

October 31, 2022

News and Notes

Before going onto a look at the marine invertebrates of the [Paleogene](#) and [Neogene](#) periods, here are a few news items that I thought were interesting.

Halloween



Credit: [Alexas Fotos](#), [Creative Commons CC0 1.0 Universal Public Domain Dedication](#)

- In North America we celebrate [Halloween](#) on October 31. Enjoy, just keep this in mind: [Why You Should Never Pull a Halloween Prank!](#)
- [How was Halloween invented? Once a Celtic pagan tradition, the holiday has evolved to let kids and adults try on new identities.](#)
- Related, Día de los Muertos: [The Day of the Dead isn't Halloween. Here are its roots, from Aztec goddess worship to modern Mexican celebration.](#)

Geoheritage Sites

- [International Union of Geological Sciences \(IUGS\) announces complete list of the first 100 Geological Heritage Sites.](#)

Research

- Publish or perish: [Rate of publication hastens, but number of publications slows academic promotion.](#)

- Ancient plate tectonics: [Coexisting divergent and convergent plate boundary assemblages indicate plate tectonics in the Neoproterozoic](#).
- Geological history: [Provenance, Age, and Tectonic Settings of Rock Complexes \(Transangarian Yenisey Ridge, East Siberia\): Geochemical and Geochronological Evidence](#).
- Mountain building: [Comparative orotomy of the Archean Superior and Phanerozoic Altai orogenic systems](#).
- Geochemistry: [Superhydrous aluminous silica phases as major water hosts in high-temperature lower mantle](#); Phys.org summary [here](#).
- Global Biogeochemical Cycles: [The Seasonality of Deuterium Excess in Non-Polar Precipitation](#); Phys.org summary [here](#).
- Sedimentology and organic carbon storage: [High rates of organic carbon burial in submarine deltas maintained on geological timescales](#); Phys.org summary [here](#).
- More sedimentology: [Evidence for the early Toarcian Carbon Isotope Excursion \(T-CIE\) from the shallow marine siliciclastic red beds of Arabia](#).
- Mineralogy: [Compositional dependence of intensity and electric field gradient tensors for Fe²⁺ at the M1 site in Ca-rich pyroxene by single crystal Mössbauer spectroscopy](#); Phys.org summary [here](#).

Martian Geology



Credit: [cogdogblog](#), [Creative Commons Attribution 2.0 Generic](#) license

- A planet shattering kaboom: [A seismic meteor strike on Mars](#).
- Geophysics: [Surface waves and crustal structure on Mars](#); Eureka Alert summary [here](#).
- [Largest recent impact craters on Mars: Orbital imaging and surface seismic co-investigation](#).
- [Early Life on Mars Might Have Wiped Out Life on Mars](#); Science Alert summary [here](#).

Paleontology

- Ecosystems and evolution: [Diversity dependence is a ubiquitous phenomenon across Phanerozoic oceans](#).
- Problematic paleontology: [Ethics, law, and politics in palaeontological research: The case of Myanmar amber](#); Phys.org summary [here](#).
- Octopus evolution from the Paper Nautilus: [Gene recruitments and dismissals in the argonaut genome provide insights into pelagic lifestyle adaptation and shell-like eggcase reacquisition](#); Eureka Alert summary [here](#).
- [Attenuated evolution of mammals through the Cenozoic](#); Eureka Alert summary [here](#).
- Whale evolution: [Skull and partial skeleton of a new pachycetine genus \(Cetacea, Basilosauridae\) from the Aridal Formation, Bartonian middle Eocene, of southwestern Morocco](#); Eureka Alert summary [here](#).
- Evolution of bird brains: [Cranial osteology and palaeobiology of the Early Cretaceous bird *Jeholornis prima* \(Aves: Jeholornithiformes\)](#); Eureka Alert summary [here](#).
- Scallops that glow under ultraviolet light: [Fluorescent colour patterns in the basal pectinid *Pleuronectites* from the Middle Triassic of Central Europe: origin, fate and taxonomic implications of fluorescence](#).
- Mosasaurs: [Rediscovery and redescription of the only known mosasaur bone from the Turonian \(Upper Cretaceous\) of Poland](#).

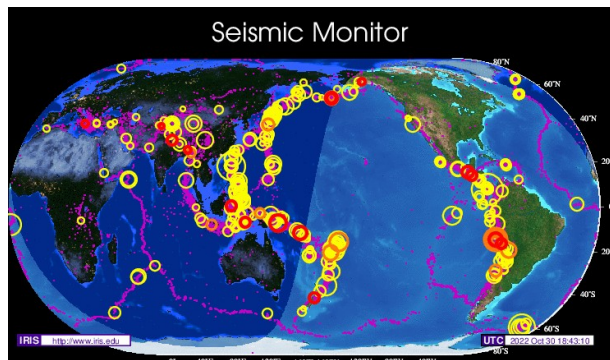
Glaciology

- From the European Geosciences Union: [Hidden beneath the surface – what can we learn from an ice sheet’s internal stratigraphy?](#)
- [Ocean Variability Beneath the Filchner-Ronne Ice Shelf Inferred From Basal Melt Rate Time Series](#); Phys.org summary [here](#).
- [Antarctic basal environment shaped by high-pressure flow through a subglacial river system](#); Phys.org summary [here](#).
- Glacial history, from Phys.org: [How old is the oldest ice in Antarctica?](#)

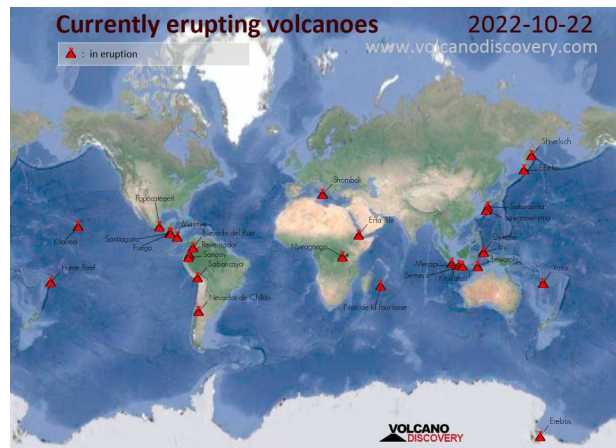
Mining and Energy

- [Germany Is Dismantling A Wind Farm To Make Way For A Coal Mine.](#)
- From Mining.com: [Canada strengthening guidelines to protect critical minerals sectors.](#)
- Prices: [Gold price drops over 1% as another Fed rate hike looms.](#)
- From Phys.org: [Study estimates how much deforestation could increase if restrictions on mining in the Amazon are lifted](#); studies [here](#), [here](#) and [here](#).
- From the United States Energy Information Administration (USEIA): [U.S. coal-fired generation declining after brief rise last year.](#)
- From Eureka Alert: [Limits of lithium extraction from thermal water](#); research paper [here](#), in German
- [Halloween Without Oil & Gas Would be All Trick and No Treat.](#)
- Exploration activity: [U.S. oil and gas rig count edges up in Oct as drilling steadies – Baker Hughes.](#)
- It's a good business: [Chevron Reports Its Second-Highest Quarterly Profits Ever](#);
- [China's Offshore Oil Giant Sees Profits Jump By 89%.](#)

Volcanoes, Earthquakes and Geohazards



[Link](#)



[Link](#)

- Predicting volcanic flows: [Toward Next-Generation Lava Flow Forecasting: Development of a Fast, Physics-Based Lava Propagation Model](#); Phys.org summary [here](#).
- Volcano research: [Basaltic Plinian eruptions at Las Sierras-Masaya volcano driven by cool storage of crystal-rich magmas.](#)

- Earthquake research: [Synchronization of small-scale seismic clusters reveals large-scale plate deformation.](#)
- More earthquake research: [The impact of faulting complexity and type on earthquake rupture dynamics.](#)
- From the United States Geological Survey (USGS): [Can you predict earthquakes?](#)
- ['Notable' earthquake shakes Northern California Tuesday](#) October 25.
- [Debris flow footage.](#)

Upcoming Events



2022-2023 Distinguished Lecture Tour

This national tour is sponsored by the Canadian Society of Exploration Geophysicists (CSEG) Foundation and presented by a distinguished member of the society. The goal of the tour is to promote the science and application of geophysics and to highlight a topic of current interest.

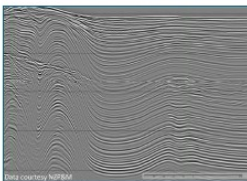


Dr. Rachel Newrick, P.Geoph., P.Geol., is an exploration geophysicist working and teaching internationally with a focus on seismic interpretation. She completed undergraduate degrees at VUW in New Zealand and a PhD in Exploration Seismology at the University of Calgary, Canada. She is the co-author of the SEG Geophysical Monograph Series #13, Fundamentals of Geophysical Interpretation with Dr. Larry Lines, a contributor to two 52 Things... books, and has presented at a variety of technical conferences and luncheons. Rachel was the 2015-2016 President of the CSEG and 2021-2022 President of the Canadian Federation of Earth Sciences. Most importantly, she is inquisitive and likes to take on challenges.

Geophysics

...the future is so bright, we have to wear shades

The world is facing many global challenges: poverty, insufficient clean water supply, hunger and a lack of energy security amongst others. To tackle them, the world needs critical thinkers, who are curious and inventive. Utilizing a variety of skills and technologies, geophysicists play a significant role in helping the world meet the 2030 UN sustainability goals.



Geophysicists interrogate the subsurface to locate oil, gas, minerals, water, brine, subsurface reservoirs for carbon sequestration, and to improve our understanding of hazards, earthquakes etc. In this presentation I will address how we need to ask critical questions and then find answers utilizing a variety of geophysical tools. The future is bright for geophysicists, and for the world because geophysicists are helping address many global challenges.

Date: **Nov. 1, 2022**
Time: **1 PM**

Location: **Wallace 223**

[Link](#)

[Link](#)

CSEG Distinguished Lecture Tour 2022/2023

Dr. Rachel Newrick

Schedule (as of 17-Oct-2022)

Institution	Location or "Virtual"	Date	Time (Local)
Lakehead University	Thunder Bay, Ontario	09-Sep-2022	10:00 AM
KEGS - Sudbury	Sudbury, Ontario	12-Sep-2022	7:00 PM
Laurentian University	Sudbury, Ontario	13-Sep-2022	11:30 AM
Memorial University	St John's, Newfoundland	29-Sep-2022	1:00 PM
St. Francis Xavier University	Antigonish, Nova Scotia	03-Oct-2022	1:00 PM
Acadia University	Wolfville, Nova Scotia	04-Oct-2022	4:00 PM
GSC Atlantic	Dartmouth, Nova Scotia	05-Oct-2022	11:00 AM
Dalhousie University	Halifax, Nova Scotia	06-Oct-2022	11:30 AM
University of New Brunswick	Fredericton, New Brunswick	07-Oct-2022	1:30 PM
INRS	Quebec City, Quebec	11-Oct-2022	12:00 PM
Laval University	Quebec City, Quebec	12-Oct-2022	informal
University of Ottawa	Ottawa, Ontario	13-Oct-2022	11:30 AM
Queen's University	Kingston, Ontario	19-Oct-2022	1:30 PM
University of Toronto	Toronto, Ontario	20-Oct-2022	4:00 PM
Western University	London, Ontario	25-Oct-2022	2:30 PM
University of Waterloo	Waterloo, Ontario	27-Oct-2022	2:30 PM
University of Windsor	Windsor, Ontario	28-Oct-2022	2:00 PM
University of Manitoba	Winnipeg, Manitoba	01-Nov-2022	1:00 PM
University of Regina	Regina, Saskatchewan	02-Nov-2022	4:00 PM
University of Saskatchewan	Saskatoon, Saskatchewan	04-Nov-2022	3:30 PM
<i>Mt Royal</i>	Calgary, Alberta	TBC	
University of Calgary	Calgary, Alberta	30-Nov-2022	4:00 PM
University of Alberta	Edmonton, Alberta	01-Dec-2022	3:00 PM
CSEG Technical Luncheon	Calgary, Alberta	10-Jan-2023	11:30 AM
University of British Columbia	Vancouver, BC	19-Jan-2023	4:00 PM
<i>GSC-Pacific</i>	Victoria, BC	TBC	
University of Victoria	Victoria, BC	24-Jan-2023	3:00 PM
Simon Fraser University	Burnaby, BC	26-Jan-2023	2:30 PM

October 31, 2022

Marine Invertebrates of the Paleogene and Neogene

I am going to wind up our look at marine life during the [Paleogene](#) and [Neogene](#) periods with some examples of invertebrates fossils from those periods such as crustaceans, echinoderms and molluscs.

Crustaceans

[Crustaceans](#) are a long established [arthropod taxon](#) whose earliest examples in the fossil record come from the Middle Cambrian age [Burgess Shale](#). Those that are familiar to us today, lobsters, crabs and shrimps, all have their ancestors in the Paleogene and Neogene periods; here are a couple of examples.

Branchioplax



Figure 1 – *Branchioplax washingtoniana*

Credit: [Kevmin](#), [Creative Commons Attribution-Share Alike 3.0 Unported license](#)

Branchioplax was a genus of crabs that lived from the [Eocene](#) to [Miocene](#). Fossils of *Branchioplax* come from the Pacific Northwest (Washington, British Columbia and Alaska) as well as in Hungary, England, Italy and Japan. Like modern crabs, *Branchioplax* was probably a carnivore and scavenger; it lived in a near shore and/or reef marine environment.

Dr. [Thomas T. Minor](#) found the first fossils of *Branchioplax* in 1873 in the [Hoko River Formation](#), donating the fossils to the [Peabody Museum at Yale University](#), his [alma mater](#). Later, [Mary J. Rathbun](#), named the fossil genus in a [1912 paper](#). In addition to the type species, *Branchioplax washingtoniana*, also described by Rathbun in 1912, there are ten other species in the genus: *B. albertii*, *B. ballingi*, *B. bidentata*, *B. carmanahensis*, *B. concinna*, *B. cordata*, *B. parva*, *B. pentagonalis*, *B. rossii*, and *B. sulcata*.

Lobocarcinus

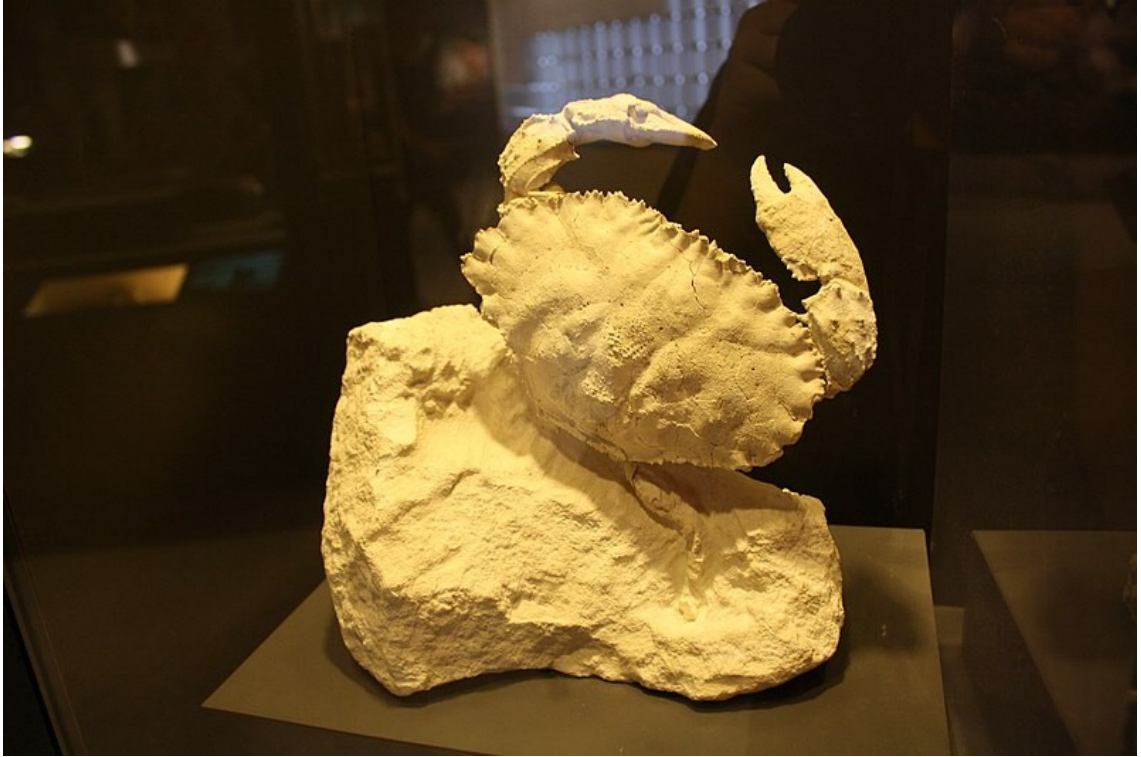


Figure 2 – *Lobocarcinus*

Credit: "[The Wookies](#)", [Creative Commons Attribution 2.0 Generic](#) license

Lobocarcinus was a genus of crab that lived from the Eocene through to the [Pliocene](#). Fossils of *Lobocarcinus* come from New Zealand, Italy, Egypt, Indonesia, Pakistan, and Panama. It lived in marine near-shore, sub-tidal, and lagoon environments.

[August Emanuel von Reuss](#), a geologist from Bohemia in the modern day Czech Republic, was the first to describe *Lobocarcinus* in 1857. There are six species in the genus: *L. sismondai*, *L. lumacopius*, *L. pustulosus*, *L. paulinowurtembergensis*, *L. indicus*, and *L. aegypticus*.

Interesting Question

[Why Do Things Keep Evolving Into Crabs?](#)

Echinoderms

[Echinoderms](#) are another invertebrate taxon with a long history with the earliest examples coming from the [Neoproterozoic Ediacaran](#) of the [Flinders Ranges](#) in South Australia. Modern echinoderms are descendants of this ancient group and have their counterparts in the Paleogene and Neogene periods; here are a couple of examples.

Echinocorys



Figure 3 – *Echinocorys*

Credit: [5snake5](#), [Creative Commons CC0 1.0 Universal Public Domain Dedication](#)

A genus of [sea urchins](#) that lived from the [Late Cretaceous](#) to the [Paleocene](#), *Echinocorys* fossils have been found in Asia, Europe, Australia, and North America. *Echinocorys* lived in a variety of marine environments: offshore shelf, deep subtidal, shallow subtidal, and carbonate reefs. Like most sea urchins, *Echinocorys* was a [detritivore](#), that lived off of the detritus of the marine ecosystem.

[Nathanael G. Leske](#) first described *Echinocorys* in 1778. The genus includes sea urchins described as *Ananchytes*, *A. austriaca* and *A. conoidea*, together with fossils described as *Echinocorys*, *E. arnaudi*, *E. australis*, *E. cipliensis*, *E. elatodepressus*, *E. elatus*, *E. gibbus*, *E. gravesi*, *E. obliquus*, *E. ovalis*, *E. ovatus*, *E. perconicus*, *E. pyramidatus*, *E. scutata*, *E. scutatus*, *E. sphaericus*, *E. sulcatus*, *E. sumbaricus*, *E. texanus*, *E. turritus*, *E. vulgaris*, and *E. Yoloensis*.

Calcancora

[Calcancora](#) was a genus of sea cucumber. Fossils of *Calcancora* have been found in [Triassic](#) aged rocks from Poland, [Late Jurassic](#) formations in Germany, Paleogene deposits from France, Brazil, and the United States during the Paleogene period, and Miocene Period ([Tortonian](#)) rocks from Austria.

Sea cucumbers are mostly soft parts and there is little that can be fossilized, as shown in Figure 4, below.

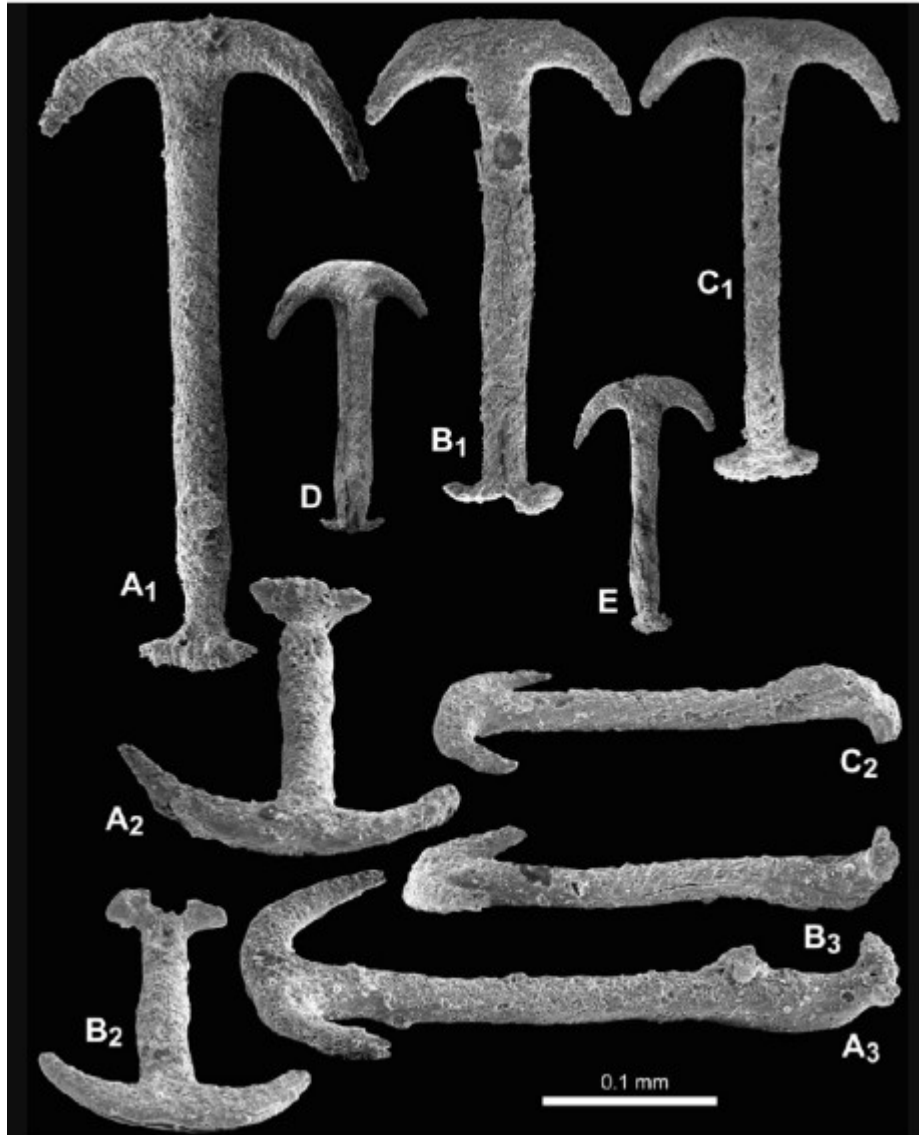


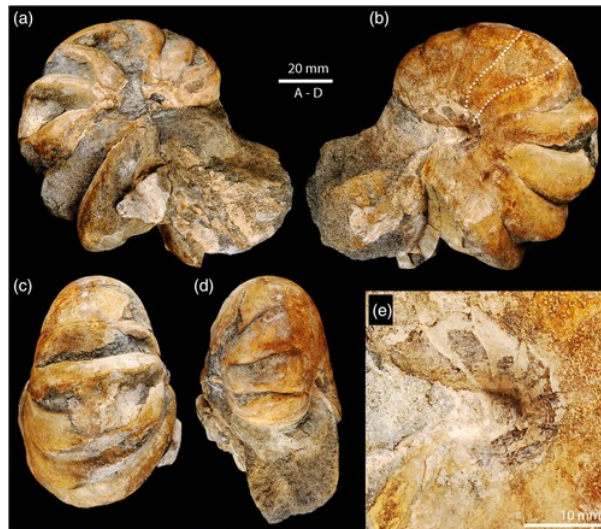
Figure 4 - *Calcancora*
Credit: [DeadMonkey8984](#), CC-BY-SA

[Don L. Frizzell](#) and [Harriet Exline](#) first [described *Calcancora*](#) in 1955. there are three species in the genus: *C. mississippiensis*, *C. pomerania*, *C. pomeraniavenusta*.

Molluscs

[Molluscs](#) are another group of animals that have an ancient ancestry. Following the [Cretaceous/Paleogene Extinction Event](#) many molluscs, such as [ammonites](#), went extinct. From the end of the Cretaceous until present we have the surviving [cephalopods](#), [gastropods](#) and [bivalves](#). Let's look as a few.

Cephalopods – Nautilus taiwanus



N. taiwanus (Huang, 2002b), referred specimen NRM PAL Mo 193 054, early Miocene, Wu River hydrocarbon seep locality, Houdongkeng Formation, Taiwan: (a), right lateral; (b), left lateral; (c), posterior; (d), anterior (apertural) views; (e), close-up on the umbilicus, same view as B. Suture indicated by dotted lines

Figure 5 – *Nautilus taiwanus*
Credit: Figure 2 in Goedert et al, 2022

Found in the [Houdongkeng Formation](#) of Taiwan, [Nautilus taiwanus](#) lived during the Miocene. Like all members of the [Nautilus](#) genus, it was a predatory creature of the open ocean.

Nautilus taiwanus was originally identified as *Kummelonautilus taiwanum* by [Tunyow Huang in 2014](#). However, in 2022, James L. Goedert, Steffen Kiel, and Cheng-Hsiu Tsai [re-assigned the species](#) to *Nautilus*.



Figure 6 – *Nautilus*
Credit: Manuae, Creative Commons Attribution-Share Alike 3.0 Unported license

Bivalves – *Chesapecten*



Figure 7- *Chesapecten jeffersonius*

Credit: [Nonenmac](#), [Creative Commons Attribution-Share Alike 3.0 Unported license](#)

Chesapecten is a genus of [scallop](#) that lived from the early Miocene to the early [Pleistocene](#). Fossils of *Chesapecten* have been found in [Quaternary](#) deposits in North Carolina, Pliocene to Pleistocene deposits in Florida, Pliocene formations in Florida, North Carolina, South Carolina, and Virginia, and Miocene rocks in Argentina, Delaware, Florida, Maryland, New Jersey, North Carolina, Rhode Island, and Virginia. *Chesapecten* lived in various marine environments including subtidal, lagoon, and estuary

While fossils belonging to *Chesapecten jeffersonius* were first described by [Martin Lister](#) in 1687, he failed to name the genus or species. In 1975, two [United States Geological Survey](#) (USGS) geologists, Lauck W. Ward and Blake W. Blackwelder, named the genus in [USGS Professional Paper 861](#). The [type species](#) for the genus is *C. nefrens*; the other eight species in the genus are: *C. coccymelus*, *C. jeffersonius*, *C. madisonius*, *C. middlesexensis*, *C. patagonensis*, *C. santamaria*, *C. sayanus*, and *C. skiptonensis*.

Gastropods – *Euthria*



Figure 8 – *Euthria cingulata*

Credit: [Jan Delsing](#), [public domain](#)

[Euthria](#) is a genus of sea snails, [whelks](#) that lived from the Eocene to the Quaternary. Fossils of *Euthria* have been found around the world in places such as Fiji, France, Germany, Greece, Japan and Italy, Poland, Romania and the United States (Alabama).

[Carl Linnaeus](#) described the type species of *Euthria* in 1758, calling it *Murex corneus*. Later, in 1850, [Maria Emma Gray](#) coined the term *Euthria* that is currently used to [describe the genus](#). The term *Siphonofusus* was used to [describe fossils found in Japan](#) but these fossils have since been recognized as belonging to *Euthria*. The [Global Biodiversity Information Facility entry for Euthria](#) lists 58 species in the genus.

Wrapping it Up

This is, of course, just an introduction to marine invertebrates from the Paleogene and Neogene. If this interests you, follow up starting with these two references:

- [Paleogene invertebrates](#)
- [Neogene invertebrates](#)

Standard Caveat

The purpose of my weblog postings is to spark people's curiosity in geology. Don't entirely believe me until you've done your own research and checked the evidence. If I have sparked your curiosity in the subject of this posting, follow up with some of the links provided here. If you want to, go out into the field and examine some rocks on your own with the help of a good field guide. Follow the evidence and make up your own mind.

In science, the only authority is the evidence.