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On Some Upper Cretaceous *Steinmannella* (*Yeharella*) in Japan

By

Mitsuo NAKANO

With Plates 13-14.

This paper contains a note on the migrations of *Steinmannella* (*Yeharella*) in Japan and the descriptions of *Steinmannella* (*Yeharella*) *kimurai* (TOKUNAGA and SHIMIZU), *Steinmannella* (*Yeharella*) *kimurai* (TOKUNAGA and SHIMIZU) subsp. *sanukiensis* NAKANO, n. subsp. and *Steinmannella* (*Yeharella*) *deckeina* (KUBOTA). The specimens of the former are kept in the Geological Institute of the Hiroshima University. The writer wishes to express his sincere thanks to Professor Teiichi KOBAYASHI of the University of Tokyo for his kind guidance, to Professor Sotoji IMAMURA of the Hiroshima University and Professor Masao MINATO of the Hokkaido University at Sapporo for their encouragements. He is much indebted to Mr. Kaoru KUBOTA of the Sapporo West High School and Messrs Koji TAKAHASHI and Makoto KATO of the Hokkaido University for the facilities of studying Trigonian specimens at the Hokkaido University.

Genus *Steinmannella* CRICKMAY, 1930

Steinmannella CRICKMAY roughly corresponds to the Pseudoquadratae. It was synonymized with *Yaadia* by COX (1952, p. 57), but KOBAYASHI and AMANO (1955) accepted it as a valid genus and divided it into 3 subgenera (*Steinmannella* s. str., *Yeharella* KOBAYASHI and AMANO, and *Setotrigonia* KOBAYASHI and AMANO).

In describing three new species, *Trigonia multituberculata*, *T. oblongotuberculata* and *T. ovata* from the Neocomian of Manghyschlack, LITSCHKOW (1912) referred the first to the Quadratae and the two others to the Clavellatae. Judging from the surface sculptures and the shell forms, however, all of them belong probably to *Steinmannella* s. str.

Subgenus *Yeharella* KOBAYASHI and AMANO, 1955

KOBAYASHI and AMANO based *Yeharella* on *Trigonia japonica* YEHARA from the Campanian at Kitadani, Omi-mura, Okawa-gun, Sanuki Prov., Kagawa Pref., Shikoku, and referred some 7 forms of Japanese *Steinmannella* to this subgenus. *Trigonia deckeina* KUBOTA from the Hakobuchi sandstone (approximately Campanio-Maestrichtian) of Hokkaido is also a member of *Yeharella* of *Steinmannella*, although the specimens are ill-preserved and its horizon is not well known.

Steinmannella (*Yeharella*) appeared in the Gyliakian (Cenomanio-Turonian) formations of Hokkaido and Sachalin, and probably migrated to the south. In the uppermost

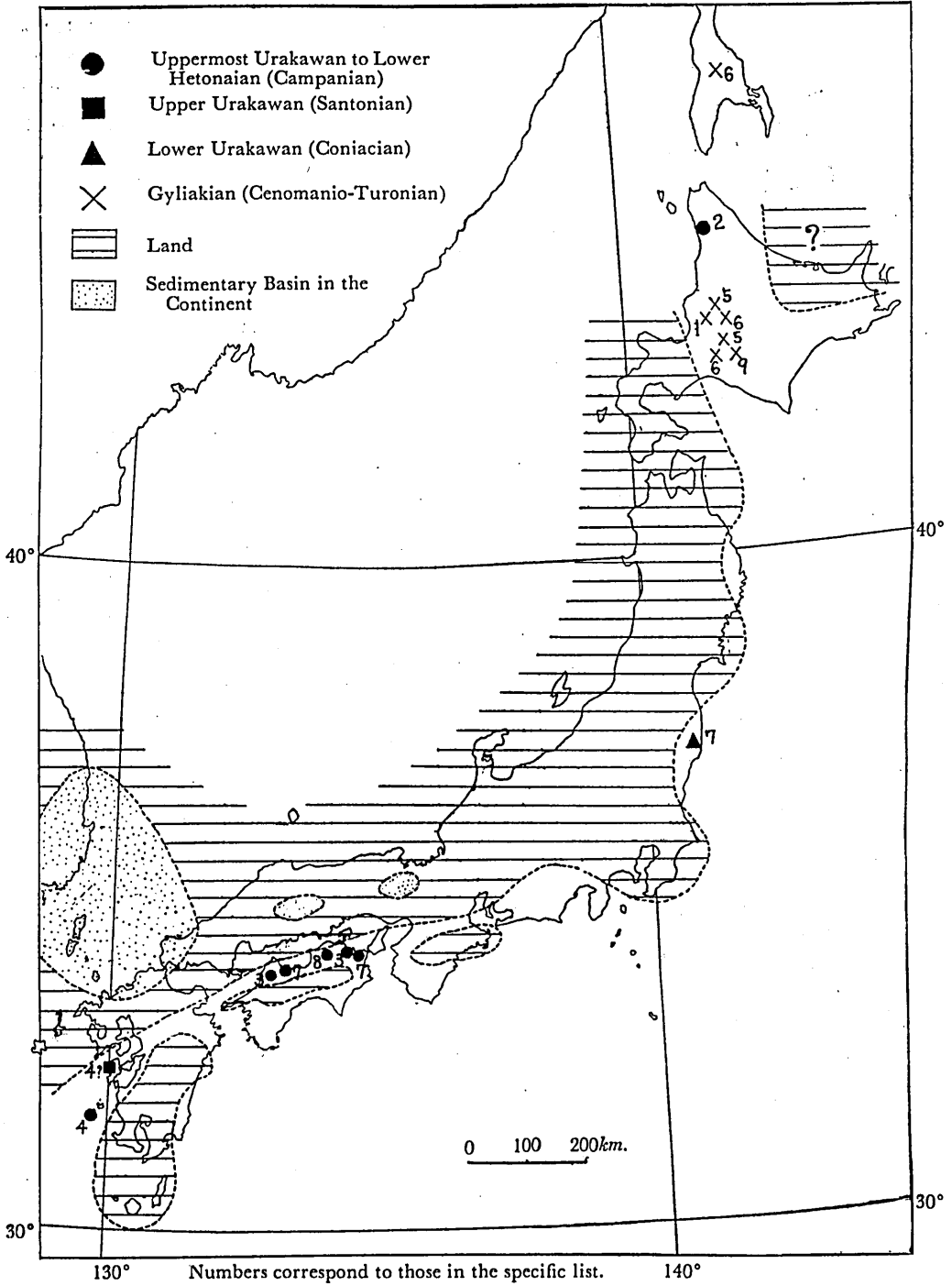
Urakawan to the lower Hetonaian, this subgenus was explosively spread from Kyushu to Hokkaido. More precisely, the forerunners of *Steinmannella* (*Yeharella*), such as *S. (Y.) lymani* KOBAYASHI and AMANO, *S. (Y.) ainuana* (YABE and NAGAO) and *S. (Y.) jimboi* KOBAYASHI and AMANO, are all known only from the Gyliakian (Cenomanio-Turonian) formations of Hokkaido and Sachalin, though the marine Gyliakian rocks are scattered at several places in Southwest Japan. In the lower Urakawan, *S. (Y.) kimurai* (TOKUNAGA and SHIMIZU) is a single species of the subgenus, and is recognized only from the lower Futaba group (Coniacian) of the Futaba district, Iwaki Prov., Fukushima Pref., North Honshu. In the upper Urakawan, the occurrence of *S. (Y.)* aff. *japonica* var. *obsoleta* KOBAYASHI and AMANO is known from the Santonian formation at Oe-mura, Amakusa-shimo-shima, Higo Prov., Kumamoto Pref., Kyushu. In the uppermost Urakawan to the lower Hetonaian (approximately middle to upper Campanian), 5 forms [*S. (Y.) deckeina* (KUBOTA), *S. (Y.) japonica* (YEHARA), *S. (Y.) japonica* var. *obsoleta* KOBAYASHI and AMANO, *S. (Y.) kimurai* (TOKUNAGA and SHIMIZU) and *S. (Y.) kimurai* subsp. *sanukiensis* NAKANO, n. subsp.] of *Steinmannella* (*Yeharella*) are collected from various localities from Kyushu to Hokkaido.

List of the Japanese Species:—

1. *Trigonia ainuana* YABE and NAGAO, 1928. *Trigonia* sandstone (Cenomanio-Turonian); Pombets, Mikasa-city, Central Hokkaido.
2. *Trigonia deckeina* KUBOTA, 1952. Hakobuchi sandstone (approximately Campanio-Maestrichtian); Teshio Prov., North Hokkaido.
3. *Trigonia japonica* YEHARA, 1923. Basal member (Campanian) of the Izumi group (Campanio-Maestrichtian); Kitadani, Omi-mura, Okawa-gun, Sanuki Prov., Kagawa Pref. and Aonami, Yuyama-mura, Onsen-gun, Iyo Prov., Ehime Pref., Shikoku.
4. *Steinmannella (Yeharella) japonica* var. *obsoleta* KOBAYASHI and AMANO, 1955. (?) Santonian formation at Oe-mura, Amakusa-shimo-shima, Higo Prov., Kumamoto Pref., Kyushu; upper Campanian formation from Shimo-koshiki-jima and Taira-jima, Satsuma Prov., Kagoshima Pref., Kyushu.
5. *Steinmannella (Yeharella) jimboi* KOBAYASHI and AMANO, 1955. *Trigonia* sandstone (Cenomanio-Turonian); Pombets and Katsurazawa in Mikasa-city and the vicinity of the Yubari coal-field, Central Hokkaido.
6. *Steinmannella (Yeharella) lymani* KOBAYASHI and AMANO, 1955. *Trigonia* sandstone (Cenomanio-Turonian); Ikushumbets in Mikasa-city and the Yubari coal-field, Central Hokkaido, and the Hoe-river region of South Sachalin.
7. *Trigonia kimurai* TOKUNAGA and SHIMIZU, 1926. Lower Futaba group (Coniacian) from Oriki, Hirono-machi, Futaba-gun, Iwaki Prov., Fukushima Pref., North Honshu; the basal part (Campanian) of the Izumi group (Campanio-Maestrichtian) from Aonami, Yuyama-mura, Onsen-gun, Iyo Prov., Ehime Pref. and the same member at Tsubasa-yama, Hiketa-machi, Okawa-gun, Sanuki Prov., Kagawa Pref., Shikoku.
8. *Steinmannella (Yeharella) kimurai* subsp. *sanukiensis* NAKANO, n. subsp. Korobishi conglomerate and sandstone (Campanian) of the Izumi group (Campanio-Maestrichtian) at Kami-kashiwara, Sogisho-mura, Ayauta-gun, Sanuki Prov., Kagawa Pref., Shikoku.
9. *Steinmannella (Yeharella)* sp. indet. by KOBAYASHI and AMANO, 1955. *Trigonia* sandstone (Cenomanio-Turonian) from the Yubari coal-field, Central Hokkaido.

On Some Upper Cretaceous *Steinmannella* (*Yeharella*) in Japan

Distribution Map of Japanese *Steinmannella* (*Yeharella*)



Steinmannella (Yeharella) kimurai (TOKUNAGA and SHIMIZU)

1926. *Trigonia kimurai* TOKUNAGA and SHIMIZU, *Jour. Fac. Sci., Imp. Univ. Tokyo*, Sect. 2, Vol. 1, Pt. 6, pp. 189-190, pl. 27, figs. 3a-b, 4.
1955. *Steinmannella (Yeharella) kimurai* KOBAYASHI and AMANO, *Japan. Jour. Geol. Geogr.*, Vol. 26, Nos. 3-4, pp. 205-206, pl. 13, fig. 1.

As pointed by KOBAYASHI and AMANO, the original illustration of the species is not sufficient, but in the umbonal region tubercles are alligned along the weak median furrow on the area of the oiginal specimens. These tubercles are, however, obsolete on the Kami-kashiwara specimens at hand. Therefore subspecies *sanukiensis* is proposed for them.

Occurrence:— Lower Futaba group (Coniacian) from Oriki, Hirono-machi, Futaba-gun, Iwaki Prov., Fukushima Pref.; basal conglomerate and sandstone member (Campanian) of the Izumi group (Campanio-Maestrichtian) from Iyo and Sanuki Provinces in Shikoku.

Steinmannella (Yeharella) kimurai (TOKUNAGA and SHIMIZU)
subspecies *sanukiensis* NAKANO, new subspecies

Plate 13, Figures 1a-c.

1955. *Steinmannella (Yeharella) kimurai* (pars) KOBAYASHI and AMANO, *Japan. Jour. Geol. Geogr.*, Vol. 26, Nos. 3-4, pp. 205-206, pl. 13, fig. 2 (non pl. 13, fig. 1).

Description:— Shell large, ovately quadrate, gently convex from umbo to venter and from anterior to posterior without marginal angulation, inequilateral, broader than high; anterior margin short, slightly rounded and gradually transforming into broadly curved ventral margin; dorsal margin slightly concave, about two-thirds as long as the shell; siphonal margin gently curved and somewhat angulated at junction with dorsal and ventral margin. Umbo low, narrow, opisthogyrous, subterminal, situated near the antero-dorsal end. Marginal and median carinae die out except for vicinity of umbo. Area smooth, almost as large as one-third of whole surface, distinguished from the flank by absence of nodes; median furrow shallow and fairly distinct in early stage, but obscure later. Escutcheon very narrow, smooth, slightly depressed; escutcheon carina obtuse near umbo but evanescent in mature. Ligament opisthodetic, external and comparatively wide. Flank with broadly spaced diagonal rows of nodes which become thicker towards ventral periphery; umbonal 2 or 3 tuberculate costae arranged concentrically to subconcentrically; about 7 rows of nodes which follow the precedings, curved diagonally and nodes arranged fairly regularly; in late stages flank ornamented with some 7 rows of cords which are somewhat elongated along growth lines. Growth lines distinct in anterior half of flank.

Comparison:— This subspecies differs from *Steinmannella (Yeharella) kimurai* (TOKUNAGA and SHIMIZU) in the absence of carinae and tubercles on its area. *Steinmannella*

(*Yeharella*) *japonica* (YEHARA) is easily distinguished from this form by the trigonal outline, presence of distinct carinae in the early stage and abrupt change of curvature from flank to area. *Steinmannella* (*Yeharella*) *leana* var. *whiteavesi* (PACKARD) from the Upper Cretaceous of the Queen Charlotte Islands of British Columbia, differs from it in transverse ridges and tubercles on the umbonal region of the area which is bordered by an obtuse ridge from the flank. This is distinguished from *Steinmannella* (*Yeharella*) *deckeina* (KUBOTA) by the absence of the concentric bands and the median furrow on its area.

Occurrence:— Holotype (NM. S. Y. 00001) is 91 mm. long and about 75 mm. high from the Korobishi conglomerate and sandstone (Campanian) at the base of the Izumi group (Campanio-Maestrichtian), at Kami-kashiwara, Sogisho-mura, Ayauta-gun, Sanuki Prov., Kagawa Pref., Shikoku.

Steinmannella (*Yeharella*) *deckeina* (KUBOTA)

Plate 13, Figure 2; Plate 14, Figures 1a-c.

1952. *Trigonia deckeina* KUBOTA, *Syumino-Tigaku*, Vol. 5, No. 3, pp. 14-15, text-figs. 1-2.

Description:— Shell large in size, ovately oblong, inequilateral, broader than high; anterior margin short and nearly straight; ventral margin rounded and broadly arched; dorsal margin long and almost straight; siphonal margin rounded. Umbo low, subterminal; beak opisthogyrous, pointed near the antero-dorsal extremity. Carinae evanescent except for umbonal region where they are ill-preserved. Area broad, with numerous concentric bands and coarse growth lines, but in early stage ornamented presumably with several transverse costae. Median furrow shallow and fairly distinct. Escutcheon depressed, narrow, not clear. Flank with broadly spaced rows of nodes which are counted, if complete, 13 or so. Ligament opisthodontic, external, comparatively long (30 mm.) and wide (6 mm.).

Internally, shallow radial furrows run along both sides of marginal angulation; pallial line entire.

Comparison:— The species was compared by Kubota with some forms of the *Scabrae* section from the Middle Cretaceous of England. It is, however, a member of *Yeharella* of *Steinmannella* or the *Pseudoquadratae*, as can be judged from the shell form and surface sculptures.

It resembles *Steinmannella* (*Yeharella*) *kimurai* (TOKUNAGA and SHIMIZU). Because of the insufficient original illustration and the ill-preservation of the former, its true relation to the latter is indeterminable.

Occurrence:— From the upper course of the Rupeshupe river, a tributary of the Teshio, Teshio Prov., North Hokkaido. According to K. KUBOTA and H. FUJII the horizon whence the fossils were collected by them belong to the Hakobuchi sandstone (approximately Campanio-Maestrichtian).

M. NAKANO

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EXPLANATION OF PLATE 13

All natural size

Steinmannella (Yeharella) kimurai (TOKUNAGA and SHIMIZU) subsp. *sanukiensis* NAKANO,
new subsp. 4

Figures 1a-c. Lateral, posterior and dorsal views of a plaster cast of bivalved specimen (holotype).
(Photo. by C. UEKI)

Korobishi conglomerate and sandstone (Campanian) of the Izumi group (Campanio-Maestrichtian); Kami-kashiwara, Sogisho-mura, Ayauta-gun, Sanuki Prov., Kagawa Pref., Shikoku.

Repository: Specimen is kept in Geological Institute, Hiroshima University.

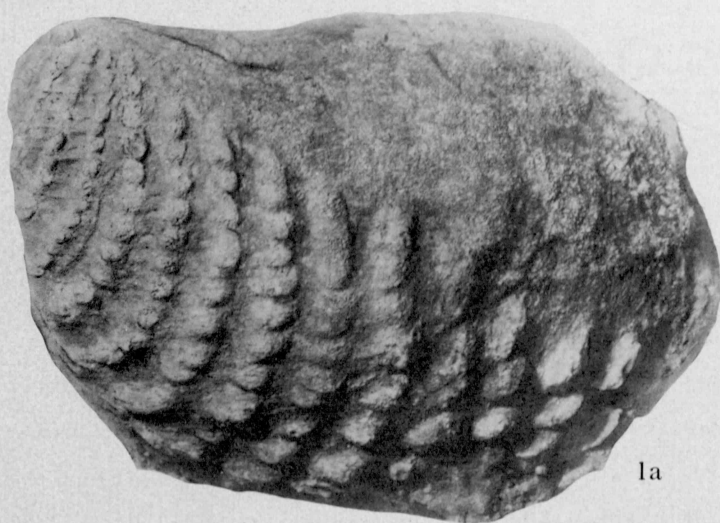
Steinmannella (Yeharella) deckeina (KUBOTA) 5

Figure 2. Internal cast of the paratype.

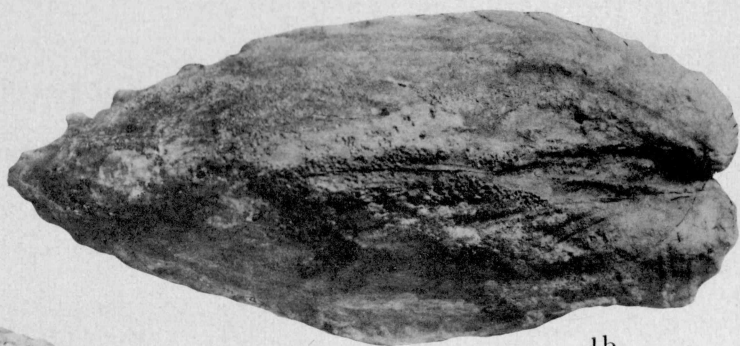
(Photo. by K. KUBOTA)

Hakobuchi sandstone (approximately Campanio-Maestrichtian) of the upper course of the Rupeshupe river, a tributary of the Teshio, Teshio Prov., North Hokkaido.

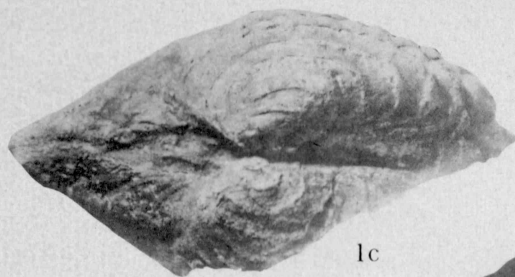
Repository: Specimen is kept in Geological Institute, Hokkaido University at Sapporo, Hokkaido.



1a



1b



1c



2

EXPLANATION OF PLATE 14

All natural size

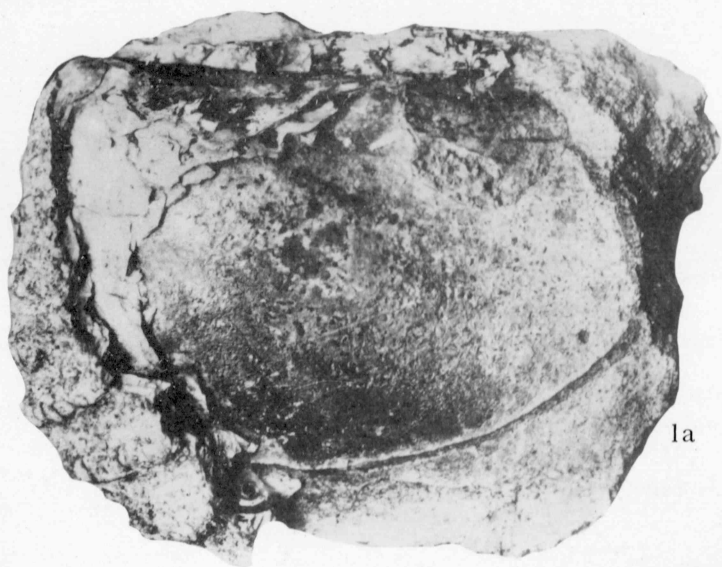
Steinmannella (Yeharella) deckeina (KUBOTA) 5

Figures 1a-c. Lateral and dorsal views of bivalved specimen (holotype).

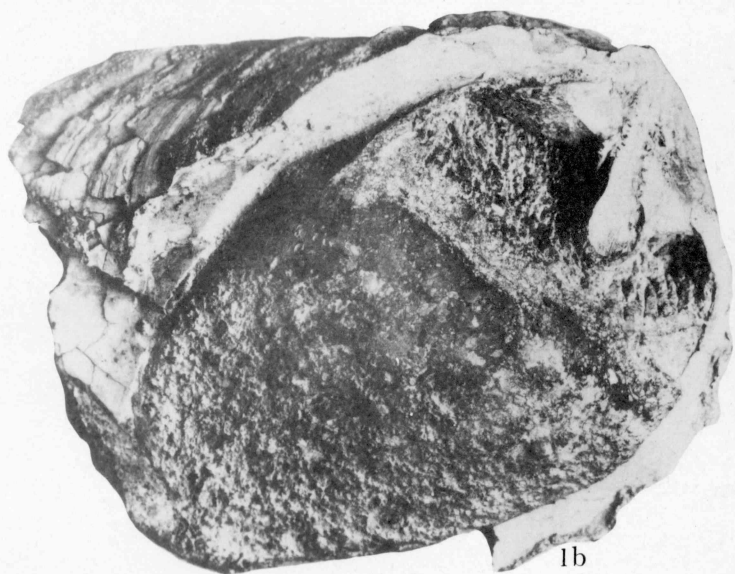
(Photo. by K. KUBOTA)

Hakobuchi sandstone (approximately Campanio-Maestrichtian) of the upper course of the Rupeshupe river, a tributary of the Teshio, Teshio Prov., North Hokkaido.

Repository: Specimen is kept in Geological Institute, Hokkaido University at Sapporo, Hokkaido.



1a



1b



1c