contains numerous pieces of that rock, thus recalling the Amuri limestone and Weka Pass stone junction in its typical aspect. A chain or two away the contact is devoid of pebbles, and soft brownish sandstone lies on a slightly irregular surface of hard bluish fine-grained sandstone.

From Weka Creek to the second or middle gorge of the Waipara appearances are consistent with a varying thickness of the Grey Marl, a condition in favour of unconformity. A quarter of a mile or more below the point where the limestone belt crosses the Waipara River a slight synclinal roll in the Grey Marl does not pass into the overlying Mount Brown beds, but this occurrence is not necessarily of such a character as to indicate unconformity. A contact of Grey Marl and probable Mount Brown beds seen in the gorge from a distance of 150 yards appears at first sight to be conformable, but no weight can be attached to this observation—a hasty one—until it is confirmed by a close examination. On the contrary, McKay when speaking of this locality states, "A stratigraphical unconformity is here evident enough in the section displayed in the right bank of the river, and again a little further down on the left bank of the river" (18, p. 102).

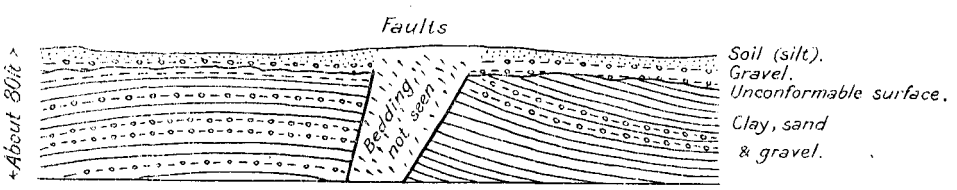
Hector very strongly supports the view that the Mount Donald—*i.e.*, Mount Brown—beds unconformably overlie the Grey Marl in the Weka Pass, and gives a section and plan in confirmation (12, pp. xi–xii).

Some miles south-east of Waipara a high cliff on the south side of Washcreek Road shows blue claystone or fine sandstone (Grey Marl), followed with apparent slight unconformity by a soft sandstone, evidently part of the Mount Brown beds. Here again further examination is necessary before the observation can be given credit.

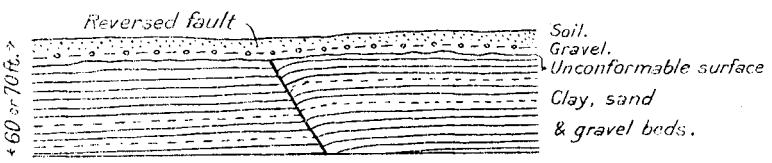
(3.) *Unconformities post-dating Mount Brown Beds.*—About two miles south-east of Waipara Township the cuttings of Washcreek Road show loose sand and shingle unconformably overlying fossiliferous sand conglomerate (? Motunau beds). On the south bank of the Waipara River, west of the road-bridge, a distinct unconformity may be seen in the Quaternary strata there exposed. (See Figs. 1 and 2 under the heading of "Faults.")

Faults.

Numerous faults, few of which have been indicated on the geological maps or sections compiled by various geologists, traverse the Waipara and Waikari districts. Hutton was the first to observe an important east-and-west fault with northerly downthrow that dislocates Cretaceous and Tertiary strata at the second or middle gorge of the Waipara River (4, p. 45 and



(1). Section on south bank of Waipara River, 1 mile above road bridge.



(2). Section on south bank of Waipara River, 1½ miles above road bridge.

section ix, opposite p. 56; see also 8, pp. 268, 269). The same geologist also mentions a fault in the Weka Pass (4, p. 45 and section x). One or two other small dislocations may be seen in the same locality (14, p. 86). Probably a strong east-and-west fault passes through Waikari Township just to the south of the railway-station.

More common than the east-and-west faults are those with strikes varying from nearly north and south to north-east and south-west. In all probability a great fault at the foot of Doctor's Range separates the Cretaceous rocks to the east from the Trias-Jura (or older) rocks to the west. West of Waikari this fault either bends to the west of north or is replaced by a series of dislocations striking in that direction. Between the second gorge of the Waipara and Waikari the limestone belt is obliquely intersected by several moderate faults, the most prominent of which is perhaps that seen where the Amuri limestone crosses Weka Creek. The limestone of the Mount Cass Range east of Waipara is broken in several places by faults of small or moderate throw. The later Tertiary strata (Mount Brown or Motunau beds) at the inland entrance to the lower Waipara Gorge dip at high angles, and are probably dislocated by a strong fault striking north-eastward and having downthrow to the north-west.

The Quaternary or, at least very late Tertiary, age of some of the faults is shown by the occurrence of two faults intersecting the late Pliocene or more probably Pleistocene gravels and clays exposed on the south bank of the Waipara River one mile and one mile and a half respectively west of the main road bridge. The one nearer the bridge appears to be a normal