Greg Middleton talking to the media. Our visit created some media interest and we all participated in television interviews.

IN SEARCH OF THE SOLITAIRE

– Steve Bourne

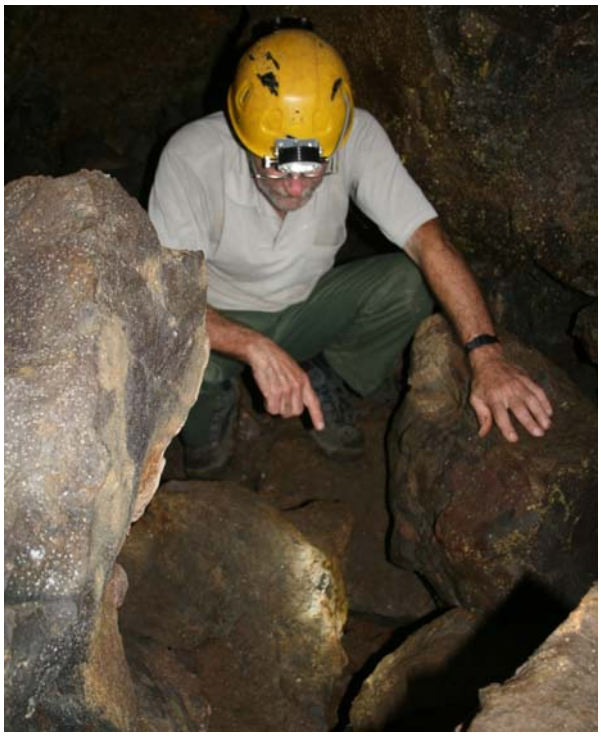
Lorna Steel in ridiculously small cave entrance.

Last year I experienced a big disappointment when a proposed trip to Mauritius to excavate bones of the Dodo *Raphus caculatus* fell through. Greg Middleton was part of the expedition but international involvement was squeezed out in favour of locals. Greg had kindly kept me up to date on progress and when I half jokingly said I was interested if another trip was planned, he indicated a trip was forthcoming in November 2008, this time to Rodrigues. Very soon, he sent another email informing me there was room for me; he was leaving from Melbourne on 5 November and I should book quickly. I had heard of the island but was not exactly sure where it was, how big it was and when I was asked about it in a radio interview before I left, could not even answer a question about the language spoken there (its French). Nevertheless, I booked the flights and then did some research on where I was going.

Greg was extremely busy prior to this trip; on Jeju with several other ACKMA members for the vulcanspeleology conference and then in Vietnam with Kevin Kiernan. He did manage to get me a brief itinerary just prior to leaving. We would spend a week caving in Mauritius before being joined by two researchers from the British Natural History Museum and an American. As I would joke later when we were together: 4 nationalities- English, American, Australian and Tasmanian!

Fossil sorting outside Caverne Dora with Julian Hume.

Greg Middleton the site
where Dodo Fred was found.



For those who know as little about Mauritius as I did before I visited, a few facts. It is the second largest of the three Mascarene Islands, with Reunion and Rodrigues being the other two. It has an area of 1865 square kilometres, about 60 by 40 kilometres with a population of approximately 1.2million. I am from the south east of South Australia, which has lost most of its native vegetation and many species of fauna, and Mauritius made me feel positive about how much we actually have left! The island has suffered greatly at the hands of first the Dutch, then French and finally English settlers. It was established as a stop off point by spice traders, who ravaged the fauna, especially the tortoises and Dodo. Most of the native vegetation has since been stripped for sugar cane plantations, however the Black River Gorges National Park (which Greg had a major role in establishing) preserves a few thousand hectares. Unfortunately, aggressive weeds such as strawberry guava have a stronghold in many areas and continue to invade the park.

'Gertrude' – tortoise number 41.
Tortoises are being established on Rodrigues
to replace its lost endemic species.

But what about the underground? Mauritius is volcanic in origin and has a large number of lava caves. Greg has mapped most of them and he kindly gave me a guided tour of a number of them. What struck me was the diversity of caves. Not all were the classic "train tunnel" shape, with collapse chambers, a spectacular maze cave, narrow tubes to chambers larger than many limestone cave areas (such as Naracoorte).

We visited Kanak Bamboo Cave, the site of the Dodo skeleton found by Debbie Ward and Fred Stone. Now famous in literature as Dodo Fred, the skeleton was in a rather dynamic part of the cave and removed with great fanfare by British palaeontologist Julian Hume and a large entourage of Mauritian politicians and media. We visited the site and moved a few rocks (carefully!!) and managed to find another bone we were pretty sure belonged to Fred. Julian later confirmed this.

The entrance to Kanak Bamboo Cave,
where Dodo Fred was found.

We visited a couple of other small caves in the area, Kanak Banana and Kanak Tea Caves. Greg found and named these caves after the Kanak Crater which was the source of the lava that formed the caves.

Camp Thorel Cave is an outstanding lava maze cave. Greg had not been to the cave for many years and his memory was a little hazy. But his caving instinct kicked in when we closed in on the site, on the edge of a small village and we missed the entrance by just one street. A few local lads loitering in a derelict ruin pointed us in the right direction informing us it was a pretty good cave. Evidence of their caving activities would be found later. The cave was originally mapped by a French team but remarkably they missed a considerable portion of the cave which Greg later mapped. The cave has some really interesting lava features including a "bath". Small silica deposits had formed stalagmites and some really nice corals.

Like a number of Mauritian lava caves, swiftlets are a feature of Camp Thorel. These small birds echo locate like microchiropteran bats and nest in colonies on cave ceilings. Their nests are constructed using saliva and unfortunately are regarded as a delicacy. Mauritian swiftlets also use lichen in nest construction hence the nests are not of the same quality for fine cuisine as other species, such as those that are plundered in Malaysia. Despite the poor quality and laws prohibiting collecting, nests are regularly taken.

Descending into Monsignor Cave.

Long sticks used to pry nests from the ceiling were found at virtually every site we found the birds. All were made a little shorter by Greg, who delighted in breaking every stick we came across. Evidence of how the local lads lit their way in the cave was unfortunately everywhere. It seems they burn plastic bottles which leave melted plastic adhered to the floor. One can only imagine the stench while trying to cave by the light of a burning plastic coke bottle!

One point a strong smell of soap permeated the cave. This was momentarily puzzling until we realised the cave was being used for liquid household waste. It must have been clothes washing time! Like many other caves we visited, the entrances had been used for dumping waste, making entry unpleasant and most likely unhealthy. This was the first cave where we found pipes directly into the cave at several points, which Greg located by plunging his hand into soft toilet waste at one point! Around the pipes, enormous American cockroaches were flourishing.

Two species of microbats are found on Mauritius, the Mascarene Free-tailed Bat Mormopterus acetabulosus and the rather interestingly named Grey Tomb Bat Taphozous mauritianus. Despite its name, the Grey Tomb Bat tends to roost on cliffs and and in vegetation and the Free-tailed Bat is a cave-dwelling species. Twilight Cave has a large colony of Free-tailed Bats, perhaps in excess of 100,000 bats. It did not appear to be breeding season and the bats did not seem overly disturbed by our presence. A sick bat was found on the floor enabling close examination and determining what the species was. It's much easier when you only have a choice of two! Twilight Cave gets its name from the many large entrances that mean most of the cave's length has at least a small amount of natural light. It also makes the cave extremely photogenic with plenty of colour and tree roots complementing large sinuous passages.

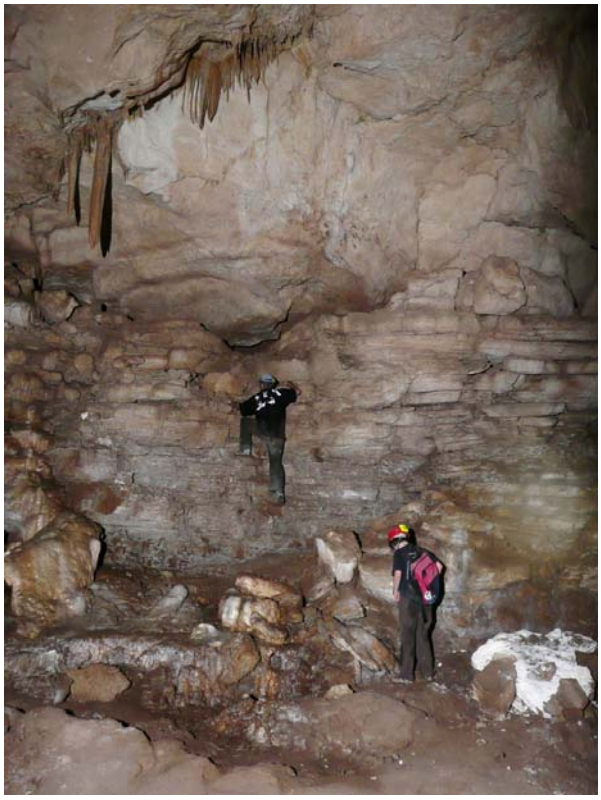
A couple of years ago, Greg had visited a much polluted cave with Arthur Clarke. Pollution was being discharged directly into a cave from a clothing factory more than a kilometre away, and appearing in this cave as smelly blue water. Apparently Arthur was the spokesman for the local paper raising the pollution as a major issue. The factory owner may have ceased dumping waste for a period but was certainly pouring plenty into the cave again.

Steve Bourne with Francois Leguat staff.
L to R: Doryn Azie, Jocelette Vun-Mally
and Corrine Emilien.

Risking the possibility of contracting a previously undescribed bacterium from the cesspool, I managed to edge my way along the wall above the water about 60 metres to the back of the cave. A small daylight hole was located and it appeared a way on further along the cave system towards the factory. A short time was plenty in this environment and I could hardly wait to get back out for some unpolluted oxygen. In the thick vegetation we could not find the entrance on the surface I could see from inside, but the idea of entering an even more enclosed polluted cave was extremely unappealing. We didn't search too hard!! Just near this cave was a Hindu cremation site. To assist the dearly departed to a better place they use old tyres to help burn the body- is there no limit to how these people pollute their country??!!

Greg Middleton was very fond of breaking
the sticks of illegal bird nesters

Lorna Steel and pristine rimpools in new extension to Cavern de La Vierge – climbing the wall to the extension.



We visited a number of other volcanic features including climbing the three highest peaks on the island. Pieter Both is an outstanding landmark on the island, a basalt "ball" perched on top the peak and seemingly defying logic that it should stay there. Apparently it has been climbed before but Greg and I had more sense than to try it (or were worn out from getting near the peak!). The Black River Gorges National Park has well thought out visitor infrastructure but key sites have rather persistent locals forcing souvenirs onto everyone. At least the negotiating can be fun. We spent a day touring the park allowing Greg to reminisce a little.

A view of the Aeolianite coastline.

The week on Mauritius just flew by and the British team of Julian Hume and Lorna Steel arrived with American Dave Staudt. We had a quick visit to Mare aux Songes; the most prolific Dodo fossil site before it was time to head to our real target, caves and fossils on Rodrigues. This island is small and remote. A Mauritian territory, it is 450km in a roughly easterly direction from the "mainland" with the next stop Australia another 4,500 km in the same direction. Head north and you eventually find Pakistan or if really lucky you may bump into the Maldives. It is a seriously remote location.

Our base was the Francois Leguat Reserve, established by Owen Griffiths. Owen has established reserves on Madagascar, Mauritius and Rodrigues and his achievements in the conservation of flora and fauna on these islands cannot be overstated. The Reserve takes its name from the island's first "permanent" resident. I use the term permanent loosely, as Leguat and seven other Huguenots were literally dumped there by French government in 1608. They lived on Rodrigues for two years before building a boat and somehow floating their way to Mauritius where they were impounded on an island for a further 6 years. Legaut was a keen observer of the island's wildlife and made the only illustration of the Solitaire bird and only description of the bird's behaviour. I had read about the Solitaire and find it a more fascinating species than the Dodo. Like the Dodo, it was a pigeon and large males apparently weighed up to 20 kilograms. Finding Solitaire fossils was high on my wish list on this trip. For the first settlers of the island they would have made a large meal. For an excellent account of the settlement of Rodrigues see Alfred North Coombs book on Rodrigues.

Greg Middleton in a lava bath.

The residents of the island are largely descendants of the slaves kept by the French and later Indian workers brought in by the English after they displaced the French. Although the island is just 10,400 hectares, 17km by 6km (less than the size of my uncle's farm at Naracoorte!) the population is supposedly 36,000. The people are incredibly friendly and many have a subsistence lifestyle, relying on fishing, a few sheep, cattle, goats and chickens. Rodrigues is volcanic in origin, with a small area of aeolian limestone on the south west corner. This was the focus of our activities.

The Plaine Corail was originally described as coralline limestone, but is actually composed of foraminifera blown onto the land during a low sea stand over 100,000 years ago. It is syngenetic karst and waterflow off the basalt hills appears to have contributed to cave development. Some of the older and larger caves have collapsed forming

"canyons" and it is in one of these canyons, Canyon Tirel, that Owen has established a tortoise reserve. Tortoises are not endemic; they were wiped out, but are from island of Aldabra, the only population of island tortoises that survived.

A Rodrigues fruit bat.

First day on Rodrigues was a reconnaissance day and as Andy Spate says "Time spent in reconnaissance is rarely wasted!" Locals had several new caves for us to visit and day one, cave one, we found our first Solitaire fossils. The cave was earmarked for later work and we ventured on to other sites. One of the locals Monsignor had a found a cave he said we would need a ladder to access. This had us excited and especially so when we moved the rocks blocking the entrance to reveal a dark interior. A ladder was rigged of the nearest 'firm' point, a rock more than 10m distant from the entrance. The cave was a real surprise, a five metre pitch into a dome chamber with some quite nice decoration.

A view inside Gastonia Cave showing underwater cones of calcite flakes.

There was a huge amount of sediment that had obviously been reworked and a large number of dog and other domestic animal skeletons. I held little hope for Solitaire fossils but I kept forgetting that this bird has only been extinct for a few hundred years so easily turns up in recent sediments. Julian proved this by digging out a couple of limb bones from the muddy banks.

The afternoon was very warm and we were ill prepared for walking around the exposed limestone plain. We had left the reserve with no water, a good lesson for future reference. We pushed ourselves into some quite small caves, with Lorna as the smallest able to access more sites than the guys. We found some fun little caves, but nothing to really get excited about. On the way home that evening we found a local store that sold the local brew beginning a lovely relationship with a local family. The lack of water we were carrying was quickly forgotten! Each evening we would call in for a few (?) beers and after a few days, our arrival became predictable triggering a rash of activity with the whole family turning out to load our supplies.

Greg has been to Rodrigues many times; advised on conservation, infrastructure and lit Grand Caverne in the reserve for Owen. Greg has previously described his work in the ACKMA journal. He used Weidmuller LED lights throughout the cave and those at the Buchan conference will remember the demonstrations by David Head. I thought Greg had done terrific job thinking through the tour route, material selection and lighting placement. Some of us cave managers have the opportunity to relight caves or alter infrastructure, but few of us get to start from scratch like this. Peter Chandler's work in New Zealand is another example I can think starting from scratch.

Francois Leguat Reserve in Canyon Tirel.

Grand Caverne has an interesting history. During cyclones, locals would drive their livestock into the cave until the danger passed. Excavations had been made in the entrance chamber over 100 years collecting a large number of Solitaire and other bones. It is one of the largest, most easily accessible caves on Rodrigues and with no supervision for hundreds of years, significant vandalism has unfortunately occurred. Greg's lighting cleverly highlights the relatively well preserved features of the cave, but also shows off some of the restoration work that has been undertaken. Many restored speleothems have

flagging tap to show they have been repaired, and interpreted for visitors. Our tour was led by Arnaud, who spent a month in Margaret River after the Guides Workshop (Gabfest) in 2006. Something that is immediately apparent is the language skills of guides. As mentioned, French is the primary language but guides easily slip to English and often speak to each other in Creole as well. How deficient are we Australians? This was the only guided tour that I took on the reserve but I watched several guides working with groups heading to the cave and in the tortoise reserve. Their natural friendliness is welcoming to visitors and creates a really pleasant atmosphere on the reserve. Each of our group gave presentations to the staff which were well received. I am hoping we may see a Rodrigues guide in Australia for the ACKMA conference.

Julian, Lorna, Arnaud and I visited a couple of caves while Greg attended to some light maintenance in Grand Caverne. One was called Gastonia Cave, a well decorated cave with a superb feature in the last chamber. There is a pool of water covered with calcite rafts. Beneath the surface are several large cones of calcite flakes, two metres across the base piled up to near the water's surface. They probably indicate fluctuating water levels in the past. Photographing them was difficult and nearly cost me a flash when I decided to try an underwater shot. It took a day to dry out and start functioning again. While exiting the cave, Lorna noticed a bone embedded in flowstone. Another Solitaire bone and when we closely inspected the floor we realised most of the skeleton was there encased in flowstone. Impossible to remove for study but a great find anyway.

A passage in Twilight Cave.

After two days of visiting caves and generally having a good time exploring, it was time to get down to work and get an excavation underway. Caverne Dora had been discovered by staff in Canyon Tirel's wall after non endemic vegetation had been cleared. Access was simple, and being just 50 metres from the visitor centre, lunch room and laboratory was certainly the easiest cave excavation site I had ever worked. A site was chosen, pegged and excavation started. I have been spoilt at Naracoorte and have worked on some extremely rich sites, where megafauna fossils are found with ease. After finding Solitaire fossils on the surface in several caves, I wrongly assumed we would be pulling out boxfuls from this excavation. Large bone material was really sparse, restricted to mainly tropic birds, which are hardly large! We bagged sediment and removed to just outside the cave where we put it through several grades of sieves. This is where the really interesting material started coming out. Tiny reptile bones were reasonably abundant and with the described island reptile fauna restricted to just 2 species of lizard, it was clear we had new species. Julian confirmed five new species when he returned to England and analysed our specimens. These await formal description and publication.

Near the summit of Pieter Both, the second highest point on Mauritius

There is a second show cave experience on offer on Rodrigues, Caverne Patate. Greg, Lorna, Dave and I visited leaving Julian to do some work with the Mauritian Wildlife Conservancy. I have seen many ways to present caves but the light sources used for this tour were quite special- large fluoro camping type lights that spread light in all directions, mostly glaring in your eyes so you can't see anything. Fortunately, Greg had brought his caving helmet and light along, which gave us a good viewing light but also gave us away as people who knew a little about caves. We were the only ones on the 45 minute tour, which was lucky as it took the best part of two hours for our guide to get us through the cave. Lorna managed to find Solitaire bones on the floor, absolutely amazing considering the cave has been used for protecting stock during cyclones like Grande Caverne, and its long history of open unrestricted access. The best decoration had a thick layer of black sludge, indicating old methods of viewing the cave with flaming torches. Despite the obvious damage from past visitors, the cave had a lot to offer and our guide did a good job with us being difficult visitors. Towards the end of the tour, she deduced that Greg was in fact the Greg Middleton whose name appears on so many Rodriguan cave maps! This gave us a leg in and a bonus, we were told about

a new cave and asked whether we were interested in taking a look. We were interested??!!

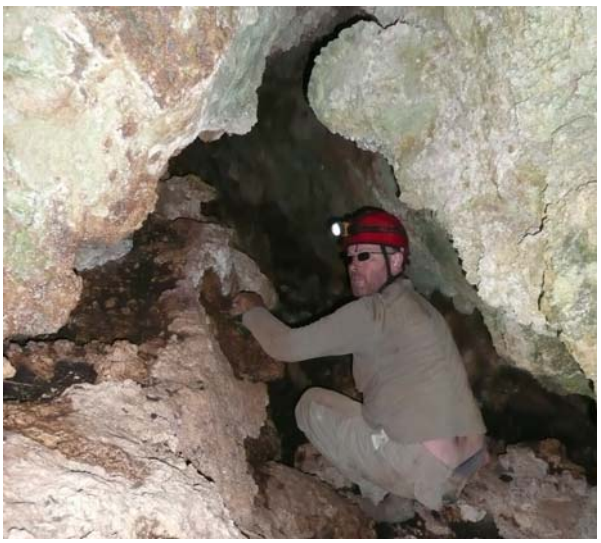
The entrance was only a couple of hundred metres from the show cave office, but carefully concealed with rocks. It was an interesting cave with some good potential for finding fossils given the nature of the sediment. Some nice decoration, including some interesting small tree root features. As far as fossils go, one for next time.

Cockroaches in sewage
waste in Camp Thorel Cave

Julian is co author, with Anthony Cheek, of a book The Lost Land of the Dodo. Despite the title, the book is not exclusively about the Dodo, but rather an excellent documentation of the natural history of the Mascarene Islands. Owen flew in for a launch and the Francois Legaut staff did an excellent job in organising the event. The book launch was conducted by the Deputy Commissioner of Rodrigues followed by a guided tour of the museum by Julian, drinks and nibbles. Just when I thought the evening was finished, I discovered that as special guests, we were wining and dining with Owen and the staff. It was good night, enough said….

Owen has a strong interest in snail fauna and worked tirelessly with Julian and helpers the following day sieving sediment and sorting material. Much of what we had excavated from Caverne Dora was processed prepared for sorting and storage. Water is a precious commodity on the island so to conserve freshwater, sieving was undertaken in the sea, only a few hundred metres from the park.

We gave ourselves a day off caving and excavating and toured the island with Arnaud as our guide. It was a fascinating trip, especially the Grand Montagne National Park, a small reserve where a huge amount of work has been done re-establishing endemic flora. The rarest plant in the world according to the Guinness Book of Records, the Café Marron Ramosmania rodriguesi has been brought back from the brink from a single tree , with a number of plants now surviving. There are several other species that are down to less than five specimens and seemingly doomed for extinction. The only two endemic bird species survive in this reserve, the Rodrigues Fody Foudia flavicans and Rodrigues Warbler Acrocephalus rodericanus. We located both and even found an active Fody nest with eggs. After reaching desperately low numbers both have recovered to population levels considered safe. The lone surviving endemic mammal (there was only two to start with!), the Rodrigues Fruit Bat Pteropus rodricensis likewise reached very low levels but with a population of about 5,000 bats it is now regarded as safe. It is considered that this level of population is about all the island can support and some locals even regard it as a pest as it invades fruit trees. We enjoyed a swim and snorkel in the warm tropical waters with absolutely amazing fish.



Julian Hume had an interesting
habit of caving in sunglasses

A real highlight for me was discovering an extension to Caverne de La Vierge, a large cave that may be developed for tourism. Greg insisted the slot I was interested in did not go anywhere but eventually inspected when my light went flat. It turned out to be quite well decorated and obviously not previously visited. I was delighted when Greg said he would name it the 'SB Extension', only to be deflated when he said SB stood for 'Silly Bugger', as only a silly bugger would consider this may have gone anywhere!

All too quickly my time came to an end on Rodrigues. The last morning was spent inspecting some more caves, with the best saved to last. A complete Solitaire skeleton embedded in flowstone was found on the last expedition. It is at the end of a small tight cave named Poule Rouge, in a very fragile section. I was allowed in to take some good photographs with the intention that the site not be visited again for quite some time to protect the unique specimen.

It was with some sadness that I left all my new friends at the Francios Leguat Reserve and headed off to Germany for a World Heritage meeting. From a tropical island to minus five degrees!! Rodrigues is a fascinating island as is Mauritius, although I fear that mass tourism is having a significant impact on Mauritius which will only increase in the future. Rodrigues is also in this predicament, there are plans to extend the runway to enable jet aircraft to land and no doubt tourism would provide a huge economic benefit. But at what cost to the environment and the current way of life? My advice is have a look soon and beat the rush.