Novica iz podzemlja:

novi vrsti krtov na Stari celini

Boris Kryštufek
Kustodiat za vretenčarje
Prirodoslovni muzej Slovenije

Masaharu Motokawa

Univerza Kjoto

Masaharu Motokawa

Univerza Kjoto

J. Zool., Lond. (2004) **263**, 147–157 Printed in the United Kingdom DOI: 10.1017/S0952836904004972

Phylogenetic relationships within the family Talpidae (Mammalia: Insectivora)

Boris M. Petrov

1917 – 2004

Institut za biološka raziskovanja „Siniša Stanković“
Beograd

1972

Bonn. zool. Beitr.	Bd. 45	H. 1	S. 1—16	Bonn, April 1994

The taxonomy of blind moles (*Talpa caeca* and *T. stankovici*, Insectivora, Mammalia) from south-eastern Europe

Boris Kryštufek

Mamm. biol. 66 (2001) 135–143

http://www.urbanfischer.de/journals/mammbiol

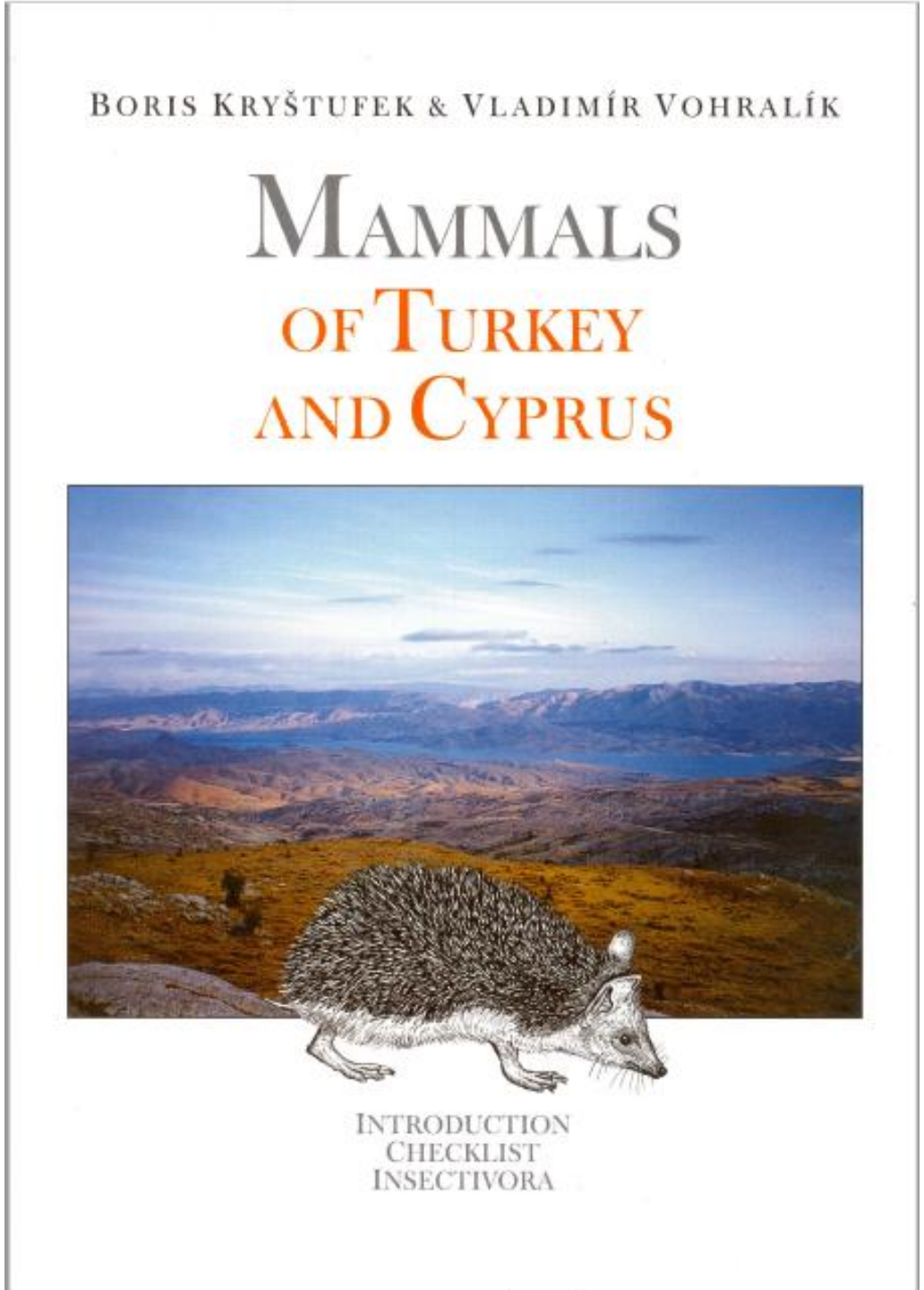
Mammalian Biology

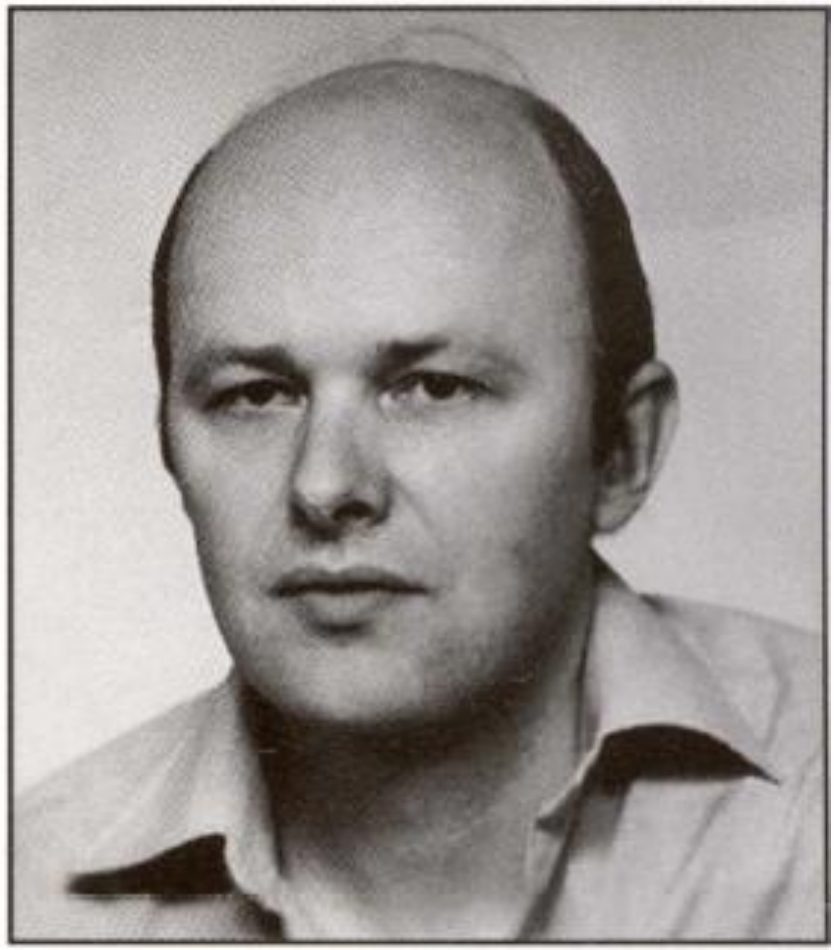
Zeitschrift für Säugetierkunde

Description, taxonomy, and distribution of *Talpa davidiana*

By B. KRYŠTUFEK, FRIEDERIKE SPITZENBERGER, and H. KEFELIOĞLU

Slovenian Museum of Natural History, Ljubljana, Slovenia; Naturhistorisches Museum Wien, Vienna, Austria; Ondokuz Mayıs University, Samsun, Turkey

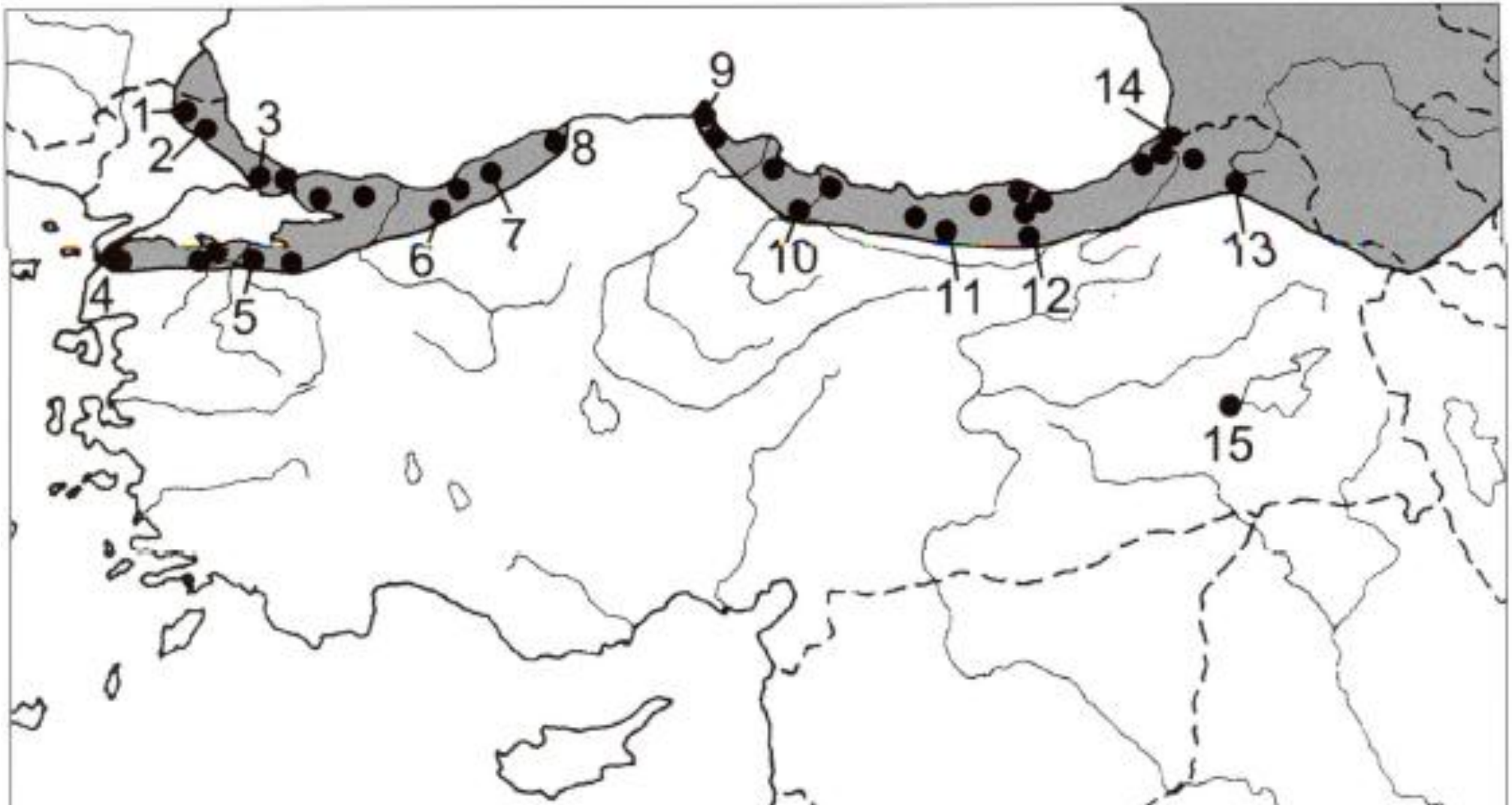




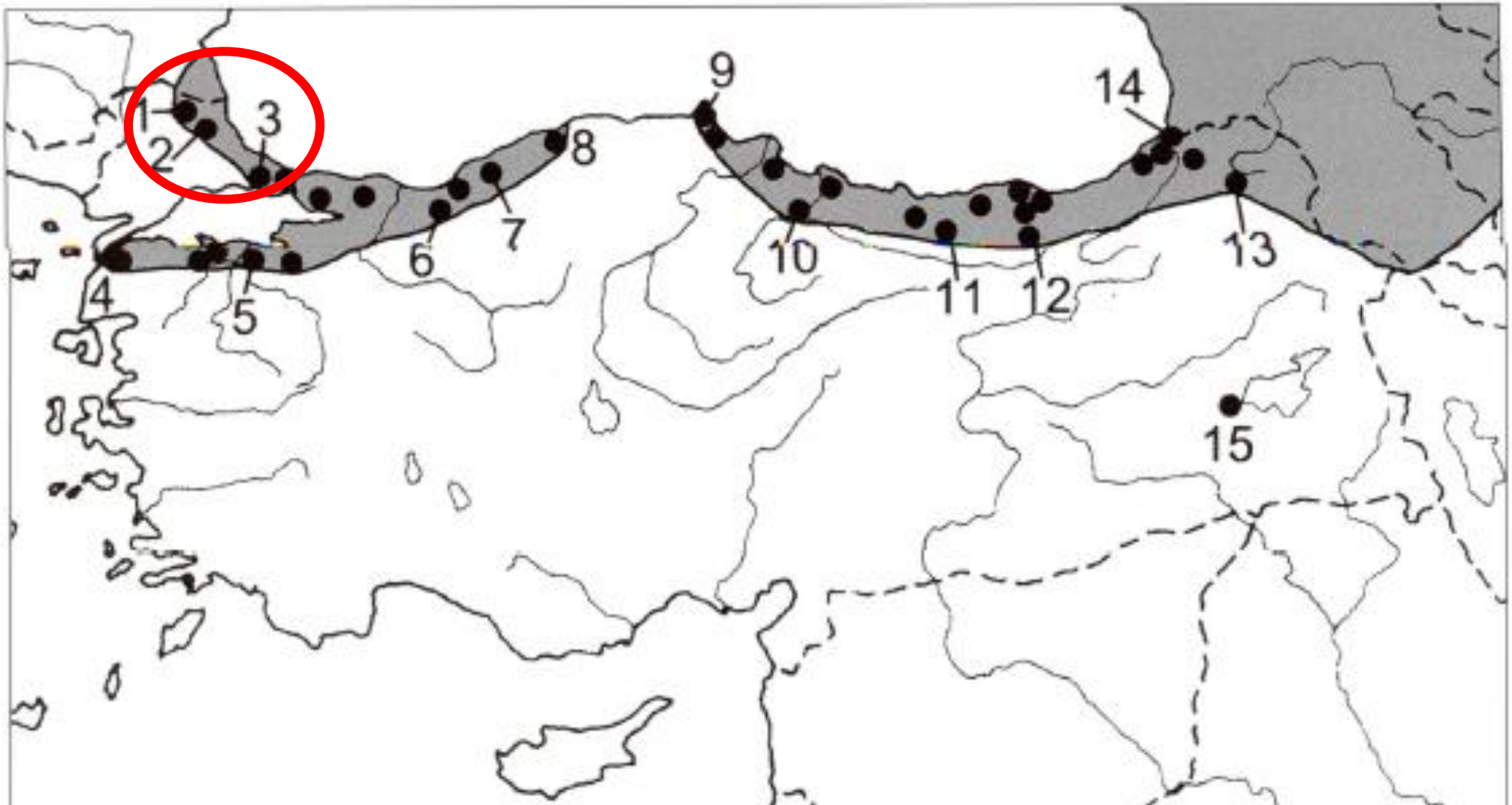
Vladimir Vohralik

Karlova Univerza, Praga

Talpa levantis



Talpa levantis

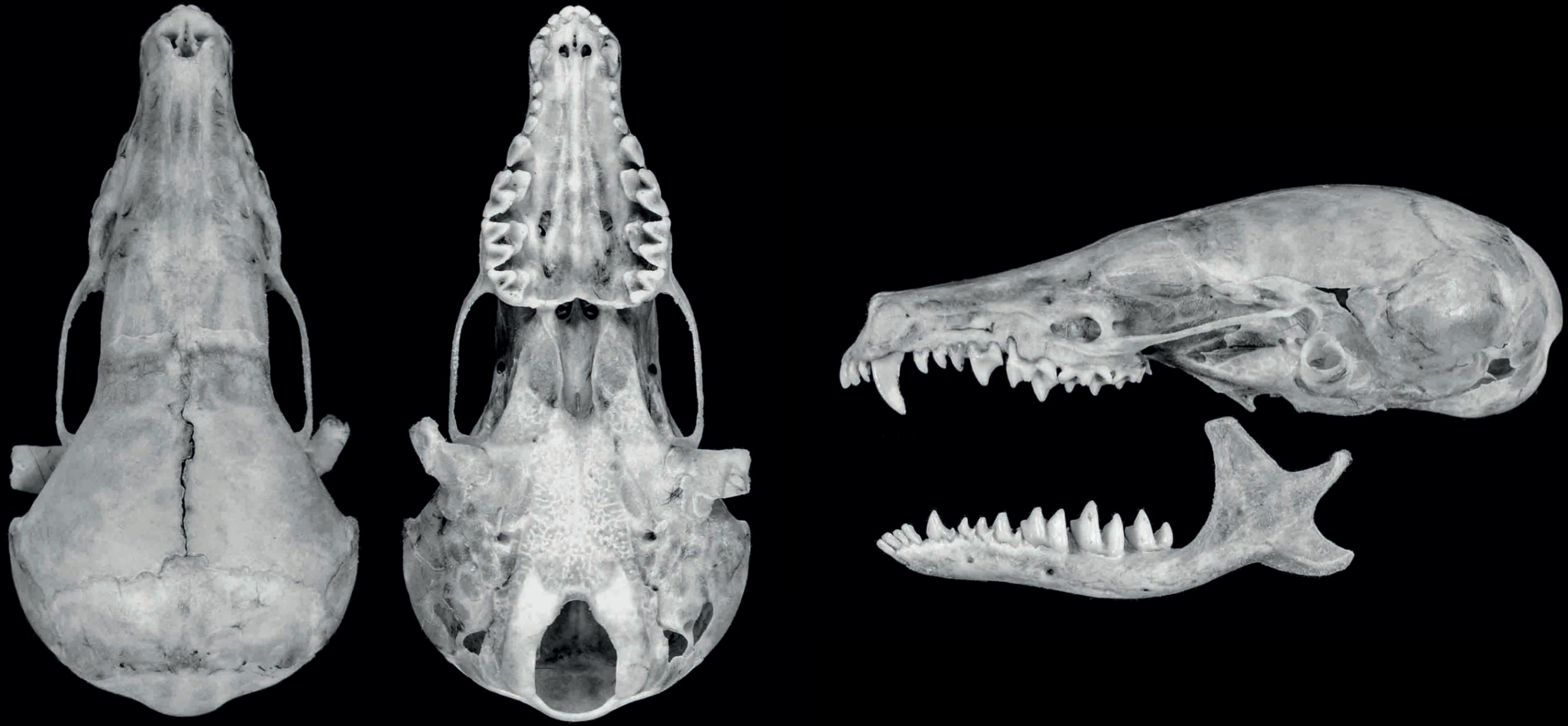


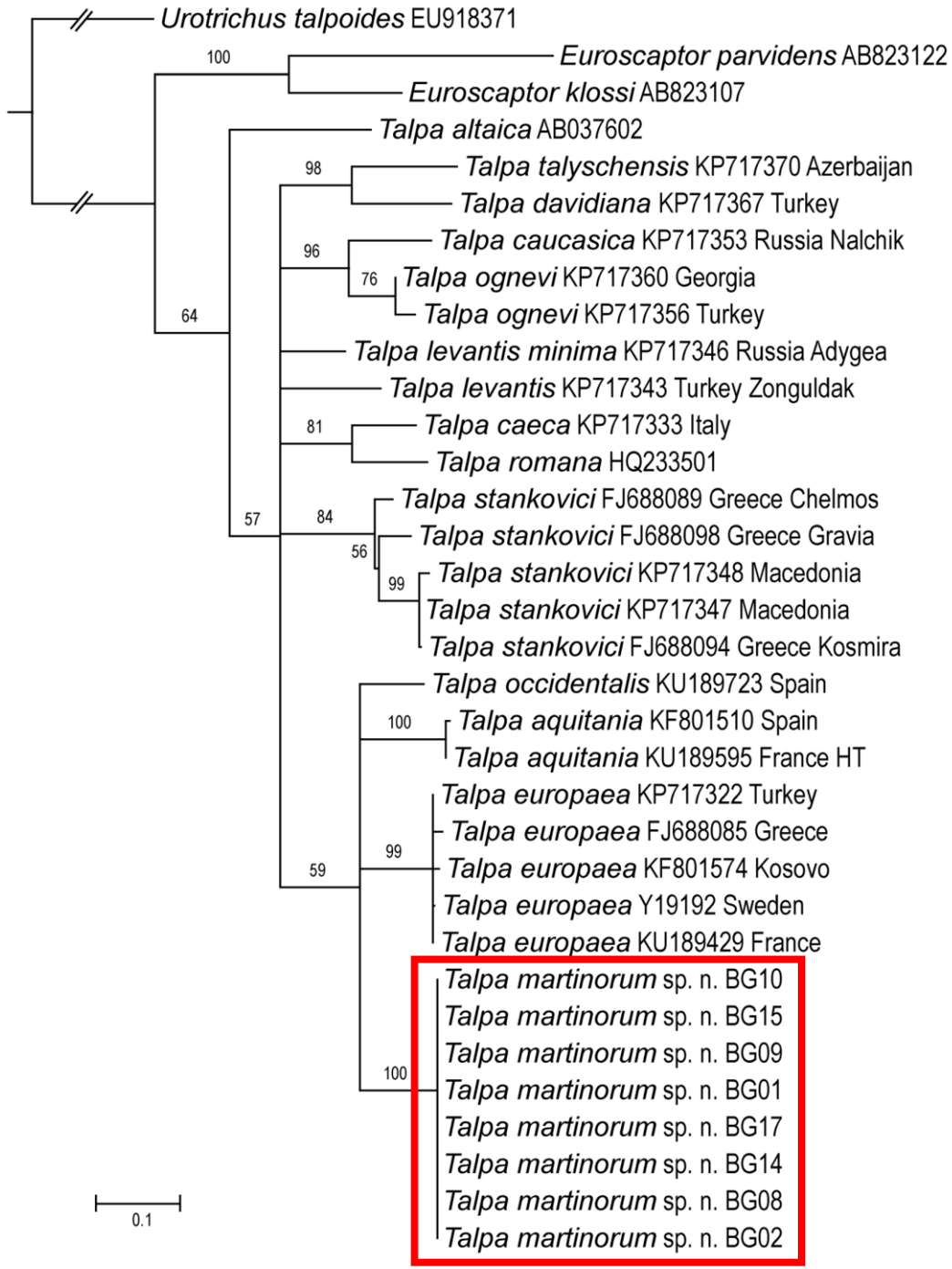
Nedko Nedyalkov

Narodni prirodoslovni muzej

Sofija

BG10

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Euroscaptor klossi AB823107
Talpa altaica AB037602
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Talpa talyschensis KP717370 Azerbaijan
Talpa davidiana KP717367 Turkey
96
Talpa caucasica KP717353 Russia Nalchik
76
Talpa ognevi KP717360 Georgia
Talpa ognevi KP717356 Turkey
64
Talpa levantis minima KP717346 Russia Adygea
Talpa levantis KP717343 Turkey Zonguldak
81
Talpa caeca KP717333 Italy
Talpa romana HQ233501
57
84
Talpa stankovici FJ688089 Greece Chelmos
56
Talpa stankovici FJ688098 Greece Gravia
99
Talpa stankovici KP717348 Macedonia
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Talpa stankovici FJ688094 Greece Kosmira
Talpa occidentalis KU189723 Spain
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Talpa aquitania KF801510 Spain
Talpa aquitania KU189595 France HT
Talpa europaea KP717322 Turkey
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Talpa europaea FJ688085 Greece
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Talpa europaea KF801574 Kosovo
Talpa europaea Y19192 Sweden
Talpa europaea KU189429 France
Talpa martinorum sp. n. BG10
Talpa martinorum sp. n. BG15
Talpa martinorum sp. n. BG09
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Talpa martinorum sp. n. BG17
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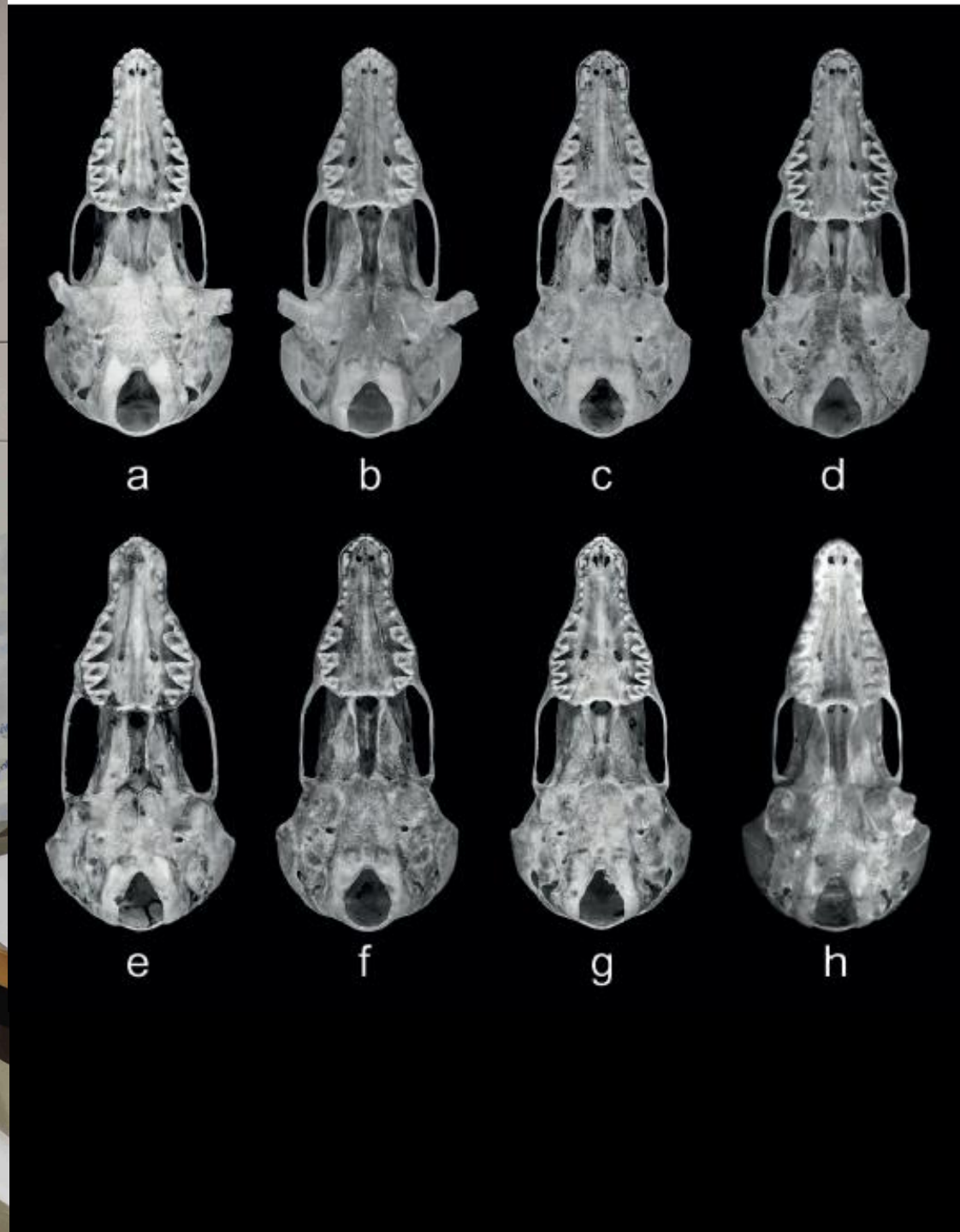
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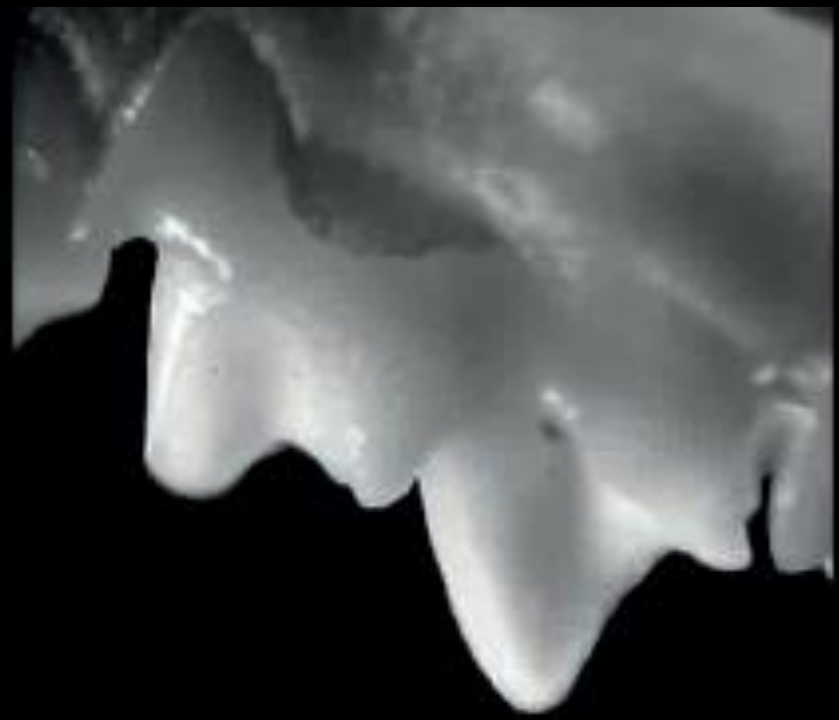

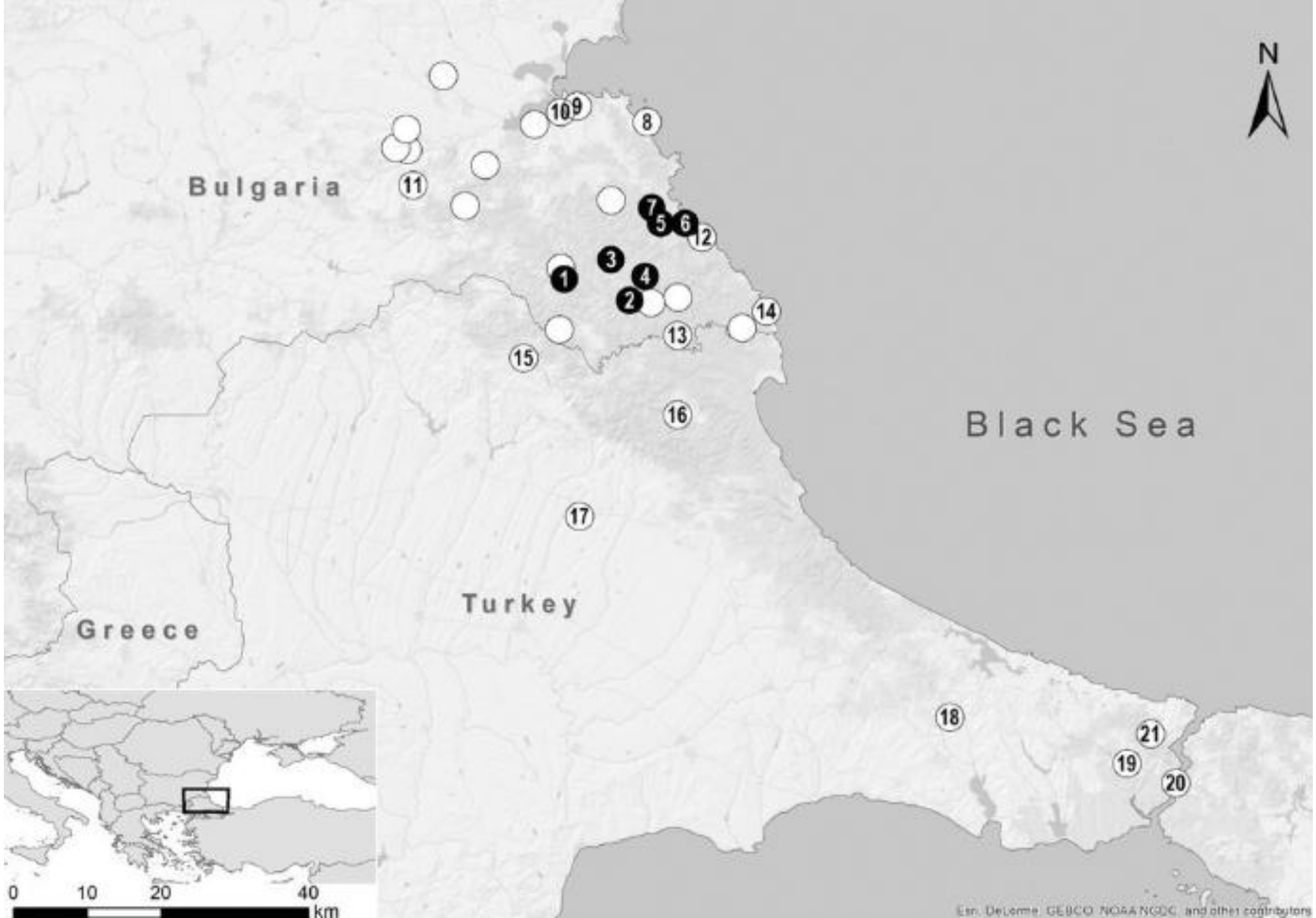
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km
Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Vladimir E. Martino

1888–1961

Evgenia V. Martino (née Stepanova)

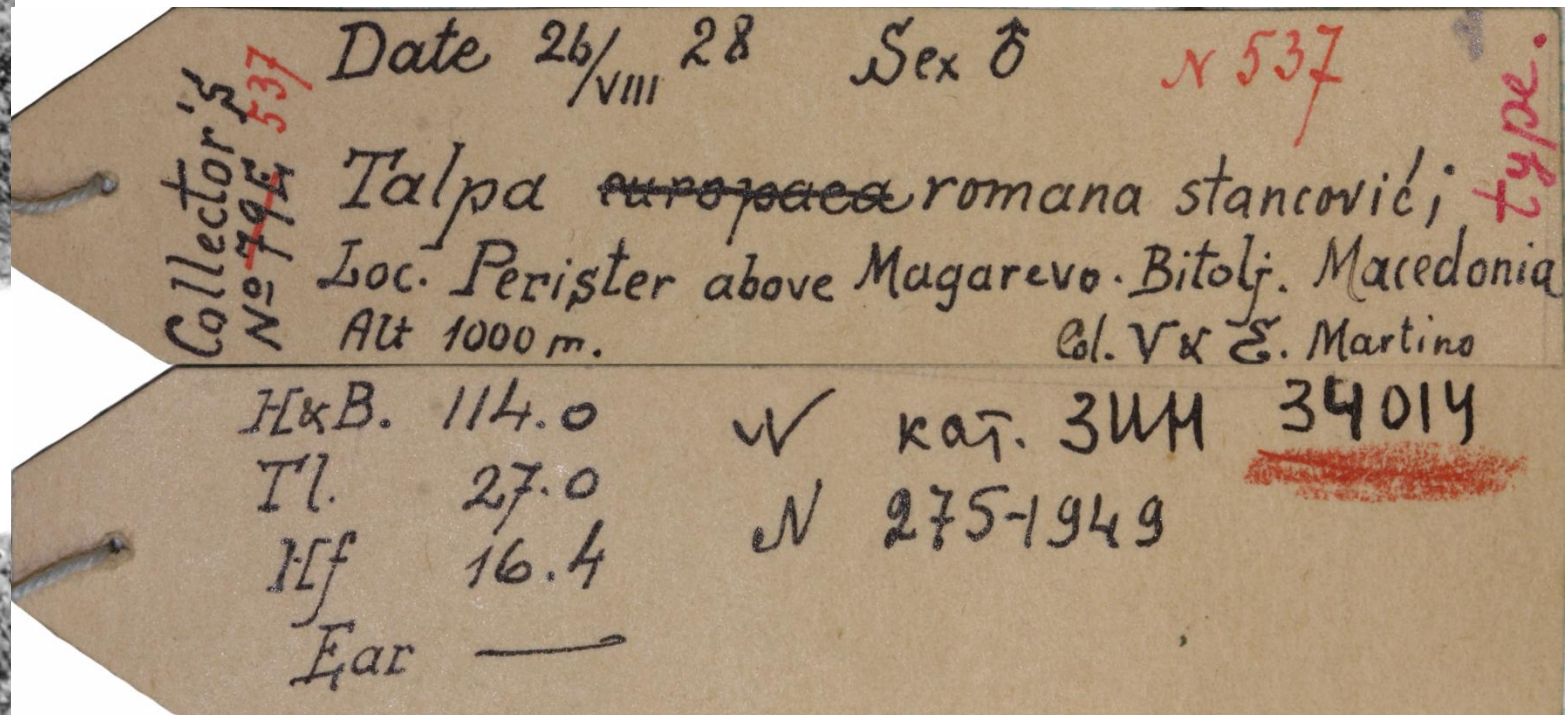
1894-1979

Vladimir E. Martino

1888–1961

Evgenia V. Martino (née Stepanova)

1894-1979



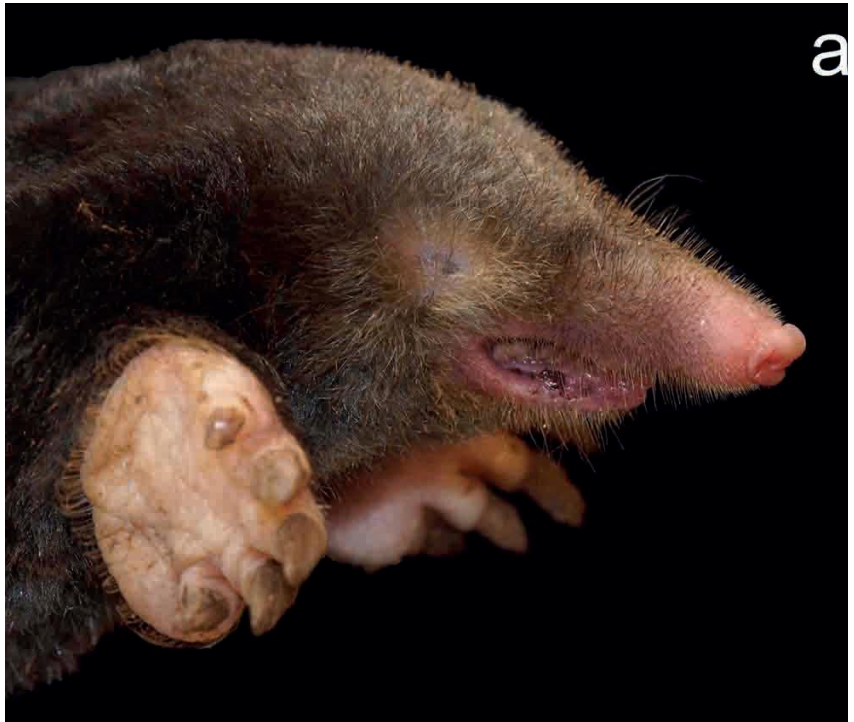
Lynx lynx ***martinoi*** Mirić, 1978

Bonn zoological Bulletin 67 (1): 41–57 May 2018

News from the Balkan refugium: Thrace has an endemic mole species (Mammalia: Talpidae)

Boris Kryštufek[1*], Nedko Nedyalkov[2], Jonas J. Astrin[3] & Rainer Hutterer[3]

[1]Slovenian Museum of Natural History, Prešernova 20, SI-1000 Ljubljana, Slovenia
[2]National Museum of Natural History, 1 Tzar Osvoboditel Blvd., BG-1000 Sofia, Bulgaria
[3]Zoologisches Forschungsmuseum Alexander Koenig, Leibniz-Institut für Biodiversität der Tiere, Adenauerallee 160, D-53113 Bonn, Germany



Talpa martinorum

Forscher fanden neue Maulwurfart

Bonn, Sofia – In Bulgarien und der angrenzenden Türkei wurden Bonner Forscher auf eine neue Maulwurfart aufmerksam. Die Forscher des Zoologischen Forschungsmuseums Alexander Koenig fanden 14 Exemplare in der Umgebung des südostbulgarischen Strandscha-Gebirges und im europäischen Teil der Türkei.

Kopf und Rumpf der Art Talpa martinorum seien etwa 13 Zentimeter lang, hinzu komme noch der etwa drei Zentimeter lange Schwanz, beschrieben die Forscher im Fachblatt *Bonn zoological Bulletin*. Eine Besonderheit ist die Struktur der Backenzähne – der neuen Art fehlt eine kleine Zacke. Auch Unterschiede im Erbgut wiesen eindeutig auf eine eigene Art hin. Ihre Augenöffnungen sind von einer hellen Haut überzogen. Daher seien die Tiere praktisch blind, während der etwas größere Europäische Maulwurf sehen könne. *(APA, dpa)*

Haut über den Augen: Der Talpa martinorum ist quasi blind. Foto: N. Nedyalkov.

Forscher fanden neue M

Bonn, Sofia – In Bulg
und der angrenzenden T
wurden Bonner Forsch
eine neue Maulwurfar
merksam. Die Forsche
Zoologischen Forschu
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fanden 14 Exemplare i
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Türkei.

Kopf und Rumpf de
Talpa martinorum seie
wa 13 Zentimeter lang,
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Zentimeter lange Schw
beschrieben die Forsch
Fachblatt *Bonn zoologica*
letin. Eine Besonderheit
Struktur der Backenzäh
der neuen Art fehlt eine
Zacke. Auch Unterschie

Bonner Forscher enttarnen Maulwurf

Die neue Spezies mit dem Namen Talpa martinorum lebt im bulgarischen Strandscha-Gebirge

BONN. Wissenschaftler aus Bonn haben eine neue Maulwurfart entdeckt. Rainer Hutterer und Jonas Astrin vom Zoologischen Forschungsmuseum Alexander Koenig sowie zwei Kollegen aus Bulgarien und Slowenien fanden 14 Exemplare im südostbulgarischen Strandscha-Gebirge und im europäischen Teil der Türkei.

Wie das Museum am Mittwoch mitteilte, sind Kopf und Rumpf der Art Talpa martinorum etwa 13 Zentimeter lang, hinzu komme noch der etwa drei Zentimeter lange Schwanz, schreiben die Forscher im Fachblatt „Bonn zoological Bulletin". Die Tiere wiegen demnach bis zu 65 Gramm. Eine Besonderheit ist die Struktur der Backenzähne: Der neuen Art fehlt eine kleine Zacke. Auch Unterschiede im Erbgut wiesen eindeutig auf eine eigene Art hin, betonen die Forscher. Die bisher unbekannten Maulwürfe sind demnach mittelgroß, ihre Augenöffnungen sind von einer hellen Haut überzogen. Daher seien die kleinen Tiere praktisch blind, während die einzige in Deutschland heimische Art – der etwas größere Europäische Maulwurf (Talpa europaea) – sehen könne.

In Europa gebe es etwa ein Dutzend Maulwurfarten, sagte Rainer Hutterer vom Zoologischen Forschungsmuseum. Alleine fünf Spezies leben im Kaukasus. Es sei aber nicht ausgeschlossen, dass noch weitere, bisher unbekannte Arten dort lebten. Die Forscher untersuchten die DNA und die äußeren Körpermerkmale der in der Umgebung des Mt. Strandzha gefangenen Tiere und stellten fest, dass es sich um eine neue, endemische Art handelt. Als endemisch bezeichnet man Arten, die nur in einem bestimmten, räumlich eng begrenzten Gebiet vorkommen. Die Autoren gaben dem neu entdeckten Maulwurf den wissenschaftlichen Namen Talpa martinorum – zu Ehren des Ehepaars Wladimir und Jewgeniya Martino. Die beiden Russen emigrierten 1920 in das Königreich der Serben, Kroaten und Slowenen und zählen zu den bedeutenden Säugetierforschern für die Balkan-Region. *ga*

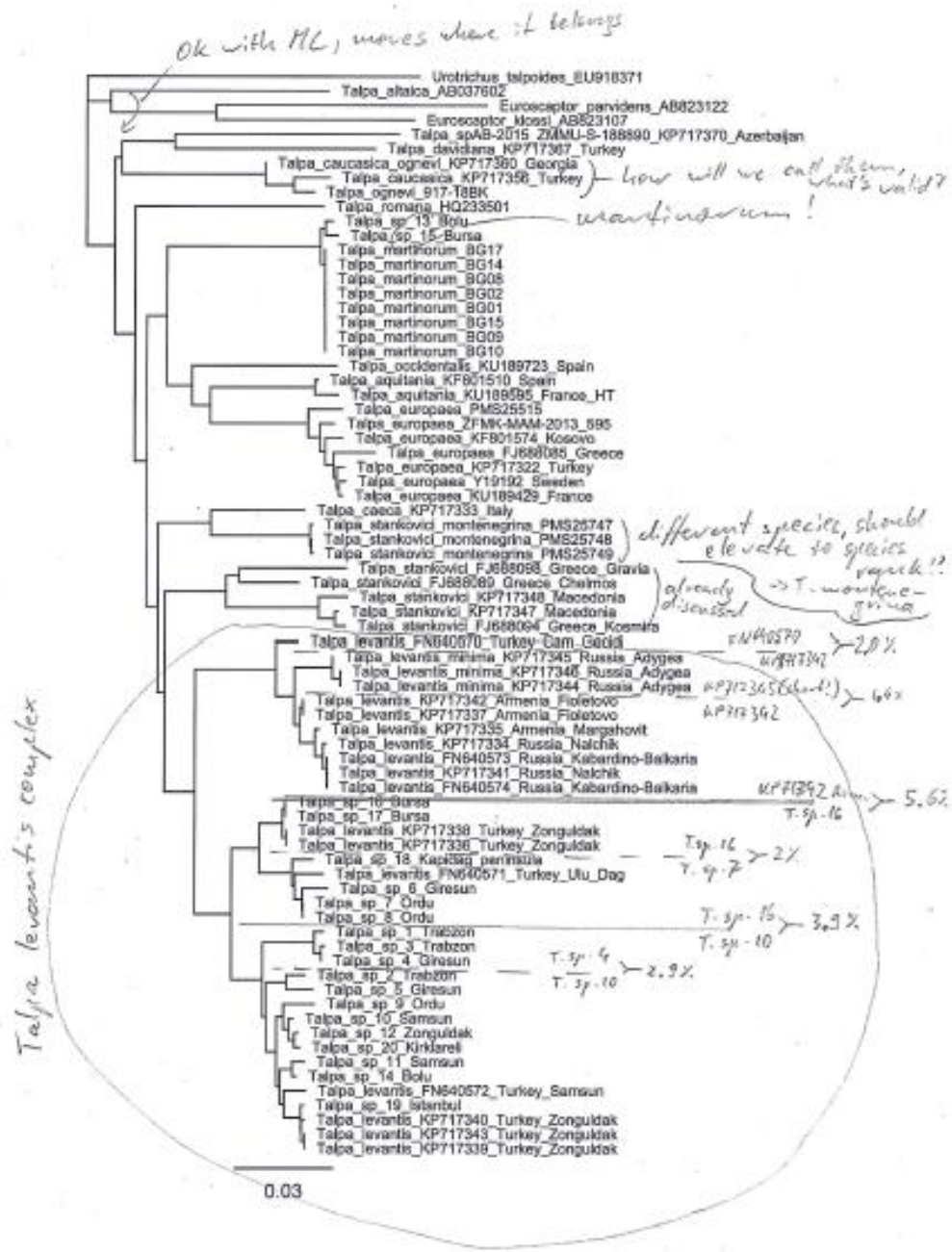
Ein Maulwurf der neu entdeckten Art Talpa Martinorum. FOTO: N. NEDYALKOV

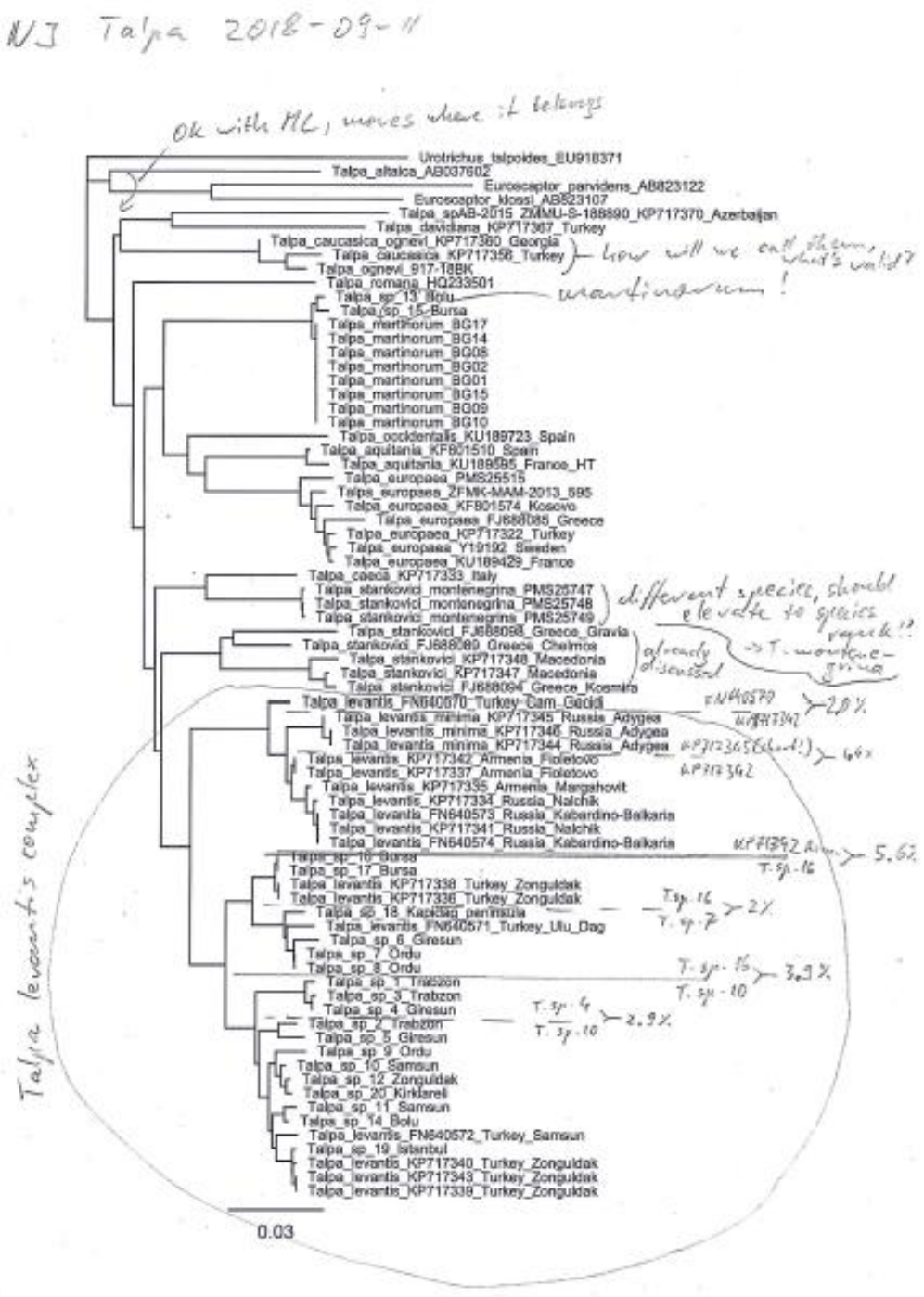
GBN02

Krt, še en znani neznanec

Vest o novi vrsti krta v Evropi bi nas najbrž obšla, če ne bi bilo med štirimi znanstveniki, ki so ga odkrili, tudi Slovenca

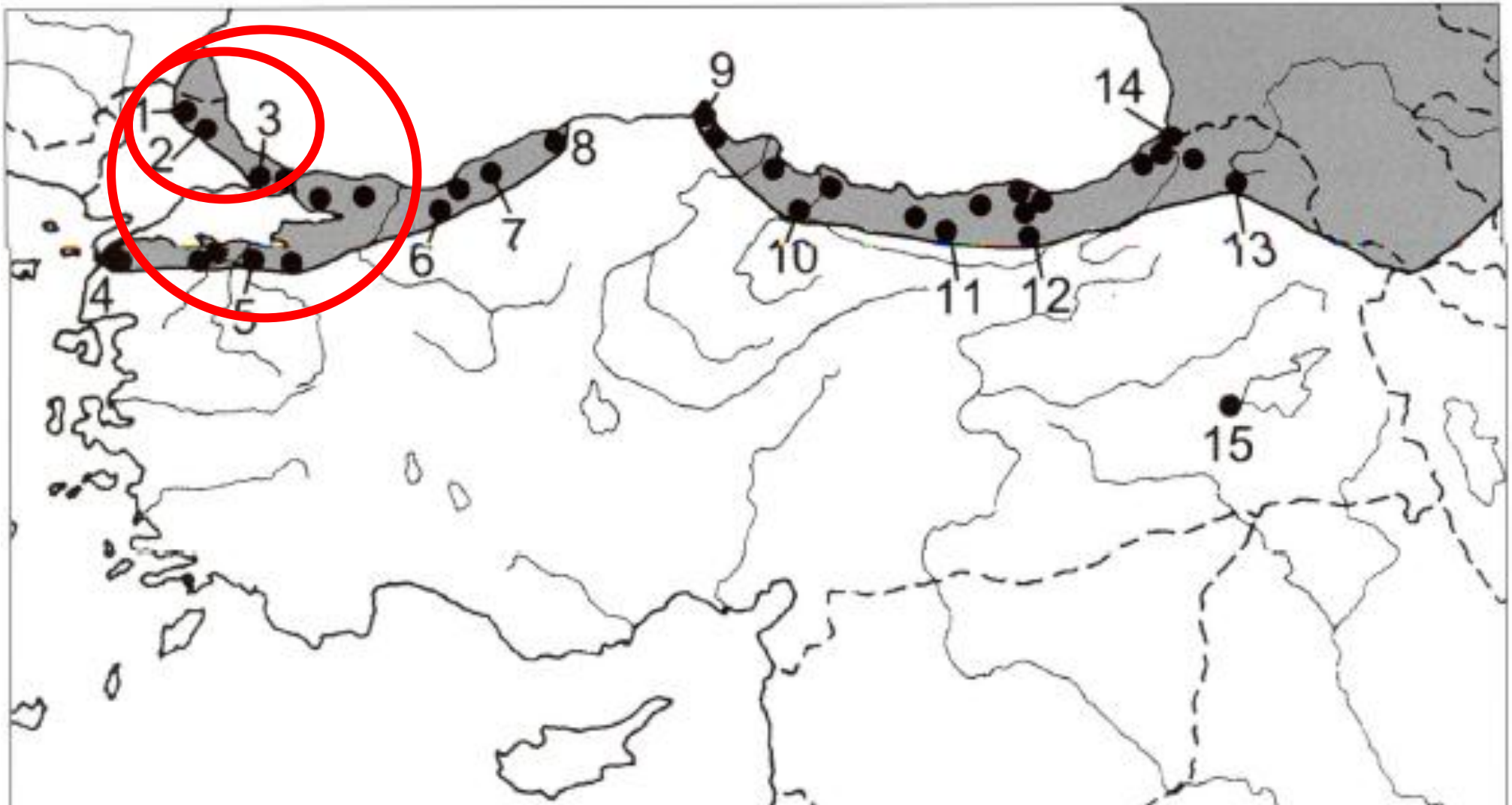
NJ Talpa 2018-09-11





Haluk Kefelioğlu
Univerza 19 maj, Samsun

Talpa levantis

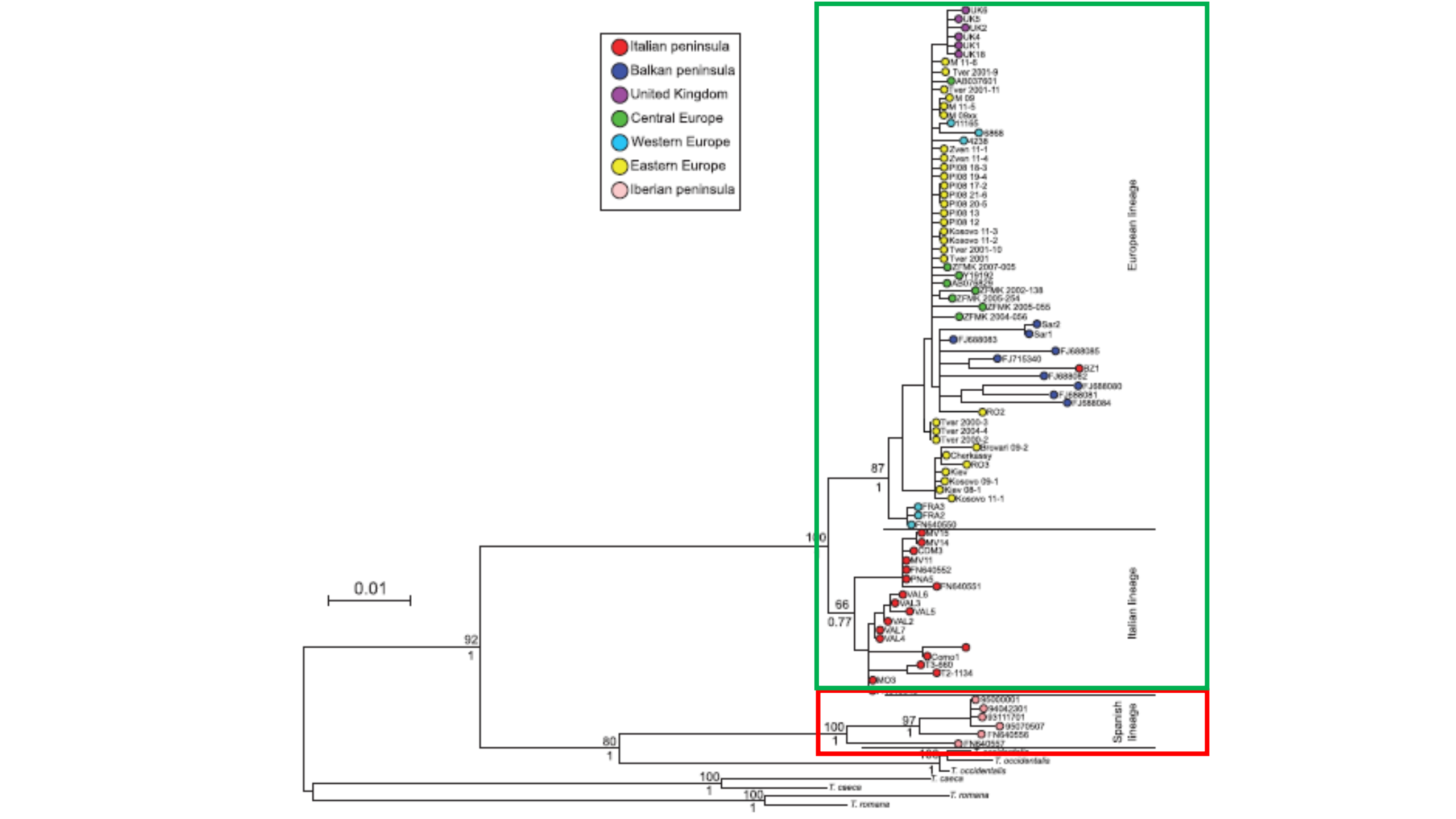


The LINNEAN SOCIETY of London BIOLOGICAL Journal of the Linnean Society

Biological Journal of the Linnean Society, 2015, 114, 495–512. With 6 figures

Tracing the evolutionary history of the mole, *Talpa europaea*, through mitochondrial DNA phylogeography and species distribution modelling

ROBERTO FEUDA[1,2,*], ANNA A. BANNIKOVA[3], ELENA D. ZEMLEMEROVA[3], MIRKO DI FEBBRARO[4], ANNA LOY[4], RAINER HUTTERER[5], GAETANO ALOISE[6], ALEXANDER E. ZYKOV[7], FLAVIA ANNESI[1] and PAOLO COLANGELO[1,8,*]


Italian peninsula
Balkan peninsula
United Kingdom
Central Europe
Western Europe
Eastern Europe
Iberian peninsula
European lineage
Italian lineage
Spanish lineage
0.01
T. occidentalis
T. caeca
T. romana

NOTES

DOI : 10.4267/2042/58283

PRELIMINARY NOTE: TALPA AQUITANIA *NOV. SP. (TALPIDAE, SORICOMORPHA) A NEW MOLE SPECIES FROM SOUTHWEST FRANCE AND NORTH SPAIN*

NOTE PRÉLIMINAIRE: *TALPA AQUITANIA* NOV. SP. (TALPIDAE, SORICOMORPHA) UNE NOUVELLE ESPÈCE DE TAUPE DU SUD-OUEST DE LA FRANCE ET DU NORD DE L'ESPAGNE

Par Violaine NICOLAS[1], Jessica MARTÍNEZ-VARGAS[2], Jean-Pierre HUGOT[1]

(Note présentée par Jean-Pierre Hugot le 11 Février 2016, Manuscrit accepté le 8 Février 2016)

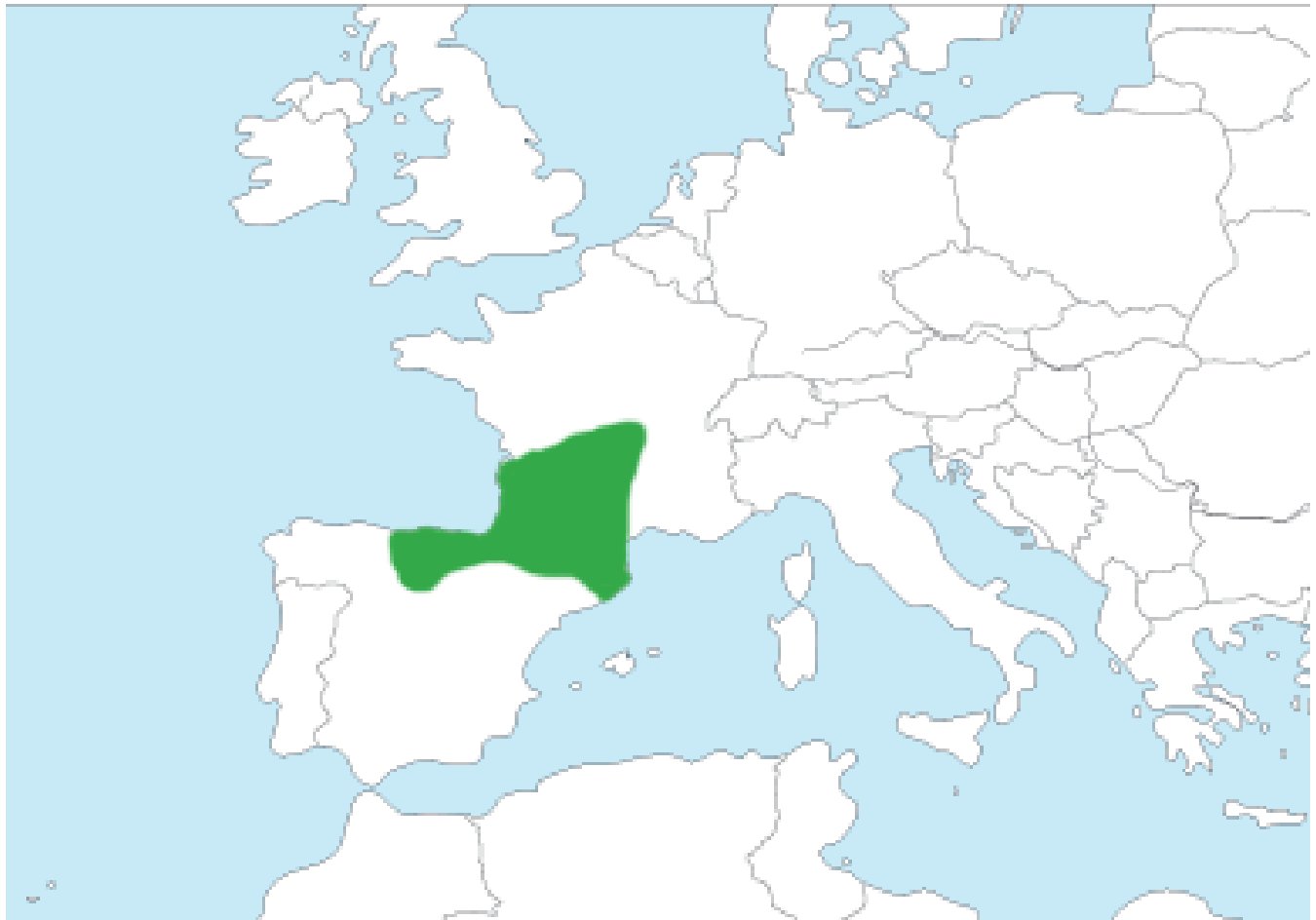
DE GRUYTER

Mammalia 2017; 81(6): 641–642

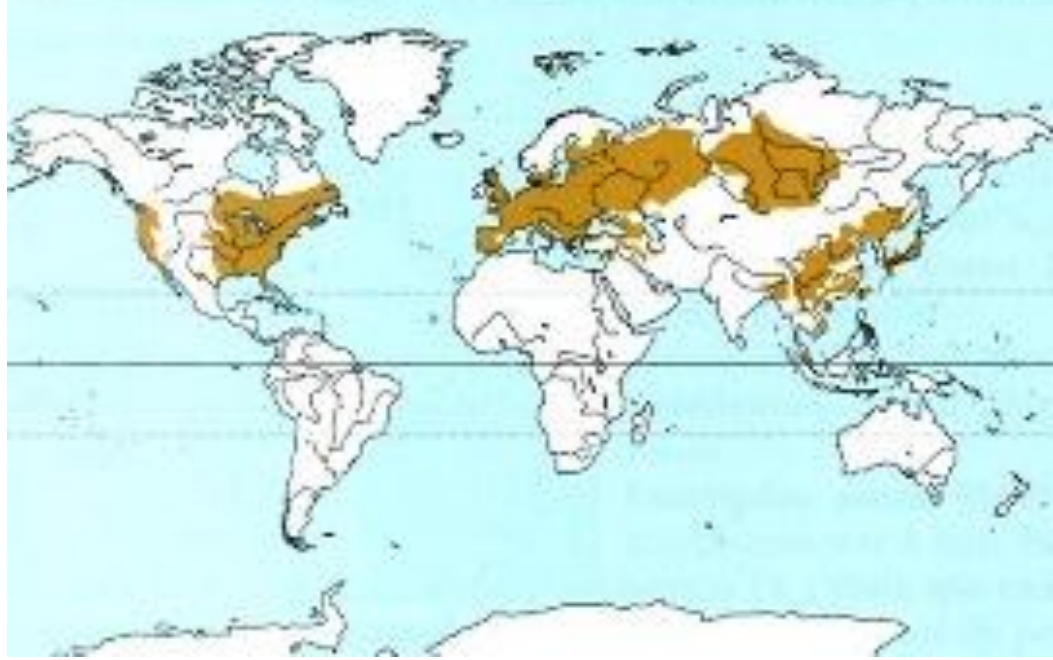
Violaine Nicolas, Jessica Martínez-Vargas and Jean-Pierre Hugot*

Talpa aquitania sp. nov. (Talpidae, Soricomorpha), a new mole species from SW France and N Spain

https://doi.org/10.1515/mammalia-2017-0057
Received May 15, 2017; accepted September 7, 2017; previously published online October 10, 2017



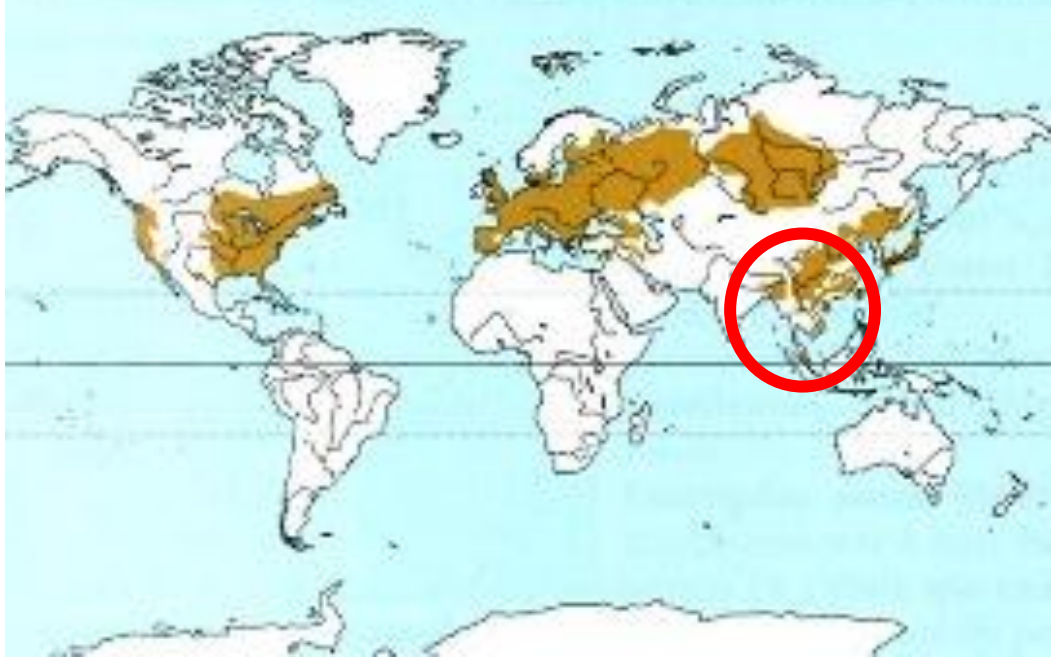
Koliko vrst krtov?



Trenutno	55 spp.
Pričakovano povečanje za najmanj 1/3*	c. 18 spp.
SKUPAJ	c. 75 spp.

*He et al. 2016. Mol. Biol. Evol. 34, 78–87.

Koliko vrst krtov?

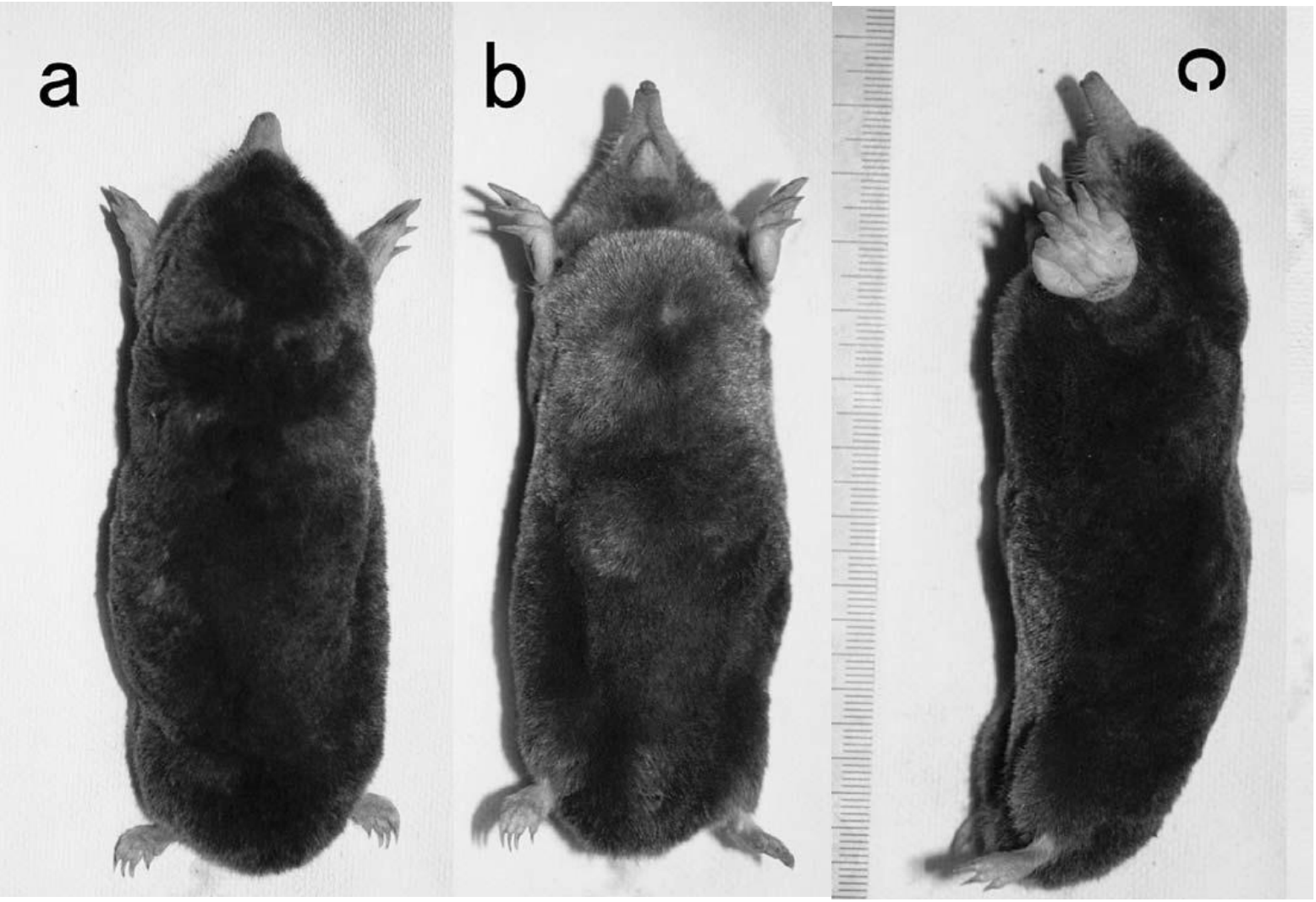


Trenutno	55 spp.
Pričakovano povečanje za najmanj 1/3*	c. 18 spp.
SKUPAJ	c. 75 spp.

≈ 1950 **17 spp**

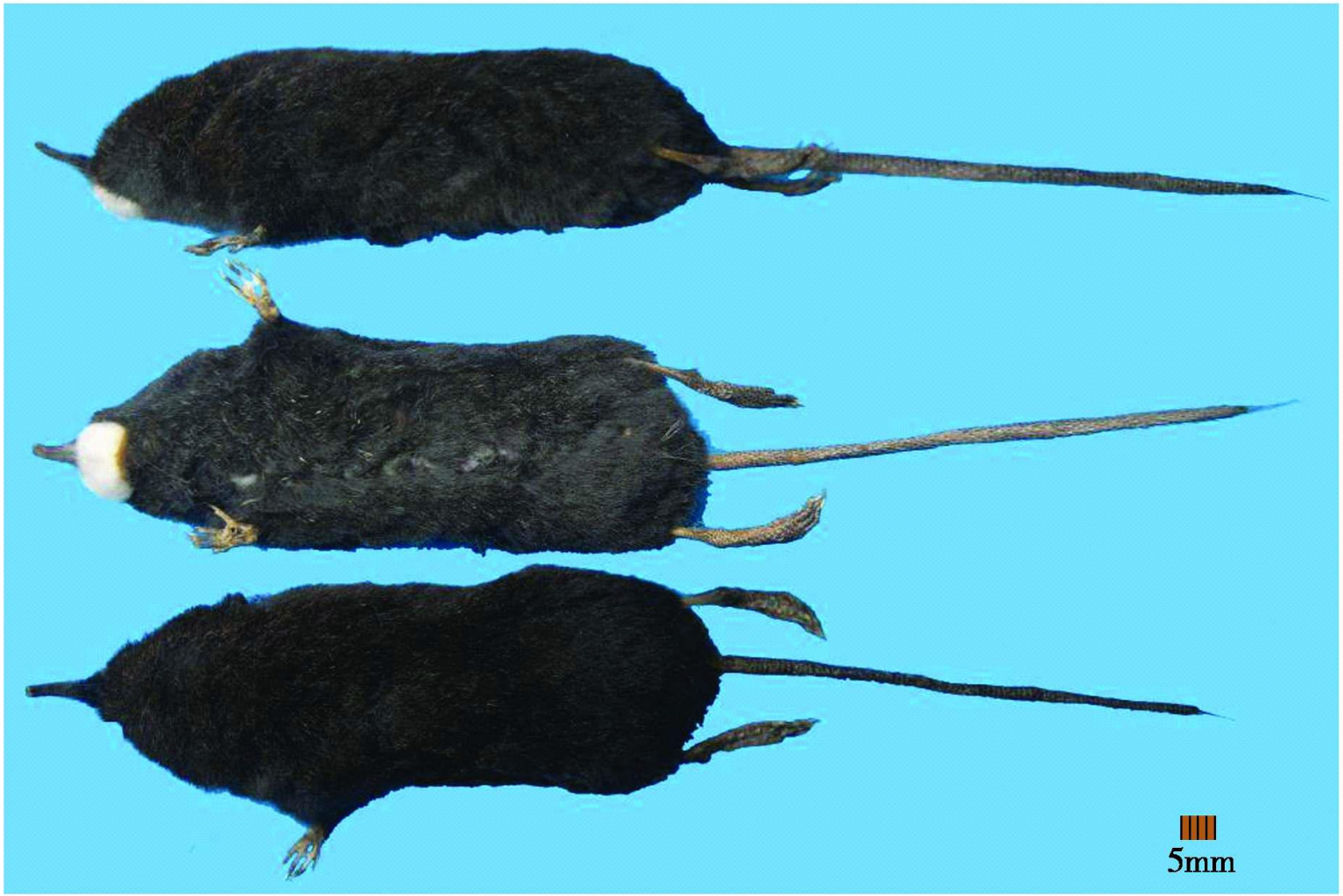
*He et al. 2016. Mol. Biol. Evol. 34, 78–87.

Euroscaptor subanura Kawada, Son & Can, 2012



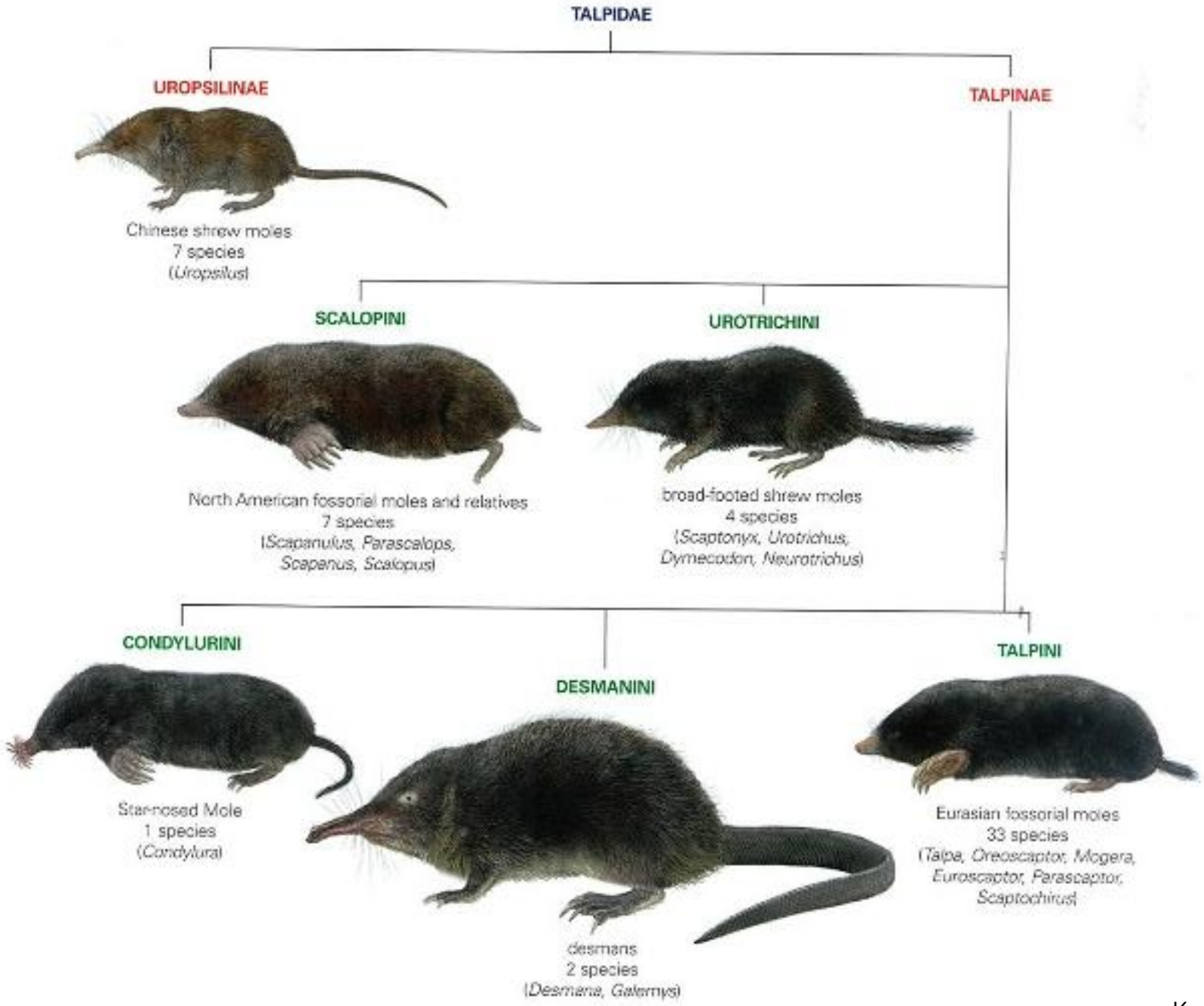
Kawada et al. 2012. J. Mammal.

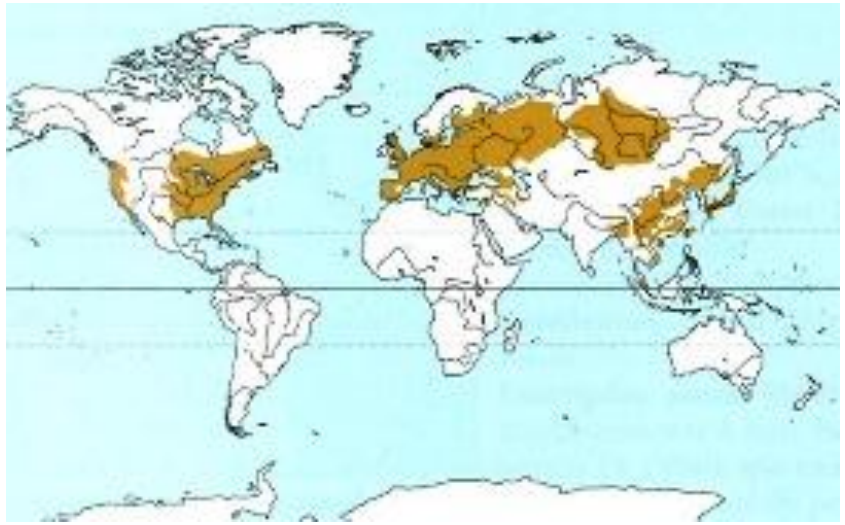
Uropsilus aequodonenia Liu, Liu, Sun, Guo, Fan & Murphy 2013



Liu et al. 2013. Acta Theriol. Sin. 33, 113-122.

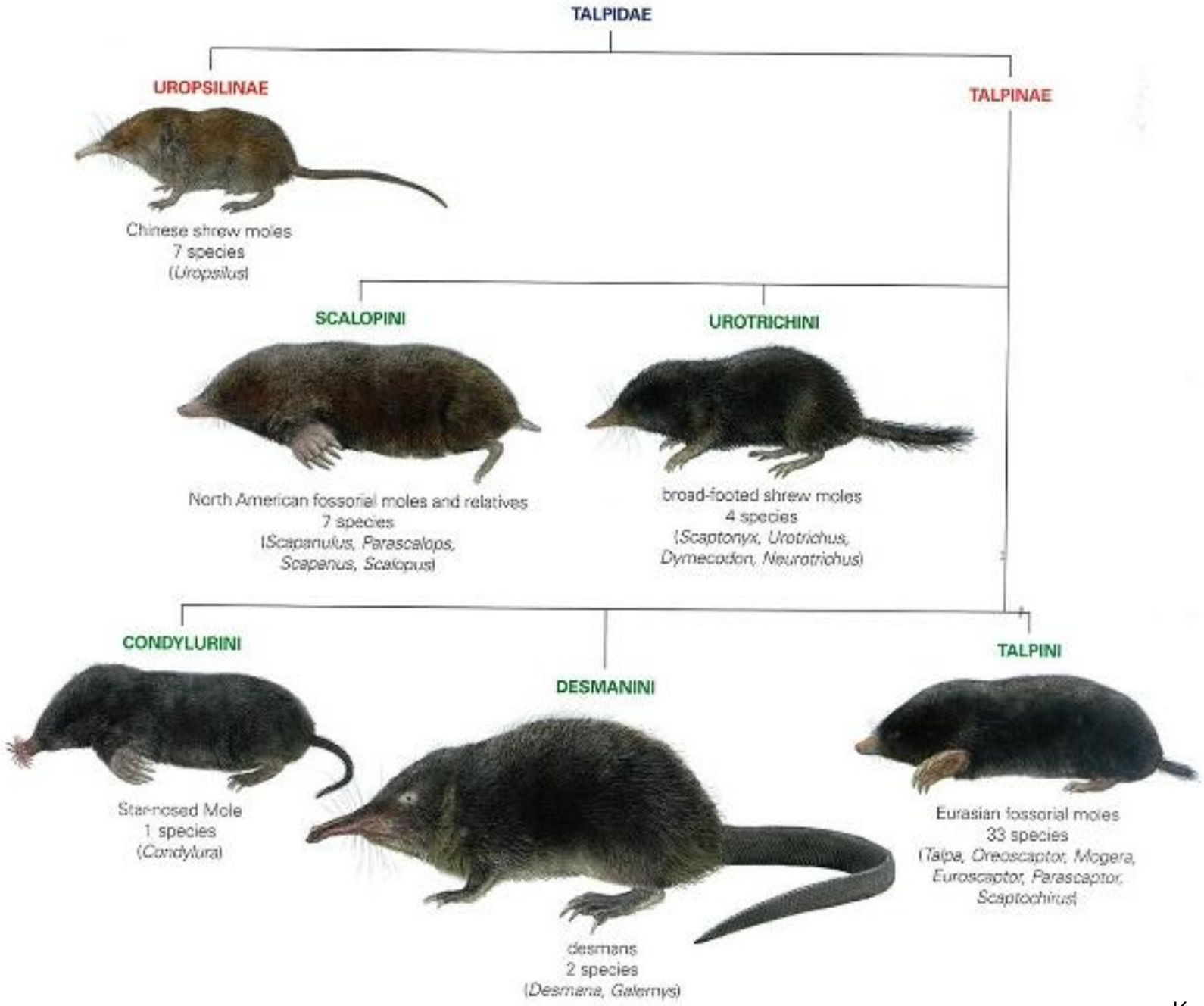
Družina: Krti (Talpidae)

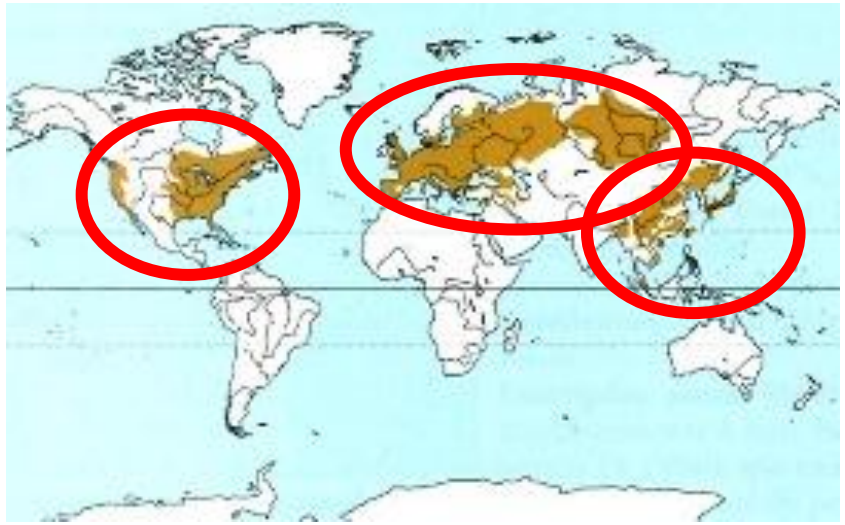




Kryštufek & Motokawa 2018. HMW, Lynx Eds, Barcelona

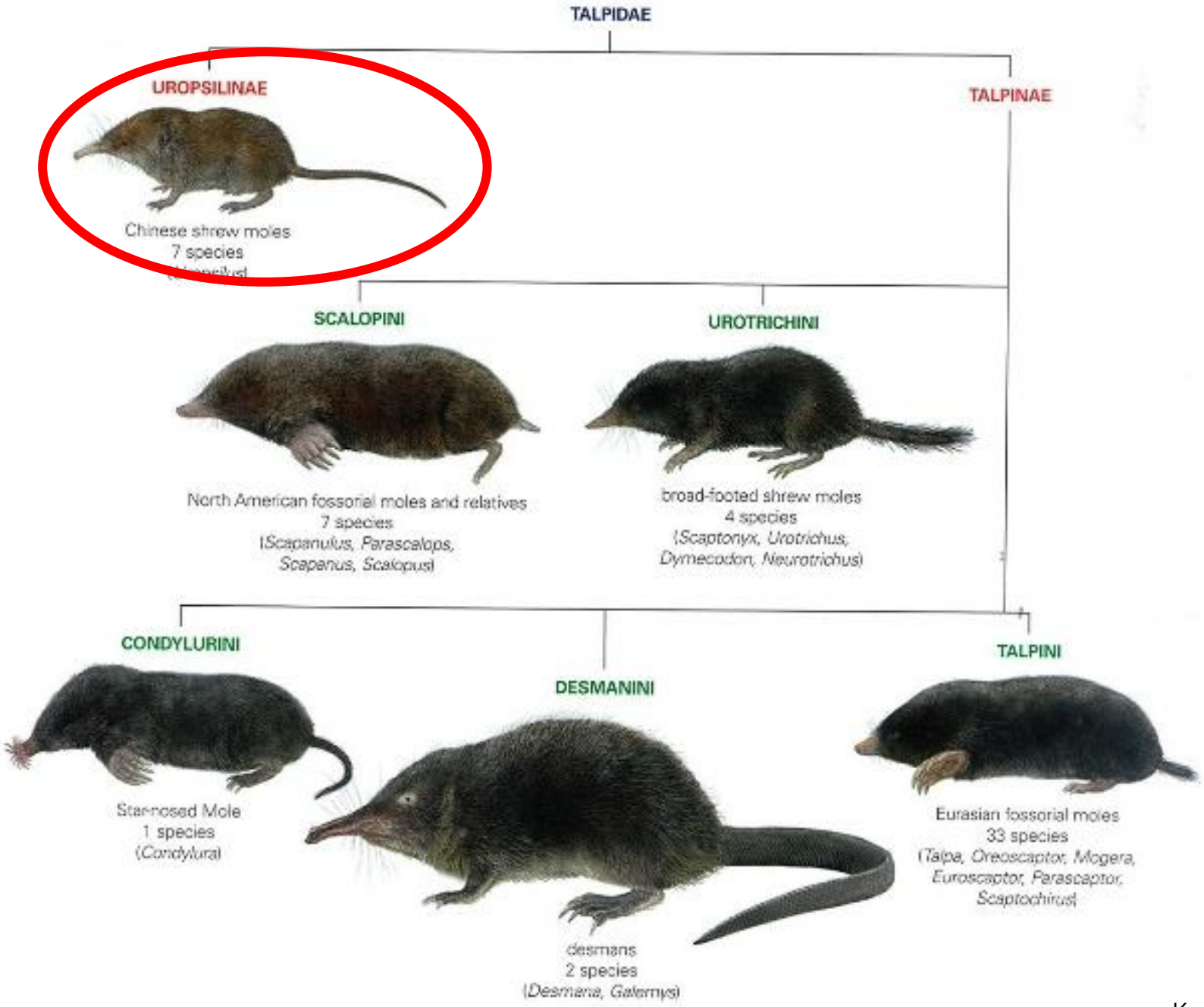
Družina: Krti (Talpidae)

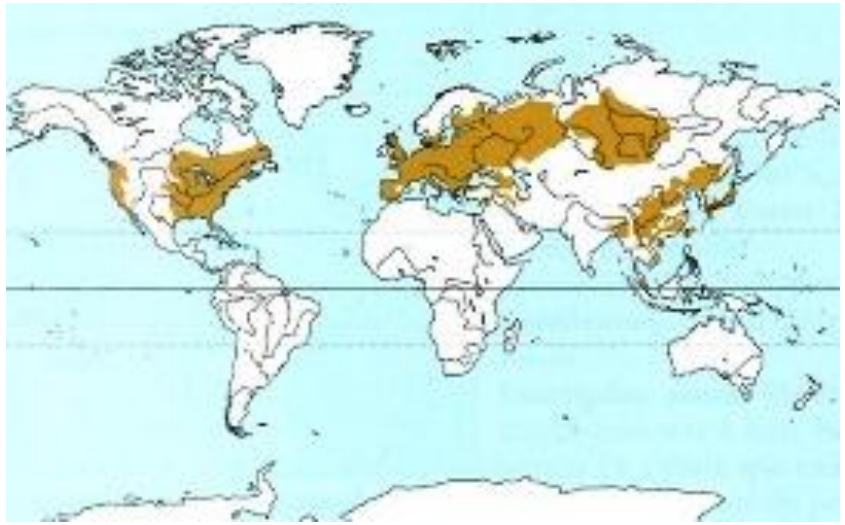




Kryštufek & Motokawa 2018. HMW, Lynx Eds, Barcelona

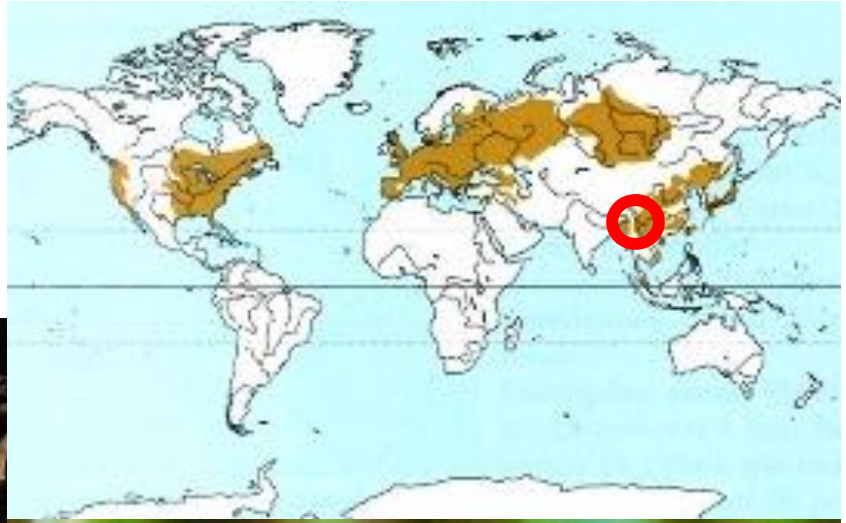
Družina: Krti (Talpidae)



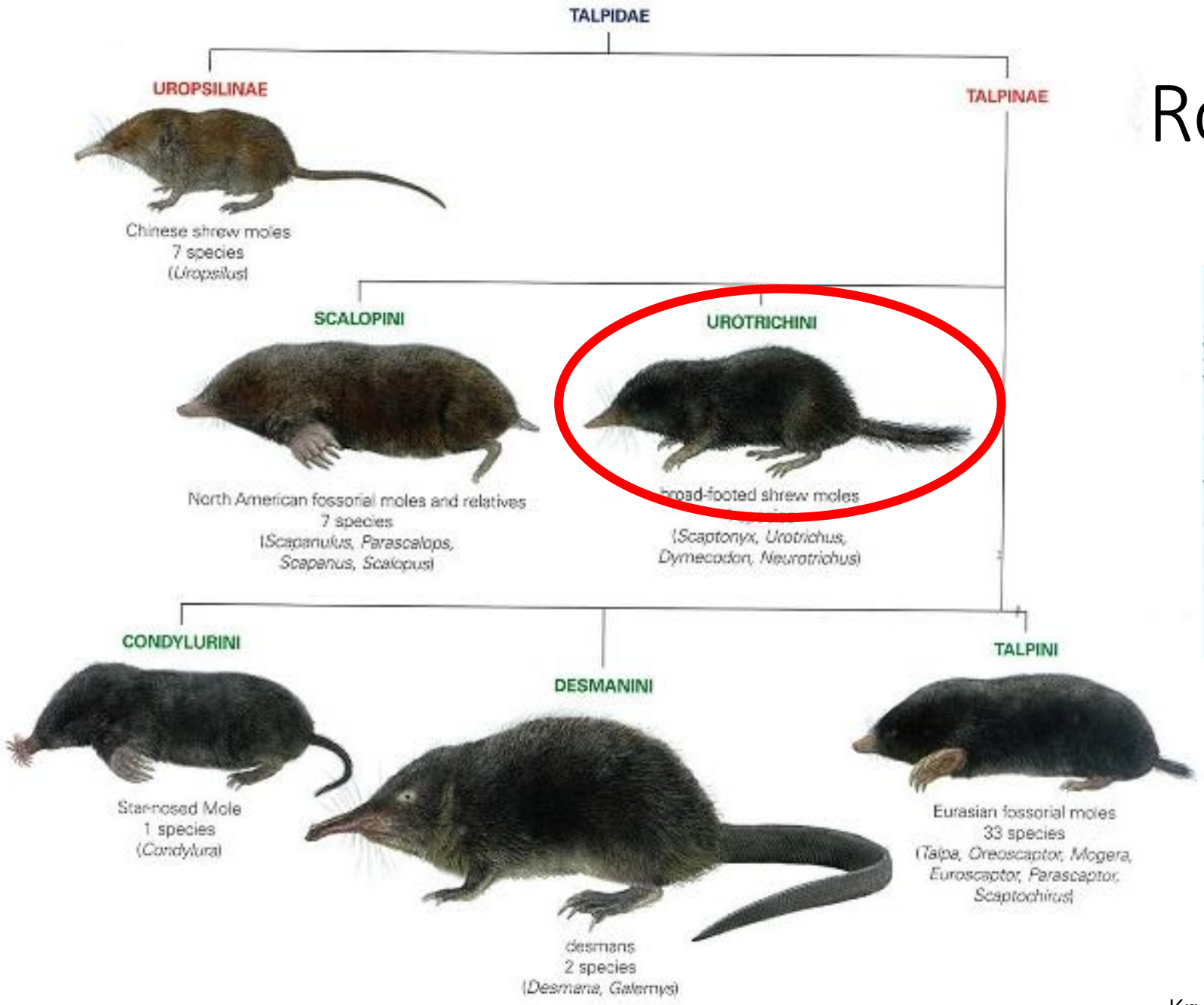


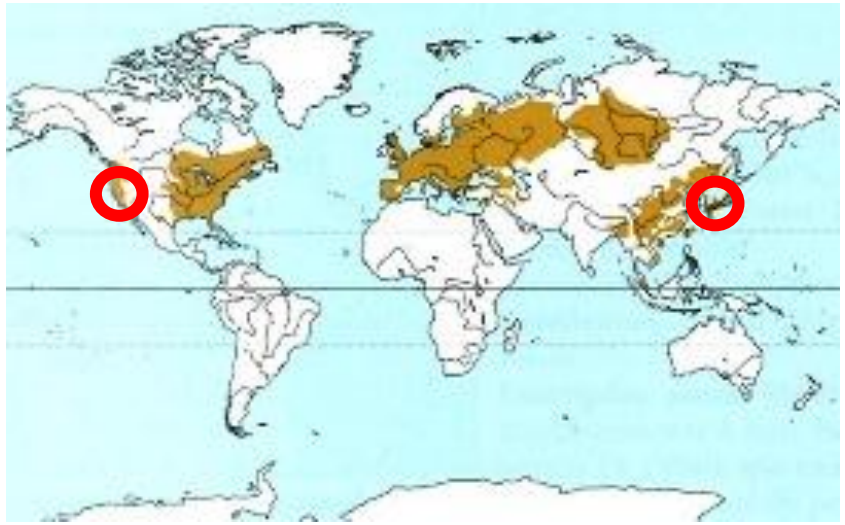
Kryštufek & Motokawa 2018. HMW, Lynx Eds, Barcelona

Kitajski rovkasti krti



Rovkasti krti

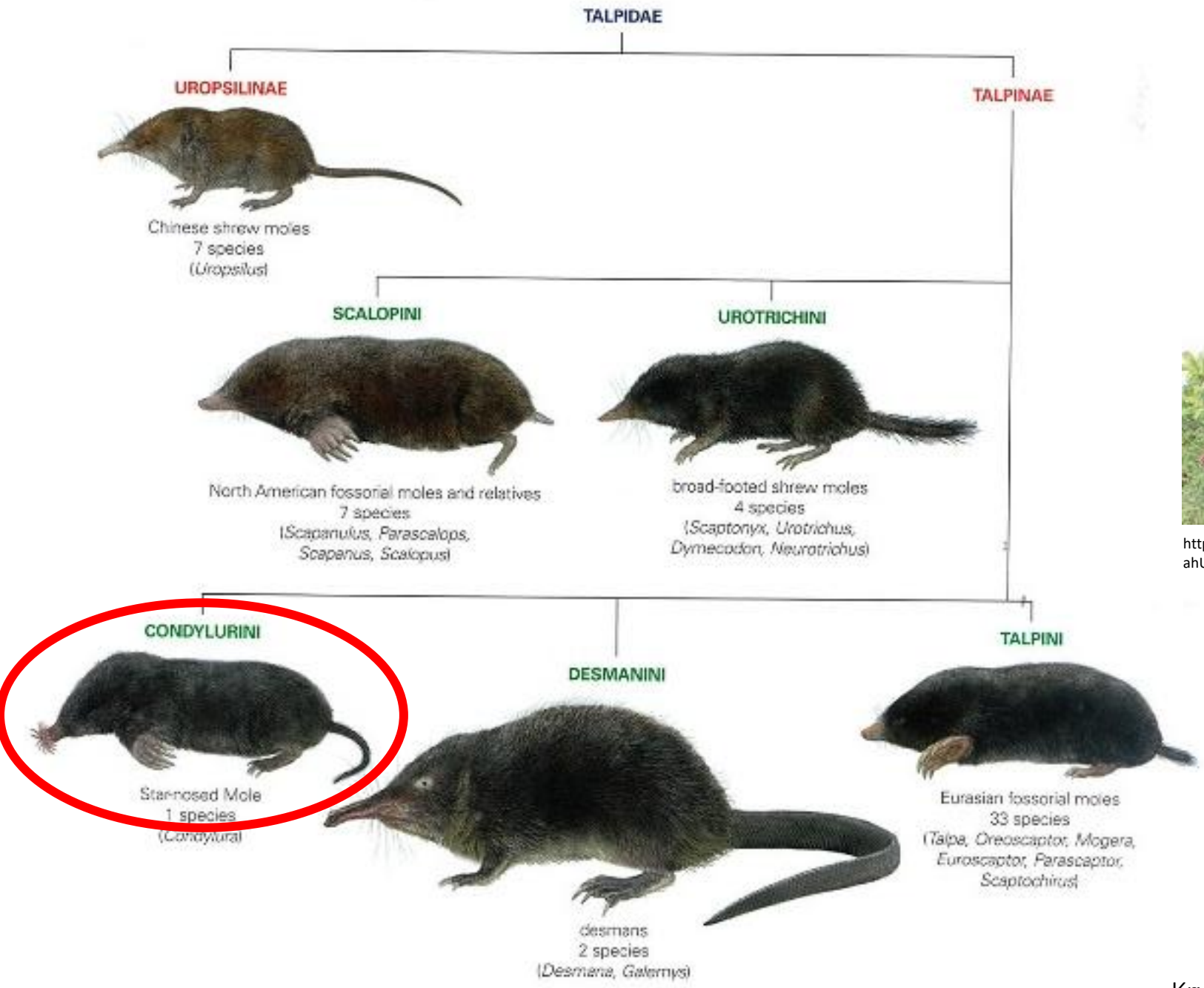




Kryštufek & Motokawa 2018. HMW, Lynx Eds, Barcelona

https://www.google.si/search?q=neurotrichus+talpoides&dcr=0&tbm=isch&tbo=u&source=univ&sa=X&ved=2ahUKEwiF2aOgnbbdAhVJZFAKHV2lDj4QsAR6BAgGEAE&biw=1366&bih=692#imgdii=hxvPHYjPBSPE6M:&imgrc=Ls1VgrWd5-QoNM:

Krti zvezdaši



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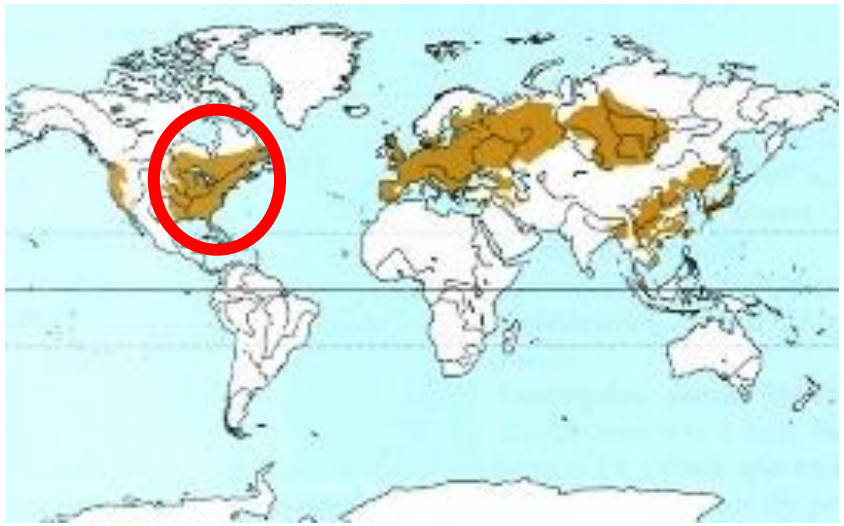
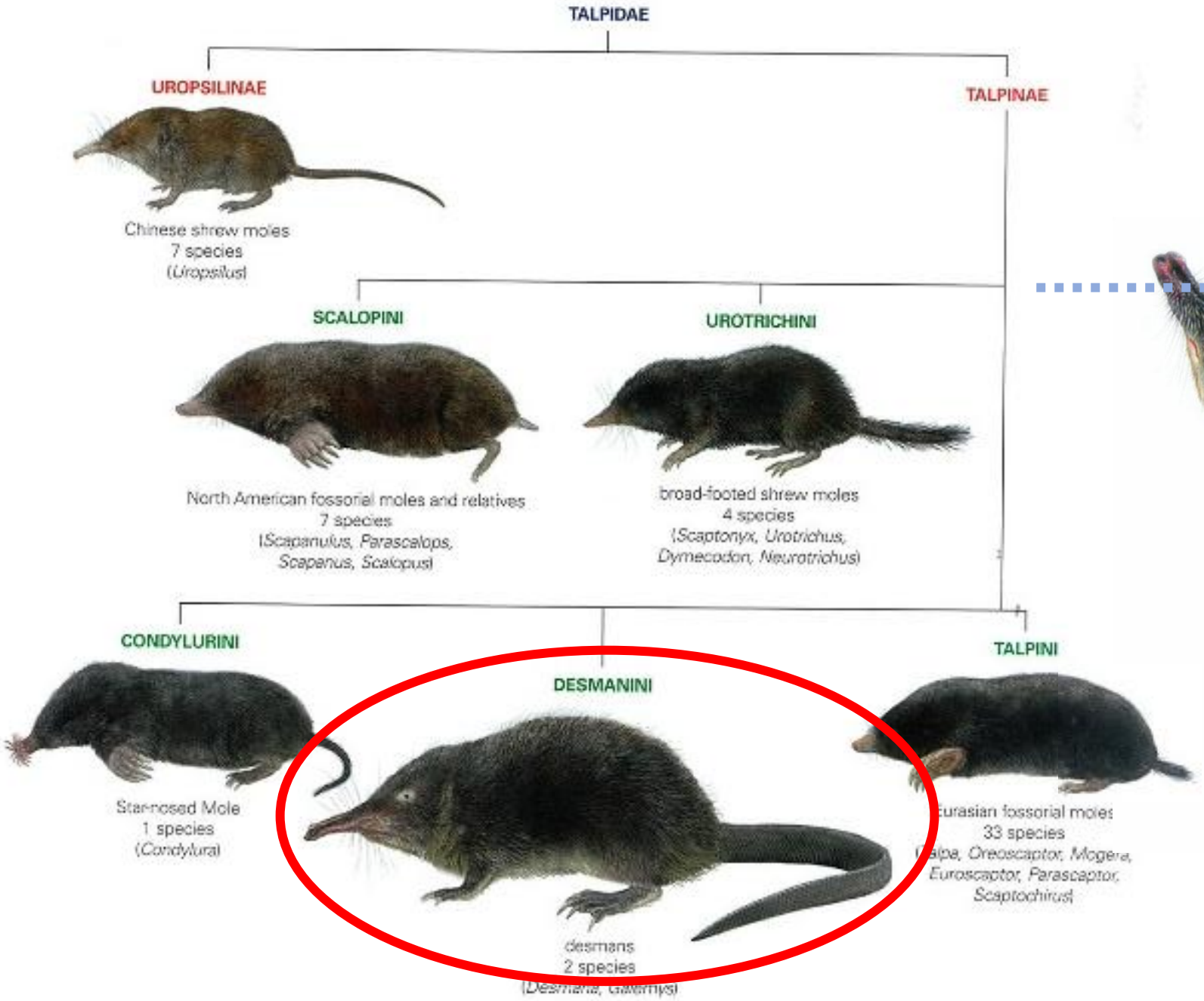
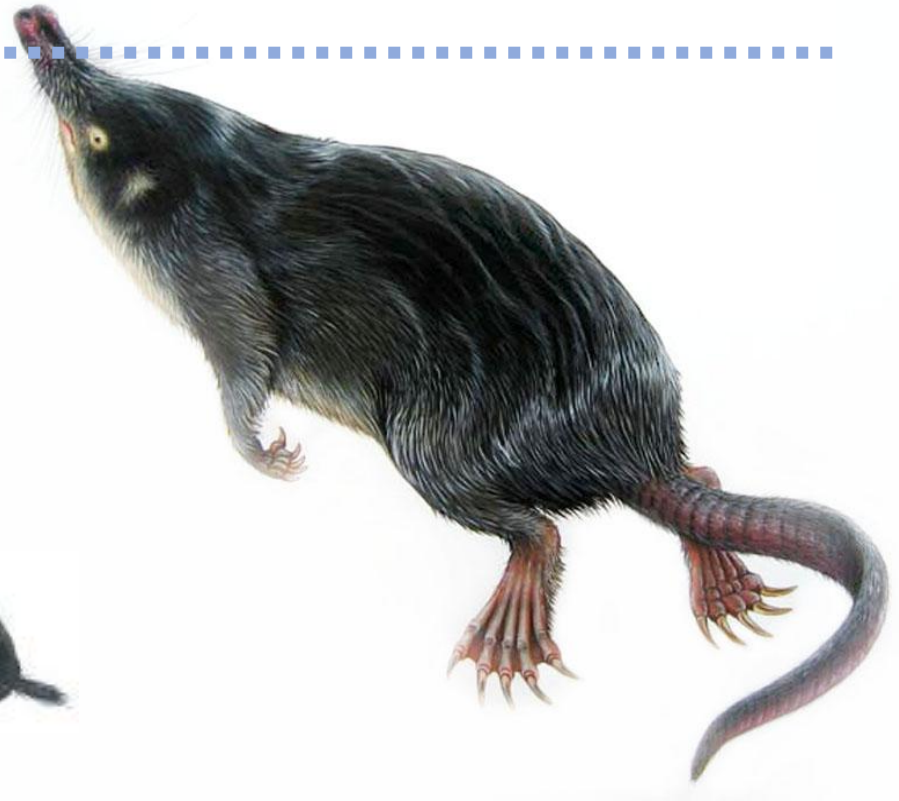


Kryštufek & Motokawa 2018. HMW, Lynx Eds, Barcelona

Vihulji





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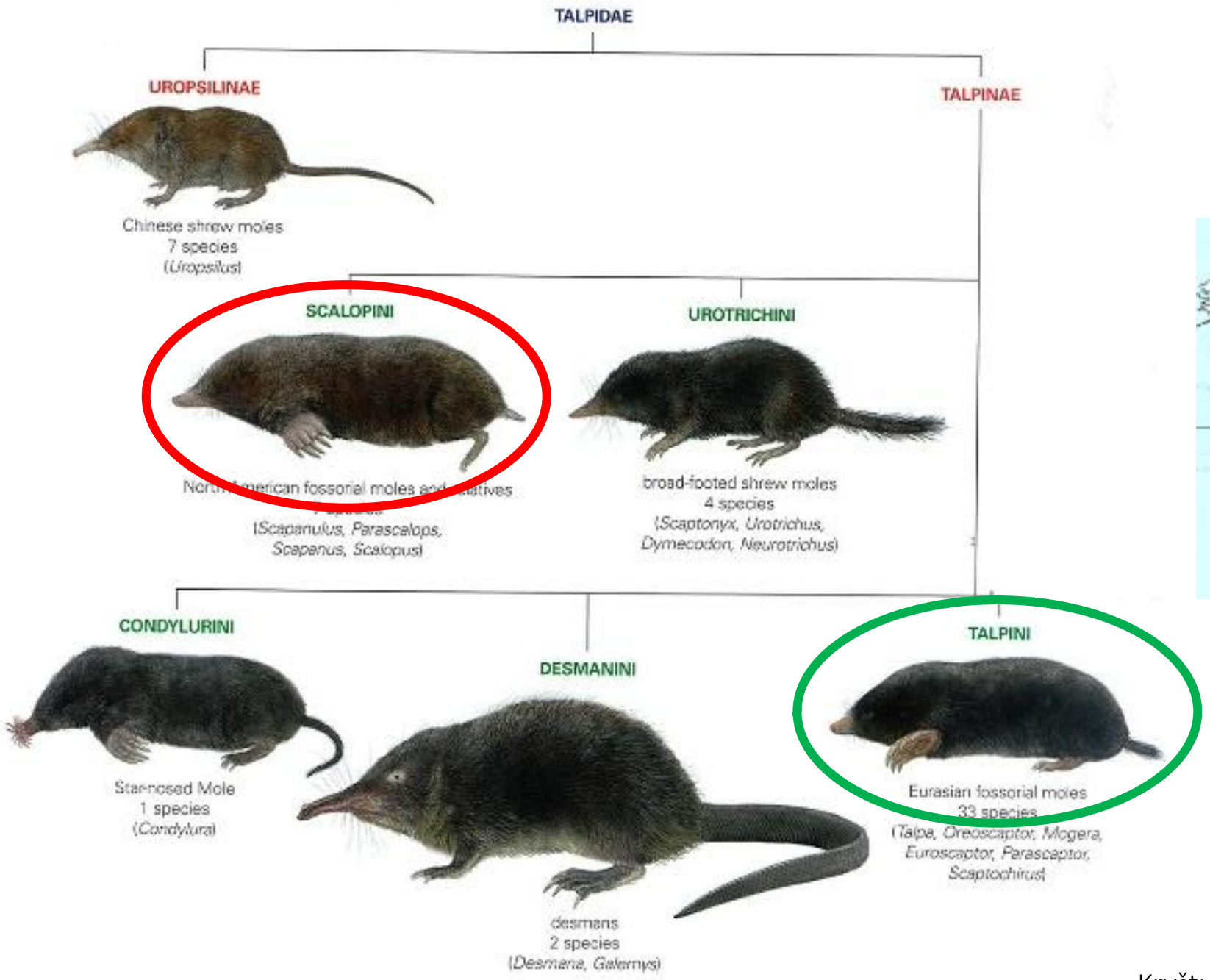
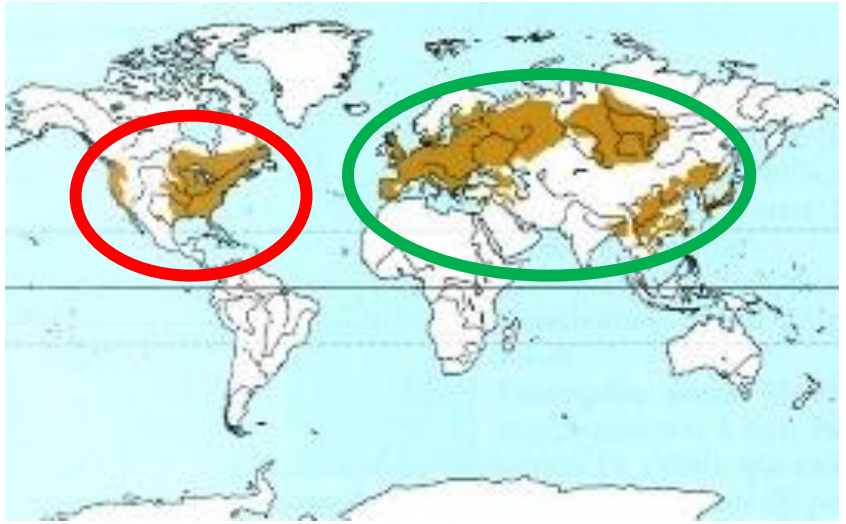
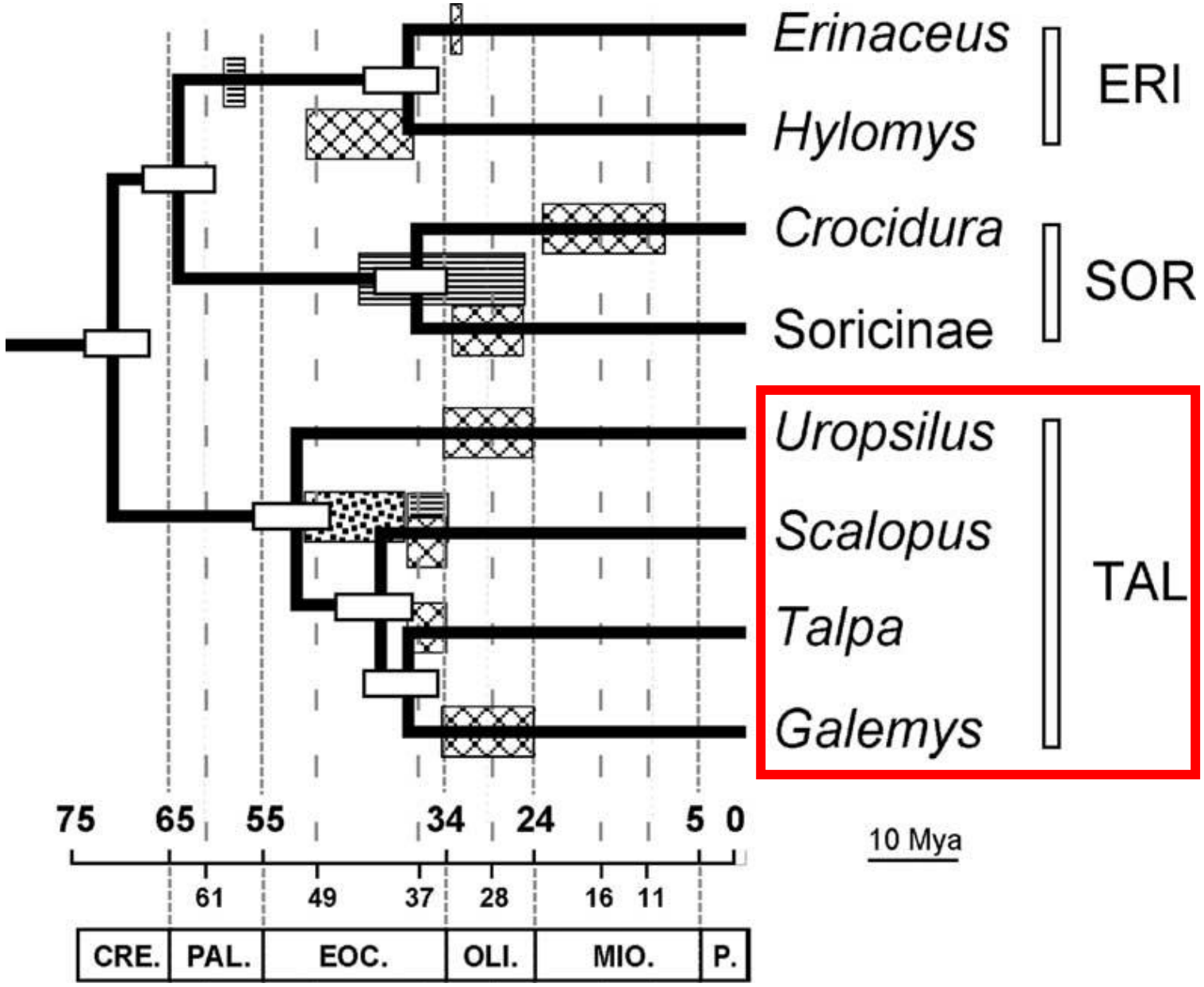
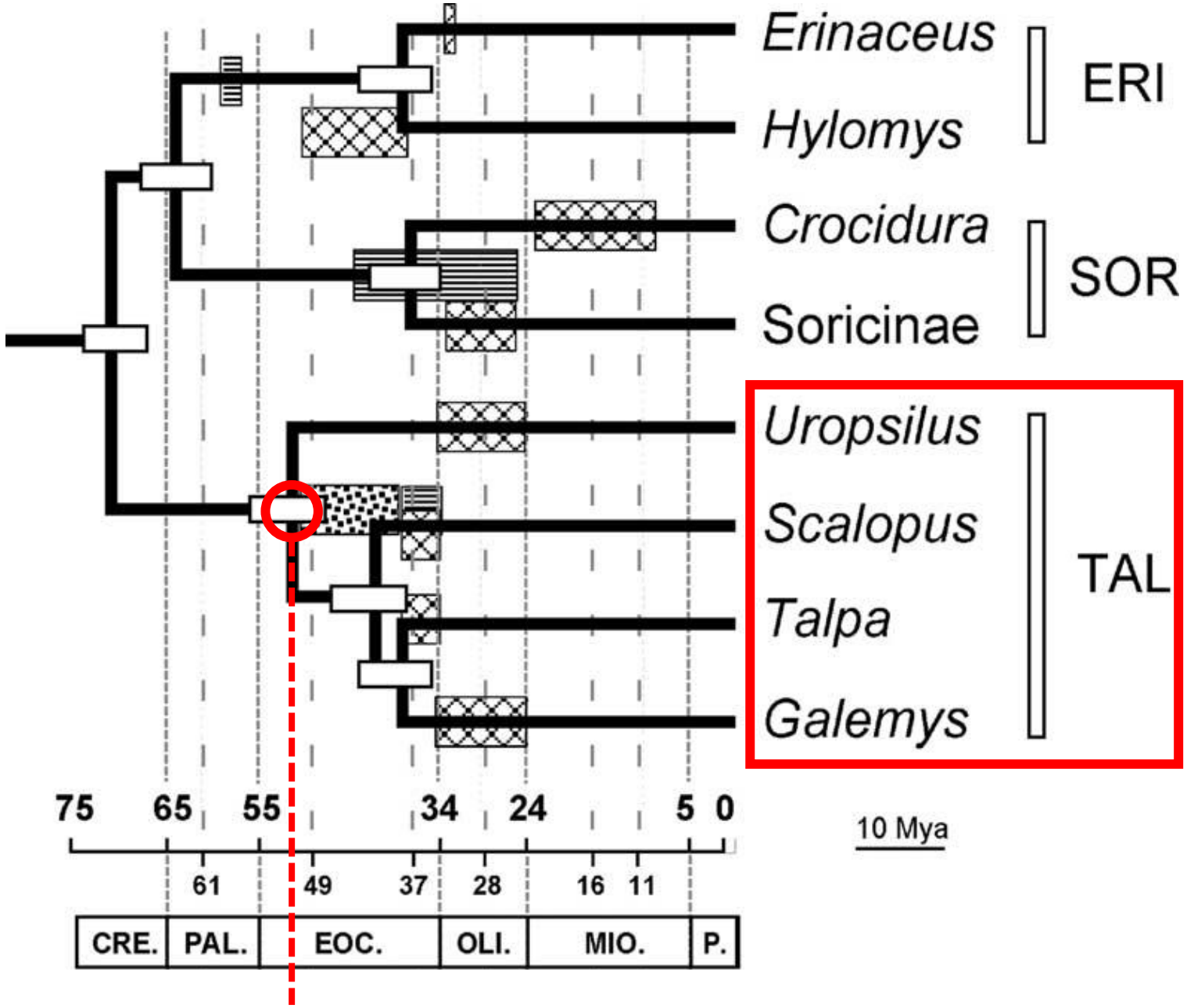




Kryštufek & Motokawa 2018. HMW, Lynx Eds, Barcelona



Douady & Douzery 2003. Mol. Phylog. Evol. 28, 285-296.



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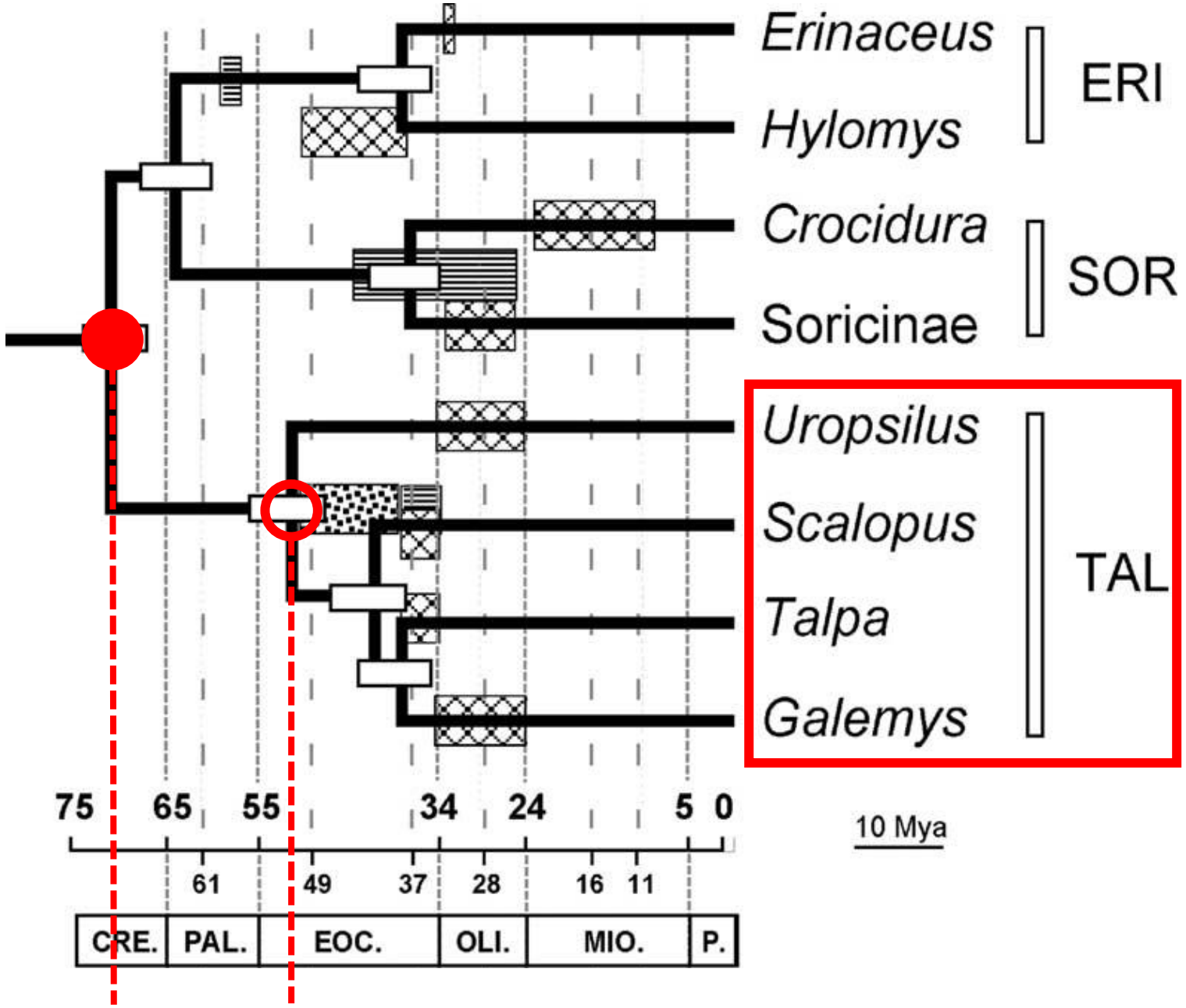

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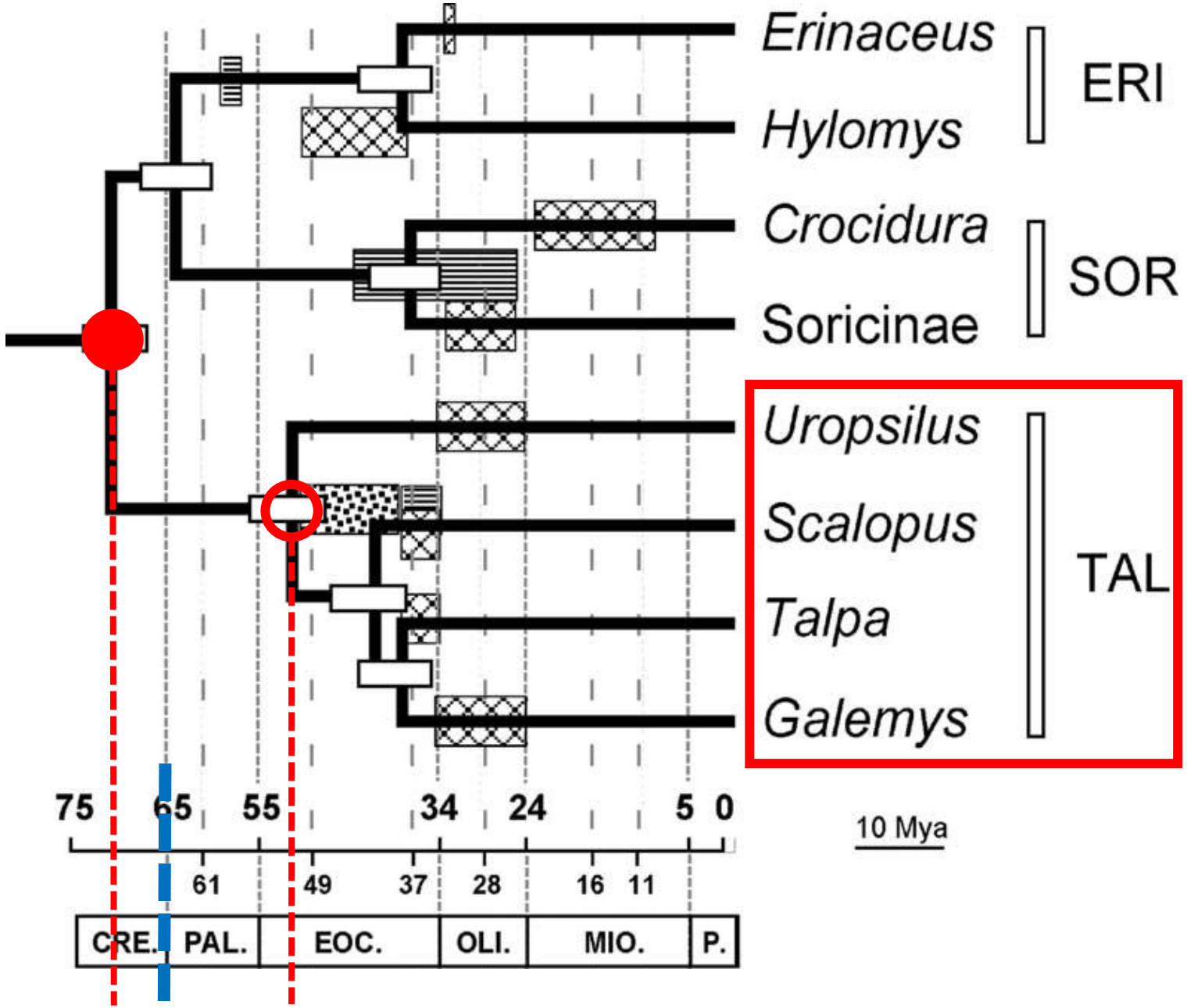

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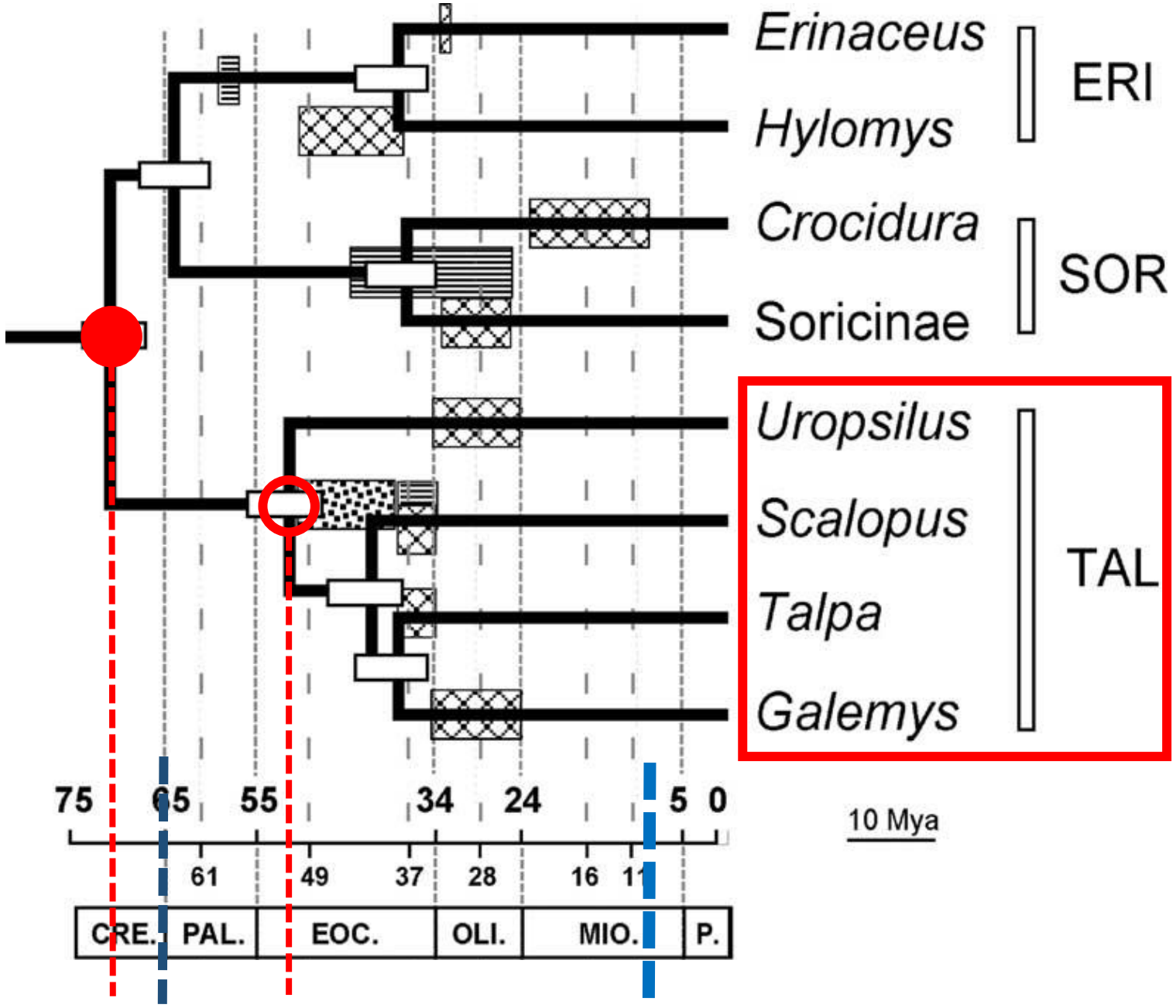
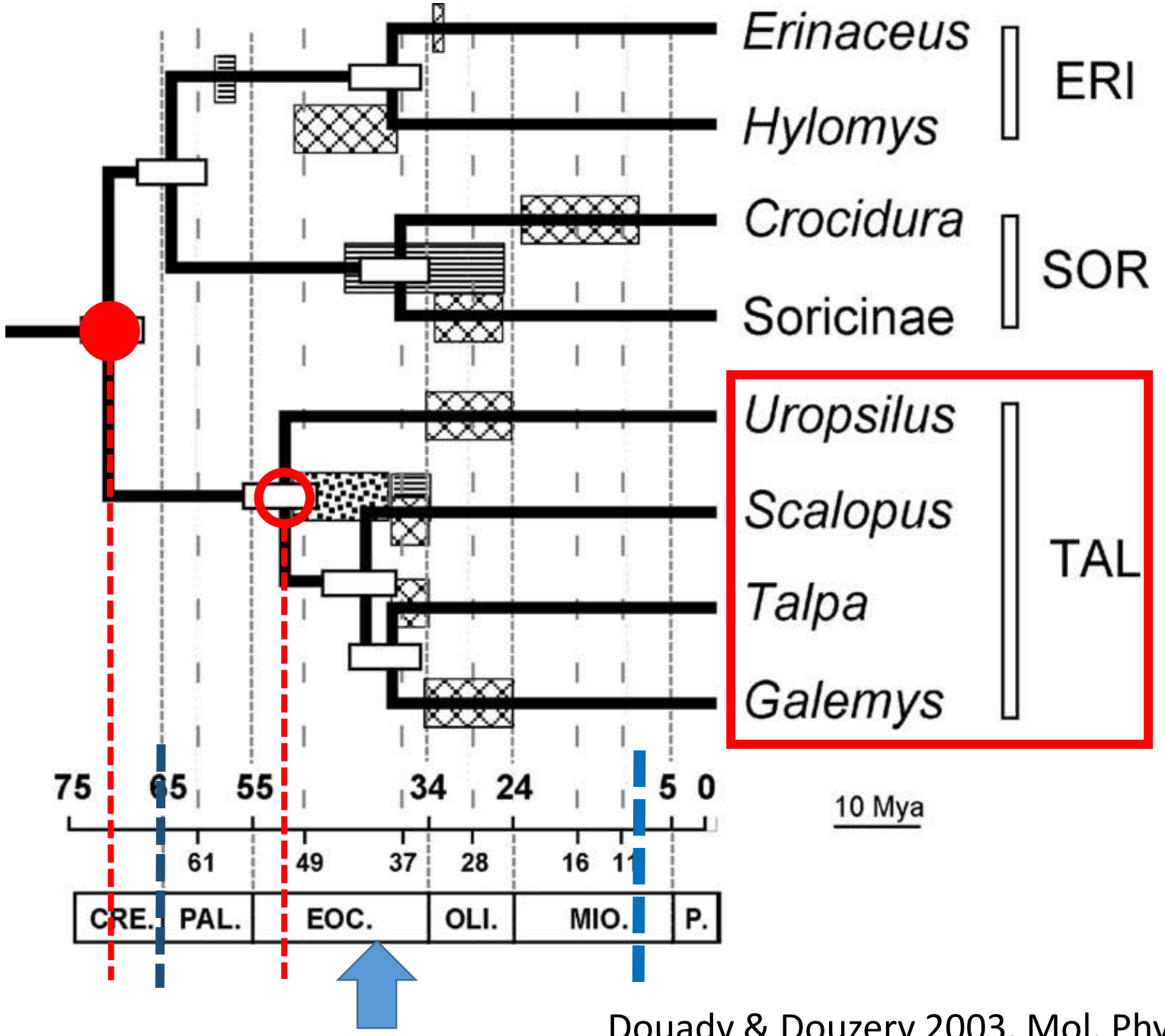


Douady & Douzery 2003. Mol. Phylog. Evol. 28, 285-296.



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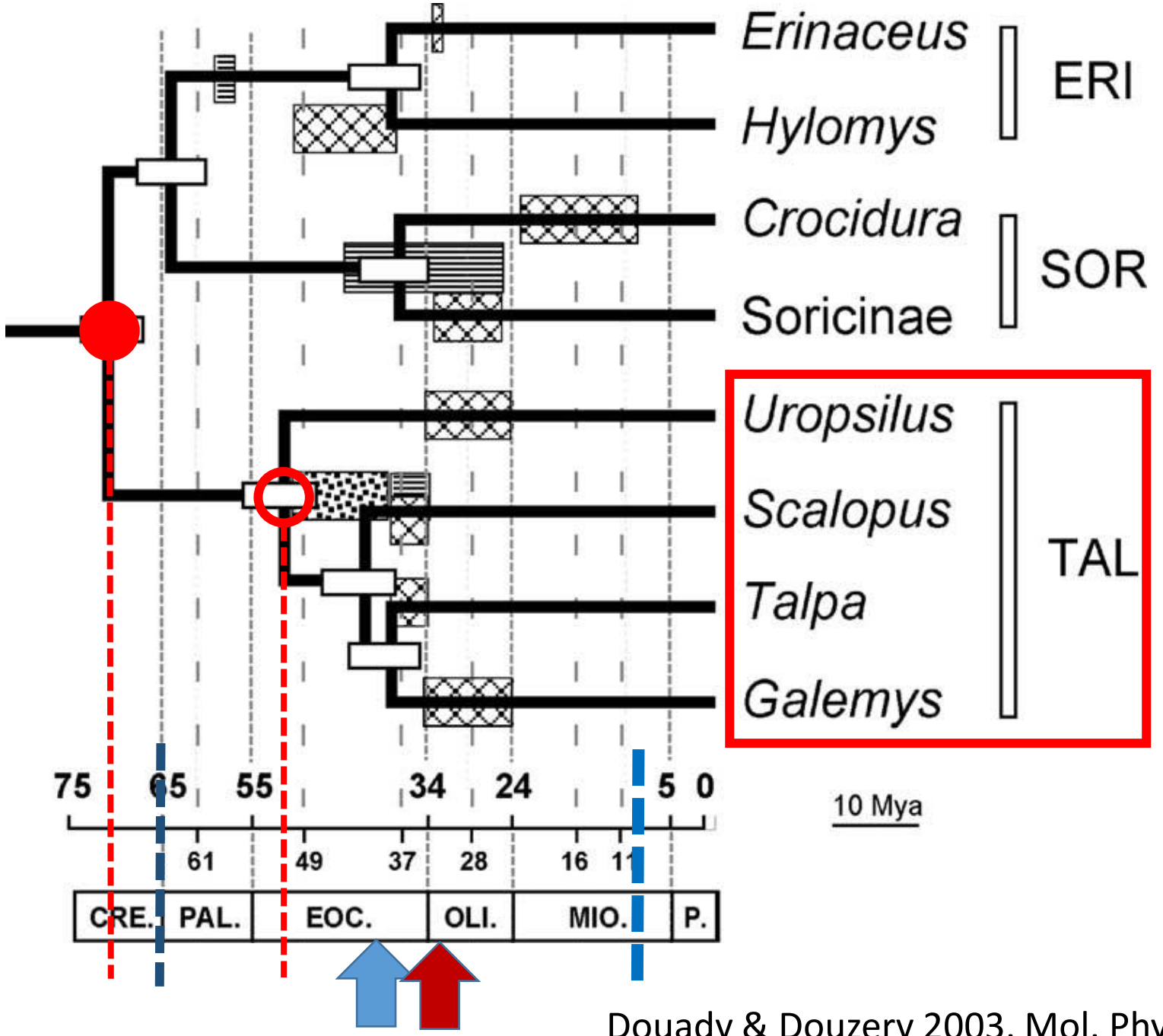
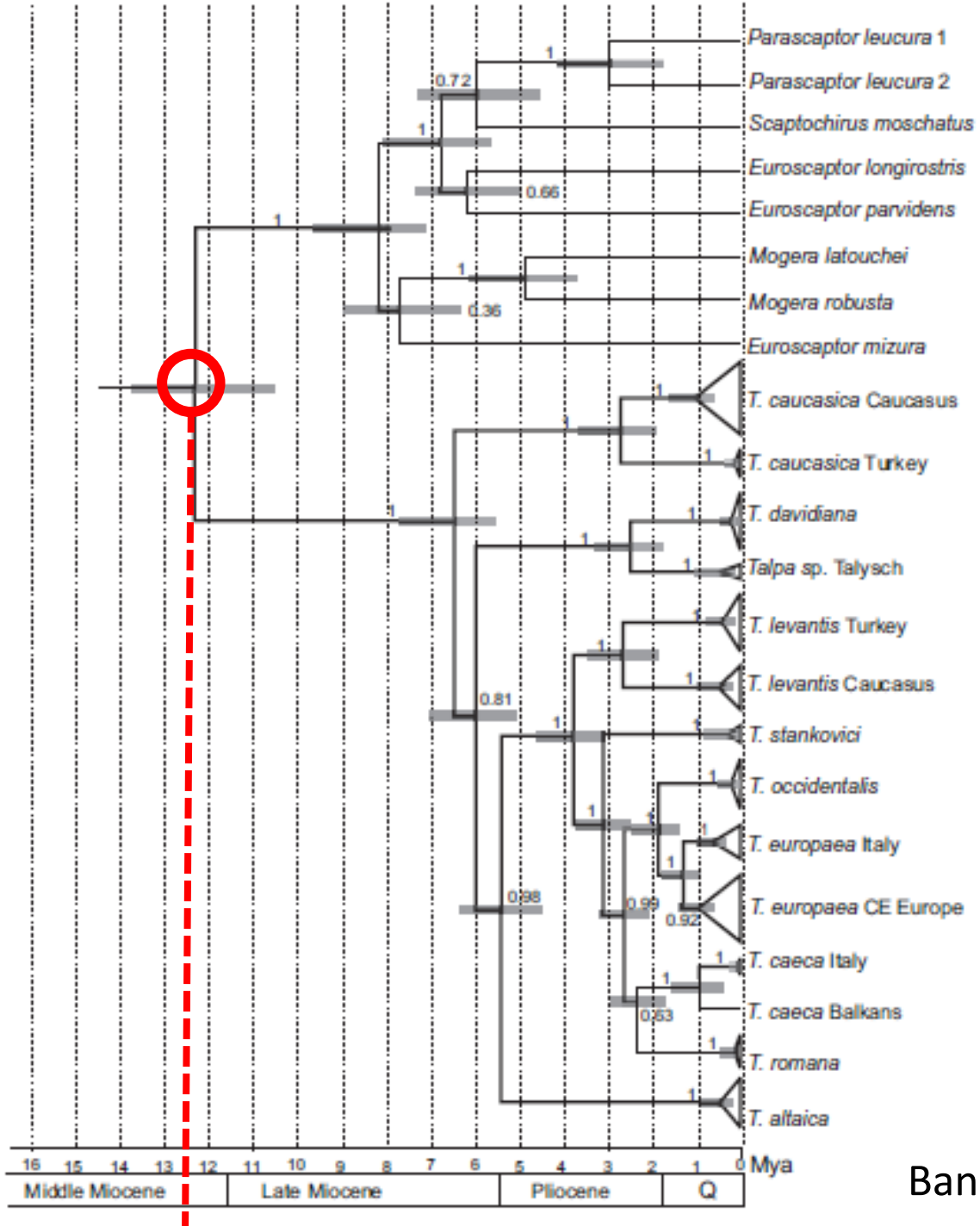


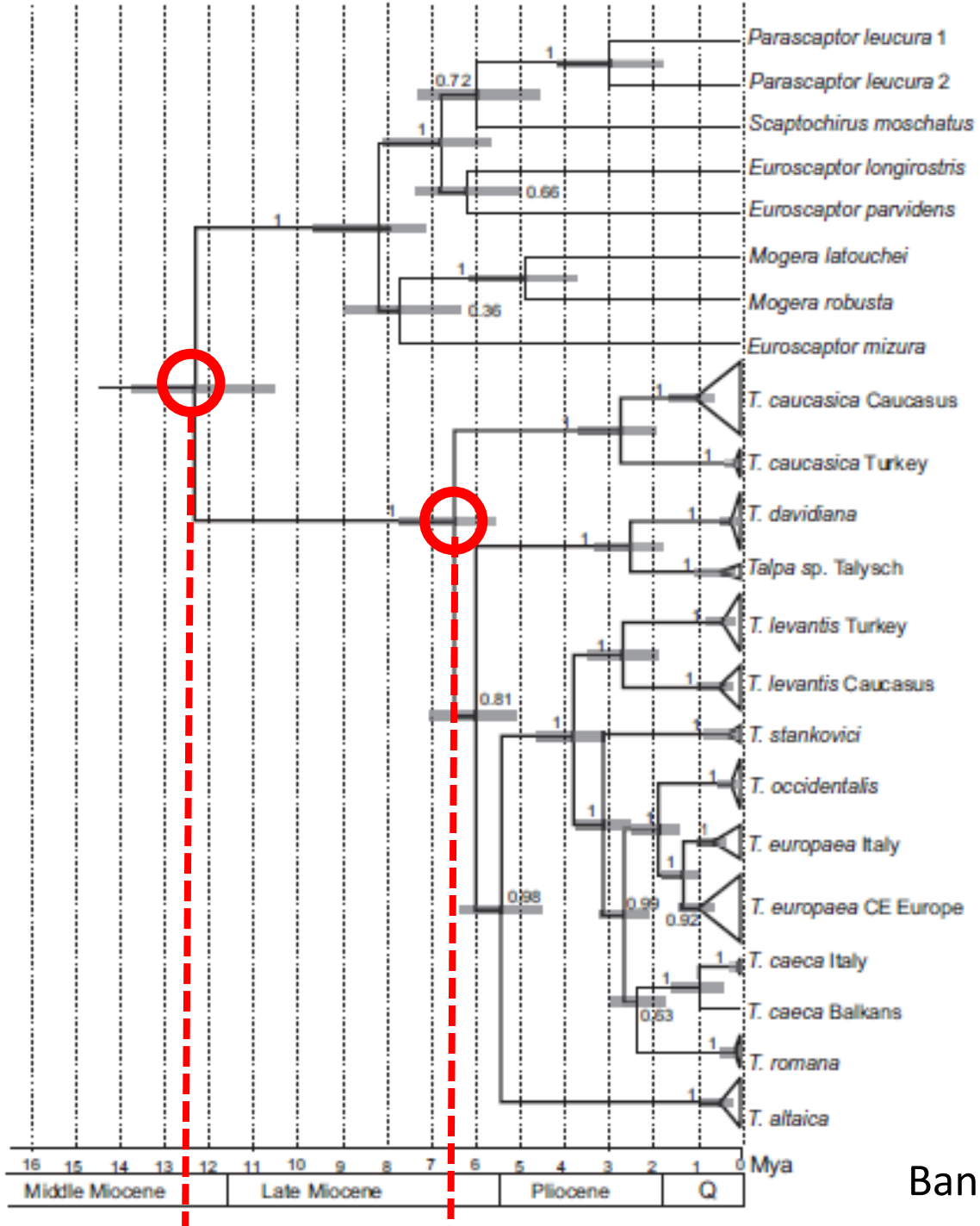
Douady & Douzery 2003. Mol. Phylog. Evol. 28, 285-296.



Vzhodna Azija

Zahodna Evrazija

Bannikova et al. 2015. Zool. J. Linn. Soc. 175, 930-948.



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Zahodna Evrazija

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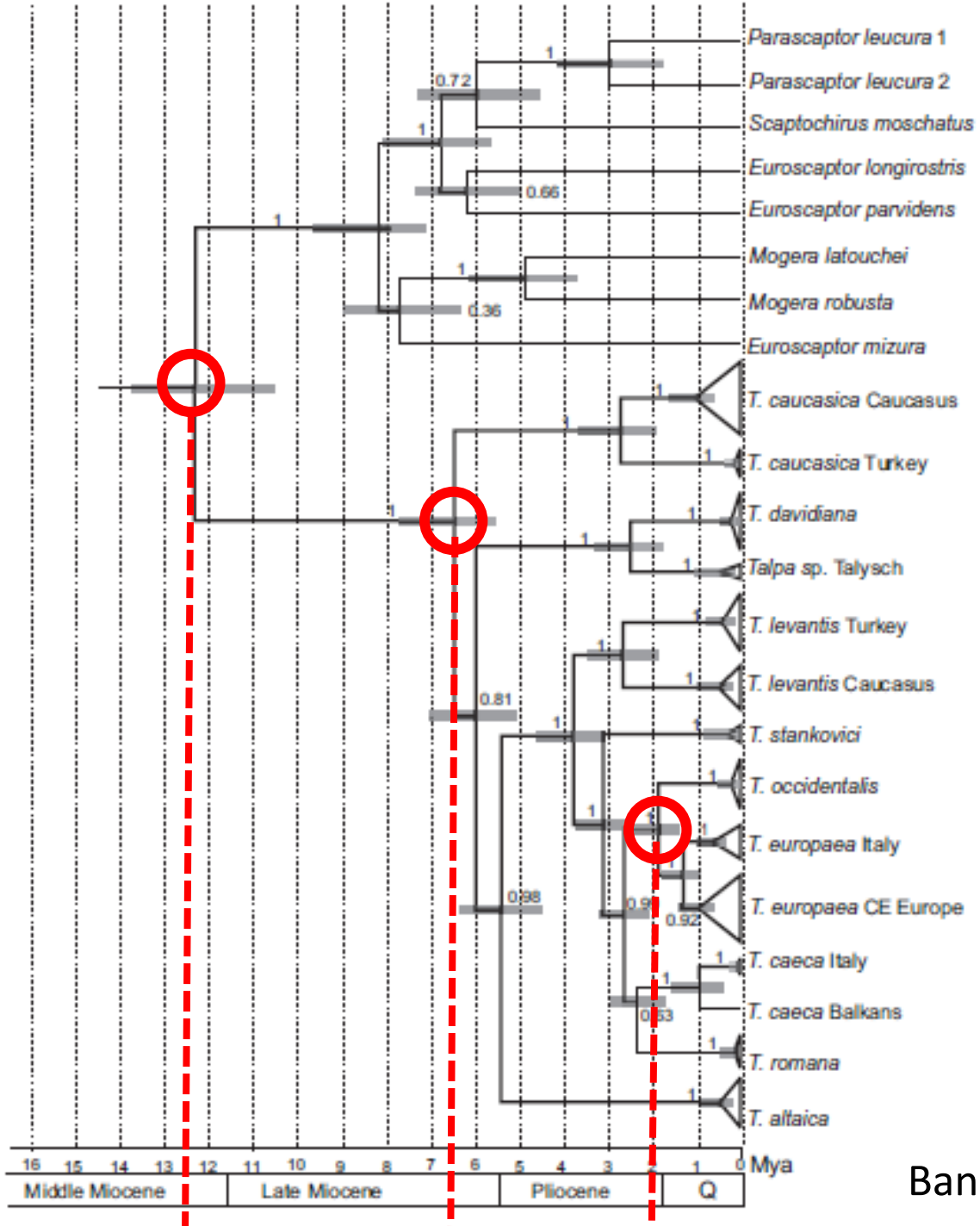


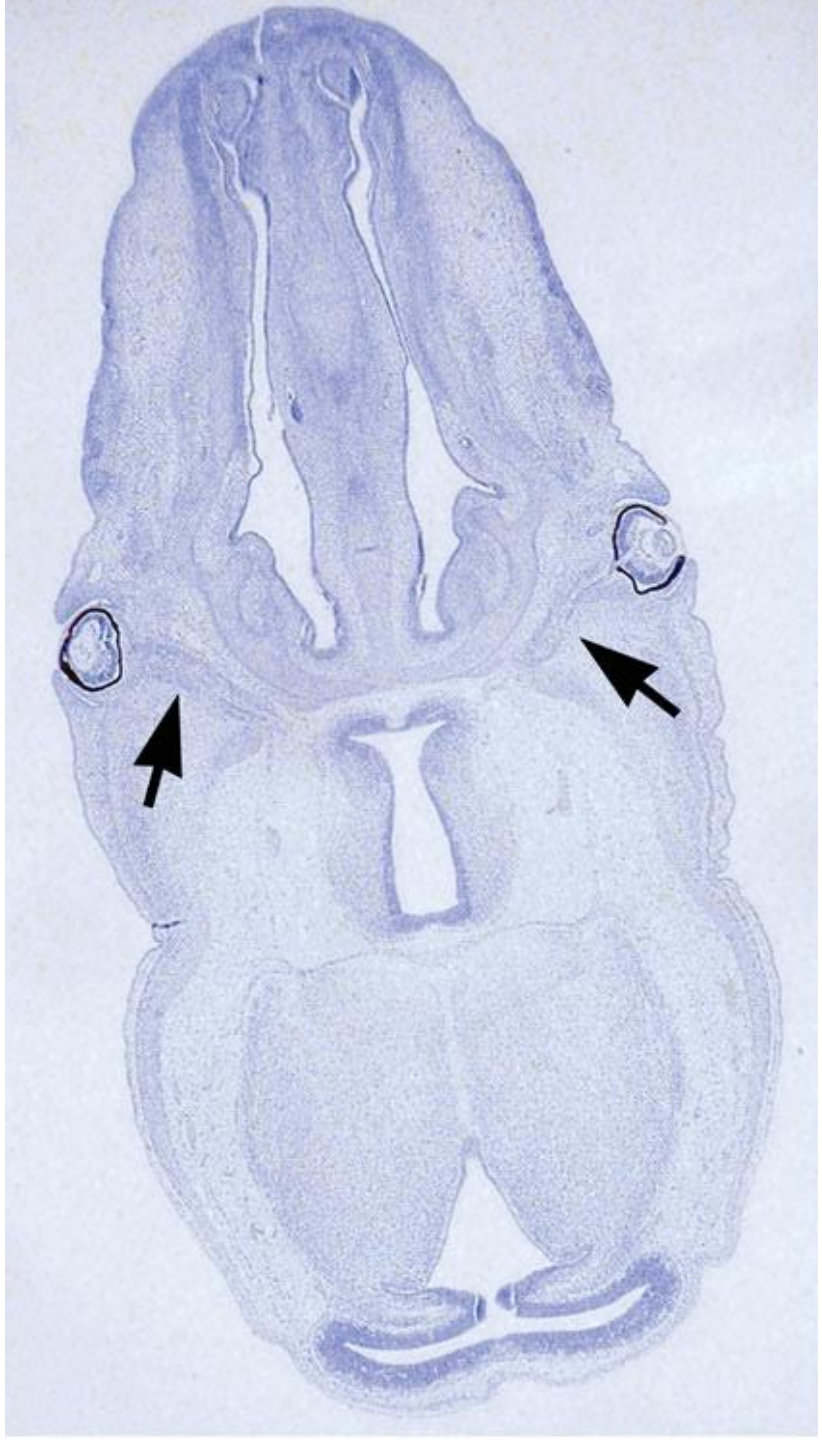
Vzhodna Azija

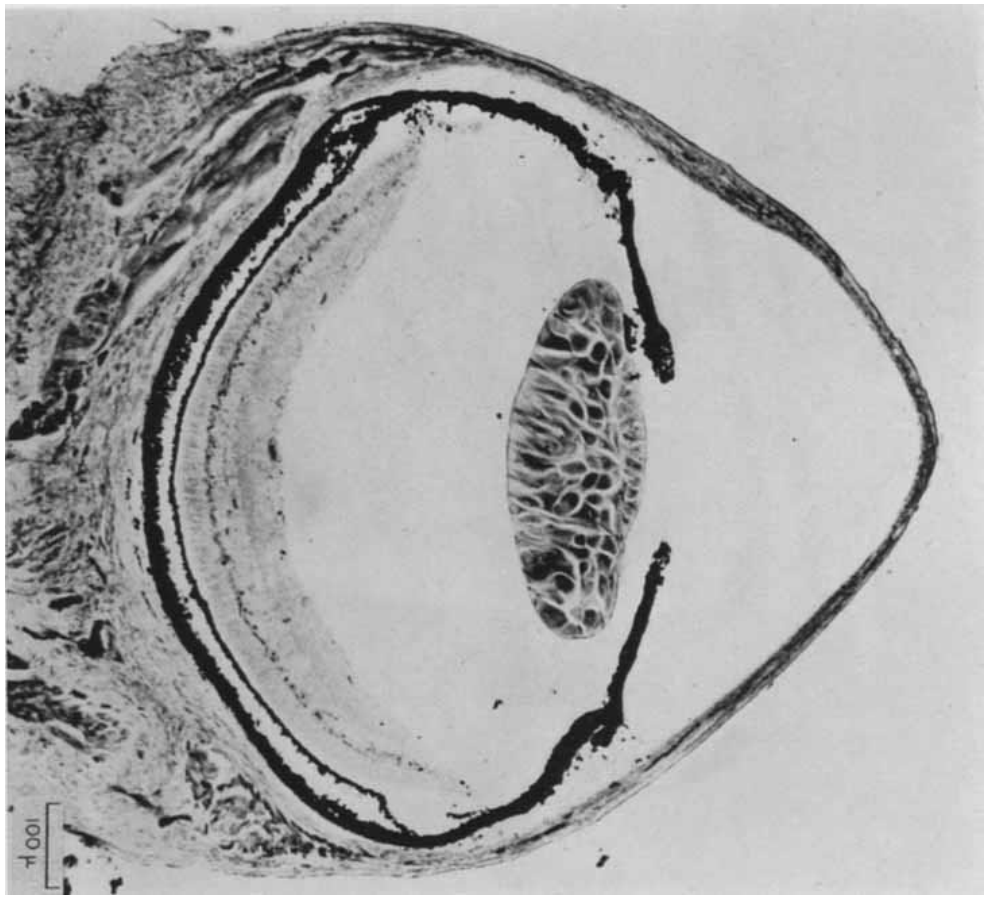
Zahodna Evrazija

Bannikova et al. 2015. Zool. J. Linn. Soc. 175, 930-948.

Posebnosti iz življenja krtov

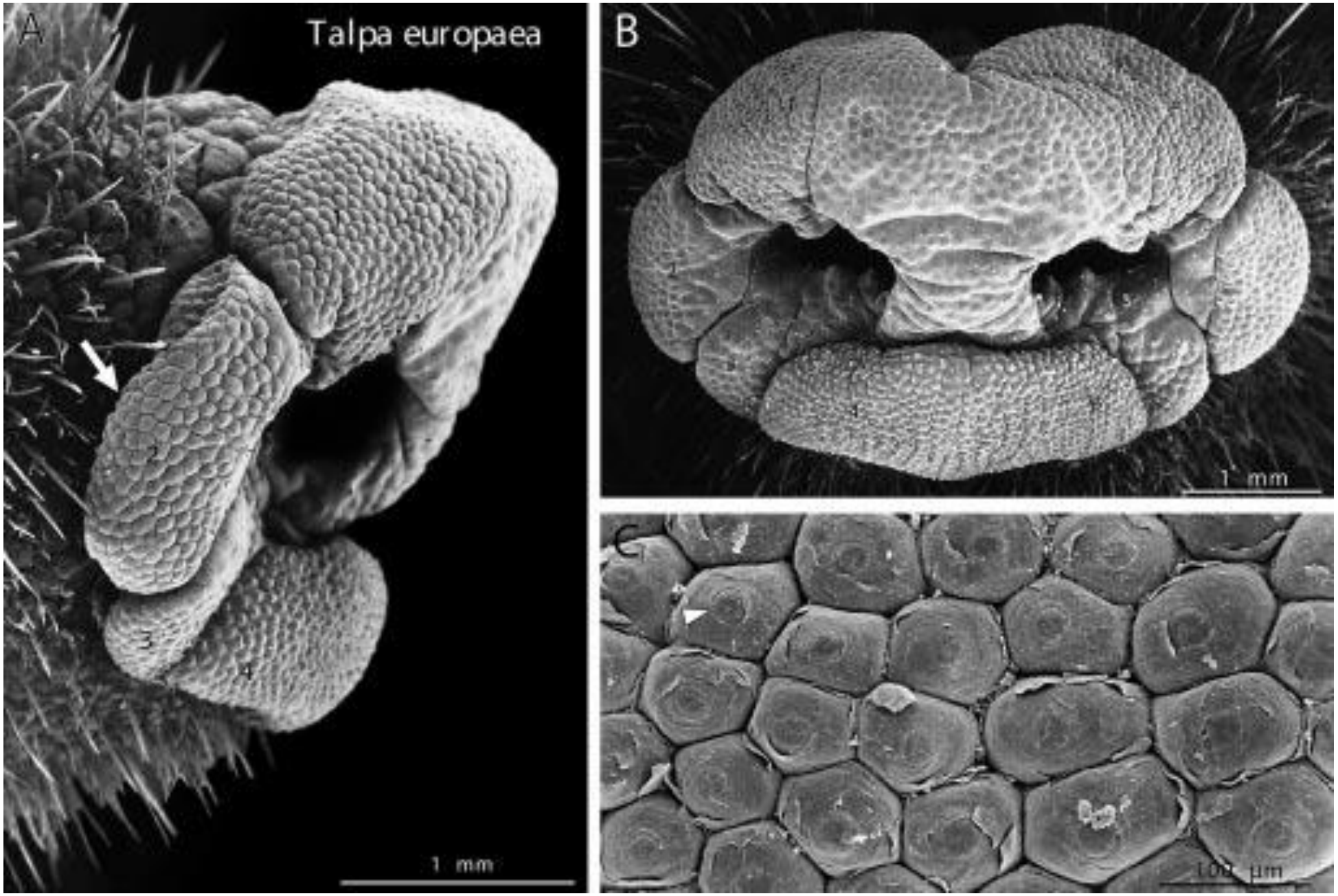
- Doživljanje sveta
- Kopanje
- Prehranjevanje
- Teritorialnost in hermafroditizem samic



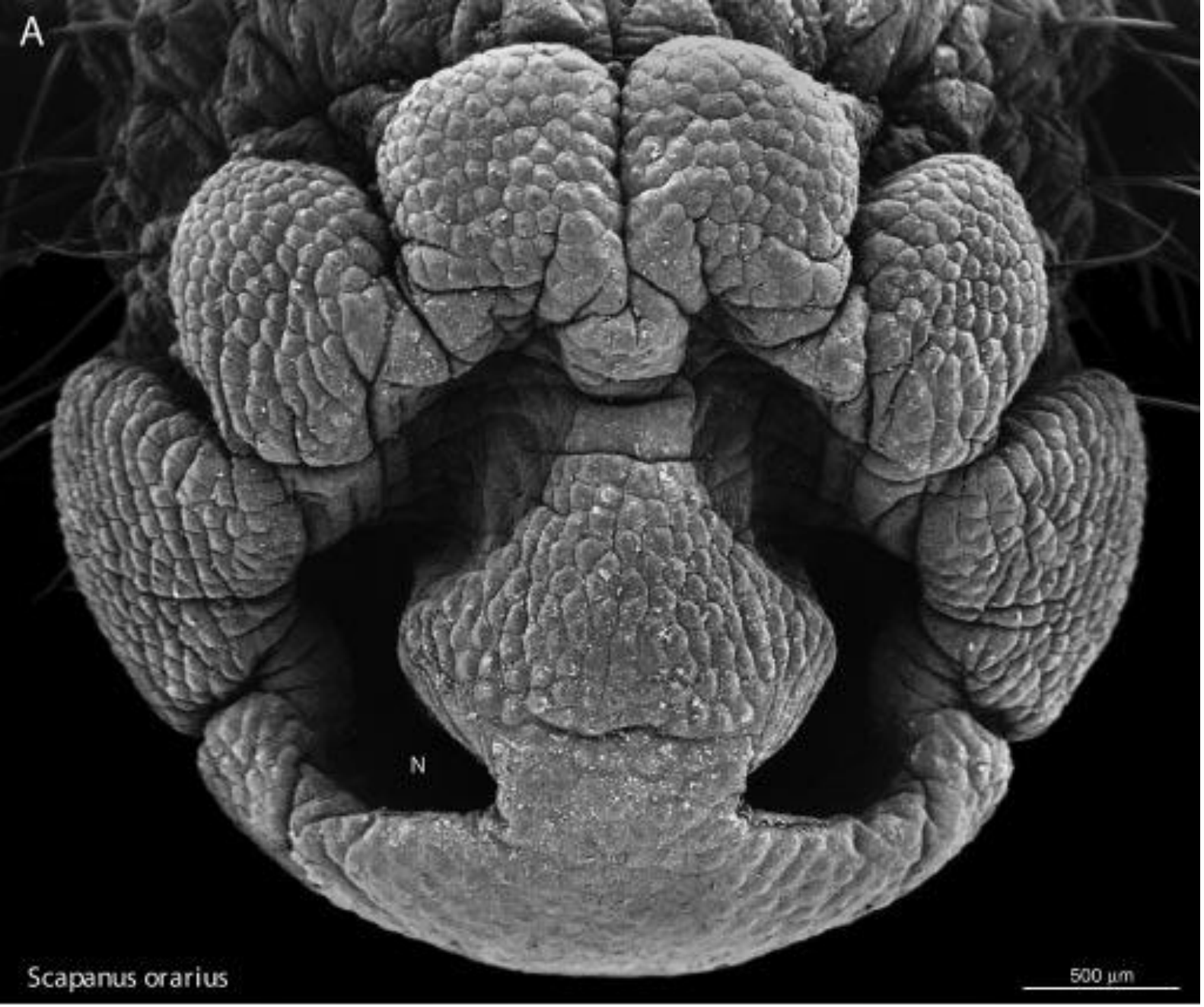


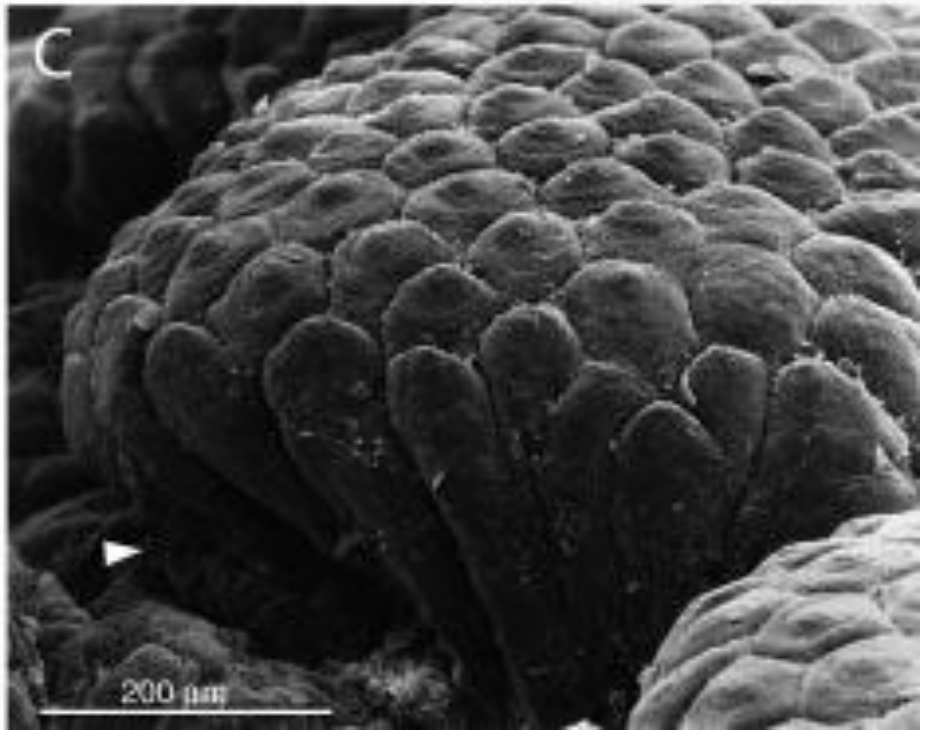
Carmona et al. 2009. Proc. R. Soc. B, doi:10.1098/rspb.2009.1744

Kriszat, 1940.. Z. Morphol. Ökol. Tiere **36**: 512–556.



Catania 2000. Brain Behav. Evol. 56, 146-174.

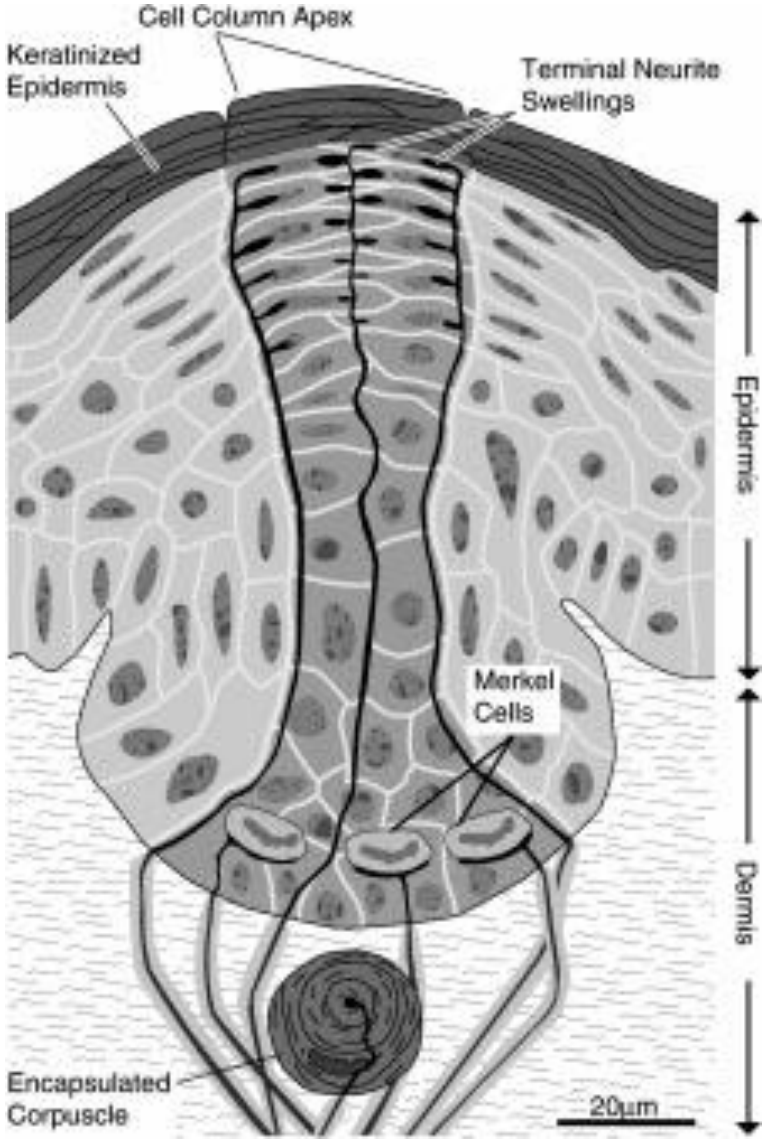




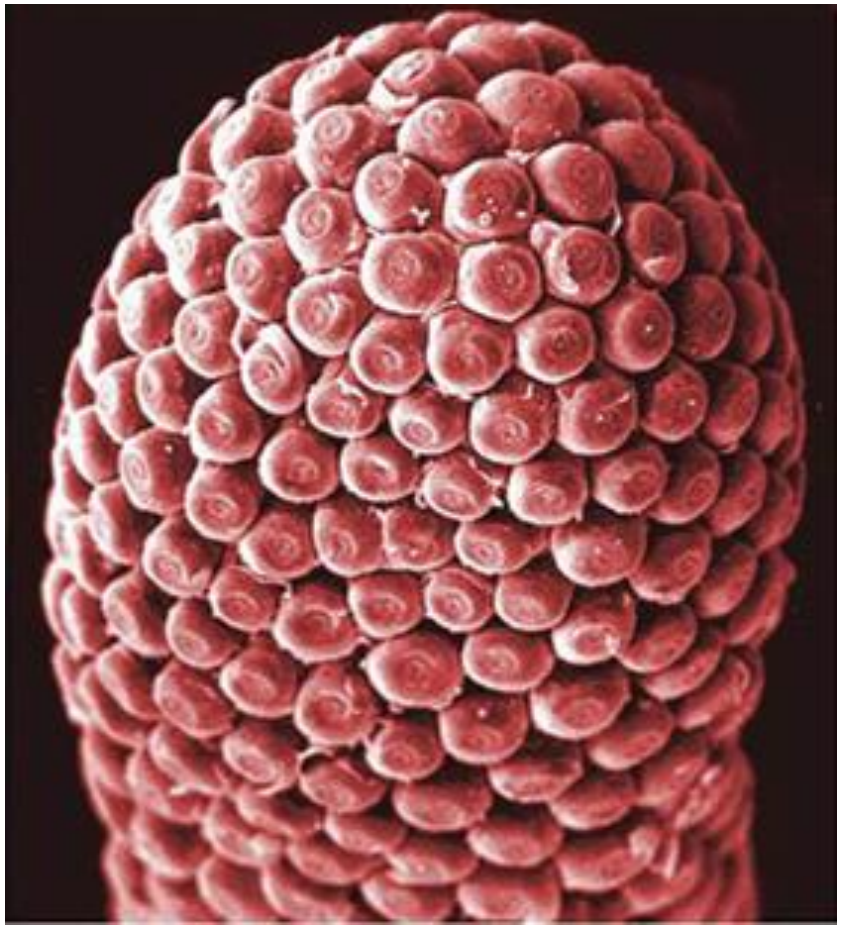
Catania 2000. Brain Behav. Evol. 56, 146-174.

Catania 2011. Proc. R. Soc. B, 366, 3016-3025.

Eimerjev organ

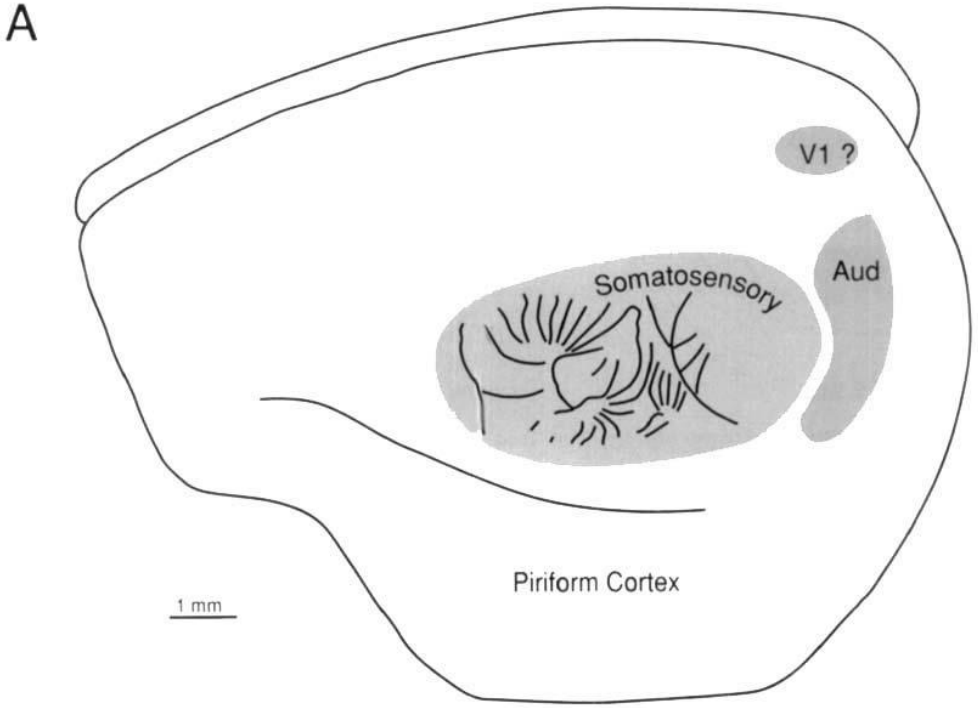


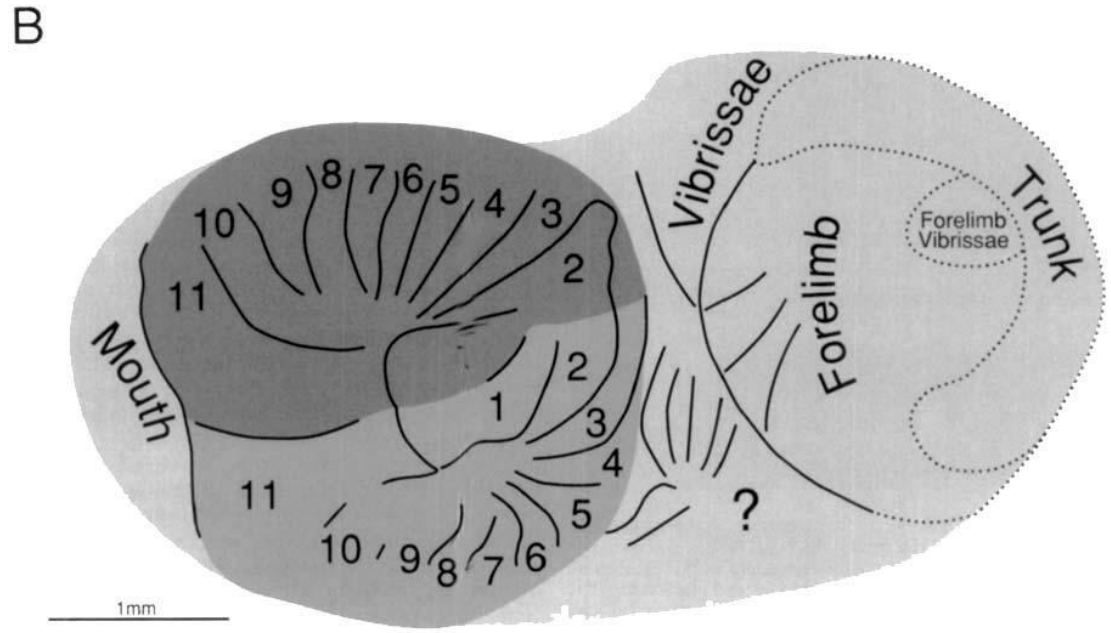
Theodor Eimer (1843–1898)



Catania 2000. Brain Behav. Evol. 56, 146-174.

Catania & Kaas 1995. J. Comp. Neurol. 351, 549-567.





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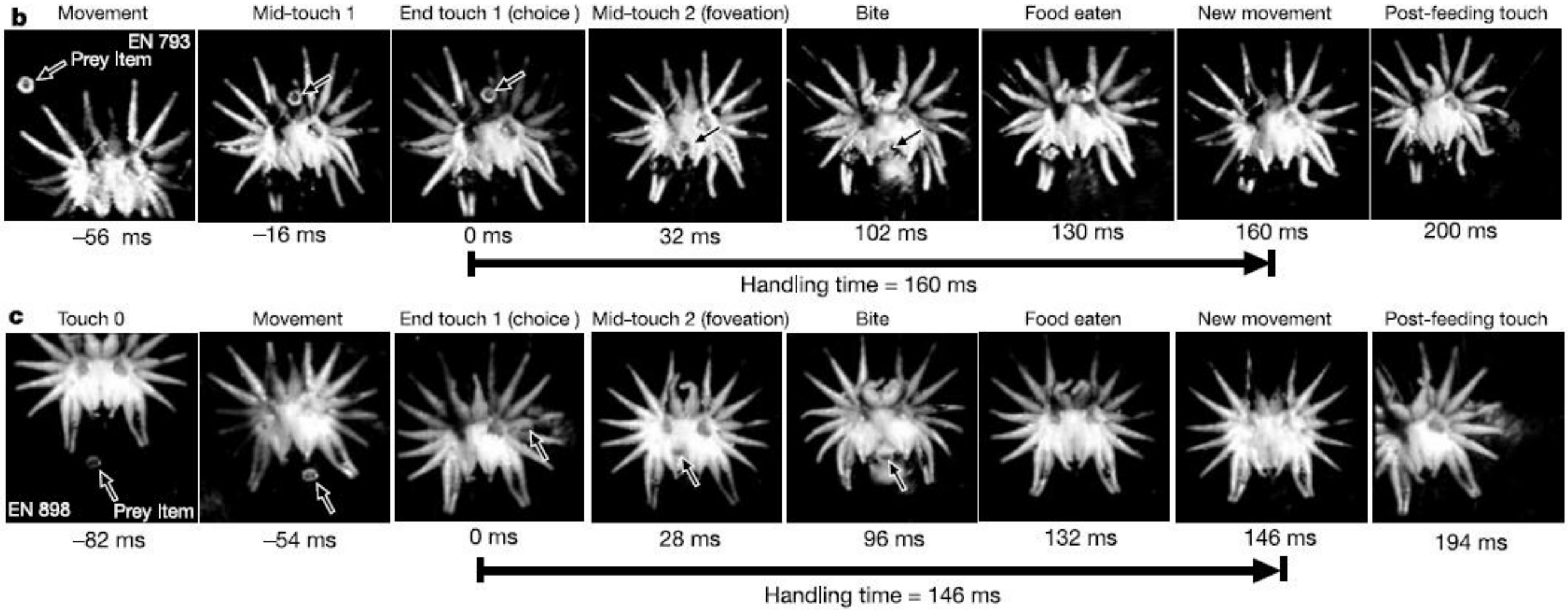
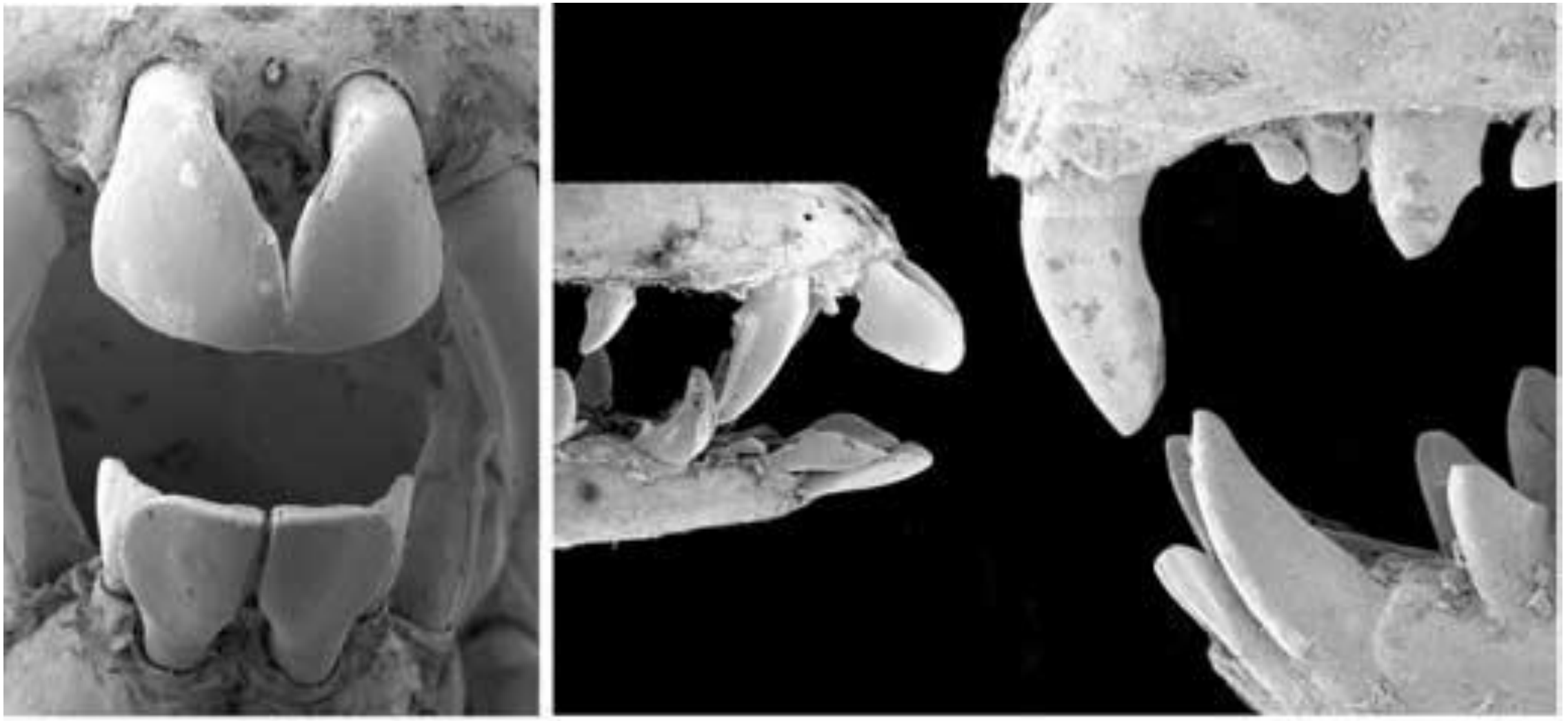


Catania & Remple 2005. Nature 433, 519-522



Catania & Remple 2005. Nature 433, 519-522

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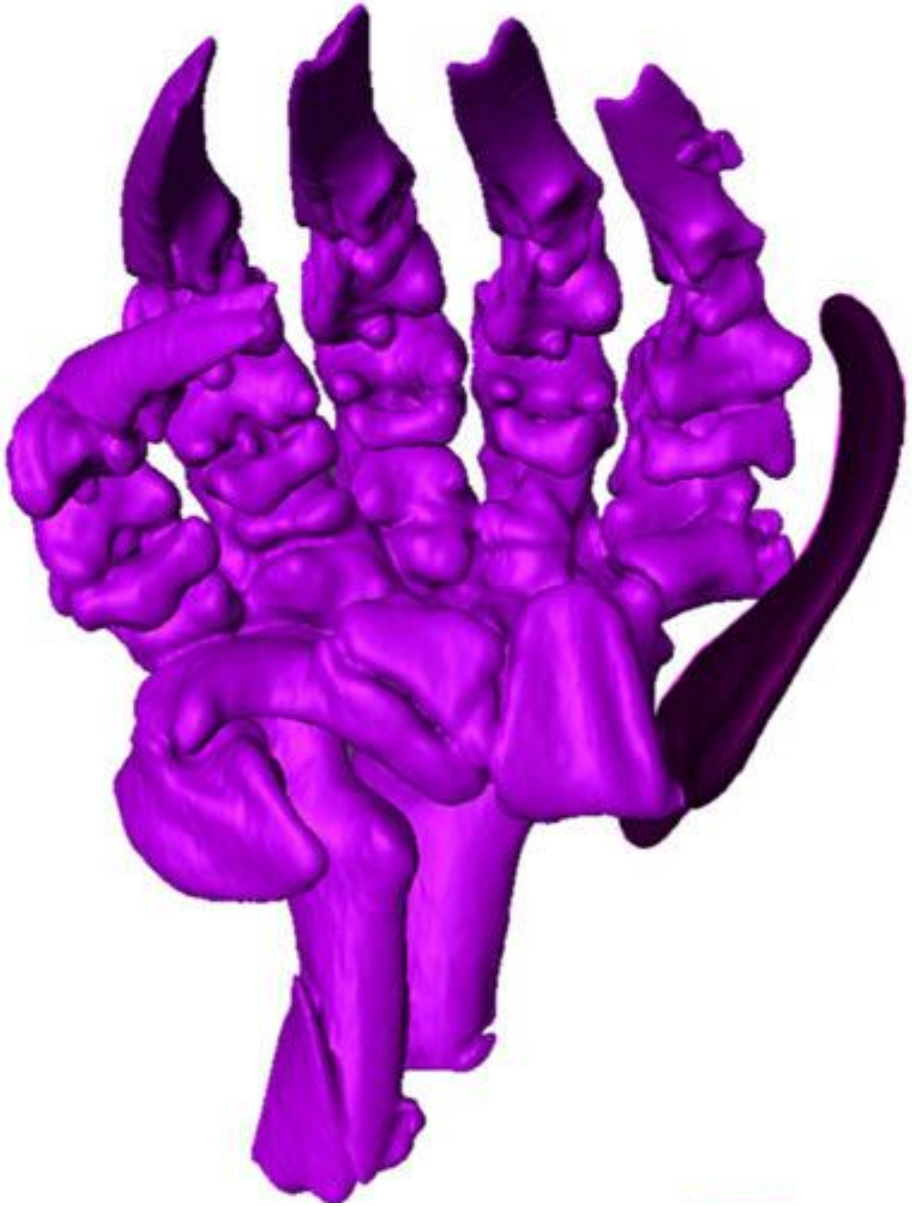
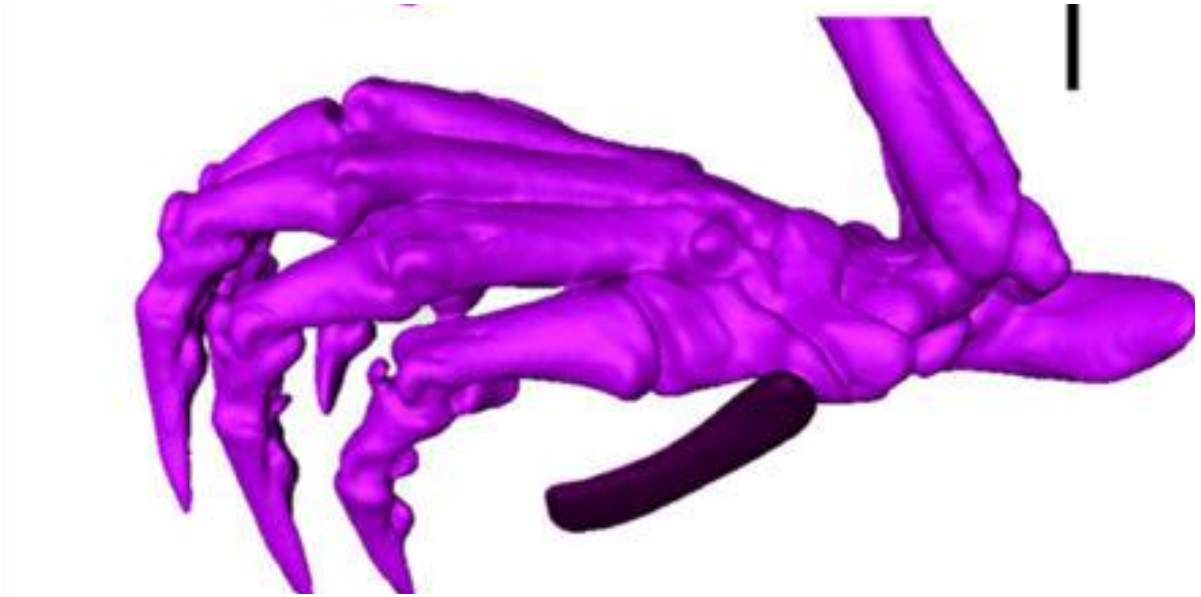
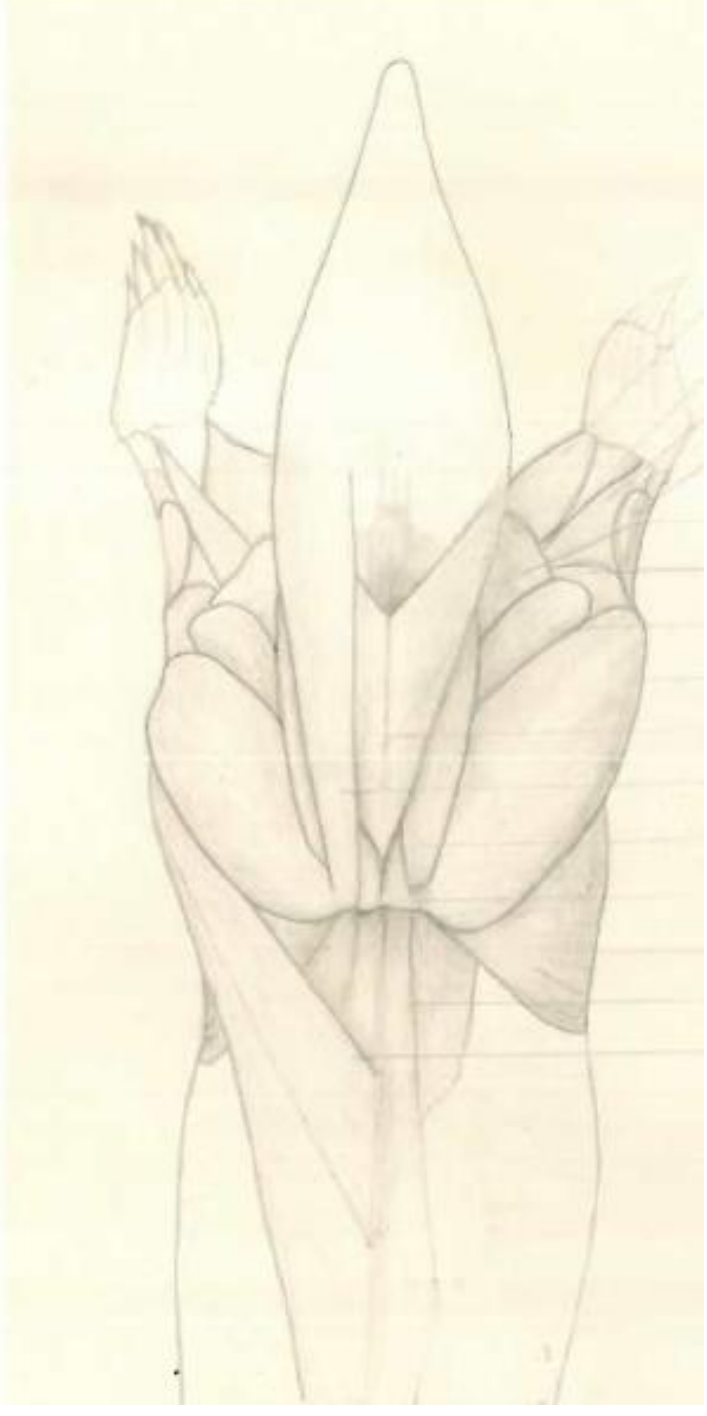
Srpasta kost

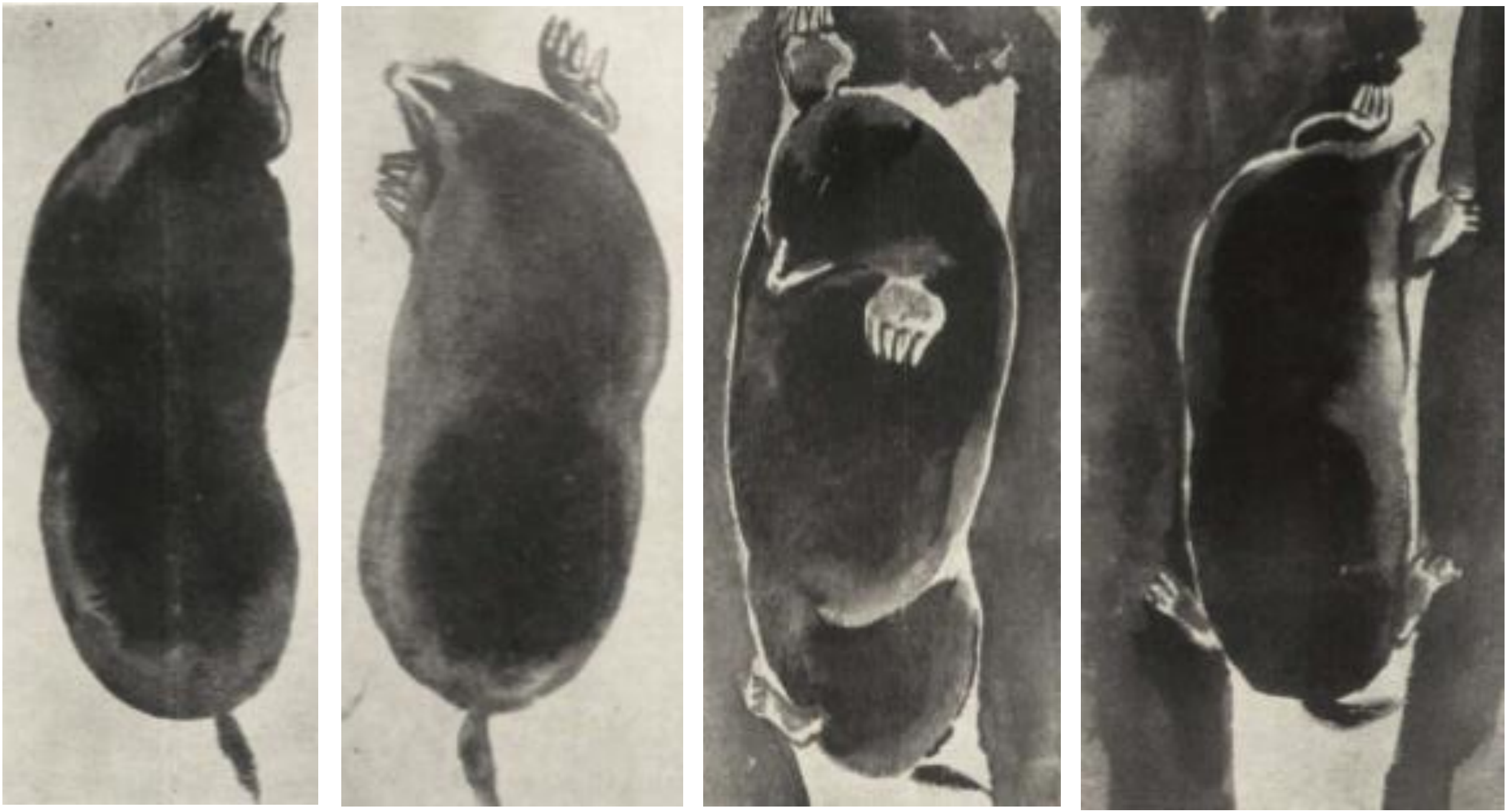




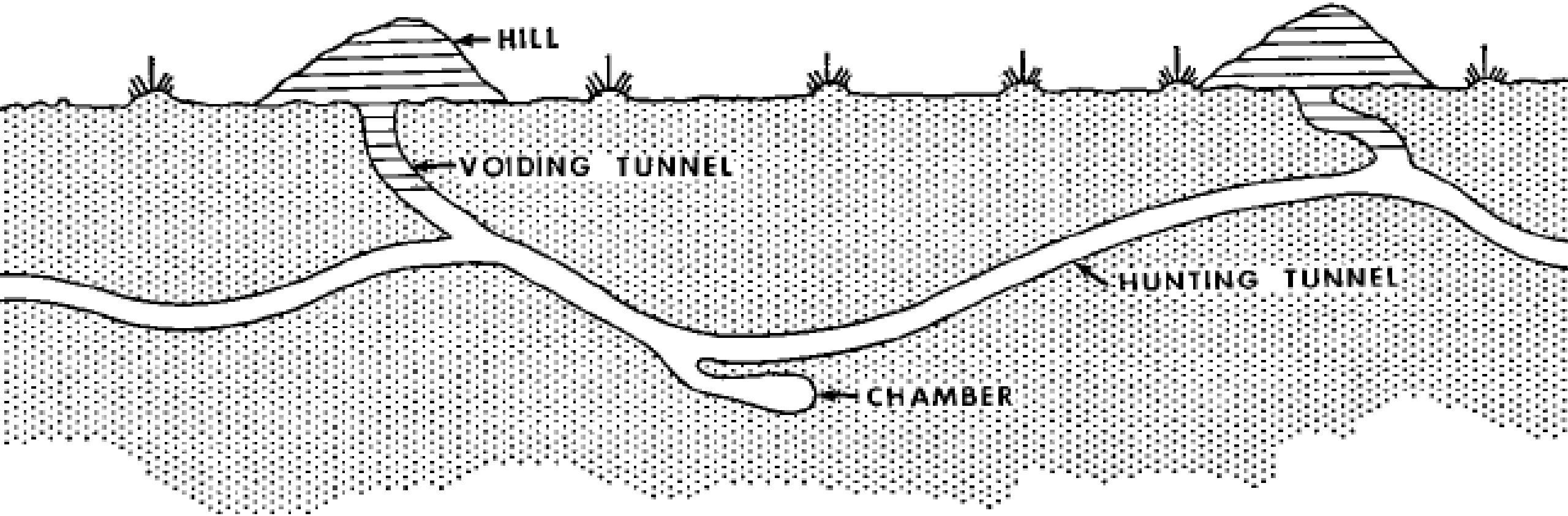
Mitgutsch et al. 2011. Biol. Lett. 8, 74-77.



Berthelsdorf, 1939. *Scholar Archive*. 1647.



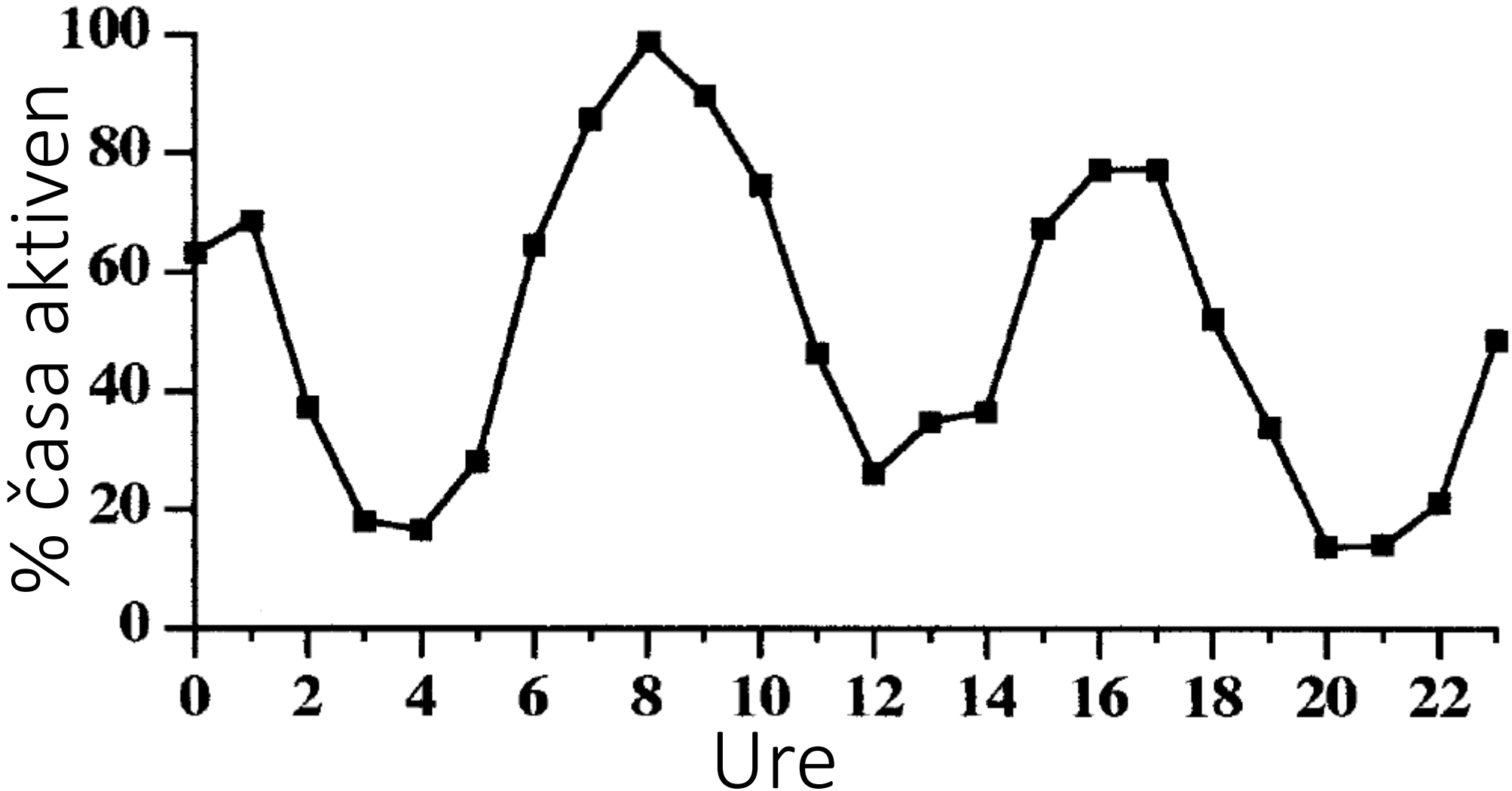
Skoczeń (1958) Acta Theriol. **2**: 235–249.



Glendenning 1959. Can. J. Animal Sci. 39: 34–44.

23–63 t / ha;; 4·3–11·2% površine

http://o.seattletimes.nwsource.com/html/localnews/2014158720_moles08m.html

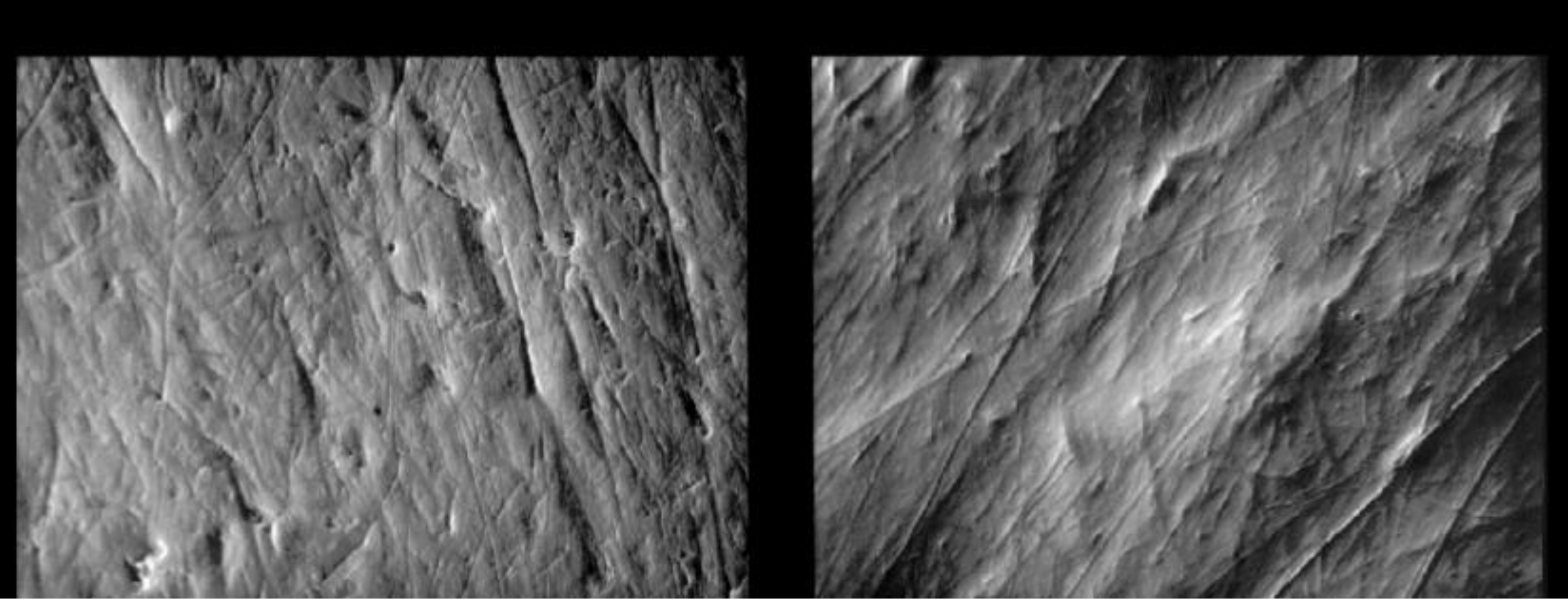

% časa aktiven
100
80
60
40
20
0
0
2
4
6
8
10
12
14
16
18
20
22
Ure

Deževniki

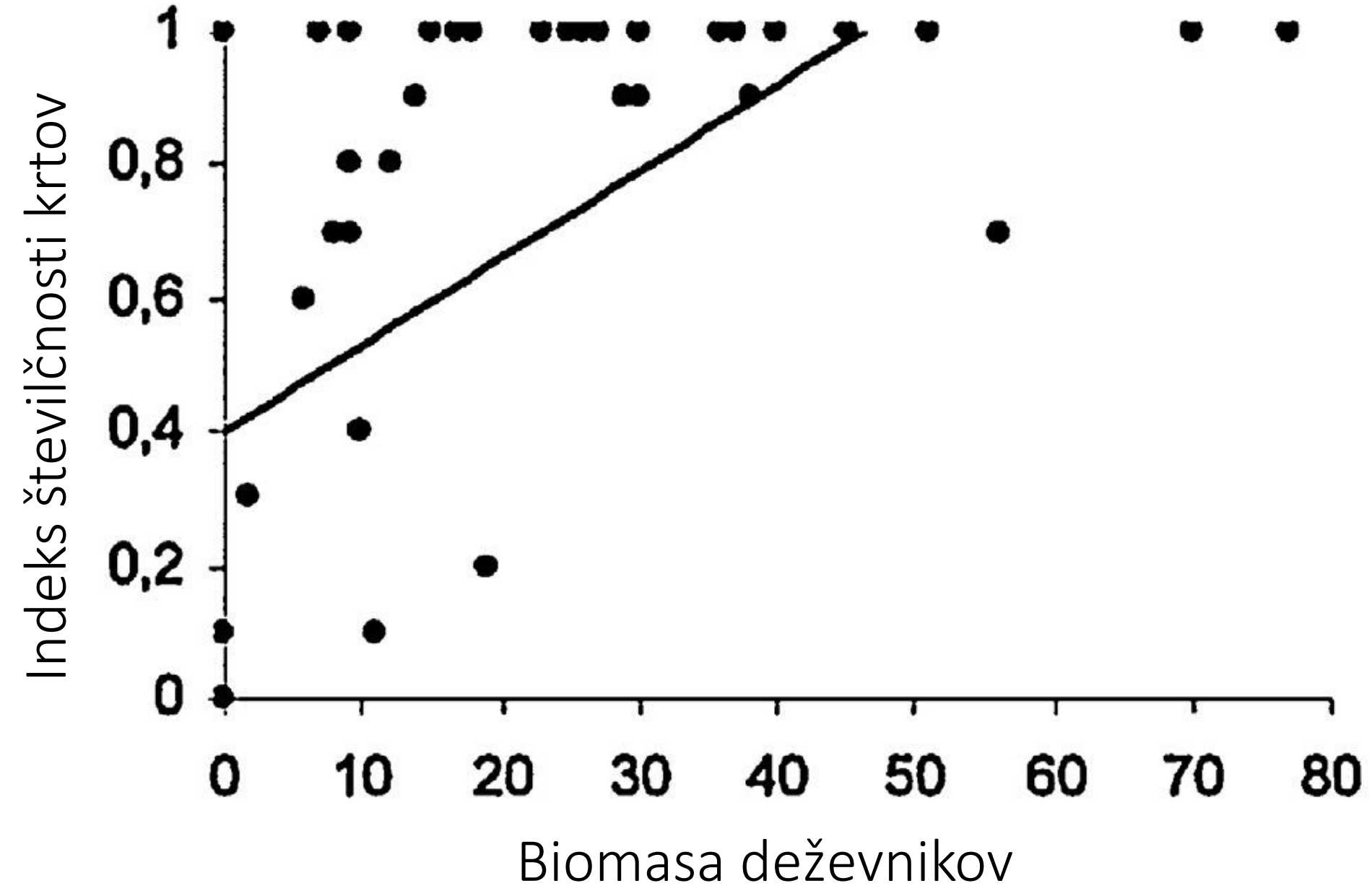
- 40–90% biomase velikih nevretenčarjev v tleh
- Biomasa do 1000 kg / ha
- Večina deževnikov v zgornjih 7,5 cm prsti
- Nizka energijska vrednost (3 kJ/g) (jajce 16 kJ/g, meso >15 kJ/g)

1,5 kg prsti / m2 je v deževnikih (= 0,75 g prsti / deževnika)

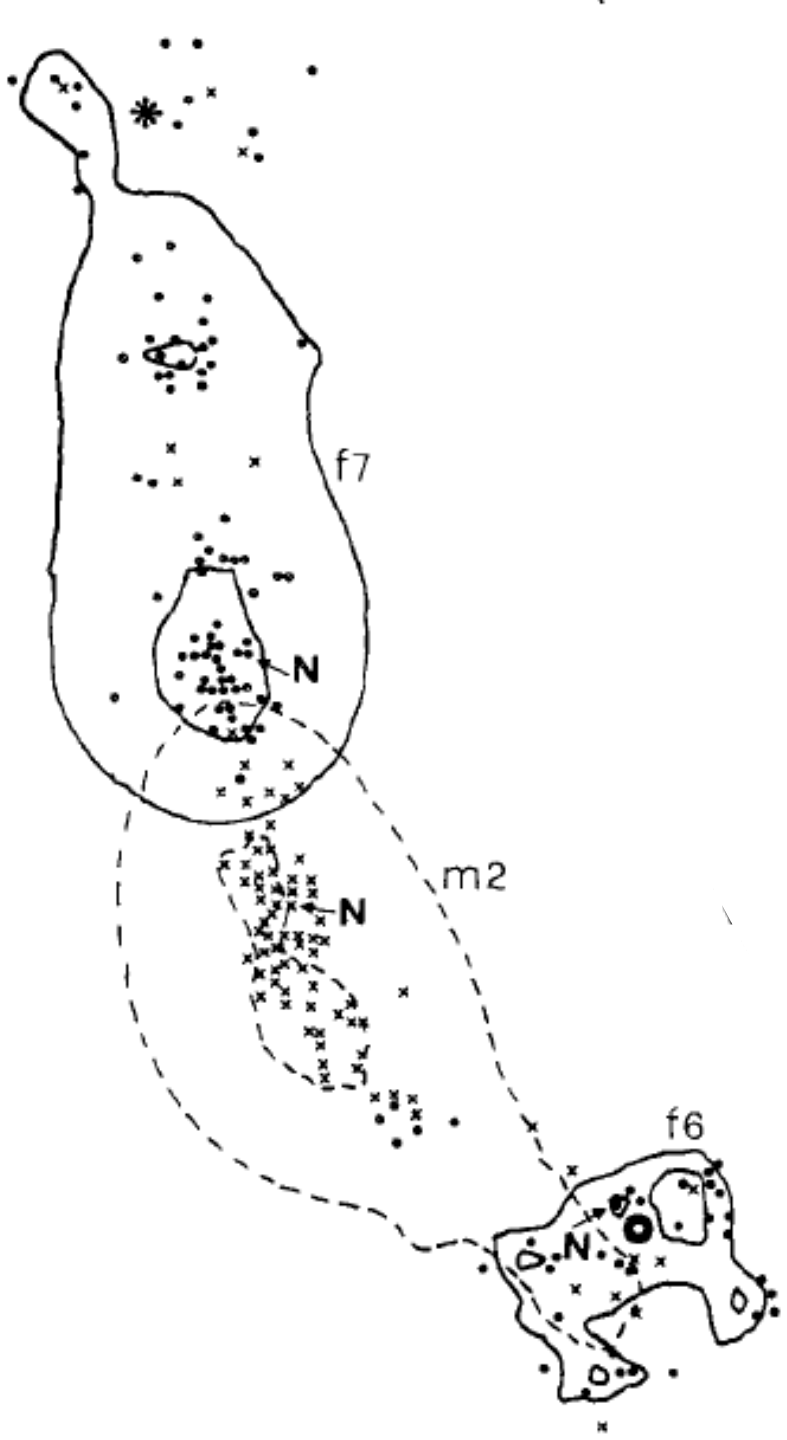
https://www.google.si/search?dcr=0&biw=1366&bih=692&tbm=isch&sa=1&ei=UnCZW4TqA4vQwAKn34_YDQ&q=mole+earthworm&oq=mole+earthworm&gs_l=img.3...4868023.4872642.0.4873627.14.14.0.0.0.0.189.1534.5j9.14.0....0...1c.1.64.img..0.10.1163...0j0i67k1j0i30k1j0i19k1j0i5i30i19k1j0i8i30i19k1.0.3JVZJG_W0Vs#imgrc=ZWR5wDSSNDQdAM:



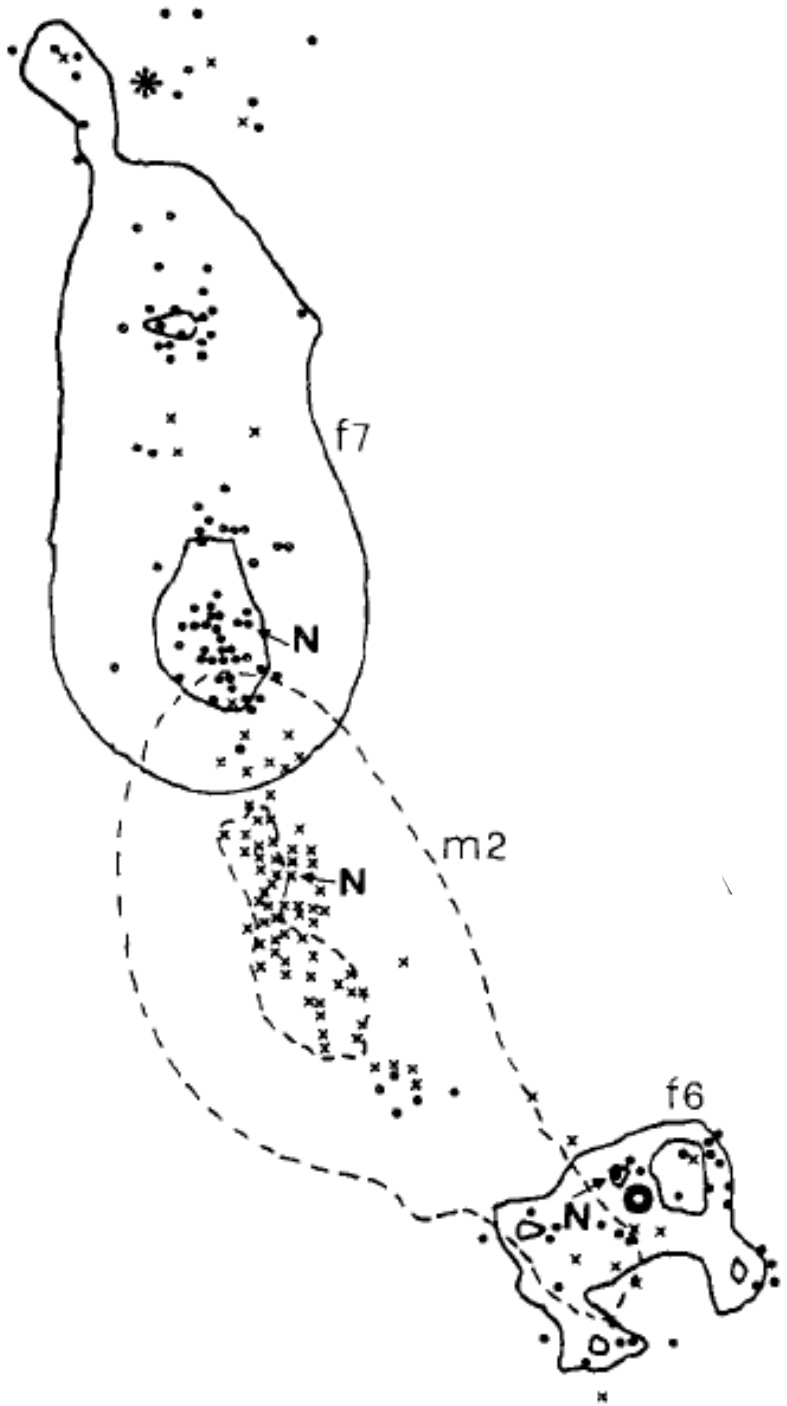
Silcox & Teaford (2002) J. Mammal. 83: 804–814.

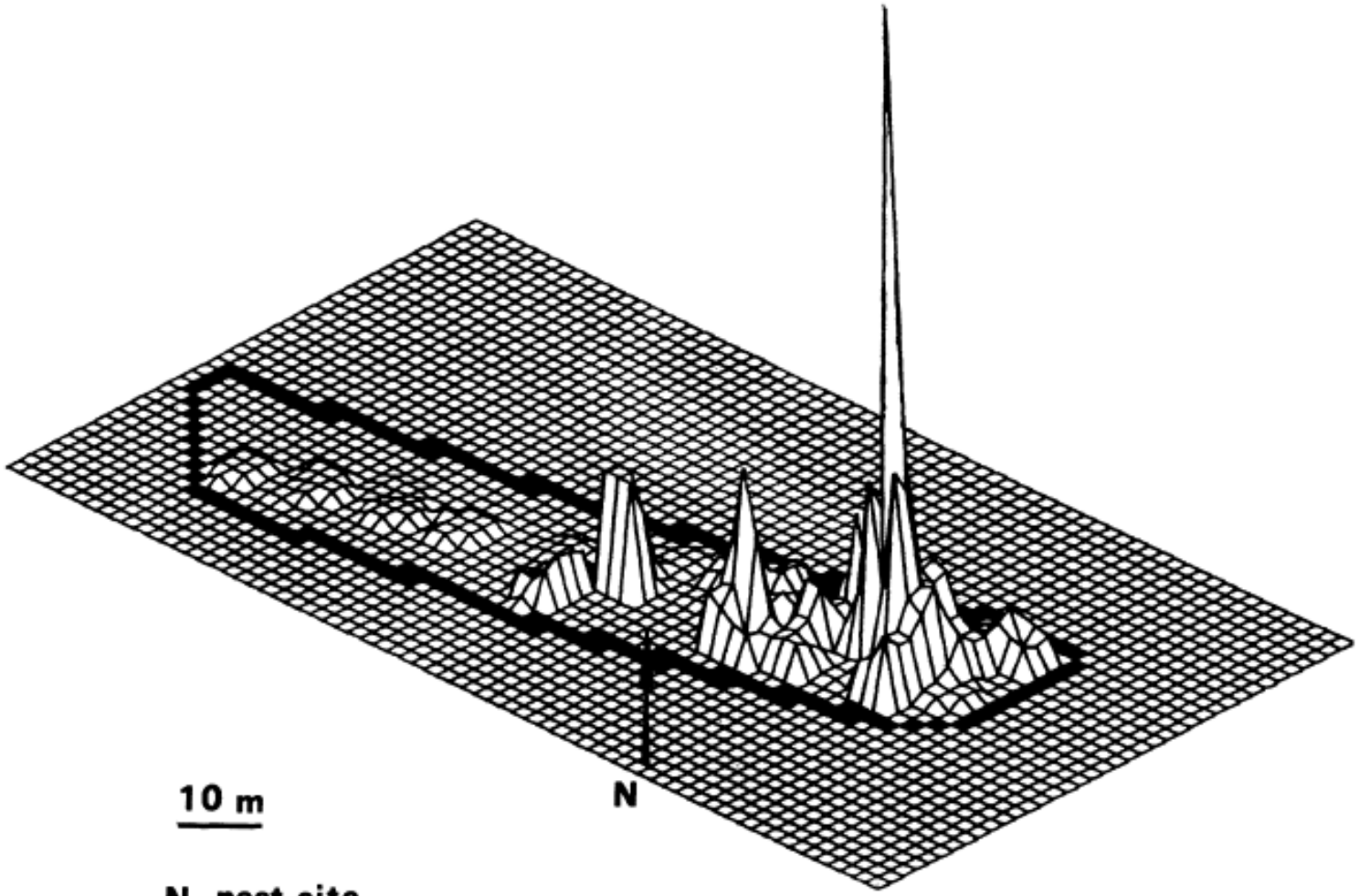


Garcia Lopez et al. 2013. Mamm. Biol. 78, 276-282.



Loy et al. 1994. J. Mammal. 75, 529-535

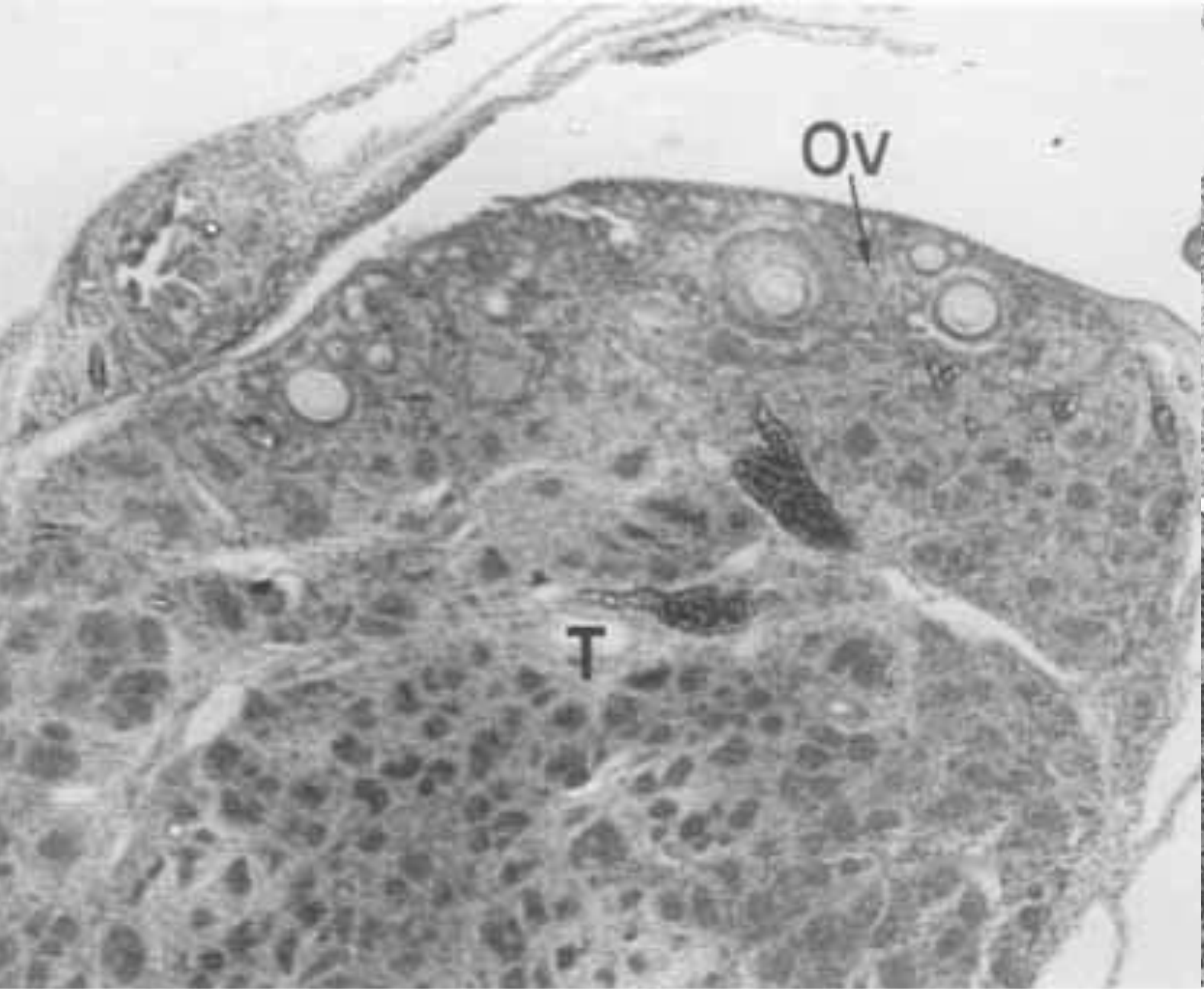


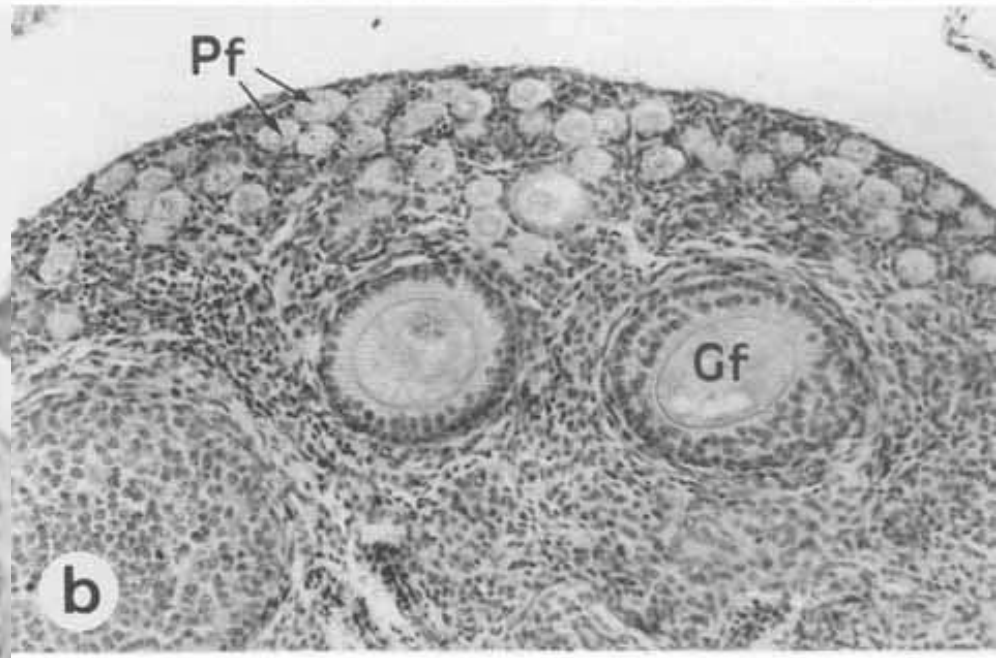


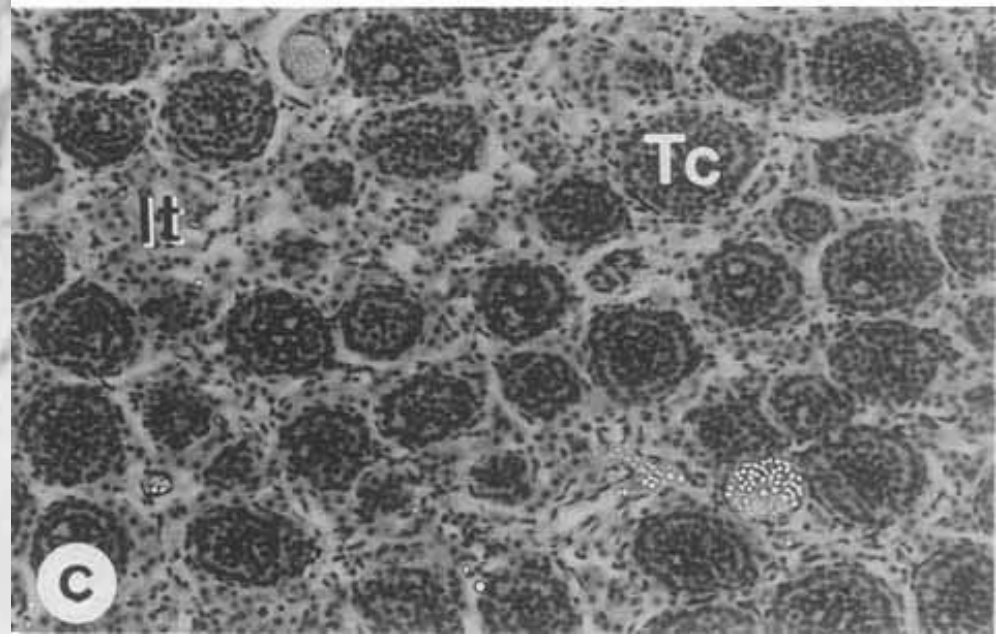
N nest site

home range boundaries

Loy et al. 1994. J. Mammal. 75, 529-535







Jimenez et al. 1996. J. Exp. Zool. 274, 130-137.

Zdeněk Miler

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- Pred 1914 je bil izvoz v ZDA prek Londona vreden 2-3 mil. $
- V 1920-ih in 1930-ih v ZSSR letni ulov 20-30 mil. krtov
- Povpraševanje upade po 1945
- Prenehanje lova v 1980-ih

https://www.google.si/search?q=lady+mole+catcher&dcr=0&tbm=isch&tbo=u&source=univ&sa=X&ved=2ahUKEwjezJD22LLdAhUL2KQKHezCCCgQsAR6BAgEEAE&biw=1366&bih=691#imgrc=TfawJK8vAb5SQM:

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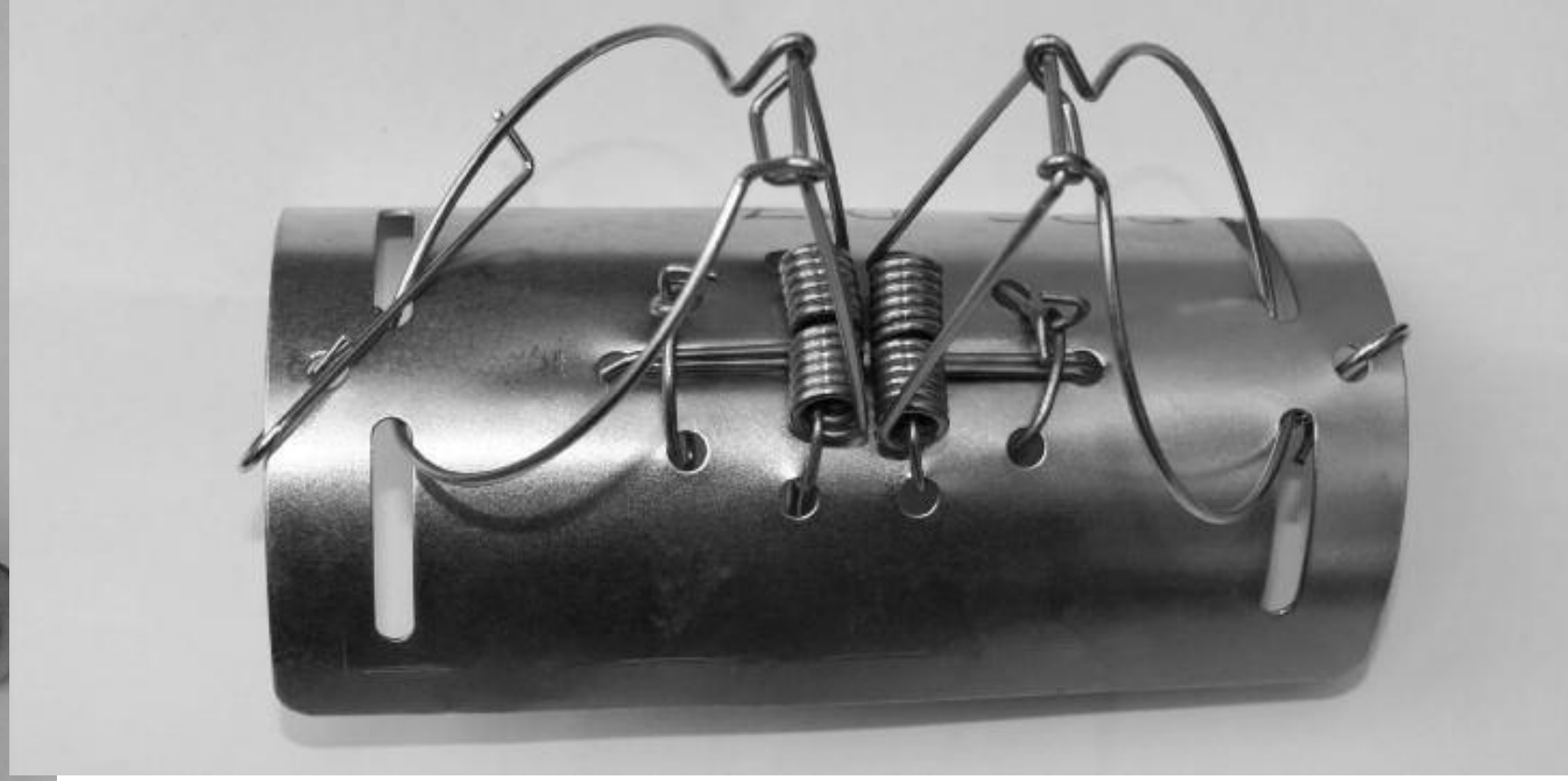
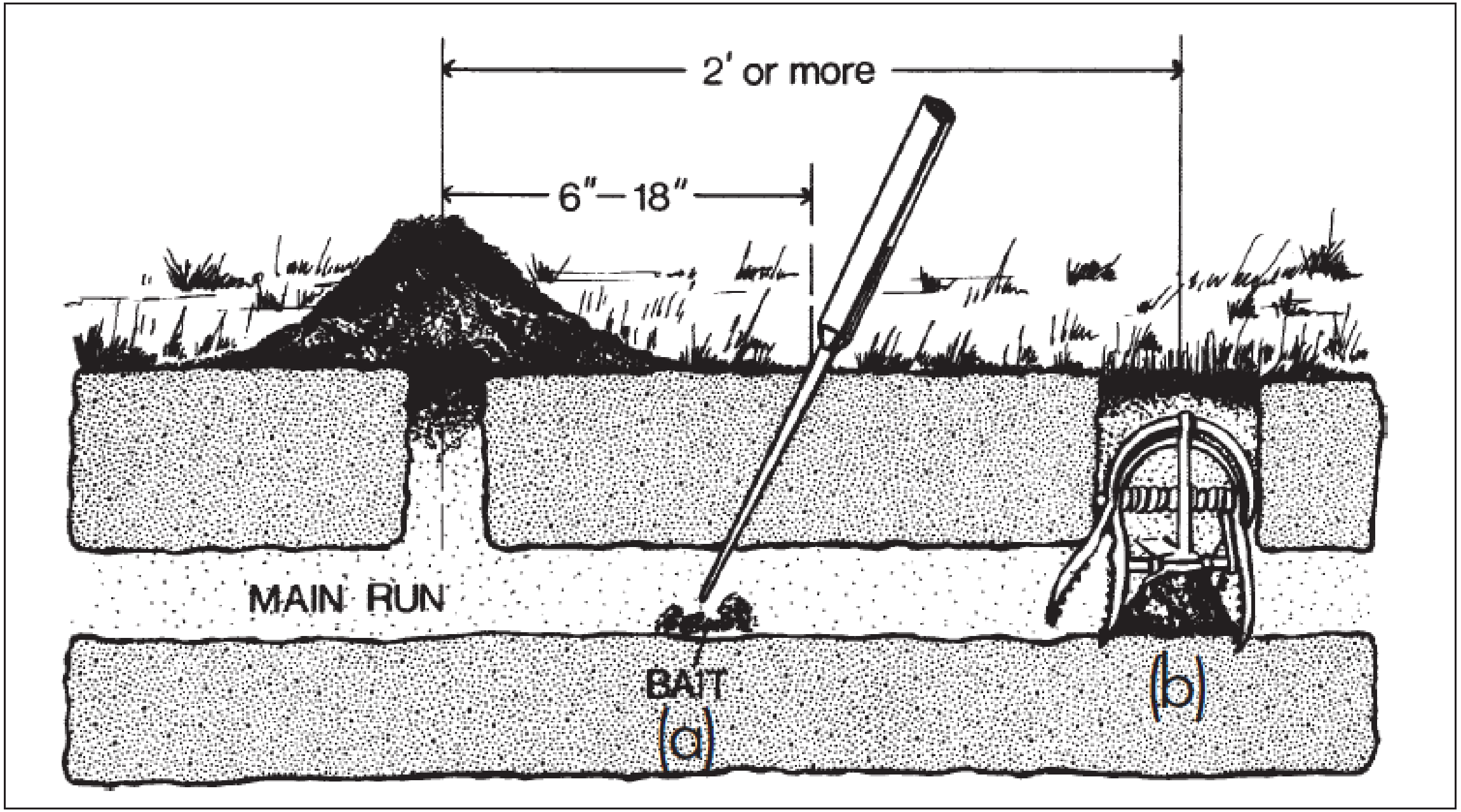
The Lady Mole-catcher

https://www.google.si/search?q=lady+mole+catcher&dcr=0&tbm=isch&tbo=u&source=univ&sa=X&ved=2ahUKEwjezJD22LLdAhUL2KQKHezCCCgQsAR6BAgEEAE&biw=1366&bih=691#imgrc=3hu33iKhzxaFcM:



Baker et al. 2015. Animal Welfare 24, 1-14.



Kuhn & Edge 2002. EC 987.

https://www.mole-catcher.co.uk/

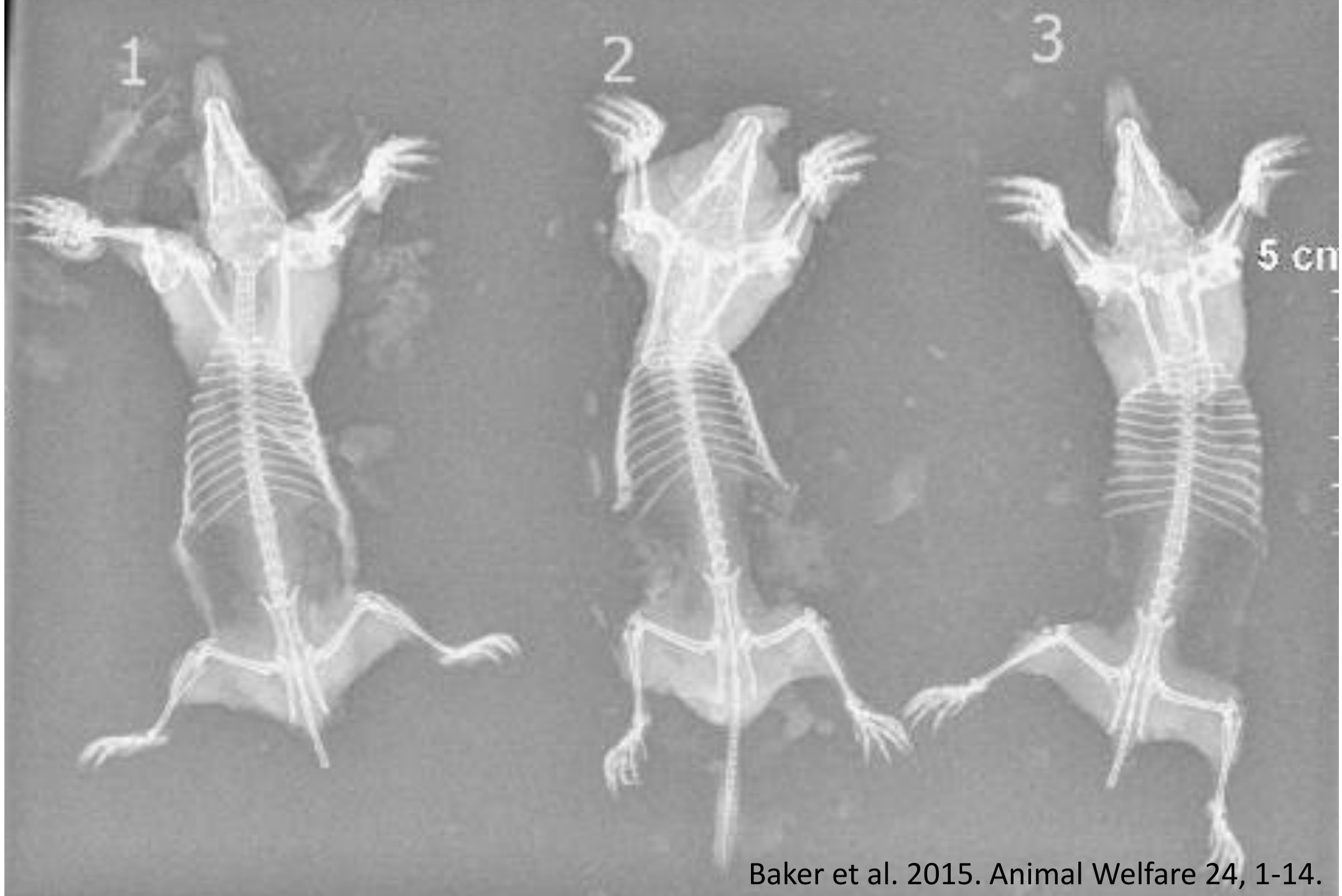
Humane ways of removing moles

Forget the sentimental human side of nature for one moment and ask yourself "what is humane?" A humane death for a pest is without a doubt the best solution for everyone concerned, none of us want the mole to suffer and the modern specialist traps we use are more than powerful enough to ensure a quick, painless end.

Humani načini odstranjevanja krtov

Pozabimo za trenutek na sentimentalno stran človekove narave in se vprašajmo „kaj je humano“? Humana smrt škodljivca je nedvomno najboljša rešitev za vse vpletene. Nihče od nas ne želi, da bi krt trpel in sodobne specialistične pasti, ki jih uporabljamo, so več kot zadosti močne za zagotavljanje hitrega, nebolečega konca.

https://www.google.si/search?q=lady+mole+catcher&dcr=0&tbm=isch&tbo=u&source=univ&sa=X&ved=2ahUKEwjezJD22LLdAhUL2KQKHezCCCgQsAR6BAgEEAE&biw=1366&bih=691#imgrc=NYzxhDTDLFLdmM:

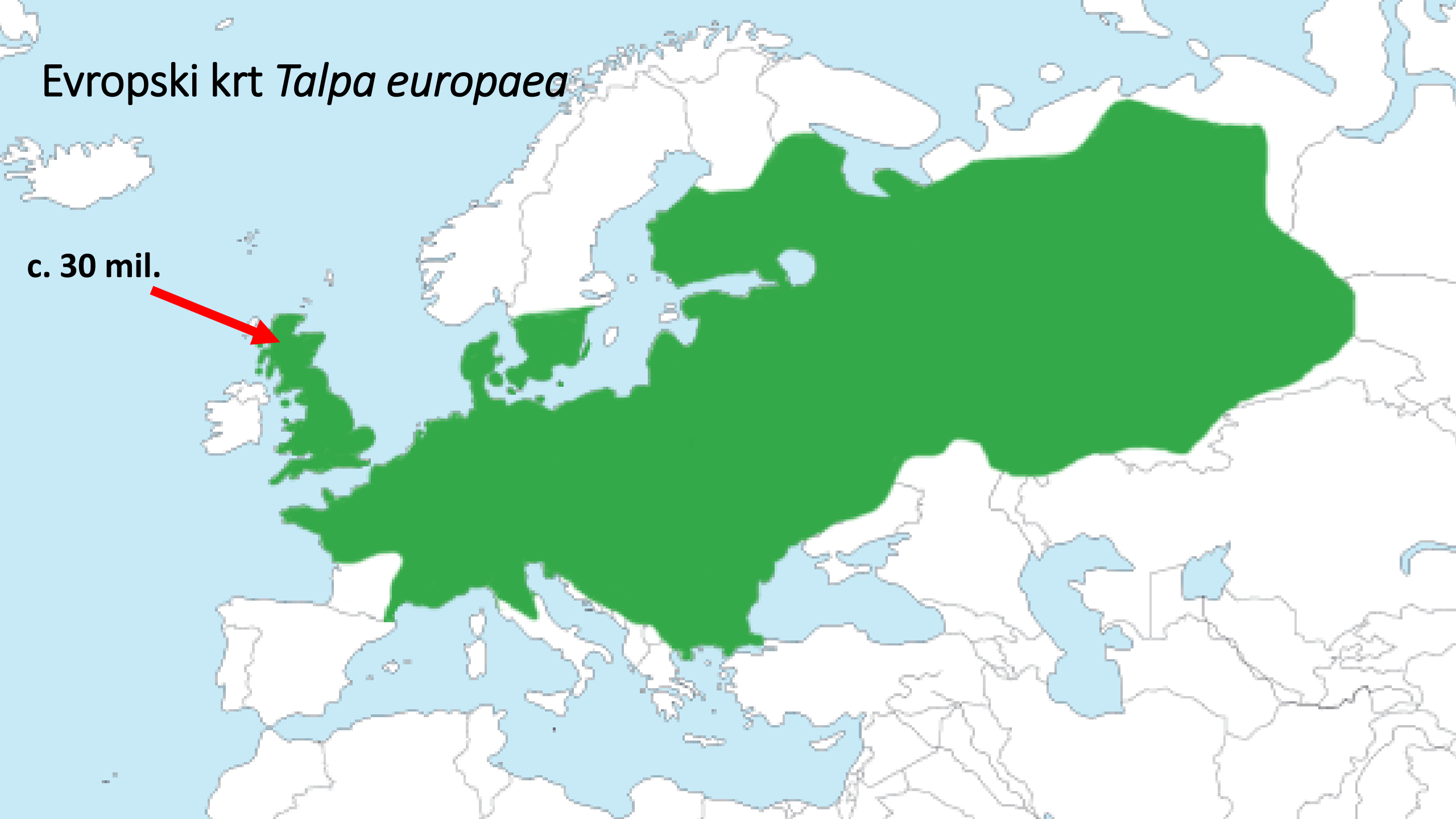


Baker et al. 2015. Animal Welfare 24, 1-14.

Baker et al. 2015. Animal Welfare 24, 1-14.

Evropski krt *Talpa europaea*

c. 30 mil.




Evropski krt *Talpa europaea*
c. 30 mil.
c. 500 mil.

Desmana moschata

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EX EW CR EN VU NT LC

〈ENDANGERED〉
EN

http://maps.iucnredlist.org/map.html?id=6506http://maps.iucnredlist.org/map.html?id=6506

Rutovskaya et al. 2017. Nat. Cons. Res. 2, 100-112.

Ruski vihulj

Leto	Št. vihuljev	Indeks
• 1930	<800.000	100
• 1970	71.000	9
• 1985	41.000	5
• 2000	28.000	4
• 2005	25.000	3
• 2015	<13.300	<2

Galemys pyrenaicus

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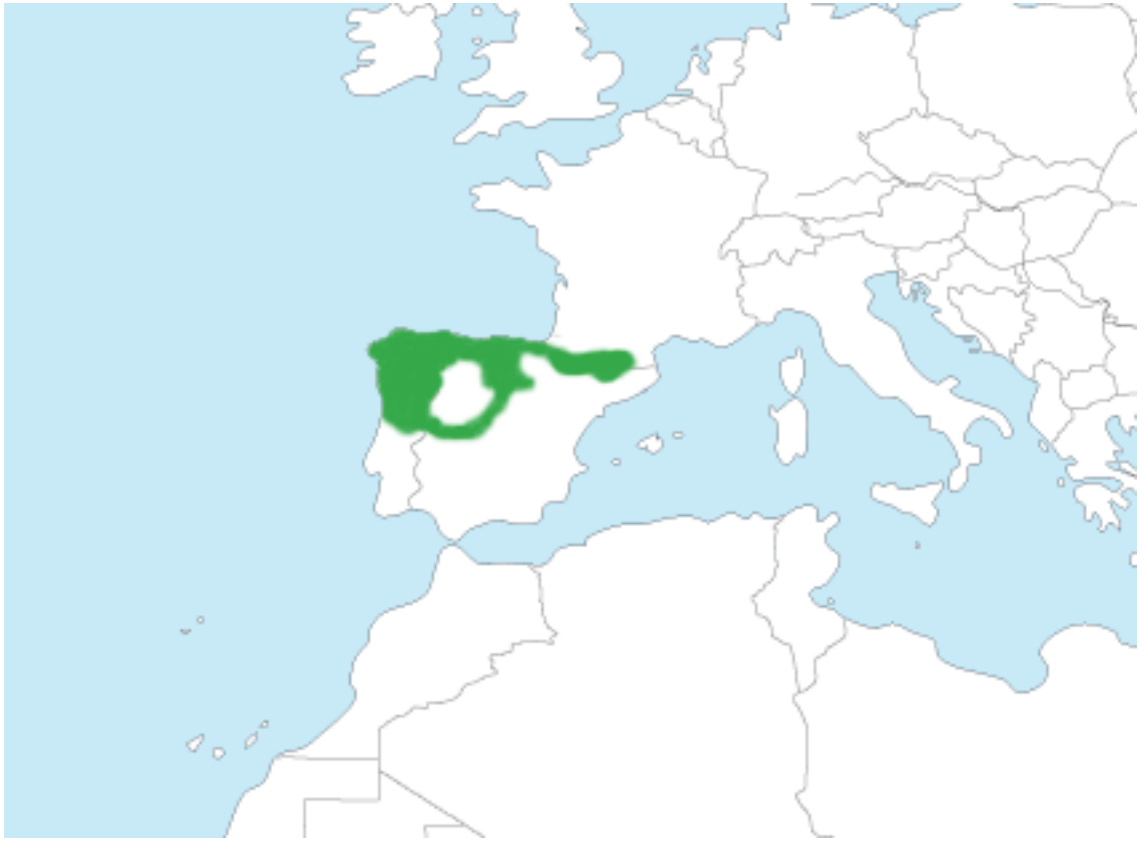
VULNERABLE

VU



https://www.google.si/search?q=galemys+pyrenaicus&dcr=0&tbm=isch&tbo=u&source=univ&sa=X&ved=2ahUKEwiFg_TI4rfdAhULGewKHSwEBVgQiR56BAgIEBI&biw=1366&bih=692#imgrc=12z9aEzdG1N8iM

Mogera etigo

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ENDANGERED
EN

Endemičen za ravnico Echigo, Niigata (880 km^2)

Ohdachi et al. 2015. The Wild Mammals of Japan. Shoukadoh, Kyoto

Mogera uchidai

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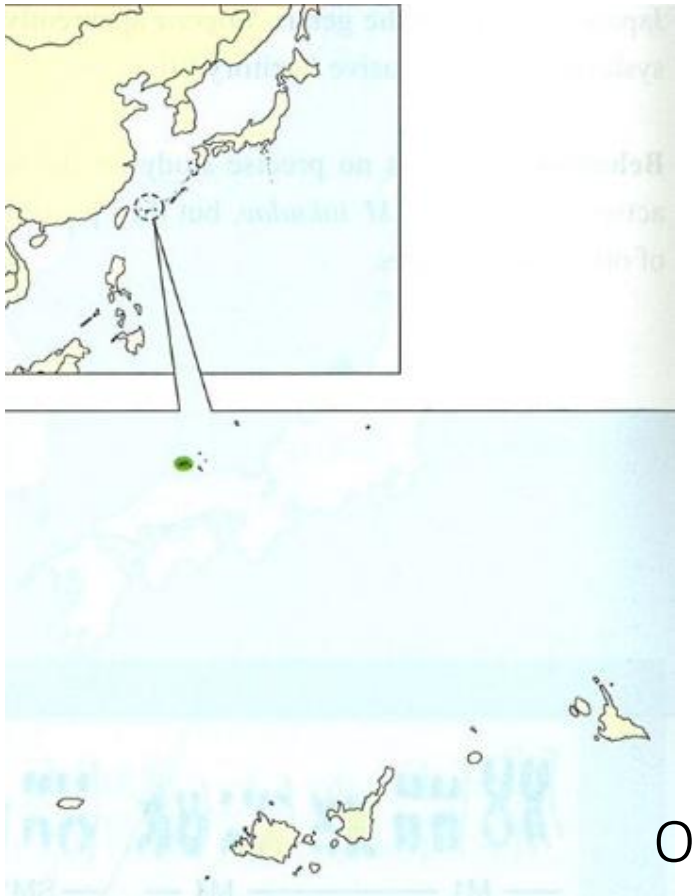
EX EW CR EN VU NT LC

VULNERABLE
VU

Endemičen za otok Uotsuri-jima, Senkaku (3,5 km^2)



Ohdachi et al. 2015. The Wild Mammals of Japan. Shoukadoh, Kyoto

1978

2006

Ohdachi et al. 2015. The Wild Mammals of Japan. Shoukadoh, Kyoto

Hvala