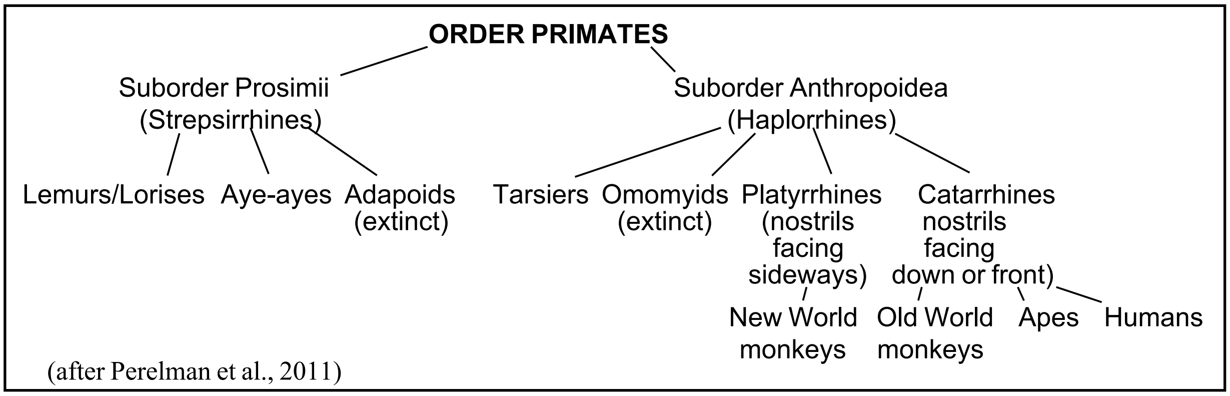
CHAPTER 9 - LOWER PRIMATES AND MONKEYS

Along with monkeys, apes, lemurs, lorises and similar types, humans are classified as members of Order Primates. In the Linnaean system, the order is broken down as follows.

Visual
9-1



(after Perelman et al., 2011)

Either primates were created as such or else they evolved from some lower type of mammal.

I. WHY WOULD ANYTHING EVOLVE?

Visual
9-2

A. USE AND DISUSE OF BODY PARTS vs. MUTATIONS.

In the early 1800s, Lamarck proposed that as body structures in animals were built up through use or atrophied through disuse, the changed would be passed on to the next generation. This belief has been thoroughly falsified by experimentation. Physical features acquired, lost, or modified through use and disuse of body parts cannot be passed on to the next generation. Nevertheless, the idea still seems to underlie many hypotheses. For instance, some (e.g., Boyer et al., 2017, 203-212) believe that the bone structures of early primates were shaped by leaping vs. climbing behavior. This is plausible in an individual, but it would have no effect on future generations. Any individuals that forced their bone structures to change by leaping or climbing would not pass the modifications on because their DNA would not be changed.

Ignoring the question of how some primitive Mesozoic mammal acquired its genetic information in the first place, the DNA would need to undergo at least thousands of mutations in order for it to evolve into primates. The error correcting mechanisms would have to allow thousands of beneficial mutations to slip through uncorrected. Each set of mutations would have to build on the previous ones, with each transition allowing the animals to stay alive despite the major structural changes taking place.

Not a single known mutation has ever increased the amount of genetic information in DNA. Nevertheless, the mutations in the line evolving into primates would have had to add a great deal of beneficial information to the evolving animals. The accumulation of so many mutations would almost certainly not happen in a single generation. Thus, it is reasonable to expect that at least a few of the transitional stages would be preserved as fossils.

B. NEED FOR PARALLEL AND COMPLEMENTARY MUTATIONS.

Visual
9-3

Like all mammals, primates reproduce sexually. Thus, each evolving type would have had to come from predecessors in which one or more males acquired a significant number of mutations leading in the direction of the new type. However, mutations are almost always recessive. Thus, in order for new features to be expressed in offspring, one or more females at the same time and place would have had to acquire a significant number of mutations that were the same as those of the males.

Acquiring only identical mutations would not be be sufficient, though. Each type of monkey or ape can only breed with those of its own type. The error correcting mechanisms of each new evolving type would have to allow a significant number of complementary mutations to slip through in one or more males and one or more females at the same time and place so that the reproductive systems would still be able to function together. This process would have to repeat for each step of the evolution of the primates.

II. DIFFICULTY IN CLASSIFYING FOSSILS.

It is often difficult to determine whether two or more fossils consisting of a few fragments represent the same species or genus. Biologists define a species as a group whose members can breed only with each other, but sometimes individuals within the same genus but belonging to different species can breed together. Examples would be lions (*Panthera leo*) with tigers (*Panthera tigris*), lions with leopards (*Panthera pardus*), and jaguars (*Panthera onca*)with leopards.

Visual # 9-4

Since we can do breeding experiments on living animals, it is easy to determine whether they belong to the same species. Even so, there can be a great deal of variation between two individuals of a single species. For instance, the 7 foot 4 inch tall wrestler "Andre the Giant" and the 2 foot 8 inch actor Verne Troyer ("Mini-me" from the "Austin Powers" movies) had vastly different features yet would have been equally capable of fathering a human child. Despite the differences in appearance and proportion, they belonged to the same species.

There is no way to perform breeding experiments on extinct animals. Paleontologists must simply take educated guesses about whether two fossils represent the same species or even genus. In many cases, they are working with such fragmentary material, e.g., a single tooth (Smith et al., 2006, 11223), that it is difficult to be confident about their conclusions until more material becomes available. In at least one case, an upper and lower jaw were placed in two separate genera until paleontologists realized they belonged to the same species (Simons, 1997, 184).

III. SCARCITY OF PRIMATE FOSSILS.

Visual # 9-5

If fossils form by slow, gradual, uniform processes over millions of years then erode away as they come to the surface, the most recent creatures should have the best fossil record. They do not. Primate fossils most often consist of teeth, sometimes associated with fragments of skulls or jaws. There are occasionally a few pieces of other bones, but even then the fossils are almost always disarticulated, i.e., broken apart. They are almost always buried in water deposited sediment.

The scarcity of fossils is apparent for lower primates, but even more so for hominoids (apes) and hominids (the line supposed to lead to humans). Nevertheless, despite the lack of transitions leading up to each type, elaborate "family trees" have been constructed. As Gillette (1943) put it, these trees

Visual # 9-6

> "are empty forms which consist of nothing but assumed roots, trunk, many limbs which grow in number through the years, and human twigs terminating the trunk which are supposed to connect with the assumed roots... Biologists are, of course, confessedly evolutionists, but it is really remarkable how little evidence they admit in support of their position."

Things have not changed much since then. Reader wrote (1981) that all the fossils of alleged human ancestors known today "would barely cover a billiard table." Commenting on the trees drawn to show man's evolution, he says,

> "Ever since Darwin's work inspired the notion that fossils linking modern man and extinct ancestor would provide the most convincing proof of human evolution, preconceptions have led evidence by the nose in the study of fossil man."

Science Digest's Lyell Watson (1982) tells us that

> "...all the physical evidence we have for human evolution can still be placed, with room to spare, inside a single coffin."

Andrea Dorfman (1984) agrees:

> "For all their painstaking efforts to trace the origins of man, paleoanthropologists have collected only a few thousand bones, representing 30 million years of hominoid [ape and human] evolution."

Paleontologists have been working diligently in the decades since those statements and have probably found several thousand extra bones. Perhaps they would now fill two coffins or cover two billiard tables.

Some of the most complete subhuman primate skeletons are:

Visual # 9-7

- The Eocene prosimian *Darwinius masillae*, discovered crushed but recognizable in a gravel pit at Messel, Germany;
- The Eocene adapiform *Notharctus*, discovered in Wyoming;
- A single almost complete but disarticulated Pleistocene skeleton found with modern animals designated IGC-UFMG 05, attributed to *Caipora bambuiorum* in Bahia, Brazil, twice the size of any living New World monkey but similar to spider monkeys (Cartelle & Hartwig, 1996);
- A single fairly complete (though badly damaged and broken into pieces) skeleton of the tiny Chinese Eocene tarsier-like *Archicebus* (Ni et al., 2013).

There have undoubtedly been billions of primates in the world so far, but we have only a handful of complete skeletons of any primate from strata lower than the Pleistocene, the layer in which Neanderthals are found. The elaborate family trees constructed to show our evolution are based on only a few thousand disarticulated bones, which may represent only a few dozen or hundred individuals.

There are two contradictory explanations for the scarcity of primate fossils:

- ***Initial Disorganization: Lack of Fossils is due to Accident.***

  Visual # 9-8

  Initial Disorganization includes the uniformitarian idea that geologic processes always happen at slow, steady, uniform rates. Fossils are formed when animals or plants die and fall into a body of water a few at a time, then are gradually covered in sediment. The sediment turns into rock over millions of years, then erodes away to expose the fossils. The suites of fossils represent time periods.

  The scarcity of primate fossils is purely accidental. The animals were not in the right place at the right time to be fossilized.

- ***Initial Complexity: Lack of Fossils is due to Catastrophic Conditions.***

  Rapid, catastrophic events (such as a global flood) were responsible for much of the fossil record. Large numbers of animals and plants could be killed, ripped apart by turbulence, and buried under massive sedimentary layers within a short time.

  Rather than representing time periods, suites of fossils found together most likely represent ecological communities buried together under catastrophic circumstances. The communities in the sea (Cambrian through Devonian) would be most likely to be buried and fossilized. Those around sea level (Carboniferous and perhaps Permian) would have a good chance of being fossilized also.

  The land-based biomes would be less likely to be buried in their original locations. As the flood waters were rising, the most mobile and resourceful creatures, such as primates, would probably be able to escape death for the longest time and would be less likely to be trapped in sediment. Thus, they would leave fewer fossils, and even those would tend to be isolated.

Neither explanation can be tested.

IV. RECAP OF PROPOSED ANCESTORS OF THE LOWEST PRIMATES.

Depending which classification system we use, there are somewhere around 32 orders of mammals. Each is subdivided into families, genera, and species. Some of the orders are believed to be extinct, but most are alive today.

Living primates comprise about 15 families that include 60 genera (Ciochon & Etler, 1994). The "lower" primates include such forms as lemurs, lorises, tarsiers, aye-ayes, and the extinct omomyids and adapoids. Higher primates include monkeys, apes, and humans.

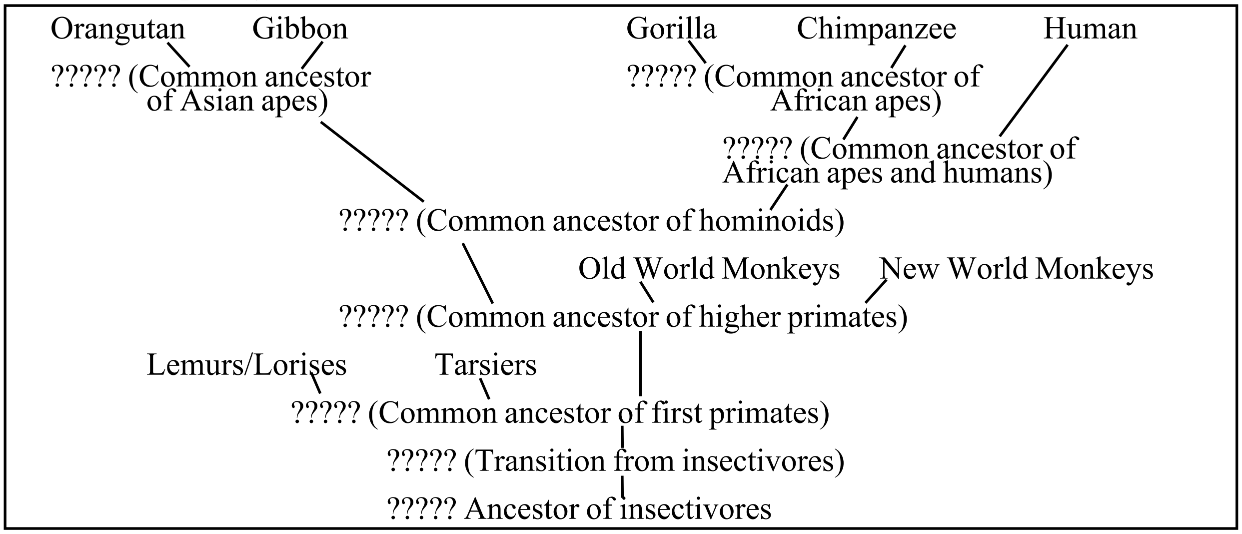
Visual # 9-9

As of this writing (2023), there are a few disputed Paleocene animals claimed by some to be primates, but there are no *undisputed* primates in any strata lower than Eocene. Most of the supposed ancestral lineages that led to primates are extinct.

- **Initial Complexity** (common design) leads us to believe that humans and each primate kind were directly created and have varied only within definite genetic limits. If this is correct, there should be a complete absence of transitional forms between any of the groups shown above. There should also be a resistance to basic change in each of the primate groups. They may exhibit variation within a kind, but there should be no traces of evolution from one kind to another.
- **Initial Disorganization** (common ancestry) leads us to believe that each type of primate has evolved from some lower type, starting with something perhaps similar to lagomorphs (rabbits and hares). Perelman, Johnson et al. (2011) give the most common scenario, that one of these evolved to something like tree shrews (Scandentia), which in turn evolved into Dermoptera (colugos or "flying lemurs"), then primates. If this is correct, the primate family tree should look something like the chart below. There should be far more transitional forms than terminal ones.

Each is a matter of faith and cannot be tested. However, we can look at the available fossils to see which seems more likely to be correct. Any time we are able to fill in transitional forms represented by question marks on the chart, it would support Initial Disorganization. If we find not just sporadic gaps but instead a systematic absence of transitional forms, it would favor Initial Complexity instead.

Visual # 9-10



Visual # 9-11

References to standard geologic time scales will be used throughout this material. Even if the geologic time scale is correct, evolution is nowhere to be seen in the fossil record.

A. MESOZOIC MAMMALS.

Visual
9-12

The morganucodonts and similar forms discussed in the last chapter are dated from the late Triassic to the middle Jurassic Periods of the Mesozoic Era.

- Morganucodonts are known mainly from teeth. There are very few skulls, jaws, legs, and so on from the rest of the body. Though it is possible that they were mammals, we cannot be sure unless we find more specimens. If one is someday found to have an Organ of Corti, the issue would be settled.

  If they really are mammals, they are not thought to have belonged to any living type, but are believed to have become extinct some time in the Middle Jurassic. No specific fossils have been proposed to connect them to other types of mammals of the Mesozoic Era, or the supposedly later Paleogene Period of the Cenozoic Era.

Visual
9-13

- The earliest *undisputed* mammals of the Mesozoic (monotremes, marsupials, rodents, and extinct forms such as multituberculates) are dated to the Late Jurassic or Cretaceous, several million years after the disappearance of the morganucodonts.

Visual
9-14

Most living mammals are called placentals because the preborn young are nourished through a placenta. Contrasting with these are the monotremes (platypus and echidna), which lay eggs, and marsupials. Because marsupials rely on a placenta for only a very short time, they are considered non-placental. They give birth to young that are not ready to emerge into the world but must crawl into the mother's pouch to develop further.

1. MARSUPIALS AND MONOTREMES.

- There are a number of Mesozoic monotremes, though only platypuses and four types of echidnas are known in the world today.
- Besides fossilized marsupials such as *Didelphodon*, there are about 250 known living species including kangaroos, wallabies, opossums, koalas, and marsupial equivalents of rats, mice, moles, cats, and many others.

Each type of monotreme and each type of marsupial appears in the fossil record suddenly with no transitions leading up to it. Except for the opossum, most of the early marsupials are believed to be extinct.

2. PLACENTAL MAMMALS.

Visual
9-15

Rodents, among the placental mammals, are found from the Mesozoic to the present. Other Mesozoic mammals include insectivorous types formerly called Order Insectivora, but now often subdivided into the orders Soricimorpha, Erinaceomorpha, and Chrysochloridea (Musser, 2018). No specific transitional genera have been proposed leading up to any of the Mesozoic types.

3. MULTITUBERCULATES.

Visual
9-16

Multituberculates, believed to be extinct, included forms such as the rodent-lie *Filikomys primaevus* (Weaver et al., 2020), *Meniscoessus*, *Ptilodus*, *Catopsbaatar*, *Taeniolabis*, and *Cimolodon*. We cannot determine if or where they fit into the above categories because their fossils give us no clue as to their manner of reproduction.

All of the Mesozoic animals including multituberculates appear suddenly. None of them show any kind of evolution from their first appearance in the Mesozoic to their last appearance in the Cenozoic or until the present.

B. PALEOCENE (EARLY CENOZOIC) MAMMALS.

Monotremes, marsupials, and rodents first appear in the Jurassic or Triassic Periods of the Mesozoic Era. The other known types of mammals appear from the Paleocene Epoch of the Cenozoic onward. They are dated more than 100 million years after the morganucodonts disappeared.

Paleocene placentals include fossils similar to shrews, moles, and hedgehogs (Musser, 2018). The animals of these types from Africa (*Aboletylestes, Cimolestes, Palaeoryctes, Afrodon, Garatherium*) are known only from a few teeth and jaws (Seiffert, 2010, 253-256). All are broken apart and buried in water deposited sediment. None are widely accepted as common ancestors of the primates because of the fragmentary nature of the evidence. The first *undisputed* primates do not appear until the Eocene.

Those who believe primates evolved from some simpler animals would probably identify the hypothetical ancestors as some sort of insectivorous type from the Paleocene. However, exactly what this ancestor was is a matter of speculation.

1. PLESIADAPIFORMES.

A group of Paleocene mammals called the Plesiadapiformes has been described as "primate-like." (The Greek prefix "plesi" means "near" or "almost," and the Adapiformes are undisputed primates found in the next higher level, the Eocene.) Some of the Plesiadapiformes have a number of characteristics similar to those of primates. However, they also had some significant differences from primates.

Visual
9-17

- The largest specimens were about 3 kg (Silcox, 2017, 1).
- Their teeth were like those of rodents, except that there was no self-sharpening edge. However, unlike the teeth of rodents, theirs are not believed to have kept growing throughout the animal's life. (Jehle, 2014)
- Fossils show that they had a broad and relatively flat rodent-like skull, a long snout, and eye orbits directed sideways. This is markedly different from the eye arrangement of living primates, in which the forward facing eyes allow 3-dimensional vision. (*ibid*.)
- The plesiadapiformes had a small braincase, long curved claws (unlike primates, which generally have fingernails), and a long bushy tail. Most evolutionists consider these "primate-like" insectivores to be comparable to living tree-shrews. They lack adaptations for fast leaping, have small brains compared to primates, and have enlarged incisors similar to those of rodents. (*ibid*.)

Plesiadapiformes lack certain diagnostic features of primates such as nails on the digits and a structure known as the postorbital bar near the eye socket (Silcox, 2017, 1). Many consider them a separate order from either insectivores or primates, perhaps most similar to Order Dermoptera, commonly known as colugos or "flying lemurs" (Silcox et al., 2017, 75). They are not considered direct ancestors of modern primates but perhaps a side branch. (Ciochon & Etler, 1994, 41)

Eleven families and more than 150 species of Paleocene plesiadapiforms have been named (Wilson Mantilla et al., 2021). The families include Micromomyidae, Picromomyidae, Picrodontidae, Microsyopidae, Toliapinidae, Palaechthonidae, Paromomyidae, Plesiadapidae, Carpolestidae, and Saxonellidae (Silcox et al., 2017).

Some of the best known genera are as follows.

- *Altiatlasius* is supposed to be one of the earliest primate ancestors, but the fossil evidence for it consists of only a few molars and a fragment of a jaw (Wayman, 2012; (Seiffert et al., 2010, 370-1). Because there are so few fossils, its position as related to primates is in dispute among paleontologists. Some such as Gingerich (1990) consider it a stem euprimate (higher primate), others a stem anthropoid (monkey), others an omomyid (a "sister group" of the New World monkeys) others a rodent-like plesiadapoid (see below), and others indeterminate (Bajpai et al., 2008, 11097; Williams et al., 2010, 4798-4803).

- *Purgatorius*, comparable in size to a small rat, is known almost entirely from teeth and jaws (Wayman, 2012; Wilson Mantilla et al., 2021). However, some isolated tarsal (foot) elements have been identified showing an ankle joint compatible with tree dwelling (Silcox et al., 2017, 79). Of course, many animals besides primates are tree-dwellers. *Ursolestes*, also known only from teeth, is very similar to *Purgatorius* except the teeth are about twice as large (Wilson Mantilla et al., 2021).

  Purgatoriids are not considered to have a close relationship with any other family of plesiadapiformes except possibly Micromomyidae (Silcox et al., 2017, 77).
- *Plesiadapis* is known from a great many teeth (DeBast et al., 2018), as well as a single fairly complete though disarticulated skeleton of *Plesiadapis cookei*, designated UM 87990 (Boyer & Gingerich, 2019). Museum displays fill in many of the ribs and tail vertebrae as well as missing shoulder and arm bones.

  The skull was reassembled from five fragments. The brain seems to have been very different in sensory development and size from any known living or fossil primate. The limbs are estimated to have been longer and lighter than the mammalian average. (Gingerich & Gunnell, 2005).

  Plesiadapis was much more like a rodent than a primate: the skull was rodent-like with eyes directed toward the sides rather than the front as in primates, and it is believed to have had claws rather than nails (Jehle, 2014).

The plesiadapiformes, though interesting, are considered to have been too derived (i.e., too evolved in the wrong direction) to be direct ancestors to the primates (Silcox et al., 2017, 88).

2. *APATOTHERIANS.*

Visual # 9-18

A group that some consider related to the plesiadapiformes, Order Apatotheria, ranges from the Paleocene to the Oligocene (McKenna, 1963), though their fossils have only been found in Europe and North America (Czaplewski & Morgan, 2015). Apatotheria contains only one family, Apatemyidae. This in turn includes six genera: *Unuchinia*, *Jepsenella*, *Labidolemur*, *Heterohyus*, *Sinclairella*, and *Apatemys*, from which the family receives its name.

The front teeth of apatotherians were similar to those of the plesiadapids. The evidence for Apatemyidae is ambiguous enough that they are not universally accepted as primates (Simpson, 1940, 185-204).

When first discovered, the apatemyids/apatotherians were identified as possible insectivores. With the discovery of more teeth and cranial and skeletal fragments, they have come to be regarded as highly specialized. They are considered a sister taxon to the plesiadapiformes (Silcox et al., 2010), and are not accepted as primates.

This does not prove that the claims about Paleocene types proposed as primate ancestors are automatically false. However, such claims are based on very scanty evidence. Every one of them is in dispute. There are no *un*disputed primates in any layer lower than the Eocene.

C. EOCENE INSECTIVORES AND PRIMATES.

The Eocene has a much better record of mammal fossils than the Paleocene, though the primate fossils are almost always disarticulated fragments. There are contrasting explanations for the larger number of Eocene fossils.

Initial Disorganization says that this is because there was a global extinction event such as an asteroid impact at the end of the Cretaceous that killed off the dinosaurs and most of the mammals. A 2016 study from the University of Bath (Longrich et al., 2016) estimated that about 93% of the Cretaceous mammals became extinct. The dinosaurs never came back, but the mammals eventually did.

Initial Complexity says that the suites of fossils do not represent time periods. Instead, they are the remains of ecological communities that lived at the same time but in different environments. Only a few types of mammals would find an environment suitable for reptiles hospitable, so their fossils would be less likely to be found with the reptiles.

1. LACK OF TRANSITIONS FROM NON-PRIMATE INSECTIVORES TO PRIMATES.

a. Incorrect sequence of fossils leading to primates.

Visual # 9-19

A common scenario for the origin of primates (Perelman, Johnson et al., 2011) has some unknown type of animals of Order Lagomorpha (the order that includes rabbits and hares) evolving into some unknown animals similar to tree shrews (Order Scandentia). These in turn are alleged to have evolved into some unknown more primate-like animals in Order Dermoptera. Some unknown members of this order (which includes such animals as colugos, commonly known as “flying lemurs” even though they are not lemurs and glide rather than fly) are then supposed to have evolved into some sort of primate similar to the prosimians.

The first true primates, the prosimians (lemurs, lorises, aye-ayes, etc.), all appear suddenly without any specific fossil types proposed as their common ancestors. Because primates and insectivores have many similarities in overall body shape, most students are told that primates came from some common ancestor that evolved from insectivores. However, Kelso tells us that

> “...the transition from insectivore to primate is not documented by fossils. The basis of knowledge about the transition is by inference from living forms” (Kelso, 1974, 142).

Some problems with the above scenario of lagomorphs to scandentians to dermopterans to primates:

Visual # 9-20

i. *Lagomorphs*. The first lagomorphs (rabbits, hares, etc.) are found in the early Eocene (Lopatin & Averianov, 2008, 131; Asher et al., 2005, 1091-4). They are represented by the first “eulagomorph” identified so far, *Arnebolagus leporinus*, from the Eocene of Mongolia (Lopatin & Averianov, 2021). Since lagomorphs are supposed to have evolved into dermopterans and then scandentians and finally prosimians after hundreds or thousands of transitional steps caused by mutations, they should appear before any of the other three types. However, lagomorph fossils are contemporary with prosimians rather than millions of years earlier. The dermopterans appear millions of years *later* than the scandentians supposed to be their descendants, and the scandentians also appear millions of years later than their alleged descendants the prosimians.

ii. *Dermoptera.* If they are ancestors, dermopterans (e.g., colugos) should appear earlier than prosimians in the fossil record. However, the earliest known member of this order is *Dermotherium,* known from a partial fragment of mandible from *late* Eocene. (Rose, 1975, 676; Marivaux et al., 2006) This is millions of years after the date of the first prosimians.

iii. *Scandentia* (tree shrews) are divided into the families Tupaiidae and Ptilocercidae. The earliest type sometimes identified as belonging to this order (though disputed) is the Middle Eocene *Eodendrogale parva*. However, most fossil tupaiids are from the Miocene (Li & Ni, 2016, 1), tens of millions of years later than the prosimians.

iv. Prosimians (strepsirrhines) and *haplorrhines*, supposed to be the most highly evolved in this series, should be the latest. However, they are among the earliest. Lemurs and lorises (prosimians), first occurring in the early Eocene, are dated ca. 56 MA alongside the tree shrews. Also appearing in the early Eocene are tarsiers, considered more advanced than prosimians. None has any documented ancestors.

b. Major differences between tupaiids and primates.

Visual # 9-21

As of this writing (2023), there are no specific candidates for the common ancestor of primates among lagomorphs or dermopterans. One of the scandentians has been proposed, though: a tree shrew of order Scandentia and genus *Tupaia*, also first found in the Eocene. Though no fossils document a transition leading from it to the prosimians, it is similar to them in some ways. However, there are also major differences.

Visual # 9-22

i. *Hands.* The tree shrew's paws have a fan-shaped arrangement of digits which can only grasp by digging in with claws. Primates have opposable thumbs which allow for precise gripping.

ii. Eyes. Unlike primates, the tree shrew's eyes are on opposite sides of its head. This gives it much less of an overlap in left and right vision (McAlester, 1968).

iii. Maternal care. The only time the female tree shrew visits her young is when she nurses them, for only about ten minutes out of each forty-eight hours (Martin, 1982, 28). This is in sharp contrast to the primates' elaborate maternal care.

iv. Gestation. Tree shrew gestation is about 45 days, less than half as long as primates of comparable size.

v. Milk fat. Tree shrew milk has a fat content of about 25%. In primate milk the fat content never exceeds 5% and is usually in the range of 1-3% (Martin., 1982, 30)

Because of such differences as these, few scientists consider the tree shrew a valid ancestor for primates. A large number of recent studies indicate that a close relationship between tupaiids and primates is unlikely (Campbell, 1966, 153). After studying them closely, R.D. Martin states that

> "...in less than fifteen years, we have come full circle: the consensus now is that tree shrews are not relatives of the primates" (Martin, 1982, 32).

To summarize: there is no known transition between any type of insectivore and the primates. The earliest primate fossils appear suddenly and without known ancestry. This is precisely what Initial Complexity predicts. It is not what Initial Disorganization led us to expect.

c. Lack of transitions from insectivores to earliest primates.

Visual # 9-23

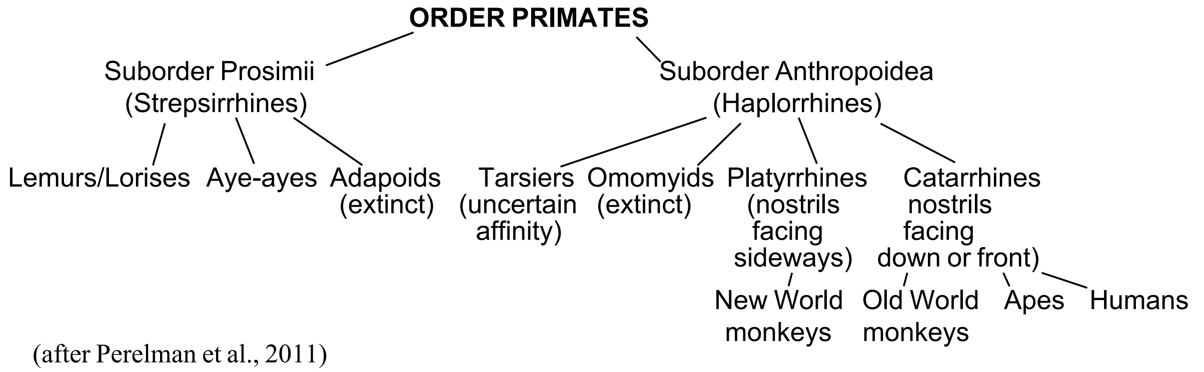
Primates had to come from *somewhere*. According to Initial Disorganization, they evolved from some lower forms. There would have been many transitional ancestors, as well as a great many "sister" taxa. When a type is said to be "derived," it simply means that they are believed to have evolved.

Initial Complexity, on the other hand, would lead us to believe that each major type was created separately. While there could have been a significant amount of genetic variability within each type, none would have evolved into a different major type. We would expect to find a great many "sister" types, but not a single "parent" that could be connected to two or more sisters.

d. *Major divisions of primates from the Eocene onward.*

Beginning with the Eocene forms, primates are divided into two major suborders, which are in turn divided into smaller groups.

Visual
9-24



(after Perelman et al., 2011)

i. Strepsirrhines (prosimians).

Strepsirrhines ("wet noses") include the primates considered the lowest: lemurs, lorises, aye-ayes, galagos (bush babies) and a group known as adapoids, thought to be extinct.

Because the fossil evidence is so fragmentary, adapoids are alleged to be either ancestors of Strepsirrhines (prosimians) or else a sister group (Bajpai et al., 2008, 11095). No definite parent has been proposed as the common ancestor of the sister groups.

Because their anatomy seems suitable for leaping, the adapoids are generally accepted as tree-dwelling quadrupeds. Their body masses ranged from a few grams up to about 7 kg. Their snouts were relatively long but their eyes were not particular large in proportion to the body.

ii. Haplorrhines (anthropoids).

Haplorrhines ("dry noses") include the *anthropoids*: New World monkeys, Old World monkeys, apes, and humans. Some include tarsiers and an extinct group known as omomyids within the haplorrhines, though others place the tarsiers in a separate suborder.

Tarsiers (named because of their unusually long ankle bones or *tarsals*) are somewhat of an enigma. Though closer to monkeys and apes than to prosimians, they are usually not classified as anthropoids (Williams et al., 2010, 4798). Since they are considered much more advanced than prosimians (suborder Strepsirrhini), some place them in a separate sister group, suborder Haplorrhini.

If tarsiers evolved, we would expect to find them later in the fossil record than the prosimians. This is not what we find. Tupaiids, lemurs, lorises, and tarsiers appear simultaneously in the lower Eocene, suddenly and without known ancestry (Gingerich, 1986, 319; Teilhard, 1965, 39). Modern tarsiers are so similar to those of the Eocene that they are sometimes considered living fossils (Williams et al., 2010, 4801; Simons, 1995, 229).

Tarsiers and anthropoids are considered to have come from sister groups, the former a sister of the Eocene omomyids and the latter a sister of Eosimiidae (Bajpai et al., 2008, 11093). No parent group is known.

Omomyids were characterized by large eye sockets, shortened noses and rows of teeth in the upper jaw, cheek teeth suited for a diet of insects and/or fruit, and body mass typically less than 500 g. Because of the limited fossil evidence, the omomyids are alleged to be either an ancestral or sister group of the anthropoids (Bajpai et al., 2008, 11095; Ciochon & Etler,1994, 42). No parent group has been definitely identified.

The limited fossil evidence sometimes makes it hard to tell whether early genera are haplorrhines or strepsirrhines (Williams et al., 2010, 4797), widely considered sister taxa. There are no known ancestors for either group. And since the haplorrhines seem to be more advanced than the strepsirrhines, it would seem logical that they would have evolved later. The fossil record is too sparse to support such a conclusion.

e. Proposed earliest primates of the Eocene.

In addition to the previously mentioned Paleocene types, several species and genera have been proposed as the earliest primates.

i. Cantius.

Visual # 9-25

The first lemur-like prosimians (strepsirrhines) of the early Eocene are dated about 56 MA (Silcox et al., 2017, 74; Fleagle, 2013). They appear without known ancestors and are virtually identical to modern-day specimens (Teilhard, 1965, 37-39). The earliest known is the adapoid genus *Cantius* of North America. About 760 fossils (teeth, bone fragments, etc.) are known.

Cantius trigonodus, a lemur of the Early Eocene Willwood Formation of the Wyoming, is very similar to the Middle Eocene *Notharctus* and bears a strong resemblance to several living types of Malagasy lemur: *Lepilemur*, *Propithecus* (*Sifaka*), and *Hapalemur griseus* (Rose & Walker, 1985). Likewise, *Smilodectes* of the middle Eocene in Wyoming is easily recognizable as a lemur (Napier & Groves, 2021).

Cantius torresi, is known from about a dozen teeth unearthed in Eocene deposits at Clark's Fork Basin, Wyoming. It was declared the most primitive of the primates on the basis of these teeth alone (Gingerich, 1986, 319). However, it is not a transition to prosimians; it is a prosimian itself. The genus appears too late to be an ancestor of any of the other prosimians. Rather than preceding them, it appears in the same stratum. It is also on the wrong side of the Atlantic.

Cantius fossils contradict the belief that higher primates radiated from Europe to North America. If this supposedly most primitive species is ancestral to higher primates, it came from an unknown ancestor that migrated from Africa to North America. After it evolved, its higher descendants migrated back to Europe, where they evolved more. Finally, their still higher descendants migrated back to North America. The back and forth migrations across the oceans would have taken at least thousands of years, and the mutations would likely have taken millions. However, *Cantius*, tupaiids, lemurs, and tarsiers all first appear in the same layer, the Eocene. There is no fossil evidence to indicate that any of them are the ancestors of anything but themselves.

Most of the other proposed ancestors are known only from a few teeth or bone fragments. For instance:

ii. Teilhardina.

One proposed candidate for the very first primate is the haplorrhine *Teilhardina* (an omomyid). Its fossils have been found in early Eocene strata in Asia, Europe, and North America. The arrangement of species within this genus alleged to be oldest to youngest is *T. asiatica* of Asia, *T. belgica* of Europe, and *T. brandti* and *T. americana* of North America. *T. asiatica* is the best documented of the early Asian Eocene primates. However, there are no known body fossils of *Teilhardina*, only teeth and jaw fragments (Smith et al., 2006, 11223-5).

As noted previously, the strepsirrhine *Cantius* is also dated to the Eocene. This would make it contemporary with the haplorrhine *Teilhardina* (Smith et al., 2006, 11223). Thus, the strepsirrhines and haplorrhines would have to be sister groups rather than ancestors and descendants. No parent groups are known.

iii. Eosimiids.

Many of the higher forms such as Old World monkeys are believed to have evolved in Africa. However, some of the primates supposed to be oldest, the eosimiids, are Asian, having been been found in such places as India, China, Myanmar, and Thailand. Some believe that Eosimiiforms overturn the idea that anthropoids originated in Africa (Jaeger et al., 2019, 2).

Eosimias is sometimes identified as a possible haplorrhine. However, the identification is uncertain because it is known only from teeth and jaw fragments (Williams et al., 2010, 4799). Though eosimiid fossils are so scanty, they are believed to have been only slightly larger than the smallest extant primates, the dwarf galagos (bush babies) and mouse lemurs.

Visual
9-26

A number of Eocene primate fossils have been discovered in the quarries at the Vastan mine in Gujarat, India. Each one was found disarticulated in water deposited sediment. They have been interpreted as adapoids and omomyids based on jaw fragments and isolated teeth (Rose et al., 2009, 1-2, 19). Species named so far include *Marcgodinotius indicus*, believed to be an adapiform, and *Vastanomys gracilis*, believed to be an omomyid. *Anthrasimias* is thought by some to be an incorrect synonym for the previously named *Marcgodinotius* (Rose *et al*., 2009, 1, 12; Bajpai et al., 2008, 11096). It is included among the eosimiids (Rose et al., 2009, 12; Boyer et al., 2017, 207).

Another Vastan species, *Suratius robustus*, was identified from a single dentary fragment (Rose et al., 2009, 18). The fossil evidence was so scarce that it was unable to be included in detailed analysis. (Rose et al., 2009, 34)

Asiadapis cambayensis has also been named from the site. It is based on a dentary (lower jaw bone) including teeth from the third premolar to the second molar (Rose et al., 2009, 1). A new species of *Asiadapis* from the nearby Tadkeshwar mine, identified from a partial dentary, has similar but larger teeth (Rose et al., 2018). In general, Asiadapines are believed to have been primitive strepsirrhines, bushbaby-sized tree dwellers (Rose et al., 2009, 36).

Donrussellia is interpreted as an adapiform (Boyer et al., 2017, 206). *D. provincialis* is differentiated from other eosimiids because of the discovery of a single talus (ankle bone) designated MNHN RI 428. Based on this one bone, it was placed in separate species from *D. gallica* (Rose et al., 2009, 10), previously identified as the most dentally primitive euprimate because of several teeth (Boyer et al., 2017, 203). It would be natural to be curious about whether that one bone represented the characteristics of all members of its species.

A number of postcranial bones have also been found in the Vastan mine - humeri, femora, radii, tali (ankle bones), calcanei (heel bones). The long bones tend to be similar to those of lemuriforms found in other locations, especially

Cantius (Rose et al., 2009, 22-33). Since the Vastan fossils are scattered and not connected to any of the jaws or teeth, researchers have to decide which of the teeth or jaws they go with, if any.

The Vastan primates are considered primitive because they are thought to lack features specialized for leaping, believed to have evolved later (Boyer et al., 2017, 213). Remember, though, that this conclusion is based on the interpretation of disarticulated teeth, dentaries, and long bones that may or may not be connected to them.

In short, the evidence for early primate evolution is uncertain.

iv. *Eocene sister taxa.*

Thus, there were at least 3 Eocene sister groups: Omomyoidea, Adapoidea, and Eosimiidae (including *Anthrasimias/Marcgodinotius*) (Bajpai et al., 2008, 11093, 11097). While many believe that there had to be a parent for the three sister groups, no specific one has been proposed.

2. *MEANS OF DISPERSAL ACROSS OPEN WATER.*

Visual # 9-27

Initial Complexity implies that the major groups of primates were living in ecological communities around the time of the flood and were sometimes fossilized in place. Modern forms spread out after the flood. Initial Disorganization, on the other hand, holds to the idea that there was no worldwide flood, and that the fossils were formed over millions of years as the animals spread out.

Visual # 9-28

The area of origin of primates is a matter of dispute. For instance, lemuriform fossils such as *Teilhardina* and *Cantius* are found simultaneously in Europe, Asia, and North America. Romer (1966, 218) says that lemurs arrived "apparently as immigrants from some unknown area." There are at least 4 competing hypotheses as to how early primates spread around the world: (1) They originated in Africa, then spread to Europe, then to N. America via Greenland; (2) They originated in N. America then spread west to Asia via the Bering Strait and east to Europe through Greenland; (3) They originated in Africa or Asia then spread east to N. America across the Bering Strait and through Greenland to Europe; or (4) They originated in Asia then spread east N. America via the Bering Strait and west to Europe (Smith et al., 2006, 11223) (Note: the only living nonhuman primates in Europe today are the Barbary "apes" of Gibraltar, which are not really apes but actually macaques with very short tails.)

During the Eocene, Europe and Africa are believed to have been separated north to south by the Tethys Sea and Obik Sea, so primates would not have been able to cross over by land. From east to west South America and Africa are supposed to have been separated since the early Cretaceous (Bond et al., 2015, 541). The Atlantic Ocean is believed to have been similar to its present size during the Eocene. To allow the possibility of crossing the Atlantic to Greenland and Europe and also from Africa to South America, some have accepted an idea considered plausible by creationists (e.g., Wise & Croxton, 2003; Statham, 2011), that the animals may have traveled over open water on vegetation rafts.

If there was a worldwide flood, most fossils are the remains of the animals that died in it. Their distribution would have little to do with the way animals are distributed in the world today. Living types are not the descendants of those that were buried, but instead, of those that survived and spread out afterward.

It is obvious that those in the region close to the Ark's landing point could have

Visual # 9-29

have spread out over contiguous land areas. As to how the animals might have migrated across open water to reach non-contiguous areas, Wise and Croxton proposed a *rafting model*: those that had spread out to coastal areas after the flood might have unknowingly stepped onto matted vegetation that had not yet decayed and then been carried relatively short distances, perhaps a few hundred miles, as the mats floated. (The need for fresh water would limit how long the animals could survive.) Such a scenario could account for travel across open water from places like the southernmost parts of Indonesia to the northernmost part of Australia or from the easternmost part of Africa to Madagascar. The process would have essentially stopped after just a few years when any remaining vegetation mats fell apart.

Some who reject the possibility of a worldwide flood (e.g., Bond et al., 2015, 541; Seiffert et al., 2020) have nevertheless accepted the possibility that a rafting process might explain the worldwide dispersion of primates and various types of rodents, lizards, and birds. Rather than a single rafting event as proposed by Wise and Croxton, there would have had to be many over millions of years.

Vegetation mats have occasionally been seen transporting animals short distances on fresh water rivers. They have also occasionally been seen adrift in the oceans. However, it would be very difficult for animals to survive an extended journey on vegetation mats in the open ocean. They would need fresh water for each voyage, either trapped in the plants or in the form of rainfall. Otherwise, they would die of thirst.

One might ask whether it is more reasonable to believe such a process could transport and sustain animals a single time in the aftermath of a great flood, or multiple times over millions of years. Either is a matter of faith.

D. SUMMARY OF LOWER PRIMATES.

If primates evolved from lower mammals there should be at least a few fossils showing the transition. Simons tells us what we actually find:

> "In spite of recent findings, the time and place of origin of order Primates remains shrouded in mystery" (Simons, 1969, 318).

That is, there is not enough physical evidence to allow us to draw firm conclusions about what happened. Even so, if humans evolved from apes within one million years, it would be odd that prosimians and tarsiers have not evolved in over fifty million.

V. LACK OF TRANSITIONS TO HIGHER PRIMATES (MONKEYS).

Visual # 9-30

The higher primates are supposed to have evolved either from the prosimians or from an ancestor shared with them. It would be logical to suppose that the next evolutionary step would have been monkeys, which belong to Suborder Anthropoidea. There are two main types of living monkeys: Old World (Africa, Asia, Europe) and New World (mainly South America).

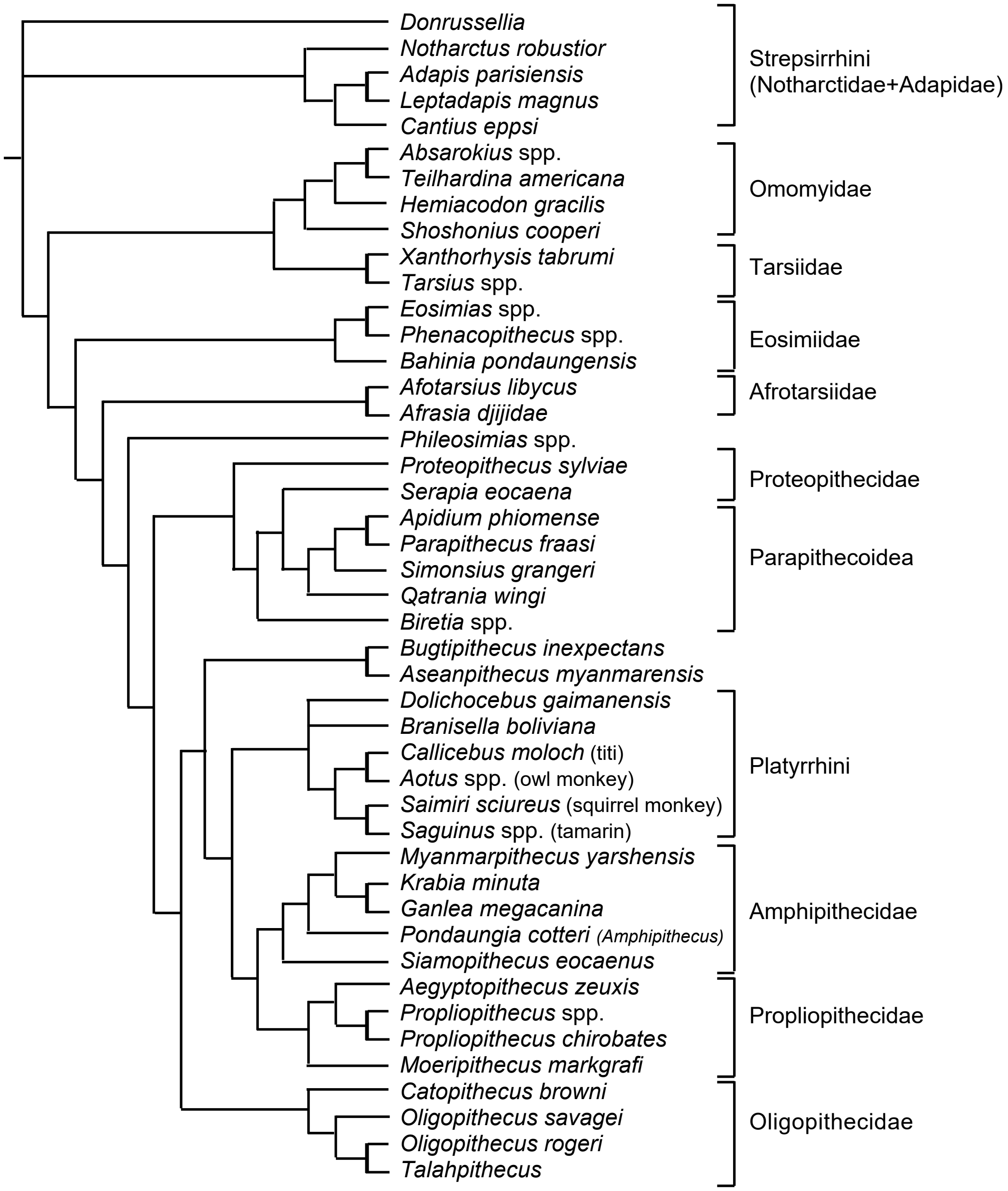
A. MODERN MONKEYS.

1. OLD WORLD MONKEYS (part of the Catarrhine group)

Living Old World monkeys belong to 24 genera. All of these belong to the same family, Cercopithecidae, divided into the subfamilies Cercopithecinae and Colobinae. Old World monkeys include:

- Allen's swamp monkey (genus *Allenopithecus*)
- Terrestrial guenons (genus *Allochrocebus*)
- White-eyelid mangabeys (genus *Cercocebus*)
- Guenons (genus *Cercopithecus*)
- Vervet or green monkeys (genus *Chlorocebus*)

Proposed cladogram of major types of living and extinct prosimians, Old World Monkeys, and New World monkeys - from Jaeger et al., “New Eocene primate from Myanmar shares dental characters with African Eocene crown anthropoids,” *Nature Communications,* 2019.
(Not every type is shown.)

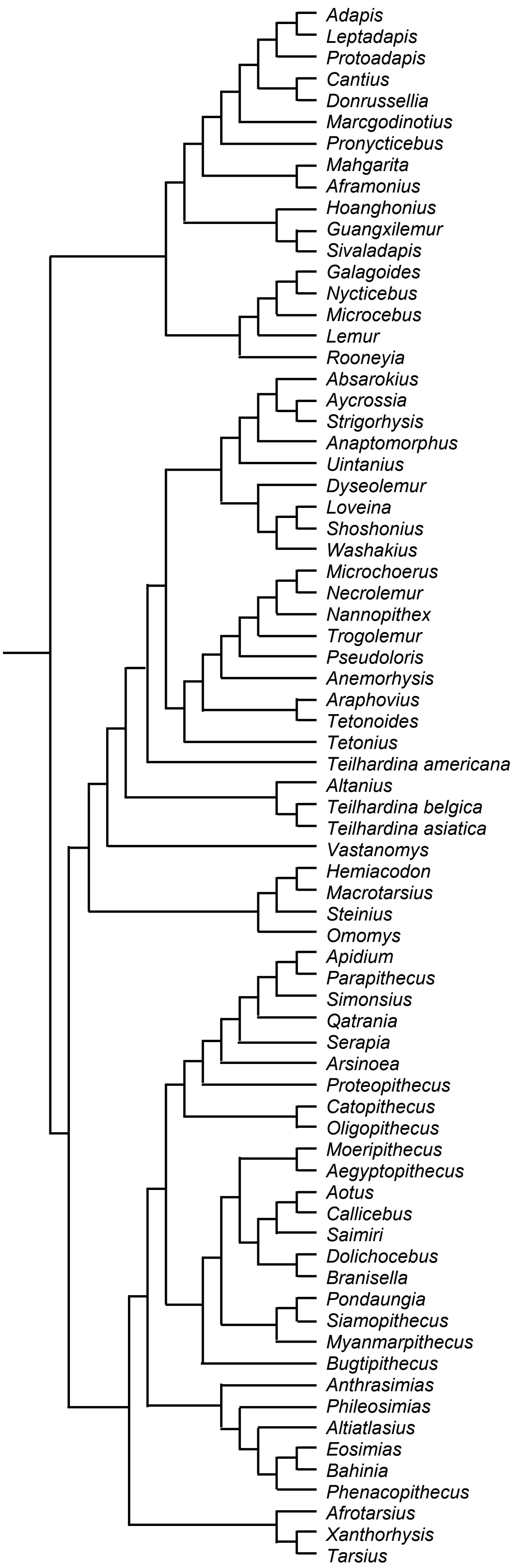


Visual
9-31

Each type is considered the sister of the ones next to it. However, not a single “parent” has been widely accepted as common to any of the sister groups.

Some of the platyrrhines are considered “living fossils.”

Living Old World monkeys are not included because there is no widely accepted specific type of fossil connecting them to any of the other groups



Alternate cladogram of major types of living and extinct prosimians, Old World Monkeys, and New World monkeys - from Bajpai et al., "The oldest Asian record of Anthroipoidea" (*PNAS*, Aug. 12 2008).
(Not every type is shown.)

This is the 50% majority consensus of 11 equally parsimonious cladograms – that is, at least 10 other trees are equally plausible.

Visual
9-32

- Colobus monkeys (genus *Colobus*)
- Patas monkeys (genus *Erythrocebus*)
- Crested mangabeys (genus *Lophocebus)*
- Macaques, including Barbary "apes" (genus *Macaca*), monkeys whose tails are so short that they are easy to overlook
- Drills and mandrills (genus *Mandrillus*)
- Extinct macaque-like monkeys (genus *Mesopithecus*)
- Talapoins (genus *Miopithecus*)
- Proboscis monkeys (genus *Nasalis*)
- Baboons (genus *Papio*)
- Red colobus monkeys (genus *Piliocolobus*)
- Surilis (genus *Presbytis*)
- Olive colobus monkeys (genus *Procolobus*)
- Langurs (genus *Pygathrix*)
- Snub-nosed monkeys (genus *Rhinopithecus*)
- Highland mangabeys (genus *Rungwecebus)*
- Leaf monkeys or gray langurs (genus *Semnopithecus*)
- Pig-tailed langurs (genus *Simias*)
- Gelada baboons (genus *Theropithecus*)
- Langurs or lutungs (genus *Trachypithecus*)

All of them are classified as catarrhines because they have nostrils that point downward. They have non-prehensile tails which they use for balance.

Old World monkeys are divided into two major groups. Cercopithecinae include types such as drills and mangabeys. They have cheek pouches used to store food. The Colobinae (e.g., langurs and guereza monkeys) are vegetarians with digestive systems able to process vegetable fodder.

Most Old World monkeys are the size of a small to medium size dog, with talapoins being the smallest (maximum about 3 lb or 1.3 kg) and mandrills the largest (maximum over 110 lb or 50 kg) .

2. *NEW WORLD MONKEYS (Platyrrhines)*

Depending on the classification system, New World monkeys are divided into either two or five different families.

- Callitrichidae (marmosets of genera *Callithrix*, *Cebuella*, *Callibella*, and *Mico*; Goeldi's marmosets of genus *Callimico;* tamarins of genus *Saguinus*).
- Cebidae (squirrel monkeys of genus *Saimiri;* capuchins of genus *Cebus*)
- Aotidae (night or owl monkeys of genus *Aotus*, the only genus in the family)
- Pitheciidae (titis of genus *Callicebus*; sakis of genus *Pithecia*; and uakaris of genus *Cacajao*)
- Atelidae (howler monkeys of genus *Alouatta*; woolly monkeys of genus *Lagothrix*; and muriquis, "woolly spider monkeys" of genus *Brachyteles*). Only the ateliedae have prehensile tails used for grasping.

There are about 16 genera of New World monkeys known today (Cartelle & Hartwig, 1996). All are classified as platyrrhines because their nostrils point sideways. They range in size from the pygmy marmoset or "pocket monkey" (average adult 4 oz or around 110 g) to the southern muriqui (maximum 33 lb or 15 kg).

B. PROPOSED FOSSIL ANCESTORS OF MONKEYS.

1. *OLD WORLD MONKEYS (Subgroup of Catarrhines).*

Visual # 9-33

Initial Complexity says that catarrhines may have diversified into subgroups due to built-in genetic variation, but they have been catarrhines from the very beginning. Initial Disorganization, on the other hand, says that they evolved from some lower type of mammal such as prosimians, omomyids, or some sort of insectivore through a length series of mutations.

Though many types have been proposed as possible transitions from prosimians or other types to catarrhines, none has been widely accepted. Kelso (1954, 151) says that fossil evidence for their evolutionary origin is unknown. Simons says that not a single Eocene primate fossil from either North America or Europe appears to be an acceptable ancestor for the catarrhines (Simons, 1964, 50). Likewise, several authors have explicitly disavowed the Chinese fossil *Eosimias* as a transition to anthropoids (Simons, 1997, 180). There are no other widely accepted candidates for the transition from lower to higher primates.

There are two major groups of Old World monkeys, African and Asian. The African monkey fossils considered oldest are found in the early Oligocene, dated at least 33 MA. However, there are no known transitions leading from them to the Asian fossil monkeys, of which those considered earliest date to the late Miocene, ca. 11 MA (Benefit, 2008, 262).

Visual # 9-34

Visual # 9-35

The first undisputed catarrhines, the propliopithecids, appear in the Oligocene of Egypt (Simons, 1962, 293). There are over a dozen quarries in the Fayum Badlands, some of which began to be explored over a hundred years ago. Some contain Eocene fossils, others Oligocene. Besides many types of subtropical plants (Simons, 1995, 229), rodents, birds, and bats, the Fayum area has the most diverse collection of fossil primates known (Simons, 1995, 235). However, not a single one of the animals discovered there has been intact. The bones are disarticulated and seem to have been torn apart. Few associations of multiple bones from a single individual mammal of any type have ever been found in Fayum (Simons, 1995, 226)

Some of the primate genera found at Fayum are *Apidium*, *Parapithecus*, *Propliopithecus* (dentition similar to the modern gibbon *Hylobates*), *Moeripithecus* (now considered part of Propliopithecids) and *Aelopithecus* (Simons, 1995, 201-220). Most of them are considered catarrhines, with teeth much different from those of prosimians or platyrrhines (Simons, 1995, 204).

Visual # 9-36

The catarrhines considered to be earliest include *Parapithecus* (early Oligocene) and *Propliopithecus*. The latter is believed to be much more similar to apes and humans than is *Parapithecus*, so it would be expected to be much more evolved. Yet the two types appear in the fossil record at the same time (Teilhard, 1965, 41-42). No fossil common ancestor is known.

The Old World monkeys are believed to have split into two subfamilies, Cercopithecinae and Colobinae, perhaps 14-15 MA (Stewart & Disotell, 1998, R585. The common ancestor is a matter of speculation.

a. Catopithecus (Late Eocene)

The late Eocene to early Oligocene fossil called *Catopithecus* is known only from crania and fragmentary dental remains (Simons, 1989, 9957; Williams et al., 2010, 4799). It is considered more primitive than *Oligopithecus*, but is still placed within the ologipithecine family(Simons, 1989, 9957-60)

b. *Parapithecines (Late Eocene - Early Oligocene)*

The best documented fossils of the Fayum are propliopithecines (including *Aegyptopithecus*) and parapithecines. Of the latter group, a form known as *Abuqatrania basiodontus* has been found in Eocene rocks, but most of the primate fossils are Oligocene. They include:

- *Qatrania* (Early Oligocene, 1/4 the size of the talapoin, the smallest Old World monkey). *Qatrania* is known only from incomplete half mandibles and isolated upper teeth (Simons, 1995, 230).
- *Afrotarsius*, a tarsier-like animal (Simons, 1995, 228). *Afrotarsius* was identified based on a single lower jaw fossil and several isolated teeth discovered later.
- Also in this group is *Apidium*, the most common mammal in the upper sequence (Oligocene) of Jebel Qatrani Formation at Fayum. It is known from scores of jaws (Simons, 1995, 215). There are also many skeletal bones believed to have come from it, but they are almost all isolated single bones (Simons, 1995, 233). Its brain size is estimated at about 1/5 that of *Aegyptopithecus* (Simons, 1997, 14972). The postcranial bones seem to resemble those of South American monkeys (Simons, 1995, 218).
- The genus for which the parapithecines are named, *Parapithecus* (40 - 33 MA, late Eocene - early Oligocene), is supposed to represent a transition from prosimians to higher primates. Its molars and premolars are similar to those of the living Old World monkey, the talapoin (Simons, 1995, 215).

Parapithecines such as *Apidium* are not considered either catarrhines nor platyrrhines (Simons, 1995, 221, 235). They are considered a sister group rather than ancestors of the anthropoids or of the propliopithecines (Simons, 1995, 207-215).

c. *Oligopithecus (Early Oligocene)*

A single partial jaw, an isolated upper molar, and a few upper teeth discovered at Fayum led to the designation of a new genus called *Oligopithecus*. (Simons, 1995, 208-210) The only other known fossils of *Oligopithecus* are isolated teeth from Oman (Gheerbrant et al., 1995; Seiffert & Simons, 2013). Though it would be difficult to be certain based on such fragmentary evidence, *Oligopithecus* is ranked with propliopithecids and is believed to be somewhat similar to gibbons (Simons, 1995, 209), and about the size of squirrel or owl monkeys. .

d. *Aegyptopithecus (also known as Propliopithecus). (Oligocene, 38 - 30 MA)*

Visual
9-37

Aegyptopithecus and *Propliopithecus* (at first mistakenly called *Aelopithecus* - Simons, 1995, 220) are widely accepted as the earliest definitive catarrhines (Williams et al., 2010, 4798). The two are very similar, but the former is about 20-30% larger (Simons, 1995, 208, 212). Though they are classified as different genera, they are placed in the same family (Simons, 1995, 212-213).

Aegyptopithecus, the best known of the early catarrhines, is found only in the Oligocene (Simons, 1995, 217). According to Simons, it is "the oldest creature we know that is in the direct ancestry of man" (Weaver, 1985, 579-582). Though we do not have a complete skeleton, it is believed to have superficially resembled a cat but been similar in size and shape to howler monkeys. It has a mosaic of features (Simons, 1995, 213):

- Disarticulated arm bones ascribed to it resemble those of woolly monkeys and howler monkeys, both platyrrhines (Simons, 1995, 217).
- Its eyes were fully enclosed in bone, facing forward with a larger visual cortex

and brain than lemurs or tarsiers.

- It had an apelike molar configuration.
- The foramen (the hole at the base of the skull where the spinal cord comes in) indicates that rather than an apelike manner of motion, it had typical monkeylike quadrupedal locomotion and did not walk upright (Murdock, 2004).
- The four fossil faces discovered so far are closer to apes than monkeys. A young male was discovered in 1966, an old male in 1981, and two more of undetermined sex in 1982. All the faces are dissimilar, showing that *Aegyptopithecus* had a high degree of individual variation. (Simons, 1995, 221).

The craniology of *Aegyptopithecus* bears little resemblance to either of its Oligocene contemporaries, the tarsiers or omomyids (Simons, 1995, 235). In fact, the Tarsiidae are considered a sister group of anthropoids rather than a possible ancestor (Simons, 1995, 228).

e. Proteopithecus. (34 - 28 MA, late Oligocene-Miocene)

A tiny Eocene primate called *Proteopithecus* ("first ape") was found only at quarry L-41 of the Fayum area. Though it is known only from upper teeth and upper jaw fragments (Simons, 1989, 9957-8; Williams et al., 2010, 4799), it is estimated to have been about the size of a dwarf lemur. Its brain size is estimated as about 1/10 of *Aegyptopithecus* (Simons, 1997, 14972).

The cranial anatomy of *Proteopithecus* is distinct enough from the tarsiers and prosimians found in the Eocene that it is not considered to belong to either of those groups. Based on the portions of its anatomy known so far such as its upper dentition, it also cannot be placed in the parapithecine group (Simons, 1989, 9960). It is also placed in a separate family from the propliopithecines (Simons, 1997, 14974-5).

Though most of the primate fossils found with in the Fayum are classified as catarrhines, *Proteopithecus* is similar to squirrel monkeys (Williams et al., 2010, 4800), and its dental arrangement resembles living squirrel monkeys, tamarins, and Goeldi's monkeys (Takai et al., 2000, 275). Since it more nearly resembles platyrrhines than any other known Old World primate does, it has been proposed as a possible ancestor of the platyrrhines (Simons, 1997, 14972-5). This would mean that platyrrhines originated in Africa and somehow migrated across the Atlantic.

f. Victoriapithecus / Prohylobates (Middle Miocene, 19 -15 MA)

Within the catarrhine group, we do not have very good skeletal material of undoubted early Old World Monkeys (Simons, 1995, 228), with the exception of the catarrhine *Victoriapithecus* of Maboko Island, Kenya. The fossil evidence for *Prohylobates* is so limited that some believe it is synonymous with *Victoriapithecus,* while others believe the two are separate genera (Benefit, 2008, 248, 256). The family Victoriapithecidae includes *V. macinessi*, *V. leakeyi*, *Prohylobates simonsi*, and *P. tandyi*. Rather than an ancestor of the later Old World monkeys, it is considered a sister taxon (Benefit & McCrossin, 2002).

Victoriapithecus is found only in the middle Miocene and disappears before the late Miocene (Benefit, 1999, 172). It was originally identified from a single male cranium designated KNM-MB 29100 (Benefit & McCrossin, 1997, 368). Several thousand more fragments have been identified since then, including complete male and female mandibles and a full set of permanent and deciduous (baby) teeth, most of the forelimb, fragments of a complete hind limb, ilium, and ischium,several vertebrae and a great many isolated teeth (Benefit, 1999, 155; Stevens et al., 2013, 613).

- Overall, the cranium of *Victoriapithecus* strongly resembles those of the propliopithecids dated millions of years earlier such as *Aegyptopithecus* (Benefit, 1999, 158), However, its estimated cranial capacity of about 54 cc (Benefit & McCrossin, 1997, 368) is more than twice as great as theirs (McCabe,2017). It is somewhat similar to the Miocene fossil colobine *Libypithecus* (Benefit & McCrossin, 1997, 369). Of the living monkeys, the red colobus monkey has the closest proportion of cranium to body size (Benefit & McCrossin, 1997, 368).
- Among living catarrhines, the upper facial morphology of *Victoriapithecus* is most similar to orangs (Benefit & McCrossin, 1997, 369).
- Among living monkeys, its limb bones are most similar to vervet monkeys (Benefit, 1999, 166).

Victoriapithecus has been proposed as a transitional form close to the last common ancestor (LCA) of apes and Old World monkeys (cercopithecoids). However, the fossils are dated 15 million years later than the time when that transition would have had to take place, and at least 10 million years later than the first cercopithecoids noted above (Benefit, 1999, 155; Pozzi et al., 2011). Either its evolution stopped for millions of years while other primates evolved all around it, or else it is far too late to be the ancestor of catarrhines. Thus, many consider it to be a sister taxon of Old World monkeys rather than an ancestor (Benefit, 1999, 155-6).

Since there are many more Miocene apes than monkeys, Benefit believes that Old World monkeys, not apes, underwent a shift in the type of locomotion from whatever their common ancestors had (Benefit, 1999, 168). Interestingly, she states that the primitive cercopithecoids were forced to evolve suspensory adaptations to travel in trees rather than on the ground.

This hints at the Lamarckian idea that use and disuse of body parts can be passed on to future generations, a concept that has been thoroughly falsified by experimentation. The only known way new features could appear would be through the accumulation of random mutations.

Though the animals listed above believed to represent catarrhines are known only from highly fragmented fossils, each type appears distinct from all the others. There are many sister groups, but not a single commonly accepted parent group.

2. *PLATYRRHINES (New World Monkeys).*

Initial Complexity leads us to expect that New World monkeys were distinct from the rest of the primates from the very beginning. While certain subgroups might have diversified due to built-in genetic variation, the platyrrhines were always platyrrhines.

Initial Disorganization, on the other hand, says that the platyrrhines evolved from some other group of mammals that was a recognizably different type. The parents could have been catarrhines, omomyids, adapids, tarsiers, insectivores, or something else. If their ancestors migrated from Europe to North America and then South America over millions of years, it seems likely that they would have left at least a few fossils. However, no monkey fossils have been found in North America (Romer, 1971, 318). Thus, the idea that they bypassed North America by crossing the ocean on vegetation rafts has been gaining in popularity.

Both the catarrhines and platyrrhines are supposed to have evolved from some common ancestor that lived in the Paleocene or Eocene. However, very little is known about the fossil history of the early platyrrhines (Takai et al., 2000, 280). They appear suddenly with no known ancestors (Romer, 1966, 221; Kelso, 1974, 150). After they evolved, the platyrrhines are then supposed to have diverged from whatever the common ancestor was into all the separate types, starting around 20-21 MA (Takai et al., 2000, 278).

a. Branisella (Late Oligocene).

Some of the early platyrrhines are *Canaanimico amazonensis*, *Carlocebus carmenensis*, and *Panamacebus transitus*, but the oldest definite platyrrhine fossil is the late Oligocene *Branisella* from Salla, Bolivia, estimated about 26 MA (Takai et al., 2000, 265; Bond et al., 2015, 538). There are no postcranial fossils of *Branisella*, only teeth and jaw fragments. .

- The jaw fragments of *Branisella* are similar to *Saimiri*, the squirrel monkey.
- Others have noted that it has similarities to tamarins (*Saguinus*) and Goeldi's monkeys (*Callimico*) (Takai et al., 2000, 275).
- *Branisella* also has similarities to *Callicebus* (the titi) (Takai et al., 2000, 263-75).
- Among living platyrrhines, the marmoset (*Cebuella*) is supposed to be the "most derived" (Takai et al., 2000, 271), i.e., the most evolved. It is the only living type that has a v-shaped mandible. *Branisella* is believed to have had the same v-shape. This would mean that the most primitive form had the v-shape, those evolved from it lost that shape, then the most evolved reacquired that shape.

Branisella does not share non-marmoset features of other Miocene fossils such as *Soriacebus, Carlocebus*, or *Chilcebus* (Takai et al., 2000, 278). Thus, it is considered unlikely to be the common ancestor of all platyrrhines, but rather a side branch (a sister) springing from an unknown ancestral taxon (Takai et al., 2000, 279), perhaps an ancestor not of all platyrrhines, but only of marmosets, tamarins, and lion tamarins (Takai et al., 2000, 278).

b. Perupithecus / Ucayalipithecus (Late Eocene).

A new species called *Perupithecus ucayaliensis* has been proposed as the most primitive stem platyrrhine. It was originally identified at Santa Rosa, Peru from one complete and two incomplete upper molars and one complete lower molar (Bond et al., 2015, 538).

This location is over 2000 miles from the Atlantic coast. If the platyrrhines really are derived from the catarrhines, the ancestors of *Perupithecus* would have had to raft across the ocean and then migrate across South America without leaving any fossils until they had ended up 2000 miles away. The other possibility is that the animals did not go through such a journey but were already in place when they were fossilized in a great flood.

Though there is no fossil evidence showing a transition from catarrhines to *Perupithecus*, it is supposed to be similar to the middle Eocene African anthropoid *Talahpithecus* (38-39 MA), probably a sister taxon. (Bond et al., 2015, 540). *Talahpithecus* has been placed in the Oligopithecidae along with *Catopithecus* (Jaeger et al., 2010).

However, Seiffert et al. (2020, 194) writing five years after the discovery of the fossils say that only one tooth, an upper molar, should be attributed to

Perupithecus. They downplay its significance and report the identification of a different genus, *Ucayalipithecus*, from the same location from partial left upper molars M^1 and M^2, and lower molars M_2 and M_3.(Seiffert et al., 2020, 194). They reject *Ucayalipithecus* as a stem platyrrhine and place it in the African Old World monkey clades (Seiffert et al., 2020, 195). They date it early Oligocene (Seiffert et al., 2020, 196). In their words:

> "Without these four tiny teeth recovered from an outcrop deep in a remote part of the Amazon basin, it could not have been predicted that early stem platyrrhines of South America were living alongside, and competing for resources with, a phylogenetically independent anthropoid lineage." (Seiffert et al., 2020, 196)

Several hypotheses have been proposed for the Santa Rosa fossils: Either they belong to some pre-platyrrhine anthropoid stock that came over from Africa and evolved further, or they came over from Africa having already developed into platyrrhines in the Eocene. In the latter case, the platyrrhines that had developed in Africa became extinct there.

To reiterate: Initial Disorganization leads to the belief that platyrrhines or their ancestors evolved in Africa and then crossed the Atlantic. However, there are no specific fossils widely accepted as transitions between groups. Initial Complexity would lead us to believe that catarrhines and platyrrhines first appeared suddenly without having gone through a process of evolution, and that the transitions are not preserved as fossils because they never existed.

C. ALLEGED COMMON ANCESTORS OF PLATYRRHINES AND CATARRHINES.

Initial Complexity includes the idea that each basic type of animal appeared distinct from all others. Initial Disorganization leads us to expect that there should be a great many transitions leading from simpler to complex organisms.

Many writers believe platyrrhines (New World monkeys) evolved from catarrhines. The time and place of their origin is controversial (Bond et al., 2015, 538). They are supposed to have split from the catarrhines around 35 MA, though some (e.g., Takai et al., 2000, 279) estimate that the split took place as early as 42 - 52 MA.

If this was the path by which platyrrhines evolved, there should be transitions leading from some lower type such as omomyids, adapids, prosimians, or tarsiers to the Old World monkeys and from them to the New World monkeys.

1. DIFFERENCES FROM PROSIMIANS AND TARSIERS TO MONKEYS.

There would have had to be a great many evolutionary changes in order for platyrrhines and catarrhines to split off from prosimians and tarsiers. For one thing, they have much larger brains. The major increases in brain size are believed to have evolved independently in Old and New World anthropoids (Williams et al., 2010, 4803). This would have required a long series of parallel random mutations. In addition, with the single exception of owl monkeys, all the anthropoids have much smaller corneas relative to eye size than tarsiers. (Williams et al., 2010, 4800) Smaller corneas help with daytime visual acuity, larger ones at night. The owl monkeys would have had to be the only group that did NOT acquire mutations for smaller corneas.

Visual
9-39

2. OBVIOUS DIFFERENCES BETWEEN CATARRHINES AND PLATYRRHINES:

a. Size.

Old World monkeys are larger, New World are smaller.

Visual # 9-40

b. *Dental formula.*

Tooth arrangement is expressed in a *dental formula*, often written in the form of 2.1.2.3. This indicates that each of the mouth's four quadrants has 2 incisors, 1 canine, 2 premolars, and 3 molars. Humans, apes and Old World monkeys have the dental formula above. Thus, for the four quadrants there are a total of 8 incisors, 4 canines, 8 premolars, and 12 molars, for a total of 32 teeth.

Most New World monkeys have the formula 2.1.3.3, indicating that they have 12 premolars and a total of 36 teeth. However, marmosets have one less molar than the rest (no wisdom teeth), giving them a dental formula of 2.1.3.2 and a total of 32 teeth that are arranged differently than the rest of the New World monkeys.

Some authorities point to reduction in relative size of wisdom teeth from earliest catarrhines to humans as an indication of evolution. However, marmosets are difficult to fit into this pattern. They are first found in the Miocene of Colombia, dated over 14 MA (Setoguchi & Rosenberger, 1985), long before the Pleistocene and Pliocene apes. If reduction in third molar size were an indication of the degree of derivation, their total lack of a third molar would indicate that they were the most advanced of the primates.

c. *Color vision.*

Most mammals (including tarsiers and some lemurs) have color vision based on two cone types in the eyes. However, catarrhines have three cone types instead of two. All the male platyrrhines except howler monkeys have two. The male howlers have three. Most female platyrrhines have three. (Williams et al., 2010, 4801).

d. *Olfactory apparatus (sense of smell).*

The olfactory apparatus of catarrhines is not nearly as good as that of platyrrhines (Williams et al., 2010, 4802)

3. *PROPOSED COMMON ANCESTORS OF CATARRHINES AND PLATYRRHINES.*

There is no universally accepted common ancestor, though several candidates have been proposed.

a. *Darwinius massilae ("Ida")- Eocene prosimian.*

Visual # 9-41

There was a great deal of media hype in 2009 concerning a 95% complete Eocene fossil primate dubbed "Ida" (*Darwinius massilae)*, proclaimed as a transition proving that humans had evolved from lower primates. The specimen was said to have been found in the Messel Pit in Germany in 1983, though its excavation had not been scientifically documented (Batton, 2009). Many experts immediately pronounced it as nothing more than a lemur, and not even the oldest one known. Within a few months this identification became widely accepted, and the furor died down.

Curiously, the fossil had sat unproclaimed for twenty-four years until it was announced just before a book and television deal.

b. *Anthrasimias / Marcgodinotius (Eocene).*

In 2008 the National Academy of Sciences announced the discovery of *Anthrasimias* (also called *Marcgodinotius*), a proposed early Eocene (54-55 MA) eosimiid ancestor of monkeys found at the Vastan excavations in India. The announcement was based on a few tooth fragments less than 2 mm (70/1000 of an inch) in size – a left molar upper M^1, a left upper molar M^2, a right lower molar M_3, and an upper premolar P^4, discovered in Gujarat, India (Bajpai et al., 2008,11093-4). No other body parts are known. Such announcements have often had to be revised as more evidence was dug up. As of 2021, no more information has been released.

c. *Amphipithecids / Pondaungids (Eocene).*

Visual # 9-42

One of the proposed common ancestors of anthropoids is an East Asian Eocene primate from Burma and Thailand designated *Amphipithecus mogaungensis*, dated 40 - 44 MA. It was originally reconstructed on the basis of two pieces of jaws and two teeth, which were later supplemented by fragments of maxillae and the front of the skull (Takai et al., 2003; Gunnell et al., 2002). At first, Russell Ciochon, a specialist in early anthropoid evolution, believed it was an anthropoid. "If we're right," he said, "this is the granddaddy of us all" (Ciochon, 1986, 22). However, he later changed his mind. Because there is so little fossil evidence, it is impossible to be certain whether *Amphipithecus* is closer to the strepsirrhines (lemurs, aye-ayes, and lorises) or omomyids, tiny extinct animals believed to have been nocturnal and have fed on insects and fruit.

- Strepsirrhines are not anthropoids, so if it was closer to them it could not be an ancestor of the anthropoids (Benton, 2005, 369).
- Omomyids are not anthropoids, but are considered a sister group of the haplorrhines (Bajpai et al., 2008, 11095).

Though some consider *Amphipithecus* to be similar to what would have been required in a transition from lower to higher primates, it has no known connection to any lower form. Nor has any specific fossil been proposed as its next higher descendant. It stands alone. Either way, no specific transitional form has been proposed to close the gap between *Amphipithecus* and anthropoids.

Ampipithecids include *Amphipithecus*, *Myanmarpithecus*, possibly *Siamopithecus*, and *Bugtipithecus* (Ciochon & Gunnell, 2002, 30; Jaeger et al., 2019, 4) They are now considered a sister taxon to the African propliopithecids (Jaeger et al., 1998).

Some regard *Pondaungia* and *Amphipithecus* as the same animal (Holroyd et al., 2002). The former name was first applied in 1927, the latter some years later. They are at least regarded as similar enough to belong to the same subfamily (Takai et al., 2003, 142; Ciochon & Gunnell, 2002, 17). However, it is difficult to draw firm conclusions due to the shortage of fossil evidence (Takai et al., 2003, 141). The only known postcranial fossils are one partial humerus and one partial ankle bone known, from a specimen designated NMMP 20 (National Museum Myanmar Primate). This specimen was assigned to the genus *Pondaungia* not because it was attached to a head or jaw – no parts of the head were discovered – but because of its location and the relative abundance of nearby primate fossils. (Ciochon & Gunnell, 2002, 30-31; Egi et al., 2004, 71-72).

Some think *Pondaungia* and *Amphipithecus* were not yet evolved into anthropoids, but came from some sort of adapiform ancestry. Because the fossil evidence is so scarce, Ciochon & Gunnell (2002, 27) raise questions about whether the Pondaung primates are actually catarrhines, or if they are even allied with anthropoids at all (2002, 16-19).

d. *Eosimiidae - Middle Eocene - Early Oligocene.*

Visual # 9-43

The previously mentioned Asian Eosimiiforms are considered by many to be a sister of all other anthropoids rather than an ancestor. They include *Afrasia* and *Bahinia* (Ciochon & Gunnell, 2002, 29), a proposed transition from Eosimiiforms to African anthropoids. (The latter genus was named based on a single molar.) At present, there is no widely accepted common ancestor of the group supposed to have diversified into anthropoids (monkeys, apes, and humans) (Jaeger et al., 2019, 2-8). Rather than an ancestor, some consider the eosimiids to be a sister group of the anthropoids (Ciochon & Gunnell, 2002, 30).

The evidence for eosimiids continues to be very scanty. For example, the new primate *Aseanpithecus myanmarensis*, discovered in Myanmar and claimed to be an anthropoid ancestor, is based on a fragment of a left maxilla, a fragment of a lower right jaw, and several teeth. It is the only specimen unearthed in 20 years of digging (Jaeger et al., 2019, 2-4).

e. Parapithecidae. (Early Oligocene).

Parapithecids such as *Parapithecus* (found in the Early Oligocene of Fayum, Egypt) were once proposed as possible Old World ancestor of platyrrhines. Many now regard them as a specialized side branch that split off from whatever unknown type the common ancestor of platyrrhines and catarrhines was (Takai et al., 2000, 267-278). Simons says that *Parapithecus* has adaptive features that exclude it from being ancestor of the later catarrhines or platyrrhines. (Simons, 1995, 231)

The recently discovered *Ucayalipithecus* was described on the basis of only four teeth discovered in Peru. Because these teeth are similar to some of the Fayum parapithecids, it has been classified with the parapithecine group. Because its teeth resemble those of the catarrhines, it is considered an Old World form rather than New World. However, the teeth were but found in Peru, on the west side of South America (Seiffert et al., 2020, 368).

Initial Complexity leads us to believe that these monkeys were living in South America and were fossilized in a great flood. Initial Disorganization leads us to believe that they evolved in Africa, rafted across the Atlantic (no one has proposed that they made the much longer trip across the Pacific), then traveled on foot more than 2000 miles across South America until they reached Peru. Neither possibility is testable.

f. Apidium. (Oligocene)

The previously mentioned Fayum fossil *Apidium* has the dental formula 2.1.3.3, like most platyrrhines (Simons, 1995, 215). Its limb bones have some features in common with New World monkeys. However, some of the characteristics of its foot bones seem closer to modern Old World monkeys. It would seem a possible distant common ancestor because a series of characters separate it from both the platyrrhine and catarrhine groups (Simons, 1995, 234). However, it is not found until the Oligocene, after some of the monkeys and contemporary with others. It appears too late to be an ancestor of the Eocene. Many consider *Apidium* to be a sister group of the monkeys (Simons, 1995, 234) rather than an ancestor.

g. Saadanius (Oligocene).

The Oligocene fossil *Saadanius* is known from a single partial skull containing a partial face, anterior neurocranium, and palate including several teeth. It is claimed to not belong to any existing catarrhine family or superfamily (Zalmout et al., 2010, 360-362). Though it has several characteristics similar to Miocene apes, it is missing others. This has led some to believe that it is less specialized and is closer to the common ancestor of monkeys. However, there is no direct relationship known between *Saadinius* and whatever might have been the common ancestor of living catarrhines. It could easily be considered a sister taxon (Pozzi et al., 2011, 210).

4. SUMMARY OF PROPOSED COMMON ANCESTRY.

Remember that in each step of evolution, a male and female of each separate branch would have to acquire identical mutations so as to pass them on to their descendants. They would meanwhile have to acquire complementary mutations so that their reproductive systems would continue to work together.

Visual # 9-44

If we look at the hypothetical family tree of higher primates including humans, all the links are missing.

Even some who believe that humans evolved from apes, e.g., Ciochon and Gunnell (2002, 33)agree with W. LeGros Clark, who wrote in 1934:

> "Although palæontology has furnished a considerable amount of information regarding the later evolutionary radiations of the higher Primates, it has yielded surprisingly little evidence in regard to the actual origin of the pithecoid stock. As we have seen, some of the fossil tarsioids and lemuroids show in their structure a tentative approach to monkeys; but none of these, it appears, can represent the ancestral stock from which the latter were derived." —Wilfred E. Le Gros Clark, 1934, *Early Forerunners of Man*, p. 273–274

Ciochon & Gunnell say that the origin of anthropoids remains as obscure as when Clark wrote this in 1934.

III. CHAPTER SUMMARY.

We noted in this chapter that

Visual # 9-45

(1) The fossil evidence for primates is very limited. It consists almost entirely of disarticulated fragments buried in water deposited sediment. .

(2) Prosimians, omomyids, adapids, and tarsiers all appear suddenly in the fossil record, with no known connection to insectivores, which themselves have no known ancestry.

(3) The only candidate for common ancestor of the primates, *Tupaia*, is not very convincing. Instead of appearing millions of years before tarsiers and lemurs, it is first found in the lower Eocene alongside them. Both *Tupaia* and these earliest primates occur suddenly with no known common ancestor.

(4) The Old World monkeys appear with no known ancestry.

(5) The New World monkeys do too.

(6) There are two explanations for the lack of fossil transitions:

Either they were not preserved due to chance, or
They were not preserved because they never existed.

Neither can be tested.

(7) There are many contradictory cladograms purporting to show the relationships between lower primates and monkeys. None can be tested.

(8) As yet, no definite common ancestors are universally accepted for primates up through anthropoids.

The fact that none of the missing links in primate evolution has been found does not prove that they never existed. However, it falsifies the claim that evolution is proven scientific fact.