disturbed greywackes and argillites forming the Seaward Kaikoura Range. These are regarded by McKay as belonging to the Maitai System, and therefore of Carboniferous age. Similar rocks occupy a considerable area near the coast north of the Hapuku River, appear in the lower part of the Puhipuhi Valley, and form hilly country south of the Kaikoura River. These, together with some badly weathered sandstones or greywacke occupying a small portion of Kaikoura Peninsula, are mapped by McKay as Liassic, whilst to lithologically similar rocks south of the Kahutara River he assigns a Triassic age. At the present time there is no satisfactory evidence to show that the rocks of the Seaward Kaikoura Range are older than those of similar appearance near the coast-line, and therefore all may well be tentatively assigned to a Trias-Jura system until the necessary criteria for subdivision are forthcoming.

Resting unconformably on the Trias-Jura rocks are sandstones and shales, reported by McKay (6, p. 176) to contain Inoceramus, and therefore presumably of Cretaceous age. These rocks, which are but poorly exposed either in the Kaikoura Peninsula or the Puhipuhi Valley, are succeeded, apparently with conformity, by the thick, fine-grained, hard limestone known to geologists as the Amuri limestone, the age of which is either Upper Cretaceous (Danian) or very early Tertiary. The upper limit of this must be regarded as defined by a water-worn surface, on which rests unconformably a thin layer of conglomerate formed almost wholly of phosphatized fragments of limestone, embedded in a calcareous glauconitic and sandy matrix, and accompanied by thin inconstant beds of greensand. Next follows from 50 ft. to 120 ft. (or more) of limestone, lithologically similar to the Amuri limestone, but considered by McKay to be equivalent to the Weka Pass stone of northern Canterbury (16, pp. 163–64), a correlation that seems to be well founded, and that, if accepted, implies a Tertiary age for the Kaikoura rock. Next in upward succession follows the Grey Marl, a calcareous argillaceous rock of great thickness, which, as previously stated, is separated by a mild unconformity from the underlying limestone. The Grey Marl in most localities contains a considerable amount of fine micaceous sand, so that the name given to it is not altogether a happy one. In places, especially towards its base, it is really a fine or even medium-grained calcareous sandstone. Small pyritic concretions, many now converted into limonite, are not uncommon in the exposed faces of Grey Marl east of the Maori village on the south side of Kaikoura Peninsula. On the tidal shelf in the same locality a number of steeply dipping veins of calcareous sandstone, none more than a foot in thickness, may be seen crossing the bedding of the Grey Marl at various angles. These are evidently of the same nature as the so-called "sandstone dykes" of California and other regions.

Notwithstanding the unconformities present, the post-Jurassic rocks of the last paragraph, whether Cretaceous or Tertiary, do not exhibit any marked divergence in structure other than the peculiar local corrugations of the limestone to be described later. In the Puhipuhi Valley, owing to the combined effects of folding and faulting, they strike north-north-east, and dip at high angles to the south of east or north of west. In Kaikoura Peninsula their strike is generally north-east and their dip of varying intensity. On the whole, as stated by McKay (6, p. 174) the arrangement appears to be anticlinal, but is complicated by minor crumpling and by faulting.

The remaining rocks of the district are of Pleistocene to Recent age, and consist in the main of the gravels forming the great conjoint delta-fan of the Hapuku, Kowhai, and Kahutara rivers, together with the shingle and sand that constitute the raised beaches described on a former page under the heading of "Physiography."

Geological Map.—McKay's geological maps being merely rough sketches on small scales, it is desirable that a more detailed map of the Kaikoura district should be published. Owing to the insufficiency of the available data, a geological map to accompany the present report could not be prepared, and it is evident that a considerable amount of survey is needed in order to enable one of a satisfactory nature to be compiled.

Minor Folds or Corrugations of Limestone.

The limestone of the Kaikoura Peninsula in places shows a remarkable corrugated structure not clearly traceable into the overlying Grey Marl. These corrugations were therefore considered by von Haast to be evidence of unconformity between the two rocks (2, p. 39, and section viii, opp. p. 46), whereas Hector, on the other hand, regarded them as produced in the limestone by some form of concretionary action (3, p. xi). At a later time he seems to have ascribed the phenomenon to dynamic forces only (12, p. x). The writer observed that on the east side of Kaikoura Peninsula the Grey Marl shows traces of minor folds in sympathy with the underlying contorted limestone, and, moreover, is slickensided close to the contact with the underlying rock. Hence it is clear that Hector was right as regards the minor significance of the local contortions in the limestone. Marshall, Speight, and Cotton's explanation of the reason why the corrugations are not seen in the Grey Marl—namely, that its plasticity allowed it to yield to external forces without itself being materially deformed (19, p. 390)—seems to be perfectly correct.

Highly irregular corrugations are seen on the tidal rock shelf at the east head of Kaikoura Peninsula, where they affect the uppermost layers of the limestone immediately below the Grey Marl. Being exposed by denudation over an area that may be measured in acres, they give an appearance comparable to a choppy sea. In the cliffs to the southward they are of greater size and appear somewhat more regular, but on the foreshore near the Maori village close irregular folds, with a vertical component of only a very few feet, are again prominent. Here the upper 60 ft. of the limestone adjoining the Grey Marl, though with a steep dip, is fairly regular. The contortions were not observed to extend in any exposure below the thin conglomerate that marks the contact with the true Amuri limestone, but it cannot be definitely stated that such is everywhere the case. McKay, indeed, gives a sketch showing corrugation in the older limestone (13, p. 76).