

has direction 30° , and so far has been established for twenty miles from the southern boundary. The Porangahau has eroded a lowland, the Wilder Depression, from the soft rocks it contains. West of the syncline and extending to the north of Porangahau Survey District is the Whangai Range, which bifurcates to the north. The east extension gives place to an easily-eroded belt of soft early Tertiary mudstone, three miles wide, and extending to just north of Wanstead. There the belt is taken up by the Tangatupara Ranges (adopted name), of Cretaceous argillites, and divided medially by an echelon fault-belt, which is occupied by Tangatupara Stream. West of this belt, and in Motuotaraia Survey District, is a succession of Tertiary beds, mudstones, thick massive Tutamoe sandstones, and the fairly hard Te Aute limestone. These beds dip to the west, some at low angles and some at high angles. Farther west in the Takapau Survey District is a block of Mesozoic (?) greywacke, faulted along its east boundary, and succeeded on the west by west-dipping Tertiary sandstone and limestone.

The Porangahau Range, north of Porangahau Gorge, and east of the Wilder Depression, consists almost entirely of Cretaceous beds, dipping steeply to the west. The sequence—Raukumara—Tapuwaeroa—Whangai—is repeated probably three times, the youngest beds being to the west in each case. The blocks are separated by faults, and are probably broken by minor faults between the formations, possibly also within them. South of the gorge the structure is even more obscure. The Raukumara sandstone appears at one point in the gorge, but in the south the rocks can be referred only to the Whangai and possibly the Tapuwaeroa series. South of Porangahau the range consists of two blocks, with the sequence Whangai—Tapuwaeroa from west to east. The blocks are separated by a fault which has a downthrow to the west. This fault continues south, where for a short distance it forms the western boundary of the Akitio Syncline, the block west of the fault cutting out. A parallel and pivotal fault within the eastern block with a downthrow to the east breaks an erosion surface, and, continuing south-west with its direction of throw reversed, also forms part of the boundary of the Akitio Syncline. The block east of the Mangamaire depression is complex and consists in the main of coarser mudstones and sandstones. These beds, however, are correlated with the Whangai Series. Along its seaward margin occur the bentonite beds, correlated tentatively with the Wanstead Series. Farther south and to the east occur Tertiary mudstones.

The Mangamaire valley stretches to the south boundary along the east side of the Porangahau Range. It is a graben floored with Tertiary let down between Whangai rocks, on the west those of the Porangahau Range, and on the east those of the coastal hills. The fault on the west probably continues north-east along the foot of the wave-cut cliff at the back of Porangahau Beach.

North of Porangahau Gorge the western part of the coastal structural belt consists of inlying faulted blocks of Cretaceous sediments separated from the main Porangahau Range by Weber mudstone. The north-eastern extension of one of these ridges forms the eastern boundary of the Akitio Syncline as far north as has been mapped. The syncline pitches north, where outcrops of hard early Tertiary mudstones indicate its presence. The ridge, beginning as a fault-block, grades northward into a fairly sharp, probably broken, anticline. East of this ridge, in the Blackhead and South Pourerere survey districts, is the canoe-shaped, southern end of a very gentle syncline of Ihungia mudstone, east of which is another anticline, possibly faulted. Another syncline, about two miles wide, occurs to the east. A fault in alignment with the fracture along Porangahau Beach bounds it on the east. The beds east of the fault are Cretaceous in age and complex in structure. Their eastern boundary is a curve concave to the east, and the east-dipping Ihungia mudstone to the east has corresponding strikes. Lying on the mudstone and dipping to the east is white tuffaceous sandstone probably representing the base of the Mapiri Series.

The rocks of the Akitio Syncline are relatively non-resistant Tertiary beds. Minor corrugations occur in the extreme south, continuing from the Eketahuna Subdivision into the area for about two miles. Two anticlines, one on either side of the synclinal axis, are indicated by the outcrops, but their continuation southward has not yet been confirmed.

The harder Whangai and Tapuwaeroa beds of the anticline of the Whangai Range are underlain by a comparatively soft and easily eroded mudstone. The axis strikes 10° east of north and pitches gently south. Faults on each side of the axis have depressed the core, fault-traces showing that recent movements of the same nature have taken place. The western fault-zone continues south as the eastern boundary of the range. North-east from Manawaangi Stream the boundary of the range is determined, first by two echelon blocks separated by the eastern of the pair of fault zones, and then farther north-east by the simple dipping of the harder Whangai rocks beneath the Tertiary beds of the syncline. Another echelon block, facing north and faulted from the main range, lies two miles south of the north boundary of Porangahau Survey District. Because of the southerly pitch of the anticline, and the softness of the rocks of the core, erosion has produced a considerable basin open only to the north, and enclosed by the harder Whangai rocks. It is drained by the streams flowing north and east, the latter occupying gorges cut through the eastern limb. West of the anticline the rocks are shattered and the structure is difficult to interpret. A thrust-plane dipping 30° west, and showing yellow-stained lower Whangai rocks thrust over younger white argillites, is seen in the Te Uri Gorge. Older beds in the midst of younger occur in a strip to the west of the anticline. This may be due to faulting, or to folding and faulting. This line is indicated on the surface by a very recent fault-trace in places showing as much as 20 ft. downthrow to the west. Te Uri Stream, where it flows eastward through the range, follows a transverse fault with downthrow to the south and with a possible horizontal displacement.

A belt, three miles wide, of soft Wanstead mudstone with inliers of Whangai argillite extends from the east limb of the Whangai anticline for about a mile north-east of Wanstead. On the east a probable bedding-fault coincides with the erosion surface between the Wanstead and overlying Ihungia mudstone of the Akitio Syncline. On the west, Weber and Tutamoe beds overlie, though the contact in its north-eastern portion is probably faulted.