

# *Landscapes around Canberra*

*- a geological  
excursion for  
students of  
all ages*

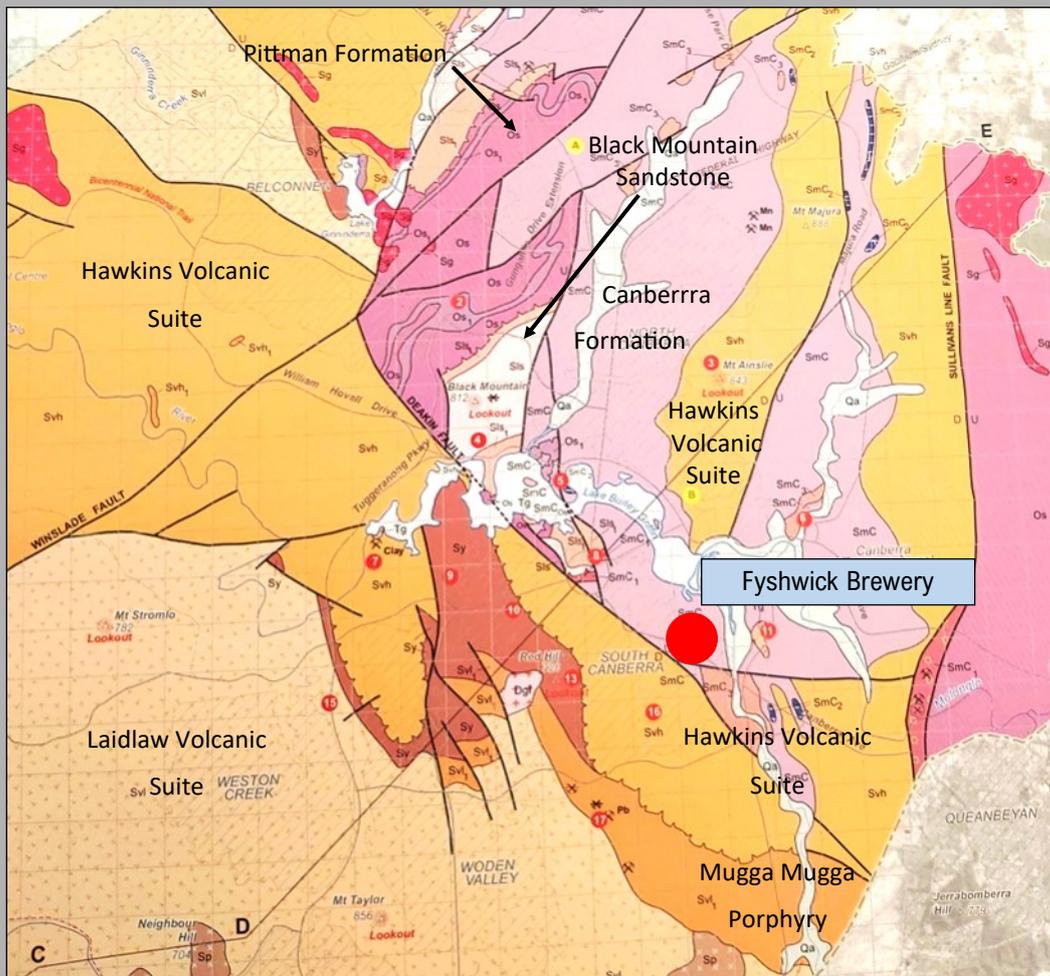


## Dairy Road

Rock outcrops around Canberra tell us about the early history and evolution of the region's landscapes.

# Canberra region landscapes

The landscapes around Canberra had their origins over 400 million years ago during the Paleozoic geological era on the margins of the supercontinent called Gondwana. Since those formative years the landscapes have been shaped and deeply eroded to reveal the rocks we now see around Canberra.

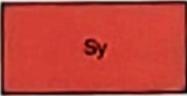
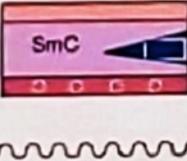
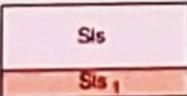
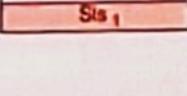
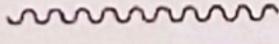
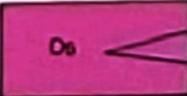


Simplified geology extract from — Geological Map of the ACT, 2008.



This publication was compiled for the ACT Division, Geological Society of Australia, by Douglas Finlayson.

# Geology Map Legend

Era	Late Silurian	Laidlaw Volcanic Suite including Deakin Volcanics		Sv <sub>2</sub> Shale and volcanoclastic sediments Sv <sub>1</sub> Rhyodacitic lava Sv <sub>1</sub> Mugga Mugga Porphyry Member Sv <sub>1</sub> Rhyodacitic ignimbrite
	423.0 Ma	Yarralumla Formation		Sy Shale, limestone, volcanoclastic sediments and calcareous horstfels
		Hawkins Volcanic Suite		SvH <sub>1</sub> Limestone SvH Dacitic ignimbrite
	Early Silurian	Canberra Formation		SmC <sub>3</sub> Tuff, ashstone SmC <sub>2</sub> Limestone, calcareous horstfels SmC <sub>1</sub> Sandstone and grt SmC Shale, siltstone
		Black Mountain Sandstone		Sis Quartz sandstone
Paleozoic		State Circle Shale		Sis <sub>1</sub> Shale, siltstone
	443.8 Ma			Intense folding and faulting
	Late Ordovician	Pittman Formation and Adaminaby Group		Os <sub>1</sub> Black graptolitic shale and chert Os Sandstone, siltstone, shale

The Canberra region is in the southeastern part of the Lachlan Orogen (or Lachlan Fold Belt), a geological province that stretches from near South Australia to the Australian southeast Tasman Sea coast.

During the Paleozoic era this province was subjected to major orogenic (mountain building) events, the Benambran Orogeny Phase 1 (444-440 Ma) and Phase 2 (431-428 Ma) and the Tabberabberan Orogeny (about 400—370 Ma).

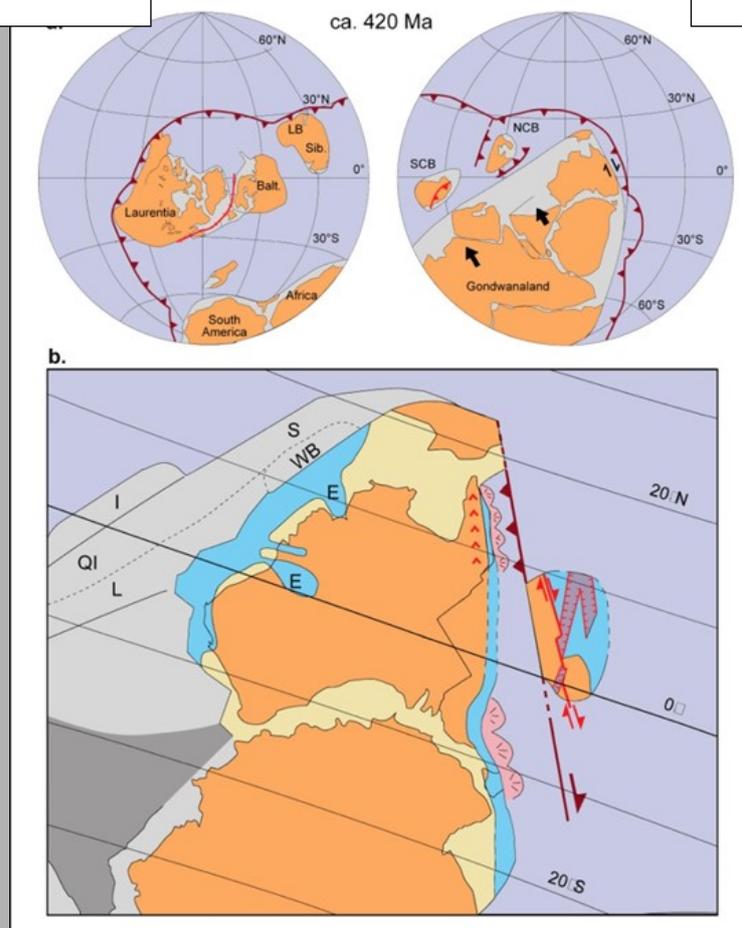
Ma = million years ago

# Where has Australia been in the past?

## Paleogeography

420 million years ago

Silurian



From — Li and Powell, 2001.

*During the later part of the Paleozoic era, during the Silurian geological period, Australia was part of the Gondwana supercontinent and at tropical latitudes with the Paleopacific Ocean lithospheric plate colliding with Gondwana and with consequent subduction zones, volcanoes and earthquakes.*

# *Limestone in central Canberra*

Outcrops of dark grey, recrystallized limestone are present along the Lake Burley Griffin foreshore of Acton Peninsula near the Museum of Australia. The exposures, which extend for about 80 to 100 metres along the eastern shore of the peninsula, show several karst solution features, particularly rillenkarren (sharp water weathering grooves). Macrofossils (corals) have been identified but are difficult to find.



# *Acton limestone*

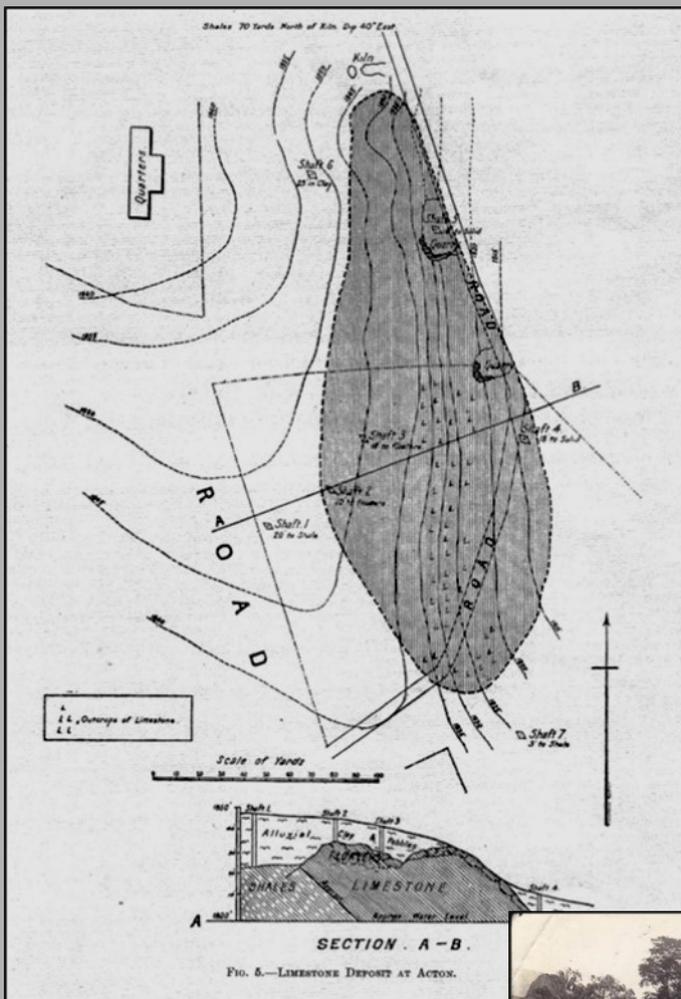


The limestone has been described informally as Acton limestone within the Canberra Formation (428-425 Ma) that also includes collectively other limestones found at shallow levels along Northbourne Avenue near the ABC building, on Mount Majura and elsewhere in the Canberra region, including under the Treasury Building and the ASIO building in central Canberra.

The Acton limestones are thought to have led to the 19<sup>th</sup> century name for the region - "Limestone Plains" after their discovery by the first Europeans to reach the area in early December 1820.

# Acton limestone quarry

The Acton limestone was used in lime kilns for the production of building mortar from the earliest days of European settlement. During the development of the city of Canberra there were lime kilns at Acton Peninsula. A survey of the limestone resource was conducted by Taylor and Mahony in 1913.



*Taylor and Mahony 1913 map of the Acton Peninsula limestone resource.*



*1930's photo of lime kilns along now Lawson Crescent with now ANU buildings in the background. Photo – Allan Mawer*

# Limestone in drillcore

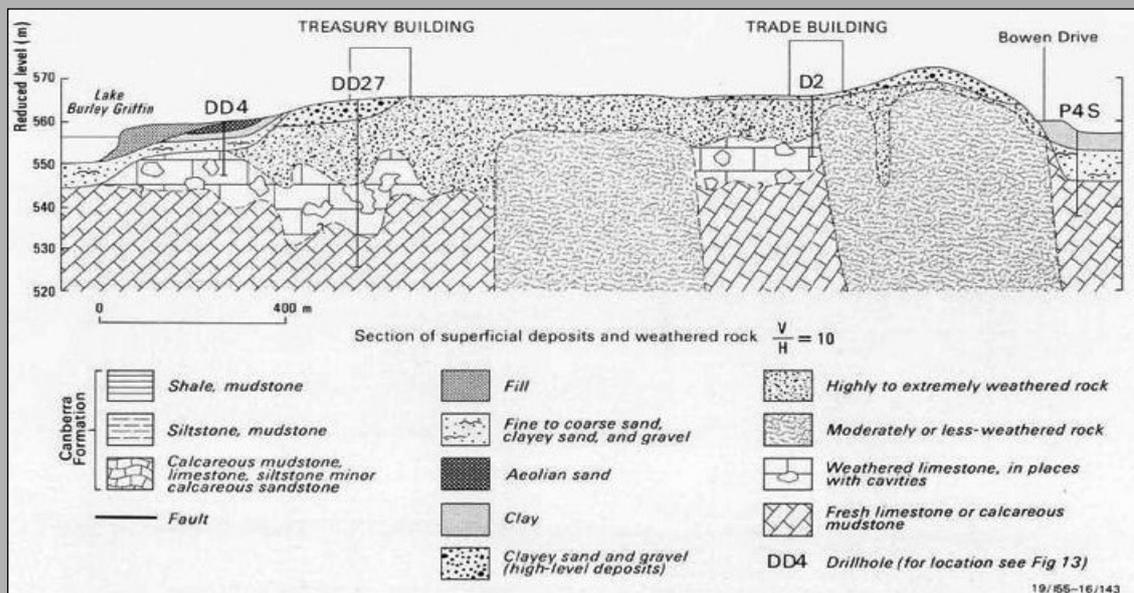
Limestone rock has been encountered in drillcore acquired during the construction of buildings around Canberra. Within the Parliamentary Triangle the foundations for the Treasury Building encountered voids in limestone that require significant engineering changes to eliminate building collapse.



*Treasury Building in the Parliamentary Triangle*

The shale is richly fossiliferous, and some drill holes encountered numerous weathered-out fossils; two well-preserved specimens of the trilobite *Encrinurus* have been identified. Also, numerous corals occur throughout the part of the limestone sequence penetrated by drill holes. Both the shale and limestone belong to the Riverside Formation, which is of Lower Silurian age.

*Best and Henderson, 1968. Note—Riverside Formation now = Canberra Formation*



# *Dairy Road limestone*

Limestone rock has also been encountered within the Canberra Formation in drillcore acquired during the construction of buildings in Fyshwick just off Dairy Road.



Geotechnical investigations at this site completed to inform future building development included a drillcore to 60m depth. The drillcore provides a good example of richly fossiliferous limestone. The drillcore is not currently on permanent display but may be in future.

Fossil treasures.

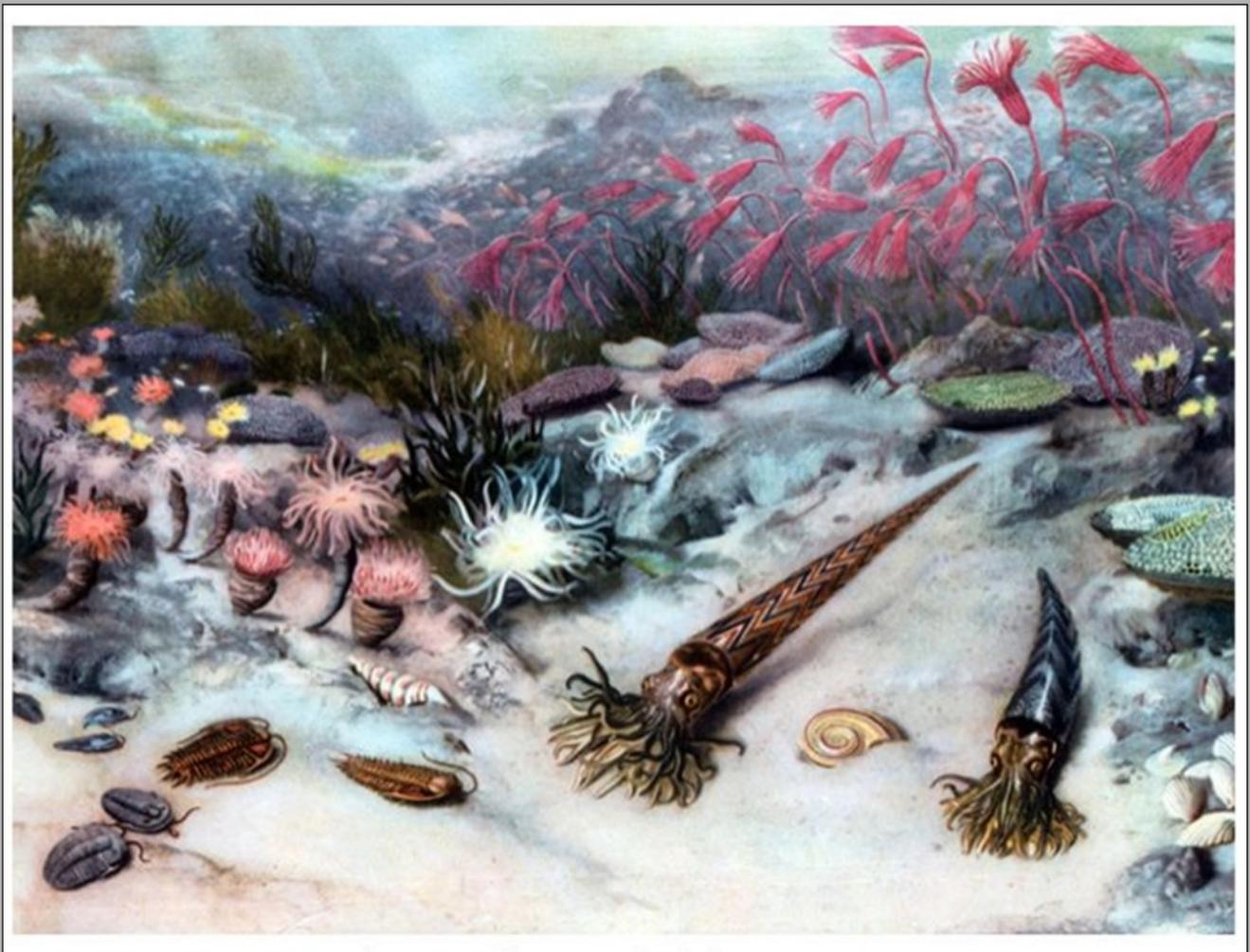


# *Fossiliferous limestone drillcore*

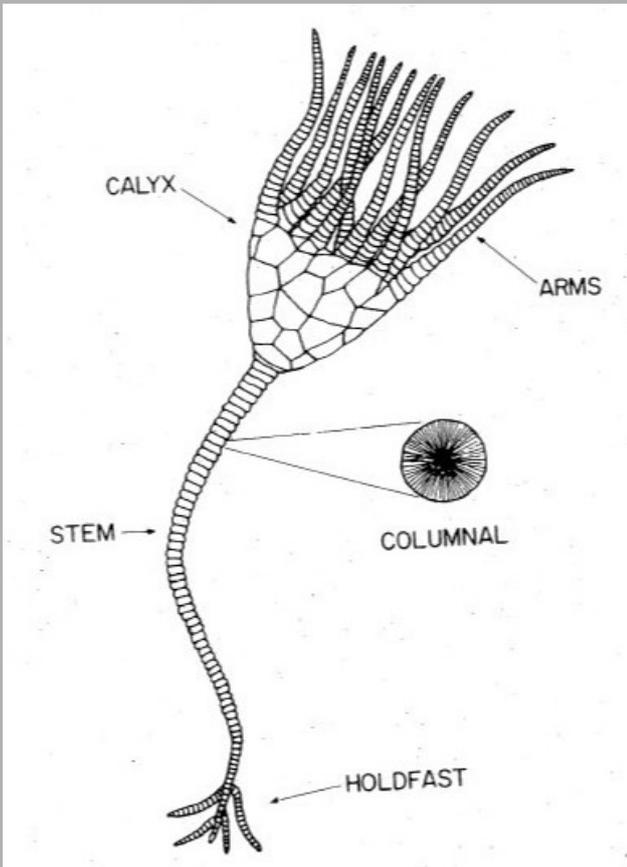


# *During Silurian times nearly all life on Earth was in the sea.*

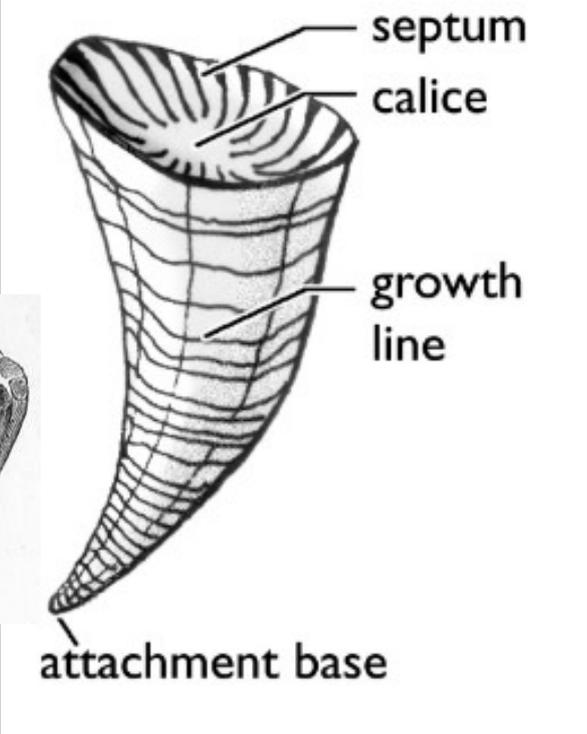
- Crinoids (sea lilies) under Civic, central Canberra.
- Brachiopods at Woolshed Creek near the Canberra airport.
- Trilobites under the Parliamentary Triangle.



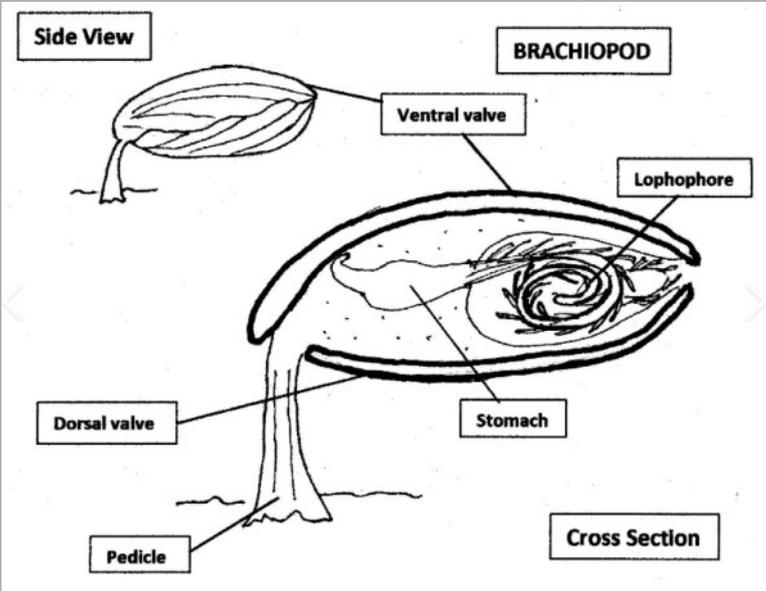
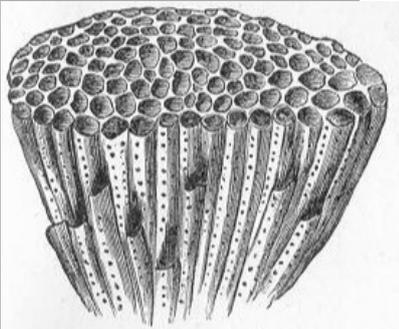
*American Geophysical Union, 2018*



*Crinoid*



*Tabulate Coral*



*Brachiopod*

*Permian crinoid stems at Ulladulla Harbour.*



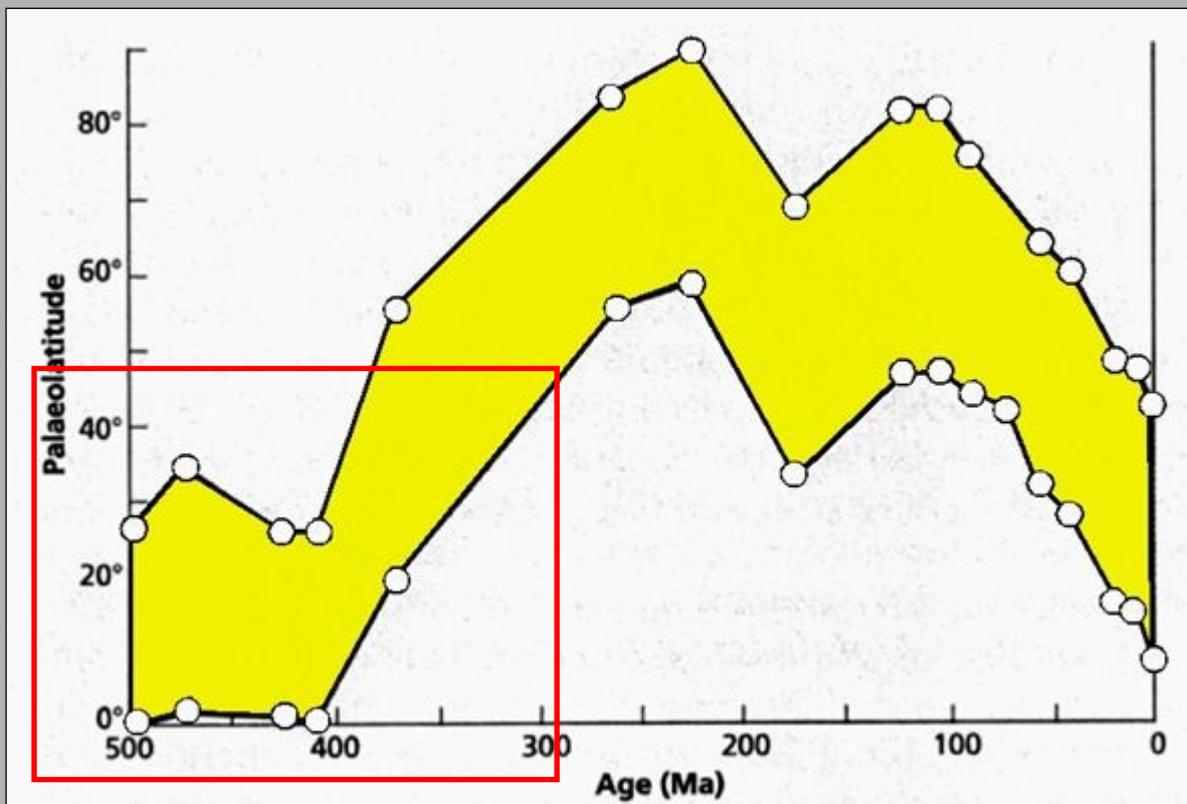
*Crinoids on the Great Barrier Reef, 2020.*



# Carbonate Rocks

Most carbonate rocks result from the accumulation of bioclasts created by calcareous organisms. Therefore carbonate rocks originate in areas favouring biological activity i.e. in shallow and warm seas in areas with little to no siliciclastic (quartz, sand) input eroded from land areas.

The eastern part of the Australian continent was at tropical latitudes for a long time during the Paleozoic geological era including the Cambrian, Ordovician, Silurian, Devonian and Carboniferous periods, from about 500 to 300 million years ago. Consequently limestone outcrops around Canberra should come as no surprise.



*Paleolatitude of continental Australia throughout geological time.  
(from — Geology of Victoria)*

# *Dairy Road drillcore*



# *Enjoy your excursion around Canberra*



*Further information on all geoheritage sites around Canberra can be downloaded from the Geological Society of Australia web site—*

***<https://www.gsa.org.au/Public/Geoheritage/>**  
and look for ACT Sites and Maps on the pulldown menu.*