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A CATALOGUE OF THE MINERALS KNOWN TO OCCUR IN TASMANIA, WITH NOTES ON THEIR DISTRIBUTION.

By W. F. PETTERD.

THE following Catalogue of the Minerals known to occur and recorded from this Island is mainly prepared from specimens contained in my own collection, and in the majority of instances I have verified the identifications by careful qualitative analysis. It cannot claim any originality of research, or even accuracy of detail, but as the material has been so rapidly accumulating during the past few years I have thought it well to place on record the result of my personal observation and collecting, which, with information gleaned from authentic sources, may, I trust, at least pave the way for a more elaborate compilation by a more capable authority. I have purposely curtailed my remarks on the various species so as to make them as concise as possible, and to reduce the bulk of the matter. As an amateur I think I may fairly claim the indulgence of the professional or other critics, for I feel sure that my task has been very inadequately performed in proportion to the importance of the subject—one not only fraught with a deep scientific interest on account of the multitude of questions arising from the occurrence and deposition of the minerals themselves, but also from the great economic results of our growing mining industry. My object has been more to give some information on this subject to the general student of nature,—to point out the large and varied field of observation open to him,—than to instruct the more advanced mineralogist.

Our minerals present a somewhat remarkable and interesting admixture of species, many of which are usually looked upon by mineralogists as restricted to certain well known and recorded localities, such as Crocoisite and Vauquelinite, which have until recently been considered as almost peculiar to the mining districts of Siberia; two of our comparatively common forms—Zaratite and Huastolite—have scarcely been recorded outside their original localities in North America, while Matlockite and Leadhillite are well known British minerals, and Pleonaste and Zircon are abundant in Ceylon. This association of species would appear to some extent to confirm the existence of areas of great economic value containing the same metallic and other minerals that are characteristic of the older and better known mining countries. A comparison of the number of mineral species herein enumerated, with the catalogues that have been compiled of those known to

occur in the various Australasian colonies, may be of some interest, as illustrating in a forcible degree the mineral wealth of this island, notwithstanding its restricted area and the paucity of investigators in this special department of science.

It will be found that in New South Wales about 185 species have been discovered (Liversidge, "Minerals of New South Wales," and "Report of the Second Meeting of the Australasian Association for the Advancement of Science, 1890"); South Australia about 100 ("Report of the Second Meeting of the Australasian Association for the Advancement of Science, 1890"); Queensland about 101 (*loc. cit.*); and New Zealand about 172 (*loc. cit.*)

The Report of the Association is not as yet completed, as it does not contain a census of those known to occur in either Victoria or Western Australia: the former may reasonably be expected to enumerate about 100 species. From a somewhat careful examination of the various catalogues that have been published, it may be fairly concluded that this island contains as many mineral forms as have been discovered throughout the whole of the mainland of Australia. Of the minerals that have been discovered here about 40 kinds have not been recorded as occurring in Australia. It will be found that the catalogue not only includes a large majority of the world's economic minerals, such as representatives of the Gold, Silver, Iron, Nickel, Cobalt, Wolfram, Bismuth, Titanium, Lead, Copper, and Platinoid groups, but also many species of considerable scientific interest, one or two of which are apparently new chemical compounds. So far no members of the Selenium, Tellurium, or Uranium groups have been discovered, but there is apparently no reason why they should not exist; their discovery may therefore be reasonably expected as the work of the prospector progresses.

I have to thank my esteemed friends Messrs. James Smith and W. R. Bell—both well known names in mineral discovery—for much kindly help and valuable information regarding the occurrence of many of the minerals here enumerated, and to Mr. A. Morton I am under great obligation for assistance in many ways.

1. APATITE (*Phosphate of Calcium*).

Occurs of a clear greenish colour with dull lustre in limited quantity in lode gangue. Hampshire Hill Silver Mine; Mt. Bischoff; Maria Island.

2. ARFVEDSONITE.

"A highly ferruginous variety of Amphibole or Black Hornblende," contains one per cent. of copper. "The copper which

it contains exists in part or all as oxychloride coating the crystals." (G. Foord.)

Swan Island, Bass Straits. (Gould, Pro. Royal Soc. Tas., 1871.)

3. ALLOPHANE (*Hydrated Silicate of Aluminum*).

The examples are of interesting colouration, which is yellow to brown in water, but blue when exposed. It is somewhat opaque. Occurs in serpentine as a narrow vein from a few inches to above one foot in width.

Harman's Rivulet, under the Parson's Hood (W. R. Bell); near Derby, as a band of a pale waxy-yellow colour.

4. ALIPITE (*a Silicate containing Nickel Oxide*).

Of extremely rare occurrence in small amorphous masses at the Heazlewood Silver-Lead Mine. In colour it is a pale apple-green with a dull lustre. It has also been obtained at the Bell's Reward and Godkin mines in limited quantity.

5. ACTINOLITE (*a green-coloured fibrous variety of Hornblende*).

The radiating variety occurs a few miles south of the Hampshire Hills, up the Emu River. It is found associated with an iron garnet, amethystine quartz, and fibrous radiating iron, which is probably limonite. At the Heazlewood it is plentiful in spreading and radiating acicular bunches of considerable size and greenish colouration. Obtained in large masses on the River Forth, about three miles from Mt. Claude. On the Whyte River, near the base of the Meredith Range, this mineral occurs of a dark asparagus-green colour—much resembling the variety termed Calamite—containing minute bunches of Asbestos and particles of Mountain-cork, the whole closely intermixed with bands of a yellowish-brown garnet rock which often contains Molybdenite. The Mountain-cork is of a spongy and closely interlaced structure, pale brown to brownish-green in colour, and is often much stained with iron oxide.

6. ARSENOPYRITE (*Mispichel*).

Widely distributed, occurring chiefly in lodes in crystalline rocks with various other forms of pyrites. It is very abundant throughout the north-eastern portion of the island, and occasionally contains a small quantity of silver. In the vicinity of the Scamander River it commonly occurs, sometimes in large masses. At Mt. Sorell, on the West Coast, it is abundant in the form of minute but extremely well-formed free crystals in river drift, the crystals showing many beautiful modifications and mackles; at Waterhouse it has been mixed in dense compact masses containing gold in a quartz matrix; at Mt. Ramsay it occurs with other pyrites and native Bismuth in Amphibole—assays of the

separated arsenical pyrites made by Mr. Cosmo Newberry gave a return of above three ounces of gold per ton; at Mt. Bischoff and at north-east Dundas it is plentiful, intimately mixed with other pyrites, the whole containing a considerable quantity of Cassiterite,—at the former locality it has been found in a lode formation with Fluor-spar, Sphalerite, and Siderite; it is fairly abundant in auriferous reefs at Mathinna, Lefroy, and Beaconsfield, also Penguin River, Mt. Ramsay, Mt. Heemskirk, Mt. Pelion, and other places.

On the southern slope of Mt. Wellington this mineral is said to occur, containing up to 15 per cent. of Cobalt. It was found intermixed with quartz in a disturbed contact formation occurring between sandstone and altered slate (Dyson Western). This form probably belongs to the sub-species *Glaucodot*.

7. **ADULARIA** (*a variety of Felspar, also known as Moonstone*).

Occurs in large crystalline masses porphyritically disseminated in granite and a dioritic rock. It is usually washy-white, but varies to a pale green colour.

Upper Arthur River; Coldstream Rivulet, a tributary of the Huskisson River; and at the Tasman Rivulet, with quartz of various forms. (W. R. Bell.)

8. **ANNABERGITE** (*Arsenate of Nickel*).

This is a secondary mineral of an apple-green colour when pure, soft, and commonly massive or incrusting.

Obtained in extremely minute quantity, Penguin River.

9. **AUGITE** (*a dark-coloured variety of Pyroxene*).

The crystals of this mineral are usually, if not always, stouter proportionally than those of its ally, Hornblende, and they are but rarely much elongated. In the basalt rock they are sometimes fairly developed.

St. Paul's Plains (Proc. Royal Soc. Tas., 1854),—in basalt, the crystals are often nearly half an inch in length; Paddy's Sugar-loaf, Emu River; Hampshire Hills, near the Emu River; near Mount Horror, in an intensely black basalt, on the weathered portions of which the crystals stand out from the surface of the rock: they are often very clearly defined.

10. **ASBOLITE** (*Hydrated Oxides of Manganese and Cobalt*).

This unsatisfactory species (?) has been found at the Godkin Silver Mine, Whyte River, in bluish-black bunches and irregular masses; occurs fairly plentiful at Dundas; Castle Forbes Bay; Magnet Range, in lode gossan with other secondary minerals; Castra, Upper Leven; Penguin River, and other places.

11. ALUNOGEN (*Sulphate of Alumina*).

Often abundant as an effloresced incrustation in caverns occurring in argillaceous rocks.

Occurs near Bridgewater; Brown's River Road; near St. Mary's; Mersey River, about four miles from Chudleigh, known locally as the Alum Cliff; Blue Tier, near Beaconsfield.

12. AXINITE (*Silicate of Alumina and Lime. with Boracic Acid, &c.*)

This rare mineral was detected by Professor Ulrich during his examination of the Bismuth and Gold discovery at Mount Ramsay. It occurs in thin brown patches or blebs in the Amphibole rock, and is comparatively rare. It has not been discovered in Australia.

13. ATACAMITE (*Oxychloride of Copper*).

The beautiful green ore of Copper is occasionally met with in radiating acicular bunches in the vughs of ferro-manganese gossan ore capping the lode on the property of the Comet S.M. Co., Dundas; in small quantity in mixed oxidised ore, Silver Queen, Zeehan; in vughs, Gad's Hill Range, Upper Mersey River.

14. ANDALUSITE (*Anhydrous Silicate of Alumina*).

Abundant in slightly elevated radiating masses of a light colour near the Lottah mine, Blue Tier.

The variety Chiasolite occurs sparingly at Zeehan in Silurian slate-rock as radiating and interlaced prisms of small size.

15. AZURITE (*Blue Carbonate of Copper*).

This beautiful mineral is only known to occur in this island as thin scaly masses, and as extremely minute crystals.

Hampshire Hills; Gad's Hill; Dundas; Zeehan; Main-wareing Inlet; Mackintosh River; Penguin; Saxon's Creek; Cascade; Heazlewood, and other places.

16. ANATASE (*Titanic Acid*).

Occasionally obtained with its chemical congeners Rutile and Brookite. It is usually very much waterworn, but occasionally fairly good examples may be found.

Clayton Rivulet; near the River Forth; near Mount Lyell; in the streams in the vicinity of Brown's Plain.

17. ALMANDITE (*Alumina-iron Garnet*).

In small crystals, which are translucent and of fair colouration, near Mount Heemskirk.

18. ANKERITE (*Carbonate of Lime, Iron, and Magnesia*).

A brown Dolomite containing a considerable proportion of Iron. Occurs on the Heazlewood; Maestrie's Broken Hill Mine at Dundas; North Valley Silver-lead mine at Mount Bischoff, where it forms a black weathered gossan capping a lode, of which it is the gangue; at the Godkin Silver Mine it occurs intermixed with dark-coloured Calcite, both of which often contain Native Silver, Galena, and an amorphous blende.

19. ANTIMONY, NATIVE.

Occurs in minute irregular flakes and patches distributed throughout the silicious gangue of an argentiferous lode on the property of the Hays Prospecting Association, Castray River.

20. ARGENTITE (*Sulphide of Silver*).

Silver Glance is an extremely rare mineral in this Island, the only authentic localities are the Godkin Extended, Whyte River, the Hampshire Silver Mine, at the Hampshire Hills, and Mount Lyell. At the first it occurs in an almost pure state—assaying at the rate of many thousands of ozs. of silver per ton—as worn rounded “slugs” with blocks and masses of Galena and Huastolite in the workings of the mine. The slugs are of small size, rarely exceeding an inch in diameter, and are always coated with a black “pug” formed by the decomposition of various minerals. At the Hampshire Hills it was obtained many years ago in the form of minute crystals implanted upon other minerals and in the cavities of lode material. (W. R. Bell).

It has been recorded as occurring at the Scamander River and at Mount Bischoff (Johnston “Geology of Tasmania.”) At Mount Lyell it is found with Chalcopyrite and other minerals plentifully scattered throughout a quartz matrix, which is said to occur as a wide band on the footwall of the enormous mass of interbedded Pyrites for which the locality is celebrated.

21. ASBESTUS (*a variety of Hornblende*).

Following Dana (“A Text Book of Mineralogy, 1885,”) I retain this term for the fibrous substance belonging to the Hornblende or Amphibole group: the term is commonly applied to fibrous Serpentine. Occurs in extremely short silky bunches, approaching the variety termed Amianthus, with a form of Actinolite and Mountain-cork, in an adit on the property of the Whyte River Proprietary Prospecting Association, Whyte River. (See CHRYSOTILE).

22. ANGLESITE (*Sulphate of Lead*).

As a rule this is not an abundant mineral, except at special localities. From its physical appearance it is usually mistaken for the Carbonate of Lead and called such. The finest examples yet

discovered in Australasia occurred in some quantity at the Maestrie's Broken Hill Silver-Lead Mine at Dundas. Many of the crystals obtained at this mine are large and beautifully developed, occurring in masses of considerable size, sometimes containing Massicot in the interstices and as a base. Commonly large lumps of Galena are coated with Anglesite, Cerussite, and Masscot, presenting an appearance that has become fairly characteristic of this mine and the Comet adjoining. This mineral has also been sparingly found at the Whyte River, and at Zeehan. It crystallises in rhombic prisms with pyramidal terminations. This mineral often gives high assay returns in silver, which is held in the form of one or either of the Chloride group. Mr. W. F. Ward states (Tasmanian Official Record, 1892), "Anglesite with Oxide of Iron and Manganese, and yielding up to 480 ozs. of Silver per ton, has been discovered."

23. ARRAGONITE (*Hard Carbonate of Calcium*).

Often found in cavities of basalt as radiating and bunching masses at Lefroy; Mount Bischoff; Sheffield and Springfield. It is stated to occur at Bridgewater and West Tamar; Chudleigh, where it forms stalactites, in the limestone caves of the locality.

24. ARSENIC, NATIVE.

In hemihedral crystallizations with radiated internal structure, colour almost tin-white, tarnishing black.

East Bischoff mine; in lowest level North Valley lode, Bischoff, in blades between laminae of Siderite with Fluorite, various Pyrites and Black Sphalerite.

25. ARSENIOLITE (*Arsenious Acid or White Arsenic*).

A single large lump was obtained at the Devon Consols mine at the Penguin, associated with Arsenical Copper, Melanconite, and a little Native Copper.

26. ASPHALTUM (*Bitumen or Mineral Pitch*).

About four miles from Chudleigh on each bank of the Mersey River. It is perfectly black, sectile, burns with a dense smoke and strong odour. It occurs in a drab-coloured aluminous shale. "A species of, occurs on the north end of Prime Seal Island" (Gould, *Proc. Royal Soc. Tas.*, 1871, page 61).

27. APLOME (*Iron-lime Garnet*).

A Garnet, of various shades of brown, but generally of a cinnamon colour. They occur in great abundance and large size, often reaching above an inch in diameter. When first broken out they are very fine and beautiful.

Hampshire Hills and on the banks of the Upper Emu River.

28. ANORTHITE (*a white Silicate of Alumina and Lime*).

Whyte River, in limited quantity.

29. BITUMINOUS SHALE.

Argillaceous shales of a more or less bituminous character and of various shades of brown and black occur at several places. They are all inflammable to some extent; so far they have not been determined.

Ben Lomond; Dilston; Beaconsfield; Piper River; George Town; Heazlewood; Blue Tier; Inglis River; Gad's Hill; and other places.

30. BEAUXITE (*Hydrated Oxides of Alumina and Iron*).

A substance from Port Davey, agrees fairly well with the general characteristics of this mineral, although the identification is doubtful.

31. BOURNONITE (*Sulphantimonite of Lead and Copper*).

Occurs in patches near the junction of the slates and granite on the south-east shores of King's Island (Gould, Proc. Royal Soc. Tas., 1871).

32. BERYL (*Silicate of Alumina and Glucina*).

The true emerald has not so far been found here, but hexagonal prisms that are colourless to bluish-green have been obtained at Flinders Island, also in stanniferous drift as water-worn pebbles at Mount Cameron. At the last locality a fairly good example was obtained some years back. It consisted of portion of a crystal about an inch in diameter and the same in length. It had the true hexagonal form and characteristic cleavage. The colour was dull green with a translucent appearance. The stone was mistaken by the miners for a peculiar form of Copper ore. More recently another specimen was obtained in the drift of almost the same colouration, rather less in diameter, but nearly three inches in length.

33. BRONZITE (See ENSTATITE).**34. BASANITE** (*variety of Quartz*).

This is the Lydian or touchstone, a compact black quartz. The stone was used for testing the purity of gold by rubbing the metal upon a smooth surface, the colour of the streak indicating the amount of impurity.

Swansea; Conara.

35. BROOKITE (*Titanic Oxide*).

This species is of the same composition as the more abundant Rutile, but crystallizes in the orthorhombic system. It occurs with

it and Anatase at Clayton's Rivulet, also near the Pieman River, and at Back Creek, near Lefroy: at the last locality it is found in flakey pieces, which are blood-red in colour by transmitted light.

36. BRUCITE (*Hydrated Magnesian Oxide*).

The common character of this mineral is massive and foliated with a somewhat pearly lustre. It is invariably found in or near Serpentine. Occurs in large masses at the Heazlewood; in hexagonal plates which are embedded in Serpentine, Lower Castray River; common west of Beaconsfield; Mt. Heemskirk, foliated and partly altered to Hydromagnesite. (Ballarat School of Mines Museum.)

37. BISMUTHENITE (*Bismuth Glance*).

In small irregular particles in Amphibole with the native metal, Mt. Ramsay. A fine mass of this mineral was met with in the workings of the West Cumberland mine at Heemskirk. Stated to occur at the Blue Tier in granite and at Mt. Reid with Fluor-spar and metallic Bismuth in quartz. At the Iris River, Middlesex, this mineral has been discovered in a lode or vein associated with Cassiterite. Much of the exposed portion is altered to carbonate.

38. BIOTITE (*Magnesia Mica*).

Abundant, often of a greenish colour, Mt. Heemskirk; the frondose variety has been found at the North Pieman River; in large plates and masses at Flinders Island and on the north-eastern coast; common near the Hampshire Hills, many of the flakes measuring half an inch across; Blue Tier and other places. This form of Mica may be distinguished from Muscovite, in a general way, by its darker colour.

39. BERTHIERITE (*Sulphide of Lead and Iron*).

Usually of a dark steel grey colour with a metallic lustre and irregularly striated surface.

On the west flank of Mt. Bischoff the mineral occurs as a compact lode closely intermixed with granular quartz. It contains a small amount of silver.

40. BOULANGERITE (*Sulphantimonite of Lead*).

Occurs near Waratah with Siderite and Mariatite in a lode, the gangue of which is Fluor-spar and quartz.

The samples vary in structure to some extent; they are commonly fibrous and compact, but often graduate to a form which is almost granular, the lustre is invariably silky and metallic. At Dundas it occurs both fibrous and massive, and is often associated with Jamesonite, Pyrites, Cerussite, and Massicot.

41. BORNITE (*Sulphide of Copper and Iron*).

Also known as Purple Copper Ore. Occurs massive and of

good colouration, Mainwaring Inlet, West Coast; fairly common with Cassiterite and other minerals, Star of Peace Mine, Cascade River; occasionally occurs in limited quantity in stanniferous dykes, Blue Tier.

At Mt. Lyell this mineral occurs in a highly argentiferous form—often giving assay returns as high as 2000 oz. of silver to the ton of ore; it is also to some extent auriferous.

Argentiferous Bornite is of very unusual occurrence; but a similar combination occurs at the Red Mountain, Colorado, U.S.A., where it is also associated with Stromeayerite and Fahlerz.

42. BISMITE (*Oxide of Bismuth*).

Of very rare occurrence. It is found as a thin yellowish earthy coating on other Bismuth minerals at Mt. Ramsay; in arborescent crystal groups, occurring in the cleavage planes of country rock; colour of a greenish-yellow. Hampshire Silver Mine (W. R. Bell.)

43. BISMUTITE (*Carbonate of Bismuth*).

Usually occurs in whitish to yellow amorphous and pulverulent masses with other ores of the same element, and sometimes as waterworn nodules in alluvial drift. Here it is of unusual rarity, having so far only been obtained in minute coatings and blebs at Mt. Ramsay, Mt. Reid, and the Hampshire Hills. Said to be occasionally met with in drift with gold and Native Bismuth at the Ring River; has been found somewhat plentiful in stanniferous drift as small waterworn slugs. Iris River, near Middlesex. At this locality it has recently been discovered *in situ* in a small lode or vein intermixed with quartz and the sulphide of the metal.

44. BISMUTH, Native.

Abundantly distributed throughout a sub-crystalline black Hornblende or Amphibole of massive structure that occurs as an extensive lenticular formation at Mt. Ramsay. The metal is freely distributed in small irregular particles and flakey masses, varying in size from microscopic grain to pieces weighing several ounces. It occurs associated with blue and white Fluor, Scheelite, and Axinite, with the metallic minerals Pyrrhotite, Chalcopyrite, and Pyrite. The mass of Hornblende occurs as a contact formation abutting upon Granite on the one side, and a Dioritic rock on the other. At Mt. Reed this metal has been discovered in quartz with Fluor; it has also been obtained at the Blue Tier in granite in a lode or dyke with Cassiterite and Molybdenite. Some of the alluvial gold obtained at the Ring River is said to contain this metal as an alloy; it would therefore approach the substance that has been named Maldonite. Although Bismuth is commonly auriferous it is not so at Mt. Ramsay; the gold at that locality was obtained from Chalcopyrite and Mispickel.

45. **BARITE** (*Sulphate of Baryta or Heavy Spar*).

Occurs at many localities throughout the north-western portion of the island. It is very plentiful at the Surrey Hills, where it often contains Copper Pyrites and minerals resulting from the decomposition of the same, such as black oxide and the carbonates. At Mt. Lyell it occurs with Gold in large compact masses; in veins under Mt. Roland, Rocky River, and near Corinna, Pieman River; at the Wilmot River, where Native Copper is found associated with it; at the Specimen Reef Mine, Savage River, often containing cupriferous pyrites and sometimes Gold; with galena, Huskinson River; with Pyrites and Galena, near Deloraine; with Calcite, Siderite, and Galena, on the banks of the Upper Leven River.

46. **BASTITE**—see SCHILLER SPAR.47. **BLÉNDE**—see SPHALERITE.48. **CHALCOPYRITE** (*Sulphide of Copper and Iron*).

Much of the mineral substance known under this name is more properly Cupriferous Pyrite, the pure chemical compound being comparatively rarely met with. It is the common ore of Copper, which here, as in most other metalliferous countries, is freely distributed, although the crystallized pure form is but rarely seen. Although copper, probably this ore, was known to exist in the island as far back as 1822 (Evans' Description of Van Diemen's Land), no profitable results have followed the few attempts that have been made to open up the discoveries of the ore at Mount Maurice, Badger Head, Saxon's Creek, &c. All have been abandoned after the expenditure of a limited amount of capital, so that the real value of these deposits still remains an open question. The more important localities are:—Mackintosh River, with Baryta and Calcite; Mainwaring Inlet; Cascade River, with Cassiterite and Schorl; Mount Ramsay, auriferous in Hornblende; Badger Head; Frankford; Mount Lyell, with Galena and other minerals; Penguin River; Lake Dora; Beaconsfield; Mount Maurice, with Cassiterite and crystallized Quartz; Mount Heemskirk; Arthur River; Scamander River, with Galena, Blende, and Arsenical Pyrites; Blue Tier; near George's Bay; Bell Mount, west of Mount Claude, where it occurs in rather large quantity as rounded lumps in alluvial drift with free gold; occurs in a lode at Mount Bischoff with Mariatite, Berthierite, and Chlorophane.

49. **CANNEL COAL** (?)

An important discovery has recently been made of a bituminous substance bearing a very close physical resemblance to the valuable Cannel Coal of England and Scotland. It was found in the form of loose surface blocks—supposed afterwards *in situ*—by the prospectors sent out by the Mole Creek and Zeehan Mineral Prospecting and Exploration Company, Limited, at Barn Bluff, near Mount Pelion.

Mr. T. Bateman, the secretary of the Company, has kindly placed specimens of the substance at my disposal, as well as allowing me the privilege of making extracts from several interesting reports thereon. The substance is of a very compact nature, with a distinct and broad conchoidal fracture in all positions, shining intensely black, with a pitch-like appearance; brittle and sectile, with a dull black streak. It is easily ignited, burning with a clear flame, and gives off a strong odour. It has been critically examined, and careful analysis made by several well-known authorities, all of which tend to prove that, if not exactly identical with the typical form of Cannel Coal, it is at least very closely allied to it both physically and chemically. Mr. J. Cosmo Newberry, in a report upon its chemical composition, states that, "Upon analysis it gave the following results:—

Water at 212 %	trace.
Volatile matter	54·20 per cent.
Fixed carbon	39·75 "
Ash	6·05 "
Total	100·00 "

Mr. W. F. Ward, Government Analyst, under date 29th Sept., 1892, gives the following result of an examination: "The Cannel Coal received from you has the following ultimate composition:—

	Per cent.
Carbon	74·0
Hydrogen	7·8
Oxygen and Nitrogen	12·8
Sulphur	0·8
Ash	4·2
Moisture....	0·4
Total	100·0

The proximate composition is:—

Fixed carbon.....	44·3	} Coke, 48·5 per cent.
Ash	4·2	
Gases, &c. lost at red heat	51·1	
Moisture	0·4	
Total	100·0	

The sulphur is included in the 'coke' and 'gases;' the coke is firm and lustrous, and the gas would be of great value for enriching that of poorer coal. The *ultimate* composition is almost identical with that of 'Grahamite,' which is described by Dana as 'an oxygenated and inspissated petroleum, found in shrinkage fissures in sandstone,' but the physical characters of the two substances are different.—The specific gravity of the sample is 1·13."

Mr. T. S. Cleminshaw, Engineer of the Launceston Gas Company, states, "*In re* sample of Cannel Coal supplied, I have tested it for quantity and quality of gas, with the following results :—

Quantity (average of 4 tests)	11·200 cubic feet per ton.
Quality (average of 3 tests)	50·40 candles corrected for barometer and thermometer."

The true Cannel—a corruption of the word "candle"—is a variety of bituminous coal. It is compact in structure, with little or no lustre, breaking with a conchoidal fracture, and somewhat smooth surface; colour dull black. It affords a large quantity of burning and lubricating oils with other products, and is of considerable economic importance. A variety is known as Torbanite (Boghead Cannel), which is of a brown colour without lustre, and gives a yellowish streak. It may be stated that "Parrot Coal" is a Scotch term for Cannel.

The arrangement of the various Hydrocarbons of the Cannel character appears to be extremely unsatisfactory, and the utility of an arbitrary specific classification is very doubtful, more especially as the majority appear to fairly agree both as regards physical and chemical character. For commercial purposes local appellations are convenient, and the variety discovered in this colony will doubtless, in due course, receive one by which it will be known from analogous substances. I would suggest that it be termed "Pelion Coal" or "Pelionite."

As an illustration of the difficulty of the scientific arrangement of this class of mineral on a satisfactory basis, the following remarks by Professor A. Liversidge ("The Minerals of New South Wales," page 145) may be interesting. Referring to the New South Wales Torbanite (Wollongongite) or Kerosene Shale, this learned gentleman states that "This so-called 'Kerosene Shale' does not differ very widely from Cannel Coal and Torbanite. Like Cannel Coal, it usually appears to occur with ordinary coal in the form of lenticular deposits. Like Cannel Coal also, when of good quality, it burns readily without melting, and emits a luminous smoky flame, * * * * Unless it be decided to give the mineral a new name, it would be better to call it Torbanite, or Cannel Coal, rather than Kerosene Shale, since the oil which it yields is probably not Kerosene, and the substance itself is not strictly a shale, and, moreover, it is not very widely separated, either in physical properties or in chemical composition, from either Torbanite or the Cannel Coals."

For comparison the following analysis of Hydrocarbons from several well-known localities will be of interest. They are taken from Professor Liversidge's valuable work on the Minerals of New South Wales :—

Locality.	Moisture.	Volatile Hydro- Carbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Analyst.
1. Hartley Vale, N.S.W.	...	82·50	6·50	11·0	...	...	B. Silliman.
2. Joadja Creek, N.S.W.	0·44	83·861	8·035	7·075	0·589	1·054	Liversidge.
3. Albertite, New Brunswick	...	57·490	42·086	0·424	...	1·105	„
4. Cannel, Scotland	...	69·77	10·45	19·78	...	...	Percy.
5. Cannel, Wigan	1·464	45·900	45·519	7·117	...	1·259	Liversidge.
6. Torbanite, Torbane Hill	...	71·17	7·65	21·18	...	1·170	How.

Mr. W. A. Dixon, F.I.C., gives the following result of an analysis of this substance, viz :—

Water	None
Volatile Hydrocarbons	50·86
Fixed Carbon	43·69
Ash	4·12
Sulphur	1·33
Total.....	<u>100·00</u>

In a communication to Mr. Bateman, this gentleman states—“Coal of this quality should be of value for gas-making, but it would be of little use for oil-making, as it would yield more tar than oils, which would be difficult to purify. I am satisfied, from its appearance and behaviour when subjected to heat, that it would give rather aromatic hydrocarbons (Benzene, Napthalis, &c.) than fatty ones (Olefines and Paraffin). It is not a Cannel (from which oils are not made) and not a shale, from which they are. Its colour, both in mass and powder and its fracture in mass, is different from either—and this difference is emphasized by the coke which it yields on rapid heating, neither Cannel or shale yielding a *true coke*. There seems to be something considerable extracted by chloroform, which is coloured brownish-yellow by the powder. I would be inclined to name the mineral Pitch Coal, as being most expressive of its appearance, and by its difference from highly bituminous coal as that of Stockton or Hetton mines, which I consider to be *resin coals*.”

50. CINNABAR (*Sulphide of Mercury*).

It is reported that this mineral was found many years ago in the Fingal District and also at Bagdad, and still more recently at Dundas, but no confirmation has occurred in either case.

51. CHRYSOLITE (*Silicate of Magnesia and Iron*).

Also known as Olivine. As a rule rocks containing this species are no good for the precious metallic minerals, and its occurrence may with some certainty be looked upon as an indication of their non-existence. Large specimens form the green stone termed Peridot, but those occurring here are usually too small to be of use to the jeweller. The crystals of this mineral are fairly common at several localities in Europe, but are very rarely found here or in Australia. Found in pale green semi-transparent particles in basalt, Dundas; in amygdaloidal basalt at Bischoff and the Wilmot River; in granite, Flinders Island (Gould); Upper Forth River, massive in basaltic dyke; of a yellowish-green colour in coarsely crystalline dolerite, Paddy's Sugar Loaf Mountain (W. R. Bell); near Hampshire Hills; Deloraine; as

somewhat large crystals, often the third of an inch in diameter, which are of a bluish colour and opalescent tarnish, in partially decomposed basalt at the Emu River; commonly scattered as small blebs in black basalt, Table Cape; in large masses often intermixed with zeolitic matter, Sheffield.

52. CHIASTOLITE (*Silicate of Alumina*).

This is often classed as a variety of Andalusite, which is of the same composition. The common form has been obtained sparingly as knotted masses penetrating slate rock near its junction with the granite at Zeehan.

53. CHRYSOTILE (*Hydrated Silicate of Magnesia*).

Almost all of the locally termed Asbestos belong to this species, which usually occurs as seams and patches in Serpentine. Abundant near Beaconsfield and the Asbestos Range. The fibres are occasionally 10 to 12 inches in length, pale in colour, silky and beautifully soft to the touch. It is easily separable from the more compact rock. Samples occasionally occur that show a gradual transition to Hematite, with which it is closely associated; at the Heazlewood it abounds in the Serpentine, but is short in fibre, and amianthus-like; about Mt. Heemskirk it occurs wherever its parent rock exists, sometimes as short entangled masses of a white colour; in more or less quantity at Mt. Claude, Pie-man River, Mt. Ramsay, the Penguin, Dundas, and it is said to occur east of the Mussel Roe River, N.E. Coast.

54. CHRYSOCOLLA (*Silicate of Copper*).

Usually occurs as a thin crust on other Copper minerals; colour various, shades of emerald green, passing to pale blue. Obtained as a thin coating in small patches.

Star of Peace Tin Mining Company, Cascade.

55. COPPER, NATIVE.

Is plentiful at several localities on the West Coast. At Mount Lyell and vicinity it is especially so, occurring in large and small arborescent masses, often reaching several pounds in weight. It is often found embedded in a clay or lithomargic magma, and sometimes attached to Limonite.

Many assays have been made which show it to be auriferous, occasionally to a high degree; at Mount Bischoff a beautiful highly polished foil of extreme tenuity has been obtained, coating the cleavage planes of the killas or altered slate near its junction with the Porphyry rock; at the Montagu and Duck Rivers Native Copper has been obtained in irregular small lumps embedded in a nearly black basaltic rock; it occurs in a vein of Garnet rock at the Hampshire Hills; with Baryta at the Wilmot River; as a flaky and frondose coating on Limonite and a silicious rock

at Nolan's Creek, near the Pieman River; at Laurel Creek, a tributary of the Blyth River, it occurs in Chlorite, with Blende, Galena, and Copper Sulphate; Dunyan Range; Badger Plain; near Circular Head; it is stated to also occur at Mainwaring Inlet, south of Macquarie Harbour.

Regarding the form that has been discovered at Mount Bischoff, this interesting and peculiar copper foil has been found under similar conditions in the elvan courses of Cornwall, England. Mr. A. K. Barnett states, in a paper entitled "Observations on the Elvan Courses, Greenstones, and Sandstones of Cornwall, with Remarks on their associated minerals" (Royal Cornwall Polytechnic Society, 1873), that "At Wheal Buller the joints of the elvan contain thin plates of Native Copper. Large quantities of Native Copper occurring in arborescent and filmy forms were found filling the joints of the elvan at the Consolidated Mines. It also occurs in the joints of the killas and the quartz veins associated with the elvan."

56. CROMFORDITE (*Chlorocarbonate of Lead*).

A single example obtained; the crystals are rectangular four-sided prisms, with the terminal edges replaced. It is very frangible, colourless, and white, with an adamantine lustre. It occurred as a small group attached to Galena with some associated Cerussite.

Adelaide Proprietary Mine, Dundas.

57. COVELLITE (*Blue Copper Sulphide*).

Obtained as an incrustation investing cupriferous Pyrites and as a bluish-black powdery deposit, filling cavities in a stanniferous lode.

Star of Peace Mine, Cascade; Ethel Mine, Blue Tier (Montgomery).

58. CUPRITE (*Red Oxide of Copper*).

In the vicinity of Mount Lyell this mineral occurs in some abundance in finely formed crystals which are, both as regards size and colouration, of the characteristic octahedron and its modifications. They are often attached or partially embedded in blocks of nodular Limonite; occasionally the cavities in the nodules are literally coated with the bright sparkling mineral, which, from its ruby colour, contrasts well with the brown iron oxide; the latter is often stained a shining black with Manganese Oxide and Stilpnomesiderite.

59. CORUNDUM (*Oxide of Aluminium*).

The ordinary dull brown coloured form of this mineral is occasionally met with in the stanniferous drift of the north-east coast, but it gradually merges into its variety Sapphire, which is far more abundant than the typical form, although good clear

gem-stones of the highly natural *Oriental* colouration are of exceptional occurrence. A limited number of very fine stones have been obtained which, after passing through the lapidary's hands, have been pronounced by good authorities to be gem stones of considerable value and quite equal to the average of those from Ceylon. They are usually very much waterworn, although occasionally specimens are met with that clearly show the rhombohedral crystallization. The *Oriental* Amethyst and Ruby are not known to occur in this island, but occasionally an *Oriental* Topaz has been obtained in Main Creek, near Thomas's Plains. The colour varies through all shades of blue, green, and purple, and from translucent to opaque. They are sometimes parti-coloured, showing various shades of blue and yellow to colourless. The highly-valued asteriated variety has been obtained, but it is of extreme rarity. A fine large example of the ordinary translucent Sapphire was obtained in the Weld River weighing 264 carats, but the colour was not of even shade or that so highly valued.

Mount Cameron; Thomas's Plains; Weld River; Main Creek; Moorina; Branxholm; occurs opaque, colourless to dirty blue and grey, Blyth River; in clear blue fragments at the Boat Harbour, near Table Cape.

The Sapphire has not been discovered *in situ*, although its matrix will in all probability be found to be Granite.

60. COPIAPITE (*Yellow Sulphate of Iron*).

Occurs in small quantity, resulting from the decomposition of Melanterite, in one of the adit levels at Mt. Bischoff. This mineral is often observed on Melanterite as a thin incrusting powder; it is probably a transmutation of that species by loss of water. Some pyrites from Bischoff decompose directly to this mineral—this peculiarity is especially noticeable in cabinet specimens, which after a time are often literally transformed into the mineral. This pyrite is found in a lode composed of Sphalerite, Fluor-Spar, and Steatite, east of the great mine.

61. CHABAZITE (*Hydrated Silicate of Alumina, &c.*)

An abundant zeolite, which occurs in the cavities of amygdaloidal Basalts. The obtuse rhombohedral crystals are usually well formed, clear, and colourless. Abundant near the railway bridge that crosses the Hellyer River; of small size but well formed groupings, Springfield; associated with other zeolitic minerals, Olivine, and Calcite, Sheffield and near Mt. Claude; with ferro-calcite, Lefroy; occurs abundantly in vesicular basalt at Mt. Pelion and vicinity,—the crystals are well developed and in fine groupings, often lining the cavities. Rounded waterworn nodules of the black basalt are often met with in the streams which clearly show the implanted crystal groups, and are sometimes mixed with other species of zeolitic minerals and ferro-calcite.

62. CHROMITE (*Oxides of Chromium and Iron*).

This mineral is apparently widely distributed throughout the north-western portion of the island, but has not been recorded as occurring in large quantity. It is always to be found in more or less profusion wherever Serpentine occurs, sometimes intermixed with that rock in the form of minute crystals, but more often as irregular patches of various sizes, which occasionally form somewhat extensive masses.

In the Heazlewood River and its vicinity minute, intensely black polished octohedral crystals are plentiful. In favourable places in the beds of some of the smaller streams it is quite possible to obtain several ounces weight of these crystals in a dish of wash-dirt. At this locality it is also fairly abundant in the massive form; in crystallized masses, in a small vein occurring between Serpentine and Quartz, near the River Forth (J. Smith); Pie-man River; Meredith Range; Dundas; Asbestos Mountain; very abundant as small crystals in Harman's Rivulet, Huskisson River, and at other places.

63. CHLORITE (*Hydrated Silicate of Alumina and Magnesia*).

Occasionally abundant in stanniferous lodes at Ben Lomond and Heemskirk; at Bell Mount, west of Mt. Claude, with Sphalerite; as Chlorite Schist it is abundant between Waratah and the West Coast. The substance occurring at Bischoff that is usually termed Chlorite is a greenish tourmaline rock which is peculiar to that locality.

A fibrous radiating variety occurs at Mt. Ramsay and Hampshire, the former of a pale green and easily decomposable, the latter of a darker colour more durable in nature. At the Laurel Creek, near Mount Housetop, the mineral occurs as a vein in a mineralised dyke; it is of various colours and much stained with Iron Oxide. At the Prince George Mine at Heemskirk in sheaf-like aggregations, which cross each other; and sometimes radiating; at the Hampshire Hills as Chloritic Porphyry, in two dyke masses running almost parallel, which are traceable for a considerable distance. On the north-eastern tin field this mineral is distributed, but usually in small quantity; it occurs as a constituent of Protogene, a stanniferous rock, at Ben Lomond and Gould's Country.

64. CIMOLITE (*Hydrous Silicate of Alumina*).

Occurs as a deposit near St. Leonards, and is often termed locally Meerschaum. It is of a smooth compact texture, with a dead white colour and subconchoidal fracture.

65. CALCITE (*Carbonate of Calcium*).

The massive form or limestone occurs abundantly at Bridge-

water; Maria Island; Mersey River; Mackintosh River; Gordon River; Don; Heazlewood; Beaconsfield; and other places.

As Travertine, at Geilston; as Roestone, on the west side of the Savage River; as Iceland Spar, near St. Mary's and near Deloraine; abundant, stalactitic, at Chudleigh and near Frankford; in more or less perfectly crystallized bunches and bands in lode-matter at Heazlewood, Zeehan, and Dundas; in vughs and imbedded in basalt rock, Bischoff and Lefroy; of a pink colour with carbonaceous matter, Swansea; as small blue-coloured crystals, Madam Melba Mine, Dundas; flesh-coloured in Syenite Porphyry composed of Orthoclase, Hornblende, and Quartz in a felspathic magma. (Ballarat School of Mines Museum.)

66. COBALTINE (*Arsenide of Cobalt and Iron*).

Occurs in masses with cupriforous pyrites, galena, and grey copper, Penguin Silver Mine, Penguin River. (James Smith.)

67. CASSITERITE (*Oxide of Tin*).

As is well known, this is the only commercial ore of Tin. It crystallizes in the pyramidal system; in habit it affects short four-faced prisms with complex terminations; it often occurs mackled, and is, when freshly broken out, of adamantine lustre. As a distinguishing character the streak or powder is always pale-brown or greyish white. In colour this mineral varies in a great degree; it occurs commonly black and in various shades of brown, but is often almost colourless, red, yellow—pale and dark, white, grey, and sometimes variegated. In structure it may be compact, fibrous, nodular, radiated, or crystalline. According to colour or structure its varied forms are termed by miners black tin, resin, amber, ruby, wood, shot-holed, blistered mahogany, and other local appellations. Alluvial tin is generally much water-worn or rolled, but in many cases the crystals are but little abraded; it is usually opaque, but is occasionally translucent to almost clear transparent. It is well known to metallurgists that stream or alluvial tin—as with gold—is richer than that derived from its matrix or lodes; the reason for this, some mineralogists suppose, is that the alluvial mineral has a kind of growth by continuous coatings received from the metal held in solution; but it appears to me more reasonable to suppose that this peculiar feature is caused by the outer crust being abraded, leaving a richer central portion or nucleus. Cassiterite occurs in either the eruptive granite rock itself or in the immediate neighbourhood. The rock itself is, as a rule, comparatively poor in Felspar and shows a corresponding increase in the important mineral Mica, which invariably contains more or less Lithia as a constituent, so that the presence of this element may be looked upon as a fair indication of the existence of Tin Oxide. The mineral is

frequently impregnated in the rock itself, in which case it is of primary origin. As occurring in lodes or veins of secondary character it is usually much more permanent, and may then be expected to exist in depth. This island is one of the most important tin-producing countries of the world, and a peculiar interest is attached to its discovery, as it was apparently one of the first minerals found in Australasia of which we have any record. Professor Liversidge states ("Minerals of New South Wales," page 77), "The probable presence of tin in Australia was mentioned as early as January, 1799. Collins, in his account of the English colony of New South Wales, states that Mr. Bass, the surgeon of *H.M.S. Reliance*, found on the beach of Preservation Island (on the north coast of Tasmania, near the south coast of Barren Island) a very considerable quantity of the black metallic particles which appear in the granite as black shining specks, and are in all probability grains of tin." The next record that I have met with occurs in the Proceedings of this Society for the year 1854, page 425-431, in which reference is made to samples in the museum of a Mr. Thomas Winsmore Wilson, of Barnsley, Yorkshire, England. In this paper the following remarks occur: "No. 25, Tinstone—as regards this Tinstone I need not remind you of its value. If you could open a mine as rich in Tin as this specimen you would be very fortunate in the mining department." This sample was obtained "on elevated land below the Tier, St. Paul's Plains." The wonderfully rich deposit of tin at Mount Bischoff was discovered by Mr. James Smith in 1871, and soon after that year many other payable finds occurred, principally in the north-eastern portion of the island. It is now known to occur, both as drift and lode, at many places throughout the northern portions, several of the eastern islands in Bass Straits, and it has been recently discovered at one locality near the extreme southern coast.

It may be enough, from a mineralogical standpoint, to state that almost all of the many recorded varieties of this important mineral have been found more or less abundantly at one or other of our tin-producing districts. The ordinary "Black Tin" predominates, but the coloured varieties are by no means rare at special localities. The "Ruby Tin" varies from pale red to a ruby tint, and is often quite pellucid; it is fairly abundant in the drift at Branhom, Moorina, and Weldborough. The "Resin Tin" is usually dull, waxy, and opaque, and of a yellow to pale brown in colour. It occurs at several of the mines in Gould's Country and at Moorina; both of these kinds are of exceptional occurrence in the lode matrix, but the first has recently been discovered in the Ben Lomond District.

The coloured forms are as a rule confined to the produce of the north-eastern tin fields, that from the north-western portion being the ordinary Black Tin of commerce. At the South Pieman

River a massive variety occurs which is known as "White Tin;" it is an amorphous compact ore of a dull white to pale brown colour. At Mount Ramsay a peculiar variety has been obtained sparingly intermixed with the normal kind; it is a small angulated form of a brown colour and highly polished, generally but little water-worn. That from Constable's Creek is of a rich brown colour, with striations of various shades in fine crystallized masses of considerable size embedded in a quartz gangue. The highly polished crystals and mackles from the Blue Tier and vicinity are exceptionally fine, and samples from some of the mines in the Ben Lomond district are remarkable for the same reason.

The ore from the Iris River, near the Middlesex Plain, is, as a rule, a very minute black to dark brown polished form, which often occurs dispersed throughout a white kaolinic clay or decomposed felspar. The Bischoff Tin is dark brown to black; the major portion of that obtained is found in small granular particles, but very large masses of almost pure Cassiterite have been obtained mainly composed of solid aggregations of crystals. At this locality this mineral has been obtained intimately associated and scattered throughout various forms of Pyrites, mainly arsenical, and it is reasonable to suppose that the greater portion of the lode mass or "Bonanza" that has been worked had its origin from a huge mass of Pyrites afterwards transmuted to Limonite, and now forms the well-known Brown Face of the mine. The recent discovery of Native Sulphur associated with a mass of fine quartz Sinter or Geyserite, showing a close resemblance to samples from the Hot Springs of New Zealand, may as investigation proceeds throw some light upon the important subject of its origin. The principal rock formation at Mount Bischoff is Quartz-porphry—often containing small crystals of Pycnite—with shoots of the Topaz-porphry, but tin is often found in the clefts of the adjacent killas or metamorphic slate. At north-east Dundas Cassiterite is also reported to occur, mixed with various forms of pyrites, in some respects resembling the Bischoff formation.

It is said that Resin and Ruby tin occur at the base of the Norfolk Range, north of the Pieman River, and that the general character of the tin-bearing drift much resembles that of the north-eastern fields, but this requires confirmation.

The principal stanniferous rocks of this island are Granite, Quartz and other Porphyry, Greissen, and Protogine. Quartz is not an unusual lode gangue, and kaolinic clay and Limonite form secondary matrices. The principal associated minerals are Wolfram, Pyrites of various kinds, Molybdenite, Tourmaline, and more rarely Fluor-spar, Chlorite, and Bismuth.

The stanniferous drift is mainly composed of fragments and crystals of quartz and other rock *débris*, that of the North-east coast containing numerous water-worn Sapphires, Zircon, Pleonaste, Menaccanite, and rarely Gold, Beryl, and silicified

wood. The drift on the West coast is mainly quartz of various varieties with fragments of wood transmuted to Marcasite—which on exposure soon decomposes to the sulphate.

The principal localities of the mineral are, on the North West—Mt. Bischoff; Mt. Hicks; Meredith Range; Mt. Ramsay; Mt. Housetop; Blyth River; North Pieman; near Mt. Claude; Iris River, near Middlesex; Granite Tor; Ring River; North Dundas. On the North-east—Mt. Cameron; Moorina; Branxholm; Mt. Stronach; Mt. Maurice; Weldborough; Blue Tier; St. Helen's; South Freycinet Peninsula; Weld River; Mussel Roe River; Cascade; Derby; Mt. Horror; St. Paul's; Ben Lomond. In Bass Straits—Flinders, Clarke, and Cape Barren Islands. In the South—Cox's Bight, near Port Davey.

The economic results of our tin-mining industry have been highly satisfactory; for although practical operations were not commenced until the year 1873, and lode-mining, with the exception of the celebrated Bischoff, has been comparatively neglected, it has now become our principal mineral product.

Tin first appeared as a factor in our mining industry in 1873, in which year the total export amounted to four tons of ore valued at £220. From that period to the end of 1892 the export of the crude and smelted metal represented not less than 62,130 tons, valued at £5,599,467.

The following statistics may be interesting as showing the quantity and value of the tin exported during the past ten years:—

Decennial Return of the Tin Mining Industry.

Year.	Ore.	Metal.	Value.
			£
1883	77	4045	376,446
1884	32	3675	301,423
1885	—	4242	357,587
1886	—	3776	363,364
1887	1	3606	407,857
1888	2	3775	426,326
1889	31	3764	344,941
1890	4	3214	296,761
1891	56	3235	293,022
1892	—	4971	298,260

(The Returns as above quoted are taken from the Tasmanian Official Record, 1892, with additional information supplied by the Mines Department.)

68. CERARGYRITE (*Chloride of Silver*).

The well-known Silver Chloride has been obtained in limited quantity at the Dundas, Zeehan, Heazlewood, and at the

Scamander River Silver-fields. It usually occurs as minute irregular blebs and crystals in ferro-manganese gossan and in kaolin with other oxidised metallic minerals.

69. CHLOROPHANE (*A variety of Fluorite*).

When heated this mineral shows the peculiar phosphorescent light of a clear emerald-green colour. It usually occurs from light violet to colourless, but is very rarely, if ever, obtained in a crystallized form, being generally in compact to granular masses. Mt. Bischoff; Mt. Ramsay; Bransholm; Ben Lomond (Great Republic Tin Mine).

70. CERVANTITE (*Antimony Oxide*).

Abundant as a result of the decomposition of Antimonial Minerals, usually as a thin coating on Jamiesonite, Galena, and and on lode-matter, but occasionally massive. Madam Melba, Comet, Mastrie's Broken Hill mines at Dundas are prominent localities; it also occurs in less profusion at several of the silver-lead mines in the Heazlewood District and at Zeehan. Occurs in small quantity in a quartz reef known as Ragged Jack, about nine miles east of Deddington; Pyrites, Galena, and Stibnite are found with it as accessory minerals.

71. COLLYRITE (?) (*Hydrated Silicate of Alumina*).

A substance fairly answering the general characters of this mineral occurs in bands and patches in the cavities and fractures of the Diabase rock at Launceston.

72. CHALCOCITE (*Copper Sulphide*).

So far I have not met with specimens of this mineral, although reported to occur at Mt. Maurice, Mt. Ramsay, and Badger Head.

73. CALAMINE (*Carbonate of Zinc*).

Occurs in small quantity at Heazlewood and Zeehan; several localities are given in the Pro. Royal Soc. Tas. for 1854, but the identification is very doubtful; is reported to occur at Mt. Bischoff.

74. CROCOISITE (*Chromate of Lead*).

A well known beautiful mineral, generally supposed to be peculiar to the silver-lead mines in Siberia.

Its first discovery in this island was made a few years back by Messrs. Smith and Bell at the Heazlewood Silver-Lead mine. It there occurs of its characteristic bright, shining, hyacinth-red colour, in somewhat small, thin, aciculine bunches penetrating and often coating a soft ferruginous-clay gossan, commonly with minute crystals of Cerussite and Pyromorphite. At the Whyte River mine it was found plentifully in the country rock, a soft

decomposed Diorite, abutting on to the lode, coating the faces of fractures and cleavage planes. In some instances flakes of the mineral several inches in diameter were detached. Rarely patches of small monoclinic crystals occurred, but this was exceptional.

In vughs, occurring in the capping of the lode or the adjacent country rock, they were often found to be thickly coated with bunches of the mineral, of bright colouration and of great beauty.

At the Adelaide Proprietary mine, at Dundas, this species is very plentiful. It commonly occurs in large columnar prisms, often several inches in length, that penetrate the vesicular ferromanganese gossan that overcaps the lode. In the workings of this mine some extremely fine and beautiful specimens have been obtained, the mineral often coating white Dundasite, and occasionally associated with crystals and large bunches of Cerussite and more rarely Anglesite. In some samples the red prisms penetrate the gossan intermixed with botryoidal Psilomelane and occasionally patches of Galena occur in the more solid portions; occurs on Embolite, Hay's Prospecting Association, Heazlewood.

Crocoisite has not been discovered in Australia. So far as examined this mineral has not been found to be argentiferous.

75. CERUSSITE (*Lead Carbonate*).

Occurs in more or less quantity wherever the primary lead sulphide exists. The Silver Queen, Sylvester, and Austral mines at Zeehan, the Maestries Broken Hill, Comet, and Adelaide Proprietary at Dundas, with the Godkin and Whyte River mines in the Heazlewood, district have afforded fine examples in massive amorphous, subcrystalline and well developed orthorhombic crystallizations.

Occasionally it is permeated to some extent with one or other of the Silver Chloride group, when it assumes a grey-coloured amorphous form, which is locally known as "grey ore." In this state it invariably gives high assay returns for Silver. It often occurs stained and encrusted with both green and blue Copper Carbonates, and in some instances found coated with a mixture of Antimony and Lead Oxides. Anglesite is a species closely resembling this mineral, and it is often intimately associated with it, but a simple qualitative analysis soon detects the different composition, its habit of crystallization is another distinguishing character—Cerussite occurs in tabular forms, usually six-sided prisms with various terminations, and is often maced.

76. CYANOSITE (*Sulphate of Copper*).

Originates from the decomposition of Cupriferous Sulphides; generally occurs stalactitic, or as an amorphous efflorescence in old mine workings. Colour, various shades of blue to bluish-green. From adit, North Valley, Mount Bischoff; Gad's Hill Range, Upper Mersey River, after a brass-yellow variety of Chalcopryrite, it is often intermixed with blebs of Galena and Blende.

77. COAL.

River Don ; Mersey ; Port Arthur ; Seymour ; Schouten Island ; South Cape ; near Waterhouse ; Three Hut Point ; New Town ; York Plains ; Jerusalem ; Cullenswood ; Mount Nicholas ; Sandfly ; Adventure Bay ; Port Cygnet ; Hamilton ; Richmond ; Prosser's River ; Spring Bay ; Mt. Munro ; Fingal ; Longford ; Jericho ; Inglis River ; Mersey River ; Western Bluff ; Gad's Hill ; Magnet Range.

Full detailed descriptions of our Coal measures, with numerous analyses of samples, will be found in the Proceedings of the Royal Society of Tasmania, 1851, Johnston's Geology of Tasmania, 1888, and in the Tasmanian Official Record, 1892.

78. DOLOMITE (*Carbonate of Magnesia and Lime*).

The pure crystallized form is of exceptional rarity, but the ordinary massive kind is of common occurrence, and is sometimes met with in considerable quantity. The gangue of the silver-lead lodes of the Heazlewood and Dundas districts is often composed of an irregular mixture of Brown-spar, Siderite, Calcite, with a limited quantity of quartz most of which is more or less stained with the oxides of Chrome and Nickel. At Dundas a blue-coloured variety has been obtained associated with Galena.

The massive form occurs at Mount Claude, near Mount Pelion, Heazlewood, and Dundas.

79. DIAMOND (*Pure Carbon*).

The occurrence of the Diamond in this island is extremely doubtful. It has been reported that a single minute specimen was detected in a parcel of gem-sand that was obtained in the vicinity of the Hellyer River, and sent to England for examination by the Van Diemen's Land Company many years ago.

80. DIALOGITE (*Carbonate of Manganese*).

See RHODOCHROSITE.

81. DUFRENOSITE (*Sulph-arsenide of Lead with Copper and Silver*).

Usual colour steel-grey, with a reddish-brown streak and metallic appearance. It is said to occur intermixed with Tetrahedrite and Cupriferous Pyrites at the Fahl Ore mine, Dundas.

82. DUNDASITE (*Hydrous Carbono-phosphate of Lead and Alumina*).

This apparently new mineral compound forms an incrustation on ferro-manganese gossan. It is composed of small spherical aggregates, usually closely matted together. Under the lens these bunches show an extremely fine radiating structure. The colour internally is silky milk-white with a velvety outer crust of a dusty yellow-brown.

The surface often has numerous adherent crystals of Crocoisite which not rarely penetrate the mass. These crystals are always minute, but remarkable for their extremely fine development and acute angles.

The qualitative reactions of this new substance are as follows :— In the matrass it becomes yellow and yields water. It is infusible before the blowpipe, but on coal, with fluxes, yields a considerable quantity of metallic lead, and coats the surface with the characteristic yellow sublimate. When moistened with sulphuric acid it gives distinct reaction for phosphoric acid. In nitric acid it dissolves with strong effervescence; the residuum from the solution strongly deflagrates and gives phosphoric reaction. The powdered material, when moistened with cobalt nitrate, clearly shows the beautiful blue colouration of alumina. With limewater gives the turbidity of carbonic acid. Hardness about 2.

Adelaide Proprietary mine, Dundas.

83. EPIDOTE (*Silicate of Iron and Calcium*).

This species frequently occurs in richly metalliferous rocks, and in a lesser degree it is widely diffused. It is usually of a peculiar and characteristic pistachio-green colour, but it often affects a reddish-brown colour when occurring in Serpentine. Common in greenstone, west of the River Leven and other places (J. Smith); abundant in clefts of rock, Magnet Range; near Table Cape; about the Forth River; vicinity of Bischoff; with quartz as veins in the greenstone, usually occurs in bunches of crystals—some of the individual specimens often met with up to an inch in length, Dunyan Range, Duck River; Woolnough, of clear colouration but small size; at Port Cygnet a black variety has been obtained in long bladed, thin, semi-crystallized bunches, which are fairly abundant in a felspathic porphyry; at the Whyte River it has been found in the clefts of lode material with bunches of Calcite and Pyrites; at Dundas it is fairly abundant in quartz.

84. EVANSITE (*Hydrated Phosphate of Alumina*).

A rare species, occurring as botryoidal incrustations, which are often almost colourless, but sometimes milky white, at all times having an attractive pearly lustre. It appears to differ from the typical form in having a proportion of Silica chemically combined. The examples were obtained in a silver-lead lode with Galena and Sphalerite.

Zeehan.

85. EPSOMITE (*Sulphate of Magnesia*).

Found as sub-crystallized aggregated and delicately fibrous masses, but also commonly as a more or less compact incrustation. It occurs in caverns and fissures. Abundant in the neighbourhood of the Dromedary Mountain; about the Upper Lake River,

near the Western Tier; at Exton; Alum Cliff Caverns, near Chudleigh.

86. ERYTHRITE (*Arsenate of Cobalt*).

This mineral may be at once known by its characteristic peach-blossom colour. An extremely small quantity has been obtained intermixed with earthy ferruginous gossan at the Penguin Silver-lead Mine, Penguin River; in small patches of distinct colouration as a coating on lode gangue, probably derived from the transmutation of an arsenide, at the Hampshire Silver Mine, Hampshire Hills (W. R. Bell).

87. ENSTATITE (*Silicate of Magnesia and Iron*).

This species is apparently synonymous with Bronzite. Occurs in sub-crystalline masses of considerable extent in connection with Serpentine at the Heazlewood with its variety Schiller Spar, and other allied forms of almost similar chemical composition; abundant with its varieties, Huskisson River; Parson's Hood; Magnet Range.

88. EUCLASE (*Silicate of Alumina and Glucina*).

Two well preserved crystals from the stanniferous drift at Moorina agree with the general characteristics of this rare mineral.

89. EMBOLITE (*Chlorobromide of Silver*).

Found in limited quantity, but often quite pure. As is usually the case the crystals are difficult to obtain well-defined, but moderately good specimens are not rare. Occurs intermixed with ferro-manganese gossan and earthy-lode matter. The more important localities are the following mines:—Central Dundas, Maestrie's Broken Hill, and Dundas Proprietary, at Dundas; The Queen, Sylvester, and Junction, at Zeehan; and the Godkin, Washington Hay, and Whyte River, in the Heazlewood District. Embolite merges gradually into Cerargyrite, the two species being isomorphous. The mixtures occur both here and in Australia in varied proportions, so that the one species may gradually merge into the other.

90. EULYTINE (*Silicate of Bismuth*),

A very rare mineral, occurring in minute globular patches of a yellow to brown colour, with a resinous lustre.

Hampshire Silver Mine (W. R. Bell.)

91. FAHLUNITE (*Hydro-mica*).

Several forms of the hydro-mica group occur at the Mt. Bischoff, the Hampshire Hills, and elsewhere. The identification of the species is at the best doubtful in almost all the members of this

very unsatisfactory group. The Bischoff samples are soft, compact, and grey in colour; that from the Hampshire is much darker, almost black in colour, with the surface shining.

92. FLUORITE (*Fluoride of Calcium—Fluor-spar*).

Some very fine masses of this mineral have been obtained at the Great Republic and other tin mines situated at Ben Lomond. The crystals are usually small, but beautifully defined: a common form is pale purple to almost colourless, with the apices of the acute angles distinctly stained an intensely dark purple. Modifications of form and macles are not uncommon at this locality. Much of the Fluor-spar occurring in this island belongs to the variety Chlorophane, which see.

93. FRANKLINITE (*Oxides of Iron, Manganese, and Zinc*).

A mineral with metallic lustre, dark, almost black colour, and characteristic reddish-brown streak. Obtained in amorphous and crystalline bunches intermixed with galena, mainly at the 200 feet level, Silver Queen Mine, Zeehan.

94. GARNET (*Silicate of various bases*).

Undetermined species occur at the Hampshire Hills, where they are found in profusion. They vary from brown to black in colour, and often reach an inch in diameter. On the south side of Cape Barren Island they exist *in situ* in a quartz porphyry, also free in the detritus derived therefrom usually mixed with Cassiterite; at several localities in the north-eastern tin fields they are plentiful in the drift, but generally of small size; common in the vicinity of Mt. Heemskirk, usually opaque, but sometimes of good colour and transparent; near Mt. Claude a solid compact to sub-crystalline garnet rock of yellowish-brown colour occurs apparently belonging to the sub-species Grossularite; at Mt. Ramsay another rock mass has been found of a dark brown colour; at this locality well formed crystals have been obtained imbedded in a soft magma that allows them to be easily extracted; near Highwood, on the Emu River, clearly cut dodecahedrons of a translucent white to light yellow colour occur in lode-matter (W. R. Bell); on the Whyte River, near the Meredith Range, in minute crystals and compact masses of reddish-yellow colour—apparently belonging to the variety Essonite—with Actinolite and Molybdenite as accessory minerals.

95. GOSLARITE (*Zinc Vitriol*).

Occurs as small stalactitic and investing bunches, which are usually much stained with iron.

Obtained in an adit, intermixed with other sulphates. Blue Tier, near Beaconsfield.

96. GRAPHITE (*Impure Carbon*).

Of common occurrence, but invariably of indifferent quality and usually in the form of graphitic slate.

It is often met with in the silver-lead lodes of Zeehan and Dundas, where it is usually found on fissure lode walls more or less intermixed with earthy matter and on the cleavage faces of Galena; Norfolk Plains (Proc. Royal Soc., Tas. 1851), near Mangana; Mt. Heemskirk, in the cleavages of the granite rock; Beaconsfield; Anderson's Creek; North Valley at Bischoff, as a large mass with a high metallic lustre; on the beach about two miles west of the Leven River; as thick coatings in the joints of a crystalline limestone on the Wilmot River; reported as occurring in considerable quantity at Barren Island.

97. GROSSULARITE (*a variety of Garnet*).

Occurs as a subcrystallized to somewhat solid rock near Mount Claude. The colour is pale olive-green to brown, with a rather vitreous lustre.

98. GREENOCKITE (*Sulphide of Cadmium*).

This has been reported to occur at the Godkin mine, Heazlewood, implanted upon Sphalerite and lode-matter. (A. R. Browne).

99. GÖETHITE (*Hydrated Peroxide of Iron*).

A good mineral species, crystallizing in the rhombic system. It may be known from other iron minerals by its blood-red colour when seen by transmitted light, and brownish yellow-streak. It is commonly globular and stalactitic, rarely in crystallized masses.

Dial Range; Blythe River; Penguin; Dundas; Pieman River; Emu Bay.

100. GALENITE (*Sulphide of Lead*).

This mineral, the most abundant ore of Lead, is widely distributed over the northern and western portions of the island, occurring in all its many variations of structure, from the steel-grain to the coarse cubical ore, often showing extreme variations in this respect in the same district or even individual mines. In geological occurrence it also varies to a greater extent than almost any other mineral species; here it is common to the tin-bearing granites of the Ben Lomond and the fossiliferous Silurian slates of the Zeehan districts.

From all localities our Lead Sulphide is characterised by the unusually large assay returns of Silver that it yields, so that it is reasonable to anticipate that it will become one of our most important economic minerals. The true crystals are exceptionally rare, and the few that have been obtained are small and obscure. This mineral often contains a considerable admixture of Antimony, in

which case it is proportionally more or less striated in structure; some samples from the Heazlewood district show this in a marked degree. As a rule it is comparatively pure and free from deleterious admixture, zinc in particular—the bane of the metallurgist—being of exceptional occurrence in large quantity. Many specimens from the Junction and Queen mines at Zeehan are highly iridescent and show a beautiful play of colouration in blue, green, and red.

At the Sylvester mine a large quantity of beautiful dark green Pyromorphite and fairly well crystallized Cerussite has been obtained, overcapping the primary ore; and one of the lodes on the Queen property contained a considerable amount of Lithomarge, more or less impregnated with Silver chlorides, in the surface levels. That from the Owen Meredith mine had in many instances very fine masses of arborescent Native Silver in the clefts of the ore body, with which an Antimonial Silver mineral was also associated.

At the Maestrie's Broken Hill mine at Dundas an extensive body of oxidised argentiferous lead ore has been worked, overcapping and interspersed throughout the original mineral. The ferro-manganese lode capping of the Adelaide Proprietary mine at the same locality has become somewhat celebrated for the wonderfully fine bunches and masses of Crocoicite that have been obtained; in some of the more solid portions of the surface outcrop the gradual transmutation of the Lead Sulphide to the Chromate can be distinctly traced, and the vughs often contain remarkably developed crystals of the latter as a coating. The Scamander Silver-lead mine consists of a mixture of several silver-bearing minerals, the more important of which are Pyrites—principally arsenical, Sphalerite, and Galena. At the Rex Hill mine in the Ben Lomond district the somewhat peculiar association of Cassiterite, Mariatite, Chalcopyrite, and Galena is a noticeable feature in a portion of the property. In addition to the minerals mentioned, small lumps of green Malachite are occasionally met with in trenches on the surface. At the Madame Melba at Dundas, and Silver Cliff at Bischoff, Galenite is commonly met with in conjunction with Jamiesonite and mixed oxides, resulting from the decomposition of the two minerals.

On the south bank of the Mackintosh River, about forty miles south-east of Bischoff, a large body of Galena has been discovered, much of which is intermixed with a cleavable Calcite and amorphous Siderite. It occurs near Deloraine with Baryta and Dolomite, sometimes showing alternate bands of Galena and Sphalerite. In the gold mining districts of Beaconsfield, Lefroy, and Mathinna, it is found in the reefs, often to considerable depth, in limited quantity, generally intermixed with Pyrites. At the Hampshire Hills an argentiferous lode was worked upon by the Van Diemen's Land Company some years back, but without any permanent practical results. The matrix of this discovery

was a hard siliceous rock, differing in many respects from any other hitherto found. Its mineral constituents also varied in a most remarkable degree, and included several species which are, so far as known, peculiar to itself. These consisted of Apatite, Strontianite, Fluor-spar, Argentite, and Pyrites, with several minerals of Cobalt and Bismuth. Scattered throughout this interesting and diverse mixture are blebs and bunches of argentiferous Galena. In the Penguin River Silver mine the ore mass mainly consisted of a mixture of Pyrites, Sphalerite, with Galena, and a small quantity of Nickel and Cobalt bearing minerals; the mass giving very satisfactory assay returns.

At the Whyte River, and at some of the Dundas mines, a singular mixture occurs, which is composed of Galena and Cerussite, forming a sulpho-carbonate. The two minerals are so closely combined that the reactions for both forms are obtained by qualitative analysis.

The characteristic gangue or lode matrix of our Silver-lead mines is commonly, if not generally, a compact form of Siderite or Carbonate of Iron, which is occasionally varied by an admixture of quartz in much less quantity, and earthy matter. The Old World matrices of Calc-spar, Fluor, and Baryta are strangely the exception, and in fact are almost unknown on the more important Silver-lead fields of the West Coast. Many of the other mineral species that are usually found associated with Galenite in the metalliferous regions in other parts of the world are, as a rule, found with it here, with the exception that some of the more common ores of Zinc elsewhere are of much less frequent occurrence, and the few that have been discovered are in far less abundance than is usual in the mines of Europe and America.

The earliest recorded discovery of Galenite in this island was apparently that of an unimportant nature made at Norfolk Plains in 1851 (Proceedings Royal Society Tasmania, 1851), and it was many years after that practical mining for Silver-lead commenced. The first was that at the Scamander River in 1885. Assays from the mixed argentiferous minerals obtained in the mine at this locality gave variable returns up to as high as 200 ozs. of Silver per ton, and a bulk test of about 50 tons produced at the rate of 32 ozs. to the ton with a fair proportion of lead. This mine is now shut down and the locality is practically abandoned, notwithstanding that several discoveries of argentiferous Galena have been made in the vicinity.

The more important discovery of the existence of Galenite at Mount Zeehan on the West Coast was made by Frank Long on the 8th December, 1882, (Tilley, "The Wild West of Tasmania," 1891), but mining for this mineral did not commence until about five years later.

The principal localities are :—Zeehan; Dundas; Ben Lomond; Scamander River; Bischoff; Mount Claude; Dove River;

Heazlewood; Mount Lyell; Castray River; Mount Pelion; Penguin; Forth; Henty River; Lake Dora; Constable's Creek; Dial Range; Arthur and Mackintosh Rivers.

The "Statistics of the Colony of Tasmania" for the year 1891, give a "Return showing, as far as can be ascertained, the value of Minerals produced to date, 31st December, 1891," in which the Silver-lead mining industry is credited with the sum of £91,653: no Silver returns being available prior to 1888. By far the greater portion was produced from Sulphide ore or Galena.

The yearly Return from the same authority is as follows:—

Silver (Argentiferous Lead).	1888.	1889.	1890.	1891.
Quantity of ore raised Tons	417	415	2053	4810
Value of Products. £	5838	7044	26,487	52,284

The following has been kindly supplied by F. Belstead, Esq., Secretary of Mines:—

Return showing the Quantity and Value of Silver producea in Tasmania during 1892.

Mineral.	Quantity.	Value of Silver.
		£ s. d.
Silver-Lead Ore...	4019 tons (yield of Silver about 140,665 ozs.)	22,858 1 3
Bullion	613 tons (yield of Silver about 36,780 ozs.)	5976 15 0

Mr. Belstead states, *in literis*, that "it is impossible to obtain even an approximate estimate of the Lead." It may be fairly estimated that the total value of the Silver-lead ore raised during the past year was not less than £60,000.

101. GOLD.

The early history of Gold discovery in this island is extremely vague, but it appears to have been found about the year 1850 in the Fingal District, although systematic mining for the metal did not commence for some time after.

The auriferous districts, so far as discovered, are fairly well understood, so that from a mineralogical point of view it would be superfluous to minutely enumerate them. A few peculiar features as to the paragenesis and other local peculiarities may be of passing interest and worthy of record. At the Campbell's Reward Mine, near Mt. Claude, the precious metal occurred in a very small vein or fracture plane in a rock that has been termed Porphyritic Syenite; the Gold was faced on to the rock with a backing of decomposed Felspar, and occurred in fern-like arborescent patches occasionally altering to radiating masses, the whole presenting a very peculiar and unique appearance. Much of the separated metal had the appearance of irregularly chopped hair, each fragment as seen under the microscope being covered with extremely minute recurved barbs; scattered throughout the mass were also flaky plates of extreme tenuity, the surface of these being covered with sub-crystalline impressions. Altogether the general structure of the metal and its mode of occurrence differ very much from any other auriferous formation known to exist in the island; the Long Plain alluvial gold-field was noted for the numerous and remarkably fine crystal forms of the metal that were obtained—even rivalling Ballarat in this respect. Many individual crystals were found measuring above $\frac{1}{4}$ -inch in length, which were often aggregated together in masses of considerable size; some presenting an exquisitely beautiful arboriform structure and others again in a filiform mass, the latter occasionally so intermixed as to present a sponge-like structure. It is to be regretted that more examples of these peculiar masses were not secured as museum specimens, for now their occurrence has almost become a matter of history. The gold was, as a rule, but little waterworn, and apparently occurred in small lenticular veins composed of Siderite, Quartz, and Pyrites, interlaminated in the folia of the schistose country rock. In some of the Lefroy mines very fine examples of "slickensides" occur, which are often faced with striations and patches of gold, the whole being furrowed and highly polished; at the Queen River an almost white gold has been obtained, caused by its admixture with silver, and thus forming the variety known as Electrum; at M'Kusick's Creek, near the King River, a considerable number of crystals were obtained, the prevailing form being much elongated, in many instances reaching nearly an inch in length; on the property of the Union Prospecting Association, at Back Creek, the metal has been discovered scattered throughout a matrix of white friable sandstone, which apparently forms the wall of a quartz reef; at Mt. Ramsay the cupriferous pyrites, occurring in the characteristic hornblende rock of the locality, has been found by analysis to be highly auriferous; at Mt. Lyell the ironstone, principally micaceous Hematite and Limonite, contains more or less free gold, which is also the case with the Baryte, Pyrites, and

Native Copper occurring at the same locality; at the Specimen Reef Mine and other places near the Savage River a large quantity of gold has been obtained in and closely associated with Siderite, which mineral appears to be the main matrix of the metal at this locality; at Lefroy and in the Fingal District when Galena is met with in the mines it often contains gold, and the small quantity of Sphalerite that occurs is invariably auriferous; at Waterhouse a considerable quantity of auriferous Mispickel and Marcasite occurs in the quartz reefs of the district, and the greater portion of the various pyritous minerals of the Beaconsfield, Lefroy, and Fingal gold mining districts are so rich in the precious metal as to make their metallurgic treatment of considerable importance to the various mines; at the Ring River the gold is commonly alloyed with a small quantity of Bismuth, a peculiarity not known to exist at any other locality in the island; in the vicinity of the Pieman River District the auriferous drifts often contain a comparatively large quantity of Osmiridium,—Badger Plain, near the Savage River, being a noted locality; in the stanniferous drift near Branhholm small flakes of gold are often met with, but not in sufficient quantity to render it of any economic importance; much of the alluvial gold obtained on the Lisle field is often coated with a dark, almost black substance, which is apparently Ferromanganese; occurs sparingly in a soft silicious tuff, of a yellowish-brown colour in a body of considerable extent in connection with a dioritic rock at the Castray River. In the same formation grains of Iridium are often met with, and numerous fine grains of Titaniferous Iron. The average purity of the gold of this colony is about 96 per cent. the balance being usually the metals of the platinoid group. The largest nuggets of gold obtained in this island were discovered at the Rocky River, a tributary of the Pieman, in 1883. Their respective weights were 143 and 243 ozs.

Mr. F. Danvers Power, F.G.S., states, regarding the auriferous formation discovered at the Castray River, that "The country rock is slate, and on this has been deposited beds of volcanic ejecta; these latter are more or less auriferous. The volcanic material, where undecomposed, is green in colour and of compact texture, showing magnetic pyrites here and there distributed throughout it. As this becomes weathered it decomposes into a ferruginous clay, somewhat sandy, but various beds may be recognized by their structure, hardness, mottled appearance, or some other feature peculiar to them. The gold in this material is not evenly distributed; occasionally a rich patch is struck, but the bulk is unpayable. The whole deposit is a *fac simile* of one occurring at Mandurama, in New South Wales, where extensive work has been done; there, also, patches have been found, but the majority is too poor to pay." (Report on the New Castray Gold Mining Co's. blocks, 1891).

Information regarding the production of gold in this island is not

available prior to 1860 ; from this year to the end of 1892 the total quantity obtained is estimated at 271,106 oz., valued at about £2,666,608, but large quantities are known to have left the colony by private hands from the alluvial districts generally, but more particularly from the western fields.

Decennial Return Showing Gold Produced.

Year.	Ozs.	Value.
		£
1883.....	46,577	176,442
1884.....	42,339	160,404
1885.....	41,240	155,309
1886.....	81,014	117,250
1887.....	42,609	158,533
1888.....	39,610	147,154
1889.....	32,332	119,703
1890.....	23,451	87,114
1891.....	39,203	149,816
1892.....	43,278	162,292

(The Returns obtained from the Tasmanian Official Record, 1892, and the Mines Department.)

102. GENTHITE (*Nickel Gymnite, Hydrated Silicate of Nickel and Magnesia*).

A few small specimens of a hydrated Silicate of Nickel, showing the clear characteristic apple-green colour, have been obtained in the workings of the Heazlewood Silver-lead Mine. They occurred as thin incrustations, and apparently belong to this species, or at least to an analogous form.

103. GYPSUM (*Sulphate of Lime or Selenite*).

Abundant on the Grunter Hill, Upper Mersey River, in veins occurring in blue mountain limestone; the radiating cubical masses are of great size and iridescent appearance (W. R. Bell); Circular Pond Marsh, near Gad's Hill; in small lumps near Launceston; Gipps Creek, Ben Lomond; Mt. Horror; Zeehan; at Trial Harbour this is often met with forming radiating bunches attached to talc.

104. GLAUBER SALT (*Sulphate of Soda*).

On the floor of the caverns, intermixed with Native Alum as a powder of a dirty-white colour.

Alum Cliff; River Mersey, near Chudleigh.

104a. GIBBSITE (*Terhydrate of Alumina*).

A white incrusting mineral with an indistinct fibrous structure.

It occurs in coralloidal aggregations and mammillary patches implanted upon Limonite and Psilomelane.

Central Dundas and other mines, Dundas.

105. HYPERSTHENE (*Silicate of Magnesia, Calcium, and Iron*).

On the east side of the Parson's Hood Mountain. This mineral occurs with Schiller Spar and Dialage Rock; occasionally it contains specks of Copper Pyrites.

Fairly abundant at the Heazlewood; on the Forth River; Meredith Range; Dundas.

106. HYDROMAGNESITE (*Hydro-carbonate of Magnesia*).

An amorphous mineral resulting from the alteration of Brucite. It has not been found in a crystallized condition, its usual mode of occurrence being in the form of chalk-like crusts. In Serpentine with Brucite.

Heemskirk; (Ballarat School of Mines, Museum); of apparently rare occurrence in thin incrustations, Heazlewood.

107. HORNBLLENDE (*Silicate of Lime, Magnesia, Iron, &c*).

Occurs massive, forming a large lenticular rock mass at Mount Ramsay. The rock is fine to fairly coarse subcrystalline structure of a black colour with a dull lustre. It in many respects resembles an analogous formation at Biggenden, Queensland; there is also a strong resemblance as regards the associated minerals, both containing the metal Bismuth, Pyrites of various kinds, and Gold. In the Biggenden mine the metallic minerals occur of a more oxidised or secondary character than at Mount Ramsay, but both have many striking points of resemblance to each other. The same variety of rock is also abundant at the Hampshire Hills, but without many of the minerals common to the Queensland locality and Mount Ramsay; columnar Hornblende occurs at a locality about six miles east of the Hampshire Hills and west of the Blythe River; it is found in combination with a large deposit of Magnetic Iron ore. The blades of this mineral, if they occurred without cleavage planes, could be obtained up to nearly two feet in length. The colour of the mineral is a very dark green to almost black; to the south-east of the Hampshire Hills a peculiar fibrous brown variety occurs. It is found in masses having much the appearance and structure of Chroikidolite from South Africa: examples have been broken out measuring above one foot in length. At the Heazlewood an extensive mass occurs which is many feet in thickness; it occurs as aciculated crystals which are interlaced, forming an almost solid compact rock of a pale asparagus-green colour. On the western side of the Heazlewood River a dark grey coloured form has been found in considerable quantity.

Abundant near the Madam Melba mine, North Dundas; at the

Upper Arthur River it forms a rock of fine texture and intense black colour ; at the head of the Savage River it occurs in large quantity as a rock of medium texture and dark colouration ; at Dundas semi-serpentinised Hornblende occurs as well as the characteristic form.

The crystals of Hornblende are always elongated, which is an important difference between that mineral and its congener Augite.

108. HALLOYSITE (*Hydrated Silicate of Alumina*).

Contains more Silica than Kaolin and more Alumina than Smectite, but all are very unsatisfactory species, as they certainly merge one with the other.

When containing an admixture of iron oxide it varies to a substance that is known as Bole.

Mount Claude ; Mount Cameron ; Heazlewood ; Blue Tier ; of a greenish-white colour with brecciated Ankerite, Dolomite, and Pyrites, Dundas ; with Galena and Siderite, Dundas and Zeehan.

109. HALITE (*Chloride of Sodium*).

Occurs as a powdery incrustation, usually very impure.
Salt Pan Plains.

110. HEMATITE (*Peroxide of Iron*).

One of the most abundant and diffused minerals ; it occurs in vast quantity at many localities, more especially throughout the northern portion of the island. Almost all the many forms it assumes have been obtained in more or less profusion ; these may be divided into four principal groups, viz :—

1. *Specular Iron*—the crystallized form.

“ Hepatic form in well defined crystals in the south end of Flinders Island, on the beach in Basalt, south-west of Mount Eliza,” (Gould, *Proc. Royal Society Tasmania*, 1871). Forth River ; Black Bluff Mountain ; Arthur River, near the Hellyer ; Dial Range, with manganese oxide ; Mount Lyell ; Ilfracombe ; Blythe, Leven, Forth, and Penguin Rivers ; Meredith Range ; at Ilfracombe a variety occurs which has been termed “ Needle Ore,” the crystals are often of considerable size and much intermixed.

2. *Massive, or Red Hematite*.

Forth River, near its junction with the Dove ; it is foliated and has a highly brilliant lustre ; it occurs in a quartz porphyry and covers a considerable area ; at the Blythe an enormous mass occurs in practically an inexhaustible quantity and very good quality ; on the

west bank of the Tamar extensive deposits exist which have been economically worked; Circular Head; Blue Tier; Mount Heemskirk; King River; Pieman River; Flinders Island; Arthur River; Dial Range and Mount Lyell; many other places.

3. *Micaceous.*

Of minute scaly structure. Whyte River, in quartz; Mount Reid; Macquarie Harbour; Pieman River; Dundas; Mount Heemskirk; Mount Lyell, where it is in part highly auriferous. At this locality a variety occurs in minute crystals, forming a black powder which is reported to be also auriferous: assays have been made up to 15 ozs. of gold per ton of material.

4. *Reddle.*—Red ochre or earthy oxide.

This variety commonly occurs with the other forms from which it is disintegrated; it is often impure by admixture with earthy matter. Occurs in considerable abundance at many places on the West Tamar and along the north-west portion of the island; Flinders Island; Mount Lyell, where it is often intimately mixed with powdery Baryte, in which state it has been termed "Volcanic Mud;" and Crocus; at this locality it often contains free gold.

It has been stated ("Tasmania and its Mineral Resources, 1888"), that "early in the century Lieut.-Governor Collins forwarded a quantity of the ore to England, but without practical results, though Mr. Commissioner Bigge subsequently stated in his report on the trade and agriculture of New South Wales (of which this colony was then a dependency), that analysis made in England passed it 'to consist of pure protoxide of iron, similar to the black ore of Sweden, and furnishing a very pure and malleable metal.'" Surveyor-General Evans states ("A Geographical, Historical, and Topographical description of Van Diemen's Land, 1822"), "Within a few miles of Launceston there is a most surprising abundance of iron. Literally speaking, there are entire mountains of the ore, which is so remarkably rich that it has been found to yield seventy per cent. of pure metal."

111. HUASCOLITE (*Sulphide of Lead and Zinc*).

Occurs in large to small blocks and masses in the workings of the Godkin Extended mine, Whyte River. The ore occurs loosely imbedded in a friable granular sandstone and pug, the latter apparently resulting from the decomposition of primary sulphide minerals. In the loosely aggregated rock, and more rarely in the mineral itself, indistinct fossil shell casts occur, so that it is reasonable to infer that this mineral may be a secondary deposition of marine origin, formed from a sediment charged with mineral

matter derived from the detrition of a lode which so far has not been discovered. In the same formation blocks of Galena and "slugs" of Silver Glance and argentiferous Pyrites also occur, the whole giving high assay returns of Silver.

112. HALOTRICHITE (*An Iron Alum*).

Found in fibrous silky masses of pale colour.

West Coast (Technological Museum Collection, Melbourne).

113. IRON, METEORIC, (*Iron, Nickel, &c*).

A remarkably fine sample of this interesting substance weighing nearly 3 lbs. was obtained some years back at the Blue Tier, north-east coast; it was found in stanniferous drift by a party of miners, and so excited their curiosity that they retained the specimen which is now in my collection.

This Meteorite is coated with a semi-polished crust much darker in colour than its general outer surface, much of which is apparently worn by attrition and is then coloured by iron oxide. The surface generally contains numerous shallow cavities or pittings, the major portion of which contain a white dull substance showing grains of mica—this is probably granitic grit. The fractured surface discloses a very white metallic iron which is finely granulated with an indistinct striated structure, exactly as if it would clearly show the Widmannstetten figures if polished. As far as I am aware this is the only instance of a discovery of a meteorite that has occurred in this island.

114. IDOCRASE (*Silicate of Calcium and Alumina coloured with Iron*).

Mount Ramsay. (J. Smith.)

115. ILVAITE (*Silicate of Iron and Calcium, colour black*).

St. Paul's Plains. (Pro. Royal Soc. Tas., 1853.)

116. IODYRITE (*Iodide of Silver*).

This important and somewhat rare ore of Silver usually occurs of a pale yellow colour, and when in crystals they are of hexagonal form. It has been obtained in small quantity at the Washington Hay Silver Mine, Heazlewood. (C. F. Heathcote).

117. IOLITE (*Silicate of Alumina, Magnesia, and Iron*).

Of a pale blue colour from a vugh.

Hampshire Silver Mine, Hampshire Hills. (W. R. Bell.)

118. JAMIESONITE (*Sulphantimonite of Lead*).

Occurs in somewhat large quantity at the Silver Cliff and the old Waratah mines at Mount Bischoff. At this locality its common mode of occurrence is filiform and amorphous, the

entangled fibres often forming large masses of a dark, almost black colour. At the Madam Melba mine at Dundas it was discovered forming a dense compact lode, the fractures of which contained bands and coatings of the mixed oxides of Antimony and Lead. At this locality it occasionally forms bunches of fine acicular crystals which are implanted upon brown spar, and it is not uncommonly intermixed with Boulangerite and Galena.

119. KAOLINITE (*Hydrated Silicate of Alumina*).

The ordinary Porcelain Clay or Kaolin, which, when pure, contains no alkaline matter and should not fuse; but the majority of substances that are locally termed "Kaolin" are to a more or less degree fusible, and therefore impure. The more alkaline matter contained in a substance the more fusible it becomes; when this is the case it probably belongs to some other form of clay-like mineral.

In abundance, of good quality, Killisnoe Bay, Flinders Island; Circular Head; Piper River, in extensive beds; Mt. Claude; Middlesex Plains; Mt. Housatonic; Mt. Bischoff; Derby, and places on the north-eastern tin field; about one mile south of Alford, Lower Piper River.

120. KAMMERERITE (*a Ripidolite, coloured Red by Chromic Acid*).

Occurs massive and granular in Serpentine with Magnetite, North Dundas. (Stitt and Cullingsworth, in Tasmanian Exhibition Collection, 1891.)

121. KERMESITE (*Sulphide of Oxide of Antimony*).

A mineral supposed to be this occurs as small red crystals, Hay's P. A. Mine, Castray River.

122. KYANITE (*Anhydrous Silicate of Alumina*).

In characteristic prisms of a pale blue colour, under Mount Cameron; near the River Forth (J. Smith).

Clayton Rivulet (Gould, Proc. Royal Soc. Tas., 1873).

123. LIMONITE (*Hydrated Peroxide of Iron*).

In fibrous radiating masses, Emu River, south of Hampshire (W. R. Bell). At Dundas this mineral occurs pseudomorphous after Siderite, and is then known locally as "Tomahawk Iron." On the banks of the River Tamar extinct Tertiary forms of several species of fresh-water shells belonging to the genus *Unio* occur, similarly changed to Limonite. At Beaconsfield crystals of Pyrites have been found also altered to this mineral, and at Bischoff it forms a portion of the "Brown Face," which was apparently originally a huge mass of Pyrites containing disseminated Cassiterite,

Abundant at the Vale of Belvoir as a secondary formation in concretionary masses, often of peculiar form and variously coloured; plentiful at Zeehan and Dundas, often forming portion of the cappings of argentiferous lodes; abundant at the Heazlewood; Meredith Range; Savage River; Ilfracombe; Beaconsfield; Blythe; Dial Range; Mount Claude; Middlesex; Mount Housatop; Mount Lyell; King River; Mount Ramsay; in fine cubes after Pyrites, Savage River; and many other localities.

Limonite is not a good mineral species, as the amount of hydration varies very much and it does not crystallize. The streak is always yellow, by which it may be known from Hematite and Magnetite. It often forms a cementing medium in breccias and conglomerates.

124. LEPIDOMELANE (*Silicate of Iron, Alumina, and Potash*).

A dark coloured variety of Mica occurring in Granite near the contact of plutonic and sedimentary rocks.

Mount Heemskirk; North-east Coast.

125. LABRADORITE (*Silicate of Alumina, Calcium, and Soda*).

A variety of Felspar; it is a well known constituent of certain rocks. Occurs in a blue slate in detached crystal forms. Arthur River near its junction with the Hellyer. (W. R. Bell.)

126. LIGNITE (*Brown Coal*).

A semi-formed coal, retaining the texture of the wood from which it was formed. Bischoff; Breadalbane; Evandale; Macquarie Harbour; Launceston; Young Town; Pig Island, and other places.

At Beaconsfield a peculiar variety is found, that appears to be close to a form that has been named Dopplerite. It is an extremely brittle, intensely black, highly polished, jet-like hydro-carbonaceous substance, that has been obtained from the Tasmania and other gold mines at Beaconsfield. It occurs at considerable depth from the surface in the workings of the mines, which are in Silurian strata and apparently originates from infiltrated water charged with organic matter. A mineral with much the same appearance and nature has been found in the Bischoff Silver-lead mine; it occurred filling cleavage planes and in vughs in the lode gangue; at the Upper Arthur River, about three miles from Bischoff, a similar substance occurs in a hard siliceous rock, again filling cavities.

127. LITHOMARGE (*Hydrated Silicate of Alumina*).

A soft unctuous clay-like substance, more or less coloured by Iron Oxide.

Near Conara; Piper River; Mount Claude; Flinders Island; Mount Bischoff. Abundant at Mount Lyell, often containing Native Copper; Blue Tier, near Beaconsfield; often met with on the North-east tin fields, where it apparently results from the decomposition of triclinic Felspars of stanniferous Granite.

128. LEAD, NATIVE.

I received two minute specimens of this rare native metal from the South Nevada mine at Dundas. One of these I carefully examined, with the result that it proved to be this metal.

129. LEPIDOLITE (*Lithia Mica*).

Occurs in a dyke between metamorphic slate and greenstone (Diorite). It varies in thickness from five to eight inches.

Mount Ramsay and near the Arthur River (W. R. Bell). The Mica of stanniferous matrices usually contains Lithia. North-east Coast.

130. LAUMONTITE (*Hydrated Silicate of Alumina and Calcium*).

A Zeolite of very decomposable nature, that occurs in cavities in a rock that abuts upon Granite. The colour is flesh-red, but fades on exposure. To preserve the specimens it is absolutely necessary to coat the mineral with a varnish or gum to exclude the air.

Hampshire Hills.

131. LEADHILLITE (*Sulphato-carbonate of Lead*).

This mineral is characterised by its pearly lustre on the cleavage face, grey colour, and chemical reactions.

At the Godkin mine, Whyte River, it is often met with in the form of amorphous nodular masses without any trace of crystallization; but more rarely minute crystals may be obtained attached to the larger lumps. It is found embedded in a Kaolinic substance, associated with earthy Pyromorphite and Cerussite. It also occurs at several of the Dundas mines, but always intimately mixed with allied lead minerals.

In Australia it commonly occurs, but, as here, in limited quantity and usually in the amorphous form.

132. MALACHITE (*Green Carbonate of Copper*).

This mineral, which is so abundant at several of the mining districts of Australia, is here comparatively rare, and only known to occur in a thin coating or incrustation.

Heazlewood; Cascade; Mackintosh River; Badger Head; Frankford, &c.

133. MELANTERITE (*Iron Vitriol*).

Doubtless originates from the decomposition of Pyrites: it is

usually found in old mine workings where there is a percolation of water.

In adit, level, Bischoff; Silver Crown mine, Zeehan; Blue Tier, near Beaconsfield.

134. MORENOSITE (*Nickel Vitriol, or Sulphate*).

This vitriol occurs as a greenish-white efflorescence in mine workings. It was obtained by Mr. G. Thereau, F.G.S. (Report on the future Prospects as regards Production and Permanency of the Beaconsfield and Salisbury Mining Districts, 1883), in an adit on the property of the Victoria Gold Mining Company, Blue Tier, near Beaconsfield. An analysis made by Mr. W. F. Ward, Government Analyst (*loc. cit.*), "from selected portions of the mineral," gave the following return :—

Nickel Oxide.....	9·15 per cent.
Iron Protoxide	1·08 "
Sulphuric Acid.....	34·20 "
Water	44·80 "

At this mine, and on the Blue Tier Company's property in the vicinity, tunnels have been driven for a considerable distance into the range, which, after passing through a disturbed formation, penetrated a large quantity of pyrites of various kinds that soon decomposed, forming a mass of sulphates much intermixed deposited upon the sides and roof of the adits, giving off a considerable evolution of heat. These sulphates present a considerable admixture of bases: both occasionally show an efflorescent mass that can be fairly defined, but more often the forms cannot be separated, and it remains to be proved how far they may be homogeneously combined.

The "dyke" or lode appears to be composed of Quartz, Calcite, with Serpentine, and, according to Mr. Thureau's Report, Felspar, intermixed with the slaty country rock. It is thickly charged with Pyrite, Sphalerite, Millerite and Pyrrhotine—the first often highly auriferous.

Mr. W. F. Ward (*loc. cit.*) has made a careful and instructive examination of this interesting mineral mass: he states :—

"This mineral occurs in crystalline masses of a pale green colour, the cavities and parts of the surface being covered with minute hair-like crystals; the fracture is saccharoidal, and of a sea-green colour. The hardness is about 2; the taste metallic astringent; powder white; readily soluble in water. When gently treated it melts in its water of crystallization, afterwards intermixing and leaving a buff-coloured mass resembling pumice, which is infusible before the blowpipe, giving off sulphurous acid, and turning brown on the surface owing to the per-oxidation of the iron present.

The following shows the average composition :—

	Per cent.
Aluminium Sulphate	30·02
Nickel Sulphate	11·60
Magnesium Sulphate	4·95
Lime Sulphate	4·77
Iron (Ferrous) Sulphate	3·57
Water	44·90
	99·81
Metallic Nickel.....	4·40
Metallic Zinc.....	1·98

The formation of the mineral is doubtless due to the oxidation of Sulphides of Nickel, Zinc, and Iron in contact with rocks capable of yielding Alumina and Magnesia, which would explain the evolution of heat stated to occur during its production."

135. MAGNESITE (*Carbonate of Magnesia*).

Occurs in Serpentine, Parson's Hood Mountain; in veins, Trial Harbour; Meredith Range; Dundas; Heazlewood.

136. MARCASITE (*White Iron Pyrites*).

This species is dimorphous with ordinary Pyrite, but is paler in colour. It is apparently of more modern origin, as it is of common occurrence in Lignite, Coal, and Clays.

Often occurs in the Mersey and Don Coal Measures, near the Scamander River; Mount Heemskirk; Beaconsfield; St. Mary's; Waterhouse; and in small quantity in many other localities.

137. MAGNETITE (*Magnetic Iron Oxide*).

A remarkably pure highly magnetic form occurs in large quantity at the Hampshire Hills; it is somewhat granular in structure and presents a beautiful iridescent tarnish; fairly abundant in the vicinity of the Pieman River; Emu River; Ilfracombe. Abundant on the banks of a small tributary of the Blyth River, near Housetop Mountain; Mount Pelion; Dundas; and other places. Magnetite powders black, which is very characteristic. It is supposed that Hornblende, upon decomposition, often alters to this mineral.

138. MASSICOT (*Yellow Lead Oxide*).

Usually occurs as a powdery coating on the Sulphide or oxidised Lead ores; it is but rarely met with in a massive condition. It is often closely intermixed with the oxides of Antimony and Iron.

Obtained in comparatively large quantity with Galena, Cerussite and Anglesite, Mastrie's Broken Hill and Comet mines, Dundas; with Ferro-manganese, Cerussite and Galenite, but rarely associated with Crocoisite, Adelaide Proprietary; incrusting Jamiesonite and Galenite, usually intermixed with Antimonial Ochre, Madam Melba, North Dundas; in limited quantity at several of the Heazlewood and Zeehan Silver-lead mines.

At Dundas this ore gives high assay returns in Silver, which metal probably occurs as an intermixed Chloride.

139. MELACONITE (*Black Oxide of Copper*).

Rarely found in large quantity: its common mode of occurrence is as a thin coating upon other Copper minerals.

Star of Peace and Lone Hand mines, Cascade. At the latter locality it was met with disseminated and filling small pockets in the granite, often occurring with Chalcopyrite and Cassiterite; Penguin Copper mine with Pyrites and Grey Sulphide of Copper; Saxon's Creek, near Frankford, in the clefts of lode quartz with cupriferous Pyrites.

140. MATLOCKITE (*Oxychloride of Lead*).

In tabular crystals of a greenish-grey colour, apparently rare. Associated with mixed Sulphide and Carbonate ores. Sylvester Mine, Zeehan (A. J. Taylor). In small plates of a honey-yellow colour attached to Galena.

Montana S. M. Co., Zeehan.

141. MUSCOVITE (*Potash Mica*).

Foliated and flexible, from the Granite district between St. Valentine's Peak and Housetop Mountain (Pro. Royal Soc. Tas., 1851); in concretionary masses and crystals which are occasionally nearly one inch in length, Hampshire Hills; common in fair sized flakes, Flinders Island; George's Bay vicinity; West Coast; abundant on East Coast, in some places of a bright golden colour in minute flakes; Gould's Country. In the majority of stanniferous rocks, such as the Granites and Greisens, the Mica contains strong traces of the element Lithia. This mineral is the common light-coloured Mica so abundant in our Granite districts, of which rock it is an important constituent.

142. MOLYBDENITE (*Sulphide of Molybdenum*).

Abundant with Cassiterite at the Lottah and other mines at Blue Tier; Mount Heemskirk; at a locality six miles east of Hampshire and west of the Blythe River, with Magnetite and Hornblende (W. R. Bell); South Flinders and Cape Barren Islands; as small flaky masses in Quartz at the Iris River, near Middlesex; sparingly in Felspar at the Western Bluff; Castra, in feldspathic porphyry; in Garnet rock, Upper Emu River; in a tough siliceous rock with columnar Hornblende at Heighwood, on the Upper Blythe River; Whyte River, with Garnet and Hornblende; Schouten Island.

143. MOLYBDINE (*Molybdic Acid or Oxide*).

Obtained in small quantity as a pulverulent incrustation of a clear yellow colour and dull earthy appearance on a hard dark

coloured siliceous base at the Hampshire Silver mine (W. R. Bell); on lode-matter, mainly Greisen and Quartz Porphyry; as a thin powdery crust with Molybdenite, at the Blue Tier; on white opaque quartz at the River Iris with the Sulphide and Cassiterite.

144. MESOLITE (*Hydrated Silicate of Alumina, Lime, and Soda*).

A Zeolite occurring as small globules of a fibrous structure. Near railway bridge, Hellyer River.

145. MIMETITE (*Phospho-Arsenate of Lead*).

Occurs in minute bunches of crystals on the wall of a lode at the Hampshire Silver mine. The groups of crystals are composed of aggregations of six-sided prisms, abruptly terminated at their apices, of a highly polished dark brown colour. They are of extreme rarity, and were only obtained in one portion of the lode. (W. R. Bell).

146. MIRABILITE—See GLAUBER SALT.

147. MARATITE (*Sulphide of Zinc and Iron*).

This is apparently a variety of Blende, portion of the Zinc being replaced by Iron. It is dark coloured, almost black, with a sub-metallic lustre.

Star of Peace Tin mine, Cascade; Rex's Hill, near Ben Lomond, Mount Bischoff.

148. MINERAL PITCH—See ASPHALTUM.

149. MILOSCHIN (*Chrome Ochre*).

A clay-like pulverulent or earthy mineral coloured green by Chromic Acid.

Blue Tier, near Beaconsfield; Dundas; near Mount Claude.

150. MENACCANITE (*Titanic Iron Oxide*).

This is the "Black Jack" of the East Coast tin-miners. It is an extremely abundant mineral, its main localities being the Blue Tier; Cascade; Mount Claude; Denison; Dundas; Blythe River (blue-black to black); George's Bay, and other places. The variety Nigrine is said to occur abundantly at Rocky Point, West Coast; Franklin Harbour. (Ballarat School of Mines Museum.)

151. MONTRONITE (*Hydrated Silicate of Iron*).

Always of a dull greenish colour, with an unctuous feel and waxy lustre. Found massive, with a conchoidal fracture. Occurs near New Norfolk; Hampshire Hills. (Melbourne Technological Museum Collection).

152. MINIUM (*Red Oxide of Lead*).

Occurs as a pulverulent coating on other Lead minerals and lode-matter. The colour is an unmistakable bright red, with a feeble lustre.

Whyte River Silver-lead mine.

At the Adelaide Proprietary, Dundas, the Cerussite crystals are occasionally pitted with a dull black lead oxide which may be this species discoloured with powdery Manganese, or it may prove to be its more rare congener the binocide (Plattnerite). The minute quantity noticed prevents a careful examination.

153. MARMOLITE (*Foliated Serpentine*).

Our Serpentine vary to a considerable extent both in colour and structure, and they include the major portion of the described variations.

Bonanza mine, Dundas (Montgomery).

154. MERCURY, NATIVE.

As minute globules distributed throughout a siliceous slate-rock which is coloured by organic matter. Native Gold-amalgam or "White Gold" of the prospectors is reported to occur with it, but this statement requires confirmation.

A short distance north of the Linda River, near Mount Lyell. (Alfred J. Taylor.)

155. MELANOCHROITE (*Chromate of Lead*).

This form of Lead Chromate mainly differs from Crocoisite in its darker colour and brick-red streak.

Judging from the small quantity obtained it appears to be of rare occurrence: that examined was found in some specimens of ferro-manganese gossan from the Adelaide Proprietary mine at Dundas. It occurred in small amorphous patches mixed with larger masses of its congener and flakes of Galena.

Hitherto its only recorded locality has been the Silver-lead mines of the Ural, Siberia, so that its detection here is of interest to mineralogists.

156. MILLERITE (*Sulphide of Nickel*).

Occurs in delicate capillary filaments of various shades of yellow, sometimes with an iridescent tarnish. The pure mineral contains 64% of metallic Nickel. The occurrence of several species of nickelliferous minerals in the north-western portion of the island is of some interest, and tends to the supposition that this metal may be discovered in payable quantity when a thorough search is made for it. It is almost needless to say that it is of great economic value. Mr. G. Thureau, F.G.S. (Report on the future Prospects as regards Production and Permanency of the Beaconsfield and Salisbury Mining Districts, 1883), states that,

"This mineral occurs in a dyke of intrusive rock, Quartzose, Felspathic, and apparently Porphyritic, containing in the joints Millerite, which shows various shades of yellow, in brittle capillary crystals, with other Sulphides"; reported to occur at the Penguin River with Galena and other minerals.

157. NICCOLITE (*Arsenical Nickel*).

This species is of doubtful identification. I am informed that it was found in limited quantity with Galena and Pyrites, at the Penguin River. As the mines at this locality have been shut down for some time it is impossible to obtain an example for examination. It is probable that nickelliferous Pyrrhotite has been mistaken for this mineral. An assay made by Mr. Cosmo Newberry in 1870, of mixed Arsenides and Sulphides, gave a return of 5 per cent. Cobalt and 3 per cent. Nickel (Just, "Tasmaniana," 1879).

158. NATROLITE (*Hydrated Silicate of Alumina and Soda, variety—Radiolite*).

A Zeolite occurring as thin white films, with radiating structure, in clefts of the diabase rock at Launceston. The identification is doubtful.

159. ORTHOCLASE (*Potash Felspar*).

Exceptionally beautiful crystals of Felspar occur in the neighbour of Kilicrankie Bay, Flinders Island (Gould, Proceedings Royal Society Tasmania, 1871). Abundant in fine crystals which are often three inches in length, of a milky-white to yellow-brown colour, which occur embedded and implanted in a siliceous magma at the Great Republic mine, Ben Lomond; plentiful about George's Bay; Mount Heemskirk, in the porphyry and granite of the locality; massive and highly crystalline, flesh-red in colour, on the east bank of the Mersey River above Gad's Hill; in dykes, of a white to pale green colour, on the west side of the Mersey, distant about two miles above the crossing, in large yellow crystals, forming a broad band in Granite rock. A dyke composed of a solid compact subcrystalline Felsite rock, yellowish-brown in colour, occurs on Ben Lomond, which penetrates and crosses the Granite near the Great Republic mine. This mass is impregnated with a considerable quantity of Galena which is irregularly dispersed throughout the mass in flaky particles and solid patches. The concentrated Sulphide assays fairly well in Silver, and also contains a small quantity of gold; a variety occurs at Harman's Rivulet, near the Parson's Hood as a band in the Granite in somewhat angulated crystals of a dull white: it probably belongs to the variety Albite; at Port Cygnet a white variety is plentiful, which is found in rather thin crystals about one inch in length. They are implanted in a grey magma in Porphyry.

Felspars of less defined character occur at several other localities.

160. OLIVINE—See CHRYSOLITE.

161. OSMIRIDIUM (*an Alloy of Osmium and Iridium*).

Found as thin, shining, tin-white scales of small size, with Gold and Iridium, in alluvial drift. At the Badger Gold diggings, west of the Savage River, which is a tributary of the Pieman, it was obtained in considerable quantity of the characteristic form, but occasional pieces were obtained of unusually large size—one example measuring about $\frac{7}{8}$ of an inch in diameter. At the Castray River fine scaly pieces are often obtained with gold and chromic-iron sand.

King River; Queen River; at Dundas it has been obtained attached to pieces of quartz; Brown's Plain and other places near the Pieman River.

This mineral as occurring in this island and in Australia invariably contains a small quantity of Platinum in alloy.

162. OBSIDIAN (*Volcanic Glass*).

Occurs in small quantity at the Mersey River; stated to exist in Gould's Country; it has been found in circular and concave or button-like flakes of an intense black colour in stanniferous drift, apparently igneous ejectamenta, Thomas's Plains; as massive lumps with Pitchstone and Olivine. Sheffield.

163. OLIGOCLASE (*Soda Felspar*).

This is a much scarcer form of Felspar than Orthoclase. It is usually of pale tints and more or less translucent.

In Porphyry, Blue Tier.

164. PHARMACOSIDERITE (*Arsenate of Iron*).

The primary form of crystallization in this mineral is the cube, by which character it may be separated from its chemical ally Scorodite—which is rhombic. In colouration it ranges through many shades of olive-green to brown. It is sectile, resinous, and is commonly found in the amorphous state or earthy.

Waterhouse.

165. PYROMORPHITE (*Chlorophosphate of Lead*).

This mineral can be readily identified by its crystallization, which is in hexagonal prisms, usually aggregated together in bunches and masses. In colour it shows gradations through many shades of green, rarely brown to almost white.

At the Godkin mine, Whyte River, it occurs in minute crystals, and as large massive amorphous earthy lumps, which are generally mixed with a kaolinic clay and more rarely Pyrolusite; at the Heazlewood mine it is found in microscopic crystals, which are almost colourless to the normal green prisms; the Sylvester mine at Zeehan has produced the largest and most beautiful masses of

this mineral; the bunches of crystals are intricately interwoven and are of a somewhat unusually dark green colour; it is often more or less associated with Cerussite and other lead minerals; it also occurs in more or less quantity in many of our silver-lead mines at Zeehan, Dundas, and the Heazlewood; in small vein with cupriferous pyrites and galena in quartz, River Lee (James Smith). Pyromorphite is usually found at some distance from the surface as the result of the alteration of a pre-existing mineral, probably Galena.

166. PICROLITE (*Fibrous Serpentine*).

A pale-green radiating variety of Serpentine, often translucent and asbestiform. Occurs with Bastite and Chrysotile at Dundas.

167. PLUMBOCALCITE (*Carbonate of Lead and Lime*).

In physical appearance this species has the ordinary characteristics of a dark-coloured Calcite.

Several small specimens have been obtained at the Bell's Reward mine at the Heazlewood.

168. PROUSTITE (*Sulphide of Silver and Arsenic*).

Ruby-silver is of extreme rarity; it was found at the Bell's Reward mine in the form of very minute crystals of a clear crimson-red colour implanted on Calcite, with small crystals of galena and red blende.

169. POLYSPHÆRITE (*Phosphate of Lead and Calcium*).

Occurs as minute rounded pellets which have an internally radiated structure: colour usually brown with a somewhat greasy appearance. It is found intimately associated with bunches of Pyromorphite and Cerussite.

Sylvester Silver mine, Zeehan. (Alfred J. Taylor.)

170. PYROLUSITE (*Oxide of Manganese*).

An abundant and widely distributed mineral, commonly found in botryoidal, radiating, or granular masses, rarely crystallized. It is black or bluish-black in colour, and is much softer than Psilomelane.

Alluvial drift is often cemented into a compact mass by Ferro-Manganese, which is a mixture of this mineral and Limonite. Its more important localities in this island are:—Penguin River; Heazlewood; Vale of Belvoir; Mount Claude; Zeehan; Dundas; Meredith Range; Pieman River; Fingal and the Dial Range. At the Balstrup Manganese Hill mine at Zeehan small crystals occur intermixed with the more profuse radiated masses; Mount Zeehan in flattened bundles of acicular prisms on Limonite. (Ballarat School of Mines Museum.)

171. PSILOMELANE (*Oxide of Manganese*).

Equally as abundant as the last mentioned and often associated with it. A common mode of occurrence is of stalactitic form as well as arborescent groups of dendritic markings caused by the infiltration of this mineral in the crevices and fractures of rocks. It always occurs amorphous, opaque, and of dark colouration. Common at the Penguin River; Heazlewood; Dundas; Zeehan; Magnet Range, and many other localities in lesser quantity.

172. PLAGIONITE (*Sulphantimonite of Lead*).

Occurs as indistinct oblique tabular crystallizations, and as massive pieces of small size. The colour of the samples obtained is a dark lead-grey, but it is generally tarnished. The identification is uncertain.

Heazlewood.

173. PRZIBRAMITE (*Sulphide of Zinc and Cadmium*).

Cadmiferous blende occurs massive and in considerable quantity near the Scamander River on the East Coast, at several localities in the Ben Lomond district, and more sparingly at the Heazlewood.

174. PHOLERITE (*Hydrated Silicate of Alumina or Hydromica*).

A soft and friable substance, with a submetallic appearance and scaly structure.

Mount Bischoff (?); West Coast (exact locality uncertain).

175. PHILLIPSITE (*Hydrated Silicate of Alumina, Calcium, and Potash*).

Somewhat abundant in vesicular Basalt with other forms of zeolitic minerals. It invariably occurs in compound groups of crystals.

Near the railway bridge crossing the Hellyer River.

176. PYROPHYLLITE (*Hydrated Silicate of Alumina*).

In small radiated masses, which are sometimes foliated; it has a subtransparent pearly lustre.

Near Outlands (granular and subcrystalline); Bischoff; Table Cape.

177. PORCELLANITE (*Silicate of Alumina*).

A milk-white compact porcelain-like substance of close, even texture, probably clay altered by heat.

Mount Lyell.

178. PIMELITE (*Hydrated Silicate of Alumina, Nickel and Magnesia*).

Always of an apple-green colour. Occurs rarely as small

nodular masses in the Heazlewood Silver-lead mine with Siderite, which is commonly more or less stained with Chrome and Nickel oxides, Sphalerite, Galena, and other minerals.

179. PLEONASTE (*Black Spinel*).

The red or other coloured Spinels are not known to occur in the island, but the black variety is very abundant in tin-drift: it occurs as waterworn lumps, which are usually of small size: occasionally the crystallization is fairly defined.

Weldborough; Blue Tier; Moorina; Branhholm; Denison; Mount Maurice; Blyth River; Mount Cameron; Hampshire Hills. This is one of the minerals termed "Black-Jack" by the miners.

180. PITTICITE (*Arsenio-sulphate of Iron*).

Several small specimens of this rare mineral have been obtained near the Scamander River.

181. PITCHSTONE (*a variety of Obsidian*).

This remarkable and interesting substance is, as a rule, of an intensely black colour with a shining vitreous lustre and often extremely vesicular, the cavities being usually lined and occasionally completely filled with pure white Calcite or a magma of zeolitic material. It is but rarely that the species of Zeolite can be differentiated. It was met with in sinking a well in the township of Sheffield.

Mr. A.W. Clarke, F.G.S., has made a careful micro-examination of this substance. The following is a copy of his report relating thereto ("The Geology and Palæontology of Queensland and New Guinea," by R. L. Jack, F.G.S., &c., and R. Etheridge, jun., 1892):—"No. 196, Sheffield (Tasmania), R. L. Jack's collection. Colour black, vitreous. Glass with clear little white crystals. This is by far the most beautiful example of Pitchstone I have yet seen. The crystals are olivine, and they are mostly preserved in exquisitely regular forms in the glass: the faces $oP(001)$ are wanting. The section being a little thick and the glass very transparent, together with their high angle of refraction, enables one to recognise in these crystals many of the characteristic planes of the typical olivine crystal. In this rock students of microscopical crystallography have an opportunity of studying olivine in a perfect crystal form. Under the $\frac{1}{4}$ -inch objective the olivines are seen to include glass with fixed glass bubbles. The glassy base carries nothing else but opaque dusty matter in spots, which is probably a darker glass nucleus fringed with dusty matter, in whose neighbourhood gas bubbles are commonly found. The glass has bubbles at tolerably regular intervals, and in one or two cases bubbles are strung out in shapes or outlines. The microlites are very small, and play no great part in the constitution of the

rock. They are tabular feldspars, not unlike the New Guinea feldspars in obsidian, described in the No. 1 of the Rhyolites."

182. PHACOLITE (*Hydrated Silicate of Alumina and Calcium*).

A variety of the zeolitic mineral Chabasite, which occurs in modified crystals of lenticular form. It is abundant in basalt rocks. Near Waratah; Hellyer River; Lefroy; Sheffield; Springfield.

183. PENTLANDITE (*Iron-nichel Pyrites*).

As small irregular patches of metallic lustre, with Magnetite, Zaratite, and Serpentine.

Heazlewood. (Montgomery.)

184. PYCNITE (*a variety of Topaz of cylindrical form*).

Occurs scattered throughout Quartz-porphry. Mt. Bischoff.

185. PLATINUM.

This has been reported to occur at St. Paul's River; Pieman River gold-field; in auriferous drift as minute flakes, but occasionally in the form of small cubes, Blue Tier, near Beaconsfield.

186. PLUMBOGUMMITE (*Hydrated Phosphate of Lead and Alumina*).

Occurs in stalactitic and irregular globular forms of a pale-brown colour and resinous lustre.

British Zeehan mine, Zeehan.

187. PERICLASITE (*Oxide of Magnesia*).

River Don (James Smith); as a vein in Serpentine, sometimes enclosing lumps of that mineral; it is white and compact. North of Trial Harbour, near the Pulpit Rock.

188. PYRITES (*Sulphide of Iron*).

This well known mineral is generally diffused throughout the metalliferous districts of the island; it occurs—primary or secondary—in rocks of all geological ages. The auriferous form occurs at Beaconsfield, Lefroy, and Mathinna. Well-formed crystals are plentiful at Beaconsfield; Zeehan; Dial Range, and Bischoff.

Massive, granular, and sub-crystalline formations of large size have been discovered at Mt. Lyell, Mt. Reed, and the Dial Range; on the Forth River between Mt. Claude and Middlesex Plains a very large band occurs between Mica Schist and metamorphic Slate—it is said to be auriferous; occasionally obtained decomposed to brown hematite at Dundas and Beaconsfield; an extensive cupriferous pyrites formation reported to be about 140 feet in

width has been exposed at Mt. Lyell, which is stated to average 4.5 per cent. of metallic Copper, 3 dwts. of Gold, and a small amount of Silver per ton of normal ore. On the surface this mass is altered to various forms of iron oxide.

189. PYRRHOTITE (*Magnetic Pyrites*).

Occurs as a large massive lode formation near George's Bay; at Mount Ramsay in amphibole rock with native Bismuth and other minerals; in main adit at Mount Bischoff the samples weather to a bronze lustre; at Hampshire in amorphous masses which have a decided red tinge and also of a grey colour, disseminated in a hard metamorphic rock; Penguin River, where it is highly nickeliferous; Dundas, said also to carry Nickel; samples from the Blue Tier, near Beaconsfield, have been found to contain Nickel, and in the old adits the mineral has decomposed to a mixed sulphate of that metal and iron; Beaconsfield, where it is often auriferous; Mount Pelion, in large masses.

190. PYROXENE (*Bisilicate of various bases*).

Abundant at the Upper Emu River; near the Whyte River it occurs sparingly. This species is identical with Augite, but the latter term is usually applied to the dark-coloured specimens.

191. PENNITE (*Hydro-nickel Magnesite*).

Occurs as a pale and somewhat dull incrustation on Chromite and Magnetite with Zaratite, from the latter it differs in containing Magnesia Carbonate. Heazlewood.

192. QUARTZ (*Silica*).

This abundant and widely diffused mineral is common both in the amorphous and crystallized form. The crystals occur as hexagonal prisms which sometimes have pyramidal terminations at both ends. It is found in many parts of the island, often in considerable abundance. The crystallized form more especially is met with in profusion in the tin-mining districts, where examples of large size, more or less waterworn, and showing a wide range of colouration, form one of the main features of the stanniferous drift. On Flinders Island and in the vicinity of Mount Cameron individual crystals weighing many pounds are commonly obtained; they are known as "rock crystal," and are beautiful representations of the species. In the auriferous districts the quartz is usually a more or less milky-white owing to enclosed vesicles, but extremely fine bunches of clear colourless crystals have been obtained at several localities. At the Heazlewood Quartz, often coloured green with the oxides of Chrome and Nickel, is an abundant admixture in the lode gangue of the Silver-lead mines, and on the West Coast crystals coloured red with Iron Oxide have been obtained. At Beaconsfield a honeycombed form occurs; this apparently

originates from the decomposition of Pyrites : masses of a similar character have been found at the Pieman River and other places.

At the Vale of Belvoir Quartz occurs pseudomorphous after Tremolite and silicified wood, which is of similar origin ; is abundant in many places. At Ben Lomond, in the workings of one of the tin mines, quartz has been found pseudomorphous after Felspar ; the specimens have a peculiar mottled appearance of various shades of brown.

Endomorphs in quartz, which is usually more or less cloudy in appearance from enclosed substances :—

Rutile.—Moorina ; Mount Cameron.

Cassiterite.—Gould's Country.

Tourmaline.—Ben Lomond ; Moorina ; Mount Heemskirk.

Iron Oxide.—In capillary fibres (known as Venus Hair Stone), Kindred Road, near the River Forth.

Manganite.—In solid dendrites in semi-opal, North-east Coast.

Principal varieties of Quartz.

Rock-crystal.—Vitreous form with a glassy appearance, commonly transparent and colourless, but occasionally tinted with yellow and brown. Mount Cameron ; Gould's Country ; Moorina ; Thomas's Plains ; Lefroy ; Mount Maurice ; Mount Heemskirk ; Beaconsfield ; Dundas ; Ben Lomond ; Flinders and other islands in Bass Straits, and other localities.

Cairngorm.—Smoky-brown, of various shades. Blue Tier ; Moorina ; Mount Cameron ; Flinders Island, &c.

False-topaz.—Of a clear pellucid yellow colour. Mount Cameron ; Moorina ; Gould's Country, &c.

Hyalite.—This variety has been found in the form of beautiful globular concretionary masses and incrustations with a pearly lustre. Zeehan ; Gould's Country.

Resinite.—A form of semi-opal of dull brown colour and resin-like appearance. Flinders' Island.

Wood-opal.—Silicified wood, usually of a pale brown colouration, with a striated structure.

In drift Derby ; Flinders' Island ; Epping Forest ; Longford ; Launceston ; in concentric layers, Franklin Rivulet ; East Arm of Port Sorell ; near Latrobe : Kentish Plains ; white, of a fine silky texture, Queen River, east of Howard's Plain ; of bright colouration and compact form, Little Forester River ; Lake Sorell ; Conara ; Swansea ; pseudomorphous after stems, Hobart ; (Ballarat School of Mines Museum).

Cacholong.—A milk-white compact siliceous substance occurring as thin veins and filling cavities in Basalt ; it is opaque and usually somewhat dull in lustre. Near Launceston.

Phrase.—Amorphous, usually of a yellowish-brown waxy lustre, Hampshire Hills ; as brown to dark-green waterworn pebbles,

Lake Sorell ; with Adularia and ordinary Quartz in the Granite rock near its junction with metamorphic slate, Tasman Rivulet ; a brown porcelaneous form is abundant at the Magnet Range.

Agate.—A variegated variety of quartz, the colours being arranged in bands, concentric layers, and cloudy masses. River Leven ; Cranbrook, near Swansea ; River Forth ; Flinders' Island ; Cornelian Bay ; Lake Sorell ; Heazlewood, and other places.

Morion.—Black Quartz. Blue Tier ; Flinders' Island ; Ben Lomond ; a mamillated Black Quartz in a solid compact form occurs on the west branch of the Savage River, nearly opposite Long Plain.

Hornstone.—A variety resembling flint, opaque to translucent, dull and glimmering lustre. In colour from white to the black Lydian stone. Lilydale ; Oyster Bay ; Flinders' Island ; Cornelian Bay ; Mount Nelson ; Mount Bischoff ; Pieman River ; Macquarie Harbour ; River Forth, and elsewhere.

Common Opal.—An amorphous hydrated form of a milk-white to pale brown colour and vitreous lustre.

Port Cygnet ; Lake Sorell ; Cornelian Bay ; Macquarie Harbour ; Supply Creek ; Mount Cameron ; Pieman ; Dugam Range, near the Montagu ; Proctor's Road, near Hobart.

Menilite.—A dull brownish to white translucent variety of common Opal, occurring in irregular reniform lumps or nodules which are impressed on the surface with angular depressions. In stanniferous drift, Gould's Country.

Geyserite.—A white hydrated form occurring in cellular masses mixed with Native Sulphur. Mount Bischoff.

Rose-quartz.—Of rare occurrence, and then not nearly so clear as that obtained in Bavaria and other places. Local examples are generally somewhat ferruginous and cloudy.

West Coast : Beaconsfield ; Moorina.

Amethyst.—Of a beautiful clear violet colour. A gem-stone much in use for ornamental work.

In large detached abraded crystals in stanniferous drift at Moorina ; in the Emu River about four miles south of the Hampshire Hills ; also occurs at Mount Cameron and Blue Tier.

Chalcedony.—Semi-transparent with a waxy lustre, often in mamillated form, but never in a crystallized condition.

Of a greenish and brown colour, apparently infiltrated in cavities and seams at Beaconsfield ; in banded brown-coloured masses at Flinders' Island ; as waterworn pebbles, Swanport ; Lake Sorell ; Tamar Heads ; Cornelian Bay ; Lisle ; Mount Cameron ; Meredith Range ; Heazlewood ; Pieman River ; Zeehan.

Cornelian.—Of a more or less variegated red colouration, often banded with white and yellow, and sometimes showing crystalline aggregations.

Fingal ; Flinders' Island ; Swansea ; River Forth ; Cornelian

Bay ; Lake Sorell ; Ilfracombe ; Supply Creek ; Longford, and many other localities.

193. RETINITE (?) (*Fossil Resin*).

A brownish-yellow hydro-carbonaceous substance of semi-perlaceous lustre, very brittle, soft, and of uneven fracture. When heated melts to a dark brown varnish-like mass, burns with a yellow flame, during which it gives off much smoke: it emits a strong resinous aromatic odour.

A sample of this material was submitted to Professor Krause, of the Ballarat School of Mines, who stated that it comes near to a fossil resin that has been named Middletonite, and that he found a similar substance in Victoria many years ago occurring between beds of coal. A partial analysis has been made by Mr. C. Burbury, who states that "it contains 1.75 % moisture at 100° C., and (by usual treatment of coal) 98% of volatile Hydrocarbons."

Occurs above and impregnating beds of lignitic coal at Macquarie Harbour.

A similar substance was obtained, also with lignite, in a clay-slate rock, which contained many leaf impressions, at a depth of about 100 feet from the surface, at the Don Tin mine, Bischoff. A fossil resin has also been found in numerous small fragments in the lignite near Evandale Junction.

194. RUTILE (*Binoxide of Titanium*).

Abundant, but much rounded, in drift, Brown's Plains ; Savage River ; about the south-west base of Mount Lyell ; in waterworn fragments and occasionally as well-formed crystals with other Titanium minerals, Clayton Rivulet ; in red-brown to black capillary bunches penetrating Quartz crystals, Moorina.

195. RHODOCHROSITE (*Carbonate of Manganese*).

This well-marked mineral is also known as Dialogite: it has been obtained at the Austral Silver-lead mine, Zeehan, in ferro-manganese gossan, the vughs often containing fine aggregations of the substance ; it also occurs massive in the fractures and in irregular botryoidal concretionary masses, lining cavities ; it has also been found at the Maestrie's Broken Hill mine at Dundas.

196. RETINALITE (*Yellow Serpentine*).

A massive resinous yellow variety of this well-known mineral substance. It is usually translucent.

Dundas.

197. RHODONITE (*Silicate of Manganese*).

Information from Zeehan states that this mineral has been found there, but the statement requires confirmation. It usually occurs massive, opaque, and flesh-red in colour, often coated black

externally from exposure. Some beautiful examples have been obtained from the New England District of New South Wales. (Cox and Ratte, "Mines and Minerals.")

198. RANDANITE (*Infusorial Earth*).

Found in small quantity; contains many fresh-water forms of Diatomaceæ.

Inglewood, near Oatlands, (Burbury).

199. STILBITE (*Hydrated Silicate of Alumina and Calcium*).

In a mineral vein on the west side of the River Mersey, a few miles above Gad's Hill crossing.

200. SILLIMANITE (*Anhydrous Silicate of Alumina*).

Occurs in small compact massive lumps of a brown to black colour with perfect and brilliant cleavage. It is translucent with a vitreous lustre.

Bischoff. (W. R. Bell).

201. SMITHSONITE (*Silicate of Zinc*).

Found in small compact patches, yellow-brown colour and dull lustre.

Bell's Reward, Whyte River, and at the Heazlewood Silver-lead mine, Heazlewood River.

202. SIDERITE (*Carbonate of Iron*).

Occurs of sub-crystalline structure and pale brown colour, with quartz, both of which often contain gold. Specimen Reef mine, Brown's Plain; in translucent masses of a vitreous appearance which rapidly weathers brown, also abundantly in the opaque form, but rarely in well-formed crystals, Mount Bischoff; in veins, usually of lenticular form and often containing Gold, Brown's Plain, Lucy River, Rocky River, and other places in the vicinity of the Pieman. This mineral appears to be the principal auriferous matrix of the locality: on the surface it is usually decomposed to the oxide. Abundant near the River Forth in compact masses; at Port Sorell it is found intermixed with quartz; in great profusion at Zeehan, Dundas, and the Heazlewood, where it forms the common lode gangue of the Silver-lead mines. The crystals are rarely obtained, but at the last-mentioned field they are occasionally met with, but very small in size: it is more often met with in the lode cavities in semi-lenticular forms aggregated together. In the Heazlewood Silver-lead and adjacent mines it is commonly coloured pale green by the admixture of the oxides of Nickel and Chrome.

203. STROMEYERITE (*Sulphide of Silver and Copper*).

When pure this mineral contains about 52% of metallic silver; it crystallizes in the rhombic system, and is isomorphous with

Copper Glance. In colour it is steel-grey, with a metallic lustre and shining streak. It is soft and perfectly sectile. It occurs disseminated, with Bornite and Chalcopyrite, in a quartz matrix at Mount Lyell. Assays of the mixed material have given returns at the rate of several thousands of ounces of Silver to the ton of ore. It is reported to occur on the footwall of the extensive interbedded formation of cupriferous pyrites for which the locality is now well known. The only recorded Australian locality for this mineral is at the A. B. H. Consols mine at Broken Hill, N.S.W., where it is reported to occur in a matrix of Carbonate of Iron in a dyke of Amphibole; it was found in close association with Dyscrasite, Sternbergite, Pyrargyrite, and other uncommon argentiferous species. (Smith, *The Australian Mining Standard*, May 22, 1893).

204. SILVER, NATIVE.

The pure metal has been obtained as small frondose branching patches in gossan, Penguin Silver mine; in clefts in lode material, Hampshire Silver mine; on Galena in flaky attached masses, which are usually tarnished, Owen Meredith mine, Dundas; in and on Calcite and Ankerite with amorphous Blende and Galena, Godkin mine, Whyte River: at this locality some extremely fine specimens have been obtained, many showing beautiful arborescent clusters of minute crystals: the crystals are often fairly well formed; it also occurs in somewhat long capillary masses and fibrous bunches, filling small vughs and coating the fractures; at the Bell's Reward mine it has been obtained associated with crystals of Calcite, the thin wire-like sprays of Native Silver are sometimes interwoven between the Calcite crystals; it has been detected in stanniferous Granite in a dyke formation at the Blue Tier, with Chalcopyrite, Bismuth, and Fluorite as accessory minerals.

205. STILPHNOSIDERITE (*Hydrated Peroxide of Iron*).

Occurs of a dark blackish-brown colour with a conchoidal fracture, shining and brittle. It is generally found in a stalactitic form or as a varnish-like coating on Limonite or Manganese minerals—more particularly on Psilomelane. Central Dundas mine; rarely Mount Bischoff; lining vughs of ironstone, with Cuprite, Mount Lyell; Central Balstrup mine, Zeehan, coating masses of Limonite, which are commonly of stalactitic form.

206. STANNITE (*Sulphide of Iron, Copper, and Tin*).

Stated by Phillips ("Ore Deposits," 1884, page 505) to occur at Bischoff. The term is usually applied to the sulphide ore as above, but Bristow ("Glossary of Mineralogy," 1861) defines a substance under this name as a mechanical mixture of Quartz and Tin oxide; if this definition is accepted then such an occurrence exists not only at Bischoff, but also in the Ben Lomond and other tin-mining districts.

The sulphide commonly known as Stannite (Dana "A Text-book of Mineralogy," 1885) is almost, if not quite peculiar to Cornwall, and has not so far been detected in this island.

This mineral is reported to occur in North Queensland and in New England, New South Wales. ("Report of the Second Meeting of the Australasian Association for the Advancement of Science, 1890," pages 215 and 260.)

207. STERNBERGITE (*Argento-pyrite*).

This species occurs with Huastolite and Galena in the workings of the Godkin Extended mine, at Heazlewood. An assay of a fairly pure specimen gave a very high return in Silver.

208. SPINEL, BLACK—See PLEONASTE.

209. SCHEELITE (*Tungstate of Calcium*).

At Mount Ramsay this occurs in the characteristic mineral-bearing hornblendic rock of the locality. It is found in well-formed crystals of considerable size, often up to one inch in length, and crystalline bunches. The colour is usually pale yellowish-brown, and in good specimens the facets are polished; in tabular crystals which are nearly white, Upper Emu River, in Garnet rock. (W. R. Bell.)

210. SMALTINE (*Arsenical Cobalt*).

Usually obtained in solid masses with a cubical fracture and of tin-white colour. It is said to occur in an almost solid vein or small lode at the North Pieman, also at the Hampshire Silver mine; in limited quantity, Penguin River; Castles Forbes Bay (Johnston, "Geology of Tasmania"); Mount Heemskirk with Cassiterite.

211. SAPPHIRE—See CORUNDUM.

212. SPHALERITE (*Zinc Sulphide or Blende*).

This mineral is of frequent occurrence, but not in great abundance at any of its many localities. It is often met with in comparatively limited quantity in the Silver-lead mines of Zeehan, Dundas, the Heazlewood, and at Ben Lomond. At the Silver Crown mine at Zeehan, bunches of somewhat large crystals occur of a brown colour; at the Godkin mine, Whyte River, a richly argentiferous Blende occurs in amorphous masses,—it is of a mahogany-brown colour with a dull lustre. It is found associated with patches of Native Silver and masses of Galena in a white and dark-coloured Calcite, and more rarely in Ankerite; at the Heazlewood Silver-lead and other mines in the vicinity, minute but remarkably well formed crystals are very abundant. They are of a clear yellow to red colour, and are usually obtained implanted in the fractures of Siderite or Quartz with crystals of

Galenite; at the Heazlewood mine it also occurs more rarely, in beautiful sharp-angled crystals which have a purple, green, and red metallic lustre; abundant in a massive form of a black colour, east branch of the Hellyer River; with the sulphides of Copper and Lead in an elvan of porphyry, opposite Gad's Hill, Mersey River, (W. R. Bell), plentifully and thickly disseminated in a vein at the Hampshire Silver mine, where it presents a peculiar copper-red colouration; Hunterston, on the Shannon, near Bothwell, (Pro. Royal Soc. Tas., 1854); of a dark brown to black colour with Chlorophane and various forms of Pyrites, Mount Bischoff; scattered throughout a dyke formation, with Galena in Granite rock, Meredith Range; as minute crystals of a pale green colour with Galena, Australasian mine, Dundas; in limited quantity, Ben Lomond; in a lode which is mainly composed of a mixture of this mineral, Arsenopyrite, and Galena, Scamander River; Penguin River Silver-lead mine; Mount Claude; Middlesex, with Pyrites and Galena; often highly auriferous, but in very small quantity, Lefroy and Mathinna; a peculiar variety of phosphorescent Blende occurs at the Castray River: it was obtained in trenching across a decomposed lode formation as rounded lumps, brown in colour, and of small size with masses of Galena and Pyrites as accessory minerals. The phosphorescent character is clearly distinct when struck or scraped with a knife blade. It is locally known as "Electric Calamine." At Mount Reed with Pyrites and Galena it is somewhat abundant.

Sphalerite often contains Gold, Silver, Cadmium, and the rare elements Thallium, Iridium, and Gallium.

213. SCORODITE (*Hydrated Arsenate of Iron*).

Formed by the decomposition of Marcasite, and usually found where that mineral is abundant. It is commonly met with at the Scamander River and vicinity; Golconda; Mount Bischoff; in the cavities of siliceous skeleton rock as beautiful green crystals at the Upper Emu River; amorphous in considerable quantity at the Waterhouse Gold field, at which locality it has been obtained in green-coloured crystals in the "Southern Cross" reef; near Mount Pelion, in quantity, the masses occasionally showing the gradual transmutation from the original mineral Arsenopyrite.

214. STEATITE (*Hydrated Silicate of Magnesia*).

Abundant with Asbestos and Serpentine, Asbestos Mountain; Mount Bischoff; Heazlewood; Beaconsfield; River Forth; near Mount Claude. "The Steatite contains a small vein of Silver, which, by the way, is not uncommon in this mineral, and is met with in most of the primitive mountains" (Pro. Royal Soc. Tas., 1854). This note refers to a specimen said to have been obtained at the Asbestos Mountain, but I have failed to detect any Silver in the numerous examples that I have examined.

215. SCHILLER SPAR (*a Hydrated Silicate of Magnesia*).

Occurs in many varieties on eastern side of the Parson's Hood Mountain; Heazlewood; Asbestos Mountain; Dundas; Magnet Range; Parson's Hood. The minerals termed Bronzite and Diallage are but varieties, and some authorities consider the whole but altered forms of Augite.

Bronzite is an essential constituent in the rock Gabbro so plentiful at the Heazlewood. It occurs of foliated structure and pale-green colour in Serpentine, Dundas. (Ballarat School of Mines Museum.) This species is also known as Bastite.

216. SERICITE (*Hydrated form of Mica*).

Occurs in foliations of schistose structure, colour greenish with a silky lustre. Dundas.

217. STEPHANITE (*Sulphide of Antimony and Silver*).

Reported as occurring at the Scamander Silver mine.

Scamander River, East Coast; at the Owen Meredith Silver mine it is found intermixed with Galena, the whole giving very high returns for Silver.

218. SULPHUR.

Found in the form of extremely minute crystals and microscopic patches in Galena. Mount Reid; British Zeehan Silver-lead mine, Zeehan; obtained in some quantity as a powdery mass composed of microscopic crystals intermixed with a pulverulent form of quartz (Geyserite), at Mount Bischoff. This discovery is interesting from the fact that it is the first of the substance in appreciable quantity that has occurred in this island.

219. SPHEROSIDERITE (*Carbonate of Iron*).

Of common occurrence in amygdaloidal Basalt in the form of small dark brown nodules. Rouse's Camp near Waratah; near the railway bridge that spans the Hellyer River.

220. STIBNITE (*Sulphide of Antimony*).

Found in massive irregular bunches in a quartz reef. The mineral was of the usual columnar structure, and of a remarkably pure character. Orlando Gold mine, Lefroy; in limited quantity south of Mount Claude, near the River Forth; impure and apparently merging to Jamesonite, Mount Bischoff; "Sulphide of Antimony, yielding 8 to 18 ozs. of Silver to the ton, from Mount Bischoff" (W. F. Ward, Tasmanian Official Record, 1892). I have not seen pure Stibnite from Mount Bischoff, although several antimonial minerals are abundant there.

221. SELENITE (*a variety of Gypsum*).

Occurs in more or less transparent laminæ. Obtained in small

quantity at St. Mary's, and near Circular Pond Marsh (W. R. Bell).

222. SERPENTINE (*Hydrated Silicate of Magnesia*).

This mineral occurs as a rock mass of considerable extent. Its normal colour is green of many shades, but almost every known variety of the substance, both in colour and in structure, has been obtained in more or less quantity. The mineral Olivine is supposed to be transmutable to Serpentine under certain conditions. At the Heazlewood and vicinity it occurs in considerable quantity, often containing a perceptible amount of Nickel oxide, which gives it a bright apple-green colour, in which case it approaches that from New Caledonia, which is worked as an ore of Nickel. Along the banks of the Heazlewood River and some of the smaller streams much of the Serpentine often contains large quantities of minute intensely black crystals of Chromic Iron, and more rarely large amorphous bunches of the same mineral. Brucite, Schiller-spar, and narrow bands of Chrysolite also occur with it as accessory minerals; at Anderson's Creek and neighbourhood extensive masses of this rock exist, in many places containing a considerable quantity of asbestiform Chrysolite and Steatite; north of Trial Harbour it often contains long fibrous Asbestos, and is connected with an extensive bed of remarkably pure Talc; also occurs at Mount Ramsay, Pieman River, Mount Claude, Clayton Rivulet, and at the Parson's Hood Mountain; at Dundas a semi-serpentinized Hornblende occurs intermixed with Bastite, and at the same locality a purple-coloured form is common, often containing disseminated Magnetite and Chromite.

223. STRONTIANITE (*Carbonate of Strontia*).

Found in small veins and pockets, usually of a white satiny appearance, at the Hampshire Silver mine (W. R. Bell). This species is not known to occur at any other locality in the island. It was obtained irregularly mixed up with lode-matter, with Fluor-spar, Apatite, and several minerals that are like it, almost peculiar to this interesting locality. "Mr. Gould recognised Strontium associated with heavy-spar in some minerals that I discovered at the Forth River."—(James Smith).

224. SEPTARIA (*Mixed amorphous Carbonates of Lime and Iron with more or less Silica*).

Rounded and occasionally flattened concretionary nodules, which are sometimes of considerable size—up to two feet in length—of a dirty white to brown colour. They have almost invariably a strong radiated structure.

Hampshire Hills (W. R. Bell).

225. TASMANITE.

A grey earthy to arenaceous shale more or less impregnated

with circular, punctate, brown microscopic fossil spore cases of a highly resinous nature, which have been named *Tasmanites punctatus* (Newton).

The spores yield an oily product in considerably quantity, but of poor illuminatory power. As much as 100 gallons of oil has been obtained by distillation per ton of shale. In beds of considerable extent on the banks of the Mersey River.

The American black paraffin shale has been found to be extremely rich in spore-cases of a similar structure and character to those so abundant in Tasmanite. The origin of the shale is supposed by some authorities to have been the accumulation of the shell spores of a species of Marine *Alga*, similar to that now existing in the Sargossa Sea.

Dana states ("A Text-book of Mineralogy") that this hydro-carbonaceous substance is "remarkable in containing sulphur, replacing part of the oxygen."

An analysis by Professor Penny (Proc. Royal Soc. Tas., 1855) gave the following results:—

Volatile matters	20·41
Coke { Fixed carbon	5·50
{ Ash	71·20
Sulphur	·73
Water.....	2·16

226. TOURMALINE (*a compound Silicate of Alumina and several other elements*).

Crystallizes in the hexagonal system; the crystals when free are generally terminated differently at the opposite ends. Common in columnar forms, which are often radiating or divergent. Exhibits many varieties of colouration; in this island it is known to occur black, brown, and green.

Black Tourmaline or Schorl.—Occurs commonly in almost all our stanniferous granites; when in prisms it generally presents a more or less triangular section, the sides being strongly striated lengthways. It is often aggregated together in radiating masses, which are occasionally of considerable size.

Occurs abundantly in drift at Moorina, the individual prisms sometimes measuring over two and a half inches in diameter. Flinders Island, of large size, penetrating the granite rock and free waterworn lumps in the drift, with topaz and large quartz crystals; Mount Heemskirk, in the granite in massive and aggregated bunches; Ben Lomond, in considerable quantity, often containing Cassiterite in the interstices and closely associated; Branzholm, in the granite and as somewhat small crystals free in the drift; Blue Tier; Granite Tor; Mount Housetop; Mount Cameron, in fine highly polished prisms; Upper Blythe River, in short stout prisms, which are intensely black; Clarke's Island; Pieman River; Meredith Range, often imbedded and penetrating Quartz;

Cascade in abundance, commonly in radiating bunches, which are occasionally intermixed with Pyrites and Cassiterite; Mount Ramsay, in the stanniferous granite abutting on to Amphibole rock.

Green Tourmaline.—This is a peculiar and local form characteristic of Mount Bischoff, where it practically often constitutes a rock mass which has erroneously been termed Chlorite. The prisms are, as a rule, thin, rather dull in lustre, and of various shades of pale-green in colour. The crystals rarely exceed one inch in length, being commonly quite minute; they sometimes form small tufted masses, composed of fine acicular prisms, in cavities of the rock, but more often they are aggregated and intimately interwoven together, forming bunches of considerable proportions. The more commonly distributed black schorl has not been found at Mount Bischoff.

Brown Tourmaline.—Obtained in small radiating prisms in a quartz matrix at Mount Ramsay; at Glenora; near the gap at Mount Heemskirk, in some abundance, of a rather dull hair-brown colour.

Regarding the formation of Tourmaline in nature, the following remarks by Mr. A. W. Clarke, F.G.S., will be of considerable scientific interest, more especially as this learned gentleman's observations are based upon a studied microscopical examination (Jack and Etheridge, jun., "The Geology and Plæontology of Queensland and New Guinea," 1892):—"The interesting question arises, which of the two minerals"—referring to this mineral and quartz—"is the first born. Rosenbusch says ('Microscopical Physiography,' p. 184) that 'Tourmaline is not directly secreted out of the eruptive magma in eruptive rocks, but resulted from the action of fumaroles carrying Fluorine and Boron on the eruptive rock, especially in its Felspar and Mica.' Teall also alludes to the action of fumaroles in the genesis of Tourmaline. This would rather support the pre-existence of Quartz; on the other hand, the uniform orientation of the Quartz between and alongside of the broken prisms would lead one to think that the reverse was the case. Could it be that the Tourmaline crystallized out in the Quartz by the action of fumaroles, as above, while the Quartz was viscous and under pressure, and that earth-stresses and dynamic metamorphism followed, separating the prisms, after which the Quartz proceeded to crystallize?"

227. TREMOLITE (*a pale-coloured variety of Hornblende*).

A variety of a pale green to white colour, generally radiating in structure; is common at Wombat Hill, about three miles from Mount Bischoff; radiating in bunches, and also massive, white, and shining; in profusion at a locality about three miles west-north-west of Mount Horror; at Heazlewood in vughs in the country rock; at the Vale of Belvoir it occurs pseudomorphed to Quartz,

in columnar blades often a foot in length: it is usually white and glassy; two miles east of the Parson's Hood Mountain, of a grey colour, compact in structure, and a somewhat dull surface; in the vicinity of Mount Pelion, in masses that are very pale in colour, almost white.

228. TETRAHEDRITE (*Fahlerz, Sulphide of Copper, Antimony, &c.*

This mineral is looked upon as a most important ore of Silver, not only because it is commonly rich in the desired metal, but also from the thoroughly established fact that it usually exists to great depth, so that its occurrence may, as a rule, be looked upon as predicting permanency in the metalliferous ore body in which it has been detected. It has long been the mainstay of the great mines of Saxony, where it has been worked for considerably over a century. It often contains a considerable admixture of other metals, such as Zinc, Iron, Lead, or even Mercury may be present, and still more rarely, Cobalt or Bismuth. It has been discovered massive and richly argentiferous at Dundas as a lode formation which is reported to be of considerable size. A qualitative analysis of this mineral shows it to be a remarkably pure form of Fahlerz: it is practically a Sulphide of Copper, Antimony, and Silver, the latter metal often giving assay returns of over 250 ozs. per ton of mineral. In this mine it is found associated with Chalcopyrite. Occurs in limited quantity with Galena and various forms of Pyrites, Penguin Silver mine; found in the form of scattered blebs and narrow compact seams in a silicious matrix, with Sphalerite, Jamiesonite, Galena, and other minerals, Hay's Prospecting Association, Castray River; it has also been reported to occur in several of the mines at Zeehan and Dundas; at Mount Lyell it is reported to occur in close association with cupriferous Pyrites; assays from this locality have given a return of above 2400 ozs. of Silver and 1 oz. of Gold per ton. The ore apparently occurs as amorphous lumps intermixed with the paler-coloured Pyrites. The manager of the Fahl Ore Silver Mining Company (Dundas) reports that "A sample of 1 cwt. of ore from this mine which was forwarded to Germany has given the following returns:—Copper, 26 per cent.; Antimony, 15.45 per cent.; Arsenic, 1.5 per cent.; and Silver, 0.75 per cent. (equal to 245 ozs. per ton)." Ferriferous Tetrahedrite in decomposed Hornblende rock, Dundas. (Ballarat School of Mines Museum).

229. THOMSONITE (*Hydrated Silicate of Alumina and Calcium*).

A zeolitic mineral occurring in Basalt rock, Sheffield; in small vughs, but the identification is somewhat doubtful, as the samples are small and indistinct, occurring in clusters of microscopical

crystals which are of a yellow colour, coating the clefts of lode material. Hampshire Silver mine, Hampshire Hills.

230. TALC (*Hydrated Silicate of Magnesia*).

A beautiful snow-white form occurs in the Arthur River near its junction with the Hellyer; on the west branch of the Clayton Rivulet this mineral occurs as a vein of a yellowish-white colour, and is about two feet in width; about one mile north of Remine, on the coast, a beautiful semi-transparent form exists in considerable abundance; it abuts upon the Serpentine outcrop; it varies in colour from translucent white to a clear pale green; a large formation occurs on the Meredith Range, near the Castray River: it is massive, compact in structure, and very pure; the prevailing colour is a beautiful pale sea-green, shining, and extremely unctuous; of sub-crystalline structure in large masses, Magnet Range; in radiating masses with Cassiterite, North Valley, as well as impure and massive at other places at or near Mount Bischoff; Asbestos Mountain, near Beaconsfield; near the Parson's Hood Mountain; Ben Lomond; Blue Tier.

231. TOPAZ (*a Fluo-silicate of Alumina*).

When waterworn this mineral has much the appearance of the more common mineral Quartz, from which it may be known by its greater hardness and rhombic crystallization.

It occurs in this island in pale shades of green and blue to colourless—the yellow, Saxon, and the Brazilian forms are unknown. It is obtained at several localities in profusion, of the “finest water, and of a brilliancy scarcely inferior to that of the Diamond” (Bristow, “Glossary of Mineralogy,” 1861, p. 383).

This beautifully brilliant gemstone is unfortunately out of fashion for the jeweller's art, although fifty years ago it was much in vogue. It is found of all sizes; specimens have been obtained measuring nearly eight inches in length and of perfect transparency. At Killisrankie Bay, on the west side of Flinders' Island, it occurs in great profusion both as waterworn pebbles and more rarely in fine well-defined crystal forms in alluvial drift resulting from the detritus of the Granite rock: several other minerals are common with it, including Quartz, Zircon, and Tourmaline. The Topaz is but rarely obtained *in situ*,—it usually occurs in vughs in the Granite associated with crystals of Felspar and Quartz. Gould states (Pro. Royal Soc. Tas., 1871, p. 60), that they originate from bands varying in width from one to several feet, composed of the ordinary ternary Granite minerals highly magnified, the size of the individual minerals being “enormously increased so that the blocks of Felspar, Quartz, and even mica, occur up to several feet in dimension. These appear to be the scene of the most abundant source of the Topazes, which have crystallized out into natural cavities from whence they have been delivered by erosion.” At

Mount Cameron they are abundant, although generally much worn; in the stanniferous drift large examples have been frequently met with. They occur more or less abundantly all through the north-eastern Tin-producing districts, Thomas's Plains, Moorina, and the Weld River being noted localities. The Topaz rarely, if ever, occurs on the West or North-western portion of the island, the only form of this substance, so far discovered, being the Topaz-porphyry of Mount Bischoff, which was first recognised and minutely described by the late Professor von Groddeck, of the celebrated School of Mines at Clausthal (Proc. Royal Soc. Tas., 1885), and the cylindrical variety Pycnite, which occurs disseminated in the more abundant Quartz-porphyry of the same locality.

The Topaz-porphyry of Bischoff is usually more or less stanniferous, and is comparatively scarce—the ordinary rock being a Quartz-porphyry, which in general characteristics is allied to a form known as Eurite: it is granular to crystallized in structure, the combined Topaz being pseudomorphous after Quartz; the crystals are usually very minute, and strongly retain the well-known hexagonal form of the parent mineral, but with a milky and less lustrous appearance. The only other recorded locality for this peculiar and interesting form of Topaz-rock is the Tin mines of the Schneckenstein of Saxony. This restricted distribution, structure, and chemical composition, render it of extreme interest to the mineralogist.

I am informed that small specimens of Topaz have been sparsely found in alluvial drift in the vicinity of Mount Claude, but the identification is open to doubt.

232. VIVIANITE (*Phosphate of Iron*).

In groups of crystals which are occasionally nearly half an inch length, from cleavage planes in rock, adit Mount Bischoff; in blue and green amorphous clay-like mass, Waratah River; in crystallized bunches, No. 1 North Pioneer reef, at Waterhouse; as a soft clay more or less impregnated with the phosphate, Supply Creek; of a dark blue colour in fibrous radiating bunches with granular Quartz, Lucy Creek, Pieman River; in large quantity disseminated in decomposing argillaceous shale, North Bischoff.

233. VALENTINITE (?) (*Oxide of Antimony*).

As small white crystals in lode-matter. Hay's Prospecting Association mine, Castray River.

234. VAUQUELINITE (*Chromate of Lead and Copper*).

This is a rare mineral, which hitherto has been considered peculiar to the Silver-lead mining districts of Siberia. The substance as occurring here has a peculiar and unusual siskin-green colour, and is found in an amorphous, somewhat mammillated mass of a dull appearance. Before the blowpipe and in Nitric Acid it

gives all the characteristic results. It has been obtained in moderate quantity, with Galena and Arsenical Pyrites, near George's Bay; in minute particles with Crocoisite, Adelaide Proprietary Silver mine, Dundas. This mineral has not been observed on the mainland of Australia.

235. VANADINITE (*Vanadate of Lead*).

Obtained in extremely limited quantity as small implanted globules and thin incrustations on Siderite, with minute crystals of Galenite and Sphalerite; it is of a reddish-yellow colour normally, but weathers yellow and again fading to a dirty brown. So far it has only been detected at the Bell's Reward Silver mine, Heazlewood.

236. WOLLASTONITE (*Silicate of Calcium*).

A massive white mineral generally obtained in lamellar masses. Mr. W. R. Bell, in *litteris*, states that "the tabular spar at Highwood, south from the Hampshire Hills, merges gradually into a crystalline rock much resembling a variety of Diallage, which is brown in colour."

237. WOLFRAMINE (*Hydrated pure or earthy Tungstic Acid*).

Occurs as pulverulent, earthy, and more rarely semi-crystallized patches and bands of a more or less intense yellow colour. It is commonly adherent to and coating Wolframite, from the decomposition of which it is derived. Ben Lomond.

238. WAVELLITE (*Phosphate of Alumina*).

This is invariably in all known localities a rare and local mineral. It has been discovered in a rock cutting in a greyish-green clay-slate. The mineral occurred in the cleavage planes of the rock in the form of flaky, radiating discs, of a white and glistening appearance, which are usually under a quarter of an inch in diameter. Australasian Slate quarry, Back Creek; on the Forth River, south of the Van Diemen's Land Company's track, in 1864, associated with Galena and Blende (James Smith); at Mount Ramsay, as white circular patches with a strongly radiating structure implanted upon Hornblende; of small size in altered slate at Mount Bischoff. (W. R. Bell).

239. WOLFRAMITE (*Tungstate of Iron*).

Usually occurs in a massive form or in radiating blades penetrating and intermixed in a Quartz gangue. It varies little in colour, being almost invariably of a dark brownish-black, with a sub-metallic lustre. Recently this mineral has become of considerable commercial importance for the production of Tungstic Acid, which is principally used to give greater hardness to steel and

aluminium. It is found associated with Cassiterite in lodes occurring in Granitic rocks. Ben Lomond; Ethel mine, Blue Tier; North Pieman River, near the coast; Gould's Country; Black Bluff Mountain; Mount Thomas, near Mount Claude; Castra, Upper Leven.

Wolfram may be known from Cassiterite by its perfect cleavage, which is a constant character; the latter mineral has always a granular structure.

240. WAD (*an impure mixture of the Oxides of Iron, Manganese, and other elements*).

A common associate of other ores of Manganese, usually occurring in botryoidal masses and bunches. Godkin and Heazlewood Silver-lead mines, Heazlewood; often met with at Dundas and Zeehan.

This is not a species, but simply a mixture of decomposed minerals; when it contains a few per-centum of Cobalt oxide it is termed Asbolite.

241. YTTROCERITE (*Hydrofluoride of Calcium, Yttria, and Cerium*).

An extremely rare mineral, occurring in amorphous masses, which usually have a sub-crystalline to earthy structure. Its only known locality in this island is Mount Ramsay, where, Mr. W. R. Bell informs me, it forms reddish-brown irregular flakes and patches of small size in the Hornblende rock of the locality.

242. ZINCITE (*Oxide of Zinc*).

Found as minute crystals and as small patches on Siderite and Quartz, which are usually aggregated in clusters. The colour is a bright clear red. Heazlewood.

243. ZARATITE (*Carbonate of Nickel*).

This is usually termed "Emerald Nickel" from its beautiful green colour. It occurs in varnish-like coatings on Chromite and Magnetite, upon either of which it is invariably parasitic; at its original locality it sometimes forms mammillary or stalactitic crusts on the same iron minerals. It is mineralogically a rare and local form, its principal and original locality being Texas, Pennsylvania, U.S. America: it occurs in less quantity in Shetland and Spain. It is not known to occur in Australia. In physical character it closely resembles the well known commercial Nickel ores of New Caledonia (Garnierite and Noumeaite), but they are hydrated silicates of Magnesia and Nickel. So far as known Zaratite is not of any economic value, although if discovered in large quantity it could probably be worked with profit.

Heazlewood, on a high hill on the north side of the river, with Serpentine and a small quantity of Pentlandite.

The Ballarat School of Mines collection contains a specimen of this mineral marked "Mt. Zeehan, 16/9 92," but I think an error has been made as to locality, for, so far as I am aware, it is restricted to the Heazlewood locality as given.

244. ZIRCON (*Silicate of Zirconia*).

This mineral is isomorphous with Cassiterite. It forms when cut and polished a beautiful gem-stone, for which purpose the Tasmanian specimens are peculiarly adapted on account of their high lustre, in which respect they perhaps excel those from all other localities, although they are not, as a rule, so highly coloured as those obtained in Northern New South Wales and Southern Queensland.

As occurring here they are usually more or less transparent: in colour they vary through many shades of brown to red, and although occasionally fine clear stones of good colour are obtained, they are usually much clouded with darker tints. The Zircon presents three distinct varieties of colour, viz., the Jargoon, yellow-brown; the Hyacinth, bright red; and that termed Zirconite, which is almost opaque and reddish-brown in colour: all three are fairly abundant here. In this island it has not apparently been obtained *in situ*, but doubtless originates from the detritus of the Granite rock. It is abundant in the stanniferous drifts of the North-east coast, where it occurs with Topaz, Pleonaste, and Quartz. Well developed crystals are of extreme rarity, as it is generally much waterworn. The specimens from near Table Cape are, as a rule, darker and brighter in colour than those occurring on the Tin-fields, but they are commonly more fractured, although fairly good crystals are not nearly so rare.

It has been found clear and colourless at the Blythe River; in beautiful glassy and lustrous crystals, ranging from one-eighth of an inch in length to extremely minute, Meredith Range and the North Pieman; in many colours—yellow, green, and red to colourless—Boat Harbour, near Table Cape; in many variations of colour, including bright clear red, Flinders and Long Islands, Bass Straits; in large numbers, often of considerable size, in drift, Moorina, Weld River, Thomas's Plains, and other places on the North-eastern tin-field.
