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A NEW SPECIES OF FRESHWATER AMPHIPOD,  
PARACALLIOPE LARAI, (FAMILY EUSIRIDAE) FROM TASMANIA

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(with two tables, one graph and 25 text-figures)

ABSTRACT

A new species of freshwater amphipod, *Paracalliope larai*, is described, the first description of a species of the genus *Paracalliope* from Tasmania. *P. larai* is found in the Dip River, north-western Tasmania. The distribution of the genus in Tasmania is briefly discussed.

INTRODUCTION

In 1879, Thomson described *Calliope fluviatilis*, a species of freshwater amphipod which was common in the Dunedin area, New Zealand. Later, Stebbing (1899) made this species the type for the new genus *Paracalliope* within the family Calliopiidae. In the same paper, Stebbing (1899, p. 210) stated that he considered *Pherusa australis* Haswell 1881 from Botany Bay, N.S.W., to be identical with *C. fluviatilis* and that both species probably are synonyms of *Oedicerus novisealandiae* Dana 1853 and 1855 (of the family Oedicerotidae). Barnard (1972a) referred *Oedicerus novaezealandiae* Dana to *Paracalliope novisealandiae* (Dana). The conflict as to the correct familial placement of the genus *Paracalliope* within amphipod phylogenetic lineages is yet to be resolved. Barnard (1972b) recently expanded the definition of the family Calliopiidae and included it in the family Eusiridae and has thus tentatively placed the genus *Paracalliope* in the family Eusiridae, but states that '*Paracalliope* cannot be written off completely and returned to the Eusiridae until further evaluation of other atypical oedicerotids is undertaken', (Barnard 1972a, p. 72).

Paracalliopes are now known from the freshwater, (*P. fluviatilis*), brackish (*P. karitane*), and marine (*P. novisealandiae*) environments of New Zealand (Barnard 1972a); from brackish (*P. indica*) waters of India (Sivaprakasam 1970); from freshwater areas (*P. novaecaledoniae*) of New Caledonia (Ruffo & Paiotta 1972); and from the Philippines (*P. fluviatilis*) (Chilton 1920). This paper extends the known geographical range of the genus to include Tasmania.

Although there have been several studies of Tasmanian freshwater amphipods, for example those of Thomson (1893), Smith (1909) and Straskraba (1964) on neoniphargids and those of Hurley (1959) and Williams (1962) on the austrochiltonids, there has been no indication that amphipods of the genus *Paracalliope* occur in Tasmania. However, during the past few years, collections of paracalliopes have been made from many brackish and freshwater localities in King and Flinders' Islands and Tasmania. The present paper describes a new species of freshwater *Paracalliope*, *P. larai*, from the Dip River, north west Tasmania.

METHODS

The paracalliopes were collected from the Dip River immediately upstream from the Dip River Falls (41° 1'S; 145° 23'E, alt. approx. 200 m) by dislodging rocks and collecting the amphipods in a Freshwater Biological Association net held downstream. The animals were returned alive to the laboratory where they were preserved in a solution of 5% glycerol in 70% alcohol.

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Dissections were performed using needles, and the appendages were mounted in lactophenol for microscopic examination. To clarify details of segmentation and structure, the relevant portions were treated overnight at room temperature in 10% KOH and either stained in lignin pink and mounted on slides in Canada Balsam or mounted in polyvinyl alcohol.

Twenty mature specimens of each sex were studied.

## DESCRIPTION

The following description of *P. larai* is applicable, except where especially stated, to either sex, male or female.

## Body

The males are lighter in colour than the females. Both sexes are brown with peraeonites 3 and 4 and pleonites 1 to 3 appearing as non-pigmented stripes. The colour pattern of preserved specimens changes slowly to creamy-white during a period of 3-4 months in 70% alcohol.

The body surface is quite smooth, lacking tergal carinae. Setae are restricted to the appendages and to areas near the margins of the abdominal epimera.

The tergite of pleonite 4 is curved concavely (fig. 5), although this feature is not always so obvious in the female. Pleonite 3, and the coalesced pleonites 5 and 6 are similarly curved, but to a considerably lesser degree (fig. 5).

There is a marked sexual dimorphism in overall body length. The males (figs. 1 and 3) are longer than the females (figs. 2 and 4; see also table 1). In both sexes, the coxal side plates bulge beyond the curvature of the tergites. The greatest width of the fusiform body, excluding the bulge of the coxal sideplates, occurs at peraeonites 4 and 5 in both males and females (see table 1 for measurements). As shown in Graph 1, there is no obvious difference with respect to the allometry of length (head-peraeon)/breadth ratios between males and females. The rostrum - telson length of males averages 3 mm, and of females, 2 mm.

## Head

The head is produced into a short rostrum. The cephalic lobe, (cf fig. 6) which projects just beyond the extension of the rostrum, may vary in shape; rounded (fig. 4) to sharply pointed (figs. 3 and 6). The laterally placed, widely separated eyes have an irregular outline, but are approximately square in shape. The eyes are many faceted and do not protrude above the contour of the head.

In overall length, antenna 2 (fig. 7) is longer than antenna 1 (fig. 8), although the flagella of both antennae are subequal in length. Setae are confined to the distal margins of the antennal segments.

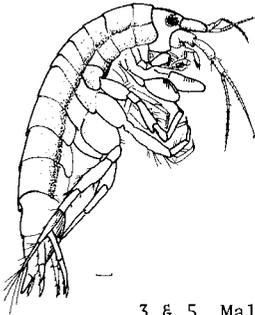
The most conspicuous segment in antenna 1 (antennule) is the basal (first) segment. Succeeding peduncular segments show a successive decrease in both length and breadth so that the flagellar segments, all of similar dimensions, are not noticeably different from the third peduncle segment.

In accord with the typical amphipod facies, antenna 2 has a peduncle of 5 segments, although segments 1 and 2 are incompletely divided, and together appear as a unit  $1\frac{1}{2}$  times greater in width than length. Peduncle segments each show a successive decrease in width. Segments 4 and 5 are subequal in length, and each is longer than any of the remaining segments in the antenna. Segment 1 in the flagellum of antenna 2 is longer than the remaining segments. The flagellum is noticeably distinct from the peduncle. The range in the number of flagella segments of both antennae is shown in table 1.

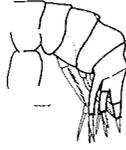
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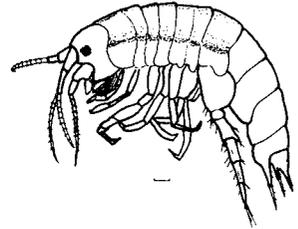
1 Male, dorsal view



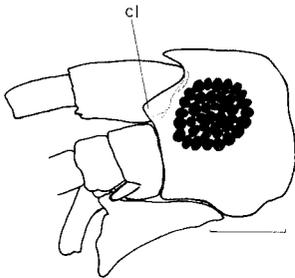
3 & 5 Male, lateral view



2 Female, dorsal view

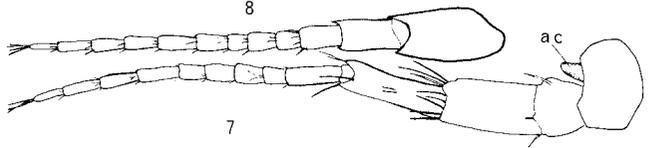


4 Female, lateral view

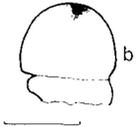


6 Male, lateral view of head

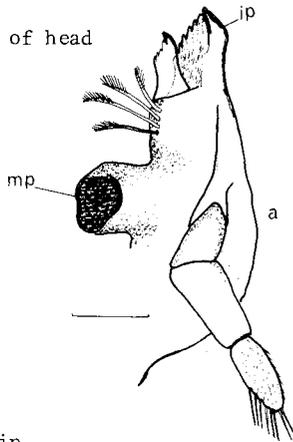
8 Male, antenna 1



7 Male, antenna 2



9a & b Male, upper lip



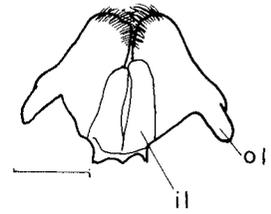
10a Male, mandible



b Male, mandible, freehand drawing of opposing lacinia



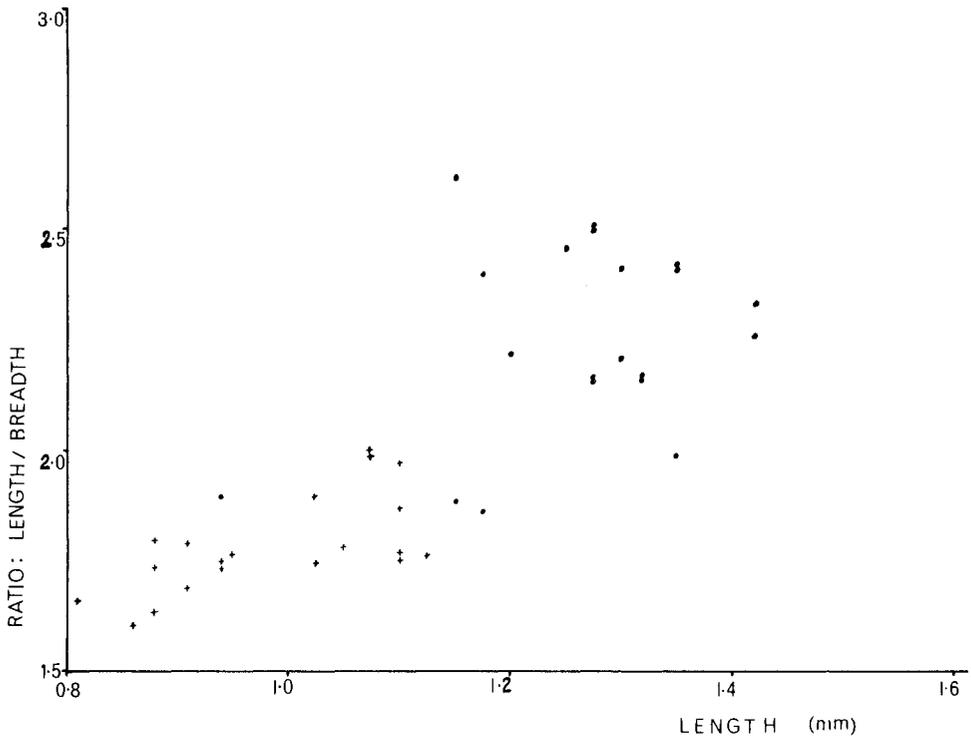
c Male, mandible, 3rd joint of palp



11 Male, lower lip

In each figure, a scale of 0.1 mm is also given

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GRAPH 1. - Graph showing the relationship between the ratio of length-breadth to the length of the amphipod.  
dots - males; plus signs - females.

On the second peduncle segment of antenna 2 is the antennal cone (ac fig. 7). This cone exhibits a distinct sexual dimorphism with regard to its length, being as long as or longer than peduncle segment 3 in females, but being no longer than half the length of the adjacent third segment in males.

Calceoli are present on the antennae of males. Calceoli are found on flagella segments 1, 2, and 4 (Antenna 1) and flagella segments 1, 2 and 4 (Antenna 2). Although in the majority of paracalliopes examined, the calceoli on any one antenna were identical, there are usually two types of calceoli on one single male paracalliope. Only one exception has been observed; in this specimen, all the calceoli were the same. This phenomenon of asymmetry of calceoli expression is currently the subject of further study (D. Coleman, pers. comm.). The females lack calceoli.

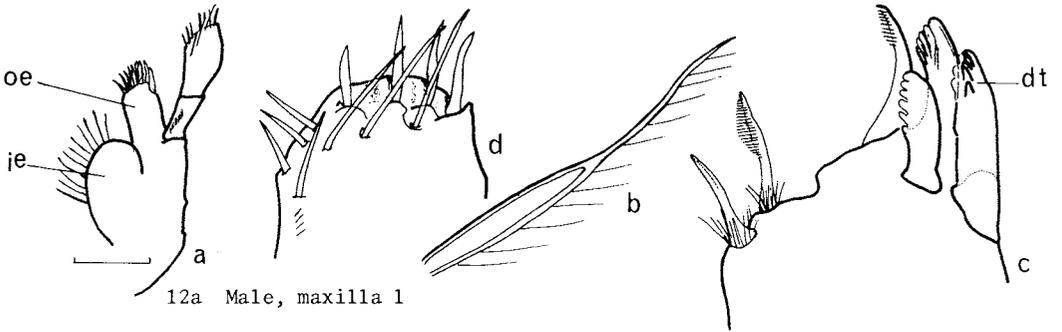
#### Upper Lip

This is sometimes skewed (fig. 9a), but is usually evenly rounded (fig. 9b).

#### Mandible

Both mandibles have a well developed lacinia mobilis, although one lacinia is generally a dentate process (fig. 10a), whilst the opposing lacinia is a spike (fig. 10b). The spine row may have one seta, or a row of several setae. Both the triturating molar (mp) and biting incisor processes (ip) are well developed.

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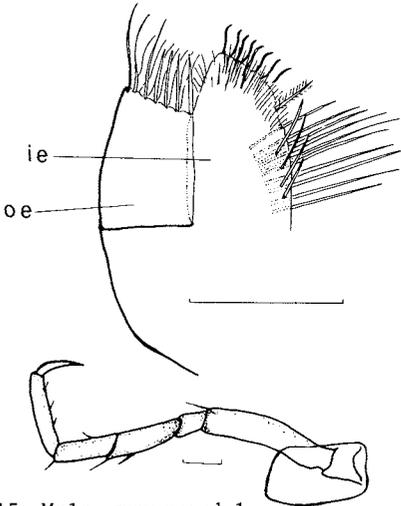
12a Male, maxilla 1

b Male, maxilla, freehand drawing of apical region of outer endite

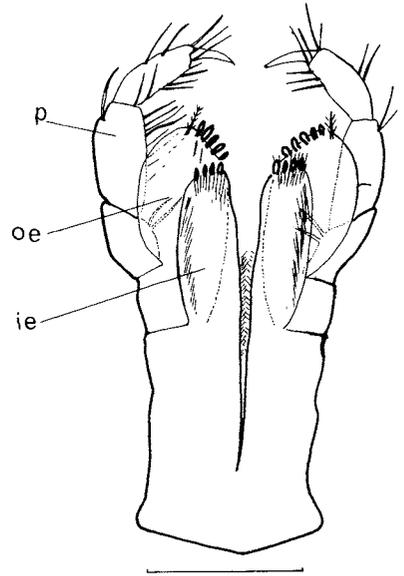
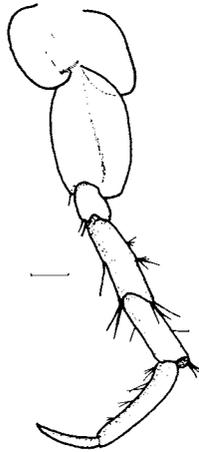
c Male, maxilla, freehand drawing of seta from inner endite

d Male, maxilla, freehand drawing of apical region of palp

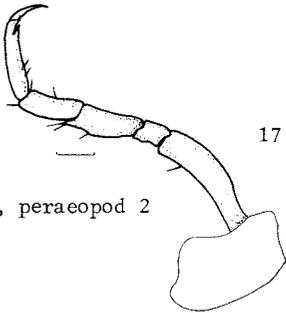
13 Male, maxilla 2 left side, anterior view



15 Male, peraeopod 1

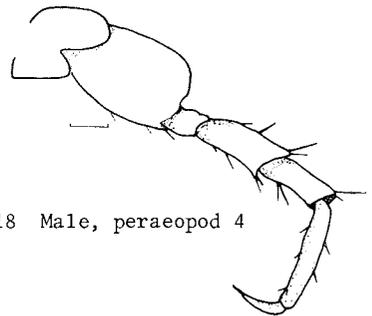


14 Male, maxilliped



16 Male, peraeopod 2

17 Male, peraeopod 3



18 Male, peraeopod 4

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Each mandible carries a three segmented palp, the middle segment being the longest in the palp. The distal segment in the male is equipped with 6-9 long setae (fig. 10a), but in the female only 2 setae are present (fig. 10c). These setae on the mandibular palp are figured in diagram 10d.

## The Lower Lip

The outer (mandibular) lobes (ol) and the inner lobes (il) are both well developed (fig. 11).

## Maxilla 1 (maxillula)

This is formed from an inner (ie) and outer (oe) endite, the latter bearing a 2 segmented palp on its anterior surface. The inner endite carries long plumosetae (fig. 12b) along the medial margin.

There are 9-11 stout teeth along the free end of the outer endite. The lateral 3 teeth are dentate (dt fig. 12c) and are closely adpressed; the remaining teeth bear comb structures with the 2 teeth closest to the medial margin of the endite carrying hair setae, basally.

The distal segment of the palp is larger than the proximal segments, and is armed terminally (fig. 12d) with 2 rows of trichia - a submarginal row of 4 spines and 3 medial setae, and proximal to this submarginal row, a line of setae obliquely crossing the mesodistal corner of the segment.

## Maxilla 2

This is formed from two simple lamellar endites. The outer endite (oe) (fig. 13) is shorter than the inner endite (ie) and carries, apically, a double row of setae. The setae of the anterior row are fine and hooked terminally, whilst those of the posterior row are straight and stouter than the others. The inner endite is carried at an angle to the outer endite. One plumoseta is present at the vaguely defined mesodistal corner of the endite. Distal to this plumoseta is a row of hooked setae; proximally there may be a row of simple setae. Obliquely across the anterior surface of the inner endite is a row of long simple setae.

## Maxilliped

This is normal, with well-developed 4 segmented palp (p) (fig. 14). The palp is sparsely setose. The outer endite (oe) bears one plumoseta terminally, and a row of spatulate processes along the margin medial to this. The inner endite (ie) carries an apical row of similar processes. There may be a row of fine hairs near the base of the inner endite.

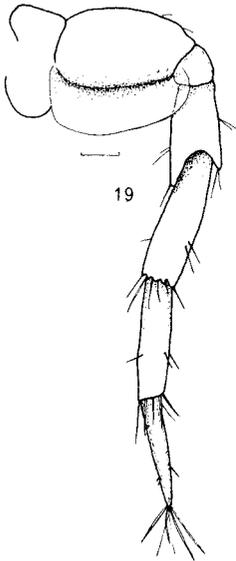
## Peraeon

Peraeonites 1-6 are subequal in length; peraeonite 7 is slightly longer. The approximately rectangular coxal sideplates of the first four peraeonites are well developed; the fourth coxal sideplate is weakly excavate posteriorly.

No sexual dimorphism is evident in peraeopods 1 to 5 which are sparsely setose (figs. 15 - 19 respectively) and are quite slender. Peraeopod 5 (fig. 19) is noticeably longer than the alternative peraeopods and the dactyl is straight. The basipodites are longer, and are expanded posteriorly on peraeopods 5, 6 and 7. The ischiopodites are small. On peraeopods 1 - 4, the meropodite and carpopodite show a small difference in length, and the two terminal segments tend to be long and slender. On peraeopod 5, the carpopodite is longer than the meropodite and articulates between two prominent disto-laterally projecting lobes of the meropodite; the dactyl is straight, and shorter than the propodite (see table 1). Simple lamellate oostegites are found at the base of the coxae of peraeopods 2 - 5 inclusive on gravid females.

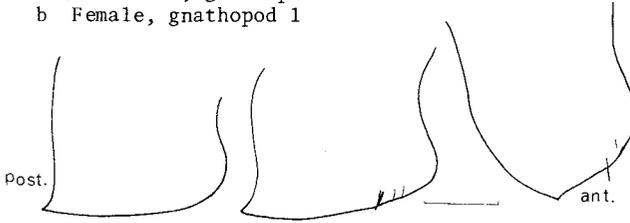
In males, Gnathopod 2 (fig. 20a) is larger than gnathopod 1 (fig. 21a) but both

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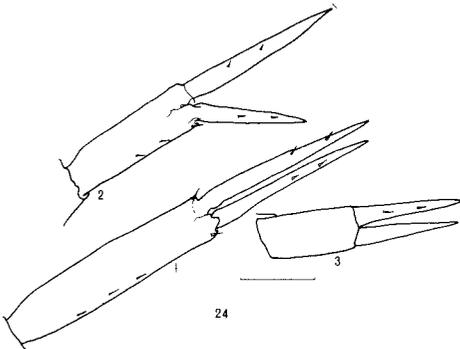
19 Male, peraeopod 5

21a & a<sup>1</sup> Male, gnathopod 1  
b Female, gnathopod 1

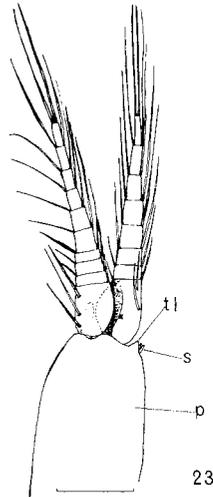


22 Male, abdominal epimera

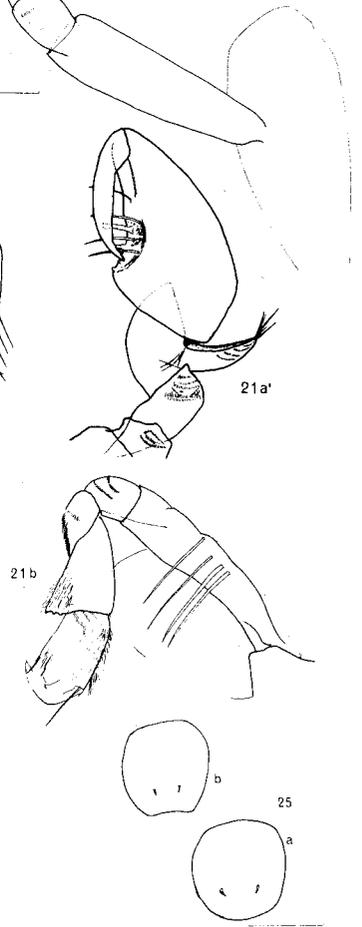
22



24a, b, c Male, uropoda 1, 2, 3



23 Male, pleopod 1  
anterior view



20a Male, gnathopod 2  
b Female, gnathopod 2

25a, b Male, telson

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gnathopods are the same size in females (figs. 20b and 21b respectively). All gnathopods are subchelate. Basipodites are long and, except in the case of female gnathopod 1, devoid of setae. The ischiopodites and meropodites are shorter; the carpopodite is twisted and expanded posteriorly into a prominent lobe. The palm of the propodite, although showing some variation in expression (fig. 21a and a<sup>1</sup>), is well developed in the male and carries teeth; in the female, the palm is poorly developed and carries only setae. The dactyl is quite simple. The forward surfaces of the ischios, meros, carpos and propos have bands of very fine hairs, with a tuft of simple setae being carried apically on the carpal lobe.

## Pleon

Pleonites 1 - 3 are equal in length and are the longest segments in the body of the amphipod. Pleonites 5 and 6 (urosomites 2 and 3 are coalesced. No sexually dimorphic features are evident in the pleon.

The epimera on the first 3 pleonites (fig. 22) are rounded at the antero-distal extremity, and have submarginal setae. The posterior-lateral margin of the epimera of pleonite 1 is convex, but is concave on pleonites 2 and 3 and the posterior-distal corner of these latter two epimera are sharply pointed.

The three pairs of pleopods are similar in form. The approximately rectangular peduncle (p, fig. 23) has an almost straight inner margin, but the outer margin is curved inwards distally. At the meso-distal margin on the anterior surface of each peduncle, there is a small triangular lobe (tl, fig. 23) which, when viewed from the anterior aspect, partially covers the pair of toothed spines (s, fig. 23) found in the 3 pairs of pleopods. A long simple seta is found on the anterior surface of the peduncle proximal to the base of the inner ramus.

Each pleopod has two multisegmented rami. The first segments of each ramus are the longest segments in the rami, the inner ramus having a conspicuously large (under the microscope) nucleus at the position marked x in fig. 23.

A postero-lateral expansion of the basal segment of the inner ramus abuts a boss on the outer endite. The apical segment of each ramus is truncated and terminates in two long plumosetae. The first segment of each ramus has one row of long setae directed anteriorly; the remaining segments each bear one long plumoseta at both of the latero-distal corners and lying in the plane of the pleopod.

## Uropods

The three pairs of uropods are all well developed, each having a peduncle with 2 rami (fig. 24). Uropods 2 and 3 extend just beyond the limit of uropod 3. The basic patterns of the variation in relative lengths of the three components of each uropod, namely peduncle, inner ramus, and outer ramus are given in table 2.

There are setae (see table 2 for the range) along the dorsal outer margins, including the distal corner, of uropods 1 and 2, and one at the corresponding meso-distal corner on uropod 1. Only rarely were setae observed on the peduncle of uropod 3, and setae were not recorded from the inner meso-distal corner of uropod 2. Setae are also found on the inner ramus of all 3 uropods, but only on the outer rami of uropods 1 and 2.

The telson is entire and usually rounded (fig. 25a) but is sometimes slightly indented (fig. 25b).

## Habitat

The collection site for these amphipods is at an altitude of approximately 200 m, 23 km in direct line from Bass Strait. The site is immediately upstream from a 40 m waterfall which marks an old fault in the Tertiary basalt sequences of the far north west of Tasmania.

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The amphipods are found in mud, gravel and on the underside of rocks in the slowly flowing portion of the Dip River immediately above the falls. Unlike the austrochiltonids and neoniphargids of Tasmanian creeks which swim, paracalliopes tend to stay still, and move only infrequently in rapid spurts. They are undoubtedly propelled in this motion by their elongate 5th peraeopods.

## Etymology

The species is named after the author's daughter, Miss L-L. Knott.

## Collections

Material has been collected on the following dates from the type locality:

- 9. 2.1973 by P.S. Lake, R.B. Mawbey, A.M.M. Richardson and B. Knott.
- 5.12.1973 by R.B. Mawbey, A.M.M. Richardson, D. Coleman, P. Suter and B. Knott.
- 28.1.1974 by R.B. Mawbey, A.M.M. Richardson and B. Knott.
- 12.7.1974 by D. Coleman.

## Type Material

Holotype: 1 adult male ; Allotype 1 gravid female.

Paratypes: 15 adult males and 15 adult females.

All types are from the collection 9.2.1973, and are deposited in the Tasmanian Museum, Hobart (reg. nos. G1624, G1625, G1626 and G1627 respectively).

## DISCUSSION

The species of amphipod described in this paper undoubtedly belongs to the genus *Paracalliope* Stebbing as recently redefined by Barnard (1972a, pp. 70, 71):- "Rostrum small, not exceeding forward extent of lateral cephalic lobe; eyes large, paired, lateral, discontinuous; antennae proportionate; vestigial accessory flagellum present; flagellum of male antenna 1 with a few calceoli; mandibular incisor projecting, toothed, lacinia mobilis large toothed, molar large, cuboid, triturative; palp article 3 sub-falciform normally; lower lip with well developed inner lobes; inner plates of maxillae 1 - 2 strongly setose medially, maxilla 2 with submarginal oblique setal row on inner plate; palp of maxilla 1 normal and 2 articulate; maxillipeds stout but otherwise basic in male; gnathopods subchelate, female gnathopods weak, those of male stout, fifth articles posteriorly lobate, lobes erect or not distinctly guarding hands, hands twisted medially, palms bearing large spines; peraeopods 1 - 4 with slender distal articles, poorly setose; coxa 4 not posteriorly excavate or weakly so; peraeopod 5 normally elongate for family Oedicerotidae, moderately setose, especially dactyl; pleonal epimera in posterodistal points; body dorsally smooth; uropods 1 - 3 all extending equally, outer rami of uropods 1 - 2 slightly shortened, peduncle of uropod 3 normally elongate, rami slightly shorter than peduncle; telson normally ovoid, thin, and unclleft; urosomites 2 - 3 coalesced".

All of these morphological features are expressed in *Paracalliope larai*, except for one, or possibly two minor differences. The vestigial accessory flagellum is lost completely in *P. larai* and the third uropod rami are subequal in length to the peduncle instead of being shorter. Neither difference is considered by the present author to be sufficiently distinct or important to raise doubts regarding the generic status of this Tasmanian material.

However, some doubt as to the family status of the genus has been raised by Barnard (1972a and b). Barnard (1972a, p. 71) recognised *Paracalliope* as an intergrade between the Eusiridae (Pontogeneiidae and Calliopiidae) and Oedicerotidae, although not being in the mainstream of calliopod evolution towards oedicerotids.

Until all of the Tasmanian freshwater "calliopid" material is examined, especially that from Lake Edgar, and the buttongrass areas of the West Coast, it would be presumptuous to propose any positive assertions or alterations to the family status as

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proposed by Barnard (1972a and b) i.e. *Paracalliope* is retained here as a member of the family Eusiridae. Nevertheless, *P. larai* has a slightly more oedicerotid condition than the New Zealand material described by Barnard (1972a). Thus *P. larai* has lost the vestigial accessory flagellum although Barnard regards this character as being of dubious familial value. Also, *P. larai*, and indeed, most Tasmanian paracalliope select the habitat typical for oedicerotids, usually being found living in the benthos in the leaf litter, mud, and silt deposits of pools in streams, although sometimes found associated with aquatic plants. This is in contrast to the observations by Phillips (1929), Percival (1932) and Hirsch (1958), that paracalliope in New Zealand are typically associated with weeds and aquatic plants in streams, and that they are a littoral, epifaunal inhabitant in the marine environment (Barnard 1972a). Otherwise, the characters evaluated by Barnard (1972a) in his attempt to elucidate the familial affinities of the genus *Paracalliope* remain unchanged in *P. larai*.

*P. larai* is separated

- (a) from the New Zealand species (see Barnard 1972a), by the absence of an accessory flagellum; by reduced setation of coxal plates, abdominal epimera and uropods, and the absence of the basal seta of the third segment of the mandibular palp.
- (b) from *P. novaecaledoniae* (see Ruffo and Paiotta 1972) by absence of the basal seta of the third segment of the mandibular palp, reduced length of the outer lobe of maxilla 2; shape, spine and setal arrangement of the outer lobe of the maxilliped, shape of the abdominal epimera.
- (c) from *P. indica* (see Barnard 1935) by reduced length of the third segment of the mandibular palp, by the reduced size of the second palp segment of the maxilliped, and the subequality of the rami of the third uropod.

Paracalliope have been found in many localities in Tasmania, King Island and Flinders Island, extending inland in Tasmania as far as the base of the Central Plateau scarp but they are especially abundant in many of the coastal creeks around the south and east coast of Tasmania where they appear to be restricted to small, ionically enriched creeks flowing over sandstone and mudstone. No paracalliope have been found on the Central Plateau where they are probably excluded because of the low ionic concentration of the waters (table 2, in Buckney and Tyler (1973) gives results of the chemical analysis of 45 water samples from the Central Plateau, showing a low concentration of ions with seawater dominance of ions prevailing; tables 1, 3, 4 and 5 of Buckney and Tyler (1973) give results of water sample analysis from areas, but not the exact locations, from which paracalliope have been collected). Ionic concentration of the water appears to be a strong factor governing the distribution of these amphipods for, while individuals may tolerate wide ranges of salinities under experimental conditions, the breeding rate reaches an optimum (for paracalliope collected from freshwater near Hobart) in 40% sea water (P.S. Lake, *pers. comm.* of class results). The largest brood size found in *P. larai* is 4 (see table 1). Paracalliope carrying 16 - 20 embryos have been collected from streams just above the brackish water zone (D. Coleman, *pers. comm.*).

The species status of Tasmanian paracalliope is currently being studied (D. Coleman, *pers. comm.*), to ascertain whether the same species is found in fresh and brackish water for example, or whether there are separate species each selecting a particular water salinity as in New Zealand: Barnard (1972b) lists *P. fluiatilis* from freshwater, *P. karitane* from brackish water and *P. novizealandiae* from marine environments. Nevertheless, there appears to be at least three freshwater species of *Paracalliope* in Tasmania, including one species associated with the yabby (*Parastacoides* spp.) burrows of western Tasmania. In New Zealand, *P. fluiatilis* is abundant in Lake Waikare (Chilton 1906) and 'may occur' in Lake Rotoiti (Barnard 1972a, p. 74). Paracalliope from lacustrine habitats in Tasmania have so far been found only in Big Lake Waterhouse where they do not appear to be taxonomically distinct from paracalliope in the nearby streams. None has yet been found in the eutrophic Lakes Dulverton and Tiberias. The genus *Paracalliope* previously recorded from Lake Edgar (Knott and Lake

TABLE 1

Sex	Length (mm)		Breadth (mm)		Antenna 1		Antenna II		No. of eggs		Ratio, <u>Length propodite</u> length dactylopodite
	Range	Average	Range	Average	Range	Mode	Range	Mode	Range	Mode	
Male	1.15 - 1.60	1.30	0.44 - 0.68	0.56	4 - 12	9	7 - 13	10	0		1 - 1.40
	(20)		(20)		(20)	(7)	(19)	(7)			(19)
Female	0.81 - 1.13	0.99	0.49 - 0.64	0.56	4 - 8	6	5 - 9	7	1 - 4	3	1 - 1.42
	(20)		(20)		(20)	(10)	(20)	(9)	(20)		(12)

Length - measured from anterior limit of rostrum to the posterior limit of the peraeon, along mid dorsal line.

Breadth - measured across the width of peraeon segments 4 & 5, but excluding the bulge of the coxal side plates.

Antennae I & II - count of the number of flagellar segments in the right hand antennae; some variation does occur between the number of segments between the right and left hand sides.

Numbers in brackets refer to the frequency of observation.

TABLE 2  
 PATTERNS OF "RELATIVE LENGTH AND SPINE NO" OF THE 3 COMPONENTS OF THE UROPOD OF *P. larai*.  
 Peduncle = P; Inner Ramus = I; Outer Ramus = O; Lengths in mm.

Uropod	Sex	Pattern	Segment	Length			Spine number	
				No. of obs.	Range	Av.	Range	Mode (frequency)
I	Male	Three components subequal, but $P > I > O$	P	20	0.27 - 0.39	0.33	3-5	4 (13)
			I	20	0.26 - 0.35	0.30	1-3	2 (15)
			O	20	0.25 - 0.32	0.27	0-2	1 (15)
	Female	Three components subequal $P \geq I$ , both $> O$	P	20	0.15 - 0.24	0.21	2-4	3 (9); 4 (9)
			I	20	0.18 - 0.24	0.21	0-3	2 (14)
			O	19	0.12 - 0.22	0.19	0-2	2 (9)
II	Male	I longest segment $P \approx O$	P	19	0.17 - 0.25	0.21	1-3	3 (10)
			I	20	0.27 - 0.35	0.30	1-3	2 (12)
			O	20	0.17 - 0.22	0.20	2-3	2 (19)
	Female	$I > O > P$	P	20	0.10 - 0.15	0.13	1-3	2 (12)
			I	20	0.15 - 0.24	0.21	1-3	3 (9)
			O	20	0.12 - 0.17	0.14	0-3	2 (15)
III	Male	Three components subequal $P=O$ , both just longer than I	P	20	0.13 - 0.17	0.16	0-2	0 (16)
			I	20	0.13 - 0.17	0.16	0-2	2 (10)
			O	20	0.15 - 0.17	0.16	0-2	2 (9)
	Female	I just longer than $P \& O$ , $P=O$	P	20	0.07 - 0.12	0.10	0-1	0 (18)
			I	20	0.071 - 0.121	0.10	0-1	0 (18)
			O	20	0.07 - 0.12	0.10	1-2	1 (17)

## Brenton Knott

1974) is now known to have been misidentified (D. Coleman, *pers. comm.*), the amphipods being in fact calliopids of another genus. Whether the paracalliopes from the marshes and creeks surrounding Lake Edgar have similarly been misidentified awaits further work.

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