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NOTES ON TASMANIAN MINERALS

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THE present paper records the more recent results of the continued investigation into the mineralogy of this State, from which it will be found that not only are several unrecorded localities enumerated for minerals which have been previously catalogued in former contributions on the subject to this Society, but also that not less than 13 species are now added to a remarkably long list.

Two peculiar chemical varieties of well-known substances are for the first time described, both of which are from one locality, and owe their unique features to a common cause. Several of the species are of special interest to the geologist, and a few are of commercial importance; but it may be needless to say that mineralogy deals with a variety of substances usually placed under that particular branch of scientific investigation, irrespective of their individual intrinsic value. In fact, by far the major portion but interest the geologist, the chemist, and those in search of some of the most beautiful of Nature's treasures.

So much is now known of the mineralogy of this State that the flood of discovery in this particular field is without doubt past, and it is only by the most strenuous efforts, coupled with close application, that additions to the minerals already known to occur can be made; but, needless to say, as to peculiarities of occurrence and chemical analysis much remains to be done.

I have to express my most grateful thanks to many friends for ready assistance as in the past, and generous donations of both beautiful and interesting material for this addendum, as well as for facilities for collecting and opportunities for the examination of many minerals *in situ*.

To Mr. R. F. Waller, General Manager of the Magnet Silver-mining Company, who is a most enthusiastic mineralogist, I am specially under obligation, both for collecting at his particular locality, as well as for assistance in the identification by blowpipe and other determinations.

1 ALBITE.—(*Polysilicate of aluminium and sodium.*)

In solid irregular milk white subtranslucent compact masses, apparently of secondary origin. Locality: Heazlewood River.

2 ALLOPHANE.—(*Hydrate silicate of aluminium.*)

Found as irregular, fairly large masses, outwardly coated with a pulverulent white powdery substance of secondary origin. The colour varies from pale yellow to a much darker shade. The general appearance of the mineral is remarkably gum-like. The composition is quite unusual, but there is little doubt about the identification.

Analysis by Mr. Watson, of the Magnet Silver-mining Company:—

Si O ₂	= 19.00
Al ₂ O ₃	= 40.40
Fe ₂ O ₃	= 4.70
Ca O	= 6.9
S O ₂	= 1.61
Ignition	= 33.30
	99.70

3 ANTIMONY (*Native.*)

Occurs in thin radiating patches, about an inch in diameter, on a silicious gangue. This is the first record of the occurrence of this somewhat rare mineral in this State. I have only seen one specimen, and that is in the collection of Mr. R. F. Waller, although I am informed a slab about a foot square was obtained, practically covered with the radiating metal. Locality: Spray Section, British Zeehan Mine, Zeehan.

4 APATITE (*Phosphate of calcium.*)

As very minute crystals, about two millimeters in length, of a pale pinkish colour, abundantly scattered throughout a stanniferous granite. Crystal Hill Mine, Blue Tier.

5 ARRAGONITE (*Orthorhombic carbonate of calcium.*)

Occasionally obtained in vughs in basalt as subradiating thin columnar crystals, which do not rarely exceed 2 inches in length. They are highly polished, g'assy clear, and colourless. This is by far the finest occurrence of this mineral in the State. Locality: Briseis Mine, Derby.

6 BERESOWITE (*Chromate and carbonate of lead.*)

This mineral has been found to be much more abundant at the Magnet Mine than hitherto supposed. It occurs in the decomposed or superficial portion of

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the lode, and is confined to cracks and small vughs in the gossan, where it forms coatings of almost microscopic plates and crystals, which often nestle in little bunches. The crystals are bright and sparkling, usually a shade of yellow to orange, but sometimes a bright crimson. It commonly decomposes to a yellow lead oxide. In the abandoned workings of the old Whyte River Silver Mine, Mr. R. F. Waller obtained some nice slabs of a decomposed rock, literally coated with the characteristic crystals of this substance. Its bright colour renders it an attractive object, but the soft base upon which the crystals are usually implanted causes it to be extremely difficult of transport. It has not so far been noticed at any other of our silver-lead mining localities. In fact, its occurrence in the Heazlewood district appears to be the first outside its original locality at Berezov, in the Ural.

7 CASSITERITE (*Dioxide of tin.*)

Occurs of unusual habit at Mayne's Mine, Heemskirk.

The colour varies from a pale dull grey to almost black, and is commonly of a radiated fibrous structure in botryoidal and reniform shapes. Where the concentric structure is well defined, the internal coloration is in bands of regular width, of various shades of grey to brown. In all essential characteristics this occurrence exactly corresponds with what is known as "wood tin" in Cornwall, England.

An acute pyramidal, intensely black variety, representing what has been termed sparable or "needle" tin in the European mining districts, occurs at Welsh's tin find near the five-mile on the Waratah-Corinna-road. The crystals are minute, very pointed, and a good imitation of the old-world form.

A remarkable occurrence of cassiterite has recently been discovered at Mount Bischoff by Mr. Bradford, in which cellular cavities, retaining in most instances the form of orthoclastic felspar, have been lined, and sometimes completely filled, with a mass of minute, well-developed, tetragonal tin crystals, combined with pycnite. The cavities are small, but perfectly distinct. The original porphyry has been almost completely topazised, simply leaving granular interspersed quartz. The replacement of the felspar with cassiterite is not so complete as that recorded from the Mount Rex Mine, where pseudomorphism has gone to the fullest extent.

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In the Bischoff specimen the two minerals, pycnite and cassiterite, form a coating in the cavities, and it is but rarely the whole space is filled with the substitution. The intensely black cassiterite, with the milk-white base, forms a striking contrast of considerable interest.

The occurrence forms a remarkable illustration of the probable action on the original rock by chemical changes, by which the topazisation occurred, and the tin crystals were deposited in the cavities of dissolved orthoclase.

At the Stanley River numerous remarkably fine pseudomorphs of compact black cassiterite after orthoclase have recently been discovered. This replacement shews the clearly distinct crystal outline of the felspar imbedded in an almost milk-white porphyritic rock, mainly composed of quartz and felted masses and radiating bunches of short and opaque crystals of tourmaline. This last-mentioned mineral is of an intensely dark-green colour, and belongs to the variety which has been named zeuxite, and which hitherto was supposed to be almost restricted in this island to Mount Bischoff. Pseudomorphs of this mineral also after felspar are somewhat abundant at the same locality.

Mr. R. F. Waller has shewn me a small specimen of topazised porphyry from Mount Heemskirk—a quite new locality for this mineral.

8 CHALCOPHANITE (*Hydrated manganese and zinc protoxide.*)

In aggregates of well-formed tabular crystals of a bluish-black, and highly polished. Locality: Magnet Silver Mine. Magnet.

9 CHRYSOBERYL (*Aluminate of beryllium,*) variety *Alexandrite.*

A remarkably fine example of this highly-prized gem stone was obtained by Mr. J. A. Thompson at the Weld River in stanniferous drift, during the ordinary streaming process of dressing tin ore. It is of a somewhat pale but attractive green colour, red by transmitted light, as is characteristic of the variety. It was by the kindness of Mr. Thompson tested with the dichroscope by Mr. W. H. Twelvetrees, Government Geologist, with the result that its identification was placed beyond doubt. It is remarkable that this is the first cut specimen which has come under

notice. In all probability this gem has been looked upon as a pale, transparent corundum, which is comparatively abundant at the locality, as is also the zircon.

10 CHROMIFEROUS MIMETITE (*Arsenate of lead with chromic acid.*)

This variety never assumes the barrel-like shape so common to the typical mineral. It is found in short hexagonal prisms and plates, with basal terminations, usually about 1 millimeter in breadth and length. The colour varies from a decided brownish-green to deep orange; it is shining and opaque. The streak is orange to siskin-green. Before the blowpipe in salt of phosphorus it remains green when cold in both flames. In closed tube with splinter of charcoal and heated intensely it gives very strong and characteristic reactions for As_2O_3 ; with cupric oxide gives flame reactions for Cl , and in closed tube with magnesium wire the odour of P_2O_5 . It is reduced to metallic lead with soda on coal. This is a variety sufficiently distinct in composition, colour, and habit to be worthy of record. It is rarely met with at its only locality, and then in comparatively small groups of crystals, but its peculiar colorization, combined with the habit of usually occurring in thin plates, at once arrests attention. The chemical reactions shew that it is more allied to mimetite than to pyromorphite, a chromiferous variety of which has been recorded. Locality: The Magnet Mine, attached to the gossan in the superficial workings.

11 CHROMIFEROUS CERUSSITE (*Lead carbonate with chromic acid.*)

This attractive variety of a common species is, so far as known, confined to the Magnet Mine, in the upper workings of which it is, although local, fairly abundant. It occurs in fractures and vughs in the gossan zone, but in bunches and sparsely attached as beautiful little crystals, generally in close association with crocoisite, but never, so far as observation has gone, intermixed with the normal form; although this is somewhat abundant in its usual adamantine characteristic habit, often shewing remarkably perfect development in stellar and cruciform triplet crystals.

It is noticeable that, while the variety under review is invariably associated with the chromate of lead, the

common type is rarely, if ever, obtained in the vicinity. It is always opaque, with a shining lustre, but not adamantine. The colour is canary yellow, with an occasional tinge of red where the crystal has impinged upon the chromate. The tint does not vary to any serious extent, although paler examples are occasionally met with. It is a most attractive mineral, and soon arrests attention. Its most constant feature is its crystallisation in flatish, frondose and spear-headed groups, twinned by repeated angles across different faces of the prism (110). The striated faces of the twinned groups are the brachyprisms O11 and O13; these are commonly deeply grooved, affording a most interesting leaf-like and unfamiliar appearance.

This variety is perfectly distinct, both as regards colour and habit of crystallisation. Moreover, intermediate variations between it and normal type have not been met with. It is undoubtedly one of our most attractive and typical minerals. Under the blowpipe gives reactions for chromic acid.

12 DOLOMITE (*Carbonate of magnesium and calcium.*)

A somewhat unusual occurrence, in the form of small attached, doubly-curved or saddle-shaped crystals, which are opaque and white. Magnet Silver Mine, Magnet.

13 DIOPSIDE (*Metasilicate of calcium, iron, and manganese.*)

This almost white variety of pyroxene occurs, both massive and crystallised, at the Tenth Legion Mine, Comstock District. Analysis:—

Si	O ₂	=	52.1
Al ₂	O ₃	=	3.0
Mg	O	=	15.0
Ca	O	=	27.7
Fe	O	=	2.3

100.1

Specific gravity 3.23; hardness, about 6. (G. Waller: Report on the iron and zinc-lead ore deposits of the Comstock District, 1st February, 1903.)

14 DUFRENITE (*Basic ferric phosphate.*)

Occurs as a thin incrustation of an olive to blackish-green colour on zinc-bearing gangue at the Bell's Reward Mine, Heazlewood.

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15 EMBOLITE (*Chlorobromide of silver.*)

In minute but perfectly cubical crystals, which are occasionally octahedrous. Occurs in a seam of gossan at the Magnet Silver Mine, Magnet.

16 FELSPAR (*Polysilicates of aluminium potassium, &c.*)

The following note on this important group is kindly supplied by Mr. W. H. Twelvetrees, Government Geologist:—

Orthoclase occurs in our granites, syenites, elvans, and quartz porphyries. The most common combinations are (010), (110), (001). Car'sbad twins [twinning plane parallel to the orthopinacoid] (100) are frequently seen. The crystals are generally turbid from decomposition into kaolin, or muscovite. Replacement by piuite chlorite, &c., has occasionally taken place. Porphyritic crystals of an inch or two in length are common in the granite of the East and North-East Coasts.

Sanidine.—This pellucid monoclinic felspar is found in the alkali syenites and elaeolite syenite porphyries of Port Cygnet. It frequently shews zonal structure.

Plagioclase Felspars, albite, oligoclase, andesine, labradorite, bytownite, anorthite, form a continuous series, in which, according to Tschermak, albite and anorthite are opposite extremes. The intermediate felspars have been shewn by Schuster to be isomorphous mixtures of albite and anorthite.

Albite occurs as replacement of the groundmass of porphyroids or keratophyres at Mount Read; in larger crystals in the actinolitized slates in the North Dundas District. Intergrown with orthoclase, it forms micropertthite; seen in granite at Anderson's Creek and in alkali syenite at Port Cygnet.

Labradorite is the felspar of our basalt and dolerite (diabase). Labradorite-bytownite and bytownite-anorthite felspars characterise the gabbros at the Heazlewood, Bald Hill, &c.

Oligoclase, with its narrow twin lamellae, is the plagioclastic felspar of our granites. Andesine occurs in essexite at Port Cygnet.

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Microcline, though chemically identical with orthoclase, is triclinic in crystallisation. Basal sections microscopically shew a characteristic cross-hatched twinning, due to the intersection nearly at right angles of the twin lamellae of two types (albite and pericline). Seen in granite porphyry at St. Marys, and in granite elsewhere.

17 GALENITE (*Sulphide of lead.*)

At the Magnet Silver Mine somewhat fine pseudomorphs of this mineral, after sphalerite, have occasionally occurred. They are usually in irregular groupings, with drusy surface and glimmering lustre.

18 GÖTHITE (*Hydrous sesquioxide of iron.*)

Occurs sparingly, usually as a coating, at the last named locality.

19 HISINGERITE (*Hydrated ferric silicate.*)

In amorphous masses of an intensely black colour, with a conchoidal fracture.

In lode matter exposed in the lower tunnel of the Comstock Mine, Comstock District. (Mr. G. Waller, loc. cit.)

20 HORNBLLENDE (*Bisilicate of various protoxides and peroxides.*)

The common black amphibole, containing aluminium, or paragasite, with the non-aluminous species tremolite and actinolite, have already been recorded (Catalogue of the "Minerals of Tasmania, 1896"), but there are several others occurring here which have not so far been satisfactorily identified.

At the Hampshire Hills a remarkably developed black amphibole occurs. It is in large crystals, which often reach several inches in length, and is closely associated with pyrophyllite and amethyst. In thin section under the microscope it is dark sombre green and yellowish-green according to the orientation. Intensely pleochroic $f = b \gg a$. Extinction angle about 14° . Crystallisation irregularly prismatic and flaky, structure poecilitic, enclosing apatite, fluoz. iron oxide, &c., and pierced with quartz grains; often surrounds felspar plates. Professor Rosenbusch, in a letter under date January 12, 1899, mentions this

mineral as "a peculiar weakly bi-refringent monoclinic amphibole, bluish-green in colour; a grey-green, b brownish-green, c bluish-green to blue, 2 E (the apparent optical axial angle) small, optical character + and with strong dispersion of the axes. It recalls strongly the blue-green amphiboles of the crystalline schists in the Scora Vale, in the centre and north of Norway, and elsewhere."

The series of phonolitic rocks of Port Cygnet afford one and perhaps two species of soda amphibole, but their specific identification is attended with considerable difficulty. Many of the rocks referred to have been microscopically examined by Professor Rosenbusch, and that well-known authority, in a communication to Mr. W. H. Twelvetrees, refers to one of the hornblendes as being barkevekitic. This is the prevailing form which is seen in rock sections from the locality indicated. It is myrtle green in colour by transmitted light, and in the absorption $b > c > a$, in this respect appertaining more to kataforite, but differing in the pleochroism. In the fractures and joints of the elaeolite syenite from the same place a black amphibole is occasionally developed, having much the general appearance of arvedsonite. It is usually plentiful, occurring as long narrow thin laths and aggregates, sometimes reaching a trifle over 2 inches in length; they do not shew terminations, but have an irregular brittle structure. Fragments examined under the microscope shew the substance to be green by transmitted light. It is apparent that the soda hornblendes at Port Cygnet differ in some degree from those recorded from similar rocks in better known localities, and that they require further investigation before they can be satisfactorily determined.

21 HISTRIXITE (*Sulphide of bismuth and antimony.*)

This mineral occurs massive at several of the North-East Dundas mines, where it is classed under the common designation of "Fahl ore," a term applied to several very distinct minerals with the general physical characters of tetrahedrite.

22 HYALITE (*Hydrated silica.*)

Occurs in cavities of a hard lode gangue in white to pale-green botryoidal masses. Locality: Bell's Reward Mine, Heazlewood.

23 HYDROCERUSSITE (*Basic lead carbonate.*)

In one of the adits at the Hercules Mine, Mount Read, a white fluidal substance was observed in decomposed lode matter, which, on giving up its hygroscopic water, assumed a silvery-white appearance, and which under the microscope is resolved into very minute scales, but with little or no hexagonal structure. In all essential respects the substance agrees with this species as detailed in "Dana's System of Mineralogy, page 299.

24 LEPIDOMELANE (*Potassium mica rich in iron.*)

Occurs in large six-sided tables, occasionally 1 inch in breadth, of a black colour, and highly adamantine. Transparent in very thin laminae, shewing a beautiful emerald green colour. The crystals for the species are remarkably fine, and well developed; they are found aggregated together in association with a peculiar amphibole and quartz, and evidently form a portion of a contact on the fringe of granite. Locality: Hampshire, near the old silver mine.

25 PHLOGOPITE (*Magnesium mica with little iron.*)

"This mineral occurs on Section 5367-93M in hornstone, associated with very large bodies of magnetite and zinc-blende. It occurs in large hexagonal crystals, with a very perfect micaceous cleavage. The colour is light green, varying sometimes to greyish-brown." (Mr. G. Waller, loc. cit.)

27 PYRARGYRITE (*Silver sulph-antimonite.*)

Ruby silver ore has recently occurred at several mines, notably at the Magnet, where it is not by any means rare in patches and blebs in close association with galenite. The mineral is sometimes surrounded by frondose and granular native silver, and the combination, needless to say, adds materially to the silver assay value of the ore. At the Mount Stewart Mine it occurs sparingly, and in small vugs little nests of micro-rhomboidal crystals have been detected, which are probably this mineral. At the Mount Farrell Mine it has been noticed embedded in galena; also at the Confidence Mine, near Waratah, and at the Hercules Mine, Mount Read, it has been seen in micro-crystals attached to filaments of native silver. Reported to have been found at the Oonah and British-Zeehan mines at Zeehan.

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The light ruby silver ore (proustite) is sometimes associated with the pyrargyrite; the latter appears to be the more often noticed, but the exact determination of the species has not been made in the majority of occurrences.

28 RESTORMELITE (*Hydrous silicate of aluminium and iron.*)

As at its original locality, Restormel Mine, Cornwall, this substance occurs as a coating on psilomelane and other manganiferous material. It is white to pale-greyish blue, sometimes almost a clear blue. The incrustation is invariably thin, but quite noticeable and distinct. Locality: The Comet Mine, Dundas.

29 SILVER (*Native.*)

Some extremely fine examples of this native metal have recently occurred in the carbonate lode at the Hercules Mine, Mount Read. The mineral assumes most attractive nests and layers of extremely fine wire-like filaments, often with fern-like expansions, commonly implanted on a glistening, pure white, fibrous cerussite. The occurrence is by far the finest of its kind hitherto found in this State.

30 TURKITE (*Hydrous sesquioxide of iron.*)

An iron ore with the general aspect of fibrous hornstone, with a red streak. Hardness = 5. 6. Locality: Blythe River.

31 XANTHOSIDERITE (*Hydrous sesquioxide of iron.*)

Found as an incrustation, often in silky needles of a bright red colour, but sometimes in the powdery form. Occurs in the lode on gossan and other gangue. Locality: Magnet Mine, Magnet.