Scale-based phylogeny of Paleozoic chondrichthyans

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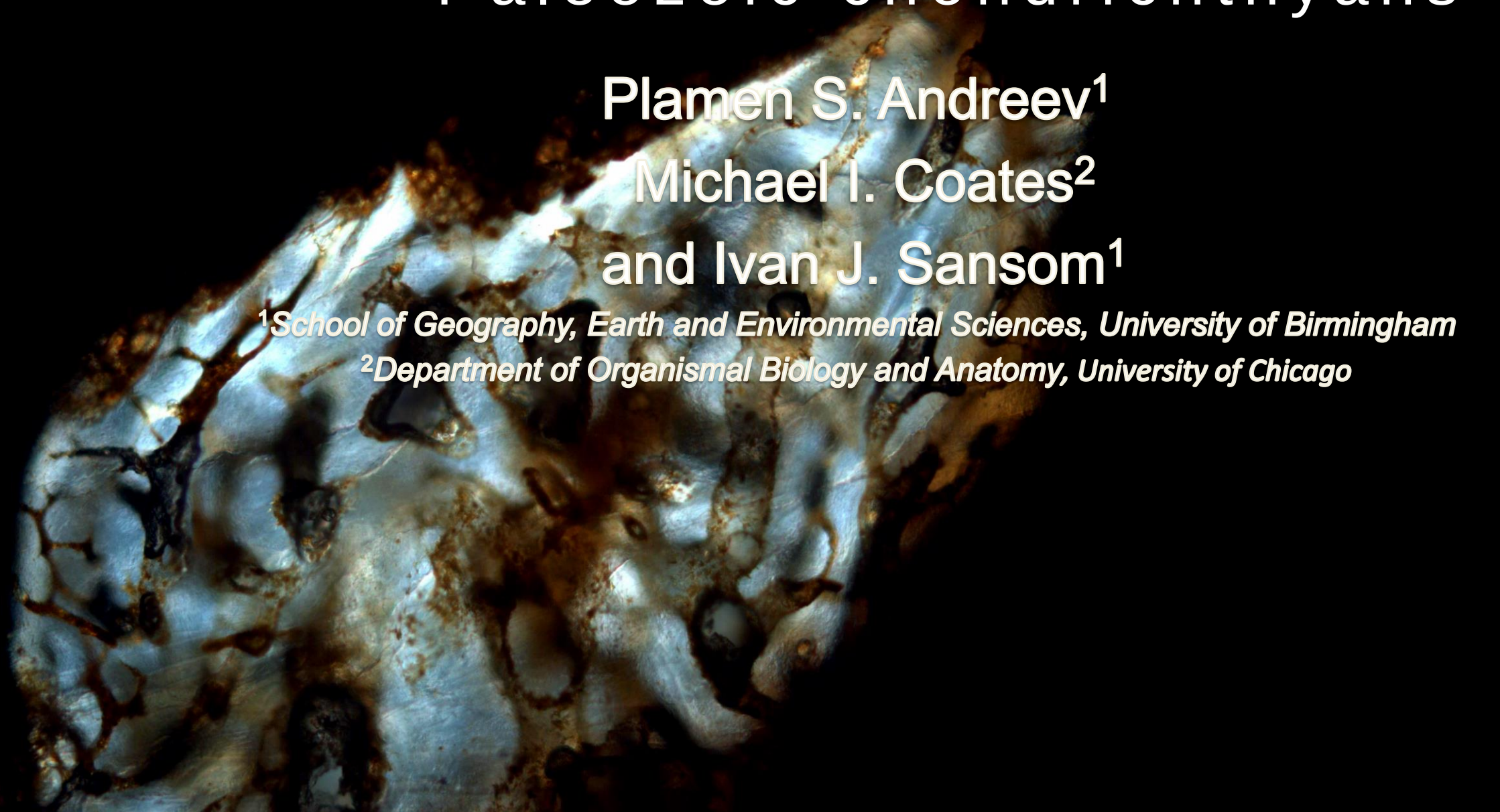
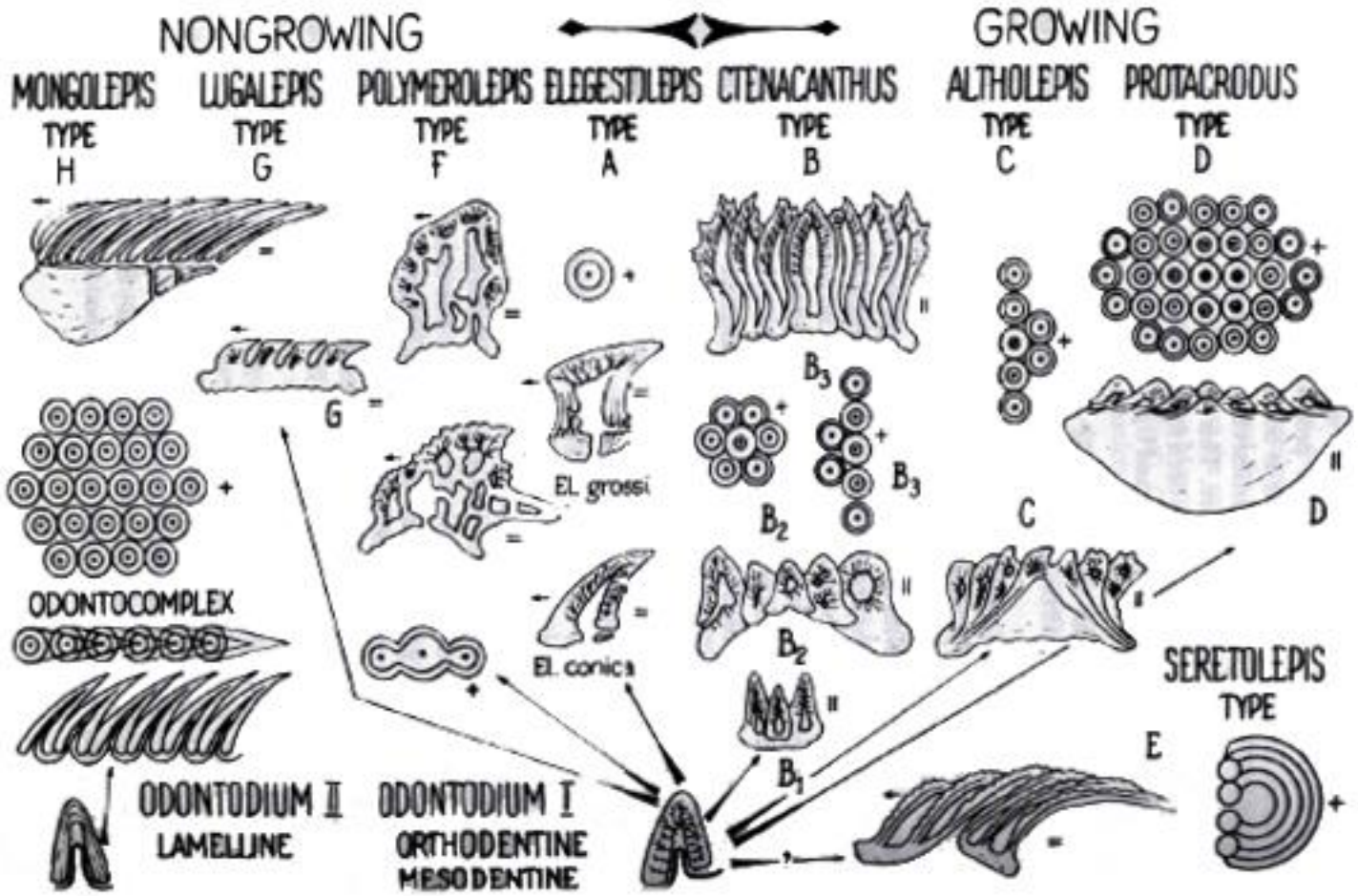
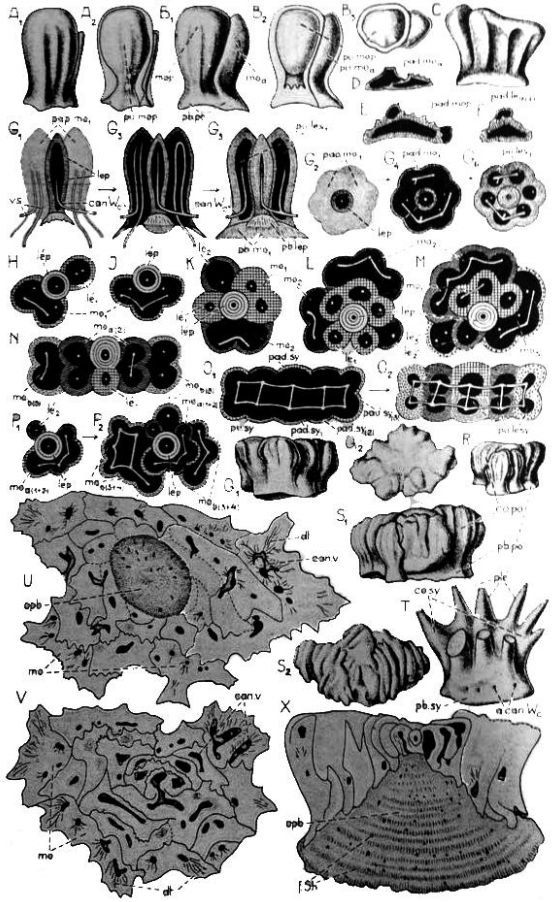
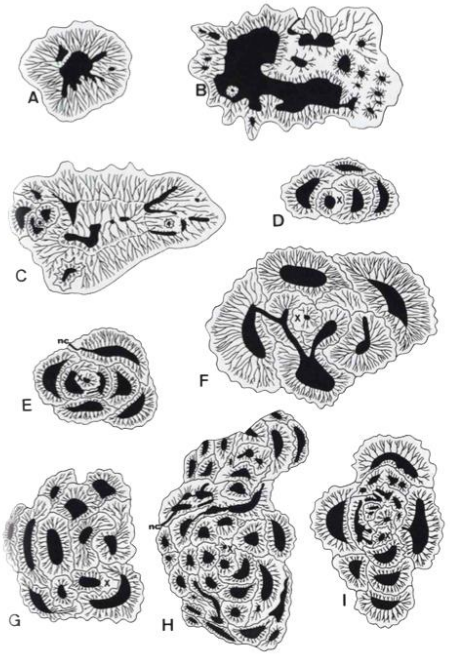


Types of scale morphogenesis in Paleozoic chondrichthyans according to Karatajūte-Talimaa (1992)

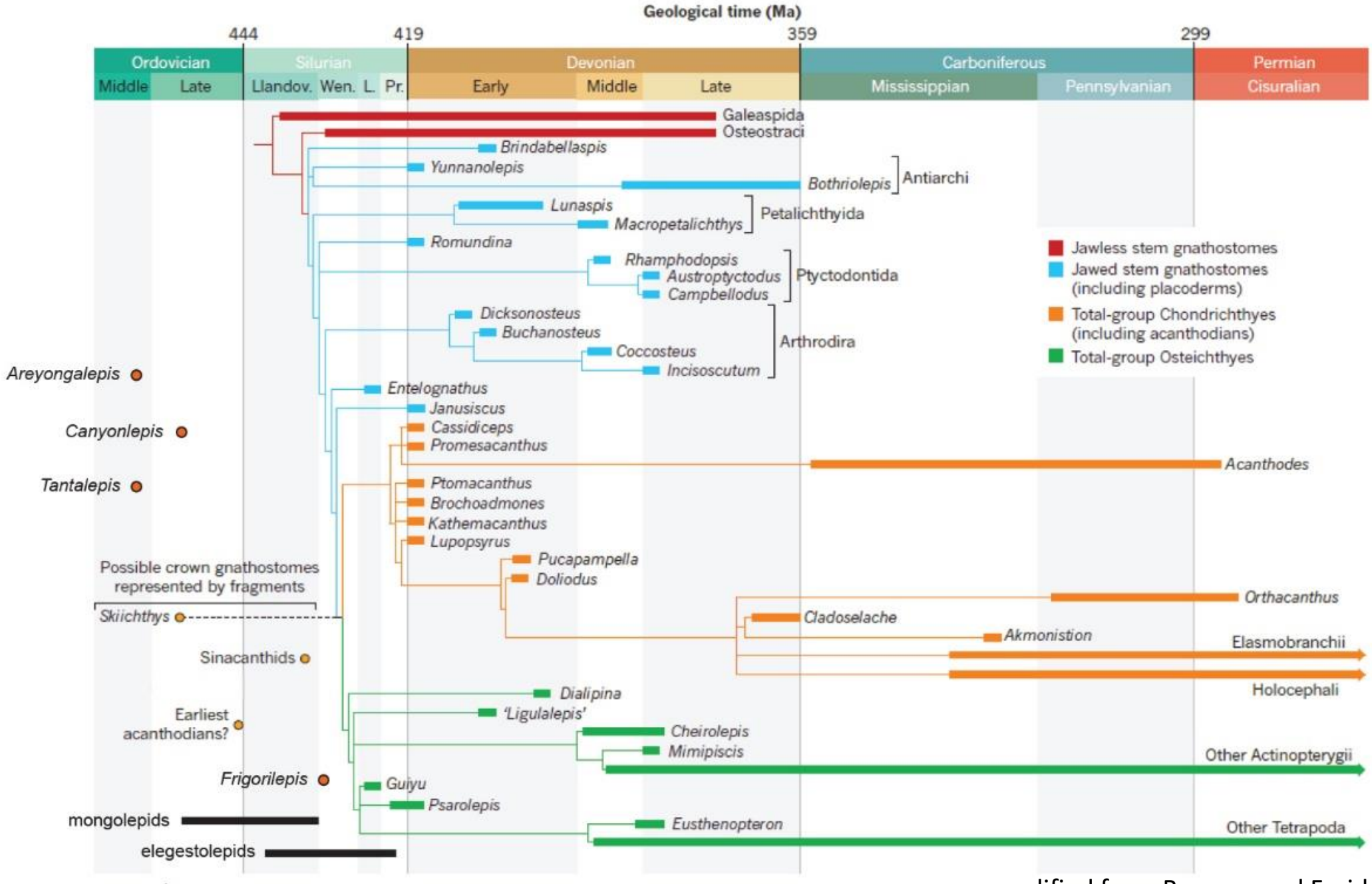




Stensio 1962

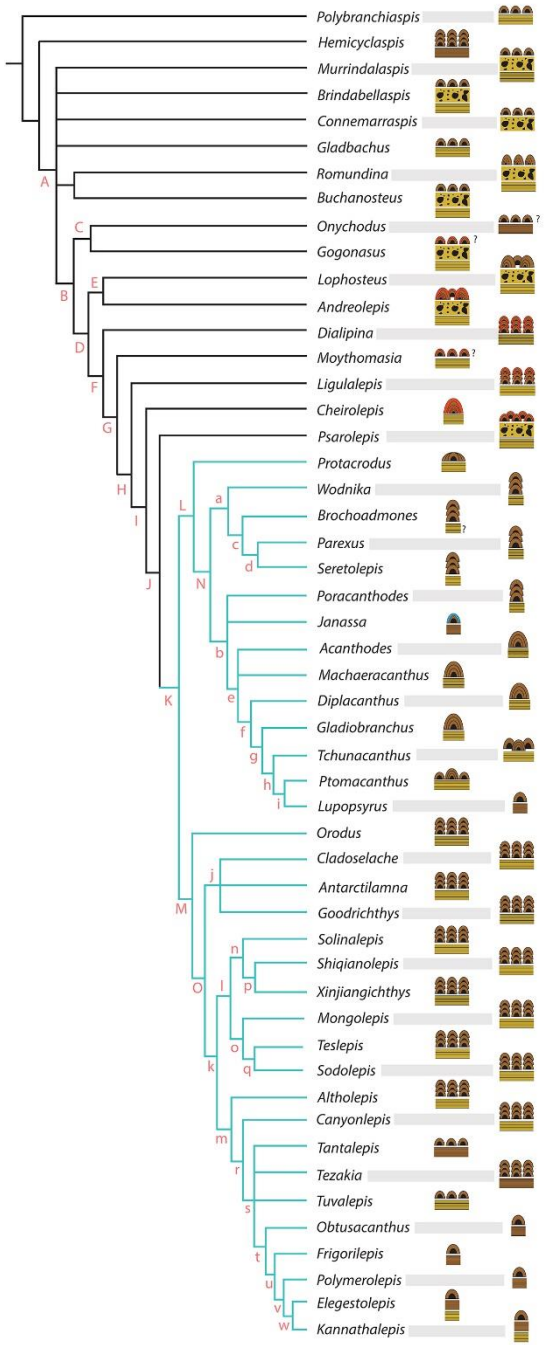


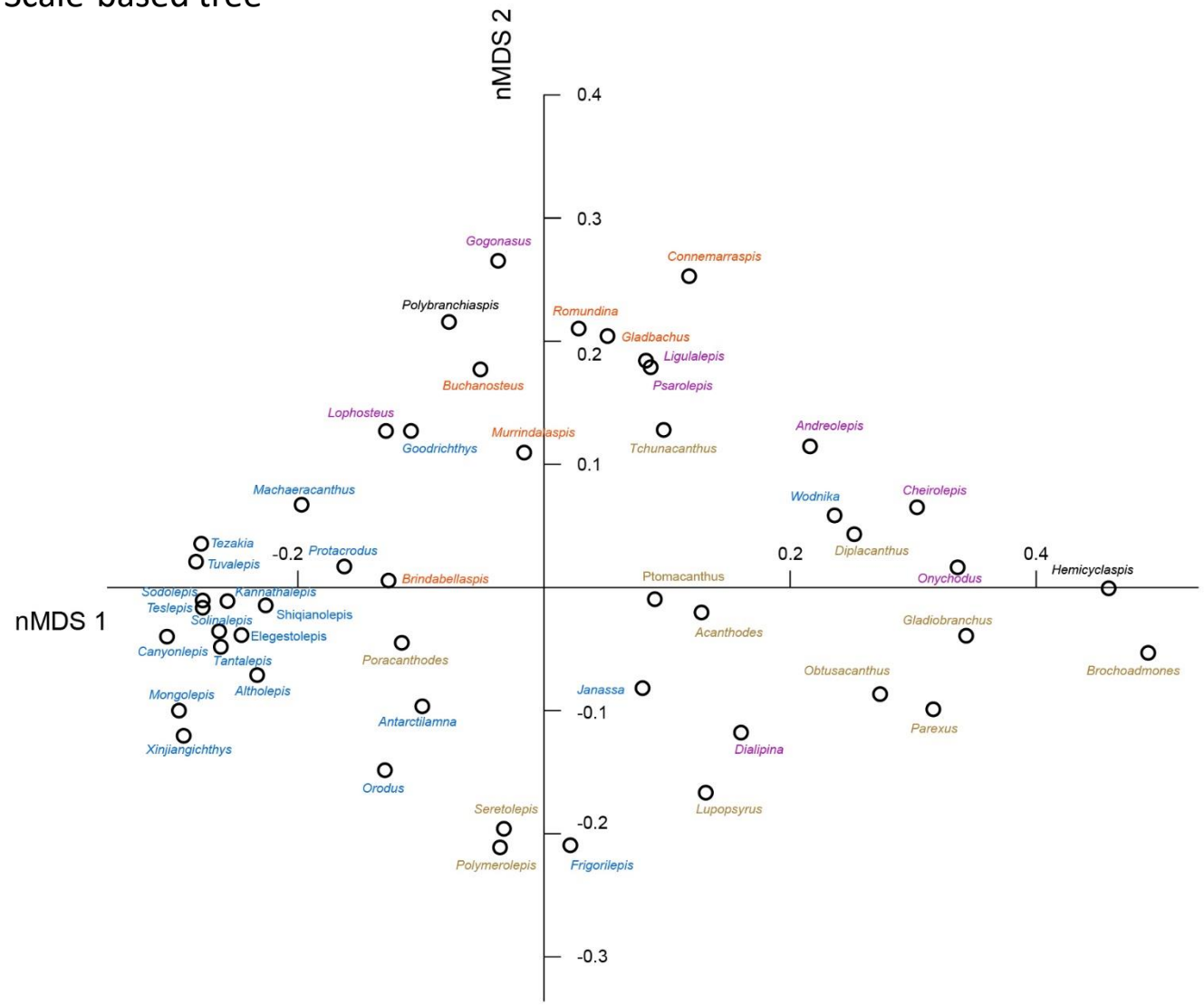
Reif 1978



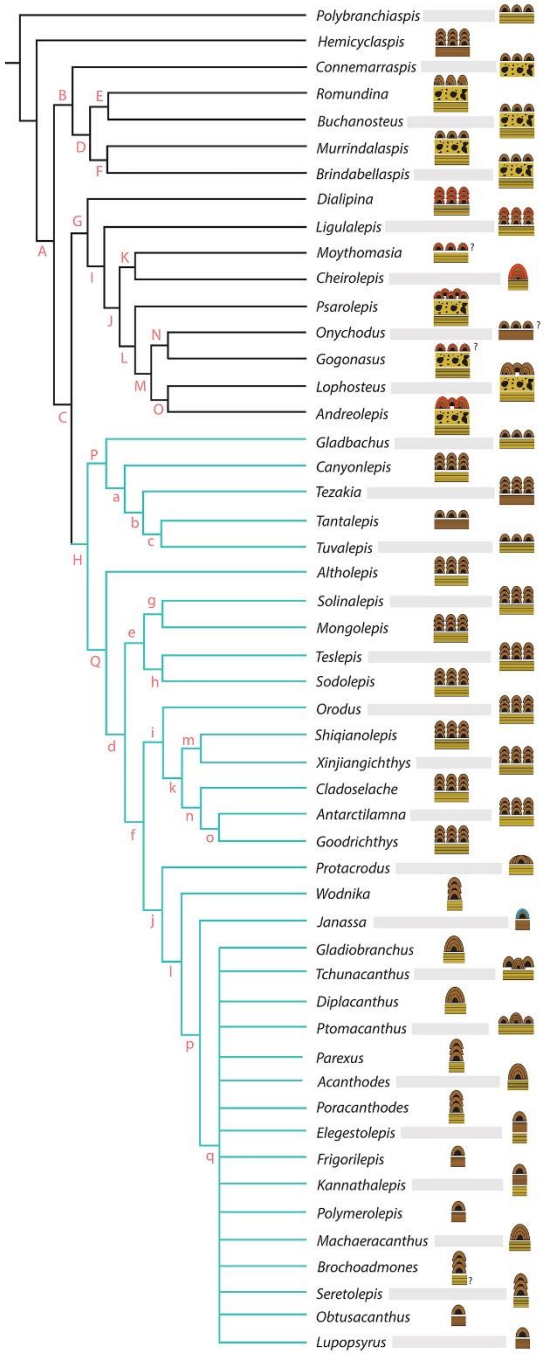
modified from Brazeau and Freidman (2015)

Scale-based tree

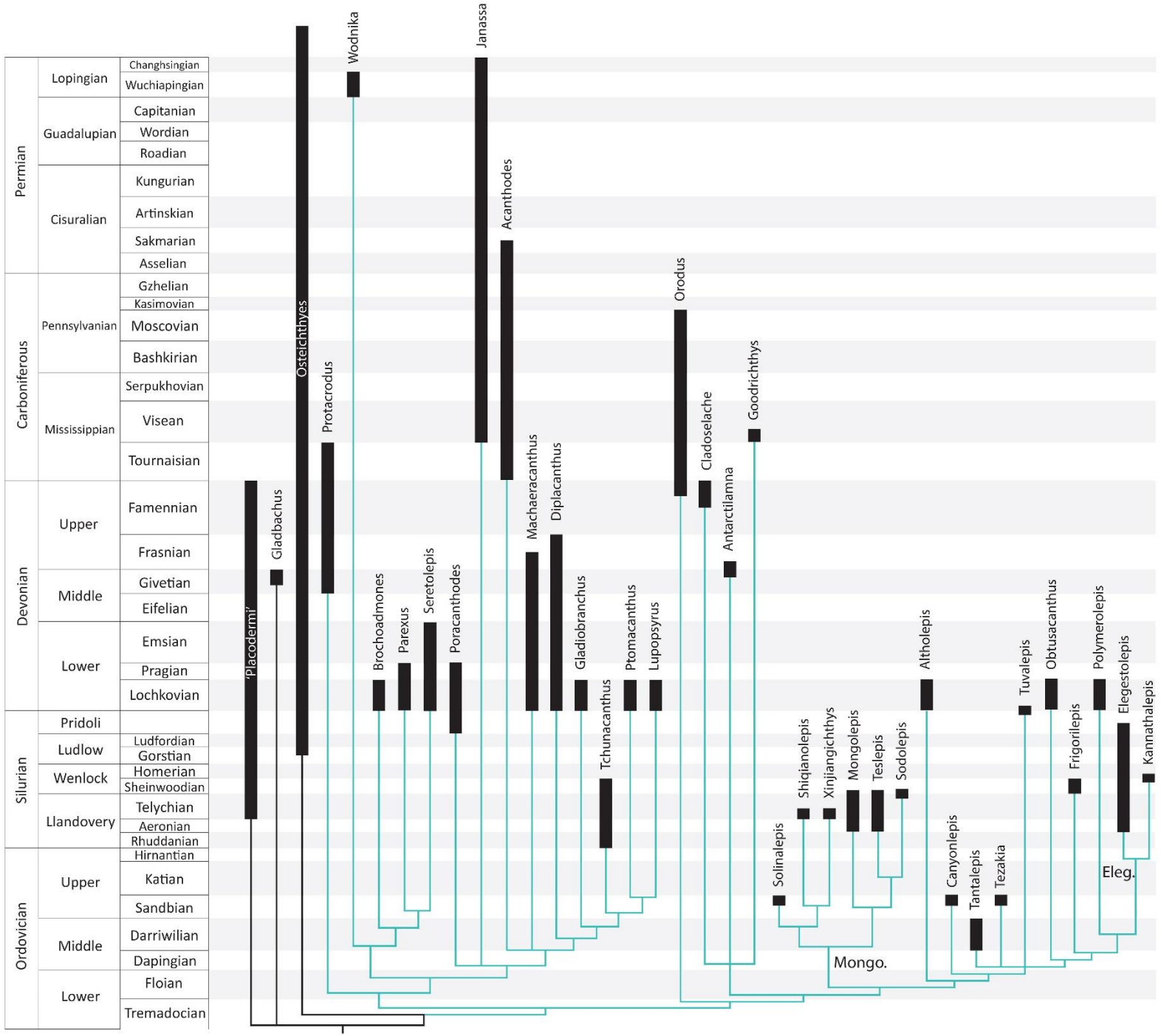




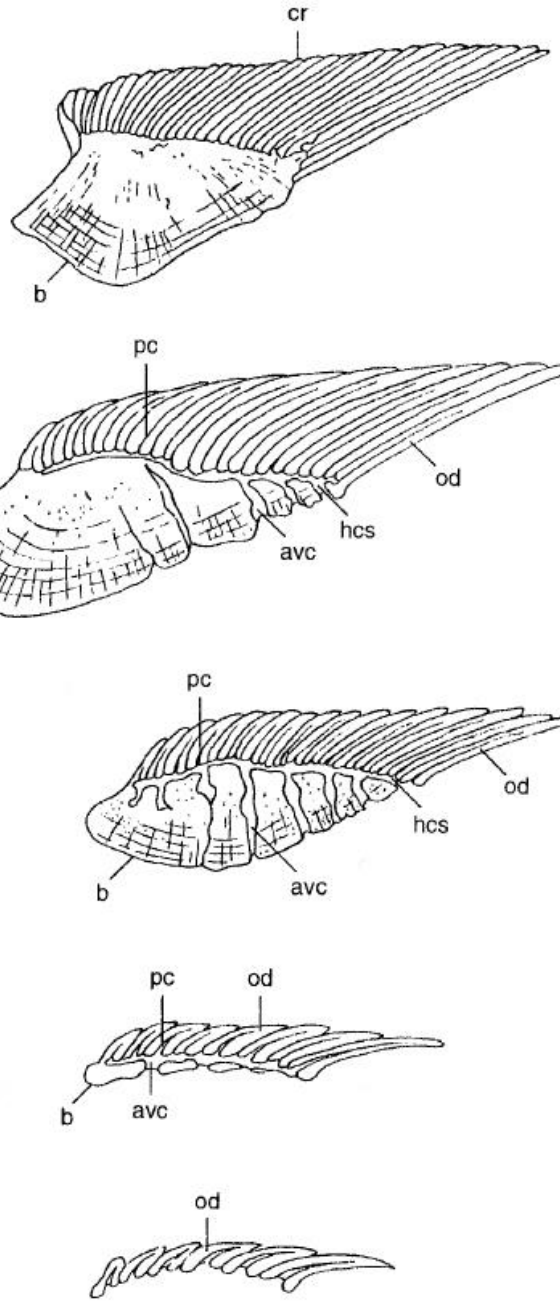
Total-skeleton tree



Scale dataset character-score distances

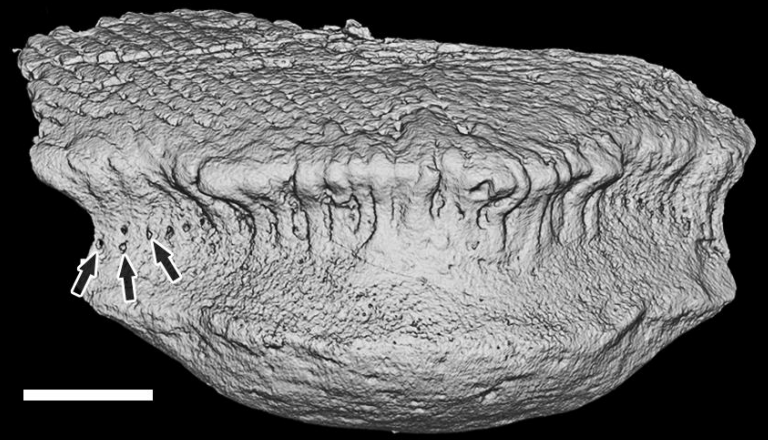


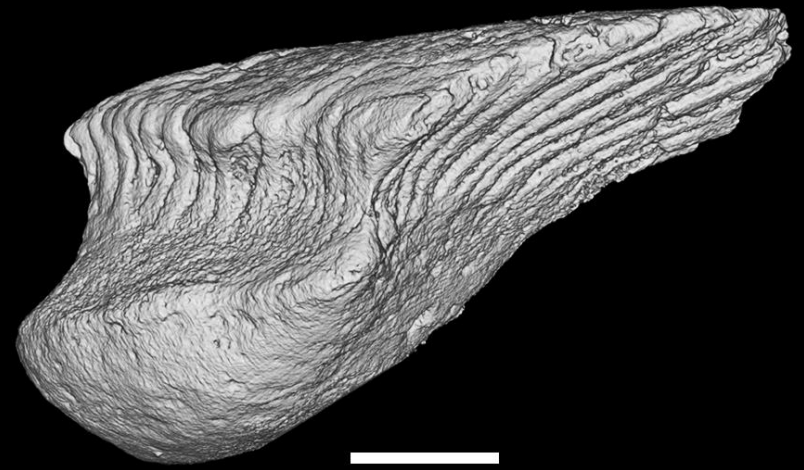
Time-correlated scale phylogeny of chondrichthyans

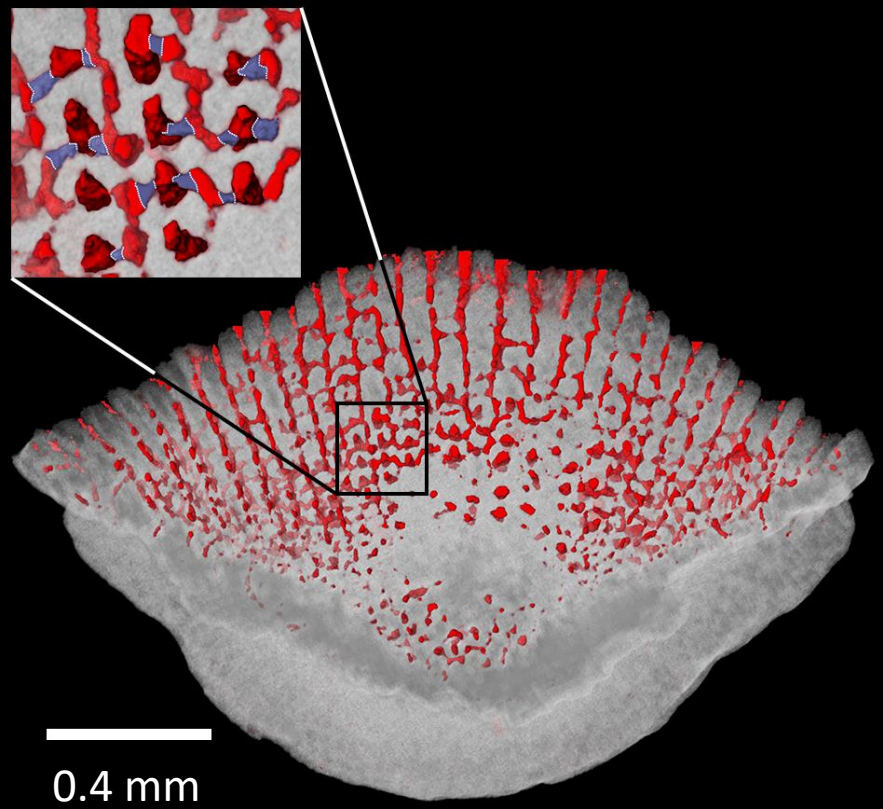


Karatajūte-Talimaa (1998)

Mongolepis

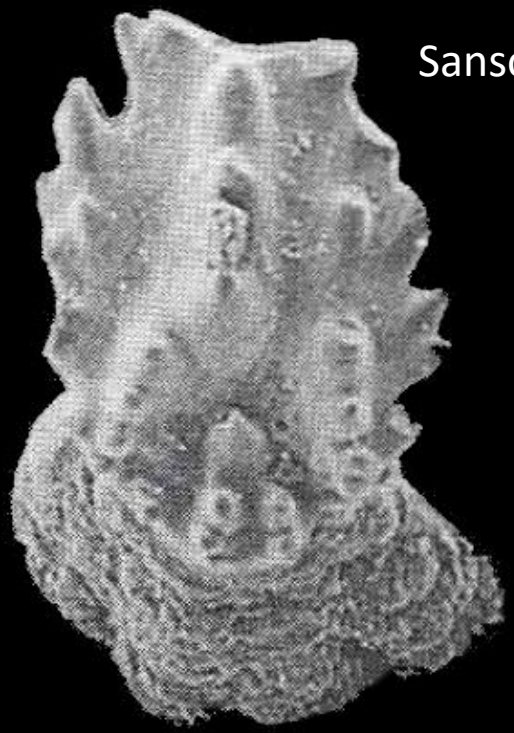


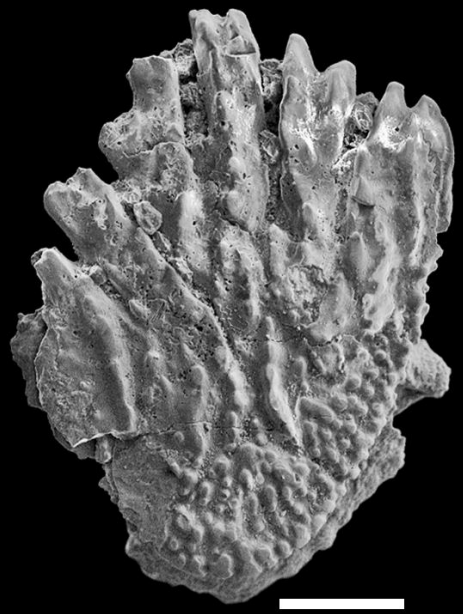


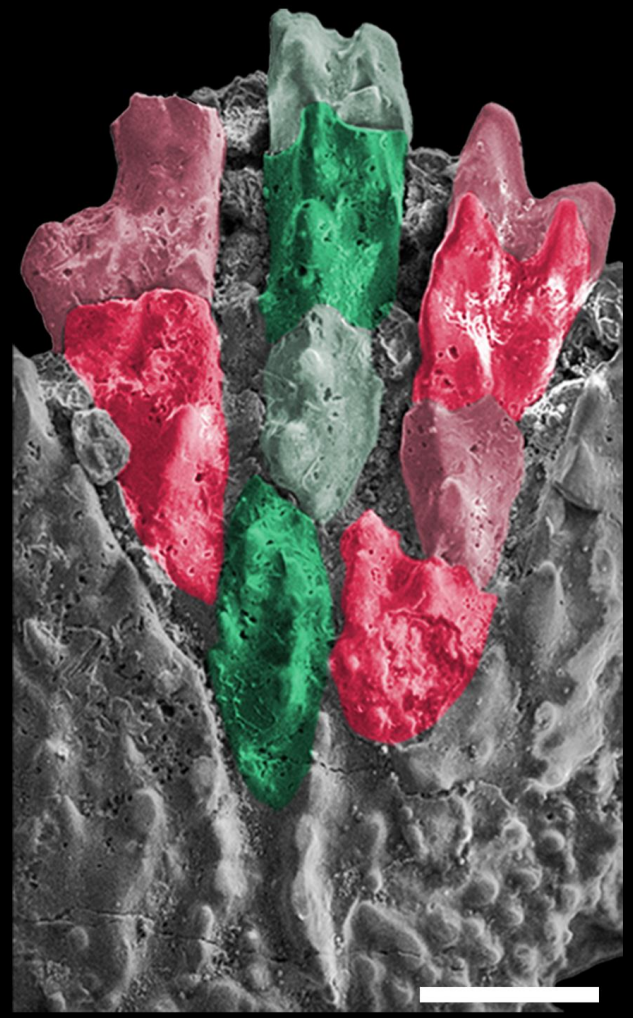


Mongolepis-type morphogenesis

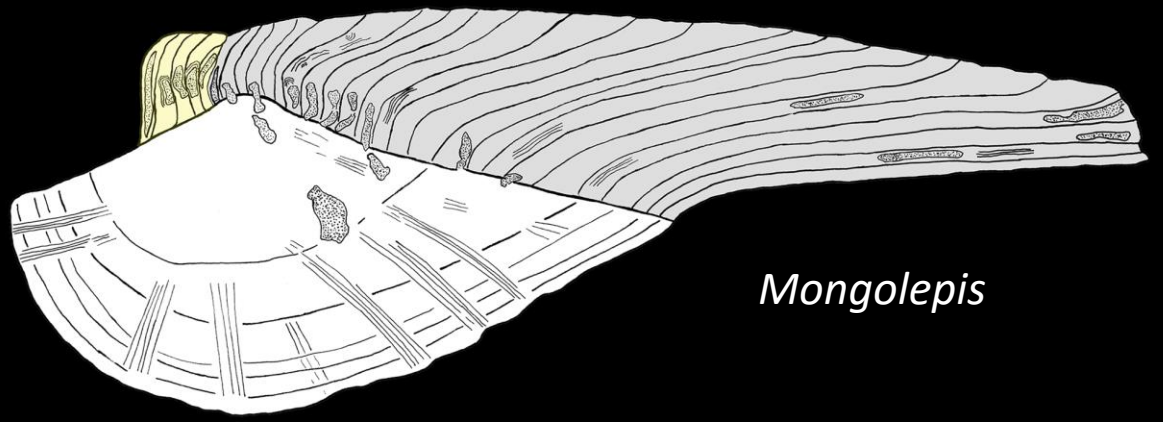
Sansom et al. (2000)



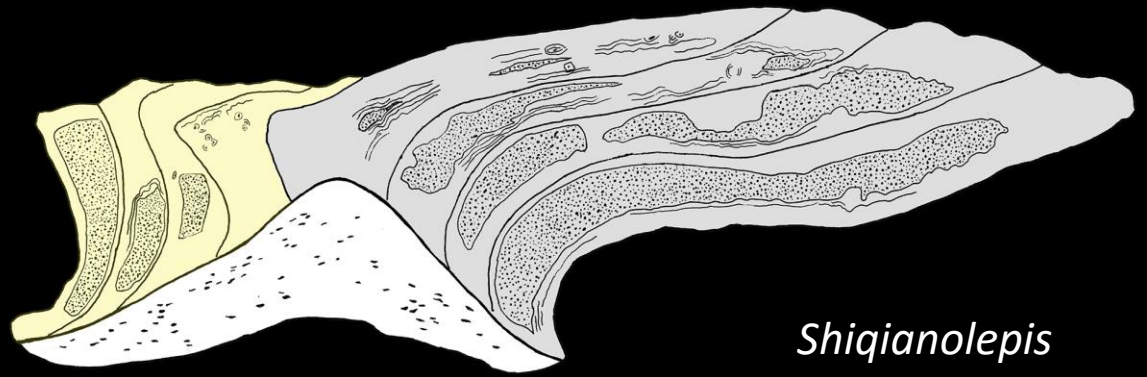




Shiqianolepis



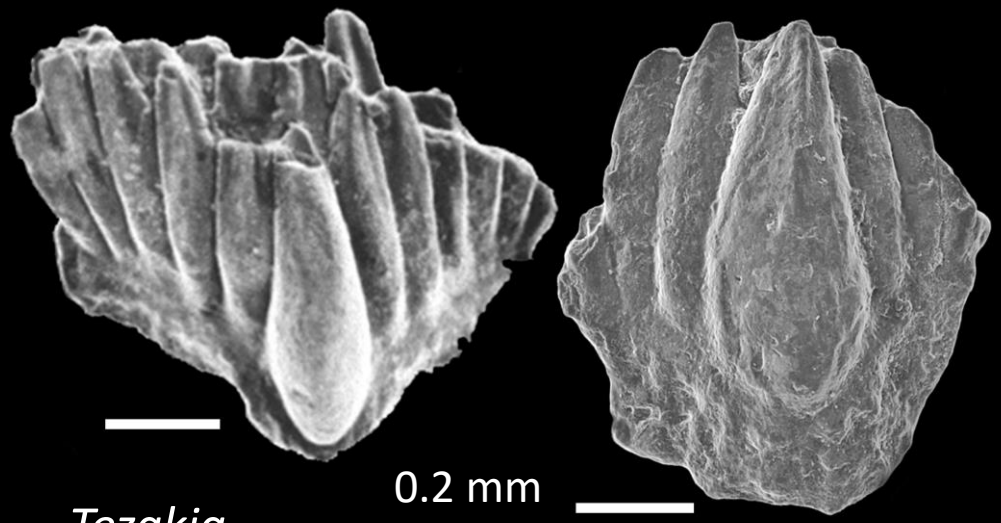
Mongolepis



Shiqianolepis

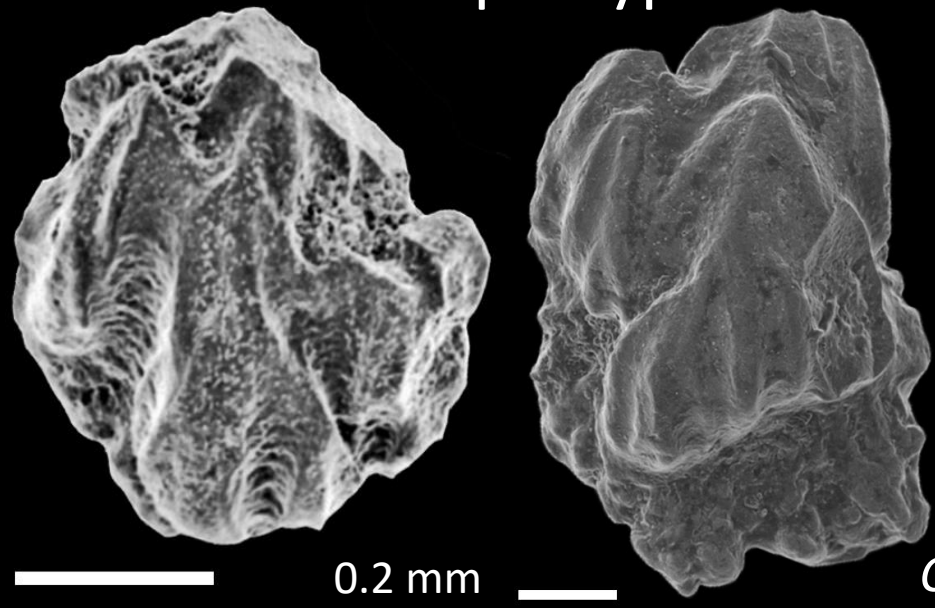
Altholepis-type

Ohiolepis-type



Tezakia

0.2 mm



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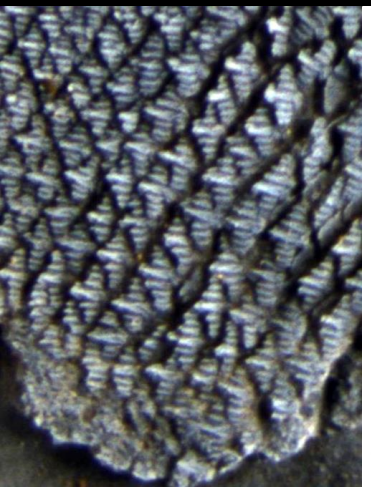
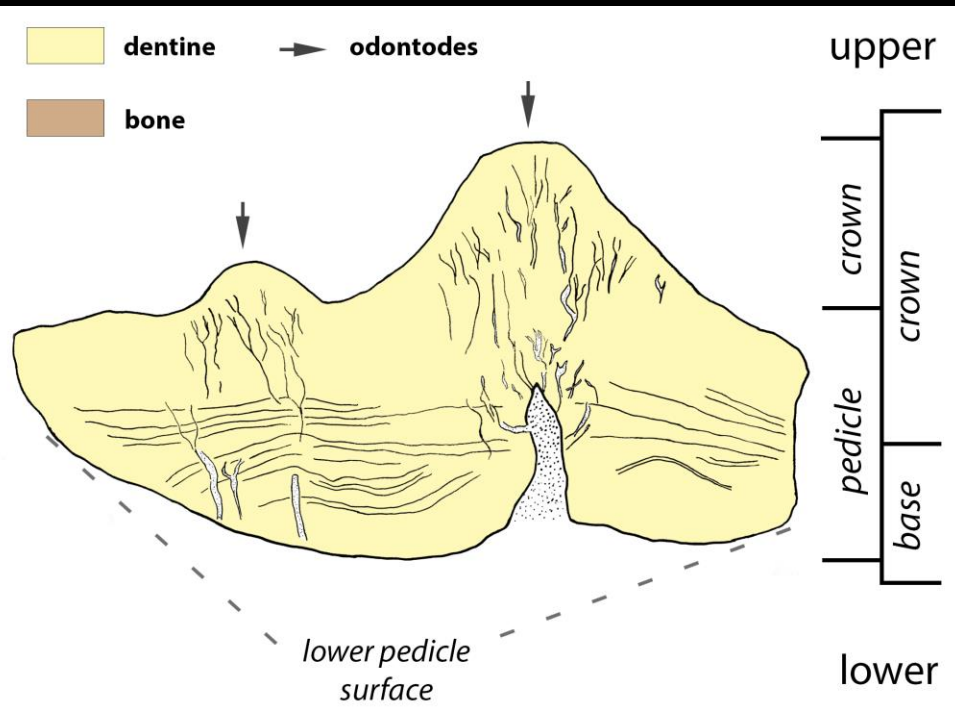
Canyonlepis

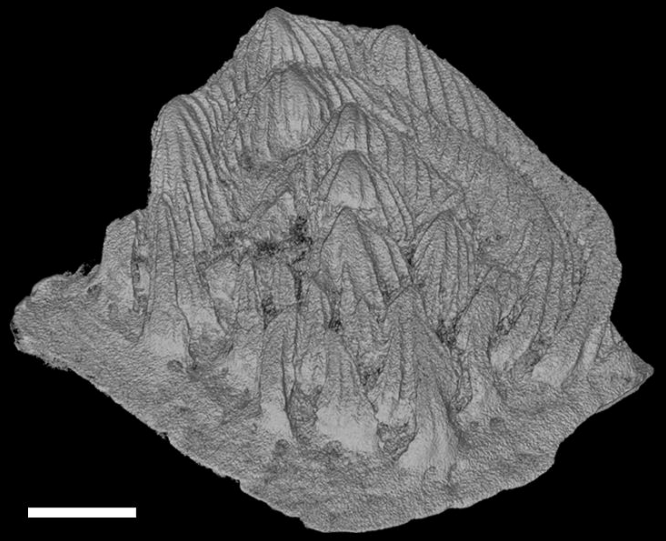


Altholepis



Ohiolepis
(Gross 1973)

Seretolepis-type morphogenesis



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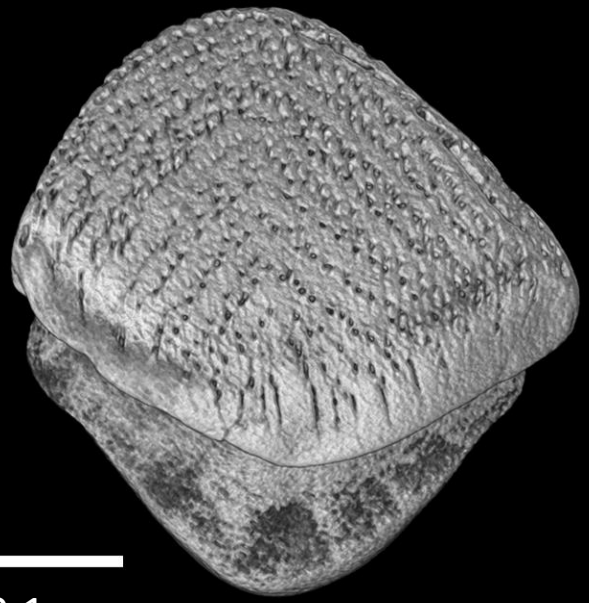

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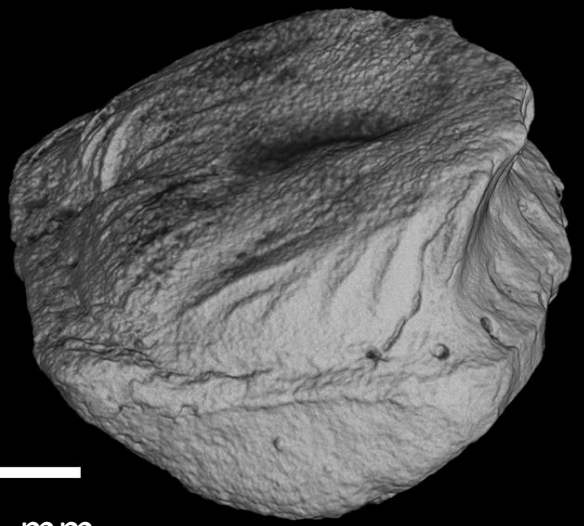

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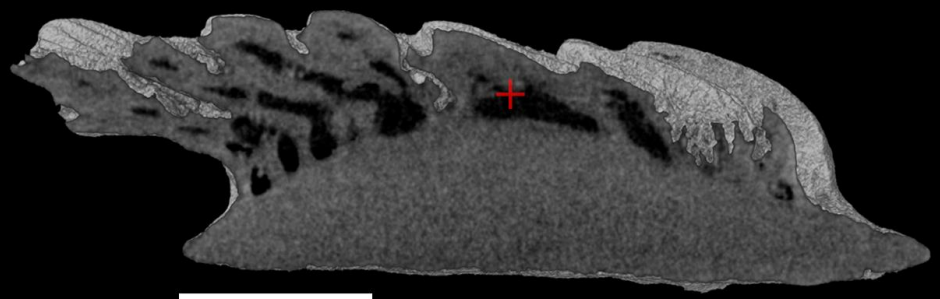

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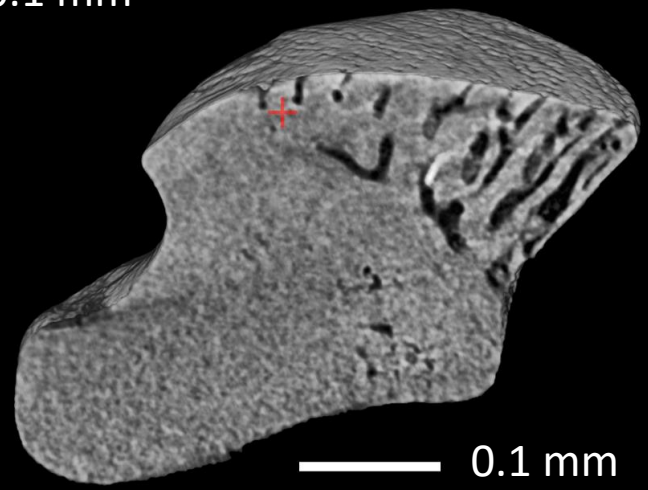
Seretolepis



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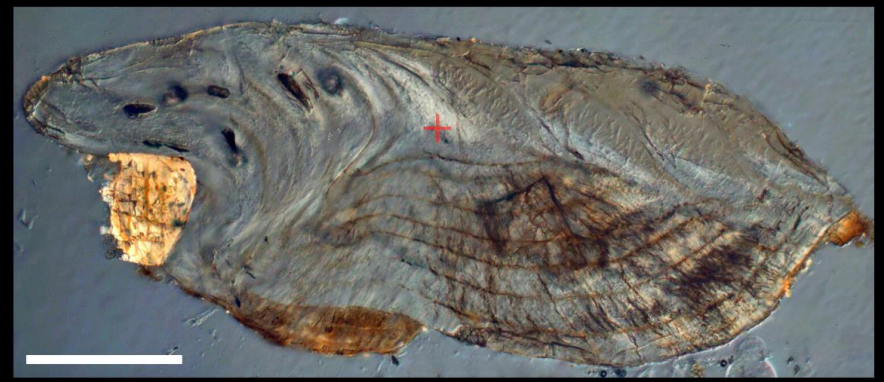
Poracanthodes



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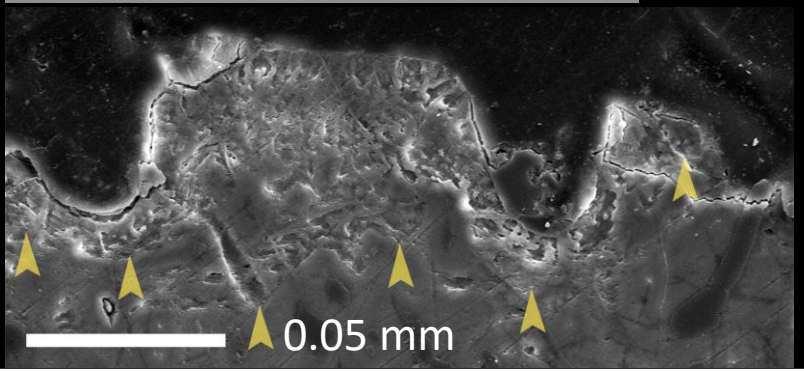
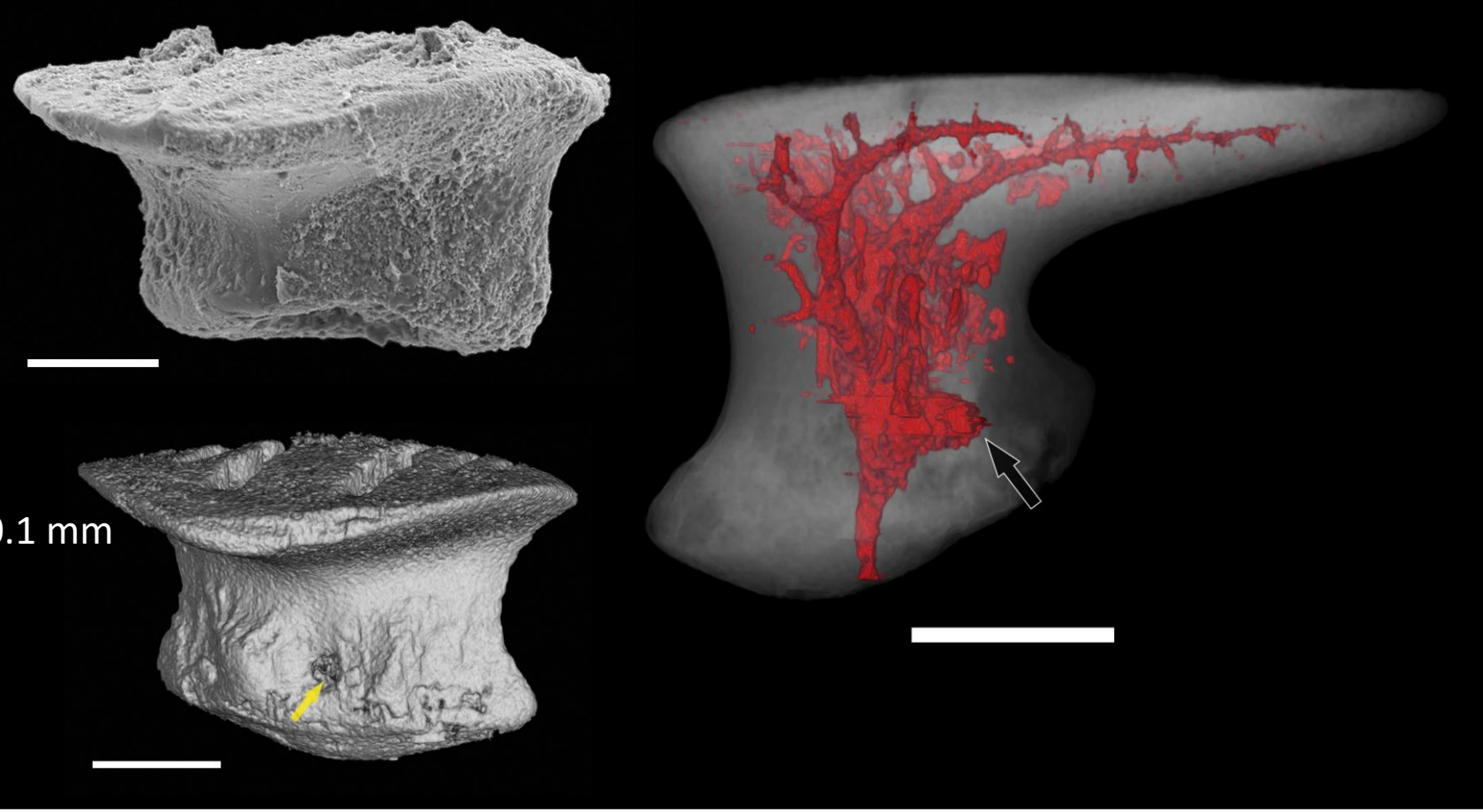
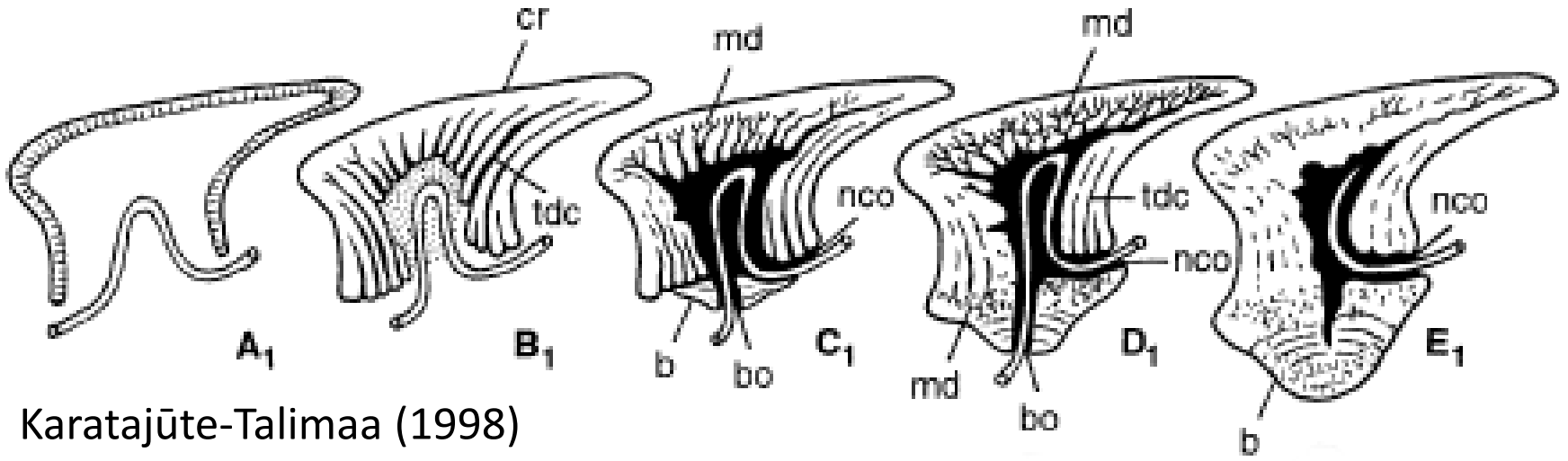
Wodnika



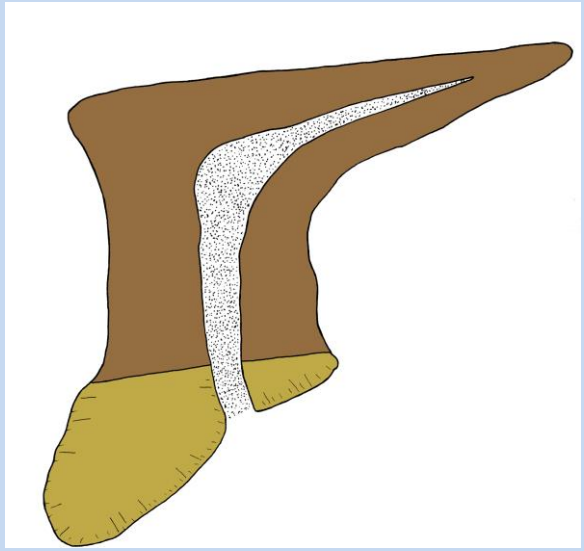


Elegestolepis-type morphogenesis

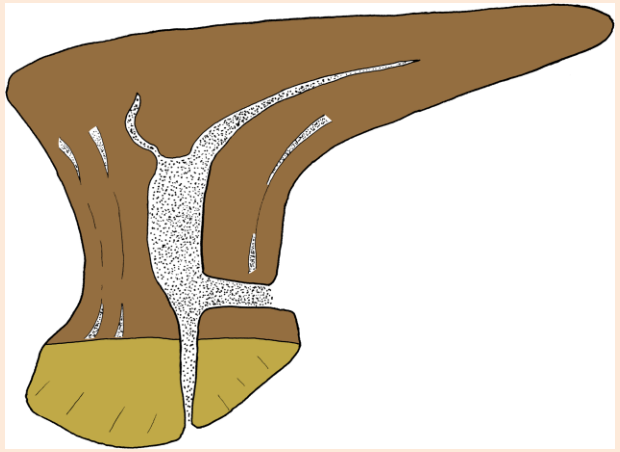


Karatajūte-Talimaa (1998)

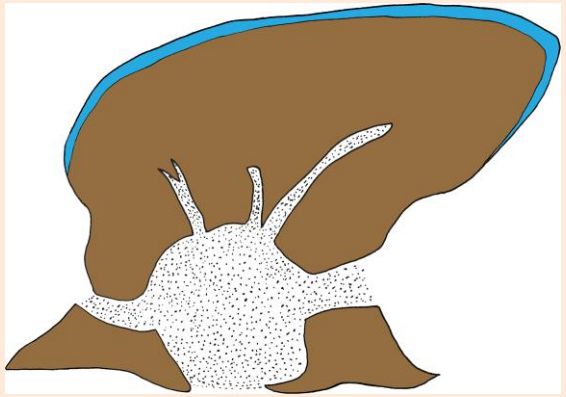
Thelodont scales



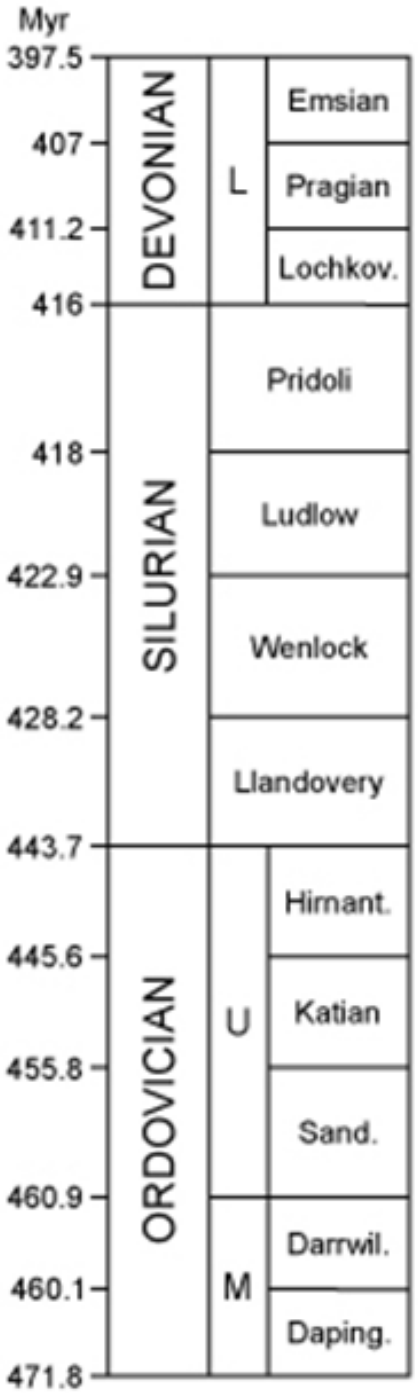
Chondrichthyan monodontode scales

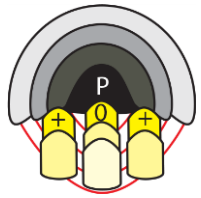


Elegestolepis-type

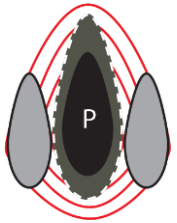


Heterodontus-type

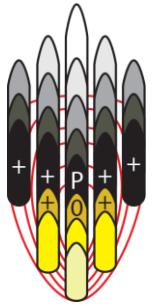




Seretolepis-type

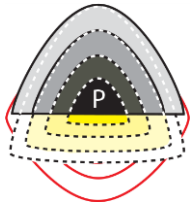


Ptomacanthus-type



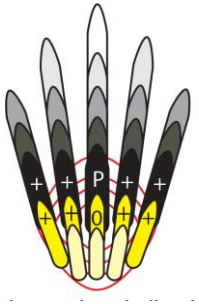
Ctenacanthus-type

Heterodontus-type

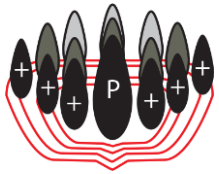


Diplacanthus-type

Elegestolepis-type

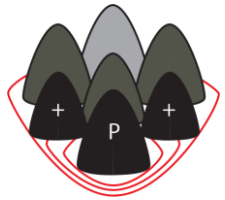


Mongolepis-type

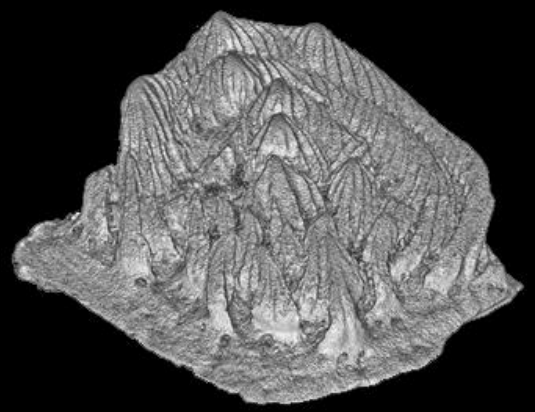


Altholepis-type

Eugeneodus-type



Ohiolepis-type



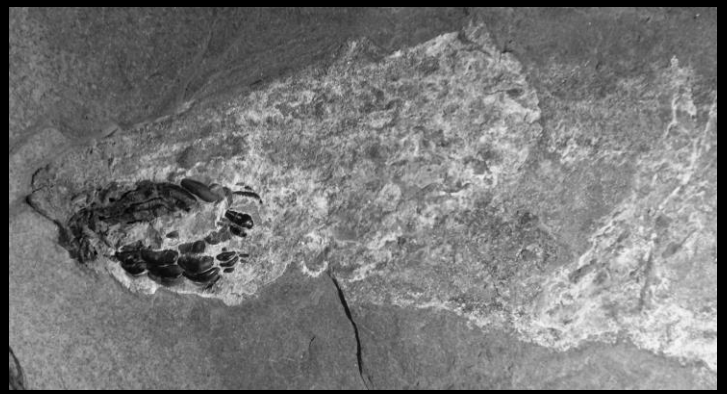
Seretolepis scale

Hanke and Wilson (2006)

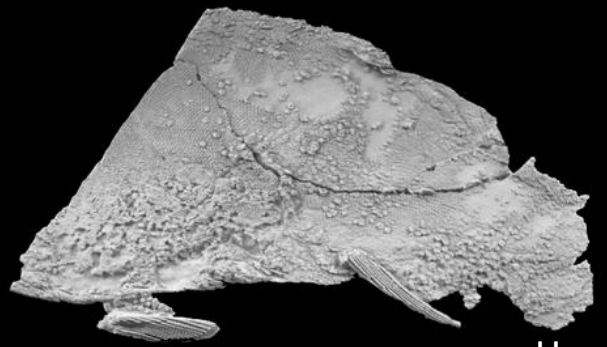
Brochoadmones

Burrow et al. (2013)

Parexus



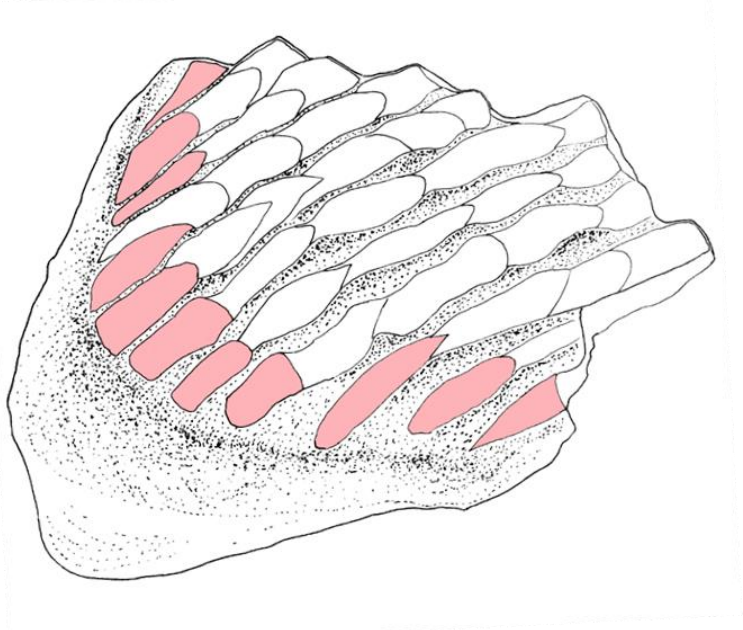
Wodnika

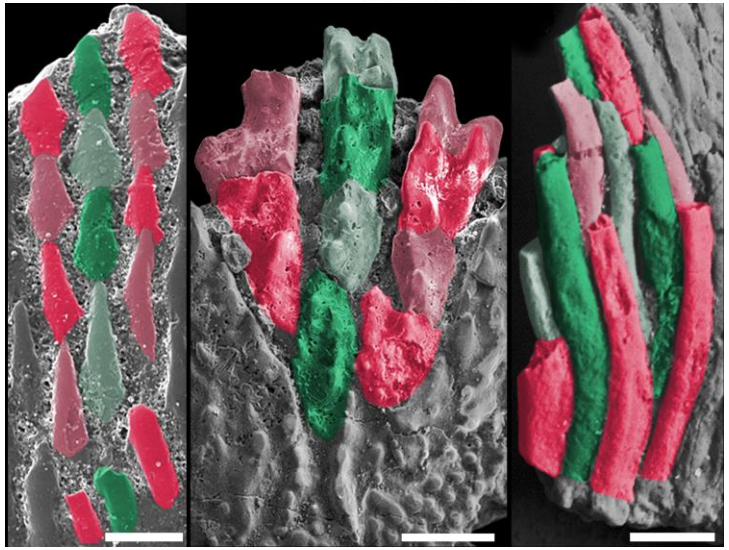


Seretolepis

Hanke and Wilson (2010)

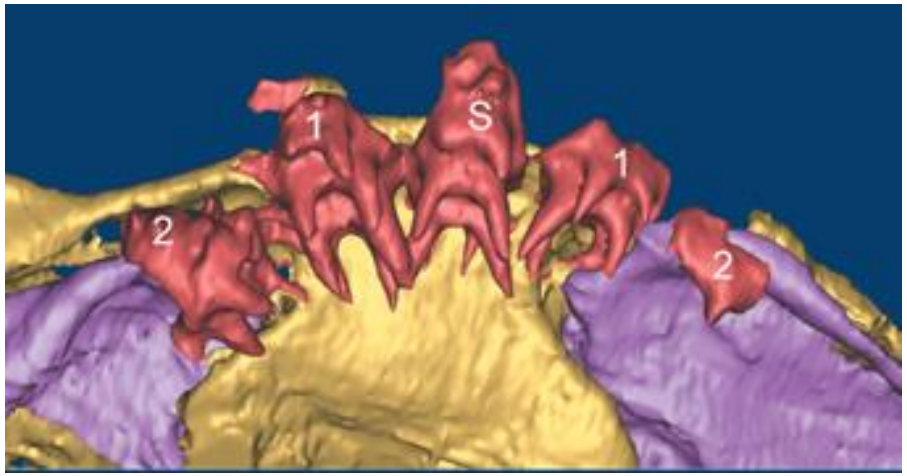
Mongolepid scales



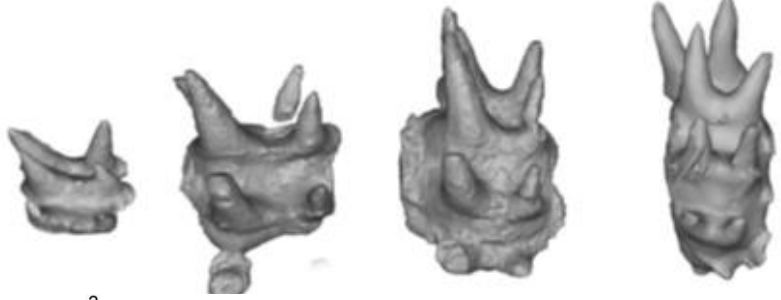


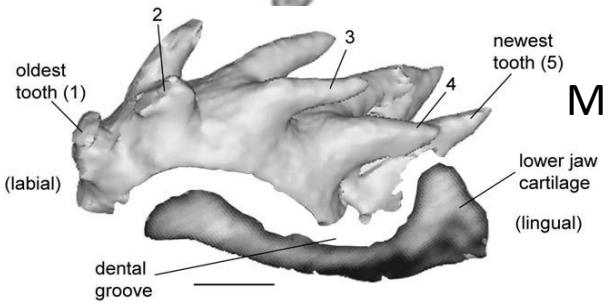
0.1 mm 0.2 mm 0.05 mm

Oral teeth of the early chondrichthyan *Doliodus*



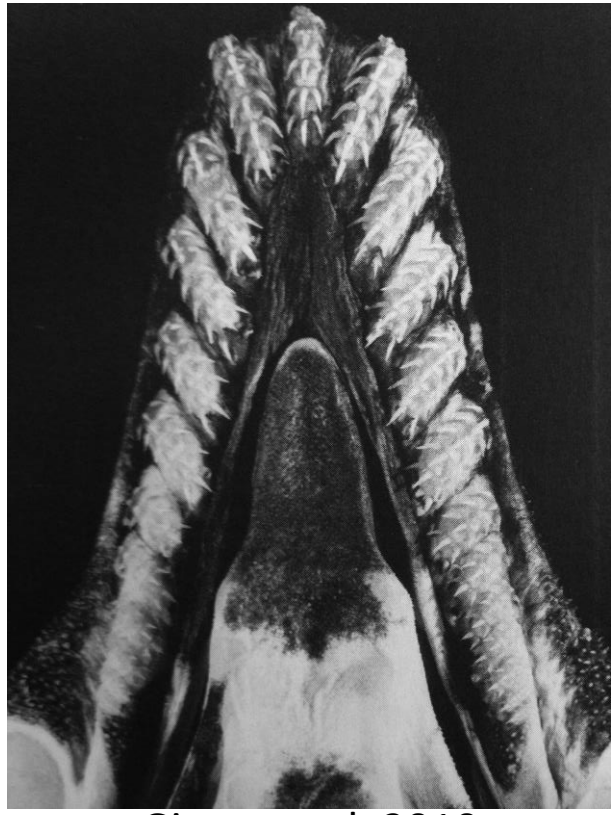
Maisey et al. 2009



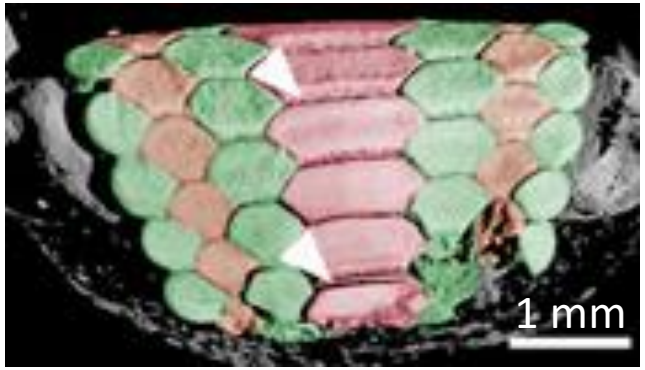


Maisey et al. 2014

Oral teeth of euselachians



Ginter et al. 2010



Underwood et al. 2015

Acknowledgements

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Publications of the lead author

ANDREEV P. S. (2010). Enameloid microstructure of the serrated cutting edges in certain fossil carcharhiniform and lamniform sharks. Microscopy research and technique 73, 704-713.

ANDREEV P. S. (2011). Convergence in dental histology between the late Triassic semionotiform *Sargodon tomicus* (Neopterygii) and a late cretaceous (Turonian) pycnodontid (Neopterygii: Pycnodontiformes) species. Microscopy research and technique 74, 464-479.

ANDREEV P. S. & CUNY, G. (2012). New Triassic stem selachimorphs (Chondrichthyes, Elasmobranchii) and their bearing on the evolution of dental enameloid in Neoselachii. Journal of Vertebrate Paleontology 32, 255-266.

SANSOM I. J., HAINES, P. W., ANDREEV, P. & NICOLL, R. S. (2013). A new pteraspidomorph from the Nibil Formation (Katian, Late Ordovician) of the Canning Basin, Western Australia. Journal of Vertebrate Paleontology 33, 764-769.

ANDREEV P. S., COATES, M. I., SHELTON, R. M., COOPER, P. R., SMITH, M. P. & SANSOM, I. J. (2015). Upper Ordovician chondrichthyan-like scales from North America. Palaeontology 58, 691-704.