

March 14, 2022

News and Views

Before looking at animal life during the Pennsylvanian Period, here are some news items that I thought were interesting

Geopolitics

The tragedy in Ukraine continues. Keeping in mind that truth is always a scarce commodity during the fog of war, here are some news items to consider:

- From the United States Energy Information Administration (USEIA): [Europe is a key destination for Russia's energy exports.](#)
- [Grain prices skyrocket in some stores as the war in Ukraine continues.](#)
- [Russia's Ukraine invasion to fuel reorientation of commodity markets – report.](#)
- [Five essential commodities that will be hit by war in Ukraine.](#)
- [Daily situation reports.](#)

Mining and Energy

- [Gold dealers swamped by demand as war creates inflation scare.](#)
- [Nickel, the devil's metal with a history of bad behaviour.](#)
- Port Kembla Coal Terminal: [Australia coal export terminal declares force majeure on flood.](#)
- Research on the origin of the [Bushveld Complex](#) mineral deposits: [Chromitite layers indicate the existence of large, long-lived, and entirely molten magma chambers.](#)
- [USEIA expects U.S. natural gas production to rise as demand for exports grow.](#)
- [Increased demand and low inventories drive U.S. distillate prices higher.](#)
- Saskatchewan: [Report on Mann Lake Uranium Project from Skyharbour's Partner Company Basin Uranium.](#)
- Really deep drilling: [Fusion tech is set to unlock near-limitless ultra-deep geothermal energy.](#)

Research

- Sedimentology, using zircons to locate source rocks for sediments: [Significance of U-Pb detrital zircon geochronology for mudstone provenance.](#)
- Phosphorus cycling and the Great Oxidation Event: ['Seafloor fertilizer factory' helped breathe life into Earth.](#)
- The carbon cycle: [Biomineralization: Integrating mechanism and evolutionary history.](#)

- Hard rock geology: [Cumulate granites: A perspective from new apatite MgO partition coefficients.](#)

Paleontology

- Fossilized vampire squid named after US President Joe Biden: [Fossil coleoid cephalopod from the Mississippian Bear Gulch Lagerstätte sheds light on early vampyropod evolution.](#)
- [How Carnivorous Plants Evolved.](#)
- On You Tube: [The Evolution of Frogs.](#)

Plate Tectonics

- [New model of a fundamental process behind the movement of Earth's tectonic plates.](#)
- [Linking metamorphism and plate boundaries over the past 2 billion years.](#)
- Ancient continents, Rodinia and Gondwana: [An embayment in the East Antarctic basement constrains the shape of the Rodinian continental margin.](#)
- Perovskite and plate tectonics: [Weak cubic CaSiO₃ perovskite in the Earth's mantle.](#)

Volcanoes, Earthquakes and Geohazards

- [Indonesia's Mount Merapi erupts multiple times, 250 evacuate](#) and [Merapi Volcano Eruption Update; Long Pyroclastic Flows; New Eruption.](#)
- [Hydrothermal fluid flow triggered by an earthquake in Iceland.](#)
- [Earthquake fracture energy relates to how a quake stops.](#)
- Videos from Geology Hub: [Asteroid Impacts Cause Volcanoes to Erupt on the Opposite Side of the Planet;](#) [This Week in Volcanoes;](#) [Evacuations at Fuego, Fukutoku Okanoba Volcano Update.](#)
- Also on You Tube: [New Madrid Fault May Unleash Catastrophic Midwest Earthquake, North Pole Rapidly Shifting.](#)
- [Worldwide Volcano News and Updates.](#)

From Out of this World

- Hiawatha Crater not connected to the Younger Dryas: [A Late Paleocene age for Greenland's Hiawatha impact structure;](#) see also: [Giant impact crater in Greenland occurred a few million years after dinosaurs went extinct.](#)

Engineers Geoscientists Manitoba - Keystone Professional

- The [Spring 2022 Edition of the Keystone Professional](#) is out, my article on environmental contaminants is under the heading **Geology and Society.**

March 14, 2022

Animal Life During the Pennsylvanian Period



Figure 1 - Diorama of a Pennsylvanian Seafloor

Credit: [James St. John](#), [Creative Commons Attribution 2.0 Generic](#) license

This week we'll wrap up our look at the [Pennsylvanian Period](#) (a.k.a Late [Carboniferous](#)) with a look at some of the animal life that lived during that time. We'll start with terrestrial life and then look at aquatic life during that time.

Terrestrial Life during the Pennsylvanian



Figure 2 - Pennsylvanian Age Fossil Tracks, Grand Canyon National Park, Arizona

Credit: [United States National Park Service](#), [public domain](#)

Terrestrial animal life during the Pennsylvanian included [arthropods](#), [amphibians](#) and the first [reptiles](#); here are some examples.

Meganeura



Figure 3 - *Meganeura monyi* from the [Museum de Toulouse](#)

Credit: [Didier Descouens](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

A large predatory insect (the specimen in Figure 3 is 68 cm (~27 inches) across) [Meganeura monyi](#) lived during the Pennsylvanian (called Late Carboniferous in Europe) swamps that eventually became coal formations in what is what is now France and England. *Meganeura* and other similar insects from the Late Carboniferous is related to the present day [dragonflies](#) and [damselflies](#). *Meganeura* is part of the [Meganeuridae](#), a family that includes other giant dragonfly-like insects. The Meganeuridae arose in the Pennsylvanian and went extinct in the Middle [Permian](#).



Figure 4 - Artist's Reconstruction of a *Meganeura*

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

Dendrerpeton



Figure 5 - *Dendrerpeton acadianum*

Credit: [Gary Todd, Creative Commons Attribution-Share Alike 4.0 International](#) license

Dendrerpeton was a member of the [temnospondyl](#) group of amphibians. The first fossil of *Dendrerpeton acadianum* was found in 1861 in the [Joggins Formation](#) coal deposit near [Joggins, Nova Scotia](#). Fossils of *Dendrerpeton* have also been found in coal deposits in [Ireland](#). The fossils have often been found within tree trunks, suggesting that *Dendrerpeton* sought shelter in hollow trunks. Approximately 35 cm in length, *Dendrerpeton* appears to have been a predator, living off of insects and any other creature it could catch.

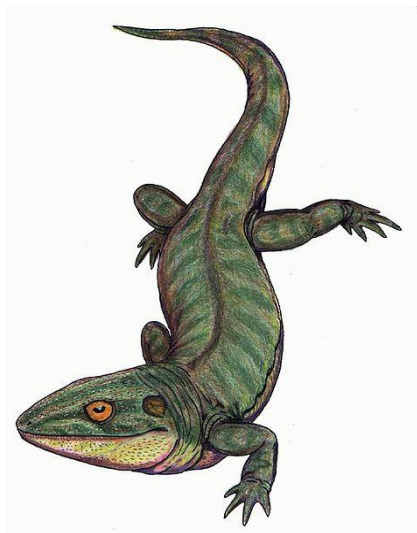


Figure 6 - Reconstruction of *Dendrerpeton*

Credit: [User:DiBgd, public domain](#)

Hylonomus

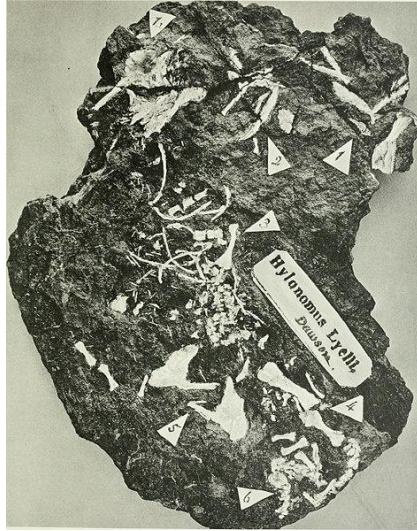


Figure 7 - Fossil *Hylonomus lyelli*
Credit: [R.L. Moodie, 1916, public domain](#)

Another fossil from the Joggins Formation, [*Hylonomus lyelli*](#) was first discovered by John William Dawson in the mid-19th century. Originally thought to be an amphibian, it is now considered a reptile. *Hylonomus* was a small (20 - 25 cm long) predator that had needle like teeth with which to catch it's prey, probably small arthropods.

In addition to the fossils of from the Joggins Formation, geologists found tracks, believed to be of *Hylonomus*, in the [Grande Anse Formation](#) in New Brunswick .



Figure 8 - Reconstruction of *Hylonomus lyelli*
**Credit: [Matteo De Stefano/MUSE](#),
[Creative Commons Attribution-Share Alike 3.0 Unported](#) license**

Aquatic life during the Pennsylvanian

Common aquatic invertebrate fossils from the Pennsylvanian include [brachiopods](#), [corals](#), [echinoderms](#), and [molluscs](#). Fossils from marine vertebrate during the Pennsylvanian include [chondrichthyes](#) (cartilaginous) and [bony fishes](#). Let's look at a few of these.

Brachiopods



Figure 9 - *Dictyoclostus americanus*

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

[Dictyoclostus](#) is a genera of brachiopods that lived from the [Mississippian Period](#) to the Permian Period. Species of *Dictyoclostus* lived in the shallow seas of North America. *Dictyoclostus americanus*, in Figure 9 above, lived in what is now Kansas during the Pennsylvanian.

Corals



Figure 10 - *Caninia torquia*, a Rugose Coral

Credit: [Kansas Geological Survey](#), [Creative Commons Attribution-Share Alike 1.0 Generic](#) license

[Rugose corals](#), also called horn corals, were solitary corals that lived from the Middle [Ordovician](#) to Late Permian Periods. [Caninia torquia](#), in Figure 10 above, lived in what is now Kansas during the Pennsylvanian. The fossil was from the Beil Limestone Member, [Lecompton Limestone](#) in Douglas County, Kansas.

Echinoderms - Crinoids



Figure 11 - *Euonychocrinus simplex*

Credit: [James St. John, Creative Commons Attribution 2.0 Generic license](#)

[Crinoids](#), also called sea lilies, lived in dense forest-like colonies in the Pennsylvanian seas of North America. The fossil of [Euonychocrinus simplex](#), Figure 11 above, was found in the Pennsylvanian [LaSalle Limestone](#) near Pontiac, Illinois.

Molluscs - Ammonoids



Figure 12 - Coiled Cephalopod Fossil Lowellville Shale, Ohio

Credit: [James St. John, Creative Commons Attribution 2.0 Generic license](#)

[Ammonites](#) first appeared during the [Devonian](#), flourished throughout the rest of the [Paleozoic](#) Era and persisted until the [Cretaceous–Paleogene extinction event](#), although some may have

lived until the [Paleocene](#). During the Pennsylvanian, ammonites and other coiled [cephalopods](#) lived many oceans, including the seas around North America. The fossil in Figure 12 was found in northeastern Ohio, in the "Lowellville Shale", an unofficial name for dark-colored shales overlying the Lowellville Limestone member in the [Pottsville Formation](#).

Chondrichthyes

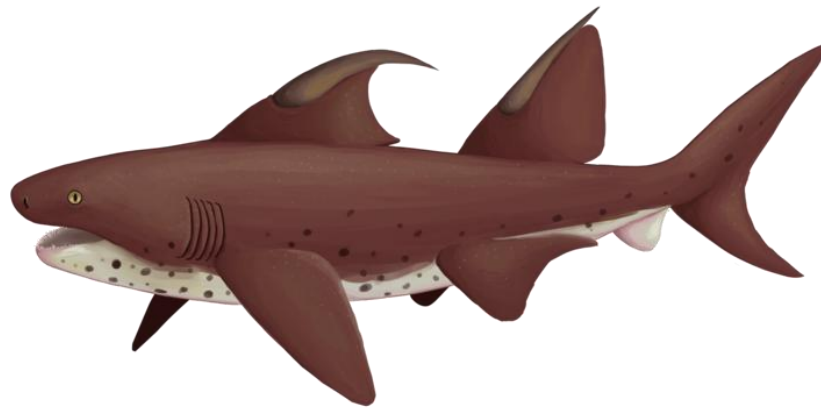


Figure 13 - Reconstruction of *Dracopristis hoffmanourm*

Credit: [Gasmisque](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

Chondrichthyes underwent a major evolutionary radiation during the Mississippian and Pennsylvanian (Carboniferous). One of the chondrichthye fish that lived in the Pennsylvanian seas was [Dracopristis hoffmanourm](#). [Discovered](#) in 2013 in the Tinajas Member of the [Atrasado Formation](#) near Albuquerque, New Mexico, *D. hoffmanourm* had 12 rows of short, squat teeth, and an array of spines on its dorsal fins. Nicknames for *D. hoffmanourm* include "Dragon shark" and "Godzilla shark."

Bony Fish

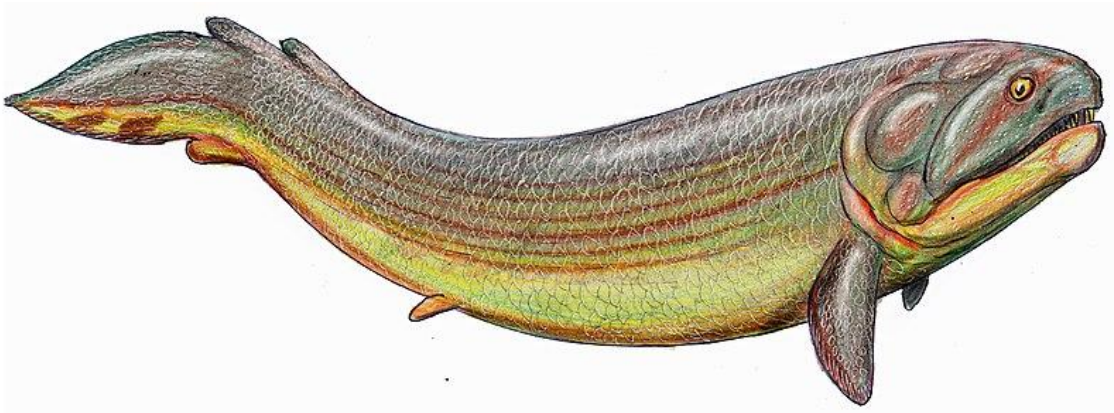


Figure 14 - Reconstruction of *Rhizodus hibberti*

Credit: [User:DiBgd](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

Among the bony fish fossils found in Pennsylvanian rocks is a freshwater predator, [*Rhizodus hibberti*](#). A [lobe-finned](#) fish, *R. hibberti* were fairly large, up to 7 m in length, and had fangs that were up to 22 cm long; just what you want to meet when you go for an afternoon dip in a lake on a hot day 300 million years ago.

Wrapping Up

The fossil evidence shows that there are many, many more examples of animal life in the Pennsylvanian Period than the few shown here. Feel free to search out the literature on these fossils, check out the examples in museums and even do some field work yourself. But be warned: fossil study is as addictive as the search for gold, and just as intellectually rewarding.

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.