

**December 13, 2021**

## **News and notes**

Before going on to a look at the Cambrian Period, here are a few news items that I thought were interesting:

### **An Earth Shattering Kaboom**

- [Study pinpoints timing of Chicxulub asteroid impact.](#)
- [Tall el-Hammam was destroyed by a 'cosmic airburst,' experts find;](#) also listen to a related [podcast.](#)



**[Credit: Quick meme](#)**

### **Earthquakes**

- [Lots of earthquakes near Japan.](#)
- [Swarm of more than 55 earthquakes strikes off Oregon coast.](#)
- [Previously unrecorded Chilean tsunami identified.](#)
- [Current earthquake news from the USGS.](#)
- [Current earthquake news from Natural Resources Canada.](#)

### **Volcanoes**

- [Spanish island volcano eruption hits local record of 85 days.](#)
- [Advisory - Okmok Volcano, Alaska, USA.](#)
- [Aftermath of Indonesian volcanic eruption captured in 8 staggering photos.](#)
- From Scientific American: [Volcanoes, their Causes—Igneous Theory.](#)
- News you can use: [5 Tips on How To Escape An Erupting Volcano.](#)
- [Worldwide Volcano News and Updates.](#)

### **Paleontology**

- From Nature: a new species of ankylosaur discovered: [Bizarre tail weaponry in a transitional ankylosaur from subantarctic Chile.](#)
- [Meat-eating dinosaurs were terrifyingly fast, footprints reveal.](#)
- Denisovians: [Our Extinct Cousins Reached 'The Roof of The World' a Long Time Before Homo Sapiens.](#)

## Geological Phenomena

- [The Gates of Hell](#); a natural gas fire.
- Related to today's posting: [When did Antarctica become a continent?](#)

## Mining and Energy

- [23rd World Petroleum Congress ends on a high note.](#)
- [New tools to unearth rare metals.](#)
- From Reuters: Analysis: [Miners face talent crunch as electric vehicles charge up metals demand.](#)

## Publications

- [Roadside Geology of Montana: Second edition takes a closer look at Treasure State geology, Part 2](#) and [Part 3](#) of the report.
- Other volumes of the Roadside Geology series [here](#).

## Crooked Geologists

- [Ex-Director Geology and Mining Department Among 4 Accused Booked For Inducted Unsatisfactory 'Rig Machine' Decade Ago](#); bought a piece of equipment and got a kickback.

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## The Cambrian Period - Part 1

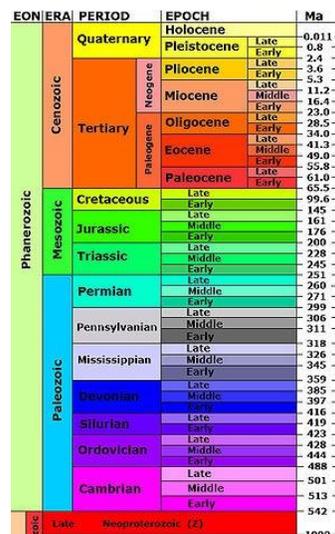


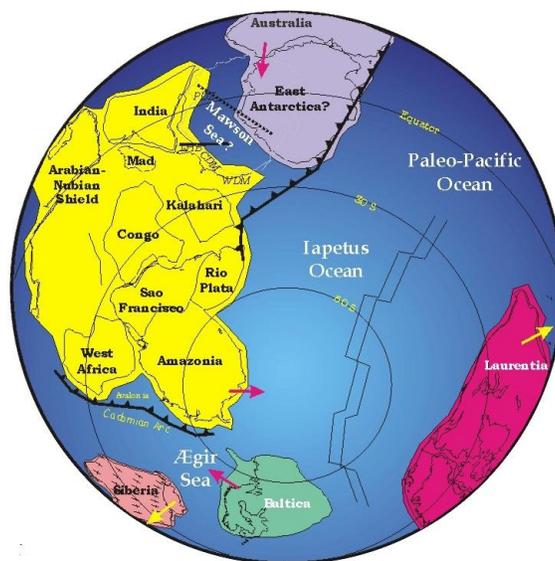
Figure 1 - Phanerozoic Time Scale

Credit: Modified from File: [Geologic time scale.jpg](#),  
[United States Geological Survey, public domain](#)

The [Phanerozoic Eon](#) covers the most recent 542 million years (Mya) since the end of the [Proterozoic Eon](#) and is divided into the [Paleozoic](#), [Mesozoic](#) and [Cenozoic](#) Eras. The earliest period in the Paleozoic Era was the [Cambrian Period](#) and we'll look at that in this week's posting.

### Summary of the Cambrian Period

In the history of the study of Geology, the Cambrian period has traditionally been taken as the beginning of complex life. Although we now know that there were multicellular organisms earlier in the Neoproterozoic, the Cambrian Period marks the proliferation of complex life. The fossil record from the Cambrian shows the ancestors, or the close relative of those ancestors, of all the living organisms alive today.



**Figure 2 - Positions of Ancient Continents, 550 Mya**  
**Credit: [127.0.0.1](#), public domain**

Tectonically, after the breakup of the supercontinent [Rodinia](#) during the Neoproterozoic, the continental cores re-sorted into another supercontinent we now call [Pannotia](#). Shortly thereafter, in geological terms, Pannotia began to break up near the end of the Neoproterozoic. This breakup continued into the Cambrian giving the general layout shown in Figure 2.

The breakup of Pannotia included the formation of the [Iapetus Ocean](#). Around the Iapetus were [Laurentia](#), [Baltica](#) and [Gondwanaland](#). Gondwanaland itself included the crust of future Africa, South America, southern Eurasia, Australia and Antarctica. Terranes that broke off Gondwana included the microcontinent [Avalonia](#), portions of which are now scattered over the east of New England, the south of Newfoundland, parts of New Brunswick and Nova Scotia, southern Ireland, most of England and Wales, the low countries and northern Germany.

## Cambrian Period Subdivisions

	Chinese	North American	Russian-Kazakhian	Australian	Regional		
Cambrian	Furongian		Ibexian (part)	Ayusokkanian	Datsonian	Dolgellian ( <i>Trempealeauan</i> , Fengshanian)	
			Sunwaptan	Sakian	Iverian		Ffestiniogian ( <i>Franconian</i> , Changshanian)
			Steptoan	Aksayan	Idamean	Maentwrogian ( <i>Dresbachian</i> )	
				Marjuman	Batyrbayan	Mindyallan	
	Cambrian Series 3	Maozhangian		Mayan	Boomerangian		
		Zuzhuangian	Delamaran	Amgan	Undillian		
		Zhuxian			Florian		
	Cambrian Series 2				Templetonian		
		Longwangmloan	Dyeran	Toyonian	Ordian	Lenian	
		Changlangpuan	Montezuman	Botomian			
Terreneuvian	Qungzusian		Atdabanian				
	Meishuchuan Jinningian	Placentian	Tommotian Nemakit-Daldynian*		Cordubian		
Precambrian	Sinian	Hadrynian	Nemakit-Daldynian* Sakharan	Adeladean			

**Figure 3 - Cambrian Period Subdivisions**  
**Credit: [Infogalactic.com](http://Infogalactic.com) - Cambrian**

The best way to describe the subdivisions of the Cambrian Period is as "it's complicated". While commonly divided into Early, Middle and Late Cambrian Epochs, researchers who study the Cambrian currently split the Cambrian into four main series of fossils and sediments, these are: the [Terreneuvian](#), the [Cambrian Series 2](#), the [Cambrian Series 3](#) and the [Furongian](#).

### The Terreneuvian Series



**Figure 4 - *Treptichnus pedum* fossil marking the Cambrian-Ediacaran Boundary**  
**Credit: [Martin Smith](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license**

The oldest subdivision of the Cambrian Period, Terreneuvian Series lasted from around 541 Mya to around 521 Mya. The first appearance of the trace fossil [Treptichnus pedum](#) defines the base of the Terreneuvian and the first appearance of [trilobites](#) in the stratigraphic record marks the end of the series. The type locality (GSSP) of the Terreneuvian is in [Fortune Head](#), at the northern edge of the [Burin Peninsula, Newfoundland, Canada](#). Terreneuvian is derived from the Latin name for Newfoundland, Terra Nova.

### The Cambrian Series 2 and 3



**Figure 5 - *Asaphiscus Wheeleri***

**Credit:** [TheoricienQuantique](#), public domain

The geologists are still discussing (at a geological pace) what to call these two series of fossils and sediments.

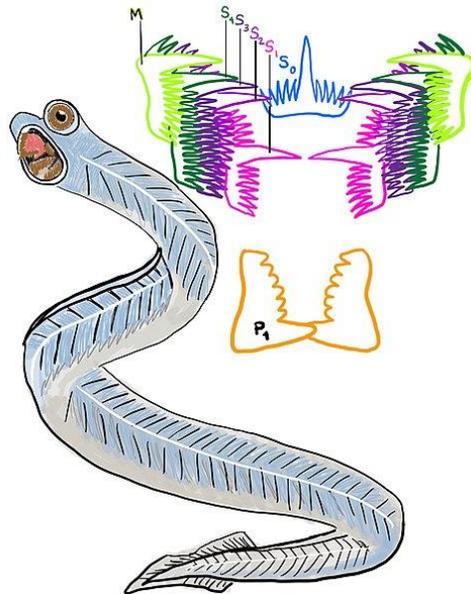
The tentative length of the Cambrian Series 2 is from around 521 Mya to 509 Mya. The proposed lower boundary is the first appearance of trilobites, such as [Asaphiscus Wheeleri](#) in Figure 5. The proposed upper boundary for the series is the first fossil appearance of either the trilobite species [Oryctocephalus indicus](#) or [Ovatoryctocara granulata](#).

The proposed beginning for Cambrian Series 3 is the first appearance in fossils of *Oryctocephalus indicus* or *Ovatoryctocara granulata*, around 509 Mya and the proposed end is defined as the first appearance of [Glyptagnostus reticulatus](#) around 497 Mya.

### The Furongian Series

The Furongian Series lasted from around 497 Mya to 485.4 Mya. The appearance of the [Glyptagnostus reticulatus](#) marks the beginning of the series and is the first appearance of the

[conodont \*lapetognathus fluctivagus\*](#).



**Figure 6 - Conodont Reconstruction**

**Credit: Irengharibyan, Creative Commons Attribution-Share Alike 4.0 International license**

Conodonts are fossils of a group of extinct creatures known from the Furongian Series in the Cambrian to the Late [Triassic](#) (about 200 Mya). The fossils appear to be the teeth of an extinct group of animals that may be distantly related to today's [hagfish](#) and thus to the ancestors of all current [vertebrates](#).

Conodonts are an important tool for dating and correlating sedimentary rocks from the Palaeozoic Era and the following Triassic Period of the Mesozoic Era. Being highly diversified and abundant both regionally and globally, they can be used as primary markers defining the boundaries of geological subdivisions within the 300 Mya that they entered the fossil record.

### **Winding Up for Now**

There is a lot more that could be said about the Cambrian Period, and a lot more will be said in next's week posting. The Cambrian Period includes the famous [Burgess Shale](#). Next week's posting will discuss more on the biota of the Cambrian, especially the fossils of the Burgess Shale.

### **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.