

alternating with beds of sandstone, which are mostly quite thin. In the cliffs of the Ouse, Cover, and Swale we found fossils, mainly *Inocerami*, at four distinct horizons; but the highest of these is still far below the base of the Amuri limestone, and the intervening beds are not exposed in the banks of the Swale. Probably they can be better explored in the Nidd, which we had not time to traverse. It is to the Coverham section that we must look for the subdivision of the Upper Cretaceous and the definition of its upper limits, unless Cretaceous forms should be discovered in the Amuri limestone itself.

Correlation of the Grey Marls.

The beds following the Amuri limestone at Amuri Bluff, Kaikoura Peninsula, and the country to the north, including the Clarence and Awatere Valleys, are light or dark grey mudstones, sometimes glauconitic at the base, and often micaceous. They are very poor in fossils at Amuri Bluff and Kaikoura Peninsula, but contain a fair number of fragmentary specimens in the Mead Gorge, Clarence Valley. Probably a satisfactory collection could be made at this point if the outcrop were followed across country. The thickness of these beds varies considerably, due in part to erosion and faulting of the upper part, but it is seldom less than 300 ft., and is estimated at 12,000 ft. in the Cape Campbell section by McKay.

Beds of the same facies are found in the Weka Pass, but are quite thin, and are followed by loose sands. In the Waipara Gorge it is doubtful if the typical Grey Marl facies is present, the section being poor just at the junction; but a great thickness of sands intervenes before the lowest calcareous horizon of the Mount Brown beds is reached. These sandy beds are generally also called Grey Marls, but it has yet to be shown that they are the real equivalents of the upper part of the Grey Marls of Amuri Bluff.

It was doubtless the persistence with which the series closes with the Grey Marls north of the Conway that influenced Hector and McKay to close the Cretaceous-Tertiary sequence with this member, and to postulate an unconformity above the Grey Marls in the Waipara section. While no unconformity has been described in section, it may still exist in plan, or there may be complete apparent conformity, but a non-sequence. The sketch-maps hitherto published of the Waipara - Weka Pass district have not been made with sufficient detail to settle this point.

So far we have but a fragmentary idea of the fauna of the Grey Marls, and further collecting is necessary. In particular it is desirable to examine in detail the 12,000 ft. of strata above the Amuri limestone in the Cape Campbell district which has not yet yielded fossils, and to exhaust the possibilities of collecting in the Mead and Dee sections of the Clarence Valley. It will then be possible to compare the fauna of the sands below the Mount Brown calcareous beds, and ascertain if these are correctly included in the Grey Marls.

The Mount Brown Beds and the Greta or Motunau Beds.

Very little material is available in the existing collections for describing the faunas of these beds. Fossils are abundant in both, but they are mostly fragmentary in the younger series, while in the Mount Brown beds few localities yield anything but brachiopods. It will therefore be necessary to traverse the outcrops of each important cuesta across country from the slopes of Mount Grey to Mount Donald before the complete fauna can be ascertained. The beds recently described by Speight* in the Lower Waipara Gorge have yielded a rich fauna, but a palæontological comparison with the Mount Brown and the Motunau beds of the Middle Waipara section must be made before confidence can be placed in his correlations.

DESCRIPTION OF FOSSILS.

The day has gone by when a palæontologist will attempt to name and describe fossils irrespective of their age and nature. Most modern palæontologists confine themselves to particular groups of organisms, and frequently again to groups of a given age. Any attempt to take a short cut and avoid specialization can only end in confusion. It is obvious, therefore, that the services of many specialists must be obtained to deal with the very varied collections in the possession of the Survey. I have entered into correspondence with many palæontologists to ascertain to what extent voluntary assistance may be forthcoming, and to what extent it will be necessary to engage the services of specialists by a suitable remuneration. Mr. D. G. Lillie, Ship Biologist to the 1910 British Antarctic Expedition; Dr. Henry Woodward, Editor of the Geological Magazine; Dr. A. Smith Woodward, lately Keeper of Geology in the British Museum; Dr. F. L. Kitchin, Palæontologist to the Geological Survey of Great Britain; Professor Sollas, University of Oxford; and Mr. W. S. Dun, Palæontologist to the Mines Department of New South Wales, have given much kind advice, and have been instrumental in obtaining offers of assistance from leading specialists, and as a result many parts of the collection have already been sent away to them. To the above-named gentlemen, and to those who are actually working on the collections, the thanks of the Survey are here gratefully recorded.

The collections that have been sent to voluntary workers outside New Zealand are as follows: Plant-fossils from Mount Potts and other Mesozoic localities, to Dr. E. A. Newell Arber, Demonstrator in Palæobotany, Cambridge (these are supplemented by specimens from the Canterbury Museum, and by fresh collections made by Mr. D. G. Lillie); graptolites from Collingwood, to Dr. E. Shakespear, Birmingham; fossil wood (Cretaceous), to Dr. Marie Stopes, British Museum; Cretaceous ammonites

* Speight, R., Trans. N.Z. Inst., vol. 44, pp. 221-33, 1912.