

南海亮钩虾属(甲壳动物:端足目)的研究*

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亮钩虾属 Genus *Photis* 属于螺赢蜚科 Corophiidae 甲壳动物端足目(Crustacea: Amphipoda),全世界有近 60 种。本属为世界性分布,世界各大洋都有记载。

作者在系统整理和研究南海端足目标本中发现南海亮钩虾 4 种,其中有 1 新种,1 种为中国沿海的首次纪录。新种的模式标本保存在中国科学院海洋研究所。

南海亮钩虾的种类检索

1. 1—4 底节板低缘具有浓密长刚毛(刚毛排列靠近,每板不少于 10 根),5—7 底节板后叶低缘具长刚毛,触角细 长毛亮钩虾(新种) *Photis longisetis* sp. nov.
- 1—4 底节板低缘具少数刚毛(刚毛排列稀疏,每板均少于 10 根),5—7 底节板后叶低缘无长刚毛,触角较粗 2
2. 第一腮足掌节简单,掌界限不明显,雄体第 2 腮足腕节前后叶具浓密、长而粗刚毛 夏威夷亮钩虾 *Photis hawaiiensis* J. L. Barnard.
- 第 1 腮足掌缘界限明显,雄体第 2 腮足腕节无长而强壮的浓密刚毛 3
3. 头部侧叶窄长、突出,第 1 腮足掌缘斜直,雄体第 2 腮足掌角稍突,掌缘无方形齿 长尾亮钩虾 *Photis longicaudata* (Bate & Westwood).
- 头部侧叶不长、不突出,第 1 腮足掌缘凹,雄体第 2 腮足掌角三角形突出,掌缘具方形齿 方齿亮钩虾 *Photis kapapa* J. L. Barnard.

1. 夏威夷亮钩虾 *Photis hawaiiensis* Barnard, 1995(图 1)

Photis hawaiiensis J. L. Barnard, 1955:35, figs. 18, 19; 1970:191, fig. 123, Ren, 1996:62, fig. 4.

研究材料 海南岛邻昌礁,南海 St. 6038(21°00'N, 115°00'E),水深 102m。共计 5♂♂,最大体长为 4.6mm; 11♀♀,最大体长为 3.5mm。

现有标本的外形与任先秋等(1996)的图和描述基本相符。本种的栖息水深从潮间带直到水下 102m。

地理分布 南海(中国近岸),夏威夷群岛。

2. 长毛亮钩虾(新种) *Photis longisetis* sp. nov. (图 2)

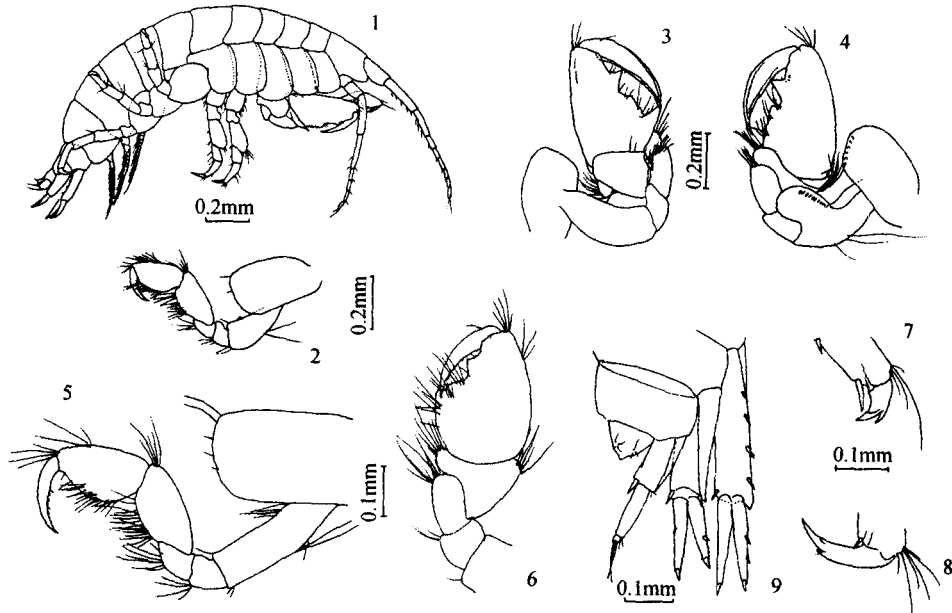
正模标本 97-CA-044, 1♀, 体长 4.9mm。1959 年 4 月 9 日采自南海 St. 6059(21°30'N, 113°45'E),水深 45m,底质沙。

副模标本 97-CA-045, 1♂, 体长为 4.7mm。1960 年 10 月 19 日采自南海 St. 6253(19°00'N, 107°

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图1 夏威夷亮钩虾 *Photis hawaiiensis* Barnard

1. 外形(♂); 2. 第1腿足(♂); 3, 4. 第2腿足(♂); 5. 第1腿足(♀);
6. 第2腿足(♀); 7. 第3步足指节(♂); 8. 第5步足指节(♂); 9. 尾肢与尾节

30'E), 水深 69m, 底质粉沙质泥。

其他标本 3♀, 最大体长为 4.4mm, 同正模标本; 1♂, 体长为 4.2mm, St. 6282(19°00'N, 106°00'E), 水深 27mm, 底质泥质沙。2♀, 大者体长为 4.0mm, 抱卵, St. 6131(20°00'N, 111°15'E), 水深 50m, 底质软泥。1♀, 体长为 3.6mm, St. 6064(21°15'N, 113°30'E), 水深 51m, 底质粗沙。

体躯较胖短, 头侧叶向前突出延伸, 眼卵圆, 处于侧叶前端, 第3腹节后下角几乎成直角, 尾节宽为长的 1.6 倍, 末端微突, 具 2 圆突出角, 每侧具 2 刚毛, 侧缘光滑。

触角细长, 约达体长的 2/3。第1触角柄长于鞭, 1—3 柄节长度之比约为 4:8:5, 鞭 8 节。第2触角等于或稍长于第1触角, 柄节长于鞭, 4, 5 柄节长度之比为 6:7, 鞭 10 节, 节细长。

上唇前缘微凹。大颚切齿具 3 齿, 动颚片具 3 齿, 刺排具 4 刺, 臼齿发达, 研磨状; 触须 3 节, 1—3 节的长度之比为 5:14:13, 节上都具刚毛。下唇具内叶, 外叶侧角钝, 峰具细短毛。小颚内板很小, 末端具 2 刚毛; 外板顶缘具 10 刺; 触须 2 节, 第2节窄长, 末端具 4 刺和长刚毛。第2小颚较宽短, 内板具侧刚毛排, 外板顶缘具细长刚毛, 叶背部具细短毛。颚足内板顶端具 2 舌状刺, 外板具 11 窄舌状刺和 2 刚毛; 触须 4 节, 第4节末端具 1 强刺, 节腹末端具刚毛。

第1底节板窄长, 前突。1—5 底节板底缘具浓密的长羽状刚毛; 第5—7 底节板后叶底缘也具很多长羽状刚毛。

第1腿足基节较窄, 背末角不呈叶状突出, 掌节圆三角形, 几乎等于腕节之长度, 掌斜截, 具栉齿, 无掌角齿, 指节腹缘具小齿。

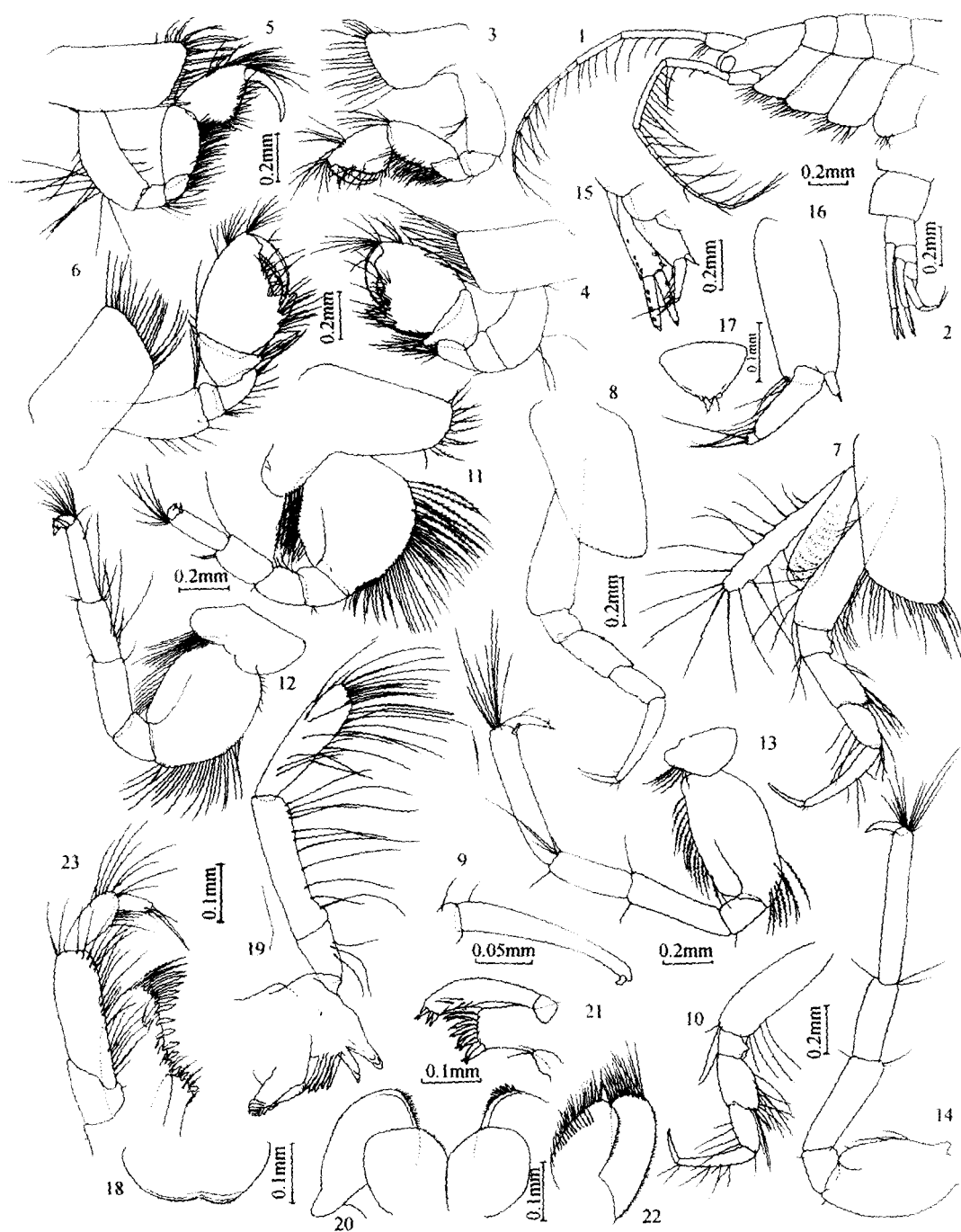


图2 长毛亮钩虾(新种)*Photis longisetis* sp. nov.

1. 外形(♀前部); 2. 尾部(♀); 3. 第1腿足(♂); 4. 第2腿足(♂); 5. 第1腿足(♀); 6. 第2腿足(♀); 7. 第3步足(♀); 8. 第4步足(♀); 9. 第4步足指节(♀); 10. 第4步足(♂); 11. 第5步足(♀); 12. 第6步足(♀); 13. 第7步足(♀); 14. 第7步足(♂); 15. 第2,3尾肢(♀); 16. 第3尾肢(♀); 17. 尾节(♀); 18. 上唇; 19. 大颚; 20. 下唇; 21. 小颚; 22. 第2小颚; 23. 颚足

雌体第2腮足底节板长方形,底缘斜截,具浓密长刚毛,腕节三角形,腹叶突出,掌节宽阔,掌缘凹成直角,近指节基部栉齿状,掌角突出,指节腹缘呈栉齿状。雄体第2腮足掌节较宽短,掌缘凹,中间具1突出齿,掌角呈三角形突出。

第3,4步足简单,第4底节板稍短,基节末部稍宽。第3步足长节背缘具长刚毛,腕、掌、指节长度之比为5:9:4,指节末端具1珠状齿(但常丢失)。第5步足底节板具发达的前叶,其底缘和叶的腹缘都具长羽状刚毛,基节梨形,前、后缘都具长羽状刚毛;座、长、腕节较粗短,掌节具1末端腹刺,背末端具1丛长羽状刚毛;指节短小,具2背齿。第6步足基节后底缘具长刚毛,基节稍窄,前、后缘都具长的羽状刚毛,掌节具2末端刺,指节具2背齿。第7步足基节卵圆形,雄体者其后基节突出,雌者前、后缘都具有长刚毛;掌节较长,具1末端刺和一丛长刚毛,指节爪状,末端具2小齿。

第1尾肢柄细长,为分支长度的2.2倍,具缘刺,两肢几乎等长,外肢具5缘刺,1末端刺,内肢光裸,具1末端刺。第2尾肢柄相当于分支长度的1.8倍,缘具小刺,两分支几乎等长,具缘刺和末端刺。第3尾肢柄为外肢长度的1.8倍,末端外侧具3刚毛;外肢具5侧刚毛,末端具小的第2节和2长刚毛;内肢短小,为外肢长度的1/4,末端具1小刺。

本新种以步足的底节板和5—7步足基节具浓密长刚毛与其他种不同。

本新种的外形、口器及第3尾肢的形状与 *Photis reinhard* Kröyer 相似(Sars, 1895),但明显的区别在于新种头部侧叶很突出(延长),两触角明显细长,第1腮足掌缘斜,第3,4步足掌节长为指节长度的2倍,指节末端具小刺,第5—7步足基节后缘具长羽状刚毛等。本新种与 *Photis longicaudata* (Bate et al., 1862)的区别在于前者触角明显细长,第1底节板前突,第1—5底节板具长而密的刚毛,第3,4步足长节后缘具长刚毛,5—7步足底节板后缘具长刚毛,第5—6步足基节后缘具浓密长刚毛,指节具2背齿。

本新种的头部侧叶及第5—7步足的形状与 *Photis aina* J. L. Barnard 者相似,两者区别在于新种步足具有长羽状刚毛,第3,4步足掌节长为指节长度的2倍,且末端具有小刺。本新种头部侧叶突出,第1,2腮足的形状与 *Photis dolichonnata* Stebbing 相似(Ledoyer, 1984),区别在于后者第2触角第4柄节短于第5柄节,第5—7步足底节板后缘具长刚毛,第5—6步足基节前、后缘都具长刚毛等。本新种的外形与 *Photis lamellifera* Schellenberg(1928)也很相似,区别在于新种尾节末端不具小钩,第1触角第3柄节长于第1柄节,第2触角第4柄节短于第5柄节,第1底节板前突,第5步足腕节后末端不圆突,指节具2背齿,雌体第2腮足具突出掌角,掌缘无中间突出齿等。

本新种栖息于热带海域,水深为20—70m。

3. 方齿亮钩虾 *Photis kapapa* J. L. Barnard, 1970(图3)

Photis kapapa J. L. Barnard, 1970: 192, figs. 124—125; Griffiths, 1973: 290, fig. 8; Ledoyer, 1982: 309, fig. 115.

研究材料 1♂, 长4.2mm, 南海 St. 6141(19°15'N, 111°00'E), 水深78m, 底质沙质泥; 1♂, 体长5.1mm, St. 6153(20°15'N, 110°45'E), 水深55m, 底质中沙; 1♂, 体长4.9mm, St. 6138(20°30'N, 111°00'E), 水深30m, 底质泥质沙; 1♂, 体长5.2mm, St. 6004(23°30'N, 117°30'E), 水深42m, 底质泥质砂; 1♂, 体长5.2mm, St. 6059(21°30'N, 113°45'E), 水深45m; 1♂, 体长6.3mm, St. 6019(22°45'N, 116°00'E), 水深23m, 底质粉沙质泥。

本种最明显的特征是雄体第2腮足基节具磨擦发育脊(stridulation ridges), 掌节宽

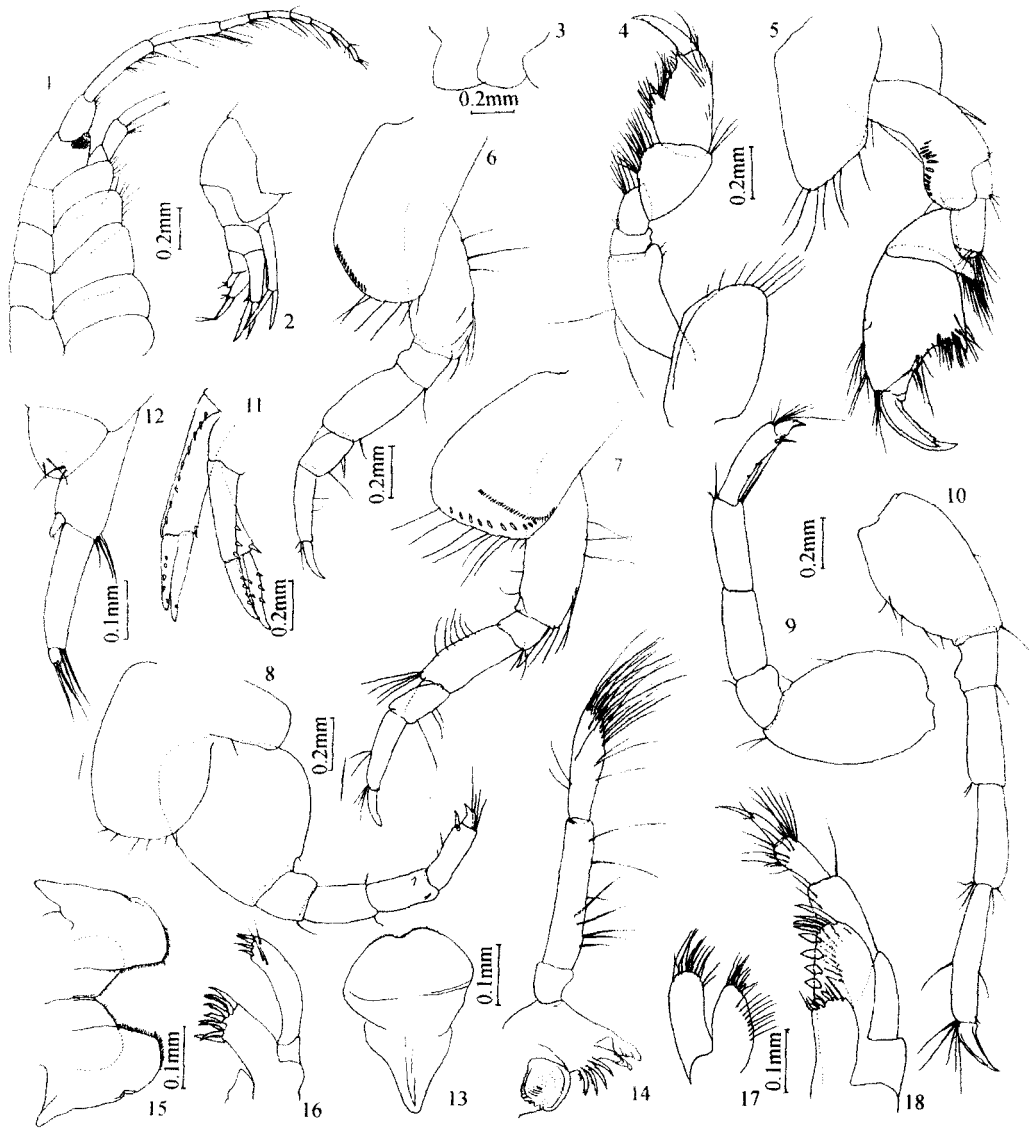


图3 方齿亮钩虾 *Photis kapapa* Barnard

1. 外形(♂前部); 2. 尾部(♂); 3. 1—3 腹节后腹角(♂); 4. 第1腮足(♂); 5. 第2腮足(♂); 6. 第3步足(♂); 7. 第4步足(♂); 8. 第5步足(♂); 9. 第6步足(♂); 10. 第7步足(♂); 11. 第1,2尾肢; 12. 第3尾肢与尾节; 13. 上唇; 14. 大颚; 15. 下唇; 16. 小颚; 17. 第2小颚; 18. 颚足

阔,掌缘具方形齿,掌角突出;第3,4步足底节板具磨擦发育脊,掌节较 *Photis longicauda* 者为粗短,第3尾肢很短等。

现有标本与原始描述的区别在于前者第2腮足的掌角突出较小,掌缘栉齿不明显,第1,2底节板发育脊不明显,第1腮足腕、掌节略宽等。

本种为中国近海的首次记录。

地理分布 南海(中国近岸),夏威夷,地中海,南非莫桑比克等。

4. 长尾亮钩虾 *Photis longicaudata* (Bate & Westwood, 1862)(图 4)

Eiscladus longicaudatus Bate & Westwood, 1862, Brit. sessile-eyed, Cryst. I:412(not see).

Photis longicaudata (Bate & Westwood). Meinert, 1877. Naturh. Tidsskr. Ser. 3, 11:142(not see); Sars, 1894: 571, Pl. 203, fig. 1; Setbning, 906:608; Chevreux & Fage, 1925:310, fig. 319; Reid, 1951:262; Nagata, 1965:310, fig. 35; Hirayama, 1984:42, fig. 71; Ledoyer, 1982:310, fig. 116; Ren, 1992:259, fig. 28.

研究材料 海南岛临昌礁, 21♂♂, 最大体长 3.8mm, 21♀♀, 最大体长 4.6mm。南海, 计 28 个站位, 29♂♂, 最大体长 7.8mm; 63♀♀, 最大体长 8.1mm。

本种第 1 腮足掌节圆三角形, 第 3 腹节后下角钝尖, 尾节的末端具侧角, 每角具 1 刺和 1 细毛, 第 3 尾肢外肢具小的第 2 节。雄体第 2 腮足基节前、后缘具斜向脊痕, 掌缘内凹, 中间具 1 齿, 第 3 底节板可见纵痕。

底栖采泥获得的标本个体较大, 第 3, 4 步足掌节较窄长, 第 5—7 步足指节具小的附加齿, 第 7 步足基节稍卵圆。

本种在我国水域广泛分布。

地理分布 中国, 日本, 印度尼西亚, 印度洋, 红海, 西南非洲, 西欧和北美大西洋海岸。

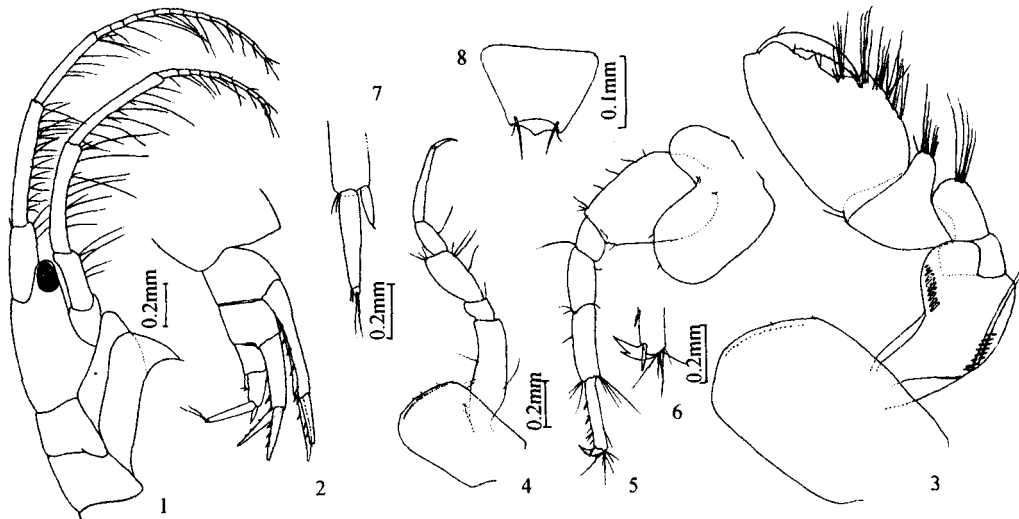


图 4 长尾亮钩虾 *Photis longicaudata* (Bate & Westwood)

1. 头部(♀); 2. 尾部(♀); 3. 第 2 腮足(♂); 4. 第 3 步足(♂); 5. 第 5 步足(♀); 6. 第 5 步足指节;
7. 第 3 尾肢(♀); 8. 尾节(♀)

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STUDIES ON GENUS *PHOTIS* (CRUSTACEA: AMPHIPODA) FROM THE SOUTH CHINA SEA *

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ABSTRACT

The present paper reports on Genus *Photis* (Amphipoda: Corophiidae) collected from the South China Sea. Four species were identified, one new, and one reported for the first time from Chinese coast waters.

The type materials of the new species are deposited in the Chinese Academy of Sciences Institute of Oceanology, in Qingdao.

List of species.

1. *Photis harwaiensis* Barnard, 1995

2. *Photis longisetis* sp. n.

3. *Photis kapapa* Barnard, 1970 *

4. *Photis logicaudata* (Bate & Westwood, 1862)

(* recorded for the first time from China Seas)

Photis logisetis sp. n. (fig. 2)

* Contribution No. 3444 from the Institute of Oceanology, Chinese Academy of Sciences.

Holotype: 97-CA-044. A mature female, body 4.9mm in length, collected from South China Sea St. 6059(20°31'N, 113°45'E.) depth 45m, bottom sand, 9, April, 1959. Coll. Zhang Wei-quan.

Paratype: 97-CA-045. Male, body 4.7mm in length, collected from South China Sea St. 6253 (19°00'N, 107°30'E.), depth 69m, bottom sand and mud. 19. October, 1960.

Other materials examined:

1. 3 ♀♀, bodies 3.4—4.4mm in length, same as holotype.

2. 1 ♀, body 3.6mm in length, collected from South China Sea St. 6064(21°15'N, 113°30'E.) depth 51m, bottom rough sand, 9, April, 1960.

3. 1 ♂, body 4.2mm in length, collected from South China Sea St. 6282(19°00'N, 106°00'E.), depth 27m, bottom muddy sand, 20, October, 1960.

4. 2 ♀♀, large body 4.0mm in length, collected from South China Sea, St. 6131(20°00'N, 111°15'E.), depth 50m, bottom soft mud, 9, April, 1960.

Body fat and short, lateral cephalic lobe long and roundly projected forward. Eyes situated in its frontal end and oval. Posteroventral angle of epimeral plate 3 nearly 90°. Telson 1.6 times as wide as long, terminal end produced; two lateral angles roundly projected, and with 2 setae respectively; lateral side smooth.

Antennae slender, reached to about 2/3 of body in length. Peduncle of antenna 1 longer than flagellum, length ratio of peduncular articles 1-3 about 4:8:5; flagellum 8 articulated. Antenna 2 subequal or longer than 1, thin; peduncle longer than flagellum, length ratio of peduncular articles 4 and 5 about 6:7, flagellar articles slender, 10-articulated.

Frontal margin of upper lip slightly concave. Incisor of mandible with 3 teeth, lacina mobilis with 3 teeth; spine-row bearing 4 spines, molar developed, triturating; palp with 3-articulated, length ratio of articles 1-3 5:14:13; articles with setae. Lower lip with inner lobe, lateral angles of outer lobe blunt, crest with setules. Inner plate of maxilla small, terminal end with 2 setae, outer plate with 10 spines; palp with 2-articulated, article 2 narrow and long, terminal end with 4 spines and long setae. Maxilla 11 broad and short, inner plate with oblique lateral setae row; terminal end of outer plate with slender setae; dorsal part of lobe with setules. Apex of inner plate of maxilliped with 2 spitulate spines, outer plate with II narrow spitulate spines and two setae; palp with 4-articulated, terminal end of article 4 with a strong spine; ventrodistal end of article with a seta.

Coxa 1 narrow and long, projected forward, lower margins of coxae with dense long plumose setae, lower margin of posterior lobes of coxae 5-7 with long plumose setae.

Basis of gnathopod 1 narrow, dorso-distal angle not produced, propodus oval triangular, subequal to carpus in length, palm obliquely truncated, with spines, without palmar angle spine; ventral margin of dactylus with setulate.

Gnathopod 2 of female: coxa oblong, lower margin obliquely truncated, with dense long setae, carpus triangular, ventral lobe produced; propodus broad, palmar margin concave to right angle; basal part near dactylus serrated, palmar angle projected, ventral margin of dactylus serrated. Gnathopod 2 of male: Propodus wider and shorter than that of female, palmar margin concave, with

a propross in middle, palmar angle triangularly produced.

Pereopods 3 and 4 simple, coxa of pereopod 4 slightly short, terminal part of basis wider than basal, dorsal margin of merus of pereopod 3 with long setae.

Pereopod 4: length ratio of posterior 3 articles, 5:9:4; distal end of dactylus with a bead-shape spine (but often lost).

Pereopod 5: frontal lobe of coxa developed, with long setae, ventral margin of its posterior lobe with long setae, basis pear-shape, anterior and posterior margins with long plumose setae, ischium, merus and carpus thick and short; propodus with a ventrodiscal spine, dorsodistal end with a clump of long plumose setae, dactylus short and small, with a dorsal tooth.

Pereopod 6: posterior and lower margin of basis with long setae, basis slightly narrow, anterior and posterior margin with long plumose setae, propodus with 2 terminal spines, dactylus with 2 dorsal teeth.

Pereopod 7: basis oval triangle, basal posterior lobe projected; anterodistal and ventral margins with long plumose setae; propodus longer, with a terminal spine and a clump of long setae, dactylus claw-shaped, terminal end with 2 teeth.

Uropod 1: peduncle slender, 2.2 times as long as ramus, with marginal spines; outer ramus subequal to inner, with 5 marginal spines and a terminal spine, inner ramus naked, with a distal spine. Peduncle of uropod 2 1.8 times as long as ramus, with marginal spines, two rami subequal in length, with marginal and terminal spines. Peduncle of uropod 3 longer than 1.8 times of outer ramus length, outer terminal end with 3 setae; outer ramus with 5 lateral setae, distal end with a small second article and 2 long setae; inner ramus short and small, about 1/4 length of outer ramus, distal end with a small spine.

The new species differs from other species in the genus by coxae, pereopods and basis of pereopods 5-7 bearing dense long plumose setae.

This new species is similar to *Photis reinhard* Kröyer in the external feature, the mouth part and the uropod 3 (see Sars, 1895, pl. 202); it differs from the former by the lateral cephalic lobe being extended forward, antennae being slender, the palmar margin of gnathopod 1 being oblique, propodus of pereopods 3-4 being longer than twice as long as the dactylus, the terminal end of the dactylus bearing a band-shape spine, and the basis of pereopods 5-7 bearing long plumose setae.

The new species differs from *Photis longicaudata* (Bate & Westwood) by the antennae being slender, and by the anterodistal angle of the coxa 1 being projected, by the pereopods 3-7, bearing long plumose setae, by the dactylus of pereopods 5-7 bearing two dorsal teeth.

The new species is similar to *Photis aina* J. L. Barnard by the lateral cephalic lobe and pereopods 5-7, the new species differs from the former by the pereopods bearing long plumose setae, by the propodus of pereopods 3-4 being longer than twice as long as the dactylus, which bears a terminal band shape spine.

This new species resembles *Photis dolichommata* Stebbing by the lateral cephalic lobe and gnathopods, (See Ledoyer, 1984:40, fig. 18). It differs from *P. dolichommata* by the peduncular article 4 of the antenna 2 being shorter than the article 5, by the posterior margins of coxae of pere-

opods 5-7 bearing long plumose setae and posterior margins of basis of pereopods 5-6 bearing long plumose setae.

The new species is similar to *Photis lamellifera* Schellenberg also, but differs from the former by the terminal end of the telson being without small hooks, by the peduncular article 3 of antenna 1 being longer than 1 (not short), the peduncular article 4 of the antenna 2 being shorer than 5, the posterodistal end of the carpus of the pereopod 5 not being ovally projected, and the dactylus bearing two dorsal teeth (not one dorsal tooth), by the female gnathopod 2 bearing tooth palmar angle, without middle tooth.