100. A new Silurian Trilobite from Ofunato, North Japan^{*)}

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A copious Silurian biota was described by Sugiyama (1940) from the Kawauchi formation at Sakari-machi, Ofunato City, Iwate Prefecture. He distinguished there five horizons, namely *Solenopora* limestone, *Encrinurus* bed, *Halysites* limestone, *Clathrodictyon* limestone and *Favosites* limestone in descending order and determined its Middle Silurian age. Through a study on the Halysitidae in Japan, however, the junior author (1958) reached the conclusion that the *Schedohalysites kitakamiensis* (Sugiyama) in the *Clathrodictyon* and *Halysites* limestones indicates a lower Ludlovian age. Therefore the authors (1974) dated the *Encrinurus* bed overlying them at middle Ludlovian. On the contrary to the profusion of corals and stromatoporoids *Encrinurus kitakamiensis* Sugiyama, 1941, was a sole trilobite. Therefore *Sphaerexochus* (*Onukia*) *sugiyamai* here described is the second Silurian trilobite in North Japan. It is of great interest not only by rarity, but also by high specialization in complete effacement of two anterior furrows on the glabella, fusion of the axial ring with the terminal piece in the pygidium, absent genal and pleural spines and large size of the shield.

Genus *Sphaerexochus* Beyrich, 1845

Recently this genus was discovered in eastern Siberia in the latest Lower Ordovician Khakitinsky horizon (Chugaeva, 1973). Subsequently it spread widely in northern continents as high as Wenlockian-Niagaran rocks. Its latest occurrences are in the Ludlovian in Gotland, Japan and New South Wales, Australia.

Subgenus *Onukia* Kobayashi and Hamada, subgen. nov.

Diagnosis: *Sphaerexochus* having broad pygidium with nearly entire margin; its axial lobe composed of two rings and a terminal piece; lateral glabellar furrows completely effaced except for posterior pair which isolate basal lobes; no genal spine.

Type species: *Sphaerexochus* (*Onukia*) *sugiyamai*, subgen. et

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sp. nov. Subgeneric and specific names are proposed respectively in favour of Dr. Yoshio Onuki who discovered Silurian fossils in Japan first in this area and the late Dr. Toshio Sugiyama who monographed the Kawauchi fauna. All what is known of this subgenus is stated in the description of its monotypic species.

Sphaerexochus (*Onukia*) *sugiyamai* Kobayashi
and Hamada, sp. nov.

Cranidium nearly as long as wide, strongly convex. Glabella highly vaulted, almost hemispheric; posterior lateral furrows of moderate strength for this genus, rectangularly meeting occipital furrow, separating a pair of basal lobes from median part which is a little broader than the lobe; basal lobe more convex and prominent above the surroundings; other lobation completely effaced. Occipital furrow more or less broader than posterior laterals; neck ring nearly uniform in thickness; median tubercle absent. Dorsal furrows as strong as occipital one and running in anterior between a narrow rim and a somewhat overhanging glabella. Fixed cheek very narrow; eyes small, near dorsal furrows and opposed at posterior lateral furrows; posterior border a little shorter than a half of neck ring, distinctly thickened laterally and bent there antero-laterally without projection of a genal spine; border furrow somewhat pronounced at bent.

Pygidium roundly sublenticular in outline, broad for genus, two-thirds as long as wide and gently convex. Axial lobe one-third as wide as pygidium, composed of two rings and a terminal piece; articulating half-ring unusually large. Axial furrow indicated only by shallow depression and becoming obsolete in posterior; two ring furrows and interpleural furrows moderate in strength and apparently continuous to each other, but different in direction; interpleural furrow somewhat broadened postero-laterally and terminating shortly before reaching margin. Postero-lateral margin gently waving by two shallow sinuations which correspond to the furrows; posterior margin more or less sinuate and a little bent up behind axis.

Text smooth.

Three cranidia and two pygidia before hand are all very large for *Sphaerexochus*. The largest cranidium (fig. 3) which is deformed measures 36 mm in length. The larger pygidium inclusive of an articulating half-ring is about 25 mm long. In comparing with *Sphaerexochus mirus* (Horný and Bastl, 1970, pl. 15, fig. 6) it is estimated that a complete dorsal shield of this species attains more than 10 cm in length.

In *Sphaerexochus* s. str. two anterior lateral furrows are general-

ly discernible on the glabella. In the pygidium pleurae are usually ending free and three axial rings are either well defined or the third ring is partly fused with the terminal piece. In *S. haspidatus* and *S. pulcher* the pygidium exclusive of a terminal piece is quinqui-segmented and pleurae are each produced into a long spine in young

stages, but the posterior segments are fused with the piece and spines become shorter and blunt through growth. Three lateral furrows of glabella are not much different in early stages of *S. pulcher* (Whittington and Evitt, 1954). In comparison with them it is quite evident that *Onukia* reveals very high specialization.

Dismembered carapaces of this species were gregarious in limestone boulders from which these specimens were obtained. Because it yields no other fossil, it indicates a special biotope resembling that of the *Sphaerexocis hiratai* limestone in the Yokokura limestone, Shikoku which was presumably deposited on a reef-slope on a rough oceanic side (Kobayashi and Hamada, 1974). The fossiliferous *sugiyamai* limestone boulders were collected at Higuchi-zawa, Sakari-machi and considered Ludlovian or lower Ludlovian in age.

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- See Kobayashi and Hamada, 1974 for other references.