
Shanidar
Skhul
Amud
Tabun
Zuttiyeh
Kebara
Qafzeh
Bahr el Ghazal
Singa
Hadar
Aramis
Bodo
Middle Awash
Konso
Omo
Nariokotome
Koobi Fora
Eliye Springs
Allia Bay
Kanapoi
Tugen-Bergland
Ndutu
Laetoli
Olduvai
Eyasi
Malema
Uraha
Kabwe
Makapansgat
Sterkfontein
Kromdraai
Border Cave
Swartkrans
Drimulen
Florisbad
Taung
Saldanha
Langebaan
Klasies River Mouth

Archaic Homo sapiens, Homo naledi and Homo heidelbergensis of Africa

Omo Valley
Ethiopia

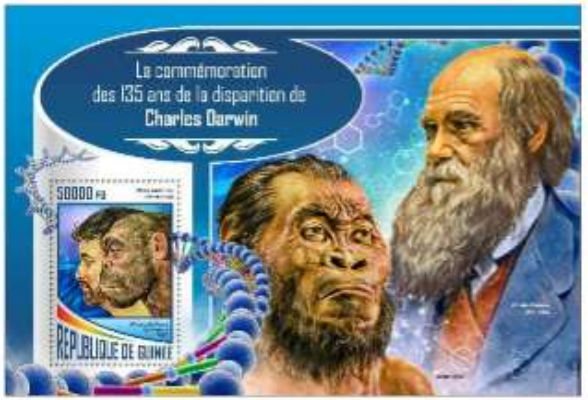
Broken Hill, Kabwe
Zambia

Florisbad
South Africa



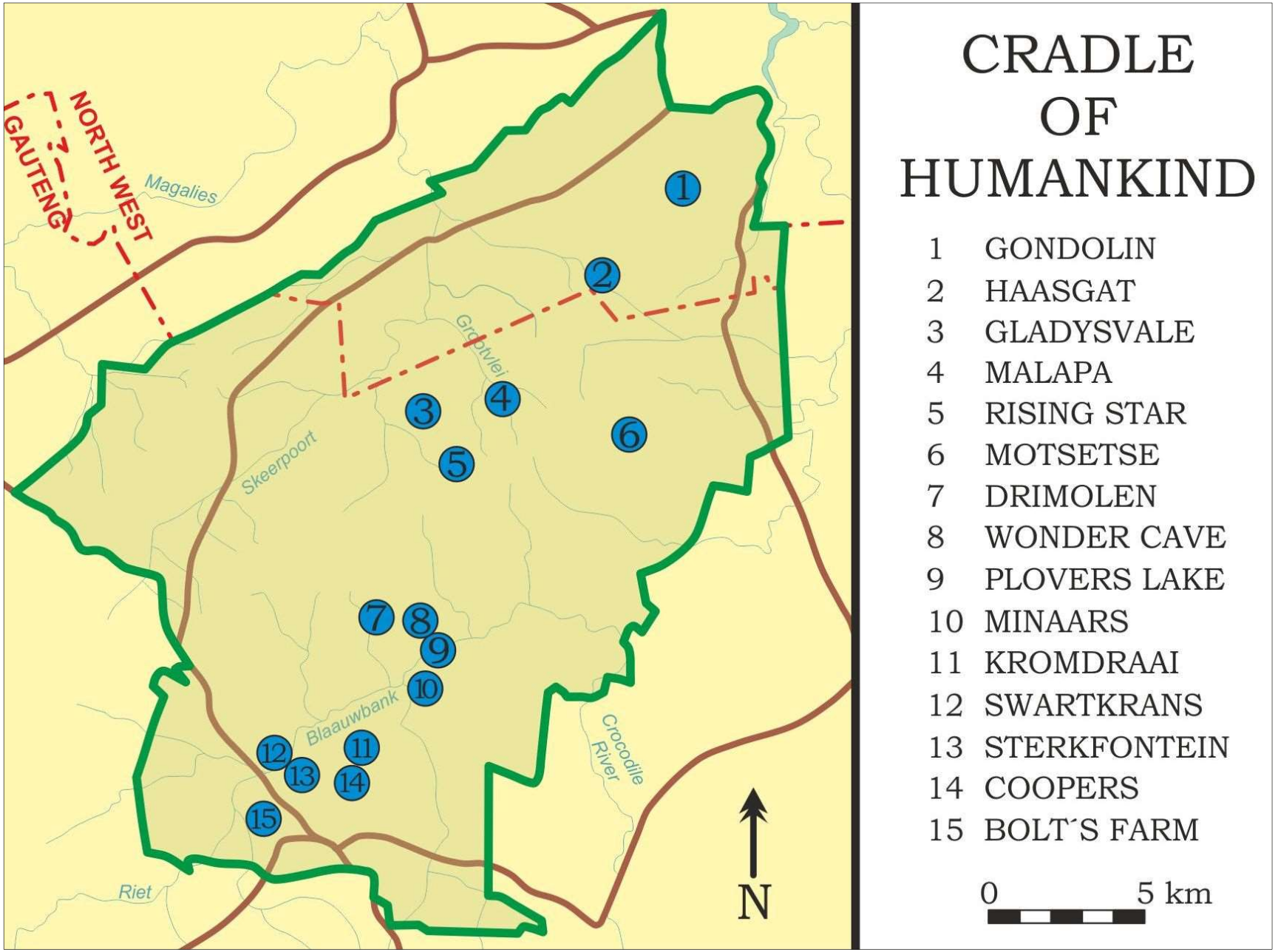
Saldanha man
H. heidelbergensis
South Africa

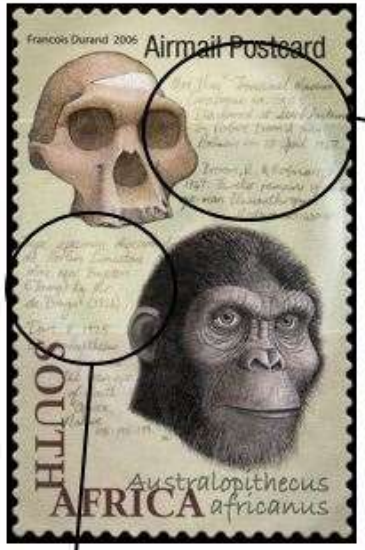
Rising Star cave
South Africa

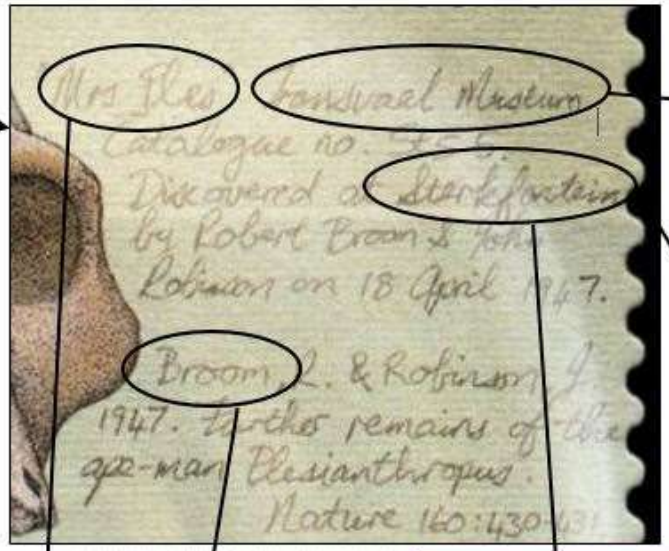


South Africa

The cradle of humankind







Sealbag „Sterkfontein", only known piece

Threering cancel „26" = „Sterkfontein

Threering cancel „26" = „Sterkfontein (forgeries)

Dr Robert Broom (1866–1951)
Palaeontologist with "Mrs Ples" *Australopithecus africanus*

1991-10-09
PRETORIA

Robert Broom (1866 - 1951)

Stw 13

Sterkfontein, South Africa

Alun Hughes and Phillip Tobias initiated a renewed program of excavation at Sterkfontein in 1966. Early in this excavation campaign, from Member 4 of the deposit, workers identified the partial skull designated as Stw 13. The current understanding of the geology of Member 4 suggests this individual lived sometime between 2.5 million and 2 million years ago. The individual was an adult at the time of death. The profound distortion of the fossil resulted from pressure and shifting of the surrounding sediments after the skull's burial. Many features of the skull resemble other Member 4 fossils, like the Sts 5 skull, and anthropologists attribute these materials to *Australopithecus africanus*.

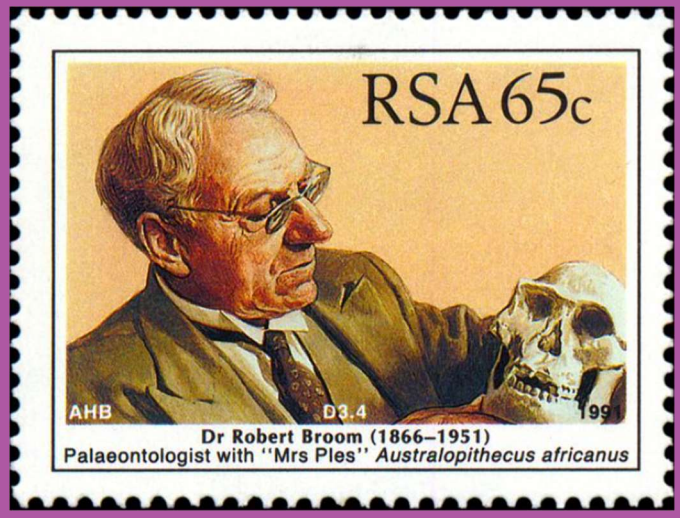
Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

Sts 5

Sterkfontein, South Africa

The excavation led at Sterkfontein by Robert Broom and John Robinson led to the discovery of this skull in April 1947. The blast that freed it from the breccia also severed it into two pieces. A third piece, with the outer table of bone of the cranial vault, was also separated by the blast and remained embedded within breccia. Stephany Potze and Francis Thackeray later extracted part of this bone, revealing high and converging temporal lines on this skull. Broom judged the skull to be a female adult of the species he named *Plesianthropus transvaalensis*, but today scientists consider it to belong to *Australopithecus africanus*. The skeletal sex of this individual remains an open scientific question, a case that helps to demonstrate the challenges of ascertaining sex for fossil hominins that may differ from the patterns of dimorphism in either humans or living great apes.

Skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.



Sts 14

Sterkfontein, South Africa

"We have been fortunate in discovering the nearly complete pelvis of *Plesianthropus*. It was blasted out on 1st August, 1947." So began the description of the Sts 14 pelvic remains by Robert Broom, John Robinson, and Gerrit Schepers. They also recovered much of the vertebral column of this partial skeleton, with some ribs and the partial left femur. Anthropologists today attribute this partial skeleton to *Australopithecus africanus*, and this individual lived sometime between 2.5 million and 2.0 million years ago. With its short, broad and flaring ilia, this pelvis showed that the early fossil hominins from South Africa had a humanlike bipedal gait. As Broom and coworkers wrote, "No one who studies this pelvis can longer hold we think, that *Plesianthropus* is either a Chimpanzee or a Gorilla, or can be closely allied to either."

Skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.

Sts 34

Sterkfontein, South Africa

Robert Broom identified this distal femur in the lower cave at Sterkfontein in 1938. The form of this part of the femur provides strong evidence of habitual bipedal gait. Today's people have femora with a strong angulation between the shaft and condyles, which enhances knee joint stability when the body's weight is supported by one leg. The Sts 34 femur was so strikingly humanlike that Broom feared other anatomists would suspect it had come from a modern person. The discovery of additional postcranial elements would show that *Australopithecus* did not have a "transitional" or intermediate form of bipedality, but instead relied fully on bipedal walking and running when on the ground. This fossil represents an individual that lived sometime between 2.5 million and 2.0 million years ago, and today most scientists attribute it to *Australopithecus africanus*.

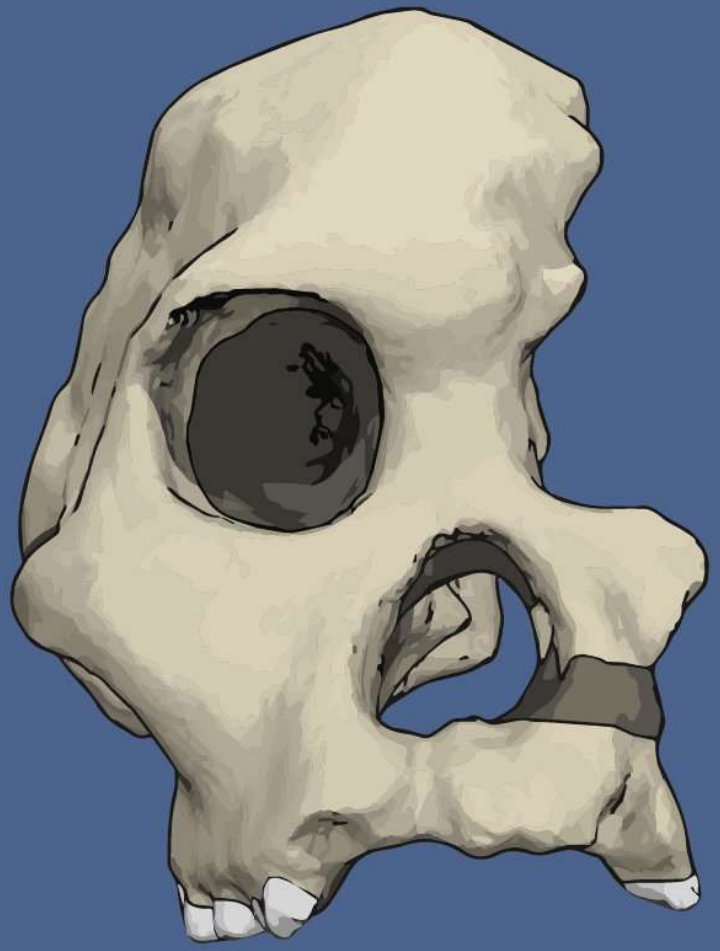
Skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.

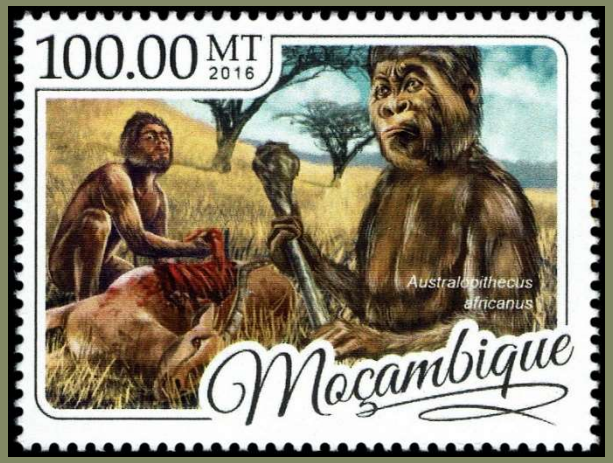
Sts 71

Sterkfontein, South Africa

The excavation led at Sterkfontein by Robert Broom and John Robinson led to the discovery of this skull in late 1947, which they initially called skull number 7. This individual had very strongly worn teeth and was one of the oldest adults known from the Member 4 fossil assemblage, although scientists do not know the lifespan of these early hominins with much accuracy. This individual lived sometime between 2.5 and 2.0 million years ago. Most scientists today attribute this skull to *Australopithecus africanus*, similar to other fossils from the Member 4 deposit. The length, height, and brain size of this skull place it among the smaller *Au. africanus* individuals known.

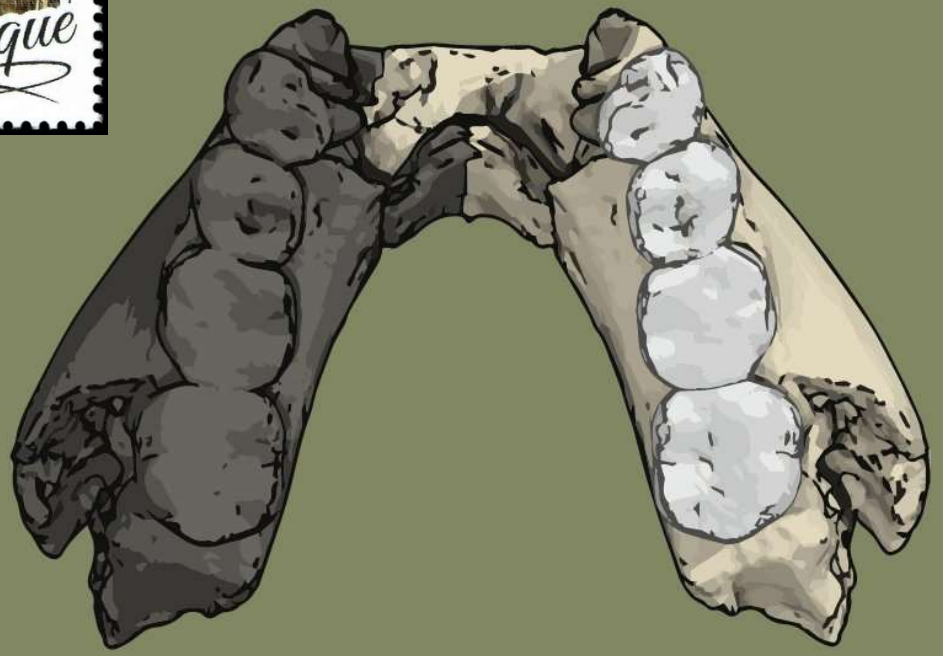
Skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.





Stw 404

Sterkfontein, South Africa



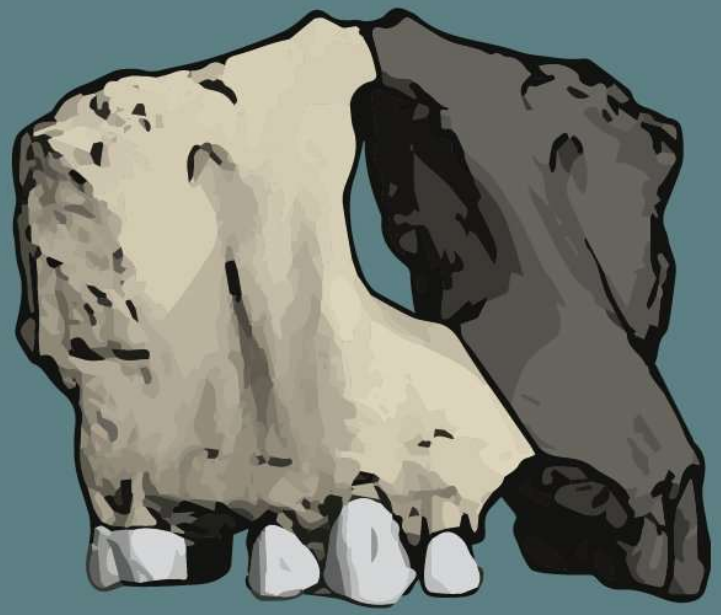
This partial mandible was found during work at Sterkfontein under direction of Alun Hughes during the mid-1980s. The dimensions of the mandibular body and molars among the smallest of the hominin fossil remains from Member 4. The individual was an adult at the time of death, with the right third molar (not pictured) erupted. This fossil has played an important part in conversations about variation in the Member 4 hominin sample. Most scientists have attributed all the Member 4 hominins to *Australopithecus africanus*, but some experts have suggested that some of the larger hominin specimens may represent a second species. Thus, Stw 404 has sometimes been considered as an extreme individual within a highly variable sample, and sometimes as an example of the smaller "morph" within the Member 4 assemblage. This individual probably lived sometime between 2.5 million and 2 million years ago.

Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

Stw 505

Sterkfontein, South Africa

In 1988, Alun Hughes began a new trench in the main excavation area at Sterkfontein to try to understand the lower boundary of the Member 4 deposit. The excavation team found the Stw 505 skull in this trench in early 1989. Today, geologists estimate the age of the Member 4 fossils to be between 2 million and 2.5 million years. This individual's skull is one of the largest attributed to *Australopithecus africanus*. Despite its large jaw muscles, evidenced by a small sagittal crest, the skull lacks other features of the "robust" hominin species. This helps to show that the teeth and skulls of *Paranthropus* are not just overgrown versions of *Australopithecus*, and our own genus *Homo* may have come from an *Au. africanus*-like ancestral population.



TM 1512

Sterkfontein, South Africa

Work in the Sterkfontein lime quarry uncovered this right hominin maxilla in 1938. This was the second fossil individual that Robert Broom considered to represent the facial and dental anatomy of the species he called *Plesianthropus transvaalensis*. Most scientists today share Broom's assessment that this fossil represents a young female individual, because of the small size of the canine and first molar teeth. This individual lived sometime between 2.5 and 2.0 million years ago, and anthropologists today attribute it to *Australopithecus africanus*, similar to much of the Sterkfontein Member 4 hominin material.

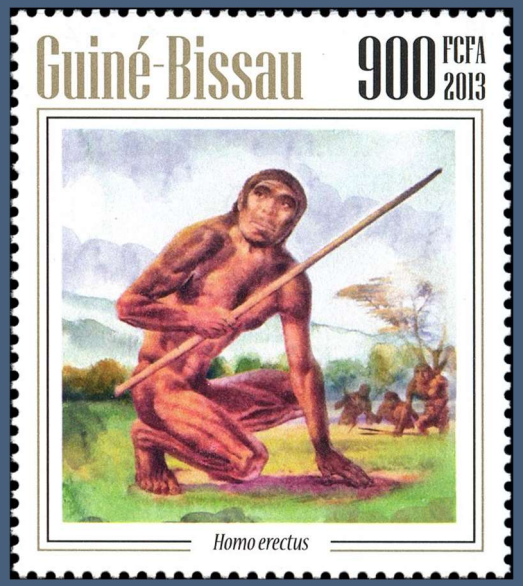
Skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.

Stw 573

Sterkfontein Caves, South Africa

Ronald Clarke identified foot bones of this hominin skeleton in 1995, among fossils from a miner's dump of breccia from the Silberberg Grotto. A search of this area of the caves by Stephen Motsumi and Nkwane Molefe located the left and right tibiae, and in 1998 excavation first uncovered the cranium. This individual lived sometime between 3.7 and 2.0 million years ago. Clarke has described the fossil as *Australopithecus prometheus*, a name that Raymond Dart first applied to the Makapansgat fossil hominins. Many other scientists have considered the fossils from both Makapansgat and Sterkfontein as representing a single, variable species, *Australopithecus africanus*. The incisors, canines, and premolars of this individual were highly worn, suggesting that he or she relied on foods that required stripping or processing with these teeth toward the front of the mouth.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

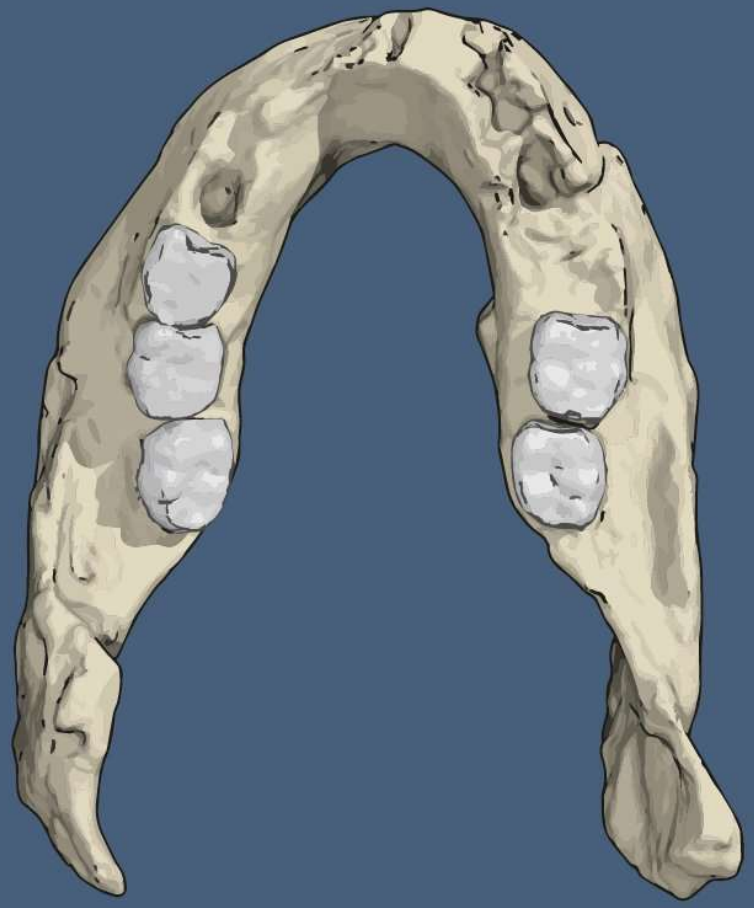


SK 15

Swartkrans, South Africa

John Robinson discovered this mandible in 1949, and together with Robert Broom recognized this as a much more humanlike jaw than those representing *Paranthropus* at Swartkrans. They designated this as the holotype of the species *Telanthropus capensis*. Robinson later reconsidered this identification and attributed the fossil to *Homo erectus*. Most scientists today accept this assessment. This individual lived sometime between 1.7 million and 1.0 million years ago. The left first molar and right second molar both have carious lesions on their mesial (front) surfaces. These cavities were forming in the space between the teeth, and are among the earliest noted for fossil individuals in the genus *Homo*.

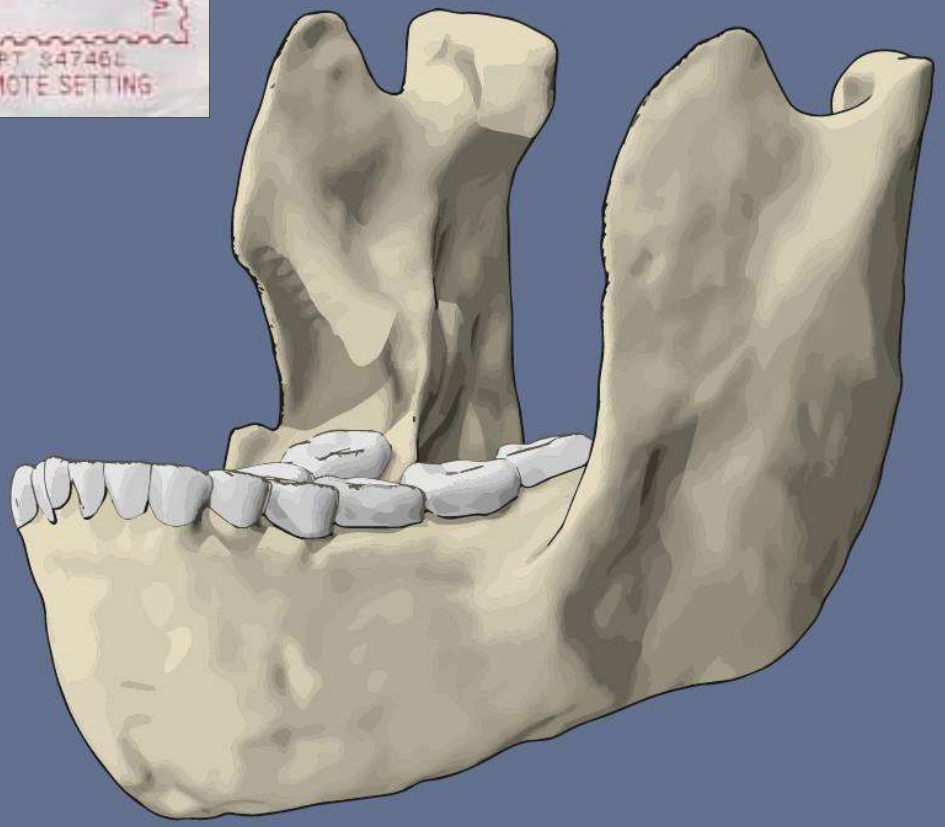
Original skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.



SK 23

Swartkrans, South Africa

Robert Broom and John Robinson began to investigate the fossil deposits at Swartkrans Cave in 1948. They quickly found large-toothed and thick-jawed hominin fossils that they named *Paranthropus crassidens*. As the sample grew to include more cranial remains and more variation of teeth and jaws, Robinson came to view the Swartkrans material as part of the same species as *Paranthropus robustus* as represented at Kromdraai, and since then most anthropologists have followed this assessment. The individual represented by the SK 23 mandible was a young adult at the time of death. The jaw was broken after burial with the two halves displaced inward, making it appear much narrower than in life. This individual lived sometime between 1.8 million and 1 million years ago.



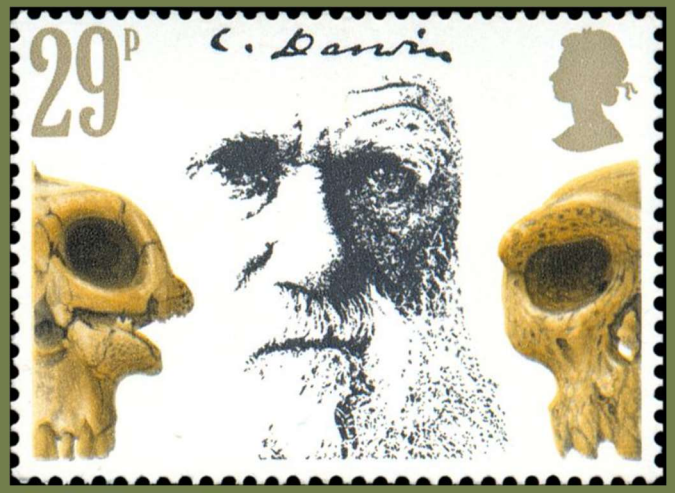
Original skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.

SK 97

Swartkrans, South Africa

Robert Broom and John Robinson recovered this fragment of proximal femur from the deposit that became known as the Hanging Remnant. The individual lived sometime between 2.2 and 1.7 million years ago. The femur is that of an adult, and the diameter of the femur head suggests a body mass of around 30 to 45 kg (66 to 99 lbs). Most scientists attribute this femur to *Paranthropus robustus*, which is much more common than Homo in the Member 1 deposit. Its long femoral neck is shared by other fossils of *Paranthropus* and *Australopithecus*. As in today's humans, the cortical bone is thicker along the bottom surface of the femoral neck than along the top surface. This internal distribution of bone reflects the stresses that result from the gluteal muscles maintaining bipedal posture and gait. However this asymmetry is less in SK 97 than in recent humans, suggesting that *Paranthropus* may have used its legs slightly differently than most people today.

Original skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.

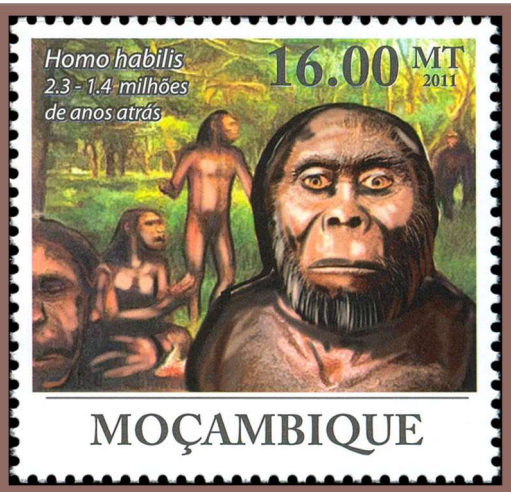


SK 48

Swartkrans, South Africa

In 1949, government funding that had supported excavation of fossil hominins at Swartkrans ran out. Commercial mining of a calcite formation began at the site, with the resulting material sold to make toothpaste. During the next year, John Robinson and other staff of the Transvaal Museum visited the site and recovered a number of fossil hominins that had been uncovered by the mining operations, including the SK 48 skull. This is the most complete cranial fossil of *Paranthropus robustus* from Swartkrans. This individual was a young adult at the time of death, and lived sometime between 2.2 million and 1.8 million years ago.

Original skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa. Illustration by John Hawks CC-BY 4.0

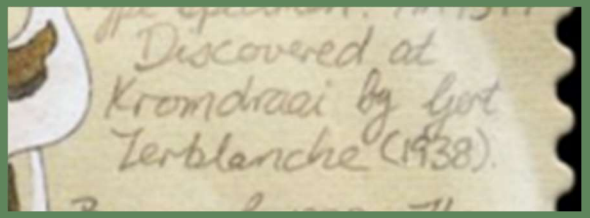


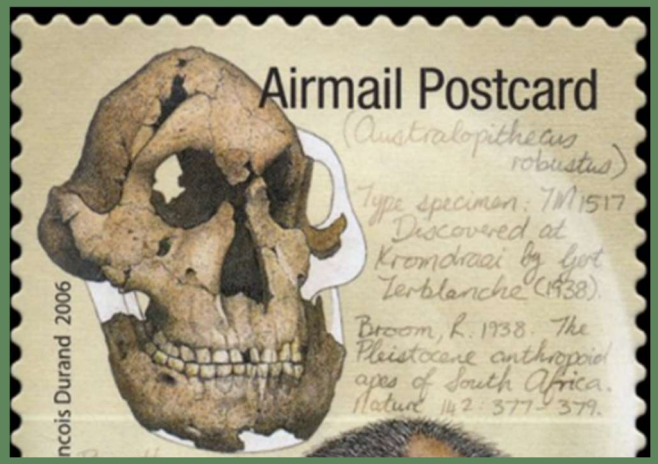
SK 80/847

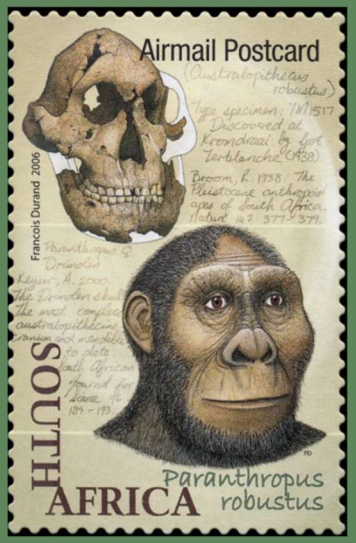
Swartkrans, South Africa

John Robinson recovered a small fragment consisting of the anterior portion of the maxilla in 1950, at first thinking it an example of *Paranthropus robustus*. Once this SK 80 fossil was prepared in 1953, Robinson recognized that it was more similar to *Homo*. In 1969, Ronald Clarke saw that this maxillary fragment refit a larger portion of the upper face catalogued as SK 847 and a temporal fragment, SK 846b, yielding a partial skull. This individual lived sometime between 2.2 million and 1.8 million years ago. Some scientists have emphasized similarities with fossil skulls of *Homo erectus*, while others have suggested the skull may represent *Homo habilis*. The individual had long-term infections affecting the roots of the incisors, leading to some of the earliest-known dental abcesses in the hominin fossil record.

Original skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.





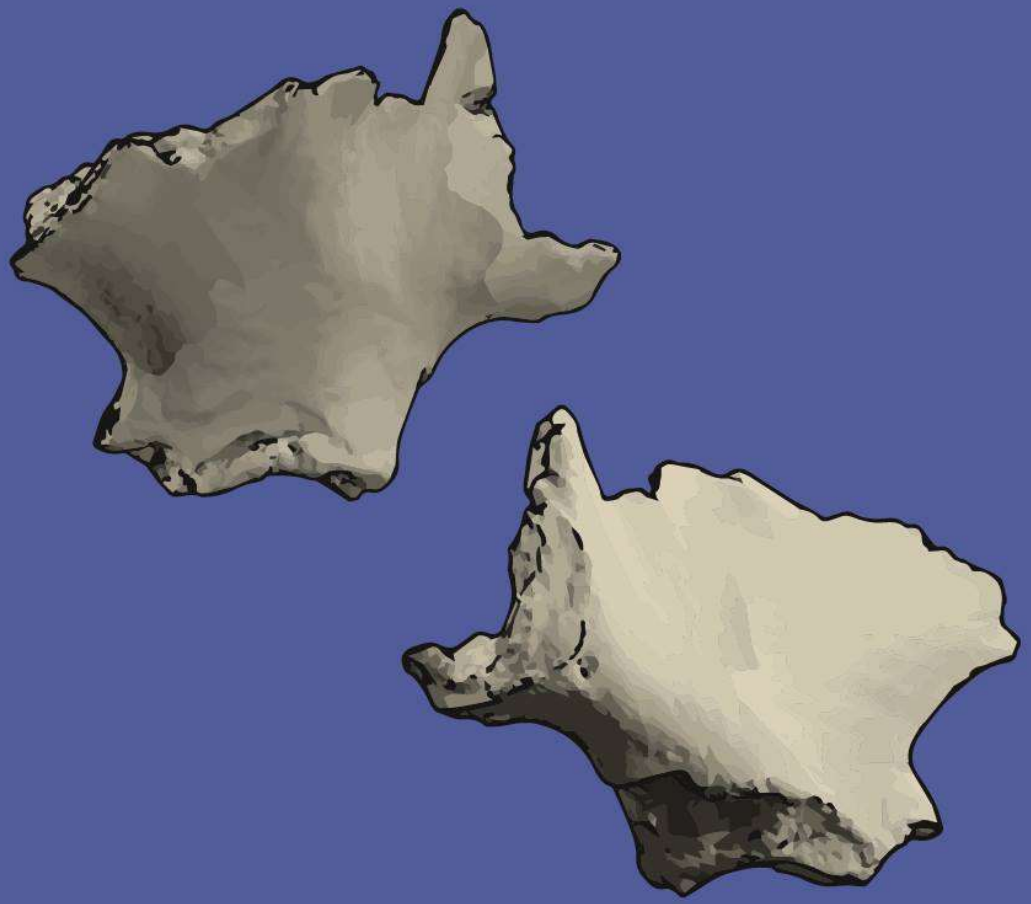


TM 1517

Kromdraai, South Africa

A boy named Gert Terblanche found the first elements of this skeleton in 1938. The paleontologist Robert Broom investigated the site and identified more pieces of the skeleton. Its large teeth and heavily built jaw and face led Broom to name the species *Paranthropus robustus*. The individual was an adolescent at the time of its death, probably between 11 and 15 years of age. Geologists do not precisely know when this individual lived, it was likely older than 1.5 million and less than 2.2 million years ago. Excavations at the site during the last decade have done much to increase knowledge of the deposit and may yield new evidence about the age of this important specimen.

Skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.

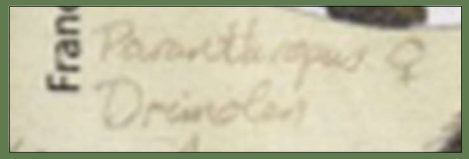


TM 1605

Kromdraai, South Africa

C. K. "Bob" Brain undertook new excavations at Kromdraai in 1955 and 1956 to better understand the formation of the hominin-bearing deposit that was first investigated by Robert Broom in 1938. The renewed excavation uncovered four hominin specimens including this partial ilium. Scientists since its discovery have assumed that the fossil represents *Paranthropus robustus*, because all of the cranial and dental material from Kromdraai B is consistent with this attribution. The ilium is fragmented but relatively undistorted, and represents an adult. The blade of the ilium flares widely, as in most other known pelvic material of *Paranthropus* and *Australopithecus*.

Skeletal material curated at the Ditsong Museum of Natural History, Pretoria, South Africa.



DNH 7

Drimolen, South Africa

A volunteer at the Drimolen fossil site, R. Smith, found the first pieces of the upper jaw of the DNH 7 skull in 1994. André Keyser, who had directed the Drimolen work since 1992, took over excavating the skull, finding that a colony of ants had tunneled through part of the spongy layer of the cranial bone. Together with its associated mandible, this fossil is the most complete cranium known of *Paranthropus robustus*. It is also one of the smallest adults known for this species. Along with its small size, the skull has small tooth dimensions, and lacks extreme muscular features such as a sagittal crest. Together, this pattern suggests that DNH 7 was a female individual. Her widely flaring cheekbones and very small canine and incisor teeth compared to larger premolars and molars all mark *P. robustus* in comparison with other South African hominin species.

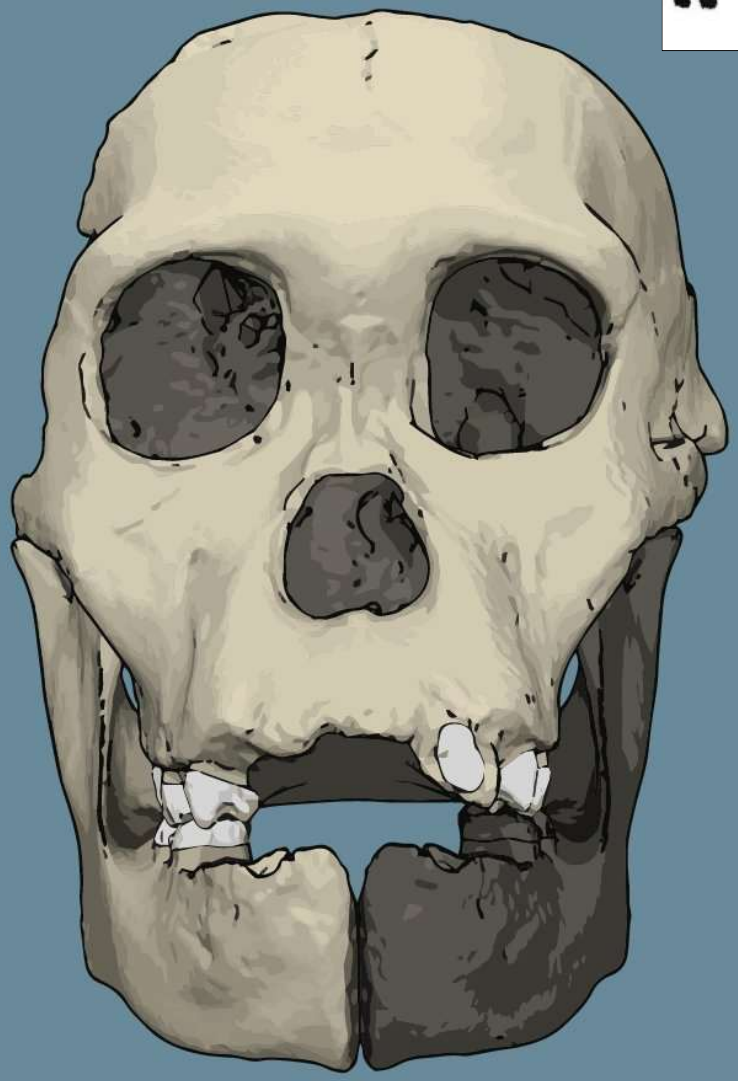
Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.
Illustration by John Hawks CC-BY 4.0

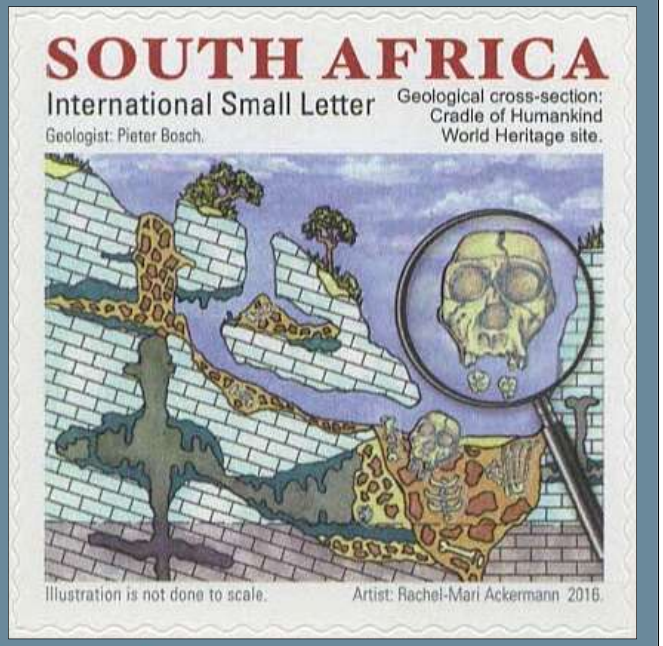
DNH 155

Drimolen, South Africa

Samantha Good uncovered the first piece of this partial skull during a field school in 2018. The fossil was reconstructed and described by Jesse Martin and coworkers, who attributed it to *Paranthropus robustus*. This individual lived sometime between 2.04 and 1.95 million years ago. In comparison to the smaller DNH 7 skull, this skull is likely to represent a male adult individual. These crania from Drimolen Main Quarry have sagittal crests, wide and flared zygomatic arches, and large postorbital contrictions, all features that reflect powerful chewing. However, the shape of these skulls would have generated less bite strength than some other *P. robustus* fossils, which may reflect evolution over time toward greater bite force.

Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.



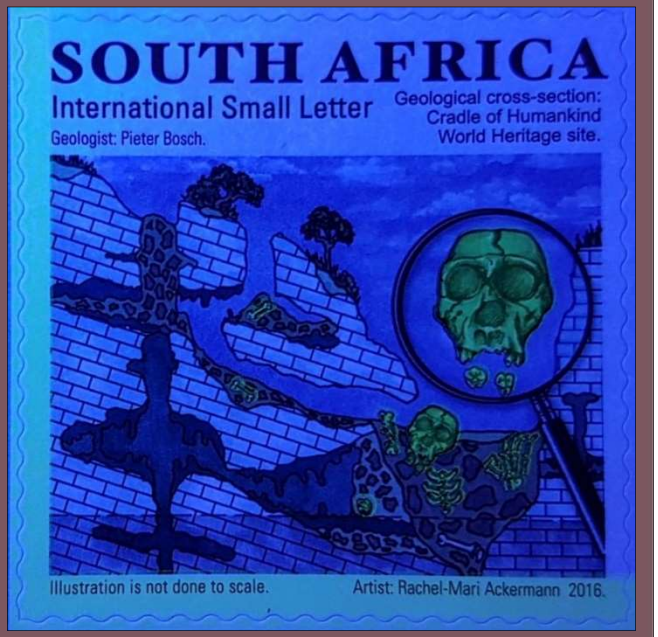


MH1

Malapa, South Africa

Matthew Berger identified the first piece of this partial skeleton of *Australopithecus sediba* at the Malapa site in 2008. Successive discoveries of more of the skeleton, including the cranium, have continued since then. Much of the skeleton and additional portions of the mandible have been found and preparation of these fossils continues. Based on evidence about the development of the teeth and other parts of the skeleton, scientists think that this individual was between 9 and 11 years old at the time of death. The Malapa *Au. sediba* skeletal remains lie between two flowstone layers which enable a fairly precise estimate of their geological age, at 1.977 million years ago.

Skeletal material curated at the University of the Witwatersrand, South Africa.



MH2

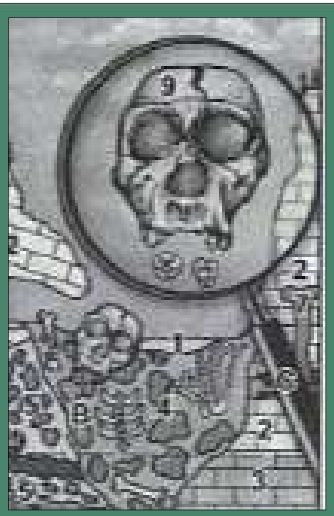
Malapa, South Africa

Lee Berger identified the first pieces of this partial skeleton of *Australopithecus sediba* at the Malapa site in 2008. Job Kibii and coworkers first reconstructed its pelvic anatomy in 2011. The pelvis and other elements support that this was a female adult individual. As in other known *Australopithecus* skeletons, the short ilia that curve around the torso and broad sacrum show MH2 to be a biped. With taller ilia and a more rounded pubic inlet than most *Australopithecus* pelvic remains, *Au. sediba* at 2 million years ago may have had a more similar walking style to humans.

Skeletal material curated at the University of the Witwatersrand, South Africa.

MH2

Malapa, South Africa



Lee Berger identified the first pieces of this partial skeleton of *Australopithecus sediba* at the Malapa site in 2008. The relatively small mandibular corpus, the relatively short and less sloping area behind the incisors, and the small sizes of the teeth are features that this mandible shares with *Homo*. The pelvic form of the MH2 skeleton suggests that this was a female individual, and its tooth wear shows that she survived well into adulthood. The *Au. sediba* skeletal remains from Malapa represent individuals that lived very close to 1.98 million years ago. At that time, these may be the latest fossils that scientists attribute to the genus *Australopithecus*. The relationships of *Au. sediba* to other hominin species are not clear. The species shares many features with earlier samples of *Australopithecus*, and some phylogenetic analyses place it as a close relative of *Au. africanus*. Others have proposed closer connections between *Au. sediba* and *Homo*, or with particular species within *Homo* such as *H. habilis*.

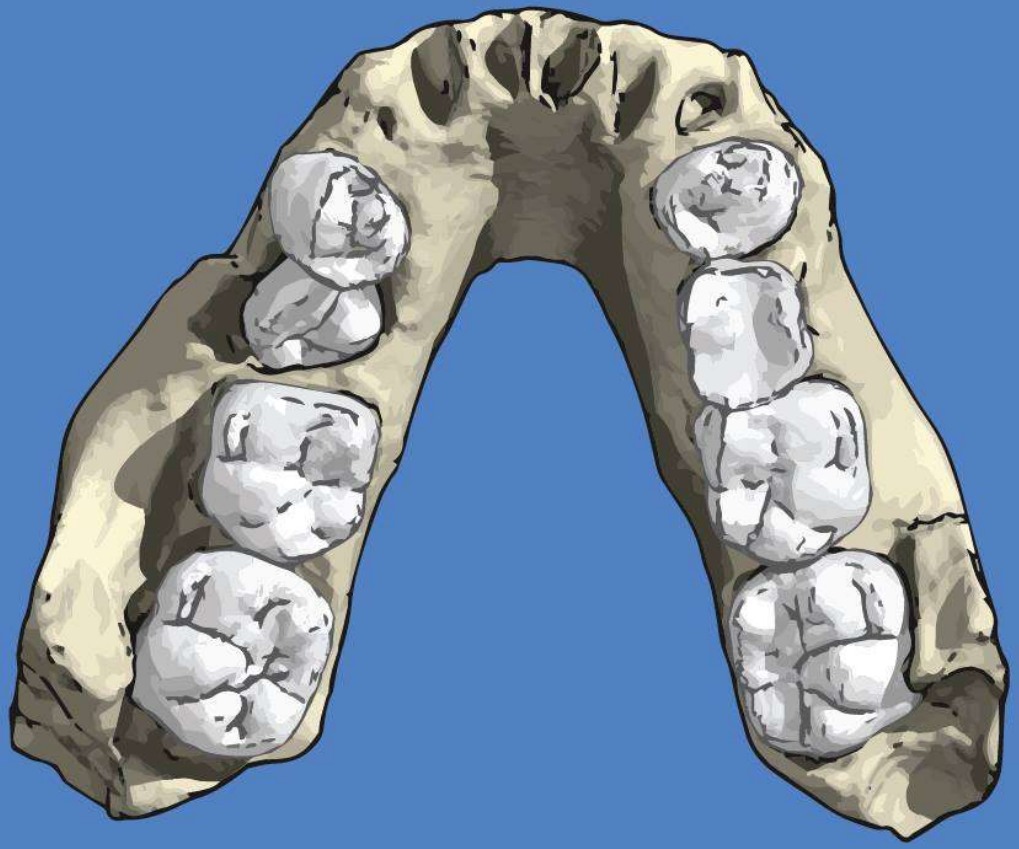
Skeletal material curated at the University of the Witwatersrand, South Africa.

MLD 1

Makapansgat, South Africa

James Kitching found this fossil in 1947 in the breccia of a miner's dump at the abandoned limeworks at Makapansgat. The fragment includes most of the occipital bone and parts of the left and right parietal bones of an adult hominin. Raymond Dart described the fossil and considered it similar to the Taung fossil skull of *Australopithecus africanus*, which he had discovered 23 years earlier. Dart was already familiar with blackened fossil animal bones from the Makapansgat breccia, believing these to be evidence of burning by ancient hominins. This inspired him to name the MLD 1 fossil *Australopithecus prometheus*. Today most scientists consider the Makapansgat fossils to represent *Au. africanus* and recognize that other fossil bones were blackened by manganese staining, not burning. The geological age of this individual is uncertain but is likely sometime between 2.85 million and 2.58 million years.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

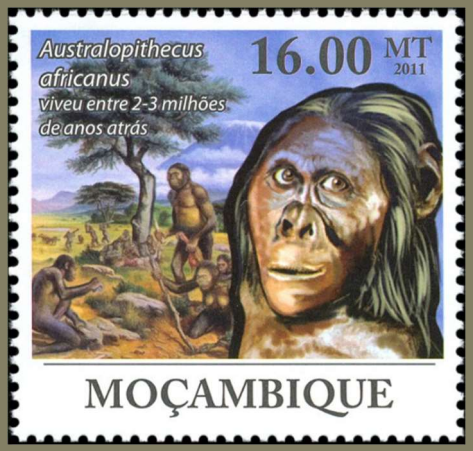


MLD 2

Makapansgat, South Africa

Alun Hughes and Scheeper Kitching found this mandible in a breccia block in a miner's dump at the Makapansgat Limeworks in 1947. Raymond Dart recognized the similarity between the first molars and those of the Taung specimen, which supported his attribution of the jaw to *Australopithecus*. Today the best guess as to the geological age of this fossil is between around 2.85 million and 2.58 million years. The jaw represents an immature individual with the permanent premolars still erupting. Dart thought that cracks and lost teeth near the front of the jaw were signs that the child had suffered a violent blow near the time of its death, but since the 1970s-era studies of cave taphonomy by C. K. Brain, these have been seen as results of weathering and stresses in the breccia deposit.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

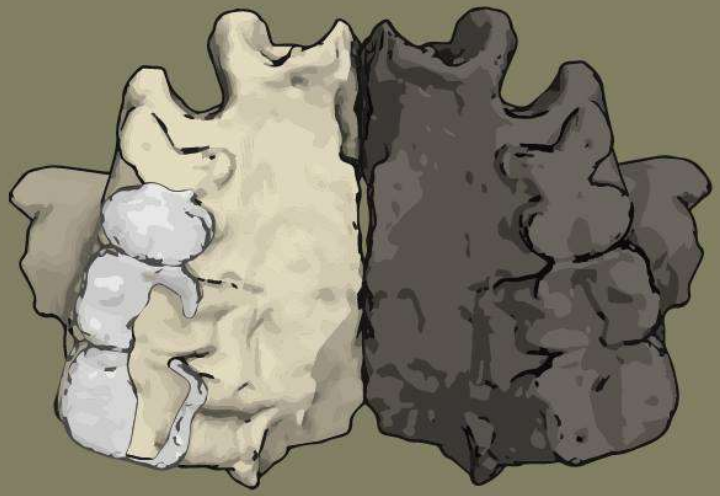


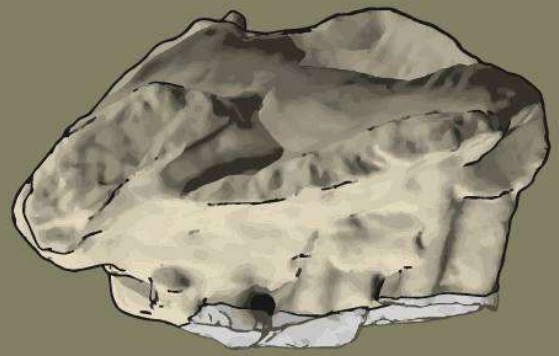
MLD 9

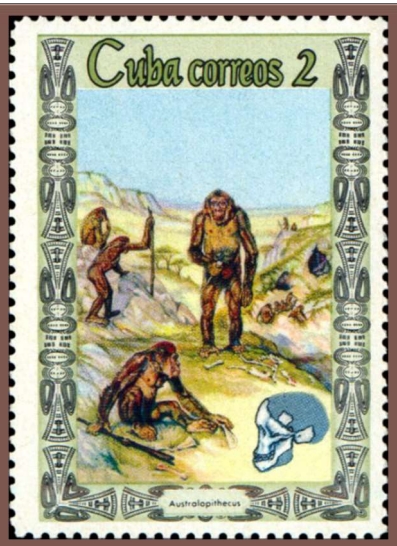
Makapansgat, South Africa

Ben Kitching collected the breccia block containing this maxillary fragment during the expedition to Makapansgat in 1947. However the hominin fragment was not noticed until the breccia was studied in the laboratory in 1948. Raymond Dart described this fossil as a "second piece of promethean palate", following his description of the Makapansgat fossils as *Australopithecus prometheus*. The fragment preserves the midline of the palate and intermaxillary suture, with the incisive foramen clearly visible. This region was important in the evolution of the "robust" hominins, which have a flatter nasal floor lacking the "step" at the incisive foramen visible in MLD 9. Today scientists think the Makapansgat fossils represent hominins that lived between 3 million and 2.5 million years ago, and most attribute the material to *Australopithecus africanus*.

Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.







MLD 18

Makapansgat, South Africa

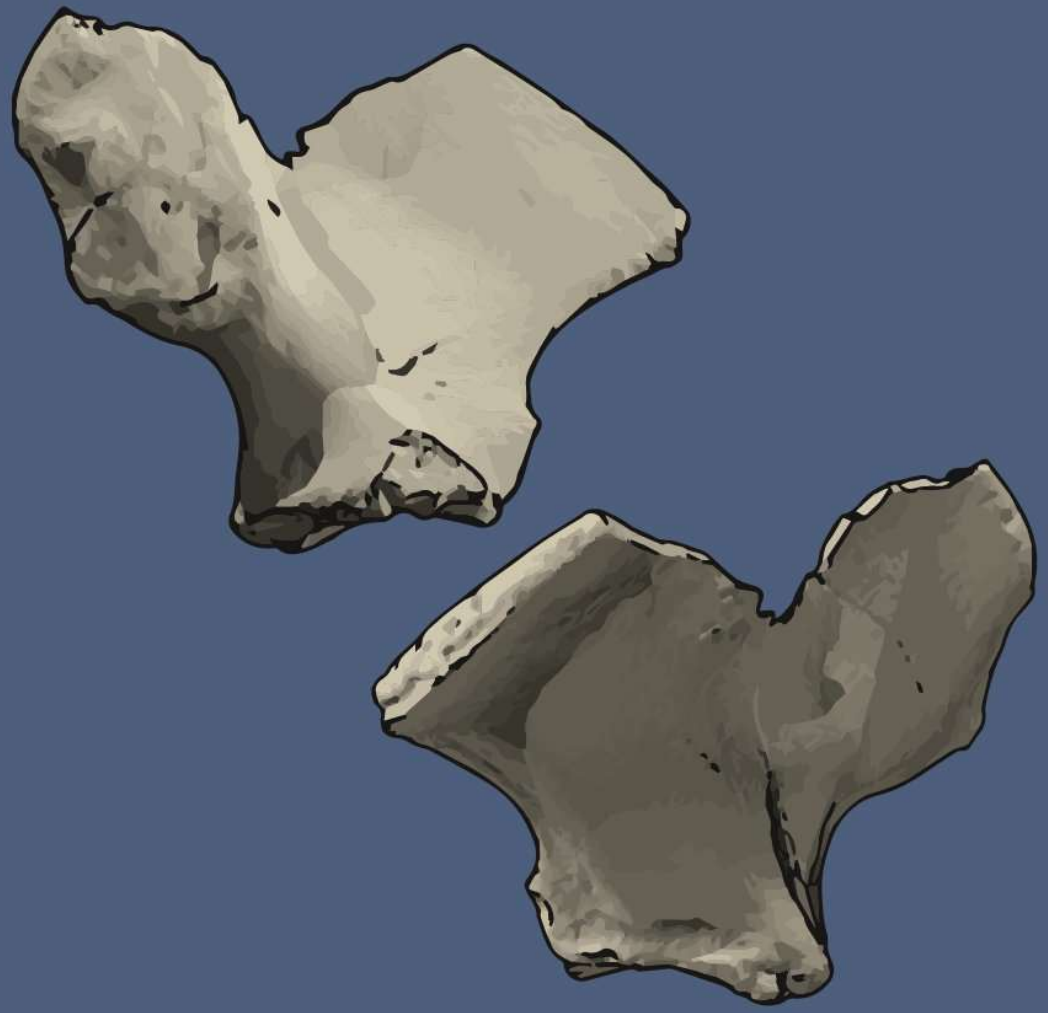
Alun Hughes recovered a block of breccia containing this mandible in 1953. By Raymond Dart's account, Hughes had supervised the movement and inspection of more than 5000 tons of limestone dump by this time. The individual was an adult at the time of death, and scientists today think that this individual lived sometime between 3 million and 2.5 million years ago. Most researchers attribute this mandible to *Australopithecus africanus*. This jaw is one of many *Australopithecus* fossils to exhibit a "reversed Monson" curve in the second and third molars. This contrasts with the majority of humans and chimpanzees that develop a helicoidal pattern of tooth wear, in which the first molars have higher lingual cusps and the third molars have higher buccal cusps. The evolution of this curve of molar wear relates to the width of the mandible and anterior projection of the face.

Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

MLD 25

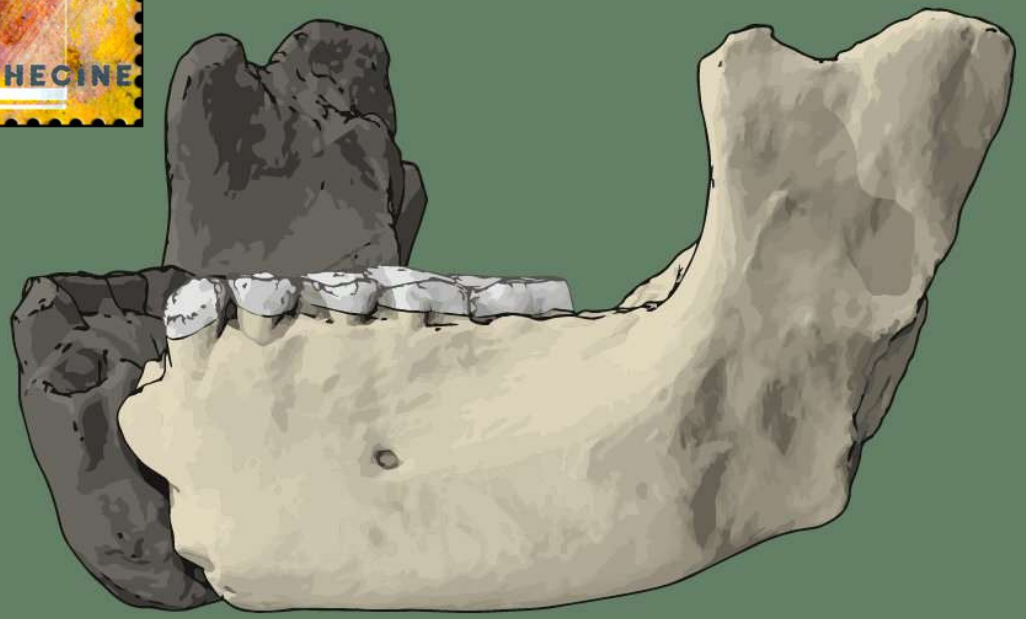
Makapansgat, South Africa

James Kitching identified this left hominin ilium during the preparation of a grey breccia block from Makapansgat in 1956. The ilium was not fused with the pubis and ischium at the time the individual died, meaning that it comes from a child or adolescent. As in other fossils that scientists attribute to *Australopithecus africanus*, the blade of the ilium flares somewhat more widely, and curves less around toward the front of the torso, than in today's humans. Despite these details, the shape of the ilium marks this fossil as a hominin, strongly different from any other group of living primates. The geological age of the Makapansgat fossil hominins is sometime between 3.0 and 2.5 million years ago.



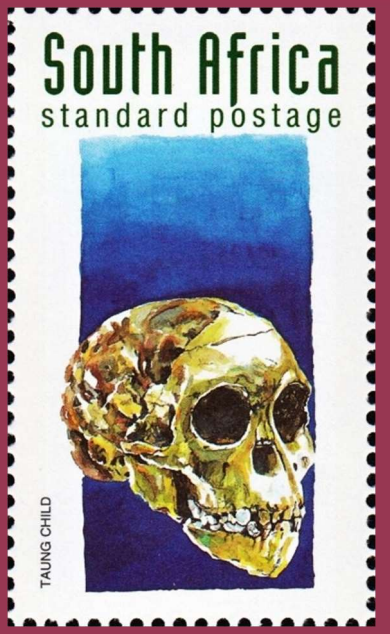
MLD 40

Makapansgat, South Africa



Brian Maguire identified this hominin mandible as he worked to prepare breccia from Makapansgat in 1961. Today scientists think the Makapansgat fossils represent hominins that lived between 3 million and 2.5 million years ago, and most attribute the material to *Australopithecus africanus*. This individual was an older adult and its thick mandible and large tooth size suggest male sex. At the time Raymond Dart described this jaw, he supported the idea that broken hominin bones at the site had probably been victims of cannibalism, because the bones were fragmented and jumbled together with the bones of antelopes and other possible prey animals. Today scientists do not think that hominins were the primary accumulators of the Makapansgat fossil bones.

Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.
Illustration by John Hawks CC-BY 4.0



Taung

Taung, South Africa

M. de Bruyn, a miner working for the Northern Lime Company, is credited with blasting the breccia deposit containing this hominin skull, while mining tufa in 1924. The geologist Robert Young selected the breccia block among those he returned to the University of the Witwatersrand. Raymond Dart recognized the nature of the skull and the matching fossil endocast, and named the specimen *Australopithecus africanus*. The discovery of this human relative initiated the scientific inquiry into deep human ancestry in Africa. Since the skull was separated from its geological context in the commercial mine, its geological age remains somewhat uncertain today. The best estimate places it between 3 and 2.5 million years old.

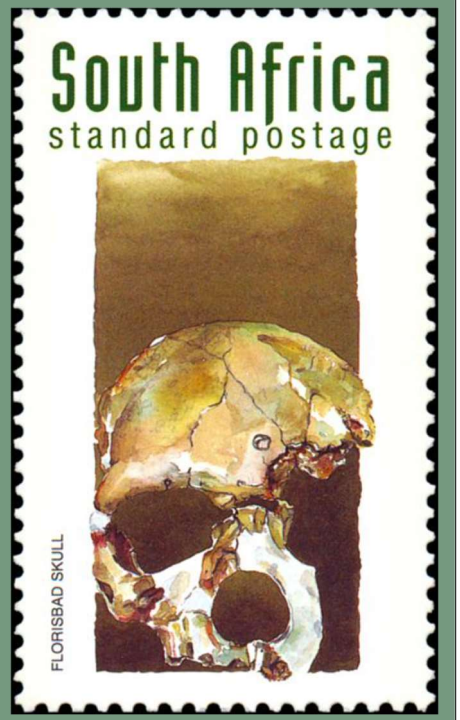
Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

Florisbad calvaria

Florisbad, South Africa

Thomas Dreyer found the partial cranial remains of an individual within an ancient peat bed in the Florisbad hot springs in 1932. The skull combines a relatively large brain size, a frontal bone with no supratoral sulcus but a sloping profile, and a large cheekbone with no malar notch. Some anthropologists have compared the Florisbad skull with Kabwe and other "archaic" hominin remains, while others suggest it belongs to an early form of *Homo sapiens*. Electron spin resonance and U-series dating have suggested that the Florisbad peat deposit may come from as early as 250,000 years ago, but the circumstances of the discovery do not make it clear whether this individual lived so long ago, or whether it may come from a more recent period.

Original skeletal material curated at the National Museum, Bloemfontein, South Africa.



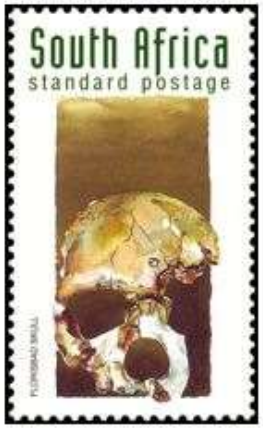
Saldanha calvaria

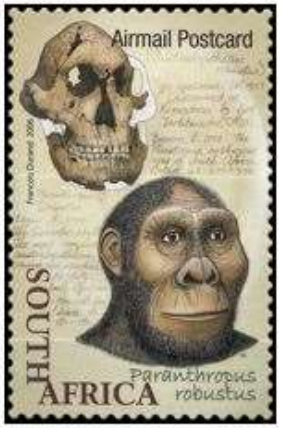
Elandsfontein site, South Africa

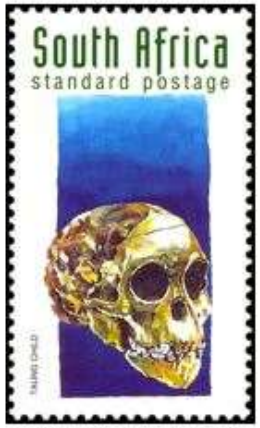
Ronald Singer and Keith Jolly found the fragments of this calvaria over several field trips to the Elandsfontein farm fossil site in 1953. Most fragments were within 10 meters of each other, but some were as much as 500 meters away. The skull comes from a fossil deposit eroding from cemented sand dunes, with a variety of stone artifacts including handaxes and Still Bay material. The geological age of this fossil is therefore uncertain; it may be Middle or Late Pleistocene. The frontal bone and supraorbital torus are similar in shape to the Kabwe skull, and the angled occipital bone with a distinct torus is similar to both Kabwe and a broader array of fossil *Homo* skulls.

Skeletal material curated at the Iziko South African Museum, Cape Town, South Africa.

Stamps and gold coins from South Africa with early Hominids







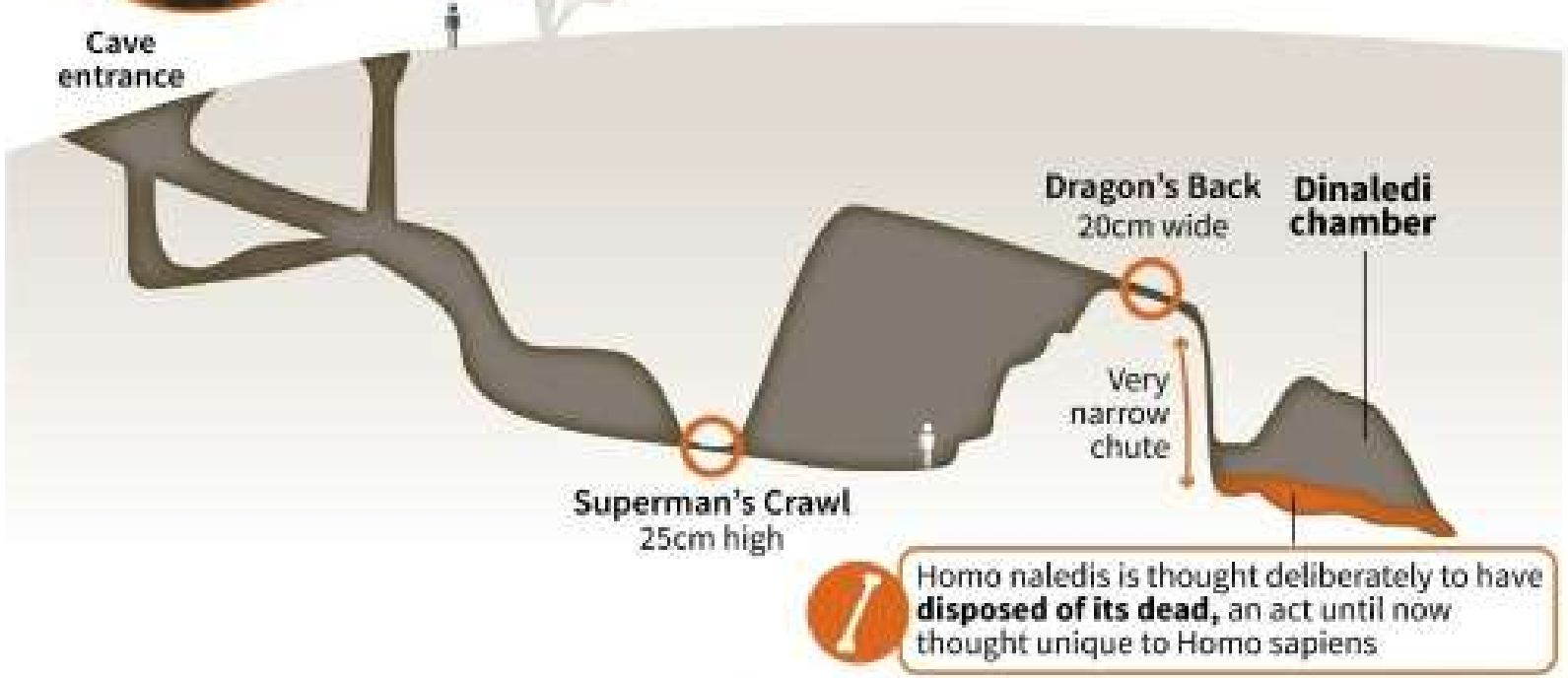
New human species discovered in South Africa

Scientists say the discovery of Homo naledi shines new light on the origin of mankind

Homo naledi

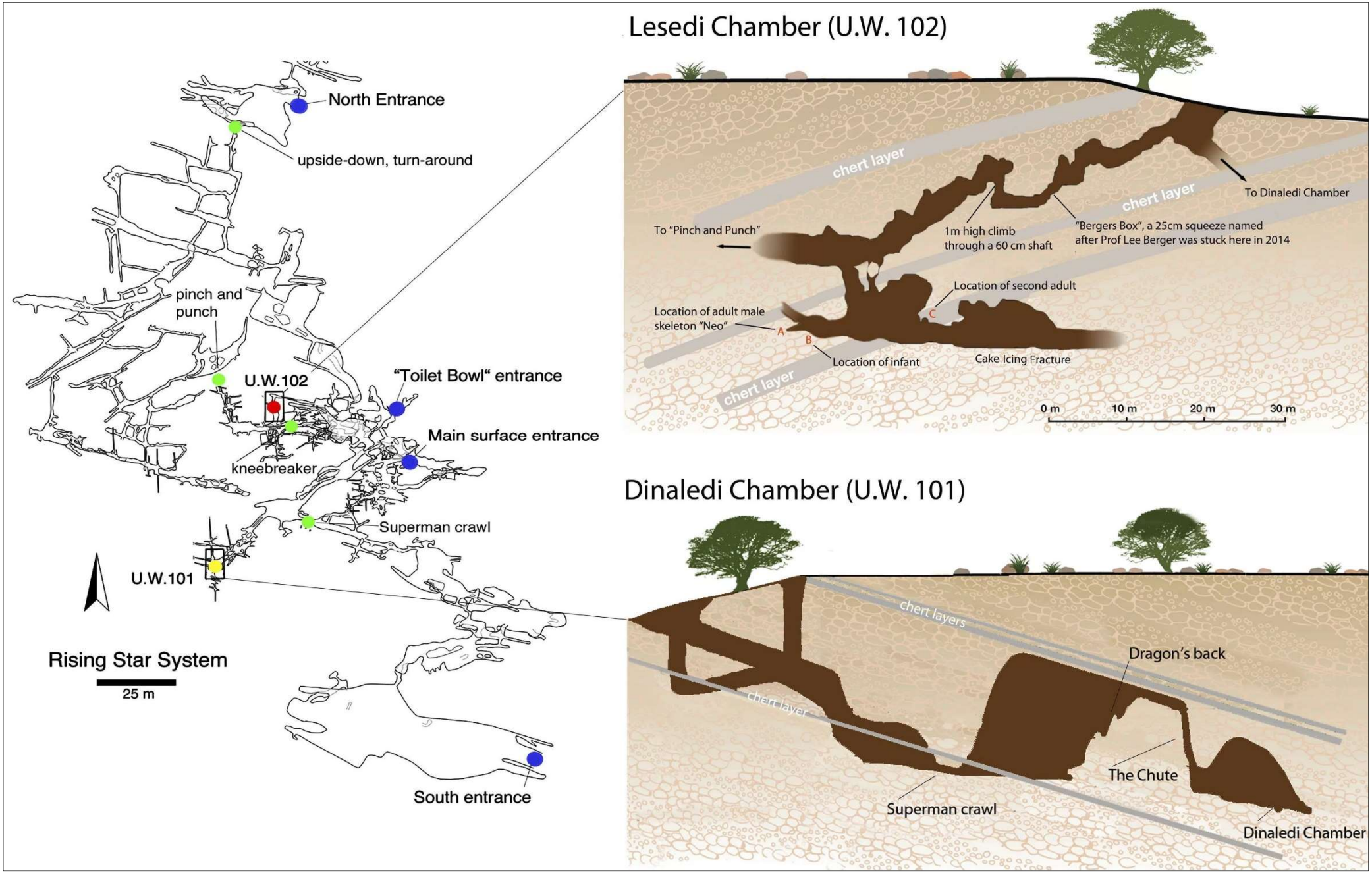
- **1.5** metres
- **45** kilos

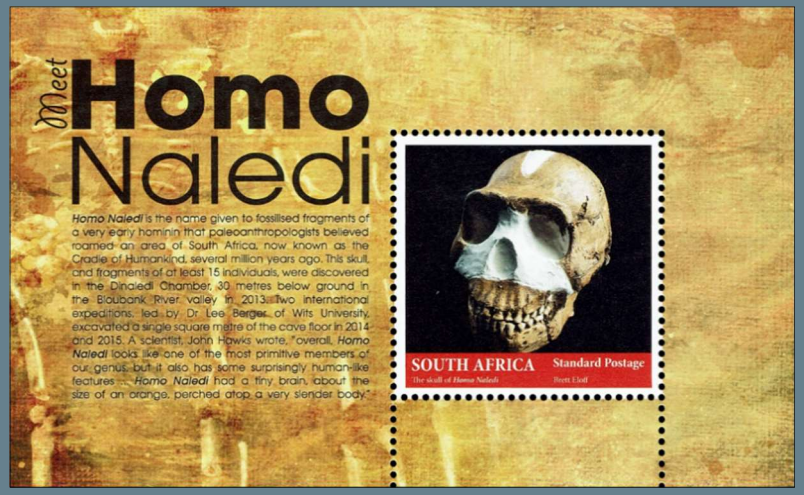
15 partial skeletons found



Source : Witwatersrand university, National Geographic

AFP


North Entrance
upside-down, turn-around
pinch and punch
U.W.102
"Toilet Bowl" entrance
Main surface entrance
kneebreaker
Superman crawl
U.W.101
Rising Star System
25 m
South entrance
Lesedi Chamber (U.W. 102)
chert layer
To Dinaledi Chamber
To "Pinch and Punch"
1m high climb through a 60 cm shaft
"Bergers Box", a 25cm squeeze named after Prof Lee Berger was stuck here in 2014
Location of second adult
Location of adult male skeleton "Neo"
A
B
C
Location of infant
Cake Icing Fracture
0 m
10 m
20 m
30 m
Dinaledi Chamber (U.W. 101)
chert layers
chert layer
Dragon's back
The Chute
Superman crawl
Dinaledi Chamber

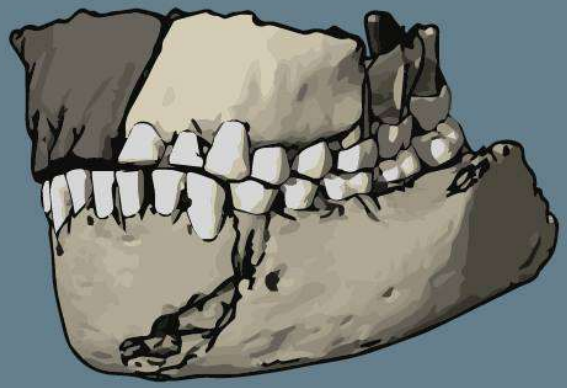


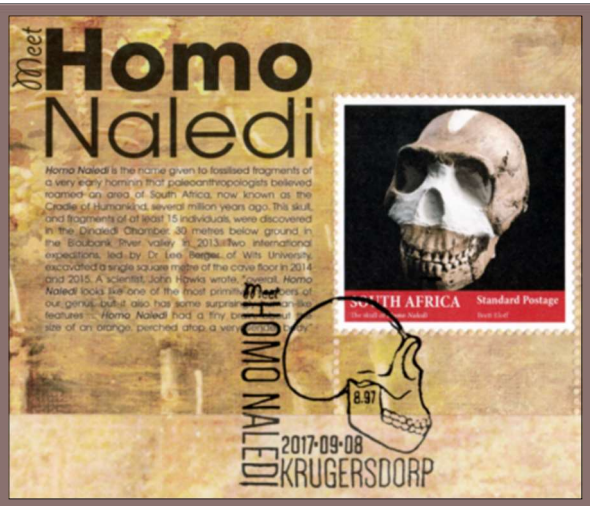
DH1

Dinaledi Chamber, South Africa

Rick Hunter and Steven Tucker identified the first fossil hominin remains in the Dinaledi Chamber in 2013. The most complete cranial remains uncovered to date are those of DH1, the holotype specimen of *Homo naledi*. This individual and others from the chamber lived sometime between 335,000 and 236,000 years ago. Their population lived at around the same time as some of the earliest modern humans in Africa. Scientists are still working to determine how *H. naledi* fits into our evolutionary tree, with its mosaic of skeletal features resembling a variety of other hominin species. Its lineage may stretch deeply toward the African origin of our genus.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.
Illustration by John Hawks CC-BY 4.0



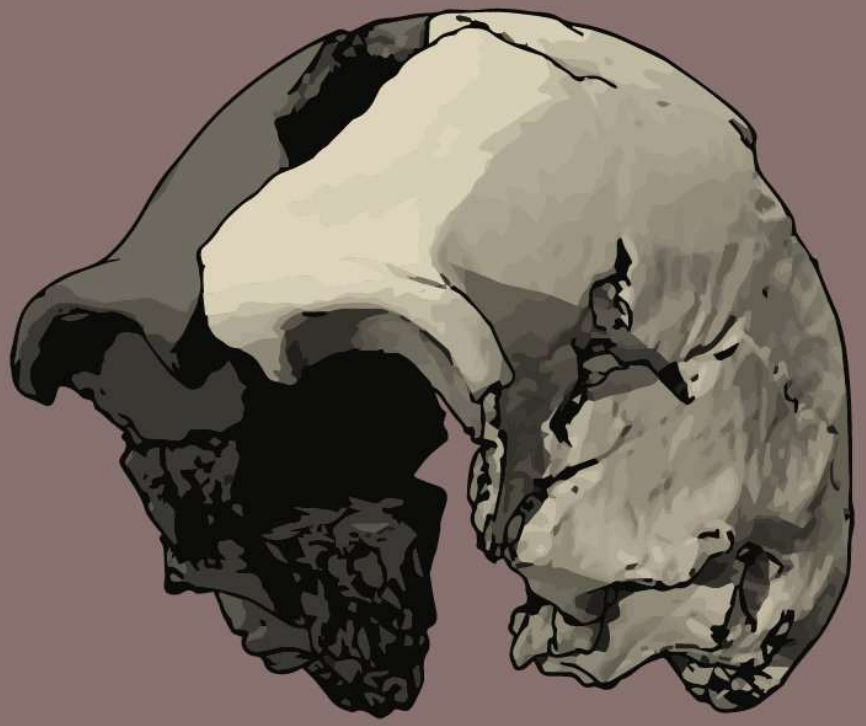


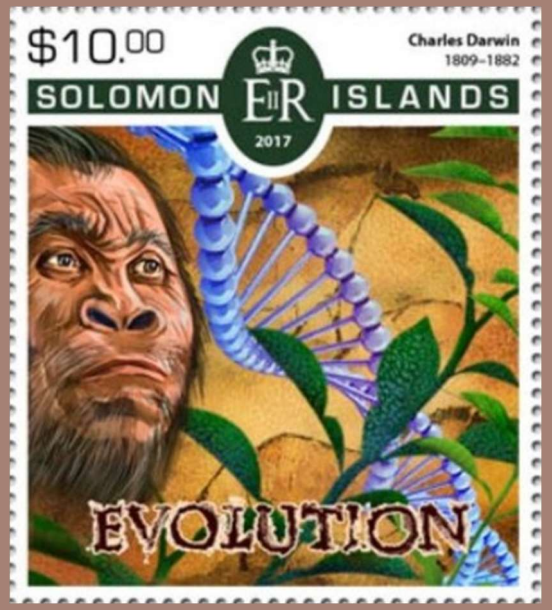
DH3

Dinaledi Chamber, South Africa

Rick Hunter and Steven Tucker identified the first fossil hominin remains in the Dinaledi Chamber in 2013. The DH3 cranial remains represent an older adult individual of *Homo naledi*. The endocranial volume of this skull is one of the smallest known for this species: at around 450 ml, it is approximately one third the size of the average human today. At the same time, the endocranial morphology of this skull shares some aspects of frontal lobe morphology other species of *Homo* with larger brains including living people. This makes DH3 different from endocasts of *Australopithecus* despite their similarity in size. Like other fossils of *H. naledi*, this skull has a small external acoustic meatus, the opening to the ear canal. The contrast between *H. naledi* and the much larger EAM of most other species of hominins defines one of the curious features of this species.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.
Illustration by John Hawks CC-BY 4.0





DH4

Dinaledi Chamber, South Africa

Marina Elliott and Becca Peixotto excavated the known fragments of this calvaria in 2014 from the Dinaledi Chamber. The relatively open sutures suggest that the individual was a relatively young adult or adolescent at the time of death. The size of this skull was among the smaller ones known for *Homo naledi*, although it is not complete enough for a very accurate estimate of endocranial volume. The fragment preserves a number of features that are characteristic of *H. naledi* cranial remains. From the side and posterior views, the development of raised angular and nuchal tori is especially notable. The external acoustic meatus, or opening of the ear canal, is small in *H. naledi* in comparison to other species of *Homo*.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

Meet HOMO NALEDI

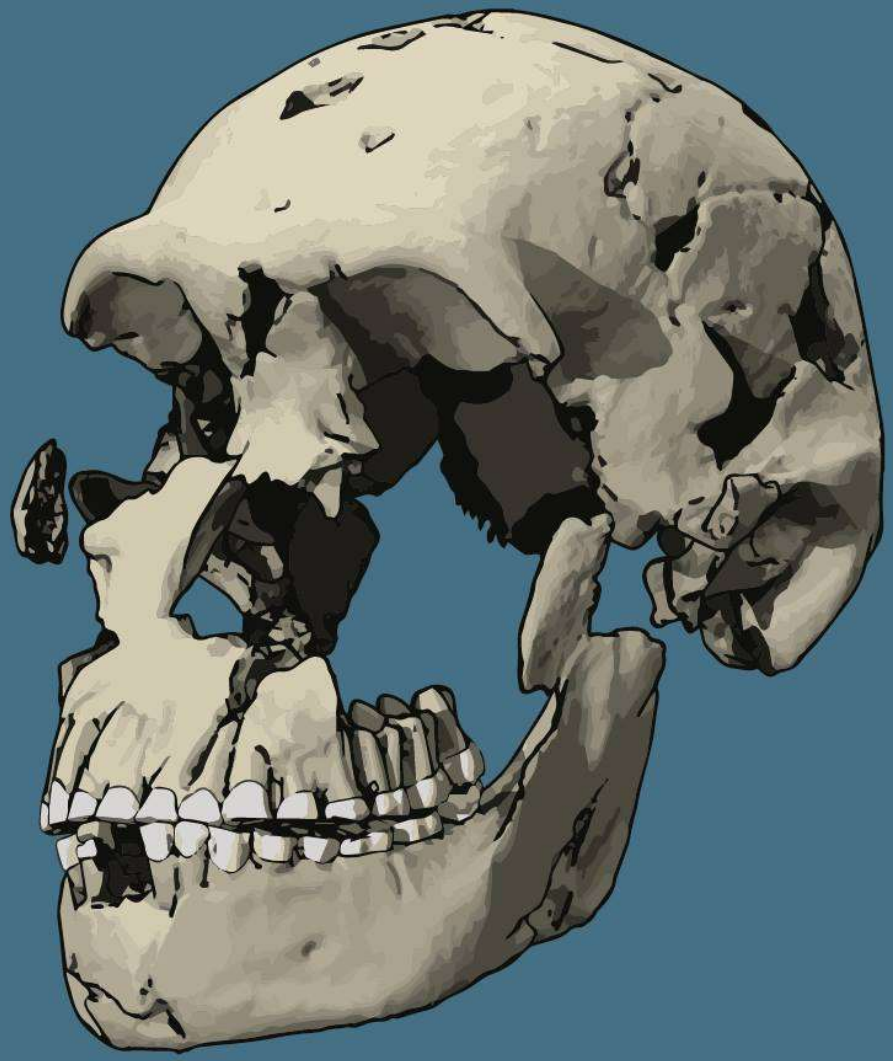
2017·09·08 KRUGERSDORP

LES1

Lesedi Chamber, South Africa

Rick Hunter and Steven Tucker noticed hominin remains in the Lesedi Chamber of the Rising Star cave system in 2013, including elements of the LES1 partial skeleton. This is the most complete known skeleton for any single individual of *Homo naledi*. The individual was an adult and probably older than 30 years at the time of death. The form of muscle attachments on the right and left temporal bones of this skull are asymmetrical, reflecting a long history of muscle use. It is not yet clear whether this asymmetry resulted from a pathology or habits. No estimate of geological age is yet available for this skeleton As excavations proceed, more parts of this individual may be recovered.

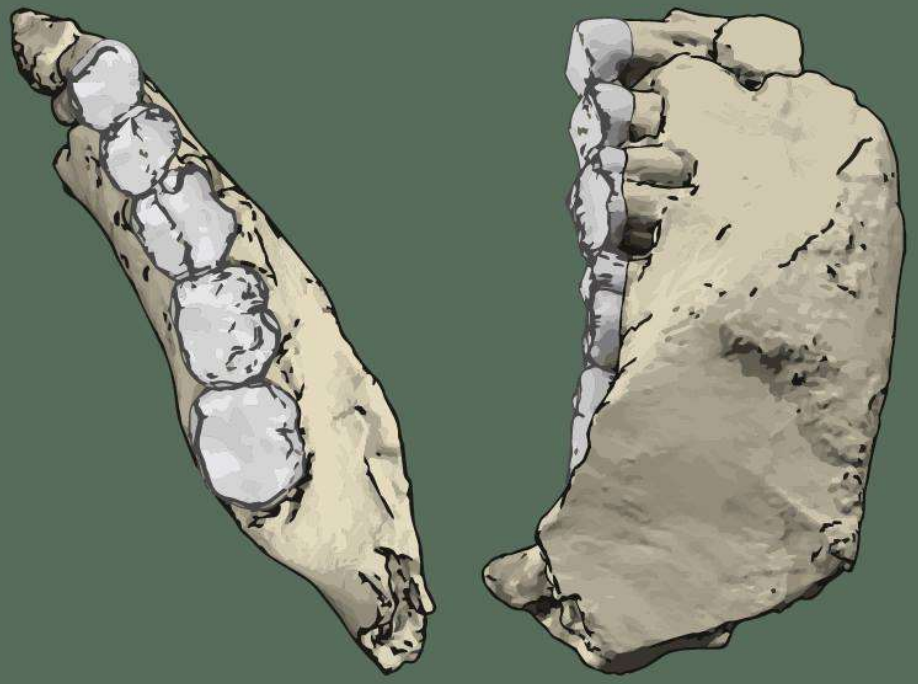
Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.



U.W. 101-001

Dinaledi Chamber, South Africa

The first fossil of *Homo naledi* to be recovered from the Dinaledi Chamber was a right mandibular corpus with four teeth, recovered by Marina Elliott and Becca Peixotto in 2013. The third premolar and additional mandibular fragment were refitted in the laboratory. The individual represented by U.W. 101-001 was an adult at the time of death, with extensive wear on the buccal sides of the molars and premolars. This fossil is one of approximately 300 collected from the floor of the Dinaledi Chamber at the time of discovery, and it is not yet known whether additional elements of this individual may be in the fossil collection or may remain in the site. Despite the relatively small molar sizes of *H. naledi*, the mandibular teeth follow a pattern in which the third molar is the largest, followed by the second, and the first is the smallest. This pattern is shared with *Australopithecus* and *Homo habilis*, suggesting that the evolution of smaller molars may have a trajectory somewhat different in the *H. naledi* lineage compared to *H. erectus* or modern humans.



Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

Dinaledi Hand 1

Dinaledi Chamber, South Africa

Very few fossil hominin sites preserve articulated hand and wrist bones. Marina Elliott and Becca Peixotto recovered this right hand from the Dinaledi Chamber in 2014. It is complete except for the pisiform bone of the wrist, and represents an adult individual of *Homo naledi*. Like other *H. naledi* hand bones, this one has a long and highly muscled thumb, as well as curved finger bones. The broad fingertips and a humanlike trapezoid bone are aspects not shared with hand and wrist bones attributed to *Australopithecus* or *Homo floresiensis*, and are similar to modern people and Neandertals. These features suggest that *H. naledi* was an effective toolmaker and tool user.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

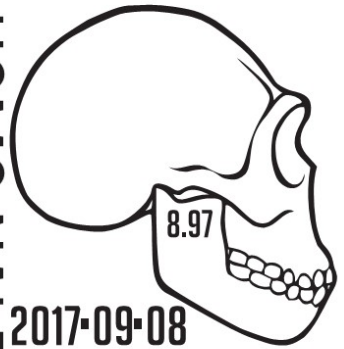
Dinaledi Foot 1

Dinaledi Chamber, South Africa

Very few fossil hominin sites preserve articulated hand and wrist bones. Marina Elliott and Becca Peixotto excavated this right foot from the Dinaledi Chamber in 2014. They also recovered most or all of the small bones of the toes, called phalanges, but these are not shown in this reconstruction. The only bone of the hindfoot that is missing is the medial cuneiform bone. This foot represents an adult *Homo naledi* individual that lived between 335,000 and 236,000 years ago. The foot has a humanlike form including a long big toe in line with the other toes, longitudinal and transverse arches. These features all reflect an ability to walk and run in ways similar to today's people. The main difference found so far between *H. naledi* feet and those of living people is that their toe bones have greater curvature. Scientists do not know whether curved toe bones have a functional explanation or whether they may simply be an ancestral shared feature with other hominins.

Original skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

Meet HOMO NALEDI



2017•09•08 KRUGERSDORP

U.W. 101-002

Dinaledi Chamber, South Africa

The second fossil recovered from the Dinaledi Chamber in 2013 was this proximal portion of a femur of *Homo naledi*. The fossil shows many of the traits manifested across the *H. naledi* femoral sample. Its femoral neck is flattened and angled slightly forward, its shaft is also slightly flatter and wider just below the lesser trochanter, and its shaft is slender with a notable linea aspera emerging at the distal end of this fragment. This morphology evolved with legs walking and running in a human pattern combined with a relatively wider pelvis than in humans of similar body size. This individual was one of the smaller adults found in the Dinaledi Chamber, with an estimated body mass between 35 and 43 kg (77 to 95 lbs).

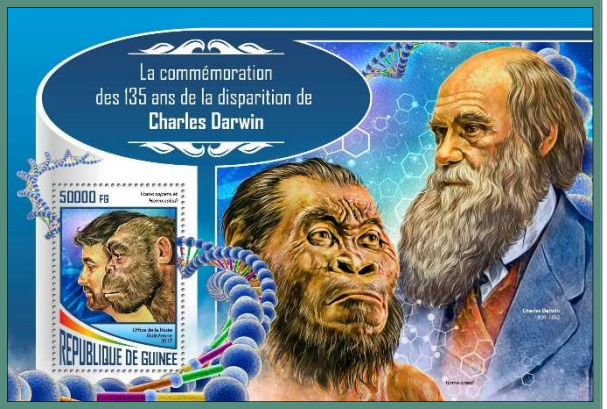
Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

U.W. 101-283

Dinaledi Chamber, South Africa

The most complete known humerus of *Homo naledi* was excavated from the Dinaledi Chamber by the Rising Star Expedition team in 2013. The individual represented by this fossil was an adult at the time of death and had a stature between 136 cm and 162 cm. That large range of possibility reflects the uncertainty about the proportion of humerus length to stature in this species. This humerus is distinctive compared to humans and most other hominin populations in that the head of the humerus faces almost 180° backward from the front of the elbow joint. The humeral head is seated in the shoulder joint and usually is more medially placed in both living people and living great apes. *Australopithecus* had a more posteriorly directed humeral head, and *H. naledi* shares this form, even to a more exaggerated degree. Anthropologists refer to this posterior orientation as low humeral torsion, and it may relate to the position of the scapula and shoulder joint in bipedal hominins that are adapted to climbing.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

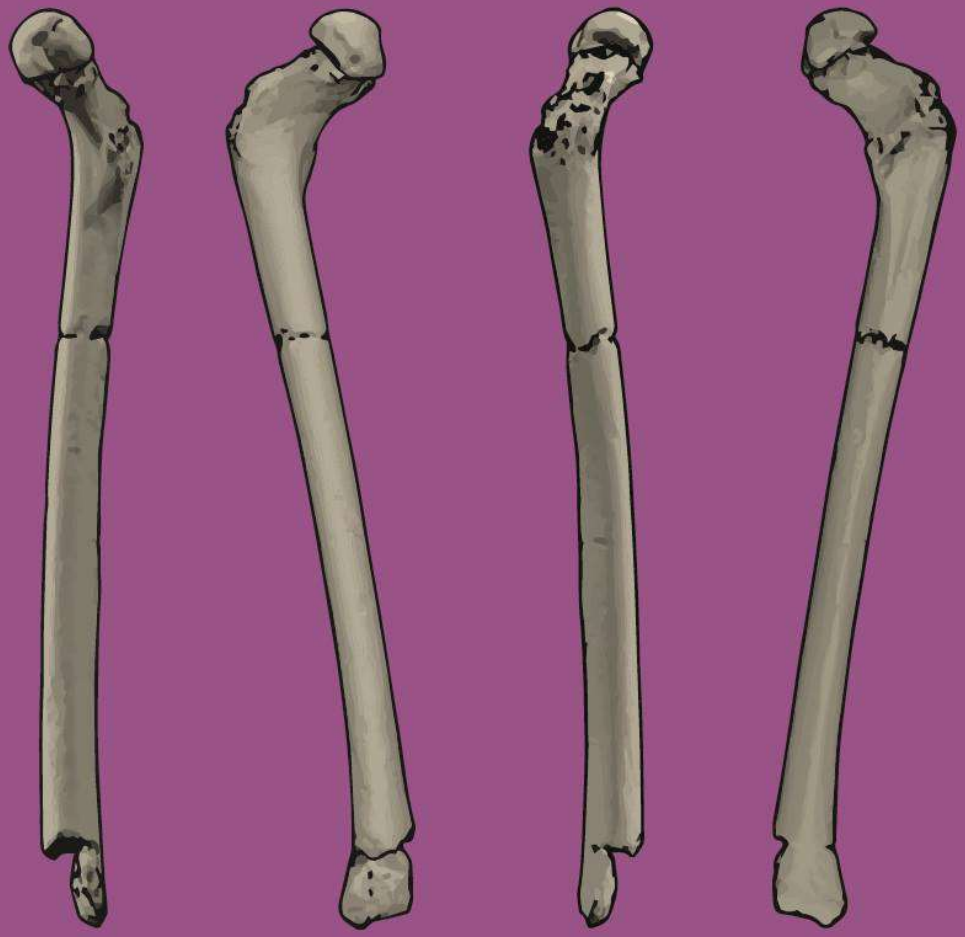


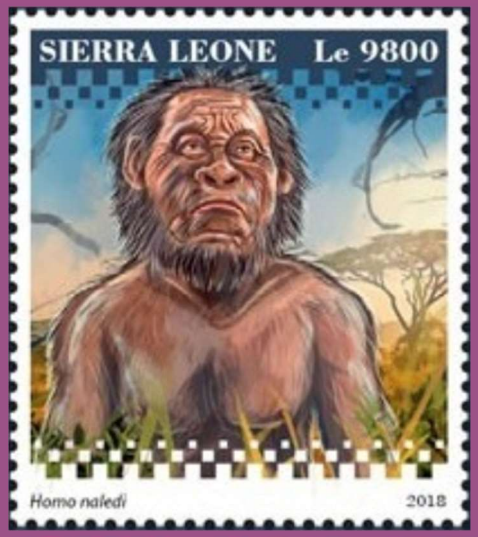
U.W. 101-484

Dinaledi Chamber, South Africa

The excavation team of the Rising Star Expedition recovered this tibia in 2013. It is the most complete leg bone of any adult *Homo naledi* individual in the Dinaledi Chamber. Long bones like this one are the best evidence of the stature of ancient hominins. Still, estimation of stature involves statistical error from several different sources. Today's human populations vary in the relationship of lower limb bone lengths to their stature, as populations that live nearer the equator tend to have longer tibiae relative to stature than populations that live at higher latitudes. Different lineages of ancient hominins also had different proportions of limb lengths to stature, and few complete skeletons are available to assess those relationships. For this individual, estimates of stature vary between 140 cm (4 feet 7 inches) and 156 cm (5 feet 1.5 inches).

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.





U.W. 101-938

Dinaledi Chamber, South Africa

One of the most complete long bones of *Homo naledi*, this femur represents a young individual with the head not yet starting to fuse with the neck. The various fragments of this fossil were recovered in 2013, and later matched and refitted in the laboratory. The duration of childhood growth in *H. naledi* is not yet fully known. This individual would have been an older child, not yet entering adolescence. The long and narrow form of the femur shaft and the marked anteversion of the femur neck are both aspects that this femur shares with adult *H. naledi* femora. Like other individuals represented in the Dinaledi Chamber assemblage, this child lived sometime between 335,000 and 236,000 years ago.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

Meet HOMO NALEDI

2017•09•08 KRUGERSDORP

U.W. 101-1301

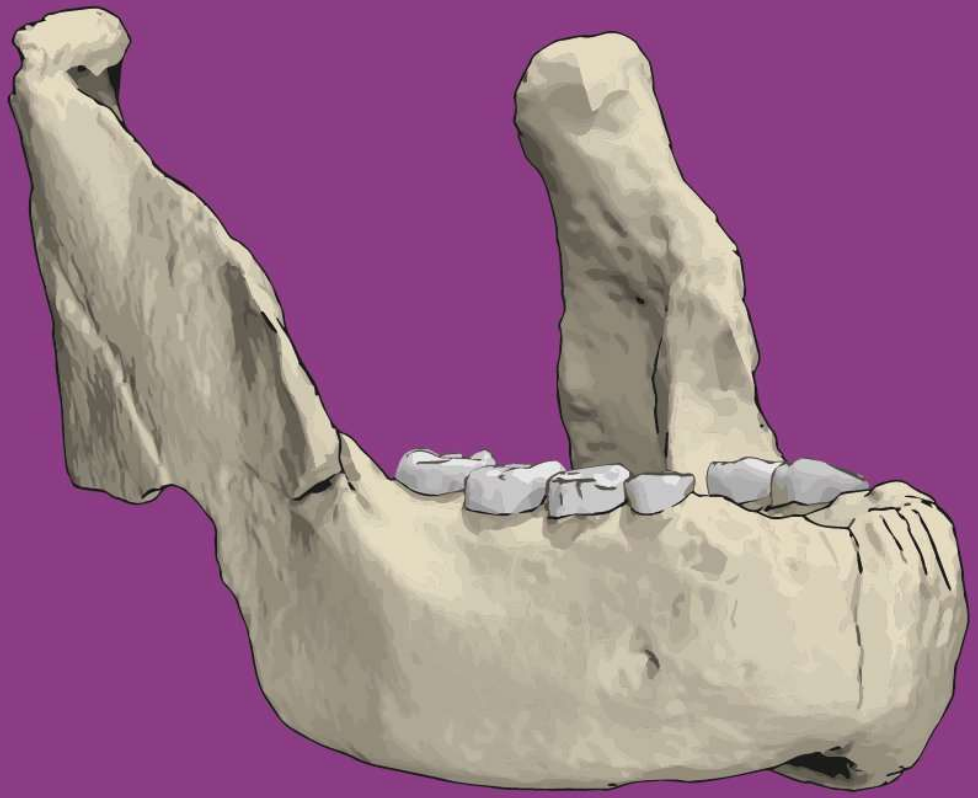
Dinaledi Chamber, South Africa

Among the remains of *Homo naledi* recovered by the Marina Elliott and Becca Peixotto in 2014 was this partial right scapula. Here the fossil is angled slightly to make visible the glenoid fossa, the scapular surface of the shoulder joint, which is at upper right. This scapula provides some of the key evidence about *H. naledi* arm and shoulder form. The glenoid is angled so that it points not only toward the side of the trunk, but also somewhat upward, as if the individual could reach more easily toward the sky. This form is shared with some of the earliest known hominins, and suggests an enhanced ability to move the arm in an overhead pose, possibly for climbing. Today's humans, Neandertals, and *Homo erectus* all have scapulae that direct the glenoid fossa more laterally.

Skeletal material curated at the University of the Witwatersrand, Johannesburg, South Africa.

East Africa


Tighenif
Ain Hanech
Sale
Rabat
Thomas-Steinbruch
Jebel Irhoud
Sidi Abderrahman
Shanidar
Skhul
Amud
Tabun
Zuttiyeh
Kebara
Qafzeh
Bahr el Ghazal
Singa
Aramis
Hadar
Bodo
Middle Awash
Konso
Omo
Nariokotome
Koobi Fora
Eliye Springs
Allia Bay
Kanapoi
Tugen-Bergland
Ndutu
Laetoli
Olduvai
Eyasi
Malema
Uraha
Kabwe
Makapansgat
Sterkfontein
Kromdraai
Border Cave
Swartkrans
Drimulen
Florisbad
Taung
Saldanha
Langebaan
Klasies River Mouth



KNM-BK 67

Edward Kandini Gully, Kenya

Edward Kandini found this hominin mandible in 1966 during survey of Kapthurin Formation strata on the western side of Lake Baringo. This individual lived sometime between 547,000 and 500,000 years ago. The mandible belonged to an adult individual and shares a number of features seen in earlier jaws attributed to *Homo erectus* from sites like Tighennif, Algeria or Sangiran, Indonesia. These include the thick corpus with slightly receding symphysis profile, the curved profile of the mandibular base, and the relatively large second compared to first and third molars. The discovery of Homo naledi in South Africa makes it clear that some populations that superficially resemble *H. erectus* persisted during the Middle Pleistocene in Africa.

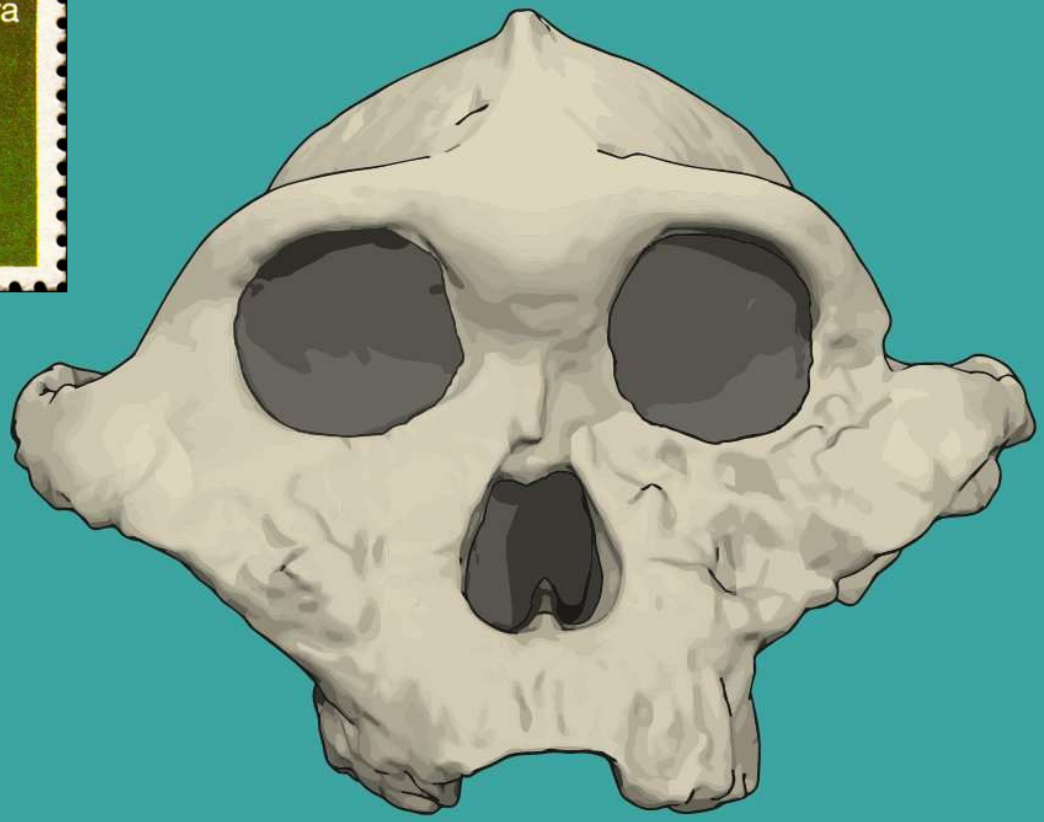
Original skeletal material curated at Nairobi National Museum, Nairobi, Kenya.

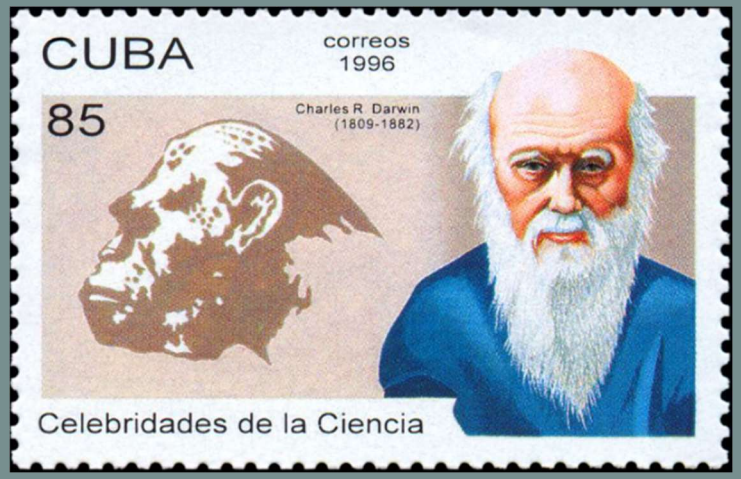
KNM-ER 406

Koobi Fora, Kenya

Richard Leakey and Meave Epps (later Leakey) found this calvaria in 1969. It is the most complete of the fossils from this early field expedition to Koobi Fora. The very wide cheekbones, flaring zygomatic arches and sagittal crest mark this as a member of *Paranthropus boisei*. This individual lived sometime between 1.7 and 1.5 million years ago. In their description of the skull, Leakey and coworkers noted a small hole in the frontal bone, just behind the left supraorbital torus. They considered this to have been present before the death of the individual, probably an abscess below the fibers of the *temporalis* muscle.

Original skeletal material curated at the Nairobi National Museum, Kenya. Illustration by John Hawks CC-BY 4.0





KNM-ER 407

Koobi Fora, Kenya

Mwongela Mwoka found this partial skull in 1969 in the fossil deposits of Koobi Fora. The individual lived between around 1.55 and 1.87 million years ago. The remains do not include any of the teeth or bones of the face, which has made this skull hard to interpret. Most scientists, looking at the relatively small brain size (around 430 ml) and inflated mastoid region behind the ear, think this was a small female individual of the large-toothed species, *Paranthropus boisei*. Still, the anatomy overlaps with other skulls attributed to *Homo* at the same place and time, like KNM-ER 1805. These similarities highlight the challenge of interpreting the initial differentiation of our genus from its close relatives.

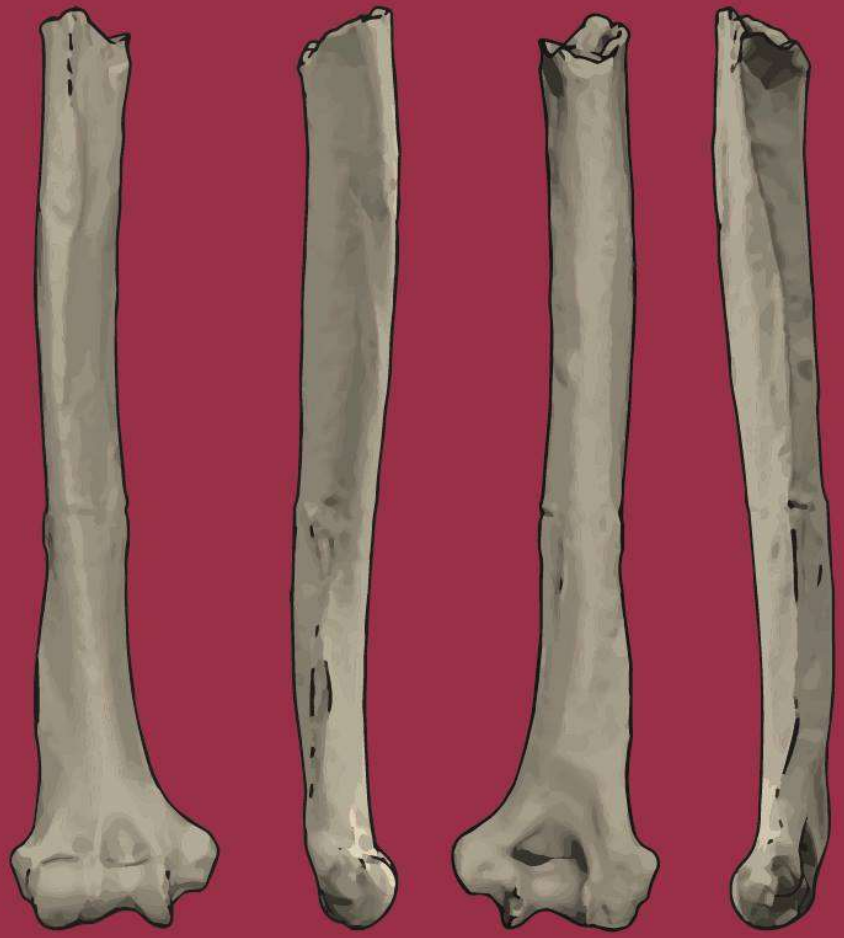
Original skeletal material curated at the Nairobi National Museum, Kenya. Illustration by John Hawks CC-BY 4.0

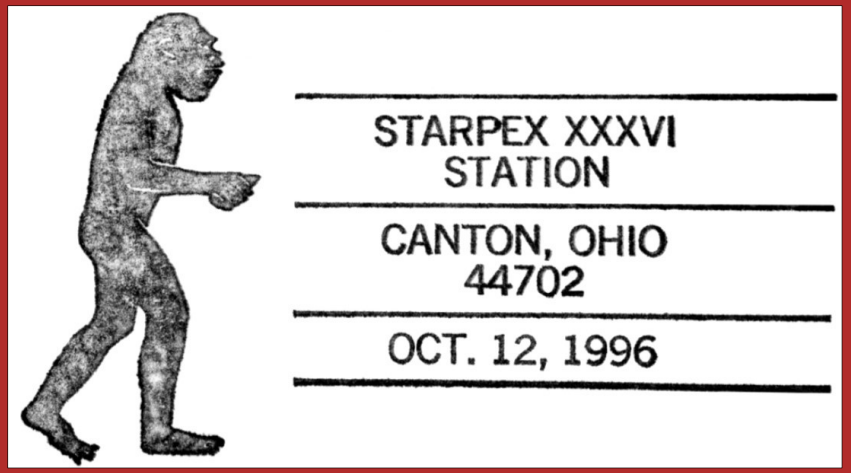
KNM-ER 739

Ileret, Kenya

This partial right humerus was discovered by the Koobi Fora Research Project team in 1970. By current estimates, the individual represented by this fossil lived sometime between 1.38 and 1.49 million years ago. It is a large humerus, with a preserved length of 310 mm and distal breadth of 87 mm. The size of the distal end and elbow joint equal those of large living people, while the prominence of muscle entheses is greater, especially the crest for the *brachioradialis* muscle. Since its discovery, most scientists have attributed this bone to *Paranthropus boisei*. Subsequent fossil discoveries, such as the KNM-ER 47000 partial upper limb skeleton fit a similar pattern.

Original skeletal material curated at the Nairobi National Museum, Nairobi, Kenya.



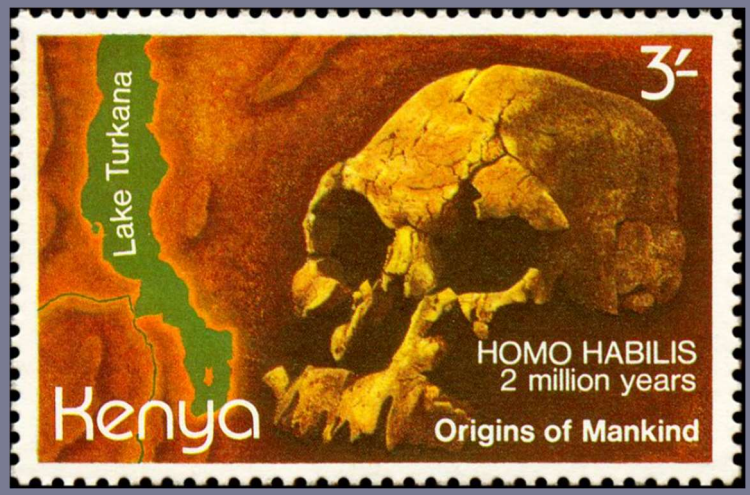


KNM-ER 992

Ileret, Kenya

The field team led by Richard Leakey discovered this nearly complete mandible in 1971.This individual lived sometime between 1.56 million and 1.38 million years ago. In 1975, Colin Groves and Vratislav Mazák proposed KNM-ER 992 as the holotype of a species, *Homo ergaster*. Some anthropologists today consider *H. ergaster* to include most fossils from Africa that are similar to *H. erectus*, which they consider to be an Asian species. However the dental and mandibular anatomy of KNM-ER 992 is similar in many ways to OH 13, attributed to *Homo habilis*, and overlaps not only with *H. erectus* but also with fossils that most researchers attribute to *Australopithecus*. Probably this isolated mandible cannot support a clear and replicable diagnosis.

Original skeletal material curated at Nairobi National Museum, Nairobi, Kenya.

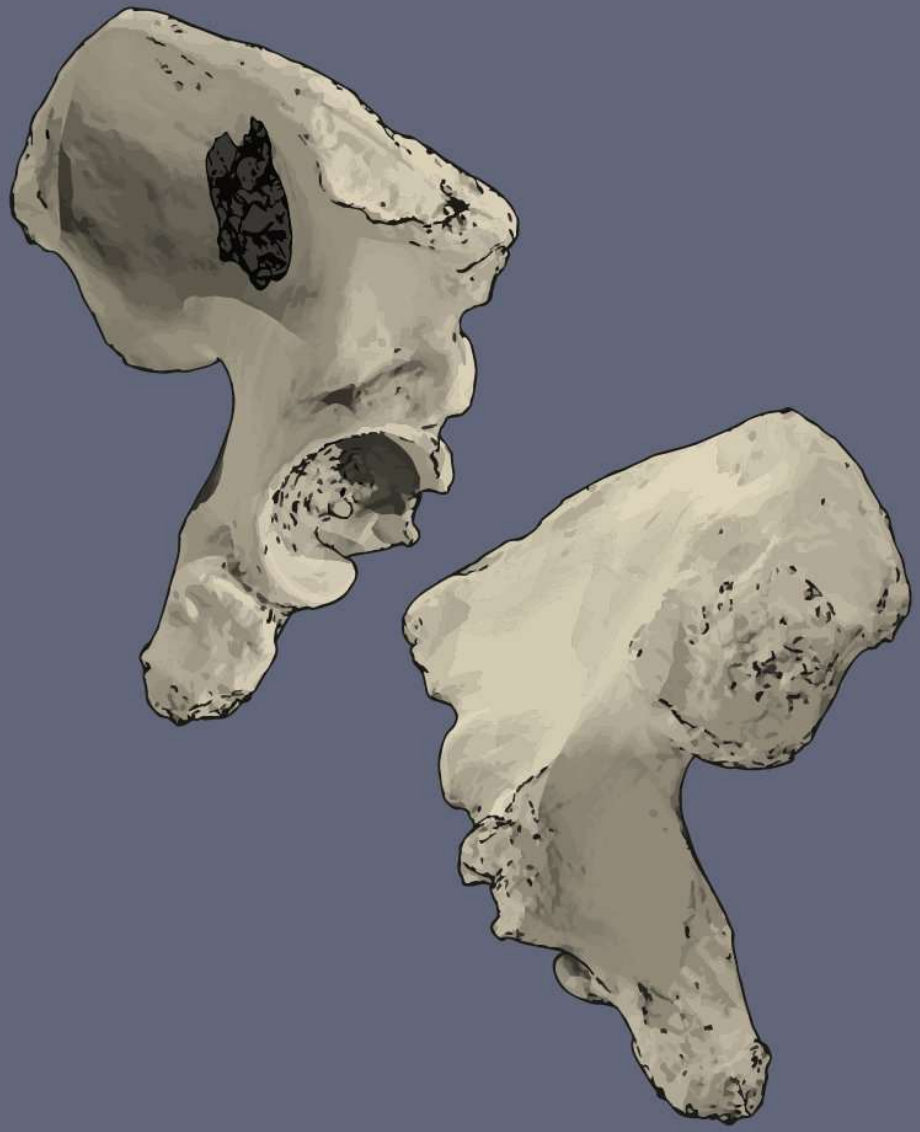


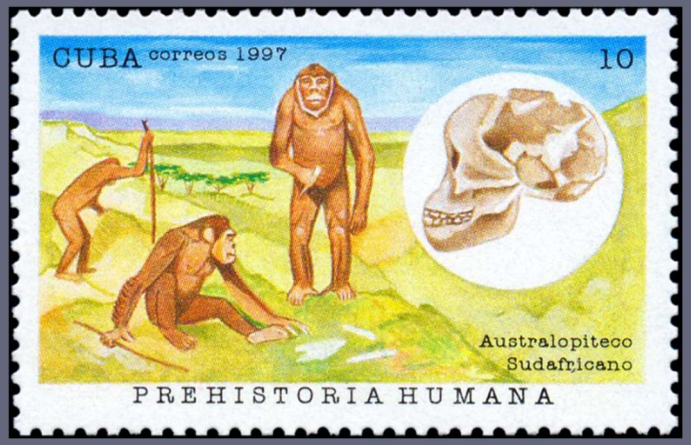
KNM-ER 1470

Koobi Fora, Kenya

Bernard Ngeneo found the first pieces of this partial skull in July of 1972. Later sieving from the site produced more than a hundred fragments, which Meave Leakey and Alan Walker reconstructed. The skull came from sediments now thought to be between 1.95 and 2.03 million years in age. With a larger brain size than any member of *Australopithecus*, the specimen is the earliest fossil with a braincase that scientists today classify in our genus, *Homo*. Today many scientists consider it and a small number of other fossils to represent the species *Homo rudolfensis*.

Skeletal material curated at the Nairobi National Museum, Kenya. Illustration by John Hawks CC-BY 4.0





KNM-ER 3228

Koobi Fora, Kenya

Bernard Ngeneo found this hominin hip bone in 1974. This individual was an adult and its hip joint suggests a body mass somewhere between 50 and 70 kg (110 to 148 lbs). The individual lived sometime between 1.95 and 1.85 million years ago. The narrow greater sciatic notch of this hip bone is similar to the form usually seen in people today who have male skeletal sex, but it has not been seen in other hominin fossil remains of this age. Since the fossil's discovery, most scientists have attributed it to *Homo erectus*, mainly focusing on its size and difference from known *Australopithecus* fossil hip bones. But other fossil hips attributed to *H. erectus* are diverse in their anatomy, raising a question about whether isolated fossils like KNM-ER 3228 may represent other species of *Homo* or *Paranthropus*.

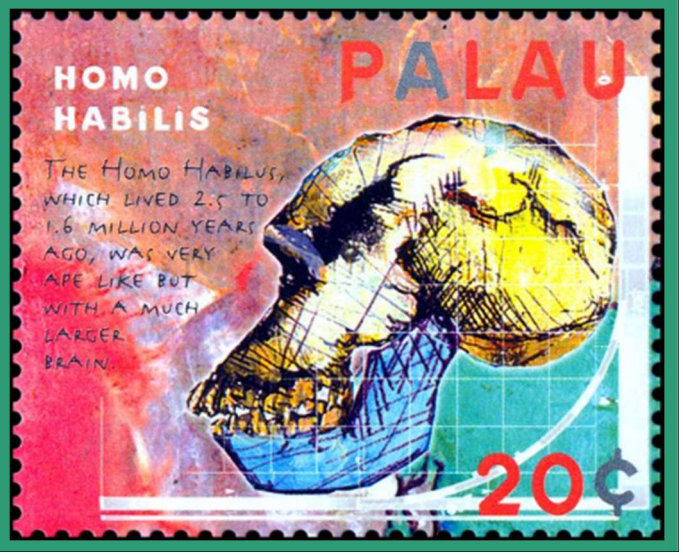
Original skeletal material curated at Nairobi National Museum, Nairobi, Kenya.

KNM-ER 3732

Koobi Fora, Kenya

Field survey in the Koobi Fora area led by Richard Leakey led to the discovery of this partial cranium in 1975. This individual lived sometime between 2.0 and 1.87 million years ago. Scientists disagree about which species of hominins this skull may represent. A portion of natural endocast allows an estimation of its endocranial volume of greater than 600 ml, within the range of sizes for known fossils attributed to *Homo habilis*, *Homo rudolfensis*, and *Homo erectus*. It has a less projecting and distinct supraorbital torus than most African fossils that belong to *H. erectus*, and based on its similarity in general size to the KNM-ER 1470 cranium, some scientists have called it *H. rudolfensis*. The skull has a raised outgrowth of bone on the left parietal bone, which may indicate a healed injury to the scalp during his or her lifetime.

Original skeletal material curated at the Nairobi National Museum, Nairobi, Kenya.

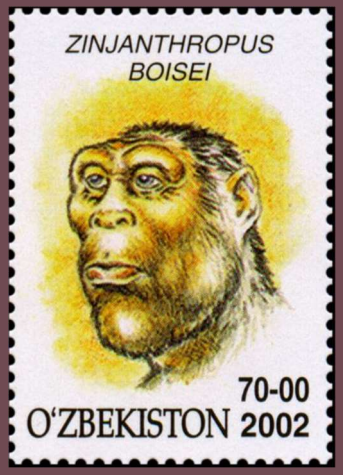


KNM-ER 3733

Koobi Fora, Kenya

Bernard Ngeneo found the first pieces of this hominin skull in 1975. The fossil was at the time the earliest cranium of *Homo erectus* ever discovered. When Richard Leakey and Alan Walker considered this *H. erectus* skull together with other fossils from Koobi Fora that represent *Paranthropus boisei*, they were able to show that these two species had coexisted at the same time and place. This provided strong evidence that human evolution had involved branching of different lineages from each other, and that the genus *Homo* might go back further than previously imagined. Today the best estimate of the geological age of KNM-ER 3733 is around 1.63 million years, while the earliest fossils of *H. erectus* are nearly 400,000 years older, from Drimolen, South Africa.

Original skeletal material curated at Nairobi National Museum, Nairobi, Kenya.



KNM-ER 13750

Koobi Fora, Kenya

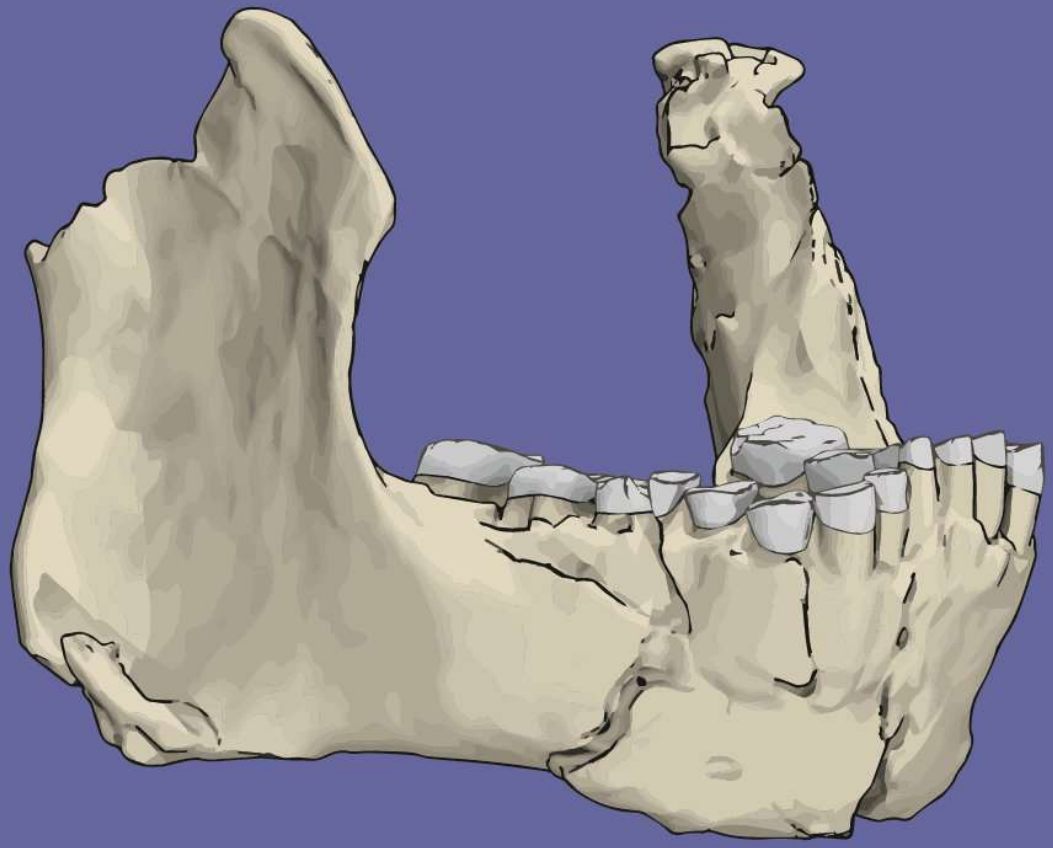
Aila, son of Derekitch, found this fossil in Area 105 of Koobi Fora in 1985. The top of the skull and part of the right side is preserved. These exhibit the hallmark features of a "robust" hominin, including the sagittal crest at the midline of the skull, the wide cranial base with air-filled pockets of bone behind the ears, and the widely flaring zygomatic arch. The view of this skull from above shows the enormous area for the passage of the *temporalis* muscle, indicating the powerful bite force that this hominin could generate. The individual is attributed to *Paranthropus boisei*, and based on its anatomy is likely a male adult. The individual lived around 1.8 million years ago.

KNM-ER 23000

Koobi Fora, Kenya

Benson Kyongo found the fragments of this partial skull at Koobi Fora in 1990. This individual lived approximately 1.9 million years ago, and was a male adult of *Paranthropus boisei*. Both *P. boisei* and *Australopithecus afarensis* tend to share a pattern of blood drainage from their brain, in which much of the flow back toward the heart passes through veins along the midline of the occipital bone and along the margin of the foramen magnum. Humans and our close fossil relatives, including *Australopithecus africanus*, tend to return most of our blood through veins that run across the occipital bone, marked by the transverse and sigmoid sinuses. In KNM-ER 23000, the left side has large sigmoid and transverse sinuses, like humans, while the right is similar to most other *P. boisei* fossils. The feature is a reminder of the variability in natural populations of fossil human relatives.

Original skeletal material curated at Nairobi National Museum, Nairobi, Kenya.

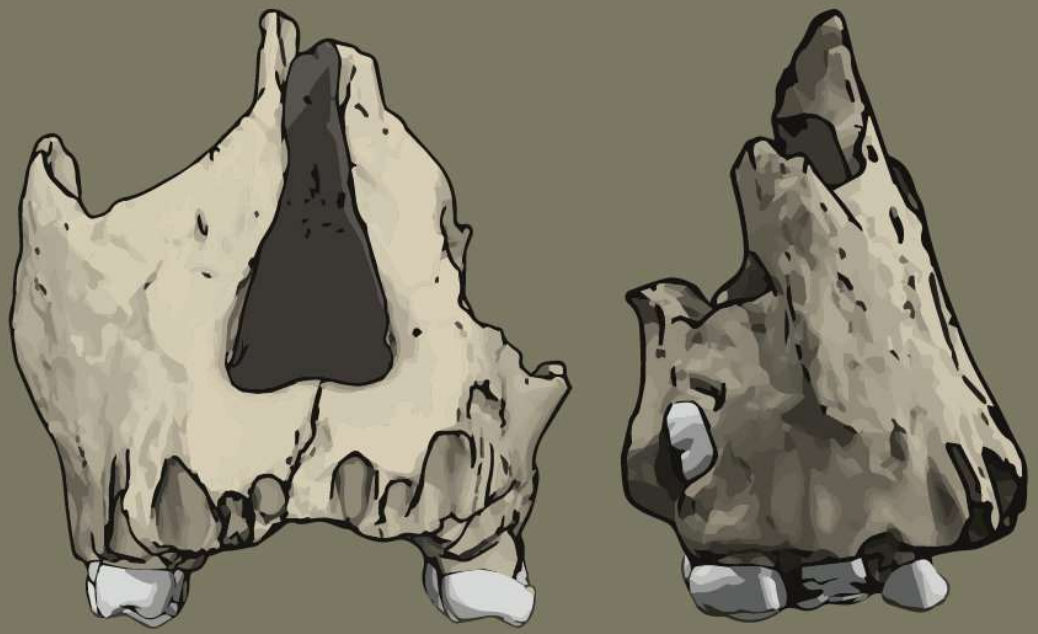


KNM-ER 60000

Koobi Fora, Kenya

Cyprian Nyete found this mandible at Koobi Fora in 2009. The individual represented by this fossil lived sometime between 1.87 and 1.78 million years ago, and was an adult at the time of death with substantial wear on the third molars. Meave Leakey and coworkers described this fossil as comparable in size and shape to the jaw that would have belonged to the KNM-ER 1470 fossil skull. This comparison supports the suggestion that this mandible belonged to an individual of *Homo rudolfensis*. Its larger third molars and proportionally smaller incisors differ from African jaws that have been attributed to *Homo erectus*. On the other hand, its dimensions and large third molars are quite similar to the large D2600 mandible from Dmanisi, regarded by most experts as a *Homo erectus* individual.

Skeletal material curated at the Nairobi National Museum, Kenya.



KNM-ER 62000

Koobi Fora, Kenya

Daniel Elgite found this fossil in 2008. The maxillary and palatine bones are preserved, as well as part of the right zygomatic bone. This individual had erupted the second molars at the time of death, while the right third molar is visible in its crypt. Maeve Leakey and coworkers suggested that the age at death might be close to that of the KNM-WT 15000 skeleton, between 8 and 10 years of age. This is also comparable in age and dental eruption to the MH1 skeleton from Malapa, South Africa. The shape of the palate and lower face resembles the KNM-ER 1470 skull attributed to *Homo rudolfensis*. The individual represented by KNM-ER 62000 lived sometime between 1.91 and 1.95 million years ago.

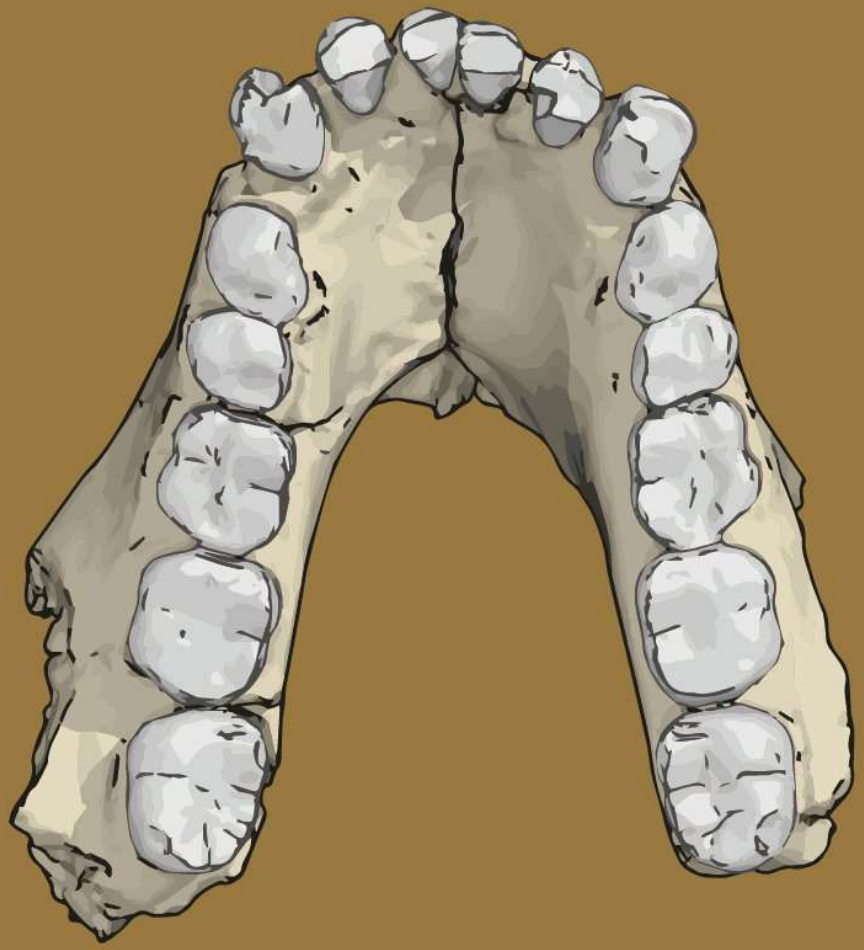
Original skeletal material curated at Nairobi National Museum, Nairobi, Kenya.

KNM-KP 29281

Kanapoi, Kenya

Peter Nzube found this partial mandible with all 16 of its adult teeth in 1994. The next year, Maeve Leakey and coworkers made this the holotype of the newly-defined *Australopithecus anamensis*. The dental arch is long and narrow in comparison to *Australopithecus afarensis*, and its mandibular symphysis much more sloping. The third premolars are also much more sectorial in shape than in *Au. afarensis*. This individual lived sometime between 4.17 million and 4.12 million years ago. The site that preserved the mandible also had a large assemblage of remains of rodents and other small mammals, probably the remains of owl pellets.

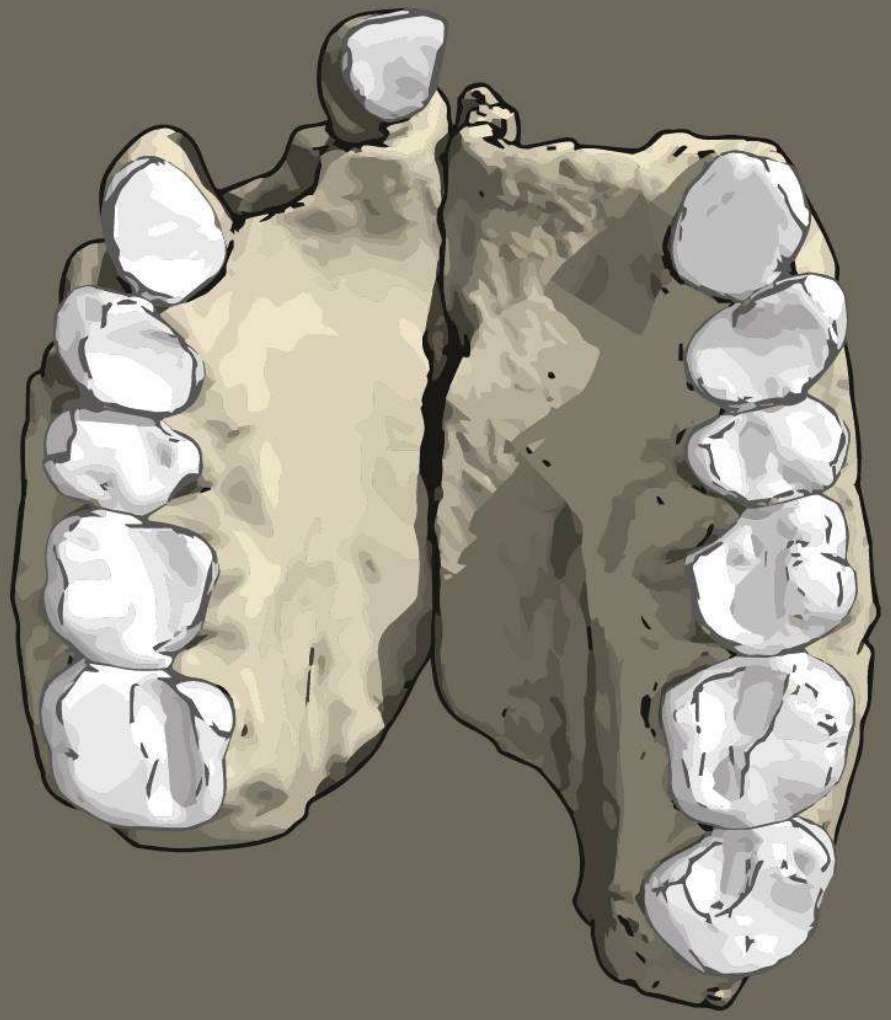
Original skeletal material curated at the Nairobi National Museum, Kenya. Illustration by John Hawks CC-BY 4.0



KNM-KP 29283

Kanapoi, Kenya

Wambua Mangao found this fragment of hominin maxilla during field survey at Kanapoi in 1994. It and other Kanapoi fossil material represent human relatives that lived around 4.1 million years ago. The larger and more vertically oriented canine roots distinguish KNM-KP 29283 from later Ethiopian specimens attributed to *Australopithecus afarensis*. Together with features of mandibular fossils, this distinctiveness led Meave Leakey and collaborators to name the species *Australopithecus anamensis*. Still, the dental and cranial features of these species overlap substantially, with some features of KNM-KP 29283 also reflected in an early maxilla of *Au. afarensis* from Garusi, Tanzania. KNM-KP 29283 had very strong wear on the incisor and canine teeth, more extreme than on the molars, suggesting that the large size and morphology of the front teeth may have been adaptive in processing foods or manipulating tools.

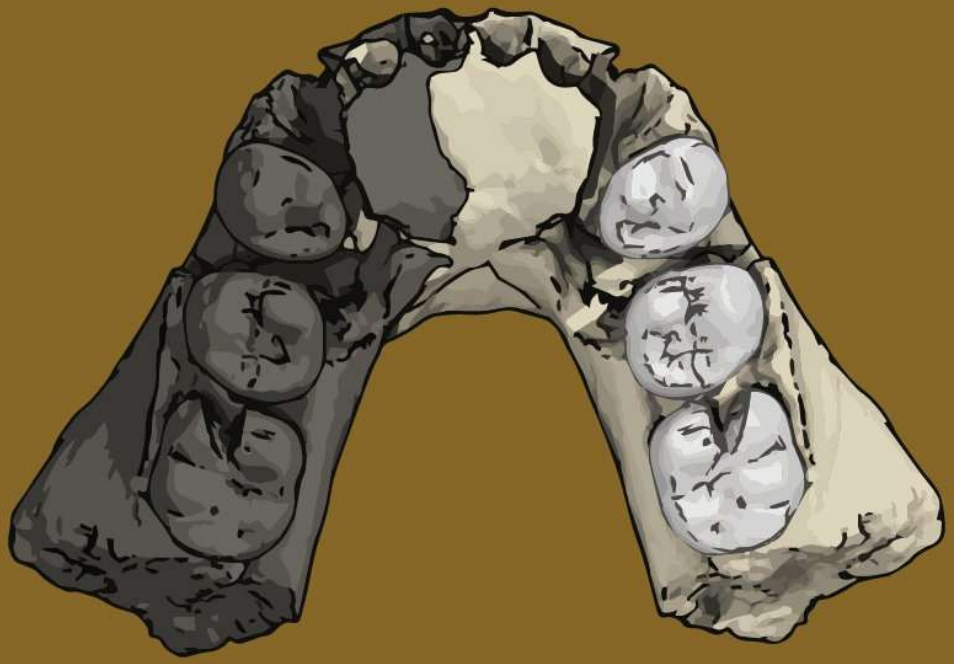


KNM-LT 329

Lothagam, Kenya

Bryan Patterson found this mandibular fragment in 1967 while surveying lower Apak Member sediments from Lothagam. This fossil for many years was thought to be the earliest known hominin, before the discovery of earlier material from Ethiopia, Chad, and southern Kenya exceeded its geological age. Today the best estimate of the age of this fossil is between 5.0 and 4.2 million years ago. The size and morphology of the tooth and mandible are similar to *Australopithecus afarensis* and the larger fossils attributed to *Australopithecus anamensis*. The size and anatomy is different from fossils attributed to *Ardipithecus*. These differences make it possible that an *Australopithecus*-like hominin existed during some or all of the time that *Ardipithecus ramidus* lived.

Skeletal material curated at the Nairobi National Museum, Kenya. Illustration by John Hawks CC-BY 4.0

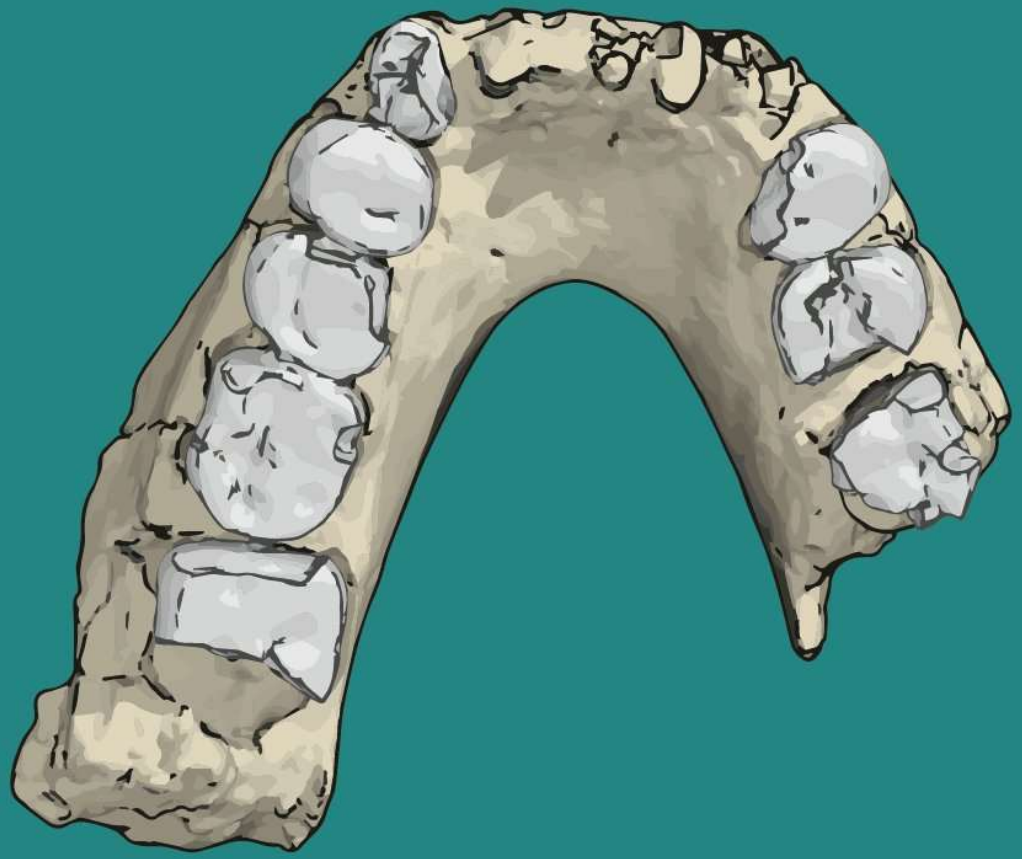


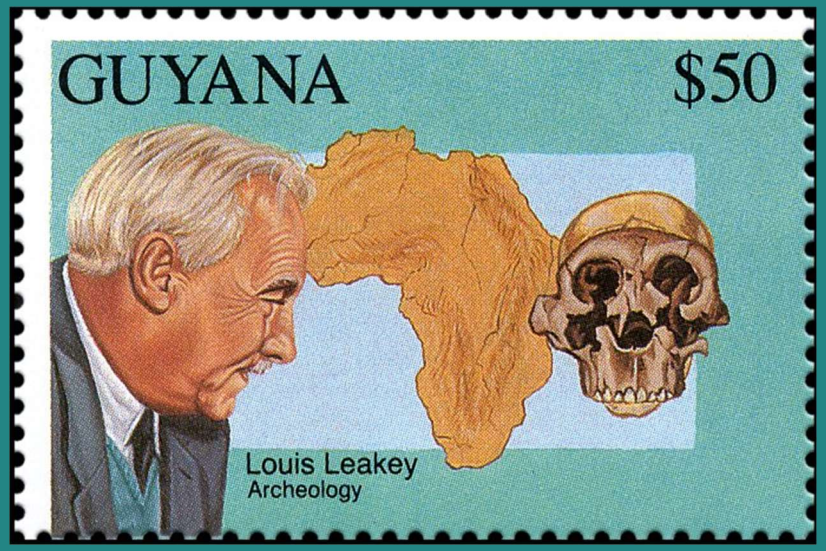
KNM-WT 8556

Lomekwi, Kenya

In 1982, Peter Nzube Mutiwa located this fragment of a hominin jaw while surveying the Lomekwi area. Later fieldwork in this area during 1998 and 1999 would recover more than two dozen hominin specimens, including the KNM-WT 40000 skull. Meave Leakey and coworkers designated this skull as *Kenyanthropus platyops*, and while it cannot be compared in features with this mandibular specimen, many scientists have accepted the Lomekwi mandibular fossils as *Kenyanthropus* also. In contrast to *Australopithecus afarensis*, which lived at the same time, the Lomekwi mandibles attributed have larger and more molarized fourth premolars. The individual represented by the KNM-WT 8556 mandible lived sometime between 3.34 and 3.14 million years ago.

Skeletal material curated at the Nairobi National Museum, Kenya. Illustration by John Hawks CC-BY 4.0



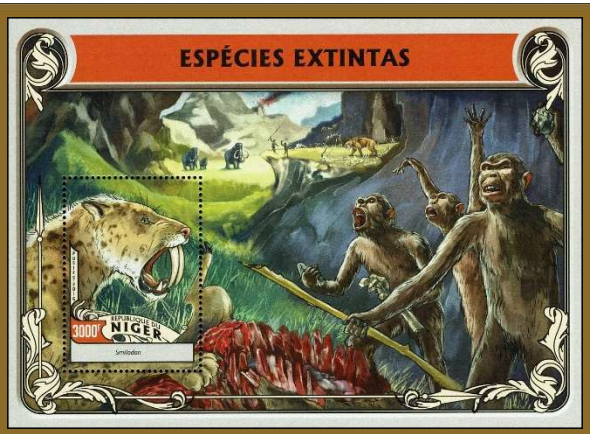


KNM-WT 16005

Kangatukuseo III, Kenya

Survey of the area near the Lomekwi area in 1985 by Richard Leakey's team found this mandible of a robust hominin. When Alan Walker and coworkers reported the fossil the next year, they attributed it to *Australopithecus boisei*, today usually included within *Paranthropus*. Its geological age is estimated between 2.5 million and 2.4 million years. Gen Suwa and coworkers observed that the dental morphology of KNM-WT 16005 is similar to robust hominin teeth from the Omo Shungura formation of similar age, which many researchers attribute to *Paranthropus aethiopicus*.

Skeletal material curated at the Nairobi National Museum, Kenya. Illustration by John Hawks CC-BY 4.0



KNM-WT 40000

Lomekwi, Kenya

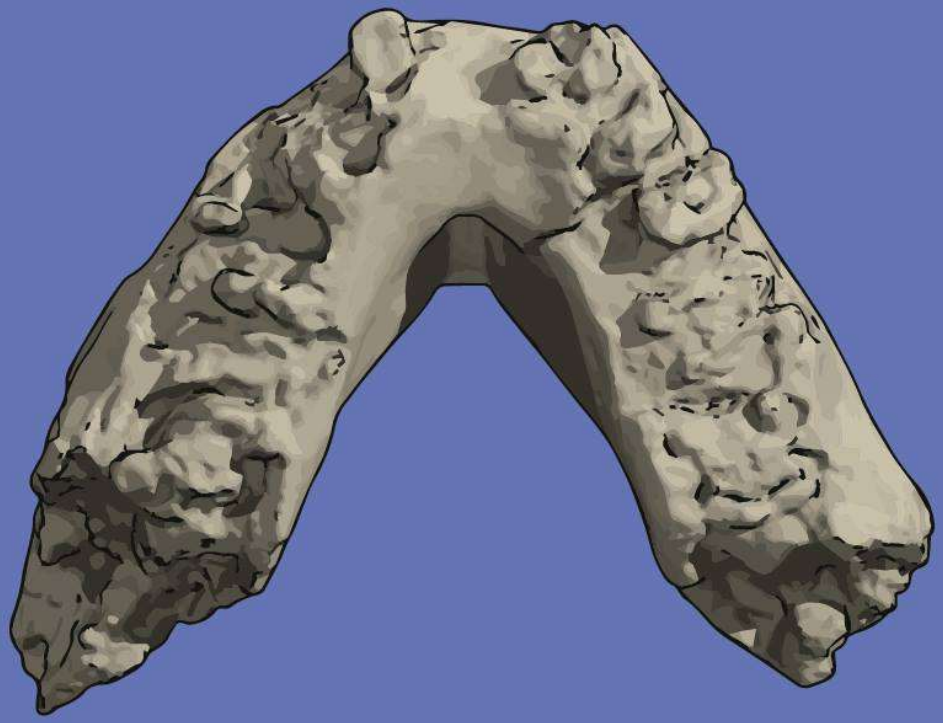
Justus Erus found this fossil calvaria in 1999. The skull was extremely fragmented and distorted by its fossilization environment. Meave Leakey and coworkers noted that the facial bones have a relatively flat shape, with the area beneath the nose wide and flattened, and the cheekbones placed forward on the maxillary bones. This and a few other features contrast with fossils attributed to the genus *Australopithecus*, leading Leakey and colleagues to attribute this skull to a new genus and species, *Kenyanthropus platyops*. This individual lived sometime between 3.57 and 3.4 million years ago. Scientists do not know whether this species coexisted or interacted with contemporaries identified in other parts of Africa such as *Australopithecus afarensis* or *Australopithecus deyiremeda*, or whether all may have been local variants of a single metapopulation.

Original skeletal material curated at the Nairobi National Museum, Kenya. Illustration by John Hawks CC-BY 4.0

Omo 18-18

Lower Omo Basin, Ethiopia

Camille Arambourg and Yves Coppens began fieldwork in the Omo Basin in 1967 as part of the international Omo Research Expedition. One of the first hominin fossils recovered was this mandible of an adult, with its teeth broken away. Arambourg and Coppens recognized many similarities to *Australopithecus* and *Paranthropus*, but pointed out some differences from known examples of these genera. They selected the name *Paraustralopithecus aethiopicus* for this specimen, now accepted to be between 2.85 and 2.5 million years old. During the 1980s, some anthropologists began to distinguish early "robust" hominins from later *Paranthropus boisei* and *Paranthropus robustus*, using the name *Paranthropus aethiopicus* for the earlier fossils. Still, the lack of ability to compare dental and cranial evidence to the highly eroded Omo 18-18 makes the taxonomy of the early "robust" lineage very confusing.



Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa.

Omo 57-41

Lower Omo Basin, Ethiopia

Anton N'Zoni and Claude Guillemot discovered the two fragments of this partial mandible in 1968, as part of the International Omo Research Expedition. The extremely thick and tall mandibular body, large molar roots, molar-like shape of the remaining premolar crown, and small incisor and canine roots mark the jawbone as one of the "robust" hominins. The surface find is thought to derive from Member E of the Shungura Formation, meaning this individual probably lived sometime between 2.40 and 2.36 million years ago. Gen Suwa and coworkers in 1996 examined the Omo dental collection and formed the hypothesis that the robust mandibles and teeth before 2.3 million years ago represent a different species from *Paranthropus boisei*, which occurs after 2.3 million. Under this hypothesis, Omo 57-41 would belong to the earlier species, *Paranthropus aethiopicus*. Although its estimated geological age lies just earlier than the hypothesized boundary, this fossil does not provide the kind of information that could test this idea.

Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa.

Omo L338y-6

Omo Shungura Formation, Ethiopia

Jean de Heinzelin found part of the occipital bone of this partial skull in 1969, and later excavation recovered the parietal bones. The open sutures of this calvaria mark it as an immature individual. In their description of the fossil, Yoel Rak and F. Clark Howell suggested the individual might have been around 10 years old at the time of death. This fossil comes from Member E of the Shungura Formation, with an estimated geological age of 2.44 to 2.32 million years ago. Based on the position of the temporal and nuchal lines, Rak and Howell attributed it to *Australopithecus (Pararanthropus) boisei*. The right parietal bone has a hole near the sagittal suture that was made near the time of death, before fossilization. The rim of this hole on the outer bone surface is smooth, but the inner bone surface is chipped, suggesting that this was a puncture from a sharp object such as a carnivore tooth.

Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa.

BOU-VP-16/1

Herto, Middle Awash, Ethiopia

David DeGusta found this partial cranium eroding from cemented sands in 1997, near the small village of Herto. The individual represented by this skull lived sometime between 162,000 and 147,000 years ago. Like recent humans, the braincase is high, but the tall face, angled occipital, and marked browridge are not characteristic of today's populations. Tim White and coworkers named the skull as a distinct subspecies, *Homo sapiens idaltu*. The skull bears two cutmarks on the right parietal and temporal, suggesting that other individuals may have conducted mortuary practices upon his death. No archaeological material was in direct association with this skull, but excavation below this skull and in nearby sites of similar age yielded a mixture of handaxes and Levallois tools that may be among the youngest Acheulean assemblages in Africa.

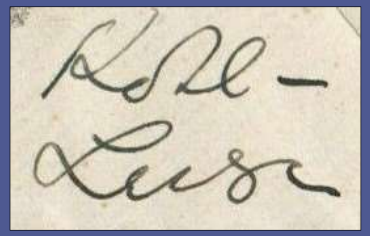
Skeletal material curated at the National Museum of Ethiopia, Addis Ababa.

BOU-VP-16/5

Herto, Middle Awash, Ethiopia

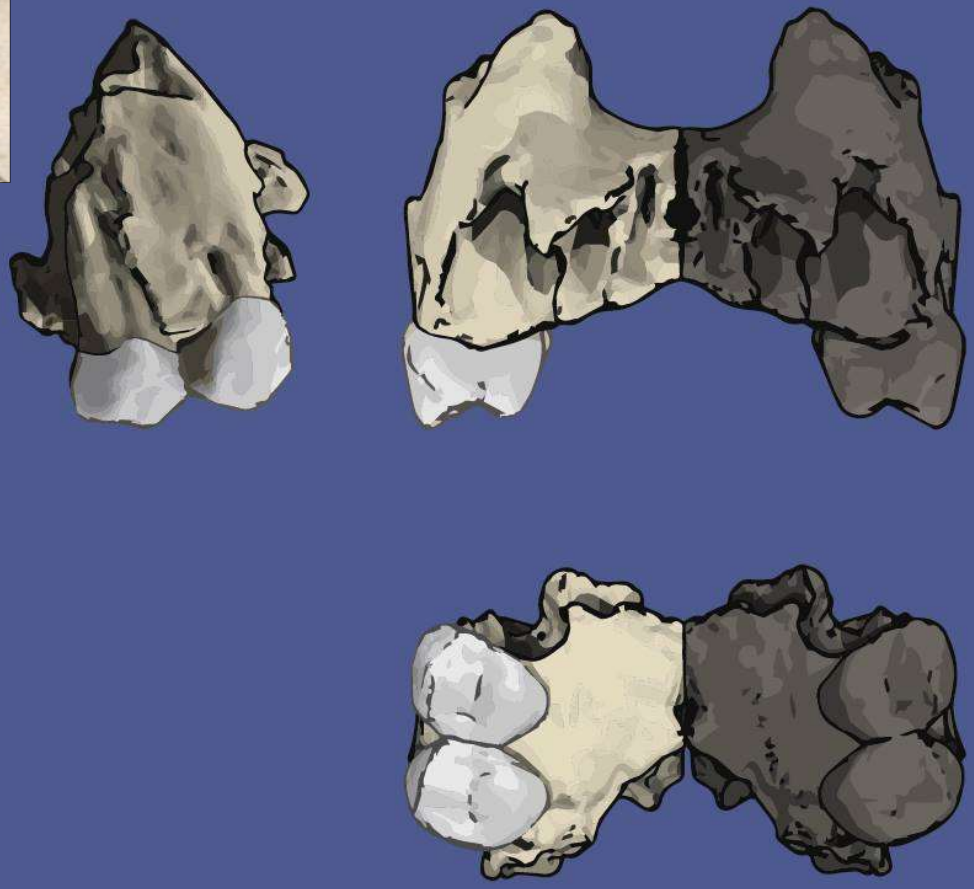
Berhane Asfaw found this partial skull of a child in 1997 while surveying Upper Herto member deposits. The child's morphology aligns it with recent humans more than with Neandertals or other known archaic human populations. She or he died sometime between 162,000 and 147,000 years ago, at around 5 to 8 years of age. The skull has a series of fine and deep cutmarks around the temporal and sphenoid bones. The portion of the occipital bone at the base of the skull is absent, and the edges that remain are polished and smooth. Clark and coworkers suggested that this polish, and the polished surface of the parietal bones, had been made by repeated handling by humans. They inferred that this skull was the subject of a mortuary practice including the curation of defleshed remains for some time.

Skeletal material curated at the National Museum of Ethiopia, Addis Ababa.



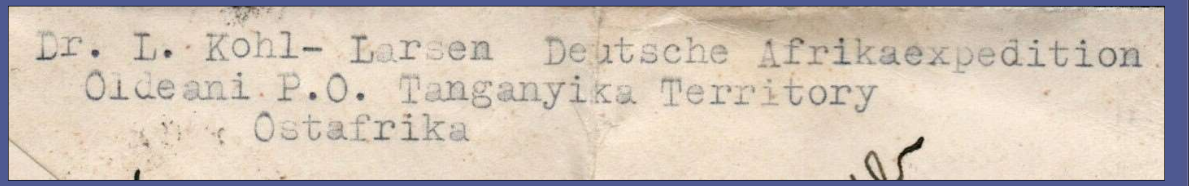
Garusi 1

Garusi, Tanzania



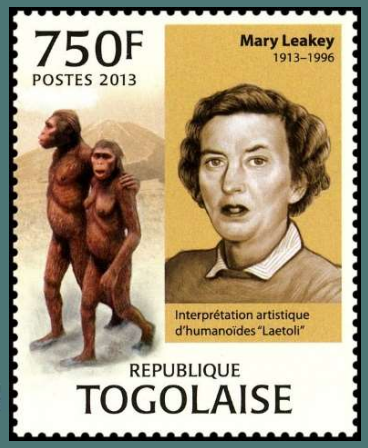
Ludwig Kohl-Larsen found this fragment of right maxillary bone during survey of the Laetolil Beds sediments in 1939. At the time it was discovered, the age of these deposits was unknown. Hans Weinert named this fossil as *Meganthropus africanus*. Later, Muzaffer Süleyman Şenyürek showed that the fossil is different from the Indonesian fossils (now recognized as *Homo erectus*) that had been named *Meganthropus*, and proposed the name *Praeanthropus africanus* for this fossil. Years later, Mary Leakey conducted excavations at Laetoli, recovering many similar fossils. These represent hominin individuals that lived sometime between 3.7 and 3.4 million years ago. Most anthropologists consider the Garusi 1 individual to represent the same species as the Laetoli material. Donald Johanson, Yves Coppens, and Tim White based their definition of *Australopithecus afarensis* on the LH 4 mandible from Laetoli. Today, paleoanthropologists continue to debate whether to recognize the priority of *Pr. africanus* over *Au. afarensis*.

Original skeletal material curated at the University of Tübingen, Germany.



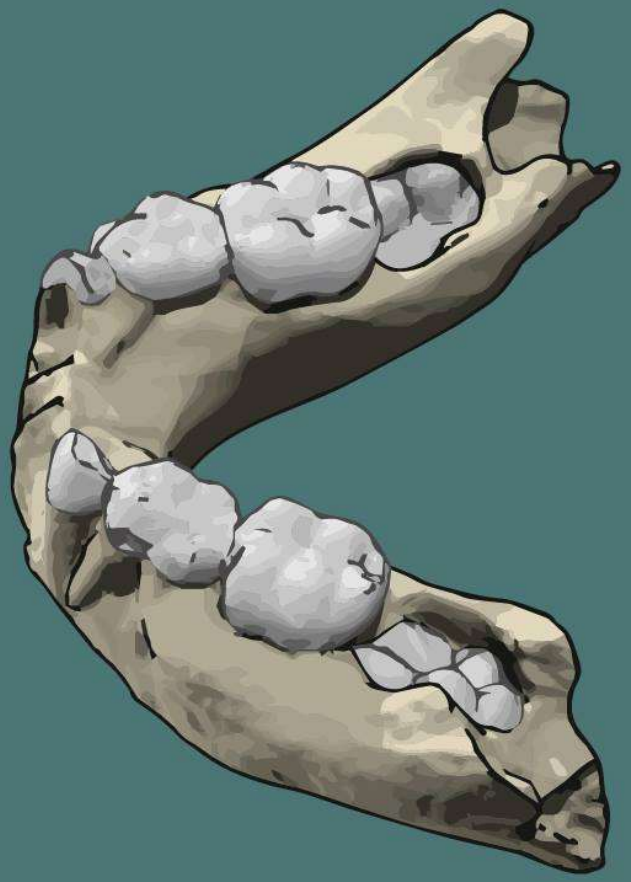
LH 2

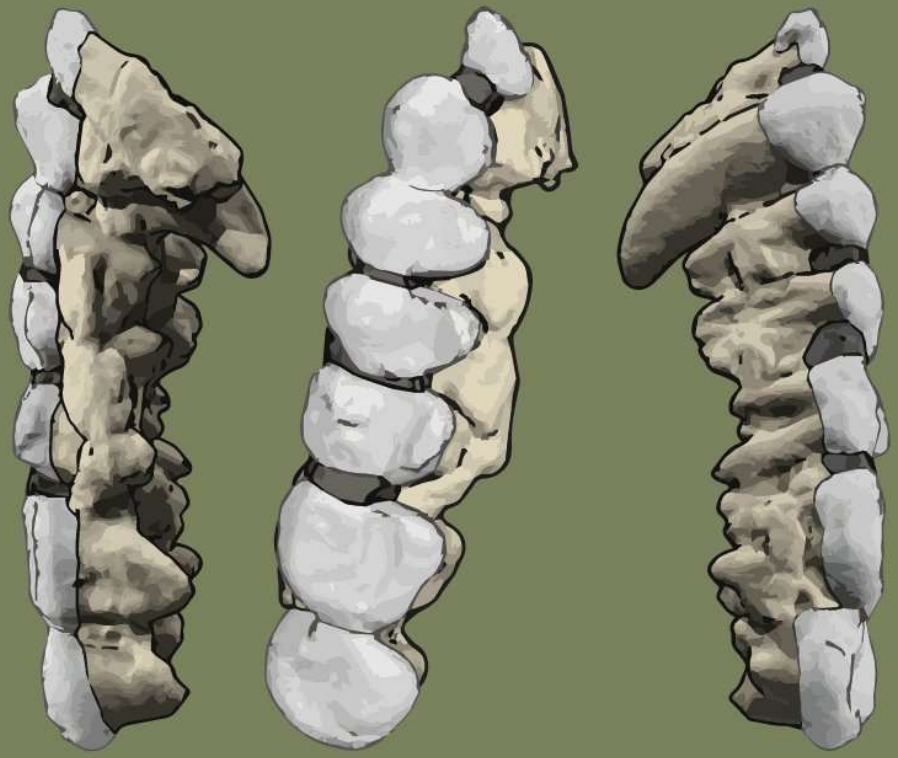
Laetoli, Tanzania

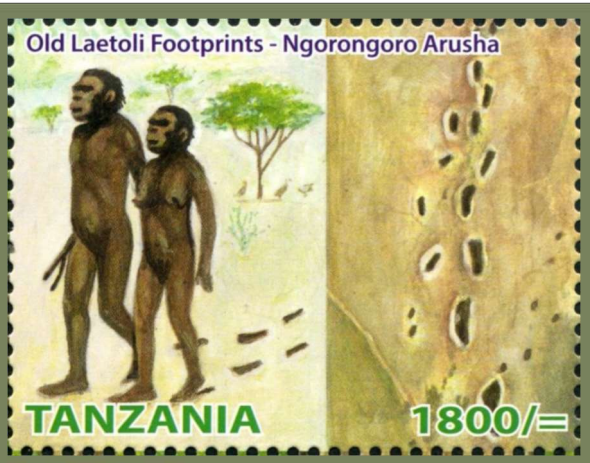


Maundu Muluila discovered this mandible in 1974, as part of the first expedition to the Laetoli area led by Mary Leakey. The individual lived between 3.85 and 3.6 million years ago. Like other Laetoli fossils of this age range, most scientists attribute this mandible to *Australopithecus afarensis*. The individual represented by LH 2 was a child at the time of death, with the adult first molars just reaching occlusion. The teeth that are visible inside their crypts are the permanent second molars. In 1985, Timothy Bromage and M. Christopher Dean examined the right first adult incisor of this jaw, which remains in the crypt where it was forming. By counting the tiny enamel growth increments, known as perikymata, they estimated that this child was 3 years and 3 months of age, which remains the best estimate. Later work by Tanya Smith and coworkers established variability in enamel formation rates in other species of *Australopithecus*. The precise age of death of LH 2 may have been several months younger or older than the best estimate.

Original skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.





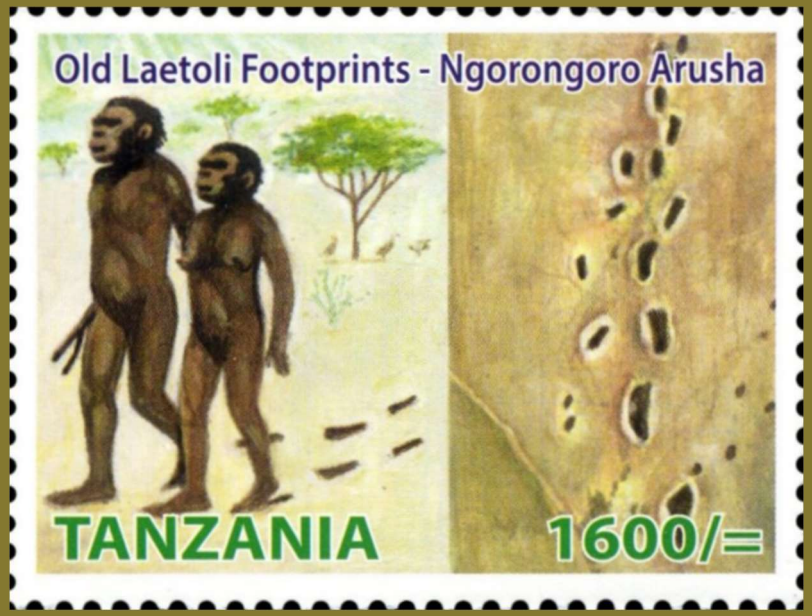


LH 5

Laetoli, Tanzania

Maundu Muluila discovered the anterior part of this fragmentary maxilla in 1974, as part of the first expedition to the Laetoli area led by Mary Leakey. Later work at the same locality in 1979 identified a second molar 21 meters from the original discovery spot, and a third molar 49 meters away. The second and third molars belong to the same individual, and although damage to the distal edge of the first molar prevents a direct match, Tim White showed that the remaining fragments of maxillary bone are compatible. This fossil was included within the original description of *Australopithecus afarensis* and it lived sometime between 3.85 and 3.6 million years ago. The canine tooth is worn on its tip and does not project beyond the other teeth, a similarity shared with other hominins.

Original skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.



LH 4

Laetoli, Tanzania

Maundu Muluila discovered this mandible in 1974, as part of the first expedition to the Laetoli area led by Mary Leakey. The individual lived between 3.85 and 3.6 million years ago. After the discovery of this specimen, Donald Johanson, Tim White, and Yves Coppens considered this and other Laetoli fossils as representing a similar form as hominin material from Hadar, Ethiopia. They designated LH 4 as the holotype of the species, *Australopithecus afarensis*.

Original skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.

LH 18

Laetoli, Tanzania

Edward Kandini discovered this skull eroding from the Upper Ngaloba Beds in the Laetoli area in 1976. Since its discovery, anthropologists have considered this to be an early member of our own species, *Homo sapiens*. However its overall shape and features do not connect the skull with any particular sample of *H. sapiens* fossils. This individual lived sometime between 290,000 and 200,000 years ago, and was a relatively old adult at the time of death, with enamel worn down on all the remaining molar teeth.

Original skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.

Laetoli Footprints (Tanzania, Arusha, Ngorongoro Conservation Area)

Laetoli" means „blood lily" (*Scadoxus multiflorus*) in the Massai language
Zambia 1989

Guinea-Bissau 2005

Guinea-Bissau 2009

Mozambique 2011

Mary LEAKEY
Mozambique 2010

Mary LEAKEY who discovered the footprints of Laetoli 1977
United Kingdom 2013

Mary LEAKEY
Togo 2013

1.600 Shilling
Tanzania 2014

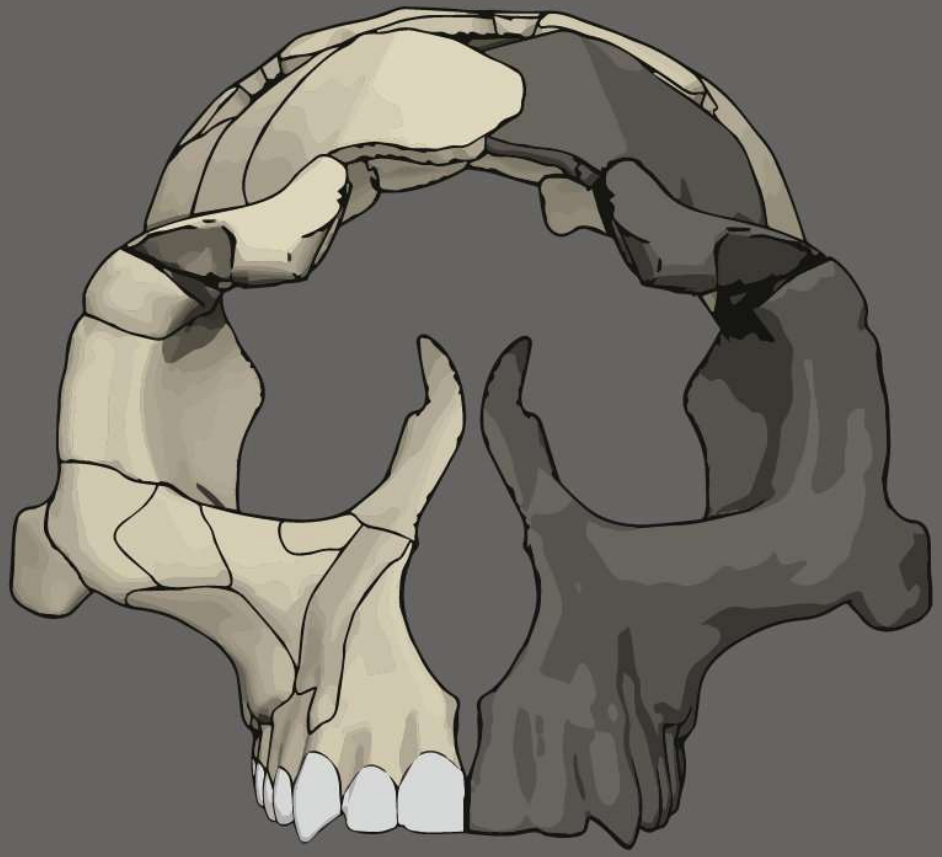
1.800 Shilling
Tanzania 2014

ARA-VP-6/500

Aramis, Ethiopia

Yohannes Haile-Selassie identified the first elements of this partial skeleton in 1994. Subsequent fieldwork recovered parts of all the limbs, partial pelvis, and a partial cranium of an adult skeleton attributed to *Ardipithecus ramidus*. This individual lived approximately 4.4 million years ago. The endocranial volume of this individual was between 300 and 350 ml, within the range of sizes found in bonobos and chimpanzees. The canine teeth are similar to size and projection to female bonobos. The phylogenetic place of *Ardipithecus* has been the subject of contradictory studies. Skeletal adaptations that reflect a habitual vertical posture and a relatively small lower third premolar suggest that *Ardipithecus* may be a sister group to later hominins.

Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa. Illustration by John Hawks CC-BY 4.0



MRD-VP-1/1

Miro Dora, Ethiopia

Ali Bereino found the face of this calvaria in 2016, and Yohannes Haile-Selassie found the major fragment of the vault later the same day. Its shape differs from fossils attributed to *Australopithecus afarensis* and the upper jaw, lower face, and canine teeth are similar to *Australopithecus anamensis*, leading Haile-Selassie and coworkers to attribute it to that species. This individual lived sometime between 3.81 million and 3.76 million years ago. Some aspects of the skull and face are also similar to much later fossils of *Australopithecus africanus* and *Paranthropus*, making it possible that these aspects are shared from the common ancestor of all bipedal hominins and not newly evolved in a common ancestor of these later kinds of hominins.

Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa.

AL 129-1 AFAR

Hadar, Ethiopia

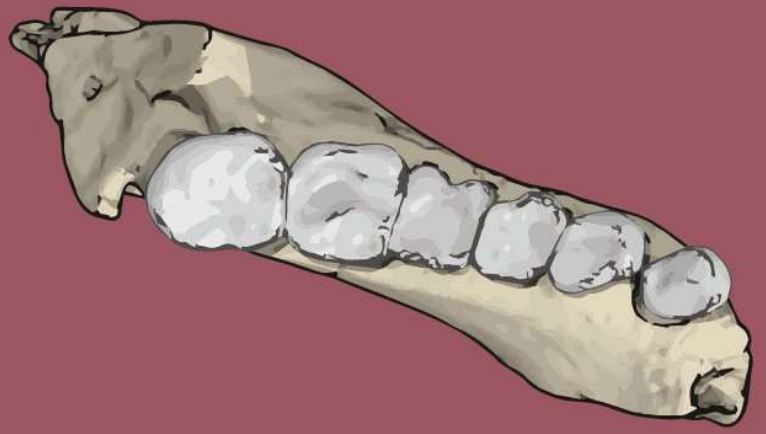
Donald Johanson found the matching proximal tibia and distal femur of a hominin in 1973. These were the first evidence of fossil hominins in the Hadar badlands, and were part of the evidence supporting the definition of *Australopithecus afarensis*. The angulation of the femur shaft relative to the femoral condyles is one of the most distinctive characteristics of bipedal hominins. This angle actually varies across childhood in living people. Most human and primate babies are born with so-called "varus" knees, the femur shaft angling medially. Once children learn to walk, the bone growth of the distal femur reverses this angulation to a "valgus" knee, with the femur shaft angling laterally. This individual lived sometime around 3.4 million years ago.

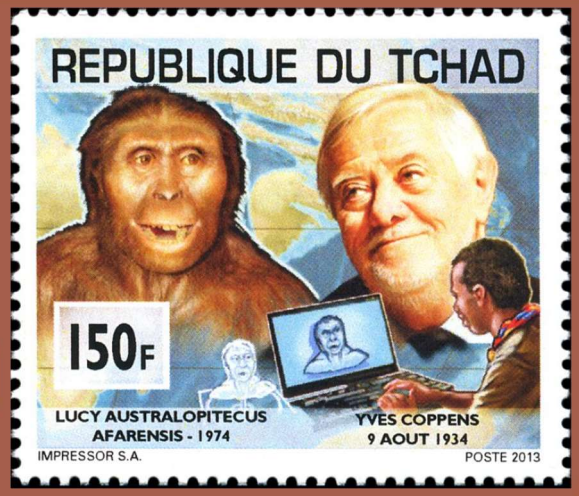
Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa.

AL 198-1

Hadar, Ethiopia

The field team at Hadar identified this partial mandible in late 1974. The individual lived sometime around 3.4 million years ago, and Donald Johanson and coworkers later identified it as an adult individual of *Australopithecus afarensis*. This mandible is one of several from the Hadar site that are broken near the midline, which is a natural point of breakage for fossil jaws. This break displays the profile of the mandibular symphysis, which is sloping and thickened near the base. The base of the mandible itself is relatively thin in this mandible, compared to other individuals attributed to *Au. afarensis*.





AL 199-1

Hadar, Ethiopia

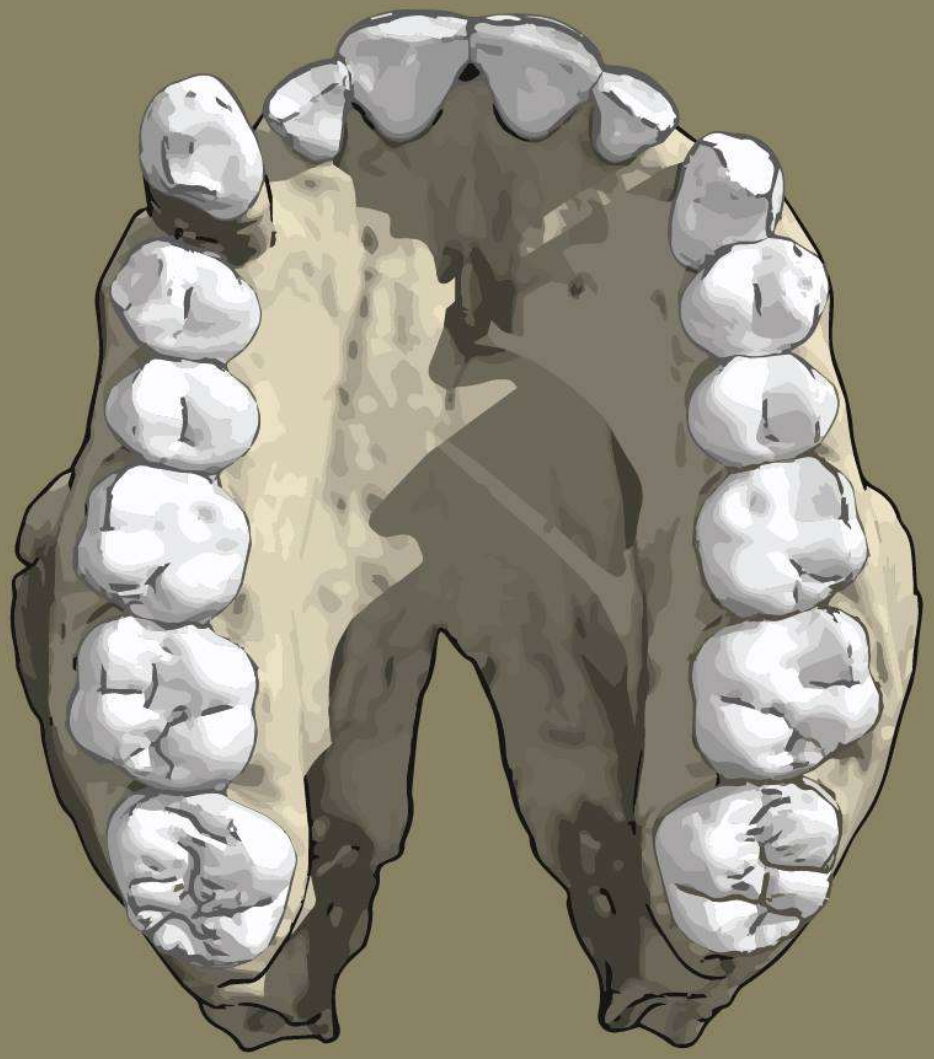
Ato Alemayehu Asfaw discovered this fragment of the left half of a maxilla during fieldwork at Hadar in 1974. The individual lived sometime around 3.4 million years ago. The size of the teeth and maxilla are among the smallest of the Hadar material, and soon after its discovery, Donald Johanson and coworkers suggested that it may represent an early species of *Homo*. They thought that some of the postcranial fossil material and larger mandibles might derive from a species more similar to *Australopithecus africanus*. However, after a fuller analysis of the Hadar remains, these authors came to view the entire sample as a single species with great sexual dimorphism, possibly a common ancestor to later hominins. They named it *Australopithecus afarensis*. Most scientists today accept the Hadar material as a single variable species. But the presence of other hominin species at nearby sites during the same time interval may require a re-evaluation of some of these fossils.

Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa. Illustration by John Hawks CC-BY 4.0

AL 200-1

Hadar, Ethiopia

Ato Alemayehu Asfaw recovered this maxilla during fieldwork at Hadar in 1974. The individual lived sometime around 3.4 million years ago, and Donald Johanson and coworkers named it as a paratype in their definition of *Australopithecus afarensis*. This individual died as an adolescent with third molars just erupting. There is extensive chipping on the surfaces of its canines and premolars closest to the cheek and lips, which may have been induced by hard objects in the diet, or possibly stripping sticks for use as probing tools.



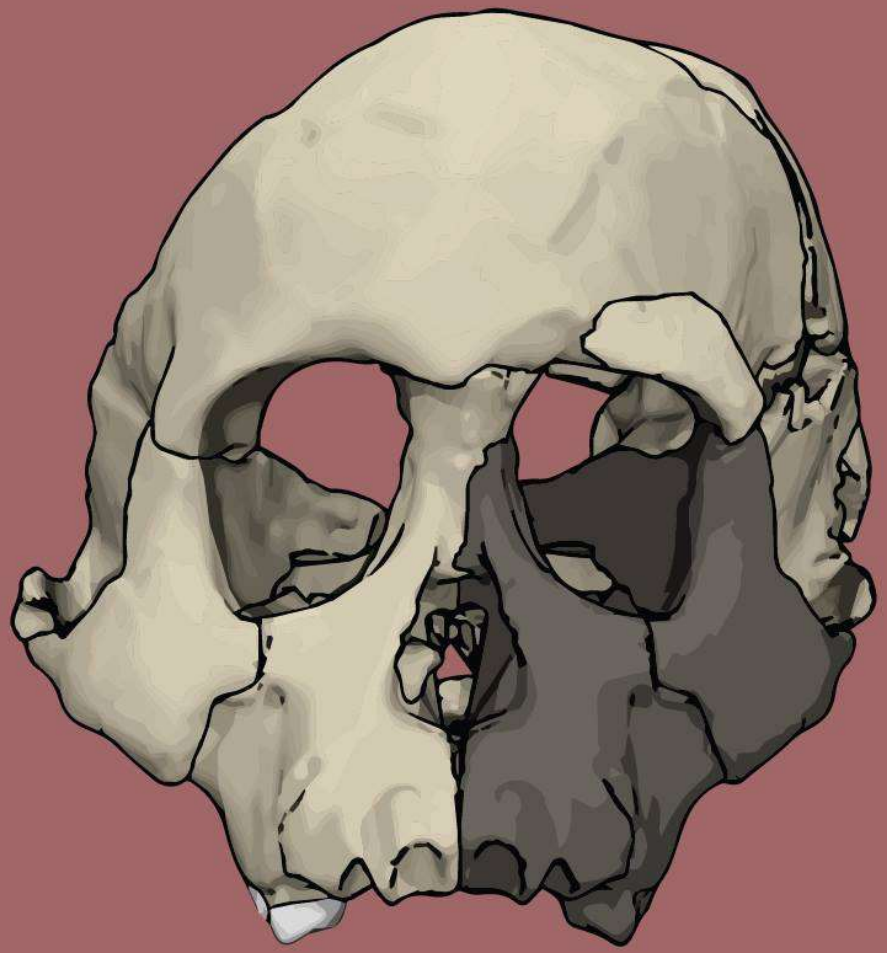
Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa. Illustration by John Hawks CC-BY 4.0

AL 333-105

Hadar, Ethiopia

In 1975, the team working at Hadar found the first fossils at the site known as AL 333. Excavation over the next three years uncovered fragmentary remains of at least 13 individuals. These remains are attributed to *Australopithecus afarensis* and represent individuals that lived around 3.4 million years ago. The most complete cranial specimen is this partial skull of a young child probably between 2 and 3 years of age. In 2020, Philipp Gunz and coworkers examined the internal surface of the cranial vault and determined that the brain organization of this species was similar to living chimpanzees. The brain size of adults is a bit larger than that of living chimpanzees and bonobos, suggesting a slightly prolonged period of brain development in *Au. afarensis*.

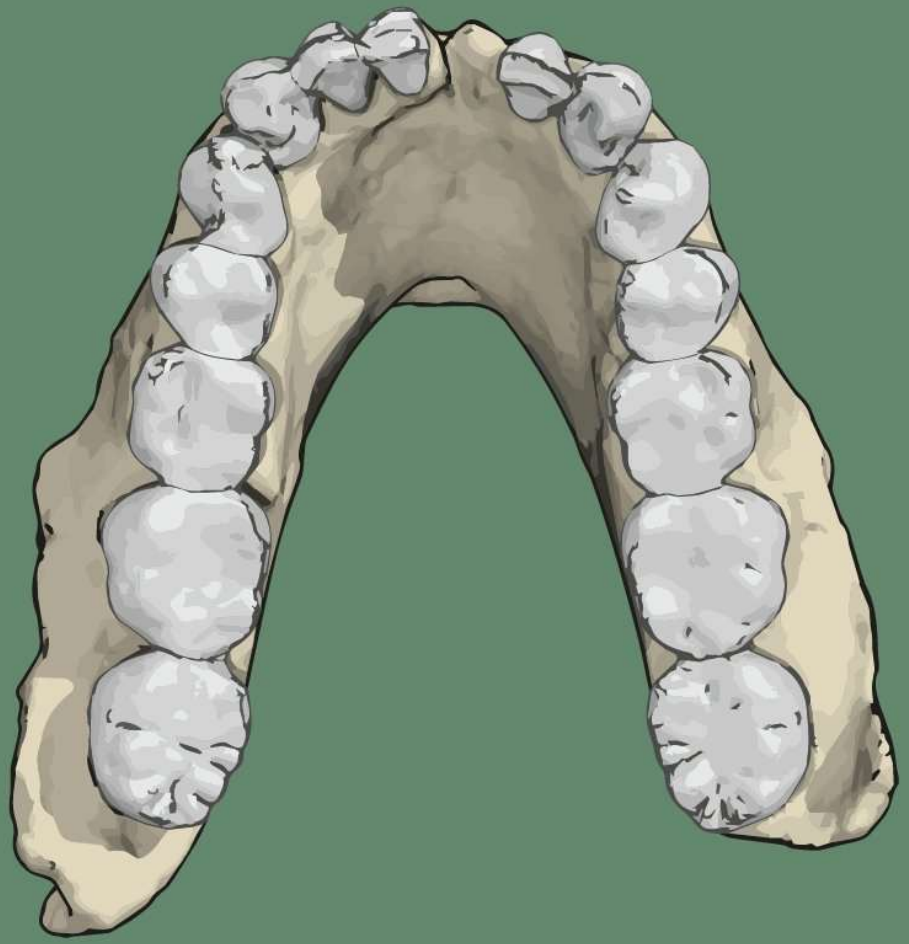
Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa.
Illustration by John Hawks CC-BY 4.0



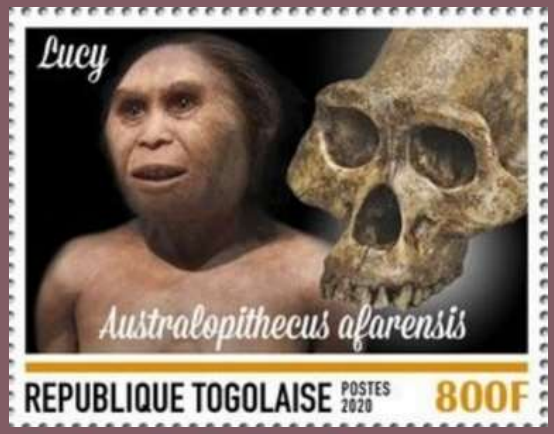
AL 400-1

Hadar, Ethiopia

The International Afar Research Expedition team found this mandible during the 1976-1977 fieldwork at Hadar. The individual represented by this mandible lived around 3.3 million years ago. All teeth except for the right first incisor are present. The shape of the jaw shows the straight and slightly diverging tooth rows that characterize most mandibles attributed to *Australopithecus afarensis*. This mandible is one of a few at Hadar that exhibit signs of carnivore chewing, in this case focused on the base of the jaw behind the premolars.



Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa. Illustration by John Hawks CC-BY 4.0



AL 444-2

Hadar, Ethiopia

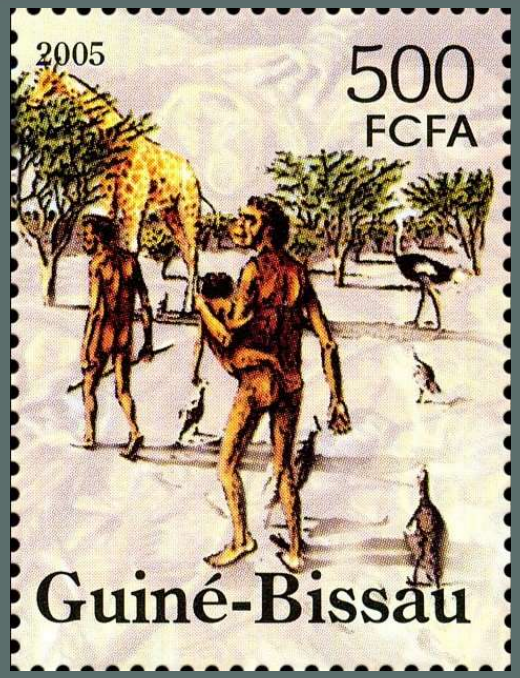
Yoel Rak found the fragments of a hominin occipital bone in February 1992, leading to a systematic search and sieving of the area. This search recovered substantial portions of a second cranium, AL 444-2. This individual attributed to *Australopithecus afarensis* lived sometime between 3.18 and 2.94 million years ago. This skull is one of the largest known for *Australopithecus*. The individual was a relatively old adult at the time of death, as indicated by the extreme degree of tooth wear. The large incisors and projecting lower face of this species combine with the great development of the posterior temporalis muscle to suggest that the incisors were important to food processing. This may have included peeling thick outer layers from fruits or underground tubers, and stripping thick fibers from plant stems or tree bark.

Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa.

DIK-1-1

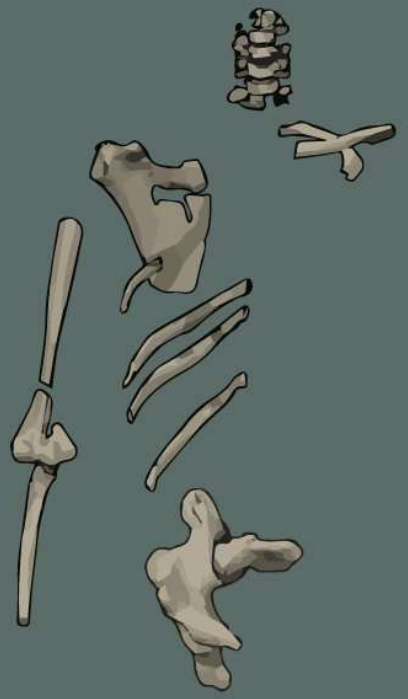
Dikika, Ethiopia

Tilahun Gebreselassie found the first pieces of the skull of this partial skeleton in 2000. The team led by Zeresenay Alemseged continued to excavate over several years, finding large portions of the vertebral column, ribs, upper and lower limbs, and hyoid bone. Anthropologists attribute this skeleton to *Australopithecus afarensis*. The hyoid is similar in morphology to chimpanzees, bonobos, and gorillas, indicating that the human vocal tract configuration had not yet evolved in these early hominins. This individual was around 3 years of age at the time of death. CT scanning has enabled researchers to examine the unerupted permanent tooth crowns within the mandible and maxilla. Their small size within the sample of *Au. afarensis* suggests that this young child was likely of female skeletal sex. This individual lived sometime between 3.35 and 3.31 million years ago.

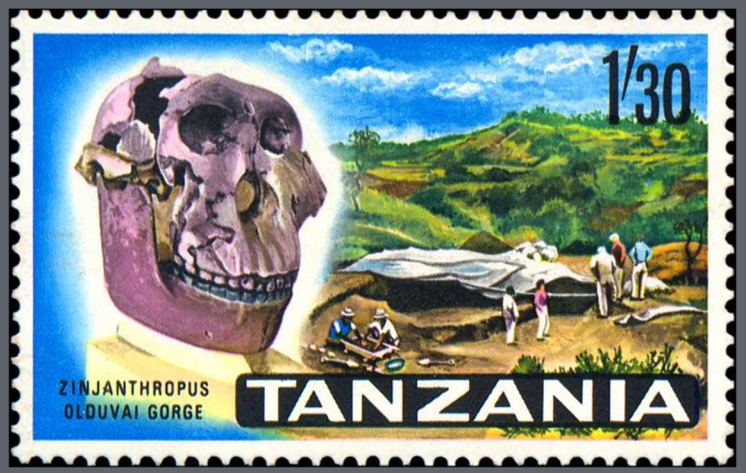


KSD-VP-1/1

Korsi Dora, Ethiopia



Alemayehu Asfaw found a proximal ulna fragment of this skeleton in 2005, and subsequent intensive search of the site by Yohannes Haile-Selassie and team recovered additional parts. This individual lived sometime between 3.6 million and 3.57 million years ago. The skeleton is generally attributed to *Australopithecus afarensis*, although no cranial or dental material are present to confirm that hypothesis. This is a relatively large individual, with a body mass of around 45 kg (100 lbs). Stature is more difficult to determine because the tibia and humerus lengths may have had different relationships to stature than in living people, but this individual was likely between 150 and 165 cm (5 feet to 5 feet 5 inches).

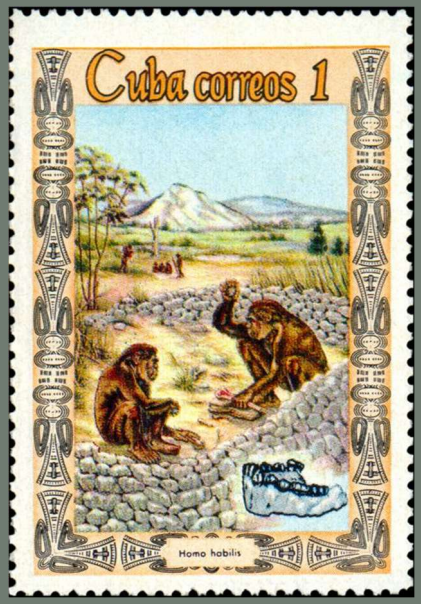


OH 5

Olduvai Gorge, Tanzania

Mary Leakey found this skull in 1959, and it became the holotype of *Zinjanthropus boisei*, which today most anthropologists consider *Paranthropus boisei*. The third molars of this skull were not yet fully erupted at the time this individual died, marking it as an adolescent. The molar and premolar teeth are extremely large, each three to four times the occlusal area of the equivalent teeth in people today. At the time the fossil was found, scientists thought that hominins from the Early Pleistocene were around a half million years old. Louis Leakey worked with Garniss Curtiss to provide the first potassium-argon age determination of sediments at Olduvai Gorge, finding that the Zinj skull was closer to 1.75 million years old, in one step tripling the time scale of human origins. Curtiss wrote to Louis: "One thing is certain. Olduvai Man is old, old, old!"

Skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.

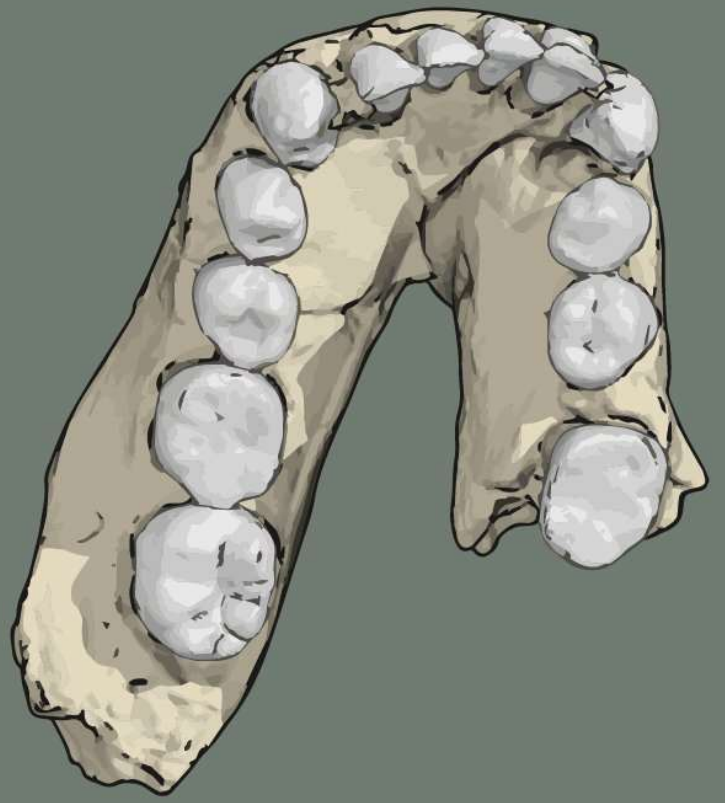


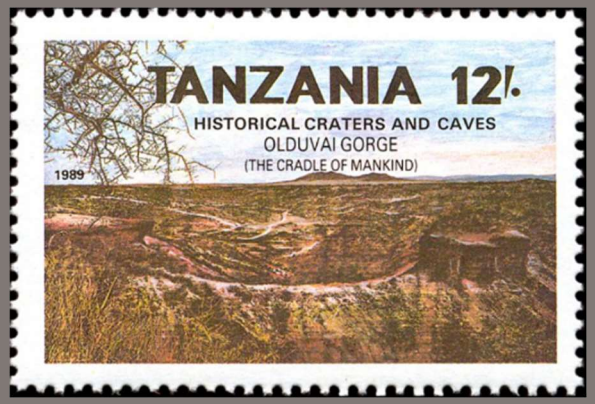
OH 7

Olduvai Gorge, Tanzania

This mandible was uncovered by Jonathan Leakey in 1960 at the site designated FLK-NN at Olduvai Gorge. The jaw is recognized as part of the same skeleton as two parietal bones and a partial hand. Louis Leakey, Phillip Tobias, and John Napier designated this partial skeleton as the holotype of *Homo habilis*. This individual lived sometime around 1.8 million years ago. The second molars had just erupted at the time this individual died. In 2015, Fred Spoor and coworkers undertook a reconstruction to correct the distortion in this fossil. They concluded that the shape of the mandible was much more similar to *Australopithecus* jaws than other specimens that some anthropologists had attributed to *H. habilis*. One possible conclusion is that *H. habilis* was one of several species making up the diversity of *Homo* by 1.8 million years ago.

Original skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.

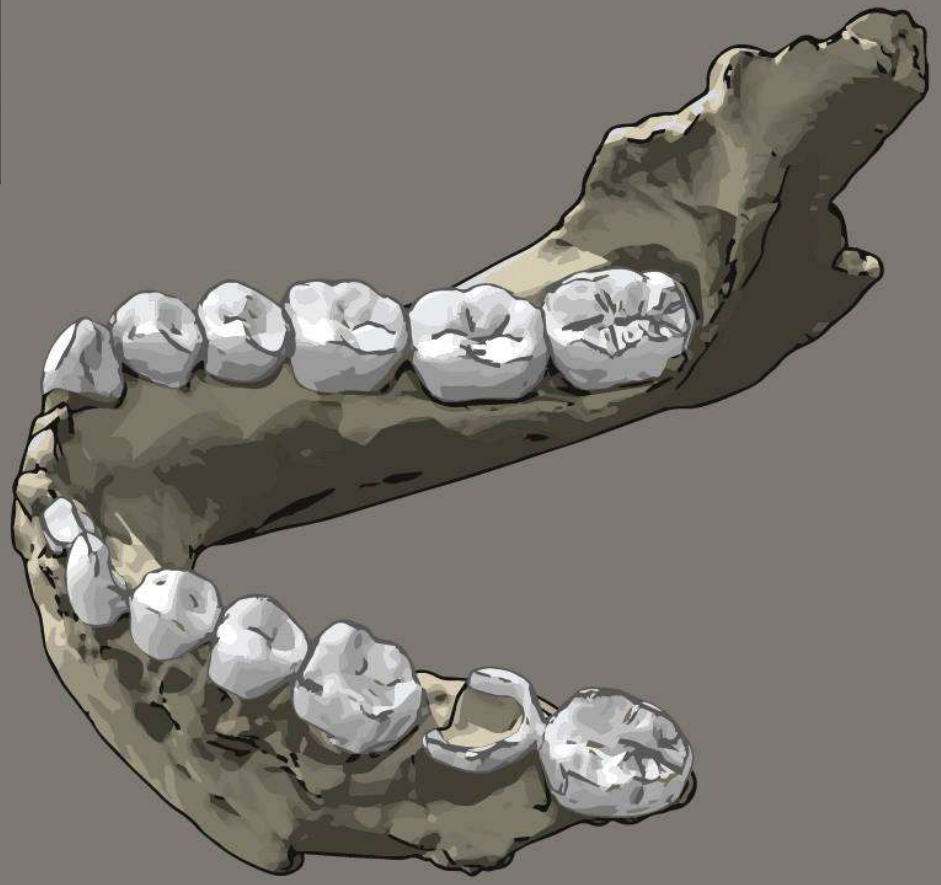




OH 13

Olduvai Gorge, Tanzania

Ndibo Mbuika found a premolar of the partial skull and mandible known as OH 13, in 1962. The remains were in the Side Gorge in an area designated as MNK, short for "Mary Nicol Korongo". Recent excavation of the skull site by Ignacio de la Torre and coworkers shows that the site was near the ancient lake shore, with some sorting of bone and artifacts by water action, and eventually covered by mudflows from the nearby volcanic highlands. The discovery of this fossil and other similar material in 1962 helped to solidify the idea that these discoveries were a *Homo*-like population, later named *Homo habilis* by Louis Leakey, Phillip Tobias, and John Napier. Today the OH 13 individual, estimated to have lived around 1.67 million years ago, is the latest known representative of this species. The place where its bones rested was surrounded by stone artifacts. Without tools usually marked as Developed Oldowan or Acheulean, this is the last known Oldowan assemblage of stone tools at Olduvai Gorge.



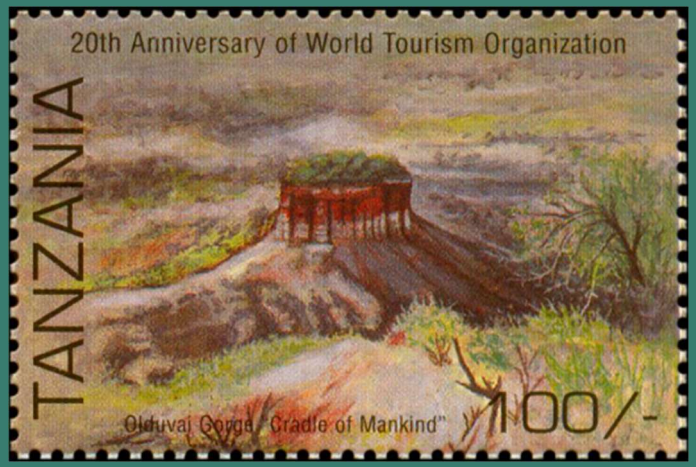
Original skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.

OH 28

Olduvai Gorge, Tanzania

In 1970, Mary Leakey undertook excavation at the WK site at Olduvai Gorge. The work exposed an ancient surface with handaxes and other stone tools, and many bones of a variety of animals including the partial hip bone and femur of a hominin. These fossils come from near the middle of Bed IV and scientists estimate that they represent an individual that lived around 800,000 years ago. The size of the hip joint suggests this individual was around 62 kg (137 lbs). Because the femur has some similarities with femoral remains of *Homo erectus* from Zhoukoudian, China, Michael Day attributed OH 28 to that species also. Today scientists recognize that the broad, flaring pelvis indicated by OH 28 is shared by several species of *Homo*, and it is not clear which species may be represented at Olduvai Gorge at the time the OH 28 individual lived.

Skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.



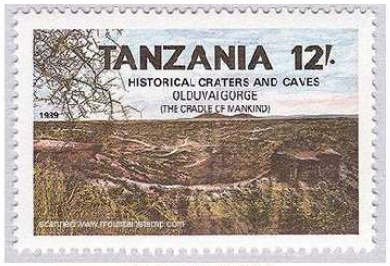
OH 36

Olduvai Gorge, Tanzania

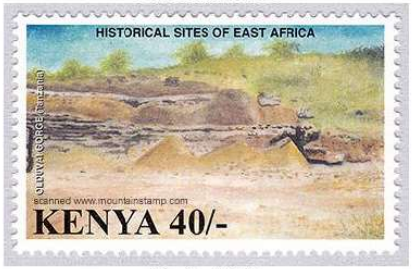
Muia Mutala found this partial ulna during field survey as part of Mary Leakey's team in 1970. Geologists have since determined that the Upper Bed II context of this fossil is roughly 1.15 million years old. Even with a centimeter or more broken off at the distal end, the preserved length of 266 mm is longer than the average human today. Its size suggests that the ulna might come from a tall individual of the human-sized *Homo erectus*. Yet its strongly curved shaft marks the bone as different from the ulna of the Turkana Boy skeleton. Another possibility is that the fossil represents *Paranthropus boisei*. Until scientists find an ulna of this species in association with identifiable skull or tooth fossils, we may not know which hominin the OH 36 ulna represents.

Skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.

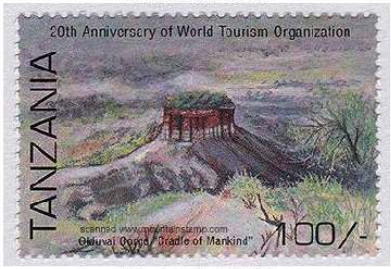
Tansania 1968



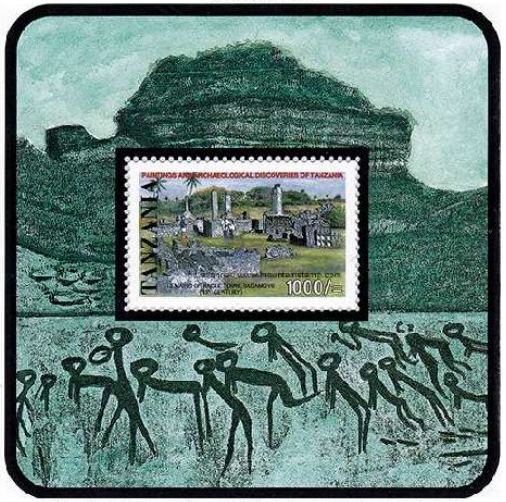
Tansania 1989



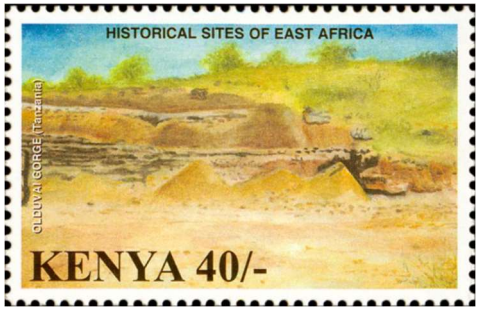
Kenia 2001



Tansania 1995

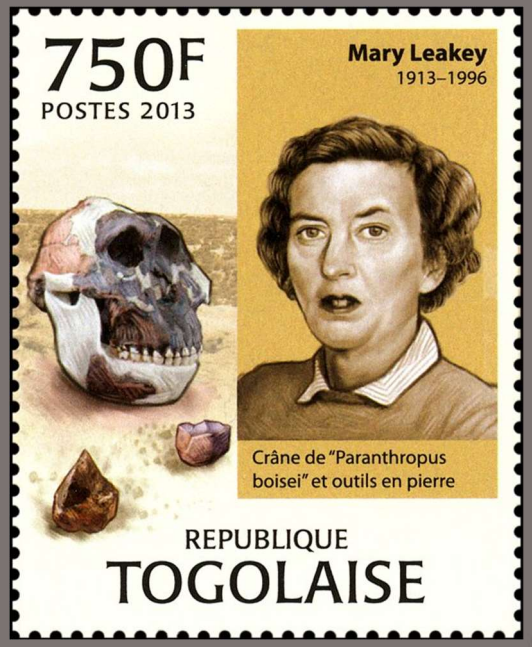


Block: Tansania 2003, oberer Bogenrand



Tansania 2001 „40 Jahre Unabhängigkeit“, rechts in der Marke „Famous landmarks“. Hier „The Olduvai Gorge“; zwei verschiedene Wertstufen zu 450 bzw. 1.000 Shilingi.

Gambia 1993 (verausgabt 1994), wahrscheinlich nicht offiziell

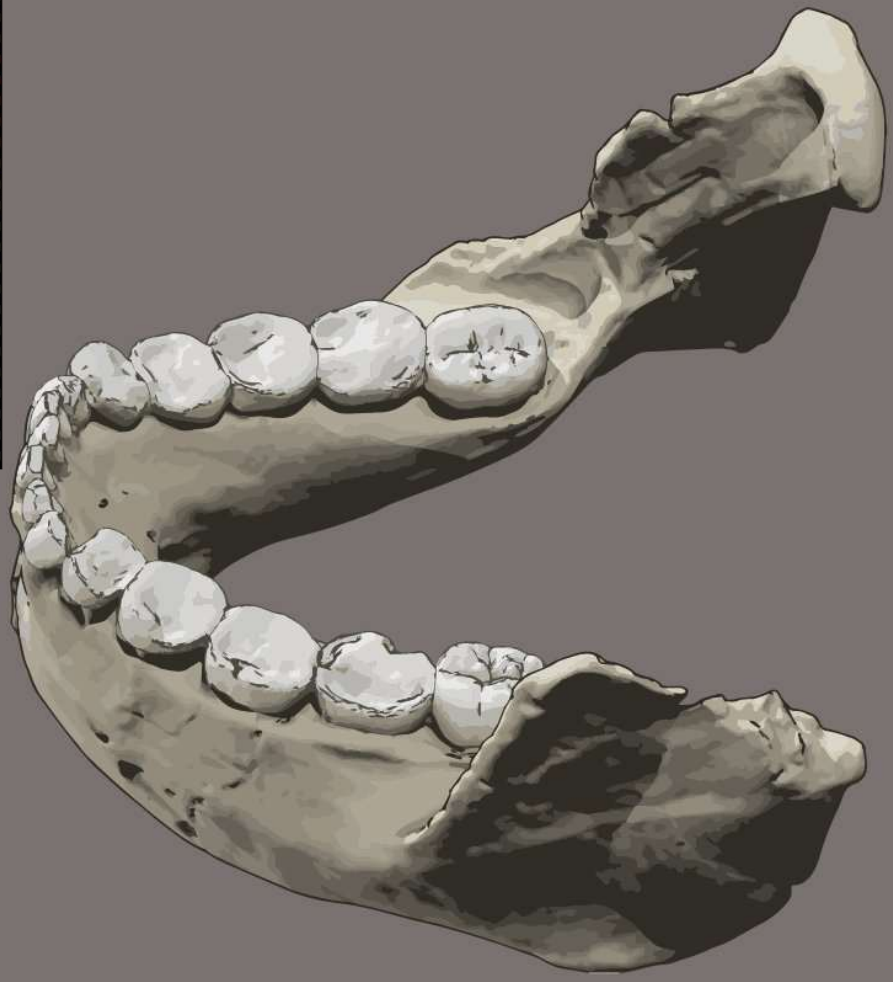


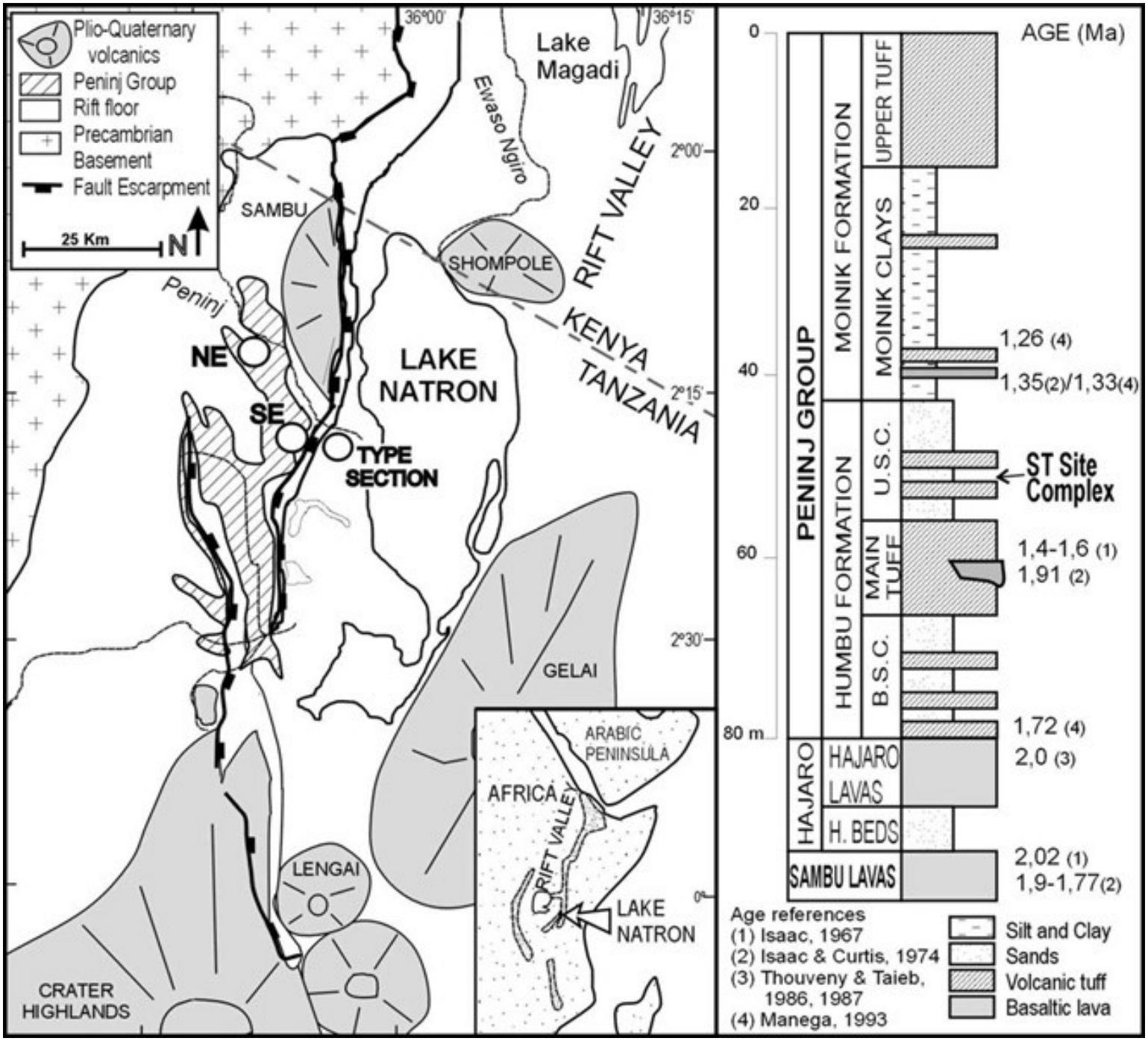
Peninj 1

Peninj, Tanzania

Kamoya Kimeu found a large mandible now attributed to *Paranthropus boisei* in 1964, as part of an expedition to the western Lake Natron area led by Richard Leakey and Glynn Isaac. The individual was an adult that lived sometime between 1.7 and 1.4 million years ago. The Peninj mandible was the first fossil of *P. boisei* to exhibit the tall mandibular ramus characteristic of this species. The mandible shows the very large premolars, particularly the fourth premolar, and the relatively small canine and incisor teeth that are shared across all species of *Paranthropus*.

Original skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.




Plio-Quaternary volcanics
Peninj Group
Rift floor
Precambrian Basement
Fault Escarpment
25 Km
N
36°00'
36°15'
Lake Magadi
Ewaso Ngiro
RIFT VALLEY
2°00'
SAMBU
SHOMPOLE
Peninj
NE
SE
LAKE NATRON
KENYA
TANZANIA
2°15'
TYPE SECTION
2°30'
GELAI
ARABIC PENINSULA
AFRICA
RIFT VALLEY
LAKE NATRON
LENGAI
CRATER HIGHLANDS
AGE (Ma)
0
20
40
60
80 m
PENINJ GROUP
MOINIK FORMATION
HUMBU FORMATION
HAJARO
UPPER TUFF
MOINIK CLAYS
U.S.C.
MAIN TUFF
B.S.C.
HAJARO LAVAS
H. BEDS
SAMBU LAVAS
1,26 (4)
1,35(2)/1,33(4)
ST Site Complex
1,4-1,6 (1)
1,91 (2)
1,72 (4)
2,0 (3)
2,02 (1)
1,9-1,77(2)
Age references
(1) Isaac, 1967
(2) Isaac & Curtis, 1974
(3) Thouveny & Taieb, 1986, 1987
(4) Manega, 1993
Silt and Clay
Sands
Volcanic tuff
Basaltic lava

KNM-ES 11693

Eliye Springs, Kenya

Gerlinde and Till Darnhofer found this partial skull near the shore of Lake Turkana in 1983. It was part of an eroded deposit of fossils jumbled together by the wave action at the shoreline, so that its geological age remains unknown. The skull's thick browridge was eroded away, together with the surface of the face and the teeth. Some aspects of the skull's shape resemble Middle Pleistocene fossils like the Kabwe skull, while others look like modern people. Scientists once speculated that the skull's form must indicate a Middle Pleistocene age. Today, anthropologists accept that diverse populations existed across Africa until the last 20,000 years, meaning that morphology is no predictor of geological age.

Natural History Museum
(British Museum) London

Singa calvaria

Singa, Sudan

In 1924, William R. G. Bond was the British governor of the Fung Province of Sudan when he found this skull embedded in calcrete near the Blue Nile River, around 300 km south of Khartoum. Later work established that the calcrete formed at least 133,000 years ago, beyond this the geological age of the skull is unknown. This was an early modern human individual, and the evidence suggests that he or she suffered a congenital blood disorder. This resulted in an unusual shape to the parietal bones, short from front to back, bulging slightly, with a very thick central layer of spongy bone, called the diploë. The right temporal bone shows abnormal bone growth where the bony labyrinths are found, part of the vestibular system that creates the sense of balance. These symptoms would probably have involved partial hearing loss, loss of balance, and anemia.

Skeletal material curated at the Natural History Museum, London, UK

Omo 2

Omo Kibish Formation, Ethiopia

Paul Abell found the first fragments of this cranium in 1967 as a member of the Kenyan team working in the International Omo Research Expedition. The fossil derives from the Omo Kibish formation, at a level now estimated to have been deposited around 200,000 and 190,000 years ago. The overall shape of the skull is long and narrow, with an angled occipital bone and sloping forehead. These aspects resemble other more ancient African skulls, as well as "archaic" fossils from southeast Asia. Yet the sides of the skull are vertical, and the preserved portion of its brow, which is just the right lateral side, does not have a projecting torus. Some scientists have interpreted this skull as one of the earliest "modern" human fossils, but its mixture of features suggests a more complicated evolutionary picture.

Original skeletal material curated at the National Museum of Ethiopia, Addis Ababa.

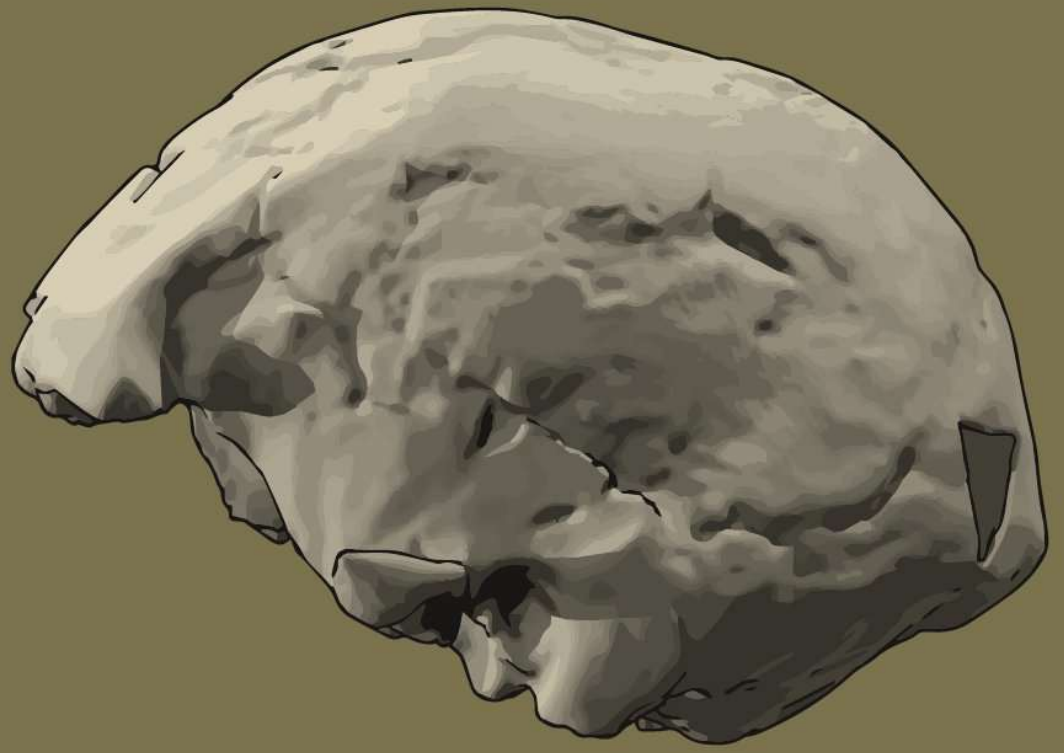


Figure 1. Left lateral views of African and Israeli archaic and early modern *Homo sapiens* crania (replicas unless otherwise stated). Top (L to R): Florisbad, Jebel Irhoud 1, Jebel Irhoud 2 (original), Eliye Springs, Guomde (reversed), Omo 2. Bottom (L to R): Omo 1, Herto (original, reversed), Ngaloba, Singa, Skhul 5, Qafzeh 9.

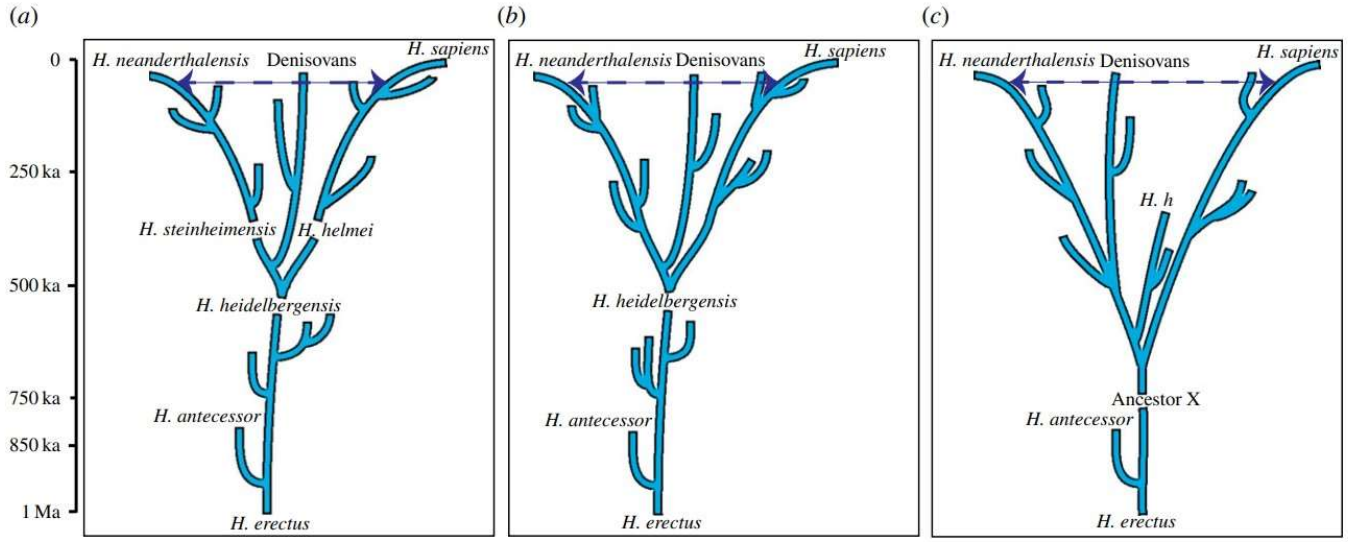


Figure 2. (*a*) *H. sapiens* and *H. neanderthalensis* as species represented only as terminal taxa, with all the traits judged to be diagnostic. *H. helmei* and *H. steinheimensis* as intermediate species between each terminal species and LCA, here suggested to be *H. heidelbergensis*. (*b*) Looser diagnoses of *H. sapiens* and *H. neanderthalensis* including all populations after the split from the LCA. Both species encompass considerable morphological variation along their lineages and populations which go extinct without issue. The overall topography of both trees and the estimated divergence and LCA 'dates' are derived from a study of whole mtDNA genomic data [25,27]. (*c*) A tree which uses the new date and Neanderthal-like morphology of the Sima sample, plus an inferred deeper divergence date based on new genomic mutation rate estimates [93]. Here, a hypothetical and older 'Ancestor X' replaces *heidelbergensis* as the LCA. The Denisovans are also shown on the diagram, as an early derivative of the Neanderthal clade. Their taxonomic status is still unclear [30]. Late Pleistocene inter-lineage gene flow is indicated by the dashed arrows [30,94,95]. (Online version in colour.)

Central Africa

UR 501

Uraha, Malawi

Team members of the Hominid Corridor Research Project found the two pieces of this mandible as they surveyed Chiwondo Beds sediments in 1991. The sediments underlying this surface find are estimated between 2.5 and 2.3 million years ago. Its geographic location in the southern portion of the East African Rift makes its identity of scientific interest toward understanding hominin dispersal. The thick mandibular body, size and shape of the fourth premolar, first and second molar are like those of KNM-ER 1802, a specimen once attributed to *Homo rudolfensis*. Today it is not clear where either jaw fits into the hominin family tree. Recent work on the internal structure of the UR 501 teeth suggests that this specimen may be connected to South African *Australopithecus*.

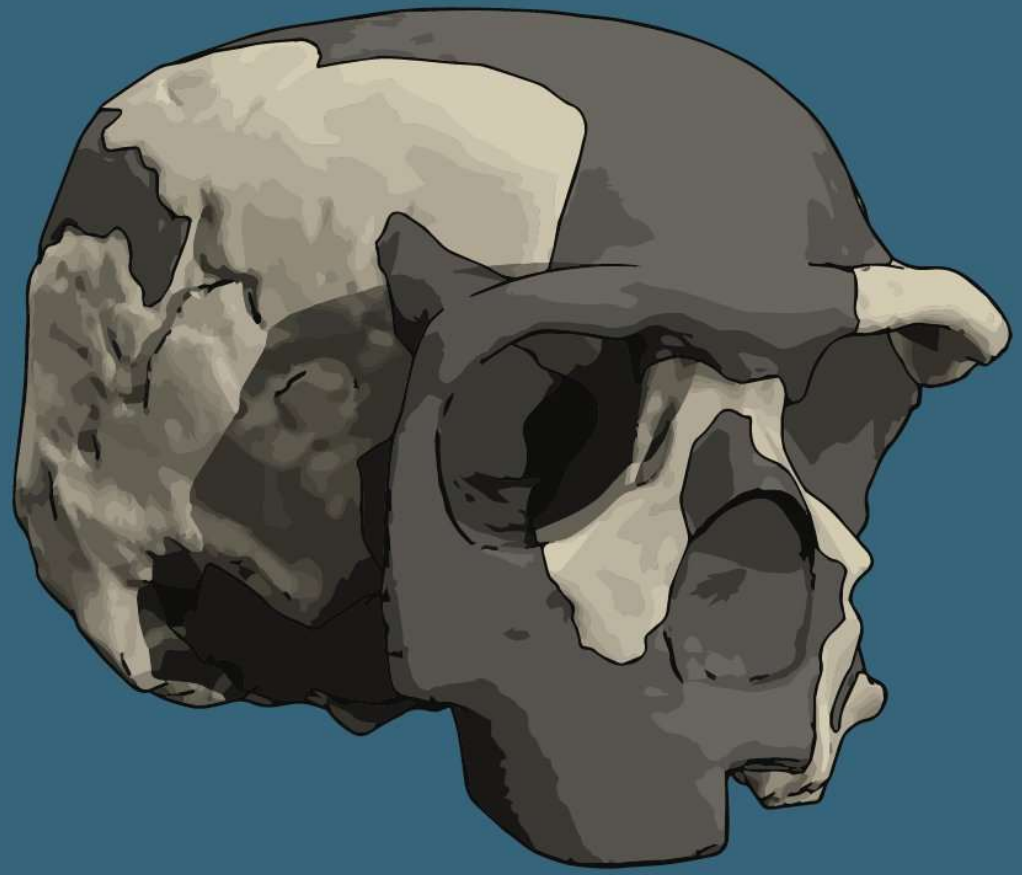
Original skeletal material curated by the Cultural and Museum Centre Karonga, Malawi.

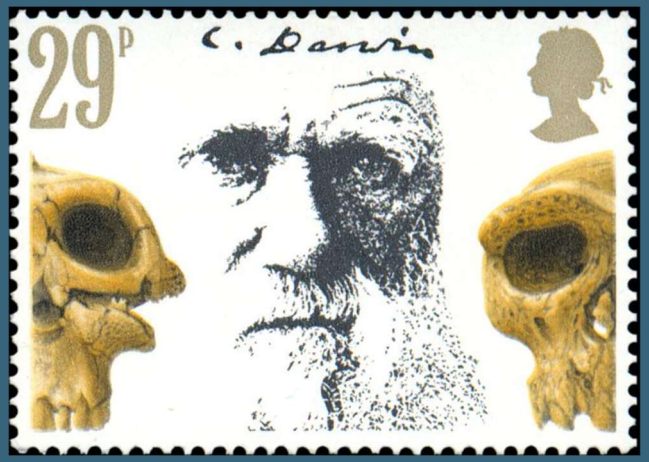
Kabwe E686

Kabwe, Zambia

An African miner whose name was not recorded, together with a miner named Tom Zwigelaar, found a cranium while working in the Broken Hill Mine in 1921. The skull, other bones representing at least two individuals, and artifacts were taken to London and studied at the British Museum, now the Natural History Museum. This individual suffered from a long-term infection of the sinuses and dental abcesses, probably contributing to his death. Recent work suggests that the individual lived sometime between 325,000 and 275,000 years ago. Some scientists consider the individual as a representative of *Homo heidelbergensis*, while others favor the name it was assigned after its discovery, *Homo rhodesiensis*. Whatever the name, this individual represents part of a deep diversity of hominins that lived in Africa in the later Middle Pleistocene.

Original skeletal material curated at the Natural History Museum, London, United Kingdom.



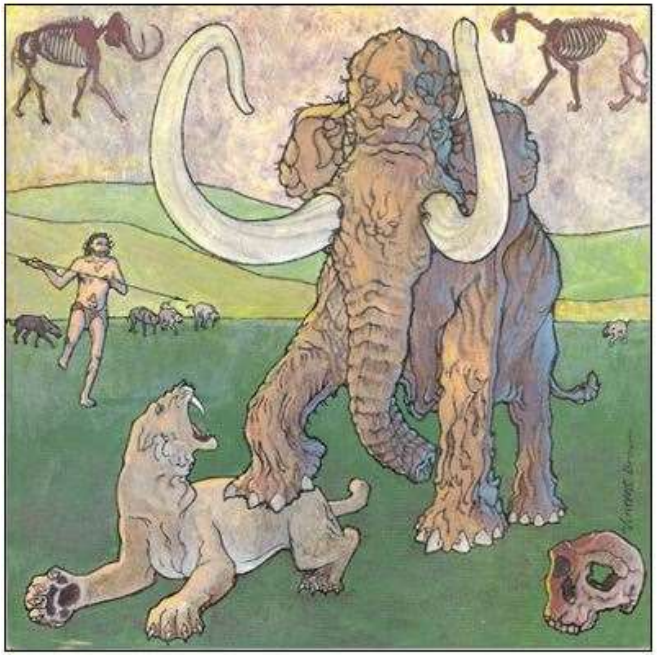


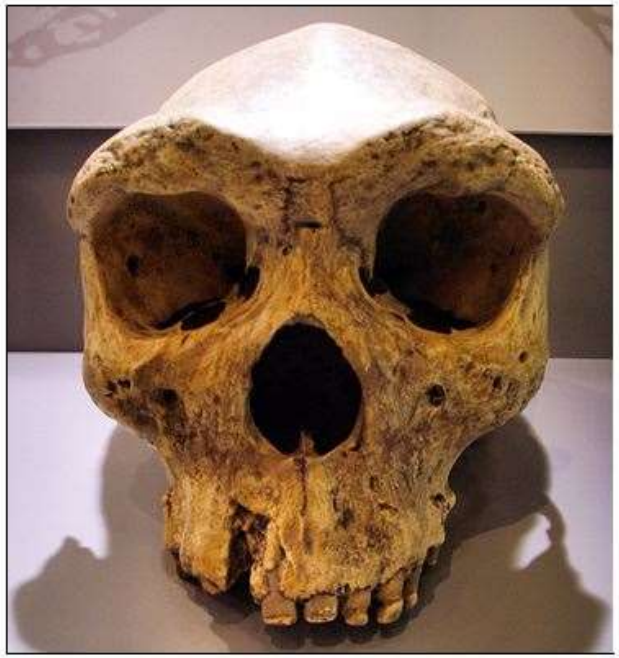
Ndutu calvaria

Lake Ndutu, Tanzania

In 1973, Amin Aza Mturi led archaeological survey of the western Lake Ndutu area, leading to the discovery of a fragmentary hominin cranium. The geological age of this fossil may be as old as 990,000 years ago, or as recent as 132,000 years ago, making it difficult to say what other hominins or environments existed at the same time. When Ronald Clarke reconstructed the skull and described it, he attributed it to *Homo erectus*. Later, he suggested that African fossils like the Ndutu cranium should be distinguised from Asian fossils attributed to *H. erectus*, and accepted the name *Homo leakeyi* for this and other fossils. Other researchers have proposed that the Ndutu individual may have been part of an "archaic" human population including the Kabwe and Bodo fossil skulls. Today the relationships of this individual remain unknown.

Skeletal material curated at the National Museum and House of Culture, Dar es Salaam, Tanzania.





The skull of the Rhodesian Man (= Broken Hill Man, today: Kabwe) appeared five times on stamps.

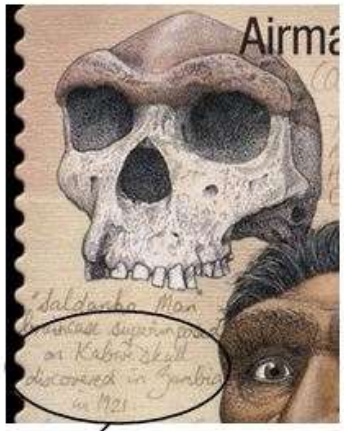
1) 1973: Zambia

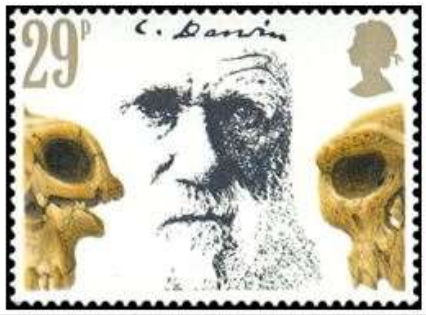
2) 1982: Great Britain

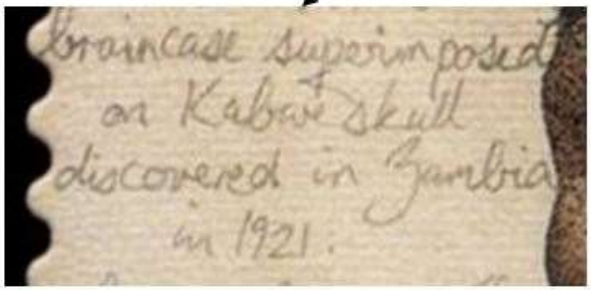
3) 2008: S. Tomé & Principe

4) 2002: Guyana. The picture of the skull is normally hidden under the gold foil stamp (also available with a silver foil stamp).

5) 2006: South Africa. The lower part of the skull is the one from Broken hill. Here it is used for reconstruction.





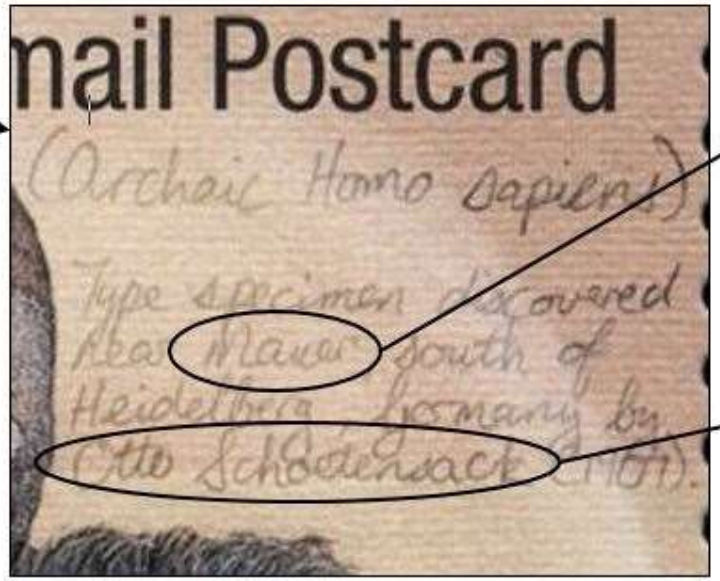



POSTAGE
ZAMBIA 9N


RSA 15c

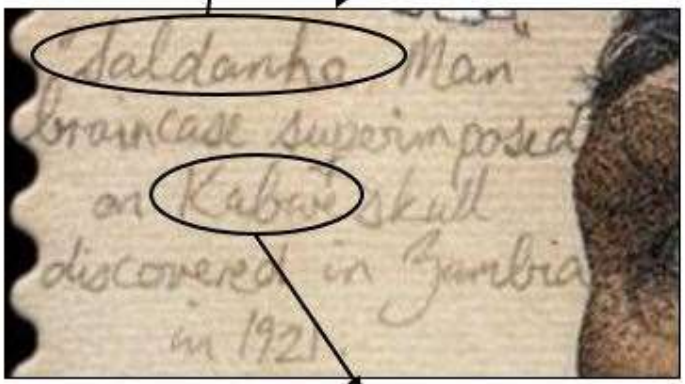

SALDANHABAAI

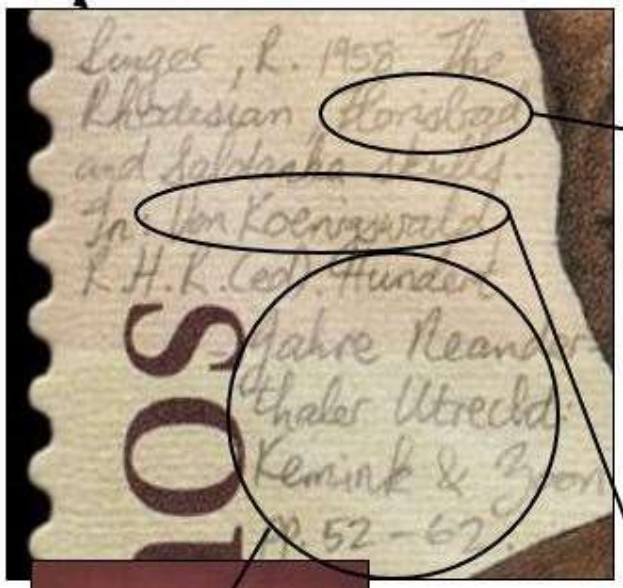

Airmail Postcard
SOUTH AFRICA
Homo heidel-bergensis


mail Postcard
(Archaic Homo sapiens)


MAUER
21.10.2007
100 Jahre Homo heidelbergensis
69256


Prof. Dr. Schoetensack


Saldanha Man
braincase superimposed
on Kabwe skull
discovered in Zambia
in 1921


Singer, R. 1958 The
Rhodesian Florisbad
and Saldanha
Jan Koenigswald
K.H.K. Ced. Hunas
Jahre Neand
thaler Utrecht
Kemink & Zoon
52-62


EARLY SOUTH AFRICAN HISTORY
SUN CITY • 28 JUNE 1998
Sun City, Südafrika
(28.06.1998)
South Africa
standard postage
Südafrika, MI 1135
(28. Juni 1998)
DUAL CONGRESS
SUN CITY • 28 JUNE-4 JULY 1998
Sun City, Südafrika
(28.06.1998)


The skull of the Rhodesian Man (= Broken Hill Man, today: Kabwe) appeared five times on stamps:
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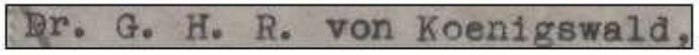
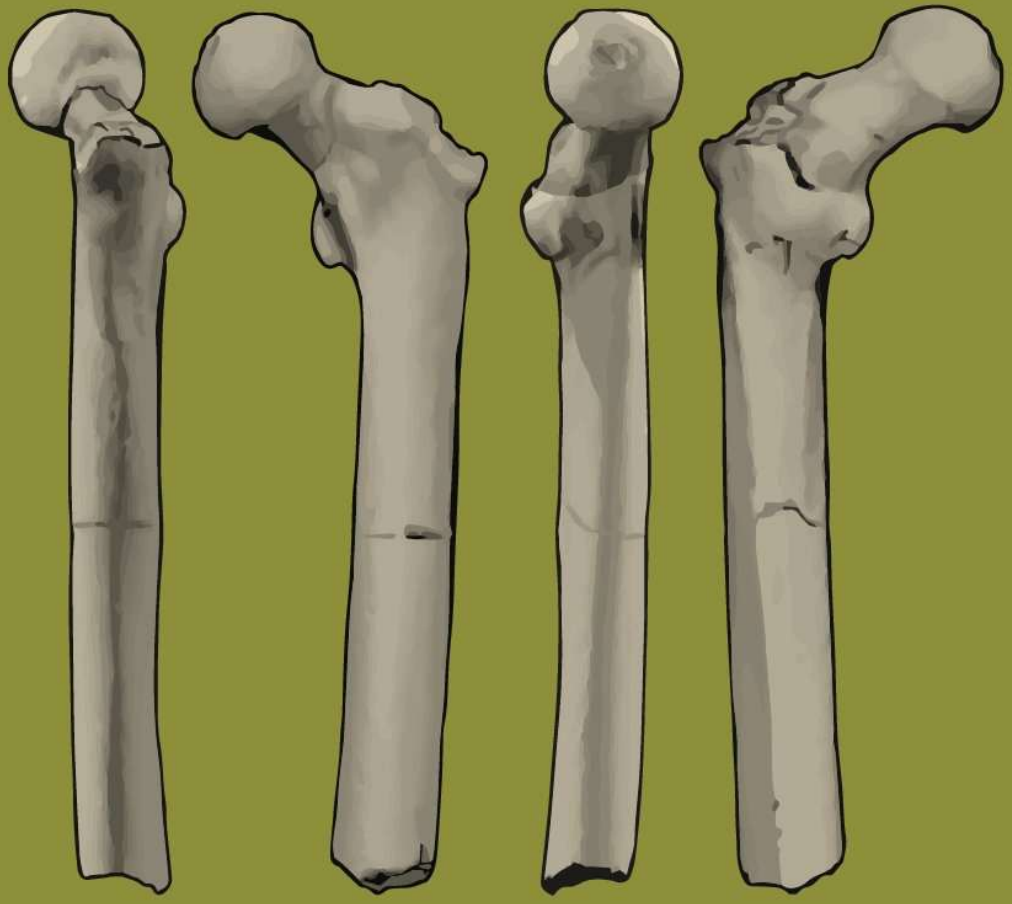
5) 2006: South Africa. The lower part of the skull is the one from Broken hill. Here it is used for reconstruction.
SOUTH AFRICA
Arms


NEANDERTHAL


BY AIR MAIL
PAR AVION
Dr. G. H. R. von Koenigswald,
The University,
Utrecht.
NETHERLANDS.


Dr. G. H. R. von Koenigswald.

North and Central Africa

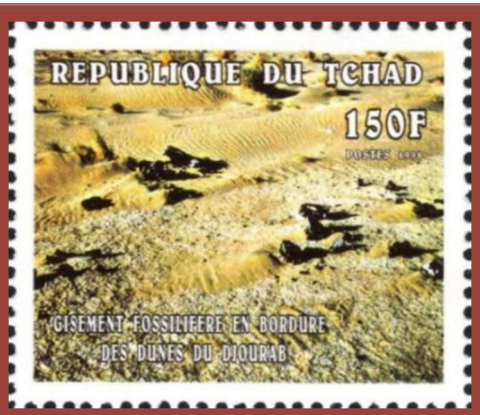


BAR 1002’00

Kapsomin, Kenya

Martin Pickford discovered this femur fragment in 2000. This individual lived sometime between 5.9 million and 5.8 million years ago. The hominin material from the Lukeino formation includes the mandible that is the holotype of *Orrorin tugenensis*, and this femur has been attributed to that species also. The long neck of this femur, groove for the obturator externus muscle, and intertrochanteric line are similar to *Australopithecus* and show a greater degree of bipedality in this individual than in living great apes. The shape of the femur is intermediate in some ways between later hominins and earlier Miocene hominoids, one of many signs that the last common ancestor of humans, chimpanzees, and bonobos had a different locomotor pattern than living chimpanzees or bonobos do today.

Skeletal material curated by the Community Museums of Kenya. Illustration by John Hawks CC-BY 4.0



TM 266-01-063

Toros-Menalla, Chad

Ahounta Djimdoumalbaye, Fanoné Gongdibé, Mahamat Adoum, and Alain Beauvilain found this partial femur in July, 2001 during survey of Toros-Menalla fossil localities. The femur was near the TM 266-01-060-01 skull that Michel Brunet and coworkers made the holotype of *Sahelanthropus tchadensis*. It is not clear whether this femur represents the same individual, but most researchers who have studied it accept that it represents the same species. The femur fragment does not preserve any clear features that would show that the individual relied upon bipedal locomotion. The bowed shape of the shaft is quite different from the femoral remains of *Orrorin tugenensis*, which are the closest hominin fossils in geological age. This individual lived sometime between 7.2 million and 6.4 million years ago.

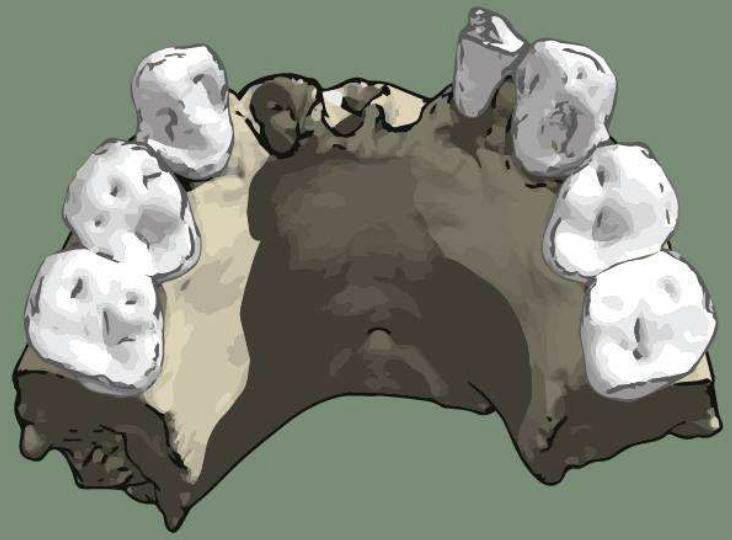
Original skeletal material curated at the Centre National d'Appui à la Recherche, N'Djaména, Chad.

KT 12/H1

Koro Toro, Chad

This partial mandible was recovered from a surface lag deposit during field survey by the Mission Paléoanthropologique Franco-Tchadienne in 1995. Examination of sediments by Anne-Elisabeth Lebatard and colleagues suggested an age of 3.5 million years. It is the holotype of the species *Australopithecus bahrelghazali*, recognizing that the more vertical symphysis of the jaw and its three-rooted premolars may set it apart from species like *Australopithecus afarensis* and *Australopithecus africanus*. Still, the real distinction of this specimen is its location. As the only known specimen of *Australopithecus* outside the East African rift system or South African caves, it suggests that *Australopithecus* was widespread across Africa, adapted to varied ecologies.

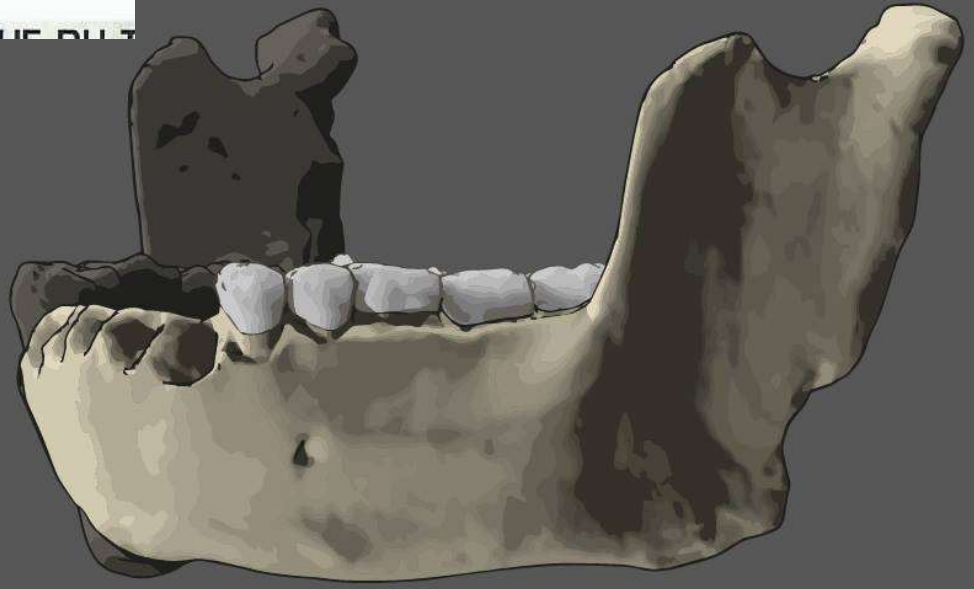
Original skeletal material curated at the Centre National d'Appui à la Recherche, N'Djaména, Chad.



Tighennif 2

Tighennif, Algeria

More than 80 years of paleontological investigation had been carried out in the sand quarry at Tighennif when Camille Arambourg and Robert Hoffstetter began to excavate there in 1954. Beneath the sand was a buried artesian lake. With the assistance of water pumps, their work recovered three hominin mandibles and some additional fragments along with sparse stone artifacts and many fossils of other animals. The geological age of these hominins remains uncertain today as does the connection of the various hominin fossils with each other. Comparison of the animal bones to other sites and the normal magnetic polarity of the sediments combine to suggest they lived in the early Middle Pleistocene, maybe 700,000 years ago. Arambourg named the fossils *Altanthropus mauritanicus*. He had reasons for a new name, finding some similarities with *Homo erectus* fossils from China but also with African *Australopithecus*. Many scientists afterward referred the fossils to *H. erectus* but today it is not clear how these jaws fit in to the human family tree.

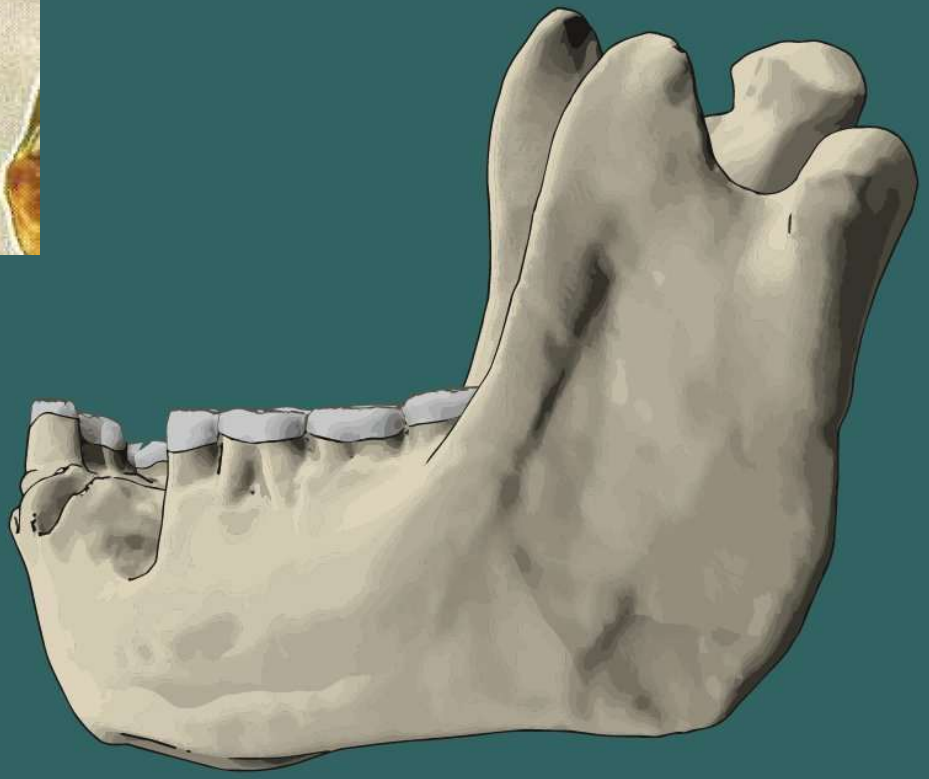


Original skeletal material curated at Muséum national d'histoire naturelle, Paris, France. Illustration by John Hawks CC-BY 4.0

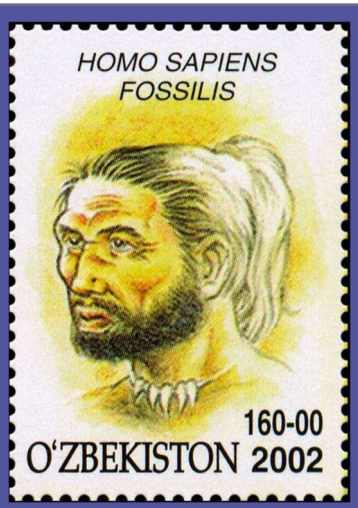
Tighennif 3

Tighennif, Algeria

The third mandible uncovered during the Tighennif excavations directed by Camille Arambourg and Robert Hoffstetter is the most complete of the series. The geological age of these hominins remains uncertain today as does the connection of the various hominin fossils with each other. Comparison of the animal bones to other sites and the normal magnetic polarity of the sediments combine to suggest they lived in the early Middle Pleistocene, maybe 700,000 years ago. Arambourg named the fossils *Altanthropus mauritanicus* and their phylogenetic position today is uncertain. Ternifine 3 is an extremely large mandible with a tall mandibular body and tall rami. Its teeth are rather worn, suggesting this was an older adult individual at the time of death.



Original skeletal material curated at Muséum national d'histoire naturelle, Paris, France. Illustration by John Hawks CC-BY 4.0



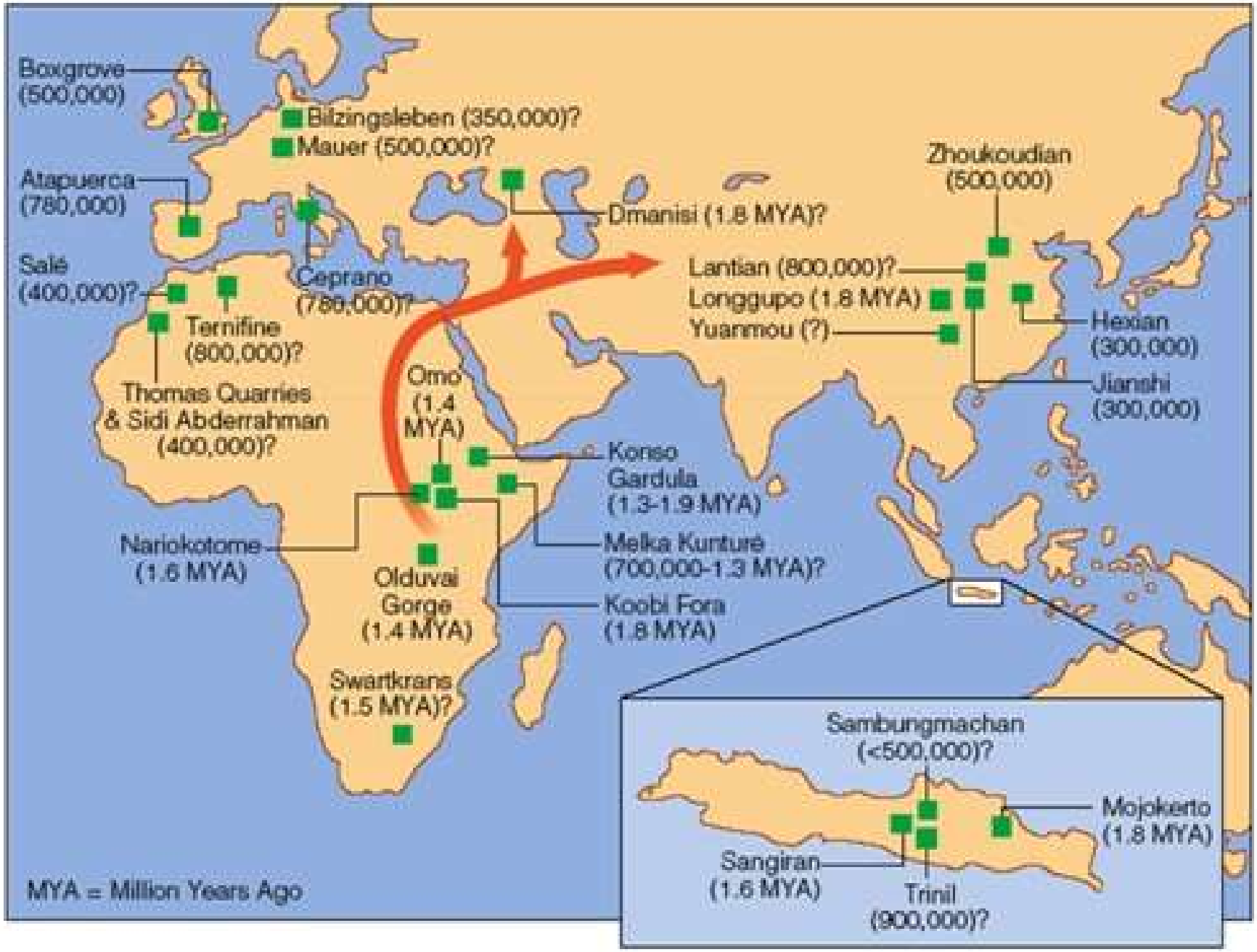
Jebel Irhoud 2

Jebel Irhoud, Morocco

Mining of the hill known as Jebel Irhoud in 1960 exposed an ancient cave with archaeological deposits in the infill, including the skull of a hominin. The following year, Émile Ennouchi initiated excavation of the site, resulting in the discovery of a second partial skull, Jebel Irhoud 2. The exact context of this skull is not known today. Later excavation of the site led by Jean-Jacques Hublin placed hominin fossil material together with an early Middle Stone Age archaeological assemblage, with a geological age between 350,000 and 280,000 years ago. The Jebel Irhoud 2 individual has some shape similarities with recent humans, including its rounded, more vertically oriented frontal bone and reduced lateral browridge. At the same time, the skull's elongated shape and projecting occipital are most similar to other Middle Pleistocene humans.

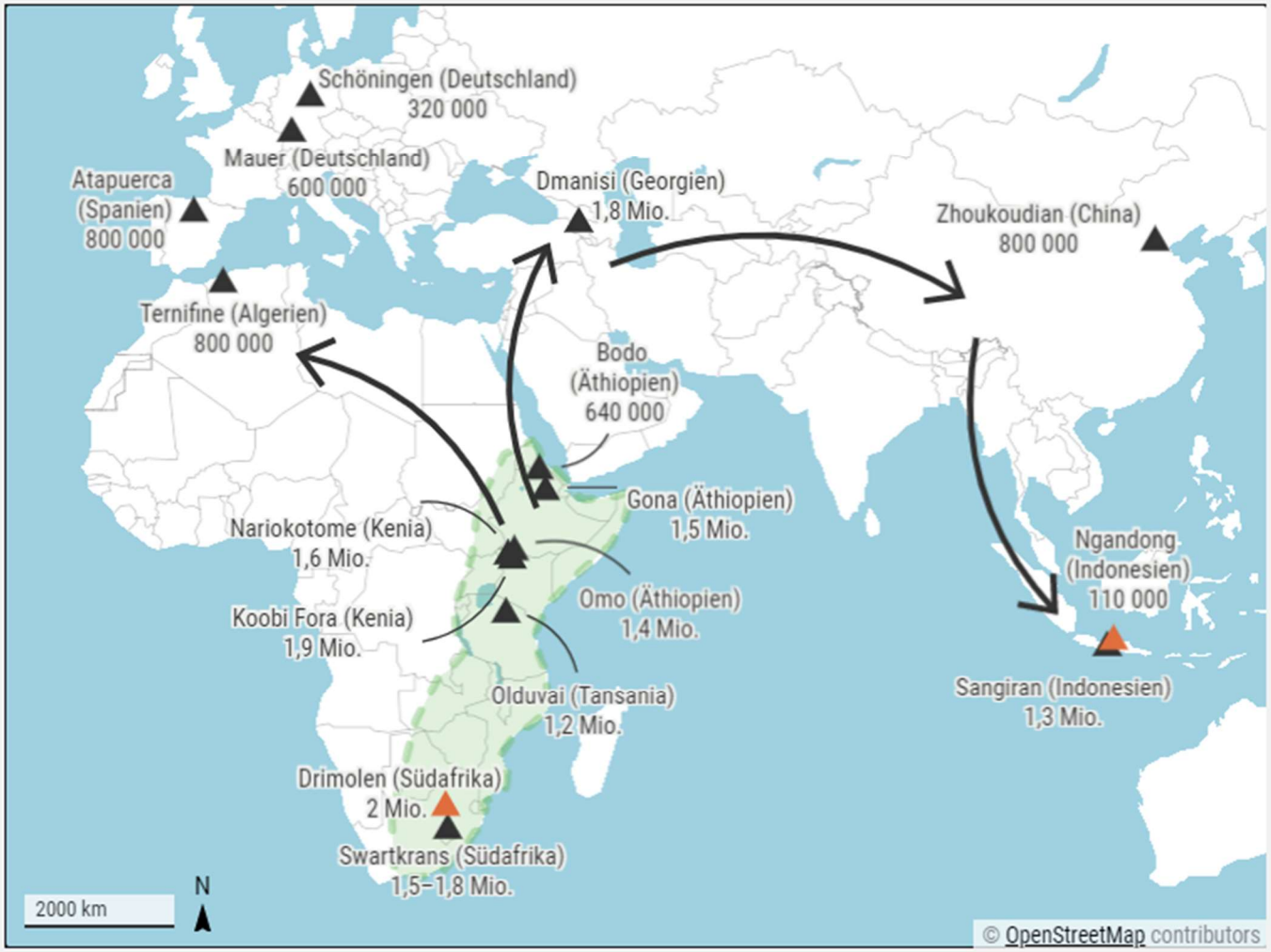
Original skeletal material curated at the Musée de l'histoire et des civilisations, Rabat, Morocco.

Asia


Boxgrove (500,000)
Bilzingsleben (350,000)?
Mauer (500,000)?
Atapuerca (780,000)
Dmanisi (1.8 MYA)?
Zhoukoudian (500,000)
Salé (400,000)?
Ceprano (780,000)?
Lantian (800,000)?
Longgupo (1.8 MYA)
Yuanmou (?)
Hexian (300,000)
Jianshi (300,000)
Ternifine (800,000)?
Thomas Quarries & Sidi Abderrahman (400,000)?
Omo (1.4 MYA)
Konso Gardula (1.3-1.9 MYA)
Melka Kunturé (700,000-1.3 MYA)?
Nariokotome (1.6 MYA)
Olduvai Gorge (1.4 MYA)
Koobi Fora (1.8 MYA)
Swartkrans (1.5 MYA)?
Sambungmachan (<500,000)?
Mojokerto (1.8 MYA)
Sangiran (1.6 MYA)
Trinil (900,000)?
MYA = Million Years Ago

Die ersten Weltbürger

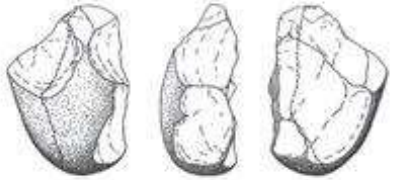
Homo erectus war vermutlich die erste Menschenform, die Afrika verließ und sich über weite Bereiche Europas und Asiens ausbreitete. Die Karte zeigt eine Auswahl wichtiger Fundstellen.



Possible stone tools found at Yiron in Israel are dated to more than 2 million years old. But very few objects have been found

Possible stone tools found at Pabbi Hills in Pakistan have been dated to more than 2 million years old. But they have been found on eroding surface

Stone tools found at Riwat in Pakistan are believed to be more than 1. 9 million years old. But the collection is very small



Possible stone tools recovered from Renzidong in Anhui province of China are more than 2 million years old. Renzidong fissure was open briefly between 2 and 2.5 million years ago. But the tools lack clear signs of hominin modification

Possible stone tools found in Longgupo cave in Gansu province of China. Fresh dating of the cave showed some of them were 2.48 million years old. But uncertainties persist over the chronological sequence of the site

Dmanisi hominin found at Dmanisi, Georgia, looks like a primitive form of *Homo erectus*. Earlier, the fossils were thought to be 1.77 million years old, representing the snapshot of migration at the very moment it happened. New evidence showed they were probably 1.85 million years old

Bones with cut marks were found in Siwalik Hills in India along with stone tools. The bones are claimed to be 2.6 million years old and cut marks attributed to scavenging hominin. But they were found on eroding surface, not *in situ*

Hobbit/*Homo floresiensis* found in Flores island of Indonesia, lived till 50,000 years ago. Its brain was exceptionally small but brain is believed to have grown bigger in humans with evolution. It had many primitive features, too, as if it evolved from Australopithecus, slightly older than *Homo*

D2700/D2735

Dmanisi, Republic of Georgia

Excavators at Dmanisi uncovered this calvaria and mandible in 2001, from adjacent grid locations around a meter apart. Some of the postcranial fossil material from Dmanisi may also represent this individual, as do several isolated teeth. Most scientists attribute this individual to *Homo erectus*, and she or he lived sometime around 1.77 million years ago. The individual was a subadult at the time of death, with third molars only beginning to erupt. The lower premolars of this individual are marked by strong linear enamel hypoplasias near the base of the crowns, which indicate a deficit of enamel formation sometime earlier in this individual's lifetime. In today's people, these are caused by disease or periods of low nutritional availability. Together with the D211 mandible, D2735 is the earliest individual attributed to *Homo* with a first molar larger than the second, which is the most common proportion in today's people.

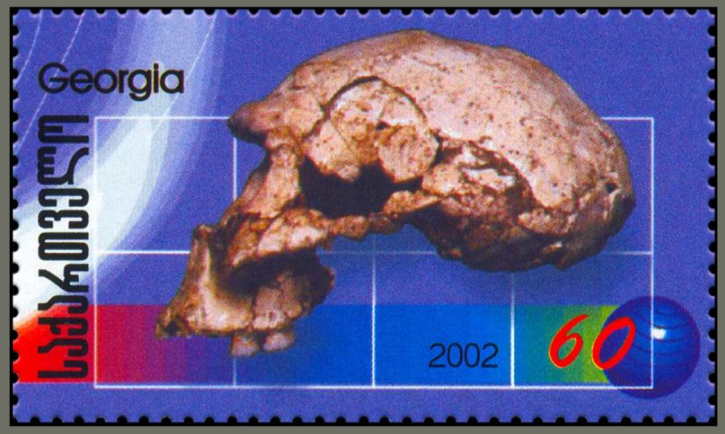
Skeletal material curated at the National Museum of Georgia, Tbilisi. Illustration by John Hawks CC-BY 4.0

D3444/D3900

Dmanisi, Republic of Georgia

Excavators working in the Block 2 area at Dmanisi uncovered the D3444 calvaria in 2002. The next year, the mandible D3900 was found around 40 cm away. The individual represented by this cranium lived sometime around 1.77 million years ago, and most scientists attribute the fossil to *Homo erectus*. The individual had lost all teeth at the time of death, except for the lower right canine. Nearly all of the alveoli for the tooth roots are completely resorbed, meaning that this individual lived for many years without a functional dentition. This is the earliest known hominin to exhibit such extensive tooth loss. Wild primates do sometimes survive for years with extensive tooth loss, as long as they can find appropriate foods. In the case of this early *H. erectus* individual, it is also possible that food sharing by other members of the social group helped him or her survive.

Skeletal material curated at the National Museum of Georgia, Tbilisi. Illustration by John Hawks CC-BY 4.0

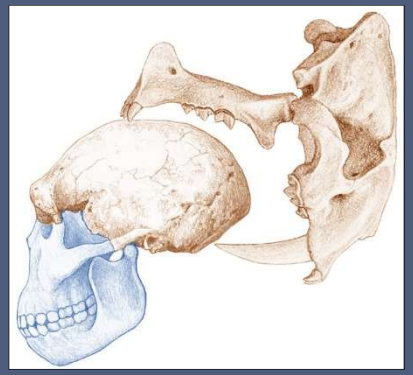


D4500/D2600

Dmanisi, Republic of Georgia

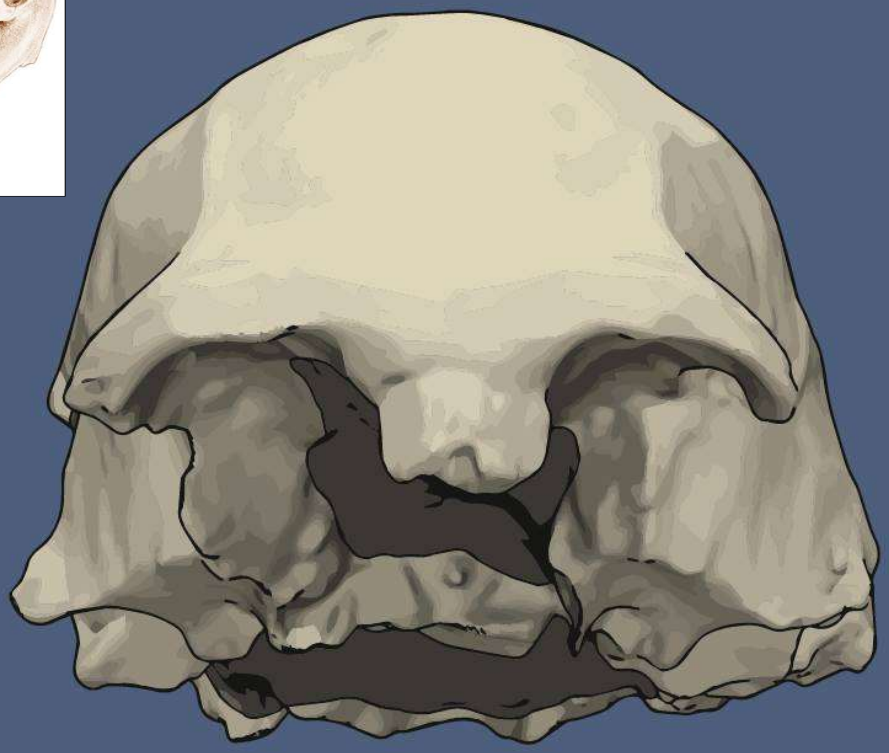
The excavation team at Dmanisi excavated the D2600 mandible in 2000. Five years later they uncovered the D4500 calvaria two meters away from the jaw. Scientists attribute this individual to *Homo erectus*, and at approximately 1.8 million years ago the Dmanisi hominins are the earliest members of this species known in Eurasia. The large jaw and robust muscle markings on this skull suggest that this was a large male individual, although its brain size is the smallest known for *H. erectus* at only 550 ml. The right zygomatic arch, visible here, is misshapen as a result of a healed fracture of the cheek bone sometime earlier in this individual's lifetime.

Skeletal material curated at the National Museum of Georgia, Tbilisi. Illustration by John Hawks CC-BY 4.0



D2280

Dmanisi, Republic of Georgia



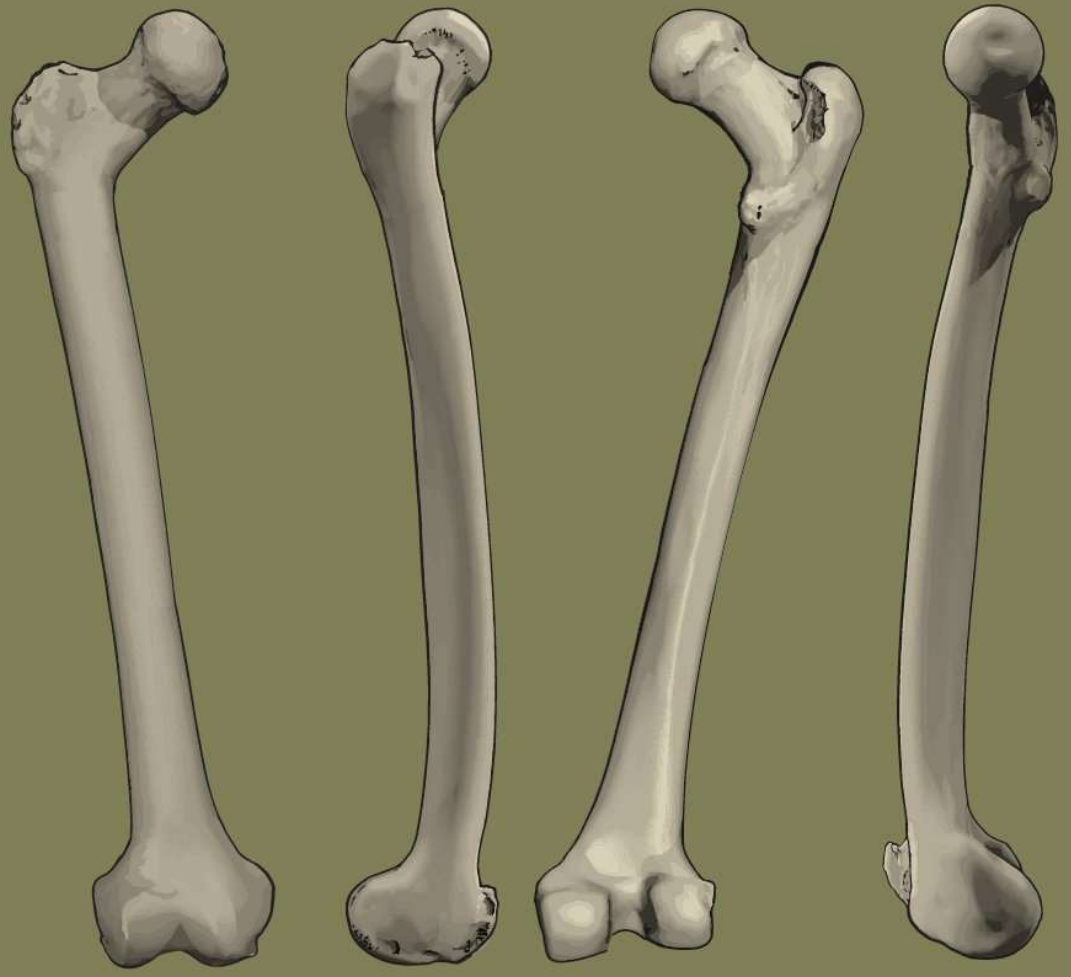
Excavators at Dmanisi uncovered this partial skull in 1999, one of at least five individuals that have been found so far. With an endocranial volume of 730 ml, this is the largest cranium at the site. However it does not have the same degree of robust muscle markings as the smaller D4500 skull. This braincase shares a similar shape with *Homo erectus* skulls from all over the world, and most anthropologists accept the Dmanisi hominins as early representatives of this species. This individual lived around 1.85 million years ago. These are the earliest known hominin fossils in Eurasia, and many scientists have suggested that the dispersal of these hominins into Eurasia may have marked a new convergence of cultural abilities and body form.

Original skeletal material curated at the Georgian National Museum, Tbilisi, Republic of Georgia.
Illustration by John Hawks CC-BY 4.0

D4167

Dmanisi, Republic of Georgia

Fieldwork at Dmanisi during the early 2000s uncovered postcranial remains of at least four hominin individuals from an excavation area known as block 2. These remains represent individuals that lived sometime around 1.77 million years ago, and most scientists attribute them to *Homo erectus*. The D4167 femur represents the largest of these individuals, with an estimated stature of between 144 and 167 cm (between 4 feet 8 inches to 5 feet 5 inches). The femur head diameter corresponds with a body mass of around 49 kg (108 lbs). This body size is well within the range of human traditional foraging populations. Compared to most people today, D4167 has a long femur neck. This feature, shared with many other hominin fossils, reflects a broader pelvis. The lateral edge of the patellar surface of this femur is strongly ridged with some outgrowth of bone. This may have resulted from stress on the knee or possibly a patellar dislocation earlier in this individual's life.



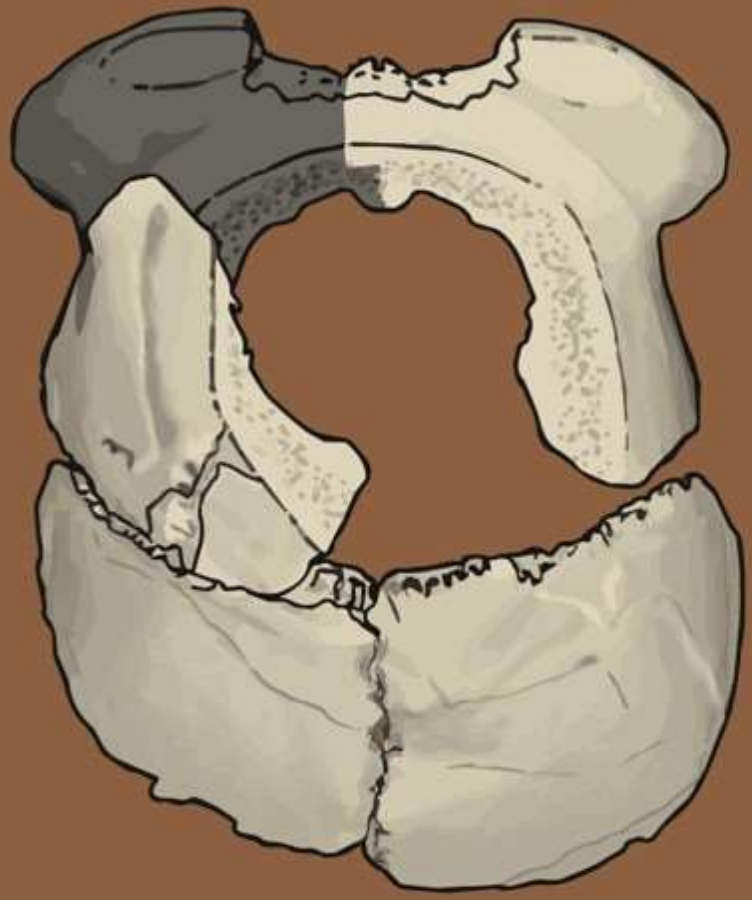
Skeletal material curated at the National Museum of Georgia, Tbilisi. Illustration by John Hawks CC-BY 4.0

Kocabaş calotte

Kocabaş, Turkey

Mehmet Cihat Alçiçek was examining fossils recovered from travertine quarries of the Denizli Basin of southwestern Turkey in 2002 when he identified these fragments of hominin cranium. The quarry had cut the travertine into sheets of 35 mm thickness, and this thickness is all that remains of the hominin skull. The upper and lower surfaces where the fossil was cut are well preserved, suggesting that more of the skull had likely been present but no more was found. This individual lived sometime between 1.6 million and 1.2 million years ago. The shape of this portion of the skull and its thick supraorbital torus have led most researchers to identify it as a *Homo erectus* individual. The endocranial surface of the frontal bone has granular impressions once suggested as possible evidence of tuberculosis infection, but they may rather reflect a common condition in which the cranial bone remodels due to arachnoid cell growth.

Original skeletal material curated at Pamukkale University, Denizli, Turkey. Illustration by John Hawks CC-BY 4.0



China


PRÄHISTORISCHE AUSGRABUNGSSTÄTTEN DES MENSCHEN
China besitzt eine Reihe von Ausgrabungsstätten von Homininen, die bis auf die 1,7 Millionen Jahre alten Überresten des *Homo erectus* in der Provinz Yunnan zurückreichen.
CHINESISCHES FESTLAND
Xujiayao, Hebei
125000–100000 J
PEKING
Zhoukoudian, Peking
Peking-Mensch, bis zu 780000 J
Dali, Shaanxi
250000 J
SCHANGHAI
Yunxian, Hubei
bis zu 900000 J
Daoxian, Hunan
80000 – 120000 J
Yuanmou, Yunnan
1,7 Million J
Zhirendong, Guangxi
100000 J
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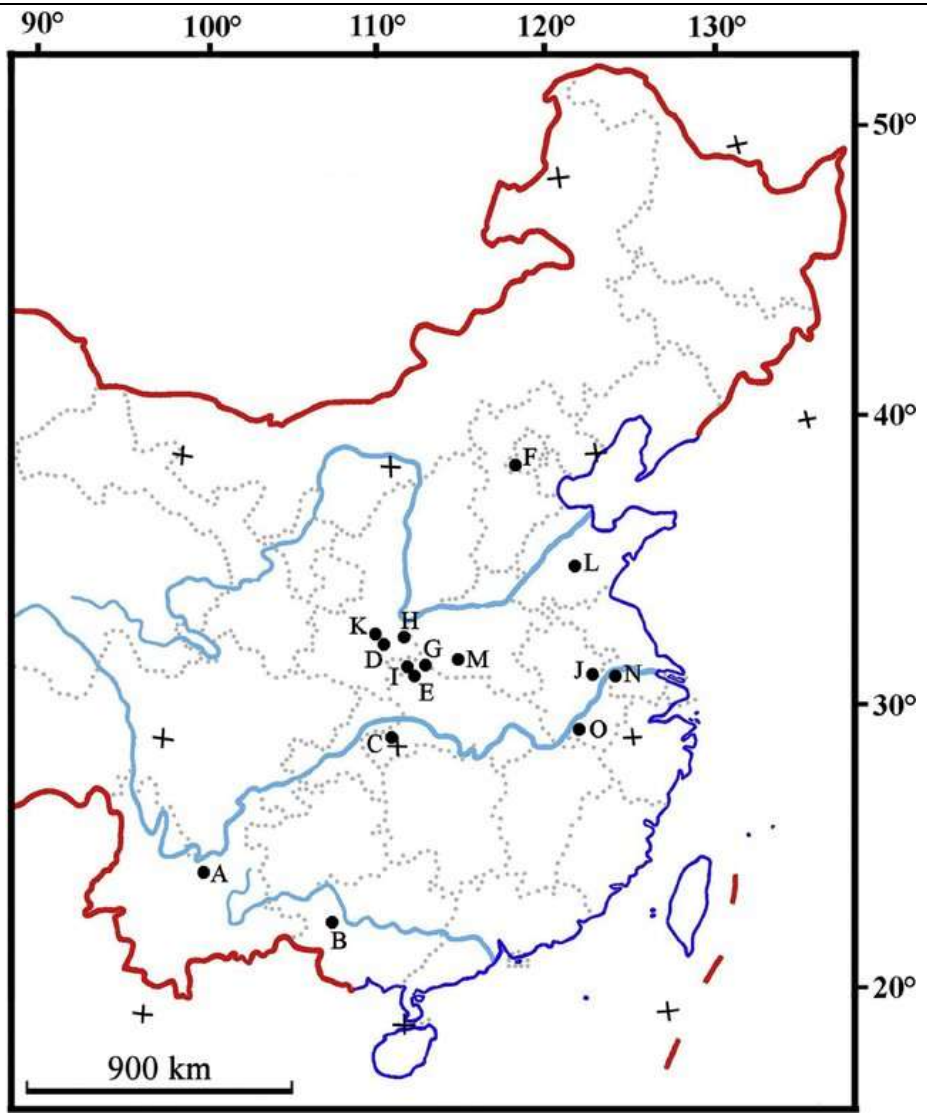
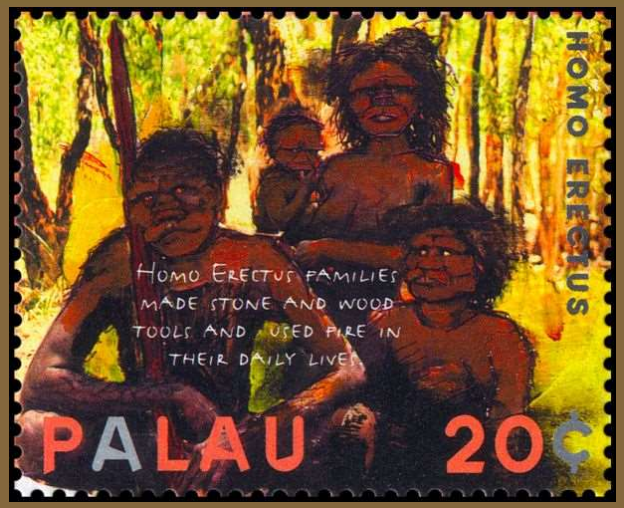


Geographic locations of Homo erectus horizons in China:

A: Yuanmou Man locality at Danawu
B: Tiandong Man locality at Mohui Cave
C: Jianshi Man locality at Longgudong
D: Lantian Man locality at Gongwanglin
E: Yunxian Man locality at Quyuanhekou
F: Locality 1 of Peking Man Site at Zhoukoudian
G: Yunxian Man locality at Meipu
H: Luonan Man locality at Donghe
I: Yunxi Man locality at Bailongdong
J: Hexian Man locality at Longtandong
K: Lantian Man locality at Chenjiawo
L: Yiyuan Man localities at Qizianshan
M: Nanzhao Man locality at Xinghuashan
N: Nanjing Man locality at Huludong
O : Dongzhi Man locality at Hualongdong



PA 830

Longtan Cave, China

Huang Wanpo led excavation of the Longtan Cave near Hexian, China, in 1980 when this calvaria was uncovered. The best current estimate for the geological age of this fossil is between 440,000 and 380,000 years. Most researchers who have studied this fossil refer it to *Homo erectus*, based on its similarity to the Zhoukoudian fossil material. Xue-jie Wu and collaborators recently examined two lesions on the left and right parietal bones of this skull. They found that the damage to the bones is consistent with soft tissue injuries sustained and healed during life. Modern medical cases that produce similar injuries include trauma from extreme hair pulling and soft tissue trauma from severe burns.

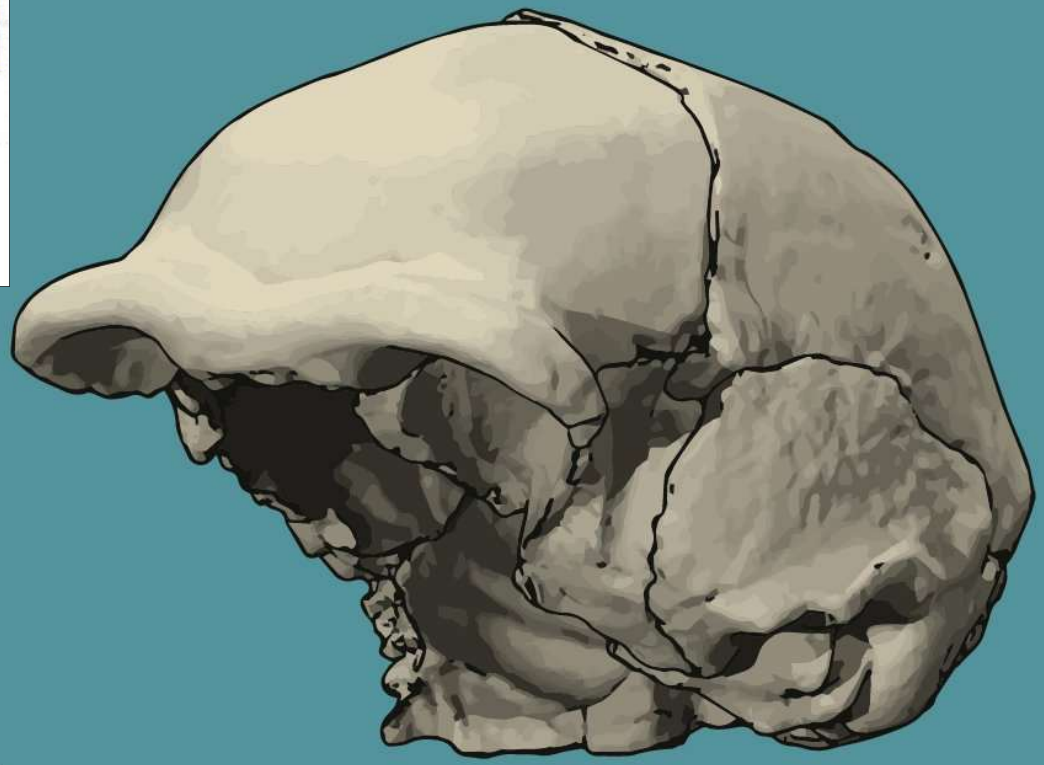
Skeletal material curated at the Institute for Vertebrate Paleontology and Paleoanthropology, Beijing, China. Illustration by John Hawks CC-BY 4.0

ZKD III

Zhoukoudian, China

Through the field season of 1929, Wenzhong Pei worked with a small team to deepen the excavation of a fissure in the Longgushan hill. In late November the excavation revealed two caves. Pei began to excavate the upper sediment layers in one of these caves and a day later uncovered a partial hominin skull. He wrapped the skull with paper and then cloth with flour paste, writing, "The weather was so cold that these wrappings did not become dry even after three days." Ultimately he applied heaters to dry the skull for transport to Beijing for study by Davidson Black. This fossil was the first to show the overall skull shape of the species that Black had named, *Sinanthropus pekinensis*. Today, scientists attribute the Zhoukoudian fossils to *Homo erectus*, and think this individual lived around 650,000 years ago. The sutures of this skull were not fused, and the individual was likely a child of less than 10 years at the time of death.

Original skeletal material lost in 1941.
Illustration by John Hawks CC-BY 4.0



ZKD X

Zhoukoudian, China

This partial skull was uncovered by excavation workers under the direction of Franz Weidenreich in 1938. The cave site of Zhoukoudian is around 50 km southwest of central Beijing, and had been known for fossil evidence of ancient humans since 1926. This fossil came from locus L, one of three partial skulls from this area of the site. By 1939, Weidenreich and Ralph von Koenigswald had begun comparisons of the Zhoukoudian fossils with material from Sangiran, Trinil, and other Javan sites concluding that they were related to each other in a similar way as present-day human populations. These comparisons laid the groundwork by which later scientists would describe all these fossil samples as *Homo erectus*. Evidence today suggests that the locus L hominins lived sometime between 680,000 and 780,000 years ago.

Original skeletal material lost in 1941.

ZKD XI

Zhoukoudian, China

This partial skull was uncovered by excavation workers under the direction of Franz Weidenreich in 1936. The cave site of Zhoukoudian is around 50 km southwest of central Beijing, and had been known for fossil evidence of ancient humans since 1926. This fossil came from locus L, one of three partial skulls from this area of the site, and is also known as the L2 skull. Evidence today suggests that the locus L hominins lived sometime between 680,000 and 780,000 years ago. Weidenreich used the cranial vault of this individual as the basis for a reconstruction of the entire skull, combining it with fragments of facial bones from locus L and a mandible from locus H. The resulting reconstruction may be the most well-known depiction of *Homo erectus*.

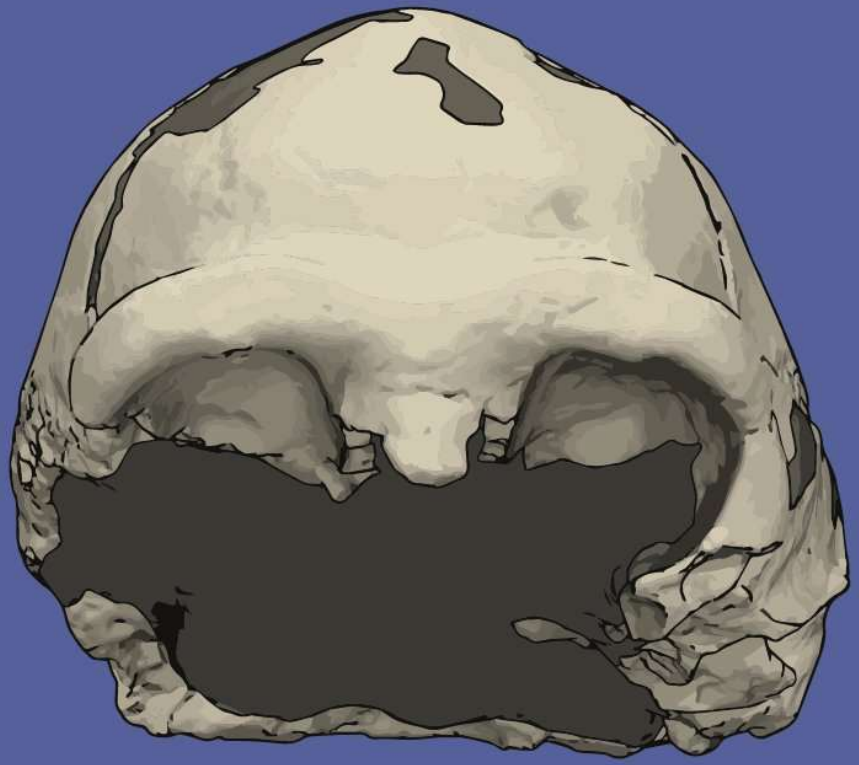
Original skeletal material lost in 1941.

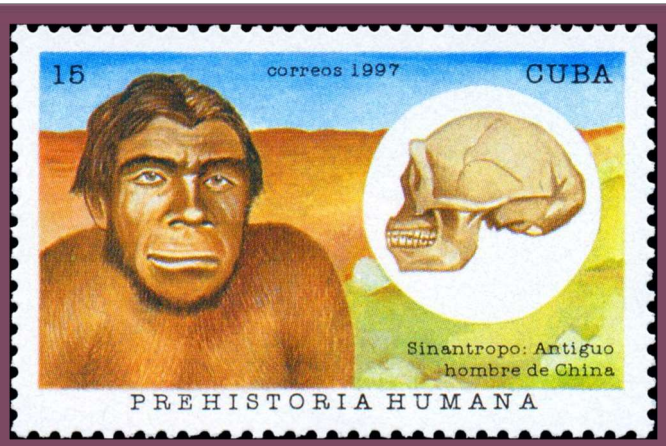
ZKD XII

Zhoukoudian, China

Jia Lanpo directed the excavation of three partial skulls from locus L at Zhoukoudian in November, 1936. The locus L hominins lived sometime between 780,000 and 680,000 years ago. The series of hominin remains from Zhoukoudian were named by Davidson Black as *Sinanthropus pekinensis*, but anthropologists today regard them as one of the best-known fossil samples of *Homo erectus*. Like other cranial remains from Zhoukoudian, the cranial base of skull XII was broken away, nearly all the facial bones are missing, and some extensive damage exists along the outside of the cranial vault. This evidence is consistent with the kind of damage left by large carnivores. A concordance of evidence from the site suggests that cave hyenas were responsible for accumulating many of the hominin remains at Zhoukoudian.

Original skeletal material lost in 1941.



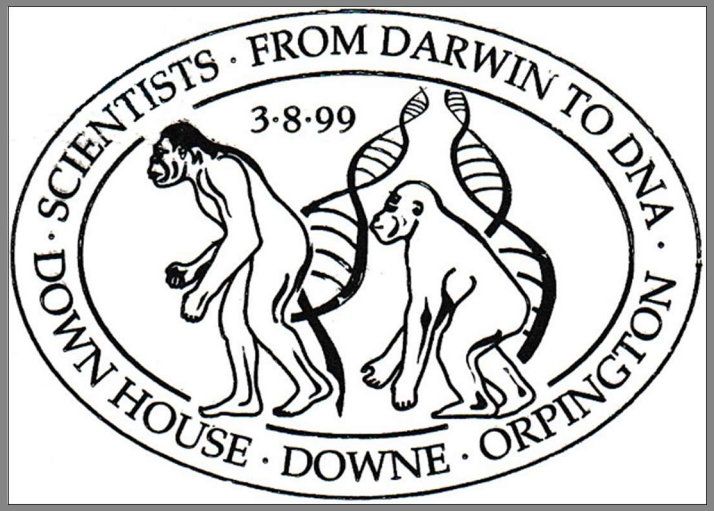


ZKD G1

Zhoukoudian, China

This left half of a mandible was uncovered in the 1931 season of excavation, under direction of Wenzhong Pei. Like the other Zhoukoudian Locality 1 material, Davidson Black attributed it to *Sinanthropus pekinensis*. Cranial fragments, a portion of a second mandible, and a number of artifacts were excavated within a meter of this fossil, and the position of this assemblage was designated as "Locus G". This individual lived sometime between 780,000 and 680,000 years ago. Today scientists attribute this mandible to *Homo erectus*. This individual had five mental foramina on the left side. The mental foramen is an opening on the external surface of the mandibular corpus that accommodates the inferior alveolar nerve and the mental artery, which innervate and conduct blood to the lower lip and soft tissue of the chin. Rarely today, these vessels or nerves may branch within the body of the mandible, resulting in multiple foramina. This condition was relatively common among the Zhoukoudian mandibles.

Original skeletal material lost in 1941.

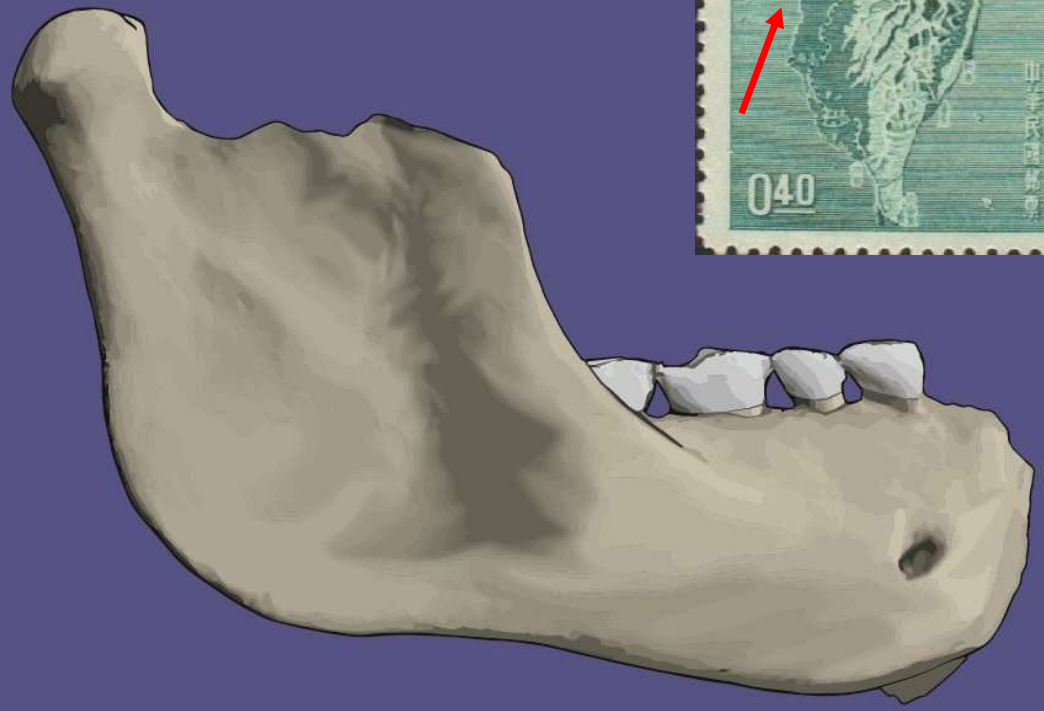


Xiahe mandible

Baishiya Karst Cave, Xiahe, China

At an altitude of 3280 m (10,800 feet) the Baishiya Karst Cave is a site of traditional Buddhist veneration. A monk, whose name has not been made public, found the right half of a jawbone in the cave in 1980. Much later, Fahu Chen and coworkers studied the jaw, finding that fragments of protein sequence preserved in the ancient dentin is most similar to genomic data from the extinct population known as the Denisovans. This population is otherwise known only from fragmentary fossils from Denisova Cave, Russia. The Xiahe individual lived at least 160,000 years ago.

Skeletal data provided courtesy of Fahu Chen *et al.*, https://doi.org/10.1038/s41586-019-1139-x

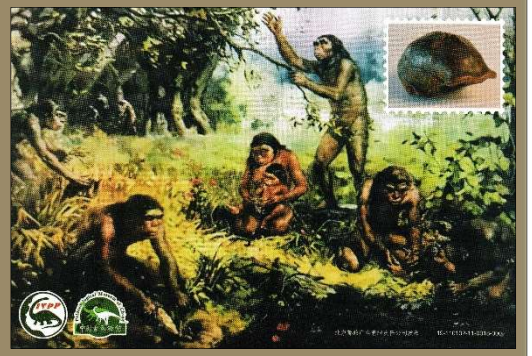


Penghu 1

Penghu Channel, Taiwan

An unknown fisherman sold this fossil to an antique shop after recovering it in trawl nets from the seafloor in the channel separating the Penghu Islands off the coast of Taiwan. The date of recovery is unknown. A collector donated it to the National Museum of Natural Science, and a scientific description was published by Chun-Hsiang Chang and coworkers in 2015. The fossil is likely Middle Pleistocene in age, and its morphology is similar in many ways to contemporary hominin mandibles from mainland China. The individual was an adult at the time of death, and exhibits M3 agenesis, one of a handful of such cases in the hominin record of East Asia. Whether this individual was part of a population of Denisovans, or instead belonged to an earlier radiation of hominins is currently not known.

Skeletal material curated at the National Museum of Natural Science, Taichung, Taiwan.

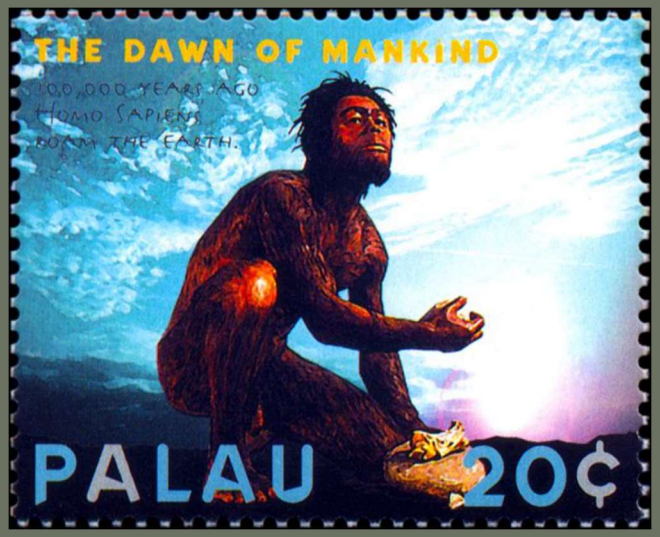


Maba 1

Maba, China

Workers digging fertilizer from a cave near the village of Maba in Guangdong Province found this partial skull in 1958. The skull came from a narrow crevice in the rock, and without remaining sediments to link it to its context, the geological age remains uncertain. Since its discovery, most scientists considering the other animal bones from the cave site have suggested a late Middle Pleistocene age. The narrow and projecting nasal bones of the skull resemble European Neandertals more than other fossil skulls from East Asia. However the remainder of the skull's anatomy has no special resemblance to any Middle Pleistocene sample of fossils. Its place in the human family tree is unknown.

Skeletal material curated at the Institute for Vertebrate Paleontology and Paleoanthropology, Beijing, China.



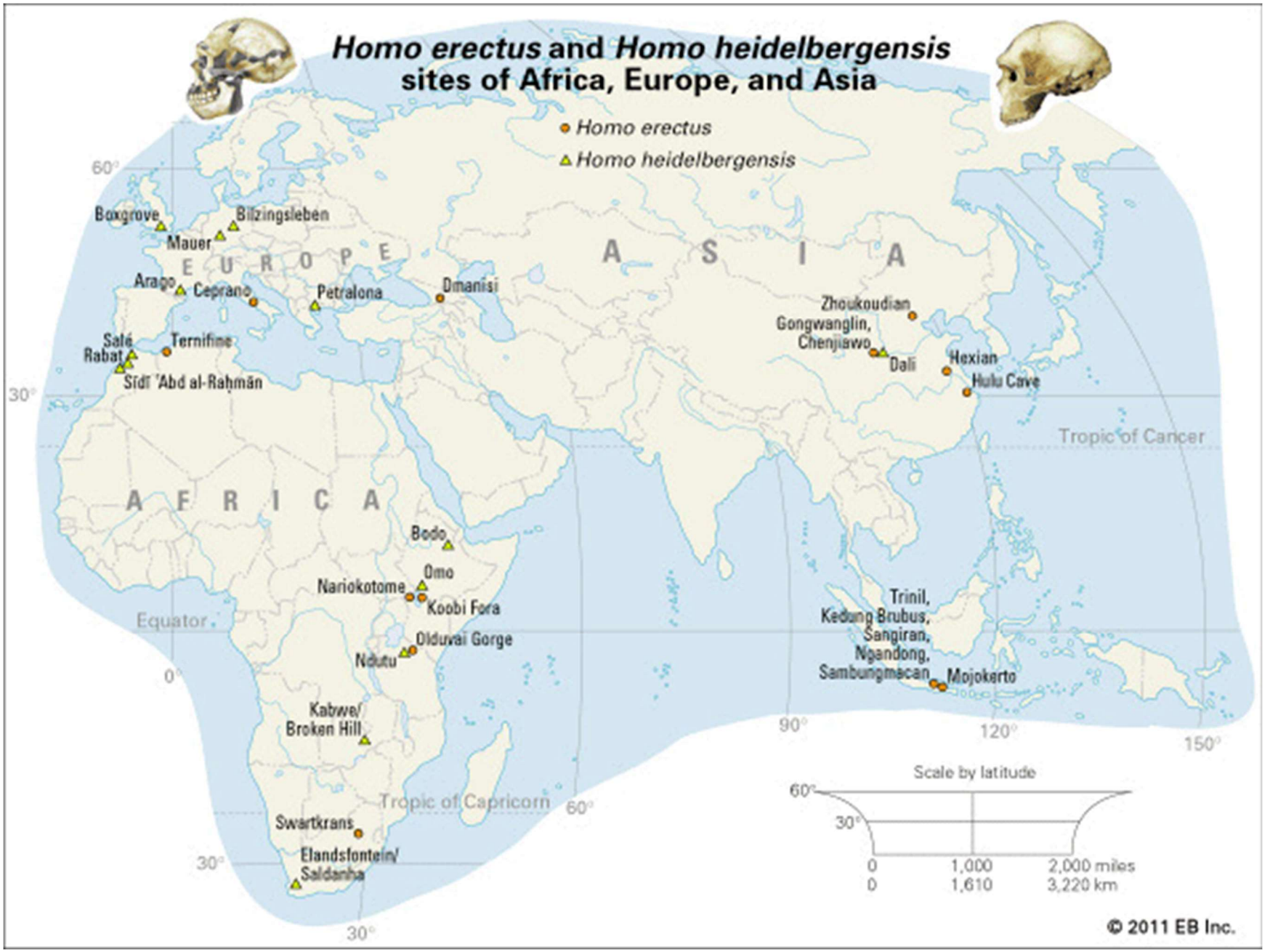
Liujiang 1

Tongtianyan Cave, Guangxi, China

Workers digging fertilizer out of the Tongtianyan Cave in 1958 found the skull, parts of the vertebral column, and pelvis of an ancient human. No artifacts have ever been found in the cave, but the animal fossils represent a Late Pleistocene fauna. Later investigation of the geology established a flowstone chronology that seems to place Liujiang 1 between 153,000 and 68,000 years ago. Anthropologists have often emphasized the similarities in the face and teeth between this skull and later humans from eastern Asia. The individual is hard to accommodate with the idea rooted in mtDNA evidence that modern people of Eurasia came from a small ancestral population within the last 70,000 years.

Original skeletal material curated at the Institute for Vertebrate Paleontology and Paleoanthropology, Beijing, China. Illustration by John Hawks CC-BY 4.0

Indonesia


Homo erectus and Homo heidelbergensis sites of Africa, Europe, and Asia
Homo erectus
Homo heidelbergensis
EUROPE
ASIA
AFRICA
Boxgrove
Bilzingsleben
Mauer
Arago
Ceprano
Petralona
Dmanisi
Salé
Rabat
Ternifine
Sidi 'Abd al-Rahmān
Zhoukoudian
Gongwanglin,
Chenjiawo
Dali
Hexian
Hulu Cave
Bodo
Omo
Nariokotome
Koobi Fora
Olduvai Gorge
Ndutu
Kabwe/
Broken Hill
Swartkrans
Elandsfontein/
Saldanha
Trinil,
Kedung Brubus,
Sangiran,
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Scale by latitude
0 1,000 2,000 miles
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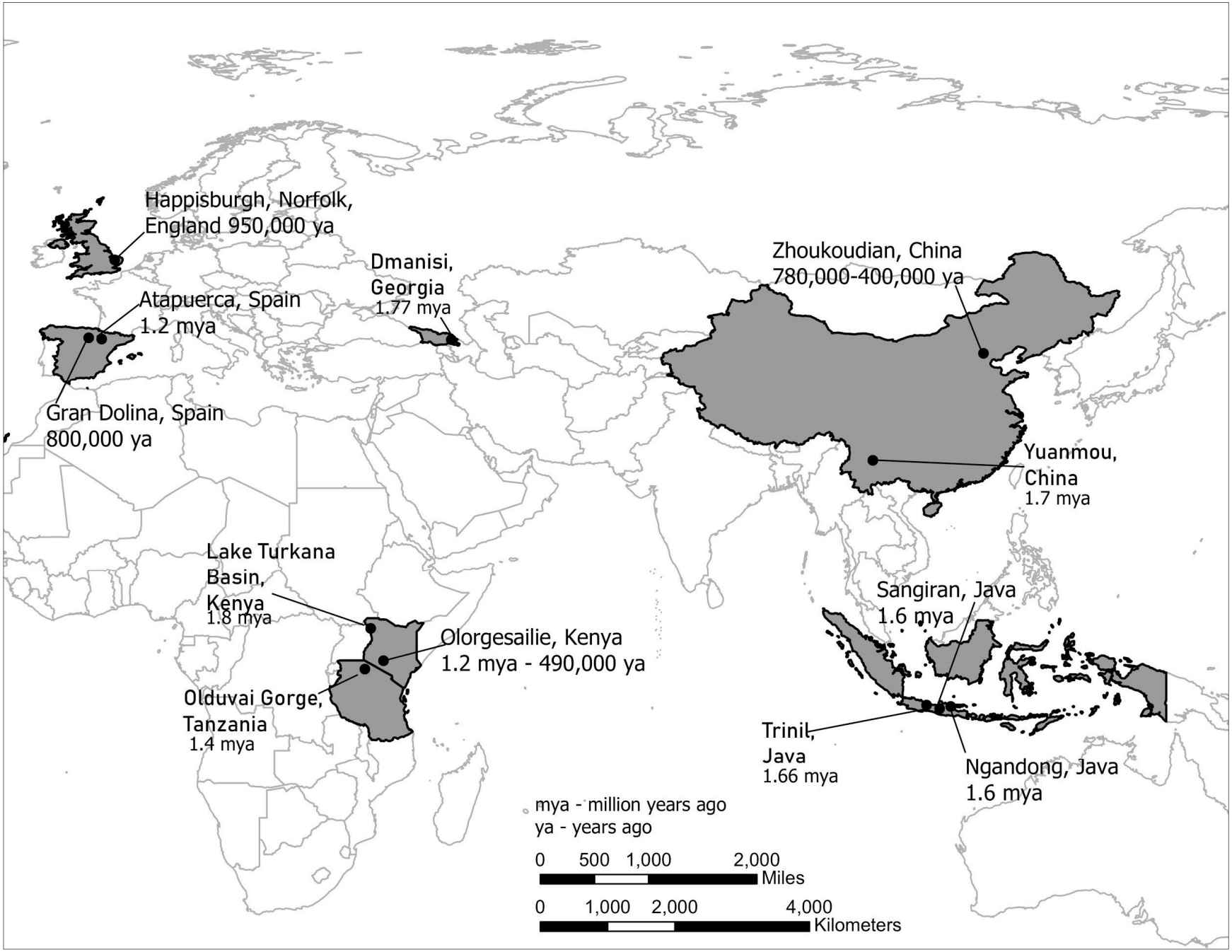
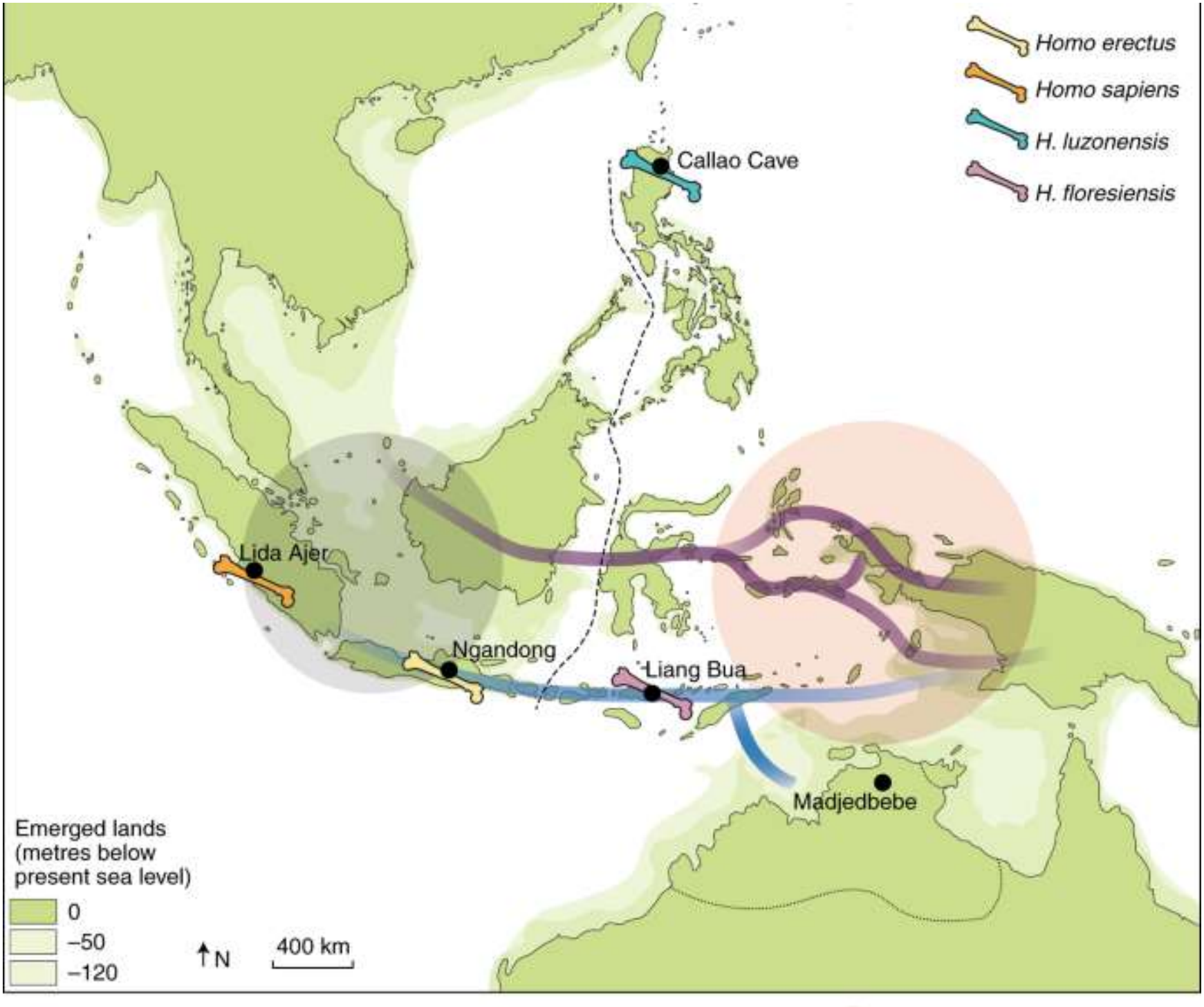

Happisburgh, Norfolk, England 950,000 ya
Atapuerca, Spain 1.2 mya
Gran Dolina, Spain 800,000 ya
Dmanisi, Georgia 1.77 mya
Zhoukoudian, China 780,000-400,000 ya
Yuanmou, China 1.7 mya
Lake Turkana Basin, Kenya 1.8 mya
Olorgesailie, Kenya 1.2 mya - 490,000 ya
Olduvai Gorge, Tanzania 1.4 mya
Sangiran, Java 1.6 mya
Trinil, Java 1.66 mya
Ngandong, Java 1.6 mya
mya - million years ago
ya - years ago
0 500 1,000 2,000 Miles
0 1,000 2,000 4,000 Kilometers


Homo erectus
Homo sapiens
H. luzonensis
H. floresiensis
Callao Cave
Lida Ajer
Ngandong
Liang Bua
Madjedbebe
Emerged lands
(metres below
present sea level)
0
–50
–120
N
400 km
Pama–Nyungan language border
Wallace line modified by Huxley
Northern route
Southern route
Denisovan introgression zone 1
Denisovan introgression zone 2

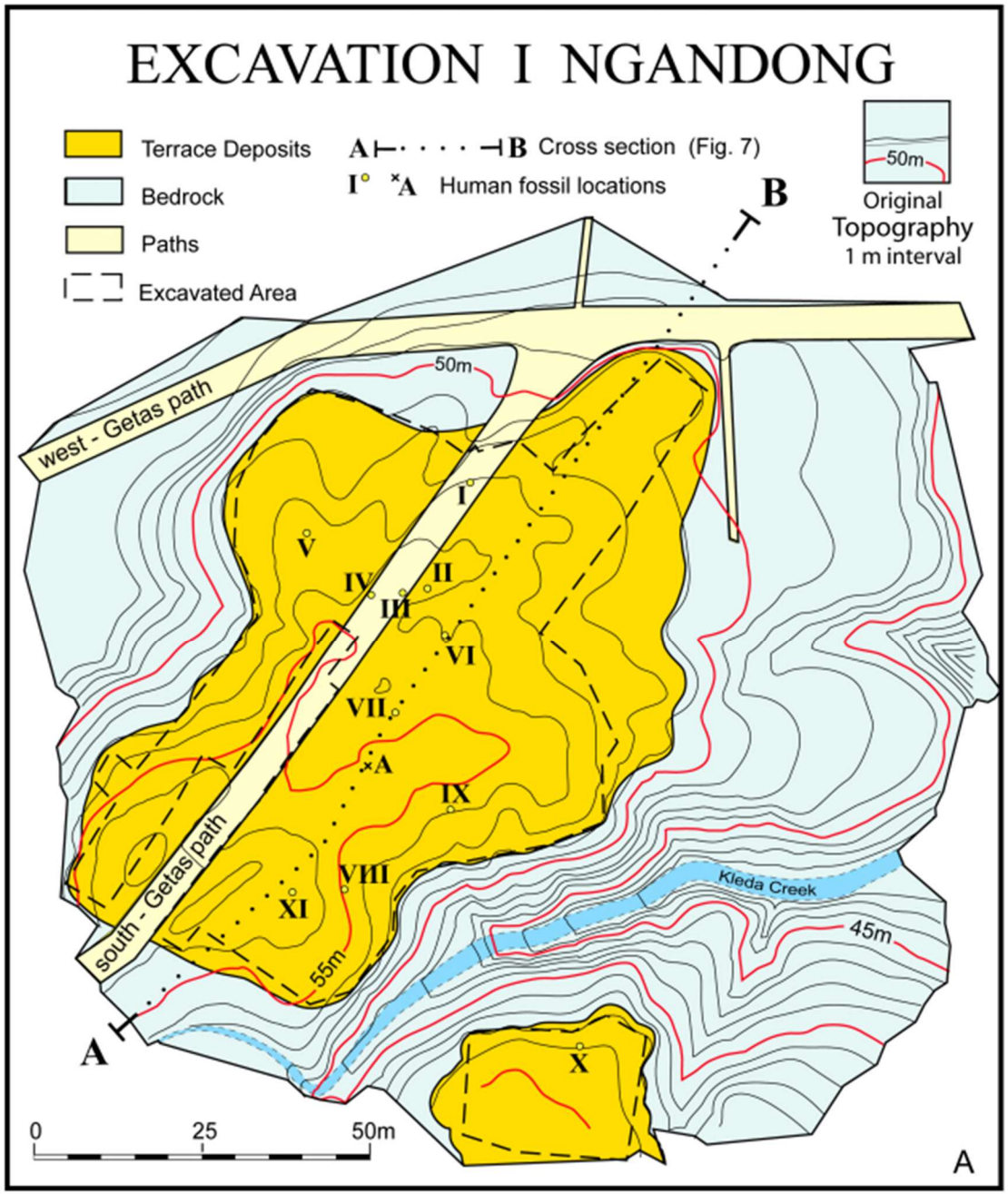


Figure 6A. 1934 Survey Site Map of Excavation I Ngandong (see also 6C, next page) with discovery points of 13 of the 14 Homo erectus *specimens found in 1931–1933 (Tibia B is not shown). We refer to the Terrace Deposits shown on this map as the Ngandong Formation, as explained in Table 3.*

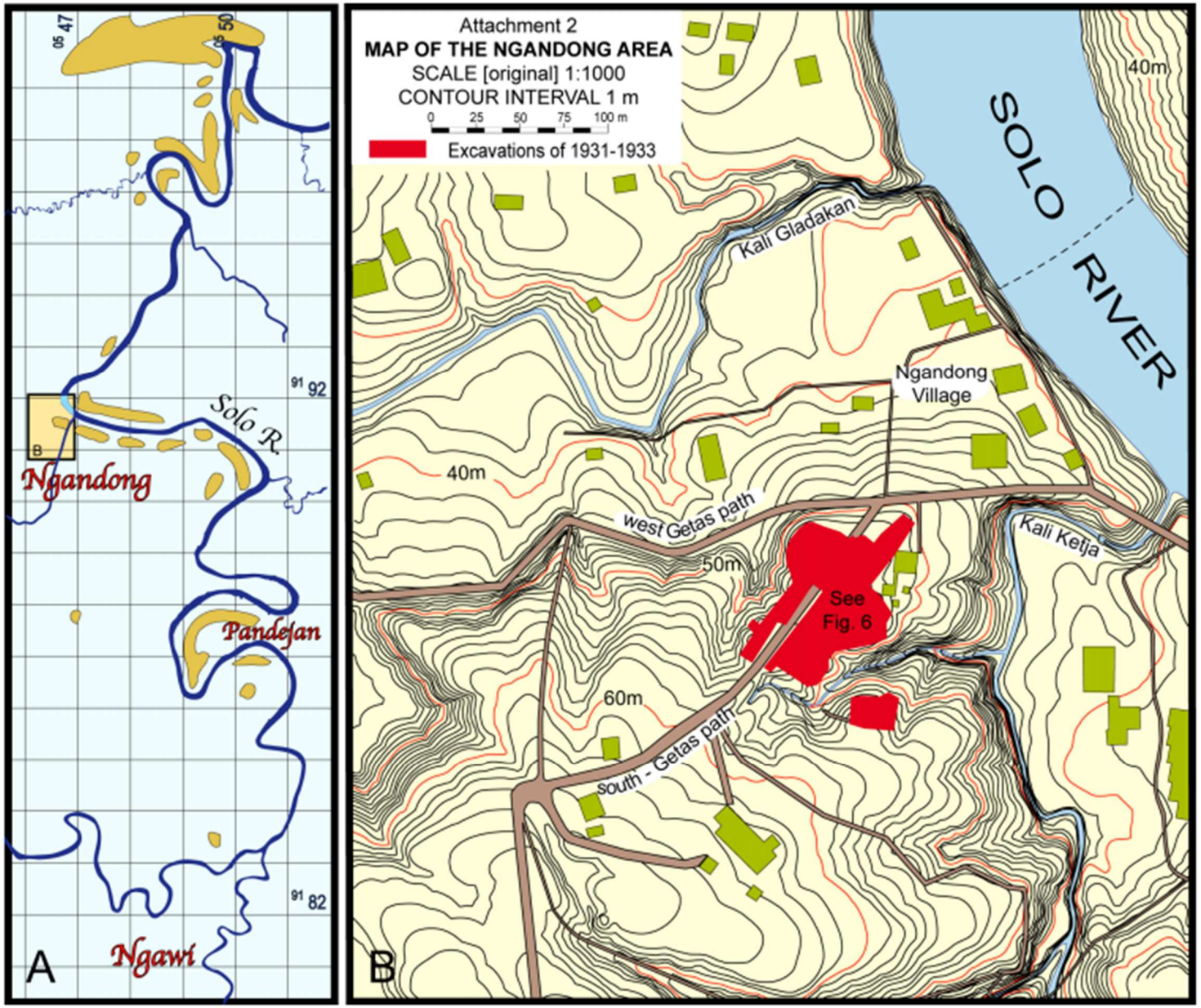
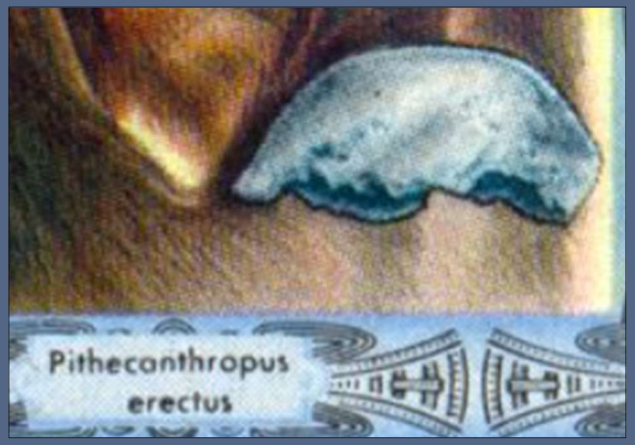


Figure 4. A—Schematic representation of ter Haar's June 1932 mapping of the terrace deposits (gold) in the Solo River Gap (ter Haar 1932; see also, Sidiarto and Morwood 2004; Suminto et al. 2004). B—Survey's 1934 1:1000 topographic map of the Ngandong area (redrafted from an Attachment in ter Haar 1934b; see Research Methods for further explanation; the roads and paths generally are located in the same position today as in the 1930s, but most buildings have been replaced).



Trinil 2

Trinil, Indonesia

In 1891, Eugène Dubois initiated the excavation of fossils from a Pleistocene river terrace near the village of Trinil, Java. The work was directed at the site by two noncommissioned officers of the Dutch Corps of Engineers, Anthonie de Winter and Gerhadus Kriele, and the excavation was carried out by forced laborers. In colonial Java, the Dutch government pressed Javan men who could not pay the heavy tax into involuntary servitude for months each year. These corvée laborers built public works such as roads; colonial administrators also abused their authority by using forced laborers as gardeners and personal servants. Today, scientists think that the Trinil calotte represents an individual that lived sometime between 1.27 million and 900,000 years ago. Dubois named the species *Pithecanthropus erectus* with this fossil as the primary example. Today it is recognized as the holotype of *Homo erectus*.

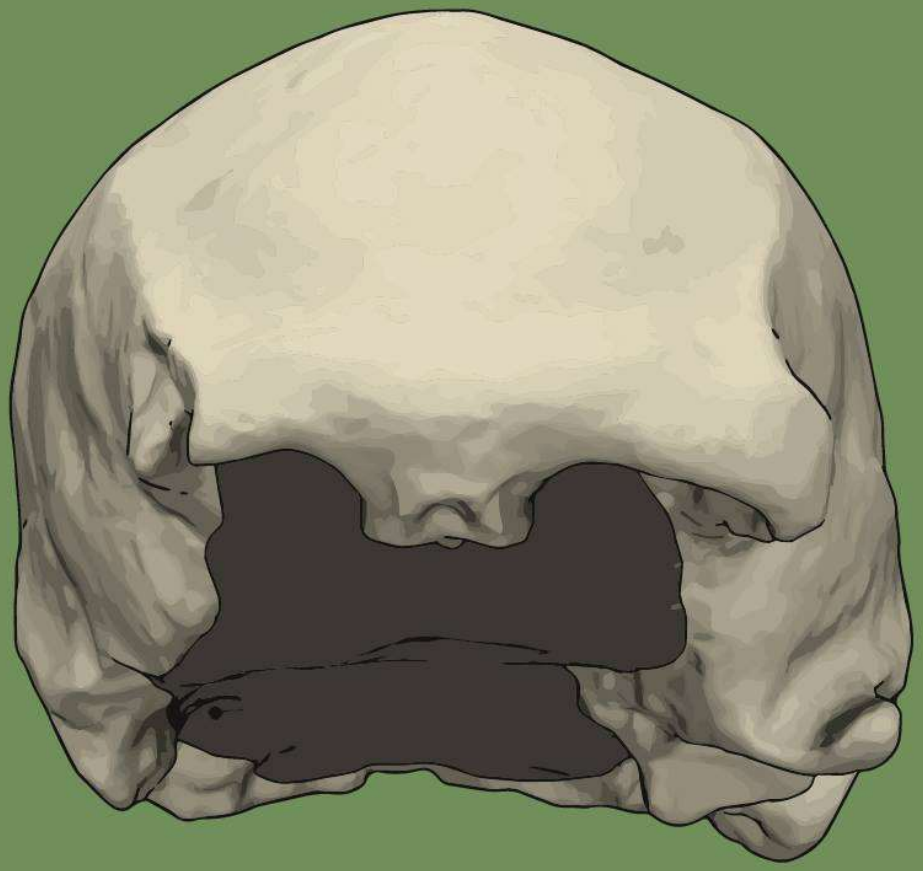
Skeletal material curated at the Naturalis Biodiversity Center, Leiden, Netherlands.

Ngandong 5

Ngandong, Indonesia

This partial skull, also known as "Solo 4", was unearthed at Ngandong by the excavation crew in January 1932. Only later in the laboratory at Bandung was the fossil recognized as a hominin skull fragment, and no record exists to tell us how the discovery happened. This fossil preserves only the top of the skull, in human anatomy known as a "calotte". Its form is very similar to other cranial material from Ngandong, and most scientists consider this to be an adult individual of *Homo erectus*. This individual lived sometime between 136,000 and 104,000 years ago. Franz Weidenreich, who examined the Ngandong fossils just after World War 2, noted that this individual had thinner cranial bone and a less prominent supraorbital torus than most of the other Ngandong individuals. He inferred from the relatively open sutures that this individual had likely not reached adulthood.

Skeletal material curated at the Gadjah Mada University, Yogyakarta, Indonesia.



Ngandong 6

Ngandong, Indonesia

This partial skull, also known as "Solo 5", was uncovered in March, 1932, during excavations of the Solo River terrace by workers of the Geological Survey of the Netherlands. The supervisor on site, Panudju, recognized this hominin skull as it came to light, enabling the survey geologist W. F. F. Oppenoorth to photograph it. This is one of the few Ngandong hominin fossils with in situ documentation. It is also the largest of the Ngandong cranial remains. Most scientists regard these fossil remains as the latest known representatives of *Homo erectus*. This individual lived sometime between 136,000 and 104,000 years ago. An unusual aspect of the Ngandong fossil deposit is the unusual concentration of hominin partial skulls, without teeth, jaws, or other bones. This does not match the other animal remains from the fossil bed, suggesting some kind of differential burial process for these ancient individuals.

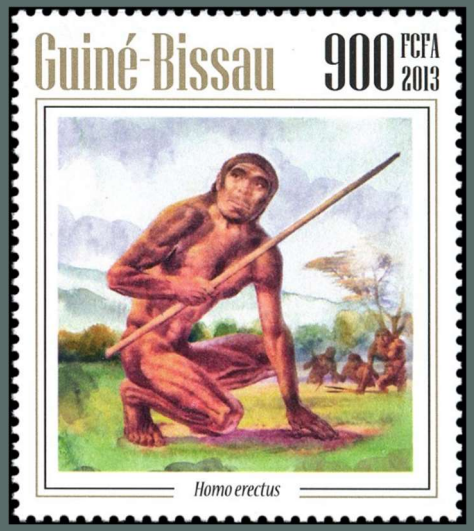
Skeletal material curated at the Gadjah Mada University, Yogyakarta, Indonesia.

Ngandong 10

Ngandong, Indonesia

This partial skull, also known as "Solo 9", was uncovered in September, 1933, during excavations of the Solo River terrace by workers of the Geological Survey of the Netherlands. The work was supervised at a distance by Carel ter Haar and Ralph von Koenigswald, and at the site by Panudju. Von Koenigswald took efforts to conceal the original Ngandong fossil material during the invasion by the Japanese in 1941. But Ngandong 10 fell into the hands of the occupation army, who—according to the late Teuku Jacob—removed the skull to Japan "as a birthday present for the Japanese emperor". Recent geological work suggests that the Ngandong fossils represent individuals that lived sometime between 136,000 and 104,000 years ago. The form of these fossils is similar in many ways to *Homo erectus* skulls from Sangiran, going back as much as 1.5 million years ago. Yet the larger cranial size and Late Pleistocene age of the Ngandong hominins makes it seem possible that they belonged to a Denisovan-like population known from DNA evidence to have intermixed with the ancestors of today's populations.

Original skeletal material curated at Gadjah Mada University, Yogyakarta, Indonesia.



Ngandong Tibia B

Ngandong, Indonesia

This nearly complete tibia, sometimes labeled as "Ngandong 14", was uncovered in January, 1933, during excavations of the Solo River terrace by workers of the Geological Survey of the Netherlands. The site foreman did not recognize this as a hominin fossil and its exact location in the site was not recorded. The hominin fossils from Ngandong represent individuals who lived sometime between 136,000 and 104,000 years ago. Most scientists attribute them to *Homo erectus*, although the time and place may suggest that they belonged to a population aligned with the Denisova 3 genome. This individual was adult at the time of death, with an estimated stature of 158 cm (5 feet 2 inches) and mass around 50 kg (110 lb).

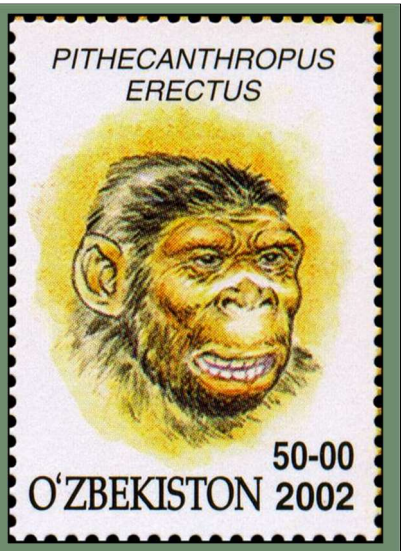
Skeletal material curated at the Gadjah Mada University, Yogyakarta, Indonesia.

Sangiran 1b

Sangiran, Indonesia

In 1937, F. M. See purchased a collection of fossils in Solo for his friend Ralph von Koenigswald, who recognized this right half of a hominin mandible. Von Koenigswald was able to trace the fossil to the area at Sangiran where it was found. The best evidence today suggests that this individual lived sometime between 1.27 million and 900,000 years ago. Von Koenigswald and Franz Weidenreich worked together to compare the Sangiran and other Javan material known at the time to the Zhoukoudian fossils from northern China. Their studies laid the groundwork for recognizing that these hominins shared a common morphological pattern, which today scientists recognize as *Homo erectus*.

Original skeletal material curated at the Seckenberg Research Institute and Natural History Museum, Frankfurt, Germany. Illustration by John Hawks CC-BY 4.0

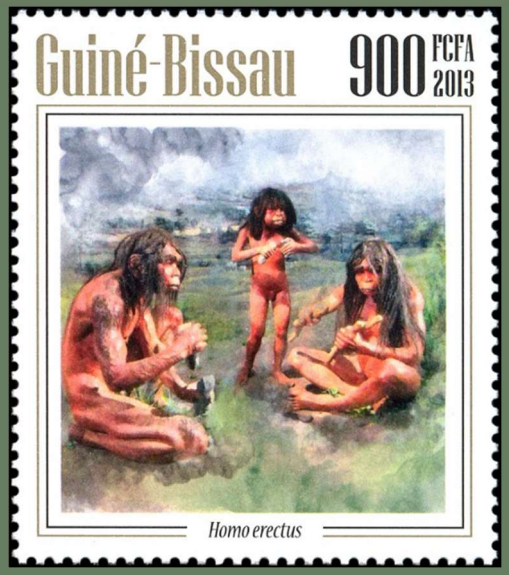


Sangiran 2

Sangiran Dome, Indonesia

Ralph von Koenigswald discovered this partial skull in 1937. Scientists today attribute the fossil to *Homo erectus*. This individual was an adult at the time of death, and lived sometime between 1.3 million and 900,000 years ago. Susan Antón noted areas of pathological bone growth on the endocranial surface of the frontal bone, a condition known as endocranial hyperostosis. This is a relatively common condition in postmenopausal women today but is rare in men. This form of hyperostosis does not result in clinical symptoms unless the bone growth becomes extreme. Its causes are not known; researchers have speculated that the bone growth might be prompted by hormonal changes or calcium loss in other parts of the skeleton. Sangiran 2 is the earliest known hominin fossil to exhibit this pathology.

Original skeletal material curated at the Seckenberg Research Institute and Natural History Museum, Frankfurt, Germany. Illustration by John Hawks CC-BY 4.0



Sangiran 13a

Sangiran, Indonesia

A farmer near the village of Tanjung found this cranial fragment in 1964. The geological age of the fossil is sometime between 900,000 and 780,000 years old. The fossil represents the posterior half of the left parietal bone and the left half of the occipital squama. Like other *Homo erectus* skulls from Sangiran, this one has thick cranial bone (around 10 mm thick in the center of the parietal bone) and a projecting nuchal torus. The attachment of the *temporalis* muscle extends to the lambdoidal suture and makes a thickened angular torus. This and other fossils from the later part of the Sangiran sequence coexisted with a less insular fauna, characteristic of greater interchange from mainland Asia.

Skeletal material curated at the Geological Research and Development Centre, Bandung, Indonesia.

Sangiran 17

Sangiran, Indonesia

The Sangiran Dome is a geological feature near Surakarta, Java, that has uplifted Pleistocene sediments and exposed them to erosion. In 1969, Towikromo was plowing his land and unearthed this fossil skull, the most complete known of *Homo erectus* from Sangiran. This individual lived sometime between 790,000 and 900,000 years ago. The size and thickness of the zygomatic bones, and the development of cranial features like the temporal lines and angular torus all suggest that the jaw muscles were capable of generating very high bite force. Yet the teeth of this skull and contemporaries from Sangiran are within the range of recent people in size. We have much to learn about the diet and adaptations of this *H. erectus* population.

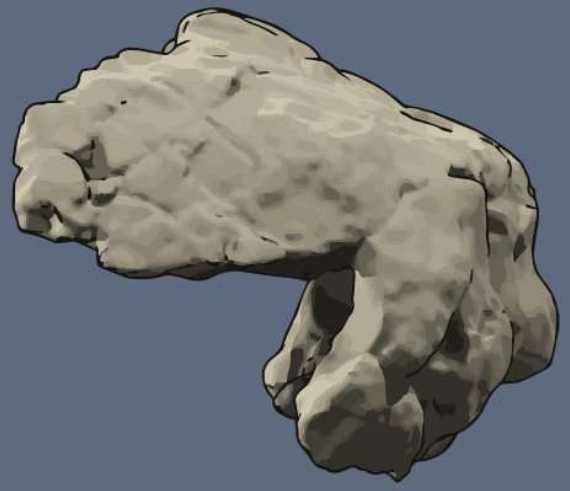
Skeletal material curated at the Geological Research and Development Centre, Bandung, Indonesia.

Sangiran 31

Sangiran, Indonesia

S. Sartono and Tony Djubiantono identified this partial skull in 1979. Its exact burial context in the Sangiran area is not known. Sartono assigned it to the earlier part of the Sangiran geological sequence, and today scientists think this fossil represents an individual that lived between around 1.27 million and 900,000 years ago. The fossil represents the parts of the parietal bones and occipital bone, which are exceptionally thick, with an average thickness of 12 mm. The occipital bone is marked by a thick and projecting nuchal torus, the largest known for any fossil hominin. Other Early Pleistocene fossils attributed to *Homo erectus* from Sangiran follow a similar pattern of thickness and robustness, but Sangiran 31 is at the extreme end of the variation in this sample.

Skeletal material curated at the Geological Research and Development Centre, Bandung, Indonesia.

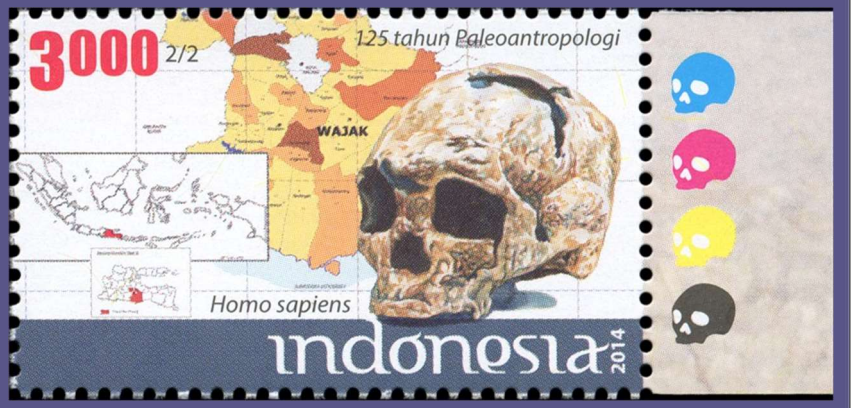


Mojokerto calvaria

Perning, Indonesia

Andoyo, a field geologist for the Geological Survey of the Netherlands Indies, found this portion of a child's skull in 1936. Ralph von Koenigswald identified the skull as hominin and named it, *Homo modjokertensis*. The exact discovery location was lost, resulting in some confusion about the geological age of the skull. Today scientists accept that this is one of the oldest skulls of *Homo erectus* known from Java, possibly as old as 1.5 million years. The individual was less than 4 years of age at the time of death. This young child has become an important part of paleoanthropologists' understanding of brain size development in *Homo erectus*. With an endocranial volume between 620 and 640 ml, the child had probably attained around 70% of the brain size that it would have reached as an adult.

Skeletal material curated at the Gadjah Mada University, Yogyakarta, Indonesia.

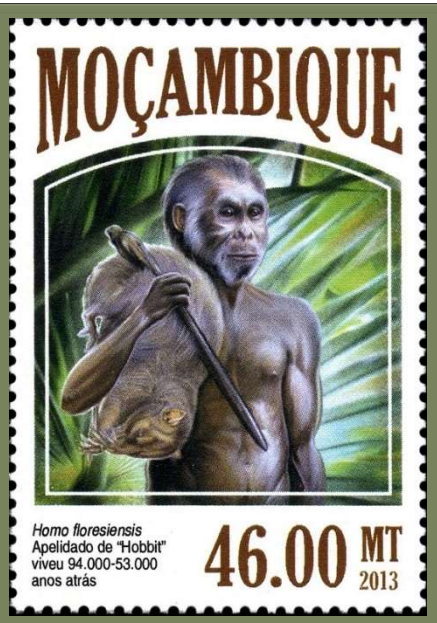


Wadjak 1

Wajak, Indonesia

B.D. von Rietschoten found a human skull while developing a limestone quarry near the village of Wajak in 1888. The next year, the skull was transferred to Eugène Dubois, who reconstructed it and examined the site. Dubois excavated additional material including fragments of two more individuals. Thesite was considered lost to quarrying until Fachroel Aziz and John de Vos relocated it in 1985. The geological age of the Wadjak fossils is unclear. A radiocarbon assessment placed them in the Holocene, while uranium-series analysis of one of the hominin teeth suggests it was at least 38,000 years old. Anthropologists have often interpreted the robust form of this skull as possibly reflecting shared ancestry with the populations of Australia and New Guinea. Today the place of this individual in the evolutionary history of the region remains unclear.

Skeletal material curated at the Naturalis Biodiversity Center, Leiden, Netherlands.



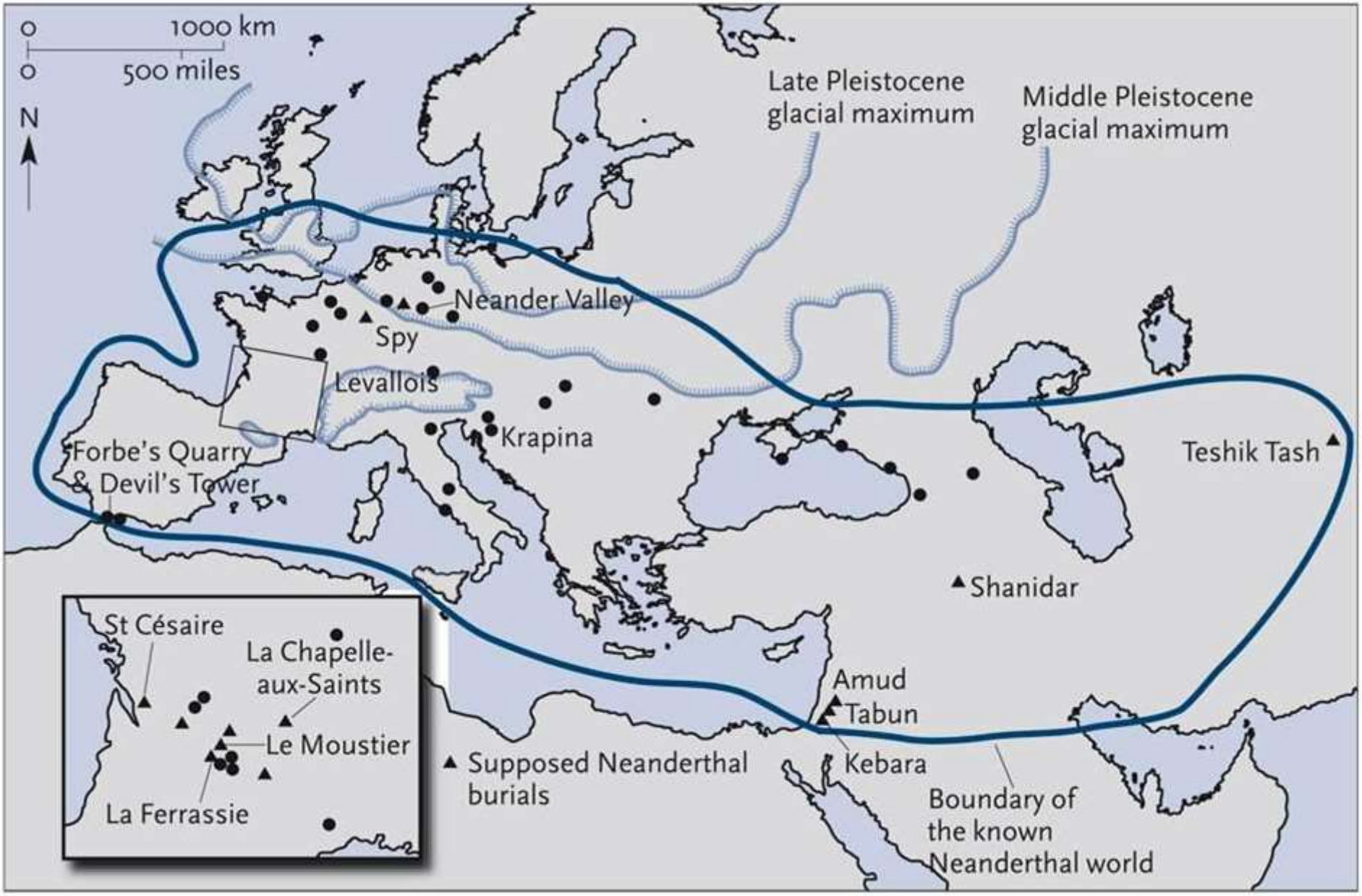
LB1

Liang Bua, Indonesia

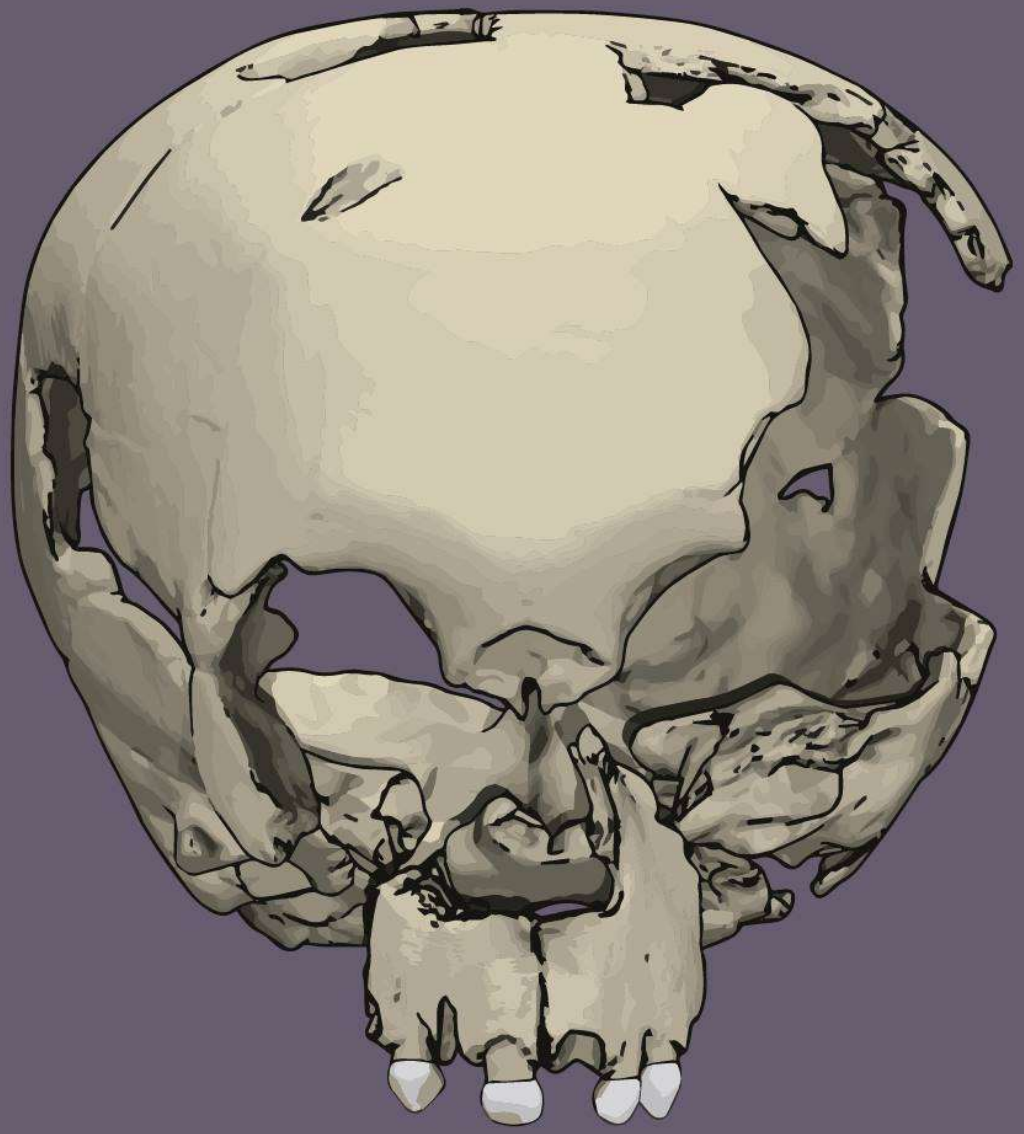
Wahyu Saptomo was supervising excavation of sector VII of Liang Bua when the LB1 skull first came to light in 2003. Substantial portions of the skeleton were later recovered, including most of both legs and feet, hip bones, and parts of both arms. This individual lived sometime between 100,000 and 60,000 years ago. The brain of this adult was approximately 420 ml, with an estimated stature between 100 and 120 cm (3 feet 4 inches to 4 feet). The skeleton is the holotype of the species, *Homo floresiensis*. The relationships of this hominin to today's people and extinct species of human relatives are not clear.

Skeletal material curated at the Indonesian National Centre for Archaeology (ARKENAS), Jakarta, Indonesia.

Europe


0 1000 km
0 500 miles
N
Late Pleistocene glacial maximum
Middle Pleistocene glacial maximum
Neander Valley
Spy
Levallois
Krapina
Forbe's Quarry & Devil's Tower
Teshik Tash
Shanidar
Amud
Tabun
Kebara
Supposed Neanderthal burials
Boundary of the known Neanderthal world
St Césaire
La Chapelle-aux-Saints
Le Moustier
La Ferrassie

1829



Engis 2

Schmerling Caves, Belgium

Philippe-Charles Schmerling explored a complex of caves near the Meuse River in 1829, excavating sediments from the lower cave. A child's fragmentary skull and additional remains came from this early excavation. A hundred years later, Charles Fraipont revisited the remains and recognized the child as a Neandertal. It thus was the first Neandertal ever found by archaeologists, although the population was not recognized until 1856. The child died at approximately age 3. Its dental enamel shows evidence of rapid growth compared to most children today. The geological age of the remains is uncertain because Schmerling's excavation did not preserve the context of the skeleton.

1848

Gibraltar 1

Forbes' Quarry, Gibraltar

"Falconer brought me the wonderful Gibraltar skull", Charles Darwin wrote in an 1864 letter. It is the only fossil from any population of extinct human ancestors that Darwin himself touched. It is not known who discovered the skull, which was unearthed during quarry work on the North Front of the Rock in 1848. The historian Alex Menez has done much to shed light on the early history of the discovery after Lt. Edmund Flint presented it to the Gibraltar Scientific Society. Recent DNA analysis shows that this female individual had greater genetic similarity to other Neandertals from Belgium, Germany, and Russia before 70,000 years ago than to the El Sidrón Neandertals from 49,000 years ago. The pattern suggests a dynamic history for the Neandertals from furthest western Europe.

Skeletal material curated at the Natural History Museum, London, United Kingdom.

1856

Neandertal 1

Feldhofer Cave, Germany

Workmen clearing the Feldhofer Cave in 1856 as they quarried limestone uncovered a partial skeleton. Johann Fuhlrott recognized the bones as human and brought them to the attention of Hermann Schaafhausen. They recognized the skeleton as a representative of a past population, which came to have the name of the valley, "Neandertal". The skeleton's size and form suggest it belonged to a male adult individual. The left ulna suffered an injury during early life, leaving him unable to extend his elbow normally. The left ulna and humerus are both smaller from disuse. Here, the left ulna is shown in the two center views, from the front and medial side. The right ulna was broken after death, here shown with the right radius. The Neandertal 1 individual lived around 40,000 years ago.

Original skeletal material curated at the Neandertal Museum, Mettmann, Germany.

1886

Spy 1

Spy, Belgium

Marcel de Puydt and Max Lohest carried out excavations in the Grotte de Spy, discovering the remains of Neandertals in 1886. Recent radiocarbon sampling of the bones shows that this individual lived sometime between 45,000 and 40,000 years ago. The Spy discovery was the first time that Neandertal skeletal remains were excavated by workers who recorded their stratigraphic context and kept associated artifacts and animal bones. Examination of the remains by Yolanda Fernández-Jalvo and Peter Andrews suggests that several of the broken places along the top and side of this skull are perimortem fractures. They propose that this individual may have been killed by one or more assailants in an act of interpersonal violence.

Original skeletal material curated at the Royal Belgian Institute of Natural Sciences.

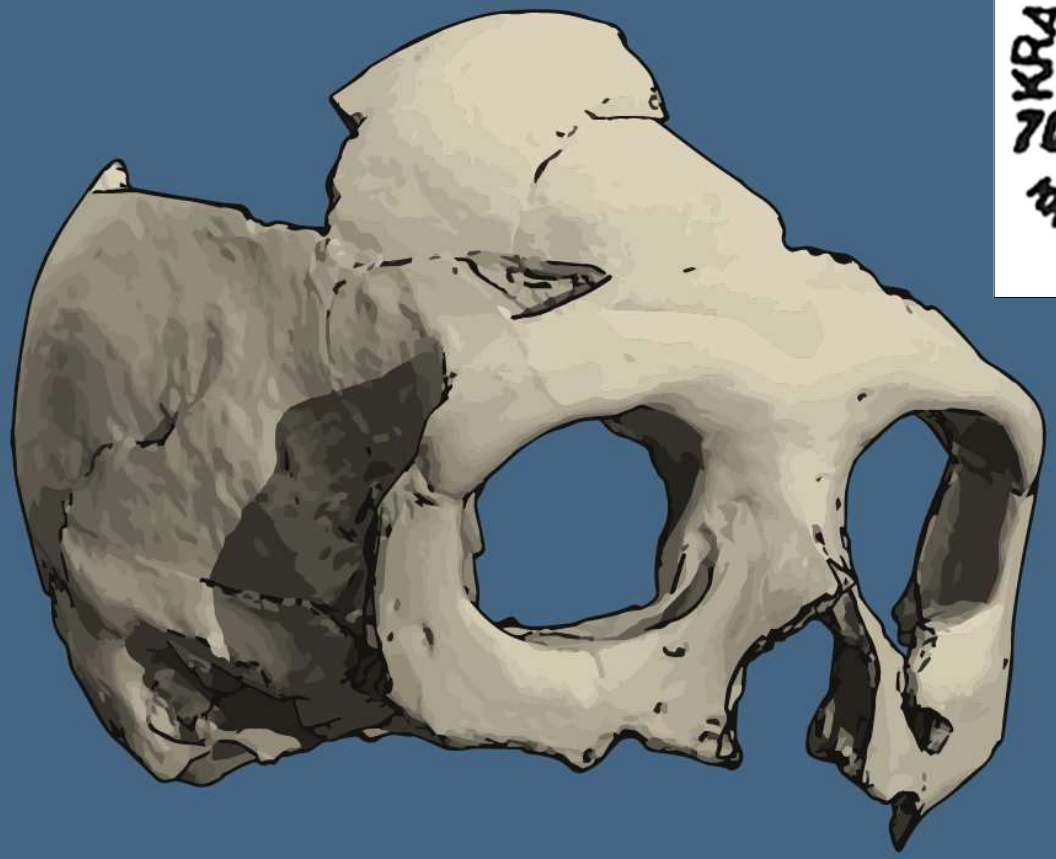
1886

Spy 8

Spy, Belgium

Marcel de Puydt and Max Lohest carried out excavations in the Grotte de Spy, discovering the remains of Neandertals in 1886. These remains are now thought to date to around 40,000 years ago, based on radiocarbon sampling. The Spy 8 femur has the same morphology noted for other Neandertal remains, with a curving shaft, thick cortical bone, and very large joint surfaces on the proximal and distal ends. This individual would have been approximately 82 kg (180 lb) in mass and 161 cm (5 ft 3 in) in height. The bones of at least two adults were confused at or after the discovery, but most specialists today think that the Spy 8 femur belonged to the same individual as the Spy II cranium, a young male adult individual.

Original skeletal material curated at the Royal Belgian Institute of Natural Sciences.



Krapina 3

1899

Krapina, Croatia

Dragutin Gorjanović-Kramberger led the excavation of the rock shelter outside Krapina, Croatia, from 1899 to 1905. He uncovered 874 hominin skeletal fossils, which represent more than 30 and possibly as many as 80 individuals. The most iconic cranial fossil from the site is Cranium C, which represents a female adult Neandertal individual who lived approximately 120,000 years ago. The frontal bone of this individual was incised with a series of 35 parallel cutmarks sometime after her death. These marks do not match the pattern left by removal of the scalp. Other Krapina skeletal remains have abundant cutmarks that correponsd to muscle or tendon removal, but the marks on Krapina 3 do not appear to have this purpose. They may have held some meaning for the individual who made them.

Original skeletal material curated at the Croatian Natural History Museum, Zagreb.

Krapina 4

Krapina, Croatia

Dragutin Gorjanović-Kramberger led the excavation of the rock shelter outside Krapina, Croatia, from 1899 to 1905. This partial calvaria includes portions of the frontal and left parietal bone. The fragmentation of this skull is typical of the Krapina Neandertal fossils, which include the remains of at least 30, and possibly as many as 80 individuals. It is not possible today to determine which of the other dental and postcranial remains may belong to this individual. The left side of the frontal bone bears a very large indentation, around 15 mm in diameter and 2 mm deep, which likely resulted from blunt force trauma. The bone surface shows evidence of incomplete healing, and the adjacent area of the bone shows signs consistent with soft tissue infection after the injury. Fracture lines are visible on the internal cranial surface. It is possible that the injury and infection contributed to the death of this individual.

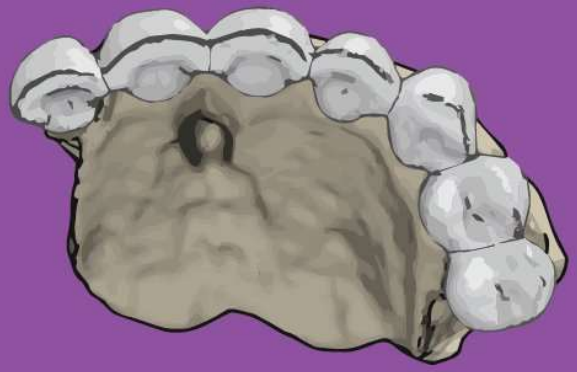
Original skeletal material curated at the Croatian Natural History Museum, Zagreb.

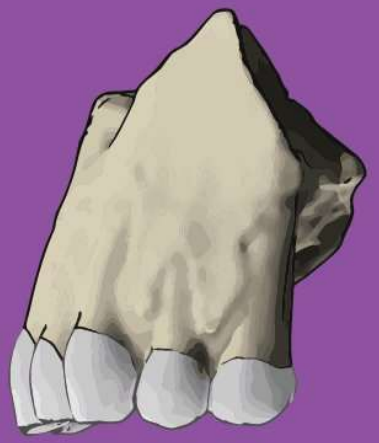
1899

Krapina 49

Krapina, Croatia

Dragutin Gorjanović-Kramberger led the excavation of the rock shelter outside Krapina, Croatia, from 1899 to 1905. The individual represented by this maxilla was one of more than thirty, and possibly as many as eighty Neandertals from the site. These Neandertals lived around 120,000 years ago. This maxilla belonged to an adolescent of around 15 or 16 years of age. The incisors have curved crowns that are defined by ridges on the mesial and distal edges of the crown. Dental specialists refer to this form as "shovel-shaped incisors", and they suggest that this form provides increased strength and resistance to wear on the incisive edge. Older Neandertal individuals have extensive wear on their front teeth, and in some individuals the plane of wear is beveled outward, suggesting that these individuals may have been pulling animal hides or plant fibers across them. The curved form of the shovel-shaping in these Neandertals is different from that found in some other populations where the incisors are straighter and the marginal ridges more distinct.





Original skeletal material curated at the Croatian Natural History Museum, Zagreb.

1899

Krapina 57

Krapina, Croatia

Dragutin Gorjanović-Kramberger led the excavation of the rock shelter outside Krapina, Croatia, from 1899 to 1905. He uncovered 874 hominin skeletal fossils, which represent more than 30 and possibly as many as 80 individuals. The individuals from Krapina were Neandertals that lived approximately 120,000 years ago, during the last interglacial period. The Krapina 57 mandible is the fossil known for much of its history as Mandible G. This individual was an adult at the time of death, with the right third molar showing some wear. In a systematic study of the Krapina dental remains in 1979, Milford Wolpoff concluded that the wear on third molars across this sample may indicate a somewhat earlier time of eruption than in most present-day human populations, but still within the range of variation.

Original skeletal material curated at the Croatian Natural History Museum, Zagreb.

1899

Krapina 58

Krapina, Croatia

Dragutin Gorjanović-Kramberger led the excavation of the rock shelter outside Krapina, Croatia, from 1899 to 1905. He uncovered 874 hominin skeletal fossils, which represent more than 30 and possibly as many as 80 individuals. The individuals from Krapina were Neandertals that lived approximately 120,000 years ago, during the last interglacial period. The individual represented by the Krapina 58 mandible was an adult probably between 20 and 30 years of age at the time of death. This mandible is one of four at the site that have the third premolar in a rotated position, curiously all four on the left side. Other Neandertal sites do not have a high incidence of premolar rotation compared to recent people, suggesting that it may reflect the genetics of the local population of the Krapina Neandertals.

Original skeletal material curated at the Croatian Natural History Museum, Zagreb.

1908

La Chapelle-aux-Saints 1

La Chapelle-aux-Saints, France

One of the best-known Neandertals, the skeletal remains of this individual were unearthed in 1908 by three brothers: Paul, Jean, and Amédée Bouyssonie. The "old man" lived with tooth loss and profound osteoarthritis for some time before his death, both of which affected the shape of his jaw. He lived sometime between 44,000 and 60,000 years ago. New research at the site in 2011 and 2012 resulted in the discovery of seven new fragments of this skeleton and shed additional light on the burial of the remains.

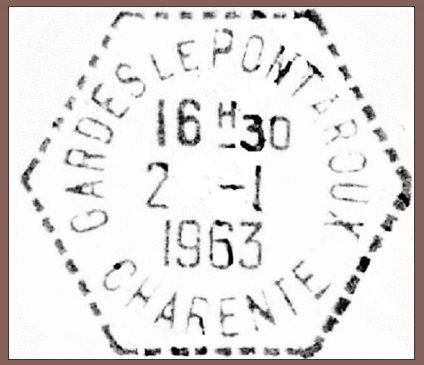
Skeletal material curated at the Musée de l'Homme, Paris, France. Illustration by John Hawks CC-BY 4.0

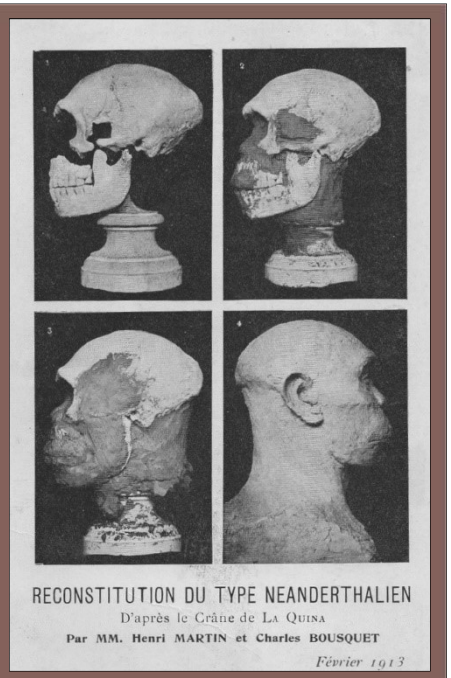
1910

SJMJ2463 and SJMJ2464

La Cotte de St. Brelade, Jersey, United Kingdom

Members of the Société Jersiaise excavated within the sediments underlying the natural arch at La Cotte de St. Brelade in 1910 and 1911, finding the teeth of at least two Neandertal individuals. These two teeth are the lower left canine and third premolar of a Neandertal individual who probably lived sometime between 50,000 and 40,000 years ago. Recent analysis of the La Cotte teeth by Tim Compton and coworkers finds that the Neandertal traits within this sample are mixed with some traits more often found in modern people. The morphology may provide a hint about the population interactions of the last Neandertals in this part of Europe.



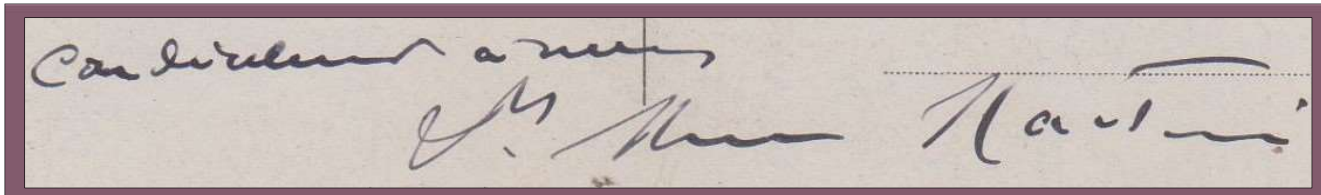

RECONSTITUTION DU TYPE NEANDERTHALIEN
D'après le Crâne de La Quina
Par MM. Henri MARTIN et Charles BOUSQUET
Février 1913

La Quina 5

La Quina, France

The La Quina site lies at the foot of a limestone cliff near the bank of the Voultron River in Charentes, France. The extent of archaeological materials stretches for 500 meters along the cliff base. Léon Henri-Martin carried out excavations from 1905 until near his death in 1936. The most important hominin fossil discovery at the site was in 1911. Excavating together with Henri Marot, Henri-Martin uncovered first the humerus, then the skull of a Neandertal partial skeleton. The length of the humerus allows an estimation of the stature of this individual at around 156 cm (5 feet 1 inch). Most researchers have assessed the remains as those of an adult female individual. She lived sometime between 65,000 and 50,000 years ago.

Skeletal material curated at the Musée de l'Homme, Paris, France. Illustration by John Hawks CC-BY 4.0



STATION PRÉHISTORIQUE
de la QUINA

LABORATOIRE DU PEYRAT
PAR VILLEBOIS LAVALETTE
(CHARENTE)

1915

La Quina 18

La Quina, France

The La Quina site lies at the foot of a limestone cliff near the bank of the Voultron River in Charentes, France. The extent of archaeological materials stretches for 500 meters along the cliff base. Léon Henri-Martin carried out excavations from 1905 until near his death in 1936. In 1915, he discovered this skull of a Neandertal child. The child lived sometime between 65,000 and 50,000 years ago. With first permanent incisors just erupting, it was around 6 years old at the time of death. Charles Peabody of Harvard University visited the excavation at La Quina in 1912, where he was impressed with the collegiality of Henri-Martin. He wrote: "any responsible institution with a dignified place of exhibition and competent curatorship seems fairly able to procure a series of La Quina specimens. What the Doctor will not do is to sell."

Skeletal material curated at the Musée de l'Homme, Paris, France. Illustration by John Hawks CC-BY 4.0

F.C.Howell
Department of Anthropology
University of Chicago
Chicago 37, Illinois, USA

AIR LETTER
AÉROGRAMME

VIA AIR MAIL
PAR AVION

Dr. Raymond Lantier
Musee des Antiquitees Nationales
Saint-Germain-en-Laye
Seine et Oise
FRANCE

MESSAGE MUST APPEAR ON INNER SIDE ONLY
NO TAPE OR STICKER MAY BE ATTACHED

IF ANYTHING IS ENCLOSED, THIS LETTER
WILL BE SENT BY ORDINARY MAIL

FIRST FOLD

SECOND FOLD

UNIVERSITY OF CHICAGO
Department of Anthropology

May 7, 1956

Dr. Raymond Lantier
Musée des Antiquitées Nationales
Saint-Germain-en-Laye
Seine et Oise
France

Dear Dr. Lantier:

The writer has been interested in the subject of Neandertal man for some time. Although I have been able to examine a number of the Neandertal specimens in Paris and Rome, I have not yet visited your museum and seen the La Quina child found by the late Henri Martin. This summer my wife and I will be in Europe, and in Paris specifically for about a week the end of June and early in July. Would it be possible for me then to visit the Musée des Antiquitées Nationales and study briefly the La Quina child? Also, would you permit me to make some color stereoscopic photographs of the material for an atlas of Neandertal man which I am helping the Wenner-Gren Foundation for Anthropological Research to prepare. I would be most grateful to you for an opportunity TO STUDY THIS MATERIAL AND, IF POSSIBLE TO MAKE A FEW PHOTOGRAPHS as well.

Very sincerely yours,

F. Clark Howell
(Assistant Professor -
Paleo-anthropology)

FCH/gt

1939

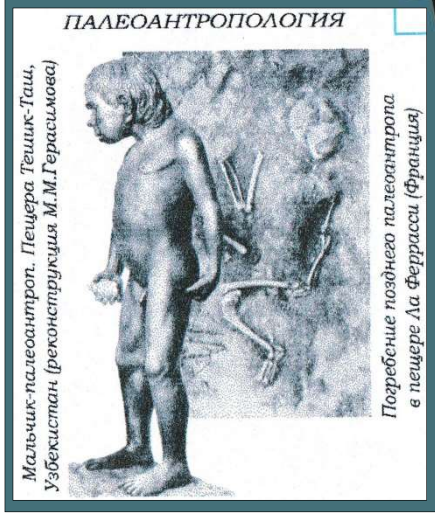
Guattari 1

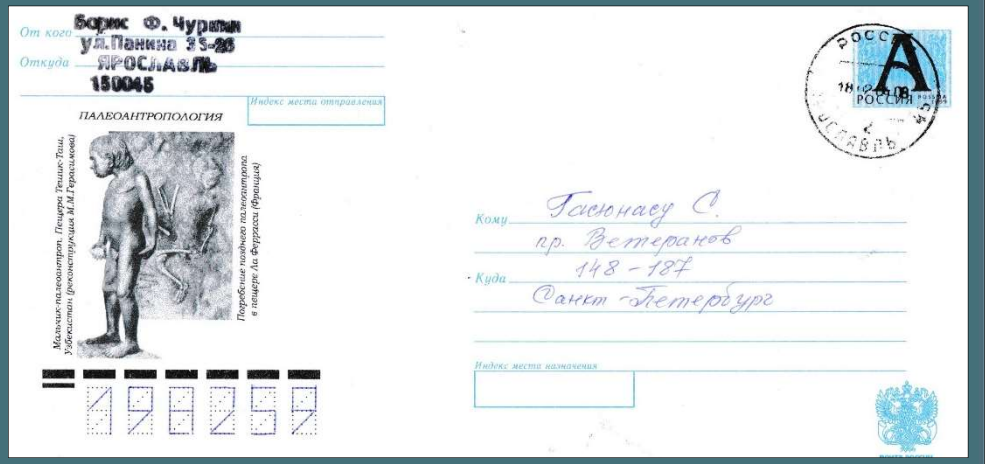
Grotta Guattari, Italy

The natural opening to the Grotta Guattari was covered by a landslide in prehistoric times, and the cave lay undiscovered until workmen in 1939 were quarrying limestone and uncovered a narrow opening. Inside on the cave floor was the skull of a Neandertal individual. Alberto Carlo Blanc was the first to study the situation, arguing that the skull was intentionally placed within a circle of stones, with the bones of other animals left as ritual offerings. During the 1980s, a reassessment of the skull found no evidence of human alterations, concluding that hyenas likely accumulated most of the bone in the cave. The individual represented by the skull was an adult at the time of death, which happened sometime between 56,000 and 50,000 years ago.

Original skeletal material curated at the National Museum of Prehistory and Ethnography "Luigi Pigorini", Rome, Italy.

1938





Teshik-Tash 1

Teshik-Tash Cave, Uzbekistan

Alexey P. Okladnikov led excavations that yielded the remains of a child in 1938. The remains are of unknown date but comparisons of stone artifacts from the site have led archaeologists to guess they are between 110,000 and 60,000 years old. The teeth show the child to have been between 7 and 11 years old at the time of death. Scientists classify this child as a Neandertal, and the recovery of its mitochondrial DNA sequence, similar to other known Neandertal remains, tends to confirm this. Still, its anatomy differs in some ways from Neandertal children found in European sites. This child may represent some degree of mixture between ancient populations.

Skeletal material curated at Moscow State University, Russia. Illustration by John Hawks CC-BY 4.0

1979

Saint-Césaire 1

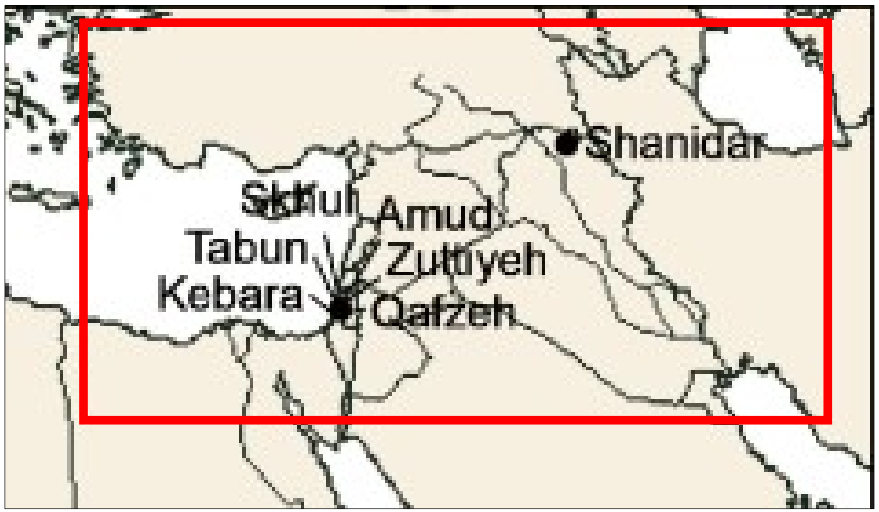
La Roche à Pierrot, France

Archaeological excavation of La Roche à Pierrot under direction of François Lévêque led to the discovery of a partial skeleton in 1979. The features of the cranium and remainder of the skeleton identify this individual as a Neandertal. The individual lived sometime between 42,000 and 40,000 years ago, and the burial was in a layer with artifacts of the Châtelperronian industry. This skeleton is one of the strongest pieces of evidence that later Neandertals made this industry with abundant evidence of personal ornaments and backed blade use. The individual suffered a cranial wound with some evidence of subsequent healing of the bone. The form of this injury led Christoph Zollikofer and coworkers to conclude it had been made by a sharp implement.

Original skeletal material curated at the Université de Bordeaux, Talence, France.

Middle East


Tighenif
Ain Hanech
Rabat
Sale
Thomas-Steinbruch
Sidi Abderrahman
Jebel Irhoud
Shanidar
Skhul
Amud
Tabun
Zuttiyeh
Kebara
Qafzeh
Bahr el Ghazal
Singa
Aramis
Hadar
Bodo
Middle Awash
Konso
Omo
Nariokotome
Koobi Fora
Eliye Springs
Allia Bay
Kanapoi
Tugen Bergland
Ndutu
Laetoli
Olduvai
Eyasi
Malema
Uraha
Kabwe
Makapansgat
Sterkfontein
Kromdraai
Border Cave
Swartkrans
Drimulen
Florisbad
Taung
Saldanha
Langebaan
Klasies River Mouth


Shanidar
Skhul
Amud
Tabun
Zuttiyeh
Kebara
Qafzeh

1925

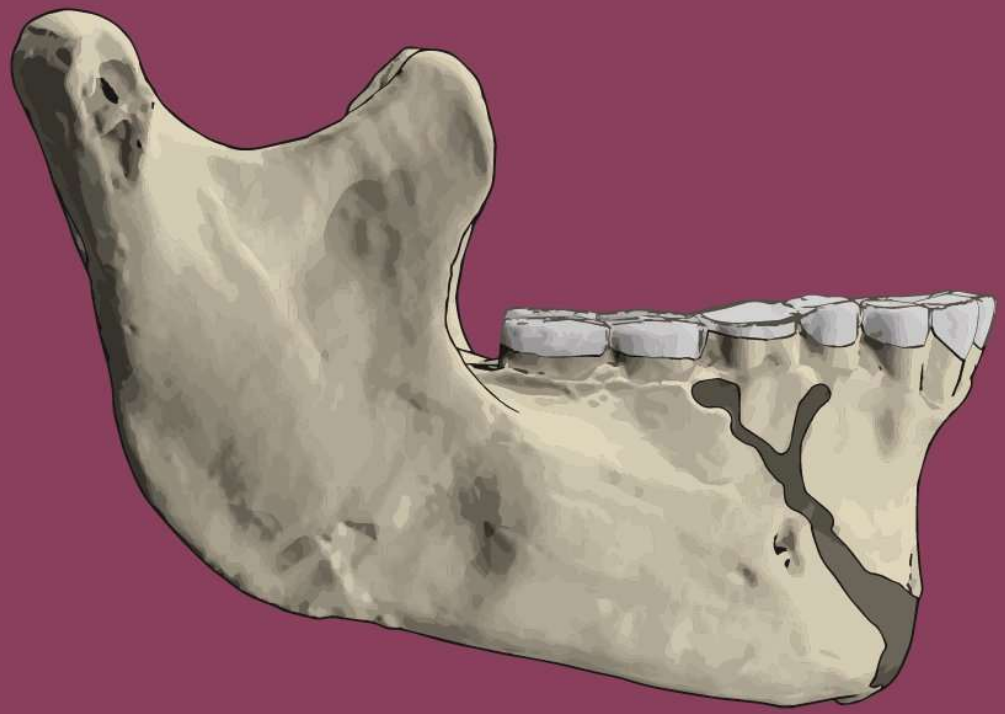
Zuttiyeh skull

Mugharat el Emireh, Israel

Francis Turville-Petre directed excavation at the Mugharat el Emireh, leading to the discovery of this fragmentary skull in 1925. The geological age of the fossil is uncertain. Based on the presence of Acheulo-Yabrudian archaeological material, this individual may have lived sometime between 500,000 and 200,000 years ago. The individual had two areas of cranial bone erosion, on the upper forehead and right supraorbital torus, which may have resulted from cranial injuries. This is one of several fossils from across Eurasia during the later Middle Pleistocene that remains hard to classify. The preserved portions show similarities both with Neandertals and with African *Homo sapiens* of similar age, and its zygomatic bone even shows some similarity with earlier material from Zhoukoudian, China–some 7000 km to the east.

Skeletal material curated at the at the Rockefeller Museum, East Jerusalem.

1929



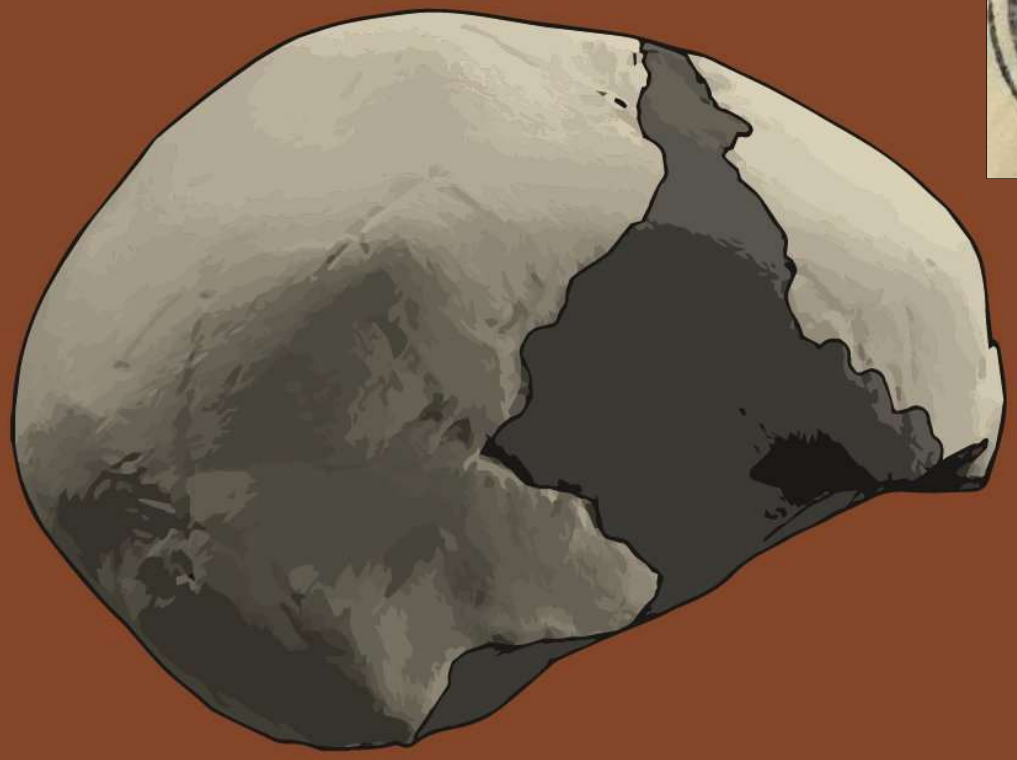
Tabun C2

Mugharat et Tabun, Israel

Dorothy Garrod directed excavation of the Tabun Cave from 1929 until 1934, and the workers found the pieces of this mandible spread across a small area in layer C of the East Terrace in front of the cave. Today scientists think that this individual lived sometime between 170,000 and 135,000 years ago. The mandible has divided paleoanthropologists for nearly 90 years. The incurvation of the symphysis below the teeth and thickening of the inferior border resemble the chins found in recent people. The retromolar space behind the third molar resembles Neandertals. Other features of the mandible recall earlier Middle Pleistocene jaws from Europe. The individual may have belonged to a third lineage, not close to either Neandertals or recent humans, or it may reflect early hybridization of these populations.

Skeletal material curated at the at the Rockefeller Museum, East Jerusalem.

1931



Skhūl 1

Mugharat es Skhūl, Israel

A child's partial skeleton was uncovered during excavation of the terrace at the entrance of Skhūl cave in 1931. Theodore McCown directed this excavation, in which local laborers removed hard breccia from the site. The child was found in a flexed position, with parts of both upper and lower limbs present. This child lived sometime between 110,000 and 90,000 years ago, and was around three years of age at the time of death. Over the past few decades, most anthropologists have seen the Skhūl hominin remains as part of an early modern human population. Still, some features of the Skhūl 1 skeleton resemble Neandertal children. We are only beginning to be able to examine possible hybridization or population mixture in the skeletons of children, and this time and place is an important one to understand.

Skeletal material curated at the at the Rockefeller Museum, East Jerusalem.

1932

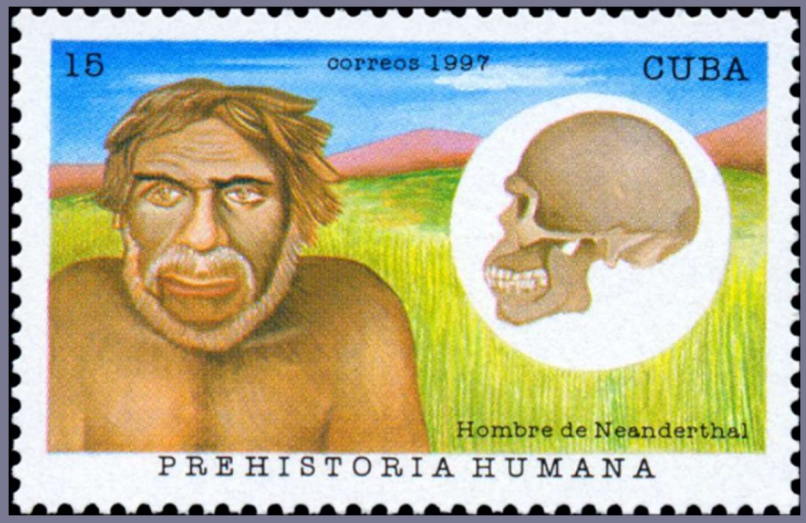
Skhūl 5

Mugharat es Skhūl, Israel

During 1932, excavators working at Skhūl under the direction of Theodore McCown found this partial skeleton of a male adult individual. This individual lived sometime between 135,000 and 100,000 years ago. McCown and Arthur Keith interpreted the form of this and other skeletal remains from Skhūl and Tabun Cave as evidence of a population "in the throes of evolution" toward a more specialized, Neandertal-like morphology. At the same time, the evolutionary geneticist Theodosius Dobzhansky proposed that the Skhūl and Tabun fossils represent a population of hybrids between modern and Neandertal groups.

Skeletal material curated at the at the Peabody Museum of Archaeology and Ethnography, Harvard University. Illustration by John Hawks CC-BY 4.0

1935



Qafzeh 6

Qafzeh Cave, Israel

René Neuville and Moshe Stekelis undertook excavation of the cave near the base of Jebel Qafzeh from 1933 to 1935. In 1934 they uncovered the partial skeleton of this individual, who lived sometime between 130,000 and 90,000 years ago. No one published a scientific description of the human remains that Neuville had found, and they were rarely studied until new excavations were undertaken in the 1960s and 1970s. Anthropologists have often classified this individual as a "modern human", owing to its anatomical differences from Neandertals. Yet the origin and relationships of this individual's population are not clear.

Skeletal material curated at the Institut de Paléontologie Humaine, Paris, France.

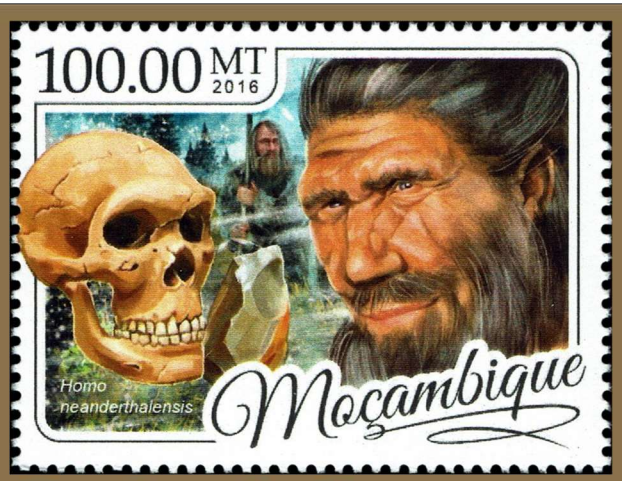
1961

Amud 1

Amud Cave, Israel

This partial skeleton was unearthed in 1961 during excavations led by Hisashi Suzuki. This individual lived sometime between 65,000 and 50,000 years ago. Anthropologists have often classified the skeleton as a Neandertal, and it does share many features of its skull and mandible with European Neandertals. But other traits of its skull and postcranial skeleton resemble modern people, suggesting that the story is not so simple. Today it seems likely that this person belonged to a population with ancestry from multiple Pleistocene groups.

Skeletal material curated at the Rockefeller Museum, East Jerusalem. Illustration by John Hawks CC-BY 4.0



1967

Qafzeh 9

Qafzeh Cave, Israel

Bernard Vandermeersch and Ofer Bar-Yosef led excavation at Qafzeh Cave in 1967 when the burials of two skeletons were uncovered. Qafzeh 9 is an adult found in a flexed position, with the Qafzeh 10 child skeleton at its feet. Anthropologists recognize that this adult individual shares most of its anatomical features with recent humans, but may not be directly connected to any recent populations. She or he was a young adult at the time of death, and had several age-related pathologies of the mandible, including malocclusion of the incisors, osteochondritis of the temporomandibular joint, and a fibroma. Probably none of these contributed to the death of this individual. The individual lived sometime between 100,000 and 90,000 years ago.

Original skeletal material curated at Tel Aviv University, Israel. Illustration by John Hawks CC-BY 4.0

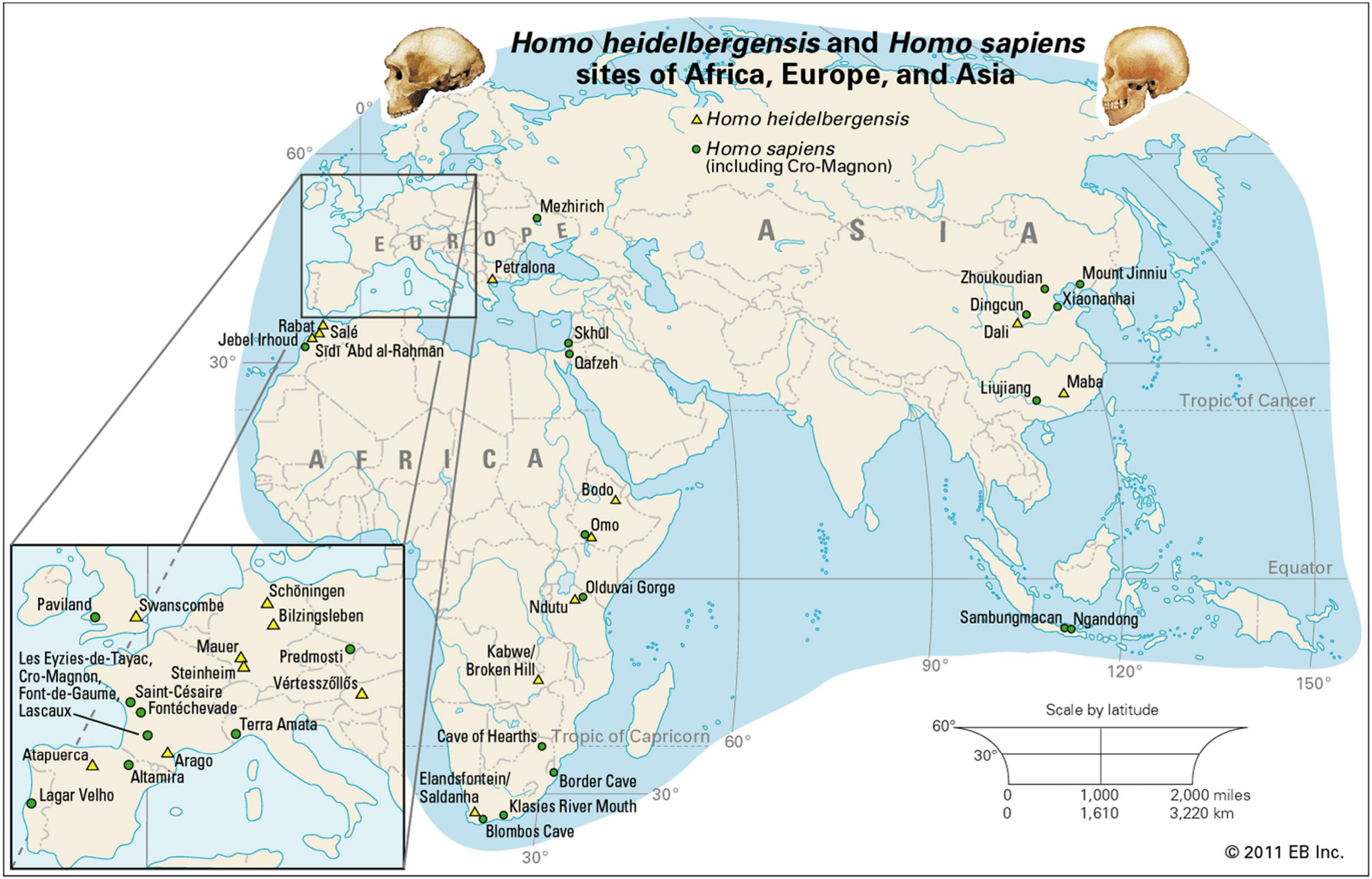
1992

Sima de los Huesos cranium 5

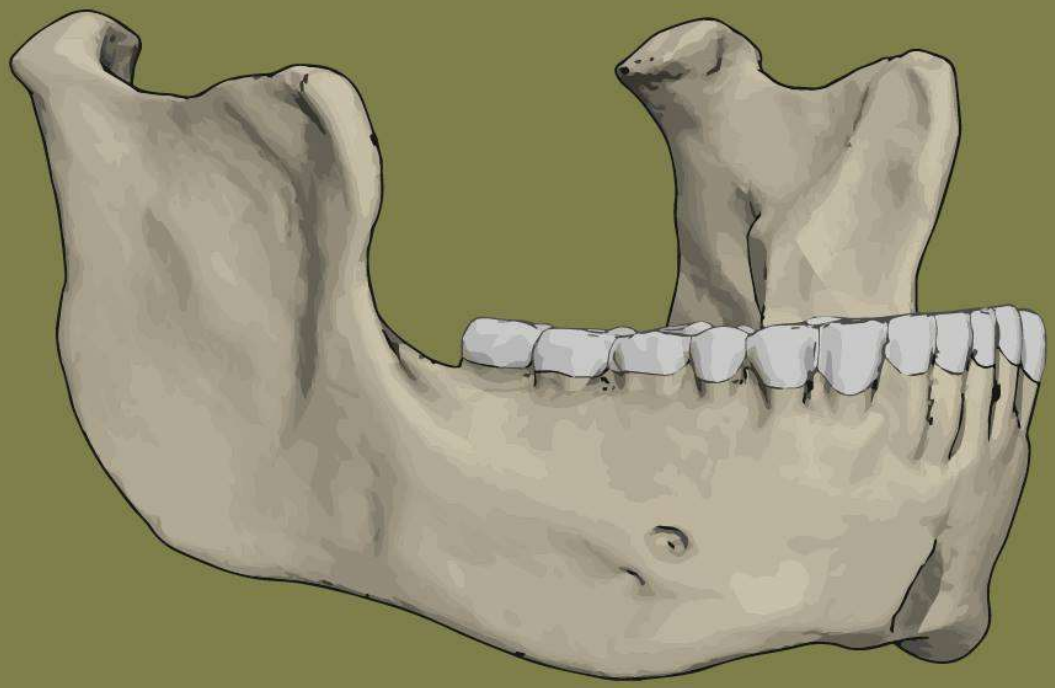
Sima de los Huesos, Spain

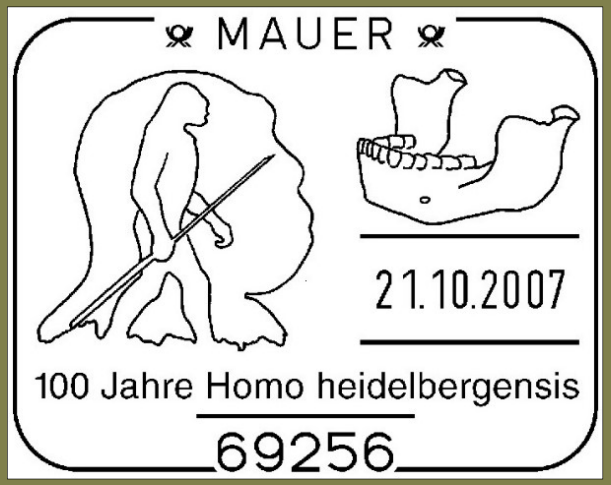
The excavation team led by Juan-Luis Arsuaga recovered much of this cranium in 1992. This is the most complete of at least 17 fossil hominin skulls that have been found so far in the Sima site. These hominins lived around 430,000 years ago and belonged to an early Neandertal population. The fragments of bone in the Sima de los Huesos deposit are pieced together over years of excavation, with later pieces sometimes completing earlier discoveries. In 1999, researchers identified anupper left premolar of this individual that had been broken before the individual died. The tooth became infected in the pulp cavity, spreading through the left maxillary bone. This infection formed a fistula and osteitis of the bone and left side of the nasal cavity. It is possible that this infection contributed to the individual's death.

Original skeletal material curated at the Centro Nacional de Investigación sobre la Evolución Humana, Burgos, Spain
Illustration by John Hawks CC-BY 4.0


Homo heidelbergensis and Homo sapiens sites of Africa, Europe, and Asia
Homo heidelbergensis
Homo sapiens (including Cro-Magnon)
EUROPE
ASIA
AFRICA
Mezhirich
Petralona
Skhūl
Qafzeh
Rabat
Salé
Jebel Irhoud
Sīdī ʿAbd al-Raḥmān
Zhoukoudian
Mount Jinniu
Dingcun
Xiaonanhai
Dali
Liujiang
Maba
Bodo
Omo
Olduvai Gorge
Ndutu
Kabwe/ Broken Hill
Cave of Hearths
Elandsfontein/ Saldanha
Border Cave
Klasies River Mouth
Blombos Cave
Sambungmacan
Ngandong
Tropic of Cancer
Equator
Tropic of Capricorn
Paviland
Swanscombe
Schöningen
Bilzingsleben
Mauer
Predmosti
Steinheim
Vértesszőllős
Les Eyzies-de-Tayac, Cro-Magnon, Font-de-Gaume, Lascaux
Saint-Césaire
Fontéchevade
Terra Amata
Atapuerca
Arago
Altamira
Lagar Velho
Scale by latitude
0 1,000 2,000 miles
0 1,610 3,220 km
© 2011 EB Inc.

1907





Mauer 1

Mauer, Germany

Daniel Hartman uncovered this ancient jaw while working in a sand quarry in 1907. Otto Schoetensack, from the nearby University of Heidelberg, studied the mandible and named the new species *Homo heidelbergensis*. The species has been a focus of scientific debate ever since. Some scientists see the jaw as emblematic of a large grouping of "archaic" humans from Europe, Africa, and Asia. Others see this individual as likely an early member of the Neandertal lineage. Today the best scientific idea of the age of the deposit places it around 600,000 years ago.

Skeletal material curated at the University of Heidelberg. Illustration by John Hawks CC-BY 4.0

1933

Steinheim skull

Sigrist Gravel Pit, Germany

Karl Sigrist identified this skull in a gravel quarry in 1933. Scientists think this individual lived sometime around 250,000 years ago, although this age is highly uncertain. Over the years, anthropologists have interpreted the possible relationships of this individual in many different ways. It has few of the features that characterize Neandertal skulls, and its relatively short, vertically-oriented face shares more with recent humans and contemporary African fossils than with the European Neandertals. Today, the ancient genomes of later Neandertals suggest that genetic exchanges from Africa into the Neandertals happened between 350,000 and 200,000 years ago. Possibly the Steinheim individual belonged to a regional population that was part of this network of genetic exchanges.

Original skeletal material curated at the Staatlisches Museum für Naturkunde, Stuttgart, Germany.

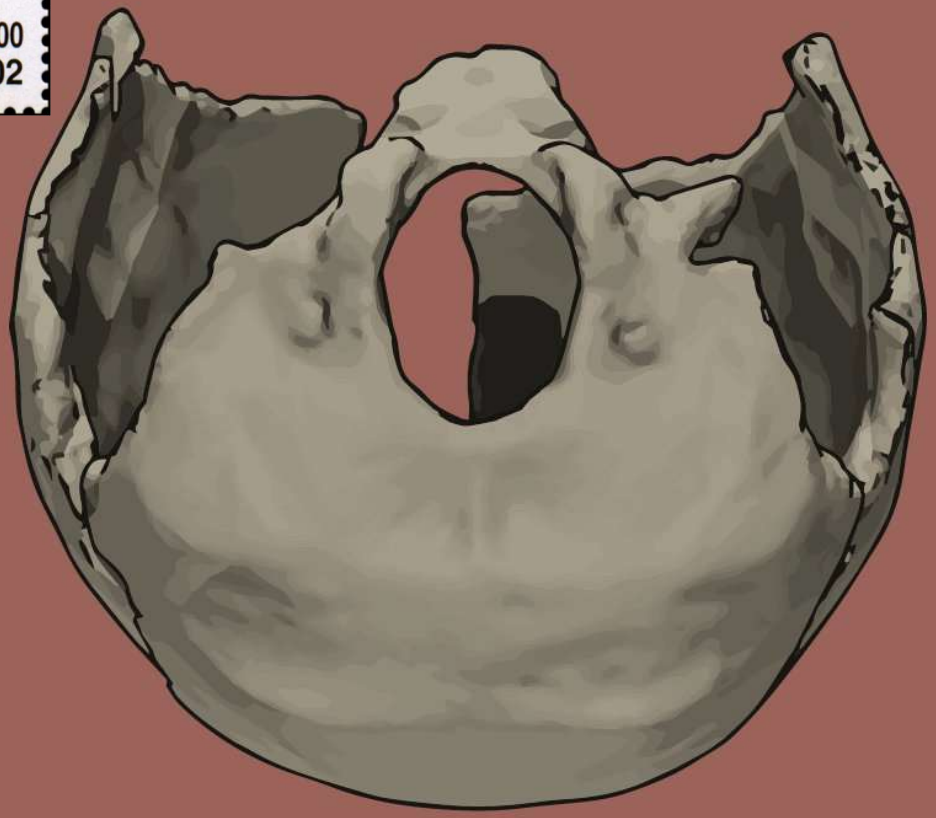
1935

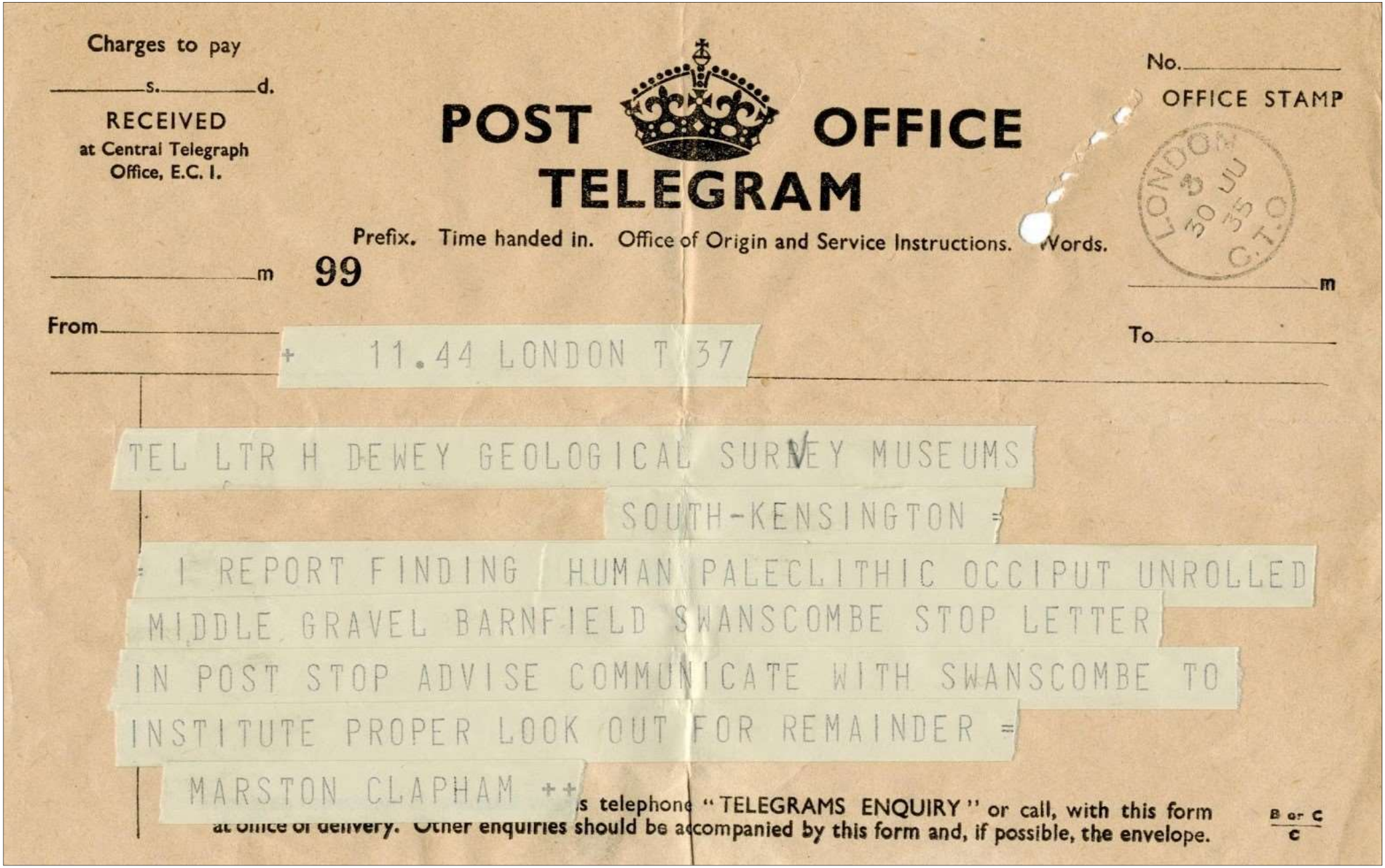
Swanscombe skull

Barnfield Pit, United Kingdom

Alvan Marston was an avocational archaeologist who monitored the work at the gravel pit near Swanscombe to note artifacts and bones that workers sometimes uncovered. In 1935 he identified a hominin occipital bone in the working face of the pit. Nine months later, the work had advanced 8 meters and Marston found the left parietal bone of the same individual. In 1955, John and Bertram Wymer found the right parietal as they carried out archaeological investigation of the gravel, roughly sixteen meters from Marston's initial discovery. These three fragments come from an individual that lived around 400,000 years ago. The bones have several features that were common in later Neandertal remains, and scientists today interpret this individual as part of the Neandertal lineage.

Original skeletal material curated at the Natural History Museum, London, UK. Illustration by John Hawks CC-BY 4.0





Charges to pay

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Prefix. Time handed in. Office of Origin and Service Instructions. Words.

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From_____ To_____

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TEL LTR H DEWEY GEOLOGICAL SURVEY MUSEUMS
SOUTH-KENSINGTON =
= I REPORT FINDING HUMAN PALECLITHIC OCCIPUT UNROLLED
MIDDLE GRAVEL BARNFIELD SWANSCOMBE STOP LETTER
IN POST STOP ADVISE COMMUNICATE WITH SWANSCOMBE TO
INSTITUTE PROPER LOOK OUT FOR REMAINDER =
MARSTON CLAPHAM ++

...s telephone "TELEGRAMS ENQUIRY" or call, with this form at office of delivery. Other enquiries should be accompanied by this form and, if possible, the envelope.

B or C
C

This telegram from June 1935 announced the discovery of the first skull fragment of what would become known as 'Swanscombe Man'. It was sent by dental surgeon and amateur palaeontologist Alvan Theophilus MARSTON (1889-1971) to Henry DEWEY (1876-1965) at the Geological Survey.

1950

Zlatý kůň cranium

Koněprusy Caves, Czechia

In 1950, blasting in a limestone quarry near Koněprusy revealed an entrance to a deep cave system under the hill known as Zlatý kůň, which means "Golden Horse". The archaeologist František Prošek investigated the caves and discovered human bone in a chamber now known as Prošek's Hall. Excavation over several years recovered substantial parts of a skeleton. Genetic analysis of the skeleton in 2021 confirmed that the skeleton represents a female individual who lived sometime between 45,000 and 36,000 years ago. This individual was part of a population of early migrants to Europe, related to later human populations of East Asia more than to the European populations of the later Upper Paleolithic. This individual also had Neandertal ancestors approximately 70 to 80 generations before her birth, making up around 3.2% of her genetic heritage.

Skeletal material curated at the National Museum, Prague, Czechia. Illustration by John Hawks CC-BY 4.0

1960

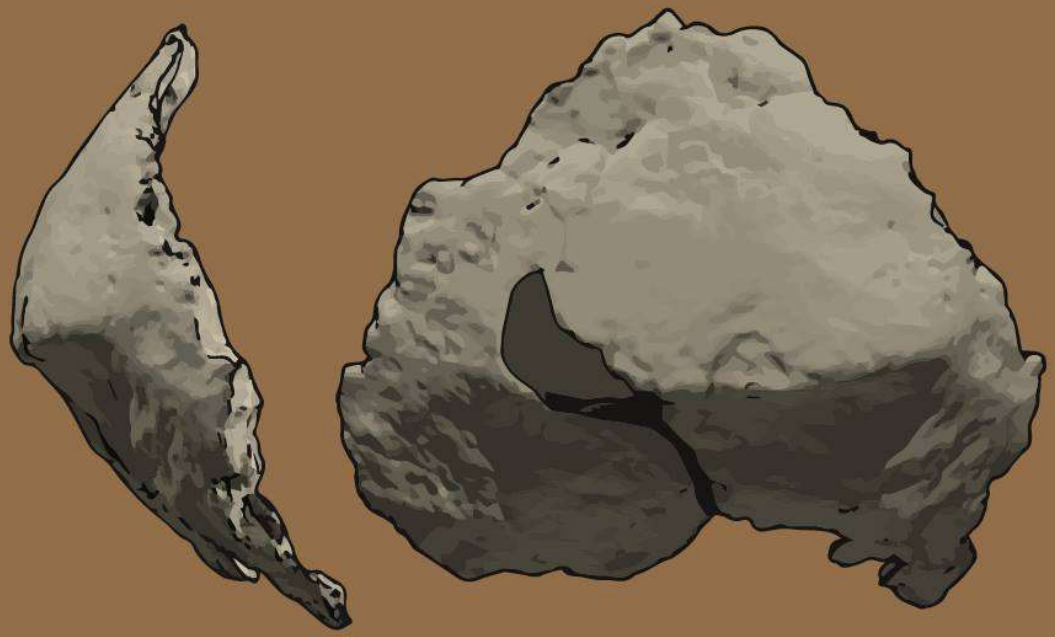
Petralona skull

Petralona Cave, Greece

Christos Sariannidis found this calvaria in 1960, attached to the cave wall by speleothem, within a chamber of the cave discovered only the previous year. Aris Poulanos, who studied the skull and its context, considered it different from both Neandertals and *Homo erectus*. It does share some features with Neandertals, such as its midfacial prognathism and shape of its nasal floor. But the cranial vault is smaller, with its maximum breadth near the base, and with nuchal musculature and angular torus resembling *H. erectus*. Uranium series and ESR approaches show that this individual lived before around 200,000 years ago, but beyond this its geological age of this skull is not well resolved. Few anthropologists use Poulanos' name for the skull, *Archanthropus europaeus*, but beyond this there has been little agreement.

Skeletal material curated at the at the Aristotle University of Thessaloniki, Greece.

1965



Vértesszőlős 2

Vértesszőlős, Hungary

László Vértes organized major excavation at Vértesszőlős, following the discovery of stone artifacts by Márton Pécsi in 1962. In 1965, excavators uncovered the occipital bone of a hominin. Today it is thought that the this individual lived around 300,000 years ago. The form of the bone resembles the occipital bones of Neandertals in some ways, including a shallow pit just above the neck muscle attachments, called the "suprainiac fossa". The individual may have been a member of an early Neandertal population. Still, with little to observe, anthropologists over the years tried to connect this fragment with varied forms of hominins following the ideas of their time, from *Homo erectus* to *Homo heidelbergensis*.

Skeletal material curated at the Hungarian National Museum, Budapest, Hungary.

1969

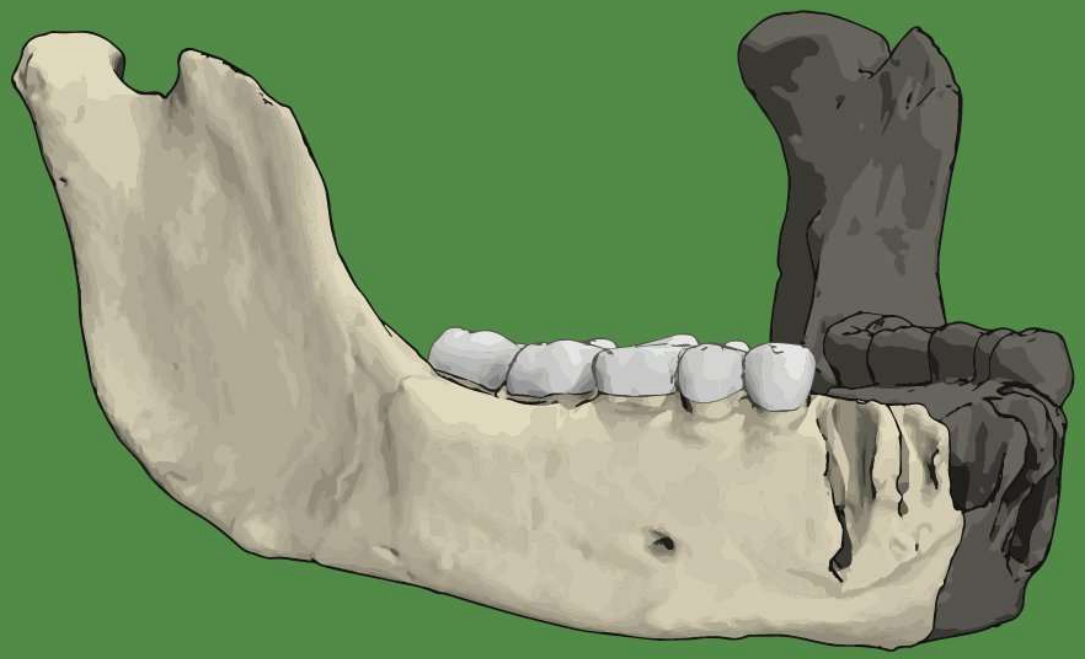
Arago II

Caune de l'Arago, France

Henry and Marie-Antoinette de Lumley initiated excavations in Arago Cave in 1964, and their work uncovered this mandible in 1969. The current state of knowledge about the age of the Arago deposits suggests that this individual lived sometime between 400,000 and 470,000 years ago. At around this time, the fossils from Sima de los Huesos, Spain, represent an early Neandertal population already expressing some mandibular features otherwise known from later Neandertals. But few if any such features are found in Arago II or other fossils from the site. Some scientists propose that these may instead represent a second ancient population not close to either Neandertals or modern humans, often suggesting that this may be *Homo heidelbergensis*. Another explanation is that the early evolution of Neandertals was a mosaic of drift and selection in small populations that differed from each other.

Original skeletal material curated at the Musée de Préhistoire de Tautavel, Tautavel, France.

1970



Henry de LUMLEY
Secrétaire Général
U. I. S. P. P. - IXe CONGRÈS
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FRANCE

Arago XIII

Caune de l'Arago, France

Henry and Marie-Antoinette de Lumley initiated excavations in Arago Cave in 1964, and their work uncovered this mandible in 1970. The current state of knowledge about the age of the Arago deposits suggests that this individual lived sometime between 400,000 and 470,000 years ago. Arago XIII is one of the longest mandibles known within the genus *Homo*, approaching or exceeding in size the large Tighennif 3 mandible. The mandibular body is also very thick for its height, in this ratio exceeding Neandertals, *Homo erectus*, and other large-bodied Pleistocene *Homo*. The fossil does not exhibit traits that would connect it closely with Neandertals.

Original skeletal material curated at the Musée de Préhistoire de Tautavel, Tautavel, France.

Arago 44

Caune de l'Arago, France

Students and volunteers in archaeology have come to the village of Tautavel in southern France for more than 55 years to participate in the excavations of the Arago Cave. A 2015 article by Marie-Antoinette de Lumley acknowledged more than 4000 students from 62 countries at that time. Arago 44 is one of the most well-preserved hip bones from the Middle Pleistocene epoch. This individual lived sometime between 470,000 and 400,000 years ago. The size of the hip joint of this hip bone suggests that the individual was around 80 kg (176 lbs). This was a large body size for individuals of the time, and indeed in many parts of the world today, although it is close to the average weight for French men today.

Original skeletal material curated at the Musée de Préhistoire de Tautavel, Tautavel, France.

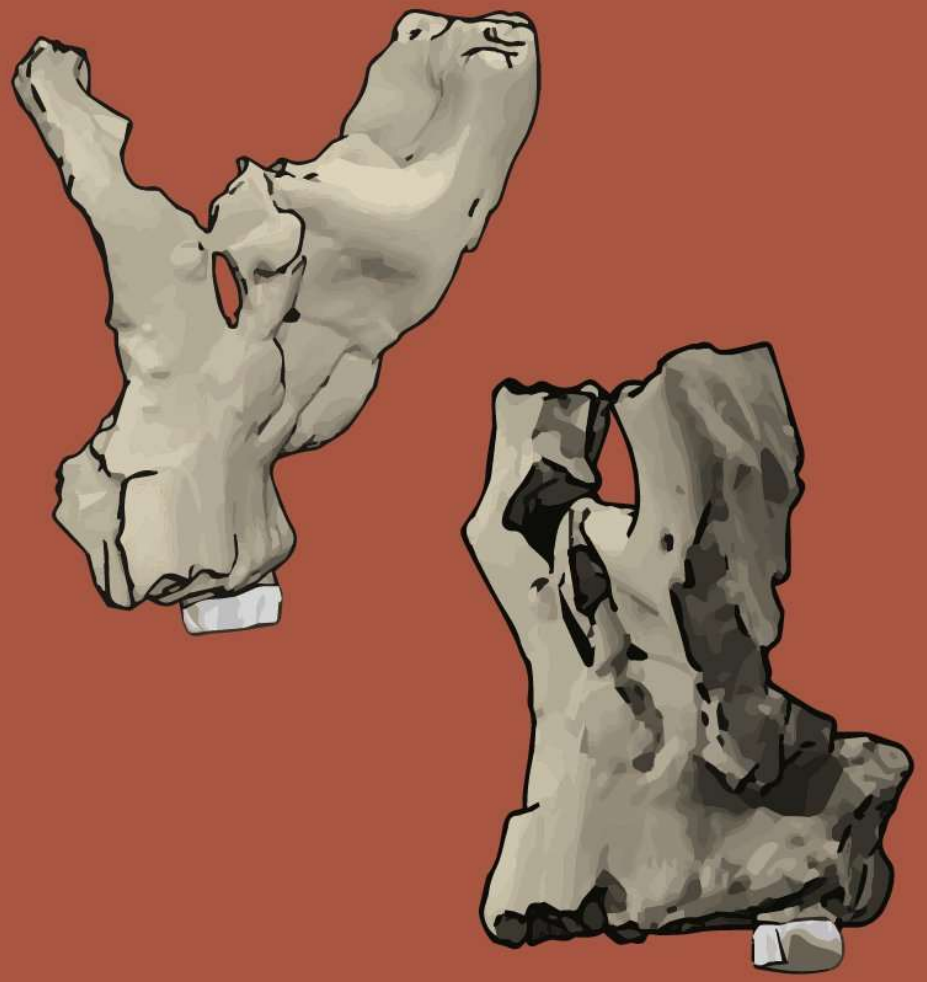
1979

Arago 45

Caune de l'Arago, France

Henry and Marie-Antoinette de Lumley initiated excavations in Arago Cave in 1964, and fieldwork uncovered this mandible in 1979. The current state of knowledge about the age of the Arago deposits suggests that this individual lived sometime between 400,000 and 470,000 years ago. The Arago 45 fossil preserves the left maxillary bone and partial left zygomatic bone of an adult individual, along with a molar tooth. The shape of this face was similar in most respects to the more complete Arago 21 fossil. Anthropologists have compared these fossils with the Sima de los Huesos early Neandertal sample, which is a similar geological age.

Original skeletal material curated at the Centre Européen de Recherches Préhistoriques de Tautavel, France.



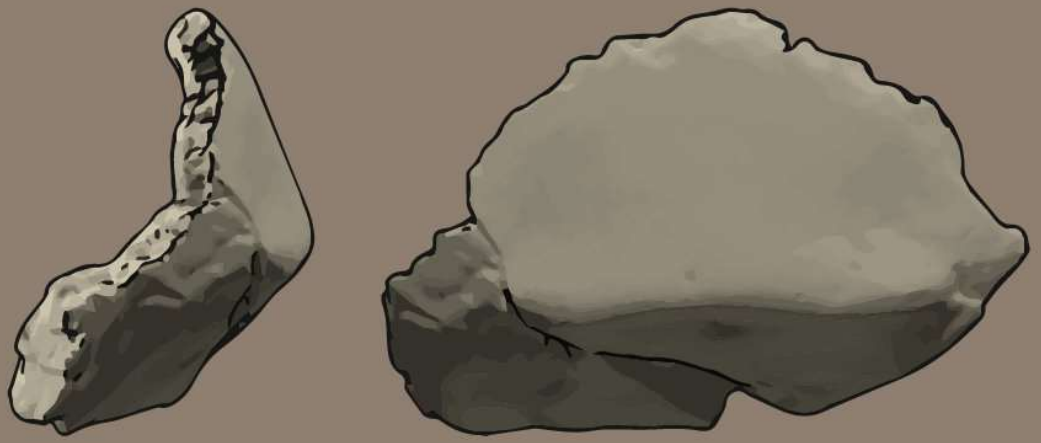
1974

Bilzingsleben I

Steinrinne, Germany

The Steinrinne travertine deposit is on a terrace of the Wipper River, close to the town of Bilzingsleben, Germany. Dietrich Mania began to investigate the fossils in the travertines in 1969. The Bilzingsleben A occipital was found in two pieces in the laboratory in 1974 as fossils were being prepared from the travertine. Mania viewed it likely that this occipital comes from the same individual as portions of a frontal bone, Bilzingsleben B. From the time of its discovery, anthropologists emphasized the similarity of this occipital bone with those of *Homo erectus*, especially its thickness and marked occipital torus, which are not like Neandertals. Today most researchers consider this morphology as the ancestral form shared with some early Neandertals like those from Sima de los Huesos. This individual lived sometime between 470,000 and 280,000 years ago.

Original skeletal material curated at the Museum für Ur- und Frühgeschichte Thüringens, Weimar, Germany.
Illustration by John Hawks CC-BY 4.0



1976

Apidima 1

Apidima Cave, Greece

A speleologist named Andreas Andreikos noticed part of a skull exposed in hard breccia in the Apidima A cave in 1976. Three years later, Théodoros Pitsios extracted the breccia block containing this skull together with a second skull. The preparation of the Apidima 1 skull from the breccia continued until 2012. In 2019, Katarina Harvati and coworkers determined that uranium deposition in the bone meant that the skull had rested within the cave for at least 210,000 years. This remaining portion of the skull does not have features that are often found in Neandertals, such as an occipital bun, and the sides of the skull are fairly vertical. Some specialists have interpreted this partial skull as evidence of African genetic influence into southeastern Europe prior to 200,000 years ago. It is clear from genetic evidence that such contacts did occur. But other specialists note the absence of derived features of modern people, and align the anatomy of this skull with the Middle Pleistocene European populations that gave rise to later Neandertals.

Original skeletal material curated at the University of Athens, Greece. Illustration by John Hawks CC-BY 4.0

2003

Oase 2

Peștera cu Oase, Romania

Ștefan Milota, Ricardo Rodrigo and Gherase Mircea discovered the first pieces of this skull as they were mapping the Peștera cu Oase in 2003. The areas of this cave system with Pleistocene hominin material are today only accessible by underwater diving. This individual was an adolescent at the time of death with third molars not yet erupted. The individual lived sometime between 42,000 and 38,000 years ago. This is one of the earliest crania from Europe that anthropologists align with modern humans, but it does share a number of traits with Neandertals. Analysis of the genome of this ancient individual has shown approximately 6% genomic ancestry from Neandertals. This individual did not contribute detectable ancestry to later European populations.

Original skeletal material curated at the Institutul de Speologie "Emil Racoviță", Bucharest, Romania.

2008

Manot 1

Manot Cave, Israel

The Cave Research Unit of Hebrew University of Jerusalem discovered this partial skull during a survey of Manot Cave in 2008. The cave had previously been hidden when an entrance was opened by a bulldozer, and the calvaria lay on a flowstone shelf in a side chamber of the main gallery. A crust of calcite on the calvaria allows a minimum age estimate from the decay of uranium into thorium, this suggests the individual lived at least 60,000 to 49,000 years ago. The overall anatomy of the skull resembles modern humans but it has some shape similarities with Neandertals, including the flattened area flanking the lambdoidal suture and a shallow suprainiac fossa. Israel Hershkovitz and collaborators have suggested that the individual belonged to a population that made early Upper Paleolithic artifacts and had some mixture from Neandertal populations.

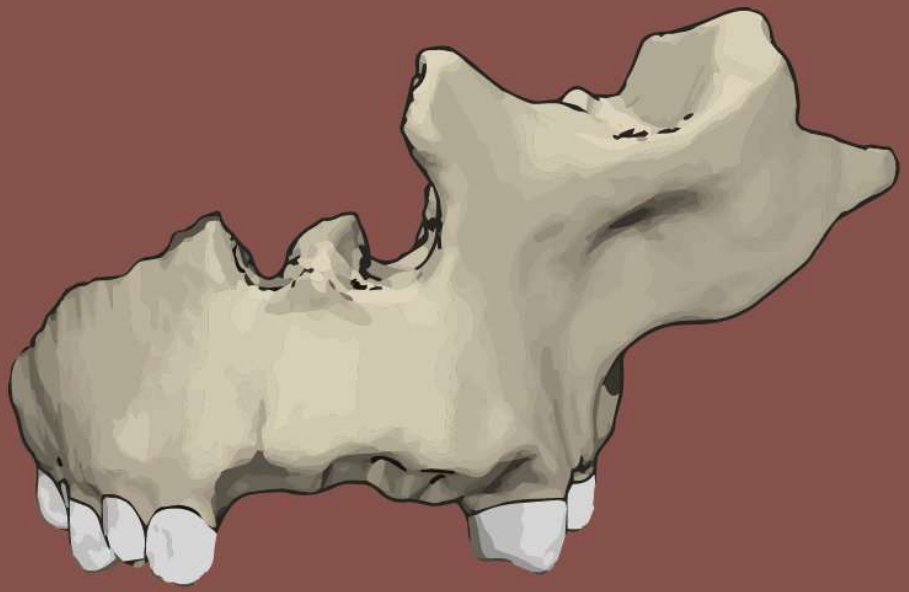
Original skeletal material curated at Tel Aviv University, Israel. Illustration by John Hawks CC-BY 4.0

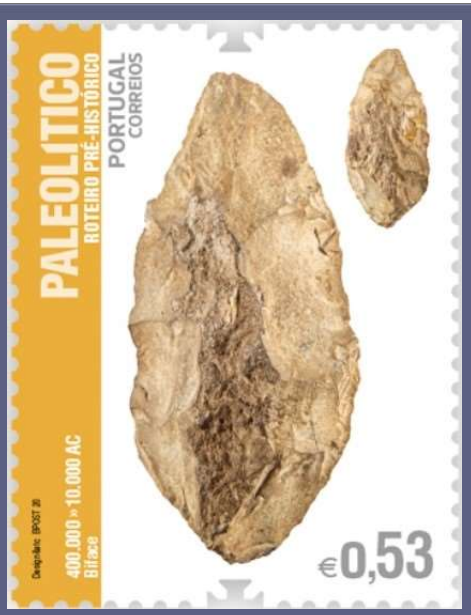
ATD6-69

Gran Dolina, Spain

In 1995, excavators uncovered the face of a juvenile hominin in the TD 6 layer of the Gran Dolina site. This individual was around 10 years of age at the time of death, and lived sometime between 950,000 and 780,000 years ago. José Bermúdez de Castro and colleagues in 1997 recognized the TD 6 hominins as *Homo antecessor*. The ATD6-69 maxilla is one of the most informative fossils from the site. Its hollowed left maxillary bone and malar notch are similar to recent humans and different from both the Neandertal lineage and known fossils attributed to *Homo erectus*. In 2020, Frido Welker and coworkers recovered enamel proteins from another Gran Dolina tooth, which show *H. antecessor* to be a sister group to the common ancestor of today's people, Neandertals, and Denisovans.

Original skeletal material curated at the Centro Nacional de Investigación sobre la Evolución Humana, Burgos, Spain
Illustration by John Hawks CC-BY 4.0





Aroeira 3

Gruta da Aroeira, Portugal

In 2013, geochronological work to establish the age of deposits within the Gruta da Aroeira led to the discovery of a partial hominin skull. This individual lived sometime between 436,000 and 390,000 years ago. The fossil is of similar geological age to those from Sima de los Huesos, Spain, and like them shares some features with later Neandertal populations. Some of the fragile parts of this skull are well-preserved, while the thick bones of the vault include some fractures that happened at or around the time of death. An analysis of the breakage by Montserrat Sanz and coworkers suggested that the best explanation for the condition of the skull was that it was lightly trampled and relocated after its primary deposition, leading to only a part of the skull being present where it was found.

Original skeletal material curated at the Museu Nacional de Arqueologia, Lisbon, Portugal