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# CATALOGUE OF THE MINERALS OF TASMANIA

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CROCOITE

Adelaide Mine, Dundas

(Tasmanian Museum)

5 cm

# CATALOGUE OF THE MINERALS OF TASMANIA

## INTRODUCTION

Almost 60 years have passed since the Department of Mines published the Catalogue of Minerals of Tasmania by W. F. Petterd (1910). During this period there has been a rapid growth of interest in minerals and considerable improvements in the equipment and techniques available for their study.

The 1910 catalogue contained 356 entries which included minerals, mineral groups and other substances. It summarised information appearing in a number of publications by W. F. Petterd over the period 1893-1910, details of which have been included in the reference list. An alphabetical presentation has been retained in this text and all entries of the 1910 catalogue are included. These have been evaluated and are either accepted, invalidated or classed as being of doubtful validity. As a result 46 of the 1910 listings have been invalidated, at least 20 are regarded as being of doubtful validity and 73 new entries have been made. A number of minerals has had to be carried forward into this text without an extensive check since no specimens were available in the Petterd Collection of the Tasmanian Museum or elsewhere and there is no access to the localities from which they were reported. At the Hampshire Silver Mine, for example, some 12 minerals involving the metals arsenic, bismuth, cobalt, lead, manganese, molybdenum, nickel, silver, strontium, vanadium and zinc were reported. There was very limited production from this mine during the period 1878-1887 and a recent study by geologists of the Department shows that the mineralisation is weak and consists largely of disseminated iron sulphides. Claims of mineral occurrences such as this must be considered dubious but they cannot be invalidated. A further difficulty has been the very broad terms in which many locality references were given in the 1910 catalogue. In some cases it has been possible to improve the locality data but in others a reference such as 'Pieman River' has had to be carried forward since there is a lack of more specific knowledge concerning the original locality.

An attempt has been made to provide a volume which will be of interest to both professional and amateur mineralogists. For simplicity an alphabetical presentation is used rather than one of the more formal mineralogical classifications. Chemical nomenclature has been kept as simple as possible and the distinctions between hydrous and hydrated, silicate and aluminosilicate normally made by mineralogists are not used. Technical data has been kept to a minimum except in cases where it is not readily available elsewhere and the professional mineralogist is catered for by an extensive listing of the sources of data. Whilst there has been substantial modification of the 1910 catalogue much of the data remains unchanged and unless other references are given it may be taken that the source of information is the former catalogue.

Publication of this text has been made possible by the interest of many people over a long period of time. Numerous geologists of the Geological Survey contributed information during their

periods of service with the Department and the late Miss E. Smith commenced a compilation of their work. Of the present staff G. Everard has made a substantial contribution whilst W. E. Baker has undertaken the difficult task of collating, rewriting and assessing the validity of the various species. Assistance from mineralogists of other institutions is gratefully acknowledged. R. J. Ford (University of Tasmania) and D. I. Groves (Tasmania Mines Department) have undertaken X-ray diffraction studies of a large number of the more unusual mineral species still available in the Petterd Collection and this has enabled a critical assessment of many entries of the 1910 catalogue. F. L. Sutherland (Tasmanian Museum) has made numerous contributions as also has R. A. Both (University of Adelaide). Acknowledgment is also due to the Directors of the Tasmanian Museum and Queen Victoria Museum who made specimens available for the plates which appear in this volume.

## CATALOGUE OF MINERALS

ACHLUSITE

Invalid—This material which was recorded as an alteration product of massive topaz related to the hydromicas has been shown by X-ray study to be a mixture of paragonite and muscovite.

ACTINOLITE (*Hydrous silicate of calcium, magnesium and iron*)

$$Ca_2(Mg,Fe)_5Si_8O_{22}(OH,F)_2$$

A comparatively abundant monoclinic 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 it crystallises as long, slender, brittle prisms. It has been recorded from the Upper Emu River, a few miles S of Hampshire Hills where it is associated with almandine, amethyst and fibrous radiating goethite. It is plentiful at Barn Bluff in association with pyrite but is often highly weathered. It also occurs in large masses on the River Forth about 3 miles from Mt Claude and at the Savage River associated with magnetite and pyrite. On the Whyte River, near the base of the Meredith Range, typical dark green actinolite containing minute asbestiform bunches and patches of pale brown to brownish green, spongy, iron oxide stained interwoven fibrous actinolite is closely intermixed with yellowish brown garnet rock containing rare molybdenite. Well crystallised bright green actinolite is of limited occurrence at Dundas. At the Colebrook Mine, near Rosebery it occurs in association with axinite and pyrrhotite. Some of it is partially decomposed, associated with minor cuprite and occasionally coated with thin films of native copper.

ADAMITE (*Basic arsenate of zinc*)

$$Zn_2(OH)AsO_4$$

This mineral was obtained from the Britannia mine, Zeehan and was named petterdite (Twelvetrees, 1902). A specimen of the alleged new mineral was examined by Anderson (1906) and was identified as mimetite. The specimen of this mineral in the Petterd

Collection at the Tasmanian Museum has been found by X-ray study to be adamite. It occurs in small groups of transparent faintly green elongate crystals which encrust gossan.

ADULARIA (*Silicate of potassium and aluminium*)

$KAlSi_3O_8$

Doubtful validity—The name adularia is generally restricted to a potassium feldspar occurring in some low temperature hydrothermal veins. An early report of the mineral as phenocrysts in porphyritic granite at the Coldstream River (W. R. Bell (Petterd, 1910)) is incorrect since this is not the environment of adularia and furthermore recent geological mapping has shown that granite does not occur in the reported locality. There is insufficient data to assess the report of association of adularia with 'quartz of various forms' at the Tasman River. It is likely that perthitic feldspars have been mistaken for adularia in these early reports.

AEGIRINE - AEGIRINE-AUGITE (*Silicates of sodium and iron*)

$NaFeSi_2O_6$ - $(Na,Ca)(Fe,Mg,Al)Si_2O_6$

Greenish black monoclinic soda pyroxenes are found in several of the dyke rocks of the Port Cygnet alkaline complex. The occurrences range from individual crystals of aegirine to crystals which have a core of augite surrounded by aegirine-augite (Edwards, 1947). At Shannon Tier pyroxene crystals up to 2 cm in length consisting of cores of titan-augite rimmed with aegirine-augite are found in melilite-fasinite (Edwards, 1950). Aegerine-augite is also a common late stage accessory mineral in the more alkaline Cainozoic volcanic rocks, such as the crinanites at Circular Head and Stanley.

AGATE see QUARTZ

AIKINITE (*Sulphide of lead, copper and bismuth*)

$PbCuBiS_3$

This rare, soft, grey sulphide has been observed microscopically in association with jamesonite, bournonite and cosalite from the Hecla Mine, Dundas (Stillwell, 1935).

ALBITE (*Silicate of sodium and aluminium*)

$NaAlSi_3O_8$ $An_{0-10}$

This is the sodic end member of the triclinic plagioclase feldspar series. The composition of a particular member is often given in terms of the content of the pure calcic end member anorthite and the name albite is applied to a plagioclase feldspar with a content of 0-10% of $CaAl_2Si_2O_8$ which is represented by $An_{0-10}$. Occurrences of the mineral have been reported as milk white, sub-translucent, irregular, compact masses at the Heazlewood River. It occurs in variable amounts in the Cambrian volcanic rocks of the west coast and in metamorphic rocks in the vicinity of Mt Mary. Minor amounts have been noted in some of the rocks associated with the Port Cygnet alkaline complex, and also at Mt Lyell.

ALEXANDRITE see CHRYSOBERYL

ALLANITE (*Essentially a silicate of calcium, iron and aluminium with thorium and rare earths*)

$$(Ca,Fe)_2(Al,Fe,Ce,La,Y,Th)_3Si_3O_{12}(OH)$$

This mineral may be considered to be a rare earth bearing epidote. It occurs as an accessory mineral in acid and alkaline igneous rock types, in pegmatites and some skarn rocks. The mineral is brown to black with a resinous lustre. It was originally recorded as scattered brownish crystals in hauyne-syenite porphyry of the Port Cygnet alkaline complex but this occurrence has not been confirmed by more recent studies (Edwards, 1947). Allanite is a common accessory in the tin bearing granites of north-eastern Tasmania and it has also been recorded from skarn at the King Island Scheelite Mine.

ALLOPHANE (*Non-crystalline hydrated silicate of aluminium*)

An amorpous clay mineral of the kaolinite group which has been reported from the Savage River where it occurs as large irregular masses of pale yellow and darker shades coated with a white powdery substance of unknown composition. Reniform masses of this mineral are also known at the Upper Forth River and an aluminium rich allophane, given the varietal name schrotterite has been recorded from fissured Silurian slates near the Pieman River.

ALMANDINE (*Silicate of iron and aluminium*)

$$Fe_3Al_2Si_3O_{12}$$

This is the common iron aluminium garnet which is generally reddish in colour and when transparent is one source of precious garnet. Small crystals have been recorded from North Mt Heemskirk; from metamorphosed tuffs in the vicinity of Trial Harbour; in alluvial deposits of the Lewis and Hudson Rivers where it is associated with rutile and kyanite; from alluvials at Sea Elephant Point, King Island; on Cape Barren Island; from Mt Stormont in garnet rock associated with bismuth ore bodies and from Georges Bay where it is associated with chlorite.

ALUNOGEN (*Hydrous sulphate of aluminium*)

$$Al_2(SO_4)_3.12\text{-}18H_2O$$

This mineral is generally colourless to white and occurs as massive and efflorescent or fibrous masses. It is formed in caves and adits through the evaporation of ground waters which have leached aluminium salts from the rocks they have traversed. It occurs widely and is known from Browns River road; near Bridgewater; on Lawrenny Estate near Ouse; near St Marys; at Blue Tier near Beaconsfield and from the Alum Cliffs near Chudleigh. Analyses of specimens from various localities show the presence of magnesium derived from either epsomite or pickeringite which are common associates of alunogen.

AMETHYST see QUARTZ

AMPHIBOLE GROUP

This is an important group of silicate minerals which are common in igneous and metamorphic rocks. They are hydrous silicates of magnesium, iron, aluminium, calcium and sodium with minor contributions from other elements. The majority of the amphiboles crystallise in the monoclinic system although a few are orthorhombic. Typically they have an elongate habit and acute angle cleavage intersections which distinguishes them from members of the pyroxene group. Amphiboles which have been recorded in Tasmania are:

Actinolite
Anthophyllite
Cummingtonite
Hornblende
Riebeckite

The details of these minerals are given in their alphabetical listing.

ANALCIME (*Hydrous silicate of sodium and aluminium*)

$NaAlSi_2O_6.H_2O$

Analcime is the only common isometric member of the zeolite group. It is often found as a late stage mineral in the Tertiary basaltic rocks of the State. Occurrences have been reported from Mt Cameron West, the Tamar Valley, the Railton-Moriarty area, the Penguin River, Table Cape, Circular Head, Bell Mount, and Port Cygnet. An interesting occurrence has been noted at Bonney's Quarry, South Burnie where radiating acicular natrolite crystals are tipped with analcime which makes up to a third of the total 2 mm length of the crystals (Sutherland, 1965).

ANATASE (*Titanium dioxide*)

$TiO_2$

This mineral is one of three polymorphs of titanium dioxide, the others being rutile and brookite. Anatase crystallises in the tetragonal system and usually forms brownish eight-faced bipyramidal crystals. It has been recorded as small waterworn crystals from Claytons Rivulet; from near Mt Lyell; from small streams in the vicinity of Brown's Plain; near Hamilton on the River Forth and from tin leads near St Helens.

ANDALUSITE (*Silicate of aluminium*)

$Al_2SiO_5$

Andalusite is one of three polymorphic forms of aluminium silicate, the others being sillimanite and kyanite. The mineral is orthorhombic and usually occurs as reddish-brown prisms with slightly rhombic cross-section. Crystals from 2-5 cm in length occur in schist near Surprise Bay, King Island. It has been found in slates in contact with ultrabasic rocks at Andersons Creek, Beaconsfield (D. Gee, pers. comm.). Radiating masses are found in lode material at Lottah and also in hornfels at Lagoon River. The variety

chiastolite occurs as radiating and interlacing prisms of small size, sparingly embedded in Silurian slate near Zeehan. It has also been observed in hornfels at Cethana.

ANDESINE (*Silicate of sodium, calcium and aluminium*)

$(Na,Ca)Al_{1-2}Si_{2-3}O_8$ $An_{30-50}$

This is a member of the plagioclase feldspar series containing 30-50% of the anorthite end member. It is a common feldspar in the granodiorites of north-eastern Tasmania and in the pyroclastics of the Cambrian volcanic sequences throughout the West Coast. Andesine also occurs in essexite of the Port Cygnet alkaline complex and in the Cretaceous(?) volcanic rocks of Cape Portland.

ANDRADITE (*Silicate of calcium and iron*)

$Ca_3Fe_2(SiO_4)_3$

A member of the garnet group of minerals which are isometric in crystallisation. Andradite is usually cinnamon in colour but may be various shades of brown and green. Well developed dodecahedral crystals which often exceed 2.5 cm in diameter have been reported from the W bank of the Upper Emu River, near the Hampshire Hills. It is one of the main gangue minerals in the lode of the King Island Scheelite Mine. Well formed translucent crystals up to about 1 cm across occur at this locality and an analysis of coarse gangue material yields—

| | % | | % |
|---|---|---|---|
| $SiO_2$ | 34.83 | MgO | Trace |
| $Al_2O_3$ | 2.84 | $Na_2O$ | 0.17 |
| $Fe_2O_3$ | 25.35 | $K_2O$ | 1.10 |
| FeO | 1.72 | $TiO_2$ | 0.26 |
| MnO | 1.28 | $H_2O-$ | 0.03 |
| CaO | 32.26 | $H_2O+$ | 0.37 |
| | | | 100.21 |

A titaniferous variety of andradite, sometimes called melanite has been recorded from dyke rocks in the Port Cygnet alkaline complex (Edwards, 1947). Chromiferous andradite has been found at the Lord Brassey Mine, Heazlewood River.

ANGLESITE (*Lead sulphate*)

$PbSO_4$

This mineral is formed in the oxidised zone overlying lead mineralisation. It crystallises in the orthorhombic system, often as white translucent prismatic or tabular crystals with an adamantine lustre. Crystals of remarkable perfection were obtained from the Comet Mine, Dundas where they were sometimes associated with massicot. Clear, colourless, tabular crystals up to 5 cm by 0.5 cm occurred at the Sussanite Mine, near Zeehan. The mineral was rare at other mines in the Zeehan district. Attractive specimens

of anglesite with crocoite, pyromorphite and silver halides were found at the Magnet Mine, about 3 miles W of Waratah and it also occurred sparingly at the Whyte River silver-lead field.

ANKERITE (*Carbonate of calcium, magnesium, iron and manganese*)

$Ca(Mg,Fe,Mn)(CO_3)_2$

Ankerite is a member of the dolomite group of carbonates which crystallise with trigonal symmetry. It is a common constituent of hydrothermal veins and has been reported as one of the lode gangue minerals at the Magnet Mine, the Heazlewood Mine and at the Comet Mine, Dundas. White and brown varieties occur at Magnet and these yield on analysis:—

| | $CaCO_3$ | $MgCO_3$ | $FeCO_3$ | $MnCO_3$ |
|---|---|---|---|---|
| | % | % | % | % |
| White variety .... | 54.60 | 39.63 | 6.74 | .... |
| Brown variety .... | 56.44 | 32.76 | 8.36 | 3.76 |

ANNABERGITE (*Hydrous arsenate of nickel*)

$Ni_3(AsO_4)_2.8H_2O$

A secondary mineral which, when pure, is a bright apple green colour. It is soft and is usually found as superficial coatings on samples carrying primary nickel minerals. Annabergite was reported as fairly pentiful thin coatings on niccolite near Leslie Junction, Dundas. It has also been recorded from the Central Balstrup Lease, Zeehan; the Lord Brassey Mine, Heazlewood; Rocky River and in small quantity from the Penguin Silver-Lead Mine.

ANORTHOCLASE

Invalid—This uncommon sodium-potassium feldspar was previously reported to be present in solvsbergites of the Port Cygnet alkaline complex. More recent study (Edwards, 1947) has shown that the feldspar listed as anorthoclase is sanidine and that the parent rocks are sanidine-tinguaites not solvsbergites.

ANTHOPHYLLITE (*Hydrous silicate of magnesium and iron*)

$(Mg,Fe)_7Si_8O_{22}(OH)_2$

A moderately uncommon orthorhombic amphibole which is restricted in occurrence to metamorphic rocks. It is usually clove-brown and occurs as fibrous or bladed aggregates. The mineral has been recorded from the Hercules Mine, near Rosebery; from a contact zone against serpentinite at Trial Harbour (Green, 1966) and an aluminous variety known as gedrite occurs in hornfels at the King Island Scheelite Mine (Edwards, *et al.*, 1955).

ANTIGORITE see SERPENTINE

ANTIMONY (*Native*)

Sb

Native antimony is of rare occurrence in the State and has been reported only from the Spray Mine, Zeehan where a slab of

siliceous material about 30 cm square covered with thin rosettes of the mineral, about 2.5 cm in diameter was obtained.

ANTLERITE (*Basic sulphate of copper*)

$Cu_3(SO_4)(OH)_4$

This occurs as fibrous, green vitreous aggregates associated with chalcanthite and also as friable pale green encrustations on the walls of the adit, at the Orieco Mine, Upper Scamander (Ford, R. J., *et al.*, 1970).

APATITE (*Chlorophosphate of calcium*)

$Ca_5(PO_4)_3(Cl,F,OH)$

This hexagonal mineral is a common accessory in igneous rocks. Prismatic pale pink crystals about 1 cm in length are abundantly scattered throughout tin-bearing granite at Crystal Hill in the Blue Tier near Lottah. The mineral occurs in granodiorite near Mathinna as inclusions surrounded by pleochroic haloes in biotite which is indicative of the occurrence of traces of radioactive elements in the apatite. It is also found in the melilite fasinite and basalt at Shannon Tier and in the nepheline basanite at Sandy Bay, Hobart where it was originally mistaken for melilite (Aurousseau, 1926). It is common in the Cretaceous(?) volcanic rocks of Cape Portland. Limited amounts of massive green apatite were reported from the Hampshire Silver Mine. Small crystals occur in topaz-porphyry at Mt Bischoff and also in wolframite at the Bischoff Extended Mine. The mineral is also associated with the magnetite of the Savage River iron deposits.

A small amount of a pale yellow mineral found coating calcite in a chabazite-calcite-nontronite association from the Liawenee Canal given an X-ray pattern consistent with the apatite group minerals and has a positive reaction for phosphate. This mineral may be hydroxyapatite or one of the rarer phosphate-silcates such as wilkeite (F. L. Sutherland, pers. comm.).

APLOME see ANDRADITE

An old name for the calcium iron garnet.

APOPHYLLITE (*Hydrous silicate of potassium and calcium with fluorine*)

$KFCa_4Si_8O_{20}.8H_2O$

Apophyllite is an abundant associate of chabazite in cavity fillings in the Tertiary volcanic rocks of the State (Sutherland, 1964a, 1965; Sutherland and Corbett, 1967). It has been reported from the Liawenee Canal on the central plateau; from NW of Gads Hill, near Middlesex; from Cape Grim; from Marrawah; from 2 miles SW of Redpa; from above Inspection Head on the West Tamar and from a quarry half a mile N of Craigburn on the East Tamar. The crystals are clear to translucent white and reach up to 2 cm across. They generally occur as flattened tablets although stout prisms with truncated corners are prominent at the Redpa site.

Chemical analysis of a specimen from Marrawah gave a fluorine content of 1.2% and also revealed some substitution of silicon by aluminium.

ARAGONITE (*Calcium carbonate*)

$CaCO_3$

This is an orthorhombic polymorph of calcium carbonate which is unstable under normal surface conditions and which changes very slowly to calcite. Several occurrences are known from the Tertiary volcanic rocks of the State. Bunches of slender radiating crystals have been reported from basalts at Derby; on Flinders Island; at Latrobe, Middlesex, Sheffield and Springfield; at Mt Bischoff and from Claremont and other basalt localities in the Hobart area. Well developed pseudohexagonal twinned-crystals occur in the basalt at Cape Grim. The mineral has also been reported from limestone at Mole Creek and at Bridgewater and from sandstone at Stonehenge. Small, slender highly resplendant crystals were obtained from the S workings of the Magnet Silver Mine.

ARFVEDSONITE

Invalid—Occurrences of this alkaline amphibole were reported on Swan Island, off north-eastern Tasmania (Gould, 1872). Recent mapping of Swan Island by D. J. Jennings (Department of Mines) and F. L. Sutherland (Tasmanian Museum) has shown that neither the mineral, nor the typical alkaline rocks in which it occurs are to be found there.

ARGENTITE (*Silver sulphide*)

$Ag_2S$

A dark lead grey soft isometric sulphide which sometimes occurs as cubic or octahedral crystals but more commonly in arborescent or massive form. Argentite has been recorded from the Godkin Extended Mine, Whyte River where it occurred as rounded slugs rarely exceeding 1 inch in diameter associated with fine grained galena and sphalerite. This ore averaged many thousands of ounces of silver to the ton. Small particles of the mineral occurred with embolite in a decomposed siliceous matrix at the Bells Reward section, Whyte River and at the Magnet Mine small patches and scales were associated with highly argentiferous galena. It was reported that very small indistinct crystals were sparingly implanted on other minerals and also within cavities in veins at the old Hampshire Silver Mine. At the Spray Mine, Zeehan flakes of nearly pure argentite occurred in association with siderite and other gangue minerals. The most significant occurrence of argentite was with chalcocite at the Mt Lyell Mine. Known as the Mt Lyell Bonanza this was found between the pyrite mass and the hematite of the Iron Blow, and consisted of a vein of chalcocite, bornite, tetrahedrite and argentite. It yielded 850 tons of ore which averaged 1011 oz of silver per ton. One specimen analysed by the Government Assayer of the time yielded 8765 oz silver and 45 oz gold per ton and also contained 19% copper. Cupriferous argentite $Ag_3CuS_2$ given the

varietal name jalpaite has also been recorded from Mt Lyell. The only record of argentite outside the west and north-west coasts is from an old mine at the Scamander River where the mineral occurred with arsenopyrite in quartz.

ARSENIC (*Native element*)

As

A tin-white brittle metal usually tarnished black. Occurrences were reported in the lowest level of the North Valley lode, East Bischoff Mine in blades between banded siderite and fluorite in association with pyrite and sphalerite.

ARSENOLITE (*Arsenic trioxide*)

$As_2O_3$

A soft white substance with vitreous to silky lustre and astringent sweetish taste. Recorded as a single lump associated with arsenical copper[1], tenorite and a little native copper from one of the old mines at Penguin.

ARSENOPYRITE (*Arsenide-sulphide of iron*)

FeAsS

This silvery-white to steel gray orthorhombic mineral is often associated with cassiterite. It is usually massive and has been reported from the Aberfoyle Mine and Rex Hill Mine near Rossarden; from the Shepherd and Murphy Mine, Moina and from Mts Bischoff and Cleveland. Arsenopyrite in association with native bismuth is plentiful in amphibolite at Mt Ramsay and it also occurs at Mt Pelion Mine, Douglas River. It was also reported from the old Penguin River mines where the ore was alleged to have contained appreciable quantities of nickel, cobalt and silver. At the Magnet Mine rare specimens of cyclic twinned crystals in the form of star-shaped trillings were obtained. On the west coast arsenopyrite has been recorded from Mt Balfour; from Mt Heemskirk; from the Colebrook Mine near Rosebery where it is associated with axinite and pyrrhotite; from the Boulder Mine, North Dundas; from the Frazer Creek Mine, North-East Dundas where it was mined for its arsenic content; from Parsons Hood; from Ringarooma and from Mt Tyndall. The mineral is also of widespread occurrence in association with gold in the reefs of north-eastern Tasmania. It has been recorded from Lefroy, Back Creek, Beaconsfield, Mathinna, Waterhouse, Lyndhurst, Golconda and other gold areas. It is abundant E of Mt Cameron and also on the Upper Scamander River where it is often partially or wholly altered to scorodite. A limited occurrence of arsenopyrite carrying 15% cobalt has been reported from the S slopes of Mt Wellington (Johnston, 1888) but it is difficult to establish a likely locality for this claim.

[1] According to Palache, *et al* (1944) arsenical copper is the mineral domeykite $Cu_3As$ but there can be no certainty that Petterd's mineral was this species.

ASBESTOS

This term is a commercial one which is applied to fibrous silicates used as a source of the material. The fibrous varieties of the amphiboles actinolite, cummingtonite (amosite) and riebeckite (crocidolite) are important in commerce as is also the fibrous serpentine, chrysotile, which is the only Tasmanian source of asbestos. The name amianthus has been given to very long fibre asbestiform minerals regardless of their affinities.

ASBOLITE (*Hydrous oxides of manganese with cobalt*)

This is not a mineral species but the name is applied to mixtures of hydrous oxides of manganese of uncertain composition which carry varying amounts of cobalt. The name cobaltian wad is also used for this material. It is abundant near Derby where it contains several per cent cobalt; from Castra on the Upper Leven; from the Penguin River; from the Magnet Range; in fair quantity at Dundas and from Castle Forbes Bay.

ASPHALTUM

Asphaltum or mineral pitch is no longer classified as a mineral. It has been reported from the E bank of the Mersey River, 4 miles from Chudleigh where it occurs in shale. There are numerous reports of finds of asphaltum of unknown origin on beaches around the State.

ATACAMITE (*Basic chloride of copper*)

$Cu_2(OH)_3Cl$

This dark green secondary copper mineral typically occurs as radiating masses of acicular crystals. It has been recorded in gossan from the Comet Mine, Dundas; in small quantities with mixed oxidised ore from the Silver Queen Mine, Zeehan and in vughs from Gads Hill Range on the Upper Mersey River.

AUGITE (*Silicate of calcium, magnesium, iron and aluminium*)

$(Ca,Mg,Fe,Al,Ti)_2(Si,Al)_2O_6$

This is a common monoclinic pyroxene in the basalt and dolerite of the State and it is also the dominant pyroxene in the main intrusive of the Port Cygnet alkaline complex. The mineral often contains titanium which gives it a strong pleochroism of purplish tints in thin section and when this is the case the varietal name titanaugite is applied. Phenocrysts of this variety up to 4 cm in length have been recorded from basalts on the Shannon Tier, Fingal Plains, Tamar Valley, Circular Head, Table Cape and elsewhere. Crystals of smaller size are abundant in the vicinity of the Hampshire Hills, Paddys Sugarloaf, Mt Horror and Hellyer River.

Xenocrysts of augite with reaction rims, and overgrowths of augite are prominent in basalt from Corra Linn and Blessington. Diopsidic augite is present as phenocrysts in some of the Cretaceous(?) volcanic rocks of Cape Portland. Ferro-augite is a typical pyroxene in the Red Hill granophyre (McDougall, 1962).

AUSTRALITES

Australites or tektites as they are generally known have been the subject of intensive study and discussion of recent years. Tektites are glassy bodies of rounded, oblong or irregular shape. They appear to have originated through solidification of a viscous melt and chemically they are characterised by an abundance of silica and alumina which is quite different from the amount of these oxides in igneous rocks or meteorites. Their origin is still problematical but there is much to favour an extra-terrestrial source. A number of tektites have been found in the north of the State, mainly in tin-bearing alluvials. Localities include: Goshen, Weld River, Springfield, Black Creek near Branxholm, Wyniford River, Flinders Island, the Western Tiers and Mt Balfour. More recently one was found at Droughty Point, near Hobart.

AUTUNITE (*Hydrous phosphate of calcium and uranium*)

$Ca(UO_2)_2(PO_4)_2.10\text{-}12H_2O$

A secondary uranium mineral of micaceous character which occurs as yellow, soft, thin tabular crystals on granite at Storeys Creek, near Rossarden.

AWARUITE (*Alloy of nickel and iron*)

(Ni,Fe) Ni>60%

This rare silver to greyish white highly magnetic natural alloy was observed microscopically by Professor Ramdohr, of Heidelberg, in small amounts with pentlandite and heazlewoodite from serpentinite at Trial Harbour. It has also been reported from the Lord Brassey Mine, Heazlewood.

AXINITE (*Hydrous boro-silicate of calcium, iron, manganese and aluminium*)

$Ca_2(Mn,Fe)Al_2BSi_4O_{15}.OH$

Dark brown, lustrous crystals of unusual perfection of this triclinic mineral occur at the Colebrook Mine, near Rosebery. Typical acute edged crystals up to 1.5 cm in length are associated with calcite, actinolite, datolite, pyrrhotite and lesser amounts of arsenopyrite and chalcopyrite. A detailed petrographic study of this occurrence has been made by Twelvetrees and Petterd (1898). Analysis shows that the Colebrook Mine axinite contains less boron and more silicon, iron and manganese than that from other deposits:

| | % |
|---|---|
| $SiO_2$ | 45.5 |
| $FeO+MnO$ | 14.7 |
| $Al_2O_3$ | 16.0 |
| $CaO$ | 18.8 |
| $MgO$ | 1.2 |
| $B_2O_3$ | 3.0 |
| $H_2O$ | 0.8 |
| | 100.0 |

Axinite has also been reported from quartz veins between the Colebrook Mine and Renison Bell; in small quantity from the bismuth-bearing amphibolite at Mt Ramsay and from the Mt Lindsay mineralisation on Parsons Hood.

AZURITE (*Basic carbonate of copper*)

$Cu_3(CO_3)_2(OH)_2$

This dark blue secondary copper mineral has been found in thin scaly masses and minute crystals at several localities including the Mainwaring Inlet, Dundas, Zeehan, Mackintosh River, Heazlewood, Penguin, Hampshire Hills, Gads Hill, Saxons Creek, Cascade River and near Scamander.

BARBERTONITE (*Hydrous carbonate-hydroxide of magnesium and chromium*)

$Mg_6Cr_2(OH)_{16}.CO_3.4H_2O$

This is a purplish, waxy foliated mineral closely related to stichtite and invariably occurring in admixture with it in the vicinity of Dundas and elsewhere.

BARITE (*Barium sulphate*)

$BaSO_4$

This is a fairly common, generally white to pale brown, vein mineral which crystallises in the orthorhombic system. Crystals are usually prismatic or tabular but the mineral is more often massive and Tasmanian occurrences are of this type. Commercial production of barite has been undertaken only near Beulah and at Madame Howard Plains, near Queenstown. Small quantities of the mineral have been found at numerous localities on the west and north-west coasts of the State. In the vicinity of Mt Lyell it occurs as pinkish veins in pyrite at the West Tharsis; with quartz veins at the Tharsis; with hematite at the Iron Blow; in veins on the W side of the Mt Lyell open cut and in Curtains Shaft, West Lyell. Barite has also been recorded on the west coast from between Mts Darwin and Jukes; S of the Murchison River; on the Mackintosh River; with pyrite and galena on the Huskisson River; from near the Hercules Mine on Mt Read; from the Linton P.A., NE Dundas; from the Specimen Reef Mine, Savage River; from Grubbs Mine, Zeehan and from the Rocky River. Along the north-west coast the mineral has been recorded from the Two Hummocks in the Surrey Hills; from the Upper Leven River; from the Alma Mine near the confluence of the Forth and Wilmot Rivers; from the Minnow River, under Mt Roland; from Beulah, Deloraine and from Port Sorell. The only record of barite in the north-east of the State is from the Aberfoyle Mine, Rossarden.

BARRANDITE (*Hydrous phosphate of aluminium and iron*)

$(Al,Fe)PO_4.2H_2O$

It was reported that small indistinctly radiated masses of dull brown colour and greasy lustre associated with vivianite occurred at Lyndhurst on the north-east coast.

BASANITE see QUARTZ

BASTITE

Invalid—In Petterd (1910) bastite was considered to be equivalent to schiller spar which was defined as altered diallage, a monoclinic pyroxene. None of these names are now widely used but bastite is accepted as a serpentine pseudomorph after orthorhombic pyroxenes and schiller spar is an old synonym for altered orthorhombic pyroxenes.

BATCHELORITE

Invalid—All specimens of batchelorite examined have been found to be chrome-muscovite. Some contain several per cent of chromium and may thus be called fuchsite. The original analysis does not show any chromium content but as only a small quantity of chromium is necessary to give a green colouration in the mineral it could have been missed in the analysis. Alternatively the original batchelorite could have been one of many fine-grained foliated green silicates other than chrome-muscovite (Hale, 1958; Bothwell and Moss, 1957).

BAUXITE

This name is applied to rock masses of secondary origin that are rich in hydrous aluminium oxides. It is the only commercial source of the metal at the present time. It is earthy and clay-like, frequently with pisolitic structure and usually discoloured by the presence of iron oxides. The principal aluminous constituents are boehmite, $\gamma$-AlO(OH), diaspore, $\alpha$-AlO(OH) and gibbsite, $\gamma$-Al(OH)$_3$, any of which may be dominant.

The Brock Bros discovered bauxite near Ouse in 1940 and subsequently it was found near Campbell Town, at Riccarden, Rosedale, Meadowbank, Fordon, Myalla, St Leonards, Swansea, Trevallyn, Cressy and Conara. Tasmanian bauxites have apparently originated through weathering of Jurassic and Tertiary volcanic rocks.

BELLITE

Invalid—The mineral from the Magnet Mine originally described as a chromarsenate of lead and given the name bellite is mimetite. The optics have been shown to be consistent with mimetite (Palache, *et al.*, 1951) and the X-ray diffraction pattern is similar to that of phosphatian mimetite. In the original analysis there is an abundance of chromium which is inconsistent with the former findings and there is too little lead to explain the discrepancy by assuming the original material to be a mixture of mimetite and crocoite. A partial micro-analysis was made of carefully cleaned material and this is compared with the essential components of the original analysis below:

| | *Original analysis* | *New microanalysis* |
|---|---|---|
| | % | % |
| PbO | 61.68 | 70.0 |
| $Cr_2O_3$ | 22.61 | 2.9 |
| $As_2O_5$ | 6.55 | 14.5 |
| Cl | 0.52 | 2.5 |

The new analysis is compatible with a mixture consisting of mimetite and crocoite in the approximate proportions of 10 : 1.

BERESOVITE

Doubtful Validity—The authenticity of this mineral has been questioned (Palache, *et al.*, 1951) as the habit is very similar to that of the mineral phoenicochroite $Pb_3(CrO_4)_2O$ and mixtures of either this mineral or crocoite with cerussite and massicot would have a composition agreeing with that given for beresovite. The Tasmanian material was reported from the Magnet Mine where it occurred as minute platey coatings on gossan and showed some alteration to crocoite and massicot.

BERTHIERITE (*Sulphide of iron and antimony*)

$FeSb_2S_4$

Invalid—X-ray examination of the mineral originally recorded as berthierite from Mt Bischoff shows it to be jamesonite.

BERYL (*Silicate of beryllium and aluminium*)

$Be_3Al_2Si_6O_{18}$

Crystals of mottled yellow-brown beryl up to 25 cm in length and 5 cm in width were found near the Great Republic Tin Mine on Ben Lomond where they were reported to be associated with large orthoclase feldspar crystals in granite pegmatite. Microscopic study of these crystals reveals them to contain numerous fluid inclusions. A few crystals up to about 6 cm in length and of translucent blue-green colour have been obtained from tin-bearing drift at Mt Cameron. Colourless to blue-green crystals have also been reported from Flinders Island. Small bright-green crystals intermixed with cassiterite occur in a tin-bearing vein traversing granite on the St Pauls River opposite Brookstead. The gem beryl, emerald, occurs as very small crystals ($\frac{1}{8}$ carat) in tin leads of the St Helens district. Small slender pale green crystals associated with quartz, topaz, molybdenite and cassiterite were found at the Shepherd and Murphy Mine, Moina. Larger crystals, up to about 8 cm in length, replaced by massive mica, fluorite and chlorite also occur at this mine. Veins of beryl occur in granite at Sayers Mine and the Dolcoath Mine, Moina.

BERZELIANITE (*Copper selenide*)

$Cu_2Se$

This mineral possibly occurs as microscopic silver white needles, which tarnish readily, in bornite from the North Lyell workings (Edwards, 1939).

BINDHEIMITE (*Pyroantimonate of lead*)

$Pb_2Sb_2O_6(O,OH)$

A common secondary mineral which develops over deposits containing minerals of lead and antimony such as jamesonite. Bindheimite is usually earthy and of yellow colour. It has been reported

to be associated with cerussite and anglesite at the Comet, Adelaide Proprietary, Silver Queen, Godkin and Whyte River mines on the west coast.

BIOTITE (*Silicate of potassium magnesium aluminium and iron*)

$K_2(Al,Mg,Fe)_4(Si_6Al_2O_{20})(OH,F)_4$

This is the common black mica which occurs widely in igneous rocks. It is abundant at Mt Heemskirk and at the North Pieman on the west coast; at the Hampshire Silver Mine on the north-west coast; on the east central side of Flinders Island; in the nepheline basalt at Shannon Tier and in the Anchor Mine on the north-west coast. Phenocrysts of biotite are common in the Cretaceous(?) volcanic rocks of Cape Portland.

BISMITE (*Bismuth trioxide*)

$Bi_2O_3$

This secondary bismuth mineral is of rare occurrence in the State. Occurrences have been reported as thin yellow coatings on other bismuth minerals at Mt Ramsay; at the West Cumberland Tin Mine, Mt Heemskirk; at the Curtin-Davis Mine, Dundas and also as greenish-yellow arborescent groups along cleavage planes in the country rock of the Hampshire Silver Mine. It has also been reported from Williamsford and Mt Read.

BISMUTH (*Native*)

Bi

A silvery-white metal with a reddish bloom. Native bismuth is abundant in the amphibolite at Mt Ramsay where it occurs as irregular particles and flaky masses from microscopic size to pieces weighing up to about 50 grams. It is associated with pyrrhotite, pyrite, chalcopyrite, blue and white fluorite, scheelite and axinite. Other west coast localities include Mt Read; Mt Heemskirk; the Ring River and Wilsons Creek, a tributary of the Pieman River. The mineral occurs with cassiterite at Middlesex and at Stanleys Reward near Zeehan. In the north-east of the State bismuth is known from the Blue Tier granite.

BISMUTHINITE (*Bismuth trisulphide*)

$Bi_2S_3$

This is a lead-grey to tin-white sulphide which becomes tarnished yellowish or iridescent on exposure. It is generally prismatic to acicular in habit and strongly striated. Bismuthinite is very similar to stibnite although it is of higher specific gravity. The most important occurrence is at the Shepherd and Murphy Mine, Moina where the mineral is associated with cassiterite, wolframite, scheelite and the gangue minerals quartz, fluorite, topaz and clay minerals. Blades of bismuthinite are often attached to quartz crystals in interstices of the gangue and the mineral also occurs as acicular crystals in clay filled crevices in fluorite and in cavernous quartz sometimes associated with pyrophyllite. Bismuthinite is

known from several localities on the west coast. At Mt Ramsay it is associated with native bismuth in amphibolite; sufficient amounts occurred in association with tetrahedrite and pyrite at the South Curtin-Davis Mine, Dundas to be mined; it occurred in lesser amounts at the Mt Black Mine and East Hercules Mine near Rosebery; also at the Federal Tin Mine and other mines on Mt Heemskirk, near Waratah and in the stannite ore of the Oonah Mine, Zeehan. In the north-east, occurrences of bismuthinite have been reported as traces in the tin-bearing granite of the Blue Tier.

BISMUTITE (*Bismuth subcarbonate*)

$(BiO)_2CO_3$

This secondary bismuth mineral usually occurs as pulverulent to dense earthy masses of straw-yellow to pale brown colour. It occurs in the oxidised zones overlying mineralisation which includes bismuth-bearing sulphides and was abundant in the upper levels of the Shepherd and Murphy Mine, Moina. It has also been reported from Hampshire, Mt Ramsay, North-East Dundas and the Federal Tin Mine, Mt Heemskirk.

BISMUTOSPHARITE

Invalid—The type of bismutospharite has been shown to be identical with bismutite (Palache, *et al.*, 1951). The material originally described as bismutospharite from the Shepherd and Murphy Mine, Moina has been found to be kaolinite carrying traces of bismuth.

BORNITE (*Sulphide of copper and iron*)

$Cu_5FeS_4$

A common copper-bearing sulphide which occurs in many of the important copper deposits. Bornite is isometric although crystals are rare and the mineral usually occurs in massive form of bronze-red colour on a fresh surface and tarnished iridescent blue-green on an exposed surface. The most important occurrence in the State is in the Mt Lyell mineral field where it has been an important contributor to the copper production from several ore bodies. In the North Lyell workings which produced the greatest quantity of bornite a common mineral association was bornite-chalcocite, yielding about 60% copper and 13 oz/ton of silver. The mineral occurs in quartz at Mainwaring Inlet and along the coast S of the inlet. Bornite has also been recorded from Lake Jukes; the Oonah and Silverstream Mines, Zeehan; Mt Black and Tasmanian Copper Mines, near Rosebery; Balfour Consolidated Mine, Balfour; Old Jasper and other mines of the Heazlewood district and from Orieco Mine, Scamander.

BOULANGERITE (*Sulphide of lead and antimony*)

$Pb_5Sb_4S_{11}$

This bluish lead-grey monoclinic mineral occurs in abundance at the Silver Cliff and old Waratah Mines at Mt Bischoff where it is associated with sphalerite, siderite, fluorite and quartz. The

structure varies from compact fibrous to somewhat granular with a silky lustre. It is common at the Melba Mine, North Dundas and other mines of the Dundas district where it is associated with jamesonite, pyrite, cerussite and massicot. At Block 291, North Dundas, it occurs with arsenopyrite and siderite.

BOURNONITE (*Sulphide of lead, copper and antimony*)

$PbCuSbS_3$

A steel-grey to iron-black orthorhombic sulphide which occurs at several localities in the Zeehan mineral field. Both well formed crystal groups and massive specimens of the mineral were obtained from a tribute of the Argent Company where the bournonite occurred in association with other sulphides and siderite. At Brown and Turners Prospect near the No. 6 Montana Lode lumps of bournonite up to 5 cm in length were found in association with galena and a little chalcopyrite. The mineral was also recorded from the Globe Mine, Mt Agnew, Tullah and from the Mt Farrell Mine. Gould (1872) reported the mineral from the granite-slate contact along the SE shores of King Island.

BRAUNITE (*Oxide of manganese and silicon*)

$(Mn,Si)_2O_3$

Invalid—The mineral recorded as the manganese silicon oxide, braunite, from the West Comet Mine, Dundas has been shown to be pyrolusite by X-ray examination.

BRAVOITE (*Sulphide of nickel and iron*)

$(Fe,Ni)S_2$

This pale yellow sulphide has been observed as an alteration product of pentlandite in serpentine at Trial Harbour and also as microscopic grains 0.025 mm in diameter in low grade mineralisation at the North Cuni, Zeehan (Williams, 1958).

BREITHAUPTITE

Invalid—The breithauptite-chloanthite association of nickel and cobalt antimonides and arsenides originally recorded from the Central Balstrup Lease, Zeehan has been shown to be a mixture of niccolite, gersdorffite and ullmanite (Both, 1966).

BROCHANTITE (*Basic sulphate of copper*)

$CuSO_4.3Cu(OH)_2$

Brochantite occurs as fine-grained emerald-green drusy crusts and also as a coating or filling in cavities in quartz-limonite veins at the Orieco Mine, Scamander. It sometimes occurs in association with chalcanthite but more commonly with antlerite (Ford, R. J., *et al.*, 1970).

BRONZITE (*Silicate of magnesium and iron*)

$(Mg,Fe)SiO_3$ $Fs_{10-30}$

This is a member of a series of orthorhombic pyroxenes which range in composition from enstatite, $MgSiO_3$, to orthoferrosilite,

$FeSiO_3$. Like the plagioclase feldspars the division into species is somewhat arbitrary and the composition is recorded in terms of the orthoferrosilite (Fs) content. Bronzite is commonly associated with ultrabasic rock complexes and is well developed at Serpentine Hill S of Renison Bell on the Murchison Highway. It also occurs in serpentineite near Beaconsfield.

BROOKITE (*Titanium dioxide*)

$TiO_2$

This is the orthorhombic member of the trimorphs of titanium dioxide. It is brownish in colour and usually tabular or prismatic in habit. It occurs as small waterworn crystals with anatase at Claytons Rivulet and has also been recorded in alluvial workings of the Lower Pieman River district. At Back Creek, near Lefroy it occurs in flaky pieces which are blood-red in transmitted light.

BRUCITE (*Magnesium hydroxide*)

$Mg(OH)_2$

A white to pale green foliated mineral with a pearly lustre. It is fairly commonly associated with serpentinite bodies. Hexagonal plates of the mineral are embedded in serpentinite on the Lower Castray River. Large masses occur at Heazlewood and it is also known from Beaconsfield, Trial Harbour and Mt Heemskirk where it is apparently partly altered to hydromagnesite(?). Brucite also occurs in marble at the King Island Scheelite Mine (Edwards, *et al.*, 1956).

BYTOWNITE (*Silicate of calcium, sodium and aluminium*)

$(Ca,Na)Al_{1-2}Si_{2-3}O_8$ $An_{80-90}$

This calcium rich member of the plagioclase feldspar group has been found as cores of feldspar crystals in granites of the north-east of the State (M. J. Longman, pers. comm.).

CACHOLONG see QUARTZ

CAIRNGORM see QUARTZ

CALAMINE see SMITHSONITE

This is an old name for the zinc carbonate smithsonite.

CALCITE (*Calcium carbonate*)

$CaCO_3$

This is a very common rock forming carbonate which is trigonal in crystallisation. The mineral occurs in a very large variety of crystal habits although crystallised calcite is not common in the State. Enormous quantities of calcite occur as the rock limestone and this is abundant at Ida Bay, Bridgewater, Maria Island, Beaconsfield, Don River, Mole Creek, Gunns Plains, Mackintosh River, Queenstown and the Gordon River. Recrystallised calcite occurs in caves in the limestones of many of these localities and remarkably fine crystals were obtained from the flux quarry at Queenstown. Small

blue crystals were found at the Madame Melba Mine, North Dundas. The clear variety known as Iceland Spar has been recorded from near St Marys. Calcite also occurs as crystalline veins and vesicle fillings in igneous rocks of numerous localities and the spring deposit travertine carrying abundant terrestrial gasteropod shells occurs at Geilston Bay on the eastern side of the Derwent River. Calcite pseudomorphs after glauberite, known as glendonites, occur in the Permian sedimentary rocks of Woody Island and elsewhere.

CAMPYLITE see MIMETITE

A varietal name for members of the pyromorphite-mimetite series with distorted crystal shape. It is common in phosphatian mimetites but is not restricted to material of any particular composition. Small crystals of this mineral have been recorded from the Britannia Mine, Zeehan, and from near Williamsford on Mt Read.

CANCRINITE (*Silicate of sodium calcium and aluminium with carbonate, sulphate and chloride*)

$Na_3CaAl_3Si_3O_{12}(CO_3,SO_4,Cl)$

Minor amounts of this mineral have been observed in the melilite-fasinite of Shannon Tier (Edwards, 1950).

CANFIELDITE (*Sulphide of silver and tin*)

$Ag_8SnS_6$

A soft black rare sulphide which crystallises as octahedra and displays spinel twinning. It has been observed microscopically in the Renison Bell lead lode (Stillwell and Edwards, 1943).

CARMINITE (*Basic arsenate of lead and iron*)

$PbFe_2(AsO_4)_2(OH)_2$

This is a rare secondary mineral which crystallises in the orthorhombic system. Limited amounts of small reddish adamantine crystals were recorded in gossan at the Magnet Mine near Waratah.

CARNELIAN see QUARTZ

CARNOTITE (*Hydrous vanadate of potassium and uranium*)

$K_2(UO_2)_2(VO_4)_2.3H_2O$

A yellow secondary uranium mineral which has been reported as powdery crusts on porphyritic microgranite from the Tasmanian United Uranium Prospect near Rossarden.

CASSITERITE (*Tin dioxide*)

$SnO_2$

This is a heavy adamantine mineral with tetragonal symmetry which is generally of yellowish to reddish brown colour but may also be red, grey, black or colourless. It is the most important source of the metal. The first reference to the occurrence of cassiterite in Australia appears to have been made in a report by Governor Collins in 1799 which noted the occurrence of black

metallic particles believed to be of this mineral on the beach of Preservation Island in the Furneaux Group. Proceedings of the Royal Society of Tasmania for 1854 comment on the occurrence of cassiterite below the Tier at St Pauls Plains, near Royal George. In 1871 Mr J. Smith discovered the rich tin bearing deposits of Mt Bischoff near Waratah which provided solid foundations for the development of the mining industry in the State.

The tin mineralisation at Mt Bischoff is of several forms and is limited to an area of about half a mile radius around the summit of the mountain. The main orebody is a replacement of Precambrian dolomite and consists largely of pyrrhotite, pyrite, talc, quartz and iron-manganese-magnesium carbonates. Small fractured crystals of cassiterite are clustered irregularly throughout the body with a tendency to concentrate where the sulphides are at a maximum. Numerous vein deposits occur and these consist of quartz veins with abundant sulphides, including stannite, and well-formed cassiterite crystals of moderate size. Tin mineralisation also occurs in altered quartz porphyry dykes and sills. Feldspars in these rocks are often completely replaced by tourmaline, topaz and cassiterite. Joint faces in sedimentary rocks adjacent to the dykes carry encrustations of cassiterite. At Mt Cleveland, about 10 miles to the W of Waratah fine grained cassiterite is dispersed through sulphide lode formations consisting largely of pyrite and pyrrhotite within Cambrian sedimentary rocks and volcanics. Numerous small lenses of mineralisation containing cassiterite occur in and around the margins of the Dolcoath Granite of the Moina district. The most noteworthy orebodies occur in the Shepherd and Murphy Mine at Moina. Here the veins carry cassiterite, wolframite and bismuthinite together with smaller amounts of native bismuth, sphalerite, molybdenite, chalcopyrite, pyrite, arsenopyrite, galena and scheelite. The gangue is largely quartz with minor fluorite, topaz, beryl, phlogopite, muscovite and laumontite.

Cassiterite occurs in several localities on the west coast. The most important is Renison Bell where the mineralisation occupies a series of sill like bodies in Precambrian and Cambrian sedimentary rocks spreading out from steep fissure lodes. The ore consists largely of quartz-pyrrhotite-pyrite with dispersed fine grained fractured cassiterite which has caused many ore dressing problems. Numerous small vein deposits consisting largely of quartz-tourmaline-cassiterite occur on Mt Heemskirk associated with the Heemskirk Granite. In the vicinity of the Federation Mine and Mayne's Mine on the W slopes of Mt Heemskirk the cassiterite is of an unusual fibrous radiated habit.

In the north-east of the State deposits of cassiterite occur in fracture fillings within Mathinna Group rocks and in greisenised granite rocks. The major producers are the Aberfoyle and Storeys Creek Mines. In these mines the ore bodies are of fracture filling type and the major minerals are cassiterite, wolframite and sphalerite together with a host of minor sulphides in a quartz-carbonate gangue. Large well formed crystals of cassiterite up to 5 cm across

have been recorded from these mines. Other smaller deposits occur in the Branxholm, Blue Tier, Royal George and Pyramid Hill districts.

Alluvial cassiterite has been obtained from the drainage of all the above mentioned primary deposits. In addition on the west coast the mineral has been found in the Balfour district, in the Yellowband Creek-Wombat Flat district and in the far south from the Ray River, Melaleuca Inlet and Cox Bight. In the north-east deep leads have been important producers and these are associated with the Ringarooma River system. The Briseis Mine is located on the Cascade Lead and the Endurance Tin Mining Company is working the Clifton Lead. Other leads not currently being worked include the Branxholm, Valley and Pioneer leads. Numerous minor alluvial deposits occur around the north-east and as far south as Coles Bay. There has been minor production from Cape Barren Island and Flinders Island in the Furneaux Group.

CERARGYRITE (*Silver chloride*)

AgCl

This is a soft, waxy, yellow-green, isometric mineral which gradually darkens on exposure to strong light. Irregular blebs and patches, rarely crystallised, have been recorded from gossan and siliceous lode material from the Dundas, Zeehan, Heazlewood and Scamander mineral fields. At the Warrentinna goldfield it was occasionally found in cavities in auriferous quartz in the upper levels of the mines.

CERUSSITE (*Lead carbonate*)

$PbCO_3$

A secondary carbonate which is common in the oxidised zones of lead deposits. Cerussite is orthorhombic and crystallises in a variety of forms which may be equant, tabular or acicular. Groups of crystals often occur in reticulated masses which are very attractive. The mineral is generally white and translucent with an adamantine lustre but it may be coloured by inclusions or staining. It also occurs in massive glassy to massive earthy form. The Comet Mine, Dundas yielded fine specimens consisting of long acicular crystals implanted on black gossan and also masses of interwoven acicular crystals often referred to as straw cerussite. Twinned crystals were also common at this mine. Well crystallised and massive specimens of the mineral have also been recorded from the Silver Queen, Sylvester, Austral and other mines in the Zeehan field, from the Whyte River and Heazlewood silver lead mines and from the Magnet Mine. In addition to yielding normal crystallised cerussite the latter mine also yielded large quantities of yellow tinted cerussite apparently caused by the presence of chromium and resulting in the name chrome-cerussite being applied to the variety.

CERVANTITE (*Oxide of antimony*)

$Sb_2O_4$?

This is usually a yellow earthy mineral associated with antimony bearing mineralisation. It occurs as a coating on jamesonite, galena and gangue minerals at the Madame Melba, Comet and Maestries Broken Hill Mines at Dundas. It is also known from several mines in the Zeehan and Heazlewood districts. Small quantities are associated with stibnite, pyrite and galena in the Ragged Jack quartz reef about 9 miles E of Deddington on the SW slopes of Ben Lomond.

CHABAZITE (*Hydrous silicate of calcium, sodium, potassium and aluminium*)

$(Ca,Na_2,K_2)\,Al_2Si_4O_{12}.6H_2O$

This is a trigonal member of the zeolite group which usually occurs as white translucent to transparent rhombohedral crystals which approximate to cubes. Chabazite is widespread in the volcanic rocks of the State. Crystals up to 1.5 cm in diameter have been recorded from Tertiary basalt at Bell Mount, Middlesex. Smaller crystals occur in the basalts at many localities including the Hellyer River, near the railway bridge; at Mt Hand, Deloraine; Gads Hill; Maggs Mountain; Lefroy; Springfield; Inspection Head, near Craigburn; Liawenee Canal; Goodwood and Catamaran. Chabazite also occurs along joint planes in Jurassic dolerite at the Giblin Street quarry, Hobart where it is associated with stilbite. Dolerites E of Deloraine, on Ben Lomond and elsewhere also carry the mineral. Twinning of chabazite crystals gives rise to hexagonal forms which have been given the varietal name of phacolite. Examples have been found at Waratah, Hellyer River, Middlesex, Sheffield, Lefroy and Springfield. An unusual hexagonal tabular to prismatic high sodium chabazite has been found in basalt from a quarry 2 miles SW of Redpa (Sutherland and Corbett, 1967) and this appears to resemble the uncommon variety herschelite recorded from Catania, Sicily and Richmond, Victoria.

CHALCANTHITE (*Hydrated copper sulphate*)

$CuSO_4.5H_2O$

A berlin to sky blue secondary copper mineral which crystallises with triclinic symmetry. As it is soluble it is not found in the surface environment in this State but it deposits in old copper mine workings as a result of post mine leaching by ground waters. In these occurrences the mineral generally occurs as stalactitic or efflorescent masses. Chalcanthite has been recorded from old workings at Mt Lyell; from the Rio Tinto Mines at Savage River; the North Valley workings at Mt Bischoff; the Gads Hill Range, Upper Mersey River; the Australasian Slate Quarry, Back Creek; from the Orieco Mine, Upper Scamander and from Rossarden.

CHALCEDONY see QUARTZ

CHALCOCITE (*Cuprous sulphide*)

$Cu_2S$

This orthorhombic lead-grey copper sulphide generally results from secondary sulphide enrichment which takes place just below

the oxidsed zone of copper ore bodies. Chalcocite is not common in the State but it has been recorded from the Mt Lyell area where it occurred at the Lyell Blocks, at the North Lyell Mine disseminated with bornite in schist, in blocks of many pounds weight from the King Lyell and also from the King Jukes Mine on Mt Jukes. Occurrences of the mineral have been reported in veins and pockets of quartz at the Mt Balfour Development Mine and Murrays Reward Mine in the Balfour district. Occurrences have also been reported at the Orieco Mine near Scamander.

CHALCOPHANITE (*Hydrous oxide of zinc, manganese and iron*)

$(Zn,Mn,Fe)Mn_2O_5.2H_2O$

An attractive bluish to iron black trigonal oxide mineral which usually occurs as lustrous drusy masses. Chalcophanite was abundant at the Comet and other mines of the Dundas district which produced many spectacular museum specimens of the mineral. It has also been recorded from the Magnet Mine, near Waratah where it occurred as encrustations on psilomelane lining small vughs and occasionally associated with small cerussite crystals.

CHALCOPYRITE (*Sulphide of copper and iron*)

$CuFeS_2$

This is a brassy-yellow tetragonal sulphide which sometimes tarnishes to an iridescent blue-green. It has only been found in massive form in this State. The most important occurrence is in the Mt Lyell district where it is found as masses in quartz and as fine dispersions in schist. It is a minor mineral in the lead-zinc ore bodies of the Electrolytic Zinc Company's mines near Rosebery. Small quantities of chalcopyrite have been recorded from Mainwaring Inlet; Lake Dora in the Tyndall Range disseminated in schist; Mt Heemskirk; with cassiterite in schist at Cascade River near Zeehan; at the Colebrook Mine near Rosebery; Mt Farrell; Mt Pelion Mine, Douglas Creek; Mt Ramsay; Savage River with magnetite; the Mt Balfour field; the Mt Lindsay ore body at Parsons Hood; at Mt Bischoff with jamesonite and fluorite; Bell Mount, Middlesex; the Dial Range; Badger Head; Saxons Creek, Mt Maurice and the Upper Creek and Orieco Mines near Scamander.

CHALCOTRICHITE see CUPRITE

CHIASTOLITE see ANDALUSITE

CHLOANTHITE (*Arsenide of nickel and cobalt*)

$(Ni,Co)As_{3-x}$

A greyish white isometric arsenide which alters readily to annabergite in moist atmosphere. It was reported that limited quantities of the mineral occurred in association with other nickel minerals from the lower levels of the Long Tunnel Mine, Rocky River, a northern tributary of the Pieman River. The breithauptite-chloanthite association originally recorded from the Central Balstrup Lease, Zeehan has been shown by X-ray studies to be a mixture of niccolite, gersdorffite and ullmanite (Both, 1966).

CHLORITE (*Hydrous silicates of magnesium aluminium and iron*)

$(Mg,Al,Fe)_{12}(Si,Al)_8O_{20}(OH)_{16}$

The name chlorite includes many varieties and classification requires details of chemical composition. Very little detailed work has been undertaken on chlorites in Tasmania and no division of the many occurrences can be attempted.

The minerals are very common in low grade metamorphic rocks. Radiating and foliated green to black masses occur in schists at various localities around Mt Lyell, Mt Read, Mt Heemskirk, Low Rocky Point and other parts of the west coast. In the north-west it is found at Waratah, Mt Ramsay and Hampshire. Associated with metalliferous veins in the Jukes-Darwin field, Tharsis and Crown Lyell mines, with the stanniferous lodes of Mt Heemskirk, at the Balfour copper mine, Mt Housetop and Hampshire silver mine. An iron-poor chlorite, sometimes called leuchtenbergite, has been observed microscopically in basic rocks from the Magnet Mine. Chlorite is less widely associated with stanniferous deposits of the north-east but occurs at Ben Lomond, Gould's Country and Georges Bay. Also reported in association with ultrabasics from Andersons Creek, near Beaconsfield, and from Smithton where it occurs in quartz veins at a dolerite-slate contact and also as an alteration product of augite in the dolerite. It is common in faults, joints and alteration zones in the Jurassic dolerite throughout the State.

CHLOROPAL see NONTRONITE

CHLOROPHANE see FLUORITE

CHONDRODITE (*Silicate and hydroxy-fluoride of magnesium*)

$Mg(OH,F)_2.2Mg_2SiO_4$

An olivine-like mineral that is restricted in occurrence to metamorphosed limestones and dolomites in the vicinity of acid or alkaline igneous rocks. At Mt Bischoff chondrodite occurs as a dark green and yellowish rock in the Brown Face open cut where it is partially replaced by serpentine and pyrrhotite (Groves and Solomon, 1964).

CHONICRITE

Invalid—The material from the Rocky River given this name is a decomposition product of feldspar, most probably kaolinite.

CHROMITE (*Oxide of iron and chromium*)

$FeCr_2O_4$

This black metallic spinel is widely distributed throughout the ultrabasic rocks of the State and the alluvials derived from them. At Adamsfield it occurs as octahedral crystals in serpentinite and bronzitite. It is also associated with osmiridium in the alluvial and cemented placer deposits of the district. Chromite has also been recorded from the Styx River; the head of the Florentine River; in limited quantity around Dundas; the Huskisson River;

the Harman River; in the Arthur River below its junction with the Waratah River; massive in serpentinite at Heazlewood; in alluvials at Marrawah associated with minor cassiterite; in vein deposits between serpentine and quartz at the Forth River; associated with alluvial gold at Brandy Creek, Beaconsfield and in high grade chromiferous Tertiary gravels overlying serpentine in the vicinity of Andersons Creek.

CHRYSOBERYL (*Oxide of beryllium and aluminium*)

$BeAl_2O_4$

Several grains of pale green chrysoberyl were obtained from tin bearing alluvials at the Weld River. These examples were dichroic, being green in reflected light and red by transmitted light, a property which establishes them as the variety alexandrite.

CHRYSOCOLLA (*Hydrous silicate of copper*)

$CuSiO_3.2H_2O$

Small amounts of this emerald-green to pale-blue secondary copper mineral have been recorded as thin coatings and small patches at the Star of Peace Mine near Ringarooma and at the Australasian Slate Quarry, Back Creek.

CHRYSOLITE see OLIVINE

An old name for olivine now sometimes used for magnesium rich varieties of the mineral.

CHRYSOTILE see SERPENTINE

CIMOLITE (*Hydrated silicate of aluminium*)

$Al_2Si_4O_5(OH)_{12}$

Doubtful Validity—The only report of this somewhat rare clay mineral from St Leonards must be considered doubtful as no supporting chemical or other evidence is given. The bulk of the Tertiary clays of the State are largely kaolinite-illite mixtures.

CINNABAR (*Mercuric sulphide*)

HgS

This bright red sulphide mineral is of limited occurrence in the State. It has been recorded from gossan on Mt Read; from gold bearing alluvials on the western foothills of the Algonkian Mountain, Jane River; as grains in parcels of osmiridium from Adamsfield and from the Mount Mary Mine, Cygnet. See also laumontite.

CLINOCHLORE see CHLORITE

CLINOHUMITE (*Silicate and hydroxy-fluoride of magnesium*)

$Mg(OH,F)_2.4Mg_2SiO_4$

This mineral is closely related to chondrodite and has a similar genesis. It occurs as uniformly distributed yellow grains through a greyish-white clinohumite brucite marble at the King Island Scheelite Mine (Edwards, *et al.*, 1956).

CLINOZOISITE (*Hydrous silicate of calcium and aluminium*)

$Ca_2Al_3Si_3O_{12}.OH$

A pale green to yellow monoclinic silicate. Near Beaconsfield clinozoisite occurs in rocks, associated with the hornblende gabbro of the district, which contain only small amounts of ferromagnesian minerals.

COAL

Coal is not a mineral substance since it is of organic origin. It is a black to brown compact material, lacking crystalline structure which sometimes breaks with a degree of regularity. It may be laminated and successive layers may differ somewhat in lustre from earthy to resinous and brilliant. The following information has been extracted from Geological Survey Bulletins No. 7—'The Coal Resources of Tasmania' (1922) and No. 50—'Geology and Mineral Resources of Tasmania' (1967).

Sedimentary rocks of Permian, Triassic and Tertiary age carry coal in this State. The oldest coal measures occur at about the middle of the Permian succession and these have been called the Mersey Coal Measures on account of their wide development in the lower Mersey River Valley in the north-west of the State. Fossil plants and spores are present and the flora is dominated by *Glossopteris* spp. and *Gangamopteris* spp. The Illamatha Colliery, Spreyton was the last operating mine in the district and whilst two seams of coal were present most of the production came from the lower seam which was worked at widths of less than two feet. The coal was a low ash, high sulphur type and gave the following results on analysis:

| | % |
|---|---|
| Moisture | 13.58 |
| Volatile matter | 36.28 |
| Fixed carbon | 45.30 |
| Ash | 4.84 |
| Sulphur | 4.39 |
| Heat value (B.T.U.) | 11056 |

Similar coal occurs in at least four seams in the vicinity of Preolenna although the ash content is higher and the sulphur content is the highest for any coal from the State (5.87%). The seams are narrow and dip at up to 20° so that production from the district has been very limited. Coal aslo occurs near the top of the Permian sequence with at least two seams and possibly four which have been named the Cygnet Coal Measures. The flora includes *Gangamopteris* spp. and *Vertebraria australis*. Only the uppermost seam which is about 3 feet in thickness has been mined in the Cygnet district and a typical analysis yields:

| | % |
|---|---|
| Moisture | 1.10 |
| Volatile matter | 10.36 |
| Fixed carbon | 66.04 |

| | % |
|---|---|
| Ash | 22.50 |
| Sulphur | 0.41 |
| Heat value (B.T.U.) | 11336 |

Permian coal probably equivalent to the Cygnet Coal Measures also occurs near Gordon and on Bruny Island.

The bulk of coal production in the State has come from the New Town Coal Measures of Triassic age. These measures consist of coal, shale and feldspathic sandstone which occur in the upper part of the Triassic sequence and contain a flora which includes abundant spores together with plants such as *Cladophlebis* spp. and *Ginkgoites* spp. The earliest mines were at New Town, a suburb of Hobart, and on the Tasman Peninsula. The most significant production has come from the north-east of the State in the St Marys-Fingal-Avoca district but there has been production in the past from Seymour, Coles Bay, Schouten Island and Buckland on the east coast; York Plans and Colebrook in the midlands and Hamilton, Sandfly and Esperance district in the south. The only mines operating at the present time are the Duncan at Fingal, the New Stanhope at Avoca and the Sandfly at Kaoota. The composition of Triassic coals is quite variable but a typical analysis of Fingal coal yields:

| | % |
|---|---|
| Moisture | 4.88 |
| Volatile matter | 26.82 |
| Fixed carbon | 47.68 |
| Ash | 20.62 |
| Sulphur | 0.48 |
| Heat value (B.T.U.) | 9742 |

At some coal occurrences in the Esperance district the effects of dolerite intrusion have been to increase the rank of the coal towards anthracite. At Catamaran one such coal yields on analysis:

| | % |
|---|---|
| Moisture | 0.86 |
| Volatile matter | 7.28 |
| Fixed carbon | 86.22 |
| Ash | 5.64 |
| Sulphur | 0.38 |
| Heat value (B.T.U.) | 14250 |

Brown coal of Tertiary age occurs in the Tamar Valley, the Derwent Valley and at Macquarie Harbour but none of this has been mined to date.

Petterd recorded anthracite from a lode in an abandoned lead mine, North Valley, Mt Bischoff. This claim must be considered invalid since anthracite does not originate by hydrothermal processes. A number of poorly defined solid hydrocarbon substances occur sporadically in some igneous rocks and hydrothermal veins and the material recorded from North Valley was possibly one of these

COBALTITE (*Sulpharsenide of cobalt and iron*)

$(Co,Fe)AsS$

This is an isometric sulphide mineral which is typically silvery-white in colour with a pale pink bloom. Small quantities of cobaltite have been recorded from the Penguin Silver-Lead Mine, Penguin River where it is associated with pyrite, galena and tetrahedrite. It is also of rare occurrence in schist near Lake Dora in the Tyndall Range.

COPALITE (*Fossil resin*)

This is no longer considered a mineral since it is an organic product. It is a brownish-yellow resinous compound of carbon, hydrogen and oxygen in the approximate proportions of 40 : 60 : 1. It melts to a dark-brown varnish-like mass, burns with a smoky yellow flame giving off a strong aromatic odour. Copalite occurs as small lumps within lignite at Macquarie Harbour. More rarely masses up to a few pounds weight are found. Similar material has been reported from lignite at Mt Bischoff, at Evandale and from alluvials on Cape Barren Island in the Furneaux Group.

COPIAPITE (*Hydrous basic iron sulphate*)

$FeFe_4(SO_4)_6(OH)_2.20H_2O$

A yellowish to orange monoclinic secondary mineral which develops from weathering pyrite and is often associated with such minerals as melanterite, alunogen, halotrichite and other sulphates. It occurs as an alteration product of melanterite in the old levels of mines of the Mt Bischoff district and frequently encrusts this mineral. In the vicinity of Barn Bluff pyrite dispersed through schist is partially altered to copiapite.

COPPER (*Native*)

Cu

This native metal crystallises in the isometric system. It is malleable, has a hackly fracture and rapidly tarnishes copper-red to brown from the light rose colour of the fresh surface. Native copper was abundant at several localities on the west coast where it occurred as a secondary mineral overlying copper sulphides. It was mined on a large scale from the Lyell Blocks Mine where it was disseminated in clays. At this locality it was occasionally auriferous. Polished native copper foil occurred on cleavage planes of metamorphic rocks against porphyry dykes at Mt Bischoff. Small lumps and scales of native copper are dispersed through basic volcanic rocks in the vicinity of the Mainwaring River; Birch Inlet on Macquarie Harbour; along the Arthur River where it also occurs in alluvials derived from the basic rocks; in the Dunyan Range near Circular Head; at Smithton; at the Argent River; near the Renison Bell Tin Mine where native copper occurs as a cement between granular quartz and other rock fragments. It occurs with galena, sphalerite and chlorite at Laurel Creek, a tributary of the Blyth

River. The mineral also occurs as a flaky coating on limonite at Nolan's Creek, a tributary of the Pieman; in garnet rock in the Hampshire district and with barite on the Wilmot River.

CORDIERITE (*Silicate of magnesium, iron and aluminum*)

$(Mg,Fe)_2Al_4Si_5O_{18}$

Cordierite is a bluish, glassy orthorhombic silicate which is commonly found as knots in rocks of contact metamorphic zones. It also occurs in igneous rocks and in rocks which have been regionally metamorphosed. It is found in rocks of the metamorphic aureole between Devonian granite and Cambrian volcanics at Trial Harbour, in hornfelses at the King Island Scheelite Mine; in granites and their contact zones in the Rossarden and Blue Tier districts of the north-east. Cordierite also occurs in buchites associated with volcanic rocks at Apsley and Mt Cameron West (Spry and Solomon, 1964; Sutherland and Corbett, 1967).

CORUNDUM (*Aluminum oxide*)

$Al_2O_3$

This is a very hard usually bluish mineral which crystallises in the trigonal system and occurs as an accessory mineral in igneous rocks and as a result of high grade metamorphism of aluminous rock types. All occurrences reported in the State are from alluvials in which the mineral occurs as dull-brown to blue rounded grains. Corundum is fairly abundant in the cassiterite bearing alluvials of the north-east such as those at Mt Cameron, Thomas Plain, Main Creek, Branxholm, Moorina and Weld River. The gem variety, sapphire, is occasionally obtained and was more common at Weld River than elsewhere. It was also recorded at Mt Stronach. The largest example weighed 264 carats and many from 4 to 12 carats were obtained. Along the north-west coast corundum has been recorded from the Blyth River, from near Bell Mount, Middlesex from Boat Harbour and Stanley. Some examples of the gem variety ruby have also been recorded from the north-east tin fields.

COSALITE (*Sulphide of lead and bismuth*)

$Pb_2Bi_2S_5$

Doubtful Validty—This soft grey mineral was doubtfully identified from the Hecla Mine, Dundas where it was observed microscopically in association with gersdorffite and other minerals (Stillwell, 1935).

COSSYRITE (*Silicate of sodium, iron and titanium*)

$Na_4(Fe,Ti)_{13}Si_{12}O_{42}$

Doubtful Validity—This rare triclinic titanium bearing silicate, now usually known as aenigmatite, was reported as an accessory mineral in the garnet-mica-solvsbergite of the Port Cygnet alkaline complex. Its presence has not been confirmed although numerous studies of the rocks concerned have since been undertaken.

COVELLITE (*Cupric sulphide*)

CuS

An indigo blue to almost black secondary sulphide mineral which crystallises in the hexagonal system. Covellite has been reported from several mines on the Balfour field including the Murray's Reward, Balfour South, Central Balfour and South Balfour Mines. It occurred in association with tenorite on the 500-feet level of the North Lyell Mine. The mineral has also been recorded from the Cascades district and the Blue Tier in the north-east where it is associated with cassiterite in granite and porphyritic rocks, and from the Orieco Mine, Scamander.

CROCOITE (*Lead chromate*)

$PbCrO_4$

A rare orange to deep red monoclinic secondary lead mineral. It usually occurs as long prismatic crystals which are frequently hollow and more rarely as equant crystals with octahedral habit. Large quantites of this mineral were obtained from mines of the Dundas district which produced crystal groups not equalled in quality anywhere else in the world. Crocoite was first observed at the Heazlewood Silver-Lead Mine in 1895 and discoveries at the Whyte River, at the Magnet Mine and Dundas followed shortly after. At the Heazlewood the mineral occurred as small acicular bunches of hyacinth-red crystals associated with cerussite and more rarely pyromorphite in friable clays. The Whyte River specimens were more plentiful than those at Heazlewood and consisted largely of small doubly terminated crystals coating fractures and cleavages in the wall rock and gossan. At Magnet entangled masses of fine prismatic crystals 5 cm and longer occurred in the gossan, small loose perfectly terminated crystals were less frequently found and in vughs the mineral was associated with the yellow chrome-cerussite. The most striking finds were made at the Dundas Extended and West Comet Mines, Dundas where both large amounts and exquisite examples of the mineral were obtained. Many specimens 10 to 12 cm in length and perfectly terminated are reported to have been obtained from these mines. The Adelaide Mine also produced large quantities, much of which went to the Zeehan smelter as a flux. Cerussite, massicot and more rarely dundasite were associated with the crocoite from this mine. At all mines the mineral occurred as pure masses, both lining vughs in ferro-manganese gossan and included in the gossan and also intermixed with friable clays. Other mines in the Dundas district such as the Central Dundas produced a little crocoite and rare occurrences were reported from Colonel North and Silver Queen Mines in the Zeehan field. Small masses of crystals of crocoite have been observed in the back and along the sides of old adits in the Dundas and Zeehan fields where they have apparently been formed by post-mine leaching. Occurrences of the mineral have also been reported in Tertiary limestones and alluvials at Ranga on Flinders Island although some doubt must be expressed concerning the validty of this claim.

CUBANITE (*Sulphide of copper and iron*)

$CuFe_2S_3$

Doubtful Validity—This brass-yellow orthorhombic magnetic sulphide was originally reported to be common in mines at Mt Lyell, Mt Read and Mt Balfour. Edwards (1939) reported the presence of minor cubanite in the North Lyell ore bodies but Markham (1963) has shown the mineral concerned to be a variety of stannite. Cubanite specimens from Mt Read have been found to be chalcopyrite.

CUMMINGTONITE (*Hydrous silicate of iron and magnesium*)

$(Mg,Fe)_7Si_8O_{22}(OH)_2$

This straw coloured to colourless orthorhombic member of the amphibole group of minerals has been recorded from the metamorphic aureole around Devonian granite near Trial Harbour (Green, 1966).

CUPRITE (*Cuprous oxide*)

$Cu_2O$

A common mineral in the oxidised zones of copper bearing ore deposits. It is generally some shade of red in colour and crystallises in the isometric system most frequently in the form of octahedra. It occurred in abundance and well crystallised form in association with nodular limonite in the vicinity of Mt Lyell. It has also been recorded from the Curtin-Davis Mine, Dundas and the Orieco Mine near Scamander. The capillary variety, chalcotrichite, occurs as tufts in cavities in limurite at the Colebrook Mine, near Rosebery and at Lake Jukes.

CYANITE see KYANITE

An old name for the aluminium silicate, kyanite.

CYANOSITE see CHALCANTHITE

An old name for the hydrated copper sulphate, chalcanthite.

DAMOURITE see MUSCOVITE

DANALITE (*Silicate of iron, manganese, zinc and beryllium with sulphur*)

$(Mn,Fe,Zn)_4Be_3Si_3O_{12}S$

A rare moderately hard reddish brown silicate which occurs in amphibolite at Mt Ramsay. The mineral was originally recorded as yttrocerite (R. J. Ford, pers. comm.).

DANBURITE (*Silicate of calcium and boron*)

$CaB_2(SiO_4)_2$

An uncommon pale yellow to colourless orthorhombic silicate very similar in appearance to topaz. Sparing occurrences with datolite have been reported in the limurite rock at the Colebrook Mine, near Rosebery.

DARWIN GLASS

This is a frothy siliceous black glass which occurs on the eastern slopes of Mt Darwin and which is particularly abundant on the eastern slopes of Ten Mile Hill, 12 miles SSE of Queenstown. The material has attracted scientific attention since 1910 and most workers have considered it to be an impact glass although no crater has yet been identified in the locality. According to Taylor and Solomon (1962) 'The glass is very irregular, slaggy, with twisted stalactitic forms and with rare teardrop and disc-like shapes. Numerous bubble pits are present and the pieces are consequently of very low density (sp. gr. 1.7-2.2) and have a frothy appearance well described by the prospectors term petrified kelp'.

DATOLITE (*Hydrous silicate of calcium and boron*)

$CaBSiO_4OH$

This is a glassy very pale coloured or white monoclinic silicate which generally crystallises with a short prismatic habit displaying numerous crystal faces. It has been recorded from the Colebrook Mine, near Rosebery, where it occurs in crystals up to 2 cm across and also as crystalline masses associated with calcite, danburite, actinolite, axinite and sulphide minerals.

DEWEYLITE (*Hydrous silicate of magnesium*)

$Mg_3Si_3O_7(OH)_4.4H_2O$

Doubtful Validity—This massive greasy silicate mineral is usually associated with serpentine from which it results by alteration. The mineral recorded as dewelite from the Harman River and elsewhere contains less water than other recorded examples (Dana, 1898) and loses very little of this below 250° C. It is most likely a variety of serpentine.

DIALLAGE

Invalid—There is some confusion over the use of this name in early texts as it has been applied to members of the pyroxene group in various ways. It is now seldom used in a varietal sense but is applied to the clinopyroxenes augite and diopside with particularly well developed partings. Petterd (1910) apparently considered diallage to be a variety of clinopyroxenes although some of the specimens to which he gave the name are orthopyroxenes.

DIALOGITE see RHODOCROSITE

An old name for the manganese carbonate, rhodocrosite.

DIAMOND (*Native carbon*)

C

Diamond is the hardest mineral known. It crystallises in the isometric system generally as octahedra and in the uncut state it is usually of pure blue-white colour, although it is rarely tinted various colours and has an adamantine to greasy lustre. Only a few diamonds have been recorded from Tasmania and

these were found around the turn of the century in the Donaldson Range district between the Savage and Donaldson Rivers. Twelvetrees (1918) states that 16 or at most 18 diamonds were found which were around $\frac{1}{8}$ carat in weight with one reaching $\frac{1}{4}$ carat. They were all transparent octahedra tinted straw-yellow at the apices. There are unconfirmed reports of a few diamonds being found in gem sands from the Hellyer River and also in peridotite at Bald Hill on the Corinna road.

DIASPORE (*Hydrogen aluminium oxide*)

$\alpha$-AlO.OH

An orthorhombic, usually white mineral which generally occurs in an earthy state. It has been recorded from the Stanhope section of the Bischoff Tin Mine and is also of widespread occurrence as a component of bauxite.

DIGENITE (*Sulphide of copper*)

$Cu_{2-x}S$

This is a bluish grey to black isometric sulphide mineral sometimes referred to as blue chalcocite. It occurs rimming grains of chalcopyrite associated with the iron ores of the Savage River and Rocky River areas (Urquhart, 1966). Bornite-digenite assemblages replacing pyrite have been recorded from Mt Lyell, particularly in ore from North Lyell (Markham, 1963).

DIOPSIDE-HEDENBERGITE (*Silicates of calcium, magnesium and iron*)

$Ca(Mg,Fe)Si_2O_6$

A group of green to black monoclinic pyroxene group minerals. Diopside is the magnesium rich end member of the series and this was originally recorded from the Comstock district, Zeehan. Detailed work on diopside bearing rocks has been undertaken in the Trial Harbour district (Green, 1966). The composition of the minerals is predominantly diopside rich (73-94% diopside) although less common hedenbergite rich (34-48% diopside) members occur. The diopside is generally granular although crystals up to 1 cm across occur in some rocks. The minerals are associated with contact rocks south of Limestone Creek in the Hampshire district and also occur near Pyengana in the north-east of the State and on King Island. Ferro-hedenbergite has been recorded from the Red Hill granophyre (McDougall, 1962).

DOLOMITE (*Carbonate of magnesium and calcium*)

$(Mg,Ca)CO_3$

This trigonal carbonate mineral is generally colourless or white when pure and very similar to calcite although it is slightly harder and does not effervesce with cold dilute hydrochloric acid. As the content of iron and manganese increases dolomite becomes grey, green, brown or reddish. Crystals are not common in the State but white curved and saddle shaped crystals were recorded from the Magnet Mine, near Waratah. Dolomite occurs in the gangue

of silver-lead mines of the Heazlewood and Dundas fields. Triboluminescent dolomite occurs in shear zones within serpentinite at the Razorback Mine, Dundas.

Dolomite of sedimentary origin occurs in the Precambrian succession in many parts of the north-west, west around to the south of the State. An analysis of an aggregate chip sample compounded from various north-western localites yielded the following:—

| | % |
|---|---|
| $CaCO_3$ | 54.3 |
| $MgCO_3$ | 43.9 |
| $Al_2O_3$ | 0.3 |
| $Fe_2O_3$ | 0.4 |
| Insoluble | 0.9 |

The rock is also found on King Island; on Robbins Island; along the Duck River at Smithton; Irishtown; Nabageena; Edith Creek; Trowutta; at the New Victory Mine and other localities along the Arthur River; Kepple Creek; along the Black River near the Bass Highway crossing; north of Pieman Heads; at Mt Bischoff where they form the host rock for part of the tin mineralisation; Savage River; Stanley River; Renison Bell; Dundas; at the junction of the Fury and MacIntosh Rivers; at Albina south of Macquarie Harbour; at Surprise River on the Lyell Highway; Alma River; Carbonate Creek; Tiger Creek; Mt Arrowsmith; Mt Ronald Cross; west of the King William Saddle; in the headwaters of the Maxwell River; along the Jane River; at Mount Tim Shea and the valley of Clarkes Creek. In the south dolomite is exposed on the Huon River east of Blakes Opening; on the northern slopes of Mt Picton and in the eastern tributaries of the Craycroft River. Near Hastings spectacular caves have formed in the dolomite. There is a single record of the occurrence of dolomite at Western Rivulet some 6 miles SW of Cressy. An old kiln operated on this dolomite which is exceptionally pure (55% $CaCO_3$, 45% $MgCO_3$).

DUFRENITE (*Hydrous basic phosphate of iron*)

$FeFe_4(PO_4)_3(OH)_5.2H_2O$

This is a dark green secondary iron mineral that usually occurs in botryoidal masses and crusts. Its occurrence was reported at Bell's Reward Mine, Heazlewood.

DUFRENOYSITE (*Sulphide of lead and arsenic*)

$Pb_2As_2S_5$

A lead-grey monoclinic sulphide which usually has a tabular habit and is striated longitudinally. It was reported that crystals almost 3 cm x 1 cm occurred in association with tetrahedrite and chalcopyrite in siderite from Block 291, North-East Dundas.

DUNDASITE (*Hydrous basic carbonate of lead and aluminium*)

$Pb_2Al_4(CO_3)_4(OH)_8.3H_2O$

This rare basic carbonate mineral occurs in small spherical aggregates of radiating white crystals and also as matted or felted

crusts. At the type locality, the Adelaide Proprietary Mine, Dundas the mineral occurs as an encrustation on ferro-manganese gossan. Minute crystals of crocoite are sometimes associated with the dundasite. It has also been recorded from the Hercules Mine, Mt Read where it is associated with gibbsite and cerussite in cellular quartz. A recent analysis reported by Ford (1967a) supports the formula given above rather than that quoted by Palache, *et al.* (1951) which contains a little less water. A comparison of the empirical formula with the analysis yields the following:

| | Dundasite | $PbAl_2(CO_3)_2(OH)_4.2H_2O$ | $Pb_2Al_4(CO_3)_4(OH)_8.3H_2O$ |
|---|---|---|---|
| PbO | 46.60 | 46.00 | 46.87 |
| $Al_2O_3$ | 21.50 | 21.01 | 21.41 |
| $Fe_2O_3$ | 00.02 | ... | ... |
| $CO_2$ | 18.10 | 18.14 | 18.48 |
| $H_2O^+$ | 13.90 | 14.85 | 13.24 |
| $H_2O^-$ | 00.08 | ... | ... |

DYSCRASITE (*Silver antimonide*)

$Ag_3Sb$

This rare lead-grey mineral was reported to occur at the Magnet and Penguin Mines. Examination of a specimen labelled dyscrasite from the Magnet Mine held in the Queen Victoria Museum has not confirmed the presence of this mineral (D. I. Groves, pers. comm.).

ELAEOLITE (*Silicate of sodium, potassium and aluminium*)

$Na_3KAl_4Si_4O_{16}$

Invalid—This is an old name for nepheline. The mineral recorded as elaeolite from the Port Cygnet alkaline complex has been shown to be hauyne (Edwards, 1947).

ELECTRUM (*Alloy of gold and silver*)

Au,Ag

This name is generally applied to gold containing 20% or more of silver. The yellowish white alloy was originally reported from alluvials at the Queen River. It has been found as ragged microscopic grains 0.009-0.06 mm across in enargite from North Lyell (Edwards, 1939) and also as anhedral grains up to 0.01 mm across in tetrahedrite from the Electrolytic Zinc Co. mine at Rosebery (Williams, 1960).

EMBOLITE (*Chloride and bromide of silver*)

Ag(Cl,Br)

A member of cerargyrite-bromyrite series of minerals which usually form waxy masses and crusts varying in colour from yellow-green to grey. With high chloride content the mineral darkens on exposure to light and eventually becomes violet-brown. The mineral crystallises in the isometric system with the cubic form being the most common. It has been recorded in ferro-manganese gossan from the Central Dundas and West Comet Mines, Dundas; from the Queen, Sylvester and Junction Mines at Zeehan; the

Godkin, Washington Hay and Whyte River Mines in the Heazlewood district; from the Magnet Silver Mine, near Waratah and from the Beulah and Orieco Mines, near Scamander.

ENARGITE (*Sulphide of copper and arsenic*)

$Cu_3AsS_4$

A greyish to iron-black sulphide which crystallises in the orthorhombic system as tabular and prismatic crystals. It is commonly massive and in this form it has been recorded in small amounts from the Curtin-Davis Mine, North-East Dundas where it is associated with arsenopyrite and tetrahedrite. Small amounts of enargite have been observed microscopically in the ores of the North Lyell and Mt Lyell Mines (Edwards, 1939).

ENDLICHITE (*Chloride and vanadate-arsenate of lead*)

$Pb_5(VO_4,AsO_4)Cl$

This is an arsenian variety of vanadinite in which V : As is approximately 1 : 1. Occurrences were recorded as rare, minute, milk white, hexagonal crystals in silver-lead mines of the Heazlewood and Magnet districts.

ENSTATITE (*Silicate of magnesium and iron*)

$(Mg,Fe)SiO_3$ $Fs_{0-10}$

This is a member of the orthorhombic pyroxene group, richer in magnesium than bronzite and generally of a lighter green colour than this mineral. Like bronzite it occurs in areas of ultrabasic rock outcrop and it has been noted from the Heazlewood district, the Magnet Range, Parsons Hood, the Huskisson River, Serpentine Hill, Birch Inlet, Adamsfield and Beaconsfield.

EPIDOTE (*Hydrous silicate of calcium, iron and aluminium*)

$Ca_2FeAl_2Si_3O_{12}OH$

A yellow-green to greenish-black monoclinic silicate which usually crystallises with prismatic form commonly yielding acicular masses. Epidote occurs sparingly in quartz at Calstock, near Deloraine. It is abundant in low grade metamorphic rocks from the Forth River to west of the Leven River; in the vicinity of the Round Hill Silver-Lead Mine, Mt Claude, it is fairly abundant in quartz; a greenish brown-yellow variety known as escherite occurs on the Upper Emu River opposite the north-west shoulder of Valentines Peak; from Table Cape and Dunyan Range near the Duck River; in the vicinity of Mt Bischoff and the Magnet Range; with calcite and pyrite at the Whyte River; abundant in quartz around Dundas; an iron rich epidote occurs in the vicinity of Lake Jukes on the track from Crotty; similar epidote is found on the coast between the Mainwaring River and Copper Creek and also in pyroxene-garnet hornfels at the King Island Scheelite Mine.

EPSOMITE (*Hydrous magnesium sulphate*)

$MgSO_4.7H_2O$

An orthorhombic colourless to white mineral with a bitter saline taste. It usually occurs as compact encrustations but may form delicate fibrous masses. It is found in caves and fissures in various localities throughout the State where it has been produced by leaching of saliferous rocks of the vicinity. Epsomite has been recorded from Mt Dromedary; associated with halite at Green Valley, north-west of Bagdad; Kangaroo River near Campania; about the upper Lake River; at Exton and from the Alum Cliff Caves, near Chudleigh.

ERYTHRITE (*Hydrous arsenate of cobalt*)

$Co_3(AsO_4)_2.8H_2O$

A crimson to peach-red monoclinic secondary cobalt mineral which usually occurs as powdery encrustations or more rarely as stellate or globular groups of acicular crystals. Only small amounts of erythrite have been recorded from the Penguin Silver Lead Mine, Penguin River; the Hampshire Silver Mine, Hampshire Hills; the Lord Brassey Mine, Heazlewood and coating schist at Lake Dora in the Tyndall Range.

ESCHERITE see EPIDOTE

EUDIALYTE (*Hydrous silicate of sodium, calcium, iron and zirconium with chloride*)

$Na_4(Ca,Fe)_2ZrSi_6O_{17}(OH,Cl)_2$

Invalid—The mineral originally recorded as eudialite from basaltic rocks at Shannon Tier has been identified as nepheline (Tilley, 1928).

EULYTITE (*Silicate of bismuth*)

$Bi_4(SiO_4)_3$

Occurrences of this rare isometric silicate have been reported as minute yellow to brown resinous globules at the Hampshire Silver Mine, Hampshire Hills.

EVANSITE (*Basic hydrous phosphate of aluminium*)

$Al_3(PO_4)(OH)_6.6H_2O$

A colourless to milk-white secondary phosphate mineral which occurs as botryoidal pearly encrustations on lode material at several localities in the Zeehan and Dundas fields.

EXCHERITE see EPIDOTE

Excherite in Petterd (1910) is a misprint for escherite, a variety of epidote.

FAHLUNITE (*Hydrous silicate of magnesium, iron and aluminium*)

$(Mg,Fe)Al_2Si_2O_{10}.2H_2O$

Invalid—The material originally reported as fahlunite and classed as a hydromica from Mt Bischoff has been shown by X-ray investigation to be a mixture of chlorite and talc.

FAYALITE (*Silicate of iron*)

$Fe_2SiO_4$

Invalid—Red grains in basalt at Sandy Bay, Hobart originally recorded as the iron olivine fayalite were shown by Aurousseau (1926) to be an alteration product of olivine to which the name iddingsite was given. This name is also now invalid since iddingsite is in fact a fine grained mixture of essentially montmorillonite, chlorite and goethite (Deer, *et al.*, 1962).

FELDSPAR GROUP

The minerals of this group are the most important of the rock-forming silicates. Some 60% of igneous rocks consist of feldspars. They are also common in many metamorphic and some sedimentary rocks. They are silicates of aluminium with potassium, sodium, calcium and more rarely barium. Division can be made into the alkali feldspars and the sodic-calcic feldspars which include the following minerals:

Alkali Feldspars

Orthoclase $KAlSi_3O_8$
Microcline $KAlSi_3O_8$
Sanidine $KAlSi_3O_8$
Adularia $KAlSi_3O_8$
Anorthoclase $(Na,K)AlSi_3O_8$
Hyalophane $(K,Na,Ba)AlSi_3O_8$

Of these microcline and anorthoclase are triclinic whilst the rest are monoclinic.

Sodic-Calcic Feldspars $(Na,Ca)Al_{1-2}Si_{2-3}O_8$

Albite $An_{0-10}$
Oligoclase $An_{10-30}$
Andesine $An_{30-50}$
Labradorite $An_{50-70}$
Bytownite $An_{70-90}$
Anorthite $An_{90-100}$
Celsian $BaAl_2Si_2O_8$

The members of the plagioclase series are triclinic whilst celsian is monoclinic. Details of the particular minerals occurring in the State are recorded in the alphabetical listing.

FERRIMOLYBDITE (*Hydrous ferric molybdate*)

$Fe_2(MoO_4)_3.8H_2O$

A soft, fibrous, earthy, canary to greenish-yellow secondary molybdenum mineral. It was formerly believed to be an oxide of molybdenum and was called molybdite. It is now known to be a

hydrous ferric molybdate although the water content is uncertain. Occurrences have been reported at the Hampshire Silver Mine, Hampshire Hills; in white quartz at the Iris River south-west of Moina; with molybdenite in beach sands from King Island and with molybdenite at Blue Tier near Weldborough.

FLUORITE (*Calcium fluoride*)

$CaF_2$

This is a common gangue mineral which is found in many vein deposits, pegmatites and sedimentary rocks. Fluorite crystallises in the isometric system usually as simple cubes and has a distinctive octahedral cleavage. The mineral is highly variable in colour although white, green and dark blue to purple are the most common. Well crystallised small colourless to pale purple cubic crystals have been recorded from the Great Republic and other mines of the Ben Lomond district. Although fluorite is commonly associated with greisen tin mineralisation it is only a minor gangue mineral throughout the north-eastern tin fields. The mineral is abundant at Mt Bischoff and well developed pale purple crystals up to 2.5 cm across were reported occurring in association with siderite, quartz, topaz and more rarely apatite. Some fluorite from Mt Bischoff and also from the Hampshire district displays strong fluorescence and thermoluminescence, properties which indicate that the specimens are of the variety chlorophane. The mineral also occurs at the Shepherd and Murphy Mine, Moina and pale-green crystals have been recorded from the amphibolite at Mt Ramsay where they are associated with scheelite and native bismuth. Appreciable amounts of fluorite were reported to be associated with galena at the Thomas Blocks Mine south of the Murchison River.

FORSTERITE see OLIVINE

FRANKËITE (*Sulphide of lead, tin and antimony*)

$Pb_5Sn_3Sb_2S_{14}$

A soft grey mineral which has been observed microscopically in ore from Renison Bell tin mine. It replaces stannite and occurs in thin plates, prisms or fibres which give it a feathery appearance (Stillwell and Edwards, 1942).

FRANKLINITE (*Oxide of zinc and iron*)

$ZnFe_2O_4$

Doubtful Validity—This zinc iron spinel is a rare mineral and its formation is the result of metamorphism of unusual rock types. Its association with hydrothermal lead mineralisation as originally claimed for the Silver Queen Mine, Zeehan is extremely unlikely.

FREIBERGITE see TETRAHEDRITE

A varietal name for silver rich tetrahedrite.

FREIESLEBENITE (*Sulphide of lead, silver and antimony*)

$Pb_2Ag_2Sb_6S_{12}$

This mineral has been listed by Ramdohr (1960) amongst minerals he observed in ore from the Electrolytic Zinc Company mine at Rosebery but no details of the occurrence are given.

FUCHSITE see MUSCOVITE

A chromium bearing variety of muscovite.

GAHNITE (*Oxide of zinc and aluminium*)

$ZnAl_2O_4$

This zinc aluminium spinel has been reported as small pale-green octahedral crystals embedded in kaolinite at Mt Bischoff.

GALENA (*Lead sulphide*)

PbS

A lead grey sulphide which breaks readily with perfect cubic cleavage. It crystallises in the isometric system as cubes, octahedra or a combination of these forms. Galena is widespread throughout the mineral fields of the State as either a major component of the ore or in minor association with the ore of other metals. It rarely occurs as crystals but commonly occurs in coarse-grained masses or in fine gained admixture with other sulphides.

Minor producers have been the Magnet field, near Waratah, the Heazlewood mines and the Round Mount, Dove and other mines of the Lorinna district. Minor galena was associated with gold reefs at Beaconsfield, Lefroy and Mathinna and it also occurs in some of the lode tin deposits of the north-east. It has also been found in association with sphalerite, barite and dolomite near Deloraine. The earliest record of galena in the State appears to be one of no economic importance at Norfolk Plains near Longford in 1851. The first mining commenced at Penguin about 1870 followed by the operations of the Bischoff Silver Lead Company in 1876 and mining in the vicinity of the Upper Scamander River around 1880. The first discovery of significance was that of the Zeehan field in 1882 but mining did not commence until around 1887. Major production has come from the Zeehan, Dundas and Rosebery fields on the west coast.

In the past the Zeehan field was the most important and this contained numerous lodes of galena-sphalerite and galena-stannite-tetrahedrite carrying around 70 oz/ton of silver. At the present time the only important producers are the Rosebery and Hercules Mines in the Read-Rosebery district and the New North Mt Farrell Mine, near Tullah which are all operated by the Electrolytic Zinc Co. Most of the galena found in the State is of massive form although octahedra and cube-octahedron combinations up to 3 cm across, but generally much less, have been recorded from the Farrell Mine, Tullah. The Western Mine, Spray Mine and North King Tribute at Zeehan have also produced crystallised galena.

GARNET GROUP

This is an important group of silicate minerals which crystallise in the isometric system. They are characteristically of

metamorphic origin but also occur in some igneous rocks and as detrital grains in sedimentary rocks. A general formula for the garnets may be written $A_3B_2(SiO_4)_3$ where A is usually calcium, magnesium, iron or manganese and B is aluminium, iron or chromium. Whilst a series of names is given to pure end-member species generally a garnet will have mixed composition and will take its name from the dominant species. The species contributing to the composition of Tasmanian garnets recorded to date include:

Almandite $Fe_3Al_2(SiO_4)_3$
Andradite $Ca_3(Fe,Ti)_2(SiO_4)_3$
Grossularite $Ca_3Al_2(SiO_4)_3$
Spessartite $Mn_3Al_2(SiO_4)_3$
Uvarovite $Ca_3Cr_2(SiO_4)_3$

Details of the garnet occurrences are given in the alphabetical listing.

GARNIERITE (*Hydrous silicate of magnesium and nickel*)

$(Mg,Ni)_3Si_2O_5(OH)_4$

This is a nickel serpentine and an ore of the metal. It is a soft and friable green mineral with a dull lustre. It occurs near Anderson's Creek, Beaconsfield at a rodingite-serpentinite contact as thin seams along joint planes and slickensided surfaces in the serpentinite. It is of variable concentration and it reaches a maximum towards the southern end of the eastern contact. The mineral is interlayered with opaline silica and its colour varies with the proportion of this. An analysis of the garnierite yielded the following:

| | % |
|---|---|
| $SiO_2$ | 47.98 |
| $Al_2O_3$ | 0.82 |
| $Fe_2O_3$ | 1.42 |
| FeO | 0.13 |
| MgO | 22.62 |
| CaO | 0.09 |
| NiO | 10.68 |
| $H_2O^+$ | 8.09 |
| $H_2O^-$ | 8.10 |
| | 99.93 |

GEDRITE see ANTHOPHYLLITE

GENTHITE (*Hydrous silicate of nickel and magnesium*)

$(Ni,Mg)_4Si_3O_{10}.6H_2O$

Invalid—This is an old name for nickel bearing deweylite. The material recorded from Heazlewood and Mt Agnew is nickeliferous but probably not a distinct species. The X-ray pattern is very poor and bears no resemblance to that of deweylite.

GERSDORFFITE (*Sulphide-arsenide of nickel*)

NiAsS

This silver-white to grey mineral of hardness 5.5 was first noted by F. L. Stillwell (1935) from part of the lode at the Hecla Mine, Dundas. Stillwell also confirmed the presence of the mineral in a specimen labelled 'Gersdorffite from Rocky River' in the Petterd Collection. The mineral has been observed as microscopic veinlets 0.15 mm in width and as myriads of minute blebs up to 0.01 mm in diameter associated with niccolite and maucherite from the Central Balstrup Lease, Zeehan (Williams, 1958). R. A. Both (1966) has recorded a niccolite-gersdorffite-ullmanite association from the former lease.

GIBBSITE (*Aluminium hydroxide*)

$Al(OH)_3$

This is a monoclinic hydroxide mineral which is usually white and occurs as crusts which are commonly mammillary or stalactitic. Gibbsite is abundant at mines of the Dundas district where it encrusts gossan and often coats crocoite crystals. It occurs as encrustations at the Rio Tinto Mine, Savage River where it is accompanied by native copper and it has been recorded from the Burnie Copper Mine at Blythe River. Gibbsite is also a component of bauxite.

GILBERTITE see MUSCOVITE

This is a massive variety of the potassium mica muscovite.

GLAUBERITE (*Sulphate of sodium and calcium*)

$Na_2Ca(SO_4)_2$

This is a common constituent of many saliferous rocks of both marine and lacustrine origin. It is a colourless to white tabular or prismatic mineral with a pearly lustre and slightly saline taste. It has been recorded from the Aberfoyle Mine, Rossarden.

GLAUBER SALT see MIRABILITE

An old name for the hydrated sodium sulphate mirabilite.

GLAUCODOT (*Arsenide-sulphide of cobalt and iron*)

(Co,Fe)AsS

A tin-white arsenide-sulphide which is closely related to arsenopyrite and which closely resembles this mineral. It is an orthorhombic mineral and crystallises with prismatic habit but is more commonly found massive. Occurrences of glaucodot have been reported in mines of the North-East Dundas district where the mineral carries up to 20% cobalt.

GLAUCONITE (*Hydrous silicate of potassium, iron, magnesium and aluminium*)

$K(Mg,Fe,Al)_4(Si,Al)_8O_{20}(OH)_4$

This mineral is one of the mica group. It is generally dark green and granular in character. Glauconite is almost exclusive to marine sediments, particularly the greensands which are so named because of the abundance of the mineral. It has been noted from Upper Permian Sandstones at Roys Hill, St Marys, in Elephant Pass S of St Marys and near Friendly Beaches about 10 miles S of Bicheno (Hale and Brill 1955).

GMELINITE (*Hydrous silicate of sodium, calcium and aluminium*)

$(Na_2Ca)Al_2Si_4O_{12}.6H_2O$

This zeolite is closely related to chabazite. It usually crystallises with hexagonal or rhombohedral habit and was reported by Petterd (1903) to occur in quantity in a vugh in Tertiary basalt at Bell Mount.

GOETHITE (*Hydrogen iron oxide*)

$HFeO_2$

An orthorhombic yellowish, reddish or blackish brown oxide which crystallises with prismatic habit but is usually found as botryoidal, reniform or stalactitic masses. Goethite has been recorded from the Penguin Mine; from the Blythe River where it is associated with hematite; sparingly at the Magnet Mine and from the gossans of several of the Dundas mines. The mineral occurs widely in admixture with other iron oxides as ' limonite '.

GOLD (*Native metal*)

Au

This golden yellow precious metal crystallises with isometric symmetry. Octahedral, dodecahedral and cubic habits are most common and oriented growths of crystals frequently yield reticulated, dendritic, arborescent and filiform aggregates. The mineral also occurs as massive rounded fragments, flattened grains and scales. Gold occurs in Tasmania in quartz reefs, in alluvial deposits and as a minor associate of various sulphide ore bodies, chiefly on the west coast. The first payable gold strike was made at The Nook, near Fingal, in 1852 and this was the site of the first gold mine. Auriferous quartz has been found at numerous localities from the north-east across to the north-west and down the west coast of the State. The more important discoveries were those lying in a belt from south of Mangana, through Mathinna, Dan Rivulet, Alberton, Warrentinna, Forester to Waterhouse on the north-east coast and the Beaconsfield and Lefroy fields to the west and east of the Tamar. Production from the Golden Gate Mine, Mathinna was about 234,000 oz; from the Tasmania Mine, Beaconsfield about 854,600 oz and from the Golden Point, Native Youth, Pinafore and Volunteer Mines, Lefroy about 172,000 oz. Most of the reef gold appears to have been free-milling in the upper levels of the mines and sulphides such as pyrite, arsenopyrite, galena, sphalerite and tetrahedrite appeared with depth.

Alluvial gold has been won from the reef districts noted above although the most important field was Lisle, between Launceston and Scottsdale, which yielded some 250,000 oz of gold. Alluvial working was also carried out at Bell Mount, Middlesex; in the vicinity of the Jane River. The two largest nuggets of gold weighing 243 and 143 oz, were obtained from the Rocky River, a tributary of the Pieman in 1883. The Long Plain alluvial field was noted for the occurrence of many fine crystal groups of gold with crystals up to about 1 cm in length aggregated into masses of considerable size.

Trace gold associated with the sulphide ore bodies of the Lyell and Read-Rosebery districts accounts for the major production of gold in the State of recent years. The discovery of the Lyell copper field came about as a result of the alluvial gold washed into the Linda Valley from the gossan over the sulphide ore. Although the sulphides became depleted in gold with depth local enrichments occurred such as that recorded from the footwall of the 500 feet level where pyrites enriched by tetrahedrite assayed:

Cu 7.97%
Ag 24.22 oz/ton
Au 6.78 oz/ton.

In addition to the more important localities given above gold occurs at numerous places and Petterd (1910) listed the following associations—

| ASSOCIATED WITH: | LOCALITIES: |
|---|---|
| Arsenopyrite | Golconda |
| Chrome-mica | Mt Lyell |
| Bornite | Mt Lyell |
| Bismutite | Middlesex |
| Cassiterite | Branxholm |
| Chalcopyrite | Mt Lyell; Read-Rosebery; North-East Dundas |
| Chromite | Castray River |
| Cupriferous pyrite | Mt Lyell; Read-Rosebery; North-East Dundas; Savage River; Scamander River |
| Galena | Zeehan; Middlesex; Mathinna |
| Hematite | Mt Lyell; Middlesex |
| Ilmenite | Pieman River; Lisle |
| Limonite | Mt Lyell; Mt Read; North-East Dundas |
| Native copper | Mt Lyell |
| Osmiridium | Adamsfield; Castray River; Pieman River; Blue Tier near Beaconsfield |
| Pyrrhotite | Beaconsfield |
| Rutile | Port Cygnet |
| Siderite | Savage River |
| Sphalerite | Mt Read; North-East Dundas |

| | |
|---|---|
| Stannite | Zeehan |
| Amphibolite | Mt Ramsay |
| Granite | Mt Claude |
| Sandstone | Middlesex; Lisle |
| Syenite | Port Cygnet |

GONNARDITE (*Hydrous silicate of sodium and calcium*)

$Na_2CaAl_3Si_5O_{20}.6H_2O$

This comparatively rare fibrous zeolite has been identified in nephelinite, 2 miles SW of Scottsdale. In this locality the mineral is overgrown by natrolite.

A mineral occurring in faults and joints within Jurassic dolerite, described as gonnardite (Sutherland, 1964a), has since been recognised as scolecite (F. L. Sutherland, pers. comm.).

GORCEIXITE (*Hydrous basic phosphate of barium, calcium and aluminium*)

$(Ba,Ca)Al_3(PO_4)_2(OH)_5.H_2O$

This is a rare mineral of the plumbogummite group. It usually occurs in hard white or brownish grains or pebbles which have a porcellanous fracture. It is found in small quantities in some of the basaltic soils of the north-west coast.

GOSLARITE (*Hydrous zinc sulphate*)

$ZnSO_4.7H_2O$

A vitreous to silky white salt with an astringent, nauseous taste. Goslarite has been recorded from an adit at Blue Tier, near Beaconsfield where it was admixed with other sulphates and from the Comstock Mine, Zeehan.

GRAPHITE (*Native carbon*)

C

An iron-black to steel grey greasy mineral usually resulting from the metamorphism of carbonaceous material but also produced by magmatic activity. Graphite was reported from the walls of lodes in the Zeehan and Dundas districts; in a small seam in the vicinity of the Ring River; at the Rocky River Mine; abundant in schist on the beach 2 miles W of the Leven River and about 20 tons of commercial grade graphite were produced from an adit 2 miles SE of Ulverstone; coating joints in limestone at the Wilmot River. Graphite was also reported from Cape Barren Island in the Furneaux Group.

GROSSULAR (*Silicate of calcium and aluminium*)

$Ca_3Al_2(SiO_4)_3$

This is the calcium aluminium garnet. In the pure state this garnet is colourless to white but the presence of other garnet components results in the production of various pale greenish and brownish colours. Grossularite occurs in a predominantly massive state at

Mt Claude where it is olive-green to brown in colour. Similar massive grossularite of yellowish-green colour is associated with magnetite and wollastonite at the Shepherd and Murphy Mine, Moina. Minute, well formed, closely packed, bright yellow-brown crystals were reported from Mayne's Tin Mine, Mt Heemskirk. Garnets with up to 80% of the grossularite component have been recorded from thermally metamorphosed rocks of the Trial Harbour district (Green, 1966).

GUITERMANITE (*Sulphide of lead and arsenic?*)

$Pb_{10}As_6S_{19}$

Doubtful Validity—The type specimen from the Zuni Mine, Colorado appears to be identical with jordanite ($Pb_{14}As_7S_{24}$) and other specimens have been found to be identical with baumhauerite ($Pb_4As_6S_{13}$). A massive bluish-grey mineral from the Magnet Mine which was originally tentatively described as guitermanite is not available for study.

GYPSUM (*Hydrous calcium sulphate*)

$CaSO_4.2H_2O$

This is a soft white sulphate which cleaves readily to give foliae with a pearly surface. Commercial deposits of this mineral do not occur in the State. It is found in veins and as radiating masses in blue limestone at Grunter Hill on the upper Mersey River. Limited quantities have been reported from Circular Pond Marsh near Gads Hill. Also at Plenty, Trial Harbour, Trefoil Island off Cape Grim and in joints in dolerite at Launceston. It occurs as small transparent plates in association with limonite on the walls of small vugs and fractures at the Orieco Mine, Scamander (R. J. Ford, *et al.*, 1970). Crystals up to several centimetres in length have been found in clay at Sandy Bay and the mineral also occurs as facings on joints in Permian siltstones at Risdon Brook.

GYROLITE (*Hydrous silicate of calcium*)

$Ca_2Si_3(OH)_2H_2O$

This mineral which was identified by X-ray study occurs as hard glassy to whitish crystals in radiating spherules, associated with, and resulting from the breakdown of tacharanite in Tertiary basalt 2 miles SW of Redpa. It also occurs in small spherules of softer more silky fibres in basalt NW of Gads Hill at Middlesex and in a quarry ½ mile N of Craigburn on the East Tamar (Sutherland; Corbett, 1967).

HALITE (*Sodium chloride*)

NaCl

A colourless to white and pale blue halide with a saline taste. A permanent source of this mineral is not known in the State although saltpans form intermittently at various localities in the Midlands where the leaching of saliferous Triassic sedimentary rocks provide a temporary source of halite. These saltpans which

are about ten in number and of 1 to 100 acres in area lie between Ross in the north and Tunbridge in the south. The two most prolific pans are those on the Ballochmyle and Mona Vale estates and have been reported to have produced many tons of salt in a favourable season. There is evidence that the district was much sought after and jealously guarded by the extinct tribal aborigines. Stalactitic pieces up to 30 cm across have been found at Carrick.

HALLOYSITE see KAOLINITE

A poorly crystallised hydrated variety of kaolinite.

HALOTRICHITE (*Hydrated sulphate of iron and aluminium*)

$FeAl_2(SO_4)_4.22H_2O$

This mineral occurs as a white to green efflorescent salt with an astringent taste or as small stalactitic growths in old mine workings. It also forms fibrous silky masses that are commonly stained with iron oxide. It has been reported from Alberton, Beaconsfield, Mt Heemskirk and other places. Specimens listed originally as knoxvillite and sclerospathite have compositions compatible with hallotrichite and are probably chromium bearing minerals related to this.

HAUCHECORNITE (*Sulphide of nickel, bismuth and antimony*)

$Ni_9(Bi,Sb)_2S_8$?

This mineral has been identified by K. L. Williams (1958) in material from the Central Balstrup Lease, Zeehan. The hauchecornite occurs microscopically in association with galena and was identified by comparison of its X-ray pattern with that published by G. A. Harcourt (1942).

HAUYNE (*Silicate of sodium, calcium and aluminum with sulphate and sulphur*)

$(Na,Ca)_{4-8}(Al_6Si_6)_{24}(SO_4,S)_{1-2}$

This is an uncommon rock forming mineral that is restricted to alkaline rock types. It was originally recorded from basalt at Sandy Bay but this mineral has been shown to be apatite (Aurousseau, 1926). A second locality was at Cygnet where it was reported from 'hauyne-trachyte'. Edwards (1947) has confirmed the occurrence of hauyne-sanidine-garnet porphyry dykes at Port Cygnet. Occurrences of hauyne have also been reported in basaltic rocks at Stanley.

HEAZLEWOODITE (*Nickel sulphide*)

$Ni_3S_2$

This rare sulphide was originally recorded as a variety of pentlandite. Peacock (1947) established the mineral as a distinct species. It is light bronze yellow in colour and of hardness about 5. It is found in veins composed of granular heazlewoodite and fine grained intergranular magnetite in serpentinite at the Lord Brassey

Mine, Heazlewood. It also occurs in serpentinite at Trial Harbour and possibly at Birch Inlet. Pentlandite is generally associated with the heazlewoodite in varying amounts.

HELLYERITE (*Hydrous nickel carbonate*)

$NiCO_3.6H_2O$

This new mineral has been described from the Lord Brassey Mine, Heazlewood (Williams, *et al.*, 1959). It occurs as blue coloured secondary coatings along shear plains in serpentinite.

HEMATITE (*Ferric oxide*)

$Fe_2O_3$

This oxide of iron is the most important source of the metal although it does not occur in economic quantities in this State. Hematite is variable in character but the occurrences take three main forms. These, together with the localities from which they have been recorded are given below:

*Specular hematite*—This variety has a metallic lustre and crystals when present are splendent, whence the name specular. The structure may be foliated and in this case the mineral is often called micaceous hematite. Localities include: Mt Lyell where it is auriferous carrying up to 15 oz gold/ton; Macquarie Harbour; Dundas; Mt Heemskirk; Mt Read; Pieman River; Whyte River; Arthur River near its confluence with the Hellyer River; Blythe River; Penguin Creek; Leven River; Forth River; Dial Range; Meredith Range; Black Bluff; Ilfracombe on the West Tamar and on the beach of Flinders Island NW of Mt Eliza.

*Massive Compact* ('Red Hematite')—This form is generally columnar or fibrous often forming radiating masses of red-brown to iron black colour; when found in reniform masses it is called 'kidney ore'. Turgite or hydrohematite carries adsorbed water but belongs to this form. Localities include: Mts Lyell, Owen, Jukes and Darwin and many other places in the west and south-west of the State; King River; Zeehan; Mt Heemskirk; Pieman River; Magnet Mine; Arthur River; Circular Head; Dial Range; Blythe River; Ilfracombe.

*Ocherous* ('Reddle')—A red earthy variety often admixed with clay, and other impurities. This is abundant along the West Tamar; Flinders Island; the north-west coast; at Mt Lyell often mixed with powdery barite and carrying free gold; at numerous places throughout the west coast mineral fields.

HERCYNITE (*Oxide of iron and aluminium*)

$FeAl_2O_4$

Occurrences of this spinel group mineral have been reported as granular bluish-black masses in cassiterite bearing alluvials near Moorina and other localities throughout the north-east tin fields.

Green (1966) records the occurrence of a spinel composed of 70% hercynite 20% spinel and 10% chromite from a diopside rock at Trial Harbour.

HINSDALITE (*Basic sulphate-phosphate of lead and aluminium*)

$PbAl_3(SO_4)(PO_4)(OH)_6$

A member of the rare beudanite group of minerals. It occurs as white pseudomorphs after typical green hexagonal prisms of pyromorphite from the West Comet Mine, Dundas (Baker, 1963).

HISINGERITE (*Hydrous silicate of iron*)

$Fe_2Si_2O_5(OH)_4.2H_2O$?

This is a hydrated ferric silicate of uncertain composition. Some specimens also contain magnesium. It occurs as amorphous black masses with a conchoidal fracture in lode material exposed in the lower tunnel of the Comstock Mine, Zeehan.

HISTRIXITE (*Sulphide of bismuth and antimony*)

Doubtful Validity—Originally recorded as a new mineral from the Curtin-Davis Mine, Dundas. Crystals from a vugh were acute terminated orthorhombic in character and up to 2 inches in length. They were steel grey but tarnished to yield a bluish iridescence. Two analyses (Petterd 1910) of pure material gave:

| | % | % |
|---|---|---|
| S | 24.05 | 23.01 |
| Bi | 55.93 | 56.08 |
| Sb | 10.08 | 9.33 |
| Cu | 6.86 | 6.12 |
| Fe | 5.18 | 5.44 |
| | 102.10 | 99.98 |

These are unsatisfactory since there is insufficient sulphur present to combine with the metals found. Furthermore although the material is stated to be pure antimony bismuth sulphide considerable copper and iron are present. No specimen of the material is now available but it appears likely that it was an antimony bearing bismuthinite similar to stibiobismuthinite associated with chalcopyrite.

HORNBLENDE (*Hydrous silicate of sodium, potassium, calcium, magnesium, iron and aluminium*)

$(Na,K)_{0-1}Ca_{1.5-2.0}(Mg,Fe)_{3-5}(Al,Fe)_{2-0}(Si_{6-7}Al_{2-1}O_{22})(OH,F)_2$

The hornblendes are monoclinic members of the amphibole group and display wide variation in composition. These minerals were originally recorded as pargasite (Petterd), but this name is now usually restricted to an end member subspecies, $NaCa_2Mg_4Al(Si_6Al_2O_{22})(OH)_2$. Seven subspecies of hornblende are recognised but the Tasmanian examples are not known in sufficient detail to attempt their classification. The mineral has

been recorded from the Upper Arthur River; the head of the Savage River; the Heazlewood district; in amphibolite at Mt Ramsay; near the Madame Melba Mine, North-East Dundas; the Hampshire Hills; west of the Blythe River where extremely coarse blades are associated with magnetite. It is relatively abundant in hornblende granodiorite in the north-east and in andesitic rocks at Cape Portland; in hornblende picrite NW of Scamander and hornblende basalt N of Priory; from tuffs at Risdon.

HUASCOLITE

Invalid—Originally described as a lead zinc sulphide. This material has been shown by X-ray studies to be a very fine grained mixture of galena and sphalerite.

HYALITE see QUARTZ

HYDROCERUSSITE

Invalid—The mineral originally reported from the Hercules Mine, Mt Read as hydrocerussite has been found by X-ray study to be cerussite.

HYDROGROSSULAR (*Hydrous silicate of calcium and aluminium*)

$$Ca_3Al_2Si_2O_8(SiO_4)_{1-x}(OH)_{4x}$$

This mineral may be regarded as one of the garnet group closely related to grossularite. It is commonly produced by hydrothermal and metasomatic activity in calcium bearing rocks. It has been recorded from volcanics on King Island (Scott, 1951) where it occurs as a hydrothermal replacement in Cambrian basic volcanic rocks. The mineral occurs as grains with a refractive index varying with the hydroxyl content from 1.663 to 1.753 from the edge inwards. It also occurs as pseudomorphs after olivine and albite and replaces glass in lavas and volcanic breccias. Groves (1963) has noted the occurrence of hydrogrossular at Mt Bischoff.

HYDROMAGNESITE (*Hydrous carbonate-hydroxide of magnesium*)

$$Mg_4(OH)_2(CO_3)_3.3H_2O$$

Doubtful Validity—Originally reported to occur as chalk-like crusts with brucite on serpentinite near Mt Agnew and in the Heazlewood district. The only available specimen from the Comstock Mine, Zeehan gives an X-ray pattern similar to that of talc.

HYDRONEPHELITE

Invalid—The type material is thought to be a mixture of natrolite, gibbsite and diaspore. The mineral originally recorded as hydronephelite from Shannon Tier has been found by X-ray study to be natrolite.

HYPERSTHENE (*Silicate of magnesium and iron*)

$$(Mg,Fe)SiO_3 \quad Fs_{30-50}$$

This is a member of the orthorhombic pyroxene series containing more iron than bronzite. Hypersthene has been recorded from the

Dundas district; from Parsons Hood; the Heazlewood district; Forth River; Meredith Range. Green (1966) has recorded hypersthene ($Fs_{40}$) from metamorphosed Cambrian tuffs in the Trial Harbour district. The mineral is also found in many of the Jurassic dolerites.

IDOCRASE see VESUVIANITE

An old name for the rock forming silicate vesuvianite.

ILLITE (*Hydrous silicate of potassium and aluminium*)

$KAl_4(Si_7AlO_{20})(OH)_4$

This is one of a group of clay minerals that are structurally related to the micas. Illite is the dominant clay mineral of sediments particularly shales and mudstones and it has its origin either in weathering of silicates, principally feldspars, or in alteration of other clay minerals during diagenesis. Some illite is also known from the hydrothermal environment. The mineral has been recorded from clay deposits at Surges Bay (Cole and Carthew, 1953).

ILMENITE (*Iron titanium oxide*)

$FeTiO_3$

Ilmenite is a common accessory mineral in igneous and metamorphic rocks and its physical characteristics are such that it tends to accumulate in placer deposits once released from such rocks by weathering. It is an important source of titanium and in beach sands occurs as rounded iron black grains with a metallic lustre and black streak. Ilmenite often contains magnesium and manganese in addition to iron. Petterd recorded the occurrence of the mineral at Blue Tier; Cascade; Georges Bay; Mt Claude; Denison River; Dundas; Blythe River and at the Mt Ramsay Bismuth Mine. It is also recorded from the Pieman River; south of Macquarie Harbour; Beaconsfield and at Lisle. It occurs widely in non-commercial quantities on many Tasmanian beaches and has been reported from Lymington, Gordon, Hobart, Lake Sorell, Interlaken and Upper Arthur Lake. It is abundant on Preservation Island and occurs associated with cassiterite on King Island. It is found in quartz at North Motton.

ILSEMANNITE (*Hydrous oxide of molybdenum*)

$Mo_2O_8.nH_2O$?

A blue-black mineral found coating molybdenite from near Lottah is probably ilsemannite.

IODYRITE (*Silver iodide*)

AgI

A rare pale yellow waxy secondary iodide mineral. Occurrences in small quantity at the Washington Hay Silver Mine, Heazlewood were reported.

IRIDOSMINE (*Alloy of iridium and osmium*)

OsIr

This mineral, popularly known as osmiridium is hexagonal and is usually found in the form of thin, shining tin-white scales, or irregular crystalline plates of small size. Occasionally nuggets are obtained and Tasmania has produced the largest found in the world, namely one of 4 oz 6dwt 6 grs from the Nineteen Mile Creek, Heazlewood. In 1914 ten nuggets weighing from ½ to 1¾ oz were sold at Waratah to several museums. The main producing areas have been Bald Hill, in the north-west with contributions from Mt Stewart, Badger Plains and other localities in the vicinity of the Savage and Heazlewood Rivers and Adamsfield in the south-west. Up to 1924 the north-west produced about 13,500 oz of osmiridium and from its discovery in 1925 until 1960 Adamsfield produced nearly 16,000 oz whilst the north-west added only another 2000 oz in the same period. The composition of the mineral varies slightly but an average of thirty analyses yields: 41.65% iridium, 45.51% osmium, 6.40% ruthenium, 1.12% platinum and 0.29% rhodium. The mineral has been noted from the Castray River, from the Wilson and Huskisson Rivers and creeks between them. From Boyles River near the head of the Styx River and from New River in the extreme south of the State. Most of the osmiridium is won from alluvial drifts derived from the ultrabasic complexes but at Adamsfield there has been considerable production from cemented fragmental serpentinite which appears to constitute an ancient shore-line placer.

IRON, METEORIC see METEORITES

ISERINE see ILMENITE

An old name for the iron titanium oxide, ilmenite.

IVAARITE

Invalid—This name was given to a garnet like mineral carrying 18.98% $TiO_2$ from nepheline bearing rocks in Finland. The mineral originally called ivaarite from the Port Cygnet alkaline complex has been shown to be melanite, a titaniferous variety of andradite garnet which at this locality carries 1.76% $TiO_2$ (Edwards, 1947).

JAMESONITE (*Sulphide of lead, antimony and iron*)

$Pb_4FeSb_6S_{14}$

Visual recognition of the sulpho-salts, many of which are greyish compact or matted fibrous, is often likely to be in error. Most of the specimens originally listed as jamesonite have been shown to be boulangerite by X-ray study. Berthierite from Mt Bischoff is jamesonite (Both, 1966).

JOHNSTONOTITE

Invalid—This was originally recorded as a new manganese garnet and later taken to be a variety of andradite. It has been found to have spessartite as the predominant component (Ford, 1967b).

JORDANITE (*Sulphide of lead and arsenic*)

$Pb_{27}As_{14}S_{48}$

A soft grey mineral occurring in association with tetrahedrite and sphalerite from the Electrolytic Zinc Co. mine at Rosebery. Identified from X-ray diffraction study undertaken by R. A. Both.

JOSËITE (*Intermetallic compound of bismuth, tellurium and sulphur*)

$Bi_4(Te,Se)_2S$.

This rare compound has been noted as greyish platy crystals 2 to 3 mm across occasionally associated with native bismuth at the King Island Scheelite Mine (Edwards, *et al.*, 1955).

KÄMMERERITE (*Hydrous silicate of magnesium, aluminium and chromium*)

$Mg_5(Al,Cr)_2Si_3O_{10}(OH)_8$

Invalid—Kammererite is a chromiferous chlorite which was originally reported as occurring in association with serpentine on the west coast of the State (Petterd, 1896). A. S. Wesley, Chief Chemist of the Mount Lyell Mining and Railway Co., at the time, showed the mineral to be a hydrous carbonate of magnesium and chromium. Petterd later gave the name stichtite to this mineral.

KAOLINITE (*Hydrous silicate of aluminium*)

$Al_4Si_4O_{10}(OH)_8$

This is the most common of the clay minerals and results chiefly from the weathering or hydrothermal alteration of feldspars and other silicates. Kaolinite occurs widely in the Tertiary lacustrine deposits throughout the State and is also common in areas underlain by granitic rock types as is the case in parts of the north-east, north-west and west of the State. In addition to kaolinite the names halloysite, smectite, pholerite and steargillite were originally used for distinct species. Halloysite is a hydrated form of kaolinite. Hey (1955) considers the original smectite to be identical with montmorillonite and more recently the name has been used as a group name for all clays related to montmorillonite. The smectite recorded by Petterd is not consistent montmorillonite on the basis of the analysis given and is probably largely kaolinite. Steargillite is considered to be a kaolinite-montmorillonite mixture. Numerous localities have been given for the kaolinite group minerals and these include: Killiecrankie Bay, Flinders Island; Lower Piper River; Beaconsfield; Derby; South Mt Cameron; St Helens; Middlesex; Mt Bischoff; Dundas; Mt Heemskirk; Mt Lyell; Conara; Dunrobin; Dover; Surges Bay.

KERMESITE (*Oxysulphide of antimony*)

$Sb_2S_2O$

This rare secondary antimony mineral has been reported occurring as tufts of radiating capillary crystals of very limited occurrence on fractures in jamesonite at the British Zeehan Mine, Zeehan.

KEROSENE SHALE see OIL SHALES

KILMARCOOITE

Invalid—This material was reported in the Read-Rosebery ore and was believed to be a lead zinc sulphide. It has been found to be a fine grained mixture of galena, sphalerite and other sulphides.

KNOXVILLITE

Invalid—The type mineral from Knoxville, California has been found to be a mixture of copiapite and redingtonite. The analysis of the mineral listed as knoxvillite from Salisbury, near Beaconsfield, was given as follows:

| | % |
|---|---|
| $Fe_2O_3$ | 15.86 |
| $Al_2O_3$ | 2.48 |
| $Cr_2O_3$ | 8.47 |
| $SO_3$ | 30.32 |
| Ignition loss | 40.56 |
| | 97.59 |

This is compatible with an empirical formula

$$Fe(Fe,Al,Cr)_2(SO_4)_4.22H_2O$$

which suggests that the mineral could be a chromium bearing member of the hallotrichite group of minerals.

KTENASITE (*Hydrous sulphate of copper and zinc*)

$$3(Cu,Zn)SO_4.4H_2O$$

Recorded from the Orieco Mine, Scamander, where it occurs as pale emerald-green powdery encrustations on quartz veins that usually contain azurite (Ford, R. J., *et al.*, 1970).

KUTNOHORITE (*Carbonate of calcium, manganese, iron and magnesium*)

$$(Ca,Mn,Mg,Fe)CO_3$$

This is a rare member of the dolomite group of minerals. A magnesium rich variety occurs in association with rhodochrosite, largely as recrystallised oolites and massive reniform aggregates at the margins of the sphalerite-pyrite-galena ore body of the Rosebery Mine (R. L. Braithwaite, pers. comm.).

KYANITE (*Silicate of aluminum*)

$$Al_2SiO_5$$

This metamorphic silicate crystallises in irregularly terminated, long, oblique four-sided prisms. The colour is usually very pale blue, commonly translucent but sometimes transparent. Recorded from Mt Cameron; near Hamilton-on-Forth; Claytons Rivulet; with rutile and almandite from alluvials of the Lewis and Hudson Rivers; from metamorphic rocks in the Raglan Range (Gee, 1963).

LABRADORITE (*Silicate of sodium, calcium and aluminium*)

$(Na,Ca)Al_{1-2}Si_{2-3}O_8$ $An_{50-70}$

A member of the triclinic plagioclase feldspar group commonly found in basic igneous rocks such as basalt and dolerite. Only known from Tasmania in microscopic crystals in the former rocks.

LANGITE (*Hydrous basic sulphate of copper*)

$CuSO_4.3Cu(OH)_2.H_2O$

A single specimen has been recorded from the Orieco Mine, Scamander, where it occurred as greenish blue fibres intergrown with brochantite (Ford, R. J., *et al.*, 1970).

LAUMONTITE (*Hydrous silicate of calcium and aluminium*)

$CaAl_2Si_4O_{12}.4H_2O$

This unstable monoclinic zeolite has been recorded from dolerite at Great Lake; Bronte; Wayatinah; Lutana and New Town. A partially dehydrated variety known as leonhardite also occurs at these localities. Laumontite makes up the matrix of Triassic sandstones at Wayatinah and has also been found near Cressy. The mineral has been recorded from the Hampshire Silver Mine. A specimen from the Shepherd and Murphy Mine, Moina analysed by the Geological Survey of Canada contained a trace of mercury, which was possibly present as cinnabar (Johnston, R. A. A., 1917, in litt.). It has also been found near a basalt-dolerite contact at Lune River.

LEAD (*Native metal*)

Pb

This native metal is of rare occurrence. It was reported to occur at the South Nevada and Comet Mines, Dundas.

LEADHILLITE (*Basic sulphate and carbonate of lead*)

$Pb_4(SO_4)(CO_3)_2(OH)_2$

Invalid—Specimens recorded to be this species from Dundas, Zeehan and Magnet have been examined by X-ray diffraction and found to be cerusite in some cases and anglesite in others.

LEPIDOLITE (*Hydrous silicate of potassium, lithium and aluminium*)

$K_2(Li,Al)_{5-6}Si_6Al_2O_{20}(OH,F)_4$

This lithium mica is usually of a pinkish to pale purple colour. An occurrence has been reported from a slate-igneous rock contact at Mt Ramsay.

LEPIDOMELANE see BIOTITE

This name is restricted to subspecies of biotite mica with high iron content involving both ferrous and ferric iron. It cannot be applied in the absence of a chemical analysis.

LEUCHTENBERGITE see CHLORITE

An old name once used for some iron deficient varieties of chlorite.

LEUCOCHALCITE (*Hydrous arsenate of copper*)

$Cu_2(AsO_4)(OH).H_2O$?

A small quantity of this substance was obtained as a fine fibrous coating of a milk-white colour with axinite and chalcopyrite at the Colebrook Mine near Rosebery.

LEUCOPYRITE see LOLLINGITE

An old name for the iron arsenide lollingite.

LEUCOXENE see RUTILE

LIGNITE see COAL

An alternative name for brown coal.

LILLIANITE (*Lead bismuth sulphide*)

$Pb_3Bi_2S_6$

Doubtful Validity—The mineral believed to be lillianite was found associated with bismuthinite in quartz at the Osborn Blocks, Mt Farrell. The type mineral has been shown to be a mixture of galena, bismuthinite and argentite but it appears likely that these have resulted from the breakdown of a high temperature sulphide of the composition quoted.

LIMONITE (*Mixture of hydrous iron oxides*)

This is not a mineral species but the name is useful as a field term to describe the abundant mixed hydrous oxides of iron which are generally hardened colloidal masses of the minerals goethite, lepidocrocite and hematite. This mixture of oxides is abundant wherever iron bearing minerals are weathering and is particularly common in the oxidised capping of ore shoots throughout the mineral fields of the State.

LINNAEITE (*Sulphide of cobalt*)

$Co_3S_4$

Possibly observed in microscopic studies of Mt Lyell ores. The mineral believed to be linnaeite occurs as blebs and rods through bornite from 19 Stope, 850 Level North Lyell Mine and one crystal whose outline was suggestive of octahedral form was observed. Also in the same specimen as a composite veinlet of chalcopyrite and linnaeite through tennantite (Edwards, 1939).

LITHOMARGE see KAOLINITE

An old name for the clay mineral kaolinite.

LIZARDITE see SERPENTINE

LOLLINGITE (*Iron arsenide*)

$FeAs_2$

This silvery to white metallic mineral was abundant in the ore of the Colebrook Mine, near Rosebery and has been noted in many of the mines of the North-East Dundas district.

MAGNESITE (*Magnesium carbonate*)

$MgCO_3$

This mineral usually occurs in white compact masses that often yield porcellanous conchoidal surfaces when fractured. It is not common in the State but has been recorded from serpentinite at Heazlewood; Meredith Range; Parsons Hood; Dundas and Trial Harbour. At the Victory Mine, Arthur River magnesite is associated with dolomite.

MAGNETITE (*Oxide of iron*)

$FeFe_2O_4$

This is the magnetic iron spinel which is moderately abundant throughout the west and north-west coasts. Economic deposits of pyritic magnetite occur associated with ultrabasic rocks between the Savage and Rocky Rivers. Some 150 million tons of reserves have been proven in the vicinity of the Savage River to date. Magnetite-hematite bodies in serpentine are known from Birthday Bay, S of Macquarie Harbour. Fibrous polar magnetite occurs at Serpentine Hill. Also recorded from the serpentinite at Dundas, from the Tenth Legion Mine, Zeehan where it sometimes occurs as crystals in vughs, from Mt Darwin, Mt Black, the Meredith Range, Mt Housetop, Mt Pelion, Bell Mount and the Hampshire Hills.

MALACHITE (*Basic carbonate of copper*)

$Cu_2CO_3(OH)_2$

This attractive green carbonate is generally abundant in the oxidised zones overlying copper mineralisation but is comparatively rare in this State. Thin coatings and encrustations have been reported from Lake Jukes; Mackintosh River; Heazlewood; Smithton; Badger Head; Frankford; Cascade Creek; Scamander; South King Mine, Zeehan; Mt Lyell and Mainwaring Inlet.

MALLARDITE (*Hydrous manganese sulphate*)

$MnSO_4.7H_2O$

Observed as pink stalactitic growths and efflorescent masses in old workings of the Renison Bell mine. The mineral loses water and becomes powdery when removed from the moist environment in which it forms.

MANGANITE (*Basic oxide of manganese*)

$MnO(OH)$

This material crystallises in the orthorhombic system and forms bunches of striated columnar crystals. It may also be massive and

radiating. Small bunches of well formed crystals were reported from the Hampshire Silver Mine.

MARCASITE (*Iron disulphide*)

$FeS_2$

An orthorhombic dimorph of iron sulphide which is unstable under normal surface conditions. It commonly occurs as stalactitic or concentric growths and sometimes as pseudomorphs after other sulphides such as sphalerite. It is of tin-white colour on a fresh surface but this rapidly tarnishes to bronze yellow or darker colours. Inclined to become moist and corrosive on exposure. It occurs at Renison Bell between zones of undisturbed gossan and oxidising pyrrhotite as a transition product in the formation of limonite boxworks from the former mineral. Small quantities are found in the ore of the North Cuni, near the Emu Bay railway line. It occurs after wood at Cox Bight and elsewhere and replaces Tertiary fossil-fruits in alluvials at Beaconsfield and Cape Barren Island. In the Endurance Lead it replaces wood and forms a cement in the gravels. It is associated with lignites and coals in several areas and also occurs as vesicle fillings in volcanic rocks in the vicinity of Magnet, Zeehan and elsewhere.

MARGARITE (*Hydrous silicate of calcium and aluminium*)

$Ca_2Al_4(Si_4Al_4O_{20})(OH)_4$

This is one of the rarer members of the mica group. The cleavage sheets of margarite are less elastic than those of the more common micas and for this reason it is sometimes referred to as 'brittle-mica'. It has been reported occurring sparingly in schists of the Lyell and Read-Rosebery districts.

MARIALITE see SCAPOLITE

A varietal name for sodium rich scapolite.

MARIATITE see SPHALERITE

Mariatite is an error for marmatite, an iron rich variety of the zinc sulphide sphalerite.

MARMOLITE see CHRYSOTILE

A varietal name for chrysotile no longer in use.

MASSICOT (*Oxide of lead*)

PbO

This mineral usually occurs as a yellowish powdery coating on the surface of oxidised lead ores. It was obtained in comparatively large quantity with galena, cerussite, anglesite and silver halides, at the Comet Mine, Dundas; in gossan with cerussite and galena but rarely associated with crocoite, at the Adelaide Proprietary; encrusting jamesonite and galena usually intermixed with antimonial ochre, at Madam Melba, North Dundas and in limited quantity at several of the Heazlewood and Zeehan silver-lead mines.

MATILDITE (*Sulphide of bismuth and silver*)

$AgBiS_2$

A minor constituent of the tin-tungsten ores of the Aberfoyle Tin N.L. mine and also possibly the Storeys Creek Tin Mining Co. N.L. mine near Rossarden (Edwards, 1951).

MATLOCKITE (*Fluoride-chloride of lead*)

PbFCl

A colourless to pale yellow to green tetragonal mineral which crystallises with a tabular habit. It was found as rare tabular crystals of a greenish-grey colour, associated with mixed sulphide and carbonate ores of lead at the Sylvester Mine, Zeehan; in small patches of a honey-yellow colour attached to galena at the Montana Mine, Zeehan. At the Magnet Mine it occurred as small pale yellow crystals attached to gossan in association with minute crystals of crocoite and purplish chalcophanite.

MAUCHERITE (*Arsenide of nickel*)

$Ni_{12-x}As_8$

A greyish metallic mineral, tarnishing coppery red. Observed in association with niccolite and gerdorffite from the Central Balstrup Lease, Zeehan (Williams, 1958).

MAWSONITE (*Sulphide of copper, iron and tin*)

$Cu_7Fe_2SnS_{10}$

A new mineral from the Mt Lyell ore previously called 'orange bornite' by mineragraphers. Electron probe analysis yielded Cu 44.3%, Fe 10.4%, Sn 33.0% (Markham and Lawrence, 1965).

MELACONITE see TENORITE

An old name for the commonly occurring massive form of the copper oxide tenorite.

MELANITE see ANDRADITE

A titanium bearing variety of the garnet andradite.

MELANOCHROITE see PHOENICOCHROITE

An old name for the basic lead chromate phoenicochroite.

MELANTERITE (*Hydrous sulphate of iron*)

$FeSO_4.7H_2O$

A greenish sulphate mineral which becomes yellowish white on exposure to dry air and which has a sweetish, astringent, metallic taste. Reported to occur with copiapite at Mt Bischoff and also in pyritiferous mudstones north of Kingston Beach (Paxton, 1968); also found at Silver Crown Mine, Zeehan; Blue Tier near Beaconsfield; Tasmania Gold Mine and Renison Bell.

MELILITE (*Silicate of calcium, sodium, potassium, magnesium, iron and aluminium*)

$(Ca,Na,K)_2(Mg,Fe,Al,Si)_3O_7$

The original record of this mineral from Sandy Bay has been discredited (Aurousseau, 1926). Melilite has been recorded from the basic rocks at Shannon Tier where it occurs as grains and pellets about 3 mm across in melilite-fasinite and as bladed crystals about 2 mm in length in melilite-basalt (Edwards, 1950).

MENACCANITE see ILMENITE

A varietal name for iron rich ilmenite.

MENEGHINITE (*Sulphide of lead and antimony*)

$Pb_{13}Sb_7S_{23}$

A rare sulpho-salt mineral previously only recorded in Australia from Broken Hill, N.S.W. The mineral occurs as massive lead grey aggregates of prismatic habit intergrown with chalcopyrite and pyrite in quartz from No. 8 level of the Electrolytic Zinc Co. mine at Rosebery. Also as closely intergrown slender striated needles of felted appearance in vughs in the former material (Williams, 1960).

MERCURY see LAUMONTITE

MESOLITE (*Hydrated silicate of sodium, calcium and aluminium*)

$Na_2Ca_2(Al_2Si_3O_{10})_3 8H_2O$

Doubtful Validity—The occurrence of this zeolite has not been confirmed during extensive studies of zeolites and it is thought that the mineral referred to may be other fibrous zeolites or gyrolite (F. L. Sutherland, pers. comm.).

METEORITES

Considerable interest is generally shown in the discovery of these extra-terrestrial materials and, whilst they are not mineral species, a record of Tasmanian occurrences is included in this text.

Meteorites are broadly classified according to their content of metal and silicates. The main metals are iron and nickel which occur as two different alloys whilst the silicates are chiefly pyroxenes, olivine and plagioclase feldspars. Graphite is fairly common and a number of sulphides, phosphides and carbides also occur. The three main divisions of meteorites are the siderites (irons), siderolites (stony irons) and aerolites (stones) and each of these includes a number of subdivisions. Most of the meteorites found in Tasmania have been siderites and these have been recorded from: Cascades, Hobart; Blue Tier, north-east Tasmania; Lefroy; Castray River, SW of Waratah and Adamsfield. Fragments of schreibersite,

a phosphide of iron, nickel and cobalt which is a constituent of some meteorites have been recorded from the Fury River, NE of Tullah and an aerolite classified as an enstatite-olivine-chondrite was found at Moorleah, near Wynyard.

MICA GROUP

The micas are important constituents of many rock types. They show considerable variation in chemical and physical properties but all are characterised by a platy morphology and perfect basal cleavage. They all crystallise in the monoclinic system but have a pseudo-hexagonal habit. A general formula for the composition of the micas may be written as $X_2Y_{4-6}Z_8O_{20}(OH,F)_4$ where X is usually potassium, sodium or calcium, Y is aluminium, magnesium or iron and Z is silicon or aluminium. On this basis the following are members of the mica group recorded from Tasmania—

| *Name* | X | Y | Z |
|---|---|---|---|
| Muscovite | $K_2$ | $Al_4$ | $Si_6Al_2$ |
| Paragonite | $Na_2$ | $Al_4$ | $Si_6Al_2$ |
| Glauconite | (K,Na) | $(Fe,Mg,Al)_4$ | $Si_7Al$ |
| Margarite | $Ca_2$ | $Al_4$ | $Si_4Al_4$ |
| Phlogopite | $K_2$ | $(Mg,Fe)_6$ | $Si_6Al_2$ |
| Biotite | $K_2$ | $(Mg,Fe,Al)_6$ | $Si_{6-5}Al_{2-3}$ |
| Lepidotite | $K_2$ | $(Li,Al)_{5-6}$ | $Si_{6-5}Al_{2-3}$ |
| Zinnwaldite | $K_2$ | $(Fe,Li,Al)_6$ | $Si_{6-7}Al_{2-1}$ |

Details of these minerals are given under their alphabetical listing.

MICROCLINE (*Silicate of potassium and aluminium*)

$KAlSi_3O_8$

It was reported that this triclinic potash feldspar occurs abundantly in the hypersthene granite in the vicinity of St Marys Pass. Much of the potash feldspar recorded originally as orthoclase is microcline.

MILLERITE (*Sulphide of nickel*)

NiS

This pale brass-yellow hexagonal sulphide usually occurs in very slender to capillary crystals often arranged in radiating groups. It has been reported that millerite occurs: with pentlandite near Leslie Junction, Dundas; from the 5 mile Cuni deposits, Zeehan; from serpentinite near the Colebrook Mine; with galena and other minerals at the Penguin Mine; from the Blue Tier, near Beaconsfield; from serpentinite at Adamsfield.

MILOSCHITE (*Hydrated silicate of aluminium with chromium*)

Formerly recorded as miloshinite this is a poorly defined clay mineral of similar composition to allophane but carrying chromium in addition. It is a soft clay-like pulverant or earthy mixture which is coloured various shades of green by chromium and is also called chromic ochre as a result. It has been recorded from the Blue Tier, near Beaconsfield; near Mt Claude; at Dundas; and at Zeehan.

MIMETITE (*Arsenate and chloride of lead*)

$Pb_5(AsO_4)_3Cl$

A colourless, pale yellow to yellowish brown, hexagonal secondary mineral occurring in the oxidised zone of lead deposits which also contain arsenic. It has been recorded from: Hampshire Silver Mine; Magnet Mine; Hercules Mine, Mt Read; Britannia and other mines in the Zeehan district; North-East Dundas. Some brownish-green to deep orange mimetite containing a little chromium was recorded as being of rare occurrence at the Magnet Mine.

Campylite is a varietal name originally applied to phosphatian mimetites in which growth distortions have produced a curved barrel-like crystal habit. This feature is not restricted to any particular composition however and any member of the pyromorphite-mimetite series may crystallise as campylite. Small crystals of the variety have been recorded from the Britannia Mine, Zeehan and from near Williamsford on Mt Read. The varietal name petterdite was applied to an alleged white to pale grey mimetite from the same mine but this has been found to be adamite.

MINIUM (*Oxide of lead*)

$Pb_3O_4$

It was reported that this scarlet to brownish red massive oxide of lead occurred at the Magnet Mine; the Whyte River Mine; at the Long Tunnel Mine, Castray River and possibly at the Adelaide Proprietary Mine, Dundas.

MIRABILITE (*Hydrous sulphate of sodium*)

$Na_2SO_4.10H_2O$

A colourless to white monoclinic salt which crystallises with prismatic or tabular habit but is more commonly found as efflorescent masses. It has a feebly saline taste which becomes bitter. Mirabilite occurs in proximity to saliferous rocks as coatings on the walls of caves and under shelving rocks. It has been recorded from the Alum Cliffs, Mersey River; near Chudleigh; Australasian Slate Quarry, Back Creek and also from the vesicle fillings in basanite at Sandy Bay (Aurousseau, 1926).

MIZZONITE see SCAPOLITE

MOLYBDENITE (*Molybdenum disulphide*)

$MoS_2$

This is a lead grey, soft, laminar sulphide with a greasy feel. It is hexagonal in crystallisation and generally forms hexagonal plates or short prisms. Well formed crystals are not common in the State but they have been rceorded from Cape Barren Island, the Blue Tier, near Weldborough and from the Shepherd and Murphy Mine, Moina. Occasionally the mineral is obtained coated with a thin layer of ferrimolybdite and examples in matrix from near Lottah show decomposition to the distinctive blue-black ilsemannite. Molybdenite has been recorded in association with cassiterite from Blue

Tier and Ruby Flat, with magnetite and amphibole 6 miles E of Hampshire and with garnet and hornblende at Whyte River. Also noted from King Island; Flinders Island; Mt Remus; Mt Stronach; Mt Pelion Mine, Douglas Creek; Lorinna; Hogarty River; Interview River; Mt Heemskirk; Old Royal Tharsis open cut; North Prince Lyell; Cox Bight and Schouten Island.

MOLYBDITE see FERRIMOLYBDITE

An old name for the hydrated ferric molybdate, ferrimolybdite.

MONAZITE (*Phosphate of rare earths and thorium*)

$(Ce,La,Th)PO_4$

Monazite was first recorded from Tasmania by Professor Stelzner of the Freiberg Mining Academy, Saxony, in lode material of the West Bischoff Tin Mine around 1893. It has since been noted in lode occurrences in other mines of the Mt Bischoff district and also from mines of the Moina, Mt Claude and Lorinna areas.

Detrital monazite has been recorded from most of the streams draining granite in Tasmania. The mineral occurs with cassiterite in placers derived from outcrops of Devonian granite in north-eastern Tasmania. Along the Ringaroma River and in the Scottsdale district the monazite and cassiterite are accompanied by tourmaline, topaz, corundum and zircon. The composition of monazite from the Scottsdale district (Wylie, 1950) is given below:

| | % |
|---|---|
| $Ce_2O_3$ | 26.7 |
| $La_2O_3$ | 14.4 |
| $Na_2O_3$ | 11.0 |
| $Pr_2O_3$ | 3.23 |
| $Sm_2O_3$ | 2.72 |
| $ThO_2$ | 7.29 |

Attempts around 1900 to mine these placers failed because the concentrates yielded only 2% $ThO_2$. Black sand reported to contain titaniferous minerals, zircon, monazite, cassiterite and gold were mined at Low Head in 1941. Detrital monazite occurs in the Stanley River tin field north of Zeehan but the mineral has not been observed in the cassiterite veins. It is abundant at the North Heemskirk tin field but rare in the South Heemskirk placers. At Yellow Band Plain about 10 miles S of Mt Cleveland monazite carrying 20-30% rare earths and 5-6% $ThO_2$ is widespread in stream placers. Monazite from beach sands on King Island yield the following analysis (Wylie, 1950)—

| | % |
|---|---|
| $Ce_2O_3$ | 28.3 |
| $La_2O_3$ | 16.8 |
| $Nd_2O_3$ | 11.0 |
| $Pr_2O_3$ | 3.12 |
| $Sm_2O_3$ | 2.72 |
| $ThO_2$ | 6.09 |

On the east coast the mineral is known from the south side of Mount Stronach, from the Pioneer Tin Mine, Roses Tier, South Esk Tin Mine and from beach sands along the coast.

MONTICELLITE (*Silicate of calcium and magnesium*)

$CaMgSiO_4$

This was originally referred to by Tilley (1927) as 'shannonite' a possible new mineral related to olivine but later shown by him (1928) to be monticellite. It occurs as rims around olivine in monticellite-nepheline-basalt from the Shannon Tier (Edwards, 1950).

MONTMORILLONITE (*Hydrous silicate of sodium magnesium and aluminium*)

$Na_7(Al_{3.3}Mg_{0.7})Si_8O_{20}(OH)_4.nH_2O$

This is the type member of a group of clay minerals which show a marked tendency to take up water ('swelling clays') and have high cation exchange capacity. Originally recorded from the vicinity of Chudleigh they are common as joint fillings in dolerite and basalt throughout Tasmania. They are particularly well exposed by Hydro-Electric Commission excavations in the Central Plateau region but have not been found in commercial quantities. Montmorillonite also occurs in bentonite bands in Permian limestones (Hale and Brill, 1955).

MORENOSITE (*Hydrous sulphate of nickel*)

$NiSO_4.7H_2O$

A greenish white to apple-green orthorhombic salt with a metallic astringent taste. This mineral was reported to have been found in small quantity in one of the old mine levels at the Blue Tier, near Beaconsfield where it was associated with other sulphates. It has also been noted in weathered ultra-basic rocks to the north-west of Birch Inlet on the west coast.

MOSANDRITE (*Hydrous silicate of calcium, sodium, cerium, titanium and zirconium*)

$NaCa_6Ce_2(Ti,Zr)_2Si_7O_{24}.(OH,F)_7$

Doubtful Validity—This mineral was originally reported in 'Garnetiferous mica—solvsbergite' of the Port Cygnet alkaline complex but its presence has not been confirmed by later studies.

MUSCOVITE (*Hydrous silicate of potassium and aluminum*)

$K_2Al_4Si_6Al_2O_{20}(OH,F)_4$

This is the common white mica which is found in acid igneous rocks (although it is less common than biotite in these), pegmatites, aplites and greisens. It occurs in a wide range of regionally metamorphosed rocks but is not common in sedimentary rocks where most of the fine grained micaceous material consists of 'mixed layer' silicates composed of several mineral species. Fairly large sheets of muscovite have been recorded from pegmatite at Killi-

krankie Bay, Flinders Island and the mineral is known from all the granitic areas of the State. The name sericite is generally applied to fine grained white mica which occurs in fibrous aggregates with a silky lustre. It is common in some metamorphic rocks such as those of the Lyell and Read-Rosebery districts and the name is also applied to some sedimentary micaceous minerals. Massive varieties of muscovite carrying chromium have a distinctive green colour. Where only a trace of chromium is present they are referred to as chrome-muscovite but where there is an excess of 1% $Cr_2O_3$ the mica is given the varietal name fuchsite. These micas are abundant throughout the west coast mineral fields and their content of $Cr_2O_3$ may reach 3%.

Other massive varieties of muscovite are less distinctive. The name damourite is now applied to a number of fine grained massive muscovites which includes the damourite originally recorded from Mt Lyell and the gilbertite which occurs at the Shepherd and Murphy Mine, Moina where it often contains crystals of cassiterite and less commonly wolframite. It is abundant in most of the tin mines of Ben Lomond and Blue Tier districts. Pinite is another massive mica which is included under damourite and is derived from other silicates. It is usually found in admixture with other products of the alteration. This variety is also common in the north-east tin and gold fields.

NATROJAROSITE (*Basic sulphate of sodium and iron*)

$NaFe_3(SO_4)_2(OH)_6$

Occurs as yellow powdery coatings on the adit walls and within fractures in the fault zone at the Orieco Mine, Scamander (Ford, R. J., *et al.*, 1970).

NATROLITE (*Hydrous silicate of sodium and aluminium*)

$Na_2(Al_2Si_3O_{10}).2H_2O$

The original records of this mineral are in some doubt. Natrolite forms a bristly overgrowth on gonnardite in nephelinite 2 miles SW of Scottsdale. It occurs as large radiating spherules in basalts around Marrawah and Redpa. Also known from basalts in the Tamar Valley and at Breadalbane. At Bonney's Quarry, South Burnie radiating groups of composite crystals of acicular natrolite tipped with analcite average 2 mm in length.

NEPHELINE (*Silicate of sodium, potassium and aluminium*)

$Na_3K(Al_4Si_4O_{16})$

This mineral is abundant in the alkaline basic Tertiary volcanics in Tasmania. It has been recorded from Sandy Bay, at the Nipples and several other localities in the Midlands, at Shannon Tier, the Briseis Mine, Derby, near Legerwood, Branxholm and Scottsdale. Also known from the Forth Gorge and from Circular Head (Edwards, 1950). The original reference to nepheline at Port Cygnet has been shown to be incorrect and the mineral identified as hauyne (Edwards, 1947).

NICCOCHROMITE (*Dichromate of nickel*)

$NiCr_2O_7$?

Invalid—The type mineral from Texas, Pennsylvania was established on the basis of partial blow-pipe analysis only which is not acceptable proof of a new species. The yellow powdery substances recorded from Heazlewood and Trial Harbour contained nickel but nothing else is known about their composition.

NICCOLITE (*Nickel arsenide*)

NiAs

A pale coppery-red hexagonal arsenide which tarnishes grey to black and which quickly becomes coated with the secondary mineral annabergite on exposure to moist air. An older name for the species was kupfernickel—an allusion to the colour as the mineral contains no copper. Niccolite has been recorded from a locality about 10 miles from Leslie Junction, Dundas; from Mt Agnew; from the Central Balstrup Lease, Zeehan and from the Rocky River Mine.

NONTRONITE (*Hydrous silicate of calcium, sodium, aluminium and iron*)

$(Ca,Na)_{0.7}Fe_4(Si,Al)_8O_{20}(OH)_4.nH_2O$

An iron rich member of the montmorillonite group of clay minerals which is also known as chloropal. The mineral is abundant as unctuous, powdery or splintery masses of highly variable colour (blue, green, yellow, red-brown, brown and black) in cavities in Tertiary volcanic rocks at the Liawenee Canal, near Gads Hill, Sheffield, Scottsdale, Marrawah-Redpa and elsewhere. Dark green nontronite occurs in joints in Jurassic dolerite at the Giblin Street Quarry, Hobart. It is found in sandstone at Kingston; in the Grange Quarry, Taroona; near New Norfolk; at the Leura Mine, Back Creek as veins in magnetite; at Hampshire and also from Bell Mount, Middlesex.

NOSEAN (*Silicate of sodium and aluminium with sulphate*)

$Na_8Al_6Si_6O_{24}.SO_4$

Doubtful Validity—This mineral, now usually called nosean was reported from Mt Livingstone, Port Cygnet but extensive studies of the rock complex have failed to confirm its presence.

OBSIDIANITES see AUSTRALITES

OIL SHALES

An oil shale which is rich in the fossil *Tasmanites punctatus* and therefore called locally 'tasmanite' occurs near West Takone, Oonah, Dulverton, Latrobe, Kimberley, Beulah, Chudleigh and Quamby Brook. The tasmanite horizon consists of pebbly and pyritic shale and contains marine fossils as well as *Tasmanites*. The oil shale member is not a facies variant of the Mersey Coal Measures as has been suggested by earlier writers but occurs much lower in the Permian sequence.

The tasmanite beds are not oil-bearing but contains an oil-producing substance that requires heat for the generation of oil. The oil is contained in the tiny disc-like spore cases set in a fine grained matrix.

The first production of oil was in 1910, when the Tasmanian Shale and Oil Company erected four retorts and obtained 4,800 gallons of oil. The industry has had a chequered career. Many companies operated intermittently between 1910 and 1934 and produced 357,115 gallons of oil from 41,572 tons of shale. The shale seam ranges in thickness up to 6 feet but generally it does not exceed 5 feet and in some areas is less than this. The oil yield on distallation depends upon the numbers of spores present in the shale: in the richest shale 59.2 gallons per ton of oil has been recovered whilst in the poorest band the yield was only 3.6 gallons per ton. Insufficient information is available to determine the average yield for the shale and various figures have been adopted in the past.

An estimate of the reserves of the shale is:—

| *Area* | *Tons* |
|---|---|
| Latrobe-Railton-Kimberley Area | 17,895,000 |
| Beulah | 2,346,750 |
| Quamby Bluff | 3,750,000 |
| Nook | 1,050,000 |
| Chudleigh | 6,000,000 |
| TOTAL | 31,041,000 |

If the average yield of oil from the shale is taken as 27 gallons per ton the oil reserve therefore amounts to 838,107,000 gallons.

Kerosene shale occurs at Preolenna. This is distinct from the tasmanite and occurs interbedded with the Mersey Coal Measures. The reserves of this material are very small compared with the tasmanite.

OLIGOCLASE (*Silicate of sodium, calcium and aluminium*)

$(Na,Ca)\,Al_{1-12}Si_{3-2}O_8 \quad An_{10-30}$

A sodium rich member of the triclinic plagioclase feldspars. Oligoclase is common in the granitic rocks of the north-east and elsewhere; in sanidine-garnet-porphyries of the Port Cygnet alkaline complex (Edwards, 1947) in oligoclase basalt in the south-east of the State and e'sewhere (Edwards, 1950).

OLIVINE (*Silicate of magnesium and iron*)

$(Mg,Fe)_2SiO_4$

This is a greenish orthorhombic mineral usually found as granular glassy aggregates. It is a common accessory mineral in the Cainozoic basalts of the State and also occurs in many of the ultra basic rock masses. The olivines may be considered members

of a series extending from forsterite, $Mg_2SiO_4$, to fayalite, $Fe_2SiO_4$ those occurring in the basalt range in composition from 55-94% forsterite. Fayalite was recorded from basaltic rocks at Sandy Bay but this has been discredited. Forsterite has been described from granophyric rocks related to Jursasic dolerite at Red Hill, SW of Margate (McDougall, 1962). Olivine ranging from 46% to 73% forsterite has been noted from ultrabasic hornfelses in the Trial Harbour district (Green, *op. cit.*).

OMPHACITE (*Silicate of calcium, sodium, magnesium, iron and aluminium*)

$$(Ca,Na)(Mg,Fe,Al)Si_2O_6$$

This is a somewhat rare, dense, green pyroxene which is restricted in occurrence to eclogites and closely related rocks. It has been recorded from eclogite on the Lyell Highway 21½ miles E of Queenstown and also on the northern side of Mary Creek Plains (Spry, 1963).

ORTHITE see ALLANITE

ORTHOCLASE (*Silicate of potassium and aluminium*)

$$KAlSi_3O_8$$

This monoclinic potassium feldspar is an essential constituent of the acid and alkaline igneous rocks. It is abundant in granites, granodiorites, syenites and their volcanic equivalents. It is also common in acid pegmatites, some hydrothermal veins, high grade metamorphic rocks and sedimentary rocks such as arkose and feldspathic sandstone. The largest crystals recorded were up to 10 cm in length and these were found in pegmatite at Killiecrankie Bay, Flinders Island. Orthoclase is common, in association with microcline in the granitic rocks of the State and some of the more striking occurrences reported were those from the vicinity of the Great Republic Mine, Ben Lomond; Mt Stronach near Scottsdale; near George Bay; Mersey River in the vicinity of Gads Hill; Wombat Hill, near Waratah and on the Harman River near Parsons Hood.

OSMIRIDIUM see IRIDOSMINE

Although the name osmiridium is firmly entrenched in Tasmanian literature and vocabulary for the natural osmium-iridium alloy it is incorrect. There has been some confusion in text books over the terminology for these alloys. For the Tasmanian material osmium is in excess of iridium (siserkerite of Palache, *et al.*, 1944) and is also in excess of 35% (iridosmine of Hey, 1955). The United States Geological Survey consider the natural alloys to fall into two structural types which are the hexagonal iridosmine-osmium series and the cubic osmiridium series. Iridosmine carries 20-68% iridium and the Tasmanian material with iridium at about 40% falls into this category.

PARAGONITE (*Hydrous silicate of sodium and aluminium*)

$Na_2Al_4Si_6Al_2O_{20}(OH,F)_4$

This mineral is the major constituent of an alteration product of topaz at the Shepherd and Murphy Mine, Moina which was originally called achlusite. The X-ray pattern is similar to that of muscovite and if the original analysis is corrected for the presence of fluorite the following results:

| | % |
|---|---|
| $SiO_2$ | 42.6 |
| $Al_2O_3$ | 38.8 |
| MgO | 0.8 |
| $K_2O$ | 2.4 |
| $Na_2O$ | 6.6 |
| Ignition loss | 8.8 |

This is consistent with the material being largely paragonite.

PARGASITE see HORNBLENDE

PECTOLITE (*Silicate of calcium and sodium*)

$Ca_2NaHSi_3O_9$

This mineral has been recorded as occuring in fibrous, white, radiating bunches with a silky lustre on the Upper Emu River. The original record of pectolite from Port Cygnet has not been confirmed.

PELIONITE

Invalid—An unnecessary name for a cannel coal of no economic significance.

PENNINITE see CHLORITE

PENTLANDITE (*Sulphide of nickel and iron*)

$(Fe,Ni)_9S_8$

This is a light bronze-yellow isometric sulphide. It was originally recorded from near Leslie Junction, Dundas with pyrite and pyrrhotite and also near Mt Agnew. It is associated with pyrrhotite-chalcopyrite at the Five-Mile Cuni, Zeehan; at Heazlewood and Trial Harbour with heazlewoodite which was formerly believed to be only a variety of pentlandite; also near Birch Inlet.

PEROVSKITE (*Essentially a titanate of calcium with sodium iron cerium and niobium*)

$(Ca,Na,Fe,Ce)(Ti,Nb)O_3$

This rare mineral occurs as an abundant accessory in the melilite-fasinite and melilite-basalt at the Shannon Tier as microscopic yellowish-red grains and crystals (Edwards, 1950).

PETTERDITE see ADAMITE

PHACOLITE see CHABAZITE

PHARMACOSIDERITE (*Hydrous arsenate of iron*)

$Fe_3(AsO_4)_2(OH)_3.5H_2O$

An olive-green to brown isometric mineral which generally crystallises as cubes with tetrahedral modifications and which has a resinous to adamantine lustre. It was reported that pharmacosiderite occurred as drusy coatings of cavities in auriferous quartz reefs of the north-east gold fields, particularly those rich in arsenopyrite. It has also been recorded from the Magnet Mine where is occurred in cellular gossan, and from the Orieco Mine, Scamander where it occurs as olive-green veinlets and powdery coatings associated with arsenopyrite, malachite and azurite (Ford, R. J., *et al.*, 1970).

PHILLIPSITE (*Hydrous silicate of calcium, sodium, potassium and aluminium*)

$(Ca,Na,K)_3Al_3Si_5O_{16}.6H_2O$

This is a common white monoclinic zeolite which usually crystallises as complex twin crystals. It is found in many basaltic rocks in the north-east and north-west of the State. Small complex twins and radiating aggregates of unusual stalatitic or coralline form have been reported from nephelinite, 2 miles SW of Scottsdale; phillipsite has also been recorded from Springfield in the north-east. Cruciform twins have been noted at Maggs Mountain and in the vicinity of Gads Hill. Also from Sheffield, Bell Mount, the Hellyer River and Cape Grim.

PHLOGOPITE (*Hydrous silicate of potassium, magnesium, iron and aluminium*)

$K_2(Mg,Fe)_6Si_6Al_2O_{20}(OH,F)_4$

This is the magnesium rich mica which occurs mainly in metamorphosed dolomitic rocks and in ultrabasics. The mineral has been recorded from the wall rock of the King Island Scheelite mine (Edwards, *et al.*, 1956) and from Trial Harbour where it occurs in magnesia rich tuffs and in ultrabasic hornfelses (Green, 1966). At Mt Bischoff it has been produced by alteration of dolomitic rocks and it has also been reported from Mt Heemskirk; Mt Agnew; the Upper Emu River, near the Hampshire Hills; and the Anchor Mine, Blue Tier.

PHOENICOCHROITE (*Basic chromate of lead*)

$Pb_2(CrO_4)_2O$?

The name melanochroite formerly used for this species has been dropped as 'melano' is indicative of black colour which is not the case. This form of lead chromate differs from crocoite mainly in its darker colour and brick-red streak. Judging from the small quantity obtained, it appears to have been of rare occurrence. That originally recorded was found on some specimens of ferro-manganese gossan from the Adelaide Proprietary Mine, at Dundas. It occurred in small massive patches, mixed with larger masses of crocoite and flakes of galena.

PHOLERITE see KAOLINITE

PHOSGENITE (*Chloride and carbonate of lead*)

$Pb_2(CO_3)Cl_2$

A white, brownish or greenish tetragonal secondary lead mineral with an adamantine lustre which usually crystallises with a prismatic habit. A number of attractive specimens were obtained from the Comet Mine, Dundas and it also occurred at the Adelaide Mine, Dundas and the Magnet Mine, near Waratah.

PICKERINGITE see ALUNOGEN

PICOTITE (*Oxide of iron, aluminium and chromium*)

$Fe(Al,Cr)_2O_4$

This spinel is a chomium rich hercynite containing more aluminium than chromium and Fe : Mg in the ratio 3 to 1. The original reports of picotite in a websterite dyke at Magnet and in alluvials at the Heazlewood River have not been confirmed. As chemical data are lacking it is not certain that this particular variety does in fact occur at the localities named. It is also stated to occur in the Kingston-Longley area.

PICROLITE see SERPENTINE

PIGEONITE (*Silicate of magnesium, calcium and iron*)

$(Mg,Fe,Ca)(Mg,Fe)Si_2O_6$

This clinopyroxene is very similar in appearance to augite and occurs associated with it in the Tasmanian dolerites. The cores of pyroxene crystals in some Tertiary basalts are also of pigeonite. Chemically it contains less alumininum than augite and it is distinguished by its differing optical properties.

PILOLITE (*Hydrous silicate of magnesium and aluminium*)

$Mg_4Al_2Si_{10}O_{27}.15H_2O$

Invalid—Originally recorded at pilotite, a 'hydrated silicate of aluminium and manganese'. Material in the Petterd Collection from Mt Bischoff bearing this name is talc, pseudomorphous after a fibrous silicate.

PIMELITE (*Hydrous silicate of magnesium and aluminium*)

$Mg_3(Si,Al)_2O_5(OH)_4$

Invalid—The type material is now considered a serpentine. That recorded from Heazlewood and Trial Harbour has been shown by X-ray study to be a chrome bearing hydromica, possibly illite.

PINITE see MUSCOVITE

PISANITE (*Hydrous sulphate of iron and copper*)

$(Fe,Cu)SO_4.7H_2O$

This mineral occurs rarely as greenish blue felt-like coatings and granular encrustations on the surface of mylonitic material of

the major fault zones at the Orieco Mine, Scamander (Ford, *et al.*, 1970).

PISTOMESITE see SIDERITE

PITTICITE (*Hydrated arsenate and sulphate of iron*)

$Fe_2(AsO_4)(SO_4)(OH).nH_2O$

This near black massive mineral with a greasy lustre, apparently derived from the alteration of arsenopyrite, has been recorded from near the Scamander River and from Mt Pelion. At North-East Dundas it was found as an intense brown coating on niccolite. The mineral often contains other substances in admixture and the analyses vary widely.

PLAGIONITE (*Sulphide of lead and antimony*)

$Pb_5Sb_8S_{17}$

Invalid—The material identified as plagionite from Heazlewood has been shown by X-ray study to be a fine grained mixture of galena, sphalerite and quartz.

PLATINUM (*Native metal*)

Pt

Doubtful Validity—Although this metal has been reported from several areas at which iridosmine occurs none of the claims have been confirmed.

PLEONASTE (*Oxide of magnesium, iron and aluminium*)

$(Mg,Fe)Al_2O_4$

This spinel group mineral is essentially a mixture of spinel and hercynite in which the Mg : Fe ratio may range from 1 to 3. It has been recorded from hornfelses against ultrabasics at Trial Harbour where the composition of the pleonaste is 55% spinel, 35% hercynite and 10% chromite (Green, 1966). The mineral has also been reported from alluvial deposits at Weldborough, Moorina, Branxholm, Mt Cameron, Hampshire, Blythe River, the Denison gold field and Sea Elephant River, King Island. Xenocrysts of a spinel, possibly pleonaste, occur in Cainozoic basalts at Corra Linn and elsewhere.

PLINTHITE

Invalid—The material given this name is not a mineral species but a clay mixture pigmented with iron oxides.

PLUMBOGUMMITE (*Hydrous basic phosphate of lead and aluminium*)

$PbAl_3(PO_4)_2(OH)_5.H_2O$

This rare secondary lead mineral occurs in stalactitic and irregular globular and botryoidal forms of a pale-brown colour, with a resinous lustre on partially decomposed galena at the British-Zeehan Mine, Zeehan.

POLYSPHAERITE see PYROMORPHITE

PORCELLANITE

Invalid—Not a mineral species. The name was applied to indurated impure clays.

POTASH ALUM (*Hydrous sulphate of potassium and aluminium*)

$KAl(SO_4)_2.12H_2O$

Reported to occur in pyritiferous mudstones north of Kingston Beach (Paxton, 1968).

POWELLITE (*Calcium molybdate*)

$CaMoO_4$

Found occasionally as coatings on molybdenite in partially oxidised ore from the King Island Scheelite Mine (Edwards, *et al.*, 1956).

PREHNITE (*Hydrous silicate of calcium and aluminium*)

$Ca_2Al_2Si_3O_{10}(OH)_2$

This green to grey translucent zeolite-like mineral has been recorded from altered gabbros at Beaconsfield. The prehnite replaces plagioclase and occurs as tubular crystals, sheaf-like aggregates and rosettes which sometimes give the imperfect columnar 'bow-tie' appearance, characteristic of the mineral (Baker, 1959). It occurs in veins as an alteration product in granites in the north-east of the State and in dolerite at Eureka Plains, 15 miles NW of Zeehan (Spry, 1958). The mineral has also been noted from calc-silicate hornfels at the contact between Permian sediments and dolerite at Collinsvale (Sutherland, 1964a).

PROSOPITE (*Hydroxy-fluoride of calcium and aluminium*)

$CaAl_2(F,OH)_8$

Occurs as a white to greyish massive granular mineral and also as monoclinic crystals which have resulted from the hydro-thermal replacement of topaz in topaz-porphyry at Mt Bischoff. The mineral is partially altered to a mixture of kaolin and fluorite (Weston-Dunn, 1922).

PROUSTITE (*Sulphide of silver and arsenic*)

$Ag_3AsS_3$

This is an attractive adamantine scarlet-vermilion coloured translucent hexagonal mineral which usually crystallises with prismatic habit and is also found massive. Proustite has been recorded from Bells Reward and Long Tunnel Mines, Heazlewood; with native silver at Magnet Mine, near Waratah; North Farrell Mine, Tullah; Hercules Mine, Mt Read; with pyrargyrite, British-Zeehan Mine, Zeehan. In most cases the mineral occurred as thin coatings although rare crystals were reported from the Magnet Mine.

PRZIBRAMITE see SPHALERITE

PSILOMELANE (*Basic oxide of manganese and barium*)

$BaMn_9O_{16}(OH)_4$

This black massive mineral usually occurs in botryoidal and stalactic form in cavernous gossan that is abundant throughout the north-west and west coast mining fields. It has been recorded from Penguin, Magnet, Heazlewood and Dundas.

PYCNITE see TOPAZ

PYRARGYRITE (*Sulphide of silver and antimony*)

$Ag_3SbS_3$

This is very similar to proustite. It is an adamantine, deep-red hexagonal mineral which is inclined to be less translucent than proustite. Pyrargyrite and proustite are often referred to as the 'ruby-silver' minerals. It has been reported to have occurred at the Magnet Mine, associated with galena and native silver and occasionally was found as small crystals. Also from the Confidence Mine, near Waratah; Mt Stewart Mine, Heazlewood; Mt Farrell Mine, Tullah; Hercules Mine, Mt Read; Oonah and British-Zeehan Mine, Zeehan.

PYRITE (*Iron disulphide*)

$FeS_2$

A pale brass-yellow isometric mineral which often occurs as crystals of cubic, dodecahedral (pyritohedral) or octahedral habit. Pyrite is the most common of the sulphide minerals. It is formed under a very wide range of geological conditions including hydrothermal activity, as primary and secondary minerals in igneous and sedimentary rocks, in metamorphic rocks and as the result of volcanic activity. Crystals of pyrite have been found at most of the mines throughout the State. Some of the better examples were recorded from the Curtin-Davis Mine, Dundas; the Ring River, North-East Dundas; Federation Mine, Mt Heemskirk; Montana Mine, Zeehan; and the Stanley River, W of Renison Bell. Massive granular pyrite has been recorded from Mt Lyell; Mt Read; Mt Kershaw, N of the Pieman River; Savage River; Dial Range; Forth River and many other places. Dispersed pyrite is associated with nearly all metalliferous deposits around the State and is also found in many igneous, sedimentary and metamorphic rocks.

PYROCHLORE (*Complex hydrous oxide of sodium, calcium, niobium and tantalum with fluorine*)

$NaCa(Nb,Ta)_2O_6(F,OH)$

Invalid—The mineral originally recorded as pyrochlore from Table Cape does not contain niobium or tantalum and is thus not this species. The occurrence recorded from the Port Cygnet alkaline complex has not been confirmed by later work.

PYROLUSITE (*Manganese dioxide*)

$MnO_2$

This mineral usually occurs as bluish-black to iron-black pulverulant masses of columnar or fibrous structure which soil the

fingers. It is a tetragonal mineral which crystallises with prismatic habit but which is rarely found crystallised. The localities from which pyrolusite have been recorded are: Vale of Belvoir, Mt Claude; Penguin River; Dial Range; Meredith Range; Pieman River; Dundas; Zeehan; Fingal. At the Balstrup Manganese Hill Mine, Zeehan it was reported that small crystals occurred within the more profuse radiating masses. Alluvial drift in many localities is cemented by a mixture of pyrolusite and 'limonite'.

PYROMORPHITE (*Chloride and phosphate of lead*)

$Pb_5(PO_4)_3Cl$

A greenish, yellowish or brownish hexagonal secondary lead mineral which generally crystallises with a prismatic habit. The best examples of this mineral were obtained from the Sylvester Mine, Zeehan which yielded masses of intricately interwoven dark green prismatic crystals. Some of this material contained considerable calcium in places of lead and was identified as the variety polysphaerite. Small quantities of pyromorphite have been recorded from a number of mines including: Magnet Mine, near Waratah; Godkin Mine, Whyte River; Hercules Mine, Mt Read. Minor occurrences from many other mines in the Heazlewood, Zeehan and Dundas mineral fields have been reported.

PYROPHYLLITE (*Hydrous silicate of aluminium*)

$Al_4(Si_8O_{20})(OH)_4$

This soft whitish mineral usually has a lamellar appearance and is often associated with quartz and mica in hydrothermal veins. It also occurs massive in some schistose rocks. The original reports of the occurrence of this mineral are excessive as much of the material described is mica. Pyrophyllite occurs in small amounts at Mt Lyell and probably also at North Heemskirk, Mt Bischoff and at the Shepherd and Murphy Mine, Moina.

PYROSTILPNITE (*Sulphide of silver and antimony*)

$Ag_3SbS_3$

Doubtful Validity—This mineral cannot be found in a specimen labelled as pyrostilpnite from the Oonah Mine, Zeehan. Material from the Long Tunnel Mine, Heazlewood is not available for study.

PYROXENE GROUP

This is the most important group of rock forming ferromagnesian silicates. They occur in almost every type of igneous rock and are common products of both thermal and regional metamorphism. Minerals of this group may be divided into those of comparatively simple chemistry which crystallise with orthorhombic symmetry, and those of more complex chemistry which crystallise with monoclinic symmetry. The former minerals are known as orthopyroxenes and have the general formula $(Mg,Fe)SiO_3$.

The orthopyroxenes are divided on the basis of content of $FeSiO_3$ (orthoferrosilite) and those recorded from Tasmania are:—

Enstatite $Fs_{0-10}$
Bronzite $Fs_{10-30}$
Hypersthene $Fs_{30-50}$

The monoclinic or clinopyroxenes vary widely in composition and a number of end member species are recognised. Those recorded from Tasmania include:

Diopside-Hedenbergite $Ca(Mg,Fe)Si_2O_6$
Aegirine - Aegirine-Augite
$NaFeSi_2O_6$ - $(Na,Ca)(Fe,Mg,Al)Si_2O_6$
Augite $(Ca,Mg,Fe,Al,Ti)_2(Si,Al)_2O_6$
Pigeonite $(Mg,Fe,Ca)(Mg,Fe)Si_2O_6$
Omphacite $(Ca,Na)(Mg,Fe,Al)Si_2O_6$

Details of these minerals are given under their alphabetical listing.

PYRRHOTITE (*Sulphide of iron*)

$FeS–Fe_7S_8$

This bronze coloured iron sulphide is slightly magnetic and has been referred to as magnetic pyrites. It is dimorphous, crystallising in the haxagonal and monoclinic systems. The hexagonal form ranges in composition from FeS to $Fe_7S_8$ whilst the monoclinic form has the composition $Fe_7S_8$. Hexagonal pyrrhotite is the higher temperature form and this has been recorded from No. 1 and No. 2 horizons at the Renison Bell tin mine and from the central region of the Mt Bischoff tin field. The lower temperature monoclinic form occurs in the Federal Lode at Renison Bell, at the Cleveland Mine and in the peripheral regions of Mt Bischoff. Small crystals of pyrrhotite have been reported from the Colebrook Mine, near Rosebery and the mineral is also recorded from Dundas; Rocky River; Savage River; Mt Lindsay Mine, Parsons Hood; Mt Pelion Mine, Douglas Creek; Hampshire; Penguin River; Mt Ramsay and on the east coast in the vicinity of Georges Bay. The character of the pyrrhotite from these localities has not been determined.

QUARTZ (*Silicon dioxide*)

$SiO_2$

Since oxygen and silicon are the most abundant elements in nature it is not surprising to find that quartz, which is the most common polymorph of silicon dioxide, is the most abundant of all mineral species. Quartz is widely distributed in many igneous, sedimentary and metamorphic rocks. It is abundant as a vein mineral both associated with mineralisation and in barren occurrences. The mineral is trigonal and most commonly crystallises as hexagonal prisms terminating in two sets of rhombohedra at each end. In rare cases the rhombohedra are of equal development and the termination of the quartz has the appearance of a hexagonal pyramid. Crystals of various degrees of perfection have been obtained from Flinders Island; Mt Cameron and many other localities in the north-

east; Bell Mount and other mines of the north-west; Hercules Mine, Mt Read; Mt Lyell and numerous other places throughout the west coast mineral fields.

The coarsely crystalline varieties of quartz may be divided on the basis of colour into:—

*Rock Crystal.*—A colourless or very pale tinted, transparent form of quartz found at numerous localities including: Flinders Island; Mt Cameron; Goulds Country; Moorina; Thomas Plains; Ben Lomond; Mt Maurice; Lefroy; Beaconsfield; Mt Heemskirk; Dundas.

*Smoky Quartz* (cairngorm).—The colour ranges from a barely perceptible smokiness through brown to almost black and opaque in large masses (morion). Recorded from Flinders Island; Mt Cameron; Blue Tier; Moorina; Ben Lomond; Savage River opposite Long Plains.

*Amethyst.*—Various shades from pale to very dark violet. This variety has been recorded from: Moorina; Mt Cameron; Blue Tier; Emu River about 4 miles S of the Hampshire Hills and from between 4 and 5 levels, Aberfoyle Mine, Rossarden.

*Citrine.*—A yellow to yellowish brown transparent form of quartz. Much of the variety originally referred to as false topaz is of this form. It has been recorded from: Mt Cameron; Goulds Country; Moorina and elsewhere.

*Rose Quartz.*—The colour varies from pale pink to deep rose red. This is not very common in the State but cloudy ferruginous examples have been recorded from Moorina; Beaconsfield; Savage River and other localities on the west coast.

*Prase.*—This is a green variety of quartz which may be crystallised or massive. The colour is due to the presence of minute inclusions, usually hornblende but also chlorite. Recorded from Tasman Rivulet, near Zeehan; Magnet Range; Hampshire Hills; Lake Sorell. Petterd records quartz coloured green by chromic oxide at Heazlewood. This material is probably prase as it is unlikely that the quartz is pigmented by chromic oxide. Chromium is normally included in spinel group minerals.

There are a number of massive very fine grained varieties of quartz and the more important of these are:

*Chalcedony.*—This is typified by the fact that microscopically its structure is seen to be fibrous. In larger masses the mineral is usually of botryoidal structure. It occurs as a vesicle and geode filling in basic igneous rocks and as a replacement of other minerals, particularly calcite and fluorite and also of fossil shells. The name chalcedony is usually restricted to the paler coloured translucent forms of cryptocrystalline quartz. Sub-varieties known in this State are carnelian which is applied to flesh-red to red-brown chalcedony; sard which is a light to dark brown translucent

chalcedony and agate which is a banded chalcedony given many qualifying names according to the colour of the bands present. These varieties have been recorded from a number of localities including: Flinders Island; Mt Cameron; Goulds Country; Lisle; Tamar Heads; Lake Sorell; Little Swanport; Sandy Bay and Cornelian Bay, Hobart; Zeehan; Pieman River; Meredith Range; Heazlewood.

*Flint, Chert and Jasper.*—These, and related forms of quartz including that originally recorded as basanite are chalcedony in part and contain in addition varying amounts of cryptocrystalline granular material. These varieties are more commonly associated with sedimentary rocks. Flint typically occurs as greyish to black irregular nodules in chalks and marly limestones. More massive deposits are usually referred to as chert which may be the same greyish colour as flint or by admixture with iron oxides it may range through yellow, brown to the reddish colour of jasper. In addition to being of uniform reddish colour jasper may be banded, spotted or cloudy in appearance. The term hornstone has been applied in the past to flints, cherts and jaspers with a fracture that tends to be splintery rather than conchoidal as is the usual case. These varieties of quartz have been recorded from: Flinders Island; Pioneer; Beaconsfield; Carrick; Poatina; Forth River; Leven River; Penguin; Smithton; Mt Bischoff; Magnet Mine; the Arthur River near Waratah; Corinna; Mt Heemskirk; Macquarie Harbour; Mt Nelson.

*Opaline Silica.*—This is not a form of quartz but is considered here because it is related to one of the other polymorphs of silicon dioxide, crystobalite. This polymorph is tetragonal but as it crystallises with a fibrous structure that is usually microscopic in character it cannot be distinguished from chalcedonic forms of silica by other than X-ray procedures. Opal stands in much the same relationship to cristobalite as does chalcedony to quartz. Usually 4-9% of water and as much as 20% is associated with opal so that its formula is written $SiO_2.nH_2O$. Very little of this water (probably less than 1%) is held structurally in the mineral, the far greater proportion being held by adsorption and capillary forces. Numerous varieties of opaline silica have been named and those recorded from the State include:

Common Opal.—Generally a whitish to brownish opal with no particular degree of translucency or markings to make it valued as an ornamental material. The variety originally recorded as menilite is a form of common opal. Recorded from: Macquarie Harbour; Pieman River; Montagu; Dugan Range; Mt Cameron; Goulds Country; Supply Creek; Lake Sorell; Cornelian Bay, Hobart; Port Cygnet.

Cacholong.—An opaque white to yellowish type of opal with a pearly lustre. Reported to occur in veins and as cavity fillings in basalt near Launceston.

Diatomite.—A deposit of opaline silica formed largely from the siliceous parts of a group of micro-organisms known as diatoms. Randanite is an old alternative name for diatomite and this has been reported to occur in seams up to 30 cm in thickness at Inglewood, near Oatlands.

Geyserite.—A cellular form of opaline silica usually resulting from thermal spring activity. Reported to have been found at Mt Bischoff where it was associated with native sulphur.

Hyalite.—A clear glassy type of opaline silica generally with a globular surface. White to pale-green botryoidal masses were reported from Bells Reward Mine, Heazlewood and the Argent Mine, Zeehan.

Wood Opal.—Commonly known as silicified wood this form of opal is relatively abundant in localities where there was Tertiary volcanic activity. It has also been found in some Permian rocks. Reported to occur at: Flinders Island; Gladstone; Little Forester River; Derby; Launceston; Evandale; Conara; Epping Forest; Longford; Meadowbank; Franklin Rivulet; Port Sorell; Kentish Plains; Hampshire; Latrobe; Howards Plain; Queen River; Ross; Lake Sorell; Coles Bay; Mangalore; Macquarie Plains; Gretna; Hollow Tree; Cornelian Bay and Rose Bay, Hobart; Lune River.

RAMMELSBERGITE (*Nickel diarsenide*)

$NiAs_2$

This tin-white, reddish tinged metallic mineral occurs in association with gersdorffite and ullmannite rimming niccolite from the Central Balstrup Mine, Zeehan (Both, 1966).

RANDANITE see QUARTZ

An old name for diatomite, a deposit of opaline silica derived from the siliceous tests of diatoms.

RESTORMELITE (*Silicate of aluminium, sodium and potassium*)

Invalid—X-ray study of the mineral reported to be restormalite from the Comet Mine, Dundas shows it to be gibbsite.

RETINALITE see CHRYSOTILE

RHODOCHROSITE (*Manganese carbonate*)

$MnCO_3$

This is a member of the calcite group of carbonates and is thus of trigonal symmetry. It is a pale to deep pink or red mineral which does not exhibit the variety of forms of crystallisation shown by calcite. Crystals are not common but rhombohedral forms predominate. The mineral has been recorded from mines of the Dundas, Zeehan, Read-Rosebery and Magnet districts. At Dundas and Zeehan it occurs in cavernous gossan whilst at Magnet it forms

layers in the typical banded sulphide-gangue arrangement of the ore from this mine. The most attractive specimens were obtained from mines on Mt Read, particularly the Hercules, where crystallised rhodochrosite-quartz-fluorite associations occurred along with ore minerals in cavities within the ore body.

RHODONITE (*Manganese silicate*)

$MnSiO_3$

A somewhat rare red to brown coloured triclinic silicate which crystallises with tabular habit but is more commonly found in massive form. Occurrences were reported in vein form with scapolite in the old asbestos workings at Andersons Creek, W of Beaconsfield. There is also an unconfirmed report of the mineral being found in Zeehan.

RIEBECKITE (*Hydrous silicate of sodium and iron*)

$Na_2Fe_5Si_8O_{22}(OH,F)_2$

Occurrences of the asbestiform variety of this soda amphibole, crocidolite have been reported in small quantities in Cambrian dolerite at Branchs Creek, East Arm, Port Sorell.

RINKITE (*Fluorite-silicate of sodium, calcium, cerium and titanium*)

$(Na,Ca)_{12}(Ce,Ti)_3Si_8(O,F)_{36}$

Doubtful Validity—The report of this mineral from the Port Cygnet alkaline complex has not been confirmed during recent studies.

RUTILE (*Titanium dioxide with iron niobium and tantalum*)

$TiO_2$

This mineral crystallises in the tetragonal system and is one of three polymorphs of titanium dioxide, the others being brookite and anatase. The mineral is generally red-brown to black in colour, dependent upon the iron content, and it is found in many stream and beach deposits. Important localities are Claytons Rivulet, Penguin and Arthur Rivers on the north-west coast, the Lewis and Hudson Rivers on the south-east coast, Ocean Beach near Strahan and other beaches around the south-west coast. Near Fraser River, King Island, 2,000,000 tons of beach sand containing over 2% rutile have been proven. The mineral is also associated with cassiterite in many of the north-eastern alluvial deposits and it has also been found associated with quartz-crystals at Moorina and other places. Occasional well formed crystals have also been reported from Claytons Rivulet. A very dark variety sometimes called nigrine occurs at Rocky Cape and similar material with a reported specific gravity of 5.94 is associated with cassiterite on Cape Barren Island. The high specific gravity value would indicate a considerable content of niobium and tantalum although in this case it is probable that the sample used for determination was contaminated with cassiterite. Rutile was also plentiful in the minor auriferous drift at Lymington

near Cygnet. The white coating on many titaniferous minerals, known as leucoxene has been identified as being largely a very fine grained aggregate of rutile.

SANIDINE (*Silicate of potassium and aluminium*)

$KAlSi_3O_8$

This high temperature monoclinic potassium feldspar occurs widely in the alkaline dyke rocks of Port Cygnet. The sanidine phenocrysts in the so called 'biscuit rocks' (sanidine-garnet-porphyries) have an average composition of 78% $KAlSi_3O_8$ 14% $NaAlSi_3O_8$ and 8% $CaAl_2Si_2O_8$. In the hauyne-sanidine-garnet porphyries the phenocrysts average 58% $KAlSi_3O_8$ 28% $NaAlSi_3O_8$ and 14% $CaAl_2Si_2O_8$ (Edwards, 1947). Sanidine also occurs in olivine-nephelinite near Scottsdale and in buchite at Mt Cameron West (Sutherland and Corbett, 1967).

SAPONITE (*Hydrous silicate of magnesium, aluminium and iron*)

$(Mg,Fe,Al)_3(Al,Si)_4O_{10}(OH)_2$

This is a magnesium bearing member of the montmorillonite group of clay minerals. It was reported that it occurs as a soft, yellow to brown massive mineral which becomes brittle on drying at the Duchess of York Mine, Salisbury, near Beaconsfield. Also recorded from Trial Harbour on the west coast.

SAPPHIRE see CORUNDUM

SCAPOLITE (*Silicate of sodium, calcium, potassium and aluminium with various anions*)

$(Na,Ca,K)_4Al_3Si_9O_{24}(Cl,F,CO_3,OH,SO_4)$

The formation of scapolites is generally confined to metamorphic and metasomatic environments although a wide variety of minor occurrences are known. The sodium rich scapolites are often called marialite and this mineral has been reported from Andersons Creek, near Beaconsfield and also from Heazlewood. The marialite is fine grained and pale green. Microscopically the crystals often form rosettes. These occurrences are in ultrabasic rocks and appear to be the result of vein forming processes. Mizzonite is a name given to scapolites of composition between the sodium rich marialites and the calcium rich meionites. Occurrences were reported at Valentines Peak and North-East Dundas but it has been found that the material from the latter locality does not have the X-ray of a scapolite.

SCHEELITE (*Calcium tungstate*)

$CaWO_4$

A heavy whitish mineral with vitreous to resinous lustre characterised by a blue-white fluorescence under short-wave U.V. light. Found in economic concentration at Grassy, King Island where it occurs as a replacement ore body in lime rich rocks against granite. The scheelite is generally finely disseminated as grains

up to 0.2 mm across although coarser grains are found occasionally. The mineral also occurs in garnet rock on the Upper Emu River, associated with wilframite N of the Pieman Heads, at the Interview River at Storeys Creek, at the Shepherd and Murphy Mine and other localities in the Moina district and at Mt Ramsay 12 miles S of Waratah. It was formerly reported as a pseudomorph after wolframite from near Mayne's Tin Mine, Mt Heemskirk but it appears that this is an error since the material from this locality is wolframite after scheelite. Recently perfectly clear light amber coloured crystals of scheelite with typical rutile like prismatic habit were discovered at Aberfoyle.

SCHILLER SPAR

Invalid—This name is no longer used in a varietal sense but the term schiller effect is sometimes applied to altered orthopyroxenes displaying a characteristic lustre due to internal reflections. The name was used incorrectly (Petterd, 1910) for altered diallage.

SCHREIBERSITE see METEORITES

SCHROTTERITE see ALLOPHANE

SCLEROSPATHITE (*Hydrous sulphate of iron and chromium*)

$$Fe(Fe,Cr)_2(SO_4)_4.24H_2O$$

This name was given to a white fibrous hydrated sulphate from the Salisbury Mine near Beaconsfield. The habit described is typical of members of the hallotrichite group. The original analysis recalculated to exclude foreign material yields the following:

| | % |
|---|---|
| $Fe_2O_3$ | 15.4 |
| $Cr_2O_3$ | 11.7 |
| $SO_3$ | 29.9 |
| Ignition loss | 43.0 |

This approximates closely to the formula given above. Specimens are not available for a study but it is probable that this mineral and that originally listed as knoxvillite are ferric iron-chromium members of the hallotrichite group.

SCOLECITE (*Hydrous silicate of calcium and aluminium*)

$$CaAl_2Si_3O_{10}.3H_2O$$

This white fibrous zeolite was originally recorded as prismatic crystals, acicular tufts and aggregates with fibrous radiating structure from dolerite in the vicinity of Launceston. It has since been identified in dolerite S of Hillwood on the East Tamar.

SCORODITE (*Hydrous arsenate of iron*)

$$Fe(AsO_4).2H_2O$$

A green to brownish secondary mineral which is abundant in the oxidised zone of mineral deposits containing arsenopyrite and other arsenic bearing minerals. Scorodite is orthorhombic and

crystallises with pyramidal or tabular habit but is often found massive. Crystals have been reported in quartz on the Upper Emu River and from the Southern Cross Mine, Waterhouse. Massive material has been recorded from the Orieco Mine, Scamander, Mt Bischoff and near Mt Pelion.

SELLAITE (*Magnesium fluoride*)

$MgF_2$

This rare mineral has been observed as small well formed tetragonal crystals up to 1 mm across in altered dolomite of the Mt Bischoff open cut. Some crystals have been replaced by talc and phlogopite (Reid, 1923; Groves, 1968).

SENARMONITE (*Antimony trioxide*)

$Sb_2O_3$

A greyish-white triclinic secondary mineral formed by oxidation of antimony bearing minerals. Reported to have been found in small quantities at the Long Tunnel Mine, Whyte River and at the Madame Melba Mine, North-East Dundas.

SERICITE see MUSCOVITE

SERPENTINE (*Hydrous silicates of magnesium*)

$Mg_3Si_2O_5(OH)_4$

The minerals chrysotile, antigorite and lizardite are referred to as serpentine. They all have the approximate composition $Mg_3Si_2O_5(OH)_4$ and are similar in general structure. They differ in the manner in which layers containing magnesium and layers containing silicon are linked together. Chrysotile commonly occurs in silky fibres and is an important source of commercial asbestos. This form of serpentine occurs in most of the serpentinite masses throughout the State and has been specifically recorded from Serpentine Hill above the Argent Tunnel, Trial Harbour, Macquarie Harbour and Beaconsfield. A yellow massive form of chrysotile given the trivial name retinalite has been reported from Dundas and Parsons Hood. Antigorite composes a large part of schistose serpentine at Serpentine Hill, Trial Harbour, Heazlewood and Beaconsfield. Somewhat fibrous antigorite known as picrolite has been recorded from North-East Dundas and near the Savage River iron deposits. Lizardite is not so common in large masses but the massive greenish-black serpentine at Serpentine Hill is of this species as is much of the matrix material containing veins of chrysotile.

SHALE (*Hydrocarbon*) see OIL SHALES

SHANDITE (*Sulphide of lead and nickel*)

$Ni_3Pb_2S_2$

This rare mineral is a minor constituent of the Trial Harbour nickel mineralisation. It is found as microscopic (0.2 mm) grains where sphalerite and heazlewoodite occur together (Williams, 1958).

SHANNONITE see MONTICELLITE

SICILIOPHITE

Invalid—A misprint for siliciophite which is a mixture of serpentine and opaline silica.

SIDERITE (*Iron carbonate*)

$FeCO_3$

This is the common name for iron carbonate but as it has been used for a number of minerals by various writers (Spencer, 1907) some authorities prefer the name chalybite. The mineral is generally pale brown in colour becoming darker as the manganese content increases. It is generally massive and is abundant in the Zeehan and Dundas mineral fields where it is one of the common gangue minerals. It is associated with auriferous reefs of the Mt Bischoff-Pieman River area and also from the reefs of the north-eastern gold fields. Massive siderite is also reported from the vicinity of the Forth River and from Port Sorell. Crystals are rare but they have been recorded from Zeehan, at the Heazlewood Silver-Lead Mine and at Mt Bischoff. At the Heazlewood much of the siderite is a pale greenish colour possibly due to the presence of chromium. The mineral also occurs as a vesicle filling in some basaltic rocks near Waratah, Springfield and the Tamar Valley. Lenses of siderite have been found in Tertiary clays of the Launceston district. Amongst the iron-manganese-magnesium carbonates in the gangue of the Renison Bell and Bischoff tin mines a variety, known as pistomesite, containing 30-40% $MgCO_3$ has been produced through alteration of original dolomite by solutions carrying iron and manganese.

SIEGENITE (*Sulphide of cobalt and nickel*)

$(Co,Ni)_3S_4$

A rare steel-grey isometric sulphide mineral which tarnishes copper-red to violet-grey. It has been recorded as occurring at the Rocky River Mine where it was associated with magnetite, pyrite and niccolite.

SILLIMANITE (*Silicate of aluminium*)

$Al_2SiO_5$

This high grade metamorphic silicate has been recorded from the Lucy River, a tributary of the Pieman and from Mt Stewart in the Heazlewood district. A mineral resembling sillimanite or mullite has been observed microscopically in buchite at Apsley (Spry and Solomon, 1964) and Mt Cameron West (Sutherland and Corbett, 1967).

SILVER (*Native metal*)

Ag

A silver-white isometric precious metal which crystallises in cubic, octahedral and dodecahedral forms. Commonly found in variously elongated, reticulated and arborescent wiry forms. Native

silver has been recorded in small amounts from all the silver-lead mines in the State. Hair-like entangled patches of silver were reported to occur in fractures and cleavages in zinc sulphide at the Magnet Mine. It occurred with calcite, ankerite and sphalerite at the Godkin Mine, Whyte River where many arborescent clusters were obtained. At the South Curtin-Davis Mine, Dundas, native silver was found with silver halides in gossan. The finest examples found in the State were from the Hercules Mines, Mt Read where wire silver was richly associated with crystallised masses of cerussite. Also recorded from the Hampshire Silver Mine and Penguin Silver-Lead Mines.

SMALTITE (*Arsenide of cobalt and nickel*)

$(Co,Ni)As_{3-x}$

A tin-white isometric mineral which tarnishes grey or iridescent. Occurrences were reported at North Heemskirk, North Pieman, Hampshire Silver Mine, Penguin Silver Mine and at Castle Forbes Bay but none of these occurrences have been verified.

SMECTITE

Invalid—This name is used as an alternative group name for the montmorillonite group clay minerals. The material originally referred to was probably a mixture of the kaolinite mineral, halloysite and soluble salts.

SMITHSONITE (*Zinc carbonate*)

$ZnCO_3$

Small quantities of this mineral were found at the Heazlewood silver-lead mines where it occurred as off-white rhomb-shaped crystals. Also from Magnet Mine as translucent grey drusy linings of cavities in gossan and from several of the Zeehan mines.

SODA ALUM (*Hydrous sulphate of sodium and aluminium*)

$NaAl(SO_4)_2.12H_2O$

Reported to occur in pyritiferous mudstones N of Kingston Beach (Paxton, 1968).

SODALITE (*Silicate of sodium and aluminium with chloride*)

$Na_8Al_6Si_6O_{24}Cl_2$

The record of this mineral from Port Cygnet has not been confirmed and a doubtful record is noted from the melilite-basalts of Shannon Tier (Edwards, 1950).

SPERRYLITE (*Arsenide of platinum*)

$PtAs_2$

This mineral has been observed microscopically in trace amounts in the pentlandite-pyrrhotite ore of the Vaudeau Mine, Five Mile Deposits, Zeehan (Williams, 1958).

SPESSARTINE (*Silicate of manganese and aluminium*)

$Mn_3Al_2Si_3O_{12}$

A member of the garnet group occurring as phenocrysts in hauyne-sanidine-garnet porphyry dykes at Port Cygnet was originally given the name johnstonotite which was believed to be a new species of manganese garnet. Recent work on the type material shows that this garnet is one in which spessartite is the predominant constituent (53.3%) with contributions from grossular (35.50%), almandine (6.12%), blythite (2.65%) and andradite (2.43%) (Ford, 1967b).

SPHALERITE (*Sulphide of zinc and iron*)

(Zn,Fe)S

This mineral, which crystallises in the cubic system, may vary in colour from pale yellow brown to black and has a characteristic resinous lustre, particularly in the lighter colours. It is generally abundant in areas of sulphide mineralisation and occurs widely throughout west and north-west Tasmania. Crystals have been reported from many mines and these generally show a predominance of tetrahedral forms sometimes modified by cubic faces. Spinel twins were also quite common. Well developed crystals occurred in small galena-sphalerite-siderite-quartz lodes of the Zeehan district where crystals up to ¾ inch have been found. Amber coloured crystals were abundant at the Mariposa and other mines of the North-East Dundas district. Small, but perfectly formed crystals up to ⅜ inch across have been recorded from the Heazlewood silver-lead mine. Massive sphalerite occurs at all the localities noted above. Economic deposits are exploited by the Electrolytic Zinc Co. at Rosebery, Hercules and Tullah where the occurrences range from massive sphalerite to fine grained mixtures of sphalerite and galena. Massive sphalerite is also recorded from Mt Lyell, Mt Bischoff, Magnet, Helleyer River, Godkin Mine, Whyte River, Hampshire Silver Mine, Penguin River Silver-Lead Mine and in small quantities from the gold reefs of the north-east such as Lefroy, Beaconsfield and Mathinna. Associated with cassiterite at the Aberfoyle Mine and from Ben Lomond and the Scamander River. Strongly triboluminescent sphalerite has been reported from the Castray River. The minerals originally recorded as wurtzite from the Hercules and Magnet Mines have been found to be secondary sphalerite.

SPHENE (*Silicate of calcium and titanium*)

$CaTiSiO_5$

This mineral occurs as small, poorly formed, dark yellow to brown tabular crystals associated with scheelite and ilmenite in amphibolite at Mt Ramsay and also in biotite hornfels at the King Island Scheelite Mine. Sphene is a common accessory mineral in igneous rocks and occurs in the syenite porphyry at Port Cygnet, in hornblende granite near the Heazlewood River and it has been recorded from Parsons Hood.

SPHEROSIDERITE see SIDERITE

SPINEL GROUP

This is an oxide group of minerals, crystallising in the cubic system, that are common as accessories in igneous and metamorphic rocks and sediments derived from these. The group is divided into three series, namely spinel series ($XAl_2O_4$ where X=Mg,Fe,Zn or Mn), magnetite series ($XFe_2O_4$ where X=Mg,Fe,Zn,Mn or Ni) and chromite series ($XCr_2O_4$ where X=Mg or Fe). Like the garnets various components may contribute to the composition of the mineral and it is usually named on the basis of the dominant component. Members of the group recorded in Tasmania to date are:

| *Spinel Series* | *Magnetite Series* | *Chromite Series* |
|---|---|---|
| Spinel $MgAl_2O_4$ | | |
| Pleonaste $(Mg,Fe)Al_2O_4$ | Magnetite $FeFe_2O_4$ | Chromite $FeCr_2O_4$ |
| Hercynite $FeAl_2O_4$ | | |
| Picotite $Fe(Al,Cr)_2O_4$ | | |

SPINEL (*Oxide of magnesium and aluminium*)

$MgAl_2O_4$

This magnesium-aluminium member of the spinel group has been recorded from alluvials in the Kingston-Longley district where it is apparently derived from basalts. An analysis yields:

| | % | |
|---|---|---|
| MgO | 21.4 | S.G. 4.08 |
| $Cr_2O_3$ | 17.9 | |
| $Fe_2O_3$ (inc. FeO) | 20.2 | |
| $Al_2O_3$ | 32.9 | |
| | 101.4 | |

This is indicative of a spinel consisting of 66% $MgAl_2O_4$, 17% $MgCr_2O_4$ and 17% $FeFe_2O_4$.

STANNITE (*Sulphide of copper, iron and tin*)

$Cu_2FeSnS_4$

This steel-grey to iron black sulphide was first reported from Clarke's Lode, Silver Queen lease Zeehan where it is associated with galena, minor chalcopyrite and sphalerite. At the Oonah Mine, Zeehan stannite occurred in a flat dipping lode of complex mineralogy consisting largely of cassiterite, wolframite, pyrite, arsenopyrite, stannite, chalcopyrite, tetrahedrite, bismuthinite, galena and antimonial lead minerals. Stannite rich material from this lode assayed:

| | % |
|---|---|
| Cu | 26.77 |
| Sn | 23.91 |
| Fe | 12.11 |
| Bi | 2.27 |
| Sb | 0.50 |
| As | tr. |
| Zn | 0.47 |
| S | 32.10 |
| $SiO_2$ | 1.40 |
| Ag oz/ton | 97.3 |

Stannite-cassiterite associations are known from a number of other deposits including those of the Black P.A. Mine, Rosebery, Renison Bell, Mts Lindsay, Bischoff and Cleveland. Pockets of sulphide minerals, including stannite, also occur in the cassiterite-wolframite-quartz lodes of north-eastern Tasmania the more important of which are the veins of the Aberfoyle Tin Mine and the nearby Storeys Creek wolfram mine (Edwards, 1951).

STEARGILLITE see KAOLINITE

STEATITE see TALC

STEINMANNITE

Invalid—Formerly believed to be a lead antimony sulphide, this material is now known to be galena carrying antimony as an impurity.

STEPHANITE (*Sulphide of silver and antimony*)

$Ag_5SbS_4$

An iron black, soft, brittle orthorhombic sulphide which crystallises as short prismatic or tabular striated crystals but is more commonly found massive. Occurrences of the mineral were reported in thin irregular patches, often associated with pyrostilpnite(?), on siliceous gangue at the Long Tunnel Mine, Castray River. Also reported to have been associated with galena at the Owen Meredith Mine, Dundas and from the Scamander Silver Mine.

STERNBERGITE (*Sulphide of silver and iron*)

$AgFe_2S_3$

A pinchbeck-brown, soft sulphide which tarnishes to a violet-blue. It crystallises with an orthorhombic platy habit but often has pseudohexagonal character. Sternbergite has only been recorded from the Godkin Extended Mine, Whyte River, where it was associated with fine-grained galena and sphalerite.

STIBIOCONITE (*Hydrous oxide of antimony*)

$Sb_3O_6(OH)$?

A yellowish to reddish white earthy powdery mineral resulting from the oxidation of antimony bearing minerals. Recorded from the British-Zeehan Mine, Zeehan, and from the Comet Mine, Dundas.

STIBNITE (*Antimony sulphide*)

$Sb_2S_3$

A lead grey, soft, sectile sulphide crystallising as slender orthorhombic prisms which are often longitudinally striated. The mineral has perfect cleavage and the cleaved fragments are highly flexible. Stibnite has been recorded from quartz reefs at the Orlando and other gold mines of the Lefroy district; in limited quantity at Mt Claude; in the vicinity of Mt Bischoff, particularly at Tinstone Creek; from Mt Balfour; Sweeneys Mine, Mt Agnew; in a lode at Halls Creek near Lynchford and in minor amounts from Rosebery and Port Davey.

STICHTITE (*Hydrous carbonate-hydroxide of magnesium and chromium*)

$Mg_6Cr_2(OH)_{16}CO_3 4H_2O$

A deep purple to rose pink, soft, waxy, foliated mineral usually found as small knots or veins in serpentinite. The mineral was first observed in the vicinity of the Adelaide Mine, Dundas and was originally thought to be the chrome chlorite kammererite. It was recognised as a new species by A. S. Wesley, a former chief chemist of the Mount Lyell Mining and Railway Co. and Petterd named it stichtite after Robert Sticht a former manager of the company who pioneered the application of pyritic smelting to copper ores. Stichtite is a member of the trigonal hydrotalcite group which includes iron (pyroaurite) and aluminium (hydrotalcite) analogues of stichtite. The mineralogy is made more complex by the existence of physically indistinguishable hexagonal polymorphs (sjogrenite group) of the former minerals. Stichtite is abundant as small knots up to 12 mm across, often associated with residual chromite grains, in the serpentinite near the Adelaide Mine. Veins of the mineral are less common, the most extensive being in a quarry on Serpentine Hill near the Argent Tunnel and others are known from the serpentinite NW of Birchs Inlet. Three analyses of stichtite are available and these show considerable variation in composition, possibly reflecting the composition of the spinel mineral from which they were derived.

| | [1] *A. S. Wesley* | [2] *L. K. Ward** | [3] *M. Rubenach** |
|---|---|---|---|
| | % | % | % |
| $Cr_2O_3$ | 11.5 | 15.6 | 12.00 |
| $Fe_2O_3$ | 9.0 | 5.1 | 3.02 |
| $Al_2O_3$ | — | — | 6.26 |
| MgO | 36.0 | 35.6 | 37.04 |
| $CO_2$ | 7.2 | 38.0 | 37.17 |
| $H_2O$ | 36.1 | | |
| $SiO_2$ | — | 4.0 | 4.90 |
| | stichtite 58 | stichtite 78 | stichtite 40 |
| | pyroaurite 42 | pyroaurite 22 | hydrotalcite 46 |
| | | | pyroaurite 14 |

[1] Mount Lyell Mining and Railway Co.
[2] Department of Mines, Tasmania
[3] University of Tasmania
* Serpentine and chromite present as contaminants.

STILBITE (*Silicate of calcium, sodium, potassium and aluminium*)

$(Ca,Na_2,K_2)Al_2Si_7O_{18}.7H_2O$

This zeolite occurs as veins in joints in the Jurassic dolerites, typically as sheaf-like aggregates of numerous small colourless crystals up to 2 mm in length. It has been recorded in this form from Tasman Island; in the vicinity of Collinsvale and from the Giblin Street quarry, Hobart. Also recorded as yellow-brown divergent masses in amygdaloidal basalt at Bell Mount, Middlesex (Sutherland, 1964a; 1965).

STILPNOSIDERITE see GOETHITE

An old varietal name for 'limonite'.

STRIGOVITE

Invalid—X-ray study of the mineral from the Great Republic Tin Mine, Ben Lomond previously recorded as the chlorite-like mineral strigovite shows it to be a mixture of magnetite, spinel and mica.

STROMEYERITE (*Sulphide of silver and copper*)

CuAgS

A dark steel-grey soft sulphide which tarnishes blue on an exposed surface. The mineral crystallises as orthorhombic prisms with pseudohexagonal character but is more commonly massive. Stromeyerite has been recorded from Mt Lyell where it was associated with bornite and chalcopyrite in a quartz matrix.

STRONTIANITE (*Strontium carbonate*)

$SrCO_3$

A greyish, brittle, vitreous mineral which forms orthorhombic prismatic crystals. Only recorded from the Hampshire Silver Mine where it was associated with fluorite, apatite and other minerals.

SULPHOHALITE (*Chloride-fluoride-sulphate of sodium*)

$Na_6ClF(SO_4)_2$

A pale greenish isometric mineral of rare occurrence in vesicle fillings in the nepheline-basanite at Sandy Bay (Aurousseau, 1926).

SULPHUR (*Native element*)

S

A yellowish brittle mineral with a resinous lustre which sometimes results from the decomposition of metallic sulphides. It has been recorded in small amounts from Mt Bischoff, from several of the Zeehan mines and from the Endurance Tin Mine. Some Tertiary sandstones on Flinders Island carry native sulphur and one analysis showed the presence of 10.4% S.

SYMPLESITE (*Hydrated ferrous arsenate*)

$Fe_3(AsO_4)_2 8H_2O$

A light to dark green vitreous triclinic mineral which becomes deep indigo blue on partial oxidation. Recorded as prismatic crystals and radiating blue-green tufts lining cavities in gossan at the Magnet Mine near Waratah.

TACHARANITE (*Hydrous silicate of calcium, aluminium and magnesium*)

$(Ca,Al,Mg)(Si,Al)_3.H_2O$

This mineral previously only known from the Isle of Skye, Scotland occurs as dense, cryptocrystalline vesicle fillings of snow-white colour in basaltic rocks at a number of localities in Tasmania. It also occurs as encrustations on the basalts and as intrafragmental cement in basalt breccias. Tacharanite has been recorded from the Liawenee Canal on the Central Plateau, from Gads Hill in Middlesex, from Redpa and Brittons Swamp on the north-west coast and from nephelinite near Scottsdale in the north-east (Sutherland, 1965).

TALC (*Hydrous silicate of magnesium*)

$Mg_6Si_8O_{20}(OH)_4$

A white to green soft foliated or massive mineral which feels greasy to the touch. Talc has been recorded from a number of localities. A vein 60 cm across occurs on the west branch of the Claytons Rivulet; abundant on the coast a mile N of Remine where it occurs against a serpentine outcrop; in the vicinity of Mt Bischoff, Mt Magnet and on the Meredith Range near the Castray River. The mineral occurs as an alteration product in the wall rock of the Savage River iron deposits. It has also been recorded from Heazlewood, Parsons Hood, Beaconsfield, Maynes Mine, Blue Tier, Ben Lomond and Adamsfield.

TASMANITE see OIL SHALES

TENNANTITE (*Sulphide of arsenic, iron and copper*)

$(Cu,Fe)_{12}As_4S_{12}$

A flint-grey to iron black isometric sulphide which forms tetrahedral crystals but is commonly massive. This mineral was found in association with bornite, stromeyerite and chalcopyrite in the Mt Lyell open cut. On analysis it was shown to contain almost 7% zinc and is thus a zincian tennantite. It was also recorded from 19 Stope 850 foot level of the North Lyell Mine where it was associated with bornite and chalcopyrite in a quartz vein (Edwards, 1939), and from the S.W. Curtin-Davis mine.

TENORITE (*Copper oxide*)

CuO

Usually found as an iron-grey to black earthy or pulverulent mass or coating on other copper minerals. The mineral has been

reported from several mines in the Cascades district, near Derby, where it occurs in association with chalcopyrite and cassiterite in granite. It has been recorded from the Orieco Mine, Scamander associated with cuprite and chalcopyrite. Tenorite has also been recorded from Saxons Creek, near Frankford; the Australasian Slate Quarry, Back Creek; the Penguin Copper Mine; the Hercules Mine, Mt Read; Burnie Copper Mine, Blythe; at Mt Balfour and Mt Lyell with other copper minerals.

TEPHROITE (*Silicate of manganese*)

$Mn_2SiO_4$

Invalid—The mineral previously recorded as tephroite has been found to be quartz.

TETRAHEDRITE (*Sulphide of antimony, iron and copper*)

$(Cu,Fe)_{12}Sb_4S_{13}$

This grey to black sulphide is very similar in appearance to tennantite. The two minerals are in fact the end members of a series in which the compositions range from purely antimony bearing to purely arsenic bearing, the division being set at an As : Sb ratio of 1 : 1. Bright well formed tetrahedral crystals of the mineral were obtained from the Western Mine, Zeehan. Crystals have also been recorded from the Oonah Mine, Zeehan and from the Hercules and other mines on Mt Read. Massive tetrahedrite has been reported from the South Curtin-Davis, Ring Valley and other mines of the North-East Dundas district. It is associated with galena and bornite from the Mt Lyell mines and has also been found at the Long Tunnel Mine, Heazlewood and the Penguin Silver Mine.

THENARDITE (*Sodium sulphate*)

$Na_2SO_4$

This glassy colourless mineral occurs in association with gypsum, halite and sulphohalite in minute vesicle fillings in the nepheline basanite from Sandy Bay, Hobart (Aurousseau, 1926).

THOMSONITE (*Hydrous silicate of sodium, calcium and aluminium*)

$NaCa_2[(Al,Si)_5O_{10}]_2.6H_2O$

This fibrous zeolite occurs as translucent, pearly spherulitic linings in vesicles in Tertiary basalt near Craigburn, East Tamar. Originally reported from Sheffield, the Hampshire Silver Mine, Hampshire Hills and from Shannon Tier. The Shannon Tier zeolite has been found to be natrolite.

TOBERMORITE (*Hydrous silicate of calcium*)

$Ca_5Si_6O_{16}(OH)_2 4H_2O$

This mineral occurs as cryptocrystalline creamy-white masses associated with tacharanite and probably results from alteration of

this mineral. It has been recorded from Tertiary volcanic rocks at the Liawenee Canal, near Redpa, near Scottsdale, near Gads Hill, at Brittons Swamp and W of Smithton (Sutherland, 1965).

TOPAZ (*Hydrous silicate of aluminium with fluorine*)

$Al_2SiO_4(OH,F)_2$

This is a hard orthorhombic silicate usually crystallising with a prismatic habit. The crystals are characterised by a perfect basal cleavage and the prism faces are frequently vertically striated. The mineral may be colourless, white, greyish or tinted yellow, green, blue or red. Topaz may also be massive and this is given the varietal name pycnite. Crystals and water worn pebbles of the mineral are abundant in creeks flowing off the granite of Mt Killiecrankie, Flinders Island, and in the bay into which these drain. The colour of the topaz varies from translucent white to pale yellow, pink and blue. Crystals of the order of 2 cm in length are abundant and some up to about 8 cm length have been reported. They are likewise abundant in the vicinity of Mt Cameron where they have been derived from pegmatitic veins associated with the Devonian granite. Water worn crystals and fragments are reasonably abundant throughout the alluvial tin fields of north-east Tasmania. Similar occurrences have been recorded at Bell Mount, Middlesex and at the Stanley River tin field. The compact fine grained topaz known as pycnite is abundant in altered porphyry at Mt Bischoff and unusual pseudomorphs of topaz after feldspar are found at this locality. Massive and irregularly crystallised topaz also accompanies cassiterite and wolfram at the Shepherd and Murphy Mine, Moina. At this locality the topaz appears to be less hard than is usual for the mineral although X-ray and chemical studies have failed to reveal the reason for this.

TORBERNITE (*Hydrous phosphate of uranium and copper*)

$Cu(UO_2)_2(PO_4)_2.12H_2O$

A grass-green soft micaceous orthorhombic mineral that generally occurs as thin square tablets. It is relatively abundant at the Royal George tin mine about 15 miles SE of Avoca, where it occurs along joint planes in granite and it has also been recorded from Storeys Creek and Mt Balfour on the west coast. The less hydrated meta-torbernite with $6\text{-}8H_2O$ has been reported from the Anchor Mine, Lottah.

TOURMALINE (*Complex hydrous silicate and borate of sodium, magnesium, iron and aluminium*)

$Na(MgFe)_3Al_6(BO_3)_3(Si_6O_{15})(OH)_4$

The common variety of this mineral occurs as hard black vitreous three-sided prisms that are strongly striated longitudinally and are often grouped in radiating or divergent masses. Tourmaline is abundant in association with cassiterite in most of the tin bearing

localities of the State. It is abundant at Killiecrankie Bay associated with topaz and quartz crystals; near Mt Cameron as prisms over 6 cm in diameter and of smaller size but widespread throughout the north-eastern, north-western and western tin fields including Ben Lomond, Moorina, Cape Barren Island, Middlesex, Mt Bischoff, Mt Ramsay, Mt Housetop, Meredith Range, Pieman River and Mt Heemskirk. At Mt Bischoff a dark green tourmaline with tufted acicular habit, which is sometimes given the varietal name zeuxite is very common. The same variety is found at the Stanley River tin field where it occasionally pseudomorphs orthoclase feldspar. Fibrous interwoven masses of green and brown tourmaline have been reported from near the site of the original Mt Lyell workings but the exact locality is not known.

TREMOLITE (*Hydrous silicate of calcium and magnesium*)

$$Ca_2Mg_5Si_8O_{22}(OH,F)_2$$

This white to pale green fibrous monoclinic amphibole is closely related to actinolite. It is a characteristic mineral of rocks resulting from low grade thermal and regional metamorphism of impure carbonate rocks and of basic igneous rocks. Thermal metamorphism adjacent to the granodiorite mass on King Island has lead to the development of tremolite, forsterite-tremolite and pholgopite-tremolite-spinel rocks (Edwards, *et al.*, 1955). Tremolite has also been recorded from thermally metamorphosed tuffs and basic lavas at Trial Harbour (Green, 1966).

TRIDYMITE (*Oxide of silicon*)

$$SiO_2$$

This high temperature polymorph of silicon dioxide has been observed microscopically as tiny hexagonal blades associated with corroded quartz fragments in buchites and porcellanites near Apsley (Spry and Solomon, 1964). The mineral has been tentatively identified in buchites N of Mt Cameron West (Sutherland and Corbett, 1967).

TRIPLITE (*Hydrous fluo-phosphate of iron and manganese*)

$$(Mn,Fe)_2PO_4(F,OH)$$

Usually occurs as a moderately hard massive, vitreous or resinous brown mineral which may become pink with high manganese content. Triplite is found as irregularly distributed pinkish brown masses up to 5 cm across between a sphalerite-wolfram zone and the central zone of quartz in the Aberfoyle Mine. It is more common in the deeper (5 to 9) levels and is associated with topaz, mica, fluorite and apatite. An analysis of a specimen from 9 level, 640 S of the Aberfoyle Mine yielded the following:

| | % |
|---|---|
| MnO | 42.30 |
| FeO | 12.50 |
| $Fe_2O_3$ | 1.59 |
| CaO | 4.18 |
| MgO | 1.26 |
| $Na_2O$ | 0.25 |
| $K_2O$ | 0.15 |
| $P_2O_5$ | 32.38 |
| F | 5.96 |
| $H_2O^+$ | 1.56 |
| $H_2O^-$ | — |
| Insoluble | 0.39 |
| | 102.52 |
| *Less* F=O | 2.5 |
| | 100.02 |

TUNGSTITE (*Hydrous oxide of tungsten*)

$WO_3.H_2O$?

A bright yellow pulverulent to earthy mineral found coating wolframite from Ben Lomond. Also recorded from a wolframite-scheelite-quartz association at the North Pieman Heads.

TURGITE see HEMATITE

TURQUOISE (*Hydrous phosphate of copper and aluminium*)

$CuAl_6(PO_4)_4(OH)_8.4H_2O$

A fine grained cryptocrystalline massive or concretionary blue mineral. It was found at the old Australasian Slate Quarry at Back Creek near Lefroy in 1963. The turquoise occurs associated with wavellite and varicite as small ramifying veins from 3-6 mm in thickness in the walls of an adit in the western side of the quarry. It encrusts the bedding and cleavage and occasionally occupies vughs which yield masses up to 3 x 2 cm. The mineral appears to have been formed by the action of meteoric water which has derived copper from cupriferous pyrite and aluminium from the slate. The origin of the phosphate is not known but the slates contain only 0.06% $P_2O_5$ and the restricted occurrence of the turquoise suggests that the source is purely local (Sutherland, 1964b). Analysis of the turquoise yields:

| | % |
|---|---|
| $Al_2O_3$ | 36.9 |
| CuO | 8.0 |
| $P_2O_5$ | 33.7 |
| $Fe_2O_3$ | 0.9 |
| $SiO_2$ | 0.9 |
| $H_2O$ | 19.5 |
| | 99.9 |

Turquoise also occurs in association with wavellite at the south end of the Den Ranges near Lefroy.

URALITE (*Amphibole of variable composition*)

Under the actions of late stage magmatic processes of hydrothermal solutions or some metamorphic processes pyroxenes may be altered to fibrous amphiboles known as uralite. This type of alteration is pronounced in the limurite rock at the Colebrook Mine, near Rosebery.

URANINITE (*Uranium dioxide*)

$UO_2$

A fine grained black earthy mineral found in granite on the eastern bank of Storeys Creek about 2 miles S of Rossarden was identified as pitchblende, a massive variety of uraninite, by X-ray diffraction procedures. Uraninite is always oxidised to some extent and the composition lies between $UO_2$ and $U_3O_8$.

UVAROVITE (*Silicate of calcium and chromium*)

$Ca_3Cr_2Si_3O_{12}$

This is one of the more uncommon members of the garnet group. A bright green chrome-bearing garnet from diopside-rock at Trial Harbour is thought to be essentially uvarovite with minor andradite and grossularite (Green, 1966). Uvarovite is also reported to contribute to the composition of a green andradite in shear planes in serpentinite at the Lord Brassey Mine, Heazlewood.

VANADINITE (*Chloride-vanadate of lead*)

$Pb_5(VO_4)_3Cl$

A rarer mineral than pyromorphite or mimetite, vanadinite has been recorded as deep reddish-brown hexagonal prisms from the Magnet Mine near Waratah. Also obtained as globules and encrustations associated with galena and sphalerite on siderite from the Hampshire Silver Mine, Hampshire Hills and Bells Reward Mine, Heazlewood.

VARISCITE (*Hydrous phosphate of aluminium*)

$AlPO_4.2H_2O$

A massive dull emerald green mineral found as encrustations on slate at Back Creek where it is associated with wavellite. A similar association has been reported from the Den Ranges, also along cleavages in quartz at Lefroy and along cleavages at the Lyell Comstock Mine.

VAUQUELINITE (*Chromate-phosphate of lead and copper*)

$Pb_2Cu(CrO_4)(PO_4)$

This rare mineral has been recorded as occurring near Georges Bay as a massive, siskin-green, dull mineral with mammilliary structure associated with galena and arsenopyrite. Also reported from the Adelaide Proprietary Silver Mine, Dundas, in association

with minute crystals of crocoite. The formula given is for the type area mineral from Beresovsk, Russia (Berry, 1948) as no analysis of the Tasmanian material is available. Published analyses (Palache, *et al.*, 1951) indicate that there is considerable variation in the Pb : Cu and Cr : P ratios.

VESUVIANITE (*Hydrous silicate of aluminium, calcium, magnesium and iron*)

$$Ca_{10}(Mg,Fe)_2Al_4Si_9O_{34}(OH)_4$$

A moderately hard, pale brownish, resinous mineral which often occurs as tetragonal prisms or short prisms terminated by pyramids and also massive. The mineral occurs at the Hampshire Silver Mine, Hampshire Hills where it is associated with magnetite; near the Shepherd and Murphy Mine, Moina; at Mt Claude; sparingly at Andersons Creek, Beaconsfield; and also from the contact of marble with garnet-pyroxene-rock at the King Island Scheelite Mine.

VIOLARITE (*Sulphide of nickel and iron*)

$$Ni_2FeS_4$$

This rare sulphide has been observed microscopically as an alteration product of pentlandite at the Lord Brassey Mine, Heazlewood, at the Five Mile Cuni deposits near Zeehan and rarely at Trial Harbour. At the Cuni deposits the violarite carries very little iron and thus approaches the composition of the mineral polydymite (Williams, 1958).

VIVIANITE (*Hydrous phosphate of iron*)

$$Fe_3(PO_4)_2.8H_2O$$

This phosphate is colourless when fresh but it rapidly oxidises to various shades of blue and green. The crystals are monoclinic and of tabular prismatic habit although the mineral is more usually earthy and pulverulent. Groups of crystals about 1 cm in length have been recorded at Mt Bischoff. Earthy vivianite is disseminated in shale at North Bischoff and impregnates clays along the Waratah River. It occurs in fibrous radiating bunches associated with granular quartz at Lucy Creek, a tributary of the Pieman River. The mineral has also been found at Hagley. Crystallised vivianite occurs at No. 1 North Pioneer Reef, Waterhouse and clays carrying the mineral occur on the Supply Creek, near Forester and along the Great Musselroe River near Gladstone.

VOLTZITE (*Oxysulphide of zinc*)

$$Zn_5S_4O$$

Invalid—The mineral previously recorded as voltzite has been found to be sphalerite.

WAVELLITE (*Hydrous phosphate of aluminium*)

$$Al_3(OH)_3(PO_4)_2.5H_2O$$

Usually occurs as white or greenish white globular masses with radiating fibrous or stellate structure. Found at the Australasian Slate Quarry, Back Creek; near Lefroy as small white discs

implanted on sandstone and also associated with turquoise at this locality. Recorded from the Den, near Lefroy associated with galena and sphalerite on the Forth River; in cavities in limestone at Mole Creek; in altered slate at Mt Bischoff; on hornblende at Mt Ramsay and from the ballast quarry on the Zeehan-Comstock tramway.

WELDITE (*Silicate of sodium and aluminium?*)

Invalid—The name was given to a supposed new mineral from the Weld River (Krausé, 1885). It is not recognised by Dana (1898) and was probably an altered fine grained rock.

WILLEMITE (*Silicate of zinc*)

$Zn_2SiO_4$

Doubtful Validity—The record of this silicate from the mines of the Heazlewood district must be considered very doubtful as the mineral association is not one which would normally include willemite.

WOLFRAMITE (*Tungstate of iron and manganese*)

$(Fe,Mn)WO_4$

This is a brownish-black to black, heavy mineral with a sub-metallic to adamantine lustre. It cleaves readily and is often found as portions of striated monoclinic prismatic crystals or wedge shaped crystals in quartz. The most important locality is near Rossarden where the mineral occurs in association with cassiterite at the Storeys Creek and Aberfoyle Tin Mines. Wolframite has also been recorded from other mines on Ben Lomond, from the Rex Tin Mine near Avoca and from the Ethel Mine, Blue Tier. The mineral also occurs in the Moina district where the most important occurrence is at the Shepherd and Murphy Mine where it occurs in association with cassiterite, bismuthinite and scheelite. At the All Nations Mine and other mines in the vicinity of Dolcoath Hill wolframite occurs as irregular bunches in quartz lodes with very minor associated minerals. In the Upper Forth Valley wolframite accompanies small granite stocks and the most important of these occurrences is at the Pelion Mine which has produced a small quantity of the mineral. In the Interview River district on the west coast, wolframite, arsenopyrite and scheelite occur with tourmaline-mica-feldspar-quartz veins which intrude Upper Precambrian siltstones and quartzites. On Mt Heemskirk, about a mile E of S of Mayne's Tin Mine pseudomorphs of wolframite after large bipyramidal scheelite crystals up to 4 cm across have been found. Some remnant scheelite is usually associated with these pseudomorphs. Wolframite also occurs asociated with stannite and other minerals at the Oonah Mine, Zeehan.

WOLLASTONITE (*Silicate of calcium*)

$CaSiO_3$

This is a white fibrous silicate closely related to rhodonite.

The mineral commonly forms in impure calcareous rocks which have been subjected to thermal metamorphism. At the Shepherd and Murphy Mine, Moina it forms a wollastonite-garnet rock. It is found in association with pyroxenes at Highwood, S of the Hampshire Hills and in quarries off Proctors Road, Hobart, where it has formed by the contact metamorphism of Permian mudstones. At Glenorchy brachiopods in Grange Limestone have been replaced by wollastonite.

WULFENITE (*Molybdate of lead*)

$PbMoO_4$

Usually an orange to yellow brown tetragonal square tabular mineral. Reported to have occurred rarely at the Hampshire Silver Mine, Hampshire Hills as brownish-yellow thin tabular crystals associated with fine grained galena and sphalerite.

WURTZITE (*Zinc sulphide*)

ZnS

Invalid—The mineral previously recorded as the hexagonal zinc sulphide wurtzite is sphalerite.

YANTHOSIDERITE see GOETHITE

YTTROCERITE (*Hydrous fluoride of calcium and rare earths*)

$(Ca,Ce,Yt,La)F_2.nH_2O$

Invalid—X-ray examination of the mineral previously identified as yttrocerite shows it to be danalite.

ZARATITE (*Hydrous carbonate of nickel*)

$Ni_3(CO_3)(OH)_4.4H_2O$

This is an emerald-green mineral which occurs as coatings and mammillary or stalactictic encrustations along joint surfaces in serpentine at the Lord Brassey Mine, Heazlewood. It is also found coating chromite and magnetite at this locality. It has also been recorded from Moores Pimple, Dundas. Some material recorded as zaratite is probably a nickel rich poorly crystallised serpentine.

ZEOLITE GROUP

The zeolites are a group of hydrous silicates of aluminium, sodium, potassium, calcium and magnesium. Typically they occur as vesicle fillings and veins along joint surfaces in basic volcanic rocks as a result of late stage magmatic processes. They may also form by alteration of minerals such as feldspar and nepheline and may grow *in situ* during the formation of sedimentary rocks.

In this State the major occurrences of zeolites are associated with the Jurassic dolerites and Tertiary basaltic rocks. Some zeolites are also formed by the alteration of hauyne in the rocks of the Cygnet alkaline complex. Members of the zeolite group that have been recorded to date include:

Analcime
Natrolite
Mesolite?
Scolecite
Thompsonite
Gonnardite
Gmelinite
Stilbite
Phillipsite
Chabazite
Laumontite

Details of these are given in the alphabetical listing.

ZEUXITE see TOURMALINE

ZINCITE (*Oxide of zinc*)

ZnO

Doubtful Validity—The record of this mineral from the Heazlewood Silver-Lead Mine must be considered very doubtful since the mineral has a very restricted environment of formation which did not occur in the Heazlewood district.

ZINKENITE (*Sulphide of lead and antimony*)

$PbSb_2S_4$

Invalid—The mineral previously recorded as zinkenite has been found to be boulangerite.

ZINNWALDITE (*Hydrous silicate of potassium, iron, lithium and aluminium*)

$K_2(Fe,Li,Al)_6Si_6Al_2O_{20}(OH,F)_4$

This is a pale violet to brown lithium bearing mica structurally related to biotite. The main occurrence of zinnwaldite is in the granite pegmatites and cassiterite bearing veins. Previously recorded as a widely occurring 'lithia muscovite' in the tin fields of the State there is some doubt as to the degree to which this somewhat rare mineral occurs.

ZIRCON (*Silicate of zirconium*)

$ZrSiO_4$

This is a colourless to yellow brown tetragonal silicate which commonly occurs as short prisms terminated by pyramids. Zircon is widely distributed as an accessory mineral in igneous rocks and it is also found in some metamorphic rocks. Also in sediments derived from either of the previous sources. The mineral often contains some thorium and uranium in place of zirconium which causes it to be radioactive. When this is the case host minerals such as mica in an igneous rock may display the effect of radiation damage in the form of radioactive haloes (darkened areas) around the zircon crystal.

Zircon is abundant but of small size in the alluvials of the north-eastern tin fields and is likewise found on Flinders and Cape Barren Islands. Colourless, yellow, red and green zircon is found at Boat Harbour and other localities around Table Cape. At the Blythe River lustrous crystals up to 3 mm across are found. The mineral has also been recorded from Sea Elephant River, King Island, Trial Harbour, Circular Head, Meredith Range and from the North Pieman Rivers. The record of abundant zircon in hornblende-gneiss from the Forth River (Petterd, 1910) is incorrect as this mineral is rutile.

ZOISITE (*Hydrous silicate of calcium and aluminium*)

$Ca_2Al_3Si_3O_{12}(OH)$

An orthorhombic silicate which occurs in moderately metamorphosed rocks of calcareous argillaceous sandstone composition. The mineral is usually greenish in colour and the crystals are prismatic and striated although it is more often observed only microscopically. It occurs as a zoisite-amphibolite near Hamilton on the Forth River and from the Collingwood Valley and many other areas of metamorphic rock on the west coast. It has also been reported occurring as an alteration product in granitic rocks of the north-east.

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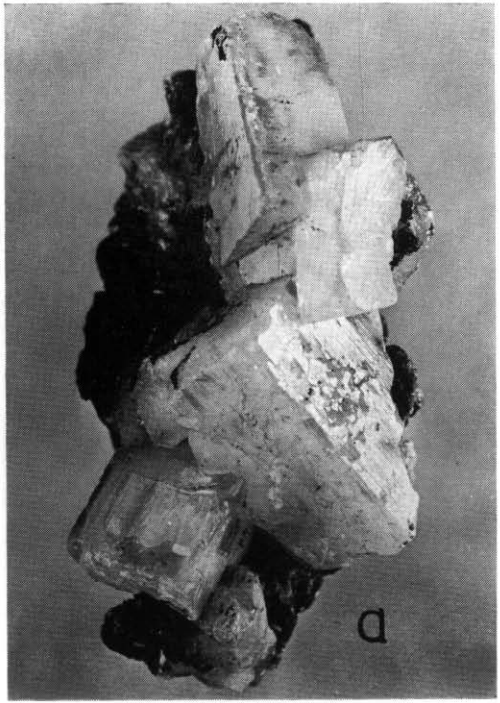
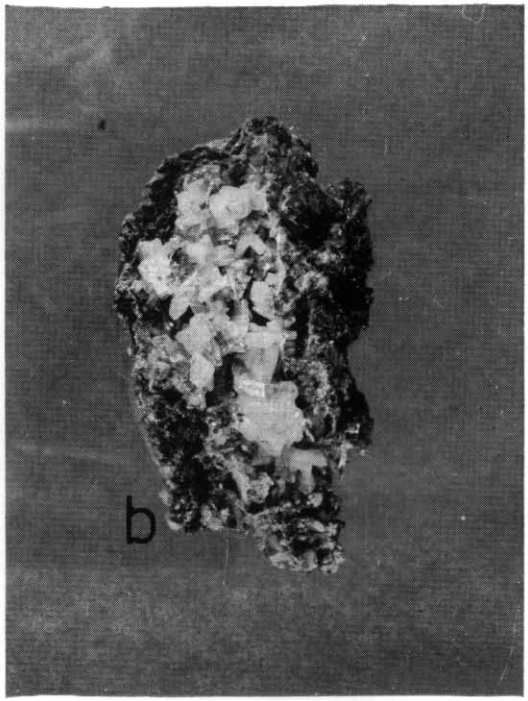
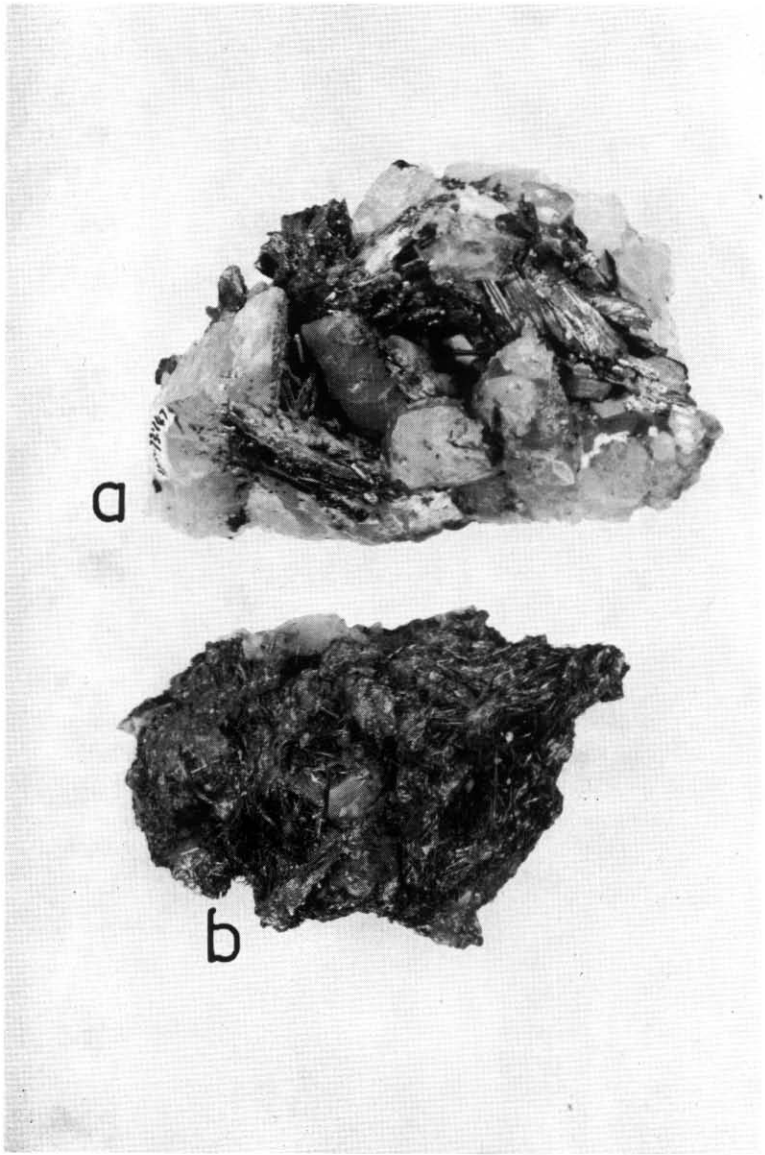



A: ANGLESITE
Comet Mine, Dundas
(Tasmanian Museum)
×$\frac{2}{3}$




B: ANGLESITE
Magnet Mine, Waratah
(Tasmanian Museum)
×$\frac{2}{3}$

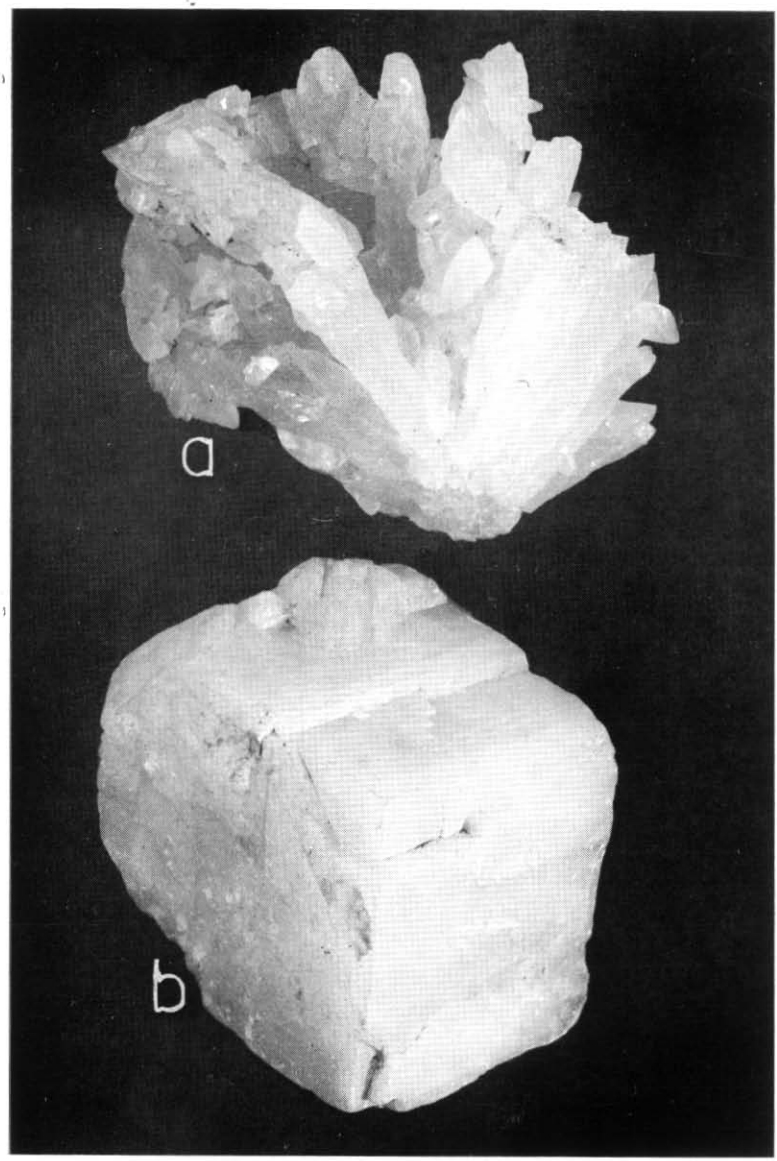
5 cm




A: BISMUTHINITE
Shepherd and Murphy Mine, Moina
(Queen Victoria Museum)
$\times\frac{3}{4}$

B: BISMUTHINITE
Shepherd and Murphy Mine, Moina
(Queen Victoria Museum)
$\times\frac{1}{2}$

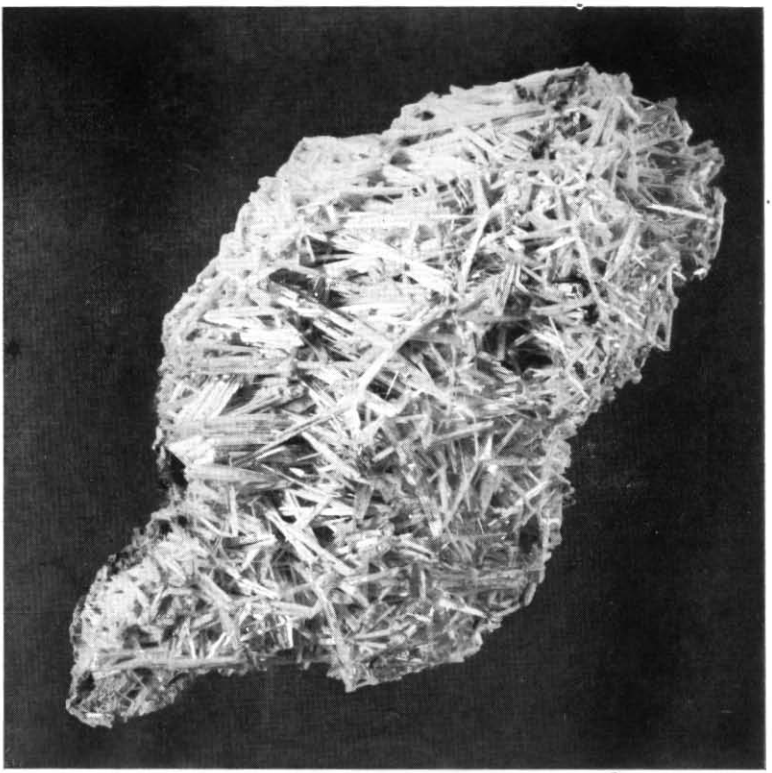
5 cm




A: CALCITE
Wayatinah
(Tasmanian Museum)
$\times\frac{2}{3}$

B: CALCITE
Mt Farrell
(Tasmanian Museum)
$\times\frac{2}{3}$

5 cm



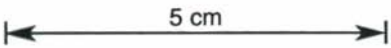
**CERUSSITE**
Comet Mine, Dundas
(Tasmanian Museum)
$\times\frac{2}{3}$

NATIVE COPPER

Mt Lyell

(Tasmanian Museum)

x½



5 cm

a: CROCOITE AND DUNDASITE

Dundas

(Queen Victoria Museum)

x⅓

b: CROCOITE AND CHROME CERUSSITE

Dundas

(Tasmanian Museum)

x⅓

B: PYRITE
South Heemskirk
(Queen Victoria Museum)




A: PYRITE
Comstock Mine, Queenstown
(Queen Victoria Museum)

5 cm

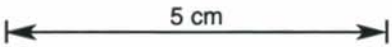
Plate 7

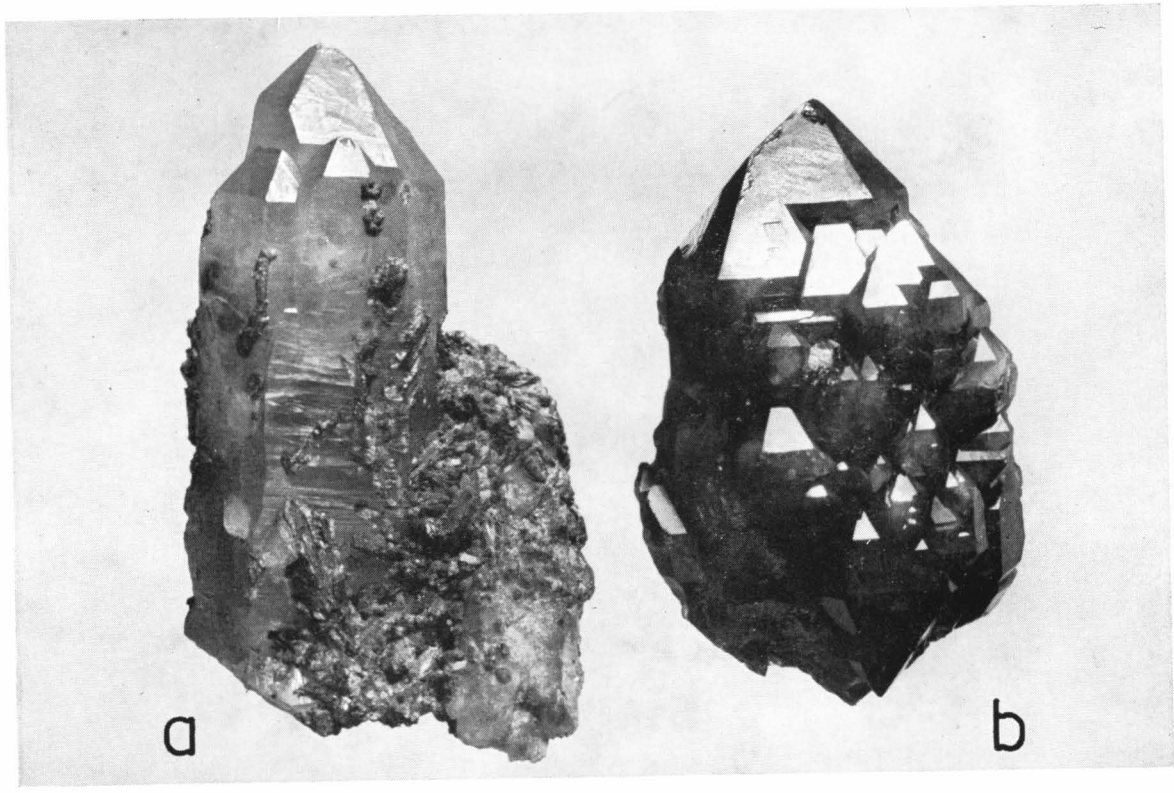
PYROMORPHITE

Sylvester Mine, Zeehan

(Tasmanian Museum)

×½



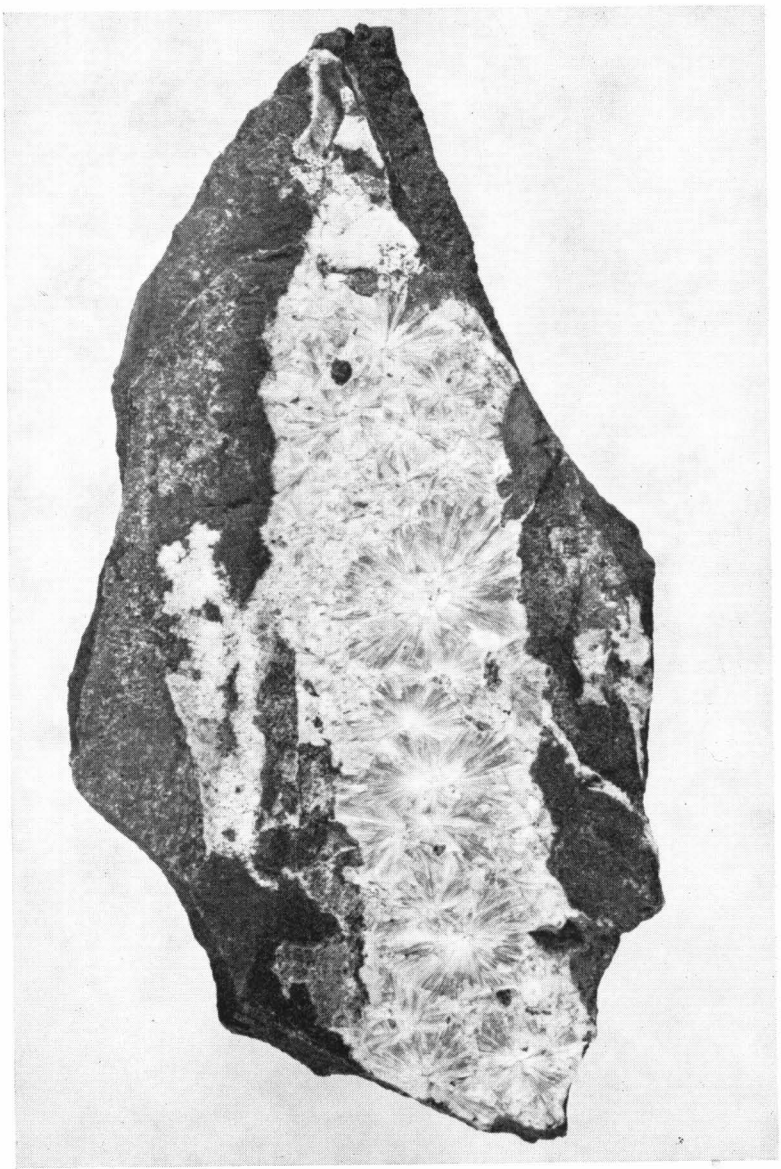



5 cm

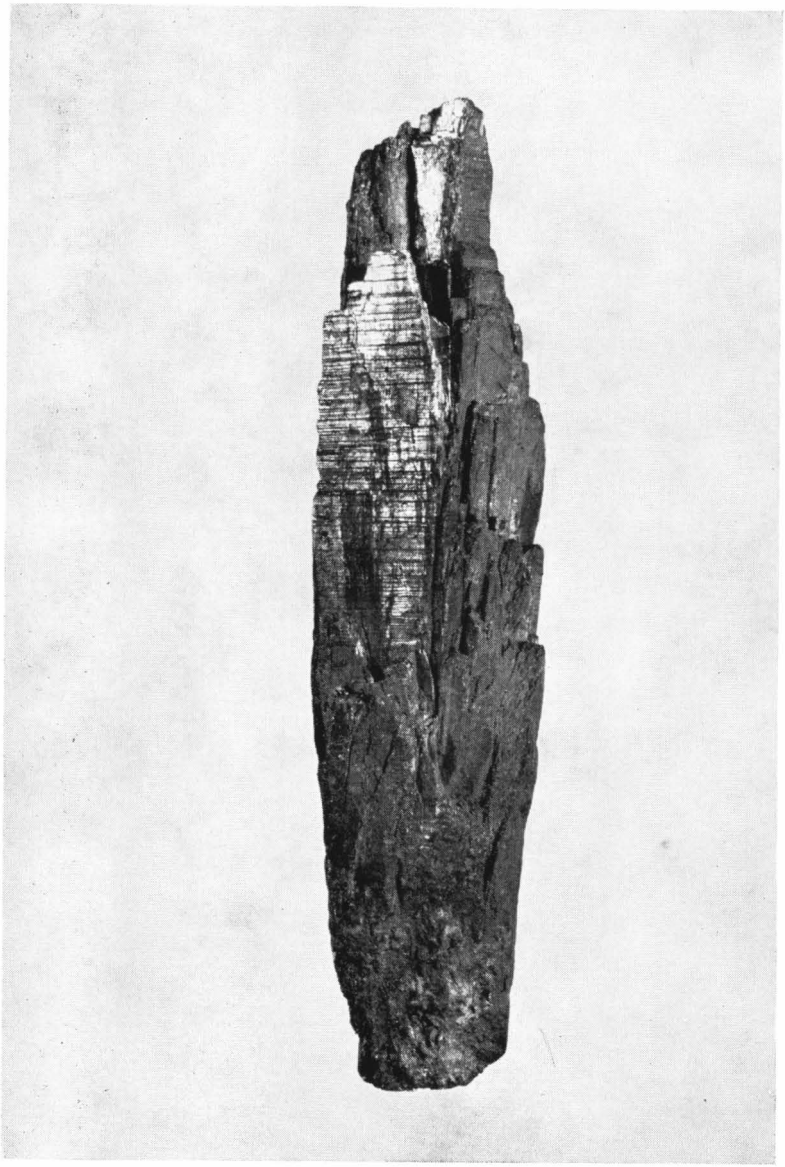
A: QUARTZ
Lefroy
(Tasmanian Museum)
×$\frac{2}{3}$

B: QUARTZ
Mt Bischoff
(Queen Victoria Museum)
×$\frac{2}{3}$

5 cm



SCOLECITE
Hillwood, East Tamar
(Queen Victoria Museum)
$\times\frac{1}{2}$



STIBNITE
Lefroy
(Queen Victoria Museum)

5 cm

STICHTITE

Serpentine Hill, Dundas

×½

5 cm