113. Discovery of Mesozoic Fossils from Southwestern Hokkaidô

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The basement complex of southwestern Hokkaidô has for a long time been considered on lithic similarity to be a continuation of the Paleozoic rocks of northern Honshû (main island of Japan), though without any positive fossil evidence. The wide extension of the probable Paleozoic rocks and non-existence of Mesozoic and Paleogene sediments in this part led Nagao (1938) to separate it geotectonically from the rest of Hokkaidô by his Sapporo-Tomakomai Line.

Recently Hashimoto and Shimado (1960) reported on some ill-preserved fossils from near the Futamata Spa, west of Oshamanbe (Fig. A, Loc. 2). The corals have their internal structure almost completely destroyed by thermal metamorphism due to a granite-intrusion; although they bear certain vestige of Paleozoic corals such as *Diphyphyllum*, specific or even generic, determination of them is quite impossible. Another record of fossils in the same region is from the pre-Tertiary Kami-iso limestone, west of Hakodate (Fig. A, Loc. 3). According to Sakagami (personal communication), this limestone rarely yields small molluscs and shell-fragments with prismatic layer like that of *Inoceramus* and may be Mesozoic in age. Minato and Yamamoto (1961) found in the same limestone some remains of calcareous algae *Mesophyllum*. This genus usually comprises Cenozoic forms only; but the authors suspected Mesozoic age of the limestone, chiefly on the lithic nature of the formation interbedding the limestone, as a whole, and its stratigraphic relation to the overlying Tertiary system.

All these discoveries are of interest and important, but none of the fossils are sufficiently well preserved for geological dating and definitely indicate Mesozoic age.

Recently a rather rich fossil fauna was discovered by the present writers from Gûnai, Nishi-Shimamaki village, Shimamaki county,

Fig. A. Map showing fossil localities 1-3.

south of Suttsu (Fig. A, Loc. 1), and it consists of fossils apparently of Mesozoic, presumably late Jurassic, age. This find incorporates the possibility that the basement complex of southwestern Hokkaidô may consist largely of Mesozoic, instead of Paleozoic, rocks, and is of particular importance for proper interpretation of the structural history of Hokkaidô.

The limestone exposed at Nagatoyo (former name of Gûnai) along the middle course of the Tomari-gawa has already been known since the early pioneer days of geological exploration in Hokkaidô (Nishiyama, 1889) and the occurrence of crinoid stem-joints in it was reported by Jimbô (1891-92). Besides, there is a paper by Matsumura (1957) with a geological sketch map along the middle course of the Tomari-gawa. The writers visited this place and observed the following stratigraphic succession in descending order:

Green schalstein with fossiliferous limestone lenses.....	Ca. 800 m.
Clayslate, tuffaceous in part.....	Ca. 300 m.
Pale green to white chert intruded by granite and porphyrite...	
	Ca. 1,500 m.
Alternation of limestone, schalstein and limy clayslate	Ca. 300 m.
Pale green to white chert.....	Ca. 800 m.
Phyllitic clayslate intercalated with tuff	Ca. 300 m.
Dark green schalstein intercalated with clayslate	Ca. 400 m.
Pale green to white chert, schalstein, and limestone	Ca. 300 m.
Alternation of black clayslate and graywacke sandstone	Ca. 300 m.

In general, these strata strike E-W and dip homoclinally northward; they are intruded by granite and covered by Neogene sediments. The uppermost member of this formation is fossiliferous, fossils being found in thin slices of the lenticular or irregularly shaped limestone in green schalstein. Most of the limestone lenses and the fossils contained are recrystallized, rendering detailed paleontological study very difficult, and the fossils discriminated are *Hikorokodium* sp. (Figs. 1-3), *Milleporella* sp. (Figs. 4-6), *Montlivaltia* ? sp. (Fig. 7), *Thecosmilia* sp. (Figs. 8-10), *Thamnasteria* ? sp. and some others. The fourth member from the top of the formation is also fossiliferous, bryozoa and stromatoporoids being found in thin sections; all the remains have their internal structure almost completely obscured by secondary alteration.

Hikorokodium is a genus established by Endô (1951) for new lower Permian calcareous algae from the Kitakami massif; subsequently he described an upper Jurassic species, *H. fertilis* ENDO, from the Torinosu limestone of the Sôma district, Fukushima prefecture, and the Miyahara district, Tokushima prefecture, and the present material resembles rather more this species than any Permian allies.

Milleporella has been reported from the Jurassic to Cretaceous

Fig. 1-10. Mesozoic fossils from Gūnai (S. Aoki photo.)

- 1 - 3, *Hikorokodium* sp. (2, $\times 5$; 2 and 3, $\times 10$).
 4 - 6, *Milleporella* sp. (4, $\times 3$; 5, $\times 5$, 6, $\times 10$)
 7, *Montlivaltia*? sp. $\times 2$.
 8 -10, *Thecosmilia* sp. $\times 5$.

limestones of several localities in Japan; the micro-structure of skeletal elements is not well preserved in the present material, but in other features, it is similar to certain species of the genus.

Montlivaltia is a cosmopolitan middle Triassic to Cretaceous genus, with its species particularly abundant in the upper Jurassic; although any reliable specific determination on thin slices only is impossible, it can be cited that the present material bears some resemblance to *M. natheimensis* MILASCHEWITZ from the Kimmeridgian of Germany.

Likewise, *Thecosmilia* is another cosmopolitan Mesozoic genus of corals, and its species are particularly abundant in the Jurassic and Cretaceous rocks. The material at hand, in spite of its considerable recrystallization, still reveals its phaceroïd colony building and tristomodaëal budding.

Thamnasteria also comprises numerous species common in the middle Triassic to middle Cretaceous rocks throughout the world, and is the most familiar type of corals in the upper Jurassic Torinosu limestone in Japan.

All the fossils cited above seem to indicate Mesozoic age of the pre-Neogene formation exposed along the middle course of the Tomari-gawa, and its most probable equivalent formation is, the writers believe, the upper Jurassic Torinosu series.

The Sorachi group with an extended distribution in central Hokkaidô comprises three divisions: the lower or Nukabira, the middle or Yamabe, and the upper or Shuyûbari formations, and is considered to be an early representative sediments in the late Triassic (?) to late Cretaceous Yezo-Saghalien geosyncline extended from central Hokkaidô to Saghalien. The lower to middle Sorachi group and its equivalents in central Hokkaidô are characterized by schalstein, chert, and frequently intercalated limestone. The limestone in the Yamabe formation yields an assemblage of stromatoporoids, corals, brachiopods of the Torinosu type (Hashimoto, 1942 and 1960). The Mesozoic rocks newly recognized in southwestern Hokkaidô may be best correlated paleontologically to certain parts of the Sorachi group of central Hokkaidô. It needs additionally to be noted that the Mesozoic sediments of southwestern Hokkaidô are not lithologically quite similar to those either of central Hokkaidô or of Honshû and yet the former is somewhat more closely related to the first of the latter than to the second.

On the other hand, Onuki (1959) reported on the occurrence of Torinosu type fossils from Shiriya, northeastern part of Aomori Prefecture (Fig. A, Loc. 4), and subsequently Murata (1962) published a short note on the geology of the district with descriptions of

several corals and a stromatoporoid, all of the Torinosu type. Further researches are necessary to settle whether the Mesozoic formation of Gûnai is a continuation of the Sorachi group of central Hokkaidô or of the Torinosu series of Honshû. The importance of the discovery of the Gûnai Mesozoic on the elucidation of geotectonic history of Hokkaidô has already been pointed out by Onuki (1962) referring to the preliminary report of the writers read before the Geological Society of Japan at its 68th Annual Meeting, 1951.

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