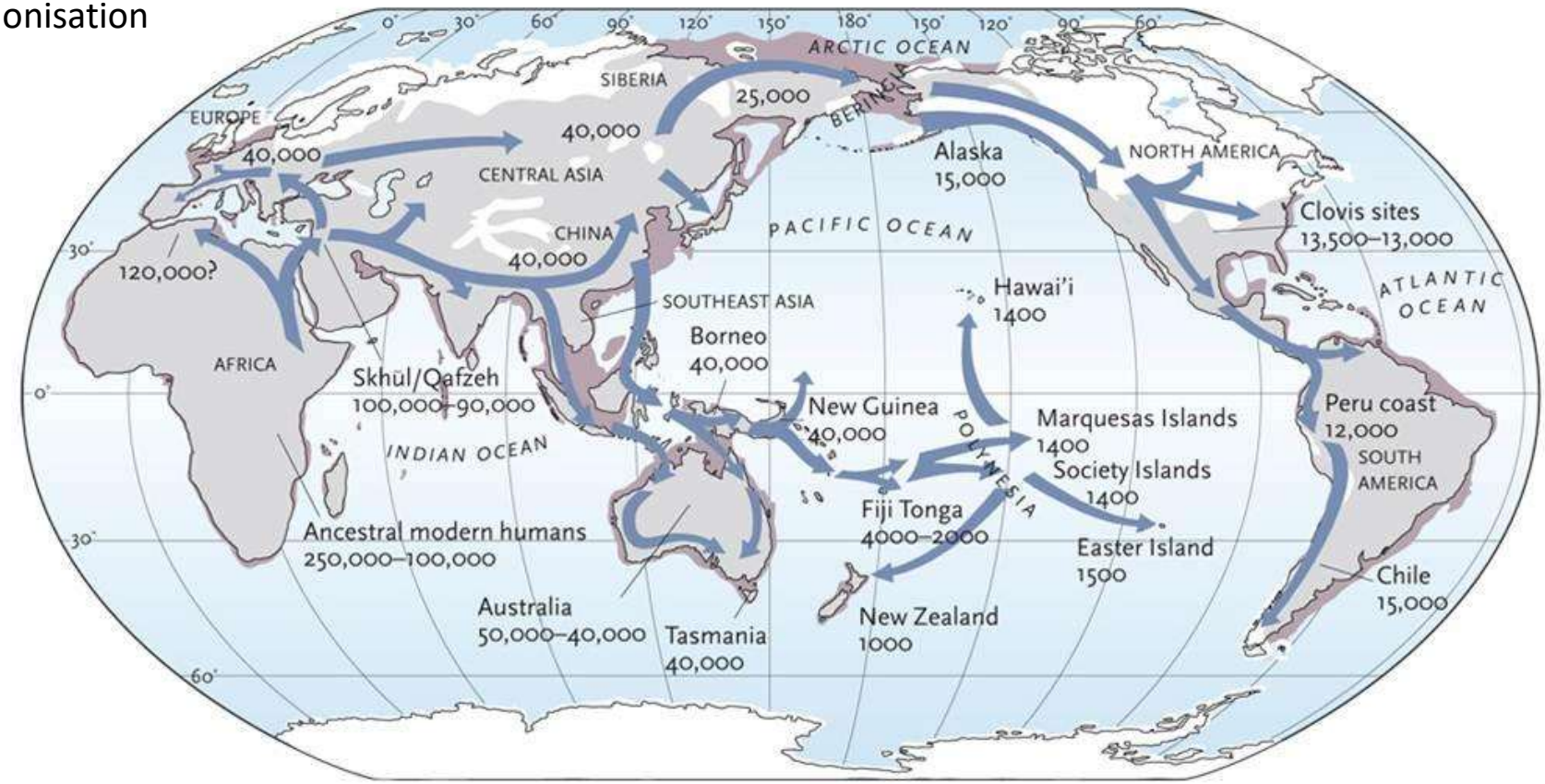
Prvotní hřích lidstva, a co má s klimatem společného

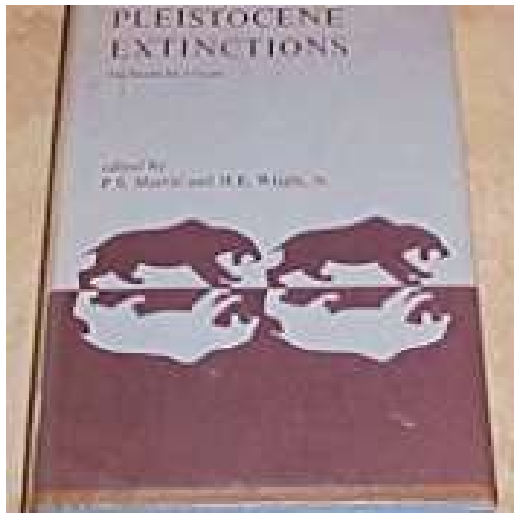
Pleistocene extinctions are special:

- **non-marine megafauna** species
- correlated with human colonisation

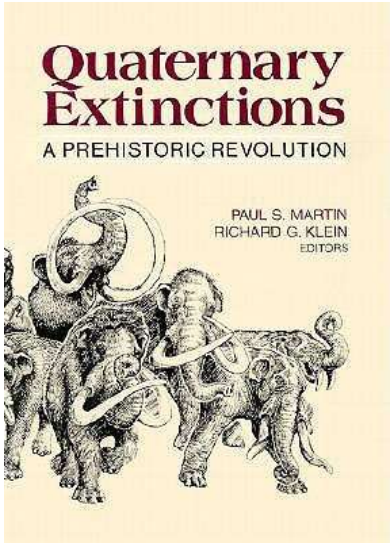


Climate has been changing rapidly even before + s**h**ould affect small species as well.

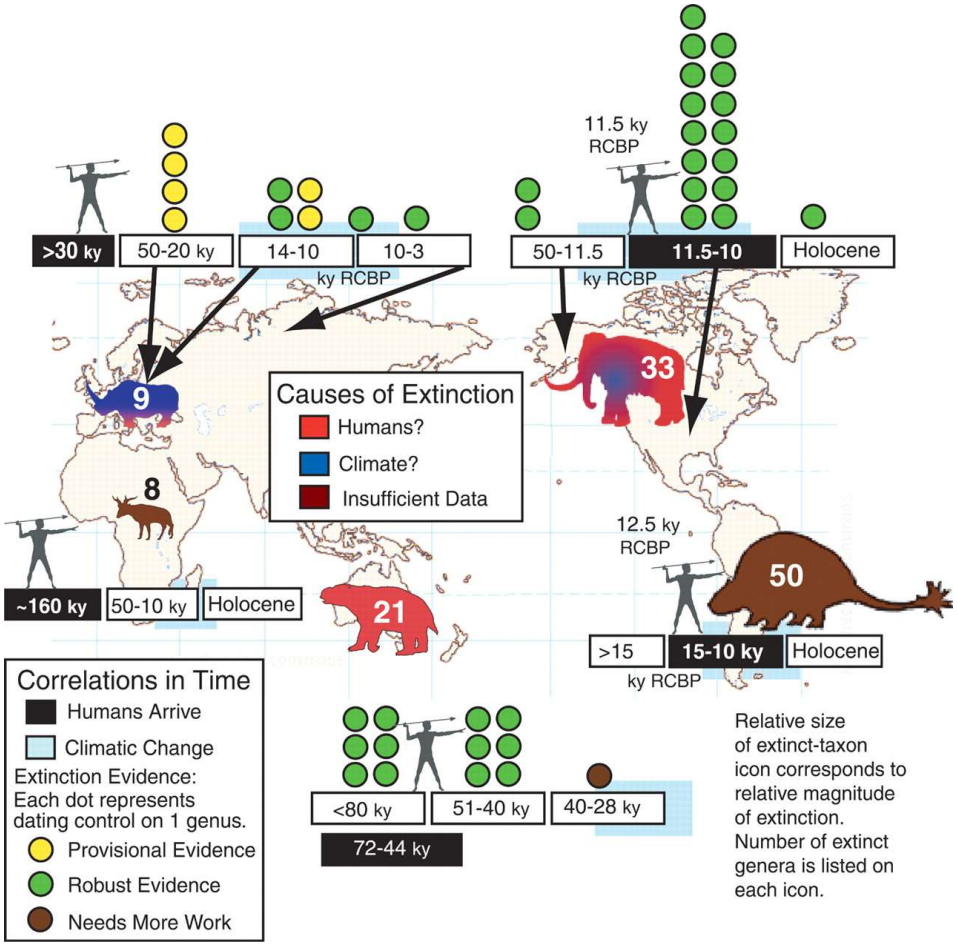
Pleistocénní vybíjení (a debaty o něm)



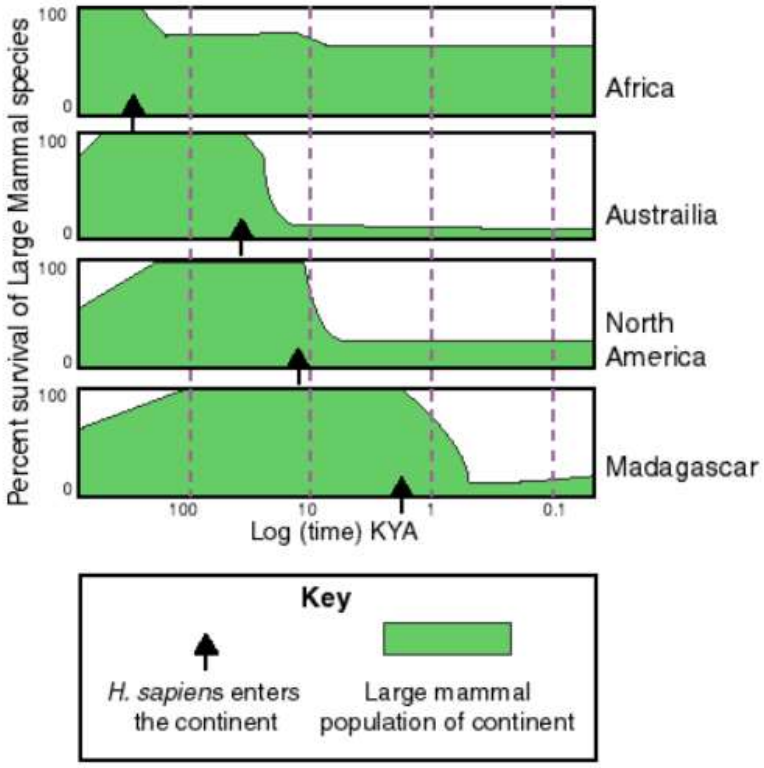
1967



1984



Barnosky et al., *Science* 2004



PODPORUJE overkill

-vymírala jen velká zvířata

- chronologie

- osudy naivních zvířat na ostrovech

- počítačové modely

NÁMITKY PROTI overkillu

- predátor většinou změní kořist, když se ta stane vzácnou

- některá zvířata (bizon, wapiti) byla lovena, a nevyhynula

- zmenšování zvířat takto nejde vysvětlit (*…jde…*).

- eurasijská fauna vymírala zhruba ve stejnou dobu, jako americká

- lovci-sběrači mají nižší natalitu (no jo, ale v lovecké bonanze ji mohli mít větší)

- málo „butcher sites“

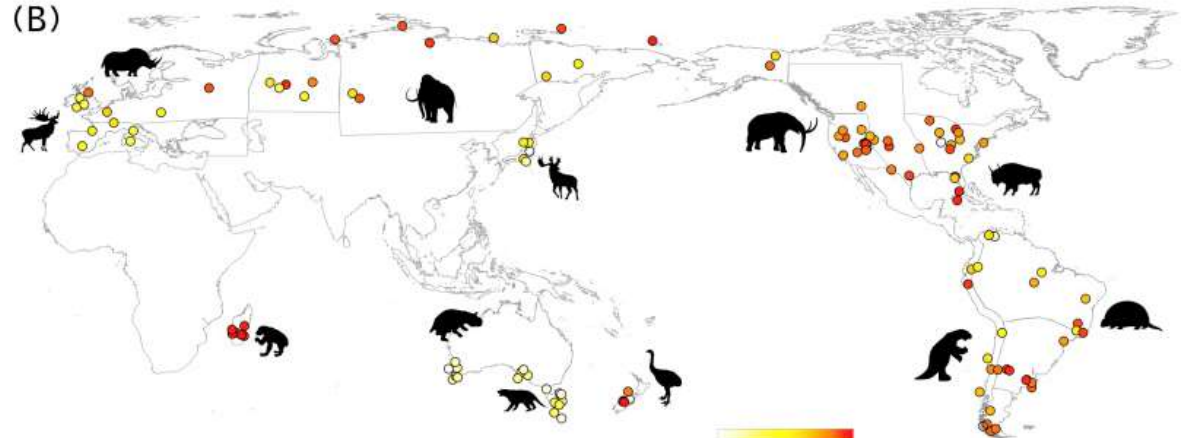
Quaternary International

journal homepage: www.elsevier.com/locate/quaint

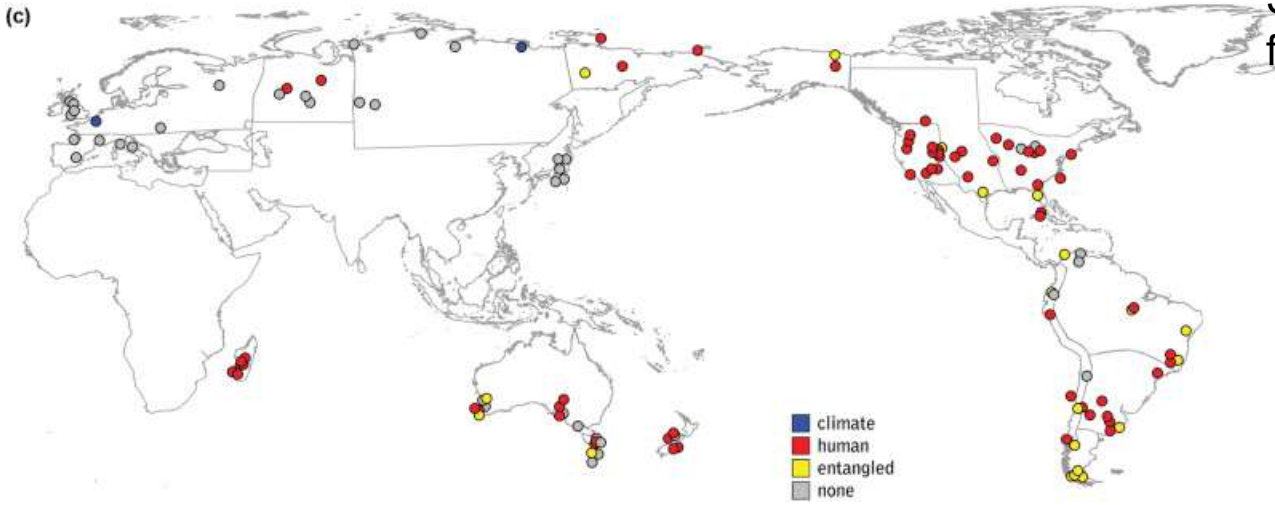
Bigger kill than chill: The uneven roles of humans and climate on late Quaternary megafaunal extinctions

Bernardo B.A. Araujo [a, *], Luiz Gustavo R. Oliveira-Santos [a, c], Matheus S. Lima-Ribeiro [b, 1], José Alexandre F. Diniz-Filho [b], Fernando A.S. Fernandez [a]

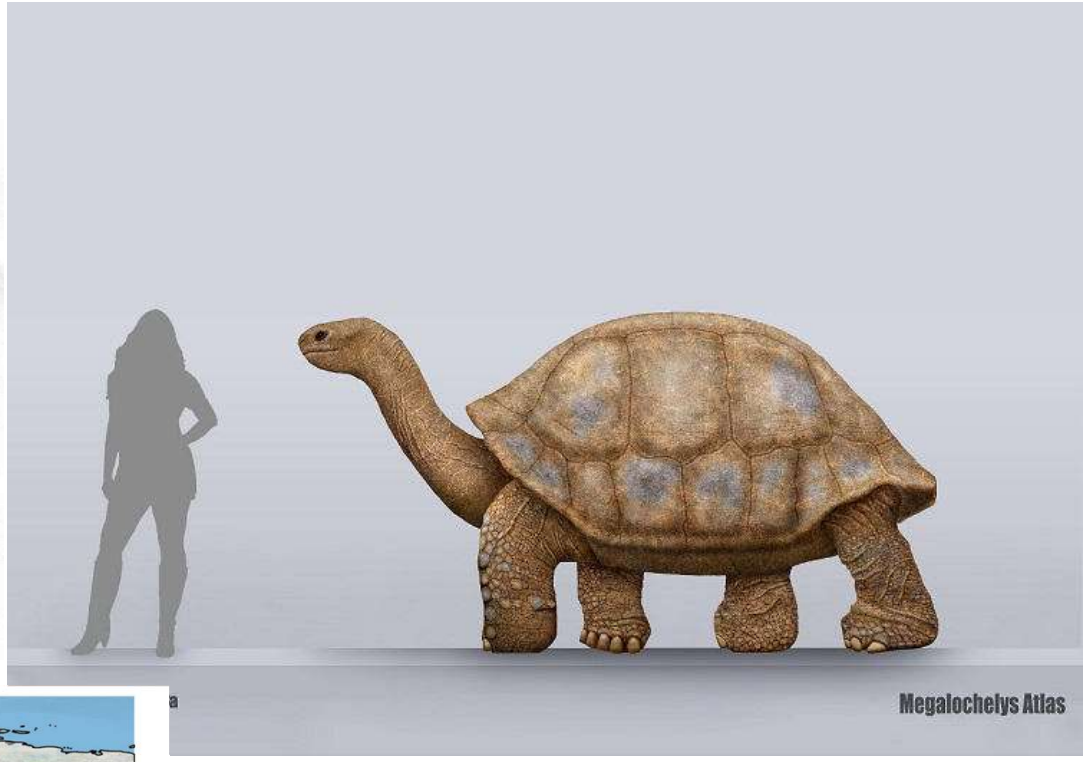
Modelované lokality a časování vymírání

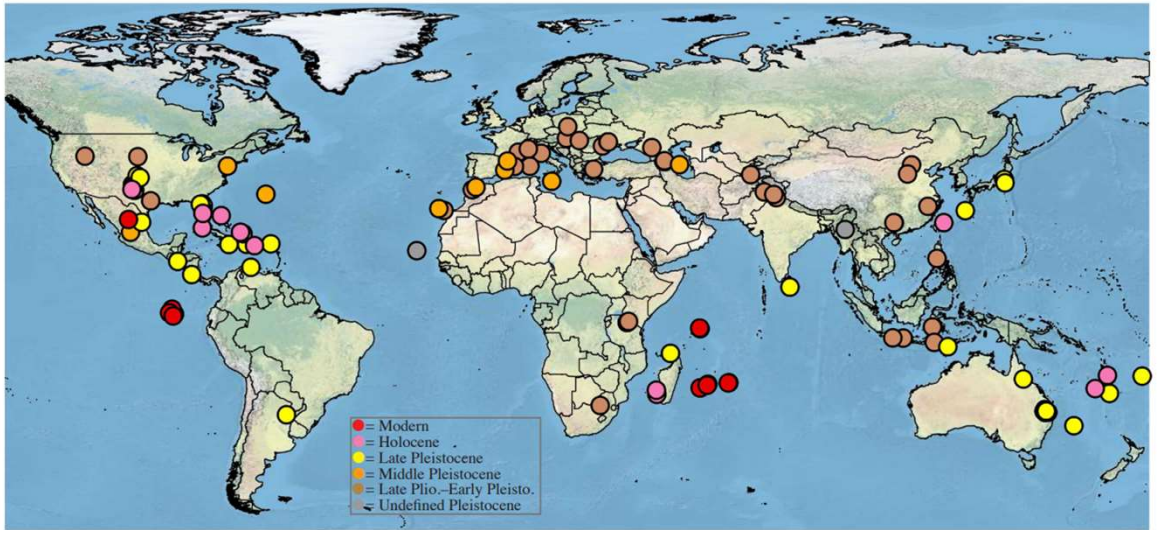


Shrnutí vítězných faktorů



PRVNÍ OBĚTÍ BYLY SUCHOZEMSKÉ ŽELVY





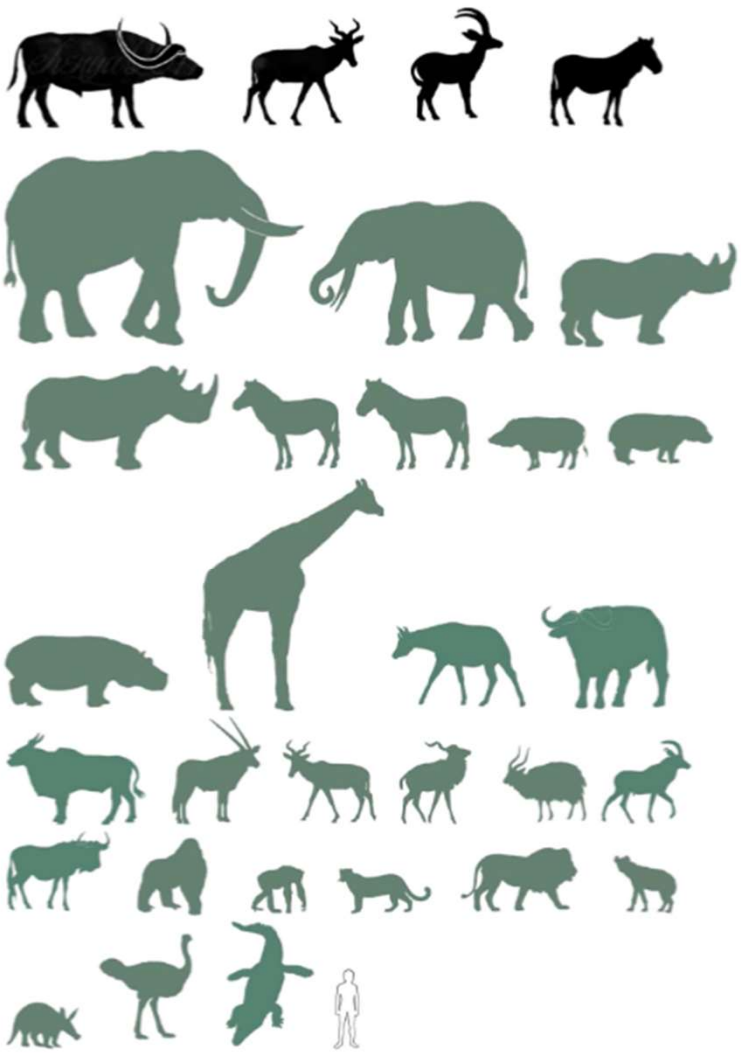
Conservation Biology of Freshwater Turtles and Tortoises:
A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group
A.G.J. Rhodin, P.C.H. Pritchard, P.P. van Dijk, R.A. Saumure, K.A. Buhlmann, J.B. Iverson, and R.A. Mittermeier, Eds.
Chelonian Research Monographs (ISSN 1088-7105) No. 5, doi:10.3854/crm.5.000e.fossil.checklist.v1.2015
© 2015 by Chelonian Research Foundation • Published 16 April 2015

Turtles and Tortoises of the World During the Rise and Global Spread of Humanity: First Checklist and Review of Extinct Pleistocene and Holocene Chelonians

TURTLE EXTINCTIONS WORKING GROUP*

**Authorship of this article is by this joint Working Group of the IUCN SSC Tortoise and Freshwater Turtle Specialist Group and specialists in Chelonian Paleontology, which for the purposes of this document consisted of the following contributors:*

ANDERS G.J. RHODIN[1], SCOTT THOMSON[2], GEORGIOS L. GEORGALIS[3,4], HANS-VOLKER KARL[5], IGOR G. DANILOV[6], AKIO TAKAHASHI[7], MARCELO S. DE LA FUENTE[8], JASON R. BOURQUE[9], MASSIMO DELFINO[4,10], ROGER BOUR[11], JOHN B. IVERSON[12], H. BRADLEY SHAFFER[13], AND PETER PAUL VAN DIJK[14]

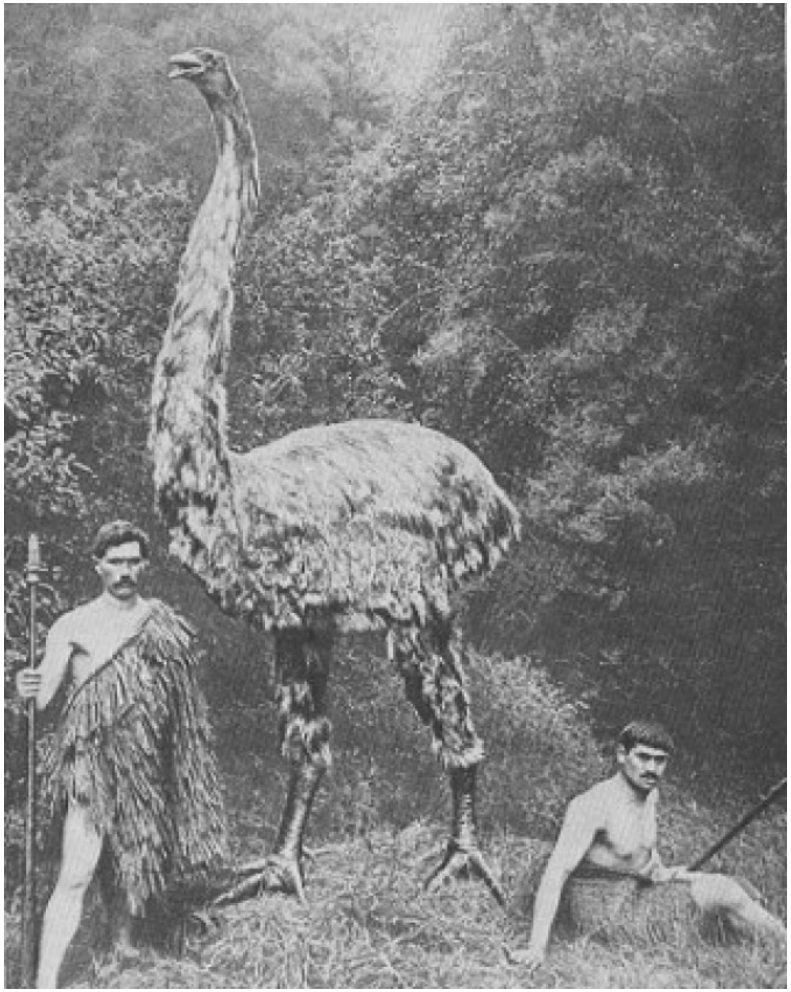


ıre 7. Sub-Saharan Africa (Afro-Tropic Ecoregion). Selected extinct species (black): *Syncerus antiquus*, *Megalotragus priscus*, *Hippotragus le us capensis*. Selected living species: *Loxodonta africana*, *Loxodonta cyclotis*, *Diceros bicornis*, *Ceratotherium simum*, *Equus grevyi*, *Equ ochoerus meinertzhageni*, *Choeropsis liberiensis*, *Hippopotamus amphibius*, *Giraffa camelopardalis*, *Okapia johnstoni*, *Syncerus caffer*, *T pianus*, *Oryx gazella*, *Alcelaphus buselaphus*, *Tragelaphus strepciseros*, *Tragelaphus angasi*, *Hippotragus equinus*, *Connochaetes taurinus*, *Gor troglodytes*, *Panthera pardus*, *Panthera leo*, *Crocuta crocuta*, *Orycteropus afer*, *Struthio camelus*, *Crocodylus niloticus*. Outline *Homo sa* approximate scale. This figure is available in colour online at wileyonlinelibrary.com/journal/gj

Afrika: Zde byla zvířata na lidi zvyklá, takže změny nastaly až v moderní době
(s národními parky, rezervacemi, atd….)

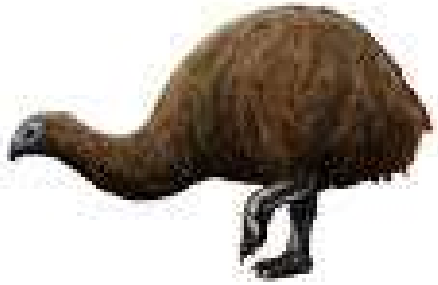
Early humans single-handedly nudged out New Zealand megafauna

by Kerry Faulkner, Science Network WA



The primary causes for the moa becoming extinct were hunting and burning ha…

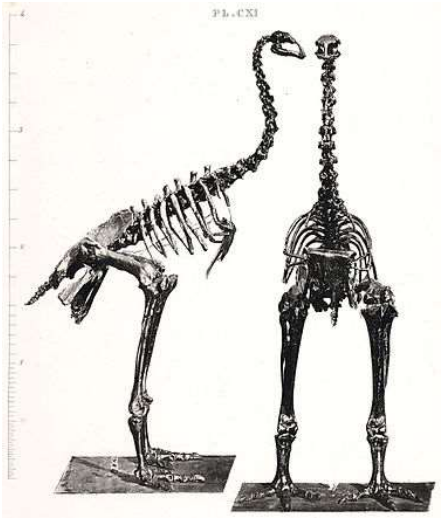
Megalapteryx didinus
1 m, 17-35 kg, hory (peří na zobáku)



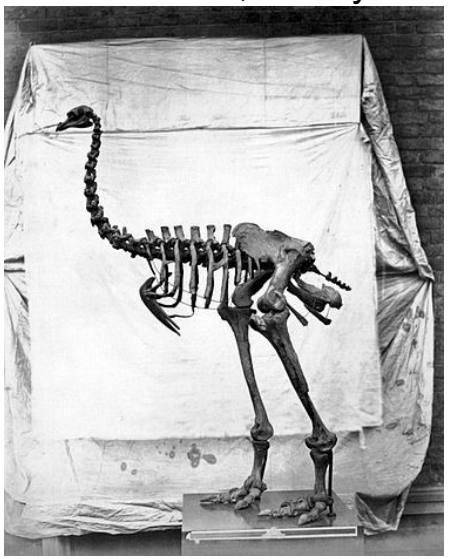
Eurapteryx curtus (ca 20 kg)

Pachyornis australis
až 75 kg, vyhynul až ca 1850, horský druh

Emeus crassus
1.5 – 1.8 m, jižní ostrov



Anomalopteryx didiformis
1.3 m, 30 kg, hlavně jižní ostrov



Pachyornis elephantopus
1.8 m, 145 kg

Aptornis

- „velikosti malého moa“
- nelétavý „chřástal“ z řádu *Eurypigiformes*

Harpagornis moorei

Těžký (10-15kg) velký orel, rozpětím jako dnešní velcí orli

Cnemiornis calcitrans, C. gracilis
Nelétavé husy, +/- podobné h. kuří

Madagaskar

UPDATED 15 SEPTEMBER, 2018 - 13:56 ANCIENT-ORIGINS

Humans were Hunting the Largest Bird in the World on Madagascar 10,500 Years

The cave art showing the only known image of a giant sloth lemur, in a hunting scene with dogs to the right [Credit: © Burney et al. 2020]

MADAGASKAR

Před 88M (křída) se trhl od Indie, ta předtím od Gondwany,
… pak už jen „rafting events“

Daubentonia robusta – „giant aye-aye“
Jako dnešní ksukol, ale 2,5x větší

Archaeoindris
pozemní lemur velikosti gorily…

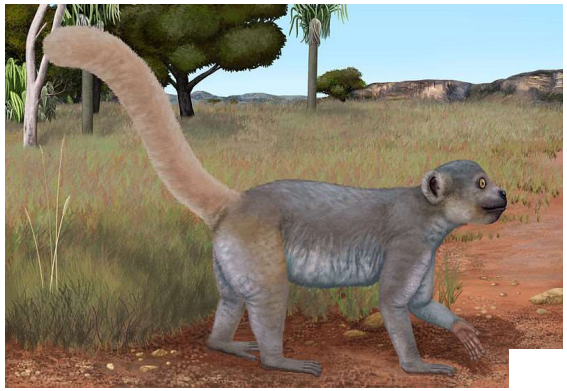
Babakotia radofilai – lemur středně velký

Palaeopropithecus – ca velikosti šimpanze…

Pachylemur – takový větší vari (s nímž příbuzný)

Megaladapis

„koala velikosti orangutana“



Archaeolemur

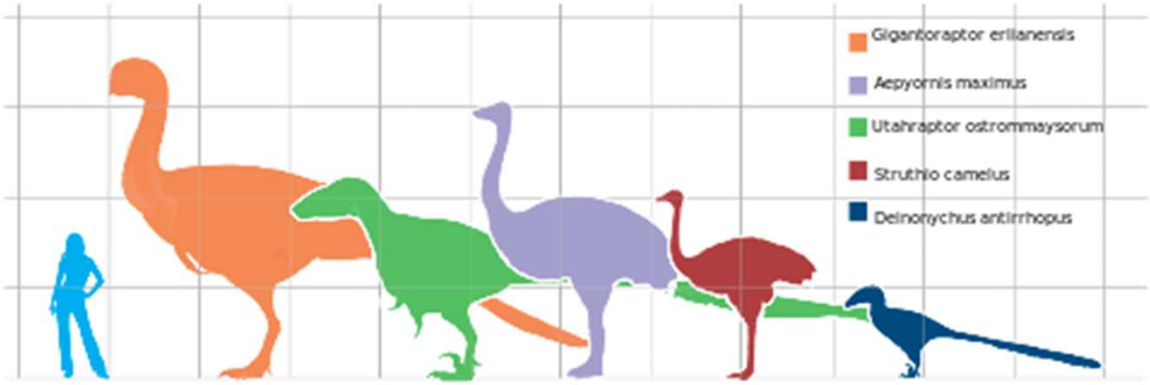
Tvz. savanoví lemuři, vzrůstem a funkcí jako paviáni…

Hadropithecus

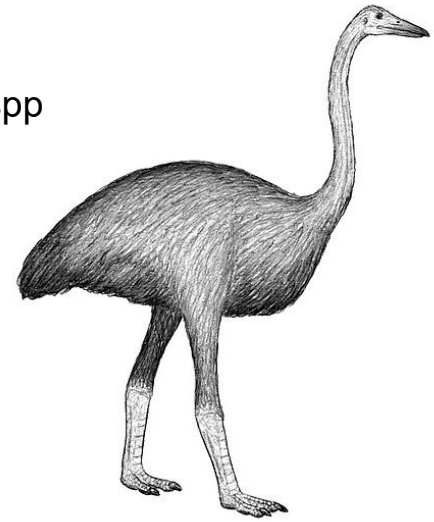
Plesiorycteropus
(ř. Bibymalagasia)

… divné afrotherijní zvíře, něco mezi luskounem a hrabáčem

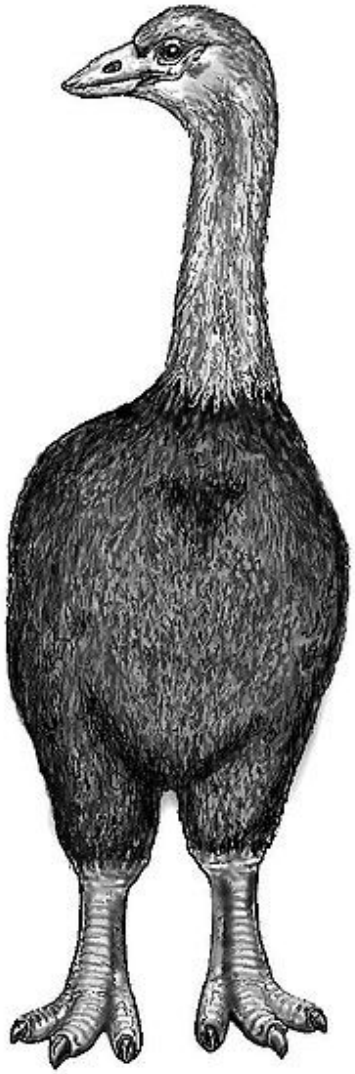
„sloní ptáci“ – ř. Aepyornitiformes



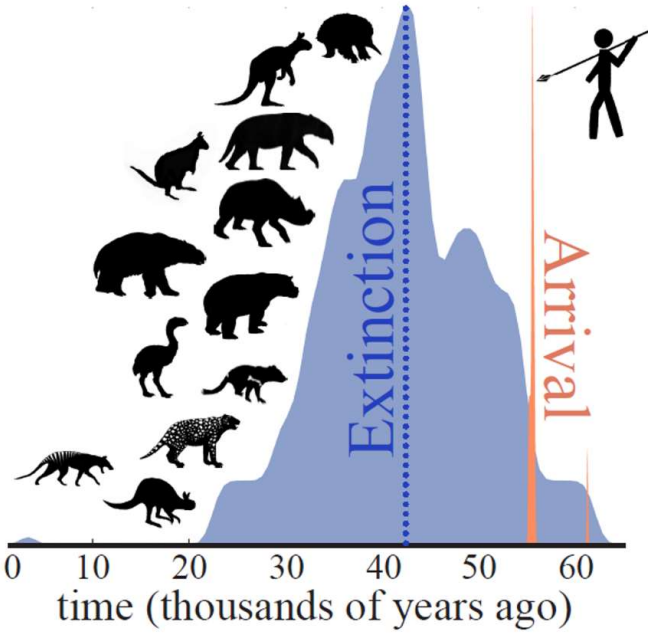
- žili ještě počátkem letopočtu
- u Aepyornise známá „butcher sites“, sběr vajec…
- rozeznávají se až 4 spp. Aepyornisů a 3 spp Mullerornisů
- Sindibádův „pták Noh“



Mullerornis agilis



Aepyornis maximus – 400 KG



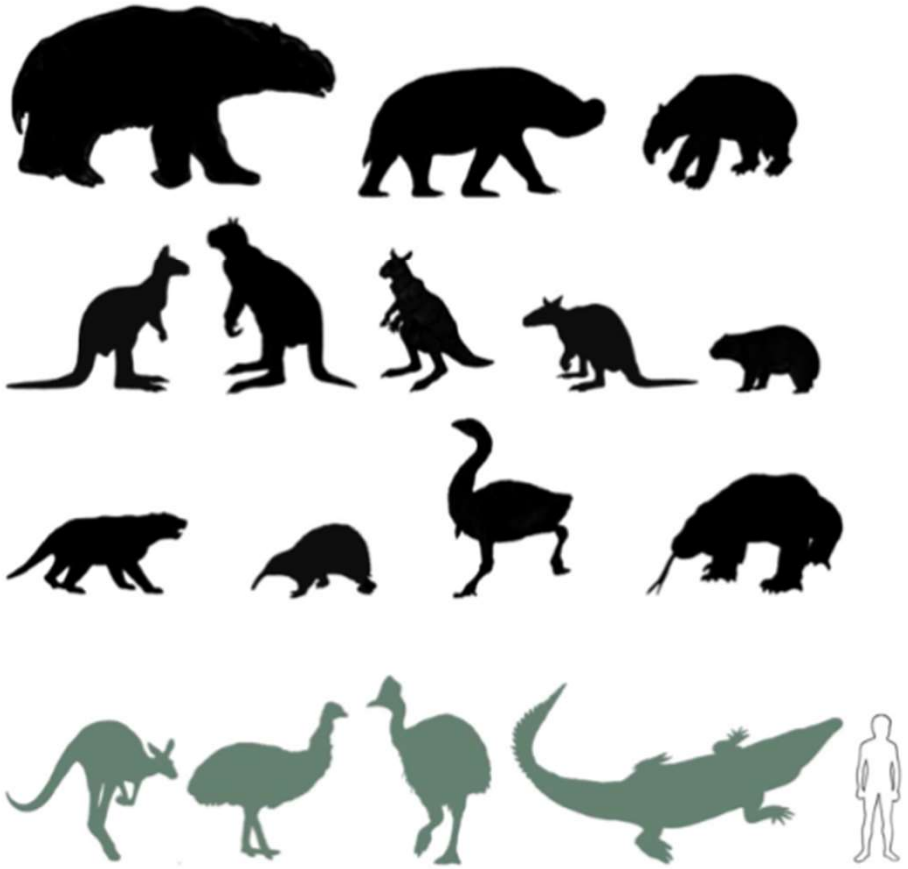
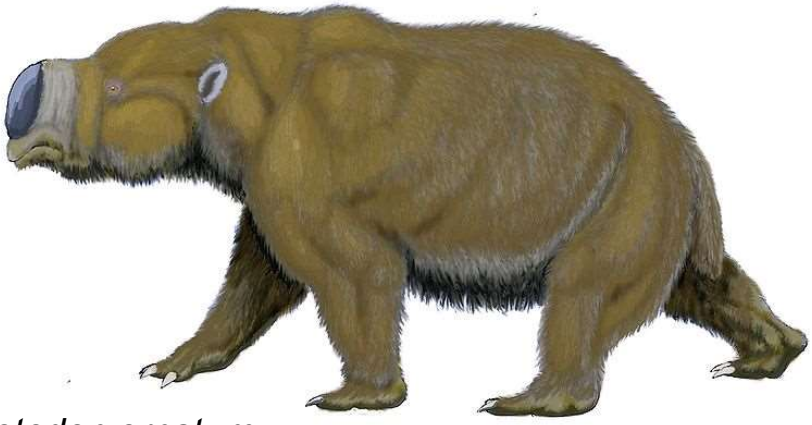
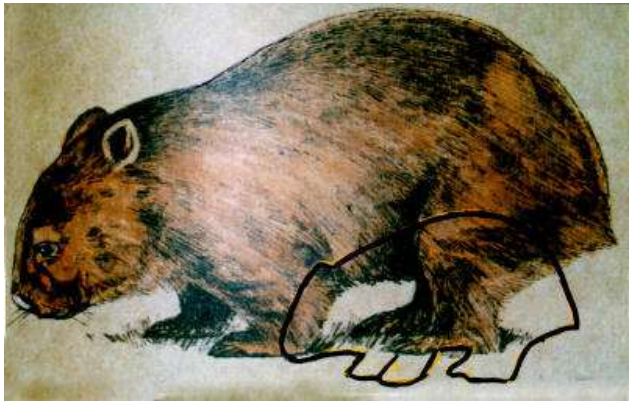


Figure 6. Australasia (Australasian Ecoregion). Selected extinct species (black): *Diprotodon optatum*, *Zygomaturus trilobus*, *Palorchestes azeal*, *Macropus ferragus*, *Procoptodon goliah*, *Sthenurus* sp., *Protemnodon brehus*, *Phascolonus gigas*, *Thylacoleo carnifex*, *Zaglossus hacketti*, *Genyornis newtoni*, *Varanus priscus* (*Megalania prisca*). Selected living species: *Macropus giganteus*, *Dromaius novaehollandiae*, *Casuarius casuarius*, *Crocodylus porosus*. Outline *Homo sapiens* gives approximate scale. This figure is available in colour online at wileyonlinelibrary.com/journal/gj



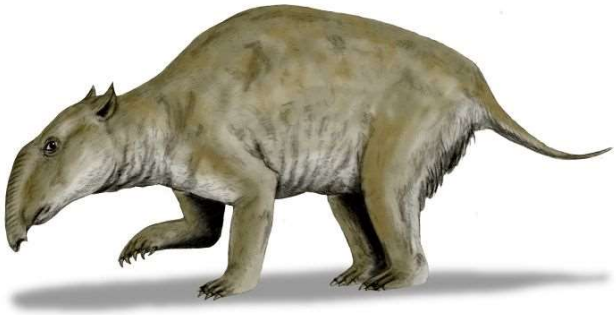
Diprotodon ornatum:

Největší vačnatci vůbec, hm. 2800 kg, vyh. někdy mezi 40 000 a Holocénem…



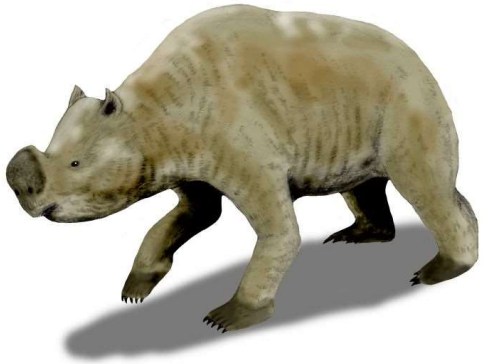
Vombat Phalascolonus gigas:

Srovnán s přeživším vombatem. Hm. 200 kg, více příbuzných druhů.



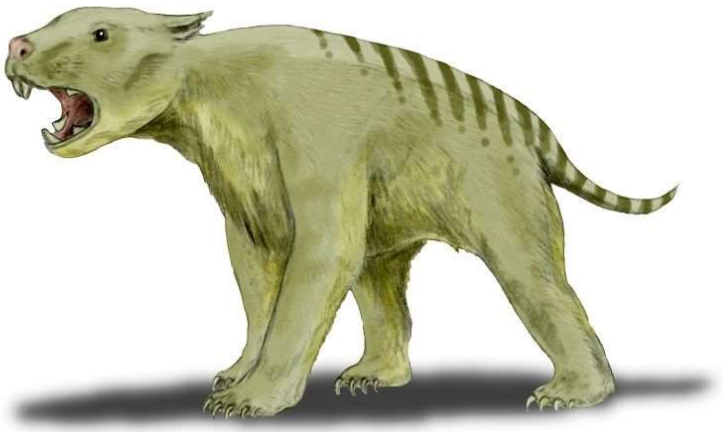
Palorchestes azeal:

hm. 200 kg, dl. 2,5 m, trhal listí u větví, vyh. 11 000 BP



Zygomaturus trilobus:

hm 500 kg, dl. 2,5 m, pobřežní bažiny, vyh. 45 000 BP



Thylacoleo carnifex:

70 cm v kohoutku, 115 cm od hlavy k ocasu, hm. 100–160 kg.

Akerman K, 2009, Antiquity 083, č. 322

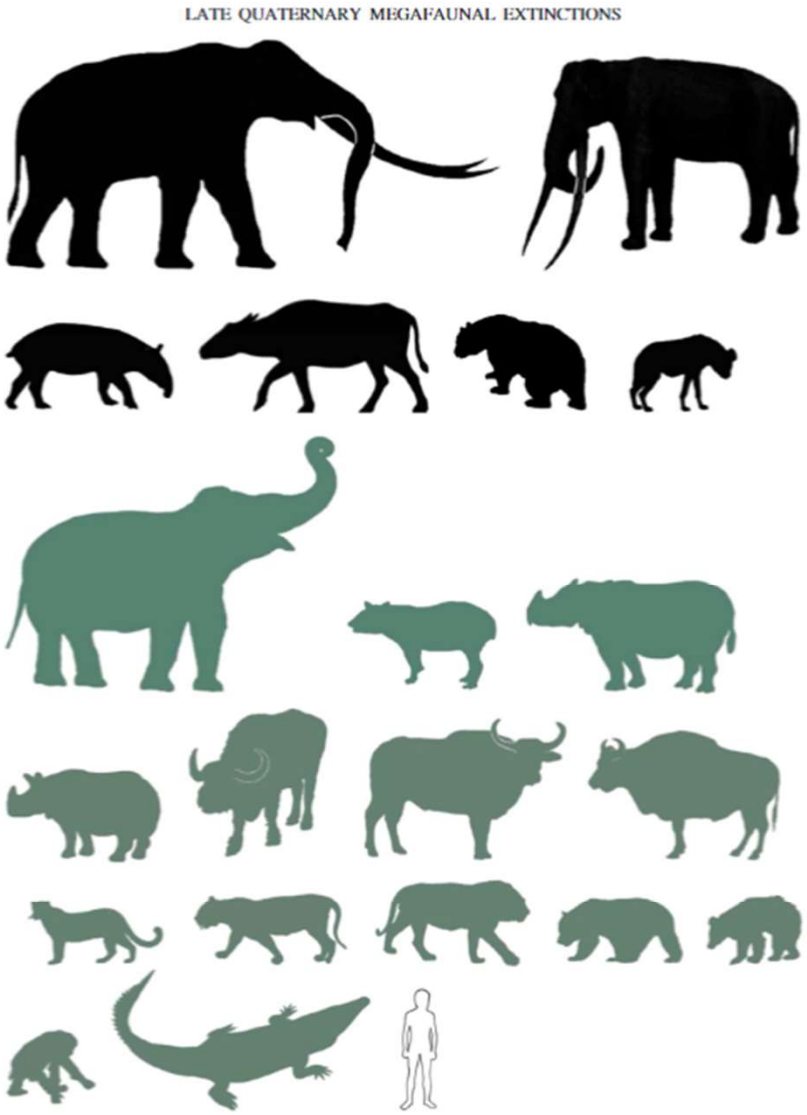


Figure 8. Southern Asia (Indo-Malay Ecoregion). Selected extinct species (black): *Stegodon orientalis*, *Palaeoloxodon namadicus*, *Megatapirus augustus*, *Bubalus mephistopheles*, *Ailuropoda baconi*, *Crocuta* (*crocuta*) *ultima*. Selected living species: *Elephas maximus*, *Rhinoceros unicornis*, *Rhinoceros sondaicus*, *Tapirus indicus*, *Bubalus arnee*, *Bos javanicus*, *Bos gaurus*, *Panthera pardus*, *Panthera tigris*, *Panthera leo*, *Ailuropoda melanoleuca*, *Melursus ursinus*, *Pongo pygmaeus*, *Crocodylus porosus*. Outline *Homo sapiens* gives approximate scale. This figure is available in colour online at wileyonlinelibrary.com/journal/gj

Fig. 1 | Map of the Indochinese and Sundaic subregions. Locality map showing the biogeographical subregions examined, land extent during the Last Glacial Maximum and the proposed extent of the 'savannah' corridor (after ref. [7]). Map from CartoGIS CAP Australian National University 20-217_KP.

Article | Published: 07 October 2020

Environmental drivers of megafauna and hominin extinction in Southeast Asia

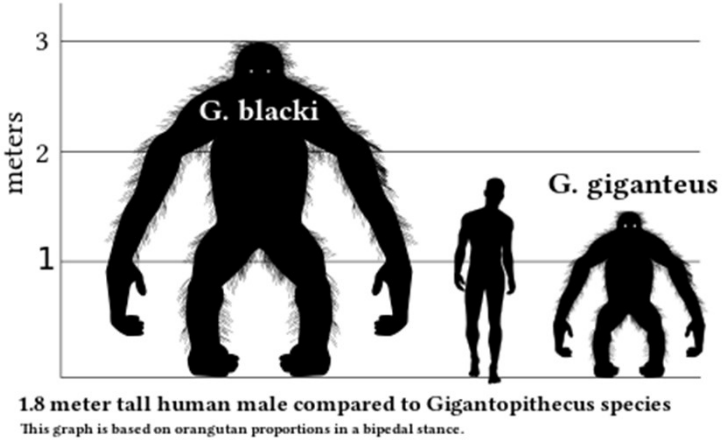
Julien Louys ✉ & Patrick Roberts ✉

Nature **586**, 402–406 (2020) | Cite this article

ORIENTÁLNÍ OBLAST

Podobně jako Afrika v kontaktu s lidmi dlouho

Extinkce spíše regionální, resp. decimace populací



1.8 meter tall human male compared to Gigantopithecus species
This graph is based on orangutan proportions in a bipedal stance.

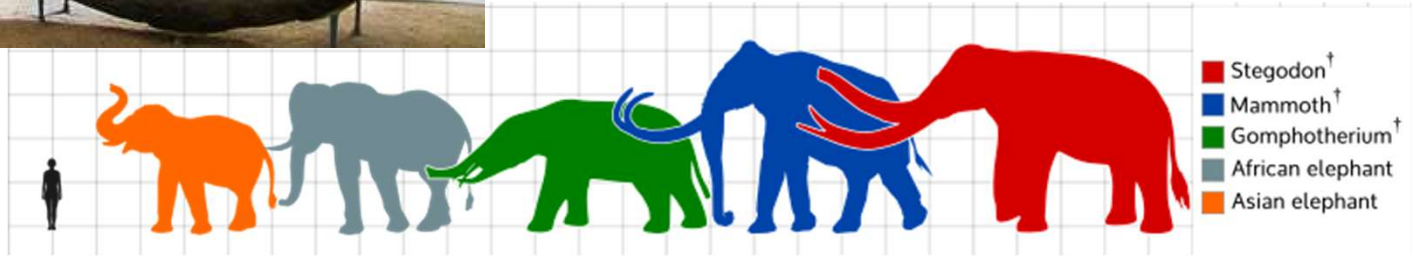
Gigantopithecus vyh. cca 100 000 BP, určitě se setkal s rodem *Homo*…

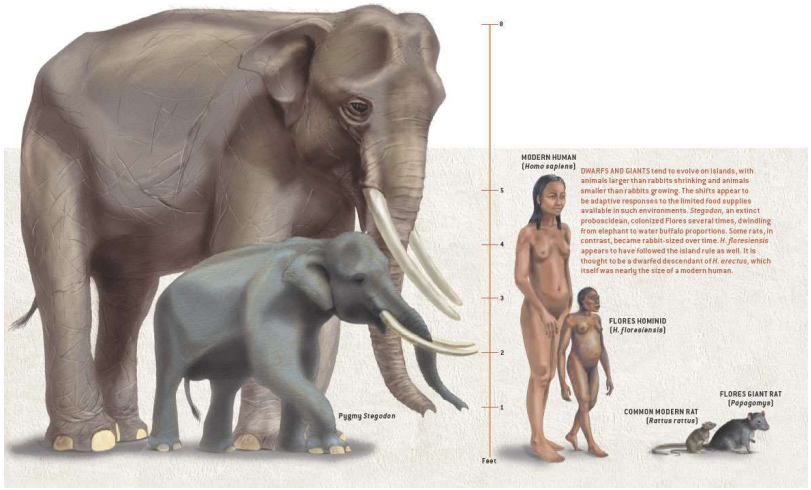
Tapír *Megatapirus augustus*

od Indočíny po Čínu, vyh. 4000 BP

Stegodon spp.

- větší počet druhů mezi Blízk. Východem a Japonskem
- časově Miocén – Holocén
- v Číně (do 4000 BP!) hojnější než *Elephas*
- Filipíny, Sulawesi, Jáva, malé Sundy … zde všude ostrovní **dwarfismus**



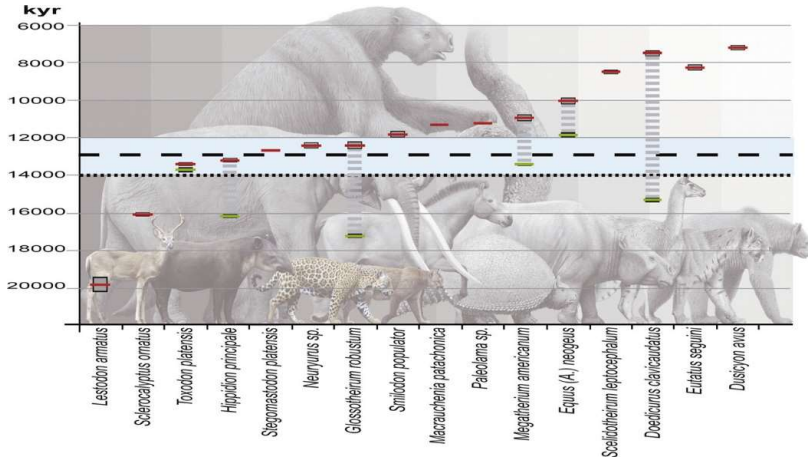


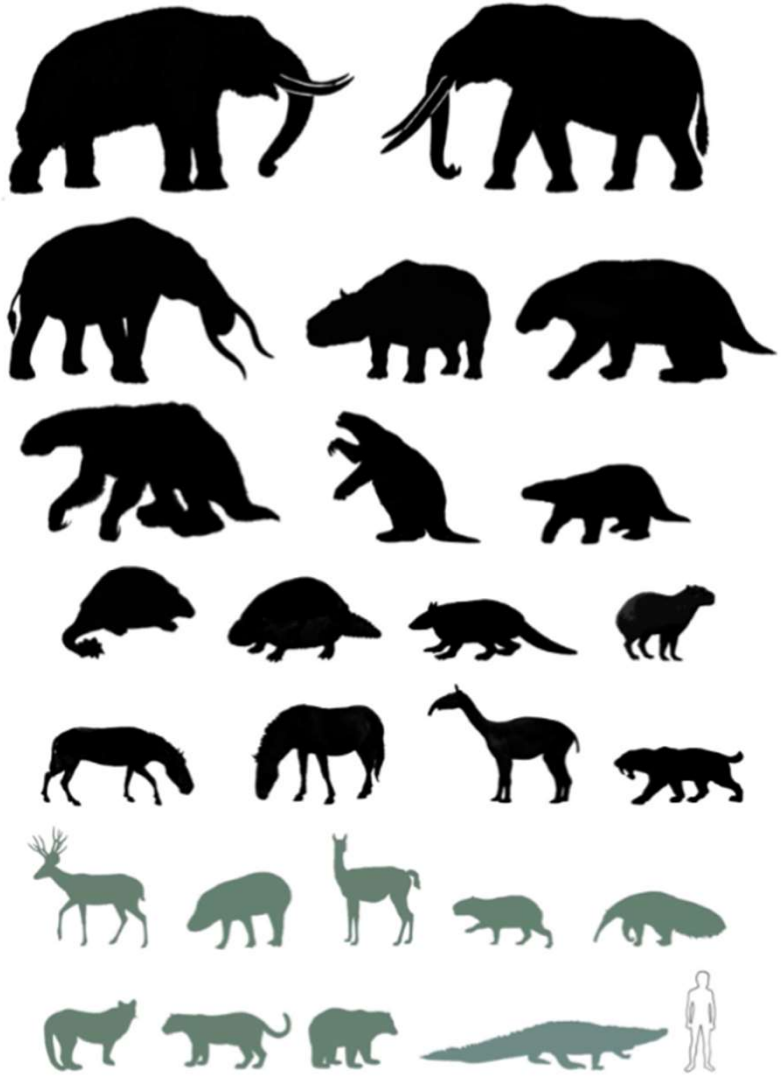
Stegodon florensis insularis

- Současník a kořist člověka *Homo florensis*

Vymírací loterie v JV Asii

		ZMIZELI	PŘEŽILI
South Asia	Middle to Late Pleistocene	Giant tortoise, stegodon, hippopotamuses, bovids, ostrich	Elephant, felids, bears, tapir, rhinoceros, bovids, cervids, suids, pythons
Continental SE Asia	Middle Pleistocene to early Holocene	*Gigantopithecus* (MP); stegodon, giant tapir, hyena, orangutans	Elephant, orangutan, tiger, leopard, bears, tapir, rhinoceros, bovids, cervids, suids, pythons
Sundaland	Late Pleistocene	Giant pangolin	As above
Java	Middle Pleistocene	Giant tortoise, stegodon, hippopotamus, hyena	As above
Philippine Islands (ex Palawan)	Pleistocene	Giant tortoise, stegodon, elephant, rhinoceros, *Bubalus* spp.	Bovids, suids, cervids, python
Sulawesi	Pleistocene	Giant tortoise, stegodon, elephant, *Celebochoerus* (Suidae)	Bovids, suids, python
Wallacean Islands	Late Pleistocene	Giant tortoises, varanid lizards, stegodons	Komodo dragon





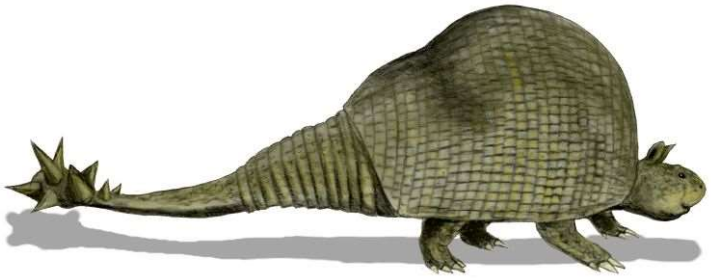
South America (Neotropic Ecoregion). Selected extinct species (black): *Haplomastodon waringi*, *Notiomastodon* (*Stegomastodon*) *platensis*, *…us hyodon*, *Toxodon platensis*, *Megatherium americanum*, *Eremotherium laurillardi*, *Catonyx cuvieri*, *Mylodon darwini*, *Doedicurus clavicaudatus*, *…odon clavipes*, *Holmesina septentrionalis*, *Neochoerus pincneyi*, *Hippidion saldiasi*, *Equus* sp., *Macrauchenia patachonica*, *Smilodon populator*. Selected species: *Blastoceros dichotomus*, *Tapirus baurdii*, *Lama guanicoe*, *Hydrochoerus hydrochaeris*, *Myrmecophaga tridactyla*, *Puma concolor*, *Panthera*

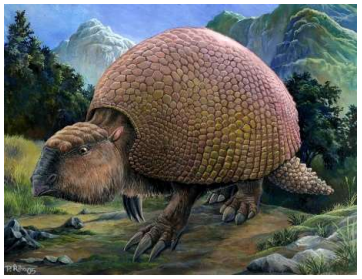
JIŽNÍ AMERIKA

Izolovaná od křídy, ale s kontakty tu byly směrem dovnitř (primáti, hlodavci, medvídci, prakopytníci) i ven (vačice směr Austrálie, lenochodi směr Karibik)

Miocénní „velká americká výměna“

Za 100 000 let vymřelo 48 rodů, z toho 17 bezpečně mezi 16 a 11 000 lety BP…. (za Pleistocén 80% rodů)





<u>Glyptodontidae</u>

Celá čeleď chudozubých …

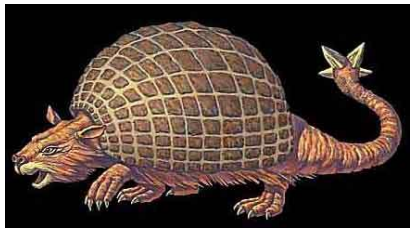
Doedicurus spp.

až 2 tuny

Eleutherocercus spp.

Glyptodon spp.

„zhruba velikosti VW brouka“



Hoplophorus spp.

Lomaphorus spp.

Panochthus spp.

1.5 tuny

Lompaphorus - ocas

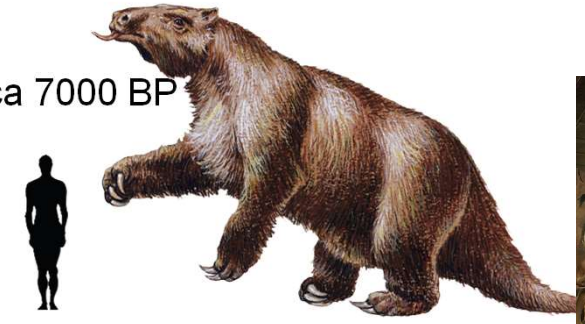
Velcí lenochodi – čeledi Megalonychidae (část.), †Megatheriidae, †Nothrotheriidae, †Mylodontidae

Někteří až 6 m na délku, hmotnost 4 tuny …

- spolu se slony největší terestričtí savci své doby

Megatherium

- 6 m, 4 tuny, poslední ca 7000 BP



Eremotherium

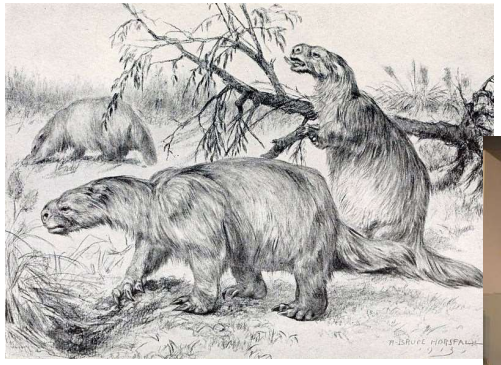
- 6 m, 3t, ext. 11000BP

Catonyx

1t

Glossotherium

4m, 1t



Lestodon

Nematherium

Nothrotherium

Scelidotherium

Vícero „menších“ lenochodů

Annals of Anatomy - Anatomischer Anzeiger
Volume 194, Issue 1, 20 January 2012, Pages 26-30

Mylodon darwinii DNA sequences from ancient fecal hair shafts

Andrew A. Clack [a], Ross D.E. MacPhee [d], Hendrik N. Poinar [a, b, c]

Show more

https://doi.org/10.1016/j.aanat.2011.05.001

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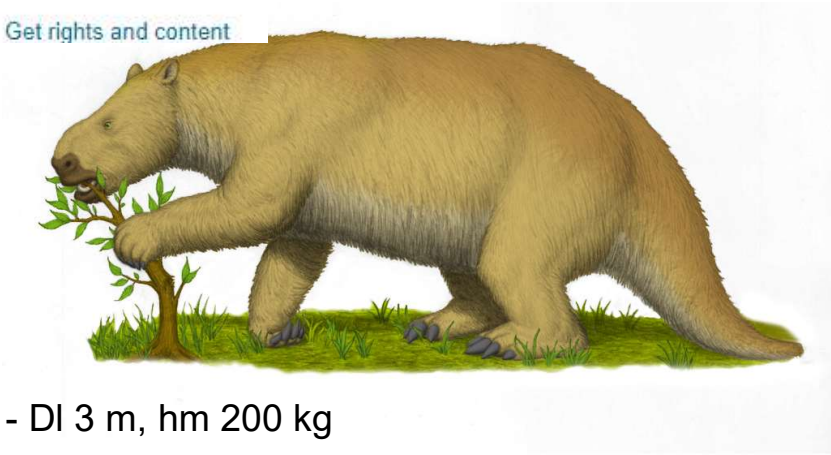
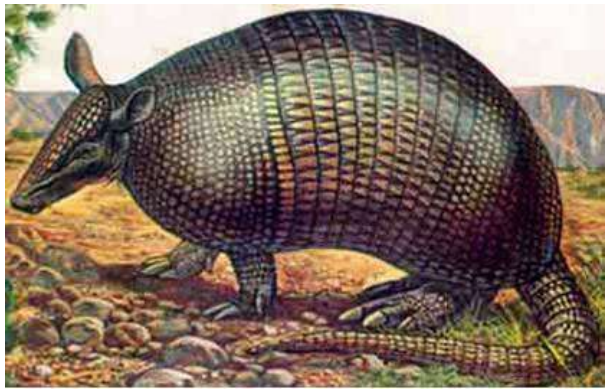


- Dl 3 m, hm 200 kg
- poslední přeživší (5000 BP)
-- nejlépe zachovalý (Patagonie, jeskyně)

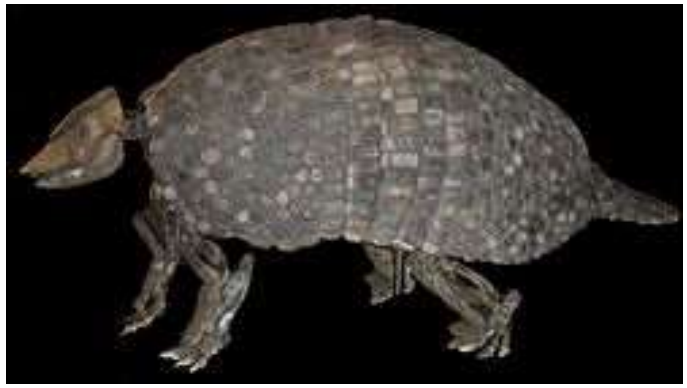
A mnohá další Xenarthra



Dasysus bellus

1.2m dlouhý, 1m vysoký, od Bolivie po Indianu

Holmesina (= *Pampatherium*)



2 m dl., 220 kg

-------- a mnozí další

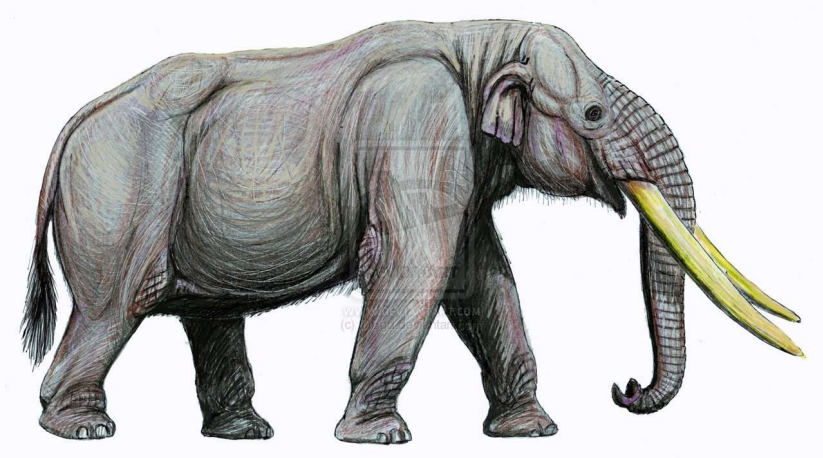
Zástupce hlodavců

Kapybara r. *Neocherus*

- Hm.100 kg

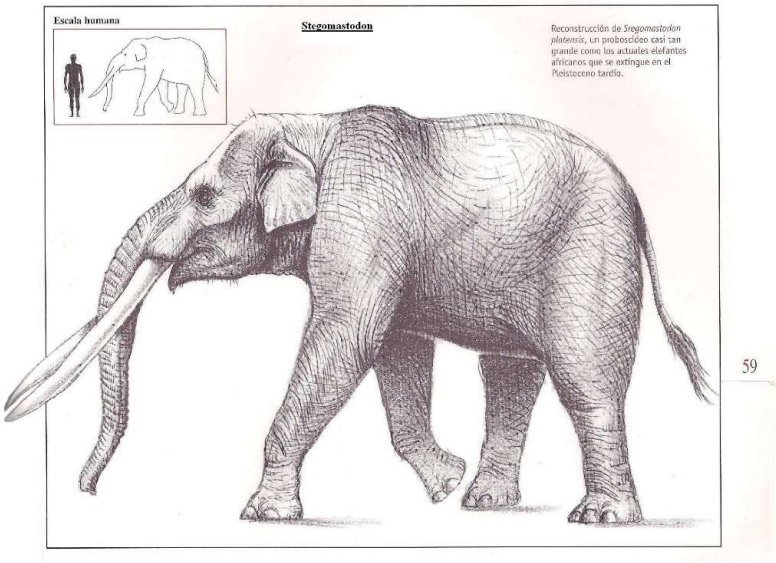
Chobotnatci

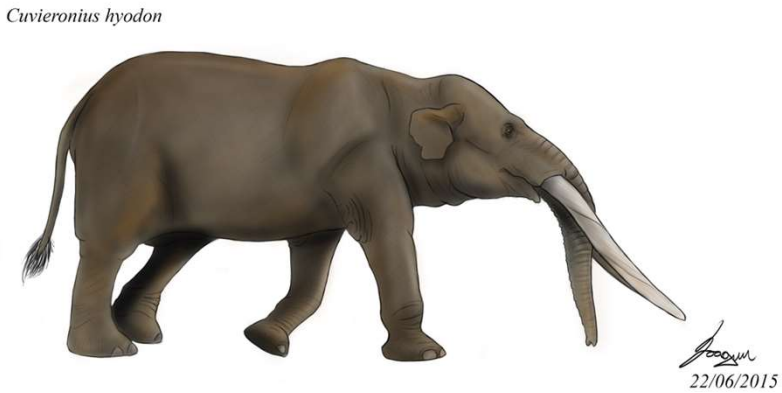
… pořádně se neví, kolik spp. jich bylo



Haplomastodon = Notiomatodon

Stegomastodon

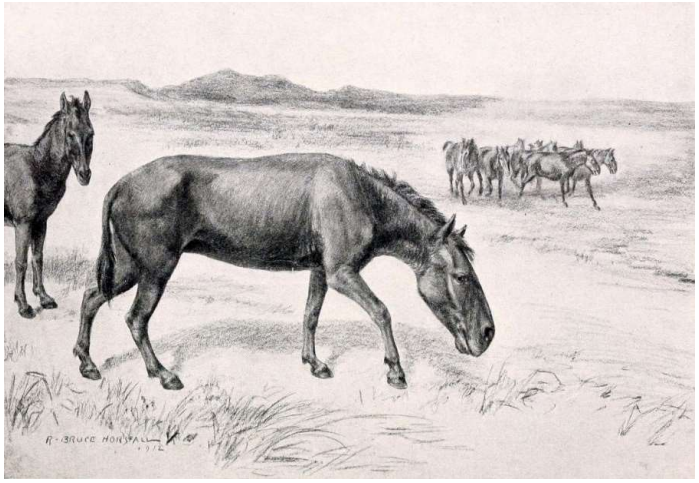




Cuvieronius = vyh. 12500BP

Koně – r. Hippidion

– ca velikosti osla
dlouho pokládán za potomka miocenních koní (e.g., *Pliohippus*), nově zjištěno, že patří k rodu *Equus.*
vyhuben 8000 BP



Jeleni

Antifer spp. – byl by největším jelenem J. Ameriky

Odoilocerus salinae (= velký jelenec)

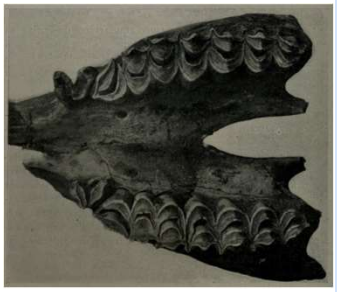
Agalmaceros spp.

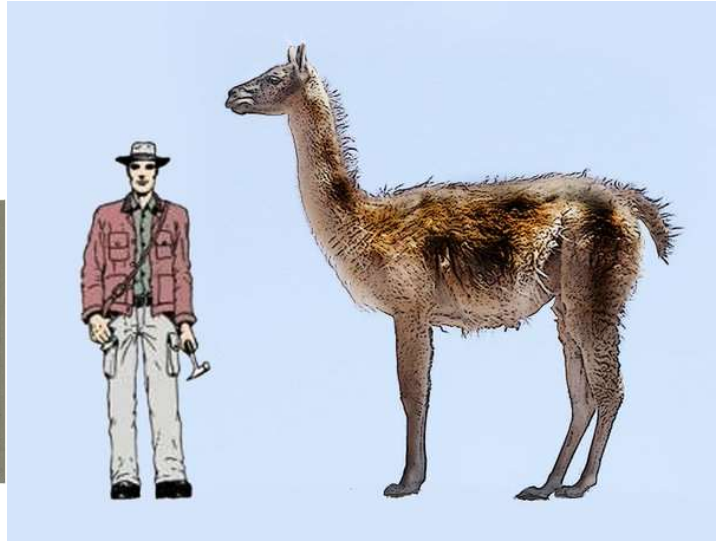
Velbloudovití

Paleolama

– zasahovala do Severní Ameriky

Hemiachaeunia



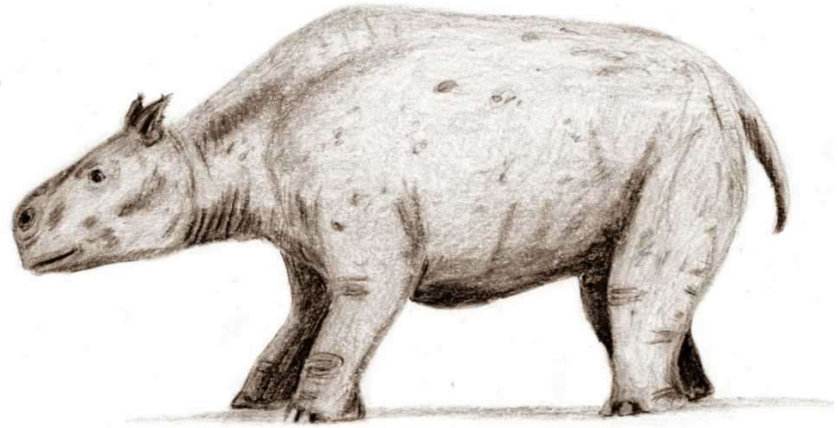


Eulamaops

Poslední svědkové svých řádů, kteří přežili „Americkou výměnu“….

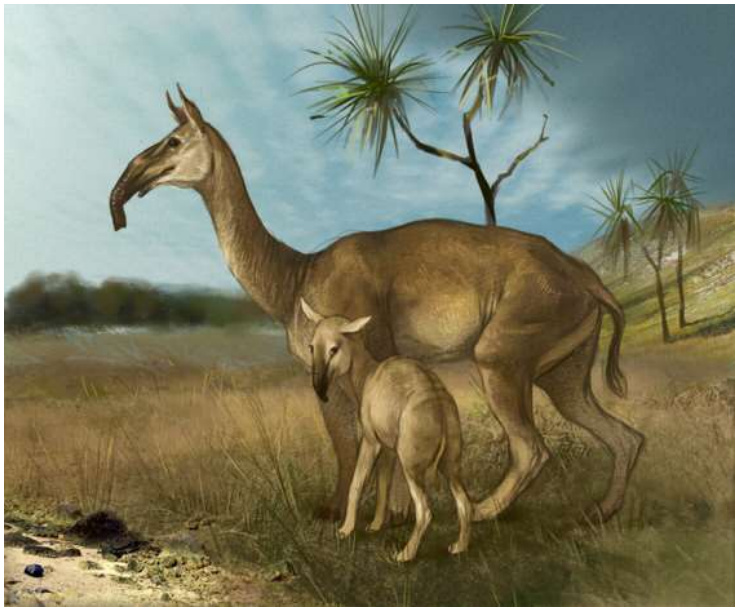
Toxodon – ř. Notoungulata

2.7 m dl, 1,500 kg, výška 1.5 m



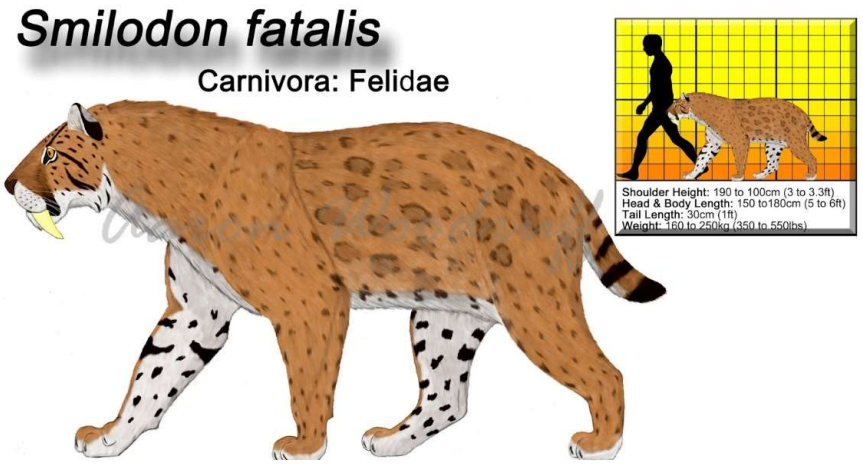
Macrauchenia – ř. Litopterna

3 m dl, ca 1 tuna



Velké šelmy

Pleistocénní „velký“ poddruh jaguára



Šavlozubé kočky:

Smilodon fatalis

Smilodon populator

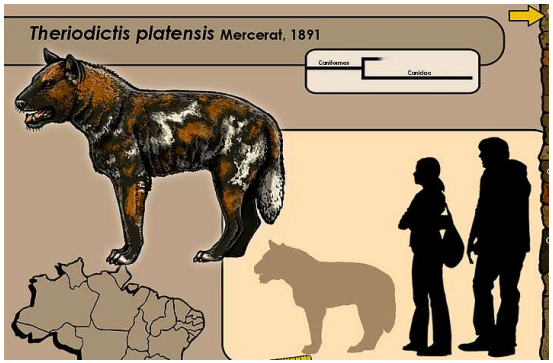
– nejv. známá kočka, vyhynul 10 000

Arctotherium sp.

– nejv. známý medvěd, vyhynul … taknějak

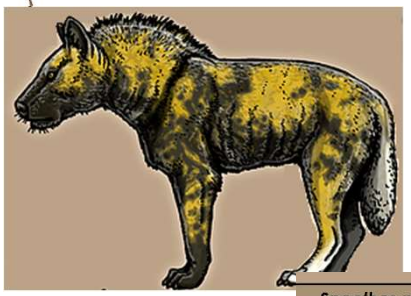
A menší „smečkové“ šelmy

pes *Theriodictys* sp.



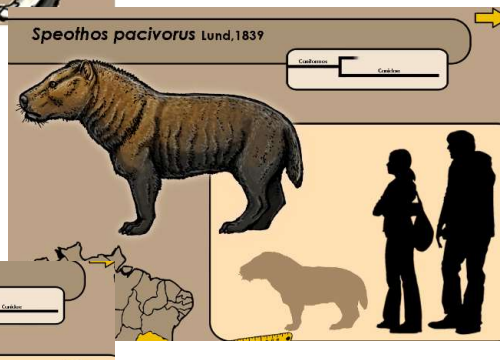
Vlci *Canis dirus*, *C. nehringi*

Protocyon



Speothos pacivorus

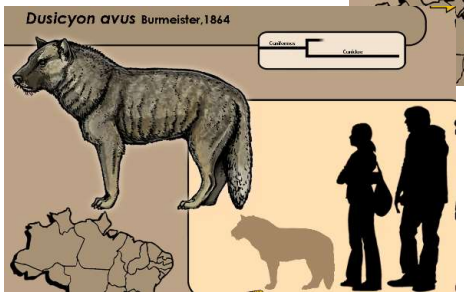
-Ca 2x větší, než pes pralesní



Dusicyon avus

Vyh. ca 1000 po Kr.

Příbuzný psu bojovnému z Falkland (ext. v 19. stol.)



KARIBIK

Kombinace lovu a přivlečených psů + krys … the most severe extinctions of any mammal fauna anywhere in the world

Opice z podč. Calicebinae (titiové), včetně gigantických forem

4 rody lenochodů (16 spp.) , vč. *Megalocnus* (> 100 kg), ostatní menší, arboreální

velehutiovití (Heptaxodontidae) - s druhem ***Amblyrhiza inundata***, okolo 100 kg(!)

korovití (Echimyidae) – mnoho druhů
hutiovití (Capromyidae) – tak 10 druhů

hmyzožravci:

štětinatcovití (Solenodontidae) – 2 spp EX, 2 přežívají

Nezofontovití (Nesofontidae) – endemická čeleď hmyzožravců

Příklad – samotný ostrov Hispaniola

- 25 endemic spp. before human arrival

nature COMMUNICATIONS

ARTICLE

https://doi.org/10.1038/s41467-021-22506-4 OPEN

Late Pleistocene South American megafaunal extinctions associated with rise of Fishtail points and human population

Luciano Prates[1,2,4✉] & S. Ivan Perez[1,3,4✉]

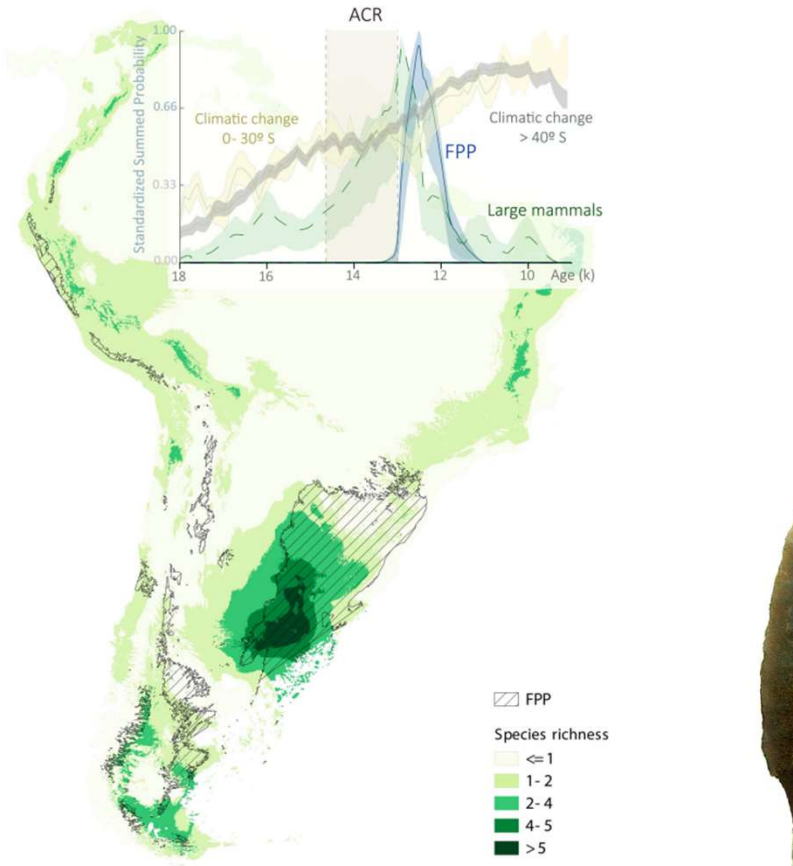


Fig. 8 Summary of spatial (map) and temporal (inset graph) results. Local species richness map of extinct large mammals and the calculated distribution of FPP, together with the temporal change in the density of both variables for all of South America and the climatic changes followi et al.[16] Striped areas in the map represent the potential distribution of FPP. Local species richness of extinct large mammals varies on the map from 1 (light

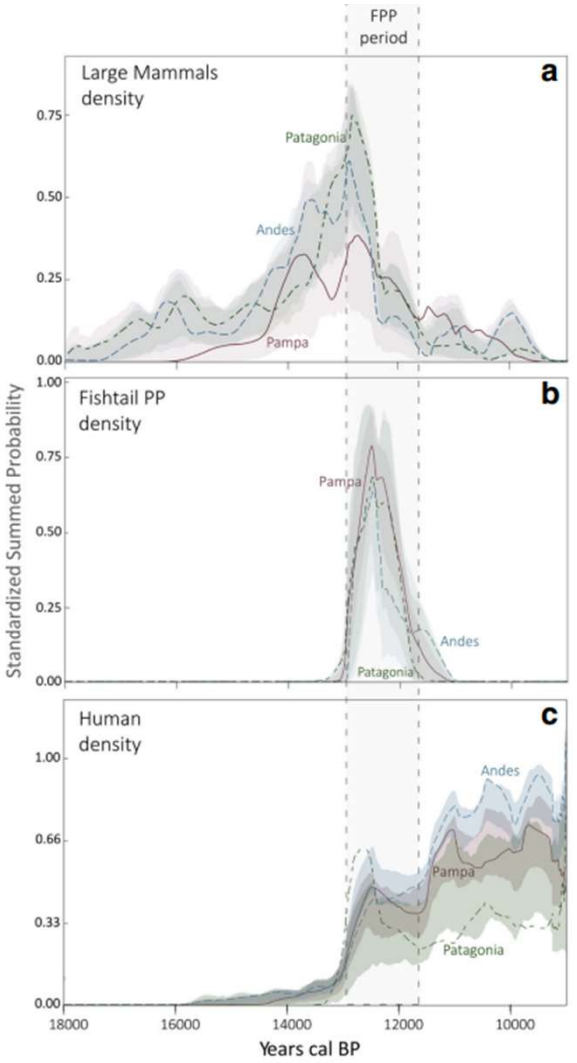
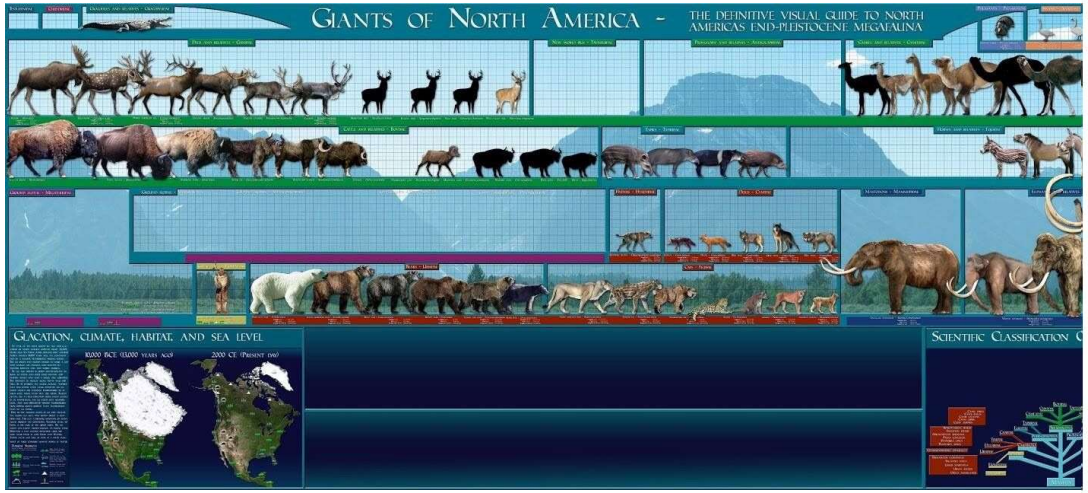


Fig. 2 Regional differences in summed probability distribution curves within South America. The temporal change in the density of large mammals (**a**), Fishtail projectile points (**b**), and all archeological sites (**c**) described using SCPD curves. Different regions are indicated in shading colors: Andes (light blues), Pampa (light red), Patagonia (light green). *X* axis represents Calibrated years BP and *Y* axis the standardized summed probability.



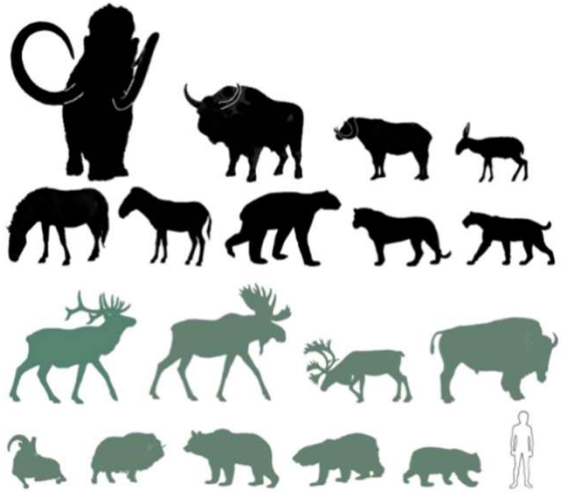
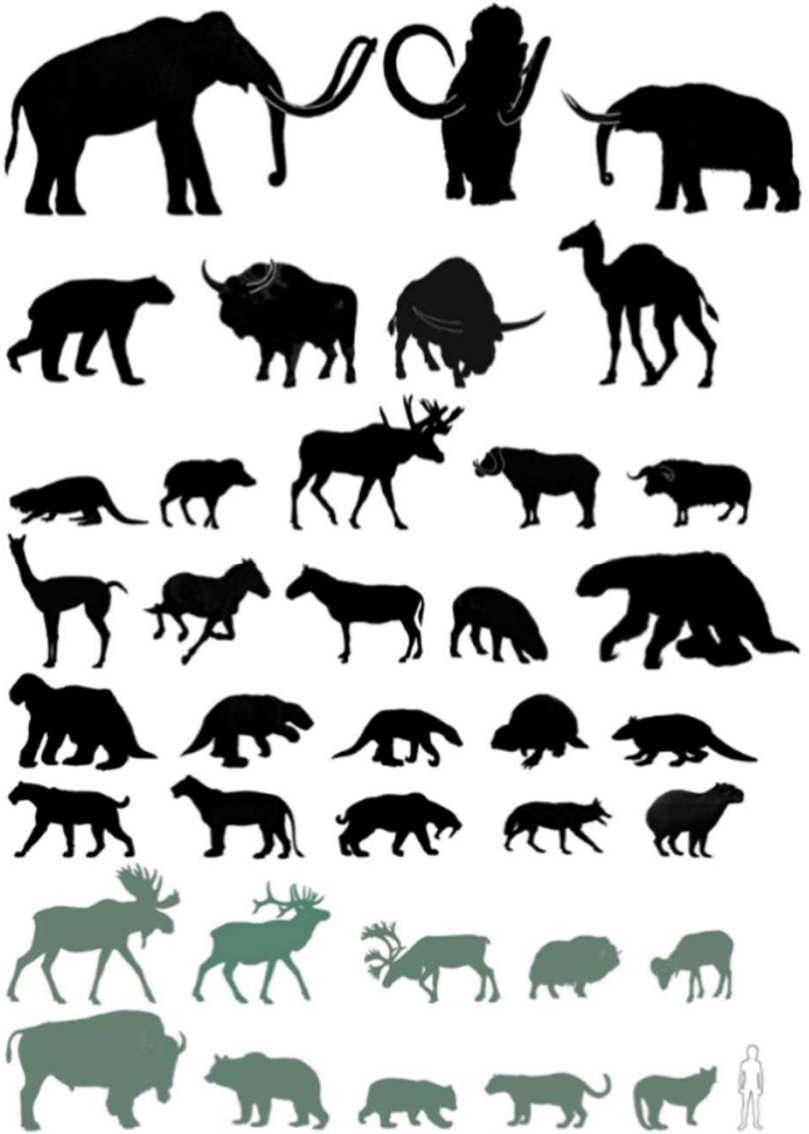


Figure 3. Alaska/Yukon (Nearctic Ecoregion). Selected extinct species (black): *Mammuthus primigenius*, *Bison priscus*, *Bootherium bombifrons*, *Saiga tatarica**, *Equus* sp. (caballine horse), *Equus* sp. ('hemione-like' ass), *Arctodus simus*, *Panthera spelaea*, *Homotherium serum*. Selected living species: *Cervus canadensis*, *Alces alces*, *Rangifer tarandus*, *Bison bison*, *Ovis dalli*, *Ovibos moschatus*, *Ursus arctos*, *Ursus maritimus*, *Ursus americanus*. Outline *Homo sapiens* gives approximate scale. *Extirpated in Last Glacial. This figure is available in colour online at wileyonlinelibrary.com/journal/gj



4. North America, south of 60° latitude (Nearctic Ecoregion). Selected extinct species (black): *Mammuthus columbi*, *Mammuthus primigeniu*
num. *Arctodus simus*. *Bison priscus*. *Bison latifrons*. *Camelops hesternus*. *Castoroides ohioensis*. *Platygonus compressus*. *Cervalces scotti*.

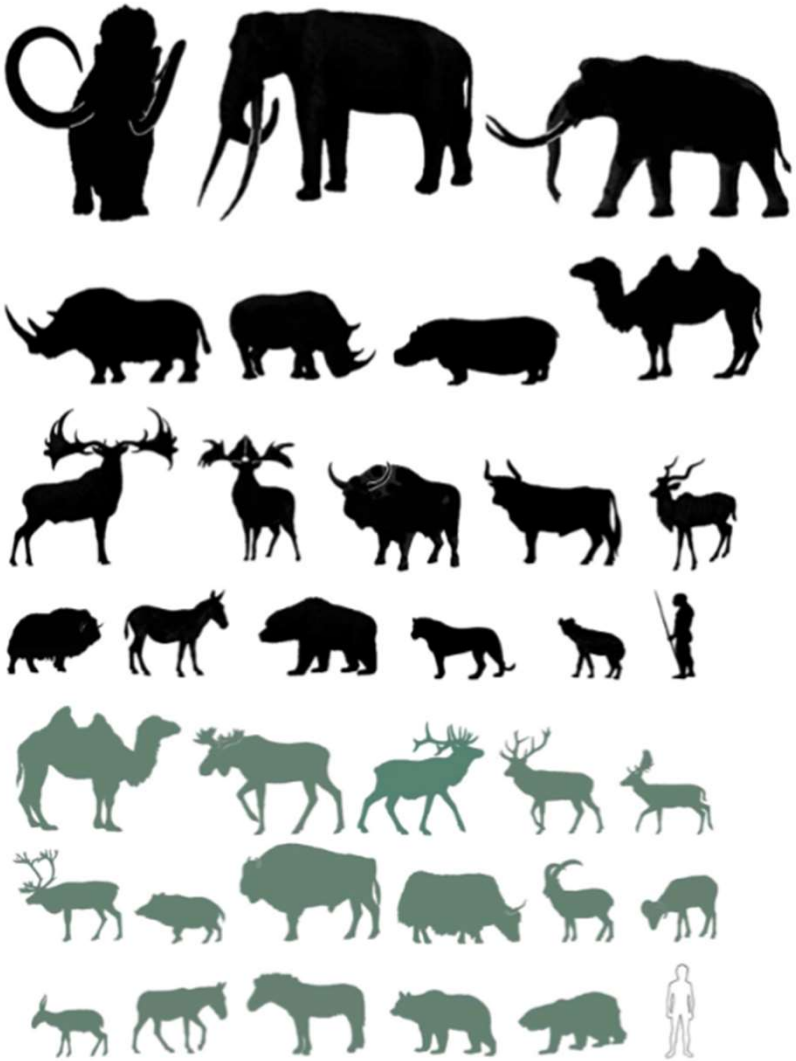
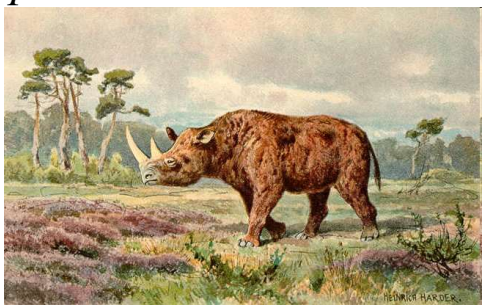


Figure 1. Northern Eurasia (Palaearctic Ecoregion). Selected extinct species (black): *Mammuthus primigenius*[11], *Palaeoloxodon antiquus naumanni*, *Coelodonta antiquitatis*, *Stephanorhinus hemitoechus*, *Hippopotamus amphibius*[*], *Camelus knoblochi*, *Megaloceros giganteus*[1] *yabei*, *Bison priscus*, *Bos primigenius*[11], *Spiroceros kiakhtensis*, *Ovibos moschatus*[h], *Equus hydruntinus*[11], *Ursus spelaeus*, *Panthera spelaea*, *Homo neanderthalensis*. Selected living species: *Camelus bactrianus*, *Alces alces*, *Cervus canadensis*, *Cervus elaphus*, *Dama dama*, *Rangi scrofa*, *Bison bonasus*, *Bos mutus*, *Capra ibex*, *Ovis canadensis*, *Saiga tatarica*, *Equus hemionus*, *Equus ferus*, *Ursus arctos*, *Ursus maritim*

interglaciální fauna

Hippopotamus amphibius –
ještě z posl. interglaciálu znám ze SZ Evropy

Stephanorhinus hemitoechus



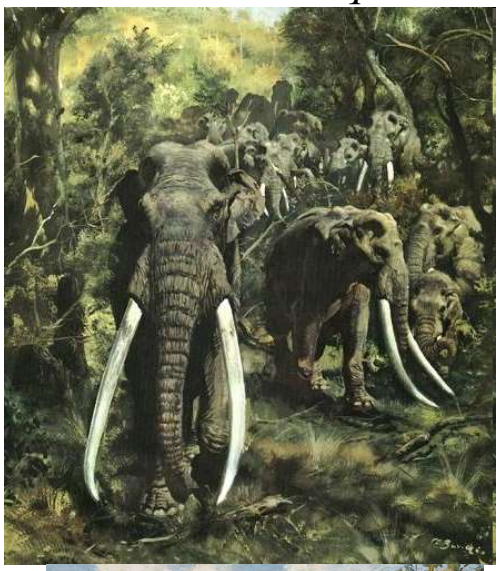
Stephanorhinus kirchbergensis

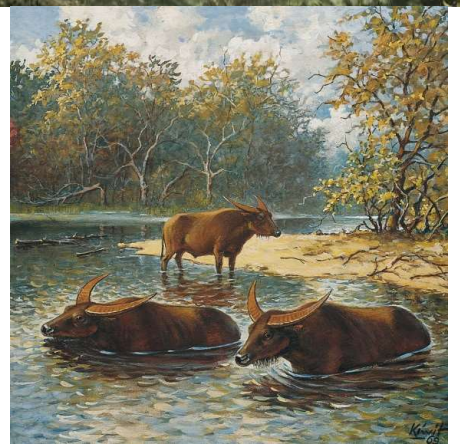
Elasmotherium (východní Evropa)

Megaloceros giganteus

Leckde do Holocénu

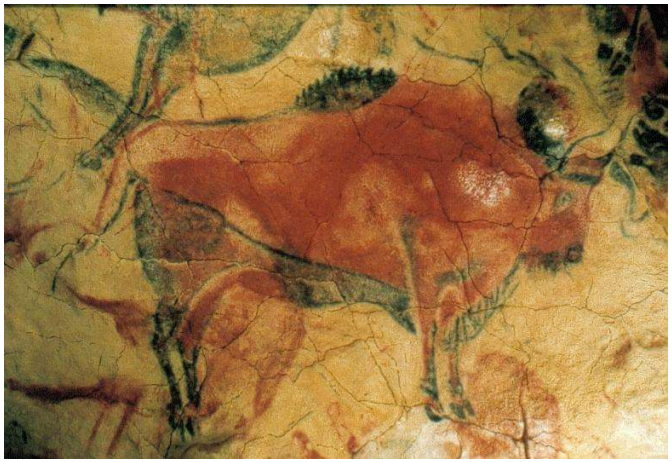
Palaeloxodon antiquus





Bubalus murrensis – do Holocénu

glaciální fauna



Bison priscus

Nosorožec srstnatý, *Coleodonta antiquitatis*

Mamutthus primigenius

\+ zvířata dosud existující, tehdy rozšířenější:

Equus caballus, *Saiga tatarica*, *Ovibos moschatus*...

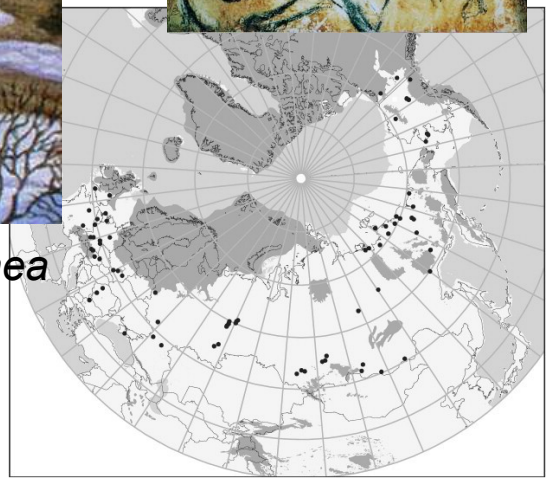
masožravci

Hyena skrvrnitá (*Crocuta crocuta spelaea*)
jeskynní malba z Francie

Medvěd jeskynní (*Ursus spelaeus*) –
vyhynul 27 Ka – tj. last glacial maximum

Lev jeskynní, *Panthera spelaea*

- na malbách vždy bez hřívy



Homotherium – šavlozubá kočka, jako v Americe

\+ *Panthera pardus* (J. Evropa, shodný se současným)

Panthera leo

(do historické doby na Balkáně)

P. tigris (po Ukrajinu…)

ostrovní fauny

TRPASLIČÍ HROŠI

Kréta: *Hippopotamus creutzburgi*, **Kypr**: *H. minor*, **Malta**: *H. Melitensis,* **Sicílie**: *H. pentlandi*

A SLONI

Sardinie*:*
Mammuthus lamarmorae

Sicílie a Malta
Elephas (Palaeoloxodon) 'mnaidriensis'
Elephas (Palaeoloxodon) falconeri

Kréta
Mammuthus creticus
Palaeoloxodon creutzburgi
Palaeoloxodon chaniensis

Kypr
Elephas (Palaeoloxodon) cypriotes

Dodekanésy:
Elephas tiliensis

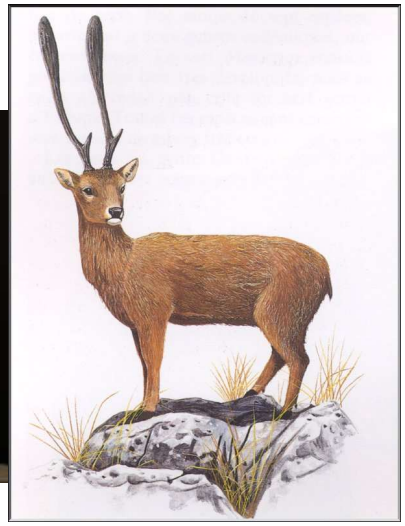
Detail of a painting in the tomb of Rekhmire in Egypt, believed by some to depict a "pygmy mammoth" (lower left) among other animals

Maltské druhy vs. slon indický

ostrovní fauny

Kréta:

Candiacervus spp.



Nejm. 8 „typů“, od 60 cm v kohoutku (!) do ca 150 cm.

Radiace?

Vyhubeni zač. Holocénu.

+ vydra *Lutrogale cretensis*

Baleáry:
Chřástal *Rallus eivissensis*

pozemní 1/4kiloví plši *Hypnomys morpheus*, *H. mahonensi,*

rejsek *Nesiotites hidalgoi*

kopytník *Myotragus balearicus*,

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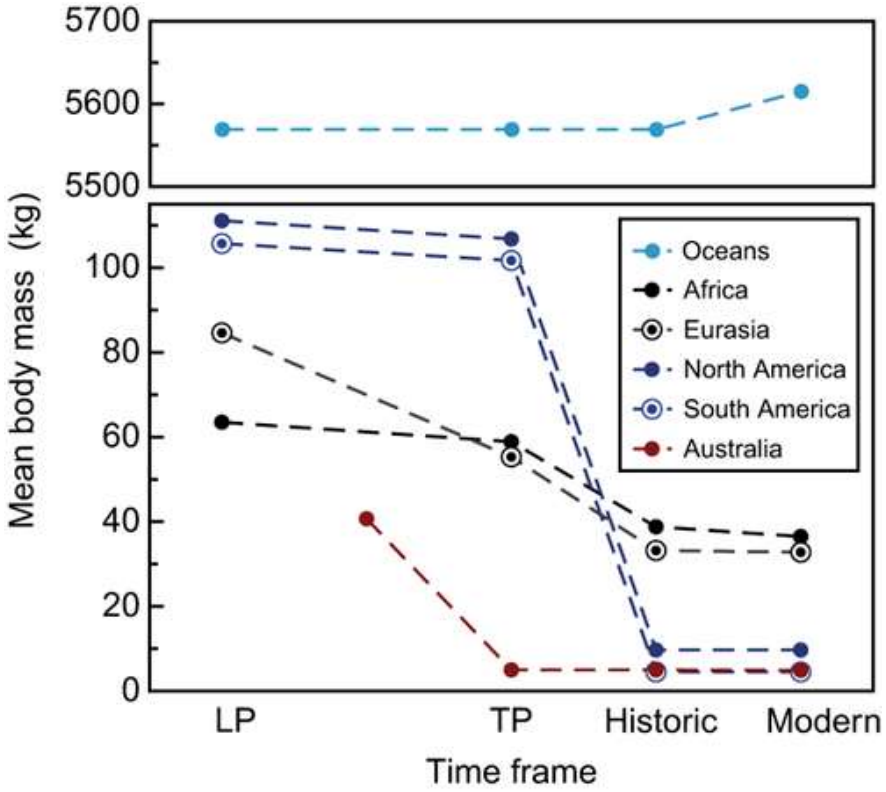
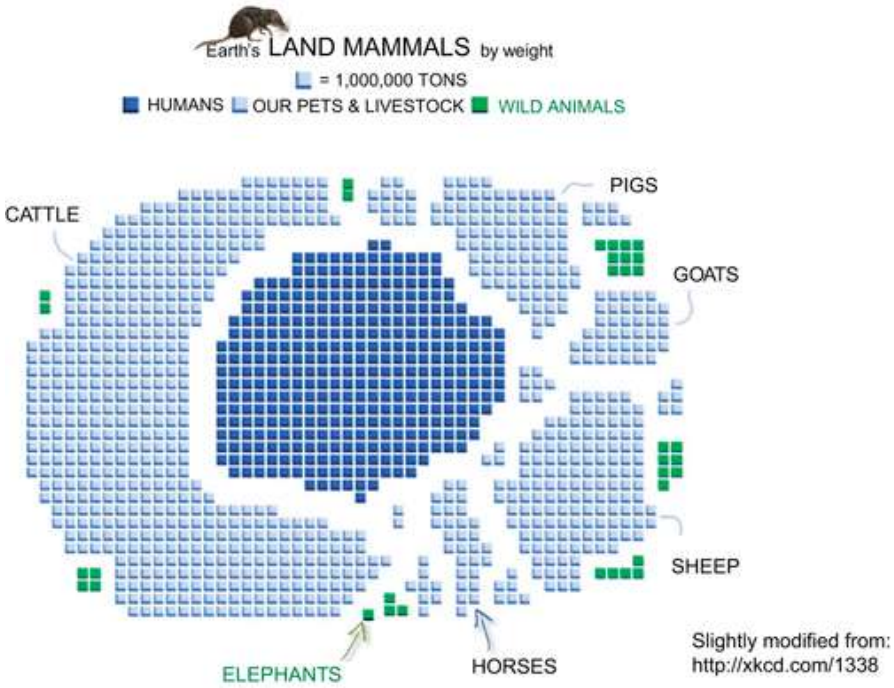
Megafauna in the Earth system

Felisa A. Smith, Christopher E. Doughty, Yadvinder Malhi, Jens-Christian Svenning, John Terborgh

First published: 15 October 2015 | https://doi.org/10.1111/ecog.02156 | Citations: 36





Kolik těch zvířat vlastně bylo (na tuny)?

Barnosky 2008 – odhadl podstatně menší biomasu, než kolik je zvířat (vč. člověka) dnes

Zimov – krapet později – ji odhadl na 8 000 000 000 t (o něco více, než dnes)

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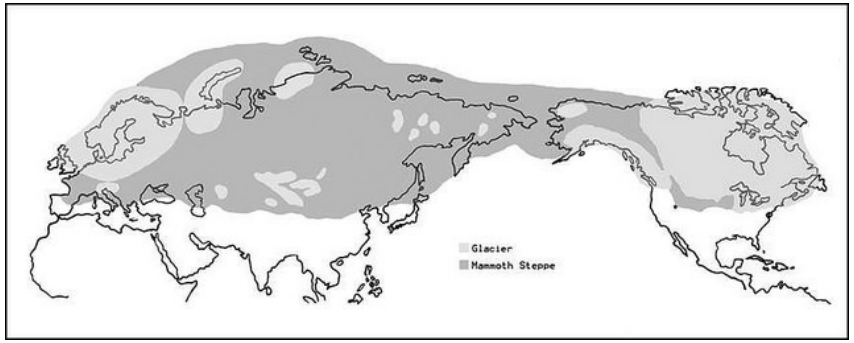
Mammoth steppe: a high-productivity phenomenon

S.A. Zimov [a,*], N.S. Zimov [a], A.N. Tikhonov [b], F.S. Chapin III [c]

[a] Northeast Science Station, Pacific Institute for Geography, Russian Academy of Sciences, Cherskii 678830, Russia



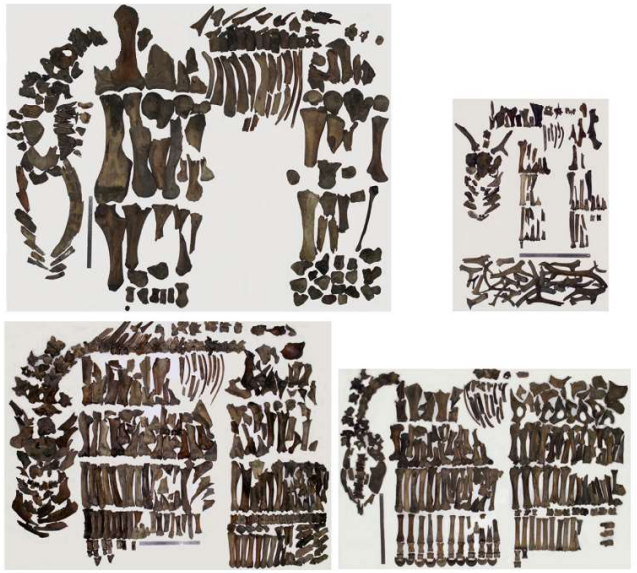


Fig. 10. Bones of mammoths (upper left), reindeer (upper right), bison (lower left) and horses (lower right) collected on the shore of Kolyma river on the western part of Duvanniy Yar exposure on the area of ~ 1 ha. Totally there were found ~ 1000 bones and bone fragments. From that follows that bone density on the site is 1 bone per 10 m^2, or (taking into account, that exposure height is 50 m) 1 bone per 500 m^3. Bones are positioned to be consistent with their place in the skeleton.

During the ice age, Northern Siberia accumulated thick layer of loess sediments. These are the soils of the mammoth steppe. By counting bones in these frozen sediments, it is possible to accurately estimate the density of animals in this ecosystem. On each square kilometer of pastures lived 1 mammoth, 5 bison, 8 horses, 15 reindeer. Additionally, more rare musk ox, elks, wooly rhinoceros, saiga, snow sheep, and moose were present. Wolves, cave lions and wolverines occupied the landscape as predators. In total, **over 10 tons of animals lived on each square kilometer of pasture- hundreds of times higher than modern animal densities in the mossy northern landscape**.

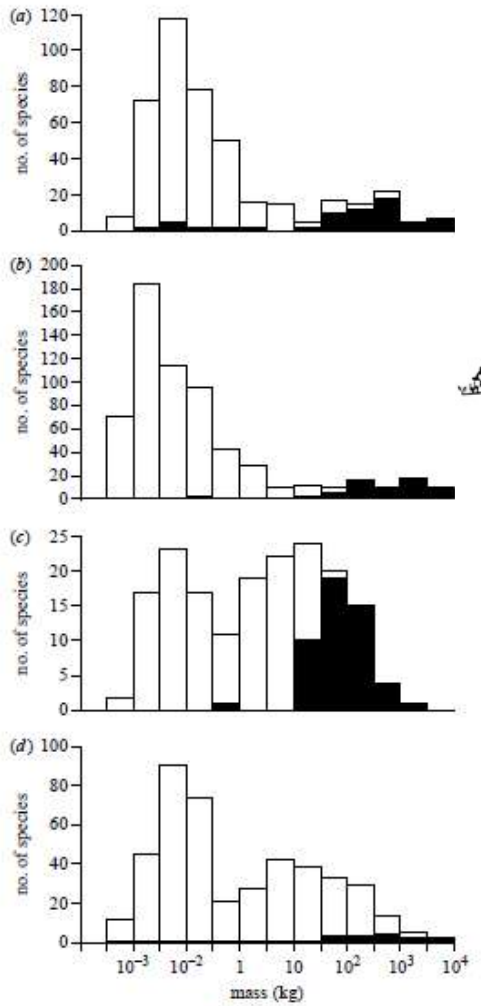
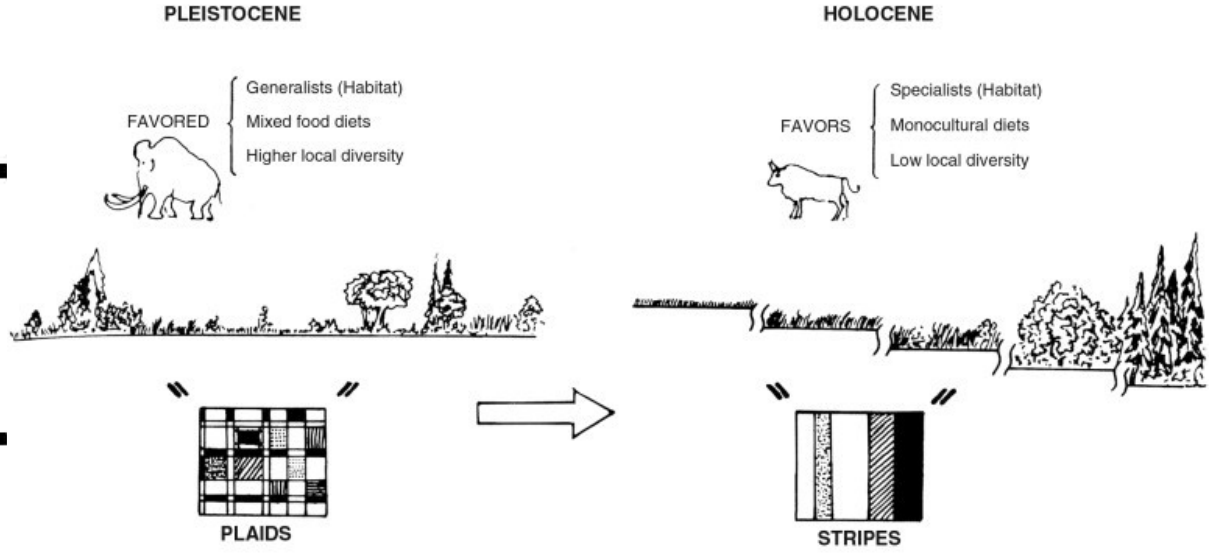


Figure 1. Body mass distributions of herbivorous mammals in (*a*) North America, (*b*) South America, (*c*) Australia and (*d*) Africa, distinguishing species that were present in the Late Pleistocene but went extinct before the historical period (filled bars) from survivors into the historical period (open bars). Data adapted from Smith *et al.* (2003) except for extinct Australian mammals, which are from Johnson (2006).

Důsledky vymření megafauny (nezávisle na příčině!)



1. Zánik otevřené vegetační mozaiky

   (Vera *versus* Mitchell)

2. Hořlavý nový svět

3. Anachronismy v interakcích rostlin + zvířat

   (*Maclura*, *Aesulus*, *Castanea*…)

Conserved ancestral tropical niche but different continental histories explain the latitudinal diversity gradient in brush-footed butterflies

Nicolas Chazot ✉, Fabien L. Condamine, Gytis Dudas, Carlos Peña, Ullasa Kodandaramaiah, Pável Matos-Maraví, Kwaku Aduse-Poku, Marianne Elias, Andrew D. Warren, David J. Lohman, Carla M. Penz, Phil DeVries, Zdenek F. Fric, Soren Nylin, Chris Müller, Akito Y. Kawahara, Karina L. Silva-Brandão, Gerardo Lamas, Irena Kleckova, Anna Zubek, Elena Ortiz-Acevedo, Roger Vila, Richard I. Vane-Wright, Sean P. Mullen, Chris D. Jiggins, Christopher W. Wheat, Andre V. L. Freitas & Niklas Wahlberg -Show fewer authors

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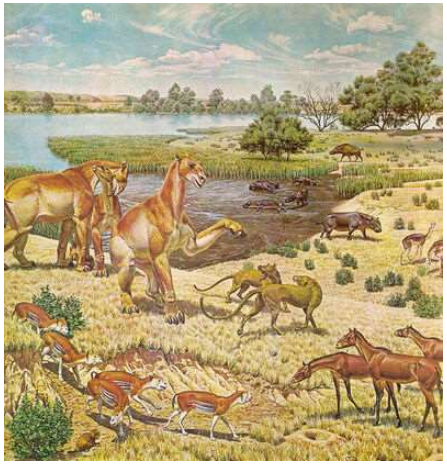
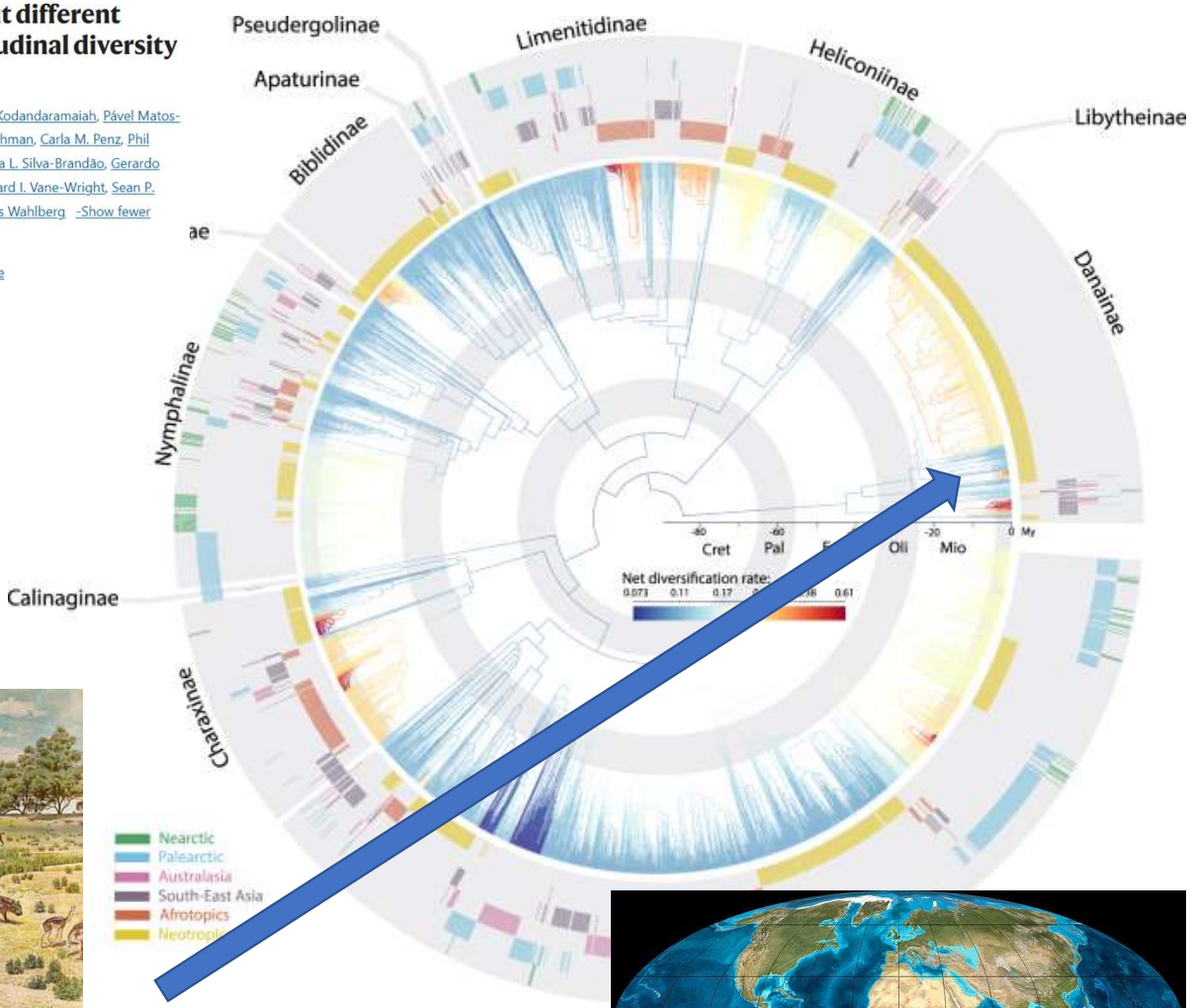
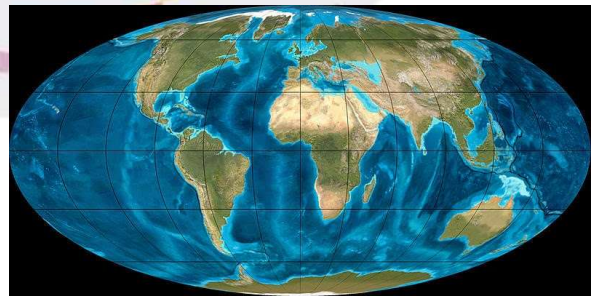






Extremely Endangered Butterflies of Scattered Central European Dry Grasslands Under Current Habitat Alteration

Alena Sucháčková Bartoňová,[1,7,*] Martin Konvička,[1,2] Jana Marešová,[1,2] Dana Bláhová,[2] David Čížp,[3] Pavel Skala,[3] Miloš Andres,[3] Vladimír Hula,[4] Matthias Dolek,[5] Adi Geyer,[5] Oliver Böck,[5] Tomáš Kadlec,[6] and Zdeněk Faltýnek Fric[1]

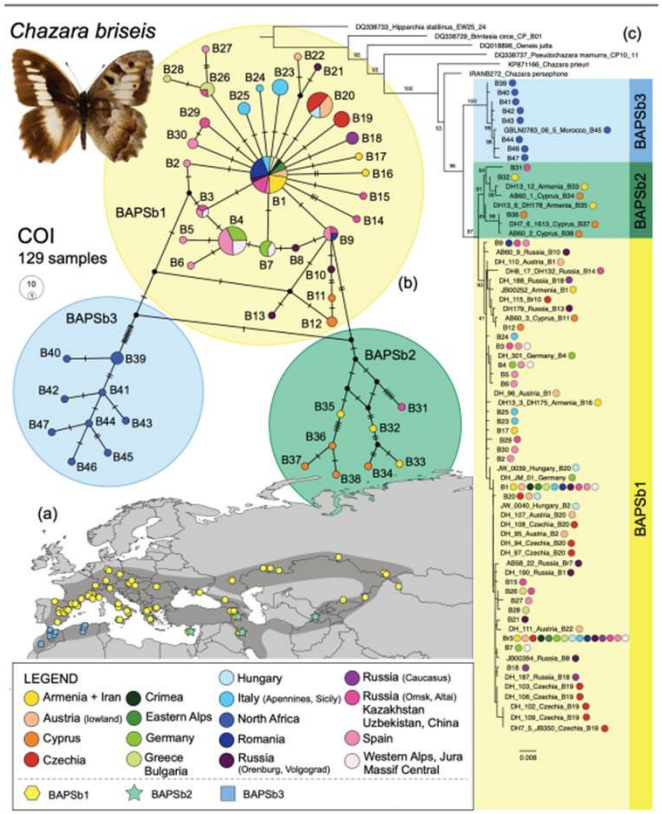
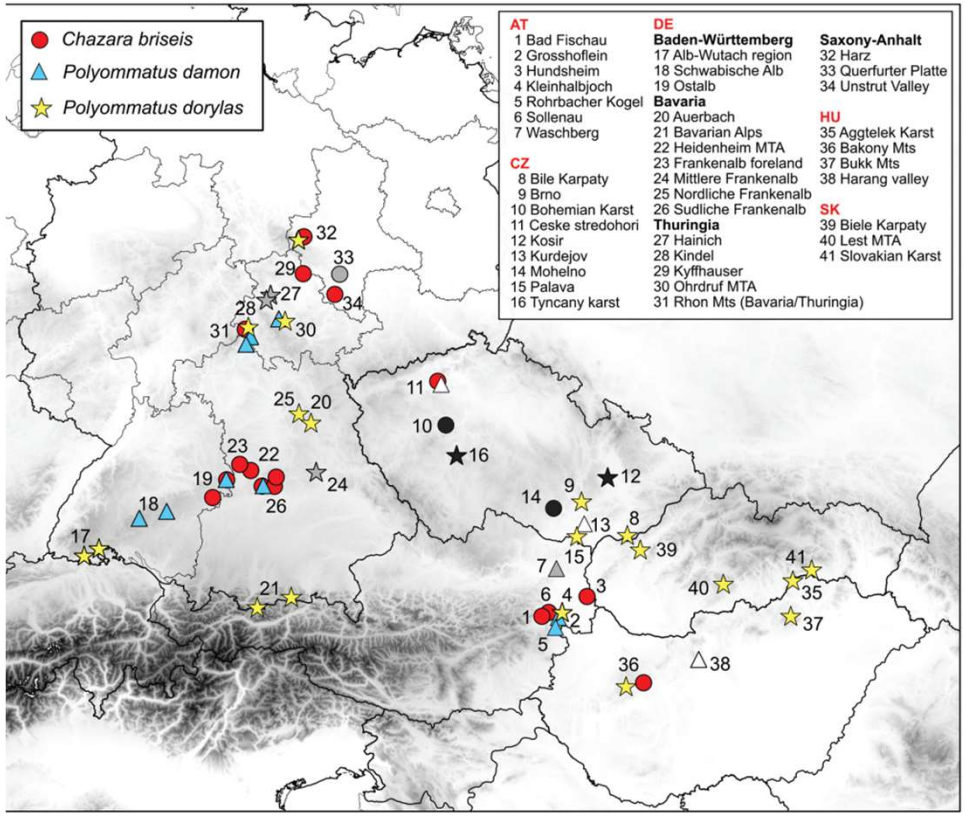


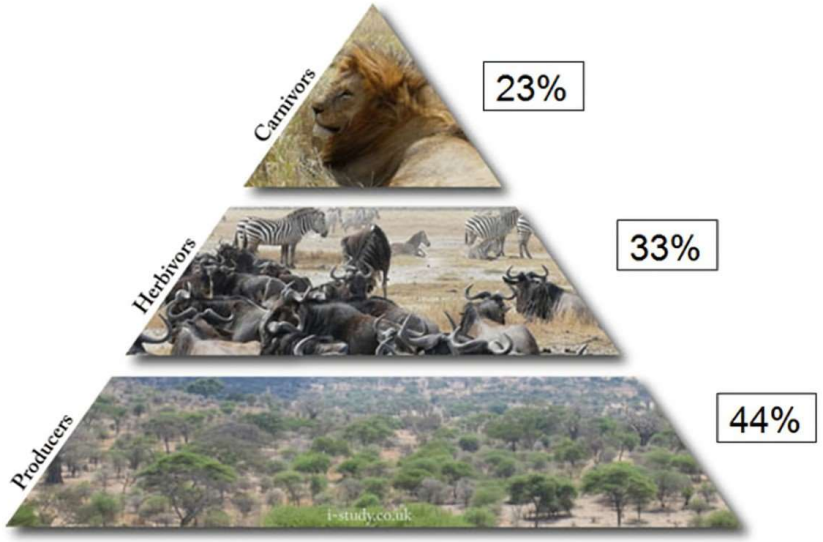
Fig. 2. Phylogeographic analyses for the butterfly *C. briseis*: (a) distribution range (shaded) with locations of samples colored and symbolized by COI BAPS groups, (b) TCS haplotype network, (c) Maximum Likelihood tree (COI + wingless). Branch labels show bootstrap values higher than 50%. Sequences in the network and the tree were assigned to geographic or political regions (described by the legend).

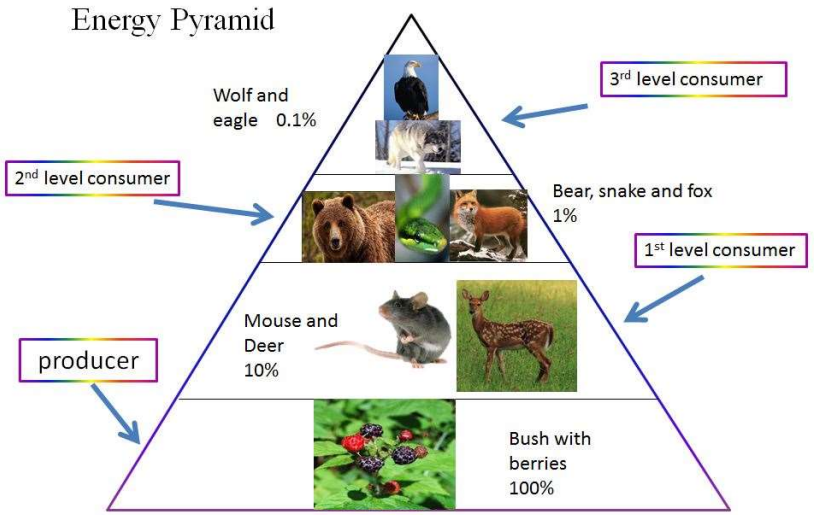


ig. 1. Localities of the study species in Central Europe (AT, CZ, four federal states of DE, HU, SK), distinguishing recently occupied (color), recently (i.e., post-010) extinct (white), recently not inventoried (light gray), and (re)introduced (including failed attempts, dark gray) populations of *C. briseis* (circles), *P. damon* (triangles), and *P. dorylas* (stars). See text for comments on their much denser distribution in the region just a few decades ago. Species *P. damon* and *P. dorylas* are present also in the Austrian Alps (not displayed on the map), and a few more (sub)recent populations of the two species are expected in lowland eastern AT.

~~Pohřbíme (konečně) ekosystém?~~

Martin Konvička | 1. 3. 2002 | Vesmír 81, 127, 2002/3 | Seriál: Pohřbíme ekosystém?, 1. díl (Následující >)





Nebudeme ho pohřbívat, ale **mějme na paměti ochuzenost a NEKOMOPLETNOS**T – © Martin Škorpík, NP Podyjí – většiny z nich.