



# Mineralogical Society of Western Australia Inc.

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## MARCH 2017 Newsletter

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### Editorial

Hi and welcome to the second MinSocWA newsletter for 2017. Trust this finds everybody well. I've been having a bit of fun these past weeks using 'low temp' hobby glue to 'mount' some smaller specimens onto perspex stands for better display. I heard it was a fairly easy thing to do from a mineral-collecting friend a while back, so decided to take the plunge. The main benefit I'm thinking is that when you have your specimen firmly 'stuck' to a stand, a person can pick it up and view it easily without getting sticky finger residue over it. Happily the glue is pliable rather than 100% brittle/rigid when set, so easy to remove if you change your mind down the track. Enclosed are a few pics of the exercise... sadly I didn't do my homework and permanently damaged a sulphur crystal (fractured and

broken from the heat) however I haven't had any other issues with delicate species like calcite and fluorite. If you want any more info on what's involved ask me this Wednesday night. A reminder: If you have any suitable articles you wish included in future newsletters; please email them to me at [craig.bosel@westnet.com.au](mailto:craig.bosel@westnet.com.au) [Mob: 0478 633 810] regards Craig Bosel – Honorary Editor



**sulphur crystal  
internally shattered by  
application of hot glue**



**BEFORE**



**AFTER**





## 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 Cole's office in West Perth, and the catalogue is available from the Secretary. The policy that members may submit short advertisements for this newsletter free of charge will remain. Additionally, commercial advertisements will be accepted for a nominal charge.

## New Members

The committee would like to welcome the following new member to the Society - Lesley Daniels.

## Membership Renewals

The committee would like to remind members that annual membership fees are due by the 30<sup>th</sup> of June. New members please fill in the form on the website. Please use the following account details to pay your annual \$30 renewal into the Commonwealth Bank, whilst not forgetting to put YOUR NAME in the transaction reference.

Account: Mineralogical Society of WA Inc.

BSB: 066 124

Account: 10168786

## Activity from other MinSoc's

The latest newsletter from the NSW MinSoc is now available on their website at [http://minsocnsw.org.au/newsletters/MinSoc\\_Newsletter\\_Mar17.pdf](http://minsocnsw.org.au/newsletters/MinSoc_Newsletter_Mar17.pdf)

## Australian Journal of Mineralogy back issues for sale

A reminder, the stockpile of AJM journals has arrived from Melbourne, and back issues are now for sale at a sizeable 30% discount for a limited time. See Geert Buters.



Photo Credit: Craig Bosel



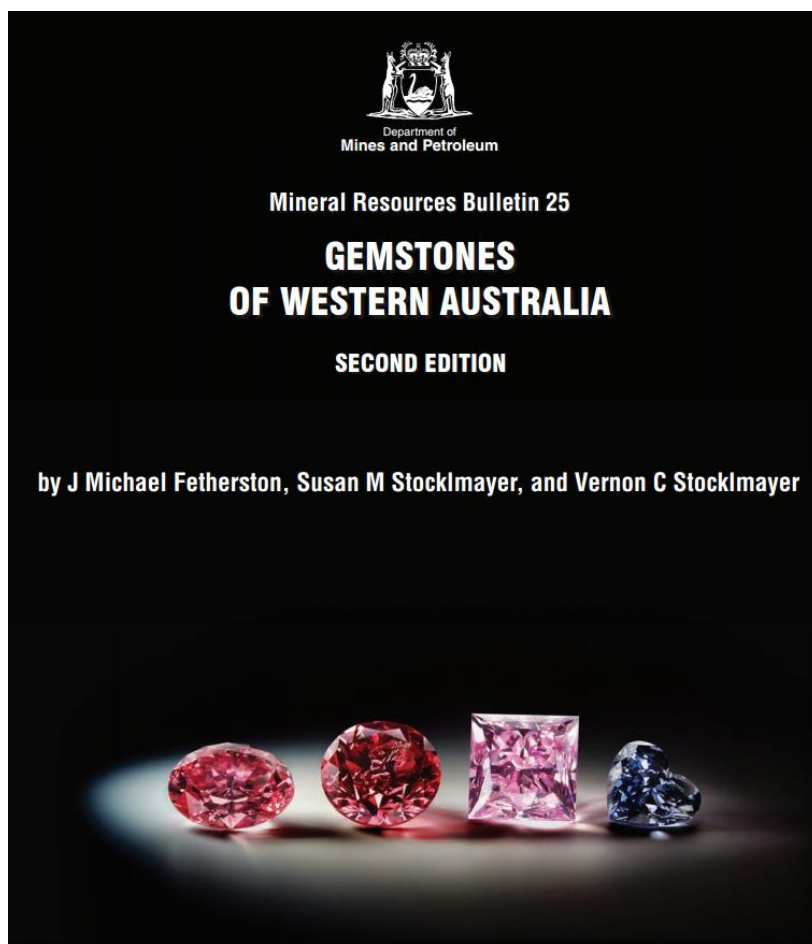


## “Gemstones of Western Australia”- 2<sup>nd</sup> Edition just published

Vernon has kindly advised us that the second edition (updated) of this excellent publication of 356 pages with many colour maps and photos is available for softcover purchase or FREE pdf download (48.9MB) at the following link ...

<http://dmpbookshop.eruditetechnologies.com.au/product/gemstones-of-western-australia-second-edition.do>

Warmest congrats to him and Susan for what must have been a mammoth task indeed, as co-authors with J Michael Fetherston. I've just downloaded my pdf copy, many thanks.



Vernon and Susan Stockmayer have generously presented an autographed copy of Gemstones of Western Australia to the Mineralogical Society of WA. The book has already been in great demand during the Mineral Appreciation group meeting last Sunday, with collectors referring to the sections on orbicular granite, Noreena Jasper and more.

As a special service and benefit to our membership, MinSocWA expects to have a stack of the second edition of Gemstones of Western Australia at the meeting this Wednesday night, available for purchase (cash only) at a discount. Get your copy while you can!

Another generous donation to MinSocWA last month came from Allan Hart who once again produced a delightful photo booklet chronicling the proceedings and activities during the Joint Mineralogical Societies seminar in Queensland last year. Allan's photo booklet will be available for viewing before and after the general meeting on 8th March, and through the MinSocWA library thereafter.

## RECENT ACTIVITIES

Talk given on Wed 11th January 2017 ... “Gorgeous Garnets” – Francine Payette

The very informative talk given by Francine at our last general meeting is summarised below.

### Garnets

- *Chemical composition & Structure*
- *Crystallography*
- *Growth features*
- *Geological setting*
- *Gem garnets*
- *Other things of interest*

#### *Chemical composition & Structure*

The name garnet may derive from the Latin ‘granatum’, meaning pomegranate, inspired by the similar red colours of the fruit flesh and of many garnets.

Garnet however is a group name where members have the same basic chemical formula ( $X_3 Y_2 (SiO_4)_3$  where X can be Ca, Mg,  $Fe^{2+}$  or  $Mn^{2+}$  and Y can be Al,  $Fe^{3+}$ ,  $Mn^{3+}$ ,  $V^{3+}$ , or  $Cr^{3+}$ ) but have the same crystal structure.

Two major isomorphous series.

Al series  $X_3 Al_2 (SiO_4)_3$  PYRALSPITE

Pyrope  $Mg_3 Al_2 (SiO_4)_3$  / Almandine  $Fe_3 Al_2 (SiO_4)_3$  / Spessartine  $Mn_3 Al_2 (SiO_4)_3$

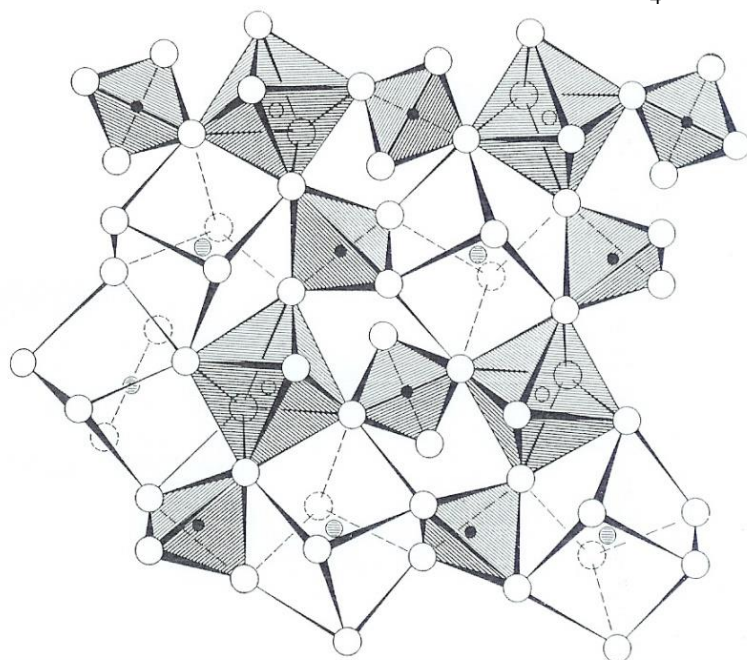
Ca series  $Ca_3 Y_2 (SiO_4)_3$  UGRANDITE

Uvarovite  $Ca_3 Cr_2 (SiO_4)_3$  / Grossular  $Ca_3 Al_2 (SiO_4)_3$  / Andradite  $Ca_3 Fe_2 (SiO_4)_3$

Variations in chemical composition between these end members define species of intermediate composition.

Same crystal structure.

Garnets are silicates with tetrahedron of  $SiO_4$  bonded with metallic ions.



From Novak and Gibbs, 1971

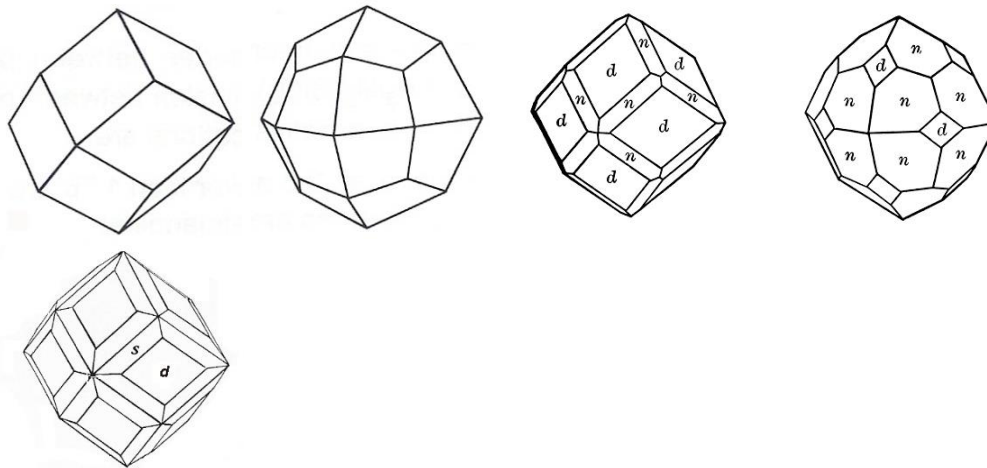
Tetrahedrons:  $\text{Si}^{4+}$  in centre with 4 Oxygen

Octahedrons: Trivalent ion ( $\text{Al}^{3+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Mn}^{3+}$ ,  $\text{V}^{3+}$ ,  $\text{Cr}^{3+}$ ) in centre with 6 Oxygen

Twisted cubes: Bivalent ion ( $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Mn}^{2+}$ ) in centre with 8 Oxygen

### *Crystallography*

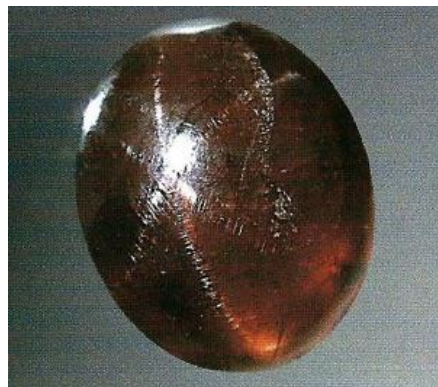
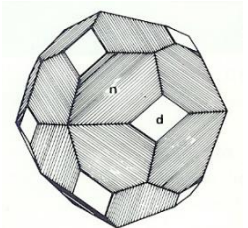
Garnet belongs to the cubic crystal system. With the most common forms being: rhombic dodecahedron  $d \{110\}$ , trapezohedron  $n \{211\}$ , or combination of these two forms. Also rare, combined rhombic dodecahedron and hexoctahedron forms  $s \{321\}$ .



### *Growth features*

Occasionally striations may develop as a result of growth oscillation between the two forms rhombic dodecahedron and trapezohedron.

Some garnets may show asterism.



[Photo credit: The AG, Vol. 21, No. 5]

Four-rayed stars: orientation of inclusions parallel to the edges of the dodecahedron, i.e. parallel to the four three-fold axes of the garnet.

Six-rayed stars: orientation of inclusions parallel to the edges of the octahedron, i.e. parallel to the six two-fold axes of the garnet.



### *Geological setting*

Most garnets generally form when a sedimentary rock such as a shale is subjected to regional metamorphism to produce schist or gneiss. The aluminium garnet almandine generally forms in this environment.

The calcium garnets typically form when argillaceous limestone is altered into marble by contact metamorphism. Andradite, grossular and uvarovite garnets form in this environment.

Garnet also occurs as accessory mineral in igneous rocks such as granite (almandine) or granite pegmatites (spessartine).

Some garnets form in the mantle and are brought to the surface during deep-source volcanic eruptions, such as pyrope in peridotite or eclogite.

### *Gem garnets*

Garnets are well appreciated as gem material as they have good durability, can show high transparency and exhibit a wide range of colours.

Basic properties are listed below.

RI: variable, 1.71 to 1.88

Lustre: vitreous to sub-adamantine

Diaphaneity: opaque to transparent

Colour: red, orange, purple, black, brown, yellow, green, blue, colourless and colour change varieties.

Cleavage: none

Hardness: 6.5 to 7.5

SG: 3.5 to 4.3

For gemmologists using basic gem testing instruments, differentiating between gem garnets may be a challenge. However due to the great variation in some properties (RI, SG), presence of typical inclusions, the specific colour of the different varieties, as well as their diagnostic absorption spectra, a positive identification is possible.



Variety	RI	SG	Differentiate with
Pyrope (Mg)	1.72-1.745	3.62-3.87	RI, SG, colour
Almandine (Fe)	1.785-1.83	3.95-4.30	RI, SG, colour, spectra
Spessartine (Mn)	1.78-1.81	4.12-4.20	RI, SG, colour, spectra
Pyrope-almandine	1.745-1.785	3.75-3.95	RI, SG, colour, spectra
Pyrope-spessartine	1.75-1.78	3.85-3.93	RI, SG, colour, spectra
Uvarovite (Cr)	1.87	3.41-3.52	RI, SG, colour
Grossular (Al)	1.73-1.76	3.57-3.73	RI, SG, colour
Andradite (Fe)	1.88-1.94	3.70-4.10	RI, SG, colour

*Other things of interest: uses, treatment, synthetic*

Besides their interest as gems, garnets have many industrial uses (abrasive blasting, abrasive powders, waterjet cutting, water filtration, etc.)

Up until now, natural garnets are not known to have been treated to enhance.

Synthetic garnets are available on the market, but they differ in their chemical composition and are easy to differentiate from natural garnets. They do not contain silica. In the gem industry, synthetic garnets are used as a diamond simulant.

- YAG: Yttrium Aluminium Garnet /  $\text{Y}_3\text{Al}_5\text{O}_{12}$  (laser industry)
- GGG: Gadolinium Gallium Garnet /  $\text{Gd}_3\text{Ga}_5\text{O}_{12}$  (magnetic, thermal)



Photo Credit: Craig Bosel



## Mineral Appreciation Group (MAG) Meeting 10AM Sunday 26<sup>th</sup> February “Garnets – Great and Small” et al

Continuing on the Garnet theme from January, enthusiasts gathered together to ‘show and tell’ at the clubrooms. Here is Susan Stocklmayer explaining garnet morphology with the aid of one of Steve Turner’s magnificent hand specimens.



Photo credit: Sue Koepke

Mike Freeman also kindly presented two brief talks, summarised below.

### **Opalised sandstone – Lambina opalfield, northern SA**

Probably a river sediment originally, it is interpreted that sand was transported and deposited in watercourse channel. It shows small erosional hollows backfilled with more sand. On one side you can see an actual lenticular-shaped channel fill in which the bedding conforms to the bottom of the channel

At the bottom of the rock are ovoid hollows that were originally clay galls. Clay in a mudflat on the bottom of a dried-out pool in river channel dries out, cracks into polygonal shaped and the edges curl up and when water flows across the surface, flakes are lifted out. Those not destroyed by the transport are incorporated into the sandy sediment. The irregular orientation of the galls shows the sediment was transported chaotically – a flood event – implying the galls were not carried far from their source

Notice at the top of the rock is a granular-looking layer and layers below it look more glassy. The granular part is finer-grained and still looks porous. The glassy bed is not porous, but if you look closely (using hand-lens) you can see the original grains and the voids between have been infilled with mineral.

When sand is first deposited, the voids (holes) between the grains are filled with water. Over time and lithification processes that can be replaced by mineral, commonly quartz, and that process turns the sediment into rock. However, it usually needs water to flow through the rock transporting the mineralising material in solution and then precipitating it in the voids. The coarser the sediment, the bigger are the holes and the easier it is for the water to flow through.

This specimen is rather spectacular because those intergranular voids were not filled with quartz but with opal, but only in the coarser-grained parts. The finer grained did not have the same amount of flow-through and so the holes were not infilled. So, the rock is best termed a cross-bedded, opalised sandstone.

I collected it in 1986 when researching opal occurrences in South Australia while with the Northern Territory Geological Survey. The goal was to find deposits of precious opal in the south-eastern Northern Territory, west of the Simpson Desert.



## OPALISED SANDSTONE



Photo credits: Sue Koepke and Allan Hart

### **Weathered Huckitta meteorite fragment.**

1937 saw famous SA geologist C. T. Madigan visit the site of a strange-looking, heavy rock sitting on a plain on Huckitta pastoral lease north of the Dulcie Range in southern NT, 250 km NE of Alice Springs. It was just over a metre long and 70 cm high. Madigan arranged for it to be loaded onto his motor truck and be transported to the SA Museum where it now resides. He also arranged for the iron shale under the meteorite to be excavated by two shepherds on Huckitta, bag it and send it to Adelaide.

In 1986 rumours started circulating in Alice Springs that specimens of Huckitta Meteorite were being sold in the town. That was strange as the original meteorite was in the SA Museum and parts would



not be sold off to the public. There was also the issue that meteorites in the Northern Territory were the property of the Crown and selling would have been illegal. After a bit of detective work I obtained a piece and, sure enough, it had the hallmarks of a pallasite meteorite, but it was all rust! With the help of a local prospector from Baikal, some 400 km NE of Alice Springs, in April 1986 we managed to battle our way over the Dulcie Range to the site where we found a small hole and it was still lined with iron shale. Iron Shale is the term given to the layered rusted meteoric iron that will underlie a meteorite that has been sitting on the ground for a long time.

Back in Alice Springs I contacted the NT Museum's meteorite curator, Dirk Megirian. So he arranged to come on an expedition to retrieve as much of the meteorite iron shale as we could. Three of us (including NTGS colleague Steve Wyche) collected the shale in July.

Measurements of the amount of material indicated the original stony-iron meteorite would have had a mass of about 10 tonnes. There was no crater. The site was in a small claypan. However the shepherds had been keeping their stock herded around the "rock" and the claypan is thought to have been created by the hoofs. Apparently the shepherds used to stand on the meteorite so they got a better look around the herded animals. If you look at the cut and buffed surface you will see:

1. Less reflective blobs. These are totally weathered grains of olivine, the stony parts of the pallasite;
2. A more reflective mass in which the olivines are "floating". This was the original nickel-iron alloy; and
3. Lines of more reflective material. These are veins of limonite (or similar) produced by terrestrial weathering of the meteorite and deposited in fractures in the meteorite.

So this is not meteorite but a weathered produce derived from a meteorite.

We have no idea when the meteorite fell. The amount of weathering suggests it had been there for many millennia. We collected some oriented samples from in the hole and sent to the Bureau of Mineral Resources in Canberra.

Paleomagnetic dating of geological materials is a well-proven technique. Every so-often the Earth's magnetic field reverses. We have good documentation of the pattern of reversals and other changes and can use this pattern to date the time of formation of the magnetic field preserved in the geological material. So the oriented sample was placed in the measuring device. However, the usual amount of magnetism being measured is very weak. The Huckitta meteorite sample had such strong magnetic properties that it totally saturated the measuring device. It had too much magnetism. Hence we still do not know how long ago the meteorite fell.



Photo credit: Allan Hart





Photo credit: Allan Hart

MinSoc members enjoying time together at the recent MAG meeting

## FUTURE ACTIVITIES

### 40th Joint MinSoc's of Australasia Seminar – Hahndorf, SA - Sep30th – Oct6th 2017

Please find attached the flyer for the 2017 40<sup>th</sup> Joint Mineralogical Societies of Australasia Seminar to be held in the picturesque village of Hahndorf in the Adelaide Hills. The MinSoc of SA invites expressions of interest from those wishing to give a presentation (and short abstract) at the 2017 seminar. The theme of the seminar is Copper Minerals and the Copper State, however talks on other topics of interest for professional and amateur mineralogists which are outside of the Copper theme will also be considered.

Those interested in contributing a presentation at the Seminar can email me at this address ([Ben.Grguric@samuseum.sa.gov.au](mailto:Ben.Grguric@samuseum.sa.gov.au)) and are recommended to copy in the current President of the SA Mineralogical Society, Harold Gallasch ([gallasch@bukartilla.com.au](mailto:gallasch@bukartilla.com.au)).

Please feel free to forward the flyer and invitation to mineral clubs and other interested parties or individuals in your state.



**SEPT. 30<sup>TH</sup> – OCT. 6<sup>TH</sup> 2017  
ADELAIDE, AUSTRALIA**

**40<sup>TH</sup> JOINT MINERALOGICAL  
SOCIETIES OF AUSTRALASIA  
SEMINAR**

**Copper Minerals - Copper State**

The 2017 seminar will take place over 2 days, the 4<sup>th</sup> & 5<sup>th</sup> of October with various activities including field trips scheduled from Oct. 1<sup>st</sup> through to the 6<sup>th</sup>. This will also coincide with the Adelaide Gem & Mineral Club show on Oct. 7<sup>th</sup> & 8<sup>th</sup>. Additional field trips are also planned for the 9<sup>th</sup> – 14<sup>th</sup> Oct. to the north of the state and to locations and collections in and around Broken Hill.



The Mineralogical Society of  
South Australia Inc.  
GPO Box 1089, Adelaide, 5001.  
<http://www.sa-minsoc.websyte.com.au>



The Seminar will be based in the historic German settled village of Hahndorf, only 30 mins drive by car from Adelaide City. A range of accommodation options are available including at the seminar venue. The theme is "Copper Minerals - Copper State" given South Australia's early copper mining history. A list of lectures & guest speakers will be provided in due course. A number of field trips to copper, uranium and phosphate deposits are currently being planned. You could also choose to visit one of the dozens of wineries in the region ..... and there's much more to do and see !!

**Noted speakers on  
a range of topics**

**Adelaide Gem &  
Mineral Show**

**Field Trips**

**View Mineral  
Collections**

**Mineral Buy & Sell**

**+ loads of other  
great places and  
activities to check  
out nearby !**

**FURTHER DETAILS WILL  
BE MADE AVAILABLE ON  
THE AUSTRALIAN  
MINERAL COLLECTOR  
WEBSITE**

[www.mineral.org.au](http://www.mineral.org.au)

**OR**

**Contact : Harold Gallasch  
(08) 8388 7218  
[gallasch@bukartilla.com.au](mailto:gallasch@bukartilla.com.au)**

[www.bukartilla.com.au](http://www.bukartilla.com.au)

**Safe handling and storage of radioactive mineral specimens**

Those interested in radioactive minerals should be pleased to learn that Alysson Rowan has updated her 78page pdf article "Here be Dragons", a highly recommended introduction to radiological safety for the amateur mineralogist. You can download it for free from

here: <https://drive.google.com/drive/folders/0B7nLLWDv-0cxfjZWaUpX3FneUZkT3RxStHFWjBfSkZHd09kVlIBak5oU2N2WWs1NFU1SDQ>

or here: <https://independentscholar.academia.edu/AlyssonRowan>

**General Meetings**

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



#### NEXT MEETING DATE

**THIS Wednesday, 8<sup>th</sup> March 2017 at 7:30pm**

... at the premises of the WA Lapidary + Rockhunting Club at 31 Gladstone Road, Rivervale, WA.  
A \$2 door charge applies

***‘Variscite and associated phosphate minerals from the Mt Deverell deposit, Milgun Station, WA’ - Dr Peter Downes***



Photo credit: Peter Downes

Peter is the Edward Simpson Curator of Minerals and Meteorites at the WA Museum. In addition to curatorial duties, Peter works extensively in characterising the mineralogy of mineral deposits in Western Australia, including the diamond-bearing alkaline volcanic rocks – kimberlites and lamproites – and the rare earth element-rich carbonatites. Other research directions are in the geochemistry and paragenesis of secondary minerals in the oxidised zones of Western Australian mineral deposits.

#### Future Activity Days

Refer a previous email from Sue Koepke 21/1/17 looking for expressions of interest from members interested in an upcoming field trip to the Greenbushes minesite. Contact person is Lee at [lee\\_notebook@msn.com](mailto:lee_notebook@msn.com)

Please pay attention to the website <http://www.minsocwa.org.au/activities.html> , your emails and social media <https://www.facebook.com/MINSOCWA/> for further updates on coming events.

#### Contacts

FYI, the committee members for FY17 are:

<b>President</b>	Stewart Cole	0414 904 169
<b>Vice President</b>	Vernon Stocklmayer	08 9291 9043
<b>Secretary</b>	Sue Koepke	0417 990 688
<b>Treasurer</b>	John Mill	
<b>Field Trip Leader</b>	<i>vacant</i>	
<b>Committee Members</b>	Ida Newton    Angela Riganti Lee Hassan	