

NASTANEK BIODIVERZITETE SKOZI ADAPTIVNE RADIACIJE

Darwinov dan 2020

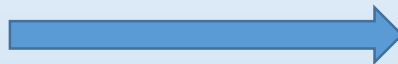
Univerza v Ljubljani
Biotehniška fakulteta



Cene Fišer, Biotehniška fakulteta, Univerza v Ljubljani

TERMINOLOGIJA

BIODIVERZITETA



Kaj sploh je biodiverziteteta?

ADAPTIVNA



Kaj pomeni "adaptacija"?

RADIACIJA

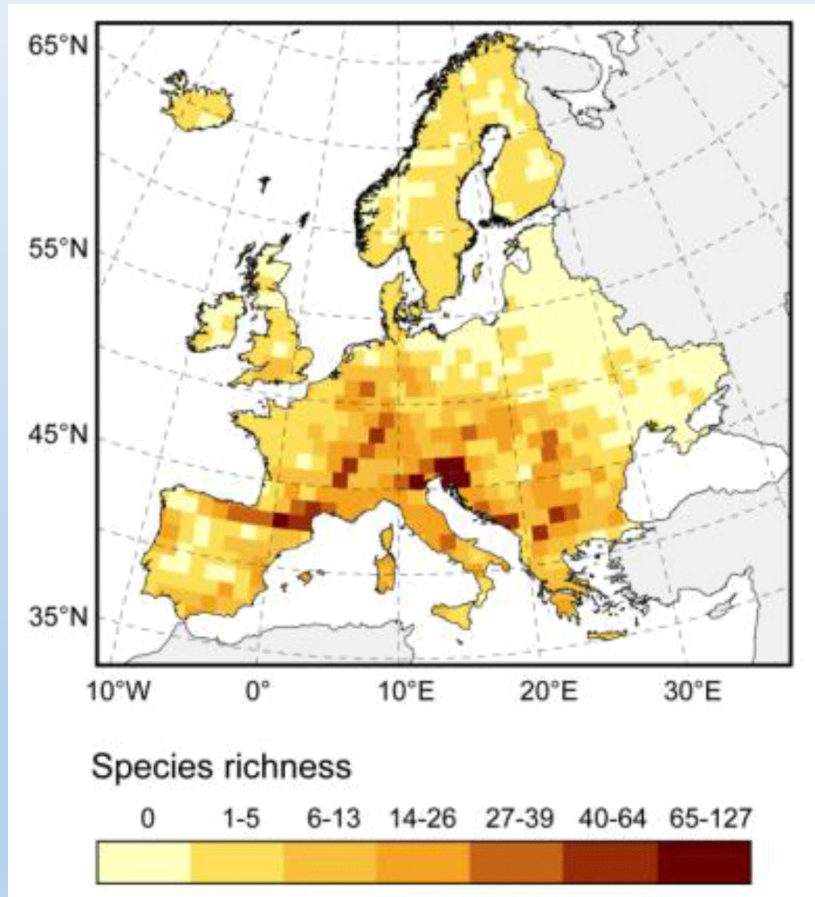


Radiacija – speciacija, kaj je to?

TERMINOLOGIJA

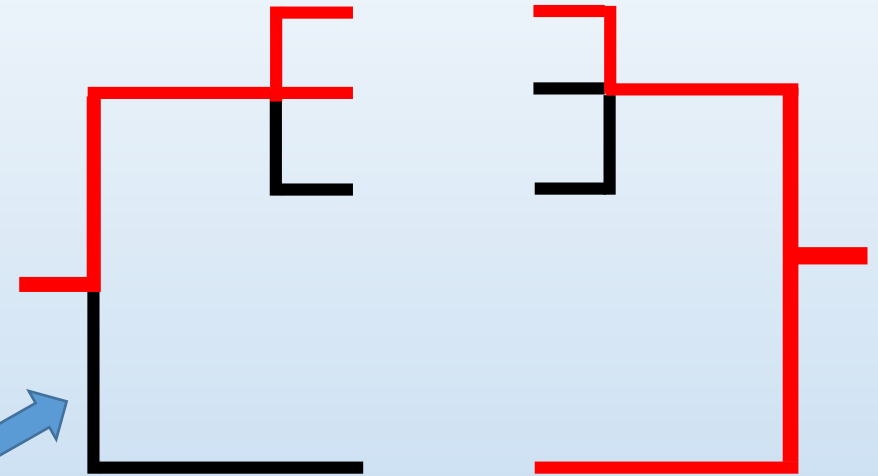
BIODIVERZITETA

Število vrst na geografsko enoto.



Zagmajster et al. 2014, Global Ecology and Biogeography.

Število filogenetskih linij na geografsko enoto.



Vrste niso enaka ena drugi!



Funkcionalno-ekološka pestrost na geografsko enoto.

TERMINOLOGIJA

ADAPTACIJA

Polimorfizem dedne lastnosti

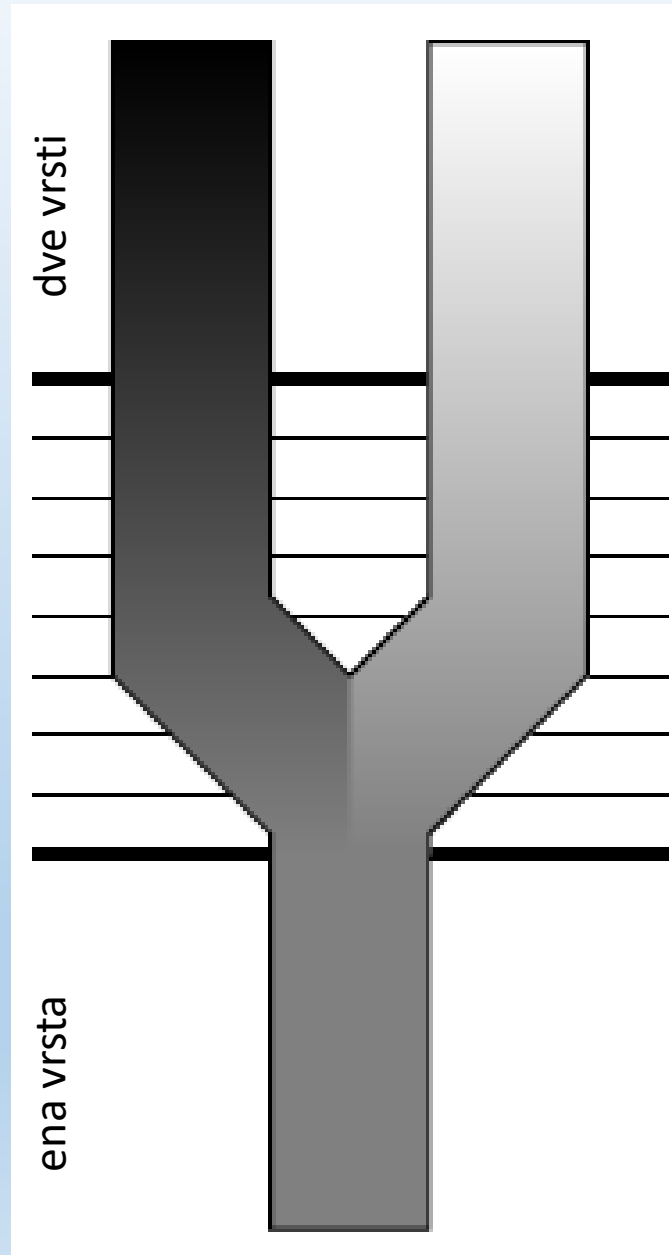


Selekcija



TERMINOLOGIJA

SPECIACIJA



Popolna divergence, zlitje vrst ni več možno.

**Kopičenje razlik med nastajajočimi vrstami;
lahko še pride do reverzibilnega procesa.**

Prekinitev genskega toka med populacijami.

SPECIACIJA IN ADAPTACIJA



Prostorska ločitev,
ekologija lahko
podobna

Postopna genetska in ekološka
divergenca



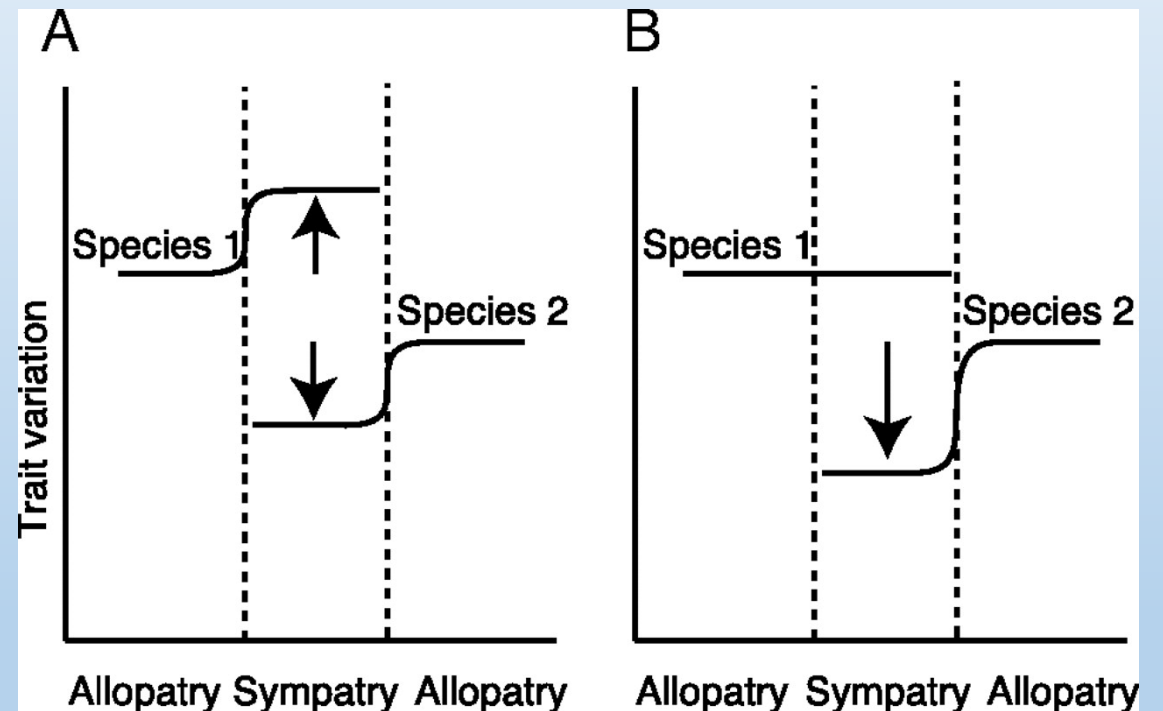
Ekološka divergenca
v istem prostoru

Postopna genetska divergenca

TERMINOLOGIJA

SPECIACIJA IN ADAPTACIJA

Kompeticija kot vir sekcije lahko pospeši adaptacijo in speciacijo in vpliva na sobivanje

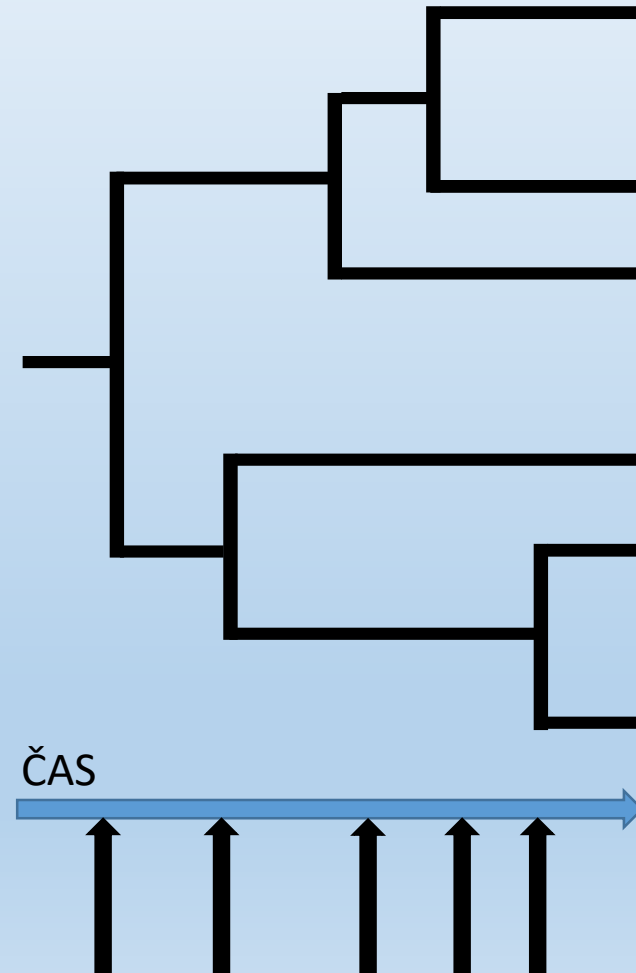


Kirschel et al. 2009. Proceedings of the National Academy of Science

TERMINOLOGIJA

RADIACIJA

Ohlapno definirana kot “obsežen pojav speciacije iz enega prednika”.

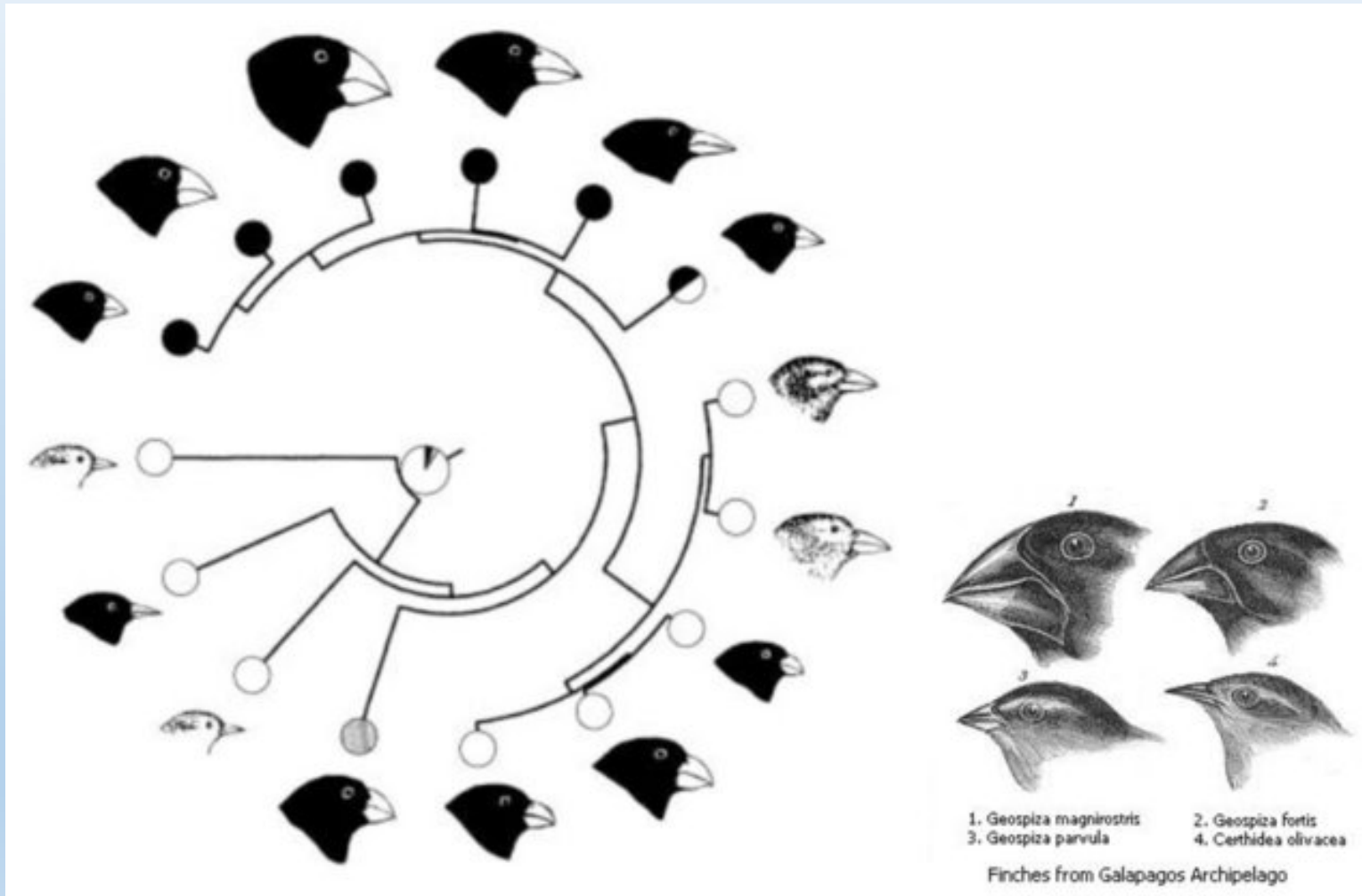


Zaporedje speciacijskih dogodkov.

TERMINOLOGIJA

ADAPTIVNA RADIACIJA

Obsežna speciacija iz enega prednika, pri kateri pride do delitve ekoloških niš.



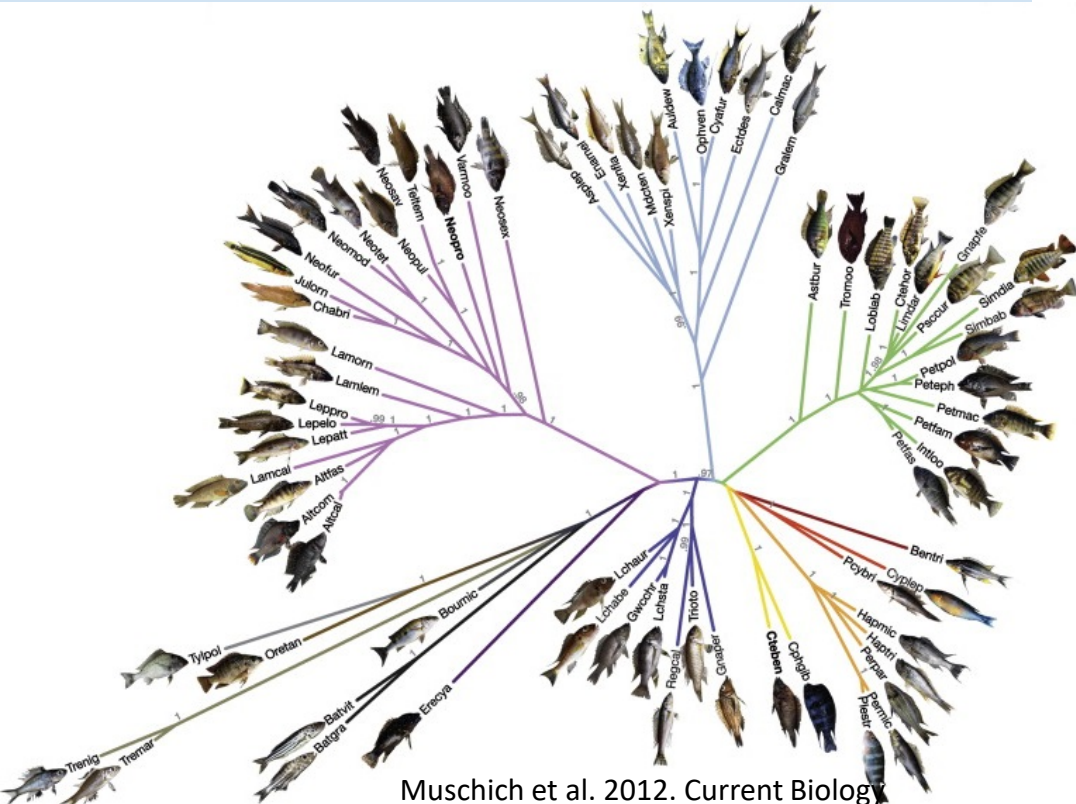
“Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that from an original paucity of birds in this archipelago, one species has been taken and modified for different ends”

(Darwin 1845: 380).

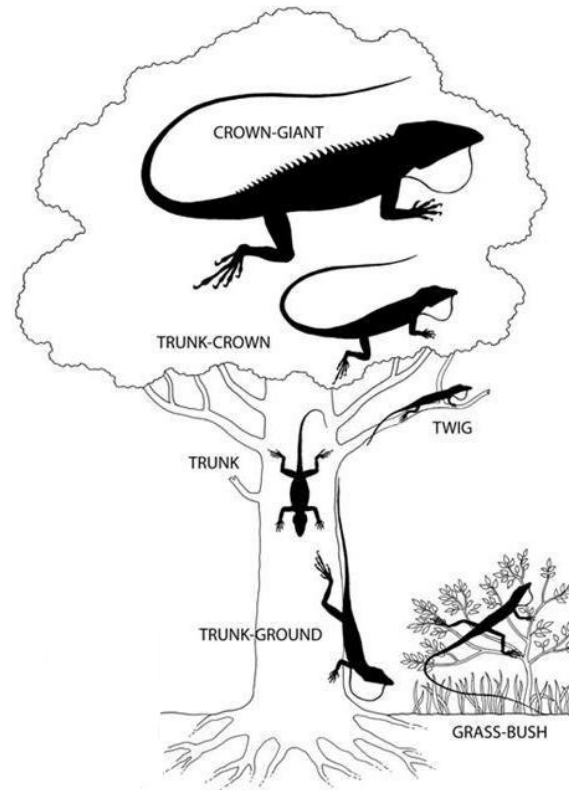
TERMINOLOGIJA

ADAPTIVNA RADIACIJA

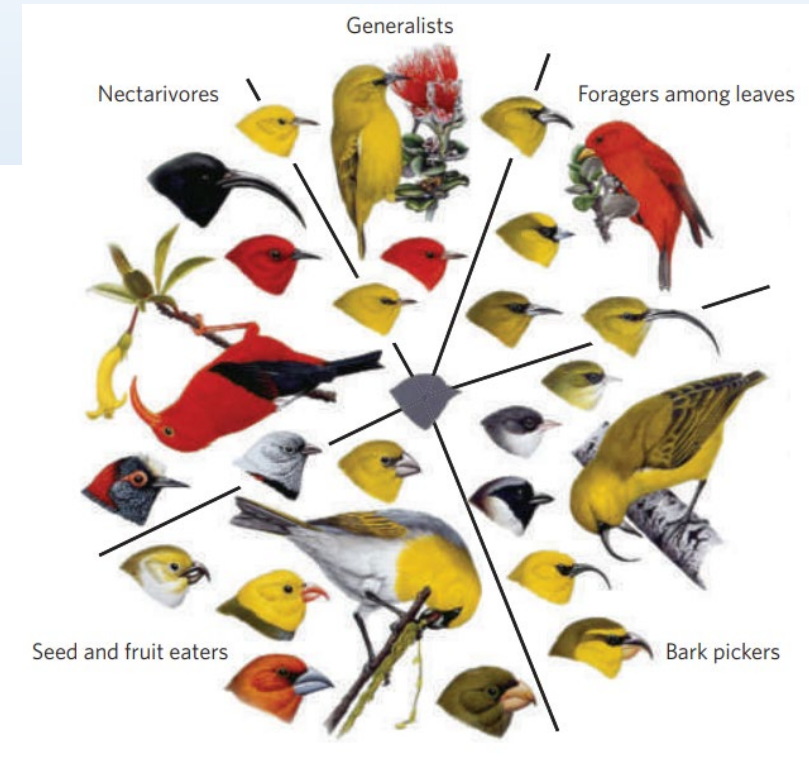
Obsežna speciacija iz enega prednika, pri kateri pride do delitve ekoloških niš.



Muschich et al. 2012. Current Biology



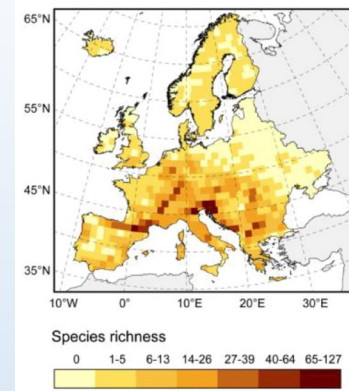
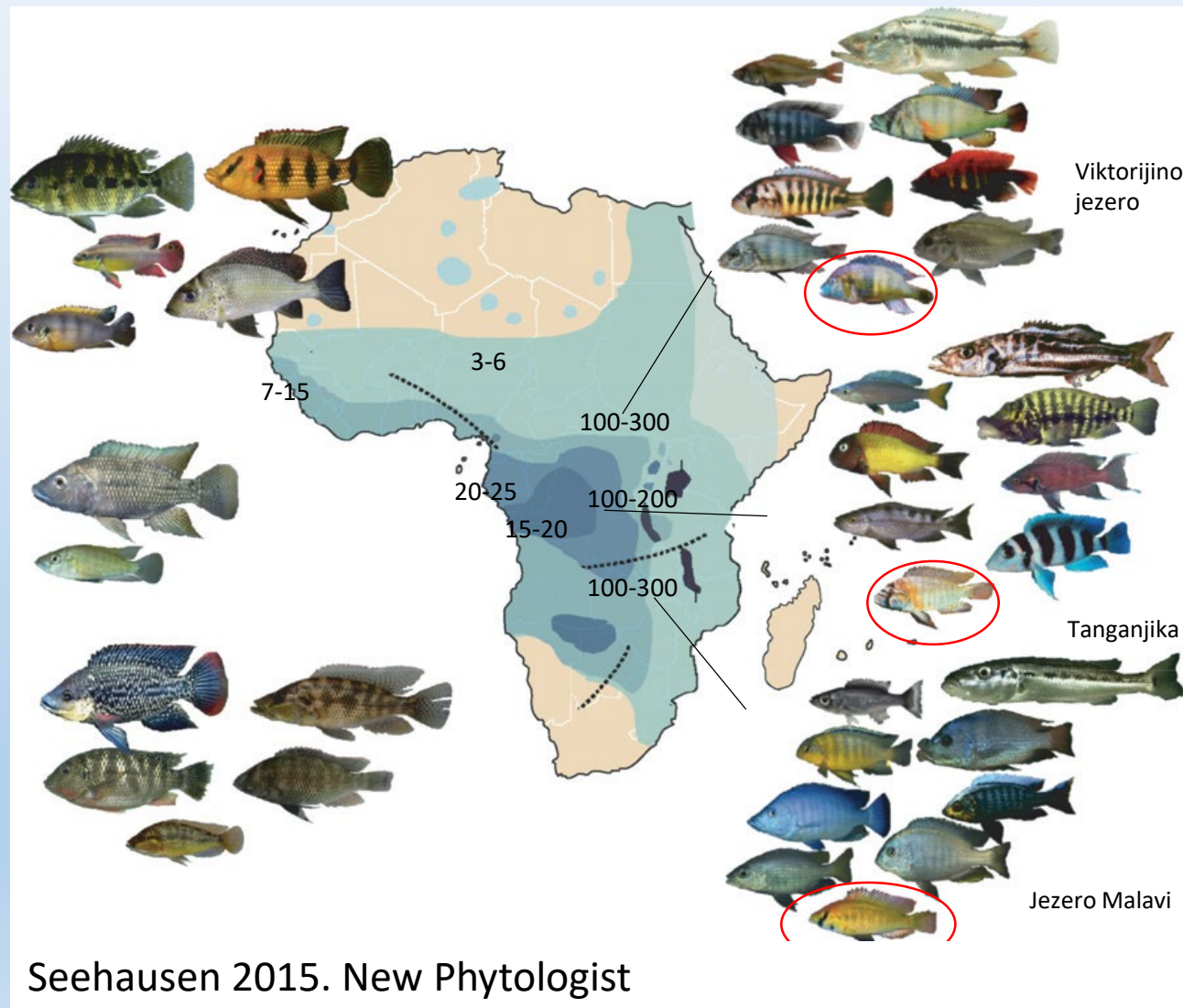
Losos 2009. Lizards in an Evolutionary Tree: Ecology and Adaptive Radiation of Anoles.



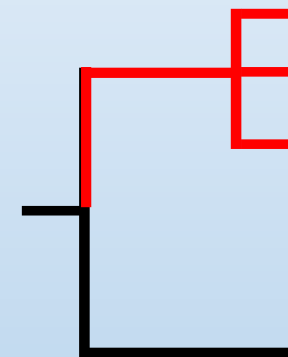
Losos and Mahler 2010. Objavljeno v: Evolution since Darwin: The First 150 years.

TERMINOLOGIJA

ADAPTIVNA RADIACIJA IN BIODIVERZITETA



**VISOKA VRSTNA
PESTROST**



**NIZKA
FILOGENETSKA
PESTROST**



**VISOKA
EKOLOŠKA
PESTROST**

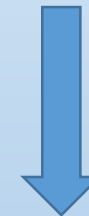
V KAKŠNIH OKOLIŠČINAH PRIDE DO ADAPTIVNE RADIACIJE?

Ali lahko pride do
adaptivne radiacije
kjerkoli na svetu?



“Zunanji” pogoji:
ekološka priložnost.

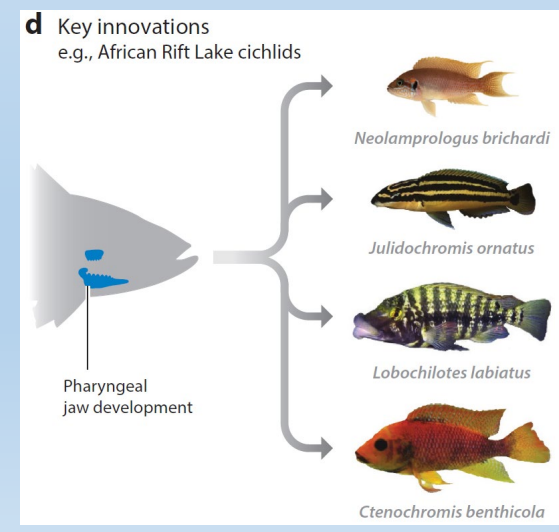
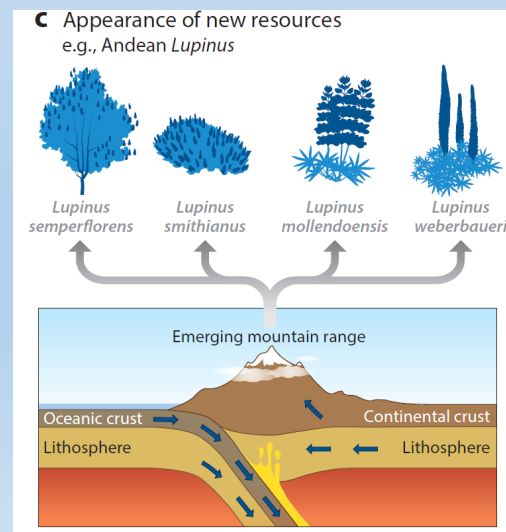
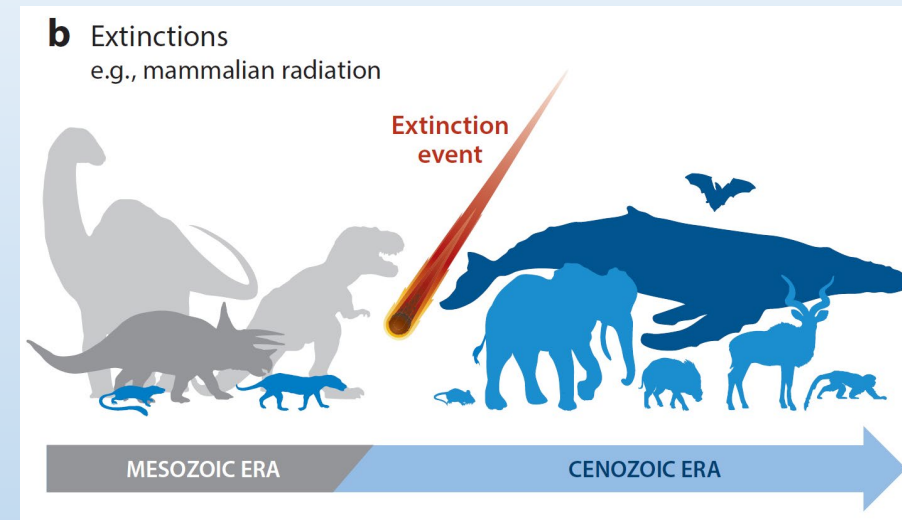
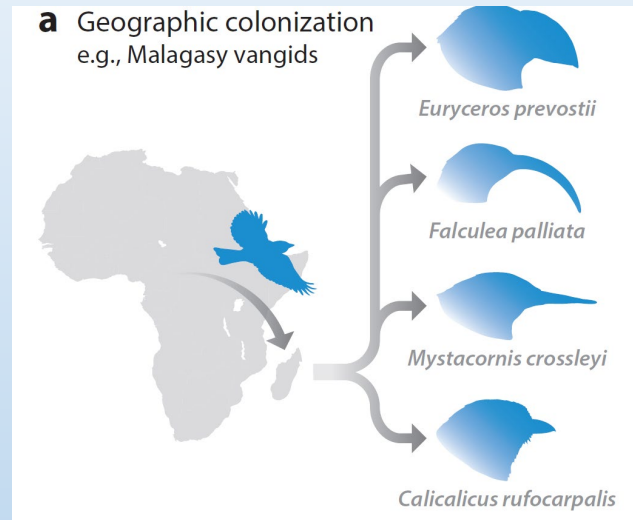
Ali lahko katerakoli vrsta
zasnuje adaptivno
radiacijo?



“Notranji” pogoji:
“evolvabilnost”.

MEHANIZMI IN POTEK ADAPTIVNE RADIACIJE

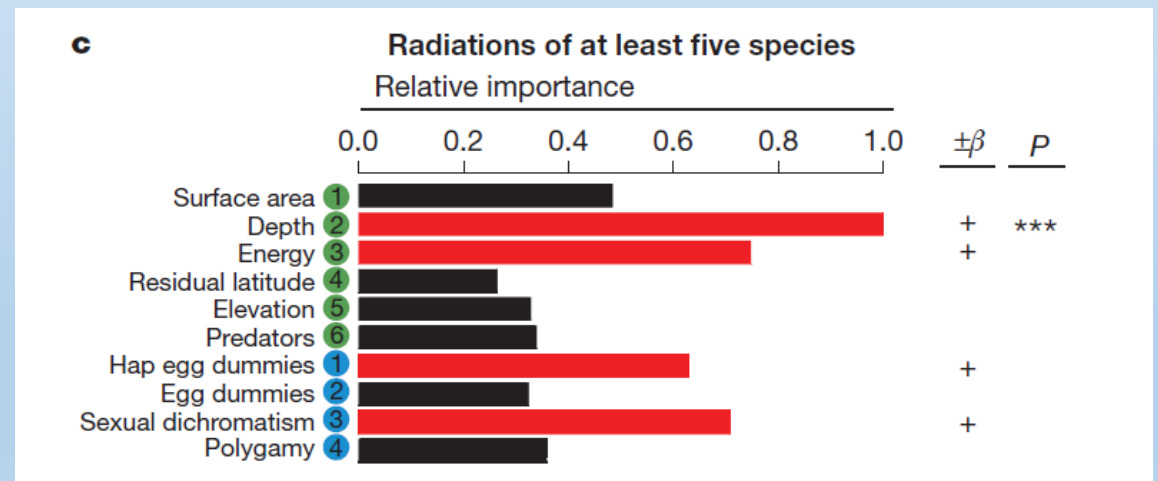
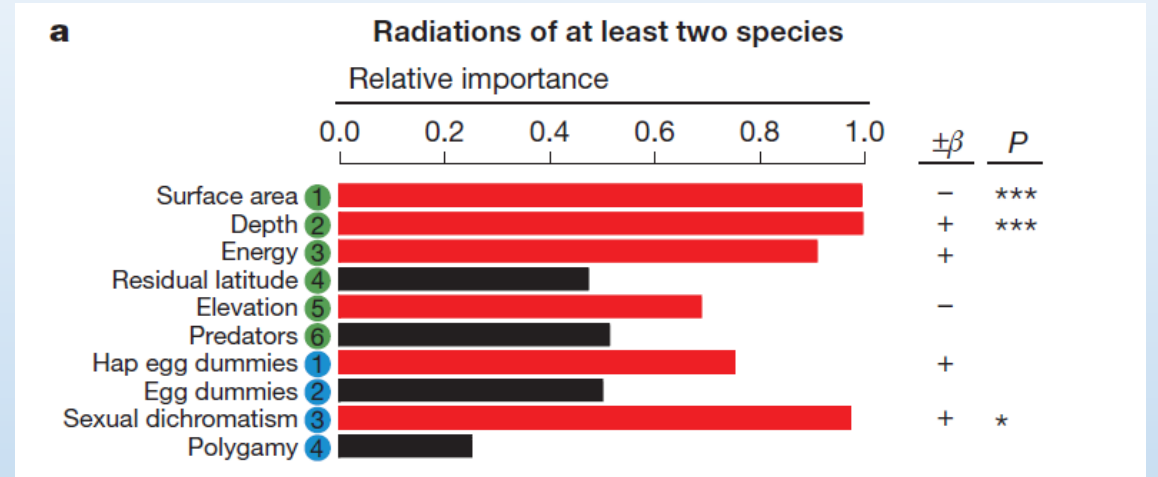
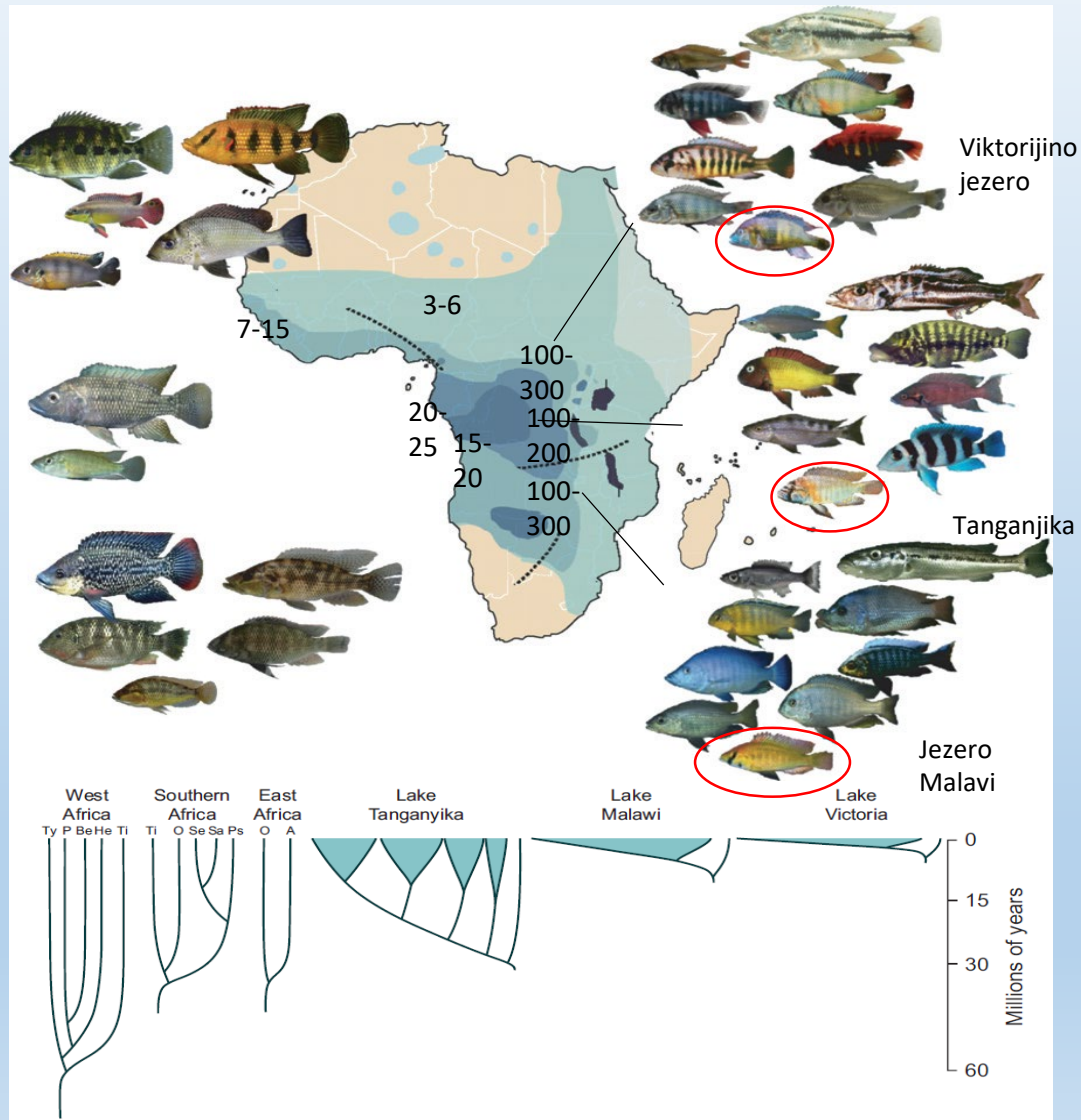
EKOLOŠKA PRILOŽNOST



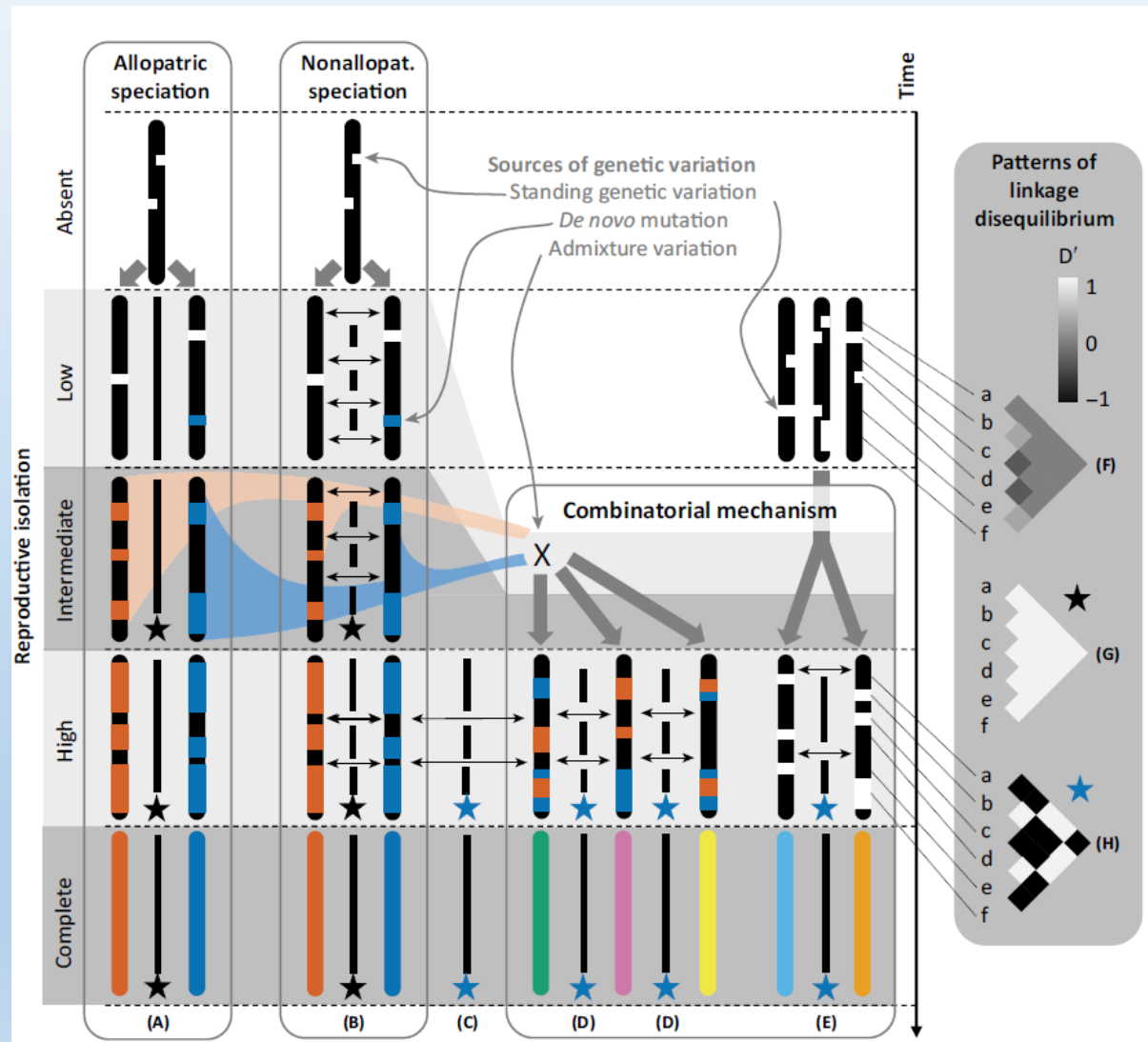
Stroud in Losos 2016. Annual Review of Ecology Evolution and Systematics

MEHANIZMI IN POTEK ADAPTIVNE RADIACIJE

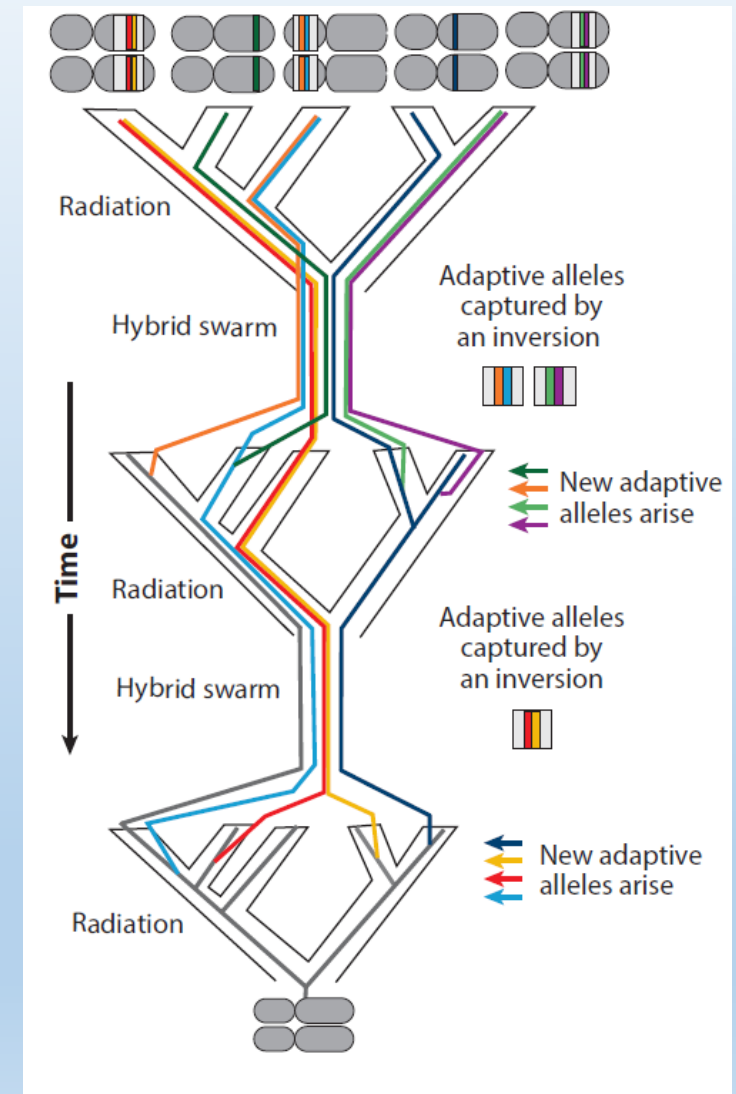
EKOLOŠKA PRILOŽNOST



EVOLVABILNOST

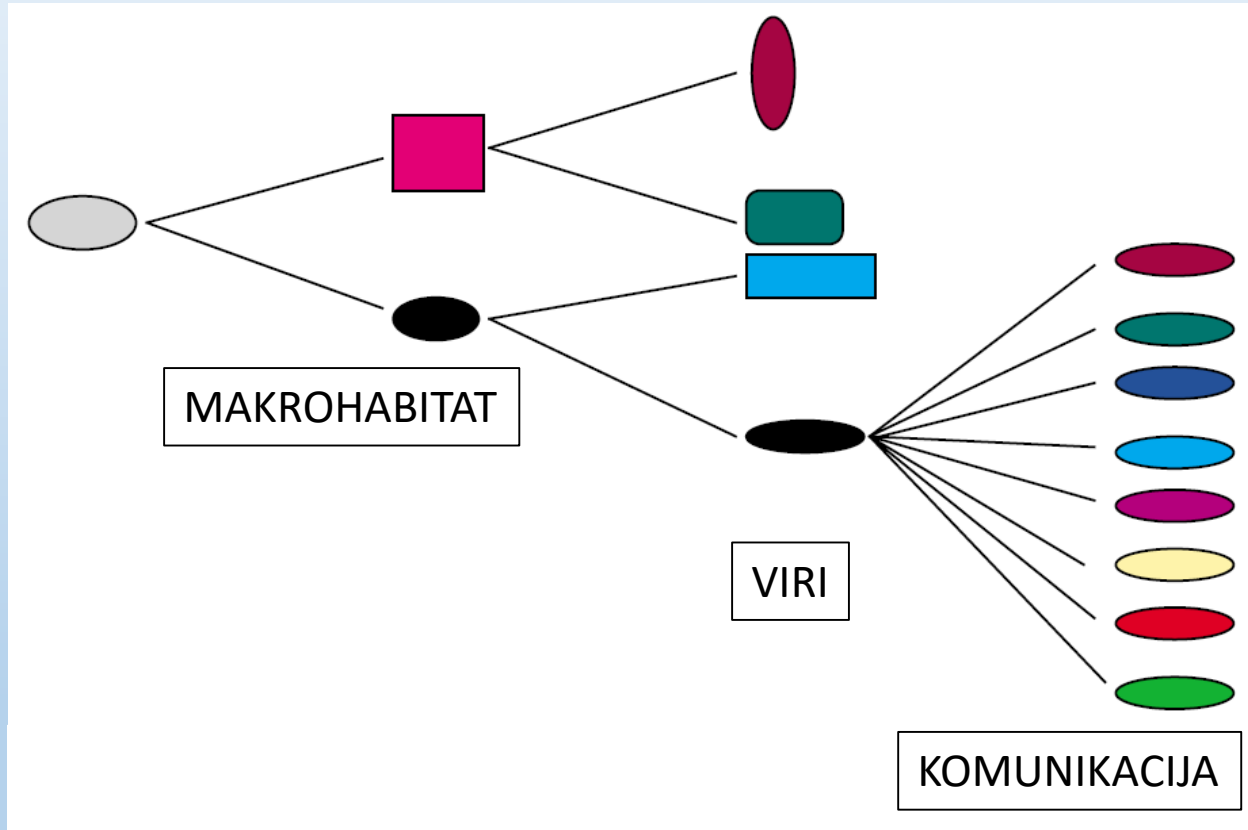


Hibridizacija: Marques et al. 2019. Trends in Ecology and Evolution



Martin in Richards 2019. Annual Review of Ecology, Evolution, and Systematics.

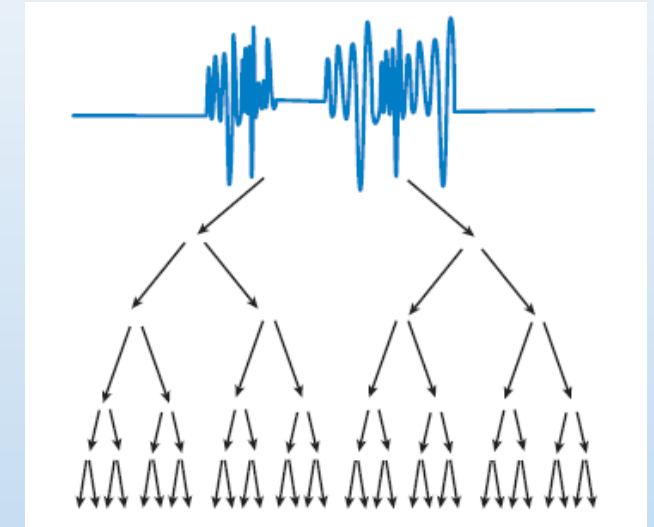
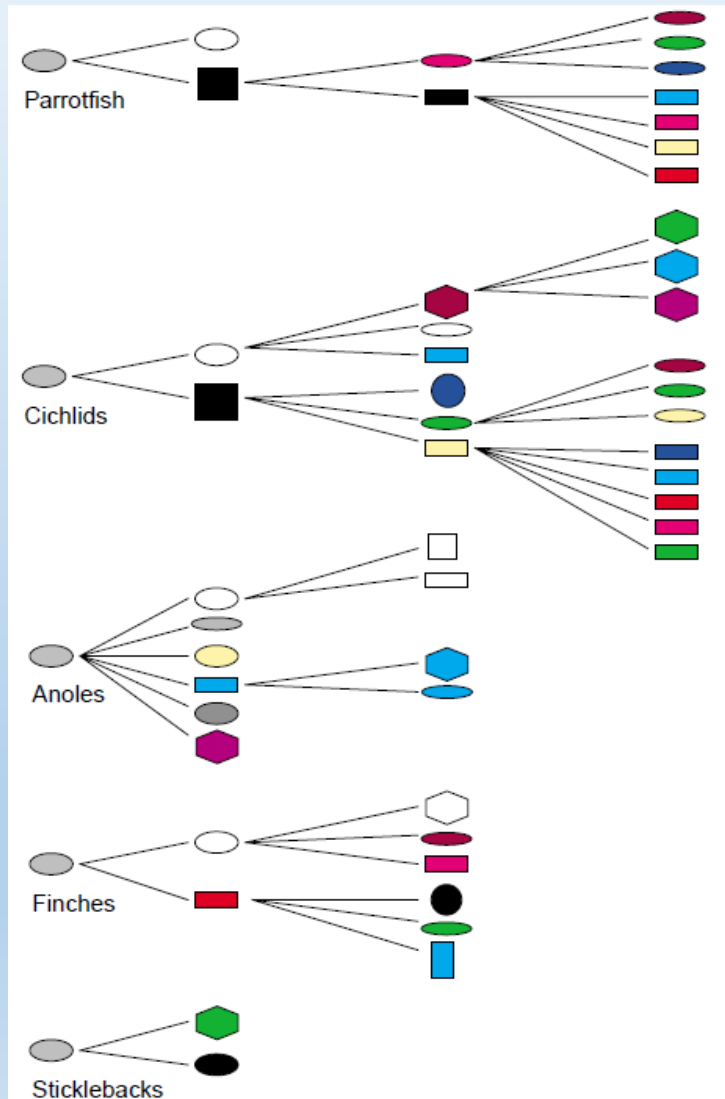
ALI POTEKA ADAPTIVNA RADIACIJA PO PREDVIDLJIVEM ZAPOREDJU?



TRI STOPNJE ADAPTIVNE RADIACIJE:

1. NASTANEK VRST GLEDE NA MAKROHABITAT (npr. globoka voda-plitvina)
2. NASTANEK VRST ZARADI DELITVE VIROV (np. strganje alg – plenjenje)
3. IZBIRA PARTNERJA, KOMUNIKACIJA (npr. drugačna obarvanost, drugačen vonj)

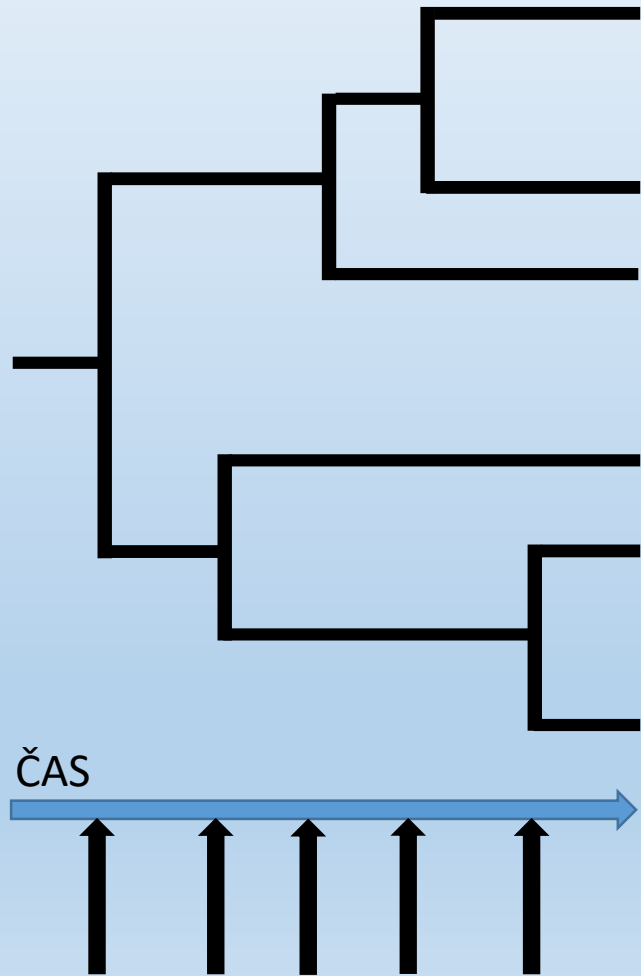
ALI POTEKA ADAPTIVNA RADIACIJA PO PREDVIDLJIVEM ZAPOREDJU?



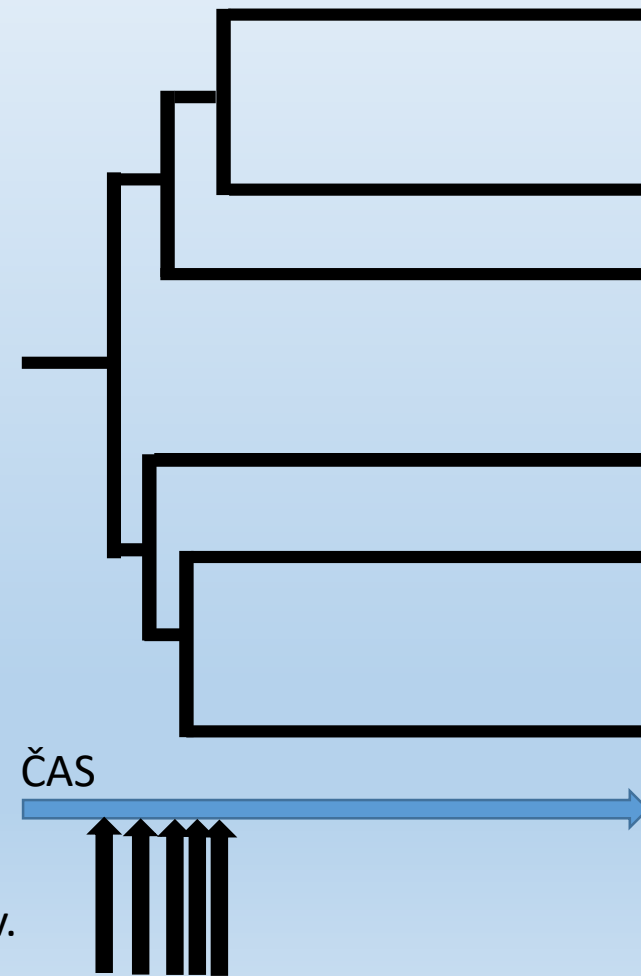
“Biodiverzитета ustvarja biodiverzitetu”

MEHANIZMI IN POTEK ADAPTIVNE RADIACIJE

DINAMIKA

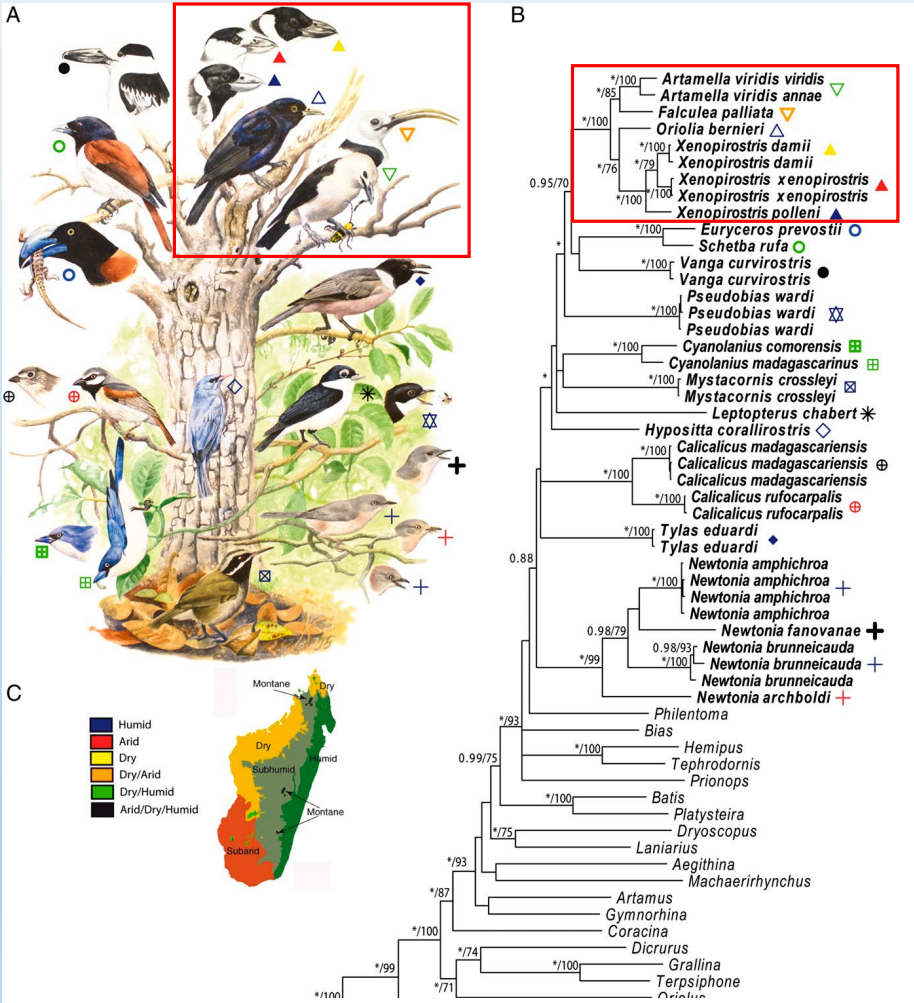


Zaporedje speciacijskih dogodkov.

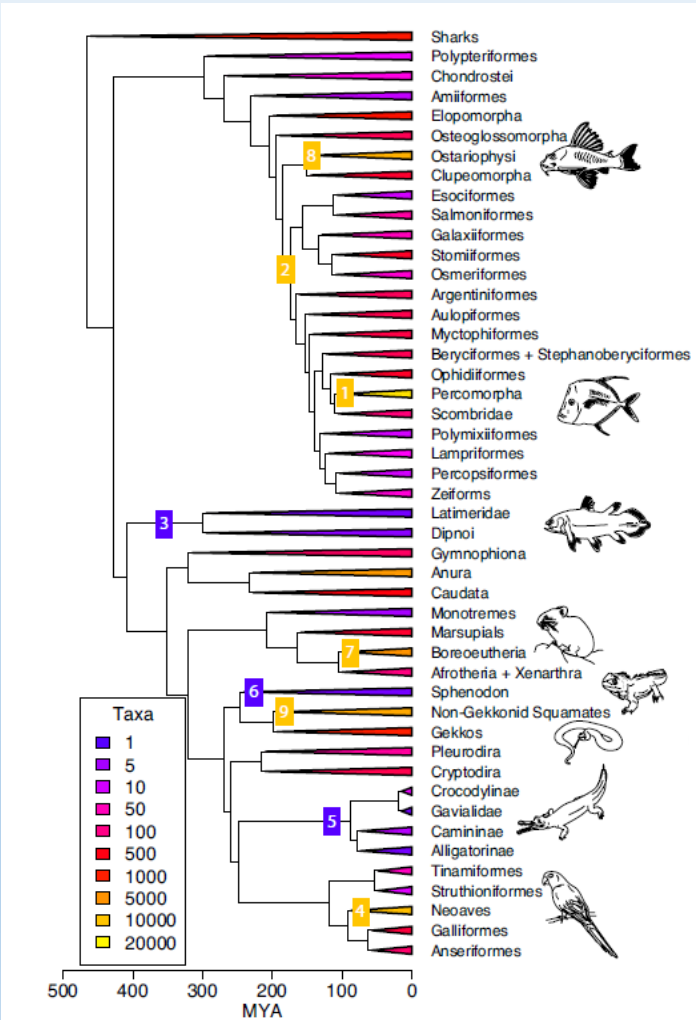


MEHANIZMI IN POTEK ADAPTIVNE RADIACIJE

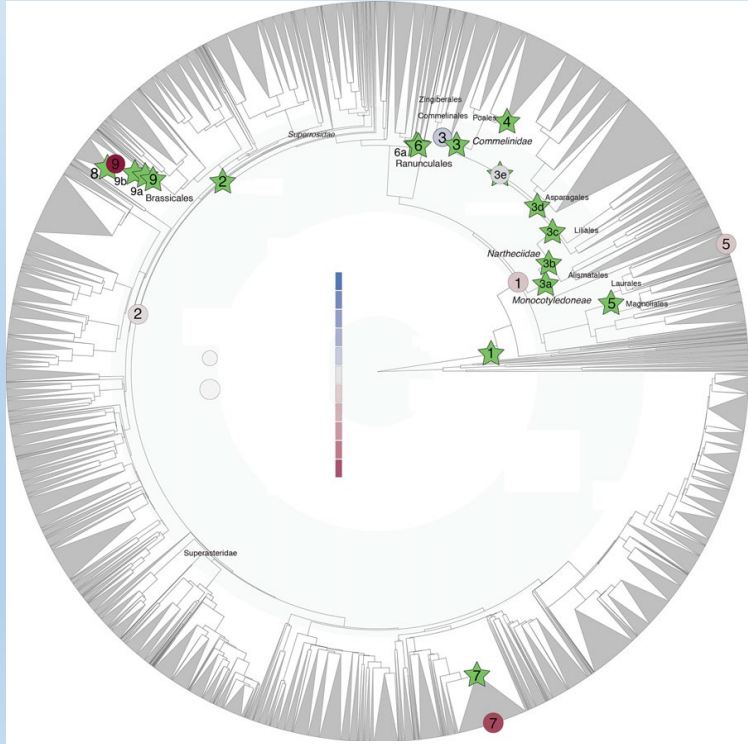
DINAMIKA ADAPTIVNE RADIACIJE - VGNEZDENJE



Jønsson et al. 2012. Proceedings of the National Academy of Science



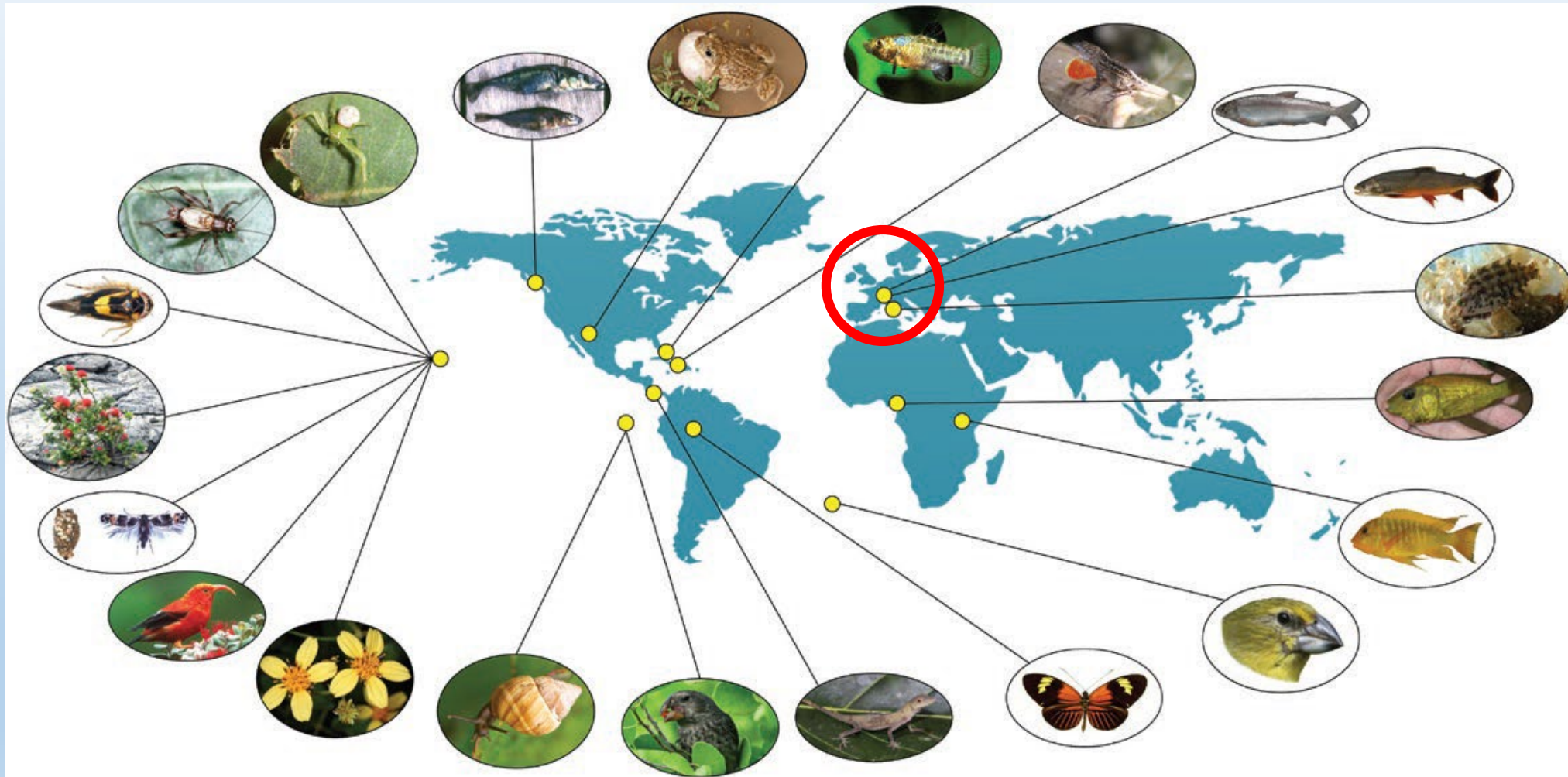
Alfaro et al. 2011. Proceedings of the National Academy of Science



Tank et al. 2015. New Phytologist.

ZNANE ADAPTIVNE RADIACIJE

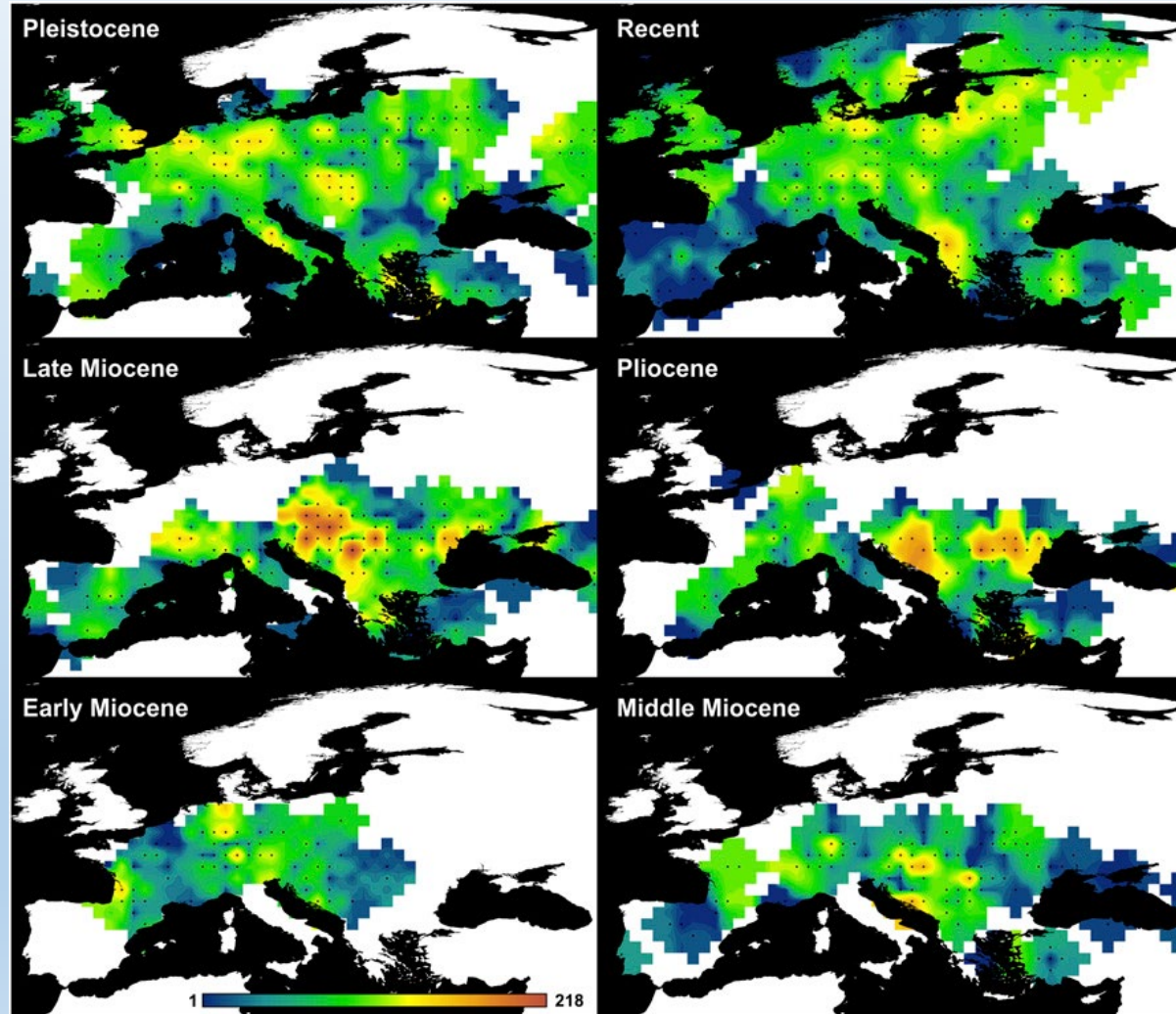
KJE NAJDEMO ADAPTIVNE RADIACIJE?



Gillespie et al. 2020. Journal of heredity.

Marsikje, zlasti na otokih...

EVROPA: PO OBSEGU SKROMNE, OBSEŽNE PA ŽE IZUMRLE...



ADAPTIVNE RADIACIJE V EVROPI

...ALI PREZRTE: PODZEMNA FAVNA

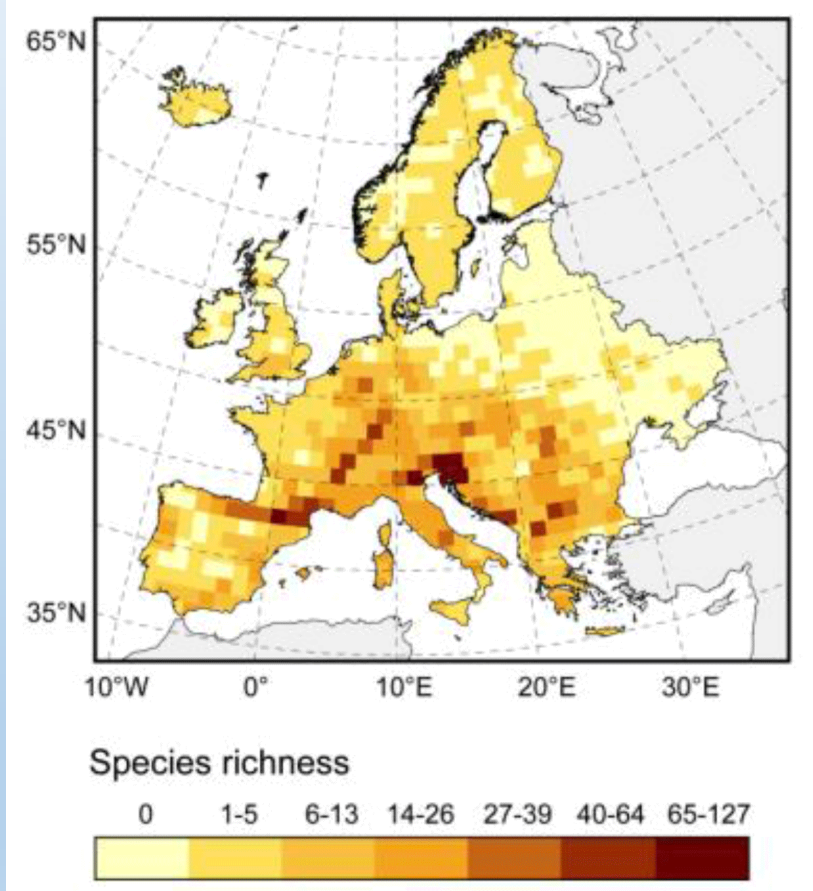
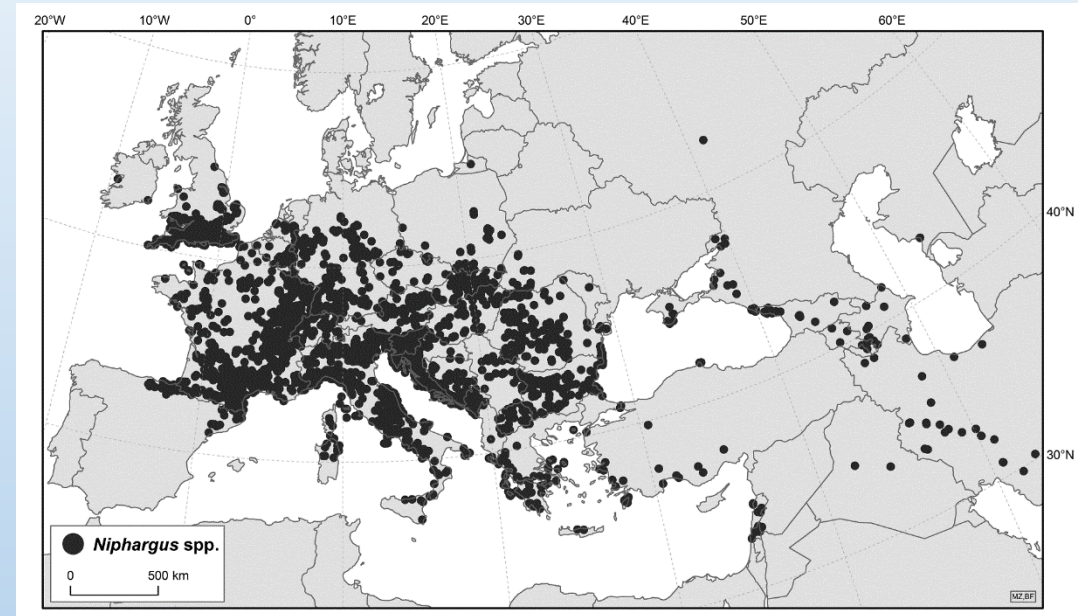


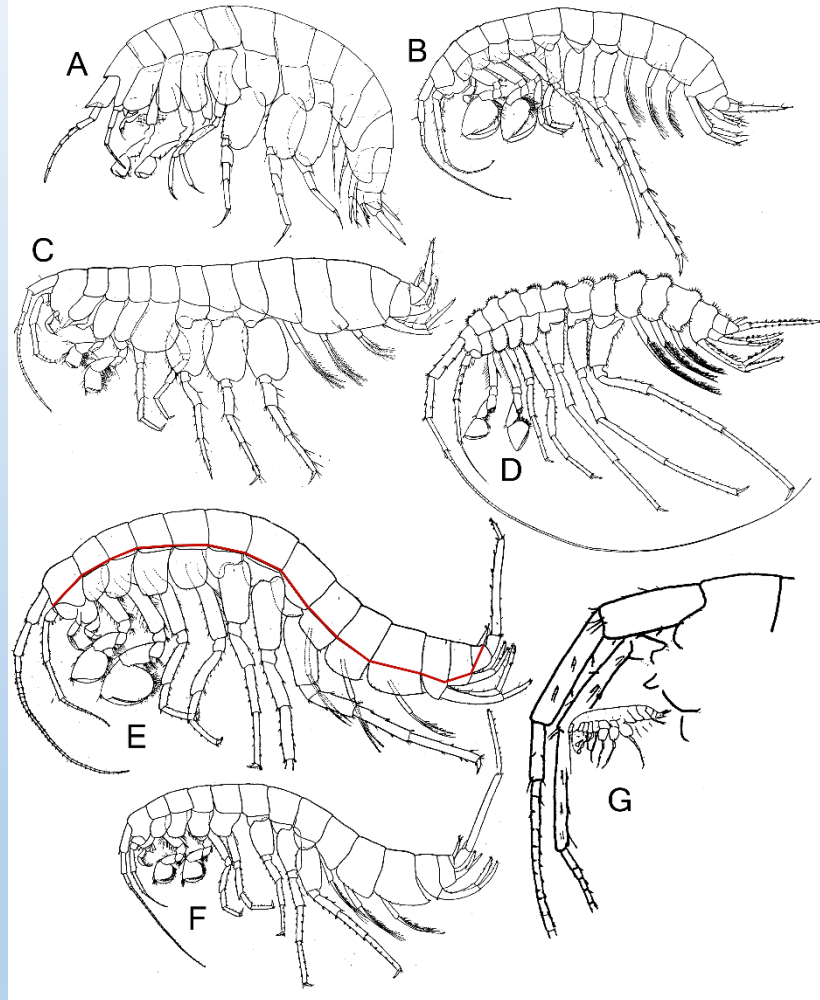
Foto: Teo Delić



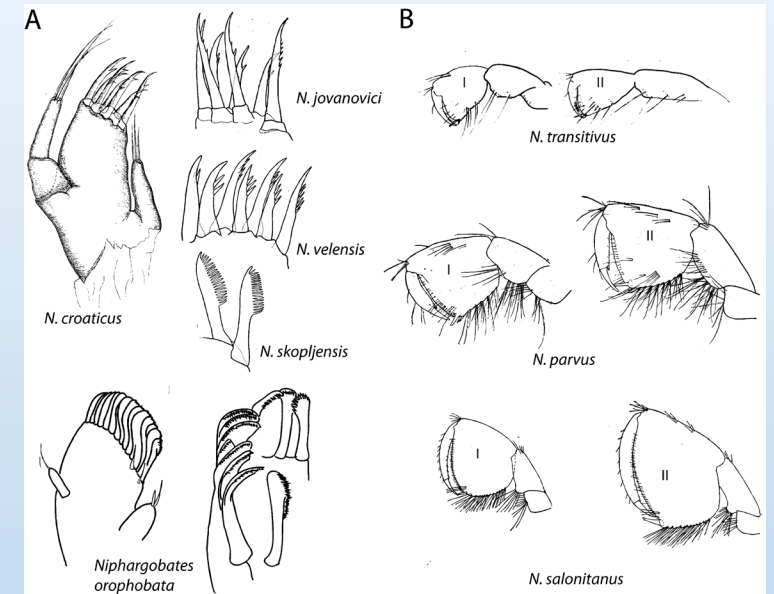
Vir: Maja Zigmajster, European Groundwater Crustacean Dataset

Zigmajster et al. 2014, Global Ecology and Biogeography.

ADAPTIVNA RADIACIJA SLEPIH POSTRANIC



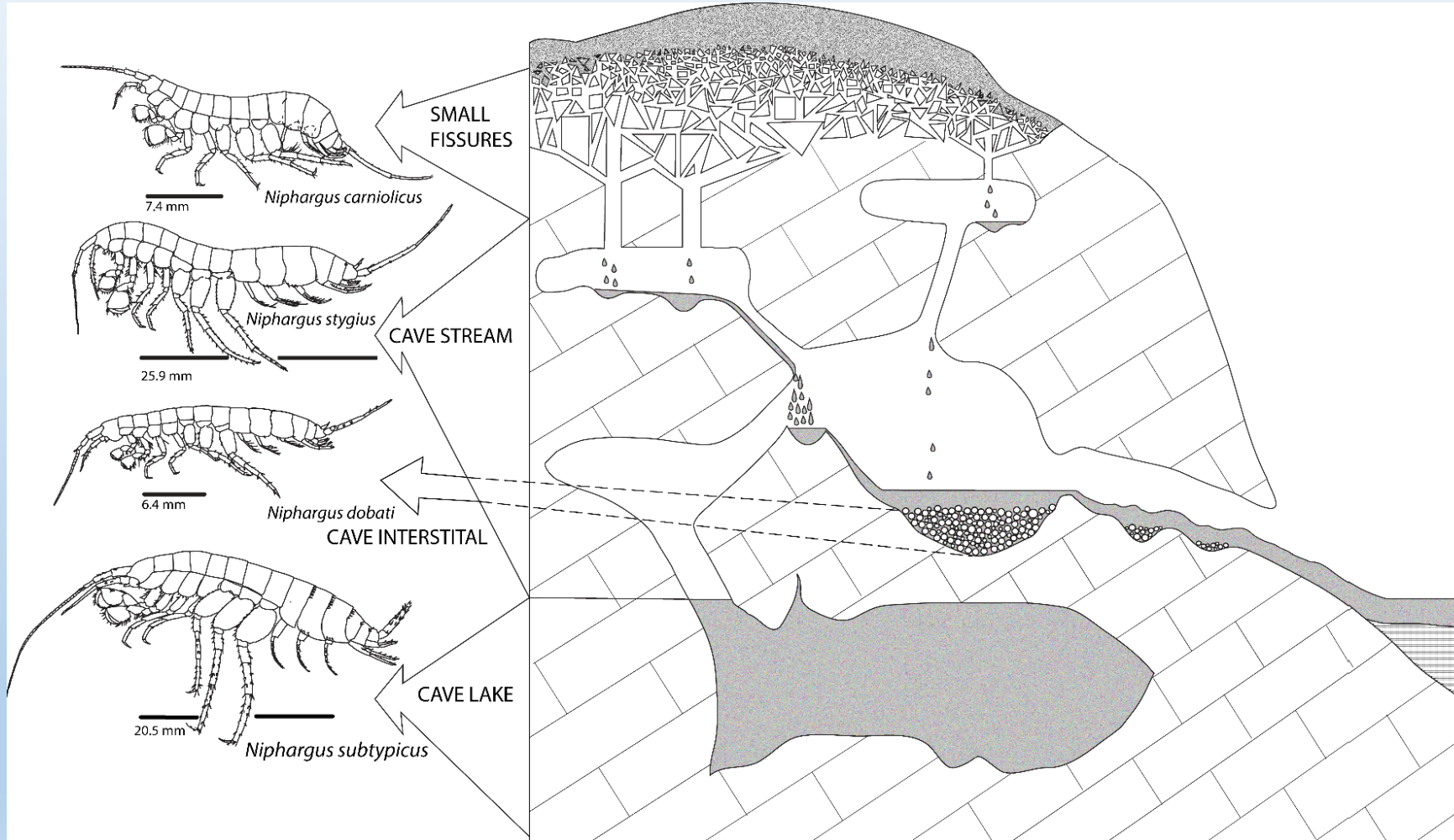
Fišer et al. 2009, Zootaxa



Fišer 2019, Encyclopedia of Caves

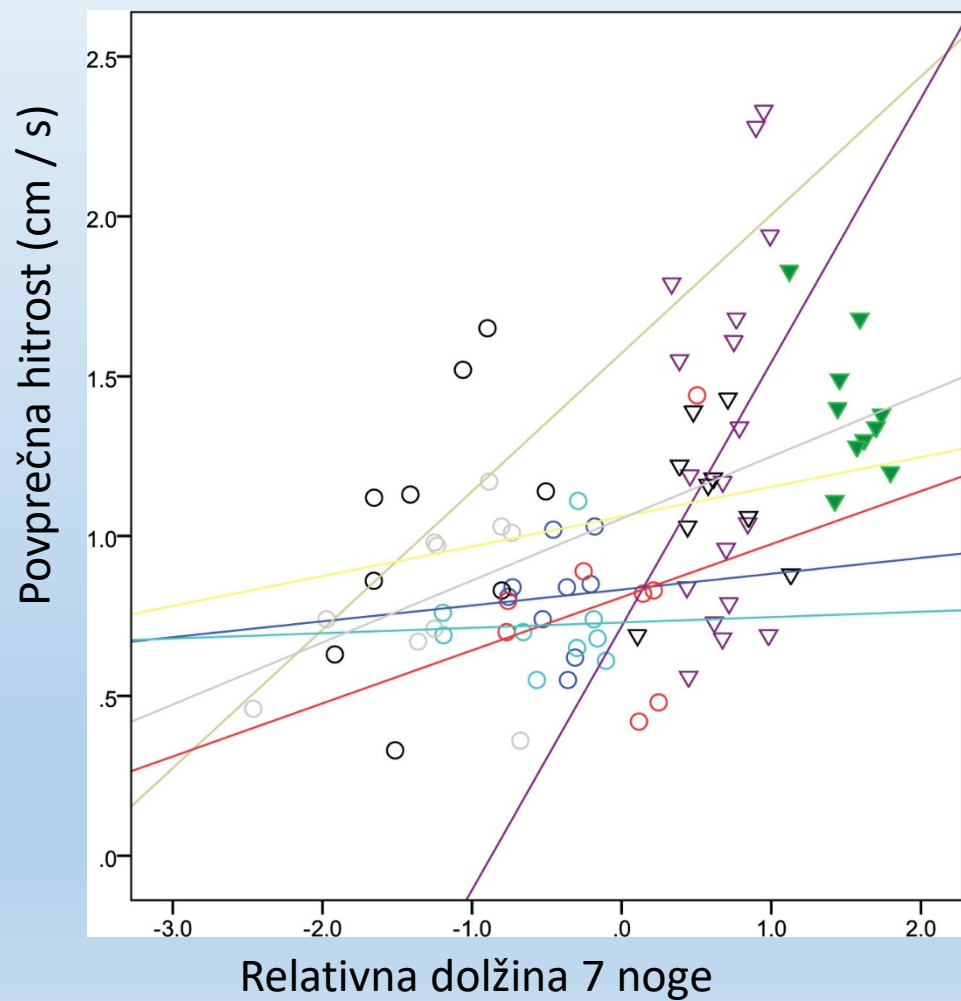
ADAPTIVNE RADIACIJE V EVROPI

ADAPTIVNA RADIACIJA SLEPIH POSTRANIC

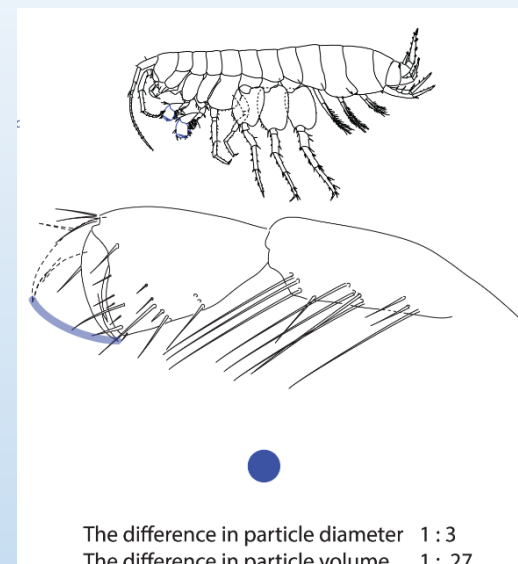
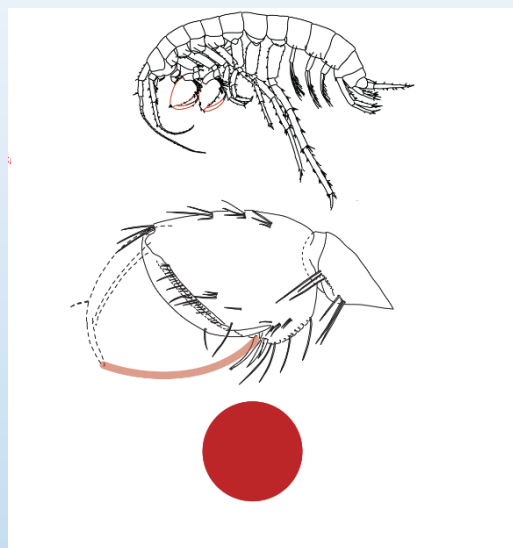


ADAPTIVNE RADIACIJE V EVROPI

ADAPTIVNA RADIACIJA SLEPIH POSTRANIC

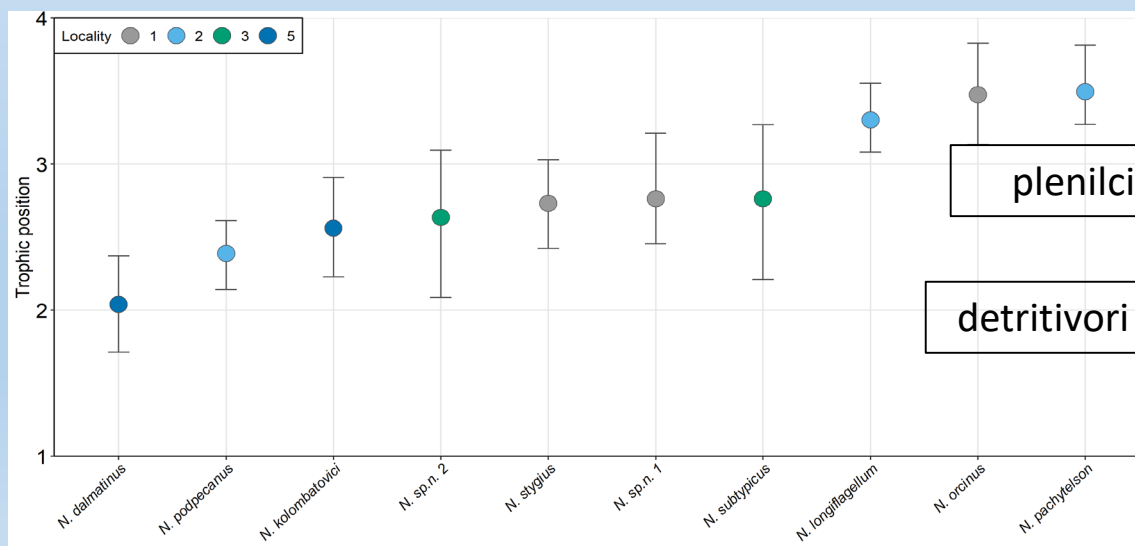


Kralj-Fišer et al. v tisku, Zoology.



The difference in particle diameter 1 : 3
The difference in particle volume 1 : 27

Fišer et al. 2019, Ecography.



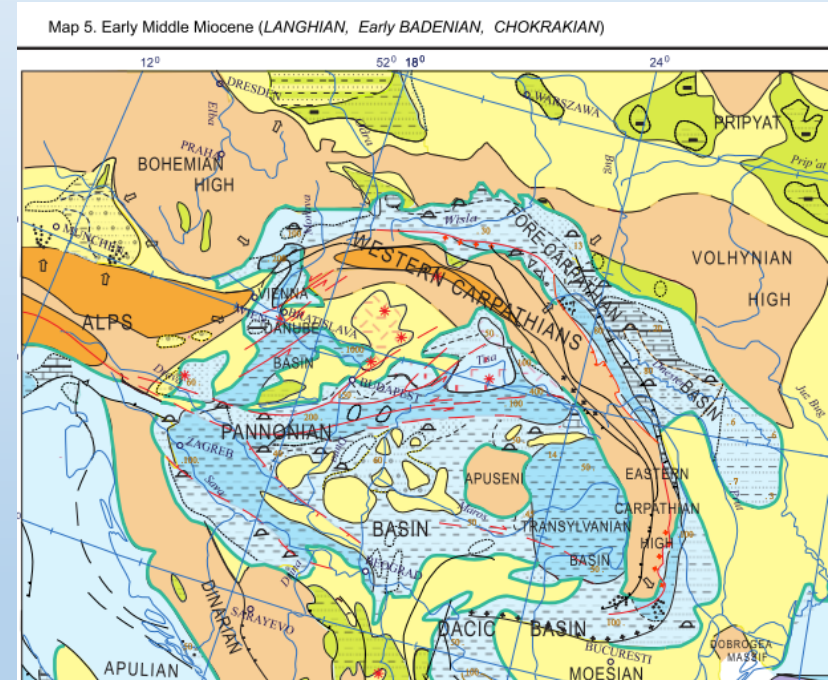
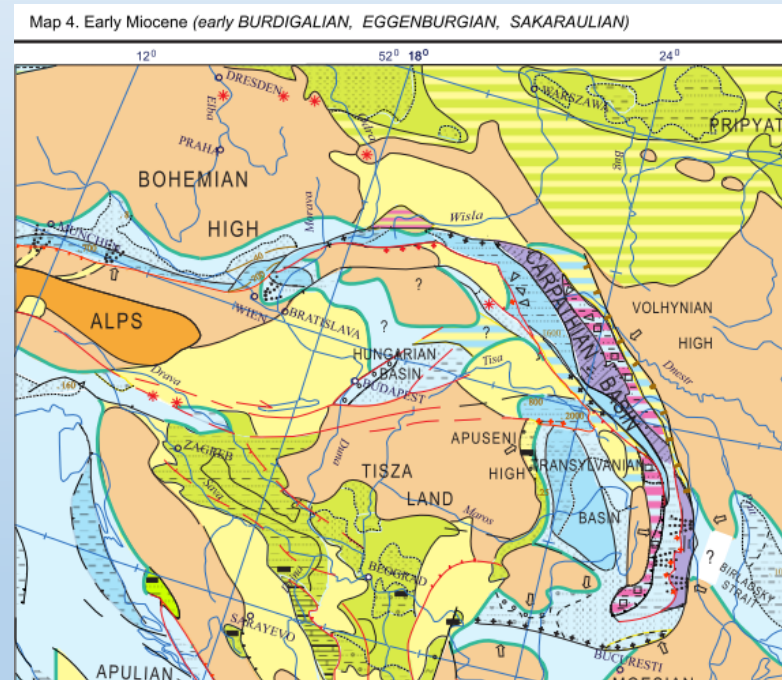
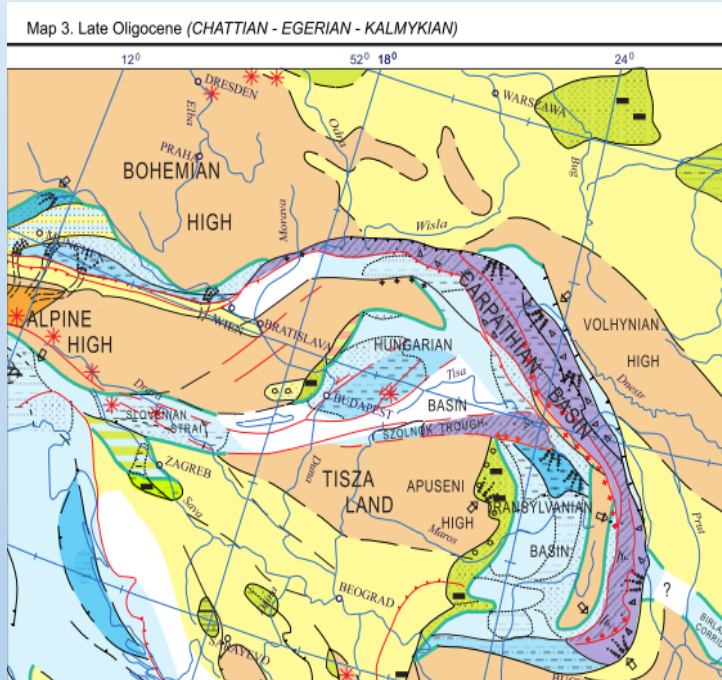
Premate et al. v pripravi

ADAPTIVNE RADIACIJE V EVROPI

ADAPTIVNA RADIACIJA SLEPIH POSTRANIC

Nastanek gorstev - ekološka priložnost?

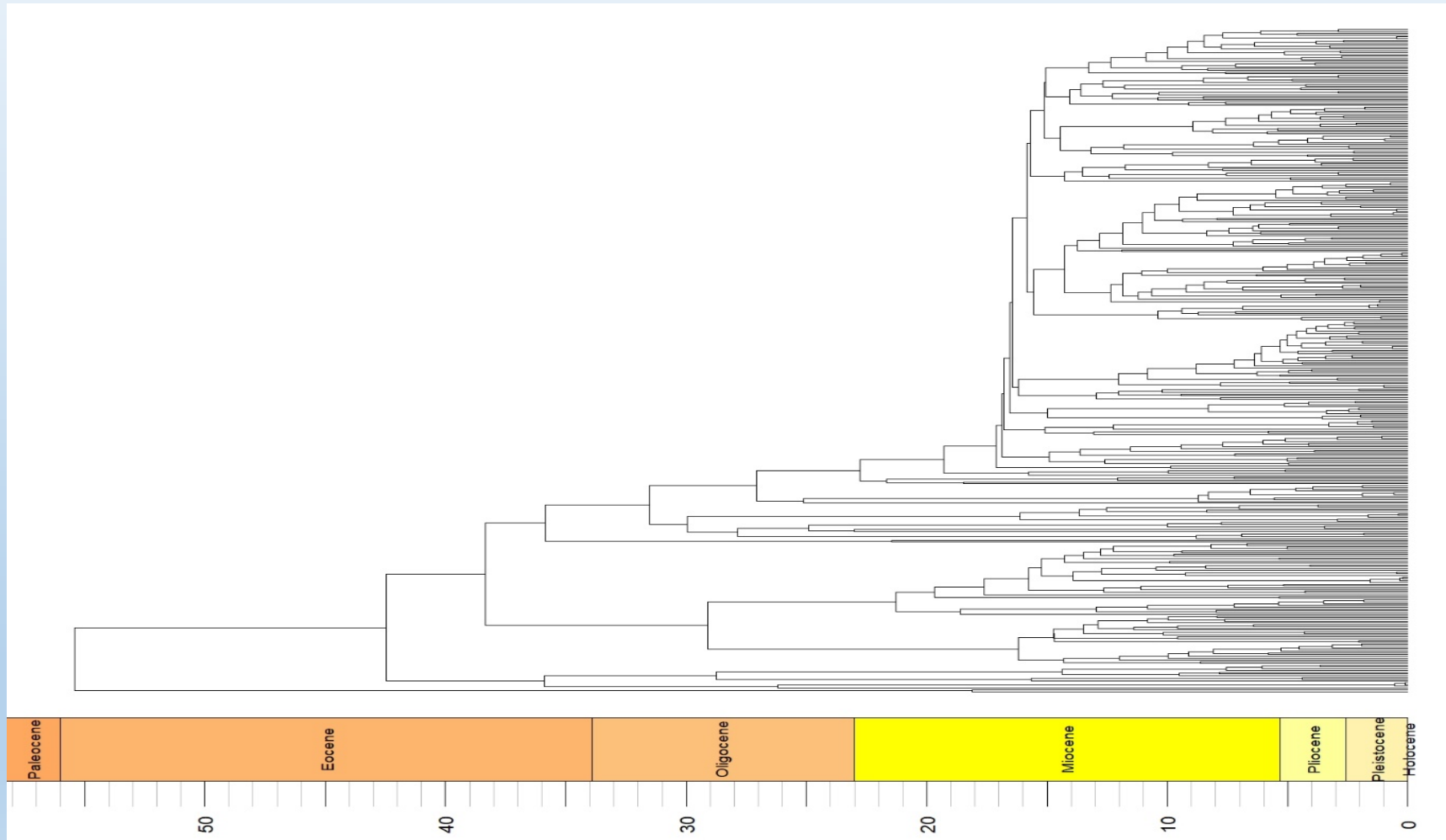
JV Evropa: pozni oligocen-srednji Miocen



after Popov, 2004

ADAPTIVNE RADIACIJE V EVROPI

ADAPTIVNA RADIACIJA SLEPIH POSTRANIC

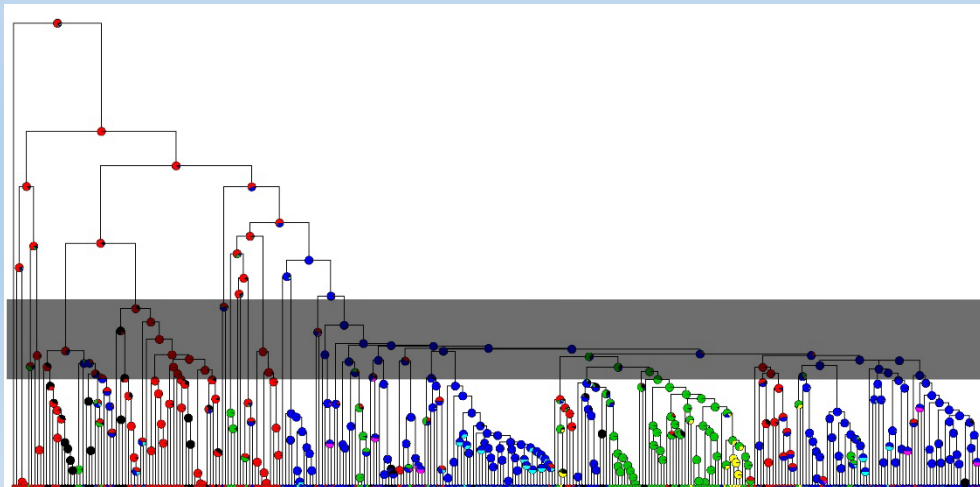
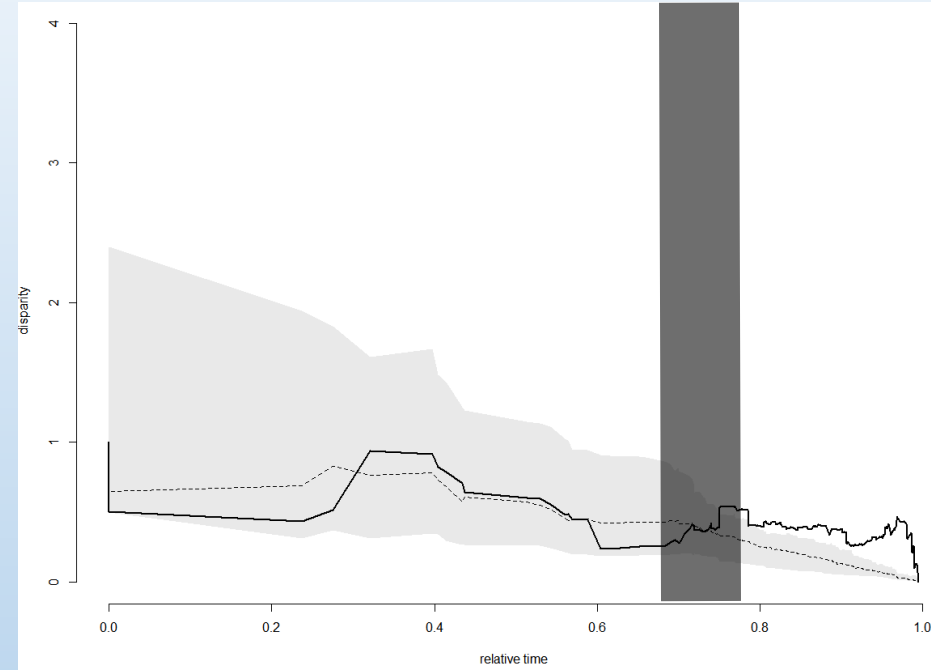
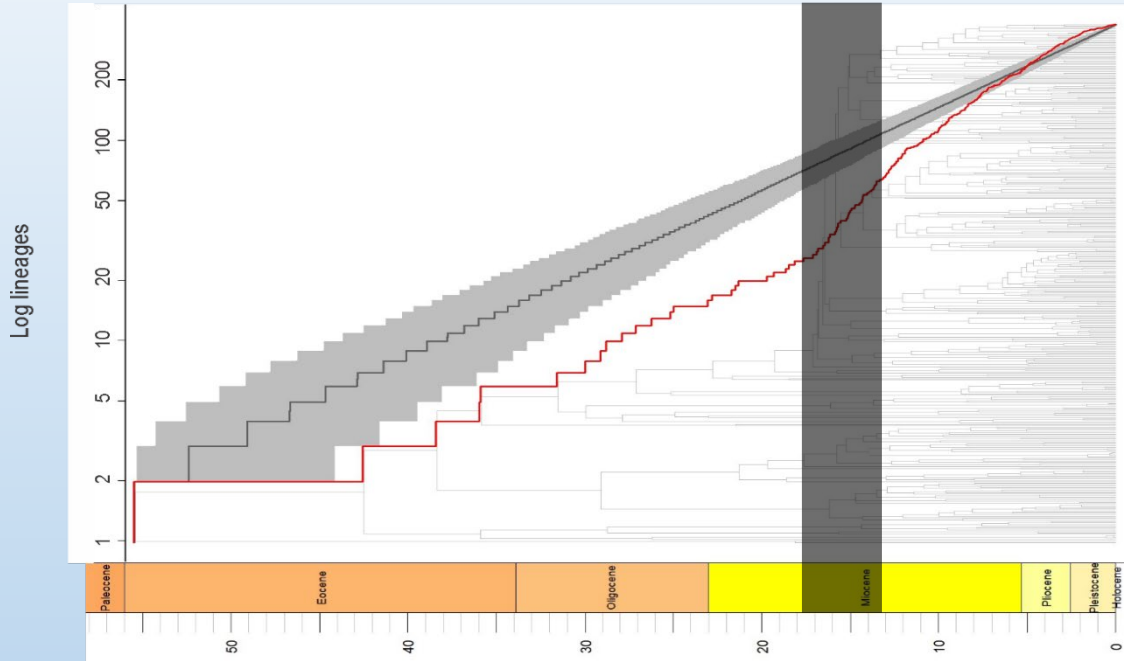


Molekularna filogenija za 377 vrst.

Borko et al., v pripravi

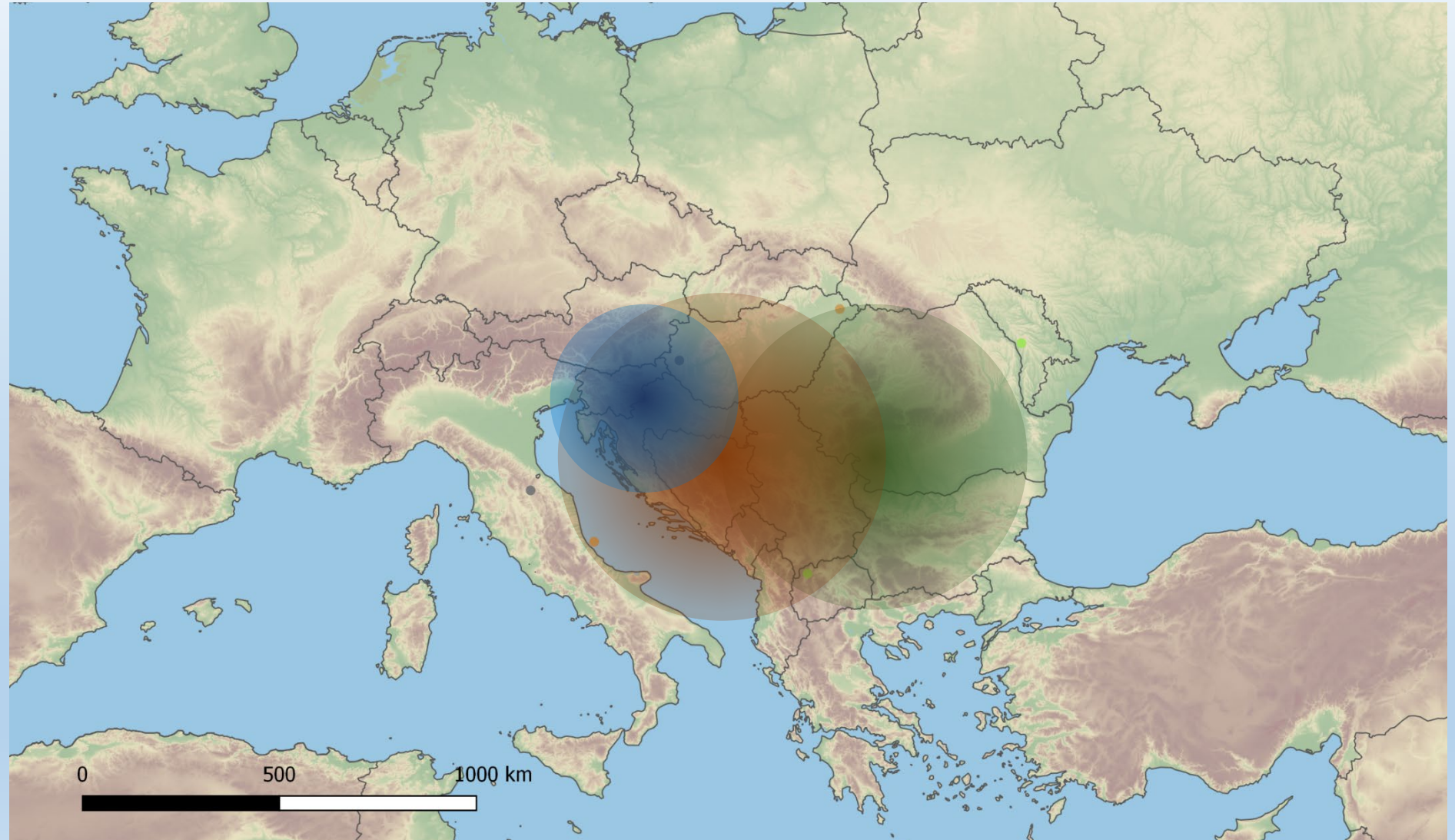
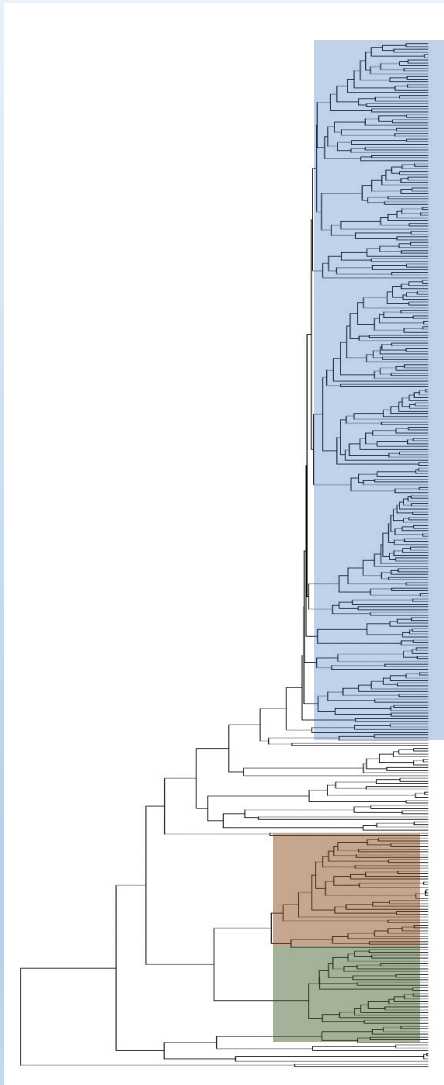
ADAPTIVNE RADIACIJE V EVROPI

ADAPTIVNA RADIACIJA SLEPIH POSTRANIC



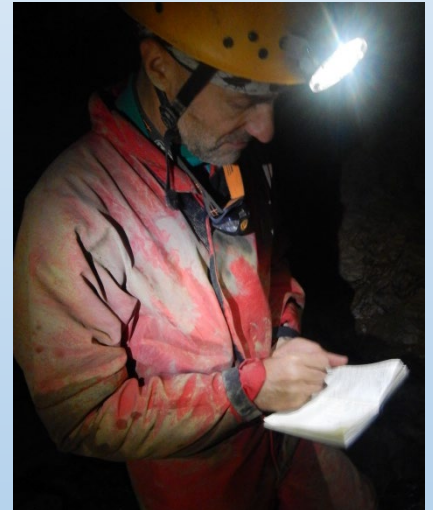
ADAPTIVNE RADIACIJE V EVROPI

ADAPTIVNA RADIACIJA SLEPIH POSTRANIC



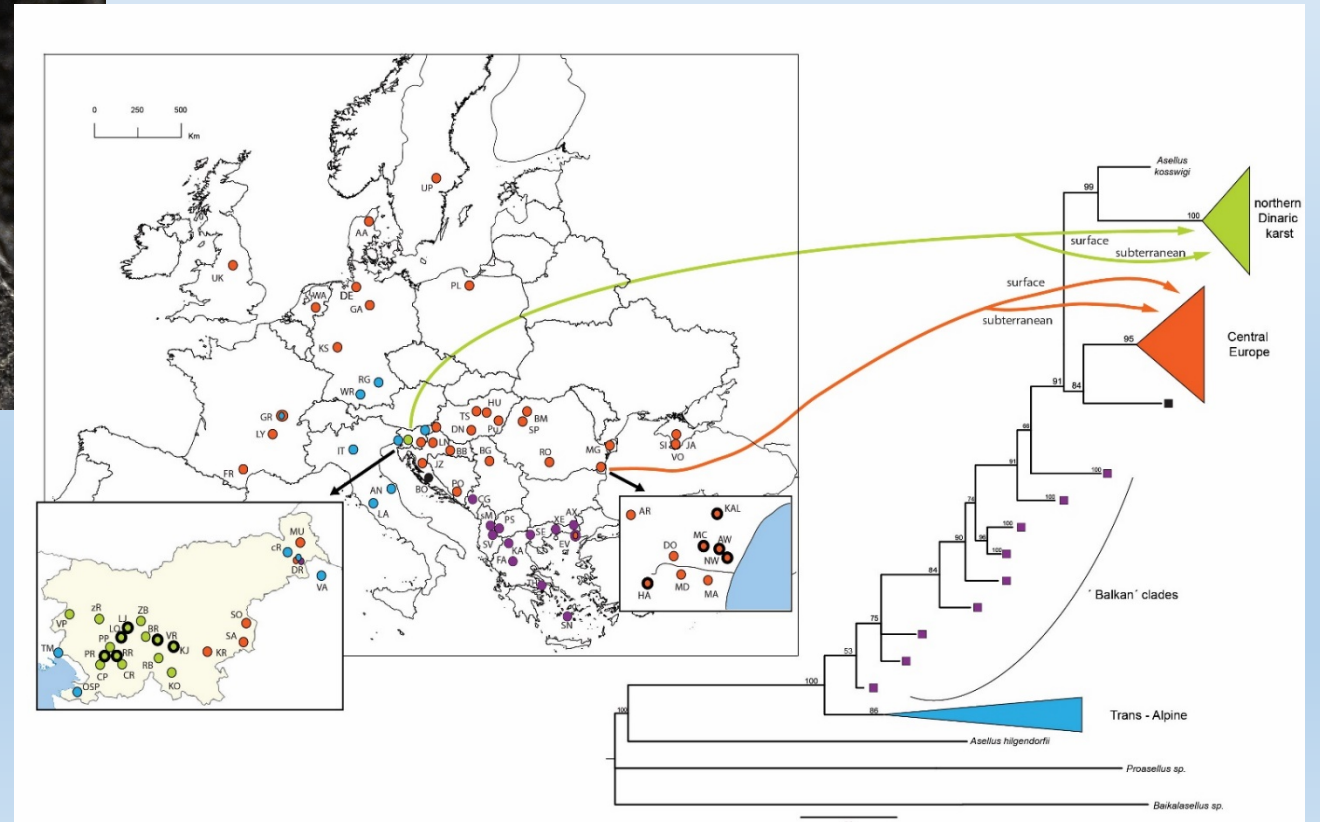


HVALA!



TERMINOLOGIJA

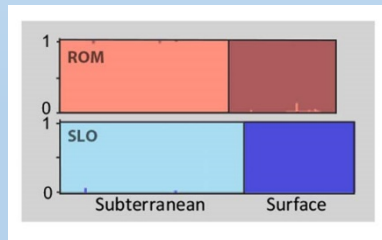
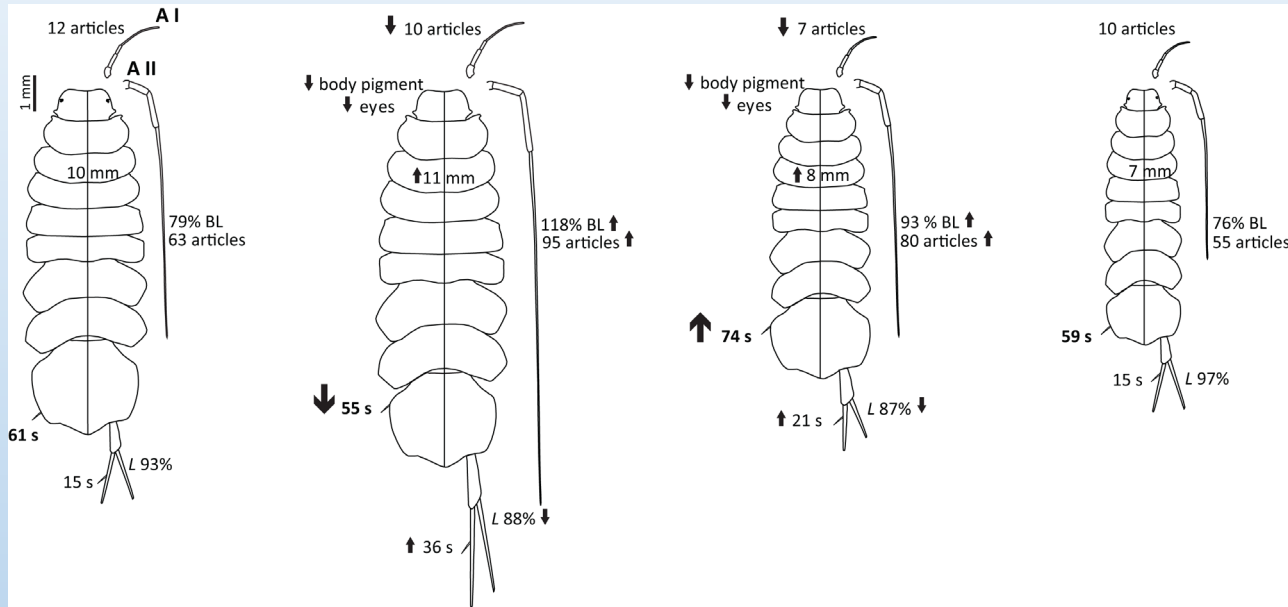
SPECIACIJA IN ADAPTACIJA



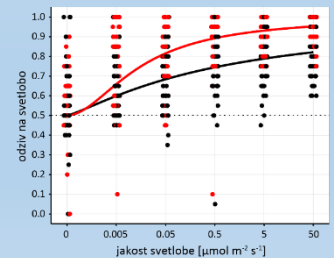
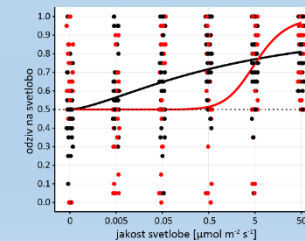
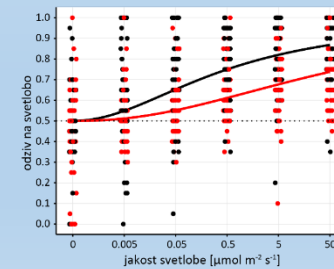
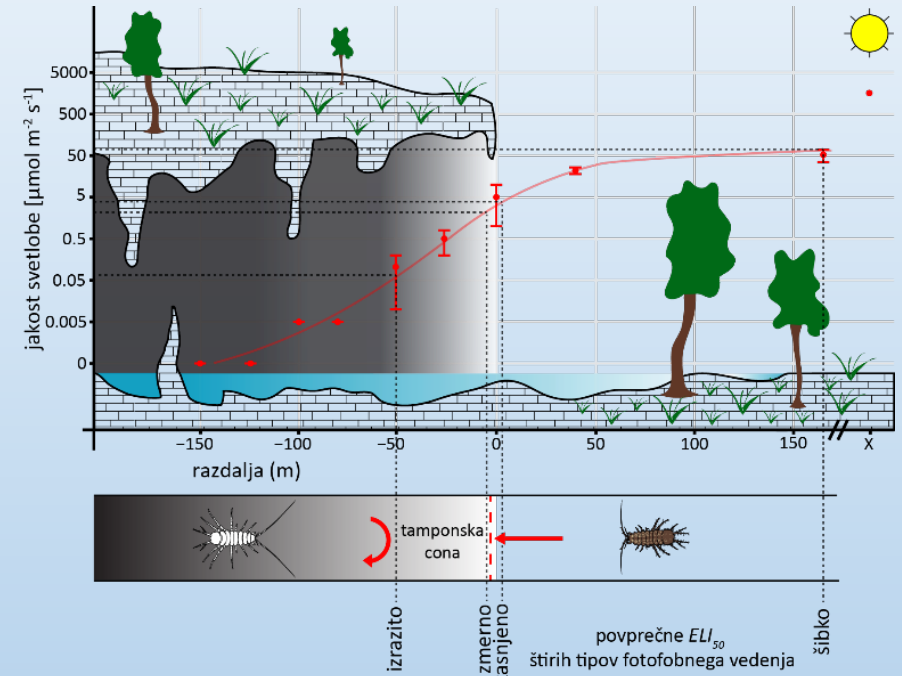
Konec et al. 2015. Journal of Evolutionary Biology

TERMINOLOGIJA

SPECIACIJA IN ADAPTACIJA



Konec et al. 2015. Journal of Evolutionary Biology



Fišer Ž. 2017. Doktorska disertacija.