LETTERS TO THE EDITOR

Dear Kent,

I have been reluctant to become involved in the discussion in the ACKMA Journal concerning my paper with Zwingmann, Pogson and Colchester on *Carboniferous Clays form Jenolan Caves* published in the *Australian Journal of Earth Sciences* 53(3) in 2006, however I feel I cannot leave unanswered some of the assertions made by Mathews and Catchpoole in ACKMA Journal 72, September 2008.

Firstly I would like to point out that neither I, nor any of my co-authors, had any involvement in the production of Warren Peck's article in ACKMA Journal 71, June 2008.

Warren provided me with a copy of his article after it was submitted for publication.

I am writing not in defence of Warren's article, but of the original paper that was published in a highly respected ISI-listed refereed journal.

I will address the issues raised by Mathews and Catchpoole point by point:

Point 1

The *Jungle* site is complex and difficult to interpret. Contrary to the assertions Matthews and Catchpoole, our Figure 3C does show that the deposit is a narrow, practically vertical body with a north-south orientation. This does not mean, however that it is part of the bedrock sequence as suggested by Matthews and Catchpoole.

In fact this deposit is not bedded and consists mostly of clay-sized quartz (68%) and clays (20%). Unlike the bedrock, it contains no precipitated or bioclastic carbonate (calcite or dolomite), only a very small quantity of calcite crystal fragments (too uncommon to register in the X-ray diffraction) similar to those derived from the disintegration of speleothem.

Matthews and Catchpoole's Figure 2 is difficult to interpret, but it does not, as they suggest, show vertical bedding in the limestone, but rather younger sediment filling a solution-enlarged joint in massive limestone.

The pattern of dark grey material in the upper half of the image (irregular width, branching, penetration to the right etc) shows that this is not a bed.

Point 2

Zircons are rare in the dated clays. Recovering zircons was only possible where the deposit was sufficiently large to allow for bulk sampling. Zircons were dated from the River Lethe site because there is a significant amount of material there.

Zircons are very resistant grains, so the survival of old (512 Ma) zircons in younger sediments is hardly surprising and tells us little about the age of the sediment in which they occur, except that it is younger than Cambrian in age.

Matthews and Catchpoole's comments on our small number of primary samples, shows a lack of understanding of the practical and financial issues relating to our study and of the questions we had to address to satisfy the demands of main-stream geology.

K-Ar dating of clays is an expensive and time-consuming technique. In all 17 samples were dated, eight with dating of multiple grain sizes, making a total of 32 dates in all for the project.

The reason for not dating more of the same material was that the reliability of the dates was never a major concern. At issue was the meaning of the dates, in particular what they might tell us about the age of the caves.

We had to convince our referees and colleagues that the clays in the seven primary cave samples giving a Carboniferous date had formed in the cave (thus making the cave older than their date) and had not formed elsewhere and entered the cave at a later time.

Other materials in the cave were dated to see if the dating results made stratigraphic sense and to exclude possible surface sources for the illite. SEM and crystallinity studies were undertaken to see if the dated clays had undergone significant post-depositional transport and to compare them with surface materials.

Cave Filling Event

In their points 1 and 2 Matthews and Catchpoole mention in quotation marks 'cave-filling event' as though the idea of sediment filling caves is a novel, or perhaps scientifically contentious, concept promoted by our 1996 paper.

There is nothing novel or contentious about cave sediments or of the idea that caves may be filled with sediment.

The science of cave sediments emerged in the 19th century with the work of pioneers such as Buckland, Pengelly and Lewis-Abbot and has continued to be practiced internationally by cave scientists, palaeontologists and archaeologists.

Readers of ACKMA 72 will have seen my account on pages 10-12 of an international conference on Cave Sediments attended by some 150 scientists and research students, not what you would expect if this were a fringe idea emanating from our work.

In Australia, the science of cave sediments began in 1830 with Mitchell's work at Wellington and has continued thereafter (see my review in *Earth Sciences History,* Osborne, 1991).

Cave sediments and ancient cave sediments (palaeokarst deposits) have been widely recognised in the scientific literature and are important not only to studies of caves and Earth history, but also as ore deposits (many of the world's largest lead-zinc deposits take the form of caves filled by ore) and as traps for petroleum.

We did not discuss whether the materials we studied are cave sediments or not, because recognition of unconsolidated sediments lying inside caves or filling cave-shaped cavities within a body of strongly-lithified limestone as cave sediments is *not scientifically controversial* and has not been for at least 180 years!

What is controversial about our paper is that cave sediments in an *accessible* cave are found to be hundreds of millions of years old and be relatively un-lithified.

The idea that cave sediments do not exist, or that most or much of the non-limestone material found in Jenolan Caves is not cave sediment as apparently suggested by Matthews and Catchpoole is *highly controversial* as it overturns almost 200 years of scientific understanding and a vast body of literature in many areas of pure and applied geology and geomorphology.

Point 3

The clays we dated are not inter-beds within the limestone, but cave sediments. Matthews and Catchpoole continue to confuse cave sediments with weathered shale and dolomitic beds within the bedrock sequence.

No fossils at all have been found in any of the samples of we dated. The presence of fossils in yellow matrix in inter-beds within the limestone has no bearing at all on our dating. Figure 3 does show crinoid fossils in a yellow matrix, but we are not told its location and Figure 3 does not show any of the material we sampled or dated. Figure 4 is difficult to interpret, even in its colour version on the ACKMA website.

None of the clay material we dated had a Silurian age. The oldest clay we dated was Devonian, suggesting it was derived from the volcaniclastics overlying the limestone, not from the limestone sequence. The dating clearly indicates that none of our samples came from the Silurian bedrock.

Point 4

Matthews and Catchpoole mention rounded stones. These can be seen in their Figures 5, 6 & 7. Pebbles, cobbles and even boulders are common in two types of cave sediment found in Jenolan Caves, matrix-supported mass-transport deposits and fluvial gravels with grain support.

Many of the boulders, cobbles and pebbles found in Jenolan Caves are fragments of the Devonian volcaniclastic rocks that stratigraphically overlie the limestone. Since many of the boulders, pebbles and cobbles are made from rock that is ***younger*** than the limestone, any material containing them cannot be part of the Silurian sequence, but must be significantly younger than it.

The 'stones with their longer axes pointed downwards' described by Matthews and Catchpoole do not result from folding but are examples of ***imbrication.*** Imbrication is a common sedimentary structure found in coarse-grained sediments.

It occurs when elongate pebbles, under the influence of a strong current lean in parallel away from the current direction. Imbrication is seen in some fluvial gravel cave sediments in Jenolan Caves.

Point 5

Mention of 'dolomite/silica/illite mix clays' here is quite confusing and incorrect. Our dated clays contain little carbonate and no dolomite. Our sampling and X-ray diffraction studies of fine-grained material throughout the Jenolan Show Cave system indicated that illite-bearing clays are quite uncommon.

Clay minerals such as illite can only be identified by techniques such as X-ray diffraction and differential thermal analysis, so I am at a complete loss as to how Matthews and Catchpoole can identify them or comment on their distribution throughout the caves.

Matthews has provided Ross Pogson and me with samples of bedrock from the caves containing zones with fossils in a yellow matrix.

I have examined these samples in thin section under a petrographic microscope and Ross has subjected the yellow material to X-ray diffraction analysis.

We both concluded that the yellow material was weathered ferroan dolomite. The yellow colour is iron oxide derived from iron in the dolomite and weathering of small pyrite grains. This yellow material is quite unlike the illite-bearing clays we dated.

Recently Matthews has supplied Ross Pogson with a sample that does resemble our dated material. This came from the World of Mud area in Mammoth Cave. None of our team has been to this site and the field relationships of this sample are unknown.

I do agree with Matthews and Catchpoole that there is much more research to be done on cave sediments at Jenolan. I estimate that there is a least two PhD's worth in the show caves alone.

While it is extremely difficult to obtain funding for cave research in Australia, the lack of people to carry out the work is a bigger problem.

So if anyone knows an honours graduate (or potential honours candidate) in geology or geomorphology who is enthusiastic about spending the best years of their life working in a low status field with no job prospects please put them in contact with me and we can get the work done.

Kind regards,

Armstrong Osborne

At the recent handover of part of Mt. Etna to the Queensland Parks and Wildlife Service – ACKMA members Scott Brook (Ranger-in-Charge, Mt. Etna Caves NP), Penney and Armstrong Osborne. Photo: Dianne Vavryn.

Dear Kent,

It is pleasing to see that my article on the age and origin of the Jenolan Caves (ACKMA Journal 71, June 2008) has prompted reader interest, such as the Letter to the Editor from Ted Matthews and Dr Dan Catchpoole printed in the ACKMA Journal 72, September 2008.

Their letter expressed concern that my article had not mentioned their ideas. However, I knew nothing about their ideas because they had not been documented in any widely-available journal. I have since contacted Ted and Dan by email urging them to publish the details of their Jenolan observations, including precise locations.

Whilst working part-time guiding visitors through the Jenolan Caves from 1956 to 1961, I did not see the 'similar vertical beds including such stones embedded in dolomite/silica/illite mix clays' that 'are found throughout the Jenolan system including the more northern caves' [their letter's **Point 5**]. This underlines the importance of accurately documenting such occurrences so that they can be examined by other researchers.

I doubt that the inclination of the longer axes of pebbles and cobbles proves the strata has been folded [their letter's **Point 4**], since similar inclinations can be seen in present-day gravels exposed in river banks that definitely have not been tilted by some tectonic upheaval.

Ted and Dan's letter refers to 'cave-filling event' and 'cave filling theory' as if this was some novel concept [**Points 1 & 2**], whereas this stage in the evolution of some caves has been known and understood for at least 65 years. The book "British Caving", published in 1953 by members of the Cave Research Group of UK, devotes a full page to 'The Fill Stage'. My article referred to the 1943 US study by Harlen Bretz, which not only described the partial filling of some caves with clay, but also recognised such fill would concentrate corrosion on cave walls and roof.

Like all papers submitted to the *Australian Journal of Earth Sciences,* Dr Osborne's 2006 paper was subjected to a rigorous refereeing process from 13 April 2005 to 17 October 2005. I am quite confident that even a minute flaw in the evidence presented in that paper would have been uncovered by the referees during that six month period. I do not believe that I need to retract, or change, any part of my article published in ACKMA Journal 71.

Yours sincerely,

Warren Peck

Dear Kent,

The last two issues of the ACKMA Journal reprinted without comment two media reports on the rescue of a caver earlier this year at Wombeyan, New South Wales.

These reports named a couple of speleological societies including that the person rescued was a Vice-President of one society and an experienced caver.

For those not familiar with the circumstances and from the way the media worded the reports, it would be quite reasonable to conclude that he was a member of the Australian Speleological Federation Inc.

This was not so. Certainly many members of ASF were involved in the rescue as volunteers, and ASF itself maintains a sound and highly respected relationship with cave managers in New South Wales including, prior to its recent restructuring, a statutory representative on the Board of Jenolan Caves Reserve Trust which until then managed Wombeyan Caves.

For these reasons it is therefore important to place on record that the person concerned was *not* a member of ASF.

Yours sincerely,

John Dunkley
Vice-President
Australian Speleological Federation Inc.

COMING EVENTS

– Professor Elery Hamilton-Smith

This list will simply list events of special interest to cave managers, cavers and others seriously interested in caves and karst. If you are interested in any listed events, contact me for further details at <elery@alphalink.com.au>.

2009: January 5-9	*KarstAway* – 27th ASF Conference, Sale, Victoria
2009: January 5-7	5th International Conference on Environmental, Cultural, Economic and Social Sustainability, Mauritius
2009: May 3-9	**18th ACKMA Conference, Margaret River, Western Australia**
2009: May 12-17	Hypogene Speleogenesis and Karst Hydrology of Artesian Basins, Chernivtsy, Ukraine
2009: July19-26	International Congress of Speleology, Kerrville, Texas
2009: Sept 23-26	Sustainability of the Karst Environment, Plitvice, Croatia
And Looking Ahead:	
2010: April 12-16	UNESCO Conference on Geoparks, Langkawi, Malaysia
2010: April 16-19	2nd Global Geotourism Conference, Kuching, Sarawak
2010: May	**ACKMA Annual General Meeting 'Week', Mulu Caves, Sarawak, Malaysia**
2010: Sept 25-28	**13th Cave Guides Gathering, Wellington, New South Wales.**
2010 (dates TBA):	14th International Symposium on Vulcanospeleology, Undara, Queensland.