On the taxonomic status of the Antarctic amphipod crustacean genera *Eclysis* (Astyridae) and *Bathypanoploea* (Stilipedidae), with partial redescriptions of their type species and description of *Bathypanoploea polarsterni* n. sp.

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Abstract

The monotypic genus *Eclysis* K.H. Barnard, 1932 and its type species, *E. similis* Barnard, are redescribed based upon a newly discovered second specimen. The genus *Bathypanoploea* Schellenberg, 1939 is reviewed; *B. schellenbergi* Holman & Watling, 1983 is fixed as the type species. *Bathypanoploea polarsterni* n. sp. is described; *Alexandrella pulchra* Ren in Ren & Huang, 1991 is a new junior synonym of *B. schellenbergi*. The morphology of *Eclysis* and *Bathypanoploea* is examined, as well as their relationships to the Astyridae and Stilipedidae.

Keywords: Amphipoda; Astyridae; Stilipedidae; *Eclysis*; *Bathypanoploea*; Taxonomy

Introduction

The taxonomic composition and position of the family Stilipedidae Holmes, 1908 have been uncertain for many years. First and foremost, it is the relationship between the Stilipedidae and the two families Astyridae and Epimeriidae (all sensu Coleman and Barnard 1991) that has remained unresolved. Several different authors have hypothesised different phylogenetic relationships among these and other taxa (e.g. Holman and Watling 1983; Andres and Lott 1986; Barnard and Karaman 1991; Coleman and Barnard 1991; Bousfield and Shih 1994), but many unresolved problems remain. Holman and Watling (1983) treated the Stilipedidae as a family consisting of three subfamilies: Alexandrellinae Holman & Watling, 1983; Astyrinae Pirlo, 1934; and Stilipedinae Holmes, 1908. According to their treatment, although they expressed some doubts about this (Holman and Watling 1983, p. 31), *Eclysis* was considered as belonging to the Paramphithoidae and hence distinct from any of the three stilipedid subfamilies. *Bathypanoploea* was considered as belonging to the Alexandrellinae by the same authors. Andres and Lott (1986, p. 134), on the other hand, stated that the "inclusion of the Astyridae in the Stilipedidae as a subfamily appears to be premature", and hence retained the two taxa as separate families. Furthermore, they considered *Eclysis* as the sister taxon to *Epimeriella* Walker, 1906, and formally transferred both to the Astyridae. Later, Coleman and Barnard (1991) partly confirmed the view of Andres and Lott (1986) in that they also treated the Astyridae and Stilipedidae as two distinct families. They did, however, not regard *Eclysis* and *Epimeriella* as closely related, and transferred the latter to the family Epimeriidae.

Much of the confusion regarding the systematic position of *Eclysis* is due to the fact that this taxon was known only from the holotype of *E. similis* Barnard, 1932, which was described and figured incompletely. Thus, the discovery and description of a second specimen (at the U.S. National Museum of Natural History, Washington, DC) is an important step towards a revision of the amphipod families Astyridae and Stilipedidae (both sensu Coleman and Barnard 1991). Similar progress is hoped to become possible with new morphological knowledge presented here on another problematic genus, *Bathypanoploea* Schellenberg, 1939.
This work is the second in a series aimed at culminating in a revision and phylogenetic analysis of the Astyridae and Stilipedidae. The genus *Stilipes* Holmes, 1908 was revised recently by Berge (2003).

**Material and methods**

This study is mainly based on material collected during the ANDEEP cruises to the Weddell Sea in 2001, and on specimens from the collections of the U.S. National Museum of Natural History in Washington, D.C. Additional material was examined or borrowed from the Museum für Naturkunde in Berlin (Germany) and the Institut Royal des Sciences Naturelles de Belgique (IRSNB) in Brussels (Belgium).

**Abbreviations:** A1, 2 = antenna 1, 2; A.f = accessory flagellum; Ep = epimeral plate; Ip = inner plate; L = labium; Lbr = labrum; Lmnd = left mandible; Mx1, 2 = maxilla 1, 2; Mxp = maxilliped; Op = outer plate; P1-7 = pereopods 1-7; Plp = palp; Rmnd = right mandible; maxilla 1, 2; Mxp = maxilliped; Op = outer plate; P1-7 = pereopods 1-7; Plp = palp; Rmnd = right mandible; ST = setal teeth on the first maxilla; T = telson; U1-3 = pereopods 1-3.

All scales in the figures represent 0.1 mm.

**Taxonomy**

**Family Astyridae sensu Coleman and Barnard (1991)**

**Genus Eclysis K.H. Barnard, 1932**


**Type species**


**Morphological characteristics**

Monotypic genus, see description of *E. similis*.

*Eclysis similis* K.H. Barnard, 1932

**Figures 1-3.**

**Material examined**

Holotype (at The Natural History Museum, London, UK). New, second specimen: male, 10 mm; collected on the RV Eltanin cruise No. 27, station 1870, depth 659-741 m, 14 Jan. 1967 in the Ross Sea at approx. 71°S, 171°E.

**Distribution**

Known from South Georgia (type locality, depth 230-250 m) and the Ross Sea.

**Description**

Body: Rostrum well developed, eyes absent. Epistome weakly produced. Body dorsally with a strong projection posteriorly on pereonite 7 and pleonites 1-3. Urosomite 1 dorsally with a strong carina posteriorly and a deep excavation anteriorly. Coxa 1 anteriorly expanded, but not covering the head. Neither pereopods nor antennae conspicuously elongate.

Antennae: Antennae broken off in the examined specimen. Andres and Lott (1986) described antenna 1 as shorter than antenna 2, with accessory flagellum present, uniarticulate.

Mouthparts: Labrum shorter than broad, distally convex and rounded. Labium distally concave and rounded, inner lobes absent. Mandibles short, hinge line proximally. Incisors toothed and narrow. Lacinia mobilis absent on both mandibles. Row of accessory setae strong, 11 cuspidate setae (only the five most distal illustrated in Fig. 1). Molar present, long and pointed, laterally serrate and with short simple setae, distally covered with simple setae. Palp long and powerful, 3-articulate, article 2 longer than 3. Article 2 distally with long and short setae, article 3 laterally with one row of setae, distally with long simple setae. Maxilla 1 palp 2-articulate, broad and powerful, distally with short robust setae. Outer plate narrow, setal teeth in a simple 4/5 arrangement, ST cuspidate. Inner plate short, with two distal rows of setae; one row with long pappopectinate setae, second row reduced with 4 short simple setae. Maxilla 2 outer plate not as broad as inner plate, both distally with three differentiated rows of setae. Maxilliped inner plate distally with 3 short nodular setae, distal and medial setae-rows parallel and reduced to 2 and 6 short simple setae. Outer plate broad, inner margin with one row of robust setae and one row of short simple setae, distal setae group absent. Palp 4-articulate, weakly setose, article 2 as long as articles 3 and 4 combined, article 4 pointed and powerful.

Pereopods and coxal plates: Coxa 1 large, produced anteriorly; coxae 2 and 3 long and narrow, slightly shorter than coxa 1; coxae 1-3 posterodistally with robust simple setae; coxa 4 posterior lobe rounded, posterodistal margin weakly concave, distally rounded; coxae 5 and 6 subequal, distally with posterior lobe large, anterior lobe absent; coxa 7 distally convex and rounded. Pereopod 1 subchelate, basis with short simple setae on both anterior and posterior margins, ischiium short with one long simple seta on posterodistal corner, carpus broader than propodus, posterodistally weakly produced, propodus subrectangular, dactylus powerful and serrate. Pereopod 2 subchelate, basis with short simple setae on anterior and posterior margins, ischiium short with one long simple seta on posterodistal corner, carpus broad, posterodistally produced, propodus subovate, dactylus powerful and serrate. Pereopods 3-7 fully or partly broken off on the examined specimen.

Gills on pereopods 2-7.

Epimeral plate 1 small and rounded, epimeral plate 2 as large as 3, posterodistally weakly produced and acute, epimeral plate 3 posterodistally not produced,
bluntly rectangular. Urosomites 1-3 free, urosomite 1 as long as 2 and 3 combined, dorsally with a deep excavation medially and distally with a large acute projection. Uropods broken off on the examined specimen.

Telson as long as broad, deeply cleft, lobes smooth and rounded.

Remarks

The examined specimen is partly damaged, but in general corresponds very well with the original description of *E. similis* (see Barnard 1932). However, there are some differences between the holotype and the Eltanin specimen. The latter possesses a larger and more conspicuous rostrum than the former, in addition to the smooth telson in the Eltanin specimen (versus a distally serrate telson in the holotype). Also, the labrum seems to be shorter and more rounded apically, and the propodus of the first pereopod is clearly more rectangular than on the holotype. Andres and Lott (1986) described the molar of the holotype as possessing laterally pectinate setae, whereas the specimen at hand has a clearly serrate lateral margin with small simple setae. However, because of the insufficient description of the holotype and the partly damaged specimen at hand, in addition to the fact that only two specimens of this genus have been collected and identified, it is very difficult to establish whether these differences reflect intra- or interspecific variation. Thus, at the moment, the two specimens are considered as representing the same species. However, there is little doubt that both belong to the same genus: both are lacking a lacinia mobilis on both mandibles, a character state otherwise not observed within the two families Astyridae and Stilipedidae (both sensu Coleman and Barnard 1991), in addition to the combination of possessing both a well developed mandibular molar and conspicuous dorsal projections on pereonite 7 and pleonites 1-3.

*Eclysis* must be considered as being very closely related to the genus *Astyra*, based on the close affinities between *E. similis* and the pair of sister species *Astyra abyssi* Boeck, 1871 (the type species of *Astyra*) and *A. antarctica* Andres, 1997. *Astyra* appears otherwise to be a heterogeneous group of species, but it is premature to discuss this in much detail; the genus will be revised in a separate paper. However, the only two main characters separating *E. similis* from the two mentioned *Astyra* species are the absence of a left lacinia mobilis and the presence of dorsal teeth on pereonite 7 and pleonites 1-3. The last of these two characters may be more virtual than real, as large specimens of *A. abyssi* in fact do possess a dorsal projection on pleonite 3 (Berge, unpublished). The maxilliped and left mandible of *A. antarctica* (Weddell Sea, ANDEEP station 133-3) are illustrated in Fig. 4, in order to show this similarity. It should be noted, however, that the specimens collected from the Weddell Sea herein referred to as *A. antarctica* in fact may be a new, undescribed species, as they show some consistent discrepancies with the original illustrations of *A. antarctica*, mainly in the setation of the mouthparts.

Especially the arrangement of the raker setae (on the left mandible only), with the seta closest to the incisor being separated from the others, is a synapomorphy shared by the two Antarctic species (or species groups, see above) *E. similis* and *A. antarctica*. On the other hand, the broad and anteriorly expanded coxa 1 and the very broad and large palp of the first maxilla are both characters that suggest a close relationship with the genus *Stilipes* (family Stilipedidae, see Berge 2003).

For the time being, and pending a revision and phylogenetic analysis of the families Astyridae and Stilipedidae, *Eclysis* is retained as a valid genus.

Family Stilipedidae sensu Coleman and Barnard (1991)

Genus *Bathypanoploea* Schellenberg, 1939

Type species

*Bathypanoploea schellenbergi* Holman & Watling, 1983, by present designation (see Remarks).

Remarks

The genus name *Bathypanoploea* was published by Schellenberg (1939) to replace the junior primary homonym *Iphimediopsis* Schellenberg, 1931. The latter had been erected with *Acanthonotozoma australis* Chilton, 1912 (= *Alexandrella australis*) as the type species. Holman and Watling (1983) discovered that Schellenberg had misidentified *Alexandrella australis* (Chilton), published the new name *Bathypanoploea schellenbergi* for Schellenberg’s misidentification, and suggested that this species, rather than *A. australis*, should be recognized as the type species of *Bathypanoploea*. Holman and Watling (1983) correctly reported this designation as “tentative”, because at that time the case would have had "to be submitted to the International Commission on Zoological Nomenclature" (op.cit., p. 46). No such Commission ruling has been issued or applied for, but this is no longer necessary under the rules of nomenclature (ICZN 1999). In accordance with Article 70.3 of this Code, the type species of *Bathypanoploea* Schellenberg, 1939 is fixed here as *B. schellenbergi* Holman & Watling, 1983, misidentified as *Acanthonotozoma australis* Chilton, 1912 in the original designation by Schellenberg (1931).

Examination of both the type species and the new species (see below), have revealed that at least one of the three known species (see *Bathypanoploea* sp. below) possesses a rudimentary molar. In the latter species, the molar is represented firstly by the rudimentary
molar process itself, but also by a small group of short simple setae (hereafter referred to as the molar tuft). In the two other *Bathypanoploea* species, only the molar tuft remains.

Holman and Watling (1983, p. 51) highlighted the shape and setation of the second maxilla, the setation of the maxilliped, and the shape and ornamentation of the telson, as the main characters distinguishing *Bathypanoploea* from *Alexandrella* Chevreux, 1912. However, examination of many previously known and new species of *Alexandrella* (Berge and Vader, in press) seems to indicate that all these differences are more virtual than real. Thus, at present, the only character that may distinguish the two genera is the presence of a rudimentary mandibular molar (see below) in *Bathypanoploea*. On the other hand, the presence of a rudimentary mandibular molar with the small group of short simple setae (i.e. the molar tuft) can easily be interpreted as evidence of a close relationship also with the Astyridae (see figures of the mandibles of *Eclysis similis* and *Astyra antarctica* above). Furthermore, both the arrangement of setae and the presence of a strongly cuspidate dactylus of the maxilliped palp and on peraeopods 1 and 2 may also be synapomorphies linking the *Bathypanoploea* / *Alexandrella* group with the two genera *Eclysis* and *Astyra*.

The allocation of these three species to *Bathypanoploea* may therefore prove to be unjustified in the future. However, as the genus *Alexandrella* is currently under revision, no further discussion on their relationship is presented here.

*Bathypanoploea schellenbergi* Holman & Watling, 1983

Figure 5.

*Bathypanoploea schellenbergi* Holman & Watling, 1983: 47

*Alexandrella pulchra* Ren in Ren & Huang, 1991: 291 (new synonymy)

**Material examined**

Female 30mm, 61°12'60"S, 54°32'30" W, 559 m, 19 Nov. 1996, RV Polarstern, ANT XIV/2 expedition, station 15-1, Museum für Naturkunde, (Berlin, Germany); female 25 mm, 61°47'00"S, 59°31'00" W, 555 m, 4 Dec. 1996, RV Polarstern, ANT XIV/2 expedition, station 63, Museum für Naturkunde, (Berlin, Germany); immature 8 mm, South Atlantic Ocean, RV Eltanin, cruise 6, station 350, 4 Dec. 1962, USNM (Washington, USA); 2 females (ca 50 mm), 72°49'54"S, 19°26'30" W, 470 m, 25 Feb. 1998, RV Polarstern, EASIZ II expedition, station 264, IRSNB; female (damaged), Weddell Sea, 28 Feb. 1996, RV Polarstern, EASIZ II expedition, station 77, IRSNB; male 25 mm, 73°17'-18"S, 21°08'-10"W, 459-457 m, 12 Feb. 1996, RV Polarstern, ANT XIII/3 expedition, station 12, IRSNB; female 25 mm, 71°12'00"S, 13°28'00"W, 672-677 m, 19 Feb. 1989, RV Polarstern, EPOS 3 expedition, station 289, IRSNB; immature 15 mm, 71°09'42"S, 12°28'42"W, 1444 m, 8 Dec. 1998, RV Polarstern, ANT XIV/2 expedition, station 77, Museum für Naturkunde (Berlin, Germany); female, Southern Ocean, off Enderby Land, Museum of Victoria reg nr J36979 (Australia); 2 males, 8 females, 74°37'00"S, 29°41'00"W, 798-810 m, 10 Feb. 1989, RV Polarstern, EPOS expedition, station 261, IRSNB; 2 females, 73°42'00"S, 22°30'00"W, 428-446 m, 15 Feb. 1996, RV Polarstern, ANT XIII/3 expedition, station 15, IRSNB; female, 60°39'53"S, 53°56'93"W, 2889 m, RV Polarstern, ANDEEP I expedition to the Weddell Sea, station 46-8, 30 Jan 2002, Agassiz Trawl, TMU; female, 75°15"S, 26°13'00"W, 500-506 m, 29 Jan. 1989, EPOS expedition, station 229, bottom trawl, IRSNB.

**Remarks**

This species was thoroughly described and figured by Holman and Watling (1983) and Coleman (1990). However, a few additional morphological characters are presented here (see Fig. 5). A molar tuft is present on the mandibles, although not observable on all specimens. This could mean that the sample contains more than one species, but no other morphological differences were detected that covaried with this particular trait. Thus, this variation is considered, at present, as falling within the concept of the species.

Two other morphological traits highlighted here are the third epimeral plate and the third uropod. The former has a distinct posteroventral tooth, whereas the latter has two long rami. The outer ramus is broader and longer than the inner.

Furthermore, because of the close similarity between the descriptions of *B. schellenbergi* and *Alexandrella pulchra* Ren, 1991, the mandibles and antennae of the latter were re-examined at our request by Dr. Ren and compared to those of the former. Originally, *A. pulchra* was described as lacking both an accessory flagellum on the first antenna and the lacinia mobilis on the right mandible. Re-examination revealed that it possesses both these features, and also a rudimentary molar similar to that of *B. schellenbergi*. As there are no other differences between these two taxa, their names are synonymized here.

**Bathypanoploea sp.**

Figure 6.
Material
Female 12 mm, 60°39'53"S, 53°56'93"W, 2889 m; RV Polarstern; ANDEEP 1 expedition to the Weddell Sea, station 46-7. 30 Jan. 2002, leg. C. De Broyer.

Remarks
The morphology of this species is very similar in general to that of Bathynanoea schellenbergi. The only detected differences are the presence of a rudimentary molar on the mandibles of B. sp. (Fig. 6), and the somewhat weaker dorsal tooth on metasome 3 in this species. However, due to the insufficiently preserved specimen and lack of additional material, the species is not given a formal scientific name. The presence of a rudimentary molar is both a novel character for the genus and potentially important for understanding the evolutionary relationships between this and other stiliipedid genera.

*Bathypanoea polarsterni* n.sp.

Figures 7-9.

Type material

Diagnosis
Maxilla 1 outer plate distally with transverse rows of short simple setae. Telson entire. Metasome segment 3 mediadly with a dorsal projection.

Etymology
This species is named after the research vessel on which the holotype was collected.

Description
Body: Rostrum very small, eyes absent. Epistome unproduced. Body dorsally smooth, but metasomite 2 and 3 dorsally with weakly developed projections. Urosomite 1 dorsally with a strong carina posteriorly and a deep excavation anteriorly. Coxa 1 anteriorly expanded, partly covering the head. Pereopods 5-7 and antennae weakly not to elongate.

Antennae: Antenna 1 shorter than antenna 2, peduncle article 1 longer than articles 2 and 3 combined, flagelhum with more than 15 segments. Accessory flagellum small, inconspicuous, uniarticulate. Callynophore absent in females. Antenna 2 peduncle article 4 shorter than 5, flagellum elongate with more than 20 segments.

Mouthparts: Labrum longer than broad, distally bilobed, right lobe large, left lobe strongly reduced. Labium distally pointed, inner lobes absent. Mandibles short, hinge line lateral. Incisors toothed and broad. Lacinia mobilis reduced on right mandible, large and toothed on left mandible. Row of accessory setae well developed, molar tuft present. Palp 3-articulate, article 2 longer than 3. Articles 2 and 3 weakly setose. Maxilla 1 palp 2-articulate, distal end weakly broader than proximal, distally with short simple and robust setae. Outer plate broad, setal teeth variable, holotype with ST in 11/6 arrangement, setae strongly cuspidate, medially with rows of short simple setae. Inner plate well developed, with two distal rows of pappopectinate setae. Maxilla 2 outer plate not as broad as inner plate, both distally with three distinct rows of setae. Maxilliped inner plate long, almost reaching end of palp article 2, distally with 2 nodular setae, distal and medial setae rows parallel and well developed with 6 and 10 short setae, respectively, inner margin heavily setose with long setae. Outer plate subovate, inner margin with one row of robust setae. Palp 4-articulate, article 1 weakly setose, half the length of article 2, dactylus cuspidate.

Pereopods and coxal plates: Coxa 1 large, weakly produced anteriorly, posterodistally with simple setae; coxae 2 and 3 long and broad, as long as coxa 1, posterodistally with simple setae; coxa 4 posterior lobe rounded, posterodistal margin straight, distally rounded; coxae 5 and 6 subequal, distally with posterior lobe large, anterior lobe absent; coxa 7 distally convex and rounded. Pereopod 1 simple, basis with long setae on posterior distal margin, ischium short, carpus weakly broader than propodus, posterodistally not produced, propodus subrectangular, dactylus powerful and serrate. Pereopod 2 simple, basis with short simple setae on anterior margin, ischium short, carpus not broader than propodus, posterodistally weakly produced, propodus subrectangular, dactylus powerful and serrate. Pereopod 3 shorter than 4, weakly setose, dactylus stout. Pereopods 5-7 not differentiated, elongate, progressively longer posteriorly, basis pereopod 7 concave posteriorly, posterodistally rounded, dactyli long and slender.

Gills on pereopods 2-7, oostegites on pereopods 2-5.

Epimeral plate 2 posterodistally acute, epimeral plate 3 posteriorly rounded and weakly produced. Urosomites 1-3 free, urosomite 1 dorsally with a deep excavation medially and distally with a large acute projection (not in holotype), urosomites 2-3 dorsally smooth. Uropod 1 reaching beyond uropod 2, biramous, rami subequal. Uropod 3 peduncle short, outer rami long and broad, without setae (inner rami lost in both specimens). Telson as long as broad, entire.

Remarks
The present species is distinguished from all other stiliipedid species by the combination of a medial tooth.
dorsally on metasome 3 (versus a distal tooth) and the special setation on the outer plate of maxilla 1 (rows of short simple setae). In addition, the entire telson separates the new species from all others in the genera Alexandrella and Bathypanoploea.

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References


Fig. 1: *Eclysis similis*. Male, 10 mm.
Fig. 2: *Eclysis similis*. Male, 10 mm.
Fig. 3: *Eclysis similis*. Male, 10 mm.
Fig. 4: Astyra antarctica.
Fig. 5: *Bathypanoploea schellenbergi*. Male, 35 mm; EPOS expedition, station 261.
Fig. 6: *Bathypanoploea* sp. Female, 12 mm; ANDEEP station 46-7.
Fig. 7: Bathypanoploea polarsterni n. sp. Holotype.
Fig. 8: *Bathypanoploea polarsterni* n. sp. Holotype.
Fig. 9: *Bathypanoploea polarsterni* n. sp. P4, T and urosome (lower): paratype; all others: holotype.