

much of the same nature, hence the following classification which was adopted for the latter subdivision applies equally well to the rocks of the Heaphy Subdivision.

- (1.) Ordovician: The Aorere Series.
- (2.) Miocene: The Oamaru Series.
- (3.) Pleistocene and Recent: Beach-deposits and river-débris.
- (4.) Post-Aorere: Igneous Rocks.

(1.) *The Aorere Series.*—The rocks of the Aorere Series constitute the oldest beds in the portion of the subdivision so far examined, and, forming as they do the mountainous "old land" of the interior, cover by far the largest portion of the area. Towards the north-west they are obscured by younger beds. The Aorere rocks consist of coarse- and fine-grained argillites and grauwackes, occasionally graphitic and sometimes extremely pyritic, with occasional bands of schist. They are intruded and somewhat altered in places by igneous rocks of both acid and intermediate nature. In appearance the sedimentary rocks are usually light greenish-grey, weathering rusty, sometimes extremely fissile, with greasy slickensided surfaces. They have a constant nearly meridional strike, and in general a steep westerly dip. Towards the east of the subdivision, however, the angle of dip lessens, and the beds become much warped, minor anticlines and synclines being of frequent occurrence.

(2.) *Oamaru Series.*—The Miocene beds of the area have their maximum development in a belt of country fringing the coast-line, and having an average width of about two miles. They also appear as isolated patches on the slopes of the "old land" to the east. The series is represented by beds of quartzitic breccia and arkositic sandstones, with shales and small coal-seams, overlain by quartzose conglomerates, followed by arenaceous limestones and calcareous sandstones. The calcareous beds forming the upper members of the series are confined entirely to the upland country flanking the coast, and bounded on the south-east by the cuestas already described. East of these, exposed by the denudation of the upper beds, the lower members of the formation are developed in an irregular belt of country, averaging about half a mile in width, and forming the valley between the "old land" and the uplands. Shales, with small coal-seams and quartzitic breccias, are exposed in patches on the hillsides still further east. The beds throughout have a nearly constant slight dip to the north-west. Occasionally, however, local flexure, the effect of faulting, is encountered where the beds abut against the "old land."

(3.) *Pleistocene and Recent.*—Deposits of Pleistocene and Recent age are encountered along and near the coast-line and in the beds of all watercourses. They consist of beach sands and gravels and river-débris.

Unconformably overlying the calcareous sandstones of the Oamaru Series, and exposed as irregular shelves on the crests of escarpments along the coast-line (sometimes at an elevation of 200 ft. above sea-level), beach boulders, gravels, and sands are to be observed. Remains of these beds are also to be found quite half a mile inland from the coast. The coarser constituents of these beds are of argillite, grauwacke, and quartz, corresponding with the rocks of the "old land." The finer sands are often extremely rusty, sometimes almost black, and frequently yield fine gold to the dish. It is probable that the fine gold found in some of the smaller creeks is a rewash from these beds.

In places the Recent beach-sands contain payable leads of gold, associated with black sand; while the gravels of some of the streams were in the early days highly auriferous.

(4.) *Igneous Rocks.*—The igneous rocks of the part of the subdivision investigated are of acidic and intermediate type. Acidic rocks are confined to a single sill of felsite of an average width of 20 ft., exposed in the headwaters of the Anatori River and extending uninterruptedly in a meridional direction for some miles. Its connection with a large granite mass lying to the south-west of the area examined is undoubted. The intermediate igneous rocks of the area appear in a dyke of diorite, about 20 ft. in width, transverse to the strike of the ancient sedimentaries, which is also exposed in the headwaters of the Anatori River. Examination has been too restricted to determine the age of these intrusives beyond the fact that they are definitely Post-Aorere, and probably Pre-Tertiary.

Economic Geology.

The economic possibilities of the portion of the Heaphy Subdivision examined are, from a geological standpoint, confined to the production of gold and the preparation of building-stone, though the agricultural possibilities are of considerable importance. The strip of country bordering the sea-coast, and formed by the decay of the calcareous beds of the Oamaru Series, affords a fine sandy soil capable of great possibilities for the agriculturist. A large area of this land is still available for settlement. Flax grows luxuriantly on the low hills near the coast, while good timber is to be found in places on the hills further inland.

Gold.—In the early days, owing to the discovery of rich gold-bearing alluvium in some of the stream-beds, the district was the scene of a diggers' "rush." Later on, auriferous veins were found; but these, though occasionally carrying high values, were unfortunately of small extent. The veins occur near the heads of Malone, Friday, and Independent creeks. In all cases the old workings were inaccessible, but our examination, which was thus necessarily confined to surface outcrops, showed that the veins are all bedded with the argillites and grauwackes of the Aorere Series, and in consequence have a north-and-south strike. Near the head of Friday Creek some small 6 in. veins are exposed in shallow prospecting-trenches. One of these veins shows a little free gold, and it is possible prospecting operations were abandoned somewhat prematurely. A picked sample of ore from this yielded on assay the following results:—

Gold	...	...	...	...	...	...	8 dwt. 19 gr. per ton.
Silver	...	...	...	...	...	...	1 dwt. 21 gr. ..
Value	...	...	...	...	...	...	£1 15s. 3d. ..