Some Upper Devonian Cyrtospiriferids from the Nagasaka District, Kitakami Mountainland.

M. Noda* and K. Tachibana**

Plate 1, figures 1-15

1. Introduction

In the Nagasaka district (fig. 1), there are well exposed the Upper Devonian and Lower Carboniferous formations.

The lowest Carboniferous rests upon the Upper Devonian as seen in fig. 2, and it contains the fauna of the Tournaisian type, such as Syringothyris spp., Spirifer (Unispirifer?) nodai Tachibana, Sp. nagasakaensis Tachibana and other many important brachiopods as stated elsewhere. Spirifer nodai Tachibana closely resembles the so-called Spirifer tornacensis from the Lower Tournaisian of Belgium and the Donetz basin and also sp. louisianensis Rowley from the lower Kinderhookian. It is especially noted that one of the syringothyrids enumerated above closely resembles Syringothyris angulata Simpson from the Corry sandstone and Cussewago formation of Pennsylvania, and these formations in which cyrtospiriferids are contained have so far been placed at the basal part of the Mississippian.

The Upper Devonian is characterized by Cyrtospirifer spp., Athyris sp., Chonetes hardrensis Phillips, Camarotoechia suzukii Tachibana(MS), Waagenoconcha cf. nummularis Winchell, and other productids of the Carboniferous type in association with the some Devonian plants, Leptophloeum cf. austral (McCoy), Lepidodendron? spp., and Cyclostigma sp.

The so-called “Spirifer (Trigonotrema) verneuili Murchison” discovered by Noda from this Upper Devonian was first described by Yabe and Noda (1933) in Japan.

But, as already published, Tachibana (1952) divided the cyrtospiriferids of this Up-

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per Devonian into two species, namely *Spirifer* (*Cyrtospirifer*) *verneuali* Murchison and *Spirifer* (*Cyrtospirifer?*) sp. The former species is characterized by developed dental lamellae in the pedicle valve and by the fine striae on the shell surface and is generally larger in size than the latter species which has short dental lamellae. These two cyrtospiriferids are different from *Cyrtospirifer kindlei* Stainbrook from the Percha shale of New Mexico and *Sinospirifer sinensis* var. *australe* Maxwell from the Lambie series of New South Wales.

In this paper, 2 new species and 1 new variety are described.

Fig. 2. Upper Devonian and lowest Carboniferous strata at Natsuyama.

2. Description

Genus *Cyrtospirifer* Nalivkin, 1918,

Diagnosis. (Nalivkin, 1931 p. 196). Form of shell mutable, both in outlines and dimensions. Hinge margin straight, more or less extended.

Ventral valve the more convex, sometimes low, curved, sometimes high, pyramidal. Sinus departing close from the apex, more or less clearly developed. Languette "varying height, arcuate of trapezoidal. Apex long, pointed, incurved or projeting. Area long of various height, always corresponding in the entire length of the hinge margin and sharply defined. Delthyrium of various width, sometimes wholly or in part covered by the pseudodeltidium.

The dorsal valve is the flatter. Mesial elevation starting from the very apex, more or less sharply delimited. Apex small, distinct.

Entire surface covered with multitudinous minute, flattish, subangular plications. The mesial plications are usually dichotomizing, the lateral—simple.

Sometimes, yet very seldom, dichotomy is to be observe! in the lateral plications too. Growth-lines closely set, more or less sharp. In condition of perfect preservation an exceedingly delicate radiating striation is observable.
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The ventral valve bears two more or less developed dental plates. In the apical region, near the area, these plates are connected by a delthyrial plate ("rostral callosity"). This latter is present in all the specimens, independently of the height of the area and of their age.


*Cyrtospirifer yabei* Noda and Tachibana, n. sp.

Plate 1, figures 1-7, 10


Shells of medium to large size; wider than long; hinge equal to greatest width of shell; cardinal area of pedicle valve not high and triangular to subtriangular in form; pedicle valve with well defined median sinus, which becomes wider and deeper anteriorly, and is divided by two sinal plicae; median fold with a shallow and narrow median depression or furrow; lateral part of the shell marked by 20 to 25 flattish, simple plicae which are bounded by linear furrows, but rarely some of the lateral plicae are bifurcated; entire surface marked by fine radial striae; dental lamellae usually long and subparallel, frequently attaining near the frontal margin; "apical callosity" well preserved between the dental lamellae; delthyrial cavity filled by shelly material; pedicle muscle scar narrow and long; cardinal process finely striated; sockets and socket plates are well defined; brachial muscle scars generally indistinct; axes of spiralia extend in posterolateral direction.

Remarks: *Cyrtospirifer yabei* Noda and Tachibana, n. sp. is most common in this Upper Devonian formation of this district and has been obtained from many localities of Higashiyamamachi.

It closely resembles *Cyrtospirifer kindlei* Stainbrook from the Percha shale of New Mexico. But, Stainbrook's species has more robust shell, the almost parallel-sided cardinal area in the pedicle valve, a convex deltidium-like plate and less developed radial striae upon the surface, and as far as Stainbrook's description is concerned, the median longitudinal furrow of the brachial fold and two prominent primary sinal plicae which are well observed in *Cyrtospirifer yabei* Noda and Tachibana, n. sp. seem to
be less developed or almost lacking in *Cyrtospirifer kindlei* Stainbrook.

From *Spirifer verneuili* Murchison originally described by Murchison (1840, pl. 11, figs. 3a-e?) *C. yabei* is different in its striated plicae and its general shape of a cardinal area of the pedicle valve.

*C. hiraethyrinae* Crickmay from the Three Forks shale of Montana closely resembles *C. yabei*, but the former species bears a smaller sized shell.

Occurrence.-Upper Devonian, Higashiyamamachi, Higashiiwaigun, Iwate Prefecture.

*Cyrtospirifer tobigamoriensis* Noda and Tachibana, n. sp.

Pl. 1, figs. 8-9

Shell of small size; form somewhat variable, usually trapezoidal in outline; wider than long, with the greatest width along the hinge-line; cardinal area of pedicle valve not so high; median sinus divided by primary sinal plicae; median fold frequently with shallow median depression or furrow; 18 to 22 lateral plicae are simple, being bounded by distinct furrows; entire surface covered by fine radial striae which become somewhat pustulose anteriorly; dental lamellae short and divergent; pedicle muscle scars well-defined; delthyrtal cavity usually filled shelly material; sockets and socket plates distinct; low median ridge extends anteriorly from cardinal process; brachial muscle scars usually ill-defined.

Remarks: *C. tobigamoriensis* Noda and Tachibana, n. sp. is found in association with *C. yabei*. Though both species closely resemble with each other, *C. tobigamoriensis* is usually smaller in size, having a different form, radial striae which become pustulose, anteriorly short dental lamellae, and well-defined muscle scars in the pedicle valve.

This species is different from *C. sinensis* var. *australis* Maxwell (Maxwell, 1951, p. 6, pl. 1, figs. 1-16, pl. figs. 1-3) from the Lambie series of Queensland. The former bears a slightly longer pedicle valve, distinct linear cardinal area of a brachial valve, different surface ornamentation, and the median fold which is frequently marked by a median furrow.

*C. cf. sinensis* var. *australis* Maxwell (Hayasaka and Minato, 1954, p. 203, pl. 26, figs. 1-6) from the Ainosawa formation of the Abukuma mountainland is somewhat related to *C. tobigamoriensis*. But, the former species is different from the latter in its general outline, its micro-ornament, and its feature of dental lamellae of the pedicle valve.

Shell of small size, wider than long, subquadrate in outline; cardinal extremities alate; median sinus usually broad and shallow; median fold with a median depression or furrow; lateral plicae simple, bounded by distinct furrows; surface covered by fine radiating striae which become frequently radiately elongate micro-pustules; dental lamellae short and divergent; sockets and socket plates distinct; thin median ridge extends anteriorly from the cardinal process which is composed of thin plates.

Remarks: This variety is different from *C. tobigamoriensis* by its more distinct median depression on the fold and its general shape, and it closely resembles *C. sulcifer* (Hall and Clarke) from the Upper Devonian of Eastern America. But, *C. sulcifer* is generally larger in shell size, and bears more prominent median furrow on the fold and a different micro-ornament.

Occurrence.-Upper Devonian, Higashiyamamachi, Higashiiwaigun, Iwate Prefecture.

3. References


Cooper G.A. and others, 1942, Index of fossils of North America.


Maxwell, W. G. H., 1951, Upper Devonian and Middle Carboniferous Brachiopods of Queensl and. Publ. Univ. Qd., Dept. of Geol., Ill


EXPLANATION TO PLATE J

All figures are natural size except with Fig.4 (x10)

Figs. 1-7 and 10. Cyrtospirifer yabei Noda and Tachibana, n. sp.

Figs. 1, 6, and 10. Internal molds of the pedicle valve.

Figs. 2 and 3. Internal molds of the brachial valve.

Fig. 4. Enlarged view of the surface showing the bifurcated plicae and radial striae.

Fig. 5. Cast from the internal mold of the pedicle valve.

Fig. 7. Apical view of the internal mold.

Figs. 8 and 9. Cyrtospirifer tobiganorniensis Noda and Tachibana, n. sp.
Figs. 8 and 9. Internal molds of the pedicle valve.

Fig. 11. *Cyrtospirifer sinensis* (Grabau). From the Upper Devonian (Frasnian) of China.


Figs. 12-15. Internal molds of the brachial valve.