

Acharax yokosukensis, n. sp. (gigantic Bivalve) from the Miocene Hayama Formation of the Miura Peninsula, south-central Japan

KANIE Y.* and KURAMOCHI T.**

三浦半島の中新統葉山層産巨大なスエヒロキヌタレガイ属の
新種 *Acharax yokosukensis*

蟹江康光*・倉持卓司**

横須賀市池上地区の中期中新世の前期 (15 Ma) 葉山層は多種の軟体動物群化石を産出した。その中でも特に多産したスエヒロキヌタレガイ属 *Acharax* の一種は、新種 *yokosukensis* と結論されたので、ここに記載する。この化石産地よりスエヒロキヌタレガイ属の新種と共にシロウリガイ属 *Calypptogena* sp. やツキガイモドキ *Lucinoma annulata*, オウナガイ *Conchocele disjuncta* などが共産し、これらの化石は、断層破砕帯中の暗灰色粘土岩もしくは石灰質の粘土岩より産出することから、極めて特殊な環境に適応した生物群であり、現生シロウリガイのコミュニティと同様の化学合成軟体動物群集と推定される。*A. yokosukensis* の生息深度は共産した底生有孔虫によれば、中部漸深海帯 (1200-1300 m) と推定されている。

Acharax yokosukensis, n. sp. ダイオウキヌタレガイ (新種) の殻は著しく大きく、殻質も著しく厚い。殻幅は大きい。殻頂は明瞭で、後部中央寄りに位置 ($Ua/L=0.66-0.62$) する。靱帯は外在する。最大殻高は殻頂付近にあり、殻長/殻高比 (H/L) は、約0.4である。幅の広い12-13本の放射肋は、前部と後部で深く強く、中央部で浅く弱い。殻の前背縁は直線的で、腹縁は弱いカーブとなっている。前縁は腹縁に弱い弧をつくる切断状で、後端は大きく丸くなっている。復元された最大標本の殻長は約300 mm、殻高は約100 mmに達する。

Introduction

The Hayama Formation (KANIE and ASAMI, 1995) distributed in the central part of the Miura Peninsula is cropping out in the two belts of north and south, which are separated each other by the younger Neogene Miura Group. The geologic age of the southern belt is the lower part of the Middle Miocene (Ca. 15 Ma) and the north is ranging from the upper part of the Lower Miocene (Ca. 16 Ma) to the lower part of the

Middle Miocene. The Hayama Formation consists mainly of the dark gray massive claystone which includes intercalary sandstone and calcareous claystone. The Hayama Formation is cutted by several revers faults running from WNW to ESE. The fossil records of the Hayama Formation are scanty excepting for some records of micro-fossils and a few mollusks.

Recently, the Research Group for Giant Clam Communities of the Hayama Group (1995) reported the molluscan fossils collected from the

* Yokosuka City Museum, Yokosuka 238.

** Sagami Shell Club, c/o Yokosuka City Museum.

Manuscript received Sept. 17, 1995. Contribution from the Yokosuka City Museum, No. 479.

Key words: *Acharax*, Solemyidae, Miura Peninsula, Miocene, Hayama Formation; キーワード: スエヒロキヌタレガイ属, キヌタレガイ科, 三浦半島, 中新世, 葉山層

fault breccia zone in the upper part of the northern belt near the entrance of the Shinhemi Tunnel, Ikegami, Yokosuka City. Some were reported by KANIE et al. (1995a, b), KANNO and KANIE (1995), and NAGANUMA et al. (1995). The molluscan fauna collected from the Ikegami is a chesynthetic one (ASAMI et al., 1995). This article describes essentially on the hugely gigantic bivalve *Acharax yokosukensis*, n. sp. collected from the fault breccia exposed at the southern entrance of the Sinhemi Tunnel.

Acknowledgement: We are grateful to KANNO S., Professor Emeritous of University of Tsukuba, for helpful advice and critical reading of the manuscript, and to ASAMI S., Kurihama High School for collaboration of the field works and valuable discussion.

Systematic description

Family Solemyidae H. & A. ADAMS, 1857

Genus *Acharax* DALL, 1908

Generic diagnosis: Shell elongate-oval or quadri-lateral, equivalve. Beaks low, placed posteriorly. Ligament wholly external, opisthodetic, supported by nymphs. Edentulous. Surface ornamented with distinct radial ribs.

Remarks: Genus *Acharax* differs from the genera *Solemya* and *Petrasma* by having external ligament on nymph and lacking condrophore and resilifer. The type species of *Acharax johnsoni* (DALL, 1891) distributes in the northern Pacific region of the west coast of North America through the west Pacific coast of the Sagami Bay.

Acharax yokosukensis, n. sp.

Japanese name: Daioh-kinutaregai
(Figs. 1–4)

1994. *Acharax* aff. *tokunagai* OGASAWARA, HISADA and KITADA. *Ann. Rept. Inst. Geosci. Univ. Tsukuba*, no. 20, p. 34–35, fig. 3.

1995. *Acharax* sp., KANIE, KURAMOCHI, ASAMI and KANNO. *Rept. Cult. & Nat. Treas. Yokosuka City*, p. 57–58, figs. 1–3.

Materials examined: At least eight specimens are at

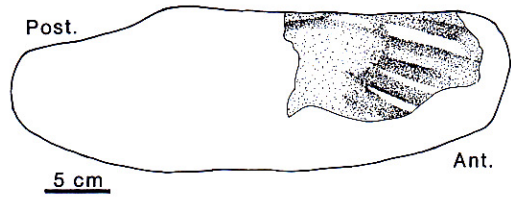


Fig. 1 A huge specimen (restored shell length ca. 30 cm) of *Acharax yokosukensis*, n. sp., paratype, YCM-GP. Ig37.

hand, but most of all are incomplete shell fragments except for an adult bivalve (YCM-GP.Ig36). All specimens are preserved in the Yokosuka City Museum.

Description: Shell hugely large, elongate, with thick (amount 5.1 mm at central part of the ventor), chalky shell; the shell length of the largest specimen YCM-GP.Ig37 is restored as approximately 300 mm in length and 100 mm in height. Straight antero-dorsal margin and slightly concave postero-dorsal end; truncated anterior margin, and rounded posterior end. Maximum shell height (H) locates near the beak. The ratio H/L is 0.39–0.38. Beak in the adult is at antero-centrally (length between beak and anterior margin: $Ua/L=0.66-0.62$), but in immature stage slightly shifts at anteriorly ($Ua/L=ca. 0.69$); height of the shell more or less varies during its growth stage, eg., the ratio of height to length of shell (H/L) is about 0.42 in immature shell, but it seems to decrease up to about 0.38 in the adult; the width of shell of the immature one shows rather small ($W/H=ca. 0.60$), whereas 0.75–0.78 in the adult. Hinge line nearly straight, with a ligament at the postero-dorsal margin which is external, visible internally only where it crosses the gap between the valve margins (Fig. 4).

Surface of the shells ornamented with 12–13 distinct radial ribs which are predominant in the both side of the anterior and the posterior, whereas faint radials are observable in the mid-disk; radial ribs separated by the interspace which are somewhat narrower than the breadth of the radials; surface is also ornamented by concentric, fine, incremental growth lines. Mantle line inac-

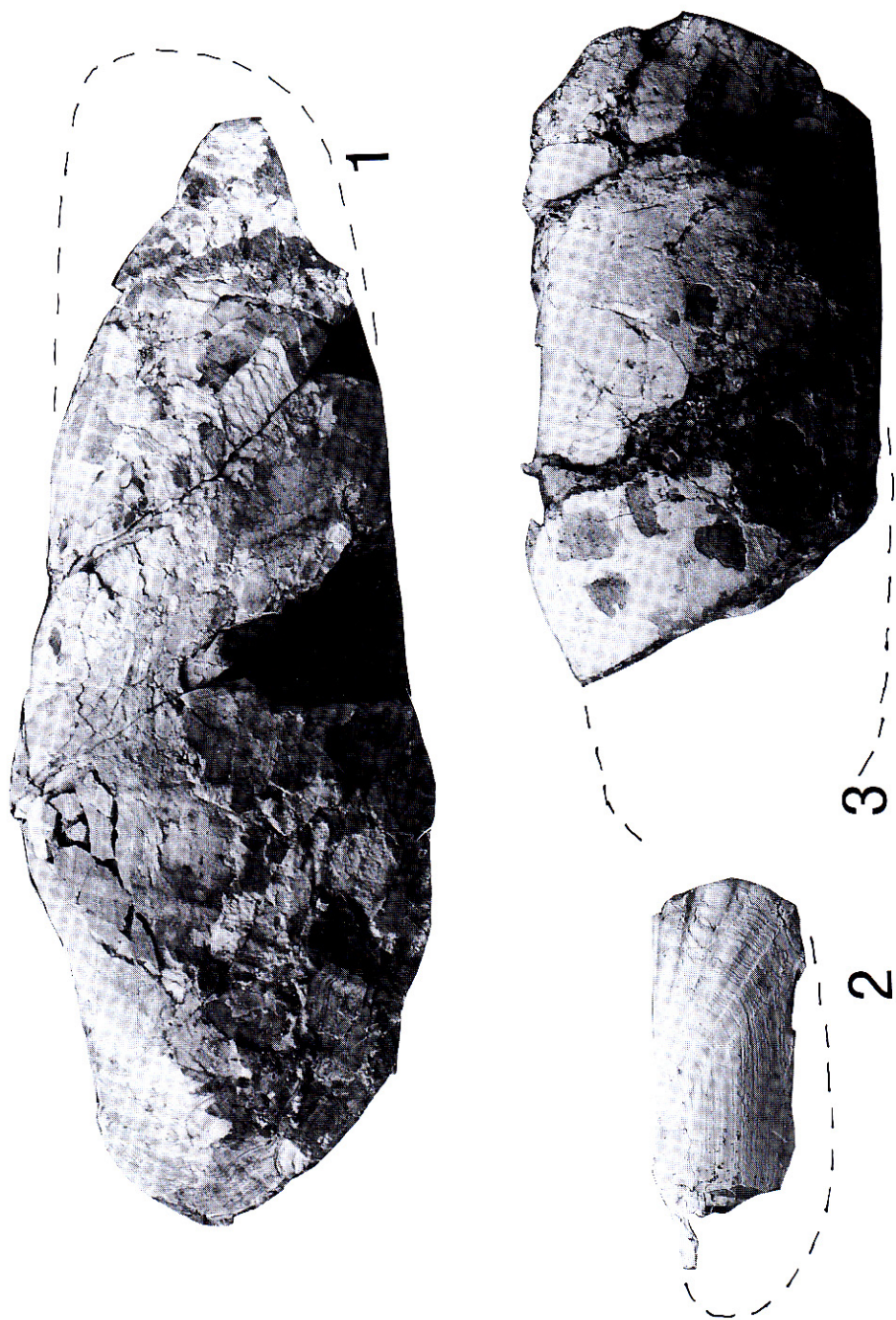


Fig. 2 *Acharax yokosukensis*, n. sp., natural size.
1. Holotype, YCM-GP.Ig36; 2. paratype, YCM-GP.Ig48; 3. paratype, YCM-GP. Ig32.

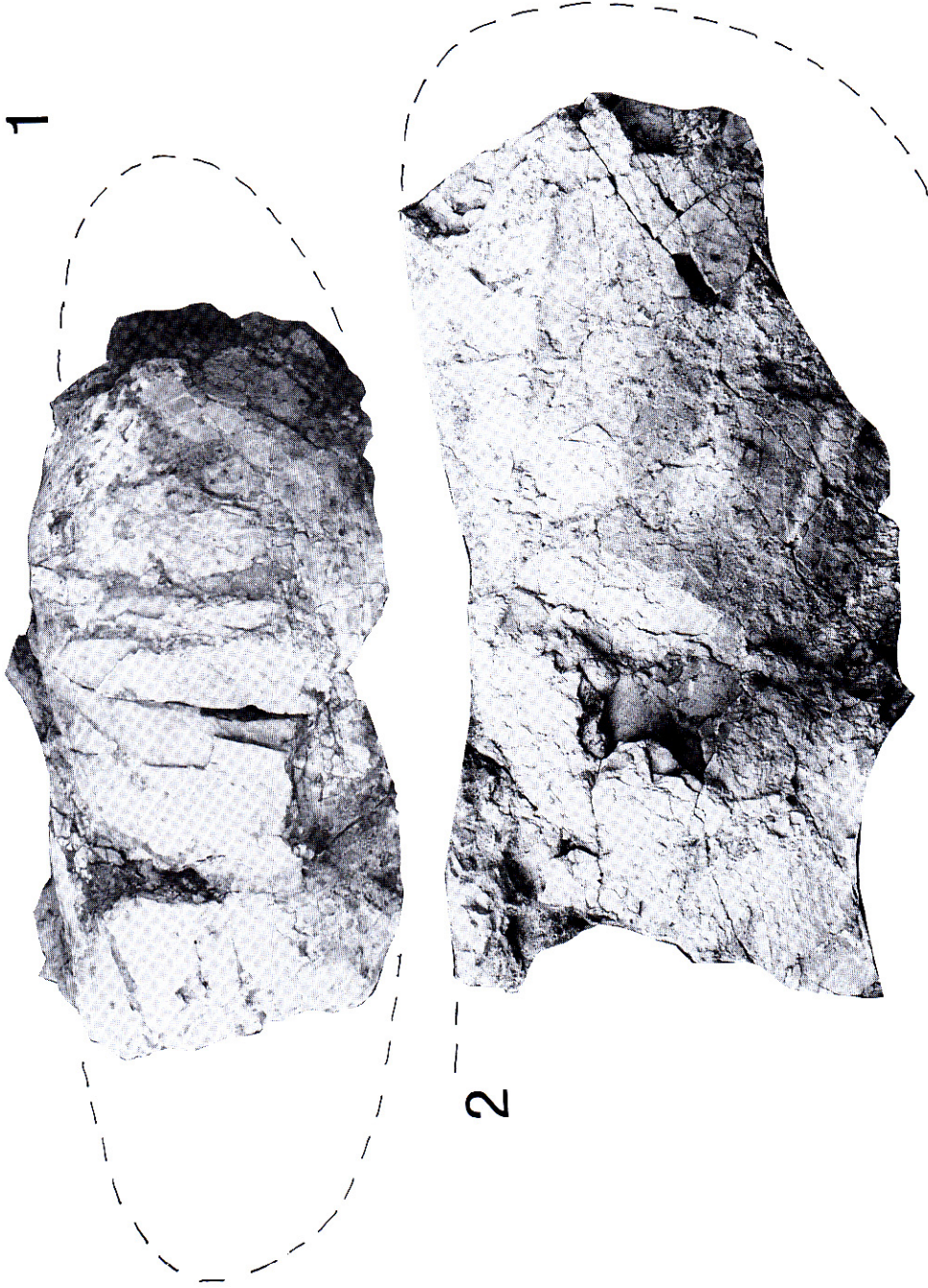


Fig. 3 *Acharax yokosukensis*, n. sp. natural size.
1. Paratype, YCM-GP.Ig33-2; 2. paratype, YCM-GP.Ig37.

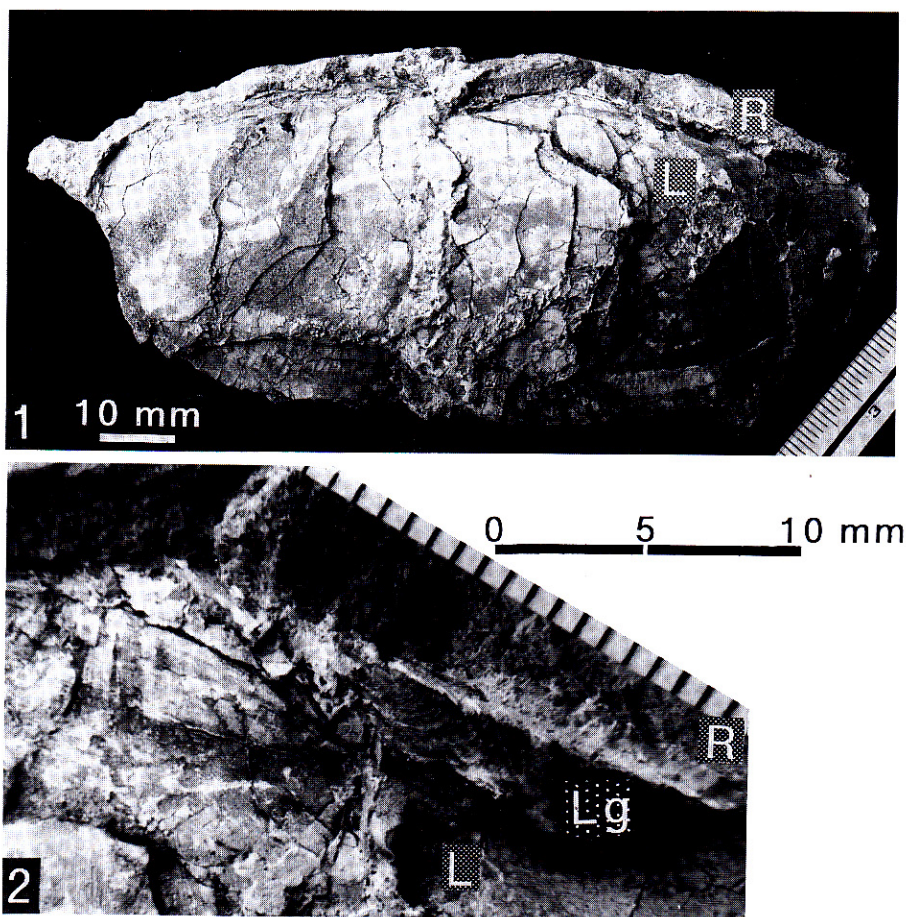


Fig. 4 Beak area of *Acharax yokosukensis*, n. sp. YCM-GP.Ig47, paratype.
 1. Left valve (L) inside of the right valve (R), natural size; 2. enlarged photo of jointed bivalve, Lg: ligament, x4.

Table 1. Measurement in mm:

Specimens	L	H	H/L	W	W/H	Ua	Ua/L
Holotype (YCM-GP. Ig36)	145.5	56.0	0.39	42.4	0.76	966.0	0.66
Paratype (YCM-GP. Ig47)	122.5	46.3	0.38	40.0	0.86	75.3	0.62
Paratype (YCM-GP. Ig32)	(120)	54.4	(0.45)	32.4	0.60	83.6	(0.70)
Paratype (YCM-GP. Ig48)	(65)	24.2	(0.37)	14.4	0.60	44.8	(0.69)
Paratype (YCM-GP. Ig37)	(300)	(100)	(0.33)	—	—	—	—

L: Length, H: height, W: width of both valves, Ua: length between beak and anterior margin. (): Numerical value estimated from the restored specimens based on the fragments.

cessible.

Periostracum and the traces were not preserved in the specimens studied.

Comparison: The present new species is characterized by having an extremely huge and thick shell with distinct wide and low radial ribs running from the beak to antero- and postero-ventral margins. In addition, beak situates more centrally ($Ua/L=0.62-0.66$) in the adult stage, but it shows about 0.69 in the more younger specimen; namely, beaks of this new species slightly shift toward centrally during the growth; the width of the new species also varies from compressed shell to expanded one during the growth stage.

This new species is closely similar to *A. aff. tokunagai* (OGASAWARA et al., 1994) from the Lower Miocene Aokiyama Formation of the Hota Group in southern Boso Peninsula, Chiba Prefecture. On this respect of the extremely large sized (restored shell length is 160 mm), and thick shell. Strongly expanded shell with centrally situated beak with a stout external ligament as well as the surface ornamentation. Judging from the these characters of the Aokiyama specimen seems to be a conspecies of the present new species.

This new species is easily distinguished from *A. gigas* KANNO, 1960. ($L=115$ mm, $H=33$ mm; $Ua/L=ca. 0.74$) from the Middle Miocene Hiranita Formation, Chichibu Basin, by having more larger and thicker shell with beaks situated more centrally in the adult. The Oligo-Miocene *A. muroensis* NATORI, 1964 is small shell ($L=22.0$ mm length., $H=10.5$ mm height), and the beak locates at posterior end. The Early Middle Miocene *A. bosoana* (HATAI & KOIKE, 1957) is large shell ($L=82$ mm, $H=27$ mm) of antero-dorsal margin long, and straight. Above mentioned and several Miocene species reported from the Japanese Island clearly differs from the new species by small sized shells and the posteriorly situated beak.

It is clear that *A. yokosukensis*, n. sp. differs from following modern species. *A. johnsoni* (DALL, 1891) is large; it is similar in ligament external on nymph, but distinct in beak is situating far

posteriorly ($Ua/L=0.78$); thin shells, dorsal and ventral margins are almost straight; fragile and quadri-lateral in profile; there are numerous radial ribs under the thick and black periostracum. The Middle Miocene-Early Pleistocene *A. tokunagai* (YOKOYAMA, 1925), KAMADA and HAYASAKA, 1959 probable synonymy of *A. yessoensis* (KANEHARA, 1937) have a strong resemblance to *A. johnsoni* living in north Pacific Ocean through to Sagami Bay. *A. japonicus* (DUNKER, 1882) is small sized thin shell; dorsal and ventral margins are straight; anterior margin is almost truncated; beak situates far posteriorly ($Ua/L=0.76$); periostracum is thin and brown; this species lives 5-20 m deep around Japanese waters.

Type locality: East side cliff of the southern entrance of the Shinsawayama Tunnel, Ikegami, Yokosuka City, Kananawa Prefecture.

Geologic horizon: Upper part of the Hayama Formation of KANIE and ASAMI, 1995 (lower Middle Miocene, ca. 15 Ma), based on CN4 nannoflora zone-early Middle Miocene (OKADA, 1995) and early Middle Miocene radiolarian zone (TAKETANI, 1995). The paleobathymetry of the Hayama Formation was inferred middle part of the middle bathyal zone from the benthic foraminiferal fauna (AKIMOTO et al., 1995).

Reference cited

- AKIMOTO K., SAGA S. and YAMADA K. 1995. Benthic foraminiferal faunas and paleo-environment of the Miocene Hayama Group in the Miura Peninsula (in Japanese with English abstract). *Rept. Cult. & Nat. Treas. Yokosuka City*, (29): 45-49.
- HATAI K. and KOIKE K. 1957. On fossil mollusca from Chiba Prefecture, Japan. *Japan. Jour. Geol. Geogr.*, **28**(1-3): 77-90, pl. 4.
- KAMADA Y. and HAYASAKA S. 1962. Remarks on a fossil marine fauna from Tateishi, Futaba district, in the Joban Coalfield, Fukushima Prefecture. *Saito Ho-on Kai Mus., Res. Bull.*, (28): 17-28.
- KANEHARA K. 1937. On some Tertiary fossil

- shells from Hokkaido (Yesso). *Japan. Jour. Geol. Geogr.*, **14** (2-3): 155-161, pls. 15.
- KANIE Y., ASAMI S., OKADA H. and WATANABE M. 1995. White clam communities discovered from fractured claystone of the Miocene Hayama Group, Miura Peninsula (in Japanese with English abstract). *Sci. Rept. Yokosuka City Mus.*, (40): 31-35.
- KANIE Y. and ASAMI S. 1995. Biostratigraphy of the Miocene Hayama Group (in Japanese with English abstract). *Rept. Cult. & Nat. Treas. Yokosuka City*, (29): 13-17.
- KANIE Y., KURAMOCHI T., ASAMI S. and KANNO S. 1955. Solemyid pelecypod of Miocene Hayama Group in the Miura Peninsula (in Japanese with English abstract). *Rept. Cult. & Nat. Treas. Yokosuka City*, (29): 57-61.
- KANNO S. 1960. The Tertiary System of the Chichibu Basin, Saitama Prefecture, central Japan. Part II. Palaeontology: 123-396, i-iv, pls. 31-51. *Japan. Soc. Prom. Sci.*
- KANNO S. and KANIE Y. 1995. Vesicomid pelecypod from the Miocene Hayama Group in the Miura Peninsula (in Japanese with English abstract). *Rept. Cult. & Nat. Treas. Yokosuka City*, (29): 51-55.
- NATORI H. 1964. Some molluscan fossils from the Tertiary Muro Group in the Kii Peninsula, Japan. *Trans. Proc. Palaeont. Soc. Japan, N.S.*, (55): 247-255, pl. 36.
- OGASAWARA K. HISADA K. and KITADA N. 1994. Early Miocene *Calyptogena* from the Aokiyama Formation, Hota Group, Boso Peninsula, Japan. *Ann. Rept., Inst. Geosci., Univ. Tsukuba*, (20): 33-37.
- OKADA H. 1995. Biostratigraphic age of calcareous nannofossils from the Hayama Group exposed in the central part of Miura Peninsula (in Japanese with English abstract). *Rept. Cult. & Nat. Treas. Yokosuka City*, (29): 23-29.
- Research Group for Giant Clam Communities of the Hayama Group 1995. Concluding remarks on the chemosynthetic communities of the Hayama Group (in Japanese with English abstract). *Rept. Cult. & Nat. Treas. Yokosuka City*, (29): 9-12.
- TAKETANI Y. 1995. Radiolarian age of the Miocene Hayama Group in the Miura Peninsula (in Japanese with English abstract). *Rept. Cult. & Nat. Treas. Yokosuka City*, (29): 35-38.
- YOKOYAMA M. 1925. Molluscan remains from the uppermost part of Joban coal-field. *Jour. Coll. Sci., Univ. Tokyo*, 45(5): 1-34, pls. 1-6.

