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Two new species of the genus *Pararetifusus* Kosuge, 1967 (Buccinidae: Colinae), with notes on the morphology of *Pararetifusus tenuis* (Okutani, 1966)

A. R. KOSYAN

A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Leninski prospect 33, Moscow 119071, RUSSIA; e-mail: kosalisa@rambler.ru

ABSTRACT. Two new species, *Pararetifusus* ***kantori*** sp. nov. and *P.* ***kosugei*** sp. nov. (Buccinidae: Colinae) are described from the Bering, Okhotsk and Japan seas. New data were obtained on the morphology of the type species of the genus *Pararetifusus, P. tenuis.*

The type species of *Pararetifusus* was originally described as *Phymorhynchus tenuis* [Okutani, 1966] in the family Turridae. Based on the analysis of its shell and radula the species was later transferred to Buccinidae by Kosuge [1967], who therefore established a new monotypic subgenus *Pararetifusus* in the genus *Retifusus* Dall, 1916. Bouchet and Warén [1985] gave the microphotograph of the radula of *P. tenuis* and another species, which they tentatively attributed to *Pararetifusus*. In 2001, another species, *P. dedonderi* Fraussen et Hadorn, was described, and tentatively placed in *Pararetifusus*.

In the collections of the Zoological Institute (ZIN, Saint-Petersburg, Russia), several specimens of two new species were found, which should be included in *Pararetifusus* Kosuge, 1967, due to their shells and radulae. Below the descriptions of shell, radula and morphology of these new species, *P.* ***kantori*** and *P.* ***kosugei***, are given.

Materials and methods

The preserved material was obtained from the Zoological Institute of Russian Academy of Sciences – ZIN, Saint-Petersburg, Russia. The radulae were extracted by gross dissection, cleaned using diluted bleach (NaOCl), air-dried, coated with gold and examined with a Tescan Scanning Electron Microscope.

The apical angle of the shell was measured between two tangents built symmetrically to all the whorls of the shell. If not all the whorls could touch the line simultaneously, the shell was oriented in a way to make the distance between these whorls and the tangent equal.

Terminology of the stomach morphology is given after Kantor [2003].

Abbreviations: ao, anterior aorta; **aoe**, anterior oesophagus; **bc**, bursa copulatrix; **bh**, body haemocoel; **bm**, buccal mass; **cg**, capsular gland; **clf**, longitudinal folds connecting oesophageal opening and the opening of anterior duct of digestive gland; **cm**, columellar muscle; **ct**, ctenidium; **dg**, digestive gland; **dgl**, duct of gland of Leiblein; **fo,** female orifice; **gl**, gland of Leiblein; **gon,** gonad; **hd**, head; **int**, intestine; **kd**, kidney; **lf**, longitudinal fold on the inner stomach wall; **mo**, mouth opening; **mrr**, medial radular retractor muscle; **n**, nerves; **nr**, nerve ring; **odp,** odontophoral protractor muscles; **odr**, odontophoral retractor muscles; **oeo**, oesophageal opening; **op**, operculum; **os**, osphradium; **p**, penis; **pma**, posterior mixing area; **poe**, posterior oesophagus; **pr**, proboscis; **prp**, propodium; **prpg**, propodial groove; **prr,** proboscis retractors; **pw**, proboscis wall; **r**, radula; **rd,** rhynchodaeum; **re**, rectum; **s**, siphon; **sd**, salivary duct; **sg**, salivary gland; **sp**, pouch of the salivary duct; **st**, stomach; **tl**, tentacle lobe; **vl**, valve of Leiblein.

Abbreviations of the shell parameters: **AL**, length of the aperture with the siphonal canal; **D**, diameter of the shell; **H**, height of the shell; **h**, height of the last whorl.

Taxonomy

Family BUCCINIDAE Rafinesque, 1815

Subfamily **Colinae** Gray, 1847

Genus *Pararetifusus* Kosuge, 1967

Type species *Phymorhynchus tenuis* Okutani, 1966 (OD) [type locality: 34°57'N, 139°21'E, 1470-1500 m, Sagami Bay, Japan].

Pararetifusus tenuis (Okutani, 1966)

(Figs. 1-3)

Phymorhynchus tenuis Okutani, 1966: 26, pl. II-21.

Descriptions of the shell and operculum were given by Okutani [1966], and figures of protoconch and operculum – by Kosuge [1967]. The radula, as

well as the nerve system and the pallial oviduct were thoroughly described and illustrated by Kosuge; the microphotograph of the radula was also given by Bouchet and Warén [1985]. We find it necessary to supplement these data with the description of the digestive tract.

Material examined: ZIN 58795/6, off Iturup Island, 44°20.8'N, 148°24'E, 414 m. H 13.7 mm, h 10.9 mm, AL 8.0 mm, D 6.5 mm (Fig. 1 E, F). Mature female.

External anatomy. The soft body consists of approximately 3 whorls. The mantle occupies one whorl, the kidney – 0.2, the digestive gland and the gonad – the rest. The head (Fig. 2 D, **hd**) is large and broad, with the width exceeding the length. Cephalic tentacles are long and thick, bearing large black eyes on small lobes at the base. The **foot** is folded transversally. Medium-sized propodium (**prp**) is separated by a deep propodial groove (**prpg**). The operculum (**op**) is oval, with subspiral nucleus.

The **mantle** length is twice the width. The siphon is moderately long. The ctenidium is crescent-curved around osphradium, occupying 4/5 of the mantle length, formed by triangular lamellae. The osphradium is very large, slightly wider than the ctenidium, symmetrical. The hypobranchial gland is not expressed. The rectum opens approximately in the middle of the mantle length.

Digestive system. The proboscis is slightly everted out of the rhynchodaeum (Fig. 2 A, E, F, **pr**). Due to contraction of odontophoral retractors (**odr**) the buccal mass is slightly pulled out of the proboscis base into the body haemocoel. The length of the buccal mass is equal to that of the proboscis (Fig. 2 A, **bm**). The radula is 3 mm long and 130 μm wide (1.63% of AL), consisting of 86 transverse rows of teeth (18 forming) (Fig. 3 A). The rachidian is thicuspidate, with the median cusp slightly longer than the marginals. Lateral teeth bear three cusps, with the median being larger than the others. Aside the posterior part of the radular sac goes strong medial radular retractor muscle (**mrr**), fusing with the rhynchodaeum (**rd**) at the base of the proboscis. The proboscis retractors (**prr**) originate at the proboscis base and pass along the rhynchodaeum (**rd**). Later they split into several muscles, fastening onto lateral walls of the body haemocoel.

The anterior oesophagus (**aoe**) is wide and flattened, passing along ventral side of the rhynchodaeum and then turning into the large elongated pyriform valve of Leiblein (Fig. 2 E, **vl**). The massive and broad nerve ring (**nr**) is situated immediately posterior to the valve. The gland of Leiblein (**gl**) is large and well-developed, lying posterior to the salivary glands and the nerve ring. The small duct of the gland (**dgl**) opens into the oesophagus at a small distance posterior to the nerve ring. Medium-sized oval salivary glands (**sg**) are separate, situated on both sides of the nerve ring. Slightly coiled thick salivary ducts (**sd**) pass along the anterior oesophagus, then opening into the buccal cavity.

The **stomach** (Fig. 2 B, C) spans 0.2 of the whorl and is situated at an angle of 45° to the longitudinal axis of the whorl. The posterior oesophagus (**poe**) is very wide, tapering before entering the stomach ventrally (**oeo**). The posterior mixing area (**pma**) is not large, lined with transverse folds. The openings of ducts of digestive gland were not found. The inner stomach wall in its upper part is lined with high transverse folds, while in the lower – with large longitudinal folds, running from the oesophageal opening into the intestine (**int**). The lateral sulcus is absent. The outer stomach wall is lined with large high transverse folds.

Pararetifusus ***kantori*** Kosyan, sp. nov.

(Figs. 1, 3-5)

Type material: Holotype and paratype 1 – ZIN 60549/1, Bering Sea Expedition, R/V "*Dalnevostochnik*", 52°40.8'N, 159°13'E, 800-1000 m, 15.07.1932, coll. A.V. Ivanov and V.V. Makarov. Paratype 2 – ZIN 60550/2, Japan Sea, 40°01.1'N, 134°49.5'E, 1400 m. 07.08.1933.

Other material: ZIN 60551/3, Okhotsk Sea, 52°34.8'N, 154°59.5'E, 135 m. 13.09.1932, coll. P.V. Ushakov (1 live spm).

Type locality: Bering Sea, 52°40.8'N, 159°13'E, 800-1000 m.

Etymology. The new species is named after Russian malacologist Dr. Yu.I. Kantor, who much helped in the process of the species identification and preparation of the figures.

Description (holotype). The **shell** (Fig. 1 C-D) is small (H – 12.9 mm, h – 10.3 mm, AL – 7.6 mm, D – 7.2 mm), thin, fragile, not translucent. Protoconch and upper whorls are eroded, the rest of the shell consists of three whorls. Periostracum is thick, yellowish-beige, easily detached from the shell. The shell under the periostracum is white. Teleoconch whorls are strongly convex, with slightly angulated shoulder. The suture is impressed. The spiral scupture is represented by strong, prominent spiral cords with rounded profile, separated by equal in width interspaces slightly wider than the cords. There are four cords on the penultimate whorl, and 14 on the last whorl; the uppermost cord and those on the siphon region are low and smoothened. The axial sculpture is represented only by incremental lines. Siphonal canal is well defined from the aperture, straight and wide. Aperture is medium high, occupies about 0.6 of **H** and 0.74 of **h**, broad. Outer lip is angulated in accordance with the spiral cords. Inner lip is concave, smooth, covered with thin callus, extending on the parietal part of the whorl. The operculum is oval, with large subspiral nucleus.

FIG. 1. A-E – *Pararetifusus* ***kantori*** sp. nov: A – paratype 1, B – paratype 2, C-D – holotype, E – specimen from the Okhotsk Sea. F – *P. tenuis* (photo by Yu.I. Kantor and A.V. Sysoev). G-J – *Pararetifusus* ***kosugei*** sp. nov: G-H – paratype 1, I-J – holotype (photo by Yu.I. Kantor and A.V. Sysoev). Scale bar – 10 mm.

РИС. 1. A-E – *Pararetifusus* ***kantori*** sp. nov: A – паратип 1, B – паратип 2, C-D – голотип, E – экземпляр из Охотского моря. F – *P. tenuis* (фото Ю.И. Кантора и А.В. Сысоева). G-J – *Pararetifusus* ***kosugei*** sp. nov: G-H – паратип 1, I-J – голотип (фото Ю.И. Кантора и А.В. Сысоева). Масштабная линейка – 10 мм.

[**Диагноз.** Раковина маленькая (голотип H 12,9 мм, h 10,3 мм, AL 7,6 мм, D 7,2 мм), непрозрачная, с хрупкими ломкими стенками. Протоконх и верхние обороты эродированы, оставшаяся часть раковины состоит из трех оборотов. Периостракум толстый, желтовато-бежевый; легко отделяется от нижележащих слоев раковины. Раковина под периостракумом белая. Обороты телеоконха сильно выпуклые, со слегка угловатым плечом. Шов вдавленный. Спиральная скульптура представлена высокими, отчетливо выраженными спиральными ребрами с закругленным профилем, разделенными чуть более широкими, равными между собой по ширине промежутками. На предпоследнем обороте насчитывается четыре ребра, на последнем – 14. Верхнее ребро и ребра, расположенные в районе сифонального выроста, – низкие и сглаженные. Осевая скульптура представлена только линиями роста. Сифональный вырост прямой, открытый и широкий, хорошо обособлен от устья. Устье умеренно высокое, занимает 0,6 H и 0,74 h, широкое. Наружная губа устья угловатая в соответствии со спиральными ребрами. Внутренняя губа вогнутая, гладкая, покрытая тонким каллусом, заходящим на париетальную часть оборота. Крышечка овальная, с большим субспиральным ядром.]

Remarks. The shell of the paratype 1 (H 13.4 mm, h 10.5 mm, AL 7.7 mm, D 6.7 mm; Fig. 1 A) is similar to that of the holotype, but has five spiral cords on the penultimate and 16 on the last whorl. The shell of the paratype 2 (H 14.1 mm, h 10.7 mm, AL 7.7 mm, D 6.6 mm; Fig. 1 B) consists of approximately two protoconch whorls (eroded) and four teleoconch whorls. There are four cords on the penultimate and 20 on the last whorl. The cords are sharper than in the other specimens. The incremental lines are more prominent, forming small knobs in crossing the spiral threads. The shell of the specimen from the Okhotsk Sea, 52°34.8'N, 154°55.5'E, which we tentatively attribute to the new species (H 10 mm, h 8.8 mm, AL 6.6 mm, D 5.7 mm; Fig. 1 E) is characterized by the presence of stronger knobs on the spire whorls, formed where the incremental lines cross the spiral threads. The number of the spiral cords on the penultimate and the last whorls is three and nineteen respectively.

Morphological description of the type specimens (Figs. 3 B-E, 4: A-B – paratype 1, C-G – holotype, H – paratype 2)**.**

The posterior whorls of the body were torn off during extraction from the shell. The remaining part consists of 1.5 whorls, the mantle occupies one whorl, the kidney – 0.2 (Fig. 4 A). The head (Fig. 4 D, **hd**) is rather large, with the length slightly exceeding the width. Cephalic tentacles are long and thick, bearing large black eyes on small lobes at the base. The **foot** is folded transversally. The wide propodium (**prp**) is separated by a deep propodial groove (**prpg**). The operculum is oval, with large subspiral nucleus (Fig. 4 A, **op,** E).

The **mantle** length is equal to its width (Fig. 4 B). The muscular siphon (**s**) is short and wide. The ctenidium (**ct**) is long, crescent-curved, occupying 5/6 of mantle length and 1/3 of its width, formed by triangular lamellae. The large osphradium (**os**) is of the same width as the ctenidium and 2/3 of its length. It is asymmetrical, with the leaflets on the left side twice narrower than on the right one. The hypobranchial gland is not expressed. The broad rectum (**re**) opens in the middle of the mantle length.

Reproductive system. Penis is large, dorso-ventrally flattened (Fig. 4 C). The seminal papilla is not expressed; the small round male orifice opens on the top of the penis.

Digestive system. The proboscis is slightly everted out of the rhynchodaeum (Fig. 4 G-H, **pr**). The proboscis retractors (Fig. 4 G, **prr**) originate at the proboscis base, pass along the rhynchodaeum (**rd**), and split into several muscles, fastening onto the lateral walls of the body haemocoel. Due to contraction of the odontophoral retractors (**odr**) the buccal mass is slightly pulled out of the proboscis base into the body haemocoel. The length of the buccal mass is equal to that of the proboscis (Fig. 4 F, **bm**). The radula (**r**) in the radular sac lies in the middle of the buccal mass in a groove formed by two cartilages, fused along the whole length. In holotype, the radula is 3.5 mm long and 120 μm wide (1.58% of AL), consisting of 78 rows of teeth (Fig. 3 B). The rachidian bears three cusps, with the median one being slightly longer than the others. Lateral teeth from both sides bear three crescent-curved cusps, with the median being slightly smaller. The radula of the paratype 1 is 3.1 mm long and 120 μm wide (1.56% of AL), consisting of 80 rows of teeth (5 are forming). The rachidian in the younger section of the ribbon bears four cusps, two median are starting to separate (Fig. 3 C). In the older section, the median cusps are totally separated, and the marginal cusp is greatly reduced, almost absent (Fig. 3 D). The lateral teeth have the same structure along the whole radula length, and bear three cusps in the left longitudinal row and five smaller cusps – in the right one. The radula of the paratype 2 (Fig. 3 E) is 3.4 mm long and 120 μm wide (1.56% of AL), with 86 rows of teeth (5 are forming). The radula is obviously abnormal as the rachidian lacks cusps, representing the simple rectangular plate. The laterals bear three cusps with the median cusp a bit larger than the others.

Aside the base of the radular sac goes strong medial radular retractor muscle (**mrr**), joining the rhynchodaeum (**rd**) at the base of the proboscis.

The anterior oesophagus (**aoe**) is wide and flattened, passing along ventral side of the rhynchodaeum and then turning into the large elongated pyriform valve of Leiblein (Fig. 4 G-H, **vl**). The massive and broad nerve ring (**nr**) is situated immediately posterior to the valve. The gland of Leiblein (**gl**) is large and well-developed, lying posterior to the salivary glands and the nerve ring. The duct of the

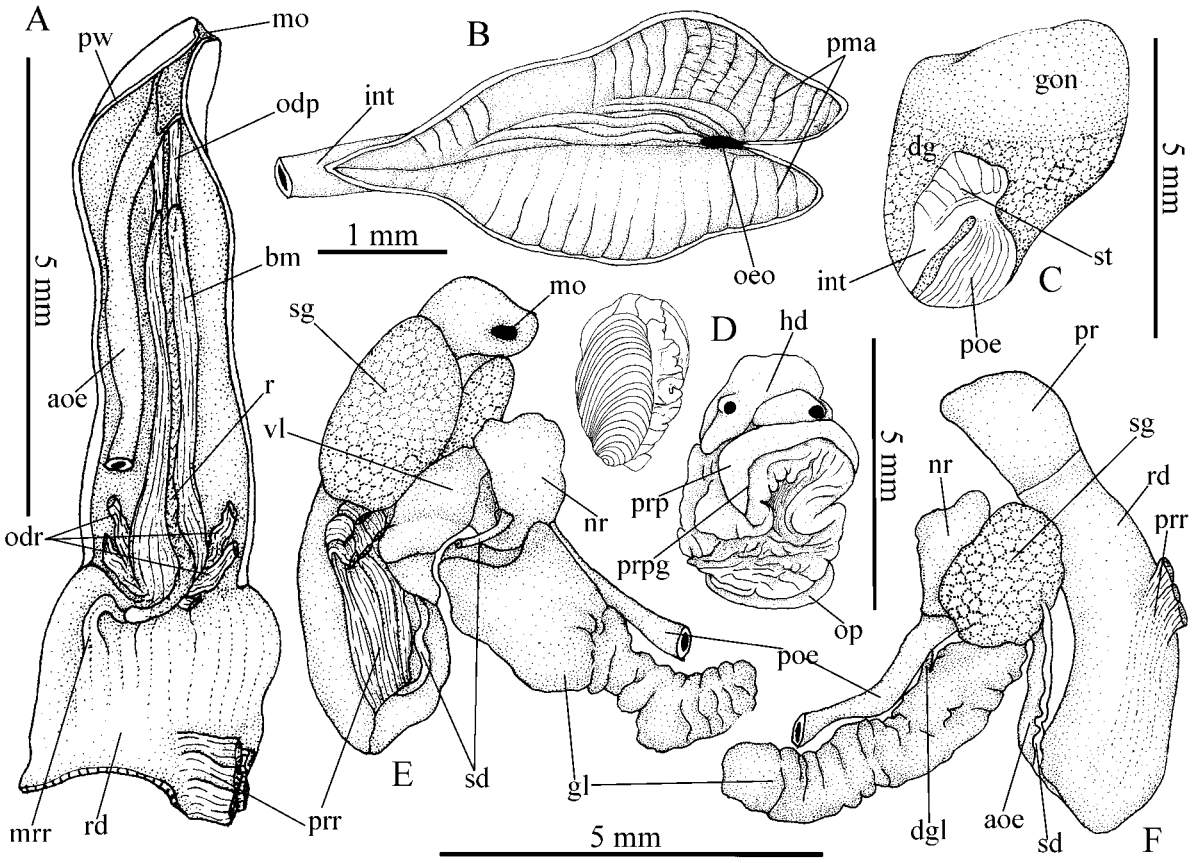

FIG. 2. Anatomy of *Pararetifusus tenuis*. A – proboscis, opened dorsally (rhynchodaeum opened dorsally and pulled backwards). B – stomach, opened dorsally. C – stomach, general view. D – antero-ventral view of the head-foot. E-F – organs of the body haemocoel (E – right view, F – left view).

РИС. 2. Анатомия *Pararetifusus tenuis*. A – хобот, вскрытый дорзально (ринходеум отвернут назад). B – желудок. C – общий вид желудка. D – фронтальный вид головы и ноги. E-F – органы туловищного гемоцеля (E – вид справа, F – вид слева).

gland was not found. Medium-sized salivary glands (**sg**) are rounded, separate, situated on both sides of the nerve ring. Slightly coiled thick salivary ducts (**sd**) pass along the anterior oesophagus and open into the buccal cavity.

The stomach was not studied.

The morphology of the specimen from the Okhotsk Sea, 52°34.8'N, 154°55.5'E, mature female, which we attribute to the new species, was also investigated (Figs. 3 F; 5).

External morphology is similar to that of the type specimens.

Reproductive system. The capsular gland is thick and well-developed, covering the rectum and consisting of two lobes separated by a slit-like canal (Fig. 5 B). Bursa copulatrix (**bc**) has thin epithelial walls, which fuse the thick glandular lobes with the thick bolster of glandular tissue, surrounding long and narrow female orifice.

The structure of the proboscis and the foregut is the same as in the type specimens (Fig. 5 C-E). The radula is 3.5 mm long and 100 μm wide (1.52% of AL), half-extended beyond the limits of inverted proboscis, with 93 transverse rows of teeth (7 are forming). The rachidian is tricuspidate, with the median cusp significantly longer than the marginals; the base of the tooth is arched deeper than in other specimens – these two characters are rather different from those of the type specimens. The lateral cusps look similar to those of the holotype (Fig. 3 F). The stomach was not investigated.

As distinct from the types, this specimen was found on much smaller depth, 135 m (compared with 800-1000 m for the holotype and the paratype 1, and 1400 m for the paratype 2). Conchologically and in radular characters the specimen is also different from the holotype and paratypes (i.e. the presence of stronger knobs on the spire whorls and different structure of the rachidian tooth), and although we attribute it to the new species, we exclude it from the type series.

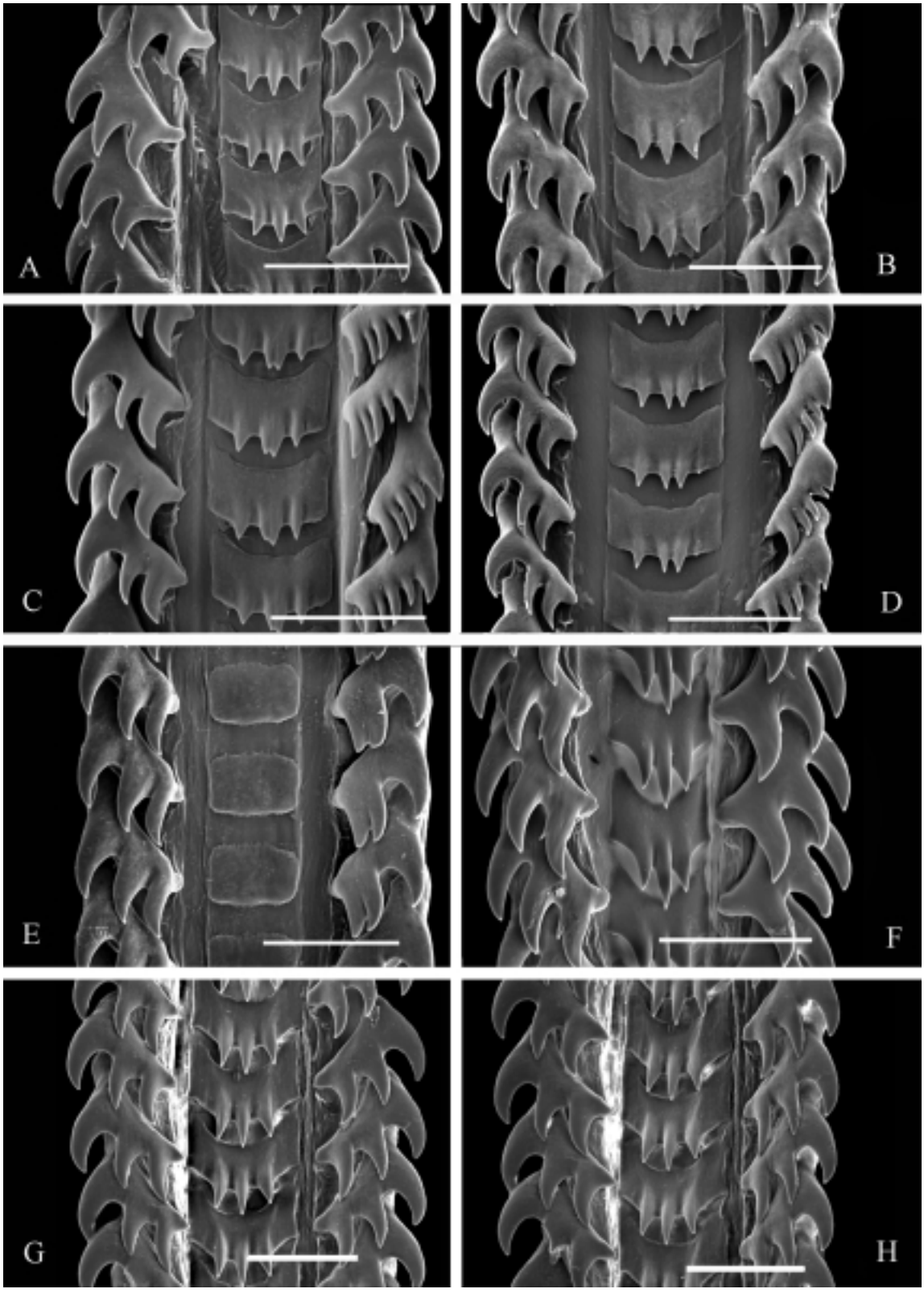

FIG. 3. Radulae. A – *P. tenuis*. B-F – *P.* ***kantori***: B – holotype, C-D – paratype 1, E – paratype 2, F – specimen from the Okhotsk Sea. G-H – *P.* ***kosugei***. Scale bar – 50 μm.

РИС. 3. Радулы. A – *P.tenuis*. B-F – *P.* ***kantori***: B – голотип, C-D – паратип 1, E – паратип 2, F – экземпляр из Охотского моря. G-H – *P.* ***kosugei***. Масштабная линейка – 50 мкм.

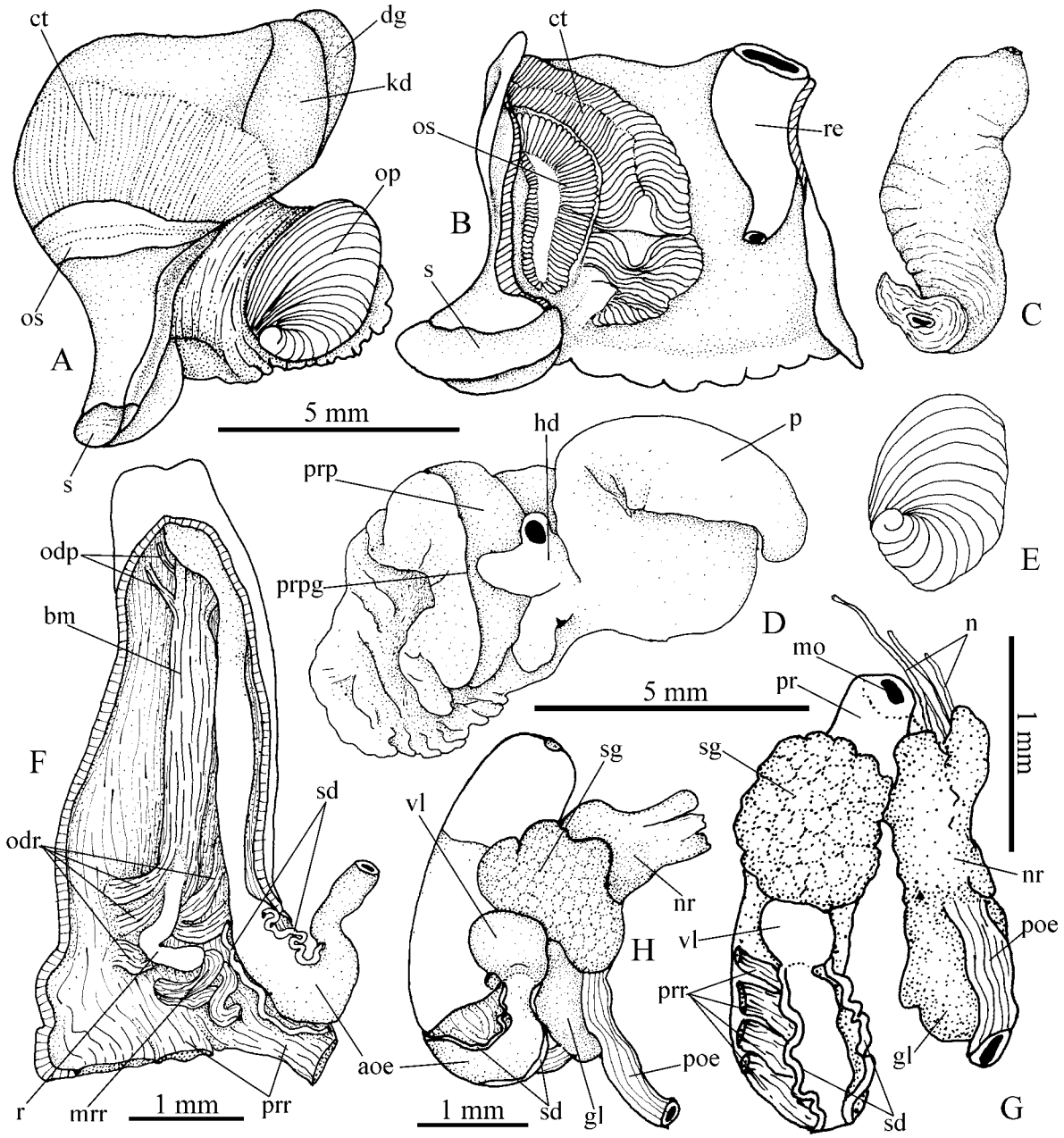

FIG. 4. Anatomy of *Pararetifusus* ***kantori***. A – soft body of paratype 1, removed from the shell. B – mantle of paratype 1. C – penis of holotype, ventral view. D – antero-dorsal view of the soft body of holotype, mantle removed. E – operculum of holotype. F – proboscis of holotype, opened dorsally (rhynchodaeum opened dorsally and pulled backwards). G – organs of the body haemocoel of holotype, ventral view. H – organs of the body haemocoel of paratype 2, lateral right view.

РИС. 4. Анатомия *Pararetifusus* ***kantori***. A – мягкое тело паратипа 1. B – мантия паратипа 1. C – пенис голотипа. D – дорзальный вид мягкого тела голотипа, мантия удалена. E – крышечка голотипа. F – хобот голотипа, вскрытый дорзально (ринходеум отвернут назад). G – органы туловищного гемоцеля голотипа, вентральный вид. H – органы туловищного гемоцеля паратипа 2, вид справа.

Comparison. *Pararetifusus* ***kantori*** resembles *Pararetifusus tenuis* much in the spiral sculpture consisting of 4-5 strong spiral cords on the penultimate whorl; axial sculpture, represented only by incremental lines; oval operculum with subspiral nucleus; and characteristic radula, which has a tricuspidate rachidian, with the median cusp being slightly longer than the others, and laterals bearing on both sides three crescent-curved cusps of subequal length. *P.* ***kantori*** differs from *P. tenuis* in the form of the spiral cords and the apical angle of the shell. In the former species the spiral cords are elevated and rounded, separated by deep channeled interspaces, and the apical angle is approximately

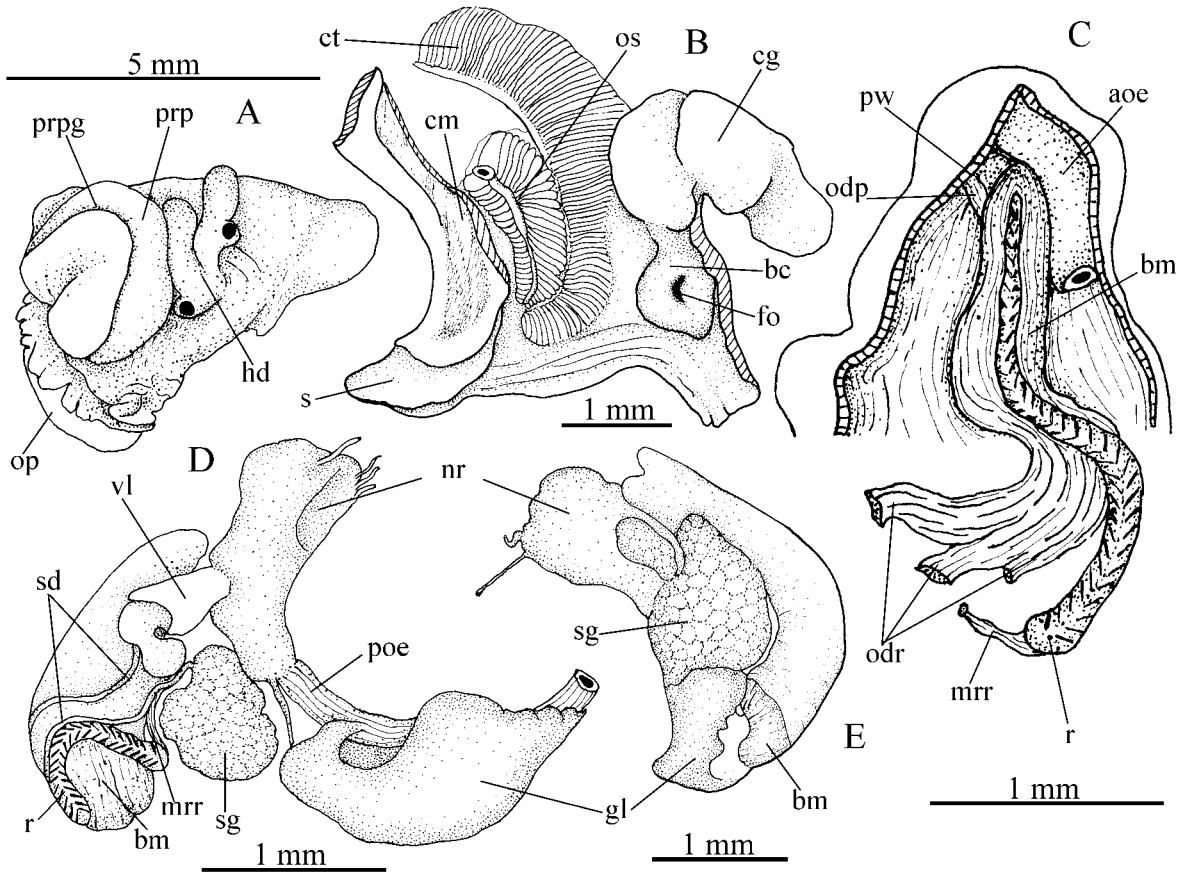

FIG. 5. Anatomy of *Pararetifusus* ***kantori***, specimen from the Okhotsk Sea. A – antero-ventral view of the soft body, mantle removed. B – mantle. C – proboscis, opened dorsally (rhynchodaeum opened dorsally and pulled backwards). D – organs of the body haemocoel, lateral right view. E – organs of the body haemocoel, lateral left view.

РИС. 5. Анатомия *Pararetifusus* ***kantori***, экземпляр из Охотского моря. A – антеро-вентральный вид мягкого тела, мантия удалена. B – мантия. C – хобот, вскрытый дорзально (ринходеум отвернут назад). D – органы туловищного гемоцеля, вид справа. E – органы туловищного гемоцеля, вид слева.

47° (52° in holotype, 47° in paratype 1, 45° in paratype 2 and the specimen from the Okhotsk sea). In *P. tenuis* the spiral cords are low and sharpened, separated by broad, slightly concave interspaces; the apical angle is smaller – 38°. The number of cusps on the central tooth of *P.* ***kantori*** varied from 4 in paratype 1 to 0 in paratype 2, but we consider that as intraspecific variability which is found to be very high in Buccinidae [Golikov, 1963, 1980; Goryachev, 1978]. For instance, the number of cusps of *Retibuccinum shiretokoensis* varied from 3-4 in young specimens to 0 in adults [Gulbin, Sirenko, 2005].

Pararetifusus ***kosugei*** Kosyan, sp. nov.

(Figs. 1, 3, 6)

Type material: Holotype ZIN 55948/6 and paratype 1 ZIN 55946/4, Bering Island, 55°08'N, 165°58.3'E, 250-130 m, 22.09.1973. Paratype 2 – ZIN 35947/5, Bering Island, 55°11.7'N, 165°34.0'E, 130-250 m, 1973, coll. B.I. Sirenko.

Type locality: Bering Island, 55°08'N, 165°58.3'E, 250-130 m.

Etymology. The species is named after Japanese malacologist Dr. Sadao Kosuge, the author of the genus *Pararetifusus*.

Description (holotype). The **shell** (Fig. 1 I-J) is small (H 16.3 mm, h 11.0 mm, AL 8.0 mm, D 6.6 mm), thin, fragile, not translucent. Periostracum is thin, pale beige, tightly adjoining to the shell. The shell under the periostracum is white. Protoconch is eroded; teleoconch consists of 4.5 strongly convex whorls, with rounded shoulder. The suture is impressed. The spiral sculpture is represented by prominent sharpened spiral cords, separated by equal in width interspaces three times wider than the cords. There are six cords on the penultimate whorl, and 18 on the last whorl; the cords are prominent throughout the whole surface of the shell. The axial sculpture is represented only by incremental lines. Siphonal canal is well separated from the aperture, straight, and narrow. Aperture is medium high, occupies 0.49 of **H** and 0.73 of **h**, broad. Outer lip is smooth inside. Inner lip is concave, smooth, covered with thin callus, slightly extending on the parietal

part of the whorl. The operculum is oval, with terminal nucleus.

[**Диагноз.** Раковина маленькая (голотип H 16,3 мм, h 11,0 мм, AL 8,0 мм, D 6,6 мм), непрозрачная, с хрупкими стенками. Периостракум тонкий, бледно-бежевый, плотно приросший к раковине. Раковина под периостракумом белая. Протоконх состоит из двух оборотов с гладкой поверхностью; телеоконх – из 4,5 выпуклых оборотов с округлым плечом, разделенных вдавленным швом. Спиральная скульптура представлена выступающими заостренными спиральными ребрами, разделенными втрое более широкими, чем сами ребра, равными между собой промежутками. На предпоследнем обороте – шесть ребер, на последнем – 18. Ребра выражены в равной степени на всей поверхности раковины. Осевая скульптура представлена только линиями роста. Сифональный вырост прямой и довольно узкий, хорошо обособлен от устья. Устье умеренно высокое, занимает 0,49 H и 0,73 h, широкое. Наружная губа устья с гладкой внутренней поверхностью. Внутренняя губа вогнутая, гладкая, покрытая тонким каллусом, слегка заходящим на париетальную часть оборота. Крышечка овальная, с терминальным ядром.]

Remarks. The shell of the paratype 1 (H 9.7 mm, h 7.3 mm, AL 5.6 mm, D 4.0 mm; Fig. 1 G-H) consists of approximately two large inflated protoconch whorls (the uppermost whorl is eroded) and three teleoconch whorls. There are also six cords on the penultimate and 18 on the last whorl, but the cords have smoother, more rounded profile than in the holotype, and separated by narrower interspaces – about 1.5 times wider than the cords.

Morphological description (paratype 2) (Fig. 6).

H 18.5 mm, h 14.5, AL 10.0, D 8.2 mm, mature female.

The posterior whorls of the body above the stomach were torn off during extraction from the shell. The remaining part consists of 1.5 whorls, the mantle occupies one whorl, the kidney – 0.2, the remaining parts are the digestive gland and the gonad (Fig. 6 A). The head (Fig. 6 B-D) is rather large, with the length slightly exceeding the width. The cephalic tentacles are long and thick, bearing large black eyes on the small lobes at the base (Fig. 6 D, **tl**). The **foot** is folded transversally. The medium-sized propodium (**prp**) is divided by a deep propodial groove (**prpg**). The operculum is oval, with terminal nucleus (Fig. 6 A, **op**).

The mantle length exceeds its width (Fig. 6 C). The muscular siphon (**s**) is short and wide. The ctenidium (**ct**) is long, crescent-curved, occupying 4/5 of mantle length and 1/5 of its width, formed by triangular lamellae. The large osphradium (**os**) is nearly of the same size as ctenidium, slightly asymmetrical, with the leaflets on the left side narrower than those on the right one. The hypobranchial gland is not expressed. The rectum (**re**) opens in the middle of the mantle length.

Reproductive system. The capsular gland is not large, partly covering the rectum (Fig. 6 C, **cg**). The bursa copulatrix (**bc**) is rather long, occupying terminal position. The female orifice (**fo**) is small and rounded.

Digestive system. The proboscis is one third everted out of the thin-walled rhynchodaeum (Fig. 6 G-H, **pr**). Paired proboscis retractors (Fig. 6 G, **prr**) originate at the proboscis base, fastening onto the bottom and the lateral walls of the body haemocoel. The buccal mass is slightly pulled into the body haemocoel (Fig. 6 G, **bm**). The radula (**r**) in the radular sac lies in the middle of the buccal mass in a groove formed by two anteriorly fused cartilages (Fig. 6 G). The radula is 5 mm long and 140 m wide (1.4% of AL), consisting of 141 rows of teeth (5 are forming) (Fig. 3 G-H). The rachidian bears three cusps, with the median one being slightly longer than the others. The laterals from both sides bear three subequal crescent-curved cusps, with the outer cusp being slightly larger than the others. Aside the base of the radular sac goes strong medial radular retractor muscle (**mrr**), fastening on the rhynchodaeum (**rd**) at the base of the proboscis. At the base, the buccal mass is attached to the proboscis wall by multiple odontophoral retractors.

The anterior oesophagus (**aoe**) is wide and flattened, following along ventral side of the rhynchodaeum and then turning into the large elongated pyriform valve of Leiblein (Fig. 6 E-F, **vl**).On both sides of anterior oesophagus go thick straight salivary ducts. After entering the proboscis they significantly widen and form two long pouches, terminating in the middle of the proboscis length. The medium-sized rounded salivary glands are located on the both sides of the massive and broad nerve ring (**nr**). The gland of Leiblein (**gl**) is large and well-developed, lying posterior to the salivary glands and the nerve ring. The duct of the gland was not found.

The stomach is large, thin-walled, occupying a third of the whorl and running parallel to its longitudinal axis (Fig 6 I). The posterior mixing area (Fig 6 J, **pma**) is rather large, lined with transverse folds. The opening of the posterior oesophagus is large, located ventrally. The opening of the anterior duct of digestive gland is situated in the middle of ventral stomach channel; it is connected with the oesophageal opening by several longitudinal folds (**clf**). The opening of the posterior duct was not found. Large longitudinal fold on the inner stomach wall (**lf**) is situated above the openings of the oesophagus and anterior duct of digestive gland; other parts of the wall are lined with transverse folds. The outer stomach wall is lined with multiple transverse folds.

Comparison. We attribute *P.* ***kosugei*** sp. nov. to the genus *Pararetifusus* based on its characteristic spiral sculpture consisting of up to six spiral cords on the penultimate whorl, axial sculpture represented

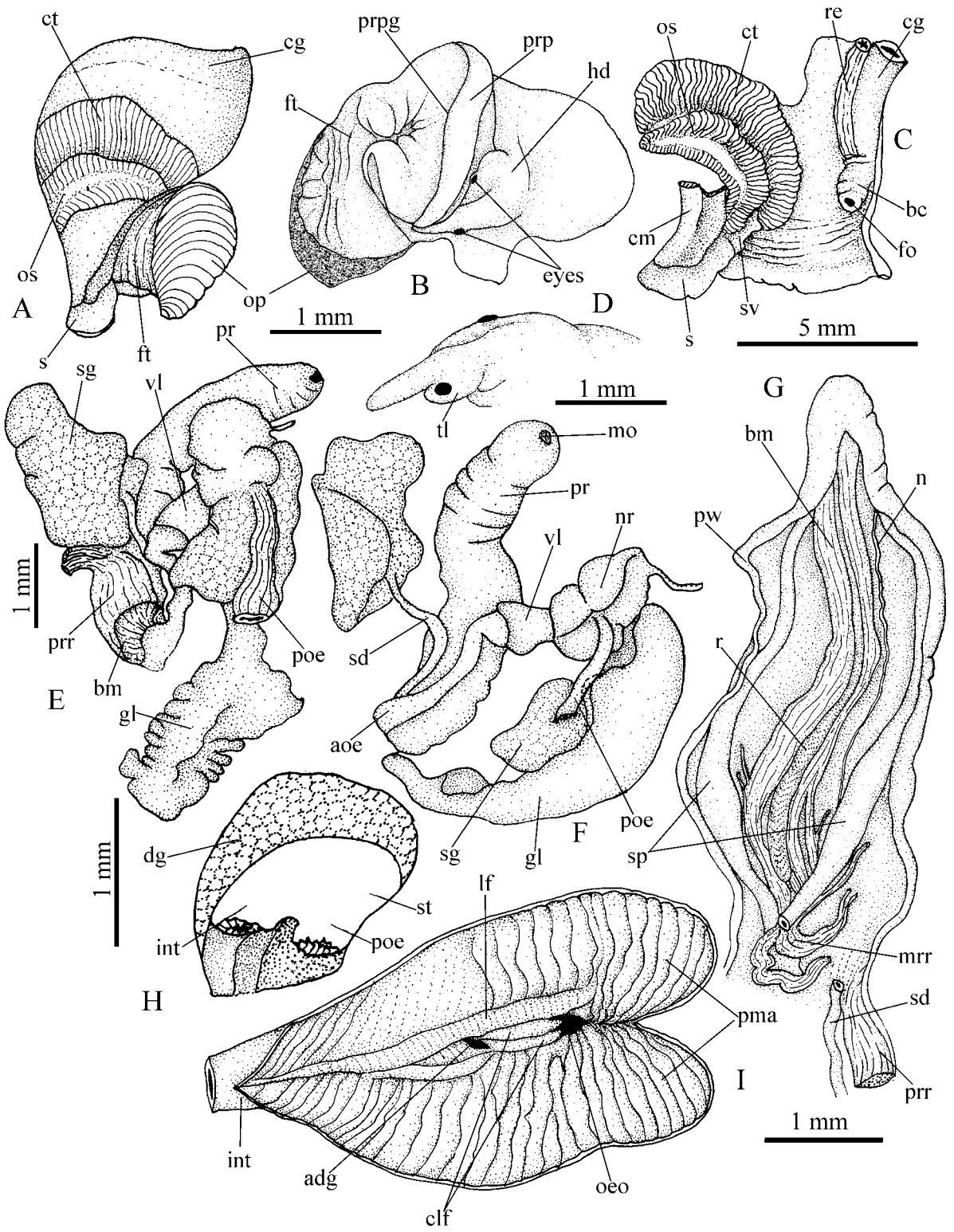

FIG. 6. Anatomy of *Pararetifusus* ***kosugei***. A – soft body, removed from the shell. B – antero-ventral view of the soft body, mantle removed. C – mantle. D – head. E – organs of the body haemocoel, lateral right view. F – organs of the body haemocoel, extended ventral view. G – proboscis, opened dorsally (rhynchodaeum opened dorsally and pulled backwards, anterior oesophagus removed). H – stomach, general view. I – stomach opened dorsally.

РИС. 6. Анатомия *Pararetifusus* ***kosugei.*** A – мягкое тело. B – антеро-вентральный вид мягкого тела, мантия удалена. C – мантия. D – голова. E – органы туловищного гемоцеля, вид справа. F – органы туловищного гемоцеля, вид с вентральной стороны. G – хобот, вскрытый дорзально (ринходеум отвернут назад). H – общий вид желудка. I – желудок, вскрытый дорзально.

only by incremental lines, and the radula like in *P. tenuis*, with tricuspidate rachidian and the laterals with three subequal crescent-curved cusps on both sides. However, the differences between *P. kosugei* and the other two species are stronger than those between *P. tenuis* and *P.* ***kantori***, and put it apart from them. These differences are: the operculum with terminal nucleus and the salivary ducts with pouches; the profile of the shell of *P. kosugei*, which is smoother than that of *P. tenuis* but sharper than that of *P.* ***kantori***, and the apical angle of its shell, 34° (average of 35° and 33°), what is slightly less than in *P. tenuis* (38°) and significantly less than in *P.* ***kantori*** (average 47°). The spiral sculpture of *Pararetifusus* ***kosugei*** and the high spire of its shell are somewhat similar to those of young specimens of *Aulacofusus periscelidus* Dall (Colinae). Nevertheless, the foregut morphology and the radular features of *P.* ***kosugei*** are totally different from those of *A. periscelidus* (personal unpublished data).

Discussion

The main distinctive feature of the genus *Pararetifusus* shared by *P. tenuis, P.* ***kantori***, and *P.* ***kosugei*** is the spiral sculpture of sharpened spiral cords, which are well defined on the surface of the shell and separated by broad, slightly concave interspaces; the axial sculpture consists only of incremental lines. The radula has a tricuspidate rachidian and the laterals with three subequal crescent-curved cusps on both sides; among anatomical characters may be mentioned large asymmetrical osphradium, short proboscis with the muscular buccal mass extending beyond the limits of the inverted proboscis; medium-sized rounded salivary glands with thick weakly coiled ducts, and the large gland and valve of Leiblein.

Another species of *Pararetifusus*, *P. dedonderi*, was tentatively attributed to the genus [Fraussen, Hadorn, 2001] based on spiral sculpture and radula structure. Nevertheless, it differs from the other three species by the presence of prominent axial sculpture of strong axial ribs and the radula having lateral teeth with the smallest median cusp and the rachidian of different shape. The type locality of *P. dedonderi* is very distant (Philippine Islands) from that of *P. tenuis*, *P.* ***kantori*** and *P.* ***kosugei***. Therefore, we exclude it from the genus. The conclusion about the generic placement of *P. dedonderi* depends on further studies on morphology and radular features of the tropical Buccinidae.

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Два новых вида рода *Pararetifusus* Kosuge, 1967 (Buccinidae: Colinae) с замечаниями по морфологии *Pararetifusus tenuis* (Okutani, 1966)

А. Р. КОСЬЯН

Институт проблем экологии и эволюции им. А. Н. Северцова РАН, Ленинский просп., 33, Москва 119071, e-mail: kosalisa@rambler.ru

РЕЗЮМЕ. Описаны два новых вида – *Pararetifusus* ***kantori*** sp. nov. и *P.* ***kosugei*** sp. nov. (Buccinidae: Colinae) из сборов в Беринговом, Охотском и Японском морях, и дополнено описание морфологии типового вида рода *Pararetifusus, P. tenuis.*