

'Geo-Log' 2007

Journal of the Amateur Geological Society of the Hunter Valley Inc.

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President's Report.

Hi members and friends,

Firstly thanks to all those members who contributed to yet another very successful year for our Amateur Geological Society of The Hunter Valley, either through acting as trip leaders or assisting in other ways. Even though most of our members are now retired and off doing their own things, which occasionally clash with Society meetings, we have still managed good attendance at most of our activities.

We have developed into a knowledgeable and well-travelled group of people, each now contributing in their own way so that field trips and social activities have become much more interactive. This can only strengthen our Society. Our interests have certainly diversified to match the range of knowledge available through our members, extending into aspects of local history with visits to the Stockton area, Singleton Convent and of course the much enjoyed historical ramble around Paterson. Several members have spread their wings and done exciting trips overseas to China, Thailand and North America, and have delighted us with their photographs at meetings.

At least one totally new geological site was added to the program this year, the glendonites at Col Fisher Park in Singleton, which gave everyone the chance to dig in the dirt and find something exciting. The Kiama weekend was a resounding success despite only moderate attendance and the two week safari to eastern Victoria led by Barry Collier took us to innumerable fascinating sights not explained in the guide books, leaving your President with the challenging but enjoyable task of coming up with plausible explanations! All is revealed in the reports in this Journal.

Very special thanks go out to those who their open their homes for special events, Sue and Ian for the Soup and Slide Night and Vic and Leonie for the Christmas Function. Thanks also go to our very capable Social Committee for their organisational expertise at these events.

Finally, thanks to the trip leaders who contributed to this journal and especially to our Life Member Ron Evans for his efforts in putting together yet another superb edition. This is something that every member of this great Society can all be proud of.

Very best regards,

Brian.

Gosford Regional Gallery and Japanese Memorial Gardens Saturday 20th January 2007

Leaders: Ron and Ellen Evans.

Attendance: 16.

Members attending met in Pioneer Park at Point Frederick, Gosford. After a chat and a walk through the old Point Frederick Cemetery, we sat around in shady spots and ate our lunch.

We had arranged with the Gosford Regional Gallery to visit the Nightwalks exhibition at 2:00 pm and to hear a talk by two of the three artists who produced the exhibition. Nightwalks was an installation exhibition based on the experiences of three artists - Erik Gunzel, Jamie Coffill and Philip Stallard. The artists had conducted regular night walks through Bouddi and Brisbane Water National Parks. The exhibition aimed to evoke the feeling of the landscape at night through video and sound installations combined with sculpture, photography and paintings.

As we had an hour to wait after finishing our lunch, we decided to explore the Gosford/ Edogawa Commemorative Gardens attached to the Gallery. The garden was a gift to the people of Gosford as a symbol of cultural exchange and friendship by Gosford's Sister City, Edogawa, (near Tokyo in Japan). It was designed in accordance to the original principles of Japanese de-



Lunch and a chat in Pioneer Park, Point Frederick



Koi Pond, Edogawa Memorial Gardens

sign of the Heian (700AD) period. The gardens were officially opened in September 1994 by the Mayor of Gosford and the Mayor of Edogawa.

The gardens were superb. Meandering pathways lead to traditional Japanese features including a Japanese teahouse, raked dry stone garden (Karesansui), stone lanterns and a pond filled with Koi fish. A roofed pavilion overlooking the Koi Pond appeared to be a popular choice for wedding ceremonies. We found out later that guided tours of the garden were available by booking through the gallery office. These are conducted by trained volunteer guides who explain the Japanese aesthetics and philosophies of this garden.

At 2:00 pm, we went into the Nightwalks exhibition & were introduced to two of the artists, Erik Gunzel & Jamie Coffill. Each artist presented an outline of their philosophy in producing the artistic pieces on display and explained, when asked, the meaning of each piece of artwork. The gallery provided afternoon tea at the completion of the visit, much appreciated by those attending.

Before leaving for home, we examined a photographic display in a nearby hall.

Avery enjoyable and educational activity.

Report by Ron Evans.

Spoon Bay and Forresters Beach Saturday 24th February 2007

Leader: Ian Rogers.

Attendance: 15.

Members met up in a small park off the Central Coast Highway in Forresters Beach where a car shuffle was arranged, then reassembled at the nearby Wyrrabalong Lookout in Wyrrabalong National Park. Perched on the edge of sea cliffs of Triassic Narrabeen Group sediments, this lookout provided spectacular views to the south towards The Skillion at Terrigal and beyond. From here the group took the 2.8 km Coast Track down the hill through the forest to Bateau Bay, where a stop was made for lunch before driving to Spoon Bay in Wamberal Lagoon Nature Reserve a little further down the coast.

From the parking area at Wamberal Lagoon it was a 500m slog along the beach to a low rock platform at the southern side of Spoon Bay. Here at least three intersecting joint sets cut sandstones of the Terrigal Formation at the top of the Narrabeen Group into a patchwork of irregular angular blocks. Weathering or earth movements had opened the joints to varying degrees to allow infilling by purplish-brown limonite (hydrated iron oxides) deposited from groundwater as a result of weathering of the overlying rocks, long since removed by erosion. The effect was quite



View South from Wyrrabalong Lookout



AGSHV members enjoying the views.

starting, the in-filled joints standing out starkly against the lighter sandstone and the purplish limonite infill standing proud of the surface like miniature stone fences dividing a field. The sandstone blocks themselves showed well-developed pockmarks, resulting from localised disintegration of the sandstone matrix by salt crystallisation as the surface lay baking in the sun during low tides.

Returning back up the beach the group then explored the high rock shelf leading around the headland. Here the low cliff at the back of the shelf showed fine examples of the cross-bedding so characteristic of the Narrabeen Group, each successive crossbed set cut off at the top by an erosion surface before the next set had been laid down and each section delineated by a thin film of iron oxides standing proud of the outcrop.

A little further around and the path was blocked by an impressive narrow 5 metre deep chasm cutting back in from the sea and continuing under the cliff line as a small cave. This appeared to have been eroded out between two



Weathered limonite concretion.

prominent parallel joints in the sandstone and no evidence could be found for the pre-existence of a dolerite or basalt dyke as a likely cause. The gap was too wide to jump, but natural rock steps in the cliff above the cave allowed for a safe crossing.

Beyond the chasm the rock bench showed a number of geological features, the most spectacular being several examples of trough crossbedding visible as sweeping arcuate laminations on the rock surface. This phenomenon in caused when thinly laminated cross beds are deposited in a wide pre-existing concave depression formed by erosion of the underlying sediments. Also found in this area were groups of small hollowed out ironstone concretions and good examples of case hardening along joint sets, where silica deposited by groundwater in the rock pores adjacent to the joints has resulted in a harder rim which is more resistant to mechanical erosion. On the way back to the stairway leading up to the cars, several good examples of honeycomb weathering were noticed, including one in which a miniature set of canyons had been eaten out of the fine grey sandstone in the rock platform.



Limonite in-filled joint exposed as softer sandstone eroded.

Report by Ian Rogers and Brian England.

Stockton Historical Walk Saturday 17th March 2007

Leader: Bob Bagnall.

Attendance: 30.

Participants for the day met at Stockton's 125 year old Boatrowers Hotel for the \$6 Luncheon Specials on what was expected to be a 22°C Autumn day. Of course, it was anything but 'balmy.' The old ships Barometer in the foyer of the Boatrowers with its attached thermometer read 31°C and it was only 12 noon. Even if the thermometer wasn't working properly, it felt that HOT!

The NSW State Elections were to be held one week after our outing and we couldn't but help notice that all members of the Hotel Staff were wearing of all colours green! The waitresses even had green nail polish on. I quietly thought to myself that Stockton must be supporting 'The Greens' in the upcoming election. But, as usual I was wrong. It was St.Patrick's Day and the \$6 Lunchtime Special was (yes, you guessed it) Irish Stew with Damper just to add Aussie flavour.

After a delicious lunch eaten in air conditioned comfort, we drove the two kilometers to Old Punt Road Stockton, our rendezvous point. Parking the cars in the shade of some magnificent Morton Bay figs, our group, totaling 30, set off on our walk to visit a series of historical sites as the nearby clock struck 1.00 pm. Each site had



Irish Stew and Damper - wonderful lunch!

a plaque containing a detailed description which was read out. In some cases, colourful stories gleaned from local folk about the early years of Convict Settlement in Stockton was also given.

So, our journey started at the exact spot where the first recorded European person set foot on the sands of Stockton. Following is a list of Stockton's Historic Plaques visited during our afternoon walk.

- Lieutenant John Shortlands landing place on September 10th, 1797.
 While chasing 6 runaway Convicts, Lt. Shortland saw smoke rising from mangroves on the northern side of Coal River. He came ashore to investigate and found that local aboriginals had lit the fire.
- 2. Stockton's Original Boat Harbour and Vehicle Ferry Site.

This area was developed into Stockton's original Boat harbour in the 1820's, then abandoned only to be resurrected into the landing site for the Newcastle-Stockton Vehicular Ferry.

3. Dave Sands (Boxing) Memorial.

This takes the form of a large sandstone monument listing the astounding achievements of Dave Sands, Middleweight Boxing Champion of the British Empire.

4. Two Huge 25 Tonne Anchors.

The anchors are two of the four that once moored Newcastle's first floating dock at Walsh Island and Carrington. The anchors



Two of the anchors that once moored Newcastle's first floating dock.



Walk Leader Bob Bagnall giving an overview of the walk.

are presently situated on the site occupied by three former hotels:

- The Federal collapsed on faulty foun dations in 1898
 - The Royal destroyed by high winds in 1831
- ♦ The Chilvers destroyed by fire in 1952
- 5. Government Crane.

A large cable driven mobile crane sat on a huge turpentine wharf which ran the full 600 feet of Stockton waterfront. The depth of water at the edge of the wharf was a minimum 25 feet which allowed large overseas sailing ships to berth. The crane was used to load and unload these vessels.

6. Passenger Ferry Jetty Site.

Originally, rowing boats were used to ferry locals across the harbour with oarsmen sleeping in their boats awaiting return. In 1865, Hugh Boyce began operating the first steam ferry across the harbour. Fares each way were 6 pence and 12 pence after 8 pm. A shelter for passengers was built on the jetty in 1915.

7. Vitriol Chemical Works - 1853.

A plaque identifies the site of Australia's first acid plant. The factory was on the corner of Hunter and South Streets where the sewer pumping station now stands. In the 1850's the plant produced Nitric, Muriatic and Sulfuric Acids which were shipped to Britain. An explosion destroyed the plant in 1870.

8. Stockton's First Slipways.

In the early days of the Colony, the only ships available were large ocean-going Square Riggers. There were few small sailing boats for coastal or inter island trips. On this site were three large slipways all producing small sailing ships which were used on the Lord Howe -Norfolk Island runs.

Bass and Flinders Tom Thumb was also build here by Taylor Winslip.

9. Original Stockton Colliery Site.

The Stockton Coal Company was formed in 1879 and the first coal mined in 1855. It was the deepest mine in the area (370 to 400 feet) with most mechanisms working on pulleys and cables. Records show that the mine employed over 200 adult men and 182 boys under the age of 16 years.

The colliery had a contract to supply the Melbourne Gas Company 1,000 tonnes and the Indian Government 500 tonnes per annum. The original colliery site has been completely demolished and the NSW State Housing Commission erected housing on the site.

10. Coal Loading Chute Site.

The chute, located on the original waters edge, consisted of a large wooden trough that was hinged at the waters edge. The chute, generally lying flat on the jetty was 80 feet long.

When a sailing ship tied up at the jetty, an extension was fitted from the chute into the opening for the ships hold. The chute was then loaded with coal from wheelbarrows before being raised by roped and pulleys to an angle of approximately 70 degrees to allow gravity to slide coal into the ships hold.

11. Tin Smelter, 1872.

The Tin Smelter was originally built to fabri-

cate basic kitchenware; plates, soup bowls, mugs etc. for the NSW Government. Their contract was extended to make dixies and pressed metal plates for use by allies in the Boer War and Indian Campaigns.

12. Salt Works, 1830.

Salt was in very short supply in the new colony. It was badly needed to cure meat and salt rations were needed by explorers and workmen of the colony where dehydration was a real problem. The salt was produced by dehydration of seawater.

13. Manually Operated Coal Loader.

It was located 300 feet east of the Coal Chute closer to the entrance of the harbour where water was deeper and larger ships could come right up to the berth.

Loading was performed by a steam driven shovel collecting coal in its bucket and dropping the 'black gold' into the ships hold.

14. Lime Kilns, 1820.

As Sydney expanded, lime was needed to make mortar to construct brick buildings. Large aboriginal Middens abundant in the **Stockton area were used to produce 100's of** tonnes of lime. Donovan McCarra constructed the kilns along Wharf Crescent. They were still producing lime from shell in the early part of the 20th Century.

15. Ballast Jetty, 1822/1830.

Construction began in 1822 in an area of the harbour adjacent to the present Lions Park. The ballast jetty was to provide a calm area on the side of the harbour so that small craft could be moored without damage.

Unfortunately the jetty, even though it was continuously worked on for years, was never finished as the tides would continuously wash rocks tipped into the harbour away.

16. Stockton Soap and Candle Factory.

The tyranny of distance was a real problem for the new Colony. Supplies could take 18 months to arrive from England, so other measures had to be taken to provide continuity of supply.

Two products in demand were Candles and Soap. The Stockton Soap and Candle Factory produced their candles by moulding them in wet sand and used native shrubs to scent their products. The factory was operational in **the mid 1800's for many years until a larger** candle/soap works was constructed in Sydney.

17. Pirate Point also known as Norfolk Rock - 1800.

In November 1800, the Naval Sloop "Norfolk" was pirated by 15 desperate convicts who had escaped from Parramatta Stockade. They sailed north up the coast hoping to make it to the Dutch East Indies and freedom.

Around Swansea Heads they encountered severe storms and put into the Coal River for shelter and supplies. Not being component sailors, they were unable to manage the Norfolk in the gale resulting in it being blown across the harbour onto rocks on the Stockton side where it sank.

All the convicts reached land safely. Six decided that they had had enough while the other nine pirated another small sailing boat anchored on the southern side of the harbour.



Statue of 'Tessa'.

They set sail out past Nobby's, but before they reached Nelson Bay they were arrested. A fast Naval Cutter from Sydney had been sent in pursuit.

Records show that the two ringleaders were hanged and the others committed to hard labour for life. Of the six who remained ashore, one later gave himself up and was given two years hard labour. The fate of the other five is unknown.

The whole of the Peninsula where the Norfolk went down was officially known as "Pirate Point" as late as the First World War.

18. Shipwreck Walk—The Oyster Bank—Stockton Breakwater.
Records show that there was an old International Sea Shanty that went:

> "The Limy and the Yank, All fear the Oyster Bank etc."

Stockton Beach and the Oyster Bank were notorious for shipwrecks. Between the Marina and Morna Point, over 140 ships have been wrecked or stranded.

The building of the Stockton Breakwater started in 1898 and is ongoing today. The hulls of 21 ships form the foundation for the breakwater hence the name, "Shipwreck Walk."

19. Old Stockton Cottage Hospital.

This magnificent building stand on the corner of Mitchell and Monmouth Streets and is a



Viewing the remains of a shipwreck used as a foundation of Stockton Breakwater.

crowning example of a colonial masterpiece. Constructed in 1880 it has won over six Australian and one International award for its classic architecture. Now privately owned, it is no longer used as a Cottage Hospital.

20. Lynn Oval and Surrounds.

Lynn Oval is primary a Cricket Oval. It has one public stand, The Members Stand which **is called the "Dave Sands Memorial" build**ing. Dave Sands carried out much of his training in the basement of the old stand at Lynn Oval.

At the western side of the oval is a life sized statue of a Guide Dog named "Tessa." Between the years 1958 and 1971, Tessa, along with her blind owner Mrs. Jean Dowsett, would visit the passenger ferry wharf at Stockton seeking donations for the blind. The International Guide Dog Association had the Bronze Statue of Tessa commissioned when it was realized that the \$45,000 raised by Mrs. Dowsett and Tessa was a world record at the time for fundraising by a single dog and its owner.

Toward the southern end of the oval are two huge sandstone columns and a large brass plaque. The plaque explains details behind the loss of twenty five lives in a mining accident at Stockton Colliery. Marble inserts in the sandstone columns give details of the 1896 mining disaster where eleven rescuers were overcome by fumes and lost their lives while trying to rescue trapped miners.

21. Round Roofed House, Church Street.

In 1862, Captain Murray, who sailed regularly in the South Pacific, noted that round roofed houses were common in Cyclone prone areas and that they were the only thing left standing after severe cyclones. In 1863 he built a new home on the corner of Queen and Church Streets, Stockton. It had a round roof and is still standing today.

22. 44 Maitland Street, Stockton. In June 1859, a large Community Hall was constructed at 44 Maitland Street and known locally as "Temperance Hall." It soon became the social centre of Stockton.

After 50 years a decision was made to change the Temperance Hall into Stockton's first Silent Movie House. In 1909 it was renamed Stockton Picture Palace.

In 1929 when "talkies" arrived, a new Masonic Temple was opened in Mitchell Street and used as the Picture Palace instead of Temperance Hall.

In 1930, the timber Temperance Hall was completely dismantled board by board and transported to Thomas Street Cardiff, where, in 1931 it was rebirthed as Cardiff's "Southern Cross Picture Theatre." The building still stands there today.

23. Old Police Station, Stockton.

To control the outbreak of crime, mainly from drunken sailors and louts from overseas sailing ships, a Police Station was constructed from sandstone blocks in 1874 on the corner of Newcastle and Hunter Street, Stockton. Although empty, the building is still standing.

24. St. Paul's Church, Church Street, Stockton.

The first foundation stone was laid on December 6th 1845. Due to the fact that money **for construction was stolen the church wasn't** built. In 1865 a start was made to construct a small wooden church using the 1845 foundation stone. The church was completed in 1866. However, a cyclone came down the east coast destroying the building before the first service could be held.

A more robust wooden church was built in 1870 and dedicated on September 11th 1870. This church was destroyed by fire in 1879. The present brick and masonry building was dedicated on October 12th 1890. It still has the December 6th 1845 foundation stone.

The church was in mothballs when we visited

in March, 2007. The Diocese had no minister so it was organized for the Vicar of another Parish to be in attendance and provide a short history on St. Paul's, Stockton. The Reverent Ken Youmann then provided afternoon tea for our enjoyment.

After our interesting walk and talk, we made our way to "Lexies" on the beach for coffee and cakes. "Lexies was lovely!" Eventually we made our way back to the vehicles parked at Old Punt Road. It was here that Ron and Brian realised it was low tide. So it was down to the harbour front to examine remnants of overseas ballast dumped in early times. Many interesting rock samples were discovered.

What a great way to end a beautiful day. No wonder we love the AGSHV so much. These sorts of days are what life is all about. As my **Grandfather used to say, "At the end of the day, every day, ask yourself, did you seize it?" We** certainly did on that day, the 17th March 2007.



Saint Paul's Anglican Church, Stockton.

Report by Bob Bagnall.

Monkey Face Lookout Saturday 28th April 2007

Leader: Brian England and Ian Rogers.

Attendance: 12.

The History of Lake Macquarie.

Looking to the east from Heaton Lookout gave us a magnificent view over the full extent of Lake Macquarie, a mixture of fresh and salt water and formed in the Quaternary (less than 1myr ago) when the coastal region subsided around 85 metres allowing the sea to drown the former coastal river valleys. On-shore ocean currents caused a sand bar to develop across the narrow entrance, periodically blocking it from the sea, and silting by rivers and creeks draining into the newly-formed lake led to the slow infilling of the drowned valleys. This process was assisted by a rise of about 3 metres in the land surface, which also raised the sand bar at the entrance above sea level. The flat land around Fassifern, Teralba and Boolaroo represents reclamation of former extensions of the lake by deltaic sediments.

Formation of Travertine Deposits at Gap Creek Falls.

Those few members who braved the leaches and the steep slippery climb and ventured down to the bottom of the Gap Creek Falls were treated to a spectacular waterfall surrounded by magical rainforest. With little water cascading over the falls, even after the heavy rain of the previous several days, the process of undercutting of the thick sandstone bed which formed and perpetuate the falls as the creek cuts back into the hillside was clearly visible. Also visible towards the top of the falls was the development of travertine formations, a form of calcium carbonate deposited from the cascading water.

The deposition of the travertine begins with decaying plant matter in the soil, which releases carbon dioxide (CO₂). This combines with

groundwater flowing through the soil to produce a weak carbonic acid (H₂CO₃).

$CO_2 + H_2O \Longrightarrow H_2CO_3$

The carbonic acid readily dissolves any calcium carbonate (CaCO₃) it comes across in the surface rocks. This reaction results in a soluble calcium bicarbonate [Ca(HCO₃)₂] being carried in the soil water.

$CaCO_3 + H_2CO_3 \Longrightarrow Ca(HCO_3)_2$

When this soil water reaches the stream bed or is aerated in waterfalls the above reaction reverses because the level of carbon dioxide in the air is much less than that contained in the water, so carbon dioxide can escape. This leads to the deposition of calcium carbonate as layered deposits of travertine.

 $Ca(HCO_3)_2 \Longrightarrow CaCO_3 \downarrow +CO_2 \uparrow +H_2O$

Travertine



Gap Creek Falls.

Report by Brian England.

Glendonites and Sacred Places, Singleton Saturday 19th May 2007

Leader: Brian England and Ian Rogers.

Attendance: 22 + 2 visitors.

Around 22 Society members met at Townhead Park on the eastern side of Singleton at 10:00am. Following the now traditional break for refreshments, with copious volumes of cake and coffee emerging from car boots and downed with eager enthusiasm in anticipation of an exciting day in the fields, the group set off in convey for Col Fisher Park at the end of Wilkinson Drive in Hunterview at 10:30am. I had long wanted to show Society members a classic glendonite locality and explain their significance but with most of the known sites now closed off or otherwise inaccessible, including the original "type" locality at Glendon, that opportunity had not arisen until now. This locality had only been shown to me by a senior geologist from the Department of Mineral Resources late in 2006 and so was completely new to the Society as well.

Leaving the cars in Col Fisher Park we took the rough pathway through the grass to the south along the edge of a deep ravine, which led after 100 metres or so to the north bank of the Hunter River. A bit of a scramble down the last few metres brought us to a narrow bench along **the water's edge beneath a spectacular 50 metre** high cliff comprising dark grey mudstones of the



An explanation of the Glendonite site being given.

Permian Mulbring Siltstone. Ian and I had investigated the locality the week before to ensure access was still possible and had exposed and left in place several fine glendonite crystals in the highly fractured mudstone in a trench along the top of a steep slippery scree slope at the extreme eastern end of the outcrop. Access to the site was not that easy, despite the presence of pre-cut steps up the scree, but those who ventured up into the trench were able to examine and photograph these crystals in situ before they were removed. Then the rush was on as everyone dug in to retrieve what they could. Many particularly fine specimens were unearthed and everyone came away with at least something after around two solid hours of digging.

Glendonite is not a mineral but the name given to pseudomorphs of impure fine granular calcite after IKAITE, a calcium carbonate hexahydrate [CaCO₃.6H₂O], which crystallised displacively within the sediment pile from very cold seawater. This mineral is unstable under normal atmospheric conditions and decomposes very rapidly to a mush of water and calcium carbonate, the latter providing the replacing material in the pseudomorphs. The original type locality at Glendon on the banks of the Hunter River east of Singleton was described by James Dwight Dana in 1849 in his geological report for the United States Exploring Expedition for the years 1838 to 1842 under the command of Charles Wilkes USN. The name glendonite was proposed by Edgeworth David and colleagues in 1905 in a paper submitted to the Records of the Geological Survey of New South Wales after extensive studies had been carried out on the Glendon locality.



Glendonite crystal.



Eager fossickers looking for Glendonites in Mulbring Siltstone.

Since these early reports, many other localities have been found in the Hunter Valley, on the South Coast of New South Wales, and around the world. David *et.al.* had proposed glauberite [Na₂Ca(SO₄)₂] as the precursor mineral and this precipitated much scientific debate. In fact the actual precursor was not discovered in nature until ikaite was found in the Ika Fjord in southern Greenland in 1963. Even then it was not until 1979 that the connection between ikaite and glendonites was finally made.

The glendonites occur as single sharp prismatic and often sygmoidal crystals up to 60cm long, although the maximum length recorded from Col Fisher Park is around 20 cm. Complex groups and intergrowths governed by twinning are common and thin coatings of crystallised gypsum are often present. Typically the glendonite horizons in the Hunter Valley are completely devoid of fossils, although at Glendon large colonies of the Polyzoa Stenopora and crinoid fragments have been found. A common feature, however, is the presence of bands of very large limestone concretions and occasional erratic boulders dropped into the sediments from rafts of sea ice moving up the palaeocoastline from the south. Both these features are present at Col Fisher Park, with some of the erratics reaching 0.5m diameter.

A line of weary but happy diggers struggled back up the steep path to their vehicles at Col Fisher Park, some leaning noticeably under the weight of their booty. The park was deemed an ideal place for lunch before moving on to the day's next event, a guided tour of the Convent of Mercy in Singleton, pre-arranged by Janet Cater.

The site and its buildings have been occupied by the Singleton Parish since the 1840's and by the Sisters of Mercy since 1875. Begun in 1995, the Sacred Spaces Project includes the first Sisters' Chapel on the side of the Parish Church of St. Patrick's, the old cottage museum, the Motherhouse Convent, the new Sisters' Chapel, and the gardens that surround these buildings. The buildings contain valuable collections of paintings and old books and reflect a lifestyle of a bygone age, a lifestyle no longer appropriate in today's religious community. Particularly beautiful is the interior of the new Sisters' Chapel with its marble decorations and huge original paintings behind the altar. A short but engrossing film shown in the small Cottage Museum tells the story of the Sisters of Mercy.

Report by Brian England.

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For more information on the Convent of Mercy visit their website on www:sacredspaces.org.au



Convent of Mercy, Singleton.



Members admiring the wonderful architecture.



One of many hidden treasures around the Convent of Mercy.

Kiama District - Geology And Landforms Friday 1st to Monday 4th June 2007

Leader: Brian England and Ian Rogers.

Attendance: 13.

Although the Society had made a previous visit to the Kiama area, this was back in 1996 and the area proved so interesting then that it was decided to program a return visit this year for those who had missed the initial excursion. Just to make sure all features were still accessible and to orientate myself with any recent changes and so avoid any unnecessary convoy U-turns in difficult situations, I drove down a day early, arriving at the Easts Beach Holiday Park in Kiama on the Thursday afternoon. The weather was cold but clear and despite a forecast of showers, these did not eventuate and the entire weekend remained clear and sunny, a far cry from the wild weather that would befall the Central Coast and Hunter Regions over the following weekend. In all, 14 members made the journey south, most arriving by midday Friday.

Background Geology.

The Gerringong Volcanics, which were extruded during a Mid-Permian episode of crustal deformation from vents located slightly offshore, comprise seven submarine and two terrestrial latite* flows (the Blowhole and Bombo Latites) as well as large quantities of tuffaceous (ashy) material. Erosion products of the volcanics were transported northwards into the Sydney Basin, which was then a marine trough, and deposited in a small delta during what is known as the Lower Tomago Depositional Episode. The top of the delta comprised oxidised red sands (the Jamberoo Sandstone), while the delta front sediments consisted of green silty sand (the Westley Park Sandstone) and supported a very rich marine fauna, examples of which can be seen at Black Head at Gerroa to the south of Kiama. Prodelta silts are represented by the Berry siltstone.

Friday 1st June.

On Friday morning I set out on a reorientation exploration of the area, first visiting the old Bombo Railway quarry on Bombo Head. This would be our principal geological target and I was unsure of access after construction of the new Princes Highway Bypass had closed the old access point just north of Bombo Railway Station. However I found that by taking the Princes Highway entry ramp (Hutchinson Street) from Terralong Street just north of the Highway overpass and then taking the second turn off the Highway (signposted Bombo) this took me directly to an underpass under both the Highway and railway line, the road then winding northwards to the old parking and picnic area just to the south of the quarry. It took close to two hours to re-locate all the features in the quarry and to find easy access to the rock platform at the base of Bombo Head, just in case there was time to explore beyond our original intentions. This done, it was time to collect lan and Jim from Kiama Railway Station and drop them back at East Beach. There I found Stan and Dawn eager to get stuck into the local geology, having spent the morning doing their own thing around Jamberoo and other places, so we all set off for Attunga Avenue to devise a plan of attack for the following day. Although many interesting features were found, we could not locate the lava tube cross-section I had seen during a visit with Macquarie University back in 1982.

Saturday 2nd June.

The initial flows in the Gerringong Volcanics were submarine pillow lavas and breccias which built up to form very steep underwater **cones. We began our tour into the area's geologi**cal past by visiting the famous Blowhole on Blowhole Point where upper part of the Blowhole Flow, the first of the lava flows erupted at sea level as the volcano became "emergent", is well-exposed. Unfortunately the seas were flat, rendering Kiama's greatest tourist attraction totally inactive, and only a short time was spent looking at the rocks here. Much better examples of the structures within the Blowhole Flow could be examined at close quarters elsewhere.

Leaving our vehicles at the north end of Shoalhaven Street, we set out on foot around the north side of Kiama Harbour to the rock platform below Pheasant Head. Just south of the Ocean Baths, a good exposure of the top of the Blowhole Flow was examined after climbing over the low sea wall. Here the lava is of the blocky aa type, the intervening spaces between the rough lava blocks filled by later fine washed-in sediment. North of the ocean baths a wide rock platform exposing the base of the Jamberoo Sandstone immediately above the Blowhole Flow opened out before us and the tide was favourable for a full exploration. The rocks underfoot displayed an intriguing tessellation, quite unlike what we were used to seeing along the coastline around Newcastle. But it was the cliff face which provided the most interesting geology. Here are exposed thinly bedded sandstones and shales showing a variety of features consistent with tidal mudflats around the emerging edge of the volcano.

Within the sequence are several thin layers of angular to sub angular volcanic rocks and the occasional isolated angular boulder. Some authors have explained these rocks as ice-rafted pebbles dropped from floating sea ice, but while this is the most likely explanation for these fea-



Examining top of the 'Blowhole Flow', a flow of blocky aa lava.

tures elsewhere in the Sydney Basin sediments (and especially in the Hunter Valley), here the pebbles more likely represent rocks thrown from the throat of the recently emergent volcano just offshore. The coarse porphyritic nature of these rocks is typical of the material that would temporarily block an active volcanic vent and the consistent and guite uniform lateral extent of this material lends support to this explanation. The enclosing shales and especially the thin bands of dark mudstone were crowded with the vertical feeding burrows of marine worms, taking full advantage of their organic-rich environment. As new sediment was washed in periodically, these organisms would migrate upwards to maintain their ideal position within the sediment pile.

From Pheasant Head we drove around to the picnic area south of Bombo quarry and then set out on foot towards the quarry floor via the rock platform at its southern boundary on Bombo Head. Here we were able to examine many features at the base of the Bombo Flow, the first purely terrestrial flow which overran the red fluvial sands formed by erosion of the earlier Blowhole flow and pooled in slumped areas of the delta.

Out on the rock platform, the base of the Bombo Flow shows a very sharp and unremarkable boundary with the underlying sandstone, suggesting it was relatively dry when the flow moved out across it. Apart from the succession of advancing pahoehoe toes with intervening sand wedges at the base of the flow, the only notable feature was another thin pebbly band near the top of the sandstone probably representing an



Boundary between Bombo Flow and underlying sandstone.

explosive clearing of the volcanic vent before the next outpouring of lava. However back towards the quarry there is a dramatic change in the nature of the boundary. Here the base of the flow is marked by flow foot breccias and irregular rounded latite pillows formed as the lava moved over an area of wet sand and into a small stream channel, causing steam-generated (phreatic) explosions, which disrupted the underlying sediment and fragmented the basalt. The result is a breccia ridge, which follows the course of the old streambed in a southerly direction to finally emerge in the cliff face on the south side of Bombo Head. Above the breccia ridge the pooled basalt still shows the vertical columnar jointing typical of basaltic rocks, but here the network of horizontal cracks called chatter marks, formed as the latite columns cooled inwards from the flow surface, follow the contours of the breccia ridge and not the surface of the flow as would normally be expected. This suggests that here cooling of the lower section of the pooled lava took place progressively from the bottom up. Interaction between the entrapped water, the basalt and underlying sediment resulted in the formation of secondary minerals, including quartz, calcite and zeolites, in cavities between the latite pillows.

From the rock platform the group made its way via the roadway passing to the east of the sewerage works onto the floor of the main quarry, winding between towering groups of basalt columns left as islands and now surrounded by a sea of impenetrable scrubby vegetation. The scenery inside the quarry was indeed spectacular, with walls of columnar basalt towering to 25 metres high in every direction. Of particular in-



Spectacular basalt columns, Bombo Quarry.

terest to the photographers however, was the narrow seawall of basalt columns 4 to 5 metres high left in place along the coastline to protect the quarry from storm surges and now standing, partly destroyed, in mute testimony to the power of the sea. This area provided some really superb photographs and indeed the site has been used on several occasions for filming television commercials.

At several points on the quarry floor quite large basalt dykes have been exposed by the guarrying operations. Yesterday I had managed to relocate and mark the most important of these, called Sue Wass's Dyke after a geologist at Macquarie University who first found it and recognised its significance. This dyke is unusual in that it contains abundant included lumps (xenoliths) of a variety of rock types transported up from the Earth's mantle, including peridotite (olivine) and Iherzolite (olivine, chrome-diopside and enstatite). Also present are layered gabbros from deep in the magma chamber and coarse aggregates of black amphibole (hornblende) plucked from altered basalts in the upper mantle or lower crust. This dyke has also been cored for palaeomagnetic studies and was found to record one of the many magnetic pole reversals (now called the Kiaman Magnetic Interval) that have occurred throughout geological history. We managed to follow the dyke as it traced a crazy path over towards the sea wall. Here we found a vertical exposure clearly showing layering, formed as the fissure in the Bombo Latite was in filled in successive stages as it gradually opened, creating what is known as a sheeted dyke. But here only the central core contained xenoliths.

By now many of the group were in desperate need of sustenance, so before moving on we sat around the dyke and ate our packed lunches, and in doing so joined that relatively small group of people who can proudly tell their friends they've had lunch sitting on Sue Wass's Dyke!

Back on our feet we headed north across the quarry floor walking over extensive areas of rounded cobbles thrown inland during wild storms, illustrating quite graphically the need for

the protective sea wall left by the quarry operators. At the northern wall of the guarry we were able to closely examine the massive columnar jointing formed as the pooled latite slowly cooled and solidified. The columns developed by contraction of the lava around cooling centres scattered at regular intervals throughout the flow. These cracks initially form on the surface and then extend downwards towards the plastic zone which gradually increases in depth as the mass cools. Evenly spaced horizontal chatter marks are also well-exposed here, clearly showing a convex section due to faster cooling at the sides of the columns. The fact that they are convex upwards shows that the lava cooled from the surface down only and not also from the base, as would have occurred in the case of a sill.

Standing back from the wall, I pointed out the thick layer of lighter coloured rock capping the latite flow and the question arose, what was it? Was it simply an overlying soil horizon? One obvious clue to its origin was that the cooling columns extended beyond the top of the latite and well up into this surface layer. But the clinching clue lay in a few scattered boulders of the material at the base of the wall, which on close examination were found to contain the weathered remnants of abundant potassium feldspar crystals up to 2cm across aligned in what would have been the flow direction in the original latite. So the mystery was guickly solved. The light coloured layer represents surface weathering of the latite to a kaolinite-rich residue.

Only one spectacular feature remained unseen, up on top of the bench in the northeast corner of the quarry. Reaching it required a bit of scrambling over piles of large angular latite boulders and then a short climb up a wall of columnar latite. Here the abundant rectangular crystals (phenocrysts) of potassium feldspar in the latite were clearly evident, glistening like diamonds in the bright sunlight. Up on the bench our goal was quickly found, a wide basalt dyke intruded along the polygonal cooling joints in the latite in spectacular fashion and standing out black against the lighter weathered surface of the latite. Chilled margins and a coarser grained central



Calcite-filled vesicle in a basalt dyke.

region with calcite-filled vesicles were clearly evident. These dykes are the result of crustal stretching associated with the opening of the Tasman Sea around 80 million years ago.

For a time this unparalleled geological site seemed destined to be partly destroyed and closed off to tourists and students alike, as the Metropolitan Water Sewerage and Drainage **Board had planned in the late 1970's to use part** of it for the construction of a sewerage treatment works for the town of Kiama. However representations made to the Heritage Council of NSW by the Geological Society of Australia and Macquarie University resulted in the Bombo Headland Geological Site being accorded the protection of a permanent conservation order (PCO) in July 1983. Now it will always remain accessible to anyone wanting to study or simply observe its unique geology.

Our exploration of the quarry over, we headed back into Kiama for a well-deserved Cappuccino before driving out to the next site at the end of Attunga Avenue in South Kiama.

In the rugged sea cliffs immediate beneath the end of Attunga Avenue below the picnic area and around the edge of the bay to the south, superb exposures of the Blowhole Flow and underlying beach sands can be studied in close detail. The beach sands have hardened into the Westley Park Sandstone, which now forms a wide relatively flat rock platform along the base of the cliffs, allowing easy access to the interface at low tide. The Blowhole Flow was the first of the flows in the Gerringong Volcanics to be erupted at sea



Injection dyke following joint pattern in Latite flow.

level, i.e. when the volcano became "emergent". Hence it shows considerable interaction between lava and wet beach sands, producing locally abundant breccia, areas of intense zeolite and carbonate mineralisation and lots of open space which became filled with sediments, including superb examples of in filled aa lava. Once the lava was able to isolate itself from the wet sands, flow of solid basalt continued along tube-like fingers called lava tubes. Two superb examples of these fingers are exposed in cross section below Attunga Avenue, both showing spectacular radial columnar jointing, developed as the lava tube filled and slowly cooled. However access to the best of these was deemed far too dangerous for a group visit, being right at water level and at the bottom of a rough and difficult climb. This was in fact the cross section I had visited with Macquarie University back in 1982 and which I had managed to at last re-locate on a reconnaissance trip before setting out with the group this morning. I also saw the reason for not photographing it back then; getting far enough away to put the full section in the camera viewfinder would have seen me backing off the narrow rock platform into the sea and getting extremely wet! Maybe next time we might hire a boat!

The abundance of interesting structures in this coastal section kept the group amused till almost sunset. It was difficult not to allow the group to collect some of the beautiful vesicle fillings of crystallised quartz (including amethyst) and calcite found in some of the basalt outcrops, but such things are best left for others to see and enjoy.



Radial columnar jointing in an infilled lava tube.

Stan and Dawn had managed to book a group table at the Grande Hotel and so after cleaning up we filed into the dining room around 6:30pm for some rowdy socialising over an evening meal. The food when it eventually came was good and reasonably priced and the atmosphere was great, until one of the cooks tried to burn down the kitchen and filled the dining area with acrid white smoke as a result!

Sunday 3rd June.

While we waited for the tides to become more favourable for a visit to Black Head at Gerroa the group decided to drive the 20km or so down to Berry to visit the local markets. This **filled in a bit of time but that's about all. We** found thousands of people milling about, but none of the dozens of stalls displayed anything worthwhile and there was not even anywhere to sit and enjoy a mug of coffee. So at 11:00 am we all headed back to Gerringong, meeting up again at the coastal park near the SLSC at the south end of Pacific Street, where the nosebags came out for a quick lunch.

I had not visited this part of the coastline for over 50 years, but on a family trip during school holidays back then I had found and collected magnificent specimens of the Permian pelecypods *Eurydesma* and *Notomya* somewhere on the rock platform south of here. The tide was now well out making the walk down the coast dry and easy. I had also noted here so many years ago the presence of spectacular spheroidal weathering in the sandstones. Suddenly, there it was, just as I remembered it, the rock platform covered in magnificent rounded patterns. All I had to do now was find the fossils. Then, just to the north of the boat ramp in Gerringong Harbour, there they were! Not many now, but unmistakable in outline and fully articulated as if buried alive. Unbelievable, two successes in one afternoon! But out on the rock platform, we found something quite strange. Here there were dozens of erratic boulders, often in groups as is characteristic of ice-rafted material. But more than a few had been cored. Such cores would of course be useless for palaeomagnetic studies and I could only conclude that the cores were used to date the rocks to see if a source could be identified. At this point we headed back to the cars and then off down to the rock platform on the north side of Black Head at Gerroa.

This richly fossiliferous locality lies within the Westley Park Sandstone Member of the Budgong Sandstone, which is unusual in that it consists largely of volcanic rock fragments and detrital plagioclase along with ferromagnesian minerals (including large perfect augite crystals) and quartz. This is one of the classic sites of Australian palaeontology and was visited by James D. Dana between 1838 and 1842 while geologist with the Wilkes US Exploring Expedition. The fossils are particularly abundant on the northern part of the rock platform where we found beautiful examples of the bryozoan Stenopora and the brachiopods Terrakea solida, Ingelarella and the wing-like *Notospirifer*. The brachiopods were found closely grouped in the sandstone, adding weight to the idea that these animals were colonial in nature. They were also fully articulated, complete with internal structures, indicating that they were buried in life position. The cliff face behind the platform showed layer after layer of fossilised feeding burrows in the sandstone, formed as the brachiopods filtered the fine sediment for organic matter. Unable to move quickly to adjust to changes in their environment, many of these shell colonies were probably buried alive during large influxes of sediment, only a few managing to escape to continue the species.

Someone in the group mentioned cappuccino and suddenly there was a scramble for the



Fossil Brachiopod showing the support structure that holds soft internal organs in place.



AGSHV members who attended the Kiama weekend.

cars for the trip back to the Sky View Café in Gerringong, where we lazily sipped our coffee while watching the sun set over Werri Beach to the north. Everyone was tired, but happy. It had been a magnificent weekend. Too weary to be bothered going out, scrambled eggs sounded good for dinner tonight back in the cabin.

Report by Brian M. England.

Reference:

PERCIVAL, I.G. (1985). The geological heritage of New South Wales. National Parks and Wildlife Service.

Soup & Slides Saturday 23rd June 2007

This year, Ian and Sue hosted 'Soup and Slides'. 33 members attended attesting to the popularity of the evening.

Four delicious soups (pumpkin, lentil and bacon, minestrone and chicken noodle) were eagerly consumed by those present.

A photographic competition amongst members was held once again, although entries were down.

Then onto the real purpose of the evening, the viewing of members photographs. This year, members were invited to bring along digital photographs which were projected onto a screen via a digital projector, as well as video presentations and DVD presentations.

Brian showed slides of cactus flowers which amazed those present by their beauty. Leonie presented photographs taken when she and husband Vic traveled around Australia. John and Janet showed a Video of their trip to Hawaii while Jim Grey used a DVD presentation on a trip to Japan.

After such a varied presentation, another name for the "Soup and Slides" may have to be found.



Members tucking into the 'goodies' on offer.

Paterson Historical Walk Saturday 21st July 2007

Leader: Brian England.

Attendance: 14 + 1 visitor.

We parked our cars amongst well established trees on an overcast winter day at Tucker Park. The park was established in 1939 and extended in the early 1970's. It bears the name of the Hunter Valley's first free settler, John Tucker Jr who was granted land known as Albion Farm, opposite Woodville School, in 1814. Some explored the damage the June floods had caused to the river banks while awaiting the latecomers.

Our first stop was the intriguing old brick shed that housed the town's first hearse. The site **was the base of Fry's Coaching Enterprise from** the 1860s to the 1920s. Nearby was a timber corn straddle designed to store fodder for the horses in a dry, vermin-free environment.' Brian gave an account of the early history of the area.

We then crossed the main road to observe The Paterson Tavern, originally the Commercial Hotel. This attractive building was erected in 1882 and renovated in 1975. It once served as a coach depot. It has a hipped roof, upstairs balcony, cast-iron lacework and a pleasant atmosphere. Inside there are historic photographs dating back to the 1830s. The house next to it, Noumea, is the oldest surviving house in Paterson and was built in 1826. It once served as a **girls' school and may soon become a bed and** breakfast extension of the tavern.

We then traversed across the road to Paul's Anglican Church that was built in 1845. The first Rector was appointed in 1839. This simple, Gothic Revival rubble stone church has a rendered interior with original cedar pews and timber pulpit. The windows are Tudor-style with timber tracery. One bears the family coat-ofarms, in stained-glass, of the first minister, Reverend James Jennings-Smith. He died in 1846 and is The region was originally occupied by the Gringgai clan of the Wanaruah Aboriginal people and was then blanketed in cedar forests. The first known European to visit the area was Colonial William Paterson, who in 1801 surveyed the area along the river that Governor King later named in his honour. The timber-cutters followed after this initial survey, gradually stripping the area of its prized cedar, and the area was then known as the Cedar Arm because of the abundance of this timber. As early as 1811 a few small farms had been established along the river banks at Paterson Plains and by 1818 there were eight farms along the river, six of them belonging to convicts. The first European settlement was at Old Banks on the river near the present site of Tocal, where convict gangs cut the cedar and floated the logs down the river.

The first land grant in the area was made to Captain William Dunn in 1821, beside the Paterson River to the south of the present town. After a legal fight Susannah Matilda Ward received 600 acres at the limit of the river's navigability from her husband's grant when he died. In 1832 some of the 600 acres belonging to Susannah Matilda Ward was acquired for the construction of Paterson village and in return Susannah received a property grant on the east side of the river and at the present site of the Sydney Harbour Bridge!

Although the town was the third to be surveyed in the Hunter Valley (after Newcastle and Maitland), it was not proclaimed until 1833. Being at the navigable head of the Paterson River, it became an important river port, as well as a service centre to the surrounding farming community. I mportant amounts of tobacco were grown, as well as grain crops, grapes (some used in wine making), citrus fruits and cotton. A small shipbuilding industry also began with the development of the river trade.

The river trade began to decline in the 1850's as the road to Maitland improved. Several timber mills had been established by 1870. In its heyday Paterson had four stores, five hotels, two shipyards, a saw mill, a tannery, four blacksmiths, two butchers, a bakery and a boarding school for girls.

By the time the railway arrived in 1911 the long-term decline of the river trade had just about finished. As a final nail in its coffin, the railway passed directly over the wharf and a mishap during the construction of the bridge badly damaged one of the moored ships. The same boat was later damaged again when a spark from a passing steam train set it ablaze. The message was **clear and the river trade stopped, apart from the cream boats which continued till the 1930's.** Throughout the 20th century agriculture has been the major source of local income. Citrus production was particularly strong at the turn of the century with an estimated 30 000 cases being handled at the port each year.

buried at the rear of the church adjacent the wall. The large tomb of his son-in-law, William Munnings Arnold, can be found at the end of the path, by the fence. Arnold represented the area in parliament. He died in the 1875 flood. John Galt Smith who, in 1823, took up the land on which Woodville developed is also buried here. Gostwyck Cory known as the 'King of Gostwyck'. Another tomb in the churchyard is that of Frederick Bedwell, who in 1815, at the age of 19, was first officer on the HMS Northumberland. This vessel conveyed Napoleon to his exile on St Helena. On the voyage Bedwell painted a watercolour depiction of Bonaparte which is still in the family. It is believed to be the only portrait of Napoleon in which he posed with his arm in his

By the front door is the tomb of Edward

jacket. Members spent some time reading the grave stones and Laurel found the resting place of long lost relatives. Unfortunately the key to the Church has found a new home since Ross last had access to it so a look inside was not to be had on this outing.

Our next place of interest was the former CBC Bank, designed by G.A. Mansfield and built between 1897 and 1902. It is now a café and bed and breakfast. The bank had previously been in the blue building with timber columns and balcony across the road (c.1840). Members were surprised at the décor in the café and the way the vault has been transformed into a gift shop with items of historical interest on show.

The post office that is still in use today was completed in 1885. Next to it is the Court House Hotel that has had a checkered history. It started as the Cricketers Arms in 1864 on the river bank north of the present village site. A major flood in 1875 made the building uninhabitable. It was demolished and the material moved to the current site and rebuilt as the Court House Hotel. That building was badly damaged again by flood and then fire in the 1930s and, in 1960, the manager's wife was burned to death in another fire.

Next door is the former School of Arts building (c.mid-19th century), now a private residence. Across the road was where the town's original wharf stood, just near the current railway bridge. The views from the roadside here are very pleasant. St Ann's Presbyterian Church, built in the late 1830s and still holding services today, is said to be the oldest Presbyterian



Post Office, Paterson.



St. Anne's Presbyterian Church.

Church on mainland Australia. As a sign of the Scottish highland presence, the church's first teacher had to be skilled in Gaelic grammar. The building has arched lancet leadlight windows with timber tracery.

Over the road we sneaked into the Italianate styled Courthouse as it was open for another walking group. The Courthouse was turned into a Museum in 1971 as Court services ceased in 1967. The Manchester Unity Paterson Lodge Banner, created by George Tuttil, was striking as one walked into the main court room. The double sided banner is the only surviving Manchester Unity Incorporated banner in the Hunter Valley and the only banner of this style in Australia. My grandfather was the Grand Master of the Paterson lodge so it has a special significance to me. The museum traces the European history of Paterson and has exhibits relating to poet Dorothea Mackellar, who spent her teenage years on a nearby property, and bushranger Captain Thunderbolt whose wife, Mary Ann Ward, was trialed there. It was erected in 1857 with additions completed in 1865. Its dominant feature is the arcaded porch with its three monumental arches. There is a central courtroom and four ancillary offices. The police were originally stationed in the barracks upstairs.

We then headed uphill along Church Street past the old and rather plain police residence that was completed in 1882. Next to the Oddfellows Hall, which was designed in 1865 by the courthouse's architect, Stephen Stanbridge stands the house my grandparents lived in for over fifty years. My grandfather constructed a bomb shelter in the backyard so that the school children would be safe during WW2. Across the road is the fine painted brick building that served as a primary school from 1877 to 1971. Set amidst fine gardens it has arched lancet windows, a steeply pitched roof, carved timber bargeboards and a gabled porch supported by two columns. On the corner is St Columba's Catholic Church (1884), an interesting brick building with an unusual design and arched lancet windows topped by decorative tiles.

We then retraced our steps back to the other end of King St to observe a fine, two-storey house with shuttered upstairs windows, known as Annandale. This was built by Captain Johnson, the local police magistrate in 1839. The second storey was added in1860. At the end of the street is the timber house that John Tucker built. He planted the pecan nut tree here to celebrate the end of WW1. We followed Queen Street back to the park before heading home.

In reflection, the older parts of Paterson are significant within the lower Hunter as a rare example of a compact, essentially nineteenth century village which is set within a dramatic rural backdrop. The Victorian and Federation buildings mostly have steep galvanised iron roofs, high single or double storeyed timber or masonry walls with high narrow window openings, 'traditional' paint colours, often bull-nosed verandas and decorative details. It is also interesting to note that town water was not connected until 1980.

Thanks go to Brian for organising the day and providing an interesting commentary on the buildings of this quaint town.

Report by Sue Rogers.

Information Sources: www.smh.com.au/news/New-South-Wales/ Paterson/2005/02/17/1108500198382.html www.tocal.com/homestead/museum - has details of the heritage walk. www.maitlandhuntervalley.com.au

Three Peaks Walk, Nelson Bay Saturday 18th August 2007

Leaders: Brian England & Ian Rogers.

Attendance: 11 + 2 visitors.

On this outing were eleven members and two visitors. One of the visitors (a university graduate from England specialising in conservation) was visiting the area for the first time and **was "roped in" to join our outing by Lynn Monk**ley.

We started our visit to the Port Stephens area by stopping at Gan Gan Lookout which is located 1.5 km south-west of the city centre along Stockton Rd, turning to the left into Lily Hill Rd which will take you up to the Gan Gan Lookout car park. Follow the path around the Telstra buildings to the viewing platform. This is truly one of the highlights of the area. The panorama is breathtaking, especially at dusk. It is possible to look south to the opposite side of the peninsula, south-west down to the stacks of Newcastle and the cargo vessels in its harbour, west to the mountain boundary, north-west over Soldiers Point, spanning eastwards over Hawks Nest, the two gigantic headlands that loom over the Port's entrance, Nelson Head and Nelson Bay. Lily Hill Rd is named after the abundance of enormous Gymea lilies to be found at the top the hill. The stalks, which grow to 5 metres, can be eaten and were used by the Aborigines for spears.

Brian England spoke of how the area was formed.

"History of Port Stephens: The whole region appears to have been a Tertiary peneplain which was uplifted about 1000 feet at the end of Tertiary times to form a tableland or plateau. The hills are residuals of this tableland. Submergence in late Pleistocene times drowned the shore line and produced Port Stephens. The ridges were partly submerged, the higher points remaining as islands. Silting followed. Bores put down at Anna Bay indicate that not less than 190 feet of silt were deposited, therefore the submergence must have been in the order of 200 feet.

A more recent emergence of fifteen to twenty feet brought the area above sea level and produced the swampy plain above which the one-time islands now rise as hills. Two of these hills, Yacaaba (North Head) and Point Stephens, are joined to the mainland by narrow sand-spits. At high tide the sand-spit to Point Stephens is submerged. At the entrance to Port Stephens there are Cabbage Tree Island and Boondalbah Island which had a similar origin but are not joined to the mainland.

Port Stephens is a typical drowned valley. Its long axis runs east-west for about thirteen miles. It is divided into two unequal parts, by convergence of the northern and southern shores, at Soldier's Point, where the normal width of three to five miles is reduced to less than a quarter of a mile. This is due to the presence of massive acid lava flows forming a ridge striking approximately north north-west south southeast.

Before submergence, this ridge formed a divide between the watershed of the Karuah and Myall Rivers. The drowning submerged a col (gap) in this onetime divide and allowed the waters of the Karuah River to flow into the eastern part of Port Stephens, which is the drowned valley of the Myall River.

Before this, the Karuah River continued its southern course and joined up with the Hunter River system. Today, there are only low lying alluvial flats between the western part of Port Stephens and the Hunter River estuary."

Reference: Nashar, Beryl: Geology of the Hunter Valley. Pages 80-81



Lunch on the summit of Stevens Peak.

We then drove to the start of the Three Peaks walk parking our cars at the southern end of Ocean Beach Road in Shoal Bay.

The walk to Stephens Peak was a gentle amble via a fire trail with many stops to inspect the flora on the way. The climb up to the Peak proved a little more strenuous but on reaching the top we all were spellbound by the 360 degree views. It was decided that lunch was in order so that we could sit and admire the views both out to sea and inland. .

Again quoting from Beryl Nashar's Geology of the Hunter Valley

"Station Hill (Stephen's Peak) provides an excellent vantage point for viewing the physiography. To the west is a low swampy sand flat just above sea level. To the south of Port Stephens is a group of isolated hills composed of Carboniferous lavas. The majority of the hills rise to a general elevation of about 400 feet above sea level, indicating a probable erosion level. There are a few exceptions to this general level. These are Yacaaba (717 feet), Tomaree (540 feet), **Ghan Ghan (527 feet).**"

While eating lunch it was decided to visit the Lighthouse Museum at Nelson Head and then visit the Café for coffee and cake.

Again it was an easy stroll back to the cars and a short drive to the Lighthouse Museum.

The Point Stephens lighthouse was erected on Nelson Head in 1872. It was originally powered by four kerosene lamps. The kerosene lamps



View of Fingal Spit & Point Stevens Island.



Barry Collier, our Botany expert.

were upgraded to an electric lamp in 1946 and electronic control in 1984. The electronic control eliminated the need for a manned lighthouse.

The last upgrade to the Nelson Head Inner Lighthouse was in 1995 when a solar powered occulting white and red sector light was installed.

The light keeper's house is attached to the light room and was built in 1875 for the original keeper William Glover. His son Frances was later the keeper of the Outer Light.

A trust was established in 1986 to restore the Inner Lighthouse and cottage, and since then has become a major tourist attraction for Port Stephens and is now heritage listed. The views from the lighthouse are panoramic and stunning. The coffee and blueberry cheesecake rivaled the views. It was decided that this is indeed a very beautiful part on the world and was seconded by our English visitor. The day came to an end when the café staff started to pack up the table so that they could go home.

Report by Ian Rogers.

Warrah Trig Walk Sunday 16th September 2007

Leader: Barry Collier.

Attendance: 16 + 2 visitors.

On 16th September members and friends met at Mt Ettymalong Lookout, overlooking Pearl Beach. Vehicular access is no prohibited from the lookout area, but the lookout was well signposted from the carpark. While there, the geology and related landforms of the junction between the Narrabeen and Hawkesbury series could be easily seen and were explained before we moved off to the former Warrah Reserve, now part of Brisbane Water National Park and our target for the day.

First stop was a laterite deposit, which contained a magnificent display of Waratahs. Because of the drought, the recovery from the 2006 fire was slower than might have been expected and there was no dramatic display of wildflowers similar to that in the adjoining areas which hadn't been burnt.

We then moved over to Warrah Trig for lunch. Warrah Trig is on a prominent rock outcrop, surround by low shrub land which traditionally provides the most spectacular spring wildflower display on the Central Coast and on this day we weren't disappointed.

After lunch we walked down to Warrah Lookout, perched on a cliff top overlooking Broken Bay. Next stop was one of two spectacular tessellated pavements, but on the way we stopped at an area where Native Rose (Boronia serrulata) can normally be seen. It was nowhere near as plentiful as in most years, but we eventually found some before moving on to the tessellated pavement.

The tessellated pavement was quite extensive and really spectacular, but Brian could only shrug his shoulders when asked how it was formed. We then moved on to another pavement which was the most spectacular I have seen. It was not as big as the previous one but had more deeply indented patterns on a surface far from level. One section even has rectangular patterns and adjoining the main platform were other smaller, but quite different pavements, and in between them we found more Native Rose.

After consulting our watches and checking our commitments, we decided there was time to go back near the other pavement and climb up to Wave Rock, a spectacular outcrop of Hawkesbury Sandstone which really did look like a giant wave, with spectacular views of Broken Bay and Patonga.

Unfortunately the area made an ideal site for skateboard activities and the area was defaced by skateboard tracks and graffiti, but the natural beauty of the area still stood out and it made a good finale for a great day.

Report by Barry Collier.



Pearl Beach from Mt. Ettymalong Lookout.



Magnificent example of Tessellated Pavement.

Hawkesbury River Cruise Wednesday 3rd October 2007

Leader: Sue Rogers.

Attendance: 17 + 4 Visitors.

Wow – what a wonderful day for a cruise – temp forecasted to be 38°C and the heat at our meeting time of 9:15am was certainly promising a hot day. We all assembled at the Brooklyn ferry wharf after securing a parking spot in the crowded car park of this otherwise sleepy village. At 9:40 we were allowed to board the traditional timber ferry. Some ventured to the sun on the top deck while others grabbed seats out of the scorching heat underneath. The boat was loaded with young and old ready to experience a trip on Australia's last riverboat postman. For some, like Joan, it was a chance to reminiscence on previous voyages. For novices like me, it was a new experience to view the range of housing that constitutes the isolated river communities. For everyone it was a chance to observe the wonderful scenery that only the Hawkesbury River can offer.

We soon departed and headed east after navigating around the various vessels docked at the wharf. Our first stop was Little Wobby where a truck that could just fit on to the wharf awaited the delivery of bread, milk, boxes of groceries and newspapers for the Broken Bay Sport and Recreation Centre. The absence of a tail gate on the truck left one wondering what would happen to the load on the steep hills in the journey to the campsite. Our next delivery was simply a newspaper to a small residence that was amongst elaborate brick homes as well as tin shack weekenders. Two men with a ladder then disem**barked for a day's work** – what a way to travel to work.

We then headed towards Dangar Island while the captain outlines the history of this popular tourist destination. Governor Arthur Phillip had explored the river in March, 1788 and named the island Mullet Island after the abundance of fish in the river. The island was purchased in the late 19th century and renamed by Henry Carey Dangar, surveyor, pastoralist and parliamentarian. In the 1920s the island, which is barely a five-minute walk across, was divided into residential plots, though space was reserved on the beach, the flat and the top of the hill for recreational use. Nowadays about 200 people live on the island that is serviced by a small passenger ferry. The riverboat postman however still brings out the daily mail and shop supplies and picks up the mail on the return trip. There are no private cars on the island so a wheelbarrow or trolley is used to haul goods. The island has a general store/cafe and a bowling club. Six passengers disembarked and two boxes were unloaded We then headed west, under the railway bridge and then the freeway bridge. Morning tea was then served while the postman continue on its duty making deliveries at Peat Island, which was originally called Rabbit Island and renamed after George Peat, a local ship builder who established a ferry across the Hawkesbury River in the 1840s. In 1911, a psychiatric hospital was established on the island. During the 1920s prisoners from the hulk Parramatta were used in construction work on the island. The facility later became a hospital primarily for people with developmental disabilities.

The next stop was Milson Island where bread, milk and newspapers were dispatched for the 160 lucky children that were spending some of their school holidays at this idyllic destination. It was first built on over 100 years ago and has been used as a mental hospital, a gaol and now is a sports and recreation centre. There are many activities there, including a high ropes course, rock climbing, canoeing, kayaking and abseiling. Our journey continued around the green grass of Sunny corner at Bar Point that once had a church and school but now only has a cemetery. One may ponder what living on this river would really be like. A number of houses were up for sale – were the views worth the isolation?

We then traveled north while observing the many mangroves and she oaks that dangle in the edges of this great rivers. Further up the bank, splendid eucalyptuses make their home. Sea eagles were spotted to everyone's delight. We then reached our final destination – Marlow Creek. The residents here have electricity and telephone but no road access. The isolation of living on the river was bought to one's attention when watching dogs and children coming to collect a biscuit from the riverboat postman. We then made the return journey back to Brooklyn Wharf, collecting the outgoing mail as we went.

Back on the mainland meant facing the midday heat without the coolness of the river breeze but we could all satisfy our hungry bellies. A shame we did not pack our togs – it was a perfect day and place to go for a dip. Everyone had enjoyed this relaxing social outing and it was hard to believe that a major bush fire only a few kilometers away at Cowan had closed the freeway for a number of hours that afternoon.

Report by Sue Rogers.



L to R: Jan Harrison, Jim Gray and Helena Gray waiting for morning tea upon departure.

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Kitchener Fossils Saturday 17th November 2007

Leader: Brian England.

Attendance: 5.

The previous Society visit to this site in February 2005 was curtailed by extreme temperatures and after only a few minutes collecting we had all adjourned to the nearby Khartoum Hotel to enjoy its much cooler environment and a few drinks. It was decided to return to Kitchener this year in the hope of much kinder weather conditions, but it was not to be!

I had arrived well before the designated time in order to check out the rough track up to the former site of the fire tower at the top of the first ridge west of the Khartoum Hotel, but found it un-negotiable by non 4WD vehicles only a few hundred metres up.

So I returned to park under the shade of the trees opposite the Pub and waited for someone else to arrive. I was about to return home when who should turn up but Ron Evans, only a few days back from his exploration of the West. For the next couple of hours, during which another 3 members arrived, we talked in the shade of the **ironbark trees about Ron's experiences, with little** regard to the fossils up on the hill!

We eventually decided to brave and heat and took two of the 4WDs up the track beside the new power line to a spot just short of the base of the hill. From there it was on foot to the top of the hill, as the track had become too rough even for a 4WD to negotiate the deep ruts and high ridges that had developed through erosion since the track had been upgraded to install the new power poles.

Along the way we were able to examine abundant examples of the extraordinarily-rich and well-preserved marine fauna in this lower unit of the Branxton Formation exposed on the



Internal mould of the marine bivalve Edmondia.

southwest side of the Lochinvar Anticline. The rocks of the Branxton Formation were laid down during a steady marine transgression (sea moving in over the land due to subsidence or rise in seal level) which followed the deposition of the largely terrestrial (land-based) Greta Coal Measures. The sediments comprise massive sandstones and conglomerates at the base of the formation with more sandstones and silty sandstones towards the top. The Branxton Formation is divided into Upper and Lower units by the Fenestella Shale, the best example of which is exposed in the Mulbring Quarry which the Society had visited last year.

At Kitchener, the rocks of the Lower Branxton formation comprise fine to coarse limoniteimpregnated sandstones and shaly sandstone in which relatively thin discontinuous layers contain an extraordinarily rich marine fauna, preserved intact and undistorted by diagenesis. Many of the fossils are articulate and cavities left by leaching of the original shelly material by groundwater result in loose internal casts which, with care, can be removed from the sandstone intact. Another notable feature of the fossils at Kitchener is the extreme thinness of their shells, especially in the fragile gastropods, and yet most have been preserved intact with no signs of damage. Hence the depositional environment in which they lived must have been very low energy, not intertidal or beach face where such thin shells would have been quickly destroyed by wave action and abrasion, but more likely sandy tidal mud flats associated with a major river delta. Occasional small specimens of driftwood and *Glossopteris sp.* leaves also suggest a strong fluvial influence in a brackish environment. But the area must have also remained open to the sea, at least periodically, as shown by the abundant drop stones of mainly volcanic rocks from a few cm to over 0.5m in diameter associated with the fossils. The articulate nature of many of the shells suggests an advancing zone of live burial as sedimentation and other conditions gradually changed with the advancing ocean.

As it turned out the weather was not hot enough to discourage swinging large hammers and the hills soon rang to the sound of steel striking hard sandstone as we searched for fossils. In a relatively short time we had found very fine examples of the brachiopods *Terrakea* and *Ingelarella*, as well as the gastropods *Peruvispira* and *Keenia*. The full range of fossils found here is listed in the report for February in Geo-Log 2005.

Satisfied with our finds we drove back down the hill to the trees opposite the Pub for a picnic lunch before returning home.



Marine Brachiopod fossils are very common occurrences. The above internal moulds belong to the genera Productus.

Christmas Social Evening Saturday 8th December 2007

Organisers: Social Committee.

Participants: 29.

Another wonderful evening once again held at Vic & Leonie's.

Our hard working Social Committee organised the event again this year. Special mention must go the members of the Social Committee namely Leonie Mills, Ellen Evans, Elaine Collier, Halina Turnbull, Jenny Green, Sue Rogers, Jan Harrison and Ethel Raine.

Unfortunately some members had prior commitments and were unable to attend this year.

A selection of hot nibbles were handed around before the main meal of cold meats and tasty salads was presented.

After the main meal had been completed, five members (Tony Turnbull, Barry Collier, Jenny Green, Ethel Raine and Leonie Mills) gave a short slide presentation and talk.

Once completed, sweets, tea and coffee was served before clean-up and departure.

A special thanks must go once again to Vic & Leonie Mills for the use of their home and facilities for our annual Christmas gathering.

Report by Ron Evans.

Report by Brian England.

South East Victoria - Geological Safari 2007

Sunday 7th to Saturday 20th October 2007

Safari Leader: Barry Collier.

Participants: Brian England, Barry and Elaine Collier, Tony and Halina Turnbull, Jim and Helena Gray, Stan and Dawn Madden, Terry and Laurel Kingdon.

Introduction

Originally to be guided by Ron Evans, planning for the trip was taken on by Barry Collier when Ron and Ellen decided to make an extended trip in their caravan to around Australia for 7 months. The final arrangements were laid down at a barbecue in the pleasant lagoon-side park at Lake Munmorah where Barry and Elaine now reside.

Barry had visited most of the sites before and enthralled us at the barbecue with tales of marvellous unexplained geological phenomena he had come across. But, as with Tasmania, it was next to impossible to find much information on the geology of the sites we had planned to visit. The internet provided a few basic details on some of the National Parks, but Parks Victoria seemed to totally ignore the geological background in all but a very few of their information sheets. The few guide books and treatises on Victorian geology held little useful information on the Gippsland region, with only Phillip Island covered in any meaningful detail. We would have to observe closely and make up some good stories as we went! As it turned out, we were to marvel at some of the most dramatic geological features in the Country.

Sunday 7th October

All 11 participants in the trip met up on the Sunday evening at the Shadrack Resort, a clean and very comfortable caravan park on the beach just south of Eden on the Princes Highway.

Those who had arrived earlier in the day drove out to the Pinnacles, a spectacular example of coastal gully erosion about 30m deep and cutting through white clay capped by red-brown laterite. The gully is quite irregular in plan and is lined by variously shaped pinnacles to form a very picturesque site.

Monday 8th October

Barry seemed to have abandoned his infamous early morning departures and we set off in convoy at the very respectable hour of 9 am. Maybe it was the 16°C outside temperature that morning that had dampened his enthusiasm, although otherwise the weather had turned out quite beautiful. Jim and Helena had departed **earlier to explore what they'd heard was a fantas**tic hidden beach called Green Glades near Wonboyn Lake and reported back that it had indeed been worth a visit.

The Convoy met up again at Cann River where coffee and cake were enjoyed before heading south along the narrow, badly corrugated and often winding Point Hicks Road. Those with vans left them at Cann River and thumbed a lift with the other drivers, so as not to slow the group down. We reached the coast at Thurra Camp and picnic area, then turned west towards the lighthouse, passing a large brown snake at the side of the narrow sandy track. But it turned tail and vanished when Barry pointed his camera at it! We found the coastal track gated about 2 kilometres west of Thurra Camp and parked beside the picnic tables. From here it was an almost flat 2.2 kilometre walk through interesting forest up to the lighthouse, past the magnificent granite outcrops on the low headlands between Honeymoon Bay and Point Hicks itself. This required numerous forays down to the beach for photographs. We found numerous wildflowers in season as well as the snakes!

The massive coastal granite outcrops at the lighthouse provided spectacular photography as well as an opportunity to examine several interesting geological features associated with the granite. This granite body, one of several we would encounter between Point Hicks and Phillip Island, was the result of offshore subduction of oceanic plate back in the Devonian (?). Frictional heat from the subducting plate melted the rocks, resulting in a rising plume of magma which ate its way up towards the surface above the subducting plate and then solidified before reaching the surface. The granite at Point Hicks shows large scattered K-feldspar crystals and small pockets of pegmatite, a coarser-grained version of the host granite formed when latestage hydrothermal fluids entered cavities and cracks in the almost solidified mass. Some of the pegmatites here contain cavities lined with wellformed crystals of quartz, feldspars and black tourmaline. There are also narrow veins of very fine-grained granite (microleucogranite) filling shrinkage cracks.

Dawn was the first to climb up to the lighthouse and was greeted by one very large black snake on the stairs. Evidently it took one look at her approaching and fled back into the grass! As well as the whitewashed stone lighthouse there are a number of associated stone buildings, now heritage-listed. Some can be rented for accommodation. Paying the caretaker \$5 each, we were given a short talk on the local history and then given free run of the lighthouse itself, locking the door behind us to keep non-paying free-loaders out. Those who made it to the top balcony were rewarded with expansive views of the coast, although the weather had by then become darkly overcast. Not everyone ventured out onto the balcony and I swear that tower, stone though it was, stood swaying in the wind!

On the long walk back to our transport further side excursions were made off the track to photograph the coastal scenery. Yet another large brown snake was seen on the road, a place they seemed to much prefer over the coastal scrub. A late lunch was held at 2:15pm at the Thurra picnic area in the shade of magnificent coastal forest.

Lunch over, we returned to Cann River, finding the caravans where they had been left, and then headed down the Highway to the Bemm River Rainforest Walk, billed as an area of magnificent rainforest at the junction of the Bemm and McKenzie Rivers. The parking area was only 500m off the Highway, but on arrival we found the track barricaded off because of the damage caused to the board walk by recent floods. Barry decided to go only as far as the damaged area, but in fact made it all the way around the circular route without any problems. There was a considerable amount of debris along the lower parts of the board walk but no structural damage that we could see. It was obvious that a massive flood had raged down this deep narrow ravine in the recent past, but now it was so dry that the forest seemed to be dying from lack of moisture! Had it been a windy day there would have been significant danger from falling dead branches, but a total absence of even the slightest breeze made it a safe and pleasant stroll.

Tony and Halina had been unable to contact Marlo Beach Caravan Park before setting out and so had booked into a luxury cabin near Cape Conran. The rest of the group continued on to Marlo Beach and after setting up camp adjourned to the Marlo Pub for what turned out to be a fantastic bistro dinner in very quiet, almost deserted, surroundings. The cabins at Marlo Beach were a concoction based on central stationary vans annexed by huts and so huge we almost needed a map to find our way around. I thought mine was really big until I slammed into a floor-to-ceiling mirror in the far bunk room!

Tuesday 9th October

The day dawned with unbelievably perfect weather, with the bluest sky and not even a hint of cloud. But by the time we left camp at 9am heavy cumulus had begun to roll in from the west. Our first goal for the day was to be Pearl Point to the east of Cape Conran. Barry had not been here, but information from Parks Victoria made mention of spectacular sedimentary rocks, so of course we had to investigate! This required us to retrace our route to the Princes Highway and then proceed east to the Bemm River Road junction. The track from Bemm River to Pearl Point had been described as a rough fisherman's track and suitable for 4WD vehicles only, so we had left the other vehicles back at camp and now headed west from Bemm River along the coast with some trepidation. However, the road had become so bad earlier in the year that local council had decided to rebuild it as an all-weather road and to top it off had just re-graded the surface a few days before our arrival! As a result, even the lowest slung Jaguar could have made it through without bottoming out!

Pearl Point was very disappointing from a scenic point of view. Here we found a low featureless headland with no cliffs, with a series of narrow rock bars radiating out into the sea from a beach backed by low sand dunes. But the further we walked eastwards the more interesting the rocks became until after several hundred metres we ended up at a large low outcrop of what the women called "telephonebookite" These rocks were in fact vertically-dipping very tightly folded thinly laminated sea-floor sediments of probable Devonian age. The folding was so tight that individual folds could only be seen by tracing sets of beds along strike until they could be seen to reverse back on themselves in very tight chevrons. Deep grooves (commonly called rillen) weathered into the surface of some of the outcrop indicated a high lime content in these rocks. Close inspection of the outcrop also revealed distinct sub-parallel kink bands cutting across the bedding. These had been formed by a later regional deformation episode. Either the initial folding or subsequent deformation had also resulted in areas of highly fractured rock, the fractures now filled with white guartz deposited from groundwater. In the mountains to the west, similar swarms of guartz veins have given up tonnes of gold, but our own fortunes were not to be made on this beach. Our treasure was to be

the knowledge gained by more than a passing glance at the rocks. They had indeed been interesting. As we headed back to the vehicles the clouds, which had earlier threatened to drench us with rain, had now formed a dramatic backdrop to the west, transforming an otherwise ordinary coastal scene into something much more dramatic and worthy of photographing.

Next on the list of places to see was Cape Conran, which could only be reached by returning to the Princes Highway, proceeding west to Cabbage Tree Creek and then driving south along the Conran - Cabbage Tree Creek Road, quite a round trip.

At East Cape we expected from Barry's initial description of the area to find granite, but instead came upon more tightly folded Devonian sediments similar to those at Pearl Point but much more dramatic both scenically and geologically. Here the chevron folds were clearly visible and again abundant guartz veins cut the rocks where fractures had formed during deformation. We followed the board walk from the west end of the beach over the low headland and down onto a wide rock platform where the geology was even more spectacular. Then, just before retreating to the vehicles, we came to two massive dolerite dykes running out into the sea at right angles to the coastline, their boundaries sharply defined and concordant with the vertical bedding in the Devonian sediments. One of the dykes displayed spectacular spheroidal weathering.

Around at West Cape Conran we scrambled through the coastal scrub down to the rock platform and here indeed we did at last find granitic rocks. But this was not granite in the true sense. The original granite had been metamorphosed and recrystallised to granite gneiss, now showing a distinct foliation due to alignment of muscovite (white mica) flakes normal to the direction of stress. Patches of large well-formed crystals of K-feldspar had also formed in rough alignment with the foliation. The foliation appeared to roughly parallel the kink bands seen at Pearl Point and may have resulted from the same event. The biggest surprise here though was not the rock, but how it had weathered and eroded. Standing before us like the skeletal remains of a ruined city in miniature were rows of exhumed core stones protruding like little pillars from the centre of joint blocks in the gneiss. Each core stone was still attached to the underlying gneiss by a thick pedestal. These had formed by subsurface weathering on land and had subsequently been exposed by marine erosion which removed the enclosing soil. Further to the west the foliation in the gneiss had resulted in even more spectacular coastal scenery which simply had to be photographed.

Back at camp the day ended with a group barbecue in the Marlo Beach Caravan Park.

Wednesday 10th October

Another glorious day had dawned! This was getting too good to be true. Our main objective for the day was to be the Buchan Caves, but there would be a few side excursions on the way. Our first stop was at the Stony Creek Trestle Bridge, the largest remaining timber trestle railway bridge in Victoria. This is located to the west of Nowa Nowa and is accessed by a three kilometre dirt road off the highway. This bridge, with a length of 245m and towering 20m above the floor of the valley was indeed spectacular. It was built in 1916 from red ironbark and grey box felled on site. Even though the last train crossed it as recently as 1988, there are now signs of serious deterioration and it seems not to be destined to stand proud much longer.

Back in Nowa Nowa we paused for coffee and cake at the Gallery, where for a small fee we also gained entry to the most spectacular gallery of carved and polished tree roots imaginable. Apart from one piece of Huon pine, all had been collected locally by the original owner of the Gallery, a highly successful timber miller who had spent his spare time creating these fascinating works and searching the local area for minerals. His large mineral collection was also housed in the Gallery but, while visually spectacular, this contained very few specimens of real aesthetic or monetary worth. This fellow had passed on but his final wish was that the collection remains where it is, much to the disappointment of other gallery owners in the district.

The current owner of the Gallery gave a short talk on the collection before directing us to the Nowa Nowa Gorge Lookout just to the north of town on the Buchan Caves road, where we were assured we would find some great scenery and interesting rocks. Eventually finding the lookout, which was signposted from the other direction, we came across a great view of the Gorge at the end of a short track lined with boulders of rock laced with veins of quartz and hematite. So the Gallery owner had been right on both



Buchan River Valley.



Spider Orchid.

counts! But we could find no way down into the deep rocky ravine so further exploration seemed futile. Just as we were wandering around wondering what to do, someone spied a native orchid in the grass amongst the trees. Soon we were seeing orchids everywhere and it was bums in the air as the photographers set about recording the variety of ground orchids, among them a species of the spider orchid group of *Caladenias* and a species of sun orchid in the *Thelymitra pauciflora* group.

Then it was northwards to Buchan where lunch was eaten in the beautiful parkland surroundings of the Caves Reserve before purchasing tickets for a guided tour of the Fairy Cave. The tour, lasting around an hour, was led by a Parks Victoria guide who had to be one of the most knowledgeable cave tour guides we had come across. The formations festooning the long narrow passageway were attractive enough, but limited in their variety to the usual stalactites, stalagmites, shawls, columns and the occasional small helectite, those weird speleothems that seemed to defy gravity. This cave was discovered by Frank Moon in March 1907 and was opened for public inspection in December of the same year. A brief call was made at the Bluff Reserve to photograph the vertically-tilted thinly bedded Devonian limestone before driving back to Orbost down the valley of the Snowy River, the often very winding road passing through steep densely forested ridge country most of the way. At Orbost we found a store from which to replenish food supplies and the day ended back at the Marlo Pub with a pleasant dinner and short social evening.

Thursday 11th October

Today each driver would find their own way to the next camp further down the Princes Highway near Traralgon. With the Phillip Island Grand Prix only a day away, trying to follow each other in convoy would have been impossible. As it was most participants took the less direct route through Nowa Nowa to Bruthen and then south to Bairnsdale along the Great Alpine Road to avoid heavy traffic.



Beautiful Sale Common.

At Bairnsdale the plan was to meet up at Eagle Point a short distance to the south. Here we eventually met up in a nice park on the shores of Lake King, one of the Gippsland Lakes, where we had morning tea with some friendly magpies who thought they had every right to share our food. Refreshed we then headed in convoy up to the nearby Silt Jetty Lookout to look out across the second largest natural silt jetty in the world, formed by the levees of the Mitchell River as it flows out into Lake King. There was not a lot to see and nothing to photograph so we soon parted and made our own individual ways back to Bairnsdale and down the South Gippsland Highway to Sale.

At Sale, once a bustling river port for the goldfields, a few of the group arrived at the Art Gallery at around the same time. We had called to try to see some of Annemeike Mein's amazing artwork depicting native flora and fauna using textiles. Sadly, only one was on display but it gave us an idea of how detailed and utterly fantastic her work was. Other examples were in the possession of Sale Council and could be viewed on appointment. The gallery also held a room filled with original botanic artwork which was quite fascinating even to the non-botanists. At various times most of the group found their way out to the extensive wetlands at Sale Common just out of town to the south. Once a picturesque red gum woodland and freshwater marsh, the latter covering over 70% of the Common, the area had been devastated by recent floods which had destroyed most of the extensive board walks and left the wetland section a stinking mush of broken vegetation which was now rapidly drying

out. But Tony and Brian found a fantastic gum tree to photograph against the lake background and a few picnic tables at the start of the Flooding Creek Track provided somewhere to have lunch. Nearby lay the old powder magazine, until recently used as a private home, but now fully restored complete with its original timber floor. It was used to store bulk supplies of black powder for the goldfields. Brian found the caretaker cleaning up in preparation for a bus load of tourists and had a long and interesting discussion on the preservation of historical relicts.

Barry was overwhelmed with the response to his request for information back at the Sale Tourist Information Centre and their attempts to help us rearrange our schedule for the next day if the weather forecasts turned out to be correct, which fortunately they were not.

Tandara Caravan Park was now but a short distance away down the Princes Highway. By the time the last of the travellers had arrived the wintry blast we had been expecting from the weather forecast had really set in, but without the predicted gale force winds and heavy rain. The forecast for the following day still held the prospect for plenty of rain, with possible hail and strong winds.

Friday 12th October

We awoke to sunshine, albeit very cool outside. But clouds soon set in, although there was no actual rain until we were well on our way north to Walhalla. Later in the morning we were dampened by repeated periods of light rain, with the sun not appearing till around lunch time. But the weather, although dismal, was not to affect our enjoyment of this historical gold mining town and simply added to the ambience by providing an eerie atmosphere to the apparently totally deserted little town nestled along the narrow floor of the deep V-shaped valley of **Stringer's Creek, a tributary of the nearby Thom**son River, which we had crossed a few kilometres to the south of the town.

In late December 1862 a small party of prospectors, among them Edward Stringer, came into the area from the north and found payable gold in what was to become Stringers Creek. Within three months there were 200 people on the new diggings but the easily-won alluvial gold soon ran out. Around the same time the actual source of the alluvial gold, Cohen's Reef, was discovered as an outcrop on the hillside above the creek on its western side and this reef was eventually traced on the surface for a distance of 3.2 kilometres along the side of the ridge. The extraction of gold from such a "hard rock" mine demanded capital and equipment which could only be provided by a mining company. Hence the settlement developed an air of permanence from the very beginning, and lacked the initial canvas town appearance so typical of the other Victorian fields. In 1864 the first quartz-crushing batteries arrived on site and the original Walhalla Gold Mining Company soon began returning huge dividends to its shareholders. In 1866 the name Walhalla was officially adopted for the town itself.

The Walhalla mine was the first but not the only guartz mine on the field. The Long Tunnel mine began work further to the north on Cohen's Reef in 1865 and in 49 years of operation earned the title of the richest gold mine in Victoria. The Long Tunnel Extended mine, still on Cohen's Reef, lies further to the north again and is the only mine still accessible to visitors. The mines on Cohen's Reef produced a total of 46.6 tonnes of gold from 1.4 million tonnes of ore up till 1914. The town's heyday years were between 1880 and 1895 when its population was around 2000. It had a brewery which earned an award at a Paris exhibition, several good hotels, the Walhalla Chronicle, Mechanics Institute, two funeral parlours and several share brokers. The railway from Moe reached Walhalla in 1910, ironically just in time to aid in the removal of many of its buildings and mining machinery. Members of the Walhalla Improvement League have worked since 1955 to preserve and restore as much of the town as possible so that it now represents one of the finest and best maintained examples of an original 19th Century gold town in Australia. It

now had a permanent population of 7 people, of whom two have the same Christian name. Interestingly, electricity, which we all take for granted, did not reach Walhalla till 1994.

Stops were made at the rebuilt Thomson River railway bridge and nearby station, current terminus for the restored Walhalla Railway, for photographs before continuing on into town. As the road came into town we could see the little train all loaded us with passengers and ready to roll down the Stringer's Creek Gorge. But according to our information the train was not running today! Down at the station though, we found that parties of 25 people or more could actually book the train for a trip on the off days. Our little group of 11 would not have had a chance! After wandering around in the rain and slush for a while everyone felt like coffee, but no-one wanted to sit outside in the wet and none of the shops were open. Then, as Barry walked past one in the old Mechanics Institute, the owner came out and said he would be open in five minutes, probably sensing a sudden influx of hungry and thirsty customers. All rounded up, we sat down to delicious coffee and cakes and were entertained by the owner with stories of old Walhalla.

Our brief brush with Walhalla history came with a visit to the cemetery, beautifully set on the very steep hillside on the southern edge of town. Here the pioneers and old miners sleep quietly beneath huge pine trees. Some were reputedly buried in tunnels rather than pits due to the steepness of the slope, a fitting end for an old miner perhaps. It was a fascinating place and filled up the remainder of the morning.



Exploring Walhalla Cemetery.

Lunch was held in the shelter sheds in the town picnic ground, once the site of the Long Tunnel mine battery, with an audience of king parrots and currawongs. Our hunger satisfied none could resist a walk along the old timber haulage tramway past the various mine entrances, despite the very steep stairway up from Stringer's Creek. The tramway presented us with some beautiful views of the town as well as an insight into the mines which exploited the gold of Cohen's Reef, a thick vein of auriferous quartz contained within Lower Devonian sediments and lving sub-parallel to the walls of a steeplydipping 2m thick diorite dyke which extended to a depth of 1130m. Our walk along the tramway ended at the entrance to the Long Tunnel Extended mine just in time to see the last tour of the day emerging from the adit. After a bit of a look around we returned to the main street and back towards the cars. Barry and Brian decided to walk up to the infamous cricket ground, billed as testing the stamina of the fittest, and it was indeed a long steep climb with no return except for the exercise. The ground was constructed by removing the top of a hill 200m above the creek and the tourist brochures had hinted that it provided excellent views over the town, but it did not. All we could see was a flat grassy area surrounded by burnt trees from the last bushfire which had stopped just short of the town. We decided on the way down that one way for the local team to ensure victory was to force the opposition to walk up to the ground just prior to the match, while they rode horses! The others in our group made a more sensible decision and had opted for another coffee instead. Once we had all reassembled it was back to camp to prepare to move on once again tomorrow.

Saturday 13th October

The day dawned rather cold with a stiff breeze and scattered light showers. Again each of the drivers would make their own way south, travelling through Tarra Bulga National Park to eventually reach our next camp at Yanakie, just short of Wilson's Promontory National Park. Those not pulling vans drove directly south from Traralgon to Traralgon South and then on to Balook on the northern edge of the park.

Once into the park the forest was unbelievably beautiful, with towering mountain ash emerging from an understorey of very tall tree ferns. Most of the van-less group, but including Barry and Elaine in their camper-trailer, met up at the Bulga Picnic Area. It was raining lightly but this did not deter us from walking the Willis Track to the suspension bridge and then along the 1.4 km scenic trail back to the cars, where we had morning tea in an ancient timber picnic shelter enclosed by giant tree ferns. This forest was simply stunning, especially in these light conditions!

From the Bulga Picnic Area Brian and Tony headed off down Grand Ridge Road to Mirboo North. The road was narrow and winding as it negotiated the steep heavily timbered ridges and we had it to ourselves, at times wondering if we were really on the right track as we passed through numerous unmarked junctions and along slippery seemingly un-maintained sections. At one stage, as we ploughed into thick swirling mountain mists along the ridge tops, the temperature outside dropped to 4°C. But the forest was absolutely stunning, till just short of Boolarra where the steep hillsides had been cleared for grazing and were now covered by bright green grass.

The other had taken different routes, Barry and Elaine opting for the road south to Yarram. **At the turnoff they came to a sign "unsuitable for caravans" but continued on, finding two caravan** parks only 5km down the road! Everyone who had driven through the Tarra Bulga forests marvelled at their sheer beauty but were also frustrated by the fact that there was nowhere to pull off safely to take photographs! Barry and Elaine came upon two parking areas, one at the start of a 500m walk to Cyathea Falls and the other beside Tarra Falls. But for those travelling via Grand Ridge Road there was just nowhere to park off the road.



Tree Ferns, Tarra Bulga National Park.

Cyathea Falls were not really worthy of a name, but the walk into them was marvellous. Barry thought it was the best myrtle beach forest he had yet come across. Tarra Falls were more spectacular, but impossible to photograph. The falls are about 50m high, but fell down a flat rock surface at a gradient of around 30°. The lookout was constructed right beside the falls about a third of the way down. Similar but smaller falls were seen further down the road and were much easier to photograph.

Those who took the Grand Ridge Road stopped for lunch in the park at Mirboo North, before continuing on down through Leongatha to Foster on more respectable roads. Everyone stocked up on perishables at Foster before continuing on south to our camp at Yanakie Caravan Park at Duck Point on the western shore of Corner Inlet.

Sunday 14th October

Taking one fleeting glance outside his van, Barry came up with the one word that summed **up the day's weather, yukky! Outside the wind** was really howling and there was almost total cloud cover, although fortunately no rain. Today we would explore the geology and scenery around Walkerville South on the western side of Waratah Bay, then on around the corner to Cape Liptrap.

Walkerville South was once a limestone mining town right on the beach, but little of the old town remains today. Between 1875 and 1926, limestone was mined from the Devonian age Waratah and Bell Point Limestones exposed on the sea cliffs and burnt with firewood in bricklined kilns to produce quick lime, which was shipped to Melbourne to supply the building industry. The lime was bagged at the kilns and hauled in tram carts along a 350m jetty which once stretched out into Waratah Bay to waiting ships. Nothing now remains of this jetty although Barry noticed a few poles sticking out of the sand on his last visit. Ruins of the series of lime kilns constructed along the sea front just above high tide remain as a spectacular reminder of this once thriving industry.

We thoroughly explored the coastline between the Bluff and Bird Rock to the south, finding lots of small caves and fascinating shapes in the exposed limestones. But the best of the geology was found beyond the end of a short board walk which took us up and over the headland to a small beach, at the far end of which was a low ragged outcrop of limestone standing like a ruined castle just offshore. Fortunately, with the tide low we were able to explore the fascinating features of this little outcrop. This small patch of karst landscape had originally developed on land, where rainwater had formed a mass of limestone pinnacles riddled with caves. Iron oxide, dissolved from the limestone, had re-precipitated below ground level in caves and fissures as brown botryoidal (rounded) masses of the mineral goethite. Much of this material now lay along the shoreline against the cliffs, having been gouged out of its limestone host by marine erosion to form what had the appearance of an ancient slag heap from some long abandoned smelting operation.

As the tide was coming in, we returned to Walkerville South to explore the lime kiln ruins then tried to reach the historic cemetery but found the track blocked by a fallen tree. We then drove around to Bear Gully, but the tide was too high to explore the area so we had lunch before moving on to Cape Liptrap.

Cape Liptrap is a narrow peninsula formed by the spine of the Hoddle Range running out to sea. It consists of steep cliffs of com-



Arch Rock, Walkerville South.

plexly-folded marine sediments of the Early Devonian Liptrap Formation flanked by rock pinnacles and wave-cut rock platforms. This was to be one of the geological highlights of the entire trip, so it was with extreme disappointment that on arrival at the lighthouse we found all access to the shoreline below blocked off. A lot of work had been done by Parks Victoria since Barry's last visit, with several lookout points and picnic tables now in place. But although there were some great views we could get nowhere near the geology, despite the Parks Victoria brochures describing it as one of the most fascinating and geologically complex sites in Victoria. Seems they want to keep it to themselves! North of the lighthouse, Barry and Brian followed several tracks down through the scrub in an attempt to reach the beach below, but none provided easy access. Disgusted and windblown we headed for home via Fish Creek, where we found the Orange Roughy Café open for business at the cross roads in the centre of town. The coffee was great, in big mugs, and those who ordered cake were faced with 0.5kg of sheer enjoyment!

While at the café we inquired about the Fish Creek Pottery, only to find that a rival gallery owner was also enjoying a mug of coffee! She informed us that the Fish Creek Potter had died and invited us up to her Hilltop Gallery nearby. The artworks there were quite nice and **she proved a great host. It's often not the things** you know about, but the unexpected things you find that make a trip great, and this gallery was one of those unexpected things.

By the time we left the gallery the clouds had returned so it was decided to give Sandy Point and its sand dunes a miss and head for camp. Back at Yanakie, Barry took a walk out to Duck Point. This was just a narrow sand spit extending out into Corner Inlet but there appeared to be no reason for its existence. Such spits usually occur along the entrance to a watercourse, or link up with a reef, but neither applied here.

Monday 15th October

We woke to a cloudless day and clear air, but the wind was still very strong. The weather forecasts had suggested this would be our only fine sunny day for a while so we made an 8 am **start for the base of Mount Oberon in Wilson's** Promontory National Park. Stops were made on the way to Tidal River for photographs overlooking Picnic and Whisky Bays and then at Norman and Glennie Lookouts, both of which provided marvellous views. At Tidal River we bought our day passes and then off to Mount Oberon.

The 3.5 km walk up the road to the 558m summit of Mount Oberon proved very tiring for some, but the amazing array of wildflowers provided welcome respite from the long relentless climb. Some of the granite freshly exposed in road cuttings was also worth inspection, displaying coarse porphyritic textures (large scattered Kfeldspar crystals) along with xenoliths (foreign lumps of rock) rich in black ferromagnesian minerals (hornblende and biotite) and plucked from volcanic dykes as the molten granite magma rose towards the surface.

The windiest place in Victoria today was Wilson's Promontory, with wind gusts of up to 117 kph and on reaching the summit rock we



Magnificent Scenery from road to Wilsons Promontory.



Mount Oberon as viewed from Pillar Point.

were abruptly hit by the full force of this gale, finding it very difficult to stay on our feet let alone gain the stability necessary to compose and take photographs. The views were spectacular in all directions, with the entire granite peninsula in full view, but the area around Mount Oberon had been burnt out only recently and much of the vegetation was still in recovery, spoiling foreground shots. On the way back to Tidal River a group of grass trees (*Xanthorrhoea australis*) in flower beside the road provided magnificent foreground in which to frame the stark rounded granite outcrops on the eastern face of Mount Oberon.

After lunch at Tidal River we took the walking track to Squeaky Beach, pausing briefly to photograph the magnificent stretch of water called Tidal River against its mountain backdrop before following the track on through coastal tea tree forest. A number of interesting wildflowers were seen along this track, including three species of orchid.

Squeaky Beach is unusual in that around 99% of the sand grains are composed of translucent to transparent quartz, unlike all the beaches west of Wilson's Promontory which comprise carbonate-rich sands made up of eroded fragments of calcareous marine organisms. Thus Wilson's Promontory forms the dividing line between the two main sand types in southern Australia. Walking on the dry quartz sands on Squeaky Beach produces a squeaking noise due to the rubbing of the highly polished almost spherical quartz grains against each other. The sands on and behind the beach were deposited during an interglacial maximum around 100,000 years ago. During the last glacial maximum around 20,000 years ago, sea level was about 150 metres lower than it is now and Wilson's Promontory formed part of a land bridge with Tasmania. Subsequent rise in sea level flooded Bass Strait and formed the present-day sand dunes around the margins of the Promontory. Sea level reached its present height around 7000 years ago and active erosion as a result of this rise formed the granite cliffs along the present coastline. The coastal dunes formed by this last sea level rise interrupted drainage patterns so that most rivers on the peninsula flow parallel to the coast before entering the sea and freshwater swamps with peat beds have developed behind the dunes.

As the track continued down to the granite outcrops on the southern side of the beach we had our first real chance to examine the granite up close in trackside boulders and elevated rock platforms. The Wilson's Promontory Granite has been dated at 384 mya (Early Devonian) and is closely related to those in north-eastern Tasmania. It is much older than the nearest batholiths of Central Victoria which are mostly 365-370 million years old. Wilson's Promontory is the most clearly exposed granite batholith in Victoria and has an extent exceeding 1200 square kilometres. It consists of at least 6 granite types with an apparent east-west zonal distribution. Down the west coast of the peninsula, porphyritic xenolithic and pale granite predominates and in the



View South from summit of Mount Oberon.



Footbridge over Tidal River, Wilsons Promontory.

outcrops at Squeaky Beach both the porphyritic and xenolithic nature of this granite type can be clearly seen. Nodular concentrations of black tourmaline are also present in the granite here. Of particular note at the southern end of Squeaky Beach is the huge round granite torr split precisely in two sitting like a split pea on the rock platform.

On the return to Tidal River we diverted along the track to Pillar Point, where there were great views out across Norman Bay to Mount Oberon, although the weather was now deteriorating with the approach of the next gale. Three more species of orchids were found along this diversion.

Afternoon tea was then enjoyed beside the Visitors Centre where we didn't have to worry about the signs warning tourists not to feed the birds. They simply helped themselves and we could do nothing about it! Elaine had one crimson rosella on her shoulder trying to steal chips as she was eating them, while another sat in Terry's hand as he was trying to eat an ice cream.

The best of the day had gone and most of the group decided to head home but Brian, Barry, Stan and Dawn decided to have a look at Whisky Beach which none of us had seen before. Here we found a great variety of wildflowers along the short access track from the car park and behind the beach was the most beautiful wetland where the water was as still as a sheet of smooth glass. The beach turned out to be the most beautiful we had yet seen on the trip, probably only 200m long but with really spectacular headlands of huge granite boulders at each end, all displaying abundant sub-angular dark-coloured xenoliths. Barry climbed up over the southern headland and reported back that the next beach at Picnic Bay was probably the most uninteresting beach in the area.

Back at the car park, Elaine had found a tame wombat which was happy to continue grazing while we took photographs. It was an unusual grey colour and very healthy.

Tuesday 16th October

We retired last night under a cloudless sky with no wind, but around midnight the next front hit with a vengeance. The cabins and vans shook with the howling wind, but there was no rain. In the morning the bitterly cold wind was still blowing but there was a surprising amount of blue sky around, although it was very hazy.

The rest of the day oscillated between clear blue sky and brief showers, which were often quite heavy. The Lilly Pilly Trail would have been too dangerous with the strong winds in the tree tops so we opted to go into Foster to stock up on provisions. Stan was having problems with the clutch on his vehicle so he and Dawn stayed in camp to wait for the RACV. Tony and Halina also decided to stay so the remainder piled into Terry's car for the trip to town. We found what we wanted at Foodworks and went off looking for a butcher and a baker but a torrential downpour accompanied by a howling gale forced us to take temporary shelter. Out of town, thanks to a friendly shopkeeper, we found a combined health food and fruit shop that stocked some great stuff, including gluten-free products.



Looking down on Tidal River from Mount Oberon.

Back at camp Barry decreed a short rest period, then an early lunch before heading off to the Promontory again. This time we would take the 2km trail to Miller's Landing through a fantastic forest of ancient old man banksias with an understorey of grass trees and a plethora of orchids and other wildflowers. While Barry and Elaine were busy photographing orchids, the rest of the group charged on ahead. On reaching the end of the track all they found was a stunted mangrove forest hugging the coast and a few scattered granite boulders and so, rather disappointed, headed back up the track. Barry, Elaine and Terry arrived at the shoreline in time to see a rather large tiger snake resting in the sun beside the track and were rather amused at the attitude of an American tourist arriving on the scene who commented "but they're pretty docile, aren't they?" Terry wasn't staying around to find out and beat a hasty retreat, joining the others who were waiting at the Verekers Lookout Track junction.

Barry and Elaine eventually turned up after what seemed an eternity with glowing reports of beautiful photographs and an offshore picturesque little island where a lone kangaroo had patiently posed for them. Only trouble was that they had to lean about 30° into the wind to remain upright! All assembled we headed off up the track, ever mindful of the wildflowers all around us. The sign at the junction had said Verekers Lookout 1 kilometre, but after the said kilometre we came to a road where another sign said Verekers Lookout 1.6 kilometres. Something wrong there!

Barry's maps mentioned a Boulders Lookout a few hundred metres from the intersection and so Barry, Elaine and Brian decided to check it out while the others headed back to the cars. After the appropriate distance we found a magnificent collection of huge granite boulders along the ridge top amongst the forest, but no lookout, although there were great views from the track. While wandering around amongst the boulders we were hit by a torrential rainstorm which soon turned into small hail, but crouching against the lower convex surface of one of the boulders we were able to gain some shelter while watching the hail bounce off the rocks around us.

The storm over, we beat a hasty retreat to the cars in case of another downpour then headed off to Whisky Bay for another look. But down on the beach we were just about blown off our feet so quickly returned to the cars and returned to camp for some dry clothes.

Wednesday 17th October

Overnight the wind finally eased off and we woke to a light southeaster and only scattered light cloud. The Victorian geology excursion guide (see reference list) which gave an excellent account of the geology of Wilson's Promontory mentioned that the only place where the granite contact with enclosing Ordovician sediments could be readily seen was at a place called Red Bluff, just to the south of Yanakie and on the western shore of Corner Inlet. This site was easily accessible via Red Bluff Road. At the end of the road we left the cars and followed a less used track which eventually led down to the shoreline beside a group of apparently abandoned boat sheds. Away in the distance to the north we could see a red bluff and so headed along the shoreline towards it. Stunted dense mangrove swamp hugged the coast and thick deposits of rotting seaweed up against the low cliff line made the going guite treacherous, but we eventually reached the bluff only to find not a patch of granite in sight! Apparently the contact lay offshore and was only visible at very low tides! But it was an interesting and photogenic spot. A quicker path back to the cars was found by using



The Pinnacles, Cape Woolamai.



Weathered Basalt, Cape Woolamai.

an old stairway up the steep bank adjacent to an abandoned pit toilet which, leaning at a hideously precarious angle, provided some additional photography. Continuing on towards our next camp on Phillip Island, most of the group met up again in the shops in Wonthaggi. Brian drove out to the nearby State Coal Mine, but with the underground tours no longer operating due to litigation problems, there was nothing of any real interest to encourage a group visit.

After lunch at the Phillip Island Caravan Park the group headed off in convoy to Cape Woolamai, a rugged area of Upper Devonian Cape Woolamai Granite. This granite is very strongly jointed, resulting in rugged coastal cliffs rising to 109 metres and offshore stacks. From the parking bay at the southern end of Woolamai Road it was a short walk along the Woolamai Surf Beach to the start of the Cape Woolamai Walking Track, accessed by a wooden stairway up from the beach. At this point there were great views of the sea stacks off Cape Woolamai to the southeast, but something even more spectacular, at least in the geological sense, lay right under our feet. Here a small outcrop of columnar Tertiary basalt in the rock platform at the base of the Quaternary limesand cliffs had been completely altered to clays and the resulting patterns and colours were simply astonishing.

From the top of the stairs, the walking track followed the edge of the sea cliffs in a 3 kilometre circuit around the Cape, with seats strategically placed at the most scenic points. Probably the most spectacular view was that out across The Pinnacles, a line of granite sea stacks running out into the boiling sea. But there were other places almost as spectacular, including solitary sea stacks, caves, and occasional exposures of Quaternary limestone with fossil tree roots. Venturing off the track was made treacherous by the abundance of mutton bird nesting holes in the sand, but sometimes this was necessary to obtain the best photographs.

Towards the end of the circuit we were approached by another walker who asked if the Police had caught up with us. Apparently a German hiker had been reported missing by his wife and everyone in the area, apart from us, had already been questioned. By the time we had arrived back at the cars, there were Police everywhere and the Police helicopter was in the air hovering over the Cape. Next thing, a Police 4WD pulled up at the Pinnacles lookout and officers raced over to the cliff edge. We feared the worst, but apparently he was reported seen soon afterwards changing \$US in Wonthaggi! Maybe his wife had been nagging him too much.

After all the excitement we adjourned to the Phillip Island Chocolate Factory which also served as a temporary visitors information centre. Everyone stocked up on delicious chocolates and finished off with great coffee.

During the break Tony mentioned he had heard of a place called The Colonnades, located at the north-western end of Woolamai Surf Beach and only a short distance away. But the others were worn out and so Barry and Brian decided to do some reconnaissance and if it looked worth-



Colonnades, weathered Basalt Columns.

while would take the group back there tomorrow.

Down on the beach below the car park what we saw stretching off to the southeast left us stunned. The vertical sea cliffs here were indeed columnar basalt, as the locality name had suggested, but the basalt had been almost completely altered to clays resulting in columns of the most colourful and intricate patterns one could possibly imagine. The cliffs were no more than 5 or so metres in height but in the setting sun absolutely glowed with colour against the pure white quartz sand at their base. In places the usual horizontal jointing ("chatter marks") had resulted in localised spheroidal weathering, leaving flat rounded core stones of black basalt at their centres, and this was undoubtedly the source of the flat rounded basalt cobbles scattered along the beach. We would certainly be back!

Thursday 18th October

We woke to a very pleasant morning with clear sky and only a light south-easterly breeze. Later in the day the wind would swing around to the north and reach very close to gale force, but we were getting used to this. At least it wasn't going to rain!

We had all hoped that Stan and Dawn would meet up with us again at Phillip Island **after having their vehicle's clutch replaced in** Foster, but a call came through to tell us it was taking longer than they thought and that once the problem had been fixed they would make their own way home back up the coast.

Today we would spend most of our time exploring the Bunurong Coastal Park, 6 kilometres to the south-west of Inverloch. This 5km stretch of coastline is a very special place, with striking rock formations, beautiful sandy coves, rugged sandstone cliffs, extensive rock platforms and prominent headlands. The area is also an important fossil site, and since 1991 has yielded over 6000 bones and teeth of dinosaurs, mammals, birds, turtles and fish from 115-120 million year old (Early Cretaceous) fluvial deposits. Way back in 1903 Australia's first dinosaur bone was found here but lay unidentified in the collections of the Victorian Mines Department for several years before its significance was realised after it was examined by the famous English palaeontologist Arthur Smith Woodward. Monash University and Museum Victoria still conduct annual field trips to this site.

In almost perfect weather conditions, with photogenic clouds in the sky and marvellous light, we began our explorations at the fancifullynamed Eagles Nest rock formation, a stunning double pinnacle of light-coloured sandstone perched on the rock platform about 50m off the cliff line. The pinnacles were covered in superb examples of honeycomb weathering and on the platform around their base were a variety of stunning tessellated pavements studded with the most amazing dark brown limonite concretions up to 3m or more in longest dimension. Some had the appearance, from a distance, of stranded seals! With low tide and the sea very calm we were able to walk right around the headland on the rock platform, pausing every few metres to photograph even more startling rock formations and weathering patterns. But time was running out and we eventually had to turn back at a group of narrow caves worn several tens of metres back into the sandstone cliff face along closespaced vertical joint sets. Even on the way back



Eagles Nest rock formation.

we found more things to photograph, including petrified logs, or the same things from a different perspective. Barry had planned to take us on to Shack Bay where the concretions were supposed to be even better, but we simply ran out of time.

As the tide was still low but on the turn we decided to travel a little further to the east and visit a site called The Caves to see if we could get into them. Fortunately the water was still low enough to access this group of sea caves, carved into the same Early Cretaceous fluvial sediments as at Eagle Rock but we got wet feet getting out again! Again there were interesting rock formations and weathering patterns and to the east along the beach we came to a very obvious fault in the rock strata in the cliff face.

After lunch back at the Caravan Park we pooled vehicles and headed off to Berry's Beach, the starting point for the Pyramid Rock Walking Track. This followed the coastline east through grassland, hugging the tops of the cliffs. Above Red Cliff head, Brian, Barry and Terry scrambled down the steep rough slope to Red Bluff, a low saddle separating Berry's Beach from a small sheltered boulder beach to the east. This was billed in the geological guide books as one of the best localities on the island to search for zeolites, a group of hydrated silicates typically occurring in vesicles (gas-formed cavities) in basalts and formed as a result of weathering. Brian was hoping to find examples of red chabazite-Ca and ferrierite, a rare magnesian zeolite first found in Australia at Unanderra in NSW by a close friend back in 1966 and first described by Brian in an article in Mineralogical Magazine a year later. This was only the second occurrence in Australia and hence of particular interest. Brian had been here before and had found good specimens, but this time the crystals eluded us and all we saw was dense vesicle fillings and a few pockets of white crystallised calcite. The tough scramble back up the steep slope to the track had hardly seemed worthwhile!

A couple more snakes along the track and we eventually reached the spur out to overlook Pyramid rock, a spectacular offshore pinnacle of columnar basalt resting on granite. We then decided to drive into Cowes for a look around, but mainly for a coffee. At the first shop we were told that the coffee shops closed at 4pm, 5 minutes ago, but the owner directed us down the street where we found another coffee shop that was more than happy to serve seven thirsty customers. Even better, the iced coffe55e came in glasses **the size of milkshake containers, much to Barry's** delight.

We had planned to return to The Colonnades to show this spectacular weathered basalt outcrop to the rest of the group, but on arrival the clouds had really moved in and the colours we had seen yesterday in the setting sun were simply not there. Brian and Tony however refused to give up and waited patiently, sure that the sun would eventually appear. And indeed it did, only for a few seconds but time enough to record some truly magic images.

During our time on Phillip Island we had been disappointed at the haphazard signposting of many of the features, such as the start of walking tracks and especially the wealth of phenomenal geological structures. For example, there was no sign to Pyramid Rock for westbound traffic, not even a street sign. There is no signpost to The Colonnades, just a sign at the start of the walk, while at the start of the track along the beach to Forrest Caves there is a large sign explaining the geology! Now if you want to spend money at a vineyard or penguin viewing platform, there are more signs than you can poke a trekking pole at!



Pyramid Rock, Phillip Island.

Friday 19th October

Another big blow last night, but it only lasted an hour or so and we woke to a sky filled with white fleecy clouds and a light southwesterly breeze. As the day wore on the wind picked up considerably but the clouds vanished.

We had planned to visit the rock platforms at Corinella today, but with the strong winds expected to make conditions there unpleasant we opted for an exploration of the island instead, beginning with Rhyll. But there was no sign to Rhyll for westbound traffic so we eventually did a U-turn and found it signposted from the east. Our maps directed us to a walking track, including a mangrove boardwalk, but on arrival at the designated spot we found no track, only a wide mown area along the top of the low sea cliffs. A short walk along the edge of the sea did not reveal any track so we headed back through town and kept a lookout for track signs.

We found a sign at the opposite end of town and at the end of that road a walking track headed off along the top of the headland. Our information stated that we should be seeing 15m cliffs of sedimentary rock but all we had here was a gentle slope covered in weeds! There were mangroves down below, but no sign of a track to them. So we returned to the cars and drove back to where the track crossed the road to Cowes.

At the crossing we found a board walk that was roped off and falling to pieces, along with a sign stating that the track now started at Observation Hill. There we found a beautifully constructed timber lookout tower from which we could see absolutely nothing and another map showing the location of a board walk through the mangroves of Rhyll Inlet. We found the boardwalk out over the mangrove-covered mudflats, but found it rather uninteresting apart from the sound of the snapping shrimps. At this stage we had had enough of Rhyll and headed back to Cowes and some art galleries. Here we spent some time at the Mingara Gallery, which left some impressed and others bored. Morning tea in the local park was followed by a visit to a gallery in the Cultural Centre, but their display was totally unimpressive.

Barry had seen the name Red Rocks on his map, located at the northern end of Red Rocks Road so we headed off to investigate. There had to be good reason for a name like that. And indeed there was! At Red Rocks we found a nice little sheltered picnic area above a beautiful sandy beach cut by reefs of smooth bright red rock which proved to be laterite rich in the red iron oxide hematite. An even redder outcrop could be seen 200 metres to the west, so this was also investigated. Unfortunately the marble-like surface of this outcrop had attracted name carvers, but some astonishing photographs were taken nevertheless.

Lunch was had in the picnic area, accompanied by some friendly and very hungry magpies, before driving off to Grossard Point where there were more beautiful beaches and layers of red laterite, but no apparent access to the beach.

Finally, we had to bite the bullet and do it, head for Grant Head and the droves of tourists. But the area was not as crowded as we had expected, not with people anyway. This was the seagull nesting season and the sky was full of squawking birds protesting at our presence and no doubt fearful of the tourists being so close to their nesting hollows on the ground. But the magnificent network of board walks kept us well clear and provided easy access to some fantastic viewpoints over the coastline, including the famous Nobbies. And the weather conditions were just fantastic for photography!



The Nobbies, Phillip Island.



Laterite at Forrest Caves, Phillip Island.

The board walks had another advantage. In keeping the stomping feet of hoards of tourists off this fragile environment, native ground covering plants had made a strong comeback and the steep rocky slopes into the sea were now green with vegetation, as they were originally. The only disappointment was not being able to access the rock platforms below where I knew there were interesting structures in the Tertiary basalts and well as spectacular zeolite-lined cavities.

From the western end of the board walk we could see a viewing platform some distance to the east on the cliff top and Brian was determined to get there. It appeared to be on a walking track, but when we found the start of the track it was actually a gravel road with an open gate and no keep out signs. Nothing ventured nothing gained, so we headed up what turned out to be a wonderful scenic coastal drive to the penguin viewing area.

While the others went back into Cowes to do some shopping, Brian, Barry and Elaine drove out to Kitty Miller Bay where they took one look and asked "what next?" Barry suggested we try to reach Forrest Caves, on the southern coast back near Cape Woolamai. Again there were no signs but we eventually ended up at a car park at the edge of a line of high sand dunes, from where a wooden stairway lead over the dunes and down onto the beach. From the base of the staircase it was an extremely pleasant 300m walk along the beach to a large low isolated detached basalt outcrop containing at least two caves. The only problem that low tide was required for easy access and the tide was now at its highest! Up on top of the outcrop though we found several holes formed by roof collapse and from the edge of these we could peer down into the crashing surf below. The caves developed through marine erosion of an underlying soft tuff (volcanic ash) layer. The beach in the immediate vicinity was patterned by streaks of shiny black ilmenite sand, weathered from the basalt.

The next headland to the south-east looked interesting so we wandered over for a look. What we found was yet another of Victoria's unannounced geological wonders! The low cliff face was composed of a honeycombed red and orange laterite, with the cavities in the laterite infilled by white kaolinite clay forming a striking contrast. In more exposed sections, differential erosion had worn away the soft clay leaving a 3D latticework of the brightly coloured laterite. The laterite had undoubtedly formed through the weathering of the underlying basalt while the clay infill was probably washed in from the weathering Woolamai Granite just a short distance to the southeast. The next headland looked equally as interesting but access was blocked by a 2m cliff diving directly into the sea.

Everyone then adjourned to the Chocolate Factory for some tasty souvenirs, but not coffee, before returning to camp for an evening out at a pub bistro in San Remo to mark the final night of what had been a wonderful holiday.

Saturday 20th October

We woke to a calm morning with a fair bit of inversion cloud, but this soon burned away to produce probably the most pleasant day of our holiday.

Today Barry would take us to Melbourne via Corinella, where on a previous trip he had found some very unusual rocks which he thought might have been sedimentary rocks displaying leisegang rings. Corinella is on the northwestern corner of a large rectangular promontory a bit north of Phillip Island and on arrival we drove through the town to the parking bay on

Settlement Point. Walking around the foreshore to the left we first came to a small outcrop of weathered basalt converted to light-coloured clays with some of the best leisegang rings we had seen so far. But further around the promontory it was to get even better. We began to see black cricket-ball size nodules of basalt washed up on the beach and wondered at their origin, but all was to be revealed just around the corner at yet another of Victoria's astonishing geological sites. Here lay a vast rock platform, well exposed to view now it was low tide covered by what looked like a vast dinosaur nesting area, with groups of round black core stones of basalt nestled in concave mounds of clay, each nest representing a former basalt column. The clay the abundance of made platform dangerously slippery but the structures we found both on the platform and in the adjacent cliff face were simply astounding and very photogenic. Weather and light conditions were just perfect.

After around two hours exploring the Corinella rocks we headed off to the Cranbourne Botanic Gardens were the final hours of the trip were spent exploring the fabulous Australian Garden Section. A great finish to a really enjoyable holiday and the cafe there made great iced coffee!!

Written by Barry Collier and Brian England.

Photographs provided by Tony Turnbull unless otherwise acknowledged.

For Further Reading:

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Ron Erans.