June 2014

COMMITTEE MEMBERS

PRESIDENT:	Committee members take turns on a two monthly basis		
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GENERAL NEWS

SUBS: You can pay direct to our bank account Wespac 03 0751 0274539 00 please inform Hub,the treasurer hub.opdenbuysch@xtra.co.nz or post a cheque to 436 Sunrise Valley Road, RD 1 Upper Moutere 7173. Cheque to be made payable to Nelson Rock and Mineral Club. Alternatively you can see Hub at one of our monthly meetings.

Sheila Hardwick has offered to write about the history of our club, and this will form part of our 50 year celebrations due next year. She intends to interview various members of the club, and if any of you feel that you have something to contribute Sheila would be very pleased to hear from you.

Digital file storage for Club business is being stored on Diane's OneDrive. The directory is viewable but not editable for those granted sharing rights. If people want access, email Diane and she will email the link to them

APRIL MEETING 2014

Stories of a Quaternary Geologist in the U.K. – By David Briggs retired Professor researching the environmental and health effects of pollution for the past 20 years.

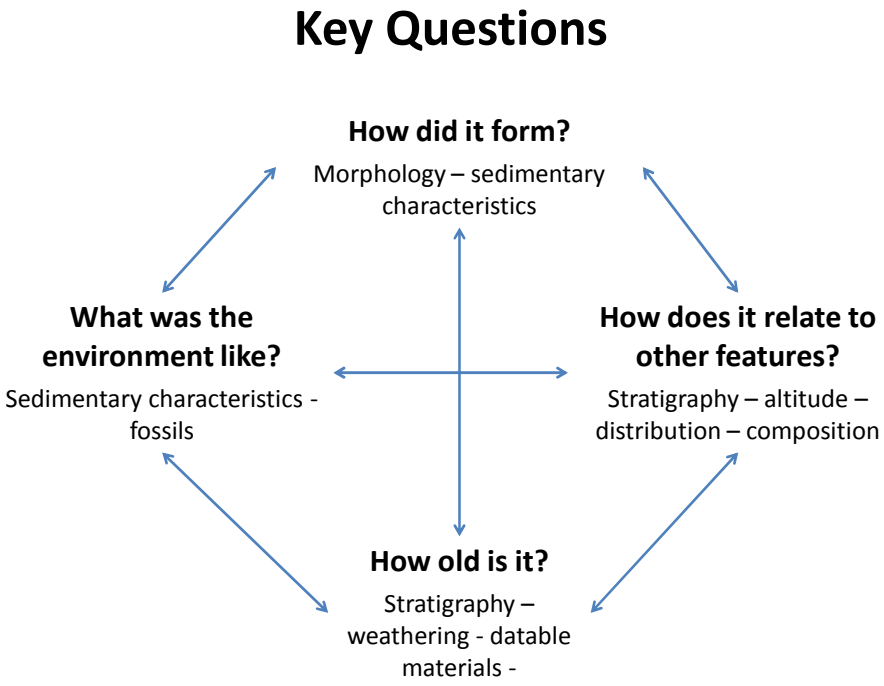
David did his Ph.D. in Quaternary Geomorphology at Bristol –followed by15-20 years research in the area and talked to us about some of his amazing discoveries.

The Quaternary – the last 2 million years, was characterised as a period of immensely rapid climatic change, with a high variation of temperatures. It used to be regarded as having three glacial periods (the Devensian (last), Wolstonian and Anglian), and four interglacial periods, (the Ipswichian, Ilfordian, Hoxnian and Cromerian). However, later research looking at marine isotopes changed the record, making it much more complex.

There were three well established glacial limits across England, the oldest reaching the furthest south. His area of research was the upper Thames basin, right at the Southern limit of the first glaciations. This was because, on a trip to his initial site of interest in Wales, he heard the driver say "This is the edge of the ice sheet." He was so taken by this comment that he decided to change his area of research and when he explained why to the driver later, he learned that what he had actually said was, "This is the edge of my sheet (of the map)".

There are 5 terraces in the Upper Thames – this talk is about the youngest 2.

Why are river terraces important?

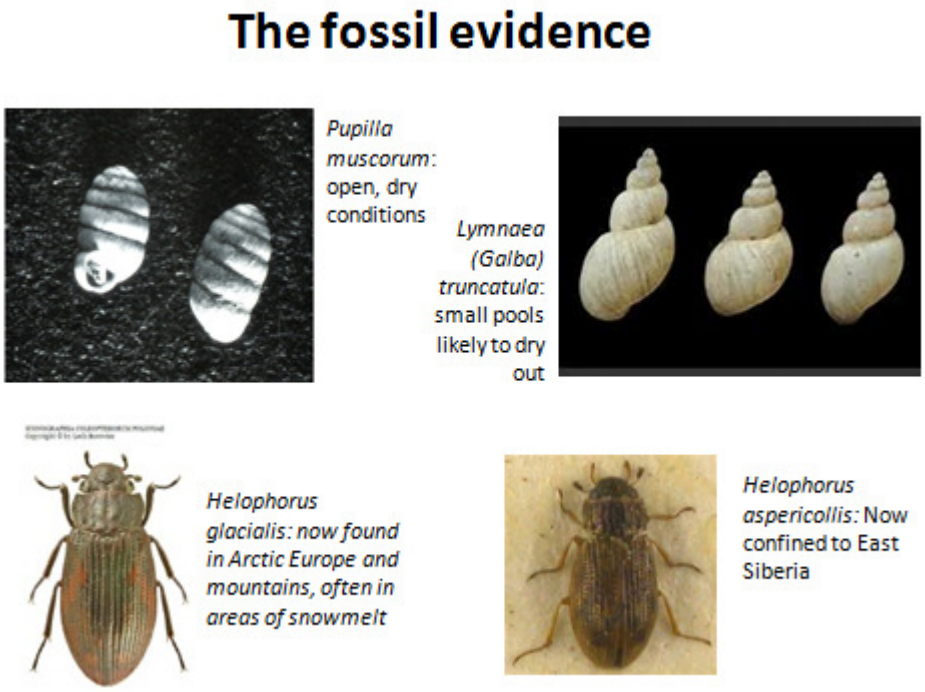


They are widespread
They contain a record of deposition (and thus of prehistoric environments)
Links between different landscape areas
Clear spatial relationships (based on height)
Sediments tell us about hydrology
Fossil remains tell us about ecology and age
They are of commercial value = gravel pits = sections

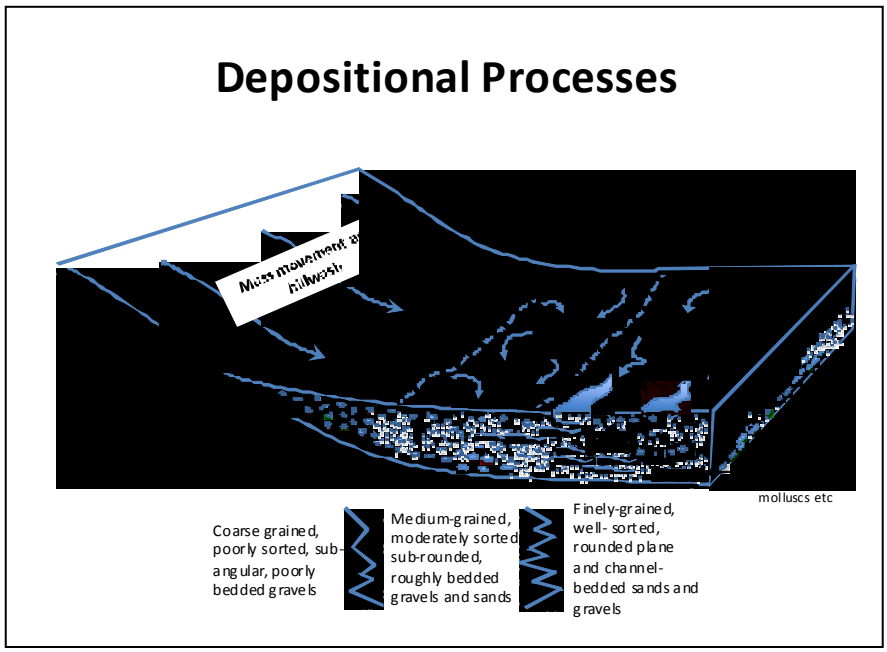
The lowest (and therefore youngest) is the Floodplain terrace – beds of gravel, with some interesting sedi-

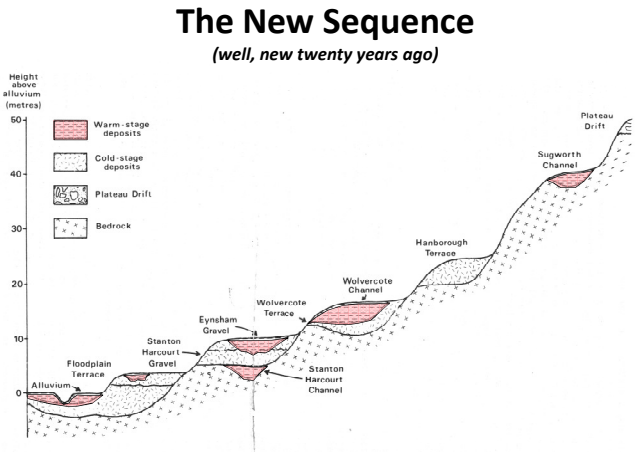
mentary features. Plane-bedding suggests braided rivers with ice-wedge casts: their formation requires mean annual temperatures below 6C (permafrost) mostly around -6C. An ice-wedge is a crack in the ground formed by a narrow or thin piece of ice that measures up to 3–4 meters in length at ground level and extends downwards into the ground up to several meters. During the winter months, the water in the ground freezes and expands. The ice that has already formed acts like a solid and expands to form cracks in the surface known as ice wedges. In areas of past permafrost, ice wedges have melted and are no longer filled with ice. The wedge, which is now empty, is filled with sediment and dirt from the surrounding walls. These are called ice wedge casts and are used to calculate the climate of hundreds of thousands of years ago. Also visible were strange churning features of the surface sediment, producing hexagonal patterns, with coarser material round the outside. These are also caused by freezing in soil and then melting.

So there was plenty of evidence of a very cold climate – with no evidence of cross-bedding but also little lenses of fossils or peat.



Hand axes were also found in areas where these glacial deposits were forming – so what were humans doing there? Maybe there was only seasonal occupation following migratory animals? But 18,000 years ago there were no plants available for radio carbon dating.



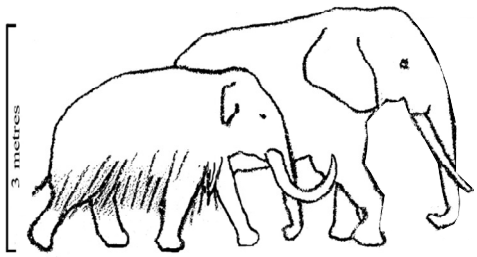


All the evidence pointed to depositional processes of gravels in cold barren landscapes and the big question was: if all the gravels form in cold periods, what is the evidence of the interglacial periods?

However, in the next terrace up, the Summertown -Radley Terrace (at Stanton Harcourt) which showed very similar glacial conditions, the discovery of a drainage trench suddenly revealed little white flecks in the channel. They turned out to be small pieces of bone and a mollusc, not seen before. It was identified as *Corbicula fluminalis* a warmer climate species whose closest range to Britain now is the Nile! So this was the interglacial!

This exciting discovery was rapidly followed by the discovery of an elephant tusk, followed by another 11. They continued to find elephant teeth, beautifully preserved, until recovered (unfortunately after a year unpreserved, they dried out and crumbled). In the mud, initially dismissed as bumps, across the surface of the gravel pits were footprints of the Ilford Mammoth and the Straight tusked elephant, also bears and lions. Suddenly the purpose of the hand axes became obvious.

The Vertebrate Fauna from Stanton Harcourt



Ilford Mammoth (left) and Straight-tusked Elephant (right)

A new sequence (twenty years ago) was worked out that in each glacial river terrace was warm stage deposits. The cold periods were characterised by rapid erosion, deposition and movement of gravel, whereas the warm periods left much less effect on the landscape.

Species	Number
Straight-tusked elephant	42
'Ilford' Mammoth	737
Horse	31
Red Deer	4
Bison	111
Bear	9
Lion	3

Fig. 3. Above: lower right M3 of mammoth *M. trogontherii* (lingual view) from Stanton Harcourt c. 200 ka. Below: lower left M3 of mammoth *M. primigenius* (buccal view) from Sutton Courtenay (Last Glacial).

Although the Palaeolithic settlements seem so far away from the riverbanks of today's rivers, this is because the rivers in England were much larger due to ice melts.

Finally we saw a snippet of a Time Team show with Tony Robinson when a TV crew was present at excavations in the area. The fossils of an amazing range of animals were being discovered. Apparently many fish fossils were also found as the Gulf Stream was washing up the west coast at the time, warming the climate.

This was a most enjoyable talk followed by a question about ice wedge casts which are not seen in New Zealand due to the steepness of topography and the lack of the continental climate. I would like to thank David on behalf of all the members present.

Talk written up by Sheila Hardwick

Trip to D'Urville Island, Rangitotokite Tonga, 25th – 28th April 2014

Mike (leader) and Hazel Blowers, Clyde Nicholson, Alan and Marion Mathews, Tom Brown, Tim Saunderson, Tez Hardwick, Mary Davies and Kevin Bourne.4wd vehicles, and good driving, provided by Mike and Alan.(The trip was postponed from Easter weekend due to bad weather).

Friday
We arrived in French Pass in time for a quick lunch and fossick on the beach before the barge arrived at 1pm with skipper Craig ready to go with the ten of us and two 4wd vehicles. In spite of strong wind, the crossing was calm and we quickly landed at Kapowai.

After studying the geological map for some minutes we set off along the road to explore. The first outcrop was to look at Permian ultramafics (Dun Mountain Ophialite Belt), including serpentine and serpentine-related rocks. Pyroxene crystals were evident and there was another rock that had us puzzled – something that looked halfway between serpentine and talc. There was also abundant white rock that Clyde suggested might be either diopside or grossular. Some of the group broke up a bit of rock showing nodules (a smashing time) that may have been pillow basalt (early Triassic, Maitai Series). Other finds included sediments such as breccia and iron stained sandstone (Brook Street Volcanics, Permian).

After several stops, we made the community house by about 4pm. A beautiful log house with a big living area that we soon found out let in some of the breeze from outside and was hard to warm with the resident fireplace– also the shower was locked behind a door next to the bathrooms!After a cup of tea we went off a few kms towards Greville Harbour, through Greville Formation rocks

(Maitai Series, Early Triassic). There we found a dyke though the sediments, though we failed to identify the particular volcanic rock in situ – the best guess was some kind of gabbro or diorite. A weka came and scuffled around us; after a rush towards some gravel Clyde tried to feed it, it looked decidedly unimpressed. Back to the house and a shared dinner (more like a buffet feast) before an evening of geological discussion, studying collected minerals through the microscope (thanks to Tim), reading and collectively contributing to this report (Mary on the keyboard).

Saturday

Thanks Mike for the warm porridge this morning, and every morning, for breakfast! This was followed by an interesting drive down to Catherine Cove (4wd only route) in time to catch the water

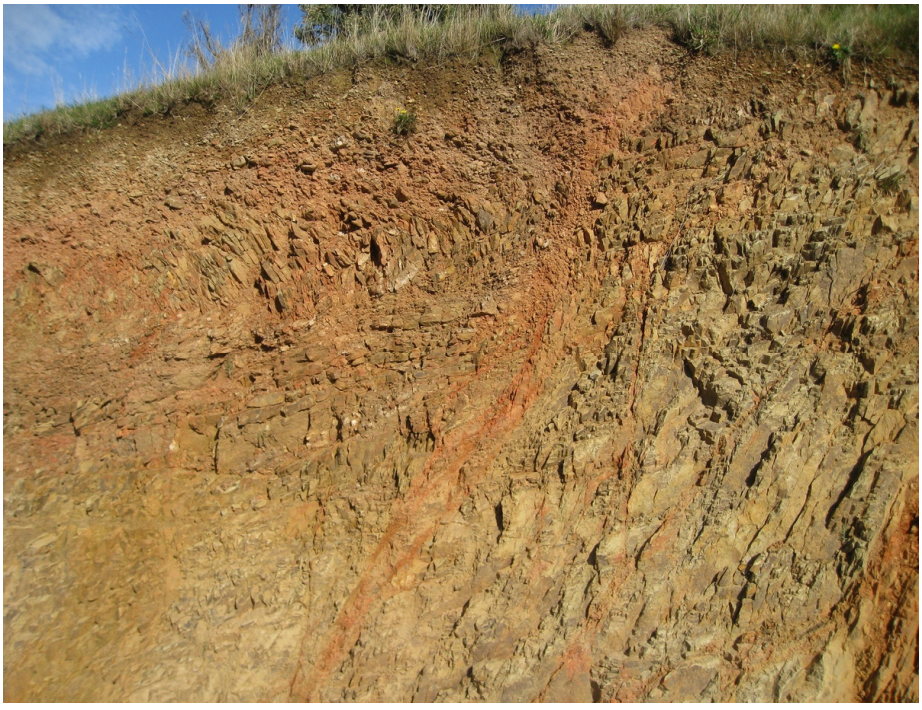
taxi at 9am. We went straight through French Pass and were put ashore at Coppermine Bay.
First a fossick along the beach – lots of serpentine and serpentine-related minerals such as antigorite and talc and some volcanic such as diorite(Patuki Melange, Jurassic). A few of these rocks were heavily weathered into interesting shapes and patterns at times including the outer shell intact and the inner shell visible through holes! Was this unusual weathering due to being washed in sea water? Other rocks were full of pyroxene crystals. There was a serpentine dyke in some sandstone that was interesting due to its extreme hardness.

We divided into groups to seek out the copper – Clyde went up the creek, Tom, Tez, Mary and Kevin went up to the tops, and the rest kept fossicking along the beach, finding mussels to bring back for dinner. Clyde went as far as the adit in the creek bed, while the top group made it to old coppermine sites and found a few bits in the tailings showing copper and copper related minerals such as malachite and chrysocolla. The route to the tops (early Permian Dun Mountain Ophialite Belt) was up the old sledge track starting from the wharf. Easy at first, the track becomes more difficult to follow in places. Marking tape would be useful to future parties. From the wharf to the top is between half and three quarters of an hour. The boundary fence is derelict.
The mines (thanks to Tom for this information):
Redwood's and Ward's – NZ Topo50 E 1667280, N 5469600 – copper oxide is evident in the tailings.
Owen's: E 166723, N 5469590, also evidence of mineralisation in the tailings. The mine is an open slot with evidence of probable collapse in both directions.
Mautons: N 1667120, E 5469518 is a tidy-looking vertical shaft blocked at about 3 metres – little mineralisation in these tailings.
No. 1 and 2 drives in the gully: N 1667140, E 5469420 – large tailing heap with little mineralisation.

On the way back to Catherine Cove, skipper Roma Elkington invited us to fish; we took this offer up with gusto and were quickly catching cod after cod with a barricuda and shark (caught by Tez) thrown in. Most of the cod were undersized and we threw them back – still, by the end, we had landed eight ‘keepers’. Alan caught his first fish ever, and as he tried to grasp it,let everyone know by squealing, ‘It wriggles!’ Tom

did a great job supporting us all with extracting hooks from the mouths of fish, chopping up bait and washing the deck down afterwards. Stopping at the café in Catherine Cove for a coffee, the lady there made a phone call to find out how we might access the locked shower. At the cars, we could hear great bellows of laughter as she got off the phone and informed Kevin (who missed out on the group photo to sort out the shower)that the locked room was storage and the shower was accessible outside.
At the house we scaled and washed the fish and cooked them along with the mussels and a feast of other shared food. The cod was fresh and delicious. The shower was popular all evening.

Sunday



We left early for Kupe Bay, stopping along the way to look at various outcrops of rock, including serpentine followed by a crush zone with impressive distorted and folded sandstones (the serpentine and serpentine-related rocks gave way to sediments as we moved closer to the bay, passing through the early Permian Dun Mountain Ophialite Belt to early Triassic Maitai Series sandstones and siltstones.

Terry, who is new to Kupe Bay (he's farmed there for just 25 years), asked us how the showers were going (no getting away with it on this island) then went on to show us some examples of ammonites (Greville Formation) that he's found over the years – pretty impressive. Lucky we photographed them as we didn't see a lot of evidence of them walking along the beach. I wonder if this was because we were looking for these Triassic critters that were laid down within Permian rocks after the Permian Extinction! We spotted, in abundance, lovely layered sediments of all kinds of colours including a deep pink hematite; along with flakes of argillite and other minerals like quartz and epidote and a minimal quantity of ultramafics. Also Tez found a dinner plate-sized shoulder bone probably belonging to a whale. The outcrops went through transformations, being sometimes heavily weathered bouldersand sometimes masses of shattered silty clay rocks (Holocene and Pleistocene).
Returning to the cars at around 3pm we set off back to the house in light rain, which became heavy after we returned. Another shared feast was prepared, along with a delicious treat of rhubarb pie with yoghurt afterwards baked by Marion.

Monday
After cleaning and packing up, in wind and overcast weather, we drove along to the northern end of the island, stopping from time to time to look at rock outcrops (both serpentines and sediments of the Patuki Melange, Jurassic) and also the stunning views. Some far off white water impressed us – we could see it jumping up the shoreline rocks – no doubt close up it would be something close to terrifying (might have been Cape Stevens). Hazel had been regaling us with stories from the book *Angelina* (Gerard Hindmarsh) and we were now in 'Angelina' territory. The work put in by those early Italians stripping the land of bush for farming was both awe-inspiring and saddening. Much of the island is 'riparian' – being kept vigilantly as native bush – so the farm land and native areas are side-by-side. Descendents of the early Maori (who lived on D'Urville for centuries trading in argillite tools) have been instrumental in keeping parts of the bush in its original state.
Back to the house for lunch and a catch-up with an island friend of Mike and Hazel's whose place we had been trying to find along the morning route, then off to meet the barge by 1pm. One of the first things our barge operator Craigsaid, grinning, was, 'I hear you had some trouble finding the shower.' I wonder if there are any D'Urville Islanders left who don't know about this – moral, try not to do anything dumb on this island because news travels speedily!

A fantastic trip to a beautiful and interesting part of our country – big thanks to Mike who spent some weeks organising access, boat rides and accommodation with the D'Urville Islanders. He also met with Dr Mike Johnston a couple of times for information – and more thanks to Dr Mike for donating the book and map *Geology of the D'Urville Area* (which he wrote) to the club.

A Trip Through Namibia – by speaker Mike Blowers, Thursday May 15th 2014

Report by Mary Davies

Mike and Hazel travelled in their camper in Namibia in August 2013 and this evening shared their adventure with us.

The geology of Namibia (South Western side of the African continent) is quite different to that of New Zealand. It is put together from 2 billion year old cratons that were once floating as separate entities in ancient oceans around the planet. The cratons, formed originally via ryholitic volcanism, came together almost 1 billion years ago and were 'glued' together slowly, during periods of uplift and erosion, with sediments eroding from the cratons. Igneous intrusions and granites are common features. Mike and Hazel's trip saw them travel across two of these ancient cratons – the Kalahari and the Congo craton. The Kalahari craton is subducting beneath Congo craton, and within both cratons 2 billion year old rocks can be found.

The roads were good – you could easily travel in a saloon to many of the places they visited. The first place they headed for was the Fish River Canyon. On the way they passed through Karoo Sediments, where strange, dry plants grew; and outcrops of clean, white quartz lay, that could be seen from miles away. In the Fish River Canyon there was no running water but there were a few small pools of water. The basement rock was metamorphic crust material 1.7 billion years of age, with younger rocks on top – very ancient-looking with twisting patterns. A quartz vein showed inclusions of copper minerals. We saw a photo of a canyon that showed three distinct layers – the original basement rocks, then a younger layer, then younger again that had formed during the erosion of the old craton covering and their surrounds. The erosion of the top layer was started by a Gondwana glaciation (300mybp) which had left a smooth level base which was further cut down by the river flow.

Other photos showed mountains buried in sand. The road here had sand blowing across and everywhere – Mike and Hazel were truly in sand country here. The sand, derived from the erosion of central African rocks is carried here by the combined action of the Orange River and a persistent southerly wind. Diamonds are also carried by these sands, possibly from as far away as the Kimberley diamond pipe and from other undiscovered Kimberlite pipes. They passed the abandoned diamond mine town of Kolmanskop that was abandoned 40-50 years ago. The sands in

Namibian Diamonds

this region have been worked out though mining is still being carried out off shore by smaller companies. Possibly there are still hidden diamond sources somewhere beneath the sands. The diamonds are largest at river mouths and smaller the further they have travelled from their source.

Next place visited was Luderitz, a town still showing its German architecture. A nearby cross commemorates the landing of the 15th century explorer Diaz. The underlying rocks here were the same lovely metamorphosed crust as previously mentioned – and this rock kept appearing at intervals throughout the trip. One outcrop past the town looked very like chromite, black in colour but much lighter – a baked amphibolite of mainly silica and alumina.

Further north and inland, they visited a castle built of local sandstone by an eccentric German Count who was killed, only months after it was completed, in the first World War.

Then they entered a vast area of red sands and dunes.

Along the coast here, the sand dunes run diagonally or perpendicular to the coast while further inland they ran in lines parallel to the coastline. Close to the Inland mountains the dunes form in star shapes because of the variability of the winds. This showed up well in an aerial photo.

In the heart of the red dunes, near to a dry river bed they found a thin, cracked, dry layer of claypan. This clay washes in with flooding every 5 years or so and quickly dries out once the flooding is over. The sand was fascinating with different sizes of grains – some fine, some coarse; and the different sizes showing different colours.

A puzzle – Mike showed us some stones that fitted into the palm of his hand, beautifully and delicately patterned. The puzzle was that the surface was different to other weathered rocks he had encountered before showing ‘elephant skin weathering’. The weathering patterns were more like a serpentine sample that Tim Saunderson found in Coppermine Bay on D’Urville Island three weeks earlier (this probably caused by sea action/chemical weathering) It was pointed out that some patterned rocks are formed when moisture content in rain/ overnight frost lifts and washes softer material out. Conclusion? The samples Mike showed us

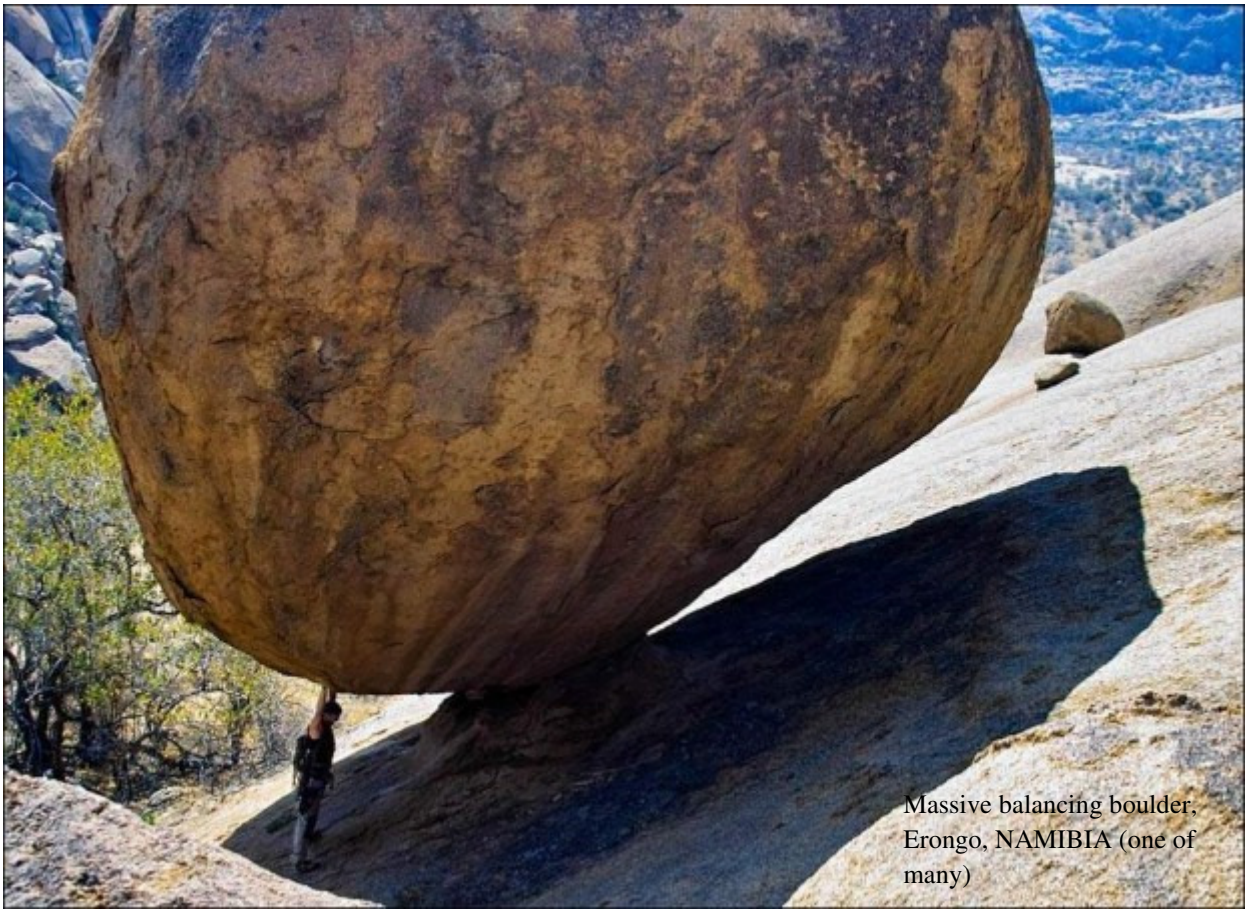
could be ventrifacts, carved and patterned by wind action, or possibly formed by some variation of chemical weathering.

A photo here showed a mountain with an obvious, patterned syncline and a small anticline; the shaping in the strata was lovely.

Travelling north the Blowers came across another sandstone formation with two layers. The top layer was the currently active red sand dunes, while the lower layer was a harder 35 million years old fossilised dune layer.

The Queseb River saw the end to the sand in a sharp demarcation. The river running through at this point washes away any sand that does try to blow over, so that it doesn't reach the rock on the northern side. The other side of the river is comprised of folded mica schists and known as the Badlands.

The Blowers reached Swakopmund, another town of German influence. They visited the Krisstal Gallery, where rocks were on display both inside and outside from mining areas. They saw a quartz crystal lump that was higher than Mike! This and other large mineral clusters were dragged behind a tractor to move them into place.



Massive balancing boulder, Erongo, NAMIBIA (one of many)

Next stop: Erongo mountains. There are batholiths present of varying origins – one recent Tertiary material and one derived from Cretaceous granites.

A rhinoceros sanctuary came next. This is situated on the remains of an old volcano; with sills of lava deposited and in plain view. There are massive granite outcrops present too. Local rock sellers include crystals of aquamarine, apatite and green tourmaline amongst their wares.

Close by is a set of dinosaur footprints – from a Ceratosaurus like dinosaur.

The Okavango Basin is surrounded by lime-contained mountains, and there are nice views from the lodge where the Blowers stayed of water pools and water bores, where herds of animals visit to drink from, included giraffes. The animals are very civilised, and one group waits patiently until the first ones have finished before moving in to take their turn. The surface of the basin has been converted to a hard limey calcrete by the evaporation of the underground water deriving from the surrounding ring of limestone mountains. This calcrete layer has been broken into scattered blocks with all the animals trampling on it. It contains fossils of worm tubes and shells and larger blocks have been used to build the walls of the game lodges. If you drive just one kilometre out into the dry salt Basin (where the road ends) there's no water, no trees, nothing, just a bleak and barren white landscape all around.

The Blowers visited another area of the park where they saw more rhinos at night. This terrain had a few small sedimentary limestone hills, which showed interesting bedding structures, some containing what looked like volcanic inclusions and in other places showed a broken pattern of banding – this reflecting undersea deposition with a mix of sand and mud that slumped from time to time – turbidite action, or turbulence.

Tsumeb Coppermine

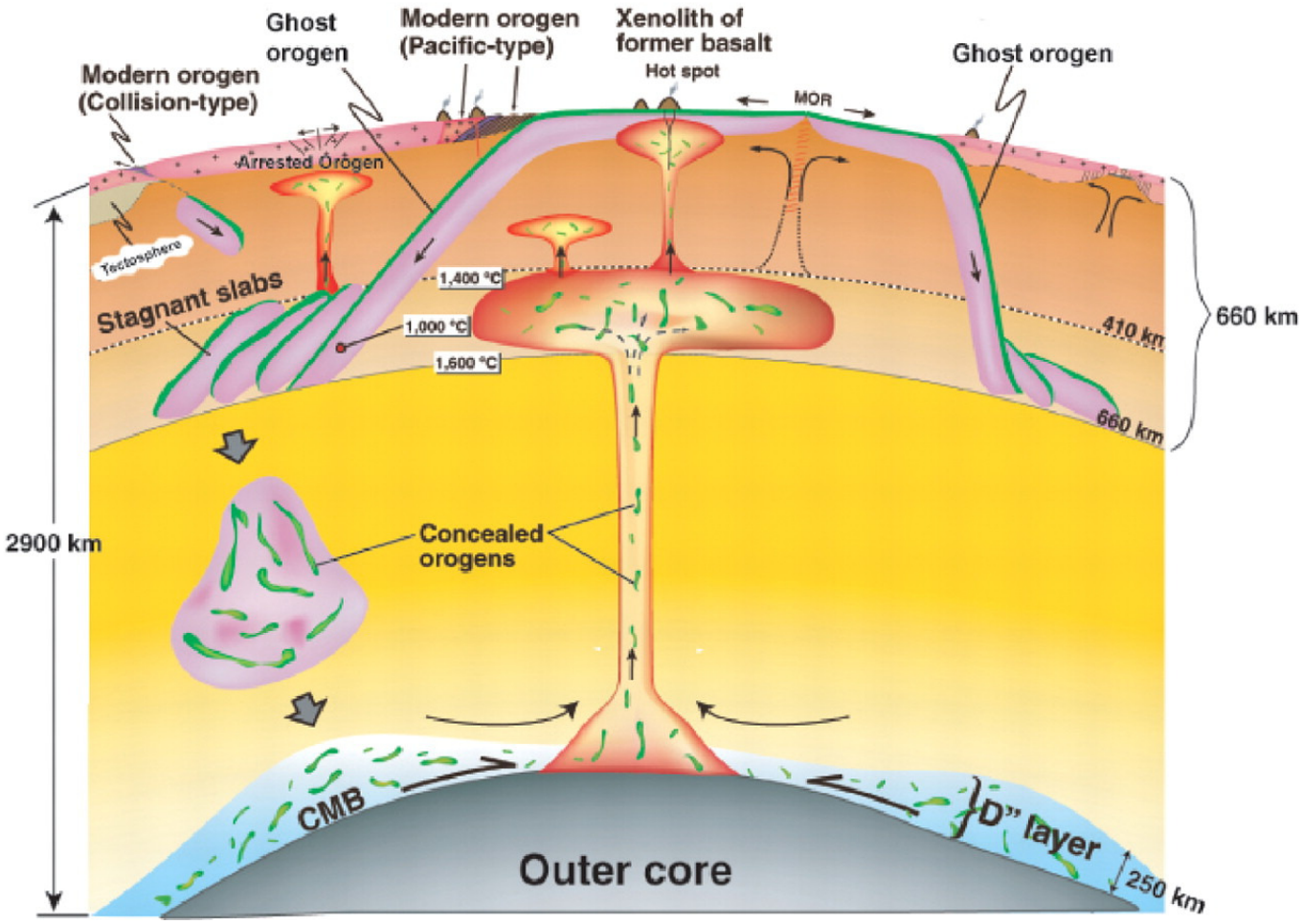
A famous mine in this area was the Tsumeb Coppermine with its copper smelter which opened in the early 1900's and is now closed. There's a museum there now showing how the local tribes made copper ornaments and used air blowers made from animal skins to operate smelting furnaces many centuries before the first European explorers and prospectors arrived. The work was done using oxide copper ores, as the artisans didn't know how to work with the sulphides. Most of the commercial Western mines were set up on the spots used by these original miners – that's how the modern mines were found.

Cuprite on Copper.

Dioptase on calcite

Tsumeb belongs to the world's most prolific mineralogical sites. The minerals from Tsumeb are unsurpassed in variety and quality of form. At least 170 mineral species have been cataloged, 20 minerals are found nowhere else, such as Krieselite.

The mines that are now closed have reverted back to being worked by local miners. In the museum, Mike was particularly taken with a box of equipment used to test every kind of rock and mineral which used to be in every respectable prospectors toolkit – it included small tools, borax, salt and other chemicals.



Minerals from these mines include calcite with dioptase and calcite with duftite. Mike had "Googled" duftite and found over seventy different beautiful duftite mineral associations from the Tsumeb mine illustrated. Mike hoped to see ancient granite and gneiss in this area but was disappointed as the ground was covered in grass and plant life with no rocks showing through.

Finally just 100 kilometres north of Windhoek they passed a classical pegmatite intrusion with wonderful micaceous and crystalline patterns with hornblende and other minerals. Again, the bedrock was undersea deposition material between the two Orogens and there had been Graben faulting as well.

If you are going on a geological trip to Namibia, be sure to buy the book by Nicole Grünert called "Namibia: Fascination With Geology" before you set off.

What a fabulous trip to take vicariously through Mike – thanks for a wonderful talk, Mike

COMING UP

June 19th: Club Meeting 7:30pm Richmond Library:

We will be showing a BBC documentary called Men of Rock:

Professor Iain Stewart traces the story of how the landscape of Scotland revealed to the world how the planet works

Please bring a green mineral for the display table and don't forget to enter the find of the month competition.

June 21st trip to Magazine Point Leaders: Mary and Diane

July 17th Club: Haematite talk by Tim

July 20th Field Trip: Trip to a micromineral collection

August 21st Meeting: Talk on Flints by Alan.

August 24th Field Trip: 88 Valley fossil sites. **Leader Ian**

September 18 Meeting : Talk on Volcanoes by Peter

September 21 Field Trip: Waitui fossil site and museum, East Takaka.

October 16th Meeting: NRMC Super Quiz Night, fun and informative backed by superb mineral specimens from Hub's private collection.

October Away Trip Labour Weekend: Hokitika. (To be confirmed)

November 20th Meeting: AGM and Talk by Mike

December: No monthly meeting. Year end NRMC BBQ open to all members family and friends.

All meetings at Richmond Library, third Thursday of the month, commencing 7:30pm

Please note that this program is provisional and liable to change. Updates will be posted by email.

If you would like to share your knowledge by giving a talk to the members at a club night, or know of anyone who would like to, please contact any member of the committee. You will have plenty of time to prepare the talk as the spare slots begin in 2015.