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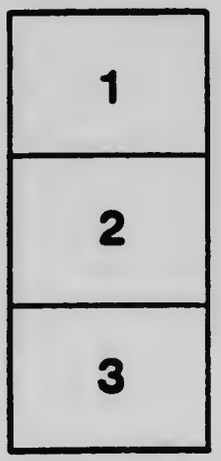

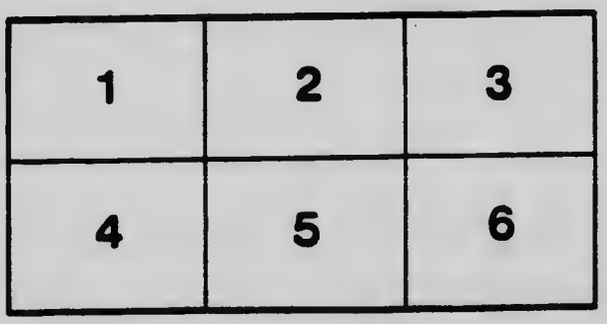

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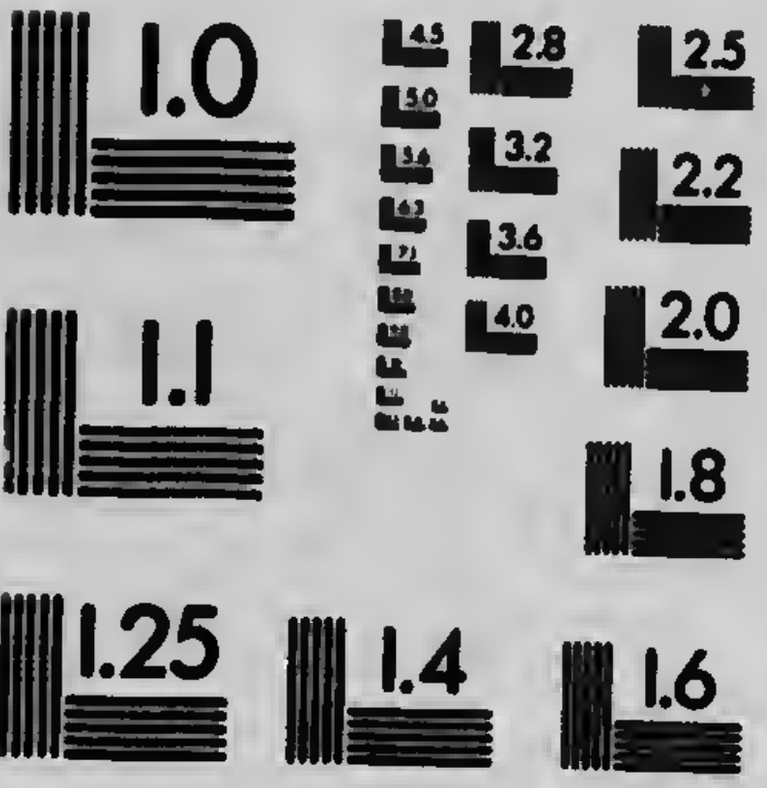

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PROVINCIAL BUREAU OF MINES.

BULLETIN No. 1, 1908.

MINERAL LOCATIONS ON MORESBY ISLAND,

—ONE OF THE—

QUEEN CHARLOTTE ISLANDS,

—BY—

WM. FLEET ROBERTSON,
Provincial Mineralogist.

QUEEN CHARLOTTE ISLANDS.

REPORT BY WM. FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

The Queen Charlotte group of islands lies between the 52nd and 54th degrees of north latitude and about 85 miles westward of the mainland, at the mouth of the Skeena river. The distance from these islands to the nearest of those islands lying adjacent to the coast of the mainland is from 60 to 70 miles across an open stretch of water—Hecate straits—sufficiently open to the Pacific ocean to share its waves and winds, and which has proved enough of a barrier to prevent much intercourse by small boats between these islands and the mainland, while, until within the past year, communication by steamer was only to be had once a month. These islands, so commandingly situated off the main coast, have therefore remained sufficiently *terra incognita* to stimulate the imagination and create much interest.

In the earlier days the Queen Charlotte Islands were peopled by the Haida Indians—the finest and most warlike tribe in British Columbia—whose raids and incursions into the districts of the mainland and Georgia straits, with, in many cases, the decimation of the tribes in these districts, forms an important part of the Indian history of the province. The warlike character of the Haidas, coupled with the remote and insular position of the district, has undoubtedly deterred prospecting or any very close investigation, as is evidenced by the fact that the islands are to-day practically uncharted, save in a very approximate way.

The outline of the west coast of the islands, as shown on the Admiralty charts, is from a rough survey made by Vancouver in 1793, while cruising along the coast in a sailing ship. The east coast line is a little more accurately marked, as this was investigated in 1878 by the late Dr. G. M. Dawson, of the Geological Survey, who made a rough reconnaissance survey, the comparative accuracy of which, though a tribute to that wonderful explorer, still leaves much to be desired.

HISTORICAL.

The early voyages of discovery to the vicinity of the Queen Charlotte islands, and in fact the entire northern Pacific coast, were all in search of a supposed northern passage for vessels from the Atlantic to the Pacific ocean—in other words, a short waterway from Europe to China.

As early as 1592 the Spanish Viceroy of Mexico fitted out an expedition for this purpose under Juan de Fuca, who sailed as far north as Vancouver island, although it is not known that he ever reached the Queen Charlotte islands.

In 1639 the Court of Spain appointed Bartholemew de Fonte to command a squadron, fitted out in Peru, which sailed in 1640. In June, 1640, he records entering an archipelago of very many islands, called by him St. Lazarus, in latitude N.53°—the latitude of the centre of the Queen Charlotte group—and that he sailed for many leagues through intricate channels between islands. These may have been the Queen Charlotte islands, but some doubt has been entertained as to the accuracy of both these early voyagers.

In 1774, Juan Perez, in the Spanish corvette "Santiago," saw and named the north cape of Queen Charlotte islands Cape de S. Margarita, but, finding no anchorage, did not land.

In 1775, another Spanish expedition, under Bodega and Maurelle, coasted along the shores of the islands but did not land.

In 1787, Dixon, in the British ship "Queen Charlotte," spent over a month on the coast of the islands, tracing the west coast from the north to the south end and sailing up the east

coast as far as as Gumshewa inlet, and named the group of islands after his ship. He traded with the Indians, buying furs, etc., the real object of his voyage.

During the next few years the islands were frequently visited by fur traders in British, French, Spanish and American vessels.

In 1792, Capt. George Vancouver, in H.M.S. "Discovery," arrived on the west coast of America, and during the next three years was engaged in a series of surveys and explorations which to-day form the basis of our present charts of the west coast of these islands.

Attention seems to have been withdrawn from the islands with the abandonment of the search for the "North-West Passage," until 1852, when H.M.S. "Thetis" visited the islands on a surveying expedition, followed, in 1853, by H.M.S. "Virago," and by H.M.S. "Alert" in 1860.

"In 1852, the Hudson Bay Company despatched a party of men in the brig 'Una,' Captain Mitchell, to discover the locality from which several specimens of gold had been brought by the Indians. This was found to be on Gold harbour, in Kuper inlet, on the western coast of Moresby island. The gold was found in a small irregular veirl, which soon proved to 'run out' in every direction. The quantity of gold obtained by the expedition was considerable, but has been variously stated. The enterprise was soon abandoned, but the discovery for a time created quite a *furore*—the first gold excitement in British Columbia—and the locality was visited by a number of miners, but with no further success."

As to the amount of gold actually obtained in this first expedition, no very authentic data is obtainable; tradition makes it very large, but Major Downie, mentioned further on, who visited the locality a few years later on a similar errand, places the amount at $5,000.

In 1859, Major William Downie, a miner, with a party of 27, in a schooner, under Capt. Robinson, went to Gold harbour, and he records in his book "Hunting for Gold" that the party found quartz but no amount of gold. They "examined the spot where a large quantity of gold had been taken out some time before, but could not find anything worth working." Major Downie, however, reports that he found coal on Skidegate inlet, and he is the first to have mentioned its existence on the islands. He, however, did not follow up his discovery, but soon left for the mainland.

"About this time a Capt. Torrens also went with a party to prospect on the Queen Charlotte islands, and narrowly escaped massacre by the Skidegate Indians."

In 1862 the "Queen Charlotte Mining Company" was formed in Victoria, and a party of men under Mr. Francis Poole—an Englishman, claiming to be a mining engineer—was sent north, landing on Skincuttle island in the inlet of that name, on which island and the adjoining island, Burnaby, they remained until 1864, engaged in prospecting. Their prospect shafts, etc., are still visible to-day and have been re-staked by present-day prospectors, more, it seems, on their historic fame than on the amount of mineral visible. Mr Poole gives an account of his expedition in a book, "Queen Charlotte Islands," published in London in 1872.

As far as is known, this constitutes the sum of the recorded early prospecting ventures on the Queen Charlotte islands. That there have been some unrecorded ventures is evidenced by the fact that at Copper bay, some nine or ten miles south of the Sand Spit, there is the remains of an old shaft, now being unwatered and cleared out, which has been proved to be at least 100 feet deep, and of which there is no record. Even traders who have frequented the islands for 25 years say the Indians know nothing of its origin or by whom the work was done; a tree, growing on an old dump, would indicate that it was over 40 years ago.

Despite the fact that the early prospectors had all found enough to indicate the probability of extensive mineralisation on the islands, for many years these early discoveries were not followed up and little or no serious prospecting took place. It was only when attention was

focussed on this northern part of the coast, by the location therein of the terminus of a trans-continental railway, that the Queen Charlotte islands again received attention from the prospector, and the more valuable discoveries that have been made have been all located within the last two years, many within the past year. Consequently, it is not to be wondered at that, up to the present, little more than very meagre development work has been done on the various claims recorded. In addition to this fact, the area found to contain mineral is so extensive that prospectors, having performed sufficient work on their respective claims to hold them for the year, have stopped at that and spent their time in trying to locate further mineral deposits.

As a result, it was found on examination that, with one or two exceptions, there were to be seen only surface prospects, of which no very definite future can be foretold; the most that can be done is to point out the probabilities from such indications as have been disclosed.

As was natural, when prospecting was resumed, it began in the vicinity of the indications found many years ago, and has proceeded along the "line of least resistance," that is, in the direction from the initial point which could most easily and safely be reached by small boats.

Skincuttle inlet was the starting point, and the majority of the claims so far staked have been in the bays or harbours opening off this inlet, viz., Huston harbour, Harriet harbour, Ikeda bay and Collison bay, with a few, and, at present, not so important localities farther south.

From Skincuttle inlet prospecting continued north, and some important locations have been made along the east coast from Klunkwoi bay to Gumshewa inlet, in a formation quite different from that found in the vicinity of Skincuttle inlet. As yet, all the locations have been made close to the sea shore, within distances that could be reached in a day from a boat.

The formation, which has been found copper-bearing, at Klunkwoi and Gumshewa bays, appears to continue N.W., parallel to the length of the island, and is again found on the north end of Moresby island, on Skidegate channel, between the Narrows, where also it is impregnated with copper, but whether the metal is here in commercial quantities has not yet been demonstrated.

Geological Observations.

The first geological examination made of the Queen Charlotte islands was in 1872, when Mr. James Richardson, of the Canadian Geological Survey, visited certain coal mines on Skidegate inlet. Mr. Richardson's time was limited to a few days and his examination did not extend beyond the vicinity of Skidegate inlet.

In 1878, Dr. George M. Dawson made an examination of the east coast of the main islands the full text of his report may be found in the Report of the Geological Survey of Canada for 1878-9. The following extract from Dr. Dawson's Report bears upon the geology of Moresby island:—

"The mountainous axis of the Queen Charlotte islands, from Cape St. James to Skidegate channel (Moresby island), and probably still farther northward as far as Hippa island, is composed of a mass of much disturbed, and in some places highly altered, rocks, which have at first sight an appearance of great antiquity, but are found on closer inspection to owe this appearance to the inclusion of great masses of easily altered contemporaneous volcanic material, and to the fact that they have been subjected to an extreme of flexure and disturbance which very frequently takes the character of actual fracture and displacement, as has been observed elsewhere on the Pacific coast. To work out the intricacies of these older rocks, which may be looked on as the nucleus of the islands, would be a work of time and would involve much patient labour.

"In a preceding report on British Columbia it has been found necessary to include for the present the Palæozoic and Triassic rocks under a single heading. They lie together, unconformably, beneath well-characterised Cretaceous beds, but are so much involved that no

attempt has been made to separate them except locally. In the southern part of the interior of British Columbia both Carboniferous and Triassic fossils have been found among these older rocks, but no forms of greater antiquity. In the Queen Charlotte Islands, now reported on, fossils have been discovered in the rocks unconformably underlying the Cretaceous in a number of places. These serve to characterise a certain zone of argillites and limestones, which is frequently repeated in sections along different parts of the coast, as distinctively Triassic; and shows it to represent the so-called Alpine Trias, which is so largely developed in California and Nevada. No forms distinctively Carboniferous or Palaeozoic have yet been discovered, but from the intimate association of Carboniferous and Triassic rocks in the southern interior of the Province, and more particularly from the occurrence of a great mass of rocks largely volcanic in origin and believed to be Carboniferous in age, in the southern part of Vancouver Island—which forms part of the same axis of elevation with the Queen Charlotte Islands—it is highly probable that rocks of this age may come to the surface in some places.

"The limestones of these localities may, therefore, possibly be of Carboniferous age, and if so, a large portion of the associated rocks of volcanic origin must be attributed to the same period. As it is at present impossible to unravel the structural complexity of the sub-Cretaceous rocks of the Islands, it has been thought best to colour them together on the map as Triassic, in correspondence with their characteristic fossils."

In 1905, Dr. R. W. Ells, of the Geological Survey, made an examination of the northern large island of the group, Graham island, his work being practically confined to the coal-bearing formation of Graham island and its environment. Dr. Ells' report is to be found in Part B. of Vol. XVI. of Reports of the Geological Survey, while a summary of his report has been reproduced in the report of this Bureau for the year 1906, on pages 74 *et seq.*, together with a map of Graham island.

In 1901, Mr. H. Carmichael, Provincial Assayer, made an examination for this Bureau of certain of the islands near and of the east coast of Moresby island. His report is to be found in the Report of the Minister of Mines for 1901, on pages 999 *et seq.*

In 1902, Dr. T. R. Marshall, D. Sc., M. I. M. M., of Glasgow, on behalf of this Bureau, made an examination of the coal prospects in the interior of Graham island. His report is contained in the Report of the Minister of Mines for 1902, on pages 54 *et seq.*

Climate.

The climate of Moresby island is particularly favourable to prospecting and to subsequent mining operations, since in summer it is never very warm, while in winter there is seldom snow or frost in the lower lands, although both are to be found on the higher mountains, the highest peaks retaining snow-caps well into the summer.

The west coast of the island is always dangerous to approach owing to the rocky character of its shores and the prevailing west wind, causing an ever-present ocean swell, which renders landing from a small boat very difficult except in the sheltered bays, and these bays, though quite numerous, are still uncharted and unknown save to a few prospectors, who have bought their knowledge by hard experience.

The east coast is in summer usually safe, as it is protected from the west wind by the main island, and the fringe of smaller islands along its shores affords some protection, and offers ample refuge, from all winds, the inner passage being always navigable for small boats.

The warm winds off the Pacific, striking the high mountainous backbone of the island, produce in winter a great deal of rain and in summer a mist, which, however, seldom develops into fog.

As compared with the shores of Vancouver island, those of Moresby island are comparatively free from troublesome underbrush.

The timber, though small for lumbering, is admirable for mining purposes, and is very plentiful, while the damp climate does away with the dangers of forest fires.

There is little soil to hamper prospecting, the surface being, however, heavily carpeted with moss.

Game.

Game on the island is unusually scarce, there being no deer, rabbits or even squirrels, while grouse are not plentiful, which fact is strange, seeing that the natural enemies of these animals, the wolves, coyotes and foxes, are also unknown on the island. Bear are present, but not plentiful. There is no area in the Province so well suited for a game preserve—the climate, topography, vegetation and position are ideal—and the island should be stocked and placed under reserve.

Nature has, however, somewhat compensated for the dearth of land game by the bounteous supply of fish found in the sea and small streams, and the clams, rock oysters, abalonies and other shell-fish along the sea-shore.

Skincuttle Inlet.

As already remarked, the greater amount of prospecting that has been done on Moresby island is in the vicinity of Skincuttle inlet, which was in 1862 the scene of early prospecting. The general geological formation of almost all Moresby island has been placed as Triassic by Dr. Dawson, with a possibility of some Carboniferous measures. Lithologically, the formation was originally composed of limestones, shales, etc., with heavy deposits of volcanic matter from some local point of issue.

On the lower end of Moresby island, as seen in the exposures in the various harbours bordering on Skincuttle inlet, whatever may have been the original formation, it has been subsequently subjected to such an upheaval, with the accompanying faulting and bending, and has been so cut by innumerable feldspathic dykes, that no sign of the original formation was traceable. The dyke intrusions are so numerous and extensive as to form the greater part of the rock mass, the sedimentary rocks showing as patches, or isolated masses, without any apparent relation to the next.

The important part, however, is the existing mineral deposits rather than the geological formation, and from the number of mineral locations seen it would appear as though the whole promontory between Huston inlet and Carpenter bay was extensively mineralised, the locations so far made simply serving as an index to its general character. The first locations in recent years were made on the shores of Harriet harbour, from which point prospecting extended to Ikeda bay and Huston inlet, and later to Collison bay and Carpenter bay.

The mineral claims examined in this vicinity during this trip were all within the area mentioned. Speaking generally of these claims the mineralisation is always found in the immediate vicinity of, if not in the actual contact of, limestone with one of the larger dykes and consists primarily of magnetite, with a greater or lesser amount of chalcopyrite and occasionally considerable pyrrhotite.

Ikeda Bay.

The Japanese firm of Awaya, Ikeda & Co., of Vancouver, originally interested in the fishing off the Queen Charlotte islands, has staked claims on all the hills surrounding Ikeda bay, and this Company was found to be the only concern on the island making any serious attempt at mining, employing over 100 men, mostly Japanese, in mining, mining construction and prospecting the claims already staked.

At the inner end of the bay the company has erected a large and substantially built wharf, capable of receiving the largest of the coasting steamships. Connecting the wharf and the mine workings a 36-inch gauge tramway has been built, over which, on cars drawn by horses, the ore is brought down for shipment.

Lily Group. While some development work has been done on all the Company's holdings in the vicinity, the greater amount and all actual mining has been focussed on the *Lily* group, which consists of eight claims, the *Lily*, *Sweet Pea*, *Apple*, *Carnation*, *Orchid*, *Lemon*, *Peach and Pansy*. The development work for the group has been performed on the *Lily*, upon which the most available outcrop appeared. This outcrop showed up in a small creek, the water of which had washed clear an outcropping of magnetite carrying chalcopyrite. This outcrop occurs in places along the actual contact and elsewhere near the contact of limestone and an igneous rock, apparently a diorite, there being

evidence of much movement and some faulting. This deposit, as is the nature of such deposits, does not assume the characteristics of a fissure vein, and is not very clearly defined, nor is it of uniform width or tenure of copper.

The development consists of what is called No. 1 tunnel, which is really an open cut in the creek-bed along a contact of limestone and diorite, much altered, along which is a deposit of magnetite with copper pyrites; this has been exposed by the work done for some 30 or 40 feet, and has a width of from one to two feet. It would be difficult to estimate the copper contents of the exposed ore body, as this mineral is far from uniformly disseminated throughout the lead, occurring sometimes in bunches of quite rich ore, again scattered through the ore body, while in places the magnetite is practically barren.

Some 400 feet farther down the creek is the No. 2 Tunnel, and here most of the development work has been done, and all the mining, some 700 tons of copper ore having been shipped from this opening in 1907, assaying about 9 % copper, 3.5 oz. silver, and 0.25 oz. gold to the ton. This tunnel had been driven in on the strike of and following the vein for some 160 feet in a S. 10° E. direction. For the first fifty feet the ore has been stoped out up to the surface, the hanging-wall, dipping at an angle of about 80°, being supported by timbers, although in the tunnel proper no timber is required. The tunnel is about ten feet wide, and in places the vein-matter occupied pretty well the whole face of the drift.

In the latter part of August the face of the drift was not in ore, the vein having been temporarily lost, but when the property was again visited about two weeks later, it was found that a cross-cut had been driven to the left, towards the hanging-wall, in which the vein had been again found and the main drift was being deflected to pick it up.

The ore from the tunnel is run out on cars and dumped on to an incline, at the bottom of which is a picking shed, where the ore is broken and hand-sorted, the sorted ore being sacked and run down to the dock on cars drawn by horses, a distance of little over a mile, in which distance there is a drop of about 300 feet. On each car two tons of ore are carried, and one horse is required to bring back the empty car; a driver takes down two cars at a trip.

All the work about the mines is performed by Japanese. The miners working "single handed" are very efficient and compare favourably with the average white miner at this class of work, but the timbermen work very slowly.

Some 100 feet from No. 2 tunnel, and 65 feet lower down, No. 3 tunnel has been started and has been laid out as the main working tunnel, the entrance being very heavily and solidly timbered where it runs through the gravel surface wash. This tunnel had, in August, only been driven through the wash to solid formation in which no work had then been done.

There were employed in actual mining operations:—At No. 1 tunnel, about 14 men; at No. 2 tunnel, about 12 men; at No. 3 tunnel, about 8 men.

Chrysanthemum Group.

The same Company has also staked out the *Chrysanthemum* group of eight claims, viz.:—*Peony*, *Chrysanthemum*, *Rose*, *Violet*, *Cherry*, *Apricot*, *Bamboo* and *Maple* mineral claims. This group is located on the south-west side of Ikeda bay, at an elevation of about 400 feet above, and about half a mile back from the sea; the approach being a gradual slant. On the *Chrysanthemum* mineral claim there is a large exposure of mineral, some 50 feet long by 20 feet wide and about 15 feet high, consisting of four feet of nearly solid magnetite, with a small percentage of iron sulphide, between defined walls of diorite, and dipping nearly vertical, with strike north and south.

Lying adjacent to this, and to the east, is a zone of from 4 feet to 8 feet wide of magnetite of a much finer grain, but not as pure, being considerably impregnated with iron pyrites and some copper pyrites. The amount of sulphide in this latter zone is so high as to render it valueless as a commercial iron ore, whereas, as far as developed, the percentage of copper is too low to be profitably worked.

On the *Rose* mineral claim, of the same group, there is naturally exposed in a bluff a mass of magnetite which, on the surface, is some 20 feet high and 50 feet long. This occurs along a diorite-limestone contact, the ore lying nearly horizontal underneath the limestone. In the limestone there is a cave, which was followed in, and up, for over 50 feet, formed by the leaching of a stream of subterraneous water, and in this there is considerable hydrated iron oxide.

At other points in the group, higher up the hill, there were seen a number of smaller exposures of magnetite, all of which are quite undeveloped or even explored, so that it is quite impossible to say whether the various outcrops and exposures are in any way related or connected.

Speaking generally, the explorations made indicate that the group contains a great deal of mineralisation, masses of magnetite of undetermined sizes, all carrying an appreciable percentage of sulphides of iron and copper, but in no instance has copper in marketable quantity been discovered.

Lotus Group.

The *Lotus* group, consisting of six mineral claims and also owned by the Awaya-Ikeda Company, is located on the south-east side of Ikeda bay, about half a mile back from the shore and at an elevation of some 500 feet above the sea. The mineral here exposed is pyrrhotite, the magnetic sulphide of iron, of which a very large body has been exposed with comparatively little work. This exposure is about 20 feet wide and is visible for a height of 20 feet, while 15 feet more depth of mineral is reported as covered by the dump made in the work done. This mass of mineral is bounded on either side by diorite country rock, the contact of which with the pyrrhotite is not sharply defined, but a gradual replacement. Included in the mineral mass are bunches of limestone, although solid limestone formation was not visible. A sample made up of fragments broken from the various large pieces of mineral on the dump assayed three quarters of one per cent. of copper, with traces of gold and silver; while an average sample broken from the exposed face assayed: Copper, 0.4 %, with traces of gold and silver. The work done on the group was also more of an exploratory nature than development work, and while the great mass of mineral exposed has no present economic value, it strongly emphasises the extensive mineralisation of the vicinity and encourages further exploration of the group and its surroundings.

Collison Bay.

Collison bay lies next to Ikeda bay to the south-east and is separated therefrom by a range of mountains forming a narrow neck of land running out into Skincuttle inlet.

On August 26th, a gasoline launch was taken from Ikeda bay around to Collison bay, but, unfortunately for the writer, the prospectors interested in claims there were absent from their claims and cabins, and it was with some difficulty, and much uncertainty, that the various claims mentioned were found; therefore, it is quite possible that there may be some confusion in the names of claims seen and that some of the workings may have been overlooked.

Meal Ticket.

The *Meal Ticket* mineral claim and the adjoining claim, the *Cash Box*, are located on the north side of Collison bay, about 280 feet elevation and about one third of a mile back from the water. The claims are reported as located by R. J. Leckie in October, 1906. On the *Meal Ticket* a tunnel has been driven in about 33 feet, and at 21 feet in cuts obliquely a four-foot lead of pyrrhotite, which continues on the left side of the tunnel to the face. The tunnel having been deflected to the right where the mineral was struck, has consequently not cut through the lead, and the thickness of the lead must be inferred from its outcrop on the surface, to the left of the tunnel mouth, at which point a fault plane is observed, along which the lead has been shifted a couple of feet north and its continuation to the east is seen in the dump in the mouth of the tunnel. A general sample of the pyrrhotite exposed was taken and assayed less than half of one per cent. copper, with traces only of gold and silver. The country rock in the vicinity of the tunnel is very much altered volcanic rock, probably originally a diabase.

To the north of the tunnel, and on the *Cash Box* mineral claim in the cliff, there is, over a length of 100 feet, an exposure of magnetite carrying a considerable percentage of sulphides, chiefly pyrrhotite with some chalcopyrite.

Deakin's Claim. To the north of the previously mentioned claims, and at an elevation of some 200 feet above sea level, there is an exposure of highly crystalline limestone cut by a number of small diorite dykes, along the contact of which was a small amount of copper pyrites. Some of these contacts have been exposed along the course of a small creek—dry in summer, on which an open cut some eight to ten feet long had been made. No sample was taken of the mineral exposure.

Harriet Harbour.

Harriet harbour lies to the west of Ikeda bay and to the east of Huston inlet, and is separated from each by mountains which run out into the sea in narrow arms, not over a mile wide at the head of the harbour, but two or three miles long.

The townsite of Jedway, with a wharf, store, Post Office, and several cabins, has been located on the south-west end of Harriet harbour, and here the office of the Deputy Mining Recorder of the district is situated. It was on the shores of this bay that the first of the more recent mineral discoveries of the district were staked, by Watson and Thompson, in 1905. These discoveries may be considered the origin of the present activity in Moresby island.

Copper Queen. Probably the best known claim on this harbour is the *Copper Queen*, now held under bond by J. S. McMillan, of Seattle. The claim is situated on the south-west side of Harriet harbour, some 5,000 feet from the water and 880 feet above it. On this claim, as on most of the claims in the district, the mineralisation consists of magnetite carrying variable amounts of copper pyrites, and upon the percentage of this latter mineral found depends the value of the deposits. When visited, the only development work done consisted of a large open pit in a small draw, made to expose and develop an exposure of magnetite found in a bluff on one side of the "draw." The work had succeeded in exposing a very considerable body of magnetite in a country rock, which appeared to be a much altered diabase. In the side of the cut there was visibly exposed, dipping at an angle of 48°, a body of magnetite 6 feet thick, of which the lower 4 feet 6 inches was almost solid magnetite, containing irregularly distributed bunches and stringers of copper pyrites. The upper 1 foot 6 inches of the ore body, although chiefly magnetite, was more mixed with rock matter and appeared to the eye to carry a lower percentage of copper. This face stood exposed for a height along its slope of 25 feet, with indications that it continued down under the dump and into the hill for some farther distance; at its highest point the ore body came out practically to the surface. An average sample of the exposed face of the ore body was carefully chipped off across the whole six feet exposed and at different places in its length; this sample assayed, copper, 1.4%, with traces of gold and silver. Some 50 to 75 tons of mineral was piled up on the dump, and this also was roughly sampled, giving about 1.5% copper.

Some little distance up the creek from the open cut, and also about 300 feet to the east, are bodies of limestone, although none show in contact with the ore body.

On the opposite side of the draw, or gully, referred to, from the open cut, some little surface stripping has been done, showing further bodies of magnetite, the connection of which with the main body is somewhat obscure.

Iron Mountain. The *Iron Mountain* is another claim in the immediate vicinity, held by J. S. McMillan. On this but little actual development has been done, but stripping has exposed a similar body of magnetite of considerable size, showing copper pyrites along its margin.

Moresby Island. The *Moresby Island* mineral claim lies somewhat to the south of the *Copper Queen* and is also held by J. S. McMillan. This claim overlaps to a considerable extent the *Tate* mineral claim, owned by T. J. Watson, as to the merits of which dispute no opinion is expressed. The first open cut seen showed a country rock consisting of a decomposed diabase or diorite, with a considerable quantity of secondary red garnets, in crystalline form, all showing copper stain and a small percentage of copper.

In the second open cut, near where a fine-grained igneous dyke, of later origin, cuts through the country rock, there is a strong impregnation of iron pyrites and nearby a small seam of copper pyrites, while a certain amount of copper carbonate occurs in the rock matter, but no considerable body of ore has been exposed. A sample was taken of the exposed face of the cut, which gave, upon assay, copper, 2.7 %, wet assay, with traces of gold and silver. The face of the cut is about 10 feet long and 10 feet high, and was in at the bottom only 6 to 8 feet.

Reco. The *Reco* mineral claim, held by J. S. McMillan, is located nearer the bottom of the hill, only 200 feet above and a quarter of a mile from the water. The country rock here is a much altered diabase, in which a deposit of magnetic iron, about 3 feet thick, is seen dipping into the hill at an angle of about 40°, accompanied by a black hornblendic dyke and overlayed by a close-grained silicious rock. The magnetite carries sulphides of iron and copper, the copper contents in the exposed face of the magnetite being estimated at from ¾ to 1 % copper. The exposure was visible for some 50 feet up the bed of the creek and was fairly uniform in character.

An inclined shaft had been sunk on the deposit and 3 sets of timbering, 5 feet apart, set up, below which the shaft is reported to have been sunk about 6 feet, but as it was full of water it could not be examined. A 16 h.-p. boiler and a steam drill were on the ground, covered by a rough board shed. This boiler had formerly been used in prospecting the claims farther up the hill.

Modoc. The *Modoc* mineral claim, also held by J. S. McMillan, lies about 1,000 feet north of the *Reco*. Here there was visible, in the bed of the creek, an irregular exposure of impure magnetite, carrying a considerable percentage of iron sulphides and a very small percentage of copper pyrites. The deposit appears to be cut off by a dyke and no ore of commercial value was visible.

Huston Inlet.

Huston inlet lies immediately to the west of Harriet harbour and is a fine body of navigable water. Some little prospecting has been done on its eastern shore, on the range of hills which separates it from Harriet harbour, but the locality must as yet be considered as unexplored. The few recorded claims are quite unprospected and undeveloped, only a little surface scratching having been attempted.

Gold Cliff. A small cabin, known as Camp Surprise, has been erected on North bay, a small arm of the main inlet, from which a crude foot-trail leads up to the *Gold Cliff* mineral claim, a claim staked in the names of John McLennan, Smith and Frank Watson. Here, on a lime-diabase contact, dipping with the hill at an angle of 35°, and a strike S.W. and N.E., there was visible a deposit consisting of 12 inches in thickness of magnetite, overlain by 24 inches of calcite, carrying copper pyrites and iron pyrites, and again, above this, a thin seam of quartz and calcite, fairly crystalline, and above these the country rock was exposed. This exposure was visible for some distance along a very steep hillside, the outcrop being nearly horizontal, broken somewhat by vertical faults which interfered with its continuity. Some bunches of very pretty copper ore were visible, but they were small. As a prospect, there is encouragement to some further development, but nothing

so far shown has any economic values. An assay, showing considerable gold, was reported from the claim, but it has not been confirmed by any subsequent samples and is regarded as doubtful.

The *Gold Peak*, an adjoining claim held by the same owners, was not visited, but was reported by Frank Watson, one of the owners, to be about the same as the *Gold Cliff*, but with even less development done.

On the opposite side of the valley of a small creek was the *Surprise* mineral claim, staked by Frank Watson and sold to C. H. Parks. It lies at an elevation of about 500 feet, and is three-quarters of a mile from the inlet, and is undeveloped. The ore, from samples seen, is pyrrhotite, carrying some copper pyrites.

About a mile from the sea, and farther up on Thunder mountain, on the north bank of the creek, the *Hercules*, *Ida* and *Dusky Maiden* mineral claims have been staked by McMillan, McEacheran and Frank Watson, and on these one assessment has been recorded. These claims were not visited, but are reported to contain a deposit of magnetite carrying copper sulphides.

Burnaby and Copper Islands.

Red Raven.

The *Red Raven* mineral claim, on the south side of Copper island, a claim recently re-staked by Abe Johnson and so named by him, is of interest as having been the spot upon which Francis Poole and his party did their work in 1862-3, and where, about five years ago, a prospector named Abe Heino, having re-located the property, did considerable work, the remains of which are still visible and excite in visitors much curiosity as to "what he was driving at."

Geologically, the island is very similar to that portion of Moresby island immediately to the south, and some two or three miles distant. The sedimentary rocks are so cut up by later volcanic rocks as to give the appearance of the limestones being the intrusions and the volcanics the country rocks.

In a little cove running into the island some 30 to 40 feet, with nearly perpendicular walls and a rocky floor, submerged at high tide, a tunnel was driven from the level of the rock floor for a distance of 35 feet, and from this tunnel a cross-cut had been started off to the right, towards the water, for some 10 feet. The work had been done along a limestone diabase contact, along which was visible a little magnetite carrying some copper pyrites, but in no place was the mineralisation sufficient to be of any importance. The present owner has done no work on the property, the work seen having been done years previously. The property is interesting, as showing what Poole spent two years upon, while so many much more promising showings were "sticking out of the ground" within three or four miles, on the larger island.

On Burnaby island more of the old work done by Poole in 1863 was visible. On the south side of the island there was found a shaft, with very old timbers, sunk about 12 feet deep, which had followed down a limestone diabase contact on which a small quantity of copper sulphides was visible. Some short distance to the east, along the steep rocks of the shore, on a contact of crystalline limestone and trap rock, a shelf had been blasted out, sufficient for a foothold, from which a tunnel had been driven in for 12 feet, at the inner end of which was a winze nine feet deep. The contact carried a little copper pyrites and some magnetite, but was unimportant. It could not be learned if these old workings had been recently re-staked.

Sea King.

The *Sea King* mineral claim is a recent staking on the south-west side of Burnaby island, by Captain Locke, of steamship "Princess Beatrice". On the beach, between high and low water, there is exposed a contact of limestone and fine-grained trap, along which stands, exposed by action of the waters, a contact deposit of magnetite, from two to three feet wide, dipping at an angle of 80° to the west. The magnetite carries some iron pyrites and a small percentage of copper pyrites.

In a small gulch, a short distance to the west, there is a light gray coloured igneous dyke, fairly crystalline, and showing some horneblende, having a width of four or five feet, containing some stringers of calcite and also some magnetite and copper pyrites. Some little surface stripping had recently been done, with an idea of tracing out the contact, which was found to contain some copper pyrites.

Skincuttle Island Claims.

On Skincuttle island was seen more of the prospecting work done by Poole in 1863, for the Queen Charlotte Mining Company, of Victoria. Here a shaft had been sunk about 15 feet deep, near which some open cuts had been made. The shaft was full of water, but had evidently been sunk down on one of the fissures exposed to the open cut, which was from 12 to 15 inches wide and contained a considerable percentage of iron pyrites and some copper pyrites. Messrs. Raper, Hamilton, Law, *et al.*, of Texada island, had re-staked this property and did some work on it, but do not appear to have recorded the last work done.

Klunkwoi Bay.

On Saturday, August 31st, thanks to the courtesy of Mr. Ikeda, of the Ikeda Bay mines, the writer was loaned a gasoline motor boat with two men, and a start was made for a group of claims situated on Klunkwoi bay, at the north end of Darwin sound and inside of Lyell island. The passages inside of Burnaby and Lyell islands were taken, as being more protected from wind and sea. This inside passage is at all seasons suitable for a small boat, although the channel inside of Burnaby island is only one fathom deep at low water and is most tortuous and difficult to follow. The distance from Ikeda bay to Klunkwoi bay is about 45 miles, and the run was made in less than eight hours.

Swede Group.

None of the claims in this section of the island have been long staked, the first being the *Swede* group, staked in January, 1907, by Larsen, Pearson and Rogers. The group consists of eight claims, the *Excelsior*, *Pearson*, *Larsen*, *Keystone*, *Bob*, *Anaconda*, *Seattle* and *Homestake* mineral claims. The claims are so located as to cover a small peninsula projecting into Klunkwoi bay and separating two smaller bays or fiords. This peninsula is not over 2,500 feet across and rises to a height above the water of about 1,000 feet, the average slope of the hillside being about 46°, and this steep slope continues under the sea level, giving deep water at which any vessel can lie almost along the shore line. Although the claims had only been located for about six months, it was found that the owners had done a very considerable amount of development work, which, as far as it had progressed, proved more than encouraging. This work consisted of a number of open cuts running horizontally along the hillside at intervals from the sea-level to a height of 700 feet above. These cuts are on the *Larsen* claim, and may be said to have prospected a strip of hillside about 250 feet wide extending from the shore up to an elevation of 700 feet. The line of these cuts continued over the hill on to the south slope, has been further prospected on the *Anaconda* claim, and found there to be similar in all respects; therefore, it is to be presumed that the mineralised zone is continuous over the peninsula along the line prospected in a N. 63° E. direction.

A short distance to the west of the workings a fault plane has cut across the peninsula, the line of its break showing clearly on the mountain side. To the west of this break the prospectors claim not to have found mineral, but it is suspected their investigation has not been very thorough, as the geological conditions are the same on either side of the break, and it has not been a channel of infiltration of mineral. The country rock right across the peninsula appears to be uniform and the same, a much altered diabase,* cut by a few later trap dykes, which, however, do not appear to have any effect upon the mineralisation.

**Microscopic examination made by Dr. Dresser, of McGill University (4,613).*—This is a massive, dark green, fine-grained rock, showing spots of epidote, and a few grains of pyrite and pyrrhotite. It is found to consist essentially of plagioclase, feldspar and pyroxene. There are also present accessory magnetite, as well as the secondary minerals, chlorite and lencoxene. No quartz or olivine could be found. The structure is ophitic, and the rock is consequently a *diabase*.

As far as disclosed in the cuts, the 4 or 6 feet of the ...ing next the surface contain very little mineral, but wh... this depth is reached the rock is found to become impregnated with copper pyrites and oc... onally bornite, and this impregnation in the deeper cuts appears to be growing greater with depth as far as the work had proceeded; this is, at the greatest, a depth of some 15 feet. Sometimes the chalcopyrite occurs in little granules, peppered all through the rock, and again it occurs in little veinlets, constituting an ore difficult to estimate the copper contents of by th... e.

Samples were taken from the most extensive of the open cuts, viz., the one at an elevation of about 75 feet above the sea level; of these a general sample gadded off the face over a distance of 75 feet horizontally, and for the height of the cut, except the upper "barren" six feet, gave upon assay better than 2 % copper, with traces of gold and silver.

Another sample, taken by the writer, and which was intended to represent ore as it would be roughly hand-picked, gave copper 5.7 %, silver 0.2 oz. to ton and trace of gold.

A third sample, taken on the south slope of the peninsula from an open cut on the *Anaconda* claim, gave 2.9 % copper, with traces of gold and silver.

The occurrence of the mineral is such as to render hopeless any form of water concentration, and the ore would have to be smelted direct, but for such treatment it is admirably suited, as the gangue matter is self-fluxing and very easily melted.

To summarise the situation, the claims have not as yet been developed sufficiently to absolutely prove their ultimate value. They are still only prospects, but the success attending the development done commands attention and gives promise of an exceedingly large, but low grade, deposit of copper ore. The location of the properties is ideal for the cheapest kind of mining, and the facilities for cheap transportation by vessel could s... ely be improved upon.

The grade of the ore, as already noted, is low, probably not higher than 2 or 3 % copper, with little or no gold and silver values, but the fact is th... the values have incre... d with depth, so far as development has proceeded. The ...l own factors ... now de... v... this improvement in values continue and how deep will the ore ... found ... ... be ...termined by development work.

Last Chance Group.

The *Last Chance* group of six claims, the *Last C... nce*, *Goodenough*, *Jumbo*, *All Right*, *No Doubt* and *Star*, owned by Messrs. Wintermute, McEachern and Jones, lies to the S.W. of and adjoining the *Swede* group near the shore of the next bay to the south. These claims are more recently located than the *Swede* group and have not had the same amount of development work done, but such as has been done, a couple of large open cuts, disclo... conditions almost identical with those found in the *Swede* group, and, as the ore found is also in direct line with the mineralised zone on the *Swede* group, it is fair to suppose it to be a direct continuation of the *Swede* group deposit. The most important development work has been done on the *Last Chance* claim, at a distance of 1,600 feet from the bay, at an elevation of about 200 feet, and consists of an open cut in rock 45 feet long in a N. & S. direction, across the ore body, and has a face of six feet in depth. A general sample, made up of small pieces broken off the ore already mined, gave, upon assay, copper 2.7 %, silver 0.4 oz. to ton, and trace of gold.

The country rock has been classed, after microscopic examination, as a "Porphyritic diabase." †

As far as the development has gone, these claims give promise similar to the *Swede* group, and the camp as a whole indicates the presence of very large quantities of low-grade copper ore. The deposits are so admirably situated for cheap mining and transportation, the character

†As result of microscopic examination, Dr. Dresser, of McGill University, reports:—"The rock is fine grained and of a uniform green colour. The slide is found to be much decomposed. Feldspar is present in a few phenocrysts and in more numerous small lathe-shaped crystals of plagioclase. There are numerous grains of augite and epidote with much chlorite, the latter being in larger irregular masses. It is a Porphyritic diabase.

of gangue matter is such as to permit of very cheap smelting, so it is estimated that such ore is well within the commercial limit and can be treated at a profit, despite the fact that there is no appreciable quantity of gold or silver present.

The formation in which these deposits occur would appear to extend for a considerable width east and west, and is found again to the north-west on the shores of Skidegate channel, near the Narrows, constituting a large area of territory which may prove productive, and is at least, well worth prospecting.

This past summer a number of claims have been staked in the vicinity of the *Swede* group and farther up the coast, but, at the time, no work of any sort had been done on them and they were not visited.

On September 2nd, the trip northward was resumed in the gasoline launch to Skidegate, a further distance of 45 miles, a stop being made at the *Old Shaft*, some seven miles south of the Sand Spit.

Old Shaft.

The *Old Shaft*, judging by the size of trees growing on the old dump, was sunk some 40 to 50 years ago, but by whom it is not known, nor does there seem to be any Indian tradition regarding it. The property has recently been taken up again by Shelden & Shabbard, who have bonded it to D. R. Young and associates, who were unwatering it, employing one white man and two Indians. At that date the shaft had been unwatered to about 90 feet depth, and the foreman reported having sounded it for a further depth of 45 feet. Some short distance above the 90-foot mark, two cross-cuts had been found, one to the east and one to the west, extending about twenty-five feet from the shaft. The shaft had not been cleaned out, so, of course, nothing was visible in it as to ore.

The country rock in the vicinity, as exposed on the beach, is an agglomerate, in which a fissure was seen a few inches wide, carrying copper pyrites in quartz. Selected samples of clear mineral assayed 10% copper ond two oz. of silver to the ton. This fissure led directly to the old shaft, distant only a few feet, and it was evidently on this fissure that the shaft had been sunk and along which the two cross-cuts had been driven. The fissure, as seen on the beach, was too small to be of any importance, and the old dump exhibited no commercial ore. The owners claim to have discovered a more extensive fissure, running north and south—that is, at right angles to the first, at a distance of some 100 feet to the west of the shaft and in the woods—to which it is proposed to drive a cross-cut from the shaft at some depth. The white man in charge did not know where the exposure of this north and south vein was, and it was consequently not seen by the writer.

Gold Harbour.

Mr. John McLellan, a British Columbia assayer, has been working during the past summer at Gold Harbour, a bay of Moore channel, on the west coast of Moresby island, just south of Skidegate channel. It was at this point the Hudson Bay Company, in 1852, found and mined a deposit of gold-bearing quartz. Mr. McLellan examined the old workings but could find no continuation of the values, though he discovered in the vicinity another small quartz vein carrying gold in considerable proportions. He reports the vein as being rich but very small; he erected last season an arrastra driven by water power and managed to extract a certain amount of gold, bringing a small "brick" to Victoria.

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