



***Centromedon zoe* (Crustacea: Amphipoda: Lysianassoidea: Uristidae),
a new deep-water scavenger species from the North Atlantic,
with a key to the genus *Centromedon***

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Abstract

A new species of *Centromedon* Sars, 1891 is described based on abundant material collected in baited traps at 2500 m on the Mid-Atlantic Ridge. The species can be distinguished from the most closely allied species, *Centromedon typhlops* (Sars, 1879), *Centromedon mediator* (Barnard, 1962) comb. nov. and *Centromedon laevis* (Bonnier, 1896) comb. nov., by the form of the gnathopods, and characters of the mouthparts. A key to the eight species in the genus is provided. The differences between the closely allied genera *Uristes* Dana, 1849 and *Centromedon* are discussed.

Key words: Crustacea, Amphipoda, Lysianassoidea, Uristidae, *Centromedon*, *Uristes*, new species, deep-sea

Introduction

Currently, the genus *Centromedon* (Lysianassoidea: Uristidae) comprises five species: *Centromedon pumilus* (Lilljeborg, 1865), an arctic and boreal shelf species (probably circumpolar); *Centromedon productus* (Goës, 1866), an arctic shelf species (Svalbard east to Kara Sea); *Centromedon typhlops* (Sars, 1879), a deep-water species from the Norwegian Sea; *Centromedon calcaratus* (Sars, 1879) a deep-water and polar emergent species (Norwegian and Kara Seas) and *Centromedon pavor* Barnard, 1966, a relatively shallow-water species from California. Barnard (1962) removed all but the type species *Centromedon pumilus* to the genus *Uristes* based on the state of the mandibular molar and the relative lengths of the carpus and propodus of gnathopod 1. Olerod (1980) transferred the three species removed by Barnard back to the genus *Centromedon*, pointing out that all species have a ‘laminar, unridged molar’ and all except the aberrant *C. calcaratus* have the carpus and propodus of gnathopod 1 subequal. This paper summarised the status of the genus *Centromedon* and gave excellent redescriptions of the type species and the four other species in the genus known at the time.

Methods

Material was fixed in 4% formaldehyde and then transferred to 80% Industrial Methylated Spirits (80% IMS) on return to the laboratory. An Olympus™ SZ-XZ-10 stereo microscope was used for initial examination of specimens. One male paratype was dissected in order to provide details of parts which were not clear or which differed from the female holotype. Dissected parts were mounted in Polyvinyl-lactophenol (PVL) stained with lignin pink. Using an Olympus™ BX51 compound microscope, illustrations were prepared and were scanned and inked digitally using Adobe® Illustrator® and a WACOM™ digitiser tablet (Coleman 2004). Setal and mouthpart classifications follow Watling (1989) and Lowry & Stoddart (1992, 1993, 1995). The description was prepared using DELTA (Descriptive Language for Taxonomy: Dallwitz *et al.* 1997). Type material has been deposited at the Natural History Museum, London (NHM) and the Australian Museum, Sydney (AM). Additional material studied is held in the Discovery Collections, National Oceanography Centre, Southampton. Type material of *Uristes typhlops*

mediator (AMNH #11898–99 and 11942–43) and type material of *Centromedon typhlops* (ZMO #F1757) were borrowed from the American Museum of Natural History and the Zoological Museum of the University, Oslo, respectively.

The following abbreviations have been used: *A*, antenna; *G*, gnathopod; *L*, lower lip; *Md*, mandible; *Mx*, maxilla; *Mxp*, maxilliped; *P*, pereopod; *T*, telson; *U*, uropod; *Y*, paratype; All parts are left side unless otherwise indicated.

Systematics

Superfamily Lysianassoidea Dana, 1849

Family Uristidae Hurley, 1963

Genus *Centromedon* Sars, 1891

Centromedon Sars, 1891: 99–101, pl. 34, fig. 2. —Barnard, 1962: 35. —Olerod, 1980: 50, 51. —Barnard & Karaman, 1991: 474. —Lowry & Stoddart, 1995: 13.

Type species. *Anonyx pumilus* Lilljeborg, 1865, original designation.

Diagnosis. Lateral cephalic lobes triangular, subacute to acute. Eyes apparently absent. Callynophore well-developed in both males and females. Epistome flattened and separated from upper lip by a sinus or notch; upper lip rounded and projecting in front of epistome. Inner lobes of lower lip weak or absent. Mandibular molar conicolaminate with vestigial triturrative area, palp attached level with molar. Maxilla 1, inner plate stout with two pappose setae on apex (one in *C. pavor*); outer plate with 7–11 setal-teeth in 7–4 crown arrangement (reduced to 4–3 crown in *C. pavor* and 6–3 crown in *C. pumilus*); palp two-articulate, reaching beyond outer plate. Maxilla 2, outer plate longer than inner plate. Maxilliped, outer plate not reaching article 3 of palp, suboval, with long robust setae apically, small and sparsely placed robust nodular setae on straight inner margin; article 4 of palp normal to vestigial. Gnathopod 1 variable from subchelate to simple; coxa 1 variable from strongly to weakly tapered, (not tapered in *C. typhlops*); ischium short (1: <1.13). Gnathopod 2 subchelate to chelate. Pereopod 7 with distal articles shortened. Epimeron 3 posteroventrally produced into an acute tooth. Urosomite 1 with dorsal carina. Outer ramus of uropod 3 two-articulate, article 2 long (>50% article 1 length). Telson longer than wide, deeply cleft.

Species composition. *Centromedon pumilus* (Lilljeborg, 1865); *Centromedon productus* (Goës, 1866); *Centromedon typhlops* (Sars, 1879); *Centromedon calcaratus* (Sars, 1879); *Centromedon laevis* (Bonnier, 1896) (new combination); *Centromedon mediator* (Barnard, 1962) (new combination); *Centromedon pavor* Barnard 1966; and *Centromedon zoe* **sp. nov.**

Remarks. *Uristes typhlops mediator* Barnard, 1962 was originally described as a subspecies of *Centromedon typhlops* (Sars, 1879). An examination of the type material of both *Uristes typhlops mediator* and *Centromedon typhlops* shows that they differ by characters of the gnathopod 2, epimeron 3 and telson. There is also a clear size difference between the two species, with mature females of *C. typhlops* reaching 17 mm in length while those of *C. mediator* are 6 mm. *Uristes typhlops mediator* conforms to the diagnosis of *Centromedon* and is hereby transferred to this genus as *C. mediator*.

Orchomenella laevis Bonnier, 1896 was described from a single adult male (5 mm) taken in the Bay of Biscay (44°17' N, 02°18' W) at 950 m. It was transferred to *Tryphosella* by Barnard, 1964 but it has a non-dominant epistome, reduced distal articles of pereopod 7 and otherwise conforms to the new diagnosis of *Centromedon*, except for the outer plate of the maxilliped, which does reach article 3 of the palp. It is hereby transferred to this genus as *C. laevis*.

The distinctions between the genus *Uristes* and *Centromedon* are unclear but clarification awaits a thorough redescription of *Uristes gigas* Dana, 1849, the type species of *Uristes* and a re-examination of the species currently included in that genus, an analysis which is beyond the scope of this paper. The location of Dana's material is unknown. It is very likely that the type material was part of a collection on loan from the Smithsonian Institution to William Stimpson, at the Chicago Academy of Science, at the time of the Chicago fire in 1871. All of Stimpson's material was lost in the fire and it is known that he had on loan 10,000 jars of Crustacea, many of which contained

type material described by James Dana (Evans 1967). Type material is not held at the Natural History Museum, London (Thurston & Allen 1969) and is presumed to be no longer extant. It is generally accepted, however, that *Tryphosa antennipotens* Stebbing, 1888 is synonymous with *Uristes gigas* (see Stebbing 1899). A full redescription of this species and designation of a neotype is needed to clarify the status of the genus. It is probable that a large number of the species currently included in the genus (22+) will be transferred to other genera following a critical analysis.

Centromedon should be retained for those species characterised by: sub-acute to acute head lobes; tapered coxa 1; laminar, unridged molar with vestigial triturative area; maxilla 1 outer plate with 7-4 crown setal-tooth arrangement; shortened distal articles of pereopod 7 and acutely produced epimeron 3.

The similarity of *Centromedon* to *Galathella* Barnard & Karaman, 1987 was noted by Lowry & Stoddart (1995), who pointed out that these are the only two genera in the Uristidae with a tapering first coxa and 7-4 crown setal-tooth arrangement. It was also noted that both genera show a range of gnathopod 1 morphologies with species characterised by a simple, weak structure through to others with a strongly subchelate gnathopod 1. The only differences between the two genera appear to be the sub-acute lateral cephalic lobe (rounded in *Galathella*), the lack of proximal A3 setae on the mandibular palp, the less well-developed molar, and the acutely produced posteroventral corner of epimeron 3 in *Centromedon*. Contrary to Lowry & Stoddart (1995), most species of *Centromedon* (*C. productus*, *C. typhlops*, *C. zoe* and *C. mediator*) have callynophores in the female. There is a degree of variability within the genus in that *C. pumilus* and *C. pavor* have a reduced number of setal-teeth on the outer plate of maxilla 1, a reduced article 4 of the maxilliped palp and less well-developed callynophore and gnathopod 1 (Olerod, 1980).

***Centromedon zoe* sp. nov.**

(Figures 1–3)

Type material. Holotype: female, 6.5 mm and 9 slides, NHMUK 2011.925. Allotype: male 6.3 mm (and one slide mount of antennae) NHMUK 2011.946. Paratypes: 12 mature females, average 6.5 mm (4.9–7.0 mm), NHMUK 2011.926 – 935; 12 mature males, average 6.1 mm (5.5–7.3 mm), NHMUK 2011.936 – 945; 5 mature females and 5 mature males (AM P.85244); collected at the Mid-Atlantic Ridge in the northern Atlantic Ocean, RRV *James Cook*, (cruise 011), station number JC011/098; freefall, acoustically-released, baited trap, deployed at 1313 hrs (UTC) 9 August 2007, 54° 04.08' N, 34° 09.43' W at 2500 m, released at 1125 hrs, 11 September 2007; bottom time, 46 hrs.

Additional material. 678 specimens, Mid-Atlantic Ridge, JC011/079, 05–07/08/2007, 53°56.44'N, 36°11.56'W, 2564 m; 1861 specimens, Mid-Atlantic Ridge, JC011/114, 12–13/08/2007, 54°02.31'N, 34°09.60'W, 2453 m; 860 specimens, Mid-Atlantic Ridge, JC011/098, 09–11/08/2007, 54°04.08'N, 34°09.43'W, 2500 m. 879 specimens, base of Sedlo Seamount, Azores, Stn. 56319#1, 40° 11.43' N, 26° 33.99' W, 2655 m; 574 specimens, 56354#1, 39° 50.17' N, 26° 17.82' W, 2876 m. 21 specimens, Stn. 51403#1, Benthic Net 1.5/3m, 51° 37.7' N, 12° 59.8' W, 1292–1314 m; 6 specimens, Stn. 51403#2, Benthic Net 1.5/3m, 51° 37.4' N, 12° 59.2' W, 1317–1325 m; 1 specimen, Stn. 51403#3, Benthic Net 1.5/3m, 51° 36.8' N, 12° 59.1' W, 1319–1325 m; 11 specimens, Stn. 51403#4 Benthic Net 1.5/3m, 51° 36.7' N, 12° 59.6' W, 1319–1333 m; 8 specimens, Stn. 51403#5, Benthic Net 1.5/3m, 51° 37.8' N, 12° 58.9' W, 1289–1297 m; 11 specimens, Stn. 51420#1, Benthic Net 1.5/3m, 51° 37.3' N, 12° 58.6' W, 1326–1328 m; 11 specimens, Stn. 51420#3, Benthic Net 1.5/3m, 51° 38.3' N, 12° 58.9' W, 1293–1298 m; 6 specimens, Stn. 51420#4, Benthic Net 1.5/3m, 51° 37.9' N, 12° 59.5' W, 1302–1319 m – all from the '*Pheronema*' ground in the Porcupine Seabight.

Diagnosis. Lateral cephalic lobes subacute, not projecting; mandibular palp with 8 distolateral A2 setae; maxillipedal palp article 4 well-developed; coxa 1 weakly tapered, anterior margin concave; gnathopod 1 subchelate, propodus subrectangular; basis anterior margin fully setose; gnathopod 2 minutely subchelate; propodus rectangular; pereopods 3 and 4 dactyli long, subequal to propodus; epimeron 3 tooth acute, not upcurved; urosome 1 with distinct triangular acute carina.

Description. Holotype female 6.5 mm. *Head:* exposed, as long as deep; lateral cephalic lobe large, narrow, subacute; *Eyes:* apparently absent. *Antenna 1:* short; peduncular article 1 short; peduncular article 2 short, length 0.3 x article 1; peduncular article 3 short, length 0.3 x article 1; primary flagellum nine-articulate; accessory flagellum long, length 0.45 x primary flagellum, three-articulate, forming cap, partially covering callynophore; callyno-

phore strong, two-field; calceoli absent. *Antenna 2*: short, length 1.17 x antenna 1; peduncle without brush setae; peduncular article 1 not greatly enlarged; weakly geniculate between peduncular articles 3–4; article 3 long, length 0.8 x article 4; flagellum well-developed, nine-articulate.

Epistome and upper lip: separate, upper lip dominant, weakly produced. *Lower lip lobes*: widely separated, inner lobes present. *Mandible*: incisor ventral margin smooth with small hook; lacinia mobilis present only on left mandible, a stemmed irregularly cusped peg; left and right accessory setal rows with simple robust setae and plumose setae; molar laminar, unridged with vestigial tritirative area at tip; palp attached level with molar; article 1 short, length 0.8 x breadth; article 2 slender, length 5 x breadth, with eight distolateral A2 setae; article 3 slender, blade-like, with two long B3 setae, ten D3 setae and three E3 setae. *Maxilla 1*: inner plate narrow, with 2 apical pappose setae; outer plate with setal-teeth in 7/4 crown arrangement, outer row with ST1–7 large and slender, ST1 four-cuspidate, ST2 three-cuspidate, ST3 four-cuspidate, ST4 six-cuspidate, ST5 seven-cuspidate, ST6 six-cuspidate, ST7 displaced from ST6, five-cuspidate, STA-D large, slender, STA four-cuspidate, STB five-cuspidate, STC six-cuspidate, STD six-cuspidate; palp large, two-articulate, article 1, short, article 2 with seven robust terminal setae, one flag seta and one sub-terminal simple seta. *Maxilla 2*: inner plate narrow, tapering distally, shorter than outer plate, with two sub-parallel, medial setal rows; outer plate with short robust and plumose setae. *Maxilliped*: inner plate large, suboval with three robust nodular setae, setal row strong, with eight pappose setae reaching apical margin, and two marginal setae; outer plate medium, subrectangular, with six simple robust setae apically and ten robust nodular setae medially; palp large, four-articulate, article 2 slender, length 2.5 x breadth, article 3 long, slender, length 1.9 x breadth, article 4 well-developed, with one subterminal seta.

Gnathopod 1: subchelate; coxa large, slightly shorter than coxa 2, weakly tapered distally, anterior margin concave, anteroventral corner broadly rounded, basis slender, long, length 4.4 x breadth, strongly setose anteriorly; ischium short, length 1.0 x breadth; carpus subrectangular, lacking posterior lobe, subequal in length to propodus, length 1.9 x breadth; propodus subrectangular, margins subparallel, palm oblique. *Gnathopod 2*: minutely subchelate; coxa large, subequal to coxa 3; ischium long, length 2.5 x breadth; carpus length 2.4 x breadth; propodus subrectangular; dactylus inserted at anterior corner of propodus, reaching palm edge. *Pereopod 3*: coxa large, subrectangular; basis slender, straight, margins subparallel, dactylus long, straight. *Pereopod 4*: coxa deeper than wide with posteroventral lobe broadly rounded, posterior margin straight. *Pereopod 5*: coxa posterior lobate (no lateral ridge); basis expanded, posterior margin weakly convex, posterior lobe narrowly rounded. *Pereopod 6*: coxa small, posterior lobate; basis expanded, posterior margin weakly convex, posterodistal lobe narrowly rounded. *Pereopod 7*: coxa small; basis broadly expanded and rounded, posterodistal lobe broadly rounded; distal articles shortened, together 0.76 x length of basis.

Pleonites 1 to 3: not carinate. *Epimeron 2*: posteroventral corner convex, broadly rounded. *Epimeron 3*: posteroventral corner produced acutely. *Urosome*: urosomite 1 with distinct carina, forming a posteriorly directed acute ‘tooth’. *Uropod 1*: peduncle, length 1.24 x inner ramus, with four lateral robust setae and six medial robust setae; outer ramus subequal to inner ramus; inner ramus with one medial robust seta and two lateral robust setae; outer ramus with one lateral robust seta and two medial robust setae. *Uropod 2*: peduncle, length 0.86 x inner ramus, with four lateral robust setae; outer ramus subequal to inner ramus; inner ramus with two medial robust setae and one lateral robust seta; outer ramus with two lateral robust setae. *Uropod 3*: peduncle, length 0.8 x inner ramus, with four apicolateral robust setae, four apicomедial robust setae and two medial simple slender setae; inner ramus shorter than outer ramus, length 0.84 x outer ramus, with one medial slender seta, one medial robust seta and one lateral robust seta; outer ramus two-articulate, article 2 length 0.77 x article 1, article 1 with one medial robust seta and three lateral robust setae. *Telson*: long, lobes tapering, length 1.56 x breadth, cleft 81%, with two dorsal robust setae per lobe; apices incised, each with apical notch and one robust seta.

Male. As for female except *Antenna 1*: peduncular article 2, length 0.23 x article 1; peduncular article 3, length 0.18 x article 1; primary flagellum 11-articulate; accessory flagellum, length 0.65 x primary flagellum, calceoli present. *Antenna 2*: long, length 2.3 x antenna 1; peduncle with brush setae; calceoli present; flagellum 22-articulate.

Distribution. North-east Atlantic Ocean, 1289–2876 m; Mid-Atlantic Ridge, Azores seamounts, Porcupine Seabight.

Etymology. The species is named in honour of the first author’s first daughter, Zoë, noun in apposition.

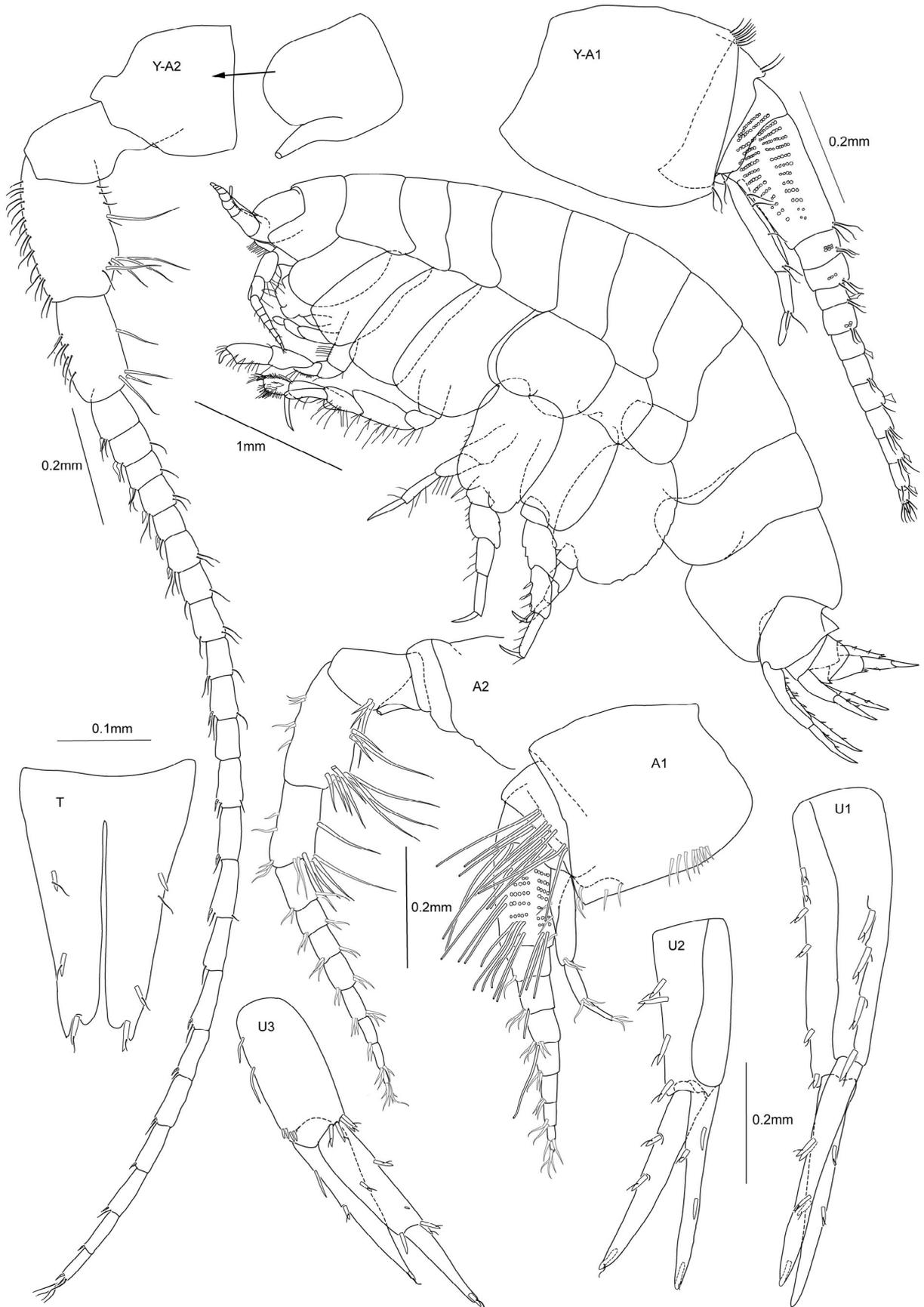


FIGURE 1. *Centromedon zoe* sp. nov. Holotype female, 6.5 mm, habitus, antennae, uropods and telson, Y-allotype male, 6.3 mm, antennae.

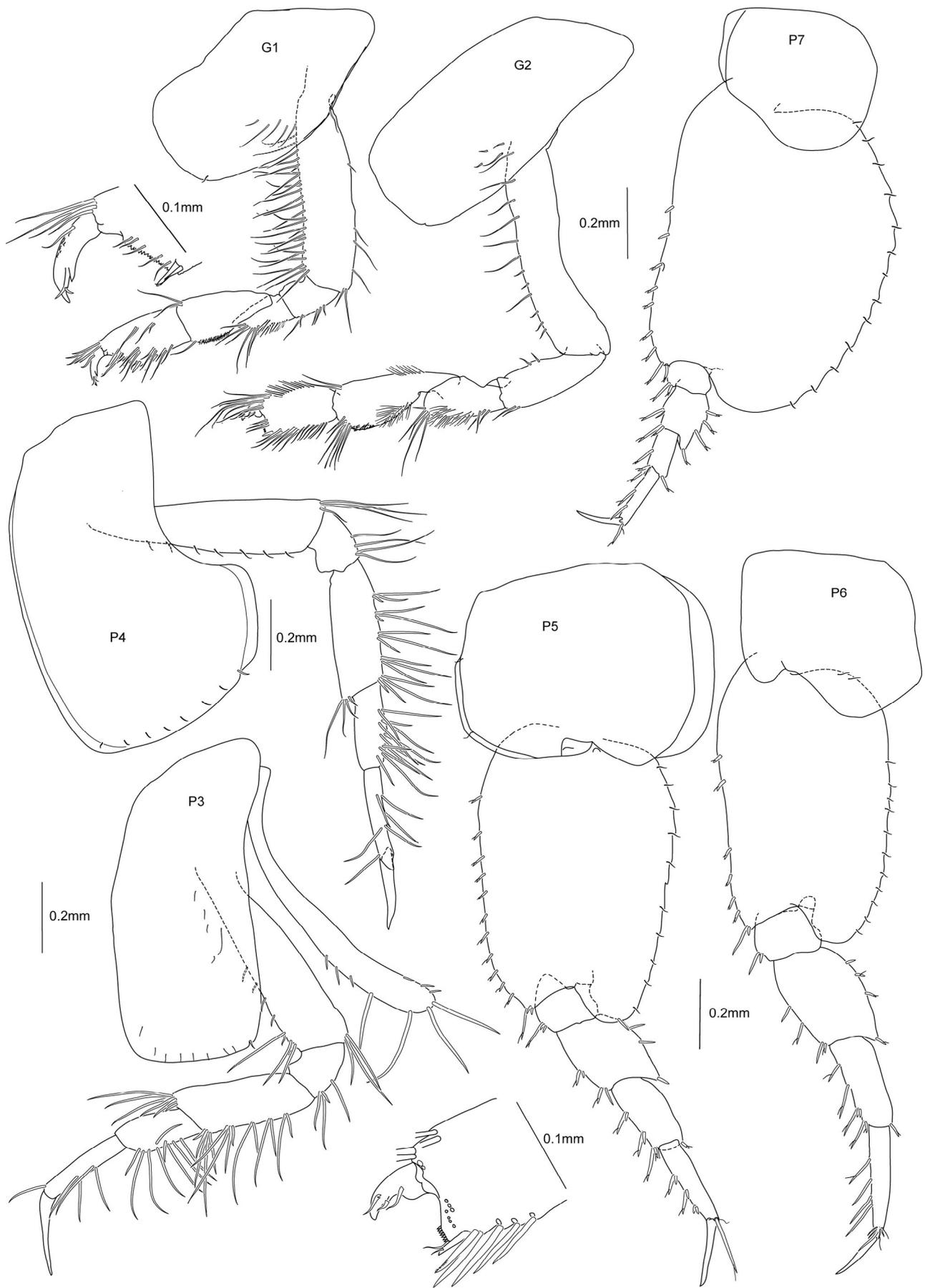


FIGURE 2. *Centromedon zoe* sp. nov. Holotype female, 6.5 mm, gnathopods and pereopods.

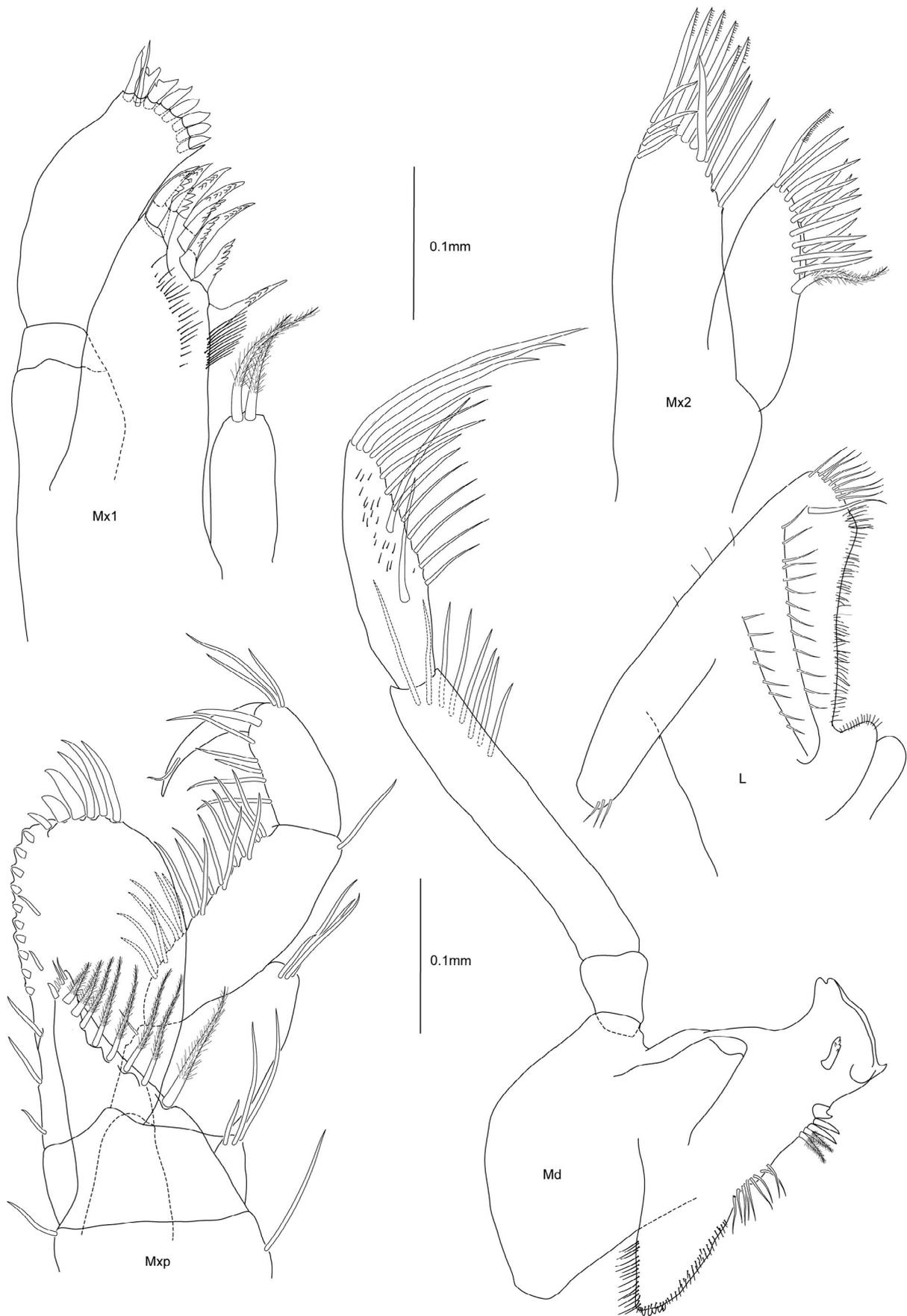


FIGURE 3. *Centromedon zoe* sp. nov. Holotype female, 6.5 mm, mouthparts.

Remarks. This small scavenging species has been captured in great numbers in baited traps set at around 2500 m at the Mid-Atlantic Ridge. It resembles most closely the species *C. typhlops*, *C. mediator* and *C. laevis*. It can be distinguished from *C. typhlops* by the acute boss on urosome 1, the longer dactyls of the pereopods, the rectangular form of the propodus of gnathopod 2 (suboval in *C. typhlops*), details of the mouthparts and antennae, and the much smaller mature female size (6 mm in *C. zoe* vs. 17.5 mm in *C. typhlops*). It can be distinguished from *C. mediator* by the form of gnathopod 2 (chelate in *C. mediator*), the number of articles in the antennae, the less well-developed molar, the number of A2 setae on the mandibular palp, and the less produced epimeron 3 tooth. It can be distinguished from *C. laevis* by the fully setose anterior margin of the basis of gnathopod 1 (only two setae in *C. laevis*), the length of the dactyls on pereopods 3 and 4 (subequal to propodus in *C. zoe*, longer than propodus in *C. laevis*), the anterior margin of coxa 1 (concave in *C. zoe*, convex in *C. laevis*) and the shape of coxa 4 posterior lobe (more rounded in *C. zoe*).

Tryphosella abyssii Norman, 1900, included under *Uristes* by Barnard & Karaman (1991) has been recorded only once. A single 6 mm male specimen was collected at 1071 m in the ‘cold area of the Faroe Channel’ by Sir John Murray, aboard HMS *Triton*, in 1882 (Station 7: 60°19' N, 7°10' W). Type material of this species is not in the Norman Collection at the Natural History Museum. The description and illustrations given by Norman (1900), particularly of the sub-acute lateral cephalic lobes, the dominant upper lip, and the acute urosome boss, place it close to the new species *Centromedon zoe*. However, the Norman species is distinguished by the rounded posterodistal lobe of epimeron 3. Without type material, or further material that can be linked with this species it is hereby referred to *nomen dubium*.

Key to the species of *Centromedon*

1. Gnathopod 1 simple; pereopod 7, basis with prominent postero-distal spur. *Centromedon calcaratus* (Sars, 1879)
- Gnathopod 1 subchelate; pereopod 7, basis lacking prominent postero-distal spur 2
2. Lateral cephalic lobe strongly projecting, acute; epimeron 3 with postero-distal corner produced into an acute strongly upcurved tooth. *Centromedon productus* (Goës, 1866)
- Lateral cephalic lobe subacute; epimeron 3 produced into an acute tooth, not strongly upcurved. 3
3. Coxa 1 tapering strongly, sub-triangular; gnathopod 1 propodus sub-triangular, palmar angle obscure 4
- Coxa 1 tapering weakly; gnathopod 1 propodus sub-rectangular, palmar angle distinct 5
4. Lateral cephalic head lobe short, sub-triangular; dactyls of pereopods 3 and 4 longer than propodus; article 4 of maxillipedal palp vestigial. *Centromedon pavor* (Barnard, 1966)
- Lateral cephalic head lobe produced, sub-acute; dactyls of pereopods 3 and 4 shorter than propodus; article 4 of maxillipedal palp short. *Centromedon pumilus* (Lilljeborg, 1865)
5. Urosomite 1 with distinct triangular acute carina. 6
- Urosomite 1 lacking distinct triangular acute carina. *Centromedon typhlops* (Sars, 1879)
6. Gnathopod 2 chelate *Centromedon mediator* (Barnard, 1962)
- Gnathopod 2 minutely subchelate 7
7. Gnathopod 1 basis setose anteriorly; pereopods 3 and 4 dactyls subequal in length to propodus; coxa 1 concave anteriorly. *Centromedon zoe* **sp. nov.**
- Gnathopod 1 basis with two setae anteriorly; pereopods 3 and 4 dactyls longer than propodus; coxa 1 convex anteriorly. *Centromedon laevis* (Bonnier, 1896)

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