report, dominates the structure of the west half of Porangahau Survey District, and is conspicuously marked by being eroded into an extensive physiographic depression. In Eketahuna Subdivision this fold was complicated by minor corrugations such as the Ti Tree and Mount Arthur anticlines; but in the lowland along its northward extension in this subdivision outcrops are too poor to allow detailed structure to be made out, for it is only in the foothills along the bounding ranges that the rocks crop out. There the Tertiary beds, containing in their base conglomerates with pebbles of the underlying Cretaceous rocks, stand nearly vertical, parallel with the Cretaceous beds; out from the ranges they dip more and more gently into the syncline. But, as already stated, away from the margins the rocks crop out so rarely that the structure cannot be followed in detail. Again, all the beds along the contact are slickensided and shattered, showing that they have moved differentially; but with both sets vertical it is impossible to diagnose the movements further than to recognize that they are bedding faults.

This Akitio syncline, occupying the depression with its margins vertical in contact with the Cretaceous ranges, suggests that the ridges are anticlinal; but the Tertiary cover is eroded off the ridges, and the undermass of the ridges does not form anticlines but complex blocks intricately faulted. Owing to the lack of fossils and distinct lithologic markers, the Cretaceous rocks are puzzling and in many places cannot be satisfactorily resolved; but in a fair section in Porangahau Gorge the nature of the Cretaceous structure is indicated. There, at the east end of the gorge, alternating sandstone and mudstone strike north-east and dip 70° to the north-west for three-quarters of a mile and rise on the west into lighter coloured argillite and glauconitic sandstone, forming the well-known Kate's Quarry beds. These contain trails and fucoids, but nothing that dates them. They have previously been classed as Opouawe (= Lower Mangatu), and from their material and state of induration they appear to belong to the upper Cretaceous. In the quarry the beds are vertical and have their tops turned over to the west. West of them is a wide crush-zone in which the rocks slump along short fault-line gullies. West of the broken belt is a hard, dark, coarse sandstone, very shattered, and resembling the greywacke, but without the usual alternating beds of argillite, and containing the "cannon-balls," smooth round, dark, concretions, 6 in. to 12 in. through. No fossils were found in these; but on lithology they are correlated with the Raukumara sandstone of Waiapu Subdivision, which has been mapped also in the Eketahuna Subdivision, where it yielded the characteristic *Inoceramus bicorrugatus*. Broken specimens, identified in the field as *I. bicorrugatus*, were found in two places, not in this section, but in similar rocks. No section was found to indicate the thickness of these beds, but they stand nearly vertical and extend continuously half a mile across the strike in Note Creek in the north-east part of Porangahau Survey District.

In Porangahau Gorge these Raukumara beds are bounded on the west by another fault-belt of broken country eroding by mud-flow and slump into fault-line gullies. West of this the beds are soft, fine chocolate and black mudstone interbedded with green sandstone, with fossils in three places that are characteristic of the Tapuwaeroa Series of Waiapu and Eketahuna Subdivisions.

As field-work has shown that the normal sequence of the formations is Raukumara at the base followed by Tapuwaeroa and Mangatu, this section through Porangahau Gorge shows that the undermass of the ridges between the synclines does not form simple anticlines.

The ridge of Cretaceous rocks west of the Akitio syncline, of which the south end was mentioned in last year's report as the Mount Cerberus - Ossa Ridge, continues across Porangahau Survey District as the Whangai Range. The ridge east of the depression, hitherto nameless, as far as can be found out, is called Porangahau Ridge. Between the two ridges the wide depression occupying part of the Akitio syncline is only part of the Porangahau basin, and so has to get a distinct name, and is called, from the Wilder Settlement in it, the Wilder Depression.

In last year's report it was mentioned that the ridge east of the Akitio syncline, the Porangahau Ridge, was at the north folded into an incipient syncline. This was followed in the south-east part of Porangahau Survey District and found to die out two miles north of the boundary.

Stratigraphy.

The rocks of the Dannevirke Subdivision are similar to those of the Eketahuna Subdivision and fall into the same classification, except that so far no rocks have been found corresponding to the three lowest formations, the Tararua, Taitai and Waewaepa Series—that is, no rocks lower than the Raukumata Series (Cretaceous) are known in the part mapped so far.

Only rarely have fossils been found, so that the mass of the rocks have to be classified on lithology and continuity, and the mapping will probably have to be revised as more evidence is obtained.

Raukumara Series.—In Note Creek and in Porangahau Gorge unbedded dark coarse sandstone, indurated and shattered, forms a belt half a mile to a mile wide, extending north-east as far as a mile past Old Hill Road. Similar rocks crop out along the west of Porangahau River south-east of Trig. 23 and also a mile upstream. Two small outcrops of similar rock, one on the east of Porangahau River east of Trig. 23 and one half a mile to the north-east, contained the large shells of Inoceramus that were not collected but in the field were taken as *Inoceramus bicorrugatus*. On the lithology and on the fossil determination the rocks were classed as belonging to the Raukumara Series. In many places the sandstone contains hard round concretions 6 in. to 12 in. through, which give it a prominent feature easily recognizable in many places.

Tapuwaeroa Series.—The characteristic Tapuwaeroa fauna was found in Maclennan Creek in the north-east part of Porangahau Survey District, and also in a bounder in the south branch of Note Creek; and in a very weathered conglomerate a quarter of a mile west of the Old Hill Road 30 chains south of Green's homestead decomposed shells and markings were taken for the same fauna. The extent of the beds that should be classified with the fossiliferous beds is difficult to decide, for the structure is complicated and the rocks are not distinct. Below, the Tapuwaeroa beds are limited by their contact with