

the track from the valley of the Aorere to the mouth of the Heaphy had been cleared of scrub and re-formed, while a hut, known as Whakapoai, had been constructed near the mouth of the Heaphy, to facilitate our operations in that locality. The track from the Aorere to the Heaphy, across the wide open stretches of the Goulard Downs, offers a ready ingress into the heart of the Heaphy subdivision, while Whakapoai, to which supplies can be brought by steamer, forms a convenient base of operations throughout the area.

Owing to the fact that the topographical surveys being conducted in the Heaphy Subdivision under our Topographer, Mr. Greville, were not sufficiently advanced to undertake detailed geological work, it was decided to limit my investigations of that nature to a brief reconnaissance into the least-known parts of the area.

*Physiography.*—The Heaphy River and its principal tributary, Gunner Creek, present an excellent section through the south central part of the subdivision. The Heaphy is of a very extraordinary shape—its main headwater branch forming an almost complete circle. Rising within ten miles of the sea, it flows first east, then north-east, and finally almost south-west to the sea, having a total length of nearly forty miles. The Gunner, which is a large stream, rises close to the headwaters of the Heaphy, and also has its upper branches interlocking with the Kowhai, a stream which enters the sea some ten miles south of Whakapoai. To the east of the prominent ridge bordering the upper waters of the main branch of the Heaphy lies the chief headwater stream of the Aorere, rising in the beautiful Heart Lake, and flowing at this point to the north-eastward. Cutting deeply into the ridge between the Heaphy and the Aorere is the deep valley of the Ugly River, flowing southward, or in the opposite direction from the Upper Heaphy and Aorere, to join the Karamea.

To the eastward from Heart Lake rise close together several tributaries of the Karamea. A stream, which is apparently the Roaring Lion, flows first north-easterly, then easterly, and finally southerly; while another branch, either entering the Karamea nearer the sea than the Roaring Lion or joining that stream near its mouth, has in general a southerly course, its headwaters draining the lofty ridge immediately south of the Roaring Lion. Some of these headwater streams rise in small mountain tarns of great beauty, showing ancient glacier cirques.

As the result of the deep dissection of the country by the numerous interlocking streams, in conjunction with the complication of past glaciation, the interior of the area exhibits a maze of ridges often showing pronounced aiguille topography. The country is not very high, the greatest elevation in the subdivision—that of Mount Domett, lying just to the south-west of Heart Lake—scarcely exceeding 5,200 ft.

The most interesting physiographic feature of the Heaphy Subdivision is shown in the ancient peneplain of the Goulard and the Gunner Downs. The Goulard Downs lie north of the Heaphy, the Gunner Downs south of that river and west of its tributary, the Gunner. They represent the south-western continuation of the old arm of the sea, which in Miocene times stretched up the valley of the present Aorere as far as Brown's River, while the ridges to the north-westward and south-eastward exhibit the higher country which stood above the sea of that period.

The Goulard Downs are a large stretch of elevated, very gently undulating country, with a length of about five miles from north-east to south-west, and about three miles in width. Their general elevation is fairly uniform, ranging from 2,000 ft. to 2,500 ft. It is remarkable that the old drainage flowing north-east along the old valley to the Aorere should have been captured by the Big River and other streams flowing directly westward to the ocean.

The Gunner Downs are of about the same extent as the Goulard Downs, being about five miles from north-east to south-west and four miles from north-west to south-east. Their elevation is somewhat greater than the Goulard Downs, averaging about 3,000 ft., and their surface is more irregular and rolling.

The small streams on both the Gunner and Goulard Downs are generally of gentle gradient, and flow in open valleys. On leaving the uplands the descent towards grade, either at sea-level or at the main rivers, is very rapid, a feature which makes nearly all the streams difficult to traverse as their headwaters are approached.

There is practically no low-lying flat land in the Heaphy Subdivision. At the mouth of the Heaphy there is a very limited area of good flat land, and for some distance up that river there are at intervals small patches. At the mouths of the smaller streams the amount of flat-lying land is practically negligible. Generally the elevated mountain country descends abruptly to the sea, and in places cliffs occur, though for the most part the sea front of the subdivision is relieved by sand beaches or gravel banks. The strong sweep of the powerful northward current prevents the rapid growth of these very narrow beaches into coastal belts.

Means of communication in the Heaphy Subdivision are poor. It is an unpleasant trip on foot from Whakapoai along the generally soft sand beaches and rolling boulder banks to the Kowhai Stream. From a few miles south of the Kowhai the sand beach as far as the Karamea Settlement is much harder, and horses can be used for this distance. From Whakapoai to Karamea the shore-line is followed all the way, save at a point just north of the Kowhai Stream, where a pronounced cliff, known as the Kowhai Bluff, necessitates leaving the beach.

The north-western part of the subdivision is reached by a rough track leading from the settlements and mines near Mangarakau to the Kahurangi lighthouse. As already remarked, the north central part of the subdivision is easily entered by the track from the Aorere to Whakapoai. At present much the most inaccessible part of the area is the south central part. It now takes three days' hard travelling from Whakapoai, through dense forest, over the rolling Gunner Downs, and along serrate mountain ridges, to reach Heart Lake. It is proposed to improve this route during the coming winter by making a rough horse-track from Whakapoai to the saddle at the head of the Kowhai and Gunner Streams. Here a small hut will be erected, whence supplies brought to that point (a day's journey from Whakapoai) can be relatively easily swagged along the ridges to the remote parts of the subdivision.