

A great unconformity follows the Greenland rocks, the next sedimentary formation represented being the coal-measures, which are by the writer thought to be of approximately Eocene-Oligocene age—that is, post-Cretaceous and pre-Miocene. The remarks made in last year's report concerning the coal-measures may be taken as, on the whole, holding good, but a very important addition has to be made. Abundant evidence has been obtained that below the horizon of the Brunner coal-seam there exists a great thickness of shales and sandstones, together with many seams of high-class coal, and finally a thick bed of conglomerate resting on Greenland rocks. The existence of these beds, to which the provisional name of Paparoa Beds has been given, has been ascertained mainly through the prospecting operations undertaken, first of all, by the original holders of the Paparoa Coal Company's lease, and at a later date by the management of the Point Elizabeth State Coal-mine. The geological survey of the past season has revealed the proper sequence of the Paparoa Beds, and their relation to the overlying measures containing the seams hitherto worked. The full discussion of these matters is reserved for the detailed report, but the following table, giving the order of succession and approximate thickness of the various divisions of the coal-measures, will be found useful.

GREYMOUTH COAL-MEASURES.

Main Divisions.	Subdivisions.	Estimated Thickness.	Remarks.
Kaiata Mudstone ..	..	2,000 ft. to 3,000 ft. ..	Contains one coal-seam locally workable.
Island Sandstone ..	..	About 500 ft. ..	Often calcareous.
Brunner Beds ..	(a.) Coarse sandstone, grits, and pebble-beds	300 ft. to 400 ft. ..	Horizon of Brunner, State Mine, and Blackball coal-seams.
	(b.) Pebble-beds and conglomerate	0 to 400 ft. ..	At Ten-mile Creek contain coal-seams.
Paparoa Beds ..	(a.) Upper sandstones and shales ..	700 ft. to 800 ft. ..	Contain one or two minor seams, workable in places.
	(b.) Middle sandstones with minor shales	500 ft. to 600 ft. ..	Contain many small seams, some workable in places.
	(c.) Lower sandstones and shales ..	700 ft. to 800 ft. ..	Contain three to five workable seams.
	(d.) Basal conglomerate with minor sandstones	0 to 1,000 ft. ..	Lower layers very coarse.

From the figures given in the above table it would appear that the maximum thickness of the Greymouth coal-measures may be as much as 7,000 ft. Some proportion of this, however, may be due to thickening caused by compression during elevation and folding.

The land-surface on which deposition of the Greymouth coal-measures began was very irregular. It thus happens that all the members from the basal conglomerate to the upper Brunner Beds may be found resting, unconformably, of course, on Greenland rocks. Thus also, the thickness of the lower members in particular varies, and there are variations in character dependent on local conditions. The folding, which is erratic, and the tremendous faulting that took place during the uplift of the Paparoa Range—matters already alluded to in this report—are other features introducing great difficulties in the reading of sections.

Perhaps the best way for the local student to obtain a clear idea of the actual succession of the coal-measures is to trace the Brunner Beds from the Brunner Mine through the area held by the North Brunner Coal-mine to Mount Sewell, and thence along the crest of the Paparoa Range to Mount Davy. Then, by descending, until Greenland rocks are seen, the branch of Bray Creek that heads about half a mile to the south-east of Mount Davy, a fair idea of the Paparoa Beds may be obtained, and more particularly their underlying position with reference to the Brunner Beds will be made manifest. Fuller knowledge of the Paparoa Beds can now be obtained by visiting the various coal-outcrops prospected and being opened out by the Paparoa Company near Roa, and by the State Coal-mine management in the Seven-mile Creek district (No. 2 Point Elizabeth Colliery).

Reference may be made to a great north-and-south fault which forms the eastern boundary of the belt of Greenland rocks that runs southward from Roa. This fault has a downward throw to the east, which at Roa exceeds 3,000 ft., and thus brings the Blackball seam, which lies in the horizon of the Brunner Beds, not only far below the seams to the westward now being worked by the Paparoa Company, but also below the outcrops of Greenland rocks forming the belt just mentioned. In other words, whereas just to the eastward of Roa one would have to bore perhaps a thousand feet to reach the Blackball seam, to the west we have the geologically underlying Paparoa seams almost in the clouds.

A description of other important faults and of the complicated system of minor folds into which the coal-measures are thrown will be reserved for the detailed report.

The statements made in last year's report referring to the undoubtedly Miocene and younger beds of the Greymouth Subdivision do not require repetition here. It need only be mentioned that beds belonging to horizons below that of the Cobden Limestone have a considerable development on the eastern side of the Paparoa Range from Rocky Creek to Mount Kinsella, and again on the eastern side of the Rapahoe Range. The crest of the latter feature, and its western slopes, including Point Elizabeth, are composed of calcareous sandstones and impure limestones belonging to the Cobden Limestone horizon. In that portion of the Grey Valley which was examined the rocks are sandstones and claystones belonging to the Blue Bottom horizon, overlain by a greater or less thickness of younger gravels. The Blue Bottom Beds, except just at the foot of the Paparoa Range, where they are more or less fault-involved, are very gently inclined, or even horizontal. There can be no doubt but that they are underlain by beds corresponding in age to the Cobden Limestone and the Omotumotu mudstones, whilst below these probably come strata of coal-measure age. Coal-seams, however, if present, are at great depth.