first hydraulic mining was started, water being first carried to gravel from flumes or ditches in canvas hose and even in stove-pipes; of course it was impossible to get much force of water in this primitive manner, but it was the beginning of the development of the hydraulic process of to-day.

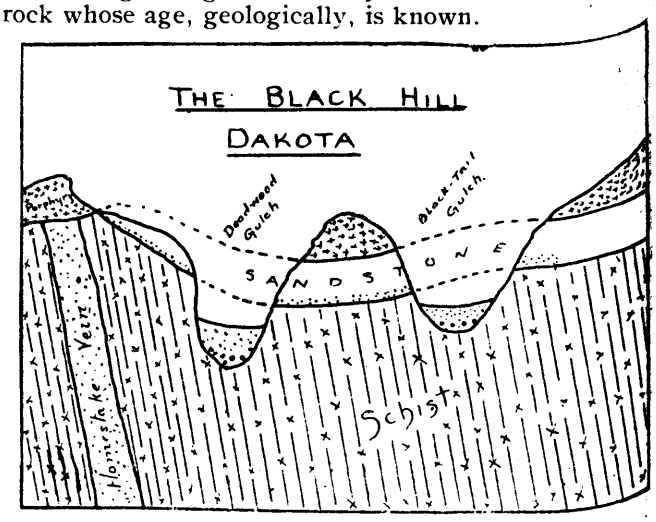
In working a placer deposit of any size, the first thing to be determined is the extent and possible yield of the claim, and this being of such vital importance, especially if it will entail the expenditure of much money in development work, money that must be spent before a dollar is returnd, must be carefully spent and often freely. In prospecting these deposits, especially these large areas of gravel, shafts or tunnels are driven in different parts to bed rock, and the gravel carefully panned, to enable the prospector, by experience and from the number and size of the "colors," to determine the value of the gold in the area over which it is intended to work. By having the different pits sunk over the area, from each of which they examine dirt, there can be formed some good idea of the richness and extent of of the gravel. Having made a careful and successful prospect the details and method of work may be planned and executed.

A great deal of gravel has been worked by the process called "ground sluicing," in which, instead of putting in wooden sluices with riffles, etc., a channel is dug in the bedrock, and rapidly flowing water is sent through carrying gravel and gold from the bank, the latter being caught behind the obstructions of the rough bottom. The gravels are attacked in several different ways by water, which may be brought to the edge of the bank, and running down over it may break loose and sweep into the sluices large portions of this bank; or else a very powerful stream may be thrown from the nozzle or monitor, mercury being placed along the upper end of the sluice to catch the gold in passing. At intervals the water is turned off while the sluice bottom is cleaned out and the gold removed.

Another mode of working placers is known as "booming." Where water is scarce, dams are placed across the stream, impounding a great mass of water. The gravel is worked loose, sometimes by using powder to loosen the banks, then the water is allowed to go through with a rush, washing or "booming" the dirt into the sluices.

Much interest is now being directed to dredging, as a great many of our river beds are found to be rich in gold, but it is very difficult, in many instances, to recover. Many streams have been deflected from a part of the bed by wing-dams, allowing the miner to work that part of the bottom of the stream, or by putting in large flumes the entire stream has been deflected from its bed, thus permitting the bottom to be worked, in some cases with very great profit, although at times, risks, as a sudden storm in the mountains, or a cloud-burst, may wash out everything in a few minutes, and the work be ruined. In some of our rivers the current is so strong that it is impossible to deflect it at all, and it is not profitable to carry it in flumes or sluices; then a method is tried that has been found very successful in New Zealand and Australia—dredging. This summer several new schemes will be tried, and the results will be awaited with interest.

We will speak for a moment about ancient river beds. High up, above the present rivers, we may find jutting out and facing on a cliff, an exposure of gravel lying in a gutter; we may trace this underground and find we have found a river bed, that once ran, perhaps, in a direction quite opposite from that of the rivers of to-day. The explanation given for these ancient rivers is that great ages back most of them were filled with overflows of volcanic rock, lava or basalt, spreading over great areas, those of our Province being covered with basalt of the same geological age as the gold-bearing lavas of Cripple Creek. After the basalt had spread out over the country, completely burying these rivers, there must have been great twisting and contorting of the strata which changed the entire contour or surface of the country, and down through new gullies the rivers have cut out new channels, those of to-day. Thus we find the remains of ancient rivers in most unexpected places, often at the top of our present mountains, where there will be seen a capping of basalt overlying the gravel of the old river bed, and the gravel lying in a trough in the tilted bed-rocks, while far down below in the valley we have the present river. This will give some idea of the situations in which such old river beds are found, and their great age is shown by the overflow of basaltic rock whose age, geologically, is known.



Before going further we will first refer to the diagram showing a section through the Black Hills Country, South Dakota, one of the most interesting of gold discoveries on the continent. In this famous district the early prospector took his life in his hand, as the Indians were very hostile, but in the streams and gullies they found extremely rich placers, which were the beginnings of a great mining camp. These placers are usually well worked out before the rock containing the gold, *in situ*, is located. It was so at Leadville, and in Australia, where, after exhausting the placer gold they have hunted for the gold leads and have found them. Here was found the great Homestake vein, 70 to 80 feet in width, from which, up to the present time, they have paid $5,600,000 in dividends, from ore yielding only $3 to $4 per ton, by crushing it in large quantities, from 1,800 to 3,000 tons per day, with 750 stamps dropping. Lying on the top of these highly inclined hills is a small area of sandstone, while in the intervening spaces the rock has been gullied out, in other words, at one time the present gullies did not exist at all, but the surface once lay along this line at the base of the sandstone, where the gold was being washed out from the decomposing rocks and deposited in small placers before the formation of sandstone that buried them. Then over this sandstone there was a great overflow of lava rock, known in that camp as "porphyry." A further change took place and the two gullies we have at the present time were formed. Here we find several horizons in which the gold is found in paying quantities. First in order of discovery are the modern placers down in the gullies, secondly, the great vein with many smaller ones, thirdly, the ancient placers now found under the sandstone on all the hills and now rapidly assuming great value; fourthly, gold ore deposited along crevices in the sandstone, and