190. Palaeozoic Coals Found in the Province of Mino.

By Shigeyasu TOKUNAGA.

Waseda University.

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Since the discovery of Palaeozoic coals by the writer in the Kwanto Mountains last July, his investigations have been extended to the Palaeozoic formation of various districts in Japan, and he was fortunate enough to find a number of Palaeozoic coal-seams in the province of Mino within a few weeks. The region, where the coal-seams are found, lies to the north of the city of Gifu and comprises a large area extending about 100 km. from east to west, and about 120 km. from north to south. It consists mostly of younger Palaeozoic strata ranging between the uppermost Carboniferous and the Permian. According to Noda, who made a geological survey of this region, these Palaeozoic strata are divided into four groups, in which the uppermost group consists of slate, sandstone and quartzite, while the second group of hard siliceous sandstone and several limestone layers with the fossils of *Fusulina*, Mollusca and corals.

In the coal locality of Nakanoho-mura there are two series of the coal bearing strata, i.e. the younger and the older. In the latter, which corresponds to the strata of the second group above-mentioned, about ten coal-seams are found imbedded in the Palaeozoic limestone. It is very noteworthy that the most of the seams are directly stratified with limestone containing the fossils of *Fusulina* group. In the sandstone and slate of the younger series there is also a number of coal and coaly-shale layers. As the plant fossils in these layers are not well preserved, it is still in question whether the coal belongs to the uppermost Palaeozoic or to the older Mesozoic formation. The maximum thickness of the coal-seams in both formations is 1 metre, but most of seams are usually less than 0.3 metre in thickness. The analyses of coals in the Permo-carboniferous limestone layer at Tatara are as follows:—

	Water	Volatile matter	Fixed carbon	Ash	Caloric value
I.	10.87	16.45	56.58	16.10	6195
II.	4.53	10.92	75.09	9.46	

Numerous coal-seams, similar in geological condition to that of Nakanoho-mura, are found in Hachiman-mura and Kitayama-mura, where each locality is separated more than 20 km. from one another.

Kitayama-mura is a village in a mountainous region about 30 km. to the north of the city of Gifu. Here is an enormous layer of limestone, about 200 m. thick, lying horizontally or very gently sloping upon older rocks such as schalstein, sandstone and slate. The occurrence of innumerable fossils of Fusulinidae in this limestone gives an inevitable proof that it belongs to the Permo-carboniferous formation. Beside many thin layers about five remarkable seams of powdered coal are found in this limestone, especially on the steep cliff of Iodo in that village. These seams have a thickness of more than half a metre, even one of them measures five metres in thickness, without any parting throughout the whole seam. The analyses of this coal is as follows :—

Water	Volatile matter	Fixed carbon	Ash
2.24	7.02	82.03	8.71

It may be mentioned that innumerable thin seams, not exceeding a few centimetres in thickness, are found everywhere in the same limestone layer and the adjacent Palaeozoic strata.

From the facts that, as in the case of the mountains of Kwanto and Mino, coal occurs in Fusulina limestone and its adjacent strata, it may be reasonably inferred that the similar occurrence may be expected with a great possibility in the same formation in other parts of Japan.