Australia and New Zealand Micromineral News

Issue 1 – September 2011

Cover photo: Clinoclase crystal, Dome Rock. 0.2mm tall.
Photo & Specimen: J.Haupt.

Issue Number 1

September 2011

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Introduction

Welcome to the very first issue of the Australia and New Zealand Micromineral News, a publication for those interested in micromounting or microminerals, and particularly in minerals from this region. The intent is to publish this on a quarterly basis, but this will very much depend on contributions. Articles on any micromineral-related subjects are welcomed.

This first issue contains articles on the Dome Rock copper mine, South Australia, twinning in pseudobrookite, and micromounting for beginners. In addition, you will find regular items including contact details, a forward diary, and news from around the region.

Contributions

Articles should be submitted to the editor in Word format, and any photos should be of a sufficient quality for publication. If you believe that you can provide a suitable article for the next issue, please advise the editor as soon as possible. Planning for the next issue begins as soon as the current one is published!

Contacts

If you want to find out what's happening in your region with micromounting or microminerals, get in touch with one of the following:

- New South Wales: George Laking – bglaking@tech2u.com.au
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- Tasmania: Ralph Bottrill – rbottrill@mrt.tas.gov.au
- Victoria: John Haupt – john.haupt@bigpond.com
- Western Australia: Susan Koepke – minsocwa@hotmail.com

Forward Diary

Please send details of upcoming events (up to six months ahead would be good) for inclusion in the next issue of the Australian and New Zealand Micromineral News.

- October 2011 – NZ Symposium, Wellington

Some minerals from the Dome Rock Copper Mine, South Australia.

by John Haupt

The Dome Rock Copper Mine is located 42 km north of Mingary in South Australia. It has been a popular collecting locality and has produced a range of less common copper arsenate minerals. The mine is on Boolcoomata station, which is now owned by the Australian Bush Heritage foundation. They are returning the property to its natural condition and future collecting at Dome Rock is therefore unlikely.

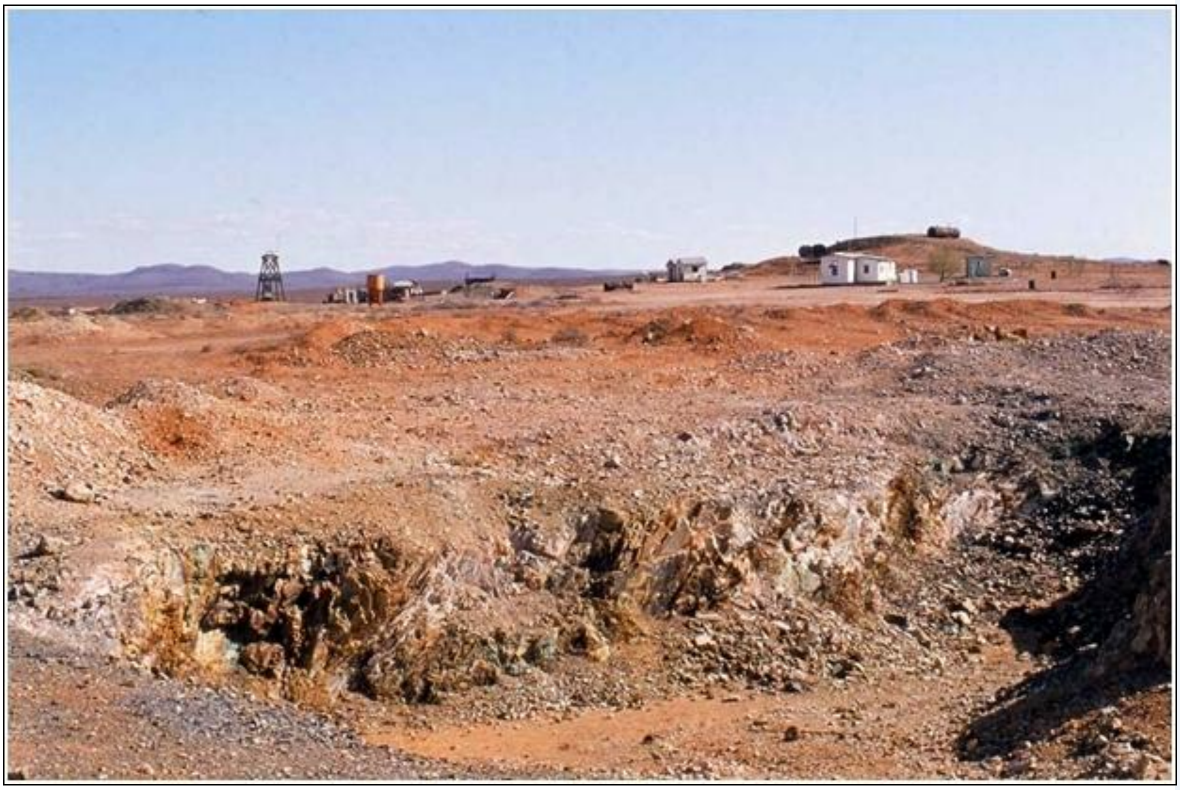
Little appears to have been published on Dome Rock Minerals. Ryall and Segnit (1976), appears to have been the best record, however it has been outdated by more recent finds. It is the type locality for 3 species, cobaltaustinite described by Nickel & Birch (1988) and hylbrownite and IMA 2009-016. Peter Elliott has been involved in identifying the latter two.

This short article attempts to show examples of some of these minerals which may help others in identifying their specimens from the locality. Additions and further information would be most welcome.

Dome Rock minerals

The following list of minerals is recorded from Dome Rock on the MINDAT website and in this article, but there are likely to be errors and omissions in this list.

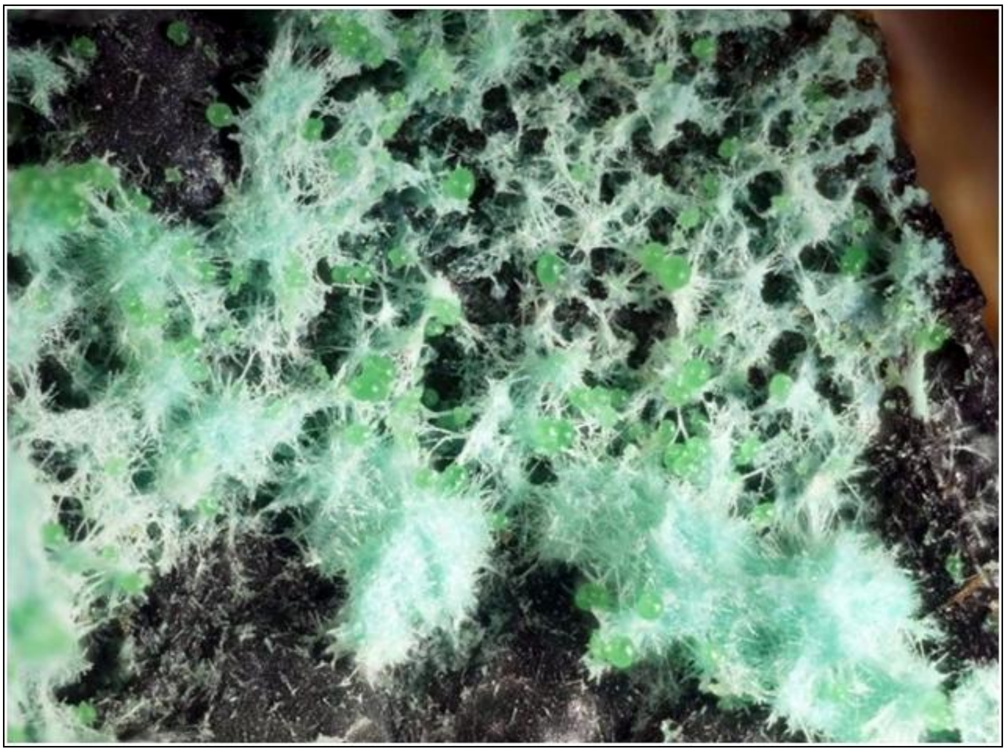
- Agardite-(Y)
- Albite
- Andalusite var: Chiastolite
- Arseniosiderite
- Arsenopyrite
- Arthurite
- Atacamite
- Brochantite
- Calcite
- Chalcocite
- Chalcopyrite
- Chenevixite
- Chrysocolla
- Clinoclase
- **Cobaltaustinite (TL)**
- Conichalcite
- Copper
- Cornwallite
- Covellite
- Cuprite
- Dioptase
- Epidote
- Erythrite
- Euchroite
- Goethite
- Gold
- Gypsum
- Heterogenite
- **'Hylbrownite' (TL)**
- **IMA2009-016 (TL)**
- Jarosite
- Kaolinite
- Lavendulan
- Liroconite?
- Löllingite
- Malachite
- Metazeunerite
- Nontronite
- Olivenite
- Opal var: Opal-AN
- Paratacamite
- Pyrite
- Pyrophanite
- Roselite-β
- Quartz var: Jasper
- Scorodite
- Smolianinovite
- Staurolite
- Tenorite
- Zálesíite?



Above and below: Views of the Dome Rock Copper Mine taken in 1983. J. Haupt Photos

Agardite-(Y) (Y,Ca)$Cu_6(AsO_4)_3(OH)_6.3H_2O$

Occurs as fibrous green to blue sprays and crystalline masses, usually associated with conichalcite.



Above: Agardite-(Y): light blue sprays, and conichalcite: green balls. FOV: 3mm.
Specimen & Photo: J. Haupt

Below: Agardite-(Y): green fibrous masses. FOV: 5mm. Specimen: M. Day Photo: J. Haupt.

Above: Agardite-(Y). FOV: 2mm. Specimen & Photo: J. Haupt.

Barite $BaSO_4$

Small clear crystals of barite occur on fractures in the country rock.

Above: Tabular barite crystals to 1 mm across. Specimen: M. Day. Photo: J. Haupt

‘Black chrysocolla’

Ryall & Segnit analysed the amorphous black coatings and infillings which commonly occurs with chrysocolla. It was found to predominantly consist of manganese, cobalt, copper, silica and water. Also see heterogenite.

Calcite $CaCO_3$

Probably more common and overlooked from Dome Rock, small yellow crystals of calcite occur with conichalcite.

Above: Small calcite crystals on conichalcite. FOV: 2mm. Specimen & Photo: J. Haupt

Chrysocolla $(Cu,Al)_2H_2S_2O_5(OH)_4.nH_2O$

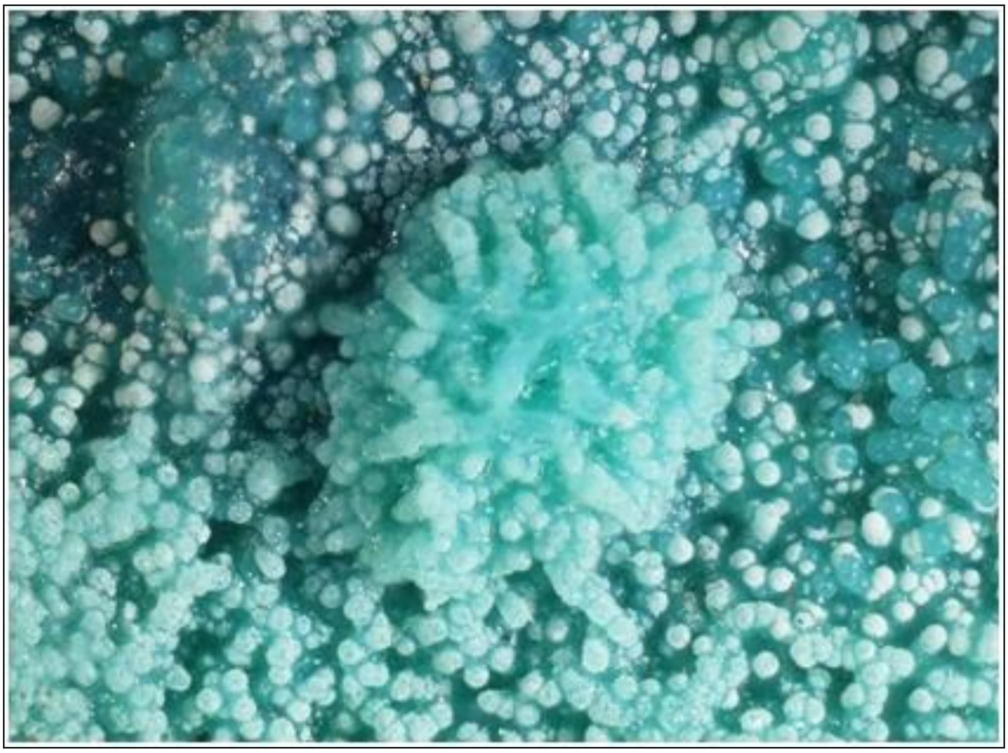
A common copper mineral at Dome Rock, where it occurs as amorphous blue to green coatings and patches along joint planes in the country rock. It occasionally appears to be finely crystalline (possibly a crystalline quartz overgrowth).

Clinoclase $Cu_3^{2+}(AsO_4)(OH)_3$

Occurs as attractive royal/electric blue radiating sprays on cleavages in the country rock. It is usually identified from other arsenates by its characteristic colour. Individual stand alone crystals are uncommon at Dome Rock. Is commonly pseudomorphed by conichalcite.

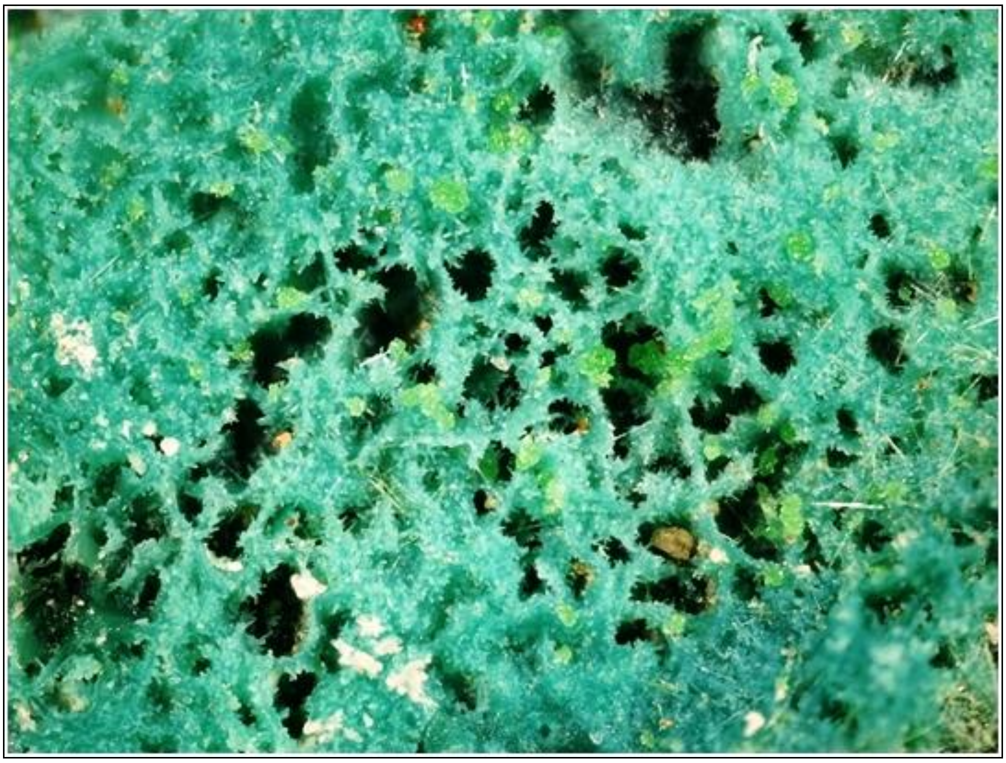
Cobaltaustinite $CaCoAsO_4(OH)$

Cobaltaustinite was first described as a new mineral at Dome Rock in 1988. It occurs as olive-green crystalline coatings, commonly botryoidal, on albitite (chert) associated with erythrite. It has a ‘greasy’ lustre. Other associated arsenates are roselite-β (pale pink), arthurite (green), conichalcite (green), chenevixite (green) & scorodite (brown) (Nickel & Birch).



Above: Chrysocolla 'fingers' and balls. FOV: 2mm. Specimen & Photo: J. Haupt.

Below: Chrysocolla/drusy quartz?. FOV: 3mm. Specimen: M. Day, Photo: J. Haupt.

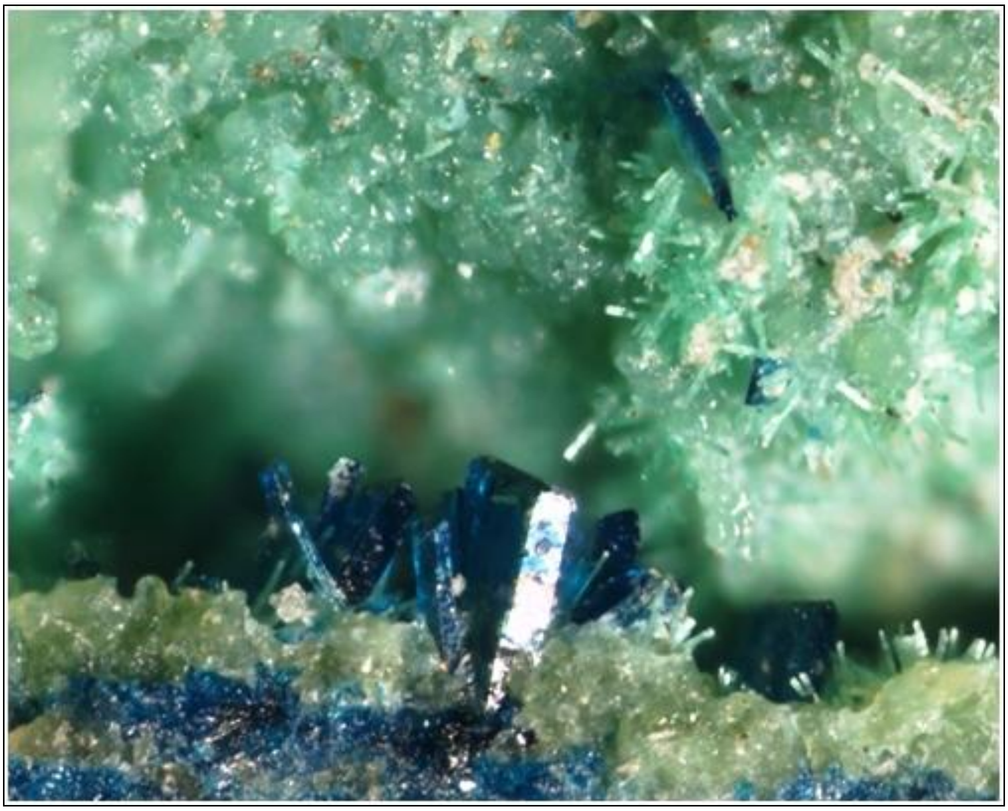


Conichalcite $CaCu^{2+}(AsO_4)(OH)$

Consists of bright apple green balls, usually on chrysocolla. It appears that hyalite has an affinity with conichalcite, as clear globules of 'hyalite' commonly form over the conichalcite, giving it a bright translucent green appearance.

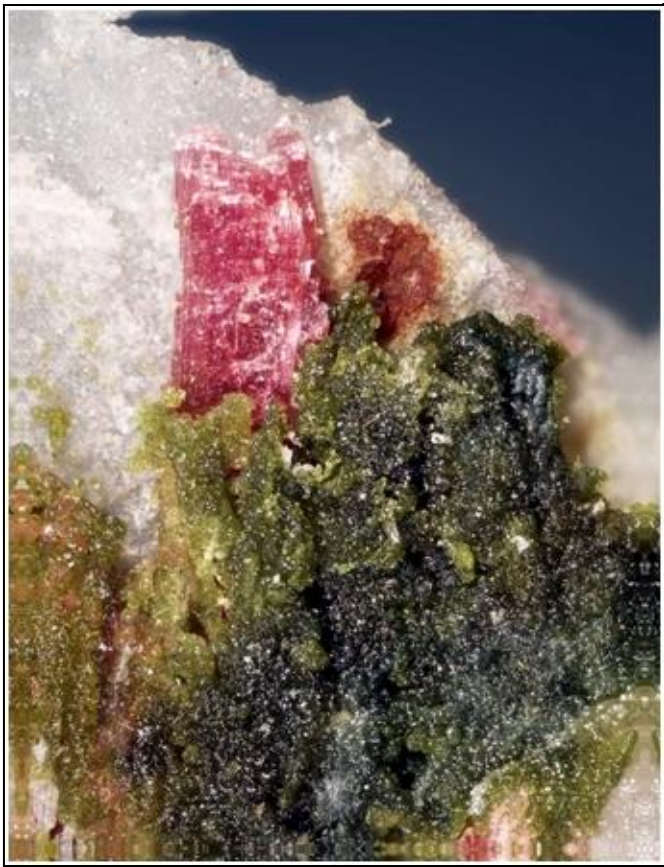
Above: Clinoclase crystals coated with conichalcite. 15 mm across. Specimen: M. Day. Photo: J.Haupt.

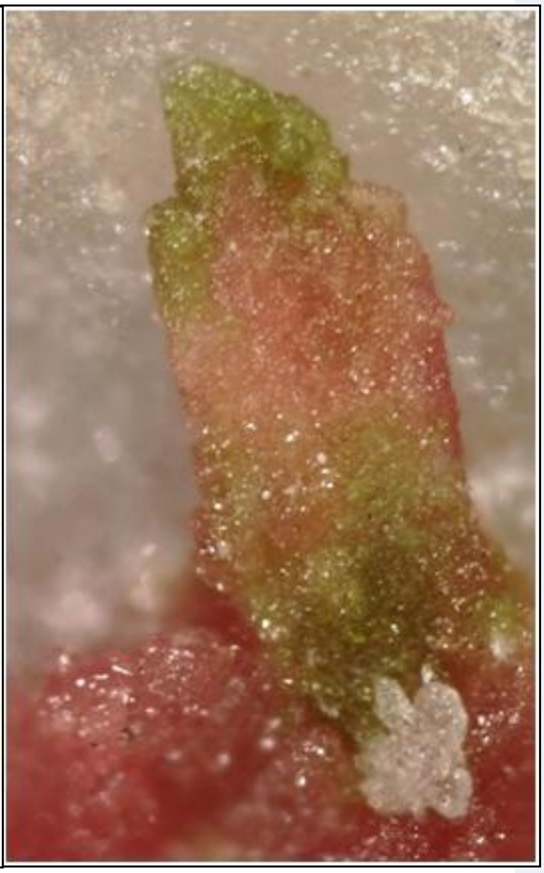
Below: Clinoclase crystals associated with agardite-(Y). FOV: 2mm. Specimen & Photo: J. Haupt

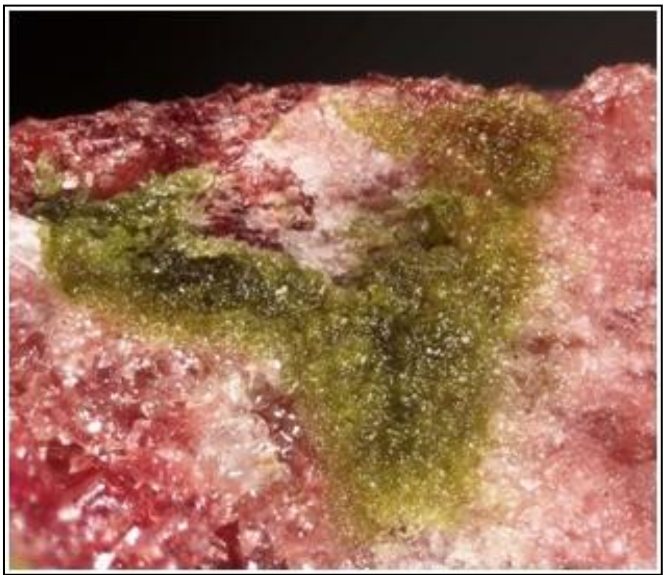


Erythrite $Co_3(AsO_4)_2.8H_2O$

Less common at Dome Rock, crystalline patches and small sprays of pink erythrite crystals occur on buff coloured chert. Individual crystals are usually small, but may be up to 1 cm.







Drusy crystals of cobaltaustinite with erythyrite. FOV: 4 mm (above left) and FOV: 0.2mm (above right). Specimen & Photo: J.Haupt.

Left: Olive green druse of cobaltaustinite with erythrite. FOV: 3mm. Specimen & Photo: J. Haupt.

Gold Au

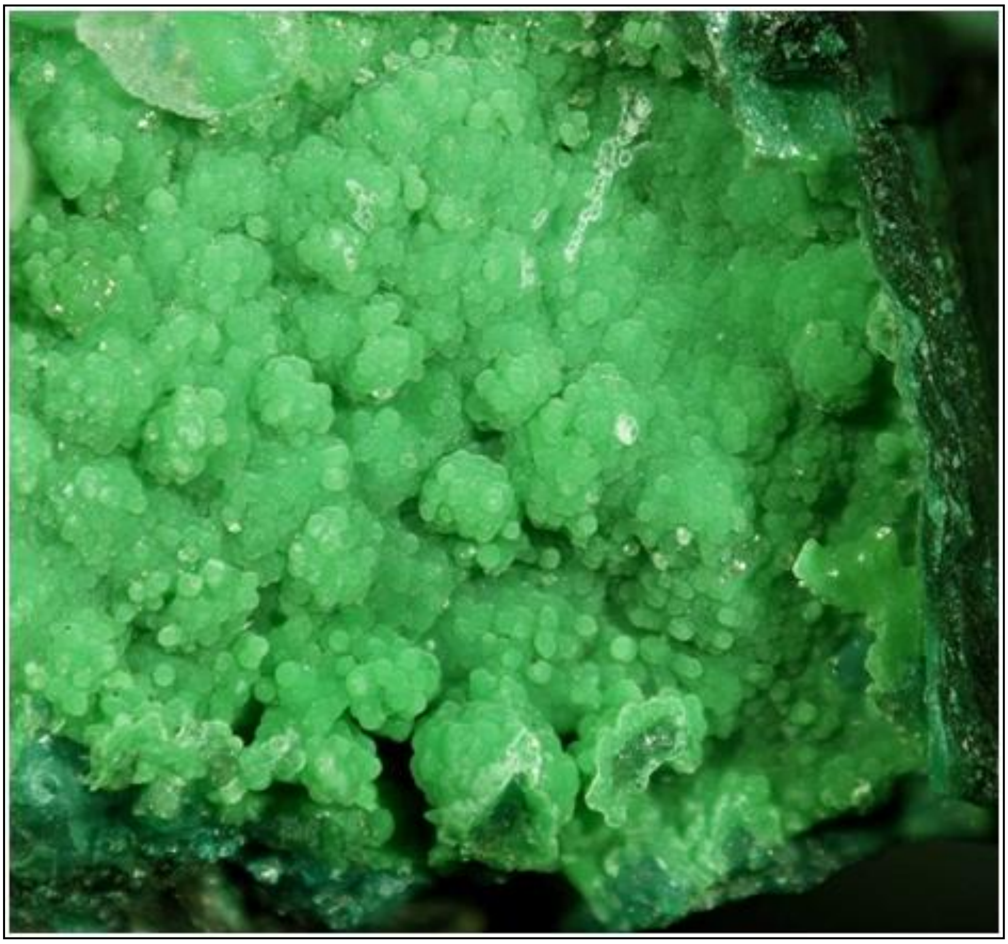
Small flecks of gold have been found on cleavage planes in the country rock. The most attractive specimens being small irregular thin plates of gold combined with blue chrysocolla.

Heterogenite $Co^{3+}O(OH)$

Occurs as botryoidal black lustrous patches on joints in the chert country rock. Its relationship with 'black chrysocolla' is uncertain. Whilst of similar appearance, its chemistry does not contain Mn.

Left: Light green balls of conichalcite. FOV: 4mm. Specimen & Photo: J.Haupt

Below Left: Conichalcite cluster. FOV: 4mm. Specimen & Photo: J.Haupt



Hyalite See Opal-An

Hylbrownite (IMA2010-054)

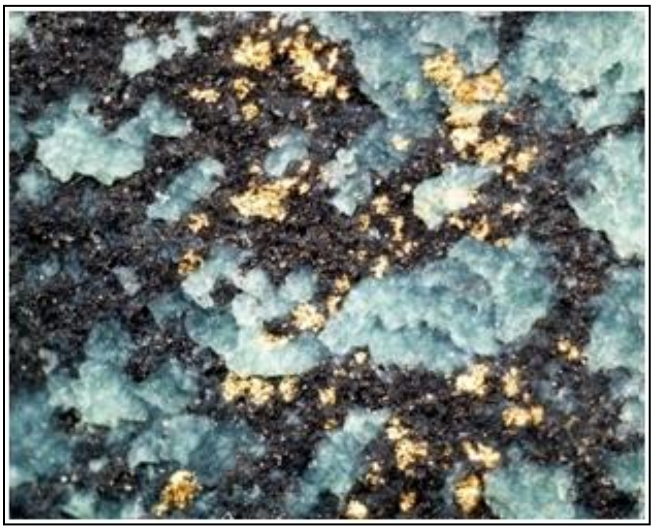
Hylbrownite was approved as a new mineral by the IMA in 2010 and named after the South Australian government geologist HYL Brown. Its composition is $MgNa_3P_3O_{10}.12H_2O$. A description of the mineral is yet to be published.

IMA2009-016 $Cu_4H(AsO_4)_2(OH)_3.H_2O$

IMA2009-016 has been approved by the IMA but is yet to be published and named. It occurs as microscopic grey-green crystals lining small cavities in brecciated chert.

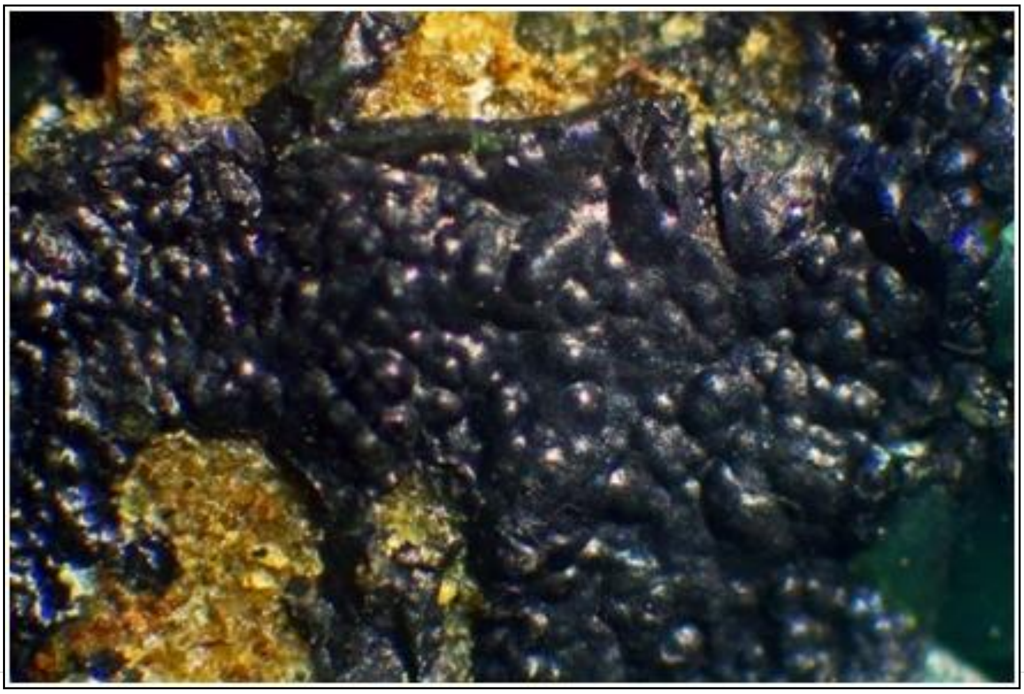
Left: Cluster of erythrite crystals. FOV: 2mm. Specimen & Photo: J. Haupt

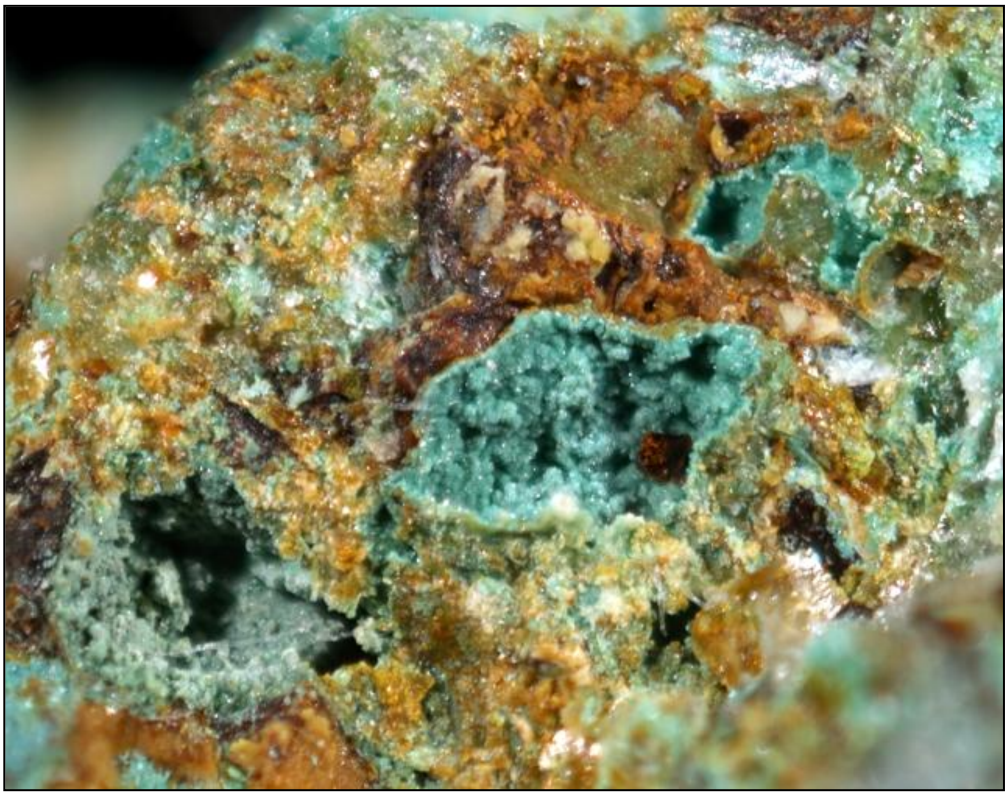
Above: Gold on Chrysocolla. 1mm across.
Specimen & Photo: J. Haupt



Left: Gold on chrysocolla. FOV: 4mm.
Specimen: M. Day. Photo: J. Haupt

Below: Botryoidal heterogenite. FOV: 3mm. Specimen & Photo: J. Rowe





Above: Small cavities lined with drusy crystals of IMA-2009-016. FOV: 3mm. Specimen & Photo: J.Haupt

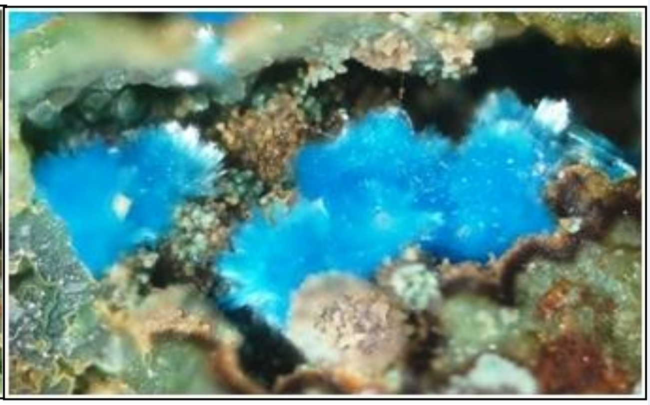
Jarosite $KFe_3(SO_4)_2(OH)_6$

Forms small lustrous honey-brown tabular crystals lining small cavities in the quartz-sulphide ore.

Left: Lustrous crystals of jarosite.
FOV: 2mm.
Specimen & Photo: J. Haupt.

Lavendulan $NaCaCu^{2+}_5(AsO_4)_4Cl.5H_2O$

Uncommon at Dome Rock, lavendulan occurs as small bright sky-blue platy crystal groups. It occurs on schistose chert closely associated with erythrite.

Lavendulan sprays. Above left: FOV: 5mm, above right FOV: 3mm. Specimens: M. Day, Photos: J. Haupt

Below: Lavendulan sprays. FOV: 12mm. Specimen & photo: J. Rowe.

Opal-A$_N$ (Hyalite) $SiO_2.nH_2O$

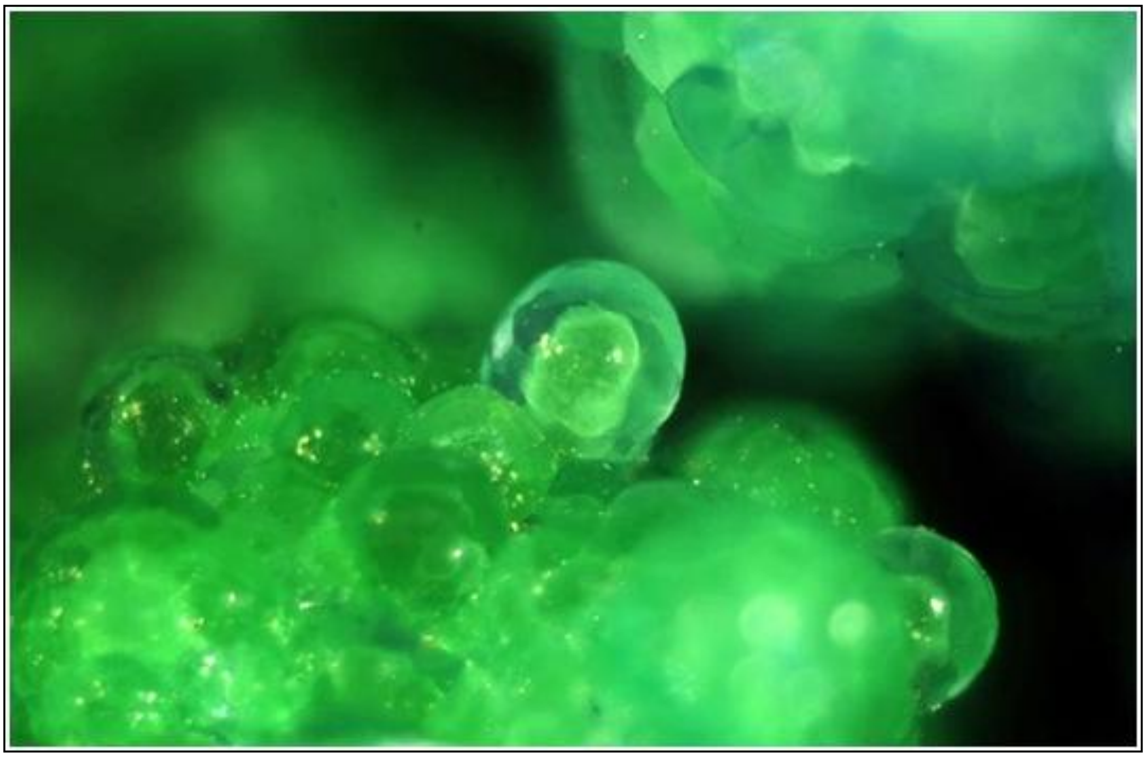
A colourless variety of opal, commonly known as hyalite. It occurs as water clear globules, commonly coating conichalcite.

Scorodite $Fe^{3+}AsO_4.2H_2O$

An uncommon mineral at Dome Rock, it occurs as small glassy lime-yellow crystals in small cavities in the quartz-sulphide ore. The crystal terminations show triangular reflections.

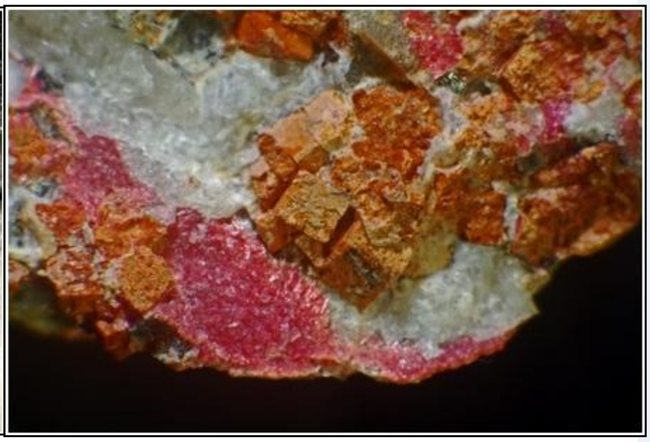
Smolyaninovite $Co_3(Fe^{3+})_2(AsO_4)_4.11H_2O$

A tan brown fibrous mineral formed from the decomposition of cobaltite ore. It occurs as brown patches and pseudomorphs after cobaltite, generally associated with erythrite.



Above: Botryoidal ‘hyalite’ overcoating conichalcite balls. FOV: 2mm. Specimen & photo: J. Haupt

Below left: Cream scorodite crystals. FOV: 4mm. Specimen & Photo: J. Haupt.



Above right: Brown smolyaninovite replacing cobaltite cubes in association with erythrite. FOV: 9mm. Specimen & Photo: J. Rowe.

References:

Nickel, ER.H., & Birch, W.D., 1988: Cobaltaustinite – A new mineral from Dome Rock, South Australia. *Australian Mineralogist,* 3, 53-57.

Ryall, W.R., & Segnit, E.R., 1976: Minerals of the oxidized zone of the Dome Rock Copper Deposit, South Australia. *Australian Mineralogist*, 1(2), 5-8.

Twinning in Pseudobrookite

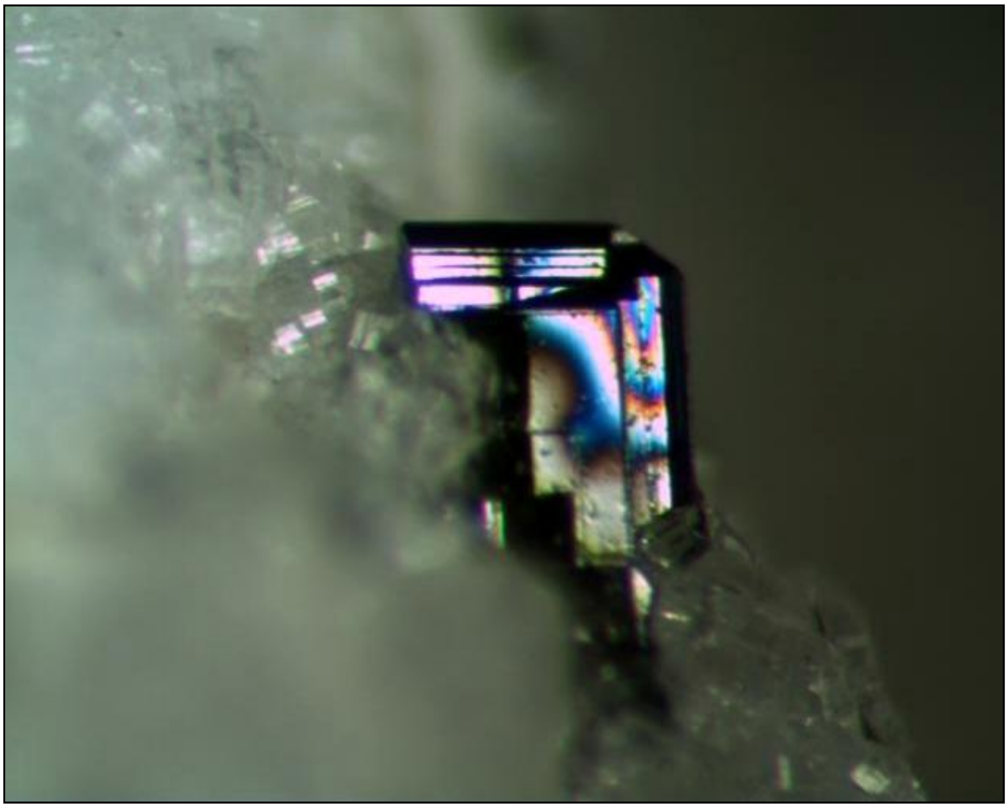
Donald G. Howard

Northern California Mineralogical Association

Speculation about the nature of twinning in pseudobrookite goes back a long time. The fact that the prism faces of many pseudobrookite crystals are striated longitudinally indicated that some sort of twinning was probably present, but until recently, no clear examples of twins had been reported in the literature. Recently collected material from several localities, two in the United States (in Arizona and in Oregon) and one in Victoria, Australia, have now provided examples (Howard & England,2010). What has emerged is a complicated and confusing array of information that need further study. Let us look at the details.

Big Lue Mountains, Greenlee Co., Arizona

A single crystal, present on a specimen of what appears to be a light-colored rhyolite, shows striated regions at nearly right angles (photo at right). The pseudobrookite is a very dark red color bordering on black. Associated minerals include hematite and hollandite in cavities that are lined with tridymite. Twinning on {031} would be expected to yield two crystals at an angle of 89.3°. Only one such crystal has been observed.



Above: Pseudobrookite twin on {031}

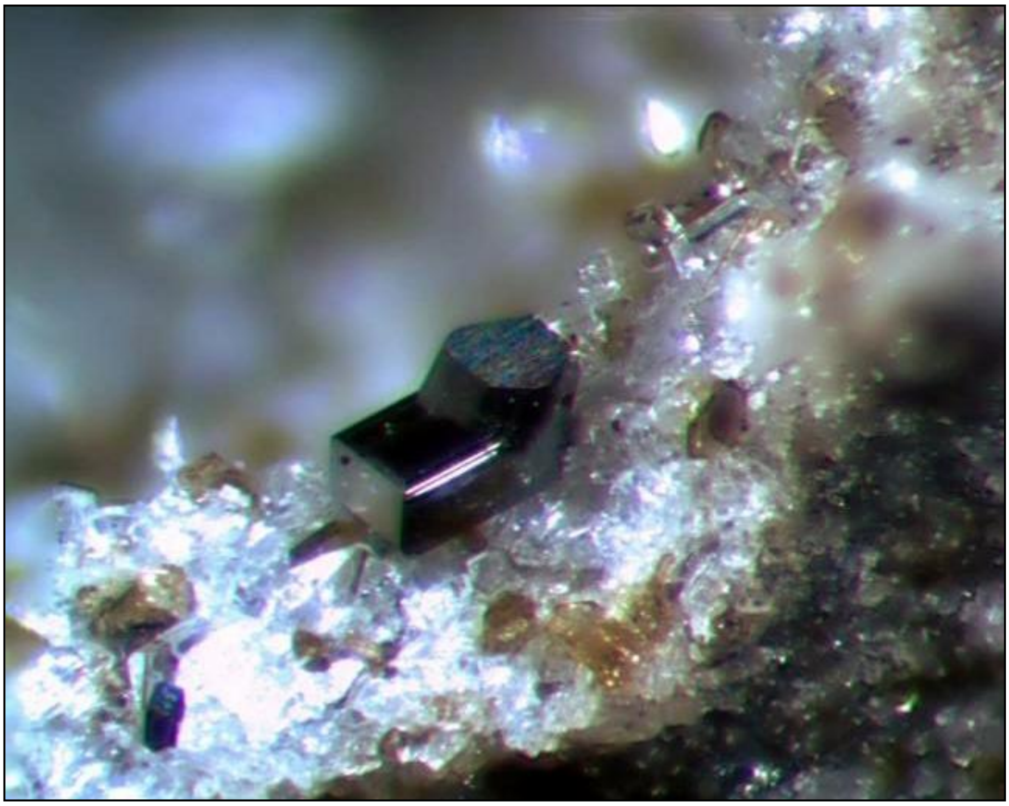
Lemolo Lake Quarry, Douglas Co., Oregon

Most of the known twinned pseudobrookite has come from a single boulder found in the quarry used for rock to form the dam on the upper Umpaqua River that is now Lemolo Lake. This material was derived from a flow of basaltic andesite about 10 meters thick that possesses occasional vesicles lined with tridymite and containing golden brown crystals of enstatite and thin blades of ilmenite. This flow overlies a red scoria layer, and extra oxygen and other metals were able to diffuse into the bottom few centimeters, where a variety of additional minerals including pseudobrookite were able to form. All but the thickest crystals of pseudobrookite crystals are simple, transparent, red in color, and show no inclusions internally. Prism faces are generally smooth and unstriated. Terminations generally are simple, consisting of {101} or occasionally {301} faces.

Many of the crystals, both of enstatite and pseudobrookite, show twinning. The most straight-forward type of twin present is that of a contact twin on {101}. Several twins of this type have been observed.

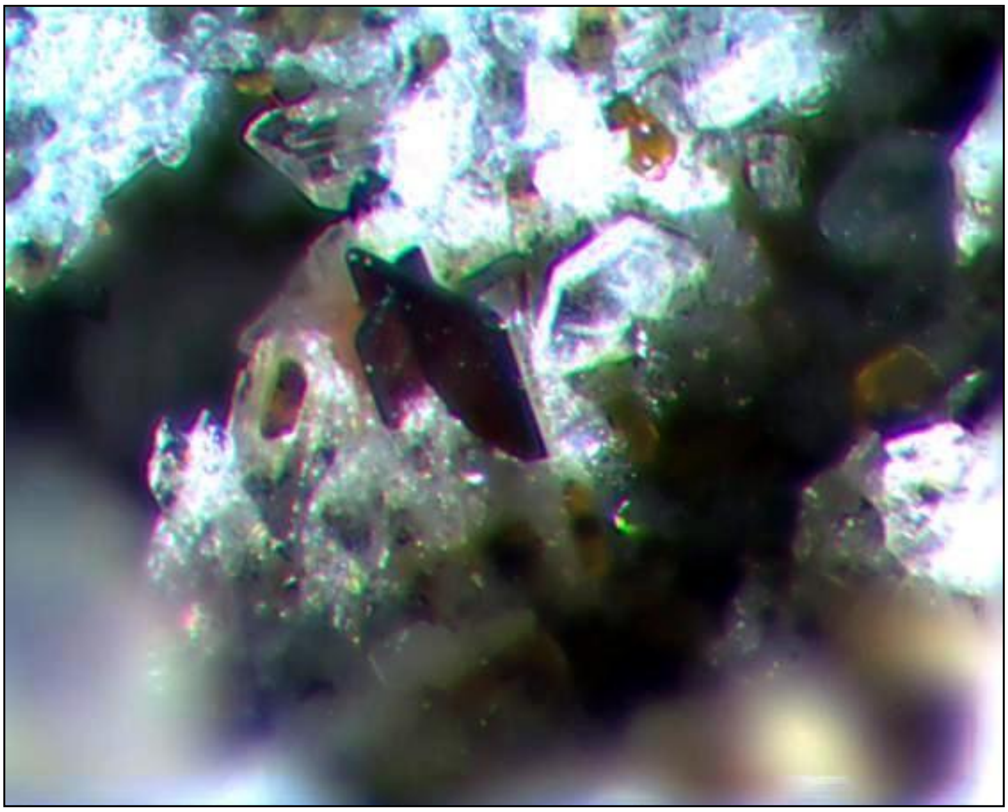
What is much more complicated involves the twins on {hk0} planes. A variety of these have been observed. Only those with two or more occurrences have been officially reported. To date, those include twinning on:

{110}	88.9°
{430}	72.7°
{210}	54.0°
{310}	36.2°

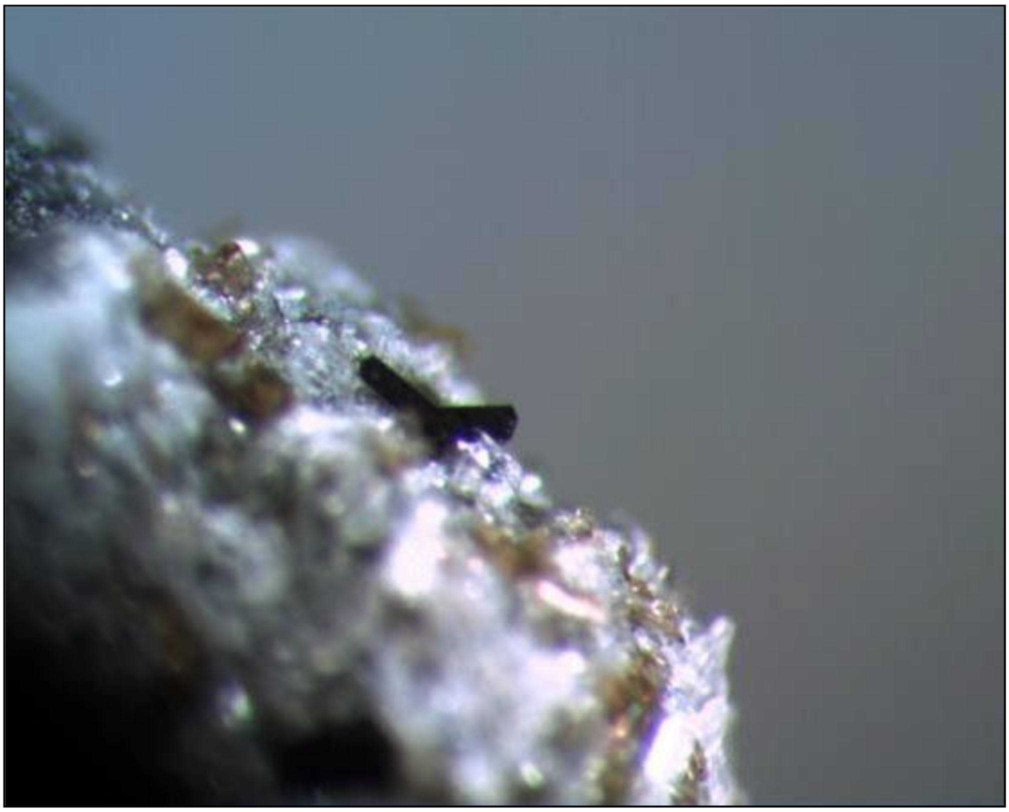


Above: Pseudobrookite twin on {101}

Some of these are contact twins, but several are penetration twins. Other twin angles have been observed, but with only one occurrence so far, so to avoid accidental pairs they have not been included. Moreover, because the **a** and **b** cell dimensions are so similar, uniquely indexing the possible composition plane for higher orders is a problem. Very low angle twins have been ignored because of the known tendency of pseudobrookite to form sprays of nearly parallel growth.



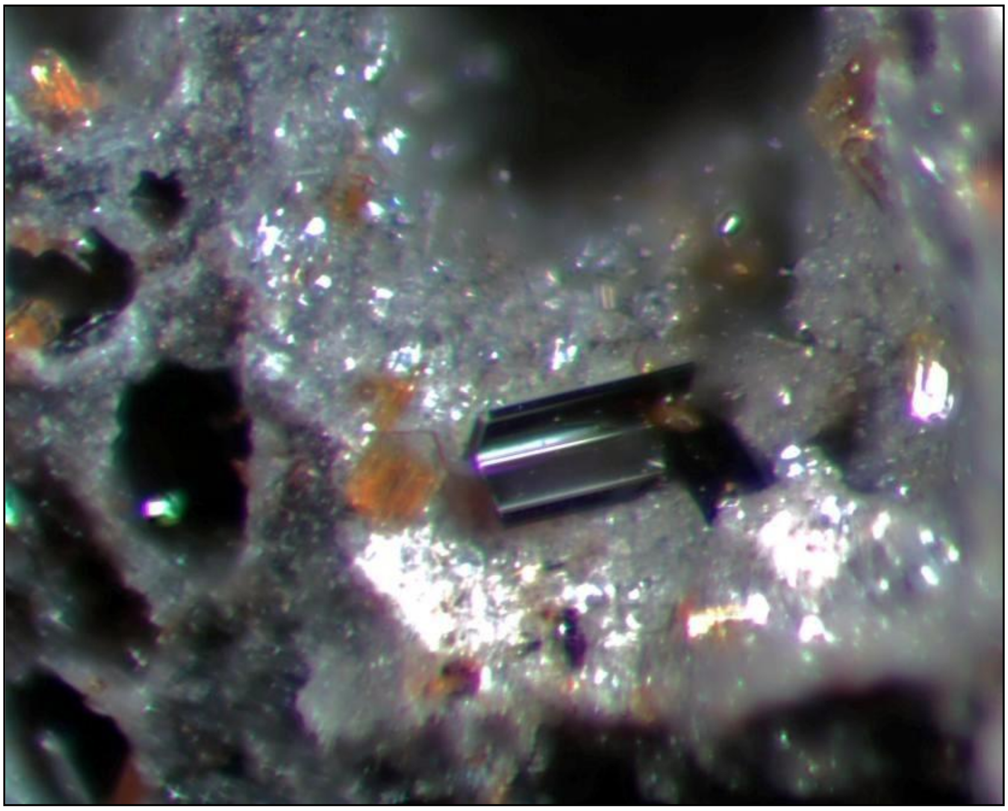
Pseudobrookite penetration twin on {110}



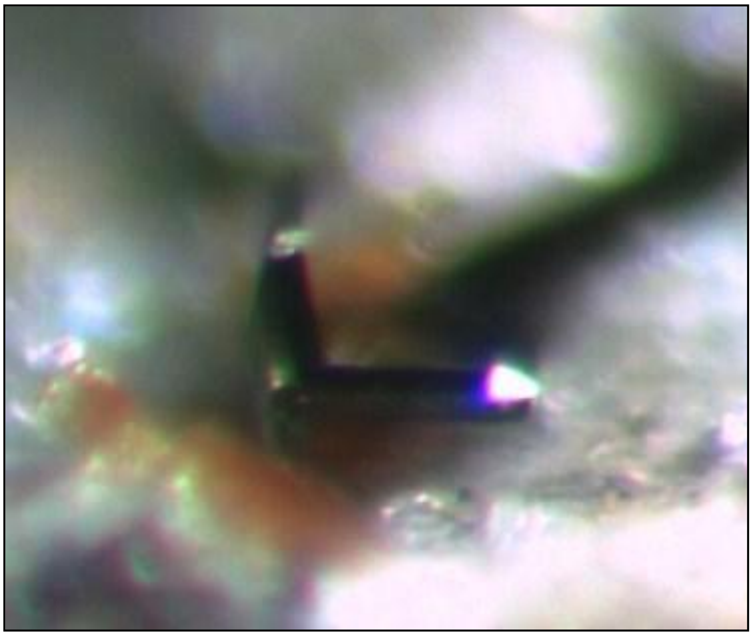
Pseudobrookite contact twin on {310}

Middle Hill, The Anakies, Geelong, Victoria

A single specimen of scoria from Middle Hill, The Anakies, contains a twin crystal of the {hk0} type. The cavities in this material are all very small, generally only 1 millimeter or less in diameter, so the crystals that they contain are even smaller. The pseudobrookite crystals are simple, transparent, and deep red in color. They strongly resemble those from Lemolo Lake. They are closely associated with orange enstatite in vesicles lined with drusy tridymite.



Pseudobrookite twin from Middle Hill, The Anakies. Associated minerals are enstatite and tridymite.



Same specimen, but the upper view is looking directly down along the c-axis.

My best estimate for twin angle, taken from enlarged photomicrographs, is 77$\pm$1°. There is a single crystal from Lemolo Lake that was measured similarly as 82.5$\pm$0.5°. These, then, are among the group awaiting further confirmation.

It is rather unusual for a material to have so many possible composition planes. Clearly, a more extensive catalog of twins is needed. The material from The Anakies, as well as other pseudobrookite localities, should be carefully and thoroughly examined to verify and/or extend the possible list of known twins. As was pointed out, the pseudobrookites from The Anakies and Lemolo Lake are very similar in appearance. Though pseudobrookite crystals are fairly common in the contact region at the bottom of the flow at Lemolo Lake, almost all the known twins have come from the one boulder. Therefore, the Australian material currently presents the best possibility of yielding more examples of these curious twins.

REFERENCES

Howard, D.G. & England, K., *New types of twinning in enstatite and pseudobrookite from Lemolo Lake, Douglas County, Oregon, USA*, **N. Jb. Miner.**, **187/1,** 91-95 (2010).

MICROMOUNTING for BEGINNERS

Noel and Ann Kennon

The Micro-Group of the Mineralogical Society of NSW organised and ran two sessions for micromounters at the 2011 Gemboree held at Bathurst over the Easter weekend.

The second of the sessions was held on the Friday evening for all-comers and started off with a forum on micromounting groups in Australasia. It was this forum that stimulated subsequent meetings at the Gemboree and later in Melbourne culminating in this 'Newsletter' as a first step in establishing a collaboration among micromounters in Australia and New Zealand.

The first of the meetings was held on the Friday afternoon for novices and attracted about 30 interested persons. We kicked off with a power point presentation on micromounting followed by the showing of a wide range of very attractive micros on a battery of microscopes. Each novice was presented with a starter kit containing several prepared and boxed specimens, a couple of plastic boxes, some rough and some information sheets. One of those sheets was about **Micromounting for Beginners**. Here it is.

A micromount is a small mineral specimen usually composed of one or more crystals mounted in a protective box for examination using some form of magnification.

A 'small mineral specimen' may be so small that it could be mounted on the head of a pin, or be an array of small mineral crystals in a much larger piece of material, or anything in between. There are five main advantages of collecting such small mineral specimens.

1 - Large specimens containing perfectly formed crystals are very difficult to find and very expensive to purchase. On the other hand, perfection is common in very small specimens.

2 - Small specimens are easy to obtain. They are prolific at many collecting localities, and they are mostly inexpensive to purchase from dealers or tailgaters. Collectors and other micromounters may give them away.

3 - Because they are small, they take up such little space that an extensive collection may be stored in a small cabinet, box or chest.

4 - Many minerals occur only as micro-sized crystals and so are impossible to collect as larger sized specimens.

5 - It is often quite easy to collect all the mineral species at a particular location as micro-crystals.

The only significant disadvantage is the initial cost of a microscope to provide the best means for examining the specimens with 'some form of magnification'. It is possible to examine small specimens with a hand lens or loupe but a microscope is by far the most satisfying. Most micromounters prefer to use a binocular stereo-microscope with a magnification range from 5 to about 30 as this gives a three-dimensional image magnified to show most of the detail that interests them.

Additional equipment will be needed to prepare the specimens as these are often collected or acquired as large pieces of material which must be worked to extract the much smaller specimen piece. This equipment could simply be a hammer and chisel, but a small rock splitter is much better. A trim saw and flat lap or grinding wheel is useful for shaping the small piece into a specimen for mounting. Finally, the specimen will usually need to be cleaned with a water jet from a spray bottle or by simply swirling it in a container of water. Minerals that are water-soluble can be cleaned by gentle brushing with a soft brush or blowing with a rubber bulb blower.

Small specimens need to be protected for handling and storage, particularly as many are fragile. This is best achieved by mounting in small, plastic 'protective boxes', available in 25mm, 31mm and other sizes. Larger specimens can be mounted directly onto the box base but smaller specimens are best mounted on an appropriate pedestal for ease of viewing. Pedestals can be made from balsa wood, cork, or various plastics and for very small specimens, from pins, comb teeth, tooth picks or matches. Some micromounters use Blu Tack to assemble their mounts, others mount their specimens permanently using adhesives such as *Tarzan's Grip*, *Aquadhere*, craft glue, hot gun glue or silicone cement.

To avoid glare interfering with viewing a mounted specimen using a lens, loupe or microscope, it is advisable to use plastic boxes with black bases, and to paint pedestals black with dye, Indian ink or other media.

Every micromounted specimen should be labelled with the name or names of the mineral species and the location where the original specimen was collected. This information enhances the value of each specimen in a collection. How the label is prepared and where it is attached to the protective box is largely a matter of personal preference. However, it is advisable to label both the lid, for ease of finding particular specimens in storage, and the base, so that specimens cannot become mixed up.

The value of a collection as a whole is further enhanced by cataloguing each specimen and identifying it with a suitable code number. Again, the type of catalogue system and the code numbering method is matter of personal preference.

As you can see from these brief notes, there are no rules for making micromounts. Simply choose a specimen you like, trim it to size, clean it, mount it in a protective box using a pedestal if necessary, label it and enjoy looking at it with whatever magnifier you have available.

Around the Region

The Mineralogical Society of Victoria

Micro-Mineral Group

Our group has been meeting regularly since 1990. Meetings rotate around members' homes – we bring our lunch and the host provides tea, coffee and cake.

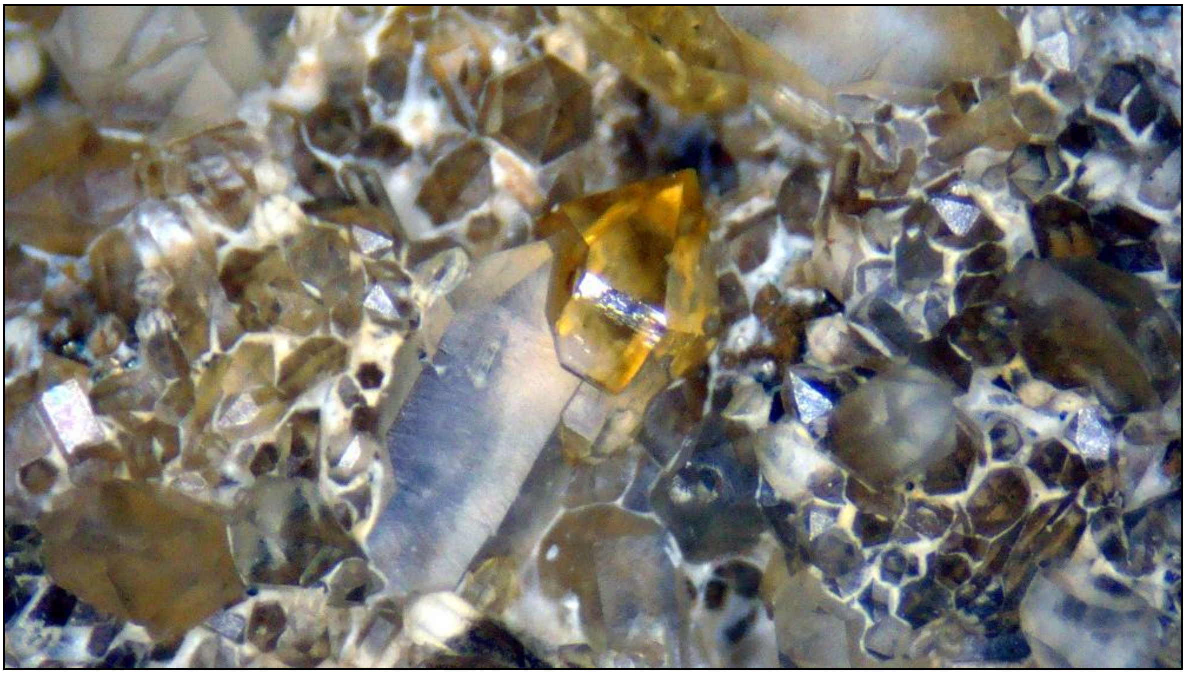
We like to set topics a couple of months ahead and try to cover crystallography, mineral species such as the apatite group, chemical groups such as phosphates, localities including "Type localities from anywhere" which is a favourite, and a few odd topics like "Self-collected specimens from Minsoc excursions" and "Uncommon minerals – a personal choice". A topic is suggested by anyone who has a new idea or wishes to re-visit a topic from years before.

Boxes of minerals for the day's topic circulate round the table and there's lots of lively discussion.

It's good to have the incentive to review our collections and maybe update or correct labels. We are agreed that while we enjoy seeing other people's mineral specimens we also learn from it.

"Wow, what a fine specimen" and "Did you find this yourself?" are the sort of comments that might be heard.

In 1990 Joan Lamond began to keep a record of our meetings, where held and the topic as well as the names of those who attended. This record continues today. We've made friends and all enjoy the company of people who share our love of minerals.



Above: Citrine sceptre. FOV: 9mm. Specimen & Photo S. Sorrell