

OS. 236

GOVERNMENT GEOLOGIST

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REPORT ON COX'S BIGHT TIN-FIELD.

[With one map.]

Government Geologist's Office,  
Launceston, 5th December, 1906.

SIR,

I HAVE the honour to report that, as instructed by you, I proceeded to Cox's Bight on the 31st August, and returned to Hobart on the 18th of the next month. I was accompanied by Mr. M. J. Griffin, Inspector of Mines for the Northern and Southern Division.

The country bordering on the Bight is little known, and the land outside the mountain ranges, which hem in the little strip of flat country on the sea-shore, is practically *terra incognita*.

The Bight is a broad bay on the south coast of Tasmania, 6 miles across, divided into two smaller bays by a small promontory (Point Eric), which rises to a conical summit, 160 feet above the surface of the water. The horn of the west bay is formed by the precipitous bluff range, known locally as Cox's Bluff (charted as New Harbour Bluff); that of the eastern bay is the hill range which terminates in what the fishermen call Red Point. The distance from South-West Cape is about 12 miles; and from Recherche, by water, 36 miles.

Between Catamaran, at Recherche, and the Bight the country is wholly uninhabited by man. In 1901 and 1902 Mr. T. B. Moore, under instructions from the Surveyor-General, cut and marked a track from Hastings to Cox's Bight, passing the western head of Port Davey, and his reports on same are published in the Surveyor-General's Annual Reports for 1900-1901 and 1901-1902. With reference to the Cox's Bight section of his track (between the mouth of the Old River and Point Eric), he says:—"Primary and eruptive rocks occupy the whole of this line of country. Silurian slates and schists, highly mineralised, occur in places along Bathurst Harbour, which are well worthy the attention of prospectors. At Cox's Bight a granite boss, about 1¼ mile in diameter, rises through the Silurian strata at the southern end of the

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Bathurst Range. The creeks on the east and west side of this intrusive mass have been worked in a very primitive way for alluvial tin. If a good supply of water were stored, and the old workings sluiced in a systematic way. I estimate that a far greater quantity of ore would be won than that previously obtained."

Mr. Moore's observations on the mineral characteristics of the country between Hastings and Port Davey are the only ones that have been published. It is known that as far as the New River, or the south end of the Arthur Range, the prevalent geological formations are Permian-Carboniferous sandstones and shales, and the eruptive trap-rock (diabase) of Mesozoic age. The western mineral country appears to come in at the New River, for Mr. Moore mentions limestone in that basin containing traces of copper pyrites, tetrahedrite, carbonate of copper, and galena. Thence westwards the country consists of slates, schists, and quartzites, which have been unprospected for mineral, but in which discoveries will very likely be made when the area is made accessible by the construction and maintenance of tracks. The mountain ranges preserve the usual north and south or north-west and south-east trend, terminating seawards, as a rule, in bold, lofty bluffs; and a track overland from Recherche, if anywhere near the sea, would have to reckon with these promontories. In March this year Messrs. Tyler and Harper were commissioned to go overland from Recherche to the Bight to find a route for a track. The way they went was as follows:—Cockle Creek, 2 miles past Recherche; across to South Cape, on to the beach; across Coal Mine Hill, past the old Government Huts; across South Cape Creek (by wading), up Fluted Cape (1600 feet); thence to Granite Bay and Shoemaker Point; thence to Surprise River (crossed at mouth by wading), and along beach to Tom Pretty's Point; from thence to the New River (crossed by raft); and thence to Deadman's Bay, and up the great High Bluff (3500 feet); west of this to the Louisa Plains and bay, separated from Cox's Bight by the dividing range of quartzite and schist. What time was occupied in cutting their way through to the Bight does not appear from the published account, but the return journey was made in five days, with one day's interruption by accidents and weather. They think that, with a boat at New River, a track could be made taking only three days to walk. It would seem certain, however, that a four-day track is possible.

Mr. T. B. Moore's track to Hastings is much longer, and crosses the high land at the heads of the rivers. This avoids the steep ascents of the bluffs near the sea, and secures a tolerably even grade; in fact, Mr. Moore says a railway grade can be obtained.

During my stay at the Bight we discussed the question of the route with Mr. Gaffney, and possibly might have returned overland if the weather had been better, and the old boat on the right side of the New River. For the purposes of the Bight, a track to Recherche is the one that is most needed, and although the country is rough, it has been shown that no insuperable difficulties exist. The men who are developing the resources of the State in such an isolated spot are entitled to a more certain and more easily available means of communication than is afforded by the little steamer which pays periodical visits. If the stores run out, or a conflagration takes place, or any serious accident happens during the absence of the steamer, the result may be disastrous. For such eventualities a track through to the nearest settlement is most desirable.

Between the Bight and the New River such a track would pass through schist-country, in which most probably mineral discoveries will be made. This south-west corner of the island has, owing to its inaccessibility, received no attention from prospectors. Much of it consists of barren-looking quartzite, very unpromising from a mineral point of view; but, on the other hand, granite and favourable-looking schist and slate belts exist, which it is difficult to believe are destitute of ore deposits.

Overland by Moore's track from the Bight it is not more than 7 or 8 miles to water, at the head of New Harbour Creek, which is an inlet of Big Bay, Bathurst Harbour; and if tin-mining here progresses, it may be the means of opening up the Port Davey district.

The high ranges round the Bight are partly bare, with their crests of white quartzite shining like snow, or lightly timbered on the spurs and heights, with heavy growths of myrtle, sassafras, gum, and fern in the ravines, which deeply score their sides.

The Bathurst Range rises to 2800 feet at the trigonometrical station, but a view of the latter is obscured by the nearer eminence of Foley's Pimple, the conical-looking end of a spur from the range, from which, in a series of saddles and prominences, a ridge descends to sea-level at Point Eric.

*Geology.*

The succession in the geological record at the Bight may be succinctly presented in tabular form, as under:—

RECENT.	Swamp and lagoon land at foot of terrace ground. This deposit descends to a few feet below sea-level. Terraces of tin-bearing detritus and wash at foot of mountains, from 50 feet to 150 feet above sea-level.
TERTIARY.	Terrace of clayey sand with carbonaceous material fringing foot of mountains 150 to 200 feet above sea-level.
JURA-TRIAS.	Not represented.
PERMO-CARBON-IFEROUS.	Not represented.
DEVONIAN. (?)	Biotite granite below recent terraces and exposed in mountain form from sea-level up to 600 feet. Intrusive in quartzite and schist and intersected by veins carrying tin ore with accessory molybdenite. Dyke of hornblende-lamprophyre intrusive into quartzite found as loose stones on beach at east end of Western Bay. Veins of greisenised quartz intrusive into quartzite near junction of latter with granite. Actinolite contact-rock as loose stones on beach near Sand Bluff.
SILURIAN AND ORDOVICIAN.	Not identified.
PRE-CAMBRIAN.	Quartzite of Cox's Bluff Range, Foley's Pimple, Bathurst Range, Red Point Range. Mica schist and quartzite at Point Eric. Mica schist at Black Bluff.
ALGONKIAN.* (?)	Slate and sandstone on Slate Range. Silvery mica schist on fall of range to Louisa Bay.

\* Proterozoic—of Chamberlin and Salisbury—Geology, Vol. II., pp.163-217.

The schist and quartzite belong, apparently, to the geological series between the Cambrian and the eruptive Archæan, to which American geologists have applied the term Algonkian, dividing the Pre-Cambrians into an upper series (Algonkian), dominantly sedimentary, and a lower one (Archæan), dominantly eruptive. At the Bight the quartzites and mica schists alternate so rapidly, and are so intimately connected, that it is reasonable to attribute a sedimentary origin to both. The white saccharoidal quartzite is undeniably an altered sandstone, and the schists (muscovite, sericite, and biotite) were most probably alternating stratified argillaceous beds, now reconstructed and distorted beyond recognition.

The Bight is one of the localities in which have been found the objects known as obsidianites (= Australites of Suess), or obsidian buttons, now very generally regarded as of cosmic origin. Mr. Christopher Iles informed me that he discovered some at about 100 feet above sea-level, under 2 feet of button-grass peat and on the top of 3 feet of tin-wash, the latter resting on granite rock. A feature of interest connected with this find is that the wash is unmistakably of recent (Quaternary) age. It adds another to the list of evidences pointing to the shower of meteorites being subsequent to the deposition of the Tertiary sediments in Tasmania.

Mr. Lark Macquarie, of Hobart, is said to have been the first discoverer of tin at the Bight, which he obtained from a hollow or basin in the south-east part of Section 1620, near the neck of Point Eric. After him came Robert Glover and W. H. Foley, from Port Davey. Reward sections on the western bay were granted to these in September, 1892, which were transferred to the Glover and Foley Proprietary in 1893. Messrs. Glover and Foley also worked on the eastern bay; and after them, one Meldon was at work, till Mr. J. J. Gaffney and the present company (Cox's Bight Tin Mines, N.L.) started work.

The information which I have been able to gather establishes the fact that from first to last about 120 tons of tin ore have been won from the ground at the Bight. In 1905 3 tons were shipped, and in 1906, up to the time of my visit, 4½ tons had been consigned.

Several parties hold sections here. The Cox's Bight Tin Mines are working terrace-ground overlooking the eastern bay, at the foot of the granite and quartzite range. The same company holds three terrace sections on the

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western bay, and two sections of alluvial flats bordering one of the lagoons on that bay.

Messrs. Weber, Gourlay, and Hawson are taking leases of lagoons and surrounding flat land on the same bay. Messrs. Pender and Atkins hold mountain sections, comprising the granite spur which has shed the ore into the lower ground on each side of it. They also have a section on Bourke's Creek, near the shore of East Bay. F. Pender has applied for a section west of the Black Point Range; and north and adjoining this is a section for which Mr. J. J. Gaffney is applicant. West of the latter H. Gaffney has applied for 80 acres.

From this it may be seen that the tin ore is spread over a fair extent of country, say about 3 miles from east to west, and from half a mile to a mile from north to south.

The observed granite contact with the quartzite spur of Foley's Peak runs east and west inside the north boundary of Pender and Atkins' section 1524-m, 80 acres, and continues east along the north boundary of A. D. Sligo, 1619-m, 20 acres, where it is exposed by the high-level race. To the north of this contact is the mountainous country of the back range, in which, so far, no granite has been seen. Inspector Griffin and Mr. J. J. Gaffney ascended the Bathurst Range to the trigonometrical station. From the summit an extensive view was obtained of Port Davey, the Arthur and Franklin ranges, and all the tumultuous sea of mountain country lying north and east, and concealing, doubtless, in its unexplored fastnesses, mineral deposits, which at some future date will be dragged to light and pressed into the service of man. For the present, the camp at Cox's Bight is the advanced outpost of explorers.

Between 50 and 60 miles further north-west, near Moore's Look-out, north of the Junction Range, Mr. T. B. Moore noticed the occurrence of stones of tourmaline-bearing quartz, and bearing in mind the generally linear character of our granite exposures, it would not be surprising to find granite outcropping somewhere between these two points. Wherever it may be found on this line, I think it is highly probable that it will be found to be tin-bearing. This likelihood should be borne in mind by prospectors. Even where the granite does not crop out visibly it may possibly have risen to no great distance below the present surface, and sent out tin-bearing veins into the overlying or surrounding schists. Taking this into account, and also the copper and antimony ores which

have been found in the Port Davey District, it is possible that the south-western portion of the island may eventually rank as a substantial contributor to the mineral output of the State.

*Cox's Bight Tin Mines, No Liability.*

This company's operations are on the following sections (charted in the name of A. D. Sligo):—1290-m, 40 acres; 1291-m, 40 acres; 1292-m, 40 acres; 1619-m, 20 acres; 1620-m, 40 acres; 1613-m, 60 acres (now forfeited); 1614-m, 80 acres; 1612-m, 40 acres; 1796-m, 76 acres; 1797-m, 80 acres; and more land has been applied for north-east of the eastern sections.

At the time of my visit work was being carried on at two faces, Meldon's and Gaffney's, on sections 1292-m and 1620-m.

These faces are in a flat terrace of wash, from 40 to 150 feet above sea-level, composed largely of stones of quartz, quartzite, and granite, and up to 15 feet deep, the waste of the adjoining hills. Meldon's face is the upper one, and is about 3 chains in length, with 7 to 10 feet of wash, the lower 3 or 4 feet being the best. This face was worked in the old time by Glover and Foley; then by Meldon; then by Gaffney.

I was informed by Messrs. Gaffney and Heise that a measured 1200 cubic yards turned out 24 bags of ore in May last, which is equivalent to  $2\frac{1}{2}$  lbs. tin ore per cubic yard. Prospects washed by Inspector Griffin were equivalent to 5 lbs. per cubic yard. Four men are employed in this face, which is yielding about  $1\frac{1}{4}$  tons per month. The bulk of the tin has always been got from this section, and it is still the best ground. It is at the foot of the granite spur, and was favourably situated for receiving the tin-drift from the mountain. The stone in this terrace-wash is heavy, interspersed with sand at intervals, in small quantity.

Owing to the quantity of stones the wash looks at the first glance unpromising, but its tin contents are undeniable, and it has always yielded more tin than its prospects.

The terrace being near the foot of the hills the stones are not so much waterworn as those which compose terraces nearer the coast. The tin ore is in fair-sized grains, generally black in colour, sometimes grey, and also resin-coloured. A nugget weighing 2 ozs. was shown to me. The largest which Mr. Gaffney has seen has weighed a quarter of a lb., but they have been reported as heavy as 7 or 8 lbs. Smoky quartz crystals have been observed, but no

gems; and tourmaline seems to be absent. A few specks of molybdenite were noticed by Inspector Griffin in a small quartz vein traversing the granite on the high spur.

The water for hydraulicing Meldon's face is brought from Bell's and Cox's Creek, in a race about a mile long. The length of column is 300 feet, and about 3 sluiceheads of water were being used, with a 2-inch nozzle. I understand that last year there was plenty of water, except for five weeks in the middle of summer, and that after rain 5 sluiceheads can be got. To pick up additional water it would be necessary to extend this high-level race (which is 230 feet above the brow of the face) nearly another mile, to Bourke's Creek, which would give twice the present quantity of water, and probably make up the total to sufficient for an uninterrupted supply all the year round.

Gaffney's face is in the terrace inside the north-east angle of section 1620-m. It is about 45 feet in length, with a bed of wash averaging 6 feet in depth. The face itself is 10 or 11 feet deep to the granite bedrock. At present the wash consists of large stones of quartzite, but sand occurs at times. This face is yielding fairly well, though the contents are not so rich as the upper one. It is served with water brought from the lower race, which has its intake on Luttrell's Creek.

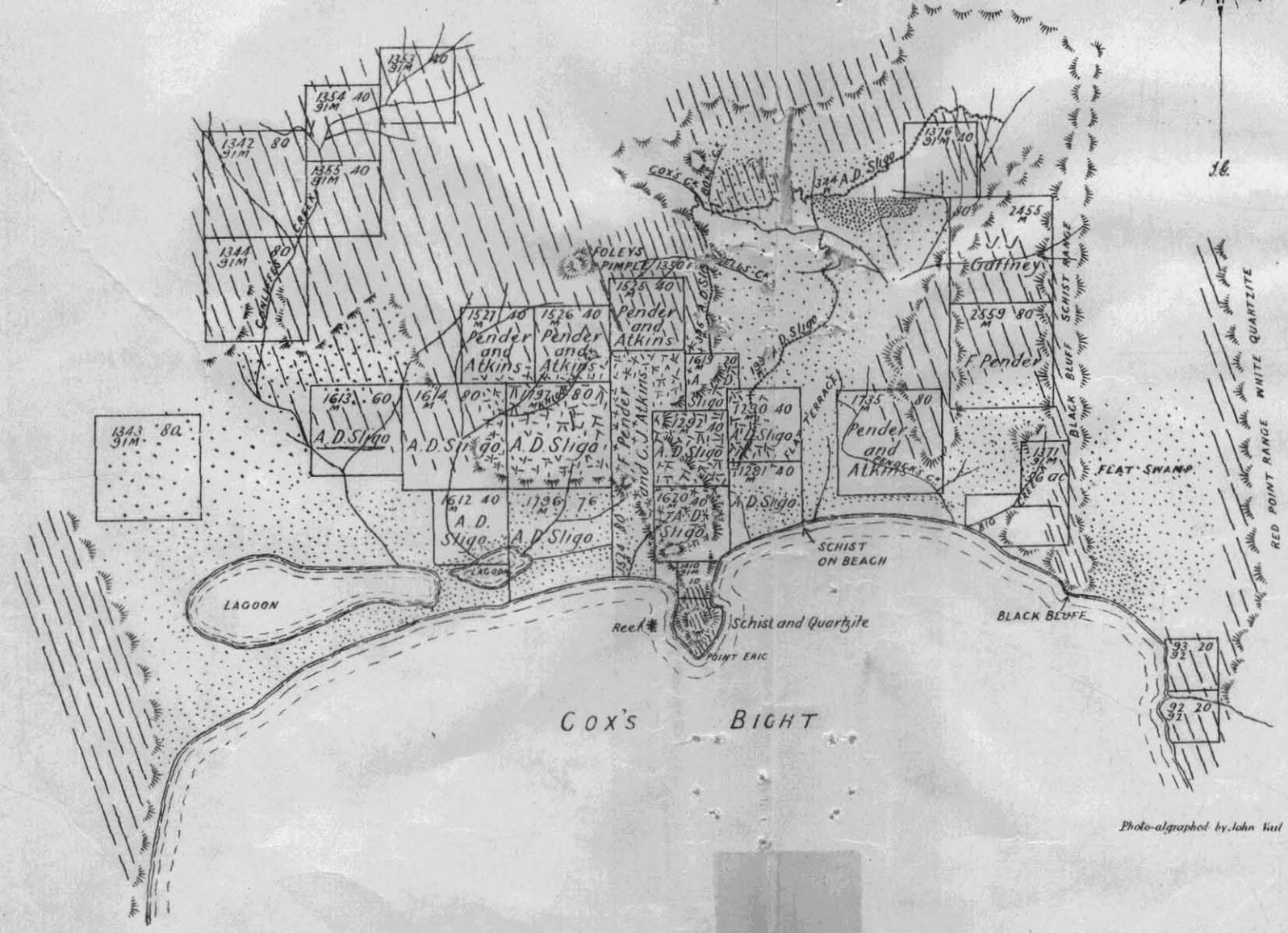
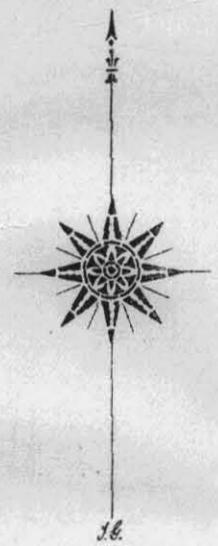
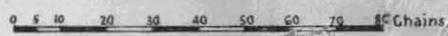
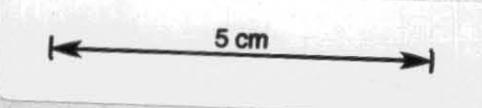
East of this are faces near the brow of the terrace, facing the sea, between 40 and 50 feet above the swamp, now idle.

A. is a small face on the edge of the terrace; 2 chains north-east from it is B. face. C. face is 2 chains north of B. face. D. face is 1 1/2 chains north-west of A. face. The terrace edge is 650 feet from the beach, and its level surface extends back for 1/2-mile to 1 mile to the foot of the mountains, covered with button-grass, which conceals from 5 to 18 feet of quartzite wash, resting, at any rate in its western part, on granite bedrock.

The section downwards in B. face is 10 feet of large wash, resting on a layer of carbonaceous matter, with decayed timber, below which are 5 feet of wash, lying on the granite. The upper 10 feet carry coarse tin (Messrs. Castle and Heise obtained over 7 lbs. to the cubic yard); the lower wash is poor and patchy. C. face has wash varying from 2 to 8 feet, with fair tin. In D. face the wash is tight—5 or 6 feet of large stones and feathers out to the south. Variable tin prospects have been got from this. Three holes have been put down further west in 6 or 7 feet of wash, with moderate to poor results. Inspector Griffin got good results from Meldon's

# VICINITY OF COXS BIGHT

Scale 20 Chains to 1 Inch.



### REFERENCE.

-  Granite
-  Schist and Quartzite and Slate.
-  Alluvial.
-  Tertiary Alluvial.

W.H. Twelvetrees  
Government Geologist  
December 1906.

shaft. This flat button-grass terrace of wash extends all over Section 1290, and over half of 1291 and 1292. The eastern part of this area has not been prospected. The wash, which is exposed wherever the peaty covering has been removed, is nearly entirely quartzite towards the extreme east, and quartzite mixed with granite in the central and western part. The bedrock over the whole area is probably granite. It is undoubtedly granite on Section 1619, on 1292, and on 1291, where the bottom is exposed in the faces on the brow of the terrace. This fact largely increases the possible area of granite whence tin ore may be derived, adding considerably to the granite area exposed above surface. This flat terrace-land extends over, approximately, 80 acres, of which perhaps 50 acres has been ascertained by prospect-holes, &c., to be tin-bearing. Nothing definite appears to be known as to the character of the balance of the ground, but there is every reason to believe that it will be stanniferous, though being further from the mountain it may not carry such heavy tin as the wash near the foot of the hills.

The timbered gully coming down from the granite ridge west of the present main workings has yielded the best prospects on the whole field, and is in an ideal position for collecting the sheddings of tin ore from the ridge. The terraces west of the Main Creek are shallow, up to 3 feet of wash, but give good prospects, and offer every inducement for extending the high-level race, and dealing with them.

Information has been submitted to me showing that Mr. H. Castle and the company's manager, Mr. F. Heise, took 39 measured samples, within an area of 50 acres, from wash averaging  $6\frac{1}{2}$  feet deep, which gave an average return of 2 lbs. 3 ozs. tin ore per cubic yard. In addition to this, 1215 cubic yards on Meldon's face, 12 feet deep and 5 chains wide, gave 2 lbs. 3 ozs. per cubic yard.

Before beginning to sluice, the face was sampled for 1 lb. 5 ozs. per cubic yard, so the actual yield proved much better than anticipated. The samples above referred to went as high as 7 lbs. 5 ozs. per cubic yard, and as low as  $4\frac{1}{2}$  ozs. to the yard. Inspector Griffin got 2 ozs. to the dish, or 5 lbs. to the yard, from the upper face, so undoubtedly high values occur. The work of sampling the area so as to form an accurate calculation of the tin contents is not within the sphere of my duties, but putting together the results of my examination and the information supplied, I should be disposed to agree that the whole

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50 acres might be estimated at between 1 and 2 lbs. per yard; perhaps fully the latter quantity for the part now being worked, and somewhat less for the eastern margin of the sections.

With the present price of tin, this ground should be highly payable, even taking into account somewhat higher working costs than ordinary, entailed by the remote position of the field and imperfect shipping facilities.

In addition to the upper terrace there is a lower flat of swamp land 2 or 3 yards above sea-level, on the southern half of the Section 1291-m, about 9 chains wide from north to south. Very little is known of its value for tin. Three holes have been sunk in it at the foot of the terrace; one was sunk to the granite bottom through 6 feet of peat and 7½ feet of wash-dirt, poor in tin. Mr. Gaffney sank another shaft through 7 feet of peat and 7 feet of wash, which carried a little tin all the way down. No. 3 hole was sunk to 16 feet in the line of the creek. I was told that wash was met with at 14 feet, but not payable.

One must be prepared for some difference in the contents of this swamp, as compared with the deposit in the higher terrace. The brow of the terrace evidently marks an old shore-line, and the swamp-ground has only been above sea-water during a comparatively recent period. It is now only 6 to 8 feet above high-water mark, which does not allow any great lapse of time for the accumulation of ore since it was raised above the waves. Before the elevation of the land the tin would tend to be scattered by the action of the waves, and the wash distributed over a somewhat wide area, and consequently not likely to be so rich in tin as the heavier wash, which has been accumulating on the terraces for a much longer time. It is possible, however, that in places a fair quantity of mineral may have collected. The flat cannot be prospected by hole-sinking, owing to water. Systematic trials by boring should be instituted, and the value of the ground ascertained; but it would also be well to consider whether this area is not too limited to warrant the expenditure required for equipping dredging-plant.

The company has not done anything to its sections on the western bay. Meldon's old workings are in the south-west corner of Section 1797-m, in a small narrow gully in the granite foot-hills. His tailrace runs down to the swamp on Section 1612-m. The wash is 6 feet deep, and consists of large stones of white mica, granite, and quartz, the latter predominating. I was told that 18 cwt.

of tin ore has been won from here. Glover's old workings are on the adjoining section to the west, 1614-m. A strip up the gully for 3 or 4 chains has been worked, and I understand 10 tons of tin-ore were obtained. The body of wash in the gully is 20 to 25 feet wide, and has been worked down to a depth of 8 to 10 feet, but not bottomed. It is composed of large stones and boulders of quartz, quartzite, and granite, and is altogether the largest deposit of heavy wash on the western sections. Nice prospects of coarse tin can be got here, some of the tin adhering to quartz. Below the false bottom Mr. H. Castle ascertained there are 5 feet of wash, prospecting 2 ozs. to the dish.

The granite is exposed in the banks of this creek; to the west of it the quartzites come in. The granite hills come down to Meldon's and Glover's workings, and then, with the exception of a low knob of granite protruding through the swamp 5 or 6 chains north of the small lagoon, the bedrock to the south all over Sections 1612-m and 1796-m is concealed below an alluvial plain or swamp.

About 100 yards below Glover's workings a hole has been put down in the plain, 10 feet deep, without bottoming. The drift showed a little tin.

Irregular prospects, some good, some poor, were obtained from 2 shafts, 16 feet and 17 feet, on this plain. No bottom was reached, owing to water.

In Section 1613-m, further west, a hole was sunk 12 feet, but no tin obtained; and I believe no granite has been found on that section. The section appears to be well within the quartzite area.

A granite bottom most probably underlies in Section 1796-m, and a part of the adjoining one to the west. A portion of a small lagoon lies within the boundaries of these two sections. This flat, swampy land can only be dealt with satisfactorily by dredging, prior to which it must be well prospected with boring rods. The whole of the granite waste from the western side of the dividing spur has been shed into this low ground, which is only a very few feet above sea-level, and it would be very surprising if tin were not found. While the distribution of the ore may be rather widely spread, there are probably special channels in the drift which could be located by boring. The good results obtained on the higher ground by Glover and Meldon indicate that much tin must have found its way into the flat.

Work on the two upper sections will have to be by sluicing. Whether the creeks can give a continuous

adequate supply of water is doubtful. The supply, however, could be supplemented by pumping from the lagoon.

Looking at this company's property, as a whole, there is no doubt that the decision to start on the eastern sections has been a wise one, for a fair area of payable ground is being worked, and a considerable extent of promising ground is ready for testing. As regards landing plant, this is not impossible in favourable weather if a landing-terrace is cut in the sea-wall at Point Eric, and hoisting machinery used; but the sea is very uncertain, and the weather would have to be watched. Tin ore in bags is at present carried to the steamer by boat through the surf. If operations are carried on here on a large scale, doubtless in course of time Bathurst Harbour will be utilised.

*Kent Tin Prospecting Association.*

This association has been formed to develop 370 acres on the west bay, viz., four 80 and two 25-acre sections, applied for in the names of Messrs. Weber, Gourlay, and Hawson. Two lagoons are situated on the property within a very few feet of sea-level. The western, or large lagoon, extends for the length of two 80-acre sections as far west as the range of Cox's Bluff, which closes in the bay in that direction. The land all round these lagoons is a swampy button-grass flat, separated from the sea-beach by a few chains of dune-sand, covered with thick ti-tree scrub, which forms a kind of bar, damming back the fresh water of the swamps. A creek, however, issues from the lagoon, and flows into the sea.

This large flat receives the drainage of the high ground on the north and north-east. Every creek which comes down from the hills carries tin, and must have been shedding ore slowly into this shallow basin for ages. The terrace-ground on this side of the dividing range runs a little farther back from the sea than on the eastern bay, and the swampy area is therefore larger. The flats in the neighbourhood of the lagoons have not been bottomed on account of water, which consequently prevents sampling before boring rods are on the spot. Prospects taken haphazard from the unbottomed drift are valueless. Below the surface peat a white sand-drift appears to prevail, and a little fine tin has been obtained from prospects. It was in another part of this large stretch of flat, swampy ground that two holes were sunk by Mr. Gaffney and the company to 16 and 17 feet without bottoming, but yielding tin from

$\frac{1}{4}$  oz. to  $2\frac{1}{2}$  ozs. per dish, so that the swamp has been definitely shown to have formed a reservoir or collecting-place for ore, which was only to be expected in view of its position.

This flat ground occupies all the area which the Kent Syndicate intends to hold, and on it is a part of the small lagoon, and the whole of the large lagoon, mentioned above. The depth of the latter has not been ascertained, but Mr. Weber judges that there are from 6 to 8 feet of water in it. Some fine tin has been found in creek sand further west, at the base of the Cox's Bluff Range. This has either been derived from veins in the quartzite, of which that range is composed, or is the remnant from a larger deposit of drift covering the plain in old times.

The plain, certainly, has been below the sea in recent time, geologically, and the tin is probably distributed through the area pretty widely, though the extreme western portion is likely to be the poorer part, being most distant from the granite hills.

In the hilly quartzite country, north of the Kent ground, are the abandoned Conliffe's Creek sections, extending a couple of miles inland to the headwaters of that creek. That area is all quartzite, and it is not probable that much tin will be found in it.

The first thing for the Kent P.A. to do is to prove its ground by boring, as there is too much water for shaft-sinking. Wherever shaft-sinking is possible, shafts should be sunk. Although more costly than boring, yet with them there is much less chance of being misled; but owing to the water the boring rods will be necessary in most cases in this flat. The whole of the contents of the bores must be carefully gauged in a measured box, and the tin weighed, and great care expended on the entire operation, as it will form the basis of all calculations. Tubed bore-holes, 1 chain apart (or a less distance whenever a channel is found to exist), in every direction would test the ground very thoroughly. Towards the western end bore-holes at each 100 feet would suffice. The depth is unknown, but I should think that it would be somewhere between 20 and 40 feet at most. With the results from these bores the owners would be in a position to calculate the value per yard to a nicety. This preliminary work is absolutely necessary prior to placing machinery on the property.

The bottom of the deposit is probably at sea-level, or below it, and the conditions require elevation of material and water. This, and the frequent removal of plant,

indicate the adoption of hydraulic dredging, if the water difficulty can be overcome.

Landing and shipping in the western bay can only be effected from the beach, but the property is only distant 7 or 8 miles from Port Davey waters.

*Pender and Atkins' Sections.*

These are 1534M, 80 acres; 1525M, 40 acres; 1526M, 40 acres; 1527M, 40 acres (on the west bay); and 1735M, 80 acres on the east bay.

Of the above, the 80-acre section is, perhaps, the most important, as it is nearly entirely composed of granite, and contains the spur traversed by the quartz veins which have shed most of the tin ore into the adjoining properties.

The spur or ridge rises from the sea in a succession of rocky knobs to a height of 600 feet, when the granite junctions with the quartzite inside the northern boundary of the section. At the junction, white mica appears in the veins of quartz, which are partly greisenised.

At about 800 feet above sea-level, west of the north-west corner of the section greisenised quartz veins occur in quartzite, and in this neighbourhood a white quartz reef in quartzite country 2 feet in width, barren and massive, courses N. 45° W. to the west boundary of the section. Still higher up, on Section 1525, is a large reef of quartz, with a north-east strike, and further west another broad outcrop of white quartz, with a north-west strike, traverses the same country rock.

These reefs in quartzite and the greisenised veins in the same country rock are important, as showing that lodes have passed from granite into the surrounding country. Such may explain some of the occurrences that have been noted in this field, of alluvial tin in creeks flowing over quartzite and schist country. Heavy tin has undoubtedly been shed from Pender and Atkins' sections into the properties on either side of the ridge, and it seems that this tin has been derived mainly, if not entirely, from veins, and not from the granite matrix itself.

The characteristic mica is magnesian, and there are no stock-works or extensive alterations of the granite in the form of stanniferous formations; but the quantity of tin found in the wash at the foot of the hills points to the existence of rich veins as yet undiscovered. The southern part of Section 1524-M descends to the alluvial ground near the sea on the western bay, which may have received a fair quantity of tin ore from the range.

Unfortunately, there is the difficulty of absence of water, which probably could be remedied by pumping supplies from the lagoons if all the sections were in the same hands.

The Sections 1527-m and 1526-m would appear to have been taken up mainly for position, as the granite is exposed only along their south boundaries. It is possible, however, that greisen veins in the quartzite may be tin-bearing. The sections have not been explored. They occupy the high hilly ground at the back of the Cox's Bight Tin Mines sections, and search might be made along the southern boundaries for tin veins at or near the granite junction, especially as the gullies coming down from them carry tin.

There is a mineral lease, 1735-m, 80 acres, on the east bay, in the name of F. Pender and C. Atkins, on which a little work has been done. The southern part of this is flat, swampy ground, a part of the low alluvial plain mentioned on the Cox's Bight Tin Mines section. This ground has not been bottomed, and will probably be found to carry fine tin. It is from 8 to 10 chains in width, and is only 2 or 3 yards above sea-level. The extent of this ground on the section is, however, limited. To the north of the creek is a hill range composed of quartzite and slate, with a strike a little west of north, dipping south-west. On the crest, brown slate is observed, crossed by east and west veins of barren quartz. Large quantities of white quartz stones are scattered over the surface of this hill. At the summit is also a vein of white vitreous-looking quartz, 1 foot wide, crossing the country east and west in soft brown laminated and jointed sandstone. This rock may possibly be a softened quartzite. At any rate, it belongs to the same series as the quartzites and schists. Further east is a parallel lode of white jointed quartz, striking N. 80° W., without any trace of mineral. This hilly ground deserves prospecting for copper lodes. The quartz, which is strewn about everywhere, has not a very favourable aspect, but mineral may eventually be found in some of the veins.

*Section 2559-m, 80 acres—F. Pender, Applicant.*

This is north-east of the preceding, and is situate in the foot-hills between the quartzite and slate range on the west, and the Black Point schist range on the east.

On this section, too, there is a lot of loose quartz scattered about. Beyond a little prospecting, no work seems to have been done, but I was told that some tin

prospects had been got out. In the south-east angle, east of the creek, a strong east and west quartz reef is marked off by a line of loose quartz. The stone is white, and mineral is not visible in it.

*Section 2455-M, 80 acres—J. J. Gaffney, Applicant.*

This is on the same hill ranges as the section to the south, 2559-M, and shows similar quartz detritus. It is a section which invites prospecting for lodes in the same way as F. Pender's.

*Gourlay and Tolman's Creeks Claims.*

This ground, situate north of the preceding, is watered by Gourlay's, Tolman's, and Bourke's creeks. These join and form a large creek, eventually flowing through Pender and Atkins' section, further south. Some prospecting has been done on it by Mr. Weber.

The works on Tolman's Creek show excavations down to about 6 feet, exposing 3 feet of turf, 9 inches of small tin-bearing wash, and 2 feet of heavy wash, resting on soft, brown, and bleached slate. The strike of the country here is N. 50° W., with dip to the west. A little tin has been won. This is on Mr. Weber's prospecting area. Better ore is obtained higher up the creek, where the wash, consisting of angular quartz and slate debris gives good prospects. The observed strike of the slate was N. 20° W., and dip, as usual, to west.

Bourke's Creek, a little further east, is too full of boulders and large stones to be worked, consequently Tolman's may be said to be the most easterly creek that has been worked, though, as mentioned above, tin has been found on Section 2559, and even as far east as the base of the Red Point Range.

There are two ways in which the presence of tin on the slate and quartzite bedrock in this part of the field may be accounted for. Some of it may be directly derived from veins which have penetrated the country rock, and some have survived from a former (Tertiary) covering of drift, vestiges of which still remain to the west of these creeks in the form of a high terrace clinging to the base of the mountain.

*Section 2456-M, 80 acres—H. Gaffney and Jones, Applicants*

The ground on this section west of the Big Creek was worked by Tolman. Heavy quartzite wash exists

for 8 feet below the peaty grass surface, but it has not been bottomed. The wash consists of flat, rolled stones, mixed with sand, and has been worked for a width of some 13 feet, and 60 feet in length. Near the edge of the workings is a 10-foot hole, also not bottomed, showing stones of quartzite all through.

In the northern and north-western portion of this section is a terrace of sandy clay raised to about 200 feet above sea-level, and some 40 feet above the other terrace-ground.

A creek east of Luttrell's Creek has cut down into this drift, which gives prospects of fine and coarse tin. The drift is a soft brown deposit, with a little carbonaceous matter in it, and is apparently a terrace of Tertiary age. From this we learn that the uplift of the shore-line shown by the lower terrace has not been the only one which has taken place here. Mr. Gaffney sank a shaft 15 feet in this deposit while I was at the Bight, and obtained a few prospects of tin, but when the boring rods are on the property a few holes should be put down on this terrace, for there may be runs of tin in it which would pay to work. Sinking holes at haphazard would be of no use, as valuable gutters might easily be missed. There are some possibilities here, as this fringing terrace is distinct in age from that of the granite terrace lower down. Luttrell's creek, to the west of this, is a narrow creek, with steep banks, and must have cut its channel in soft material, possibly the same Tertiary deposit. The ground between here and the Cox's Bight T.M. properties further west, is the lower-terrace ground, covered with quartzite detritus. It has not been prospected, and little is known of its capabilities. It should receive whatever tin is shed from veins in the quartzite range.

#### *Black Point.*

The mica schist range terminates on the sea-coast as a precipitous bluff, running north and south. Tin is said to have been found on this range on the vacant 56-acre section, 1371-91m, and again, further north, to the east of Section 2455-m. At the bluff itself, on the sea-front, there is a pyritic quartz vein in the schist a few inches in width. Some of the pyrites is arsenical. An assay of the stone by Mr. W. F. Ward, the Government Analyst, yielded the following result:—Gold, trace; silver, 8 dwts. per ton.

This, and the slate range to the west, would appear to be more favourable for the discovery of silver or copper veins than the harder quartzites, but prospecting has been

so limited that the potentialities of these mountains can hardly be gauged at present.

Further south-east are the two old gold Reward sections, granted to Messrs. Brakespeare and Brice, but indications of mineral upon them are not known.

#### CONCLUSION.

Reviewing the district as a whole, there is no doubt that its present value is due to the output of tin ore, which is proceeding steadily on a limited scale. With respect to this mineral, the field is not likely ever to be one of more than moderate dimensions, as the exposure of granite is not large. The extent of terrace-ground fringing the base of the mountains is known and easily measured, and the area of lagoon and swamp ground is clearly defined. The nature of these areas has been outlined in this report. The sections taken up by the various associations cover, approximately, the tin-bearing ground at the Bight, so that we have there a compact proposition parcelled out among a few owners, some of whom, with proper management and adequate capital, will probably find their venture payable. The Cox's Bight Tin Mines Company ought certainly to do so, for the extensive tests made in different parts of the area by Messrs. Castle and Heise indicate a valuable property. The Kent Tin P.A. has not yet proved its property sufficiently to enable a forecast to be made.

Meanwhile much interest attaches to the work going on there, for success means the extension of exploration northwards and eastwards into practically virgin mineral country. If granite is found further north, tin will most probably accompany it; but irrespective of granite exposures, the ancient schists of this part of the island are likely depositories of copper and antimony ores, and from the scattered indications which have been found hitherto it is possible that when the country is better known discoveries of value will be made.

I have the honour to be,

Sir,

Your obedient Servant,

W. H. TWELVETREES,  
Government Geologist.

W. H. WALLACE, Esq.,  
Secretary for Mines, Hobart