AUGUST 2015

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GENERAL NEWS

Places are available for the Labour Weekend trip to **Oaro**. There are some interesting sites to visit on the way, and Oaro is a special place for fossilised dinosaur bones and other sea creatures. Nice fossilised wood to be found, along with various minerals. Please contact Mike Blowers or Tez Hardwick. There will be an early start on the Sunday to catch the low tide.

Thank you Mary for sending out a newsletter whilst I was away. You did a great job.

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 you want access, email Diane and she will email you the link .

Large tumbler for hire: Takes two drums. Operates off main. Size: 1m x 300depth x 900high.including table. Grit available. Cost: $10/month plus the cost of grit. Contact Kevin.

Mining Asteroids and Comets in Deep Space – a Talk by Barry Korcheski from the Astronomy Section of the Nelson Science Society

Written up by Mary Davies

Barry launched his fascinating talk on the race to mine minerals from comets and asteroids out in deep space by likening it to the gold rushes of the 1800 and early 1900's. The first part of his talk focussed on mining while the second part illustrated the latest geological discoveries made on Comet 67P Churyumov-Gerasimenko.

There is a lot of interest from a small number of agencies and companies in mining minerals from deep space as recent discoveries continue to confirm that asteroids and comets are both abundant in rich minerals.

These companies and agencies include NASA, ESA, Deep Space Industries, and Planetary Resources. Basically whoever gets to particular sites first will probably be granted governance rights – finder's keeper's syndrome – the same sort of process that was carried through with Antarctic territory.

The universe was formed 4.6 billion year ago when condensed matter rapidly expanded, forming both dark matter and dark energy. After expanding fast, it slowed down and began to cool after about 380 million years. As it continued to expand at a slower pace, dark energy (form of energy that causes expansion of universe) and dark matter (common material of outer space but can't be seen) were formed.

A lot of bodies were formed during this time, including asteroids and comets. An asteroid is made of rock while a comet is made of ice, rocks and dust. Asteroids range in size from moon-sized to being as small as a grain of sand. Near earth, objects can be either asteroids or comets – they are regarded as the same thing, as a comet can become an asteroid under particular circumstances.

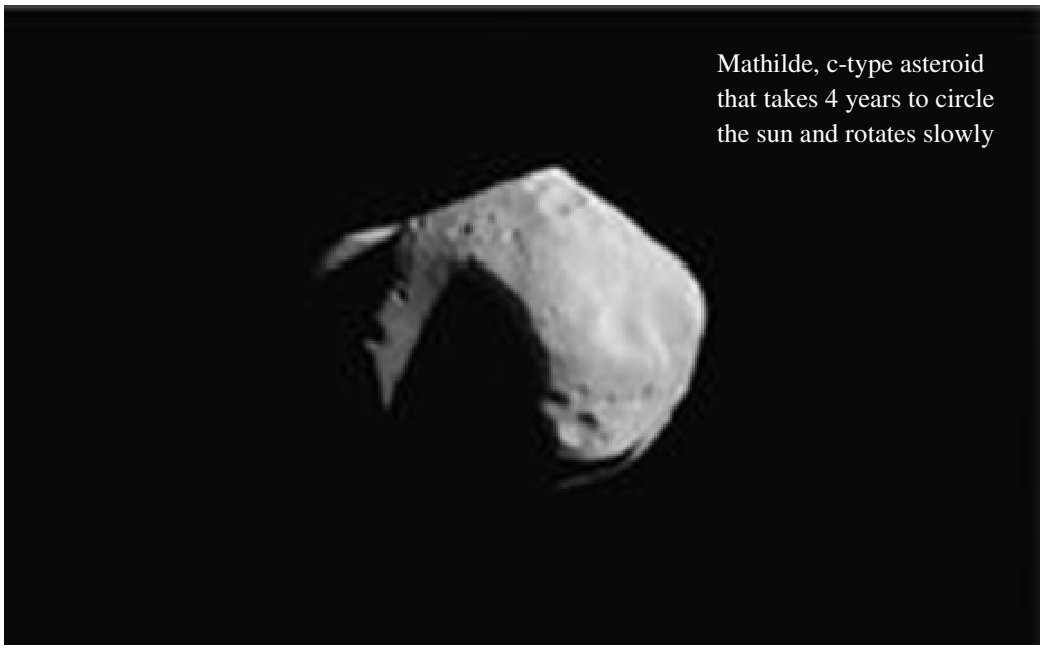
Most space rocks are situated between Mars and Jupiter. The Kuiper Belt, which is full of asteroids, is just outside the outer edge of the solar system. Pluto is in the Kuiper Belt – some call it an asteroid while others call it a planet – but if it's an asteroid it's a big one.

The Oort Cloud rings the outside of the Kuiper Belt and is also full of asteroids. It is a pristine environment, and very cold. Astronomers are very interested in the Oort Cloud. Sedna, the furthermost travelling body that reaches within our solar system, orbits around the Sun every 10,000 or so years. Our solar system is in a small corner of Sedan's orbit. Asteroids from the Oort Cloud also travel huge orbits, a long long way from our system.

Many asteroids sit within Lagrange Points, where their gravity is offset by two bigger bodies nearby whose gravities cancel one another out. Asteroids here are easy to work with and thus fantastic spots for potential mining.

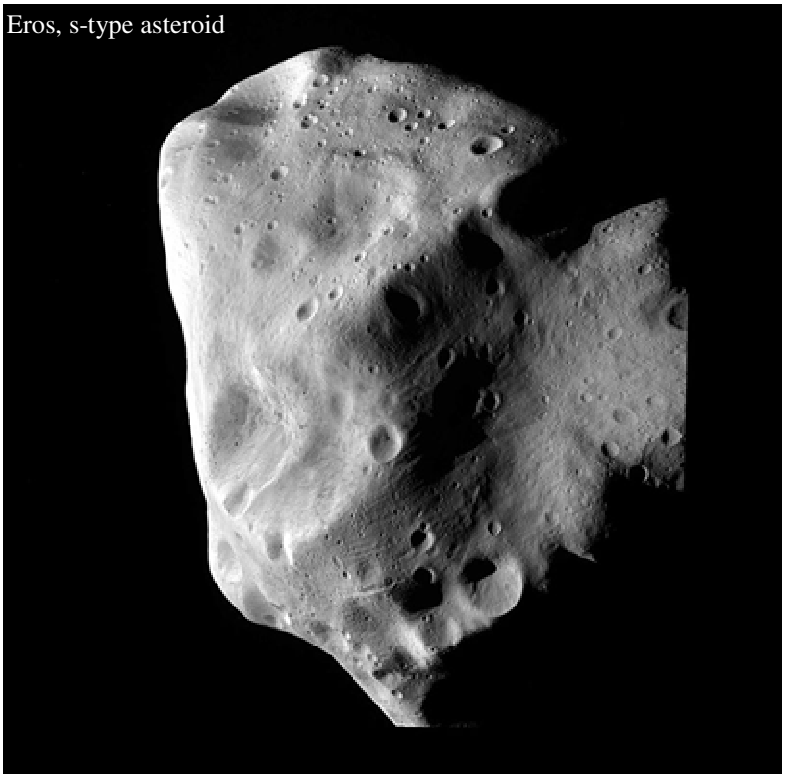
The three most common types of asteroids are as follows:

C-type are dark with a chemical composition similar to the sun – mostly carbon. These asteroids are the most common type with about 75% of all asteroids being of this type.



Mathilde, c-type asteroid that takes 4 years to circle the sun and rotates slowly

S-typeare17% nickel, with iron and magnesiumsilicates and are relatively bright to look at. These are the second most common type of asteroid.

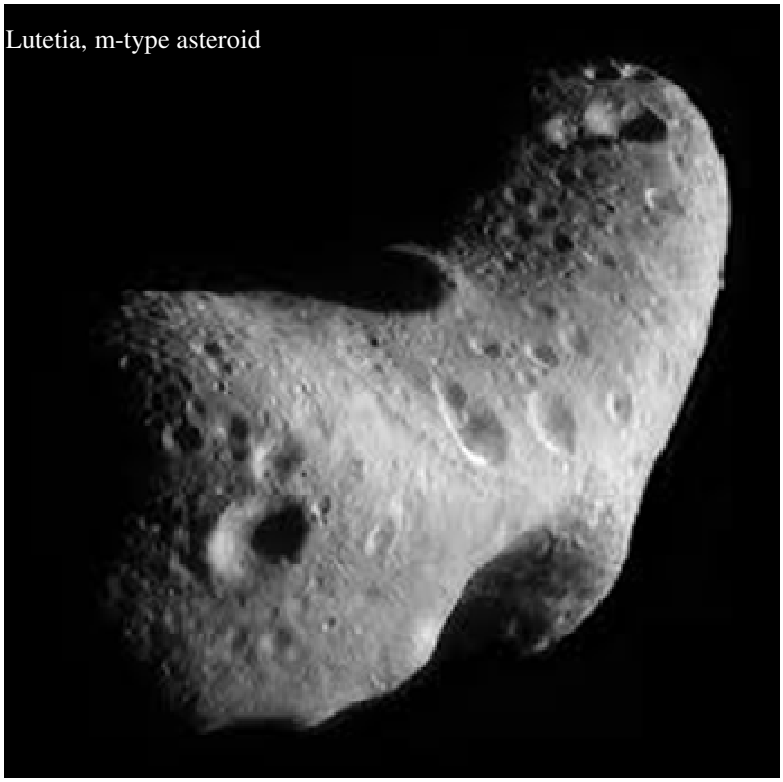

Eros, s-type asteroid

M-type are almost pure nickel and iron with a small percentage of stones and other minerals included. More is needed to be known about mineral composition. They are bright to observe.

The largest known asteroid is a dwarf planet called 1 Ceres (1as it was the first found asteroid) that orbits in the asteroid belt between Mars and Jupiter. It's 974 km in diameter and holds25 % of the mass of the asteroid belt.

Next come 2 Pallas, 4 Vesta and 10 Hygiea all of which are between 400 and 525 km in diameter. All other asteroids are less that 340km in diameter.

Asteroids are mined on earth in rare places; one such is the Sudbury Basin where Barry's Dad worked, a major geological structure in Ontario where the second largest known impact crater lies.


Lutetia, m-type asteroid

Mining in space has several potential options – minerals could be mined on site before being brought back to Earth – likely to be cheaper this way. There could be open cast strip mining, shaft mining, mining by magnetic rakes, mining by heating, use of robots, mining of regolith rather than the actual rock itself – this could be collected from debris fields.

Robots are currently the most popular, at least in theory, way to mine in outer space. The Mars rover, Curiosity, took the first drill sample of rock on Mars.

Initial mining will focus on water rich material to enable hydration, air to breathe, radiation shielding and manufacturing capabilities. It's still very early days for this, but thinking ahead!

The company Deep Space is at the cutting edge of technology that will be used in mining and space exploration. They have developed the Firefly as a satellite to seek out suitable asteroids, and the Dragonfly that they hope will bring some mineral material back to Earth in the near future. The microgravity foundry is a 3 dimensional printer that may be able to produce parts and equipment for mining in outer space. The harvester will be able to process minerals onsite

that will enable minerals to be used for further exploration without having to return to Earth first. The rotating space-based wheel habitat might be a place people can live one day while mining in outer space.

The asteroid known as 2012DA14 that flew by Earth on Feb 15th2013 with its diameter of 30m could be worth up to $195billion in metals and propellants if it was able to be mined.

Sought after minerals by humanity include nickel, iron, aluminium, cobalt, copper, lead,molybdenum, tin, zinc and platinum. These are in abundance in deep space, just got to get out there and get them! Steel and alloys can be manufactured from these minerals. One 500 m diameter asteroid that's been found contains more platinum than has been found on earth in all of mankind's history.

Barry showed us some fantastic video material of asteroids, their distribution, and how they move in space.

Now we came to the second part of the talk.

The Rosetta spacecraft was named for the Rosetta Stone and it's lander Philae for the Philae Obelisk.

The Rosetta set off in March 2004 and took 12 years to reach the Comet 67P Churyumov-Gerasimenko. The flight path was gravity assisted, first from Earth's gravitational field, then from that of Mars, then Earth's again. It made several spirals using gravity assistance – there was no rocket on earth powerful enough to give it the speed it needed. To save on battery power, it went into deep space hibernation in 2011, coming out of it again in 2014 before flying past the comet. Signals were sent back to Earth, arriving a whole 17 minutes late which had the stakeholders, working on it for a couple of decades before the launch, very worried! A receiver was built in Australia especially to receive the signals from the Rosetta. The maths involved in getting the spacecraft to the comet was phenomenal – they got the Rosetta within 10kms of the comet.

The comet is 2 ½ kms across. Gases picked up include carbon monoxide, carbon dioxide, water, ammonia, methane, methanol, sodium and magnesium. The lander undertook some magnetic scanning. It found that the comet was rocky, lumpy and uneven, with no ice at all – this had likely evaporated leaving the comet very light and porous as it was no heavier than a car. There was gas coming out of sinkholes and fissures. Due to a particularly big crack on the neck of the comet, it may be that two comets joined together at some point in the past, by crashing into one another. It may crack apart again at some point in the future. Reflectivity is only 6% - so it's very dark. It's fluffy, being half as dense as water – pumice-like, and carbon-rich. The deuterium/hydrogen ratio – should become more active in coming months. It is thought that the comet may come from the Oort Cloud though this is yet to be proved. Geologists mapped out 19 distinct regions on the comet, and named them after Egyptian gods.

Another kind of meteorite is a pallasite and consists of gem quality olivine, equivalent to mantle rock on Earth. The surface of olivine is really hard though it may only be surface deep and change to another mineral inside that is soft. The Philae Lander didn't fire it's harpoon so that it could land in the right place, and ended up bouncing twice in the low-gravity environment and landing between rock valleys where there was little heat to fire it's batteries. It is hoped that as the comet moves closer to the Sun the batteries will fire then – in August of this year.

There's still a lot to find out about asteroids and comets – how they form, why they form, how the minerals within come about and what their make-up is. This knowledge will continue to grow as mining possibilities are worked through and achieved.

This write-up is just a snapshot of Barry's talk - big thanks to Barry for this interesting and varied talk, and I recommend you to go to one in the future if you get

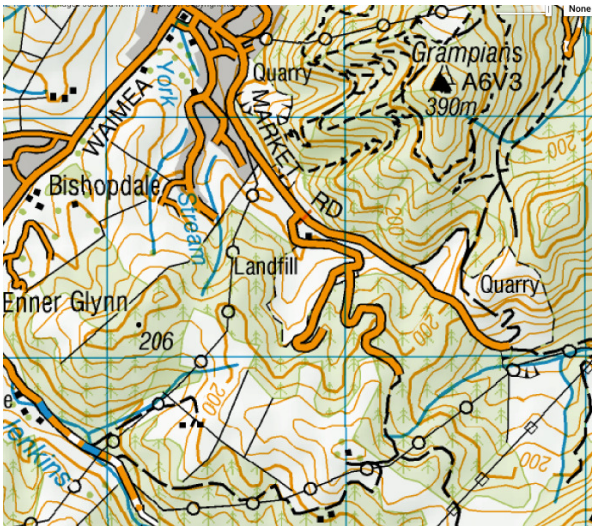
Field Trip to Local Quarries led by Ian Ladds

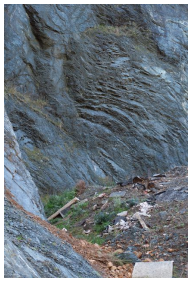
21st June 2015-08-02

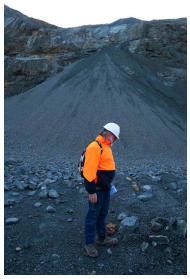
Mary Davies-Bourne, Kevin Davies-Bourne, Lis Martins,

Tom Brown, Stephen Eager

Visit to the York Valley Quarry at Bishopdale







After receiving our maps and briefing we drove to the first quarry of the day.When we arrived we found the gate to be locked so we entered by scrambling over the high fence and walked up to the excavated area, which contained machinery and mounds of crushed material that glowed green from added crushed glass. While poking around we found samples of epidote and augite (some partly crushed and altered to chlorite or serpentinised with a greenish-yellow tinge), breccia and basalt containing scattered spherical vugs (cavities) either open or filled with calcite, quartz or zeolite as well as quartz veins.As we left the quarry we also noted where the Bishopdale fault (which branches off

the Flaxmore Fault) passed up the valley.

The rocks are part of the Kaka sequence of the Brook Street volcanics. The Brook Street Terrane corresponds to a Permian (300-250 Ma) oceanic island arc.

There have been two operational aggregate quarries in York Valley since 1970, one quarry at the top (eastern) end of the valley and the other adjacent to Market Road at the western entrance to the valley.

The quarry crushes and uses the hard basaltic rock for making road material including asphalt and for drainage.

New Zealand had always had plentiful supplies of accessible aggregate but in recent years the use of alluvial riverbed sources for road construction have been restricted. Consequently, Fulton Hogan has been adding crushed glass to aggregate production since 2005. (Use of recycled glass in pavement aggregate: Bob Fulton, Fulton Hogan, New Zealand).

Visit to Flaxmore Quarry



The Flaxmore quarry is part of the Grampians formation and contains

mostly sedimentary material including bedded grey calcareous mudstone,siltstone and sandstone

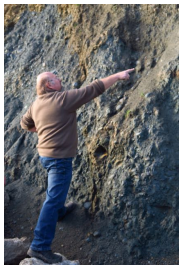
some tuffaceousmaterial

rare lenses of black impure limestone

Atomodesmatinid fragments and the gastropod *Peruvispira*(Bruce 1962) that indicate a Pennian age

Saxton's Road Quarry



The Saxton road quarry is situated on Oaklands Farm which is on private landbelonging to Julian Rainy. We were soon finding a variety of Triassic Fossils and minerals including heulandite and dendrites.

The geology of the structure plan area is covered by New Zealand Geological Survey, Map sheet N27 (part) Richmond.

This trip article was written by Lis Martins and includes her photos.

JULY FIELD TRIP TO KEVIN and MARY'S

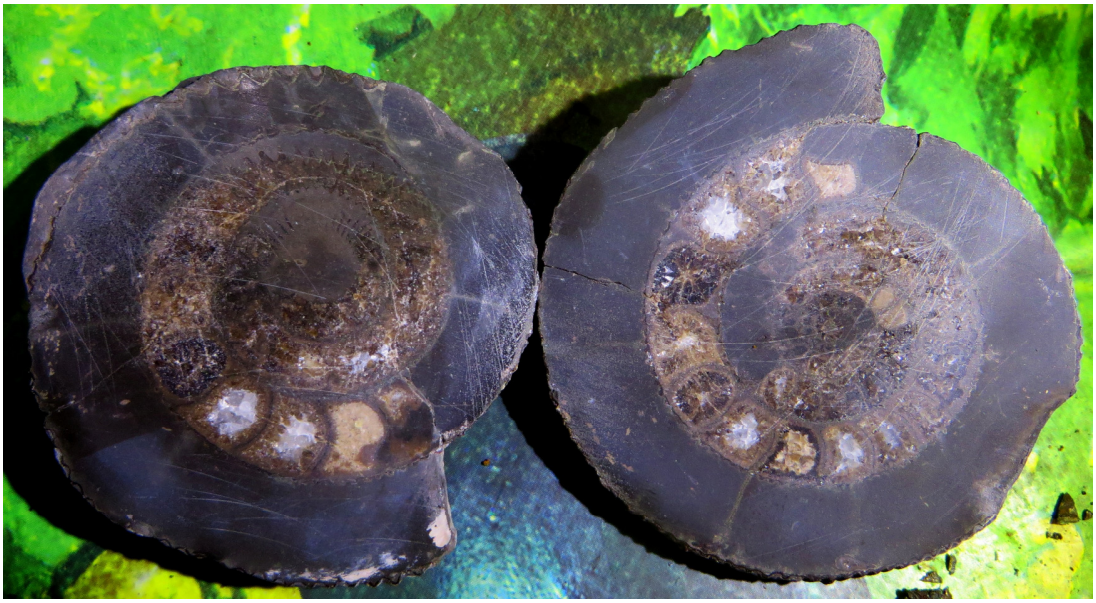
It was decided to hold this months trip at our hosts place in Nelson where most of the clubs equipment is housed.

The day was a social day, devoted to cutting and polishing rocks, and the continued cataloguing of the clubs mineral collection

Philip Wells was on hand to supervise the use of club machinery, and throughout the day a good number of members turned up to take advantage of Philip's knowledge.

Mike Blowers and Mary provided the impetus for the collection.

On a visit to Whitby in England Sheila found an ammonite that was so embedded in a concretion that only the outer coil was visible. In its current state it was not worthy of display so we decided to cut and polish it.



A good outcome I thought.

Thanks to Kevin and Mary for once again being the perfect hosts.

AUGUST 21 FIELD TRIP TO 88 VALLEY

Prof Ewan Fordyce came along with a large group of us on Aug 22nd 2015. This field trip differed slightly from previous trips to this area that I have been on, in that it was carried out in a far more scientific manner, with a view to producing further evidence for the paper the club is putting together on this important site.

His knowledge and appreciation of the area was apparent; he was excited to find daonella apteryx high up in a Gully , not far from our favourite scree gully. He thought we might load that onto the FRED database, and reminded us to load all new and/or interesting finds onto this database. He told us that daonella and halobia are used to age rocks of the triassic as they were so widespread around the planet. Paul found a complete small bryozoan.

Dave Briggs and Prof Ewan spent time finding the fault line up on the road then we followed it down fairly closely down a Gulley. Prof Ewan suggested we look at the Permian material closely on the east side of the 88 fault and see if we can find Permian atomodesma (bivalves) within to define the boundary well.

Some of the scientific talk, although interesting and enjoyable, went over my head. However this site can be appreciated on many different levels. Everyone is guaranteed to find fossils there, finding one better than your previous best is the challenge. Also the views are stunning and the fresh air does you good.

Looking for faults, 88 Valley

Talk by Paul BensemannJune Meeting 2015

Write-up by Mary Davies

Paul is not a geologist but has an interest in it, and has studied basic geology. He has a long association with the Nelson region starting with his uncles who were gold prospectors in the region in the Depression. Paul himself spent time picking tobacco when it was still grown around Motueka.He currently has a claim in the WakamarinaValley which he prospects with his partner. Paul showed us some gold found in the Wakamarina. It sounded to me like a dangerous past-time with holes in the river being dived to a depth of 10 metres or more in places. Watch out changing river levels and falling stones!
Paul informed us that he would talk with us about some of the characters in his book – the process of gleaning information out of them – rather than telling the stories already contained within the book. The book was begun in 1976 and took 35 years to complete – with lots of unrelated activity going on simultaneously. Paul's interest in the subject matter of his book still goes on to this day.

It was in a hospital in Nelson that a doctor was handed a map by a patient, at least that was how the original story was told in the Motueka Valley. The map was covered with plastic so that it could be carried in a pocket into the bush. As Paul later found out, –the map in question was in fact drawn by Mervyn's father – the Mervyn of Paul's book Lost Gold. It is a four-day walk from the Cobb Valley to the region where the lost gold lies, walking over and around peak after peak after peak. The map created a real puzzle as it drew so many people in with its intriguing lost gold reef, and yet due to information that was vague enough to be frustrating, and maps that were only loosely accurate, was so impossible to pinpoint it'sexact position.

Paul collected several more maps with time, from descendants connected with the lost reef, including descendants still

living in Karamea. Often the maps were retrieved from shoeboxes kept beneath beds where belongings from fathers and grandfathers had been stored. Paul didn't take any of these maps but instead scanned them using a portable scanner. Some of the maps were difficult to obtain, taking several persuasive trips. They were often sellotaped together from so much use. Mt Centre features in one of the maps, showing all the rivers going off from it. Another was drawn in 1911 by Marshall, drawn for FG Gibbs who is one of the characters in the book.


Paul at his Wakamarina gold claim last summer

Paul showed us many fascinating photos of the people and places in his book. There was the precipitous Haystack with the Roaring Lion in foreground. There was one of the All Inn in the Flora Valley, one of many rough mining huts in the area that were given names, such as Stagger Inn, Do Call Inn and Cram 'Em Inn . Folk back then would typically dress up in formal clothing, especially when hosting visitors in the bush. -.

Paul gave tribute to Dr Mike Johnston and to Jock Braithwaite. Dr Mike gave big help to Paul, reading the manuscript and fixing up geological errors. Jock, who helped to form the lime and marble mines in North West Nelson, spent time himself looking for the lost reef, once he had the resources in the form of funds from an American company. Jock gave Paul a lot of help with information.

FG Gibbs was one of the main benefactors of Nelson, helping to set up the Cawthron Institute, the library, the school of music and the museum. He was an entrepreneur and a passionate rock hound. He put lots of family money into gold prospectors, becoming obsessed with the lost gold story of North West Nelson and paying people in the Depression to go in search of it.

Another main character of the book, Trevor McNabb, lived in Karamea, Nelson and Motueka. He found communication with people difficult at times but was totally at home in the bush. He always had a rifle with him and shot game for food on his trips into the bush. We saw photos of him – one from his younger days and one from the 1960s. The word is that he may have found the reef but would have been very unlikely to let on if he had. So this is unknown.

Stan Simkin, Trevor's cousin, lived with his wife and children in the upper reaches of the Cobb Valley. It was a mission to get there, but this family was tough. Stan spent his life looking for gold.

– The Johnsons including Elaine and Levis Johnson of whom we saw a photo – this family were founders of Karamea and ran a mine behind Karamea. Trevor McNabb was a descendent of the Johnson's.Levis did a lot of trips with Trevor McNabb, as did Stan Simkin. Trevor would often disappear and it could be days before they saw him again. Trevor never spoke to his companions about the gold reef, ever, even though they went out tramping and hunting together.

Trevor did not even tell his family about the reef even when pressed by his oldest son Elmer. Elmer however discovered Trevor's maps, letters and photographs about the reef and then went into the bush throughout the 50's and 60's, trying to find it. Elmer was difficult to question – for example, Paul would ask questions repeatedly such as 'what did you take?' only to receive the reply 'food.'

Earn Ray, also a character in the book, was prospecting for gold way down in the Leslie and was there for a whole year.

The Heath family had an accommodation house in the Graham Valley. One of these was Florence Heath of whom we saw a photo. She and her family who ran the house had to deal at times with ragtag miners who were heading out prospecting. They would pick people from the MouterePub and take them up into the hills, hiring themselves out as guides. Ashley Heath was one of these, whom Paul interviewed in his second to last year of life. They took horses, loaded up with gear that could see them stay out for weeks on end. Jim Heath, an uncle, was photographed with tour-

ists dressed up in dresses. This was not unusual with folk in remote places toting with them a formal set of clothing, including boaters, for use in accommodation houses and pubs. The Heath's owned a car in the early days of these new fangled vehicles.

There were many searches that went on after the Murchison earthquake to find the gold, then again after the Inangahua earthquake. The reef may have become hidden due to erosion or slippage from the earthquakes. Bush may have grown over the area. The landscape can change rapidly, and is such difficult country that to re-find the reef is a big task.

Trevor's son used a canoe made of the kahikatea tree to search for the gold. We saw a photo from one of his trips.

Paul showed us photos and real life gold nuggets from North West Nelson and from Wakamarina. These nuggets were in such as state that it is highly likely they came from a reef. One of these was found with ex-ranger Max Polglase. TV 1 then flew Paul and Max back to where one of the nuggets was found at the head of the Roaring Lion, looking back to Garibaldi, and they spent five days searching for the reef, using a polythene sheet to sleep under at night- a bit miserable in the rain that fell.


A nugget the author and friends found in the upper Karamea

Chaffey, who lived with his wife for many years in the Cobb Valley and surrounds, also looked for gold. Many years after his death a tramper found a 'hidden' camp that was assumed to belong to Chaffey, his secret place for mining gold. Jim Henderson wrote a good book on the asbestos cottage – worth a read. Mrs Chaffey would always dress up to receive visitors, otherwise leaving a note outside letting visitors know when she was too busy to entertain.

More discussion from the Question time raised the following points:

Molybdenum was at one point more sought after, and worth more, than the gold in North West Nelson and it was looked at for commercial mining. Drilling rigs were set up on the Marshall Ridge. But it was too hard to get to and was dropped.

It was very cold working in winter mining gold – miners wore several layers of clothing to keep warm.

One of the geologists Paul interviewed, Peter Roberts, did a lot of field work on Marshall Ridge and other areas of the upper Roaring Lion. He believed there could be-some kind of intrusive underground reef of gold that feeds the roaring lion.

Helicopters have been used to search for the lost reef but the country is so rugged and steep that they haven't been able to find it.

If you haven't yet read Lost Gold I can totally recommend it – it's a great swashbuckling adventure story that keeps you intrigued (myth or fact) and is hard to put down. You can buy it from Page and Blackmores in Nelson.

UPCOMING EVENTS

September 17th meeting: Prof Cooper talking on Haast Schists and Carbonatites

September 19th Field Trip: Prof Cooper and Clyde leading to Copperstain Creek. 8.30 at Warring Car Park or 9am Clock Tower, Motueka.

Oct 14th meeting: AGM and talk by Mike J on gold mineralization in China

Labour Weekend Away Trip 23rd to 26th: Oaro and coastal area.

Nov 19th meeting: Craig Potton: New Zealand Landforms

Nov 22nd field trip: To be confirmed

December No meeting,

Please note that the **AGM is on Wednesday 14 October** due to Craig Cotton only being available in November.

Further details will be emailed to the members.

Members who have not paid their subs are now being chased by Hub, so please pay up if you wish to remain part of the club. Otherwise please let Hub know that you wish to leave so that we may update our records.

If you have done anything of interest relating to Rocks and Minerals, why not submit a short article for possible inclusion in the next newsletter, as the other members would love to hear about it. This newsletter is great forum for sharing ideas and activities.