ANTH 42: Primates in Nature

Lecture 3:
Finish evolution, then
Methods (1)

Quiz clock

Minutes remaining: **ONE**

7 **6** **5** **4** **3** **30 sec …**

18 **10** **2**

Omomyids

Shoshonius

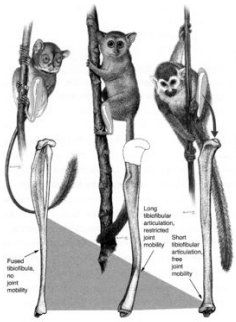


Figure 24. Variation in the anatomy of the tibiofibular joint reflects different adaptations for posture and locomotion in primates. In living tarsiers (left) the tibia and fibula are fused, stabilizing that joint as an adaptation for leaping. In living squirrel monkeys (right), the tibia and fibula remain unfused, allowing free joint mobility across the wide range of postures and modes of locomotion employed by these animals. An intermediate condition occurs in *Shoshonius*. Original art by Mark Klingler, copyright Carnegie Museum of Natural History. Beard (2004) *Hunt for the Dawn Monkey*

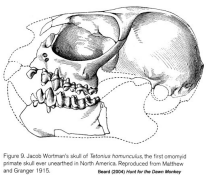


Figure 9. Jacob Wortman's skull of *Tetonius homunculus*, the first omomyid primate skull ever unearthed in North America. Reproduced from Matthew and Granger 1915. Beard (2004) *Hunt for the Dawn Monkey*

Plate 7. A skull of *Shoshonius* compared with that of a living tarsier (right). Beard (2004) *Hunt for the Dawn Monkey*

Plate 1. A tarsier, the only living primate that consumes nothing but live animal prey. Photograph courtesy of and copyright by David Haring, Duke University Primate Center. Beard (2004) *Hunt for the Dawn Monkey*

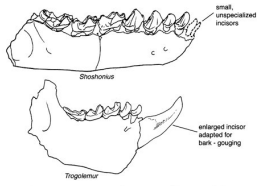
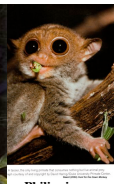


Figure 10. Divergent incisor morphology reflects the range of dietary specialization among North American omomyid primates. Enlarged and procumbent incisors like those found in *Trogolemur* suggest that certain omomyids were specialized gum-feeders who used their incisors to gouge the bark of trees to stimulate the flow of sap and gum. Based on the development of shearing crests on its cheek teeth, *Shoshonius* ate mainly insects and small vertebrates. Its incisors were small and relatively unspecialized. Original art by Mark Klingler, copyright Carnegie Museum of Natural History. Beard (2004) *Hunt for the Dawn Monkey*

Omomyids (*Necrolemur*, *Shoshonius*)

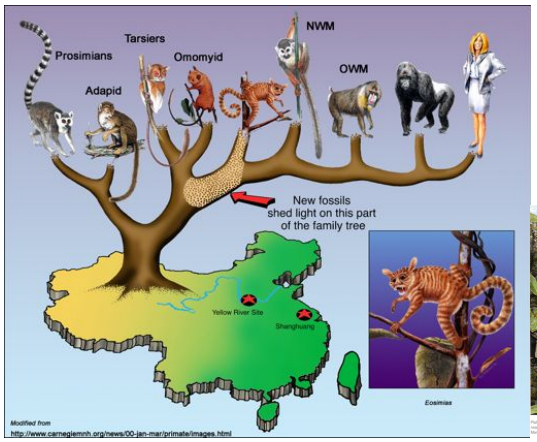
Plate 8. Artist's rendering of *Shoshonius cooperi*, a nocturnal omomyid primate that lived in central Wyoming roughly fifty million years ago. Original art by Mark Klingler, copyright Carnegie Museum of Natural History. Beard (2004) *Hunt for the Dawn Monkey*

Plate 6. Artist's rendering of *Necrolemur antiquus* in the forests of southern France roughly thirty-eight million years ago. Original art by Mark Klingler, copyright Carnegie Museum of Natural History. Beard (2004) *Hunt for the Dawn Monkey*



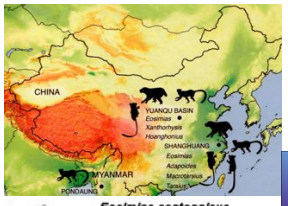
Philippines

Anthropoid origins



Mao's role in primate origins

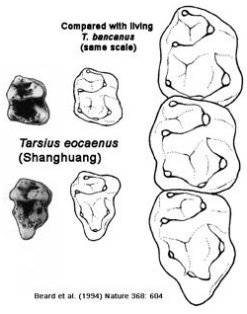
China



Beard et al. (1996) *Science* 272: 82

Anthropoid (tiny!)

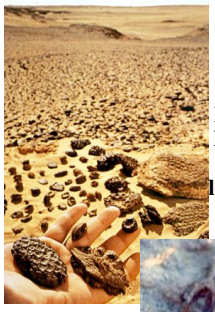
~ 40 mya



Beard et al. (1994) Nature 368: 604

Eocene tarsier, *same genus* as modern.

This modern, this early, opened possibility anthropoids direct from ?? (not adapid or omomyid)



Fayum, Egypt

Multiple late Eocene/early Oligocene localities span ~37 - 33 mya

Plate 9. The L-41 site in the Fayum region of Egypt, where *Catopithecus*, *Proteopithecus*, *Arsinoea*, and other early anthropoids were discovered. Photograph courtesy of and copyright by Marc Godinot.

Beard (2004) *Hunt for the Dawn Monkey*

L-41: Eocene, 35-36 mya

Rainforest

~ 33mya:

Aegyptopithecus

(mix of monkey, ape features)

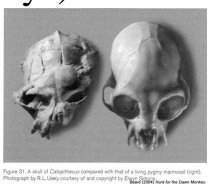
Apidium

Catopithecus (oligopithecid, 37mya. 2 premolars (derived) similar to later *Aegyptopithecus* ~33mya)

Fayum

Huh?

More primate fossils representing more taxa.
Modern: ~15 major groups, ~200 species, all with histories.



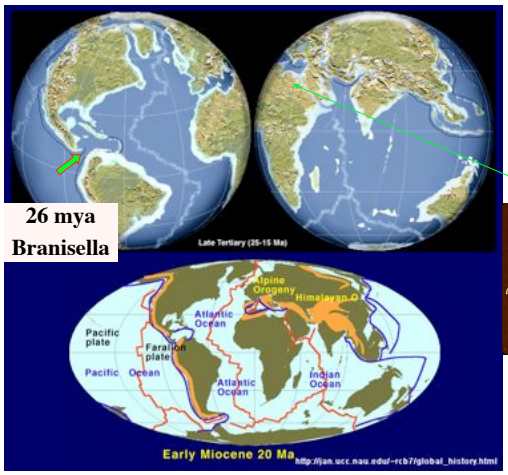
Follow Falk.

Older: Oligopithecids (2 premolars [derived]) e.g. *Catopithecus*

Younger: Parapithecids (3 premolars [NWM]; e.g. *Apidium*) and propliopithecids (*Aegyptopithecus*)

Key point:

- **Features of both apes (esp. teeth) and monkeys (esp. postcranial). Anthropoids, yes; monkey/ape split not clear, if even present.**

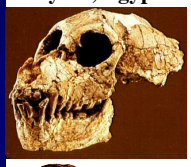


26 mya Branisella

Oligocene to Miocene

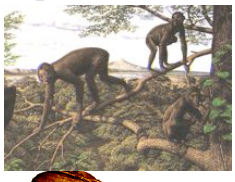
Planet of the apes

Fayum, Egypt



Miocene hominoids; "dental apes" to *Proconsul*, *Sivapithecus*, and us.

Locations of Sivapithecid fossils



40+ species, 3-50 kg

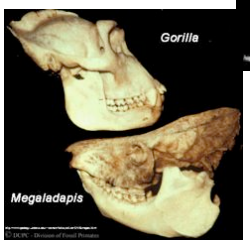
- **Africa: *Proconsul* (early)**
- **Europe: Dryopiths, Sivapiths**
- **Asia: Sivapiths (orangs)**

Then, monkeys happened

- **Or at least, something did. Debated.**
- **Monkey radiations mostly within last 5-10my**

Madagascar

Lemur versions of donkeys, sloths, gorillas…



Ecosystems we see today are altered

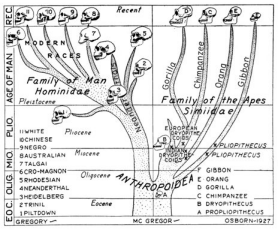
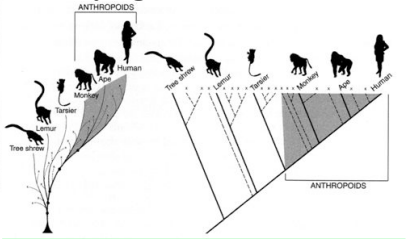


Figure 47. The "dawn man" theory of human origins as it was developed by Henry Fairfield Osborn in the late 1920s. Note that the human lineage, depicted to the left of the family tree, originates in the Oligocene, entirely bypassing the branch to the right leading to modern apes. From Osborn 1927, copyright American Philosophical Society. Reproduced by permission.

Beard (2004) *Hunt for the Dawn Monkey*

Phylogenies tell stories

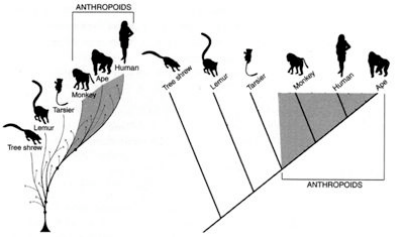


Above: humans have very deep roots (we're so important and unique, must have been separated from apes for very long time)

If draw it with different "grades" symbolized by levels [LEFT], implies primate evolution led up to us AND a succession of "higher" taxa evolving from "lower". On [RIGHT], all lineages evolved from common ancestors; neutral.

Removed fossil taxa from one on right.

Phylogenies tell stories



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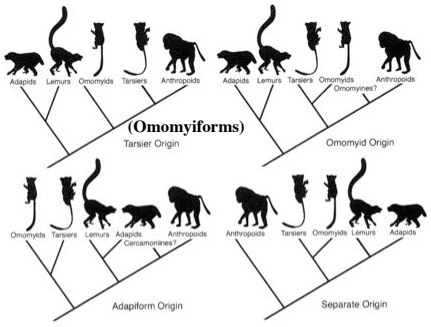


Alternative ideas for origin of the Anthropoids (monkeys and apes)

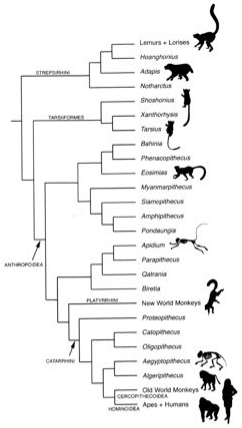


Figure 45. A provisional primate family tree. This phylogeny recognizes an ancient evolutionary bifurcation between tarsiform primates (tarsiers, omomyids, and microchoerids) and anthropoids. Soon thereafter, anthropoids split into Asian and African branches, which evolved in isolation from each other for the remainder of the Eocene. Original art by Mark Klingler, copyright Carnegie Museum of Natural History.

Beard (2004) *Hunt for the Dawn Monkey*

SUMMARY: Key concepts

1. **Interpretation of fossil record**
2. **Issues identifying "transitional" mammal, primate fossils**
3. **Plesiadapids (? Protoprimates); Adapids (prosimians); Omomyids (tarsiers), and the puzzle of anthropoid origins**
4. **Wide distribution, multiple species, most small**
5. **Oligocene radiation, Miocene apes**
6. **Pliocene monkeys**
7. **Madagascar megafaunal extinctions & human arrival**

WHY: Evolution and its mechanisms

But not until some discussion of methods of study…

Methods

- **Need to understand because influences how interpret results, and why uncertainty exists.**
- **Part of "primates in nature" is studying them, and some at least interested in what that's like.**

Sources of data in primatology

Biomedical (physiology, anatomy).

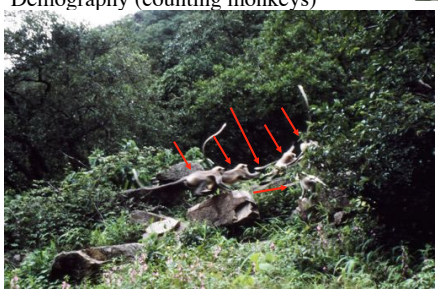
Skeletal study (including fossils)

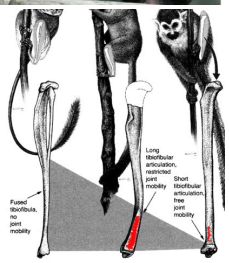
Precise measurements, knowing what to measure. One definition of "data".

Demography (counting monkeys)


COMMENTARY

The ethics of research on great apes





Behavior: tigers

Observing animal behavior can be difficult to do, and immensely difficult to do in an unbiased way.

To start, get paper & pen (pencil) ready; next slide showing 2.5 minute clip from a film on observational methods. There's about 25 seconds of introduction, then a beep and the goal is to record what you see.

Do your best to write down the behavior of the tigers, from the moment you hear the beep on.

Behavior: tigers

Next, watch again, with my notes on the 1st 35 seconds…

Do your best to write down the behavior of the tigers, from the moment you hear the beep on.

Behavior: tigers (I cheated, & still missed plenty)

Red #s are the second, starting from 0, that the noted behavior starts

- **0:** 2 tigers, call #1 (moving toward viewer) & #2 (side to viewer). Both looking toward viewer. #1 walks twd viewer;
- **2:** #2 glances behind rock then follows cple steps, both stop. Both attending to something near viewer.
- **5:** #1 brief open mouth slightly, tongue protrude, then looks to it's right; return face forward
- **15:** flicks right ear (sound?)
- **17:** #2 looks to right; several seconds pass, then #1 glances same direction
- **19:** #2, then #1, turn back forward.
- **24:** #1, keeping attention forward, steps to right, then faces right & walks, some apparent tongue sticking out motions. Goes > 1 tiger length, starts to climb rock, ears/ attention twd top of rock.
- **30:** Camera leaves #2; #1 draws ears back against head & appears to hesitate
- **33:** Bounds up, another tiger on rock lying down facing roughly twd viewer (#3). #3 glances toward #2 as #2 approaches, then
- **35:** looks downslope again

Now for something primatological…

This time, just imagine you're writing it all down.

The narration is a bit over the top, sorry… but think about the *interpretations* being placed on the *observations*. How does he <u>know</u>?

NB: I chose segments with relatively long clips - but the editing does make "observation" even trickier. Sorry.

Now for something primatological…

Valley of the Golden Baboon