

extend across Mount Stalker to a few miles west of the "Dasher" homestead. The junction with the rocks of the Kakanui Series is not sharp, and no trace of Williamson's hypothetical fault was found, so that the Waihemo Series may merely be a competent phase of the Kakanui Series.

The three series described above are classed tentatively as Palæozoic in age. A sharp break is present above the Kakanui Series, and the next rocks encountered are of Cretaceous age. Professor Park had given to him a specimen of *Pleuromya* cf. *spitiensis* Holdhaus, a typical Jurassic fossil, reported as having been found in the strata west of South Peak, Hampden. Up to the present, however, the only rocks known in this locality are Kakanui semischists, so that further investigation is necessary.

Horse Range Series.—Coarse conglomerates with occasional sandstone bands occur throughout the western parts of the Horse Range and form the coal-measures at Shag Point. The pebbles of the conglomerate are up to 3 in. diameter and consist chiefly of schist and quartz. As noted earlier, the conditions of their formation were probably similar to those of the gravels on the modern Canterbury Plains, and ancient lagoonal swamps are represented by seams of lignite and coal.

Herbert Series.—This series is substantially the same as McKay's Limonitic Sandstone and occurs more or less continuously along the foothills from Island Stream southward to Puke Hiwi Tahi. These limonitic quartz sandstones are seen, in a few places, to rest unconformably on the Horse Range conglomerates, but difficulty is experienced in separating sandy phases of both series, so that it may be necessary to map them as one unit. Fossils are rare, but the presence of *Trigonia* indicates a Cretaceous age for this series.

West of the Shag Valley Fault limonitic sandstones and conglomerates are present as isolated caps on the mica-schists, and the deposition of these sediments was probably cœval with that of the Herbert Series. From Williamson's descriptions*, the Hogburn Series of Naseby Subdivision seems to be the nearest equivalent of the Herbert Series.

Otepopo Series.—High-grade greensands appear near Herbert Township and stretch southward to Waianakarua, where they seem to lens out between the Herbert Series on the west and the Hampden Series on the east. So far no fossils have been collected from these beds.

Katiki Series.—South of Waianakarua the Otepopo Series is replaced by a group of shaly, greyish-blue sandstones containing occasional spherical concretions. These are the Kartigi Beach Beds of McKay, and they extend to Shag Point, where a few belemnites have been collected.

Moeraki Boulder Beds.—These lie east of the Katiki Series and consist of buff-coloured shaly mudstones with large septarian concretions well exposed at the south end of Hampden Beach. The evidence of the Foraminifera is not yet definite, but this series appears to be merely a facies of the Katiki beds.

Hampden Series.—A richly fossiliferous group of pale-blue micaceous mudstones and clays appears to the south of the Waianakarua Estuary. A division into three stages has been made by Professor Park and is confirmed by the work of Dr. Finlay on the Foraminifera. The lowest strata are glauconitic clays with occasional fossils, greensands overlies, and the younger beds which extend north to Kakaho Creek, contain numerous Bortonian fossils.

Concretionary greensands overlying fine micaceous clays outcrop in the cuttings of the Shag River, near Dunback, and from foraminiferal evidence are placed tentatively in the Hampden Series.

Apart from rather weak stratigraphical evidence in favour of correlation with the Hampden beds, there is little to indicate the age of the fine-grained, pink, sandy mudstones and glauconitic sandstones occurring at and near Palmerston.

Waiarekan Volcanic Group.—Tuffs and volcanic breccias form the gently-undulating coastal strip between Kakanui and the Waianakarua Estuary. Associated closely with these rocks are the dolerites and basalts of Mount Charles, Look-out Bluff, and Moeraki Point. At Herbert the tuffs are extremely hard and fine-grained and have been used in the construction of the flourmill at Waianakarua. With this series are correlated the basalt and dolerite caps on such hills as North and South Peaks; Government Hill; Little Table Hill; and Trig. S, Maheno.

These caps appear to be the remnants of a once-continuous lava plateau, the origin of which is obscure, but the ancient craters and plugs at Kattothyrist and Siberia Hill offer some solution to the problem.

Caversham Sandstone and Goodwood Series.—Brown calcareous sandstones with poorly preserved echinoids, brachiopods, and molluscs underlie the basalt at Puketapu, Palmerston, and pass eastwards beneath limestone and mudstones of the Goodwood Series. Service† correlates the latter with the Awamoia beds and the former with the Hutchinson Quarry beds.

All-day Bay Series.—This is a group of light-blue and brown fossiliferous mudstones of Awamoian age lying in a synclinal basin of Waiarekan tuffs between Kakanui and Aorere Points.

Waipiata Series.—This name was introduced by Williamson for the basalt flows and caps of igneous rock lying above the Wedderburn sedimentaries. In this group are included such volcanic caps as Puketapu, Janet Peak, Smyler Peak, and Taieri Peak. The basalt is post-Awamoian in age since it overlies the Caversham Sandstone at Puketapu.

Pleistocene and Recent sediments form the terraces occurring in the valleys of the Shag and Waianakarua Rivers, and many of the terrace levels can be correlated with uplifted platforms on the coast.

* WILLIAMSON, J. H.: 28th Ann. Rep. N.Z.G.S., 1934, p. 7.

† SERVICE, H.: "The Geology of the Goodwood District, North-east Otago." N.Z. Jour. Sci. & Tech., Vol. 16, 1934, pp. 270-1.