the stream meanders along a typical glaciated valley, some two miles long, whose U-shaped cross-section has been somewhat obscured by post-glacial landslides and slips. After leaving this valley the stream flows down a narrow rocky gorge over many cascades to its junction with the Left-hand Branch, which is 700 ft. below the alluviated glaciated valley mentioned above. The chief tributary of this branch is a mountain torrent flowing from the range between it and the Lake Creek from Lochnagar and having its source on the eastern face of the Centaur Peaks. This creek has built a large alluvial fan out into the main valley. The valley of the Left-hand Branch is strikingly similar to that just described, although not quite as extensive. Two huge landslides block the mouth of the glacial valley, and over them the stream cascades to the junction some 700 ft. below. Where the Left-hand Branch discharges from the small glacial valley at its source, practically at the same height above the main valley as that of the Right-hand Branch, it does so over a gentler cascade and smaller falls than the Alexander McKay Falls. Talus deposits at the base of the main valley's walls are much in evidence and in places meet across the valley, the stream meandering in a narrow channel. From the junction of its two branches Sixteen-mile Creek continues down a deep schist gorge containing several large waterfalls, and joins Shotover River, the eastern boundary of the Earnslaw Survey District. At the junction there is a well-marked series of terraces, ranging from 108 ft., the height of the first series above the Shotover River bed, to 230 ft., the top of the main and highest series of these terraces. The surface of the 230 ft. terraces rises gently toward the base of the hills, where it is then 300 ft. above the Shotover, and this fact, coupled with the general fanlike appearance of the terraces, suggests that the gravels were originally deposited as a vast alluvial fan by the Sixteen- and Seventeen-mile creeks, at a time when the general base level was some 200 ft. to 250 ft. higher than it is to-day. Such a condition was probably due to the blocking of the main river valleys by the recessional moraines of the dying glaciers and vast outwash fans from the glacial streams. The formation of the alluvial fans by the tributary streams in the Shotover valley has forced the main stream hard against the opposite bank, where in several cases the Shotover has cut a deep (80 ft.) gorge in the toe of a schist spur; this can be seen to advantage just a few chains below the point where the Sixteen-mile Creek joins the Shotover. Corresponding to the series of terraces at the mouth of the Sixteen-mile Creek is a similar series at the junction of the Flood Burn and the Shotover, and again in the valley of Moonlight Creek, along the eastern boundary of the Glenorchy Survey District, just west of Trig. BB.

Glaciation.

Throughout the district there is strong evidence of extensive valley glaciation, but none for anything in the nature of an ice-sheet. The main streams draining the eastern slopes of the Richardson Range flow through glaciated valleys in their upper reaches for a distance of some three miles; this is to be seen in the upper valleys of Flood Burn, Sixteen-mile Creek, and Moonlight Creek. At the heads of these valleys are well-developed cirques, each about 1,000 ft. high, above which are small hanging valleys, lying in the same direction as the main valley below. These hanging valleys along the main valleys are characteristic of the glacial topography of the Earnslaw Survey District.

The evidence of the ice action in the Rees Valley on the eastern slopes of the Richardson Range is by no means as marked as on the western slopes, although there is a general correspondence of the major glacial features on both sides of the range. On the eastern side of the range, as in the other parts of the subdivision, all the cirques face south-west, south, or south-east, and similarly the height to which signs of ice action can be observed—namely, about 4,500 ft. Many of the characteristic features of the valleys are obscured by immense post-glacial landslides and slips. To a large extent the major slipping has been along the schistosity planes, and an excellent example of this can be seen at Lochnagar, just outside the north-east corner of the subdivision, where an immense slip blocks the valley and forms the lake; the schistosity plane on which slipping occurred forms a conspicuous feature on the landscape.

The evidence for two periods of the glaciation is fairly strong and consistent. In addition to the features described in last year's annual report from the western portion of the subdivision, there is the evidence of ice advance in the upper valleys after the main glaciation as shown by the hanging-glacial valleys at the head of all the main valleys draining the eastern slopes of the Richardson Range. Another feature that lends support to the "two-period" theory, although outside the subdivision, is worth mention—that is, the moulding and carving of an old moraine by a second and later glacier in the upper reaches of the Left-hand Branch of Skipper's Creek. Park (1909, p. 30) describes part of the Miller's Flat moraine as planed to an even surface by the Shotover Glacier.

Structure.

The major structural feature of the district is the Moonlight Fault, which crosses the subdivision in the subdivision south-east corner of Glenorchy Survey District. Infaulted along the line of the Moonlight Fault is a band of Tertiary rocks, which has been traced from Bob's Cove to the Flood Burn described by Park (Bull. No. 7, 1909). Where the infaulted Tertiary crosses the Glenorchy Survey District it can be seen in Dead Horse or Ben More Creek, in Moonlight Creek, and on the ridges between these streams. The fault strikes a few degrees east of north and dips west at 63°. It is well exposed in the face of the bluff on the south side of Moonlight Creek at the point where the Moonlight Sluicing Co. have driven a tunnel through the Tertiary for their water-race. Here on the east side of the fault the schist is thoroughly crushed, sheared, and strongly contorted; the Tertiary is about 200 ft. thick and consists of bands of hard, dull-grey limestone, calcareous sandstone, and a hard quartz conglomerate, together with a small thickness of fault breccia. The plane of contact on the western side of the fault is clear cut and well defined. Poor but determinable fossils have been described from the Tertiary beds which belong to the Oamaru Series (Park, 1909, p. 67).