

Gold-workings in cements of Cretaceous date are also likely to develop into considerable importance, and prove a comparatively permanent form of mining in both the Grey and Buller Valleys. In the Grey Valley, and on the south-west part of the Paparoa Range, the beds in question have been but little prospected with the direct purpose of proving them gold-bearing, but there lacks not indications of their auriferous character, both in the Mount Davy Range and in the Valley of Slaty Creek and Big River. In the first-mentioned part of the district a great development of coarse breccia-conglomerates and pebbly quartz-drifts extends through the range, from the slopes of the Grey Valley to the coast-line between the Nine-mile and the Twelve-mile Creeks, north of Greymouth. The coarser material of this division of the cements resembles the breccia-conglomerates of the Horse Range and Trotter's Creek that form the lower strata of the Shag Point Coal-field, in the Otago Provincial District, where, of somewhat finer grain and not quite so angular in character, it resembles the deposit of the Blue Spur, at Tuapeka. The finer and more quartz material, which is the higher in the series, resembles closely the quartz-drifts of Central Otago, where, over a widely-extended area, they are often very rich in gold.

In the Buller Watershed, along the east side of the Inangahua Valley, both kinds of deposit are developed; the coarser brecciated material within the valley of Boatman's Creek and the quartz drifts from Rainy Creek to the gorge of the Buller River, on the west slope of the Brunner Mountains.

The vast formation of angular brecciated material represented in Hawk's Crag, in the middle part of the Lower Buller Gorge, has not been proved to contain gold, but, so far as has been ascertained, no one has thought of testing any part of this formation with the object of proving it auriferous; nor may it be said does it hold out any great prospects of rewarding efforts to show that it is payably auriferous, but there is quite a possibility of its being so. The arguments in favour of the Hawk's Crag breccias being gold-bearing are, that the material, though angular, has been transported from a distance, and therefore some sort of arrangement favourable to the aggregation in particular horizons of the gold it contains must have taken place. The component rocks of the breccia material, though various, is mainly a subschistose rock, which, when *in situ*, was likely enough to contain gold-bearing reefs. Unfortunately, so far as proved, the gneissic schists of the Paparoa Range do not contain gold.

While dealing with the probability of gold occurring in cements of Cretaceous date, I may close this by remarking that, during a recent visit to the Upper Buller Valley, in which I accompanied Mr. Gordon, Inspecting Engineer, we were both strongly impressed with the evidences that a very large part of the gold found in the valleys of the Maruia, Matakītaki, Mangles, &c., have been directly derived or liberated from conglomerates and pebble-beds under- and over-lying the principal or lower coal seams. The facts constituting the evidence on which our opinion as to the auriferous character of the conglomerates referred to have been known to all during the last twenty years or more, and in a vague way have been speculated upon by Mr. Cox when reporting on the geology of the district.\*

The facts are not more clear now than they have been at any time during the past twenty years; but they are such as lead to the very definite conclusion that the conglomerates referred to are a great storehouse of gold, and are likely to prove of the utmost importance in the near future, now that attention has been pointedly drawn to them.

Of course it remains to be proved whether the gold is widely dispersed throughout a great thickness of gravel or conglomerate cement, or whether it is concentrated so as to occur as rich deposits, allowing of its being mined from particular bands of conglomerate. From the well-rounded character of the bulk of the conglomerates the inference is that the gold will be found as rich deposits in particular horizons, although, at the same time, the cements may be generally gold-bearing to a less degree.

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## GEOLOGY OF THE GREY AND BULLER VALLEYS.

### GENERAL SKETCH.

*Grey Valley.*—The principal source of the Grey River is Lake Christabel, which lies towards the south-western end of the Spencer Mountains. Towards the east, these mountains are formed of sandstone and indurated shales of probable Carboniferous age, followed at places by calcareous breccias, and diabasic ash-beds, red or green, that are probably of Triassic age. From beneath these, to the westward, appear mica-schists.

From Lake Christabel the Grey flows west across the schist-belt till it receives the Brown Grey coming from the north, from the junction with which it has a south-west course between schist mountains on the east side of the valley and granite mountains on the west side, till, again altering its course, the river breaks through the chain of granite mountains, and thus forms the first gorge of the Big Grey. Through the granite gorge the river at first runs north, then north-west to the point where it receives the Alexander coming from the north-east. Thence the Big Grey has a generally west-north-west course to its junction with the Little Grey, below which junction the united waters are known as the Grey River. The gorge of the Big Grey and the course of the Alexander River are in granite or gneissic rocks; but around the sources of the Snowy River, a tributary of the Little Grey, the granite gives place to unaltered rocks consisting of sandstones and slates, forming part of the auriferous series of Reefton (Maitai series of Carboniferous age). These rocks, as a belt four to five miles wide, extend north-east to the Inangahua, and from Merrijigs north to the reefing district of Crushington and Murray Creek.