10. *The Cretaceous Formation of Futaba, and its Fossils.*

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In October, 1922, some Cretaceous fossils were discovered in a place hitherto thought to be a part of the Jōban Coal-Field, which belongs to the Tertiary formation. This newly discovered Cretaceous formation was called the Futaba formation and is found in Iwaki in a long belt-like form, which runs in a north-south direction for more than 16 k.m. On the south and east it is in direct contact with the Tertiary strata, while on the west it is bounded by granite and diorite. The whole formation is divided into three parts, viz: Upper, Middle and Lower Futaba Beds. The strata are nowhere horizontal, yet they are never folded. Except at the southern extremity, no great fault exists. They have the regular strike and dip, the former being generally N.20°E., and the latter 10°–20° to S.70°E., the overlying Tertiary formation also having a similar strike and dip. But in many places there exists a discordancy between the two formations, which is the so-called paraconformity. The three beds taken together have an average thickness of 600 m., wherever the strata are well developed. As to the fossils, the plant remains are found only in the Lower Futaba bed, with an exception of a limited area in the Upper Futaba. Those determined by the authors are chiefly confined to Reptiles, Ammonites and a few Lamelli-branches, as indicated below:—

The Upper Futaba Beds.

Plesiosaurus sp., *Hamites* β sp., *Trigonia subovalis* JIMBO.

The Lower Futaba Beds.

Ichthyosaurus sp., *Basilemys* sp., *Gaudryceras limatum* var. *iwakiensis* nov. sp., *Hamites* α sp., *Bostrychoceras indicum* STOL., *Baculites yokoyamai* nov. sp., *Puzosia kuratai* nov. sp., *Scaphites puerculus* var. *tesioensis* YABE, *Yabeiceras* (nov. genus) *orientale* nov. sp., *Yabeiceras*

kotoi nov. sp., *Yabeiceras himuroi* nov. sp., *Trigonia kimurai* nov. sp., *Trigonia subovalis* JIMBO.

Of the Ammonites found in the Lower Beds, *Scaphites puerculus* var. *tesioensis* is a species previously found in the *Scaphites* Beds of Hokkaido; while *S. inermis*, a species closely allied to it, was reported from the Lower Chico of California. *Gaudryceras limatum* occurs also in the *Scaphites* Beds of Hokkaido and in a shale in a younger Cretaceous in Shikoku; *G. politissimum* from the Upper Trichinopoly Group of South India is its ally. *Bostrychoceras indicum* is characteristic of the Upper Trichinopoly Group, *B. otsukai* from the *Scaphites* Beds of Hokkaido and the Toyajo Series of Kii, and *B. polyplocum* from the Upper Senonian of Europe being its allies. *Hamites a* sp., is a species more or less akin to *H. compressus* from the Valdayur Group of South India and from Nanaimo Group of Vancouver Island. *Baculites yokoyamai* resembles very closely to *B. anceps* var. *leopodiensis* of the Lower Cenomanian of Europe. From these considerations, the authors conclude that the Lower Futaba Beds are almost of the same age as the *Scaphites* Beds and the lower part of the *Pachydiscus* Beds of Hokkaido, both of which are in turn contemporaneous with the Upper Trichinopoly of India.