

Original Article

Eolyttonia (Lyttonioidea, Brachiopoda) from Kiryu, central Japan

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Abstract: Two brachiopod species, *Eolyttonia diabloensis* (Stehli, 1954) and *Eolyttonia kiryuensis* sp. nov., are described from Early Permian (Artinskian) sandstone block in the Jurassic accretionary complex of the Ashio Belt, Kiryu area, central Japan. This is the first systematic study of *Eolyttonia* from Kiryu.

Key Words: Ashio Belt, brachiopod, *Eolyttonia*, Kiryu, Early Permian

Introduction

Eolyttonia is a medium-sized lyttionoid brachiopod, characterized by its numerous, more or less symmetrically disposed lateral septa with flat or concave crests in the ventral valve. This genus was established by Fredericks in 1924, with *Oldhamina* (*Lyttonia*) *mira* Fredericks, 1916 from the Middle Permian Chandalar Formation of South Primorye, Far East Russia as type species. More than 35 species of *Eolyttonia* have been described from the Upper Carboniferous (Kasimovian) to Upper Permian (Changhsingian) of the Palaeo-equatorial Realm (by Shi and Grunt, 2000) and its surroundings, i.e., North America (British Columbia and West Texas), southern Europe (Cantabrian Mts., Carnic Alps and Karawanke Mts.), Russia (Urals and South Primorye), China (Inner Mongolia, Heilongjiang, Shaanxi, Anhui, Hubei, Zhejiang, Fujian, Guangdong, Guizhou and Yunnan), Japan (South Kitakami, Maizuru and Mino Belts), Southeast Asia (Thailand, Malaysia and Timor) and Southwest Asia (Salt Range), mostly from the Lower Permian (upper Wolfcampian and Leonardian) of West Texas (e.g., Waagen, 1883; Fredericks, 1916, 1924; Licharew, 1925; Shimizu, 1961; Gauri and Ramovs, 1964; Gauri, 1965; Cooper and Grant, 1974; Tazawa, 1975; Grant, 1976; Lee and Gu in Lee et al., 1980; Tazawa and Shen, 1997; Yanagida and Nakornsri, 1999; Sone et al., 2001).

In Japan, the following three species of *Eolyttonia* have been described from the Permian strata: *Eolyttonia nakazawai*

Shimizu, 1961, from the Upper Permian (Changhsingian) Maizuru Group of Yakuno (Takauchi) in the Maizuru Belt, southwest Japan (Shimizu, 1961; Tazawa, 2006a, b); *Eolyttonia* cf. *nakazawai* Shimizu, 1961, from the Upper Permian (Changhsingian) Toyoma Formation of Kesenuma (Nabekoshiyama) in the South Kitakami Belt, northeast Japan (Tazawa, 1975, 2006b); and *Eolyttonia* sp., from the Middle Permian (Roadian) limestone block in the Jurassic accretionary complex of the Nyukawa area (Hiyomo), Mino Belt, central Japan (Tazawa and Shen, 1997).

The present paper indicates the first occurrence of *Eolyttonia* from Kiryu in the Ashio Belt, central Japan. The specimens described here as *Eolyttonia diabloensis* (Stehli, 1954) and *Eolyttonia kiryuensis* sp. nov. were collected by some members of the Kiryu High School Earth Science Club from floats of greenish-grey, fine-grained sandstone at the upper stream of the Iwakayasawa (36°30'50"N, 139°24'37"E), north of Jarubuchi, Kiryu City, Gunma Prefecture (Fig. 1). The fossil-bearing sandstone floats are probably derived from the Early Permian (Artinskian) sandstone block in the Jurassic accretionary complex, Ashio Belt (Sudo et al., 1991; Kamata, 1996; Igo et al., 2000). No brachiopod species has hitherto been described from the Kiryu area, although Koizumi et al. (1998) briefly mentioned the occurrence of *Eolyttonia* and *Permorthotetes* from the same fossil locality of Iwakayasawa.

The described specimens are registered (GMNH-PI) and housed in the Gunma Museum of Natural History in Tomioka City, Gunma Prefecture.

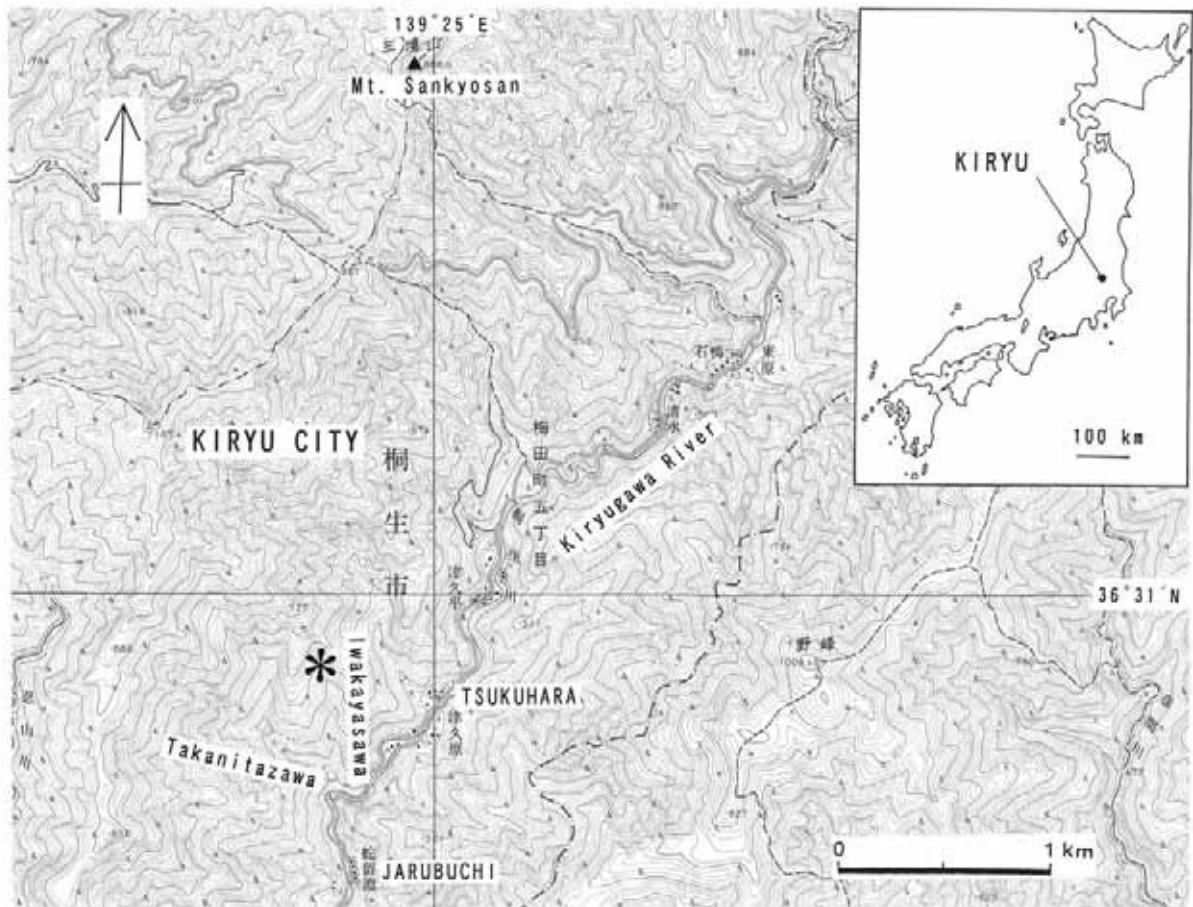


Figure 1 Index map showing the fossil locality (asterisk). Using the topographical map of “So-ori” scale 1:25,000 published by the Geographical Survey Institute of Japan.

Systematic descriptions

Order Productida Sarytcheva and Sokolskaya, 1959
 Suborder Lytoniina Williams, Harper and Grant, 2000
 Superfamily Lytonioidea Waagen, 1883
 Family Lytoniidae Waagen, 1883
 Subfamily Lytoniinae Waagen, 1883
 Genus *Eolyttonia* Fredericks, 1924

Uralina Schuchert and LeVene, 1929, p. 122.

Paraleptodus Lee and Gu in Lee et al., 1980, p. 390.

Type species.—*Oldhamina* (*Lyttonia*) *mira* Fredericks, 1916.

Diagnosis.—Medium-sized Lytoniinae with conical to subconical, rarely flat ventral valve, elongate subcircular in outline; attached by everted posterior flap; numerous more or less symmetrically arranged lateral septa transverse, thick, with flat or concave crests. Dorsal valve with small cardinal process having single shaft and bifid myophore.

Remarks.—Most species of *Eolyttonia* have conical to subconical ventral valve, but *Eolyttonia kiryuensis* sp. nov., from Kiryu has flattened ventral valve like that of *Eolyttonia?* sp., described by Grant (1976, p. 165) from the Rat Buri Limestone of Ko Muk, southern Thailand.

Lyttonia tenuis Waagen (1883, p. 401, pl. 30, figs. 3, 4, 7, 9),

from the Wargal Formation of the Salt Range, Pakistan clearly belongs to the genus *Eolyttonia*, in having lateral septa with deeply concave crests in the ventral valve, although many students (e.g., Huang, 1932; Zhan, 1979; Duan and Li, 1985; Liang, 1990; Campi et al., 2005) assigned this species to the genus *Leptodus* Kayser, 1883.

Eolyttonia diabloensis (Stehli, 1954)

Figs. 2A, 3.1, 3.2

Lyttonia nobilis americanus (Girty) : King, 1931, p. 103, pl. 32, figs. 1a, 1b only.

Leptodus? *diabloensis* Stehli, 1954, p. 307, pl. 18, figs. 12-14.

Eolyttonia diabloensis (Stehli) : Cooper and Grant, 1974, p. 420, pl. 140, figs. 1-25 ; pl. 162, figs. 11-18.

Material.—Two specimens, internal moulds of two ventral valves, GMNH-PI-1254, 1255.

Description.—Shell small to medium size for genus, with almost flattened ventral valve; length more than 29 mm, width about 32 mm in the larger specimen (GMNH-PI-1254) ; length about 18 mm, width about 14 mm in the smaller specimen (GMNH-PI-1255). Ventral valve interior with a rather thin median septum and more than 9 lateral septa on each side of ventral valve. Median septum separated into two parts in anterior region. Lateral septa somewhat irregular, but symmetrically arranged, slightly arched towards front ; crests of septa deeply concave (see Fig. 2A) ;

posterior side of lateral septa ornamented with numerous elongate pustules.

Remarks.—These specimens are referred to *Eolyttonia diabloensis* (Stehli, 1954), from the upper Wolfcampian and lower Leonardian of West Texas, in having a thin, anteriorly separated median septum, and somewhat irregular, deeply grooved lateral septa in the ventral valve.

Eolyttonia circularis Cooper and Grant (1974, p. 418, pl. 143, figs. 1-16; pl. 144, figs. 6-14; pl. 145, fig. 5) from the Leonardian of West Texas differs from *Eolyttonia diabloensis* by its less papillose lateral septa in the ventral valve.

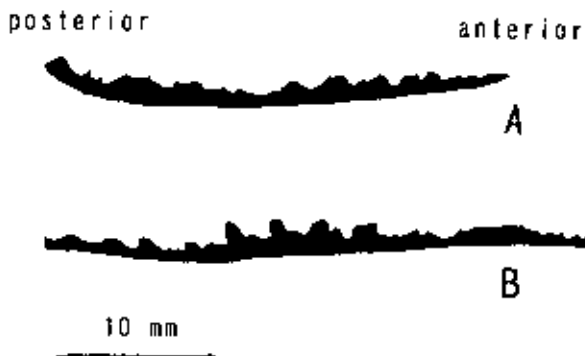


Figure 2 Longitudinal section of internal latex cast of ventral valve, showing crests of lateral septa. A: *Eolyttonia diabloensis* (Stehli), GMNH-PI-1254, B: *Eolyttonia kiryuensis* sp. nov., GMNH-PI-1256.

Eolyttonia kiryuensis sp. nov.

Figs. 2B, 3.3-3.5

Material.—Three specimens, internal moulds of three ventral valves, GMNH-PI-1256 (holotype), 1257, 1258.

Diagnosis.—*Eolyttonia* with thick median septum and nearly straight lateral septa in ventral valve.

Description.—Shell medium size for genus, elongate spatulate in outline, with greatest width near anterior margin; length about 41 mm, width about 37 mm in the holotype (GMNH-PI-1256). Ventral valve interior with a median septum and at least 11 lateral septa on both sides of median septum. Median septum thick, fairly strongly elevated and narrow in posterior half, but becoming flattened towards anterior margin. Lateral septa symmetrically arranged, straight to slightly arched towards front; crests of septa bluntly rounded in posterior region, flat or concave in anterior region (see Fig. 2B); interseptal ridges developed anteriorly. Numerous elongate pustules pitted on interseptal ridges and both posterior and anterior sides of lateral septa.

Remarks.—*Eolyttonia kiryuensis* sp. nov. is distinguished from the other *Eolyttonia* species by its strong median septum and nearly straight lateral septa, with flat crests in the posterior region, and deeply concave crests in the anterior region.

Eolyttonia? sp., described and figured by Grant (1976, p. 165, pl. 40, fig. 7; pl. 43, fig. 17) from the Rat Buri Limestone of Ko Muk, southern Thailand is similar to *Eolyttonia kiryuensis* in having flattened ventral valve with thick median septum and nearly straight lateral septa. It is highly probable that the Thai

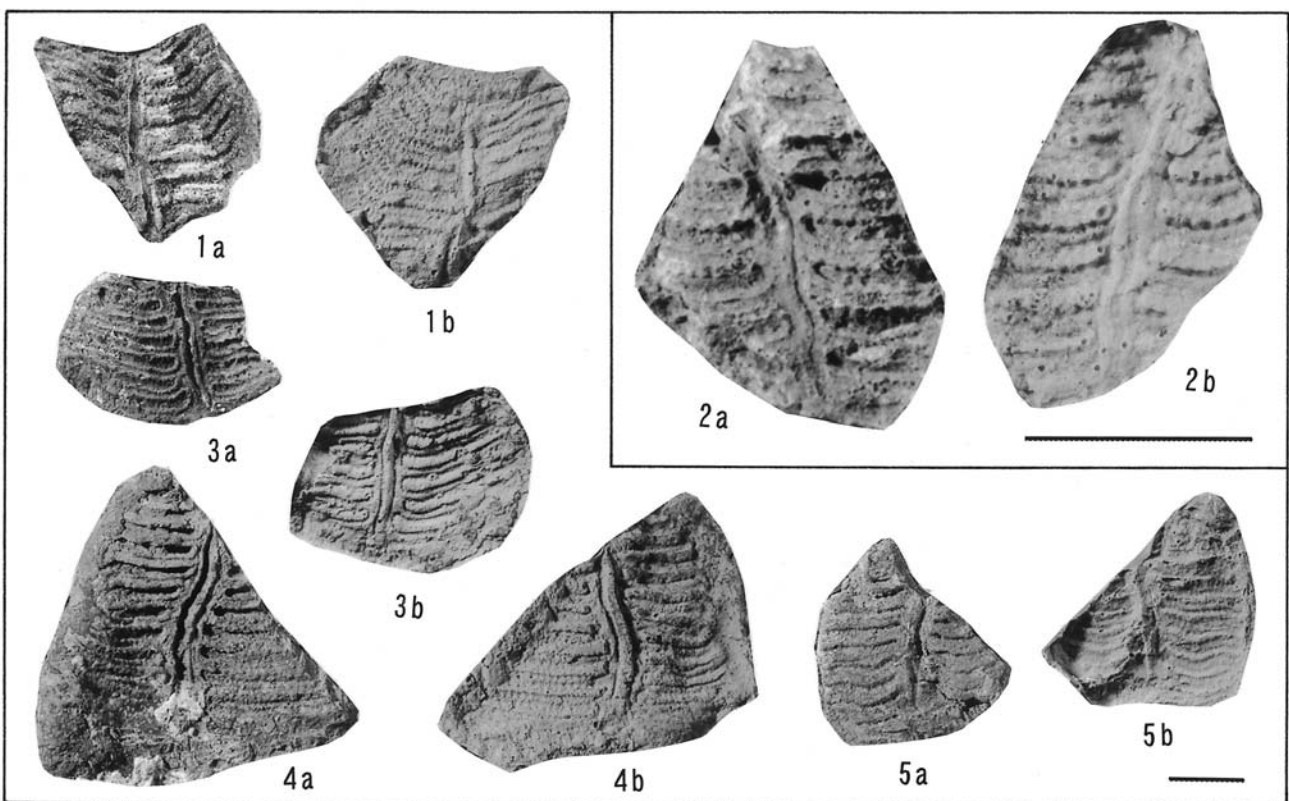


Figure 3 *Eolyttonia* from Kiryu in the Ashio Belt, central Japan. 1, 2: *Eolyttonia diabloensis* (Stehli), 1a, 1b: internal mould and internal latex cast of ventral valve, GMNH-PI-1254, 2a, 2b: internal mould and internal latex cast of ventral valve, GMNH-PI-1255. 3-5: *Eolyttonia kiryuensis* sp. nov., 3a, 3b: internal mould and internal latex cast of ventral valve, GMNH-PI-1257, 4a, 4b: internal mould and internal latex cast of ventral valve, GMNH-PI-1256 (holotype), 5a, 5b: internal mould and internal latex cast of ventral valve, GMNH-PI-1258. Scale bars represent 1 cm.

species is conspecific with the Kiryu species. *Eolyttonia kiryuensis* sp. nov. is easily distinguished from the above described species, *Eolyttonia diabloensis* by its strong, thick median septum and nearly straight lateral septa in the ventral valve.

Eolyttonis sp. Yanagida and Nakornsri (1999, p. 132, pl. 31, figs. 2, 3), from the Rat Buri Group (Tak Fa Formation) of Khao Hin Kling, north-central Thailand, resembles *E. kiryuensis* in having flattened ventral valve, but the Thai species differs from the Kiryu species by its more strongly arcuated lateral septa in the ventral valve.

Eolyttonia sp. Tazawa and Shen (1997, p. 7, pl. 1, figs. 7a, 7b), from the Middle Permian limestone block of Hiyomo in the Mino Belt, central Japan, differs from the present new species by its much broader lateral septa with deeply concave crests in the ventral valve.

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桐生から産出した腕足類エオリットニア

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要旨：足尾帯桐生地域のジュラ紀付加体中の前期ペルム紀（Artinskian）砂岩ブロックから産出した腕足類 *Eolyttoni* の2種，すなわち *Eolyttonia diabloensis* (Stehli, 1954) と *Eolyttonia kiryuensis* sp. nov. について記載する．これは桐生産 *Eolyttonia* についての初めての分類学的研究である．

キーワード：足尾帯，腕足類，*Eolyttonia*，桐生，前期ペルム紀