

A photograph of a cave interior. A waterfall flows down a rocky wall. A spotlight beam illuminates a section of the rock face. The text "The spotlight is on...." is overlaid in red.

The spotlight is on....

**DISCOVERING
AUSTRALIAN
CAVES**

ana Little

A photograph of a cave interior showing numerous stalactites hanging from the ceiling. The text "Andy Spate" is overlaid in black.

Andy Spate

Optimal Karst Management

www.karstmanagement.com

0407 293 3011

**I want to take
you on a
photographic
journey
around
Australian
caves and
karst ...**

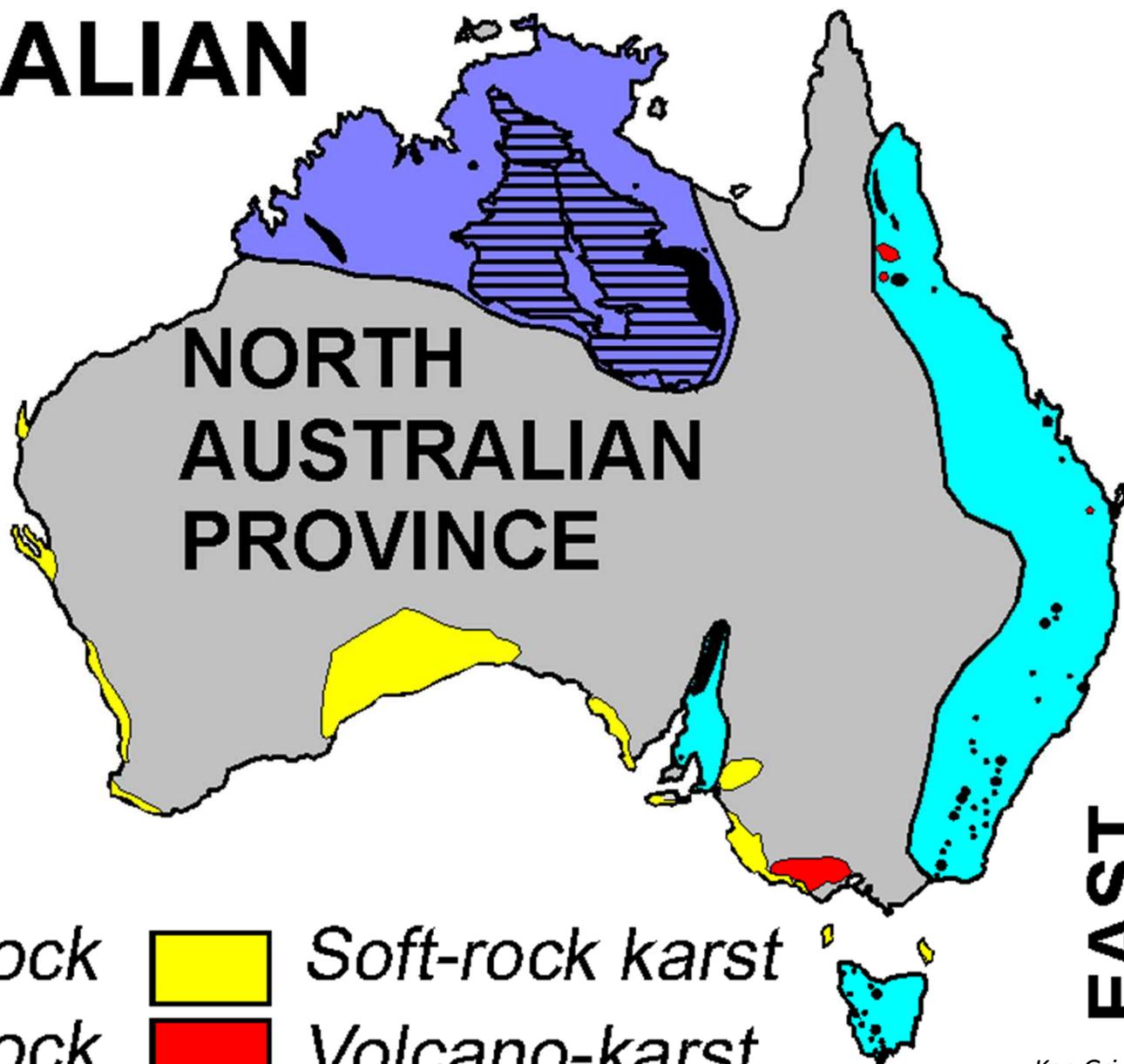
***But please look
at the
readme.docx file
on the disk.***

We have caves and karst-like features in a wide variety of settings:

- In 'Hard' limestones – Proterozoic to Permian in age
- In 'Soft' limestones - Cenozoic in age
- In 'Softer' limestones – Quaternary in age
- In lava flows - Miocene and Pliocene/Pleistocene to Recent
- In sandstone and in rocks such as quartzite and laterite
- Boulder caves in granite and similar rock types
- Sea caves in a wide variety of rocks
- In other rocks such as laterite, magnesite, calcrete and iron ore deposits
- In ice and snow
- In soil
- And probably elsewhere

Our show caves do not sample all of these features but the first three categories are represented plus we have Undara's lava tubes.

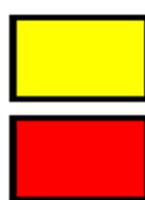
AUSTRALIAN KARST



**EAST
AUSTRALIAN PROVINCE**



Hard-rock
Hard-rock



Soft-rock karst
Volcano-karst

Starting with 'hardest' limestones let's look at Northern Australia and the East Australian Province 1

- **North Australia Province**
 - Proterozoic (2500 Ma) to Devonian (359 Ma) in age
 - Dolomite and limestone
 - Australia's longest cave (>100 km)
 - Exhumed Devonian barrier reef
- **Flinders Ranges and Eyre Peninsula**
 - Late Cambrian to Cambrian (252 Ma) in age
 - Limestone and dolomite



Starting with 'hardest' limestones let's look at Northern Australia and the East Australian Province 2

- We have both epigene and hypogen cave types – and probably some others.
- What do these terms mean?
 - Epigene means that the caves develop from the surface down – e. g. vadose (above the water table) stream caves.
 - Hypogene means that the caves develop beneath the water table in the phreatic zone.
 - This could mean ascending waters from depth; or
 - Slowly moving waters moving through the saturated zone.
- We see all of these as we move from Tasmania to the 'Top End'
- But because of geologic history, rock structure, climate change and hydrologic regimes we see widely different cave morphologies. These have operated over 600 million years (Ma) to several billion years – Precambrian to Permian.

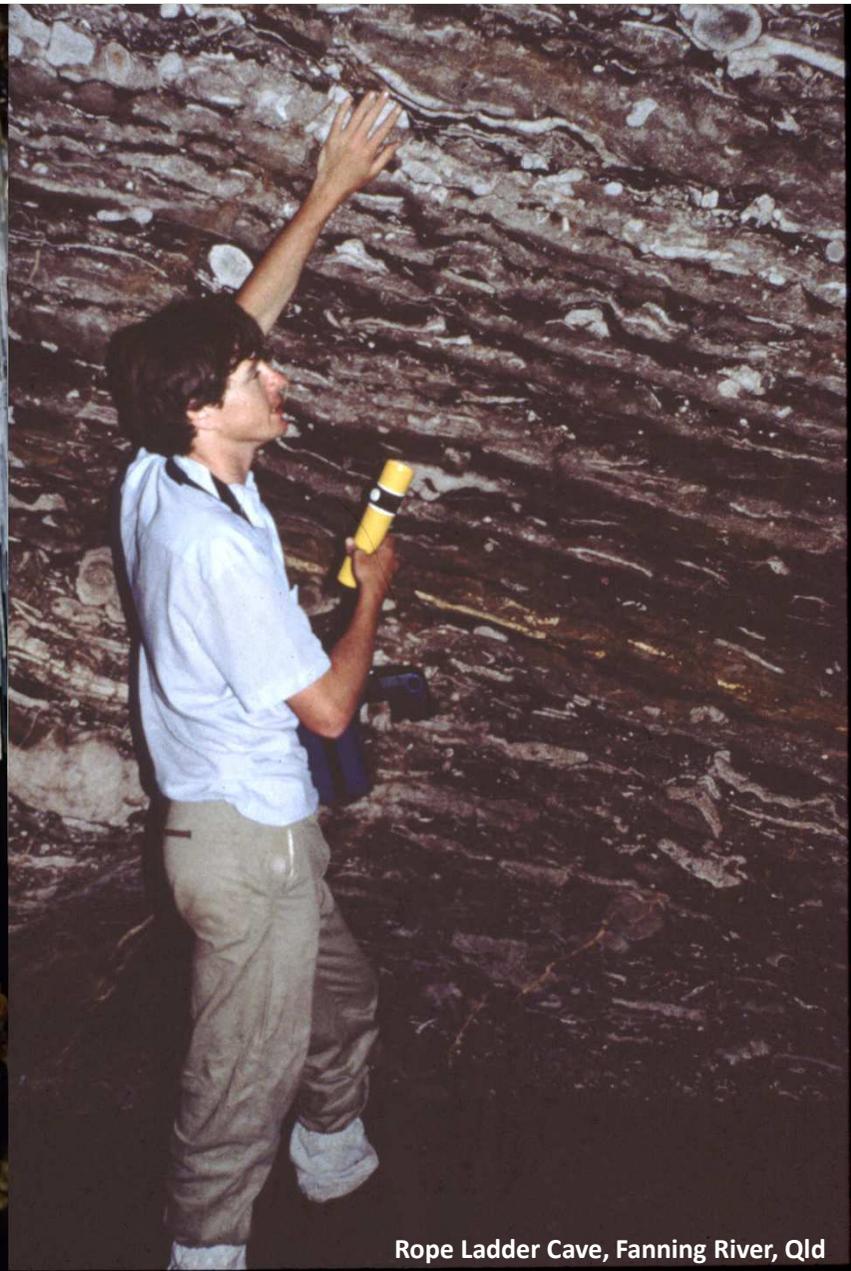
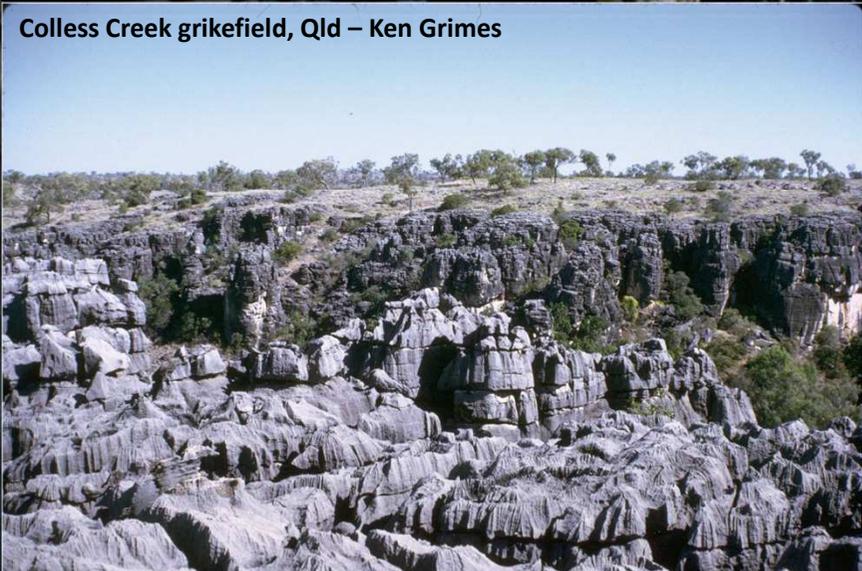
'Top End' 1



Pinnacle, Cutta Cutta, Northern Territory



'Top End' 2

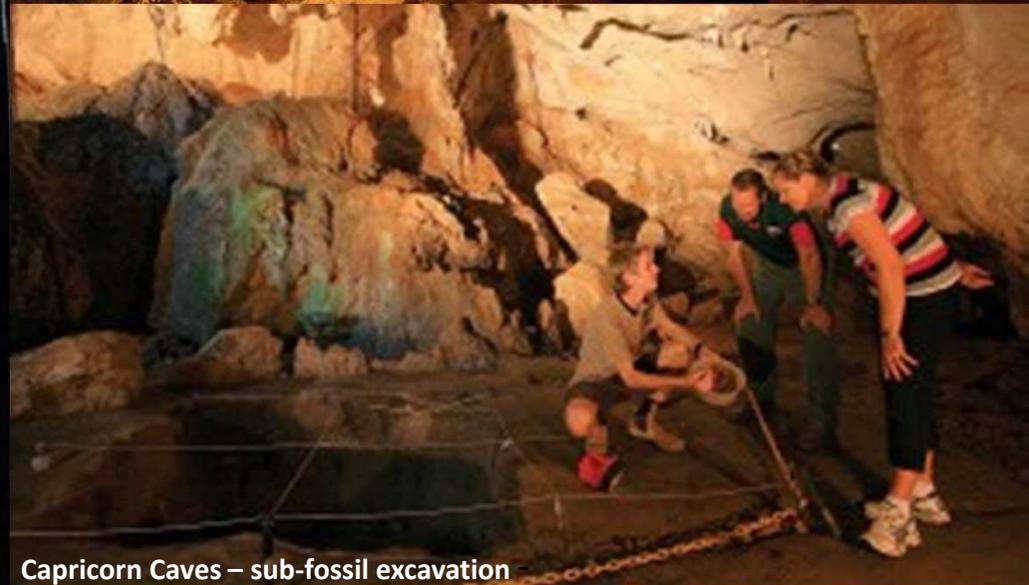
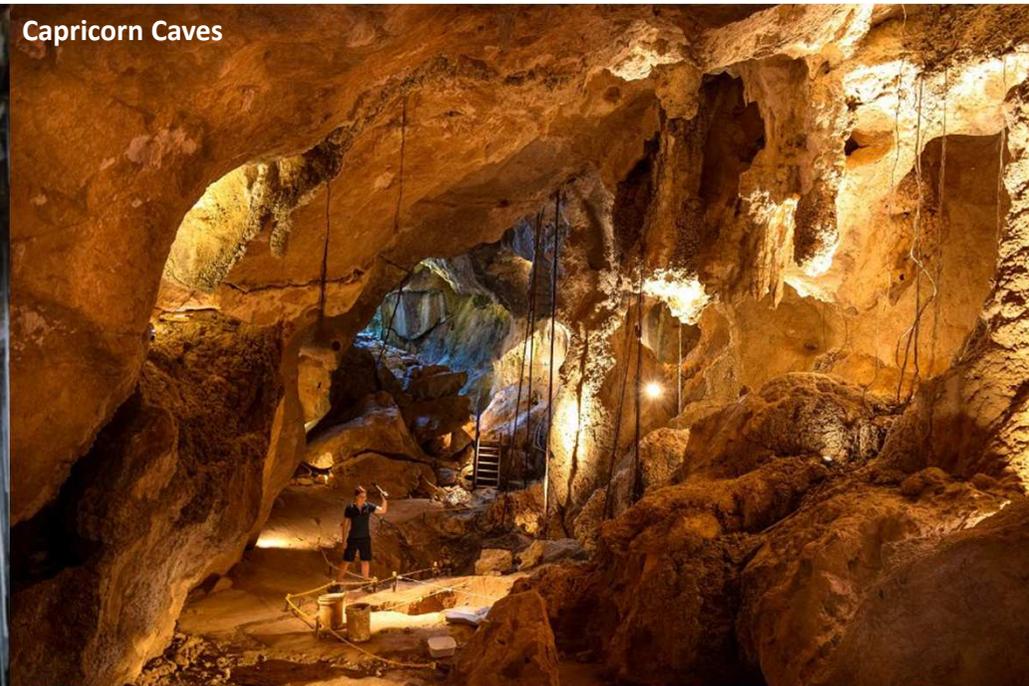
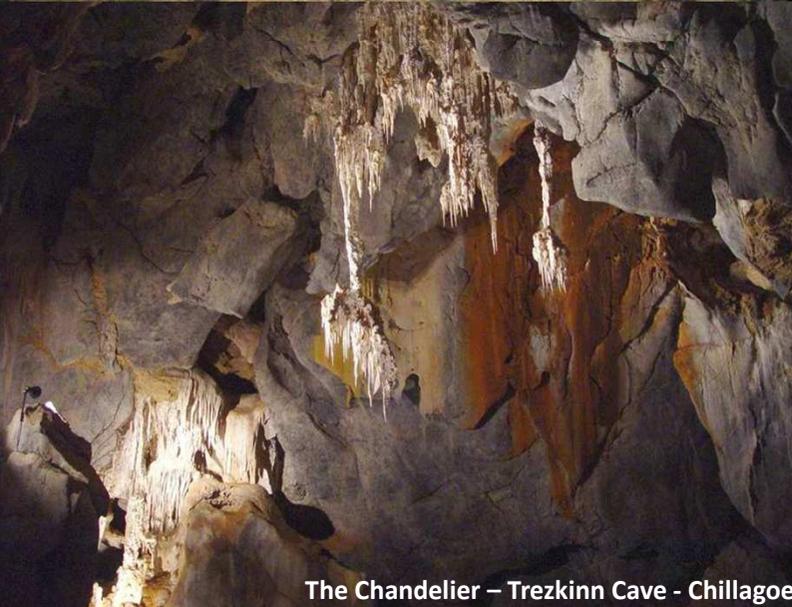


Rope Ladder Cave, Fanning River, Qld

'Top End' 3



Ken Grimes

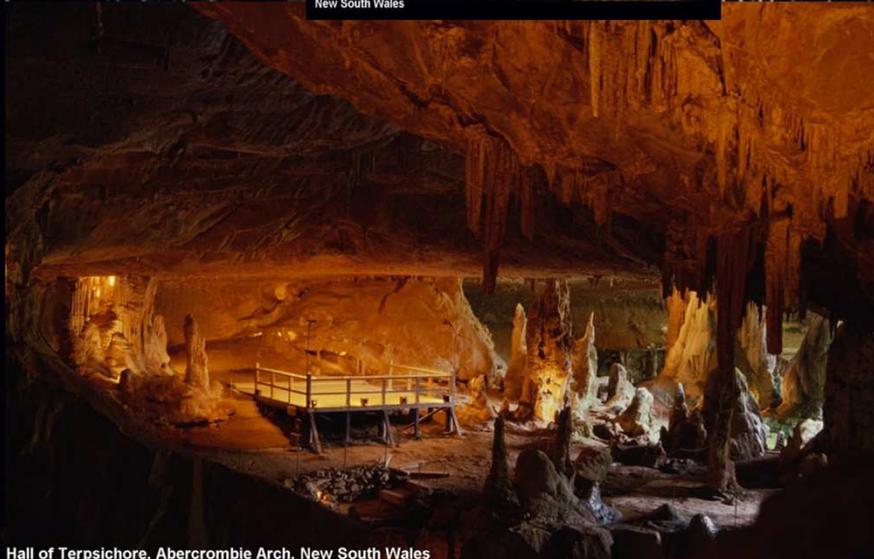


New South Wales

Chalker's Blanket, Junction Cave,
Wombeyan – John Brush



The Broken Column
Lucas Cave
Jenolan
New South Wales



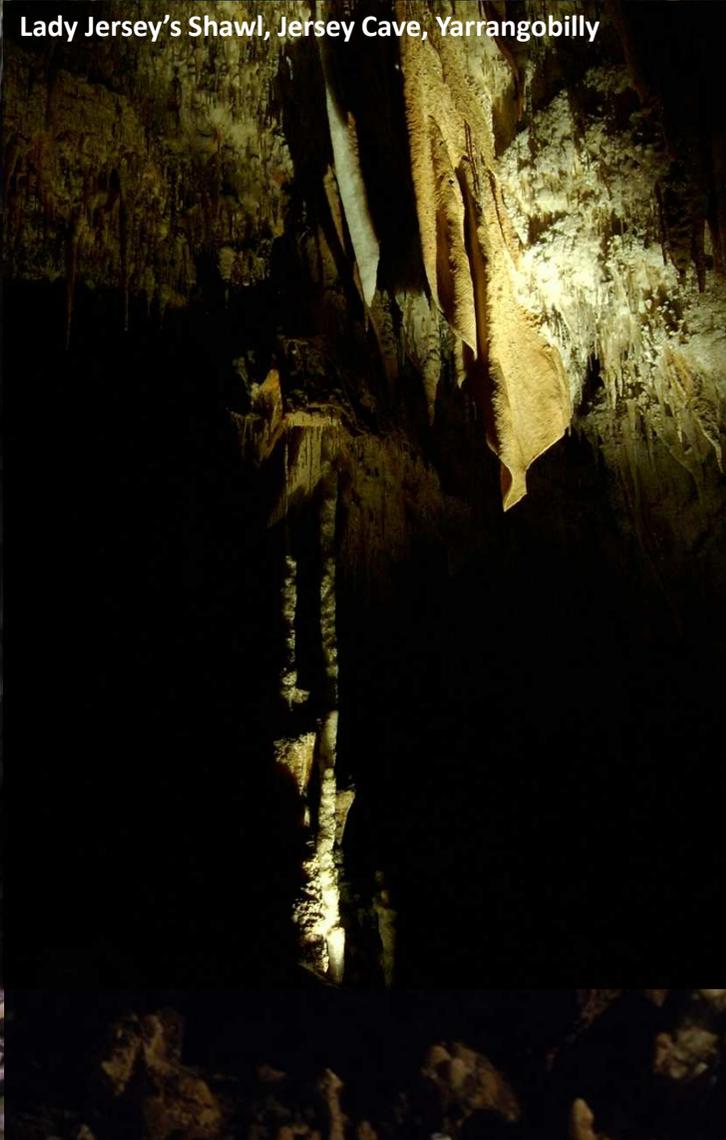
Hall of Terpsichore, Abercrombie Arch, New South Wales



New South Wales



Devils Coachhouse
Jenolan
New South Wales



Lady Jersey's Shawl, Jersey Cave, Yarrangobilly

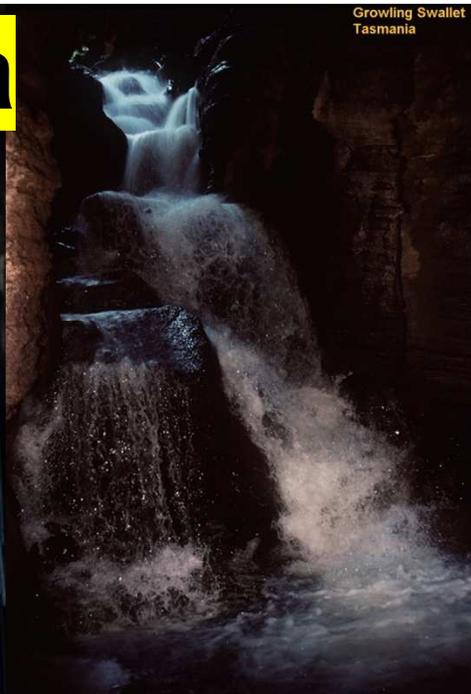


Dogleg Cave, Wee Jasper – Alan Pryke

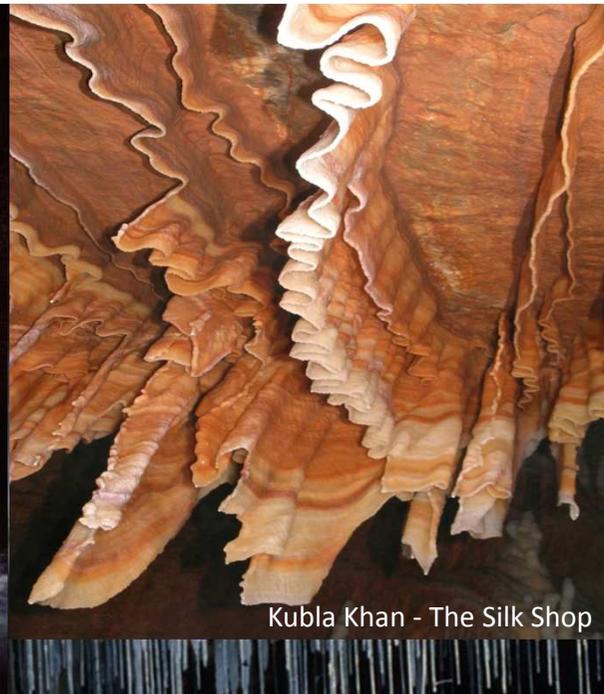


Wollondilly Cave
Wombeyan
New South Wales

Tasmania



Growling Swallet
Tasmania



Kubla Khan - The Silk Shop



Kubla Khan - Jade Pool



Kubla Khan



Marakoopa Cave
Underground Rivers Passage



All Kubla Khan
either David
David Wills

Turning now to the older and harder 'soft' limestones - Tertiary 1

- **Cape Range**
 - Late Oligocene – Mid Miocene (25-30 Ma – 15 Ma)
 - Anticlinal structure with several spectacular gorges
 - Several hundred caves
 - Highly significant subterranean fauna
- **Nullarbor**
 - Mid-Late Eocene – Mid Miocene (43-36 Ma – 15 Ma)
 - Semi-arid to arid flat-lying plain of over 200,000 km²
 - About 20 large and deep caves plus many collapse dolines
 - 10,000 of small caves and other karst features
 - Significant megafauna and other subfossils
 - Significant evidence of climate change in speleothems
 - High significance to Indigenous people for art, flint mining and access to water

A photograph of a cave interior, showing numerous stalactites hanging from the ceiling. The stalactites are long, thin, and white, creating a dense forest-like appearance. The cave walls are dark and rocky, and the floor is also dark. The lighting is dim, highlighting the texture and length of the stalactites.

Turning now to the older and harder ‘soft’ limestones -Tertiary 2

- **Mount Gambier – Port Campbell region plus Murray Basin**
 - Late Eocene – Mid Miocene (38-15 Ma)
 - Many cenotes
 - Spectacular cliff-lines and the ‘Apostles’
 - Most caves are in the Gambier – Naracoorte area
 - World Heritage fossil site with significant sub-fossils elsewhere
 - Significant groundwater supply areas

Cape Range



Cape Range – Darren Brooks



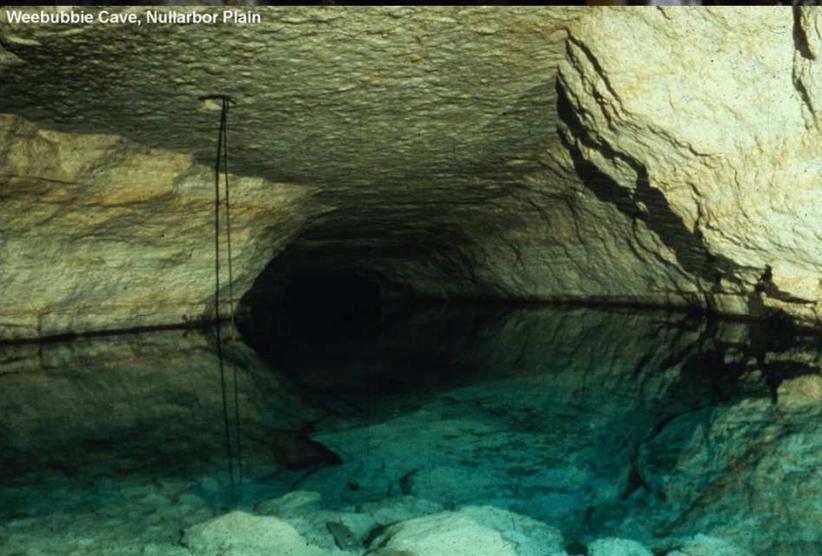
Mandu Gorge



Blind cave gudgeon, Cape Range

Douglas Elford WA Museum

Weebubbie Cave, Nullarbor Plain



NULLARBOR

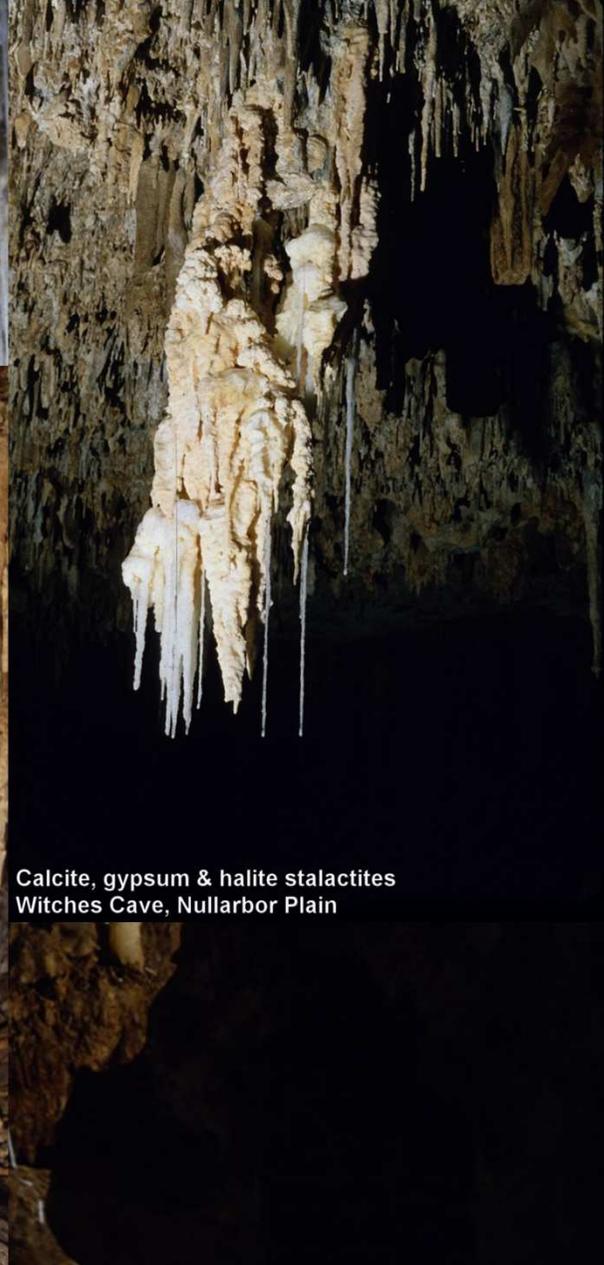
Cave entrance, Nullarbor Plain



"Stegamite", Purple Gorrige Cave, Nullarbor Plain



Calcite, gypsum & halite stalactites
Witches Cave, Nullarbor Plain



Gambier and Victoria



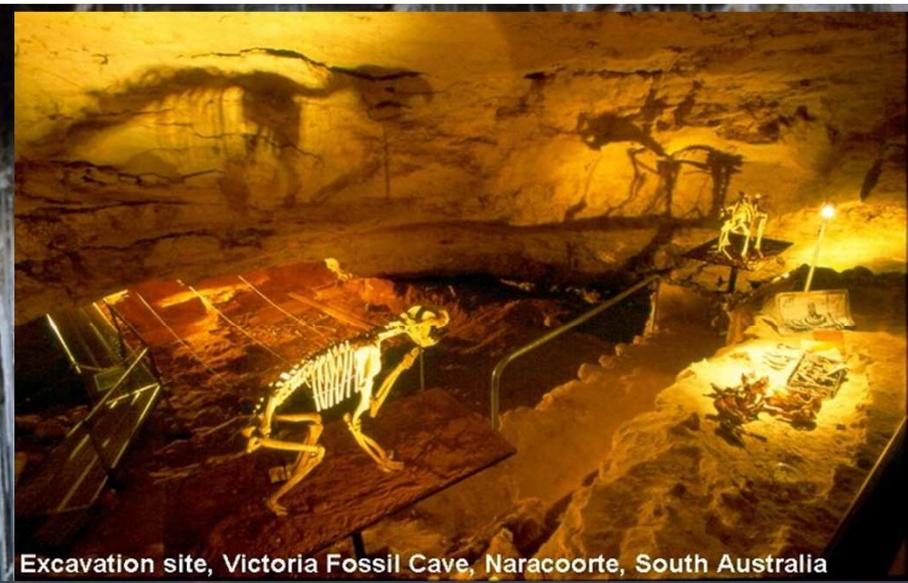
Cave, southeast South Australia



Alexandra Cave
Naracoorte
South Australia



Gil-ryeong Lee
FEB 2019



Excavation site, Victoria Fossil Cave, Naracoorte, South Australia



Gambier



Fossil Cave (Green Waterhole)



Little Blue Lake (cenote)



Morgans Cave solution tube entrance
South Australia

Now to the younger and softer 'soft' limestones - Quaternary

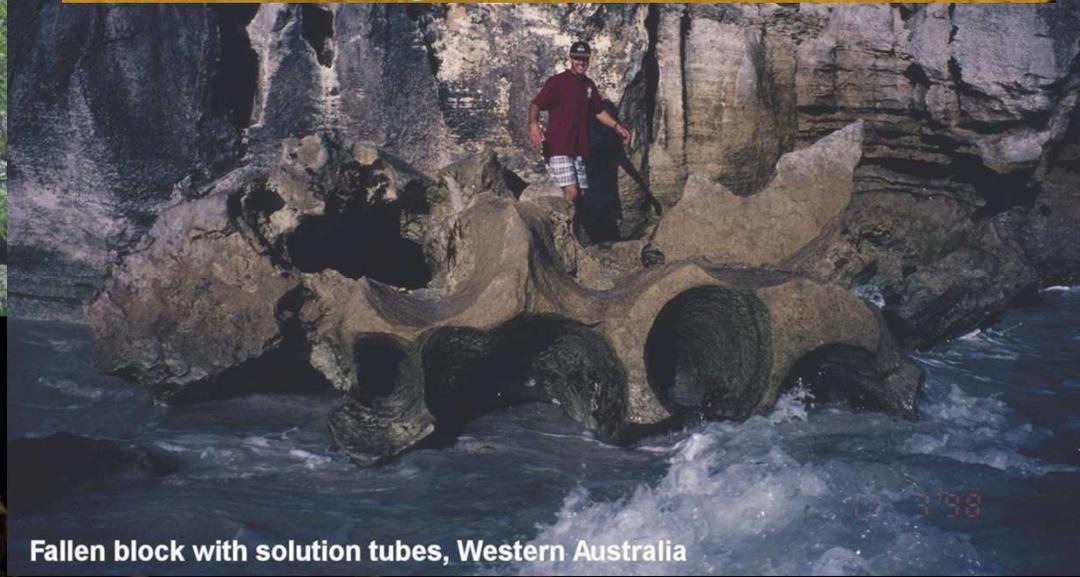
- These are the very young limestones that fringe the coast of Western Australia and are found on the Eyre Peninsula, in the Gambier Region, southwestern Victoria and on King and Lord Howe Islands.
- The limestones here are aeolian calcarenite – carbonate sands consisting of fossil fragments blown off the exposed sea floor at times of lower sea levels (during cold climate regimes).
- They are the so-called syngentic karsts – the limestone and karst features develop at the same time.
- The caves are often extremely well decorated.

Syngenetic karst 1

Beekeepers Cave, Eneabba, Western Australia



Pinnacle karst, Nambung National Park, Western Australia



Fallen block with solution tubes, Western Australia

Syngenetic karst - 2



Crystal Cave, Witchcliffe, WA – Stefan Eberhard



Easter Cave, Augusta, Western Australia



Cave, southeast South Australia



Easter Cave, Augusta, Western Australia

Christmas Island

- Raised coral reefs based on a basalt sea mount.
- Not geologically part of Australia.
- The 73 km coastline is mainly limestone cliffs.
- The karst systems are an essential part of the island's water supply.
- They also support mangrove communities growing in freshwater many tens of metres above sea level.
- One of loveliest part of the island has the detention centre built adjacent.

Rauleigh Webb



Daniel Roux Cave
Christmas Island

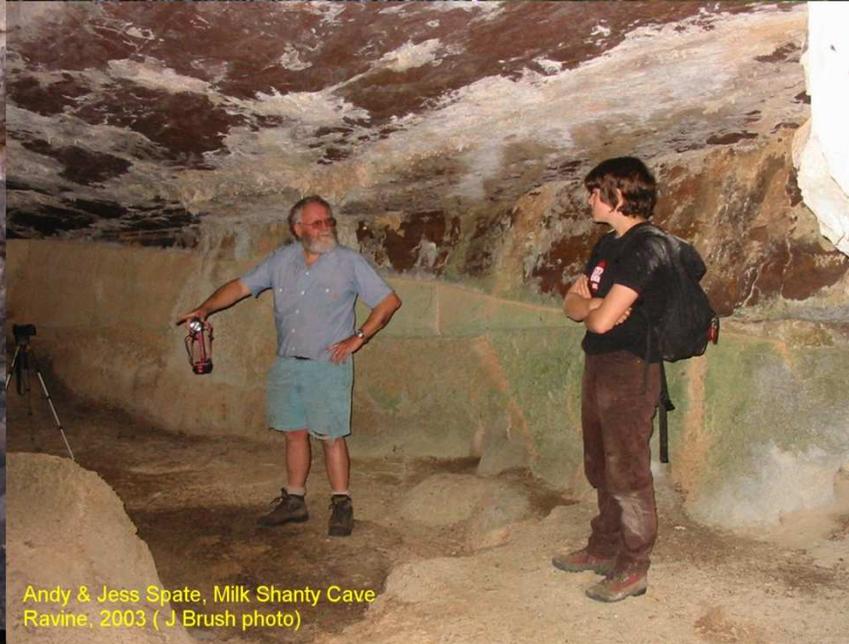


Lost Lake
Lost Lake Cave
Christmas Island



Lost Lake Cave
Christmas Island

Caves of construction – very young



Andy & Jess Spate, Milk Shanty Cave Ravine, 2003 (J Brush photo)



Karst in other rocks

- Caves and karst and karst-like features occur in a wide variety of materials including:
 - Silicates (e.g. sandstone)
 - Granite-like rocks
 - Laterite
 - Iron ore deposits
 - Soil
 - Ice and firn (frozen snow)



Sandstone 1



Ruiniform terrain



[KG]



[RW]



[KG]



[KG]



Arches & Dolines

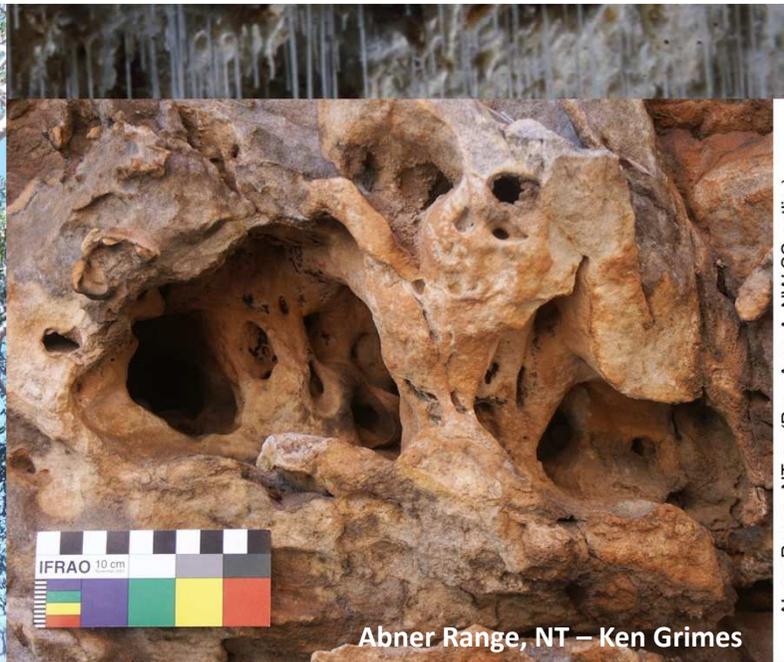
Sandstone



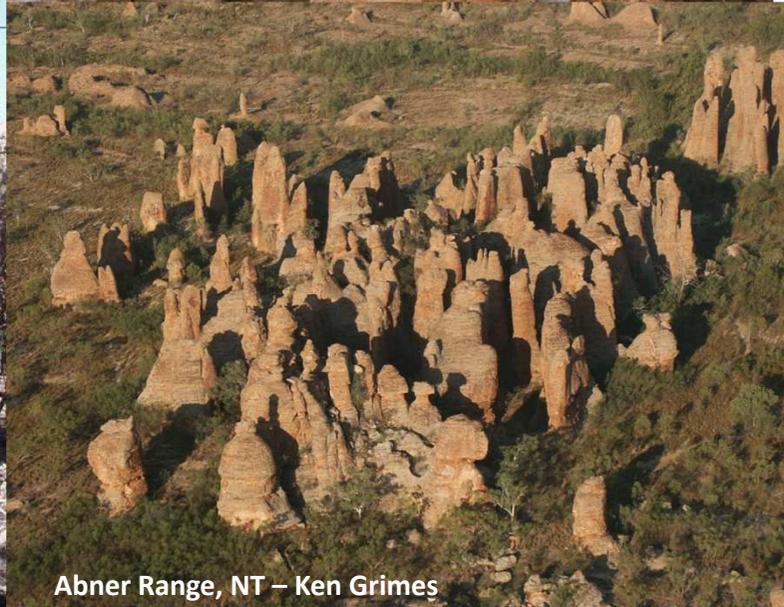
Cobbold Gorge, NT – Ken Grimes.



Limmen NP, NT – Ken Grimes



Abner Range, NT – Ken Grimes



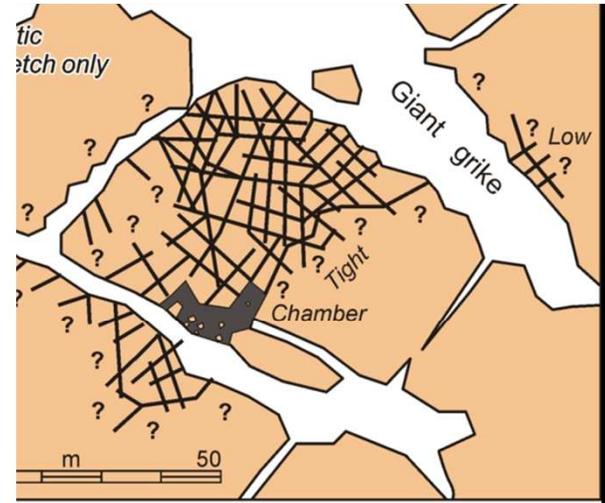
Abner Range, NT – Ken Grimes

Sandstone 3

Kakadu National Park
All Ken Grimes



Nourlangie (Plateau, Pinnacled area ~629777), Kakadu, NT.au.
Hole through a pinnacle [stereo L]
KG081792: (c) K.G. Grimes, 2008



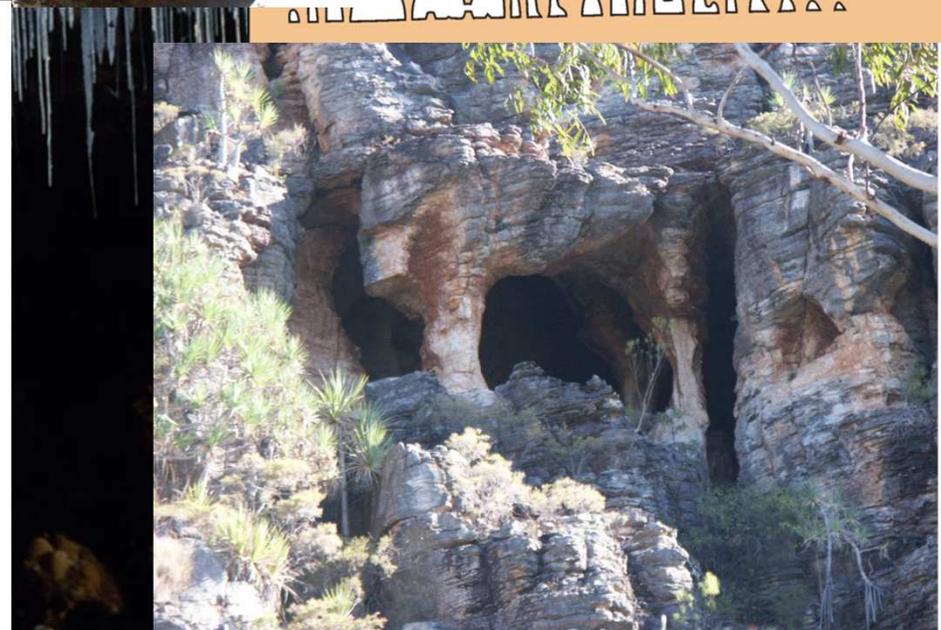
Diagrammatic Profile through Maze Cave



**Kakadu
maze
cave**



Nourlangie, Kakadu, NT.au Maze Cave:
View SW at junction of NW & SW bounding grikes
NB cave entrances & pillars
RW084765: (c) R.A. Wray, 2008



Nourlangie, Kakadu, NT.au
Cave entrance with pillars, in cliff (~630776±100)
KG081874: (c) K.G. Grimes 2008

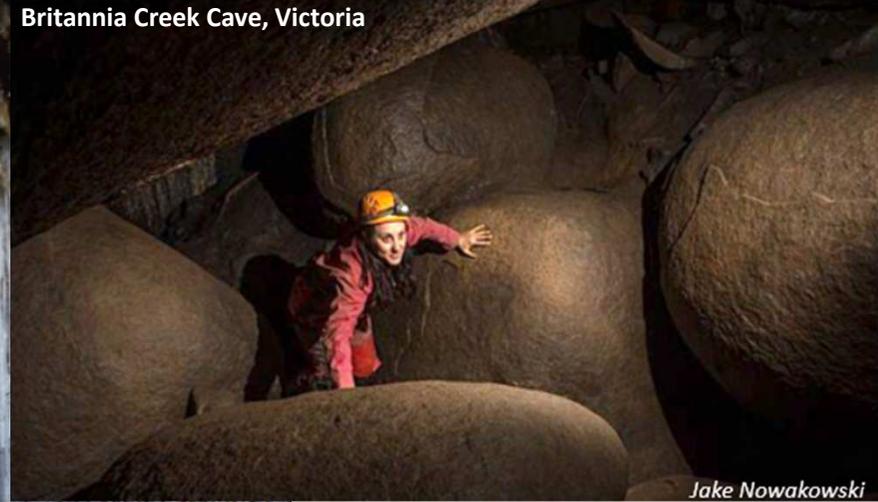
Caves in granite, dolerite and similar rock types

Stone Bridge, NSW



Kirsty Dixon

Britannia Creek Cave, Victoria

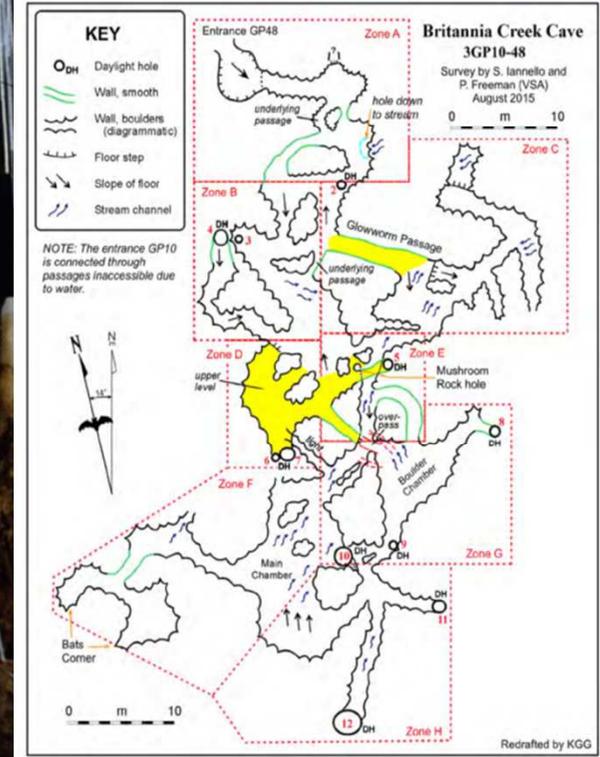
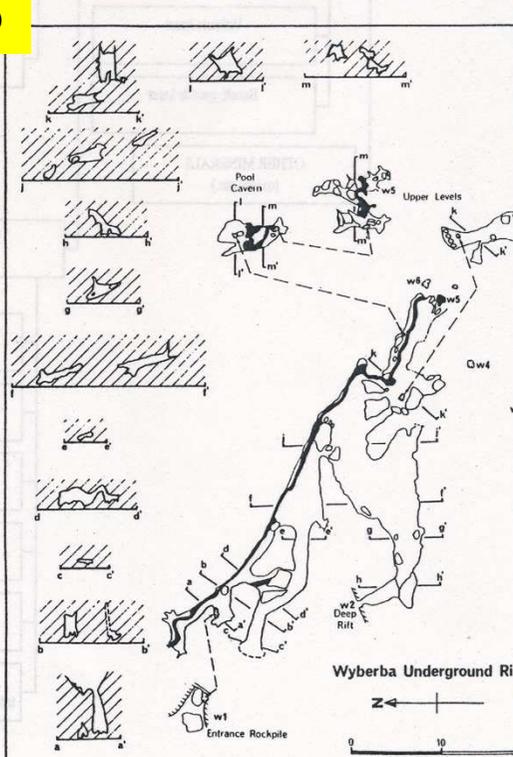


Jake Nowakowski



Black Mountain, FN Qld.

(photographer unknown)



Sea caves

- Sea caves are found in a wide variety of rock types on Australia's rocky coasts
- Some are quite extensive and complex
- Some are important bat habitats and invertebrate fauna
- Some were utilized by Indigenous people
- Often significant tourism attractions



Admirals Ach – Kangaroo Island



Remarkable Cave - Tasmania



Tasman Arch - Tasmania

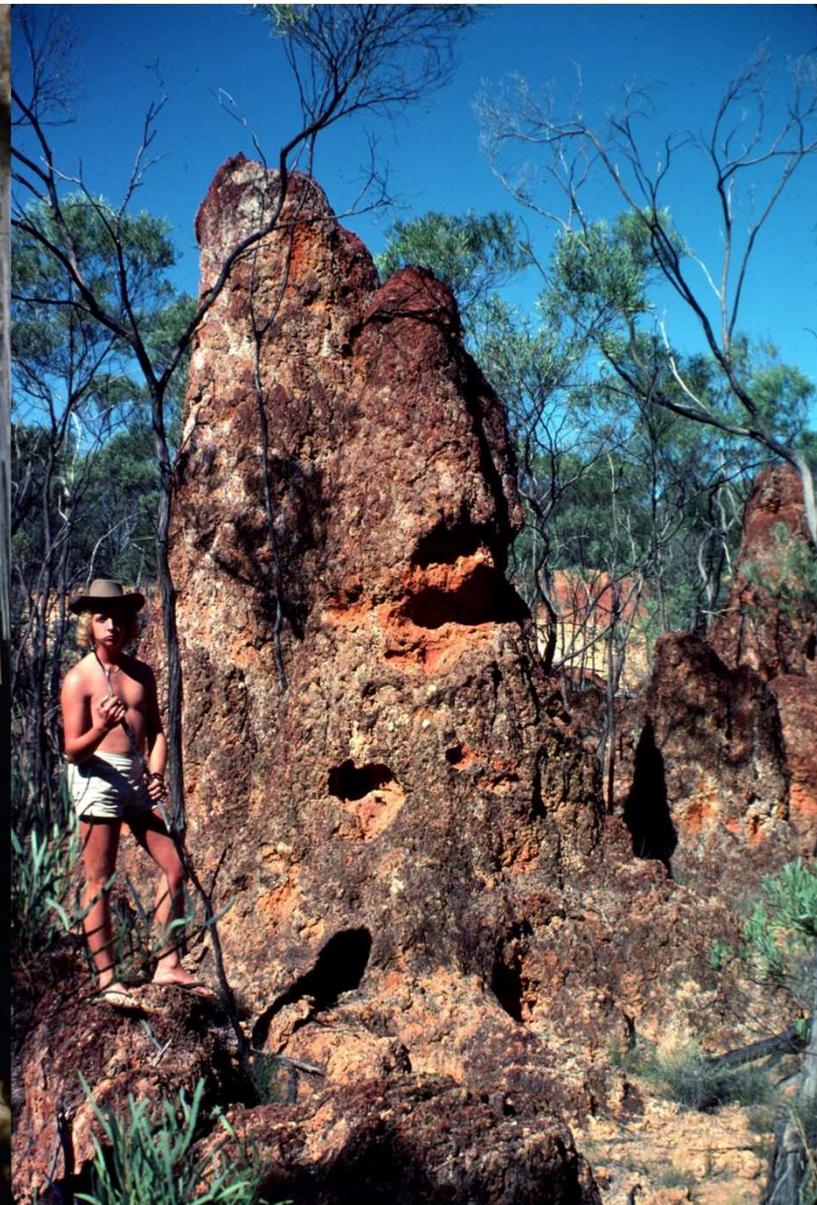
Laterites



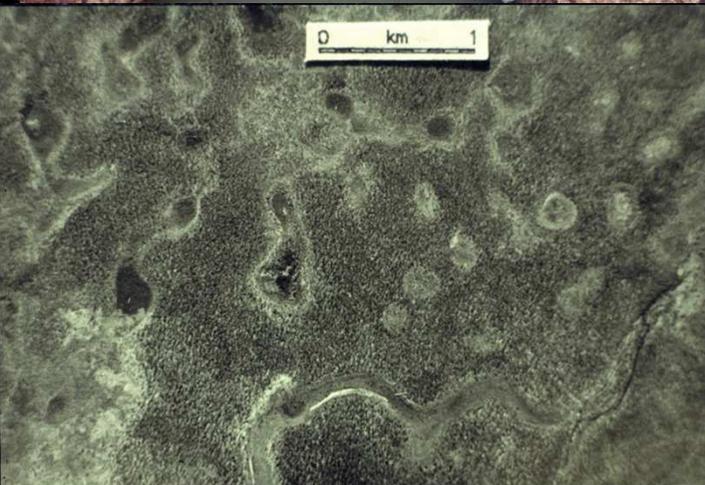
'Mystery Craters' - Bundaberg



White Mountains, Qld Qld



S780516: Hughenden, Qld, Hu-1. Edge of Denham Plain KG. Grimes, 1978
Pinnacle in Deep Weathered Profile. Stereo Left



Cooktown RC9 Run 2-31. West of Kennedy R., Princess Charlotte Bay.
Laterite karst(?) and dambos on an old sandy alluvial plain.

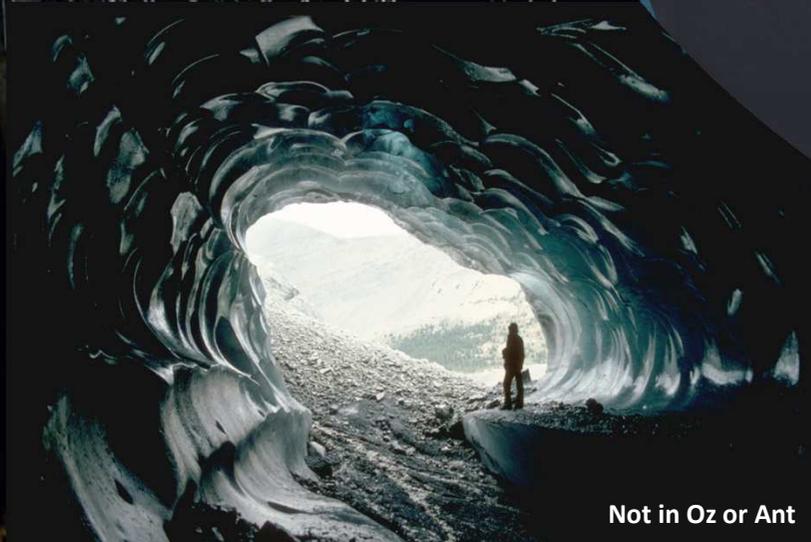


Caves in ice/firn

Obviously Australia is not well off for caves in ice and firn (frozen snow) but there are a number of caves in the Australian Antarctic Territory (AAT) including ones like Lake Moore Ice Cave which has many karst-like features such as scalloping – who knew that the technical term for an ice stalactite is ‘icicle’?

There are also many vertical caves in glaciers – crevasses – to explore.

However, on the mainland we do have ephemeral caves in Kosciuszko National Park and probably in the Victorian Alps. Some are very beautiful – at least for a while.



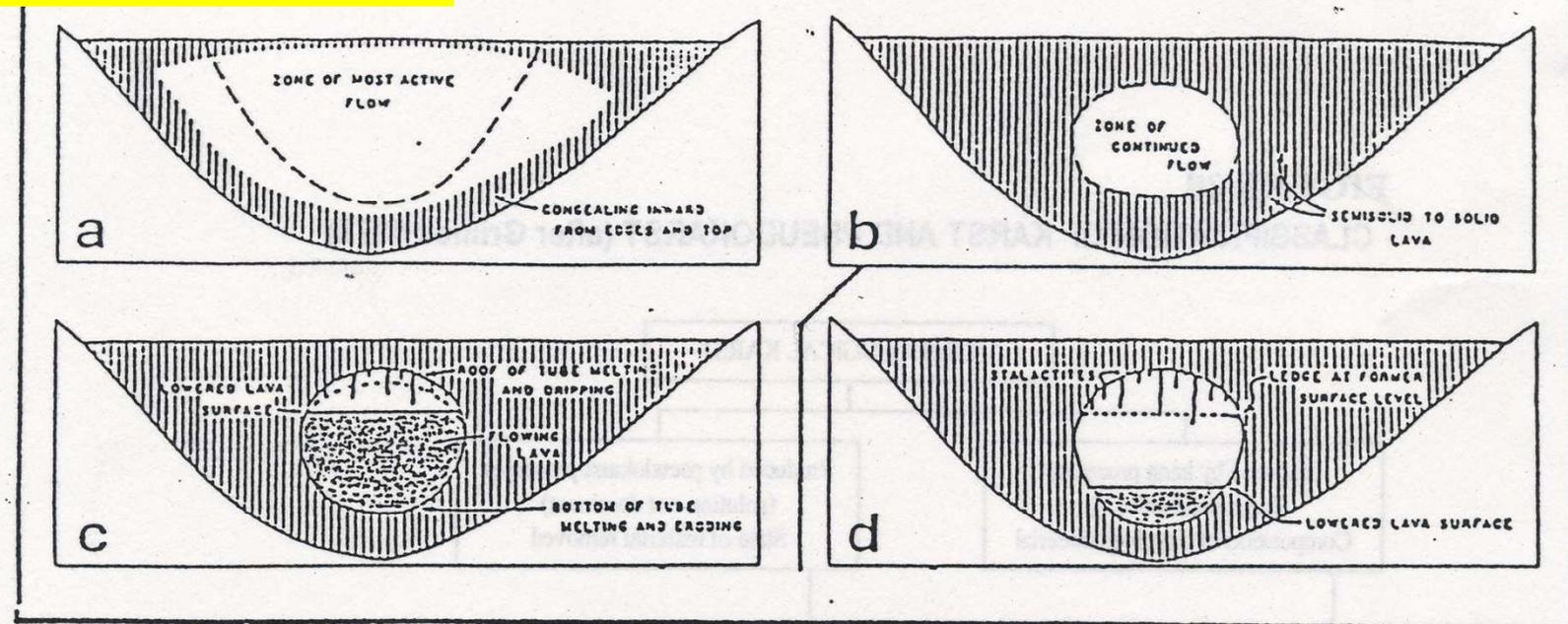
Not in Oz or Ant

On to lava flows ...

Australia has lava tubes in volcanic rocks in:

- Far North Queensland around Undara and elsewhere nearby and in
- Western Victoria
- And in isolated places such as Coolah Tops in NSW we have vug-like cavities

At Undara there are other features such as The Wall and many kilometres of collapsed lava tubes



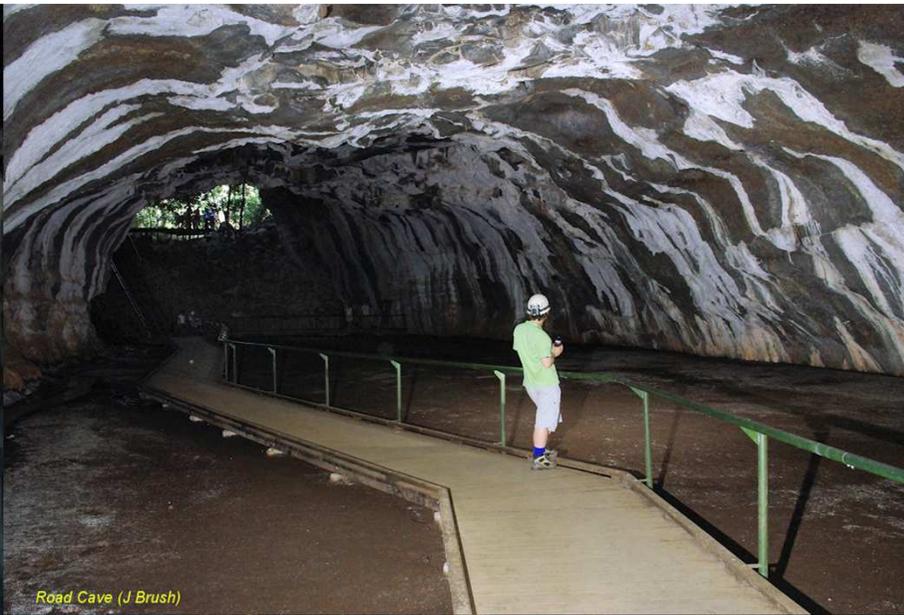
Diagrams to illustrate stages observed in the development of lava tubes in Hawaii. (from Macdonald and Abbott, 1972)

(a) the lava flow, confined in a valley, develops a thin crust by one of several methods and starts to solidify inward from the edges, but the centre continues to flow;

(b) The active movement of liquid becomes restricted to a more or less cylindrical pipelike zone near the axis;

(c) The supply of lava diminishes and the liquid no longer fills the pipe. Burning gases above the liquid heat the roof of the pipe and cause it to remelt and drip;

(d) Further diminution of the supply lowers the level of the surface of the liquid which eventually congeals to form a flat floor in the tube.



Road Cave (J Brush)



All John Brush



The Turk Cave, Byaduk (J Brush)



Wind Cave (J Brush)



es (J Brush)

Soil tunnels



Marokko148a



Cave Fauna

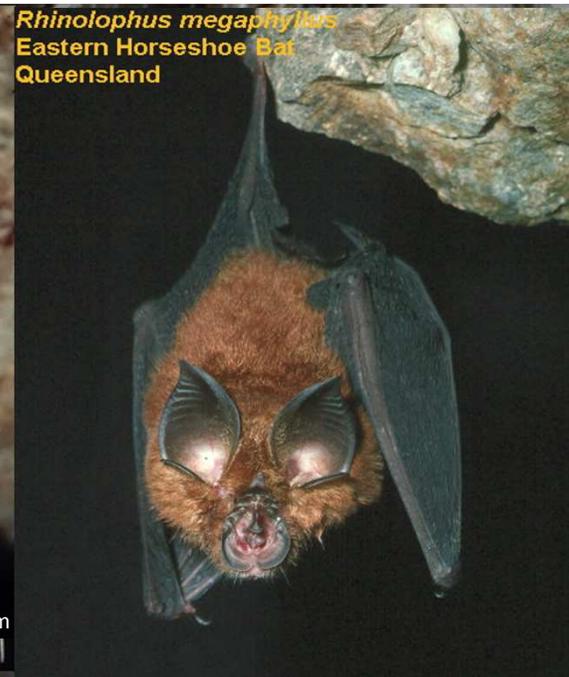


Whip scorpion, Christmas Island



Blind cave gudgeon, Cape Range

Douglas Elford WA Museum



Rhinolophus megaphyllus
Eastern Horseshoe Bat
Queensland



Microbial mantles, Nullarbor Plain

er Rogers

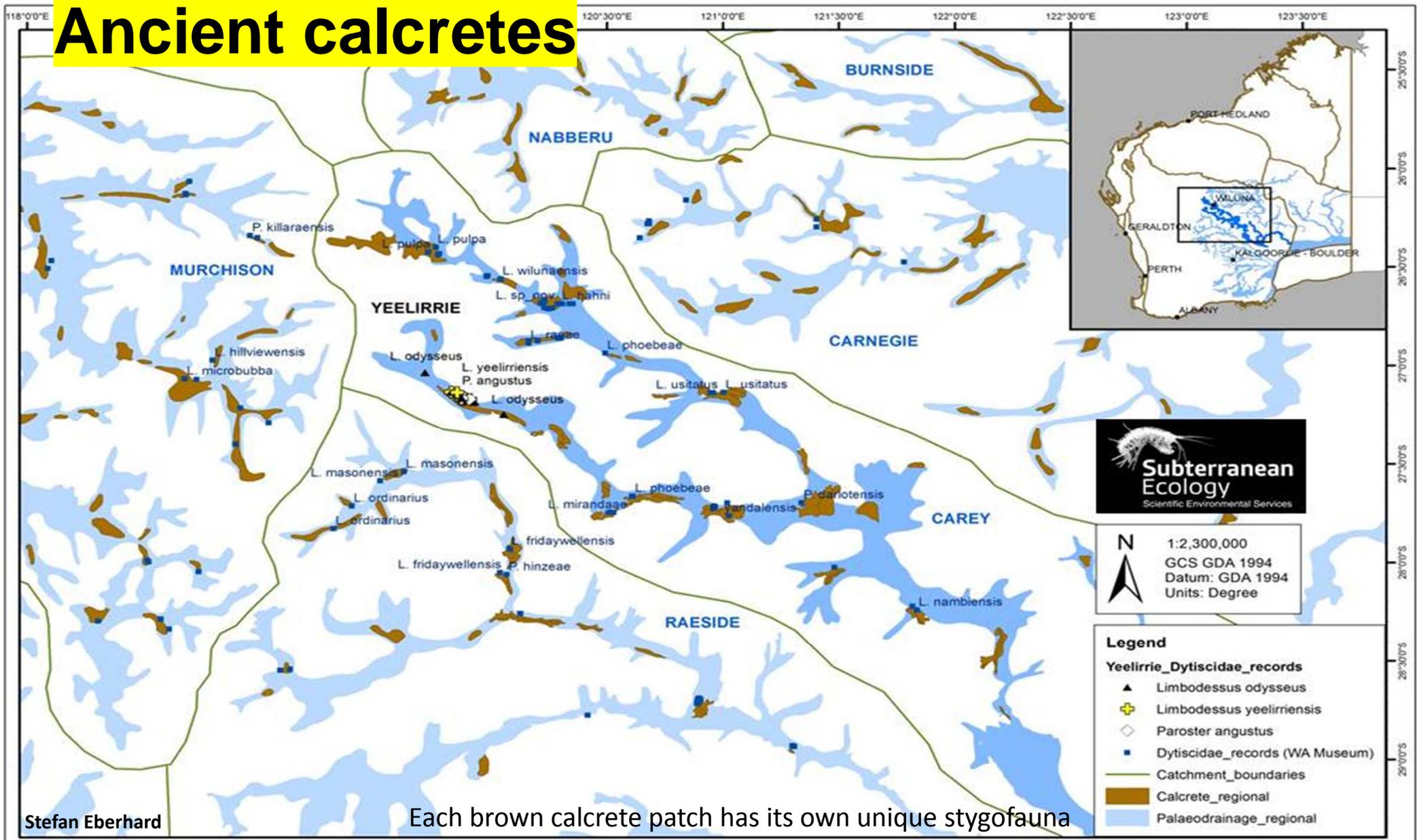


Syncarid crustacean, Jenolan, New South Wales



Scutiglerid eating baby bat, Mount Etna, Queensland

Ancient calcretes



Pilbara landscape



Indigenous use

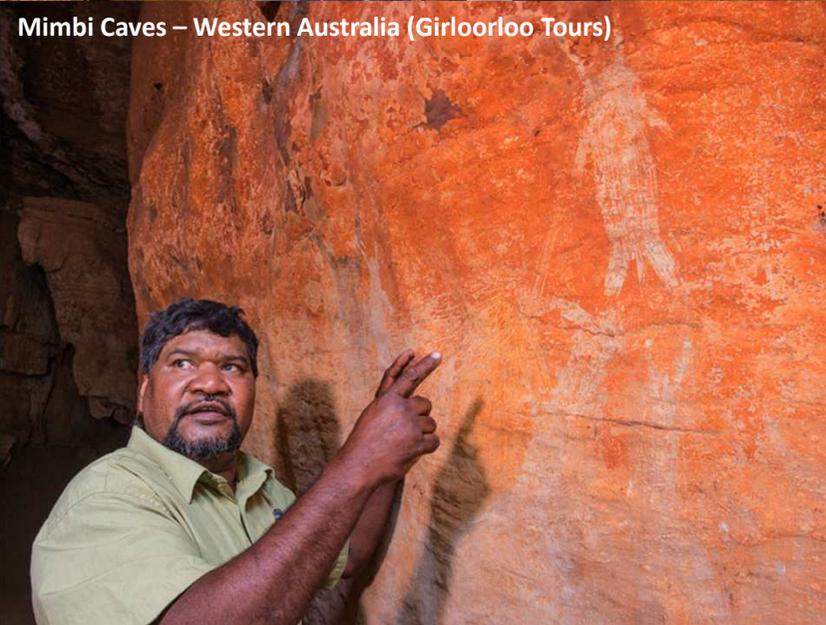
Indigenous people have used Australia caves for more than 65,000 years for:

- Art
- Shelter
- Disposition (burial practices)
- Access to water and flint
- And now - tourism

Mimbi Caves – Western Australia (Girloorloo Tours)



Mimbi Caves – Western Australia (Girloorloo Tours)



Far North Queensland

A final lesson

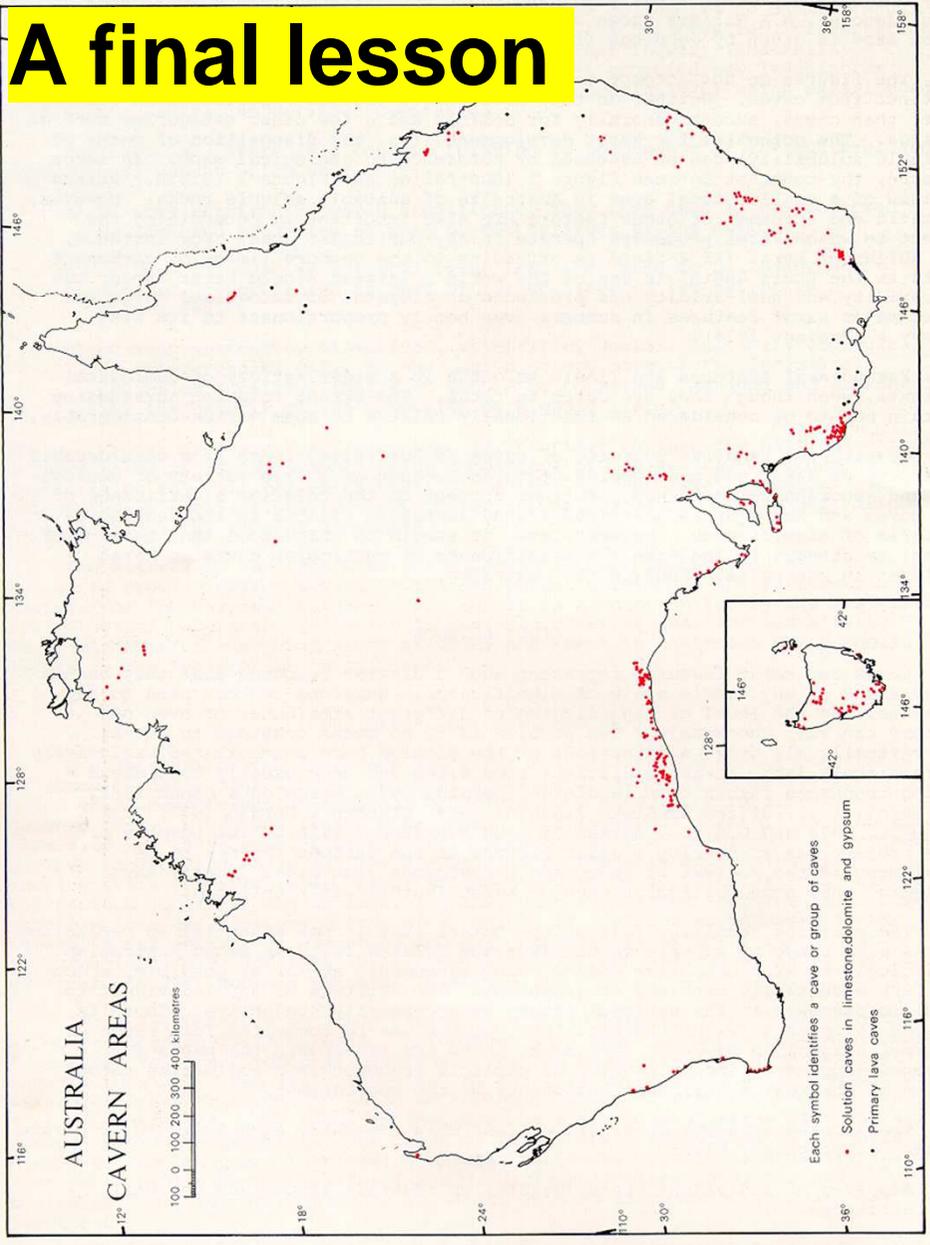


Figure 1.

