effected, so that the loss by the formation of cinders will be much below the average." (P. Galvin, in "New Zealand Mining Handbook," p. 381.) The chief sources of supply are on the west coast of the South Island.

(3.) *Semi-bituminous*, or pitch-coal, friable, containing from 5 to 10 per cent of water, and forming a soft coke. The coals of this class show some variety; the pitch-coals are glossy and clean, and contain more water than the glance-coals. Semi-bituminous coals are used largely for steam-raising, and are mined chiefly at North Auckland, North-west Nelson, Reefton, and in parts of the Grey district.

(4.) *Brown* coal, containing from 10 to 20 per cent. of water, forming no coke during combustion, and desiccating rapidly on exposure to the air. The chief sources of supply are the Waikato, Kaitangata, and Nightcaps districts, with some localities in Canterbury and North-east Otago.

(5.) *Lignite*, an inferior coal with a high percentage of water (over 20 per cent.), a clearly marked woody structure, and light weight in proportion to its bulk. The chief lignite-mines are in Canterbury, Otago, and Southland, where in many cases the deposits are practically quarried and thus easily made available for local consumption.

Friability in the case of the bituminous and semi-bituminous coals, and rapid desiccation and disintegration upon exposure to the atmosphere, are general qualities of New Zealand coals which have an important bearing upon methods of mining, upon the problems of the storage and the transport of coal to the consumer, and upon the percentage of the total amount mined or of the total calorific value of the coal as it leaves the working-places that is really available for his use.

The classification of our coals is, of course, based mainly on differences in their chemical composition. These differences entail differences in calorific or heating power and evaporative power. The following proximate analyses of representative coal-samples are taken from a table prepared by Dr. Maclaurin, Dominion Analyst, of results obtained in his laboratories.

TABLE 1.—ANALYSIS OF NEW ZEALAND COALS, WITH SIMILAR ANALYSIS OF CERTAIN FOREIGN COALS FOR COMPARISON.

Description of Coal.	Locality.	Analysis.						Calorific Value.	Evaporative Power as determined by Calorimeter.	Evaporative Power.
		Fixed Carbon.	Volatile Matter.	Water.	Ash.	Total Sulphur	Percentage of Coke.			
Anthracite ..	Paparoa Coal Company (No. 1 seam)	78·90	16·93	0·40	3·77	0·37	82·67	8439	15·74	9·44
Bituminous..	Paparoa (best)	62·90	33·53	0·67	2·90	0·33	65·80	8443	15·75	9·45
„ ..	Mine Creek, Millerton Colliery (east)..	57·67	41·14	0·91	0·28	4·62	57·95	8227	15·35	9·21
„ ..	Coalbrookdale, Munsie's Section ..	55·73	40·08	2·37	1·82	0·55	57·55	7923	14·78	8·87
„ ..	State Coal-mines, Point Elizabeth (best)	56·07	40·58	0·60	2·75	0·49	58·82	8213	15·32	9·19
„ ..	State Coal-mines, Point Elizabeth (household)	48·70	41·52	8·36	1·42	0·82	50·12	7143	13·33	8·00
„ ..	Tyneside Mine, Brunnerton ..	56·57	37·22	0·46	5·75	2·67	62·32	8064	15·05	9·03
„ ..	Blackball Mine (lower seam) ..	46·67	48·66	3·52	1·15	4·70	47·82	7541	14·07	8·44
Glance ..	Puponga (west workings)	49·28	41·51	4·94	4·27	0·42	53·55	6921	12·91	7·75
„ ..	Hikurangi Coal Company	44·56	47·17	4·06	4·21	5·81	48·77	6810	12·71	7·63
„ ..	Northern Collieries, Kiripaka (Ngunguru)	43·08	44·79	4·65	7·48	1·03	50·56	6581	12·28	7·37
Brown ..	Taupiri, Taupiri Extended ..	43·73	42·12	11·72	2·43	0·32	..	6129	11·44	6·86
„ ..	Nightcaps, Southland (new workings)	41·20	38·72	17·56	2·52	0·28	..	5737	10·70	6·42
„ ..	Kaitangata	38·00	39·96	18·22	3·82	0·40	..	5553	10·36	6·22
„ ..	Homebush, Canterbury	31·83	41·82	23·15	3·20	0·41	..	4953	9·24	5·54
Lignite ..	Bannockburn, Cromwell, Central Otago	23·75	43·83	26·12	6·30	0·32	..	4291	8·00	4·80
„ ..	Mataura, Southland	19·01	40·77	35·65	4·57	0·31	..	3789	7·07	4·24
	For Comparison.									
Anthracite*	Wales	89·07	6·51	2·27	2·15	0·86	..	8220	15·34	9·20
Bituminous..	Sydney, Nova Scotia, Canada ..	60·70	34·93	2·62	1·75	0·41	62·45	8120	15·15	9·09
„ ..	Aberdare Collieries	52·55	41·59	2·46	3·40	0·55	55·95	7900	14·74	8·84

* These samples were taken from coal that had been in store several months, and anthracite is said to deteriorate on keeping.

(iii.) SOME GEOLOGICAL FEATURES.

Geological facts, besides in some degree accounting for the chemical composition of the coals, control the amount contained in a given area and the methods of mining the coal. In the first place the seams of coal vary in thickness over a large range. Seams of about 30 ft. are not infrequent, and some of the lignite-seams run to 80 ft., whilst one of 100 ft. is on record; but the character of the strata immediately overlying is often such that a great deal of the coal has to be left *in situ* on working, in order to guard against subsidence. The hardness of the coal, too, often varies much in the same seam, and in many cases stone and dross render mining more difficult and reduce the value of the coal. In the next place, the coal deposits are marginal (see Park, "Geology of New Zealand," pp. 281–4), which helps to explain the great variability in thickness. The coal thins out wherever the basement rock rises in ridges, and it thickens in the basins; this is a very noticeable feature of the coalfields of New Zealand. Denudation has in some districts worn away great amounts of the coal. "In no New Zealand coalfield are the effects of marginal thinning of the coal-seams and of denudation more apparent than in the Buller–Mokihinui district. Owing to these causes the workable area is not more than one-tenth of that originally occupied by the coal-measures. Again, owing to the great thickness of the seams in places and to other causes a very large percentage of the coal is lost, and it is doubtful whether the extraction reaches 33 per cent. Moreover, considerable areas are left