Only truly freshwater and subterranean species are included in this analysis, estuarine forms having been treated by Griffiths (1976). The freshwater fauna is clearly divided into three elements. Of these the ingolfiellid *Leleupiella* is known only from northern South West Africa, *Sternophysinx* (three species) is recorded only from the Transvaal, and *Paramelita* (twelve species and one variety) is restricted to the south-western Cape.

In accordance with modern practice, the pereiopods are numbered 3–7, so that they correspond to the pereon segments on which they occur. It should be noted that, while this system is used by Holsinger & Straskraba (1973) and Thurston (1973), authors such as Methuen (1911a, 1911b) and Barnard (1916, 1927, 1966) number the pereiopods 1–5.

### **SYSTEMATICS**

KEY TO THE GENERA OF SOUTHERN AFRICAN FRESHWATER AMPHIPODA

1.	Body vermiform, coxae minute, widely separated, pleopods reduced to
	small lobesLeleupiella (p. 96)
	Body laterally compressed, coxae well developed, contiguous or overlap-
	ping, pleopods large, biramous2
2.	Coxae not overlapping, pereon segments 2-7 with bladder-like medioventral
	processes
	Coxae overlapping, pereon segments bearing accessory gills but lacking
	medioventral processes

Superfamily CRANGONYCTOIDEA Bousfield, 1973

Family Paramelitidae Bousfield, 1977

### Paramelita Schellenberg, 1926

The species described by Barnard (1916, 1927) were transferred from *Gammarus* to *Paramelita* by Schellenberg (1937). In a revision of the family Gammaridae, Bousfield (1977) subsequently placed this genus in his new family Paramelitidae.

*Paramelita* spp are restricted to fully freshwater habitats, both in surface streams and in caves. All known records are from the south-western Cape Province, South Africa. The recorded distribution patterns within the genus are given in Figure 1.

#### KEY TO SPECIES OF PARAMELITA

1	Eyes conspicuous, black (Fig. 6A–B)
	Eyes small, white, invisible in preserved material (Fig. 4A)
2	Posterior margins of antenna 2 and pereiopods 2-7 densely setose posteriorly, especially
	in & (Fig. 6A)nigroculus var. persetosus
	Posterior margins of antenna 2 and pereiopods 3-7 moderately setose, lacking setal brushes
	(Fig. 6B)nigroculus
3	Peduncle of antenna 2 3 greatly enlarged and/or with articles 3 or 4 posterodistally lobed
	or toothed (Fig. 3A, D-E)4
	Peduncle of antenna 2 3 not enlarged, articles 3 and 4 not lobed or toothed (Figs 4A, 2D)8

4	Article 3 of antenna 2 3 posterodistally lobed (Figs 3A, 5A)
F	Article 5 of alternia 2.6 not loocd
С	Antenna 2 3 Intear, coxa 4 quadrangular, perelopod 5 chetate in adult 3 (Fig. 3A–C)
	Antenna 2 3, article 5 attached at right angles to 4, coxa 4 posteriorly excavate, pereiopod 3 3 normal (Fig. 5A, G)
6	Antenna 2 3, article 4 with a strong posterodistal tooth, article 5 attached normally to 4 (Fig. 3D)
7	Coxa 4 not posteriorly excavate, dactyls of pereiopods 3–7 each with a single spinule (Fig. 3F–G)
8	Palm of gnathopod 2 distinctly oblique (Fig. 2A)
9	Coxa 4 strongly excavate posteriorly, uropod 3 strongly setose (Fig. 4A-B)capensis Coxa 4 shallowly excavate posteriorly, uropod 3 spinose, not setose (Fig. 2B-C)barnardi
10	Coxa 4 distinctly excavate posteriorly (Fig. 2E)
11	Peduncle of antenna 2 densely setose posteriorly, article 2 of outer ramus of uropod 3 obsolete (Fig. 2D, F)seticornis Peduncle of antenna 2 not strongly setose, outer ramus of uropod 3 with distinct second joint (Fig. 2G)kogelensis
12	Article 2 of gnathopod 2 with a group of spines on posterior margin, palm strongly convex, with distinct defining tooth (Fig. 2I)

# Paramelita aurantius (K. H. Barnard, 1927)

Fig. 2J

Gammarus aurantius Barnard, 1927: 173-174; pl. 10, figs 6, 16.

### Remarks

One of a closely related group of species comprising *P. aurantius*, *P. granulicornis*, *P. kogelensis*, and *P. seticornis*. Distinguished by the quadrate coxa 4, sparsely setose antenna 2, and absence of a defining tooth and of spines on gnathopod 2.

### Distribution

Hottentots Holland Mountains, south-western Cape.

Paramelita auricularius (K. H. Barnard, 1916)

Fig. 3A–C

Gammarus auricularius Barnard, 1916: 209-210, pl. 27, figs 26-68; 1927, 169-170.

### Remarks

The ear-like lobe on article 3 of antenna 2  $\Im$  distinguishes this species from all others except *P*. *flexa* sp. nov., from which it differs in the shape of coxa 4,

82



Fig. 2. A-C. Paramelita barnardi, female, 9 mm. A. Gnathopod 2. B. Coxa 4. C. Uropod 3. D-F. Paramelita seticornis, male, 5 mm. D. Head and antennae. E. Coxa 4. F. Uropod 3. G. Paramelita kogelensis, male, 6 mm. Uropod 3. H-I. Paramelita granulicornis, male, 6 mm. H. Coxa 4. I. Gnathopod 2. J. Paramelita aurantius, male, 7 mm. Gnathopod 2.



Fig. 3. A. Paramelita auricularius, male, 5,5 mm. Head and antennae. B-C. Male, 6 mm.
B. Pereiopod 3. C. Coxa 4. D. Paramelita spinicornis, male, 8 mm. Head and antennae.
E-G. Paramelita crassicornis, male, 8 mm. E. Head and antennae. F. Coxa 4. G. Articles 6 and 7 of pereiopod 7. H-I. Paramelita tulbaghensis, male, 7 mm. H. Coxa 4. I Articles 6 and 7 of pereiopod 7.

non-flexed antenna 2, and in the extraordinary subchelate condition of pereiopod 3 in the adult 3.

### Distribution

Top of Table Mountain only.

### Paramelita barnardi Thurston, 1973

### Fig. 2A–C

Paramelita barnardi Thurston, 1973: 159-168, figs 1-3.

#### Remarks

Similar to *P. capensis* but distinguished by the weakly excavate coxa 4 and spinose (not setose) uropod 3.

### Distribution

Known only from the type locality, a cave above Kalk Bay on the Cape Peninsula.

#### Paramelita capensis (K. H. Barnard, 1916)

# Fig. 4

Gammarus capensis Barnard, 1916: 203–205, pl. 27, figs 20–22; 1927: 169. Paramelita ctenodactyla Schellenberg, 1926: 367, fig. 57.

#### Remarks

The degree of setation of the pleon segments and of pereiopods 5–7 is very variable, ranging from the condition shown in Figure 4A to one in which the dorsal surface of the pleon and the anterior margins of articles 2–6 of pereiopods 5–7 are densely clothed in setae. Antenna 2 may be as long as and sturdier than antenna 1. A wide variety of forms may be collected from the same stream, suggesting that the various forms are not of any taxonomic significance.

C. capensis may be recognized by its large size (15-25 mm) at maturity, unmodified antennae, oblique palm of gnathopod 2, deeply excavate coxa 4, and setose uropod 3.

### Distribution

Widely distributed from Clanwilliam in the north to Bredasdorp in the east.

#### Paramelita crassicornis (K. H. Barnard, 1916)

### Fig. 3E-G

Gammarus crassicornis Barnard, 1916: 207-209, pl. 27, figs 24-25.

### Remarks

The unusual form of antenna 2  $\mathcal{J}$ , in which the peduncle is enlarged and bent between articles 4 and 5, is found only in this species, *P. flexa* sp. nov. and *P. tulbaghensis*. *P. crassicornis* is recognized by the quadrate coxa 4, the single



Fig. 4. Paramelita capensis, male, 18 mm. A. Lateral aspect. B. Uropod 3. C. Telson.

spinule on article 7 of pereiopods 3–7 and the absence of a posterodistal lobe on article 3 of antenna 2 3.

### Distribution

Northern and western slopes of Table Mountain.

### Paramelita flexa sp. nov.

Fig. 5

# Description (of male, 7 mm)

Head slightly shorter than pereon segments 1 and 2 together, anterolateral lobes deep, rounded-truncate, eyes invisible in alcohol. Antenna 1 as long as body, flagellum 1,5 times length of peduncle, 26-articulate, accessory flagellum 5-articulate. Antenna 2 somewhat shorter but stouter than 1, article 3 strongly

86



Fig. 5. *Paramelita flexa* sp. nov., male, 7 mm. A. Head and antennae. B. Mandible. C. Maxilla 1. D. Maxilla 2. E. Maxilliped. F. Gnathopod 2. G. Coxa 4 and pereiopod 4. H. Pereiopod 7. I. Uropod 3. J. Telson.

lobed posterodistally, article 4 three times length of 3, curved ventrally, article 5 bent almost at right angles to 4, flagellum 16-articulate. Cutting-edge of mandible 5-toothed, lacinia mobilis (left side) with four teeth, spine row of nine strongly pectinate spines, molar strongly triturative, palp articles 2 and 3 subequal, distal half of 3 lined with dense row of short setae. Inner plate of maxilla 1 with four plumose setae, outer plate bearing ten stout toothed spines, palp exceeding outer plate, with five terminal spines and three subterminal setae. Inner plate of maxilla 2 a little shorter and narrower than outer plate, both strongly setose terminally. Inner plate of maxilliped with three short blunt spines and fifteen plumose setae, outer plate bearing twelve medial spine-teeth and seven terminal pectinate setae, palp densely setose medially.

Pereon segments dorsally smooth, coxae 1–3 slightly deeper than corresponding segments, rounded-quadrate, coxa 4 distinctly excavate posteriorly, 5 and 6 bilobed, 7 rounded-quadrate. Gnathopods 1 and 2 of similar structure but 2 slightly the larger, article 6 slightly longer than wide, palm convex, slightly oblique, defined by three short stout spines, dactyl as long as palm. Pereiopods 3 and 4 of similar structure, article 4 slightly produced anterodistally, 5 with five posterior spines, 6 with six pairs of spines posteriorly, 7 with four spinules posteriorly. Pereiopods 5–6, articles 4, 5 and 6 subequal, dactyl with seven spinules anteriorly. Pereiopod 7 similar to 5 and 6 but dactyl with nine spinules.

Pleon segments 1–3 each with a few setae along posterodorsal margin, first pleonal epimeron rounded, 2 and 3 quadrate, each with long plumose setae just above distal margin, posterior margin with short setae in minute notches. Pleon segments 4–6 each with a few dorsal setae, uropod 1 extending slightly beyond 2, rami equal, inner ramus of uropod 2 slightly the shorter, uropod 3 exceeding 2 by half length of outer ramus, peduncle as broad as long, inner ramus short, half length of peduncle, terminating in a short spine and one seta, outer ramus twice length of peduncle, three groups of spines on each margin, apex strongly spinose, concealing minute second article. Telson slightly longer than broad, cleft almost to base, each lobe with one large subapical spine between two long setae, dorsal margin with two long and two short setae, plus one pair of minute setae on lateral margin.

### Holotype

Albany Museum MISC 52B, male, 7 mm.

### Type locality

Palmiet River (34° 09'S 19°01'E), beneath bridge on main Elgin–Grabouw road, south-western Cape, 20 October 1952.

### Material

Two juveniles from the same sample as the type specimen and an ovigerous female and four further juveniles collected by the author on 7 December 1979 from the same locality (SAM-A16776).

#### Etymology

From the Latin *flexus* (bending), an allusion to the flexion of antenna 2 between articles 4 and 5.

### **Relationships**

The posterodistal lobe on article 3 of antenna 2 of this species is similar to that found in *P. auricularius*. Antenna 2 in *P. auricularius* is, however, linear, whereas in *P. flexa* sp. nov. article 5 is attached at right angles to article 4, in a manner similar to that occurring in *P. crassicornis* and *P. tulbaghensis*. *P. auricularius* may also be distinguished from *P. flexa* sp. nov. in the form of coxa 4 and pereiopod 3 as well as by its distribution, which is limited to Table Mountain.

Paramelita granulicornis (K. H. Barnard, 1927)

### Fig. 2H–I

Gammarus granulicornis Barnard, 1927: 175-177, pl. 10, figs 10-11, 20.

#### Remarks

The second gnathopod of this species, with its spinose article 2 and convex, transverse palm, defined by an acute tooth, is diagnostic. The square coxa 4 and spinose posterior margin of article 2 of pereiopod 4 also aid in identification.

## Distribution

Hottentots Holland Mountains.

### Paramelita kogelensis (K. H. Barnard, 1927)

Fig. 2G

Gammarus kogelensis Barnard, 1927: 172-173, pl. 10, figs 9, 21.

### Remarks

Closely related to *P. seticornis* but differs in the degree of setation of the peduncle of antenna 2 (both species have the flagellum setose) and in details of the spination of the pereiopods and of uropod 3.

# Distribution

Hottentots Holland Mountains.

Paramelita nigroculus (K. H. Barnard, 1916)

### Fig. 6

Gammarus nigroculus Barnard, 1916: 206-207, pl. 27, fig. 23; 1927: 168-169.

#### Remarks

The dark eyes distinguish the species, which is otherwise similar to P. *capensis*. Although a variety based on degree of setation (var. *persetosus*) is recognized, the degree of setation is very variable, even within individual samples.



Fig. 6. A. Paramelita nigroculus var. persetosus, male, 13 mm. Head and antennae. B-C. Paramelita nigroculus, male, 12 mm. B. Head and antennae. C. Coxa 4 (both sides).

### Distribution

The most common and widely distributed *Paramelita* species, occurring from Tulbagh and the Cedarberg in the north to Swellendam in the east.

Paramelita seticornis (K. H. Barnard, 1927) Fig. 2D-F

Gammarus seticornis Barnard, 1927: 171-172, pl. 10, figs 7, 17.

# Remarks

A small form, mature at 5 mm, distinguished from the allied *P. kogelensis* by the form of antenna 2  $\Im$ .

# Distribution

Hottentots Holland Mountains.

Paramelita spinicornis (K. H. Barnard, 1927)

### Fig. 3D

Gammarus spinicornis Barnard, 1927: 174-175, pl. 10, figs 8, 18-19.

#### Remarks

The form of antenna 2  $\Im$  in this species is characteristic.

### Distribution

Hottentots Holland Mountains eastwards to Swellendam.

Paramelita tulbaghensis (K. H. Barnard, 1927)

### Fig. 3H–I

Gammarus tulbaghensis Barnard, 1927: 170-171, pl. 10, figs 5, 15.

#### Remarks

The enlarged and bent peduncle of antenna 2  $\Im$  is similar to that of *P*. *crassicornis*, but coxa 4 is excavate posteriorly and there are more spinules on the dactyls of the pereiopods (two in pereiopods 3 and 4, three in pereiopod 5, and four in pereiopods 6 and 7). Lacks the lobe on article 3 of antenna 2  $\Im$  found in *P*. *flexa* sp. nov.

### Distribution

Known only from the type locality in the Sneeuwgat Valley, Tulbagh, south-western Cape.

# Pseudocrangonyx-Sternophysinx family group (Bousfield, 1977) Sternophysinx Holsinger & Straskraba, 1973

Originally erected to accommodate *Crangonyx robertsi* and two new species from the Transvaal, *Sternophysinx* was transferred from the Gammaridae to a new Superfamily Bogidielloidea by Bousfield (1977) and again to the Superfamily Crangonyctoidea by Bousfield (1978). The genus has not been recorded outside the Transvaal and is hence geographically isolated from *Paramelita*. Morphologically *Sternophysinx* may readily be distinguished from *Paramelita* by the smaller, non-overlapping coxae and distinctive bladder-like sternal processes on pereon segments 2–7.

#### KEY TO SPECIES OF STERNOPHYSINX

1 Article 2 of pereiopods 5–7 widened, with distinct posterodistal lobe (Fig. 7A–B).....2 Article 2 of pereiopods 5–7 narrowly tapering, without posterodistal lobe (Fig. 7C–D)....3

- 3 Palm of gnathopods 1 and 2 evenly convex, body length about 5 mm at maturity...... transvaalensis

Palm of gnathopods 1 and 2 excavate (Fig. 8H, I), body length at maturity about 10–12 mm *alca* sp. nov.

### Sternophysinx alca sp. nov.

Figs 7D, 8

### Description (of female, 15 mm)

Antenna 1 about half length of body, flagellum 22-articulate, accessory flagellum uni-articulate, about as long as first segment of primary flagellum. Antenna 2 somewhat shorter than 1, gland cone prominent, flagellum 9-articulate. Mandible with large triturative molar, spine row of eight spines, palp well developed, articles 2 and 3 subequal. Palp of maxilla 1 bi-articulate, bearing seven terminal spines, outer plate with six serrate spines apically, inner plate with two terminal plumose setae. Both inner and outer plates of maxilla 2 strongly setose apically, inner plate with two long subterminal plumose setae. Inner plate of maxilliped armed with three short thick spines, outer plate with thirteen medial and terminal spines, palp 4-segmented.

Pereon dorsally smooth. Coxa 1 slightly produced anteroventrally, coxae 2-4 quadrate, 4 not strongly excavate posteriorly, 5 and 6 bilobed, 7 semicircular. Gnathopod 1 short but stout, palm defined by large pair of spines,



Fig. 7. Pereiopod 7 in *Sternophysinx* species. A. S. filaris, male, 8 mm. B. S. robertsi, male, 8 mm. C. S. transvaalensis, male, 5 mm. D. S. alca, female, 13 mm.

posterior margin bearing three further pairs of large spines, palmar margin lined by short setae, with semicircular excision and small tooth at its midpoint, dactyl exceeding palm, nail long, bearing small secondary process at its base. Gnathopod 2 as 1 but article 2 slender, more elongate and without anterior setae. Pereiopods 3 and 4 with article 2 slightly expanded and with long slender setae equally spaced along posterior margin. Pereiopod 5 considerably shorter than 6 or 7, article 2 not expanded, lacking posterodistal lobe, dactyl with two spines. Pereiopods 6 and 7 similar to 5 but much longer, extending to end of uropods, dactyl with single spine. Pereon segments 2–7 each with bladder-like median sternal process.

Pleon segments 1–4 each with few small setae along posterodorsal margin. Pleonal epimera rounded-quadrate, two small setules at posterodistal corner of each, posterior margins almost straight. Uropod 1 extending slightly beyond 2, outer ramus slightly the shorter, both rami dorsally and terminally spinose. Uropod 3 considerably exceeding 1 and 2, outer ramus with five groups of setae along ventral and four along dorsal margin, inner ramus minute, rounded, bearing single terminal seta. Telson slightly longer than broad, apically emarginate, each lobe with four large terminal spines.

#### Holotype

SAM-A16775, female, 13 mm.

#### Type locality

Peppercorn's Cave, Makapansgat, Transvaal (24°09'S 29°12'E) collected from a small clear pool, June 1979, by A. J. Cannone of the Zoology Department, University of the Witwatersrand.

#### Material

Twenty-five individuals from Peppercorn's Cave and from Ficus Cave, Makapansgat.

### Etymology

Named for Dr Al Cannone, who discovered this species and allowed the author to describe it.

### **Relationships**

The excavation and tooth on the palm of gnathopods 1 and 2 readily identify this species. S. alca sp. nov. is also distinguished from S. robertsi and S. filaris by the narrowly tapering article 2 of pereiopods 5–7, and from S. transvaalensis by its larger body size and by details of spination of the pereiopods. The species is found in the same pools as S. robertsi.



Fig. 8. Sternophysinx alca sp. nov., female, 15 mm. A. Lateral aspect. B. Accessory flagellum. C. Mandible. D. Lower lip. E. Maxilla 1. F. Maxilla 2. G. Maxilliped. H–I. Gnathopods 1, 2. J. Uropod 3. K. Telson.

#### Sternophysinx filaris Holsinger & Straskraba, 1973

Fig. 7A

? Eucrangonyx robertsi (partim.) Methuen, 1911a: 948–957, pls 49–51. Sternophysinx filaris Holsinger & Straskraba, 1973: 75–76, figs 2–3.

### Remarks

Distinguished by the thread-like setae along the posterior margins of articles 5 and 6 of pereiopods 5 and 6 and of article 6 of pereiopod 7. The material reported from Irene by Methuen (1911a) should probably be allocated to S. *filaris*, rather than S. *robertsi*, the latter being positively known only from the Makapan Caves area some 200 km to the north.

### Distribution

Sterkfontein Caves, and (?) Irene, Transvaal.

# Sternophysinx robertsi (Methuen, 1911)

### Fig. 7B

Eucrangonyx robertsi Methuen, 1911a: 948–957, pls 49–51; 1911b: 96–101. Barnard, 1927: 141, 209. [Non]Crangonyx robertsi: Barnard, 1949: 523–525 (=Sternophysinx transvaalensis).

### Remarks

The expanded article 2 of pereiopods 5–7 distinguishes this species from S. transvaalensis and S. alca sp. nov., while the posterior pereiopods are shorter than those of S. filaris, lack thread-like seta on articles 5 and 6 and have only a single spine on article 7. The material identified as S. robertsi by Barnard (1949) -SAM-A8372—has been re-examined and transferred to S. transvaalensis.

#### Distribution

Makapan Caves and springs in the vicinity.

Sternophysinx transvaalensis Holsinger & Straskraba, 1973

Fig. 7C

Crangonyx robertsi (non Methuen, 1911a): Barnard, 1949: 523–525. Sternophysinx transvaalensis Holsinger & Straskraba, 1973: 76–79, figs. 4–5.

### Remarks

The small size, smoothly convex palm of gnathopods 1 and 2, unexpanded article 2 of pereiopods 5–7, and absence of long setae on these appendages serve to identify this species. The material identified as *Crangonyx robertsi* by Barnard (1949) has been re-examined and the structure of pereiopod 7 (Fig. 7C) clearly identifies it as belonging to *S. transvaalensis*.

### Distribution

Surface streams in the northern Drakensberg region.

# Suborder INGOLFIELLIDEA Hansen, 1903 Family Ingolfiellidae Hansen, 1903 Leleupiella Karaman, 1959 Leleupiella eggerti Ruffo, 1964

Leleupiella eggerti Ruffo, 1964: 1019–1031, figs 1–2. Ingolfiella opisthodorus Barnard, 1966: 189–197, figs 1–2.

### Remarks

First described by Ruffo (1964) from Tsumeb, this species was subsequently redescribed as new in a posthumous paper by Barnard (1966). No further material has been recorded. *L. eggerti* is the only ingolfiellid recorded from South or South West Africa and is notable for its large size (up to 25 mm). The elongate body form, minute coxae and carpochelate gnathopods readily distinguish the Ingolfiellidae from members of the Crangonyctoidea.

#### Distribution

Recorded from boreholes near Tsumeb, South West Africa.

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