ANDYSEZ 21
PHYTOKARST

- Andy Spate

As I said in the last ANDYSEZ the term 'phytokarst' was first used to describe the incredibly rugged and spiky terrain developed on limestones very similar to our aeolian calcarenites found on the coasts of Western Australia, South Australia, Victoria, the Bass Strait islands and on Lord Howe Island. They were first described by Folk et al. (1973) from the Island of Hell in the Carribean; they actually used the term 'black phytokarst'. Anyone who has had to walk across such terrains will easily see where the Island's name comes from! These are denudational (= erosional) micro- to meso-scale landforms.

Unfortunately, however, cave people will encounter or use the term in a fashion which describes other landforms - one denudational and the other constructive. Both of these are found in the twilight zone of cave entrances and are sometimes called biokarst. Thus we must be extremely careful when using the term 'phytokarst' - it means different things to different people (or even the same people in different contexts). Perhaps we should be looking toward some neologisms! Perhaps 'green phytokarst' might be appropriate for these latter cave-related forms.

Having got this far in this ANDYSEZ I have decided to take a great leap back and talk little more about limestone erosion. [This will allow me to have another go at phytokarst in the next edition of the Journal and save me having to think about a new topic next time!]. So we will introduce some complexity into limestone weathering and discuss the coastal form of phytokarst in this ANDYSEZ and move into cave entrances in the next. Unfortunately the request to discuss phytokarst referred to the cave form - good things come to those who wait!

When I talked about limestone erosion in the past I referred to the role water with dissolved carbon dioxide plays in the solution of limestone. I mentioned the role that vegetation plays in generating carbon dioxide in the soil to lift the aggressiveness of natural waters and I may well have mentioned a role for humic and fulvic acids in further dissolving limestone. All that was pretty straight forward. Now is the time to get to the real world!

Naturally occurring rock surfaces are not bare but are covered in a variety of lower plants including bacteria, fungi, green algae, blue-green algae and lichens. These play a large role in promoting rock weathering in a variety of ways including the production of carbon dioxide and humic and fulvic acids and by direct mechanical action. Even apparently solid and dense rock surfaces may be penetrated by plant material to the depth of many millimetres (Viles 1987). So the removal of limestone is much more complicated than just the simple carbonate solution processes I talked about earlier. For those interested in the subject more detailed discussion in Australian context can be found in Moses et al. and Smith et al. (both 1995. I have a few reprints available.).

In the coastal situation, and especially in the humid tropics, platforms and limestone surfaces generally develop highly pitted zones. As Jennings (1985) has it:

The pitted zone... is rougher, more ragged and more honeycombed in the tropical than in mid- and high-latitude equivalents; it is hideous to traverse. It is often dark grey to black in colour and this points to the cause, namely algal boring (p 220).

However, there will often be plants other than algae involved - nor must we forget the role of saltwater, mixing corrosion, crystal wedging, wetting/drying effects and so on. The form and scale of these features is a series of spikes and razor-sharp ridges some 10 to 25 cm tall. In plan view the scene is somewhat honeycombed - often chaotic. There may be the occasional solution pans as well as gently meandering runnels. I fully endorse Jennings' statement that the can be difficult to cross - very reminiscent of a limestone "bluff" I was on recently.

The soft aeolian calcarenites of the western and southern coastlines of Australia are particularly prone to developing these forms even if the coastline around Augusta, Mount Gambier and Portland can't readily be recognised as tropical! We also see the related forms of Spitzkarren (spikes) on harder limestones as at Cutta Cutta, Yessabah and Chillagoe. Viles (1987) was not able to demonstrate a major role for the lower plants away from coastal situations but they are certainly present and active even in cool temperate climates. It is the plants that give limestone its characteristic grey colour once exposed to the weather.

Back to the caves (the entrances anyway!) next issue with ANDYSEZ 22.

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