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A Redescription of *Gloiopotes huttoni* (Thomson, 1889),
with a Key to the Species of the Genus

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Abstract

A redescription of *Gloiopotes huttoni* (Thomson, 1889) is given together with comments on variations in body form and ornamentation as seen in the author's material. It is concluded that *Gloiopotes longicaudatus* (Marukawa, 1925), *G. watsoni* Kirtisinge, 1934, and *G. zeugopteri* Satyanarayana Rao, 1951, are synonyms of *G. huttoni*. Other species of the genus are briefly discussed and a key to the species is given.

INTRODUCTION

The genus *Gloiopotes* is parasitic on several of the larger pelagic fishes and is essentially cosmopolitan in distribution.

In the past most of the species of *Gloiopotes* have been described from a few specimens only, but the present material is sufficiently abundant to obtain a good idea of the variability of some characters. The range of variation shown has necessitated a reconsideration of the specific characters of other described species.

MATERIAL EXAMINED. Material from the Dominion Museum, Wellington: From the striped marlin (*Makaira mitsukurii*); Mayor Island, 2.3.1948, six females (three damaged) and one male; Bay of Islands, 2.3.1957, ("from flank, near vent"), six females and five males; Bay of Islands, —/3/1960 ("from flank"), seven females and two males. From the black marlin (*Makaira marlina*); Bay of Islands, —/3/1960 ("from flank") two females and two males.

Material from M. J. Daniels, N.Z. Forest Service: From the striped marlin; off Russell, Bay of Islands, —/2/1963, nine females and two males.

Total number of New Zealand specimens, 30 females and 12 males.

Material from the British Museum (Natural History): From *Histiophorus brevirostris*; Madras, one female and one male.

Gloiopotes Steenstrup and Lütken, 1861

(After Wilson, 1907, p. 698, modified as required by the description of later species.)

Carapace large, oval, shield shaped, first antenna slender and two jointed but usually with the second joint pigmented distally so that the antenna appears three jointed, second maxilla bifurcated in the female, sternal furca bifurcated with each branch dividing again distally, first pereopod with endopod reduced or missing, second and third pereopods biramous, fourth pereopod uniramous, two of the terminal claws on the first pereopods tri-parted; fourth thoracic segment freely articulated, with two lateral plates that may obscure part of the genital segment in dorsal view; genital segment large, produced backwards in the females on either side of the abdomen as two more or less slender posterolateral lobes; the male without these lobes; in both male and female the genital segment bears laterally a pair of posteriorly directed styliform processes, possibly derived from the fifth pereopods; abdomen slender and two segmented; anal laminae slender and elongated; surface of body with spines, mainly on the dorsal surface and dorsal surface of carapace bearing rows of sensory hairs; egg strings large, eggs uniserial, flattened, plate-like.

Gloiopotes huttoni (Thomson, 1889)

Lepeophtheirus huttoni Thomson, 1889. *Trans. Proc. N.Z. Inst.*: 354-356, Pl. 28, fig. 10, a-c; Pl. 29, a-m.

Gloiopotes huttoni (Th.) Bassett-Smith, 1899. *Proc. zool. Soc. Lond.*, 1899: 458.

Caligus longicaudatus Marukawa, 1925. *Illustrated Encyclopedia of the Fauna of Japan*, 1925: 1243, fig. 2396; 1947: 927, fig. 2654.

Gloiopotes watsoni Kirtisinge, 1934. *Parasitol.*, 26: 167-173, figs. 1-17.

Gloiopotes sp. Yamaguti, 1936. *Parasitic copepods from fishes of Japan*: Part 3 Caligoida, II, 1936: 4-5, Pl. II, fig. 20 and Pl. III, figs. 21-35.

Gloiopotes zeugopteri Satyanarayana Rao, 1951. *Proc. Ind. Acad. Sci.*, 34B: 248-255, figs. 1-15.

Gloiopotes longicaudatus (Marukawa) Shiino, 1954. *Rep. Fac. Fish. Pref. Univ. Mie*, 1 (3): 273-278, figs. 1 A-I. 2 A-H.

Gloiopotes longicaudatus (Marukawa) Shiino, 1959. *Rep. Fac. Fish. Univ. Mie*, 3 (2): 348-349.

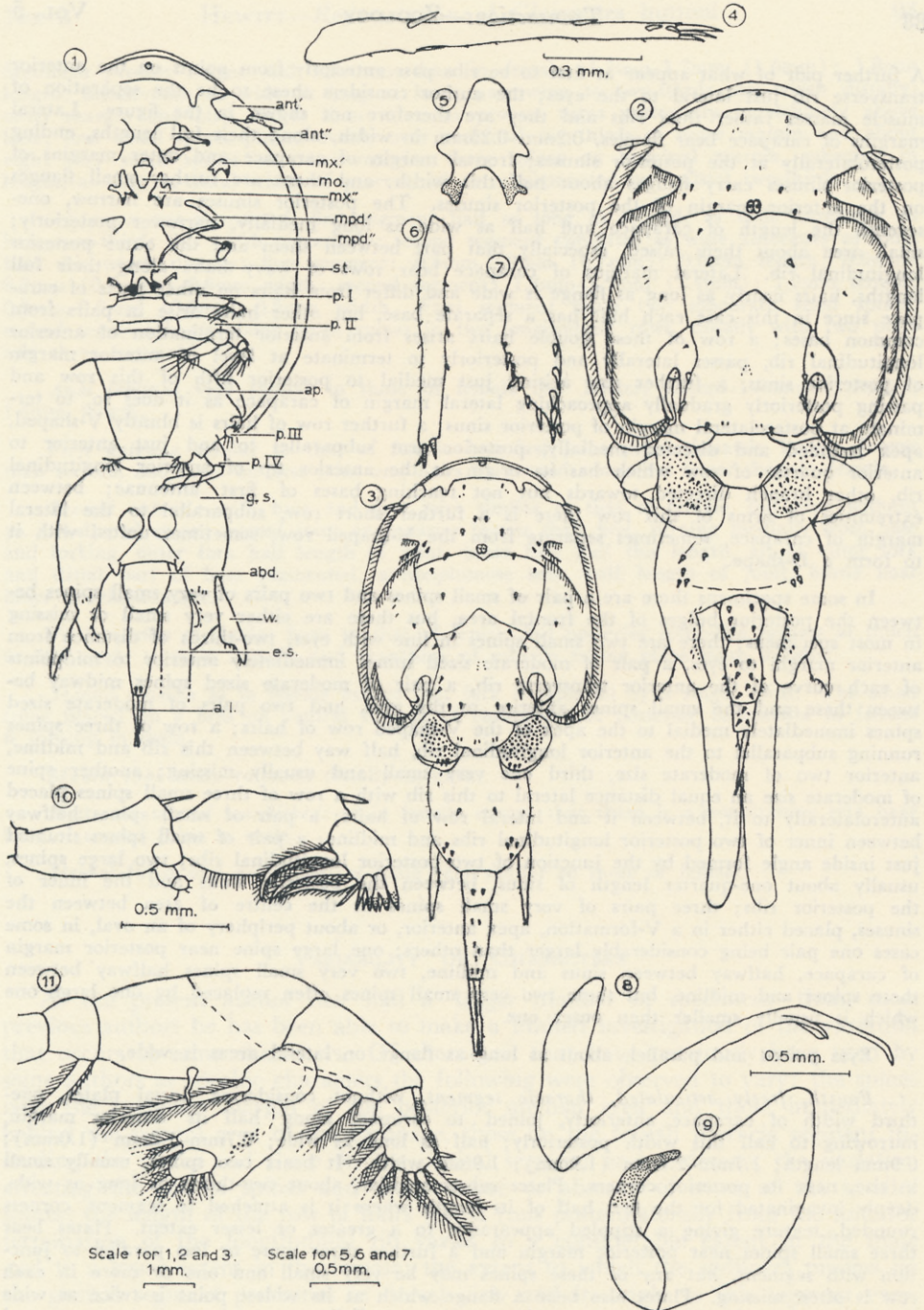
Gloiopotes longicaudatus (Marukawa) Heegaard, 1962. *Rec. Aust. Mus.*, 25 (9): 174, figs. 151-153.

Gloiopotes longicaudatus (Marukawa) Ho, 1963. *Crustaceana*, 5 (2): 87-90, figs. 6-10.

DESCRIPTION. (Measurements given are from 25 females and ten males from striped marlin and two females and two males from black marlin. As the specimens from the black marlin tend to be smaller than any of those from the striped marlin their measurements are given separately as follows: measurement of specimens from striped marlin minimum-maximum (average); measurement of specimens from black marlin; measurements from both the male or female specimens from black marlin is only given where these are very different, otherwise only the average is given.

Female. Large compared to other records of *Gloiopotes*, 12.1mm-14.0mm (13.0mm); 11.6mm total body length. Carapace about half length of body.

Carapace a little longer than wide, 6.0mm-6.7mm (6.3mm); 6.1mm; length 5.5mm-6.4mm (13.0mm); 11.6mm. Frontal area half width of carapace, one-ninth as long as wide medially, becoming shorter laterally except for two posterior bulges which double length at a point midway between lateral margin and midpoint. There are two transverse ribs, one one-third of distance from anterior margin, the other two-thirds this distance at its posterior extremities; anterior transverse rib half carapace width, in form of two shallow curves meeting in a shallow V immediately posterior to median eyes; posterior transverse rib one-third carapace width; from posterior transverse rib a posterior longitudinal rib passes back to meet posterior sinuses posteromedially; from a point just posterior to junction of this rib with posterior transverse rib a very short branch passes laterally to join with a further longitudinal rib which passes forward to join the lateral extremities of the anterior transverse rib and terminate just anterior to it; same longitudinal rib passes posteriorly, curving laterally as it does so, to terminate posterolaterally at posterior sinuses.



Gloiopotes huttoni (Thomson, 1889). Text-figs 1-11. Fig. 1—Female, ventral view. Fig. 2—Female, dorsal view. Fig. 3—Male, dorsal view. Fig. 4—Female, anal lamina. Fig. 5—Female, sternal furca. Fig. 6—Male, styliform process. Fig. 7—Female, styliform process. Fig. 8—Female, first maxilliped. Fig. 9—Female, second maxilliped. Fig. 10—Female, first pereopod. Fig. 11—Female, second pereopod.

Abbreviations: ant.'—first antenna; ant."—second antenna; mx.'—first maxilla, mx."—second maxilla; mo.—mouth tube; mpd.'—first maxilliped; mpd."—second maxilliped; st.—sternal furca; p. I-IV—first to fourth pereopods; ap.—apron of third pereopods; g. s.—genital segment; abd.—abdomen; w.—styliform process; e. s.—egg strings; a. l.—anal laminae.

A further pair of what appear at first to be ribs pass anteriorly from points on the anterior transverse rib just lateral to the eyes; the author considers these to be the separation of muscle masses rather than ribs and they are therefore not shown in the figure. Lateral margins of carapace bear flanges, 0.2mm–0.25mm in width, along their full lengths, ending posterolaterally at the posterior sinuses; frontal margin of carapace and outer margins of posterior sinuses carry flanges about half this width, and there are further small flanges on the anterior margin of the posterior sinuses. The posterior sinuses are narrow, one-seventh the length of carapace and half as wide as long medially, narrower posteriorly; small area about them raised, especially that part between them and the outer posterior longitudinal rib. Lateral margins of carapace bear rows of wavy hairs along their full lengths, hairs nearly as long as flange is wide and differ from hairs on other parts of carapace since in this case each hair has a separate base, but other hairs arise in pairs from common bases; a row of these double hairs arises from anterior termination of anterior longitudinal rib, passes laterally and posteriorly to terminate at level of anterior margin of posterior sinus, a further row arising just medial to posterior fifth of this row and passing posteriorly gradually approaching lateral margin of carapace as it does so, to terminate at posterolateral margin of posterior sinus; a further row of hairs is bluntly V-shaped, apex rounded and directed medially, posterior arm subparallel to and just anterior to anterior quarter of row which has its origin at the anterior tip of anterior longitudinal rib, other branch directed towards but not reaching bases of first antennae; between extremities of arms of this row there is a further short row, subparallel to the lateral margin of carapace, sometimes separate from the V-shaped row, sometimes united with it to form a D-shape.

In some specimens there are a pair of small spines and two pairs of very small spines between the posterior bulges of the frontal area, but these are either very small or missing in most specimens; there are two small spines in line with eyes, two-thirds of distance from anterior margin to eyes, a pair of moderate sized spines immediately anterior to midpoints of each curve of the anterior transverse rib, a pair of moderate sized spines midway between these and the small spines anterior to the eyes, and two pairs of moderate sized spines immediately medial to the apex of the V-shaped row of hairs; a row of three spines running subparallel to the anterior longitudinal rib, half way between this rib and midline, anterior two of moderate size, third one very small and usually missing; another spine of moderate size an equal distance lateral to this rib with a row of three small spines placed anterolaterally to it, between it and lateral row of hairs; a pair of small spines halfway between inner of two posterior longitudinal ribs and midline; a pair of small spines situated just inside angle formed by the junction of two posterior longitudinal ribs; two large spines, usually about one-quarter length of sinus, between the posterior sinus and the inner of the posterior ribs; three pairs of very small spines in the centre of area between the sinuses, placed either in a V-formation, apex anterior, or about periphery of an oval, in some cases one pair being considerably larger than others; one large spine near posterior margin of carapace, halfway between sinus and midline, two very small spines halfway between these spines and midline, but these two very small spines often replaced by one large one which is usually smaller than outer one.

Eyes paired and parallel, about as long as flange on lateral areas is wide.

Fourth, freely articulated, thoracic segment, without considering dorsal plates, one-third width of carapace anteriorly, joined to carapace along half its anterior margin, narrowing to half this width posteriorly; half as long as wide; 0.7mm–1.2mm (1.0mm); 0.9mm length; 1.7mm–2.1mm (1.9mm); 1.9mm width. It bears two spines, usually small in size, near its posterior corners. Plates subrectangular, about two-thirds as long as wide, deeply invaginated for the first half of its length where it is attached to segment, corners rounded, texture giving a stippled appearance to a greater or lesser extent. Plates bear three small spines near posterior margin and a further three more or less parallel to junction with segment, but any of these spines may be very small and one or more in each row is often missing. Plates also bear a flange which at its widest point is twice as wide as that on lateral areas of carapace but narrows medially to terminate at segment and laterally to terminate two-fifths of way along lateral margin. Taking plates into account fourth thoracic segment has following measurements: 1.7mm–2.4mm (2.1mm); 1.8mm length; 3.2mm–3.7mm (3.5mm); 3.1mm width.

Genital segment more than half length of carapace, longer than wide, two-fifths of length due to the long and narrow posterolateral lobes; measurements of genital segment including lobes: 3.4mm–4.4mm (3.8 mm); 2.5mm and 3.4mm length; 2.8mm–3.7mm (3.3mm); 2.5mm and 3.0mm width. Lateral margins of segment including lobes an entire

curve; lobes half as wide as long, narrowing at midpoint to two-thirds this width, rounded posteriorly, with a slight dorsal medial lip posteriorly; margin between lobes a shallow concave curve meeting the straight inner margins of the lobes in sharp angles; median two-thirds of area anterior to lobes gently depressed. Segment bears a row of three spines along posterior lateral margin of depression, rarely another spine medial to most anterior of these and sometimes yet another spine just lateral to posterior angles of depression; two small spines just medial to anal laminae on margin between them, another three small spines just posterolateral to these and a row of eight to 15 small spines, decreasing in size posteriorly which extend along inner dorsal margin of the posterolateral lobes and may extend down to and around the posterior margin; three or four small spines lateral to this row on medial third of lobes; a row of four to six very small spines on inner ventral margin of the lobes, usually with one small and two very small spines placed half way between most anterior of these and bases of styliform processes. Styliform processes attached to genital segment just medial to outer margin of lobes, near their origin; three-sevenths as long as genital segment, one-third as wide as long at mid-point, narrowing to three-quarters this width at base and to a sharp point distally: they project beyond segment at various angles so that they may hardly extend beyond the lobes or they may reach almost to the posterior end of the abdomen; from 1.0mm to 1.9mm of length of processes visible in dorsal view; process bears six spines along distal half of outer margin and eight spines along distal two-thirds of inner margin, which is three-quarters length of outer; spines tending to decrease in size proximally.

Abdomen two-segmented, first segment half as long as second, as wide as long at midpoint, narrowing to three-quarters this width anteriorly and posteriorly, lateral margins entire curves; second segment two-fifths as wide as long at a point two-fifths of the distance from anterior margin, narrowing to two-thirds this width anteriorly and half this width posteriorly, anterior two-thirds sharply swollen dorsally so that abdomen appears to be three-segmented in dorsal view in some specimens; first segment: 0.6mm–1.0mm (0.8mm); 0.7mm length; 0.7mm–1.0mm (0.8mm); 0.8mm width; second segment: 1.5mm–2.0mm (1.7mm); 1.5mm length; 0.6mm–0.9mm (0.7mm); 0.6mm width. First segment bears from three to five moderate sized spines, same size as those on posterior margin of carapace, in two rows situated halfway between lateral margin and midline, and a pair of small spines just inside the posterior angles of the segment; second joint bears nine to eleven spines, often in the form of two rows of five pairs situated one-third of segment width in from lateral margin, with a single median spine between fourth and fifth pairs, but either one of either of second and third pairs may be missing, leaving a single asymmetrically placed spine on other side; a further eight to ten small spines are placed in single rows between larger spines and lateral margins, usually alternating with larger spines; there are three to five large spines on median third of each lateral margin; two moderate sized spines have their bases immediately anterior to posterior margin of ventral surface.

Anal laminae long and narrow; 1.0mm–1.3mm (1.1mm); 1.2mm length; one-eighth as wide as long proximally, narrowing to two-fifths this width distally; each bears five spines on outer margin decreasing in length distally; three spines as long as basal width on distal margin, a further spine as long as proximal spine on outer margin, placed opposite it on inner margin, and a row of about six small hairs on remainder of inner margin.

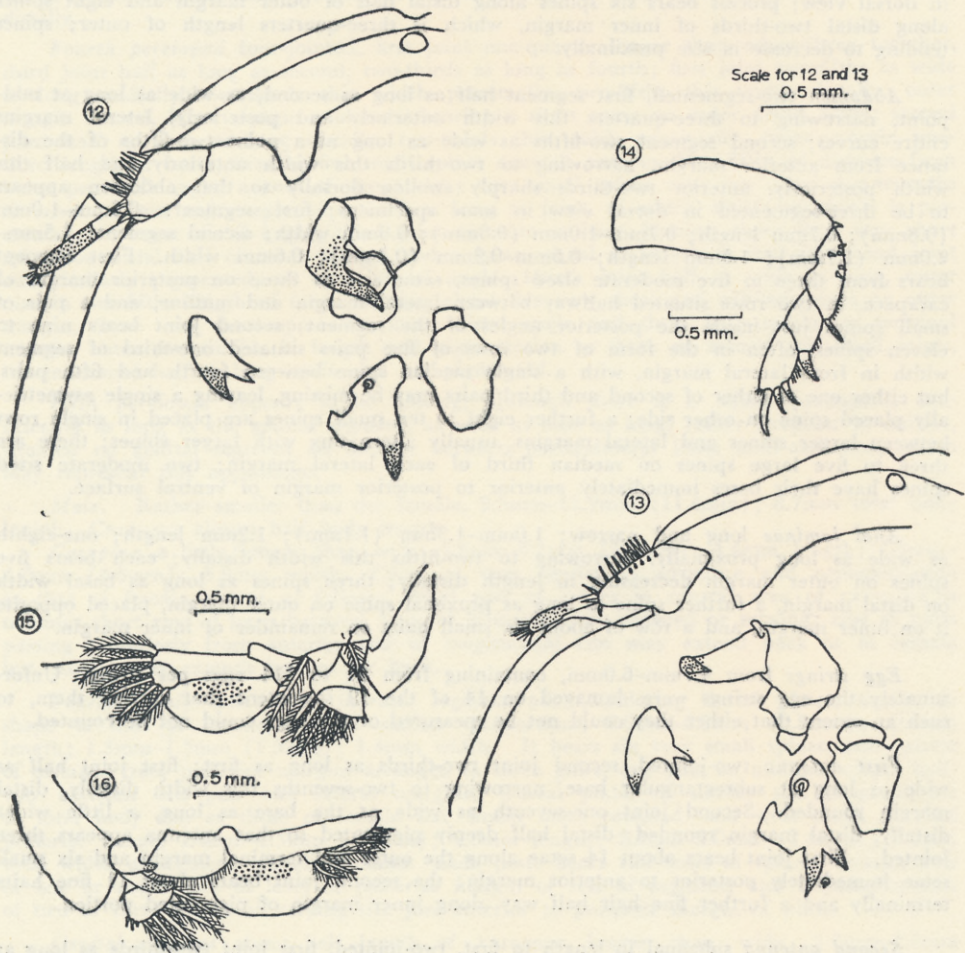
Egg strings from 4.7mm–6.0mm, containing from 91 to 114 eggs per string. Unfortunately the egg strings were damaged on 14 of the 19 specimens that carried them, to such an extent that either they could not be measured or the eggs could not be counted.

First antenna two-jointed, second joint two-thirds as long as first; first joint half as wide as long at subrectangular base, narrowing to two-sevenths this width distally, distal margin rounded. Second joint one-seventh as wide at the base as long, a little wider distally, distal margin rounded; distal half deeply pigmented so that antenna appears three jointed. First joint bears about 14 setae along the outer and terminal margin and six small setae immediately posterior to anterior margin; the second joint bears about 11 fine hairs terminally and a further fine hair half way along inner margin of pigmented portion.

Second antenna subequal in length to first, two-jointed, first joint two-thirds as long as second; set on a base that is as wide as first joint, three-quarters as long as wide, and bears a posteriorly directed awl-shaped spine on posterior margin. First joint three-quarters as wide as long, curved outer margin six times as long as straight inner margin; second joint one-third as wide at base as long, narrowing gradually to a distal point, distal third curved ventrally; outer proximal angle bearing a slight ridge.

First maxilla two-thirds as long as first joint of first antenna, basal width two-thirds the length, base giving off a spinous projection posteriorly which is four-fifths as long as base is wide, as wide at base as long, distal half pigmented; proximal margin of maxilla and inner margin of projection forming a single entire curve; maxilla narrows to one-third the basal width at a point one-third of distance from distal end before dividing into two sub-equal, divergent branches, each of which ends in a sharp point.

Second maxilla four-fifths as long as the first, placed on a subrectangular plate, half as wide again as the maxilla is long, half as long laterally as wide, narrowing to two-thirds this length medially, proximal margin with a large sub-rectangular invagination over median third and a spine on a raised boss immediately medial to this invagination. Maxilla a little narrower at base than long, narrowing rapidly to half this width, then dividing into two unequal branches one-third of the distance from base; inner branch straight, two-thirds the length and two-thirds basal width of outer branch which curves slightly laterally; both branches sharply pointed distally and both with brown pigmentation over most of their lengths. There is a small spine on a raised boss on ventral surface of carapace between branches of this maxilla.



Gloiopotes huttoni (Thomson, 1889). Text-figs. 12-16.—Fig. 12—Antennae and mouth parts of male. Fig. 13—Antennae and mouth parts of female. Fig. 14—Female, fourth pereopod. Fig. 15—Female, third pereopod, dorsal aspect. Fig. 16—Female, third pereopod, ventral aspect.

Mouth tube as long as second joint of first antenna, three-quarters as wide at base as long, narrowing to one-third this width distally, distal margin sublinear.

First maxilliped one-third as long as carapace is wide, first joint half as long as second, one-quarter as wide as long, proximal and distal margins rounded; second joint one-seventh as wide as long, narrowing to half this width proximally, proximal margin rounded, and one-third this width distally, distal margins carrying two spines, innermost half the length of joint, outer spine two-fifths length of inner and with a narrow flange along its outer margin, both spines ending in sharp points.

Second maxilliped three-quarters as long as first, second joint three-quarters as long as first; first joint suboval, median width half length; second joint one-third as wide at base as long, narrowing distally to a point, curved to a depth equal to one-fifth its length; distal half of second joint pigmented dark brown.

Sternal furca on midline of ventral surface of carapace, immediately posterior to second maxillipeds which are halfway between anterior and posterior margins of carapace, one-seventh length of carapace. Base subtriangular, anterior apex broadly rounded, length equal to half length of furca, posterior width five-sixths length of base. Branches of furca one-third length of furca, broadly divergent, basal width four-fifths length, narrowing to two-thirds this width two-thirds of the distance from the base, then branching into two widely diverging secondary branches; distal half of primary branches brown pigmented.

First pereopod one-quarter as long as carapace is wide, three-jointed, first joint (basipod) as long as second, twice as long as third, basal width one-fifth length, broadening to twice this width distally, angles only slightly rounded, inner distal angle with a subcircular swelling, outer distal angle bearing a narrow spine one-quarter the length of the joint; inner distal angle bears a rudimentary endopod, one-seventh length of exopod, two-jointed, the first joint suboval, twice length of second joint, which is rounded and bears a few small setae; second joint attached to inner half of distal margin of first joint, half as wide as long medially, narrowing to two-fifths this width proximally and distally, inner margin an entire curve, inner margin bearing a row of long cilia, outer distal angle carrying a spine one-sixth as long as joint; third joint sub-rectangular, angles rounded, two-thirds as wide as long, attached to inner distal angle of second joint, bearing three long plumose setae on distal two-thirds of inner margin, a non-plumose seta on inner distal angle and three spines distally; outermost of spines simple, two-thirds as long as joint, distal half pigmented, other two slightly shorter, branching distally, these branches pigmented, a further unpigmented branch arising between these two.

Second pereopod biramose, each ramus three-jointed; *basipod* two-jointed, as long as two distal joints of first pereopods together, first joint one-quarter as long as second, distal width equal to length, narrowing to two-thirds this width proximally, bearing a very large plumose seta on inner distal angle; second joint half as wide as long distally, narrowing to nearly half this width proximally, distal angles rounded, bearing a short non-plumose seta halfway along inner margin and a flange two-fifths distal width of joint along full length of inner margin. Second joint of *exopod* one-quarter as long as first, half as long as second; first joint half as wide as long at base, narrowing to two-thirds this width distally, inner margin three-quarters as long as outer, bearing a long plumose seta on inner margin one-fifth of distance from inner distal angle and a spine on outer distal angle that is one-quarter as long as joint, pigmented over distal two-thirds; second joint two-thirds as long as wide, bearing a long plumose seta immediately proximal to inner distal angle and a spine on outer distal angle similar to that on first joint; third joint as wide as long, rounded distally, a spine similar to those on the first and second joints halfway along outer margin, a small nonplumose seta on outer distal area and a row of six plumose setae on terminal and inner margins, those on inner margin being the longest. There is a long flange, its medial width equal to width of first joint of exopod, narrowing proximally and distally, which is attached to outer margin of distal half of basipod and all three joints of exopod. Third joint of *endopod* half as long as second, four-fifths as long as first; first joint half as wide as long at rounded outer margin, narrowing to half this length at inner margin, outer seventh of joint thin and flange-like, long plumose seta borne on middle of inner margin; second joint three-fifths as wide as long, proximal margin rounded, attached to first joint by inner half of proximal margin, outer distal angle invaginated for one-third length of joint and two-thirds width at attachment of third joint, outer third of second joint thin and flange-like, area immediately medial to flattened area having a stippled appearance, two long setae borne on free part of distal margin; third joint sub-oval, half as wide as long, bearing six plumose setae on outer and distal margins.

Third pereopod with its *basipods* united in a broad apron which is one-third as long and half as wide as carapace, podites placed posterolaterally; apron divided longitudinally by two ribs, separated by a distance equal to two-fifths width of apron anteriorly and half this distance posteriorly, joined by a transverse rib one-third of distance from anterior margin; wide flanges on lateral and posterior margins. Endopod nearly half length of apron, but turned medially so that inner margin touches apron, exopod two-thirds length of endopod. *Exopod* three-jointed, joints subequal in length; first joint subtriangular, two-thirds as long as wide, outer margin reduced, carrying a plumose seta on inner proximal angle and a large forked spine, subequal in length to the exopod, pigmented over distal half of each fork, directed medially from outer half of joint; a further plumose seta near outer proximal angle may be borne on this angle but appears to be borne on margin of apron; second joint two-thirds as long as wide, bearing a plumose seta on inner distal angle and a short spine on outer distal angle; third joint subtriangular, two-thirds as long as wide, inner margin reduced and combined with distal margin, three short spines on outer distal angle of joint and six plumose setae on terminal and inner margins. *Endopod* two-jointed, second joint one-fifth as long as first and contained in a semicircular invagination of outer distal angle of first joint; second joint one-quarter as wide as long at base of second joint, slightly narrower proximally, bearing two plumose setae on part of distal margin which is free; second joint suboval, two-thirds as long as wide, carrying four plumose setae distally.

Fourth pereopod four-jointed, first joint one-quarter longer than other three together, third joint half as long as second, two-thirds as long as fourth; first joint two-fifths as wide as long medially, two-thirds this width proximally, two-fifths this width distally, outer margin curved, inner margin sublinear, bearing a short spine on outer distal angle; second joint half as wide as long distally, two-thirds this width proximally, inner margin one-third length of outer, bearing five small spines situated one- to three-fifths of distance from outer proximal angle, a row of about eight very small spines over the distal two-sevenths of outer margin and a spine one-third as long as joint, of which distal two-thirds is pigmented, on outer distal angle; third joint as wide as long, bearing about four very short spines on distal half of outer margin and a spine, equal in length to that of second joint and similarly pigmented, on outer distal angle; fourth joint half as wide as long, outer margin two-fifths length of inner, bearing about five very short and narrow spines on outer margin, three very short spines on inner distal angle and three long spines on terminal margin, outer two similar in length and pigmentation to those on second and third joints, the innermost half as long again and not pigmented.

Fifth pereopod appears to be missing, although there is a small protrusion, one-fifteenth as long as the genital segment, as wide at base as long, rather irregular in outline, situated on genital segment on margin between posterolateral lobes and abdomen, which may represent this appendage.

Male. Rather smaller than the female, 9.5mm–12.2mm (11.4mm); 8.7mm total body length. Carapace almost half body length.

Carapace a little longer than wide, 4.8mm–5.1mm (4.9mm); 4.4mm length; 4.5mm–4.8mm (4.6mm); 3.9mm width. Carapace very similar in structure and ornamentation to that of female except as follows: third pair of spines in central area of carapace is missing; short row of hairs between arms of V-shaped row reduced or missing; row of hairs passing posteriorly from anterior end of longitudinal ribs may extend back as in female but usually only extends half as far back.

Fourth, freely articulated, thoracic segment not considering dorsal plates, similar in shape to that of female, and of similar proportions, 0.6mm–0.9mm (0.8mm); 0.6mm length; 1.3mm–1.5mm (1.5mm); 1.4mm width. It bears six very small spines, one-quarter of distance from posterior margin, arranged in three pairs, one pair on midline, others halfway between this pair and lateral margins. Dorsal plates of similar size proportionate to total body size as those of female but much more rounded and with much smaller posterior flange, 1.0mm–1.3mm (1.2mm); 1.0mm length; 2.6mm–3.0mm (2.8mm); 2.5mm total width of segment including plates. Each plate bears two rows of spines, anterior row of one or two spines at level of posterior margin of rest of segment, and a posterior row of two or three spines of varying size just anterior to posterior margin of plate.

Genital segment about half length of carapace, longer than wide, 2.2mm–2.6mm (2.4mm); 2.1mm length; 2.0mm–2.2mm (2.1mm); 1.8mm width; subrectangular, angles rounded. It bears about five small hairs on lateral margins, four very small spines in an irregular line just in from lateral margin, over anterior two-thirds of segment; two large spines halfway along segment, one-third of distance from lateral margins and three or more, usually four, moderate sized spines in a group on dorsal aspect of posterior angles.

Styliform process longer and narrower than in female, 1.3mm–1.7mm (1.6mm); 1.8mm length; one-seventh as wide as long at base, narrowing to two-thirds this width distally; outer margin one-third longer than inner as process turns posteriorly immediately above base; four small spines placed evenly over proximal two-thirds of inner margin and about eight very small spines on outer margin; three spines on terminal margin, subequal in length, as long as distal width of process, all three pigmented over distal two-thirds.

Abdomen two-segmented, first segment half as long as second, as wide anteriorly as long, two-thirds this width posteriorly; second segment two-fifths as wide anteriorly as long, half this width distally; first segment: 0.6mm–0.9mm (0.7mm); 0.6mm length; 0.6mm–0.7mm (0.7mm); 0.6mm width; second segment: 1.3mm–1.5mm (1.4mm); 1.2mm length; 0.5mm–0.6mm (0.6m); 0.5mm width. First segment bears two moderate sized spines, second segment bears about seven spines in two longitudinal rows, usually with two pairs and three unpaired.

Anal laminae very similar to those of female but longer, 1.2mm–1.5mm (1.4mm); 1.4mm length.

First antenna similar to that of female but first joint proportionately longer, longer than second, and setae on first joint and hairs on second somewhat fewer than in female.

Second antenna with base and first joint similar to that of female, but base without an awl-shaped spine; second joint one-quarter longer than first, turning medially from base and forking, outer fork half length of joint, inner fork half this length, all of outer fork and distal part of base pigmented, a nonplumose seta, half length of joint, borne near inner proximal angle.

First maxilla of similar form to that of female but posterior spine-like process at much smaller angle to main maxilla and branching of maxilla taking place more distally.

Second maxilla as in female except that fork is replaced by a single spine. The small spine placed on a boss on ventral surface of carapace just posterior to maxilla in female is missing in male.

Mouth tube more rounded distally in male.

First and second maxillipeds as in female except that there is a nonplumose seta near base of second joint in male.

Sternal furca and pereopods of male very similar to those of female.

VARIABILITY OF CHARACTERS

As the present author has had a larger number of specimens than most previous authors he has been able to make a limited investigation of the variation that occurs in some characters. Of characters that have previously been used by some authors as specific characters the following were observed to vary: the spines near the posterior margin of the posterior median area and those immediately behind the frontal area of the carapace, those on the fourth thoracic segment including the plates and those on the genital segment and abdomen, the variation affecting the size of spines and the presence or absence of some of the smaller spines; the length of the row of hairs which runs posterolaterally from the anterior termination of the longitudinal rib varies to a considerable extent in the male and to a lesser extent in the female; the extent to which the styliform process on the genital segment protrudes in dorsal view and its angle to this segment vary, so that the extent to which these extend beyond the segment cannot be considered a reliable character. The shape of the plates on the fourth thoracic segment does not appear to vary but they may be inclined at various angles to this segment so that a plane drawing in dorsal view may misrepresent their shape; further the posterior flanges, which have only previously been figured by Yamaguti (1936, Pl. 2, fig. 20 and Pl. 3, fig. 21) may have been included or excluded by other authors in their representation and measurement of this plate.

Unfortunately, in the species of *Gloiopotes* so far described, there appear to be comparatively few variations in the body form with the exception of the plates on the fourth thoracic segment, or in the appendages, although a system of classification may be derived from the ornamentation of the third pereopods (see Shiino, 1954, p. 278). The disadvantage of this system is that the setae and spines may very easily be damaged and this system must only be used, as it is by Shiino, to confirm identification by other means. Thus it is still necessary to rely to a considerable extent on the spines on the body and the plates on the fourth thoracic segment for identification. However, bearing in mind the variation mentioned above, the author considers that only where the differences in spination involve the presence or complete absence of entire groups or rows of spines and where the differences in the plates involve marked differences in the sinus between the plates, or the shape of the plates, may these characters be used in proposing that differences are specific.

DISCUSSION

The original description of *Gloiopotes huttoni* made by Thomson in 1889 under the name *Lepeophtheirus* leaves little doubt that the present specimens are the same species, although the specimen described by him as a male is obviously a young female as has been pointed out by Wilson (1907, p. 701; 1920, p. 315). Thomson does not illustrate the rows of long hairs and many of the spines on the dorsal body surface. Nonetheless, the size and general body proportions as figured by Thomson are very close to those of the present material provided that the posterior part of the plates on the fourth thoracic segment as shown by Thomson is taken as representing the flange. This assumption seems justified by his figure (Pl. 29, 1a). Thomson's figures and description of the appendages are very full and agree closely with the present material, except in the setation of the endopod of the third pereopod. This he shows as having one seta on the first joint and three on the second, which would agree with the condition found in *G. costatus*. Perhaps Thomson's material was damaged. But, since the exopod of this limb, as well as the other appendages, agree with the present material, the present material is regarded here as belonging to Thomson's species.

Specimens of *Gloiopotes* from *Histiophorus brevis* taken at Madras were identified by Bassett-Smith (1899, p. 458) as *G. huttoni*. The British Museum (Natural History) kindly lent a male and a female specimen from this collection to the present author. These specimens differ from the specimens taken in New Zealand waters only in the length of the row of hairs which runs posterolaterally from the anterior termination of the anterior longitudinal rib. This row of hairs is a little shorter in the females from Madras than in local material, but this difference is not significant in the light of the variation discussed above. The specimens are a little smaller than the local specimens, the female 10.0mm in total length, the male 8.8mm in total length, but this size difference is not considered here to be of taxonomic significance compared with the overall agreement of body proportions and appendages, and the present author agrees with Bassett-Smith that the specimens from Madras are *G. huttoni*.

G. longicaudatus (Marukawa, 1925) is included in the synonymy of *G. huttoni* since the descriptions by Shiino (1954) and Heegaard (1962) show that their material differs from the present material only in the length of the longitudinal row of hairs on the carapace and in the arrangement of a few small spines on the dorsal surface of the body. Both these characters have been shown to vary in the present material.

Shiino (1954) has already pointed out the synonymy of *Gloiopotes longicaudatus* (Marukawa, 1925), *G. sp.* Yamaguti, 1936, and *G. zeugopteri* Satyanarayana Rao, 1951.

G. watsoni Kirtisinghe, 1934, differs from the present material in having only one plumose seta on the first joint of the endopod of the third pereopod. Since in most cases this podite in preserved material is partly turned under the apron, the other seta could easily have been overlooked. The endopod of the first pereopod is not shown in Kirtisinghe's figure, but as the pereopod appears to have been drawn from the other side it has probably been obscured. There are no marked differences in the spination, and the rows of hairs, although not figured, are described and do not appear to differ from those in the present material. The shape of the plates on the fourth segment and the sinus between them resemble those of the present material as do the general proportions of the body. Thus the present author considers *G. watsoni* to be yet another synonym of *G. huttoni*.

G. auriculatus Barnard, 1957, is not included in the key given below, since the present author is unable to separate it from *G. costatus* Wilson, 1920, from the literature.

The present author agrees with Shiino (1960b, p. 546) that *G. crassus* Wilson and Bere, 1936, is more properly considered a species of the genus *Lepeophtheirus* and this species is not included in the key.

Shiino's redescription (1960a, p. 533) of *G. hygomanus* Stp. & Ltk., 1861, confirms the major diagnostic characters given by these authors for the female and by Stebbing (1900, p. 670) for the male.

KEY TO THE FEMALES OF THE GENUS *Gloiopotes*

- | | | | | | | |
|--|-------|-------|-------|-------|-------|---------------------------------------|
| 1 (2) Plates of fourth thoracic segment covering almost all the dorsum of the genital segment except the posterior processes | ..... | ..... | ..... | ..... | ..... | <i>G. hygomanus</i> Stp. & Ltk., 1861 |
| 2 (1) Plates of fourth segment covering two-thirds or less of the dorsum of the genital segment. | | | | | | |
| 3 (4) Plates of fourth segment close together | ..... | ..... |  |  |  | <i>G. costatus</i> Wilson, 1920. |
| 4 (3) Plates of fourth segment well separated. | | | | | | |
| 5 (6) Lateral margin of genital segment with well developed spines | ..... | ..... | ..... | ..... | ..... | <i>G. ornatus</i> Wilson, 1907 |
| 6 (5) Lateral margin of genital segment without well developed spines | | | | | | <i>G. huttoni</i> (Thomson, 1889). |

KEY TO THE MALES OF *Gloiopotes*

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|--|-------|-------|-------|-------|-------|--|
| 1 (2) Plates of fourth thoracic segment sharply pointed posterolaterally | | | | | | <i>G. hygomanus</i> Stp. & Ltk., 1861. |
| 2 (1) Plates of fourth segment not sharply pointed posterolaterally | | | | | | |
| 3 (4) Plates of fourth segment well separated | ..... | ..... |  |  |  | <i>G. huttoni</i> (Thomson, 1889). |
| 4 (3) Plates of fourth segment close together | | | | | | |
| 5 (6) Plates of fourth segment rounded | ..... | ..... | ..... |  |  | <i>G. costatus</i> Wilson, 1920. |
| 6 (5) Plates of fourth segment suboval, anterior margin linear | | | | | | <i>G. ornatus</i> Wilson, 1907. |

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