

are associated in general with granitic rocks. Further they are associated with the roofs of the granitic Introduction. to a less extent with the sides of the granite. When associated with the roofs they are found in and at the top of the cupolas and Mt. Paris and adjacent regions form a fine. The mine was known originally as the Nugget and was worked by the Nugget Tin Mining Company Regd. from 1882 onwards. At a later date (1897) it was taken over by the Appalachian Tin Mine Ltd. These companies were engaged in underground work, driving adits to test the hard quartz greisen lodes. At a later date F. Krushka erected a treatment plant but was not successful. The Mt. Paris Tin Mining Co. N.L. held the mine under lease during 1907 and 1908.

In addition to the lodes, a large portion of the surface had been sluiced to shallow depths by Chinese for the detrital tin ore in it.

The tin-bearing nature of the rock containing the hard greisen lodes does not appear to have been discovered until about 1925. Since then attention has been devoted solely to this material.

Location & Access.

The mine is situated to the south of Mt. Paris, a small hill near the western end of the range stretching from Branxholm on the west to the Blue Tier on the east. Mt. Paris is 2 miles N.E. of Ringarooma and 4 miles south of Branxholm. Access can be gained by road from both Ringarooma and Branxholm to points within one mile of the present workings.

Leases.

The mine is included in Consolidated Lease 10298/M of 121 acres chartered in the names of S. Chapman, J.S. Barr, and T. Lyons. Two water-rights (2395/W and 2466/W) of 7 and 2 sluiceheads respectively are also held while an application has been lodged for a further 6 sluiceheads.

Geology.

The district around Mt. Paris is occupied by two rock formations, viz. the quartzites and slates of the Cambro-Ordovician sedimentary system, and the granitic rocks of Devonian age. The quartzites and slates are the older formations and have been intruded by the granitic rocks. The granitic rocks contain numerous types, the most common of which is a coarse grained granite with large white phenocrysts of felspar. The remaining types are associated with the tin deposits and will be discussed below.

The most interesting feature of the geology and also the most important from the economic view point is that only thin layers of quartzites and slates now cover the granite, the overlying thicknesses having been removed by erosion. Where the quartzites &c. have been entirely removed, the granitic rocks are of course exposed at the surface and have been eroded to shallow depths.

The upper surface of the granite is not uniform and there is a ridge (or "cupola") of it rising above the remainder of the granite. This cupola occurs near the pinnacle of Mt. Paris and extends chiefly in an easterly direction under the range of hills referred to above. The importance of this cupola will be referred to below.

Economic Geology.

Tin deposits, particularly in Tasmania, are associated in general with granitic rocks. Further they are especially associated with the roofs of the granitic intrusions and to a less extent with the sides of the intrusions. When associated with the roofs they are found to occur in and at the top of the cupolas and Mt. Paris and adjacent regions form a fine example of this type or types of deposits.

Of great economic importance at and around Mt. Paris, is the fact that thin layers of quartzite and slates still exist above the granitic rocks of the cupola. This means that practically the whole of the deposits in the cupola are intact and a small proportion only have been removed by denudation in those localities where the cover of quartzites have been removed.

The normal porphyritic granite occurs to the south-east, south and probably south-west of the mine workings at various distances. This type is not tin-bearing and needs no further description.

The common type around the workings is a soft white rock of fine grain and containing quartz, felspar and muscovite (white mica). Actually it is a fine-grained muscovite granite, but on account of its fine grain it has been termed "aplite" and though not strictly correct usage, this term will be used for descriptive purposes. The aplite does not outcrop prominently due to its soft nature and the covering of soil and hill detritus. It has been exposed on Nos. 1, 2 and 3 adits, the open cut sluiced out and in a small open cut at the east end of Krushka's lode. The soft nature near the surface is partly, if not wholly due to the weathering agencies, and this would lead to the conclusion that it would become harder at depth. Part of the softness may be due to the nature of the rock but even under these conditions it would become harder below the zone of weathering.

The aplite contains tin ore (cassiterite) and it is also the home of numerous other formations containing richer concentrations of tin ore. Of these the most conspicuous are the hard quartz and quartz-mica greisen veins forming the Pinnacle and Appalachian lodes and numerous smaller lodes and veins. Mica greisen occurs as irregular bunches and veins in the aplite and also in association with the other types of greisen. The mica greisen is usually rich in tin ore and being soft is readily treated to extract the ore. Veins of pegmatitic quartz and reef quartz are also present. They occur as independent veins in the aplite and also in the centre of the quartz-mica greisen lodes in which they are of later origin than the greisen.

Veins of pegmatite and of decomposed felspathic material are also present, but contain little or no tin ore and need not be further considered.

Cassiterite (tin oxide) is the mineral of economic importance in the above deposits. It is generally black in colour and has a considerable range in grain size. It is coarsest in the quartz veins and the greisen (quartz) veins occurring in pieces up to $\frac{1}{2}$ " or even 1" in size. It is fine to medium in size in the mica greisen and is fine to very fine in the aplite. The only other metallic mineral present is chalcopryrite or copper pyrites. This has been more or less completely removed by oxidation and solution near the surface, and will be found to be more plentiful at depth. It is more or less restricted to the quartz

greisen veins.

The tin deposits are restricted almost entirely to the granitic rocks. On the east side of Nuggety Creek, however, narrow veins of cassiterite penetrate the overlying quartzites &c., the cassiterite being of a dull black variety.

Mine Workings.

The older mine workings consist of four adits driven in a general northerly direction, which have in recent years been numbered from top to bottom. No. 1 adit was driven to cut the Pinnacles lode. No. 2 was driven to cut the Appalachian lode and its continuation may have cut the Pinnacles lode. No. 3 adit cut Krushka's lode. It is not known if No. 4 cut any lode. The adits are connected by rises and winzes, so that ore could be transported to the mouth of No. 4 adit.

Another short adit and small open cut occur near the Pinnacle, and two open cuts exist on Krushka's lode.

The recent working consist of a large open cut sluiced out near No. 2 adit and the Appalachian lode.

The Quartz & Quartz Mica Griesen Lodes.

Several lodes of this type occur on the property and from north to south are the North or quartz lode, the Pinnacle lode, Appalachian lode and Krushka lode. There are other narrow veins which have not been named.

The Pinnacle lode has a bold outcrop at the surface some 40 to 60 feet wide, the general strike being 290° . In the No. 1 adit, numerous veins of quartz greisen were intersected, but in the aggregate do not compare in thickness with the outcrop.

The Appalachian lode has a strike of 285° . It was cut in No. 2 adit and has been exposed in the open cut recently sluiced. In the cut, the lode exhibits the irregularity in width, (both along the strike and in depth) characteristic of these lodes. It has a maximum width of 3 to 5 feet, but towards the east, the width decreases to a few inches though two wider veins appear further east. Krushka lode was cut in No. 3 adit and opened up at the surface by two open cuts. It has also been traced both to the east and west. The open cut at the surface suggests that a certain amount of the lode has been mined and treated.

The question of treating these lodes is not difficult and a crushing and concentrating plant is necessary. As mining proceeded below the oxidised zone, it would be found that chalcopyrite was also present in the ore (and possibly pyrite and arsenopyrite). Additional concentrating plant would be necessary to separate these sulphides.

The lodes are erratic in width and values and the mining would have to be arranged accordingly. Several reefs and faces would need to be kept open, so that ore could be obtained from one or more, while the narrow and poor patches in the others were being passed through. The reserves of this type of ore would not

be large and any contemplated treatment plant should be of small capacity.

The values are not uniform and not easy to determine by sampling. The results of past working would be valuable but few records are available. For the quarter ending September, 1898, it was reported however that the Appalachian Co. treated 150 tons for $1\frac{1}{2}$ tons black tin, such crushing being apparently from either the Appalachian or the Krushka lode.

The Aplite

Recent work has been devoted to sluicing the aplite and a large open cut has resulted from this work. The aplite is soft and easily broken by the hydraulic nozzle, and the tin ore is concentrated in a race. The hard quartz greisen obtained during this work is stacked for possible future treatment.

The tin ore obtained during the sluicing is derived from the aplite itself and the contained patches of mica greisen, as well as from that which falls out of the quartz greisen and quartz veins.

It is not easy to determine the outline and extent of the aplite owing to its lack of prominent outcrops. It could however be easily determined by sinking shallow shafts or trenches. It has been exposed in No. 1 adit, No. 2 adit, the recently worked open cut, No. 3 adit and a small open cut east of Krushka lode. Its boundaries at the surface will be determined generally by:

- (a) The quartzites and slates east of Nuggety Creek.
- (b) The hard granite (porphyritic) to the south of Krushka lode.
- (c) Probably hard granite to the west.
- (d) Quartzites and slates to the west and north-west of the open cut.

In general it may be said that its trend is from south to north or S.S.E. to N.N.W., its maximum length appearing to be 18 chains and width 4 to 5 chains, but the latter may be found to be greater.

As regards extension in depth, it should go down vertically in an irregular manner as regards the adjacent hard granite. It will possibly be found to extend below the quartzites on the eastern and north-western sides, and its boundaries in these directions determined by hard granite.

There are no known adjacent deposits of similar material with which it can be connected, the somewhat similar deposits at the Royal Gordon, Woods and Bessell's faces being altered granite and not aplite.

The value of the aplite and contained formations would be somewhat difficult to determine by sampling unless a large number of properly representative samples were taken. The results of the past workings should give a general idea of the content of tin ore, taking into consideration the quantity of ground treated and the tin ore recovered. It must not be assumed however that the value is uniform throughout as the number and richness of

the mica greisen and other veins &c. greatly affects the value.

The breaking of the material should offer no difficulties particularly in the early stages of development. While it is soft and can be broken with a nozzle, this would be the best and cheapest method, supplemented by the breaking of any harder portions by explosives where necessary. If, as is possible, the aplite becomes appreciably harder in depth, the methods would have to be modified somewhat.

The treatment of the material, however, requires consideration. The concentration in a race as used at present should recover a large proportion of the tin ore. However, the tin ore is not free as in alluvial deposits, and many pieces probably adhere to pieces of aplite, quartz, mica &c. These attached minerals lower the specific gravity of the pieces and may cause loss of tin ore in the tailings. Everything depends upon the actual loss in the tailings and other difficulties of concentration in a race as to whether some other method is necessary. If the sluicing can be carried out profitably despite the tailings loss, other methods may not be deemed necessary. If however, the tailings loss affects the profitable nature of the operations, then other methods of treatment will be necessary. These would have to take the form of cheap crushing to free the tin ore from aplite &c. followed by sluicing and/or mechanical methods of concentration (screens, jigs &c.).

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25th August, 1933.