CHAPTER 12 - MIOCENE HIGHER PRIMATES (APES AND MONKEYS).

Visual #12-1

We humans are classified as members of **Order Primates**. Besides ourselves, this order includes lemur-like prosimians, aye-ayes, lorises, adapids, tarsiers, omomyids, platyrrhines (New World monkeys), and catarrhines (Old World monkeys, apes, and humans.)

Visual #12-2

No serious scientist believes that humans came from any sort of modern monkey. As previously discussed, there are major differences between monkeys and apes. Likewise, no one believes humans came from any sort of living ape, whether chimpanzees, orangutans, or gorillas. This

Visual #12-3

chapter will deal with the question of whether primate fossils support the belief that humans evolved from any sort of Last Common Ancestor (LCA) shared with extinct apes.

Visual #12-4

It is appropriate at this point to review geologic dating terminology. The geologic column is divided into four **Eons** (the largest division, dated to perhaps billions of years); each eon is divided into **Eras** (smaller, supposed to last hundreds of millions of years); each era is divided into **Periods** (supposed to last tens of millions of years); and each period is divided into **Epochs** (supposed to be a few million to tens of millions of years).

The **Eons** have been named Hadean, Archean, Proterozoic, and Phanerozoic. The latter, which includes the times in which we live, has been subdivided into the Archaeozoic, Paleozoic, Mesozoic, and Cenozoic **Eras**.

The Cenozoic has been further divided into the Paleogene and Neogene **Periods**. The Paleogene is divided into the Paleocene, Eocene, and Oligocene **Epochs**, and the Neogene into the Miocene, Pliocene, Pleistocene, and Holocene **Epochs**.

The syllable "-cene"in the naming of the strata above means "recent," indicating that the layers are considered to be relatively recent (as compared to Archaeozoic and Mesozoic). The suffix "zoic" in the naming of fossil-beating strata indicates that they contain traces of animal (as opposed to plant) life.

Many of the names of geologic strata were assigned by Charles Lyell in the 1800s. Though many animals such as reptiles are dated back to the Mesozoic, the names of strata that relate to primates are all in the Paleogene and Neogene epochs of the Cenozoic.

Visual #12-5

- Paleocene - life considered "old" or "ancient" as compared to the rest of the Cenozoic
- Eocene - "dawn" of recent types
- Oligocene - "few" or "scanty" types of modern animals
- Miocene - "less" recent, as compared to the types of modern-type animals found in higher strata
- Pliocene - "more" fossils than the strata below
- Pleistocene - the "most" recent fossils
- Holocene - "entirely" recent fossils. (This is the current geological epoch in which we live.)

> Common terminology in the study of fossil primates: "Pro" means before, "plesi" means almost, "anthro" means man, "sim" means monkeylike or apelike, "pithec" means ape, "homo" means human, and "australo" means southern. The name sometimes includes a mention of where the fossil was discovered or hints at some characteristic (e.g., "Equatorius" or "giganto").

Miocene apes (not including monkeys) have been classified into as many as 35 genera including up to 56 species (Urciuoli & Alba, 2023). Since many of these may be pre-Flood types, the diversity is not a problem for creationists.

I. FUNDAMENTAL ASSUMPTION BEHIND ASSIGNED AGES.

Despite the fact that there are well over a hundred cultures around the world with legends of a

Visual #12-6

worldwide flood, ages were assigned to most fossils (including primates) based on the assumption that there has never been such an event. Instead, the animals are said to have evolved over many millions of years, then were buried and fossilized as a result of uniformitarian conditions.

Several techniques are used in an attempt to confirm the ages. These do NOT include Carbon-14 dating, used only for ages measured in thousands of years. They include variations of Rubidium-Strontium and Potassium-Argon tests as well as magneto stratigraphy (used in an attempt to correlate sedimentary flows with volcanic sequences). These will be critiqued in Appendices B and C.

Visual #12-7

References to these ages does not indicate agreement with them. This book is written from the perspective that a great deal of the fossil record was formed under catastrophic rather than uniformitarian conditions. This allows for the possibility that the earth is much younger.

II. CHANGES NECESSARY TO EVOLVE FROM LOWER PRIMATES TO HUMANS.

Those that believe humans evolved from lower primates must believe that some Paleocene pre-primates underwent mutations that gave them new features identifying them as Eocene primates, which then acquired different features as they evolved into Oligocene monkeys and then later to apes. A different branch acquired different features to evolve into some Miocene hominoid which then acquired (or lost) yet more different features on the way to becoming some Pliocene hominid, and so on.

Visual #12-8

Since primates reproduce sexually, the males and females of those evolving toward new types would have to experience many identical mutations to pass them on to future generations as well as many complementary mutations so that the male and female reproductive systems could continue to work together.

Some of the other features that would need to develop would have included:

Visual #12-9

- The types evolving into apes would have had to not only lose tails but also develop a different rib shape.
- The number of lumbar and sacral vertebrae would have needed to change.
- Some types would have had to acquire features that would allow them to swing from branches (suspensory ability or brachiation). This would have had to happen independently in monkeys and in only certain types of apes. (Gorillas do not swing from branches.)
- The evolving apes would have acquired the ability to straighten their elbows, while the monkeys did not gain this ability.
- Some of the primates would have had to acquire upright (orthograde) posture rather than forward-leaning (pronograde).

Visual #12-10

- Some hominoids/hominids would have had to develop spines with varying numbers of lumbar (lower) vertebrae ranging from four to six, as well as varying numbers of thoracic (rib supporting) vertebrae in different types.
- Some would have had to develop pelvises with a markedly different structure and orientation.
- Some would have had to come down from trees to ground and acquire a different leg structure whereby the feet were directly below the knees during walking.
- Some would have had to develop human-type feet with the big (great) toes very different from thumbs.
- Some would have had to develop much larger brains.

As to why would all these features would have developed, some paleontologists (e.g., Lovejoy et al., 2009b) seem to imply that the animals acquired them because they needed them. For example, as many generations leapt through the trees their bodies gradually became better suited to such activity. This Lamarckian idea that "form follows function" has been thoroughly falsified. Any changes developed in an individual by use and disuse of body parts are not

passed on to descendants because the DNA is not affected. The ancestral animals would likely fall and be injured or killed.

Visual #12-11

As emphasized in earlier chapters, the reason living things have the features that they do is that their DNA contains the instructions to produce those features. These instructions could theoretically be changed for the better by beneficial mutations, but beneficial mutations are extraordinarily rare. Even if a few occurred, there would have to be many series of such mutations. Even then, it would be insufficient for mutations to happen to only males or only females. As each evolving line gradually lost old structures and developed new ones, a male and female living at the same time and place would have to acquire not only many identical mutations but also many complementary ones to enable their reproductive systems to continue to work together.

Initial Disorganization (evolution) includes the idea that mutations can lead to increasing genetic information in DNA. This would have had to be the mechanism that led to more and more advanced primates, culminating in the appearance of humans. Initial Complexity (creation), on the other hand, includes the idea that the present laws of biology were brought into existence after the major types were established. Ever since then, mutations would have resulted in a loss rather than a gain of genetic information.

In summary, there are two basic possibilities about the origin of apes and humans:

- Either they acquired all their distinctive characteristics through some unknown combination of factors (Initial Disorganization) going through thousands or millions of steps, or
- Those characteristics were programmed into their DNA from the beginning by some unknown one-time process involving an intelligent designer (Initial Complexity).

Neither can be tested. It is up to the individual to decide which seems more reasonable.

III. DIVERSITY OF MIOCENE PRIMATES.

Visual #12-12

Recall that the Eocene contains only a small number of lower primates such as lemur-like forms, a few other types such as *Teilhardina*, and a few possible monkeys. There are no known apes. The Oligocene contains a few monkeys and apes. There is no known LCA for any of these groups.

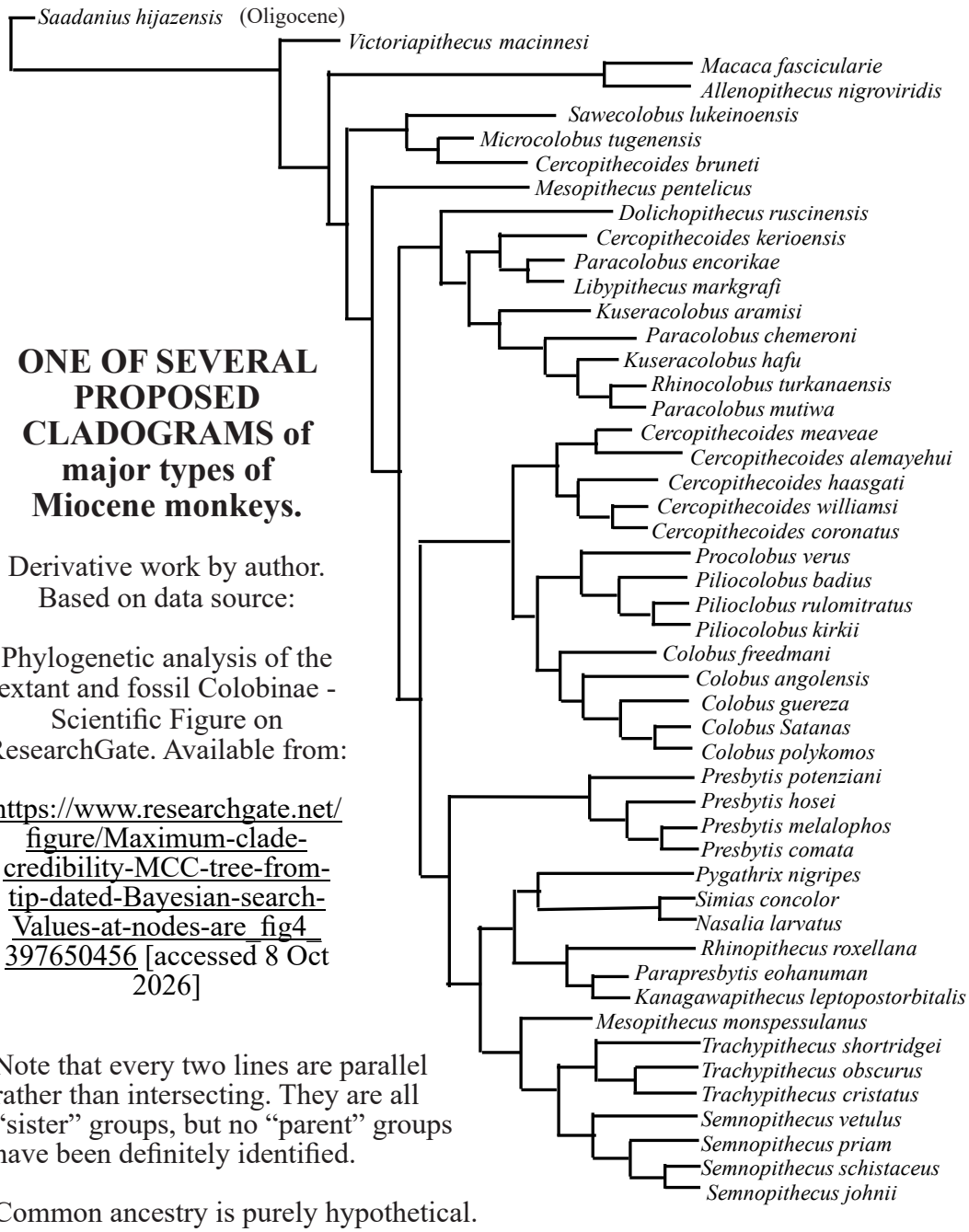
In contrast to the relatively small number of genera named in the Oligocene, at least 50 genus and species names have been assigned to Miocene fossils identified as apes or monkeys (Almécija et al., 2021, 5). Some of the names are: *Afropithecus*, *Alophia*, *Ankarapithecus*, *Ardipithecus kadabba*, *Ar. ramidus*, *Chororapithecus*, *Danuvius*, *Dendropithecus*, *Dryopithecus guggenmosi*, *Ekembo* (*Proconsul heseloni*), *Equatorius*, *Gigantopithecus* (aka *Indopithecus*) *bilaspurensis*, *G. blacki*, *Graecopithecus*, *Griphopithecus*, *Hispanopithecus*, *Kenyapithecus*, *Kapi ramnagarensis*, *Khoratpithecus piriyai*, *Limnopithecus*, *Lufengpithecus*, *Morotopithecus bishopi*, *Nacholapithecus*, *Nakalipithecus*, *Oreopithecus*, *Orrorin tuginensis*, *Ouranopithecus*, *Pierolapithecus catalaunicus*, *Pliobates cataloniae*, *Proconsul*, *Ramapithecus brevirostris* (junior synonym of *Sivapithecus*), *Rangwapithecus*, *Rudapithecus*, *Sahelanthropus tchadensis*, *Samburupithecus*, *Simiolus*, *Sivapithecus* (*Siv. indicus*, *Siv. parvada*, *Siv. sivalensis*), and *Victoriapithecus*.

Visual #12-13

Despite this list, there is enough uncertainty that it is difficult to identify the exact number of Miocene genera and species.

- Species are defined by the ability to breed. It is impossible to do breeding experiments on fossils.
- Since the bodies of modern apes contain over 200 bones, it seems likely that Miocene types would have had a similar number. However, **not a single one** of the Miocene primates is known from a 100% complete skeleton. Few are known from more than a small percent of the bones that would have been present in any one individual.

Visual
#12-14



ONE OF SEVERAL PROPOSED CLADOGRAMS of major types of Miocene monkeys.

Derivative work by author.
Based on data source:

Phylogenetic analysis of the extant and fossil Colobinae - Scientific Figure on ResearchGate. Available from:

https://www.researchgate.net/figure/Maximum-clade-credibility-MCC-tree-from-tip-dated-Bayesian-search-Values-at-nodes-are_fig4_397650456 [accessed 8 Oct 2026]

Note that every two lines are parallel rather than intersecting. They are all "sister" groups, but no "parent" groups have been definitely identified.

Common ancestry is purely hypothetical.

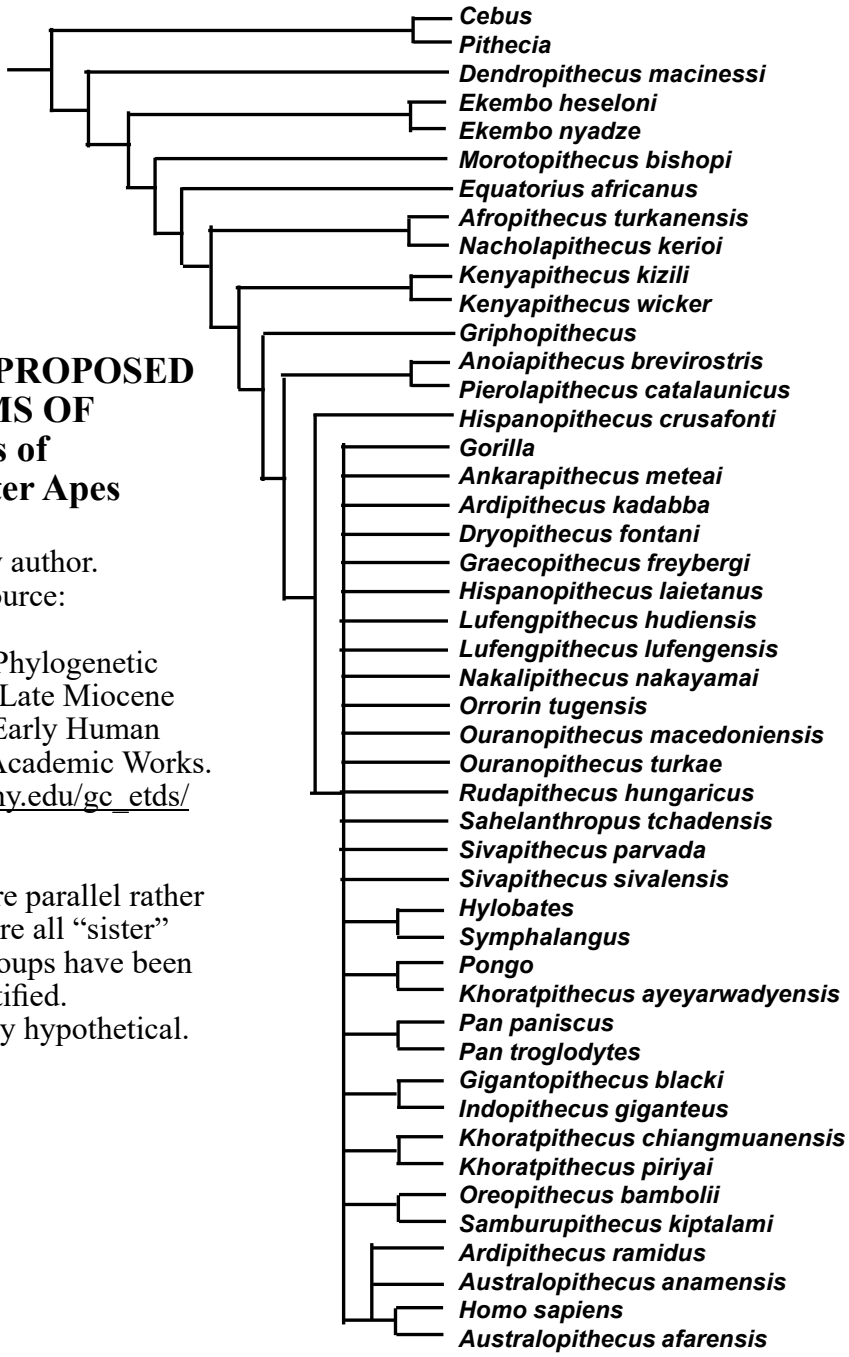
Visual
#12-15

ONE OF SEVERAL PROPOSED CLADOGRAMS OF Major Types of Miocene and Later Apes

Derivative work by author.
Based on data source:

Pugh, Kelsey D., "The Phylogenetic Relationships of Middle-Late Miocene Apes: Implications for Early Human Evolution" (2020). CUNY Academic Works. https://academicworks.cuny.edu/gc_etds/3619

Note that every two lines are parallel rather than intersecting. They are all "sister" groups, but no "parent" groups have been definitively identified.
Common ancestry is purely hypothetical.



The oldest fossil for which we have a complete skeleton is Neanderthal, dated to the the much more recent Pleistocene Epoch.) The great majority of the primate fossils consist of isolated teeth or fragments of upper or lower jaws (Ciochon & Etler, 1994, 37).

- Because of the limited evidence, researchers who disagree with existing classification sometimes transfer fossils from one category to another (McNulty et al., 2015, 57). They may split groups and "erect" new species or genera, or they may "sink" one group into another by combining two or more species or genera. However, such reclassifications are a matter of opinion and are not always universally agreed upon. Different authorities group fossils differently (Alba & Moyà-Solà, 2009, 80).

Visual #12-16

Even in the rare cases where Miocene primates are named and described based on more than a few dozen bones, the fragments are often believed to come from only one or two individuals. Researchers must assume that the bones they are working from represent the characteristics of all the members of the genus or species. Since there is a great deal of variation even within the single human species, one might be skeptical about whether the bones of one or two fossil apes truly represent every member of their type.

A. ANTHROPOIDS, HOMINOIDS, CERCOPITHECOIDS, AND HOMINIDS / HOMININS.

Visual #12-17

Anthropoids are any primates that more or less resemble humans. Monkeys are anthropoids but are not considered members of the superfamily Hominoidea, which is limited to modern apes, humans, and their supposed direct ancestors.

Old World monkeys belong to the family Cercopithecidae, supposed to be ancestors of hominoids, but are not included in that group themselves. New World monkeys are not cercopithecoids but belong to five families: Pitheciidae, Callitrichidae, Atelidae, Cebidae and Aotidae.

All living apes are believed to have diverged from some unknown extinct type of Old World monkey ancestor in the Oligocene by about 30 - 25 Ma (Stewart & Disotell, 1998, R583).

- **Hominoids** include lesser apes (gibbons and siamangs, part of the family Hylobatidae), great apes (gorillas, chimpanzees, orangutans), humans, and the supposed closely connected ancestors of these groups.
- **Hominids** exclude the lesser apes but include humans, greater apes, and our supposed immediate ancestors.
- **Hominins** refers specifically to the supposed human lineage (e.g., *Australopithecus* and *Ardipithecus*) but does not include living apes.

Initial Disorganization (evolution) says there had to be a Last Common Ancestor (LCA) for every two types of monkeys and apes. Since none of them have been found, they must either have been destroyed or else still be buried in the ground somewhere. In contrast, *Initial Complexity* (creation) says that the LCAs have not been found because they never existed.

Despite the fact that there is no known LCA, the lesser apes and great apes are commonly believed to have split by 17 Ma (middle Miocene). At least one type of lesser ape (*Pliobates*) appears in the Miocene, but no universally accepted great ape fossils have been found in that stratum. However, some of the genera on the following pages have been proposed as possible relatives of the great apes.

Other researchers are skeptical. As Almécija et al. (2021, 587) put it, "There is no consensus on the phylogenetic positions of the diverse and widely distributed Miocene apes." The hypothetical hominoid (ape) stem lineage seems to have left no trace in the fossil record (Stewart & Disotell,1998, R586). There is nothing linking Miocene apes with either

human ancestry or African ape ancestry (Andrews & Harrison, 2005, 109).

There is very little fossil evidence of African apes in the Miocene, though there is a bit more in Europe and Asia (Alba & Moyà-Solà, 2009, 77).

B. MIOCENE MONKEYS AND APES.

The first undisputed fossils of hominids (humans, chimps, gorillas, and orangs) are found in the Pleistocene, millions of years after the Miocene. If they evolved, the LCA would most likely be found among the Miocene apes (hominoids).

Visual #12-18

The groupings of the known Miocene apes are by no means unanimous. For instance, some authors treat proconsulids as a separate group including *Afropithecus*, *Heliopithecus*, *Kalepithecus, Kamoyapithecus, Limnopithecus*, *Mabokopithecus, Morotopithecus*, *Nyanzapithecus*, *Rangwapithecus*, and *Turkanapithecus*. Others include proconsulids in Tribe Dryopithecinae, supposed to contain the ancestors of chimps and humans. (As of 2022, this tribe is considered to include at least 15 genera, which include at least 19 species.)

Out of all the following Miocene apes or monkeys, the only one proposed to have a strong link to any of the Oligocene forms is *Afropithecus*. It has several features in common with *Aegyptopithecus* from the Oligocene, though it is more than twice the size of *Aegyptopithecus* (Simons, 1995, 232).

Visual #12-19

All the following Miocene types are believed to be "sister" taxa. Though Initial Disorganization leads us to believe that many share common ancestry, none have been definitively identified as "parents" of two or more taxa. Nevertheless, evolution posits that each major type of animal had to come from ancestors from which it eventually became recognizably different. There should be many sister taxa that have common ancestors, as well as the parents ancestral to both. The history of life would be represented as a single tree, in which each branch was derived (evolved) from the branch below it.

Initial Complexity, on the other hand, assumes that the major types of animal were brought into existence distinct from each other by a Creator not subject to natural processes. Since there would probably be a great deal of genetic variation built into each type, many types might appear to be sisters. However, there should not be any parent taxa ancestral to two or more major groups. The history of life would be represented as a whole forest of trees in which each tree might have several branches, but no two trees would have a common ancestor.

The following Miocene primates are listed in more or less chronological order according to the evolutionary time scale. A careful reading will reveal that only one of these (*Afropithecus turkanensis*) is considered to show a strong connection to Oligocene forms and only two (*Gigantopithecus blacki* and *Ardipithecus ramidus*) are said to have a strong connection to those of the Pleistocene.

1. PROCONSUL / EKEMBO. (23-14 Ma, early to middle Miocene hominoid)

UGANDAPITHECUS - sometimes used as a junior synonym for certain Proconsul/ Ekembo specimens.

Visual #12-20

Consul was a circus chimpanzee on display in London in 1909, known for smoking cigarettes and riding a bicycle. When a fossil believed by some to be the ancestor of chimpanzees was discovered, his name was the basis of the designation *Proconsul*, which means "before consul."

The African Miocene genus *Proconsul* is considered a member of Tribe Dryopithecinae. It is dated by different writers between 23 to 14 Ma (Benefit & McCrossin, 2015, 516; McNulty et al., 2015, 44). Depending on whose classification we follow, it includes up to 6 species, ranging in size from macaques (10 kg) to small gorillas (50 kg). The uncertainty in the number of species included is because it is impossible to do

breeding experiments on fossils. Some (e.g., Almécija et al., 2021, 6) believe *Ekembo* is an alternate name for *Proconsul*. The two types are very similar, but some place *Ekembo* (formerly known as *P. heseloni*) in a different clade because of differences such as teeth. Some researchers classify a number of the specimens as a different genus, *Ugandapithecus* (McNulty et al., 2015, 47-48).

Proconsul is presently believed to have included multiple species including *P. africanus*, *P. meswae*, and *P. major*.

- The type specimen of *P. africanus* is a fossil known as M 14084. It was originally called *Dryopithecus africanus*, based on a skull numbered KNM-RU 7290, dated at 18 Ma by discoverer Mary Leakey. It had a smaller snout than its supposed ancestor, the Oligocene *Aegyptopithecus*. Its brain size was estimated at 167.3 cc, larger than monkeys of similar size but much smaller than chimps (400cc) or gorillas (500cc).

  P. africanus is believed to have possessed characteristics of both apes and monkeys. It had a shorter forearm relative to upper arm than a chimp, with limb proportions similar to modern quadruped monkeys. Its forelimbs would have been able to rotate more than living monkeys. It had grasping hands and feet, apelike shoulder and elbow, and monkey-like wrists. Its lumbar vertebrae were gibbon-like but its spine and ilium were more monkey-like than apelike. Its anatomy would have allowed it to walk on top of branches, but would have made it difficult to swing or hang (suspensory locomotion) (Miller & Rossie, 2018, 8). It did not show the gradual loss of a tail, but had clearly defined sacral vertebrae indicating no tail at all (Alba & Moyà-Solà, 2009, 79). Since one of the main distinctions between monkeys and apes is the presence or absence of a tail, we can be confident that it was fully ape, though displaying a mosaic mixture of characters of living apes (Murdock, 2003) However, it did not exhibit the peculiar characteristics of humans.
- *P. major* is known from the specimens M14331, KNM-CA 2127, KNM-SO 584, KNM-SO 396, KNM-SO 404, and KNM-LG 452. It is estimated to have been almost the size of female gorilla, about 50 kg (110 lb) (Miller & Rossie, 2018, 8).

In general, *Proconsul* seems to have had modern hominoid features but a pronograde (more or less forward leaning) monkey-like body plan. (Moyà-Solà et al., 2004, 1342; Almécija et al., 2021, 6) The vertebrae are similar to those of Old World monkeys (MacLatchy et al., 2000, 176). However, the feet and hind limbs resemble those of *Pan*, the chimpanzee (Simons, 1995, 224).

In several of the proposed genera and species, the fossil evidence is limited enough that some of the proconsulids are classified differently by different paleontologists. They are often assigned to different genera or even families.

- *P. heseloni* and *P. nyanzae* are alternately classified *Ekembo heseloni* and *E. nyanzae* (McNulty et al., 2015).

  P. heseloni is known from fossils designated KNM-RU 7290 and KNM-RU 2036. Rib fragments (KNM-RU 2036) are monkeylike (Moyà-Solà et al., 2004, 1340).

  P. nyanzae is known from KNM-RU 1676-77, as well as the type specimen of M 16647, a crushed palate containing most of the teeth as well as a lower face and a partially complete skeleton designated KNM-MW 13142 (Hammond & Almécija, 2017, 829). At first *P. nyanzae* was assigned to *P. africanus* but was reclassified because of its larger size. (Whybrow & Andrews, 1978, 115-6)
- Some consider *P. gitongai* as a different genus, *Ugandapithecus gitongai*, though this is disputed.

Because of the variation in fossils and in the number of proposed genera, there is still uncertainty about whether *Proconsul* is hominoid (ape) or stem catarrhine (McNulty et al., 2015, 42; Andrews & Harrison, 2005, 105). Those who take simple-to-complex evolution for granted believe that the proconsulids must have shared a LCA with other Miocene apes. However, no specific earlier genus has been proposed as the LCA. Nor are the proconsulids considered a direct ancestor of the living apes or humans, but rather, a sister taxon.

2. ALOPHIA METIOS (21.9 Ma, early Miocene Anthropoid monkey)

Visual #12-21

Catarrhines such as Old World monkeys are believed to have diverged from apes about 30 Ma. However, for many years Miocene monkey evolution from 30 Ma to 18 Ma was documented by only a single tooth from Uganda and one from Tanzania (Rasmussen et al., 2019,6051).

In 2019 Rasmussen et al. reported the discovery of a monkey from Kenya dated in the middle of the Miocene at 22 Ma. *Alophia metios* was described based on a partial right mandible containing four lower teeth P4 M3, and a partial left mandible from a different individual containing two lower molars M2 M3. The rest of the skeleton is unknown. The teeth were considered morphologically more primitive than any previously known cercopithecoid such as the victoriapithecids from later Miocene deposits (Rasmussen et al., 2019, 6052-4). However, the fossil evidence is so limited that some consider it a sister group to the victoriapithecids rather than an ancestor. Until more fossils are discovered, it will be difficult to be certain. At any rate, it occurs later in the fossil record than several named types of apes and so is not likely to be their ancestor.

3. MOROTOPITHECUS. (20.6 Ma, early Miocene hominoid of uncertain affinity)

Since the fossil evidence seldom contains postcranial fragments, comparisons between *Ekembo* and *Afropithecus*, *Heliopithecus*, *Equatorius*, *Nacholapithecus*, *Nyanzapithecus*, *Rangwapithecus*, *Turkanapithecus*, *Mabokopithecus*, *Xenopithecus* and the like are difficult. They are usually based on teeth, jaw fragments, and occasionally skull fragments. *Morotopithecus* has a greater amount of fossil evidence, allowing for comparisons of the skull, vertebrae, and femur (McNulty et al., 2015, 46).

M. bishopi was originally attributed to *P. major* but is now considered more derived (evolved) than *Proconsul* (Andrews & Harrison, 2005, 106) The first *Morotopithecus* fossils consisted of facial and dental fragments found between 1961-1965 at Moroto, Uganda, including one definite mandible with several teeth and a second possibly belong to same type. These were combined with later discoveries such as a single lumbar vertebra designated UMP 67.28 resembling those of extant hominoids, into *M. bishopi* (Young & MacLatchy, 2004, 172).

The vertebrae were found in water deposited sediment, some overlain by basalt. (Gebo et al., 1997, 401; Young & MacLatchy, 2004, 172) A 1994 discovery designated MUZM 60 included a fragment of a scapula (shoulder blade). MUZM 80 consisted of six fragments of the left & right femora. The orientation of the head of the femur was not like living Old World monkeys, but instead like some Miocene and extant hominoids, and also like the New World spider monkey *Ateles* (MacLatchy et al., 2000, 162-9). Depending on which bones are used in analysis, body mass estimates range from 20 to 54 kg, or about 44 to 118 lbs. (MacLatchy et al., 2000, 169).

There are not enough *Morotopithecus* fossils to lead to unanimous agreement as to whether it was closer to the great or lesser apes (Young & MacLatchy, 2004, 164). Some (e.g., Gebo et al., 1997) believe it is a primitive member of the line leading to great apes. However, since it is dated about 9 million years earlier than the lesser ape

Hylobates, others consider it a lesser ape (MacLatchy et al., 2000, 180).

Young and MacLatchy analyzed data for over a dozen extinct and extant ape species and came up with 15 equally parsimonious (i.e., equally likely) cladograms. Most of these suggest that *Morotopithecus* was a primitive member of the great ape clade, but that it lived 6.3 million years before the split of great and lesser apes. (If this were the case, *Morotopithecus* would have had to remain unchanged for over 6 million years while many other apes were undergoing drastic changes all around it.) Young and MacLatchy's work shows that the fossil characters researchers choose as more important can lead to very different conclusions about phylogenetic positions (Young & MacLatchy, 2004, 168-178). Its true phylogeny cannot be known for certain.

Morotopithecus seems to have had hominoid (ape) features but a pronograde monkey-like body plan (Almécija et al., 2021, 6; Moya-Sola et al., 2004, 1342). Nevertheless, it is considered the oldest hominoid to share several features with the living apes. However, because of differences with the Miocene apes such as *Sivapithecus* (12.5-8.5 Ma), *Proconsul/Ekembo* (21-11 Ma), from which it differs in the skull, vertebrae, and femur (McNulty et al., 2015, 46), *Afropithecus* (18-16 Ma), and *Equatorius* (15.6 - 15.4 Ma), MacLatchy et al. believe that Miocene apes may belong to a different radiation than the one that led to the living hominoids. Both Gebo et al., MacLatchy et al., and Moyà-Solà et al. believe *Morotopithecus* is not the ancestor of all living hominoids but instead a sister taxon (Gebo et al., 1997, 403; MacLatchy et al., 2000, 180; Moyà-Solà et al., 2004, 1342)

4. LIMNOPITHECUS (20.4-11.6 Ma, Early Miocene hominoid, considered small bodied ape)

Visual #12-22

The species *Limnopithecus legetet* was named in 1933 based on two fragments found at the Legetet Formation in Kenya, an adult mandible containing two teeth and a juvenile mandible fragment containing a canine and several premolar teeth. In 1943 several more fragments were included and a second species (*L. evansi*) was named. The two were later reclassified into a single species and then separated again. Other fragments have been identified at several locations in Kenya and Uganda (Cote et al., 2016, 3-7).

In the 1950's the fragments of *Limnopithecus* were interpreted by some as gibbon-like, resulting in it being regarded as a potential gibbon ancestor (Tuttle, 2006, 16). Others believed the remains represented a stem hominoid or primitive catarrhine. Later in the 1950's, several postcranial and craniodental remains attributed to at least four individuals were added to the genus. These included fragments of two ribs, a scapula, and a humerus (Tuttle, 2006, 16-17). However, in the 1970's some began to interpret the new fossils as closer to *Dryopithecus* (*Proconsul*) (Cote et al., 2016, 4). The fossils of *L. macinnesi* were transferred to a new genus and species, *Dendropithecus macinnesi* (Harrison, 2002, 312; Tuttle, 2006, 18), one of the dendropithecoids.

Limnopithecus is known mainly from jaw fragments and teeth. It has been subdivided, combined with other genera, and re-elevated to its own genus several times. Some have considered it to have affinities with *Proconsul*, others with other hominoids, and others with hylobatids. Its postcrania are more similar to platyrrhines (New World monkeys) than catarrhines, leading some to doubt its status as a hominoid at all (Benefit, 1999, 168). In short, very little is known about it with certainty.

5. VICTORIAPITHECUS / PROHYLOBATES (19-15 Ma early-middle Miocene, Old World cercopithecoid monkey)

As noted earlier, *Victoriapithecus* has long been considered one of the older known

Visual #12-23

monkeys (Andrews & Harrison, 2005, 105). It is not a cercopithecoid (Old World monkey) itself, but has been proposed as a transitional form close to the last common ancestor (LCA) of apes and cercopithecoids. This hypothetical LCA is supposed to have lived some time during the Oligocene.

The *Victoriapithecus* fossils found at Maboko Island are in sediments dated about 19 Ma (Pozzi, 2011, 209), an estimated 10 million years after the unknown LCA. The Maboko fossils are said to have features that are "clearly intermediate" between those of the LCA and the modern Old World monkeys. However, there are enough differences (e.g., skulls) that it is placed into its own family, Victoriapithecidae. This is considered a sister taxon of the cercopithecoids rather than an ancestor (Benefit, 1999, 155-9).

Victoriapithecus is dated about 10 million years after another Miocene primate supposed to be a stem catarrhine, the Oligocene *Saadanius* (dated about 28 Ma) (Pozzi et al., 2011). Since *Victoriapithecus* is much different but is also supposed to be a stem catarrhine, it would have had to stop evolving for millions of years while other monkeys evolved all around it. Or, another alternative is that it is not the ancestor of catarrhines.

Prohylobates means "pre-gibbon." *P. simonsi* is known only from a single partial mandible containing two teeth (Benefit, 2008, 247) It is similar enough to *Victoriapithecus* that some say the two names may represent the same genus. However, several features are different between the two genera. The two are at least considered to belong to the same family (Benefit, 2008, 248-9).

There are no proposed transitional forms connecting this family to later apes or monkeys. Belief that the victoriapithecids are their ancestor is based entirely on the belief that evolution must have happened.

6. DIONYSOPITHECUS (18-17 Ma, Early Miocene Cercopithecoid monkey)

Dionysopithecus is a Miocene primate found in East China, known only from a partial upper jaw with 3 teeth (Bernor et al., 1988, 339; Ciochon & Etler, 1994, 48). The known parts are similar to *Micropithecus* of Uganda. Several isolated teeth found in Pakistan were first believed to be from *Dionysopithecus* but were later eliminated as too dissimilar (Harrison, 2016, 98-99).

7. AFROPITHECUS turkanensis (18-16 Ma, Middle Miocene, believed to be a hominoid)

Afropithecus was first identified from 46 fossil fragments from the Miocene of north Kenya, (Benefit & McCrossin, 1995, 239) in the Lake Turkana region. It is considered a primitive monkeylike hominoid, with an orientation that follows a typical monkey-like pronograde pattern (Moyà-Solà et al., 2004, 1342). It has a complex of primitive facial features similar to *Aegyptopithecus*, indicating that the face remained unchanged for 17 million years (Simons, 1995, 222).

Because *Afropithecus* does not share many postcranial characteristics with living hominoids, it is believed to represent a different radiation than the one which gave rise to them (MacLatchy et al., 2000, 160). That is, it is considered an evolutionary side branch leading to a dead end.

8. DENDROPITHACOIDEA: DENDROPITHECUS / SIMIOLUS / MICROPITHECUS (18-14 Ma, early - middle Miocene) Considered stem catarrhines.

Visual #12-24

A common grouping system places the Miocene forms believed to be apes or ape ancestors into three superfamilies: Dendropithecoidea, Proconsuloidea, and Hominoidea (Harrison, 2002, 315). Dendropithecoids are a distinct group consisting of three genera considered close relatives. From largest to smallest they were *Dendropithecus, Simiolus*, and *Micropithecus.* All were small catarrhines with body mass averaging between 4–8 kg. They are regarded as a sister taxon to proconsuloids, hominoids, and

cercopithecoids (Harrison, 2013, 388).

Three species of *Simiolus* have been named. They are comparable to *Dendropithecus*, though a bit smaller (Harrison, 2013, 390).

Simiolus is believed to have been an agile tree dweller, with movement similar to platyrrhines (New World monkeys) (Miller & Rossie, 2018, 8; Harrison, 2013, 390).

> The *cranium* means the skull. *Postcranial* indicates other parts of the skeleton not associated with the head.

Its postcranial fossils are so similar to platyrrhines and propliopithecids that is questionable whether it could have been associated with hominoids (Benefit, 1999, 168).

9. PLIOPITHECUS / EPIPLIOPITHECUS. (15-10 Ma, Early - Middle Miocene)
Thought to be a basal catarrhine monkey rather than a hominoid.

Visual #12-25

Corruccini et al. (1976, 206) have proposed the Miocene *Pliopithecus* (*Epipliopithecus*) *vindobonensis* as a possible ancestor of the hylobatids such as gibbons, though it has no known connection to any living descendants.

At least four species of *Pliopithecus* have been named. They are known from fragments of several individuals including jaws, isolated teeth, a single partial skull, fragments of limbs, vertebrae, scapulae, and an ilium (hip bone). The skull had a wide ring-like external ear opening similar to that found in New World monkeys. There was a hole in the elbows for passage of nerves to the inside of the joint. Neither of these features is found in Old World monkeys or apes. One example is the Miocene *Pliobates cataloniae*, which is believed to be a lesser ape but does not have the hole in the elbow (Benefit & McCrossin, 2015, 515).

- The foot of *Pliopithecus* is significantly different from that of gibbons (Corruccini et al., 1976, 213).
- Its shoulder girdles are well preserved, showing no indication of the initial development of hominoid features.
- It is believed to have had a tail. (Corruccini et al., 1976, 211)
- The skull has a mosaic of features. For instance, the brain is twice as large relative to estimated body mass as the later *Victoriapithecus* and is most nearly like modern Old World monkeys.
- The Oligocene monkey *Saadanius* is dated 28 Ma, but *Pliopithecus*, dated millions of years later, has an external ear considered more primitive.

  Proconsul (18Ma), *Victoriapithecus* (15Ma), and living Old World monkeys and apes also have an ear structure similar to *Saadanius*. If the ears are the result of evolution rather than design, the constricted bony ear tube would have had to evolve independently multiple times in Old World monkeys and apes by parallel random mutations.

As a result of such features, many believe *Pliopithecus* was a basal catarrhine not connected to gibbons.

10. EQUATORIUS. (15 Ma, middle Miocene hominoid)

Visual #12-26

Between 1990 and 1992, researchers found 41 teeth believed to come from at least five individuals at the Kipsaramon site in Kenya. 38 of the teeth were first attributed to *Kenyapithecus* but were later transferred to a newly created genus, *Equatorius*. The reclassification greatly reduced the number of samples supporting previous descriptions of *Kenyapithecus africanus* (Kelley et al., 2008, 471).

Besides the teeth at Kipsaramon, other fossils were later found at a higher location (BPRP #122). These included a mandible fragment containing several teeth and a partial skeleton (Kelley et al., 2002; Sherwood et al., 2002, 63-64). Unlike many other primate

fossil finds that consist only of teeth, this one included over 20 fragments of the postcranial skeleton. Among these were parts of several arm and leg bones, parts of the upper skeleton, a vertebra, several finger and toe bones, and a number of rib fragments (Sherwood et al., 2002, 64-70). Study of the fossils led to the conclusion that *Equatorius* was fairly large, at least as large as *Nacholapithecus* (Takano et al., 2020, 146).

Though the bones comprised a fairly small percentage of a complete skeleton, they did allow researchers to conclude that *Equatorius* was monkey-like rather than apelike.

- Extant apes have an orthograde (upright) posture. However, *Equatorius* had a typical monkey-like pronograde pattern (Moyà-Solà et al., 2004, 1342; Almécija et al., 2021, 6).
- The ribs of apes are more curved than those of monkeys, but the fragments of the first rib of *E. africanus* are monkeylike (Moyà-Solà et al., 2004, 1340).

Equatorius is considered more derived, i.e., more evolved, than *Proconsul* (Andrews & Harrison, 2005, 106). Whatever it was, it was more monkeylike than *Proconsul*. It is not believed to be on the line of human descent.

One might be skeptical of the conclusions about the overall body characteristics of the kenyapithecines due to the limited number of postcranial fossils. At any rate, there is no clear affinity with either modern apes or monkeys.

11. NACHOLAPITHECUS (15 Ma, Middle Miocene hominoid)

Visual #12-27

Nacholapithecus kerioi, named for the Nachola Formation of Kenya, was where one of the most complete primate skeletons (KNM-BG 35250) was discovered, though the skeleton is deformed. The only other fossils known other than the single skeleton are several isolated postcranial fragments, jaw fragments, and teeth (Harrison, 2010, 445). These include fragments identified as BG-14708, BG-17835, BG-14700, and BG-17840 (Kelley et al, 2008, 472) and lower spine fragments KNM-BG 42753I and KNM-BG 47687A (Kikuchi et al., 2016, 117). Based on these parts, the body mass was estimated at about 22 kg (Takano et al., 2020, 135). However, the ischium of the skeleton is fragmentary so it is not very useful in determining the anatomy of the torso (Morgan et al., 2015, 86).

Nacholapithecus is considered more derived (evolved) than *Proconsul* (Andrews & Harrison, 2005, 106). Based on the single skeleton and the scattered parts, researchers have concluded that:

- It had a longer premaxilla than *Proconsul* (Begun, 2007, 1275).
- Compared to *Proconsul*, it had "relatively larger forelimb bones, longer clavicle and scapular spine, and longer pedal rays" (Harrison, 2010, 447).
- It had several features found in hominoids such as the lack of a tail (Alba & Moyà-Solà, 2009, 79), but it had a pronograde monkey-like body plan (Almécija et al., 2021, 6; Moyà-Solà et al., 2004, 1342).
- Its elbow seems intermediate between that of early catarrhines and that of apes. If it was not created that way, (1) it was a transitional stage from primitive catarrhines toward living apes, or (2) it acquired the elbow structure through random mutations that produced parallel evolution (Takano et al., 2020, 147).
- It did not have the "full suite of suspensory features predicted to characterize fossil crown hominoids." In particular, its shoulders do not seem to have been capable of the full circular motion needed for ape brachiation through the trees (Patel et al. 2009, 770).
- The joints on its forelimbs are the size of the corresponding joints of chimpanzees, but the joints on its hind limbs are much smaller, closer to those of baboons.
- Its anterior palate was unlike those of hominids (Begun, 2007, 1286).

Its affinity to hominoids and catarrhines is somewhat contentious (Takano et al., 2020, 146). Some authors have classified it as a proconsuloid (subfamily Afropithecinae), while others place it alongside *Equatorius*, *Kenyapithecus*, and *Griphopithecus* in the griphopithecines or kenyapithecines (Takano et al., 2020, 146; Begun 2005, 2). It is unclear if it is closer to stem catarrhines, stem hominoids, or hominids (Harrison, 2010, 447). Because it had monkey-like pronograde orientation and "primitive" facial anatomy, some believe it is not a member of the great ape/human clade but is instead a stem hominoid (Moya-Sola et al., 2004, 1343). There is not sufficient fossil evidence to draw firm conclusions (Takano et al., 2020, 147).

Because of all its oddities, Begun (2007, 1285) describes *Nacholapithecus* as a "weird, unique fossil ape without a modern counterpart."

12. GRIPHOPITHECUS. (15-14 Ma, middle Miocene. Status as hominid or hominoid debated)

Visual #12-28

Fossils identified as *Griphopithecus* have been found in the middle Miocene of Turkey and Eastern Europe, as well as Kenya in Africa (Alba & Moyà-Solà, 2009, 80-81). However, it is known only from teeth and jaws (Andrews & Harrison, 2005, 107); Kelly et al., 2007). Because the evidence is so fragmentary, there is no consensus on its relationships with other fossil primates (Almécija et al., 2021, 7). However, it is often grouped with the kenyapiths (Alba & Moyà-Solà, 2009).

13. KENYAPITHECUS. (15-14 Ma, middle Miocene. Status as hominid or hominoid debated)

There has been a great deal of uncertainty regarding *Kenyapithecus* fossils. As the name implies, the first ones were found in Kenya. *K. wickeri* was first identified at Fort Ternan in that country in 1962. However, shortly thereafter a fossil maxilla previously identified as the type specimen of *Sivapithecus africanus* (BMNH 16649) was transferred to *Kenyapithecus*. Some authorities are not convinced that the transfer was correct and believe that it should either be transferred back to *Sivapithecus* or else should be considered *Proconsul nyanzae*. Excavations at Maboko Island in Kenya in the early 1980's later unearthed 34 teeth, a fragment of an ulna, and a fairly complete but deformed mandible attributed to a different species, *K. africanus*. More excavation in 1987-89 yielded 32 more specimens including another deformed mandible and multiple teeth (Benefit & McCrossin, 1992, 11).

In addition to the teeth and maxillae, a humerus (arm bone) was found at Fort Ternan (McCrossin & Benefit, 1997, 242). Based on this fossil and the aforementioned fragment of an ulna, *Kenyapithecus* is said to have had modern hominoid features but the pronograde (forward leaning) body plan typical of monkeys rather than the orthograde (upright) body plan of apes (Almécija et al., 2021, 6; Alba & Moyà-Solà, 2009, 80).

Yet another different species has been named in Turkey and Eastern Europe (Alba & Moyà-Solà, 2009, 80-81). *Kenyapithecus kizili* from Paşalar, Turkey is based on a partial left maxilla and several dozen isolated teeth. It is difficult to be certain about its overall body shape because little is known about it besides its dentition (Kelley et al., 2008, 469-470).

The transfers between genera underscore the fact that though there are a significant number of fossils attributed to *Kenyapithecus*, there is disagreement among authorities on how they fit into the ancestry of apes.

14. KAPI ramnagarensis (13.8–12.5 Ma, middle Miocene hominoid)

Visual #12-29

Kapi ramnagarensis has been identified as a small-bodied Miocene ape based on a single molar found in an area of river and stream deposits known as the Lower Siwaliks of Ram-

nagar, India (Gilbert et al., 2020). The tooth is gibbon-like, but as in other cases, it is impossible to draw firm conclusions about the entire species based on a single fragment.

15. KHORATPITHECUS (13 - 10 Ma, Middle Miocene hominid)

The Thai fossil *Khoratpithecus* (also reported to have occurred in Myanmar - Jaeger et al., 2011) is considered pongine but it is considered different enough from other Miocene hominoids to be classified as a unique type (Chaimanee et al., 2004, 441).

Khoratpithecus is known only from cranial and dental remains (Miller & Rossie, 2018, 9). Three species have been named.

- *K. chiangmuanensis* is based on isolated teeth.
- *K. piriyai* is based on a single partial mandible (lower jaw) containing several teeth (Chaimanee et al., 2006; Grehan & Schwartz, 2009, 1828). It had a U-shaped dental arcade (Chaimanee et al., 2004, 439).
- *K. ayeyarwadyensis* is based only on a partial left mandible containing lower teeth P3 - M2 (Jaeger et al., 2011, 2).

Until more fossils have been recovered, it will be difficult to be sure about the rest of the anatomy.

16. RAMAPITHECUS. (13.5-6.3 Ma, Middle to Late Miocene hominoid)

The first *Ramapithecus* fossils were found in India in 1932. For years, the total fossil evidence for this genus consisted of several teeth and jaw fragments, with incisors smaller than those of apes (Morris, 1974, 172).

Visual #12-30

The discovery of *R. brevirostris* in India in 1967-69 led to a change in interpretation of *Ramapithecus*. Until that time, no bones of the face, skull, or any other part of the body had been recovered (Simons, 1964, 50; Simons, 1969, 319; Simons & Pilbeam, 1971, 23). However, more complete samples showed that it did not have the parabolic dental arcade which had been assumed on the basis of the previous limited samples (Walker & Andrews, 1973, 313), but instead had the typical U-shaped jaw of an ape. Its jaws were shaped wrong for a human ancestor.

As a result of the later discoveries *Ramapithecus* was subsumed into the genus *Sivapithecus* (Patnaik, 2008, 197), and is now accepted as a junior synonym of *Sivapithecus* (Almécija et al., 2021, 6; Grehan & Schwartz, 2009, 1829; Andrews & Harrison, 2005, 107), perhaps the female form (*Encyclopedia Britannica*, 2015; Andrews & Cronin, 1982).

17. PIEROLAPITHECUS. (13 Ma, Middle Miocene hominid)

The great and lesser apes are commonly believed to have diverged around the Middle Miocene, but the LCA is unknown. The relationship between Miocene and extant apes is debated (Moyà-Solà et al., 2004, 1339).

One proposed ancestor is *Pierolapithecus catalaunicus*, considered one of the dryopiths (Almécija et al., 2021, 6). It is known from a face and partial skeleton including 83 bone fragments (Moyà-Solà et al., 2004, 1339) found in Catalonia, Spain, believed to be from a single individual. The skeleton is interpreted as indicating orthogrady (upright posture), and the broad and shallow thorax is more characteristic of apes than monkeys (Alba & Moyà-Solà, 2009, 78). Though the hands and wrists resemble those of modern apes (Miller & Rossie, 2018, 9), the hand does not indicate suspensory behavior, unlike the modern apes (Moyà-Solà et al., 2004, 1343).

Many features of the head of *Pierolapithecus* are different from all other known Miocene Eurasian hominoids including *Dryopithecus* (Moyà-Solà et al., 2004, 1339-40). However, it has other features shared with extant great apes, *Dryopithecus*, *Sivapithecus*, *Ankarapithecus*, and *Ouranopithecus*, but not with *Proconsul*, *Afropithecus*, or

Morotopithecus (Moyà-Solà et al., 2004, 1340).

Since the fragments are attributed to a single individual, it is difficult to draw firm conclusions about the genus. The uncertain evidence leads to contradictory hypotheses about its correct taxonomic position (Moyà-Solà et al., 2004, 1343).

18. MIOCENE APES (e.g., DRYOPITHECINES AND SIVAPITHECINES, 13.5-9 Ma) COMMONLY CONSIDERED HOMINIDS OR ANCESTORS.

Few authors allow for the possibility that multiple types of hominoids (apes) or hominids (considered ancestors or close relatives of humans) could have been directly created. Instead, most believe that humans share a LCA with chimps (CLCA) and farther back with gorillas (GLCA) and orangs, and even farther back, with the lesser apes.

No specific fossil type has been proposed as a transition leading to any of the above LCAs, nor has any specific type been proposed as a transition leading to the first humans, chimpanzees, gorillas, and orangutans. However, since those four types are first found in the Pleistocene, some authors would say that the LCAs should be sought among the Miocene apes, which are commonly grouped into the superfamilies Dendropithecoidea, Proconsuloidea, and Hominoidea (Harrison, 2002, 315).

Visual #12-31

A recent grouping of proconsulids includes *Dendropithecus*, *Micropithecus*, and *Simiolus* (the three genera usually classified as dendropithecines) as well as four species of *Proconsul*, one of *Afropithecus*, one of *Heliopithecus*, three of *Nyanzapithecus*, one of *Mabokopithecus*, one of *Rangwapithecus*, one of *Turkanapithecus*, one of *Morotopithecus*, two of *Limnopithecus*, one of *Kalepithecus*, and one of *Kamoyapithecus*. Others may be added or removed according to the opinions of later authors.

Some authors do not place proconsulids at the superfamily level but instead include them in a larger group known as the dryopithecenes. That practice will be followed herein. Some of the genera sometimes classified as dryopithecines include *Anoiapithecus*, *Danuvius*, *Graecopithecus*, *Hispanopithecus*, *Limnopithecus*, *Otavipithecus*, *Oreopithecus*, *Ouranopithecus*, *Nakalipithecus*, *Neopithecus*, *Pierolapithecus*, *Proconsul*, *Rudapithecus*, *Samburupithecus*, *Udabnopithecus*, and possibly *Griphopithecus* and *Kenyapithecus*. They are all grouped together because they have the same dental pattern.

a. Sivapithecines (13.5 - 7.5 Ma, Middle to Late Miocene hominid, possible Asian dryopithecine.)

Visual #12-32

Though sivapithecines are sometimes considered part of the dryopithecine group, they are associated more with Asia than with Europe and Africa.

Though the first definite orangutan (*Pongo*) fossils occur in the Pleistocene, several Miocene fossils such as *Sivapithecus* are considered pongine.

The skull of *Sivapithecus* is similar enough to the orang that it is considered a member of the same family tree (Miller & Rossie, 2018, 9). However, the lower jaw of *Sivapithecus* has several dissimilarities to the *Pongo* mandible (Chaimanee et al., 2004, 440-1). It is not considered an ancestor to *Pongo*, but instead a sister (Andrews & Harrison, 2005, 107).

Sivapithecus fossils were first discovered in the Siwaliks deposits of India and Pakistan. Three species names have been erected.

- *S. indicus* is known from a single cranium and lower jaw (Ciochon & Etler, 1994, 52-3) and a partial innominate (hip) bone (Morgan et al., 2015).
- *S. sivalensis* is known from a first upper incisor, right second lower molar, and third upper premolar (Patnaik, 2008, 200) and a partial femoral head (Morgan et al., 2015, 85).
- *S. parvada* is known from even fewer cranial and postcranial remains, plus

several molars (Grehan & Schwartz, 2009, 1829).

In general, the difference between the three named species has to do with size. *S. sivalensis* is slightly smaller than *S. indicus*, and *S. parvada* is the largest (Kelley, 1988). Some believe there is no compelling reason to separate *indicus* from *sivalensis* (Bhandari et al., 2018, 13-14). Many museums display a cast of the *S. indicus* skull reconstruction designated GSP 15000 (Geological Survey of Pakistan), first described in 1982 by Pilbeam (Pilbeam, 1982). However, a number of museums have recently begun to display a slightly different looking cast labeled *S. sivalensis*. This is not based on any new fossil material, but is simply a different arrangement of the fragments of GSP 15000 relabeled sivalensis rather than indicus.

Early paleomagnetic data had *S. indicus* dated 12.5-9.3 Ma, *sivalensis* 8.8 - 7.4 Ma, and *parvada* 9 Ma. However, these ages have been revised upward due to stratigraphic positions. Latest age estimates for *Sivapithecus* vary from 13.5 ma to 7.5 ma (Patnaik, 2008, 202).

b. Dryopithecines (12.5 - 9 Ma, Middle to Late Miocene hominid.)

Visual #12-33

The best known proposed LCAs for hominoids (and later, the hominids/hominins) are the dryopithecines, from the Greek word for "forest ape." (Some, though, view them as an evolutionary dead end.) Though dryopiths ranged from the size of gibbons to small gorillas, they are classified as members of the same tribe (a category higher than a genus but lower than a family) because they were all alike in dental pattern.

Different authorities have placed a number of genera besides *Dryopithecus* into Tribe Dryopithecinae. They include but are not limited to the well-known *Proconsul*, *Danuvius*, *Graecopithecus*/*Ouranopithecus* (discovered in Greece and Turkey, may be different names for the same genus – Ciochon & Etler, 1994, 55-57), *Hispanopithecus*, *Limnopithecus*/*Dendropithecus*, *Oreopithecus* (found in Italy), *Pierolapithecus* (based on a single cranium and parts of a skeleton from Spain), *Rudapithecus* (found in Rudabánya, Hungary), and possibly *Griphopithecus* and *Kenyapithecus* (Almécija et al., 2021, 6).

Most of the dryopithecines are known from Africa and Europe. However, the aforementioned smaller sivapithecine group (*Sivapithecus*, *Ramapithecus*, *Gigantopithecus*) most commonly found in Asia are usually included.

- Creationists believe that the dryopithecines lived around the world in similar environments until they were buried in a global flood. Since they were mobile and intelligent, they would have been able to avoid burial longer than many other types of animal and thus left a poor fossil record.
- Evolutionists, on the other hand, believe that they were evolving during the Miocene. Since they are known from Africa, Europe, and Asia, the ancestors in one of those areas one of them would have had to leave the forested ("dryopithecus" means "forest ape") area where they evolved, traveled across the arid Arabian region, and settled into a different forested area thousands of miles away to give rise to the other group.

Sivapithecines had some differences from the rest of the dryopithecines. They had thick enamel on their teeth. thick jaw bones, and are believed to have had baboon-like forelimbs. They are generally accepted as a sister taxon to orangutans. In contrast, dryopithecines had thin molar enamel and jaw bones and are believed to have had forelimbs suitable for hanging from tree limbs (Begun, 2005).

Since all the dryopithecines had the same dental pattern, Yale's McAlester

(1968, 136) believed the different sizes may have represented individual variation within a single genus. Eckhardt of Penn State (Eckhardt, 1971, 94-101) goes beyond this conclusion. Based on his extensive studies of teeth, he believes that several dryopithecines identified as separate genera were not only members of the same genus, but may have belonged to the same species.

Eckhardt's studies involved 24 different measurements on fossil teeth from one species of *Ramapithecus*, *R. punjabicus*. and two species that were at the time classified *Dryopithecus* (*D. sivalensis* and *D. indicus*) but are now classified *Sivapithecus*. He then made the same 24 measurements on chimpanzees at the Yerkes Research Center and in the wild in Liberia. He found that the range of variation between the three fossil species was less than that in the chimpanzees in 14 measurements, the same in one, and more for nine. The differences in those nine points were very small. Thus, the three fossil species actually showed less overall variation than the one living species. He then compared the teeth of 5 other species of *Dryopithecus* and of *Kenyapithecus*. On the basis of his calculations relating to the teeth, he says that there is little reason to classify the dryopithecines as more than a single phyletic line. He believes that the variations within the teeth are probably due to genetic variability within a genus or species rather than to the development of separate species. He also reports that European and African fossils of *D. fontani*, *D. laietanus*, *D. africanus*, *D. nyanzae*, *D. major*, *Oreopithecus*, *Kenyapithecus* as well as other *Dryopithecus* and *Ramapithecus* fossils from Asia did not have a range of variation significantly greater than the of the modern chimpanzee. As he puts it, "On the basis of these tooth-size calculations, at least, there would appear to be little evidence to suggest that several different hominoid species are represented among the Old World dryopithecine fossils of late Miocene and early Pliocene times." (Eckhardt, 1972, 101).

Harvard's Pilbeam at first believed that the dryopithecines were the ancestors of hominids (Pilbeam, 1968, 1335). However, he later changed his opinion and said that the dryopithecines were already too apelike to produce the hominids. Teilhard agrees that *Dryopithecus* was too far committed toward "to have been able to produce hominians without first 'retreating' some degrees toward a type more 'generalised' than theirs" (Teilhard, 1965, 45). That is, *Dryopithecus* was too apelike to be a human ancestor either.

Dryopithecus / Rudapithecus. (12.5 - 11.1 Ma Middle to late Miocene hominid.)

Visual #12-34

Three species of *Dryopithecus* have been named in Europe, though there is no known ancestor for any of them.

- *D. fontani* from France was described based on fragmentary mandibles, isolated teeth, and part of the shaft of a humerus. A specimen from Catalonia, Spain was described based on only a lower face and partial femur. It was a bit larger than *Pierolapithecus* (Alba & Moyà-Solà, 2009, 79). A few teeth have also been found in Czechoslovakia (Pilbeam, 1969, 127).
- *D. brancoi* from Rudabanya, Hungary was described based on a left lower molar M3, a partial cranium RUD 77, mandibles and maxillae with several teeth, and isolated teeth. For a while it was designated *Rudapithecus hungaricus*, but that name is now considered to be as junior synonym for *Dryopithecus brancoi* (Kordos & Szeged, 2000, 71).
- *D. crusafonti from* Spain was described based on one badly preserved left

maxilla and a separate left canine fragment, along with 15 isolated teeth and a mandible (Grehan & Schwartz, 2009, 1827).

A small number of very fragmentary vertebrae have been used to link *Dryopithecus* to living apes (MacLatchy et al., 2000, 177; Moyà-Solà et al., 2004, 1342). It seems to have had hands and wrists resembling those of modern apes (Miller & Rossie, 2018, 9), and may have been suited for climbing & suspensory (tree-hanging) locomotion (Andrews & Harrison, 2005, 109).

Some consider *Dryopithecus* to be an ancestor to chimpanzees but not gorillas. If this were the case, the gorillas would have had to independently evolve arm and shoulder structures that would allow suspensory motion as well as independently evolving similar wrist structures. Their putative ancestors *Dryopithecus* and *Pliopithecus* show no indication of the beginning of such adaptations (Corruccini et al., 1976, 208). As a result, some consider them as sister taxa of australopithecines and African apes. Others (Grehan & Schwartz, 2009, 1827) Almécija et al. (2021, 7) believe the dryopiths could either be stem hominids or evolutionary dead ends. Without more fossil evidence, there is no way to be sure.

19. PLIOBATES / HYLOBATES (13 Ma - present. Lesser apes similar to Gibbons. Status debated - thought to be a stem catarrhine rather than a hominoid)

Visual #12-35

Modern gibbons and siamangs (*Hylobates*) first appear in the Pleistocene (Ciochon & Etler, 1994, 51). They are supposed to have branched off from a LCA shared with African apes about 18 Ma, but Miocene fossil evidence on their origin is extremely rare (Alba & Moyà-Solà, 2009, 77, 81).

The first known lesser ape fossil, *Pliobates cataloniae*, is a small-bodied Miocene ape discovered near Barcelona in 2011. It is unmistakably gibbon–like (Alba et al., 2015). It was described based on a single partial specimen designated IPS58443. There were a total of 70 fragments from the whole body. Parts of the head include most of the cranium with parts of a neurocranium, basicranium, muzzle, and right maxilla. Other smaller fragments were found nearby, including a very small fragment of a mandible with upper cheek teeth similar to those of other Miocene catarrhines. The muzzle is fairly well defined, but because the skull was fragmented the cranial capacity is not measurable. It is estimated between 60-75 cc. Depending on which body parts are used, the animal's mass is estimated anywhere between 2.5 and 6.3 kg, or about 6 to 14 lbs.

There is no known LCA for the lesser and great apes, leading those who believe they evolved to disagree about which appeared first. Alba et al. believe *Pliobates* is closer to crown (most highly evolved) hominoids than other Miocene small bodied catarrhines, but others believe *Pliobates* is closely related to the stem (ancestral) catarrhines. That is, rather than the great apes being descended from the lesser, the lesser evolved from the great. (Alba et al., 2015, aab2625-1-9). Young and MacLatchy believe that rather than being a descendant, living gibbons (*Hylobates*) are a sister taxon to the African apes (Young & MacLatchy, 2004, 163). Some consider *Pliobates* the ancestor of nothing else but gibbons (Benefit & McCrossin, 2015, 516).

Gibbons orangs, gorillas, chimps, and humans are all supposed to have branched off from the same LCA. However, there is a problem with the rates at which they are alleged to have evolved. Chimps and humans are supposed to have evolved at roughly the same rate as each other. We would expect gibbons to also evolve at a similar rate. According to the commonly accepted dating scheme, though, the gibbon-like *Pliobates* appears in rocks (Miocene) dated more than seven million years before the chimp-like

Australopithecus (Pliocene), commonly claimed to be a human ancestor. Thus, *Pliobates* would have had to evolve in a sudden leap while the unknown line leading to *Australopithecus* took about seven million years to make the same amount of progress.

While this could be true, it is not testable. Believing in stagnation among gibbons while human ancestors went through extreme evolutionary change is faith, not science.

20. *DANUVIUS. (11.6 Ma, Middle to late Miocene hominid)*

The majority of Miocene apes have been discovered in Asia and Africa. However, *Danuvius guggenmosi* is a European discovery from near the Danube River in Bavaria.

Visual #12-36

Danuvius is known from 38 fragments believed to come from four individuals. Twenty-one of these, or about 15% of a skeleton (Böhme et al., 2019, 6), are attributed to a single male. The bones include not only jaws and teeth, but also a complete ulna (lower arm bone) and a mostly complete tibia (shin bone) from the male and a partial femur (upper leg bone) from a female (Böhme et al., 2019, 2). The other parts are believed to be from at least two other individuals. Based on the teeth and jaw fragments, *Danuvius* is considered dryopithecine.

- Size estimates for *Danuvius* range from 17 to 31 kg, between siamangs and bonobos.
- Several features such as the hand are believed to show the ability for suspensory (limb hanging) behavior, but some think it could also walk bipedally (Böhme et al.. 2019, 2-5).
- The ulna of *Danuvius* is comparable to that of *Pan paniscus*, the bonobo (Böhme et al., 2019, 3).
- The limb measurements of *Danuvius* are not unique Based on reconstructed bone lengths, two other Miocene apes, *Oreopithecus* and *Hispanopithecus*, are believed to have a tibia-to-ulna ratio comparable to *Danuvius* (Böhme et al.. 2019, 3).

One of the most interesting claims about *Danuvius* is that unlike living apes, it had arms and legs of similar length. However, this claim is based on a single lower arm bone (ulna) and leg bone (tibia) believed to be from one male, and a partial upper leg bone (femur) from a single different individual, a female. One might question the validity of assuming that these two individuals, whose age we do not know, represent every male and female member of the species.

Whereas the idea of complex-to-simple allows for the possibility that the dryopithecines (perhaps *Danuvius*) were separate created types, those who believe in simple-to-complex evolution require transitions leading to and from each type. Before we can draw firm conclusions about the possible transitional status of *Danuvius*, we need many more fossils than just these few.

21. *ANOIAPITHECUS (10.9 Ma, Middle Miocene - possible afropithecid/hominid)*

Anoiapithecus brevirostris was discovered in Catalonia, Spain. It is known from a single adult skull IPS43000 preserving the face, partial mandible, and several teeth. The rear of the skull is missing. There are no postcranial fragments.

The muzzle is unusually short for Miocene hominoids or living apes (Moyà-Solà et al., 2009, 9601-6). Of course, since we only have one partial skull to work form, we cannot tell if this was characteristic of all the members of the species.

Some believe *Anoiapithecus* belongs to the same genus as the previously mentioned *Pierolapithecus* (Alba et al., 2013, 574).

22. *MICROCOLOBUS tugensis (10.5 - 8.5 MA, middle Miocene monkey)*

Visual #12-37

The Miocene monkey *Microcolobus tugensis*, named for the Tugen Hills of Kenya, is dated 10.5 - 8.5 Ma. It is known only from molars and mandible fragments. (Benefit & Pickford, 1986.) It is thought to be similar to the living colobus monkey.

23. ANKARAPITHECUS (10.7 - 10.6 Ma, Middle Miocene hominid)

The genus *Ankarapithecus* from central Turkey contains only a single species, previously known as *Sivapithecus meteai*. It is generally considered pongine, but is based on mandible and skull fragments only. The features suggest affinity with the great apes (Moyà-Solà et al., 2004, 1340), specifically with with orangs (Grehan & Schwartz, 2009, 1826).

24. CHORORAPITHECUS (10.5-10 Ma, Middle Miocene hominid)

The East African genus *Chororapithecus abyssinicus* was found in the Chorora Formation of Ethiopia (once known as Abyssinia). It has been described as a large bodied ape, but the description is based on isolated teeth only. The fossils include one canine and eight partial molars from at least three individuals.

There is no fossil record for either gorillas or chimps (Miller & Rossie, 2018, 9), which appear suddenly in the Pleistocene. The teeth of *Chororapithecus* are similar to those of gorillas, but it is considered too specialized to be their direct ancestor. It is the first Miocene ape species considered a possible member of their clade, that is, a sister group of the gorillas rather than an ancestor (Suwa et al., 2007, 921-4).

Many evolutionists believe the LCA of the great apes and lesser apes lived about 15 Ma; the orangutan/African ape LCA about 12 Ma; the gorilla/chimp LCA 7.5 Ma; the chimp/human CLCA about 5 Ma, (Ciochon & Etler, 1994, 51). Creationists believe the major types of apes were created as separate kinds rather than evolving from a LCA. At any rate, *Chororapithecus* is considered too recent to be the common ancestor of the living apes.

25. HISPANOPITHECUS (10-9.5 Ma, Middle Miocene hominid)

Visual #12-38

Hispanopithecus laeietanus was identified based on fragments of a skull, upper and lower jaw, isolated teeth, and a partial skeleton including several limb fragments, found in northeastern Spain. Some consider it a junior synonym of *Dryopithecus* (Grehan & Schwartz, 2009, 1828). As noted previously, it is believed to have a tibia-to-ulna ratio comparable to *Oreopithecus* and *Danuvius* (Böhme et al.. 2019, 3).Whether it is the same genus as *Dryopithecus* or is a valid taxonomic group, it is assigned to Tribe Dryopithecinae (Almécija et al., 2021, 6).

26. NAKALIPITHECUS (10 Ma, middle Miocene hominid)

The East African species *Nakalipithecus nakayamai* is known only from 11 isolated teeth and a right jaw fragment containing three molars. It is believed to have been about the size of a female gorilla (Miller & Rossie, 2018, 9).

Since the LCA of the living apes is estimated to have lived at least 12 Ma (Ciochon & Etler, 1994, 51), *Nakalipithecus* is considered too recent to be their ancestor.

27. LUFENGPITHECUS. (9-7 Ma, late Miocene hominid)

Visual #12-39

Though there are no known transitional fossils leading from some ancient ancestor to orangutans, several types have been proposed. Besides the previously mentioned *Sivapithecus* (Indo-Pakistan Miocene) and *Khoratpithecus*, another candidate is *Lufengpithecus* (Chinese and Thai Middle Miocene). Both are generally considered pongine, i.e., somewhat close to orangutans.

Several species of *Lufengpithecus* have been named in China, distinguished mostly by size and geography (Begun 2007, 1299). Two species are known from partial skulls and a number of teeth; the third also includes a few postcranial remains.

- *L. keiyuanensis* was named from isolated teeth and fragments of a mandible and maxilla (Grehan & Schwartz, 2009, 1828; Ji et al., 2013, 3776).
- *L. hudienensis* is represented by YV0999, a partial skull recovered at Shuitangba.

It is believed to be from a younger individual than ZT 299 below (Ji et al., 2013, 3776). It contains only the front of the skull, including most of the face. (Image at Kelley & Gao, 2012, 6883.)

- *L. lufengensis* was discovered near Shihuiba, China. It was originally named based on a single mandible containing two incisors and a molar. There was a report in 1978 that said it also included some postcranial remains. These included a partial scapula, clavicle, radius, a metatarsal (foot) bone, and two toe bones (Begun, 2007, 1299). However, as of 2022 these fragments have not been described in the literature.

  Two *lufengensis* skulls were found later. Skull PA 644, believed to be from an adult, was at first attributed to *Sivapithecus* but later ascribed to *L. lufengensis* (Etler, 1984, 23; Ji et al., 2013, 3772-6). Though the face of PA 644 can be made out, it is badly damaged. (Image at Kelley, 2002, 380.) The partial cranium ZT 299 from Shuitangba, believed to be from a young juvenile, is also attributed to *L. lufengensis*. It preserves most of the facial skeleton (Ji et al., 2013, 3772-4) but none of the back of the skull. (Image at Ji et al., 2013, 2774.) It is considered possible that PA 644 and ZT 299 represent different species (Ji et al., 2013, 3778).

  PA 644 is damaged enough to produce uncertainty about the appearance of adults. Skulls YV0999 and ZT 299 are believed to be from young juveniles. Since the shape of the face and head change so much between baby and adult primates, it is difficult to be certain from these two how adults would have looked.

Lufengpithecus had no special resemblance to any known Asian or African hominoids. In particular, despite the fact that its teeth are closer to *Pongo* than those of *Sivapithecus*, it is likely excluded from *Pongo* ancestry because of face & skull differences (Chaimanee et al., 2004, 441). Besides, it occurs too late in the fossil record to be the ancestor of orangs (Ciochon & Etler, 1994, 57). It is now considered a sister taxon to *Pongo* rather than an ancestor (Harrison et al., 2002, 220).

28. *OREOPITHECUS (9-7 Ma, Miocene hominoid - status as hominid disputed)*

Visual #12-40

Oreopithecus bambolii is known form only two areas of Italy, Tuscany and Sardinia, in an area believed to once have been an isolated island in the Mediterranean (Andrews & Harrison, 2005, 110).

Though there are reported fossils of several dozen individuals in the area, only one consists of more than a few fragments. IGF11778, the fossil referred to when *Oreopithecus* is described in the literature, is one of the few relatively complete postcranial skeletons of any fossil primate anywhere (Rook et al., 2004, 348). Despite the relative completeness, the fossil is embedded in a lignite (coal) slab and is very badly deformed, almost completely flattened (Hammond et al., 2017, 830-1).

- Micro CT scans show that the labyrinth (inner ear) of *Oreopithecus* is close to that of the great apes, especially chimpanzees, but is regarded as lower than that of humans (Rook et al., 2004, 351-2).
- *Oreopithecus* was one of the only apes (the other is possibly *Dryopithecus*) with lumbar vertebrae like those of living hominoids. (MacLatchy et al., 2000, 177; Moyà-Solà et al., 2004, 1342)
- *Oreopithecus* teeth are unlike those of any other fossil ape (Andrews & Harrison, 2005, 109).
- Because the skeleton is so badly crushed, scientists cannot be certain whether *Oreopithecus* was a cercopithecoid (Old World monkey), stem hominoid, or hominid (Almécija et al., 2021, 8).
- Based on the single deformed skeleton, *Oreopithecus* is believed to have had an

orthograde (upright) orientation. There are four opposing hypotheses as to why it had this posture.

1. It acquired this posture by adaptation to climbing and below-branch movement.
2. It became upright as it adapted to bipedal locomotion.
3. It acquired its features through convergent evolution in which both *Oreopithecus* and similar types happened to acquire corresponding features through random mutations (Rook, 2009, 69).
4. It was designed that way.

Many of the dryopithecines were described based on teeth and jaw fragments. Only a few are known from cranial fragments. Postcranial fragments such as ribs, vertebrae, or limb bones are extremely rare. Oreopithecus is the only one known from a fairly complete skeleton.

Due to the lack of fossils other than the single skeleton, *Oreopithecus* remains a puzzle. Some believe it is somehow related to the dryopithecines, while others believe it is a sister taxon.

29. OURANOPITHECUS/GRAECOPITHECUS (9.6-7.4 Ma, late Miocene hominid)

Visual #12-41

Fossils of *Ouranopithecus* have been found in Greece and Turkey. The original description was based only on cranial and dental remains (Miller & Rossie, 2018, 9), though *O. macedoniensis*, found in Greece, is based on a partial skull, several mandibles, isolated teeth, and two finger bones. *O. turkae* from Turkey is based only on maxilla and several partial mandibles (Grehan & Schwartz, 2009, 1829).

As noted previously, *Graecopithecus* and *Ouranopithecus* may be different names for the same genus. Only one nearly complete face is known for the latter (Ciochon & Etler, 1994, 55-57). It is difficult to be certain about the phyletic position of these fossils based on such scanty evidence.

30. SAMBURUPITHECUS (9.5 Ma, late Miocene. Homin(o)id status uncertain)

Samburupithecus kiptalami is known only from a single fragment of a maxilla (upper jaw) from the Samburu Hills of Kenya, designated KNM-SH 8531. The tooth shape is considered to resemble that of gorillas. (Benefit & McCrossin, 1995, 241; Miller & Rossie, 2018, 9; Kunimatsu et al., 2016, 1-3).

Even those who believe apes and humans evolved from some ancient LCA consider *Samburupithecus* too recent to be ancestors of living apes (Miller & Rossie, 2018, 9). Some consider it likely a late-occurring stem hominoid (Almécija et al., 2021, 7). However, with only a single fossil to go on, it is difficult to draw any firm conclusions about the animal's anatomy.

31. GIGANTOPITHECUS (8.85-6.3 Ma, Miocene to Pleistocene hominid.)

Gigantopithecus is one of the few hominoids that appears in more than one geologic stratum. Three species have been named, two from the Late Miocene (*G. giganteus* and *G. bilaspurensis*) and one (*G. blacki*) from the Pleistocene. All three are believed to be pongine (McMenamin, 2015, 4). The largest is known as *Gigantopithecus blacki* or *Indopithecus giganteus* (Patnaik, 2008, 198; Almécija et al., 2021, 9).

We know almost nothing about *Gigantopithecus* except the size and shape of the teeth and lower jaw (Patnaik, 2008, 206). The teeth are isolated and highly worn (Grehan & Schwartz, 2009, 1827).

a. Miocene Siwalik specimens from Pakistan/India.

Sivapithecus giganteus is the oldest name attributed to Late Miocene fossils related to *Gigantopithecus*. The fossil was described based on a **single lower molar** M3 from the Late Miocene of the Siwaliks, differing from *Sivapithecus* mainly in size.

Later, a mandible with similar sized teeth was discovered and given a new species name, *Gigantopithecus bilaspurensis*. However, many researchers later combined the mandible with the lower molar previously used to identify *Sivapithecus giganteus*. *G. bilaspurensis* and *S. giganteus* are now commonly considered together under the species name *Gigantopithecus giganteus* (Begun, 2007, 1298; Kelley, 1998, 305-6; Patnaik, 2008, 202; Bhandari et al., 2018, 2).

G. bilaspurensis, also known as *I. giganteus*, is known from the partial lower jaw fossil CYP359/68, found in the Siwaliks of India and Pakistan. It is dated anywhere between 9.23 - 5.5 Ma (Patnaik, 2008, 199-202; Grehan & Schwartz, 2009, 1827). *G. giganteus*, dated 7.8 - 7.5 Ma, is based on a right lower second or third molar (Grehan & Schwartz, 2009, 1827). As of 2008, there was no known cranium nor any parts of the skeleton that might tell us how it moved (Patnaik, 2008, 206).

b. Pleistocene G. blacki specimens from China.

Visual #12-42

A different species attributed to *Gigantopithecus*, *G. blacki,* was identified in rocks dated millions of years later, in the early and middle Pleistocene of China (Patnaik, 2008, 197-8; Zhang & Harrison, 2017, 157). These are dated around 2.0 - 0.3 Ma. No known fossils document movement of *G. giganteus* to China and subsequent evolution to the much larger *G. blacki*.

G. blacki is believed to be the largest hominoid that ever lived, perhaps up to 10 ft tall. It was first identified based on a right lower third molar and a partial mandible (Grehan & Schwartz, 2009, 1827; McMenamin 2015, 4). Since then perhaps two thousand teeth but only four partial mandibles have been discovered. Not a single bone is known from the rest of the body (Zhang & Harrison, 2017, 153-9). Zhang and Harrison note that the teeth seem to have been gnawed by something. They speculate that porcupines (which need calcium for their quills) may have eaten all the rest of the bones.

The date assigned to *G. blacki* would make it contemporary with orangs and *H. erectus* (Ciochon & Etler, 1994, 58), ruling out *blacki*, at least, as their ancestor. It is considered a sister taxon to the orangs.

> Movie trivia: Rudyard Kipling's novel *The Jungle Book* did not have the giant orangutan-like character King Louie, the king of the apes. He was added in the later Disney movies of the same title and was based on *Gigantopithecus blacki* (Dove, 2008).

32. MESOPITHECUS. (8.2 - 2.6 Ma, Late Miocene Old World cercopithecoid monkey)

Visual #12-43

Mesopithecus is known from cranial fragments and partial skeletons found in Europe, and also from jaw fragments, teeth, and part of an upper femur in the Pakistani Siwaliks. The femur is assumed to be associated with the other parts.

Mesopithecus has a number of similarities to some modern monkeys such as *Simias*, *Papio*, *Theropithecus*, and *Macaca* (Jablonski et al., 2020). However, it appears too late to be considered ancestral to any of the other Miocene monkeys. The models assembled in museums could represent an extinct monkey, or they could simply be from fossilized fragments of modern monkeys.

33. SAHELANTHROPUS. (7 Ma, Late Miocene hominid/hominin)

There are no universally accepted fossil ancestors of gorillas. However, one fossil that seems similar to them stands out. *Sahelanthropus tchadensis*, nicknamed Toumai ("hope of life") was discovered in the Late Upper Miocene of Chad in 2001 (Smithsonian Institute, 2015; Andrews & Harrison, 2005, 104). It was first identified from a single partially crushed skull, five jaw fragments, and a few teeth. The skull is very apelike, sim-

ilar to a gorilla or chimpanzee and having a brain capacity of only about 350 cc. Later discoveries include two more partial lower jaws, one left lower canine, and a crown of the right P3. (Brunet et al., 2005, 753; Grehan & Schwartz, 2009, 1829). The fossils are believed to come from at least 6 individuals. A partial femur TM 266-01-063 has also been attributed to *Sahelanthropus* (Macchiarelli, et al., 2020).

Based on the single crushed skull, the cranial capacity of *S. tchadensis* is estimated to be less than that of the proposed later human ancestor *Australopithecus* discussed in the next chapter. The neurocranium is long and low. The upper face is extended with a large supraorbital torus (eyebrow ridge). The jaws do not jut out as much as those of than gorillas or chimps (Suwa et al., 2009, 68e1). Also, based on this one skull, *Sahelanthropus* is believed to have been a bit larger than *Ardipithecus*. Both had a short but projecting muzzle. Their muzzles differ from *Australopithecus* and early *Homo* (Suwa et al., 2009, 68e5).

Several paleontologists (e.g., Wolpoff et al., 2006) have noted that the skull bears strong similarities to a female gorilla. If it were considered to belong to the line of human ancestry, it would rule out the well known "later" australopithecines as being on the path to humans because its brow ridge is much closer to that of humans than theirs.

Since *Sahelanthropus* was dated by its discoverers at about 7 million years ago, many say that it is a possible ancestor of the African great apes. Some consider it close to the LCA of humans, chimps, and gorillas (Brunet et al., 2005, 753-4). However, the fossil evidence is so limited that it is impossible to draw firm conclusions.

34. LACCOPITHECUS (7 Ma, late Miocene pliopithecoid monkey)

Visual #12-44

Like *Lufengpithecus*, *Laccopithecus* is from Lufeng in China. It is based on fossil evidence consisting of a nearly complete face, 14 upper and lower jaw fragments, 14 tooth rows, 67 isolated teeth, and one finger bone (Ciochon & Etler, 1994, 52; Harrison, 2016, 97).

Laccopithecus has been proposed as a possible ancestor for the gibbon-like lesser apes. However, it has a number of characters considered primitive and not found in the catarrhines considered more evolved, but instead shared with other pliopithecoids. In particular, its cranium is similar to the only other known pliopithecoid cranial specimens, *Pliopithecus vindobonensis*, *Pliopithecus zhanxiangi*, and *Anapithecus hernyak*. Rather than a hylobatid, *Laccopithecus* is generally accepted as a late surviving pliopithecoid, i.e., a primitive catarrhine (Harrison, 2016, 97). It has no connection with any known later forms.

35. ORRORIN tugensis (6-0 - 5.7 Ma, late Miocene hominid/hominin)

As of this writing, only one species of *Orrorin* has been named, *O. tugenensis* from the late Miocene of Kenya (Andrews & Harrison, 2005, 104). The species was named based on two fragments of mandibles designated BAR 1000'00a & b, isolated teeth, and a fragment of a femur designated BAR 1002'00 (Grehan & Schwartz, 2009, 1828; Andrews & Harrison, 2005, 111).

Though *Orrorin* is often mentioned as the possible first hominin, it is based on such a small amount of evidence that it could be either an unknown hominoid with no living descendants, or a precursor of humans or chimps or gorillas (Haile-Selassie, 2001, 180).

35. ARDIPITHECUS kadabba (5.8-5.2 Ma, late Miocene hominid/hominin) See also the Pliocene *Ar. ramidus* in the next chapter.

Ardipithecus is one of the extremely small number of primate genera found in more than one geologic stratum. Two species have been named: *Ar. kadabba* from the very late

Miocene, and *Ar. ramidus* from the Pliocene. ("Kadabba" means "oldest ancestor" and "ramidus" means "root" in the Afar language used where the fossils were discovered.)

The first *Ardipithecus* fossils, found in the Middle Awash of Ethiopia, were given the species name *Ar. ramidus* and were dated 4.4 Ma in the Pliocene. More *Ardipithecus* fossils were found later in rocks dated hundreds of thousands of years older at 5.2-5.8 Ma (Miocene) and attributed to a second species, *Ar. kadabba*. *Ar. ramidus* will be dealt with more extensively in the next chapter, which deals with Pliocene and Pleistocene apes.

Ar. kadabba is believed by some to be close to the LCA of chimps and humans (Andrews & Harrison, 2005, 104). However, there is not much evidence for it. It is based primarily on teeth and jaw fragments, plus three partial finger phalanges (finger bones) and one from a toe (Semaw et al., 2005, 301-2). Its total fossil evidence consists of less than 3 dozen fragments (Haile-Selassie, 2001, 179-180). There are no skulls or vertebrae.

- Some believe *Ardipithecus* was too far committed in the direction of apes to be a human ancestor, but too different from the living apes to be considered their possible ancestor (Gee, 1995).
- Some believe it is not a member of the chimp clade because it shares many characters with non-chimp hominids (Haile-Selassie, 2001, 180). Thus, it is considered by some to be an adaptive cul-de-sac.
- Some believe that rather than being an ancestor of *Pongo*, *Gorilla*, *Pan*, and *Homo*, it may be a sister group (Lovejoy et al., 2009a, 104).

Though most of the fossils considered best documented are listed above, paleontologists continue to discover new bones and name new genera and species. These include such names as *Platodontopithecus*, *Fanchangia*, *Barberapithecus*, *Crouzelia*, *Egarapithecus*, and others. Out of all the Miocene types, though, *Ardipithecus* is the only one commonly associated with the line supposed to lead to humans.

IV. CHAPTER SUMMARY.

Visual #12-45

I. Young-earth creationists generally interpret suites of fossils as ecological communities that were buried together, which would be most likely if they lived in the same environment. Those in the higher strata represent the most mobile and intelligent forms that would have been able to escape being buried the longest in the rising waters of the Flood.

II. Humans are not believed to have come from any sort of modern monkeys, but from some sort of extinct apes. These in turn are supposed to have evolved from a Last Common Ancestor shared with some sort of extinct monkey-like catarrhines.

III. Primates are found in the Cenozoic Era of the Phanerozoic Eon. Within that Era, they occur in the Paleogene and Neogene Periods. The first undisputed primates occur in the Paleocene, Eocene, and Oligocene Epochs, followed by supposed descendants in the Miocene, Pliocene, Pleistocene, and Holocene (Recent) Epochs.

IV. Lack of pre-Eocene primate fossils.

There are no undisputed primate fossils in any geologic layer lower than the Eocene.

- Creation: this is because the fossils in the strata represent ecological communities. Because the Paleocene and lower layers would have had an environment inhospitable to primates, few of them would have been buried in those layers.
- Evolution: primates are not preserved below the Eocene because they had not evolved yet.

V. Anthropoids include any type of primate with a more or less human form.

- The five orders of New World monkeys are not associated with human ancestry.

- Old World monkeys (cercopithecoids) are native to Africa and Asia. There are no known connections from them to humans, though evolutionists insist that such a connection must have existed some time in the prehistoric past.
- Hominoids include lesser apes, great apes, humans, and their supposed closely connected ancestors.
- Hominids are a subgroup of hominoids that excludes the lesser apes.
- Hominins are supposed human ancestors, not including living apes.

VI. Miocene monkeys and apes.

Visual #12-46

Dozens of genus and species names have been assigned to Miocene ape and monkey fossils. The number has changed repeatedly as different writers erect, combine, reclassify, and eliminate the names in their publications.

- Out of all the Miocene primates, the only one proposed to have a strong link to any of the Oligocene forms is *Afropithecus*, which is twice the size of *Aegyptopithecus* but has several similarities. However, neither is considered closely connected to humans.
- Many if not most of the Miocene higher primate fossils are from Asia and Europe. The great majority were identified from teeth, jaw fragments, and occasionally other bone fragments. Only a handful are known from parts of skeletons. Not a single one has been identified from a 100% complete skeleton.
- Miocene apes range in size from *Micropithecus* (believed to be smaller than any living ape) to *Proconsul major*, estimated to be almost the size of a female gorilla, to *Gigantopithecus*, larger than any known living ape.
- Out of all the Miocene primates, only one genus is also found in the next higher stratum, the Pliocene. The Miocene species *Ardipithecus kadabba* is based on less than three dozen fossil fragments, none of which are from the skull or vertebrae. It is not found in the Pliocene, though a different species attributed to the same genus is. *Ar. ramidus* will be dealt with in the next chapter. Many consider *Ardipithecus* an evolutionary dead end.
- Out of all the Miocene hominoids, almost none except *Gigantopithecus* is found in higher strata. It skips the Pliocene and reappears in the Pleistocene.

Visual #12-47

- The cladograms for Miocene monkeys and apes show dozens of sister taxa, but there is no way to test them to see if any are ancestors of any others.