한국동물분류학회지 제9권 제1호
The Korean Journal of Systematic Zoology
Vol. 9, No. 1: 61~67 (June 1, 1993)

Lepeophtheirus tuberculatus, a New Copepod (Siphonostomatoida, Caligidae) Parasitic on the Greenlings (Pisces) from the Sea of Japan

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동해의 노래미류(魚網)에 기생하는 요각류 1신종, *Lepeophtheirus tuberculatus*

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요 약

강릉 인근의 동해에서 잡힌 어류 *Hexagrammos otakii* (쥐노래미) 및 *H. agrammus* (노래미)로부터 채집된 기생성 요각류 일종을 조사한 결과 신종임이 밝혀져 기재한다. 이종은 과거에 *L. scutiger* Shiino, 1952 및 *L. sheni* Boxshall and Bellwood, 1981와 혼동되어 왔으나 후자의 종들과는 분명히 다르다.

Key words: Parasitic Copepoda, *Lepeophtheirus*, *Hexagrammos*, Korea, Sea of Japan.

Lepeophtheirus scutiger Shiino, 1952 was described originally on the basis of five females from the fish *Hexagrammos otakii* Jordan and Starks from the southeastern coast of Japan. Shen (1958) reported this copepod species from *Hexgrammos otakii* and *Platichthys bicoloratus* (Basillewsky) caught in the Yellow Sea, but his identification was erroneous. Later, Boxshall and Bellwood (1981) examined Shiino's (1952) types and found that the types were composed of two species: Four *Lepeophtheiurs scutiger* and one female of another species which was unknown untill that time. They described the latter as a new species by the name of *L. sheni*, and treated

the above Shen's (1958) specimens as conspecific with their *L. shenl*.

Recently, the author could find a species of *Lepeophtheirus* from two species of *Hexagrammos* in the Sea of Japan. This species of copepod was truned out to be identical to *L. scutiger* sensu Shen (1958), but showed distinct differences not only from *L. shenl* Boxshall and Bellwood but also from *L. scutiger* Shiino. A comparison of my specimens and Shen's description to other known species resulted in a conclusion that this copepod is new to science.

Family Caligidae

Lepeophtheirus tuberculatus, n. sp. (Figs. 1-3)

Lepeophtherius scutiger: Shen, 1958, (p. 139, pl. 1).

Type specimens. Holotype female and 4 female paratypes (3 intact and 1 dissected) from lateral and ventral body surfaces of *Hexagrammos agrammus* (Temminck and Schlegel) collected off Kangreung in the Sea of Japan, on 21 March 1993. Holotype and 3 intact paratypes will be deposited in the U. S. National Museum of Natural History, Smithsonian Institution. Dissected paratype has been retained in the collections of the author.

Other material examined. Two females from lateral body surface of *Hexagrammos otakii* Jordan and Starks collected at type locality, on 5 April 1993; 2 females from lateral body surface of *Hexagrammos agrammus* collected at type locality, on 5 April 1993.

Female. Body (Fig. 1A) 4.69㎜ long, excluding setae on caudal rami, with dark brown pigments (pigmentation not illustrated in Fig. 1A). Cephalothorax subcircular, 2.69㎜ wide. Lateral zones each with forked cuticular rib on ventral surface. Thoracic zone narrower than genital complex, with deep and wide posterior sinuses. Posterior margin of thoracic zone slightly extending beyond posterior ends of lateral zones. Genital complex 1.31×1.29㎜, slightly longer than wide, with sloping anterior margins, nearly stright, parallel lateral margins, and roundly protruded posterior margins. Abdomen 1-segmented, slightly wider than long, with anterior third distinctly wider than posterior two thirds, several setules, and 1 multibranched setule on each side of posterodorsal surface. Caudal ramus 133×95㎛, or 1.40 time longer than wide, weakly incurved, with expanded inner posterior corner, rounded posterior margin, 6 plumose setae, and several setules (Fig. 1B).

Antennule (Fig. 1C) 2-segmented; first segment with 25 plumose and 2 naked setae anteriorly and 2 plate-like processes at posterodistal corner; second segment bearing 12 naked setae and 2 aesthetascs. Antenna (Fig. 1D) 4-segmented; first segment with 1 large tubercle; second segment with large, tapering, posteriorly directed process; third segment unguiform, with 1 distinct process accompanied by setule, and 1 seta on anterior margin. Postantennary process (Fig. 1E) with 3 multibranched setules, and accompanied by 1 large tubercle near base.

Mandible (Fig. 1F) composed of 4 parts; terminal part with 12 teeth on inner margin and transparent membrane along outer margin. Maxillule (Fig. 1G) composed of 3 unequal setae based on papilla, and 2 posterior tines, with 1 large, but less distinct tubercle at area inner to papilla, and 1 smaller, but distinct tubercle on basal part of inner tine; outer tine curved inward, flanged along outer margin, with distinct crest; inner tine nearly straight, flanged along both sides, with weak crest. Maxilla (Fig. 1H) with lacertus of 442㎛ long and 129㎛ wide; brachium 604㎛

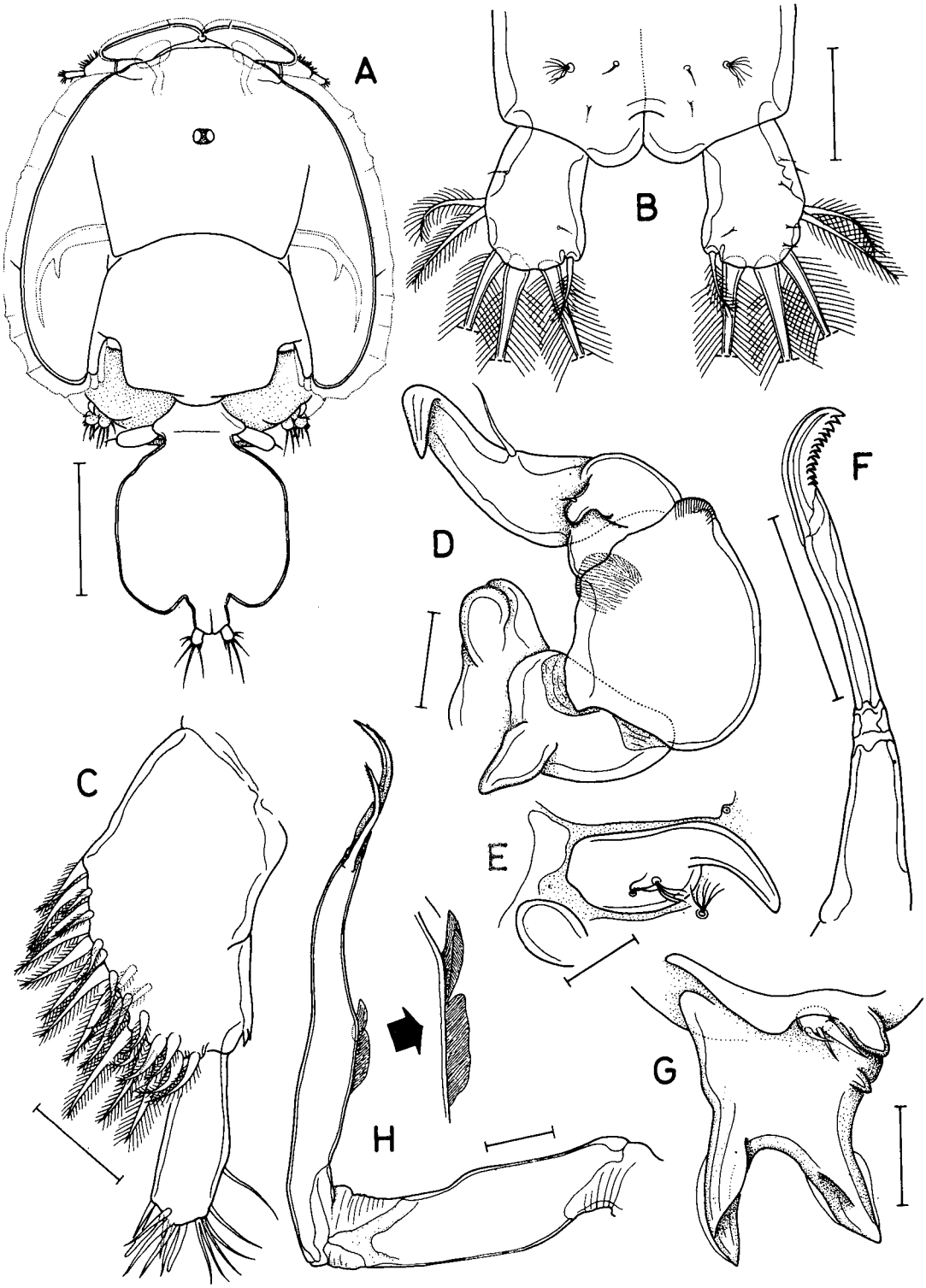

Fig. 1. *Lepeophtheirus tuberculatus*, n. sp., female: A, habitus, dorsal; B. caudal rami, dorsal; C, antennule; D, antenna; E, postantennary process; F, mandible; G, maxillule; H, maxilla. Scales: A=1㎜; B-H=0.1㎜.

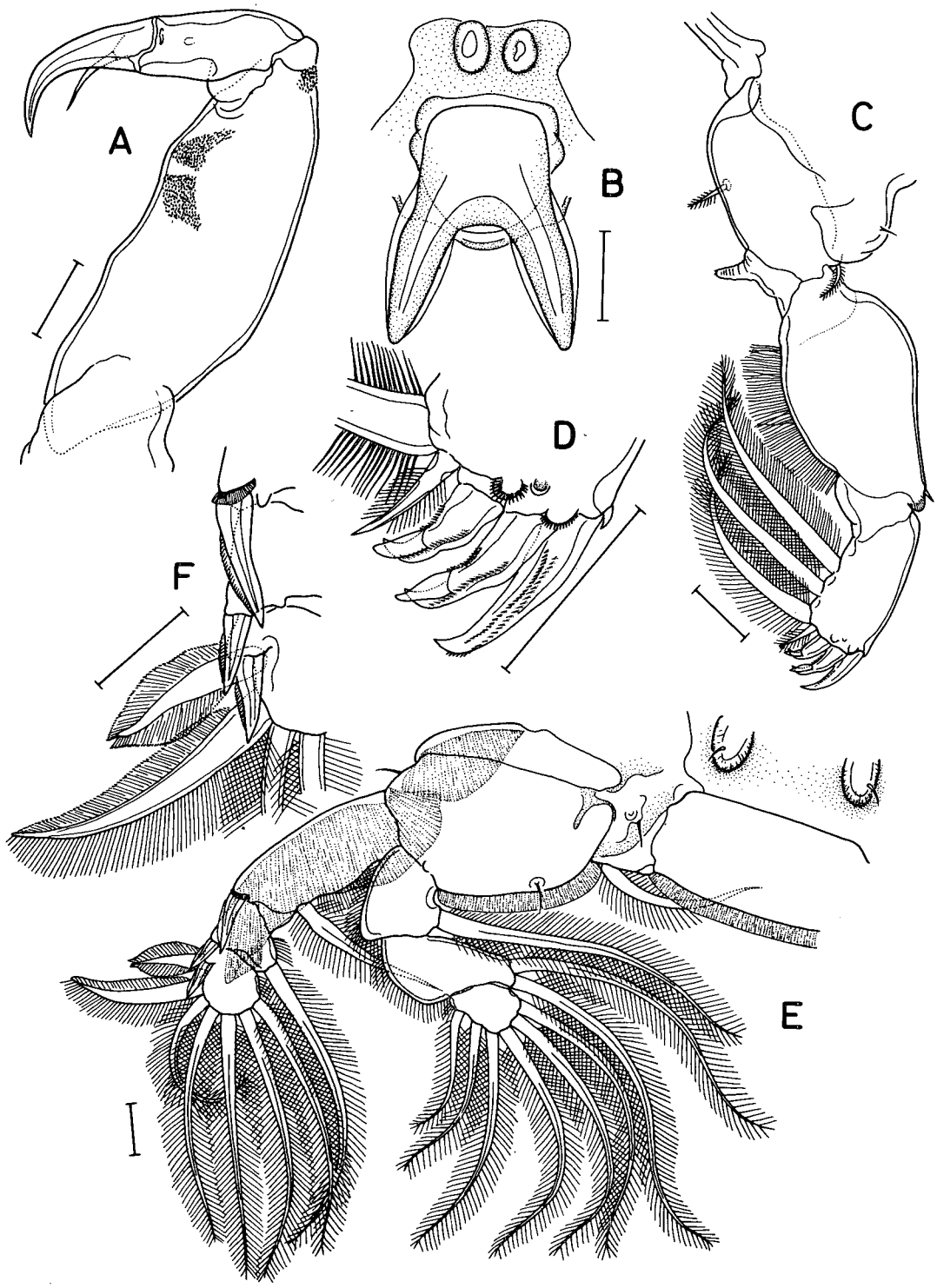

Fig. 2. *Lepeophtheirus tuberculatus*, n. sp., female: A, maxilliped; B, sternal furca; C, leg 1; D, terminal portion of leg 1; E, leg 2; F, outer distal portion of exopod of leg 2. Scales: 0.1㎜ in all.

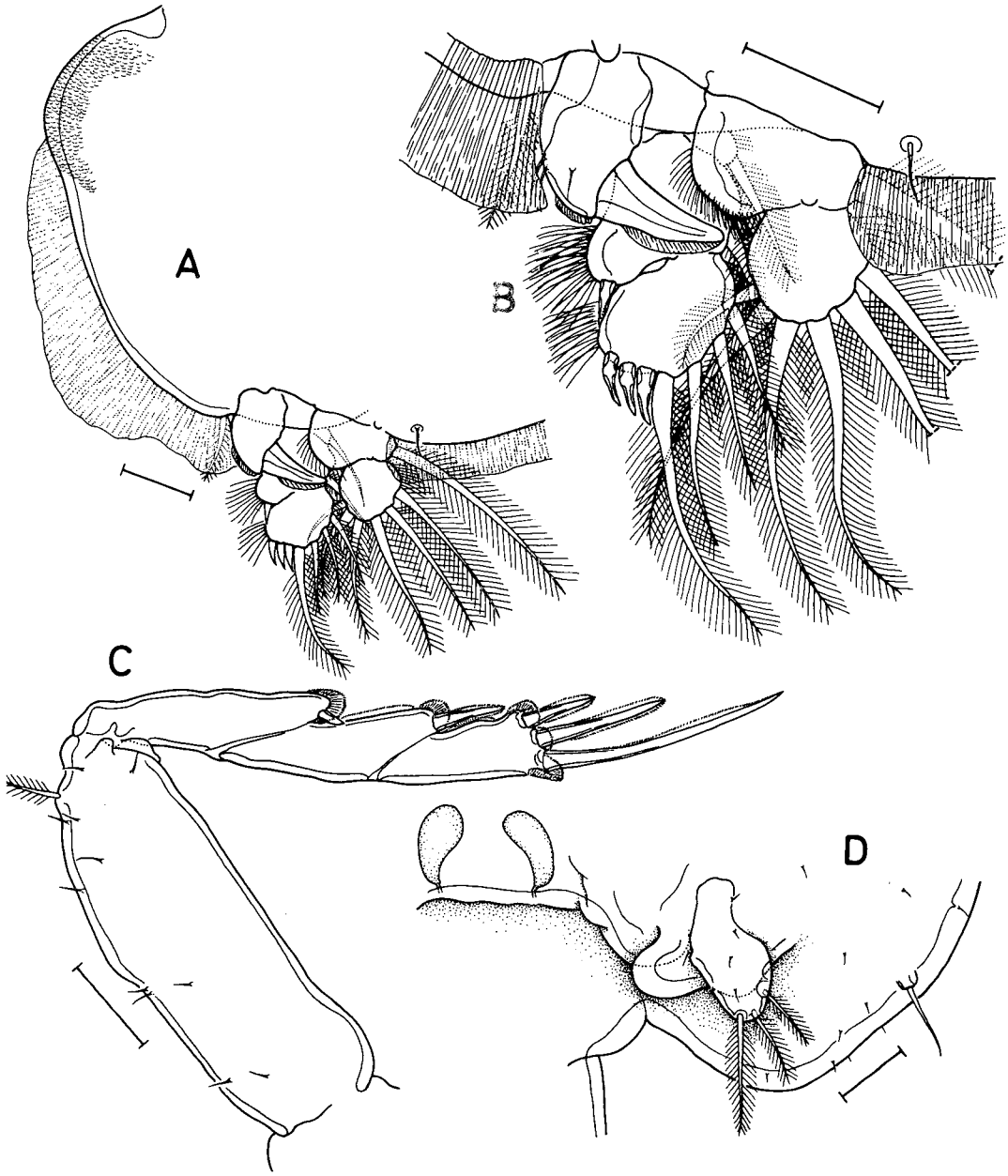

Fig. 3. *Lepeophtheirus tuberculatus*, n. sp., female: A, leg 3; B, rami of leg 3; C, leg 4; D, leg 5. Scales: 0.1mm in all.

long, curved in distal half; 2 flabella located at midlength of brachium; calamus and canna 220μm and 154μm long, respectively. Maxilliped (Fig. 2A) with 2 weak curvatures on inner margin of corpus bearing 2 groups of granules near disteroventral surface and 1 smaller groups of granules near disterodorsal corner; shaft with distal seta; claw as long as shaft. Sternal furca (Fig. 2B) consisting of 2 divergent, tapering, rather straight tines; both tines with flanges. Ventral surface of body anterior to sternal furca with 1 pair of distinct tubercles (Fig. 2B).

Leg 1 (Fig. 2C) with sympod bearing 2 setae, each on outer and inner margins. Endopod vestigial and tipped with 2 minute processes. Exopod 2-segmented; first segment with row of setules along inner margin and 1 spinule at distal outer corner; second segment with 3 large plumose setae, and terminally 3 spines and 1 plumose seta; outer spine longest, accompanied at base by small, plate-like process; 2 inner spines with hyaline accessory process, and pectinate membrane near bases; both sides of all spines with row of spinules (Fig. 2D). Leg 2 (Fig. 2E) with 3-segmented rami. Ventral body surface anterior to intercoxal plate with 1 pair of setule-tipped tubercles. Exopod with formula for armature: I -1; I -1; II, I, 5; first 3 exopodal spines with serrate flange on outer margin (Fig. 2F); first exopodal spine with membrane at base; second spine of third segment foliaceous, with broad, serrate membranes on both margins. Endopod with formula for armature: 0-1; 0-2; 5. Leg 3 (Fig. 3A) with sympod bearing adhesion pad. Exopod 3-segmented with formula I -1; I -1; III, 4; first segment with 3 setules, flange on outer distal margin, and large spine bearing flange on outer margin (Fig. 3B); spines on second and third segments nearly equal in length and shape. Endopod 2-segmented, with formula: 0-1; 6. Leg 4 (Fig. 3C) with sympod bearing about 10 setules, 1 distal plumose seta, and of 438×153 μm. Exopod 3-segmented, with formula I, II, III; each spine with serrate membranes at base; spine of first segment small and naked; spine on second segment and outer 2 spines of terminal segment each with serrate flanges on both sides; innermost spine on terminal segment with serrate membrane only on outer margin; each distal 2 segments with serrate membrane on outer margin. Leg 5 (Fig. 3D) being bluntly ended plate bearing 3 plumose setae and 1 remotely separated, naked seta based on small papilla near posterolateral margin of genital complex.

Male. Unknown.

Etymology. The specific name, *tuberculatus*, originated from the Latin *tuberculum* (=tubercle), alludes bearing the tubercles on the ventral body surface anterior to sternal furca, on the first segment of antenna, and on some other area of body.

Remarks. While reporting *L. scutiger* Shiino, Shen (1958) was dealing erroneously with the other species which was unknown untill that time. *L. tuberculatus*, n. sp., is conspecific with his specimens, and both can be characterized by the following features: 1) The caudal ramus is distinctly longer than wide, and has expanded inner distal portion; 2) there is a tubercle on the first segment of antenna, and near the base and near the base of postantennary process; 3) there is a pair of tubercles on the ventral surface anterior to sternal furca. These features are not found in *L. scutiger*, nor in *L. sheni*. Although Shen (1958) described or illustrated these features, these was not noticed by Boxshall and Bellwood (1981), who, consequently, treated Shen's specimens as conspecific with *L. sheni*. It is presumed that Shen's description in Chinese and incospicuous illustrations for the important morphologies prevented them from differentiating the two. Although *L. tuberculatus* and *L. sheni* can easily be differentiated from each other, both species have peculiar characters in common, in which the antenna has a tine-like process on the proximal portion of terminal segment and the lateral zones of the dorsal shield have the forked

ventral cuticular ribs, as already discussed by Boxshall and Bellwood in the descrition of *L. shenl*.

The other close relative of *L. tuberculatus* seems to be *L. hexagrammi* Gussev, 1951 which has been found from three species of fishes of the genus *Hexagrammos* (Gussev, 1951; Shiino, 1959). A comparison of these two species on the basis of Korean materials resulted in that both are alike in having tubercles on maxillule, near the base of postantennary process and on the area anterior to the interpodal plate of leg 2 (these morphologies were not illustrated by Gussev, 1951), and similar maxilla (with two flabella). However, the round margins of genital complex and shorter caudal rami are easily observable in *L. hexagrammi*, but are not represented by *L. tuberculatus*. A pair of tubercles on the ventral surface of body anterior to sternal furca may be a character typifying *L. tuberculatus*.

ABSTRACT

Lepeophtheirus tuberculatus, n. sp., is described from the greenlings *Hexagrammos otakii* and *H. agrammus* from the Sea of Japan off Kangreung, Korea. This species has been confused with *L. scutiger* Shiino, 1952 and L. *shenl* Boxshall and Bellwood, 1981. However, the new species apparently differs from the latter two species.

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RECEIVED : 10 APRIL 1993
ACCEPTED : 1 MAY 1993