

Coal-measures.

The greater part of the foothill country south of the Mokihinui River, and a small area to the north, are occupied by rocks of the coal-measures. These rocks, which are believed to be of Eocene age, consist of a basal conglomerate followed by grits, sandstones, and shales containing coal-seams, above which comes a thick stratum of marine mudstone with subordinate limestone.

The basal conglomerate is not invariably present, and where it does occur may vary from a few inches to perhaps 50 ft. or 60 ft. in thickness. The pebbles, which are never large, consist mainly of grauwacke, granite, and quartz.

The grits and sandstones are composed almost entirely of quartz grains, but the former rocks in particular may contain fragments of feldspar and other minerals. Pebbles of grauwacke and of granite are not uncommon in the grits, which, as these increase in size and number, pass into conglomerate. On the other hand, the grits may become finer in grain, and thus grade into sandstone or even shale. It thus follows that, as a rule, a specified stratum cannot be traced any great distance. In the watershed of Coal Creek it is even probable that the upper fresh-water grits and sandstones pass into marine sandstone and mudstone.

The shales of the coal-measures are of minor importance. They occur in bands varying in thickness from an inch or two to perhaps 10 ft.

The grits, sandstones, and shales, with their contained coal-seams, have an estimated average thickness of about 200 ft. in the Seddonville district. In portions of Charming Creek valley, however, the thickness may reach, or exceed, 300 ft.

The marine sandstone mentioned in a previous paragraph occurs over a limited area between Coal and Chasm Creeks. It contains *Ostrea*, *Turritella*, and other fossils.

The mudstone of the coal-measures is a dark-bluish calcareous rock of marine origin, that only in a few places shows distinct bedding. Very exceptionally it passes into a lighter-coloured highly calcareous rock, and thus becomes an impure limestone. In one or two localities it contains interbedded pebble bands. Owing to extensive overlap, there are considerable areas where the mudstone rests upon granite, gneiss, or grauwacke. At such contacts with the ancient rocks as have been seen the lowest layers of the mudstone are very tough, dark, and hard. In one or two places a thin pebble bed is present at the contact.

The mudstone was originally of great thickness, but in much of the area under discussion has been greatly affected by erosion. On the ridges it has either quite disappeared or remains as a thin layer only. In Charming Creek valley a thickness of 300 ft. is probably attained. A much greater thickness is reached in the Upper Ngakawau watershed and in the area north of the Mokihinui.

The mudstone is in places moderately fossiliferous. Its most characteristic fossil is *Amusium zittelli*, which occurs on the north side of the Mokihinui River and near Chasm Creek (McKay). Echinoids are common, but are always crushed and specifically unrecognizable. A species of *Flabellum* was observed in the Chasm Creek mudstone. *Foraminifera* occur almost everywhere, and evidently form the main part of the calcareous content.

Limestone occurs in Fletcher Brook, in St. David Creek, and on the saddle between the Ngakawau and Mackley, over which the foot-track passes. It is formed mainly of the remains of a species of calcareous alga (probably *Lithothamnion*) and of *Foraminifera*.

It is unquestionable that the coal-measures of the Buller district are of the same age as those of the Greymouth Subdivision. The lower or coal-bearing horizon of the Buller coal-measures corresponds to the Brunner Beds of the Greymouth area. The Island sandstone of the latter district is very poorly represented in the Buller Coalfield, its place being taken largely by the marine mudstone mentioned above. This mudstone corresponds exactly in its lithological characters with the Kaiata Mudstone, of which its upper layers must be the exact equivalent.

A brief account of the structure of the coal-measures will be given in the section on Economic Geology.

Kongahu Series.

Rocks which may be referred to the Kongahu Series of Webb are extensively developed north of the Mokihinui River, and there are small outcrops near Nikau. The greater part of the area over which the Kongahu Series occurs was not surveyed in detail last season, so that it cannot now be described at any length.

The Kongahu rocks are mainly impure limestones, but in places sandstones and mudstones appear. A sandy mudstone seen in Podge's Creek is remarkable for containing water-worn pebbles of coal. It thus corresponds in character with the Omotumotu Beds near Greymouth, though coal-fragments are far more numerous in the latter strata.

The following analyses show the composition of waterworn coal-pebbles from the Omotumotu Beds and from Podge's Creek :—

	(1.)	(2.)	(3.)	(4.)	(5.)
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Fixed carbon	40.70	35.59	39.33	17.37	41.96
Volatile hydrocarbons	45.61	47.28	49.00	29.38	46.19
Water	7.37	5.05	8.15	4.55	8.10
Ash	6.32	12.08	3.52	48.70	3.75
	100.00	100.00	100.00	100.00	100.00
Total sulphur	0.96	0.91	1.46

(1) and (2). From "Omotumotu Ridge." Samples collected by Alex. McKay in December, 1873. Analyses by W. Skey.