

geological side by Mr. E. J. H. Webb and Mr. E. de C. Clarke, and on the topographical by Mr. K. M. Graham. It was considered advisable for me to have the assistance of both Mr. Webb and Mr. Clarke, in order that they might become familiarised with the methods of geological survey work. The geological work in North Westland is being directed by Mr. P. G. Morgan, while the topographical survey in the same area is under Mr. Greville's direction. Professor James Park has been again given temporary employment by the Geological Survey, and is now prosecuting work, with several temporary assistants, in the Western Otago division.

ROUTINE OF THE YEAR.

Throughout the year I have been engaged practically continuously in field-work, with the exception of the period from the 13th April to the 8th September. During this period I was engaged at headquarters in the preparation of my report for the year 1905 and of Bulletin No. 1 on the Hokitika Sheet of North Westland, and in various other matters arising out of the supervision of the departmental work throughout the colony.

As previously mentioned, at the close of 1905 I was engaged with Mr. Colin Fraser in the geological survey of the Coromandel subdivision of the Hauraki Peninsula. Early in January, feeling that the work was well started, I left this part of the survey-work in Mr. Fraser's hands, and departed for Auckland. While in Auckland I was enabled to pay a brief visit to the Drury Mine, near the city, and attend to other minor departmental matters. On the 22nd January I left Auckland, and proceeded south *via* the Wanganui River. At Wellington and Christchurch a few days were necessarily spent in attending to various departmental matters, but by the beginning of February I was able to join Professor Park in Central Otago, where he was engaged in prosecuting the geological survey of the Alexandra subdivision. A few days were passed with Professor Park, in order to familiarise myself with the interesting work which he had in hand, and a departure was then made for the Hermitage, Mount Cook. The route followed was by the road from Cromwell, up the Clutha Valley to Queensberry, and thence across the Clutha River to Tarras Station, on to Omarama and Lake Pukaki, and thence to the Hermitage. Some ten days were spent in and around the Hermitage, and a very good general idea was obtained of this centre of glaciation in New Zealand. As a stranger to the country, I was greatly impressed with the magnificence of the ice features, and their really wonderful proportions, considering the relatively low altitude of the country and its comparative proximity to the Equator.

Reconnaissance of Copland River.—On the 26th February I left the Hermitage in company with Guide Clarke and Dr. Marshall, and, having crossed the lofty mountain col in the Moorehouse Range known as Fitzgerald Pass, we descended into the valley of the Copland. This river was followed to its junction with the Karangarua, down which we continued to the Main South Road.

The Copland rises in the Marchant Glacier, under the name of the Douglas. About five miles below the frontal face of the glacier it is joined by the Strauchon, a river which flows from a glacier of the same name. The Copland is a typical example of a stream formed by glacial erosion of a pre-existing river-channel, as shown by the broad U-shaped valley, smooth steep mural precipices bordering it, and by the truncation of spurs jutting from the ridge on either side of the valley. Scenically the river-valley is of great beauty, with its gorgeous vegetation, magnificent cliffs, and the snow-clad peaks ever visible in the background. Lithologically the river-valley is not of great interest, and there is a pronounced similarity in the rocks exposed along its banks. Near the headwaters schistose argillites and phyllites prevail, while more to the westward these are underlain by highly metamorphic mica-schists and quartz-schists. Vein quartz is generally conspicuous by its absence. Alluvial gold has been found, I believe, at Welcome Flat, situated some five miles below the mouth of the Strauchon, but never in any appreciable quantity. Scientific interest in the lower part of the river centres around some remarkable thermal springs on the northern bank of the stream, just below Welcome Flat. These springs rise in a small flat-topped area of brownish sinter exhibiting miniature terraces. The sinter area is surrounded by a luxuriant growth of New Zealand flax and other coarse vegetation, while close at hand, beneath an immense erratic, apparently but slightly removed from its original position, is a cave at the base of which a spring heavily charged with hydrogen-sulphide occurs. The springs issuing through numerous orifices within the sinter area are at a high temperature, but below boiling-point.

Assays were made of the sinter by Dr. Maclaurin, Colonial Analyst, and gave negative results for gold, silver, and platinum. An analysis of hot water issuing from the springs gave the following results, which are expressed in grains per gallon: Potassium-chloride, 2.3; sodium-chloride, 17.0; sodium-bicarbonate, 76.6; calcium-bicarbonate, 27.0; magnesium-bicarbonate, 2.5; ferrous bicarbonate, 2.0; sodium-silicate, 14.9; total solids, 142.3 grains. This shows a mineral water resembling the Puriri waters, containing, however, a very much smaller amount of salts than the latter. The Copland water may perhaps be of value as a mild alkaline water.

Early in March, after proceeding to Christchurch *via* the Otira Gorge and Arthur's Pass, I joined Mr. Colin Fraser at the head of the Wilberforce River, travelling from Christchurch by way of Lake Coleridge. Mr. Fraser, who had left his work in the Hauraki division to assist me in Westland, in order that a bulletin on the Hokitika subdivision could be published during the session, was at the time engaged on a detailed survey of the area included within the Westland Reefs Mining District, which lies between the area drained by the headwaters of the Wilberforce River, a tributary of the Rakaia flowing eastward through Canterbury, and the headwaters of the Arahura River, flowing westward through Westland. This district, and the contiguous mountainous country to the westward within the limits of the Hokitika subdivision of North Westland, occupied the united attention of Mr. Fraser and myself for the rest of the season.

As already remarked, I returned in April to Wellington and gave my attention to office-work there until the 8th September, when I departed for the southern part of the Hot Lakes District.