The famous fish beds of Lebanon

Hady George

Lagerstätten: the clearest windows into the past

Burgess Shale
Cambrian

Anomalocaris

Solnhofen
Limestone

Archaeopteryx

Messel pit
Eocene

Darwinius


Pierre Abi Saad

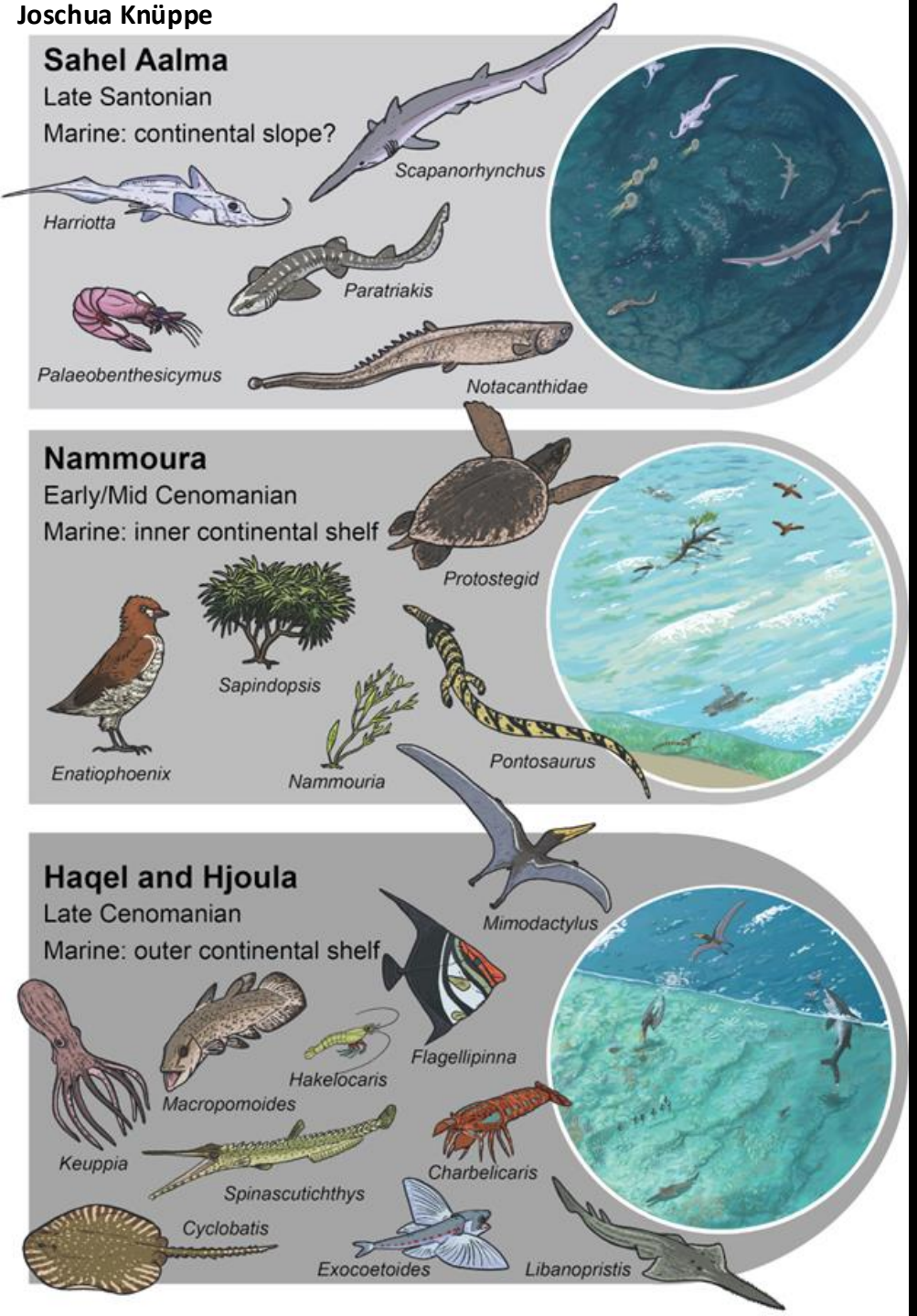

Expo Hakel


Audo and Charbonnier, 2013
B1
10 mm


Pierre Abi Saad


Pierre Abi Saad

Joschua Knüppe




Tamara El Hossny
Haqel

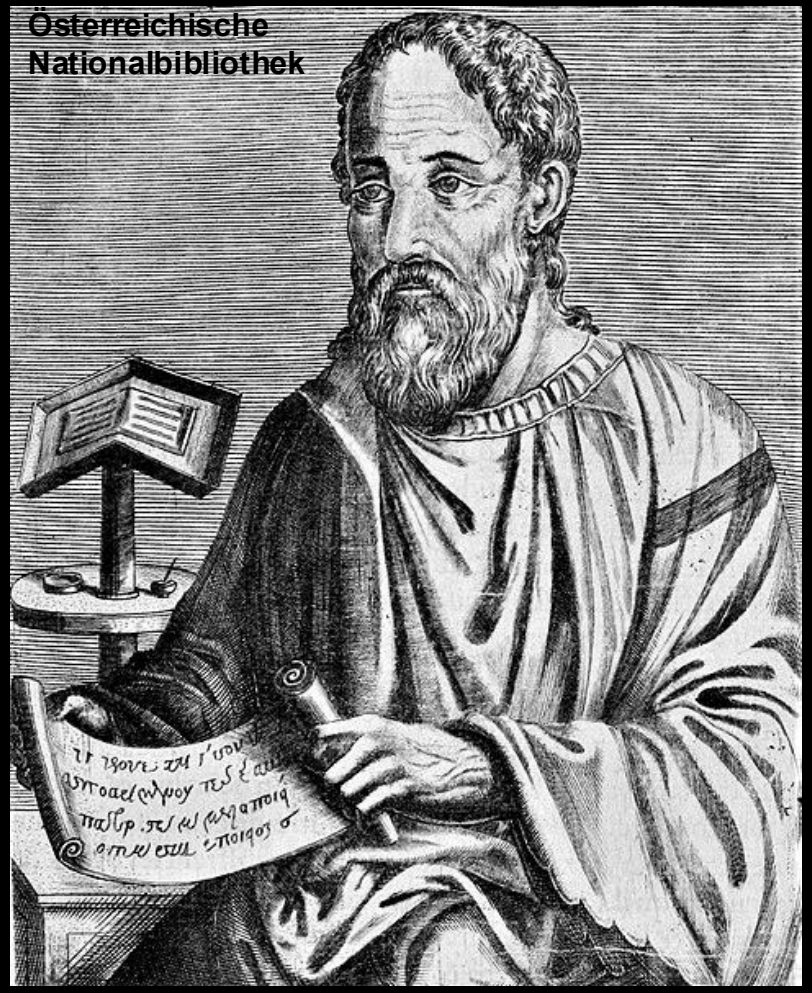

Tamara El Hossny
Hjoula

Nammoura

Tamara El Hossny


Taylor, 1882
Sahel Aalma
No longer accessible

Ancient Rome



Saint Eusebius,
Bishop of Caesarea

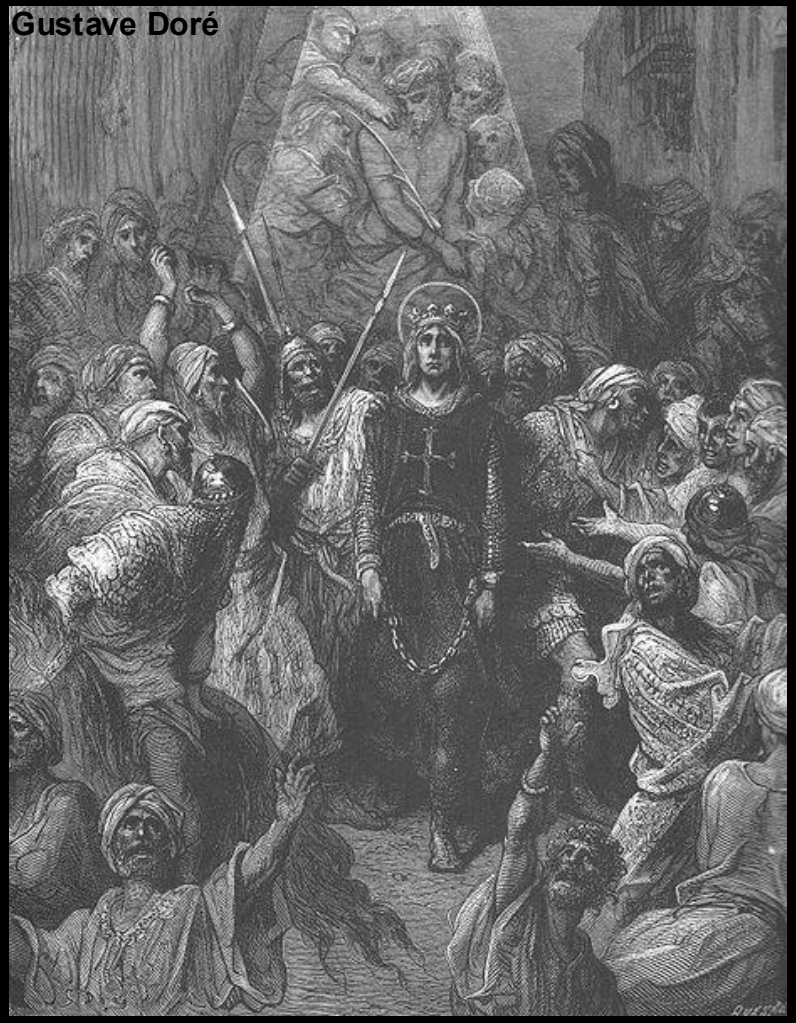
In our day, fish
were discovered high up Mt. Lebanon.

It happened that while rocks were being quarried there for construction in the valley, various types of ocean fish were uncovered, pressed into the mud.

These had been preserved to the present, thus providing evidence that the old story is credible. Those who hear this may believe it or not

- The Chronicron, Early 4th century

The Crusades



King Louis IX of France,
in chains following defeat in
Egypt (1250)

Sahel Aalma Monastery likely constructed in 800s,
built on a fossil locality

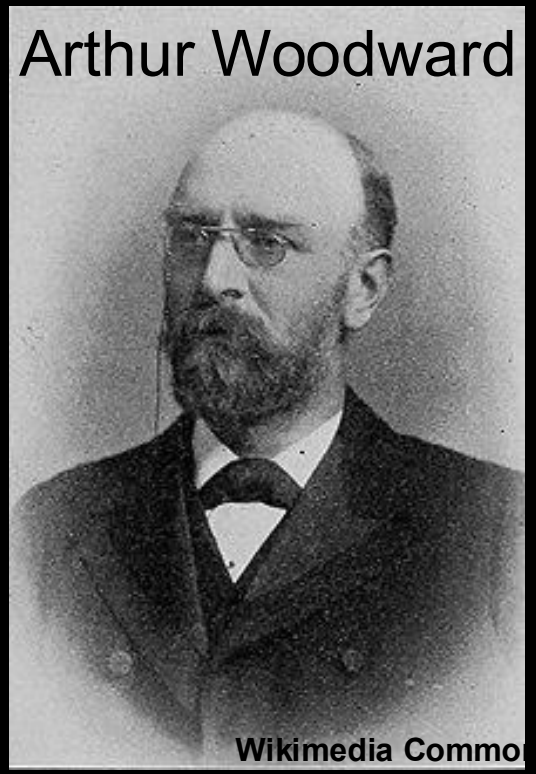
King Louis IX was gifted a fossil fish while
coordinating war plans from the Levant

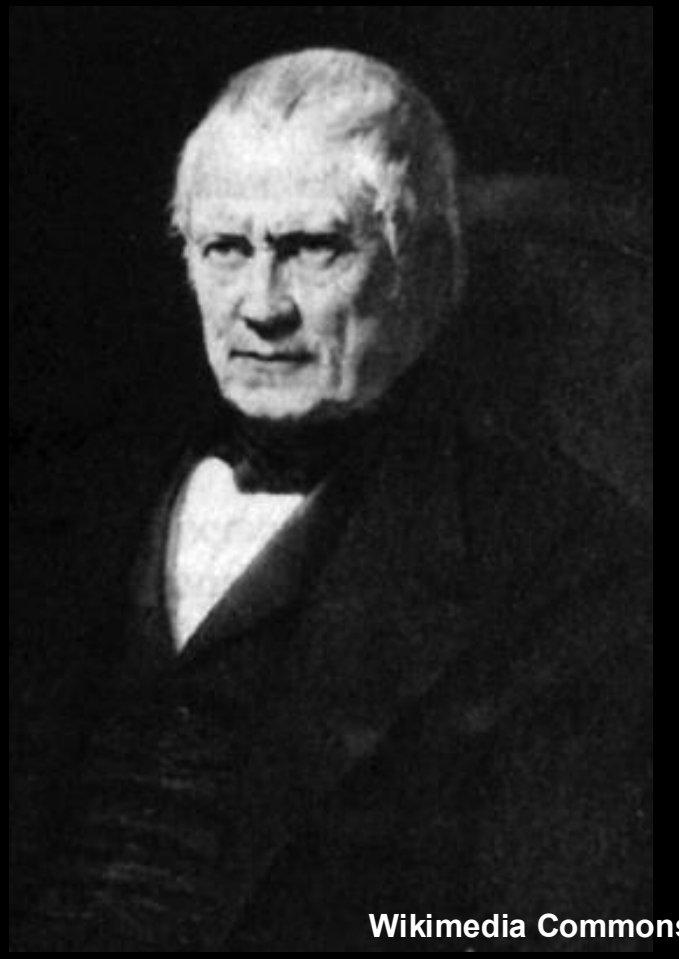
-Chronicler Jean de Joinville, 7th crusade

Lady Hester Stanhope

British aristocrat

Organised many fossil collection trips





Henri de Blainville

Coined ‘palaeontology’
Described the first fossil fish from Lebanon

Lebanese fossils contribute to Museums around the world

NHM, London, UK

MNHN, Paris, France

Historic collections include numerous invertebrates & fish

MSNM, Milan, Italy

Pierre Abi Saad

The angiosperm
Sapindopsis

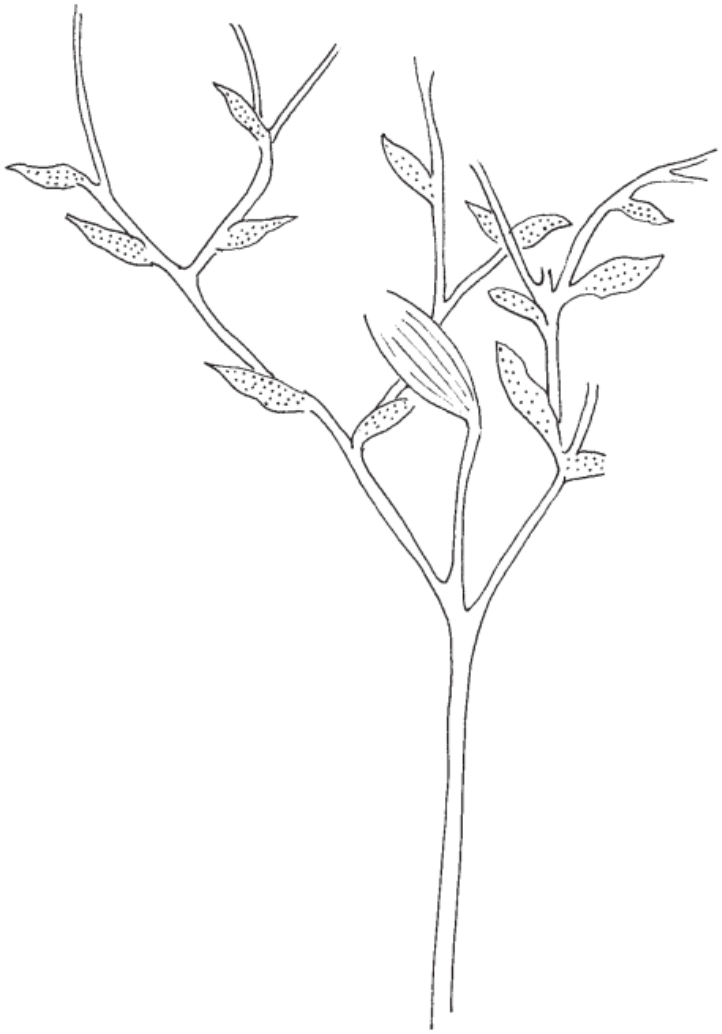
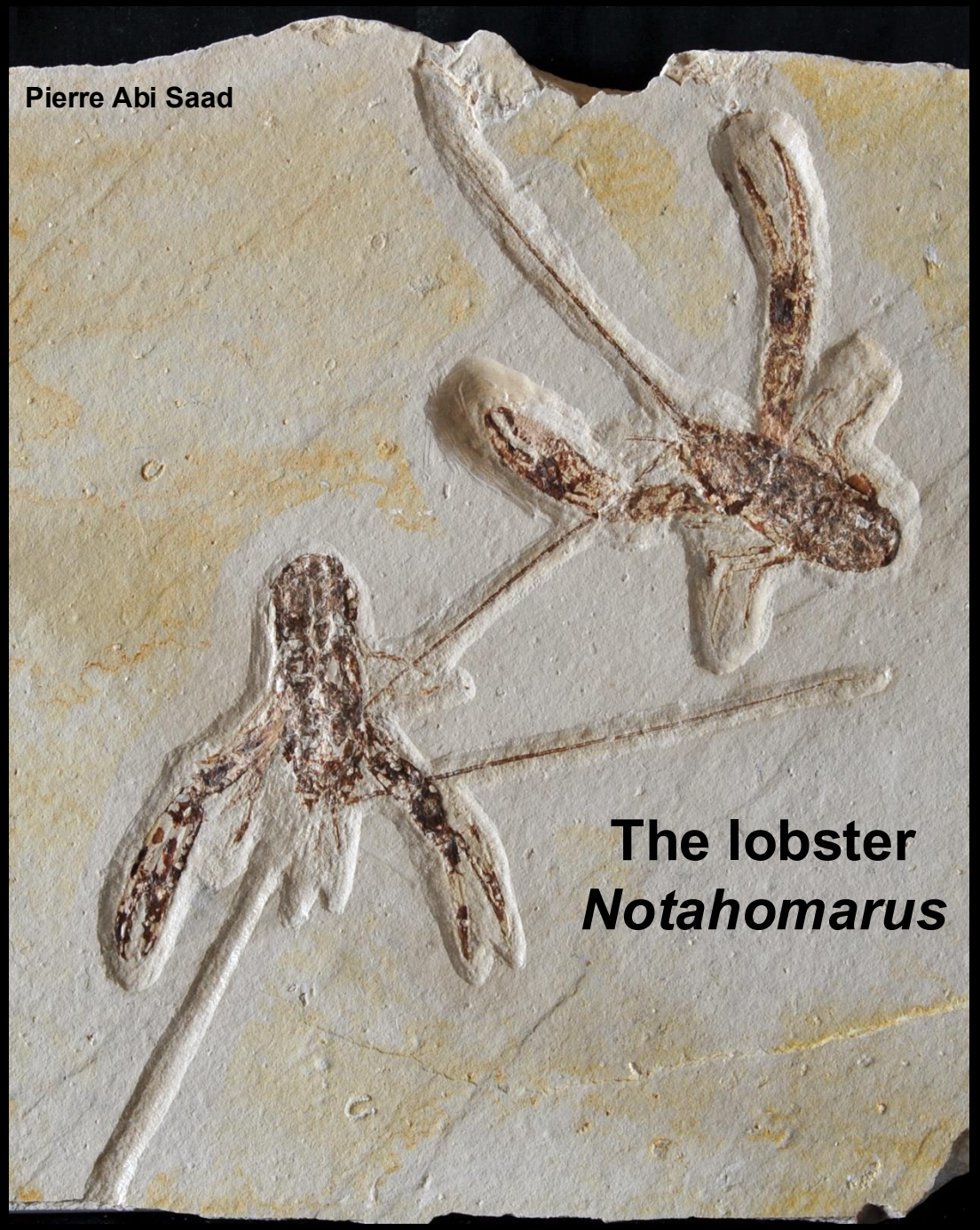
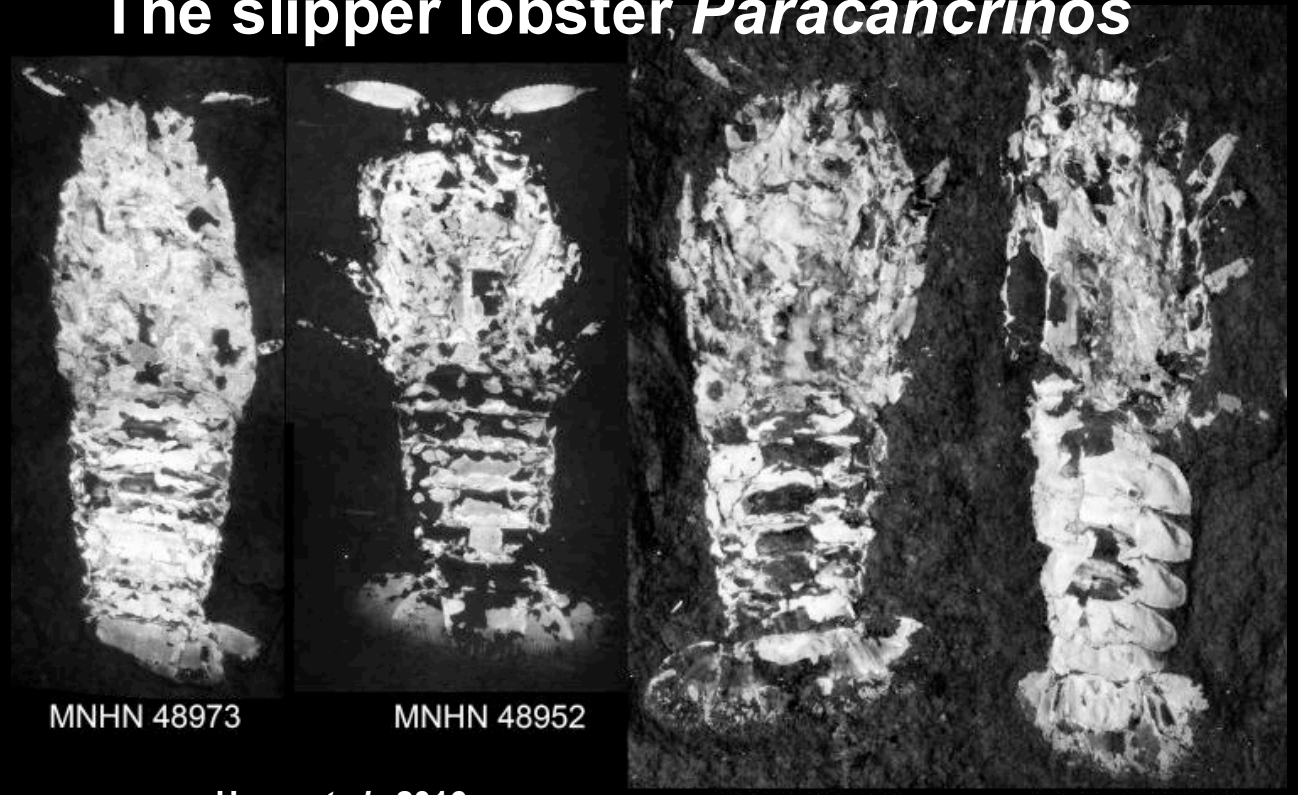


Figure 3. *Nammouria gracilis* gen. et sp. nov., aquatic fern (?) from the Cenomanian of Nammoura, Lebanon: sketch drawing of holotype, × 1.5.

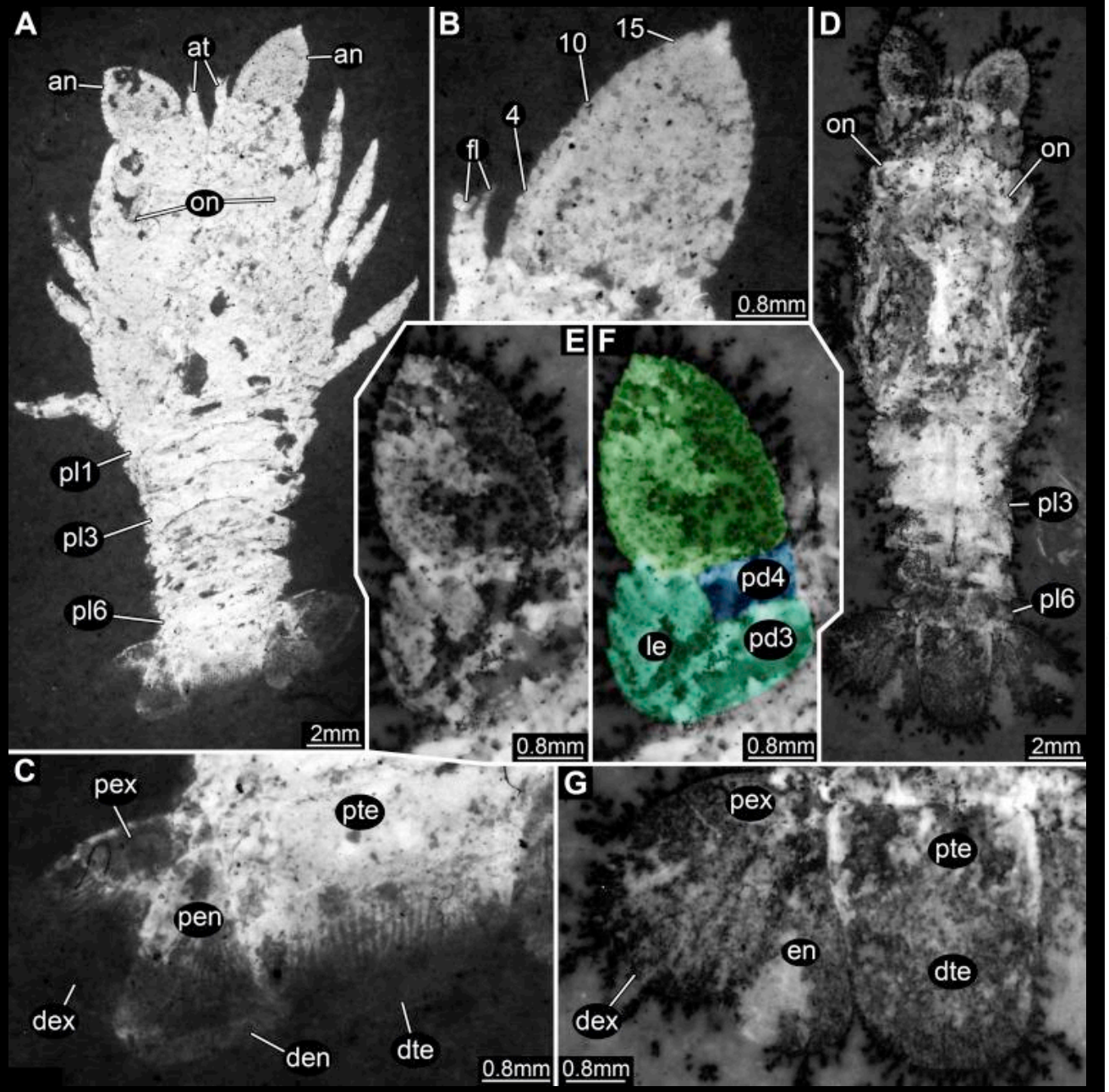


The crested shrimp *Palaeobenthesicymus*

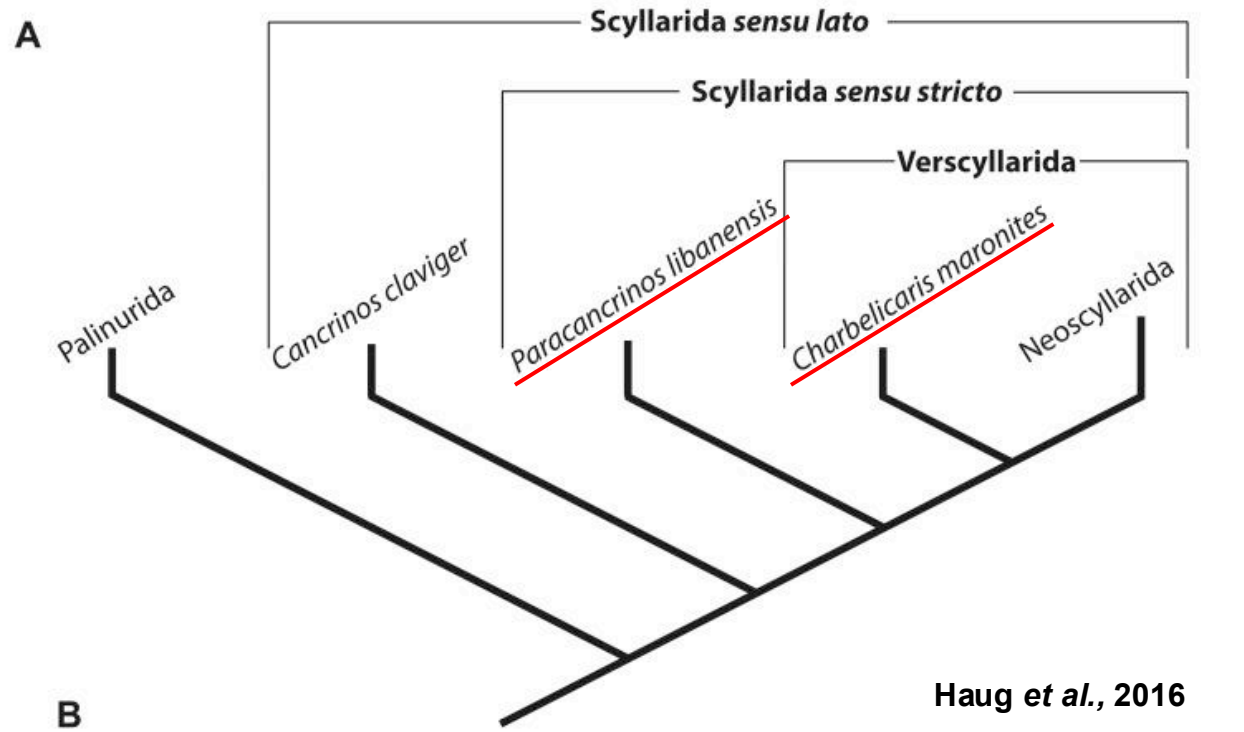
The slipper lobster *Paracancrinos*



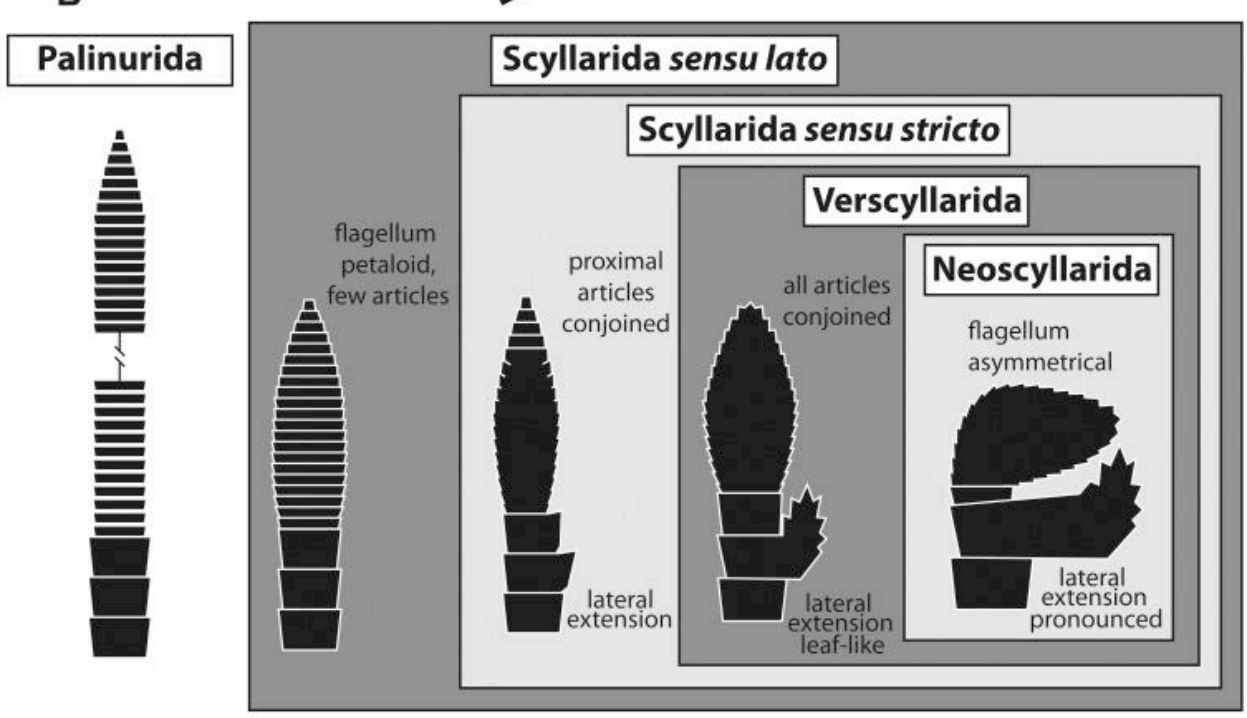
Haug *et al.*, 2016



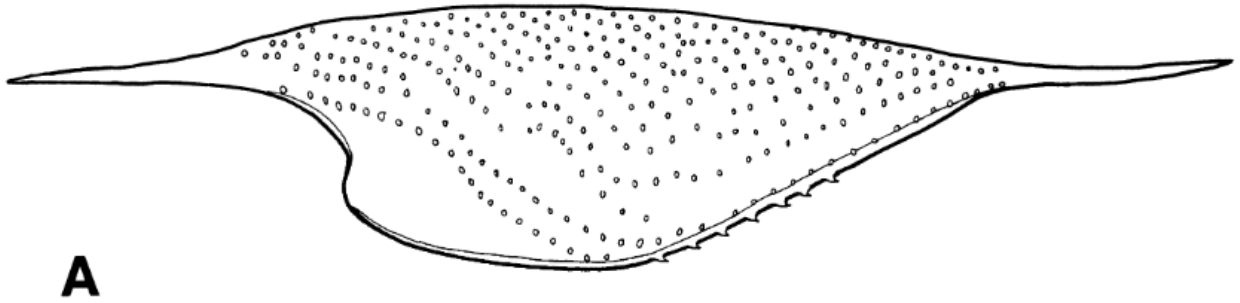
Charbelicaris maronites



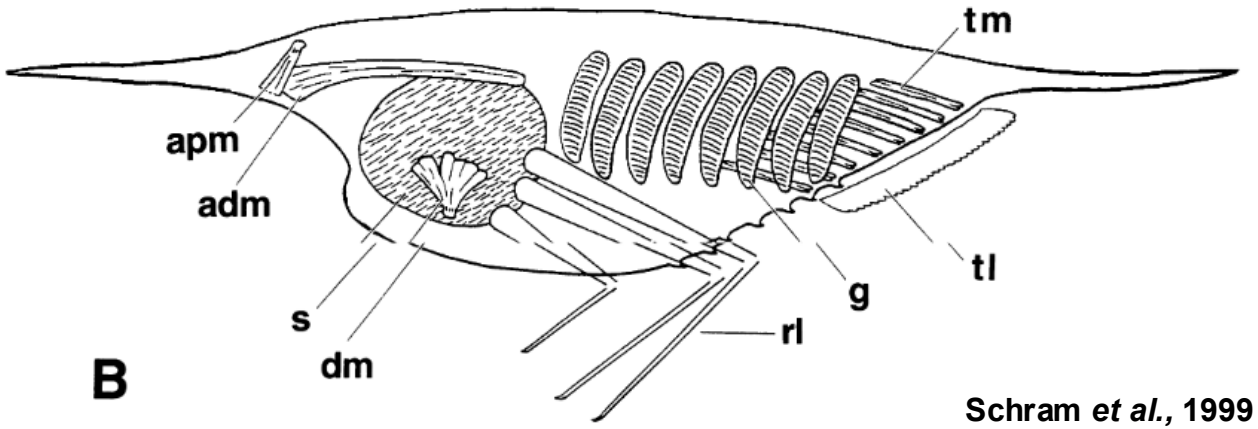
Haug *et al.*, 2016



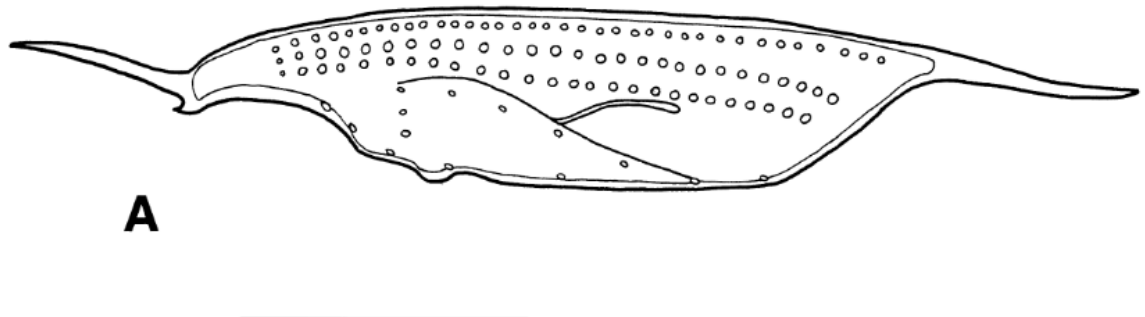
Thylacocephala represented by 8 genera



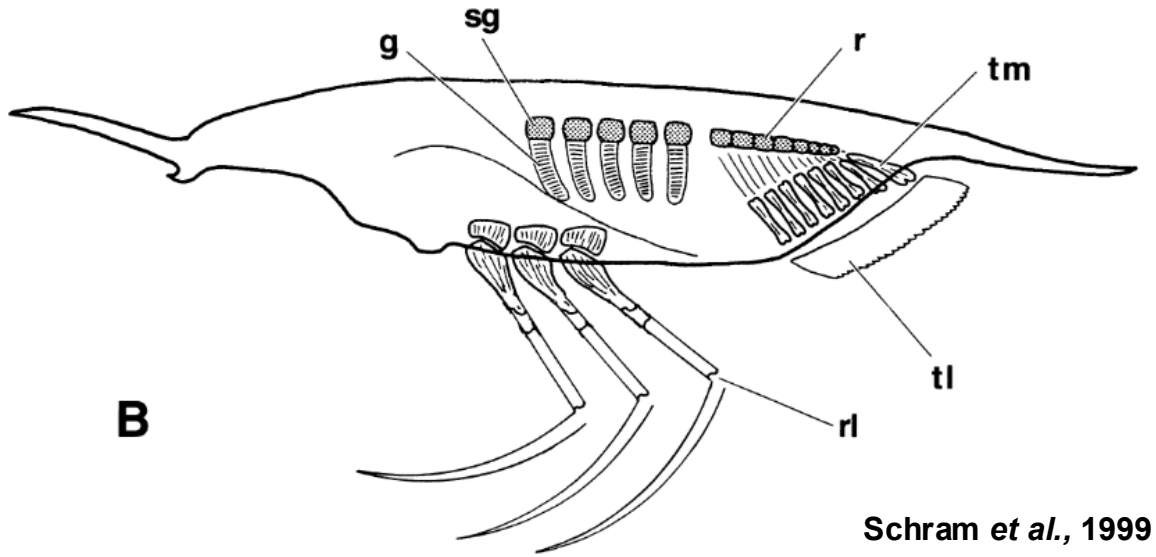
Protozoea hilgendorfi



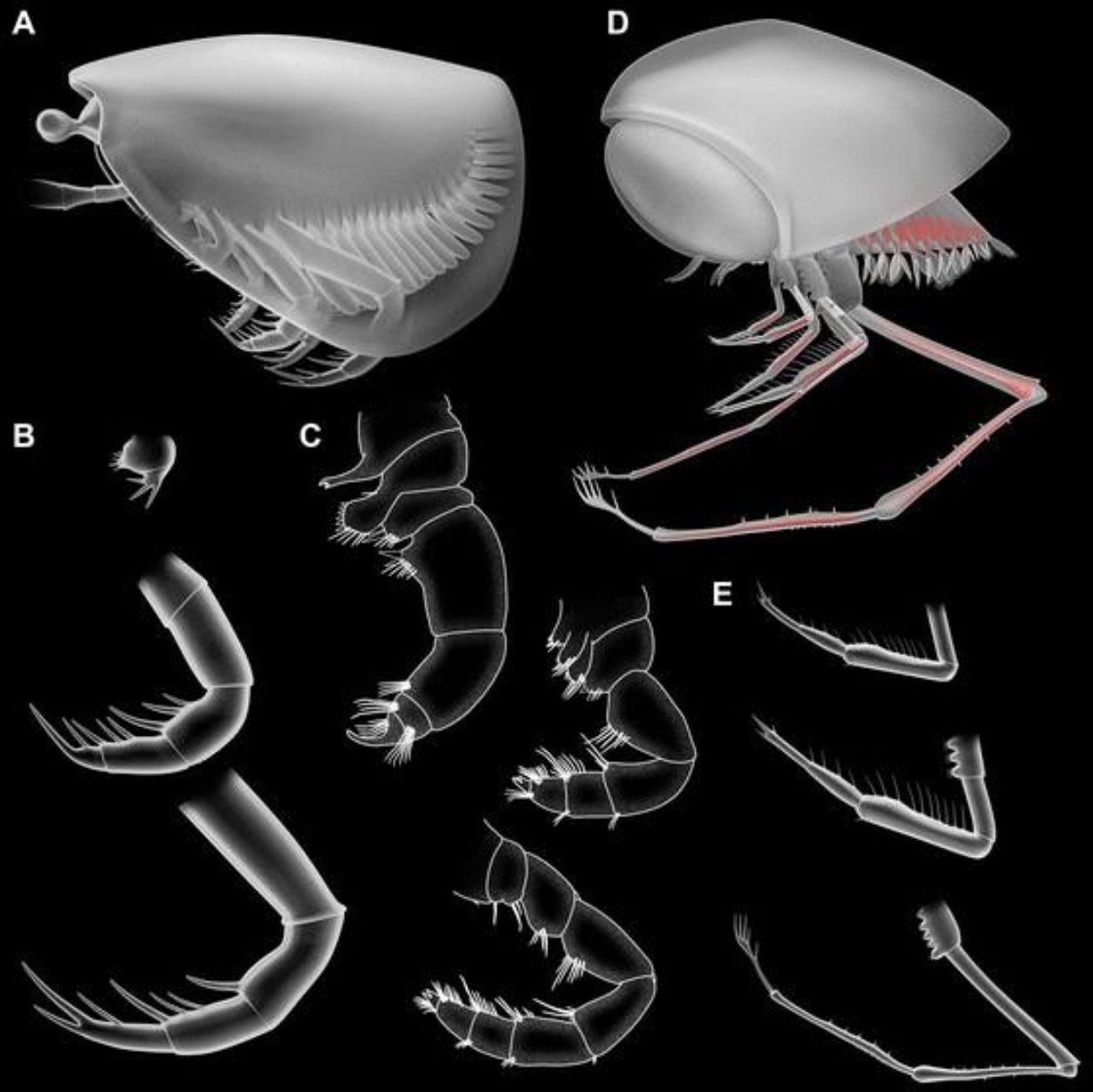
Schram *et al.*, 1999



Protozoea damesi



Schram *et al.*, 1999



Haug *et al.*, 2014

What are thylacocephalans?

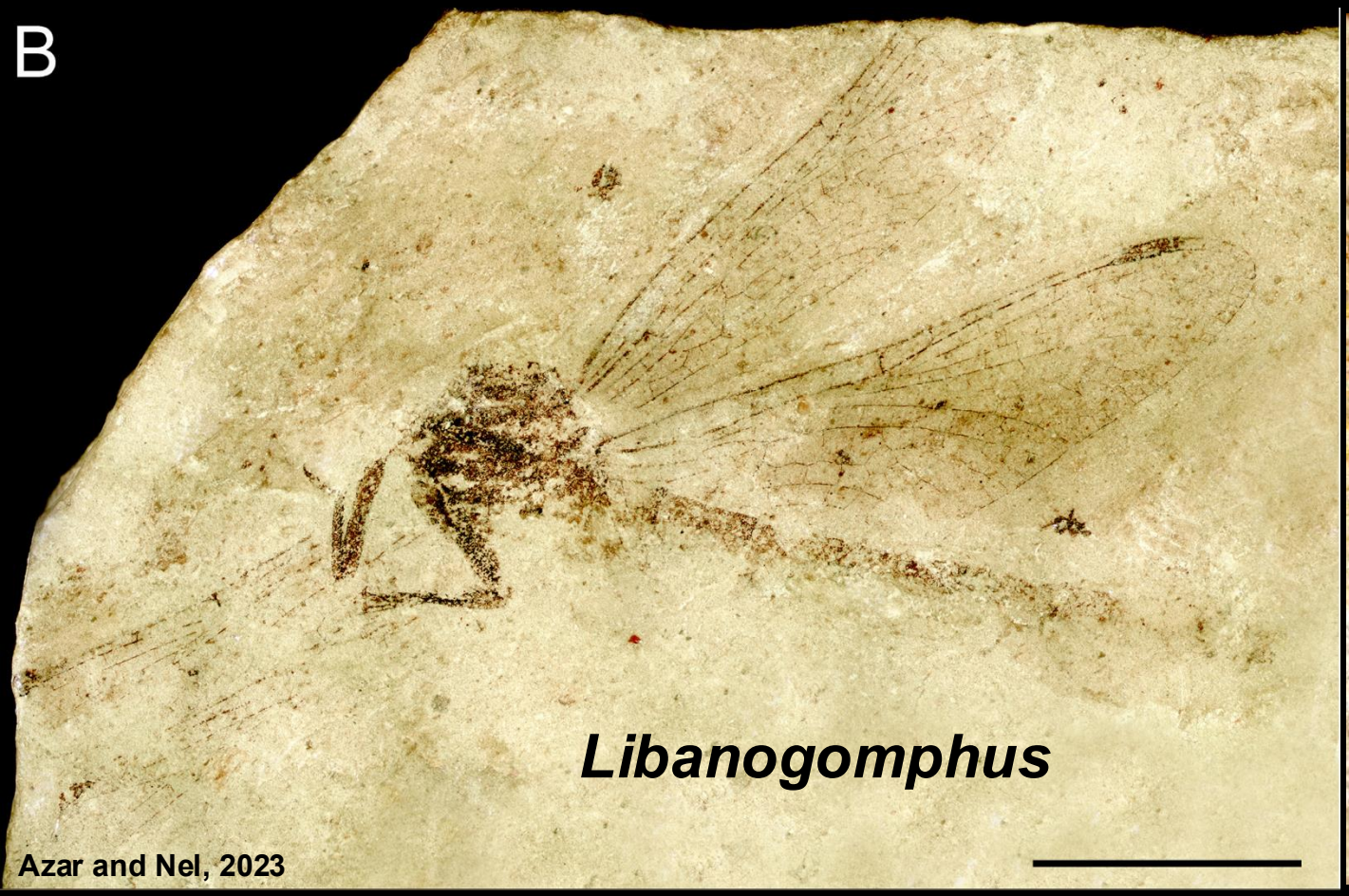
Unclear where in Arthropoda, possibly within or close to Crustacea

Very rare extinct group

Terrestrial arthropods from Hjoula and Nammoura too

Close to land?

B

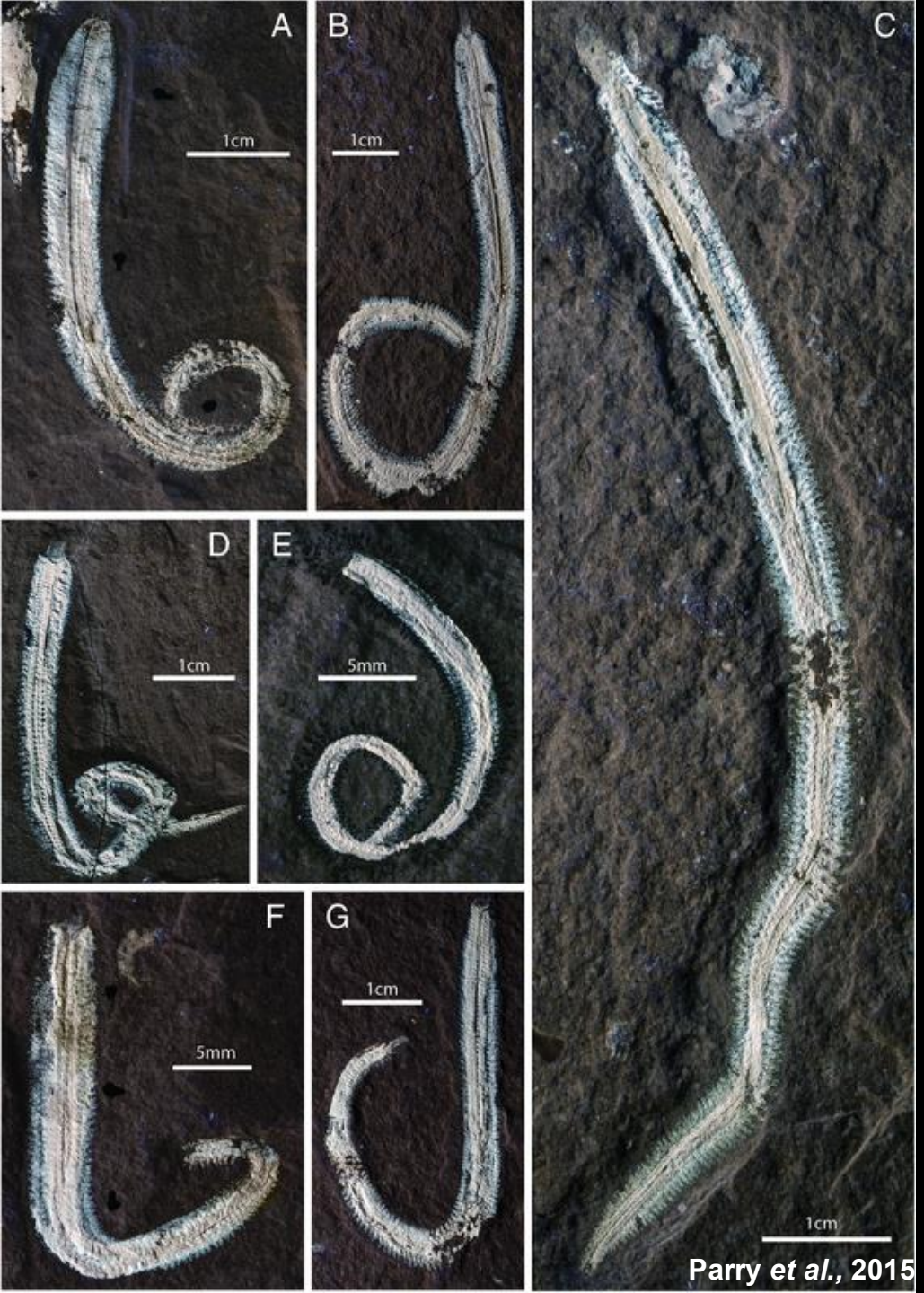


Libanogomphus

Azar and Nel, 2023

Libanoliupanshania

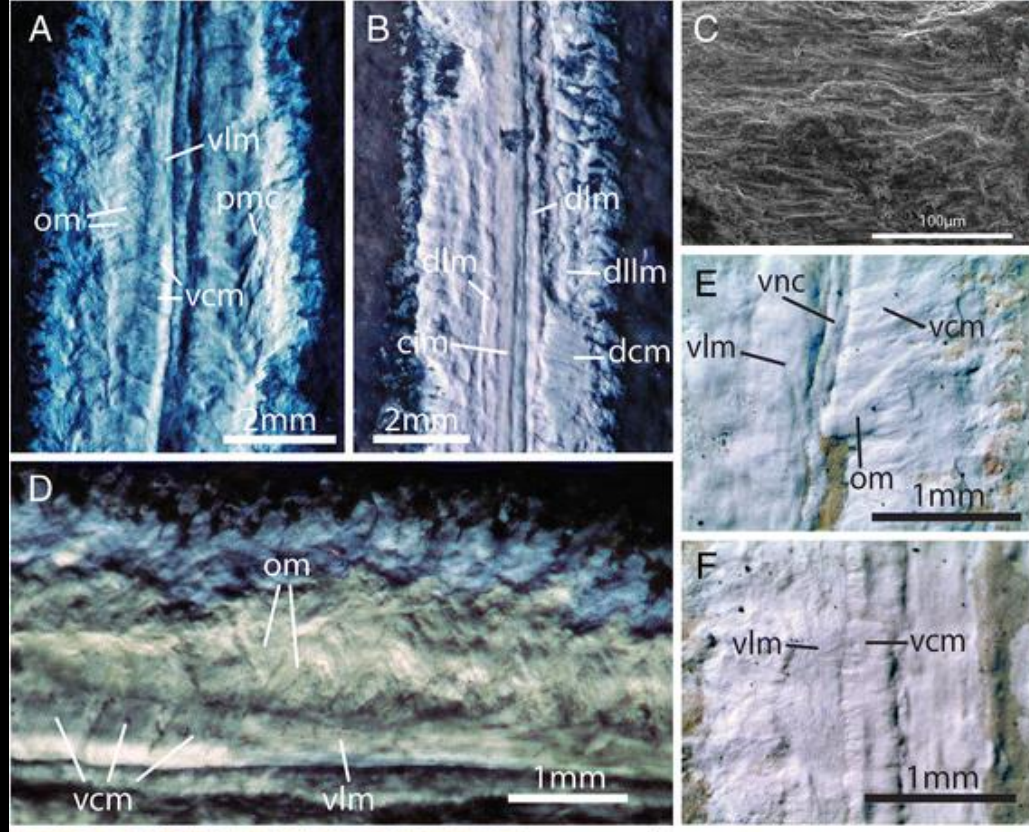
Azar *et al.*, 2018

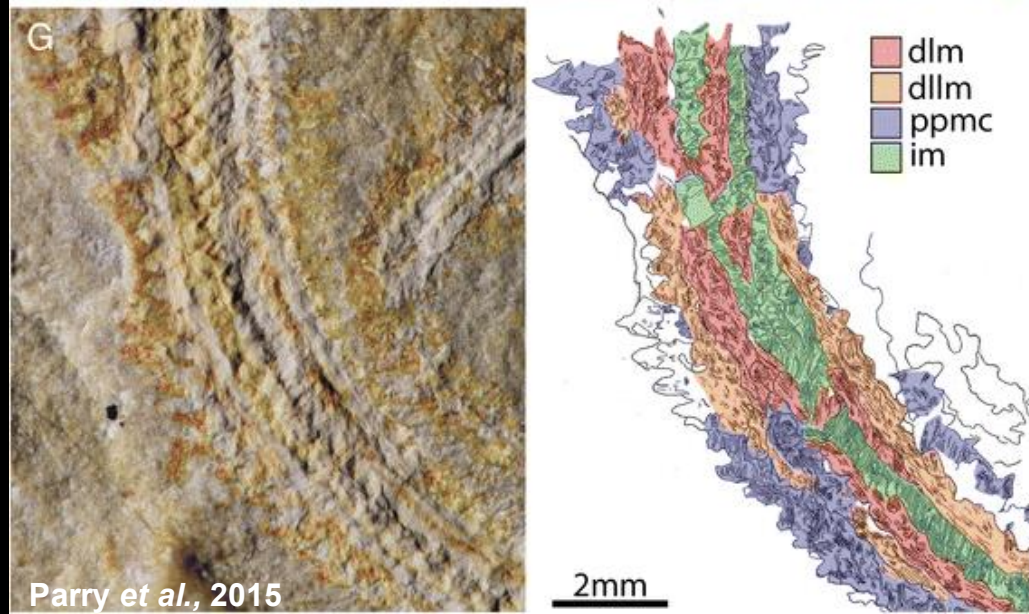


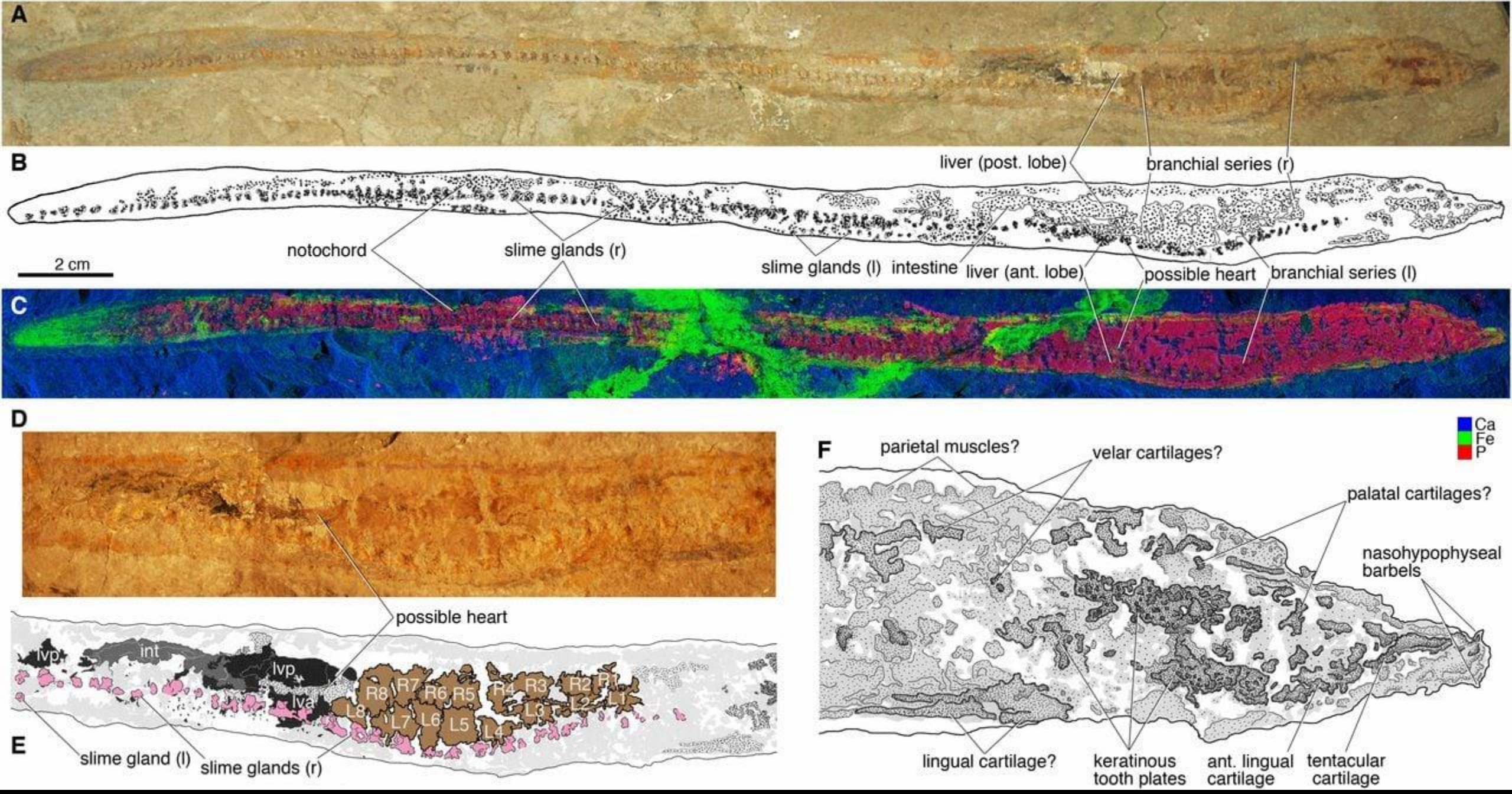
Many fossil polychaetes

Rollinschaeta myoplena is unusually preserved with extensive musculature

Identification to a family level (fireworm)



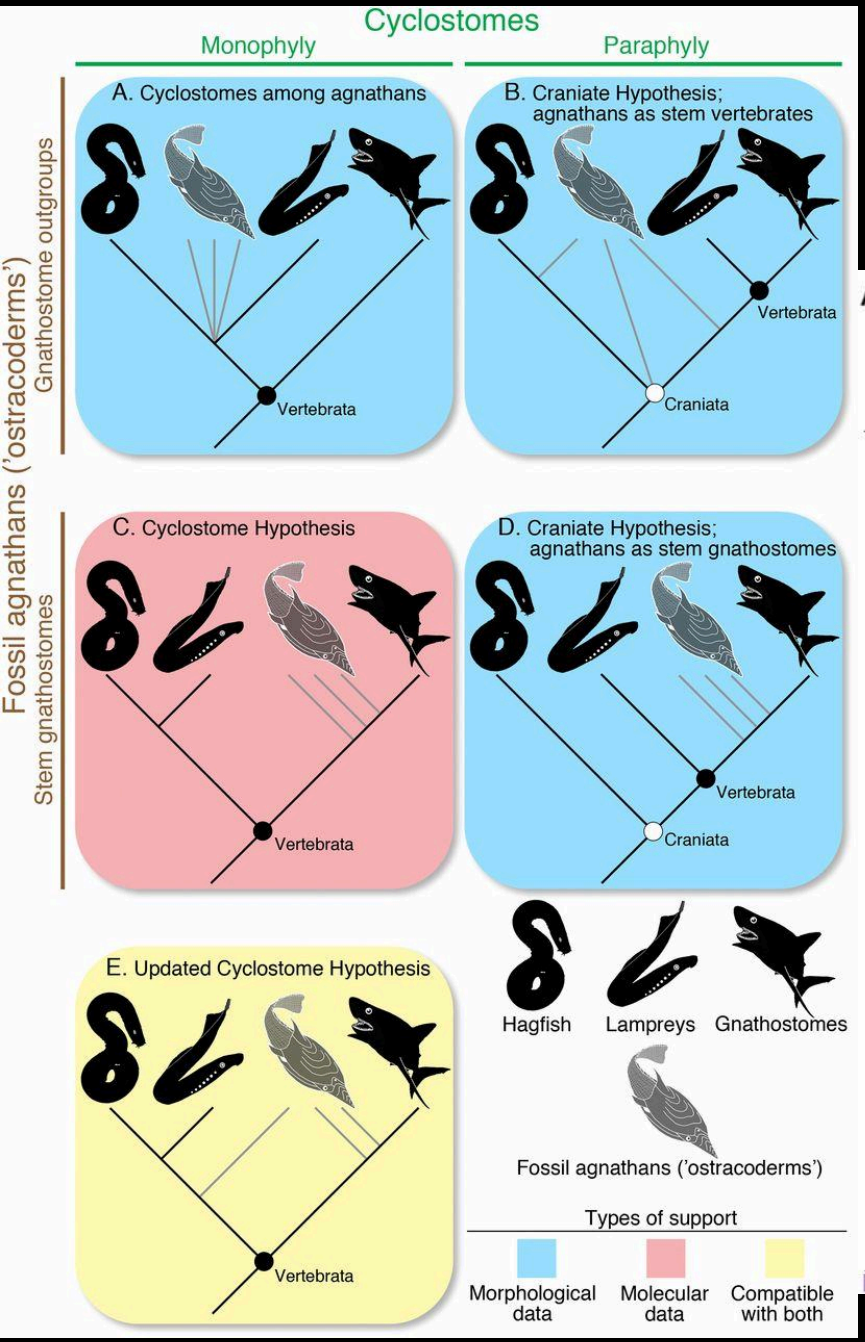


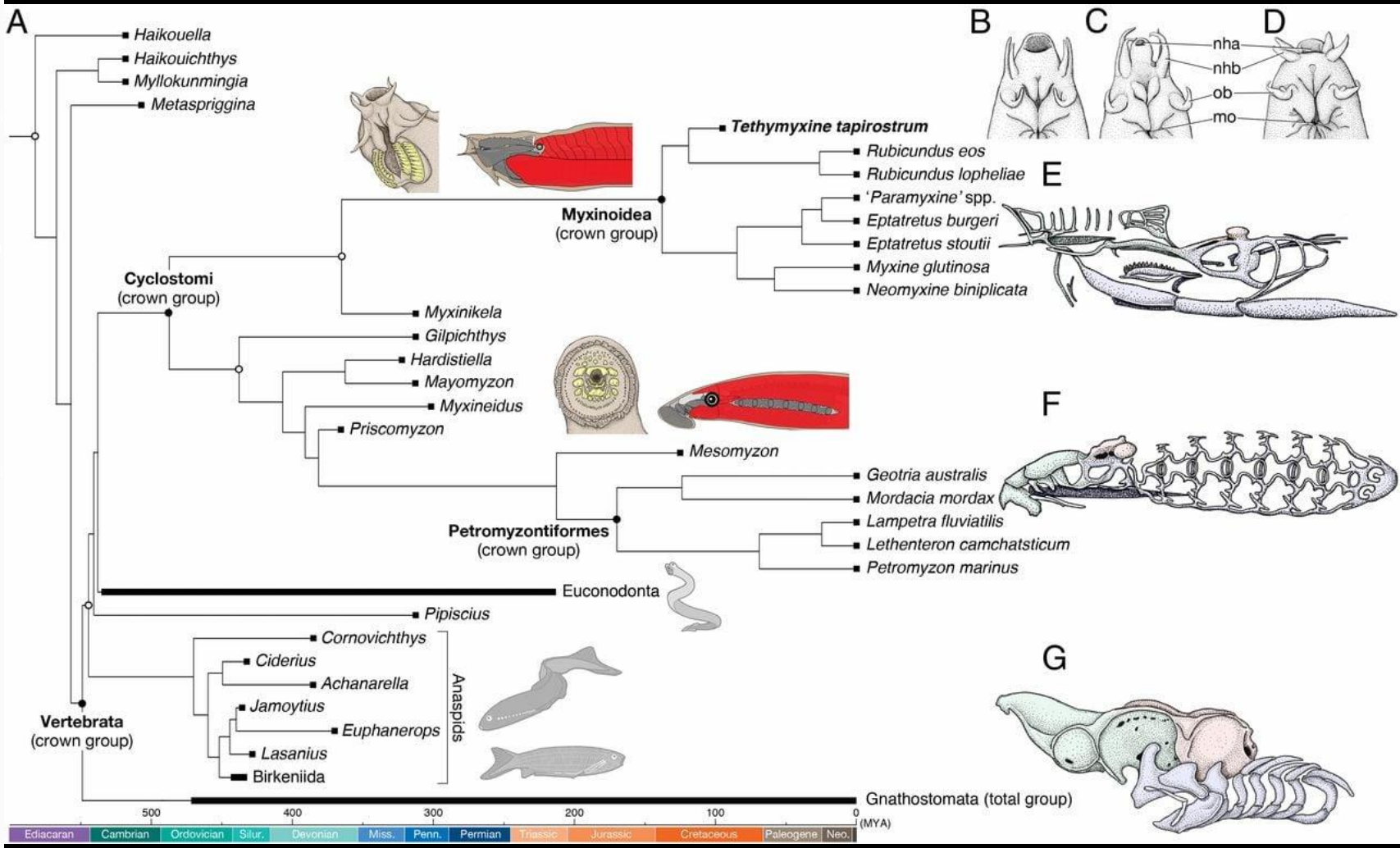


The hagfish *Tethymyxine*

Miyashita *et al.*, 2019

Much needed insight into early vertebrates





Miyashita *et al.*, 2019

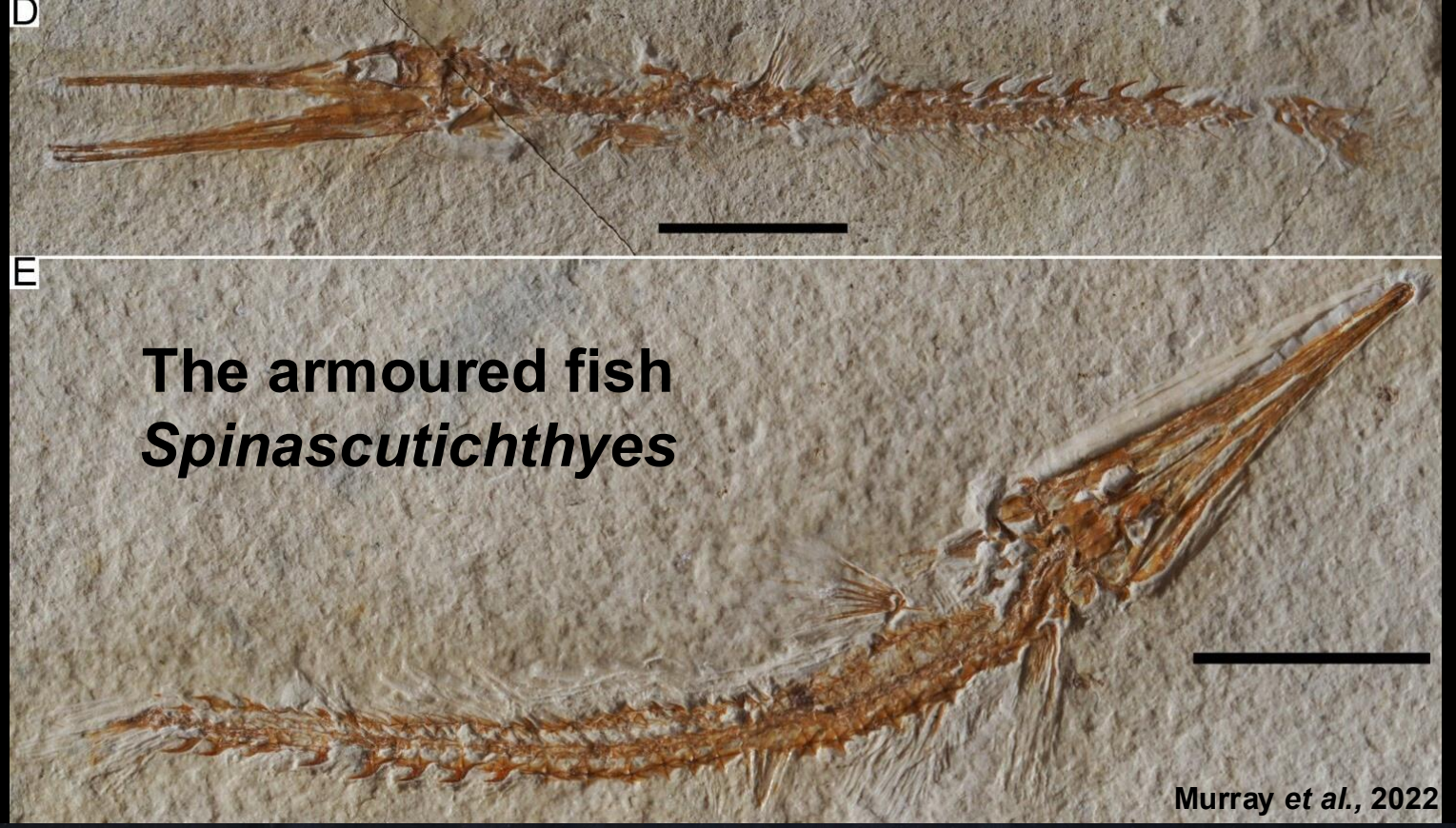

The carpet shark
Pararhincodon
Pierre Abi Saad


The skate *Pararaja*
Pierre Abi Saad

Exquisitely preserved goblin sharks show the ‘rostrum’ has been around for at least 100 million years

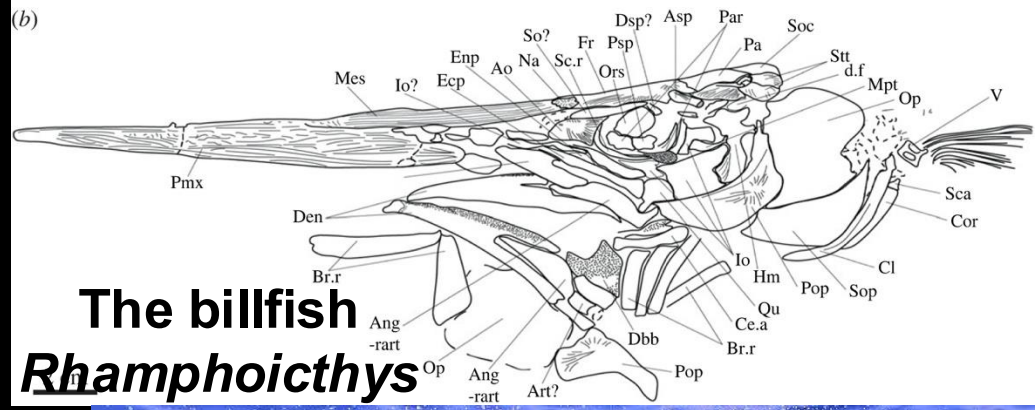

“flying fish” *Exocoetoides*
Pierre Abi Saad


Pierre Abi Saad
The coelacanth *Macropomoides*


D
E
The armoured fish
Spinascutichthyes
Murray *et al.*, 2022


Mass mortality
of *Armigatus*
Pierre Abi Saad

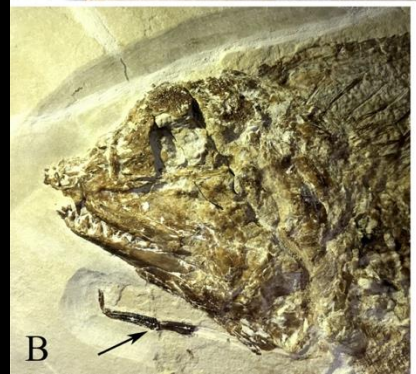
Research by Tamara El Hossny

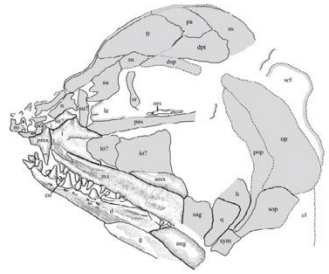


The billfish *Rhamphoicthys*

The teleost *Ypsiloichthys*

The bowfin *Spathiurus*



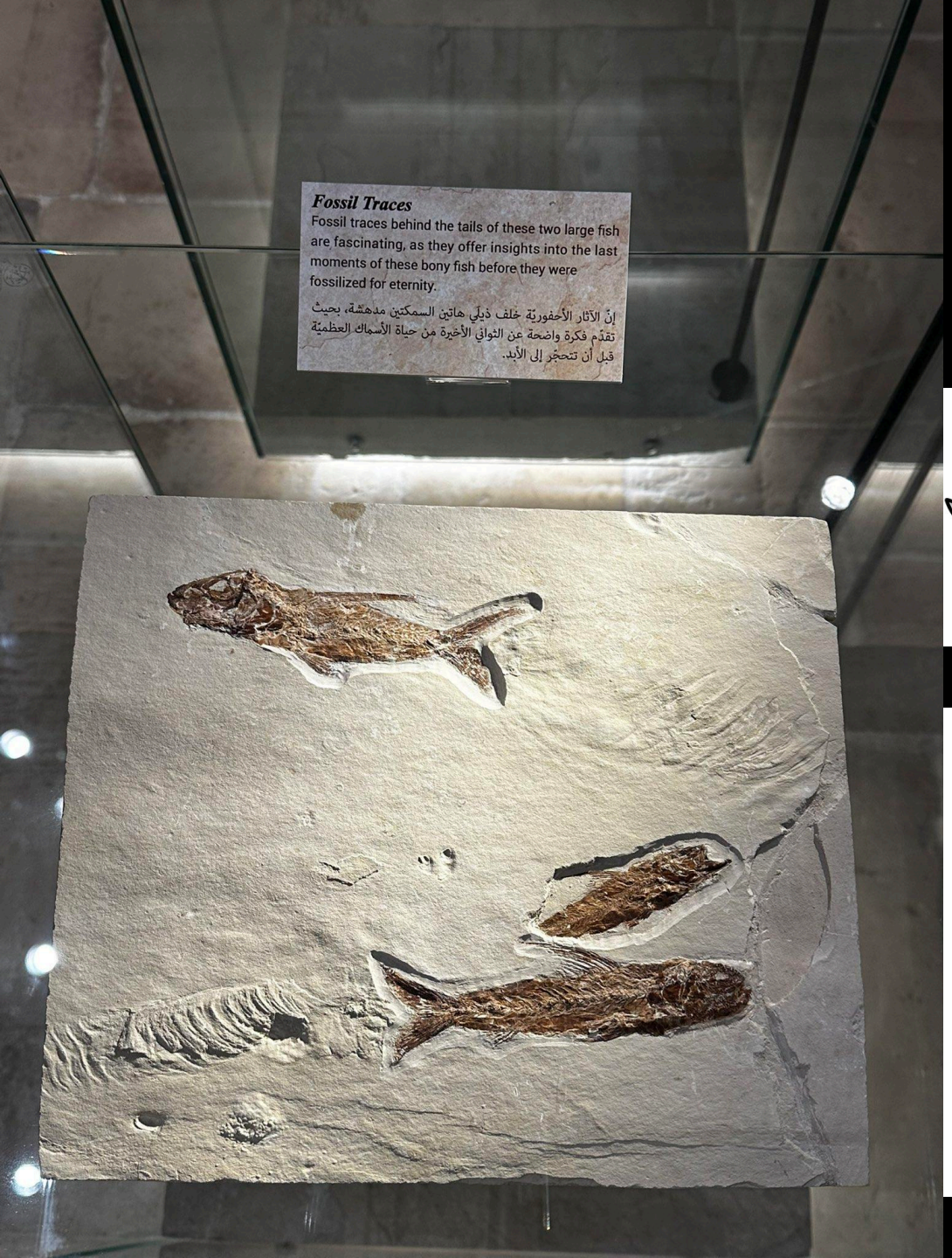


Endemic clades

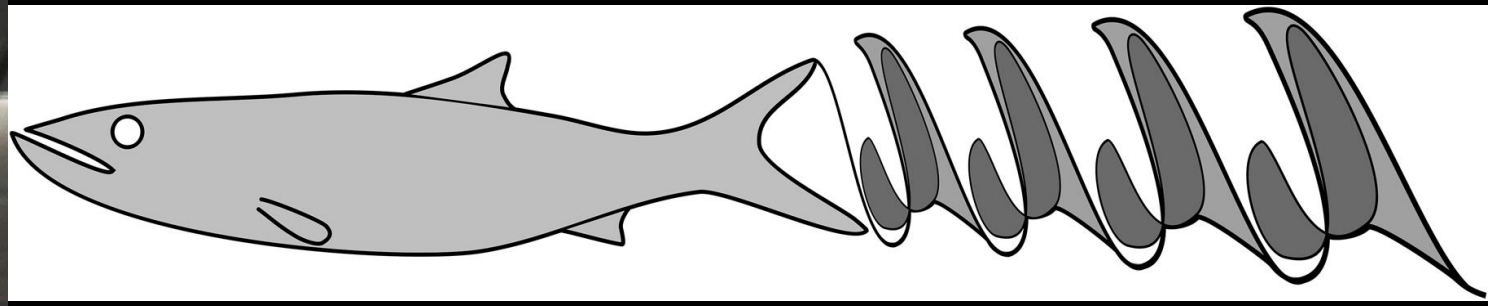
Abisaadichthys
Protobramidae

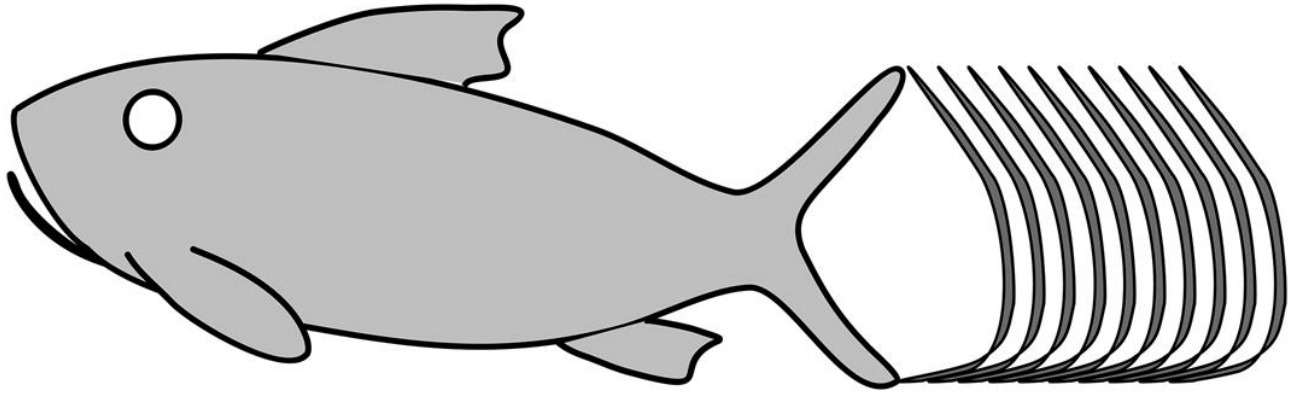
Gebrayelichthys
Gebrayelichthyidae

Coccodus
Coccodontidae



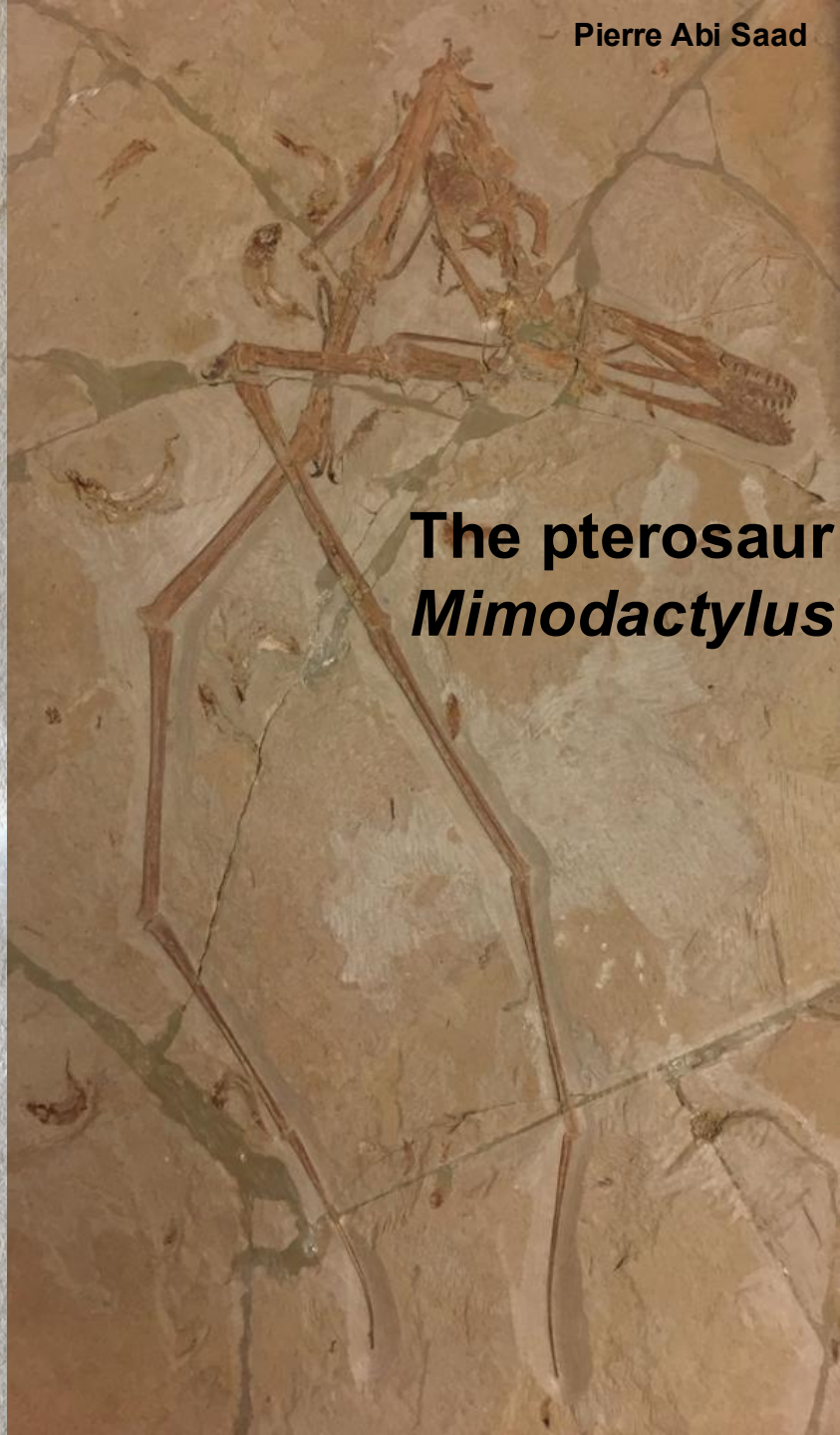
Mortichnia: “death trackways” preserved with tracemaker

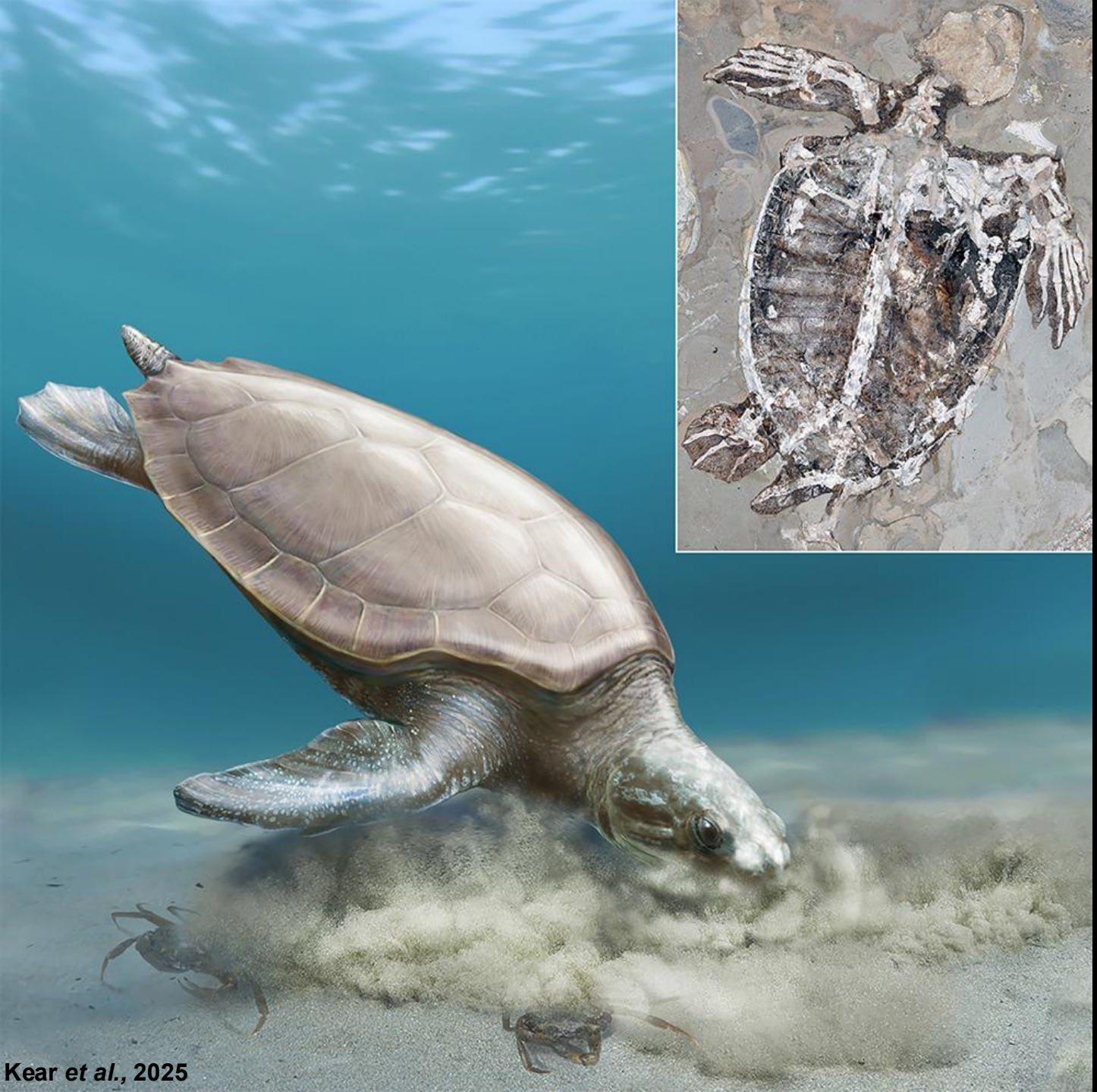




Pokorný *et al.*, 2025


Pierre Abi Saad
Undescribed
protostegid
turtle


Pierre Abi Saad
The pterosaur
Mimodactylus



Kear *et al.*, 2025

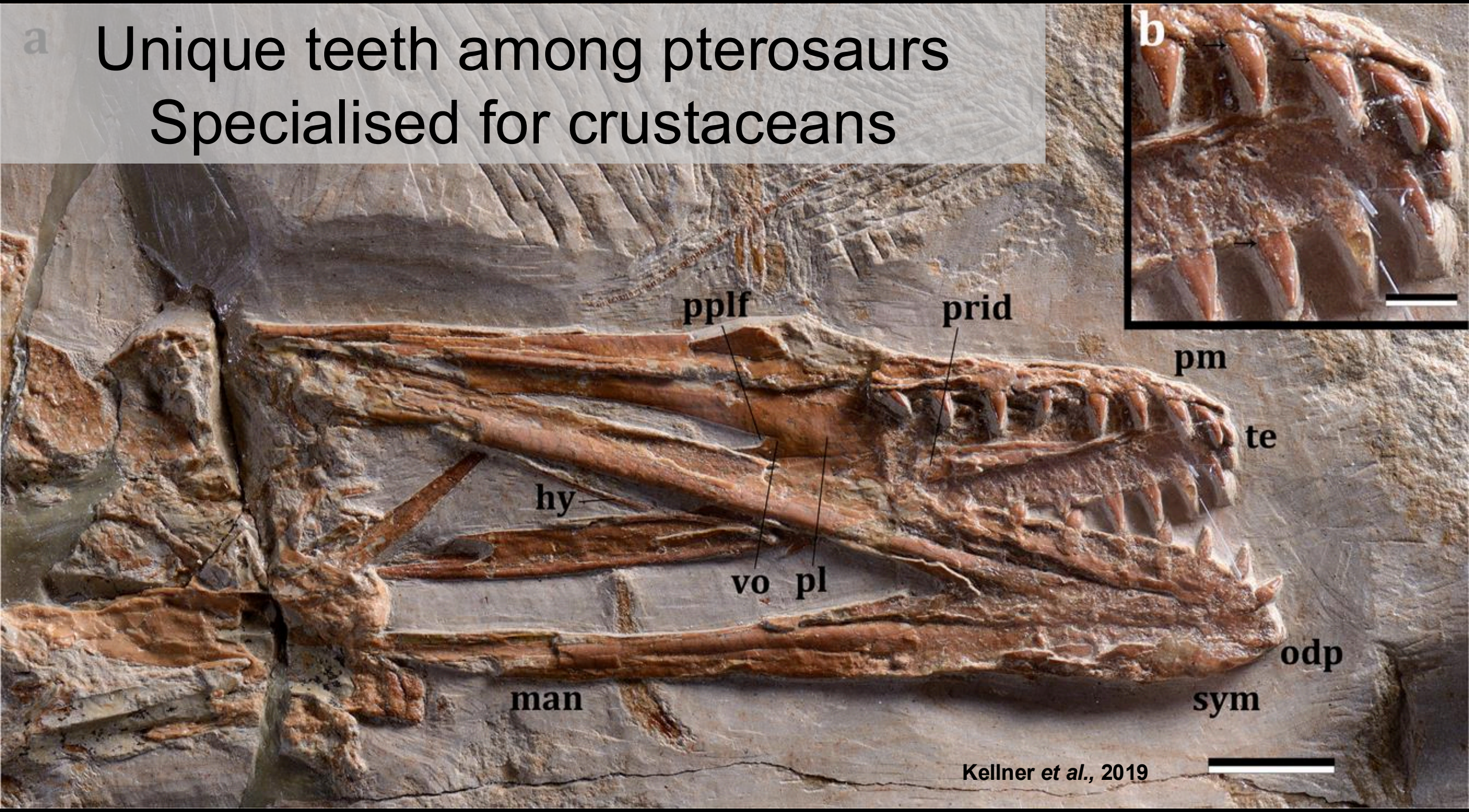
Recent description of a *Rhinochelys nammourensis* covered in soft tissues

Totally lacks scales like a leatherback sea turtle and other extinct sea turtles

Unlike modern sea turtles, all of which have scales

Very important insight into how reptiles adapt to returning to the sea

Unique teeth among pterosaurs
Specialised for crustaceans

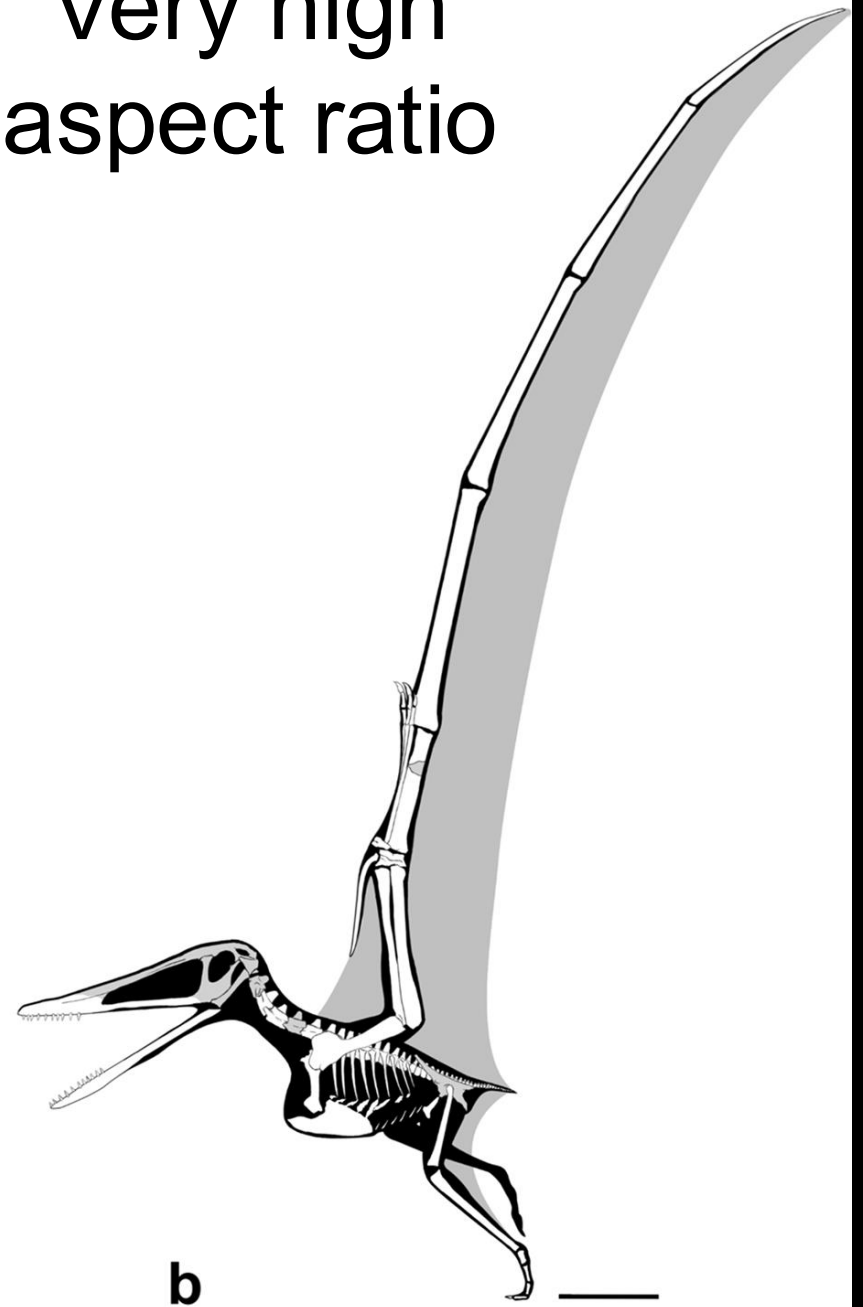


Kellner *et al.*, 2019

Julius Csotonyi

Kellner *et al.*, 2019

Very high aspect ratio



b

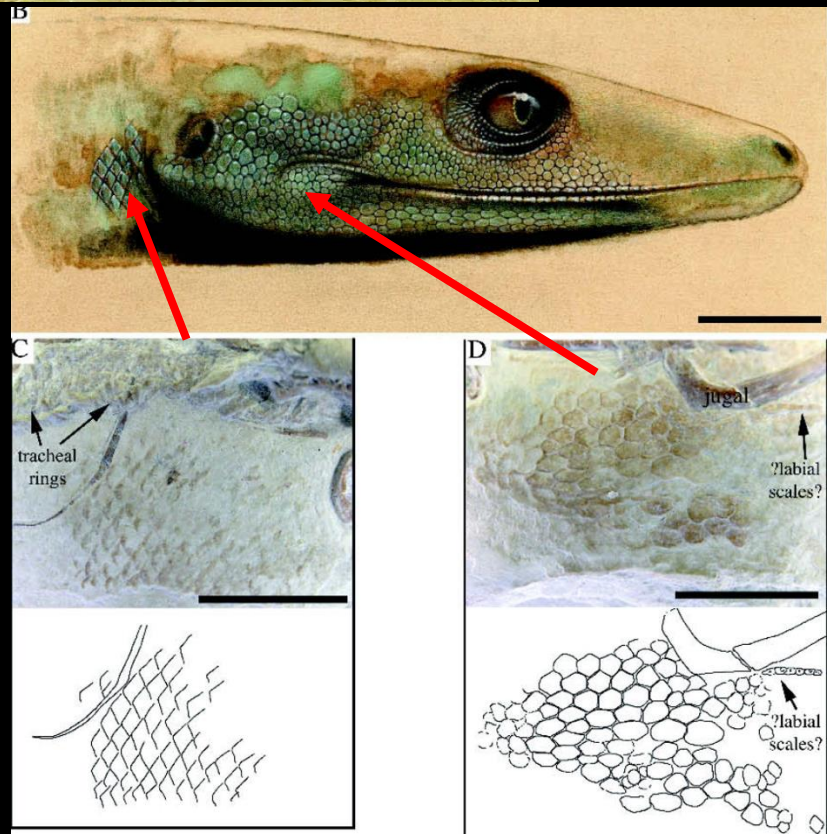
Ghedoghedo

The dolichosaur (stem-snake/mosasaur) *Pontosaurus*

The hind-limbed snake *Eupodophis*

Didier Descouens

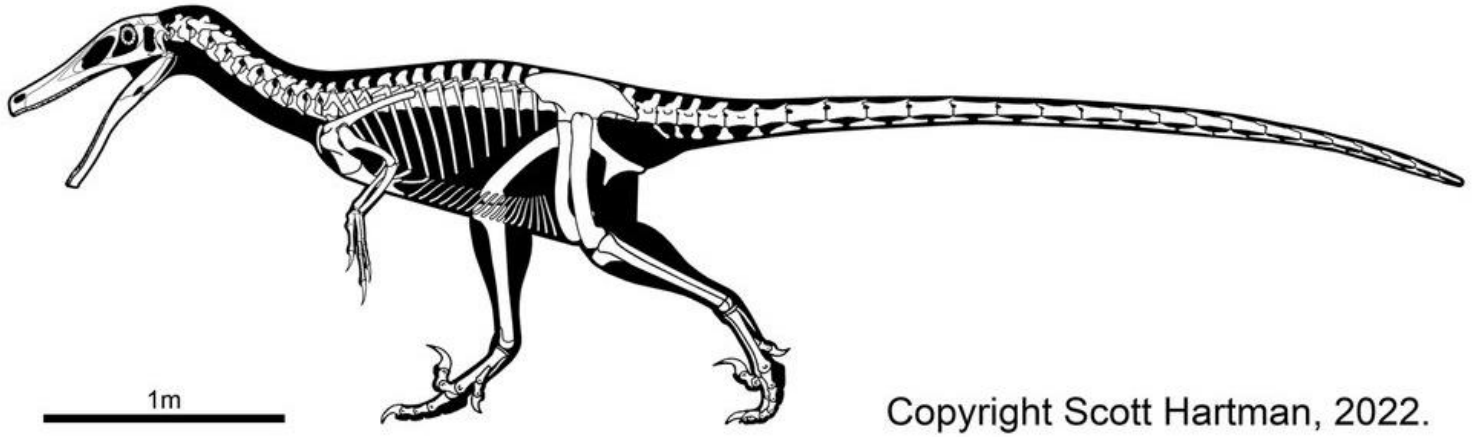
Some of these squamates are even preserved with scales



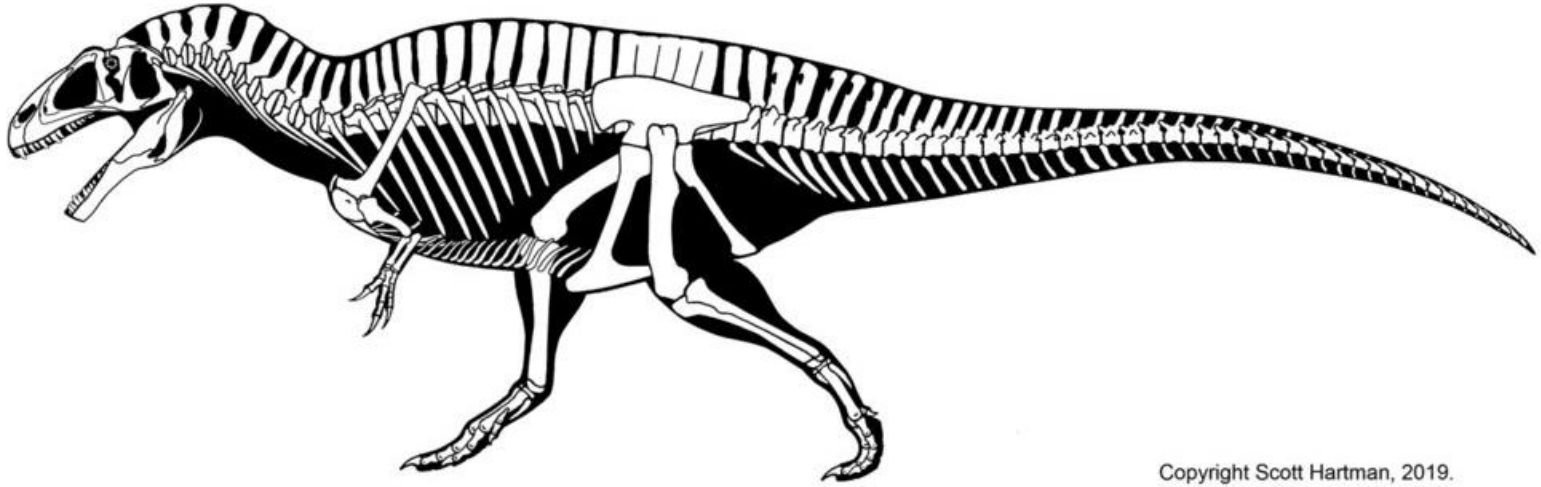
Henry Sharpe

and fecal pellets a few millimeters in diameter. There are also dismembered skeletons of aquatic and terrestrial reptiles, including a forearm of a large theropod dinosaur and a few bird feathers. The holotype of

Krassilov and Bacchia, 2000



Copyright Scott Hartman, 2022.



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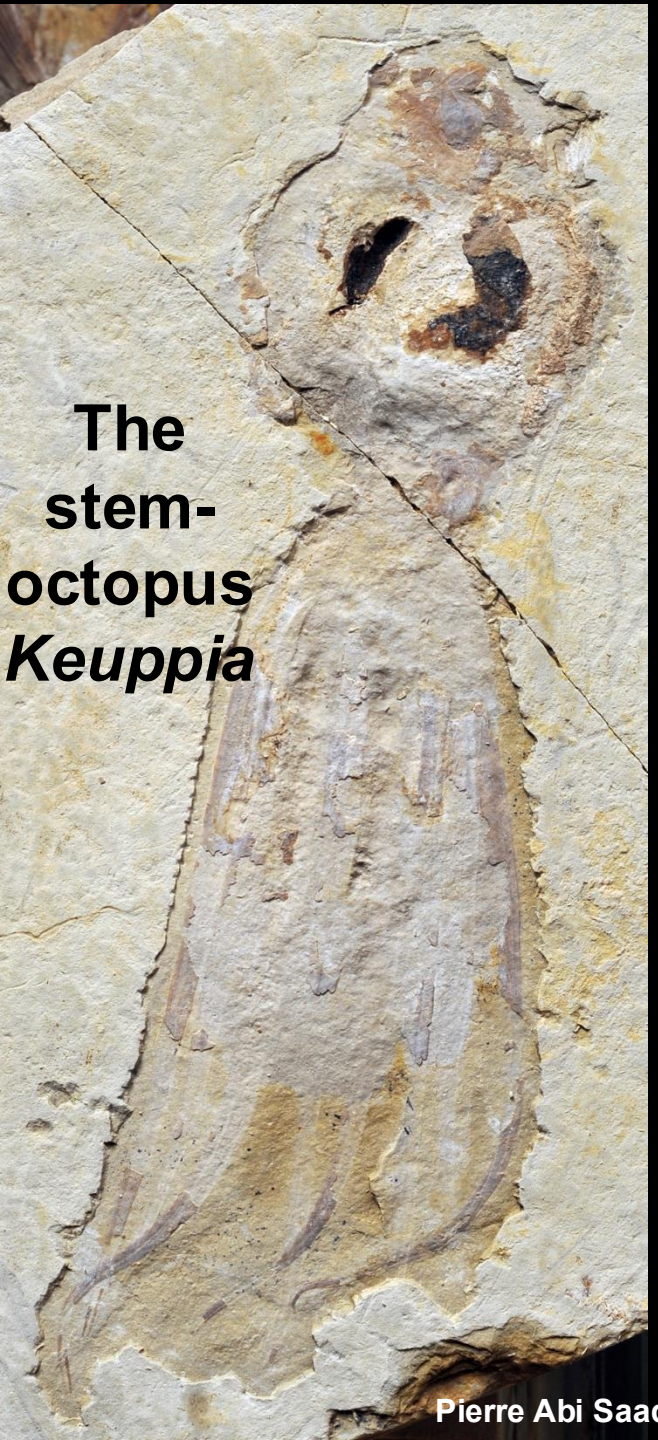
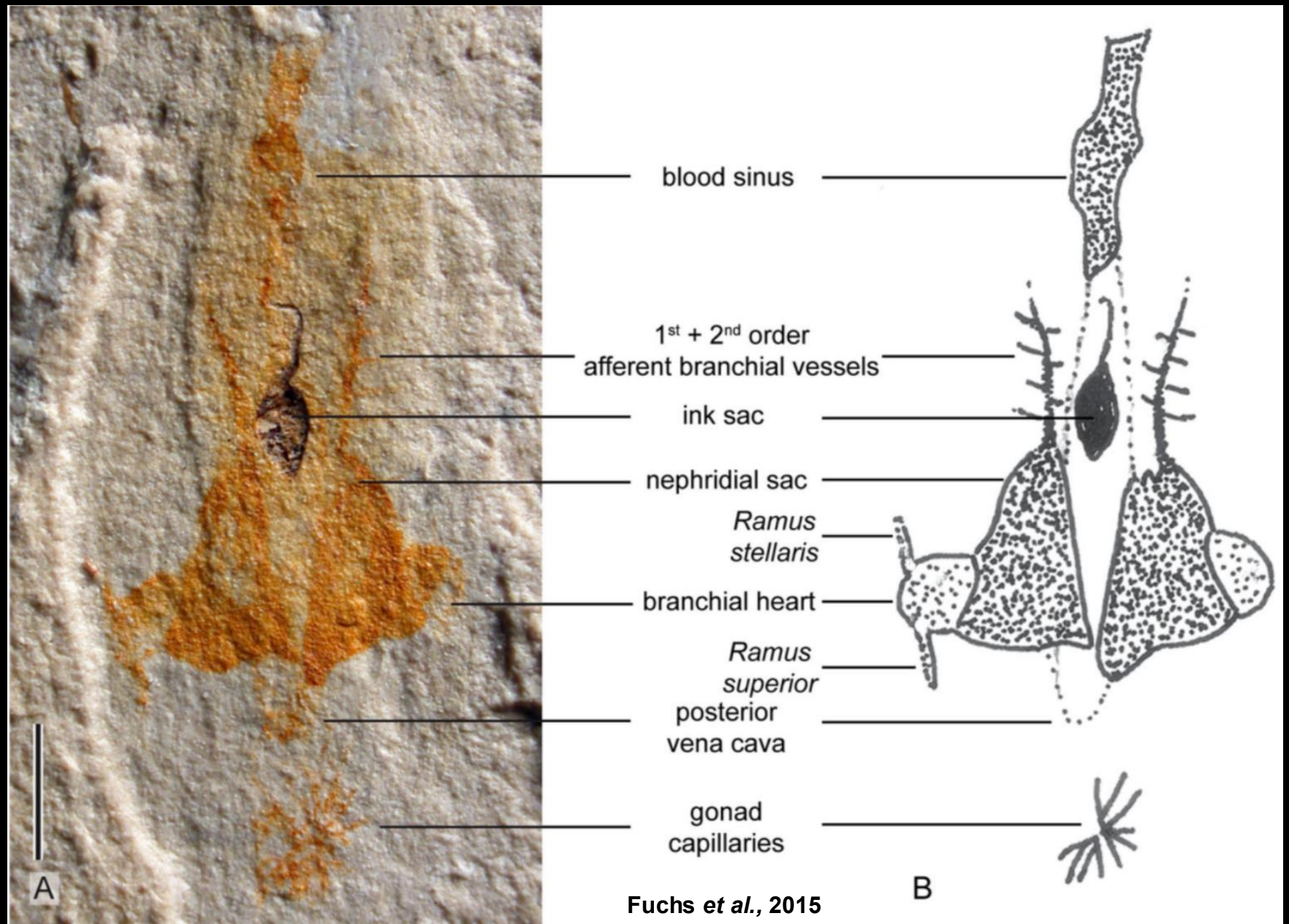
The best coleoid fossils in the world?

The stem-octopus *Keuppia*



Pierre Abi Saad

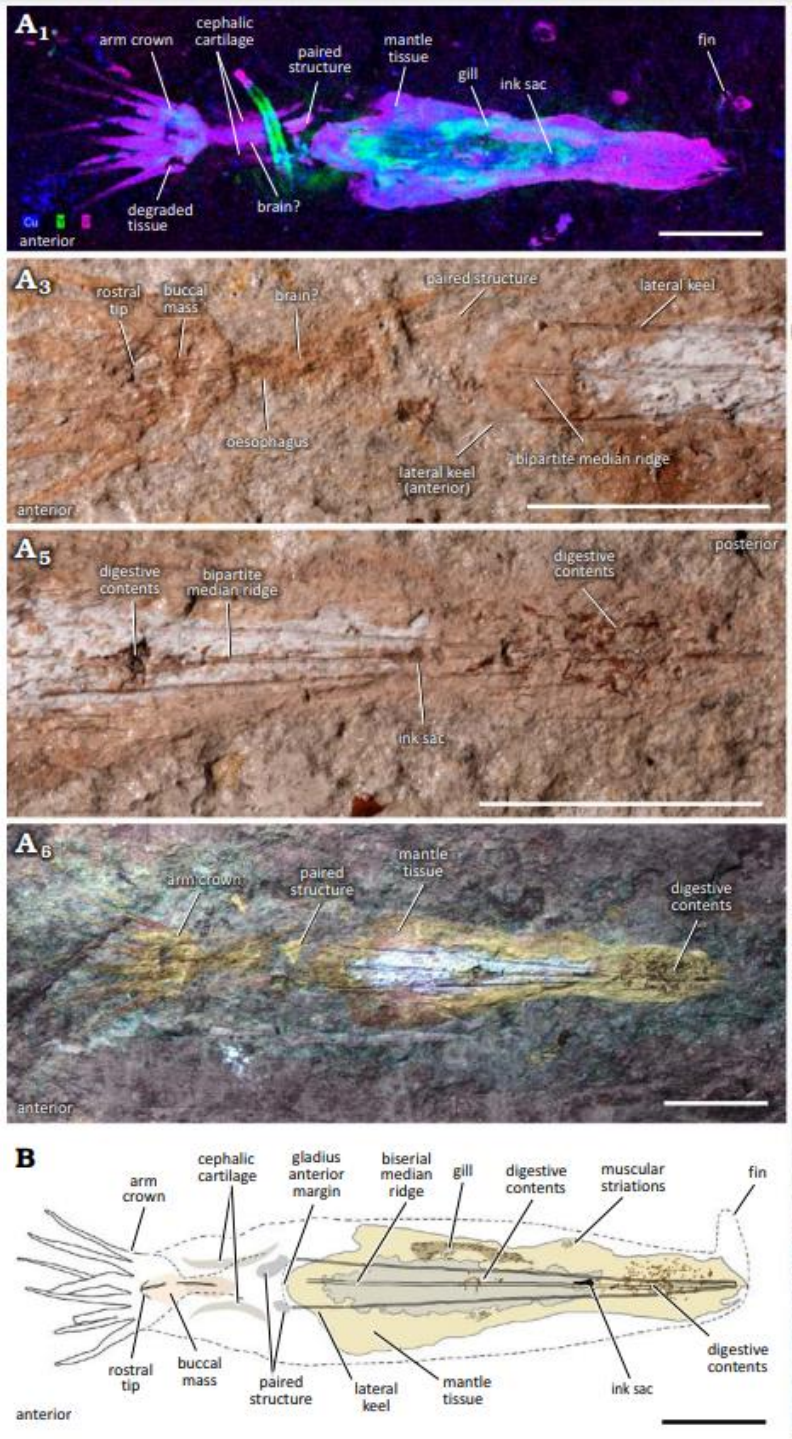


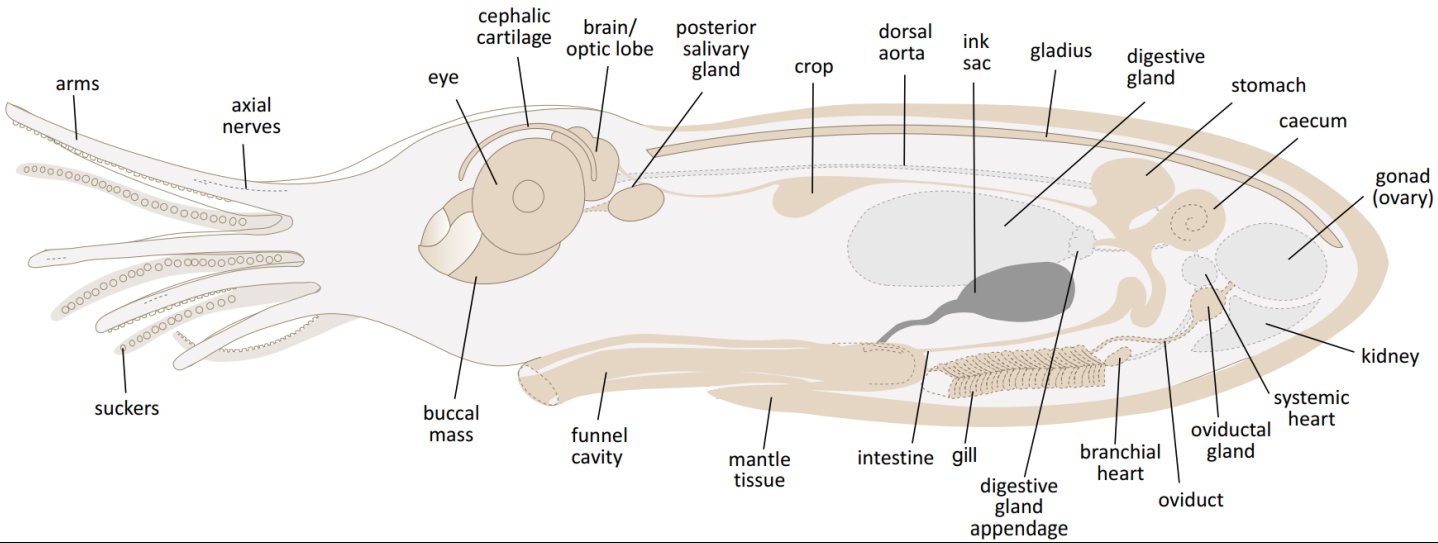
Fuchs *et al.*, 2015

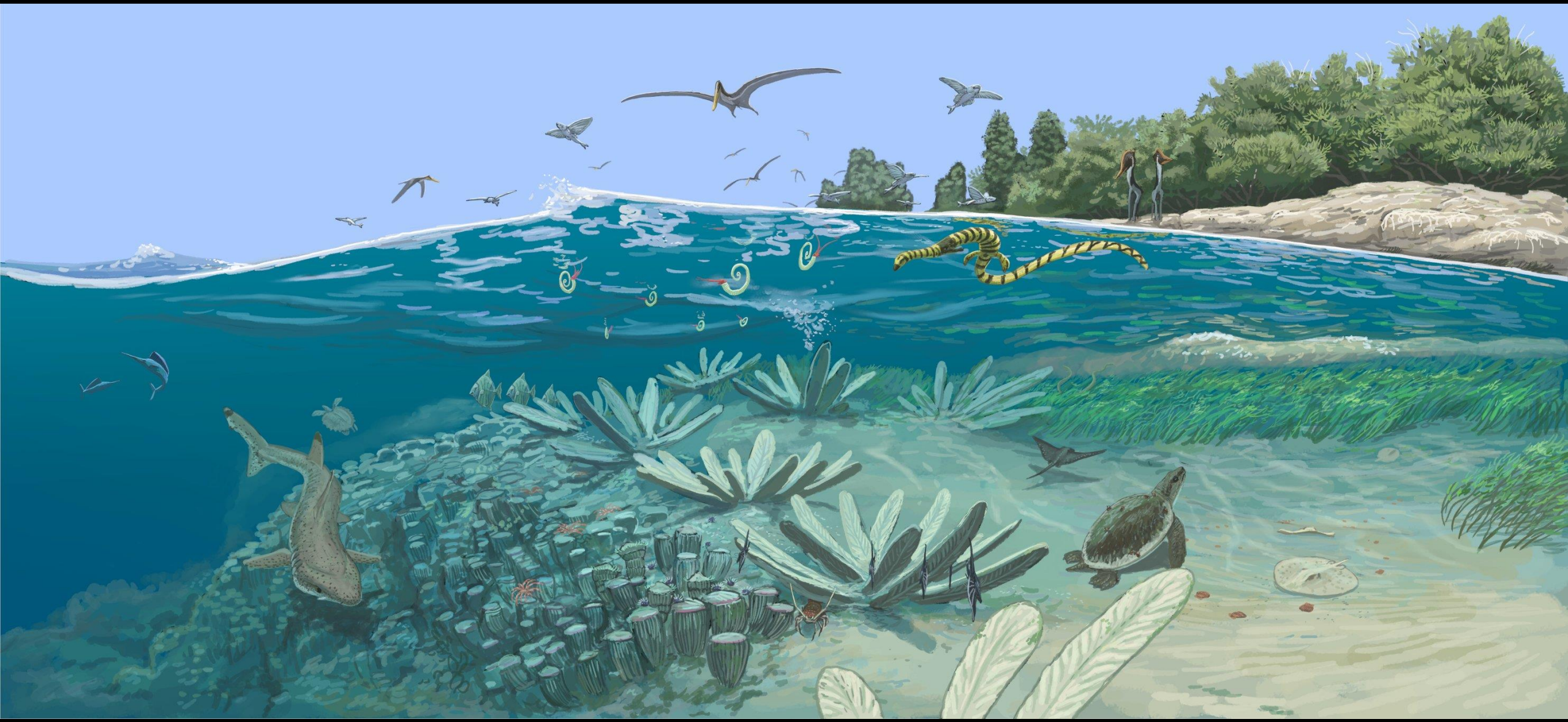
Palaeoctopus newboldi Woodward 1896

The first fossil octopus to be described

Almost entire anatomy preserved



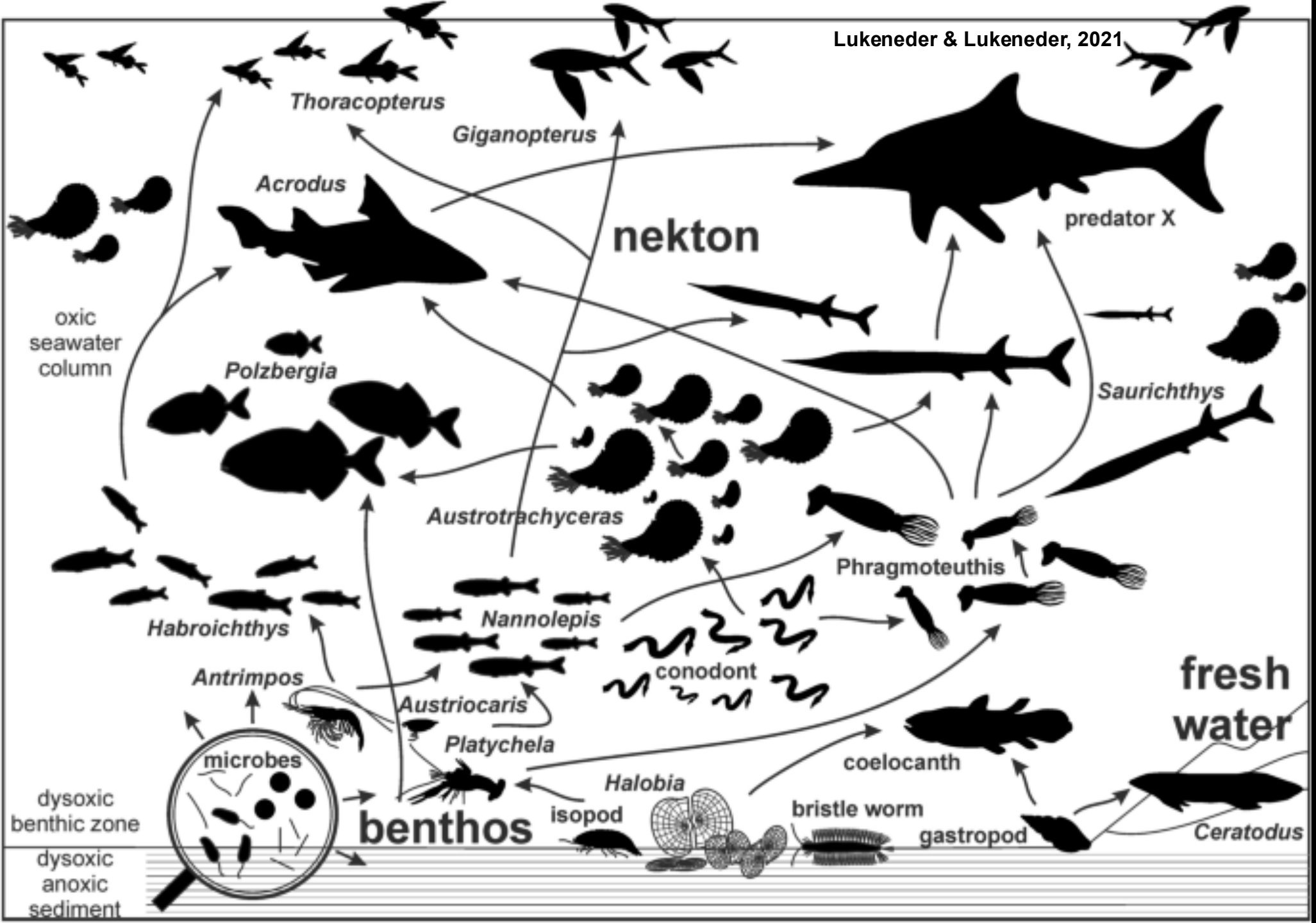




Joschua Knuppe

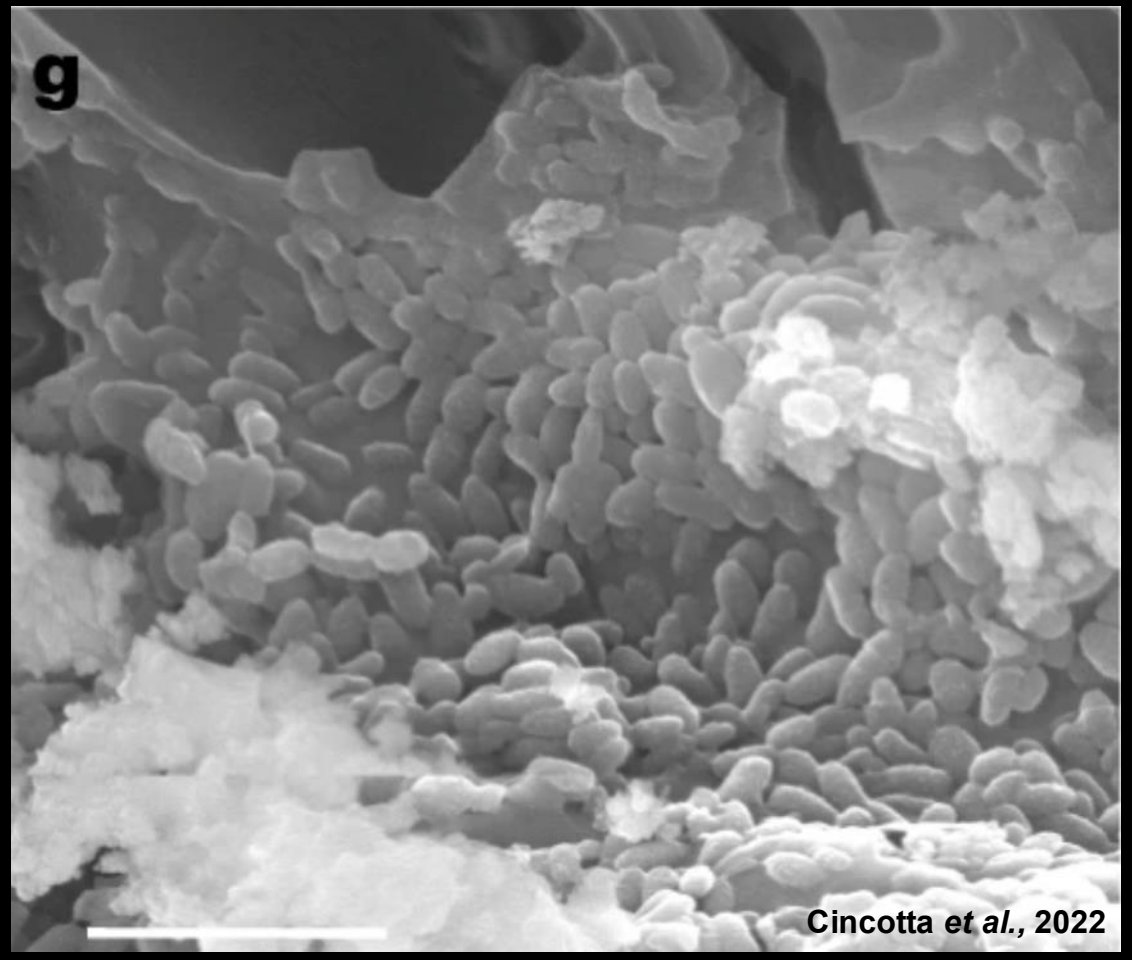
A lot of basic geology research needs to be done

Lots of fossils require modern descriptions

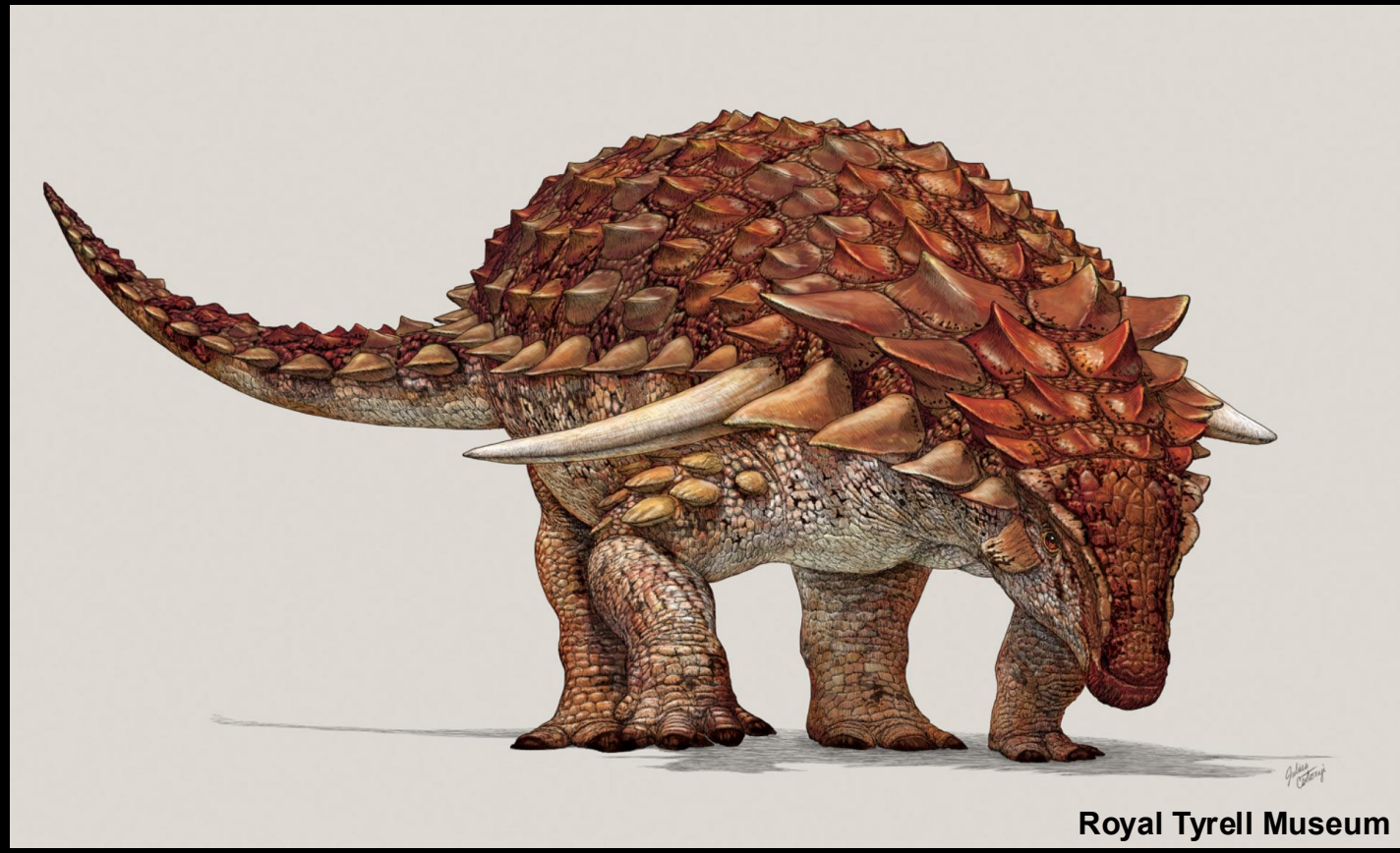


Trophic interactions Based on indirect and direct evidence

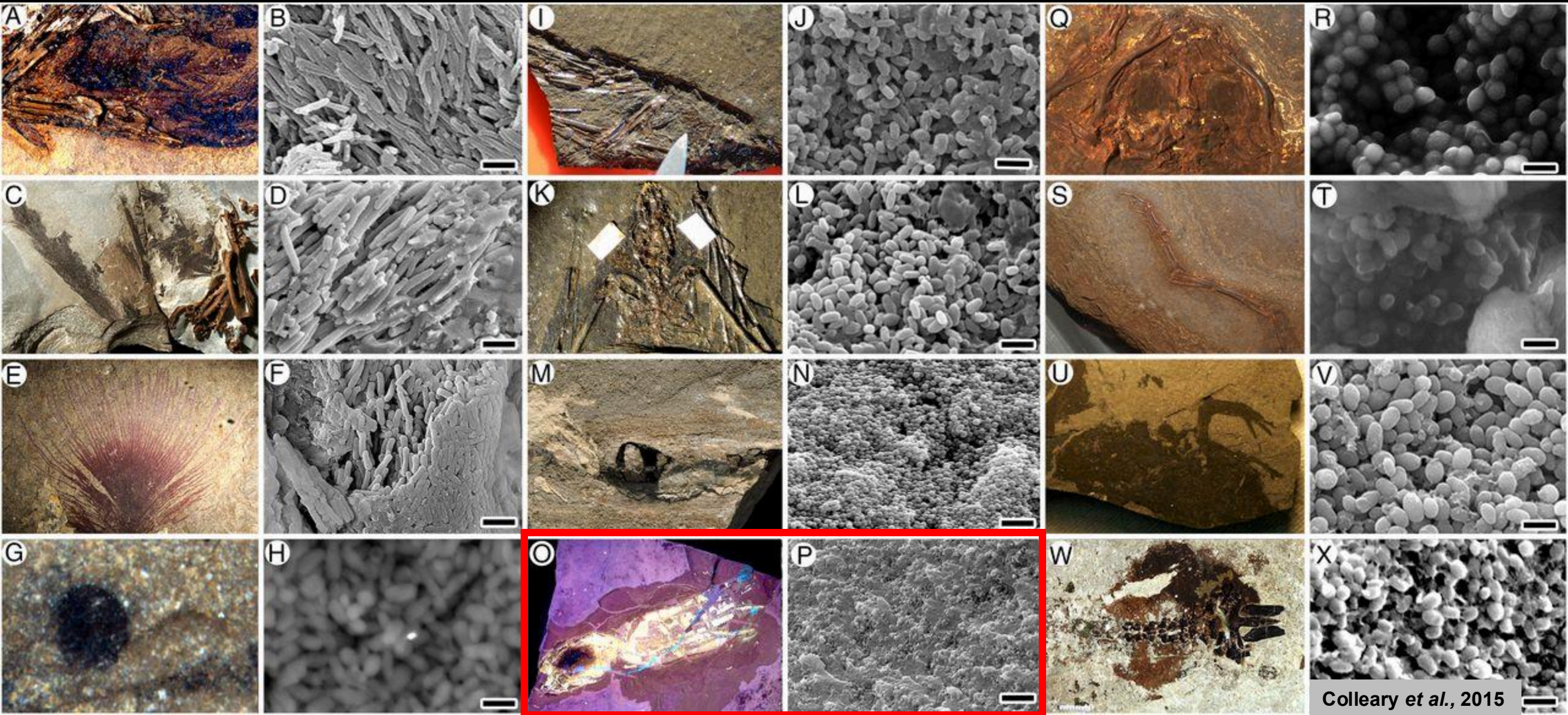
Many Lebanese fossils likely contain melanosomes
Can colour be identified?



Cincotta *et al.*, 2022


Royal Tyrell Museum

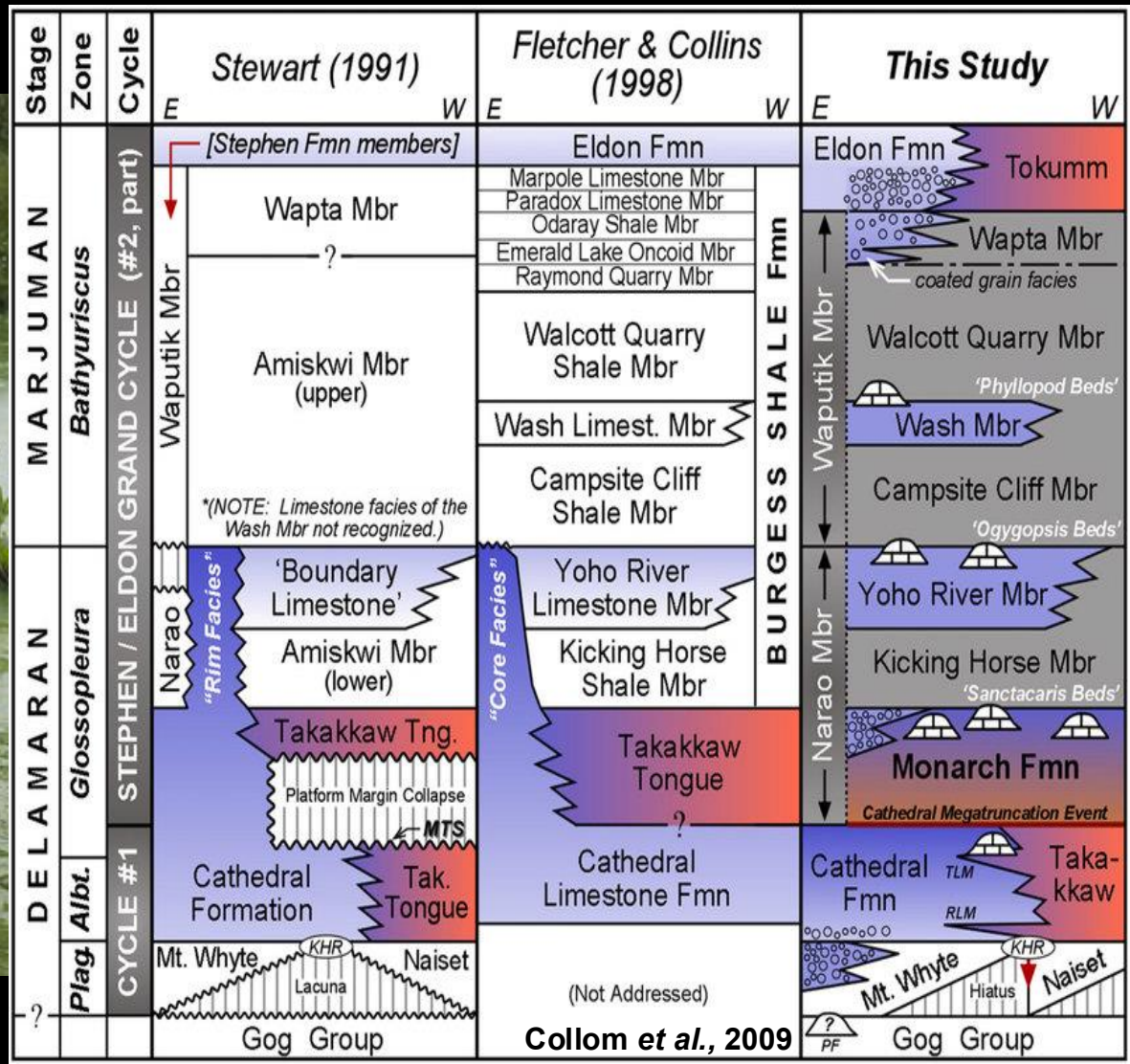
Some octopus melanosomes already identified by Bristol palaeobiologists



Taphonomy is unclear

Algal blooms as kill mechanisms?

Stratigraphy is unclear



Pierre Abi Saad

Memory of Time (Memoire de temps)

A museum of amazing discoveries made by locals

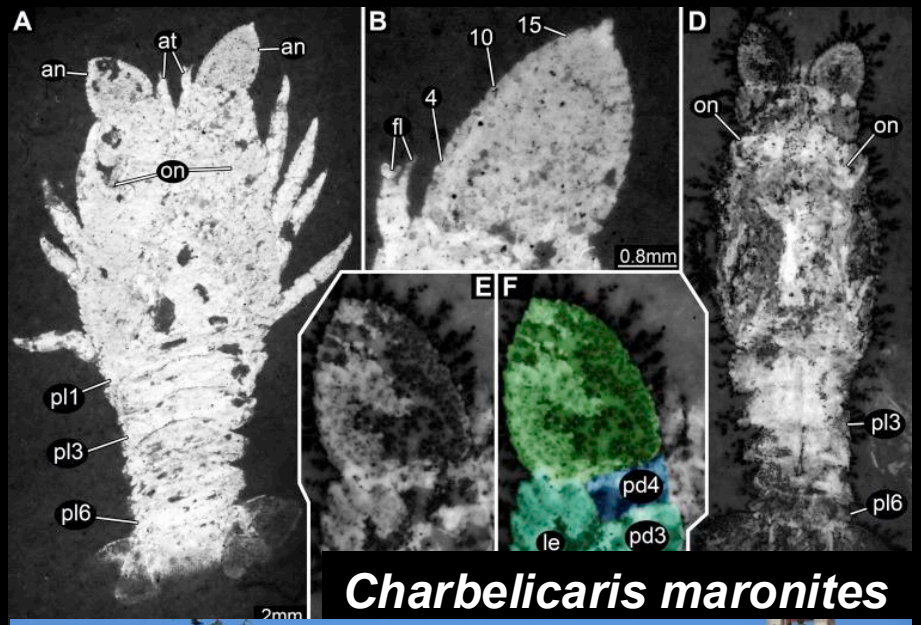

Pierre Abi Saad

Strong connection with the local community

An important part of Lebanese heritage


PLEASE
DO NOT TOUCH

Strong connection with the Church



Charbelicaris maronites

St. Charbel of the Maronite church

Modern day fieldwork led by locals

Abi Saad family

Pierre Abi Saad

University of BRISTOL

Thanks for listening!

Palaeobiology
University of Bristol

Thomas Clements
University of Reading, UK

Pierre Abi Saad
Memory of Time, Byblos, Lebanon

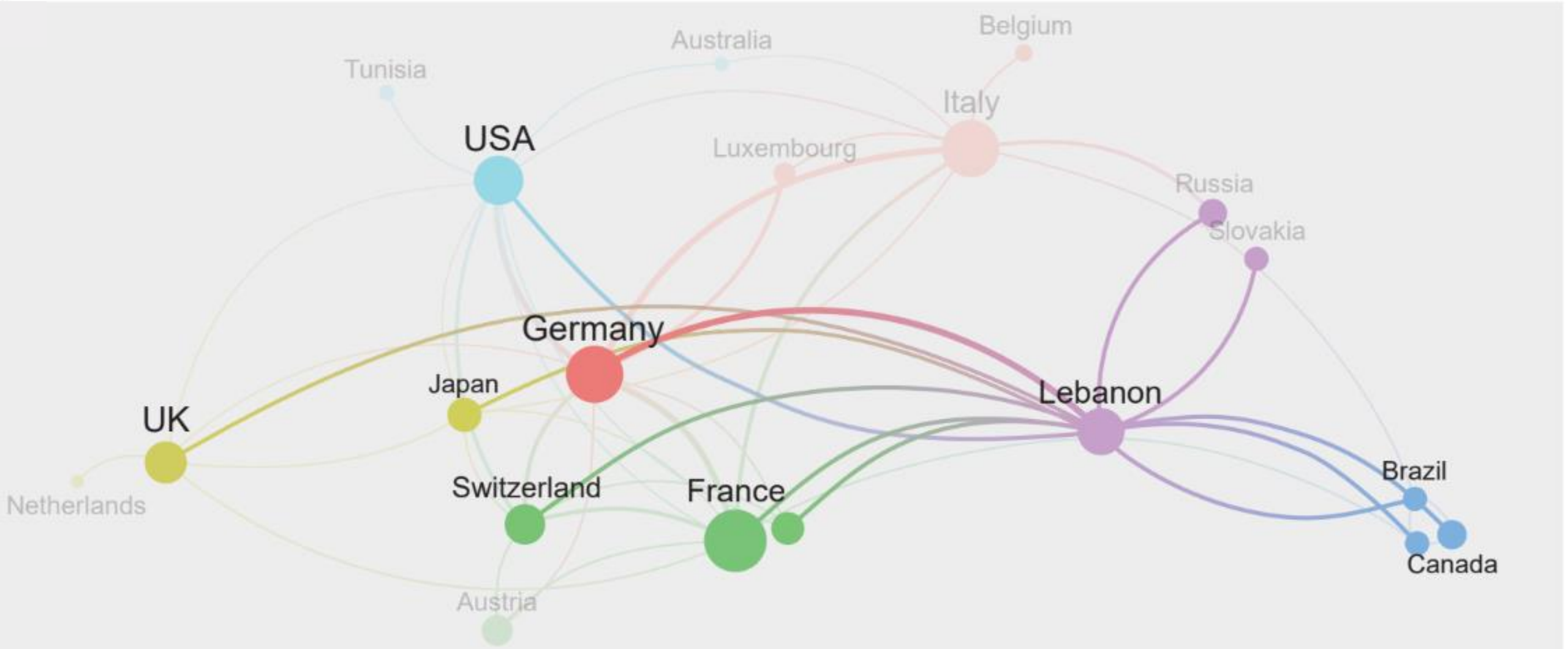
Tamara El Hossny
University of Geneva, Switzerland

Mohamad Bazzi
Stanford University, California, USA

Read the paper:

George *et al.*, 2024, *Journal of the Geological Society*

Connections stretch far and wide
Bold = collaborations include Lebanon-based authors



Interrogating the colonial legacy

"Ubirajara jubatus"

Stevens *et al.*, 2022

The Return of Fossils Removed Under Colonial Rule

Abstract: Debates on the restitution of colonial loot usually focus on art, antiquities, religious artefacts, and similar objects. Many fossils of considerable scientific and cultural value were also removed under colonial rule, yet they rarely feature in these discussions despite being classified as cultural objects. This article seeks to shed light on the colonial removal of fossils and explore potential avenues for their return under public international law. Instead of focusing on the (il-)legality of colonial takings, we argue that the right to access culture has developed from the right to participate in cultural life in Article 15(1)(a) of the International Covenant on Economic, Social and Cultural Rights (ICESCR), which provides, if not a solid legal basis, a valuable set of arguments for former colonies requesting the return of fossils looted from their countries/territories of origin. The case study of the negotiations on the return of the Broken Hill skull before the UNESCO Intergovernmental Committee for Promoting the Return of Cultural Property to its Countries of Origin or its Restitution in Case of Illicit Appropriation (ICPRCP) highlights the potential of this mechanism of dispute resolution with respect to fossils.

Keywords: cultural property, colonialism, repatriation, human rights, fossils, palaeontology

Decolonising palaeontology has gained traction in recent years

What can be done?

- Increased collaboration provides Lebanese researchers access to fossils + technology
- Also provides foreign researchers access to fieldwork in Lebanon
- Not decolonising, but paves the way for it

This can work for other developing countries too?:
Laos, Mozambique, etc…