Cave and Karst Science Explained

Charlie Self gives layman's summaries of Cave and Karst Science issues 36(3) and 37(1), featuring research from Micronesia, Spain, and the UK.

Issue 36(3) contains four papers, very different in content, but all thought-provoking in some way.

Ecology of the Hyporheic Zone: A Review

Octavian Pacioglu

The hyporheic zone comprises the saturated sediments beneath and adjacent to streams and rivers. The gaps between the particles are an important habitat for small aquatic invertebrates and for the early larval stages of some surface-dwelling insects. Compared to surface streams, the hyporheic zone is less susceptible to floods and droughts and so is a good indicator of long-term water quality.

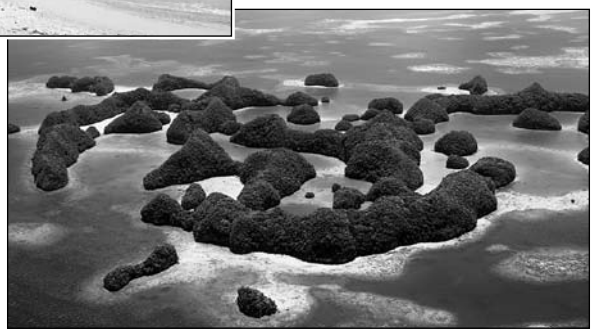
This is a review paper, so the author devotes most of the text to the findings of other researchers. What is striking is how relatively little is known about the ecology of this environment; and when it comes to the hyporheic zone in caves, the information we have is particularly sparse.

Is there a caver reading this who is also a zoology student at university? There is a potential research career here … and you might persuade a water supply or waste water treatment company to provide sponsorship.

Karst and Caves of Palau

Tony Waltham

Dr Waltham presents us with another gorgeously photographed report from a tropical karst paradise. This time it is Palau in Micronesia, a Pacific island group to the east of the Philippines. The particular scientific interest of this paper is the presence of fengcong (cone karst) that has been partially submerged by rising sea levels. The more famous 'drowned' karst towers of Vietnam are of course fenglin, as are many similar landscapes in south-east Asia. (If you think you need a dictionary, go back to C&KS Explained in Speleology 15, where the same author tells us why we need to use these Chinese terms).



Above: Some of the forested islands that comprise the drowned fengcong karst of the Rock Islands of Palau, in the western Pacific Ocean. Above left: Costal karst of the Bacuit Achipelago. Photos: Tony Waltham.

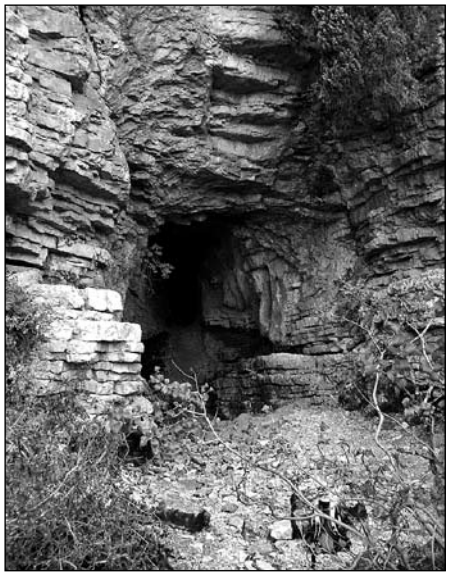
Perhaps unintentionally, Dr Waltham is also giving us a masterclass in cave science, the first lesson being: choose your research topic carefully. I will think on this when I am in the Cotswolds visiting my tight and spider-infested landslip rifts.

Interim Report on a Geoarchaeological Project in the Karstic Regions of the Serrania de Cuenca (Central Spain)

Alfonso Benito-Calvo and Ignacio de la Torre

In Britain, archaeologists have visited (if not excavated) most of the caves and rock shelters that could potentially contain Palaeolithic (Stone Age) human occupation material. This is not the case elsewhere in the world.

The authors have chosen a study area in central Spain covering 2,300 square kilometres. Their initial literature search produced a list of caves and cave locations, but very few rock shelters. They then made a pilot survey using digital map analysis to help identify locations with steep slopes and the correct geology – and therefore the best archaeological potential. During a season of fieldwork, several sites containing Pleistocene (Ice Age) sediments were discovered. This is only a preliminary report, but it nicely demonstrates how modern techniques of map analysis can focus limited fieldwork resources towards the most promising areas. The report contains an interesting selection of photographs, plus original maps of such exquisite detail and professionalism that special congratulations are due to the authors of this BCRA-supported project.



Entrance to the 5km-long Boquerón Cave in Serrania del Cuenca. Photo: Alfonso Benito-Calvo.

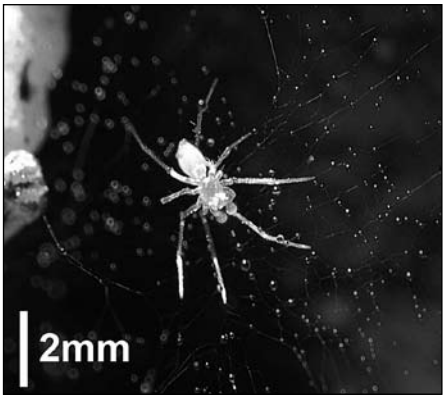
A High Resolution Spatial Survey of Cave Air Carbon Dioxide Concentrations in Scoska Cave (North Yorkshire, UK): Implications for Calcite Deposition and Redissolution

Tom Whitaker, Daniel Jones, James Baldini and Alex Baker

One of the main factors controlling the growth of calcite speleothems is the concentration of carbon dioxide in the cave air. If it is less than the concentration in drip water, stalactites and stalagmites can grow; if it is more, then calcite will be dissolved. But the concentration varies from cave to cave, and also within caves. This variability has implications for palaeoclimate research involving the stable isotope testing of stalagmites, since local causes within the cave can produce changes in growth rate or composition that can be mistaken for seasonal or longer term climate effects. For this reason, we need to know more about the distribution of carbon dioxide in various cave sites.

In this study, air carbon dioxide measurements were taken every 10m throughout a Yorkshire cave. This allowed colour coded surveys of the cave to be drawn showing zones of optimum calcite growth and zones of possible dissolution. This study is just a snapshot of one cave at one time, but it is a useful template for future research.

Issue 37(1) of Cave and Karst Science is of particular interest as the two presented



P. rosenhaueri. Photo: National Museum Wales.

papers concern underground research at British sites. The issue also contains the collated abstracts of the 21st Cave Science Symposium, held at the University of Bristol in 2010.

Monitoring the Population of the Linyphid Spider *Porrhomma rosenhaueri* (L. Koch, 1872) (Arenaea: Linyphiidae) in Lesser Garth Cave, Cardiff, UK

Julian Carter, Adrian Fowles and Catalena Angele

This tiny white cave dwelling spider is known from only two sites in the British Isles, both of them in South Wales. There are scattered records for the species from across western Europe, but little is known of its biology. It is considered to be an obligate cave dweller, which makes it unique among British spiders. To help future conservation and management decisions, a monitoring programme has been started in a defined section of Lower Garth Cave, which is located in the grounds of an active limestone quarry near Cardiff. All accessible parts of the defined section were searched for spiders (or webs in good condition) and the locations noted. The general impression from the first two visits is that the spider is well established in the cave, despite repeated vandalism of the entrance gate. The project continues with the support and cooperation of the quarry owners.

Derbyshire Pipe Veins – Deep-Seated Speleogenesis

Trevor Ford

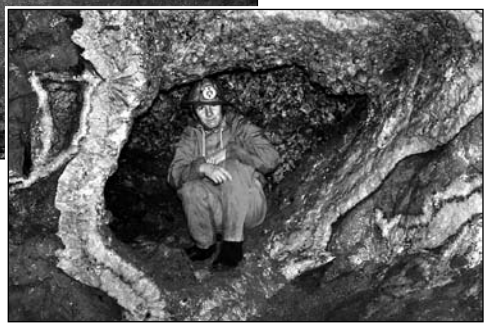
This is a large paper and an impressive piece of deductive research. Though principally written for geologists, there is plenty to interest the many sport cavers who visit old mineral mines.

The main part of the Peak District ore-field lies in the county of Derbyshire. The deposits are of lead, zinc, fluorine, barium and calcium minerals (a combination known as Mississippi Valley Type) but here with particularly high levels of fluorine. The famous Derbyshire 'Blue John' fluorite is part of this mineral suite. The host rock is the Carboniferous Limestone, whose beds generally are close to horizontal, so the mineral veins tend to be subvertical (following joints and faults) or subhorizontal (following the bedding). Pipe veins are of the latter type, generally about 1m in diameter.

The author has studied about 100 pipe veins. Less than half are still accessible, so he has had to research the rest from lead mining archives. From this extensive database he has concluded that most (if not all) pipes began as deep-seated hydrothermal caves which formed during late Carboniferous times, when the limestone was buried by sediments of the Millstone Grit Group. Hot locally aggressive water moved into the limestone from adjacent clay basins as a result of stress changes during deep burial. The water followed discontinuities in the limestone sequence, such as the top and the base of clay bands, or the contact with volcanic 'toadstone' beds within the limestone. From these 'inception horizons', subhorizontal caves developed. At the very end of the Carboniferous period, the chemistry of the water changed and the caves filled with minerals. The minerals themselves came from ions that were expelled when the clays in the basins were compressed and turned into shale.

The author has identified five categories of pipe vein, based on their geological placement, and cites many examples of each in the text. The illustrations are plentiful, but many of the maps and mine surveys are reproduced from other publications. This means that there is a considerable amount of additional general interest information available, though some figures have been printed at a reduced scale. I found a magnifying glass was helpful, though other interested readers may prefer to look at the PDF version on the BCRA website.

A small pipe in Golconda Mine, Brassington. Photo: Trevor Ford.



Above: The Blende Vein of Magpie Mine, Sheldon, intersected by Magpie Sough about 1100m from the tail, is a short section of a pipe vein with pre-minerlization cavities lined with calcite and sphalerite. Photo: Paul Deakin. Right: A pipe vein with a lining of calcite and sphalerite, exposed where Magpie Sough intersected the Blende Vein. Photo: Trevor Ford.

21st British Cave Research Association Cave Science Symposium Abstracts: University of Bristol, 6 March 2010

These are the abstracts from the 22 lectures and poster presentations that were given at the 2010 symposium. The cave science symposia are small and friendly annual meetings which are open to all. Speakers range from members of local caving clubs to university professors. They are particularly useful to postgraduate students, as it gives them an early opportunity to showcase their work and to get comments and suggestions from the wider cave science community. This being the 21st such meeting, it was celebrated with a birthday cake. See p12 for a full review of the symposium.

Forum

This is the correspondence section of the journal and I would not normally comment on its contents. However, Dr Trevor Faulkner has posted a report on the Ancient Human Occupation of Britain Conference that was held in April 2010 at the British Museum. This is the best short review of this subject that I have read and I recommend it. ■

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