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Journal of Natural History

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tnah20>

New records of West and South African Bathyporeia, with the description of four new species and a key to all species of the genus (Crustacea, Amphipoda)

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Published online: 21 Feb 2007.

To cite this article: Cédric d'Udekem d'Acoz & Wim Vader (2005) New records of West and South African Bathyporeia, with the description of four new species and a key to all species of the genus (Crustacea, Amphipoda), Journal of Natural History, 39:30, 2759-2794, DOI:

[10.1080/00222930500190129](http://dx.doi.org/10.1080/00222930500190129)

To link to this article: <http://dx.doi.org/10.1080/00222930500190129>

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New records of West and South African *Bathyporeia*, with the description of four new species and a key to all species of the genus (Crustacea, Amphipoda)

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(Accepted 25 May 2005)

Abstract

New data on the warm temperate and tropical east Atlantic *Bathyporeia* species are presented. Four new species are described: *Bathyporeia cunctator* sp. nov. from South Africa, *B. chevreuxi* sp. nov. from Senegal, *B. gladiura* sp. nov. from South Africa, and *B. griffithsi* sp. nov. from Namibia. *Bathyporeia cunctator* sp. nov. and *B. chevreuxi* sp. nov. are very closely related to the west European *B. tenuipes* Meinert, 1877 and the Mediterranean *B. lindstromi* Stebbing, 1906; these four cryptic species forming the complex *tenuipes*. *Bathyporeia griffithsi* sp. nov. and *B. gladiura* sp. nov. are highly distinctive new species. The morphotype “*sunniavae*” of *Bathyporeia guilliamsoniana* is recorded for the first time outside the Mediterranean Sea, in the Canary Islands. An identification key to all known *Bathyporeia* species is given.

Keywords: Africa, Amphipoda, Bathyporeia, Crustacea, East Atlantic, new species, taxonomy

Introduction

The amphipod genus *Bathyporeia* in the north-eastern Atlantic and the Mediterranean Sea has been studied extensively by d’Udekem d’Acoz (2004), d’Udekem d’Acoz and Menioui (2004), and d’Udekem d’Acoz and Vader (forthcoming). The present paper, which is the fourth part of the revision of the genus, is devoted to the African material of the South African Museum and the Muséum National d’Histoire Naturelle, Paris (Chevreux collection).

So far, only a single species of *Bathyporeia* has been recorded from the austral part of the eastern Atlantic. Earlier authors such as Barnard (1951) and Day (1959) identified their material with *Bathyporeia gracilis* G. O. Sars, 1891. Vader (1970) considered that it was close to, albeit distinct from, *B. tenuipes* Meinert, 1877. He was followed by Griffiths (1974a, 1974b, 1975, 1976) who identified his material as *Bathyporeia* sp. The present study confirmed the existence of a species very close to *B. tenuipes* in South Africa, which is here described as *Bathyporeia cunctator* sp. nov. However, a few South African samples

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Published 18 August 2005.

ISSN 0022-2933 print/ISSN 1464-5262 online © 2005 Taylor & Francis

DOI: 10.1080/00222930500190129

included another species with a very stocky outline: *Bathyporeia gladiura* sp. nov. Another distinctive new species, with a slender morphology, was found in the Namibian material of the South African Museum: *Bathyporeia griffithsi* sp. nov.

Examination of the material belonging to the Muséum National d'Histoire Naturelle, Paris revealed another new species of the *tenuipes* group collected 100 years ago by Édouard Chevreux in Senegal: *Bathyporeia chevreuxi* sp. nov. A single specimen found amongst these *B. chevreuxi* sp. nov. belongs to a very different species, which is rather similar to *B. griffithsi* sp. nov. Its mutilated condition does not allow us to conclude if it is a new species or not and it is therefore referred to as *Bathyporeia* sp. The Chevreux collection also included material of *B. guilliamsoniana* (Bate, 1857) from the Canary Islands, the females of this sample belonging to the morphotype "*sunivae*".

Finally, an identification key to all known *Bathyporeia* species is provided at the end of this paper.

Material and methods

The South African and Namibian material examined belongs to the South African Museum (SAM), the material from Senegal to the Muséum National d'Histoire Naturelle, Paris (MNHN). Material from the Dublin Museum (DM) and the Museo Civico di Storia Naturale di Verona (MVRCr) already listed by d'Udekem d'Acoz (2004) and d'Udekem d'Acoz and Vader (forthcoming), has been used for comparative purposes.

All illustrations have been drawn by the first author utilizing a camera lucida. For the measurement of the different ratios, see d'Udekem d'Acoz (2004). The model of description for *B. gladiura* sp. nov. and *B. griffithsi* sp. nov. is similar albeit not identical to that of d'Udekem d'Acoz (2004) and d'Udekem d'Acoz and Menioui (2004). After the examination of all known species of *Bathyporeia*, some ratios used in previous papers have proved to be of low informative value or redundant. Such ratios have been abandoned in the present paper. For *B. chevreuxi* sp. nov. and *B. cunctator* sp. nov., which are extremely similar to the European species *B. lindstromi* and *B. tenuipes*, the description is limited to a diagnosis; a few invariant morphological features are not illustrated and several specimens have been illustrated to show some parts of essential diagnostic importance in order to give an idea of their variability. The term "pseudorostrum" denotes the enlarged first article of the peduncle of the first antenna. The terminal crown of setae of the third article of the maxillipedal palp is not illustrated. The "carpal fang" is a long and strong modified seta found on the carpus of the third and fourth pereopods in all *Bathyporeia* species. The medial border of the outer ramus of the third uropod normally has long plumose setae orientated in the same plane as the outer ramus; each plumose seta is either single or forms a pair with a shorter non-setulose spiniform seta pointing obliquely upwards; these spiniform setae, which are not present in all species, are called "accessory spiniform setae".

The ratios should be considered as indicative only. Indeed they have been measured on one or two specimens only in *B. gladiura* sp. nov. and *B. griffithsi* sp. nov., and mostly from non-dissected specimens in *Bathyporeia* of the *tenuipes* group (about eight specimens per species in this group). Ratios are more objective than terms such as "stout" and "slender", since interspecific differences are usually small and are often not perceived at first glance.

The following abbreviations are adopted in the present paper, either systematically or in some parts of the text: A1, first antenna; A2, second antenna; coxae 1–7, coxal plates of the first to seventh pereopods; Ep1–Ep3, first to third epimeral plates; Md, mandible; Mx1, first maxilla; Mx2, second maxilla; Mxp, maxilliped; P1, first pereopod (first gnathopod);

P2, second pereopod (second gnathopod); P3–P7, third to seventh pereopods; U1–U3, first to third uropods.

Taxonomic part

Family PONTOPOREIIDAE Dana, 1855

Genus *Bathyporeia* Lindström, 1855

Bathyporeia* complex *tenuipes Meinert, 1877

Composition

Bathyporeia chevreauxi sp. nov., *B. cunctator* sp. nov., *B. lindstromi* Stebbing, 1906, *B. tenuipes* Meinert, 1877.

Diagnosis

Body and appendages slender. Anteroventral spines of pseudorostrum short and few in number. Eye with numerous well-developed ommatidia in adults. Articles of major flagellum of A1 in adult males dramatically decreasing in diameter from base to tip of flagellum. Third article of peduncle of A2 with at least two groups of spines or spiniform setae. A2 longer than body in adult males. Penultimate article of maxillipedal palp without longitudinal dorsal row of setae. Inner plate of maxilliped with two to four strong setae on dorsal surface (most commonly four). Ventral margin of coxa 1 toothless or with notch, never with a true tooth. Coxae 2–3 with strong posterior tooth. Some ventral setae of coxae 2–3 quite robust. Coxa 2 with a very characteristic triangular/trapezoidal shape. Propodus of P3 and P4 subequal. Carpal fang of P3–P4 entire, with acute tip. Dactylus of P3–P4 long, slender with long unguis, with posterior border distinctly concave. Basis of P5 with anterior and posterior border distinctly and similarly convex. Merus of P5 broad to very broad, with posterodistal seta group with one short spiniform seta in males and in females (both in adults and in immatures). P6 basis with anterior and posterior border distinctly convex, with posterodistal lobe well developed. Anteromedial setae of merus of P6 especially well developed. Carpus and propodus of P6 quite long and slender. Posterior border of carpus of P6 with at least one group of spines in addition to the distal one. P7 long and slender. Basis of P7 with a fairly large number of posterior setae. Medial face of basis of P7 with pappose setae only, without spines. Ischium of P7 quite long and acute with anterior border distinctly concave. Ep1–Ep2 with middle of posterior border angular. Ep3 without posterior tooth. Urosomite 1 usually with two to four (rarely one) posteriorly directed spines. Outer ventral part of urosomite 1 with several strong setae. Outer dorsal border of peduncle of U1 with long slender spines or setae on proximal half and short and stockier spines on distal half. Inner rami of U1–U2 with border facing outer ramus, with only one long spine in subdistal position. U3 with especially long spines and setae on outer border. Second article of U3 long with spines/setae on both sides. Medial side of U3 usually with short and narrow accessory spiniform setae.

Discussion

The *tenuipes* complex is quite distinct from any other *Bathyporeia* taxon, being only distantly related to *B. gracilis* G. O. Sars, 1891, a species redescribed by d'Udekem d'Acoz

(2004). On the other hand, the *tenuipes* complex itself is perhaps the most difficult case to unravel taxonomically within the, already difficult, genus *Bathyporeia*. It has an extremely wide distribution, from Denmark to South Africa and to the Mediterranean Sea and it is morphologically extremely homogeneous throughout its range. On first examination, we were tempted to lump all the material available into one species, *B. tenuipes*. However, it appeared that the typical *B. tenuipes* from north-west Europe had slightly shorter dactyli than the warm-temperate and tropical populations. Therefore, d’Udekem d’Acoz and Vader (forthcoming) admitted two species: *B. tenuipes* from north-west Europe and *B. lindstromi* from the Mediterranean and probably the West African coast. However, after a second look at the African material it appeared that small but consistent differences could be observed between the South African, the Senegalese, the Mediterranean and the north-western European material. These differences can only be appreciated when good samples of properly fixed material are available. The existence of a single Mediterranean/pan-east-Atlantic species seemed a priori unlikely and we have therefore decided to consider these four groups of populations as different species. The Senegalese and the South African forms are therefore reluctantly described as new, respectively under the names *B. chevreuxi* sp. nov. and *B. cunctator* sp. nov. This choice is of course debatable, and other carcinologists could argue that the forms of the complex *tenuipes* are mere local intraspecific variations or subspecies. The differences between the four species are listed in Table I.

Table I. Differences between the *Bathyporeia* species of the complex *tenuipes*.

	<i>B. chevreuxi</i> sp. nov. (Figures 1–4)	<i>B. cunctator</i> sp. nov. (Figures 5–8)	<i>B. lindstromi</i> Stebbing (Figure 9)	<i>B. tenuipes</i> Meinert (Figure 10)
Rate of protrusion of pseudorostrum	Weakly protruding	Variable	Much protruding	Much protruding
Shape of upper distal angle of pseudorostrum	Rounded	Rounded	Subangular to rounded	Angular to subangular
Interval of the ratio dactylus/propodus length in P3	0.39–0.51	0.40–0.59	0.39–0.52	0.29–0.38
Interval of the ratio dactylus/propodus length in P4	0.46–0.53	0.40–0.57	0.47–0.56	0.39–0.45
Basis of P7, posterior ornamentation	Rather short, spiniform in the middle	Long, setiform	Rather short, spiniform in the middle	Long, setiform
Peduncle of U1, proximal dorsal outer setae	Moderately long	Very long	Very long	Very long
Peduncle of U1, difference between proximal and distal dorsal outer setae	Slight, not clear-cut, gradual differentiation	Important and clear-cut	Important and clear-cut	Important and clear-cut
Maximum size in specimens examined	4.5 mm	4.5 mm	4.5 mm	6 mm
Distribution	West Sahara to Senegal	South Africa	Mediterranean	North-western Europe

Comparative figures of essential characters have been given for *B. lindstromi* (Figure 9) and *B. tenuipes* (Figure 10). More detailed figures of those species can be found in d'Udekem d'Acoz and Vader (forthcoming) for the former and d'Udekem d'Acoz (2004) for the latter.

***Bathyporeia chevreuxi* sp. nov.**

(Figures 1–4)

Bathyporeia pelagica; Chevreux 1925, p 295, in part, list, no description; Chevreux and Fage 1925, p 94, in part, Dakar record only [not *B. pelagica* (Bate, 1857)].

Etymology

The species is dedicated to Édouard Chevreux who collected the type series more than 100 years ago. The name is a genitive.

Figure 1. *Bathyporeia chevreuxi* sp. nov. Senegal, Dakar: (A, D–J) Melita Sta. 335, female holotype; (B) Melita Sta. 335, female paratype; (C) Melita Sta. 337, female paratype. (A) Right A1; (B) proximal part of left A1; (C) proximal part of right A1; (D) left A2; (E) left Md; (F) right Mxp; (G) right coxa 1; (H) right coxa 2; (I) left coxa 3; (J) right coxa 4. Scale bar: 0.21 mm (A–C, E, H, I); 0.42 mm (D); 0.125 mm (F); 0.175 mm (G); 0.30 mm (J).

Figure 2. *Bathyporeia chevreuxi* sp. nov. Senegal, Dakar: (A–H) Melita Sta. 335; (I) Melita Sta. 333. (A–G) Female holotype; (H, I) female paratypes. (A) Anterior part of left P3 (medial spines/setae of propodus not shown); (B) anterior part of right P4 (medial spines/setae of propodus not shown); (C) left P5; (D) left P6; (E) right P7; (F, H, I) posterior border of basis of left P7; (G) ischium of left P7 (medial view). Scale bar: 0.13 mm (A, B); 0.42 mm (C–E); 0.21 mm (F, H, I); 0.20 mm (G).

Material examined

Holotype: ovigerous female mounted on 10 slides, Melita Sta. 335, Senegal, “rade de Dakar”, mud, 5 m depth, 3 March 1890, previously identified as *B. pelagica* Bate by E. Chevreux, MNHN-Am 5451. Paratypes: 40 specimens, Melita Sta. 333, Senegal, Dakar, 9 m depth, fine sand, 26 February 1890, previously identified as *B. pelagica* Bate by E. Chevreux, MNHN-Am 5454; two adult males, seven immature males, three ovigerous females, three juveniles, Melita Sta. 335, Senegal, “rade de Dakar”, mud, 5 m depth, 3 March 1890, previously identified as *B. pelagica* Bate by E. Chevreux, MNHN-Am 5452; one immature male, two adult females, Melita, Sta. 337, Senegal, “rade de Dakar”, mud, 5 m, 5 March 1890, previously identified as *B. pelagica* Bate by E. Chevreux, MNHN-Am 5453.

Figure 3. *Bathyporeia chevreuxi* sp. nov. Senegal, Dakar, Melita Sta. 335: (A–C, E–H) female holotype; (D) male paratype; (I) sex unknown (detached appendix), paratype. (A) Right Ep1; (B) left Ep2; (C, D) right Ep3; (E) dorsal part of first urosomite (left side); (F) ventral part of first urosomite and peduncle of right U1 in outer view (medial spines not shown); (G) left U1; (H) left U2; (I) right U3. Scale bar: 0.26 mm (A–D); 0.21 mm (E–H); 0.30 mm (I).

Diagnosis

Pseudorostrum weakly protruding, barely overhanging, upper distal angle regularly rounded, not angular. Pseudorostrum with two to four proximoventral long plumose setae. Flagellum of A1 with six articles in females. Flagellum of A2 with 8–10 articles in females. Coxa 1 with five to seven marginal setae, coxa 2 with 15–24 marginal setae, coxa 3 with 11–16 marginal setae, coxa 4 with 19–29 marginal setae in females. P3–P4 with long dactyli. Carpal fang of P3 reaching 0.78–0.84 of propodus (note: this is the level reached by the carpal fang and not the ratio length of carpal fang/length of propodus). Dactylus of P3 0.46–0.51 (sometimes 0.39) times as long as propodus. Carpal fang of P4 reaching 0.71–0.74 (sometimes 0.88) of propodus. Dactylus of P4 0.46–0.53 times as long as propodus. Merus of P5 in female holotype 1.6 times as long as wide. Posterior border of basis of P7 with rather short spines/setae; those of the middle of the border spiniform and distinctly shorter than the proximal and distal ones. Ischium of P7 slightly shorter than in *B. tenuipes*. Proximal spines of outer side of dorsal border of peduncle of U1 narrow and moderately long; difference between proximal and distal spines small, not clear-cut (rather gradual change between proximal and distal spines). Total number of spines on outer side of dorsal border of peduncle of U1: 8–11 in adults.

Figure 4. *Bathyporeia chevreuxi* sp. nov. Senegal, Dakar, paratypes: (A–F, H) Melita Sta. 335; (G) Melita Sta. 337. (A–D, F) Adult male; (E, G) adult females; (H) sex unknown (incomplete animal). (A) Head, antennae and mandibular palp; (B) second antenna; (C) distal part of right P5; (D) urosomite 1; (E, F) ventral part of first urosomite and peduncle of left U1 in outer view (medial spines not shown); (G, H) ventral part of first urosomite and peduncle of right U1 in outer view (medial spines not shown). Scale bar: 0.42 mm (A); 0.88 mm (B); 0.30 mm (C); 0.26 mm (D); 0.21 mm (E–H).

Size. 4.5 mm.

Ecology. Fine sand and mud between 5 and 9 m.

Distribution. Senegal.

Discussion

Chevreux presumably took great care to fix the specimens properly since there are no distortion artefacts on the pseudorostrum. A few *Bathyporeia* from Western Sahara and Mauritania examined are presumably also referable to *B. chevreuxi* sp. nov. However they exhibit a higher variability than the type series. They are dealt with elsewhere by d'Udekem d'Acoz et al. (forthcoming).

Figure 5. *Bathyporeia cunctator* sp. nov. South Africa, LB. 189F, female holotype. (A) Anterior part of head; (B) right A1; (C) left A2; (D) third article of peduncle of left A2; (E) right Md; (F) left Md (palp not shown); (G) outer plate of right Mxp; (H) three distal articles of palp of Mxp; (I) left coxa 1; (J) right coxa 2; (K) right coxa 3; (L) right coxa 4. Scale bar: 0.21 mm (A, B, E, F, J, K); 0.42 mm (C); 0.10 mm (D, G, H); 0.14 mm (I); 0.30 mm (L).

***Bathyporeia cunctator* sp. nov.**

(Figures 5–8)

Bathyporeia gracilis; Barnard 1951, p 704; Day 1959, p 528 [non *Bathyporeia gracilis* G. O. Sars, 1891].

Bathyporeia sp. Griffiths 1974a, p 192; 1974b, p 293; 1975, p 135; 1976, p 46, Figure 26b. “species ... close to *tenuipes*”; Vader 1970, p 161.

Etymology

From the Latin *cunctator*, delayer. The name alludes to the fact that the species was recognized as new by Vader (1970) but only described 35 years later. The name is used as a noun in apposition.

Figure 6. *Bathyporeia cunctator* sp. nov. South Africa, LB. 189F, female holotype. (A) Anterior part of right P3 (medial spines/setae of propodus not shown); (B) anterior part of left P4 (medial spines/setae of propodus not shown); (C) left P5; (D) right P6; (E) left P7; (F) ischium of left P7 (medial view). Scale bar: 0.21 mm (A, B, F); 0.42 mm (C, D, E).

Material examined

Holotype: female (dissected and mounted on 13 slides), University of Cape Town, Ecological Survey, LB. 189. F., South Africa, Langebaan, mid-channel off Skrywershoek, 26 April 1949, previously identified as *Bathyporeia gracilis* by K. H. Barnard (1951); Day (1959) indicates that it is in Saldanha Bay, 33°S, 018°E and that the substrate is sandy, SAM A45255. Paratypes: 27 specimens, University of Cape Town, Ecological Survey, LB. 189. F., Langebaan, mid-channel off Skrywershoek, 26 April 1949, SAM A45255; one female, University of Cape Town, Ecological Survey, FBY. 46. U., 34°16'S, 018°38'E, 59 m, green sand and shell, grab, 25 April 1967, SAM A45256; one fine female, University of Cape Town, Ecological Survey, FBY. 80. E., 34°21'S, 018°41'E, 82 m, green mud with smell of H₂S, grab, 13 July 1967, SAM A45257; one female, University of Cape Town, Ecological Survey, SB 223 N, 33°00.5'S, 017°57.5'E, 3 fms (5.5 m), fine khaki sand and stone, rock dredge, 2 May 1960, SAM A45258; one male in pre-terminal intermoult, University of Cape Town, Ecological Survey, SB 242 Q, 33°03.6'S, 017°55.5'E, 44 m, khaki sand, Van Veen grab, 5 May 1960, SAM A45259; 12 females (including very fine ones), University of Cape Town, Ecological Study, FAL 399 X, 34°08.8'S, 018°33.5'E,

Figure 7. *Bathyporeia cunctator* sp. nov. South Africa, LB. 189F, female holotype. (A) Left Ep1; (B) left Ep2; (C) left Ep3; (D) urosomite 1 (left side); (E) left U1; (F) left U2; (G) left U3. Scale bar: 0.42 mm (A–C); 0.30 mm (D); 0.21 mm (E–G).

32 m, fine khaki sand, Van Veen grab, 16 May 1961, SAM A45260; two females, University of Cape Town, Ecological Survey, FAL 409 J, 34°08.8'S, 018°33.5'E, 32 m, fine khaki sand, Van Veen grab, 16 May 1961, SAM A45261; seven specimens, University of Cape Town, Ecological Survey, FAL 410 X, 34°08.8'S, 018°33.5'E, 32 m, fine khaki sand, Van Veen grab, 16 May 1961, SAM A45262; one immature male, University of Cape Town, Ecological Survey, FAL 426 T, 34°08.8'S, 018°33.5'E, 32 m, fine khaki sand, dredge, 16 May 1961, SAM A45263; one immature male and eight females, University of Cape Town, Ecological Survey, WCD 37 Y, 33°06.7'S, 017°54.8'E, 68 m, khaki sandy mud, Van Veen grab, 2 May 1960, SAM A45264; one male in pre-terminal intermoult and two females, University of Cape Town, Ecological Survey, WCD 45 N, 33°06.4'S, 017°52.6'E, 61 m, khaki sand, rock dredge, 3 May 1960, SAM A45265; one large and fine female, University of Cape Town, Ecological Survey, WCD 48K, 33°06.8'S, 017°57.1'E, 33 m, light grey sand, Van Veen grab, 3 May 1960, SAM A45266; one immature male and two females, University of Cape Town, Ecological Survey, WCD 50 Q, 33°05.5'S, 017°53.5'E, 78 m, dark green mud, Van Veen grab, 5 May 1960, SAM A45267; one female, University of Cape Town, Ecological Survey, WCD 42 T, 33°06.4'S, 017°52.6'E, 61 m, khaki sand, Van Veen grab, 3 May 1960, SAM A45268; one very fine female, University of Cape Town, Ecological Survey, SCD 199, 34°10'S, 023°32'E, 97 m, greenish mud, Van Veen grab, 30 November 1960, SAM A45269; one immature male, University of Cape Town, Ecological Survey, coordinates lost, SAM A45270; one adult male, two

Figure 8. *Bathyporeia cunctator* sp. nov. South Africa, paratypes: (A–C, F, H–L) LB. 189F; (D, E, G) FAL 399X. (A–E, H–L) Females; (F, G) adult male. (A–E) Proximal part of left A1; (F) right A2 (spines and setae of peduncle not shown); (G, H) posterior border of basis of right P7; (I–L) ventral part of first urosomite and peduncle of right U1 in outer view (medial spines not shown). Scale bar: 0.21 mm (A–E, G–L); 0.88 mm (F).

immature males and 13 females, University of Cape Town, Ecological Survey, LB. 189. F., Langebaan, mid-channel off Skrywershoek, 26 April 1949, SAM A 18 868.

Diagnosis

Pseudorostrum moderately to extremely protuberant, distinctly to strongly overhanging, upper distal angle regularly rounded, not angular. Pseudorostrum with three to five proximoventral long plumose setae. Flagellum of A1 with six (sometimes five) articles in females. Flagellum of A2 with seven to eight articles in females. Coxa 1 with about nine marginal setae, coxa 2 with 21–40 marginal setae, coxa 3 with 16–30 marginal setae, coxa 4 with 24–70 marginal setae (the number of setae increases with size). P3–P4 with long dactyli. Carpal fang of P3 reaching 0.88–0.91 of propodus (note: this is the level reached by the carpal fang and not the ratio length of carpal fang/length of propodus). Dactylus of P3 0.40–0.59 times as long as propodus (a single specimen with ratio=0.36). Carpal fang of P3 reaching 0.86–0.92 of propodus. Dactylus of P4 0.40–0.57 times as long as propodus. Merus of P5 in female holotype 1.8 times as long as wide. Posterior border of basis of P7

Figure 9. *Bathyporeia lindstromi* Stebbing, 1906, females, Italy: (A, G) MVRCr, Toscana, Piombino, station T2, 4–8 m depth, April 1978, leg. Cognetti; (B, C, D) MVRCr, Caffè di Napoli, 11 m depth, 6 August 1892, leg. A. Della Valle; (E, F) MVRCr, “Napoli 22”, Ischia, Spiaggia degli Inglesi, fine sand, 4–5 m depth, 1 August 1969, leg. Ulrich Schiecke. (A) Proximal part of right A1; (B) proximal part of left A1; (C) anterior part of right P4 (medial spines/setae of propodus not shown); (D) distal part of left P5; (E) proximal part of right P7; (F) posterior border of basis of right P7 (medial view); (G) ventral part of first urosomite and peduncle of right U1 in outer view (medial spines not shown). Scale bar: 0.21 mm (A, B, G); 0.10 mm (C); 0.30 mm (D); 0.42 mm (E); 0.17 mm (F).

Figure 10. *Bathyporeia tenuipes* Meinert, 1877, females, Ireland, Galway Bay, station GB 49, Decca coordinates R.E.16/G.A.44, sand, 77 m depth, Dave McGrath leg., DM. (A) Proximal part of right A1; (B) anterior part of right P4 (medial spines/setae of propodus not shown); (C) distal part of left P5; (D) proximal part of left P7; (E) posterior border of basis of left P7; (F) ventral part of first urosomite and peduncle of right U1 in outer view (medial spines not shown). Scale bar: 0.21 mm (A, E, F); 0.10 mm (B); 0.42 mm (C, D).

with rather long spines/setae. Ischium of P7 slightly shorter than in *B. tenuipes*. Proximal spines of outer side of dorsal border of peduncle of U1 narrow and very long; difference between proximal and distal spines important, clear-cut (change between proximal and distal spines abrupt). Total number of spines on outer side of dorsal border of peduncle of U1: seven to nine (12) in adults.

Size. 4.5 mm.

Ecology. On sandy mud and shell, mud and shell, mud and sand (Griffiths 1974a, 1974b as *Bathyporeia* sp.), on sand and shell, on sand, on mud, between 5.5 and 97 m (present study).

Distribution. Lüderitz Bay (Griffiths 1974a as *Bathyporeia* sp.), Saldanha Bay (Day 1959 as *Bathyporeia gracilis*), south coast of South Africa (Griffiths 1974b as *Bathyporeia* sp.). The material examined during this study comes from south-western South Africa.

Discussion

This form is exceedingly close to *B. lindstromi* but the posterior spines/setae of the basis of P7 are more robust in *B. lindstromi* than in *B. cunctator* sp. nov. Furthermore, the distribution range of both forms is discontinuous. Some of the apparent profile of the pseudorostrum illustrated in *B. cunctator* sp. nov. may result from distortion artefacts.

Remarks

The collections of the South African Museum include a sample of *Bathyporeia* group *tenuipes* without locality, registered as SAM A 13 496 and including 22 specimens (four adult males, three immature males and 15 females). These specimens are very large (up to 6 mm) and look exceedingly similar to *B. tenuipes* (they have an acute to subacute pseudorostrum). Most probably these specimens are true *B. tenuipes* from north-west Europe received long ago by K. H. Barnard.

***Bathyporeia gladiura* sp. nov.**

(Figures 11–15)

Etymology

From the Latin, *gladius*=sword and the Greek *ούρά*=tail, alluding to the large sword-like third uropod. The name is a noun in apposition.

Material examined

Holotype: one female holotype mounted on nine slides, University of Cape Town, Ecological Survey, FBY. 100. P., South Africa, 34°07.5'S, 018°29'E, 16 m, "white sand and shell coarser than FBY 98–99", grab, 12 October 1967, SAM A45273. Paratypes: two specimens, University of Cape Town, Ecological Survey, FBY. 90. P., 34°08.4'S, 018°30'E, 23 m, medium white sand with coarse particles, grab, 12 October 1967, SAM A45271; one adult male (U3 removed and mounted on a slide), University of Cape Town,

Figure 11. *Bathyporeia gladiura* sp. nov. Adult females, South Africa, FBY. 100: (A–D, F–H, J, K) holotype; (E, I) paratype. (A) Head; (B) left A1; (C) ventral border of first article of peduncle of right A1; (D) left A2; (E) flagellum of right A2; (F) mandibular palp; (G) right Mxp; (H) left coxa 1; (I) right coxa 1; (J) right coxa 2; (K) left coxa 3. Scale bar: 0.21 mm (A, B); 0.10 mm (C, G–I); 0.26 mm (D, E); 0.13 mm (F, J, K).

Ecological Survey, FBY. 98. T., 34°07.5'S, 018°29'E, 16 m, “white sand and shell finer than FBY 100–101”, grab, 12 October 1967, SAM A45272; 10 specimens (one female partly mounted on three slides), University of Cape Town, Ecological Survey, FBY. 100. P., 34°07.5'S, 018°29'E, 16 m, “white sand and shell coarser than FBY 98–99”, grab, 12 October 1967, SAM A45273; one specimen, University of Cape Town, Ecological Survey, FBY. 112. N., 34°16'S, 18°38.1'E, 58 m, khaki sand, grab, 12 October 1967, SAM A45274.

Description

Body and appendages extremely stout. Eye small with well-developed ommatidia in adults. Pseudorostrum short and broad, with rounded tip, not overhanging, with two proximoventral setae in adults; development and number of apical spines normal. Major flagellum of A1 with six articles in females, 10 in males; several articles of major flagellum with a spine in male; first article of accessory flagellum with one or two non-apical groups of

Figure 12. *Bathyporeia gladiura* sp. nov. Adult female, holotype, South Africa, FBY. 100: (A) Left P1; (B) right P2; (C) left P3; (D) anterior part of left P3 (medial spines/setae of propodus not shown); (E) right P4; (F) anterior part of right P4 (medial spines/setae of propodus not shown); (G) dactylus of right P4. Scale bar: 0.21 mm (A, C, E); 0.42 mm (B); 0.071 mm (D, F); 0.025 mm (G).

spines. Flagellum of A1 in males rather long (combined length of major flagellum and distal two articles of peduncle 1.8 as long as length of pseudorostrum). Anterior border of third article of peduncle of A2 with one group of spinules and setae in apical position only; article 4 with lateral and apical spinules; flagellum with seven to eight articles in females, eight in males; A2 of adult males 0.4 times as long as body length, not longer than in females, with flagellum almost as long as peduncle.

Penultimate article of mandibular palp elongate.

Third article of maxillipedal palp without longitudinal row of setae on dorsal side (two transverse groups of anterior setae only are present); inner plate with four strong setae on dorsal surface; outer plate with five nodular spines.

Coxa 1 with tip narrowly rounded, without ventral tooth, with anteroventral angular discontinuity; a long seta associated with this discontinuity, other setae short, especially those anterior to the anteroventral angular discontinuity, which can be considered as setules.

Coxa 2 without posterior tooth; transition between anterior and ventral border without any angular discontinuity; anterior and ventral borders forming a regular curve; anterior

Figure 13. *Bathyporeia gladiura* sp. nov. Adult females: (A–C, E) holotype, South Africa, FBY. 100; (D) paratype, South Africa, FBY. 112N. (A) Right P5; (B) left P6; (C) left P7; (D) tip of left P7; (E) proximal part of right P7 (medial view). Scale bar: 0.26 mm (A–D); 0.21 mm (E).

and posterior borders parallel converging downwards (since the anterior border is curved and the posterior nearly straight); ventral border with 10–12 short and narrow irregular-sized setae; four to five medial setae.

Coxa 3 without posterior tooth; anterior and posterior border parallel; ventral border with 12 slender irregular-sized setae in adult females, of normal length, four medial setae.

Coxa 4 with 20 irregular-sized setae in adult females, of normal width and length; posterior setae not setulose.

P3 with carpal fang not reaching tip of propodus, distally broad, with accessory setule; propodus extremely robust; outer spines/setae of propodus few in number (six), consisting of two long very strong spines, two short strong spines, one long seta and one rather short seta; dactylus stout, with well-developed unguis, with posterior border convex. Propodus of P3 longer than propodus of P4. Ratio of propodus length and merus length of P3 in adult female: 0.62. Ratio of dactylus length and propodus length of P3 in adult female: 0.19. Ratio of length and width of dactylus of P3 in adult female: 2.5. Ratio of unguis length and total length of dactylus of P3 in adult female: 0.33. Ratio of unguis length and dactylus width in P3 of adult female: 0.83.

P4 with carpal fang much shorter than propodus, distally broad, with accessory setule; propodus extremely robust; outer spines/setae of propodus few in number (five), consisting

Figure 14. *Bathyporeia gladiura* sp. nov. Adult females, South Africa, FBY. 100: (A–E, G–I) holotype; (F) paratype. (A) Right Ep1; (B) right Ep2; (C) right Ep3; (D) left Ep3; (E) first urosomite and proximoventral part of peduncle of left U1; (F) right U1; (G) right U2; (H) left U3; (I) telson. Scale bar: 0.21 mm (A–E); 0.14 mm (F, G); 0.18 mm (H); 0.10 mm (I).

of two long very strong spines, two short strong spines, one long seta; dactylus stout, with well-developed unguis, with posterior border convex.

Median part of anterior border of basis of P5 straight. Posterior border of basis of P5 with only four very short setae in holotype. Merus of P5 elliptic but not unusually broad (2.0–2.1 times as long as broad); posteromedian seta group of merus with one long and strong major seta and one minute non-setulose accessory seta; posterodistal seta group with one long and strong straight seta (overreaching tip of carpus in female, almost reaching tip of carpus in male), and zero to two setules (minor sexual dimorphism); anterodistal area with one to two setae that are distally denticulate; longest posterior spine of carpus overreaching tip of propodus or shorter than propodus.

Posterodistal lobe of basis of P6 protruding; anterior border strongly and regularly convex; posterior border distinctly convex; in females, anterior border with narrow setae on proximal 0.7, with spiniform setae on distal 0.3. Posterior border of basis of P6 with only three very short setae in holotype. Merus of P6 with three posterior groups of spines/setae and five anterior groups (one reduced to a single seta); longest seta of each anterior seta

Figure 15. *Bathyporeia gladiura* sp. nov. Adult male, paratype, South Africa, FBY. 98T. (A) Head, antennae and mandibular palp; (B) distal part of left P5; (C) basis and ischium of left P7; (D) first urosomite; (E) right U3; (F) accessory spine. Scale bar: 0.21 mm (A–D); 0.18 mm (E); 0.083 mm (F).

group not of significantly increasing size towards distal part of merus; carpus without posterior spines (distal group not considered); propodus with two posterolateral, and two anteromedial groups of spines (terminal crown of spines not considered). Spines of carpus and merus long and of normal robustness.

P7 with anterior and posterior border of basis very convex; posterior border of basis with stout ornamentation (spines); spines regular-sized; four to five spines; medial side without spines in females (with pappose setae only). Ischium very short, reaching 0.34 of outer side of merus; anterodistal border barely concave on outer side, weakly concave on medial side; posterodistal border straight on outer side, scarcely concave on medial side. Spines of carpus and merus stout and normal-sized.

Middle of posterior border of Ep1 weakly angular and of Ep2 scarcely angular (almost straight); neither Ep1 nor Ep2 with middle of posterior border produced as tooth.

Ep3 with posteroventral border regularly rounded, without posteroventral tooth, with zero to two single ventrolateral spines and three to four ventral setules, with two to four setules on posterior border.

Urosomite 1 with one pair of anteriorly directed setae, and no posteriorly directed spines dorsally; ventrolateral border without strong setae arising from outer side.

Peduncle of uropod 1: outer dorsal border with four to five spines consisting of following succession: (1) two to three short robust spines, (2) the usual penultimate short robust

spine, (3) very short space followed by very strong distal spine; dorsomedial border with three single strong styliform spines. Inner and outer rami neither especially stout nor slender; inner ramus with border facing outer ramus, with only one long spine in subdistal position. Spines on rami neither especially stout nor slender.

Peduncle of uropod 2 of normal proportions; outer dorsal border with four robust spines; dorsomedial border with two single robust spines. Rami neither especially stout nor especially slender; inner ramus with border facing outer ramus with only one long spine in subdistal position. Spines on rami neither especially stout nor especially slender. Peduncle of uropod 3: longest distal spine may slightly overreach inner ramus (endopodal spines excluded); outer border of peduncle of uropod 3 with one group of two strong setae or without setae. Inner ramus elliptic, with two normal-sized spines. Outer ramus with first article of normal width, second article long and very broad. Second article of outer ramus with one to three medial setae and one to two very short outer setae. Medial side of outer ramus (first and second articles together) in female with six rather short, non-plumose setae (setules); in male with nine rather short plumose setae, sometimes associated with short accessory spiniform non-setulose setae; all plumose setae much longer than longest setae on outer side (in male). Outer side of outer ramus (first and second article together) with four to five groups of one to three spiniform setae, much shorter than outer ramus width. Ratio between length of second article and length of first article: 0.47–0.48. Ratio between length of second article and width of first article: 1.8–1.9.

Telson of typical morphology; lobes without medial setae.

Size. 3 mm.

Ecology. On sand, and sand with coarse particles, between 16 and 58 m. Not found in the same samples as *B. cunctator* sp. nov., which seems to prefer finer sediments.

Distribution. South-western South Africa.

Discussion

Bathyporeia gladiura sp. nov. shares a number of characters with the north-east Atlantic species *B. elkaimi* d'Udekem d'Acoz and Menioui, 2004, *B. pilosa* Lindström, 1855 and *B. sarsi* Watkin, 1938, such as the absence of teeth on coxae 1–3, the morphology of the carpal fang (blunt-tipped with accessory setule), and the absence of posteriorly directed dorsal spines on the first urosomite. However, its pseudorostrum is stouter (actually it is the stoutest in the genus) and it has quite distinctive third uropods with a long and broad second article (this is short and narrow in *B. pilosa* and *B. sarsi*). *B. gladiura* sp. nov. has slightly stouter dactyli on P3–P4 than in *B. pilosa* and *B. sarsi* and therefore differs considerably from *B. elkaimi* which has slender dactyli with a long unguis. *B. gladiura* sp. nov. of both sexes have strong spines on the posterior border of the basis of P7 as in female *B. sarsi*, while *B. pilosa*, *B. elkaimi*, and male *B. sarsi* have setae on this border. The third epimeral plate has zero to two ventrolateral spines in *B. gladiura* sp. nov. while it has at least four spines (and usually many more) in *B. elkaimi*, *B. pilosa*, and *B. sarsi*. The second article of the outer ramus of U3 is long in *B. gladiura* sp. nov., just as in *B. elkaimi*, but it is broader. It differs considerably from the second articles of *B. pilosa* and *B. sarsi* which are short and narrow. Adult males of *B. gladiura* sp. nov. have short second antennae as in females, just like *B. elkaimi*, *B. gracilis*, *B. microceras* d'Udekem d'Acoz and Menioui, 2004,

B. parkeri Bousfield, 1973, and *B. quoddyensis* Shoemaker, 1949. Other *Bathyporeia* species have long or medium-sized antennae in adult males. In the related more basal genus *Amphiporeia*, the adult males have short antennae too, as in the even more basal and morphologically similar genus *Gammarus*. Therefore, the character stage “short antennae in adult males” is possibly the plesiomorphic condition in the genus *Bathyporeia* and would give an indication of the evolutionary trends in the genus. This problem will be examined in more detail elsewhere.

A single *Bathyporeia* specimen is identified as *Bathyporeia* cf. *gladiura*. This female specimen is exceedingly similar to *B. gladiura* sp. nov. and is probably identical with it. It has, however, a slightly narrower pseudorostrum (possibly a distortion artefact) and a different third uropod, with much longer outer spines and a narrow second article. This difference in the third uropod is possibly a regeneration anomaly. This specimen has been dissected and mounted on 17 slides. Its coordinates are: University of Cape Town, Ecological Survey, South Africa, FBY. 125. A., 34°06.3'S, 018°29'E, fine white sand, 2 m depth, grab, 6 November 1967, SAM A45275.

***Bathyporeia griffithsi* sp. nov.**

(Figures 16–21)

Etymology

The species is dedicated to Prof. Charles L. Griffiths who suspected it was new. The name is a genitive.

Material examined

Holotype: one adult female dissected and mounted on 11 slides, Namibia, Langstrand, 22°04'S, 14°10'E, 7 August 1998, previously identified as “*Bathyporeia* n. sp. ?” by C. L. Griffiths, SAM 43 815. Paratypes: one adult male and two adult females, Namibia, Langstrand, 22°04'S, 14°10'E, 7 August 1998, previously identified as “*Bathyporeia* n. sp. ?” by C. L. Griffiths, SAM 43 815.

Description

Species rather slender. Eye with well-developed ommatidia in adults. Pseudorostrum with rounded tip, narrow, not overhanging, with two to three proximoventral setae in adults; development and number of apical spines normal. Major flagellum of A1 with six to seven articles in females, 10 in male; first article of accessory flagellum with one to three non-apical groups of spines. Flagellum of A1 in males rather long (combined length of major flagellum and distal two articles of peduncle 1.7 times as long as pseudorostrum). Anterior border of third article of peduncle of A2 with one group of spinules and setae in apical position only or with one single narrow seta more proximally; article 4 with lateral and apical spinules; flagellum with seven to eight articles in female, 30 in male. A2 of adult male longer than body length, with flagellum four times as long as peduncle.

Penultimate article of mandibular palp elongate.

Third article of maxilliped palp with longitudinal row of setae on dorsal side (and two transverse groups of anterior setae); inner plate with eight strong setae on dorsal surface; outer plate with six nodular spines.

Figure 16. *Bathyporeia griffithsi* sp. nov. Ovigerous female, holotype, Namibia, Langstrand: (A) Head; (B) left A1; (C) right A2; (D) right Md; (E) incisor process of left Md; (F) left Mxp; (G) right P1 (most setae not shown); (H) left P2 (setae not shown except the most proximal one of propodus). Scale bar: 0.21 mm (A–C, G); 0.14 mm (D, E); 0.10 mm (F); 0.35 mm (H).

Coxa 1 with tip narrowly rounded, without ventral tooth, without anteroventral angular discontinuity, with well-developed ventral setae, without apical setule.

Coxa 2 with small posterior tooth which may be separated from coxa by a deep or a shallow notch; transition between anterior and ventral borders with angular discontinuity; anterior border straight; anterior and posterior borders parallel; ventral border with eight regular-sized setae of normal length and width (except seta associated with tooth, which is reduced to a setule); no medial setae in dissected specimen.

Coxa 3 without posterior tooth; anterior and posterior border parallel; ventral border with 12 rather regular-sized setae in adult females, of normal width and length, six medial setae.

Coxa 4 with 19 regular-sized setae, of normal width and length; posterior setae not setulose.

P3 with carpal fang just overreaching tip of propodus, distally styliform, without accessory setule; propodus rather slender; outer spines/setae of propodus in normal number (eight), of normal size and shape; dactylus slender, with rather short unguis, with posterior border barely concave (straight if the unguis is not considered). Propodus of P3 longer than propodus of P4. Ratio of propodus length and merus length of P3 in adult female: 0.93.

Figure 17. *Bathyporeia griffithsi* sp. nov. Adult females, Namibia, Langstrand: (A–E, G–I, K, L) holotype; (F, J) paratype. (A) Left coxa 1; (B) right coxa 1; (C) right coxa 2; (D) posteroventral angle of right coxa 2; (E, F) posteroventral angle of left coxa 2; (G) left coxa 3; (H) posteroventral angle of left coxa 3; (I) posteroventral angle of right coxa 3; (J) posteroventral angle of left coxa 3; (K) left coxa 4; (L) telson. Scale bar: 0.15 mm (A–C, G); 0.025 mm (D–F, H–J); 0.21 mm (K); 0.125 mm (L).

Ratio of dactylus length and propodus length of P3 in adult female: 0.32. Ratio of length and width of dactylus of P3 in adult female: 4.6. Ratio of unguis length and total length of dactylus of P3 in adult female: 0.23. Ratio of unguis length and dactylus width in P3 of adult female: 1.0.

P4 with carpal fang not reaching tip of propodus, distally styliform, without accessory setule; propodus of normal robustness; outer spines/setae of propodus in normal number (eight), of normal size and shape; dactylus rather slender, with rather short unguis, with posterior border barely concave, with scarcely distinct median convexity.

Median part of anterior border of basis of P5 weakly convex; merus elliptic but not unusually broad (2.2 times as long as broad); posteromedian seta group of merus with one long and strong major seta and one 0.2–0.3 times as long non-setulose accessory seta; posterodistal seta group with one long and strong straight seta (nearly reaching tip of carpus), and one well-developed setule (no sexual dimorphism); longest posterior spine of carpus overreaching tip of propodus.

Figure 18. *Bathyporeia griffithsi* sp. nov. Ovigerous female, holotype, Namibia, Langstrand. (A) Left P3 (setae and spines not shown except carpal fang); (B) anterior part of left P3 (medial spines/setae of propodus not shown); (C) dactylus of left P3; (D) left P4 (setae and spines not shown except carpal fang); (E) anterior part of left P4 (medial spines/setae of propodus not shown); (F) dactylus of left P4; (G) dactylus of right P4; (H) carpal fang of right P4. Scale bar: 0.42 mm (A, D); 0.10 mm (B, E); 0.05 mm (C, F–H).

Posterodistal lobe of basis of P6 protruding; anterior border regularly convex; posterior border distinctly convex; in females, anterior border with narrow setae on proximal 0.5, with spiniform setae on distal 0.5. Merus of P6 with three (sometimes only two) posterior groups of spines/setae and five to six anterior groups; longest seta of each anterior seta group not of significantly increasing size towards distal part of merus; carpus without posterior spines (distal group not considered); propodus with two posterolateral, and two anteromedial groups of spines (terminal crown of spines not considered). Spines of carpus and merus long and of normal robustness. P7 with anterior and posterior border of basis almost straight, parallel; posterior border of basis with robust ornamentation (spines) except proximally and distally where the spines are replaced by longer spiniform setae; seven spines/setae; medial side with pappose setae and minute spines in females. Ischium short, reaching 0.34 of outer side of merus; anterodistal border barely concave on outer side, distinctly concave on medial side; posterodistal border straight both on outer and medial side. Spines of carpus and merus of normal length and robustness.

Middle of posterior border of Ep1 and Ep2 distinctly angular but not produced as tooth.

Figure 19. *Bathyporeia griffithsi* sp. nov. Ovigerous female, holotype, Namibia, Langstrand. (A) Right P5; (B) right P6; (C) left P7; (D) basis and ischium of right P7 (medial view). Scale bar: 0.26 mm (A–C); 0.21 mm (D).

Ep3 with posteroventral border regularly rounded, without posteroventral tooth, with ventrolateral ornamentation consisting of three single spines and a transverse row of two spines; one ventral setule; one setule on posterior border (i.e. a low number).

Urosomite 1 with one pair of anteriorly directed setae, and two (sometimes one) pairs of posteriorly directed spines dorsally; ventrolateral border without strong setae arising from outer side.

Peduncle of uropod 1: outer dorsal border with six to eight spines consisting of following succession: (1) four to six short robust spines, (2) the usual penultimate short robust spine, (3) very short space followed by very strong distal spine; dorsomedial border with four single styliform spines. Rami of normal length and rather slender; inner ramus with border facing outer ramus, with only one long spine in subdistal position. Spines on rami neither especially stout nor especially slender.

Peduncle of uropod 2 of normal proportions; outer dorsal border with four to five short and robust spines; dorsomedial border with two narrow single spines. Rami of normal length and robustness; inner ramus with border facing outer ramus with only one long spine in subdistal position. Spines on rami neither especially stout nor especially slender.

Figure 20. *Bathyporeia griffithsi* sp. nov. Ovigerous female, holotype, Namibia, Langstrand. (A) Right Ep1; (B) left Ep2; (C) right Ep3; (D) urosomite 1 (left side); (E) right U1; (F) left U2; (G) left U3. Scale bar: 0.21 mm (A–D); 0.14 mm (E, F); 0.18 mm (G).

Peduncle of uropod 3 with longest distal spine almost reaching tip of inner ramus (endopodal spines excluded); outer border of peduncle of uropod 3 with two groups of one to two slender setae. Inner ramus elliptic, with two spines (one short and one long). Outer ramus with first article narrow, second article long and narrow. Second article of outer ramus with three to four medial setae, without outer setae. Medial side of outer ramus (first and second articles together) with 11–12 long, plumose setae; accessory spiniform non-setulose setae may be present; all plumose setae much longer than longest setae on outer side. Outer side of outer ramus (first and second article together) with three to four groups of two spiniform setae, much shorter than outer ramus width. Ratio between length of second article and length of first article: 0.41. Ratio between length of second article and width of first article: 1.8.

Telson of typical morphology; lobes without medial setae.

Colour in life. Unknown, but eye very dark in alcohol.

Size. 4 mm.

Figure 21. *Bathyporeia griffithsi* sp. nov. Adult male, paratype, Namibia, Langstrand. (A) Head (right side) with A1, proximal part of A2 and mandibular palp; (B) right A2; (C) posteroventral angle of right coxa 2; (D) posteroventral angle of right coxa 3; (E) distal part of P5; (F) urosomite 1 (right side) and peduncle of U1. Scale bar: 0.21 mm (A, E, F); 0.42 mm (B); 0.1 mm (C, D).

Ecology. Concerning the ecology of this species, C. L. Griffiths provided us with the following information: "The beach ... is a wave exposed beach of clean sand with grain size 280 microns and intertidal width 35 m. I do not know exactly what height the sample came from, but given the situation with related species I strongly suspect it would be from the low intertidal. I do not think any samples were taken below low water".

Distribution. Namibia.

Discussion

It is difficult to express an opinion concerning the affinities of this species. None of its individual characters is really special, although their combination is unique. However, to a certain extent it seems to exhibit some similarities with *B. pelagica*, *B. elegans*, and *B. phaiophthalma*. The tooth/notch pattern of its coxae 1–3 is somewhat similar albeit not identical with that of *B. pelagica*. The robustness of the posterior spines of the basis of the

seventh pereopod is similar to *B. pelagica* and *B. elegans*. The absence of a tooth on the third epimeral plate is shared with *B. elegans* and *B. phaiophthalma* but not with *B. pelagica*. However, a rather uncommon character is the presence of a quite long and narrow second article on the outer ramus of the third uropod with well-developed setation on the medial side and no setae on the outer side. This condition is also observed in *B. phaiophthalma*.

***Bathyporeia guilliamsoniana* (Bate, 1857)**

Thersites Guilliamsonia Bate 1856, p 59 (*nomen nudum*).

Thersites Guilliamsoniana Bate 1857, p 146.

Bathyporeia pontica Marcusen 1867, p 359.

Bathyporeia norvegica G. O. Sars 1891, p 128, Plate 43.

Bathyporeia megalops Chevreux 1911, p 184, Figure 6, Plate 10 Figures 1–11.

Bathyporeia pelagica; Chevreux 1925, p 295, in part (list, no description) (not *B. pelagica* (Bate, 1857)); Chevreux and Fage 1925, p 94 (in part: Canarian record only).

Bathyporeia guilliamsoniana; Watkin 1938, p 216, Figure 1a–g; d'Udekem d'Acoz 2004, p 46, Figures 26–36; d'Udekem d'Acoz and Vader forthcoming, Figures 12–20 (*ubi syn.*).

Bathyporeia sunnivae Bellan-Santini and Vader 1988, p 237, Figure 4; Bellan-Santini 1989, p 378, Figure 254.

Material examined

Seven specimens (two adult males with a dorsal pair of posteriorly directed spines on urosomite 1 and with eyes very big but not dorsally merged, one immature male of the morphotype “*sunnivae*”, three adult females (two ovigerous) of the morphotype “*sunnivae*”, two juveniles of the morphotype “*sunnivae*”), Canary Islands, La Luz [Gran Canaria], Melita St. 283 [28°09'N, 15°25'W], sand, 4 m depth, 10 January 1890, previously identified as “*Bathyporeia pelagica* ?” by E. Chevreux, MNHN-Am 5455.

Ecology. In sand, from extreme lower shore to 75 m depth (d'Udekem d'Acoz 2004).

Distribution. From southern Norway (Sars 1890–95 as *B. norvegica*) to Western Sahara (d'Udekem d'Acoz et al. forthcoming), Mediterranean, Black Sea (d'Udekem d'Acoz and Vader forthcoming).

Discussion

d'Udekem d'Acoz and Vader (forthcoming) observed (1) that the absence of posteriorly directed spines on the first urosomite was the only character differentiating *Bathyporeia sunnivae* Bellan-Santini and Vader, 1988 from *B. guilliamsoniana*; (2) that *B. sunnivae* and *B. guilliamsoniana* were often found together in the same sample; and (3) that specimens identifiable as *B. sunnivae* were always either females or immature males, never adult males. They concluded that in the absence of new evidence, *B. sunnivae* should be considered a junior synonym of *B. guilliamsoniana*. So far the morphotype “*sunnivae*” was only known from the Mediterranean Sea. It is recorded here for the first time in the east Atlantic. It is worth mentioning that the polymorphism of *B. guilliamsoniana* has similarities with that of *B. pilosa*. Female *B. pilosa* have almost never posteriorly directed spines on the first urosomite, while in some populations over 20% of adult male *B. pilosa* have such spines. For example, a sample of 86 *B. pilosa* from Wemeldinge (the Netherlands) collected on 23

April 2003 by the first author (TMU 12 241) consists of eight adult males with posterior spines, 28 adult males without posterior spines, 21 immature males without posterior spines, and 29 females without posterior spines. Furthermore, in *Bathyporeia* species such as *B. elegans* Watkin, 1938 which always have posterior spines of the first urosomite, those spines are usually longer in adult males than in other specimens, confirming that the extent of dorsal spination of the first urosomite is partly related to sex and maturity.

***Bathyporeia* sp.**

Material examined.

One adult female in alcohol, Melita Sta. 333, Senegal, Dakar, 9 m depth, fine sand, 26 February 1890, previously identified as *B. pelagica* Bate by E. Chevreux and previously mixed together with *B. chevreuxi* sp. nov. (right appendages lacking, presumably previously dissected), MNHN-Am 5461; one ovigerous female (two dried out slides with right appendages, but without P6 and without U3; microscopical preparations probably made from the specimen in alcohol listed above, which had been partly dissected), Melita Sta. 333, Senegal, Dakar, 9 m depth, fine sand, 26 February 1890, MNHN-Am 5462.

Description of the specimen in alcohol

Species rather slender. Eye very large with well-developed ommatidia. Pseudorostrum with bluntly subquadrate tip, of normal height, scarcely overhanging, with two proximoventral setae; development and number of apical spines normal. Major flagellum of A1 with six articles; first article of accessory flagellum with two non-apical groups of spines. Anterior border of article 3 of peduncle of A2 with one group of spinules and setae in apical position; article 4 with lateral and apical spinules; flagellum with 10 articles.

Penultimate article of mandibular palp elongate but broader than ultimate article.

Third article of maxilliped palp with longitudinal row of setae on dorsal side.

Coxa 1 with tip narrowly rounded, without ventral tooth, without ventral notch, without anteroventral angular discontinuity, with well-developed ventral setae, without apical setule.

Coxa 2 without posterior tooth but with notch; transition between anterior and ventral border without angular discontinuity; anterior border curved and convex; ventral border with 10 narrow regular-sized setae of normal length (except posterior seta associated with notch, which is reduced to a setule); probably five medial setae (difficult to see without dissection).

Coxa 3 without posterior tooth but with notch; ventral border with 11 regular-sized setae, of normal width and length (except posterior seta associated with notch, which is reduced to a setule); six medial setae.

Coxa 4 with 20 regular-sized setae, of normal width and length; posterior setae not setulose.

P3 with carpal fang just overreaching tip of propodus, distally styliiform, without accessory setule; propodus rather slender; outer spines/setae of propodus in normal number (eight), of normal size and shape; dactylus slender, of normal size, with normal-sized unguis (albeit not very long), with posterior border slightly concave (unguis considered or not).

P4 with carpal fang reaching tip of propodus, distally styliiform, without accessory setule; propodus of normal robustness; outer spines/setae of propodus in normal number (seven), of normal size and shape; dactylus rather short, difficult to examine properly without dissection.

Median part of anterior border of basis of P5 straight (faintly convex); merus rather narrow; posteromedian seta group of merus with one long seta and no accessory seta; posterodistal seta group with one long and strong straight seta (reaching tip of carpus), and without setule; longest posterior spine of carpus almost overreaching tip of propodus; ratio between carpus+propodus length and merus length in adult female: 0.95.

Posterodistal lobe of basis of P6 protruding; anterior border regularly convex; posterior border distinctly convex. Merus of P6 with three posterior groups of spines/setae and five anterior groups; carpus and propodus lacking.

Posterior border of basis of P7 with very robust ornamentation (11 short and strong spines). Ischium short, reaching 0.32 of outer side of merus; anterodistal border nearly straight on outer side. Carpus and propodus lacking.

Ep3 with posteroventral border regularly rounded, without posteroventral tooth, with one single slender spine followed by a transverse row of two slender spines and a transverse row of three slender spines on ventrolateral surface; with one setule on posterior border (there could have been more that have been rubbed off).

Urosomite 1 with one pair of anteriorly directed setae, and one pair of posteriorly directed stout spines dorsally; ventrolateral border without strong setae arising from outer side.

Peduncle of uropod 1: outer dorsal border with six short (not very stout) spines consisting of following succession: (1) four short robust spines, (2) the usual penultimate short robust spine, (3) very short space followed by a much stronger distal spine; dorsomedial border with six groups of spines/setae (one seta followed by two $\times$ one strong spine paired with one seta, followed by two $\times$ one strong single spine, followed by one strong spine paired with one seta); inner ramus with border facing outer ramus, with only one long spine in subdistal position. Peduncle of uropod 2 with five stout outer dorsal spines; dorsomedial border with three strong single spines; inner ramus with border facing outer ramus with only one long spine in subdistal position.

U3 lacking.

Telson of typical morphology; lobes without medial setae.

Descriptive notes based on the two dried-out slides

Coxa 1 with tip narrowly rounded, without ventral tooth, without ventral notch, without anteroventral angular discontinuity, with well-developed ventral setae, without apical setule.

Coxa 2 with small posterior tooth.

Coxa 3 with anterior and posterior borders slightly converging downwards; posteroventral angle difficult to understand on dried-out microscopical preparation: apparently without tooth but with a setule associated with a notch.

Basis of P5 with both margins straight and parallel. Posteromedian seta group of merus of P5 with major seta rubbed off but with a short accessory seta; posterodistal seta group with one long and strong straight seta (reaching tip of carpus), and one setule.

Basis of P7 with both spines and pappose setae on medial surface, with 11 short spines on posterior border (they look narrower than on specimen in alcohol but this is presumably a drying out artefact). Anterior border of ischium distinctly concave on medial side.

Size. 4.5 mm.

Ecology. On fine sand at 9 m depth.

Distribution. Senegal

Discussion

The specimen in alcohol (found in the same vial as *B. chevreuxi* sp. nov.) has apparently been previously dissected on the right side and we have found two slides (unfortunately dried out) labelled “*B. spec. B. Female ov., Dakar St 333 Chevr.*” with right appendages, which belong to the same species and presumably to the same specimen. This unique mutilated specimen exhibits similarities with *B. griffithsi* sp. nov. and perhaps falls within the range of variation of the latter. However, due to the considerable distance between the sampling localities of both forms, this seems unlikely. *Bathyporeia griffithsi* sp. nov. has a pseudorostrum distally narrow and regularly rounded, whilst it is bluntly subquadrate and not especially narrow in *Bathyporeia* sp. The coxa 2 is narrower in *B. griffithsi* sp. nov. than in *Bathyporeia* sp. On the posterior border of the basis of P7, the proximal and distal spines are replaced by setae in *B. griffithsi* sp. nov. while there are only spines in *Bathyporeia* sp. Finally, *Bathyporeia griffithsi* sp. nov. has usually two pairs of posterior spines on the dorsal part of the first urosomite (three specimens of four) while there is a single one in *Bathyporeia* sp. More material is necessary to settle the identity of *Bathyporeia* sp., which may be a new species.

Key to the genus *Bathyporeia*

Specimens of all species have been examined. *Bathyporeia* sp. which is known from a single mutilated specimen only is not included. Some species appear twice in the key. When examining West or South African material, it must be borne in mind that undescribed species may be expected in these areas. The geographical range of southern species is imperfectly known and the distributional indications given in the key should therefore be considered with caution.

1. Posterodistal seta group of merus of P5 with at least two spines or stout setae. Posterior border of basis of P7 strongly expanded and angular (the angle divides the posterior border in a posteroproximal and a posterodistal part). NW Atlantic 2
 - Posterodistal seta group of merus of P5 with one large spine or stout seta and often one or several minute slender setules. Posterior border of basis of P7 not strongly expanded, not angular, not divided in two distinct parts. E Atlantic and Mediterranean 3
2. Basis of P5 broad and elliptic with posterior border strongly convex. Posterior border of basis of P7 strongly angular, with spines on posteroproximal part and setae on posterodistal part. Middle of posterior border of Ep1–Ep2 pointed. Posterior border of Ep3 strongly convex considerably overreaching posteroventral tooth. Urosomite 1 with two (sometimes three) pairs of spinules on the anterior hump. Medial side of outer ramus of U3 with one plumose seta and one long slender spiniform non-setulose seta at the tip of the first article. Telson lobes without medial setae. South of Cape Cod to north Florida *B. parkeri* Bousfield, 1973

- Basis of P5 rather narrow with anterior border nearly straight and posterior border straight, both borders parallel. Posterior border of basis of P7 obtusely angular, with setae and spines on posteroproximal part and on angle separating the two parts; no spines/setae on posterodistal part itself. Middle of posterior border of Ep1–Ep2 barely angular. Posterior border of Ep3 weakly convex, not reaching posteroventral tooth. Urosomite 1 without spinules on the anterior hump (only on the posterior hump). Medial side of outer ramus of U3 with two to three very strong spines and often a plumose seta at the tip of the first article. Telson lobes with one to two pairs of medial setae. Nova Scotia to Chesapeake Bay
. *B. quoddyensis* Shoemaker, 1949
- 3. Posterodistal seta group of merus of P5 with a short spiniform seta, shorter than half of carpus length 4
- Posterior seta group of merus of P5 with a long slender seta, longer than half of carpus length 9
- 4. Coxa 2 with anterior and posterior borders strongly diverging downwards. Carpus of P6 with at least one group of spines on posterior border (besides distal group). Ventrolateral border of urosomite 1 with spiniform setae. Outer dorsal border of peduncle of U1 proximally with long or fairly long setae: *B. tenuipes* complex 5
- Coxa 2 with anterior and posterior borders not diverging downwards. Carpus of P6 without groups of spines on posterior border (besides distal group). Ventrolateral border of urosomite 1 without spiniform setae. Outer dorsal border of peduncle of U1 proximally (and distally) with short spines 8
- 5. Proximal dorsal setae of outer border of peduncle of U1 extremely long; difference between proximal and distal setae important, clear-cut 6
- Proximal dorsal setae of outer border of peduncle of U1 moderately long; difference between proximal and distal setae slight, not clear-cut [pseudorostrum rounded not very protruding; dactylus of P3–P4 usually >0.45 times as long as propodus; middle of posterior border of basis of P7 with spines]. Senegal
. *B. chevreuxi* sp. nov.
- 6. Dactylus of P3–P4 usually >0.45 times as long as propodus. Pseudorostrum rounded to subangular 7
- Dactylus of P3–P4 usually <0.45 times as long as propodus. Pseudorostrum usually sharply angular, sometimes subangular. [Middle of posterior border of basis of P7 with setae]. NW Europe *B. tenuipes* Meinert, 1877
- 7. Pseudorostrum rounded to subangular. Middle of posterior border of basis of P7 with spines. Mediterranean *B. lindstromi* Stebbing, 1906
- Pseudorostrum rounded. Middle of posterior border of basis of P7 with setae. S Africa *B. cunctator* sp. nov.
- 8. Coxa 1 with tooth. Carpal fang of P3–P4 entire. Unguis of P3–P4 well developed. Border of inner ramus of U1–U2 facing outer ramus with at least two long spines. Medial border of U3 without accessory spiniform setae (except often a small one associated to the most distal plumose seta of the first article). NW Europe, temperate N Africa, Mediterranean, Black Sea. Extreme lower shore and subtidal adult males of *B. guilliamsomiana* (Bate, 1857)

- Coxa 1 without tooth. Carpal fang of P3–P4 with two narrow apical branches. Unguis of P3–P4 very short. Border of inner ramus of U1–U2 facing outer ramus with one long spine. Medial border of U3 with several well-developed accessory spiniform setae. NW Europe, south to N Portugal. Mostly on the middle of the shore and higher, usually uncommon below tidemarks
. adult males of *B. pelagica* (Bate, 1857)
- 9. Ventrolateral border of urosomite 1 with at least one spiniform seta 10
- Ventrolateral border of urosomite 1 without spiniform setae 12
- 10. Carpus of P6 without groups of spines on posterior border (besides distal group). Urosomite 1 with zero to one pairs of posteriorly directed dorsal spines. Outer dorsal border of peduncle of U1 proximally (and distally) with short spines 11
- Carpus of P6 with at least one group of spines on posterior border (besides distal group). Urosomite 1 with two to three pairs of posteriorly directed dorsal spines. Outer dorsal border of peduncle of U1 proximally with setae or long slender spines. NW Europe, rare *B. gracilis* G. O. Sars, 1891
- 11. A1 of adult male much shorter than body. P3–P4 with stout dactyli, with carpal fang blunt-tipped and with accessory seta. Urosomite 1 without pair of posteriorly directed dorsal spines. U3 with first article very broad and second short. Adults >3 mm. NW Europe *B. sarsi* Watkin, 1938
- A1 of adult male about as long as body or longer. P3–P4 with slender dactyli, with carpal fang with narrow acute tip and without accessory seta. Urosomite 1 usually with one pair of posteriorly directed dorsal spines (rarely without spines). U3 with first article of normal width and second of normal length. Maximum length <3 mm. Mediterranean
. *Bathyporeia* sp. 1 (d’Udekem d’Acoz and Vader, forthcoming)
- 12. Carpal fang of P3–P4 bifid or blunt with an accessory seta. Coxa 1 without tooth 13
- Carpal fang of P3–P4 entire and with narrow acute tip. Coxa 1 with or without tooth. 19
- 13. Carpal fang with broad blunt tip and narrow accessory seta. Coxae 2–3 without tooth. Ep3 never with tooth. Urosomite 1 with or without pair of posteriorly directed dorsal spines 14
- Carpal fang with two narrow acute branches. Coxae 2–3 with small tooth separated from coxa by shallow notch. Ep3 usually with small tooth. Urosomite 1 with pair of posteriorly directed dorsal spines. [Pseudorostrum very angular]. NW Europe females and immature males of *B. pelagica* (Bate, 1857)
- 14. Pseudorostrum of normal proportions. Second article of U3 not simultaneously long and broad. NE Atlantic 15
- Pseudorostrum short, very broad in its middle. Second article of U3 long and broad. [A2 of adult males not longer than in females. Dactylus of P3–P4 very stout with short unguis. Urosomite 1 with pair of anteriorly directed setae but without pair of posteriorly directed spines]. S Africa *B. gladiura* sp. nov.
- 15. Second article of outer ramus of U3 with setae on medial side only. Dactylus of P3–P4 slender or robust, with posterior border straight or convex and with short or fairly short unguis. A2 of adult males longer than in females 16

- Second article of outer ramus of U3 with setae on both sides. Dactylus of P3–P4 slender, curved and with long unguis. A2 of adult males not longer than in females. [Urosomite 1 with pair of anteriorly directed setae but without pair of posteriorly directed spines]. N of Morocco and SW of Iberian Peninsula *B. elkaimi* d'Udekem d'Acoz and Menioui, 2004
- 16. U3 with first article very broad. [Urosomite 1 with pair of anteriorly directed setae but usually without pair of posteriorly directed spines]. NW Europe only. 17
- U3 with first article of normal width. Western Sahara 18
- 17. Pseudorostrum apex regularly rounded and very narrow; tip of coxa 1 fairly narrow; subdistal setule of carpal fang about as long as tip of fang; P5 merus posteromedian group of setae consisting of one major glabrous seta and one long very plumose accessory seta; P7 basis with narrow setae on posterior border in females. Not farther south than the Bay of Biscay . . . *B. pilosa* Lindström, 1855
- Pseudorostrum apex subrectangular and always broad in females, more rounded and fairly narrow (i.e. much less characteristic) in males; tip of coxa 1 broadly rounded; subdistal setule of carpal fang much longer than tip of fang; P5 merus posteromedian group of setae consisting of one major glabrous seta and one to two very short setae which are sparsely setulose or appear as non-setulose on microscopical preparations; P7 basis with spines on posterior border in females. As far south as Galicia and possibly N Portugal *B. sarsi* Watkin, 1938
- 18. Dorsal surface of article 2 of Mxp palp with four to six strong long setae in adults. Coxa 1 anteriorly not especially broad, without ventral angular discontinuity, without very short seta behind the anteroventral long setae. Dactylus of P3–P4 normally developed and fairly slender. Posterior border of basis of P7 straight or slightly concave. Ventrolateral surface of Ep3 with spines forming at least one transverse row. Urosomite 1 with pair of well-developed and stout posteriorly directed dorsal conical spines (besides pair of anteriorly directed setae) *B. ledoyeri* d'Udekem d'Acoz and Menioui, 2004
- Dorsal surface of article 2 of Mxp palp with 13–17 strong long setae in adults. Coxa 1 usually anteriorly very broad, usually with ventral angular discontinuity, with very short seta behind the anteroventral long setae. Dactylus of P3–P4 very short and stout. Posterior border of basis of P7 convex. Ventrolateral surface of Ep3 with spines scattered and not forming transverse rows. Urosomite 1 with at least one pair of short and slender posteriorly directed dorsal setiform spines (besides pair of anteriorly directed setae) *Bathyporeia* sp. 2 (d'Udekem d'Acoz et al., forthcoming)
- 19. Ep3 with tooth 20
- Ep3 without tooth 21
- 20. Tip of pseudorostrum rather high. Coxa 1 acute with ventral tooth. Basis of P5–P7 with many setae on posterior border. Ep3 with many ventrolateral spines, most spines forming transverse rows. Second article of U3 with several setae on both sides. Up to 7 mm long. NW Europe, temperate N Africa, Mediterranean, Black Sea females and immature males of *B. guilliamsoniana* (Bate, 1857)
- Tip of pseudorostrum narrow. Coxa 1 blunt without ventral tooth. Basis of P5–P7 with one to three spines/setae on posterior border. Ep3 with one single ventrolateral spine. Second article of U3 with a seta on medial side and none

on outer side. About 3 mm long. Western Sahara.
 B. microceras d'Udekem d'Acoz and Menioui, 2004

21. Urosomite 1 with at least one pair of posteriorly directed dorsal spines 22
 – Urosomite 1 without pair of posteriorly directed dorsal spines. [Coxae 1–3 without tooth. Second article of U3 with setae on medial side only.] Mediterranean *B. phaiophthalma* Bellan-Santini, 1973
22. Either coxae 1–3 each with tooth or notch, or none with tooth or notch. Normally one pair of posteriorly directed dorsal spines (when there are two, they are close to each other). European species 23
 – Coxae 1 and 3 without tooth or notch; coxa 2 with small tooth or notch. Usually two pairs of dorsal spines separated by long space (sometimes a single spine). [Second article of U3 quite long but with setae on medial side only.] Namibia *B. griffithsi* sp. nov.
23. Coxae 1–3 with tooth. Coxa 1 without apical setule. Adults normally >3 mm 24
 – Coxae 1–3 without tooth. Coxa 1 with apical setule. Adults normally <3 mm. NW Europe *B. nana* Toulmond, 1966
24. Second article of U3 with seta(e) (if any) on medial side only. Eggs pink. Norway *B. elegans* Watkin, 1938 forma A
 – Second article of U3 may have seta(e) on both sides. Eggs whitish to yellowish. Western Europe and Mediterranean *B. elegans* Watkin, 1938 forma B

Acknowledgements

We are deeply indebted to the Muséum National d'Histoire Naturelle, Paris (Nguyen Ngoc-Ho, Danielle Defaye and Régis Cleve) and the South African Museum (Charles Griffiths and Liz Hoenson) for the loan of material studied in this paper.

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