

Mapiri Beds.—The Morere beds continue up to a strong bed of white pumiceous sandstone. Generally the lowest 6 in. of this bed is darker and crystalline, formed of quartz, feldspar, and mica, and grades up through grey into fine white sandstone. It is 6 ft. thick at Mapiri. This pumiceous-sandstone band forms strong dip-slopes, and can be followed inland from Mapiri across the main road and the Maraehara River and up the ridge to the west, forming dip-slopes that trend north-west and north into Turanganui Survey District. Here the outcrop runs round the north of the Morere anticline and turns south-west again into Nuhaka North Survey District. It extends along the west side of Te Arai Valley, and into the Mangapoike watershed. With the beds of pumiceous sandstone occur massive beds of bluish-grey mudstone. North of Mapiri these beds are 3,500 ft. thick; and in the south of Mahia Peninsula, 5,000 ft. thick.

Otunua Beds.—Above the pumiceous bands in the west of Mahia Peninsula, and well exposed in the Turanganui and Otunua streams, occurs mudstone similar to that of the Mapiri beds, but free from pumiceous layers. On Mahia Peninsula it is 4,000 ft. thick, and has been eroded at the top.

Ormond Beds.—Resting on the pumiceous-sandstone beds, and containing boulders of them with a conglomerate 15 ft. thick at its base, is the limestone cap of Moumoukai Hill, 120 ft. thick. On the west side of Mahia Peninsula the same bed, resting on an eroded surface of Otunua mudstone, forms Long Point and Black Reef, and has a conglomerate at the base. There it is 200 ft. thick.

Petane Beds.—On the west-south-west part of Mahia Peninsula, above the limestone at the mouth of Mangatea Stream, is 1,000 ft. of fossiliferous Petane mudstone.

Pleistocene and Recent.—Mahia Isthmus, three miles long and two wide, consists of sand flats and dunes. Sand-beaches form the coast for three miles east of the mouth of the Nuhaka River and for three miles south of the northern boundary of the subdivision. Short boulder-beaches occur at Onepoto Bay, Waikokopu, Opoutama, Takararoa, Tikiwhata, Waikara, Whareongaonga, and south of Mapiri. A shell-beach extends along the north coast of Mahia Peninsula from three miles to four miles and a half west of the Whangawehi Stream. Signal Hill, in the north-west of Mahia, is surrounded by sand-flats a quarter of a mile wide, 20 ft. above sea-level, joining it to the mainland. McKay mentioned that on the north shore of Mahia Peninsula there is a low raised beach 5 ft. to 7 ft. above present high-water mark, and that on the terraced flat lands of the peninsula there are shingle beds, evidently an old beach, at a height of 200 ft. to 300 ft. (Rep. Geol. Explor. during 1886–87, No. 18, pp. 108–9; 1887.)

The Cretaceous Mangatu rocks of the subdivision have been tightly folded, overturned, and crushed; and in the small areas exposed the attitudes of the beds are difficult to interpret. On the east side of Mahia Peninsula they crop out in a semicircle with an overturned fold in the centre, both limbs of which dip south 80°. An anticline extends north-west from the coast across Taiporutu Stream, trending towards the gas-emanations one mile inland. Both limbs are steep, one dipping north 60°, the other south 80°. In the south part of Mahia Peninsula, too, the beds are steep, and a short steep anticline trends north-north-east, dipping 60° to the west and 70° to the east. In Kopuawhara Stream, in Mahanga Survey District, the Mangatu beds strike north, and dip east 40° to 70°.

The Tertiary rocks are gently folded. The Moumoukai syncline, extending north across the subdivision from the coast west of the mouth of Nuhaka River, through Moumoukai Hill, to Te Arai Stream, separates two large anticlines. One, the Morere anticline, trends north-east from the Nuhaka River, past Morere, to the coast of Paritu Survey District, three-quarters of a mile north of Paritu Stream. It has on its north flank a large bulge extending across Nuhaka North Survey District into Patutahi Survey District, east of Te Arai Stream, and a smaller one extending three miles north in Paritu Survey District. This fold covers more than a hundred square miles. West of the Moumoukai syncline another big anticline, the Mangapahi anticline, trends north for ten miles across the west part of Nuhaka North Survey District from the southern boundary to Mangapoike Stream near the northern.

Within the area examined faults are of minor importance in determining the structure as compared with folding; but the folds are modified by faults. The folded Cretaceous rocks on the east side of Mahia Peninsula run against a fault trending north that lets up gas and salt water in three sets of springs. The Morere anticline is cut by several parallel faults near Kopuawhara Stream, close to the boundary between Mahanga and Nuhaka North survey districts, on which occur many gas-emanations. These faults trend south-south-west into Opoutama Stream, and there, too, allow salt water and gas to escape in groups of springs.

Another strong fault trends west-north-west from the coast at Waikara, in Paritu Survey District, across the south of Nuhaka North Survey District, and has been observed as far as Mangapoike Stream.

Small faults break the rocks almost every chain, and are well exposed on the wave-cut platforms of the shore-line, especially on the east coast of Mahia Peninsula.

ECONOMIC GEOLOGY.

Oil and Gas.—This subdivision being part of the much larger area of the east coast of the North Island in which oil-indications are known, naturally attracts attention as a prospective oilfield. The area examined during the past season contains two big anticlines affording favourable places for oil to accumulate in, and from fractures in these structures hydrocarbon gases are escaping. The underlying Cretaceous rocks exposed in the east part of Mahia Peninsula smell strongly of oil; and similar Cretaceous rocks were found exposed by faults crossing the Morere anticline, so that evidently they underlie this field.

Gas-springs were mapped in several places. In the east part of Mahia are three groups; in Mahanga Survey District, six groups; in Nuhaka North Survey District, two groups. The occurrence of these close to Cretaceous rocks or on faults along which fragments of Cretaceous rocks have been brought up indicates that the gas has its source in the Cretaceous. A gas-spring in Mangapoike Stream and three sets of emanations in the south part of Mahanga Survey District do not, however, show connection with the Cretaceous.

In the Morere anticline hot saline water escapes at Morere Spa at a temperature of 49° C. (120° F.). The water contains 1,899.60 grains of solids to the gallon, or 2.714 per cent.—mainly sodium