ANTH 42

Lecture 10

Atelines: stomachs and tails

Quiz clock

Minutes remaining: **ONE**

30 sec …

5 4 3 2

Owl monkeys & fur rubbing

Eduardo Fernandez-Duque: yes, both plants and millipedes (captive study); not seen in field (yet); do also urine wash (hands only).

Millipede segmental glands: 2-methyl-1,4-benzoquinone & 2-methoxyl-3-methyl-1,4-benzoquinone; deter mosquitoes.

Latest on *Cebus*:
Meunier H, et al. (2008) Social facilitation of fur rubbing behavior in white-faced capuchins. *Am J Primatol* 70: 161-168. Group rubbing is fundamentally social, with mimetic component; proposed explanation is that by having entire group rub same time, mosquitoes less likely to approach anyone.

Rub with garlic, onions also.

Orangutans & fur rubbing

HC Morrogh-Bernard (2008) Fur-Rubbing as a Form of Self-Medication in Pongo pygmaeus. *Int J Primatol* **29**: 1059-1064

"Holding the bunch of leaves in her hand, she bit the tops of the leaves (Fig. 1) and chewed them for 3–5 min, mixing the chewed-up leaves with saliva that produced a green-white lather. … chewing probably releases saponins in the leaves, which, when mixed with saliva, make it easy to apply, like a soap. … She rubbed the lather along the back of her forelimb from the base of the shoulder to the wrist, similar to a person applying sunscreen. The behavior appeared to be purposeful, concentrating on the elbow. … Once the back of her limb was covered in the white lather and her fur was obviously wet, she bit off more of the leaves that she was holding in her foot, and repeated the process, this time on her right forelimb. After she had lathered both limbs, she removed the wedge from her mouth and discarded it."

Unlike *Cebus*, no change in affect, no excitement.

Commelina sp.

White uakari (*Cacajao calvus calvus*) & white-faced saki (*Pithecia pithecia*) (yes, he calls the uakari a saki…)

Specialists at seed predation.

BBC Life of Mammals: *Social Climbers*

M

F

Monogamous

***Pithecia* (sakis),**

***Chiropotes* (bearded sakis),**

***Cacajao* (uakaris)**

Multi-male, multi-female but 'pairing' within group for *C. satanus*

Seed predators

Why don't we say "fruit predators"?

Multi-male, multi-female

Red-necked owl monkey (*Aotus nigriceps*)

Mainly monogamous medical model for malaria

nocturnal, cathemeral, crepuscular - difficult to pigeonhole.

1982: 1 species;

1983: 10+

Gray-necked owl monkey or douroucouli (*Aotus trivirgatus* *[maybe; 1 split to 10+ in early 1980s]*)

Cathemeral populations; cryptic species

BBC Life of Mammals: ***Social Climbers***

Spider monkeys,

wooly monkeys,

wooly spider monkeys,

and howlers...

Demography

Howlers (*Alouatta ?pigra*) and spider monkeys (*Ateles* sp.)

BBC Cousins: ***The monkeys***

Spider monkeys (*Ateles* sp.): ripe fruit specialists

BBC Life of Mammals: ***The social climbers***

NWM & grooming

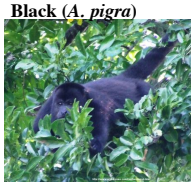
Howlers (*Alouatta*)

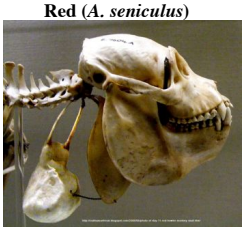
Mantled (*A. palliata*)

Red (*A. seniculus*)

Black & gold (*A. caraya*)

Black (*A. pigra*)





Brown (*A. fusca*)

Howlers (*Alouatta*)

Mantled (*A. palliata*)

Black (*A. pigra*)

Red-handed (*A. belzebul*)

Brown (*A. fusca*)

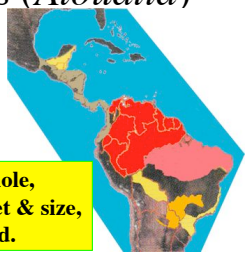
Just allopatric variants on a theme?

Red (*A. seniculus*)

Bolivian red (*A. sara*)

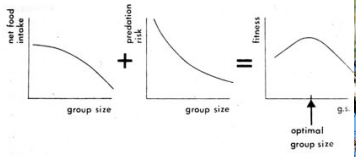
Black & gold (*A. caraya*)

Howlers (*Alouatta*)

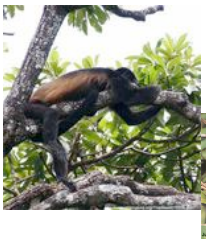


On the whole, similar diet & size, and related.

Species	% leaves
palliata	63
pigra	
seniculus	52
fusca	66
caraya	76
belzebul	

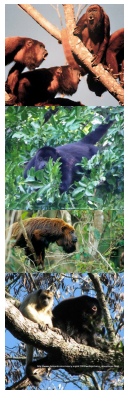


Howlers (*Alouatta*)



Species	% leaves	Grp Size	SM or MM	Testes descent	Hyoid volume (ml)
palliata	63	5 to 20	MM	Pub	4.5
pigra		7	SM or MM	Inf	
seniculus	52	4.6	1° SM	Inf	69.5
fusca	66	6 to 11	1° SM	< Pub	39
caraya	76	8	SM or MM	Inf	23
belzebul		2 to 8	SM	< Pub	56.5

Howlers (*Alouatta*)



Howlers represent one of most interesting groups to sort out for socioecology. Appears to be that small differences in ecology having significant effects (or that the paradigm is in trouble… nah…)

What role has eating played in evolution of intelligence?

Decisions: how to maximize food intake and nutritional quality, minimize time & energy spent, risk of predation, etc.

These decisions vary with type of food....

Plant defenses

Forest not salad bowl

Plants try to regulate what parts get eaten, when. Stop feeding by mechanical (thorns, hard shells etc.) and chemical (secondary compounds) means.

inhibit digestion
poison

But *do* want animals to eat *some* parts, e.g., ripe fruit

So STRATEGIES

Plant resource patchiness in *space*

MANY species, esp. tropics. Katie Milton: ≈ 135 species of tree in ≈15 acres Panamanian forest.

If [large] specialist, need to find scattered trees

If generalist, need to cope with many defenses

Plant resource patchiness in *time*

Finally: plants want animals to eat certain parts, at certain times -- fruit, nectar -- to attract animals.

certain times...

So the easy-to-eat stuff is not only patchy in space, it is patchy in time.

Patterns to patchiness

Patchiness not random:
individual trees live a long time

species tend to synchronize fruiting, if individual tree X is ripe, Y likely to be also (figs [*Ficus*] an important exception)

So there is some point to trying to figure out the complexity.

Giant, updated map + calendar great things to have, *if behaving optimally*.

Howler and spider monkeys

Milton H_o: primates eating fruit (very patchy) smarter than those feeding on leaves (not *as* patchy)

spider monkeys - frugivore, home ranges ≈ 800 ha (≈ 8km^2)

howler monkeys, folivore, home range ≈ 30ha (≈ 0.35km^2)

Body size, group size similar.

Howlers: groups cohesive.

Spiders: fission/fusion.

==>> spider monkeys, individual is unit of information; for howlers, in some sense the whole troop is the information storage unit.

To eat, spiders face more difficult spatiotemporal task, and face it more alone.

Howlers & spiders compared

Differences ? related ? to 'intelligence'

Infancy: howlers independent sooner

Diet flexibility: captive howlers tend refuse unfamiliar foods (many role models) [also, 2ndary compounds maybe...]

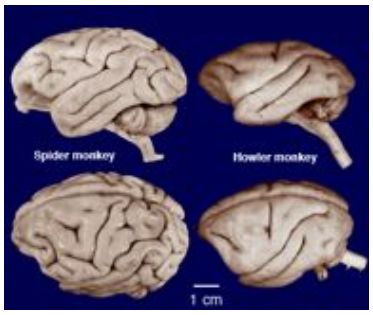
Travel: howlers predictable route in space/time

Their brains ...

Spider monkeys bit larger than howlers (as much as 25% more), brains about twice as large.

~ 7.5kg/107g vs 6.2kg/50g

1.4% vs 0.8%



Brain food: Not so fast...

? link between brain size - intelligence?

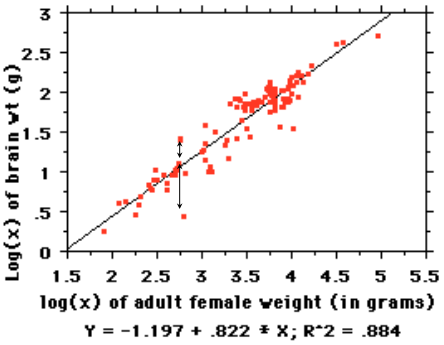
brain size related to metabolic rate, and howlers have low metabolism [2ndary cmpds] - they lack *specialized* gut.

Go cautiously with interpretation...

As with megafaunal extinctions - can we gain insight by "backing up" and looking at broad *pattern*?

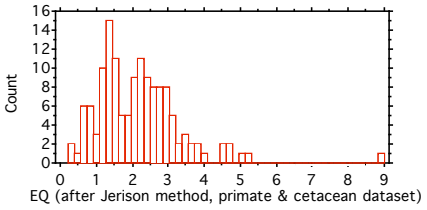
Allometry: EQ reminder

Can calculate "encephalization quotient" or EQ. Basically a residual.



Some EQs..

139 primate and cetacean (whale & dolphin) species' brain & body weight estimates



Cebus monkeys:	3.4 - 3.8 (diff. species)
Rhesus monkeys:	3.8
Olive baboon:	2.8
Squirrel monkey:	3.1
Chimpanzees:	3.5
Orangutan:	3.1
Baleen whales:	0.2 - 0.6
Orcas:	2.5
Bottlenose dolphin:	5.2
Humans:	8.9

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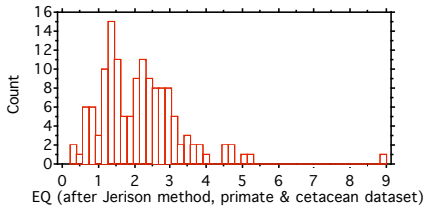

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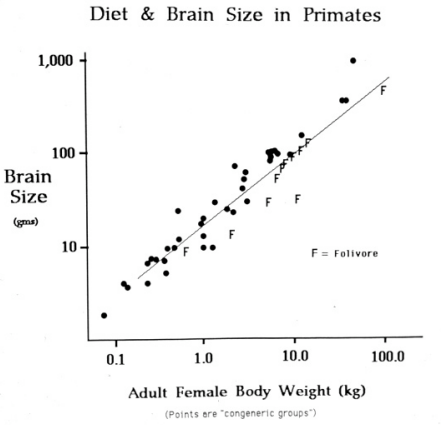
No method's perfect... or our intuitions are wrong.

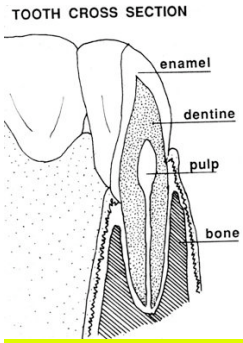
But let's see what pattern says about diet...

EQs & primate diets

Is relative brain size influenced by diet? IE, are large brains "for" dealing with obtaining food?

Looks like it... and not all folivores have metabolisms as depressed as howlers.





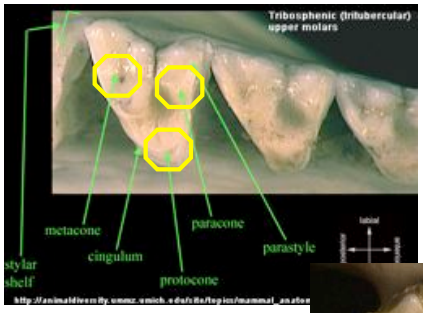
To set the stage, what happens to monkeys without dentists?

So a bit more on study of diet...

How do we know what extinct animals were like?

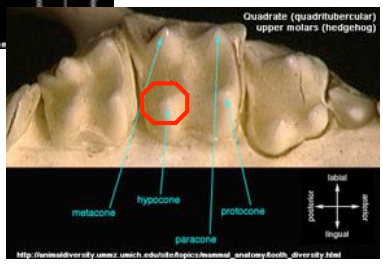
Why does Falk go on about dental formulas?

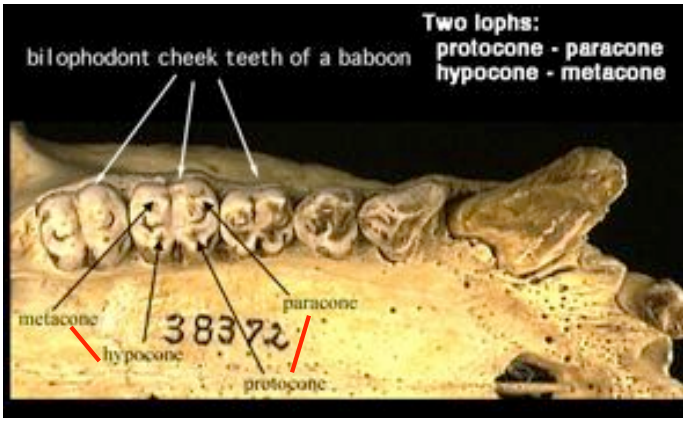
How detailed is the link between morphology and behavior?



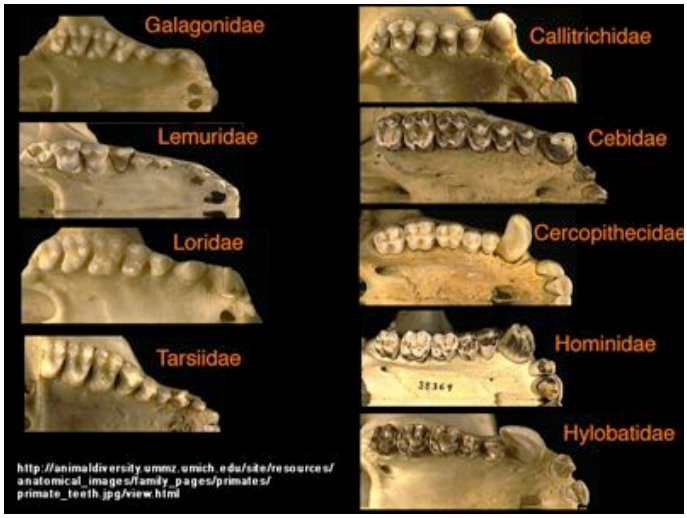
Trituberculate molars ('primitive' mammalian)

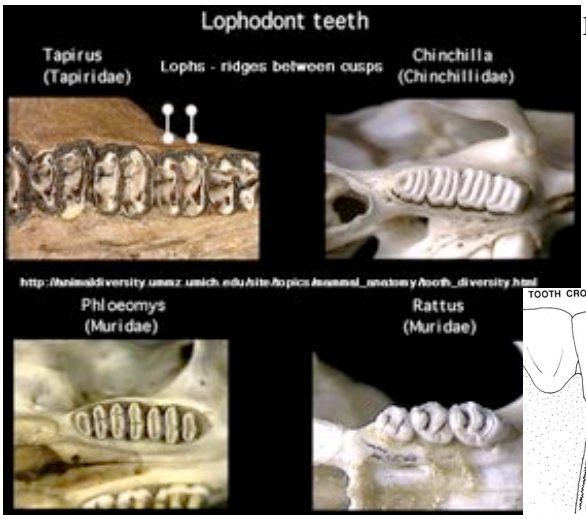
Quadrituberculate - adds a cusp

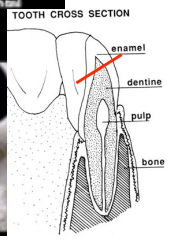




Lophs - ridges connecting cusps.







Back to lophs.

What makes the ridges visible?

Folivores & frugivores

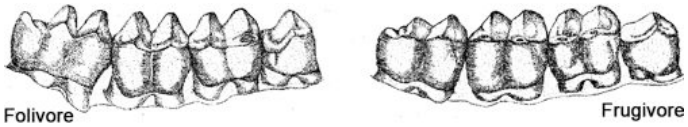
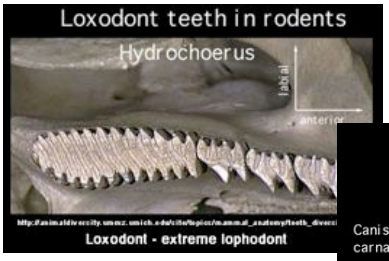


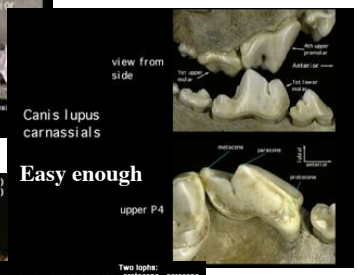
Figure 5.17 Comparison of the lower second premolar and three molar teeth of frugivorous (right) and folivorous (left) cercopithecids. Note the sharper cusps, more sharply defined shearing blades, and larger crushing surfaces of the folivore. (Adapted from Kay and Hylander 1978.)

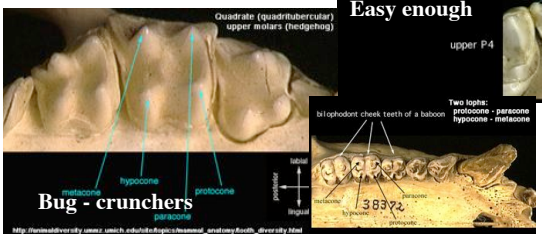
A. Richard, *Primates in Nature*



So why loxodont?

Why?





Generalized