The mountains along the eastern border of the subdivision belong to two distinct elevated masses, and are separated by a great fault following the Wairau valley. This fracture reaches the edge of the Nelson lowland near Tophouse, and thence extends south-west past the northern end of Lake Rotoiti and the southern end of Lake Rotoroa. The mountains to the south-east are part of the great area of uplift that extends throughout the South Island. That part within the subdivision, which occupies most of Arnaud Survey District and part of Rotoroa Survey District, is traversed by strong north-north-east faults. Along these, streams and glaciers have excavated the valleys of the D'Urville, Sabine, Travers, and upper Wairau rivers. The massive interfracture blocks now form the exceedingly rugged ridges of the Mount Misery, Mount Robert, and Raglan ranges. These mountains are not yet mature, and there are no low passes between the valleys. Since the larger branches of each main stream flow from the west and the watershed of each range is near its western border, the blocks when elevated probably had an eastward tilt. The peaks on each ridge increase in height southward; this increase is gradual over long stretches separated by step-ups where cross-faults occur. Mount Travers (7,666 ft.), on the Mount Robert ridge and near the south-east corner of the subdivision, is the highest point within it.

The mountains north-west of the Wairau fault are separated from the Nelson lowland by a well-marked fracture-zone (the Waimea fault of McKay) that extends from Tophouse to the northern boundary of the subdivision, a distance of ten miles. These highlands form part of the Ben Nevis Range, the highest point within the area examined being Beeby's Knob (4,712 ft.).

The central highlands of the Murchison Subdivision have not yet been completely explored. They form a triangular mass ten miles wide on the northern boundary, with the apex at Mount Murchison, thirteen miles south. The most easterly of the three blocks that make up these highlands forms the Hope Range and Mount Murchison, its continuation south of the Buller. It is a broad plateau-like mass of granite, fourteen miles long and about four miles wide, separated from the Nelson lowland by the well-known Hope fault, and from the adjacent uplifted block and from the Murchison lowland by equally well-marked fractures. The elevated block to the west forms the Look-out Range, which is continued north into the Motueka Subdivision as the high ridge between the Dart and Rolling rivers, branches of the Wangapeka. It is about 1,000 ft. higher than the Hope Range, and when elevated probably had a tilt to the west. The third earth-block of the central highlands is the Mount Owen massif, a dissected plateau of which the southern four miles is within the Murchison Subdivision. It is about three miles wide, and, on the whole, has a gentle westward slope. The highest point, Mount Owen, is 6,155 ft. above sea-level.

No part of the western highlands was explored during the season. They extend along the western border of the subdivision, forming the Lyell Range north of the Buller and the Brunner Range south of that river.

The Nelson depression extends south and south-west through the subdivision, and, so far as explored, maintains an average width of rather more than twelve miles. Southward its floor rises; the step-up to the southern part of the central highlands is small, though that to the south-eastern highlands is still more than 1,000 ft. The northern half is filled with late Tertiary and younger gravels, but in the south the hard rocks flooring it are exposed over large areas.

Only a small part of the eastern edge of the Murchison depression has been explored in detail. It is covered with strata of middle Tertiary age or older, which form ranges up to 4,000 ft. high.

Except for some eighty square miles in the north-east corner of the subdivision, drained by the Motupiko and its branch, Rainy River, the whole of the area examined lies in the basin of the Buller River. This large stream flows from Lake Rotoiti in a general west-north-west direction for twenty-one miles; from the junction of Owen River it is in a straight south-south-west valley for nine miles as far as Longford, whence its course to the boundary of the subdivision, seventeen miles away, though decidedly winding, is in general west.

Rotoiti is a narrow, flat-bottomed lake of about 3·8 square miles in area, with a maximum depth of 269 ft. It occupies about five miles of a moraine-dammed valley extending south-south-west for eighteen miles into the eastern highlands. The Travers River flows through the upper part of this trough, which is characterized by numerous truncated spurs and hanging tributary valleys.

The Buller, in the west-north-west part of its course, is joined from the north by the Hope and Owen rivers, which drain respectively the east and west portions of the central highlands and parts of the adjacent depressions. From the south it receives the Howard and Gowan rivers. The former drains a considerable area of the Nelson lowlands; the latter is a stream larger than the Buller at their junction. The Gowan flows from Lake Rotoroa, which receives its waters from the D'Urville and Sabine rivers, similar in size and environment to the Travers. Lake Rotoroa is 9·2 square miles in area, nine miles long, from 60 to 120 chains wide, and 500 ft. deep. It lies entirely within the Nelson depression, and occupies part of a glacial trough that is continued north for six miles as the Gowan valley.

In the south-south-west part of its course the Buller receives no large tributary, but in the westward-flowing part it is joined by the Matiri and Newton rivers from the north, by the Mangles from the east, and by the Matakitaki and Maruia from the south. The Matiri drains most of the Murchison depression north of the Buller, and the Newton part of the western highlands. The Matakitaki and Maruia, streams similar in size to the Gowan, rise far to the south in the eastern highlands, and have about a dozen miles of their lower courses in the Murchison Subdivision. The Mangles forms the natural up-stream continuation of the Buller, which above the Mangles junction abruptly changes its general direction.

General Geology.

The oldest strata examined during the season are the Palæozoic marbles, schists, phyllites, and quartzites of Mount Owen. These are continuous with the rocks of the Mount Arthur Series in the adjoining Motueka Subdivision. Poorly preserved graptolites were observed in pebbles of dark phyllite in the bed of the west branch of Owen River.