Sections illustrating Coal-measures, etc.

According to my notes of August, 1914, the Tertiary coal-measures may be seen in contact with Trias-Jura greywacke on the western shore of Picton Harbour, north-west of the end of the new wharf. For 11 chains or more to the north from the contact the Tertiary rocks are shelly conglomerate, pebbly limestone, and sandstone, more or less faulted for the first 2 chains. At 4½ chains to the north of the contact a 6 ft. band of sandstone strikes 321°, and dips at 65° to the south-west. At 5½ chains to 8 or 9 chains Trias-Jura greywacke seems to underlie the conglomerate. At 8 chains there is sandstone, striking 256° and dipping about 25° to the north-north-west; it rests on twisted greywacke. Hence an anticlinal structure seems to be present. From 9 chains to the point near the freezing company's wharf, where outcrops cease, the dip of the Tertiary beds steepens. North of the wharf the first rock visible is a crushed breccia formed of schistose rocks and greywacke. The predominating rock in this crush-zone is schist, with quartz laminæ; some phyllite is also present. The masses of schistose rock lie nearly flat.

On the western side of the peninsula, below the freezing-works, a brown sandstone which dips at 50° or 60° (probably) in an easterly direction is seen for several chains along the foreshore. It is succeeded southward by a fine dark-coloured conglomerate, which is perhaps of Trias-Jura age. Coarse brown sandstone and fine conglomerate, undoubtedly belonging to the Tertiary series, are next seen. A small excavation has lately been made in these rocks just above high-water mark. Not far from here the first discovery of coal in the Picton district is said to have been made, and in consequence the prospecting-shafts mentioned on an earlier page were sunk under the direction of Mr. Pugh. Conglomerate continues to outcrop for some chains to the south-west. A coarse breccia-conglomerate involved in a fault-zone is then seen for over a chain. Bands of argillite and fine-grained greywacke (Trias-Jura) just to the south strike 225°, and dip at 65° to the south-east. Half a chain on, the strike is nearly the same, but the dip is 90°. Then coarse sandstone, fine conglomerate, and coarse conglomerate appear in succession. The next rock is a narrow band of fault-crushed greywacke. This is followed by a shelly conglomerate, and this by shale and sandstone, striking 178°, and dipping at 45° to the west. The old workings of the Picton Coal-mine are a few chains to the south. Brown sandstone appears at intervals to the mouth of Williams Creek. It contains indistinct shell-casts, but no recognizable fossils. To the south-west a patch of the same rock outcrops on the roadside just to the east of Laymont Creek.

As will be gathered from the descriptions, the coal-measures as seen in section along the east and west shores of the neck of land on which the freezing-works stand are much contorted and faulted. Moreover, only thin irregular coal-seams have been discovered. Hence any further attempt to prospect the area must be regarded as altogether inadvisable.

Faulting.

Reference to faults has been made in preceding sections of this report.* The depressed belt or trough between Picton and Tuamarina has a complex inner structure. Each boundary fault is a fault-zone, and not a simple break. In addition the depressed area is badly smashed by subsidiary faults, some nearly parallel to the main faults, others nearly at right angles to them. Only near Picton has the subsidiary faulting been distinguished in any detail, as shown on the accompanying map, but even there much careful field-work and exact mapping on a large scale are required in order to attain anything like completeness.

The eastern main fault is indicated east of Waikawa Village by low spurs or shoulders, above which a steep high slope begins. The fault, evidently trending south-south-west, traverses the headwaters of the Waitohi Stream some distance above the Picton Reservoir. In the Koromiko district it is perhaps two miles east of the railway-line, but my observations do not enable me to say what is its position farther south, though if its direction remains unchanged it must approach the railway and the Tuamarina River valley.

The main western fault practically determines the western side of Shakespeare Bay. Thence it trends south-south-west towards Mount Freeth; but whether it turns more to the south so as to pass along the eastern base of Mount Freeth, or actually keeps on its course and intersects the mass of Mount Freeth, has not been determined. There is, however, a great fault at the eastern base of the mountain, in line with the fault which determines the vertical position of the coal at the old Picton Coal-mine. Probably the main western fault does turn a little to the east so as to join the subsidiary fault. It would not be surprising if a third fault, coming from Picton Bay, joins the other two here. In any case a great fault-zone continues south-westward from the foot of Mount Freeth, passing through Speed's Valley and Bragg Creek Valley, and finally reaching the Wairau Valley well to the west of Tuamarina. The fault as described forms the boundary between mica-schist of supposed Palæozoic age and less altered rocks of Trias-Jura age. Hence it may well be, in part, of pre-Tertiary age. The fact that the northern part of the peninsula between Picton and Shakespeare bays consists of schist may be construed as evidence of pre-Tertiary faulting. However this may be, the fact that Oamaruian strata are involved in the faulting proves a late Tertiary age for the fault as it is now revealed.

A fault passes along the western side of the broad low valley between Waikawa Village and Picton. It trends south-westward through Picton and past The Elevation, whence it continues for some miles down the eastern side of Tuamarina Valley not far from the railway-line. Evidence of it is afforded not only by the topography, but by the almost vertical Tertiary claystone seen in Waitohi Stream near the Picton power-house and at The Elevation. There may be a parallel fault about

* See also Sir James Hector's remarks of 1894, quoted on page 13 of this report, and Mr. Alexander McKay's various reports.