

GEOLOGICAL
SURVEY
1889
CANADA
HISTORICAL SURVEY

CANADIAN MAGAZINE

OF
Science and the Industrial Arts.
Patent Office Record.

Vol. XVII.

JULY, 1889.

No. 7

THE OCCURRENCE OF GOLD.

BY D. A. LOUIS, F.I.C., F.C.S.

In considering the occurrence of gold, there are two or three of its properties which it is useful to bear in mind in order to account for the unique position it holds in the mineral kingdom; these are:—its high specific gravity, the great disinclination it exhibits to enter into combination with other elements, and the peculiarity of its solubility.

Most metals occur in nature mineralised or combined with various elements; for instance, silver is found sometimes free, but most frequently combined with sulphur as in silver glance, also with arsenic or antimony and sulphur in pyrrargyrite and proustite, with chlorine in horn silver, and with other elements. Lead is universally found combined with sulphur and galena, also with carbonic acid as cerussite or lead spar, and in other combinations; tin, in its best known ore, cassiterite, is combined with oxygen, whilst zinc in blende is combined with sulphur, and in calamine with carbonic acid. But gold is one of the few elements which exist in nature free or uncombined, and with the exception of its existence in comparatively small quantities, combined with the rare element tellurium, it is always found in the metallic state. Native gold, however, contains various proportions of impurities, the impurity in most instances being metallic silver, and perhaps copper; therefore we can dismiss the question of the chemical occurrence of gold with the statement that it generally occurs in the free state alloyed with more or less silver, and is sometimes found as telluride.

Turning to its mineralogical or petrological associations, a very similar degree of simplicity awaits us, for gold is, with few exceptions, found associated with the well-known non-metallic mineral quartz, whilst iron pyrites is the most general metalliferous mineral which accompanies gold, although copper pyrites, galena, blende, and arsenical pyrites are frequently auriferous, and some dozen other minerals are from time to time found to have particles of gold mixed with them. The rocks in which gold is found are mostly metamorphic, or those rocks which have in periods gone by been deposited during the decay of pre-existing rocks, but have, some considerable time after deposition, undergone changes and, in many cases, have been subjected to great heat, to violent upheavals, disruptions, and compressions, with the result that they have become more or less crystalline, and frequently flaky or schistose in structure, and are traversed by numerous cracks and fissures in which quartz has accumulated, and,

with it, gold in many instances. The rocks in which these auriferous quartz veins are generally found are those schists which are named from their predominating mineral chloritic, talcose, micaceous, or hornblendic; it is found less commonly in diorite, in porphyry, and sometimes in granite. These rocks often contain gold in very minute proportions, which becomes sometimes more prominent in the vicinity of a fissure or crack, but it is never present in quantities which would permit of the idea being entertained of its commercial extraction from this so-called "country" rock; in the intersecting quartz veins, however, gold is frequently found in paying quantities, and such veins constitute the "gold reefs" found in different parts of the world. Gold is never found in these veins in continuous bands, as is the case with other metalliferous deposits; but it occurs in patches and accumulations, here and there, in the vein; such patches are known as bunches, shoots, pipes, chimneys, according to the length, breadth, size, and position of the accumulation. In some cases veins are filled with pyrites instead of quartz, or sometimes, in fact very frequently, both are present, and the pyrites is found to contain gold; it then appears not to be so bunchy as when it exists in the quartz veins. I have seen in Colorado thick bands of auriferous pyrites, which, from their appearance in many adjacent mines, may be presumed to be many hundred yards in length, and apparently more or less continuous. Gold tellurides are also found in veins in Transylvania, in Hungary, and in Boulder County, Colorado.

Gold, however, does not exclusively occur in reefs; in fact, the largest supplies have been obtained from "placers," where it occurs in beds of sand and gravel, which have been, or are even now, the beds of rivers. Other instances are known where gold occurs in deposits consisting of fragments of rock cemented together by silicious material, forming what is known as breccias, or conglomerates, or pudding-stone, or, in the Transvaal, as banket.

Both the auriferous sand and the banket owe their origin to the destruction—which is constantly going on now, and has been going on ever since the rocks have existed—of the auriferous rocks. The detritus, in the case of the sand, has been carried down the rocky slopes by streams of water, which have dissolved much of the rocky material, and carried away light particles, wearing away larger ones, and allowing the heavy gold and wear-resisting quartz to deposit themselves. In course of time the former has become concentrated in those parts of the river where the current has been interrupted by bends, etc., for the simple reason that the sand being lighter,