

on the Mammoth Bluff on the Britannia, and of a value far exceeding the ore body on that property.

The country rock in which the Beatson ore body occurs is a slate (graphitic in places) on the hanging wall side, and a greenstone on the foot wall. The zone of slate is quite wide and extends for hundreds of feet in length, but there are several intrusions of igneous rock some of which have apparently caused faulting in the belt of slate. No geological survey has yet been made to determine the details of the conditions surrounding this interesting property.

The third illustration mentioned as representing this class of ore bodies is the Gladhaugh mine, at El-lamar on Prince William Sound, Alaska. The development at this property has determined that continuity in depth may reasonably be looked for in such ore bodies because the ore is found at the 500-ft. level, the lowest depth to which the shaft has been sunk.

4.—The fourth class of copper ore deposits, that in which chalcopyrite ore occurs in a gangue composed of iron pyrites, barite, silica, and some lime is, so far as at present known, peculiar to the Mount Sicker district on Vancouver Island. The country rock is a sericite schist with numerous intrusions of igneous rocks, generally diorite, sometimes having a porphyritic structure. A portion of the schist is graphitic, and the ore bodies are generally in this portion of the schist belt.

The grade of the ore is higher than the general run of chalcopyrite deposits on the Pacific coast, and has averaged rather more than 4% copper, with 0.17 oz. gold and 4 oz. silver per ton, as shown by the returns from about 250,000 tons of ore smelted during the past four years.

These ore bodies have been more systematically and thoroughly developed than any other on the coast. They present a most interesting subject for study from a geological standpoint, because of the many pronounced evidences of extensive faulting and the fact that movements have taken place since the formation of the ore deposits as well as prior thereto. This latter condition is attested to by the numerous slickensided cleavage planes exposed throughout the ore bodies as mining operations have progressed, and that the former condition exists is apparent from a study of the surface, although the geology in detail has never been worked out.

The ore apparently occurs in large lenses, but these are so closely allied with each other along the line of strike that in a drift in the Tyee mine some 1,300 ft. in length it appears at a casual glance that there has been no break in the continuity of the ore, however, on the Lenora mineral claim, adjoining the Tyee on the west, the lenticular structure is more pronounced.

The interesting feature, from a commercial as well as a scientific standpoint, is the fact that no ore has been discovered between the 300 and the 1,000-ft. levels in the Tyee, although the ore body above the 300-ft. level often reaches a width of about 50 ft. of clean solid shipping ore, and has been found practi-

cally continuous for a length of about 1,300 ft. Similar conditions apply to the ore body in the Lenora mine, except that the length of the deposit was not nearly so great, nor has the exploitation been carried on so thoroughly, systematically, or extensively in search of other ore bodies as has been done in the Tyee mine.

On the latter property sinking has been carried to a depth of 1,000 ft., on which level an ore body has recently been exposed and is being exploited. Levels have been opened every 100 ft., and considerable cross-cutting and drifting done on each level. This drastic development work is being carried on continuously, and, in consequence, the underground workings offer a splendid opportunity for making a thorough study of the geological conditions.

Unfortunately, the owners of adjoining properties have suspended development work, apparently with the intention of awaiting the outcome of that being prosecuted by the Tyee Co., consequently the full extent of the ore bearing zone is not known at this time. The schist formation, though, can be traced on the surface through Mount Sicker, and westerly across the valley of the Chemainus River on to Mount Brenton, except where intrusive masses and dykes of igneous rocks have cut it off. Even then the same character of schist is found towards the south, in which direction it has apparently been thrust.

Another feature, almost unique in mining, is the fact that on the Tyee property there is no second grade ore or waste in the ore body itself. The entire width between the boundaries or walls is a solid mass of clean ore. The walls are well defined, both being schist, and have considerable gouge between them and the ore, so that in mining the latter is easily broken away.

5.—The fifth class of ore bodies is that in which occurs pyrrhotite ore carrying low copper values, sometimes in a gangue composed of a high percentage of epidote, garnet, amphibolite and some calc-spar occurring either in fissures in basic igneous rocks or else at the contact of crystalline limestone and igneous rocks.

In this class of ore bodies the copper values are carried by masses and particles of chalcopyrite disseminated with variable regularity through the pyrrhotite. The writer has observed instances where at comparatively shallow depth the pyrrhotite has apparently been replaced (this word is not used here with the same sense as is understood generally in mining parlance) by lenses of quartz carrying chalcopyrite of such high grade as to show by assay as much as fifteen per cent in copper, but usually at depth the pyrrhotite grades into marcasite carrying a low percentage of chalcopyrite together with low gold and silver values.

In appearance the pyrrhotite from some of these ore bodies resembles so strongly the nickel bearing ores of the Sudbury district that mining engineers well acquainted with the Sudbury ores have expressed the opinion that the pyrrhotite found especially on the