fault (really a narrow fault-zone) with considerable downthrow to the north-eastward. A small flat-topped hill, immediately to the south-west, almost certainly owes its origin to the conditions produced by this fault. It is worthy of note that a trigonometrical station placed on this hill has received the name of "Mound." The second dislocation is a small reversed fault with upthrow of 20 ft. or more to the west or south-west. Sketches (1) and (2) diagrammatically illustrate these faults.

Economic Geology.

The Weka Pass stone many years ago was quarried to some extent for building purposes (2, p. 13; 4, p. 43), but its use in this connection seems to have been discontinued. The Amuri limestone, though everywhere somewhat siliceous, is in places sufficiently pure to furnish lime of fair quality. The soft-limestone deposits of the Waikari and Weka Pass district are described in another report. Their value for agriculture has yet to be determined by exploration and experimental work. Although the phosphatic horizon marking the unconformity above the Amuri limestone at Kaikoura and Amuri Bluff is present in the Waikari and Weka Pass districts, no locality where phosphate is present in commercial quantity has yet been discovered.

Discussion of Unconformities.

If the very late Tertiary or Quaternary unconformities observed near Waipara be disregarded as of no great importance, there remain three or four supposedly unconformable horizons to be discussed—namely (1) between the Amuri limestone and the Weka Pass stone, (2) between the Weka Pass stone and the Grey Marl, (3) between the Grey Marl and the Mount Brown beds, and (4) below the Great Marlborough Conglomerate. All these unconformities have been strongly affirmed and just as strongly denied by geologists of repute, so that the student who has not had an opportunity of examining the typical sections at Kaikoura, Amuri Bluff, Weka Pass, and elsewhere for himself feels at a loss what to believe. From the data given here and in other papers by the writer it is not unreasonable to conclude that the stratigraphical break between the Amuri limestone and the overlying Weka Pass stone is widespread, whilst that between the latter rock and the Grey Marl, being seen only at Kaikoura Peninsula, is merely local. The next break, that above the Grey Marl, is probably tolerably widespread, especially if the unconformity below the Great Marlborough Conglomerate be considered to come into this horizon. More probably, perhaps, the last-named break is at a higher point in the geological succession. At present in no case, unfortunately, have we sufficient palæontological data for enabling the time value of the break to be estimated.

The fact that no marked discordance in strike or dip can be found in the succession of beds from Cretaceous to upper Tertiary has led Marshall and others to advance the view that perfect physical conformity exists from top to bottom of a Cretaceo-Tertiary sequence in all parts of New Zealand (19, 20, 21, &c.). Though of a bold simplicity, this conception has not been fruitful in any respect save the promotion of discussion and a temporary thickening of the cloud of confusion involving an admittedly difficult problem. Under these circumstances the writer hesitates in making the new, or partly new, suggestion—and it is not intended to be anything more than a suggestion—that since the deposition of the Amuri limestone there have been many movements producing local unconformity in different areas, but none (with perhaps one exception) that affected the whole of New Zealand simultaneously, at least in the same way and to a like degree. Hence there may be no universal post-Amuri unconformity, but a series of local stratigraphical breaks, comparable to a number of faults disposed *en echelon*, in places overlapping, but as a rule not uniting so as to form a continuous fracture. In the absence of sufficient palæontological data it is not possible to decide whether the break above the Amuri limestone is of major importance or represents only a minor land-movement. The physical criteria as they stand seem in favour of the latter view, whilst the scanty palæontological evidence tends the other way. To some extent the few fossils reported as collected from the Amuri limestone indicate a Tertiary age for that much-disputed rock, but there can be no doubt that some of these came from the conglomerate, greensand, and limestone overlying the Amuri limestone proper, and therefore above an unconformity. Though McKay, the chief collector, usually distinguished the upper limestone as the "Weka Pass stone," it is by no means certain that he always did so. One fact not hitherto mentioned is significant, or rather may be so. Kaikoura, Amuri Bluff, and Weka Pass are points on what is practically a straight line, and that straight line is parallel to the trend not to the South Island, but of the Southern Alps and their continuation, the Spenser Range. Can we suppose that whilst the Southern Alps were being uplifted, probably for the first time, a sympathetic but much less pronounced movement raised the Amuri limestone and any overlying strata to or above sea-level, and that subsequently, depression having taken place, the Weka Pass stone and its equivalents were deposited on the eroded but almost imperceptibly tilted surface of the older rock? Such a supposition, though ill founded on facts, is in accordance with those that are known. When data are scanty, however, hypotheses are easy to construct, and what is needed is rather the accumulation of facts through the extension of detailed surveys and palæontological research, so as to obtain a solid foundation for theoretical conclusions.

Literature.

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