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**A NEW SPECIES OF PARASITIC COPEPOD *SPHAERONELLA*
GOTTOI N.SP. (SIPHONOSTOMATOIDA; NICOTHOIDAE) FROM AN
OSTRACOD COLLECTED OFF THE EAST COAST OF SCOTLAND**

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INTRODUCTION

The Nicothoidae is a large family of copepods which now includes the family formerly known as the Choniostomatidae. They all parasitise other crustaceans with over 20 species known from British waters associated with lobsters, crabs, prawns, mysid shrimps, cumaceans, amphipods, and an ostracod (Green, 1958, Gotto & McGrath, 1980, Gotto, 1993). Recent re-examination of the only adult specimen from a British ostracod collected in 1987 by the present author off the east coast of Scotland, indicated that the original identification as *Sphaeronella monothrix* (Bowman & Kornicker, 1967) was incorrect and that the copepod in fact represents a species new to science. A full description of the new copepod is provided along with a discussion of its relationship to other ostracod infesting nicothoids.

The material was collected in the course of a benthic monitoring surveys of the sewage disposal grounds 13.5 km east of Bell Rock off the Fife coast. Sediment samples were collected by grab and sieved on 0.5mm mesh. The sieve residue was fixed with formalin before return to the laboratory where the fauna contained in the sample was extracted and identified. The brood pouches of any myodocopidan ostracods were checked for copepod parasites. (Among ostracods only myodocopidans brood their eggs and hence can act as hosts to *Sphaeronella* copepods.) The only species observed in the area was *Synasterope norvegica* (Sars, 1869), originally identified under its synonym *Cylindroleberis mariae* but now referred to *Synasterope norvegica* (see Angel, 1993).

Sphaeronella gottoi n.sp.

MATERIAL EXAMINED

1 mature female (Holotype) with 9 ovisacs from brood marsupium of *Synasterope norvegica* (Sars, 1869) (Fig. 1a), collected at Bell Rock disposal ground, Stn.3, (56° 26.00'N, 02° 10.00'W), depth 51m, 27 Nov. 1987. Female and one ovisac permanently mounted on slide, host and remaining extruded ovisacs in vial. Deposited in National Museum of Scotland (Registration No. NMSZ.012.15).

1 pupa from brood marsupium of *Synasterope norvegica* (Sars, 1869) at Bell Rock disposal ground (Stn.9, 56°25.00'N, 02°13.62'W), depth 55m, 22 Jan. 1987, mounted on slide, but diagnostic features not discernible.

Etymology: The new species is dedicated to my colleague Dr R. Vivian Gotto, of the Queen's University, Belfast, in recognition of his contribution to the study of copepods associated with invertebrates in British marine waters.

DESCRIPTION

Female (Fig. 1b): Length 0.58 - measured as compressed on slide. Estimated non-compressed length 0.4-0.5mm. Ovisacs (Fig. 1a, c) ovoid detached from female, diameters (uncompressed) 0.36-0.46mm. Head (Fig. 1e) well defined from trunk. Lateral margins poorly defined from oral area, with two or three uneven longitudinal spinule rows. First antennae (A.1) structure difficult to discern; left antennae short, apparently two-segmented; proximal segment short, with single distal seta; second segment a little longer with seven setae and a cylindrical aesthetasc (chemosensory appendage) attached midventrally. Terminal seta possibly bifurcate, but perhaps may be two overlapping setae as detail not resolvable; right antennae details not observable. Second antennae absent. Oral disc encircled with filaments, with median incision ventrally and central aperture through which the tips of the mandibles (Md) are visible. First maxillae (Mx.1) details also difficult to see but apparently with two filamentous processes, directed anteriorly and posteriorly. Second maxillae (Mx.2) two-segmented; proximal segment robust with row of spinules adjacent to articulation with distal segment; distal segment tapered, curved, surmounted with weak process, and with fine setules subterminally and also at the tip.

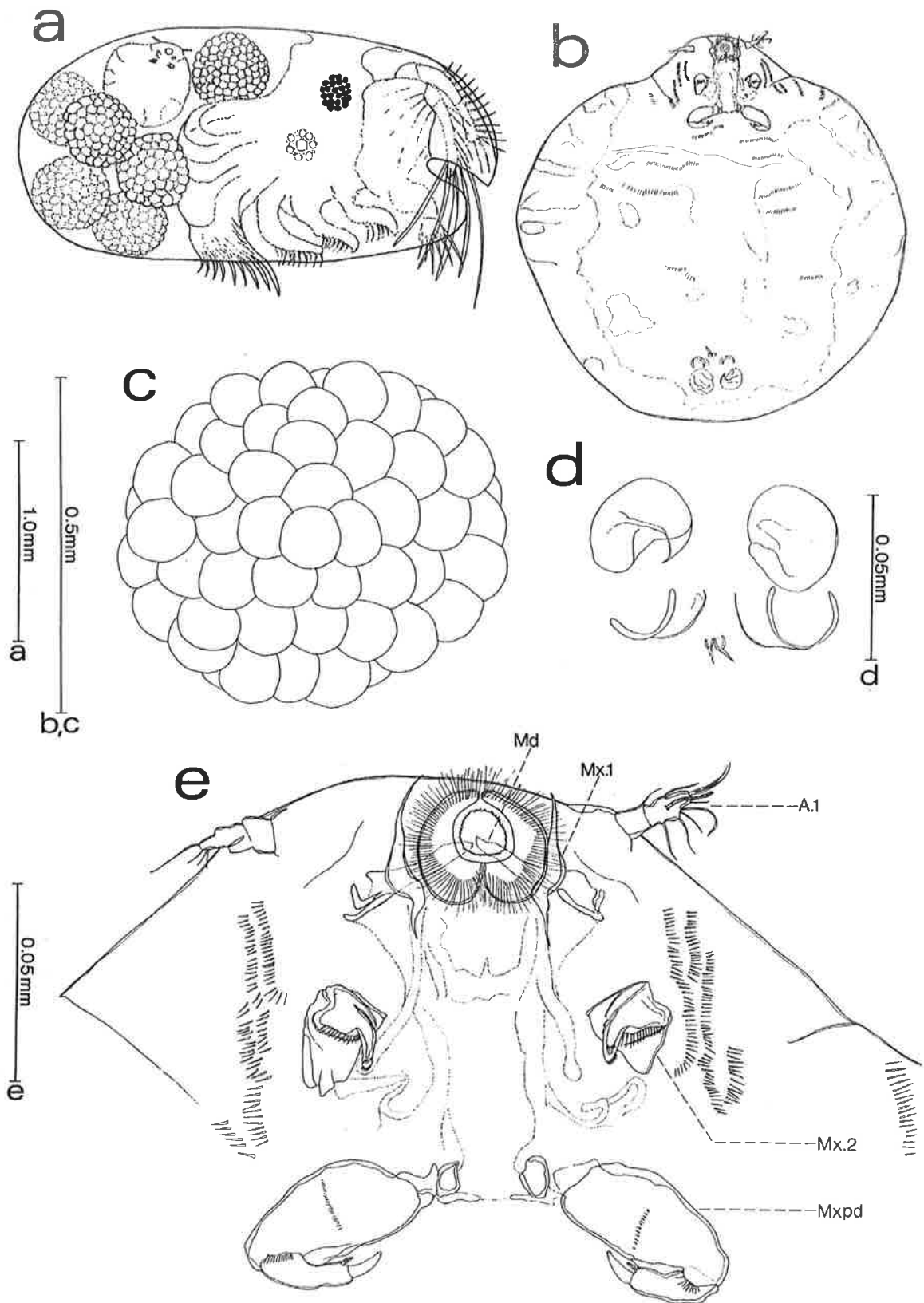


Figure 1: *Sphaeronella gottoi* (Holotype), a) female and ovisacs in marsupium of ostracod *Synasterope norvegica*, b) Female habitus ventral, c) ovisac, d) female genital area and caudal rami, e) female head, ventral; A.1- first antenna, Md - mandible, Mx.1 - first maxilla, Mx.2 - second maxilla, Mxpd - maxilliped.

Maxillipeds (Mxpd) three-segmented, first segment broad, with transverse row of fine setules medially and another row distally at the articulation with the second segment, second segment narrow with short spine distally on inner edge, third segment short curved with minutely toothed tip. Ratio of maxilliped segments approximately 5:2:1. The sub-median skeleton is visible ventrally (dotted). It is somewhat convoluted, extending from the base of the mandibles posteriad to the bases of the second maxillae and maxillipeds, with strongly chitinised nodules and a weak transverse bar between the latter.

Trunk spherical with a few transverse rows of minute spinules scattered round the body, dorsally and ventrally. Trunk legs absent. The genital area (Fig. 1d), comprises a pair of oval seminal receptacles and semi-circular genital apertures between which lie the caudal rami each composed of a single minute segment and short smooth seta (although right seta, shown as dotted is missing). Note in the habitus Figure (1b) the genital area and caudal rami are curled up dorsally and viewed through the body. Hence the caudal rami appear to be anterior to the genital area.

DISCUSSION

The first nicothoid copepod described from an ostracod was *Sphaeronellopsis littoralis* Hansen, 1905, found in sarsiellid *Sarsiella hispida* Brady from New Zealand. Hansen created a new genus for his species based on a prominent protuberance over the genital area, the elongated seminal receptacles, the fusion of the caudal rami into a single central stylet, and the unusual host group. Further ostracod-infesting *Sphaeronellopsis* species were described from off the eastern coast of the United States from cylindroleberid and philomedid ostracods (Bowman & Kornicker 1967, 1968) and from a cypridinid ostracod in the Peru-Chile trench system (Kornicker & Bowman, 1969). The largest single contribution to the study of ostracod infesting copepods was provided by Janet Bradford (1975) in her work on parasites of antarctic and subantarctic ostracods. She re-considered the status of the four *Sphaeronellopsis* species and re-assigned all, except for the type *Sphaeronellopsis littoralis*, to the large genus *Sphaeronella* Selensky, 1868, parasites of amphipods, isopods, and cumaceans. Bradford added fourteen new *Sphaeronella* species recorded from various cylindroleberid, cypridinid, philomedid, and sarsiellid ostracods, as well as *Sphaeronelloides vargulae* a new species and genus, also from ostracods, which is similar to *Sphaeronella* but lacking second maxillae and with only rudimentary maxillipeds. Only two further ostracod infesting nicothoids have been described since 1975; *Sphaeronella spinosa* Bradford, 1980 from the eastern United States and *S. squamosa* Yoo & Lim, 1996 from off the Korean coast.

Bradford (1975) placed the ostracod infesting *Sphaeronella* species into seven groups based on three features of adult females: the number of segments in the first antennae, the presence or absence of a second antenna, and the number of branches in the first maxilla. *S. gottoi*, with two-segmented first antenna, no second antenna, and two-branched first maxilla would be placed in the "*S. monothrix* Group", along with *S. anarthronis* Bradford, 1975, *S. philomedesi* Bradford, 1975, and also *S. spinosa* Bradford, 1980. These species are distinguishable from *S. gottoi* as follows:

The *S. monothrix* female appears to lack setules on the lateral margins of the head. It has a different antennal structure with a minute terminal second segment. The first maxillae branches are oriented antierad and laterad. The second maxillae appear shorter and more coarsely toothed at the tip. The maxillipeds are similar in shape but lack setule ornamentation. The submedian skeleton, genital area, and caudal rami resemble *S. gottoi* but *S. monothrix* possesses two pairs of minute trunk legs which are entirely lacking in *S. gottoi* and other members of the "*S. monothrix* Group". The *S. anarthronis* female has more spinous head margins, anterior trunk, and genital area. The first segment of the maxilliped is proportionately much shorter and the submedian skeleton appears to have a quite different shape. The caudal rami also possess plumose setae. The *S. philomedesi* female has first maxillae branches oriented antierad and laterad. The second maxillae appear shorter and more coarsely toothed at the tip. The maxillipeds are proportionately different, lack the distal spine on the second segment, and have a shorter more coarsely toothed distal segment. The submedian skeleton appears to be of a quite different shape. *S. philomedesi* also has a spinous genital area and caudal rami with plumose setae. The *S. spinosa* female also appears to have second maxillae which are shorter and more coarsely toothed at the tip. The maxillipeds are proportionately shorter with several spines distally on the second segment and two rows of robust teeth on the terminal segment. The submedian skeleton is poorly sclerotized, and like the two preceding species *S. spinosa* has caudal rami with plumose setae.

The small size of *Sphaeronella* copepods often presents observation difficulties. This may be compounded if limited material is available for study. Many descriptions are, like *S. gottoi*, based on a single specimen, which may be easily damaged during mounting. Moreover the orientation of a permanent mount may not always allow good observation of all the appendages, as is the case for the present specimen with respect to the antennae and first maxillae. Some of the finer morphological features are difficult to discern even with high magnification (x1000, phase contrast) and it should be borne in mind that published descriptions and illustrations may contain some errors. Despite these problems, sufficient detail of

S. gottoi is observable to establish it as a distinct species.

Most *Sphaeronella* copepods appear to be restricted to only one or two allied host species. Bradford (1975) considered that copepods parasitising the same ostracod family had some common features though this did not seem to be the case with those infesting cylindroleberids. However within the "*S. monothrix* Group", *S. monothrix* & *S. gottoi* infest cylindroleberids, *S. anarthronis* & *S. philomedesi* parasitise philomedids, and *S. spinosa* is associated with rutidermatids. One antarctic species, *S. synasterope*, infests the same ostracod genus as *S. gottoi*, but has few morphological features in common.

S. gottoi presently is the only ostracod-infesting nicothoid known in European waters. The record cited by Gotto (1993) of *S. monothrix* (Bowman & Kornicker, 1967) from south-east Scotland refers to the specimen described here, though the figures used by Gotto are of the genuine type description of *S. monothrix* from the New England coast. The recovery of further material of *S. gottoi*, including males, may help clarify the details of its morphology and elucidate its relationship with other members of the genus.

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***AGABUS CHALCONATUS* (COLEOPTERA, DYTISCIDAE) NEW FOR SCOTLAND**

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The precise distribution of two closely related species of diving beetle, *Agabus chalconatus* (Panzer, 1796) and *A. montanus* (Stephens, 1828) has been in doubt for some time. The two species may be easily distinguished by the male genitalia, the parameres of which possess an apical brush of sucker hairs in *chalconatus*, these being wholly absent in *montanus*. However, the status of these species has been confused. *Agabus montanus* was known for many years as *A. melanocornis* Zimmermann, 1915, named as a variety of *A. chalconatus* and accepted as such by Balfour-Browne (1950). Fery and Nilsson (1993) demonstrated that Zimmermann's taxon was not the species without the sucker hairs on the parameres, and that it was necessary to resurrect Stephens' name *montanus* for this distinct species. Before recognition of the cryptic species pair, the complex was simply known as *chalconatus*, so old published records of this name have limited value. By way of further complication, it should be noted the unjustified emendation *chalconotus* Panzer, 1805 has occasionally been used instead of *chalconatus*.

Agabus chalconatus is a Western Palaearctic species ranging from the United Kingdom to North Africa and Iran. Balfour-Browne (1950) was only able to record it from England north to Mid-west Yorkshire and west to West Gloucestershire; it has subsequently (unpublished data) been found in the Northern Ireland. Foster (1982) reported it from Lazonby Fell, Cumberland, Wynyard Forest, County Durham, and Gosforth Park, South Northumberland; it has been found in North Northumberland by Dr M. D. Eyre subsequently (Figure 1). The known distribution is more or less continuous from there to the south coast. In Wales, it is confirmed only from Whitson, on the Welsh part of the Severn Levels. A record for Skokholm Island (Green, Pearson & Wilkinson, 1951) has been referred to *A. montanus* (Williams & Williams, 1978).

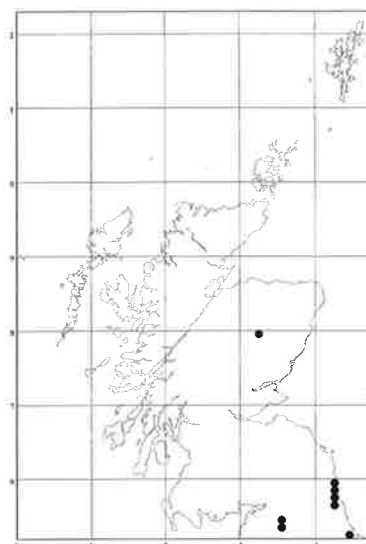


Figure 1. Distribution of *Agabus chalconatus* in northern Britain. Solid circles represent 10 km squares in which the species has been found, all records being from 1980 onwards.

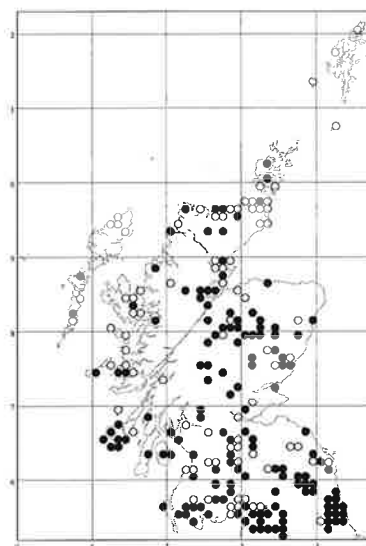


Figure 2. Distribution of *Agabus montanus* in northern Britain. Solid circles represent 10 km squares in which the species has been found from 1980 onwards, open circles representing earlier records.