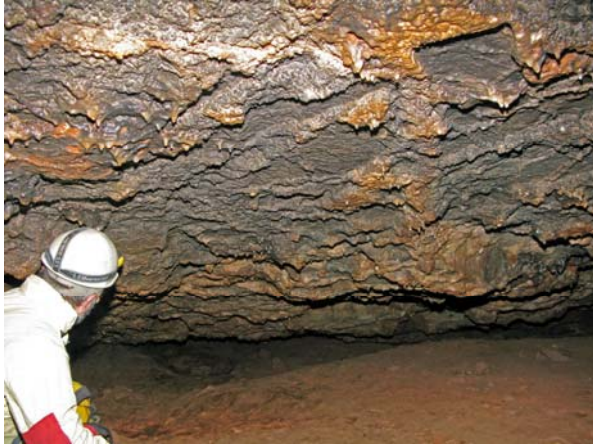


A JAMA OF A TIME, POLAND-SWITZERLAND-SLOVENIA, MAY-JUNE 2008

– Dr. Armstrong Osborne

Jan Urban in Chelosiowa Cave, the ceiling intersects hollows filed with crystal



From late May to early June, Penney and I travelled in Poland, Switzerland and Slovenia doing fieldwork, visiting family and attending the 16th International Karst School on Cave Sediments at Postojna, Slovenia. Here are some of the karstic highlights of our trip.

POLAND

Poland may seem a strange place for an Australian cave scientist to visit. Why would caves and karst at latitude 50°N be of interest to someone working at 33°S? Surely the climatic differences would make this pointless. Poland is important for my work as hypogene caves were first recognised there in the 1960s. Hypogene caves are little affected by surface climate. Caves in Poland also intersect palaeokarst deposits. The object of this trip was to look at palaeokarst deposits with Dr Jan Urban of the Institute of Nature Conservation, Polish Academy of Sciences, Krakow and at hypogene cave morphology and palaeokarst with Dr Andrzej Tyc of the Department of Geomorphology, University of Silesia, Sosnowiec.



Fold in old quarry near Kielce

MONDAY 26 MAY, KRAKOW

Monday afternoon and night was taken up with a high-speed tour of the old city and meetings with colleagues, here are some of the points of interest:

Smocza Jama (Dragon's Den Cave)

This small self-guided cave is located in the limestone hill under Walwel Castle, the ancient seat of Polish kings. You enter the cave down a spiral staircase from the castle and exit at river level. A well in the bottom of the cave served as a siege-proof water supply. Smocza Jama has many cupolas, pockets and related hypogene forms. Local scientists consider the cave was formed by rising artesian water.

Photo Monitoring

We often talk about the potential of photo-monitoring as an aid for cave conservation, but is anyone really doing it? The answer from Krakow is yes and the application very specific. Many of you will have heard of the Wieliczka Salt Mine near Krakow. While most of what the tourists see is the work of miners, the mine also intersects a number of natural cavities in the salt. These are lined with extraordinarily large salt crystals. Jan and his team have been monitoring the atmosphere in these cavities, as any increase in humidity could cause the crystals to dissolve. Photo-monitoring using macro and micro-photography is used to check that the crystals are not dissolving. Nice straight crystal edges indicate all is well, while even the slightest rounding indicates re-solution.

Geoconservation

Geoconservation is taken much more seriously in Poland than it is in most of Australia. Jan is a geologist working in one office of the national agency for conservation. His colleague Janina (Nina) Oteska-Budzyn is also active in this work, she has written an interesting paper on the topic. As I discovered later there is a lot of practical geoconservation going on in Poland.

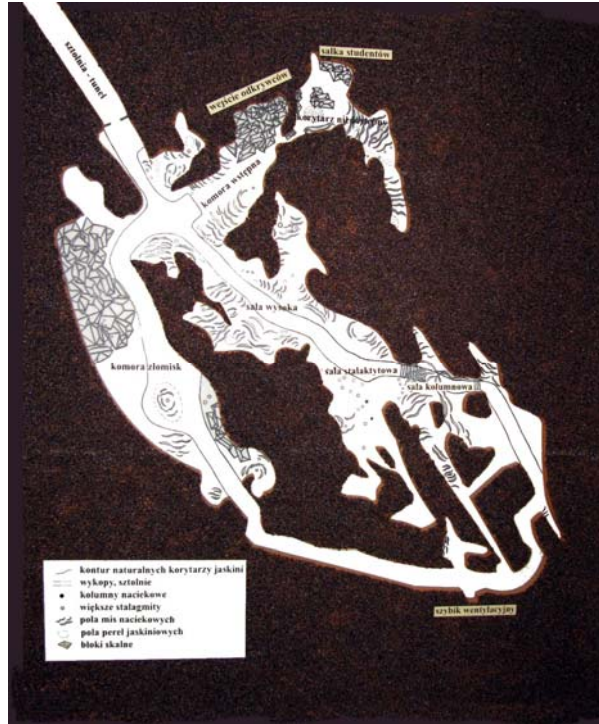
TUESDAY 27 MAY, KIELCE

Kielce is a regional centre approximately 80 km NW of Krakow, on the road from Krakow to Warsaw. We stayed in accommodation in the regional offices of the Polish Geological Institute.

Chelosiowa Jama, Chelosiowa Jama Nature Reserve- Jawdrznia Quarry

Chelosiowa Jama is a tight and extremely muddy cave that intersects several generations of palaeokarst. It had no natural entrance and was intersected by a quarry. The quarry is now a Nature Reserve and the cave has very restricted access. The object of the trip was to show me the

After dinner in town, Tuesday night was spent cleaning equipment.



Cave Map at Raj Cave – maps are key parts of interpretation at central European show caves

After breakfast and a meeting with the Regional Director of the Geological Institute we packed and left for Sosnowiec.

There are several abandoned limestone quarries in the outskirts of Kielce. Several of these expose important palaeokarst deposits and are preserved as Natural Monuments. We visited three on Wednesday morning. The palaeokarst exposures are impressive. One quarry intersects a cave that is being prepared for tourist use, while another exposes a wonderful fold.

Raj Cave is a small show cave located just off the road between Kielce and Sosnowiec. The cave has a very rectangular, almost cubist form with strange square cupola-like forms, moonmilk and many straws. The management were very friendly and they get many visitors.

We arrived at Sosnowiec at 7.30 pm (still bright daylight given the latitude and time of year), and were met by Andrzej Tyc, booked into the academic hotel adjacent to the Faculty of Earth Sciences and ate local pizza for dinner.

The Faculty of Earth Sciences at Sosnowiec is an imposing building, with lecture theatres, teaching labs, a library and museum displays in the broad lower floors and a narrow tower of staff offices and labs reaching to the sky. A new feature is a well-produced display depicting humans in Poland during the ice age, complete with local megafauna and a very interesting-looking human.

The main order of the day was for me to give a seminar to staff and postgraduate students at 10 am on *The Morphology of Hypogene Caves*. The seminar was preceded by a meeting with senior staff and followed by lunch. After lunch we were off again, this time with two cars and both Andrzej and Jan. Our destination was the Krakow-Czestochowa Upland (also known as the Polish Jura), an amazing upland area with many strange-looking hills and monoliths made from Jurassic limestone and lots of old castles. Some are complete atoll structures with castles built around their rims.

We arrived at Okiennik Wielki (Rock Window) at 4.30 pm and spent till 8 pm looking at the strange hills and the fragments of caves, shafts and bellholes exposed in their sides and penetrating through them. The Polish Jura is a real eye-opener to anyone interested in cave morphology because you can see amazing sections through cavities that would normally be inaccessible.



There are many aspects of the areas around Okiennik Wielki and the Polish Jura in general that many Australian karst people would find surprising from a management point of view. Firstly the Karst Jura is a centre for both casual rock climbing and professional rock climbing schools.

This is seen as a perfectly normal activity and is clearly not discouraged in any way by the authorities or conservationists. Secondly the growth of scrubby (regrowth) vegetation obscuring the view of the pointy rocks is seen as a bad thing (unlike here). Conservation funds are being used to hire herds of goats to initially control the vegetation. Plans are underway to then establish flocks of dairy sheep to maintain the grasslands around the rocks. It is planned to finance this as a long-term measure by selling sheep cheese to tourists.

Rock Window



Expansion of vegetation is likely to be a major issue in countries such as Poland where small-scale agriculture is in decline, fields are being abandoned and there is no tradition of grazing. The European approach, which includes EU grants for mowing to maintain threatened pastures, makes a very interesting contrast with policies here such as those underpinning the *NSW Native Vegetation Protection Act*!

On Thursday night, quite late, we had a Polish BBQ. This consisted of a small fire and some long sticks with sharpened ends. Thick pork sausages were threaded onto the sticks and cooked over the fire, the trick was to get them to cook without the fat and stick catching on fire.

FRIDAY 30 MAY, PODLESICE

Ostreznicka Cave

Ostreznicka Cave is developed in a classic Polish Jura limestone hill. A mound of sand, which supports a mature beech forest, surrounds the dome shaped limestone hill. The cave has many cupolas and other classic hypogene forms and on top of the hill the ruins of a castle can be found (or is it a 19th century fake?)

Mirów Hill and Castle

Mirów Hill really does have a castle, and its new owner is repairing it. The castles were mostly destroyed during the Swedish Wars (1600-1629) but now the Nouveau riche are moving in. The limestone cliffs below the castle contain many speleogen fragments, including pockets and long rising half-tubes.

Berkowa Cave, Kołoczek Hill

Berkowa Cave in Kołoczek Hill is one of the most important sites for hypogene cave enthusiasts. This cave was mapped by Rudnicki (1978). The main chamber of the cave is surrounded by a

series amazing pockets. This was my first visit to the cave and I was struck with the strange "collars" around the opening of the pocket, a feature I had not seen before.

Andrzej showed me some of his palaeokarst outcrops at Koloczek Hill. These included layers of cave pearls now turned to rock and some more exotic materials that were difficult to identify by eye.

When we met up again at Postojna there was a box of thin-sections of these rocks for me to bring home and examine.

On Friday night our hostess at Podlesice put on a special meal for us on the open fire. This was cooked slowly in a large iron pot, like a camp oven, with a pressure lid. The pot was filled with layers of sausages and vegetables. We ate very late, but well.

SATURDAY 31 MAY

On Saturday morning Andrzej and I dropped Penney off at Krakow airport at 6 am and then met up in the field with his new research student, Bernadeta Mysliwiec who is commencing a MSc degree at the Department of Geomorphology, University of Silesia. Bernadeta will be using my detailed mapping techniques to study some of the caves and exposed speleogens in the hills at Smoleń.



Looking down a vertical shaft at Rzedouvice with a top view of Andrzej Tyc

Smoleń

At Smoleń a complex of strange, tower-like limestone hills and blocks projects out of the forest. After returning from China some locals were convinced that these were evidence of a tropical climate in the past.

Caves and fragments of caves penetrate the hills and blocks. Some of the large flat spaces between the hills and blocky limestone outcrops appear to be unroofed chambers.

SWITZERLAND

In Switzerland I was officially on holiday for a week with Penney visiting the kids and grandkid, but somehow two caves snuck in!



Trümmelbach

Imagine a waterfall, or series of waterfalls that is really a partly unroofed limestone cave carrying water down the side of the cliff in a deep glacial valley. This is Trümmelbach! You are taken about three quarters of the way to the top of the cascades up a steeply sloping artificial shaft in a funicular. Only cave people would appreciate the view. Stairs and tunnels allow you to see the series of cascades and real underground whirlpools. You get covered in mist and spray while viewing the tumbling water. This is absolutely amazing and well worth a visit, you just don't see fluvial action like this in Australia!

Höllengrotte

Höllengrotte is a small self-guided show cave not far from Luzern. At first I rather smugly thought that the name was an attempt to say cave in two of the Swiss official languages, but it was later pointed out to me that the name probably means Hell Hole, or something like that. Höllengrotte is a quite unusual cave; it is not formed in bedrock limestone, but in a tufa spring mound. The show cave path consists of drives connecting separated cavities and former perched pools within the tufa mass.

Below the former water level the pool sides and floors are lined with amazing orange clouds, while orange flowstone is abundant above the water level. This is an excellent example of an unusual type of cave and well worth a visit. Don't believe the tourist map, however, the cave is not in the adjacent town but is on a back road, way out in the forest.

SLOVENIA

I took the early morning flight on Monday June 9 from Zurich to Ljubljana and arrived to find much confusion and security at the normally peaceful Birnik airport due to the unscheduled arrival of Mrs Bush (wife of President G.W. Bush). After meeting up with my lift, we crawled through the traffic and onto the expressway on our way to Postojna. Arriving at Postojna, I found the town was also in chaos. The crumbling Kras Hotel had finally been demolished and the town square was being excavated for an underground car park.

MONDAY 9 JUNE-FRIDAY 20 JUNE, POSTOJNA

Karst Research Institute

If you are serious about cave and karst science, then a visit to the Karst Research Institute on Titov trg (Square) at Postojna is a must. My plan was to spend the week before the conference meeting with colleagues, doing a little writing and perhaps some fieldwork. However, almost as soon as I was in the building I was given a thick typescript to work on. Almost all of the week was taken up with editing a paper on palaeomagnetic dating of cave sediments. Penney joined me during the week, so we escaped on Saturday by bus to Piran, a historic Venetian town on the Adriatic coast, and spent Sunday touring polje and caves with Anderj Kranjc and family on Sunday.



The castle at Mirów Hill

The Slovenia Palaeomagnetism Book

You may not have noticed, but there are two revolutions currently taking place in cave science. One, the Hypogene Revolution, was greatly advanced by the publication last year of Alexander Klimchouk's book *Hypogene Speleogenesis*. A new book, released in time for the Karst School, advanced the other current revolution, the Ancient Caves Revolution. *Palaeomagnetism and Magnetostratigraphy of Karst Sediments in Slovenia* by Nadja Zupan Hajna, Andrej Mihevc, Petr Pruner and Pavel Bosak may not be on your reading list, but its contents are dynamite (actually they have been known to use a petrol-powered rock saw in the caves). To quote from p 251 "cave fills have substantially older ages than generally expected". Their dates extend to 5 million years and some sediment may be up to 35 million years old. This suggests that the Slovenian Caves, previously thought to be only hundreds of thousands of years old are now clearly many millions of years old!

16th International Karst School, Cave Sediments

The Karst Research Institute has held an annual conference for 16 years. It attracts both young and established researchers and would be a great venue to meet up with international colleagues if the program were less full. This year there were about 150 participants, mostly from continental Europe and the USA. There were only four from

the southern hemisphere Luiz Travassos and Isabela Varela from Brazil and Penney and me from Australia, the Gondwana contingent expanded to six when we included the Indians. There were North Africans from Egypt and Morocco, but no southern Africans. The mix extended to the east with some Iranians, Chinese and Japanese (Kazuko Urshibara-Yoshino who some of you will have met).

The striking thing always to me about these events is that there are always many young researchers (<30), male and female attending and presenting papers and posters. Cave and karst science is surprisingly healthy in Europe and there are even encouraging signs in the USA.



Above: Wall pocket with collar, Berkowa Cave Kołozek Hill. Below: Looking from the top of a limestone Tower at Smolen, looks at bit tropical eh?



MONDAY 16 JUNE

After registration commencing at 7.30 am, paper sessions started at 8.30 am on Monday in the Town Hall about 10 minutes walk from the Institute. Ira Sasowsky from Akron, Ohio (USA) began by giving a general introduction. Then followed a series of papers on flowstones. Of great interest was a paper by Charles Self from the UK called "How Speleothems Grow". This explored genetic mineralogy and crystal splitting which I really don't understand, but it seems to explain many of the strange shapes we see in caves. I

chaired the coffee-lunch session with papers on stalagmite shape, including the important information that the World's largest stalagmite is in Cuba and is **20 metres in diameter** and **70 metres high** (Wolfgang Dreybrodt, Germany), Moonmilk in a Spanish Cave (Andrea Martin-Perez, Spain), Bacterial deposition (Annette Summers-Engel, USA). The last speaker before lunch described opal speleothems from the giant quartzite caves in Venezuela (the ones where they park helicopters in the entrance).

There were more papers Monday afternoon and the poster session. Monday evening was the after hours trip to the non-tourist part of Postojna Cave. The train was out of action and the tour ran late into the night.

TUESDAY 17 JUNE

Tuesday was extremely busy for me. Sessions started again at 8.30 am with Professor Peter Bull from Oxford giving the keynote address, which included a discussion of clays being deposited on the cave ceiling in water-filled caves, followed by an invited lecture by Professor Pavel Bosák from Prague on entrance facies and my invited lecture on Cave Turbidites.

After morning tea Bernard Sigé (France) gave his invited lecture on bone-bearing phosphate deposits in southern France. These have some similarities to the sediments in the Wellington Caves Phosphate Mine, but are exposed in quarries and appear to fill fissures rather than caves.

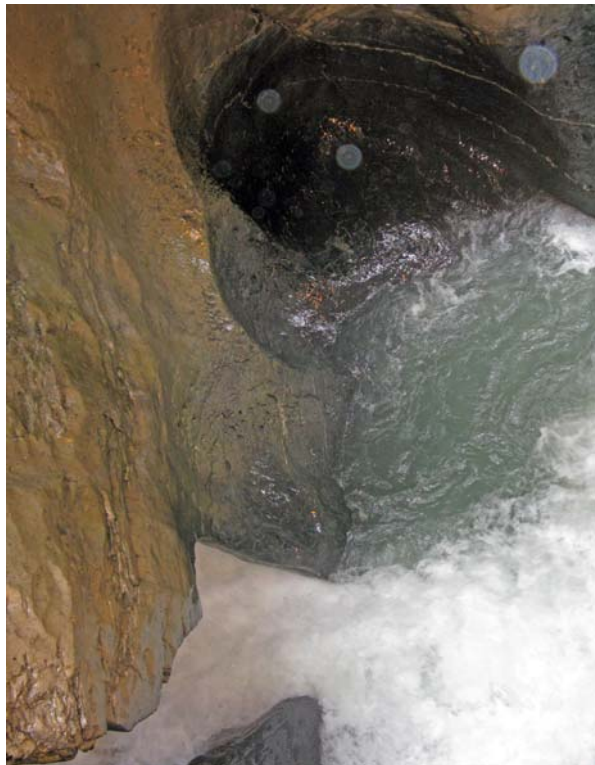
I had to leave early, as I was giving my Hypogene Cave presentation as an extra lunchtime talk. The afternoon excursion was to Dimince Cave. I had not been to this cave before. It is a huge cave, partly developed for tourist use, entered by a spiral path and steps down a deep circular shaft. Paths and steps are installed, but not surfaced and there are no handrails in the cave. Ropes had been installed to help in steep places, but the paths were steep and extremely slippery and I fell quite badly at one point.

The cave consists of a very large chamber with two shafts to the entrance and a long passage extending off one side. A large stream flows across the bottom of the chamber and basic works have been done to install a hydroelectric plant in the cave. The fieldtrip as always took longer than intended and we arrived at the hotel very late for dinner.

WEDNESDAY 18 JUNE

The pace did not slack off on Wednesday. I had an early morning meeting with the Institute Director Dr Tadej Slabe and Andrzej Tyc to discuss possible joint projects. Then it was off to the conference sessions, again starting at 8.30 am. The focus on Wednesday was surface sediments and "various". We started with a very French lecture on clays and climate (J-N Salomon) followed by a comparison of some Australian and Japanese red soils by Kazuko Urshibara. The last lecture before morning tea really impressed me; Tihomor Marjanac (Croatia) and his wife have

found large quantities of previously unrecognised glacial sediments along the Adriatic coast of Croatia. It just goes to show that there are still unexpected things out there to find!



Whirlpool at Trümmelbach

I could only stay for three of the next papers as I was off to another engagement. These were a very interesting invited lecture on tufa (Nada Horvatić, Croatia) a review of chemical sedimentation in caves (Paolo Forti) and a paper by Philippe Adura (France) on sediments in hypogene caves. The features described by Philippe reminded me very much of the deposits in Gaden Cave at Wellington.



Penney in the clouds at Höllengrotte

After rushing back to the Institute I crept into a closed room where a PhD student from Serbia was giving her research proposal (in English) to a serious collection of academics, scientists and a small number of her colleagues. I was squeezed in on the serious desk between a professor and an academician. She gave an excellent 45-minute presentation followed by very detailed questioning from the assembled throng. Questions came in

Slovenian, English and I think Polish and the answers were usually in English. The research topic is about uvalas and if they really exist as a distinct karst landform. She is based at the Institute with supervisors from Slovenia and Poland. One of the important issues to discuss was if some field areas were safe from landmines. The committee was impressed and the proposal approved, so it was off to the restaurant to celebrate.

I was then invited on a field trip with the student and Professor Emeritus France Šusteršič to look at a nearby possible study site. Off we went in France's, large by European standards, American car, the drivers seat fully back and reclined to make space for his significant height, and the student cramped between the seat and France's grandkids' baby capsule. After some wandering on dirt roads in the forest we reached the edge of a large grassed hollow in the landscape.

This was our possible uvala. The slopes were steep and mostly grassed and the bottom was undulating. There were several streamsinks in the bottom and there were tufts of vegetation suggesting it might flood. There were also some indications that there might be an unroofed cave in the side of the feature.

The depression was too large and irregular to be a doline, but too small and not rectangular enough to be a classical polje, so perhaps it really was an uvala. Puzzlement and discussion ended when France discovered a bear bath and realised that the depression would be a great place for a mummy and baby bear to play. So we left happy not to have met them and become a bear-human interaction statistic (bears are the Balkan equivalents of sharks, people are rarely killed, but injury can occur if you get between a female and her cub).

Later on when I managed to catch up with Penney I found she had been on Excursion 3 to Škocjanske jame on what was supposed to be an easy walk. Their trip had, however, avoided the inclinator and walked in and out of the valley on the steep old paths and stairs.

THURSDAY 19 JUNE

On Thursday we were supposed to be on the all day excursion, attend the official reception, pack and leave the hotel at 5 am the next morning. Sanity or perhaps weakness of the flesh prevailed and coffee, toast and souvenir shopping followed waking up late. The official reception was worth the wait as usual. Along with plenty of food, drink and good company, organizers were thanked; the Minister, the Mayor and the Director gave speeches and people even looked more respectable than usual, some in coats and ties.

FRIDAY 20 JUNE

At 5am on the dot our lift to the airport arrived and so began our long journey back to the super-continent and hemisphere where we belong having met old friends, made new ones and hopefully learned something new and contributed to the world of karstology.

