



# Mineralogical Society of Western Australia Inc.

*To encourage mineralogical study by amateur and professional alike  
and, in so doing, discover, document and preserve the Earth's  
and in particular Western Australia's natural history.*

## Newsletter - November 2020

### CONTENTS

Editorial & Annual President's Report	2
Past Events	6
School of Rock - By Dr Robert Madden	14
Articles by MinSocWA Members	16
Interesting Articles & Other News	19
Simpson WA Update Project	19
Minerals of Western Australia	20
Mineralogical Society of WA Library	21
Upcoming Events - Meetings, Workshops, Activity Days & Social Events	22
New Members, Membership & Meetings	24
Contacts - Committee Members	24
MinSocWA Links	24
Advertising & Advertisers	24

#### **Mineralogical Society of WA, Inc.**

Meetings held at the WA Lapidary & Rockhunting Club rooms

31 Gladstone Road, Rivervale (corner of Newey Street)

Registered Society No. A1009304P

## EDITORIAL

On Wednesday 9<sup>th</sup> September 2020 we celebrated the 20<sup>th</sup> Anniversary of the incorporation of the Mineralogical Society of Western Australia. Our Annual General Meeting was held and followed by a casual catered social gathering where members enjoyed catering from Kate Mizerski and relaxed catching up with each other. The evening included a presentation on the 'History of the Society' over the last 20 years showing lots of photos and stories of field trips, workshops and other events over that time. The door prize was a Western Australian gypsum specimen that was very kindly donated by Stewart Cole.

Sue Koepke chaired the meeting and reported on the events of the year including workshops, field trips and the Australasian Seminar. A full transcript of the President's Report is on page 3. The new Committee for the next year was elected and are listed in this newsletter in the Committee Members section. Congratulations to all committee members and welcome to new members to our committee. I would also like to thank last year's committee for their time and dedication to the Mineralogical Society of WA. Without the valuable time given by members we would not have a Society.

During the socialising prior to the meeting formalities a Photo Competition was open for members to vote on their favourite photos. Tom Bateman did a great job of collecting all the votes and establishing who won. The winning entry, shown below, was photographed by Olga Blay. Congratulations Olga!



*Chrysocolla specimen at DeGrussa Mine  
Photo by Olga Blay*

A quiz entertained members and everyone appeared to be having fun or getting frustrated finding the answers to Vernon Stockmayer's quiz. Vernon watched on in amusement as members examined photos and mineral specimens looking for the answers. It was a fun event that encouraged member interaction and discussion. Craig Bosel won the quiz and earned a newly published mineral book prize.

## **President's Report – By Sue Koepke**

It has been another successful year for our society, notwithstanding a few challenges due to COVID-19 restrictions. During the 2019/2020 financial year, our membership had grown to 68, which is an all-time high.

Last year, it was MinSocWA's turn to host the 42<sup>nd</sup> Joint Mineralogical Societies of Australasia Seminar, and the hard work and preparation certainly paid off. Hearing the positive feedback from speakers and delegates was very gratifying and well deserved by everyone involved.

Many members and volunteers contributed in a variety of ways to the success of the seminar, and I thank you all. I wish to especially thank Angela Riganti for steering the Seminar Organising Committee, and Lee Hassan, Rodney Berrell, Murray Thompson, Peter Willems, Allan Hart, John Mill, Susan Stockmayer and Vernon Stockmayer for their tireless commitment towards organising the seminar program, venues, catering, fundraising auction, events and entertainment, mineral market, and post-seminar field trip – we couldn't have done it without you.

The micro-mineral workshop led by Alan Longbottom and Clive Daw in the lead-up to the seminar was a resounding success, with everyone having access to microscopes loaned by Murdoch University thanks to Alan's great efforts, and participants taking home mineral samples donated by Alan, Clive and many others. The WA Lapidary Club hall proved eminently suitable for this workshop.

Peter Downes and staff at the WA Museum are thanked for offering a tour behind the scenes to inspect rarely displayed parts of the mineral collections of the WA Museum.

Thanks also go to Elena Hancock and staff at the GSWA Perth Core library for their tour which showcased cores from mineral exploration drillholes, and how modern technologies such as the HyLogger assist in mineral identification and exploration.

Murray Thompson opened his Desert Fire Designs workshop to show some of the finest specimens of Western Australian mineral and lapidary material – thank you, Murray.

Rob Sielecki's Crystal Universe showroom is the perfect setting for a "Welcome to Perth" Friday night mineral party. I thank CU manager J.Lynn Sunderland and her attentive team for their fantastic hospitality and ensuring everyone had a thoroughly enjoyable time.

Geologist and part-time Uber driver Craig Bosel happily chauffeured visitors without transport back to their accommodation - thank you, Craig.

Mignonne Clark kindly volunteered to help with the registration desk – thank you, Mignonne.

Once again, MinSocWA's patron Mark Creasy hosted a fabulous social event at his home, which gave seminar delegates the opportunity to admire Mark's ever growing fine mineral collection. My sincere thank you goes to Mark Creasy for his generosity.

Convening a joint societies seminar incurs considerable expenses. The Mineralogical Society of Western Australia thanks all our sponsors for their generous support, but in particular Sandfire Resources for their outstanding hospitality during the post-seminar field trip to the Murchison region.

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All those who supported the auction with their generous donations

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Last but not least I wish to thank the 17 seminar speakers who so generously gave their time and shared their knowledge.

I highly recommend to you reading the seminar report written by George Stacey which you may access free of charge at the Australian Journal of Mineralogy's website <https://www.ajmin.org.au/events> .

Financially, the seminar returned a moderate surplus, which leaves our society in a sound financial position.

With COVID-19 restrictions eased, your committee continues to make progress towards acquiring another microscope. In the interim, we graciously accepted a transmitted light microscope that was generously donated to the society by Alicia Verbeeten. Those of you who attended The Reflecting Petrographic Microscope workshop by Mike Wort last month, had the opportunity to view and use the donated transmitted light microscope which we had serviced and put in a protective case. It is planned that we will run regular microscope sessions as an ongoing activity.

During a workshop earlier this year, Susan Stocklmayer demonstrated the newly acquired refractometer which members then had an opportunity to use, and demonstrated how to determine the specific gravity of a mineral sample.

Unlike our Eastern States counterparts, Western Australian members have been fortunate during the COVID-19 crisis, only missing out on a MinSoc activity during April and having just one general meeting cancelled the following month.

With the exception of May, bi-monthly general meetings continued during the past year, and our speakers were:

Rodney Berrell on Opal Fossils;

Francine Payette on Fantastic Feldspars;

John Mill on his 2019 visit to The Tucson Gem and Mineral Show;

Nicolas Hebert on Mineralogy of the gem-bearing marbles of SE Asia: a journey from Luc Yen to Mogok;

Craig Bosel on The Munich Show - Minerals & Gems;

Kari Pitts on Ever wondered how minerals are used in forensic science?

In place of the May physical general meeting, your committee uploaded a virtual talk to YouTube in lieu of a live talk.

In addition to general meetings, the following activities took place:

MinSocWA facilitated three mineral markets in the past year. The first was held as part of the joint seminar, the second 2 months later in November, and the third in March, just prior to COVID-19 restrictions.

We welcomed 2020 with a very enjoyable social BBQ hosted by Susan and Vernon Stocklmayer in January.

This July, Craig and Ruth Bosel hosted a 'Mineral Appreciation Group' meeting at their home, which included small group tours of Craig's impressive aesthetic collection viewed in artificial (LED) light as well as short and long wave UV light.

The post-seminar 7-day field trip took participants to the Murchison region, while the recent field trip destination was Donnybrook.

The *Simpson WA update* project coordinated by Susan and Vernon Stocklmayer is a new collaborative project for all MinSocWA members to contribute towards.

I thank you all for your continuing support of the Mineralogical Society of Western Australia.

**Sue Koepke**

## PAST EVENTS

### AGM & 20<sup>th</sup> ANNIVERSARY CELEBRATION - 9 Sep 2020

See the Editorial section for a report on this event. Below are some photos from the event. All photos by Allan Hart.





*All photos by Allan Hart*

### **VIRTUAL SEMINAR - 3 & 4 Oct 2020**

As the October 2020 Joint Mineralogical Societies of Australasia Seminar was postponed to October 2021 due to Covid-19, it was decided by their Committee to hold a Virtual Seminar on 3<sup>rd</sup> & 4<sup>th</sup> October. Thanks to Kari Pitts for organising the ChemCentre as a venue of us to meet.

The following summary of the event was written by Niels Dahl.

#### **A short overview of the Joint Mineralogical Societies of Australasia Zoom Seminar held on 3rd and 4th October 2020.**

Due to the COVID 19 pandemic, the 43rd Annual Seminar of the mineralogical societies of Australasia could not be held in Sydney as previously arranged. Instead, the organizers, the Mineralogical Society of New South Wales, arranged a conference via Zoom which was very successful.

Our thanks go to everyone involved with its arrangement, in particular Dieter Mylius, and George Laking, respectively President and Secretary of the Mineralogical Society of New South Wales. A more detailed coverage of the seminar can be read in the forthcoming issue of Australian Journal of Mineralogy.

The seminar started with a description of a visit to Aranga quarry in the Waipoua District north of Auckland on the west coast of New Zealand by Rod Martin. Rare vanadium-bearing minerals have been found here, including waipouaite, accepted as a new mineral in 2019 and found nowhere else.

This was followed by Adam McKinnon who described finds of both supergene and other minerals in fresh rock associated with copper and gold mineralization in the Cobar felsic volcanic belt. Boulangerite was intercepted in drill core from the Federation Prospect.

Dermot Henry, from Museums Victoria, called for any information on the Matthew McVicker Smyth collection of minerals from Western Australian mine sites collected early 1900s. These finally ended up, with samples missing, at Museums Victoria.

Trevor Dart described many sites in the Broken Hill District away from town and worthy of visits by mineral collectors. Several sites showed good specimens of staurolite and garnet with kyanite, andalusite and chiastolite. Ralph Bottrill showed that tungsten minerals can be found at many localities in Tasmania and King Island.

Saturday's presentations finished with a request from Susan and Vernon Stocklmayer from Western Australia for assistance on a project proposed on behalf of the Mineralogical Society of WA to compile a new volume describing minerals of WA that have been identified since publication of Dr E. S. Simpson's works published in the early 1950s. Minerals found in Western Australia since 1952 nearly outnumber those described in Simpson's published three volume work. Contributions to this project are welcomed from all interested members.

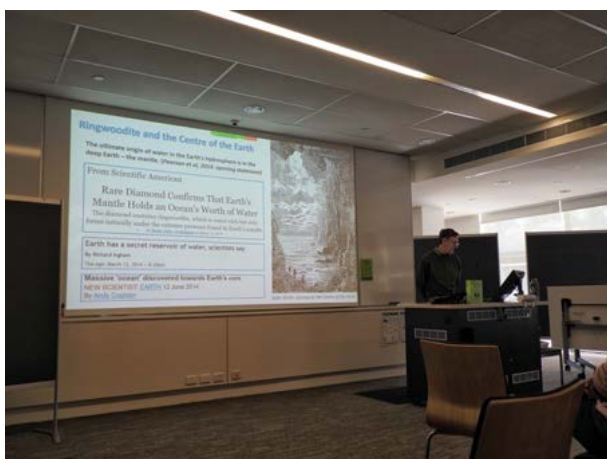
Sunday's sessions began with an illustrated talk on minerals from Ballarat Gold Field by Stephen Sorrell, including dittmarite and parwanite amongst many others. Following this, Stephen Turner described ringwoodite, a high temperature and high-pressure mineral of the olivine group, found in the Tenham meteorite that has since been recognized on Earth.

John Haupt presented a long list of minerals, many of which are phosphates, from Lake Boga quarry southeast of Swan Hill in northwest Victoria. Sadly, this quarry is no longer accessible. Bill Birch pointed out that the Wedderburn meteorite hosts edscottite, an iron-carbide, which was also recognized as a new mineral in 2019. Bill, furthermore, commented on that only very little research was done on the Ellerslie meteorite.

The seminar finished with a very informative presentation on blue spinel from Southeast Asia by Nicholas Hebert. Briefly, the spinels from Southeast Asia can vary in colour from pink to blue, the blue colour attributed to the presence of cobalt in the A2+ position of the spinel structure. Both the A2+ and the A3+ position in the spinel crystal lattice can hold iron, and the colour changes of the spinels from Southeast Asia are due to variations in the iron2+/iron3+ ratio and not due to the presence of cobalt.







*All photos by Allan Hart*

## **FIELD TRIP - DONNYBROOK - 8 Aug 2020**

*Field trip report by Peter Willems (Field Trip Leader)*

On a brisk Saturday morning, the 8<sup>th</sup> of August 2020, 14 members of MinSoc WA met in Donnybrook in Western Australia's Southwest Region. The purpose – to visit some abandoned shafts of the Donnybrook Goldfield. The hope was to sieve and pan samples of the famous 'fern gold', which good evidence suggests has been recrystallised by microbial activity. The trip was led by Peter Willems under the guidance of Alan Longbottom, who had visited the site previously.

From the Donnybrook township we set off on a short drive to the gated four-wheel drive track into the site. As this was a different access track than had been used in previous visits, we managed to drive right past the spur which lead to our destination. Fortunately for us, Alan was onto it! A short bushwalk ensued to locate the correct route before turning the convoy around on the narrow track (which was a fun exercise in itself) before playing 'duck and weave' with our vehicles between trees and arriving at the site. The group gathered near one of the shafts and Alan briefed us all on the perfect technique for finding some gold, which involved sieving and then panning the mullock material from around the shafts. We set up two circuits of tubs filled with water for a 'muddy' first pass pan and 'clear' final pan, making sure detergent was added to each tub to prevent fine gold from floating from the pan. After some further discussion regarding safe practice around the open holes and a little site geology/history, we were off!



Contrary to Alan's assurance that we were highly unlikely to find any nuggets, Sue S pulled some very impressive, large gold nuggets out of her first sieve – one being well over an ounce in weight! The sample however had been salted by none other than the groups troublesome youth/prankster – John M.



After the scandal had been resolved and the nuggets had been admired, most members of the trip managed to successfully pan some small examples of gold, including a couple of crystallised pieced displaying fern habit. We also took a few dozen kilograms of sieved material which we are hoping to put through a sluice at a follow-up event.

By all accounts, the trip was a very enjoyable day in the bush and a great little outing for the members who joined in. Finding a bit of gold was a bonus! Thanks for everyone who came along and made the day an easy success. Special thanks also to Alan for all your hard work helping organise the site permissions and for sharing your local knowledge and to Allan Hart for taking so many great photos on the day.



*Photo by Allan Hart*



*Photo of Susan Stockmayer by John Mill*

## ACTIVITY - DONNYBROOK SAMPLE PROCESSING - 24 Oct 2020

### The hunt for Donnybrook gold – Stage 2

A few gathered on Saturday 24 October to process the material collected in Donnybrook in August. Clive's apparatus made it a lot easier and faster to process the sand and reduce the coarser fraction, and Alan demonstrated the fine art of panning. Speckles of gold were visible to the naked eye during the panning, including Angela's 2.5 mm fragment with quartz pictured under the microscope. – *Angela Riganti*



**Left:** Before panning sands were crushed to release gold from quartz.

**Right:** Sluice where fine sands are washed over riffles with water recycled continuously.

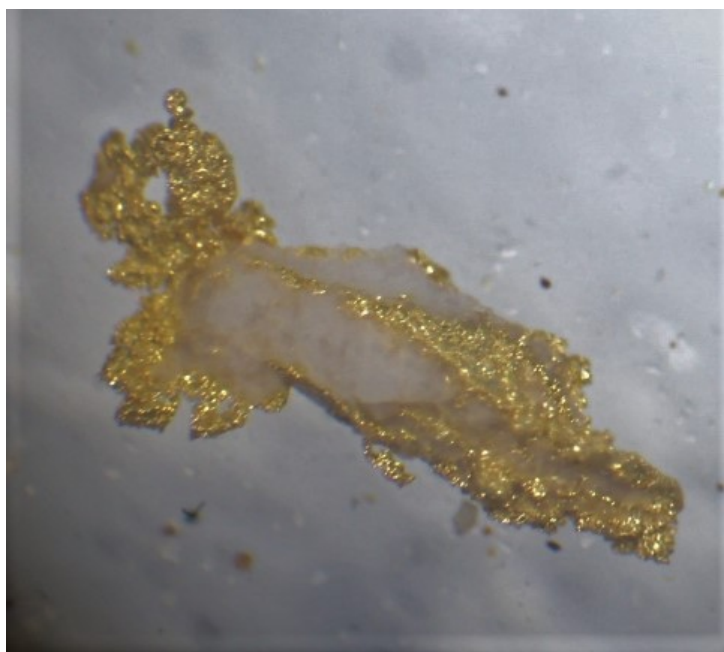
Photos by Susan Stockmayer



**Left:** Lining from sluice is then removed and rinsed for hand panning.

**Right:** Riffle mat contents washed into pan.

Photos by Susan Stockmayer



**Left:** Panning, final concentration of heavies.  
**Right:** Amongst the heavy fraction gold grain, this one intergrown with quartz.  
Photos by Susan Stocklmayer



*'The Torch-bearer'* by Alan Longbottom



## SCHOOL OF ROCK - DR ROBERT MADDEN

*Dr Robert Madden is an avid science communicator writing small geology vignettes, geology stories and educational resources on his social media account "School of Rock".*

*This segment of our newsletter shares some of Dr Madden's incredibly interesting articles and photos.*

*You can follow Robert's 'School of Rock' for more geoscience content on Instagram @drhcmadden.*

### Grandidierite

Found in the Proterozoic (1.6-2.5 Ga) Ihoisy Formation of Madagascar, one of the rarest minerals on Earth can be found. The Ihoisy Formation contains a range of high-temperature (granulite facies) metamorphic rocks derived from clay-rich sedimentary protoliths. These high temperature rocks include banded cordierite-gneisses and migmatites. Migmatites are 'mixed-rocks', which have formed by partially melting during peak metamorphism. The fraction that melts will be made of felsic minerals (quartz, feldspar) with low melting points. The melted fraction re-solidifies in situ and may cross-cut the rock it was derived from as a vein known as a leucosome. Quartzo-feldspathic leucosomes may also contain high temperature metamorphic minerals.



The coarse grained rock sample shown here is a section of a leucosome extracted from a larger migmatite body. In this example we see beautiful purple cordierite (iolite) crystals amongst the quartz and feldspars. The metamorphic conditions that formed this stunning rock were  $\sim 700\text{ }^{\circ}\text{C}$  at 4-5 kbar of pressure. These cordierites have an extra secret though. They hide a very rare mineral: grandidierite. Grandidierite is often featured in lists of the world's rarest minerals and here they are enclosed in the cordierite as 0.1 mm crystals.

Named after the French explorer Alfred Grandidier who was the first western explorer to describe Madagascar in detail; grandidierite is a blueish-green, complex boro-silicate mineral that forms during granulite facies metamorphism. Until recently grandidierite was only known from Madagascar but there are now reported sources emerging from around ten other countries around the world and

even Antarctica. Grandidierite was discovered over one hundred years ago but the only high quality, coloured and gem-grade material is from Tranomaro in Madagascar. Most large pieces of grandidierite is opaque, riddled with impurities and defects and is commonly colourless.



Even when gem quality material is recovered it is typically only semi-transparent (like this 32 carat chunk). Gem quality grandidierite is so rare that only 1 in 10,000 carats are able to be faceted. In fact, the rarity is so extreme that gem quality, facetable grandidierite was essentially impossible to source until 2015 following the discovery of the richest deposit in the world (in Madagascar). This new deposit has only managed to produce 60 carats (only twice what is pictured here) of this remarkable stone. Adding to its appeal, grandidierite is also trichroic and shows three different colours depending how it's orientated to a light source! If you were interested in getting hold of a piece of gem quality grandidierite then it is worth knowing the first known transparent, faceted grandidierite weighed in at a staggeringly small 0.29 carats and sold for \$50,000 back in 2003.

*Dr Madden only writes about specimens he has personally seen and he takes all his own specimen photos.*



*Dr Robert Madden  
Sedimentology research in Namibia*

**Dr Robert H.C. Madden** has been looking at rocks and minerals for the last 17 years. Robert's specialities lie in carbonate sedimentology and petrology as well as exploration geology, particularly porphyry-epithermal and MVT systems.

He is also a Fellow of the Geological Society of London and a Member of the Australian Institute of Geoscientists with a rich, global portfolio of geological experience.

Robert is an avid science communicator writing small geology vignettes, geology stories and educational resources on his social media account "School of Rock".

Follow Robert for more geoscience content on Instagram @drrhcmadden.

## ARTICLES BY MINSOCWA MEMBERS

This new section of the newsletter is for articles written and submitted by members of the Mineralogical Society of WA. There is a vast databank of knowledge and experience held by our membership so members are encouraged to submit articles or reports they have written. They can be old or new. I'm sure other members will find them interesting.

Thank you to Mike Wort for the first report.

### Brush up on your ore mineralogy! By Mike Wort © 2016

#### 1. Iron Ores and their constituent minerals

Iron occurs as a formal part of the compositional formula of a large number of minerals. However, comparatively very few minerals have been exploited as a source of iron, and they are shown in the table below:

Mineral	Formula	Density	Moh's hardness	%Fe	Crystal System	Colour/Lustre in hand specimen
Hematite	Fe <sub>2</sub> O <sub>3</sub>	5.26	5-6	69.94	Trig	Black to dark grey, red-brown on weathered surfaces
Goethite	Fe <sub>2</sub> O <sub>3</sub> .H <sub>2</sub> O or FeO.OH	5.07	5-5.5	62.85	Orth	Earthy, brown to yellow
Limonite	Fe <sub>2</sub> O <sub>3</sub> .nH <sub>2</sub> O	3.6-4.0	3.5	40-60	Amor	Yellow to red-brown
Siderite	FeCO <sub>3</sub>	3.96	4	48.2	Trig	Grey, brown, green, white, vitreous
Magnetite	Fe <sub>3</sub> O <sub>4</sub> or Fe <sup>2+</sup> O.Fe <sup>3+</sup> <sub>2</sub> O <sub>3</sub>	5.18	3-4.5	72.4	Cub	Black, sub-met to met.
Pyrite	FeS <sub>2</sub>	5.02	6-6.5	46.55	Cub	Brassy, met.

Abbreviations: Trig = trigonal, Cub = cubic, Orth = orthorhombic. Met = metallic; sub-met = sub-metallic

Native or metallic iron is rarely found in rocks but is more common in meteorites. Until we get to conducting mining operations in space, we do not need to consider them further!

Limonite is a reddish-brown to yellow-brown earthy secondary mineral which consists of poorly crystalline or amorphous hydrated iron oxides. It can be exploited commercially if the grade is high enough, but would be third in preference to hematite and magnetite. Limonite is the common form of surface oxide residue which marks the presence of a sulphide vein below ground. The iron oxides are all that is left of the original iron-bearing sulphide minerals pyrite, chalcopyrite or bornite after they have been oxidised and leached. This tell-tale crust is known as "gossan" and is a key indicator for prospectors. The micro-textures of the gossan, if subjected to expert examination, can give a good pointer to the identity of the original minerals from which the gossan was formed. Probably Rio Tinto at Huelva in Spain had the first famous gossan, which was mined by the Romans to recover the residual gold and silver long before the pyrite/chalcopyrite ores underneath were mined.

Currently hematite forms the main iron ore deposits of commercial interest especially those of direct shipping grade, with close to 60% Fe but preferably 65% plus. The percentage of impurities is critical and iron ores with little or no impurities are preferred. The chief impurities are SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, P, and S which have corresponding typical acceptable limits of about 4%, 2-3%, 0.05% and 0.05%.



P levels above 0.08% are considered high. The exact acceptable limits for premium grade products depend on whether the product is lump, fines or pellets. Acceptable grades also depend on whether the product is being sold on a long-term contract to an end-user, or being sold on the spot market to iron ore traders.

The full suite of elements routinely analysed for iron ores includes Na<sub>2</sub>O, K<sub>2</sub>O, Mn, Ca, Mg, Ti, V and loss on ignition (LOI). LOI is often measured at three different calcination temperatures namely 371°C, 650°C, and 1000°C. The first two temperatures are required to respectively drive off hydroxyl groups from gibbsite and kaolinite, and the LOI data can be used diagnostically to identify the source of the Al<sub>2</sub>O<sub>3</sub> contaminant. In Australian iron ores, kaolinite is more common than gibbsite.

## 2. Impurity minerals in iron ores

Mineral	Formula	Density	Moh's hardness	Crystal System	Colour/Lustre
Gibbsite	Al(OH) <sub>3</sub>	2.40	2.5-3.5	Mon	Pearly white, greyish, greenish, vitreous
Kaolinite	Al <sub>2</sub> Si <sub>2</sub> O <sub>5</sub> (OH) <sub>4</sub>	2.62	2-2.5	Tric	White, greyish, yellowish, etc
Pyrite	FeS <sub>2</sub>	5.02	6-6.5	Cub	Yellow, brassy, met
Pyrrhotite	Fe <sub>1-x</sub> S	4.6	3.5-4.5	Mon or Hex	Bronze, metallic
Siderite	FeCO <sub>3</sub>	3.96	4	Trig	White to brown, grey, greenish, vitreous
Chert	SiO <sub>2</sub>	2.65	7	Amor	White to red
Riebeckite	Na <sub>2</sub> (Fe <sup>2+</sup> , Mg) <sub>3</sub> Fe <sup>3+</sup> <sub>2</sub> Si <sub>8</sub> O <sub>22</sub> (OH) <sub>2</sub>	3.2	5	Mon	Blue to green, vitreous, Granular or fibrous (asbestiform)
Minnesotaite	(Fe, Mg) <sub>3</sub> Si <sub>4</sub> O <sub>10</sub> (OH) <sub>2</sub>	3.01	<3	Tric	Greenish-grey, waxy

Abbreviations: Trig = trigonal, Cub = cubic, Hex = hexagonal, Tric = triclinic, Mon = monoclinic, Amor = amorphous. Met = metallic.

## 3. Discussion on Ore Types

Pure magnetite (72.4% Fe) contains more iron than pure hematite (69.94% Fe). However, hematite ores often have a much higher average grade than magnetite ores of the Banded Iron Formation (BIF) type. Magnetite is the original 'lodestone' used by ancient mariners as a form of compass needle, due to its ferrimagnetic properties which allow it to become magnetised by a lightning strike. Magnetite is the main iron mineral in BIF ores, but because BIF consists of alternating layers of iron oxide and silica, the overall Fe grade of a BIF ore is commonly in the range 30-35%. The Ridley Magnetite project 65km due east of Port Hedland and also Citic Pacific's big Cape Preston project near Karratha are based on BIF magnetite ores.

Another type of magnetite occurs in the so called skarn ores where magnetite has been introduced as the result of contact metamorphism of other rocks (e.g. limestones) as the result of an igneous intrusion. This occurs at the Ok Tedi copper- gold project in Papua New Guinea, and also there is massive magnetite mineralisation at the Apurimac deposit now being developed by Strike Resources in Peru. Magnetite can also be a substantial proportion of so called IOCG ores (iron oxide-copper-gold) of the Olympic Dam, Ernest Henry and Prominent Hill type. At Ernest Henry, magnetite forms 30% of the primary ore, but at present this is all discarded to tailings.

Whatever the type of deposit, magnetite ores are frequently oxidised in their upper near-surface parts to hematite, with transitional hematite/magnetite intergrowths in the transitional zone below, while fresh unoxidised magnetite remains at depth.

Original magnetite which has fully oxidised to hematite is known as martite. The martite can perfectly pseudomorph the octahedral shape of the original magnetite crystals.

The Hamersley Range ores of the Brockman and Marra Mamba formations are altered variants of original BIF magnetite ores that have been oxidised and enriched by removal of silica over millions of years of weathering. In South Australia, the Middleback Ranges near Whyalla which are still being mined for hematite were from 2013 also being mined for the underlying magnetite as part of Onesteel's Project Magnet.

In West Australian ores, siderite is present as a very minor component, but in UK occurs in oolitic form in sedimentary iron ores of Jurassic age. These ores averaged only 28% Fe but were the backbone of the British industrial revolution. Similar oolitic ores with limonite and siderite occur in France, Belgium and Germany.

In North America, banded iron formations are known as taconite. In Brazil, a rich iron ore type known as itabirite occurs which is oxidised and metamorphosed BIF which has been subjected to supergene leaching to form a residual accumulation of hematite.

Iron ores have been grouped by John Clout of FMG into three types:

1. Unenriched primary iron formations with typically 25-45 wt. % Fe
2. Martite-goethite ore formed by supergene processes from primary ore, with abundant hydrous iron oxides containing typically 60-63% Fe
3. High-grade hematite ores thought to be of hypogene origin, or formed by metamorphism of primary iron deposits, with overprinting by subsequent supergene enrichment with typically 60-68% Fe.

Martite-goethite ores are generally the result of supergene leaching and replacement of BIF and commonly have a goethite content >50% by weight. The chert or carbonate layers in the original BIF have been replaced by iron oxides.

Much of the high grade replacement ore is now composed of micro-platy hematite, which consists of a three-dimensional structure of thin plates 10-200µm in diameter with interstitial voids, and has replaced original silicate and carbonate layers in the original BIF. Such ore occurs in the deposits at Mt Newman, Mt Tom Price, Paraburdoo and Channar in WA, and also at Iron Duke and Iron Knight in South Australia.

## REFERENCES

Data in these notes were taken in part from the following publications, but can also be found in many other mineralogical texts:

Nickel E H and Nichols M C: Mineral Reference Manual, Van Nostrand Reinhold, New York, 1991.

Field Geologists Manual: Ed Berkman D A and Ryall W R, The Australasian Institute of Mining &

Metallurgy, Monograph Series No. 9, 1976.

J.M.F. Clout "Iron Formation-Hosted Iron Ores in the Hamersley province of Western Australia", Iron Ore 2005 Proceedings, AusIMM, Sept 2005, pp 9-19

M J Wort July © 2016

## INTERESTING ARTICLES & OTHER NEWS

### **Title: Rio Tinto unveils rare diamonds as Argyle nears end**

This interesting article was submitted to the newsletter by Angela Riganti.

**Reference:** Australian Mining

**Link:** <https://www.australianmining.com.au/news/rio-tinto-previews-rare-argyle-gems-including-six-hero-diamonds/>

### **Mineral talks on YouTube:**

Stewart Cole submitted this link to some interesting mineral talks on YouTube:

[https://www.youtube.com/channel/UCSIGYON34E\\_XN97bJAPqYuA](https://www.youtube.com/channel/UCSIGYON34E_XN97bJAPqYuA)

The 42<sup>nd</sup> Joint Mineralogical Societies of Australasia Seminar was mentioned in the Rocks & Minerals 2019 summary of micro-mounting events. For those interested in reading the whole article, please contact our secretary at [tormalina@bigpond.com.au](mailto:tormalina@bigpond.com.au).

*If any members have any interesting articles they would like to share with other members through the newsletter please email your submission to the Newsletter Editor.*

## SIMPSON WA UPDATE PROJECT

Thank you to all members who have already shown keen interest in the proposed collaborative MinSocWA Simpson WA Update Project. This section has been added to the newsletter to keep you up to date with progress along the way.

A package giving all the details of the project including a list of minerals for write-up and examples of style has been sent to all those who expressed interest in contributing to the project. There has been considerable interest with several members offering to write up specific minerals – some individuals focussing on their favourite mineral whilst others have offered to do up to twelve. One individual has already supplied preliminary details on three minerals for editing and is working on a fourth.

However, don't hold back – there is plenty for everybody and, as the project progresses, more minerals are found and added to the list.

Please contact Susan at [simpsonwa@minsocwa.org.au](mailto:simpsonwa@minsocwa.org.au) for information on what minerals are still available for descriptions.

## MINERALS OF WESTERN AUSTRALIA

Vernon Stocklmayer has suggested this new section to our newsletter on some of the more interesting and unique Western Australian minerals that members have written or would like to write for "Simpson Revised". It is aimed at informing members of some of the more unique minerals found in Western Australia and hopefully will encourage members to become involved in the exciting 'Simpson Revised' project.

The first article on Mogánite has been submitted by Vernon Stocklmayer.

### Mogánite



IMA approved – renamed as a valid species in 1999.

Monoclinic

Nickel- Strunz 4.DA.20

Mogánite was first described in 1976 and named from the locality of Mogán, on southern Gran Canaria, Las Palmas Province in the Canary Islands, Spain. In 1994, the International Mineralogical Association (IMA) disapproved it as being a separate mineral but, in 1999 it was approved as a valid mineral by the CNMNC, the Commission on New Minerals, Nomenclature and Classification (part of the IMA).

Mogánite is considered to be a meta-stable polymorph of quartz with the same chemical composition but a different crystal structure. It has a Mohs hardness of about 6, a calculated specific gravity of 2.55 and is biaxial with a maximum birefringence of 0.007. Physically it is a grey, semi-transparent mineral with a dull lustre and a white streak. It may be identified by careful powder diffraction analysis or Raman and infrared spectroscopy.

The original type area was from veins of massive silica occurring in fractures in rhyolitic ignimbrites on Southern Gran Canaria. However, it was soon recognized that mogánite is a common constituent of much agate, chalcedony, chert and flint, notably in cherts from arid, alkaline settings. It was considered that mogánite formed during evaporitic sedimentation and there was great excitement when it was identified from a lunar meteorite discovered in a desert in northwest Africa.

Mogánite is typically intergrown with cryptocrystalline quartz to form chalcedony; the content varies greatly but is typically between 1% and 20% in agate, chalcedony, chert and flint. It is very rare for "pure" mogánite to be found. The amount of mogánite seems to decrease with time as it is slowly converted into chalcedony, and agates older than approximately 100-150 million years appear to be almost devoid of it.

There is only one recorded occurrence of mogánite in Western Australia even though it is likely to be far more abundant.

## Sylvania Inlier

### Southern Ultramafic Intrusion

23° 43'S, 119°50'E

Warrawanda (2850)

The Southern Ultramafic Intrusion (SUI) is an east-west striking dyke-like body of some 40km length and widths varying between 200 and 800m that lies towards the southern margin of the geologically discrete Sylvania Inlier comprising mixed granite-greenstone of Archean age. Cenozoic weathering of the SUI is intense and pervasive and rare fresh material is described as serpentinite composed mainly of serpentine with minor talc and magnetite.

Chalcedony, chrysoprase and common opal have all been reported as common capping materials over the weathered ultramafics and a new discovery of chrome chalcedony was made at a point on the SUI lying some 40km south-southeast of the town of Newman.

The chrome chalcedony comprises a tough, fairly uniform dark green material made up almost entirely of microcrystalline silica with a grainsize in the order of 20 microns. Small shards of serpentinite and composite grains composed of magnetite, hematite and chromite attest to the nature of the original ultramafic rock.

An x-ray powder examination of the chrome chalcedony revealed the presence of mogánite.

*Reference:* Willing M and Stocklmayer S, 2003.



*Slab of chrome chalcedony made up almost entirely of microcrystalline silica with black grains of magnetite, hematite and chromite. An x-ray powder examination revealed the presence of mogánite. FOV55mm*

*Photo. S.M. Stocklmayer*

## References

Willing MJ and Stocklmayer SM, 2003. A new chrome chalcedony occurrence from Western Australia. *The Journal of Gemmology*, v.28 (5), p265-279.

## MINERALOGICAL SOCIETY OF WA LIBRARY



The Mineralogical Society of WA library currently owns over 150 publications housed in a lockable cupboard in the WA Lapidary & Rockhunters Club premises comprising of numerous books, reports and journals that have been donated by members. To access the books please see the Librarian, John Mill. Members are encouraged to borrow books from our library to keep it viable to continue maintaining.

Donations of books and other relevant publications are also appreciated. Please see John Mill if you have any publications you would like to donate to the library or email John at [millrock@iinet.net.au](mailto:millrock@iinet.net.au).

The Mineralogical Society of WA receives complimentary copies of the Australian Journal of Mineralogy (AJM) which are available for members to borrow. These journals cover a wide spectrum of articles on mineralogy, ranging from descriptions of new minerals to book reviews, museum news and items of general interest to mineral collectors. MinSocWA members are regular contributors to the AJM.

## UPCOMING EVENTS - MEETINGS & ACTIVITIES

### GENERAL MEETING - Wed 11 Nov 2020

The next General Meeting will be held at 7.30pm at the WA Lapidary & Rockhunting Club rooms located at 31 Gladstone Road, Rivervale (corner of Newey Street).

Following the meeting there will be a talk by Ben Nicholson.

### TALK - Wed 11 Nov 2020

**Ben Nicholson - A Namibian Odyssey: Mineral Specimen Mining from 2000 until September 11, 2001**



*Azurite on malachite and calcite, 12cm (xtals to 1.5cm)*

Ben Nicholson is a geologist and mineral collector. Work and mineral collecting over the last 30 years have taken him to over 40 countries around the world, spanning some of the world's highest mountain ranges, hottest and coldest deserts, and tropical and temperate jungles, but also to some of the world's most spectacular and beautiful places. In 1999 whilst in the UK he became actively involved in specimen mining in Devon, UK, and subsequently moved to Namibia in 2001 to oversee and run a new venture to recover mineral specimens at the defunct Tsumeb Mine. Whilst things didn't go exactly to plan at the mine, he was able to spend considerable time travelling around and visiting many of the diverse mineral specimen producing localities in Namibia that have helped make the country's specimens so desirable for many collectors around the world.

### MINERAL MARKET - Sun 6 Dec 2020 (10:00am - 3:00pm)

The next Mineral Market Day will be held in our usual venue of the WA Lapidary & Rockhunting Club rooms on Sunday 6 December 2020 and will be open to the public from 10:00am to 3:00pm.

Please spread the word to friends who may be interested in coming along. Entry is \$2.00 (free for <12y).

Open for sellers at 9am to set up. Cost is \$5.00 per table for sellers. One table per seller, with a waiting list for extra tables if they are not sold out a week before the market.

To book a table please contact Sue Koepke via email at [minsocwa@hotmail.com](mailto:minsocwa@hotmail.com)

## GENERAL MEETING - Wed 20 Jan 2021

Due to the closure of the Lapidary Club for maintenance from 13/12/20 to 16/01/21, the MinSocWA General Meeting has been postponed to 20 January 2021.

This General Meeting will be held at 7.30pm at the WA Lapidary & Rockhunting Club rooms located at 31 Gladstone Road, Rivervale (corner of Newey Street).

Following the meeting there will be a talk by Dr Milo Barham.

## TALK - Wed 20 Jan 2021

**Dr Milo Barham - Detrital mineralogy and the Australia-Antarctica connection**

## GENERAL MEETING - Wed 10 Mar 2021

This General Meeting will be held at 7.30pm at the WA Lapidary & Rockhunting Club rooms located at 31 Gladstone Road, Rivervale (corner of Newey Street).

Following the meeting there will be a talk by Mike Freeman.

## TALK - Wed 10 Mar 2021

**Mike Freeman - Ellendale: The 'Fancy Yellow' diamond story**

Details in next newsletter.

## NEW MEMBERS, MEMBERSHIP & MEETINGS

The Mineralogical Society of WA would like to welcome the following new members:

- Michael Belperio
- Emma Tulsy
- David Maidment
- Victoria Bambaci
- Luke Maxwell
- Maciej F Napieraj

*Members are asked to ensure that all your contact details are up to date with the Secretary. If you change your email address or phone number please let us know so that you continue to receive all MinSocWA communications. And don't forget to check your junk inbox in case!*

### Meetings

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

*At all meetings the Society's microscopes,  
UV lamp and refractometer are available for use by members.*

## COMMITTEE MEMBERS FOR 2019/2020

<b>President</b>	Sue Koepke	0417 990 688	<a href="mailto:minsocwa@hotmail.com">minsocwa@hotmail.com</a>
<b>Vice President</b>	Susan Stocklmayer	9291 9043	<a href="mailto:baobab46@dodo.com.au">baobab46@dodo.com.au</a>
<b>Secretary</b>	Angela Riganti	9243 7472	<a href="mailto:tormalina@bigpond.com">tormalina@bigpond.com</a>
<b>Treasurer</b>	John Mill	0411 420 921	<a href="mailto:millrock@inet.net.au">millrock@inet.net.au</a>
<b>Field Trip Leader</b>	Peter Willems	0467 040 409	<a href="mailto:pjwillems90@gmail.com">pjwillems90@gmail.com</a>
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<b>Committee Member</b>	James Sherborne		<a href="mailto:jamessherborne@hotmail.com">jamessherborne@hotmail.com</a>

**Patron - Mark Creasy**

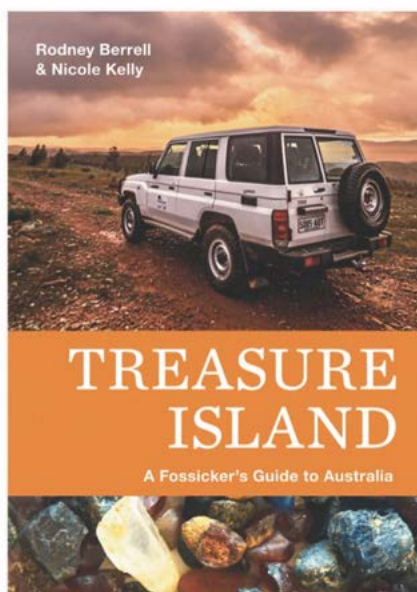
## MinSocWA LINKS

Web: <http://www.minsocwa.org.au>  
Facebook Group: <https://www.facebook.com/groups/minsocwa>  
Facebook Page: <https://www.facebook.com/MINSOCWA>  
Instagram: <https://www.instagram.com/MINSOCWA>  
YouTube Channel: <https://www.youtube.com/channel/UC0S2TFVFIBLU-2zIEzE5VNA>

## ADVERTISING

*Members may submit adverts free of charge. Commercial adverts will be accepted for a nominal charge. If you are interested in submitting an advert to the newsletter contact the Newsletter Editor.*

### **Treasure Island: A Fossicker's Guide to Australia, is a new book by Rodney Berrell and Nicole Kelly**



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The book is a treasure trove for anyone keen to learn more about geology, minerals, gems and fossils. Through inspirational commentary, marvellously illustrated maps and photography, it explores over eight different areas across Australia including over 50 gemstone, mineral or fossil locations. Whether you are a professional or just starting out, this book will set you on an incredible journey – the history and formation of Australia and its geology.

**Contact Rod Berrell at [rodneyberrell@yahoo.com](mailto:rodneyberrell@yahoo.com) to order your copy.**

## The Australian Journal of Mineralogy

<https://www.ajmin.org.au>

The Australian Journal of Mineralogy now has its own website. It lists all the issues of the journal, and visitors can use the site to pay for subscriptions, or purchase past issues. There is a free index, and a PDF of the now out-of-print V1.1, also free of charge. It has photo galleries, a mineral events calendar, handy links, and more.

*Cover and contents of Volume 21, Number 1, 2020*



### Contents

#### Featured Articles

- The cause of colour in phillipsite-Na and phillipsite-K in basanite from Kulnura quarry, Central Coast, New South Wales .....7  
*Ian T Graham, Karina Judd, David M Colchester, Simon Hager, Angela Lay, Alan Greig*
- The discovery of a probable Johannes Menge specimen and other South Australian 1851 Great Exhibition specimens .....19  
*Benjamin A Grguric, Robin Hansen*
- A note on pseudobrookite and associated minerals from The Anakies volcanoes, Victoria, Australia .....27  
*William D Birch, John C Haupt*

#### Other items

- Molybdenum-bearing minerals from Mount Moliagul, Victoria, Australia .....39  
*Pat Sutton*
- Every Picture Tells a Story .....46  
*Steve Sorrell*
- What's new in Tasmania: March 2020 .....69  
*Ralph Bottrill*

#### Society news

- Postponement of the 43rd Joint Mineralogical Societies of Australasia Seminar .....71