

**A TAXONOMIC REVISION OF THE EUROPEAN,  
MEDITERRANEAN AND NW. AFRICAN SPECIES GENERALLY  
PLACED IN *SPHAEROMA* BOSCH, 1802 (ISOPODA: FLABELLIFERA:  
SPHAEROMATIDAE)**

by

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Key words: Isopoda; Flabellifera; Sphaeromatidae; *Sphaeroma*; *Lekanesphaera*; *Exosphaeroma*; Verhoeff; keys; species; new species.

The European, Mediterranean and NW. African species usually assigned to the genus *Sphaeroma* are revised. The genus *Sphaeroma* as understood so far has been divided into two genera: *Sphaeroma* s.s. and *Lekanesphaera* Verhoeff, 1943. Keys to the three species of *Sphaeroma* and the thirteen species of *Lekanesphaera* are given. Two new species are described viz., *L. glabella* (from Madeira) and *L. terceirae* (from Terceira, Azores) and the synonymy of known species is provided.

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## INTRODUCTION

The sphaeromatid isopod fauna of Europe, the Mediterranean and the NW. coast of Africa has been studied intensively by zoologists. These isopods, commonly found as an integral part of the littoral zone, are suitable for a great variety of studies, e.g. in the fields of ecology and biochemistry. Their rich polymorphism especially has recently been given much attention, mainly by French and Italian zoologists.

The French school of Bocquet et al., during studies of the polychromatism of *Sphaeroma serratum* (Fabr., 1787), came across several undescribed species. Since 1960 no less than six new species have been described by them from the Eastern Atlantic and the Mediterranean.

In several other instances the status of previously established Sphaeromatidae was reviewed, especially by the Italian school, who, e.g., identified most of the Mediterranean species. Verhoeff's rather radical revision with descriptions of many new species has, peculiarly, been ignored by most later workers in the field. Only Argano did some study on one of Verhoeff's new species, while Forsman (1952) synonymized *Europosphaera* with *Sphaeroma*.

The present paper is an attempt to review the systematic status of the species that have so far been assigned to the genus *Sphaeroma* and to decide their status, both taxonomically and nomenclaturally. An effort has been made to take all previous systematic studies into account, also those, like Verhoeff's papers, that have usually been ignored by modern zoologists.

It proved necessary in this study to reinstate the genus *Lekanesphaera* Verhoeff, 1943 and to describe two new species.

To clarify the position of the genus *Lekanesphaera* Verhoeff, 1943 a detailed discussion of the genera *Sphaeroma* Bosc, 1802 and *Exosphaeroma* Stebbing, 1900 will be given, while all the species of *Sphaeroma* and *Lekanesphaera* from the area studied (which until now have been considered *Sphaeroma*) will be described according to their most characteristic differences.

The specimens studied come from a number of sources. Most form part of

the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, the Netherlands. Dr. M. Băceşcu, Muzeul de Historie Naturale, Bucarest, Rumania, donated Black Sea Material and Dr. R. Argano, provided me with specimens from Italy. Dr. L. Tiefenbacher, Zoologische Sammlung des Bayerische Staates, Munich, kindly lent the sphaeromatid type material of the K.W. Verhoeff collection. Important material discussed by Monod (1931) was received on loan from the Muséum National d'Histoire Naturelle, Paris through the kind offices of Prof. J. Forest. I was permitted to study the collection of the British Museum (Natural History), London, for which I want to thank Dr. R.J. Lincoln. Dr. D.M. Holdich (University of Nottingham, England) was kind enough to show me his material, which was a great help to me.

All the material studied that was not borrowed from other institutions now forms part of the collection of the Leiden Museum. Part of the specimens collected by myself are in my private collection.

I am most grateful to Drs. R. Argano, M. Băceşcu, J. Forest, D.M. Holdich, R.J. Lincoln and L. Tiefenbacher for the essential help they gave me, by entrusting me with the study of important material. Most of all I want to thank Prof. L.B. Holthuis for his continuous support and interest, and Dr. K. Harrison who read my manuscript very thoroughly and gave me many recommendations.

#### Alphabetical list of the depositories of the material

BMNH	British Museum (Natural History), London, U.K.
MNP	Muséum National d'Histoire Naturelle, Paris, France
PCJ	Private Collection Jacobs
RMNH	Rijksmuseum van Natuurlijke Historie, Leiden, the Netherlands
UN	University of Nottingham, U.K.
ZSBS	Zoologische Sammlung des Bayerischen Staates, Munich, W. Germany

### SYSTEMATICS

#### Subfamily Sphaeromatinae Latreille, 1825

The three genera treated in the present paper, *Sphaeroma*, *Lekanesphaera* and *Exosphaeroma*, all belong to the subfamily Sphaeromatinae Latreille,

1825, one of the five subfamilies of the family Sphaeromatidae (Nom. Correct. Dahl, 1916). This subfamily was previously called Hemibranchiatae (Hansen, 1905) but as pointed out by Iverson (1982) this name is unavailable as it is not based on a genus (no genus *Hemibranchiatus*, *-a*, *-um* exists). As it contains the genus *Sphaeroma*, this is the nominotypical subfamily and it must bear the name Sphaeromatinae. Iverson was mistaken however in citing Milne Edwards (1840) as the author of the family (and subfamily) name. The first use of the family name Sphaeromatidae that I can find, albeit in the form Sphaeromides, is by Latreille (1825: 294), who used both the vernacular and scientific name: "Troisième famille Sphéromides, Sphaeromides." This antedates Milne Edwards' use by 15 years.

The history of the three genera treated in this paper is rather confused. Until 1900 all the species were placed in the genus *Sphaeroma*. In 1900 Stebbing split off the genus *Exosphaeroma* (with *Sphaeroma gigas* Leach, 1818 as the type). Ever since there has been a discussion as to the extent of the two genera and as to their differences. The only character that Stebbing (1900: 553) used to characterize *Exosphaeroma* was "having the penultimate and the two preceding joints of the maxillipeds lobed on the inner side . . .". However, intermediate forms between the typical *Exosphaeroma* and the typical *Sphaeroma* were found in Europe. Monod (1931b) gave an excellent account of the situation and divided the *Sphaeroma*-group into four sections considering the lobes of the palp segments: Section I is the typical *Sphaeroma* and contains *S. serratum*. Section IV is the typical *Exosphaeroma* with *E. gigas*. Sections II and III are more or less intermediate, but were assigned by Monod to *Sphaeroma* because of some other distinct characters. This was necessary, because some authors, like Giltay (1927) had already considered the species of group III (containing *S. hookeri* and *S. rugicauda*) to belong to *Exosphaeroma*, since the maxillipeds showed some similarity to those of *Exosphaeroma*.

Monod's redefinition of *Exosphaeroma*, however, was only accepted by a few authors, among them Hurley & Jansen (1977), but, especially in older literature dealing with non-European species, there was still confusion. The redefinition of *Exosphaeroma* did not help to clarify the situation for the European species as all of these (Monod's sections I, II and III) remained in *Sphaeroma*, which even after Monod's treatment was still a rather heterogeneous group.

Verhoeff, who had made a great name as a specialist in Oniscidea (and Myriapoda), quite late in his career started to work in the field of sphaeromatid systematics. He (Verhoeff, 1943a, 1943b, 1944a, 1944b, 1949) created numerous genera and species. His sphaeromatid papers, most of

which were published during World War II, did not get much notice and were generally overlooked by later sphaeromatid workers, whether by ignorance or intentionally is difficult to make out. Anyhow, the critical evaluation that they deserved has so far not been given to them, and I have tried here to ascertain the status of the species and genera of Sphaeromatinae that Verhoeff described, and the nomenclatural implications thereof.

On the generic level I fully agree with Monod's treatment and definition of *Exosphaeroma*. In my opinion, however, his sections I, II, III belong to two genera. Section I, as Monod also pointed out, is the true *Sphaeroma*. The species of section II and III are assigned by me to a separate genus for which the name *Lekanesphaera* Verhoeff, 1943 is available. This new genus is more or less intermediate between *Exosphaeroma* and *Sphaeroma* in the character of the lobes on the maxilliped used by previous authors, but other differences make the distinction between the three genera clearer. The generic status of all examined species could be ascertained, but several species from outside the NE. Atlantic region, which are referred to *Sphaeroma* or *Exosphaeroma*, should be examined to ensure to which genus they do belong. *Sphaeroma intermedium* (Baker, 1926) from Australia, almost certainly belongs to *Lekanesphaera*. It is possible also that other species of *Sphaeroma* from outside the area considered in this paper belong to *Lekanesphaera*. This however can only be ascertained by a direct examination. Species studied belonging to *Sphaeroma* are: *S. annandalei* Stebbing, *S. quadridentatum* Say, *S. quoyanum* Milne Edwards, *S. terebrans* Bate.

Although *Exosphaeroma* does not occur in the area under consideration (it is found in most parts of the world) its status is so closely interwoven with that of the other two genera that all three have to be considered here.

#### METHODS AND TERMINOLOGY

I have tried to straighten out the status and nomenclature of the various species, if possible by examination of type material. Of some species no material was available, although repeated efforts have been made to obtain this. In such cases I had to rely solely on the literature. Of most species it has been tried to provide a complete list of references, of the most common species (like *Lekanesphaera hookeri* and *L. rugicauda*) only a restricted list is given, omitting most purely local records.

In the list of examined material the following abbreviations are used: Leg. (Legit) — collected by; Coll. — collection; Exc. — excursion.

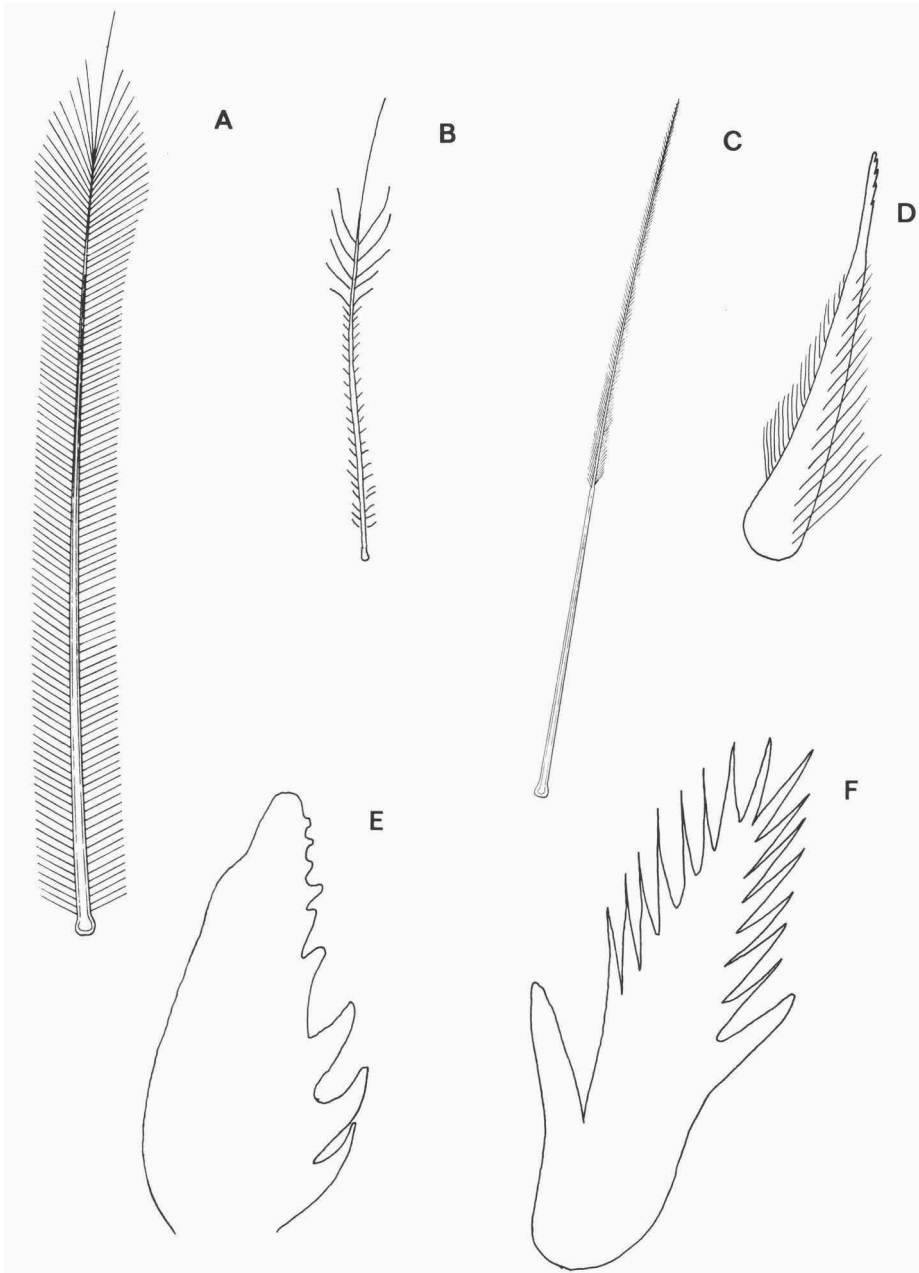


Fig. 1. Setae and spines. a, plumose seta in *S. serratum* (F.) (PI) after Lejuez (1966); b, semi-plumose seta in *L. monodi* (Arcangeli) (PI); c, smooth seta in *L. levii* (Argano & Ponticelli) (PI) after Lejuez (1966); d, robust, plumose seta with swollen base in *S. serratum* (F.) (endite of Mxp); e, comb-shaped spine in *L. hookeri* (Leach) (PI); f, serrated spine in *L. hookeri* (Leach) (PI).

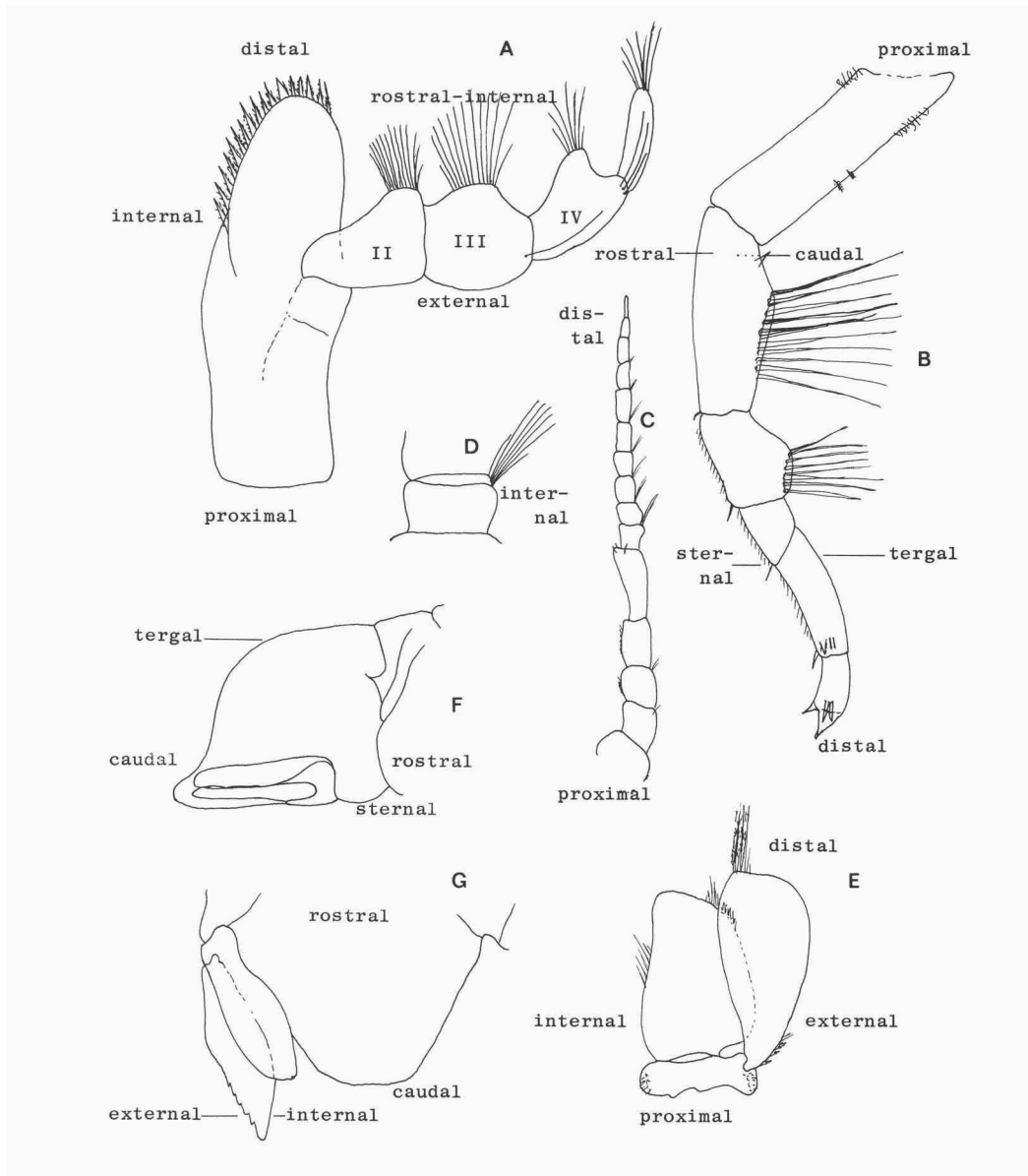


Fig. 2. Terminology. a, Mxp; b, Pl; c, A2; d, detail A2, e, Plp III; f, pleotelson in lateral view; g, pleotelson in tergal view.

In the description of the species the morphological terminology for the various parts used by Lejuez (1966) is usually adopted. The terminology for the setae and spines used in the present paper is as follows: plumose seta (fig. 1a); semi-plumose seta (fig. 1b); smooth seta (fig. 1c); robust and plumose seta with swollen base (fig. 1d); comb-shaped spine (fig. 1e); serrated spine (fig. 1f). The terminology used is explained in fig. 2.

A short account is given of the shape of antenna, maxilliped, pereopod, pleotelson, uropod and pleopod III of each species. All characters used are those that distinguish one or more species from the rest. Illustrations of each, usually taken from the literature, are provided. Of the new species the descriptions are more extensive than those of the known forms. Abbreviations used are as follows: A1 — antennule; A2 — antenna; Mnd — mandible; Mx1 — maxillule; Mx2 — maxilla; Mxp — maxilliped; P1 — pereopod 1; Plp — pleopod.

#### KEY TO THE GENERA *SPHAEROMA*, *EXOSPHAEROMA* AND *LEKANESPHAERA*

1. Maxilliped with robust palp, articles II-IV lacking lobes, inferior margins straight, bearing dense fringes of long, finely plumose setae. Inferior raised border of endite with a fringe of robust, plumose setae with swollen base. Semicircular distal margin of endite with smooth setae ..... *Sphaeroma*
- Maxilliped with slender palp, articles II-IV more or less lobed, inferior margins bearing a fringe of long, smooth setae. Inferior raised border of endite with or without a fringe of smooth setae. Semicircular distal margin with robust, plumose setae with swollen base or short, robust setae with swollen base ..... 2
2. Exopod of pleopod III with a complete articulation in distal half. Endopod of pleopod IV not showing any signs of a pronounced apical lobe. Pereopods robust, bearing only a few setae. Propodus of pereopod I bearing a few stout comb-shaped spines and on rostral side a row of serrated spines ..... *Exosphaeroma*
- Exopod of pleopod III not articulated or sometimes with a rudimentary articulation in distal half. Endopod of pleopod IV showing a pronounced apical lobe. Pereopods slender, bearing tergally a more or less distinct fringe of smooth or semi-plumose setae, especially on merus and ischium. Propodus of pereopod I bearing one comb-shaped infero-distal spine and one serrated spine on rostradistal region. Sometimes a transverse row of smooth setae being inserted next to serrated spine ..... *Lekanesphaera*



**Sphaeroma** Bosc, 1802

Type-species, selected by Latreille (1810: 109, 423): *Oniscus serratus* Fabricius, 1787. Gender: neuter.

Diagnosis. — As a complete description of the genus *Lekanesphaera* Verhoeff, 1943 will be given below, a short diagnosis is provided here based on the characters in which the European *Sphaeroma* can be distinguished from *Lekanesphaera*.

Maxilliped robust, particularly the palp. Fringe of robust, plumose setae with swollen base on internal border of endite. Semicircular distal margin of endite with bare setae. Palp articles II-IV without lobes, inferior margins straight, bearing dense fringes of long, fine-plumose setae.

Pereopods I-III slender, merus and ischium tergally with dense fringe of long, plumose setae. Pereopods IV and V distinctly shorter and more robust, pereopods VI and VII longer and less robust. Transverse row of plumose setae situated near rostro-distal spine. Long setae on lobe of merus and on ischium densely plumose, ending in short spine (about 1/10 of total length of seta).

Exopod of pleopod III without articulation, not even rudimental articulation visible.

Uropodal rami subequal, usually reaching beyond posterior margin of pleotelson. External margin of exopod pronouncedly serrated.

In lateral view abdomen convex proximally and concave distally. Sometimes entire abdomen convex (*S. serratum* (F.)).

Remarks. — The date, author, type species and gender of the generic name *Sphaeroma* have caused considerable confusion and may be given some attention here.

The date given on the title pages of the two volumes of Bosc's work is "An X", that is the 10th year of the French Revolution running from 23 September 1801 to 22 September 1802 incl. As pointed out by Dupuis (1976): "Les tomes 1 et 2 de Bosc, an X, sont signalés dans la Décade philosophique, an X, 2e trim., no 12, 30 nivôse = 20 janvier 1802". This narrows the date of publication down to 23 September 1801 to 20 January 1802. For nomenclatural purposes the date 20 January 1802 has to be accepted as the date of publication, until it can be further narrowed down.

The author of the genus *Sphaeroma* is often cited as Latreille (even by Bosc (1802) himself). Bosc (1802: 48) makes clear that he has seen the manuscript of Latreille for his "Histoire Naturelle générale et particulière des Crustacés et des Insectes" and that he was permitted by Latreille to use it. In both vol. 1, p. 82 and vol. 2, p. 182 Bosc dealt with *Sphaeroma*. He gave an account of it in his own words and added observations made by himself. It is clear that

Bosc did not just merely quote a text by Latreille, and that there is no reason to cite the author of *Sphaeroma* as “Latreille in Bosc” as in this case Latreille is not “alone responsible both for the name and the conditions that make it available” (Int. Code Zool. Nomencl., Art. 50). In contrast to the belief of Harrison and Holdich (1984), vol. 3 of Latreille’s work (containing his first mention of *Sphaeroma* on p. 41) was published later than Bosc’s work. Dupuis (1976: 4) showed that vol. 3 of Latreille’s book was published after April 1802, as that date is mentioned on p. 369 of the text, and before 6 November 1802 as it was “signalé dès les numéro du 15 brumaire an XI = 6 novembre 1802 du Journ. typogr. et bibliogr.”. All this shows that the author of *Sphaeroma* has to be cited as Bosc, 1802.

The type species was also the subject of some recent discussion. In the original description of *Sphaeroma*, Bosc (1802) mentioned the following species: in vol. 1, p. 82 *Oniscus globator* Pallas, 1772; in vol. 2, p. 186 *Oniscus assimilis* Linnaeus, 1767; *Oniscus serratus* Fabricius, 1787; *Sphaeroma cinerea* Bosc, 1802 and *Oniscus conglobator* Pallas, 1766. *Oniscus assimilis* L. 1767, was based on specimens of *Ligia oceanica* (L., 1758) which had lost the uropods. *Oniscus conglobator* Pallas, 1766 (for which *Oniscus globator* Pallas, 1772 is a later name) is a species dubia, probably *Lekanesphaera hookeri* (Leach, 1814) or *L. rugicauda* (Leach, 1814). *Sphaeroma cinerea* Bosc, 1802 is a new name for *Oniscus assimilis*, *Oniscus serratus* and *Oniscus conglobator* and thus a junior synonym of one of these. As the lectotype of *Sphaeroma cinerea* I now select the holotype of *Oniscus serratus* Fabricius, 1787. The two names thereby definitely become objective synonyms. The first type selection for the genus *Sphaeroma* is by Latreille (1810) where the genus *Sphaeroma* is mentioned on pp. 109 and 423: *Cymothoa serrata* (Fabr.) (= *Oniscus serratus* Fabr., 1787) is indicated on p. 423 as the type species of *Sphaeroma*. This type selection is entirely valid.

The gender of *Sphaeroma* has variously been treated as neuter and feminine. The derivation of the name *Sphaeroma* is not provided by Bosc or Latreille. Dr. C.W. Wright, Classical Adviser to the International Commission on Zoological Nomenclature, in an answer to a request for information on this point made by Dr. L.B. Holthuis pointed out that “*Sphaeroma* is a greek word, third declension, neuter”. According to him it appears in Liddell & Scott’s Lexicon. He also stated that “Even if it were not known as a greek word, *Sphaeroma* would not be treated as an arbitrary combination of letters. The ending -oma is a standard greek suffix producing a substantive meaning ‘anything made so-and-so; thus *Sphaeroma* = ‘anything made spherical or globular.’ ”

In relation to the family name Dr. Wright noticed: “the formation of the

family name from *Sphaeroma* would in any case be governed by Article 29(a); the greek suffix -oma follows the example of -soma, and the family name must be Sphaeromatidae.” Dahl (1916: 28) as well as Hurley & Jansen (1977: 6) had already pointed out that Sphaeromatidae is the correct spelling for the family name.

Key to the European, Mediterranean and NW. African species of  
*Sphaeroma* Bosc, 1802

1. Pleon dorsally smooth. Pleotelson of both male and female regularly convex in lateral view; margin of apex straight and smooth . . . . . *serratum*
  - Dorsal surface of pleotelson granulose, with longitudinal rows of prominent tubercles at either side of the midline. In lateral view pleotelson subapically concave; margin of apex more or less straight, slightly to prominently crenated . . . . . 2
2. Dorsal surface of pleotelson with four longitudinal rows of prominent tubercles, two on either side of midline caudally converging. Margin apex of telson slightly crenated in older specimens (practically smooth in younger ones). Uropods without tergal tubercles, exopod with four or five large, triangular, external teeth . . . . . *venustissimum*
  - Dorsal surface of pleotelson with four long, parallel and longitudinal rows of prominent tubercles, two on either side of midline. Margin of apex of telson distinctly crenated. Endopod of uropod dorsally with prominent, median tubercles. Exopod with five to seven large, triangular, external teeth . . . . . *walkeri*

***Sphaeroma serratum* (Fabricius, 1787)**  
(fig. 3)

- Oniscus serratus* Fabr., 1787: 242.  
*Cymothoa serrata*- Fabr., 1793: 510; Leach, 1814: 405; Leach, 1815: 368.  
*Sphaeroma cinerea* Bosc, 1802: 186; Latreille, 1802: 16; Latreille, 1806: 65; Risso, 1816: 146; Audouin, 1826: 95; Bosc (éd. Desmarest), 1830: 151.  
*Sphaeroma siciliense* White, 1847: 102; Hansen, 1905: 116.  
*Sphaeroma conglobator* Pallas, 1766; Stebbing, 1910: 219-220.  
*Sphaeroma podicipites* (part.) Monod, 1913b: 26, fig. 45 G, H (only specimen from Iles Chausey).  
*Sphaeroma adriaticum* Verhoeff, 1943a: 171; Verhoeff, 1949: 406–407, 409.  
*Sphaeroma ischianum* Verhoeff, 1943a: 173–174; Verhoeff, 1943b: 279-280; Verhoeff, 1944a: 111; Verhoeff, 1944b: 156; Verhoeff, 1949: 406-407, 409.  
*Sphaeroma aenariense* Verhoeff, 1943a: 173–174.

- Sphaeroma capreae* Verhoeff, 1943b: 277-279; Verhoeff, 1944a: 111; Verhoeff, 1944b: 156; Verhoeff, 1949: 406, 410-413.  
*Sphaeroma foveolatum* Verhoeff, 1943b: 280.  
*Sphaeroma aegaeum* Verhoeff, 1949: 405, 407-408.  
*Sphaeroma dalmaticum* Verhoeff, 1949: 406, 408-409.  
*Sphaeroma illyricum* Verhoeff, 1949: 406, 408, 410.

Material examined. — RMNH: Israel: Habonim shore (littoral, leg. H. Fishelson, June 1982, many specimens). Romania: Constantza (littoral, leg. T. Negoescu, July 1980, many specimens). Greece: Paraisla, Gulf of Arta (coast, leg. W.J. Wolff & M. Loosjes, June 1964, 10 specimens); Salaora, Gulf of Arta (rocky shore, sea-weed, depth 0-1,5 m., leg. W.J. Wolff & M. Loosjes, June 1964, 12 specimens); Athens, Gulf of Sardonía (rocky shore, leg. W.J. Wolff & M. Loosjes, June 1964, 1 ♂). Yugoslavia: Rovinj, Adriatic Sea (sea-weed, Exc. Leidse Biologen, August 1960, 1 juv.); Split and surroundings (beach, Exc. Leidse Biologen, May 1956, August 1960, June 1962, many specimens). Italy: Rapallo, prov. Genova (leg. J. Taapken, February 1950, 1 ♂, 4 ♀). Tunisia: Djerba, Gulf of Bou Grara (SE. coast, April 1961, many specimens). Spain: Cadaqués, prov. Gerona (bay, depth 0-4 m., leg. L.B. Holthuis, August 1949, 1950, 1954, many specimens); Rosas, prov. Gerona (beach, leg. L.B. Holthuis, August 1949, 2 ♂, 1 ♀ 1 juv.); Barcelona, prov. Barcelona (harbour, depth 0-5 m., leg. L.B. Holthuis, July 1957, 17 specimens); Denià, prov. Alicante (leg. M. Boeseman, October 1958, 3 ♂, 4 ♀, 2 juvs.); Mar Menor, prov. Murcia (stones, dead sea-weed, Exc. RMNH, May 1971, 3 ♂, 3 ♀); Fuengirola-Torreblasco, prov. Malaga (leg. M. Boeseman, October 1958, many specimens); Puerto de Santa Maria, Gulf of Cadiz, prov. Cadiz (beach, Exc. RMNH, October 1974, many specimens); Chipiona, prov. Cadiz (beach near harbour, under stones, exc. RMNH, May 1971, 1 ♀); Rio Jara, prov. Cadiz (rocky beach, algae, Exc. RMNH, October 1974, many specimens); Jidoiro Pedregoso, W. of Isla de Arosa, Ria de Arosa, prov. Pontevedra (Exc. Leidse Biologen, July 1963, 10 specimens); Isla Salvora, Ria de Arosa, prov. Pontevedra (Exc. RMNH, July 1963, many specimens). Morocco: Oued Iquem, 22 km. S. of Rabat (rocky shore, Exc. RMNH, October 1974, 10 specimens). Madeira: south coast (pebble beach, Tydeman Madeira-Mauritania Exp., October 1978, 1 ♀). Azores, Pico, south coast, Lages (harbour, rocky shore, leg. J.C. den Hartog & M.S.S. Lavaleye, October 1979, 2 ♂, 1 ♀ 1 juv.); S. Jorge, Faja de Caldeira (cobble beach and lagoon, leg. Tydeman Azores Exp., June 1981, 2 ♂). France: Cap Griz Nez, dépt. Pas de Calais (Exc. Leidse Biologen, August 1957, 2 ♂, 1 ♀); Concarneau, south coast of Pointe Cabellou, dépt. Finistère (Exc. RMNH, September 1958, many specimens). MNP: France: Iles Chausey (Sphérome trigone Risso, 1 ♂, 4 ♀).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 13 to 18 articles. Each article of flagellum with fringe of smooth setae at distal interior angle. Adult males with setae more abundant, up to three times length of article in question. In females these setae reach only to end of next segment.

Endite of maxilliped with fringe of robust, plumose setae with swollen base on internal border. Semicircular distal margin of endite with bare setae. Robust palp segments II-IV lacking lobes, interior margins straight, bearing dense fringes of long fine-plumose setae. Ratio of width of third segment to that of protruding internal margin 6 : 1. In external distal corner, third and fourth segments bearing 3-5 and 5-10 long, bare setae, respectively.

Propodus of pereopod I has one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine transverse row of 6-20

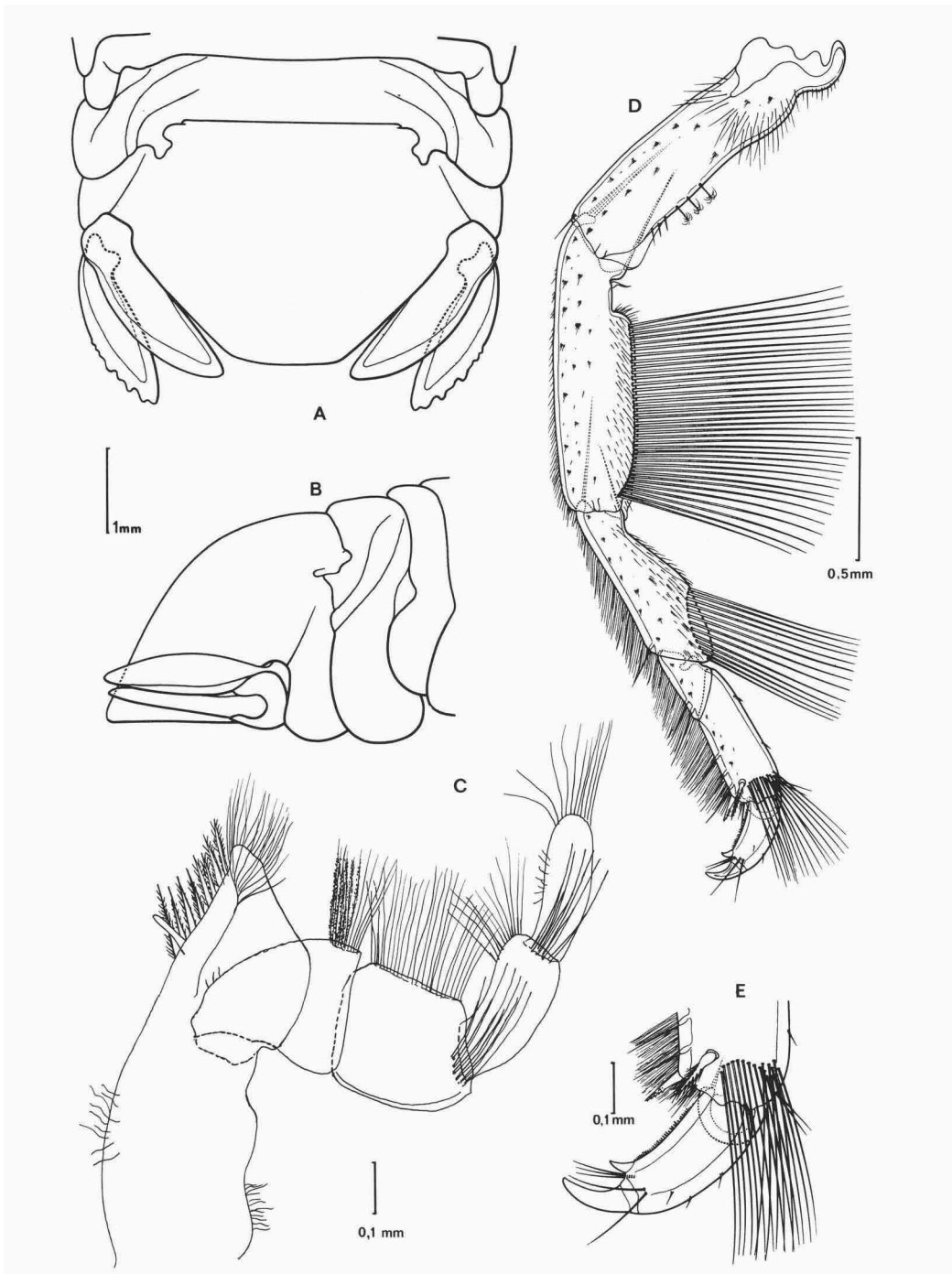


Fig. 3. *S. serratum* (F.). a-d, after Lejuez (1966): a, pleotelson in tergal view; b, pleotelson in lateral view; c, Pl; d, detail Pl; e, RMNH coll. nr. 6570: Mxp.

long, plumose setae being inserted. Tergally merus and ischium bearing 50-60 and 60 long, plumose setae, respectively. These setae, ending in short spine (about 1/10 of total length of seta), are densely and regularly plumose: length of setules best developed caudally.

Dorsal surface of pleotelson smooth. In lateral view pleotelson of both male and female regularly convex, posterior margin of apex in male broadly rounded, less straight transversally and relatively narrower than posterior margin of apex in female. Ratio of length to width of pleotelson, and ratio of pleotelson length to caudal apex width, rather constant in female; in male differing in different populations (see table). However, geographically close populations not necessarily have these ratios more similar than populations separated by large distances.

Uropodal rami robust, usually reaching just beyond posterior margin of pleotelson. External margin of exopod having 4-7 more or less pronounced teeth, mostly situated in caudal part. However, females may have irregularly serrated margin.

Ecology. — *S. serratum* is an intertidal species, often found in sheltered places under stones or in crevices preferring clean-grained sand or shelly sand.

Distribution. — The species has a remarkably extensive range. In the Atlantic it has been found from the British Isles to Morocco. It is also found in the Mediterranean, the Black Sea (Bulgarian and Rumanian coast) and even in the Suez Canal. Outside the area under consideration it is found in S. Africa and W. Australia (Holdich & Harrison, 1983; Holdich & Tolba, 1985).

Remarks. — Verhoeff (1943a, 1943b, 1949) described seven new species belonging to *Sphaeroma*. For their distinction he used characters like the shape of the cephalon and the presence of granulations or pits on it, and the shape of the segments of the sixth and seventh pereopods. I will discuss these later.

Verhoeff ignored the characters used by Monod (1931b). Other zoologists (like Consiglio & Argano, 1966) working in the group had their doubts about the value of the characters used by Verhoeff, and about the validity of his species. Argano et al. (1969, 1971) interbred a population of *Sphaeroma serratum* (F.) and *S. capreae* Verhoeff, 1943, and proved those two taxa conspecific. Schmalzfuss (1975) mentioned *S. aegaeum* Verhoeff, 1949, which is found near the coast of the island of Aegina (Greece), as a synonym of *S. serratum* (F.).

The following of Verhoeff's material was studied by me: *S. capreae* Verhoeff, 1943b — Island of Capri, Italy: coast (Leg. G. Buchner, many specimens). *S. dalmatinum* Verhoeff, 1949 — Southern Dalmatia, Yugoslavia, partly from Raguso (leg. K.W. Verhoeff, many specimens). *S.*

*aegaeum* Verhoeff, 1949 – Island Aegina, Greece: coast (leg. K.W. Verhoeff, 1♀). *S. foveolatum* Verhoeff, 1943b – St. Maxime, French rivièra: beach (leg. K.W. Verhoeff, 1♂). *S. adriaticum* Verhoeff, 1949 – Cherso, Yugoslavia (10 specimens); Buccari, Yugoslavia (1 specimen); Cherso, Yugoslavia (many species) (leg. K. Strasser). *S. serratum* (F.) – San Remo, St. Maxime, St. Jean and Antibes, French and Italian rivièra (leg. K.W. Verhoeff, many specimens).

A study of the above material, which includes type material of all Verhoeff's species mentioned, showed that the characters used by Verhoeff to distinguish his "species", like the shape and sculpture of the cephalon, and the shape of the last two pairs of pereopods, all fall within the variation of these characters shown by *S. serratum*, and that they are more or less constant within a population. A comparison of Verhoeff's material with other material of *S. serratum* confirmed this. Most of the characters used by Verhoeff were differences of degree, like length/width ratio of pereopod segments or length ratio of two pereopod segments, which were slightly higher in one of his species than in another. So Verhoeff thought the dactylus of P4 and P5 in *S. capreae* to be short and blunt, in *S. serratum* and his other species, long and sharp. I found that the specimens from Capri, on the whole, had the average length of the dactylus shorter than in a population from e.g. Israel, but in most populations of *S. serratum* these dactyls are robust and blunt. In some populations (e.g. from Split, Yugoslavia) the size range of the dactylus included both forms: the extreme short, blunt form (*S. capreae*) and the extreme long, sharp form, and all intermediate forms.

Another character studied was the ratio of propodus length to dactylus length for P7. This ratio is rather constant within each population, although the overlap between populations is so great that the character is not usable. Verhoeff also mentioned the overlap of the merus of P6 over the carpus. In some of his species the overlap is half the length of the carpus. This character also is rather constant within each population, but again the overlap was too great to make the character usable.

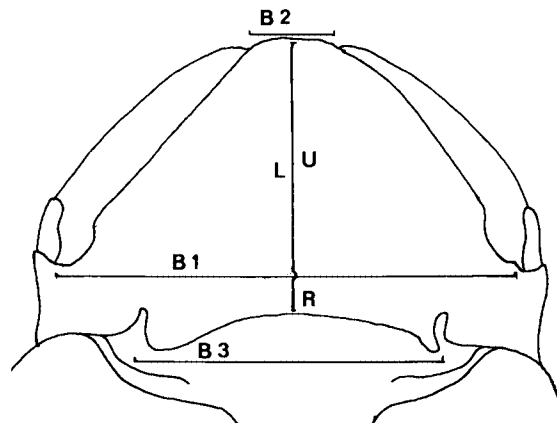
The number of setae on the segments of the sixth and seventh pereopod, on which Verhoeff partly distinguished *S. dalmatinum*, *S. illyricum* and *S. adriaticum*, may be slightly different in each population of *S. serratum*, as is the number of spines on Mx1. But the differences are not clear enough to make the characters usable. Grooves and little pits on the cephalon, pereonites and uropods, hardly recognisable in Verhoeff's type-material, are undoubtedly not distinct characters. The presence of tubercles and distinct ridges (e.g. on the pleotelson), often used as characters within the family Sphaeromatidae, are not always species-specific and should be used with some reserve.

Verhoeff evidently considered population-specific characters as species-specific and therefore came to the conclusion that a number of populations belonged to undescribed species. Although I did not study the type-material of *S. illyricum* Verhoeff, 1949 I consider it also conspecific with *S. serratum* because of the characters used by Verhoeff. Their distinctness varies greatly, even in a single population and cannot be considered reliable.

Many research workers have stated that the pleotelson of the male and of the female of *S. serratum* seems to show no obvious difference. However in my opinion both sexes are distinguishable on the characteristic form of the pleotelson, also mentioned lately by Holdich and Tolba (1985). To show this I made some measurements on the pleotelson of both male and female samples from diverse sites in its distributions area. Measured are: length of the pleotelson, L; width of the pleotelson between the uropods, B1; width of rostral part of the pleotelson, B2; width of caudal part of the pleotelson, B3; length of the caudal part of the pleotelson, from the insertion of the uropods to the tip, U; length of the rostral part of the pleotelson, R (see fig. 4). The results are given in table 1.

All specimens were adult, except for the few where the data are put between quotation marks. The table shows an obvious difference between the sexes when studying the ratios L:B3. The pleotelson of the male is relatively longer and caudally more narrow and less straight than the female pleotelson. Striking is the constant ratio L:B1 for both male and female, while the male ratio L:B3 differs between populations. The ratio U:R does not show which part of the telson is lengthened.

As the table shows, this difference in the ratio L:B3 of the male does not seem to be geographically determined.





		L:B1 ♂ ♀	L:B2 ♂ ♀	L:B3 ♂ ♀	U:R ♂ ♀				
Romenia									
coll. nr.	6553	0.80 '0.73'	0.68 '1.04'	1.14 '1.04'	0.97 '2.20'	2.30 '1.55'	2.20 '1.55'	1.60	
Greece									
coll. nr.	6555	0.78		1.18		2.90		1.35	
	6556	0.79 0.77	0.60	1.15 1.11	0.84	2.60 2.73	1.59	1.20 1.22	2.00
Yugoslavia									
coll. nr.	6547	0.87 0.71	0.63	1.09 1.11	0.95	2.40 3.40	1.90	1.88 2.10	1.52
	6552	0.66		0.96		1.92		2.43	
Italy									
syntype									
S. capreae		0.74	0.63	1.20	1.09	2.43	1.92	1.62	1.40
Tunesia									
coll. nr.	2458	0.80 0.71	0.63	1.17 1.08	0.90	3.50 3.19	2.00	1.59 2.00	1.67
Italy									
coll. nr.	6557	0.68	0.68	1.06	1.05	2.52	2.10	1.62	1.18
Spain									
coll. nr.	6566	0.68 0.65	0.63	1.00 1.00	0.94	2.36 2.60	1.79	2.25 2.71	1.52
Spain									
coll. nr.	6558	0.76 '0.67'	0.60	1.12 '1.09'	0.90	2.67 '2.27'	1.64	1.91 '1.94'	2.00
Spain									
coll. nr.	6560	'0.61'	'0.64'	'0.96'	'1.00'	'2.09'	'1.68'	'2.21'	'1.67'
Spain									
coll. nr.	6573	'0.83'	'0.63'	'0.97'	'1.03'	'2.23'	'1.94'	'1.90'	'1.20'
	6570	0.73 0.72	0.57	1.03 1.09	0.80	2.57 2.96	1.78	1.69 1.32	1.67
Morocco									
coll. nr.	6567	'0.67' '0.71'	'0.67'	'0.94' '1.00'	'0.92'	'2.22' '2.45'	'2.18'	'1.55' '1.45'	'1.40'
Spain									
coll. nr.	2472	0.70	0.61	1.00	0.95	2.40	1.90	1.46	1.71
	2473	0.72 0.70	0.69	1.13 1.03	0.95	2.96 3.00	2.00	1.83 1.67	1.25
France									
coll. nr.	2460	0.70 '0.65'	'0.61'	1.03 '1.00'	'0.90'	2.60 '2.24'	'2.05'	1.66 '1.71'	'1.87'
Madeira									
coll. nr.	6569	'0.60'		'0.83'		1.85'		'2.00'	
Azores									
coll. nr.	6568	'0.69' '0.66'		'0.98' '1.00'		'2.12' '2.00'		'1.45' '1.64'	

Table 1. Ratios of length (L, U) and width (B1, B2, B3, R) of pleotelson of samples of males and females of *Sphaeroma serratum* (F.). For explanation, see text.

**Sphaeroma venustissimum** Monod, 1931

(fig. 5)

*Sphaeroma venustissimum* Monod, 1931a: 492-494, figs. 1-3; Monod, 1931b: 37, figs. 3, 4, 18A, 23B, 25A, 32H, 33C-E, 34 F, L, 38H, 43H-I.

Material examined. — RMNH: Portugal: Albufeira, Algarve (on the shore, under stones, near the high-water mark, Exc. RMNH, November 1974, many specimens). Spain: Punta de la Cruz, Bay of Cadiz (beach W. of breakwaters, Exc. RMNH, October 1974, many specimens). Morocco: Agadir (beach, washed ashore, leg. J.A.W. Lucas, May 1974, 3 specimens). Senegal: Cap de Biche (sandy beach with lime-stone formation with holes and pools, leg. J.C. den Hartog, November 1983, many specimens).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 15 to 19 articles. Each article of flagellum with fringe of smooth setae at distal interior angle. Adult males with these setae more abundant and up to three times length of article. In female these setae reaching only 1.5 times length of article.

Interior endite of maxilliped with fringe of 13-17 robust, plumose setae with swollen base on internal border. Semicircular distal margin of endite with bare setae. Robust palp segments II-IV lacking lobes, interior margins, being little convex, situated in one line, bearing dense fringes of long fine-plumose setae. Ratio of width of third segment to that of protruding internal distal margin 5.5 : 1. Third and fourth segments bearing 7-8 and 6-10 long, bare setae, respectively in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine transverse row of 10 long, plumose setae being inserted. Merus and ischium tergally bearing 40-50 and 65-75 long, plumose setae, respectively. These setae, ending in short spine (about 1/10 of total length of seta), densely and regularly plumose: setules longest caudally.

Caudal part of dorsal surface of pleotelson bearing four longitudinal rows of prominent tubercles, two on either side of midline caudally converging. Rostro-laterally pleotelson with another, short row of tubercles. Dorsal surface of body (especially tergites 5-7) with rows of tubercles along posterior margins, those median being most prominent. In lateral view pleotelson subapically concave, posterior margin of apex more or less straight and slightly crenated. In older specimens distal half of lateral margin of pleotelson ridge-like, raised, giving spoon-like appearance.

Uropodal rami robust, usually reaching beyond posterior margin of pleotelson. External margin of exopod with 4-5 pronounced teeth, mostly situated in caudal region. In female these teeth pronounced also and both rami reaching posterior margin of pleotelson.

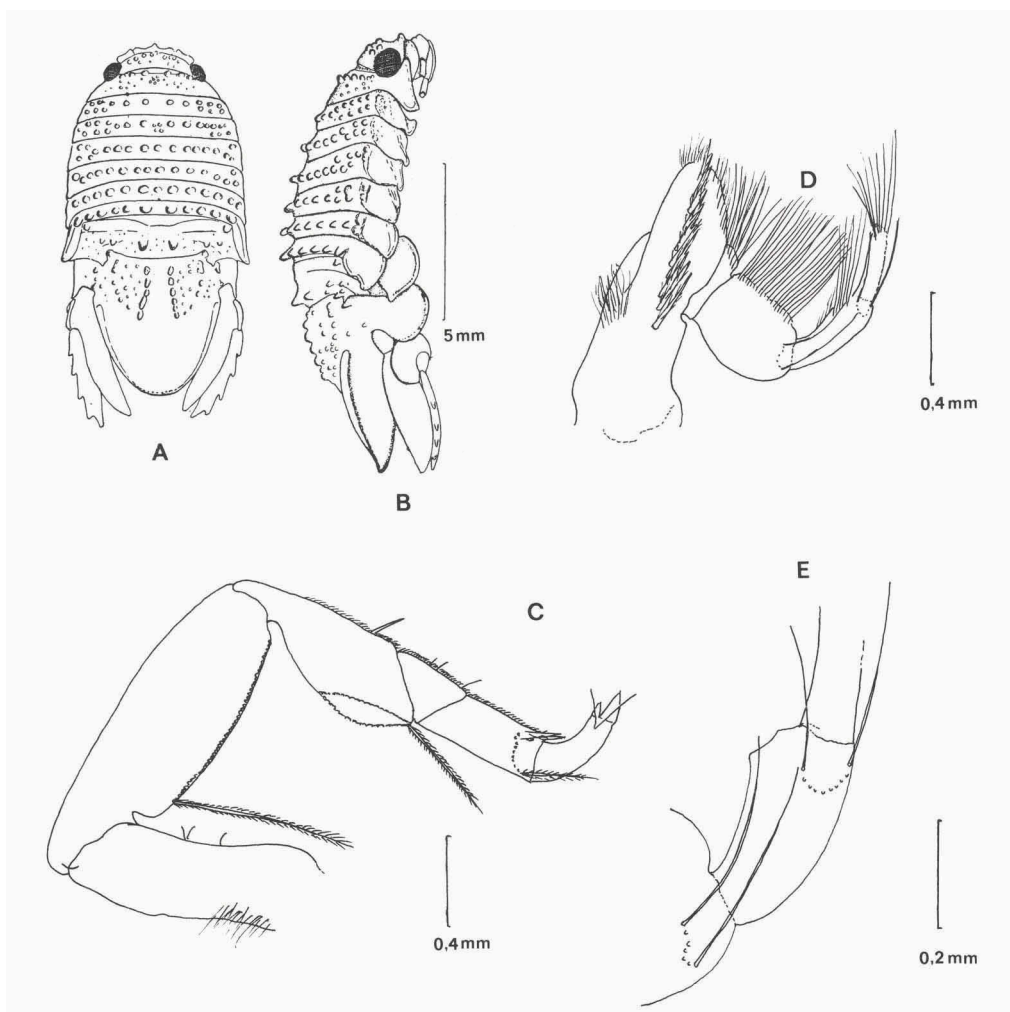


Fig. 5. *S. venustissimum* Monod. a-b, after Monod (1931b): a, tergal view; b, lateral view; c-e, RMNH coll. nr. 6576: c, P1; d, Mxp; e, Mxp palpsegments III, IV, V.

**Ecology.** — *S. venustissimum* is an intertidal species, often found under stones preferring clean sand. Sometimes it is found on the beach, a little higher on the shore than *S. serratum*.

**Distribution.** — The species is found along the Atlantic coast of NW. Africa (Morocco, Mauritania and Senegal) and along the coast of the Iberian peninsula (Algarve, Andalusia).

**Remarks.** — Like in most other *Sphaeroma* and *Lekanesphaera* species, the populations of *S. venustissimum* differ from each other in some characters,

e.g. the tuberculation of the dorsal surface of the body. I studied a sample of adult specimens from Senegal, of which the male body was completely smooth, while the pleotelson showed the characteristic tuberculation, but in a weak way. On the other hand I have studied males from Cadiz in which all tergites bore stout tubercles and the pleotelson showed the characteristic tuberculation in a very strong way. In the population from Cadiz the specimens were noticeably larger than the specimens from Senegal. Differences in lengths have already been reported by Monod (1931a) and Hoestlandt (1959).

***Sphaeroma walkeri* Stebbing, 1905**

(fig. 6)

*Sphaeroma walkeri* Stebbing, 1905: 31, pl. 7; Monod, 1931b: 36, figs. 5, 23A, 43 A-B; de Loyola e Silva, 1960: 41, figs. 6, 7; Carlton & Iverson, 1981: 31; Mak et al., 1985: 75.

Material examined. — RMNH: Mozambique: Lourenço Marques (Polona beach, leg. C.A. & W.H. van Bruggen, April, 1959, 1♀). S. Africa: Natal Bay (south enbankement, leg. C.A. van Bruggen & W.H. van Bruggen, July 1962, 8 specimens). Mauritania: Nouadhibou (quay in harbour, piling, Tydeman Madeira-Mauritania Exp., November 1978, 1♀). UN: Morocco: Tangiers (harbour, ship fouling, 1982, many specimens). Spain: Alicante (harbour, stones, depth 0.5-1 m, 1981, many specimens).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 14 to 15 articles. Each article of flagellum bearing fringe of smooth setae at distal interior angle. Adult males with these setae more abundant, setae up to two to three times length of article. In female these setae reaching only as far as end of next segment.

Interior endite of maxilliped with fringe of 11-13 robust, plumose setae with swollen base on internal border. Semicircular distal margin of endite with bare setae. Robust palp segments II-IV lacking lobes, interior margins straight, bearing dense fringes of long, fine-plumose setae. Ratio of width of third segment to that of protruding internal margin 6 : 1. In external distal corner third and fourth segment bearing 4-7 and 7-10 long, bare setae, respectively.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine transverse row of 10 long, plumose setae being inserted. Merus and ischium bear tergally 30-40 and 50-60 long, plumose setae, respectively. These setae, ending in a short spine (about 1/10 of total length of seta), being densely and regularly plumose: length of setules best developed caudally.

Dorsal surface of pleotelson bearing four long, longitudinal rows of promi-

ment tubercles, two on either side, parallel to midline. Anterior to insertion of uropod pleotelson with short row of tubercles. Dorsal surface of body with rows of prominent tubercles along posterior margins of pereonites. In lateral view pleotelson subapically concave, posterior margin of apex straight and crenated. In older specimens distal half of lateral margin of pleotelson being raised, giving a spoon-like appearance.

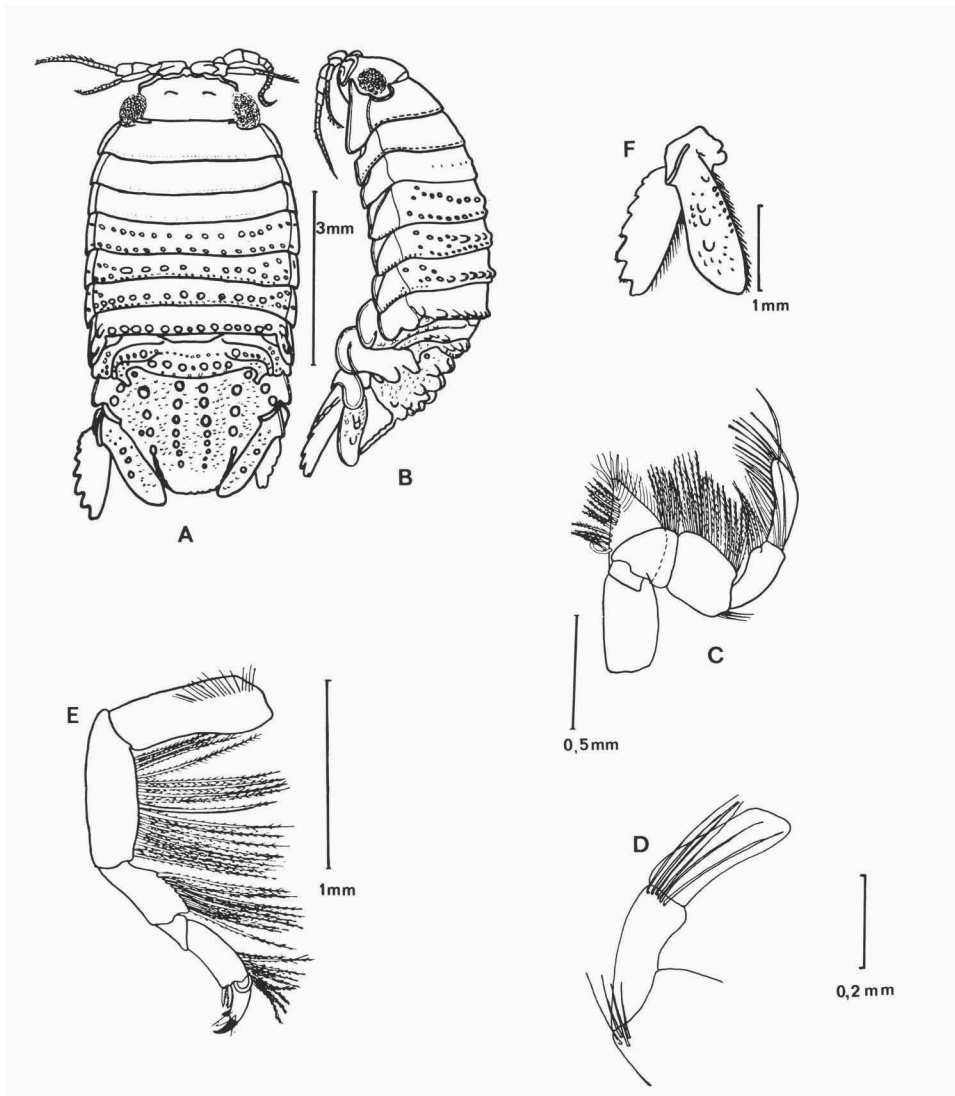


Fig. 6. *S. walkeri* Stebbing. a-e, after Loyola & Silva (1960): a, tergal view; b, lateral view; c, Mxp; d, Pl; e, uropoda ♂; f, RMNH coll. nr. 6578: Mxp palpsegments III, IV, V.

Uropodal rami robust, usually reaching beyond posterior margin of pleotelson. External margin of exopod with 5-7 pronounced teeth, mostly situated in caudal region. In female these teeth pronounced also and both rami reaching posterior margin of pleotelson. In both male and female endopod of uropod dorsally bearing few prominent, median tubercles.

Ecology. — *S. walkeri* is an intertidal species, mostly found in sheltered places, sometimes along the open coast (India, Brazil). It can be found in crevices of rock and wood or in empty shells. It is also found on the outside wall of ships, so it would be liable to dispersal by shipping.

Distribution. — The species is found worldwide. According to Carlton & Iverson (1981) it could be a native of the North-Indian Ocean. Outside this area it is mostly found in all kinds of harbours. Recently it has been found in Hong Kong (Mak et al., 1985) where the species has established itself and I have found a sample of the species from Mozambique, Lourenço Marques and from the coast of Morocco in the harbours of Tangiers and Nouadhibou. This and its presence in Port-Said and Spain brings this species into the area under study here.

### **Lekanesphaera** Verhoeff, 1943

Type-species, by monotypy, *Europosphaera (Lekanesphaera) excavatum* Verhoeff, 1943: 171-174, pl. 23-25, 27. (= jun. syn. of *Lekanesphaera monodi* (Arcangeli, 1934) (see below). Gender: feminine.

*Sphaeroma* (part) Bosc, 1802: 182-186, pl. 15.

*Europosphaera* Verhoeff, 1943: 169-174, pl. 23-25, 27-29; Forsman, 1952: 154, 158.

Description. — *Lekanesphaera* is a genus of Sphaeromatidae (Isopoda, Flabellifera) of medium length (to about 20 mm.). Male slender, female often more globular and smaller.

Both sexes with cephalosome sub-rectangular, and anterior margin broadly rounded. Body noticeably convex, pereon and pleon lacking dorsal extensions; sometimes bearing ridges or tubercles, which can be of systematic importance. Pleon with three suture lines at each side. In lateral view abdomen convex in proximal part and concave, sometimes slightly upcurved, in distal part, more evident in males than in females.

Appendages: First segment of antennular peduncle globular and sub-equal in length to third segment; segment two short; segment three slender and oblong; flagellum multi-articulate, with all articles, except first and sometimes second with few setae and one or two aesthetascs, distal-most article bearing

fringe of setae. First segment of antennal peduncle small; segments four and five more oblong; flagellum with many articles, each article bearing semicircular fringe of smooth setae at distal interior angle. In adult males these fringes of setae being more abundant and better developed than in adult females or juveniles.

Mouthparts of usual sphaeromatid form, not metamorphosed in ovigerous female. Maxillipeds showing important generic character: endite ending distally in circular fringe of strongly plumose setae with swollen base, first seta inserted above palp. Palp segments II-IV with more or less pronounced lobes; segments II-V not densely fringed, but with long, smooth setae on inner margin.

Pereopods 1-3 slender, merus and ischium tergally bearing number of long setae. These setae sometimes sparsely plumose, ending in long smooth spine (about 1/3 of total length of seta), otherwise these setae smooth, microscopically plumose at top. Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Sometimes one or few smooth setae inserted in transverse row distally of rostro-distal spine. Pereopods 4-7 less slender, with fewer setae.

Pleopods I-III distally with long, plumose setae, exopod of pleopod III lacking articulation, sometimes with rudimental articulation: extending 1/5-1/3 across width of ramus; exopod of pleopod IV articulated, endopod of pleopod IV with pronounced apical lobe.

Uropodal rami subequal, reaching to or beyond posterior margin of pleotelson. External margin of exopod smooth or more or less pronouncedly serrated.

Sexual dimorphism slight, but always recognisable. Adult male with appendix masculina arising from proximal-internal angle of endopod of pleopod II, extending to or beyond apex of endopod. Ovigerous female with broodpouch (marsupium) formed from oostegites arising from bases of pereopods 2-4. Marsupial lamellae overlapping at midline.

Remarks. — Verhoeff (1943a) described a new genus of Sphaeromatidae based on material from the Mediterranean. He mentioned two new species which together with *S. rugicauda* Leach, 1814, formed this genus *Europosphaera*. One of his species he placed in a subgenus *Lekanesphaera*. The generic name *Europosphaera* Verhoeff, 1943, is not available as Verhoeff (1943a) assigned more than one nominal species to the genus when he established it, without indicating a type species (Art. 13b of the International Code of Zoological Nomenclature). As Verhoeff did indicate a type species for his subgenus *Lekanesphaera*, that name becomes thereby available and being the oldest available name for the genus, has to be accepted as the valid

name. The type species of *Lekanesphaera* is *Europosphaera (Lekanesphaera) excavatum* Verhoeff, 1943. As shown below this name is a junior synonym of *Lekanesphaera monodi* (Arcangeli, 1934).

Key to the European, Mediterranean and NW. African species of  
*Lekanesphaera* Verhoeff, 1943

1. Propodus of pereopod I without distal setae next to rostro-distal spine (e.g. fig. 17e) ..... 2
- Propodus of pereopod I with few to many bare distal setae next to rostro-distal spine (e.g. fig. 15e) ..... 7
2. Dorsal surface of pleotelson with two longitudinal rows of more or less prominent tubercles, one on either side of midline. External margin of exopod of uropod smooth (if external margin of exopod of uropod with prominent teeth, then go to 8) ..... 3
- Dorsal surface of pleotelson smooth. External margin of exopod of uropod smooth or provided with 2(-3) small, but prominent, teeth (e.g. fig. 8a) ..... 4
3. Exopod of pleopod III without any sign of articulation. In older male specimens distal half of lateral margin of pleotelson raised, giving it a spoon-like appearance. Marine ..... *terceirae*
- Exopod of pleopod III with rudimental articulation (e.g. fig. 8e). Distal half of lateral margin of pleotelson not ridge-like or raised. Found in brackish water ..... *hookeri*
4. Uropodal rami clearly reaching beyond posterior margin of pleotelson, not inwardly bent. Exopod of pleopod III with rudimental articulation. Adult specimens reaching length up to 10-14 mm ..... 5
- Uropodal rami in male inwardly bent, more than in female, reaching to or little beyond posterior margin of pleotelson. Exopod of pleopod III without rudimental articulation. Adult specimens reaching length up to 4-6 mm ..... 6
5. Uropodal rami cylindrical, ending in sharp point. Exopod with 2(-3) small teeth ..... *ephippium*
- Uropodal rami flat, ending bluntly. Exopod smooth ..... *glabella*
6. Distal part of pleotelson slightly upcurved. Exopod of uropod in male truncate, in female rounded. External margin smooth in both sexes. Uropodal rami reaching posterior margin of pleotelson. Usually found buried 1-2 cm deep in sand ..... *teissieri*
- Distal part of pleotelson straight, not upcurved. Exopod of uropod in male truncate, smooth. In female more rounded, more or less crenulated



- at external margin. Uropodal rami reaching little beyond posterior margin of pleotelson. Usually found buried 10-15 cm deep in sand . . .  
 . . . . . *weilli*
7. Setae on ischium and merus of pereopod I long, sparsely plumose, ending in long, smooth spine (about 1/3 of total length of seta) (fig. 1b). Uropodal rami reaching far beyond posterior margin of pleotelson. External margin of exopod of uropod with prominent teeth . . . . . 8
- Setae on ischium and merus of pereopod I long and smooth (fig. 1c). Uropodal rami not reaching, or reaching beyond posterior margin of pleotelson. External margin of exopod with or without prominent teeth . . . . . 9
8. Propodus of pereopod I with 5-10 setae inserted distally in transverse row next to rostro-distal spine. Dorsal surface of pleotelson with four ridges: two long, in medium area and parallel to midline, and two short, in rostro-lateral part of pleotelson. In lateral view pleotelson subapically concave, but not apically upcurved . . . . . *marginata*
- Propodus of pereopod I with (0-)1-2 setae inserted distally in semi-transverse “row” next to rostro-distal spine. Dorsal surface of pleotelson sometimes bearing two ridges of tubercles, parallel to midline; sometimes granulated; or sometimes smooth. In lateral view pleotelson subapically concave, with lateral margins in distal half ridge-like, raised (in older specimens) . . . . . *monodi*
9. Propodus of pereopod I with 2-3 setae inserted distally in transverse row next to rostro-distal spine. Flagellum articles of antenna with fringe of few short setae at distal interior angle. Seta 1.5 times length of article. Palp articles II-IV of maxilliped with pronounced lobes: ratio of width of third segment to that of protruding internal margin being 2.8 to 1 (e.g. fig. 16c) . . . . . 10
- Propodus of pereopod I with more than three setae inserted distally in a transverse row next to rostro-distal spine. Flagellum articles of antenna with fringe of long setae, 2 to 3 times length of article. Palp articles II-IV of maxilliped with less pronounced lobes: ratio of width of third segment to that of protruding internal margin being 4 to 1 (e.g. fig. 15c) . . 11
10. Dorsal surface of pleotelson slightly granular. External margin of exopod of uropod smooth. Uropodal rami reaching beyond posterior margin of pleotelson. Exopod of pleopod III with rudimental articulation . . . . .  
 . . . . . *rugicauda*
- Dorsal surface of pleotelson smooth. External margin of exopod of uropod with 2-3 small, rounded teeth in male. In females this margin crenulated. Uropodal rami short, not reaching posterior margin of

- pleotelson. Exopod of pleopod III without any articulation .....  
 ..... *bocqueti*
11. Propodus of pereopod I with 4-8 setae inserted distally in transverse row next to rostro-distal spine. Dorsal surface of pleotelson smooth. In lateral view pleotelson subapically concave. External margin of uropod with 6-7 teeth ..... *levii*
- Propodus of pereopod I with 9-15 setae inserted distally in transverse row next to rostro-distal spine ..... 12
12. Dorsal surface of pleotelson slightly granular. Pleotelson subapically concave, slightly upcurved. External margin of exopod of uropod with 5-7 little teeth, giving it crenate appearance ..... *hoestlandti*
- Dorsal surface of pleotelson with row of 6-7 partly fused tubercles on each side of midline; rows slightly diverging. Pleotelson subapically concave, but not upcurved. External margin of exopod of uropod with 6-7 pronounced teeth ..... *panousei*

**Lekanesphaera monodi** (Arcangeli, 1934)

(fig. 7)

“*Sphaeroma serratum* oder *cinereum*” Rathke, 1837: 391.

*Sphaeroma tridentulum* Grube, 1864; Stalio, 1877: 1372.

*Sphaeroma tridentatum* (err. pro *S. tridentulum* Grube, 1864; Sovinskii, 1898: 505; Sovinskii, 1904: 108-109, 137.

*Sphaeroma serratum* (Fabr., 1787); Sovinskii, 1898: 539; Dollfus, 1899: 124; Chichkoff, 1912: XXXVII; Borcea, 1925: 448, 541; Borcea, 1926: 136; Borcea, 1931a: 677, 692, 694-695, 717, 721, 723, 726, 736-737); Borcea, 1931b: 757; Băceşcu, 1940: 475, 483, 491, 495, 497, 511, 517.

*Sphaeroma pulchellum* Monod, 1931b: 41-42; Pora, Pora & Jitariu, 1949: 1-48; Cărăuşu, 1950: 298-391; Pauli, 1954: 128-129; Kaneva-Abadjieva, 1960: 399; Daguerre de Hureaux, Hoestlandt & Lejuez, 1960: 296; Daguerre de Hureaux et al., 1964: 9, 12; Kussakin, 1969: 420; Tsikhon-Lukanina & Lukashova, 1969: 139-140; Bocquet & Lejuez, 1969: 12; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 340; Rezig, 1977a: 26; Rezig, 1977b: 13; Kussakin, 1979: 375, 391-393; Negoescu, 1979: 171-176; Argano & Ponticelli, 1981: 227-234.

*Sphaeroma monodi* Arcangeli, 1934: 149; Argano, 1979: 40, 47-49; Argano & Ponticelli, 1981: 227 – 234.

*Sphaeroma ghigii* Arcangeli, 1941: 22-29; Argano, 1967: 337-351; Bocquet & Lejuez, 1969: 12; Kerambrun, 1970: 438-441; de Casabianca & Kerambrun, 1970: 491-493; de Casabianca & Kerambrun, 1972: 935-946; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 340; Kerambrun, 1975a: 95-100; Kerambrun, 1975b: 101-109; Rezig, 1977a: 26; Argano & Ponticelli, 1981: 227-234.

*Europosphaera excavatum* Verhoeff, 1943a: 171-174; Verhoeff, 1943b: 281; Verhoeff, 1944a: 111; Verhoeff, 1944b: 156.

*Europosphaera (Lekanesphaera) excavatum* Verhoeff, 1943a: 172.

*Europosphaera noduliger* Verhoeff, 1943a: 171-172, 174; Verhoeff, 1944a: 111; Verhoeff, 1944b: 156.

*Europosphaera excavatum sorrentinum* Verhoeff, 1943b: 281; Verhoeff, 1944a: 111; Verhoeff, 1944b: 156.

*Europosphaera media* Verhoeff, 1943b: 281-282.

*Sphaeroma lejeuzi* Bocquet & Rezig, 1973: 2497-2499; Prunus & Pantoustier, 1974: 161; Rezig, 1974: 340; Rezig, 1976: 21-27; Prunus & Pantoustier, 1977: 252, 256-257; Rezig, 1977a: 5-28; Rezig, 1978: 67-72; Argano & Ponticelli, 1981: 227-234.  
 Not *Sphaeroma monodi* Bocquet, Hoestlandt & Levi, 1954 (see *Lekanesphaera levi*).

Material examined. — RMNH: Israel: near Tel Aviv (coast, leg. L. Fishelson, August 1983, many specimens). Turkey: Black Sea, near Samsun (rocky shore, depth 0-2 m, Turkey Exp. C. Swennen, June 1959, many specimens); Black Sea, Ilnye (scraped from scaffolding-poles, Turkey Exp. C. Swennen, June 1959, 1♂); Black Sea, Trabzon (harbour, pelagic at night, Turkey Exp. C. Swennen, 2♀); Black Sea, surroundings of Trabzon (depth 0-5 m, Turkey Exp. C. Swennen, 9 specimens); Sea of Marmara, Jalova (Turkey Exp. C. Swennen, June 1959, 1♀); Aegean Sea (depth 0-2 m., Turkey Exp. C. Swennen, June 1959, many specimens); Mediterranean Sea, Antalya (harbour, depth 5-20 m, among sea-weed and under stones, a strong flow of fresh water, Turkey Exp. C. Swennen, June 1959, 1♂, 2 juvs.); Black Sea, Persembe (leg. R. Argano, June 1973, 3♂, 2♀). Romania: Black Sea, Constantza (littoral, under stones, leg. T. Negoescu, July 1980, many specimens). Greece: Aegean Sea, Etang near Porto Lago, Thrace (brackish water, Turkey Exp. C. Swennen, June 1959, many specimens). MNP: Egypt: Port-Said (*S. rugicauda* Leach, det. Dollfus and *S. pulchellum* (Colosi), det. Monod). ZSBS: Italy: Ischia (north coast, leg. G. Buchner: syntypes *Europosphaera noduliger* 1♂, 2♀); Ischia and San Remo (leg. G. Buchner and K.W. Verhoeff: syntypes *E. excavatum* 3♂); Agnello di Sorrento (beach, leg. G. Buchner: syntype *E. e. sorrentinum* 1♂); San Remo (beach, leg. K.W. Verhoeff: syntype *E. media*, 1♀). PCJ: Greece: Rhodos, near Kalithea (under stones, depth 4 cm, leg. B.J.M. Jacobs, June 1984, 1♂).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 10-15 articles. Each article of flagellum bearing fringe of smooth setae at distal interior angle. Adult male with these setae more abundant, up to two to three times length of article. In female these setae reaching only as far as end of next segment.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with pronounced lobes: ratio of width of third segment to that of protruding internal margin 3 : 1. Palp segments II-V with fringe of long, bare setae. Third and fourth segments bearing, in external distal corner, one and 3-4 long, bare setae, respectively.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine semi-transverse "row" of (0-)1-2 bare setae being inserted (number differs in different populations). Merus and ischium tergally bearing 20-25 and 30-40 long, sparsely plumose setae, respectively. These setae ending in long, smooth spine (about 1/3 of total length of seta).

Dorsal surface of pleotelson sometimes bearing two ridges of tubercles, one on either side of midline (Arcangeli, 1934; Argano, 1967), sometimes granular (Cărăușu, 1950) or smooth (Rezig, 1976). I found all three forms in one population (from Constantza): female and juvenile mostly smooth or slightly granular, old male sometimes having two ridges of tubercles or being slightly

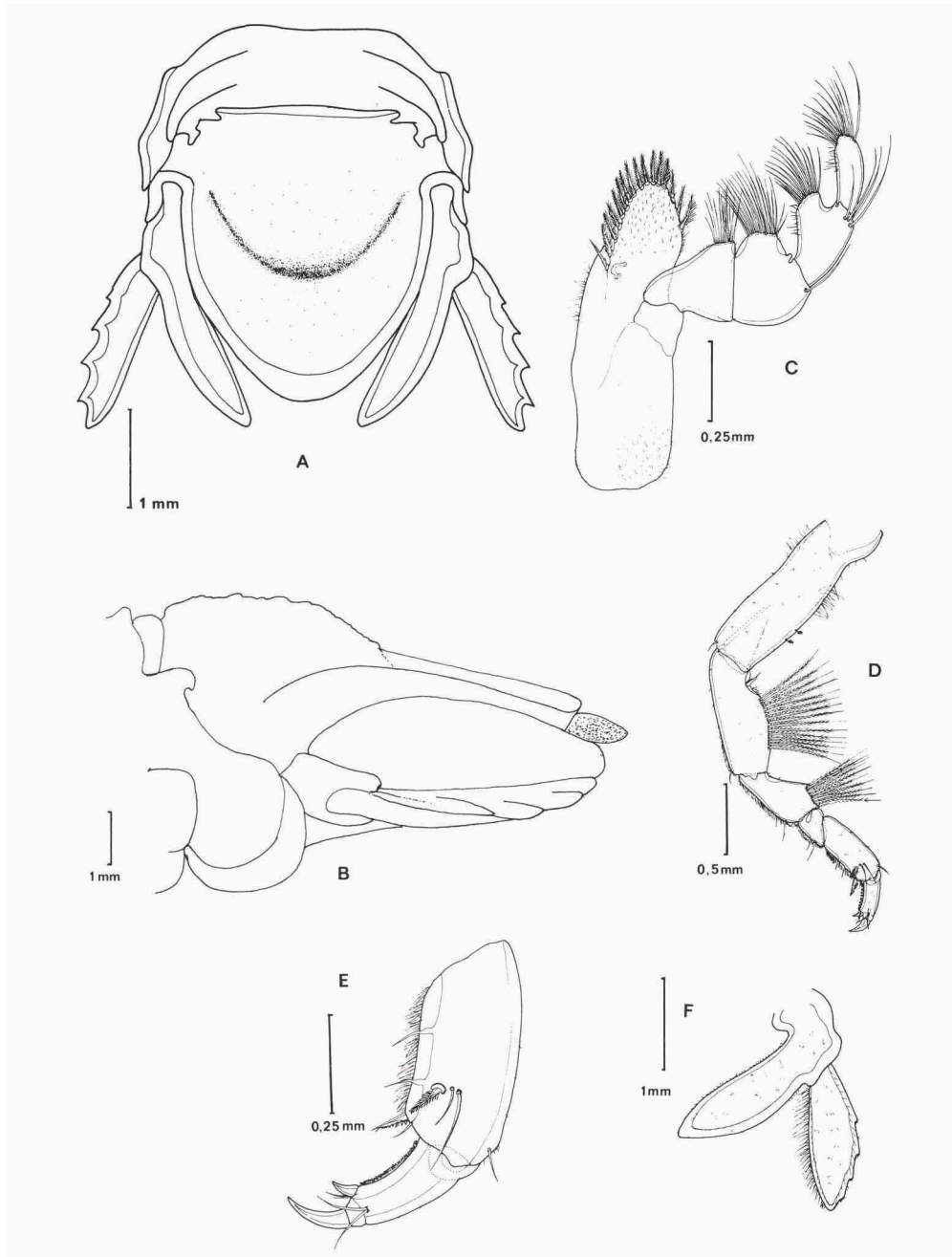


Fig. 7. *L. monodi* (Arcangeli). a, syntype *Europosphaera excavatum* Verhoeff (1943a): pleotelson in lateral view; b-e, after Rezig (1977a): b, pleotelson in dorsal view; c, Mxp; d, Pl; e, uropod ♀.

to prominently granular. In lateral view pleotelson concave subapically, distal half of lateral margin raised, giving spoon-like appearance. Posterior margin rounded.

Uropodal rami slender, reaching far beyond posterior margin of pleotelson. External margin of exopod with 4-6 well pronounced teeth, first near apex, second relatively far from first, rest following close.

Ecology. — *L. monodi* is an intertidal species, restricted to sheltered places, often found in crevices and under stones, preferring clean coarse-grained sand. Sometimes together with *S. serratum*.

Distribution. — The species is found throughout the Mediterranean, from San Remo, N. Italy (Verhoeff, 1943a) to Port-Said, Egypt (Monod, 1931), including the Adriatic and the Black Sea.

Remarks. — Argano & Ponticelli (1981) showed *S. ghigii* Arcangeli, 1941 and *S. pulchellum* (Colosi, 1921) sensu Cărbăușu et auctorum to be conspecific with *S. monodi* Arcangeli, 1934. They mentioned *S. lejeuzi* as being a third synonym of *S. monodi*; after comparing Bocquet & Rezig's description of *S. lejeuzi* with the material of *L. monodi* at my disposal, I fully agree with Argano & Ponticelli.

Verhoeff (1943a) described four Mediterranean species, together forming his genus *Europosphaera*. For their distinction he used the form of the pleotelson. In some of his specimens the lateral margins of the pleotelson are raised ridge-like (adult male *L. monodi*). On this character Verhoeff based the new subgenus *Lekanesphaera* containing one new species *Europosphaera excavatum* Verhoeff, 1943a with the new subspecies *E. excavatum sorrentinum* Verhoeff, 1943b. The subspecies *sorrentinum* was distinguished from the nominate subspecies by having the granulations of the pleotelson more distinct. Studying Verhoeff's type-material of the two subspecies I could not tell any real difference. Some of the material placed by Verhoeff in his subgenus *Europosphaera* was assigned to two new species *E. (E.) media* and *E. (E.) noduliger*. Examination of the type of *E. media* showed this to be an adult female and those of *E. noduliger* were two juvenile males and one juvenile female. The character on which Verhoeff distinguished these "species", viz., not having the lateral margins of the pleotelson raised and ridge-like (*E. media*) or showing only the beginning of these ridge-like raised margins (*E. noduliger*), prove not to be specific but due partly to the different age of the specimens and partly to sexual differences. Like *E. (L.) e. excavatum* and *E. (L.) e. sorrentinum*, the characters of *E. (E.) media* and *E. (E.) noduliger* all fall within the range of variation of this character shown in my material of *L. monodi*. As I can find no consistent character to separate these taxa I have no hesitation in synonymizing Verhoeff's three species with *L. monodi* (Arcangeli, 1934).

**Lekanesphaera ehippium** (Costa, 1882)

(fig. 8)

*Sphaeroma ehippium* Costa, 1882: 1-42; Hansen, 1905: 116; Torelli, 1929: 3-5; Torelli, 1930: 305, 338; Monod, 1931b: 20-21, 39-40; Arcangeli, 1934: 151-152; Arcangeli, 1941: 28; Daguerre de Hureaux, Hoestlandt & Lejuez, 1960: 296; Daguerre de Hureaux, Elkaïm & Lejuez, 1964: 12; Elkaïm, 1966: 262, 264; Bocquet & Rezig, 1972: 129-145; Rezig, 1972: 245-249; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 324, 334, 340; Rezig, 1976: 21-27; Rezig, 1978: 67-72; Argano, 1979: 46-48.

Material examined. — RMNH: Tunisia: Gulf of Bou Grara, SE. coast of Djerba (leg. L.D. Brongersma, April 1961, 1 ♂); Khereddine (beach, leg. G.A.L. Bisseling, April-June 1951, 3 specimens, dry). Italy: Sicily: Trapani (salt-works, leg. B. Palma, June 1981, 3 ♂ 1 ♀).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 15-20 articles. Each article of flagellum bearing fringe of smooth setae at distal interior angle. Adult male with these setae more abundant, up to 2 to 2.5 times length of articles. In female these setae reaching only as far as end of next segment.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with pronounced lobes: ratio of width of third segment to that of protruding internal margin 3 : 1. Palp segments II-V with fringe of long, bare setae. Fourth segment bearing four long, bare setae in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. No setae being inserted near rostro-distal spine. Merus and ischium tergally bearing 20-25 long, sparsely plumose setae each. These setae ending in long, smooth spine (about 1/3 of total length of seta).

Dorsal surface of pleotelson smooth. Caudally pleotelson ending in rather narrow apex (male only). In lateral view pleotelson concave subapically and slightly upcurved.

Uropodal rami cylindrical, slender, ending in sharp point and reaching beyond posterior margin of pleotelson. External margin of exopod with two(-three) well marked, but not protruding teeth.

Exopod of pleopod III with rudimental articulation, being 1/5-1/4 of total breadth of ramus.

Ecology. — *L. ehippium* is an intertidal species, restricted to sheltered places, often found under stones laying on a muddy substratum, sometimes among *Ulva*.

Distribution. — The species has so far been found in the central part of the Mediterranean: in Tunis, the south coast of Sardinia and in Sicily.

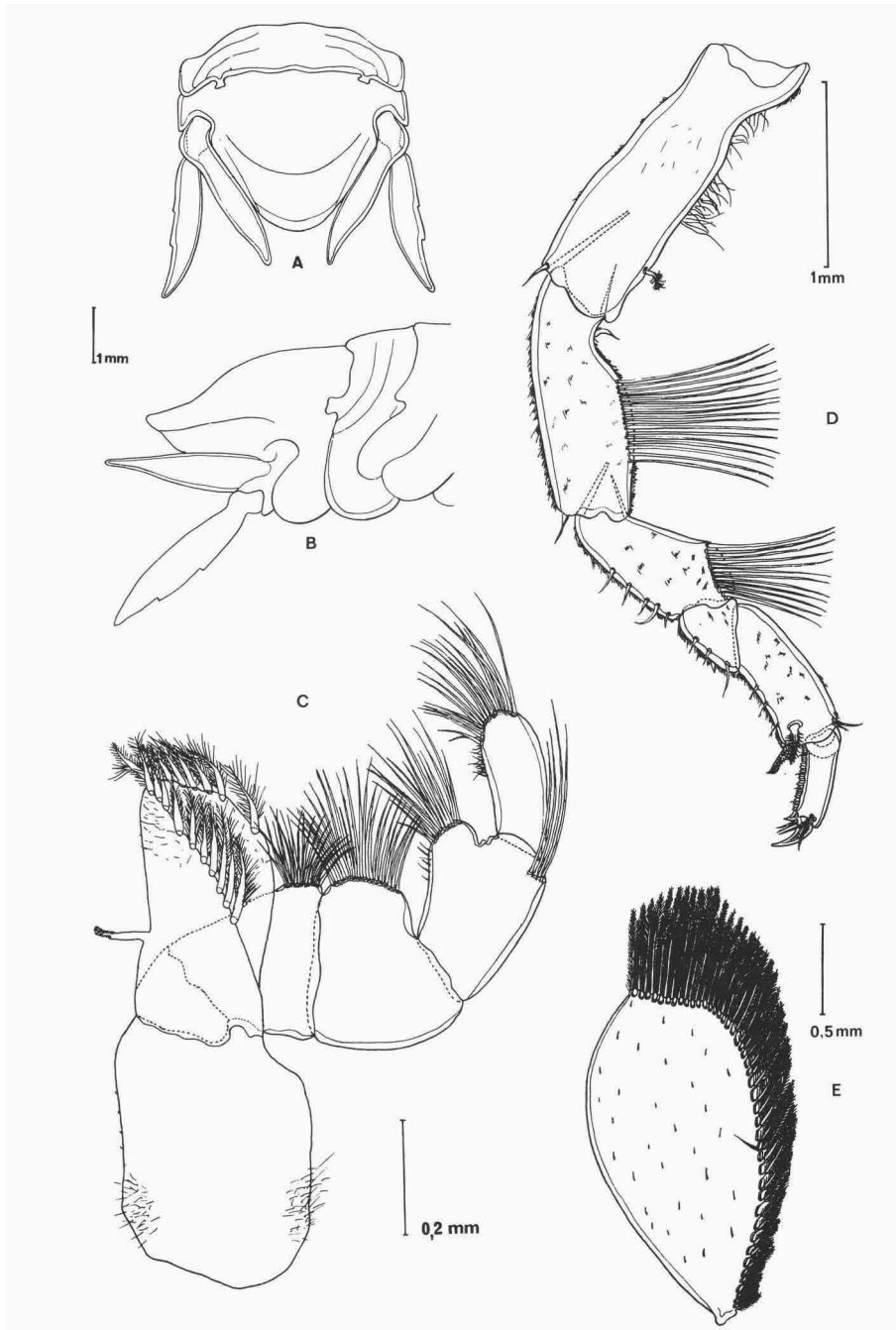


Fig. 8. *L. ephippium* (Costa). a-e, after Bocquet & Rezig (1972): a, pleotelson in tergal view; b, pleotelson in lateral view; c, Mxp; d, Pl; e, Plp III.

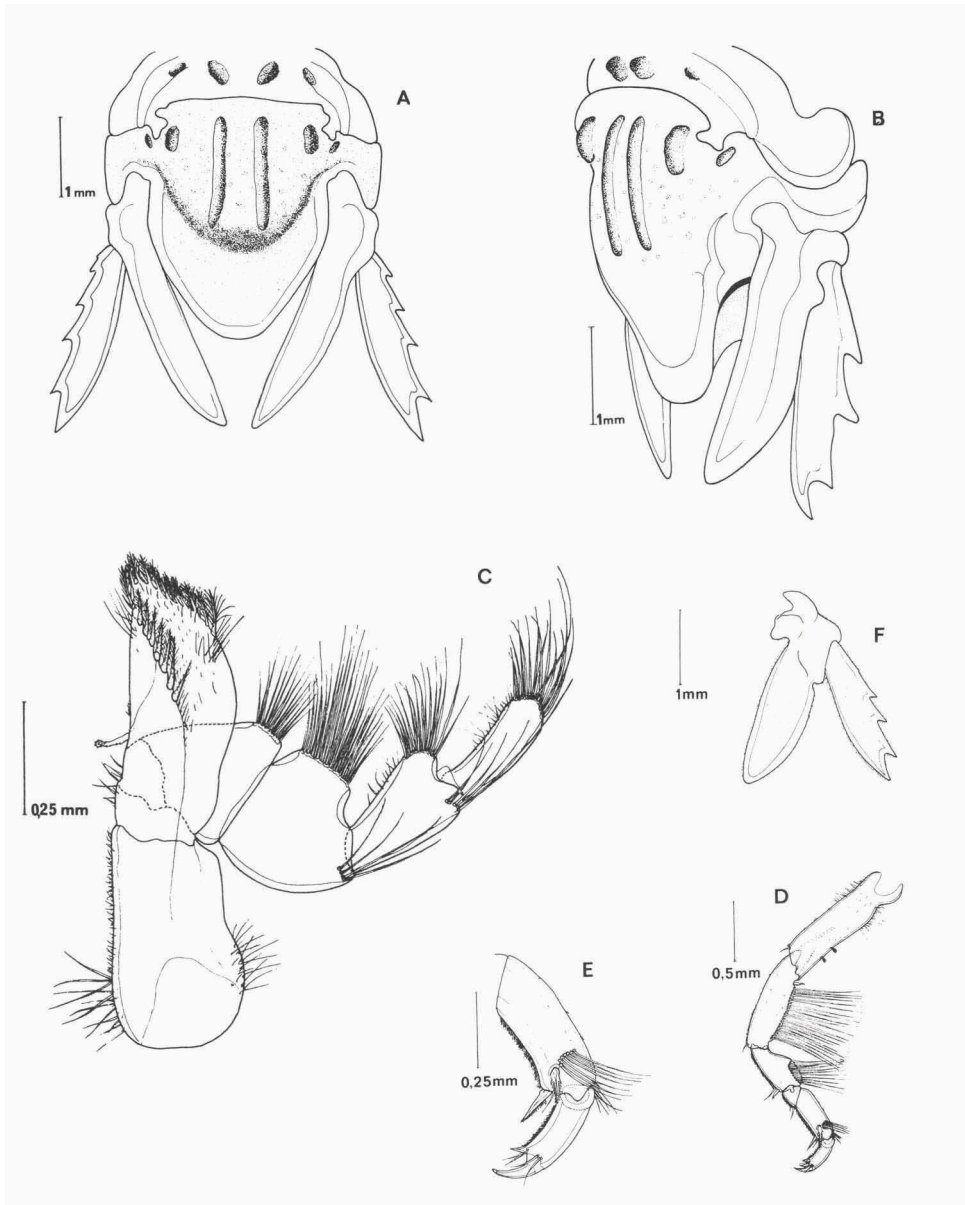


Fig. 9. *L. marginatum* (Milne Edwards). a-f, after Rezig (1974): a, pleotelson in tergal view; b, pleotelson in dorso-lateral view; c, Mxp; d, Pl; e, detail Pl; f, uropod ♀.



**Lekanesphaera marginata** (Milne Edwards, 1840)  
(fig. 9)

*Sphaeroma marginata* Milne Edwards, 1840: 206.

*Sphaeroma marginatum* Hansen, 1905: 116; Monod, 1931b: 20, 23, 38-39; Giordani Soika, 1950: 225-230; Daguerre de Hureaux et al., 1960: 296; Bocquet & Lejuez, 1969: 12; Bocquet & Rezig, 1972: 130; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 323-342; Rezig, 1976: 21-27; Rezig, 1977a: 18; Rezig, 1978: 67-72.

No material examined.

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 11-16 articles. Each article of flagellum bearing fringe of smooth setae at distal interior angle. Adult male with these setae more abundant, up to 2 to 2.5 times length of article. In female these setae reaching only as far as end of next segment.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with pronounced lobes: ratio of width of third segment to that of protruding internal margin 3 : 1. Palp segments II-V with fringe of long, bare setae. Third and fourth segments bearing, in external distal corner, four and five long, bare setae, respectively.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine transverse row of 5-10 bare setae being inserted. Merus and ischium tergally bearing 25-30 and 40-50 setae, respectively.

Dorsal surface of fused abdomen with four tubercles. Dorsal surface of pleotelson with four ridges; two long ridges, one on either side of midline, and two short rostro-lateral ridges, one on either side; also one rostro-lateral tubercle on each side. In lateral view pleotelson concave subapically, distal half of lateral margin raised, giving spoon-like appearance. Posterior margin rounded.

Uropodal rami slender, reaching far beyond posterior margin of pleotelson. External margin of exopod with 4(-6) distinct teeth, proximally less pronounced than distally.

Ecology. — *L. marginatum* is an intertidal species, restricted to sheltered places, often found under stones or in empty shells (Lamellibranchiata), along rocky coasts, preferring a not too muddy substratum; sometimes in patches of *Ulva*.

Distribution. — The species is found in the Mediterranean. Milne Edwards described it from the Languedoc, S. France. At present it has been found in two other areas: Tunisia and the Lagoon of Venice.

**Lekanesphaera hoestlandti** (Daguerre de Hureaux, Elkaïm & Lejuez, 1965)  
(fig. 10)

*Sphaeroma hoestlandti* Daguerre de Hureaux, Elkaïm & Lejuez, 1965: 117-122; Bocquet & Lejuez, 1969: 8, 12; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 339-340; Rezig, 1977a: 6.

? *Sphaeroma podicipitis* (part.) Monod, 1931: 26, fig. 19A-B, 23C, 24A (only specimen from Sidi Maklouf).

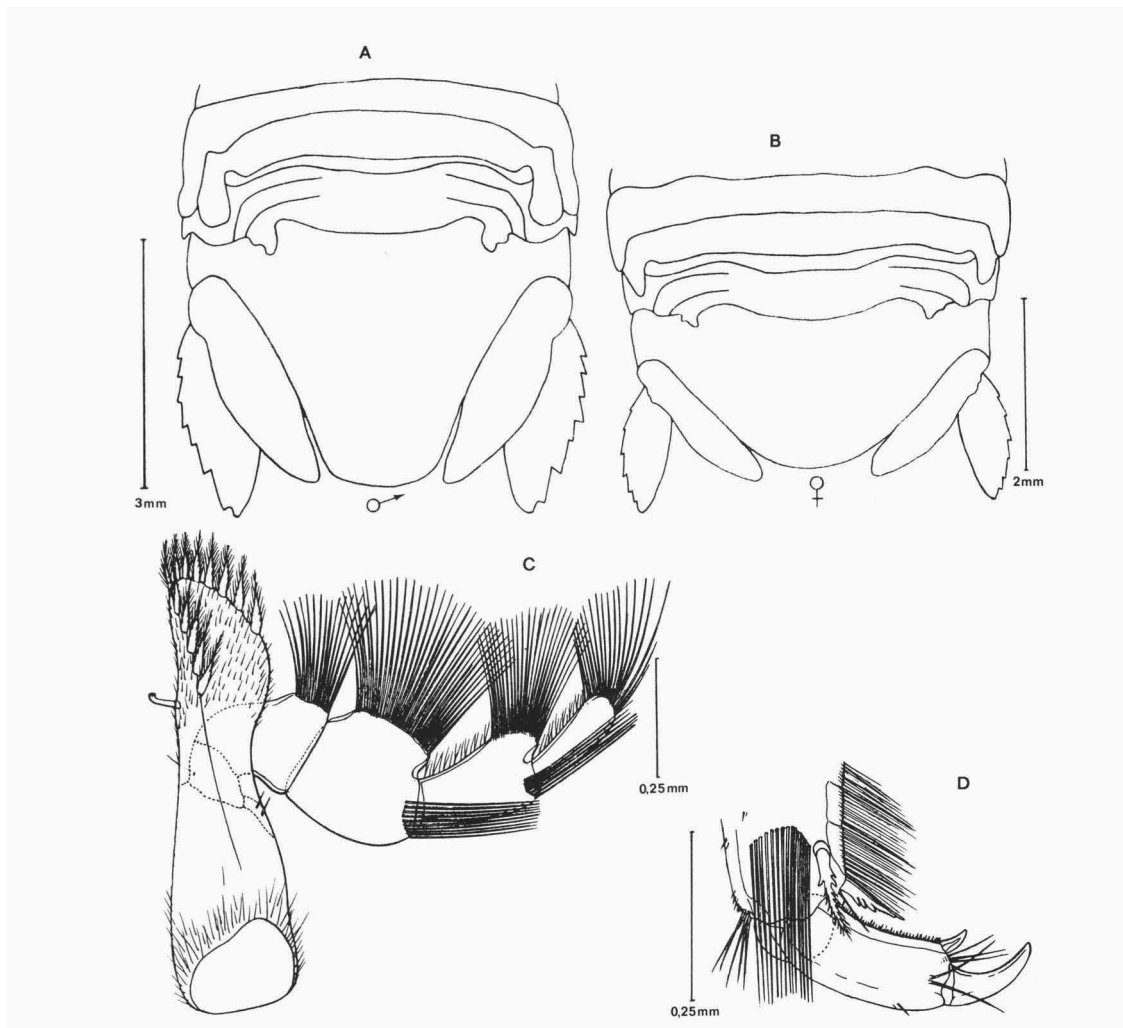


Fig. 10. *L. hoestlandti* (Daguerre de Hureaux, Elkaïm & Lejuez). a-f, after Daguerre de Hureaux et al. (1965): a, pleotelson ♂ in tergal view; b, pleotelson ♀ in tergal view; c, pleotelson ♂ in lateral view; d, Mxp; e, detail Pl.

Material examined. — No material of *L. hoestlandti* examined, but for comparison I did study the type specimen of *S. podicipitis* Monod, 1931b, which lacks the mouthparts and first pereopods: MNP: Morocco: Sidi Maklouf, Bou Regreg (found in the stomach of Great Crested Grebe; Coll. 1388).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 15-18 articles. Each article of flagellum bearing fringe of smooth setae at distal interior angle. Adult male with these setae more abundant, up to two to three times length of article. In female these setae reaching only as far as end of next segment.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with broad lobes: ratio of width of third segment to that of protruding internal margin 4 : 1. Palp segments II-V with fringe of long, bare setae. Third and fourth segments bearing 6-10 long, bare setae in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine transverse row of 9-15 bare setae being inserted. Merus and ischium tergally bearing number of long setae.

Dorsal surface of pleotelson granulated in both sexes, older male often bearing two tubercles, one on either side of midline. Caudally pleotelson concave subapically and slightly upcurved.

Uropodal rami robust, usually reaching little beyond posterior margin of pleotelson. External margin of exopod with 5-7 small teeth, giving irregularly serrated appearance.

Ecology. — *L. hoestlandti* is an intertidal species. It is found in empty shells, on a muddy substratum. It penetrates into estuaries, where it is found further up than *S. serratum*, although it is a euhaline species.

Distribution. — The species is only known from the mouth of the Bou Regreg near Rabat (Morocco).

Remarks. — One of Monod's specimens of his species *S. podicipitis* was found in the stomach of a Great Crested Grebe (*Podiceps cristatus* (L.)), which was found in the estuary of the Bou Regreg (Sidi Maklouf, near Rabat-Salé, Morocco). He also mentioned one other specimen, found at Iles Chausey, France, but that proved to belong to *Sphaeroma serratum*, not to *Lekanesphaera levii* (Argano & Ponticelli, 1981) as thought by Bocquet et al., (1954). As no type-specimen was chosen by Monod, I hereby select the specimen from Sidi Maklouf (found in the stomach of a bird after which Monod named the species) as the lecto-type.

Daguerre de Hureaux et al. (1964, 1965) described two new species from the same estuary where Monod found his *Sphaeroma podicipitis*, viz., *S. hoestlandti* and *S. panousei*. Although they collected very intensively in the Bou Regreg estuary *S. podicipitis* was evidently missed by them. As *S. hoestlandti* resembles *S. podicipitis* in the pleotelson and the uropods (the type specimen of *S. podicipitis* lacks the mouthparts and the first pereopods, which are taxonomically very important), it seems likely that they are the same species, but only examination of more material, especially the types, can decide this matter. Fact is that Monod thought his new species a real *Sphaeroma* (Section I) (but his material included the specimen of Iles Chausey, which proves to belong indeed to *Sphaeroma serratum*), while it was found in a bird's stomach (one is never sure where this bird came from). For these reasons I will consider them here as two different species, but I will not describe *S. podicipitis* as a distinct species while no good description is at hand and the taxonomically most important parts of the specimen are missing.

**Lekanesphaera panousei** (Daguerre de Hureaux, Elkaïm & Lejuez, 1964)  
(fig. 11)

*Sphaeroma panousei* Daguerre de Hureaux, Elkaïm & Lejuez, 1964: 1-14; Daguerre de Hureaux et al., 1965: 119; Bocquet & Lejuez, 1969: 8, 12; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 339-340; Rezig, 1977a: 6.

No material examined.

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 15-18 articles. Each article of flagellum bearing fringe of smooth setae at distal interior angle. Adult male with these setae more abundant, up to two to three times length of article. In female these setae reaching only as far as end of next segment.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with broad lobes: ratio of width of third segment to that of protruding internal margin 4 : 1. Palp segments II-V with fringe of long, bare setae. Third or fourth segments bearing 7-8 long, bare setae in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine transverse row of 15 bare setae being inserted. Merus and ischium tergally bearing 200 and 100-200 long, bare setae, respectively.

Dorsal surface of fused abdomen bearing two robust tubercles (as do sixth

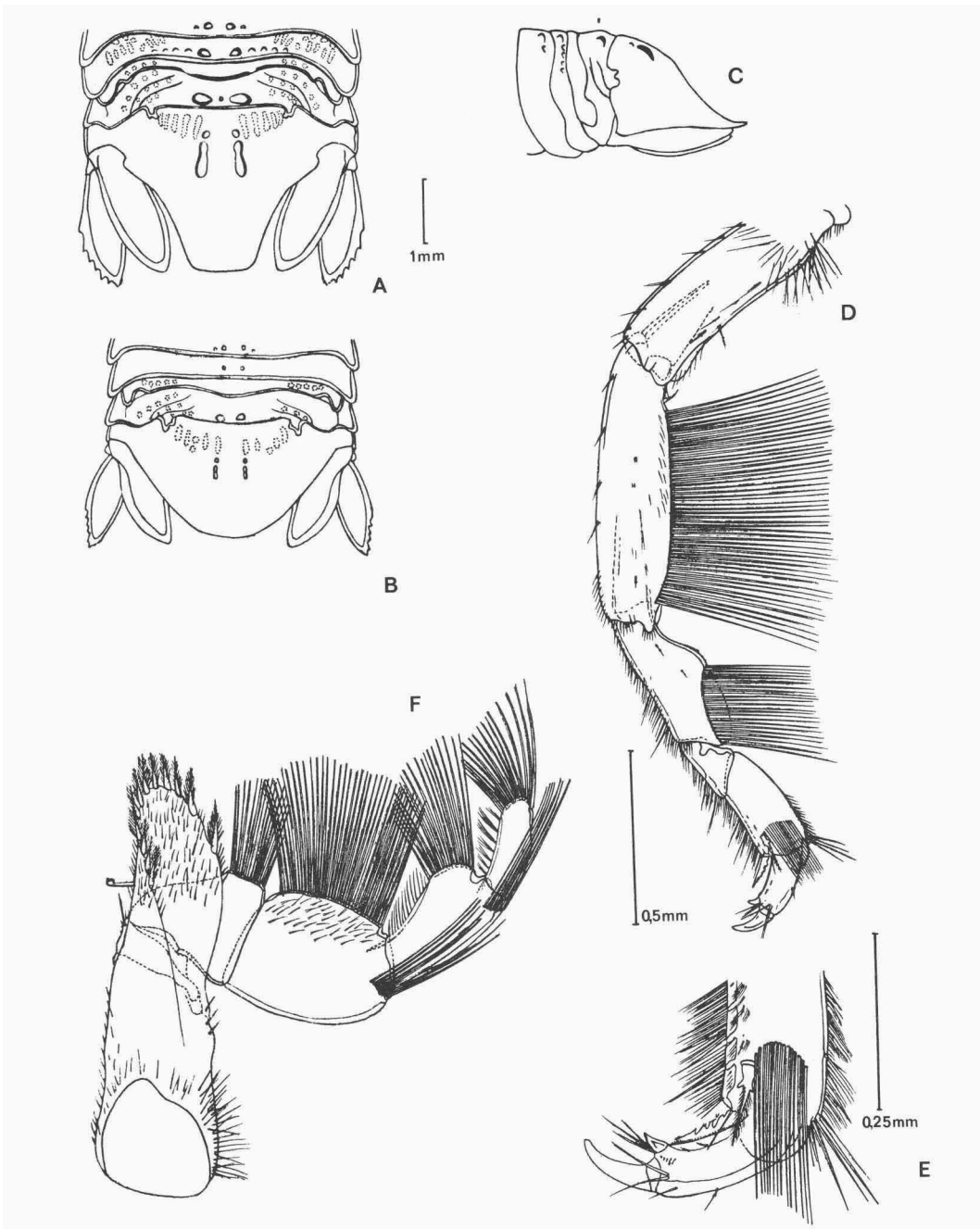


Fig. 11. *L. panousei* (Daguerre de Hureaux, Elkaim & Lejuez). a-e, after Daguerre de Hureaux et al. (1964): a, pleotelson ♂ in tergal view; b, pleotelson ♀ in tergal view; c, pleotelson ♂ in lateral view; d, Mxp; e, Pl; f, detail Pl.

and seventh segments of pereon). Dorsal surface of pleotelson with two ridges, one on either side of midline, each composed of 6-7 partly fused tubercles and one separate tubercle. In both sexes dorsal surface of pleotelson granulated. Apex of pleotelson rather narrow, straight. In lateral view pleotelson concave subapically without any sign of upcurving.

Uropodal rami robust, usually reaching little beyond posterior margin of pleotelson. External margin of exopod with 6-7 small teeth, giving irregularly serrated appearance.

Ecology. — *L. panousei* lives in brackish water; it is found under stones, on a muddy substratum.

Distribution. — The species is only known from the estuary of the Bou Regreg near Rabat (Morocco).

Remarks. — As both *L. hoestlandti* and *L. panousei* are found only in the Bou Regreg and resemble each other in many characteristics, it is possible that they are more closely related than thought so far. They may even represent two populations of one species. I noted above that the characteristic ornamentation of the pleotelson can differ between populations in *L. monodi* and that populations of *L. monodi* are found as well in brackish water as in euhaline water. As I cannot find any good difference between these two species mentioned above except the ornamentation of the pleotelson they could well be conspecific. As I was not able to examine the type material (or other material) of either species, I refrain from making a decision here and, for the time being, consider them two distinct species.

### **Lekanesphaera weilli** (Elkaïm, 1966)

(fig. 12)

*Sphaeroma weilli* Elkaïm, 1966: 257-266; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 334, 340; Rezig, 1977a: 6.

Material examined. — UN: Italy: Ischia, Englishmen beach (under 1 m of water, in the sand, leg. U. Schiecke, 1967, many specimens).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 7-9 articles. Each article of flagellum bearing fringe of few smooth setae at distal interior angle. In adult male these setae reaching to 0.5 times length of article.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with broad lobes: ratio of width of third segment to that of protruding internal margin

4 : 1. Palp segments II-V with fringe of long, bare setae. Third and fourth segments bearing four and three long, bare setae, respectively in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. No setae being inserted near rostro-distal spine. Merus and ischium tergally bearing 20-25 and 35-45 long, bare setae, respectively.

Dorsal surface of pleotelson smooth. Posterior margin of apex of pleotelson, in both sexes, straight. In lateral view pleotelson of male slightly concave subapically, but not upcurved. In female pleotelson regularly convex.

Uropodal rami slender, exopod usually reaching little beyond posterior

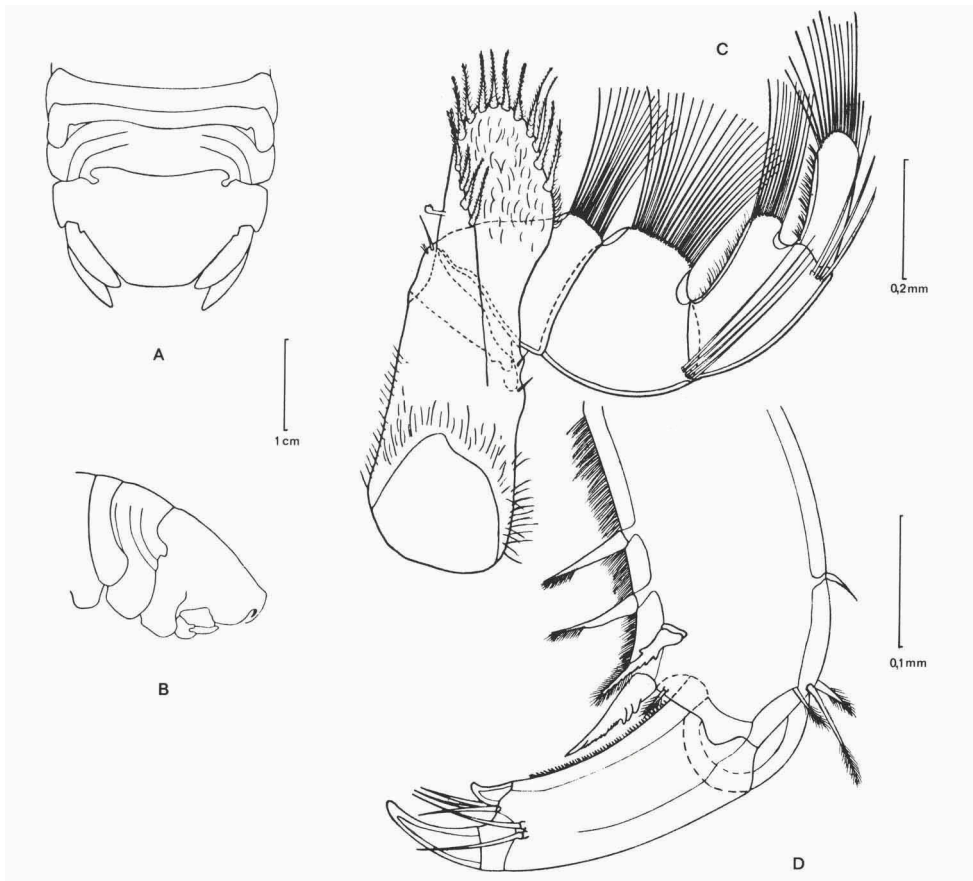


Fig. 12. *L. weilli* (Elkaïm). a-d, after Elkaïm (1966): a, pleotelson in lateral view; b, pleotelson in tergal view; c, Mxp; d, detail Pl.

margin of pleotelson. In males, external margin of inwardly bent exopod smooth, while in females exopod straight and irregularly serrated (when examined microscopically).

Ecology. — *L. weilli* is an intertidal species, found in moist or wet clean sand, buried 10-15 cm deep.

Distribution. — Until recently the species was only known from the mouth of the Bou Regreg, but through the kindness of Dr. D.M. Holdich I was allowed to study some specimens from Ischia, Italy. The peculiar habitat in which it seems to live, could well be the reason that the species has been overlooked in other localities.

***Lekanesphaera teissieri* (Bocquet & Lejuez, 1967)**  
(fig. 13)

*Sphaeroma teissieri* Bocquet & Lejuez, 1967: 689-692; Bocquet & Lejuez, 1969: 12; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 334, 340; Laulier, 1979: 417-429; Laulier & Lejuez, 1976: 1779-1781; Rezig, 1977a: 6; Kussakin, 1979: 385-389.

Material examined. — RMNH: France: Pors Nevez, Finistère (coll. H. Nouvel, October 1952, seven specimens).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 10-14 articles. Each article of flagellum bearing fringe of 5 smooth setae at distal interior angle. In adult male these setae only reaching as far as end of next segment. In female these setae being slightly shorter.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with relatively broad lobes: ratio of width of third segment to that of protruding internal margin 3.5 : 1. Palp segments II-V with fringe of long, bare setae. Third and fourth segments bearing 3-4 long, bare setae in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. No setae inserted near rostro-distal spine. Merus and ischium tergally bearing 40-50 and 60 long, bare setae, respectively.

Dorsal surface of pleotelson smooth. Posterior margin of apex of pleotelson similar in both sexes, straight. In lateral view pleotelson subapically slightly concave and little upcurved.

Uropodal rami slender, exopod usually reaching little beyond posterior margin of pleotelson. In male, external margin of exopod smooth and bent inwards more than in female. Exopod ending in rather sharp point.



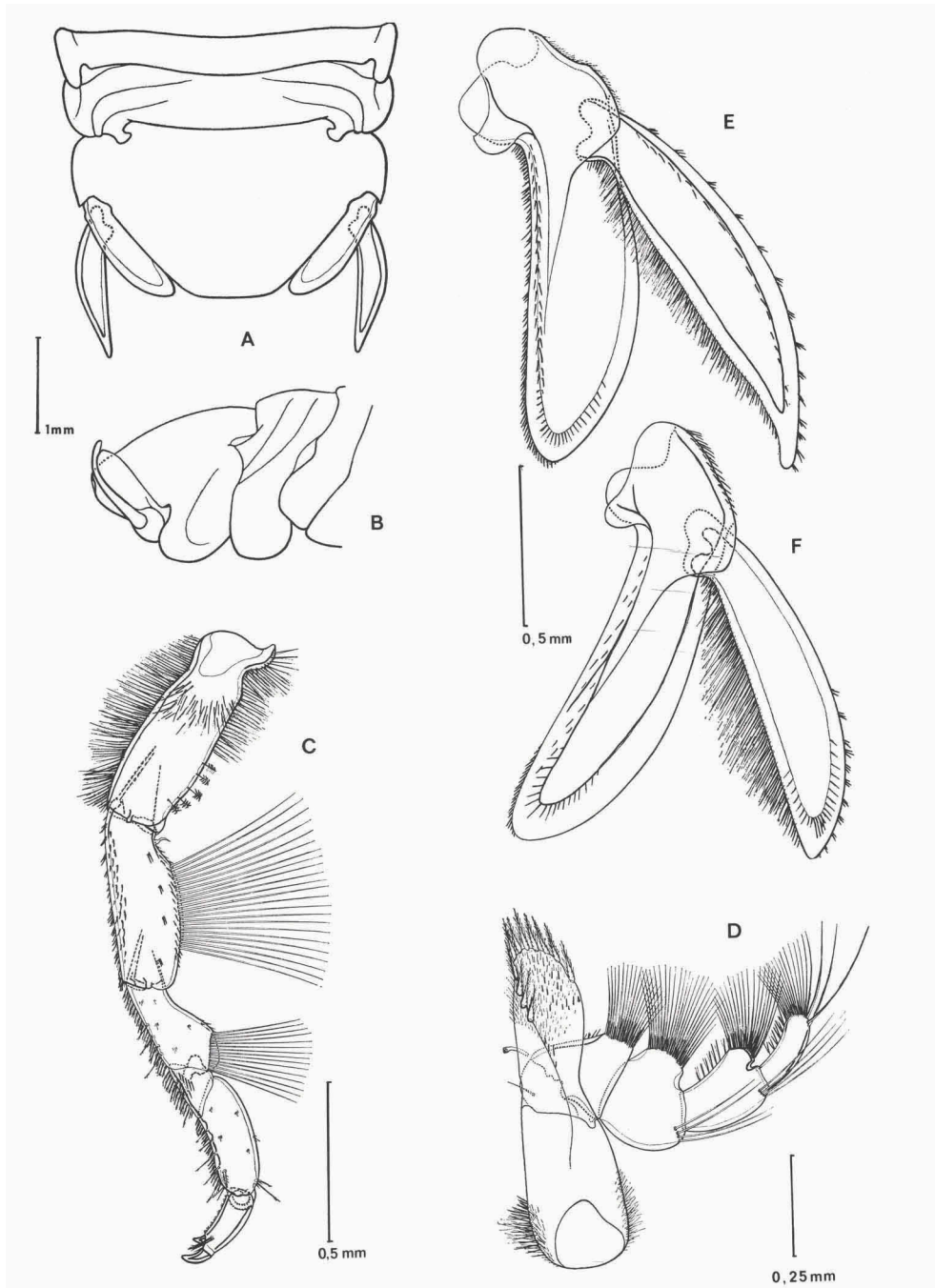


Fig. 13. *L. teissieri* (Bocquet & Lejeuz). a-f, after Bocquet & Lejeuz (1969): a, pleotelson in tergal view; b, pleotelson in lateral view; c, Mxp; d, Pl; e, uropod ♂; f, uropod ♀.

Ecology. — *L. teissieri* is an intertidal species, found buried 1-2 cm deep in clean sand, in places where there are still small pools of water on the beach at low tide.

Distribution. — So far the species has only been recorded from the north coast of Finistère, Brittany (France).

***Lekanesphaera bocqueti* (Daguerre de Hureaux, Hoestlandt & Lejuez, 1960)**  
(fig. 14)

*Sphaeroma bocqueti* Daguerre de Hureaux, Hoestlandt & Lejuez, 1960: 285-296; Daguerre de Hureaux et al., 1964: 9, 13; Elkaïm, 1966: 258, 260, 262, 264; Lejuez, 1966: 497-500, 583-606; Argano, 1967: 346-348; Bocquet & Lejuez, 1969: 8, 12; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 334, 340; Rezig, 1977a: 6.

No material examined.

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 13-15 articles. Each article of flagellum bearing fringe of 10 smooth, short setae at distal interior angle. In adult male these setae only reaching as far as end of next segment, while in female only reaching half way to end.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with relatively broad lobes: ratio of width of third segment to that of protruding internal margin 3.5 : 1. Palp segments II-V with fringe of long, bare setae. Third and fourth segments bearing two and three long, bare setae, respectively in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine semi-transverse row of 2 bare setae being inserted. Merus and ischium tergally bearing 20-25 and 40-50 long, bare setae, respectively.

Dorsal surface of pleotelson smooth. Posterior margin of apex of pleotelson, in both sexes, straight. In lateral view pleotelson regularly convex, but not upcurved.

Uropodal rami short, not reaching posterior margin of pleotelson. External margin of exopod with 2-3 small teeth. In females external margin more or less crenulated.

Ecology. — *L. bocqueti* is an intertidal species, restricted to sheltered places. It is found under stones and in rock crevices, preferring clean sand.

Distribution. — The species is known from the Atlantic coast of Portugal (Algarve) and Morocco (Casablanca).

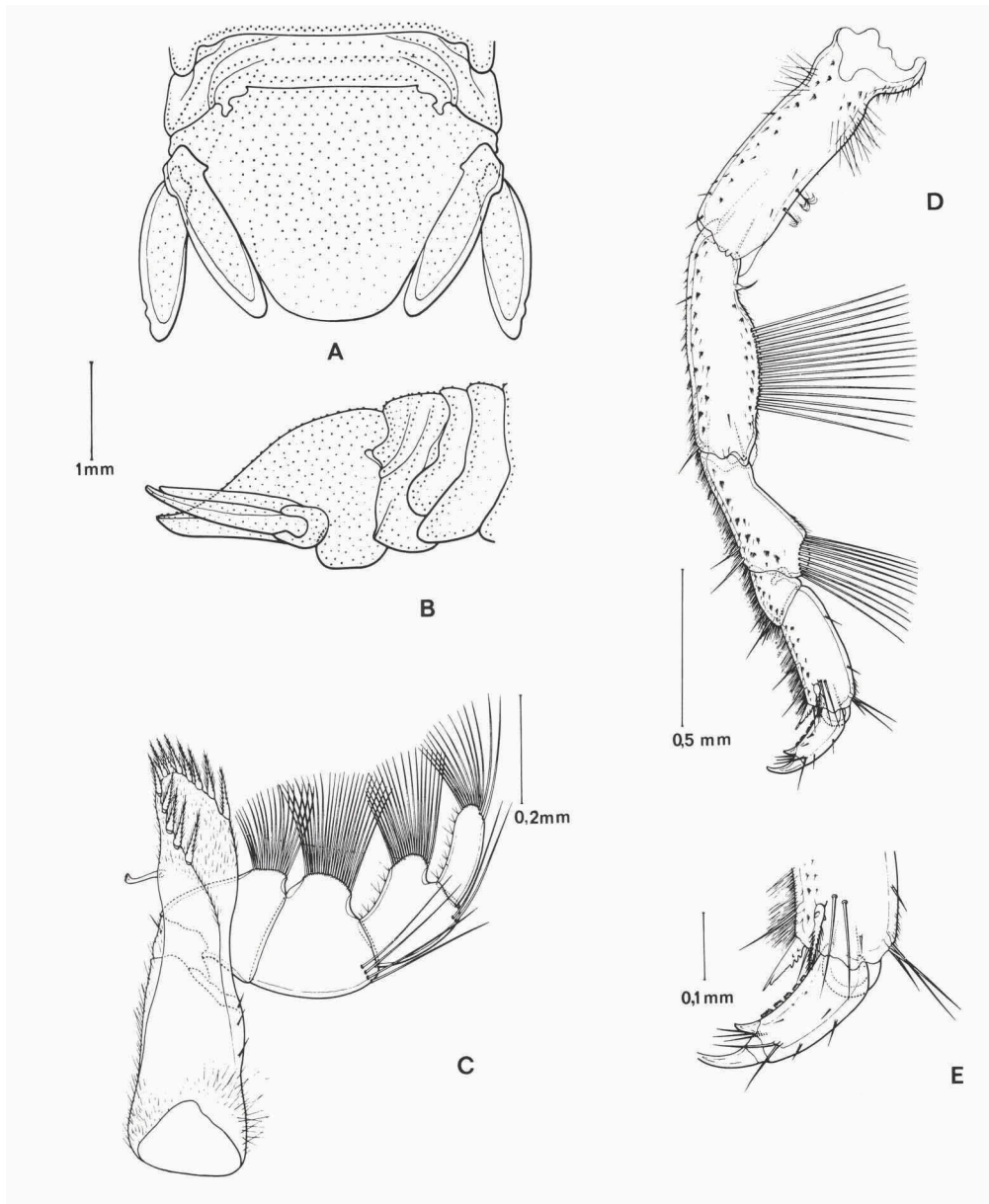


Fig. 14. *L. bocqueti* (Daguerre de Hureaux, Hoestlandt & Lejuez). a-e, after Lejuez (1966): a, pleotelson in tergal view; b, pleotelson in lateral view; c, Mxp; d, Pl; f, detail Pl.

**Lekanesphaera levii** (Argano & Ponticelli, 1981)

(fig. 15)

*Sphaeroma monodi* Bocquet, Hoestlandt & Levi, 1954: 244-245; Hoestlandt, 1959: 115; Lejuez, 1959a: 1389-1391; Lejuez, 1959b: 1824-1826; Daguerre de Hureaux et al., 1960: 295-296; Lejuez, 1960: 192-194; Lejuez, 1962b: 146-157; Daguerre de Hureaux et al., 1964: 13; Lejuez, 1966: 492-497, 554-582; Elkaïm, 1966: 262-265; Bocquet & Lejuez, 1967: 691; Green, 1968: 170, 177; Bocquet & Lejuez, 1969: 1, 8, 12; Harvey, 1969: 399-406; Naylor, 1972: 31, 34; Harvey, Jones & Naylor, 1973: 113-124; Bocquet & Rezig, 1973: 2497; Rezig, 1974: 340; Lejuez, 1974: 41-59; Laulier & Lejuez, 1976: 1779-1781; Heath, 1977: 105-113; Kussakin, 1979: 389-391; Laulier, 1979: 417-429; Argano & Ponticelli, 1981: 227-234.

Not *Sphaeroma monodi* (Arcangeli, 1934), see p. 29.

Material examined. — RMNH: Portugal: Ria de Faro, Ladrao and Cabo de Arnel, near Faro (Exc. RMNH, July 1962, 3♂, 3♀); Vale da Lama (Alvor), near Lagos, Algarve (sandy beach, lagoon, Exc. RMNH, May 1971, 1♀). Spain: Ria de Arosa: Punta de Fidreira, near Rianjo (Exc. RMNH, August 1962, 1♂, 2♀, 4 juvs.); Isla de Corta (depth 5-10 m, sea-weed, Exc. RMNH, August 1962, 1♂); Ria Umia, 500 m upstream of the bridge near Santo Tomé do Mar (together with *L. hookeri* and within 400 m of a population of *L. rugicauda*, Exc. RMNH, August 1964, 1♂, 2♀); NE. of Jidoiro Pedregoso, W. of Isla de Arosa (Exc. RMNH, July 1963, 1♂, 1♀). France: Arcachon, Cap Ferret, dépt. Gironde (Coll. H. Nouvel, August 1958, 1♂, 1 juv.); Arcachon, dépt. Gironde (Coll. H. Nouvel, October 1958, 1♂, 2 juvs.); Damgan, SE. of Vannes, dépt. Morbihan (Exc. RMNH, May 1955, 1♂); Quiberon, Petit Rohu, dépt. Morbihan (leg. T.A.J.M. Brongersma, August 1956, 1♂); Begmeil, Baie de la Forêt, dépt. Finistère (leg. T.A.J.M. Brongersma, August 1956, 1♀); Pempoul, near Roscoff, dépt. Finistère (Exc. RMNH, October 1938, 1♂); Pors Nevez, dépt. Finistère (Coll. H. Nouvel, October 1952, 12 specimens); Port-en-Bessin, Normandy (in empty shell of *Nucella lapillus* (L.)), leg. P.H.C. Lina, April 1981, 1♂, 1♀); Wimereux, dépt. Pas de Calais (leg. J.A.W. Lucas, August 1955, 1♂, 2♀); Ambleteuse, dépt. Pas de Calais (Exc. RMNH, June 1951; leg. C. Swennen, August 1953; Exc. Leidse Biologen, August 1957, many specimens). UN: Italy: Ischia, Naples dock (together with many *S. serratum* (F.)), 1967, 1♂).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 12-16 articles. Each article of flagellum bearing fringe of smooth setae at distal interior angle. In adult male these setae more abundant, up to two to three times length of article. In female setae less numerous, only reaching as far as end of next segment.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with broad lobes: ratio of width of third segment to that of protruding internal margin 4 : 1. Palp segments II-V with fringe of long, bare setae. Third and fourth segments bearing 6-7 and 4-6 long, bare setae, respectively in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine transverse row of 4-8 bare setae being inserted. Merus and ischium tergally bearing 40-50 and 50-60 long, bare setae, respectively.

Dorsal surface of pleotelson smooth. Apex in male narrower and posterior margin less straight than in female. In lateral view pleotelson of both sexes subapically concave and slightly upcurved. In female pleotelson more regularly convex.

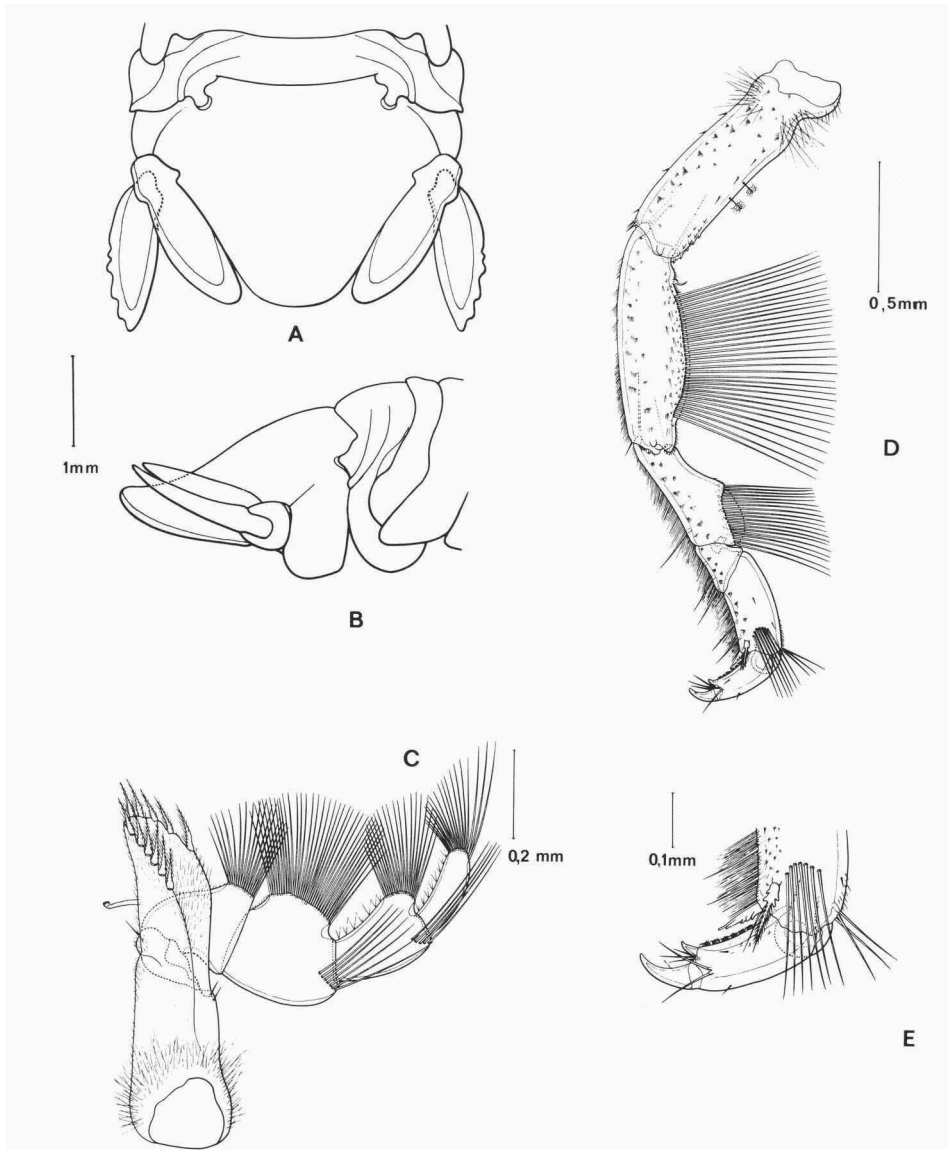


Fig. 15. *L. levii* (Argano & Ponticelli). a-e, after Lejuez (1966): a, pleotelson in tergal view; b, pleotelson in lateral view; c, Mxp; d, Pl; e, detail Pl.

Uropodal rami robust, reaching just beyond posterior margin of pleotelson. External margin of exopod with 6-7 more or less prominent teeth, mostly situated in the caudal part. However, females sometimes having irregularly serrated margin.

Ecology. — *L. levii* is an intertidal species, often found in sheltered places, under stones or in rock crevices and shells. Although they seem to need a less clean substratum than *S. serratum*, the two species are sometimes found in mixed populations.

Distribution. — The species is characterised by an extensive range along the Atlantic coasts. It has been found in the British Isles, France, Spain and Portugal. Recently a specimen was found in a sample of *S. serratum* collected near Ischia (Italy); this might be due to human activity, e.g. shipping (it was found in Naples dock), which has also affected the distribution of *S. walkeri*.

### **Lekanesphaera rugicauda** (Leach, 1814)

(fig. 16)

Restricted synonymy:

? *Oniscus conglobator* Pallas, 1766: 194.

? *Oniscus globator* Pallas, 1772: 70-71.

? *Asellus globator*, Olivier, 1789: 256.

*Sphaeroma cinerea* Bosc, 1802: 186; Latreille, 1802: 16-17; Latreille, 1806: 65.

*Sphaeroma rugicauda* Leach, 1814: 405, 433; Desmarest, 1825: 300-301; Bouchard-Chanteraux, 1833: 19-20; Milne Edwards, 1840: 207; White, 1857: 245; Bate & Westwood, 1886: 408-409; Parfitt, 1874: 255-256; Meinert, 1890: 190; Leichman, 1891: 1-11; Stebbing, 1893: 361; Dollfus, 1899: 123-124; Hansen, 1905: 73, 76, 116; Gurney, 1907: 417, 427-428, 433; Apstein, 1908: 43; Bjørck, 1915: 37; Dahl, 1916: 28, 72; Nierstrasz, 1917: 107; Nierstrasz, 1922: 318-320; Giltay, 1927: 58; Nierstrasz & Schuurmans-Stekhoven, 1930: 80; Wahrberg, 1930: 28-29; Monod, 1931b: 42-44; Omer-Cooper & Rawson, 1934: 22-26, 34-38; Stephensen, 1948: 46-47; Urbánski, 1950: 337; Forsman, 1952: 154-157; Margalef, 1953: 174; Holthuis, 1956: 59-63; Messner & Wohlrab, 1959: 172-176; Gruner, 1965: 57-61; Lejuez, 1966: 502-507, 526-546, 607-623; Harvey, 1969: 399-406; Naylor, 1972: 34; Zmudzinski, 1974: 130-131; Laulier & Lejuez, 1976: 1779-1781; Kussakin, 1979: 380-382; Laulier, 1979: 417-429.

*Sphaeroma globator*, Guérin-Méneville, 1844: 27-30.

*Sphaeroma marginata* Milne Edwards, 1840; Leuckart, 1847: 158.

*Sphaeroma balticum* Schiødte, 1866: 177-178.

*Sphaeroma rugicandata* Bate, 1878: 122, incorrect spelling.

*Sphaeroma longicauda* Stebbing, 1911: 157, incorrect spelling.

*Exosphaeroma rugicauda*, Tattersall, 1916: 37; Tattersall, 1930: 105; Giltay, 1927: 57.

*Sphaeroma rugicaudum*, Seifert, 1938: 240; Seifert, 1939: 15; Harrison & Holdich, 1984: 378.

*Europosphaera rugicauda*, Verhoeff, 1943a: 171-172.

Material examined. — RMNH: Spain: Guadalquivir, N. of Bonanza, prov. Cadiz (salt marshes, on an old car-tire, Exc. RMNH, May 1971, many specimens); Ria de Arosa, Rio Umia, prov. Pontevedra, near the bridge of Santo Tomé do Mar (Exc. RMNH, August 1964, many specimens); Ria de Arosa, Rio Umia, prov. Pontevedra, near the bridge of Cambados, SW. of

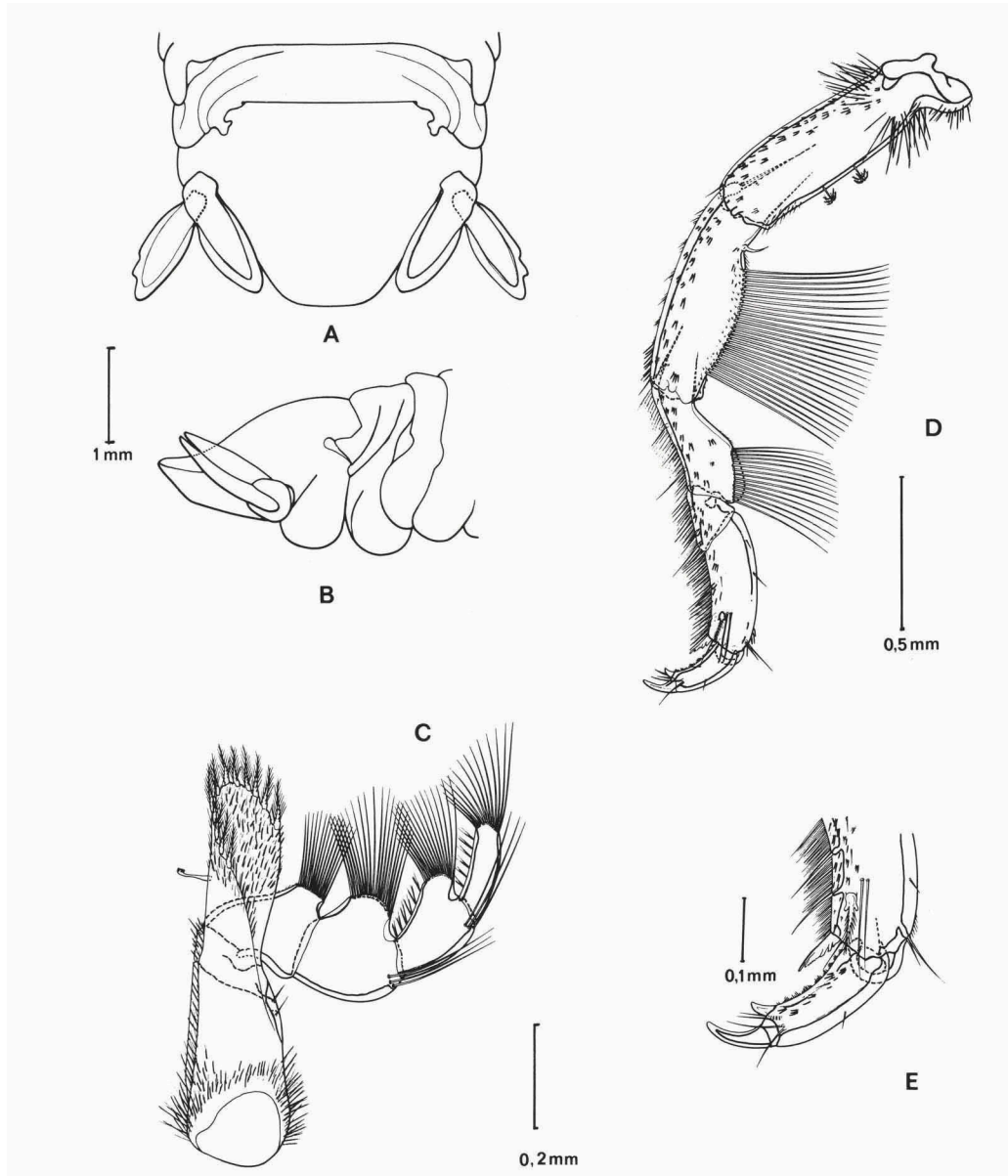


Fig. 16. *L. rugicauda* (Leach). a-e, after Lejuez (1966): a, pleotelson in tergal view; b, pleotelson in lateral view; c, Mxp; d, Pl; e, detail Pl.

Villagarcia (Exc. RMNH, July 1962, many specimens); Ria de Arosa, Rio Ulla, prov. Pontevedra, W. of station Catoira (Exc. RMNH, July 1963, 1♂). France: Laforêt, dépt. Finistère (estuary, brackish water, leg. C. Swennen, July 1958, 2♂, 3♀); Plage de Kerdelant, W. of Plouescat, dépt. Finistère (Exc. Leidse Biologen, June 1969, 1♀). MNP: Morocco: Rabat, Bou Regreg (salt marshes, leg. Burollet, August 1927, fragments).

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 12-16 articles. Each article of flagellum with fringe of few smooth, short setae at distal interior angle. Adult males with these setae more abundant, up to 1 to 1.5 times length of article in question. Females with only few short setae.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with pronounced lobes. Ratio of width of third segment to that of protruding internal margin 2.8 : 1. Palp segments II-V bearing fringe of long, bare setae. Third and fourth segments bearing 3-4 long, bare setae, in external distal corner.

Propodus of pereopod I has one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine semi-transverse row of 2(-3) bare setae being inserted. Merus and ischium bearing tergally 40 and 30-35 long, bare setae, respectively.

Dorsal surface of pleotelson slightly granulated. Posterior margin of apex broadly rounded. In lateral view pleotelson subapically concave and slightly upcurved, while in older male specimens lateral margins in distal half sometimes being ridge-like, raised.

Uropodal rami slender, reaching just beyond posterior margin of pleotelson. External margin of exopod appearing smooth, but 2-3 barely visible teeth decorating posterior part.

Exopod of pleopod III with rudimental articulation, of which length being 1/4 of total breadth.

Ecology. — *L. rugicauda* lives in brackish water, mostly in salt-marshes, lagoons and estuaries. Specimens seem to prefer a habitat with a muddy substratum and aquatic vegetation, as this provides shelter in which they can survive extreme fluctuations of the environmental conditions (Marsden, 1973, 1976; West, 1965). The species is also capable of surviving large fluctuations of temperature and salinity, which explains its area of occurrence (Frier, 1976; Jansen, 1970).

Distribution. — The species has an extensive range along the East Atlantic coast. It has been found in the Baltic, Denmark, Sweden, Poland, the British Isles, the Netherlands, Belgium, France, Portugal and Morocco.



**Lekanesphaera hookeri** (Leach, 1814)

(fig. 17)

Restricted synonymy:

? *Oniscus conglobator* Pallas, 1766: 194.? *Oniscus globator* Pallas, 1772: 70-71.? *Asellus globator*, Olivier, 1789: 256.

*Sphaeroma hookeri* Leach, 1814: 433; Desmarest, 1825: 300; Milne Edwards, 1840: 206-207; White, 1957: 245; Bate & Westwood, 1886: 410-411; Parfitt, 1874: 256; Stebbing, 1893: 361; Hansen, 1905: 116; Giltay, 1927: 58; Gautier, 1928: 377-382; Nierstrasz & Schuurmans-Stekhoven, 1930: 169; Monod, 1931b: 44-52; Arcangeli, 1934: 14; Omer-Cooper & Rawson, 1934: 22-26, 36-38; Forsman, 1952: 156-158; Margalef, 1953: 174-175; Kinne, 1954: 100-120; Jensen, 1955: 305-339; Holthuis, 1956: 63-67; Messner & Wohlrab, 1959: 172-176; Patanè, 1961: 131-136; Giraud-Laplane, 1962: 152-169; Jazdzewski, 1962: 91; Lejuez, 1962a: 3034-3036; Schachter, Razakandisa & Kerambrun, 1964: 1666-1668; Gruner, 1965: 61-67; Kerambrun, 1965: 705-708; Patanè, 1965: 449-464; Lejuez, 1966: 507-512, 515-525, 526-546, 624-648; Schachter et al., 1966: 51-59; Harvey, 1969: 399-406; Talin, 1970a: 135-145; Talin, 1970b: 295-303; Naylor, 1972: 32; Harvey et al., 1973: 116-119; Zmudzinski, 1974: 130-131; Laulier & Lejuez, 1976: 1779-1781; Rezig, 1976: 21-27; Kussakin, 1979: 382-385; Laulier, 1979: 417-429; Harrison & Holdich, 1984: 378.

*Sphaeroma fossarum* von Martens, 1857: 186-188; Torelli, 1930: 305.*Sphaeroma bolivarii* de Buen, 1888: 415-416; Bolivar, 1893: 133.

*Sphaeroma rugicauda* Dollfus, 1899: 123-124; Dahl, 1916: 28; de Vos, 1941: 46; Schuurmans-Stekhoven, 1944: 25; Urbanski, 1950: 337 (not *Sphaeroma rugicauda* Leach = *Lekanesphaera rugicauda*).

*Sphaeroma rissoi* Seurat, 1924: 17; Seurat, 1929: 27.*Exosphaeroma pulchellum* Colosi, 1921: 1-7.*Exosphaeroma* spec. Omer-Cooper, 1930: 252.*Sphaeroma pulchellum*, Monod, 1931b: 22, 41-42.

Material examined. — RMNH: Turkey: Mediterranean Sea, Lara (depth 0-50 cm, under stones; a strong flow of fresh water, Turkey Exc. C. Swennen, April 1959, 1♂, 1♀). Greece: Kefallinia (spring (micro-lake) just north of the branch road to Milissani, north of Karavomilos, west of the road, leg. E. Gittenberger, May 1979, 2♂, 2♀). Italy: Lago di Patria, 40 km north of Naples (brackish water (4-5%), leg. C.F. Sacchi, March 1959, 12 specimens). France: La Nouvelle, south of Narbonne, dépt. Aude (brackish water, ditch, Exc. Leidse Biologen, September 1957, 1 juv.); Narbonne, Etang de Gruisson, dépt. Aude (Exc. Leidse Biologen, May 1959, 1♂); Font Estramar near Salses, north of Perpignan, dépt. Pyr. Or. (well, warm and brackish water, Exc. Leidse Biologen, September 1957, many specimens); Touvieille, dépt. Bouches-du-Rhône (little pool, leg. A. Havermans & M. Veldhoven, August 1977, many specimens). Mallorca, Etang de ses Gambes (lagoon, distance from the sea: 800 m, no connection with the sea, leg. R. Margalef, May 1951, 3♂, 1♀, 1 juv.). Spain: Rio Jara, near bridge of main road, N. 340, 8 km NW. of Tarifa (brackish water (16‰), Exc. RMNH, October 1974, 9 specimens); Ria de Arosa, Rio Ulla, near the northern point of Isla de Bejo (depth 2 m, coarse sand, Exc. RMNH, August 1964, 1♂); Ria de Arosa, Rio Umia, 500 m upstream of the bridge near Santo Tomé de Mar (together with *L. levii* and within a distance of 400 m of a population of *L. rugicauda*, Exc. RMNH, August 1964, 1 juv.); Ria de Arosa, Rio Umia, bridge near Cambadós, SW. of Villagarcía, Exc. RMNH, July 1963, 4♂, 2♀, 1 juv.). Morocco: Oued Cherrat, little river 32 km south of Rabat, near the main road Rabat-Casablanca (near a bridge, brackish water (3‰), Exc. RMNH, October 1974, 1 juv.); Buel es Seghiz, 45 Km E. of Tangier, main road 704 (salinity 35‰, Exc. RMNH, October 1974, many specimens); between Tangier and Ceuta, 22 km E. of Tangier (shallow "wadi"; salinity 25‰, Exc. RMNH, October 1974, many

specimens). The Netherlands: Den Helder, Fortgracht (leg. C. Swennen, February 1950, 3♂, 3♀). PCJ: France: Camargue: Etang de Gr. Palun, dépt. Bouches-du-Rhône (warm, brackish water, depth 1-3 cm, muddy substratum, leg. B.J.M. Jacobs, July 1982, many specimens); Camargue: Etang de Repausset, in the direction of La Grande Motte, dépt. Bouches-du-Rhône (brackish water, depth 10 cm, under stones, leg. B.J.M. Jacobs, July 1982, many specimens).

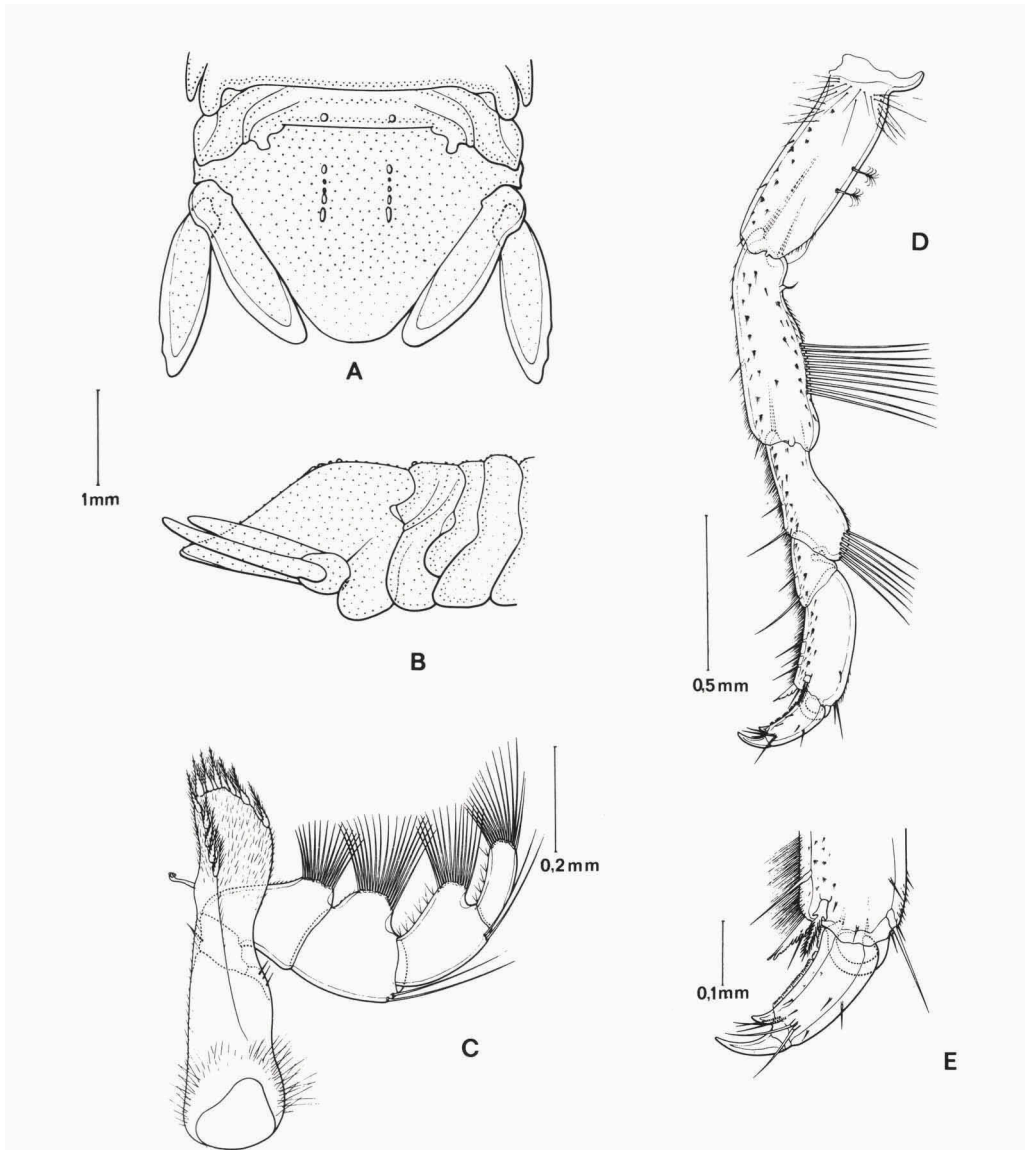


Fig. 17. *L. hookeri* (Leach). a-e, after Lejuez (1966): a, pleotelson in tergal view; b, pleotelson in lateral view; c, Mxp; d, Pl; e, detail Pl.

Diagnosis of adult male. — Antenna with five-segmented peduncle and flagellum of 12-16 articles. Each article of flagellum with fringe of few smooth, short setae at distal interior angle. Adult males with these setae more abundant, up to one to two times length of article in question. Females with only few short setae.

Interior endite of maxilliped with fringe of robust, plumose setae with swollen base on semicircular distal margin. Palp segments II-IV with pronounced lobes. Ratio of width of third segment to that of protruding internal margin 2.8 : 1. Palp segments II-V bearing fringe of long, bare setae. Third and fourth segments bearing 1-2 long, bare setae, in external distal corner.

Propodus of pereopod I with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Near rostro-distal spine no setae being inserted. Merus bearing tergally 2-10 or 15-20 long, bare setae. Ischium bearing 3-10 or 15-20 long, bare setae.

Dorsal surface of pleotelson with two ridges of tubercles, one on either side on midline. Dorsal surface of fused abdomen sometimes bearing two, more or less pronounced, tubercles, as also can be seen on seventh segment of pereon. Posterior margin of apex rounded. In lateral view pleotelson subapically concave and slightly upcurved.

Uropodal rami slender, reaching just beyond posterior margin of pleotelson. External margin of exopod appearing smooth, but in older specimens with 2-3 barely visible teeth decorating posterior part.

Exopod of pleopod III with rudimental articulation, of which length being 1/5 to 1/3 of total breadth.

Ecology. — *L. hookeri* lives in brackish water, and is mostly found in estuaries, brackish inland ditches and salt marshes. Specimens prefer stagnant water and a muddy substratum, and are found under stones or in shallow water amongst sea-weed. The species is better able to survive low salinities (3‰), than strong fluctuations in salinity; this in contrast to *L. rugicauda*.

Distribution. — The species has an extensive range which in Europe even exceeds that of *S. serratum*. Along the Baltic and Atlantic coasts it is found from Poland to Morocco. Furthermore it is found throughout the Mediterranean, as far east as Lara (10 km SE. of Antalya, Turkey), and also in the Adriatic and the Aegean Seas.

Remarks. — The names *Oniscus conglobator* Pallas, 1766 and *O. globator* Pallas, 1772, the oldest available names for any sphaeromatid species, are usually considered nomina dubia and have been ignored during the last 200 years. It is not possible to determine with certainty on which species these names are based (it could be *L. rugicauda* as well as *L. hookeri*). Pallas' original description is inadequate for identification and there are no type

specimens known. A request will be submitted to the International Commission on Zoological Nomenclature to use its plenary powers to suppress both names.

As many research workers noticed, *L. hookeri* is a species that shows noticeable and recognisable differences between the diverse populations. These differences are described, but none of these populations is given the status of subspecies. Lejuez (1962a, 1966) studied several specimens collected in the Mediterranean and along the Atlantic coasts. He found a few constant differences between populations from NW. Europe and the Mediterranean, and he gave both groups of populations the status of subspecies: *L. hookeri hookeri* and *L. hookeri mediterranea*, respectively.

I do agree with the taxonomic views of Lejuez (1962a) but the name of the Mediterranean subspecies should be *L. hookeri sardoa* (Arcangeli, 1934). Arcangeli had already noticed the differences between populations of *L. hookeri* and characterised one population from the Mediterranean (Sardinia, Italy) as a new subspecies. As the type specimens of *L. hookeri sardoa* (Arcangeli, 1934) and *L. hookeri mediterranea* (Lejuez, 1962a) belong to the same subspecies the oldest name, viz. the one proposed by Arcangeli, has priority.

I studied samples of diverse populations in order to find the limits of both subspecies or perhaps the presence of a transitional area. *L. hookeri sardoa* is not limited to the Mediterranean, but it is also found in Morocco and S. Portugal. *L. hookeri hookeri*, which Lejuez (1962a, 1966) described from the NW. European coasts, has its most southern limit in NW. Spain: Ria de Arosa.

A short diagnosis of both subspecies is given below.

#### ***Lekanesphaera hookeri hookeri* (Leach, 1814)**

Diagnosis. — Antenna: setae at distal interior angle of each article of flagellum longer than article.

Maxilliped: palp segments II-IV with pronounced lobes bearing fringes of long, bare setae. Setae inserted in external distal corner of third and fourth segments reaching as far as end of next segment.

Pereopod I: lobe of merus little developed, bearing 15-20 long, bare setae. Ischium bearing 15-20 setae.

Pleotelson: two ridges of tubercles little developed. In lateral view pleotelson proximally convex, while transition to concave part being rather gradual.

Distribution. — NW. Europe.

**Lekanesphaera hookeri sardoa** (Arcangeli, 1934)

*Sphaeroma hookeri mediterranea* Lejuez, 1962: 3034-3036.

Diagnosis indicating distinction from *L. hookeri hookeri*. — Antenna: setae at distal interior angle of each article of flagellum reaching only as far as end of article, and being less abundant.

Maxilliped: palp segments II-IV with strongly pronounced lobes and fringe of shorter, less numerous, bare setae. Setae inserted in external distal corner of third and fourth segments reaching up to 2/3 of length of segment.

Pereopod I: lobe of merus well developed, bearing 2-10 long, bare setae. Ischium bearing 3-10 setae.

Pleotelson: two ridges of tubercles strongly developed. In lateral view pleotelson proximally convex, while transition to concave part being rather abrupt.

Distribution. — Mediterranean, Morocco, S. Portugal.

**Lekanesphaera glabella** spec. nov.

(figs. 18, 19)

Material examined. — Holotype: (RMNH: 6622) adult male, 8 mm, Funchal, south coast of Madeira, W. of harbour pier, 32°38'N, 16°55'W; polluted rocky littoral pool, coll. Tydeman Madeira-Mauritania Exp. 1978 sta 3KO3 (Cancap III), 10 or 17 October 1978. Paratypes: (RMNH: 6623) numerous specimens, Funchal, south coast of Madeira, W. of harbour pier, 32°38'N, 16°55'W; polluted rocky littoral pool, coll. Tydeman Madeira-Mauritania Exp. 1978 sta 3KO3 (Cancap III), 10, 17 October 1978. (RMNH: 6624) numerous specimens, Funchal, south coast of Madeira, west of harbour pier, 32°38'N, 17°05'W; rocky littoral/sublittoral with boulders, coll. Onversaagd Madeira-Morocco Exp. 1976 sta 8 (Cancap I), 24 February 1976. (RMNH: 7013) numerous specimens, Funchal, south coast of Madeira, 32°41'N, 16°57'W; polluted littoral, rocky sandy flat with silt, coll. Tydeman Selvagens-Canary Isl. Exp. sta 4K16 (Cancap IV), 24 May 1980. BMNH: numerous specimens, Madeira, coll. A.M. Norman, 1897.

Description. — Adult male: *Lekanesphaera* of medium length (8-9 mm) with body slender, sub-elliptical, 1.6 times as long as broad. Cephalon and pereonites smooth, lacking tubercles or granulation. Pleotelson smooth, 1.5 times as broad as long, in lateral view convex in proximal part and little concave subapically, the caudal part hardly curved up. Posterior margin of pleotelson smooth, narrow and rounded.

Appendages: A1 with peduncle segment 1 globular, twice as long as broad, with many fine setae on internal side. Peduncular segment 2 of A1 short, with four short, plumose setae on external margin and one bare seta at distal internal angle. Segment 3 slender, cylindrical, with few plumose distal setae.

Flagellum little shorter than peduncle. First two articles bare, others carrying at distal internal angle two aesthetascs. Last two articles however with one aesthetasc in proximal internal angle, flagellum ending with five setae. A2 with peduncle segments 1 and 2 small and short, segment 3 longer; segments 2 and 3 with one and three setae respectively in distal internal angle. Segments

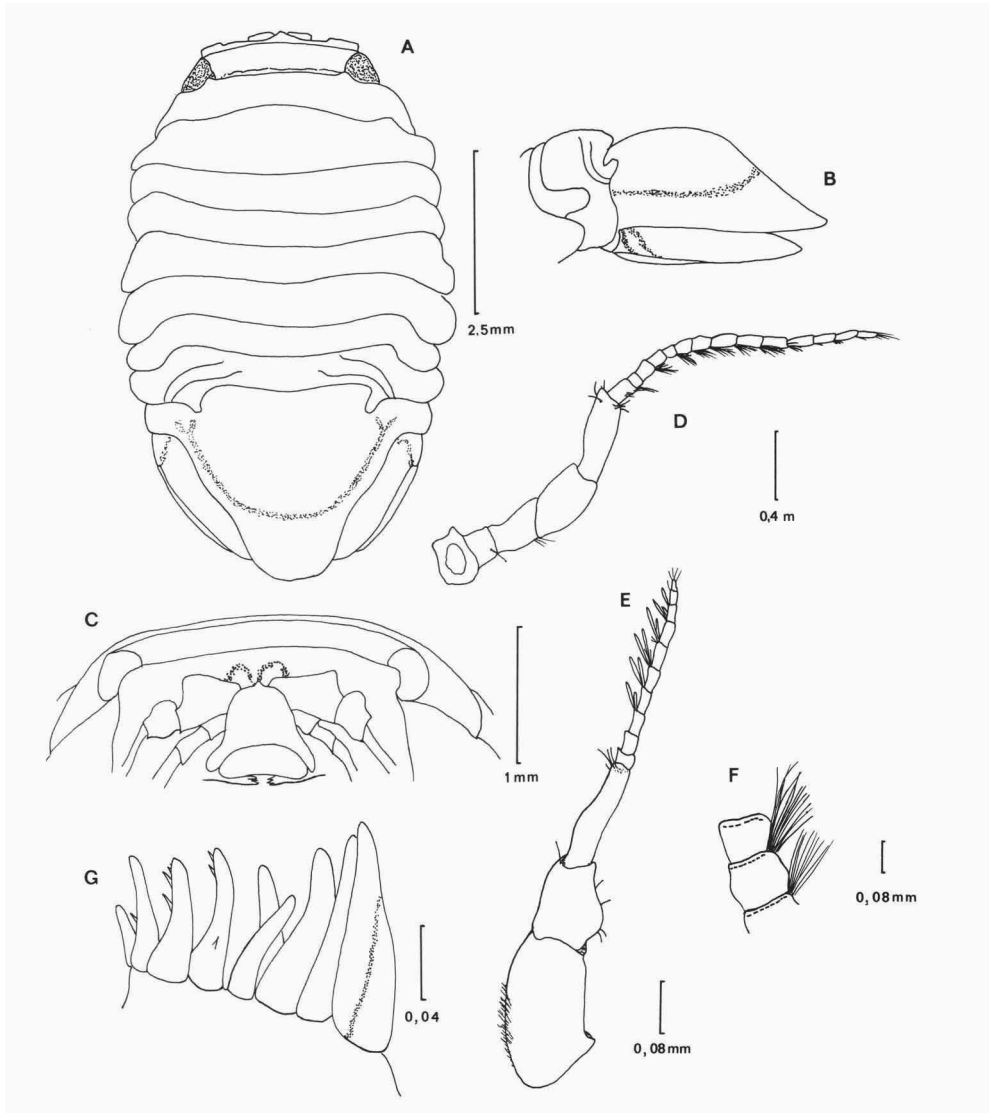


Fig. 18. *L. glabella* spec. nov. a-g, RMNH coll. nr. 6622: a, tergal view; b, pleotelson in lateral view; c, cephalon in rostral view; d, A2; e, A1; f, detail A2; g, detail outer lobes Mxl.

4 and 5 as 3, longer than broad, segment 5 with stiff setae at distal margin. Flagellum 15-articled, little longer than peduncle. Each article in proximal part of flagellum short; longer and more slender in distal part. Each article, especially proximal ones, bearing fringe of few, smooth setae at distal internal angle. These setae reaching 2 to 2.5 times length of article. Mnds with incisor processes dentate, lacinia mobilis of left mnd well developed, segment 1 of

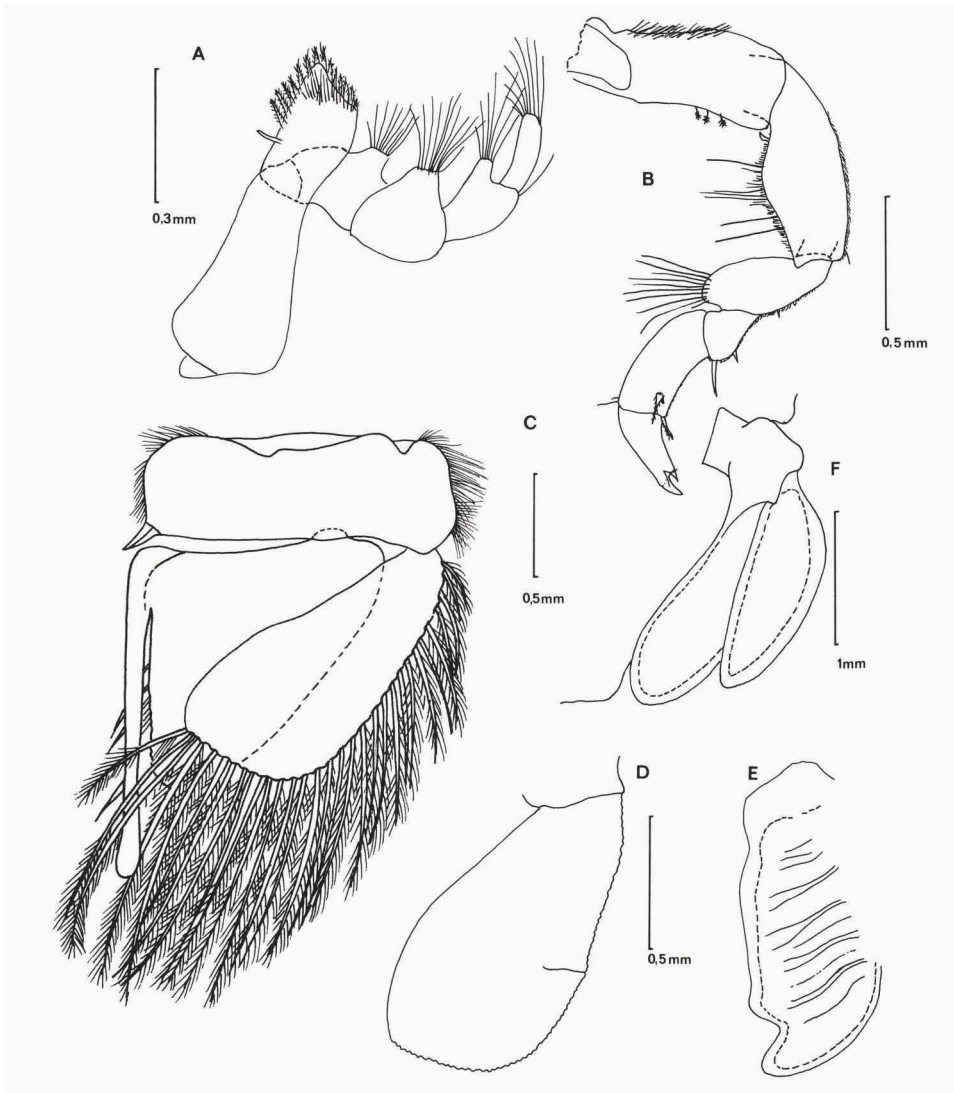


Fig. 19. *L. glabella* spec. nov. a-f, RMNH coll. nr. 6622: a, Mxp; b, Pl; c, Plp II; d, exopod of Plp III; e, endopod of Plp IV; f, uropod.

mandibular palp long, bearing fringe of fine setae, segments 2 and 3 with fringe of strongly plumose setae on external side, length of setae increasing distally. Mx1 with inner lobe having four long setae with swollen base, outer lobe with ten, often serrated, distal spines. Mx2 with outer lobes bearing long, ribbed and curved setae with swollen base, inner lobe bearing 12 setae with swollen base, distally plumose. Mxp with sympodite broad and globular, having fine setae. Endite ending distally in semi-circular fringe of strongly plumose setae with swollen base. Palp segments II-IV with pronounced lobes: ratio of width of third segment to that of protruding internal margin 3 : 1. Inferior margins bearing relatively few setae. Fourth segment bearing one seta in external distal angle, not reaching as far as end of next segment. Pereopods slender, 1 to 3 shorter than 4 to 7. Propodus of P1 with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Merus lobe bearing tergally 7-9 long, bare setae. Ischium bearing tergally 5-6 long, bare setae and dense pad of fine setae; at tergo-rostral angle one small spine inserted. P7 more densely covered with fine setae, propodus rather oblong, caudal margin of carpus with 10 setae. Merus lobe bearing tergally five setae, ischium densely fringed with setae. Plp I-III with bases bearing three internal coupling hooks, endopod subtriangular and exopod apically truncate, both with long, distal, plumose setae. Endopod of plp II carrying in proximal-internal angle appendix masculina: long, straight, 1.3 times length of ramus, with broadly rounded apex. Exopod of plp III with rudimental articulation, which can be one quarter of total breadth. Endopod of plp IV and V of hemibranchiate form, endopod of plp IV with pronounced apical lobe, exopods of plp IV and V articulated. Uropod with rami slender and smooth, extending beyond pleotelsonic apex, exopod slightly shorter than endopod.

Ovigerous female: resembling adult male, but smaller and more globular. Pleotelson 1.8 times as broad as long, posterior margin of pleotelson less narrow. Setae of flagellum articles of A2 few in number, reaching as far as end of next segment. All pairs of oostegites broad and overlapping in midline.

Ecology. — *L. glabella* is an intertidal species, found in rocky, (polluted) pools under stones or in shallow water amongst *Enteromorpha*.

Etymology. — The name *glabella* is derived from the Latin “*Glbellus*”, i.e. “smooth”.

Remarks. — Of the known species of *Lekanesphaera*, *L. glabella* spec. nov. most closely resembles *L. hookeri* (Leach, 1814) and *L. rugicauda* (Leach, 1814). *L. glabella* is obviously distinct from both species while the body is smooth (*L. rugicauda* is granulated and the pleotelson of *L. hookeri* has two characteristic rows of tubercles). Also it is a marine species, while both other species are found in brackish water.



***Lekanesphaera terceirae* spec. nov.**

(figs. 20, 21)

Material examined. — Holotype: (RMNH: 6625) adult male, 6 mm, Azores, south coast of Terceira, W. of Angra do Heroísmo, between Baía de Vila Maria and São Mateus da Calheta, 38°39'N, 27°15'W; rocky shore with large protected pool and several smaller pools, all connected with the sea by crevices, coll. J.C. den Hartog and M.S.S. Lavaleye, sta 22, 1 October 1979. Paratypes: (RMNH: 6571) 6 females and juvs., Azores, south coast of Terceira, W. of Angra do Heroísmo, between Baía de Vila Maria and São Mateus da Calheta, 38°39'N, 27°15'W; rocky shore with large protected pool and several smaller pools, all connected with the sea by crevices, coll. J.C. den Hartog and M.S.S. Lavaleye, sta 22, 1 October 1979; (RMNH: 7010) numerous specimens, Azores, south coast of Pico, SW. of Lajes, 38°23'N, 28°15'W; pools in large rock flat, protected by boulder wall, coll. Tydeman Azores Exp. 1981 sta 5KO9 (Cancap V), 7, 8 June 1981; (RMNH: 7012) 20 specimens, Azores, south coast of Pico, SW. of Lajes, 38°23'N, 28°15'W; pools in large rock flat, protected by boulder wall, coll. Tydeman Azores Exp. 1981 sta 5KO9 (Cancap V), 7, 8 June 1981.

Description. — Adult male: *Lekanesphaera* of medium length (7 mm) with body slender, sub-elliptical, 1.8 times as long as broad. Cephalon only slightly granulated. Pereonites 1-7 smooth, posterior margin of pereonite (6-)7 sometimes thickened. Pleon with posterior margin bearing two prominent, round, blunt tubercles. Dorsal surface of pleotelson granulated, in proximal half, either side of midline, bearing longitudinal ridge or irregular and connected tubercles. Pleotelson 1.6 times as broad as long, tapering to broad, rounded apex, the caudal part barely upcurved. Pleotelson in lateral view convex in proximal part and subapically concave, lateral margin in distal half ridge-like.

Appendages: A1 with peduncle segment 1 globular, distally flattened, twice as long as broad, with many fine setae on internal side. Peduncular segment 2 of A1 short, with few setae on external margin and one bare seta at distal internal angle. Segment 3 slender, cylindrical, with few plumose distal setae. Flagellum little shorter than peduncle. First two articles bare, others carrying at distal internal angle two aesthetascs. Last two articles, however, with one aesthetasc in proximal internal angle, flagellum ending with seven setae. A2 with peduncle segments 1 to 3 short, segments 2 and 3 with two and four setae respectively in distal internal angle. Segments 4 and 5 longer than broad, segment 5 with few stiff setae at distal margin. Flagellum 12-articled, as long as peduncle. Each article in proximal part of flagellum short; longer and more slender in distal part. Each article, especially proximal ones, bearing fringe of smooth setae at distal internal angle. These setae reaching 1.5 to 2 times length of article. Mnds with incisor processes dentate, lacinia mobilis of left mnd well developed, segment 1 of mandibular palp long, bearing fringe of fine setae, segments 2 and 3 with fringe of strongly plumose setae on external side,

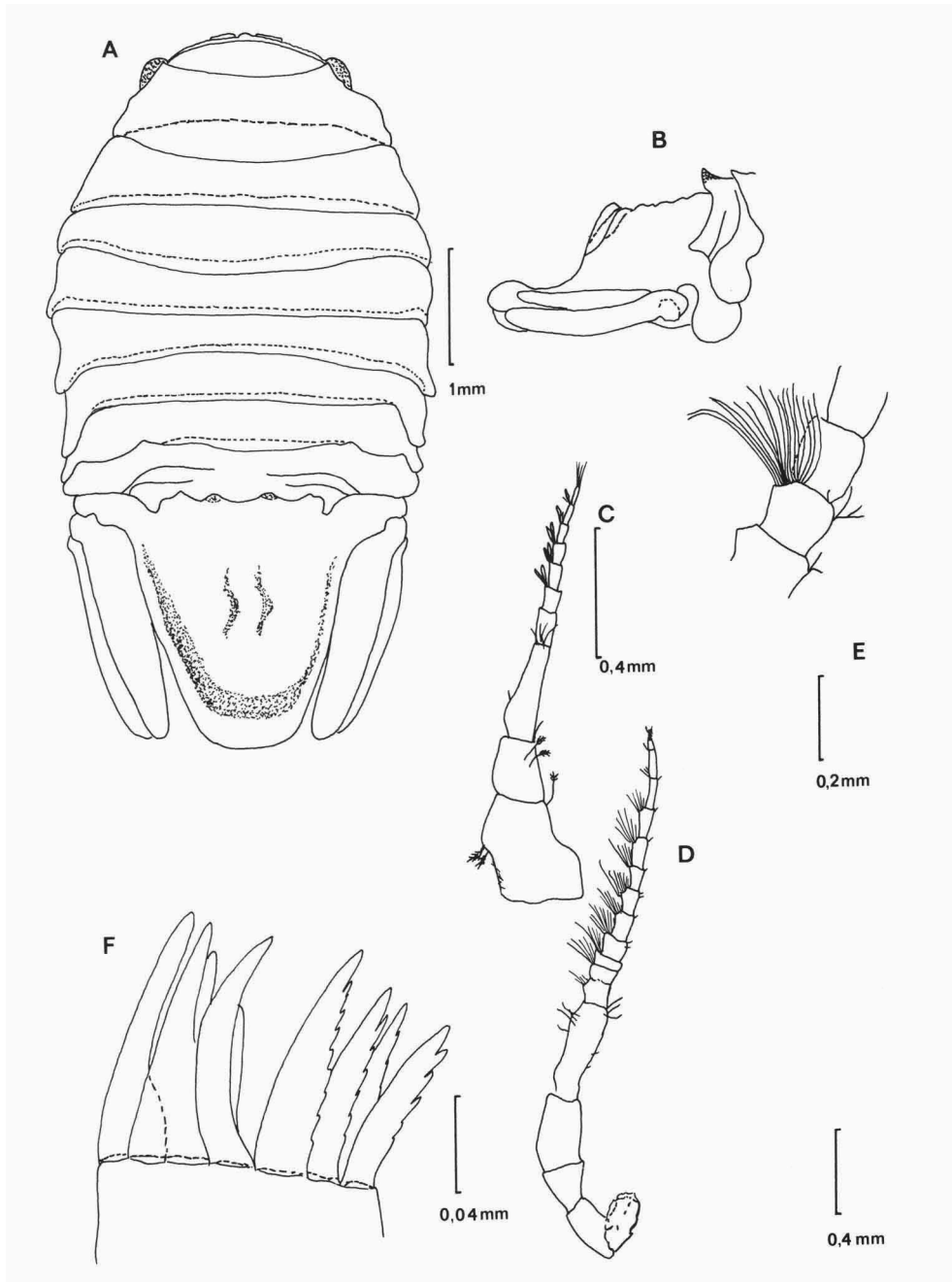


Fig. 20. *L. terceirae* spec. nov. a-f, RMNH coll. nr. 6625: a, tergal view; b, pleotelson in lateral view; c, A1; d, A2; e, detail A2; f, detail outer lobe Mxl.

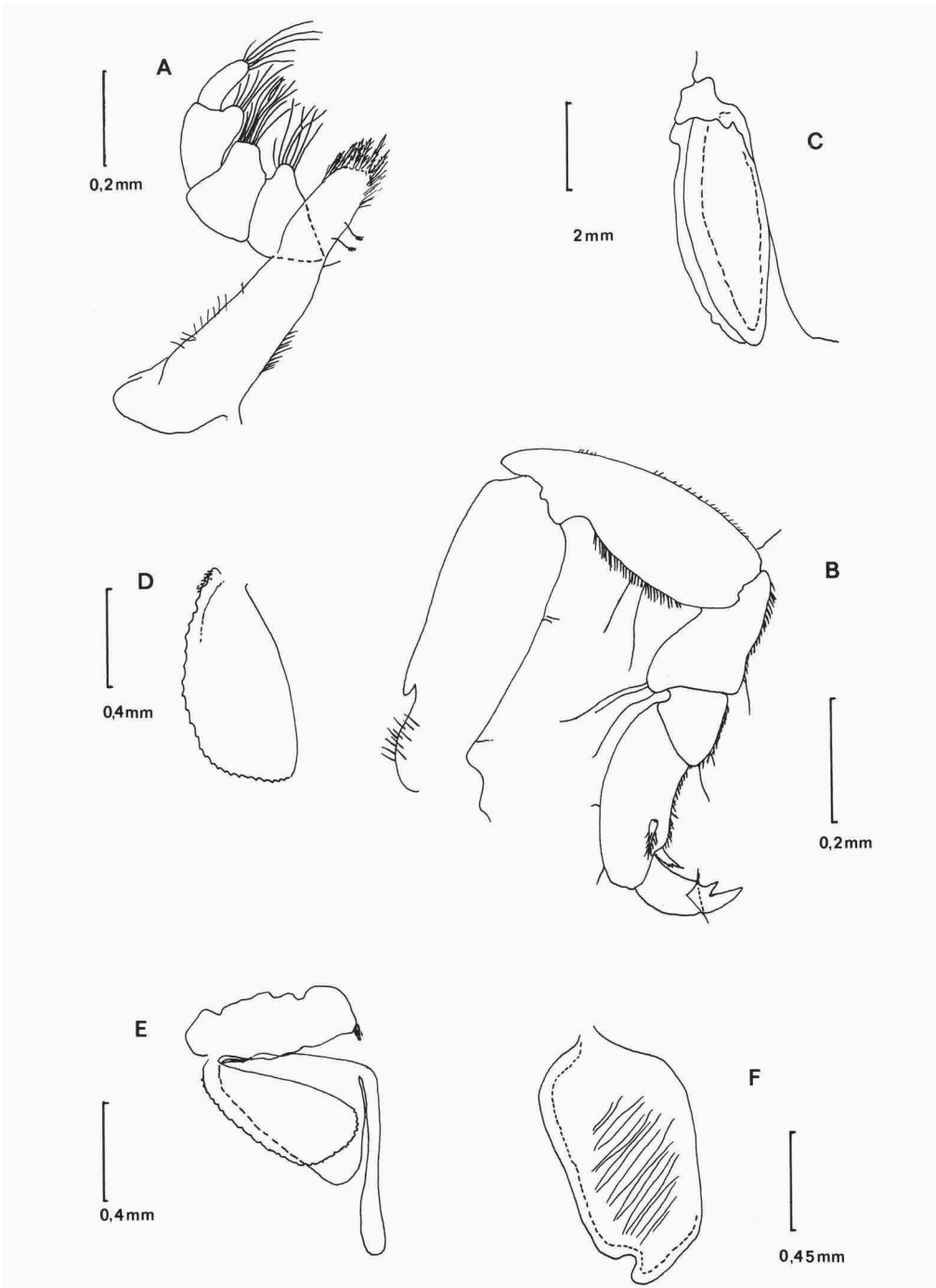


Fig. 21. *L. terceirae* spec. nov. a-f, RMNH coll. nr. 6625: a, Mxp; b, Pl; c, uropod; d, exopod of Plp III; e, Plp II; f, endopod of Plp IV.

length of setae increasing distally. Mx1 with inner lobe having four long setae with swollen base, outer lobe with 8-9, often serrated, distal spines. Mx2 with outer lobes bearing long, ribbed and curved setae with swollen base, inner lobe bearing setae with swollen base, distally plumose. Mxp with sympodite broad and globular, having fine setae. Endite ending distally in semi-circular fringe of strongly plumose setae with swollen base. Palp segments II-IV with pronounced lobes: ratio of width of third segment to that of protruding internal margin 2.8 : 1. Inferior margins bearing relatively few setae. Fourth segment bearing two setae in external distal angle, not reaching as far as end of next segment. Pereopods slender, 1 to 3 shorter than 4 to 7. Propodus of P1 with one stout comb-like infero-distal spine and one serrated rostro-distal spine. Merus lobe bearing tergally 4-6 long, bare setae. Ischium bearing tergally 2-4 long, bare setae and dense pad of small setae, at tergo-rostral angle one small stiff spine inserted. P7 more densely covered with fine setae; propodus rather oblong, caudal margin of carpus with few long, bare setae and few short, ribbed setae. Merus lobe bearing tergally 5-6 long, sparsely plumose setae, ischium densely fringed with setae. Plp I-III with bases bearing three internal coupling hooks, endopod subtriangular and exopod apically truncate, both with long, distal plumose setae. Endopod of plp II carrying in proximal-internal angle appendix masculina: long, straight, 1.3 times length of ramus, with broadly rounded apex. Exopod of plp III without rudimental articulation. Endopod of plp IV and V of hemibranchiate form, endopod of plp IV with pronounced apical lobe, exopods of palp IV and V articulated. Uropod with rami slender and smooth, extending beyond pleotelsonic apex; exopod slightly longer than endopod, at top being slightly crenulated (microscopically).

Ovigerous female: resembling adult male, but smaller and more globular. Pleotelson 1.9 times as broad as long, lateral margins not ridge-like, caudal part upcurved. Setae of flagellum articles of A2 few in number, reaching as far as end of next segment. All pairs of oostegites broad and overlapping little, but evidently, in midline.

Ecology. — *L. terceirae* is an intertidal species, found in rocky pools which are connected with the sea.

Etymology. — The name *terceirae* is chosen while the first record of this species is near the island Terceira, Azores.

Remarks. — Of the known species of *Lekanesphaera*, *L. terceirae* spec. nov. most closely resembles *L. hookeri* (Leach, 1814) and *L. rugicauda* (Leach, 1814). *L. terceirae* can be distinguished from *L. rugicauda* by the two longitudinal rows of tubercles on the pleotelson. In this species the presence of tubercles seems to be a good character because their presence is undoubted.

The species differs from *L. hookeri* in the ridge-like, raised form of the pleotelson (in the male) and in lacking the rudimental articulation of the exopod III. Furthermore *L. terceirae* is a marine species, while *L. hookeri* and *L. rugicauda* are found in brackish water.

### **Exosphaeroma** Stebbing, 1900

*Exosphaeroma* Stebbing, 1900: 553. Type-species, by monotypy, *Sphaeroma gigas* Leach, 1818: 346. Gender: neuter.

Material examined. — RMNH: New Zealand (leg. H. Suter, 1894, 3 specimens).

Diagnosis, based on the type-species. — *Exosphaeroma* can be distinguished from *Lekanesphaera* (and *Sphaeroma*) by the following characters:

Pereopods robust; P4 and P5 not distinctly shorter than P1 to P3, P6 and P7 longer than P1 to P3. Pereopods with short, bare setae. Propodus of P1 with more than one stout comb-like infero-distal spine and more than one serrated rostro-distal spine. Merus lobe and ischium bearing few short, robust setae.

Maxilliped slender, endite ending distally in straight fringe of short, robust, plumose setae. Palp segments II-IV with strongly pronounced, sometimes fingerlike lobes: ratio of width of segment three to that of protruding internal margin being smaller than 2.5 : 1 (*E. gigas* with ratio of 2 : 1).

Exopod of pleopod III articulated, endopod of pleopod IV without pronounced apical lobe.

All pairs of oostegites small, not overlapping each other (Hansen, 1905).

Remarks. — The only species of *Exosphaeroma* available to me is the type-species, *E. gigas*, of which 3 specimens were examined. Therefore this diagnosis is mainly based on that provided by Monod (1931b) against which the material was checked, and on the material seen by me.

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