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 NOVEMBER 2024

The November Meeting will be held on Friday the 1st of Novemober at 7.30 p.m. in the clubrooms of the Parramatta and Holroyd Lapidary Club at 73 Fullagar Road, Wentworthville.

The program will include a lecture to be given by Adam McKinnon on : -

Finding Ore Bodies – The Exploration Process

The lecture will be followed by a second lecture by Ian Graham on : -

Bottom of the Harbour Minerals

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FORTHCOMING MEETINGS and PROGRAMS

Saturday December 7th **Christmas Social, Swap and Sell.** The Christmas Social will be held on the first Saturday in December at the Parramatta and Holroyd Lapidary Club between 11.00am to approximately 3.00 pm. The Social will comprise the sale or exchange of mineral specimens and mineralogical material, books, magazines and equipment etc and the opportunity to socialise. Food and drinks will be provided which will include a BBQ Sausage Sizzle at midday.

Sale tables will be set up inside the Lapidary Club room and depending on the weather tables will also be set up under awnings outside in the car park, either location to be used depending on the preference of the seller and first come, first choice. Members intending to sell will be recommended to book a table. The Club premises will be opened before 11.00 am in order to set up tables etc and allow members with minerals to sell to bring in sales material but selling should not commence before 11.00 am.

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The SOCIETY COMMITTEE

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	Ed Zbik	Mobile: 0401 538 480

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OCTOBER FIELD TRIP REPORT

Over the first week of October a Society Field Trip attended by eleven members, organised by Brian Holden, Haley Bambridge and Mark Walters was held to a number of sites in the New England District. The trip was very successful with a large amount of specimen material being found and as the following Report will show, a large number of images were taken.

Denis O'Brien has again compiled a detailed and colourful Report on the Trip.

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MINERALOGICAL SOCIETY OF NEW SOUTH WALES

NEW ENGLAND DISTRICT FIELD TRIP

2nd OF SEPTEMBER TO 6th SEPTEMBER 2024

Cassiterite in Greisen: Elsmore Tin Mine
(Photo: John Chapman.)

Ten enthusiastic Minsoc members gathered near Glen Innes for a much-anticipated field trip organised by Brian Holden, Haley Bambridge and Mark Walters to explore the district's historical mineral sites and to collect specimens of Molybdenite (Molybdenum), Cassiterite, (Tin) Wolframite (Tungsten), Bismuth and plant fossils. This field trip has taken 12 months of effort to plan, organise and coordinate. The excellent results repaid all the hard administrative work by all involved.

Field trip participants
(Photo: Brian Holden)

L to R: John Chapman, Denis O'Brien, Doug Austen, Robyn Baker, Neil Baker, Marion Ong, Glenn Brown, Brian England, Haley Bambridge, Brian Holden (Graham Ogle not pictured)

Special thanks to:
Brian Holden for leading and organising this field trip
Haley Bambridge and Mark Walters for essential administration and documentation
Brian England for mineral identification, history and site information.
Brian Holden and Brian England for reviewing early drafts of this field trip report
(Any remaining errors or inaccuracies can be attributed solely to the writer).

COLLECTING PROGRAM AND SUMMARY OF FINDS

Sunday 1st September Travel to Emmaville and settle into accommodation

Monday **Allies Mine, Deepwater**
Abundant Molybdenite in quartz, smokey quartz and a large black snake.
Brian Holden found a nice micro of bismuthinite partly replaced by white bismutite (?)

Tuesday a.m. **Dutchmans / Harts Mine**, **Torrington**
Mainly Cassiterite, but Brian England found good micros of quartz / clinochlore / Monazite in thin open veinlets in dense tough quartz / chloritoid rock. A large quartz pocket produced dozens of white to colourless "candle" quartz crystals. Also found were samples of galena and sphalerite in white quartz. Also, intriguing textures in the granite on the dumps (one for the petrologists).

Tuesday p.m. **James Mine**, **Torrington**
Abundant Wolframite (Tungsten) in quartz. Brian England found a nice 4cm Smokey quartz crystal with interesting crystal inclusions - right under Brian Holden's left foot! Not in situ but obviously from one of the many vertical quartz / muscovite veins in the pit wall.
Wednesday am. **Taronga Tin Prospect**, **Emmaville.**
Arsenopyrite with Scorodite and abundant plates of Cassiterite.

Wednesday p.m. Tattersall's Hotel, Emmaville.
Lunch followed by a visit to the Emmaville Mining Museum.

Thursday a.m. Bismuth Mine, Torrington
Native Bismuth in quartz. A silvery mineral in the biotite pegmatite is mainly arsenopyrite with varying amounts of skutterudite, Safflorite, Ioellingite, Niccolite, Gersdorfite, and Rammelsbergite. Haley found patches of pale-yellow fluorescent Fluorite (SW) in the lithium biotite pegmatite. Identical to specimens found underground by Brian England back in the 1960's.

Thursday p.m. Fielder's Hill, Torrington
Ferberite and pale blue Topaz in Silexite.

Friday a.m. Elsmore Tin Mine, Elsmore.
Abundant large Cassiterite crystals in greisen and large smokey quartz crystals.

Friday p.m. Private property, Elsmore.
Large plates of yellow leaf fossils in a dark brown matrix (Cinnamomum genus, Eocene, 50Ma).

Saturday Wallangra fossicking area.
Specimens of black Tourmaline in quartz.

Club Hotel, Emmaville
(Photo: Brian Holden)

COLLECTING SITE PHOTOS

Allies Molybdenite Mine dump, Deepwater
Brian England., John Chapman and Brian Holden
(Photo Denis O'Brien)

Fielders Hill Open Cut, Torrington
Glenn Brown and Haley Bambridge
(Photo: Brian Holden)

James Mine, Torrington
Brian Holden
(Photo: Denis O'Brien)

Taronga Prospect, Emmaville
These plates were often covered in Cassiterite
(Photo: Denis O'Brien)

Bismuth Mine
Doug, Neil, Glenn, Brian H. Haley, John
(Photo: Denis O'Brien)

Elsmore Tin Mine
Brian Holden, and John Chapman
(Photo: Denis O'Brien)

WORKING MINE PHOTOS

Historical processing Plant, Torrington

Handmade curvilinear table
(Photo: Denis O'Brien)

Crusher operation
(Photo: Denis O'Brien)

Elsmore Tin Mine, Elsmore

Tailings dam pump
(Photo: Brian Holden)

Sampling tin concentrate
(Photo: Brian Holden)

Taronga Tin Prospect, Emmaville

Examing drill cores
(Photo: Brian Holden)

Steep descent down the hill
(Photo: Brian Holden)

HISTORY PHOTOS

Historic Silexite and Wolframite plant: Torrington (Photo: Denis O'Brien)

Mine boiler in the bush: Torrington
(Photo: Denis O'Brien)

Travelling to Allies Molybdenite mine, Deepwater
19th century Cobb and Co coach track marked by the truck on the right.
(Photo: Brian Holden)

Old warning sign, Dutchman's Mine
(Photo: Denis O'Brien)

Old dozer much modified, Allies Mine
(Photo: Denis O'Brien)

SOCIAL PHOTOS

Lunch at Tattersalls Hotel, Emmaville
(Photo: Denis O'Brien.)

Afternoon Tea, Emmaville Museum
(Photo: Denis O'Brien)

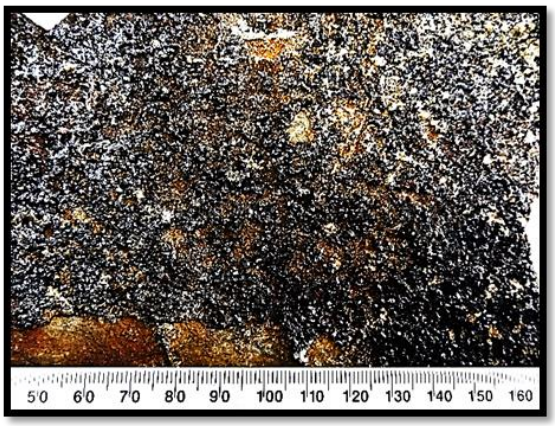
Lunch break at the Bismuth Mine
(Photo Brian Holden)

Lunch break, Elsmore Hill
(Photo: Brian Holden)

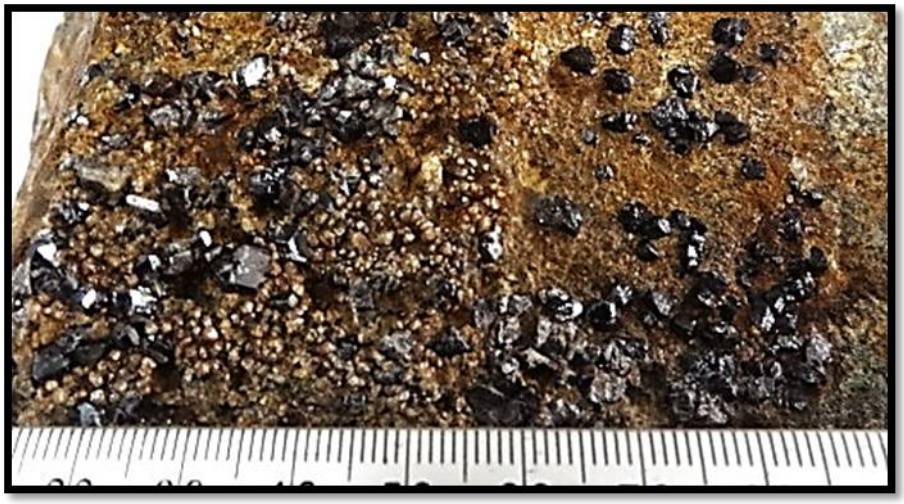
Dinner, Emmaville Club Hotel
L to R: Brian Holden., Doug Austen, Denis O'Brien, Robyn Baker, Neil Baker
Marion Ong, Glenn Brown, Haley Bambridge, John Chapman
(Photo: Brian Holden)

SPECIMEN PHOTOS

Cassiterite crystals
Elsmore Tin Mine, Elsmore
(Photo Denis O'Brien)



Cassiterite in matrix
Taronga Tin Prospect, Emmaville
(Photo: Denis O'Brien)

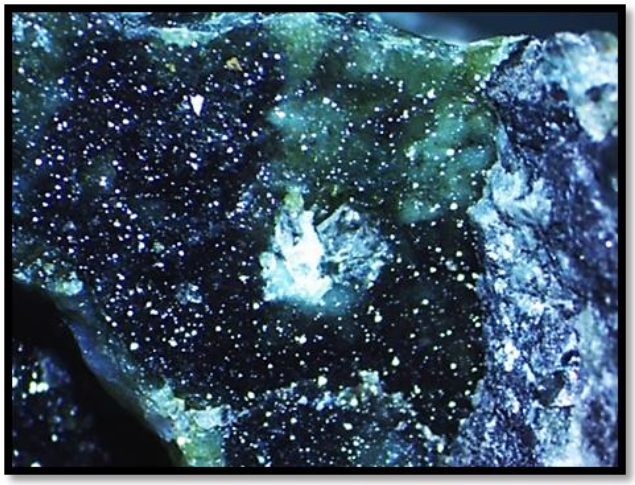


Cassiterite in matrix, Taronga Tin Prospect, Emmaville
(Photo Denis O'Brien.)

Wolframite in Quartz. James's mine, Torrington
(Photo Denis O'Brien.)

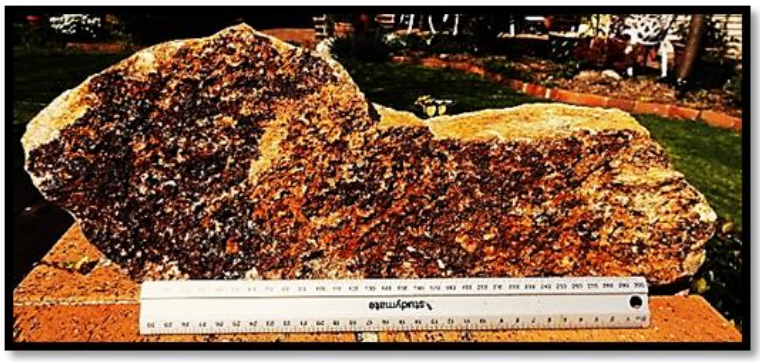
Wolframite in quartz. FOV 10mm
from specimen at left
(Photo: Denis O'Brien)

Molybdenite on quartz
Allies Mine, Deepwater
(Photo: Denis O'Brien.)



Arsenopyrite and Scorodite (FOV 10mm)
Taronga prospect
(Photo: Denis O'Brien)

Cinnamomum Leaf fossils, Elsmore
(Photo: Denis O'Brien)



Wolframite in quartz, James Mine, Torrington
(Photo: Denis O'Brien)

Haley's Fantastic Fossil Find, Elsmore
(Photo: Brian Holden)

Cassiterite in Greisen: Elsmore Tin Mine
(Photo: Denis O'Brien)

DISCLAIMER

Mineral identification is based on prior knowledge, field indicators and known site data.
Denis O'Brien September 2024.

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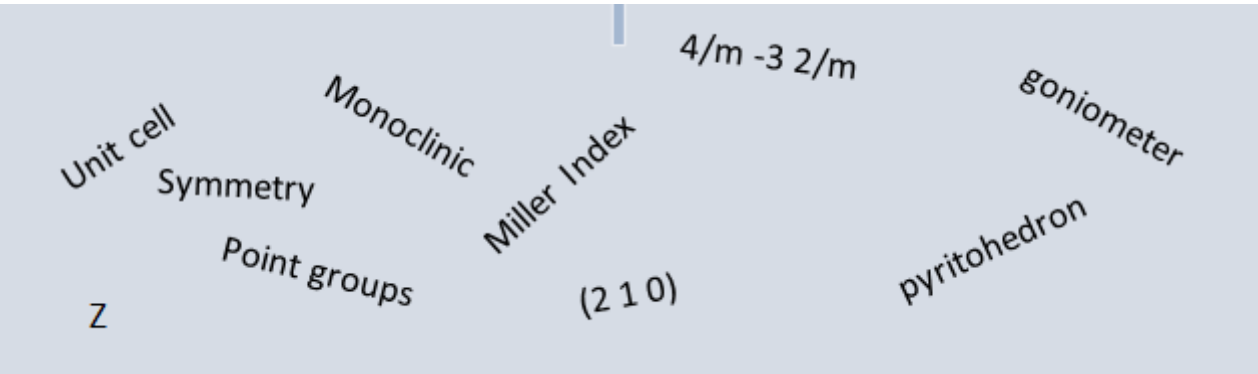
THE OCTOBER MEETING

The Meeting was opened by the Society Vice-President, John Chapman. There were a few announcements. Ed Zbik was asked about the Society Library and reported that a new book *'A Practical Guide to Collecting Minerals and Crystals*.' by Tony Forsyth was being purchased, otherwise all books and magazines were available for borrowing. Graham Ogle displayed two zeolite specimens he had acquired on a visit to India in 2023.

With no further announcements John Chapman asked David Colchester to deliver the first talk of the evening. This was to be Part 1 of an educational description of Crystallography. Part 2 would be delivered to a Society meeting early in the New Year. David Colchester has been a member of the Society for many years and has delivered a number of talks to meetings.

The Language of Crystallography



Part 1 Introduction: Presented by David Colchester

Talk Subjects

The main topics discussed in two mini-talks will be:
The language of crystallography including a little history.
Drawing crystals using a computer. (the fun stuff!)

The Study of Crystal Morphology

- Historically, crystal morphology was the major property used to describe, identify and classify minerals.
- Disappointingly, its influence has waned, being superseded by the use of XRD.
- However, being a visual property influencing the appearance of a mineral specimen it is still survives - especially as it is non destructive.

Two Pioneers of Crystallography

The work of two pioneers laid the foundations establishing crystallography as a scientific discipline;
They are:
Nicholas Steno (His latin name) (1638-1686),
or **Niels Steensen.** (His Danish name) a geologist and priest
AND
René Just Haüy (1743 – 1822) a French geologist and abbot

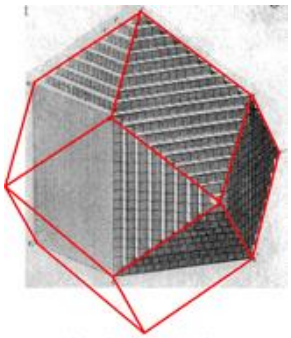
Nicholas Steno (latin), Niels Steensen (Danish) (1638-1686)

Nicholas Steno was a Danish scientist and pioneering geologist who in later life became a Catholic bishop.
In 1669 he published a book on crystallography in which he proposed that:
"The angles between corresponding faces on crystals are the same for all specimens of the same mineral" and is often called the first law of crystallography.

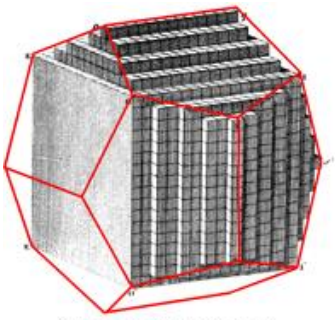
René-Just Haüy (1743 – 1822)

René–Just Haüy was a French crystallographer, geologist scientist and priest.
In 1801 he published a 4 volume work on mineralogy.
He showed how crystal shapes could be explained as being built up of myriads of small building blocks.
Using Steno's principle, he could calculate the shape, but not the size of these building blocks.

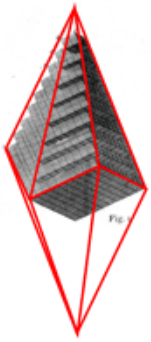
Haüy's Building Block Principle



Rhomb-dodecahedron



Pentagon-dodecahedron



Scalenohedron

Haüy's crystal drawings of pyrite and calcite.
They illustrate his "building block principle" and his "Law of rational indices"

Unit cells and Miller Indices

Haüy was able to calculate the shape, but not the size, of these building blocks leading him to propose his law of rational crystallographic indices" in which the orientation of crystal planes and directions can be expressed in terms of rational numbers.
Hauy's building blocks are now called unit cells and his rational numbers Miller Indices.

Crystallographic Axes

Unit cells are described with reference to crystallographic axes.

There are 7 types axes angles

Systems with 3 axes

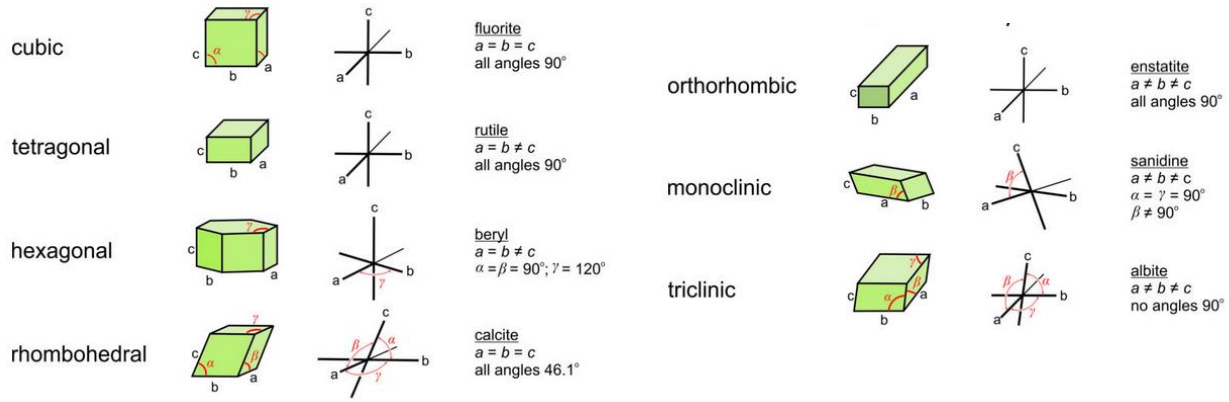
Isometric (cubic)	$a_1 = a_2 = a_3$	$\alpha = \beta = \gamma = 90^0$
tetragonal	$a_1 = a_2 \neq c$	$\alpha = \beta = \gamma = 90^0$
orthorhombic	$a \neq b \neq c$	$\alpha = \beta = \gamma = 90^0$
monoclinic	$a \neq b \neq c$	$\alpha = \gamma = 90^0 \quad \beta \neq 90^0$
triclinic	$a \neq b \neq c$	$\alpha \neq \beta \neq \gamma \neq 90^0$

Systems with 4 axes

hexagonal & $a_1 = a_2 = a_3$ angles at 60^0

trigonal c at 90^0 to a_1 a_2 a_3

Unit Cells & Crystallographic Axes



Unit cells are described with reference to crystallographic axes, of which there are 7 types referred to as the 7 crystal systems.

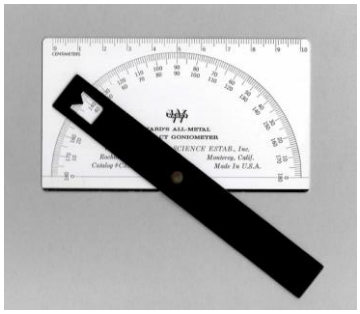
There are three axes for the cubic, tetragonal, orthorhombic, monoclinic, and triclinic systems and four axes for the hexagonal and trigonal systems.

Each face of a unit cell intersects one crystallographic axis at unit length.

Miller Indices

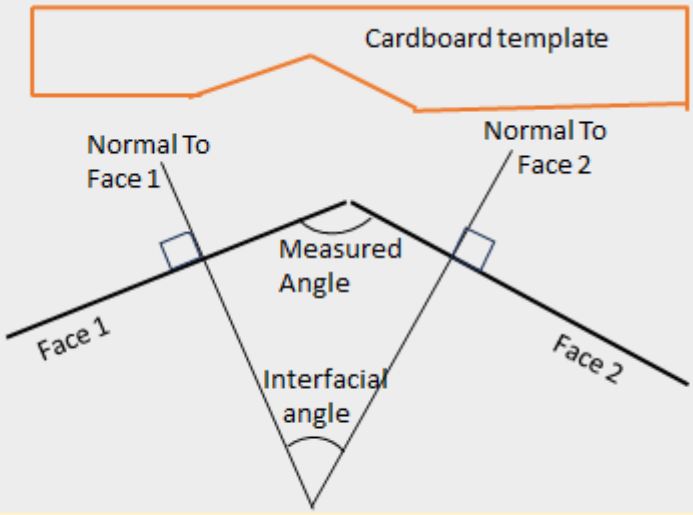
- The length of a crystallographic axis is made proportional to the length of the unit cell in that direction. The axes are usually labelled a, b, and c with their negative ends prefaced by a minus sign.
- A crystal face may intersect one or more of these axes in a simple proportion to their length, - usually at, 1, ½, 1/3 divisions. (Haüy's Law).
- A Millar index lists the reciprocal of the value of these intersections e.g. as 1, 2, and 3. Incidentally if a crystal face is parallel to an axis, it intersects that axis at infinity and the reciprocal of infinity is zero.
- Millar indices are usually housed in brackets e.g. (012) or (0 -1 2) the minus sign indicating the negative end of the axis.

Contact Goniometer



Instruments used to measure the angle between two adjacent crystal faces are called goniometers.
There are many designs, a simple one is called a contact goniometer.
Note in the illustration, the angle measured is 180 degrees minus the interfacial angle.
The interfacial angle can be read directly using, the inner scale, in this case.

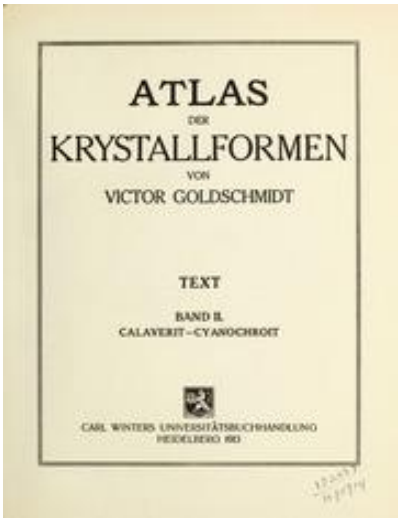
Interfacial Angles

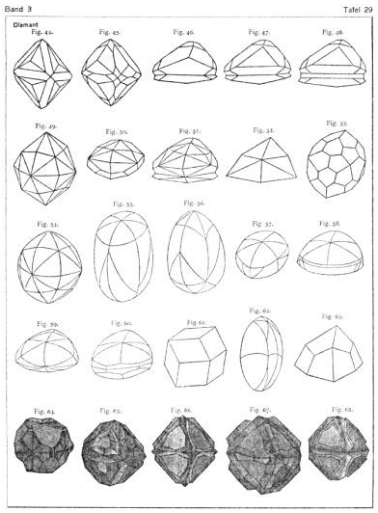


An interfacial angle can be tested by cutting out a template from a piece of cardboard

Interfacial angle = 180^0 – measured angle

Atlas der Krystallformen. By Victor M. Goldschmidt (1853 – 1933)





Atlas published in 9 volumes between 1913 and 1923.

Over 23,600 scale drawings of crystals.

725 scale drawings of different mineral Crystals.

2544 drawings of calcite crystals.

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The second lecture of the evening was delivered by Brenainn Simpson of the Geological Survey who was to describe in considerable detail the geology and significance of the Toongi Rare Earth deposit in central NSW.

Quoting from the Internet:

'The significant Toongi rare earth deposit is the basis of the Dubbo Zirconia Project (DZP) and is located 30 km south of Dubbo in central western New South Wales, approximately 400 klm north-west of Sydney. The Deposit hosts significant resources of zirconium, niobium, tantalum, hafnium, yttrium and other rare earth elements (REE's) within a small (ca. 0.3 km²), of rapidly cooled trachyte laccolith. It also contains low level uranium and thorium values and would be classified as weakly radioactive.

Toongi is part of the regional Late Triassic to Jurassic alkaline magmatic field, but is distinguished from the other igneous bodies by its peralkaline composition and economically significant rare metal content that is homogenously distributed throughout the trachyte body.'

The lecture was extremely detailed, the speaker initially providing acknowledgments to the ARC Linkage project *'Realising Australia's Rare Earth Resource Potential'* and the partners in the study, the Universities of Adelaide, Queensland, the ANU and the ASM, (Australian Strategic Minerals), company.

The lecture then dealt with a number of sub-headings of the subject providing explanations of each with displayed texts, diagrams and charts of the geology, history, origin, structure and geochemistry of Toongi. Questions, with explanations or suggestions, were posed during the presentation about aspects of these features of the deposit

Sub-headings:

Peralkaline magmas – what are they?

Alkaline igneous rocks as a critical metals resource.

The 'mineral problem'. Why do trace elements partition into other minerals?

Why do they sometimes form their own? It's not just abundance.

What is liquidus undercooling?

The development and changes to example minerals such as clinopyroxene and aegirine and the formation of volcanic antecrysts were described.

Radiometric response Th / K. Prospective rocks are U and Th rich.

Regional Geology: References with descriptions were made for neighbouring geological structures such as the Benolong Volcanic Suite, the Karingle Trachyte Formation, the Railway Comendite Formation, the Mullaley Province and the Garrawilla Volcanics.

A few images of Field photos, Pyroxene phenocrysts and drill cores were displayed.

Tectonic significance. – Geochronology is consistent with post-orogenic relaxation after the Hunter-Bowen Orogeny

Toongi deposit. Peralkaline magmatism occurs in the Lachlan and New England from the Silurian to the Cenozoic. The best example is the Toongi Mesozoic volcanics.

Dating Toongi: U-Pb geochronology gives 212.5±5.0 Ma MSWD 1.6. - Late Triassic age.

Geochronology: Most Mesozoic volcanics in NSW were considered **Jurassic.** New geochronology demonstrates these rocks are **Triassic.**

The following notes, images and diagrams are excerpts from the speaker's lecture.

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Mineralogy, Petrology, and Geochronology of the Toongi Deposit and Associated Volcanic Field.

Brenainn Simpson

This talk will describe the mineralogy, and the processes which are responsible for the Toongi deposit and associated volcanic rocks. The rocks are globally significant and have a story to tell.

Exploration history

- First identified from airborne radiometrics by the Bureau of Mineral Resources (now Geoscience Australia) in 1951

- Geochemistry by Geopeko in 1982 looking for porphyry-Cu deposits revealed a very unusual rock. This finding posed a few questions.
- It shouldn't be possible, but it is…
- So how can it be?
- And why is it here in New South Wales?
- Alkane resources pegged the deposit in 1987. They're still trying to get a mine off the ground in 2024.

Peralkaline magmas – what are they?

Mineralogy

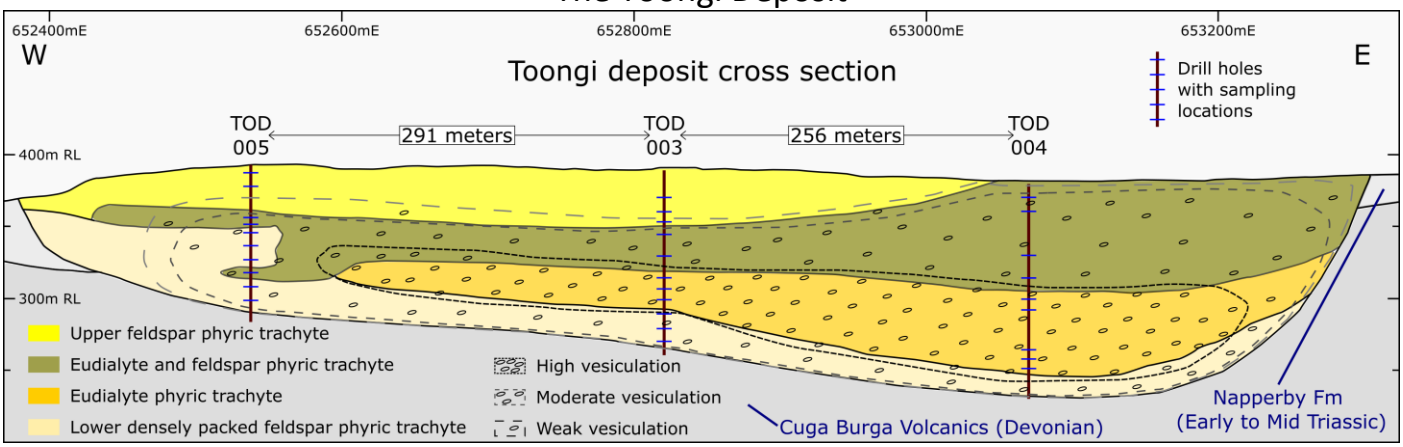
- Dominated by feldspathoids, feldspars, or a combination of feldspars and quartz
- Na-rich amphiboles and pyroxenes
- Ore minerals
    - Primary igneous minerals: zircon, baddeleyite, eudialyte group minerals (EGMs), apatite, monazite, xenotime, pyrochlore, niobite
    - Secondary (alteration) minerals: REE carbonates, REE bearing clays.

  What is eudialyte? - A complex Na-Zr silicate
- Zircon is simple ($ZrSiO_4$)
- EGMs are anything but… --- $Na_{15}Ca_6(Fe,Mn)_3Zr_3SiO(O,OH,H2O)_3(Si_3O_9)_2(Si_9O_{27})_2(OH,Cl)_2$

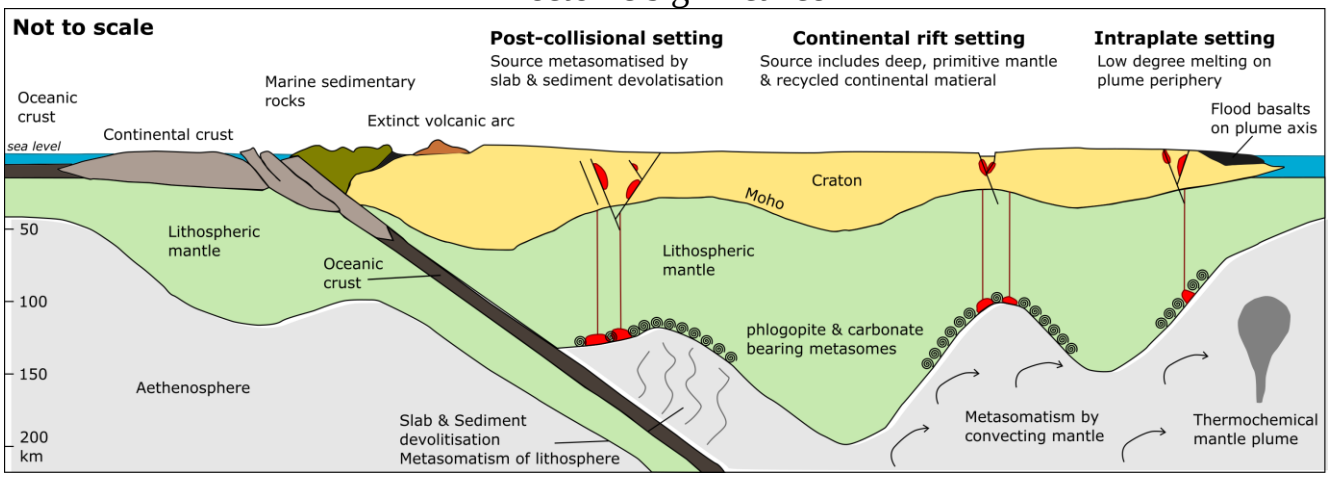
Image credit: Andrey Arzamastsev

The Toongi countryside.

The Toongi Deposit



Tectonic significance



Synthesis

- Pre-fertilisation of the SCLM, (sub-continental lithospheric mantle), under the LAO occurred during the accretion of the NEO in the Carboniferous
- Post-Kanimblan relaxation triggers extension and formation of Permo-Triassic Basins
- Hunter-Bowen orogeny (~265 Ma) compression followed by relaxation and A-type magmatism in the NEO (235-210 Ma)
- Post-HBO relaxation triggers low degree partial melts of metasomatically enriched mantle under the LAO producing enriched parental magmas
- Extensive differentiation in the crust results in peralkaline volcanism at surface (or as subvolcanic intrusions)
- The Toongi trachyte is a sub-volcanic sill which represents a highly fractionated ‘sweat’ from a batholith at depth

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FORTHCOMING EVENTS

Cessnock Gem and Mineral Club Auction: Saturday 2nd Nov 2024

Being held in the Cessnock Gem & Mineral Clubhouse, Hall Park, Stephen Street, Cessnock West, NSW.

Commencing at 10:30 am *(Viewing from 10:00 am.* Gems, Slabs, Cabachons, Faceting Material, Fossils, Specimens and Jewellery. Light Refreshments available at small cost. Cash & Card Accepted.

For more information – Lynda Marshall – Auction co-ordinator. email: *merriwa2001@yahoo.com.au*

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Canberra Spring Gemcraft & Mineral Show.

Being held in the Mallee Pavilion at the Exhibition Park In Canberra (EPIC), over the 2nd & 3rd of November.

. For more info call Norm on 0407 718 347 or email: nmenadue@optusnet.com.au

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The Illawarra Lapidary Club Inc

proudly presents

THE 62ND ANNUAL

JEWELLERY GEMS & MINERALS FESTIVAL

SAT 2 November – 9am to 4pm
SUN 3 November – 9am to 3pm

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PART OF THE RIBBONWOOD CENTRE

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*Gemstone Faceting
*Club Information
*Mineral Group Display
*Silver Crafts
*Kids Games
*Guessing Competitions

Lapidary Supplies*
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Findings*
Fossils*
Beads*
Opals*
Crystals*

Refreshments available

$5 ADMISSION – CHILDREN UNDER 12 YEARS FREE
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See you there!

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