

New species of chemosynthetic bivalves, *Vesicomya* and *Acharax*,
from the Cretaceous deposits of northwestern Hokkaido

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北海道北西部の白亜系産化学合成二枚貝 *Vesicomya* 属 と *Acharax* 属 の新種

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北海道北西部の幌加内町, 三十線沢上流の中部蝦夷層群My4部層 (白亜系の下部セノマニアン, 約95Ma) に含まれる巨大円形の石灰質ノジュールから3種の二枚貝化石が合弁状態で密集して発見された。それは, 1) オトヒメハマグリ属 *Vesicomya* (オトヒメハマグリ科), スエヒロキヌタレガイ属 *Acharax* (キヌタレガイ科), *Miltha* 属 (ツキガイ科) であった (KANIE *et al.*, 2000)。そのうち, *Vesicomya* と *Acharax* は新種であるので, ここに *V. inflata* と *A. cretacea* と命名・記載する。上記3属からなるコミュニティは化学合成軟体動物群集とみなされる。

Introduction

Several species of articulated bivalves were discovered in an huge-sized calcareous concretion embedded in unit My4 (Lower Cenomanian, ca 95 Ma) of the Middle Yezo Group, exposed at Locality R7203, in the upper course of the Sanjussen-zawa, Horokanai-cho, northwestern Hokkaido (NISHIDA *et al.*, 1998).

KANIE *et al.* (1999) reported the mollusks as the genera *Vesicomya* (Vesicomyiidae), *Acharax* (Solemyidae) and *Miltha* (Lucinidae), and they were regarded as the constituents of chemosynthetic mollusks. In this paper, we ascribe them to two genera and describe as new species. The geological setting and mode of occurrence are shown in KANIE *et al.* (2000).

The specimens described here are housed in the Yokosuka City Museum (YCM).

Systematic description

Family *Vesicomyiidae* DALL, 1908

Genus *Vesicomya* DALL, 1886

Vesicomya inflata KANIE *et al.* NISHIDA, n. sp.
(Figs. 1, 2; Table 1)

Specimens studied: Holotype (YCM-GP1173); paratype (YCM-GP1174); referred specimens (YCM-GP1177~1179)

Description: Large shell probably (length [L] L=130 mm in holotype and probably gerontic stage) of rounded triangular in form (height [H] H/L=0.8). Umbo (shell apex) situates at almost central (45-46% from anterior margin). Strongly inflated valve ([H]/breadth [B], H/B≠0.68). The measurement is in Table 1. Shells of right and left are equivalves. Posterior end is truncated.

In the juvenile to middle growth stage represented by paratype (L=88.6 mm), the

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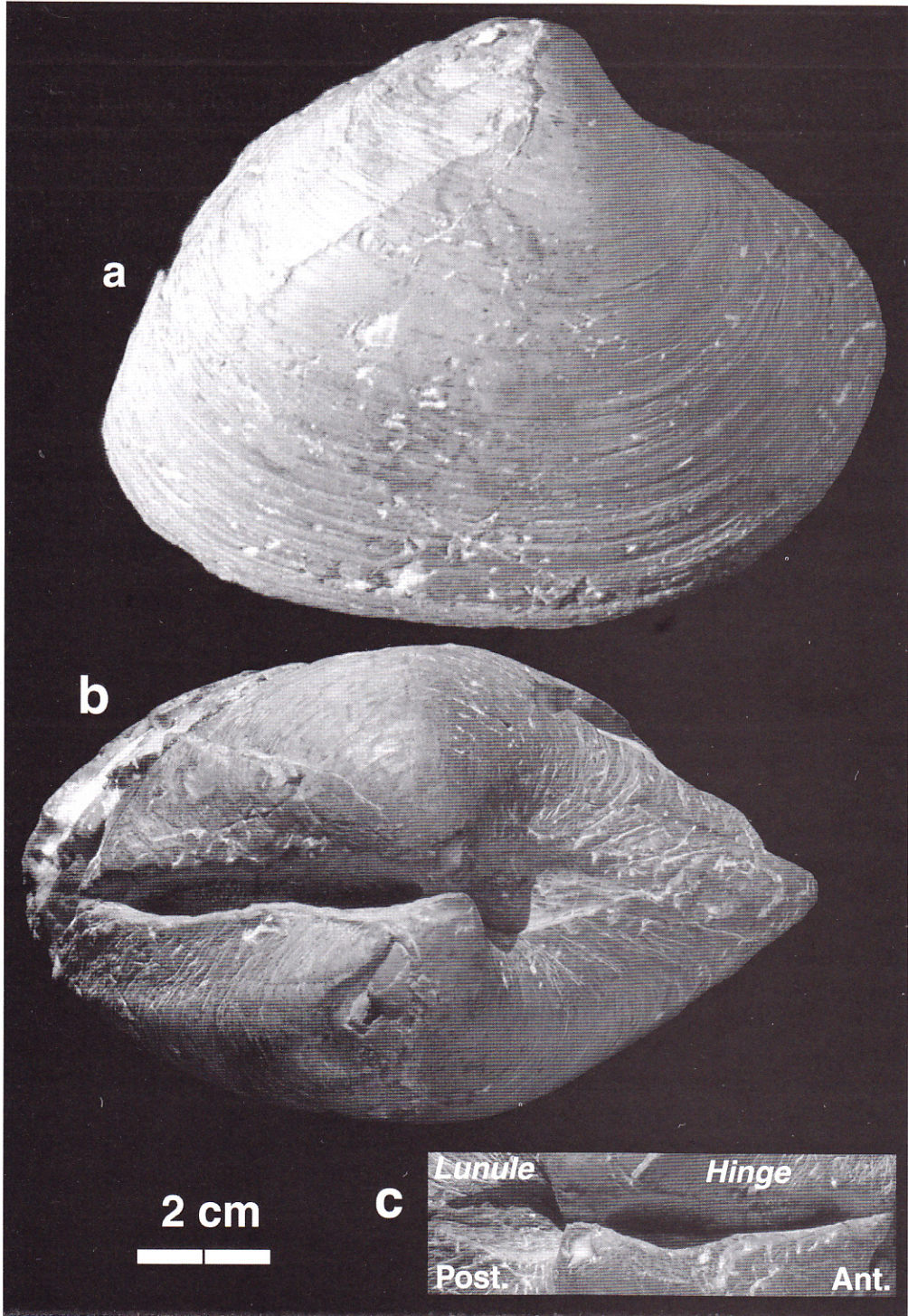


Fig. 1 *Vesicomya inflata* KANIE et NISHIDA n. sp. from the Upper Cretaceous deposits in the upper course of the Sanjussen-zawa, Horokanai-cho, northwestern Hokkaido. Natural size. a, b. Holotype, YCM-GP1173, c. Hinge area and lunule of the holotype.

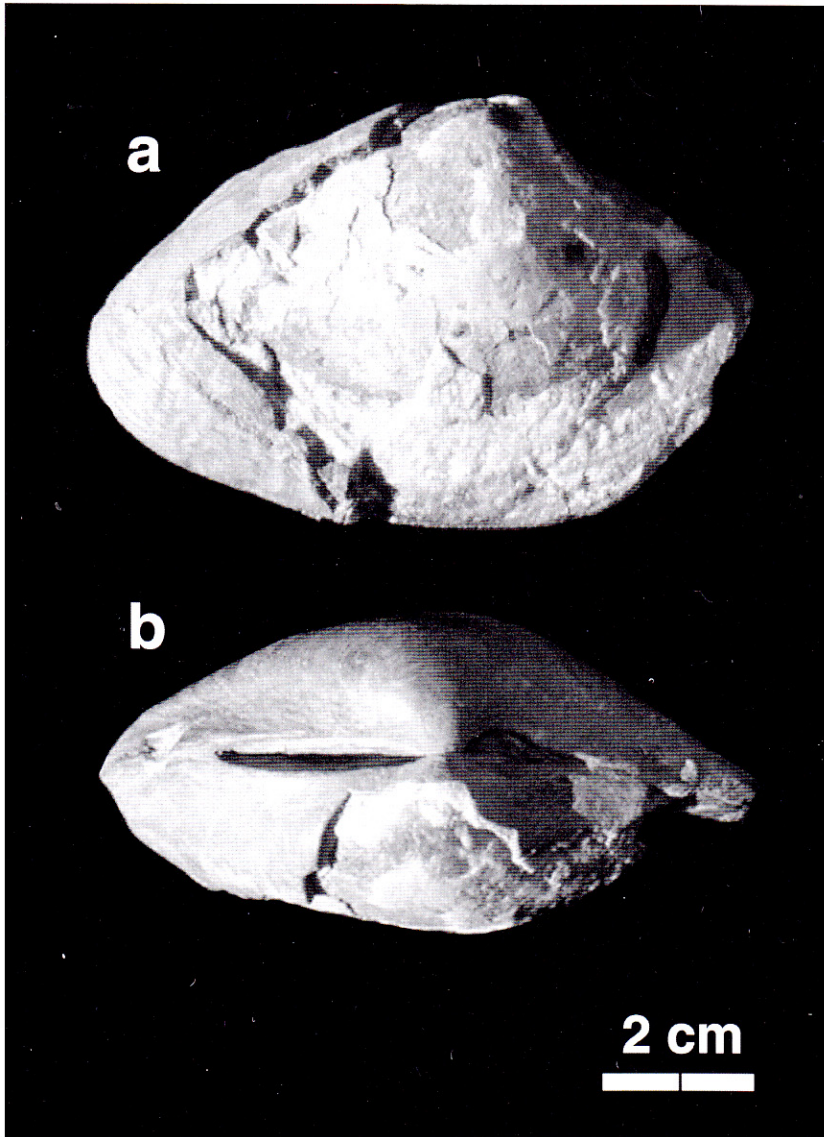


Fig. 2 *Vesicomya inflata* KANIE et NISHIDA n. sp. from the Upper Cretaceous deposits in the upper course of the Sanjussen-zawa, Horokanai-cho, northwestern Hokkaido. Natural size. a, b. paratype, YCM-GP1174.

Table 1. Measurements of the shell of *Vesicomya inflata* in mm.

Specimen	Length(L)	Height(H)	H/L	Breadth(B)(x2)	B/L	Ua	Notes	Ua/L
YCM-P1173	127.6	102.3	0.80	69.9	0.68	58.5	Holotype	0.46
YCM-P1174	88.6	60.0	0.68	37.0	0.61		Paratype	
YCM-P1177	123.0	94.5	0.77	70.7	0.75	55.0	Referred	0.45
YCM-P1178	103.3	86.0	0.84	57.3	0.67		Referred	
YCM-P1179	119.0	94.4	0.79	64.5	0.68		Referred	

Ua: distance between umbonal area and anterior shell margin.

shell height is shortened ($H/L=0.68$). Postero-dorsal end is truncated meeting with the posterior margin. Lunule (Fig. 1-c) and hinge form is the same as gerontic one.

There is a lunule at antero-dorsal part. The ventral margin is weakly arched. Ligament probably external and long on the basis of morphology of the hinge area (Fig. 1-c) at postero-dorsal part.

Test is very thick about 7 mm at the ventral margin. Shell surface is ornamented by concentric growth lines.

The umbo bends strongly inside, where characteristic subumbonal pit exists at the inside of the shell apex.

Comparison: We could not observe the specimens of subgenera *Vesicomya*, *Callogonia*, *Venriglossa*, and *Waisiuconch* under the Vesicomyiidae. They are small-sized Atlantic subgenera summarized by KEEN (1969). In this paper, we regarded above subgenera as *Vesicomya* (s.l.).

KURODA (1952) described *V. katsuae* from depth ca. 150 m off Shikoku. The shells were 12.1-13.8 mm in length. TSUCHIDA (1994) reported *V. katsuae*, *V. indica*, *V. nakai* from deep sea waters around Japan, although they are small (10-35 mm in length of bivalves).

GOEDERT and SQUIRES (1990, Fig. 2-t) illustrated pitarid bivalve ca. 100 mm in length and considered as chemosynthetic animal from the Middle Eocene limestones from southwestern Washington. Thereafter GOEDERT and KALER (1996) named the bivalve as *Vesicomya* sp. *V. inflata* n. sp. is similar to the form of *Vesicomya* sp except of large shell..

MATSUMOTO Takashi allowed observation of undescribed specimens. The morphology of modern species of *Vesicomya* sp. (Fig. 3) collected by submergible "Dorphan 3K" of the JAMSTEC is similar to the Cretaceous new species. However, the shell of modern species is small, approximately 2 to 3 cm. The specimens (JAMSTEC-Biv-006292) were collected on depth 813 m off Kuroshima, Ryukyu

Trench (N24° 07'35.7", E124° 12'13.4"; diving #D3K 347). *V. inflata* n. sp. is similar to the form of *Vesicomya* sp., but differ from *Vesicomya* sp. in large shell size.

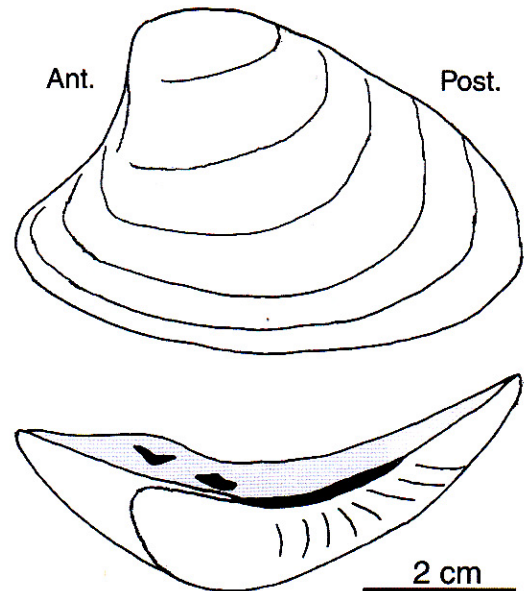


Fig. 3 The sketch on one of the modern species of genus *Vesicomya*.

The specimen (JAMSTEC-Biv-006292) from depth 813 m off Kuroshima, Ryukyu Trench (N24° 07'35.7", E124° 12'13.4"). diving #D3K 347 using the unmanned submergible "Dorphan 3K" of the JAMSTEC. The specimen is by courtesy of Mr. MATSUMOTO Takashi.

Family Solemyidae ADAMS et ADAMS, 1857

Genus *Acharax* DALL, 1908

Acharax cretacea KANIE et NISHIDA n. sp.

(Fig. 4, Table 2)

Specimens studied: Holotype (YCM-P1175); and paratype (YCM-1180) (Table 2).

Description: Shell is middle sized, often exceeds 100 mm in length. Long and narrow in form. Thin shell is ornamented with wide-spaced radial ribs, strong at anterior part. Ligament probably external and long based on morphology of the hinge area at postero-dorsal part. Therefore, this specimen is

identified with genus *Acharax*, but not *Solemya*. Umbo situated 25 to 31% from the anterior margin.

Comparison : Widely distributed Miocene to Pleistocene species, *Acharax tokunagai*, is characterized by the external ligament which is situated posteriorly, the very long antero-dorsal margin. Height is small relatively compared with the length. And, recent species *Acharax johnsoni* is characterized by elongation and thinness, surface have numerous radial ribs on the periostracum.

The new species is morphologically closely similar to those of the Miocene to Pleistocene *A. tokunagai* and living *A.*

johnsoni, although there has been long time between the Cretaceous and the Miocene time.

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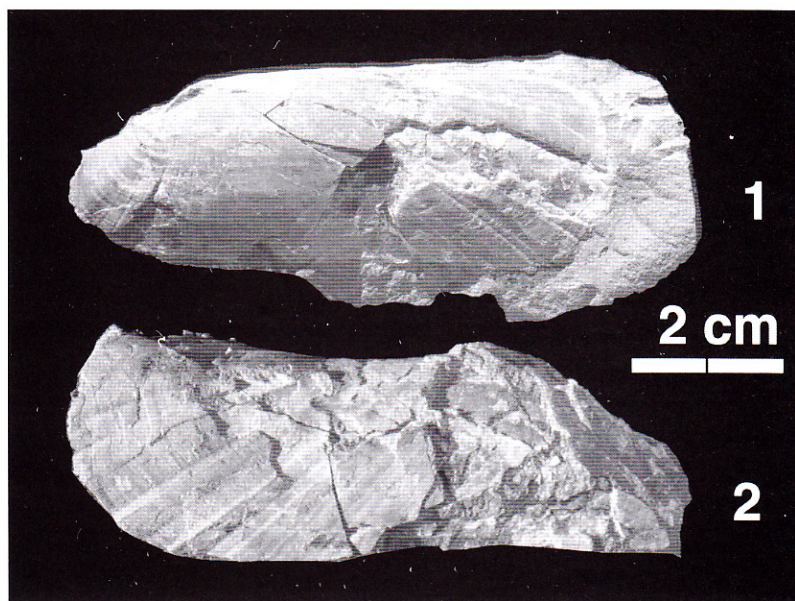


Fig. 4 *Acharax cretacea* KANIE et NISHIDA, n. sp. from the Upper Cretaceous deposits in the upper course of the Sanjussen-zawa, Horokanai-cho, northwestern Hokkaido. Natural size. 1. Paratype, YCM-GP1180, 2. holotype, YCM-GP1175.

Table 2. Measurements of the shell of *Acharax cretacea* in mm.

Specimen	Length(L)	Height(H)	H/L	Breadth(B)(x2)	Ua	Ua/L	Notes
YCM-P1175	100.0	41.3	0.41		24.70	.025	Holotype
YCM-P1180	74.9	26.7	0.36	17.0	23.001		Paratype

Ua: distance between umbonal area and anterior shell margin.

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