108. Permian Plants from Maiya in Northern Honshû, Japan (Preliminary Note)

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The upper Paleozoic formations bearing the luxuriant Cathaysian flora are extensively developed in China, Manchuria, and Korea, but the occurrences of the Paleozoic plants in Japan have been very scarcely recorded, since the sediments of terrestrial facies are poorly developed in the country. Only the occurrence of a calcified stem of *Calamites* from a Paleozoic limestone in Yamaguchi Prefecture was reported by H. Yabe and S. Endô,¹⁾ and two Devonian plants, *Leptophloeum* cf. *australe* and *Cyclostigma* sp. and a Permian form, *Calamites Takahashii* were described by K. Tachibana²⁾ from Iwate Prefecture and by S. Endô³⁾ from Miyagi Prefecture^{*)} respectively.

Recently, Mr. F. Ueda discovered some plant beds in the Permian formation in the vicinity of Maiya Town, Tome-gun, Miyagi Prefecture and kindly furnished his collection of some fossil plants from the locality to the writer for study. Later, the writer himself had the opportunity to make a fairly sufficient collection of the fossil plants with Mr. Ueda's assistance from two localities adjoining Furudate in Maiya Township.

The Permian sediments of this region are subdivided into the following formations by Y. Onuki, Y. Moriai, and the writer.⁴⁾ They are as follow in descending order:

Maruki formation (*Yabeina* zone)

Tenjinnoki formation (*Neoschwagerina* zone)

Rôdai formation (*Parafusulina* zone)⁵⁾

Nishikôri formation (*Pseudoschwagerina* zone)⁶⁾

The fossil plants which are now dealt with in the present article are found in a black shale interbedded in the marine sediments of the Artinskian Rôdai formation.

The following species of plants are identified by the writer:

*) This occurrence is somewhat questionable, owing to the fact that the locality "a slate quarry some 100 m south of Hunado, Zyûgohama-mura, Monô-gun, Miyagi Prefecture" lies in an area occupied by the Lower Triassic Onagawa formation of black slate, which is separated from the Upper Permian Okatu formation, likewise of black slate, by a conglomerate correlative to the Tate formation, farther north, with a characteristic Skytic molluscan fauna. In his geological report of this district, N. Ôyama (formerly Takahashi) cited the locality 100 m south of Hunado, not 1000 m south as stated by S. Endô. (Note by H. Yabe)

- 1) *Sphenophyllum* cf. *oblongifolium* (Germ. et Kaulf.) Unger (Common)
- 2) *Sphenophyllum* *Thonii* var. *minor* Sterzel (Rare)
- 3) *Pecopteris* sp. (Common)
- 4) *Odontopteris subcrenulata* (Rost) Zeiller (Rare)
- 5) *Gigantopteris Whitei* Halle (Rare)
- 6) *Taeniopteris latecostata* Halle (Common)
- 7) *Taeniopteris* cf. *Schenkii* Sterzel (Common)
- 8) *Taeniopteris Nystroemii* Halle (Common)
- 9) *Cordaites principalis* Germ. (Common)
- 10) *Cordaites (Noeggerathiopsis) Arakawae*, n. sp. (Common)
- 11) *Zamiopteris glossopteroides* (Schmalh.) f. *minor* Kawasaki (Common)
- 12) *Zamiopteris Uedae*, n. sp. (Common)
- 13) *Psymphyllum flabellatum* (Lindley et Hutton) (Rare)

Among the species just cited, 1, 3, 4, 7, 9, and 13 occur also in the Permo-Carboniferous sediments in Europe, 1, 2, 4, 5, 6, 7, 8, and 9^{7,8)} in the Shansi, Liutang, and Jido formations and their equivalents in North China, Manchuria, and Korea, and 11 in the Kôbôsan formation in Korea.

Four distinctive features would be noticeable in the present flora as described below:

1) Two types of *Cordaites* are found together in the present collection; one of them is the *Noeggerathiopsis* type and the other the typical *Cordaites*. The former is usually found in the *Glossopteris* flora as well as the Angara flora, whilst the latter, in the Cathaysian flora and the Euramerican Permo-Carboniferous flora.

2) *Zamiopteris glossopteroides* Schmalh. was described first by Schmalhausen⁹⁾ and later by Zalesky¹⁰⁾ (as *Gangamopteris*) from the Angara flora and *Zamiopteris glossopteroides* Schmalh. f. *minor* Kawasaki, smaller than the former, was described from Korea by Kawasaki.¹¹⁾ The Kawasaki's form just cited and *Zamiopteris Uedae*, n. sp., a much smaller form, are found in the present collection.

3) The presence of *Gigantopteris Whitei* Halle in this flora is most interesting. This is the second record of its occurrence throughout the world since Halle ever described it from the Shansi formation^{12) 13)} of Taiyuan, Shansi Province, North China. As to the species, the writer agrees with G. Koidzumi¹⁴⁾ in thinking it might be generically distinguished by being much peculiar in nervation and different in certain other characters from the genus *Gigantopteris* (s. s.: genotype *Gigantopteris nicotianaefolia* Schenk), although it was assigned by Halle to the genus *Gigantopteris* (s. l.).

4) The Equisetales and Lepidodendrales, which are common in

both the Cathaysian and Euramerican Permo-Carboniferous floras are quite destitute of the present collection.

These floral features just mentioned show that the present flora consists largely of the Euramerican Permo-Carboniferous genera and somewhat resembles the Middle Cathaysian flora of the Shansi formation and its equivalents in North China and Korea by containing *Gigantopteris Whitei*, *Taeniopteris*, *Odontopteris*, and *Sphenophyllum*, although it differs widely from the latter in the presence of the *Noeggerathiopsis*-type *Cordaites* and in the absence of many characteristic genera and species of the Cathaysian flora.

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