The National Rock Garden needs younger rocks

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Australia has significant suites of rocks dating from the Eocene Epoch through to virtually the present (Holocene Epoch)—more than 120 Ma (Ma = million years) younger than the youngest in the NRG collection. The young rocks I am most interested in are the limestones shown in yellow on the map in Figure 1.

Let's start with some silly statistics: the average age of rocks currently on, or ready for, display in the NRG is 947 Ma. The oldest is ~2700 Ma, the youngest is Mt Gibraltar Microsyenite at 178 Ma. The median is 430 Ma. Let's have something like the Nullarbor Limestone at about 16 Ma and a piece of the aeolian calcarenite at about 0.2 Ma

Table 1. The current National Rock Garden specimens either on display or ready for display

Unit	State/Territory	Age (Ma)
Tumbiana Formation	WA	2700
Boogardie Orbicular granite	WA	2686
Brockman Iron Formation	WA	2450
Mt Goyder Syenite	NT	1825
Oolano Metasomite	SA	1760
Mawson Charnockite	Antarctica	954
Bendigo metasandstone and Ballarat quartz	Vic	480
Canberra Limestone	ACT	430
Adelong Norite	NSW	430
Middledale Gabbroic Diorite	NSW	417
Chinaman Creek Limestone	Qld	407
Moruya Tonalite	NSW	379
Tarana Granite	NSW	312
Bulahdelah alunite	NSW	275
Hawkesbury Sandstone	NSW	247
Tasmanian Dolerite	Tas	179
Mt Gibraltar Microsyenite	NSW	178
Marlborough chrysoprase	Qld	Uncertain

*Karst is a distinctive topography in which the landscape is largely shaped by the dissolving action of water on carbonate bedrock (usually limestone, dolomite, or marble)

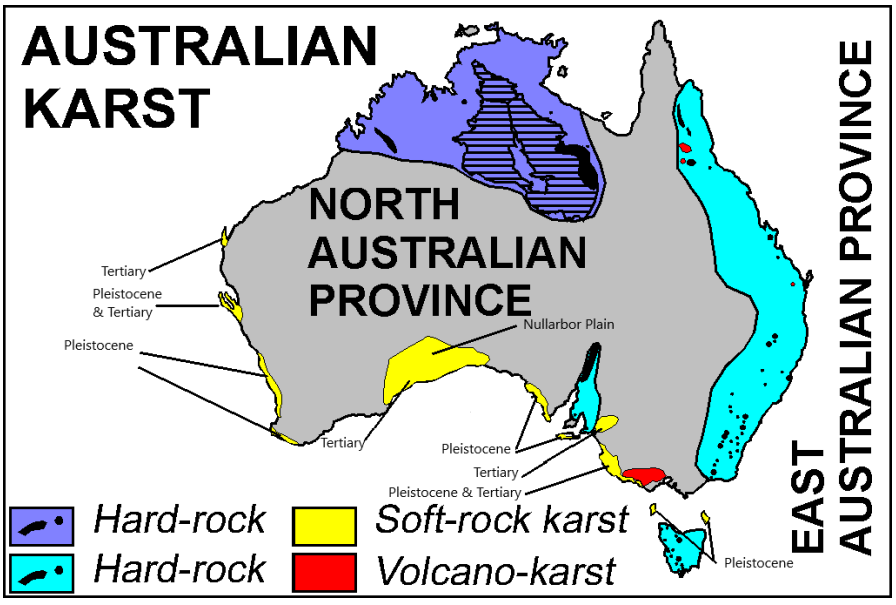

Figure 1. Map of Australian carbonate rocks and volcanics hosting karst or lava tubes. Where 'Pleistocene & Tertiary' is shown there are caves and other karst features present in both units. The Pleistocene Neds Beach Calcarenite on Lord Howe Island is not shown. Base map © the late K.G. Grimes.

Similar aged limestones can be found in south-east South Australia and western Victoria hosting such sites as the World Heritage Naracoorte Caves, celebrated for their vertebrate sub-fossil assemblages. These limestones are often overlain by the much younger limestones described below.

An extensive suite of young limestones, dating to the Quaternary Epoch, is found along the coasts of Western Australia, South Australia, Victoria, Tasmania and on Lord Howe Island off the New South Wales coast. These limestones are dune limestones—formed by calcareous sands blown off the sea floor during glacial sea level lows. Australia has more of these aeolian calcarenites than elsewhere around the globe. And possibly more caves than the rest of the world in such limestones? Again, they contain significant past-climate and bushfire records, as well as sub-fossil faunas, invertebrate faunas, anthropological and archaeological values. As at Naracoorte and in the Gambier area, show cave attractions make a significant contribution to the local tourism economies from Margaret River to Yanchep north of Perth.

Neither of these limestone types are represented as yet in the NRG collection although there is a piece of the 18 Ma Naracoorte Limestone awaiting transport to Canberra. We need both this specimen and some examples of the aeolian calcarenites as well as the Nullarbor limestones for Canberra to emphasize that not all of Australia is super old.

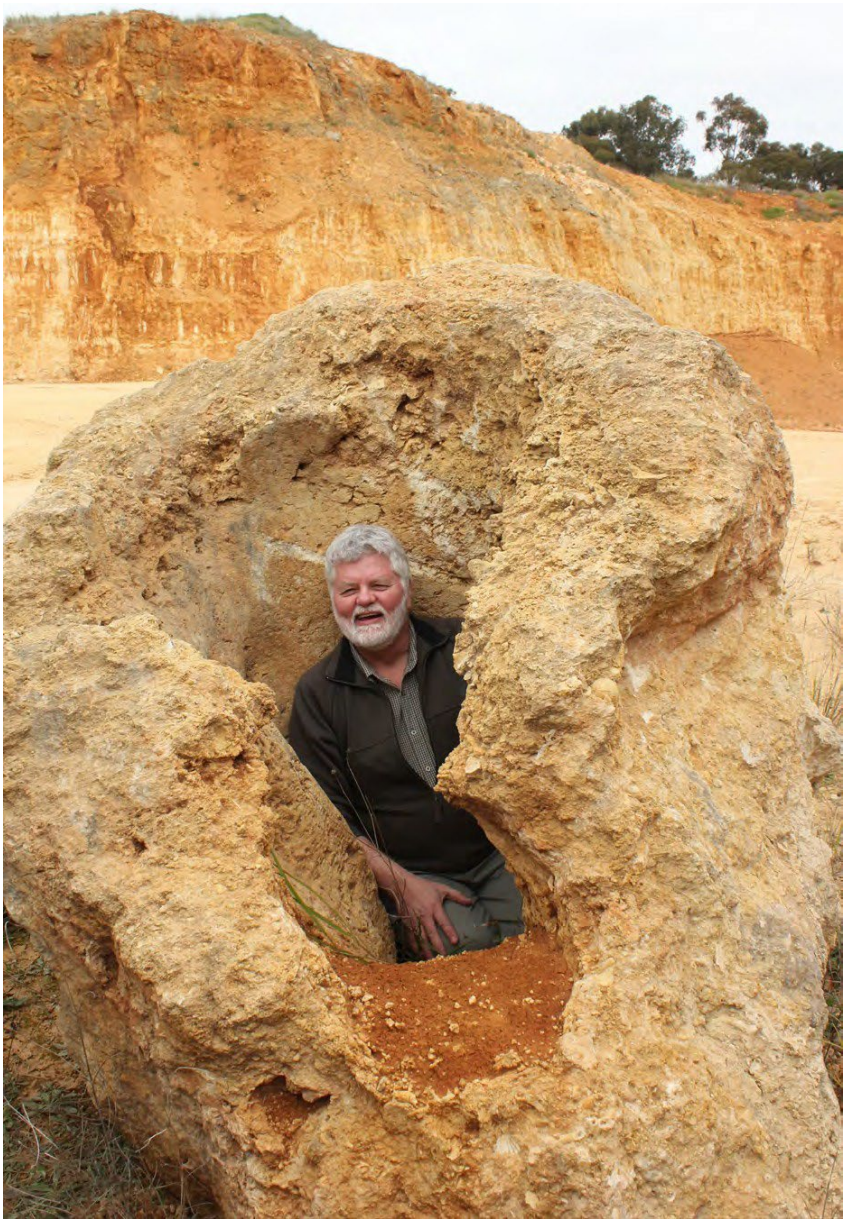

Figure 2. Solution tube in the Naracoorte Limestone (mid Miocene) from Henschkes Quarry, Naracoorte. This is the specimen proposed for the NRG. Note the Terra Rossa soil infill, now unfortunately washed from the tube. Ian Lewis—pictured for scale. Image courtesy Frances Williams, SA Field Geology Club.

Figure 3: Cross section of solution tubes from Gartners Quarry, near Coonawarra, SA. These are in the Bridgewater Formation dated to about 750,000. This young, calcareous aeolinite overlies the Naracoorte and Gambier Limestones which are 33–15 Ma in age. Note the Terra Rossa soils. Image courtesy Brad Pillans.

Where might we get samples of these younger limestones to place in the National Rock Garden? As shown in Figure 2, we do have a sample of the Naracoorte Limestone Member awaiting transport to Canberra from Henschkes Quarry, Naracoorte, SA. The non-profit Australasian Cave and Karst Management Association Inc. (ACKMA) has pledged $1000 to help support the move to Canberra.

Obtaining a sample from the Nullarbor presents far more difficulties. The obvious starting point might be the roadside quarries along the Eyre Highway—but is the lifting and trucking equipment available? The other place might be the Rawlinna Limestone Member (Miocene) at the Loongana Quarry on the Trans- Continental Railway. Whilst this unit does not have some of the karst-related values of other Nullarbor limestone units it could still make its point.

Fragile specimens of the young calcarenites of the Bridgewater Formation from South Australia and Victoria could be obtained from quarries in those regions. But again, we need someone in those places to find a sample. Another candidate calcarenite is the Tamala Limestone in Western Australia, which is of particular historic significance, being one of the rocks that was described and studied by mineralogists aboard the 1801–03 French expedition of discovery, led by Nicholas Baudin (Mayer 2009). ACKMA may well support the transport of a sample from the Nullarbor and/or one of the calcarenites.

Acknowledgements

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References

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Note: *Whilst this report is obviously very dated, ongoing work by many scientists (including a growing number of peer-reviewed scientific papers) and devoted cave explorers and documenters is adding greatly to our knowledge and significance of the Nullarbor.*

Mayer, W., 2009. The geological work of the Baudin Expedition in Australia (1801-1803): the mineralogists, the discoveries and the legacy. Earth Science History, 28: 293-324. Available at https://openresearch-repository.anu.edu.au/bitstream/1885/20167/2/01_Mayer_The_Geological_Work_of_the_2009.pdf