

Main Points

1) Diversity, Phylogeny, and Systematics:

- Infraclass Eutheria
- Orders Chiroptera through Primates
- Superorder Afrotheria, Suborders Megachiroptera, Microchiroptera

2) The evolution of mimicry

- Muellerian vs Batesian mimicry
- example: acoustic mimicry in tiger moths
- example: Batesian mimics as parasites

3) What constitutes scientific evidence?

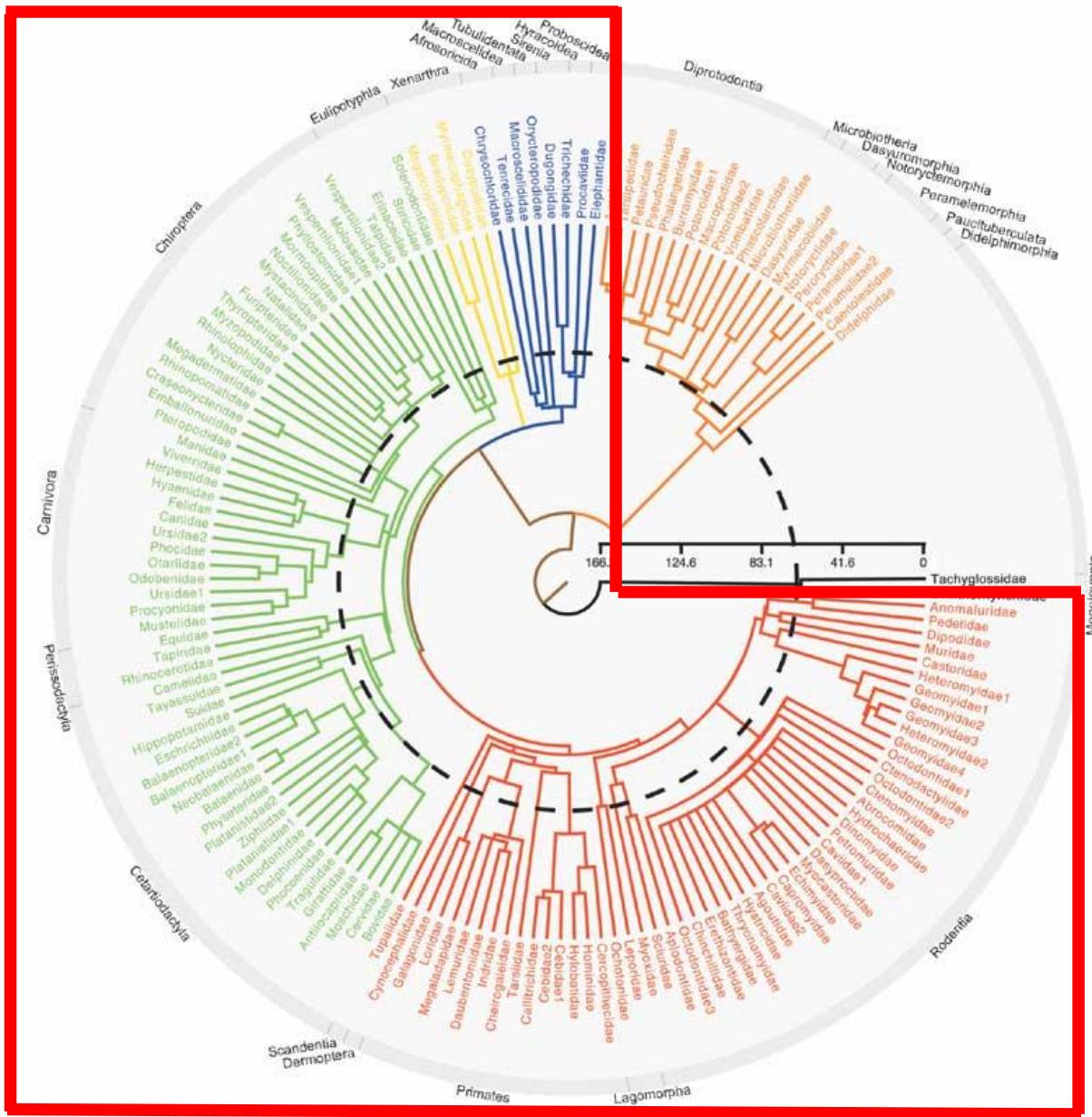
- example: cryptozoology and DNA sequencing of yeti hair

Terms: echolocation, tragus, mimic, model, Muellerian mimic, carnassials, Batesian mimic, graviportal, falsifiability/testability

Pre-reading: Wednesday 20 Sep = Nagasawa et al 2015

Monday 25 Sep = Crooks et al 2017

Subclass Theria, Infraclass Eutheria



Order Chiroptera: bats

Taxonomy: 17 families, 928 species

Distribution: cosmopolitan



Suborder Megachiroptera: fruit bats

Taxonomy: 1 family, 173 species

Distribution: Australasian, Ethiopian, Oriental

Characteristics:

- ear and nose simple and unmodified
- vision is derived (primate-like)
- echolocation and hibernation rare



Suborder Microchiroptera: microbats

Taxonomy: 16 families, 755 species

Distribution: cosmopolitan

Characteristics:

- elaborate ear (tragus) and nose modification
- vision is poor
- echolocation and hibernation common

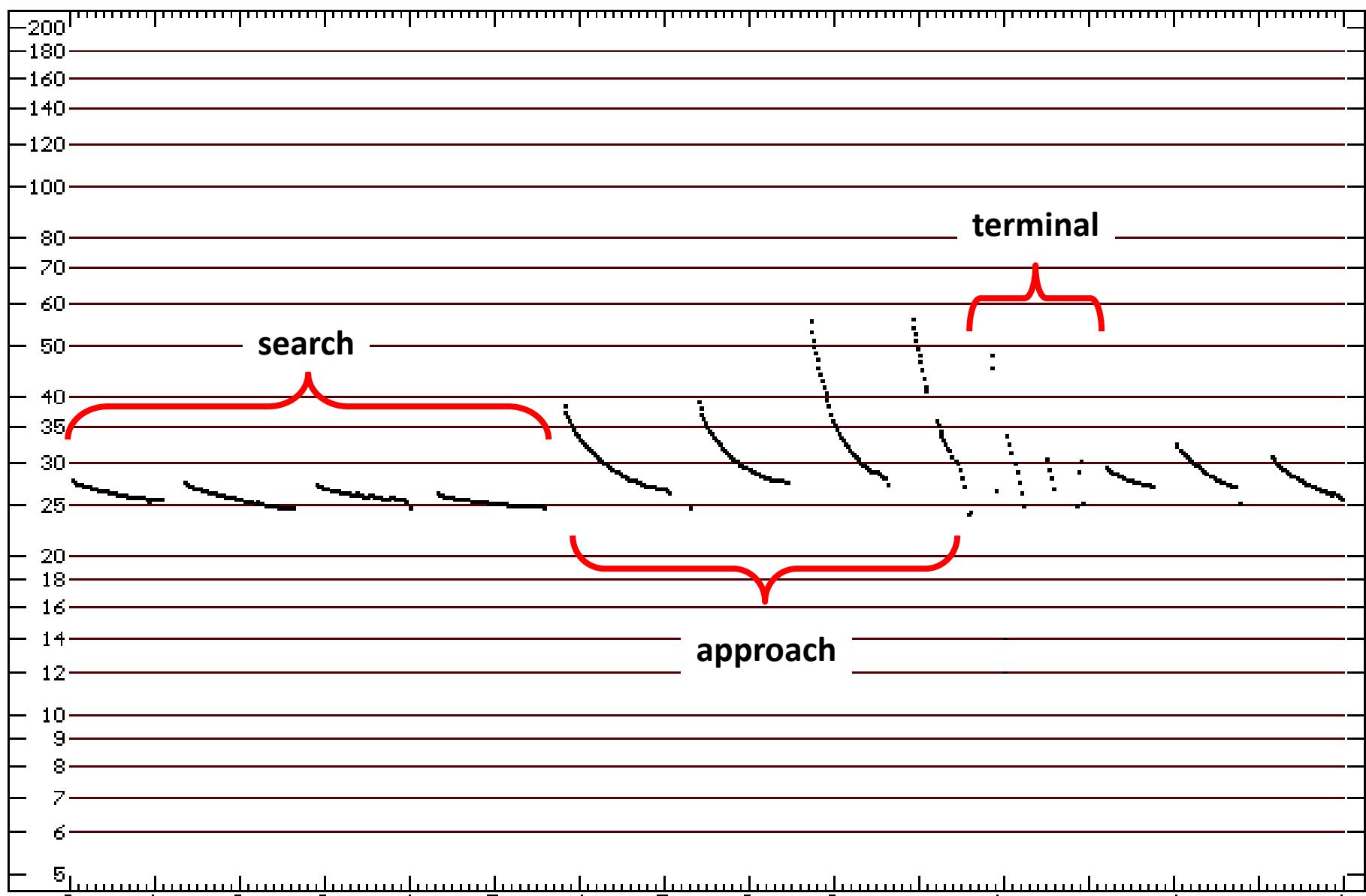


Photo credit: Alex Borisenko
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Echolocation

echolocation =

emission of high-frequency sound pulses (usually ultrasonic) to gather information about objects from the returning echoes



Tape: Computer Date: 13.07.98 Loc: Weimer Springs, Coconino Co., AZ
Sp: Tadarida brasiliensis Spec:
Note: Active monitoring, near tank 3 mist nets

87132059.01# Div 16
TOT 150ms TR 10ms t7 COMP ST 206 FILT 0
ANALOOK 2.6 January 1996

Mimicry

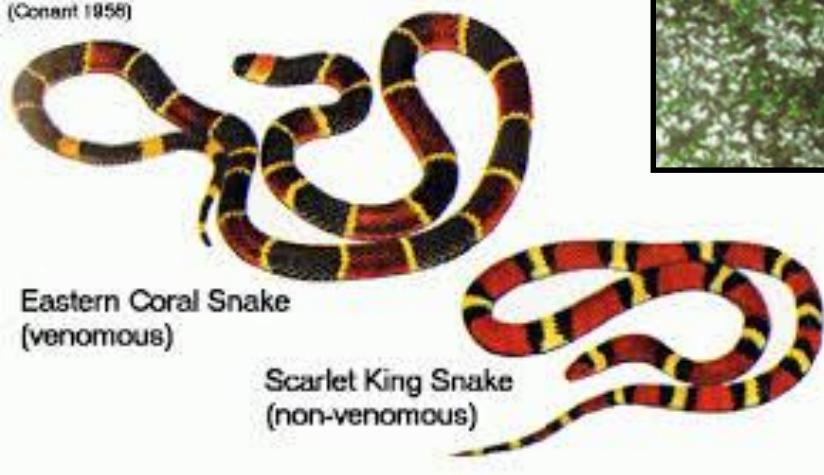
- **mimicry = resemblance of one organism (the mimic) to another (the model) to confuse the identity of the mimic to enemies, often utilizing aposematic coloration**

Mimicry

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(Conant 1958)



Eastern Coral Snake
(venomous)

Scarlet King Snake
(non-venomous)

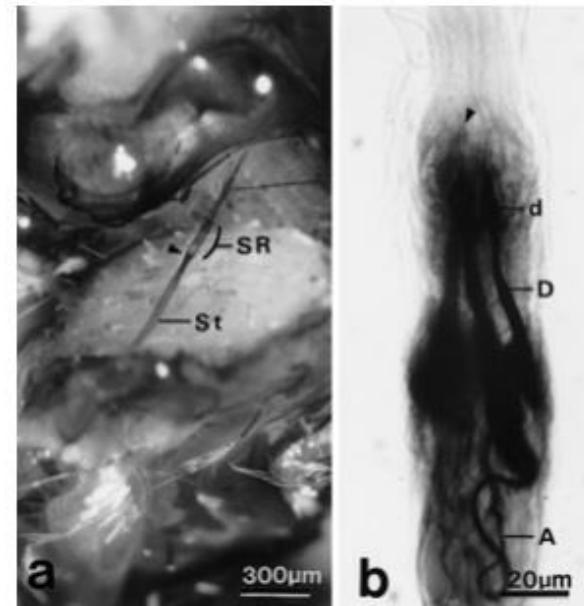
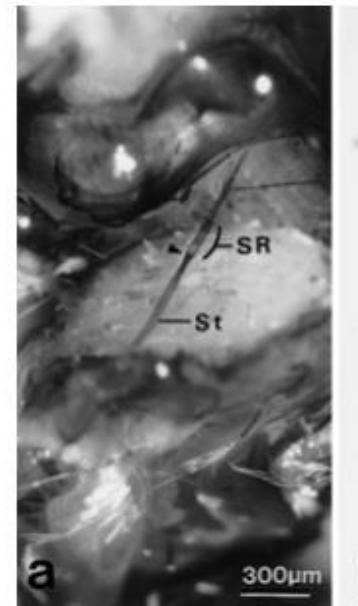
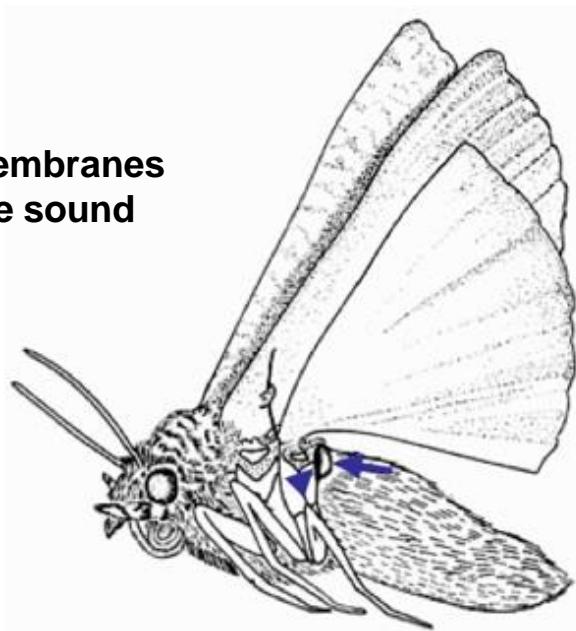
Mimicry

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- **Mullerian mimicry** = dangerous and/or bad-tasting model, dangerous and/or bad-tasting mimic

Mimicry

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- **Muellerian mimicry** = dangerous and/or bad-tasting model, dangerous and/or bad-tasting mimic

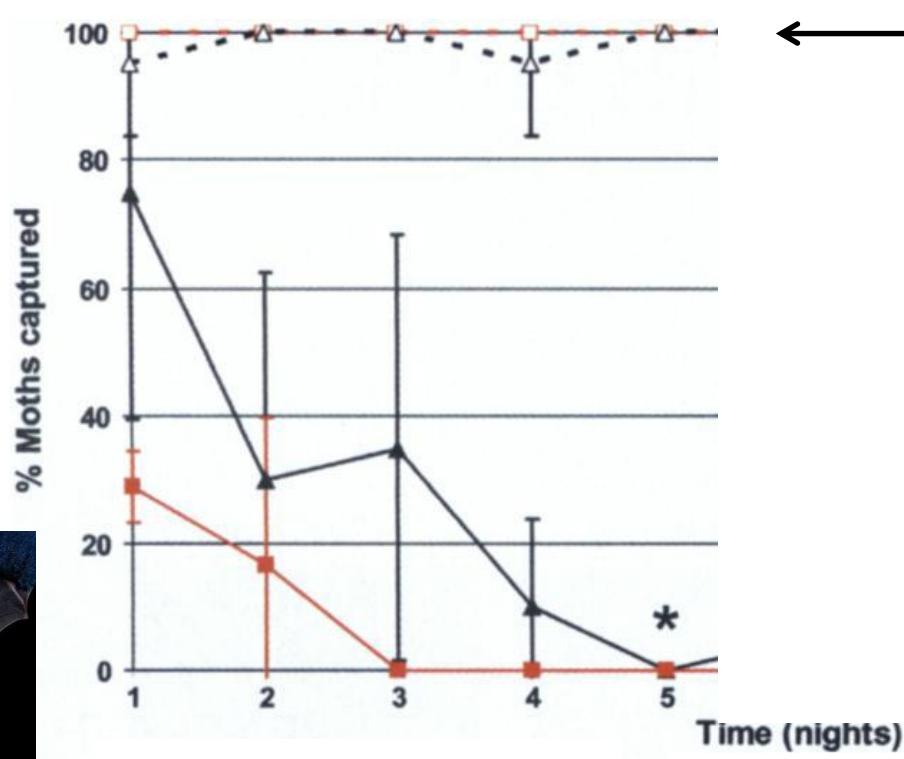
tymbals are
vibrating membranes
that produce sound



Mimicry



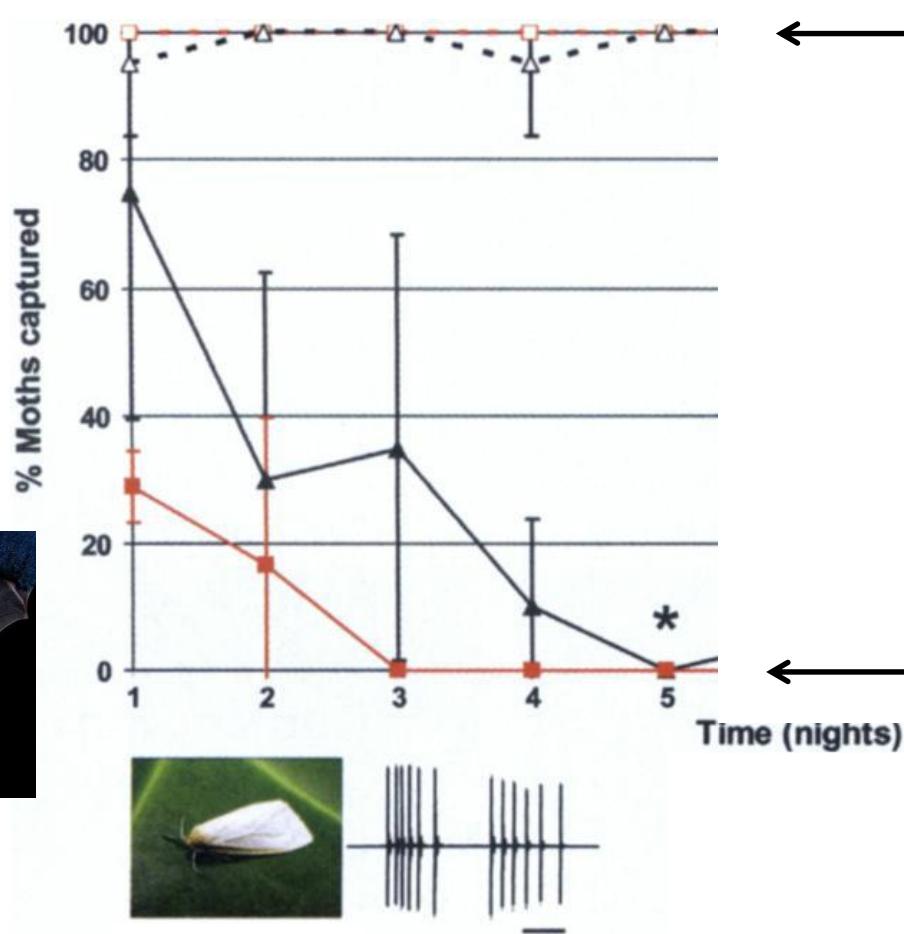
Mimicry



tasty noctuid
moths

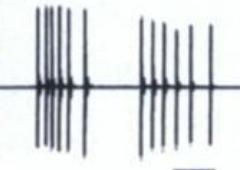


Mimicry



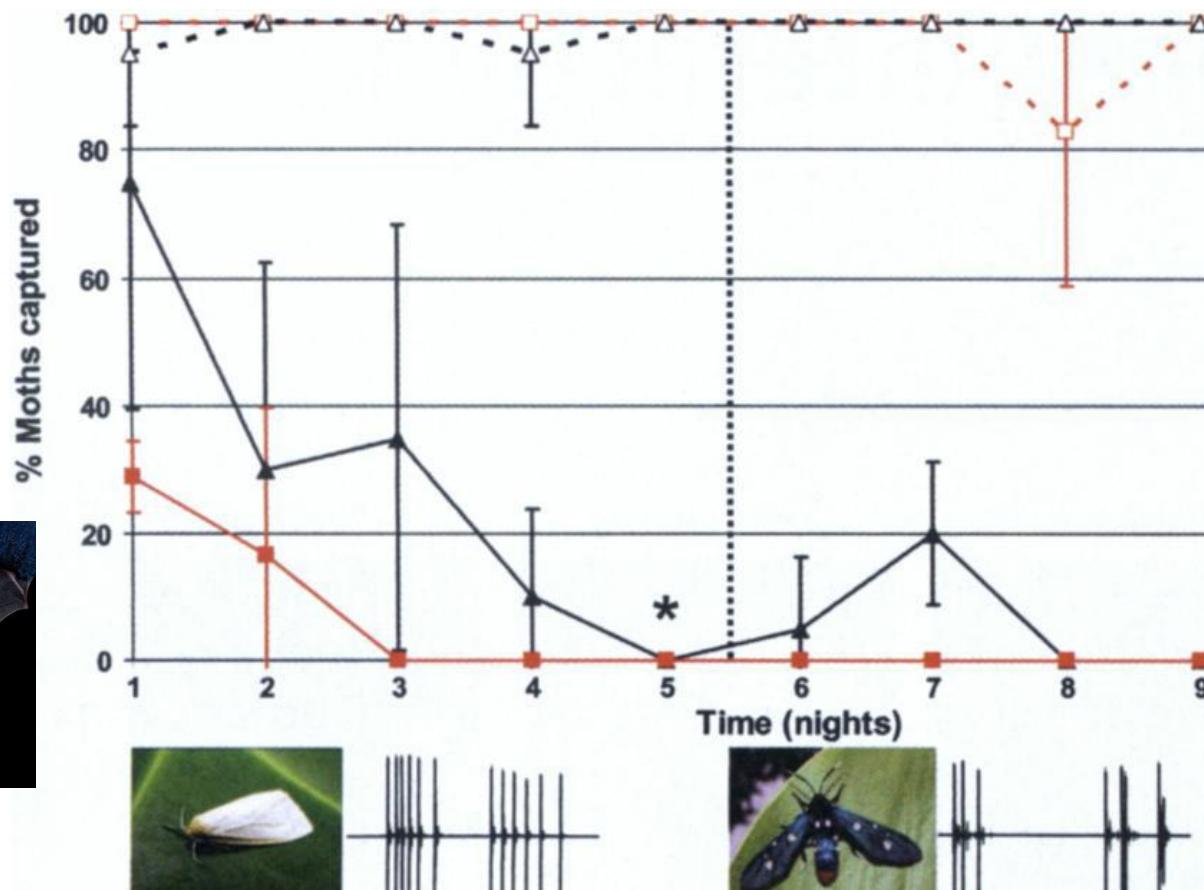
tasty noctuid
moths

nasty tiger
moths



Tiger moth
Species 1

Mimicry



Tiger moth



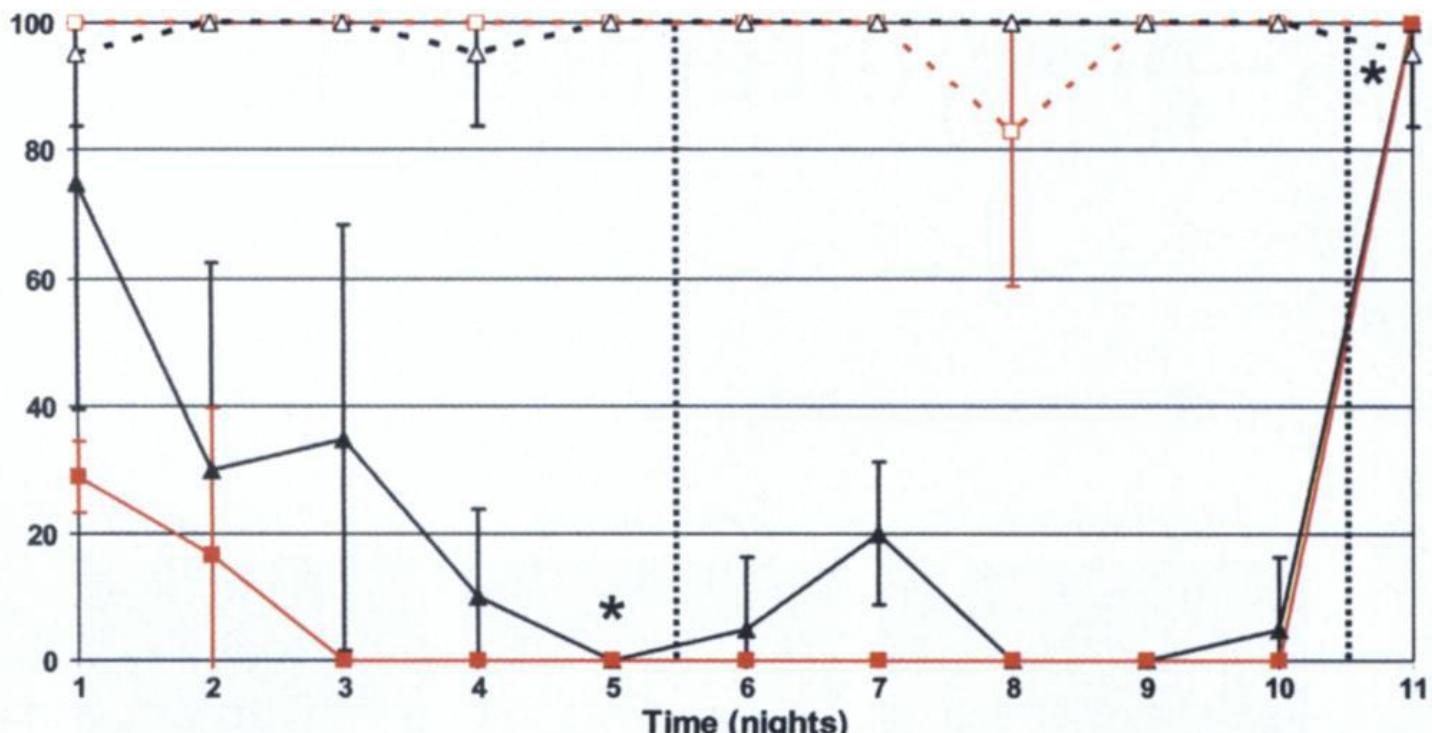
Tiger moth
mimic



Mimicry



% Moths captured



Tiger moth



Tiger moth
mimic



Tymbals ablated

Order Carnivora: carnivores

Taxonomy: 11 families, 271 species

Distribution: cosmopolitan

Pallas's cat



walrus



spectacled bear



kinkajou



Order Carnivora: carnivores

Taxonomy: 11 families, 271 species

Distribution: cosmopolitan

Characteristics:

- derived vision and hearing
- strong jaws and prominent canines
- P4 and m1 = carnassials

Pallas's cat



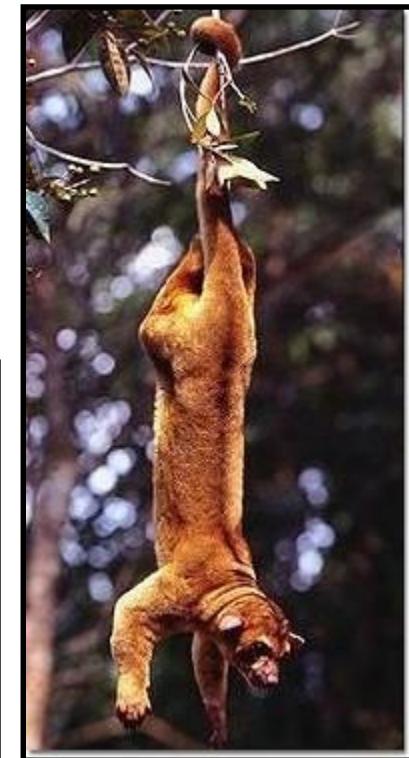
walrus



spectacled bear



kinkajou



Mimicry

- **mimicry** = resemblance of one organism (**the mimic**) to another (**the model**) to confuse the identity of the mimic to enemies, often utilizing aposematic coloration
- **Batesian mimicry** = dangerous and/or bad-tasting model, harmless and/or good-tasting mimic

Mimicry

- myrmecophagous aardwolf mimic, carnivorous striped hyena model
- Batesian mimics as parasites?

Hyaena skull



Proteles skull



copyright Vijay Cavale 2010



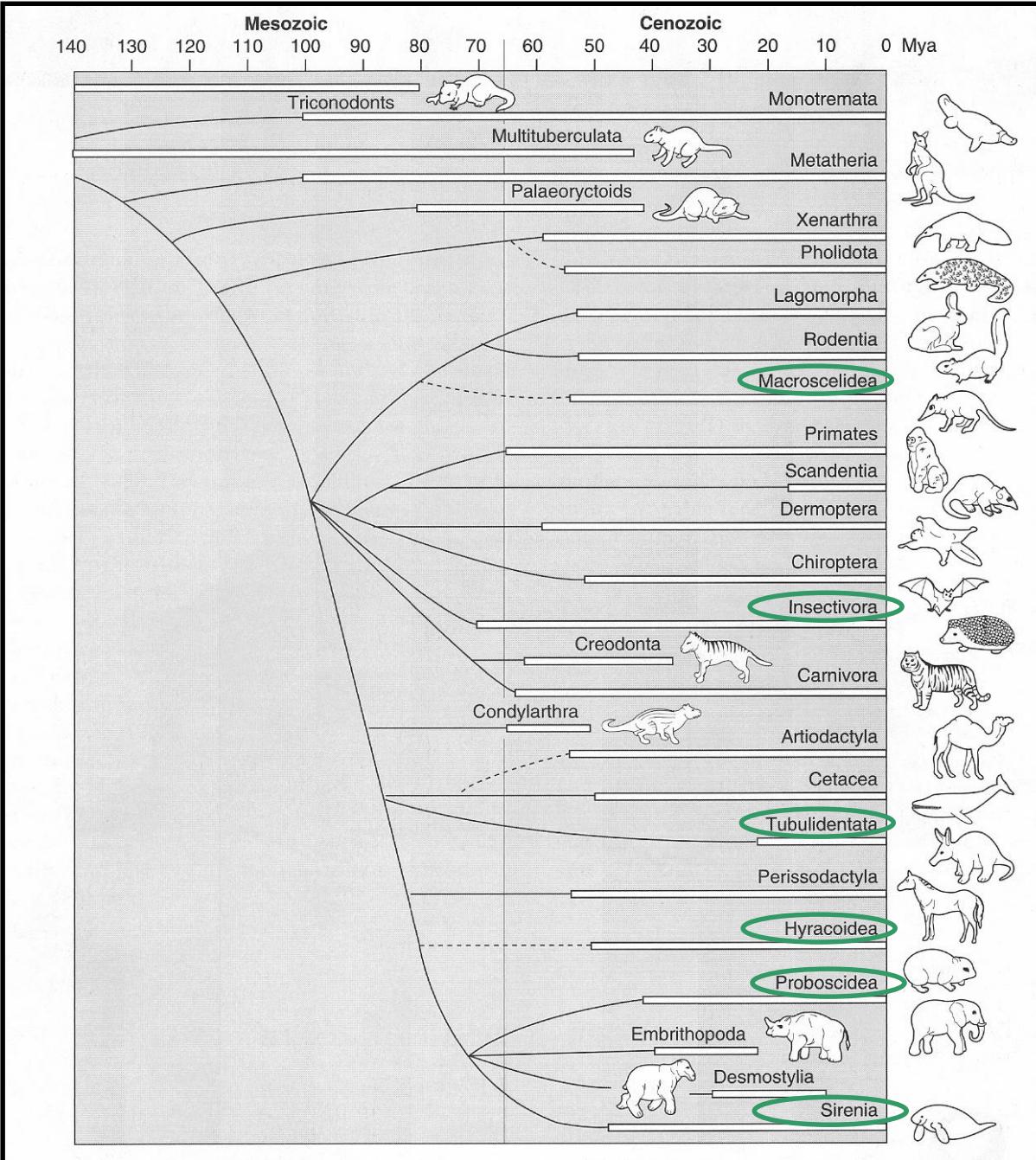
Discussion Q: regarding Batesian mimicry, would you expect mimics or models to be more abundant? Why?

Hyaena skull

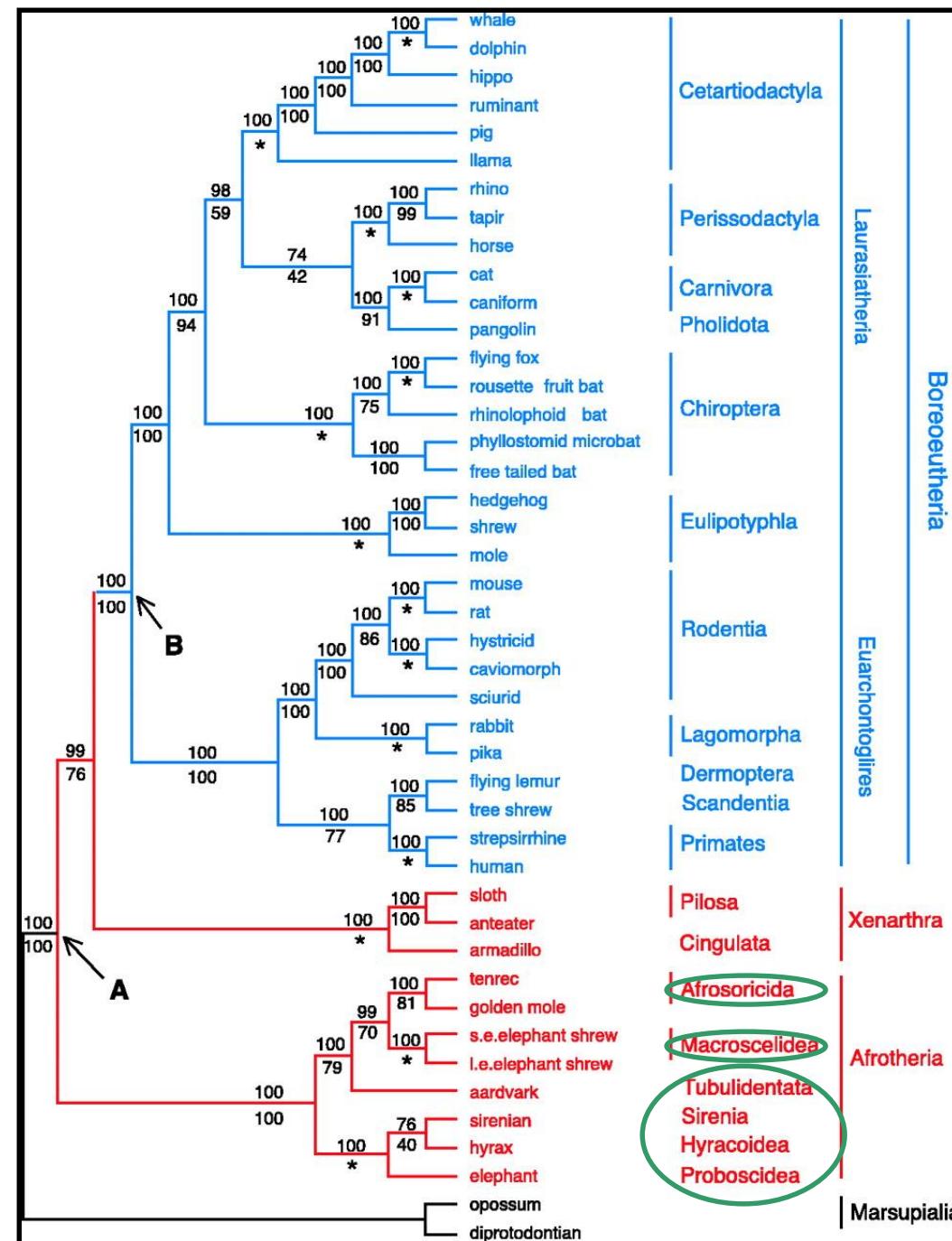


Proteles skull

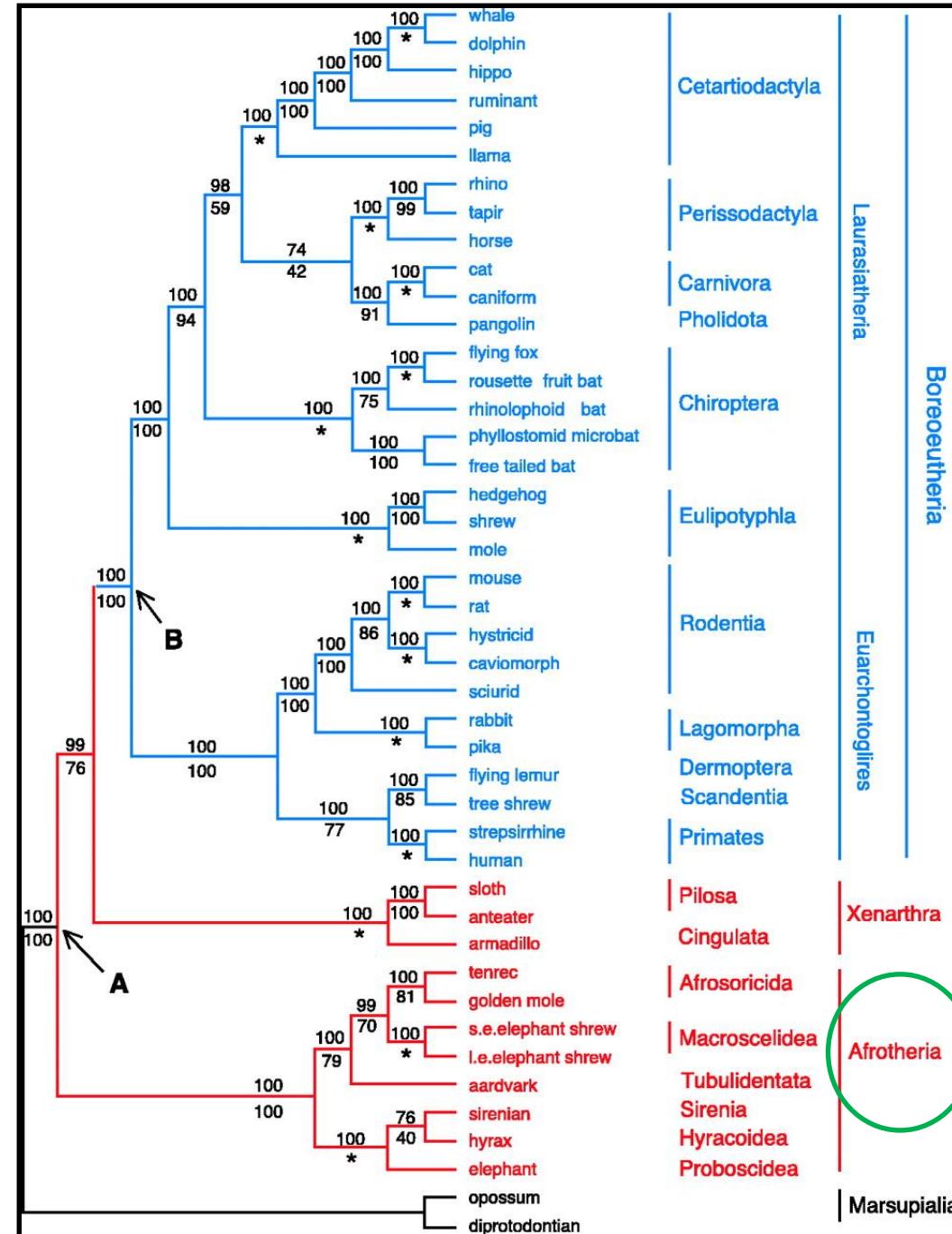




from Novacek 1992



from Murphy et al. 2001



Order Afrosoricida: tenrecs, otter shrews, golden moles

Taxonomy: 2 families, 51 species

Distribution: Ethiopian

Characteristics:

- cloaca
- cone-like skulls

giant otter shrew



streaked tenrec



Namib golden mole



Order Macroscelidea: elephant shrews

Taxonomy: 1 family, 15 species

Distribution: Ethiopian

Characteristics:

-- cursorial

-- long, movable snouts

gray-faced elephant shrew



checkered elephant shrew



golden-rumped elephant shrew



Order Proboscidea: elephants

Taxonomy: 1 family, 3 species

Distribution: Ethiopian and Oriental

Characteristics:

- upper incisors modified into tusks
- infrasonic communication
- graviportal locomotion

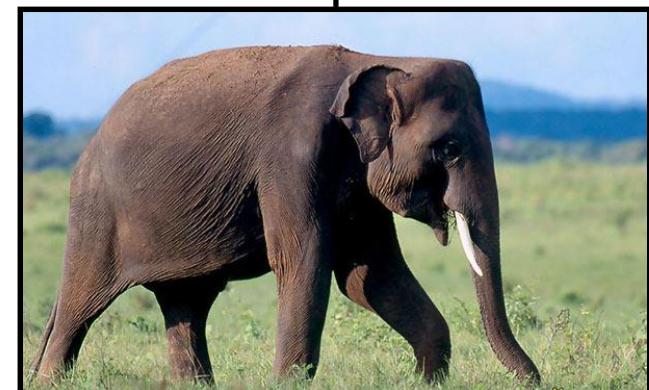
bush elephant

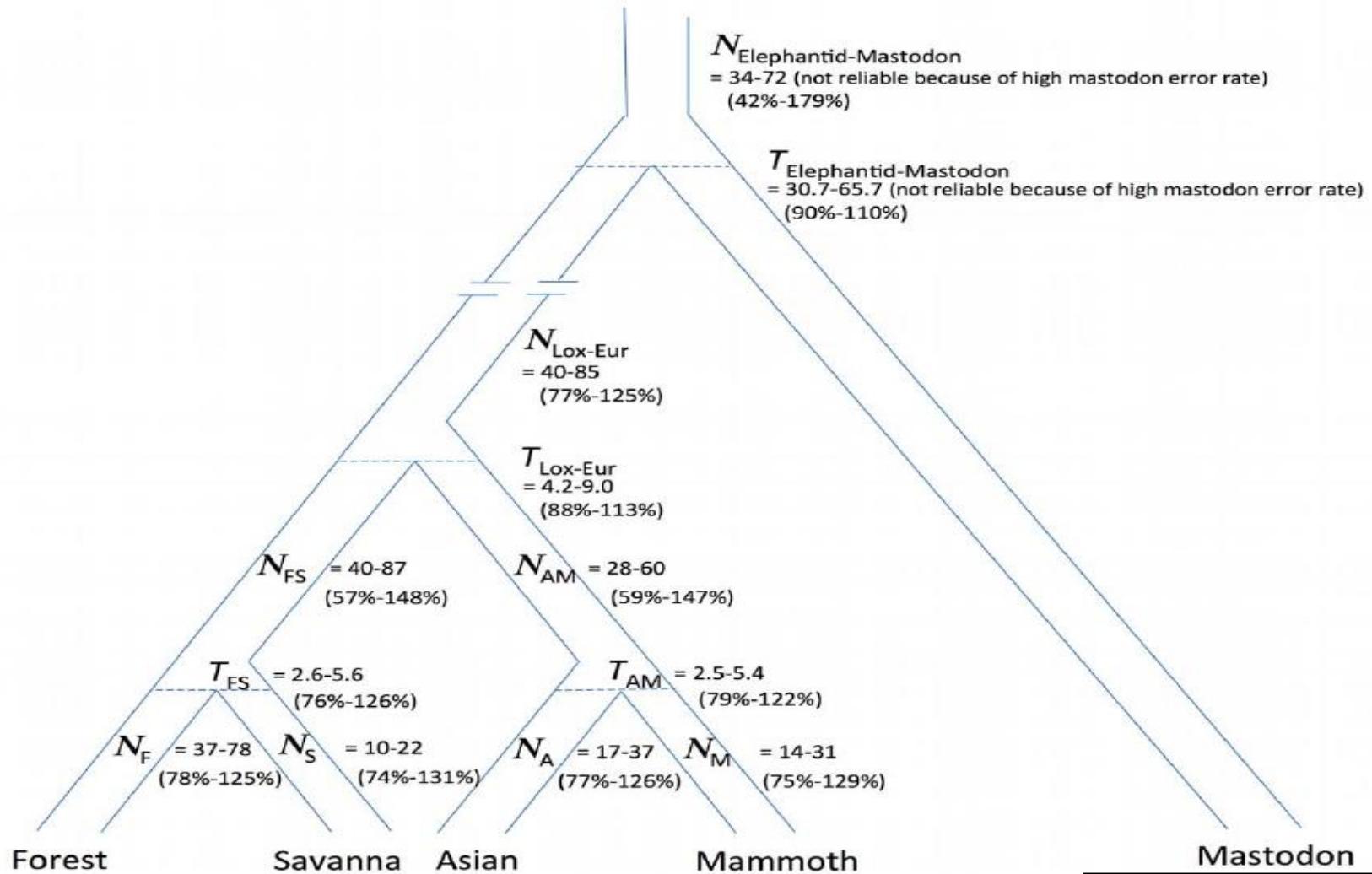


forest elephant



Asian elephant





Order Sirenia: dugongs and manatees

Taxonomy: 2 families, 5 species

Distribution: Oceanic and rivers, except Palearctic

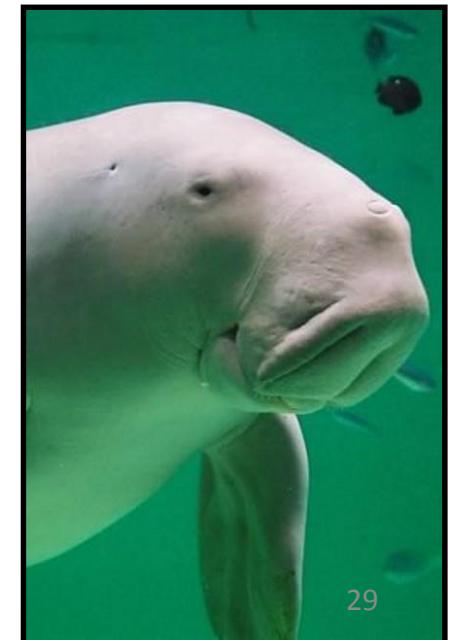
Characteristics:

- fusiform body with vestigial hind limbs
- reduced dentition (10-14 teeth)
- folivorous

West Indian manatee



dugong



Order Hyracoidea: hyraxes

Taxonomy: 1 family, 6 species

Distribution: Ethiopian

Characteristics:

- upper incisors constantly growing
- primitive hooves

tree hyrax



bush hyrax



rock hyrax



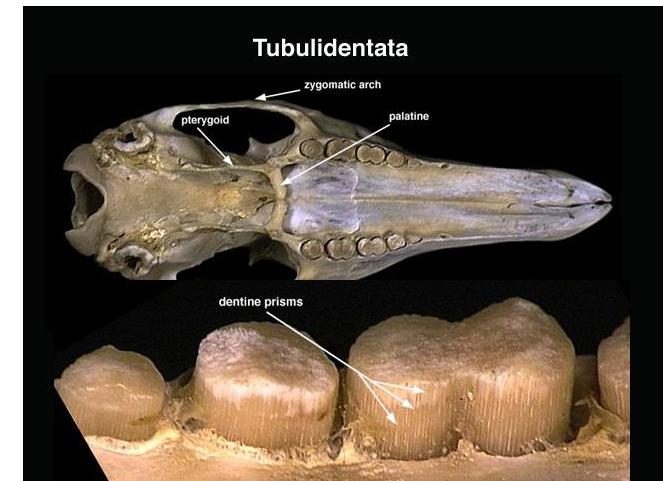
Order Tubulidentata: aardvark

Taxonomy: 1 family, 1 species (monotypic)

Distribution: Ethiopian

Characteristics:

- cheek teeth are rootless and tube-like
- long, thin snout with protractile tongue
- myrmecophagous and fossorial
- convergent with anteaters



Order Primates: apes, monkeys, prosimians

Taxonomy: 12 families, 236 species

Distribution: cosmopolitan, excepting Australasia and Nearctic

Phillipine tarsier



indri



slow loris



aye-aye



Order Primates: apes, monkeys, prosimians



Order Primates: apes, monkeys, prosimians

Taxonomy: 12 families, 236 species

Distribution: cosmopolitan, excepting Australasia and Nearctic

Characteristics:

- reduced rostrum (reduced olfactory region of brain)
- heightened binocular vision (enlarged cranium and cerebral cortex)
- often arboreal
- modified hands and opposable thumbs



Discussion Q: MacLeod wrote a commentary on Sykes et al's effort to sequence DNA samples of hair hypothesized to be from yeti and bigfoot/sasquatch.

MacLeod stated that the Sykes et al study offered something valuable that no other study concerning cryptozoology had attempted. What was this?

bigfoot, northern California



yeti footprint, Himalayas



wampa, Hoth



Falsifiability is key

Falsifiability = the possibility to conceive of an argument or observation that could negate a statement, hypothesis, or theory.

- requires answering the question “what would be required to convince you that _____ is false?”
- falsifiability distinguishes science from belief.

Cryptozoology, Testability, and an Undiscovered Bear

