

A new *Epimeria* (Crustacea, Amphipoda, Paramphithoidae) from the Weddell Sea

CLAUDE DE BROYER¹ and MICHAEL KLAGES²

¹Institut Royal des Sciences Naturelles de Belgique, Rue Vautier, 29, B-1040 Bruxelles, Belgium
²Alfred-Wegener-Institut für Polar und Meeresforschung, Postfach 120161, D-2850 Bremerhaven, Germany

Abstract: *Epimeria rubrieques* sp. n., belonging to the cold water family Paramphithoidae, occurred relatively often in Agassiz and bottom trawls taken during several German Antarctic Expeditions into the eastern Weddell Sea since 1983. Although this species is very conspicuous because of its long mid-dorsal teeth, bright pink-red colour and large size (up to 70 mm), it has only been recorded in the Weddell Sea. The new species is compared to its closest relatives *Epimeria macrodonta* and *E. similis*, and an updated key to the 14 species of Antarctic *Epimeria* is provided. Observations on the general and feeding behaviour of living specimens of *Epimeria rubrieques* sp. n. in aquaria showed the species to be an ambush predator and a weakly motile epibenthic walker, which swims only rarely.

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Keywords: Antarctic, Amphipoda, *Epimeria rubrieques* sp. n., feeding behaviour, Paramphithoidae.

Introduction

During several cruises of the German vessel R.V. *Polarstern*, large collections of benthic gammaridean amphipods were taken. In the Antarctic summer seasons 1984/85, 1986/87, 1987/88 and 1989 the benthic communities of the continental shelf and upper slope of the Eastern Weddell Sea were investigated from 180 m down to 2000 m depth. One species, not uncommon in the trawl samples, was very conspicuous because of its enormous dorsal ornamentation, bright colours and giant body size, up to 70 mm. Despite these characteristics, attempts at identification led to the conclusion that this *Epimeria* species had never been recorded before. The genus *Epimeria* belongs to the cold-water family Paramphithoidae which is represented by many species in the Antarctic Ocean. In the waters of the Weddell Sea and in the *Polarstern* collections, the genus is represented by *Epimeria georgiana* Schellenberg 1931, *E. grandirostris* (Chevreux 1912), *E. inermis* Walker 1903, *E. macrodonta* Walker 1906, *E. oxycarinata* Coleman 1990, *E. pulchra* Coleman 1990, *E. robusta* K.H. Barnard 1930 and *E. similis* Chevreux 1912. During the third leg of the European *Polarstern* Study in 1989 (EPOS 3), the authors obtained living specimens of *Epimeria rubrieques* n. sp. and of six other *Epimeria* spp. which were brought back alive to the Alfred Wegener Institute for Polar and Marine Research (AWI), allowing life history investigations, behaviour observations and feeding experiments (De Broyer & Klages 1990, Klages & Gutt in press).

Material and methods

Material

Table I summarizes all stations where the new species was

collected. Detailed information on the stations and gears are published in the respective cruise reports (Hempel 1985, Schnack-Schiel 1987, Fütterer 1989, Arntz *et al.* 1990).

Aquarium observations

Living specimens of *Epimeria rubrieques* n. sp., 30–60 mm long, were selected from various catches and transferred to 25 l aquaria. The aquaria were kept at a temperature of $-1^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ with low intensity red light to reduce the risk of blindness in the amphipods. After the cruise, the animals were transferred to cool laboratories at the AWI where they were used for detailed studies of their feeding behaviour. Detailed information on the life maintenance of Antarctic gammaridean amphipods is given by Klages & Gutt (1990). Behaviour during the feeding experiments in low intensity red light was monitored using a colour video camera (SONY DXC-3000P) and for experiments in darkness by low light camera (Pieper Cohu Series 5000). The behavioural sequences were recorded on a SONY U-matic recorder and analysed subsequently. Additional results came from observations during routine feeding. Specimens of *E. rubrieques* were fed on board with thawed pieces of fish meat of appropriate size and at the Institute with thawed pieces of krill meat, or living chironomid and *Artemia* spp. larvae 2–10 mm long.

Abbreviations used in text and figures.

A: antennae. C: coxal plate. D: dactylus. Ep: epimeral plate. G: gnathopod. H: head. LL: lower lip. Md: mandible. Mx: maxilla. Mxp: maxilliped. P: pereopod. U: urosome. UL: upper lip. U: uropod. AGT: Agassiz trawl. GSN: bottom trawl. GKG: large box-corer.

Table I. Station list

Cruise/ Station	Position	Depth (m)	Date	Gear
ANT III/3 Collector: W.E. Armitz				
247	73°09'S 20°32'W	695	22 Jan 1985	GSN
248	73°10'S 20°27'W	409	22 Jan 1985	GSN
273	72°35'S 18°07'W	673	27 Jan 1985	AGT
330	72°26'S 17°38'W	660	15 Feb 1985	AGT
335	72°28'S 17°35'W	470	16 Feb 1985	AGT
ANT V/3 Collector: S. Hain & D. Gerdes				
536	72°50'S 19°37'W	595	24 Oct 1986	GSN
537	73°06'S 20°14'W	420	24 Oct 1986	GSN
566	73°17'S 21°05'W	573	04 Nov 1986	AGT
575	72°50'S 19°27'W	670	07 Nov 1986	AGT
580	72°51'S 19°41'W	710	08 Nov 1986	GSN
ANT VI/3 Collector: M Klages				
305	71°07'S 13°01'W	706	19 Jan 1988	AGT
350	74°24'S 37°01'W	815	28 Jan 1988	GKG
ANT VII/4 EPOS 3 Collector: C. De Broyer & M Klages				
248	74°40'S 29°31'W	602	03 Feb 1989	GSN10
289	71°12'S 13°28'W	672	19 Feb 1989	AGT23
293	71°06'S 12°54'W	771	20 Feb 1989	GSN15

Species description

Epimeria rubriques n. sp. (Figs. 1–5)

Holotype: mature female, 69.4 mm. Type-locality: station 273, R.V. *Polarstern* cruise ANT III/3, 27 January 1985, Eastern Weddell Sea, 72° 35'S 18° 07'W, 673 m, Agassiz trawl. Kept at the Institut royal des Sciences naturelles de Belgique (IRSNB), Brussels, Belgium, I.G. nr 27.497.

Paratypes: 1 male, 55.3 mm, station 305, R.V. *Polarstern* cruise ANT VI/3 19.01.1988, Eastern Weddell Sea, 71°07'S 13°01'W, 706 m, Agassiz trawl. IRSN BIG nr 27.497. 4 females: 44.8 mm, 45.1 mm, 55.8 mm, 62.4 mm; 4 males: 38.2 mm, 39.2 mm, 40.8 mm, 44.1 mm from the type-locality. Deposited in the Zoologisches Museum, Hamburg, Natural History Museum, London, Smithsonian Institution, Washington and at the IRSNB, Brussels.

Additional material: (71 ♀♀, 18.8 mm to 64.9 mm, 53 ♂♂, 15.8 mm to 51.0 mm, 1 juv., 12.8 mm): R.V. *Polarstern* cruise ANT III/3 1984/85, Sta. 247 (see table 1): 22 ♀♀, 39.3 mm to 64.9 mm; 18 ♂♂, 31.7 mm to 49.0 mm. Sta. 248: 1 ♂, 39.2 mm. Sta. 330: 3 ♀♀, 44.1 mm to 48.8 mm; 3 ♂♂, 36.1 mm to 47.1 mm. Sta. 335: 2 ♀♀, 42.8 mm & 44.3 mm. Cruise ANT V/3 1986/87, Sta. 536: 16 ♀♀, 34.0 mm to

63.0 mm; 11 ♂♂, 34.0 mm to 50.1 mm. Sta. 537: 1 ♀, 61.3 mm. Sta. 566: 3 ♂♂, 48.0 mm to 51.0 mm. Sta. 575: 5 ♀♀, 24.8 mm to 25.6 mm; 3 ♂♂, 23.9 mm to 25.6 mm. Sta. 580: 3 ♀♀, 38.2 mm to 51.8 mm. Cruise ANT VI/3 1987/88, Sta. 305: 1 ♀, 1 ♂. Sta. 350: 1 ♂, 30.9 mm (without telson). Cruise ANT VII/4 EPOS 3 1989, Sta. 248: 1 ♀. Sta. 289: 2 ♀♀, 44.8 mm & 49.8 mm; 1 ♂, 37.0 mm. Sta. 293: 15 ♀♀, 18.8 mm to 48.0 mm; 12 ♂♂, 15.8 mm to 42.2 mm; 1 juv., 12.8 mm.

Name: The specific name is derived from a common name used on board *Polarstern* — der rote Ritter (the red knight) — giving the latin name *rubriques*.

Diagnosis: All pereonites and pleonites 1–2 with a long narrow mid-dorsal tooth. Pleonite 3 with a strong and wide triangular mid-dorsal tooth. Coxa 4 postero-ventral and posterior angles acutely produced. Coxa 5 strongly and acutely produced posteriorly. Basis of pereopods 5–7 strongly excavated posteriorly with postero-distal corner rounded.

Description: Body: pereonite 2 shortest; otherwise, pereonite 1 to pleonite 3 slightly increasing in size. All pereonites and pleonites 1–2 with long, narrow, apically blunt mid-dorsal tooth, increasing in length from the first to the fifth segment. Pleonite 3 with wide triangular mid-dorsal tooth. On pleonites 1–3 the front base of the tooth marked with a rounded protuberance. Pereonites 5 to 7 and pleonites 1–3 with slightly produced mid-lateral tubercle, weakly increasing in size from pereonite 5 to pleonite 3 where it is very conspicuous.

Urosomite 1 slightly longer than urosomite 2 and 3 together, with median hump, weak lateral tubercle and mid-lateral antero-posterior blunt ridge. Urosomite 2 shortest and without carina or tubercle. Urosomite 3 with a low mid-dorsal carina ending in a triangular posterior projection; lateral carinae weakly acute posteriorly.

Head longer than pereonite 1; rostrum long, nearly twice the dorsal length of the head, reaching or nearly reaching apex of peduncular article 2 of antenna 1; interantennal lobe slightly rounded in holotype, but usually clearly angular. Postantennal lobe weakly triangular; eyes oval, prominent.

Antenna 1 and 2 subequal; antenna 1, peduncle article 1 the longest, article 3 the shortest; apical margin of article 1 and 2 with short teeth on inner face; apex of article 3 slightly produced ventrally, reaching the tip of the unarticulate accessory flagellum; flagellum with 62 articles, the first longer than articles 2–5 together. Antenna 2, peduncle article 4–5 subequal; flagellum as in antenna 1.

Labrum symmetrically notched. Mandible incisor with 7 (right) to 8 (left) teeth; right lacinia mobilis bidentate, left with 7 teeth; setal row of two proximal setae and 18 flat raker spines, apically and dorsally denticulate; molar strong, with suboval triturative surface; palp article 3 shorter (85%) than article 2. Lower lip with short acute mandibular lobe; outer lobe with a disto-medial group of blunt spines. Maxilla 1 inner lobe with 16 marginal and apical setulate setae and 1

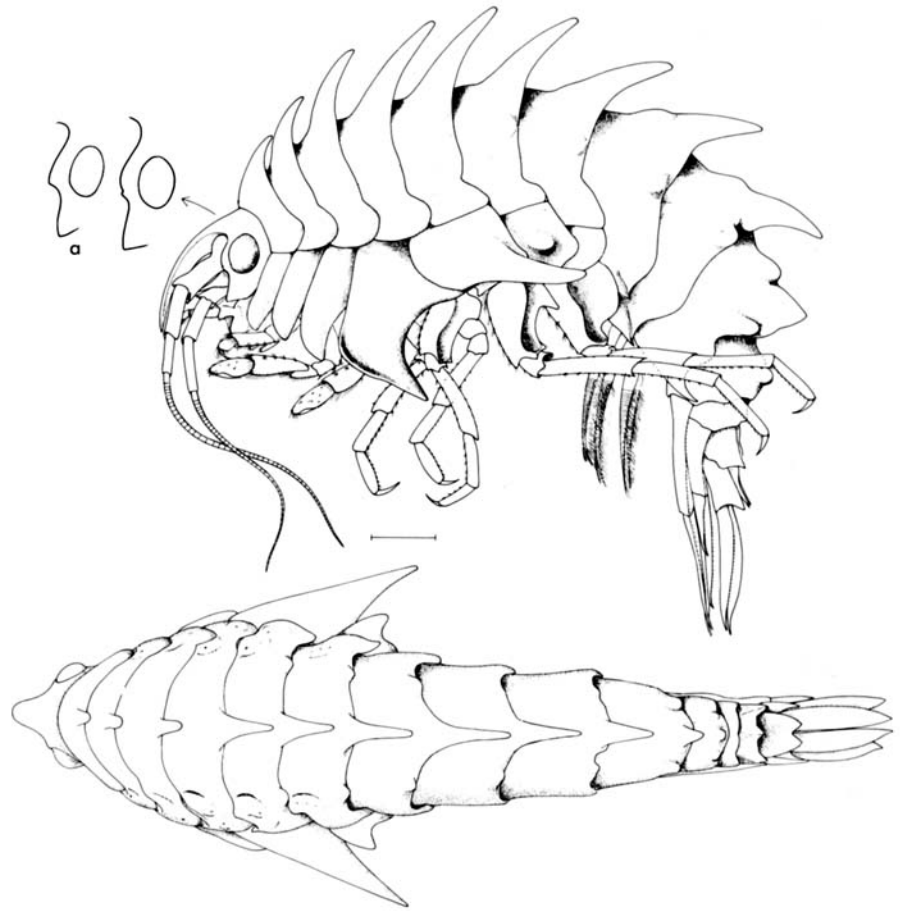


Fig. 1. *Epimeria rubriques* n. sp.
 Holotype, mature female, 69.4
 mm. a: paratype, male 55.3
 mm. Scale: 5 mm.

short distal simple seta; outer lobe with 18 (right) or 19 (left) apical spines arranged in three to two ranks, spines distally weakly denticulate, terminal pair strong and simple; inner margin of palp article 2, with 9 setulate setae, continuing in an apical row of 5 short, thick and acute simple spines and 1 longer serrate spine; an outer submarginal row of 11 setulate setae; inner and outer faces partly covered with setules. Maxilla 2 inner plate shorter and slightly broader than outer, partly covered with setules, with a rank of long spinulate setae and two ranks of short simple setae, plus at the apex a short submarginal rank of long serrate setae; outer lobe with one marginal rank of spinulate setae and one submarginal rank of serrate setae. Maxilliped inner plate subquadrate, nearly reaching apex of palp article 2; medio-marginal setae setulate; apical margin with spinulate setae, medio-apical angle with stouter spines; outer plate with inner margin irregularly serrate and a submarginal rank of setae on the outer face; distal margin with serrate setae; palp article 2 the longest; dactyl long, conspicuously pectinate, inserted subapically in article 3.

Coxae 1–4 not overlapping. Coxa 1–3 not acute distally, with dorso-ventral ridge; antero-ventral angle broadly rounded; postero-ventral angle weakly acute. Coxa 4 postero-ventral and posterior angles acutely produced. Coxa 5 with very long and acute posterior process. Coxa 6 partly subquadrate,

with strong blunt central tubercle.

Gnathopod 1, basis long but shorter than carpus and propod combined; propod clearly subchelate, distally widening, shorter than carpus; palm finely denticulate; dactyl conspicuously pectinate, subequal to palm. Gnathopod 2 similar to gnathopod 1, except basis subequal to carpus and propod combined.

Pereopod 3 and 4 basis as long as ischium and merus combined; carpus subequal to propod, shorter than merus. Pereopod 5–7 basis posteriorly excavate, with a dorso-ventral ridge; Pereopod 5 postero-proximal lobe of basis with sub-quadrate angle, postero-distal lobe rounded; anterior margin setose, slightly concave medially; merus, carpus and propod subequal. Pereopod 6 postero-proximal lobe of basis acutely produced; distal lobe rounded; anterior margin setose and spinose, convex; carpus and propod subequal, slightly shorter than merus. Pereopod 7, basis excavate only on the distal third, postero-proximal and distal lobes rounded; merus, carpus and propod subequal.

Uropod 1 peduncle subequal to outer ramus and shorter than inner ramus. Uropod 2 not reaching apex of both others; peduncle slightly longer than outer ramus, which is in turn slightly longer than half the inner ramus. Uropod 3 peduncle 45 % of outer ramus, which is slightly shorter than inner ramus. Telson slightly longer than wide, notched to 20% of

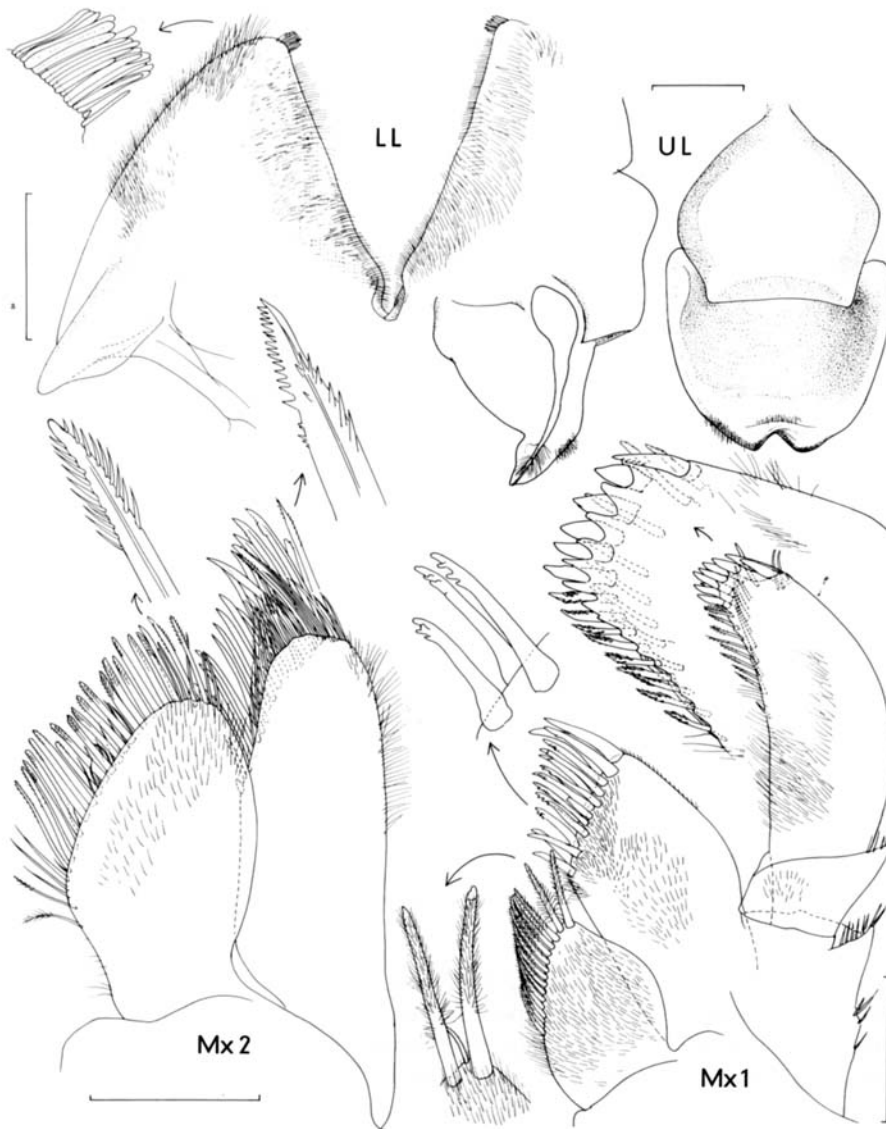


Fig. 2. *Epimeria rubrieques* n. sp. Holotype, mature female, 69.4 mm. Scale: 1 mm.

the length.

Gill of pereopod 7 folded in two, the proximal part covering part of the tergite. Oostegites suboval, large, the fourth the largest, the fifth the smallest, without setae in ovigerous females.

Colours in life: body bright pink-red, with white patches increasing in size on coxal plates 1–4, dorsal margin and apex of long acute posterior lobe of coxal plate 5 white. Antennae 1–2 red, other appendages pink, except pereopods 5–7 white with part of bases pink. Eye vermillion red, surrounded by irregular white ring.

Sexual dimorphism: none

Juveniles: newly hatched juveniles observed in aquarium were similar in shape and colour to the adults.

Distribution: Known only from the Eastern Weddell Sea shelf from Cape Norvegia to the Vahsel Bight, 227–771 m depth.

Remarks: The new species shares some overall similarities (large dorsal teeth, long and acute posterolateral processes on coxa 4 and 5, long rostrum) with *E. macrodonta* and *E. similis*. These latter species were synonymized by Barnard (1930, 1932), a change accepted by Watling & Holman (1981, p. 212), but rejected by Andres (1985, p. 124). Examination of preserved as well as living material from the *Polarstern* collections at AWI, Bremerhaven, and from the Belgian Antarctic Expeditions 1964–1967 at IRSNB, Brussels, confirmed the separate identity of the two species.

E. rubrieques n. sp. can be distinguished from its two relatives by :

- a) the long upright mid-dorsal teeth on all pereonites. (*E. macrodonta* has no tooth on pereonite 2 and *E. similis* has no tooth or carina on pereonite 1 or pereonites 1 and 2)
- b) the non-acute protuberance on coxa 6 (both *E. macrodonta*

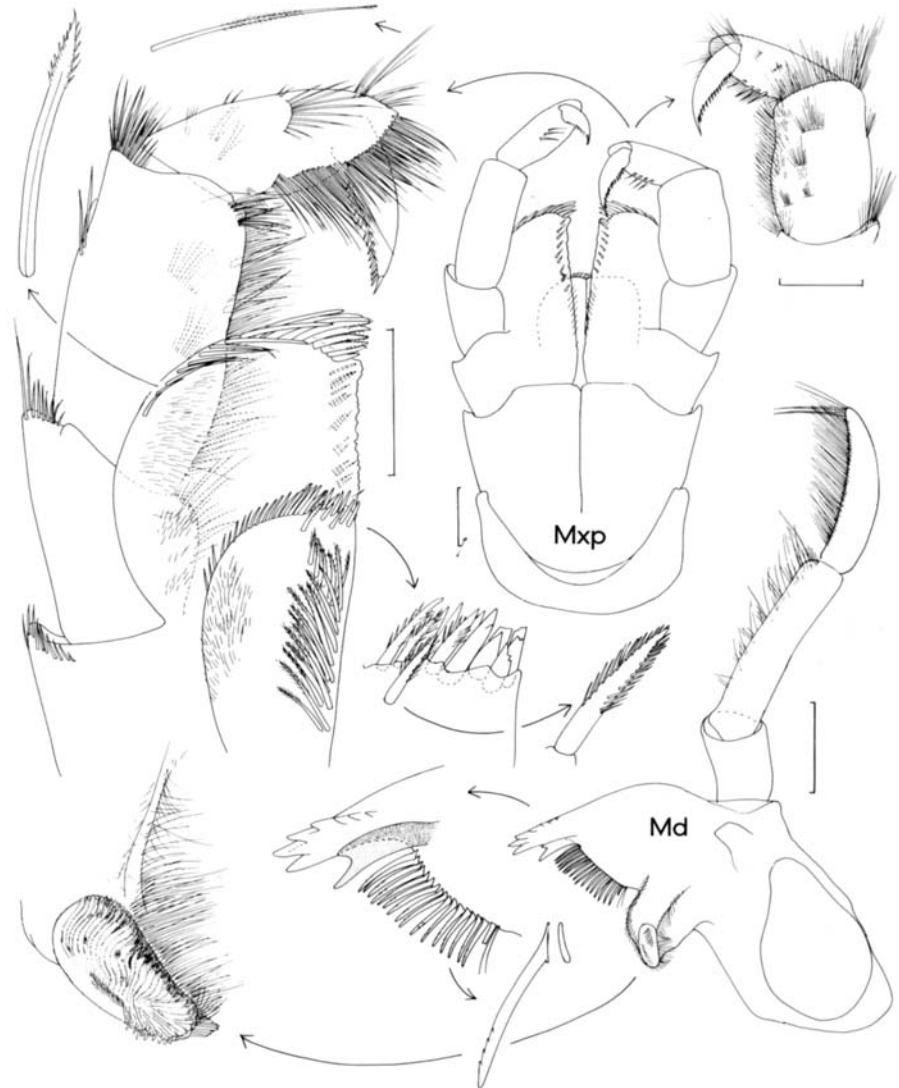


Fig. 3. *Epimeria rubriques* n. sp.
Holotype, mature female,
69.4 mm. Scale: 1 mm.

- and *E. similis* have an acute tooth produced posteriorly)
- c) the strongly excavate basis of pereopods 5–7, with the posterodistal angle rounded (both *E. macrodonta* and *E. similis* have the basis of pereopods 5–6 only slightly excavate posteriorly and pereopod 7 is nearly not excavate; in addition the posterodistal corner is always strongly acute).
 - d) the short distal teeth on peduncular articles 1–2 of antenna 1 (both *E. macrodonta* and *E. similis* have long, strongly projecting teeth on each article).
 - e) the bright pink-red colour of nearly all the body and the vermilion red eye (*E. macrodonta* and *E. similis* have a white body with different patterns of numerous orange spots, patches or stripes, which are less abundant in *similis*; the eye in both species is white with a central red spot).

According to Watling & Holman (1981) the genus *Epimeria*

includes as a synonym the genus *Pseudepimeria* Chevreux 1912. These authors argued that the gnathopods palm condition intergrades from the typical subchelate type found in most *Epimeria* to the simple type found in *Pseudepimeria*. The palm condition indeed varies from the very enlarged type exhibited by *E. yaquinae* McCain 1971 to the reduced but still clearly distinct palm found in *E. puncticulata* K.H. Barnard 1930 (see Bellan-Santini 1972, pl. 33, figs. 10 and 11 under *Subepimeria geodesiae* and Watling & Holman 1981, fig. 21 h). In three species, namely *E. grandirostris*, *E. oxycarinata* and *E. pulchra* the palm is clearly absent and the dactyl relatively broad and strongly spinose, especially on gnathopod 2 (see Chevreux, 1913, fig. 46 and Coleman 1990, pls. 3, 7, 8, 12, 13). These morphological differences imply the loss of the prehension capability of the gnathopods whilst the stout spinose dactyls could indicate a kind of raking function. This could reflect another feeding mode for this group of three species and throws some doubts on the invalidity of *Pseudepimeria*.

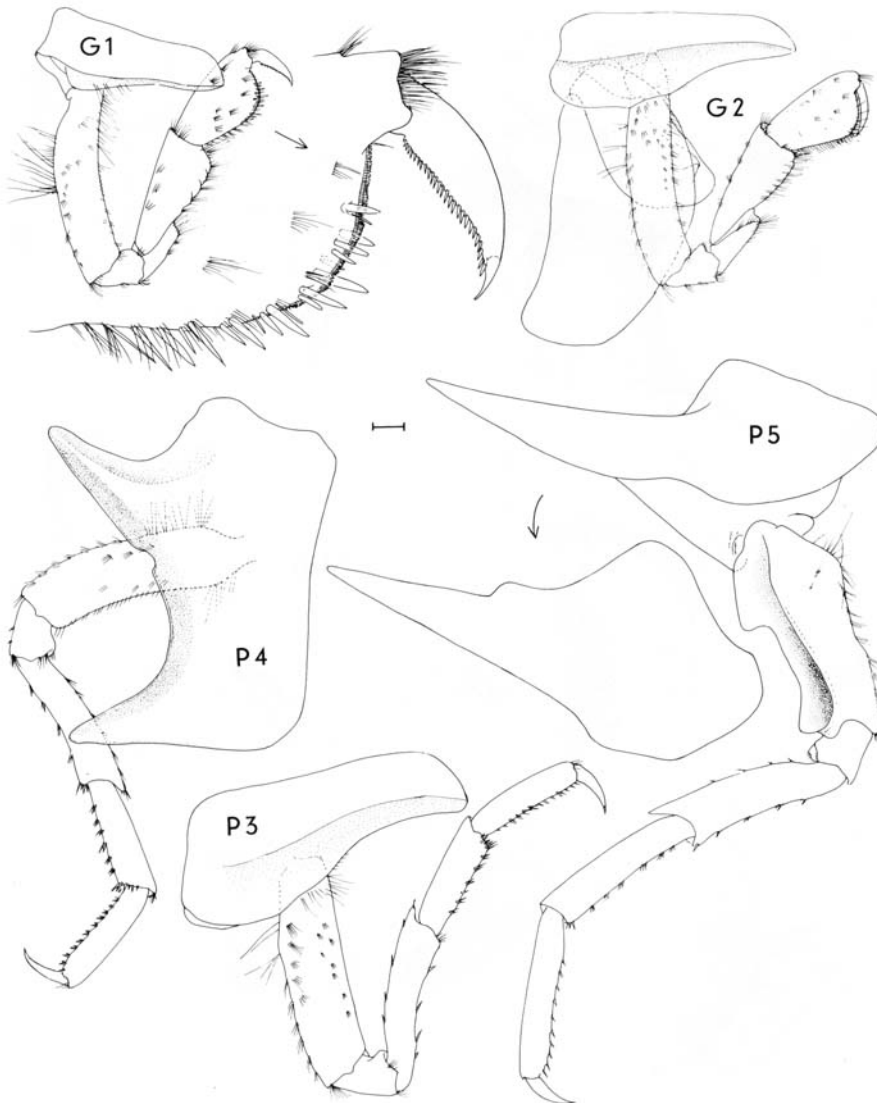


Fig. 4. *Epimeria rubrieques* n. sp. Holotype, mature female, 69.4 mm. Scale: 1 mm.

Key to adult Antarctic *Epimeria*.

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|---|---|---|----|
| 1 All pereonites lacking mid-dorsal carinae. Coxa 4 ventrally broad, margin straight or slightly convex. Coxa 5 not acutely produced posterodistally. | 2 | 4 Basis of pereopod 7 with posterodistal lobe regularly rounded, not reaching the apical margin of <i>ischium monodon</i> Stephensen 1947 | |
| Some or all pereonites bearing mid-dorsal carinae. Coxa 4 ventrally broad or narrow, blunt or pointed. Coxa 5 posterodistally produced or not | 5 | Basis of pereopod 7 posterodistal lobe with slightly concave margin, lobe distinctly longer than <i>ischium extensa</i> Andres 1985 | |
| 2 Basis of pereopods 5 and 6 posteriorly notched | | 5 Gnathopods 1–2 with distinct, occasionally short, palm; dactyl slender, weakly pectinate | 6 |
| Basis of pereopods 5 and 6 not posteriorly notched | 3 | Gnathopods 1–2 without palm; dactyl stout, strongly pectinate | 12 |
| 3 Basis of pereopods 5 and 6 posteriorly concave. Mid-dorsal carinae present on pleonites 1–3 | | 6 Coxa 4 ventrally broadened, not acutely produced posterodistally. Coxa 5 posterodistally blunt | 7 |
| <i>puncticulata</i> K.H. Barnard 1930 | | Coxa 4 ventrally narrow or broad but acutely pointed posterodistally. Coxa 5 posterodistally acutely produced | 10 |
| Basis of pereopods 5 and 6 posteriorly straight or convex, not excavate. Posterodorsal blunt projection on pleonite 3 | 4 | | |

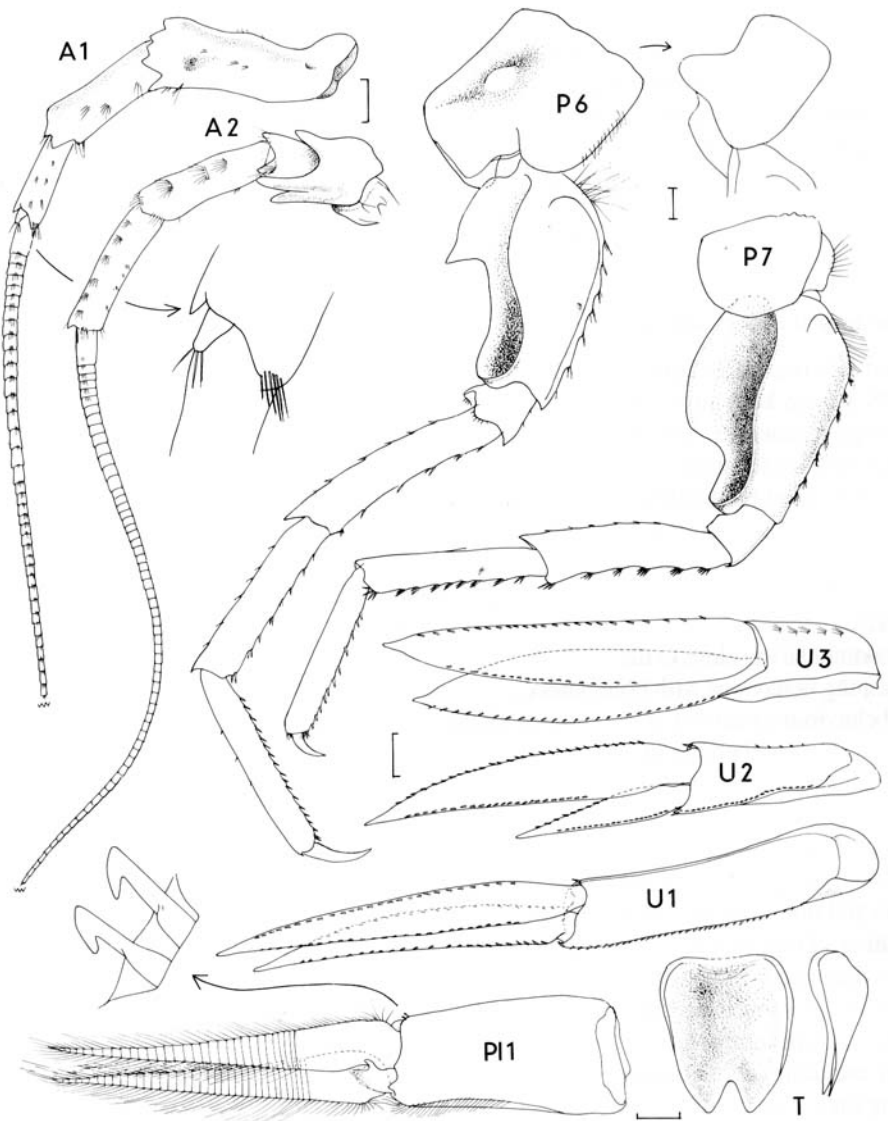


Fig. 5. *Epimeria rubriques* n. sp.
Holotype, mature female, 69.4 mm. Scale: 1mm.

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| <p>7 Mid-dorsal carinae on all pereonites
<i>intermedia</i> Schellenberg 1931.
Mid-dorsal carinae on some pereonites only 8</p> <p>8 Mid-dorsal carinae on pereonites 3–7, clearly bilobed on pereonites 5–7
<i>rimicarinata</i> Watling & Holman 1980
Mid-dorsal carinae on pereonites 4–7 blunt, not bilobed 9</p> <p>9 Basis of pereopods 5–7 strongly notched posteriorly
<i>georgiana</i> Schellenberg 1931
Basis of pereopods 5–7 without posterior notch
<i>inermis</i> Walker 1903</p> <p>10 Coxa 4 ventrally broad. Mid-dorsal acute teeth on all pereonites. <i>rubriques</i> n.sp.
Coxa 4 ventrally narrowed and pointed. Mid-dorsal teeth absent on pereonites 1 or 2. 11</p> | <p>11 Mid-dorsal and mid-lateral teeth absent only on pereonite 2, occasionally weak on pereonite 1. Pleonite 3 with simple, acute and upright mid-dorsal tooth.
<i>macrodonta</i> Walker 1906
Mid-dorsal tooth absent on pereonite 1, weak or absent on pereonite 2. Mid-lateral teeth present on all pereonites. Pleonite 3 with mid-dorsal bilobed carina.
<i>similis</i> Chevreux 1912</p> <p>12 Coxa 4 with distal margin straight or slightly convex, surface dorsoventral ridge not produced in tooth
<i>grandirostris</i> (Chevreux 1912)
Coxa 4 with distal margin deeply excavate, surface dorsoventral ridge produced in tooth 13</p> <p>13 Mid-dorsal carina of pereonite 1 curved forwards, three times longer than that of pereonite 2. Lateral armature of pereonites consisting of acute teeth. Coxa 5 postero-lateral wing shorter than half the</p> |
|--|--|

width of pereonite 5

oxicarinata Coleman 1990

Mid-dorsal carina of pereonite 1 straight, slightly longer than that of pereonite 2. Lateral armature of pereonites consisting of tubercles. Coxa 5 very strongly protruding laterally, wing longer (1.5 times) than half the width of pereonite 5.

pulchra Coleman 1990

Behavioural observations

About 20 specimens collected at different stations during EPOS 3 were kept alive for up to nine months. *Epimeria rubriques* generally rested for periods of hours to days on stones or other substrates in the aquaria. If this non-activity was interrupted by disturbance caused by other amphipods or during routine operations, *E. rubriques* reacted either by swimming or more frequently by walking away. This species became very active when food was provided. Pieces of thawed fish or krill meat as well as living *Artemia* or chironomid larvae close to the antennae immediately induced a grasping behaviour with both pairs of antennae, similar to the behaviour observed in *E. robusta* (Klages & Gutt, in press). The same behaviour in prey localization and grasping has been observed in juveniles which hatched in aquaria at the end of January 1989. These aquarium observations indicate that *E. rubriques* is an ambush predator. After hatching, the juveniles clung to the females back for some hours and one juvenile was observed to moult shortly after hatching. Four months later the next exuviae of juveniles were detected in aquaria, which might demonstrate the extremely prolonged intermoult cycles of these high Antarctic crustaceans in comparison to temperate or tropical relatives. After moulting, neither adults nor juveniles were observed eating their own or others exuviae, although this behaviour has been sometimes observed in aquaria e.g. in the giant isopod *Glyptonotus antarcticus* (unpublished observations).

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