

amount, estimated at \$1,100,000,000, while as vast an amount was also taken from the placers of Australia, and in this Province, it is estimated, \$45,000,000 was recovered in 22 years.

As to the formation of placers, we know that many rocks carry gold, especially most of the older rocks, and many igneous rocks, as granite, carry gold, not in veins but in small particles scattered through the mass, perhaps of little value in the great mass of rock. As these rocks are rotted and decomposed—you must remember that these placers have been accumulating the gold for many thousands of years—these little particles of gold are separated from the low grade rock and gradually washed down and concentrated in the sands and gravels collecting in low-lying parts, as in gulches, lake and river or creek beds, and such particles of gold being from eight to ten times heavier than the sands and gravels in which they are found, gradually work their way down into the lowest positions in the deposit of alluvium.

So we find gravel and sand carrying gold in varying quantities and in many different localities. We find the gold scattered through as fine as (1) dust, or in little (2) sheets or leaves of float gold—so called from the fact that if it becomes dry and is put in water it will float from ten to fifteen minutes, causing considerable trouble to the millmen and placer miners attempting to collect it and keep it from being washed away. In the placers we have also the (3) nuggets. There is one peculiar thing about nuggets, we never find in quartz or hard ore mining such large pieces of gold as are found in nuggets, and a theory has been given to account for this that carries considerable weight. It is well known that there are certain organic acids in Nature that will dissolve gold. An Australian chemist happened to have, in a flask, some gold in solution, in which still remained a little pellet of gold, and a small piece of cork having fallen into the solution a change in the size of the pellet became apparent, and on making further experiments he found that if a piece of gold was put in a solution of gold and any organic matter, twig, cork or leaf put in, that this little nugget became larger and heavier. Whether this theory is true or not we do not know, but certainly it has led to much interesting but conflicting experimentation. You may have heard of the famous nuggets found in Australia, one weighing over 2,200 ounces, yielding about \$45,000 in gold, yet such masses of gold have never been found in hard ore mining. We find, generally, that gold is scattered through sands or gravels, it may be found in the soil at the very grass roots, but it is seldom found in clays; we often find in a placer deposit that certain layers of gravel are auriferous, while others are perfectly barren, nevertheless, the richest parts are usually found in the lowest beds, near the rock underlying the gravel, the bedrock, which in many placers is shale or slate rock, standing highly inclined where these upturned jagged edges have acted as riffles or obstacles to the stream running down over them, catching the gold working down through the gravel or sand. The greatest yield is found in just such a situation. In some cases the gold has worked its way several inches into the slate or bedrock, which then has to be worked out with a pick, so solid is it there. We may find along the bedrock the paying gold-bearing gravels, over them a layer of barren gravel, and perhaps over that again another gravel bed that pays, and the most probable reason for the change from gold-bearing to barren strata may be that at one time the stream flowed from a quarter through or across a gold-bearing region, gathering the gold in its course; then there was some radical change in the direction of the currents, and the water now coming from a direction in which it could gather no gold, would lay down the

barren bed of gravel or clay mentioned, and with yet another change in the surface of the country, and from new directions, the stream would then bring in other gold-bearing gravels.

In speaking of alluvial gold deposits, we may classify them into (1) modern and (2) ancient. Some of these ancient placers, occupying old river beds, are found in the most surprising places, and in unexpected localities. In modern deposits the gravels may be comparatively shallow, a few feet in depth, and, again, they may occur in great areas, from 200 to 300 feet, or even 600 to 700 feet in depth, as in the two large placer mines operated by Mr. Hobson in the Cariboo district, where they have gravel several hundred feet in depth, with gold scattered more or less all through the mass.

The first placer deposits to be worked were bars of sand and gravel formed along and in river beds, from which bars fabulously rich returns have been got. These bars are many times found at a bend of the river, and the gold bearing deposit is found on the inner part of the curve, as the river scouring around the bend works the gold up onto the inner curve. In some places the rivers have been worked in the deeper water or at the outer bend, and in most cases such places have been found to carry gold, but not always sufficient to satisfy the expectations of the miners. Besides the bars in the rivers, many people, Chinese often, are found working up the gulches, in the bottom of which much gold may be concentrated, and thus we have the river (1) bars and the (2) gulch diggings. At the mouths of rivers fine sand and mud are laid down in vast quantities forming extensive (3) flats, and often containing paying quantities of gold. This is found to be the case with the Australian and American rivers, as well as with the rivers which flow through the auriferous districts of British Columbia. Many important placers are on and along (4) benches. We know that rivers are constantly cutting for themselves deeper channels, whether running over loose ground or solid rock, and as they cut a deeper channel they usually are of less width, and leave above the present bed perhaps several benches or terraces on either side, showing where, at one time or at different times, the bed of the river, or of the older channel, had been. Where these terraces are of sand or gravel above and back from the present river, we may often get gold from them. Many of our important placers are on terraces, the river now occupying a much lower channel, and in the bottom of the present channel the gold may be concentrated for the second or third time from the old channels above.

Another interesting and surprising form of alluvial gold deposit is what is known as a (5) hill claim, of which many have been discovered and worked extensively in Australia, and to some extent in British Columbia. In a rolling country, on some of the hill tops or hillocks they have been surprised to find great deposits of gravel which were gold-bearing.

Another form of deposit, which in many cases has proved to be an "ignis fatuus," occurs along the (6) coast,—gold-bearing sands and gravels that are being washed continually by the tides, at one time exposed, only to be buried again by the next tide. In New Zealand they are able to gather these sands when the tide is out, and considerable gold has been got from such a source by different methods.

Of course the first method of working placer claims was by the miner's pan and shovel, but this soon gave way to the cradle, or rocker, still used in places, which was superseded by the sluice box, first the short, then the longer sluices, by shovelling into which much more but less paying dirt could be quickly washed. Then, miners becoming more ambitious and enterprising, the