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The Marine Fauna of New Zealand: Family Sphaeromatidae (Crustacea Isopoda: Flabellifera)

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The Marine Fauna of New Zealand:

Family Sphaeromatidae (Crustacea Isopoda: Flabellifera)

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ABSTRACT

The taxonomy and distribution of sphaeromatid isopods in the New Zealand region and Subantarctic Islands are revised in the light of collections made in recent years and of re-examination of early New Zealand material. All species are diagnosed and figured, and a checklist and keys to genera and species are provided. Twenty-six new species in 12 genera are added, and one new genus has been erected.

CHECKLIST OF NEW ZEALAND AND SUBANTARCTIC SPHAEROMATIDAE

SUBFAMILY EUBRANCHIATINAE

Amphoroidea falcifer Thomson 27
Amphoroidea longipes n.sp. 27
Amphoroidea media Hurley & Jansen 28
Cassidinopsis admirabilis n.sp. 29
Cymodocella capra n.sp. 31
Cymodocella egregia (Chilton) 31
Cymodocella tubicauda Pfeffer 32
Dynamenella condita n.sp. 32
Dynamenella cordiforaminalis (Chilton) 33
Dynamenella hirsuta Hurley & Jansen 34
Dynamenella huttoni (Thomson) 34
Dynamenella insulsa n.sp. 36
Dynamenella mortenseni n.sp. 36
Dynamenoides decima n.sp. 37
Dynamenoides vulcanata n.sp. 38
Dynamenopsis varicolor Hurley & Jansen 39
Scutuloidea maculata Chilton 40

SUBFAMILY HEMIBRANCHIATINAE

Cilicaea angustispinata n.sp. 42
Cilicaea caniculata (Thomson) 42
Cilicaea dolorosa n.sp. 44
Cilicaea tasmanensis n.sp. 45
Cymodoce allegra n.sp. 47
Cymodoce australis Hodgson 47
Cymodoce convexa Miers 48
Cymodoce granulata Miers 48
Cymodoce hodgsoni Tattersall 49
Cymodoce iocosa n.sp. 51
Cymodoce penserosa n.sp. 51
Cymodoce perversa n.n. 52
Cymodopsis impudica n.sp. 53
Cymodopsis montis n.sp. 53
Cymodopsis sphyracephalata n.sp. 54
Cymodopsis torminosa n.sp. 55
Exosphaeroma chilensis (Dana) 56
Exosphaeroma echinensis n.sp. 57
Exosphaeroma falcatum Tattersall 57
Exosphaeroma gigas (Leach) 58
Exosphaeroma obtusum (Dana) 59
Exosphaeroma planulum Hurley & Jansen 60
Isocladus armatus (Milne Edwards) 62
Isocladus calcareus (Dana) 63
Isocladus dulciculus n.sp. 63
Isocladus inaccuratus n.sp. 64
Isocladus reconditus n.sp. 65
Isocladus spiculatus n.sp. 67
Pseudosphaeroma callidum n.sp. 67
Pseudosphaeroma campbellensis Chilton 67
Sphaeroma laurensi n.sp. 70
Sphaeroma quoyanum Milne Edwards 70

SUBFAMILY PLATYBRANCHIATINAE

Cassidina typa Milne Edwards 72

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INTRODUCTION

Sphaeromatidae* (Crustacea Isopoda: Tribe Flabellifera) or "marine pill-bugs" are perhaps the most commonly seen isopods of predominantly marine provenance. They are characterised by seven pereon segments and seven pereopods (except in the very young, which have only six pereopods), and by a pleon of two distinct segments. The anterior pleon segment has five pairs of pleopods ventrally, and the posterior pleon segment, or pleotelson, has one pair of biramous uropods anterolaterally. The inner ramus of this uropod is fixed to the peduncle, but the outer is movable.

Sphaeromatids occur in a wide range of habitats, from fresh water, through brackish water and high eulittoral levels, to depths as great as 1800 m (Stebbing 1893: 363). Individual species, however, occur in more or less defined habitat niches, being restricted there by their morphology, physiology, and breeding potential (Riegel 1959, Elkaim 1966, Lejuez 1966, Holdich 1968a, Jansen 1971). In the intertidal, they may be found on or burrowing in wood, sand or mud, beneath stones, and in or among weed, especially algal holdfasts, bryozoans, sponges, and tunicates. As a common and almost universally present–but varyingly composed–component of the littoral zone, they lend themselves particularly well to ecological studies. In their recent book "The New Zealand Sea Shore", Professor John Morton and Dr Michael Miller (1968) have shown how usefully these animals can be integrated into an ecological description of the littoral zone, and have pointed the way for more detailed work. It is our hope that the present revision will stimulate further ecological work in New Zealand, as well as assist in solving more mundane problems of identification.

The earliest records of sphaeromatids from New Zealand appear in "Histoire Naturelle des Crustacés" (Milne Edwards 1840). Then came J. D. Dana's (1853) report on "Crustacea" in the Reports of the United States Exploring Expedition. In succeeding years, new species and genera were recorded and described by several New Zealand workers, among whom G. M. Thomson and Charles Chilton were prominent.

Sexes and stages of maturity were often not distinguished, but sphaeromatids often vary greatly with growth and sexual differentiation. Consequently, conspecific males and females have often been referred to different species or even genera. For these and other reasons the Sphaeromatidae have vexed taxonomists for many years. Hansen (1905) made the first significant attempt to put the systematics on a sound basis when he divided the family into three groups of genera on the morphology of the fourth and fifth pleopods, and recognised that many species had been created unnecessarily owing to the males and females being described separately.

In the present account, it has been possible with a few exceptions to match males with females and juveniles so that a number of synonymies have been amended. At the same time, large samples from some localities have allowed the recognition of sympatric forms where small but consistent morphological differences have indicated hitherto unrecognised species previously lumped together. In this respect the situation in New Zealand resembles that described by Monod (1931a: 8) ". . . the opinion that all European *Sphaeroma* with non-toothed uropods are *rugicauda* belongs to that category of ancient but false affirmations which hinder those whom they influence from practising the examination of detail which would enlighten them; they prefer to continue calling *serratum* all *Sphaeroma* to which can be applied Fabricius's 1787 diagnosis; that is to say, to confuse under one name several perfectly distinct species".

Several genera and species are recognisable only from adult males, since females and juveniles lack the necessary diagnostic characters. For most of them, samples have been adequate to allow each form to be properly placed and figured. Unsubstantiated records in the literature have been omitted.

*It has been customary in the past to use the family name Sphaeromidae, but recent usage has turned to Sphaeromatidae (e.g., Monod 1931a, Grüner 1965, Kusakin 1969). Through Dr Isabella Gordon we obtained the opinion of Mrs E. N. Arnold, a Greek scholar, on the correct classical derivation. Mrs Arnold comments:

"The word *Sphaeroma* exists as a noun in Greek. Liddel and Scott's Greek Lexicon (7th edition, 1893, unabridged) gives the following translations; (i) anything round or globular; (ii) a steelyard weight; (iii) a star; (iv) in plural, buttocks. The Lexicon does not give the genitive singular stem of *Sphaeroma* but it is likely that it declines like other third declension neuter nouns ending in –oma; e.g. coma, comatose = sleep; diploma, diplomatos = a folded letter; carcinoma, carcinomatos = a cancer. The stem would thus be Sphaeromat- and the familial name derived from it, Sphaeromatidae. *Sphaeroma* is used in Aristotle and it is likely that an eighteenth century scientist would have known it.

"It is possible to argue that *Sphaeroma* in Bosc's sense is a compound of *Sphaera* = a sphere and *(h)omos* = like. If this were the derivation, the stem would be Sphaerom- and the familial name Sphaeromidae. However, it is a somewhat devious argument when *Sphaeroma* already exists as a word in classical Greek."

We have therefore accepted "*Sphaeromatidae*" as being the correct familial form.

GENERAL ACCOUNT OF SPHAEROMATIDAE

External Morphology (Fig. 1)

The body is divided into cephalon, pereon, and pleon. The anterior margin of the cephalon often projects in a small apex, below and either side of which the shorter first and longer second antennae are inserted. The eyes are well developed and set laterally on the cephalon, facing forward, outward, and upward. Between the bases of the antennae, the epistome faces anteroventrally and extends posteriorly to the labrum, which partly covers the anterior part of the mandibles and mouth opening. The mandibles are well developed, with palps, and asymmetrical, a state common in malacostracans. First and second maxillae and maxillipeds lie

ventral and posterior to the mouth opening and paragnath.

The pereon comprises seven segments contained by sclerotised tergites, laterally fused coxal plates, and unsclerotised sternites. A pair of pereopods corresponds to each pereonal segment. Each pereopod comprises six movable articles–the coxae being fused laterally with the tergites and sternites–and ends in a claw and a short stout spine.

The pleon comprises two segments and their appendages. The anterior segment appears to arise from fusion of five somites as it supports five pairs of biramous pleopods, although visible suture lines indicate only four segments originally. The first three pairs of pleopods, used in swimming, are lightly sclerotised and bordered with long, plumose setae; the last two pairs are respiratory, unsclerotised, and without plumose setae, but are sometimes bordered with short, fine setae. The rami of the last two pairs of pleopods occur with a few exceptions in two forms (Fig. 2); thin and membranous with flat surfaces, or thick and fleshy with pleated surfaces. In one New Zealand genus, *Pseudosphaeroma*, some of the rami are partly thin and membranous, partly thick and fleshy, but not pleated. The various combinations of these forms in pleopods 4 and 5 are the basis of the three groups of genera into which the (then) subfamily was divided by Hansen (1905: 94, 100–101): Eubranchiatae, Hemibranchiatae, and Platybranchiatae.

Sexual Differentiation

Sexual differences are not apparent in small specimens, but develop with growth. Males tend to be larger than females, and in several genera to be more prominently sculptured.

Males are first distinguishable externally by the penes, which appears as tiny rudiments at the posterior margin of the seventh pereon sternite and grow with succeeding moults. At the same time, the appendices masculinae appear at the inner distal ends of the inner rami of the second pleopods as small projections, which separate towards the bases of the rami with succeeding moults. Adult males are distinguished by the complete separation of the appendix masculina above the point of origin on the inner ramus of pleopod 2 (Fig. 16F), and this is extremely important taxonomically. Concurrently, the body changes towards the distinctive male form, and differences from the female form increase with each moult.

Females are first distinguishable externally by the oöstegites, or brood plates, which appear as minute projections from the sternites just inside the fused coxae of the second, third, and fourth pairs of pereopods (Fig. 1); at this stage the ovaries are full of yolky eggs. After

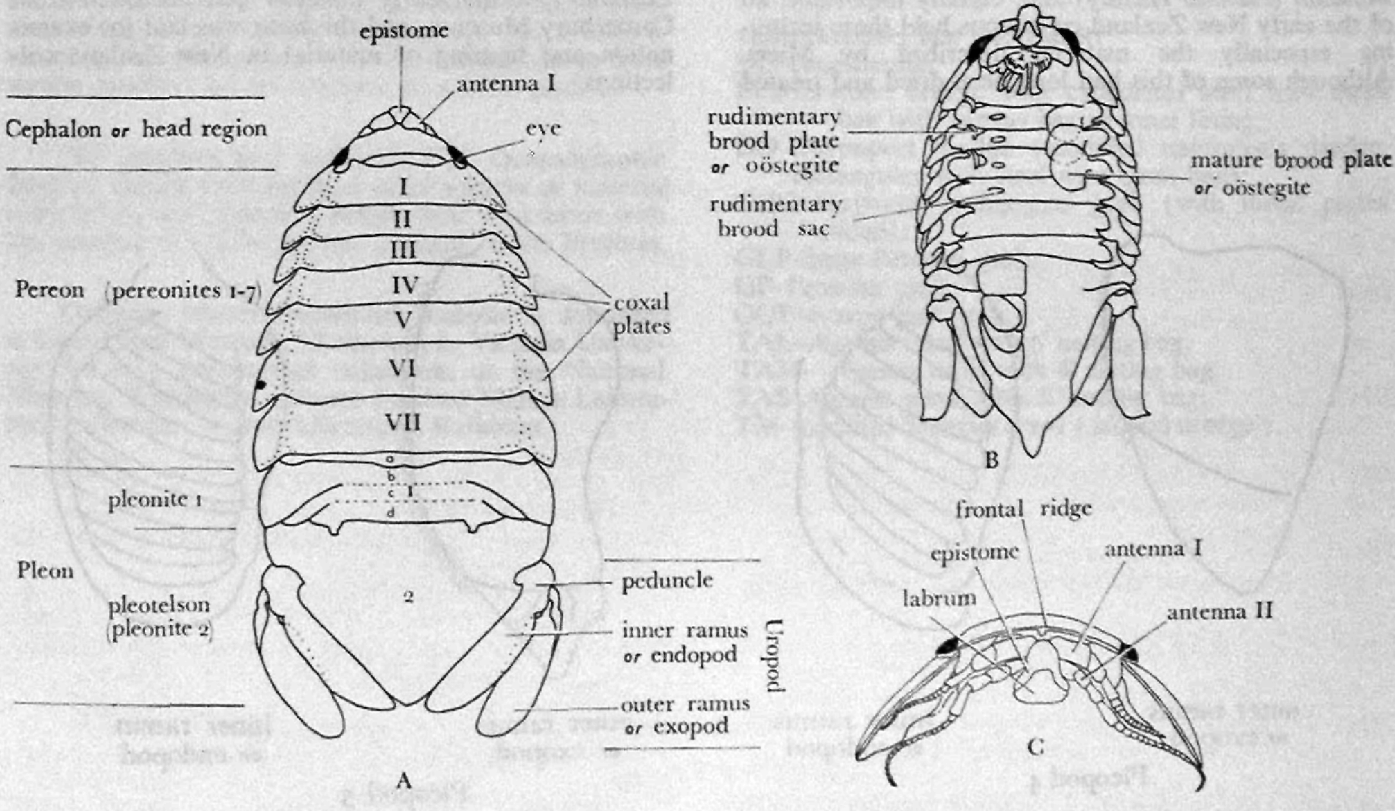

Fig. 1. External morphological features of sphaeromatids: A, dorsal view of generalised sphaeromatid; B, ventral view of female *Isocladus armatus* (legs omitted); C, ventral view of head of *Exosphaeroma gigas*.