
Original Articles 原著

Two Additional New Species to Gastropod Fauna of Chemosynthetic Site on North Knoll of Iheya Ridge, Okinawa Trough

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Abstract: Two more trochoid species are added to the gastropod fauna in North Knoll of Iheya Ridge, Okinawa Trough, based on new collection of *Shinkai 2000*: *Iheyaspira lequios* n. gen. et n. sp. characterized by skeneid-like shell and 12 lateral teeth of radula, and *Margarites ryukyuensis* n. sp.

Keywords: Iheya Ridge, Trochidae, new genus, new species

Since a preliminary report on chemosynthesis-based gastropod fauna on North Knoll of Iheya Ridge, Okinawa Trough was published (Okutani & Fujiwara, 2000), two more gastropods were collected by Dives 1092, 1093 and 1094 of *Shinkai 2000* at nearby spots in May 1999 (Fig. 1). One is an interesting tiny trochid requiring the establishment of a new genus and another one is a new species of *Margarites*. The descriptions of these two taxa are here given as a supplement to the previous paper.

Localities of *Shinkai 2000* dives:

Dive 1092 (May 6, 1999): 27 47.22'N, 126 53.91'E, at a depth of 968 m

Dive 1093 (May 7, 1999): 27 47.19'N, 126 54.13'E, at a depth of 1058 m

Dive 1094 (May 8, 1999): 27 47.18'N, 126 54.09'E, at a depth of 1053 m

Abbreviations

JAMSTEC — Japan Marine Science & Technology Center

UMUT — The University Museum, The University of Tokyo

SL — Shell length (= shell height); SW — Shell width (= shell diameter)

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Taxonomy

Order VETIGASTROPODA

Superfamily Trochoidea

Family Trochidae

Iheyaspira n. gen.

Diagnosis: Shell skeneid-like. Eye stalks well developed. Right neck lobe doubled, elongate and left neck lobe single, trilobate. Epipodial tentacles four pairs: anterior three pairs juxtaposed, lacking micropapillae; fourth pair isolated posteriorly and distinctly papillated. Radula rhipidoglossate with formula n-12-1-12-n.

Type species: *Iheyaspira lequios* n. sp.

Comparison and affinity: See "Remarks" in the description of the species.

Etymology: The generic name came from the type locality of the type species.

Iheyaspira lequios n. sp.

(Figs. 2-5)

Materials examined: 17 specimens from Dive 1092 and 18 from Dive 1094.

Description: Shell minute, thick, opaque white, skeneid-like in shape, not umbilicated (Fig. 2A). Protoconch eroded but probably pale amber-colored, about 1.5 in number of turns. Teleoconch a little less than 2 in number of whorls, gently increasing in diameter, ornamented by faint growth lines and a thin periostracum, occasionally deposited by black substance. Suture moderately constricted. Aperture circular, with smooth outer lip, and very weakly calloused inner to columellar lips. Internal wall lacking iridescence probably due to absence of nacreous structure. Operculum thin, yellow, corneous, multispiral, well-fit to aperture (Fig. 2A).

Radula rhipidoglossate (Fig. 2B-E). Rachidian tooth rhombic or arrowhead-shaped with a single, incurved central cusp, which is not dentate but has a sharply pointed tip. Lateral teeth 12 in number, unicuspid, with long shaft, which has distinct concavity near lobate base at nearly right

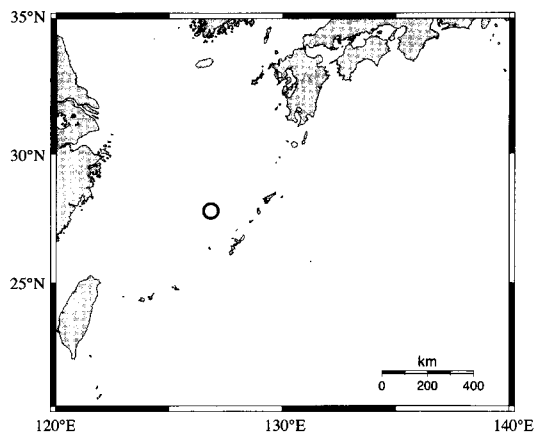


Fig. 1. Locality of Dives 1092-1094 of *Shinkai 2000*.

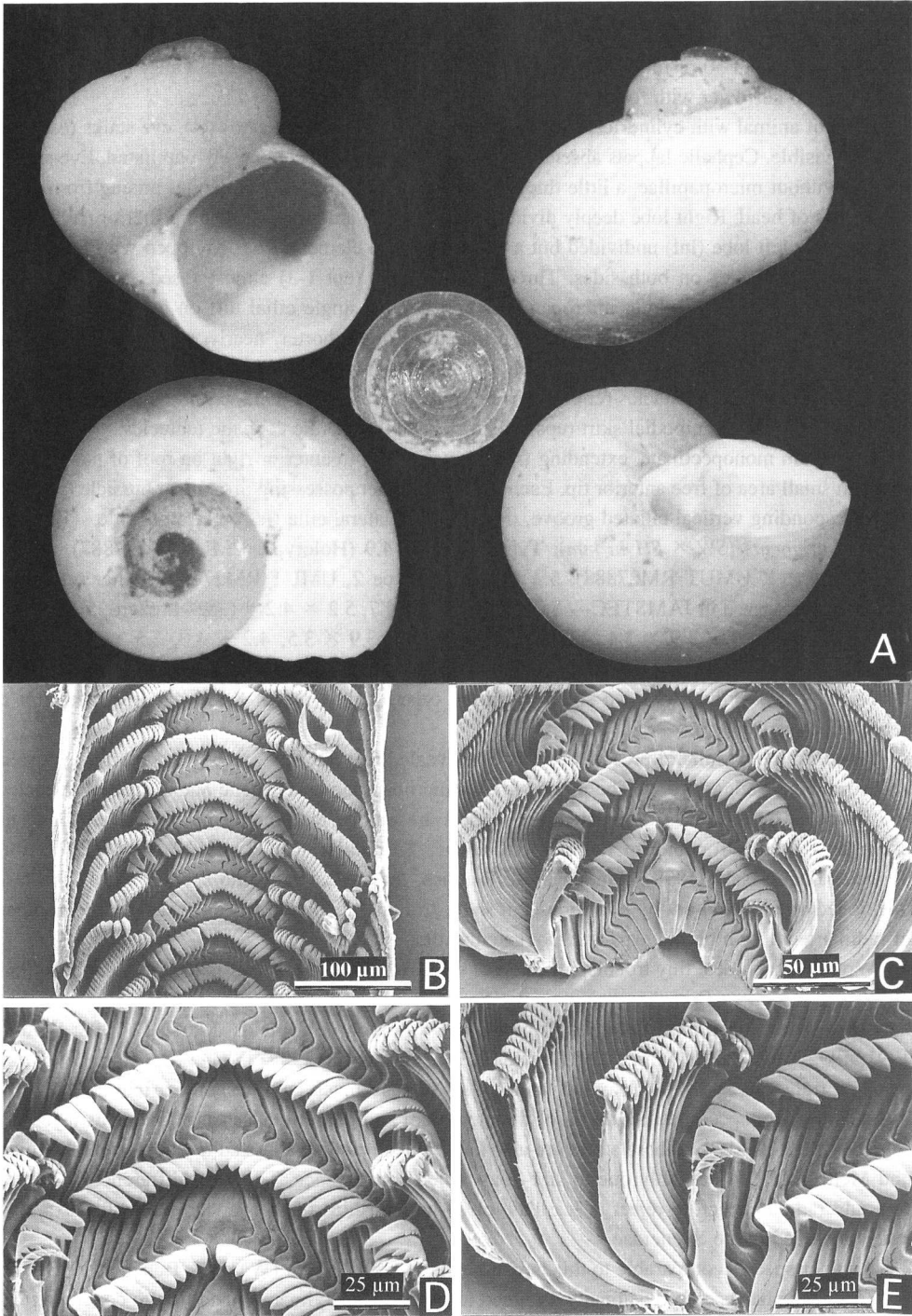


Fig. 2. *Theyaspira lequios* n. gen. et n. sp. **A.** Shell and operculum (Holotype: UMUT RM27887), **B-E.** Radula (Paratype 1: UMUT RM27889).

angle. Serrations on outer edge of cusp indistinct except outermost and nearby lateral teeth. Lateromarginal plates absent between outermost laterals and innermost marginals. Inner marginal teeth slender, about 30 or more in number, with arched shaft and forked top. Outer marginal teeth slenderer and narrower with forked top.

Head of animal with cylindrical snout (sn, Figs. 3-4), cephalic tentacles (ct), eye stalks (es), but eyes not visible. Cephalic lappets absent. Surface of cephalic tentacle densely papillated. Eye stalks smooth without micropapillae, a little thicker than cephalic tentacles. Neck lobes arising from both basal sides of head: Right lobe deeply divided into elongate anterior (rn11) and posterior (rn12) elements, while left lobe (ln1) undivided but a trilobate single element. Foot equipped with four pairs of epipodial tentacles on both sides. Three anterior pairs (ept 1-3) almost fused at anterolateral bases of pallial cavity, lacking micropapillae, only with a single ciliary tuft on each tip. On right side, first epipodial tentacle longest; second and third ones shorter, nearly equal in size to each other. On left side, first and third epipodial tentacles almost same in size; second one greatly reduced. Pair of fourth tentacles (ept 4) isolated from anterior three pairs in middle part of epipodium between lobes of epipodial skirt (eps), distinctly papillated like cephalic tentacles.

Ctenidium monopectinate, extending from posterior left to anterior right on roof of pallial cavity, with small area of free anterior tip. Each ctenidial leaflet possessing prominent bursicle (br, Fig. 5), corresponding vertical ciliated groove, thick zone of lateral cilia (lc) on efferent side.

Measurements (SW \times SH in mm): Types— 5.5 \times 4.9 (Holotype, UMUT RM27887), 4.4 \times 4.1 (Paratype 1, UMUT RM27888), 5.3 \times 4.8 (Paratype 2, UMUT RM27889). Other reference specimens preserved in JAMSTEC— 5.0 \times 4.2, 5.2 \times 4.7, 5.2 \times 4.2 + (apex broken), 5.1 \times 4.5, 3.9 \times 3.4, 4.4 \times 4.0, 3.9 \times 3.4, 4.7 \times 4.2, 5.7 \times 5.4, 3.9 \times 3.5, 4.2 \times 4.0, 2.5 \times 2.2, 4.0 \times 3.7, 3.7 \times 3.3.

Distribution: Hitherto known solely from the type locality, North Knoll of Iheya Ridge at a depth of about 1,000 m.

Remarks: The results of present observation revealed that the new species is certainly allocated in the trochoid vetigastropod. The possession of micropapillae on cephalic and epipodial tentacles and bursicles on efferent side of ctenidial leaflets are unique features which have been found to occur only in the trochoidean families Skeneidae, Turbinidae, and Trochoidea, as well as the Seguenziidae (Sasaki, 1998). Among these families, the inclusion of the species within the last mentioned one is ruled out by non-iridescent shell, straight labral margin of the shell, large number of radular teeth with blunt cusps and elongated shafts.

Within Trochoidea, tiny trochispiral shell of the new species has superficial resemblance to that of skeneids, such as *Protolira valvatoidea* (Warén & Bouchet, 1993: Fig. 17A-B). However, the new species has apparent differences from general definition of skeneids (Marshall, 1998; Warén, 1991, 1992, 1993, 1996; Warén and Bouchet, 1993; Hasegawa, 1997) in (1) propodium devoid of penis on right side and (2) 12 pairs of lateral teeth that are much larger in number than 2 to 6 pairs in skeneids. Monopectinate condition of the ctenidium and possible absence of nacreous layer are shared with skeneids, but these states are also known in several small-sized trochoideans (Hickman and McLean, 1990) probably due to size-constrained convergence. The great differences in head-foot and radular structure reject at least the close relationships of the new species with taxa currently included in the Skeneidae.

Another species comparable to this new taxon is *Fucaria striata* (Warén & Bouchet, 1993: Fig. 12A-C) which has been provisionally assigned to trochid Halistylinae. In addition to conchological similarity, the two species share 12 pairs of lateral teeth with slender and straight shafts, quite unique among trochoideans. The head-foot of *F. striata*, nevertheless, exhibits great dissimilarities to that of the present new species: (1) "Eye-lobes" is much smaller than cephalic tentacles; (2) the right neck lobe is fringed with a single larger and four smaller tentacles; (3) the left neck lobe is

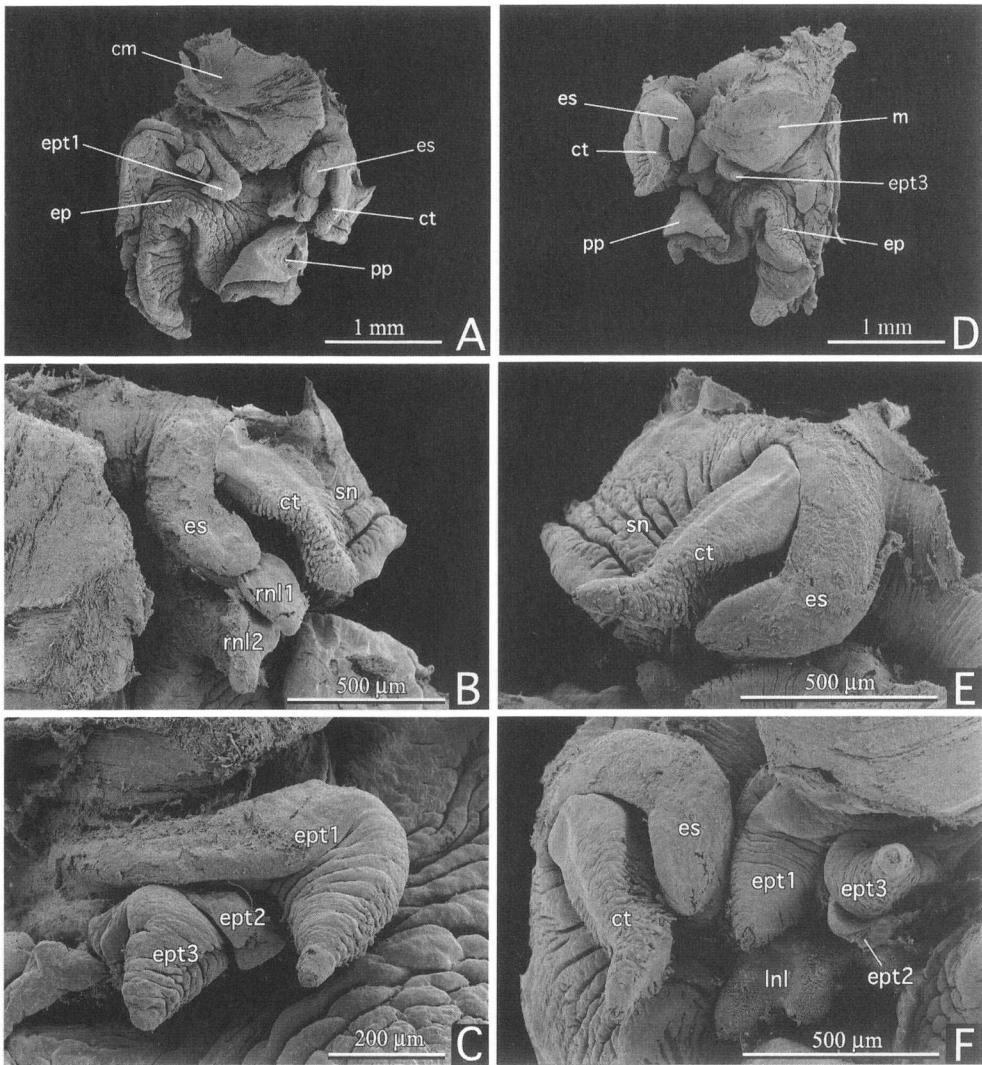


Fig. 3. *Iheyaspira lequios* n. gen. et n. sp. SEM micrographs of head-foot part (Holotype: UMUT RM27884). **A-C.** Right side view. **A.** Right lateral view of whole head-foot. **B.** Head region with snout, cephalic tentacles, eye stalks, and neck lobes. **C.** Three anterior pairs of right epipodial tentacles. **D-F.** Left side view. **D.** Left lateral view of whole head-foot. **E.** Head with snout, cephalic tentacle and eye stalk. **F.** Anterior part of left side showing positions of cephalic tentacles, eye stalks, neck lobes, and anterior three pairs of epipodial tentacles.

cm = columellar muscle, ct = cephalic tentacle, ep = epipodium, ept 1 = first epipodial tentacles, ept 2 = second epipodial tentacles, ept 3 = third epipodial tentacles, es = eye stalk, lnl = left neck lobe, m = mantle, pp = propodium, rnl 1 = first right neck lobe, rnl 2 = second right neck lobe, sn = snout

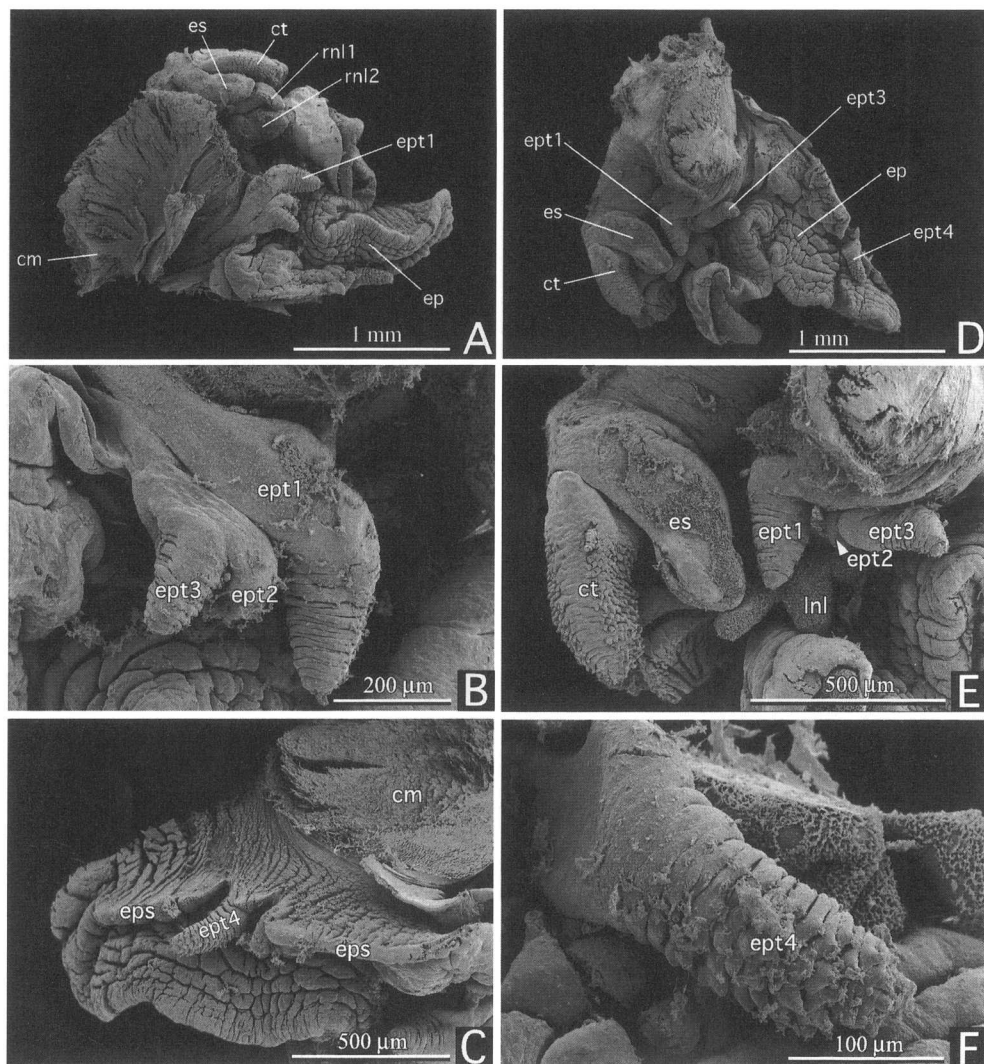


Fig. 4. *Theyaspira lequios* n. gen. et n. sp. SEM micrographs of head-foot part (Paratype 1: UMUT RM27885). **A-C.** Right side view. **A.** Right lateral view of whole head-foot. **B.** Anterior three pairs of epipodial tentacles. **C.** Epipodium with epipodial skirts and tentacles. **D-F.** Left side view. **D.** Left lateral view of whole head-foot. **E.** Anterior part of left side showing positions of cephalic tentacles, eye stalks, necklobes, and anterior three pairs of epipodial tentacles. **F.** Fourth epipodial tentacle. eps = epipodial skirt, ept 4 = fourth epipodial tentacle. See Fig. 3 for letters for other abbreviations.

simple and not divided; and (4) epipodial tentacles are at least six on right side, and two or perhaps three on left side (Warén & Bouchet, 1993). The rest of trochoidean genera likewise exhibit different composition of neck lobes and epipodial tentacles (Hickman and McLean, 1990). Therefore, we admit a certain relation of the new species to *Fucaria* because of the similarity in shell and radular characters, but distinguish it at generic level based on striking differences in appendage structure of head-foot.

Etymology: The species name *lequios* is traders of the Ryukyus (Okinawa Islands) in 14th-16th

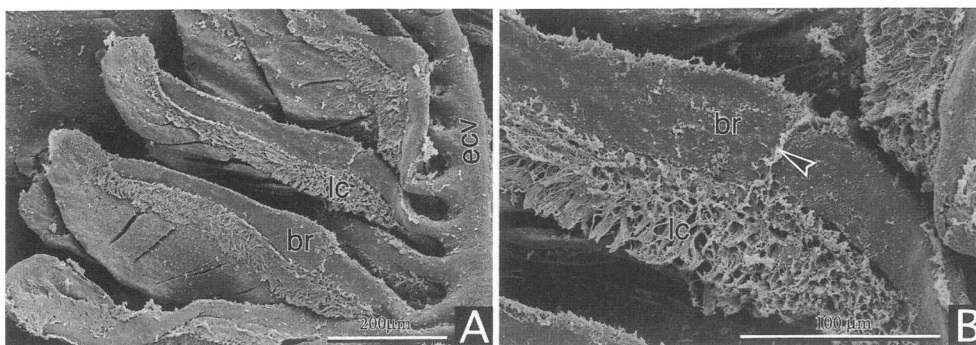


Fig. 5. *Iheyaspira lequios* n. gen. et n. sp. SEM micrographs of ctenidial leaflets (Holotype: UMUT RM27884). **A.** Ctenidial leaflets viewed obliquely from posterior to anterior. **B.** Enlarged view of bursicle and a part of lateral cilia. Arrowhead indicates a ciliated groove connecting to bursicle. br = bursicle, ecv = efferent ctenidial vessel, lc = lateral cilia.

centuries.

Margarites ryukyuensis n. sp.

(Fig. 6)

Materials examined: 2 specimens from Dive 1092 and 8 specimens from Dive 1094.

Description: Shell turbinid, thin, light-built, covered with greenish yellow periostracum. Protoconch eroded. Teleoconch whorls moderately inflated, about 5 in number, all ornamented by rather sharp spiral cords, 7 in number on both penultimate and body whorls. Interspaces between cords gradually widening abapically. These cords occasionally become irregular by being cut by irregular growth lines. Base weakly inflated, with very weak spiral grooves crossed by irregular growth lines. Umbilicus narrow but apparently deep. Aperture oval, with thin outer lip and faintly reflected columellar margin. Internal wall with weak pearly luster. Operculum corneous, multispiral and yellow.

Radula rhipidoglossate. Rachidian tooth with simple, bluntly tipped cusp and broadly ovate shaft. Lateral teeth 10 in number each on both sides, overlapping, gradually increasing in size outwardly, with blunt top, serrated margin, and broad shaft. Lateral teeth with comb-like top and rather sigmoidally curved shaft carrying subquadrate lateromarginal plates. Marginal teeth thin and elongate with deep food groove. Cusps spatulate with finely serrate cutting edge.

Measurements (SW × SH in mm): Types— 16.5 × 9.9 (Holotype, UMUT RM27884), 11.4 × 9.3 (Paratype 1, UMUT RM27885), 13.5 × 10.5 (Paratype 2, UMUT RM27886). Other reference specimens in JAMSTEC— 13.6 × 10.4, 12.0 × 10.2, 9.1 × 6.8, 8.2 × 5.6, 6.6 × 4.6.

Distribution: Iheya Knoll, at a depth of about 1,000 m and nearby localities in the Okinawa Trough (Unpublished data on JAMSTEC collection).

Remarks: *M. shinkai* Okutani, Tsuchida & Fujikura, 1992 from chemosynthesis-based community in Sagami Bay and Izena Hole (about 1,300 m deep) differs from this new species in having low, iridescent silvery spire and eight pairs of lateral teeth (Okutani, Tsuchida & Fujikura, 1992: Figs. 12-16).

Etymology: Named after locality for this species.

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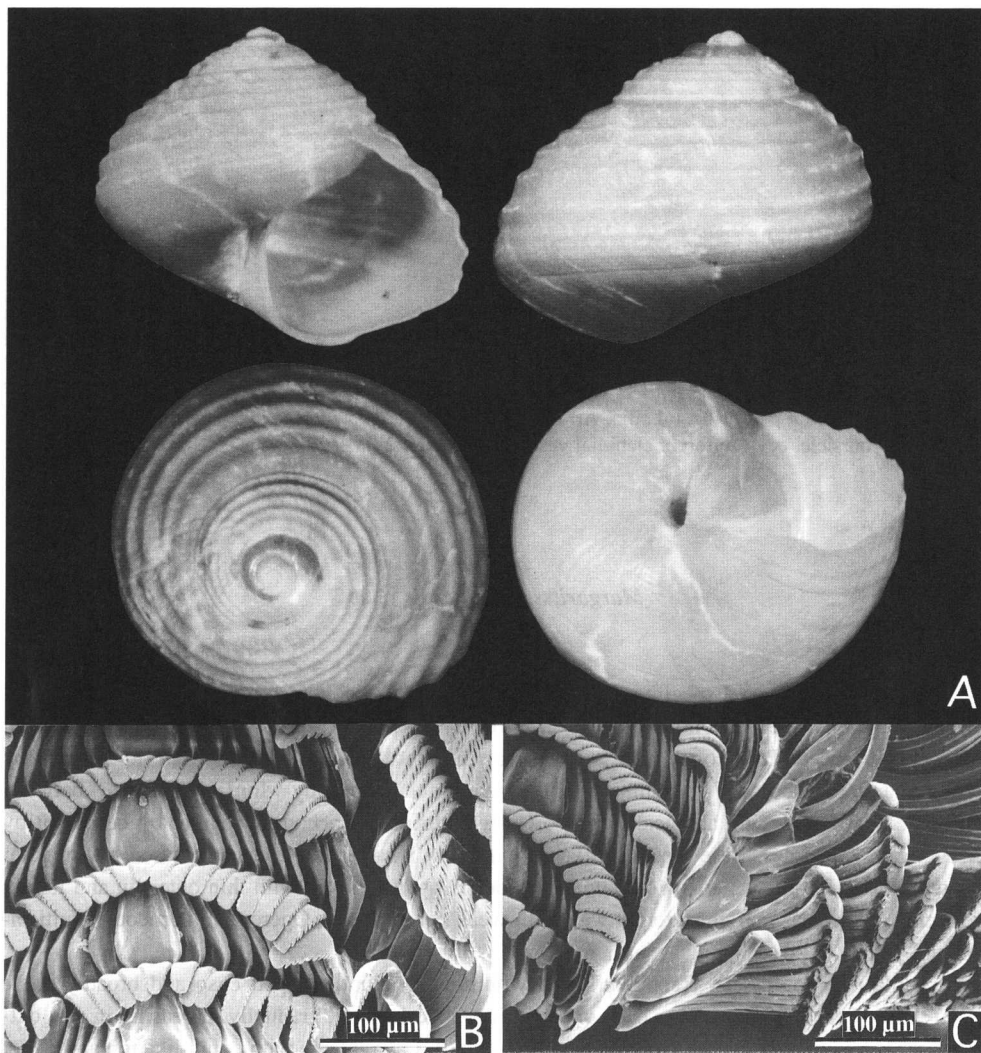


Fig. 6. *Margarites ryukyuensis* n. sp. A. Shell, B-C. Radula (Holotype: UMUT RM27884).

沖縄トラフ伊平屋北部海嶺からの腹足類 2 新種の追加

奥谷喬司・佐々木猛智・土田真二

要 約

さきに沖縄トラフの伊平屋北部海嶺の熱水噴出域付近から「しんかい 2000」によって採集された腹足類 6 種を報告した (Okutani & Fujiwara, 2000) が, その後ほぼ同地点の水深約 1000 m から 2 種の腹

足類が発見されたので追加する。今回発見された2種ともニシキウズガイ科に属する新種で、うち1種には新属を必要とする。

Iheyaspira lequios イヘヤケシツブシタダミ (新属新種・新称)

殻高 4.9 mm, 殻幅 5.5 mm (ホロタイプ): 殻は白色で丸く, 臍孔は開かない。歯舌は扇舌型で n-12-l-12-n。東太平洋から知られる *Fucaria* に外見と歯舌は類似するが, 上足触角は左右4対で前方の3対は近接して微乳頭を欠き, 4番目のものは他から隔離して微乳頭を持つことや, 右の頸葉は二重で左の頸葉は単葉で三叉しているところなど, 軟体部の外部形態に特異な形質が見られるため, 新属を提唱する。

Margarites ryukyuensis オキナワシンカイシタダミ (新種・新称)

殻高 9.9 mm, 殻幅 16.5 mm (ホロタイプ): 殻は薄質で緑色がかった殻皮を被り7本の螺肋を周らす。臍孔は狭く深い。歯舌式は n-10-l-10-n。本種同様に化学合成生物群集付近に産するシンカイシタダミ *M. shinkai* の殻表は銀白色で, 歯舌の側歯は8対なので区別される。

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