

PHYSIOGRAPHY.

The main physiographic features are the fault-block mountains of schist separated by intermontane plains or basins similar to those mentioned in last year's report. Mount Pisa Range (6,327 ft.) and Grandview Range (4,577 ft.) rise to the west, and Dunstan Range rises to the east of the Cromwell basin, which is from 700 ft. to 1,000 ft. above sea-level. To the west of the Grandview block mountain are the depressions in which lie Wanaka and Hawea, two lakes maintained at their present level by morainic material and separated from each other by the Mount Maude fault-block. Kernbuts, which according to A. C. Lawson indicate downthrow faulting or subsidence rather than uplift, are noticeable features on the shores of these lakes. The Remarkables Range (Double Cone, 7,688 ft.), in Coneburn Survey District, is part of a fault-block tilted to the east. A broad north-south valley, for which the name Strath Gyle is suggested, lies to the west of the range in continuation northward of the Kingston reach of Lake Wakatipu. Peninsula Hill (2,768 ft.) stands in the angle formed by the intersection of the downfaulted strips now occupied in part by the Queenstown and Kingston reaches of the lake.

The drainage of lakes Wanaka and Hawea and of the Cromwell basin is by way of the Clutha River, which after being joined at Cromwell by the Kawarau from Lake Wakatipu becomes the Molyneux River properly so called.

GENERAL GEOLOGY.

Previous geological work carried out in the newly mapped areas was done by A. McKay, who journeyed over Lindis Pass to Lake Wanaka. Little need be added to the geological summary contained in last year's report. In general the Maniototo schists of Palæozoic age pass upwards into less-metamorphosed phyllites, but no unmetamorphosed greywackes belonging to the Kakanui Formation were seen. Of Tertiary sediments, the Kyeburn conglomerate as well as the Naseby marine beds are absent. The lowest horizon of the St. Bathans beds is represented in Lindis Valley by remnants of silicified quartz-grit in the form of wetherstones; clays representing the overlying lake-beds outcrop in Lindis Stream near Ardour; conglomerates, sands, and clays faulted in near Tarras village and near Albert Town represent higher Tertiary horizons.

The greywacke conglomerate or "Maori bottom," that was piled into the intermontane basins was largely washed out again before glaciers invaded the basins. A period of erosion followed this Pleistocene Glacial Epoch. After a second but smaller invasion of ice, the fluvial and fluvio-glacial material now covering the floors of the basins was subjected to the present steppe conditions, under which the existing soil mantle accumulated.

ECONOMIC GEOLOGY.

Soils.—Soils and irrigation-water are the most important geologic assets of the subdivision. Soil maps, which are being described in a separate report, have been prepared showing, among other things, the distribution of land differentiated according to facilities for irrigation and drainage, irrespective of availability of water. These maps will show how the limited quantities of water available can best be utilized.

Limestone.—In addition to the already known deposits on the shores of lakes Wakatipu, Hayes, and Wanaka, a mound of calcareous travertine at Gibbston is the only new source of limestone mapped.

Building-materials.—Unlimited quantities of schist are available for constructional work. Sandstone beds at Bob's Cove are quarried to a small extent.

Roadmaking-materials.—An abundant supply of roadmaking-material is obtained from deposits of gravel which, being naturally mixed with earth, binds well.

Quartz Sands.—A bed of exceptionally white quartz sand suitable for glassmaking is being quarried near Bannockburn School. This bed extends farther south along Shepherd Creek, but its full extent is not known.

Lignite.—Very little lignite is found in the area covered last season. The mines at Gibbston are abandoned, and the small mine in Doolan Creek is so difficult of access that its output is almost negligible.

Gold.—Alluvial gold is unevenly distributed throughout the fluvial and fluvio-glacial deposits of Central Otago, and was more plentiful in Recent river-gravels than in older beds. The Recent river-gravels are for the most part worked out, while the thicker fluvio-glacial accumulations and old gravels have mostly been abandoned before being worked out. The maximum annual output of gold was made in 1863, three years after the discovery of the goldfield. The population reached a maximum in 1864, after which date miners left the district, rapidly at first and later in gradually decreasing numbers until now there are comparatively few. No miners were seen working in the area covered by Tarras and Cluden survey districts. On the Kawarau River a party is sluicing fluvio-glacial material near Victoria bridge, and between this point and the Kawarau Falls one miner was seen at work. At Arrowtown a sluicing plant is operated at intervals in extensive old workings in Bracken Gully. At The Sugarloaf, near Arthur's Point, on the Shotover River, a party is attacking a thick deposit of fluvio-glacial gravel abandoned many years ago. To the north of Arthur's Point the Shotover River has been diverted through a tunnel so that part of its bed may be worked for gold, and at Sandhills, on the Upper Shotover, an insilted channel is being sluiced open in order to lay bare some 40 chains of channel now occupied by the river. Other parties are at work in Moonlight Creek, a tributary of the Shotover, and in Twelve-mile Creek, west of Queenstown.