Main Points

1) Mammalian characteristics:
Diversity, Phylogeny, and Systematics:
-- Infraclass Eutheria
-- Orders Chiroptera through Primates
-- Superorder Afrotheria, Suborders Megachiroptera, Microchiroptera

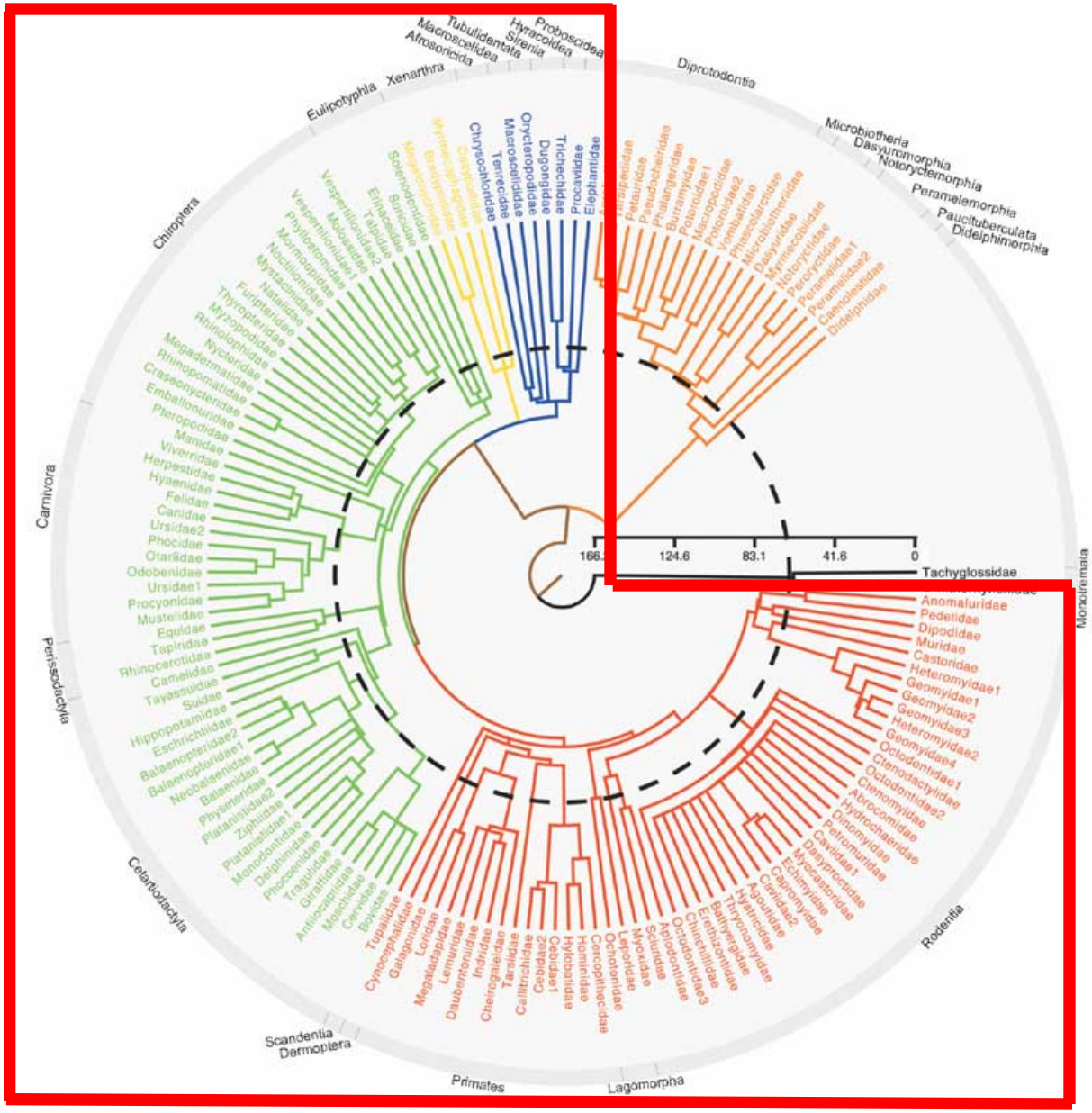
2) The evolution of mimicry
-- Muellerian vs Batesian mimicry
-- example: acoustic mimicry in tiger moths
-- example: Batesian mimics as parasites

3) What constitutes scientific evidence?
-- example: cryptozoology and DNA sequencing of yeti hair

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

Pre-reading: Monday 21 Sep = Nagasawa et al 2015
Wednesday 23 Sep = Isaac et al 2007

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)
-- <u>echolocation</u> and hibernation rare

Suborder Microchiroptera: microbats

Taxonomy: 16 families, 755 species

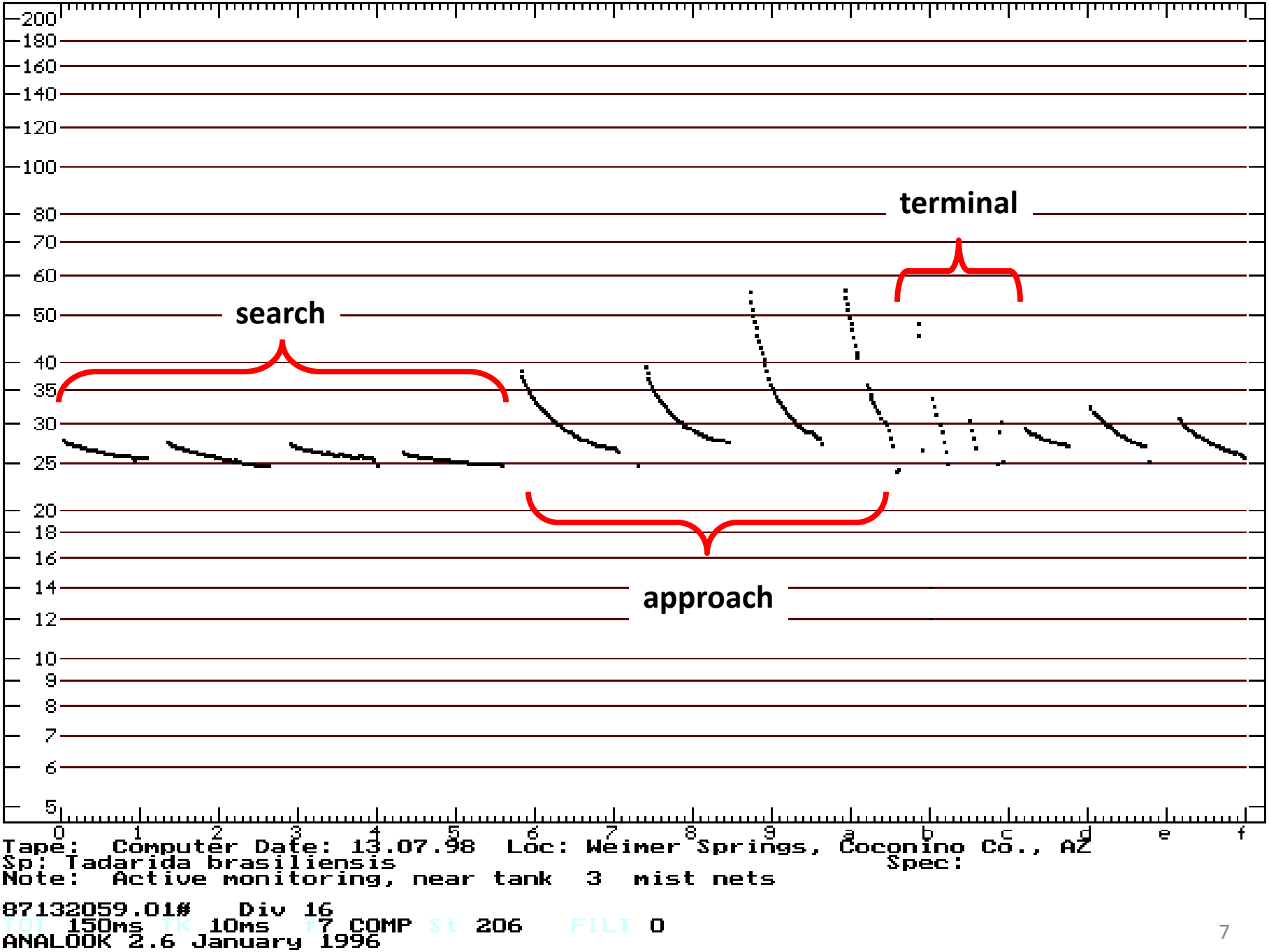
Distribution: cosmopolitan

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

Echolocation

<u>echolocation</u> =

emission of high-frequency sound pulses (usually ultrasonic) to gather information about objects from the returning echoes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Tape: Computer Date: 13.07.98 Loc: Weimer Springs, Coconino Co., AZ
Sp: Tadarida brasiliensis Spec:
Note: Active monitoring, near tank 3 mist nets
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ANALOOK 2.6 January 1996

Mimicry

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

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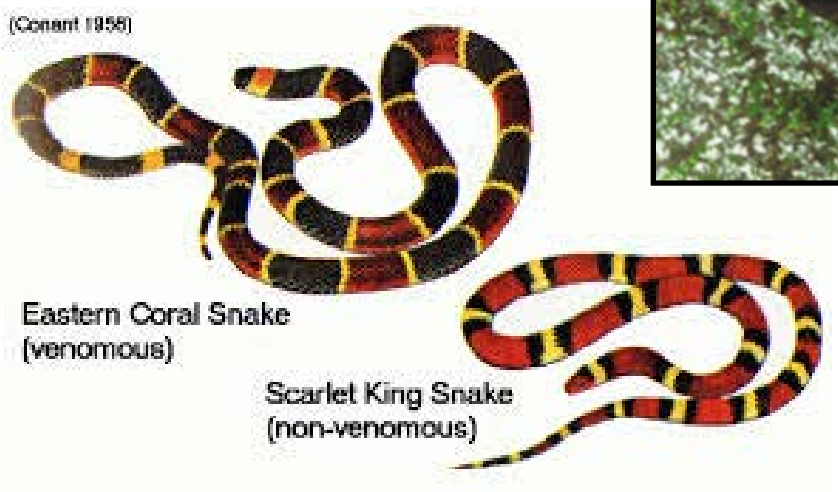

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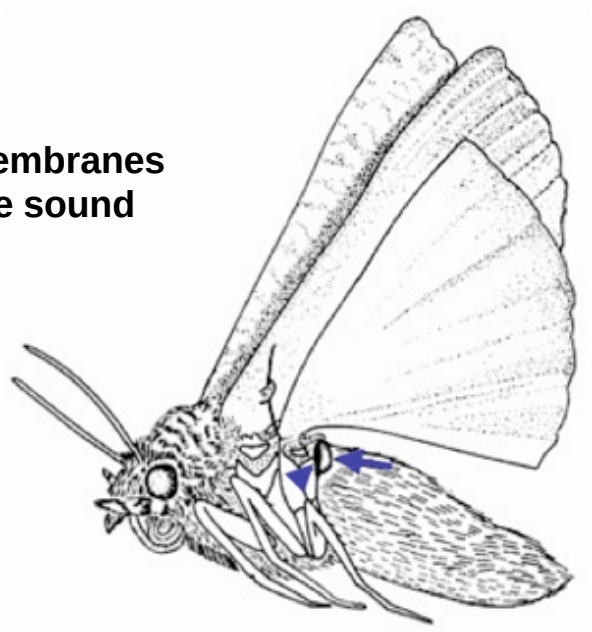
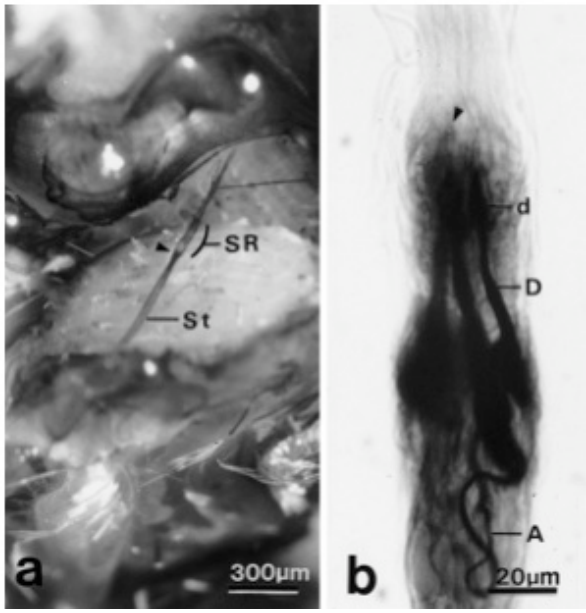
tymbals are vibrating membranes that produce sound

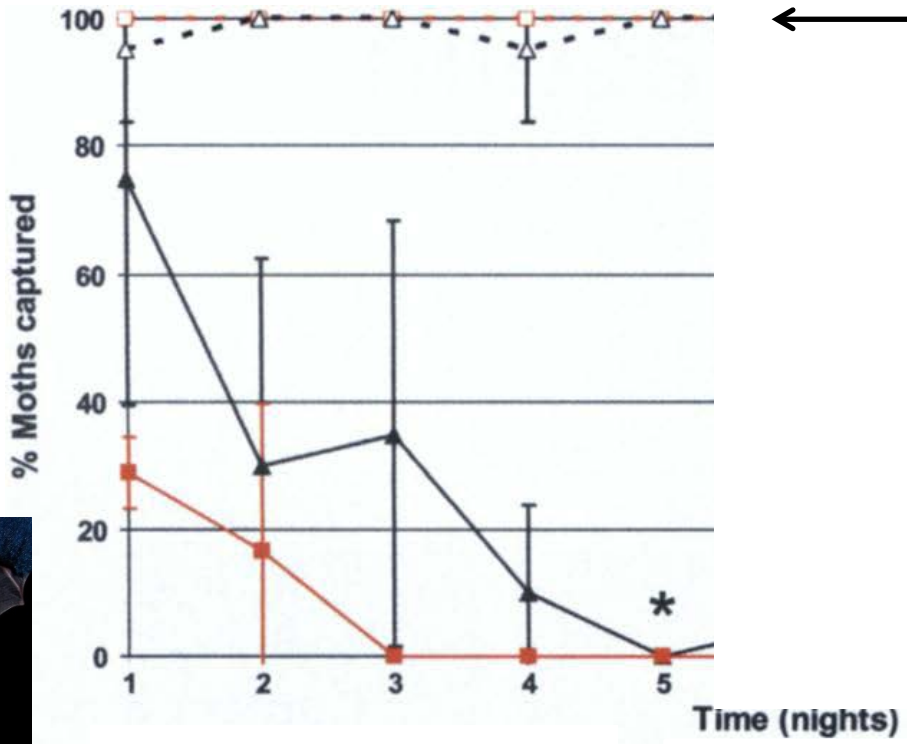




Mimicry

Barber and Conner 2007

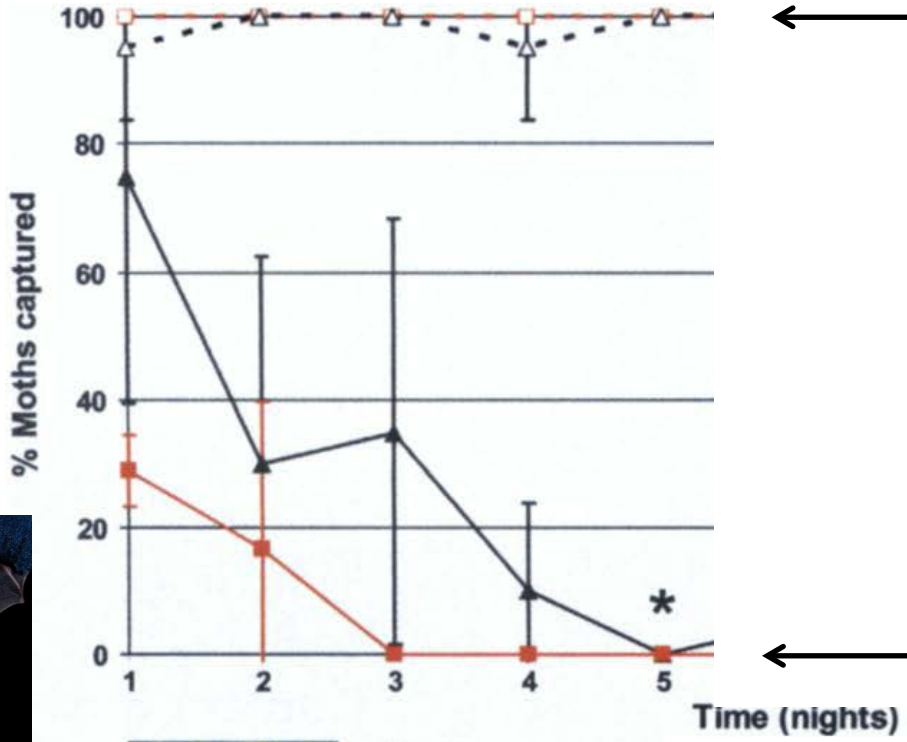
Mimicry



tasty noctuid moths

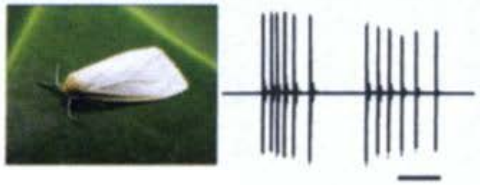
Barber and Conner 2007

Mimicry



tasty noctuid moths

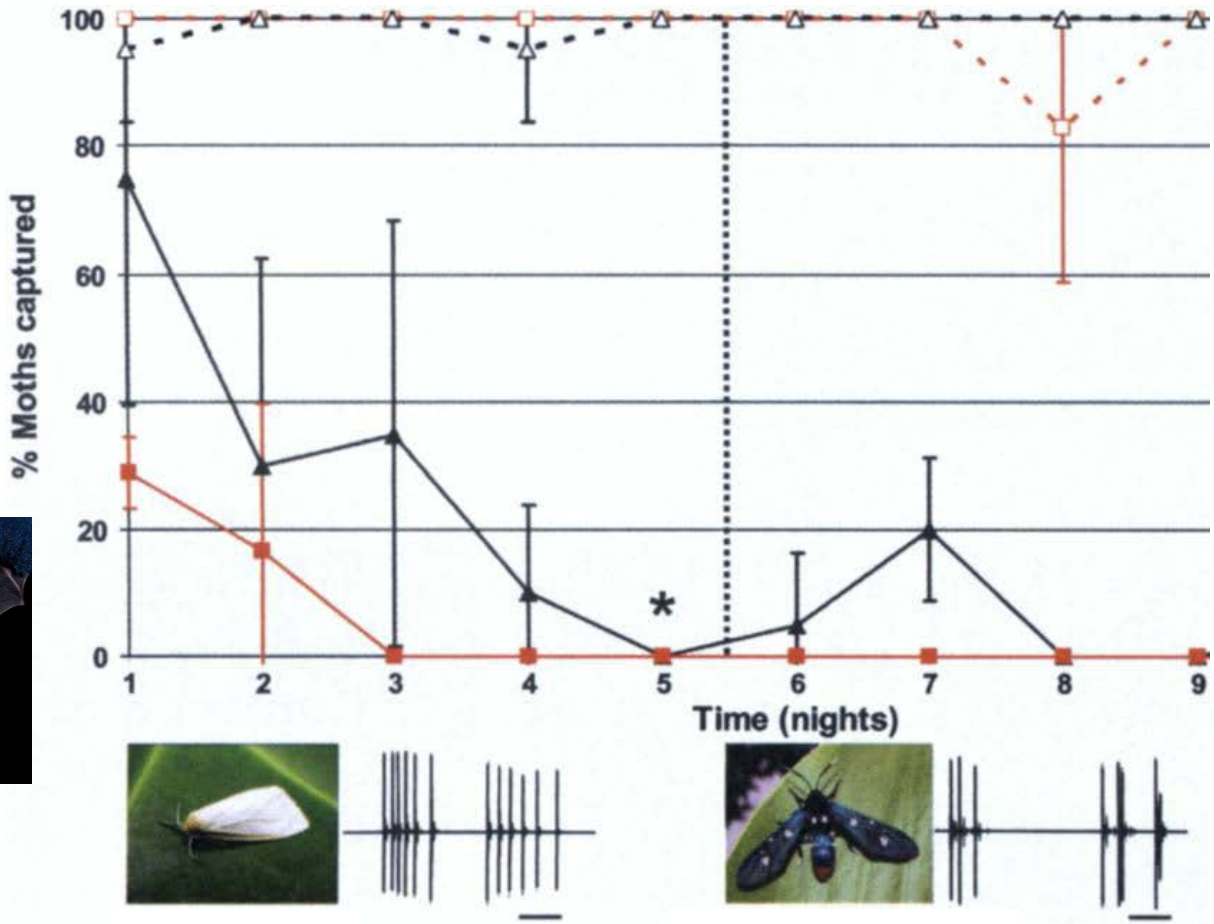
nasty tiger moths



Tiger moth Species 1

Barber and Conner 2007

Mimicry

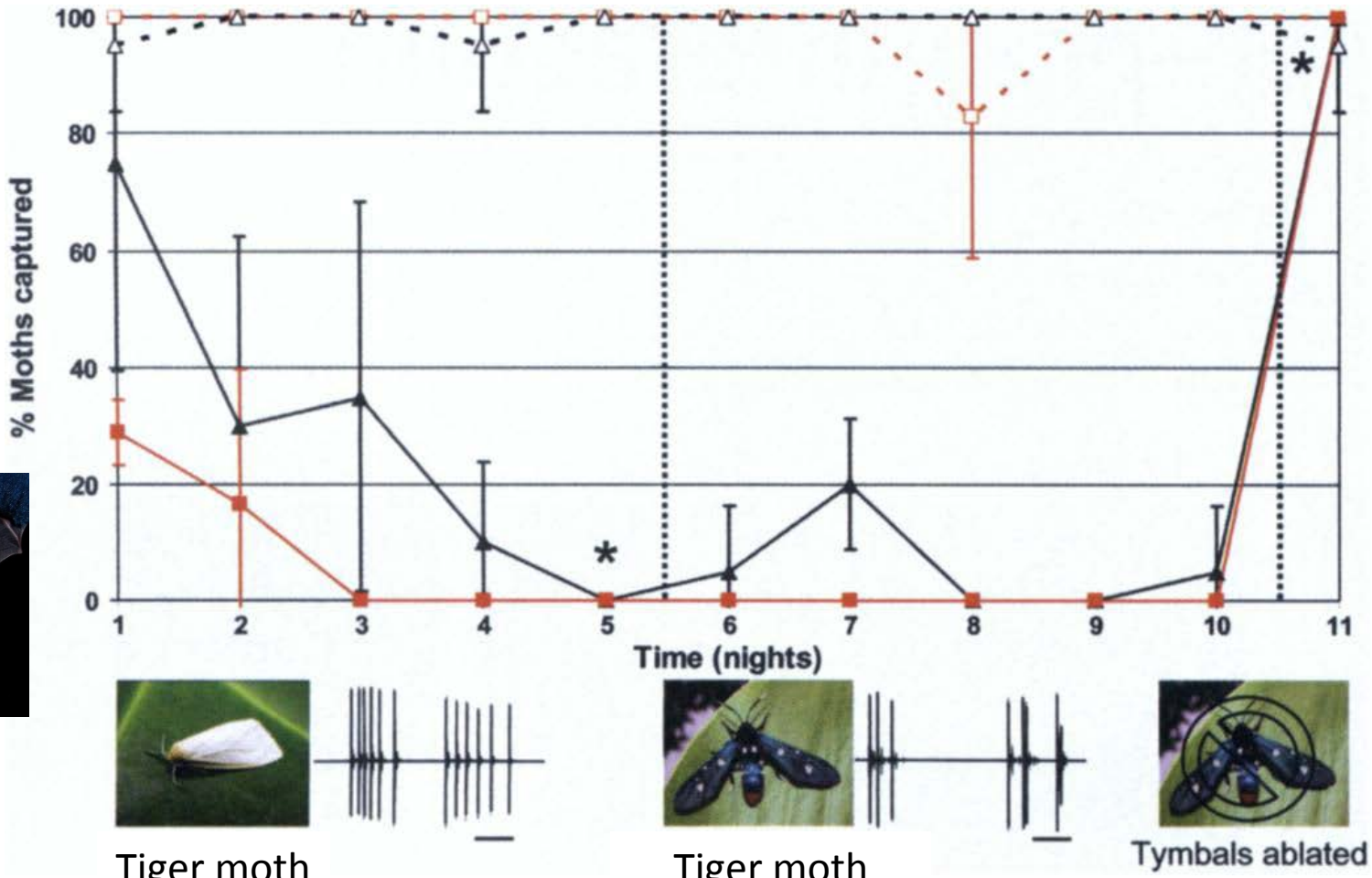


Tiger moth

Tiger moth mimic

Barber and Conner 2007

Mimicry



Tiger moth

Tiger moth mimic

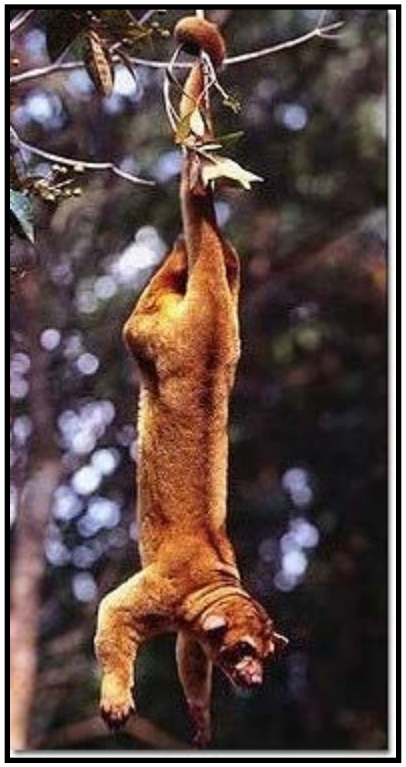
Barber and Conner 2007

Order Carnivora: carnivores

Taxonomy: 11 families, 271 species

Distribution: cosmopolitan

kinkajou



spectacled bear

Pallas's cat

walrus

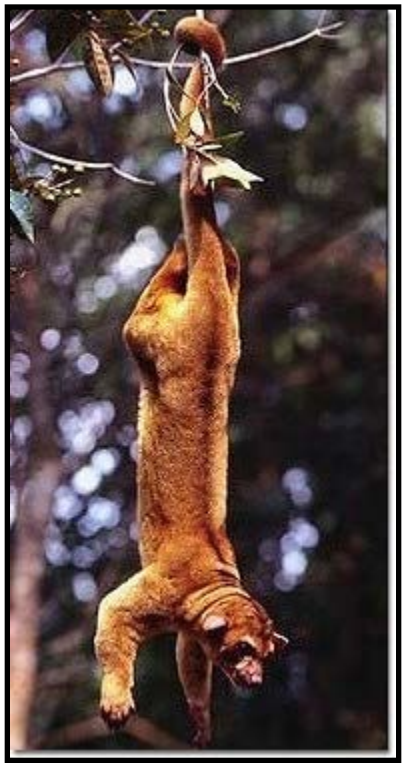
Order Carnivora: carnivores

Taxonomy: 11 families, 271 species

Distribution: cosmopolitan

Characteristics:
-- derived vision and hearing
-- strong jaws and prominent canines
-- P4 and m1 = <u>carnassials</u>

kinkajou



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- **<u>Batesian mimicry</u> = dangerous and/or bad-tasting model, harmless and/or good-tasting mimic**

Mimicry

- **myrmecophagous aardwolf mimic, carnivorous striped hyena model**

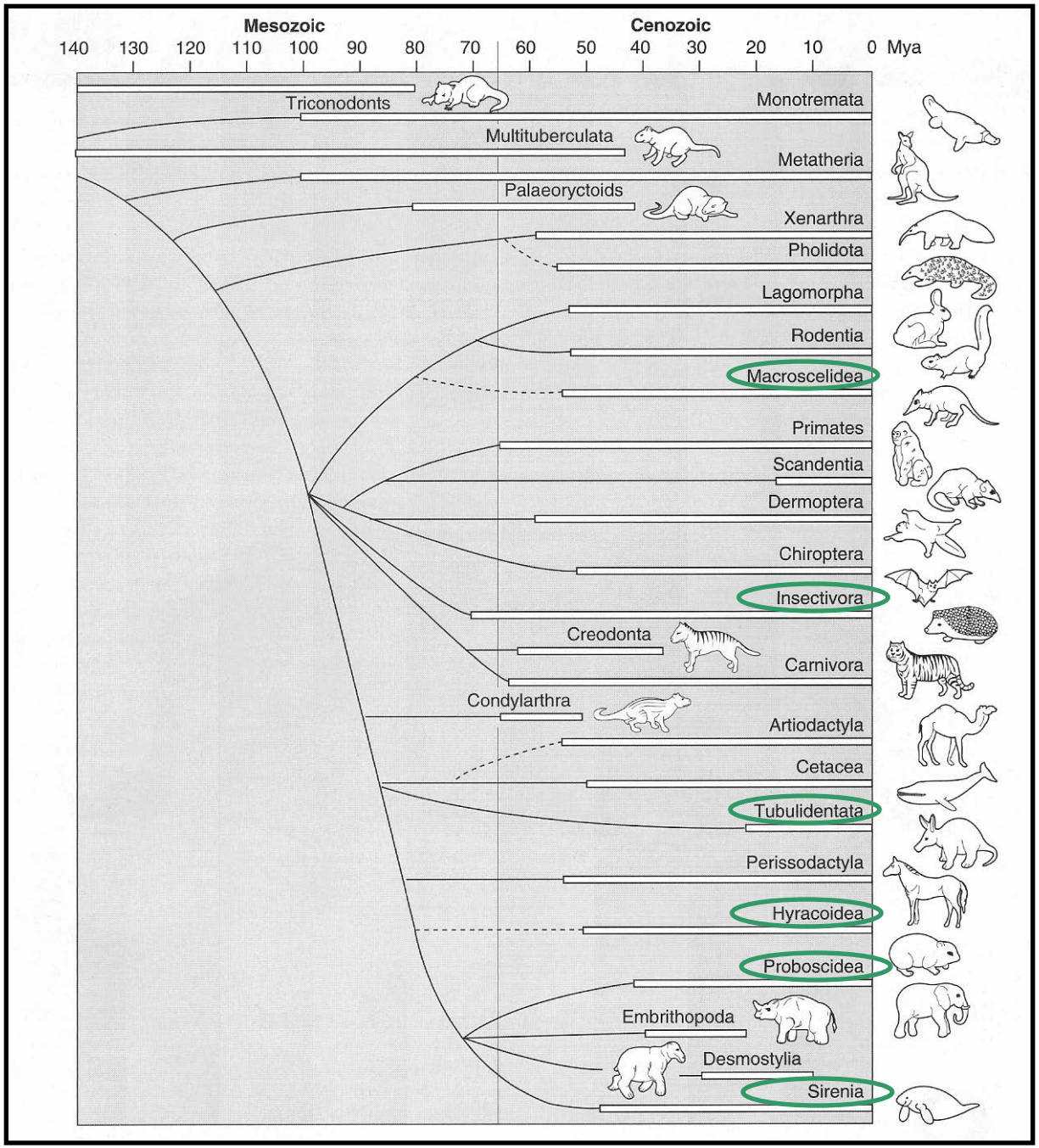
- **<u>Batesian mimics</u> as parasites?**

<u>Hyaena</u> skull <u>Proteles</u> skull

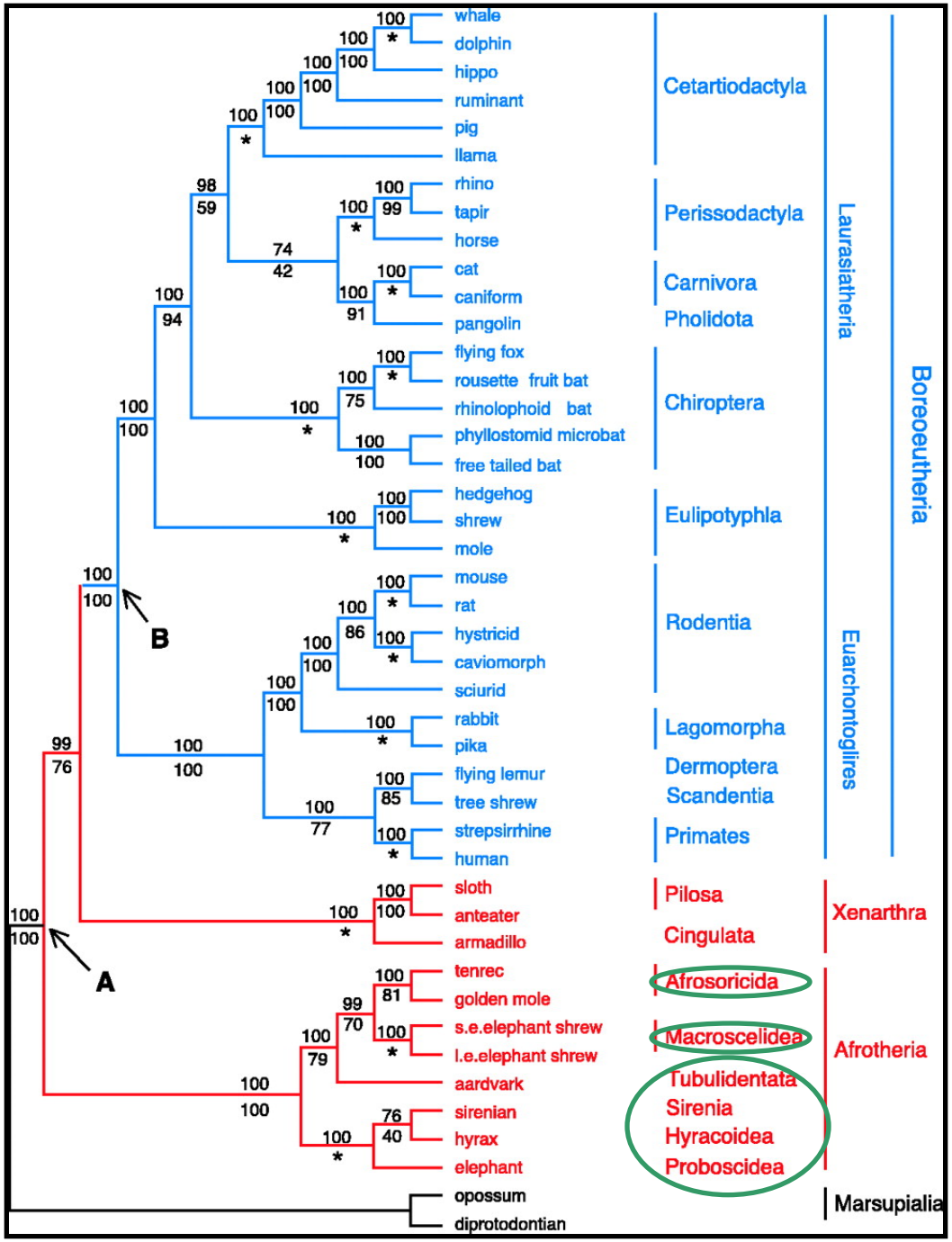
Discussion Q: regarding Batesian mimicry, would you expect mimics or models to be more abundant? Why?

Hyaena skull

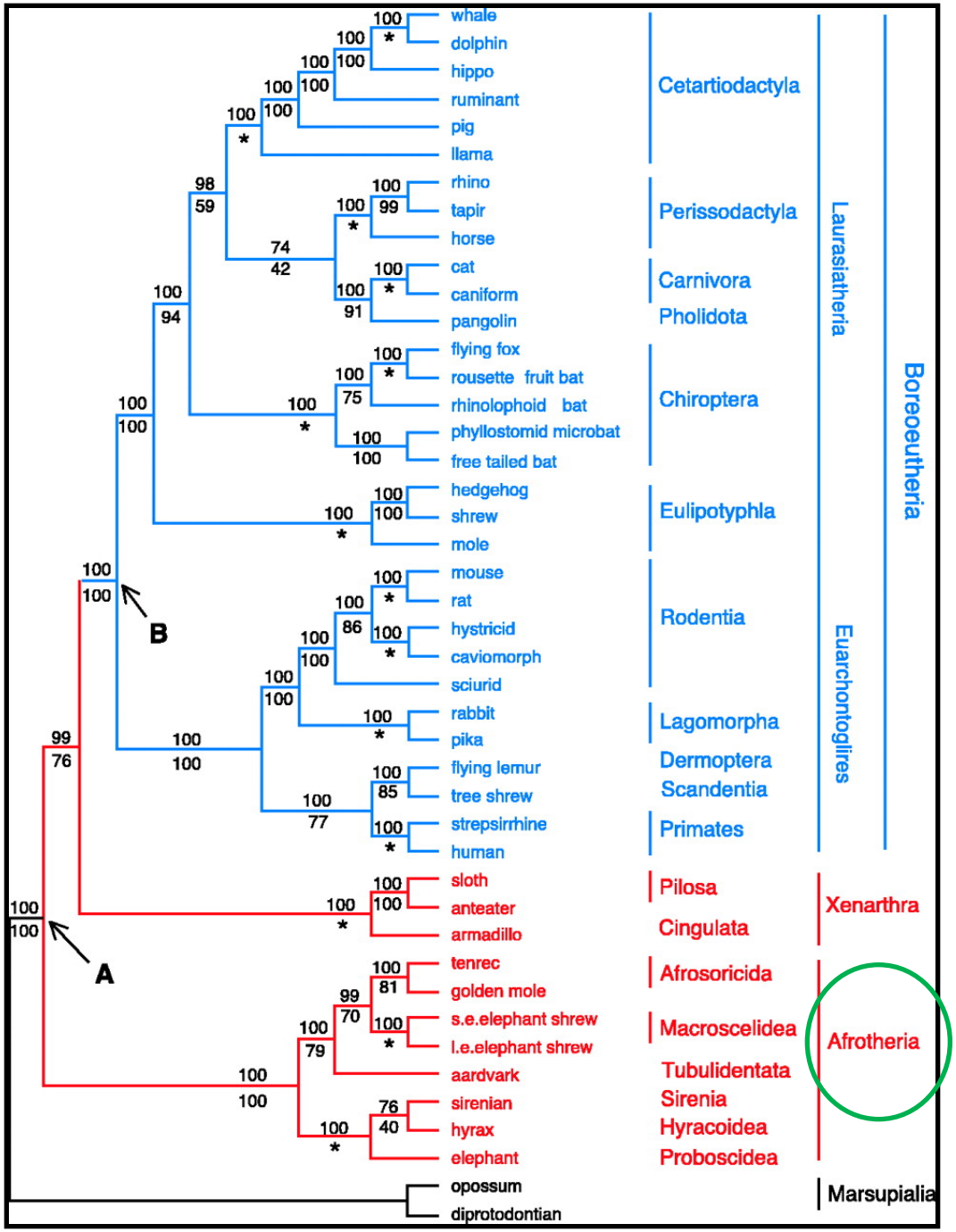
Proteles skull



from Novacek 1992



from Murphy et al. 2001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dolphin
hippo
ruminant
pig
llama
rhino
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horse
cat
caniform
pangolin
flying fox
rousette fruit bat
rhinolophoid bat
phyllostomid microbat
free tailed bat
hedgehog
shrew
mole
mouse
rat
hystricid
caviomorph
sciurid
rabbit
pika
flying lemur
tree shrew
strepsirrhine
human
sloth
anteater
armadillo
tenrec
golden mole
s.e.elephant shrew
l.e.elephant shrew
aardvark
sirenian
hyrax
elephant
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diprotodontian
Cetartiodactyla
Perissodactyla
Carnivora
Pholidota
Chiroptera
Eulipotyphla
Rodentia
Lagomorpha
Dermoptera
Scandentia
Primates
Pilosa
Cingulata
Afrosoricida
Macroscelidea
Tubulidentata
Sirenia
Hyracoidea
Proboscidea
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Xenarthra
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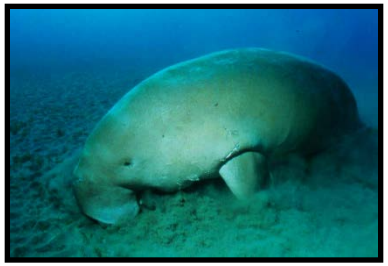


Order Afrosoricida:
tenrecs, otter shrews, golden moles

Taxonomy: 2 families, 51 species

Distribution: Ethiopian

Characteristics:
-- cloaca
-- cone-like skulls

Namib golden mole

giant otter shrew

streaked tenrec

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

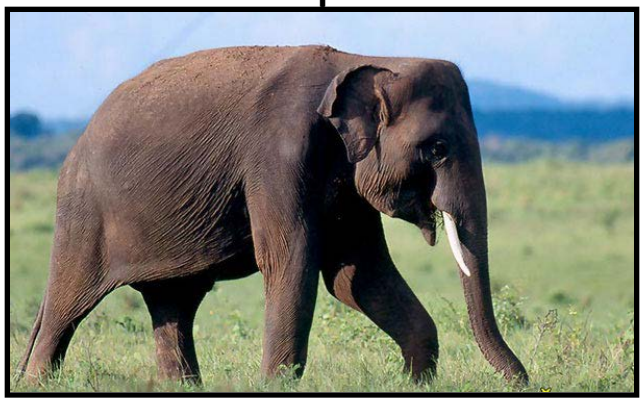
Distribution: Ethiopian and Oriental

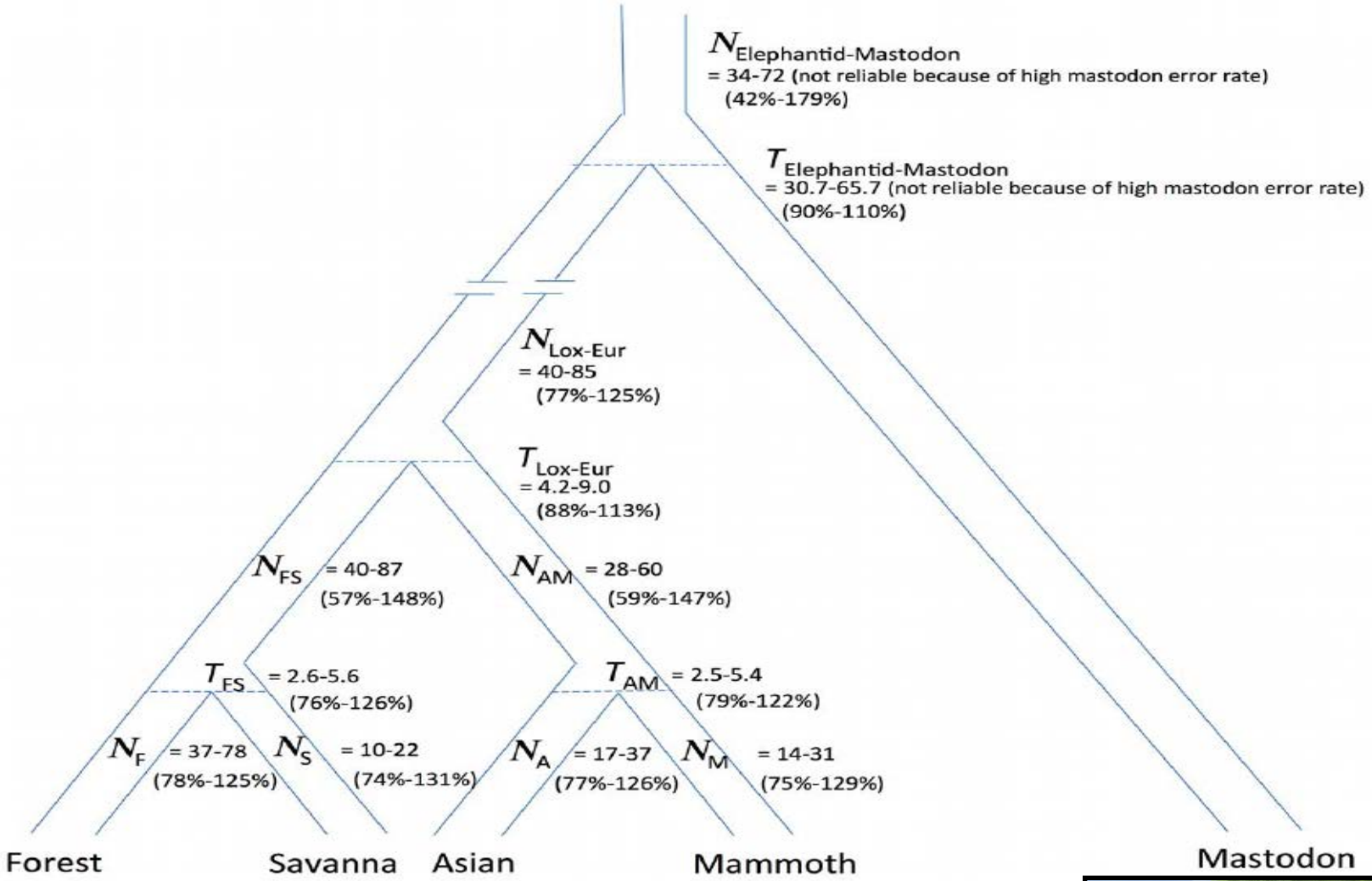
Characteristics:
-- upper incisors modified into tusks
-- infrasonic communication
-- <u>graviportal</u> locomotion

bush elephant

forest elephant

Asian elephant




$N_{Elephantid\text{-}Mastodon}$
= 34-72 (not reliable because of high mastodon error rate)
(42%-179%)
$T_{Elephantid\text{-}Mastodon}$
= 30.7-65.7 (not reliable because of high mastodon error rate)
(90%-110%)
$N_{Lox\text{-}Eur}$
= 40-85
(77%-125%)
$T_{Lox\text{-}Eur}$
= 4.2-9.0
(88%-113%)
N_{FS} = 40-87
(57%-148%)
N_{AM} = 28-60
(59%-147%)
T_{FS} = 2.6-5.6
(76%-126%)
T_{AM} = 2.5-5.4
(79%-122%)
N_F = 37-78
(78%-125%)
N_S = 10-22
(74%-131%)
N_A = 17-37
(77%-126%)
N_M = 14-31
(75%-129%)
Forest
Savanna
Asian
Mammoth
Mastodon

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

dugong

West Indian manatee

Order Hyracoidea: hyraxes

Taxonomy: 1 family, 6 species

Distribution: Ethiopian

Characteristics:
-- upper incisors constantly growing
-- primitive hooves

tree hyrax

bush hyrax

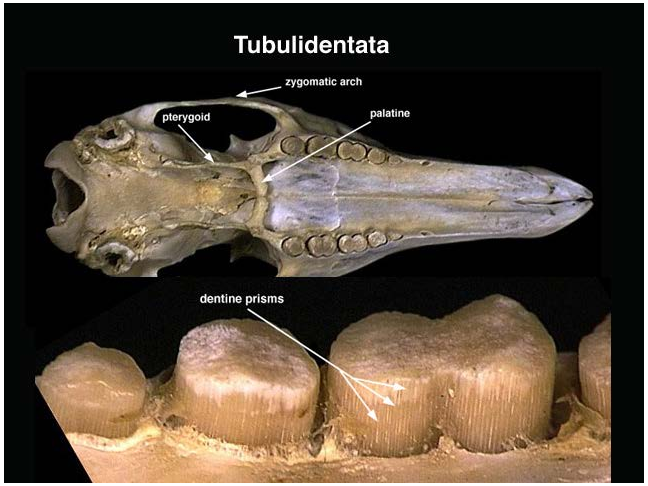
rock hyrax

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

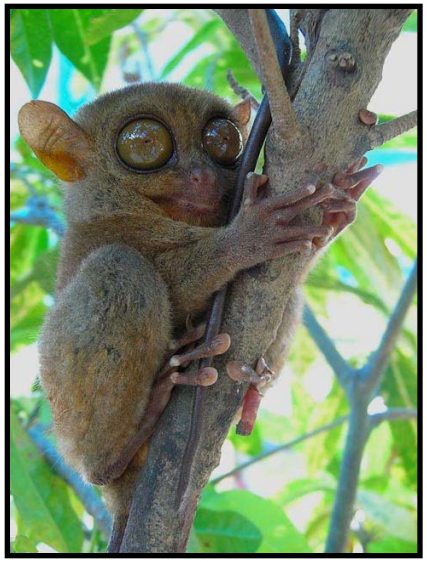


Order Primates: apes, monkeys, prosimians

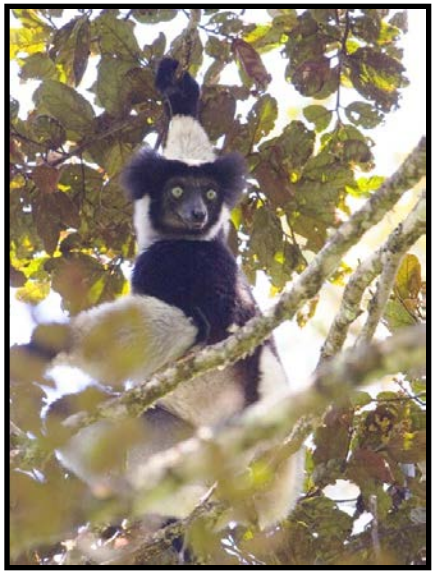
Taxonomy: 12 families, 236 species

Distribution: cosmopolitan, excepting Australasia and Nearctic

Phillipine tarsier



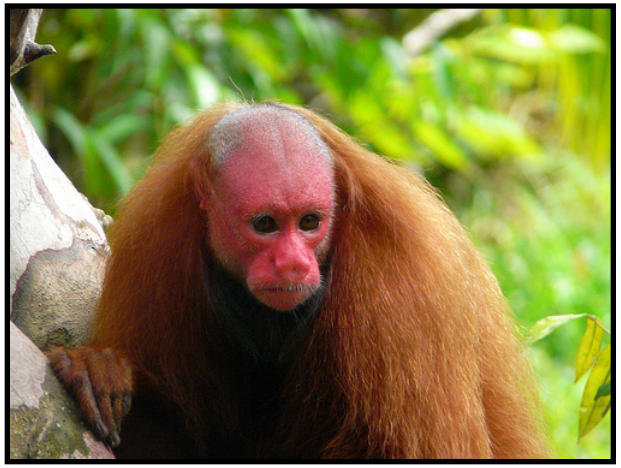
indri



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

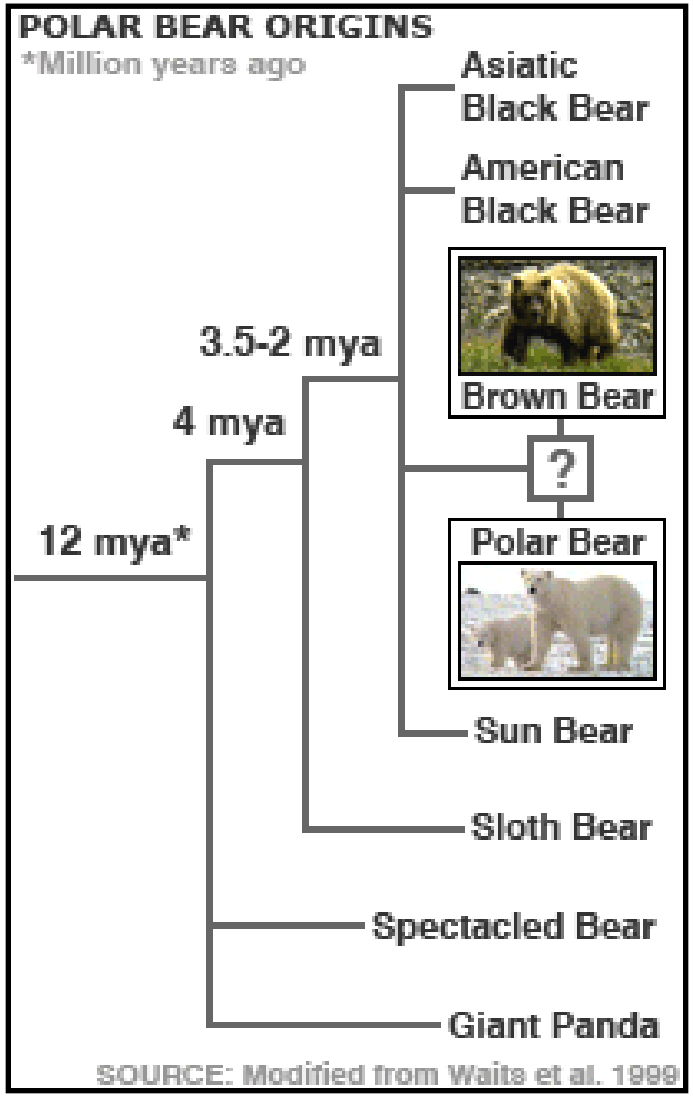
Characteristics:
-- reduced rostrum (reduced olfactory region of brain)
-- heightened binocular vision (enlarged cranium and cerebral cortex)
-- often arboreal
-- modified hands and opposable thumbs

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

Cryptozoology, Testability, and an Undiscovered Bear