# Mineralogical Society of Western Australia Inc.

# Mar-June 2016 Newsletter

## Contents

## Editorial

Hi Everyone,

Gosh this year is flying past quickly… it's already June and I'm a newsletter behind, sorry about that! It just means that there is lots to read about in this edition though. It's been difficult to find the time to sit down and bring this all together, and as such I have decided to step back a bit in the next financial year. I will be hitting the halfway point in my PhD, and things will only get busier. So at the next annual general meeting, I will be looking for someone to either take over the role of Newsletter Editor for (probably) the next two financial years, or join me as a co-editor so we can share the workload.

Come and have a chat with me if you feel like you'd like to get involved, or else I will be 'nominating' someone at the next AGM…. (*Insert Jaws theme here*)

See you all at the next meeting,

Jason

## Reminders

At all meetings the Society's microscope and UV lamp are available for use by members.

The Society has a library from which members may borrow free of charge. The library is housed at Stewart's office in West Perth, and the catalogue is available from the Secretary.

The policy that members may submit short advertisements free of charge will remain. Additionally, commercial advertisements will be accepted for a nominal charge.

## New Members

The committee would like to welcome Marion Lesbros to the family, Welcome Marion!

## Membership Renewals

The committee would like to remind members that the membership fees are due by the end of the month (30th June). New members please fill in the form on the website. To pay your annual $30 renewal to the Commonwealth Bank:

Account: Mineralogical Society of WA Inc.
BSB: 066 124
Account: 10168786
Do not forget to put YOUR NAME in the transaction reference.

## Carbon Mineral Challenge

You may have noticed an email from Sue Koepke just before Christmas, forwarding on an email inviting us, as a mineralogical society, to join the Carbon Mineral Challenge. The idea is to find and identify as many of the 145 carbon bearing mineral species estimated to remain undiscovered by 2019. You can read more about it here and here. So, when you are out bush over winter, keep your eyes peeled for anything that looks unusual!

## Joint Mineralogical Societies of Australasia Seminar 2016

*Details provided below are from the website, accessed 21st May 2016.*


### Friday 30th Sept – Tuesday 4th Oct.

The Mineralogical Society of Queensland is pleased to announce details of their 2016 seminar and invite you to attend in Brisbane, Queensland on the Queen's Birthday weekend, Sept-Oct 2016.

The theme is **Mineralogy - Science and Passion** - giving guest speakers leeway to speak on almost any subject that they are passionate about. We are presently finalising our program of guest speakers and this will publicised on the website www.mineral.org.au and through state and affiliated societies and clubs. We are sure that the variety of topics and our presenters will have something for everyone. As well as the seminar we are conducting field trips and a microscopy session in the days before and after the formal proceedings for those who can attend.

**Seminar Registration** is **$85** per person

**Student Registration** is **$40** per person

**Seminar Dinner** is **$50** per person

A PDF copy of the 2016 registration form is now available by following this link.

**The Speakers:**

**PLEASE NOTE:** We are currently working to get a complete list of speakers together but please revisit the page soon.

**The venue:**

The seminar venue is the Queensland Museum theatrette, Southbank. It is situated on main transport corridors, and easily accessible by bus or train, from the CBD, or an easy 10 minute walk from the CBD across Victoria Bridge. Also within the precinct is the Queensland Art Gallery, State Library and the Museum of Modern Art. Adjoining the Museum is Southbank itself, with over 80 hectares of gardens, walking paths, restaurants and a large swimming lagoon. Entry to all areas is free.

**The seminar dinner:**

In keeping with seminar tradition we are also planning a seminar dinner for the Saturday night 1st October. The dinner will be held within walking distance of the seminar venue at Southbank.

**The Minerals Heritage Museum:**

For those delegates in Brisbane before or after the seminar, a visit to the Minerals Heritage Museum is worthwhile. Located on the mezzanine floor of the Queensland Museum , it has five large cabinets of mineral specimens on display. These include many high quality Australian pieces. The display can be accessed during Queensland Museum opening hours.

**Field Trips:**

Monday October 3 - (Afternoon). Location to be announced but probably in Lockyer Valley SE Queensland.

Tuesday October 4 - (Full day). Another field trip will be run for those delegates who have the extra day available. Leave early morning returning to Brisbane around 5pm. Probably west of Toowoomba SE Queensland.

**Mineral Bazaar:**

Monday October 3 - Queensland Museum (Early morning - towards lunchtime). A swap/buy/sell session will be held early Monday so that delegates can still attend the afternoon field trip organised for the day if required.

**Accommodation:**

We are currently negotiating special rates for delegates and these will be posted shortly.

For further details please contact:

**Russell Kanowski** President, MinSoc Qld and Seminar convenor
Tel: 07 4635 8627 (Home)
0407 390 758 (Mob)
email: kanowfam@gmail.com

**Sue/Phil Ericksson** Treasurer, MinSoc Queensland
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0431 906 769 (Mob)
email: ps.ericksson@gmail.com

# The 6th Frank Radke Memorial Mineral Auction

The Mineralogical Society of Western Australia (Inc.), (MinSocWA), will be conducting its biennial mineral auction on Sunday, 20th November 2016. It is planned to hold the auction at the premises of the WA Lapidary and Rockhunting Club in Rivervale and it will be an all-day event, with two live auction sessions, in the morning and afternoon, with a lunch break, during which bids for the silent auction can be made.

These auctions are extremely important in providing funds for the smooth running of our Society and for the purchase of equipment for use by its members. Currently, we are looking at procuring a simple polarizing microscope to assist members in identifying their own minerals and not relying exclusively on "buying a label". We would also like to encourage research and publication of data pertaining to Western Australian minerals and to assist with this we plan to meet all or some of the costs of the more expensive mineral identification techniques such as XRD, thin sections and chemical analyses.

We are in the preliminary stages of organizing the auction. Bidding will be open to anybody who wishes to buy. Sellers will be restricted to members of the MinSocWA, kindred associations such as the Gemmological Association and Lapidary Clubs as well as invited mineral dealers

The last auction, held in February 2014, was an outstanding success in no small part due to the donations of mineral specimens and other paraphernalia by leading mineral deals and members such as you.

This is a request for specimens, mineralogical books and instruments for the auction, either to sell on your behalf or as a donation. The Auction Committee would like to get all items for sale by the end of July 2016, if possible. This would allow sufficient time to catalogue and photograph the specimens and to organize advertising material such as posters, advertising in other journals and the web page in a timely fashion.

Naturally, any donations will be acknowledged by the Society and full recognition will be given to all donors during the auction.

If you are able to assist, could you please contact John Mill (millrock@iinet.net.au), Vernon Stocklmayer (nyanga@icenet.com.au) or Jason Bennett (Jason.bennett@iinet.net.au). We will make arrangements for the collection of any donated specimens.

Best wishes,
John Mill
Auction Organizer Mineralogical Society of Western Australia (Inc.)
Email: millrock@iinet.net.au (Preferred Contact)
Phone: 0411 420 921

# A Tale of Mineral Identification

*By Geert Buters*

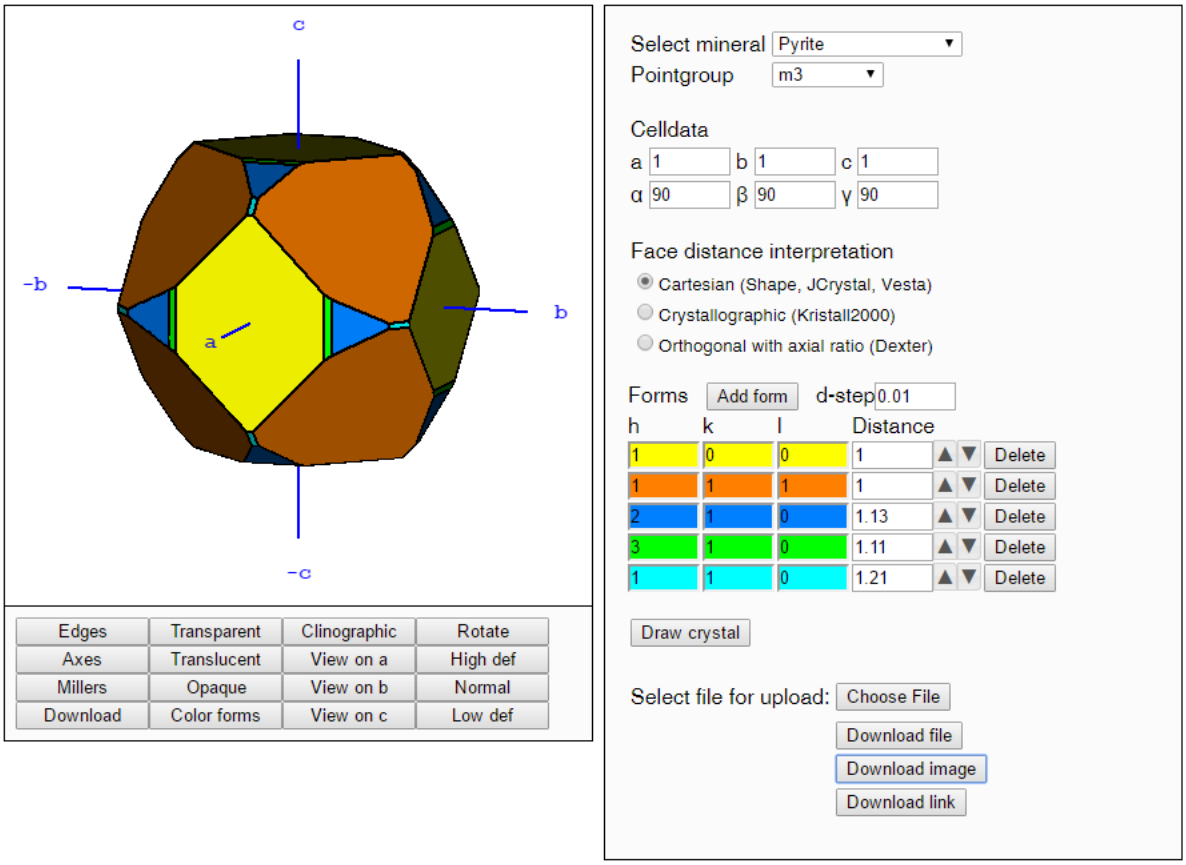
How many MinSoc members does it take to identify a mineral? We recently had an opportunity to find out the answer to this "twist" on the old Irish joke, when Ann and John Mill invited MinSocWA members for an Australia Day BBQ (thanks guys, it was a terrific evening). In between watching the fireworks and enjoying the catering many of those attending took the opportunity to admire John's mineral collection. An unusual looking "garnet" caught Craig Bosel's eye, but when he asked for more information, John wasn't quite sure where it was from or how he had acquired it. Sue Koepke overheard the exchange and was intrigued. After tossing the mineral about in her hand she thought it might be a little too heavy for garnet. Others agreed, but if it wasn't a garnet, then what was it? No one seemed to know, so Susan Stocklmayer kindly offered to take it home and do some tests.

*The mysterious 'Garnet' in question… Each view is ~5cm across. Photographs by Sue Koepke.*

Being opaque the specimen did not lend itself to optical tests, and because it was someone else's rock Susan was reluctant to attempt streak or hardness tests. She was however able to do very accurate specific gravity determinations, and found it to be 5.01 – well above the 3.5-4.3 range for garnet. The crystal shape was described as a modified pyritohedron with three sets of striations at right angles strongly suggestive of pyrite, and the abraded edges of what seemed to be a coating revealed the colour and lustre of pyrite. Finally, she found the specimen to be non-magnetic. If it walks like a duck, and quacks like a duck…., but, ever the scientist, Susan refused to jump to conclusions. With a committee meeting coming up it was suggested Vernon bring the mystery mineral along, and ask Stewart to zap it with the portable XRF. Knowing the composition might help narrow down the possibilities.

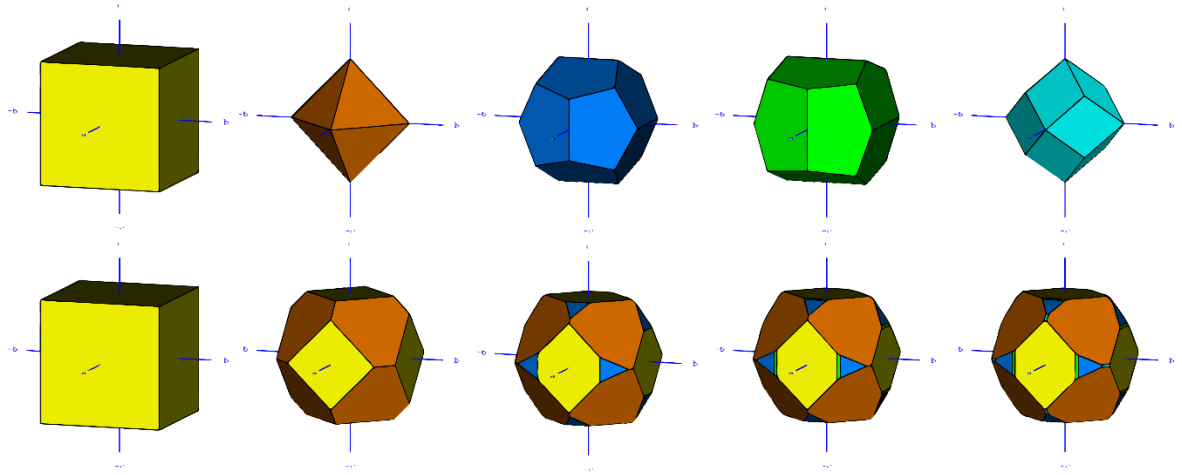
Well, as so often happens when an oracle is consulted, the supplicants heard the message, but were confused, and debate grew amongst them. According to the XRF the crystal contained copper, iron and sulphur. This would suggest chalcopyrite or bornite, but neither has an SG of 5.01 (Editor's Comments – the composition returned by the XRF was also a bit off…it was mostly iron and sulfur, with ~10wt% Cu... too low to be one of these minerals). Bornite comes close with a density of 5.1, but that is still a miss considering the accuracy of Susan's determination. Could it be bornite with some impurity that lowered the weight? The thing didn't look like bornite. Of course the three elements needn't combine to form one mineral. Maybe there were two minerals involved? Stumped for answers, Sue Koepke offered to take the little recalcitrant home, and consult her internet "brains trust".

When I saw the "garnet" again, I was struck by the similarity to a cobaltite crystal, recently discussed on Mindat[1], which displayed {100}, {210}, and {111} faces. Of course, there was no cobalt in our specimen, but the crystal form looked the same. Meanwhile, Sue had taken a few photographs and posted them on the facebook group Australian Crystals and Minerals[2], together with a full description and a request for help. Within minutes she called out excitedly "It has been identified. It is ducktownite!". "Yeah right, pull the other wader", was my initial response. But sure enough, when I looked it up on Mindat, even this sceptic was convinced. Ducktownite[3] is a named variety of chalcocite that occurs as a coating on pyrite, and was first described from the Ducktown mine in the USA. It would appear the XRF identified the copper from the chalcocite outer layer, and the iron of the pyrite inside, and Susan's SG determination confirms the pyrite. As Sue K pointed out, there is even a little ding on one of the corners, where you can see not only pyrite's colour and lustre but also conchoidal fracture. Now that I knew we were looking for pyrite I was able to match up the crystal shape in Goldschmidt[4], and Jason Bennett has since done a mock up on Smorf[5], a site well worth a visit for anyone interested in crystallography.

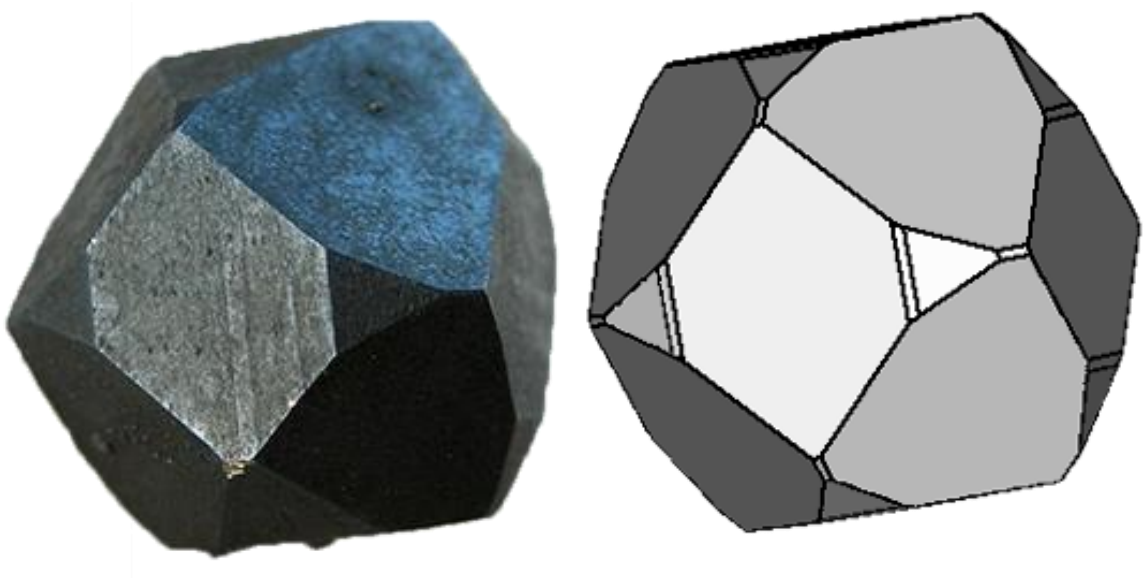



*Jason Bennett's crystallographic reconstruction in Smorf. The dominant faces are the yellow cube {100} and orange octahedron {111} sets, with blue pyritohedron {210} modification. Traces of the {310} and {110} sets also appear. You can view the model interactively here: http://www.smorf.nl/. Figure generated by Jason Bennett.*

[1] Cobaltite Discussion: www.mindat.org/forum.php?read,11,374608,374624#msg-374624
[2] Australian Crystals and Minerals Facebook Group. www.facebook.com/groups/australiancrystals/
[3] Ducktownite. www.mindat.org/min-7583.html
[4] Goldschmidt's Crystal Forms: Atlas der Krystallformen, Tafeln, Band 6, pyrit, fig. 156
[5] Smorf (Crystal Model Generator). www.smorf.nl



*Sequential generation of the complex crystal habit through addition of base isometic forms. Left to right: The {100} Cube, the {111} Octahedron, the {210} Pyritohedron define the main shape, with {310} and {110} adding minor facets. Figure generated by Jason Bennett using smorf.*



*Side by side comparison of the 'ducktownite' crystal and the smorf generated model. Note the weak vertical striations on the [100] face typical of pyrite, as well as the small brassy coloured chip on the bottom corner of this face. Models in smorf are generated with perfect symmetry, and uniform development of all faces. Note however, that the image in this view lacks the thin {310} faces seen on other views, and the {110} set is visible on the horizontal axis only. Image on left by Sue Koepke, figure generated by Jason Bennett in smorf.*

So what did it take to identify this mineral? The tally is about 7 or 8 MinSocWA members, a good old fashioned specific gravity determination, some newfangled technology, and the wisdom of the internet crowd. Taking into account that not one but two minerals were identified, the answer to the question posed at the beginning of this article is precisely 3.6751 members, though the accuracy of this answer cannot be guaranteed.

But did we really prove the specimen to be ducktownite? While the collectors amongst us have already written the label, the scientists are uneasy. Yes, we have a very credible theory that explains all the available evidence, but, as Susan Stocklmayer pointed out, though our specimen may look like the picture on Mindat, we have not actually proven the coating is chalcocite. To make matters even more interesting Ralph Bottrill reported that George Stacey bought a very similar looking pyrite coated in bornite at this year's Tucson Show. It would appear this story is to be continued.

# Recent Activities

## Mineral Appreciation Group Meeting, Wednesday 17th February 2016 – "Azurite and other blue minerals"

*Summary by Vernon Stocklmayer*

The WA Mineral Society inaugural "Mineral Appreciation Group Meeting" was held at a member's private residence on Wednesday 17th February.

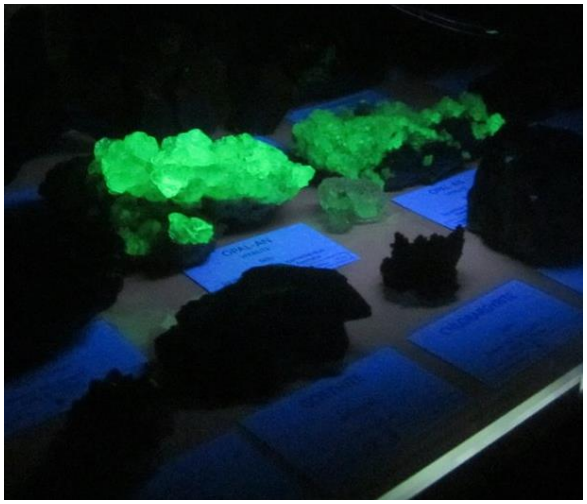
The topic of the day was "Blue Minerals" and the small group of 10 members who attended brought a wide variety of blue-coloured minerals for viewing and discussion. These included crystals of azurite in various forms as well as rarer crystals and minerals such as a loose crystal of a doubly terminated topaz, a fine crystal group of euclase, a cabochon cut ceruleite and an afghanite crystal in matrix.

Our host has a very fine collection of minerals and crystals originating from many countries worldwide; these are housed in well-lit glass shelved cabinets and each specimen was clearly labelled to allow easy identification. The Society UV lamp was put to good use and the Society microscope was also set up for those who wished to view their specimens under high magnification.

Some possible mineral misidentifications again gendered discussion about "Buying a label" as against performing an actual identification; something that the Mineral Society could possibly partly rectify by holding mineral identification workshops.

Refreshments and nibbles were provided and our hosts for the evening are to be thanked for inviting us to their house to admire their mineral and crystal collection.

*Azurite – Unknown Locality (Africa?). Specimens such as this were the topic of discussion.*



*Hyalite - Squaretop Mountain QLD. One of the 'Hyalited' minerals fluorescing under the Society's Short Wave UV.*

*Note: The newly formed Mineral Appreciation Group (MAG) aims to meet semi-regularly at the private residences of society members. Details of events will be emailed directly to financial members only – if you are interested in attending or hosting one of these events, please contact the society via minsocwa@hotmail.com.*

## General Meeting, Wednesday 9th March 2016 – Dr Trudi Kennedy: "A Shocking Tale of Some Meteorites"

*Summary by Dr Trudi Kennedy*

The talk discussed my study of three meteorites (two eucrites – Lake Carnegie and Deakin 010 and a howardite – Old Homestead 003) thought to derive from the asteroid 4 Vesta. This study incorporated petrology, geochemistry, oxygen isotope systematics, elemental mapping at the Australian Synchrotron on the X-ray Fluorescence Microscopy beamline, WDS elemental mapping (Figure 1) and $^{40}Ar/^{39}Ar$ dating (Kennedy et al., 2013).

The asteroid 4 Vesta accreted, melted, and differentiated within 1-2 Ma of the formation of the Solar System. The probable heat source for melting short-lived isotopes: $^{26}Al$ and $^{60}Fe$. Images from NASA's Dawn Mission to 4 Vesta (in orbit: July, 2011 – September, 2012), showing impact craters, the equatorial trough, and topographic mapping showing the large south polar basins were explained. The differentiation model for the asteroid 4 Vesta, as proposed by Mandler & Elkins-Tanton (2013) was also discussed (see Figure 2 below).

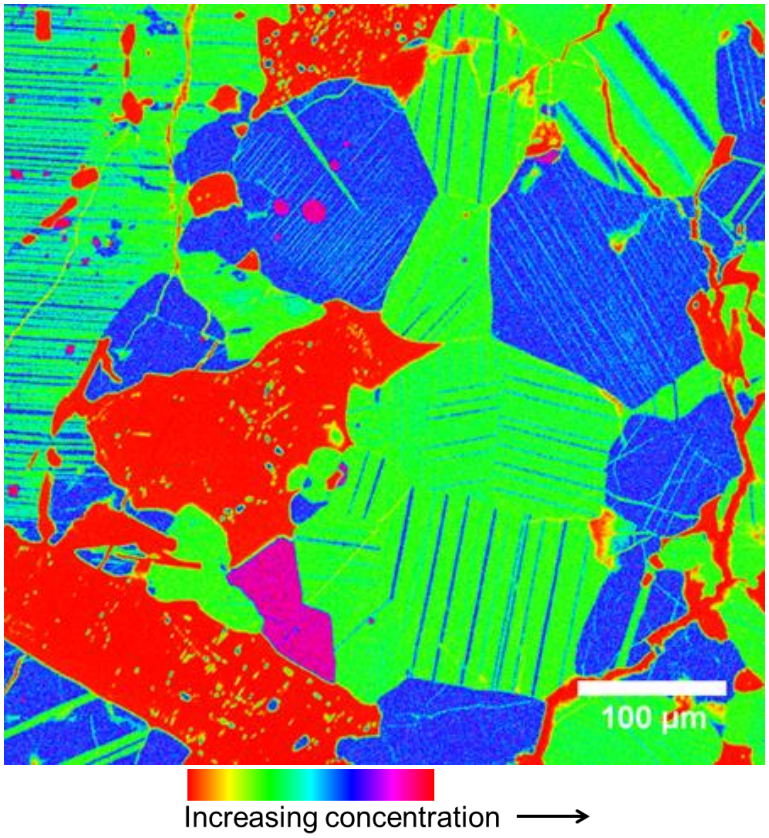



*Figure 1: Example of Fe concentration map (WDS), of Lake Carnegie, showing pyroxene, and exsolution lamellae. Red minerals are plagioclase and purple is ilmenite.*

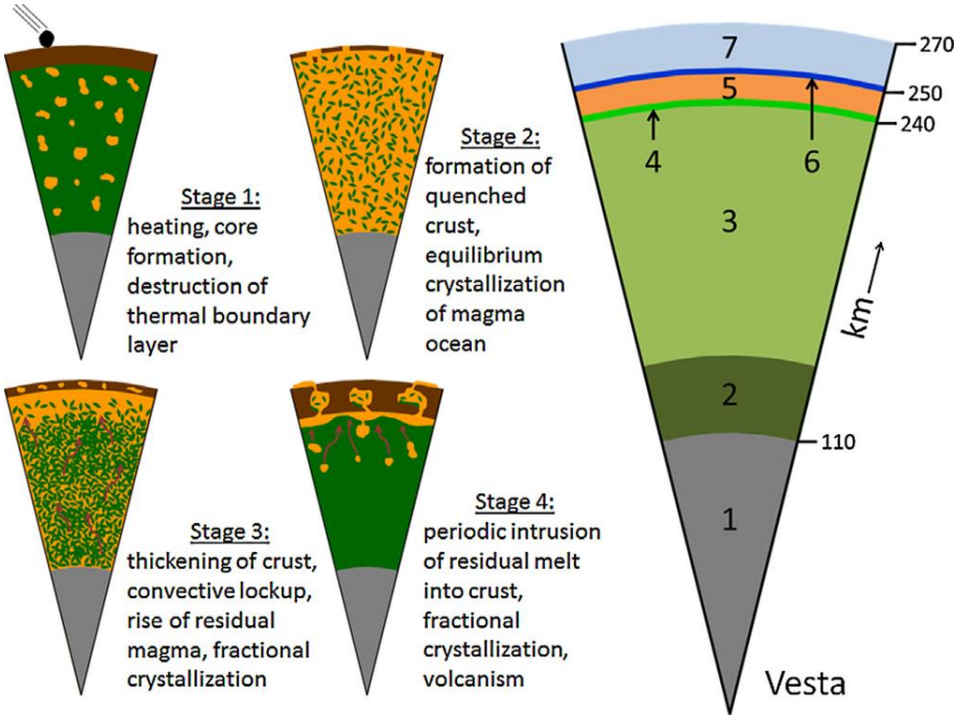



*Figure 2: Schematic of the differentiation model for 4 Vesta.*

Conclusions:

1. Pyroxene Mn vs Fe ratios suggest that Lake Carnegie, Old Homestead 003 & Deakin 010 originated from the HED parent body

2. $\Delta^{17}O$ of Lake Carnegie, Old Homestead 003, Camel Donga & Millbillillie support a HED parent body origin

3. $\Delta^{17}O$ of Deakin 010: - an anomalous basaltic achondrite

4. Lake Carnegie: mega impact at 4507 ± 20 Ma

5. Millbillillie: major, significant and small impacts at 3722 ± 55 Ma, 3579 ± 28 Ma and 3313 ± 174 Ma respectively (small impact did not reset plagioclase age)

6. Camel Donga & Millbillillie: 2 major events ~3.7 Ga

7. A restricted time range for the main phase of bombardment on the HED parent body (largest impacts cluster ~3.8-3.5 Ga)

If 4 Vesta is the HED parent body:

Lake Carnegie excavated at ~4.51 Ga from south polar Veneneia basin that partially underlies the younger (~3.7 Ga) Rheasilvia impact basin (Camel Donga & Millbillillie)

Alternatively: formation of the Veneneia basin ~3.7 Ga

• Visual evidence for a Lake Carnegie mega-impact on 4 Vesta is long gone

• Material excavated by Rheasilvia has not been sampled by the current HED meteorite collection

No evidence for any significant impacts at ~1 Ga.

(Ed. Thank you Trudi for an interesting talk!)

## Activity Night, Wednesday 13th April 2016 –"The Mineral Exhibition in the New WA Museum: What would you like to see?"

*Summary by Allan Longbottom*

At a well-attended event on 13th April, Dan Schoknecht, Jessica Brainard and Peter Downes from the Western Australian Museum presented a conceptual overview of the geology & mineral section in the New WA Museum that is due to open in 2020.

From the origin and evolution of the solar system and the formation of the Earth right through to the present day Western Australian landscape, the exhibition will be focused on WA and incorporate highlights of its immense geological record. The significance to, and use by, our various cultural groups, as well as Australia and the world, will be woven through the gallery.

The current collection of meteorites and stromatolites will provide an excellent starting point for displays which will include the oldest terrestrial minerals (the Jack Hills zircons), komatiite volcanism and associated nickel deposits, WA's gold deposits, banded iron formations, Kimberley diamonds, pegmatites and their gems, and the diverse colourful minerals of the oxidised zone. Minerals unique to the State, such as Putnisite, may be on view to the general public for the first time.

Considerable use of interactive technology will provide the visitor to seek more in-depth information about subjects and aspects of particular interest. Close liaison with education providers will ensure an outstanding resource for teachers, students and researchers

Facilities for temporary displays will be significantly expanded to accommodate overseas, interstate and enhanced special topic presentations. As with the general planning, suggestions and input from other organisations, such as Department of Minerals & Energy, Geological Survey of WA, CSIRO, the universities, DPaW and the like, will be an ongoing part of these programmes.

After the conclusion of the presentation an extended session of questions, suggestions and comments that continued through a highly social and animated supper concluded a totally enjoyable evening, definitely justifying the 300+ km round trip.

But Dan, Jessica and Peter would also like to hear from members, including those not able to attend, what you would like to see in the new mineral exhibition and hope to feature your mineral stories in the finished product. Contact can be made via the WA Museum.

## General Meeting, Wednesday 11th May 2016 – Dr Tony Kemp: "The zircon time capsule"

*Summary by Jason Bennett*

Dr Tony Kemp followed the general meeting on Wednesday the 11th of May with a talk about how zircons are used to provide windows into past geological events. Tony is currently a Future Fellow at the Centre for Exploration Targeting, UWA. His research seeks to unravel the generation of the continental crust and the evolution of the crust-mantle system through a combination of detailed field study, trace element geochemistry and stable and radiogenic isotope tracing.

During his talk, Tony described how he processes and concentrates zircons from rocks collected in the field, and how he then uses them to obtain information about the age of those rocks, where they came from, and what that means for our understanding of the history of our planet. Tony used the Jack Hills conglomerate as an example, showing how the sub-millimetre zircon crystals contained within are the only known remains of material present shortly after the formation of Earth. After the

talk, some of these tiny zircons were admired under the society's microscope, along with a large piece of the conglomerate from which they are obtained.

Thank you Tony for a wonderful evening!

# Future Activities

Many activities for the year are still in planning, please pay attention to the website, your emails and social media for further updates leading up to the events.

## General Meetings

**Note:** The General and Annual General Meetings of the Mineralogical Society of Western Australia Incorporated are now held at 7.30pm on the **second** Wednesday of every odd month at the WA Lapidary Club rooms located at 31, Gladstone Road, Rivervale (corner of Newey Street).

## Wednesday 13th July: Mike Freeman (DMP)

Mike Freeman from the Department of Mines and Petroleum , but as usual the meeting will be held at the WA Lapidary Club rooms, on Wednesday 13th July.

## Activity Days

### Gem Identification Workshop – July/August TBA (Fee Applicable)

Susan Stocklmayer is organising one (or two) Gem Identification Workshops at the Gemmological Society Clubhouse/Laboratory. Numbers will be limited, so please notify Susan of your interest as soon as possible for organisational purposes.

Final dates and cost is TBA, subject to final approval by the Gem Soc committee.

The content will focus on the use of Gemmological equipment to identify a mix of non-opaque crystals and gems, with an introduction to the polarising microscope as used by geologists.

### Mineral Identification Workshop – August/September TBA

Susan Stocklmayer and Jason Bennett are also organising a Mineral Identification Workshop at the University of Western Australia. Final dates are subject to confirmation of the Gem ID workshop above. Numbers will also be limited, so please contact Susan or Jason to register your interest.

The content in this workshop will continue on from the Gem ID course (above) through the use of a polarising light microscope to identify microscopic fragments of minerals that are not necessarily of gem quality. We will also introduce reflected light microscopy for opaques such as sulphide minerals.

# Contacts

The committee members for FY16 are:

| | | |
|---|---|---|
| **President** | Stewart Cole | 0414 904 169 |
| **Vice President** | Ida Newton | |
| **Secretary** | Sue Koepke | 0417 990 688 |
| **Treasurer** | John Mill | |
| **Field Trip Leader** | Juan Fernandez Buelga | 0416 316 321 |
| **Newsletter Editor** | Jason Bennett | 0435 057 501 |
| **Member** | Vernon Stocklmayer | 08 9291 9043 |