

Little can be said as to their age, apart from the fact that they are at least older than Ototaran, as they underlie marine strata of that age. They were tentatively correlated by Macpherson with Williamson's Highburn Series of Otago Central, to which an Eocene age was given. Lithologically the fine quartz conglomerates are very similar to those of the Taratu Series of Cretaceous age described by Ongley from the Kaitangata-Green Island district.

*Chatton Series.*—The beds of this series comprise marine sandstones, grits, conglomerates, and greensands. The fossiliferous localities are few, the best collection in the Wakaia district being from near Landslip Hill. During the period in which the gold dredges were operating large marine shells were brought up from what was apparently a marine sandstone bottom immediately west of Muddy Terrace, while many years ago fossils were collected from the eastern side of Muddy Terrace near Freshford; here weathering has proceeded to such an extent that casts only are procurable. Fossiliferous limestone is found at Balfour, fifteen miles to the south-west, but no limestones have been found within the subdivision.

*Maori Bottom Series.*—Near Wakaia are several sets of gravels ranging in age probably from the Pliocene to Recent. Their separation is extremely difficult, for although they can locally be distinguished they grade laterally into gravels which are indistinguishable. In all cases the degree of consolidation and weathering are similar. The gravels have their greatest development immediately east and south-east of the township, where large areas were worked for gold many years ago; there appear to be two sets of gravels, the Maori Bottom proper being the older and richer.

The gravels of this formation contain a fair percentage of quartz, most of it as small, well-rounded pebbles, as well as rounded to subrounded pebbles of weathered greywacke and semi-schist, some of which are more than 6 in. across; the whole are set in a sandy matrix and strongly weathered. These beds overlie the rich wash at the lately-worked King Solomon Mine; there is a small strip of similar gravels a mile farther east in the Winding Creek valley. The auriferous gravels at Muddy Terrace appear to be identical with those at Switzers, and the inference is that the beds mentioned should be linked up as the remnants of a continuous deposit laid down by an ancient river. To account for the sudden appearance of gravels of greywacke and semi-schist succeeding beds predominantly of quartz detritus, crust movements and faulting are postulated; and since schistose rocks override the gravels in the King Solomon, and Maori Bottom beds are crushed against the schist at the foot of Round Down a mile and a half south-east of Wakaia, these gravels were at least in part laid down before faulting had ceased.

The surface of all these deposits is maturely dissected and shows a rounded topography retaining no appearance of flat-topped terrace remnants.

There is no very good evidence for the direction of flow of the ancient river. All outcrops were examined carefully to see if the imbricate arrangement of the component pebbles would yield any information, but no definite evidence could be so adduced. Macpherson advanced a theory that possibly the early river flowed down the eastern side of Whakaea Valley to Switzers, whence it flowed through the gap to the east and made its escape to the south down the Wendon-Otama Valley. No supporting evidence could be found, and, indeed, the absence of Maori Bottom gravels in both the upper Whakaea and Wendon-Otama valleys is against this hypothesis. There are practically no pebbles derived from highly altered schists, a fact suggesting that the river which deposited the gravels did not come from the north.

*Pleistocene and Recent Beds.*—There are widespread areas of gravel deposits, usually preserved as terrace remnants, which probably range through the Pleistocene to the Recent. In many places these gravels contain quartz pebbles, though mostly they contain little or none; but these differences can be explained by the suggestion that where the quartz is present the depositing stream was then eroding an area on which remnants of the early quartz conglomerates still existed. The gravels of these sets of terraces are not richly auriferous. Small patches were worked a short distance south-east of Wakaia, and from the top of the hill at Switzers the flat remnants of their terraced surface show out clearly as compared with the rounded surface of the Maori Bottom gravels nearby. This dissimilarity of the topography extends to the composition of the gravels, as the younger set contains practically no quartz pebbles, and is, without doubt, a deposit of Winding Creek before it had cut the gorge it now occupies between Round Down and the White Umbrella Range.

The most recent deposits are the gravels, sands, and silts occupying the floors of the main valleys and having their greatest extent in the Whakaea Valley. There are also considerable areas of tailings in the vicinity of the township. Various thicknesses of a heavy clay cover all the less-elevated areas. This has formerly been described as a wind deposit and termed loess, but this theory is doubtful, as pebbles of quartz are included, sometimes abundantly.

#### ECONOMIC GEOLOGY.

*Gold.*—Since gold was discovered near Wakaia over seventy years ago the district has been the centre of fairly extensive mining activities until the present day. Recently the closing-down of the King Solomon Deep Lead Co.'s mine marked the cessation of work on what has been one of the richest finds in Southland.

Most of the gold taken from the district came from the gravels of the Maori Bottom beds and in its turn was presumably derived from the quartz conglomerates of the Welshman Series, which are slightly auriferous.

The most important workings in beds of the former age were at Switzers and Muddy Terrace, though small remnants have been worked between Switzers and Welshman Gully. Large areas of a former, much more widely-spread, deposit of Maori Bottom gravels have been removed, yielding further gravels which have been worked extensively in the gullies to the south-east of Wakaia. Such was also the origin of the gold obtained by the dredges which worked from near the township south to Freshford and along