



A Catalogue of
The Minerals of Tasmania

Tasmanian Geological Survey Bulletin 73



A Catalogue of the Minerals of Tasmania

Geological Survey Bulletin 73

by R. S. Bottrill and W. E. Baker

First published in Australia in 2008 by Mineral Resources Tasmania
Department of Infrastructure, Energy and Resources
PO Box 56, Rosny Park, Tasmania 7018
www.mrt.tas.gov.au

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National Library of Australia Cataloguing-in-Publication entry:

Bottrill, R. S. (Ralph Stephen)

A catalogue of the minerals of Tasmania / R. S. Bottrill and W. E. Baker.

ISBN: 9780724640218 (pbk.)

Series: Tasmanian Geological Survey Bulletin; 73.

Includes index and bibliography.

1. Minerals – Catalogs and collections – Tasmania
2. Precious stones –Tasmania – Catalogs.

1. Baker, W. E. (William E.)
2. Mineral Resources Tasmania.

016.5499946

Reference this publication as:

BOTTRILL, R. S.; BAKER, W. E. 2008. A catalogue of the minerals of Tasmania.
Bulletin Geological Survey Tasmania 73.

Cover design and printing: Print Applied Technology Pty Ltd, Hobart

Cover photo: Crocoite, Adelaide mine, Dundas [*Photo: A. Wright*]

Rear cover: Bismuthinite on quartz and siderite, Princess mine [*Photo: A. Tuma*]
Cassiterite on quartz, Blue Tier [*Photo: R. Bottrill*]
Fluorite on ferroan magnesite, Mount Bischoff [*Photo: A. Tuma*]
Siderite, Renison mine [*Photo: J. Leeming*]

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Introduction

All entries are classified as either:

- valid occurrences of accepted mineral species (titles such as **Acanthite**);
- unconfirmed occurrences of a valid species (e.g. **Adamite**);
- occurrences of a mineral series or group (e.g. **Amphibole**);
- or a variety or obsolete species name (e.g. **Adularia**).

Chemical formulae and crystal systems are listed for each species (Hexagonal-R is short for hexagonal-rhombohedral or trigonal). Technical terms are listed in a glossary (Appendix 1), while many chemistry terms are listed in Appendix 2. Details of photographs are listed in Appendix 5, with details of geographic locations being listed in Appendix 6.

Minerals A–Z

A

Acanthite

Ag_2S
Monoclinic

Acanthite is a dark lead-grey soft sulfide mineral found in hydrothermal silver and lead deposits.

Most of the previously reported argentite occurrences in Tasmania are probably acanthite inverted from primary, cubic argentite (which is unstable at room temperature), and are re-listed here. 'Argentite' sometimes occurs as cubic or octahedral crystals but more commonly in arborescent or massive form.

Argentite was also earlier reported (Petterd, 1910; Baker, 1970) at the:

- Godkin Extended mine, Whyte River, where it occurred as relatively pure masses and rounded slugs, rarely exceeding 25 mm in diameter, associated with fine-grained galena and sphalerite. This ore reportedly "averaged many thousands of ounces of silver to the ton".
- Bells Reward mine, Whyte River: small particles of the mineral occurred with chlorargyrite in a decomposed siliceous matrix.
- Magnet mine: small patches and scales were associated with highly argentiferous galena.
- Hampshire silver mine: very small indistinct crystals were sparingly implanted on other minerals and also within cavities in veins.
- Spray mine, Zeehan: flakes of nearly pure argentite occurred in association with siderite and other gangue minerals.
- Mt Lyell mine: the most significant occurrence of argentite was a large, rich body, known as the Mt Lyell Bonanza, found between the pyrite mass and the hematite of the Iron Blow, and consisting of a vein of chalcocite, bornite, tetrahedrite and argentite. This body yielded 850 tons of ore, which averaged 1011



1. Acanthite, Magnet mine

ounces of silver per ton. One specimen analysed by the Government Assayer of the time yielded 8765 ounces of silver and 45 ounces of gold per ton and also contained 19 wt% copper. The species jalpaite (Ag_3CuS_2) was originally described as a cupriferous variety of argentite from Mt Lyell.

- Scamander River: the only record of argentite outside west and northwest Tasmania is from an old mine here, where the mineral occurred with arsenopyrite in quartz.

Recently described occurrences include:

- in serpentinised dunite, with auricupride, nickel, zinc, galena, covellite, awaruite, chromite and magnetite, in the Wilson River ultramafic body (Just, 1988);
- the Queen Hill deposit, Zeehan, with proustite, pyrargyrite and pyrostitpnite (Kwak, 1987);
- in the Rosebery lead-zinc ores (Khin Zaw *et al.*, 1997).

Attractive specimens showing radiating groups of dark grey, lustrous, sword-shaped blades to ~0.5 mm, overgrowing native silver in cavities with siderite and arsenopyrite at the Magnet mine, are a rare occurrence of primary acanthite, the only such known in Tasmania (confirmed by EDAX; R. Bottrill, unpublished data). It has also been recently found with partly oxidised galena in the Red Lead mine at Dundas.

Actinolite

$\text{Ca}_2(\text{Mg,Fe}^{2+})_5\text{Si}_8\text{O}_{22}(\text{OH,F})_2$
Monoclinic

This is a comparatively common amphibole of various shades of green. Actinolite generally crystallises in fibrous radiating aggregates, which tend to break into wedge-shaped masses. The mineral is sometimes asbestiform in character and less commonly crystallises as long, slender, brittle prisms. It mostly occurs in skarns, calc-silicate rocks and altered or metamorphosed igneous rocks. A tough, fine-grained massive variety of actinolite known as 'nephrite jade' is an important gem and carving material.

Actinolite occurs as fibrous aggregates replacing diopside-hedenbergite, and as granular aggregates grading into ferro-actinolite in the Stormont skarn near Moina (Taylor, 1990). It also occurs in skarns at the Cleveland mine at Luina, and in the Renison mine at Renison Bell.

An actinolite-like mineral is abundant in andradite-hedenbergite-amphibole-magnetite skarn at the Kara scheelite mine near Hampshire (Sorrell and Bottrill, 2005), as radiating fibrous green aggregates. The amphibole is largely dark green hastingsite (Kwak, 1987; Singoyi, 1995), but appears to grade into pale green tremolite and actinolite, especially in late-stage calcitic veins.

Iron-rich actinolite, grading into ferro-actinolite, occurs as radiating aggregates in altered carbonate clasts in hornfelsed tillitic mudstone at Martins Point and the Mt Mary mine at Cygnet, associated with adularia, pyrite, pyrrhotite and quartz (Taheri and Bottrill, 1999).

Actinolite occurs in retrogressed amphibolite and metabasalt of the Arthur Metamorphic Complex at the Savage River mine (Bottrill and Taheri, 2007), associated with magnetite and pyrite, and near Corinna (Bottrill, 1992c; Turner and Bottrill, 2001), with glaucophane, chlorite and albite. It occurs as asbestiform veins with green fibres to 50 mm long in metabasalt in the Savage River iron ores and is probably common in other altered Precambrian and Cambrian dolerites in western Tasmania and on King Island.

Actinolite is common as a secondary mineral replacing diopside in Devonian diorite in northeast Tasmania (McClenaghan *et al.*, 1992). It also occurs in unusual amphibole-talc-hematite altered ultramafic conglomerate at the Forster prospect, Weld River, in southern Tasmania (Bottrill and Woolley, 1997; Bottrill *et al.*, 1999).

Some of the best actinolite specimens in Tasmania occur in the axinite skarn ('limurite') at the Colebrook Hill mine near Rosebery (Twelvetrees and Petterd, 1898a, 1899; Manchester and Bottrill, in prep.). In this deposit tremolite-actinolite is abundant as fine specimens, including pale green fibrous crystals and masses, with arsenopyrite, axinite-(Fe), calcite, chalcopyrite and quartz. Some probably pseudomorphs diopsidic pyroxene crystals to 10 mm, and some occurs in fractures as attractive flat sprays to about 300 mm diameter. It is usually enclosed in calcite.

'Nephrite jade' occurs as pale to mid-green masses in hornfelsed Cambrian rocks near Trial Harbour (S. Stephens and N. Ellis, pers. comm.).

Actinolite was also previously reported at:



2. Actinolite on axinite-(Fe) with calcite, Colebrook Hill mine

- Barn Bluff, being plentiful in association with pyrite;
- on the River Forth about five kilometres from Mt Claude, in large masses;
- at Heazlewood, plentiful, in green acicular masses;
- on the Whyte River, near the base of the Meredith Range, as typical dark green masses containing minute asbestiform bunches and patches of pale brown to brownish green, spongy, interwoven fibrous actinolite, closely intermixed with yellowish-brown garnet in skarn containing minor molybdenite;
- at Dundas, in limited occurrence in well-crystallised bright green masses; and
- the upper Emu River, a few kilometres south of Hampshire (probably near the present Kara mine), where it was described as associated with andradite, amethyst and fibrous radiating goethite.

Adamite

$\text{Zn}_2(\text{OH})\text{AsO}_4$
Orthorhombic

This mineral usually occurs as colourless, white, yellow or green, resinous to vitreous crystals and druses in gossans in zinc deposits.

A sample labelled 'Petterdite, Zeehan' in the Petterd collection at the Tasmanian Museum and Art Gallery was analysed by X-ray diffraction and found to be adamite (Ford and Kemp, 1980). It occurs as small groups of transparent, colourless to faintly green, elongate crystals on limonitic gossan. The type sample of 'petterdite' was found to be mimetite (Anderson, 1906; Ford and Kemp, 1980). There is some doubt as to the provenance of these specimens, as the 'type specimen' of petterdite (recognised from the original photographs) is labelled as matlockite from England, and another sample in the collection, labelled as matlockite from Magnet, probably is from Matlock, England. The adamite described as 'petterdite' was reportedly found at the Britannia mine at Zeehan and was described as a new species by Twelvetrees (1902). The occurrence of adamite in Tasmania thus requires confirmation.

Adularia

See *Orthoclase*

Aegirine

$\text{NaFe}^{3+}\text{Si}_2\text{O}_6$
Monoclinic

This is a greenish black sodic clinopyroxene, which grades into augite, with intermediate compositions described as 'aegirine-augite'. Some of the 'aegirine-augite' described below may actually be augite.

Aegirine occurs in some of the porphyritic, syenitic dyke rocks of the Cygnet alkaline complex, and in associated metasomatised dolerite (the 'hybrid zone'). These occurrences are mostly microscopic and range from individual crystals of aegirine to crystals that have a core of augite surrounded by 'aegirine-augite' (Edwards, 1947; Ford, 1984).

A typical microprobe analysis for crystals in hybrid rocks gives $(\text{Na}_{0.9}\text{Ca}_{0.2})(\text{Fe}^{3+}_{0.9}\text{Mg}_{0.1})\text{Si}_{1.9}\text{O}_6$ (Ford, 1984).

Aegirine forms a microscopic constituent of green, hornfelsed impure limestone in contact with dolerite at The Lea, near Hobart, with grossular, microcline, opal, magnesio-arfvedsonite and vesuvianite. A typical microprobe analysis gives $(\text{Na}_{0.9}\text{Ca}_{0.1})(\text{Fe}^{3+}_{0.8}\text{Ti}_{0.1})\text{Si}_2\text{O}_6$.

Aegirine probably occurs as the outer, bright green zones of augitic clinopyroxene which occurs as small acicular green crystals in siliceous xenoliths in basalt on Dogs Head Tier, Interlaken, associated with sanidine, quartz and aenigmatite. It forms deep blue-green crystals in alkaline miarolitic cavities in a nephelinitic plug east of Lagoon Plain, where microprobe analyses resemble one given for titanian aegirine in Deer *et al.* (1978) (F. L. Sutherland and B. J. Barron, unpublished data).

Aegirine was found in gabbroic rocks from Macquarie Island, as microscopic rims on kaersutite (J. Everard,

pers. comm.) and was also recently identified in a phonolite from near Tomahawk River (Everard *et al.*, 2004a).

Aegirine-augite

$(\text{Na,Ca})(\text{Fe}^{3+},\text{Fe},\text{Mg},\text{Al})\text{Si}_2\text{O}_6$
Monoclinic

This name covers pyroxenes intermediate between aegirine and augite.

Deep blue-green crystals occur in alkaline miarolitic cavities in a nephelinitic plug east of Lagoon Plain, where microprobe analyses indicate the rock is strongly sodic (Na_2O up to 9.3 wt%) and iron rich ($\text{Mg}_{15-21}\text{Ca}_{25-29}\text{Fe}_{50-60}$) (F. L. Sutherland and B. J. Barron, unpublished data). Aegirine-augite also occurs in Cretaceous syenitic intrusive rocks at Cygnet (see under *augite*) and was previously reported as a common late-stage accessory mineral in some alkaline Cainozoic volcanic rocks such as the crinanite at Circular Head and Stanley, but no supporting analyses are available.

Aenigmatite

$\text{Na}_2\text{Fe}^{+2}_5\text{TiSi}_6\text{O}_{20}$
Triclinic

This is a rare, dark coloured, pyroxene-like mineral, which occurs in some alkaline igneous rocks.

Microscopic acicular brown crystals in hornfelsed xenoliths in basalt on Dogs Head Tier at Interlaken, optically appear to be this rare mineral. They occur with sanidine, quartz, aegirine(?) and augite. This requires confirmation.



3. Aegirine, Interlaken

Aikinite

PbCuBiS_3
Orthorhombic

This rare, soft grey sulfide mineral has been observed microscopically in association with jamesonite, bournonite and cosalite from the Hecla mine at North East Dundas (Stillwell, 1935) and as microscopic grains in some chalcopyrite-rich ores from Rosebery (Khin Zaw *et al.*, 1997).

It was also recorded as microscopic grains in concentrates prepared from the andradite-magnetite-calcite ores of the Kara mine (D. C. Green, unpublished data). It has recently been found to occur as attractive silvery needles, blades and radiating aggregates to 25 mm in length, associated with minor galena and/or chalcopyrite in calcite veins in tremolitic skarn, at the Kara mine (Sorrell and Bottrill, 2005; A. Tuma, pers. comm.).

It is a rare microscopic ore mineral in sulfide concentrates from the Prince Lyell copper ores at Mt Lyell (R. Bottrill, unpublished data).

Åkermanite

$(\text{Ca}, \text{Na}, \text{K})_2(\text{Mg}, \text{Fe}, \text{Al}, \text{Si})_3\text{O}_7$
Tetragonal

This is a major rock-forming mineral of the melilite group and is very important in some uncommon alkaline igneous rocks. It is mostly fine-grained.

Comparative compositions of melilite from melilitite and melilite nephelinite from Laughing Jack Marsh ($(\text{Ca}_{1.7}\text{Na}_{0.3})(\text{Mg}_{0.5}\text{Fe}_{0.1}\text{Al}_{0.4}\text{Si}_{2.0})\text{O}_7$); M. Zhang, unpublished data) and Boat Harbour (Sutherland *et al.*, 1996; $(\text{Ca}_{1.6}\text{Na}_{0.4})(\text{Mg}_{0.5}\text{Fe}_{0.2}\text{Al}_{0.4})\text{Si}_2\text{O}_7$) indicate that they are closest to åkermanite. Other Tasmanian occurrences of melilite-group minerals require analysis for proper classification.

Albite

$\text{NaAlSi}_3\text{O}_8$
Triclinic

This common mineral is the sodic end member of the plagioclase feldspar series. The composition of a particular member is often given in terms of the content of the pure calcic end member anorthite ($\text{CaAl}_2\text{Si}_2\text{O}_8$) and the name albite was originally applied to a plagioclase feldspar with a content of 0–10 mol% anorthite, which is represented as An_{0-10} . In recent nomenclature, the old species oligoclase (An_{10-30}) and andesine (An_{30-50}) are now relegated to calcic varieties of albite, but most old descriptions of albite refer to near end-member material (An_{0-10}).

This mineral was reported in the former catalogue as milk-white, sub-translucent, irregular, compact masses occurring at the Heazlewood River.

Albite occurs very commonly as a rock-forming mineral in the Cambrian and Precambrian igneous and metamorphic rocks of western Tasmania. It is common in some syenitic porphyries in the Cretaceous Cygnet alkaline complex (including the varieties oligoclase and andesine; Ford, 1984). 'Albitites', composed mostly of albite and of uncertain origin, are abundant in the Savage River mine.



4. Aikinite needles in calcite, Kara mine



5. Aikinite needles on andradite, Kara mine

Analyses are reported for albite in Precambrian amphibolites in the Savage River–Pieman River area (Turner and Bottrill, 2001) and in skarns at the Kara mine, Hampshire (Bacon and Bottrill, 1988). Albite is abundant in many of the granites of northeastern Tasmania, particularly as rims on more calcic plagioclase (McClenaghan *et al.*, 1982, 1992).

Large crystallised specimens are rare in Tasmania, but crystals occur in small veins in Precambrian rocks at Burnie and in miarolytic cavities in Devonian granite at The Rocks near Tulendeena.

The varieties 'oligoclase' and 'andesine' are common feldspars in granodiorite and diorite of northeastern Tasmania (McClenaghan *et al.*, 1982, 1992); the Cambrian volcanic sequences throughout western Tasmania; in porphyries of the Cygnet alkaline complex (Ford, 1984) and in the Cretaceous alkaline complex of Cape Portland (Jennings and Sutherland, 1969). The rims on zoned plagioclase microcrystals in Jurassic dolerite, throughout much of Tasmania, are mostly andesine in composition (McDougall, 1962), and it also occurs in the matrix of some Cenozoic basalts (Everard, 1989).

Albite, including the varieties 'oligoclase' and 'andesine', occurs as distinct megacrysts in alkaline Cenozoic basalts and analyses are quoted from the Runnymede and Copping areas (Sutherland *et al.*, 2004). 'Oligoclase' and 'andesine' are also common in granulite and cumulate xenoliths found in these basalts (Sutherland *et al.*, 1996).