

5. WEKA PASS DISTRICT, NORTH CANTERBURY.

(By P. G. MORGAN, Director.)

INTRODUCTORY.

On the 24th March last a visit was made by the writer to the Weka Pass district, North Canterbury, in order to examine the contact between the Weka Pass stone and the underlying limestone, which by common agreement is identified with the Amuri limestone. For many years a controversy as to whether an unconformity existed at this horizon has been in progress, and as yet shows little sign of being settled. Although the extent of country that could be examined by the writer in the few hours at his disposal was necessarily limited, and only tentative conclusions could be reached, yet a statement of the observations made and of the probable inferences to be drawn therefrom may be useful.

GENERAL GEOLOGICAL FEATURES.

So much has been written concerning the Weka Pass and the adjoining Waipara district that only a very brief description of their geological features need be given, and for further information the reader may be referred to the literature listed at the end of this report. The oldest rocks of the district are greywackes and argillites of probable Trias-Jura age. These are unconformably overlain by a series of quartzose sands, greensands, and other rocks, the whole terminating in the white foraminiferal Amuri limestone. On this rock rests a calcareous glauconitic sandstone of small thickness, which as a rule gradually and almost imperceptibly passes into the arenaceous limestone commonly known as the Weka Pass stone. This is succeeded by a mudstone, the so-called Grey Marl, above which come the two series of soft sandstones interstratified with rubbly limestones and shelly conglomerates known respectively as the Mount Brown and the Motunau beds. The youngest rocks of the region are the Pleistocene and Recent gravels that form the surface of the Waipara and other river-flats.

The Trias-Jura rocks are strongly folded, whilst the overlying sedimentaries, with the exception of the Pleistocene and Recent strata, are thrown into moderately gentle but irregular folds, in places complicated by faulting, but, if broadly viewed, everywhere forming an apparently conformable succession, in which, however, various geologists believe discordances of some kind exist at several horizons. A good account of the structural relations near Weka Pass is given by Marshall, Speight, and Cotton (21, pp. 384–89).*

The greensands and associated strata below the Amuri limestone contain fossils of distinctive Cretaceous aspect. The Amuri limestone itself, except for Foraminifera, is almost devoid of fossils, but is commonly regarded as certainly belonging to the same series as the underlying beds, and therefore to be of Upper Cretaceous or possibly Early Tertiary age. The Weka Pass stone is poorly fossiliferous, but the presence of *Pecten huttoni* and *Epitonium (Cirsotrema) rugulosum lyratum* with several other fossils more or less characteristic of the Oamaru Series leaves practically no doubt of its Miocene age. Thus there appears to be a decided palaeontological break between the Amuri limestone and the Weka Pass stone.

SECTION NEAR WEKA PASS.

The section observed by the writer in the gorge of Weka Pass Creek near the railway-viaduct and in its upper valley is as follows:—

- (1.) Weka Pass stone, say 100 ft. thick, overlain by Grey Marl, Mount Brown beds, &c., and at base passing into—
- (2.) Calcareous glauconitic sandstone, say 2 ft. thick. This rock is not sufficiently glauconitic to deserve the name of “greensand.”
- (3.) Amuri limestone, fairly pure, 40 ft. or less in thickness. This is much jointed and even shattered in places.
- (4.) Amuri limestone, argillaceous, about 40 ft. thick. This rock where exposed to weathering breaks into small cuboidal or irregularly shaped fragments.
- (5.) Calcareous light-grey claystone, probably between 40 ft. and 50 ft. thick. Exposed surfaces break into very small fragments.
- (6.) Uncemented sand, with lumps of clay. This appears to be in the horizon of the greensand well seen in the railway-cutting towards Waikari, but probably the latter rock forms the underlying stratum.

CHARACTERISTICS OF AMURI LIMESTONE AND WEKA PASS STONE.

The Amuri limestone as developed near Weka Pass is greyish-white to almost pure white in colour, and is so much jointed as to present a somewhat shattered appearance. Bedding-planes at intervals of 1 ft. to 4 ft. are well marked by thin argillaceous layers; these appear to be perfectly parallel to the bedding of the overlying Weka Pass stone. Though fine-grained and foraminiferal, the Amuri limestone is in general so hard that the term “chalky” cannot be appropriately applied. The observation made by McKay (10, p. 83) that the uppermost layer is highly siliceous is not in accordance with the analyses quoted on a later page, which, while confirming Park’s less-pronounced statement (18, p. 554), show only a slight increase in the silica-content of this layer as compared with that of those immediately below, and indicate also that the lowest layers are more impure than the uppermost. To the eye there is no change in the Amuri limestone near the contact with the overlying glauconitic sandstone.

* The number in parentheses here and elsewhere refers to the list of publications at the end of this report.