

CONCERNING IRON CAPS.

This article is not written by any expert, but by an observer who is content to apply the inductive method of reasoning to the phenomena which appear. The trouble with experts is that they are too much given to applying the a priori method of reasoning to new data. The whole science of mineralogy is strictly empirical. It has been built up by the observation of widely differing phenomena, and so far as the establishment of general rules go it is still in its infancy. But the expert, with human nature's hankering after authority, is apt to apply the inductive results of previous observation as a basis for deductive reasoning about new phenomena. Consequently, although he will admit that mineralogy is, as a whole, empirical, he is often as dogmatic as a professor of theology when confronted with new conditions. Compared with the theologian, however, he is at a serious disadvantage, because events frequently prove him wrong, whereas the event which will test the dogma of the theologian is sufficiently far removed to give him immunity from the consequences of logical discomfiture. The most remarkable instance is the unanimity with which experts agreed that copper could not exist at depth in a sandstone conglomerate, in which formation the Calumet and Hecla is now being worked at the greatest depth and with the biggest output of any individual mine in the world. Every schoolboy knows that a conclusion cannot be reached by induction, unless all possible modifying factors are taken into account, and what mineralogy does not know about the occurrence of the precious metals would fill many more books than have hitherto been written on the subject. At its present stage, the more facts presented and the fewer dogmas inculcated, the better for the science of mineralogy. We are all more or less familiar with iron capping in Trail Creek. We ought to be; we hear enough about it. There are three main surface indications on which claims are staked in this country. The first is where massive sulphide ore crops out on the surface, without many traces of oxidation, the second is where oxidation has left the surface of the deposit a crumbling mass of iron and copper oxide, the third is where the rock is stained with iron in its seams, but is not decomposed. Now, it is frequently said with regard to the two former that when you get through the oxidised surface and into the solid sulphide you are through the cap rock and into the ore. But there is absolutely no difference between the oxidised surface and the solid ore, except what has been brought about by the action of air and water. If you have your solid ore exposed on the dump long enough, you can make all the oxidised iron cap you want. The point is that if one of these is an iron cap, the other is equally an iron cap. If the one is not capping but ore, neither is the other. As regards the third, it must be frankly said, at the risk of disillusioning many excellent people, that it is not iron capping at all. It is country rock cap. It is, at the same time, indicative of a seam of iron ore somewhere in the vicinity. The prettiest example of this in the camp is shown in the south vein on the Southern Cross mine. It deeply interested Mr. Carlyle, the provincial mineralogist, who said he had looked at iron stained country rock cappings till he was tired without knowing what to make of them, but here he had some sort of key to their meaning. In his report he says of it: "On the Southern Cross two open cuts and two tunnels, one 75 feet the other 90 feet long, are made in the very iron-stained diorite to develop a well-defined fissure, in which the ore in places widens out from nothing to two or three feet of solid sulphides."

Thus iron caps would appear to be more or less eliminated altogether if there is no distinction between solid ore and oxidised surface ore, and if iron stained rock is country rock capping. The facts, however, go some distance towards putting a different construction on the meaning of iron cap altogether. It looks as though the massive sulphide of iron and copper in which most of the mining has been done, and of which most of our shipments have been composed, were itself a capping—a veritable iron cap. It is being proved by development that these bodies of massive sulphide do not go down, but that the ore changes under them and becomes more silicious in character. It is a mere accident that some of this iron and copper sulphide will pay to ship, while some will not. The

real mining has not begun until the iron cap has been pierced and the value of the silicious ore underneath tested. This is a daring theory. What are the facts in support of it? It is undisputed that the ore in the Le Roi is much more silicious than it was on the surface, and that silicious ore is much richer for some reason or another not easily explained, except that it is in accordance with the old dictum that quartz is the womb of gold. On the Jumbo no pay ore was found on the surface, nor until a body of silicious ore was discovered. The Deer Park, however, is the most complete demonstration. A vertical shaft was there sunk on a body of massive iron sulphide containing calc spar and only a trace of gold. At a depth of over 90 feet this capping was broken through and a granulated whitey blue quartz, containing some iron and copper, was encountered, and no calc spar at all, but very high grade in both gold and silver. This fact here was so clear and obvious that it amounted in the mind of the writer to a demonstration of his theory. Precisely the same phenomenon was visible in the Black Hawk, on Champion Creek. In the Jumbo, in Trail Creek, and the Winnipeg, in Boundary, enormous masses of low grade sulphide ore are present beside the high grade silicious ore.

Why this ore should be higher grade than the capping of iron sulphide is a hard question. One expert gave as a reason why Trail Creek ores became higher grade with depth, this, that the gold was of higher specific gravity than the iron and remained below. Unfortunately for his self-consistency he believed that the ores became silicious with depth. Does the gold stay below because it is heavier and the quartz because it is lighter than the iron?

The fact is that there is no explanation of it, except the saw that quartz is the womb of gold and the fact that it is so.

This is all theory, of course, and has yet to be established finally. Take it for granted and see the result. First, the prospector with his blind faith in iron cap is all right, and the smart expert with his pay ore on the surface is all wrong, and the fools who, from reasons connected with the law of gravity or the promotion of wildcats, maintained that ore without changing in character would grow richer with depth, just as porpoises come to the surface of the sea because they feel like it, is all wrong, too, but just as well off as if he had been right. There is one possibility which, although it is a logical outcome of this theory, is almost too startling to formulate, namely, that the Trail Creek ores might become to a large extent milling ores. One thing is certain, that instead of commanding a premium to smelt other ores, other ores are likely to command a premium to smelt them.

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"The ownership of land by aliens, other than those who in good faith have declared their intention to become citizens of the United States, is prohibited in this state, except when acquired by inheritance, under mortgage or in good faith in the ordinary course of justice in the collection of debts, and all conveyances of lands hereafter made to any alien directly or in trust for such alien shall be void; provided, that the provisions of this section shall not apply to lands containing valuable deposits of minerals, metals, iron, coal or fire clay, and the necessary land for mills and machinery to be used in the development thereof and the manufacture of the products therefrom. Every corporation, the majority of the capital stock of which is owned by aliens, shall be considered as alien for the purposes of this prohibition."

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CERTIFICATE OF IMPROVEMENTS.

CAMBRIDGE MINERAL CLAIM.

Situate in the Trail Creek Mining division of West Kootenay district. Where located. About 4 miles south east of the town of Rossland, on Violin Creek.

TAKE notice that I, N. F. Townsend, as agent for H. S. Wallace, No. 73,495; John Elliott, No. 75,011, and Ernest Miller, No. 72,357, intend, sixty days from the date hereof, to apply to the Mining Recorder for a certificate of improvements, for the purpose of obtaining a Crown grant of the above claim.

And, further take notice, that action under section 37 must be commenced before the issuance of such certificate of improvements.

Dated this 10th day of October, 1896.
10-14

N. F. TOWNSEND.

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