THE MINERALOGICAL SOCIETY OF NEW SOUTH WALES INC

Website: ***www.minsocnsw.org.au***

Please address all correspondence to :-
The Secretary, 58 Amazon Road, Seven Hills, NSW 2147

NEWSLETTER DECEMBER 2024

Christmas Social, Swap and Sell. Saturday December 7th

The Christmas Social will be held on the first Saturday in December at the Parramatta and Holroyd Lapidary Club commencing at 11.00 am to approximately 3.00 pm. The Social will comprise the sale or exchange of mineral specimens and mineralogical material, books, magazines and equipment and the opportunity to socialise.

A range of foods, salads, cakes, cheeses, hot and cold drinks, beer and wine, etc will be provided and there will also be a BBQ Sausage Sizzle at midday, a variety of sausages, bread rolls and condiments also provided. Some of the refreshments will be set up inside the Club room and the sausage sizzle alongside the BBQ griller outside. A fee of $10 per person will be requested to cover the cost of the refreshments and lottery tickets for a Lucky Door Prize will be issued to each person as they arrive.

Sales tables will be set up inside the Lapidary Club room and under awnings outside in the car park. Since the outside area will be used for the BBQ and sales tables all members are asked not to bring vehicles into the carpark but to park in Fullagar Street outside the Club premises. Members intending to sell are requested to book a table and register with the secretary, George Laking, contacts Tel: (02) 9636 7145, Mobile 0468 387 899 or e-mail *bglaking/@tech2u.com.au* before Saturday. Last year virtually all sellers were accommodated in the Club Room but late applicants may have to be set up outside.

Members and sellers are particularly asked not to start selling or buying before 11.00 am. Everyone is reminded that the Society Committee has previously determined that anyone attending the Christmas Social who was not currently financial may buy but would not be allowed to sell minerals. Membership subscriptions which have been paid within this current year are valid until March 31st 2025. Anyone who was unsure of their current financial status should pay their subscriptions for 2025 from now on and they would then be taken as financial immediately and until March 2026.

Society Membership subscriptions are due from January 1st. Members are recommended to pay subscriptions by direct debiting only which would provide a bank record for both parties. Receipts would not be issued for direct debit payments. The payer should be sure to enter his or her name into the description or memo line in their bank account direct debit window so that the Society will know from whom the payment has been made. The phrase *'Minsoc sub'* would not be sufficient to identify the member. According to the Society Constitution memberships are valid until March 31st in any year. Members currently financial and wishing to renew could do so at any time up to the end of March.

Fees are as follows : - Adult membership, Sydney metropolitan area	$30
Adult membership, country or interstate	$25
Child/youth (under 18 years), or student member	$20

To direct-debit the Society account the details are: - Commonwealth Bank
Account Name: - Mineralogical Society of NSW Inc.
BSB: 062016 Account number: 28023647

Family members (spouse/partner and children only) can be registered for membership at the additional cost of $5 each. The name of the family member should be provided for the record and members are recommended to fill in a Membership Renewal form if any of their details, e-mail addresses etc, have changed since last year. A renewal form is available on the Society Website and at the end of this Newsletter.

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FORTHCOMING MEETINGS and PROGRAMS

The Society does not hold meetings in January. The first meeting in 2025 will be on February the 7th

February 7th There will be a lecture to be given by Dioni Cendon on : -
'Rare Earth Elements (REE): Misconceptions, Oddities, and some Minerals'.

The program will include the second part of David Colchester's
'Introduction to Crystallography – Part 2'

March 7th: Dayna McGeeney will deliver a lecture on 'Rare and Unusual Gemstones in the Australian Museum Collection.' There will also be a talk to be given by Graham Ogle on 'Minerals from Deposits in the Otto Mountains, California'.

April 4th: Program not yet finalised

May 2nd: Member's Annual Mineral Auction

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The SOCIETY COMMITTEE

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The NOVEMBER MEETING

At the commencement of the Meeting there were a number of announcements. The Society President, Dieter Mylius, referred to a recent touring trip he had intended to make through the Northern Territory during October only to turn back after a few days. He strongly recommended that no-one should attempt to travel on the **Birdsville Track** in October when he had found that the temperature remained around 40^0C during the days and did not get much lower at night.

Ed Zbik drew member's attention to the **Society Library** which has an extensive inventory of mineralogical books and magazines. The Library has been in existence since the formation of the Society in 1975. In addition to numerous books there is a full set of the **Mineralogical Records** from the first edition in 1970 up to 2016 and a set of the **Rocks & Minerals** magazines from the year 2000 to date. Ed noted that only a very small number of members borrowed books from the Library and recommended that more should do so, there was a wealth of information available.

Ed referred to a number of titles of books in the Library which he showed to the Meeting including the latest addition, '*A Broken Hill Guide to Collecting Minerals and Crystals*' by Tony Forsyth. The copy would be available for borrowing or for any members wishing to purchase, the price was $35 plus postage. He also referred to several other books, *'Minerals of South Africa'* and '*Minerals of the Australian Museum',* the last signed by the Museum Curator of Minerals, Ross Pogson. Another book Ed Zbik had found very interesting was *'Making It Mine. Sir Arthur Russell and his Mineral Collection'*, by author Roy Starkey. The book deals with the collector's activities around the World in the 1800s. It is very well written with good pictures and includes interesting stories about other people.

Sir Arthur Russell, (6^{th} Baronet), 1868 – 1964, was a noted English collector and to quote from the NHBS, (Natural History Book Service), mail-order website … *'The book delves into Sir Arthur Russell's family history, the background to his passion for mineralogy and his single-minded determination to secure the very best specimens for his collection. The stories and people behind the specimens are woven into a compelling narrative together with sketches and anecdotes concerning the many colleagues and contacts that assisted him along the way. The book will appeal to all those interested in British mineralogy, to mineral collectors and dealers, to historians of mineralogy, museum curators, university researchers and to anyone who is simply interested in the treasures of the natural world. This is neither a coffee table book nor a biography, but rather a blend of the two that takes the reader on an absorbing journey through the last 200 years of mineral collecting'.*

Ed Zbik finally reported that a **Field Trip** was being planned for February next year to the Paddy's River area near Canberra. Society member Dioni Cendon had visited the site in 2022 and found some unusual minerals, notably a specimen of the rare mineral kozulite, (Mindat No 2267), which has a complex formula. Kozulite is a synonym of mangano-ferri-eckermannite. Ed was hoping to find some more specimens of the mineral.

John Chapman reported to the Meeting that the Society had been donated a large collection of specimens collected by the late **Ross Godwin**. The collection had already been examined by the Australian Museum which had taken out the more notable specimens and the remainder were of relatively lower quality. There were however probably between 1,000 -2,000 specimens which should include a number of items of interest. Dieter Mylius added that he had seen some of the specimens which had been taken for the Australian Museum and had noted that some were from very strange locations.

(NOTE: John Chapman also reported that the collection had included five good quality display cabinets but after the Meeting it was learned that the Godwin family had already disposed of them).

The Society had been sorting out the collection and would bring trays of a selection of the specimens to the forthcoming Christmas Social and subsequent Meetings. All proceeds would be collected for the **Kids with Cancer Foundation.**

The President then introduced the first speaker for the evening, Society member Dr Ian Graham who is an Associate Professor at the School of Biological, Earth & Environmental Sciences, University of NSW.

Ian Graham initially described how in the course of his work he might get asked quite a variety of questions and he could never be quite certain what might be coming next! The following description has been provided by the speaker, commencing with a query he received on an afternoon in May.

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Mysterious Crystals from the Bottom of Sydney Harbour

Dr Ian Graham

The Story…… Begins at 3:59 pm on Tuesday, 24th May

1. Phone call from Dr David Och (WSP), chief geologist for Sydney metro developments (including western Harbour tunnel).
2. Crew on drilling barge on Sydney Harbour (west of the Harbour Bridge) had found unusual white crystals coming from the core within a mud matrix.
3. I waited around until 6:30 pm that night for the samples to be delivered to me at UNSW.
4. Samples immediately placed within a cool room.

A Drilling Rig in Sydney Harbour

Samples from drillhole BH3008 at a depth of 20 metres below the sea bed.

The unknown crystals. Drillers were concerned that they may be asbestos fibres……

However ……

Performing SEM with EDS analysis

Only calcium and oxygen – a simple calcium carbonate

X-ray diffraction analysis (XRD)

Samples finely crushed using an agate mortar and pestle and then placed on a silicon disc for XRD analysis, and run from 2-70^{o} 2Θ. Result – calcite.

These calcite crystals:

1. Occur with an organic-rich mud (at least partially reduced environment) from 20m below the sea bed surface.
2. They are terminated on both sides with no attachment to anything. Partial dissolution of the crystals has occurred.
3. Associated with minor pyrite which is partially oxidised.
4. Must have grown in-situ below the seawater-seafloor interface under conditions at 5-10 ^{0}C.
5. Source of calcium - possibly dissolution of former shells which also occur in the mud.
6. Crystallisation of calcite possibly due to pressure and pH change.
7. Sediments dated (using C^{14} on organic matter) around 35,000 years.

ACKNOWLEDGEMENTS

Dr David Och, WSP
Daniel Kamphorst, GHD
Karen Privat, UNSW Electron Microscopy Unit

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After the conclusion of his talk Ian Graham was asked a few questions and then thanked for having delivered an interesting insight into the kind of unusual but topical work a geologist might be asked to conduct.

The second lecture for the evening was given by Dr Adam McKinnon who also holds a PhD in Mineralogy and Geochemistry from Western Sydney University. He has been involved in several successful mineral exploration programs for KBL Mining and Aurelia Metals Ltd. During his lecture he was to describe aspects of the exploration process and then list the recent discoveries by mining companies of a number of promising mineral deposits.

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How Orebodies are Found – The Exploration Process

and some recent base metal and gold discoveries in New South Wales.

Dr. Adam McKinnon

OVERVIEW

How do we find an orebody?
Where to look?
Different exploration methods:
Prospecting and mapping
Geophysics
Geochemistry
Drilling
Example of the Exploration Process in a New Discovery
The Achilles high grade silver-gold-base metal discovery near lake Cargelligo, NSW
Other recent discoveries in NSW – Potential future source of mineral specimens??
Selected developments in exploration and mining in NSW

INTRODUCTION

Exploring for an ore deposit is an iterative process of continuous hypothesis testing with increasing amounts of geological data

Discovery is very rarely quick or simple, on average a project will pass through seven different explorers before a discovery is made

There are over 850 mining and exploration companies listed on the ASX in Australia; statistically very few will ever make a discovery that proceeds to mining

Exploration is a very expensive and high risk exercise, currently only ~90 cents of value is returned for every $1 spent exploring

The number of significant (Tier 1) deposits being discovered is decreasing decade on decade, in spite of an increased need for metals

The average depth of discoveries is also increasing as the easier to find deposits are exhausted

New technologies are playing an ever more important role in exploration

Adam McKinnon pegging the discovery hole at Myall near Narromine NSW in June 2022. This discovery now sits at 110Mt with 354,000t of contained copper (eq).

WHERE TO LOOK

For an orebody to form, three things are generally required:

THE SOURCE

A source is required because metal must come from somewhere, and be liberated by some process

For example, the source of metal may be the surrounding host rock, or it may be a magma intrusion deep below.

THE TRANSPORT

Some form of transport is required to move the metal-bearing fluids or solid minerals into their current position

Faults are very effective method of transporting metal-bearing fluids so are often associated with orebodies.

THE TRAPPING SITE

Required to concentrate the metal via some physical, chemical, or geological mechanism into a concentration which forms mineable ore

Trap sites can be local structures, stratigraphy and physical barriers or sites with rapid changes in temperature and/or chemistry.

WHERE TO LOOK?

To narrow down where we look, we can consider a number of factors:

The type of rocks

The age of the rocks

The presence of faulting and folding

The metamorphic grade (how the rocks have been compressed and heated)

The amount of cover/ depth below surface is also a key factor

Different types of ore deposit will often cluster in areas with specific combinations of these factors

MAPPING AND RECONNAISANCE

This is the simplest way to locate an orebody

Involves walking, riding, driving or flying over the ground and looking for signs of an orebody

Historically most orebodies were found this way - increasingly rare nowadays

Requires the orebody to be “outcropping” or sticking out of the ground

Even if ore minerals aren’t present at surface, an experienced geologist can often recognise the remnants of a weathered orebody (i.e. gossans)

Mapping the geology can help locate prospective areas for follow-up

Discoveries can still be made this way even in well explored regions

More recently satellite data has been increasing used for mapping and reconnaissance.

EXPLORATION GEOCHEMISTRY

The presence of certain geochemical pathfinder elements can indicate the nearby presence of an orebody

Relatively cheap method, large areas can be covered depending on sample density

Works best where orebodies are at or near surface

Many mediums can be tested including soils, rock chips, lag, stream sediments, groundwater, trees and grasses and even animal scats

Different elements are more or less dispersed away from an orebody and geochemical patterns can be used to vector towards mineralisation

Modern analytic tools such as portable XRF machines can give real time geochemical results

Geochemical patterns are often compared to known deposits:

GEOPHYSICS

Geophysical techniques measure one or more of the physical attributes of an area or rock of interest

Surveys can be conducted at a huge range of scales, from thousands of kilometres to an individual rock sample.

Some techniques can see from hundreds of metres to hundreds of kilometres into the earth surface

Data can be collected from satellites, fixed wing aircraft, helicopters, from vehicles and even inside of drill holes

Geophysical techniques are often useful for mapping geology and faults, particularly magnetics, radiometrics, seismic and gravity

Some techniques can directly detect potential orebodies, eg induced polarisation (IP) and various EM techniques.

DRILLING METHODS

Drilling is the most expensive, but most definitive method to test for an orebody

An individual drill hole typically costs tens to hundreds of thousands of dollars.

Different styles of drilling are used depending on depth, geology and budget.

Percussion drilling and diamond drilling are the most common techniques used in Australia for exploration.

Rock is typically logged and sampled at various intervals as drilling progress to understand the geology and whether any economic minerals are present.

Reverse circulation (RC) percussion drilling is a standard drilling technique in Australia.
It uses an air-driven hammer to pulverise the rock and return it to the surface.
It is relatively cheap and fast and can typically drill up to 350m depth.

Diamond drilling utilises a diamond-impregnated bit rotating at high speed to collect a core sample.
It requires water to cool the drill bit.
Best option to collect detailed geological data. It is slower and more expensive but can drill >2,000m depth.

The Achilles Discovery

Lake Cargelligo, central western New South Wales. A New high-grade Ag-Au-Pb-Zn-Cu discovery by Australian Gold & Copper Limited.

Achilles – Drilling currently ongoing (2024)

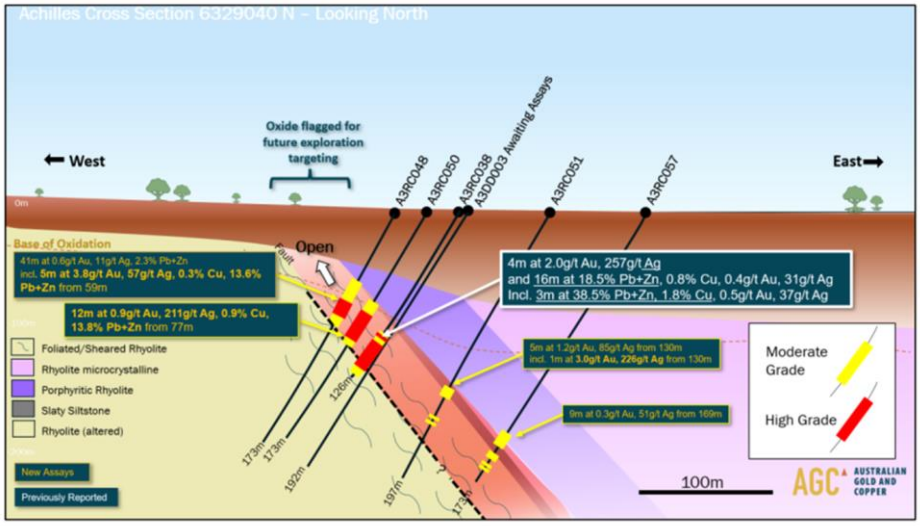


Figure 2: *Schematic cross section through 6329040N demonstrating exceptional near-surface mineralisation.*

Achilles – High grades discovered!!! (2024)

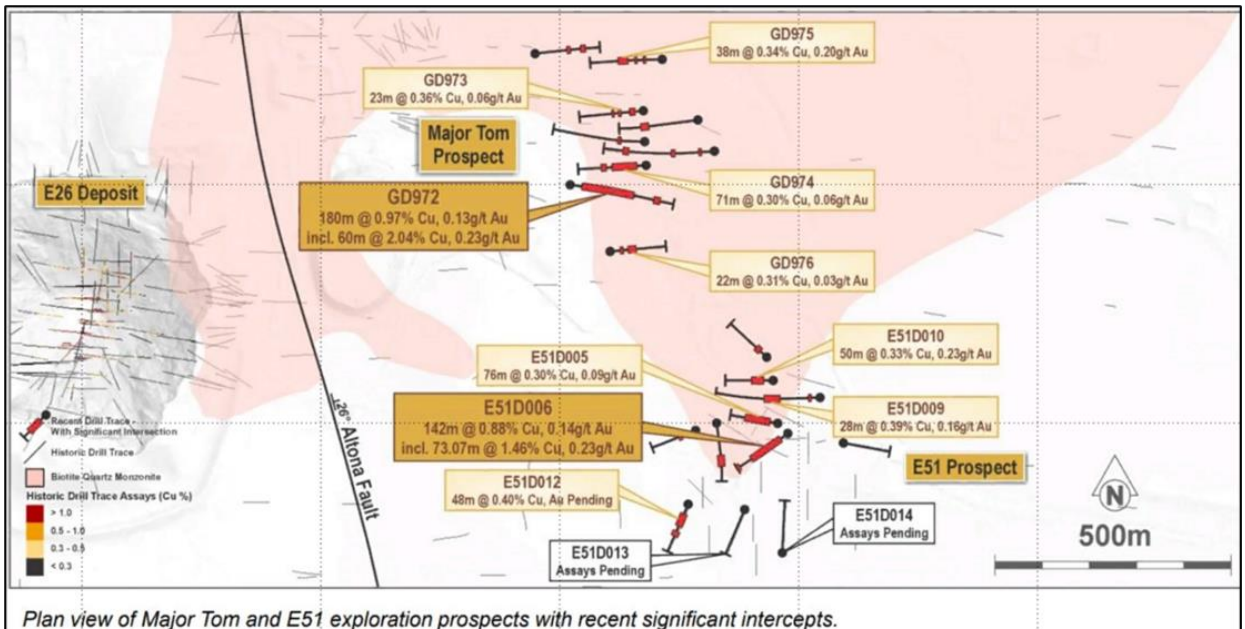
Other recent developments in NSW -? *Potential future source of mineral specimens??*

Endeavor (Elura) Mine Restart: Polymetals targeting near surface lode

Endeavor Mine specimens.

Bowdens Silver: Silver Mines Limited

Northparkes Mine: Evolution Mining/Sumitomo



Plan view of Major Tom and E51 exploration prospects with recent significant intercepts.
160m vertical slice from top of fresh rock (from 10230mRL to 10070mRL)

Boda/Kaiser Discoveries at Wellington NSW: Alkane Resources.

Discovered September 2019. Located immediately north of Wellington NSW. Large tonnage, low grade Au-Cu porphyry deposits. Currently hosts nearly 15Moz gold-equivalent. Scoping study release for mining July 2024. Proposed 20Mtpa mining operation. Multiple large open cuts.
$2 billion capital cost. Likely 7-10 years until production.

Constellation Discovery: Aeris Resources

Discovered in late 2020.

Located north of Nyngan in central NSW

Related to Girilambone and Tritton deposits.

Mineralisation comes to within 3 metres of surface.

Known to host oxide copper mineralisation (malachite/azurite).

Supergene copper mineralisation (chalcocite/cuprite).

Primary copper mineralisation (chalcopyrite/pyrite).

Potential to produce Girilambone-style mineral specimens when mined.

Federation Mine: Aurelia Metals

Semi-crystalline native copper mineralisation in drill core from the supergene zone at the Federation Deposit (FOV 25 millimetres in both cases).

Mineral Hill – Pearse and SOZ (Southern Ore Zone): Kingston Resources.

ACKNOWLEDGEMENT
Australian Gold and Copper (ASX: AGC) and Managing Director **Glen Diemar** are thanked for provided many of the images and details in relation to the Achilles discovery

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THE MINERALOGICAL SOCIETY
OF NEW SOUTH WALES INC

MEMBERSHIP APPLICATION / RENEWAL

Membership fees are due from January 1st

Please provide your full name, postal address, telephone number/s and e-mail address (if available). Members with e-mail capability will receive the Newsletter and other information only by e-mail.

NAME: ……
POSTAL ADDRESS: ……
……
……
Telephone (ah)……. (bh)…….……
(mobile)…….….
E-mail address ……..…….

FEES:		
	Adult membership, Sydney metropolitan area	$30
	Adult membership, country or interstate	$25
	Child/youth (under 18 years), or student member	$20

Additional family members (spouse/partner and children only) can be admitted for membership at the cost of $5 each (after the first member's costs as per the list above). If applying for additional family members, please list the name(s) here:

……..…..……. ……..……..……. ……..…….

New members joining from May 1st in any year are deemed to be financial for both the current and the whole of the following year.

Options for payment

1). Direct Credit / bank transfer to the Society's account

The account details are: -

Commonwealth Bank:
Account Name: Mineralogical Society of NSW Inc.
BSB: 062016 Account number: 28023647

Please put your name in the Memo line when making a direct debit/bank transfer so that the Society will know who the payment is from. If any of your address or telephone details have changed you should provide those details on this form and return it to the Treasurer - either : -

1) at the next General Meeting,
2) by e-mail to *quartzandsirius@hotmail.com*
3) by post to the address below

2). Cheque or Australia Post Money Order sent with a completed renewal form to : -

The Mineralogical Society of New South Wales Inc.
58 Amazon Rd,
Seven Hills,
NSW 2147

3). ***By cash or cheque delivered to the Treasurer, or in his absence the Secretary, at any General meeting.*** Members however are strongly urged to pay subscriptions by direct debit only as this will provide bank records of the payment for both the member and the Society.