

**A new species of *Chaetozone*
(Polychaeta, Cirratulidae) from Europe,
with a re-description of *Caulleriella*
zetlandica (McIntosh)**

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ABSTRACT

Chaetozone setosa Malmgren, 1867 is common in soft sediments from the intertidal zone to the deep sea and is recorded as having a cosmopolitan distribution. It has been apparent for some time that more species of *Chaetozone* may be present than are currently recognised. During benthic monitoring in the English Channel, a distinct species of *Chaetozone*, *C. gibber* sp. nov. was recognised. The new species is described in detail and distinguished from *C. setosa*. As *Caulleriella zetlandica* (McIntosh, 1911) is similar in overall appearance and lacks a full description, this species is re-described from material obtained near the type locality. Although the spines of both species are unidentate in fully grown individuals, *C. zetlandica* can be distinguished from *C. gibber* by the lack of spines in the notopodia. The need for re-definitions of the genera *Chaetozone* and *Caulleriella* is discussed.

RÉSUMÉ

Une nouvelle espèce de *Chaetozone* (Polychètes, Cirratulidae) en Europe, avec une re-description de *Caulleriella zetlandica* (McIntosh)

Chaetozone setosa Malmgren, 1867 est une espèce commune dans les sédiments meubles, depuis la zone intertidale jusqu'aux grandes profondeurs et présente une distribution cosmopolite. Depuis quelques temps, il s'est avéré qu'il existait davantage d'espèces de *Chaetozone* qu'on ne l'admettait habituellement. Au cours d'un suivi des peuplements benthiques de la Manche, une espèce distincte de *Chaetozone*, *C. gibber* sp. nov. a été reconnue. La nouvelle espèce est décrite en détail et comparée à *C. setosa*. *Caulleriella zetlandica* (McIntosh, 1911), espèce d'aspect général similaire et dont on ne possédait pas de description complète, est redécrite d'après des spécimens obtenus près de la localité type. Quoique les épines des deux espèces soient unidentées chez les individus adultes, *C. zetlandica* peut être distinguée de *C. gibber* par l'absence d'épines au notopode. Le besoin d'une redéfinition des genres *Chaetozone* et *Caulleriella* est commenté.

INTRODUCTION

Chaetozone setosa Malmgren, 1867 has been recorded from the intertidal zone to the deep sea, and from such widespread areas as the Arctic (MALMGREN, 1867), north Pacific (HARTMAN, 1961) and West Africa (DAY, 1967). It is the only species of *Chaetozone* recorded from the eastern North Atlantic area (SOUTHERN, 1914; FAUVEL, 1927; HARTMANN-SCHRÖDER, 1971; HOWSON *et al.*, 1987), although its apparent variability in form has been noted (CHRISTIE, 1985; LECHAPT, 1983; pers. obs.).

During benthic monitoring in the English Channel, an undescribed bi-tentaculate cirratulid was discovered. It possesses spines with unidentate tips only and, following the definitions of HARTMAN (1961), is assigned to *Chaetozone*. The new species is most similar in appearance to *Caulleriella zetlandica* (McIntosh, 1911), a species common around the British Isles but originally described from a posterior fragment only. This species is re-described using abundant material collected during surveys close to the type locality in Shetland. A syntype of *Caulleriella caputesocis* (de Saint-Joseph, 1894), another species distinguished by spines with unidentate tips and recorded from European waters, was also re-examined.

MATERIALS AND METHODS

The bulk of the specimens of *Chaetozone gibber* sp. nov. and *Caulleriella zetlandica* were collected using a van Veen grab during benthic monitoring surveys off Folkestone, Kent, U.K. and in Sullom Voe, Shetland, U.K. respectively. Samples were sieved through a 1.0 mm (*C. gibber* sp. nov.) or 0.5 mm (*C. zetlandica*) mesh and the retained material fixed in an approximately 10% formalin solution, later being transferred to a 2% phenoxytol solution containing Rose Bengal stain to aid sorting. Material for scanning electron microscopy (SEM) was relaxed for two hours in magnesium chloride solution before fixation. After washing in distilled water, it was dehydrated through an acetone series, critical point dried and gold-coated. Specimens were examined using a Wild M7 stereomicroscope and a Cam Scan Series 4 SEM. All drawings were prepared with the aid of a camera lucida.

Additional material from the National Museum of Wales (NMW), National Museum of Ireland (NMI), British Museum (Natural History) (BMNH), Muséum National d'Histoire Naturelle (MNHN) and the Plymouth Marine Laboratory (PML) was also examined.

SYSTEMATICS

Chaetozone gibber sp. nov.

MATERIAL EXAMINED. — U.K.: off Folkestone, Kent, SE England, very fine silt-medium sand, 3.5-20.5 m, numerous specimens collected by Environment and Resource Technology Ltd (ERT) and deposited in the National Museums of Scotland, NMSZ 1992.89; Turnaware Point, Cornwall, SW England, 4.3 m, two specimens, NMWZ 1992.046.5; Milford Haven, S Wales, 46 specimens, NMWZ 1985.083 and .087. France: Banyuls-sur-Mer, 40-45 m, two specimens, NMWZ 1992.03.

TYPE MATERIAL. — One holotype and nine paratypes from Folkestone are deposited in the National Museums of Scotland (Holotype NMSZ 1992.87, Paratypes NMSZ 1992.88). The holotype measures 19 mm for 115 chaetigers. Paratype material is also deposited in the British Museum (Natural History) (BMNH 1992.427-432), the National Museum of Wales (NMWZ 1993.009) and the Muséum National d'Histoire Naturelle (MNHN 1992 U.C.355).

DESCRIPTION. — Length of body up to 20 mm for approximately 200 segments. Body surfaces smooth; dorsal surface swollen anteriorly between chaetigers 7-30 approximately, giving a characteristic hump-backed appearance (Figs 1c & 3a); ventral surface flattened with a longitudinal groove; posterior region bluntly tapered, dorso-ventrally compressed with lateral surfaces somewhat flattened giving almost rectangular shape in cross section (Fig. 1e). Segments broad, short and crowded in anterior region, becoming narrower and longer posteriorly, without intersegmental constrictions. Colour of preserved material (in alcohol) creamy white.

Prostomium conical with acutely pointed tip. Pair of subdermal eyes, round to elongate, near lateral posterior margins; shallow nuchal groove below and behind each eye (Fig. 1c).

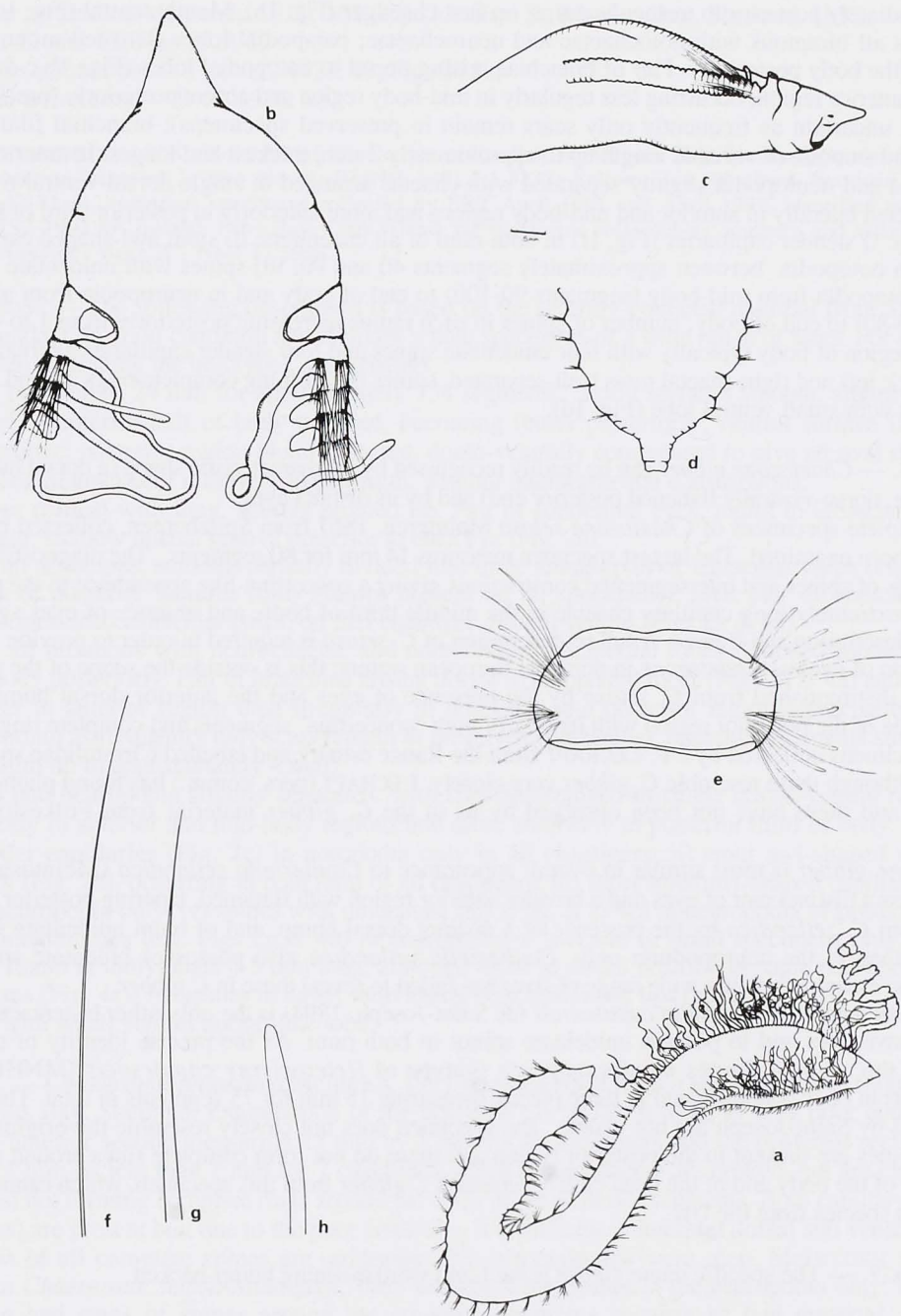


FIG. 1. — *Chaetozone gibber* sp. nov. from Folkestone: a, complete animal, holotype. b, anterior end, dorsal view. c, anterior end, lateral view. d, posterior region, dorsal view. e, cross section of posterior segment. f, slender capillary chaeta. g, stout awl-shaped capillary chaeta from mid-body notopodium. h, spine with blunt unidentate tip from posterior chaetiger.

Peristomium achaetous, smooth, partially divided into 3 annuli, pair of grooved tentacular palps originating from dorsal surface of posterior annulus, measuring approximately 1/3 of body length. First pair of branchiae arising immediately posterior to tentacular palps, on first chaetiger (Fig. 1b). Mouth ventral (Fig. 1c).

Parapodia all biramous with notochoetae and neurochoetae; parapodial lobes flattened mounds, extending further from the body posteriorly. Pair of branchiae arising dorsal to notopodial lobes (Figs 1b,c & 3b) on every chaetiger in anterior region, occurring less regularly in mid-body region and absent posteriorly (precise occurrence of branchiae uncertain as frequently only scars remain in preserved specimens); branchial filaments simple, cylindrical and smooth, of variable length up to approximately 2 mm, thickest and longest in anterior region.

Notopodia and neuropodia slightly separated with chaetae arranged in single dorsal-ventral rows (Fig. 1e). Chaetae directed laterally in anterior and mid-body regions and more anteriorly in posterior third of body. Chaetae of three types: i) slender capillaries (Fig. 1f) in both rami of all chaetigers; ii) stout awl-shaped capillaries (Figs. 1g and 3d) in notopodia between approximately segments 40 and 90; iii) spines with unidentate tips (Figs. 1h and 3c) in notopodia from mid-body (segments 90-100) to end of body and in neuropodia from anterior region (segments 50-80) to end of body; number of spines in each ramus increasing posteriorly from 1 to 4; each ramus in posterior region of body typically with four unidentate spines and four slender capillaries alternating with each other (Fig. 1e); left and right chaetal rows well-separated, spines not forming complete rings around segments.

Pygidium with small ventral lobe (Fig. 1d).

REMARKS. — *Chaetozone gibber* can be readily recognised by its characteristic shape (a dorsal hump anteriorly and a tapering, dorso-ventrally flattened posterior end) and by its distinct eyes.

Nine complete specimens of *Chaetozone setosa* Malmgren, 1867 from Spitzbergen, collected by M. Kendall (PML) have been examined. The largest specimen measures 14 mm for 80 segments. The diagnostic characters of complete rings of spines and intersegmental constrictions giving a concertina-like appearance to the posterior third of the body, extremely long capillary chaetae in the middle third of body, and absence of eyes agree well with Malmgren's description and figures. A full re-description of *C. setosa* is required in order to provide a basis for the re-examination of eyeless *Chaetozone* in northern European waters; this is outside the scope of the present paper. *C. gibber* is distinguished from *C. setosa* by the presence of eyes and the anterior dorsal hump, and by the flattened shape of the posterior region with its lack of both "concertina" segments and complete rings of spines.

Eight specimens collected by J-P. LECHAPT from the Rance estuary and labelled Cirratulidae sp. A have been examined. Although these resemble *C. gibber* very closely, LECHAPT (pers. comm.) has found plumose chaetae in his material and these have not been observed by us in the *C. gibber* material from Folkestone and other localities.

Chaetozone gibber is most similar in overall appearance to *Caulleriella zetlandica* (McIntosh, 1911): both species possess a distinct pair of eyes and a broader anterior region with flattened, tapering posterior end. It can be separated from *C. zetlandica* by the presence of a distinct dorsal hump, and of blunt unidentate spines in both rami, rather than in the neuropodium only. *Caulleriella zetlandica* also possesses bidentate spines in small individuals; an examination of a wide range of sizes has failed to reveal these in *C. gibber*.

In European waters, *Caulleriella caputesocis* (de Saint-Joseph, 1894) is the only other bi-tentaculate cirratulid reported to have eyes and to possess unidentate spines in both rami. As the precise identity of this species is unclear, and the original figures uninformative, a syntype of *Heterocirrus caputesocis* (MNHN A181) was examined. It is in poor condition and in three pieces, measuring 15 mm for 75 segments in total. The eyes figured and described by Saint-Joseph are not visible. The specimen does not closely resemble the original figures, but unidentate spines are present in the posterior region and these do not form complete rings around the body. The overall shape of the body and of the head clearly separates *C. gibber* from this specimen, which cannot be assigned to any known species from the UK.

ETYMOLOGY. — The specific name *gibber* is the Latin word meaning hump-backed.

DISTRIBUTION AND HABITAT. — The species has been recorded from the south coasts of England and Wales and the Mediterranean coast of France, from depths of 3.5-45 m. It has been found in silty and sandy sediments and in abundances of up to 245 ind. m⁻². The benthic fauna at Folkestone, England, U.K. (type locality) has been monitored annually since 1983 and is very similar to the *Abra alba-Melinna palmata* community described by IBANEZ & DAUVIN (1988) from the Bay of Morlaix area of the western English Channel (Institute of Offshore Engineering/ERT, unpublished reports). *Chaetozone gibber* sp. nov. has appeared constantly in samples collected each year throughout this period. A species identified as *C. setosa* is present in the same community.

Re-description of *Caulleriella zetlandica* (McIntosh, 1911)

Chaetozone zetlandica McIntosh, 1911: 161 (type locality: St. Magnus Bay, Shetland, U.K.). — SOUTHERN, 1914: 115, pls 12 and 13, Figs 29 A-K

Heterocirrus zetlandica. — FAUVEL, 1927: 99, Figs 34 i-n

Caulleriella zetlandica. — DAY, 1976: 507

MATERIAL EXAMINED. — U.K.: Holotype of *Chaetozone zetlandica*, St. Magnus Bay, Shetland, Scotland, 100 fathoms (\approx 170 m), posterior fragment in two pieces, BMNH 1921.5.1.3232; Sullom Voe, Shetland, Scotland, very fine to medium sand, 17-31 m, numerous specimens collected by ERT April 1991 and April 1992, identified as *Caulleriella zetlandica*, NMSZ 1992.89. Ireland: Fahy Bay, Clare Island, six specimens collected by Southern and assigned by him to *Chaetozone zetlandica* "stage A", NMI 77.1908.

DESCRIPTION. — The following description is based on the recently-collected material from Shetland. This material is abundant, in good condition and includes whole specimens of a wide range of sizes. For consideration of other material (including the holotype), see *Remarks*.

Length of body up to 24 mm for approximately 154 segments. Body surfaces smooth, slightly iridescent. Dorsal surface of anterior half of body rounded, becoming flatter posteriorly; ventral surface flattened with longitudinal groove; posterior region bluntly tapered, dorso-ventrally compressed to give an oval shape in cross section (Fig. 2b). Segments of relatively even length, without intersegmental constrictions.

Prostomium conical with long, acutely pointed tip. Pair of subdermal eyes, round to elongate, near lateral posterior margin; shallow nuchal groove posterior to each eye (Fig. 2a).

Peristomium achaetous, smooth, partially divided into three annuli, pair of tentacular palps originating from dorsal surface of posterior annulus (only stumps present on all specimens). First pair of branchiae originate immediately posterior to tentacular palps, on first chaetiger. Mouth ventral (Figs 2a & 4a).

Parapodia all biramous with neurochaetae and notochaetae; parapodial lobes flattened mounds, extending further from body posteriorly. Pair of branchiae arising dorsal to notopodial lobes (Figs 2a & 4a) and occurring on every chaetiger in anterior region then irregularly in mid-body and posterior regions (precise occurrence of branchiae uncertain as frequently only scars remain in preserved specimens); branchial filaments simple, smooth, of variable length up to approximately 4 mm.

Notopodia and neuropodia slightly separated, with chaetae arranged in single dorsal-ventral rows, directed latero-posteriorly in anterior and mid-body regions and more anteriorly in posterior third of body. Chaetae of 5 types: i) slender capillaries (Fig. 2c) in notopodia only in all chaetigers; ii) stout awl-shaped capillaries of medium length (Fig. 2d), occurring in both rami of all chaetigers; iii) short stout awl-shaped capillaries (Fig. 2e), in mid-body neuropodia only; iv) spines with unidentate tips (Figs 2f & 4c) in neuropodia of posterior region; v) spines with bidentate tips (e.g. Figs 2g & 4d) in neuropodia of juvenile or small specimens only. Spines with bidentate tips found in individuals 4-5 mm long, although those in dorsal position of same neuropodia approach unidentate forms (Fig. 4c). All spines in larger individuals with unidentate tips only.

Pygidium with small ventral button-like lobe.

REMARKS. — *Chaetozone zetlandica* McIntosh, 1911 was described from a single headless fragment dredged from St Magnus Bay, Shetland. Examination of the holotype has shown it to be in very poor condition and in two parts, the anterior section measuring 15 mm by 1 mm for 46 chaetigers and the posterior section including the pygidium 1 mm by less than 1 mm for 7 chaetigers. Most of the chaetae are broken, but are clearly in well-separated rows; not forming complete rings around the body in the posterior segments. Both capillary and acicular chaetae (spines) are present but, due to the poor condition, it is difficult to interpret dorsal and ventral surfaces of the body. Tips of all complete spines are unidentate. No bidentate tips were seen. McINTOSH separated his specimen from *Chaetozone setosa* Malmgren, 1867 because it had spines in the neuropodia only: he was aware that *C. setosa* had rings of spines around the posterior segments because he had material, collected by MALMGREN, from Finmark (BMNH 1921.5.1.3226).

SOUTHERN (1914) described material from Clare Island, northwest Ireland, which he assigned to *Chaetozone zetlandica* after examining McINTOSH's holotype. His collection included three forms, which he believed represented three different stages of development (Stages A, B and C; table and summary p.118). Six specimens of SOUTHERN's stage A, the smallest of the forms he described, were examined in the present study. The smallest individual is 5 mm by 0.5 mm for 43 chaetigers and the largest 6 mm by 0.5 mm for 75 chaetigers. The bidentate

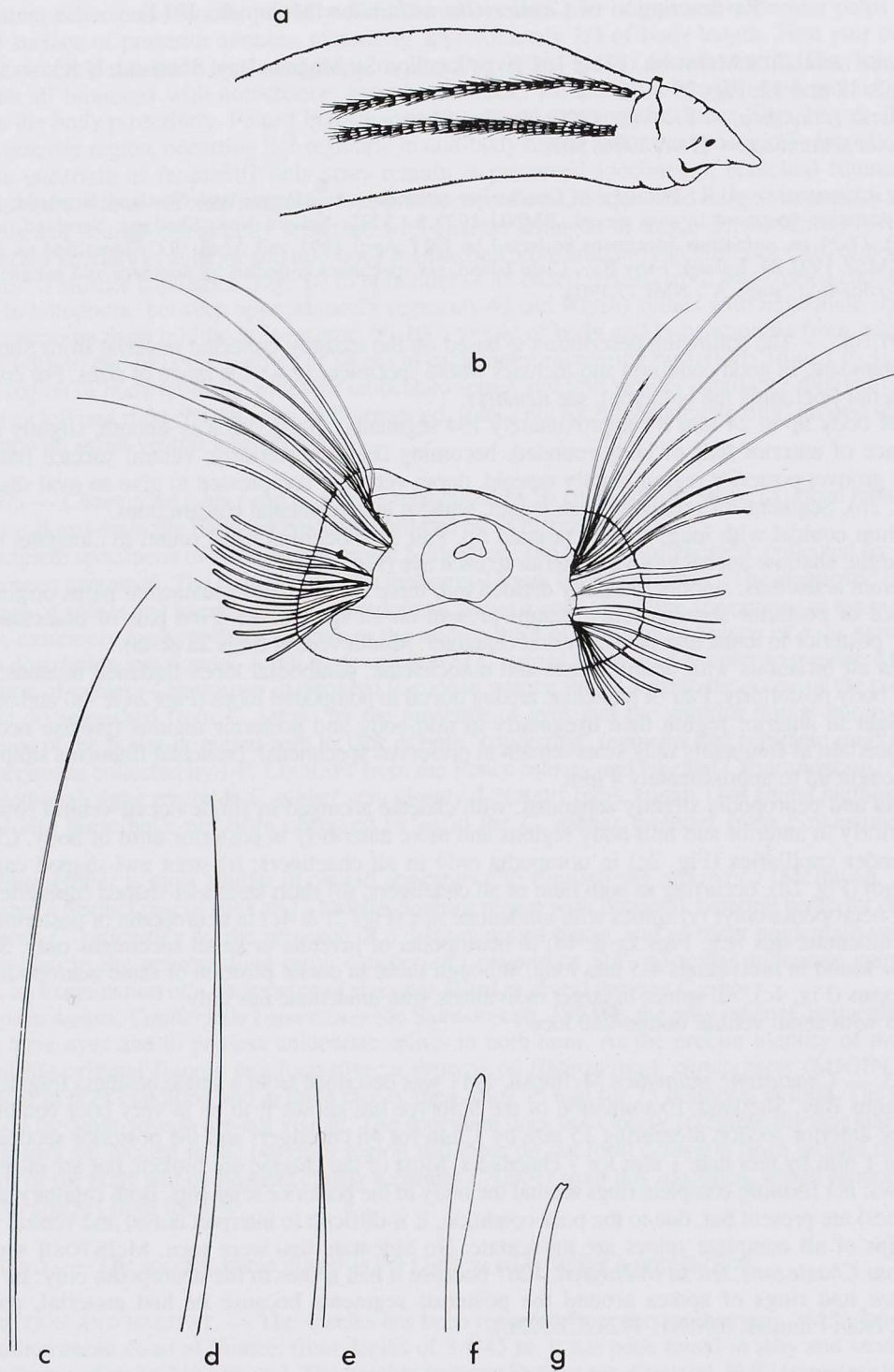


FIG. 2. — *Caulleriella zetlandica* from Sullom Voe: **a**, anterior end, lateral view. **b**, cross section of posterior segment. **c**, slender capillary chaeta. **d**, stout awl-shaped capillary chaeta, medium length. **e**, stout awl-shaped capillary chaeta, short. **f**, spine with unidentate tip. **g**, spine with bidentate tip from individual of 5 mm length.

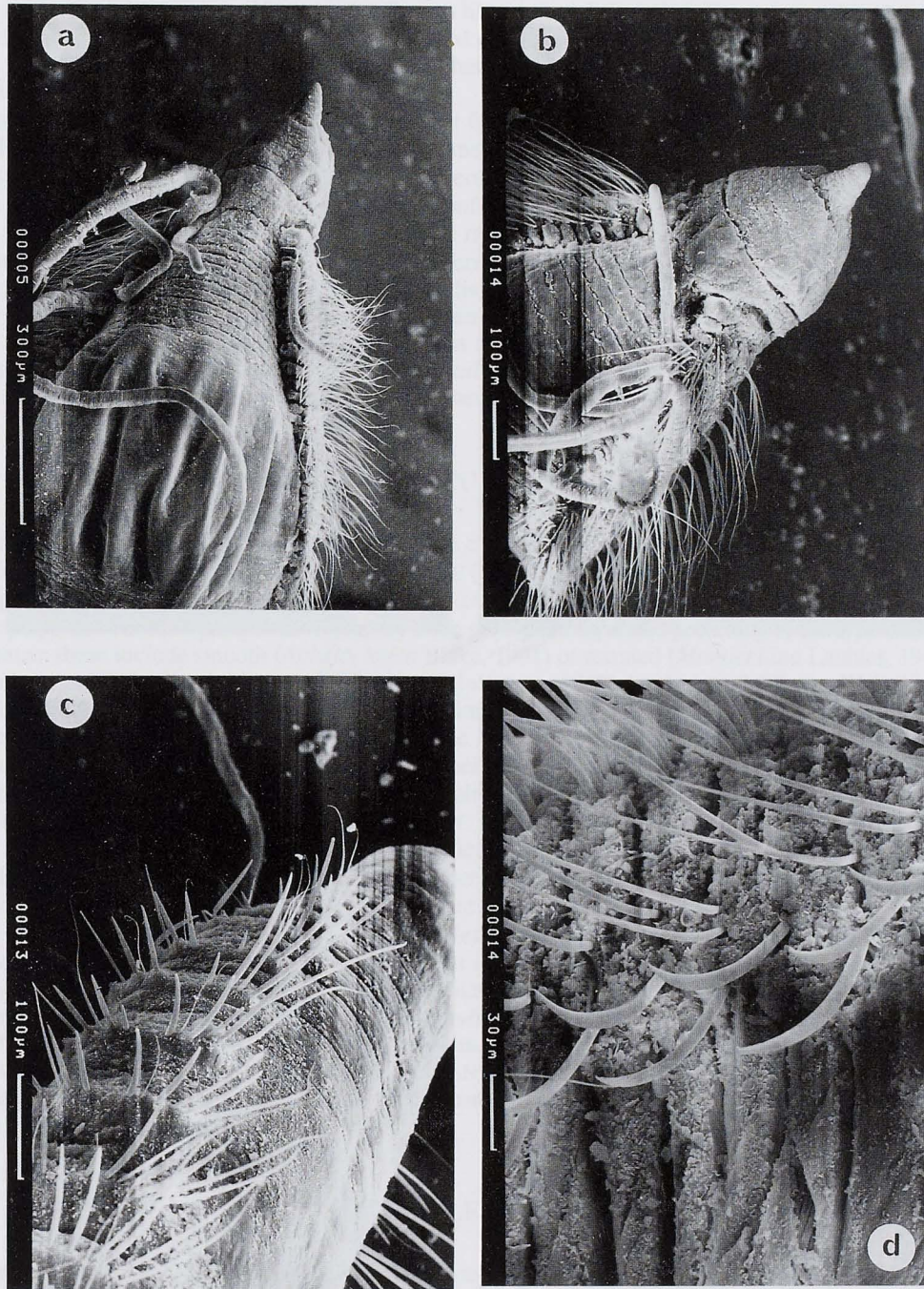


FIG. 3. — Scanning electron micrographs of *Chaetozone gibber* sp. nov.: **a**, anterior end, dorsal view showing position of hump. **b**, anterior end, dorsal view, showing arrangement of appendages (only stumps of tentacular palps present). **c**, posterior end, lateral view, showing arrangement of chaetae in notopodia and neuropodia. **d**, mid-body segments with stout awl-shaped capillary chaetae in notopodium.

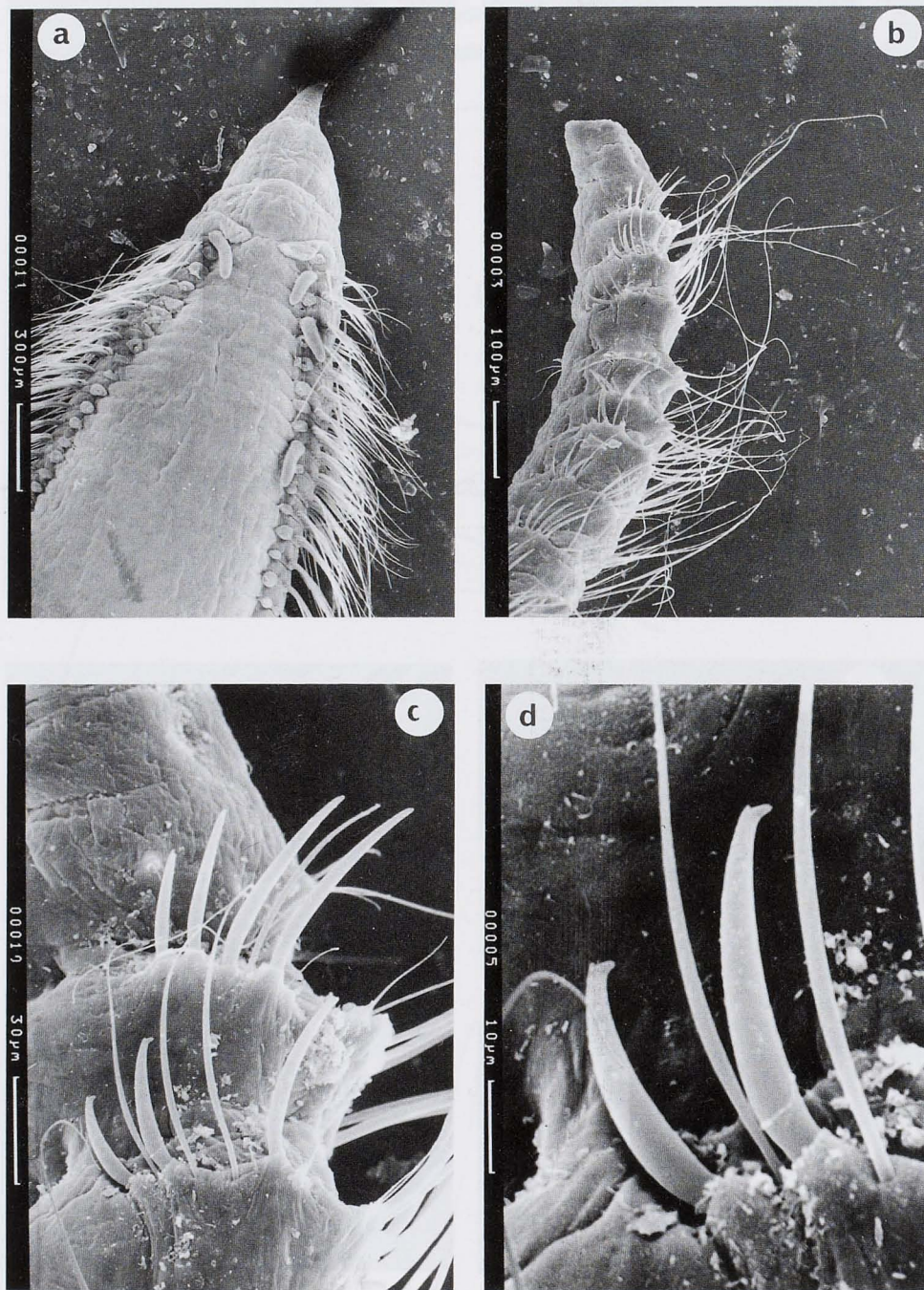


FIG. 4. — Scanning electron micrographs of *Caulleriella zetlandica* from Sullom Voe: a, anterior end, dorsal view, showing arrangement of appendages (only stumps of tentacular palps present) - b - d, posterior end, lateral view of small specimen (5 mm long) showing: b, presence of spines on neuropodium only - c, both unidentate and bidentate spines - d, bidentate spines from ventral side of neuropodium.

crochets (= spines) described and figured by SOUTHERN are clearly visible in the material examined and occur only in the neuropodium.

In his monograph McINTOSH (1915), expanding on his original description, figured one chaeta and mentioned the material of SOUTHERN (1914), but neither figured nor described bidentate chaetae. He suggested that his specimen obtained in July was a mature female, and that Southern's material was of a young pelagic form found between March and August.

Numerous specimens identified as *C. zetlandica* from Sullom Voe, very close to the type locality, were examined and compared with both McIntosh's fragment and Southern's material. The Sullom Voe material includes specimens ranging from 4 mm for 54 chaetigers to 24 mm for 154 chaetigers. The presence of bidentate spines on posterior segments of small specimens is confirmed (Figs 2g & 4d), together with the absence of such tips from larger specimens. Examination of a full size range of specimens has confirmed Southern's assumption that the three forms described by him represented different developmental stages of the same species. All of this material clearly belongs to the same species, which is distinguished from other members of the genus *Caulleriella* by the presence of acicular spines in the neuropodium only. Following HARTMAN (1961) and HARTMANN-SCHRÖDER (1971), the presence of bidentate hooks in small individuals, and lack of complete rings of spines, justify its continued placement within the genus *Caulleriella*, although the original diagnosis of this genus (CHAMBERLIN, 1919) included species with acicular chaetae in both neuropodia and notopodia.

DISCUSSION

HARTMAN'S (1961) definitions of the bi-tentaculate cirratulid genera *Tharyx*, *Caulleriella* and *Chaetozone* are under review and have been partially revised by BLAKE (1991). As several authors have observed, all members of this group are similar in appearance, having a pointed prostomium, elongate peristomium bearing a pair of tentacular palps, and reduced parapodia. Currently these genera are separated according to the type and arrangement of the chaetae: these include smooth (*Aphelochaeta* Blake, 1991) or serrated (*Monticellina* Laubier, 1961) capillary chaetae only or, additionally, unidentate (*Chaetozone* Malmgren, 1867), knob-tipped (*Tharyx* Webster & Benedict, 1887) or bidentate (*Caulleriella* Chamberlin, 1919) spines. Spines, when present, can occur on the neuropodium only or on both rami, and may commence from the first chaetiger or (more commonly) further back; the arrangement of chaetae at the posterior end frequently being of key importance in identification.

The genus *Chaetozone* was erected for *C. setosa* Malmgren, 1867 but no generic diagnosis was included. Later workers (e.g. FAUVEL, 1927; BERKELEY & BERKELEY, 1952; HARTMANN-SCHRÖDER, 1971) have defined it as having a complete ring of unidentate spines on posteriormost segments; species with unidentate spines not arranged like this were referred to *Caulleriella* Chamberlin, 1919. DAY (1967) modified the definition slightly to those having spines in a continuous dorso-ventral arc. The definition of *Chaetozone* by HARTMAN (1961), however, includes all of the species with unidentate (entire) spines. CHRISTIE (1985) described populations of "*C. setosa*" in which the rings of spines are less than complete. The discovery of *C. gibber* and the apparent variability in form of *C. setosa*, together with the problems posed by species such as *C. zetlandica*, highlight the need for re-definitions of the genera *Chaetozone* and *Caulleriella*.

The status of *C. caputesocis* needs further examination. This species was transferred to *Caulleriella* by CHAMBERLIN (1919), but the definitions of HARTMAN (1961) suggest that, due to the presence of unidentate spines only, it should be referred to *Chaetozone*. Records of *C. caputesocis* from British waters need to be re-examined, and may be found to refer to *C. gibber*.

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