



**THE  
MINERALOGICAL SOCIETY  
OF  
NEW SOUTH WALES INC**

C/o School of Natural Science  
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Website: [www.minsocnsw.org.au](http://www.minsocnsw.org.au)

**NEWSLETTER**

**NOVEMBER 2013**

**The Meeting will be held on Friday the 1<sup>st</sup> of November at 7.30 p.m. in the LZG14 lecture theatre on the ground floor of Building LZ in the Science campus of the University of Western Sydney on the corner of Victoria Road and James Ruse Drive in North Parramatta.**

The program will be a display, presentation and discussion on: -

**FLUORITE**

Gary Sutherland will introduce the program with an initial presentation and lead the discussion. Members are invited to bring in fluorite specimens for display and to describe these if they wish or to contribute any additional information, comments or anecdotes on the mineral.

A UV cabinet will be set up so that fluorescence under Ultra-Violet light can be demonstrated. Since some fluorite fluoresces in colours other than purple it would be very interesting to view such examples. If any members have such fluorite specimens they are particularly requested to bring these in for display, even if the specimen is not otherwise of notably well-formed crystal quality.

Any members who have UV lamps are requested to bring these in to help with the demonstrations.

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There will also be a mini-talk to be given by Jim Sharpe on : -

**“Coal discovered at Hornsby”.**

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**FORTHCOMING MEETINGS**

Subject to circumstances some changes to the following schedule of program subjects and speakers may have to be made in due course.

December 6th: **Annual Christmas Social and ‘Swap n’ Sell.**

Members are cordially reminded that the Society Committee determined the previous year and will take the view for this year that members attending the Christmas Social who are not currently financial may buy but would not be allowed to sell minerals. Any members who are unsure of their financial status should consult the Secretary or Treasurer who will have current financial lists.

**2014:** The Society does not hold General Meetings in January. The first Society Meeting in 2014 will be on February 7th. Meetings will be held on the first Friday of each month throughout the year except before the long weekends of June and October when it will be held on the second Friday.

February 7th 2014: Talks by Dieter Mylius and Noel Kennon on :-  
**‘Some British Mines & Minerals. Part I’**

At the February Meeting there will also be a Mineral Sale to raise money for **Kids with Cancer.**

March 7th 2014: Lecture by George Stacey on  
**‘My Recollections of Mt Isa – The Mine in the Spinifex.**

April 4th 2014 Program to be confirmed but may include a lecture on  
**Skarn Type Mineral Deposits.**

May 2nd 2014: **Member’s Mini-Auction**

June 13th 2014: (Second Friday of this month). Program to be confirmed.  
Lectures possibly on Ultra-Small Minerals and How We Can See Them;  
or ‘The History of Broken Hill’.

July 4th 2014: Talks by Gary Sutherland and John Rankin on : -  
**Some British Mines & Minerals: Part II.**

August 1<sup>st</sup> 2014: Society A.G.M. and Betty Mayne Memorial Lecture.

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## The SOCIETY COMMITTEE

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## The OCTOBER MEETING

At the commencement of the Meeting the President, Dieter Mylius, gave a short report about the **Tambar Springs Field Trip** held the previous month and which he had attended. A variety of minerals had been found by the members of the Trip party, mostly fairly weathered stellerite but also some heulandite, chabazite, analcime, laumontite and quartz.

Jo Collas who had also attended the Field Trip addressed the Meeting to describe items of information that he had picked up at the Coonabarabran Information Centre and brought in to the Meeting for members to examine. One of these was a 'GeoTourism' pamphlet and map '**Geological Sites of New South Wales**' published by Cartoscope Ltd which was quite interesting and informative with a number of brief descriptions provided of many of the sites indicated. He suggested that the map might be difficult to find since the Geological Survey in Maitland seemed not to have heard of the publication and provided the Website name, [www.geomaps.com.au](http://www.geomaps.com.au) to which members could refer. David Colchester advised that the maps could be obtained free from the Tourist Information Bureau in the Rocks.

The small town of **Binnaway**, about fifty kilometers south of Coonabarabran, is apparently attempting to generate tourist interest in the town and area. Among other material it has published a pamphlet with an amount of information which members were invited to examine. Apart from information about the town and immediate area the pamphlet suggests that Binnaway was ideally and centrally located near to the 'Garrawilla Basalt', Warrumbungles and Coolah Tops.

At the end of the Meeting Bob Meyer-Gleaves asked to report to the members about a visit that he had made to **Kingsgate** the previous weekend with a group of members of the Redcliffe lapidary club. Written permission had been obtained from the current lease-holders to enter the site but after the party had been there for a short while a fellow turned up whom Bob Meyer-Gleaves described as 'obnoxious', sufficiently so for the police to be called. The police did not arrive for quite some time but when they did and after a discussion the decision was made to allow the club party onto the property. Bob advised that whilst it was therefore possible to obtain permission to get into Kingsgate the area has been 'wrecked' having been substantially bull-dozed to bring in drilling rigs. Also obviously a party would need to be wary about the presence in the area of the obnoxious fellow.

The report prompted a short discussion among members with the speculation being put forward that unfortunately there would probably be a significant difference between the lease-holders of a property on the one hand and the owners of the property on the other and therefore who could the more legitimately be approached to give permission to enter a site. Bob Meyer-Gleaves advised that he believed that the original owner of Kingsgate had died some three years ago and that the property was still under probate because lawyers could not find all of the relevant people. Jeremy Taylor-Edwards reported that he believed Kingsgate had been on the market last year for \$230,000. Peter Williams also advised that as far as he was aware most of the actual mining areas of Kingsgate were on Crown land.

The current lease-holder at Kingsgate is the AUZEX EXPLORATION Co Ltd who according to the letter from the Managing Director to the Redcliffe lapidary club '*The area is held under Exploration License by the company*' The letter to the club from the company was given by Bob Meyer-Gleaves to the (NSW) Secretary for reference. It also advises that ... '*there are areas that have not been rehabilitated as yet. These areas have been fenced off, as have previous (historical) shafts and workings*'. The report and discussion obviously indicated that any person or persons planning a field trip and wishing to enter a property would need to be certain who they were obtaining permission from and whether that permission would be recognized or accepted by others associated with the property.

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## **Cassiterite Fossils from Doctor's Gully.**

**Jim Sharpe**

Jim Sharpe had hoped to attend the previous Meeting on Cassiterite to present and explain about a few unusual specimens he had acquired and instead had brought them to this Meeting. The specimens comprised small cassiterite fossils recovered from Doctor's Gully near Emmaville in New England. Cassiterite pseudomorphs of other minerals such as feldspar are well-known and have occurred in a number of places but the New England location is probably the only occurrence of fossils of this type in the World. The Australian Museum curator of minerals from 1923 to 1945, Thomas Hodge-Smith, wrote a paper describing them and this could be examined on the Internet.

Apparently during the period of mining of the Doctor's Gully area the fossils were reasonably common and regularly found by the miners and locals who had learned of the occurrence. Unfortunately once the area was mined out many years ago it has been rehabilitated and the specimens cannot now be found although the speaker suggested that local people in Emmaville could be asked if they had specimens to exchange and the Emmaville Museum would be a useful place to start asking.

The fossils are of Permian Era age and comprise gastropods and segments of crinoid stems. Most are not more than one centimeter in size and usually less. Jim Sharpe had brought in a few examples to display but because of their size had to set these up for viewing under a microscope. He concluded his talk by observing that specimens such as pyrite replacing fossils are quite common but that cassiterite replacing fossils is a different story altogether and he asked Peter Williams to explain this further.

The fossils became known to the Emmaville miners and local collectors as 'screw-tin' for the crinoid pseudomorphs and 'shell-tin' for the gastropods. They originally came from limestone and whilst the second speaker could not be certain that fossickers would find any specimens in the area now, there might be remnants of the limestone with fossils further up the Gully. The replacement of the original limestone with cassiterite was very unusual and the only other example that Peter Williams knew of were reports from the early 20<sup>th</sup> century. These were of specimens of ancient deer antlers being found in streams in Cornwall which had been worked for alluvial tin and the antler material had been replaced in part by cassiterite. This finding was very unusual since the replacement process would have been occurring at room temperature which is an exceptional temperature for tin to have been chemically moving and able to replace some of the apatite in the antler bone.

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## **Bronze Age Minerals and Metallurgy'**

**Professor Peter Williams**

Peter Williams moved on to present his lecture on Bronze Age Minerals and Metallurgy which was a subject he had been researching for quite some time and eventually hoped to publish his findings in the international literature. Throughout his lecture the speaker displayed a series of images of early metal tools, artefacts, jewellery and ornaments as well as views of various ancient mining areas today.

At the outset the speaker stressed that the people working with minerals and stone in ancient times were actually probably quite sophisticated and able to do a great deal even with limited knowledge, materials and tools. As an example he first showed an image of Stonehenge in Britain noting that the bluestones forming the inner ring of the structure and weighing up to four tons each had been quarried from a source in Wales and transported to Stonehenge, no mean feat for the people in those days.

The reference to Stonehenge was also relevant to the speaker's lecture since the history of the site overlapped between the New Stone Age and the Bronze Age. Most archeologists in Britain had long accepted that the bluestones at Stonehenge had been acquired from the Preseli Mountains in south-west Wales although there had been a number who have held that they were glacial erratics originally found scattered about southern England and gradually collected up by the Stonehenge builders. Modern research however has not only definitely established that the stones came from Wales but have identified the quarry where they were obtained and in excavating it have even found an unfinished stone still in situ. Professor Williams advised that this research was due to be published soon in the journal 'NATURE' and recommended that members interested in the story of Stonehenge should keep their eyes open for the article appearing in print.

The Bronze Age defines the beginning of technology and marks the period when people started to intentionally fabricate things using new materials rather than simply exploiting existing materials. Late Stone Age artisans probably started using the metals gold, silver and copper which they found initially in native form but gradually learned to recognise ores and to start smelting them to acquire more metal. It is not certain when or where smelting started but metallurgy came into being and was the fore-runner of modern processing and the start of what we now recognize as chemistry.

The use of copper itself can be traced to Anatolia around about six and a half thousand years BC. This early stage of the Bronze Age is known as the Chalcolithic when 'chalco' – copper was starting to replace 'lithic' – stone, in tool-making. Workers at first were using more or less pure copper but then around two thousand years BC bronze emerged in China, Thailand, Iran, Iraq and Bulgaria. This was 'modern' bronze, an alloy of copper and tin whereas a smaller amount of early bronzes were alloys of copper and arsenic and for a time a culture in Africa was making and using an alloy of copper and zinc, or 'modern' brass. By about one thousand years BC the Bronze Age was giving way to the Iron Age.

Examining how the early metal workers may have obtained metal Professor Williams stressed that it is fairly easy to smelt copper, if one started with the right minerals. Secondary copper minerals such as azurite and malachite can easily be smelted in a simple charcoal furnace. In looking for gold deposits early prospectors would have also found silver such as at the Rio Tinto mining area in Spain which has been worked for several thousand years. It was the main economic driver for the Roman Empire as well as for the Greeks and Carthaginians.

But how and why bronze emerged is an intriguing question that archeologists have posed for a long time and also whether arsenic bronze appeared first. The general feeling by now is that this was accidental. An image was shown of a set of carpenter's tools recovered as part of a hoard from a site on Naxos in Greece. The metal was arsenic bronze which was highly prized at the time because it was much harder than copper. Eventually tin bronze superseded arsenic bronze because it was harder yet again.

Carbon 14 dating of remnants of primitive charcoal furnaces have reliably established dates for early smelting activities such as the date of 1,500 years BC for smelting in Cornwall. Other sites where very early smelting was carried out in Britain were in Wales, on Parys Mountain on the Isle of Anglesey, in Cwmysthwyth near Aberystwyth and Llandudno on the north coast.

Artistic interpretation of the archeological historical record inferred that arsenic bronze developed in Ireland. This work was based on the recovery of various items from peat bogs, many of which have been drained and mined by now and which have been perfect environments to preserve artefacts due to the oxygen-poor conditions. The interpretation has since been shown to be incorrect because there are very few sources of arsenic-rich copper deposits in Ireland which could have been exploited and the country is essentially devoid of tin deposits. Accordingly the bronze artefacts found in Ireland must have come in from outside the country.

Trace element analysis has been used to try and trace the origin of ancient metal artefacts, tools, utensils and ornaments but not too successfully. Because all the artefacts were highly treasured and important useful items if they became broken they were melted down and re-made, possibly combined with pieces of other objects which had different origins.

By reference to a number of images of different copper minerals Professor Williams indicated how early miners and smelters would have on occasion collected amounts of copper arsenate minerals such as cornwallite and cornubite. Given that the colours of those minerals are similar to secondary copper carbonates on occasion these would have been put into the smelting furnace, - inadvertently but conveniently making arsenic bronze. Since there are some six hundred secondary copper minerals coloured green or blue the potential for early smelters to mix these together was substantial.

It also has had to be considered how tin bronze came to be made because a higher temperature is needed to smelt cassiterite and copper. However smelters apparently developed the use of charcoal furnaces with a tuyere, a means of blowing or forcing air into the charcoal with a form of bellows and a pipe into the charcoal hearth making it burn more fiercely and producing a higher temperature.

Moving to ancient Egypt the speaker showed images of hieroglyphics from the tomb of king Teti, first king of the 6<sup>th</sup> dynasty who reigned from 2345 to 2333 BC. Particular hieroglyphs which were pointed out showed smelting activities and specifically of tin bronze. There were glyphs of workers measuring materials with small scales, fabricating things, and an individual shown blowing air from his cheeks into a small furnace. Later the Egyptians developed the use of bellows and this is shown by later hieroglyphs from other tombs. In Egypt there were local sources of tin and copper was mined in Sinai. Since bronze and the materials for making it were so prized at this time they were traded far and wide.

So tin won and the production of tin bronze became widespread throughout Europe, Africa, the Middle East and the Far East. The question then arises how did the technology spread? It may be that to a degree it developed separately in different places. Or it may be that bronze technology was spread by trade since it is known that trade was extensively developed through Europe, the Middle East, India and to the Far East. It is known that the trade in cassiterite from Spain and Portugal was very widespread before the Phoenicians took it over also trading the silver from Rio Tinto.

The Phoenician civilization lasted approximately from 1500 to 300 BC. They were great metal workers and traders and may have traded as far as Cornwall although this has remained controversial. One of the largest resources of tin towards the end of the Bronze Age has been recorded by the Greeks as being from the Cassiterides, from which we get the word cassiterite, and this source has been identified as the British Isles. Cornwall had originally started mining copper but much later became an important source of tin. There are indications that the Phoenicians also traded with the source, i.e. Cornwall, because ingots of tin have been recovered from ancient wrecks off the coast of Cornwall which have the same shape as ingots recovered from certain Phoenician shipwrecks in the Mediterranean.

Moving almost completely away from bronze Professor Williams referred next to the large variety of artefacts recovered by archeologists from the royal tombs of Ur in ancient Mesopotamia, now southern Iraq. Excavation of the tombs was commenced by Sir Leonard Wooley over the years 1921 to 1934. The royal tombs were the burial places of members of a dynasty ruling over the period of approximately 2,600 to 2,450 BC. Members of the royal families were buried with a collection of household goods, utensils and jewellery, and also with their courtiers and servants. There has been a surprising diversity in terms of metals and minerals represented by the objects recovered from the tombs. There were objects of gold, silver, copper, bronze and various alloys of these metals as well as a variety of gems, semi-precious stones, carnelian, lapis lazuli, pearls and malachite and minerals such as calcite and alabaster.

A number of images of jewellery and ornaments from the royal tombs of Ur now in the British Museum were displayed by the speaker including such fabulous objects as the King of Kish's helmet and the 'Ram Caught in a Thicket' statuette made from silver, gilded bronze and lapis lazuli.

Modern examination of the gold artefacts from Ur has shown that they were made by partially welding small grains of gold together, indicating an alluvial origin of the metal. Further analysis showed many very small inclusions in the gold which turned out to be small grains up to about half a millimeter in size of platinum-group (PGE) metals. The grains did not include platinum itself which will dissolve in the gold and palladium was not found but the grains otherwise comprised a mixture of osmium, iridium, ruthenium and rhodium. This finding provided clues as to where the gold may have come from and for a time the likely source was thought to be the Pactalos River in western Anatolia. Later osmium isotope ratio analysis indicated the source as alluvial deposits just outside Kabul in Afghanistan.

In conclusion Professor Williams advised that the ancient Bronze Age metal workers were obviously highly developed in terms of metallurgy and they must also have been good mineralogists. They would not have regarded minerals in the same way as we do today but they knew what to look for and how to work with their materials. A feature which stood out for him about the Bronze Age was that it was highly sophisticated in terms of its technological ability and its artistic sensibilities and the modern World has been fortunate to have had bequeathed so many objects made from so many beautiful metals.

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## **New MINERAL SHOP in SYDNEY**

Correction to the telephone number previously given

Rock n Crystals advise that the information provided about their new Mineral Shop had an incorrect telephone number.

The number previously given was 02 9599 6737 which should have been :-02 9559 6737.

Other details about the Mineral Shop are as previously given, the location is at 330 Illawarra Road, Marrickville. (300m from the train station).

Hours are : - Monday and Tuesday = Closed;

Wednesday, Thursday and Friday - 10:00am to 6:00pm

Saturday - 10:00am to 5:00pm      Sunday - 10:00am to 4:00pm

Phone: 02 9559 6737 or Mobile Stu on 0404 470 494.      *Enquiries@rockncrystals.com.au*

Website : - *www.rockncrystals.com.au*

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## **FORTHCOMING EVENTS**

### **FESTIVAL OF MINERALS AND GEMS by the ILLAWARRA LAPIDARY CLUB**

Saturday & Sunday 2nd & 3rd of November, 10.00am to 5.00pm

at the Ribbonwood Centre, Princes Highway, Dapto.

<http://www.illawarralapidaryclub.com.au/>

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## **PARRAMATTA-HOLROYD LAPIDARY CLUB ANNUAL EXHIBITION**

Friday 8th, Saturday 9th and Sunday 10th of November. From 9am to 4pm each day  
At the Club Rooms at 73 Fullagar Road, Wentworthville, Sydney.

‘Competition, sales, demonstrations, children’s activities, sand sieve,  
fossicking heap, refreshments. Wheelchair access and plenty of parking  
Contact the Club on 02 9636 7843 or <http://www.freewebs.com/parraholroydlapidaryclub/>

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## **ANNUAL JEWELLERY SHOW by the NEWCASTLE LAPIDARY CLUB**

The Newcastle Lapidary Club will be holding their annual jewellery show  
on the weekend of 9th & 10th of November 2013.

The Show is in the club rooms at 2 Dora Rd Adamstown, Newcastle, NSW.

Starting times on both days are 9.00am and finish at 4.00pm.

Rocks, tools and jewellery will be for sale.

There will be a sausage sizzle, devonshire tea, coffee and drinks.

Parking is available and admission is free.

For more information contact the club 0249529611 or email [newlap@gmail.com](mailto:newlap@gmail.com).

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## **The BATHURST COLLECTABLES SWAP MEET AND GEM EXPO 2013**

Presented by the

**BATHURST STAMP, COIN, COLLECTABLES & LAPIDARY CLUB INC**

Over Saturday 30th November & Sunday 1st December

At Bathurst Showground Pavilions, Sydney Road, Bathurst. N.S.W.

Saturday 9.00 a.m. to 5.00 p.m. and Sunday 9.00 a.m. to 4.00 p.m.

Largest array of collectables, bric-a-brac, items from yesteryear and lots of other goods –

Dealers, tailgaters, car boot sellers – buying, selling & swapping including –

Stamps, coins, medals and swords, Cobb & Co coach memorabilia, shearing and farm items, documents,  
old banknotes, shipwreck artefacts, radios, model cars, crystals, rocks and minerals, glassware,  
Roman coins, ceramic ware, goldfield items, seashells, photographic equipment & jewellery.

Enquiries – Ernst Holland, PO Box 1351, Bathurst NSW 2795 02 63373661 [ernst.holland@bigpond.com](mailto:ernst.holland@bigpond.com)  
Secretary - Alan McRae 02 63315404 [amcrae@lisp.com.au](mailto:amcrae@lisp.com.au)

The July, August and September Newsletters from the Bathurst Collectables Club describing in more  
detail the Collectables Swap Meet can be e-mailed to any Society members upon request  
to A.McRae as above or from George Laking, (NSW) Society Secretary.

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## **GEMBOREE 2014**

Australia's 50th NATIONAL GEM, LAPIDARY, JEWELLERY AND MINERAL SHOW.

GEMBOREE 2014 is to be held in Gatton, Queensland, over Easter, the 18th to 21st April 2014.

Presented by the Australian Federation of Lapidary & Allied Crafts Associations Inc. (AFLACA).

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