of these rocks, but such is not the case. They contain quantities of well-rounded pebbles of dense quartzites, quartzoze conglomerates, and finely grained slates. These are especially noticeable in the drifts of the Dunstan and Earnscleugh flats. As these rocks are hardly known to occur *in situ* within the present watershed, they must either have been brought into the deposits by other agencies than existing ones, or they are the remains of a formation at one time overlying the schists. The gravels of the Mataura Valley, on the other hand, consist almost entirely of quartzites, ranging in texture from those so fine grained that their clastic nature can only be discerned under the microscope to coarse conglomerates. These drifts contain gold differing in form from that found in purely schistose wash, and as both kinds of gravel are intermixed in the Molyneux drifts, so are both forms of gold.

The mica-schist rocks, when subjected to erosive agencies, whether glacial or aqueous, do not form rounded pebbles. The difference in the hardness of the quartz and mica laminations precludes this. Water-worn fragments of schist are always irregular in their outline, and when travelling along with gold do not exert the same pounding and flattening effects upon the grains that well-rounded pebbles do. A considerable quantity of micaceous silt always results from the erosion of mica-schist rocks. This finely divided material is carried by the rivers in suspension until it reaches still water, where it is deposited among the gravels; if the conditions remain stationary for any length of time it forms seams of clay, which are prejudicial in more ways than one to the saving of fine gold.

The bottom upon which the auriferous gravels rest is one of great importance. The difficulty of dredging upon a hard-rock bottom has already been mentioned. Soft-rock bottoms occur sometimes near the margins of old lake-beds, and nearly always in flats which have been formed by the accidental damming of small streams, and in the beds of rivers where the flow of water has not been sufficient to scour the rock. In a soft-schist bottom the rock is frequently decomposed to a depth of 2 ft.; the change appears to penetrate deepest where the dip of the rock is least. In outward aspect the rock is unaltered, the foliations and flakes of mica appear unchanged, but the rock can be crushed to powder with the hands, the quartz laminations being quite soft. A better bottom for dredging can hardly be conceived. The term "false bottom" is generally used by miners to designate a stratum other than rock upon which an auriferous wash rests. It may mean a band of clay in beds of gravel, or a layer of barren gravel with gold-bearing wash on the top. In a more restricted sense it is used to denote a bed of pipe or other clay often containing fresh-water shells: this is the only bottom there is any possibility of reaching in the wide flats through which many of the Otago rivers flow. It represents the old lake-bed, and was formed by deposition at a time when nothing but silt was brought into the lake by its tributary streams. It can be seen on the margin of the Mataura Lake basin, but is probably at too great a depth to be reached by dredging anywhere along the existing river-channel. It forms the bottom upon which the wash rests in the upper portion of the Ida and Manuherikia Valleys, and in other places. It depends in a great measure upon the nature of the clay whether it forms a good dredging-bottom. If the clay is soft but at the same time tenacious, it not only retains any gold imbedded in it, but has also a tendency to pick up any loose gold with which it may come into contact during its passage through the revolving screen or sluice-box. A bed of lignite forms an excellent dredging-bottom, but can only be found underlying recent deposits.

The stripping, or overburden, is another important factor in dredging operations. A valley-bottom or river-flat subject to frequent flooding is nearly always covered with a layer of clay. Where the stream that runs through the ground is swift, and the natural fall of the surface comparatively steep, the deposit of clay is not so deep, as each recurring flood has a tendency to remove some of the silt deposited when the last flood was receding; but when the fall of the ground is small each flood adds to the layer of clay until it often reaches a thickness which renders dredging unprofitable. A clay formed by the erosion of the mica-shists is more friable and less detrimental to gold-saving than the stiffer and more tenacious clays derived from the clay slates and other rocks. The depth of overburden of this nature sufficient to render the working of the ground unprofitable depends upon the depth and richness of the wash below. There is no doubt that sooner or later the attention of engineers will be directed to the construction of dredges that will enable the stripping to be entirely removed before the wash is lifted. Bands of tough clay interstratified with the wash are of rare occurrence; when they do exist they are more inimical to gold-saving than when the clay forms either the overburden or the bottom.

The Physiography of the Gold.

The mass of individual grains of gold appear to be relative to the distance the gold and the enclosing wash has travelled from its original source. Whether the gold of Otago was derived from silicified rocks and lodes, or whether, as held by some, the grains were built up in the gravels from solutions, does not affect the question, as both drifts and gold have been redistributed more than once. The shape of the grains is determined by the nature of the gravels with which they are associated, and the forces which have transported them. Only a small portion of the gold found in the Otago rivers was set free from its matrix by the rivers themselves. Denudation has in ages past worn down gold-bearing formations, and river systems now extinct have deposited the resulting auriferous drifts on the flanks of the mountains which form the watersheds of the rivers as we know them. These drifts are present on the slopes of the mountains surrounding the Maniototo Plain, on the Dunstan Range from St. Bathan's to Alexandra, on the lower slopes of the Carrick Range at Bannockburn, and in many other places. The deposits have been cut through and partially removed by the mountain torrents which form the tributaries of the rivers of to-day, and their golden wealth is scattered in the beds of the streams in ever-increasing fineness as the distance from the source is lengthened.