'Geo-Log'

2009

Journal of the Amateur Geological Society of the Hunter Valley

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President's Introduction.

Hi members and friends,

It has been yet another very successful year and thanks go to all those members who contributed in whichever way they could. Most of our outings continue to attract a lot of interest and even after 30 years we still manage a variety of interesting activities without repeating too much from previous years.

Society outings again reflected our wide range of interests, from Bob Bagnall's fascinating tour of old Plattsburg to a superbly organised weekend of pure geology looking at the structure and stratigraphy of the Lorne Basin near Taree with new member Winston Pratt. The safari to the North Coast of New South Wales was moderately successful and venturing off the more frequented tracks revealed some astonishing scenery and more than a few interesting rocks. A few people even climbed Mount Warning. It was very surprising to see such a large turnout at the geological seminar at Ron's place in October, where Brian and Ron struggled successfully to get through a packed program of mineral and rock identification, with Barry following up with an excellent account of map reading.

Very special thanks go to Ron and Ellen Evans for providing the venue for both the seminar and Christmas party. The Society is also grateful to the Social Committee for their often unrecognised organisational expertise at these and other events held throughout the year.

Finally, thanks to the leaders who gave up their time in organising and conducting the field trips and who contributed to this journal, and especially to our Life Member Ron Evans for his sterling efforts in putting together another superb edition that we can all be proud of.

Very best regards,

Brian.

Barrenjoey Lighthouse Walk
Saturday 10th January 2009

Leader: Jim Grey.

Attendance: 14 members, 4 visitors.

The outing was arranged so members could use public transport (rail and ferry) to Palm Beach then walk via the shore to the light-house.

Four members met at Fassifern Station and joined nine more at Ettalong Ferry Wharf. The remaining four joined the party at Palm Beach Ferry Wharf for the walk to Barren Joey Light-house.

History

The Barranjoey Lighthouse was the third light on the headland and was completed in 1881.

A customs station was established in 1843 as the Headland marked the entrance to Broken Bay and the Pittwater which were considered to be the backdoor of Sydney for smugglers.

The first report of any light on the headland was in 1855 when a fire was raised in a basket to assist mariners during stormy weather. Broken Bay and the Pittwater were a safe haven in storms for vessels carrying coal from Newcastle to Sydney.

Palm Beach - ready for the walk to Barrenjoey Lighthouse

Station Beach walk before climbing to the light-house (on the right)

Later, in 1868, two wooden lighthouses know as the Stewart Towers, were built at either end of the headland to guide ships in.

The need for a more permanent light lead to the construction of the current lighthouse. The tower is unpainted and built of the very aesthetic local sandstone.

The original apparatus in the new tower was a fixed red dioptric of 700 candlepower with four oil wick burners. It is interesting to note that when this light commenced operations in 1881, and the first keepers were the George Mulhalls, father and son, who had also tended the lamps of the wooden Stewart Towers.

In 1900, an explosion followed by a fire destroyed the ornamental roof of the adjacent oil house. Fortunately it was subdued before reaching the tower.

In 1932, the Barranjoey Lighthouse was converted to automatic operation with the installation of a acetylene gas apparatus. A new character of group flashing white light of 6,000 candlepower was introduced. It was turned off and on by a Dalen Sun Valve.

Even though the acetylene gas apparatus was efficient, access to the tower for re-supply caused problems and in 1972 the light was converted to electric operation.

The Walk

An interesting fact is that Barrenjoey Head is a 'Tied Island'. Currents moving along the coast deposit sand in sheltered locations forming sand spits. Sometimes they join islands to the shore forming Tied Islands. The sand spit in these cases are called Tombolas.

An so we walked along Station Beach on the Pittwater side before climbing a steep path to the lighthouse. Spectacular views in all directions were a feature of the headland.

After lunch, the road was followed down to the beach and we headed back towards Palm Beach Wharf. Luckily for us, a coffee shop was on the way. You don't waste a coffee shop do you!

The ferry trip between Palm Beach and Ettalong was thoroughly enjoyable. A great day out.

Barrenjoey Lighthouse and light keepers house

Tombola joining Palm Beach and Barrenjoey Head with Pittwater on the right

Report by Jim Grey & Ron Evans.

Geological Tour of the Central Coast
Saturday 21st February 2009

Leader: Barry Collier.

Attendance: 15 members + 1 visitor.

On the morning of February 21st, 15 members met at the Pacific Lakes Estate car park. From there we drove into Munmorah SCA and stopped at the Bongon Head Lookout to examine evidence of the past geological history. Next stop was Snapper Point where we had a close look at the junction between the Permian and Triassic periods, joint planes and the typical "scalloping" of conglomerate cliffs.

The next stop was just inside the park boundary where we looked at an isolated, vegetated, Holocene dune which was not impacted by sand mining or the encroaching dunes on the pre-existing landscape. From there, off to Norah Head.

Large sea cave Bongon, Head Frazer Park

Erosion caves in conglomerate at Frazer Park

90 my old Dolerite Dyke below Norah Head

The Skillion, Terrigal

Terrace erosion in conglomerate, Norah Head

Somersby Falls (Hawkesbury Sandstone)

Below the Norah Head lighthouse, we examined two Tertiary dykes and compared the stratified conglomerate cliffs with the massive conglomerate we had observed at Snapper Point. Then we walked onto a Pleistocene dune and marveled at the difference in vegetation to the Holocene dune we had seen earlier.

Then on to Picnic Point at The Entrance where we looked at the foreshore structure of a non-tidal lake and observed one of the country's biggest silt jetties, where Ourimbah Creek flows into Tuggerah Lake.

From there it was off to Bateau Bay, where we enjoyed lunch in a park overlooking the beach, before heading down to look at the chocolate shales of the Clifton Sub-Group and their impact on the landscape. While there, we also looked at coffee rock and concretions, as well as stamping on the thousands of bluebottles which had been washed onto the beach.

Next stop was the entrance to Wamberal Lagoon, where we observed the impact of Holocene sands on the entrances to lagoons with minimal discharges. This was what the entrance to Tuggerah Lakes was like prior to Council's dredging and foreshore restoration projects.

By this time the weather was beginning to close in, so we hightailed it to The Skillion at Terrigal, where we examined typical Terrigal Formation Rocks and the interesting soil profiles of this geological series before the heavens opened.

We then drove across to a lookout at Kariong where we were able to compare tidal estuary formation with what we had seen at Tuggerah Lake and Wamberal Lagoon.

Last stop was Somersby Falls where we could see the typical watercourse formations in Hawkesbury Sandstones. As time was getting on and the weather looked too threatening for any further walks, we decided to call it a day.

Report by Barry Collier.

Ash Island History & Walk
Friday 13th March 2009

Leader: Jan Harrison.

Attendance: 11 members.

Friday March 13th was a beautiful sunny day (in spite of the date). Participating members met at 9:30 am in the car park at the beginning of the 'Welcome Walk' on Ash Island. The 'Welcome Walk' is a boardwalk about ½ km long, taking in several different habitats with interpretive signs along the way. My favourite part is the last section through the mangroves which can be quite beautiful in the correct light. The walk leads to the visitor's centre, the old schoolmasters' cottage which has been restored.

After morning tea in the garden, Peggy Svoboda, the project manager, gave an interesting talk on the history and aims of the project. We were able to see photos of the island as it originally was (extremely degraded) so we could appreciate what has been achieved to date. We were also able to look at the books of paintings of the flora, moths and butterflies which were on the island when Europeans arrived. The paintings were done by the Scott sisters who were the daughters of an early landholder on the island. The books are an important resource so we know what to plant to restore the island.

On returning to the cars, we drove to the car park at the old silos which are the beginning of the rainforest walk. We were pleased to find the endangered vine the White Cynanchum covered in a mass of white flowers and thriving. Barry took a few photos of the vine and its flowers. The walk took us through rainforest and on a boardwalk across an area of wetland to the river. We wandered along to Scott's point where we rested in the Gazebo and enjoyed river views. Then back to the cars and down to Riverside Park Picnic Area for lunch.

After a lazy lunch, we drove to the community garden which is part of the City Farm. The City Farm plays an active part in managing the wetlands. It demonstrates sustainable agricultural practices that are in harmony with rivers and wetlands. The herd of contented beef cattle provide delicious sausages for a BBQ after busy tree planting days. The vegetable garden is managed organically, incorporating Permaculture principles. After a tour of the garden, the group decided to call it a day. Some adjoined to the nearby McDonalds for coffee to top off an interesting day.

Report by Jan Harrison.

Ian Rogers

Old Schoolhouse, now the Visitors Centre

Ian Rogers

Boardwalk through Mangrove forest

Rix's Creek Coke Ovens

Saturday 21st March 2009

Leader: Terry Kingdon.

Attendance: 7 members.

Participants met in the park on the outskirts of Singleton at 9.30 am and had morning tea. We car pooled and drove to the mine site where we were met by one of the mine personnel, Shane. He suggested that we would all fit into one of the mine troop carriers for our tour around the mine site. This was quiet new to me, as I have been to the mine site many times in the past to visit the Washery where the coal is processed, but I have never been to the open cut.

We started off by being driven around the old section of the open cut mine. These areas have been reclaimed and revegetated. These areas, when they are finished, must be brought back to as close as possible to the same land contours as was present before mining started. They must not make hills taller than what was originally there, water ways are to be replaced etc.

Shane then took us over to the new section of the mine. We were not allowed to get too close to the high wall for safety reasons. These holes in the ground are huge. While we were standing on some high ground looking down into the open cut, there was a vehicle approaching in the distance. It looked like a match box toy, but in fact it was a large tip truck about 100 tons in weight. As it got closer you could see the size of it. Where we were standing, we noticed that there were fossils in the rocks by the side of the road in the form of leaf patterns.

Terry Kingdon

Glossopteris leaf fossils in shale, Rix's Creek mine

We went further into the mine and stopped next to a large digger and were shown the extreme inclines of the coal seams, some inclined upward at about 45° and ending up at the surface of the ground. We were some distance from these seams and they looked like they were only a about a few centimetres thick, but in fact were several metres thick.

This brought us to the end of the mine tour. Shane then took us to the area where the Coke Ovens are located and because he had other things to do, left us to have a look around. The Coke Ovens have been left to decay over the years. Trees have grown over and through them and people have vandalized them by removing sandstone blocks from around the ovens. Some of the ovens have collapsed, and are in a really bad state of disrepair. The Coke Ovens are out of the way and this may be the reason as to why they are vandalized. It is a shame to see them in so bad a state because once they are gone so has a

Terry Kingdon

Rix's Creek Open Cut mine

Terry Kingdon

Coal seams tilted to about 45°

lot of history.

Shane came back to pick us up and we had a good chat with him under some trees. He was only too happy to answer our questions, not only then, but during our tour of the mine. We were then taken us back to our cars. We thanked him very much for taking us around, showing us everything and very freely answering our questions.

After leaving the mine, we travelled back into Singleton and went and had a look at the Sun Dial in the park near the river (this sun dial is supposed to be the largest in the southern hemisphere) and then had lunch in the park under some trees.

After lunch we went and had a look at a Museum in Burdekin Park. The museum has a lot history in it about the local area and is well worth having a look at. We had a stop on the way home at a fruit vinery where we all sampled the wines with some people buying bottles. We all had a very full day and I hope everyone enjoyed it as much as I did.

Some Interesting References:

Re coke ovens: a relic of this kind of coke making is at Rix's Creek, north of Singleton. At this place was the first coal mine in what was to become a major coal producer about 100 years later. A battery of ovens was built at Rix's Creek and in 1890, the coke was described as the best available. Before 1900, a second battery was built. Both batteries are clearly discernible at Rix's Creek.
Source: Armstrong, J., (ed) Shaping the Hunter, Newcastle Division of Engineers, Newcastle. 1988.

About (1860): a pit was opened at Rix's Creek in the Singleton district. Coal was sold at 10/- a ton at the pit or 17/6 delivered to Singleton. A large quantity of the material was bought to the town day by day.

Rix's Creek mine was still at work in 1866, but the pit was so far from the railway terminus that it could not compete with mines closer to Newcastle. The coal was sold in Singleton and two men were employed at the mine in winter and one in summer. In 1869 Rix's Creek colliery was said to be one of the most promising industries in the neighbour hood of Singleton. James Singleton the then proprietor had spent about £1000 on the work which sent into Singleton 'the finest sample of coal that the colony can produce'.
Source: Jervis, J., The Hunter Valley. A Century of its History, Journal of the Royal Australian History Society. Vol. XXX1X, Part 111, 1953.

William Longworth was born in Lancashire in 1847. William and his brother Thomas were labourers at "Dulwich". He was engaged by the Bowman family to sink a shaft at Rix's Creek to test for coal. He reported there was coal there but not in sufficient quantity or quality to merit mining, so the shaft was closed. William then spent a short period in the gold field. He returned to Rix's Creek, secured mining rights and opened a mine which he called "Whodathoughtit". This mine produced very good steaming coal which prompted William and his brother Thomas to open another mine a few miles away at Nundah.


Terry Kingdon

A row of coke ovens, Rix's Creek


Terry Kingdon

Coke ovens overgrown by trees

They called this mine "Elsmere colliery" and it was opened in 1879. It later became known as "Rosedale Mine".

Another mine called "New Park" was opened at Rix's Creek in 1881 by a syndicate formed by Dr. Richard Read. This company also opened the Rix's Creek "Coke Ovens".

Rix's Creek had three hotels, two stores a church and a large sports ground. It was reported to have had the best brass band in the north of the state. The combined population of Nundah and Rix's Creek was over six hundred people.
Source: Noble, L.M. The Glennies Creek Story. This book also includes a list of early residents of the area. The book is out of publication, but there may be a copy for sale at the Family History Society of Singleton, Post Office Box 422, Singleton. There would certainly be one available for reference.

Report by Terry Kingdon.

Catherine Hill Bay to Caves Beach
Saturday 18th April 2009

Leader: Barry Collier.

Attendance: 15 members.

Participating members met at Caves Beach and car-pooled into a minimum number of cars, before driving up to the entrance to the former Camp Yondaio. From there we walked along former roads to a quarry in which we could examine the junction between the Permian and Triassic periods. We then walked up to the remains of a World War II radar establishment. An old road was then followed along a ridge line, towards Catherine Hill Bay, with spectacular views along the way and patches of drizzly rain. At the bottom of a steep descent, we turned onto an old fishermen's track, which led out onto a headland, with views into a spectacular gorge.

At this time we came across crowds of people in athletic gear, running madly around the

Terry Kingdon

A well preserved Coke Oven

First stop - Permian and Triassic boundary

Terry Kingdon

AHSHV members at Rix's Creek Coke Ovens

Permian (lower) & Triassic strata junction

View south towards Catherine Hill Bay

Rock platform south of the gorge

place, trying to find check-in stations, which had been set out in advance. They were to be our constant companions for the rest of the morning.

After looking into the gorge, we descended to the rock platform and proceeded to the Bogey Hole, a massive rock pool, up to 6 metres deep. We decided to walk around the ocean side of the pool, where, by keeping a lookout for larger waves, we were able to traverse the pool with dry feet. The other crowd chose the landward side, which required a 20 metre swim.

From there we walked past interesting rock formations and structures, to the Shark Hole, a spectacular, partially cliff lined bay, about 150 metres long and 100 metres wide. At the head of the gorge is one of the most spectacular gorges on the NSW coast. The other crew were climbing down the cliff face, swimming across the entrance to the gorge and climbing up ropes to get out of the water, before running off to the Bogey Hole.

The Shark Hole terminating in a gorge

Lunch above the shark hole

After examining the gorge from below, we then climbed up the headland to view it from above, then walked out along the peninsular to an overhang where we could have lunch while sheltered from the now strong wind and at the same time enjoy spectacular views.

'The Gorge", an eroded dyke

During lunch the sky to the south turned black and it was obvious that the rain, which had been holding off, would hold off no longer, so we donned our coats and headed back to the cars, where the day was called off and it was decided to complete the walk in the 2010 program.

Report by Barry Collier.

Kurri Kurri Murals
Saturday 9th May 2009

Leader: Ron Evans.

Attendance: 22 + 4 visitors.

Background

'Towns With Heart' is a small community group working in the area of Kurri Kurri and surrounding villages of Abermain, Stanford Merthyr, Western, Heddon Greta, Pelaw Main and Neath. The program was initiated in an effort to address the local level of unemployment and to facilitate local business growth and development.

In 2003 the group decided to undertake a 'Mural Project' with the aim of getting more of the thousands of cars that pass through the town, to stop and see what Kurri Kurri has to offer.

Today, the town and nearby villages have over 40 murals showcasing the areas history, heritage and uniqueness.

Local guides (booked via Kurri Kurri Visitors Centre) provide a free escort service to visitors wanting to see the magnificent murals, provide they eat at one of the local eateries. People not eating locally are asked for a gold coin donation.

The Walk

Participants were to meet our guide outside the Kurri Kurri Visitors Centre at 9:15 for a 9:30 start.

Waiting for our guide (front centre) to lead the way

Steam Train by Phil Presker

However, the walk started a little late as the monthly Kurri Kurri farmers Markets were being held across the road in Rotary Park. Given their proximity and gorgeous warm clear day, they just had to be explored before the walk commenced. Our guide was very understanding.

At about 10:00, off we went. The murals adorn many walls on buildings, both at ground level and above building awnings, with some actually inside a building. Some 25 artists were involved in the painting of the murals which highlight the history and heritage of Kurri Kurri, famous locals and important events.

Our guide, Vicki Drew was very informative explaining the significance of each mural. Many murals would be missed by the casual observer as many were located on side streets.

Since the mural project commenced, civic pride has increased. Graffiti is now almost non existent, buildings are freshly painted and the town has a 'good feel' about it.

At the end of our two hour guided walk, we adjourned to the Station Hotel for an enjoyable lunch to conclude what was a very interesting and informative day.

Report by Ron Evans

Sewing by Peter Sesselmann

Toilet Block in Rotary Park by Grant Franklin

Rock and Roll above café by John Dorahy

Waiting for lunch at the Station Hotel

Murrurundi Weekend
Friday 29th to Sunday 31st May 2009

Leader: Brian England.

Attendance: 13 members + 3 visitors.

Murrurundi Background

Murrurundi is a small town of around 1000 inhabitants lying at 417 metres above sea level and nestled on the banks of the Pages River at the head of the Hunter Valley and at the foot of the Liverpool Ranges. The region was once the home of the Wanaruah and Kamilaroi Aboriginal tribes, but by the early 1900's they had all vanished, with their only lasting legacy being the origin of the town's name from the Wanaruah "Murrumdoorandi", in reference to five unusual rock formations near Temple Court. The first European to visit the area was Henry Dangar, who passed through the Upper Hunter on his way west in 1824 in search of new grazing lands. The town was laid out by Government surveyors in 1840. Except for oil shale processing in the early 20th Century there has been an absence of heavy industry in the area and the town has retained a rural charm, with the main street (New England Highway) being proclaimed an urban conservation area.

The area has many attractions including historic buildings, a small museum, craft shops, spectacular lookouts and picnic areas. In three days it is not possible to see everything the region has to offer.

Friday 29th May

Thirteen members and three visitors braved the cold and damp conditions to meet up at the picnic area beside the highway at Burning Mountain Nature Reserve at around midday. Following lunch in the shelter of the pavilion we set off single file through low cloud and up the steep track towards the current burning area. At the old track to the clay quarries we turned up

the hill to the abandoned workings, which on previous visits had provided excellent sections through the heated rocks lying above the burned out coal seam. However, after about a kilometre of gentle uphill walking, the weather began closing in even more and we abandoned any idea of exploring the quarries and headed back down the hill to the Burning Mountain walking track.

As we continued along the side of the ridge it wasn't long before we came upon spectacular evidence of the effect of the burning coal seam on the physiography, with huge gaping zigzag cracks appearing at the side of the track where the sandstones overlying the burnt out seam had collapsed along joint planes. Previous explorations had shown some of these holes to be over 30 metres deep! Further along the track even the vegetation began to show the effects of the high heat flow from below, with undergrowth vanishing over the burnt out area leaving only open forest with a rough stony and potholed floor.

At the current burning area near the end of the ridge we found a new picnic shelter and a path leading off to a new elevated board walk which skirted around the edge of the active vent area to provide an excellent overview. This new additions was far superior to the original walkway which had been built across the vent area and after only a few months had begun to settle into the white fuming mass. It was also well hidden by scrub for those wishing to photograph the area without its natural ambience being spoiled. After a short lecture on the geology and its significance everyone made their own way back to their cars and on to Murrurundi to make camp at the Pages River Caravan Park.

Evidence of burning coal seams along the track

Burning Mountain where the coal seam is currently burning

Geology of Burning Mountain

The burning coal seam is the uppermost of four seams within the Lower Permian Koogah Formation which also contains thick beds of non-marine kaolinite claystones interbedded with the coal. The upper part of the Koogah Formation comprises sandstones and conglomerates containing *Glossopteris* flora. These rocks form a straight narrow outcrop between the Pages River and the New England Highway and are the time equivalent of the Greta Coal Measures. Underlying the Koogah Formation is the Lower Permian Werrie Basalt while overlying it is the Upper Permian Bickham Formation comprising marine periglacial sandstones and conglomerates with drop stones. It is these rocks which outcrop on the path as it climbs to the top of the ridge. Both Formations lie on the side of a small anticline and so dip steeply to the west.

The cause of ignition of the coal seam is uncertain but was most likely due to spontaneous combustion of the outcrop due to the unusually high sulphur content (as pyrite) in the coal. The present activity is marked by smoking highly fissured area riddled with fumaroles around which are being deposited a number of white to pale grey exhalative minerals, as well as sulphur and native selenium. Gases from the fumaroles reach 320^{o}C, while just above the burning seam the claystones are subjected to temperatures of at least 1750^{o}C. The effect of heat on the kaolinite clays below the burning seam has converted them to porcelain-like halloysite, while above the seam where much higher temperatures

are reached the claystones are converted to mauve-coloured mullite rock (mullite-tridymite-cristobalite-sillimanite) which has been the target of quarrying adjacent to the reserve.

Saturday 30th May

Most of the group had already decided that crawling around in tight dark caves was not their thing and so headed off towards Nundle for the day. If was left to a minority to drive out to Timor Caves for a day underground.

On arrival at the reserve we found the area quite overgrown compared to previous visits. Another group had already set up their tents on the best grassy patch next to the creek so we drove further along the creek to another flat grassy patch where we parked the vehicles.

After lunch beside the cars, a small group of eager cavers, all togged up for an underground experience, set off slowly up the steep slippery path to the entrance of Belfry Cave (TR2). This is the most accessible cave in the Reserve, with a scree slope of angular limestone boulders providing an easy if somewhat slippery path down to the cave floor. The main chamber of this cave is devoid of formations and one has to negotiate a variety of very tight squeezes (including the infamous Rat Hole Squeeze) to access the best speleothems. However of major interest here was a Tertiary basalt flow dated at 73.5 my old visible in the roof of a small alcove just to the right of the entrance. This basalt places age restraints on cave formation; the present cave cannot be older than the basalt exposed within it, so that its maximum possible age is Late Cretaceous. On the other hand, the earlier part of the cave which hosted the basalt flow can be no younger than Late Cretaceous. This makes the caves in the Timor Reserve amongst the oldest in Australia and they are but the remnants of what was once a very much larger cave system.

Vic performing a trumpet solo

Before moving on Vic gave a resounding rendition on his trumpet, standing next to what appeared to be a grave marked by a mound of rocks and a headstone with undecipherable scratching. If this was indeed the last resting place of some unfortunate caver, we sincerely hoped his ghost enjoyed the performance. This was rather ironic as I had just related tales of a few unfortunate people who had become trapped on the other side of Rat Hole Squeeze, unable to get back out until they lost some weight through an enforced fasting over several days! Some people believed the myth, but in truth it could well happen!

Terry entering the Belfry Cave

Alec entering "The Rat Hole"

Battling sideways through the wet and slippery scrub along the side of the hill from TR2 we eventually managed to find the entrance to Helectite Cave (TR4). Again this cave is easily accessible, although the rock scree down onto the floor was a little rougher to negotiate. This cave comprises one large entrance chamber off which lead a number of tight squeezes, one providing access to an area of helectites in a long narrow passage formed by dissolution of the limestone along a vertical joint plane. Only two of the group explored this section, the others perhaps chickening out after hearing those terrifying tales of stuck cavers.

We found the TR 7 entrance to Hill Cave on the hill opposite the camping area without any problem and spent an hour or so exploring and photographing its formations. Just inside the entrance and to the left, perched on a ledge in a small alcove we found a pile of short sticks and leaves which I immediately thought must be the nest of a stick nest rat. Just as we moved off towards "The Flattener", the owner of the nest appeared out of the back of the cave, confirming my thoughts on the origin of the rubbish pile. A few bats had also taken up residence in this cave.

Fighting though dense undergrowth we headed off towards the TR8 entrance, which again was found without problem despite the absence of a well-defined tack. However Ron took one look at the very confined shaft-like entrance and decided he'd had enough caving for one day! A great pity, since this is the best and most undamaged cave in the Timor System.

Stick Rat nest in TR 7 cave

Grass tree forest Crawney Pass

Before returning to Murrurundi we drove a few kilometres up the Crawney Pass road to a fantastic forest of grass trees covering a ridge of limestone which extended right down to the road. More patches of similar forest could be seen on other limestone ridges to the east. That made the botanists in the group very happy indeed! Then to satisfy the geologists' appetite for something completely new, recent quarrying beside the road back to Murrurundi on the first ridge west of the Crawney Pass road junction revealed an astonishing section through a major fault in bedded shelf sediments, with the upthrown block showing pronounced downdragging of the bedding adjacent to the fault plane. This fault has a considerable throw and forms part of the Hunter-Mooki Thrust System which began to develop during the Middle Permian Hunter Orogeny.

There were only two choices for dinner in town on the Saturday night, the Shell Service Station or the Chinese Restaurant at the Bowling Club. So we all ended up eating Chinese, some for the second night running.

Sunday 31st May

Before joining the others at Paradise Park, Ron and I drove to the end of Doughboy Street (off Boyd Street) and up the dirt road to investigate the old oil shale works. The site is overgrowth with tall weeds and lies on private property, but the remains of the unusual circular brick retort and railway siding lie fairly close to the track and so are easily visible without trespassing.

By the time we arrived at Paradise Park, Barry and most of the others had already set off up through the Eye of the Needle and were somewhere up on top of the ridge. The views from the lookout were well worth the effort of the steep climb, and taking the fairly new circuit track back to the cars through the forest between towering rock formations we found a number of other lookout points that gave good view of the valley and the spectacular conglomerate outcrops forming the edge of the ridge.

At the bottom of the steep slippery slope and surrounded by rainforest, stood the most magnificent fig tree, its roots draped artistically over a huge conglomerate boulder that had slipped down the hillside in the distant past.

Following lunch in the park at around 12pm, everyone made their way home.

Report by Brian M. England
Digital photographs by Ron Evans.

For Further Reading

ENGLAND, B.M. (1982). The Hunter Valley. Gemcraft Publications.

RUTLEDGE, J; SMITH, G.K.; BRAINWOOD, M. and BAKER, A.C. (2008). Timor Caves, Hunter Valley, New South Wales. Newcastle and Hunter Valley Speleological Society Inc. Copies of both publications are in the Society's library.

Soup and Slides
Saturday 20th June 2009

Following on the success of last years event held at the Community Hall Pacific Lakes Estate at Munmorah, the same venue was used this year.

Twenty seven members and one visitor were in attendance.

The Social Committee under the excellent leadership of Leonie Mills once again arranged the evening commencing with a selection of tasty nibbles followed by four soups (pea and ham, pumpkin, lamb and vegetable , chicken and corn) accompanied by bread rolls.

Members participated in the photographic competition where two 6″ x 4″ photographs only were able to be entered in each category: landscape, humorous, people, geology and miscellaneous.

Following the meal, Brian England showed slides on Pakistan.

A viewing of digital photographs followed:
- ◊ Leonie Mills: Purnululu National Park.
- ◊ Winston Pratt: SW Western Australia.

The evening concluded with supper of cakes, slices and biscuits, tea and coffee.

All present then helped to clean up before heading for home.

Pagoda formations Paradise Park

Waiting for the soup to get hot - lots of cooks!

Plattsburg Historical Walk
Saturday 18th July 2009

Leader: Bob Bagnall.

Attendance: 24 members + 15 visitors.

In the back of my desk, behind some long forgotten photographs I have an old school year book which shows a group of stony faced children, sitting on wooden trestles back in 1946. I had been told by "Geo" members that three people from that class photo were coming along as guests on our 2009 Plattsburg walk. Hmmm – would I remember their faces I thought? More to the point, would they remember me? It had been 60 years since we last set eyes on each other.

We all assembled at the Kemp Street car park in Wallsend at 11:15 sharp, as directed. There were 25 of us for lunch with another 7 or 8 joining us after we had eaten. It was my guess that the "Colliery Inn" would not have had such large numbers for lunch since we had visited 12 months before. Lunch was excellent and economical.

The historical walk was to consist of 4 - 5 kms of promenading around the streets of Plattsburg taking in historical points of interest as we went. The day was one of those almost perfect winter days with long shadows, pastel blue skies and soft sunlight, perfect for walking.

First and foremost, why is this little suburb called Plattsburg? The name Plattsburg is registered with the Lands Department in Sydney as adjoining the Newcastle Suburbs of Wallsend, Maryland and Birmingham Gardens. It consists of 350 acres of very arable land being named after John Platt, who obtained deeds to the area as part of a wedding dowry from its owners, Emma Brooks family in 1845.

Emma's' father was George Brooks. He was sent to Australia from the battle fronts of the Napoleonic Wars to become the colonies senior surgeon. George Brooks is reputed to have the Georges River in Sydney named after him and had been granted large tracts of land in this part of the world.

Plattsburg was originally laid out as huge market gardens which were known as the Lemon Grove Estate. Over almost three decades, hundred of thousands of English lemons were grown along the banks of Ironbark Creek and taken to Newcastle Harbour for distribution to sailing ships (sometimes at thousands per ship) to be used at sea to inhibit Scurvy outbreaks.

The suburb also had its own coal mine, Plattsburg Cooperative. It came about because of the Newcastle/Wallsend Coal Companies harsh treatment of the Cornish and Welsh miners that were under contract.

The Plattsburg mine was privately owned by local folk who paid £10 each to become a part owner. In its day, it was an extremely profitable enterprise, but always run on a shoe string. It was Australia's first and last initiative at running a local cooperative mine. It was purchased in the 1870's by the much larger Newcastle/Wallsend Coal Company who continued to run it as a successful business until 1932.

Absolutely nothing remains of the old pit today except for a few faded non-descriptive photos. The Olympic Pool at Wallsend is located where the collieries tailing dam was situated, while Wallsend High sits in the area where the Pit Head and Coke Ovens used to be.

Its interesting to note that over a quarter of a million tons of premium grade coal was floated across the Hexham swamplands (presumably at high tide) in well defined channels on large wooden barges that were drawn by horses walking on dry tow paths.

Eventually the barges reached the Hunter River and were floated down to Newcastle Harbour where the coal was shovelled into waiting ships holds. Records show that most of the coal from the cooperative mine went to Indian steel

mills where it was used in the production of canons for use in the Sikh and Indian uprisings of the 1850's and 1860's.

Plattsburg village really shone during this period. It had developed its own local council which amalgamated with Wallsend in 1917. It had its own food and fresh water supplies, and in the 1870's its own churches, funeral parlours and cemetery, fire brigade and even its own hospital.

The 1880's saw the community open its own Police Station, Bank and its own newspaper, The Plattsburg Sun and Cooperative Miners Advocate, the prelude to the Newcastle Morning Herald.

Those were the heady days in Plattsburg!

The village of Plattsburg, even in present times, boasts its own Plattsburg Infants, Primary and High Schools. We were fortunate enough to be shown around this complex by one of its senior teachers who told us that during the 1990's, before Maryland and Glendale Schools were constructed, the school boasted daily attendance figures of just under 1000 students. Not bad for a school built in 1869.

Another interesting place we visited was that of an old cabinet maker's area. We soon found out that work for the cabinet makers had become very scarce in the late 1960's due to cheap imports from Asia.

The cabinet makers in question, Pettigrew Brothers, turned their excellent wood making skills into a new area, coffin manufacture. They soon realised the benefits of owning their own Funeral Home and entering the burial business.

Alan Pettigrew, the patriarch of the family, invited us into his luxurious Funeral Chapel, turned on the air conditioning and waterfall and proceeded to give a half hour address of the local area and its characters. He was dead funny keeping us all fascinated.

After emerging from the Chapel we found that the day was almost gone and long shadows were giving away to the chill of the night air. On our way back to the car park we couldn't help but wonder about those early settlers and the 'harsh' conditions of no electricity, no running water, no sewage and God forbid, no cars. Living conditions really were tough.

Only one thing puzzled me about the day. Walking back past the Health shop in Plattsburg I couldn't help but chuckle at a notice in its window which read "closed due to illness".

Report by Bob Bagnall.

Ron Evans

Plattsburg Primary School established in 1869

Ron Evans

Beautifully preserved early cottage in Plattsburg

Newcastle Botanical Gardens
Saturday 19th September 2009

Leader: Ann Clarke.

Attendance: 10 members.

A small group enjoyed a pleasant morning in the Botanic Garden. It was the morning before the Garden's Spring Fair and so there was much activity amongst the Garden's Volunteers.

Anne gave the group a short History of the gardens and management during morning tea after which we were ready to walk. Around the Visitor's centre, the planting is only of Exotic plants and trees to give as much colour as possibly. We then proceeded to the Theme Gardens, each garden displaying Native Flora in a particular Plant Family. The Mission Statement of the garden being "To grow, study, conserve and promote plants of the Hunter Region".

A visit to the nursery confirmed now much the Hunter Garden propagates for re-planting in the garden and for sale to the public. From the nursery we continued to the extensive Succulent and Cactus Garden, one of the biggest in Australia, and all donated.

Leaving the Succulent Garden we then enjoyed a longer trek along the Botanic Walk to the Northern Swamp. Here our male volunteers have recently build a large board walk right across the swamp for easy viewing. Finally a visit to the Fern Garden, the Palm Garden and Rainforest Garden completed our ramble.

Our Group were then shown over the new Herbarium and Library by Elaine Bythe and given the opportunity to use the microscope.

Report by Ann Clarke.

Geological Seminar - Rocks and Minerals
Saturday 10th October 2009

Leaders: Ron Evans, Brian England, Barry Collier.

Attendance: 19 members + 1 visitor.

A hands-on geological workshop was held at the Evans residence with the aim of giving participants information on:

1.Common rock forming minerals & their identification.
2.The classification of rocks.
3.Distinguishing features and examples of each rock group.
4.Map reading - types of maps and map projections, using a compass to find directions using a map.

Ron and Brian organised the morning session on minerals and rocks with both providing specimens for participants to examine, while Ron put together an information booklet for participants to use and keep during the workshops. The back verandah of the Evans house was used for the rock and mineral sessions as good light was essential when examining specimens. Ron presented section 1 which commenced at 10:30.

Important terms such as earth, rock, mineral, element and compound were explained before minerals were talked about in more detail. Of the more than 4000 minerals known, only 10 common rock forming minerals (RFM) make up the bulk of all rocks. These are quartz, orthoclase feldspar, plagioclase feldspar, hornblende, augite, olivine, mica, calcite, clay and iron minerals.

Ron briefly outlined the various properties of minerals, but then explained that one or two specific (diagnostic) properties were sufficient to identify these minerals. While discussing these properties, participants examined examples of

each of the common RFM with the aim of becoming familiar with these diagnostic properties.

Many questions were forthcoming and answered by both Ron and Brian.

Brian then presented sections 2 and 3 commencing with the classification of rocks. Samples were used to illustrate each group; igneous, sedimentary and metamorphic.

Samples of igneous rocks were then passed around while Brian described how the rate and position of cooling influenced crystal size of the igneous rock formed and hence sub-classification into plutonic (large crystals), hypabyssal (fine crystals) and volcanic ((microcrystalline).

Sedimentary rocks were discussed next. Samples of conglomerate, sandstone, shale, limestone and tuff were examined while Brian explained how the processes of weathering and erosion, transportation, deposition and diagenesis formed sedimentary rocks.

Lastly, metamorphic rocks were discussed while samples were distributed and examined. The mechanism of metamorphism (heat, pressure, time) were briefly dealt with before describing the two main groups of metamorphic rocks, contact and regional. Brian finished the session by explaining how pegmatites were formed and by passing around spectacular examples.

A very pleasing aspect of the morning session was the number of questions asked by participants. This enabled Ron and Brian to provide specific information needed to enhance understanding.

Participants actively involved in workshop activities

After some 2½ hours of workshop, the lunch break was most welcome.

After lunch, Barry presented session 4 in Ron's shed as a power point presentation was used to explain the different types of maps in use, and how map projections developed.

A hands on session the took place with Barry demonstrating how a compass is used to find directions on a topographical map. People with compasses and maps the practised the technique while Barry assisted. A very useful and interesting activity. Big thanks to Jim Grey for providing the use of his laptop and LCD projector for the session.

Those present then assisted in cleaning up and packing away specimens.

Report by Ron Evans.

Brian explaining how rocks are classified

Magnificent example of a Pegmatite

Sculptures by the Sea
Tuesday 3rd November 2009

Leader: Ian Rogers.

Attendance: 5 members.

Three of us went to Sydney and then to Bondi Junction by train before catching a bus to Bondi Beach. We were dropped off next to the start of the walk. Before heading off on to look at the sculptures, we refreshed ourselves with a nice coffee.

It was a beautiful sunny day and lots of people were on the walk which took us from the Bondi Icebergs Club to Tamarama Bay. There were over 100 sculptures by both Australian and overseas artists to admire along the way.

We met the other two members who attended on the day at Tamarama Bay where we had lunch before returning to Bondi via Hunter Park high above the coastal track.

It was a very interesting day with many innovative sculptures presented. As is usual with competitions, none of us agreed with the judges award for the best sculpture.

Report by Ron Evans.

Start of Sculpture by The Sea walk, Bondi end with the sculpture "6th constructive cannibalism"

"Waiting"

Tamarama Beach with the controversial sculpture, "little boy lost" on the right

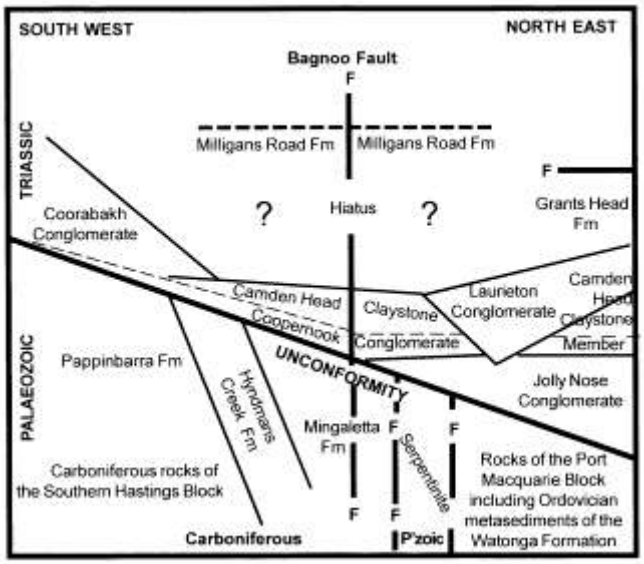
"little boy lost" - caused controversy because he was nude. Swimmers were placed on him for a few days before being removed by the artist.

Lorne Basin Excursion
Friday 13th to Sunday 15th November 2009

Leader: Winston Pratt.

Attendance: 10 members.

The group met at noon on Friday at Kew where Winston displayed a large geological map of the area and gave a brief description of the tour route. He explained that the aim of the tour was to see the stratigraphic sequence of the Triassic rocks, to get an overview of the structure of the basin and see some of the unusual structural features within. Each vehicle was given an A3 copy of the map, a route map of the tour and a generalised stratigraphic diagram of the sequence.



Stratigraphic sequences of the Lorne Basin

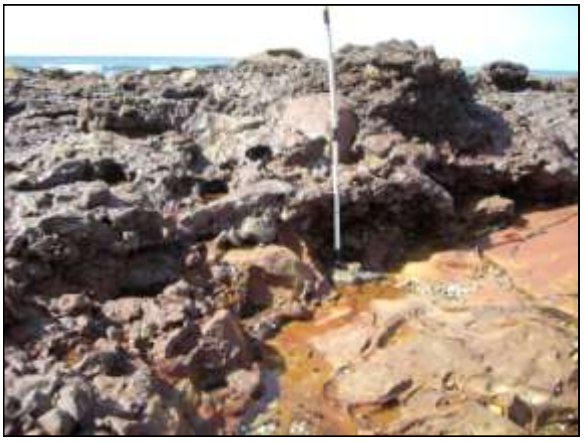
Friday 13 November

From the Palaeozoic basement rocks at Kew the tour headed north crossing the Herons Creek Fault onto Triassic rocks and further on turning off on the Bago Road. At the intersection with Milligans Road the pale airfall tuffs, weathered tuffaceous sandstone, and mudstone (with some poor 'coaly' horizons) of the presumed Upper Triassic – Lower Jurassic Milligans Road Formation were examined. Northwards along Bago Road after crossing the Kings Creek Fault the Lower Triassic Camden Head Claystone was exposed and further north and down dip the basal Coopernook Conglomerate Member of the Camden Head Claystone was well exposed in road cuttings. Onwards towards Wauchope an outcrop of the Coorabakh Conglomerate was visible as a capping on a nearby peak.

Ron Evans

Winston talking about the Jolly Nose Conglomerate

The next stop was at Pacific Park where the basal bed of the Lorne Basin infill, the Jolly Nose Conglomerate, could be seen overlying the locally present Palaeozoic serpentinite of the basin floor. The Jolly Nose Conglomerate is only developed in the north-east of the basin where it is then overlain by the Coopernook Conglomerate Member of the Camden Head Claystone. Elsewhere the Coopernook Conglomerate forms the basal infill unit. The lithology of the Jolly Nose Conglomerate was examined for comparison with other conglomerates in the sequence. Travelling south along the Old Pacific Highway the overlying Coopernook Conglomerate Member



Winston Pratt

Laterised Conglomerate overlaying Grants Head Fm

Winston Pratt

Boundary between the Laurieton Conglomerate (right) and the Grants Head Formation (left) at north side of Grants Head

Ron Evans

Worm burrows in mudstone outcrop Grants Head Formation

with its interbedded reddish-purple mudstones was viewed in an old quarry and in road cuttings near Sapling Creek.

The tour then visited the Bonny Hills area where, at Boat Ramp Beach, presumed Recent ferricreted beach gravels were cemented onto the sandstone, siltstone and mudstone of the Grants Head Formation. The beach had patches of unconsolidated gravel derived mainly from the weathering of the Laurieton Conglomerate which forms the cliffed headlands of Grants Head, Perpendicular Point and Camden Head to the south. The Laurieton Conglomerate is composed of resistant chert, jasper and quartz cobbles and pebbles and, if carefully selected, can produce suitable material for lapidary polishing. Moving south to Grants Head the boundary between the Laurieton Conglomerate and the overlying Grants Head Formation was examined, as was the Laurieton Conglomerate as the group walked along the rock platform and onto the cliff top where the boundary with the reddish-purple mudstone of the upper part of the underlying Camden Head Claystone could be seen.

At the end of the day all of the stratigraphic units in the basin had been seen at close hand, except the Coorabakh Conglomerate which was seen at a distance.

The group met for dinner and drinks at the North Haven Bowling Club.

Saturday 14 November

Commencing again at Kew, the group travelled south along the Pacific Highway past the igneous Middle Brother Mountain to Johns River where the route turned west between Middle Brother and another prominent igneous feature, South Brother Mountain. This road crossed an unusual structural feature, the Holey Flat Uplift. This structure is circular in plan with a diameter

Winston Pratt

Camden Head Claystone underlying Laurieton Conglomerate at Grants Head

Ron Evans

View from Flat Rock lookout. View is south with the volcanic neck of Mt. Olive in the foreground

Winston Pratt

Newbys Cave formed by undercutting Coopernook Conglomerate

Ron Evans

Waitui Falls, a weathered columnar jointed acid sill

of 7 km and around which the usually shallow basin-inwards dipping Coopernook Conglomerate has been turned up very steeply exposing the Palaeozoic basement rocks in the centre. The tour then crossed back and forth several times over the structure rim formed by the steeply dipping resistant Coopernook Conglomerate. The Palaeozoic basement rocks of the sedimentary Lower Carboniferous Pappinbarra Formation exposed in the centre of the structure were examined at Fords Quarry before the tour travelled south-westwards to Newbys Cave where Newbys Creek has an undercut the very thickly bedded Coopernook Conglomerate.

Newbys Lookout was the next stop and here on the cliff tops forming the Lansdowne Escarpment great views of the Manning Valley and many of its geological features could be clearly seen. Some of the steps, handrails and other timber fittings here had been destroyed by recent bushfires on the October Long Weekend. Morning Tea was had at the Starr's Creek Boardwalk, an approximately 300 m boardwalk through rainforest along Starr's Creek.

Ron Evans

Quartz rich Coorabakh Conglomerate

A weaver bird's nest was found at the car park and to the surprise of all the weaver bird returned to the nest to delight the audience whose cameras put the paparazzi to shame.

Big Nellie, a Tertiary volcanic plug, was the next feature. There are many of these plugs in the Upper Lansdowne area, including Nellie's sisters Flat Nellie and Little Nellie, and several others such as Mts Coxcomb, Goonook, Oliver and Kennedy were visible from the next stop at Flat Rock Lookout.

Further north-west along the escarpment at Oskies Trail, the Coorabahk Conglomerate was examined close up and its quartz rich composition was readily apparent when compared with its lateral stratigraphic equivalent, the Laurieton Conglomerate at Grants Head.

After crossing to the upthrown western side of the Delward Fault, an exposure of the Coopernook Conglomerate overlying the Palaeozoic basement rocks was viewed on Slaters Road before a stop on the western rim of the basin provided views over to the Comboyne Plateau where rich basaltic soils of the Tertiary Comboyne Volcano combined with a very high and reliable rainfall provide very fertile agricultural land. At this point interbedded reddish-purple mudstone indicated that the conglomerate cliffs are Coopernook Conglomerate not Coorabakh

Conglomerate.

After a minor hold up involving a road closure due to logging operations, Ron's CB saved the day and enabled us to continue a few more kilometres to lunch at the Watui Falls on the south arm of the Camden Haven River. Here the river plunges over a shallow dipping 4 m thick igneous sill underlain by Triassic sandstone.

On the homeward journey airfall tuffs of the Milligans Road Formation were examined after crossing back over the Delward Fault. Some of the tuffs were soft and grey-blue in colour while others were cream to pale brown and quite hard. These hard resistant tuffs form a prominent ridge on the northern side of Stewarts River while on the southern side of the river, and on the other side of the curving Watui Fault, north facing cliffs of Coorabakh Conglomerate define the northern extent of the unit in this area. Heading further eastward the route crossed from the Milligans Road Formation over the Watui Fault onto the Camden Head Claystone until a kilometre east of Hannam Vale the western rim of the Holey Flat Uplift was encountered. In a deep road cutting the near vertical beds of the Coopernook Conglomerate could be clearly seen. The route then traversed igneous and Palaeozoic rocks of the uplifted basin floor before tuning north and crossing back out of the Holey Flat Uplift.

Northward, at the intersection of Stewarts River Road and Lorne Road, more airfall tuffs

Ron Evans

Quarry Upsalls Creek Road - rhyolite flow (Light) & faulted sediments of basement rocks (perhaps the Hannam Vale Formation)

Ron Evans

Restored section of the Longworth Tramway with its wooden rails

underlying very dark grey mudstone and brown tuffaceous sandstone of the Milligans Road Formation were observed. A short drive westward on Lorne Road to the Palm Valley Lane intersection enabled more airfall tuffs sandstone and mudstone of the Milligans Road Formation to be observed.

Returning back on the Lorne Road towards Kew the route crossed the southern boundary of the other unusual circular structure in the basin, the Black Creek Uplift of 11 km in diameter. Only the south-western quadrant of this structure is defined by steeply dipping beds of Coopernook Conglomerate, the south-eastern quadrant is defined by igneous rocks and the bordering Triassic rocks in the northern quadrant have been removed by erosion. The circular outline however is still visible on Google Earth images as two concentric lineaments a few hundred metres apart and presumed to be faults.

The final stop was a visit to the lookout on the top of the igneous North Brother Mountain. Unfortunately haze limited the visibility at a distance but the birdsfoot delta of the Camden Haven River as it enters Watson Taylor Lake could be clearly seen.

After a long day drinks and dinner again at the North Haven Bowling Club were most enjoyable.

Sunday 15 November

The final day of the tour commenced at Kew and headed westward, crossing the eastern edge of the Black Creek Uplift on the western side of Kendall, then turning onto Upsalls Creek Road and further on stopping at a road materials quarry in the Palaeozoic basement rocks, this time the Lower Carboniferous Hyndmans Creek Formation of hard dark grey mudstone. Also in this quarry was a near horizontal sill of pale flow -banded rhyolite. However since the previous reconnaissance trip, considerable quarrying operations had removed 10 or more metres of material to form a new quarry face and in that face was exposed a fault zone which had acted as a conduit for the intrusion and a near horizontal sill could be seen extending from the intrusion in the fault zone. The tour continued now to the south-west to cross over again the south-western edge of the Black Creek Uplift where again the Coopernook Conglomerate delineating the uplift was observed at a steeply dipping attitude. Further along the road and away from the uplift edge, the Triassic rocks progressively resumed their usual basin inwards shallow dip.

Ron Evans

Comboyne plateau as seen from Mt. Comboyne

Ron Evans

Southern rim of Lorne Basin - Little & Big Nellie, Flat Rock Lookout

The Longworth tramway featured at the next stop. The Longworth Tramway was constructed in 1913 to bring timber to the Camden Haven River at Kendall from where it could be taken by barge down the river to Longworth Sawmill at Laurieton. Initially the logs were loaded onto rail truck and hauled by bullock

Photograph by Ron Evans

Lorne excursion participants, Flat rock Lookout

Ron Evans

Enjoying the view from the fire lookout tower on top of Mt. Comboyne

teams but in 1916 a Climax B-series locomotive was introduced and it could haul 30 to 35 tons of timber a day, as much as a bullock team could haul in a week. However the loco derailed on a bridge and fell into the gully and the line closed in 1929. In 1998 work began in planning and reconstructing a short length of the tramway with its wooden rails. The Longworth Tramway Heritage Walk was opened in April 2001. The abundant local wildlife, namely leaches, deterred several of the group from a prolonged visit to the site. *Boronia mollis*, a rare shrub unique to the Camden Haven Valley, is found in the area.

After morning tea at the Swans Crossing Camping area where airfall tuffs of the Milligans Road Formation are exposed on the opposite side of the swimming hole, the tour headed northwest to the top of Mount Comboyne. A magnificent 360 degree panorama was visible thanks to a very clear day. The overall shape of the basin, as evidenced by the resistant Laurieton, Coorabakh and Coopernook Conglomerate hog-back ridges of the basin rim infill, could be clearly seen.

A downhill run past some of the Tertiary basalt outcrops, along the Coopernook Conglomerate and sandstone of the western edge of the Black Creek Uplift, back onto the Palaeozoic basement rocks of the uplift centre and back out again at Kendall where the tour concluded opposite the statue of Henry Kendall after whom the town is named.

Report by Winston Pratt.

Christmas Social Evening
Saturday 12th December 2009

Organisers: Social Committee.

Participants: 31.

This year, the Christmas celebration was hosted by Ron and Ellen Evans. Our hard working Social Committee once again organised and prepared the meal of tasty hors d'oeuvres, cold meats, salads, bread rolls and sweets.

Lucky door prizes were given out (participants brought a present so each person received a mystery prize) and digital photographs were shown throughout the evening.

President Brian thanked all the hard worker and wished all present the compliments of the season.

North Coast of NSW - Geological Safari 2009

Saturday 8th August to Sunday 23rd August 2009

Safari Leader: Brian England.

Travel Consultant: Barry Collier.

Attendance: 10 members.

Two weeks were spent in glorious weather exploring the geology and scenery associated with Early Permian to Silurian basement rocks, the Late Triassic Clarence-Moreton Basin and the volcanic rocks and landforms associated with the Tweed Volcano in northeastern New South Wales.

Saturday 8th August

Participants made their own way to the first camp site at Pelican Caravan Park on the north bank of the Nambucca River a few kilometres to the south of Nambucca Heads. Most had arrived by 4:30pm after a four to five hour drive from Newcastle.

Sunday 9th August

After pooling vehicles the group left camp at 9:30am and headed south along the Highway to Scott's Head, a tiny town nestled inland of a series of rocky headlands separated by small sandy beaches. We parked at the roadside overlooking one of the beaches and walked south down along the rock platform.

What at first appeared to be dark grey to black uninteresting rocks proved on close examination to be steeply dipping turbidites showing a variety of spectacular structural features, including superb examples of kink bands, worm burrows, and most importantly en-echelon quartz veins formed by shearing forces during regional deformation. These are a boon to structural geologists who can use them to study deformation history and stress directions. Weathered concretions were also found in one outcrop and dolerite dykes cut the whole sequence.

The geology of the area uncovered and explained, the group drove into Scott's Head township for morning tea in the Council park, where we found toilet blocks and shelter sheds decorated with the most fantastic ceramic murals depicting local aboriginal and European history as well as local features.

Back towards the Highway we turned southwards along a narrow dirt road leading into the Way Way State Forest and after a few kilometres came to the beautiful Pines Picnic Area. Here we had lunch beneath a stand of old hoop pines festooned with stag horn ferns, looking out towards a magnificent stand of white flooded

Barry Collier

Kink folding in turbidites, Scott's Head

Barry Collier

Ceramic decorations Nambucca Heads

gums. More than 70 tree species are found here and many have been labeled for easy identification. Unfortunately there was no time to explore the 20 minute walking track through the rain forest leading off opposite the picnic area.

Lunch over we drove south along Rosebrook Road, turning off for Mount Yarrahapinni after a few more kilometres. At 495 metres the lookout on Mount Yarrahapinni, just below the communication towers, provides an uninterrupted view extending from Crescent Head to Coffs Harbour. But while it was fine and sunny, a thick smoke haze spoiled the view for photography.

We retraced the route to Rosebrook road and continued west, joining the Pacific Highway again just north of Warrel Creek township.

Back in Nambucca Heads we all managed to find parking in the main street just north of the Post Office. Here along the footpath we found the most astonishing ceramic mosaic mural depicting the natural attractions of the region, done with broken crockery, tiles and ceramic motifs made especially for this work of art. Just up the street we came upon the Bakery Café where coffee and vanilla slices went down really well. Elaine just had to try one of their psychedelic meringues, but found it almost tasteless.

Fortified by generous servings of cappuccino we returned to our cars and turned towards the coastline at the Post Office corner, taking the left fork in the road down to the boat ramp at the southern end of Shelley Beach. This provided easy access to the rock platforms and coastal cliffs between Cliffy Point and Wellington Rocks to the south. The structures and patterns in the Early Permian Nambucca Beds exposed here are truly fascinating and highly photogenic. The rocks comprise complexly deformed thinly bedded shales which have gone low grade regional metamorphism to phyllite, a metamorphic rock intermediate between slate and schist. The rocks are very fine grained and composed largely of quartz grains less than 0.01mm diameter along with chlorite and mica flakes which give the rocks their characteristic sheen. These flysch sediments were lain down in an offshore ocean trench and were deformed and metamorphosed in the Late Permian as the sediments were squeezed against the continental margin by subduction. At the southern end of the rock platform, Wellington Rocks provided a dramatic background for coastal photography. Sheltering from the breeze we found masses of fly-like insects clinging to the rock in small alcoves along Cliffy Point.

On the way back to camp several people paused at the Rotary Lookout which provided dramatic views over the Nambucca River estuary and the coastal mountains to the south, resplendent in the late afternoon light. After washing off the salty residues of sea mist the group adjourned to the Nambucca Bowling Club to celebrate Alex's birthday.

Monday 10th August

Time to move on and most had packed up and left camp by 8:50am. Each would make their own way north to Yamba, although we would meet up several times for short walks and coffee.

Barry Collier

South West Rocks from Yarahappini Mountain

Barry Collier

"Look At Me Now" Headland

The first diversion off the Pacific Highway came at Emerald Beach where we examined the rocky coastal cliffs below Signal Hill and Look At Me Now Headland, where turbidites of the Lower Permian Coramba Beds outcrop. The scenery was spectacular and the wildflowers plentiful along this well-trodden coastal walk but there was little to see in the rocks apart from some minor folding out near the end of the headland.

A name often conjures up an image of something exciting and so it was with Red Rock, so at Corindi Beach we turned off the highway again and headed for this tiny holiday town nestled on a low headland on the south side of the sprawling sandy estuary of the Corindi River. From the Caravan Park we ambled down the path which led to a shaded picnic area and then the coast. Here we found not a massive expanse of red coastal cliffs, but merely a few low outcrops of bright red jasper jutting out of the beach. The jasper was laced with purple veins of almost pure hematite. Just as well it was low tide or we'd have missed it! It was a pretty place but not quite what we had expected. A little disappointed we returned to the Pacific Highway and resumed our trip north through Grafton to Maclean, where the group re-assembled at the Ferry Park Café and Art Gallery for coffee and cake before turning off the Highway again for Yamba, our final destination for the day and home for the next three nights.

Tuesday 11th August

The day dawned fine and clear after a few sprinkles overnight. We were off at 9:30am for the drive back to the Pacific Highway and then south to Brooms Head. Barry and Elaine had several things to attend to and would join us for lunch at a roadside picnic area near Grey Cliffs.

At Brooms Head we drove through the camping reserve directly behind the beach to the end of the road on the north side of the headland. Here lines of jagged steeply dipping rocks ran out from the coastal cliffs to create a small sandy-bottomed embayment which fills at high tide, providing a popular meeting place for the local pelicans. After morning tea on the grassy foreshore we headed off along the walking track over the headland. As the track skirted the top of the cliff above the stony beach below we had an excellent view of spectacular folding in thickly bedded Carboniferous metasediments in the coastal cliff to the south. The track continued over the headland and down onto the next beach, where we found grass balls similar to those seen on Kangaroo Island last year amongst the beach pebbles. Sponges were also unusually abundant, washed up as a result of the huge storms which had lashed the area a few months ago. A local who appeared very knowledgeable on the natural history of the area kept some of the group enthralled for several minutes and gave the origin of the balls as grass from the base of the coastal dunes being washed into the swash zone by wave action, then rolled in the surf amongst the rocks before being thrown back up on the beach. The tide was about to turn so we retraced the path to the cars and then scrambled around the rocks at the north end of the head to the pebbly beach, which provided an excellent overview towards the folding in the cliffs we had first seen

Ron Evans

Anticlinal folding of sediments, Broome's Head

Ron Evans

Lake Arragan Yuraygur NP

from the walking track above.

We had planned to meet up with Barry and Elaine for lunch at a small picnic area beside the road into Yuraygir National Park, but once we'd turned north off the Brooms Head road reality bore no resemblance to Barry's mud map! Near the end of the dirt road we followed a track off to the left and found ourselves at a delightful picnic area amongst huge paper barks on the southern shore of the Lake Arragan coastal lagoon complex. Here we had lunch.

After a relaxing lunch we suddenly realized Barry and Elaine would probably not find our perfect hideaway and so returned to the main track to wait for them. In the meantime we kept busy by photographing the many wildflowers, including boronia and yellow sun orchids, scattered through the low heath land.

Barry and Elaine arrived at 1:30pm and we all drove up to the Grey Cliff parking area. From there we set out on foot northwards along the beach beneath the Grey Cliffs, which provided a superb section through the Jurassic Red Cliff Coal Measures at the eastern edge of the Clarence-Moreton Basin. Between the parking area and Red Cliff at the north end of the section we were able to examine interbedded coal, shale and breccia layers, the latter the result of numerous debris flows comprising solidified soupy masses of angular rock fragments and mud. The coal layers are quite vitreous but so interlayered with carbonaceous shale as to be useless economically. Rhythmic bedding (interlayered coal and shale), small scale faulting and soft sediment slump folding provided additional interest and photographic opportunities for those fascinated by natural patterns. At the north end of the cliff line we found the upper part of the sequence to be capped by red laterite, hence the name Red Cliff.

From Red Cliff it was quite a reasonable walk along the southern part of the Angourie Track back over the headland to the cars and as usual it was some time before everyone had reassembled and were ready to move out. We left the area more or less in convoy at 4:15pm and made it to the Ferry Park Café at MacLean in time for coffee. We were home by 5:30pm.

Wednesday 12th August

The group left camp at 9:30 am and headed south to Angourie. There would be little driving today, with most of the areas of interest reached on foot. Leaving the cars at the Angourie Blue Pool parking area we followed the walking track down by the pool, which was anything but blue! Beyond this we walked into a narrow coastal forest of old pandanus trees which opened out into a sand-filled sandstone-walled depression in the rock platform. Behind this and hidden from view by the pandanus lay the Green Pool, much larger and considerably more photogenic than the Blue Pool. Both features, now tourist attractions, are old dimensional stone quarries in thickly bedded fluvial greywacke, an impure sandstone containing abundant sand-size rock fragments. Quarrying was forced to cease when an aquifer was intersected which flooded the workings.

Climbing up the rock wall onto the marine platform, we could find little of geological interest apart from faint indications of cross-bedding

Ron Evans

Red Cliff headland Yuraygir NP

Barry Collier

Green Pool at Angourie

and so continued on to the tiny Point Beach which separated this section of rocky coastline from the next outcrop at Angourie Head. Several middle-aged surfers had chosen this secluded beach to ride the waves, but the real surprise here lay beneath our feet in the sand. First one, then dozens of cowrie shells appeared along the pebble strand lines formed by the departing tide. To find one cowrie, maybe two on a beach is noteworthy, but to find over 50 incorporating more than 10 species in a single traverse is truly exceptional! Stan came back with the best find, a large shiny black individual which must have fallen off its perch only yesterday.

Angourie Head comprised rocks similar to those we had already passed over. The thick bedding and regular jointing had resulted in the formation of hundreds of dark grey boulders which now lay strewn in the intertidal zone on the north side of the head.

We found another jumbled pile of intertidal boulders on the south side of the headland, which merged into the wide sandy expanse of Back Beach. Chip marks on the rock platform adjacent to the boulder pile bore testimony to the power of the ocean in throwing some of the boulders against the platform during heavy seas.

The low sand cliff line behind Back Beach, undoubtedly formed or at least enlarged by the storms of a few months ago, revealed sections through fossil sand dunes showing cross-bedding typical of wind-blown coastal dunes and capped by a dark brown peaty soil layer formed in the perched coastal swamp behind the beach.

The southern part of Back Beach looked interesting, even at a distance, so we continued on to discover the most amazing outcrop of coffee rock any of the group had seen. Initially, dark brown fingers of this unusual rock ran out into the surf from under the beach sand and then a few tens of metres further south the outcrop towered to 20 metres or so in a continuous cliff line for more than 100 metres. At first the cliffs were uniformly dark brown and pockmarked by numerous shallow caves. There was even an arch, with dune sand from behind pouring down through it onto the beach. We continued to the end of the cliff line, amazed by the ever-changing colours and patterns formed by the percolation of ground water around old tree roots and other vegetation in these fossil dunes. Water dripping down the face had even formed a row of small sand stalactites in one section. From Back Beach we took a short cut over the coastal grassland back to the cars and drove south to the Mara Creek picnic area for lunch.

From Mara Creek we began one of the longest treks of the trip, the 3.5 kilometres to Shelley Beach Head and return. This well-defined and often sandy track hugged the coastline most of the way, with board walks crossing swampy areas and stair cases providing access to secluded beaches. It passes through a variety of ecosystems and wildflowers were reasonably plentiful including Boronia, Hardenbergia, blue flags and lawyer vine with both flowers and fruit. After a kilometre we came to another sign which also read Shelly Head 3.5 kilometres! Had we gone around in a circle or what?

At one point the track came very close to

Ron Evans

Banksia aemula in flower, Shelly Head walk

Ron Evans

Cross-bedding in sandstone

the sea cliffs and a way was found down to the rocks to examine some very spectacular cross-bedding. Further south the view from Dirrangan Lookout, on the highest point of the track, provided spectacular views up and down the coast and especially south towards Shelley Head at the far end of the great sandy expanse of Shelley Beach. At this point several of the group turned back.

From the lookout the track wound steeply down the side of the hills to the beach, the heath land along the way abundantly dotted with blue flags in flower. Down on the beach it was a long trudge to the headland, the soft sand only interrupted by a few small shallow tea-coloured streams flowing out of the coastal scrub backing the beach. But the anastomosing patterns formed by the water flowing across the gentle slope provided some good natural patterns for the photographers.

The Shelley Head rock platforms came as a real surprise. Laid out before us and retreating into the surf were large areas of eroded rock bearing an uncanny resemblance to the Bungle Bungle Ranges in Western Australia, in miniature! The photographers went berserk! This peculiar coastal feature is the result of marine erosion of shallow-dipping thinly-bedded sandy shales. Nearby, more thickly bedded and even-grained sandstone layers showed the deep closely-spaced circular holes similar to those seen on rock platforms along the Central Coast. Barry climbed around the rocky headland in search of the three caves said to occur on the southern side, but was blocked by vertical rock faces. However he did find and climb through a natural tunnel in the cliff, following it to its end, but access was difficult and dangerous.

Barry Collier

Shelly Head rock platform

On the way back along the beach we marveled at the industriousness of the indigenous crab population who had covered the sand above the swash zone with patterns of sand balls rolled from within their burrows, and all within an hour! We arrived back at the cars at 4:15pm to find the others had already departed.

Thursday 13th August

Time to move on again to our third stop-over, Ballina. Again everyone made their own way, calling in wherever they wished to break the journey. I went back to Point Beach and Angourie Point before leaving Yamba.

To fill in time I diverted off the Pacific Highway to Iluka and out to Iluka Head in Iluka Nature Reserve. Walking down onto the beach from the picnic area I began to walk south around the headland. At first I thought I was wasting my time, with only uninteresting sandstone beds in the cliff and rock platform. But then, just south of a prominent rock pinnacle standing just proud of the cliff line, the rocks suddenly became much more interesting. Along the top of the cliff lay a thick bed of porous sandstone showing very colourful and quite dramatic Leisegang rings similar to that seen in the coastal cliffs of Boudi National Park on the Central Coast.

Watching me take photographs of the patterns, a fisherman down on the rock platform wandered up and inquired if I was interested in geology. Well, of Course! Turned out he was a retired inspector from the Department of Agriculture who was nearing the end of a study of mineral deposits in the Clarence Valley. His next study area was to be the Cangai copper mine, an area I know well! We swapped email and postal addresses and promised to keep in touch. Small World!

Back on the road again I reached Ballina Headlands Leisure Park in Skennars Head Road at 3pm.

Friday 14th August

Today we would venture northwest into the Nightcap National Park to explore the area around Minyon Falls. Beginning at the Minyon Grass picnic area, the moderate-graded two kilometre track to the base of the falls plunges 70 metres in the first 500 metres, passing from wet schlerophyll forest to sub-tropical rain forest where the track flattens out along the moss-covered bouldery banks of the creek. Here Bangalow palms and woody vines predominated. Most turned back where the track crossed the creek but Barry pushed on towards the plunge pool, reporting back some time later that he could find no way to reach the base of the falls.

Back up at Minyon Grass we continued on by vehicle to the Minyon Falls picnic area, from where a short board walk led to a lookout leaning out over the abyss. Minyon Falls drops 97 metres over an outcrop of heavily jointed Minyon Falls Rhyolite which forms the most prominent cliff line in the region. We then drove north to the Rummery Park picnic area for lunch. Walking around the ford on the south side of the reserve we found fresh boulders of obsidian and perlite amongst the fill used to replace a recent washout. These rocks belong to the Tertiary Boomerang Creek Obsidian and examination of fresh specimens here saved us a stop further down the track at a cutting and small quarry mentioned in Field Geology of New South Wales.

Ron Evans

Minyon Falls

Ron Evans

Abandoned Bexhill Quarry

We had intended to take the loop road through to Rocky Creek Dam but found the road closed just north of the picnic ground. But a large goanna ambling across the road at the road block provided some amusement.

With the loop road closed we returned to Minyon Drive and continued around the loop until it reached the Murwillumbah to Lismore road. Since we were now only a short distance from Bex Hill a group decision was made to visit the old Bex Hill Brickworks quarry instead of leaving it until the Rocky Creek Dam excursion later in the trip.

The Bex Hill quarry, now abandoned and filled with amazingly clear green water, exposes gently tilted sediments belonging to the Jurassic Walloon Coal Measures, which comprise a thick sandstone bed overlying thinly bedded coal, coaly shale and shale. We parked off the road on the old brickworks railway siding and walked onto the site. The quarry was enclosed by a high cyclone wire mesh fence in which several large holes had been cut, presumably by local kids to gain access to their favourite swimming hole. We walked through the largest gap and clambered around the northern side of the quarry to gain the best possible views of the rocks. Here only the upper bed of sandstone lay exposed and there was no easy access to the shale bands which are said to host Jurassic plant fossils.

Curiosity satisfied, we took advantage of cheap strawberries being offered at a nearby roadside stall and then headed for Bangalow we had hoped to pause for afternoon coffee at one of

the many small cafes. But there was nowhere to park and Barry very quickly lost interest in coffee. So we headed back to Ballina, a few stopping off at the Macadamia Castle for that much anticipated cappuccino.

Saturday 15th August

This morning Barry had a few spectacular geological outcrops to show us that he had found on his previous trip. So at 9am we headed north along The Coast Road to the Pat Morton Lookout at Lennox Head where it was safe to turn around, and drove back to the small parking bay at the head of the walking track down onto Boulder Beach. It was only a few hundred metres along this regularly mown pathway to the edge of the Tertiary basalt cliffs on the north side of the beach. Boulder Beach as the name suggests is a beach of boulders formed from rounded unweathered basalt core stones derived from the partially weathered columnar basalts in the cliffs to the north, which we were about to examine.

The path followed the edge of the cliffs closely but we could see no safe way down to any vantage point. However after a few hundred metres Barry led the group down onto a narrow rock ledge well above the waves and overlooking the nearby black columnar basalt sea stack known as Shag Rock, complete with resident shags and copious amounts of bird droppings forming a white cap like the froth on a mug of cappuccino. At the back of the ledge the columnar basalt immediately below the soil layer showed classic examples of spheroidal weathering, with black core stones enclosed by concentric layers of lighter-coloured weathered rock. The

Ron Evans

Columnar jointed basalt Skennars Head

offshore rocks formed a great background for photographs of the astonishing patterns.

We returned to the cars and drove to the car park at the end of Rocky Point Road on the south side of Boulder Beach and walked south along the cliff edge to view spectacular examples of columnar jointing in the thick Tertiary basalt flow exposed in the sea cliff on Skennars Head. After morning tea we then explored the coastal cliffs at Rocky Point immediately to the north of the car park, finding superb examples of what appeared to be basalt and ash-filled cross-sections of stream beds complete with stream bed sediments and phreatically-fragmented basalt layers, all overlain by dense black columnar basalt. But the structures here are complex and require detailed study to understand with any degree of certainty.

We then drove further north along The Coast Road to join the Pacific Highway, then turned into Broken Head and continued on to the parking area adjacent to the caravan park. This is the starting point for the Two Sisters Track, a dramatic 1.6 kilometer return walk along well-

Ron Evans

Exfoliation weathering in basalt Lennox Head

Ron Evans

Shag rocks & exfoliation weathering in basalt cliff

made board walks hugging the cliff line and passing through coastal cottonwood and banksia forest, the last remnant of a once vast coastal subtropical rain forest. There was access to the base of Cocked Hat Rocks half way into the walk, but the climb down was very steep and most of the group continued on to the lookout providing views to the south down the rugged coastline past Kings Beach towards Snapper Rock jutting out in the distance. From the lookout the track descended steeply via rough steps onto a small rocky beach backed by Pandanus.

Time did not allow exploration further south and proceeding on would involve scrambling over rough outcrops of the steeply dipping Silurian sediments characteristic of this part of the coastline. So we returned to the large park at the start of the walk and found a sheltered picnic table that had just been vacated. Here we had lunch while wild bush turkeys wandering amongst our feet, pouncing on anything remotely edible that happed to drop on the ground.

Following lunch we drove back to the Pacific Highway, turning left onto the Seven Mile Beach Road which wound south through remnant littoral rain forest along the western boundary of the Broken Head Nature Reserve. Although initially separated from the Big Scrub, which was once the largest area of tall subtropical rain forest in Australia, by a narrow strip of schlerophyll forest and wetlands, the reserve contains many rain forest tree species including white booyong, rosewood, red bean, and red carabeen. It also contains the southernmost example of the smooth-seeded *Kurrajong* and one of the few known examples of stinking *Cryptocarya* in New South Wales. Most of the sheltered gullies contain *Bangalow* palms and there is an understorey of Burrawangs throughout the forest.

Ron Evans

Littoral Rainforest bordering Kings Beach

We pulled into the small parking bay above Snapper Rock and walked down the narrow but well-defined track identified as 4B, passing through possibly the best example of littoral rainforest in the reserve and even surprising a large blue tongue lizard sunning itself at the side of the track. The track ended at a steep grassy slope above the sea and we could find no defined path through to Brays Beach to the north, so returned to the cars. A short foray was then made down track 5B towards Brays Beach but it soon became too steep and rough for many of the group to handle comfortably.

We stopped on the way home at the tidy little village of Lennox Head for iced coffee and a few groceries. As a break from preparing meals the group adjourned to the Ballina RSL Club for dinner.

Sunday 16th August

A few eager souls followed Barry at 6:30am on a return visit to the cliff tops overlooking Shag Rock. The early morning light was perfect for photography and down on the beach we found we could walk part way along the base of the cliffs. Here we found more superb examples of spheroidal weathering in the columnar basalt, appearing even more colourful in the early light.

In the meantime back at camp someone had found out that there were markets in Lismore today. They were said to be exceptional and well worth a visit. Sadly the abstainers were outvoted, so we headed for Lismore.

The markets had taken over the basement car park of a large supermarket and were nothing more than a reasonably large car boot sale, very similar in concept but much smaller than one I had seen in Fremantle many years ago when such things were rare and a real novelty. An hour to look around was mutually agreed on.

There were just the usual things, even a few minerals to look at, but nothing exciting.

Thoroughly marketed-out well before the allotted time we headed off separately northwards through Dunoon towards the Rocky Creek Dam. But we were thwarted once again, with the road closed at the turnoff due to construction work involving extensions to the dam wall. We were to meet Elaine's brother and family at the dam, but clearly this was not to be! Disappointed, we parked at the roadside near the junction and threw some rugs on the weeds at the corner adjacent to a rustic moss-covered wooden farm gate and ate our picnic lunch. We were an unusual sight to say the least, something many of the locals passing by had apparently not witnessed before!

Unable to do the Rocky Creek Dam circuit, there was another option for exploring some of the Big Scrub by driving down the Gibbergunyah Range Road, a narrow dirt track through cleared hilly grazing land which took us to the edge of the largest remaining area of forest. But, after driving only a few hundred metres through glorious rain forest dripping with epiphytes we reached the crossing over Rocky Creek and found this road also closed! So even the Big Scrub loop walk was beyond our reach!

Even more disappointed now, we drove back down through Lismore then out through Wyrallah and Rous Mill to Victoria Park. Here we finally met up with Elaine's brother and family and shared a picnic-style afternoon tea before setting out around the 400 metre raised board walk winding between huge rain forest trees in

Ron Evans

Lunch near Rocky Creek Dam

Ron Evans

Buttress roots supporting tree, Victoria Park

one of the few small remnants of the Big Scrub.

Victoria Park Reserve covers 17.5 hectares and contains 152 tree species as well as a variety of mammals and birds, including the cat bird, which just on dusk remained hidden from our view but made their presence known by calling like a meowing cat, first one then eventually dozens joining in. A most eerie sound as the sun dipped below the horizon and the mists began rising. Another notable feature of the park was the large bean-like seeds scattered on the ground beneath the black bean trees. These seeds are encased in a large brown to black bean-like pod which falls to the ground when mature and slowly releases the seeds as it dries out and curls into attractive shapes.

Monday 17th August

Time to move on for the last time and everyone made their own way to the delightfully positioned Mount Warning Caravan Park near the lower slopes of Mount Warning southwest of Murwillumbah.

I returned briefly to the Sisters Walking Track at Broken Head to explore the coast south of the lookout and the Silurian sediments exposed around Two Sisters rocks. However nothing of great interest was found. I then drove north to Byron Bay, intending to walk the Cape Byron Track around the edge of Australia's most easterly point at the end of a prominent rain forest covered basalt ridge. But the area was packed with tourists! No parking was available at the lighthouse, nor was there any space anywhere

back along Lighthouse Road. You had to pay to park anyway, so I left the area with some disgust and headed for Mullumbimby a short distance to the northwest.

Some of us had heard of "the Crystal Palace" near Mullumbimby and although I imagined it was nothing more than a 'healy-feely' tourist trap I had some spare time to fill and so decided to give it a go. It is located on Monet Drive off the Minyon Falls Road to the southwest of Murwillumbah and reached by a narrow winding mountain road which afforded great views over the countryside, but not for the driver! I arrived at the parking area at Crystal Palace to find Barry and Elaine already there.

It was with some apprehension that I paid the $12 entry fee, thinking I was probably wasting my time, and money. But I could not have been more wrong. Right from the start I was walking through beautifully landscaped tropical gardens rimmed by large groups of quartz crystals. In the shop I met up with Barry and Elaine and we began our exploration of this magical garden with a delicious iced coffee in the Lotus Café. The adjacent souvenir shop held treasures to behold – beautiful groups of colourless quartz crystals, amethyst and other minerals, including water-clear cleavage blocks of calcite which could have come from the Garibaldi gold mine near Lionsville where 53 tonnes of optic-grade calcite had been mined early last century and sent to Germany for the manufacture of petrological microscopes. Calcite has the highest double refraction of any mineral and such optic grade material is rare and a delight to play with!

Ron Evans

Mineral display at the Crystal Castle

Ron Evans

Gardens Crystal Castle

There was also a wide range of locally-made jewellery. A nearby room housed a superb display of large amethyst geodes brought in from Uruguay. Many were for sale.

We then embarked on a walking tour of the site designed as a series of separate interconnecting gardens, each reflecting some highlight of Tibetan culture and rimmed by boulders of rose quartz and/or massive purple sodalite. Scattered throughout are stone statues of Garnash, Lakshmi, Buddha, Nandi, Garuda and Vishnu, each covered in coins left by visitors making a wish. These coins are periodically collected by staff and sent to support refugee Tibetan nuns, an orphanage in Kenya, Sea Shepherd, Doctors Without Borders and Rainforest Rescue.

To end our visit we did the one kilometre rainforest walk through vegetation planted by local volunteers in an attempt to regenerate a small part of the Big Scrub environment. This magnificent place is the result of 25 years of hard work by the King family and hundreds of local volunteers. We left with a lasting impression of peace and tranquility.

Both Barry and I returned to the Pacific Highway via the road north of Mullumbimby. Barry headed off first, while I downed another iced coffee. The road was so narrow, steep and winding in places that I fully expected to see them pulled up at one of the more difficult sections, but they made it through with the van alright. After only a few kilometres on the Highway our route turned off to pass through

Mooball, where all the power poles and the walls of the local pub had been painted in a jersey cow pattern, then on to Murwillumbah and Mount Warning. Even in the late light, the views from the last few kilometres of the road were spectacular, backed by the sharp prominent peak of Mount Warning glowing in the setting sun.

Tuesday 18th August

The Mount Warning Caravan Park was to be our base for the next four nights, enabling us to explore most of the scenic and geological attractions of the area, as well as nearby Nimbin.

Barry had though last night that the sky would be too hazy for good views from the Mount Warning summit and this activity was deferred till later in the week. So this morning we drove off filled with expectations and also some apprehension to the little town of Nimbin.

We began at the Nimbin Café, not for coffee (due to the fear of what might be in it) but for information on the area, which was freely given by the friendly owner. It was disappointing to learn that, despite what we had read in Field Geology of New South Wales, there was in fact no walking track to the base of Nimbin Rocks and that despite being a nature reserve they were totally enclosed by private land and hence inaccessible! However they could be seen from a viewing area beside Nimbin Road to the south of the village. So we headed down there for a look before exploring the town. These pinnacles of rhyolite dotted along the ridge summit are indeed spectacular, but the roadside viewing areas provided no opportunity for good photographs.

Barry Collier

Candle factory in Nimbin

Barry Collier

Nimbin Rocks

Back in town we called on the Rainbow Power Company out on Alternative Way, a local company formed to promote alternative energy sources. Then we began a walk around the centre of the village. There were few people about, apart from some apparently out of work locals and alternative lifestylers. Some of the shop names including Hemp Embassy, Stoned Fish Cafe, Spangled Drongo, Bringabong and Happy High Herbs say it all! The Nimbin Museum, a cramped, dark, dusty, unkempt labyrinth packed with an unsorted mismatch of crumpled ancient memorabilia smelled as old as it looked and continues to defy description.

No one was adventurous or foolish enough to try one of the many coffee shops so we had morning tea in the picnic area near the town swimming pool, more sure of our own provisions than anything we could find in town. We then drove out of town and along Turntable Falls Road, then turned north on Newton Drive, passing extraordinary views back over the Nimbin Valley and Nimbin Rocks. At the picnic area on Mount Nardi adjacent to the Telstra towers we had lunch while contemplating what to do next.

The description of the Pholis Gap walk in our guidebook (Bushwalking in the Rainbow Region by M. Smith) sounded the most interesting and achievable, being only 4 kilometres return. But some were a little apprehensive on reading the line "there are usually plenty of leeches on this walk". The track began in magnificent subtropical rain forest comprising large buttressed trees and woody vines, which further down the slope passed into a drier forest of grass trees and

New England blackbutt. There were tantalizing views through the forest into the valley below but the track became too steep, slippery and rough before we reached the lookout and so we turned back. Just before retreating we passed a father and son group who had also turned back short of the lookout, unsure of where they were going. Our fear of leeches proved unfounded – the forest was so dry there was not a leech in sight!

Back at the cars we found wild raspberry bushes with a few ripe fruit at the side of the road near the parking area but there were only enough for one each! As we were leaving Barry was summoned by the two walkers we had met coming out of the track. It appears they had left the fridge in their rented van on and the battery was now so flat it wouldn't even run a torch bulb. We saw them going again before leaving.

Back to the south of Nimbin we turned down Stony Chute Road to get what proved to be better views of Nimbin Rocks then made a last stop at the candle factory in the old mill on Mulgum Creek just to the north of the town. Here we were shown the process of candle dipping and molding and were able to purchase candles to take home. We just caught the Sphinx Rock Café for coffee before they closed on the way back to camp.

The evening saw the group get together for a brief happy hour and barbecue at the excellent facilities at the caravan park. Strangely, the steak I had bought with some apprehension at the Aquarius Butcher and Bakery in Nimbin proved one of the best ever!

Barry Collier

The Natural Arch, Springbrook NP

Wednesday 19th August

This morning we would head northwards into southern Queensland to explore some of the most scenic parts of Springbrook National Park. Again cars were pooled to avoid traveling in a long convoy up the Murwillumbah to Nerang Road. At the border gate without a gate the views back down the valley we had just driven up were spectacular, with only the ridge lines covered by native forest, the lower parts having been cleared long ago for agriculture.

Our first point of interest, the Natural Bridge section of Springbrook National Park, lay only a few kilometres north of the Border hidden in dense subtropical rain forest deep in the Numinbah Valley. How this feature, lying at the head of a gorge eroded back into the northern side of the Mount Warning Caldera escarpment, was ever found defies the imagination. But it is now completely enclosed by privately-owned land.

From the parking area a well-constructed one kilometre walkway leads down to the creek and along the other side of the gorge to the cave then back up to the car park. The group chose to walk down the stairs rather than up and so took the left fork down into the rain forest. Giant hoop pines *Araucania cunninghamii* are abundant here and are living representatives of the Jurassic age 180 million years ago.

The upper part of Cave Creek is strewn with large basalt boulders, the track eventually breaking through a gap between them to an overview of the cave mouth. From here a short timber spur track led down onto a viewing platform inside the cave, where the waterfall tumbling two metres or so through a large hole in the roof at the far side could be seen close hand. At night the cave becomes a fairyland illuminated by the tiny green lights of thousands of glow worms and it is also sometimes the home of thousands of bats. The cave formed by creek erosion along the relatively soft interface between a lower basaltic agglomerate and an upper dense basalt flow. The track wound up and over the cave, with another

short spur leading down to an overview of the pit through which the creek plunged into the cave, before slowly winding back up the side of the gorge to the car park.

To access the major part of the National Park we had to drive north along the Murwillumbah-Nerang Road for several kilometres, the road hugging the Nerang River as it clawed its way north down the deep narrow valley, then turning right down Pine Creek Road and going all the way down the Lyrebird Ridge Road to the Best of All Lookout at the repeater station on the edge of the Mount Warning Caldera escarpment. From the car park a 300 metre walking track passing beside ancient Antarctic beech *Nothofagus moorei*, one of the few remaining links with the ancient forests of Gondwana, led through the forest to the lookout. These trees now only occur on the cooler higher peaks (around 900 metres) of the Springbrook Plateau and are so far out of their original natural habitat that they can no longer reproduce from seed, but rely solely on their roots to procreate. The view to the south from the lookout was exceptional, but spoiled on this day by haze from burning cane fields. But again the forest was magnificent.

Then it was on to Gomoolahra picnic area at the end of Springbrook Road on the banks of Mundora Creek just above Goomoolahra Falls, where we lunched with a family of hungry currawongs. A short track led to a lookout at the side of the falls, which were almost dry, and on to a second lookout over the valley a few hundred metres to the east. The rocks in the area comprise rhyolites showing spectacularly contorted flow banding and this was visible along many of the walking tracks.

Ron Evans

Mt. Warning from the 'Best of All Lookout'

Ron Evans

Huge Antarctic Beech coppice, Best of All Lookout

While on Springbrook Road we called briefly at the Tallanbana picnic area to view the canyon from Twin Falls, walking a short way up the Twin Falls circuit track before driving up to Canyon Lookout where views down into the canyon, carved out of the thick rhyolite flows by Boy-ull Creek, could be seen a few metres from the car park.

Then it was back to Lyrebird Ridge Road and Pine Creek Road to rejoin the Nerang-Murwillumbah Road for the return trip to camp.

Thursday 20th August

At 9:30am cars were pooled and we headed off for Fingal Head just to the south of Tweed Heads. Parking the cars in Bamberry Street because the tiny car park at Fingal Head was already full, we walked down to the beach and along the wide vehicle track through the coastal forest of banksias and other natives. This area had been mined for heavy mineral sands around 30-40 years ago and had since been regenerated and re-landscaped by the local Landcare group. We were fortunate in meeting up with one of the volunteers, a botanist, part-way along the walk and he kept Barry amused with details of the coastal vegetation and the regeneration program. He also knew of a few good geological sites along the coast further to the south that were not mentioned in any of the guide books.

The low headland at Fingal Point was alive with picnickers and fisher folk as we climbed

down the step-like columnar basalt outcrop to the edge of the sea. Just like a miniature Giant's Causeway, the exposed hexagonal tops of the basalt columns receded into the crashing surf in a small bay between the shoreline and a small offshore island of similar rock linked to the coastal outcrop at low tide by a narrow bridge. Edging around the base of the cliff line to the south we found the columnar basalt to be spectacular indeed, as good as the outcrops we had explored around Kiama a few years ago but not as extensive. It was evident hat several basalt flows were present and the top exposure was found to be highly vesicular, full of small rounded cavities where volatiles (carbon dioxide and water) had escaped from the lava due to the sudden pressure release as the basalt flowed out along low points in the landscape. These cavities are often a source of spectacular crystals including zeolites, quartz and calcite but here weathering had not proceeded to the extent required for these minerals to form. We followed the coastal basalt outcrop to the next beach then re-grouped in the park beside Fingal Head Road for morning tea.

Checking out the locality at Carabita Beach we had been directed to by the coastal volunteer at Fingal Head, we found a geological wonderland on the beach just north of Norrie Headland at Bogangar, after successfully finding our way there through a maze of residential streets. Here we found dark grey thickly bedded turbidites juxtaposed against tightly folded thickly bedded sea floor cherty sediments by a major fault, providing spectacular patterns for photography.

Before leaving we walked along the Norrie Head board walk which lep up over the headland covered in dense native kangaroo grass to a deep gully on the southern side fringed by pandanus.

From here we drove further south to the low headland of Hastings Point, just because it looked interesting from the Norrie Head walkway. But here were just more thickly bedded dark grey turbidites and no interesting structures.

We drove back to the Murwillumbah Regional Gallery for coffee and took the opportunity to look through their photograph display, which included some real surprises. There was also a great view up the valley towards Mount Warning from the glassed-in balcony.

We were back at camp by 5pm and drove up to the Lyrebird Walk at the foot of Mount Warning where masses of black diorite outcrop but it was then too dark to attempt the walk.

Friday 21st August

This was the last day of the trip so Barry and Alex took their final opportunity to climb to the summit of Mount Warning and left camp at 7:20am. Elaine and Heather went into Murwillumbah shopping, while the remainder of the group headed out on a drive around Mount Warning via Tyalgum.

This was a spectacular drive indeed, through rolling grassy hills with the scenery at all points dominated by the high thickly wooded escarpment of the Mount Warning erosion caldera. Our main objective was to attain a good

Barry Collier

Columnar jointed Basalt columns, Fingal Head

Ron Evans

North Caldera rim from the Pinnacle Lookout

Ron Evans

Mt. Warning from Blackbutts Lookout

Barry Collier

Track to Brush Box Falls

viewpoint over The Pinnacle, a rhyolite ridge jutting out from the Border Range escarpment. This was eventually achieved after following a number of blind leads up forestry roads.

We then drove up into the Border Ranges National Park where Barry and Elaine met up with us at Bar Mountain picnic area. After lunch we explored the nearby Falcorostrum loop walk through the cool temperate rain forest before driving off along the Tweed Range Scenic Drive to Blackbutts Lookout, then to Pinnacles Lookout perched above The Pinnacle. The latter afforded one of the most spectacular views in the region, dominated by Mount Warning and the western rim of the caldera.

43 million years ago the area which is now the Border Ranges was occupied by a vast swampy basin. Over 20 million years ago the local rivers were draining into the Clarence-Moreton depositional basin, depositing a layer of water-borne sediments over 3 kilometres thick. Then around 20 million years ago the Australian continent moved over one of the Earth's mantle hot spots and for around 3 million years the region was dominated by volcanic activity which created much of the present landscape. Subsequent erosion has removed much of the softer volcanics to leave the prominent peaks of Mount Lindsay and Mount Glennie.

The ranges actually comprise the overlapping remnants of two adjacent shield volcanoes. Focal Peak, centred slightly to the northwest of Mount Barney, erupted 24 million years ago, a few million years earlier than Mount Warning which now overlaps the eastern side of the Focal Peak Shield. The prominent cliffs in the Park are the result of undercutting of the resistant rhyolite flows by preferential erosion of the softer underlying basalt, leaving the rhyolite to fall away along major joints in huge blocks to leave high cliffs. The eastern section of the Park, which our exploration was limited to, comprises the least eroded part of the Mount Warning Shield.

It was fairly late in the afternoon before we arrived at the Palm Forest Walk, beginning as a slowly descending path through dry eucalypt forest, then becoming quite steep as it entered a gully occupied by the most picturesque subtropical rain forest we had seen on this trip, dominated by bangalow and piccabeen palms. In places we saw where the old cedar cutters had carved their names on the mossy sandstone rock faces. The track ended at the magnificent Brushbox Falls, the crystal-clear water tumbling over moss-covered rocks amidst a backdrop of palms.

We returned to camp via Kyogle, passing by the old basalt quarries once famous for the fabulous calcite and zeolite specimens found in unusually large vesicles.

Most of the group assembled at the Murwillumbah RSL for a final dinner. The trip had come to an end.

Report by Brian England.

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