Welcome to another year and a major step forward in our club.

After saying we would do this for such a long time it is good to finally have the benches built, the clubroom cleaned up and the polishing machines set up and running.

Graeme Strike, our new club secretary has offered to teach cabochon cutting and the basics of faceting to anyone interested. He will open the clubroom up for workshops on Wednesdays from 12:00 - 3:00 during the day and then again from 7:00 - 9:00 in the evening.

Any members who wish to learn how to cut and polish stones are welcome to come down to the clubroom during these times.

We also have other machines up and running in the workshop such as diamond saws and flat lap polishers. With these any member can now cut and trim mineral samples or polish a face on a sliced rock.

During our clean-up of the clubroom we have sorted through a lot of the material in the boxes and now have a good supply of rough for cutting. We also call out to all of our members for any other rough material you can spare for beginners to use to learn. Agates, petrified wood, nundorite or other suitable materials would be greatly appreciated.

So, if you haven’t already done so, come down to the clubroom and have a look.

Until next time…

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The world famous silver-lead-zinc deposit of Broken Hill is contained within rocks that are part of a much larger geological province. This province, called the Curnamona craton - after the pastoral station located at its centre - is a 300 x 200 km, roughly oval shaped area of ancient, highly metamorphosed rocks, straddling the NSW and South Australian border and contains a great wealth of minerals, both to the collector and to industry alike.

Most of the Curnamona craton lies hidden under the sediment of the Callabonna and Frome basins, which includes the Mundi Mundi plain at its southernmost part. The outcropping rocks of the Curnamona Craton occur as three domains, the Broken Hill domain, the Olary domain and the Mount Painter domain. Each of these domains are broken into smaller blocks and these are:

- The Broken Hill and Euriowie Blocks
- The Olary Block and Weekaroo Inlier
- The Mount Painter Inlier and Mount Babbage Inlier

A large body of near surface ancient rock is located in the central section of the Curnamona craton and is known as the Benagerie Ridge. While it is covered by the lake Frome sediments and has no actual outcrop, the depth to basement is relatively shallow.

A craton is defined as a piece of old stable crust away from plate tectonically active areas, that has undergone the full process of rock formation (often more than once) where sediments are laid down in basins, compacted into rock, metamorphosed under heat and pressure and possibly melted and re-crystallised. The cratons together make up some of the oldest parts of the continents and are collectively called a shield. These shields exist on every continent and form the basement rocks on which all younger sedimentary basins lie. The shields are also the world’s richest sources of many base metals such as gold, platinum, lead and uranium.

Large cratonic shields exist in Canada, Brazil, South Africa, Russia, Antarctica and of course Australia. The Australian shield covers two thirds of the continent and the most eastern part is the Curnamona craton.

The geology of the Curnamona craton is very complicated as the whole area has undergone at least five episodes of deformation. The ~1720 – 1640 million year old Willyama supergroup is a sequence of shallow marine sediments such as shales and sandstones, along with lava flows from undersea volcanoes. This sequence forms the bulk of the southern section of the Curnamona craton - the Willyama Complex.

Units of rock can be correlated across the Broken Hill and Olary domains. The Ettlewood Calcisilicate Member marks the base of the Broken Hill Group and the interpreted equivalent of which in South Australia, is the ‘Bimba Sulphide Member’. This distinctive layer of rock is a marker that divides the whole Willyama Supergroup of rocks into an upper and lower sequence. The lower sequence has a higher calcium content while the upper sequence is more siliceous. The upper sequence also contains higher occurrences of amphibolites - metamorphosed basaltic lavas - indicating rifting and volcanism. The upper sequence houses most of the exhalative lead-zinc deposits, of which the main Broken Hill lode is the best example. Many more gold-lead-zinc-copper lodes occur across the Curnamona craton with several target-
ed sites out on the Mundi Mundi plains being investigated for another Broken Hill style lode.

The whole region has undergone at least five episodes of metamorphism and deformation. The first three events culminated with the Olarian Orogeny, around 1600 million years ago while the last two occurred during the Ordovician Delamerian Orogeny 500 million years ago, which also affected the overlying Adelaidean sediments.

During the Olarian orogeny the sequence of rock was folded in two separate directions and turned upside down. These folding episodes generated heat which recrystallised many of the mineral deposits causing new and rare minerals to grow and to quite large sizes. The calcite and galena in the main Broken Hill lode became almost fluid and allowed the perfect medium for the growth of spectacular rhodonite, bustamite and spessatine.

Towards the end of the Olarian orogeny there was a melting of some of the rock to produce sodium rich magmas that intruded to form pegmatites. These pegmatites have been exploited across the Broken Hill and Olary blocks for first their Beryl and then again for the fine feldspar. The Olarian orogeny also produced large quantities of granite. Around Plumbago Station these granite form the main topographical features including Mount Victoria while further north in the Mount Painter domain, the granites now dominate the landscape at Arkaroola. Associated with these granites are uranium minerals that were deposited in late stage veins within the granites, as hot mineral rich fluids filled cracks in the cooling igneous bodies.

During the Delamerian orogeny a retrograde metamorphic event occurred across the Willyama complex and large shear zones dissected the area. These are marked by coarse grained mica schists that often contain large garnets and staurolites. The event also re-dissolved some of the silver and lead from older deposits and re-deposited these metals in cracks. These were the first type of silver veins exploited in the Broken Hill region and are common at Thackaringa and around Silverton.

Since this time the central section of the Curnamona craton has been covered with younger sediments. During the Jurassic and Cretaceous periods part of the Eromanga basin covered the Curnamona craton and then during the Tertiary period further covering occurred. It was during this second phase that large channels formed across the area and these were subsequently filled with sediments that contained secondary uranium. These palaeo-channels house the Beverly and Honeymoon uranium deposits, both of which are mined via a chemical dissolution process.

The final stage in the Curnamona craton history has occurred relatively recently and this is the deep weathering of the outcropping rocks. This weathering is also responsible for the enrichment and recrystallisation of the mineral ores in their upper oxidised zones. The spectacular lead and zinc carbonates and silver halides at Broken Hill and the Uranium phosphates at Mount Painter formed as a result of this process.
A MYSTERY SOLVED : by Trevor Dart

Here is a story about a mystery rock and how a very unlikely sequence of events returned it back to its true home.

It all started in 2003, when I was on holiday in Melbourne visiting family, when a fellow collector Wally Kennewell, invited me to the Frankston Gem Club to see their workrooms. I was staying in Somerville on the Mornington Peninsula and the Frankston Club rooms were not that far away so I went to meet Wally on a Wednesday, when their clubroom was open. He introduced me to some of the other members then gave me a tour of their clubroom. They had some good displays of minerals in a couple of cabinets and a lot of odds and ends scattered around. We went outside and around the back of their rooms to where there was a large pile of rocks, some just on the ground while others stacked in crates. Wally showed me some of these crates and explained that they had been donated to the club from a deceased estate. There was a lot of bulk lapidary material and selection of pretty ordinary minerals specimens, including some from Broken Hill.

After having a brief look through these samples I noticed one specimen that looked unusual. It was a piece of tan coloured rock with a layer of cubic cleaved galena across one face. What was unusual was two brown crystals sticking out of the galena. Unfortunately the crystals were only partially complete but what was there showed good shape. I though it could be a Broken Hill piece so I asked Wally if I could buy the sample. He said that I could have it as most members of the Frankston Club were not that interested in minerals or even knew that it was there. So I returned it to Broken Hill and placed it within my collection.

Not knowing exactly what these brown crystals were and not certain that it was a Broken Hill piece, I asked a few “experts” over the following years to identify the sample. I had tentatively identified the crystals as axinite, of which these were very large for a Broken Hill piece. Consensus confirmed axinite as the brown crystals but the location was still not truly known.

In February 2013, I received a phone call from Reg Pedergnana saying to come and help him identify some samples he had just acquired from an old work mate. All of the samples in this small collection had come from either the Zinc or South Mines where he had worked. To my surprise among these samples was a similar tan coloured rock with cubic cleaved galena across one side and what appeared to be two broken brown crystals embedded in the galena. Could this be a sister piece to the one I already had in my collection.

Reg gave me the piece so that I could compare both samples, as this could be the proof I had waited for and my specimen is indeed from Broken Hill. Not only did it have the same matrix, but one broken crystal on each piece fitted perfectly back together, reunited after many years and miles of separation.

This second piece had the missing section from one of my crystals embedded in the galena and it showed when it was reunited that there were in fact three separate axinite crystals. My sample was indeed from Broken Hill - mystery solved.

While there are occurrences of up to 5cm axinite coming from Broken Hill, this sample has a new mineral assemblage with the crystals entirely enclosed within galena. The sample also has some quartz and calcite on the underside.
Everyone today seems to have a fear of lead and the poisoning that is associated with this heavy metal. Is there any real reason to fear lead bearing minerals in your collection? The answer is, if the samples are respected, stored properly and due care taken when handled, then no problems should arise. Minerals that contain lead are often colourful and spectacular and are great additions to any mineral collection.

Lead is often concentrated in orebodies with other base metals such as copper, gold, silver and zinc. The minerals that form are determined by the origin of the orebody and the sub-sequential weathering processes as it is exposed near the surface of the Earth.

In the primary ore lead is usually found as the sulphide - Galena. While in the oxidised zone there are a number of secondary lead bearing minerals that form depending on what other impurities are found in the ore. Lead will most commonly occur as a carbonate - Cerussite, a sulphate - Anglesite or a phosphate - Pyromorphite.

With the addition of vanadium, chromium, molybdenum, tungsten or arsenic we get some of the rarer lead mineral such as:
- Mimetite - lead arsenate chloride
- Vanadinite - lead vanadate chloride
- Wulfenite - lead molybdate
- Crocoite - lead chromate
- Stolzite and Raspite - lead tungstate

In some deposits the lead can form sulphosalts with elements close by on the periodic table such as copper, tin, antimony, arsenic and bismuth. These include: Boulangerite, Bournonite, Cylindrite, Franckeite, Gratnait, Guettardite, Jamesonite, Jordanite, Madocite, Salzburgite Teallite, Xilingolite and Zinkenite.

Lead is of course renown for having minerals with vividly bright colours. Vanadinite and crocoite are deep red, wulfenite can be orange or yellow, while mimetite can be yellow through to brown. Cerussite is usually white and anglesite usually cream. Anglesite can also be yellow and rarely green. Pyromorphite can range from salmon brown to orange, yellow and green. The green colour of plumbian orthoclase comes from traces of lead in these crystals. This property of lead compounds made it useful as pigments in paints. The bright and rich pigment in red and yellow paint came from coloured compounds of lead.
MINERAL COMPETITIONS AT NATIONAL SHOWS

For those members heading down to Murray Bridge for the 2013 Gemboree, one of the sections to check out is the mineral competition section. Here is some information about how these competitions at these national shows are run.

So, how do you rate the best specimen of a particular mineral or how can samples of the same mineral be compared to pick the best, when every person has different tastes and what looks the best to one may not be the best to someone else? The answer is to place the samples in a competition and have an independent judge using a defined set of rules tally up the points of merit and pick the best.

This process is used by AFLACA (The Australian Federation of Lapidary and Allied Crafts Associations) at their shows around the country for the Mineral section of the competitions.

If you wanted to enter a specimen in a competition, what guidelines need to be followed to get that possible win? There are different categories into which minerals can be entered and these include...

**Non display**
- Single specimen
- Group of specimens

**Display**
- Showcase of Specimens – lit and unlit
- Showcase with solo specimen – lit and unlit

The rules for mineral competitions are straightforward and based on simple criteria. The classes of judging are labelling correctness and presentation, specimen preparation, specimen quality and aesthetic appeal. A few things that downgrade a specimen include excess matrix, crystals too small to be seen, poor setting and untidy labels.

**Specimen Quality** – refers to how close the sample is to a perfect example. If the crystal shape is good and the faces are clean then higher points will be allocated. Crystals that have obvious breaks or damage or that have faces rounded off by the intergrowth of other minerals should not be used. Although it may be more spectacular, the biggest sample does not always win on points, as larger specimens often have damage, excess matrix and the crystals are not usually perfect. Smaller samples tend to have better crystal form and the lack of excess matrix points the centre of focus towards the mineral on display.

**Specimen Preparation** – refers to how well the specimen has been prepared. In this case the better specimens have excess matrix removed, have been cleaned and are free of dirt and staining and there is no evidence of tampering. The things to avoid are cut or polished faces and trimmings, lacquer or artificial coatings and glue from any repairs. Under normal circumstances it is fine to repair a specimen by gluing back on a crystal that has broken off during the specimen’s removal from the ground to return it to its original form, however adding any extra crystals is tampering.

**Aesthetic Appeal** – is self-explanatory. How much appeal a sample has is dependant on the viewer and can be subjective. In the past many minerals that were very rare were awarded points on this quality. These rare species often lacked aesthetic appeal and an example of this is the Abalanderites from the Broken Hill mines. Although they are very rare they are not the most attractive specimens. Rarity has thankfully been removed from judging criteria as too few judges had the scope of knowledge needed to allocate points on the scarceness of a mineral species.

**Labelling** – is probably the most important part of mineral competitions and the easiest place to lose points. For Australian specimens, the correctly identified name (according to Fleischer’s Glossary of Mineral Species) and location where found are all that is needed. The name is to be written in capitals with the location done in title case. The location must include the area or nearest town and state, with the actual mine optional. The name cannot be the variety name and if there is an impurity then it is labelled in title case as a prefix. Some examples of common Broken Hill region minerals showing the correct and incorrect ways to label are.

<table>
<thead>
<tr>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPESSARTINE</td>
<td>GARNET variety Spessartine</td>
</tr>
<tr>
<td>North Mine</td>
<td>Broken Hill Mines</td>
</tr>
<tr>
<td>Broken Hill NSW</td>
<td>NSW</td>
</tr>
</tbody>
</table>
Spessartite is the mineral species name and it is not a variety, garnet is the name of a group of minerals with a similar crystal form, chemistry and physical properties. With the name of the mine, be specific or do not name it at all.

**Correct**

<table>
<thead>
<tr>
<th>Manganeseo CALCITE</th>
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<tbody>
<tr>
<td>Zinc / NBHC Mine</td>
</tr>
<tr>
<td>Broken Hill NSW</td>
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</tbody>
</table>

**Incorrect**

<table>
<thead>
<tr>
<th>MANGANOCALCITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line of Lode</td>
</tr>
<tr>
<td>Broken Hill NSW</td>
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</table>

Calcite is the correct mineral name. The pink “manganocalcite” has a major manganoan impurity and should be labelled as such. Again be specific with the mine location or do not name it at all.

**Correct**

<table>
<thead>
<tr>
<th>QUARTZ variety Amethyst</th>
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<tbody>
<tr>
<td>MacDougall’s Well Station</td>
</tr>
<tr>
<td>Via Broken Hill NSW</td>
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</table>

**Incorrect**

<table>
<thead>
<tr>
<th>AMETHYST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corona Station</td>
</tr>
<tr>
<td>Broken Hill District NSW</td>
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</tbody>
</table>

Amethyst is the purple coloured true variety of the mineral quartz. It is not a separate species but has minor impurities of iron that give the colour. The “Corona Amethyst” deposit in question occurs on McDougall’s Well station, not on Corona station as many people believe. Mineral competitions can be rewarding and they certainly are a valuable educational experience. In reading these guidelines it becomes easier to distinguish which samples in a collection make good pieces to enter in a competition and which to avoid. With this though, one must remember that each show will have an extra set of rules to follow and these could include a theme, or a maximum number of samples in a display.

The final piece of advice is to read any schedule carefully and use common sense when setting up a display. Remember to have the samples arranged to maximise aesthetic appeal by keeping the best side towards the audience and balance the sizes of the samples so that one single sample doesn’t overshadow the others.

Competitions are one of the best ways to get collectors to show off their samples to the public and for those that win it is quite an ego trip to know that they have the best of it’s kind at that show. Even if you are not inclined to enter a mineral competition, it is still good practice to make correct labels for specimens for your own personal catalogue.

**MINERAL OF THE MONTH**

At each of our general meetings we have a mineral of the month. While this is not a true competition, we can, however, practice our labelling skills for each sample on show.

The main reason for the mineral of the month is to educate new members and show examples of the minerals the club will be looking for on upcoming field trips.

The minerals of the month for the rest of this year are:

<table>
<thead>
<tr>
<th>MONTH</th>
<th>MINERAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>Topaz</td>
</tr>
<tr>
<td>April</td>
<td>No Meeting</td>
</tr>
<tr>
<td>May</td>
<td>Hematite</td>
</tr>
<tr>
<td>June</td>
<td>Aragonite</td>
</tr>
<tr>
<td>July</td>
<td>Sphalerite</td>
</tr>
<tr>
<td>August</td>
<td>Scheelite</td>
</tr>
<tr>
<td>September</td>
<td>Quartz</td>
</tr>
<tr>
<td>October</td>
<td>Grossular and Andradite</td>
</tr>
<tr>
<td>November</td>
<td>Kyanite</td>
</tr>
<tr>
<td>December</td>
<td>Find of the Year</td>
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</table>
THE BROKEN HILL MINERAL CLUB INC.

FOSSICKING CODE OF ETHICS

(For the benefit of the new members in our club, here is our club code of fossicking ethics)

1. All Members, Associates, Temporary Members, Honorary Life Members and visitors of the Broken Hill Mineral Club Inc. must adhere to this Code of Ethics.

2. All persons shall display good manners, respect other people’s property and at all times conduct themselves in a manner, which will add stature to the public image of mineral fossicking / collecting everywhere.

3. All persons shall comply with all safety rules and precautions in the interest of personal safety. Hard hats, enclosed footwear, protective clothing and safety glasses are necessary in all underground or cliff workings or as requested by property owners / managers / operators / and field officers.

4. Parents or guardians must closely supervise all children at all times.

5. No members shall enter private property without obtaining the prior consent of the landowner, lessee or manager, and shall conform in all regards with the Mining Act in force at the time.

6. Due care shall be taken not to damage property, crops, flora, fauna, Aboriginal art or natural monuments. Stock (including domestic animals) shall not be disturbed.

7. Gates of properties must be left as found or requested by owner.

8. Water supplies in many areas are essential to life itself; care must be taken not to contaminate or waste water in any way.

9. Camp sites and fossicking areas are to be left clean, all rubbish removed from site and holes filled in. Campsites must be situated minimum of 200 metres from any watering place so as not to deny stock and animals access to water.

10. Discretion must be used when collecting material, leaving some for future collectors, whilst abiding by the Dept of Mineral Resources weight limits.

11. All fire bans must be observed. If fires are permitted, they must be extinguished thoroughly before departure.

12. Firearms and explosives are not permitted on field trips.

13. Permission must be obtained from the Field Officer before any pet is taken on a field trip. Pets on field trips must be controlled at all times.

14. All persons attend all activities at their own risk and must sign the relevant indemnity form prior to entry to properties, minesites, etc.

15. No member shall use The Broken Hill Mineral Club Inc. name to gain entry to fossicking areas for personal gain without permission from the executive. Any member returning to a field trip site without field officer's and/or owner's permission shall become liable to expulsion from the club and to any legal action pressed by the landholder; The Broken Hill Mineral Club Inc. accepting no responsibility for any such action.

16. Any member who wilfully infringes any of the above rules shall be liable to expulsion from The Broken Hill Mineral Club Inc. and shall be personally liable for any legal action pressed by landholders as a result of their non-compliance with the above rules. The Broken Hill Mineral Club Inc. will not accept any responsibility for any such action.