

SPECIAL REPORTS.

1. MOTUEKA SUBDIVISION. (By J. HENDERSON, L. I. GRANGE, and E. O. MACPHERSON.)

Introduction.

THE geological examination of an area in the Nelson District, for the most part within and including almost the whole of the basin of the Motueka River, was begun in September, 1923, and was continued to May, 1924. The survey districts of Owen, Tadmor, and Gordon, as well as a portion of Wangapeka, in all an area of about 450 square miles, were examined in detail. The northern portion of the basin of the Motueka will be surveyed next season. The district adjoins the Dun Mountain Subdivision, reported on thirteen years ago (N.Z. Geol. Surv. Bull. No. 12, 1911), and forms a considerable part of the area separating that subdivision from the Parapara (Bull. No. 3, 1907) and Collingwood (Bull. No. 25, 1923) subdivisions lying to the north-west, and the Mount Radiant (Bull. No. 11, 1910) and Buller-Mokihinui (Bull. No. 17, 1915) subdivisions lying to the west and south-west.

Physiography and Structure.

The northern portion of the Alpine range of the South Island extends through the eastern part of the district, in the south-eastern corner of which the highest peaks of the so-called Red Hills rise to nearly 6,000 ft. above sea-level. The western third of the district examined covers part of the mountain-system of western Nelson, and numerous crests rise above 5,000 ft. and even 6,000 ft., the highest points being Mount Arthur (5,800 ft.) and Mount Owen (6,155 ft.). Between these highlands is a broad belt of much lower country, which, according to the ideas now accepted by most New Zealand geologists, has been depressed by fault-movements relatively to the earth-blocks forming the mountains on either side. McKay, many years ago, traced the general courses of the great fractures along the edges of the low country, that to the east being termed the Waimea fault, and that to the west the Motueka fault. The highlands are traversed by other strong faults, which in part control the courses of the streams and the distribution of the rock formations.

The principal river of the district, the Motueka, which drains almost the whole area here considered, rises in the eastern mountains and flows diagonally across the lowlands to the western side of Tasman Bay, which occupies the northern portion of the depressed area. Its chief tributaries are the Motupiko, draining the southern part of the lowlands, and the Wangapeka, which has its basin almost entirely in the western highlands. Other branches traversing the western part of the lowlands are the Tadmor and Sherry streams. The Wairoa, a stream much smaller than the Motueka, has its source in the eastern mountains, but after reaching the lowlands flows out of the subdivision.

There are no permanent snowfields in the subdivision, although these must formerly have covered considerable areas, especially in the western highlands. Corries and cirques with small tarns occur at the heads of many of the streams, some of which flow for several miles through upland glacial troughs. In some localities moraines occur down to about 2,000 ft. above sea-level, but there is no evidence that glaciers ever reached the lowlands.

General Geology.

The subdivision is interesting in containing probably the least incomplete sequence of Palæozoic rocks in New Zealand. Sediments of Mesozoic age are exposed over a small area, Tertiary rocks outcrop in several localities, and large deposits of Pleistocene gravels cover the lowlands. Granite forms a wide strip along the eastern side of the western highlands, and basic and ultra-basic igneous rocks have been intruded into the older sediments of both mountain blocks.

The oldest rocks of the district examined, the Mount Arthur Series of McKay (1879), consist chiefly of strongly folded dark carbonaceous argillites, slates, and phyllites, which are generally calcareous and in places pass into thick lenticular masses of impure limestone (marble). Beds of quartzite and quartzose greywacke also occur in the upper part of the series. These rocks form the great massif of Mount Owen, whence they continue north through the district. Two thin dark bands of argillaceous rock with pronounced slaty cleavage, and containing numerous casts of trilobites, outcrop on the saddle between Patriarch and Taylor creeks, about 60 chains north-north-east from Patriarch Trig. Fragments of encrinite stems were obtained from impure limestone a little above the Dart junction, and markings, probably graptolites, were found in pebbles of black slate occurring in Wright Creek, a small branch of the Wangapeka. The rocks of the Mount Arthur Series are thought to be of Ordovician age, or older.

Next in age is a thick series of greenish argillites, greywackes, and quartzose greywackes, also strongly folded, extending along the western edge of the subdivision. For the most part these rocks are separated from those of the Mount Arthur Series by powerful faults or by areas of younger rocks, but are in contact with them near the Wangapeka Forks. Here coarse greenish greywackes pass downward into dark-greyish quartzites which are interbedded with black slates and phyllites, and these, though not in direct continuity with any area of typical Mount Arthur strata, exactly resemble the predominant rocks of that series. The greywackes and argillites of the younger series cannot be distinguished lithologically from similar rocks forming the Aorere Series of Collingwood and the west coast of the South Island.

Folded rocks of the Baton River Series, which consists chiefly of quartzite-conglomerates, quartzites, and calcareous quartzites with minor bands of carbonaceous shale, overlie the Mount Arthur beds, but, so far as known, are nowhere, within the area examined, in contact with those of Aorere age. They outcrop over a wide belt west of the Mount Arthur rocks, extending north from Rolling River and lying chiefly to the west of the Wangapeka River. Their distribution clearly indicates that they overlie the Mount Arthur beds with strong unconformity, but no section showing actual contact was found. In several localities the calcareous quartzites contain poorly preserved fossils. These are supposed to be of Silurian (Wenlock) age.