SCI. MAR., 56(Supl. 1): 65-112 SCIENTIA MARINA 1992

Siphonophores (Cnidaria, Hydrozoa) of the Benguela Current (southeastern Atlantic)

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SUMMARY: This report provides a systematic account of the siphonophores (cystonects, physonects and calycophores) collected by cruises carried out by the Institut de Ciències del Mar (Barcelona, Spain) and the Sea Fisheries Research Institut (Cape Town, Republic of South Africa) along the Southwest continental shelf of Africa from 1977 to 1986. The siphonophores collection comprises 52 species distributed in 11 families. The species were collected between 0 and 200 m depth. Illustrations and data on morphology and distribution are given for all species.

Key words: Siphonophora, Systematics, Benguela Current, southeastern Atlantic.

RESUMEN: SIFONÓFOROS (CNIDARIA, HYDROZOA) DE LA CORRIENTE DE BENGUELA (ATLÁNTICO SUDORIENTAL). — En esta monografía se estudian las colecciones de sifonóforos (cistonéctidos, fisonéctidos y calicóforos) recolectados por las diferentes campañas oceanográficas efectuadas por el Institut de Ciències del Mar (Barcelona) y el Sea Fisheries Research Institut (Ciudad del Cabo, República Sudafricana) en toda la plataforma continental del sudoeste de África desde 1977 a 1986. Se han estudiado un total de 52 especies de sifonóforos distribuidas en 11 familias. Los ejemplares se recolectaron mediante pescas de plancton efectuadas entre 0 y 200 m de profundidad. Se han ilustrado todas las especies recolectadas y se acompaña cada una con un estudio de su taxonomía, morfología y distribución.

Palabras clave: Sifonóforos, sistemática, corriente de Benguela, Atlántico sudoriental.

INTRODUCTION

Siphonophores are abundant in planktonic communities, but even though they are an important component of what is termed the gelatinous zooplankton, most of the work on zooplankton has dealt with them only superficially. Because they are basically consumers and often voracious predators, they have a major impact on the structure and dynamics of the zooplankton (e.g., ALLDREDGE, 1983; MACKIE *et al.*, 1987). Determining the exact role played by these organisms in a given ecosystem requires, first of all, knowledge of their species composition and population abundance. Although siphonophore composition and distribution is known in certain areas, in the Benguela system knowledge of this zooplankton group has been extremely limited (SHANNON and PILLAR, 1986) up to now.

The few previous records made in the region resulted from collections made during major oceanographic expeditions that visited stations off Namibia and South Africa at the end of the last century and beginning of the present one. Such expeditions included the H.M.S. Challenger Expedition 1873-1876 (HAECKEL, 1888), the Deutschen Südpolar-Expedition in 1901-1903 (MOSER, 1925), surveys carried out by the "Discovery" from 1928 to 1937 (TOTTON, 1941, 1954) and the "Meteor" in 1928-1930 (LELOUP and HENTSCHEL, 1935), all of them collected some samples in the Benguela System. Nevertheless, avail-

* Received May 20, 1992. Accepted December 10, 1992.

able information on siphonophore distribution in the region is exceedingly scant (ALVARIÑO, 1971).

MATERIALS AND METHODS

The siphonophores examined were collected on a number of oceanographic and fisheries surveys carried out by the Instituto de Ciencias del Mar in Barcelona and the Sea Fisheries Research Institute in Cape Town beginning in 1979. PAGÈS and GILI (1992c, this volume) published a discussion of the particular features of each survey and data on each of the sampling stations occupied. Species identification was carried out according to the classification system put forward by TOTTON (1965). The material examined is deposited at the Instituto de Ciencias del Mar, and a reference collection is deposited at the South African Museum in Cape Town.

All siphonophore specimens were removed from each sample analyzed without taking any aliquots. In the material examined paragraph, the number of specimens collected is shown in brackets. For the most part specimens were preserved in buffered 5 % formalin.

Information related to the distribution and ecology of the siphonophores studied in this monography has been already published in several other papers (PAGÈS and GILI, 1991a,b; 1992a,b; PAGÈS *et al.*, 1991; PAGÈS, 1992)

LIST OF SPECIES

The species identified and examined include 3 cystonects, 8 physonects and 41 calycophores.

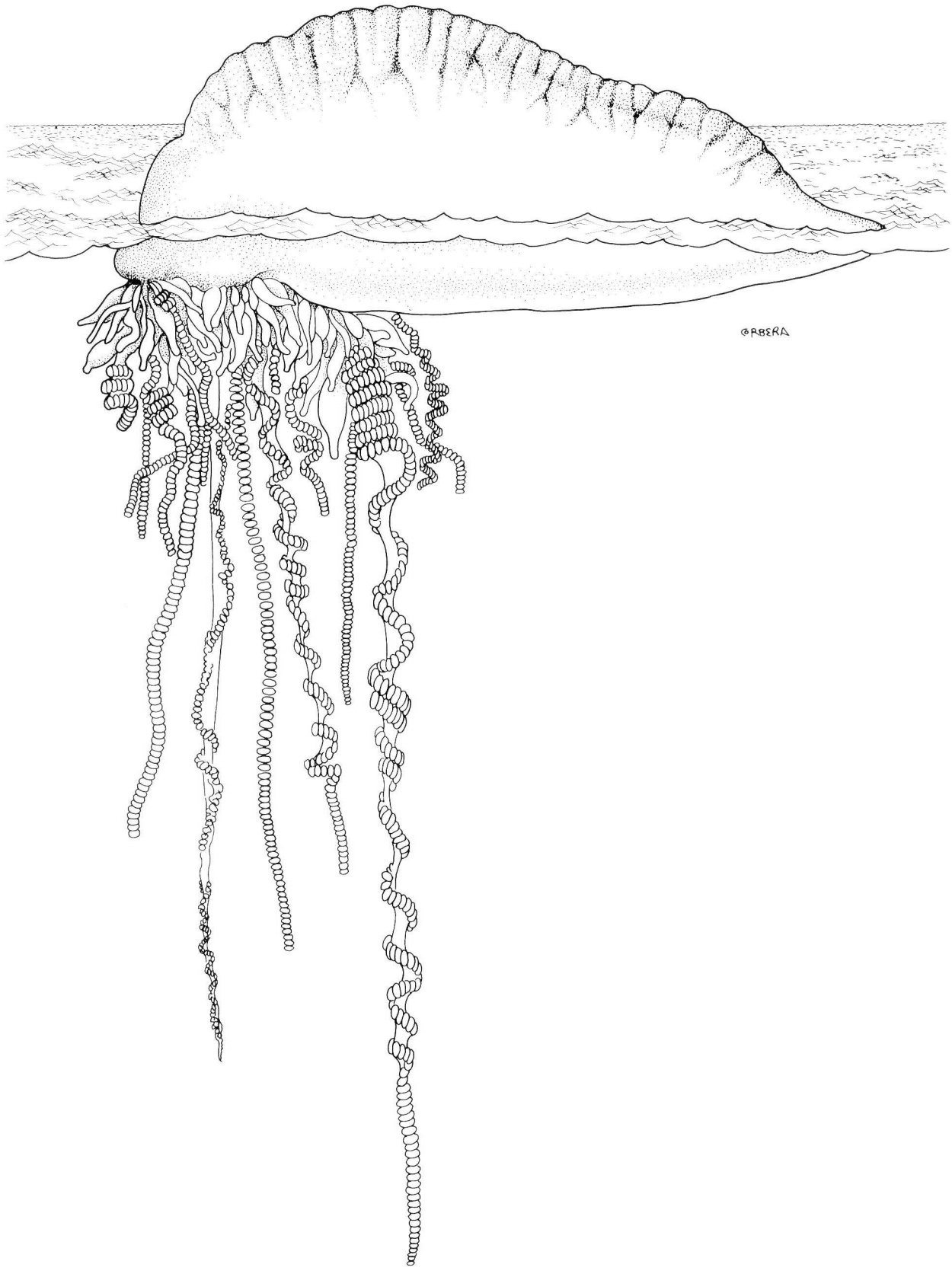

FIG. 1. — Colony of *Physalia physalis*.

ACCOUNT OF SPECIES COLECTED

ORDER CYSTONECTAE Haeckel, 1887
Family PHYSALIIDAE Brandt, 1835

Physalia physalis (Linné, 1758)
(Fig. 1)

References: VANHÖFFEN 1920, p. 16; as *Physalia arethusa*. TOTTON 1960, p. 301-366. TOTTON 1965, p. 39-40; pl. I fig. 1. DANIEL 1974, p. 22-27; figs. 1 A-G. SHANNON and CHAPMAN 1983, p. 454-458. KIRKPATRICK and PUGH 1984, p. 26-27; fig. 5.

Material examined: WCHB January 1984: B-34, 1 colony. B/C "Campa del Infanzón": 27°50'5 S 14°49'2E, 3-12-1988, 2 colonies. Swakopmund, 21-2-1989, 2 colonies stranded on the beach. Fish Hoek, False Bay, 30-10-1989, 13 colonies stranded on the beach. Cape of Good Hope, 17-3-1991, 16 colonies stranded on the beach.

Description: Colony consisting of a large, bluish gas bag called pneumatophore that floats on the sea surface, reaching 8.0 cm in length in the largest specimen examined. Pneumatophore carries the polyps, which form cormidia at the oral end; float acting like a sail, drifting at the mercy of the winds. Pneumatophore asymmetrical; two forms, each the mirror image of the other. Each cormidium consisting of a gastrozooid associated with a tentacle and a gonodendron; however, unlike other siphonophores, tentacle separating from the basigaster during the later stages of development. The tentacles may attain several meters in length. Formation of new cormidia in the colony in continuous. As the cormidia mature, new gastrozooids gradually lose their tentacles and becoming palpons. Small medusoid gonophores developing at the bases of the terminal palpons. One gonophore on each terminal palpon becoming an asexual nectophore. Functional gonophores of a given colony are of a single sex only.

Distribution: Benguela Current: common throughout the Benguela System, with colonies found beached after storms or periods of strong winds blowing off the ocean. Recorded in Swakopmund by VANHÖFFEN (1920). Presence of this species on beaches on the western shore of the Cape Province during periods of dominant shoreward winds was considered in an interesting study by SHANNON and CHAPMAN (1983), who suggested that the presence of *Physalia* in the summer of 1982/83 was due to the occurrence of warmer than usual waters inshore and to frequent east winds. World-wide distribution: widely distributed in tropical and subtropical regions in the three great oceans and in the Mediterranean.

Family RHIZOPHYSIDAE Brandt, 1835

Rhizophysa eysenhardti Gegenbaur, 1859
(Fig. 2)

References: LENS and VAN RIEMSDIJK 1908, p. 103-104; pl. XX fig. 147, pl. XXI fig. 150, pl. XXIV fig. 172. BIGELOW 1911b, p. 320. BROWNE 1926, p. 83. TOTTON 1965, p. 42; pl. I figs. 3-3a, pl. V fig. 1, pl. VII. PURCELL 1981a, p. 424-431. PURCELL 1984, p. 322; fig. 5E, 5H. MACKIE *et. al.*, 1987, p. 113, 116.

FIG. 2. — Colony of *Rhizophysa* eysenhardti. Scale bar = 2 mm.

Material examined: SNEC II: E-91 P-5+6 (1), WCHB July 1984: A1596 B17 (1).

Description: Colonies collected small in size. Pneumatophore upright, oval, 3.3 mm high by 2.1 mm wide, with an apical pore surrounded by a dark red circular spot. Pneumatosaccus large, occupying the upper half of the pneumatophore. *Hypocysti villi* containing gas-secreting cells located at the base of the pneumatophore. Small gastrozooids with undeveloped tentacles located below the pneumatophore. Stem up to 24 mm long. Gastrozooids progressively increasing in size from the apical end of the stem. Largest gastrozooid 5.9 mm in length. Tentacles with a single type of unicornuate or filiform tentillum. Several yolk-like developing gonodendrons but only a single mature gonodendra.

Distribution: Benguela Current: rare species in the region, with only two colonies collected. One caught between 40 m and the surface in the open ocean off the Cunene River, the other caught in the 50 to 0-m depth over the shelf zone, south of Hondeklip Bay (southern Benguela). World-wide distribution: widely distributed in warm and temperate regions in the three great oceans, although it has not been recorded in the Southwest Atlantic (ALVARIÑO, 1981).

Rhizophysa filiformis (Forskål, 1775)
(Fig. 3)

References: LENS and VAN RIEMSDIJK 1908, p. 100-103; pl. XVIII figs. 141-145, pl. XXI figs. 151-152. BIGELOW 1911b, p. 319. BIGELOW and SEARS 1937, p. 65; fig. 50. TOTTON 1965, p. 41-42; pl. 1 fig. 2; pl. II-IV. DANIEL 1974, p. 28-31; fig. 1 H-N.

Material examined: CELP August 1977: 72-12 (1), CELP January 1978: 68-08 (1), 48-06 (1).

Description: Pneumatophore oval, 4.9 mm high by 4.0 mm wide. Apical pore surrounded by a dark red circular spot. Pneumatocodon, or outer wall, separated from the pneumatosaccus, or inner wall, by a large cavity. Pneumatosaccus occupying the upper half of the pneumatophore. *Hypocysti villi* well developed, occupying the lower half. Polyps developing at the base of the pneumatophore, forming the cormidia that make up the colony. Gastrozooids with three types of tentilla: tricornuate, the most common, with three terminations at the end of the tentillum; palmate, or dendritic; and in the shape of a bird's beak. Gonodendra shaped like clusters of grapes located halfway between each pair of gastrozooids.

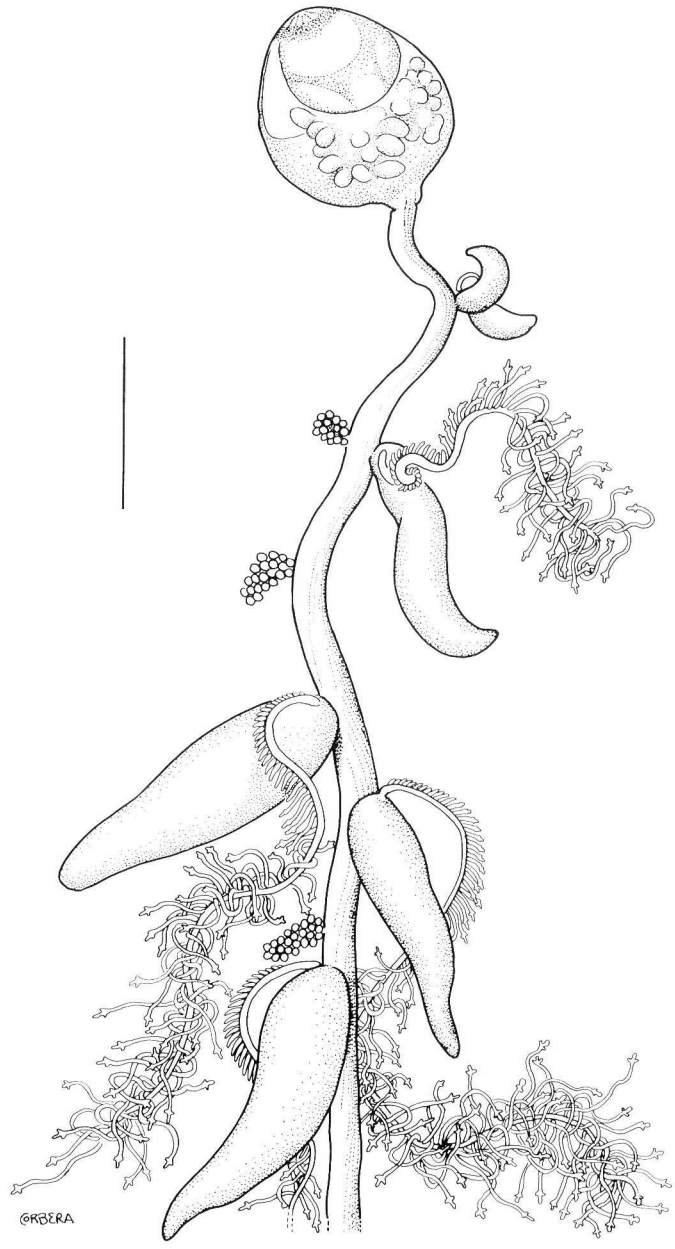

FIG. 3. — Colony of *Rhizophysa filiformis* . Scale bar = 5 mm.

Distribution: Benguela Current: occasionally present, collected only over the shelf between the Cape of Good Hope and Cape Agulhas in the southern Benguela both in summer, when intrusions by Agulhas water take place, and in winter, when hydrographic conditions are more stable. World-wide distribution: uncommon but widely distributed in warm and temperate regions in the three great Oceans, and the Mediterranean, although it has not been recorded in the Southwest Atlantic (ALVARIÑO, 1981).

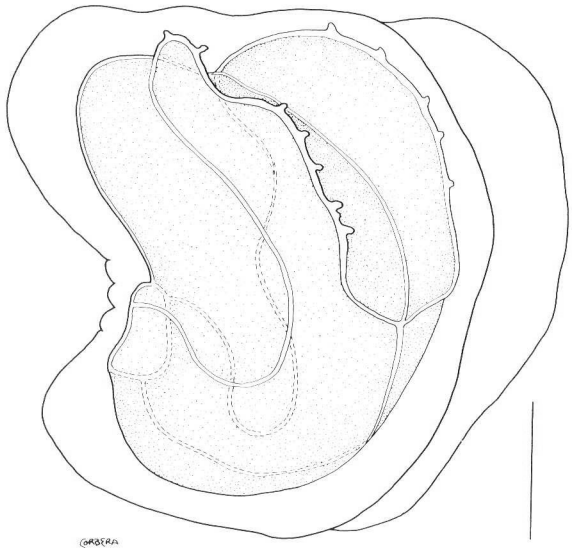

FIG. 4. — Nectophore of *Apolemia uvaria* (latero-dorsal view). Scale bar = 1 mm.

ORDER PHYSONECTAE Haeckel, 1888

Family APOLEMIIDAE Huxley, 1859

Apolemia uvaria (Lesueur, ?1811) (Fig. 4)

References: TOTTON 1965, p. 45-51; figs. 13-17; pl. VIII figs. 1-14. ALVARIÑO 1971, p. 231. KIRKPATRICK and PUGH 1984, p. 28-29; fig. 6.

Material examined: SNEC II: E-73 P-2 (1).

Description: Pneumatophore bulb-shaped, widening near the apex. Nectosome of the colony collected composing four nectophores, although there may be up to twelve, in two parallel rows on the stem. Largest nectophore 3.7 mm high by 3.4 mm wide by 4.2 mm deep. Nectophore consisting of two wings like those of a butterfly, especially when viewed laterally, with a deep ventral furrow. Nectosac large. Lateral radial canals form S-shaped bends with short branches on the upper bend. Groups of five or six nectosomal tentacles issuing from the base of the nectophores near the pedicular canal, at the base of the muscular lamellae. Siphosome measuring up to several meters in length, composed of several cormidia. Each cormidium consists of a gastrozooid and about fifty palpons, both with thin filiform tentacles of a single type issuing from their bases. Palpons very long and delicate. Bracts, like the nectophores, covered by opaque spots bearing nematocysts on the outer surface.

Distribution: Benguela Current: first record for the region. Colony caught at a depth between 200 and 100 m at an oceanic station off the Cunene River. World-wide distribution: seldom caught epiplanktonic species. Cited in the Mediterranean, in the vicinity of Naples, Messina, Monaco, and Villefranche-sur-Mer (ALVARIÑO, 1971). In the Atlantic Ocean cited off the British Isles (KIRKPATRICK and PUGH, 1984) and also in the epipelagic zone off the Antarctic Peninsula at 63°04' S, 39°56' W (ALVARIÑO *et al.*, 1990).

Family AGALMATIDAE Brandt, 1835

Agalma elegans (Sars, 1846) Fewkes, 1880 (Fig. 5A-B)

References: BIGELOW 1911b, p. 281-283; pl. 18 figs. 9-13, pl. 19 figs. 1-4. TOTTON 1954, p. 61-64; fig. 24. TOTTON 1956, p. 239-241; figs. 1-9. TOTTON 1965, p. 54-55; figs. 7, 18-20; pl. X figs. 11-17, pl. XI figs. 1-2. ALVARIÑO 1971, p. 234-235. PALMA 1973, p. 25-27; pl. IA-IB. ALVARIÑO 1981, p. 394; fig. 174-3. KIRKPATRICK and PUGH 1984; p. 32-33; fig. 7. GILI 1986, p. 270-271; fig. 4.49 C, 4.64 l-m, o-p. ALVARIÑO *et al.*, 1990, p. 5; fig. 6; maps A6, B2.

Material examined: SWAPELS December 1981: 22-08 (1), 34-10 (1), 82-08 (1), 88-10 (1), 88-12 (12). SWAPELS January 1982: 16-14 (3), 28-12 (1), 34-14 (1), 46-14 (1), 76-08 (1), 76-14 (3), 88-10 (2), 88-12 (3). SWAPELS February 1982: 04-04 (1), 22-10 (2), 28-10 (1), 28-12 (1), 34-10 (1), 46-14 (1), 76-10 (1), 76-14 (1), 88-12 (1), 94-14 (1). SWAPELS March 1982: 28-08 (1), 34-10 (1), 34-12 (1), 40-08 (1), 40-14 (1), 46-12 (1), 76-14 (1), 88-10 (2), 88-12 (2). SNEC II: E-14 P-5 (1), E-23 P-4 (3), E-23 P-5 (1), E-23 P-6 (3), E-61 P-4 (1).WCHB July 1983: A0666 B05 (1), A0678 B09 (1), A0684 B11 (1), A0732 B25 (1).WCHB July 1984: A1596 B17 (1). CELP January 1978: 48-12 (1).

Description: Pneumatophore elongate, small, 1.1 mm high, apex red. Two rows of alternating nectophores attached to the stem. Nectophores V-shaped, with two prominent lateral wings. An apico-lateral ridge running from the apex of the lateral wing to the midpoint of the nectophore, an infero-lateral ridge running along the outer margin, and a latero-ventral ridge located on the central portion of the nectophore. Nectosac triangular, T-shaped. Pedicular canal short. Bracts triangular, elongate, foliaceous in appearance, dorsal surface convex, 9 mm long, with a bracteal canal medially. Tentilla tricornuate.

Distribution: Benguela Current: more frequent and abundant in the northern Benguela, in the open ocean from the Cunene River to Lüderitz. More sporadic, less frequent in the southern Benguela, present in the open ocean between the Cape of Good Hope and Hondeklip Bay. World-wide distribution: widely distributed in tropical and subtropical regions in the three great Oceans and in the Mediterranean (ALVARIÑO, 1971).

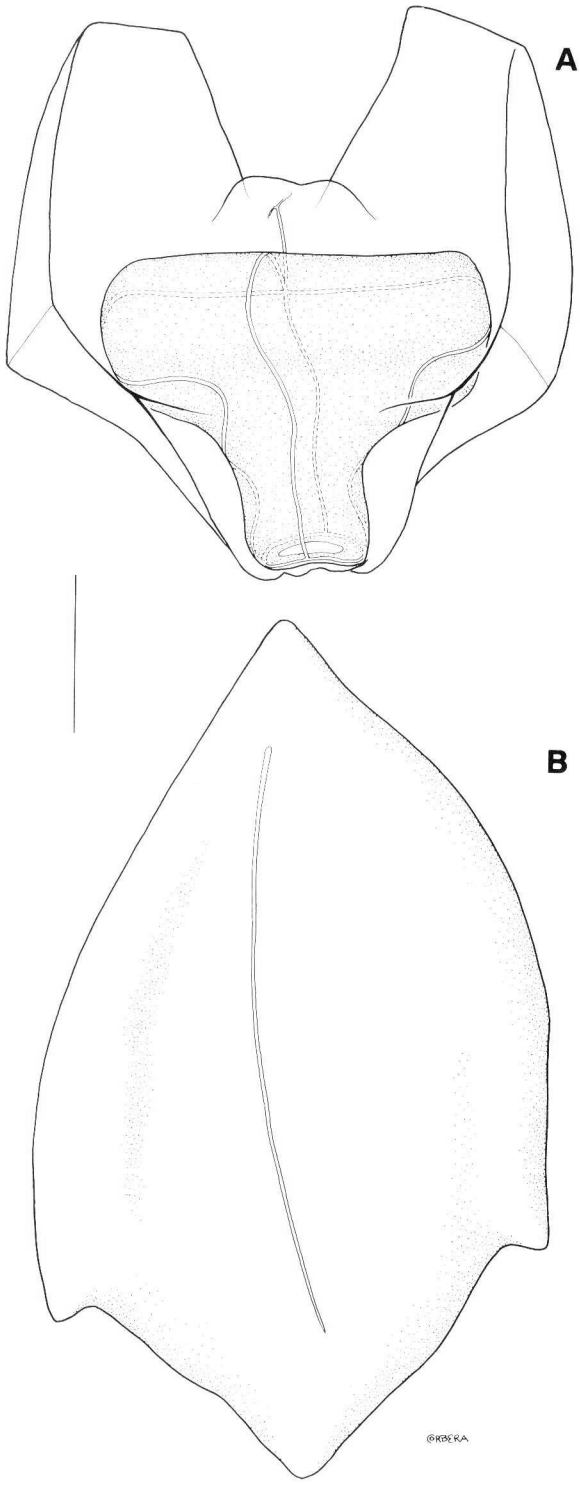

FIG. 5. — *Agalma elegans*, A nectophore, B bract. Scale bar = 2 mm.

Agalma okeni Eschscholtz, 1825
(Fig. 6A-B)

References: BIGELOW 1911b, p. 277-281; pl. 17. TOTTON 1932, p. 321-322; figs. 1-2. TOTTON 1954, p. 64-69; figs. 25-27. TOTTON 1965, p.53; pl. IX figs. 1-14, pl. XI fig. 3. DANIEL 1974, p. 37-41; fig. 2 A-M. GILI 1986, p. 269-270; figs. 4.48 C-D, 4.63 k,p.

Material examined: SWAPELS March 1982: 04-14 (1), 16-10 (1), 28-06 (1). SNEC II: E-47 P-2 (2), E-49 P-5 (1), E-51 P-6 (2), E-52 P-4 (1), E-52 P-6 (1), E-58 P-6 (1), E-59 P-5 (1), E-59 P-6 (2), E-60 P-2 (1), E-66 P-3 (1), E-68 P-2 (2), E-71 P-2 (1), E-71 P-3 (1), E-71 P-3 (1), E-71 P-4 (1), E-71 P-5 (1), E-71 P-6 (1), E-72 P-6 (3), E-73 P-5 (1), E-73 P-6 (3), E-75 P-6 (5), E-77 P-2 (1), E-77 P-6 (7), E-78 P-6 (6), E-80 P-2 (1), E-80 P-3 (1), E-80 P-6 (2), E-81 P-3 (1), E-81 P-5 (2), E-81 P-6 (1), E-83 P-3 (3), E-85 P-2 (2), E-85 P-3 (1), E-85 P-4 (2), E-85 P-6 (3), E-86 P-6 (16), E-88 P-5 (1), E-88 P-6 (8), E-90 P-6 (11), E-91 P-4 (1), E-91 P-6 (1), E-92 P-4 (1), E-92 P-5 (1), E-92 P-6 (11).WCHB July 1984: A1547 B05 (1), A1572 B11 (2). CELP January 1978: 68-08 (1), 84-12 (1).

Description: Pneumatophore elongate, 7.0 mm high, apex pigmented. Nectophores similar to those of *A. elegans*, but nectosac Y-shaped. Bracts firm, up to 5.0 mm long, prismatic, triangular, gradually thickening towards the distal portion, which has three vertical ridges delimiting four distal facets. Bracteal canal filiform, central, not reaching the distal facets.

Distribution: Benguela Current: uncommon in the region, although it was caught in the open ocean at both the northern and southern ends of the system. Highly abundant during the 48-h sampling period carried out at an oceanic station off the Cunene River (PAGÈS and GILI, 1991b). During that period the species was distributed in the upper 200 m in the daytime and formed aggregations in the 20 to 0-m interval at night. World-wide distribution: widely distributed in tropical and subtropical regions in all seas and in the Mediterranean (ALVARIÑO, 1971).

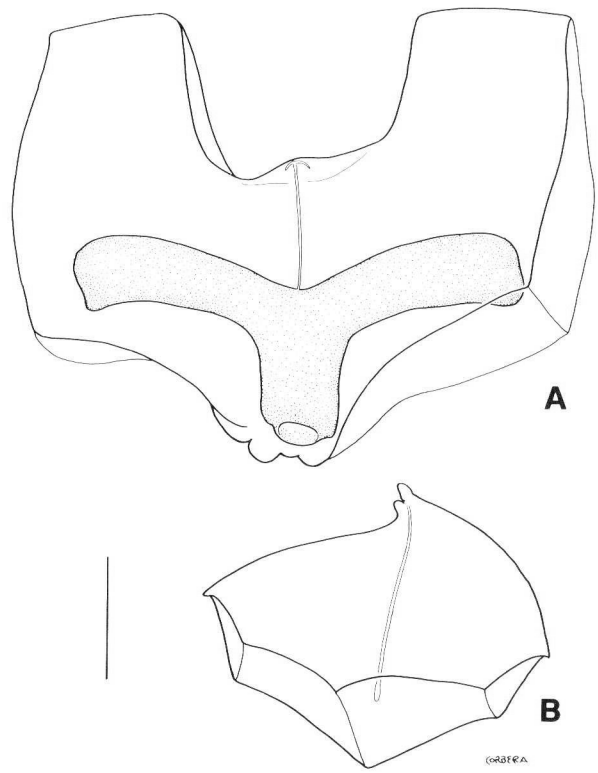

FIG. 6. — *Agalma okeni*, A nectophore, B bract. Scale bar = 2 mm.

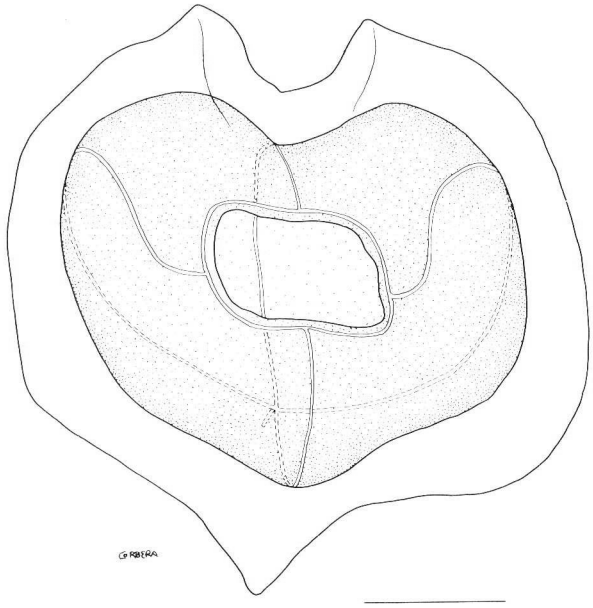

FIG. 7. — Nectophore of *Cordagalma cordiformis* (ostial view). Scale bar = 0.5 mm.

Cordagalma cordiformis Totton, 1932
(Fig. 7)

References: TOTTON 1932, p. 325-327, figs. 8-9. TOTTON 1954, p. 69. TOTTON 1965, p. 61; fig. 25. CARRÉ 1968b, p. 79-86; pl. I figs. 1-4, pl. II figs. 1-4, pl. III figs. 1-9. CARRÉ 1973, p. 113-118; fig. 1; pl. I figs. 1-9; pl. II figs. 1-6. PALMA 1973, p. 27-28; pl. II figs. 1-3. PALMA 1977, p. 123 tab. 1, p. 130 tab. III. CASANOVA 1980, p. 21-22; tab. 2. GILI 1986, p. 268-269; figs. 4.49 B, 4.63 j,o.

Material examined: WCHB July 1983: A0684 B11 (1), A0695 B15 (1), A0732 B25 (1),WCHB July 1984: A1529 b02 (1), A1572 B11 (1), A1653 B31 (1).

Description: Colony extremely fragile, reaching up to 30 cm in length. Nectosome occupying a third of colony length. Pneumatophore fusiform, apex lightly pigmented. Two opposing rows of alternating nectophores. Adult colonies having up to 40 heart-shaped nectophores with two rounded latero-anterior lobes and an acute centro-inferior lobe, 2.0 mm high by 1.4 mm wide. Lateral radial canals, ascending from the ostial canal, join the dorsal canal at the apex without describing a sigmoidal curve.

Distribution: Benguela Current: first record for the region. Captured only in the southern Benguela in the open ocean near the continental shelf between Cape Agulhas and Hondeklip Bay in winter. World-wide distribution: uncommon but widely distributed throughout the world: Western Mediterranean (CARRÉ, 1968b, 1973; GILI, 1986), Great Barrier Reef off Australia (TOTTON, 1932), Chile (PALMA, 1977). Epipelagic species also present at depths between 700 and 500 m in the Mediterranean (CASANOVA, 1980).

Nanomia bijuga (Chiaje, 1841)
(Fig. 8A-B)

References: BIGELOW 1911b, p. 284-286, pl. 19 figs. 5-11, pl. 20 figs. 1-3. TOTTON 1932, p. 324-325; figs. 6-7; as *Stephanomia bijuga*. TOTTON 1954, p. 52-55; fig. 19D. TOTTON 1965, p. 68-71, figs. 32-36; pl. X figs. 1-10, pl. XIV fig. 9. CARRÉ 1969b, p. 325-340; figs. 1-7; pls. I-IV. ALVARIÑO 1971, p. 245-246; fig. 61; as *Stephanomia bijuga*. PALMA 1986, p. 73; fig. 2. ALVARIÑO *et al.* 1990, p. 8; fig. 8; map A18, B6; tab. A4. GILI 1986, p. 271-272; figs. 4.48 B, 4.65 m-n.

Material examined: SNEC II: E-40 P-4 (1), E-40 P-5 (2), E-40 P-6 (1), E-45 P-5 (2), E-48 P-6 (1), E-51 P-5 (2), E-51 P-6 (6), E-68 P-6 (1), E-69 P-5 (1), E-69 P-6 (8), E-71 P-6 (1), E-72 P-6 (45), E-75 P-6 (4), E-76 P-6 (4), E-77 P-6 (5), E-78 P-6 (7), E-80 P-6 (15), E-81 P-6 (21), E-85 P-6 (12), E-86 P-6 (6), E-88 P-6 (45), E-90 P-6 (17), E-91 P-6 (20), E-92 P-3 (1), E-92 P-6 (42). CELP January 1978: 28-08 (1), 28-12 (1), 32-06 (3), 40-12 (6), 48-12 (2), 56-10 (6), 60-12 (6), 68-08 (10), 68-10 (7), 76-10 (4), 80-04 (5), 80-06 (4), 80-08 (7), 80-10 (3), 80-12 (3), 84-04 (30), 84-06 (15), 84-08 (1).

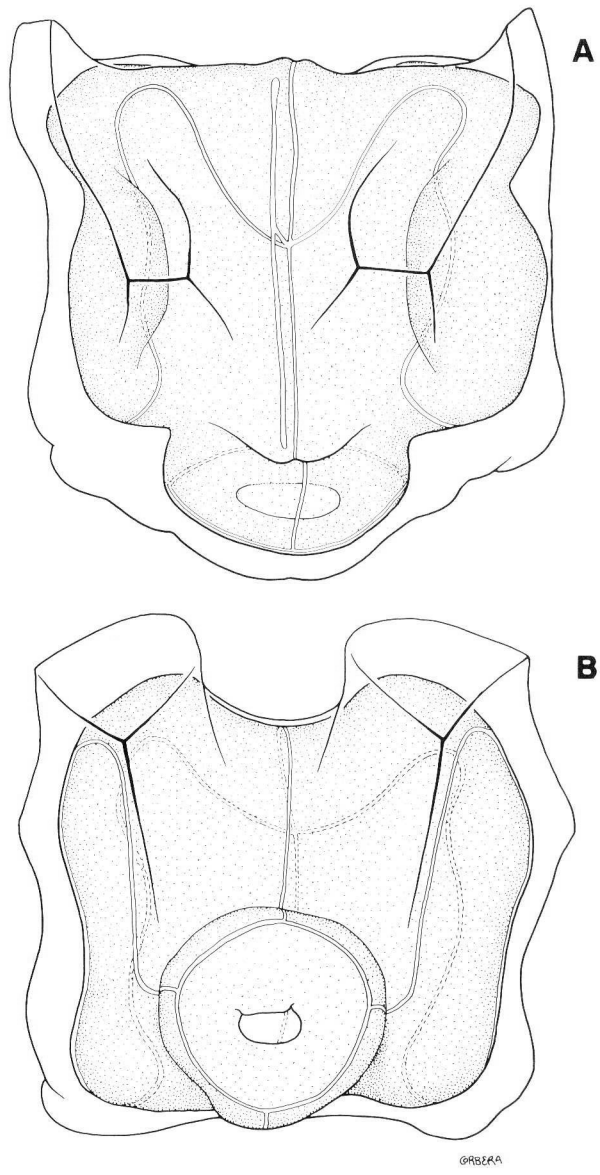

FIG. 8. — Nectophore of *Nanomia bijuga*; A ventral view, B. ostial view. Scale bar = 1 mm.

Description: Pneumatophore elongate, very small, 1.8 mm high, apex pigmented. Nectophores quadrangular, up to 2.3 mm high. Lateral wings twisting towards the adaxial or ventral surface of the colony. Nectophore L-shaped when viewed laterally, with a well-developed ostial mouth; ostial velum broad. Pedicular canal long.

Distribution: Benguela Current: four pneumatophores and 88 nectophores cited by PAGÈS and GILI (1989) at 38°00' S, 18°15' E south of Cape Agulhas. First record in the region. Present throughout the system, mainly in the open ocean, though sometimes found inshore as well. Inhabiting the upper 100 m of the water column, chiefly near the surface. World-wide distribution: widely distributed in warm and temperate regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971). Southern limit to its range at 59°06' S in the African sector (PAGÈS and GILI, 1989) and 65° S in the American sector of souther Ocean (ALVARIÑO *et al.*, 1990).

Halistemma rubrum (Vogt, 1852)
(Fig. 9)

References: TOTTON 1954, p. 47-52; figs. 12-18; as *Stephanomia rubra*. TOTTON 1965, p. 56-58; fig. 21-22; pl. XII. ALVARIÑO 1971, p. 247-248; fig. 62; as *Stephanomia rubra*. CARRÉ 1971, p. 77-92. KIRKPATRICK and PUGH 1984, p. 34-35; fig. 8. GILI 1986, p. 273-274; fig. 4.48A, 4.64 a-d.

Material examined: BENGUELA III: E-37 P-47 (1), SNEC II: E-85 P-2 (1), E-86 P-5 (2), E-91 P-3 (1).

Description: Pneumatophore oval, 5.0 mm high by 5.3 mm wide. Up to 46 nectophores per colony in two opposing rows. Nectophore shape variable but squarish in appearance, up to 5.2 mm in height, 6.6 mm in width, and 4.0 mm in dorso-ventral length. Two prominent lateral wings and central thrust block containing the pedicular canal, more conspicuous in older nectophores. Nectosac large, T-shaped. Characteristic pattern of lateral radial canals describing three curves along the lateral surface of the nectosac; middle curve widest. Apico-lateral ridges not always reaching the level of the ostium.

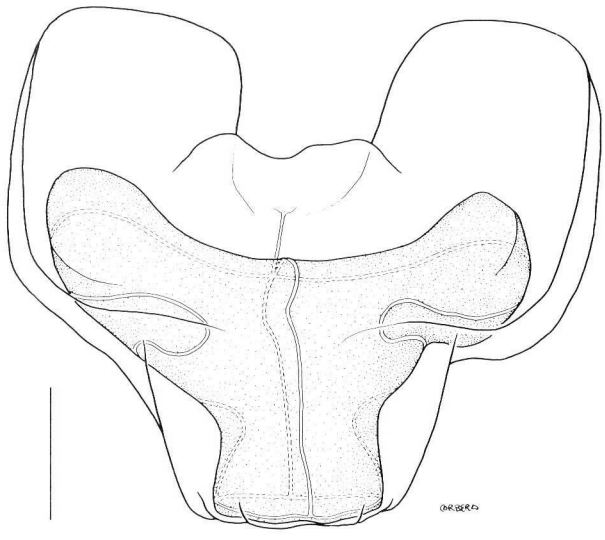

FIG. 9. — Nectophore of *Halistema rubrum* (ventral view). Scale bar = 2 mm.

Distribution: Benguela Current: first record for the region, where the species is uncommon. Collected only in the open ocean off Palgrave Point and the Cunene River in the northern Benguela. Depth distribution indicating that the species is present throughout the epipelagic zone in the water column. World-wide distribution: widely distributed in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971).

Family PHYSOPHORIDAE Eschscholtz, 1829

Physophora hydrostatica Forskål, 1775
(Fig. 10A-B)

References: BIGELOW 1911b, p. 293; pl. 16 figs. 1-9. BIGELOW and SEARS 1937, p. 63-64; fig. 49. TOTTON 1965, p. 83-86; figs. 46-47; pl. XV figs. 1-10. ALVARIÑO 1971, p. 250-253; fig. 63. KIRKPATRICK and PUGH 1984, p. 42-43; fig. 12. GILI 1986, p. 267-268; figs. 4.49 D, 4.64 n.

Material examined: BENGUELA I: E-44 P-46 (1). SWAPELS January 1982: 10-04 (1), 46-14 (1), 76-14 (1). SWAPELS February 1982: 16-12 (1). SWAPELS March 1982: 76-14 (1), 88-12 (2). SNEC II: E-16 P-4 (1), E-37 P-2 (1), E-43 P-2 (2), E-45 P-5 (1), E-52 P-5 (2), E-52 P-6 (2), E-71 P-5 (1), E-76 P-5 (1), E-77 P-3 (1), E-77 P-4 (1), E-85 P-6 (1), E-86 P-4 (1), E-88 P-2 (1), E-90 P-2 (1), E-92 P-4 (1). WCHB July 1983: A0700 B17 (1).

Description: Pneumatophore elongate, 4.5 mm high by 1.1 mm wide, apical region reddish in colour, with a pore. Nectosome consisting of up to 12 nectophores in two alternate rows. Nectophore quite rounded, devoid of conspicuous ridges. Nectophores 6.0 mm high, 5.5 mm wide. Nectosac Y-shaped. Upper half of radial canals on the nectosacs describing a highly characteristic sigmoidal curve. Pedicular canal prominent. Palpon highly characteristic (Figure 10A) because of its large size and flattened shape, with thin palpacle. Palpons covering and protecting the rest of the elements making up the siphosome and bearing clusters of nematocysts on their distal ends.

Distribution: Benguela Current: first record for the region. Oceanic species inhabiting the entire epiplanktonic zone in the water column. Present throughout the Benguela System, chiefly in the open ocean in the northern Benguela. World-wide distri-

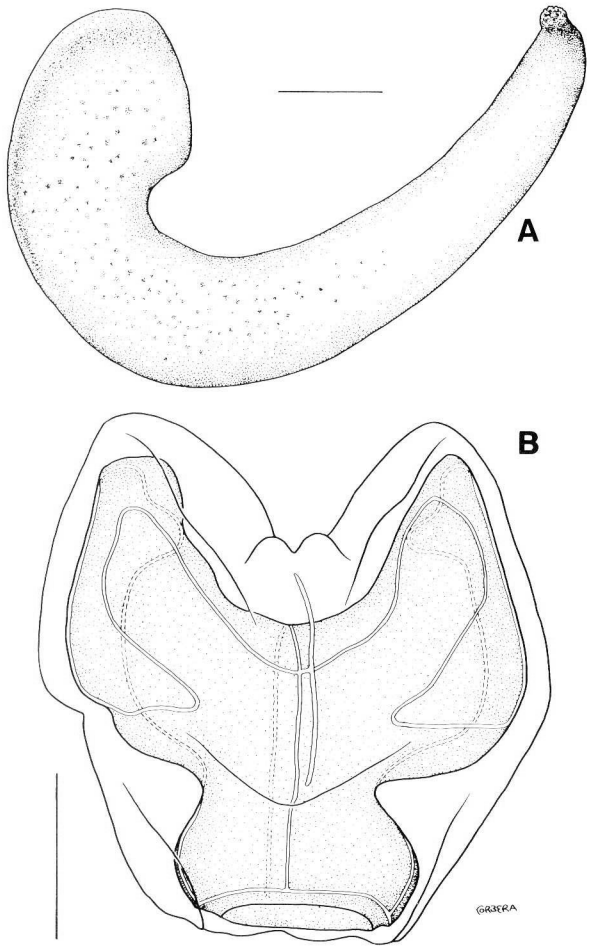

FIG. 10. — *Physophora hydrostatica*: A palpon, B nectophore (ventral view). Scale bar = 2 mm.

bution: widely distributed in tropical and subtropical regions in the three great oceans and in the Mediterranean (ALVARIÑO, 1971). Recently recorded in the subantarctic region at 64°34' S, 45°46' W by ALVARIÑO *et al.* (1990), who pointed out that the presence of the species may have been due to intrusions by temperate water from the north.

Family FORSKALIDAE Haeckel, 1888

Forskalia leuckarti Bedot, 1893
(Fig. 11)

References: TOTTON 1965, p. 102-108; figs. 56-60; pl. XX figs. 3-4. YOUNGBLUTH 1984, tab. 1.

Material examined: SWAPELS December 1981: 10-14 (1), 40-08 (1), 40-12 (2), 52-14 (2), 58-03 (1), 58-14 (2), 70-12 (1), 88-10 (3), 94-10 (1). SWAPELS January 1982: 04-10 (1), 10-06 (1), 34-12 (2), 40-14 (1), 46-14 (2), 52-14 (1), 58-06 (2), 82-08 (1), 88-08 (1). SWAPELS February 1982: 28-14 (2), 34-12 (1), 52-10 (1), 76-10 (1), 94-08 (1), 94-10 (2). SWAPELS March 1982: 10-04 (2), 10-10 (2), 22-10 (1), 28-08 (2), 34-12 (1), 40-14 (1), 46-12 (1), 52-12 (1), 76-14 (2), 82-08 (2), 88-10 (5), 88-14 (1). SNEC II: E-17 P-2 (1), E-18 P-5 (1), E-25 P-2 (1), E-26 P-3+4 (1), E-27 P-5 (1), E-27 P-6 (1), E-35 P-4 (1), E-35 P-5 (6), E-35 P-6 (10), E-37 P-5 (9), E-37 P-6 (10), E-43 P-3+4 (1), E-47 P-3+4 (1), E-48 P-2 (1), E-51 P-2 (2), E-52 P-5 (2), E-53 P-5 (1), E-57 P-2 (1), E-58 P-4 (1), E-58 P-5 (1), E-58 P-6 (2), E-59 P-5 (1), E-61 P-3 (1), E-69 P-3 (1), E-69 P-4 (1), E-72 P-4 (1), E-73 P-4 (1), E-76 P-6 (1), E-83 P-2 (1), E-83 P-3 (1), E-86 P-6 (1), E-88 P-5 (1), E-91 P-6 (1), E-92 P-4 (1), E-92 P-5 (1).

Description: Pneumatophore oval, very small, 1.6 mm high. Nectophores overlapping, forming several spirals wrapped around the stem of the colony. Nectophores asymmetric, dorsoventrally flattened, with one high, well-developed supralateral wing, the other small. Larger nectophore wing height 8.0 mm high by 6.2 mm wide. A lateral indentation at the level of the upper border of the nectosac. Pedicular canal long, with an oval, red *rete mirabile* characteristic to this species. Lateral radial canals running along the border of the nectosac from the ring canal to the origin of the pedicular canal at the apex.

Distribution: Benguela Current: collected only in the northern Benguela, where it is frequent throughout the epipelagic zone in the open ocean. Worldwide distribution: rare, to date only caught in the Mediterranean (TOTTON, 1965) and observed from submersibles at depths between 150 and 600 m in the Bahamas (YOUNGBLUTH, 1984).

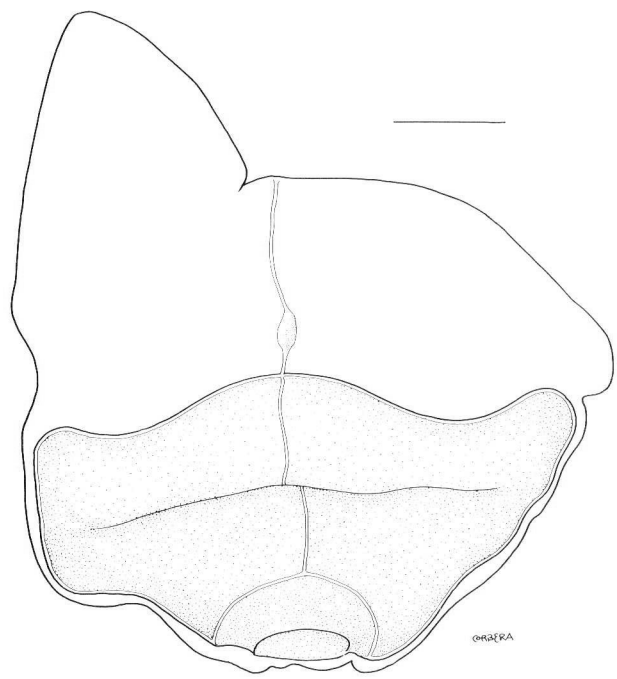

FIG. 11. — Nectophore of *Forskalia leuckarti* (ventral view). Scale bar = 1 mm.

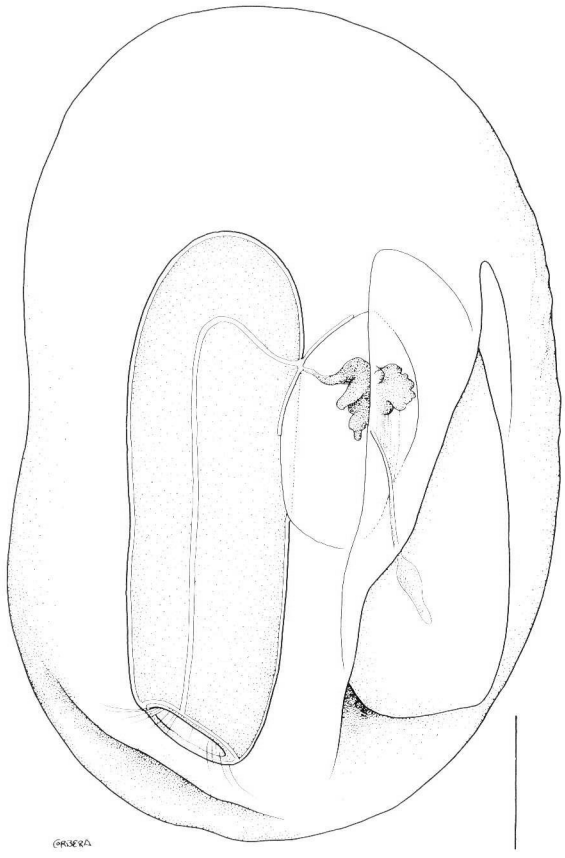

FIG. 12. — Nectophores (definitive and vestigial) of *Amphicaryon acaule* (laterial view of the polygastric stage). Scale bar = 2 mm.

ORDER CALYCOPHORAE Leuckart, 1854

Family PRAYIDAE Kölliker, 1853

Amphicaryon acaule Chun, 1888
(Fig. 12)

References: BIGELOW 1911b, p. 195-197; pl. 4 figs. 1-8. MOSER 1925, p. 399-400. TOTTON 1965, p. 112; pl. XXI fig. 6. PALMA 1973, p. 30-31; pl. IV figs. 1-4. DANIEL 1974, p. 76-77; figs. 6 A-E. PUGH 1974, p. 35-37; fig. 1A. KIRKPATRICK and PUGH 1984, p. 50-51; fig. 15. ALVARIÑO *et al.* 1990, p. 11-12; fig. 14; tab. A4; map A32-A38.

Material examined: SNEC II: E-53 P-4 (1), E-58 P-6 (1), E-61 P-5 (1), E-73 P-3 (1), E-75 P-6 (1), E-77 P-3 (1). SWAPELS January 1982: 76-12 (1). SWAPELS February 1982: 34-12 (1). WCHB July 1983: A0732 B25 (1). CELP January 1978: 64-12 (1). PHYLLOSOMA SURVEY: 002013 (11), 002017 (1).

Description: Colony globe-shaped, composed of two nectophores. Vestigial nectophore larger, ovoid, up to 10.7 mm in height, higher than wide, partially surrounding the vestigial nectophore. Larger nectophore has a nectosac somewhat higher than half nectophore height with four radial canals, the dorsal canal longer than the ventral canal. Upper portion of lateral canal forming a right angle. Vestigial nectophore is a disc within the ventral cavity of the larger nectophore. Nectosac with four radial canals, not open to the outside. Eudoxid not collected in the region.

Distribution: Benguela Current: relatively uncommon species, inhabiting the upper 100 m of the water column offshore throughout the region. Worldwide distribution: present in tropical and subtropical regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971; PUGH, 1974). Epipelagic species that has been caught in the mesopelagic zone (PUGH, 1974). Distribution range has been extended to include the meso— and epipelagic zones in the subantarctic region, both in the Atlantic and in the Pacific sector (ALVARIÑO *et al.*, 1990).

Amphicaryon ernesti Totton, 1954
(Fig. 13)

References: TOTTON 1954, p. 94-96; figs. 44-45. ALVARIÑO 1971, p. 227; fig. 56. PUGH 1974, p. 37. CASANOVA 1980, p. 19-20; fig. 3. ALVARIÑO 1981, p. 401; fig. 174-15. ALVARIÑO *et al.* 1990, p. 12; fig. 15; map A39-A40.

Material examined: CELP January 1978: 28-10 (1).

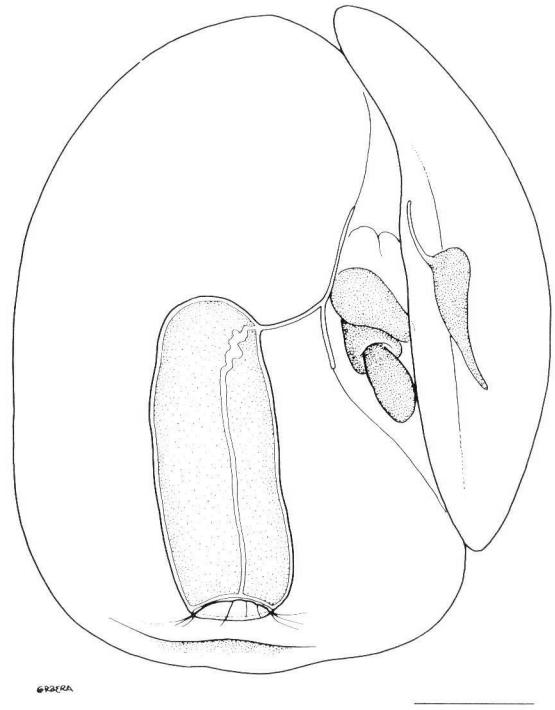

FIG. 13. — Nectophores (definitive and vestigial) of *Amphicaryon ernesti* (lateral view of the polygastric stage). Scale bar = 1 mm.

Description: Polygastric stage: Colony small, 4.0 mm high composed of two nectophores. Vestigial nectophore larger, not surrounding the vestigial nectophore. Lateral canals in the larger nectophore convoluted at the apex of the nectosac. Nectosac of vestigial nectophore without an opening to the nectophore surface. Ventral canal forming a complicated network which cover the ventral surface. Radial canals disappearing, leaving only the dorsal canal. Eudoxid unknown.

Distribution: Benguela Current: first record in the region. Captured in the 61 to 0-m depth interval offshore near the shelf off Cape Columbine. World-wide distribution: relatively uncommon species distributed in temperate regions in the three great oceans (PUGH, 1974) and in the Red Sea (ALVARIÑO, 1971). Also occurring in the mesopelagic zone of the Pacific subantarctic region (ALVARIÑO *et al.*, 1990). The few records available suggest that it inhabits the upper 150-250 m of the water column (PUGH, 1974).

Rosacea plicata sensu Bigelow 1911
(Fig. 14)

References: BIGELOW 1911a, p. 341-343. BIGELOW 1911b, p. 201-203; pl. 2 figs. 7-9, as ?*Rosacea plicta*. BIGELOW and SEARS 1937, p. 11-13; figs. 9-14. TOTTON 1954, p. 89-92, figs. 41-43. TOTTON 1965, p. 116-118; figs. 65-67. ALVARIÑO 1971, p. 217-219. KIRKPATRICK and PUGH 1984, p. 54-55; fig. 17. PUGH 1984, p. 471-473; figs. 5 a-b. GILI 1986, p. 277; figs 4.50 D, 4.65 f. PUGH and HARBISON 1987, p. 90-91; figs. 13 F-G; tab. 1. ALVARIÑO *et al.* 1990, p. 14-15; fig. 20; maps A48-A54.

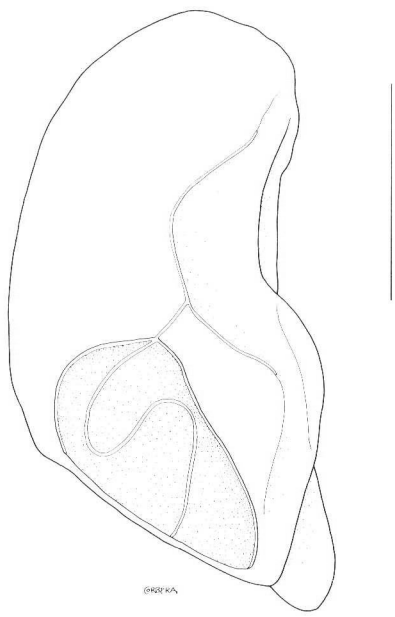

FIG. 14. — Definitive nectophore of *Rosacea plicata* (lateral view). Scale bar = 5 mm.

Material examined: SWAPELS January 1982: 04-10 (1), 16-10(1), 46-14 (1), 70-14 (4), 100-14 (1). SWAPELS February 1982: 16-10 (1), 28-12 (1), 76-10 (1) 100-14 (1). SWAPELS March 1982: 46-08 (1). SNEC II: E-27 P-2 (9), E-44 P-2 (3), E-53 P-2 (2), E-58 P-2 (8), E-59 P-2 (16), E-60 P-2 (5), E-66 P-2 (9), E-68 P-2 (7), E-71 P-2 (8), E-72 P-2 (16), E-73 P-2 (17), E-75 P-3 (1), E-76 P-2 (22), E-77 P-2 (17), E-78 P-2 (22), E-80 P-2 (13), E-81 P-2 (54), E-83 P-2 (8), E-85 P-2 (8), E-86 P-2 (1), E-88 P-2 (2), E-92 P-2 (7).

Description: Polygastric stage: Two types of nectophore, a temporary larval and a definitive one. Larval nectophore small, globe-shaped, 4.7 mm in size. Similar to that of the Hippopodidae, except that the pallial canal makes a sharp turn around the central organ. This nectophore is replaced by two larger definitive nectophores up to 18.0 mm in height. Mesogloea thick but not rigid, and consequently specimens when preserved are easily deformed, hindering identification and creating confusion with *R. cymbiformis*. Nectophores without ridges, globe-shaped or cylindrical. Nectosac dome-shaped, located at the base of the nectophore, reaching to one the quarter nectophore height. Radial canals curving twice to form a horizontal S. Hydroecium ventral, deep, occupying a large part of the central portion of the nectophore without reaching either the apex or the base. Somatocyst simple with descending branchs. Eudoxid not collected in the region.

Distribution: Benguela Current: uncommon in the region, caught only at isolated stations in the oceanic zone off Namibia in the northern Benguela. Vertical distribution extending down to an upper limit of around 100 m, making this species mesopelagic. World-wide distribution: mesopelagic species (PUGH, 1984) widely distributed in the three great oceans and in the Mediterranean (ALVARIÑO, 1971). Distribution range extends to the Antarctic, where it inhabits the epi— and mesopelagic zones (ALVARIÑO *et al.*, 1990).

Rosacea cymbiformis (Chiaje 1822)
(Fig. 15)

References: BIGELOW 1911b, p. 198, 200-201; pl. 2 figs. 1-6, as *Praya cymbiformis*. MOSER 1925, p. 374-377, as *Praya cymbiformis*. BIGELOW and SEARS 1937, p. 20; figs. 6-8. LELOUP and HENTSCHEL 1935, p. 5; fig. 4. TOTTON 1965, p. 118-121; figs. 68-69; pl. XXI fig.1; pl. XXII figs. 1-3. DANIEL 1974, p. 85-86; figs. 6 K,L,P. PURCELL 1981b, p. 283-294; figs. 1-4; tabs. 1-7. KIRKPATRICK and PUGH 1984, p. 56-57; fig. 18.

Material examined: SNEC II: E-26 P-2 (3), E-61 P-2 (7).

Description: Polygastric stage: Definitive nectophore less rounded, more flattened and elongate than in *R. plicata*, up to 17.5 mm high. The two definitive nectophores are attached ventrally, one partially sur-

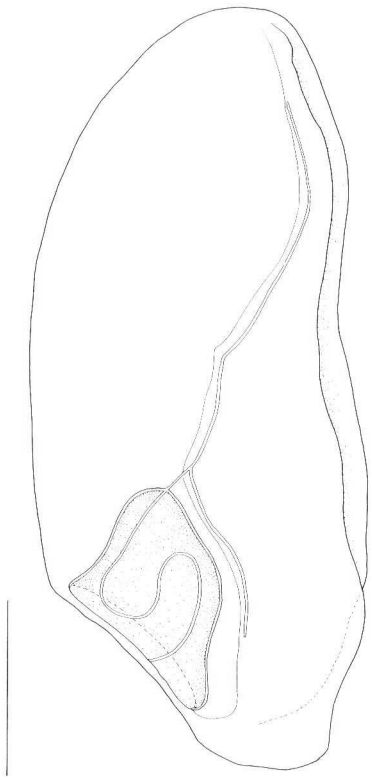

FIG. 15. — Definitive nectophores of *Rosacea cymbiformis* (lateral view). Scale bar = 5 mm.

rounding the other. Hydroecium shallow, comprising a ventral canal with two faint lateral projections extending, dorso-basally, from near the apex to the ostium of the nectosac. Nectosac displaced dorsally, small, less than two-fifths of nectophore height, lateral radial canals curving three times, forming a W from the pedicular canal to the ostial ring canal. Somatocyst with descending branch as in *R. plicata*. Eudoxid not collected in the region.

Distribution: Benguela Current: occasionally present, captured by the Meteor expedition off Cape Town (LELOUP and HENTSCHEL, 1935). The new records were colonies caught offshore off Walvis Bay and the Cunene River at depths between 200 and 100 m, making it a mesopelagic and deep epipelagic species. World-wide distribution: relatively common species, more abundant in the Atlantic, taken off the British Isles (KIRKPATRICK and PUGH, 1984), in the Bay of Biscay and off the Azores (LELOUP, 1955), and in the Sargasso Sea (PURCELL, 1981b). In the Pacific taken off Valparaiso, Chile (MOSER, 1925) and California (PURCELL, 1981b). In the Indian Ocean taken off southwestern India (DANIEL, 1974). Also taken in the Mediterranean (BIGELOW and SEARS, 1937). The depth distribution appears to be more epiplanktonic than that of *R. plicata*.

Praya reticulata Bigelow, 1911
(Fig. 16)

References: BIGELOW 1911b, p. 206-207; pl. 1 figs. 7-8, pl. 3 figs. 1-7, as *Nectodroma reticulata* sp. nov.. TOTTON 1965, p. 123-124, pl. XXIII figs. 1-4. ALVARIÑO 1971, p. 216. PUGH 1974, p. 38. PUGH and HARBISON 1987, p. 87; tab. 1. PAGÈS and GILI 1991b, tab. 1 as *Praya dubia*

Material examined: SNEC II: E-73 P-2 (12 bracts).

Description: Only bracts collected. Kidney-shaped, 16.0 mm long. A thin groove along the entire dorsal margin. Dorsal bracteal canal arising from a short spur on the left hydroecial canal and curving along the outer margin of the bract, with occasional short, blind branches. Right hydroecial canal longer than the left, with a short, blind canal at the origin, curving before it reaches the apical margin; may have

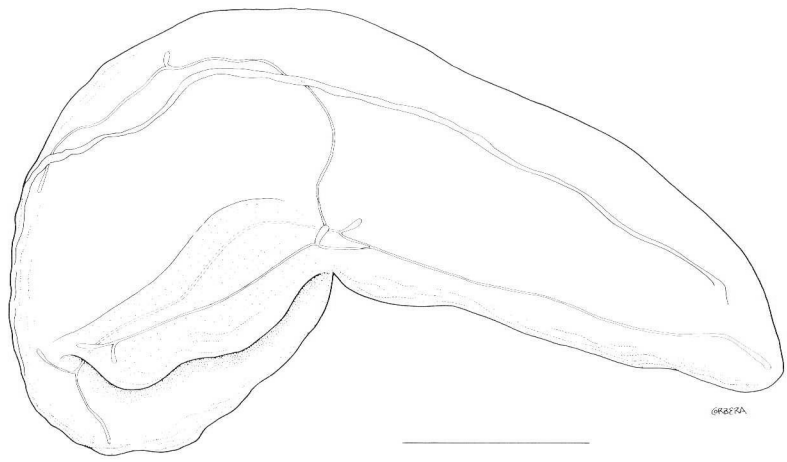

FIG. 16. — Bract of *Praya reticulata* (lateral view). Scale bar = 5 mm.

blind ending branches. Ventral canal longest, may also have short, blind ending branches.

Distribution: Benguela Current: first record in the region. Collected at a depth between 200 and 100 m at an oceanic station off the Cunene River. World-wide distribution: uncommon species, to date collected mainly in the North Pacific and the China Sea and off California, Panama, Colombia, Peru, and the Galapagos Islands (ALVARIÑO, 1971). In the Atlantic collected by horizontal trawls at 205, 600, and 900 m off the Canary Islands (PUGH, 1974) and off Africa between the Equator and latitude 10° S.

Family HIPPOPODIIDAE Kölliker, 1853

Hippopodius hippopus (Forskål, 1776) (Fig. 17)

References: TOTTON 1932, p. 330-331; fig. 11. BIGELOW and SEARS 1937, p. 14-17; figs. 15-19. TOTTON 1954, p. 99-100. TOTTON 1965, p. 139-140; pl. XXVIII figs. 1-2, pl. XXIX figs. 1-3. CARRÉ 1968, p. 417-420; fig. 1; pl. 1. ALVARIÑO 1971, p. 199-204; fig. 44. PUGH 1974, p.43-45; fig. 2. KIRKPATRICK and PUGH 1984, p. 72-73; fig. 25. GILI 1986, p. 275-276; figs. 4.49 A, 4.65 o-p.

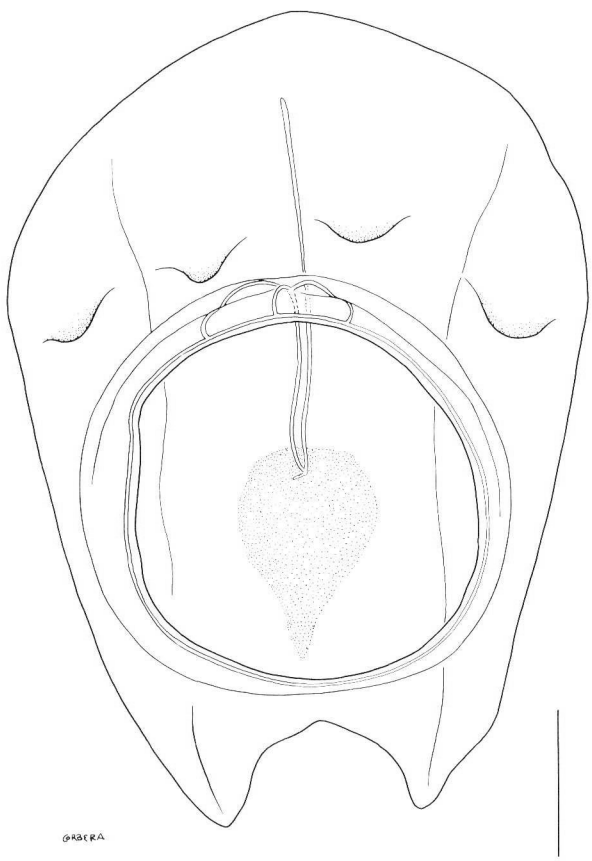

FIG. 17. — Nectophore of *Hippopodius hippopus* (dorsal view). Scale bar = 2 mm.

Material examined: BENGUELA I: E-44 P-46 (1). SWAPELS March 1982: 10-04 (1), 22-10 (1). SNEC II: E-37 P-5 (1), E-51 P-2 (1), E-56 P-6 (1), E-57 P-4 (1), E-57 P-5 (1), E-57 P-6 (1), E-58 P-5 (1), E-69 P-3 (1), E-71 P-2 (1), E-78 P-3 (1). WCHB July 1983: A0666 B05 (1), A0669 B06 (1). CELP August 1977: 32-10 (1), 32-12 (1).

Description: Colonies formed by up to 16 nectophores arranged in two series opposite each other joined by a thin central stem. Upper nectophores younger, lower nectophores dropped from the colony as new nectophores form at the apex. Definitive nectophore hard and tough, horseshoe-shaped, up to 20.6 mm high and 16.0 mm wide. It may become opaque during fixation. Four rounded dorsal protuberances variable in size forming an arc above the ostium; the two central protuberances smaller. A *rete mirabile* located on the ventral radial canal, larger in juveniles.

Distribution: Benguela Current: present in the oceanic zone throughout the region; broad depth distribution. World-wide distribution: widely distributed in tropical and subtropical regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971; PUGH, 1974).

Vogtia spinosa Keferstein and Ehlers, 1861 (Fig. 18)

References: BIGELOW 1911b, p. 210-213; pl. 15 figs. 5-13. BIGELOW and SEARS 1937, p. 82-83. TOTTON 1965, p. 140-142; fig. 3. PUGH 1974, p.46; fig. 4. KIRKPATRICK and PUGH 1984, p. 74-75; fig. 26. PUGH 1984, p. 479-480, fig. 11. ALVARIÑO *et al.*, 1990, p. 21; fig. 30, map A79.

Material examined: BENGUELA I: E-53 P-64 (1). SNEC II: E-52 P-2 (1).

Description: Colony composed of two parallel rows of nectophores attached obliquely to a central stem. Up to 19 nectophores, the older ones at the base of the colony. Nectophores pentagonal in shape, up to 16.0 mm high by 21.2 mm wide. Spine-like gelatinous tubercles closely spaced on the upper surface of the nectophore. Ventral surface a deep concavity devoid of spines. Nectosac large, flattened, with four radial canals and a *rete mirabile* on the ventral surface.

Distribution: Benguela Current: first record in the region. Occasionally present, caught in the 200 to 0-m depth interval offshore off Möwe Point and in the 200 to 120-m interval between Cape Frio and the Cunene River. World-wide distribution: infrequent but inhabiting tropical and subtropical regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971). Southernmost records from the Tasman

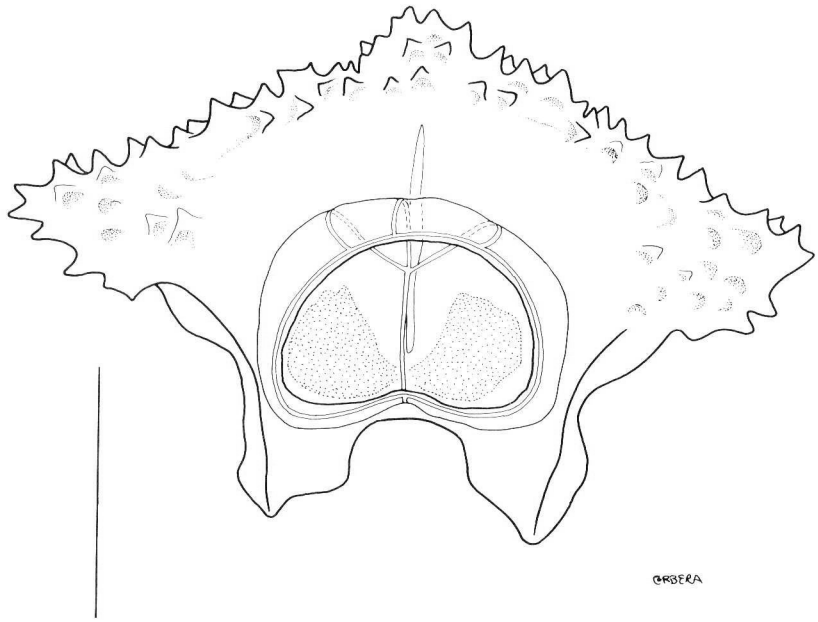

FIG. 18. — Adult nectophore (dorsal view) of *Vogtia spinosa*. Scale bar = 5 mm.

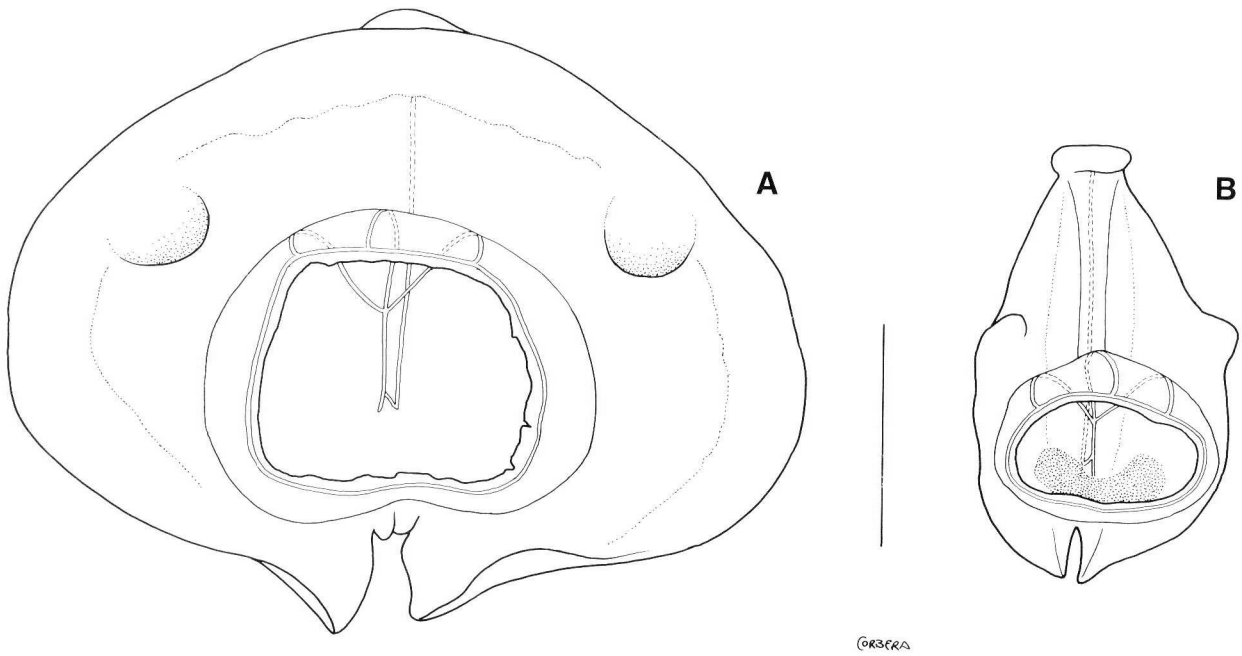

FIG. 19. — *Vogtia glabra;* A adult nectophore (dorsal view), B juvenile nectophore (dorsal view). Scale bar = 5 mm.

Sea (45° S, 160° E) and the vicinity of the South Orkney Islands (50° S, 45° W) (ALVARIÑO *et al.*, 1990). Inhabiting the mesopelagic zone and the deep epipelagic zone (PUGH, 1974, 1984).

Vogtia glabra Bigelow, 1918
(Fig. 19A-B)

References: BIGELOW 1918, p. 407-408; pl. 4 figs. 2-7. BIGELOW and SEARS 1937, p. 17-18; fig. 20. ALVARIÑO 1971, p. 205-207. PUGH 1974, p. 45-46; fig.3. KIRKPATRICK and PUGH 1984, p. 76-77; fig. 29. PUGH 1984, p. 480-481; fig. 12a. GILI 1986, p. 276-277; fig. 4.47 D. ALVARIÑO *et al.*, 1990, p. 19; fig. 26; map. A68.

Material examined: BENGUELA III: E-61 P-3 (1). SNEC II: E-47 P-2 (1), E-51 P-2 (1), E-53 P-2 (1), E-56 P-2 (1), E-56 P-4 (1), E-57 P-2 (1), E-58 P-2 (1), E-66 P-2 (1), E-68 P-2 (1), E-72 P-2 (1), E-75 P-2 (1), E-76 P-2 (1), E-78 P-2 (1), E-78 P-3 (1), E-80 P-2 (1), E-81 P-2 (1), E-83 P-2 (1), E-83 P-3 (1), E-85 P-2 (1), E-86 P-2 (1), E-88 P-2 (2), E-90 P-2 (1), E-91 P-2 (1), E-91 P-3 (1), E-92 P-2 (1).

Description: Colony organized like the rest of the hippopodiids. Youngest nectophores elongate, up to 7.3 mm high by 4.6 mm wide, with a triangular apical process consisting of three rounded protuberances, a larger central protuberance and two smaller lateral protuberances, halfway along the height of the nectophore. *Rete mirabile* present. Deep hydroecial groove from the base of the apex on the ventral surface of the nectophore, protected by lateral wings. Adult nectophore more rounded, up to 10.6 mm high by 13.8 mm wide, horseshoe-shaped. Characterized by two rounded dorso-lateral processes and an additional apical process. Hydroecial groove shallower; hydroecium large and flattened.

Distribution: Benguela Current: first record in the region. All colonies collected in the northern Benguela, nearly all at an oceanic station off the Cunene River. Most colonies collected at between 200 and 100 m in depth over a 48 hours sampling period (PAGÈS and GILI, 1991b). Mesopelagic depth distribution. World-wide distribution: widely distributed in the Atlantic Ocean from off northwestern Ireland (57°41' N, 11°48' W) (LELOUP, 1955) to Tristan da Cunha (37° S, 13° W). ALVARIÑO *et al.* (1990) cited it in the mesopelagic zone near the Antarctic Peninsula (60° S, 55° W). Sporadically present in the Pacific and Indian oceans and the Mediterranean (ALVARIÑO, 1971). Broad depth distribution from 40 to 950 m, with maximum concentrations in the 400 to 600 m depth interval (PUGH, 1974, 1984).

Family DIPHYIDAE Quoy and Gaimard, 1827

Sulculeolaria biloba (Sars, 1846)
(Fig. 20A-B)

References: MOSER 1925, p. 145-149; pl. III fig. 1-2; as *Galeolaria australis*. TOTTON 1954, p. 104-107; figs. 49-51. TOTTON 1965, p. 145-148; figs. 83-86. ALVARIÑO 1971, p. 185-188; fig. 41. CARRÉ 1979, p. 41-43; tab. I-III. ALVARIÑO 1981, p. 407; fig. 174-31. KIRKPATRICK and PUGH 1984, p. 82-83; fig. 31. GILI 1986, p. 264; fig. 4.51 D.

Material examined: SNEC II: E-36 P-2 (1).

Description: Polygastric stage: Anterior nectophore conical, without ridges, apex rounded. Firm consistency. Up to 20.0 mm high. Ostial margin devoid of teeth. Radial canals with transverse commis-

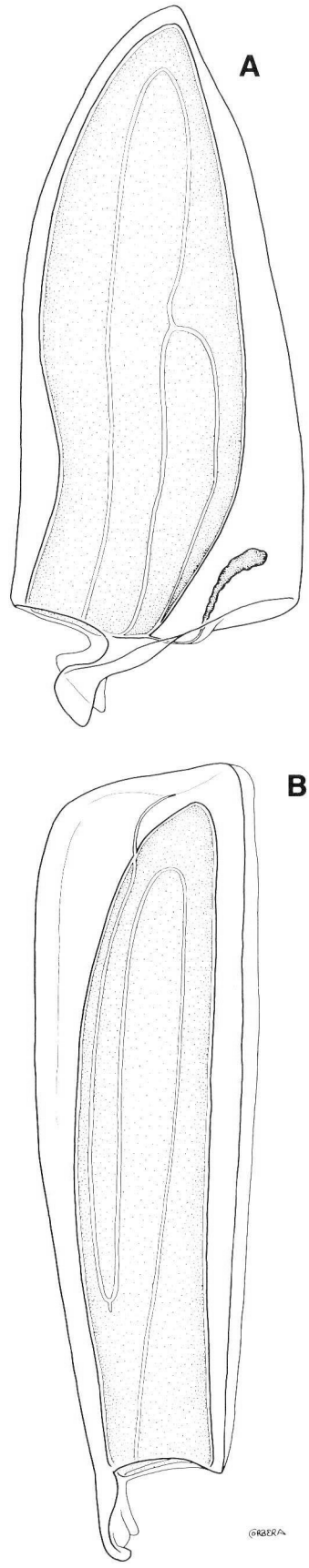

FIG. 20. — Nectophores of *Sulculeolaria biloba*: A anterior, B posterior (lateral views). Scale bar = 5 mm.

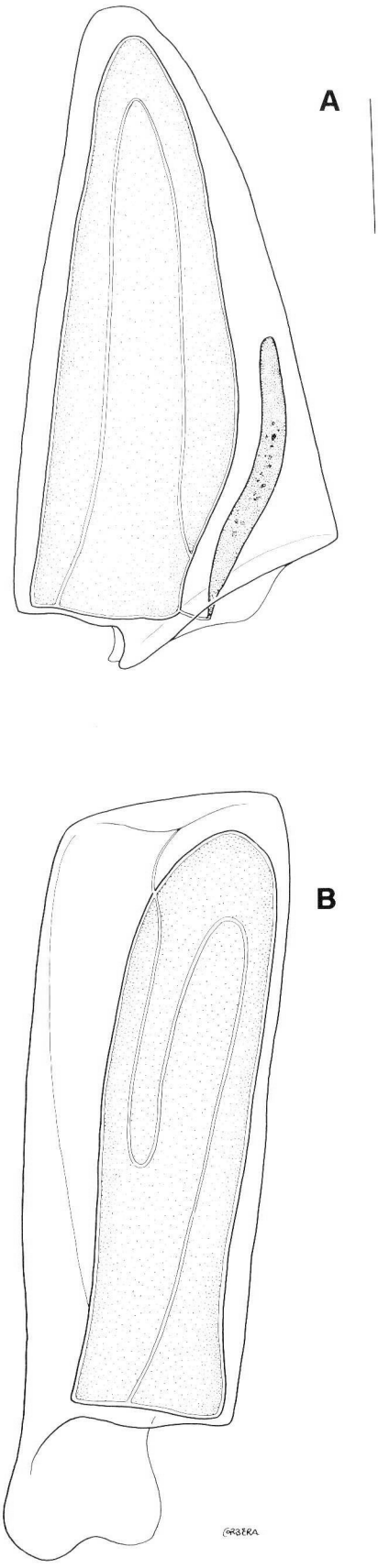

FIG. 21. — Nectophores of *Sulculeolaria chuni*; A anterior, B posterior (lateral views). Scale bar = 2 mm.

sures connected to the ventral canal nearly at the level of the ostium. Somatocyst ovoid or filiform, sloping ventrally, one-sixth of nectophore height. Basal lamella divided into two large, rounded lappets, without protuberances. Posterior nectophore rectangular, up to 24.6 mm in height. No ostial teeth. Basal lamella consisting of two lateral lappets and a central plate, with furrows reaching to half of lamella height; protuberances absent.

Distribution: Benguela Current: first record in the region; MOSER (1925) cited two colonies captured at 25° S, but far offshore, possibly outside the influence of the Benguela System. The colony examined was caught offshore at a depth between 200 and 100 m off Palgrave Point in the northern Benguela. World-wide distribution: inhabiting of warm, surface waters in the three great oceans (ALVARIÑO, 1971), and in the Mediterranean (GILI, 1986). Seldom present in temperate regions. The numerous synonyms used for this species in the past make it difficult to confirm some of the early records, as discussed previously by TOTTON (1954).

Sulculeolaria chuni (Lens and Van Riemsdijk, 1908) (Fig. 21A-B)

References: MOSER 1925, p. 150-152; pl. III figs. 3-6; as *Galeolaria chuni*. TOTTON 1932, p. 342-345; fig. 20; as *Galetta chuni*. CERVIGÓN 1958, p. 34-35; figs. 19-20; tab. IV. TOTTON 1965, p. 150-151; fig. 90. ALVARIÑO 1971, p. 190-191. PALMA 1973, p. 40-41; pl. XIV figs. 1-3, pl. XV figs. 1-3. CARRÉ 1979, p. 20, 32-36, 39-40, 45; fig. 2; pl. II figs. 1-5, pl. III figs. 1-12; tab. I-III. IANORA and SCOTTO DI CARLO 1981, p. 57, 59; tab. 1. GILI 1986, p. 284-285; figs. 4.51 A, 4.63 h.

Material examined: SNEC II: E-47 P-6 (1), E-71 P-6 (1), E-81 P-6 (1). WCHB July 1983: A0683 B10 (1). WCHB July 1984: A1664 B34 (1). CELP January 1978: 08-12 (1), 32-06 (1), 32-08 (2), 36-10 (2), 40-10 (2), 48-10 (11), 48-12 (3), 68-08 (1), 76-06 (1), 76-08 (1), 76-08 (1), 76-10 (1), 84-06 (1).

Description: Polygastric stage: Anterior nectophore conical, without ridges, apex rounded, consistency more delicate than in other species in the genus. Up to 8.0 mm high. Ostial margin without teeth. Radial canals without transverse commissures in the first anterior nectophore (NA1), but commissures present in the replacement nectophore (NA2). Somatocyst quite straight, filiform or fusiform, up to two-fifths to three-fifths of nectophore height. Basal lamella short, divided into two lappets, without protuberances. Posterior nectophore cylindrical, up to 8.6 mm in height. No teeth on the ostial margin. Basal lamella divided into two rounded lappets separated by a shallow medial notch. Secondary posterior nectophore (NP2) similar. Eudoxid not collected in the region.

Distribution: Benguela Current: first record in the region. Present offshore in the surface layer, also approaching the inshore strip. More abundant offshore in the southern Benguela, in intrusions by Agulhas water; less common in the northern Benguela, where its presence is associated with penetrations by warmer water from Angola. World-wide distribution: common species in equatorial and tropical regions in the three great oceans (ALVARIÑO, 1971) and in the Mediterranean (GILI, 1986).

Sulculeolaria monoica (Chun, 1888)
(Fig. 22A-B)

References: Bigelow 1911b, p. 239-240; pl. 6 figs. 4-9, as *Galeolaria monoica*. TOTTON 1965, p. 152; pl. XXXI figs. 5, 7, 10, 12. ALVARIÑO 1971, p. 192-193; fig. 42. CARRÉ 1979, tab. I-III. CASANOVA 1980, p. 19; fig. 2. ALVARIÑO 1981, p. 408; fig. 174-33.

Material examined: BENGUELA VIII: Patín 4 Nivel 1 (1). SWAPELS March 1982: 16-10 (2). SNEC II: E-59 P-6 (1), E-61 P-5 (1), E-72 P-6 (1), E-85 P-4 (1), E-90 P-6 (1). CELP January 1978: 48-10 (1), 64-12 (1).

Description: Polygastric stage: Anterior nectophore conical, without ridges, apex rounded, firm consistency, up to 16.6 mm in height. Ostial margin bearing five teeth, one dorsal, two dorso-lateral, and two lateral. Radial canals straight or slightly sinuate, with transverse commissures. Both transverse commissures and lateral radial canals connected to the ventral canal above the level of the ostium. Somatocyst small, globe-shaped, approximately one-twentieth of nectophore height. Basal lamella divided into two lappets, each with a small ventral tooth on the upper third. Posterior nectophore cylindrical, up to 13.3 mm high. Ostial margin bearing five teeth, one dorsal, two dorso-lateral, and two lateral. Basal lamella divided into two lappets with a deep furrow in between. Each lappet bearing a dorsall tooth on the upper third. Eudoxid not collected in the region.

Distribution: Benguela Current: first record in the region. Species uncommon, present mainly offshore in the surface layers at the northernmost and southernmost edges of the system. World-wide distribution: epiplanktonic species, uncommon but distributed in tropical regions in the three great oceans (ALVARIÑO, 1971).

Sulculeolaria quadrivalvis Blainville, 1834
(Fig. 23A-B)

References: BIGELOW 1918, p. 417-418; pl. 8 figs. 1-2; as *Galeolaria quadridentata*. TOTTON 1932, p. 340-342; fig. 19. BIGELOW and SEARS, 1937, p. 29-33. TOTTON 1954, p. 109-110. CERVIGÓN 1958, p. 43-44; figs. 38-39. PATRITI 1964, p. 43-44; figs. 38-39. TOTTON

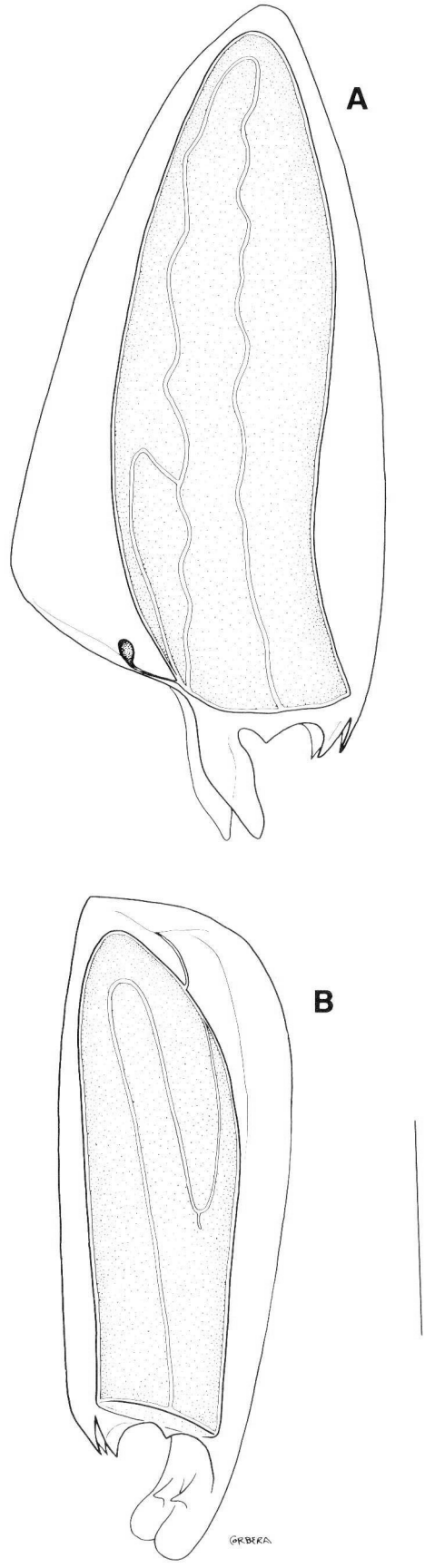

FIG. 22. — Nectophores of *Sulculeolaria monoica*; A anterior, B posterior (lateral views). Scale bar = 5 mm.

1965, p. 143-145; fig. 82; pl. XXIX fig. 4, pl. XXX figs. 1-4, pl. XXXI figs. 1-3. ALVARIÑO 1971, p. 194-196; fig. 43. PALMA 1973, p. 38-40; pl. XII figs. 1-3, pl. XIII figs. 1-3. CARRÉ 1979, p. 28-30, 38-39, 45-46; fig. 1; tabs I-III; pl. I figs. 1-6. ALVARIÑO 1981, p. 408; fig. 174-34. KIRKPATRICK and PUGH 1984, p. 80-81; fig. 30. GILI 1986, p. 283; figs. 4.51 E, 4.63 g.

Material examined: SWAPELS February 1982: 04-04 (2), 04-12 (12), 10-10 (14), 10-12 (1), 16-08 (1), 16-10 (1), 40-14 (1). SWAPELS March 1982: 04-08 (1), 10-03 (2), 10-04 (2), 16-10 (1), 16-14 (1), 22-14 (1). SNEC II: E-37 P-6 (1), E-49 P-6 (2), E-51 P-6 (1), E-68 P-5 (1), E-83 P-4 (1), E-90 P-6 (2), E-91 P-6 (1). WCHB July 1984: A1552 B06 (3), A1556 B07 (1). CELP August 1977: 56-12 (1). CELP August 1978: 48-12 (1), 56-08 (1), 60-12 (1), 72-08 (1), 76-10 (1), 84-12 (1).

Description: Polygastric stage: Anterior nectophore conical, apex rounded, without ridges, firm consistency. Large, up to 17.5 mm in height. Ostial margin bearing two lateral and two dorsal teeth, well-developed, decreasing in size in the replacement anterior nectophores. Radial canals with transverse commissures linking the canals to the ventral canal at the level of the lower third of the nectosac. Transverse commissure tending to be smaller in replacement nectophores and sometimes not reaching the dorsal canal in the second following nectophore (NA3). Somatocyst elongate, sinuous, ventrally slanted, one-fifth to two-fifths of nectophore height in size, tending to be straighter in following nectophores. Two prominent, rounded basal lappets, each with a small protuberance on the dorsal margin, decreasing in size and disappearing in replacement nectophores. Posterior nectophore up to 26.6 mm high. Nectosac with an oblique annular constriction affecting the upper dorsal and lower ventral halves. Ostial margin with two dorsal and two lateral teeth. Basal lamella divided into two large, rounded lobes with a central furrow occupying three-fourths of basal lamella length. Each lappet bearing an acute protuberance on the upper dorsal portion. Eudoxid not collected in the region.

Distribution: Benguela Current: first record in the region. Uncommon, present mainly offshore throughout the system. More common towards the northern and southern edges of the system, because colonies are carried into the system by the Angola and Agulhas currents; may even be found inshore. Epiplanktonic species dwelling mainly in the surface layers. World-wide distribution: widely distributed in tropical and subtropical regions in the three great oceans and in the Mediterranean (ALVARIÑO, 1971).

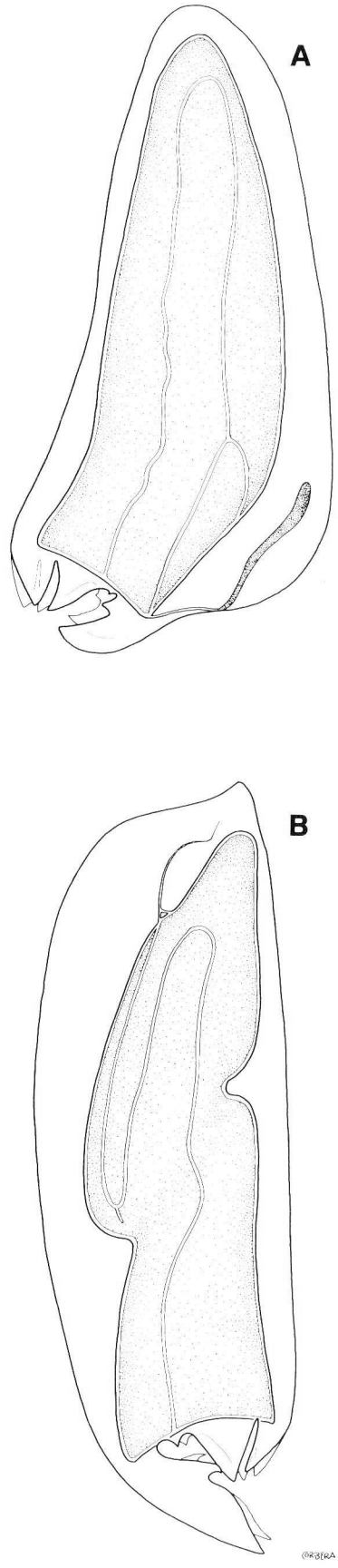

FIG. 23. — Nectophores of *Sulculeolaria quadrivalvis*; A anterior, B posterior (lateral views). Scale bar = 5 mm.

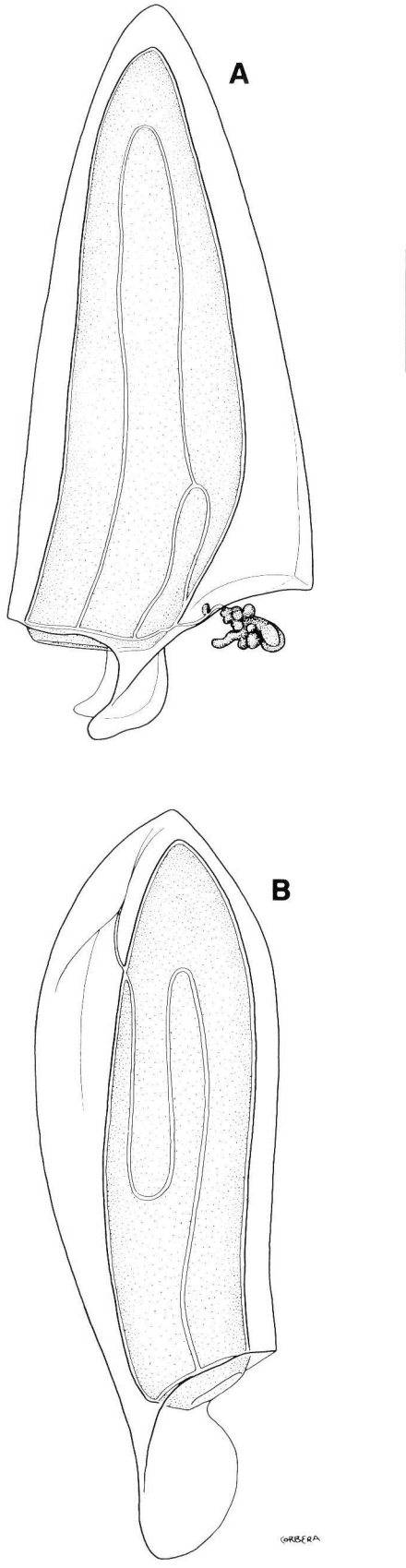

FIG. 24. — Nectophores of *Sulculeolaria turgida*; A anterior, B posterior (lateral views). Scale bar = 2 mm.

Sulculeolaria turgida (Gegenbaur, 1853) (Fig. 24A-B)

References: TOTTON 1932, p. 345. TOTTON 1954 p. 107-108; fig. 52. TOTTON 1965, p. 148-149; figs. 87-88; pl. XXXI figs. 8-9. CARRÉ 1979, p. 36-38, 40-43; fig. 3; pl. IV figs. 1-5; tabs. I-III. KIRKPATRICK and PUGH 1984, p. 82-83; fig. 32.

Material examined: SWAPELS February 1982: 10-12 (1). SWAPELS March 1982: 10-08 (1), 16-06 (1). SNEC II: E-85 P-4 (1).

Description: Polygastric stage: Anterior nectophore conical, apex rounded, firm consistency, reaching 9.2 mm in height. Ostial margin devoid of teeth. Somatocyst small, one-twentieth of nectophore height. Radial canals without transverse commissures in the first nectophore (NA1), but transverse commissures are present in the replacement nectophore (NA2), attached to the ventral canal above the level of the pedicular canal. Basal lamella divided into two lappets by a deep furrow reaching to the ostial margin, shorter in NA2. Tooth-like protuberances absent. Posterior nectophore cylindrical, tapering towards the ostial margin. Up to 10.0 mm high. No teeth on the ostial margin. Basal lamella entire, large, rounded, devoid of protuberances. Eudoxid not collected in the region.

Distribution: Benguela Current: reported by Totton (1954) west of Cape Town (33°20'S, 15°18'E — 33°46'S, 15°08'E) and west of the Cape of Good Hope (34°05'S, 16°00'E). The new records show the species to be uncommon, present in the oceanic zone off the Cunene River mouth, suggesting that the presence of this species was due to an intrusion of warm Angolan water at the northern edge of the Benguela System. World-wide distribution: uncommon but distributed in temperate regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971). Epiplanktonic distribution.

Diphyes bojani (Eschscholtz, 1829) (Fig. 25A-B)

References: BIGELOW 1911b, p. 251-254; pl. 7 figs. 2-3, pl. 8 fig. 6, pl. 9 figs. 1-2, pl. 10 figs. 2-3, pl. 11 fig. 5, pl. 12 fig. 1. BIGELOW 1918, p. 424-425; pl. 8 fig. 3. TOTTON 1932, p. 349-350; fig. 22. TOTTON 1965, p. 155-156; fig. 92. ALVARIÑO 1971, p. 53-58, fig. 6. NETO and LOURENÇO 1973, p. 30-32; figs. 27-32. ALVARIÑO 1981, p. 415-416; fig. 174-54.

Material examined: SNEC II: E-68 P-6 (1), E-76 P-6 (1), E-78 P-6 (1), E-80 P-6 (3), E-90 P-6 (1), E-91 P-6 (1). WCHB July 1983: A0649 B01 (3), A0651 B03 (4), A0677 B08 (1), A0684 B11 (3), A0707 B19 (1). WCHB July 1984: A1527 B01 (11), A1659 B02 (6), A1534 B03 (10), A1544 B04 (1), A1522 B06 (6), A1558 B08 (4), A1567 B10 (5), A1572 B11 (7), A1580 B13 (5), A1588 B15 (1), A1593 B16 (2), A1602 B18 (4), A1661 B33 (1). CELP August 1977: 36-10 (1), 44-10 (1), 56-08 (3), 64-02 (1), 64-04 (1), 64-08 (2), 64-10 (1), 72-10 (1), 72-12 (2). CELP January 1978: 28-12 (2), 32-

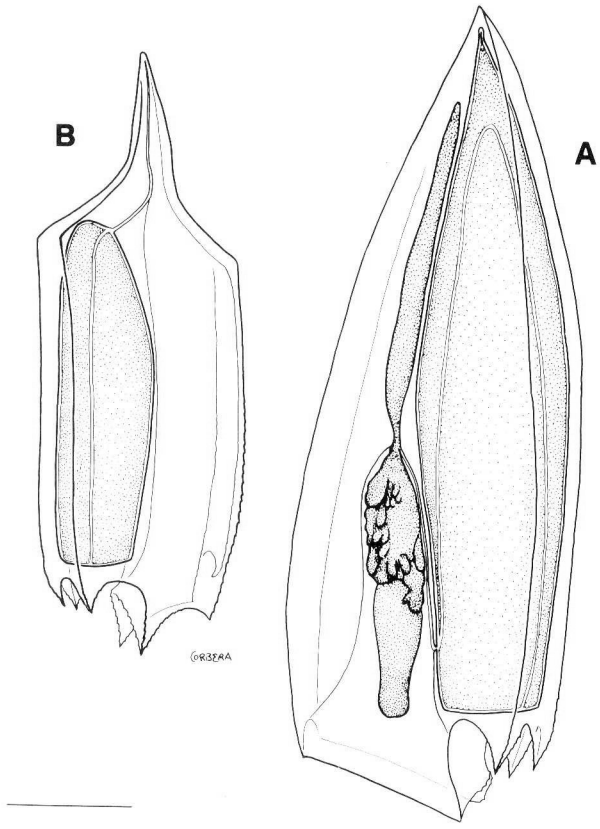

FIG. 25. — Nectophores of *Diphyes bojani*: A anterior, B posterior (lateral views). Scale bar = 2 mm.

08 (2), 36-10 (1), 40-10 (1), 40-12 (1), 44-08 (4), 44-10 (1), 44-12 (1), 48-06 (3), 48-12 (3), 56-06 (1), 56-10 (1), 60-08 (1), 60-10 (1), 60-12 (2), 64-06 (1), 68-06 (8), 68-08 (3), 68-10 (4), 72-08 (3), 76-12 (1).

Description: Polygastric stage: Anterior nectophore bearing five long, variably serrated ridges converging at the apex to form a pyramid. Elongate nectophore pentagonal in cross-section, 10.0 mm in height by 3.0 mm in dorso-ventral width. Three basal teeth all of the same size. Nectosac cylindrical, upper third tapering, reaching nearly to the apex of the nectophore. Hydroecium deep, narrower than in *D. dispar*, nearly one-half of nectosac height. Somatocyst fusiform, tip reaching nearly to the apex of the nectosac. Basal lamella entire, bearing a thin median crest. Posterior nectophore bearing five serrated ridges, upper third tapering, forming a prominent apophysis. Up to 6.6 mm in height by 2.2 mm in dorso-ventral width. Eudoxid: Bract differing from that of all other diphyids, in that it covers the upper ventral half of the gonophore.

Distribution: Benguela Current: more abundant in the southern Benguela, present offshore all along the continental shelf of South Africa. In the northern Benguela collected only at one oceanic station off the Cunene River. Dwelling in the surface layers. Worldwide distribution: widely distributed in tropical and subtropical regions in the three great oceans and in the Mediterranean (ALVARIÑO, 1971).

Diphyes chamissonis Huxley, 1859
(Fig. 26)

References: LENS and VAN RIEMSDIJK 1908, p. 53-54; pl. VIII figs. 67-68, as *Diphyopsis weberi*. MOSER 1925, p. 216-220; pl. VIII, pl. XII fig. 2. TOTTON 1932, p. 351-354; figs. 23-24. TOTTON 1965, p. 156-157; figs. 93-94. ALVARIÑO 1971, p. 59-60. DANIEL 1974, p. 125-126; fig. 10 G-I.

Material examined: CELP January 1978: 68-08 (1).

Description: Polygastric stage — posterior nectophore non-existent: Nectophore tough, with five serrated ridges converging at the apex. Height 5.0 mm, dorso-ventral length 1.6 mm. Somatocyst short, fusiform. Nectosac cylindrical. Hydroecium deep, reaching to half of nectosac height. Hydroecial opening large, quadrangular. Basal lamella entire, margins of both the dorsal and the ventral walls concave. Three ostial teeth all the same size. Eudoxid not collected in the region.

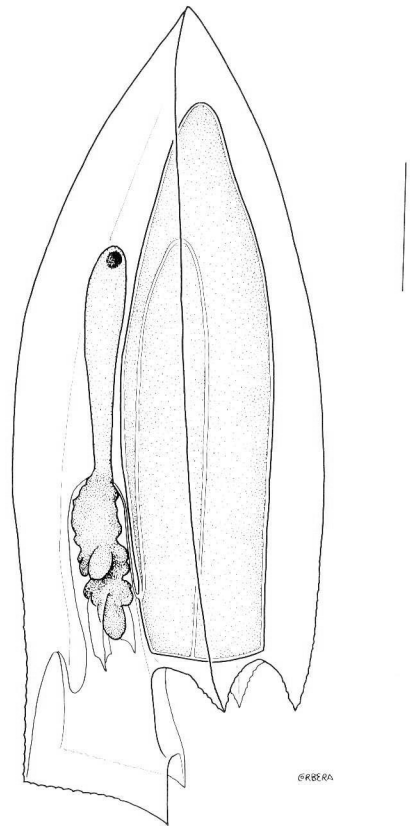

FIG. 26. — Nectophore of *Diphyes chamissonis* (lateral view). Scale bar = 1 mm.

Distribution: Benguela Current: second record of this species in the Atlantic, counting the unconfirmed citation by FEWKES (1881) off Newport, RI, U.S.A. Uncommon, sporadic, sole colony collected offshore off Cape Agulhas in a filament of warm Agulhas water that had penetrated into the southern Benguela, indicating that the colony examined was Indian Ocean in origin. World-wide distribution: Indo-Pacific species widely distributed in the surface layer in both oceans (ALVARIÑO, 1971).

Diphyes dispar Chamisso and Eysenhardt, 1821 (Fig. 27A-B)

References: LENS and VAN RIEMSDIJK 1908, p. 42; pl. VI fig. 51-52. MOSER 1925, p. 170-207; pl. V figs. 1-9, pl. VI figs. 1-9, pl. VII figs. 1-5, pl. VIII figs. 1-2. LELOUP and HENTSCHEL 1935. TOTTON 1965, p. 153-155; fig. 91; pl. XXXIII, fig. 3. ALVARIÑO 1971, p. 61-66; fig. 7. NETO and LOURENÇO 1973, p. 28-29; figs. 23-26. VAN SOEST 1973, p. 125; fig. F. PUGH 1974, p. 50. ALVARIÑO 1981, p. 416; fig. 174-55.

Material examined: SWAPELS February 1982: 04-12 (5), 10-8 (1), 10-10 (3), 10-12 (1). SNEC II: E-4 P-6 (1), E-5 P-5 (1), E-44 P-6 (1), E-47 P-6 (1), E-52 P-6 (1), E-61 P-6 (1), E-71 P-6 (3), E-72 P-6 (61), E-75 P-6 (5), E-76 P-6 (43), E-77 P-6 (51), E-78 P-6 (2), E-80 P-6 (8), E-81 P-6 (115), E-85 P-6 (81), E-86 P-6 (1), E-88 P-6 (2), E-90 P-6 (93), E-91 P-6 (2), E-92 P-6 (32). WCHB July 1983: A0649 B01 (4), A0651 B03 (9), A0669 B06 (4), A0689 B12 (1), A0699 B16 (2), A0732 B25 (2). WCHB July 1984: A1527 B01 (2), A1529 B02 (1), A1534 B03 (4), A1552 B06 (1), A1556 B07 (2), A1572 B11 (14), A1580 B13 (1), A1488 B15 (1). CELP January 1978: 56-10 (3), 56-08 (1), 60-10 (2), 60-12 (3), 68-10 (1), 76-10 (1), 84-06 (1).

Description: Polygastric stage: Anterior nectophore large, up to 36.0 mm in height by 18.0 mm in dorso-ventral width. Five ridges: dorsal ridge slightly dentate, dorso-basal tooth larger than the two lateral teeth. Nectosac cylindrical, the upper portion tapering to a filiform apex. Hydroecial opening large, square, very deep, reaching to half of nectophore height or more. Somatocyst cylindrical, of variable length, but not exceeding the filiform apex of the nectosac, curving dorsally towards the nectosac until it touches. Basal lamella entire, margin concave. Posterior nectophore bearing five ridges, height 27.0 mm, dorsoventral width 13.0 mm. Prominent apical apophysis fitting into the hydroecium of the anterior nectophore. Hydroecial groove large, bounded ventrally by a flat hook-shaped plate directed towards one of the lateral walls. Tooth at basal end of dorsal ridge dentiform, slightly larger than the lateral teeth. Eudoxid: Bract conical, hood-shaped, with a large, rounded base. Hydroecium shallow, phyllocyst cylindrical, tapering near the tip, not reaching the apex of the bract. Gonophore with four denticulate ridges. Bases of the two dorsal ridges sharp, each of the two ventral ridges terminating in a small tooth and joined by an entire basal lamella.

Distribution: Benguela Current: to date, the location closest to the Benguela Current where this species had been collected was 38°35' S, 17°46' E, southwest of Cape Agulhas (LELOUP and HENTSCHEL, 1935). The new records indicate that its distribution

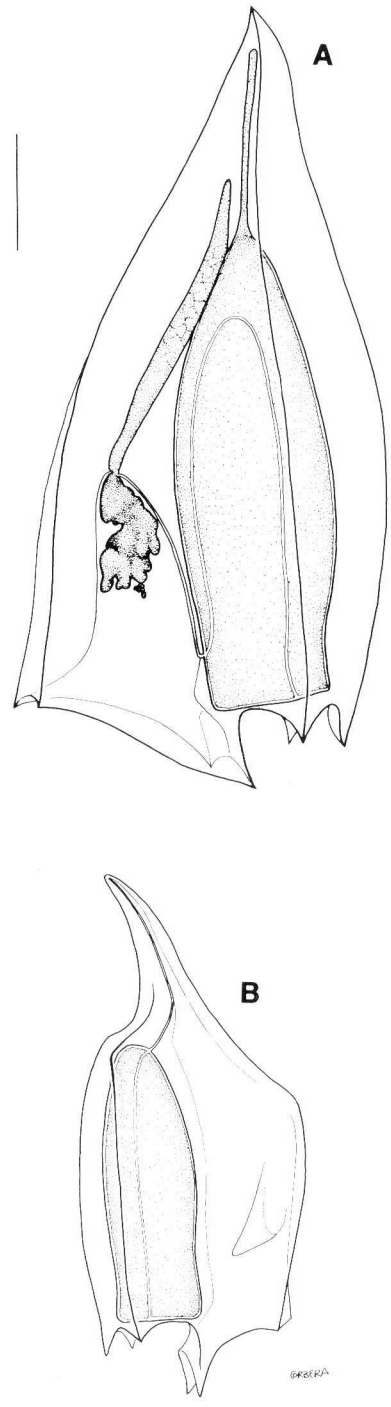

FIG. 27. — Nectophores of *Diphyes dispar*; A anterior, B posterior (lateral views). Scale bar = 2 mm.

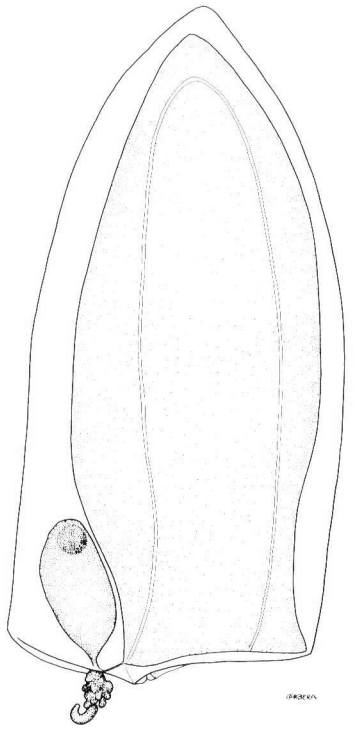

FIG. 28. — Anterior nectophore of *Lensia campanella* (lateral view). Scale bar = 2 mm.

range extends throughout the surface layers in the oceanic zone in the Benguela System. World-wide distribution: widely distributed in temperate and warm regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971). Species apparently epipelagic, occasionally present at greater depths (Pugh, 1974).

Lensia campanella (Moser, 1925) (Fig. 28)

References: MOSER 1925, p. 152.154; lám IV figs. 1-2.; as *Galeolaria campanella* . TOTTON 1932, p. 368-370; figs. 35-36. LELOUP 1934, p. 40-41. TOTTON 1965, p. 165; fig. 100; pl. XXXI fig. 4. CARRÉ 1968a, p. 438-444; figs. 1-3; pl. I figs. 1-7. ALVARIÑO 1971, p. 91-92, fig. 12. PUGH 1974, p. 55.

Material examined: SWAPELS December 1981: 82-10 (1), 82-14 (1), 94-14 (1). SWAPELS February 1982: 82-14 (1). SNEC II: E-5 P-5 (1), E-6 P-3 (1), E-6 P-6 (1), E-36 P-4 (1), E-36 P-5 (1). WCHB July 1983: A0649 BO1 (1). WCHB July 1984: A1552 B06 (2), A1593 B16 (1). CELP August 1977: 08-08 (1), 32-12 (1), 48-08 (1), 52-10 (1), 56-04 (1), 56-10 (1), 64-10 (1), 64-12 (1), 68-04 (1). CELP January 1978: 36-08 (4).

Description: Polygastric stage: Anterior nectophore up to 6.3 mm in height by 3.0 mm in dorsoventral width, laterally compressed. Often twisted due to preservation. Walls smooth, rounded, bearing five very fine, barely discernible ridges, one dorsal, two lateral, and two ventral. Basal lamella slanted upwards towards the ventral surface. Hydroecium very flat. Basal lamella short, divided into two halves with rounded margins. Nectosac large, occupying nearly the entire nectophore. Somatocyst ovoid, slanted towards the basal lamella, with a short, thin peduncle. Pedicular canal mouving to the base of the somatocyst. Posterior nectophore and eudoxid not reported in the region.

Distribution: Benguela Current: oceanic species more common in the southern Benguela, mainly distributed between Cape Agulhas and Doring Bay, more frequent in winter. Rarely present in the northern Benguela, collected between Lüderitz and Palgrave Point. World-wide distribution: epipelagic species (PUGH, 1974) common in tropical regions in the three great oceans and in the Mediterranean (ALVARIÑO, 1971).

Lensia conoidea (Keferstein and Ehlers, 1860) (Fig. 29)

References: LELOUP 1934, p. 42-44, as *Lensia truncata*. BIGELOW and SEARS 1937, p. 48-55; figs. 25-35,47. LELOUP and HENTSCHEL 1935, p. 17; fig. 14; as *Lensia truncata*. TOTTON 1965, p. 162-164;

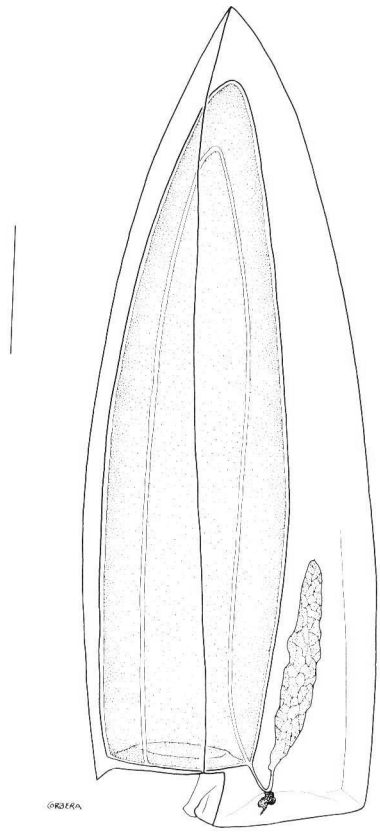

FIG. 29. — Anterior nectophore of *Lensia conoidea* (lateral view). Scale bar = 2 mm.

fig. 99a; pl. XXXI fig. 11. CARRÉ 1967a, p. 233-243, figs. 1-3, pl. I. ALVARIÑO 1971, p. 94-99, fig. 14. PALMA 1973, p. 44-45,; pl. XVIII. ALVARIÑO 1981, p. 410; fig. 174-39. PUGH 1984, p. 473-474; fig. 6 a-b. KIRKPATRICK and PUGH 1984, p. 88-89; fig. 34. GILI 1986, p. 290-291; figs. 4.52 C-D, 4.63 m,q, 4.64 f-g.

Material examined: SWAPELS December 1981: 04-04 (1), 10-03 (1), 10-14 (1). SWAPELS January 1982: 46-10 (1). SWAPELS March 1982: 88-14 (1). SNEC II: E-15 P-2 (1), E-26 P-3+4 (1), E-27 P-5 (1), E-42 P-2 (1), E-47 P-2 (1), E-57 P-2 (3), E-58 P-2 (2), E-61 P-3 (4), E-66 P-2 (14), E-66 P-3 (4), E-68 P-2 (11), E-72 P-2 (2), E-73 P-2 (1), E-73 P-3 (3), E-73 P-5 (1), E-75 P-2 (2), E-76 P-2 (2), E-76 P-3 (1), E-77 P-2 (4), E-77 P-3 (1), E-77 P-2 (5), E-77 P-3 (2), E-77 P-4 (1), E-80 P-2 (9), E-81 P-2 (5), E-81 P-3 (2), E-83 P-2 (1), E-83 P-3 (1), E-85 P-2 (9), E-85 P-4 (1), E-86 P-2 (4), E-88 P-2 (23), E-90 P-2 (16), E-90 P-3 (1), E-91 P-2 (1), E-92 P-2 (1). WCHB July 1983: A0707 B19 (1). CELP August 1977: 08-08 (4), 08-10 (4), 20-10 (4), 36-06 (1), 48-04 (5), 48-06 (3), 48-08 (1), 52-04 (2), 52-08 (2), 52-10 (2), 52-12 (3), 56-04 (17), 56-08 (4), 56-10 (7), 56-12 (6), 60-04 (26), 60-06 (14), 60-08 (8), 60-10 (1), 60-12 (1), 64-12 (1), 72-06 (1), 76-12 (2). CELP January 1978: 28-06 (7), 28-08 (18), 32-06 (45), 36-06 (2), 36-08 (12), 40-08 (4), 40-10 (7), 44-04 (3), 44-08 (1), 48-10 (10), 52-08 (9), 52-10 (6), 56-04 (3), 56-06 (3),56-08 (2), 60-10 (1), 64-02 (8), 64-04 (5), 64-12 (1), 68-02 (1), 68-04 (7), 80-10 (8), 80-12 (10), 80-08 (11). AFRICANA 045 Cruise: 13-2-3 (1).

Description: Polygastric stage: Anterior nectophore up to 8.5 mm high, consistency firm. Five ridges converging at an acute apex; basal end of dorsal ridge forming a tooth extending to below the level of the ostium. Basal lamella short, wide, cleft, extending underneath the nectosac. Somatocyst fusiform and vacuolate, reaching to the midpoint of the nectosac. In most specimens examined the somatocyst was shorter and more filiform than in specimens from other regions. Base of basal lamella slanted upwards towards the ventral surface. Posterior nectophore rectangular but bearing five ridges, up to 7.2 mm high. Mesogloea thick, occupying nearly the entire ventral half of the nectophore. Basal lamella asymmetrical, with a central notch; left lappet somewhat higher than right lappet. Eudoxid not collected in the region.

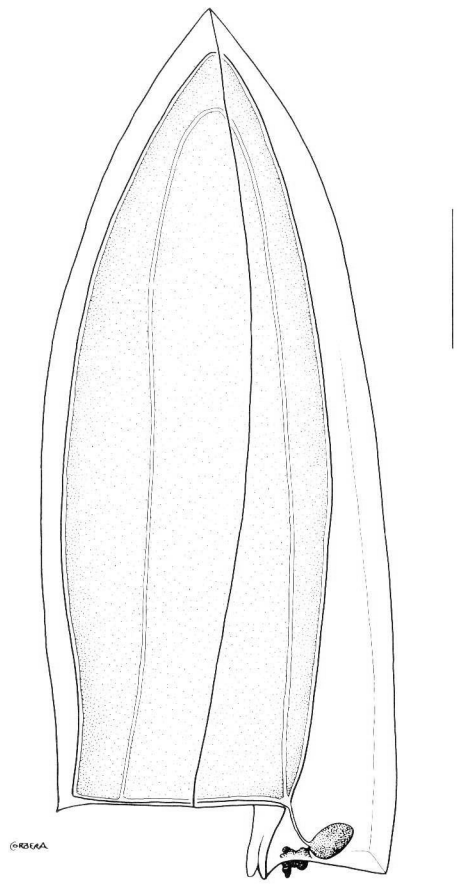

FIG. 30. — Anterior nectophore of *Lensia fowleri* (lateral view). Scale bar = 2 mm.

Distribution: Benguela Current: cited by LELOUP (1934) off the Orange River mouth, offshore off Walvis Bay, and near the Cape of Good Hope. Later reported offshore off Walvis Bay at 22°00' S, 11°07' E and southwest of Cape Agulhas at 39°46' S, 22°12' E (LELOUP and HENTSCHEL, 1935). Cited by TOTTON (1954) at 33°46' S, 15°08' E west of Cape Town. The new records indicate that the species is common, but in the northern Benguela it is more oceanic and inhabits the deeper epiplanktonic layers as compared to the southern Benguela, where it is more neritic. World-wide distribution: common and abundant in all seas, and in the Mediterranean (ALVARIÑO, 1971), spanning a broad depth distribution from the surface down to the bathypelagic zone.

Lensia fowleri (Bigelow, 1911)
(Fig. 30)

References: BIGELOW 1911a, p. 346-348; pl. 28 fig. 5. LELOUP 1934, p. 41. BIGELOW and SEARS 1937, p. 53-55; figs. 37-39. LELOUP and HENTSCHEL 1935, p. 17; fig. 13. TOTTON 1965, p. 174-175; figs. 112-113. GAMULIN 1966, p. 1-5; figs. 1-5. PUGH 1974, p. 55; fig.6. CASANOVA 1980, p. 18-19; tab. 1. ALVARIÑO 1981, p. 411; figs. 1-5. KIRKPATRICK and PUGH 1984, p. 92; fig. 36.

Material examined: SNEC II: E-5 P-2 (1), E-6 P-2 (2).

Description: Polygastric stage: Anterior nectophore high, up to 8.1 mm in height by 3.7 mm in dorsoventral length. Five ridges converging at the apex. Lateral ridges curving slightly towards the ventral surface at the base. Basal lamella large, hydroecium extremely flat. Somatocyst ovoid or spherical, resting on the basal lamella, entirely below the level of the ostium. Basal lamella divided into two wings. Posterior nectophore and eudoxid not collected in the region.

Distribution: Benguela Current: one individual recorded off the Orange River mouth, three specimens west of the Cape of Good Hope in the vicinity of the Benguela System, and three more in Great Fish Bay, today Porto Alexandre, off Angola (LE-

LOUP, 1934). The three specimens collected confirm that this species is occasionally present in the region. Specimens caught in the 200 to 100-m depth interval offshore off Lüderitz. World-wide distribution: more frequent and abundant in the Atlantic Ocean but extending into temperate regions in the Pacific and Indian oceans and the Mediterranean (ALVARIÑO, 1971). Reported at depths down to 800 m (LELOUP and HENTSCHEL, 1935) but mainly dwelling in the upper 250 m (PUGH, 1974).

Lensia hardy Totton,1941
(Fig. 31A-B)

References: TOTTON 1941, p. 153-154; fig. 10. TOTTON 1965, p. 173; fig. 111. ALVARIÑO 1971, p. 107. MARGULIS 1971, p. 82; fig. 1.15. PALMA 1973, p. 46-47; pl. XXI figs. 1-5, pl. XXII figs. 1-4. ALVARIÑO 1981, p. 412; fig. 174-44. ALVARIÑO *et. al.*, 1990, p. 34; fig. 52; map. B42.

Material examined: SWAPELS January 1982: 40-14 (1). SNEC II: E-4 P-2 (1), E-5 P-3 (3), E-17 P-3+4 (8), E-26 P-2 (11), E-26 P-3+4 (3), E-27 P-4 (2), E-27 P-6 (1), E-36 P-2 (3), E-36 P-4 (2), E-44 P-2 (8), E-45 P-4 (12), E-52 P-2 (3), E-52 P-4 (1), E-60 P-4 (1), E-61 P-3 (1), E-66 P-2 (2), E-66 P-3 (3), E-68 P-3 (2), E-69 P-2 (1), E-71 P-2 (1), E-71 P-3 (1), E-72 P-2 (2), E-73 P-2 (1), E-76 P-4 (1), E-77 P-2 (1), E-77 P-3 (1), E-78 P-3 (1), E-81 P-2 (1), E-85 P-3 (2), E-86 P-3 (1), E-90 P-3 (1), E-90 P-4 (1), E-90 P-6 (1), E-91 P-2 (2), E-92 P-2 (2). CELP January 1978: 08-12 (1), 28-08 (1), 32-06 (6), 48-12 (1), 60-12 (1).

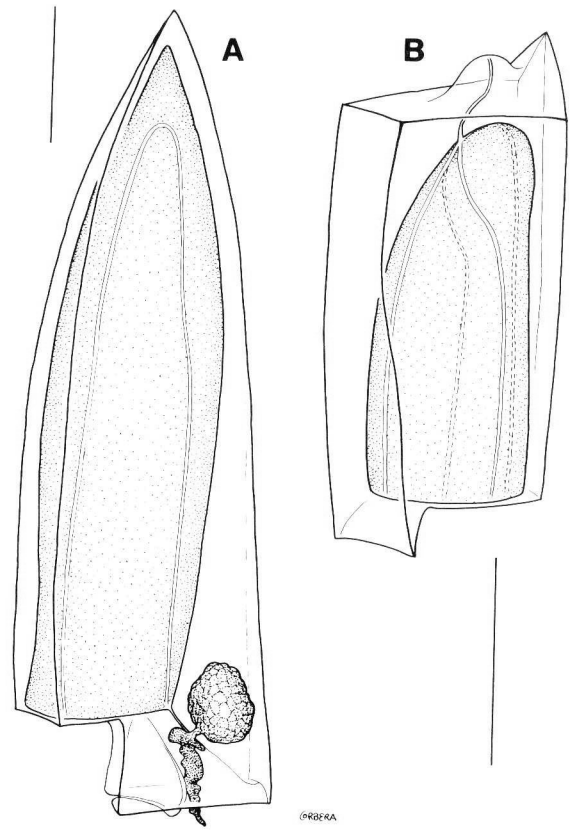

FIG. 31. — Nectophores of *Lensia hardy*; A anterior, B posterior (lateral views). Scale bar = 2 mm.

Description: Polygastric stage: Anterior nectophore up to 9.0 mm in height by 2.6 mm in dorsoventral width although exceptional specimens measuring up to 12.6 mm in height were observed. Five distinct, straight ridges converging at the apex, with the two lateral ridges. Hydroecium located below the level of the ostium, upper surface convex. Ostium descending from the baso-dorsal end of the nectosac and then ascending towards the dorsal surface. Somatocyst globular when viewed laterally, reniform when viewed ventrally, with a short peduncle. Basal lamella large, divided into two quadrangular wings with rounded baso-ventral margins. Posterior nectophore smaller than the anterior nectophore, 3.7 mm in height by 1.1 mm in dorso-ventral length. Five ridges, two ventral, two lateral, and one dorsal. Lateral ridges very close to dorsal ridge. Ventral portion of apical surface flat, median portion with a rounded prominence, and dorsal portion with another triangular prominence. Nectosac straight dorsally, upper portion curved ventrally. Four radial canals: a ventral canal, a dorsal canal running on the apex of the nectosac, and two lateral canals; upper third of lateral canals curved ventrally, converging with the others. Pallial canal short, running towards the medial apical prominence. Basal lamella entire, rectangular. Eudoxid probably unknown (TOTTON, 1965).

Distribution: Benguela Current: in the Benguela Current mainly inhabiting deep epipelagic layers (200-100 m), though occasionally found near the surface. Collected chiefly in the northern Benguela, frequent in the southern Benguela when environmental conditions are conducive to intrusions by South Atlantic Central Water (SACW). World-wide distribution: distribution restricted to the Southern Hemisphere, and basically to the Atlantic Ocean (ALVARIÑO, 1971; MARGULIS, 1971). Until recently thought to be distributed only on the South Atlantic, the distribution range running from Recife (Brazil) to northwest of the Falkland Islands, spawning the oceanic region, and crossing to Namibia and South Africa. Collected off Chile in the Pacific (PALMA, 1973). Recorded southeast of South Island in New Zealand, in the Tasmanian Sea, and north of the Bellingshausen Sea (55°01'S, 94°48'E) (ALVARIÑO *et al.*, 1990).

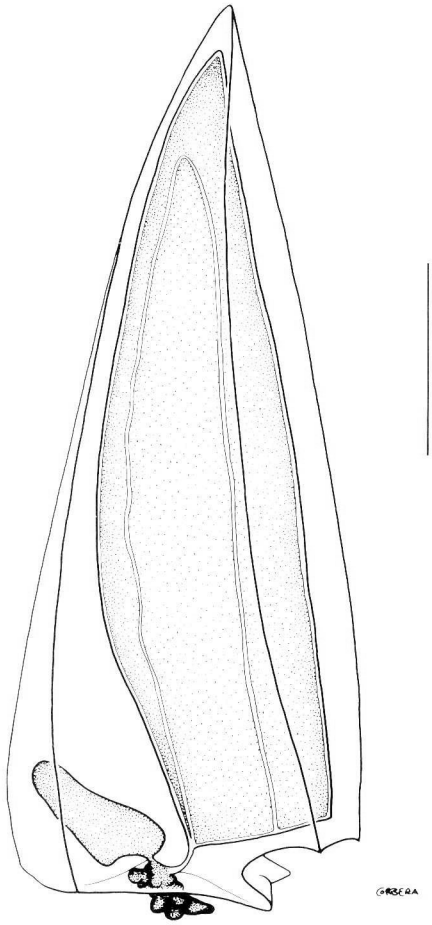

FIG. 32. — Anterior nectophore of *Lensia hotspur* (lateral view). Scale bar = 2 mm.

Lensia hotspur Totton, 1941
(Fig. 32)

References: TOTTON 1954, p. 110-111; figs. 54 C-E. TOTTON 1965, p. 167; figs. 102 C-E. ALVARIÑO 1971, p. 110-111; fig. 15. PALMA 1973, p. 45-46; pl. XIX figs. 1-3, pl. XX figs. 1-3. PUGH 1974, p. 54; fig. 6. ALVARIÑO 1981, p. 412-413; fig. 174-47. DALLOT *et al.*, 1988, p. 197.

Material examined: SWAPELS January 1982: 88-14 (1). SNEC II: E-5 P-5 (1), E-49 P-6 (1), E-57 P-6 (2). WCHB July 1984: A1556 B07 (15), A1602 B18 (2). CELP August 1977: 28-08 (22), 32-06 (5), 32-08 (3), 44-04 (1), 44-06 (1), 48-06 (1). CELP January 1978: 08-08 (3), 08-12 (3), 20-08 (1), 28-12(1), 32-06 (2), 32-08 (1), 40-10 (2), 48-08 (1), 60-04 (6).

Description: Polygastric stage: Anterior nectophore with five complete ridges, lateral ridges closer to dorsal ridge than to ventral ridges. Up to 7.2 mm in height by 2.3 mm in dorso-ventral length. Hydroecium wide, very flat, located below the level of the ostium. Somatocyst exhibiting great morphological variability, ovate or sausage-shaped, ventrally slanted, with a short peduncle. Basal lamella divided into two rounded, dorsally slanted wings. Posterior nectophore not collected, eudoxid not yet discovered.

Distribution: Benguela Current: some of the specimens examined by TOTTON (1941) for the description of the species were taken in the vicinity of the Cape of Good Hope. Distributed throughout the Benguela System but more common in the southern half, mainly from Cape Agulhas to Cape Columbine. World-wide distribution: widely distributed in tropical regions in the Atlantic Ocean, but distribution range extending from latitude 59° N (FRASER, 1967) to 40° S. Isolated presence in the Indian and Pacific oceans (ALVARIÑO, 1971). Recently cited in the Mediterranean Sea, namely, in the Alborán Sea, near the Strait of Gibraltar (DALLOT *et al.*, 1988). Epiplanktonic species dwelling in the depth interval from 250 m to the surface (PUGH, 1974).

Lensia meteori (Leloup, 1934)
(Fig. 33)

References: LELOUP 1934, p. 15-18; fig. 6, as *Galetta meteori*. TOTTON 1965, p. 170; fig. 107. DANIEL 1974, p. 145-146; figs. 11 Q,R,S,T. PUGH 1974, p. 53; fig.7. KIRKPATRICK and PUGH 1984, p. 98; fig. 42. GILI 1986, p. 289-290; fig. 4.51 C, 4.64 j, 4.65 b.

Material examined: WCHB July 1983: A0695 B15 (1). WCHB July 1984: A1556 B07 (2).

Description: Polygastric stage: Anterior nectophore very small and delicate, apex rounded, appar-

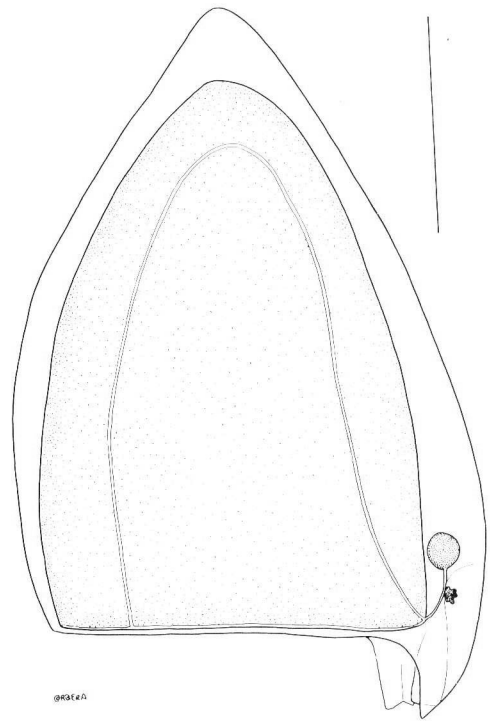

FIG. 33. — Anterior nectophore of *Lensia meteori* (lateral view). Scale bar = 1 mm.

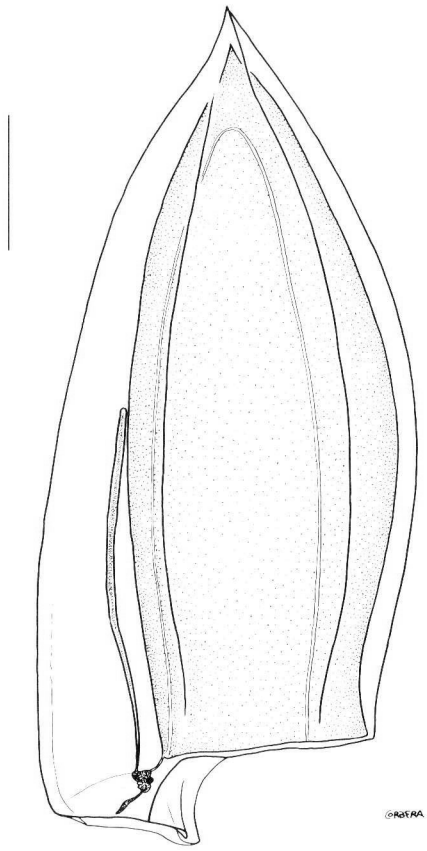

FIG. 34. — Anterior nectophore of *Lensia multicristata* (lateral view). Scale bar = 2 mm.

ently without ridges, up to 2.2 mm high. Hydroecium narrow, high, slanting ventrally upwards, basal lamella indistinguishable from ventral surface of hydroecium. Upper edge of hydroecium above the level of the ostium. Basal lamella divided into two quadrangular wings. Somatocyst small, pyriform or globe-shaped, with a short pedicel. Eudoxid unknown.

Distribution: Benguela Current: some of the specimens examined by LELOUP (1934) were collected in the oceanic zone off the Orange River and south of the Cape of Good Hope. Also cited southwest of Lüderitz (LELOUP and HENTSCHEL, 1935). The specimens examined herein were taken over the shelf off Hondeklip Bay and the Cape of Good Hope. World-wide distribution: inhabiting temperate regions in the three great Oceans (ALVARIÑO, 1971), and in the Mediterranean (GILI, 1986). Broad vertical distribution extending down to 800 m in depth (PUGH, 1974).

Lensia multicristata (Moser, 1925)
(Fig. 34)

References: MOSER 1925, p. 165-166; pl. III fig. 9. LELOUP 1934, p. 33-36; fig. 8, as *Lensia multicristata* form *typica*. BIGELOW and SEARS 1937, p. 55-58; figs. 40-44,47. TOTTON 1954, p. 113-114. TOTTON 1965, p. 164; fig. 99B. ALVARIÑO 1971, p. 117-119; fig. 17. PUGH 1974, p. 51; fig. 5. ALVARIÑO 1981, p. 414; fig. 174-52. KIRKPATRICK and PUGH 1984, p. 100; fig. 43. PUGH 1984, p. 476-478; fig. 9 a-b. GILI 1986, p. 287-288; figs. 4.53 C, 4.64 e,h.

Material examined: SNEC II: E-27 P-2 (1), E-36 P-2 (1), E-45 P-2 (4), E-52 P-2 (1), E-62 P-2 (1), E-68 P-2 (3), E-68 P-6 (2), E-69 P-2 (3), E-71 P-2 (5), E-71 P-2 (5), E-72 P-2 (2), E-73 P-2 (1), E-73 P-3 (3), E-73 P-5 (1), E-75 P-2 (3), E-76 P-2 (1), E-77 P-2 (1), E-78 P-2 (1), E-80 P-2 (1), E-82 P-3 (2), E-83 P-2 (2), E-85 P-2 (3), E-85 P-5 (1), E-86 P-2 (1), E-92 P-2 (1). CELP August 1977: 32-12 (1).

Description: Polygastric stage: Anterior nectophore elongate, up to 9.1 mm in height by 3.6 mm in dorso-ventral length. Seven ridges, lateroventral ridges reaching neither the apex nor the ostial margin of the nectophore, lateral ridges ending slightly above the level of the ostium. Hydroecium small, located below the level of the ostium. Basal lamella wide, divided into two wings whose inner margins are formed by a rounded tooth directed towards the hydroecium. Somatocyst filiform, with an extremely thin peduncle, reaching nearly to the midpoint of the nectosac. Posterior nectophore up to 4.0 mm in height by 1.5 mm in dorsoventral length. Five ridges, lateral ridges not reaching the ostium. Basal lamella low and broad. Eudoxid not yet discovered, although KIRKPATRICK and PUGH (1984) suggested that it might be *Eudoxia tenuis* (PATRITI, 1965).

Distribution: Benguela Current: cited in the vicinity of the Cape of Good Hope and offshore west of Lüderitz (TOTTON, 1954). New records indicative of greater abundance in the northern Benguela at the border with the Angola Current, where the species dwells primarily in the 200 to 100-m depth interval, suggestive of a epipelagic distribution. World-wide distribution: mesopelagic species (PUGH, 1984) distributed in the temperate regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971).

Lensia subtilis (Chun, 1886)
(Fig. 35)

References: BIGELOW 1911a, p. 343-344. TOTTON 1932, p. 367-368; fig. 34. LELOUP 1934, p. 31-33. CERVIGÓN 1958, p. 32-34; figs. 15-18; tab. III. TOTTON 1965, p. 168-169; figs. 104-105. PUGH 1974, p. 52-53; fig. 5. ALVARIÑO 1981, p. 414; fig. 174-53. KIRKPATRICK and PUGH 1984, p. 102; fig. 44. GILI 1986, p. 288-289; figs. 4.50 C; 4.64 i,k. ALVARIÑO *et al.*, 1990, p. 40-41; fig. 62.

Material examined: SWAPELS December 1981: 82-14 (1). SWAPELS January 1982: 46-14 (2), 88-14(4). SNEC II: E-4 P-2 (8), E-6 P-2 (2), E-44 P-2 (1), E-45 P-4 (11). WCHB July 1983: A0649 B01 (8), A0651 B03 (7), A0662 B04 (1), A0666 B05 (1), A0669 B06 (1), A0678 B09 (3), A0684 B11 (1), A0689 B12 (2), A0694 B14

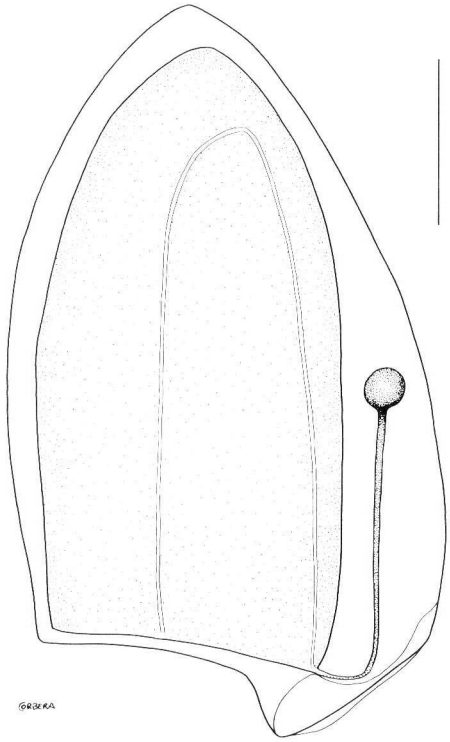

FIG. 35. — Anterior nectophore of *Lensia subtilis* (lateral view). Scale bar = 1 mm.

(6), A0695 B15 (10), A0699 B16 (6), A0700 B17 (7), A0705 B18 (4), A0716 B22 (3), A0732 B25 (1). WCHB July 1984: A1527 B01 (12), A1529 B02 (6), A1534 B03 (21), A1552 B06 (17), A1556 B07 (21), A1558 B08 (6), A1567 B10 (5), A1572 B11 (2), A1574 B12 (1), A1580 B13 (23), A1588 B15 (2), A1593 B16 (18), A1596 B17 (1), A1607 B20 (20), A1611 B21 (17), A1641 B28 (3), A1646 B29 (2), A1649 B30 (1), A1653 B31 (1), A1656 B32 (14), A1661 B33 (11). CELP August 1977: 08-10 (10), 28-08 (2), 32-08 (4), 56-06 (2), 60-10 (1), 60-12 (2), 64-10 (1), 68-12 (1). CELP January 1978: 08-08 (1), 08-12 (1), 28-06 (1), 28-08 (5), 28-10 (1), 32-06 (2), 36-08 (59), 40-10 (4), 44-04 (1), 44-08 (3), 48-12 (1), 56-08 (1), 56-12 (2), 60-12 (2), 64-02 (1), 64-12 (3).

Description: Anterior nectophore conical, laterally compressed, apex rounded, apparently devoid of ridges. Up to 3.2 mm in height by 1.5 mm in dorso-ventral length. Hydroecium wide, short, slanting upwards towards the ventral surface, upper edge above the level of the ostium. Somatocyst composed of a long, straight peduncle reaching to the midpoint of the nectophore, ending in a globe. Basal lamella small, divided into two wings. Posterior nectophore approximately the same size as the anterior nectophore, with five ridges, truncate apex, and rounded basal lamella. Eudoxid not collected in the region.

Distribution: Benguela Current: recorded off the Orange River mouth and the Cape of Good Hope and in Great Fish Bay, today Porto Alexandre, Angola (LELOUP, 1934). Uncommon in the northern Benguela, present at isolated stations between Möwe Point and Lüderitz in the oceanic zone far offshore. Very frequent and abundant in the southern Benguela all year round both in the oceanic region and over the shelf. More abundant between Cape Agulhas and Saint Helena Bay in summer due to the influx of Agulhas water. World-wide distribution: inhabiting temperate regions in all seas, and in the Mediterranean (ALVARIÑO, 1971). Distributed in the Atlantic between latitude 50° N and latitude 37° S (MARGULIS, 1971). Vertical distribution epiplanktonic, though it may extend down to depths of 500 m (PUGH, 1974).

Lensia subtiloides (Lens and Van Riemsdijk, 1908) (Fig. 36)

References: LENS and VAN RIEMSDIJK 1908, p. 46-48; figs. 59-61, as *Diphyes (Diphyopsis) subtiloides*. TOTTON 1932, p. 364-367; figs. 31-33. BIGELOW and SEARS 1937, p. 58-59; figs. 45-47. TOTTON 1954, p. 112-113; fig. 55 D. TOTTON 1965, p. 159-160; figs. 95,96, 97B. DANIEL 1974, p. 130-132; figs. 10 J-N. GILI 1986, p. 290; fig. 4.51 B.

Material examined: WCHB July 1983: A0649 B01 (1). WCHB July 1984: A1556 B07 (1), A1593 B16 (1). CELP January 1978: 28-08 (1), 36-06 (1), 48-04 (1), 60-04 (1), 64-12 (1), 84-12 (1).

Description: Anterior nectophore 3.7 mm high by 1.4 mm wide, consistency firm. Five ridges converg-

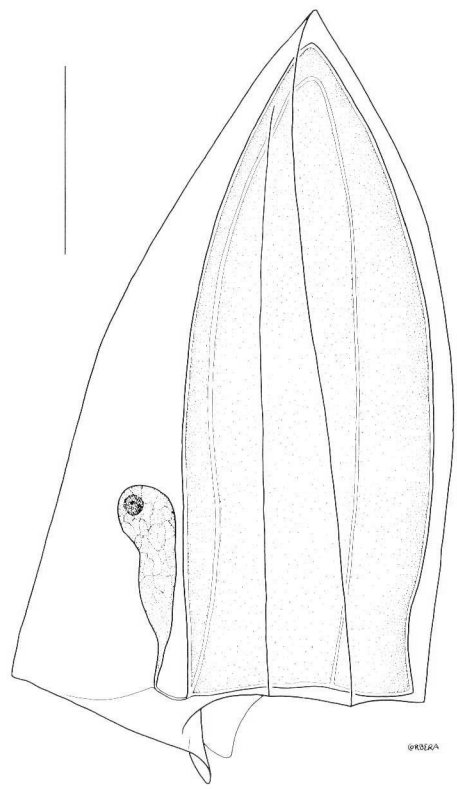

FIG. 36. — Anterior nectophore of *Lensia subtiloides* (lateral view). Scale bar = 1 mm.

ing at the apex. Hydroecium low, summit at the same level as the ostium. Basal lamella slanting slightly upwards towards the ventral surface, wide, with two short wings with rounded borders slightly overlapping. Somatocyst club-shaped, one-third of nectophore height. Posterior nectophore 3.0 mm in height with a slight apical promontory and a small tooth on the right side of the apex. Eudoxid not collected in the region.

Distribution: Benguela Current: occasionally present, only recorded in the southern Benguela in the oceanic zone off Doring Bay and mainly between Cape Agulhas and Cape Columbine during an intrusion by Agulhas water. World-wide distribution: present, though uncommon, in the temperate regions in the three great oceans and in the Mediterranean (ALVARIÑO, 1971). When present, frequently collected together with *Diphyes chamissonis*, which appear to be associated in the Indo-Pacific region (TOTTON, 1954; PAGÈS *et al.*, 1989).

Dimophyes arctica (Chun, 1897)
(Fig. 37)

References: LELOUP 1934, p. 29-31. LELOUP and HENTSCHEL 1935, p. 12,14; fig. 11. TOTTON 1954, p. 123-127. TOTTON 1965, p. 184-185; fig. 121; pl. XXXIII figs. 1-2,7. ALVARIÑO 1971, p. 46-51; fig. 4. PUGH 1974, p. 64-66; fig. 10 A. ALVARIÑO 1981, p. 417-418. KIRKPATRICK and PUGH 1984, p. 106-107; fig. 47. PUGH 1984, p. 478-479; fig. 10. ALVARIÑO *et. al.*, 1990, p. 24-25; fig. 35.

Material examined: BENGUELA I: E-53 P-64 (1).SNEC II: E-4 P-2 (1), E-5 P-2 (5), E-5 P-3+4 (4), E-6 P-2 (3), E-25 P-2 (6), E-26 P-2 (21), E-26 P-3+4 (6), E-27 P-2 (6), E-27 P-4 (14), E-27 P-5 (4), E-36 P-2 (19), E-36 P-4 (1), E-44 P-2 (2), E-45 P-2 (25), E-45 P-4 (3). CELP August 1977: 16-10 (2), 24-10 (1). CELP January 1978: 12-10 (1), 20-06 (1), 44-04 (6).

Description: Polygastric stage: Anterior nectophore devoid of ridges, apex arched, 6.9 mm in height by 2.6 mm in dorso-ventral width. Hydroecium deep, bell-shaped, with ventral opening, and summit above the ostium. Basal lamella high, entire, without wings. Somatocyst carrot-shaped, reaching to three-quarters of nectophore height. Posterior nectophore and eudoxid not collected in the region.

Distribution: Benguela Current: cited by LELOUP (1934) offshore off the Orange River, Walvis Bay, and the Cape of Good Hope. The new records provide evidence for the occurrence of the species throughout the Benguela System in the deeper layers of the epipelagic zone. World-wide distribution: cosmopolitan species in the broadest sense, inhabiting the three great oceans as well as the Antarctic, Arctic, and Mediterranean (ALVARIÑO, 1971). Mesopelagic distribution in tropical latitudes, more epipelagic distribution in more boreal and austral latitudes (PUGH, 1984; ALVARIÑO *et al.*, 1990), though it may be found throughout the upper 1 000 m of the water column (PUGH, 1974).

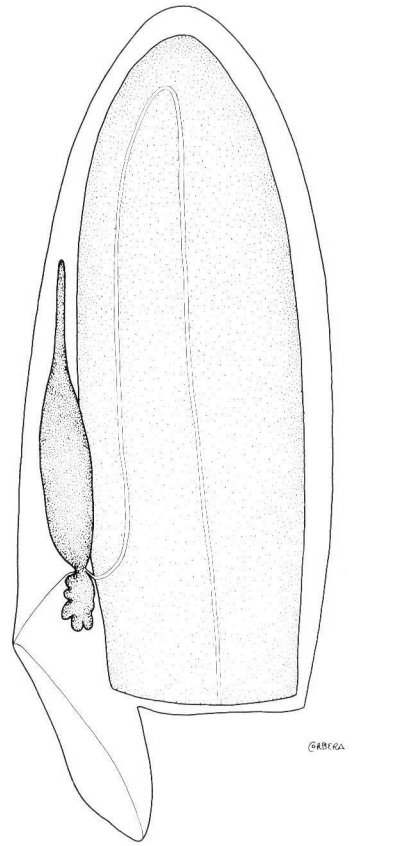

FIG. 37. — Anterior nectophore of *Dimophyes arctica* (lateral view). Scale bar = 2 mm.

Muggiaea atlantica Cunningham, 1892
(Fig. 38)

References: BIGELOW 1911b, p. 187-188; pl. 7 fig. 1, pl. 9 figs 7-8. LELOUP and HENTSCHEL 1935, p. 8; fig. 4. RUSSELL 1938, p. 441-446. CERVIGÓN 1958, p. 39; fig. 10. MACKIE and BOAG 1963, p. 184-185; fig. 3. PATRITI 1964, p. 227-228. TOTTON 1965, p. 181-183; fig. 119B; pl. XXXII fig.3. DANIEL 1974, p. 149-150. ALVARIÑO 1981, p. 421; fig. 174-73. PURCELL 1982, p. 39-53. KIRKPATRICK and PUGH 1984, p. 104-105; fig. 46. GILI 1986, p. 292-293; figs. 4.52 B, 4.63 n, 4.64 q. GILI *et al.*, 1987a, p. 326-328; fig. 2-3. GILI *et al.*, 1987b, p. 157-168. GILI *et al.*, 1988, p. 385-399.

Material examined: SWAPELS December 1981: 04-01 (1), 04-03 (93), 10-01 (157), 10-02 (57), 10-03 (26), 16-01 (644), 16-01 (655), 16-04 (9), 22-01 (874), 22-02 (908), 22-03 (764), 22-06 (30), 22-08 (1), 28-01 (2893), 28-02 (2440), 29-03 (1325), 28-04 (250), 28-06 (14), 34-01 (2), 34-02 (704), 34-03 (1569), 34-04 (1391), 34-06 (67), 40-03 (1200), 40-06 (398), 40-08 (12), 52-02 (1804), 52-03 (1747), 52-04 (338), 52-06 (566), 52-08 (406), 52-10 (4), 58-02 (351), 58-03 (3775), 58-04 (66), 58-06(123), 58-08 (363), 58-10 (255), 64-03 (2487), 64-04 (352), 64-06 (408), 64-08 (939), 64-10 (234), 64-12 (48), 70-01 (196), 70-02 (212), 70-03 (163), 70-04 (292), 70-06

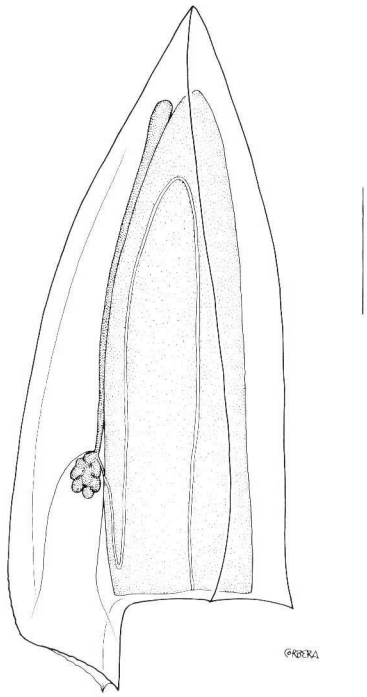

FIG. 38. — Nectophore of *Muggiaea atlantica* (lateral view). Scale bar = 1 mm.

(111), 70-08 (130), 70-10 (88), 70-12 (2), 76-01 (13), 75-02 (196), 76-04 (278), 76-06 (11), 76-08 (3), 82-01 (4), 82-02 (9), 82-03 (15), 82-06 (94), 88-03 (17), 88-04 (31), 88-06 (2), 94-04 (20). SWAPELS January 1982: 16-01 (515), 16-02 (1114), 16-03 (23), 16-04 (9), 28-01 (51), 28-02 (526), 28-03 (50), 28-04 (162), 28-06 (161), 28-08 (11), 28-10 (29), 28-12 (2), 34-02 (36), 34-04 (18), 34-06 (20), 34-08 (1), 34-12 (5), 34-14 (1), 40-03 (55), 40-06 (2), 46-01 (8), 46-02 (14), 46-03 (45), 46-04 (2), 46-06 (1), 46-10 (1), 52-02 (1), 52-03 (24), 52-04 (43), 52-06 (9), 52-08 (3), 52-10 (1), 52-12 (1), 58-02 (4), 58-03 (165), 58-04 (58), 58-06 (151), 58-08 (37), 58-10 (17), 64-12 (17), 64-14 (4), 70-01 (196), 70-02 (212), 70-04 (13), 70-06 (262), 70-08 (12), 70-10 (15), 70-12 (2), 76-01 (101), 76-02 (78), 76-03 (16), 76-04 (169), 76-06 (6), 76-08 (2), 82-03 (14), 88-03 (4), 88-06 (2), 88-08 (7), 88-10 (1), 94-01 (58), 94-06 (6), 100-04 (3). SWAPELS February 1982: 04-02 (82), 04-03 (23), 10-01 (819), 10-02 (779), 10-03 (91), 10-04 (4), 10-08 (3), 10-10 (2), 16-02 (904), 16-03 (1466), 16-04 (794), 16-08 (1), 16-10 (1), 22-01 (1123), 22-02 (996), 22-04 (222), 28-02 (1432), 28-03 (126), 28-04 (28), 28-06 (24), 28-08 (7), 34-01 (2737), 34-03 (146), 34-04 (117), 34-06 (30), 40-01 (133), 40-02 (529), 40-03 (1511), 46-01 (2274), 46-02 (1902), 46-03 (1302), 52-02 (591), 52-03 (258), 76-03 (258), 76-08 (21), 82-02 (125), 82-03 (166), 88-04 (2452), 88-06 (294), 88-08 (491), 88-10 (36), 88-12 (22), 94-06 (344), 94-08 (2653), 94-10 (9), 94-14 (26), 100-04 (30), 100-06 (1206). SWAPELS March 1982: 10-01 (65), 10-02 (102), 10-03 (22), 10-04 (2), 16-01 (133), 16-02 (115), 16-03 (20), 16-06 (142), 16-10 (1), 22-01 (17), 22-03 (550), 22-04 (137), 22-10 (2), 28-01 (3855), 28-02 (6320), 28-03 (1320), 28-04 (327), 34-02 (1005), 34-03 (2555), 34-04 (2634), 34-06 (286), 40-01 (103), 40-04 (485), 40-06 (186), 40-08 (65), 46-01 (3133), 46-03 (4678), 40-04 (2443), 46-08 (4), 52-02 (584), 52-03 (651), 52-04 (663), 52-10 (15), 58-03 (62), 58-04 (13), 76-12 (1), 82-02 (173), 82-04 (10), 82-06 (81), 82-08 (13), 82-12 (5), 82-14 (1), 88-03 (175), 88-04 (175), 88-06 (111), 88-08 (81). SNEC II: E-1 P-2 (62), E-1 P-3 (12), E-1 P-4 (3), E-1 P-5 (21), E-9 P-3 (17), E-9 P-5 (394), E-10 P-2 (114), E-10 P-4 (73), E-10 P-5 (6), E-10 P-6 (3), E-11 P-4 (27), E-12 P-2 (74), E-12 P-4 (12), E-20 P-2 (266), E-20 P-3 (43), E-20 P-5 (179), E-20 P-6 (103), E-22 P-3+4 (81), E-22 P-5 (23), E-29 P-3+4 (3), E-29 P-6 (623), E-33 P-3+4 (5), E-34 P-2 (224), E-34 P-3+4 (127), E-34 P-5 (61), E-34 P-6 (123), E-35 P-2 (16), E-35 P-4 (8), E-35 P-5 (2), E-37 P-4 (9), E-37 P-5 (23), E-38 P-2 (6), E-38 P-4 (87), E-38 P-5 (2), E-38 P-6 (11), E-39 P-2 (66), E-39 P-3+4 (29), E-40 P-2 (2),E-40 P-4 (8), E-41 P-4 (19), E-41 P-5 (13), E-43 P-2 (2), E-48 P-4 (45), E-48 P-5 (36), E-71 P-6 (3), E-72 P-6 (1), E-80 P-6 (1). WCHB July 1983: A0649 B01 (257), A0651 B03 (60), A0662 B04 (1), A0666 B05 (120), A0669 B06 (4), A0670 B07 (2), A0677 B08 (9), A0684 B11 (1), A0689 B12 (2), A0694 B14 (327), A0695 B15 (273), A0699 B16 (12), A0700 B17 (249), A0705 (369), A0707 B19 (112), A0711 B20 (8), A0716 B22 (346), A0722 B23 (158), A0723 B24 (2), A0732 B25 (109). WCHB July 1984: A1527 B01 (63), A1529 B02 (191), A1534 B03 (204), A1544 B04 (162), A1547 B05 (8), A1522 B06 (13), A1556 B07 (53), A1558 B08 (1195), A1564 B09 (274), A1567 B10 (2721), A1572 B11 (79), A1574 B12 (82), A1580 B13 (368), A1588 B15 (275), A1593 B16 (707), A1596 B17 (229), A1602 B18 (377), A1603 B19 (19), A1607 B20 (121), A1611 B21 (313), A1649 B30 (2), A1653 B31 (15), A1656 B32 (20), A1661 B33 (8), A1668 B35 (1). AFRICANA 045 Cruise: 1-3-1 (1), 3-3-2 (4), 3-3-3 (53), 3-3-4 (12), 4-3-1 (2), 5-3-3 (17), 5-3-4 (20), 9-3-3 (183), 9-3-4 (138), 10-2-1 (31), 10-2-2 (53), 10-2-3 (3), 11-2-1 (70), 11-2-2 (51), 11-2-3 (45), 11-2-4 (41), 12-1-1 (24), 12-1-2 (50), 12-1-3 (24), 12-2-1 (33), 12-2-2 (36), 12-2-3 (1), 12-2-4 (3), 13-1-1 (52), 13-1-2 (200), 13-1-3 (303), 13-2-1 (386), 13-2-3 (25), 14-1-2 (8), 14-1-3 (11), 14-2-1 (16), 14-2-2 (137), 14-2-3 (10), 14-2-4 (8), 15-1-1 (137) 15-1-2 (135), 15-1-3 (24). CELP August 1977: 08-04 (10), 08-06 (1), 08-08 (491), 08-10 (92), 08-12 (72), 12-08 (36), 12-10 (63), 12-12 (55), 16-10 (109), 16-12 (445), 24-08 (100), 24-10 (119), 24-12 (10), 32-02 (9), 32-04 (4), 36-04 (1), 36-06 (14), 36-08 (30), 40-02 (2), 40-04 (17), 40-06 (2), 40-08 (17), 44-02 (32), 44-04 (17), 44-06 (49), 44-08 (10), 44-10 (4), 48-02 (183), 48-04 (102), 48-06 (43), 48-08 (5), 48-10 (18), 48-12 (2), 52-04 (91), 52-08 (29), 52-10 (4), 56-02 (6), 56-04 (497), 56-06 (128), 56-08 (21), 56-10 (7), 56-12 (1), 60-02 (4), 60-04 (48), 60-06 (88), 60-08 (103), 60-10 (88), 60-12 (70), 64-02 (133), 64-04 (125), 64-06 (56), 64-08 (9), 64-10 (84), 64-12 (38), 68-02 (63), 68-04 (142), 68-06 (81), 68-08 (159), 68-10 (40), 68-12 (35), 72-02 (70), 72-04 (132), 72-06 (192), 72-08 (187), 72-10 (177), 72-12 (398), 76-02 (86), 76-04 (277), 76-06 (457), 76-08 (266), 76-10 (225), 76-12 (335), 80-02 (388), 80-04 (447), 80-06 (243), 80-08 (8), 84-02 (623), 84-04 (699), 84-06 (209), 84-10 (348). CELP January 1978: 08-08 (1), 08-10 (1), 08-12 (128), 12-08 (2), 12-12 (2), 16-04 (13), 16-06 (2), 16-08 (7), 16-12 (7), 20-08 (76), 28-04 (9), 28-06 (369), 28-08 (178), 28-10 (10), 28-12 (66), 32-02 (10), 32-06 (358), 32-08 (83), 36-02 (40), 36-04 (22), 36-06 (84), 36-08 (1419), 36-10 (89), 36-12 (1), 40-04 (116), 40-06 (16), 40-08 (399), 40-10 (431), 40-12 (181), 44-02 (18), 44-04 (146), 44-06 (29), 44-08 (584), 44-10 (3), 44-12 (28), 48-04 (99), 48-06 (64), 48-08 (32), 48-10 (36), 48-12 (151), 52-06 (48), 52-08 (206), 52-10 (27), 52-12 (91), 56-02 (765), 56-04 (52), 56-06 (430), 56-08 (161), 56-10 (67), 56-12 (4), 60-02 (7), 60-04 (127), 60-06 (66), 60-08 (87), 60-10 (434), 60-12 (1005), 64-02 (172), 64-04 (438), 64-06 (31), 64-08 (12), 64-12 (91), 68-02 (568), 68-04 (322), 68-06 (112), 68-08 (1707), 68-10 (2532), 68-12 (1094), 72-02 (68), 72-04 (63), 72-06 (425), 72-08 (62), 72-10 (180), 72-12 (28), 76-04 (17), 76-06 (586), 76-08 (747), 76-10 (343), 76-12 (49), 80-02 (228), 80-04 (336), 80-06 (2456), 80-08 (1054), 80-10 (262), 80-12 (465), 84-02 (18), 84-04 (1034), 84-06 (1876), 84-08 (1700), 84-10 (285), 84-12 (798).

Description: Polygastric stage — posterior nectophore non-existent. Nectophore small, up to 4.5 mm in height, with five complete ridges converging at the apex. No basal teeth. Hydroecium bell-shaped, deep, up to one-third of nectophore height, the lower half situated below the level of the ostium. Somatocyst filiform, running closely along the ventral surface of the nectosac, ending in a small thickening at the level of the apex of the nectosac. Basal lamella wide, divided into two wings whose medial margins overlap. Bract conical, dorsal surface longer than ventral surface. Sutural surface broad, flattened, suture prominent. Hydroecial cavity shallow. Gonophore slightly twisted, with four ridges running from the base to the apex. Basal lamella short, curved.

Distribution: Benguela Current: most abundant

siphonophore in the region. Neritic species inhabiting coastal and shelf waters throughout the system. Populations declining progressively oceanwards, with only isolated specimens present in the oceanic region. No significant variation in population levels between periods of high and low upwelling activity. Depth distribution spanning the entire epiplanktonic zone in the water column; available data do not provide a clearer picture of the species' vertical distribution and possible migrations. World-wide distribution: neritic species inhabiting warm and temperate regions over the continental shelf in the three great oceans and the Mediterranean (ALVARIÑO, 1971). More frequent in the Atlantic and Mediterranean than in the Pacific and Indian oceans.

Muggiaea kochi (Will, 1844)
(Fig. 39)

References: BIGELOW 1911a, p. 188-189, pl. 12 figs. 2-4. TOTTON 1965, p. 180-181; fig. 119A; pl. XXXII figs. 1-2. ALVARIÑO 1971, p. 77-78. ALVARIÑO 1974, p. 535; fig. 10. ALVARIÑO 1981, p. 422; fig. 174-65. KIRKPATRICK and PUGH 1984, p. 104-105; fig. 45. ALVARIÑO and LEIRA 1986, p. 83-84; fig. 19. GILI 1986, p. 292; figs. 4.52 F, 4.65 c,g.

Material examined: SNEC II: E-47 P-6 (1), E-53 P-6 (2), E-54 P-2 (28), E-54 P-4 (118), E-54 P-5 (10), E-54 P-6 (10), E-55 P-2 (12), E-55 P-3+4 (29), E-55 P-5 (53), E-55 P-6 (56), E-56 P-4 (2), E-56 P-5 (5), E-56 P-6 (23), E-72 P-5 (1), E-73 P-5 (1), E-76 P-5 (1), E-77 P-6 (1), E-78 P-6 (1), E-80 P-6 (2), E-81 P-6 (3), E-85 P-6 (2), E-86 P-6 (1), E-88 P-6 (1).

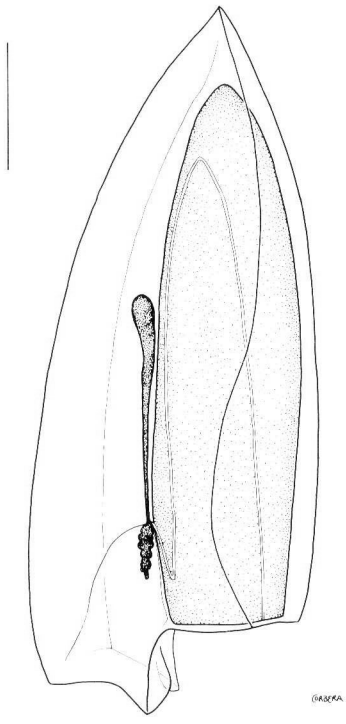

FIG. 39. — Nectophore of *Muggiaea kochi* (lateral view). Scale bar = 1 mm.

Description: Polygastric stage — posterior nectophore non-existent. Nectophore similar in appearance to that of *M. atlantica*, with five ridges converging at the apex. Up to 3.7 mm in height by 1.4 mm in dorso-ventral width. Lateral ridges describing a characteristic sigmoidal curve. Hydroecium conical, less deep than in *M. atlantica*, reaching to one-quarter of nectosac height. Basal lamella divided into two equal rectangular wings. Somatocyst filiform, cylindrical, reaching to the midpoint of the nectosac. Eudoxid not collected in the region.

Distribution: Benguela Current: first record in the region. Only captured in the neritic zone inshore in the northern Benguela and at one oceanic station between Möwe Point and the Cunene River. Depth distribution indicating that the species is present throughout the epipelagic zone in the water column and is abundant in the deeper layers within that zone. World-wide distribution: Atlantic species abundant in the neritic zone inshore to latitude 50° N in the northern hemisphere on both sides of the ocean (ALVARIÑO, 1971). In the southern hemisphere collected to latitude 23° S off Brazil (LELOUP and HENTSCHEL, 1935). Also present in the Mediterranean (GILI, 1986). In the Pacific reported only in the vicinity of the Galapagos Islands (ALVARIÑO and LEIRA, 1986) and near the Panama Canal after entering from the Atlantic (ALVARIÑO, 1974). The record by BIGELOW (1911a) off northern Chile would appear to be unlikely based on the description and drawings, which do not match later descriptions.

Chelophyes appendiculata (Eschscholtz, 1829)
(Fig. 40A-B)

References: BIGELOW 1911b, p. 248-249; pl. 7 figs 5-6, pl. 8 figs 7-8, pl. 9 fig. 6, pl. 10 fig. 6, pl. 11 fig. 1, as *Diphyes appendiculata*. LELOUP and HENTSCHEL 1935, p. 9 fig. 7. TOTTON 1954, p. 127-130; pl. 4 figs. 1-3. CERVIGÓN 1958, p. 25-29; figs 2-8; tab. 1. TOTTON 1965, p. 185-187; figs. 123-124; pl. XXXII fig. 4, pl. XXXIII fig. 6. NETO and LOURENÇO 1973, p. 20-24; figs 17-18. PUGH 1974, p. 60-62; fig. 8. BONE and TRUEMAN 1982, p. 315-327; fig. 1A, 2 B-C, 4; tab. 1-2. MACKIE and CARRÉ 1983, p. 139-169; figs. 1-23. KIRKPATRICK and PUGH 1984, p. 108-109; fig. 48. GILI 1986, p. 286-287; figs. 4.50 A-B, 4.65 a,h,s. GILI *et al.*, 1987a, p. 329-330, fig. 5.

Material examined: SWAPELS December 1981: 04-04 (1), 04-06 (2), 10-12 (1), 16-06 (6), 16-08 (2), 22-14 (1), 28-14 (2), 34-14 (3), 40-06 (1), 64-12 (1), 94-10 (2), 94-12 (2), 94-14 (1). SWAPELS January 1982: 10-14 (6), 16-10 (2), 16-14 (1), 22-14 (1), 28-14 (1), 46-10 (2), 52-14 (1), 64-14 (2), 70-12 (2), 70-14 (2), 76-14 (2), 88-14 (1). SWAPELS February 1982: 04-08 (8), 04-10 (28), 04-12 (6), 04-14 (1), 16-08 (4), 22-12 (1), 34-14 (1), 40-12 (1), 40-14 (1), 46-10 (1), 76-14 (1), 100-14 (2). SWAPELS March 1982: 04-08 (3), 04-12 (2), 10-06 (9), 10-08 (1), 22-12 (1), 28-12 (1), 28-14 (1), 34-12 (1), 40-10 (1), 46-08 (1), 46-12 (1), 46-14 (8), 52-10 (1), 52-14 (2), 82-10 (1), 82-12 (2), 88-14 (2). SNEC II: E-4 P-6 (1), E-5 P-5 (1), E-5 P-6 (2), E-7 P-6 (2), E-36 P-2 (1), E-36 P-4 (2), E-37 P-5 (2), E-42 P-6 (1), E-43 P-5 (2), E-43 P-6 (3), E-44 P-6 (1), E-45 P-2 (1), E-45 P-6 (1), E-46 P-2 (2), E-46 P-4 (1), E-46 P-5 (1), E-46 P-6 (1),

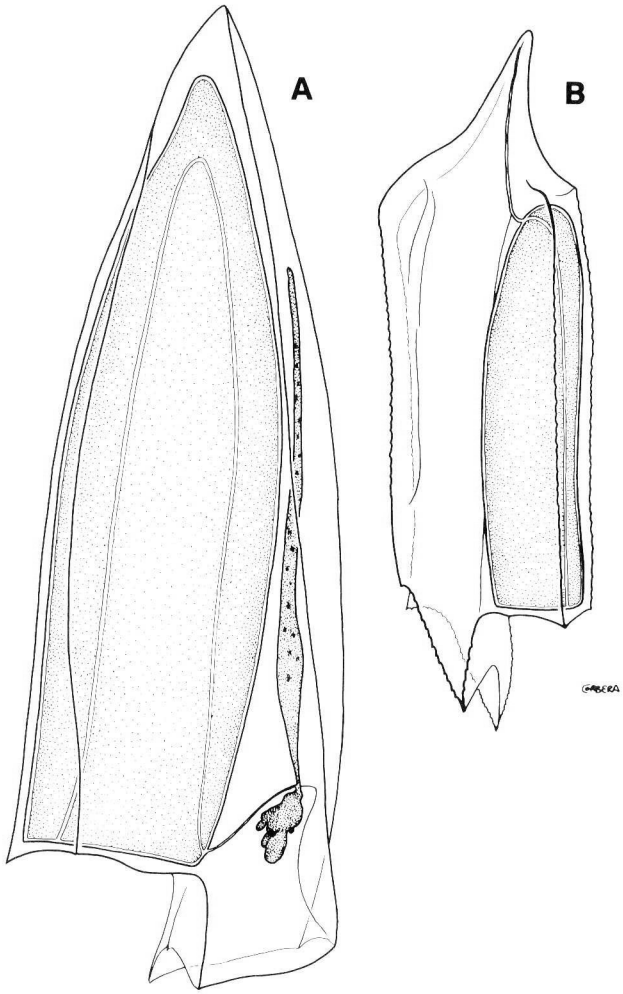

FIG. 40. — Nectophores of *Chelophyes appendiculata*; A anterior, B posterior (lateral views). Scale bar = 2 mm.

E-49 P-4 (1), E-49 P-5 (2), E-49 P-6 (8),, E-51 P-5 (2), E-51 P-6 (9), E-52 P-5 (2), E-52 P-6 (26), E-53 P-6 (2), E-58 P-6 (6), E-59 P-5 (1), E-59 P-6 (87), E-60 P-2 (22), E-60 P-5 (7), E-60 P-6 (1), E-61 P-3 (3), E-61 P-4 (11), E-61 P-5 (9), E-61 P-6 (1), E-66 P-2 (9), E-66 P-3 (2), E-66 P-4 (1), E-66 P-6 (1), E-68 P-2 (7), E-68 P-3 (3), E-68 P-6 (5), E-69 P-2 (2), E-69 P-5 (1), E-69 P-6 (5), E-71 P-2 (6), E-71 P-3 (2), E-71 P-6 (24), E-72 P-5 (4), E-72 P-6 (22), E-73 P-5 (2), E-73 P-6 (10), E-75 P-6 (3), E-76 P-6 (21), E-77 P-6 (23), E-78 P-2 (8), E-78 P-3 (4), E-78 P-6 (22), E-80 P-2 (4), E-80 P-3 (2), E-80 P-5 (1), E-80 P-6 (28), E-81 P-2 (3), E-81 P-3 (3), E-81 P-5 (1), E-81 P-6 (14), E-83 P-2 (9), E-83 P-3 (8), E-83 P-4 (1), E-85 P-2 (25), E-85 P-3 (8), E-85 P-4 (4), E-85 P-6 (26), E-86 P-6 (46), E-88 P-5 (5), E-88 P-6 (32), E-90 P-3 (1), E-90 P-4 (1), E-90 P-5 (3), E-90 P-6 (39), E-91 P-6 (7), E-92 P-5 (4), E-92 P-6 (51). WCHB July 1983: A0684 B11 (1), A0689 B12 (1), A0732 B25 (1). WCHB July 1984: A1527 B01 (1), A1529 B02 (3), A1534 B03 (5), A1544 B04 (1), A1558 B08 (4), A1567 B10 (1), A1588 B15 (2), A1593 B16 (2), A1596 B17 (1), A1656 B32 (2), A1661 B33 (1), A1664 B34 (2). CELP August 1977: 28-08 (2), 28-10 (6), 28-12 (4), 32-06 (1), 32-10 (3), 36-10 (2), 48-08 (1), 48-12 (1), 52-08 (2), 52-12 (1), 56-02 (1), 56-06 (1), 56-10 (4), 56-12 (1). CELP January 1978: 08-12 (1), 28-10 (2), 32-08 (1), 32-12 (1), 48-10 (18), 48-12 (17), 56-08 (1), 60-08 (1), 64-12 (1), 68-06 (1), 68-08 (4), 68-12 (2), 68-10 (1), 72-06 (2), 72-12 (1).

Description: Polygastric stage; anterior nectophore firm, consistency tough, sometimes turning opaque when fixed. Up to 12.0 mm in height by 3.6 mm in dorso-ventral width. Only three ridges, the two ventral ridges and the right lateral ridge (*sensu* Bigelow) converging at the apex. Left lateral ridge not reaching the apex and only a short section of the dorsal ridge visible above the ostium. Hydroecium horn-shaped, directed towards the ventral surface. Basal lamella divided into two square wings with sharp outer ends; basal lamella margin convex. Somatocyst fusiform, long, reaching to two-thirds to three-quarters of nectosac height. Posterior nectophore 8.2 mm in height by 2.0 mm in dorsoventral width, consistency same as that of the anterior nectophore. Four ridges. Ventral ridges bearing a tooth at the level of the ostium, each ending basally in a conspicuous tooth, left tooth longer than right tooth. Basal lamella entire, concave. Hydroecial canal long, ventral edge bordered by a plate ending a little above the ostium. Bract conical, hood-shaped, with a short, rounded neck. Hydroecium deep. Phyllocyst cylindrical, reaching nearly to the apex. Gonophore composed of four ridges. Peduncle long, penetrating into the bracteal cavity, rigidly attached to the bracteal margin.

Distribution: Benguela Current: cited by LELOUP and HENTSCHEL (1935) west of the Cape of Good Hope. Oceanic species highly abundant in the region, mainly located in the oceanic zone beyond the continental shelf, with concentrations increasing progressively oceanwards. A study of the depth distribution of this species (PAGÈS and GILI, 1991b) revealed that it was distributed throughout the epiplanktonic layers of the water column during the daytime, rising to the surface layers at dusk, where it remained overnight. World-wide distribution: widely distributed in warm and temperate regions in the three great oceans and in the Mediterranean (ALVARIÑO, 1971); one of the most common and abundant siphonophores in all seas. Epipelagic species also dwelling in the mesopelagic zone (PUGH, 1974; GILI *et al.*, 1987a).

Chelophyes contorta
(Lens and Van Riemsdijk, 1908)
(Fig. 41A, B-C)

References: LENS and VAN RIEMSDIJK 1908, p. 39-41; pl. VI figs. 48-50, as *Diphyes contorta*. BROWNE 1926, p. 71-73, as *Diphyes contorta*. TOTTON 1932, p. 357-358.; fig. 27. TOTTON 1954, p. 130; fig. 65. ALVARIÑO 1971, p. 44-45; fig. 3. ALVARIÑO 1981, p. 419-420; fig. 174-60.

Material examined: WCHB July 1983: A0649 B01 (3), A0651 B03 (5), A0666 B05 (2), A0677 B08 (1), A0689 B12 (1), A0716 B22 (1).WCHB July 1984: A1641 B28 (1), A1656 B32 (1). CELP August 1977: 48-12 (2), 56-08 (2), 64-10 (1), 84-10 (1). CELP January 1978: 40-10 (2), 40-12 (3), 44-08 (3), 48-08 (3), 48-12 (1), 52-10 (1), 52-12 (1), 56-10 (1), 64-06 (1), 64-12 (9), 68-08 (2), 72-06 (1), 72-10 (1), 76-10 (1), 76-12 (1), 80-06 (3).

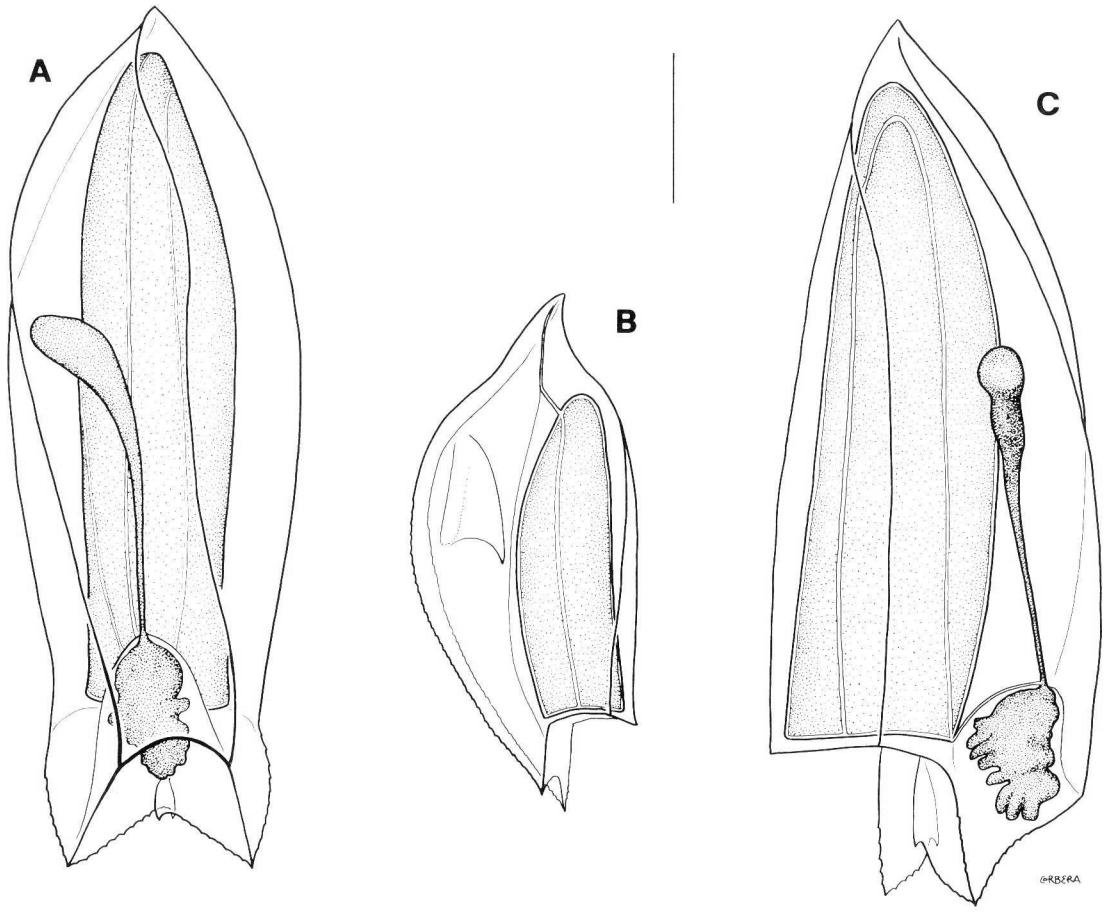

FIG. 41. — Nectophores of *Chelophyes contorta*; A anterior (ventral view), B posterior (lateral view), C anterior (lateral view). Scale bar = 1 mm.

Description: Polygastric stage: anterior nectophore similar to that of *C. appendiculata*, consistency firm. Up to 4.6 mm in height by 1.7 mm in dorsoventral width. Five serrate ridges, (three to the apex) only a short section of the dorsal ridge visible above the ostium, right lateral ridge not reaching the apex. Ventral surface and somatocyst twisted to the right. Hydroecium cornuate, directed towards the ventral surface, not as deep as in *C. appendiculata*, edge blunt. Basal lamella divided into two quadrangular wings, with a small tooth on the basocentral end of each. Posterior nectophore with five serrate ridges, ventral ridges longer on upper half of nectophore, shorter on the lower half, ending in sharp point longer on the left ventral ridge. Upper ventral plate fingernail-shaped issuing from the right ridge and directed towards the left ridge. Eudoxid not collected in the region.

Distribution: Benguela Current: first record in the region. Captured only in the southern Benguela, chiefly offshore between Cape Agulhas and Cape Columbine, both in summer and in winter, when they are more abundant in association with intrusions of Agulhas Current water. World-wide distribution: widely distributed in warm and temperate regions in the Pacific and Indian oceans. Occasionally present in the Atlantic, where it has been recorded off Honduras, Venezuela, Bermuda, and Cape Verde. Cited in the Alboran Sea in the Mediterranean, near the Strait of Gibraltar (ALVARIÑO, 1971). Nevertheless, the Atlantic records are doubtful because it seems that this species shows mainly an Indo-Pacific distribution.

Eudoxoides mitra Huxley, 1859
(Fig. 42A, B-C)

References: BIGELOW 1911b, p. 258-261; pl. 7 fig. 9, pl. 9 fig. 4, pl. 10 figs. 4-5, pl. 11 fig. 6, pl. 12 fig. 5, as *Diphyopsis mitra*; pl. 11 fig. 9 as *Diphyes appendiculata*. TOTTON 1932, p. 358-360; figs. 28-29. LELOUP 1934, p. 28-29. TOTTON 1965, p. 188-189; fig. 127; lám XXXIII figs. 4-5. ALVARIÑO 1971, p. 67-71; fig. 8, as *Diphyopsis mitra*. PUGH 1974, p. 62-63; fig. 9. ALVARIÑO 1981, p. 418; fig. 174-58, as *Diphyopsis mitra*.

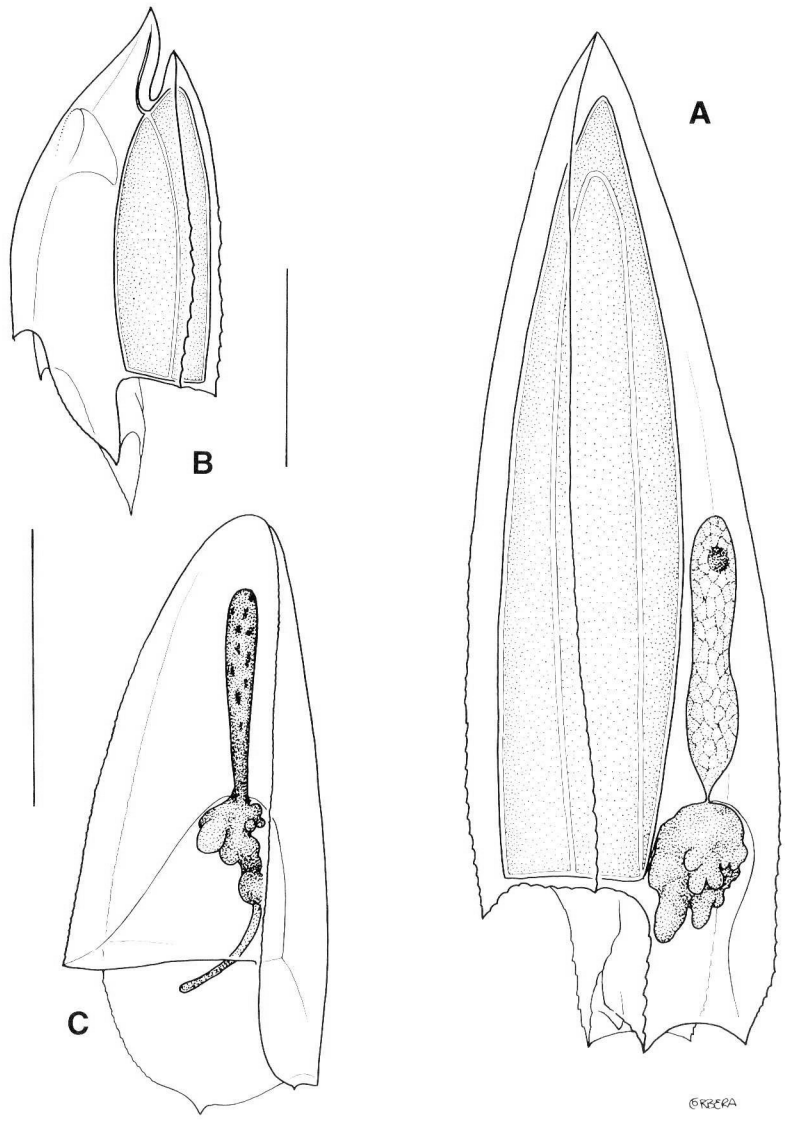

FIG. 42. — *Eudoxoides mitra*; A anterior nectophore, B posterior nectophore (lateral views), C bract (latero-ventral view). Scale bar = 2 mm.

Material examined: SNEC II: E-6 P-6 (2), E-45 P-6 (1), E-49 P-4 (1), E-60 P-2 (1), E-61 P-5 (1), E-76 P-6 (1), E-90 P-6 (1), E-92 P-6 (1). WCHB July 1983: A0649 B01 (6), A0651 B03 (1), A0662 B04 (1), A0666 B05 (17), A0669 B06 (16), A0677 B08 (1), A0678 B09 (3), A0683 B10 (2), A0689 B12 (1), A0695 B15 (1), A0700 B17 (3), A0705 B18 (2), A0716 B22 (1). WCHB July 1984: A1527 B01 (1), A1529 B02 (2), A1552 B06 (9), A1556 B07 (5), A1558 B08 (3), A1567 B10 (4), A1572 B11 (3), A1574 B12 (1), A1588 B15 (3), A1641 B28 (1), A1646 B29 (3), A1649 B30 (1). CELP August 1977: 24-10 (1), 28-08 (1), 32-10 (1), 36-10 (1), 40-12 (1), 48-10 (1), 52-08 (1), 52-10 (4), 52-12 (1), 56-08 (2), 56-10 (1), 60-06 (1), 60-12 (1), 64-02 (1), 64-10 (1), 64-12 (1), 68-12 (3), 72-06 (2), 72-12 (2). CELP January 1978: 28-06 (2), 28-08 (1), 28-10 (1), 32-06 (3), 32-08 (2), 36-08 (3), 40-10 (1), 40-12 (4), 44-12 (4), 48-04 (1), 48-06 (1), 48-10 (1), 48-12 (14), 52-12 (2), 56-02 (1), 56-06 (5), 56-08 (6), 56-10 (7), 60-12 (5), 64-12 (2), 68-06 (2), 68-08 (4), 68-12 (1), 72-04 (1), 72-06 (1), 72-10 (1).

Description: Polygastric stage; anterior nectophore not spiraled, consistency firm. Five serrate ridges converging at the apex, where they are smooth. Up to 7.4 mm in height by 2.5 mm in dorso-ventral width. Dorsal ridge with a prolongation forming a tooth basally. Hydroecium wide, wider below the level of the ostium, upper edge curved. Basal lamella divided into two serrate, dimorphic wings with sharp distal ends. Basal tip of right wing concave, basal tip of left wing convex. Left wing bearing a tooth-like secondary projection. Somatocyst sausage-shaped, reaching to less than the midheight of the nectosac, with a tiny peduncle. Posterior nectophore up to 3.5 mm in height by 1.3 mm in dorsoventral width. A curved furrow between apex and pedicel. Hydroecial canal open except on the upper half, where a process on the right wing of the hydroecium rests like a ton

gue on a process on the left wing, forming a bridge-like structure. Both wings of the hydroecium bearing a tooth located somewhat below the medial region, placed lower down on the left wing. Bases of both wings sharp, left wing extending below the right wing. Basal lamella entire. Bract hood-shaped, 3.1 mm high. Phyllocyst pyriform or sausage-shaped. Sutural surface forming an acute angle with the dorsal wall of the hydroecial cavity. Left sutural ridge serrate, forming a curve ending in a distal tooth. Curve smooth from that point to the base of the other sutural ridge. Gonophore high, up to 5.0 mm, with a large pedicel and a prominent apophysis. Nectosac narrowing towards the upper apex. Basal lamella entire, concave, with two lateral teeth. Two prominent dorsolateral teeth.

Distribution: Benguela Current: collected off Walvis Bay, the Orange River, and near the Cape of Good Hope (LELOUP, 1934). The new records indicate that the species inhabits the surface layer throughout the system but is more abundant in the southern Benguela. World-wide distribution: widely distributed in the temperate regions in the three great oceans (ALVARIÑO, 1971), chiefly in the epipelagic zone (PUGH, 1974).

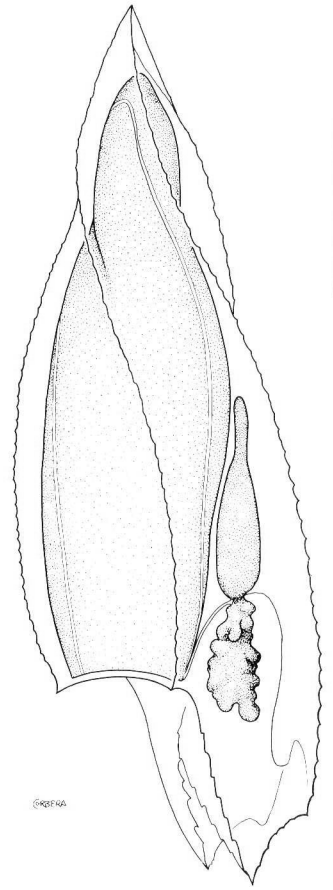

FIG. 43. — Nectophore of *Eudoxoides spiralis* (lateral view). Scale bar = 2 mm.

Eudoxoides spiralis (Bigelow, 1911) (Fig. 43)

References: BIGELOW 1911b, p. 249-251; pl. 7 fig. 4, pl. 8 figs. 1-2, pl. 9 fig. 3, pl. 11 fig.4, as *Diphyes spiralis* sp. nov.. TOTTON 1932, p. 360-363; fig. 30. TOTTON 1965, p. 189-191; figs. 128-129.; pl. XXXII figs. 5-6. ALVARIÑO 1971, p. 81-86. PUGH 1974, p. 63-64; fig. 9. ALVARIÑO 1981, p. 420; fig. 174-61B. KIRKPATRICK and PUGH 1984, p. 110-111; fig. 49. GILI 1986, p. 285-286; figs. 4.52 A, 4.65 j-k.

Material examined: SWAPELS December 1981: 16-06 (1), 82-10 (1). SWAPELS January 1982: 70-14 (1), 88-14 (1). SWAPELS February 1982: 28-10 (1), 88-14 (2). SWAPELS March 1982: 82-12 (1), 88-14 (1). SNEC II: E-4 P-3+4 (1), E-6 P-3 (1), E-6 P-6 (1), E-26 P-5 (1), E-27 P-6 (2), E-36 P-4 (1), E-44 P-6 (1), E-60 P-4 (1), E-68 P-2 (1), E-69 P-2 (1), E-76 P-2 (1), E-83 P-2 (1), E-90 P-2 (1), E-91 P-6 (1). WCHB July 1983: A0649 B01 (4), A0653 B03 (9), A0662 B04 (2), A0666 B05 (2), A0669 B06 (12), A0677 B08 (1), A0678 B09 (3), A0683 B10 (1), A0684 B11 (7), A0694 B14 (2), A0695 B15 (4), A0700 B17 (6), A0705 B18 (3), A0716 B22 (3). WCHB July 1984: A1527 B01 (3), A1529 B02 (4), A1544 B04 (1), A1552 B06 (5), A1556 B07 (4), A1558 B08 (13), A1567 B10 (11), A1572 B11 (30), A1574 B12 (6), A1580 B13 (11), A1588 B13 (8), A1593 B16 (11), A1596 B17 (5), A1602 B18 (4), A1607 B20 (4), A1611 B21 (30), A1641 B28 (9), A1649 B30 (14), A1656 B32 (1), A1661 B33 (5), A1664 B34 (5), A1668 B35 (2). CELP August 1977: 08-04 (1), 08-10 (4), 24-12 (1), 28-08 (33), 28-10 (9), 28-12 (1), 32-04 (1), 32-06 (2), 32-08 (8), 32-10 (8), 32-12 (7), 36-06 (3), 36-08 (1), 36-10 (3), 40-12 (13), 44-06 (1), 44-10 (1), 48-04 (4), 48-06 (9), 48-10 (2), 48-12 (17), 52-04 (2), 52-08 (5), 52-10 (2), 56-04 (3), 56-06 (3), 56-08 (7), 56-10 (17), 56-12 (28), 60-04 (1), 60-06 (3), 60-08 (1), 60-10 (3), 60-12 (7), 64-02 (4), 64-04 (4), 64-08 (3), 64-10 (5), 64-12 (2), 68-02 (2), 68-04 (6), 68-06 (1), 68-08 (1), 68-12 (4), 72-08 (2), 72-10 (1), 72-12 (1), 76-12 (2), 84-04 (2), 84-10 (1). CELP January 1978: 08-12 (1), 28-08 (1), 28-10 (4), 28-12 (4), 32-06 (1), 32-08 (1), 32-10 (1), 36-08 (5), 40-10 (4), 40-12 (1), 44-08 (7), 44-12 (2), 48-04 (2), 48-06 (10), 48-08 (9), 48-10 (4), 48-12 (11), 52-08 (1), 52-10 (3), 52-12 (4), 56-06 (8), 56-08 (6), 56-10 (10), 56-12 (2), 60-06 (4), 60-08 (4), 60-10 (6), 60-12 (5), 64-12 (3), 68-06 (25), 68-08 (8), 68-10 (13), 68-12 (4), 72-06 (2), 72-08 (1), 72-10 (4), 76-10 (4), 76-12 (3), 80-06 (4), 84-06 (1), 84-12 (1).

Description: Polygastric stage — posterior nectophore not developed. Nectophore spiralled, up to 8.0 mm in height by 2.9 mm in dorso-ventral width, consistency firm. Five denticulate ridges, but only four at apex as left ventral ridge joins the right ventral ridge just below the apex. Bases of ventral ridges dissimilar, in that the right ridge starts from the ventral notch in the hydroecium, while the left ridge starts at the level of the ostium. Hydroecium deep, with a rounded apex. Bases of the lateral walls of the hydroecium asymmetrical, with sharp ends. Basal lamella divided into two lanceolate wings, right wing larger than left wing. Somatocyst, arising from a tiny peduncle, carrot-shaped, reaching to around the midpoint of the nectosac. Bract hood-shaped, with two serrated ridges and a large, deep base. Phyllocyst tall

and straight, reaching nearly to the apex. Gonophore spiral, with four slightly dentate ridges, truncated at the summit.

Distribution: Benguela Current: widely distributed on the shelf and in the oceanic zone throughout the region. World-wide distribution: widely distributed in the temperate regions in the three great oceans, including the Mediterranean (ALVARIÑO, 1971; PUGH, 1974).

Family SPHAERONECTIDAE Huxley, 1859

Sphaeronectes gracilis (Claus, 1873, 1874)
(Fig. 44)

References: CHUN 1892, p. 108-110; fig. 5. MOSER 1925, p. 30 fig. 4d, p. 97-99, as *Sphaeronectes köllikeri*. TOTTON 1965, p. 202-203; fig. 138; pl. XXXVI fig. 1. CARRÉ 1968c, p. 85-92; pl. I fig. 1, pl. II figs. 1-4; tabs. I-II. CARRÉ 1969a, p. 31-33; pl. I figs. 1-8. PALMA 1973, p. 52-53; pl. XXIX figs. 1-2. IANORA and SCOTTO DI CARLO 1981, p. 55-61; figs. 2C,3C,4.2; tab. 1. PURCELL and KREMER 1983, p. 95-104. KIRKPATRICK and PUGH 1984, p. 126-127; fig. 56.

Material examined: SWAPELS December 1981: 04-04 (9), 04-12 (1), 10-04 (1), 10-10 (4), 10-12 (1), 10-14 (1), 16-06 (16), 22-08 (3), 34-12 (1), 58-10 (2), 58-14 (4), 94-10 (1), 94-12 (1), 94-14 (1). SWAPELS January 1982: 04-08 (1), 10-12 (8), 16-10 (5), 16-14 (1), 28-14 (1), 40-12 (1), 40-14 (2). SWAPELS February 1982: 04-02 (3), 10-10 (14), 10-12 (13), 10-14 (1), 16-02 (17), 16-03 (76), 16-04 (5), 16-08 (2), 16-10 (4), 16-12 (26), 16-14 (24), 22-10 (6), 22-14 (6), 28-10 (3), 28-12 (4), 28-14 (7), 34-12 (3), 34-14 (2), 76-14 (1), 94-12 (1). SWAPELS March 1982: 10-02 (1), 10-03 (23), 10-04 (1), 10-06 (3), 10-08 (3), 16-06 (2), 16-10 (26), 16-12 (36), 16-14 (13), 22-10 (8), 22-12 (1), 28-06 (1), 28-08 (6), 28-10 (12), 28-12 (4), 28-14 (29),34-10 (1), 34-12 (2), 46-12 (4), 52-12 (2). SNEC II: E-37 P-2 (1), E-37 P-4 (2), E-40 P-2 (2), E-41 P-2 (2), E-41 P-4 (5), E-42 P-3+4 (1), E-42 P-5 (2), E-43 P-2 (7), E-44 P-2 (1), E-45 P-4 (1), E-47 P-2 (11), E-47 P-3+4 (10), E-50 P-2 (1), E-50 P-4 (1), E-51 P-2 (26), E-51 P-4 (1), E-51 P-5 (4), E-51 P-6 (5), E-52 P-4 (3), E-52 P-5 (14), E-52 P-6 (2), E-53 P-4 (1), E-55 P-5 (20), E-55 P-6 (16), E-57 P-2 (3), E-57 P-4 (18), E-57 P-5 (45), E-57 P-6 (120), E-58 P-2 (1), E-58 P-4 (5),E-58 P-5 (2), E-58 P-6 (40), E-59 P-2 (24), E-59 P-4 (18), E-59 P-5 (5), E-59 P-6 (13), E-61 P-5 (9), E-66 P-3 (3), E-68 P-3 (14), E-68 P-4 (2), E-72 P-4 (1), E-72 P-6 (13), E-73 P-5 (3), E-75 P-6 (3), E-76 P-3 (9), E-76 P-4 (2), E-76 P-6 (1), E-77 P-2 (4), E-77 P-3 (5), E-77 P-4 (1), E-77 P-5 (4), E-77 P-6 (4), E-78 P-2 (1), E-78 P-2 (1), E-78 P-3 (3), E-78 P-5 (7), E-78 P-6 (4), E-80 P-2 (4), E-80 P-3 (15), E-80 P-4 (4), E-80 P-5 (6), E-80 P-6 (2), E-81 P-2 (4), E-81 P-2 (4), E-81 P-3 (4), E-81 P-4 (2), E-81 P-5 (12), E-81 P-6 (14), E-83 P-2 (4), E-83 P-3 (10), E-83 P-4 (2), E-83 P-5 (9), E-85 P-2 (3), E-85 P-3 (4), E-85 P-6 (9), E-86 P-2 (5), E-86 P-3 (7), E-86 P-6 (5), E-88 P-2 (4), E-88 P-3 (3), E-88 P-4 (3), E-88 P-6 (10), E-90 P-2 (3), E-90 P-3 (3), E-90 P-4 (2), E-90 P-5 (1), E-90 P-6 (7), E-91 P-2 (2), E-91 P-6 (9), E-92 P-2 (1), E-92 P-3 (2), E-92 P-5 (7), E-92 P-6 (29). WCHB July 1983: A0684 B11 (1). WCHB July 1984: A1529 B02 (1), A1556 B07 (2), A1574 B12 (2), A1611 B21 (1), A1668 B35 (6). AFRICANA 045 Cruise: 11-2-1 (1), 11-2-2 (1).

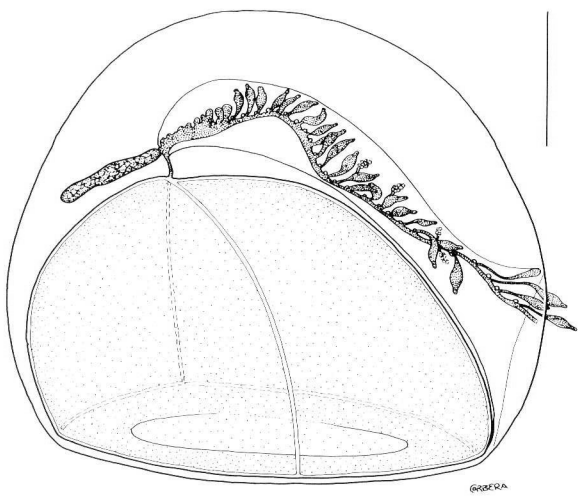

FIG. 44. — Nectophore of *Sphaeronectes gracilis* (lateral view). Scale bar = 1 mm.

Description: Polygastric stage; nectophore spherical, quite fragile, up to 7.0 mm high. Nectosac large, reaching to half of nectophore height. The intersection between lateral canals and dorsal canal. Velum broad. Pedicular canal long, readily distinguishable. Hydroecium tubular, running from the external opening to the pedicular canal at the apex of the nectosac. Somatocyst horizontal, short, fusiform, directed towards the dorsum above the apex of the nectosac. Eudoxid not collected in the region.

Distribution: Benguela Current: first record for the region. Present offshore throughout the system. More abundant in the northern Benguela, which the species is carried in by intrusions of Angolan water (PAGÈS and GILI, 1991b). Epiplanktonic distribution, forming aggregations in the surface layers. World-wide distribution: common in the western Mediterranean (IANORA and SCOTTO DI CARLO, 1981); in the Atlantic collected off the Canary Islands (CHUN, 1892) and the British Isles (KIRKPATRICK and PUGH, 1984). In the Pacific collected off California (PURCELL and KREMER, 1983) and Chile (PALMA, 1977).

Family ABYLIDAE L. Agassiz, 1862

Ceratocymba dentata (Bigelow, 1918)
(Fig. 45A-B)

References: BIGELOW 1918, p.409-410; pl. 5 figs. 1-4. MOSER 1925, p. 293-298; pl. XVII figs. 1-3, pl. XVIII figs. 1-5, pl. XIX figs. 1-2. SEARS 1953, p. 69-71; figs. 1B, 21. TOTTON 1954, p. 152-155; figs. 80-81; pl. X, pl. XI figs. 1-5. TOTTON 1965, p. 207-208; pl. XXXVIII figs. 1-3. ALVARIÑO 1971, p. 170-171. DANIEL 1974, p. 179-180; fig. 14 H-N.

Material examined: SWAPELS February 1982: 10-06 (1). SWAPELS March 1982: 10-02 (1).

Description: Only eudoxid collected. Bract triangular but with five sides when viewed dorsally or ventrally. Height: 14.0 mm; width: 13.8 mm. Compared with the bract of *C. sagittata*, bract wider, with less prominent supralateral horns and more rounded basal margins. Slight depression in the centre of the apico-ventral ridge. Dorsal ridge well-developed,

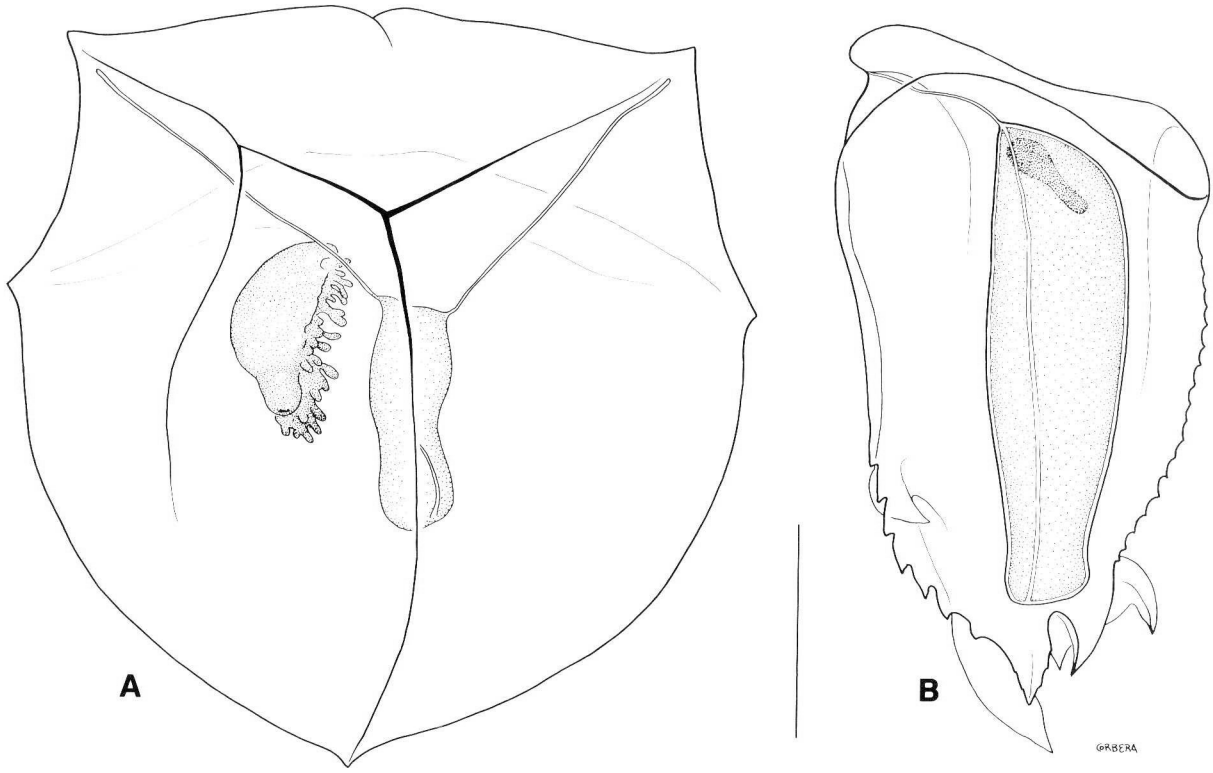

FIG. 45. — *Ceratocymba dentata*; A bract (dorsal view), B gonophore (lateral view). Scale bar = 5 mm.

smooth, latero-dorsal ridges slightly serrate. Ridge on lateral left surface issuing from the apico-lateral ridge and ending halfway along the lateral surface without reaching the lower margin is the differentiating morphological character. Phyllocyst cylindrical, with two long, very thin diverticula directed towards the apico-lateral corners; basal end curved upwards. Eudoxid bearing up to three gonophores of either sex, symmetrical, like mirror-images. Rectangular, ridges untoothed, up to 17.2 mm high. Hydroecial canal deep, protected by two ventral wings with more prominent upper halves. One of the ventral wings bearing a conspicuous, inwardly directed hook-shaped tooth. Basal teeth robust, longest on the same side as the prominent hook.

Distribution: Benguela Current: first record for the region. The two eudoxids were collected at two stations on the same transect on the continental shelf between Cape Frio and the Cunene River in two consecutive months. Upwelling activity was low at the time of capture, suggesting that these specimens were carried into the region by the Angola Current, in which the species had already been cited (SEARS, 1953), west (08°13'S, 02°59'E) and southwest (10°19' S, 09°36' E) of Luanda. World-wide distribution: uncommon but present in the tropical regions in the three great oceans (Alvariño, 1971). Depth distribution broad, ranging from the surface to depths of more than 1 000 m.

Ceratocymba leuckarti (Huxley, 1859) (Fig. 46A-B)

References: LENS and VAN RIEMSDIJK 1908, p. 34-35; figs. 41-45; pl. V figs. 42-46, as *Abyla leuckarti*. SEARS 1953, p. 67-68; figs. 1A, 2B, 19 A-B, 20. DANIEL and DANIEL 1963, p. 215-216; fig. VIII 8-11. TOTTON 1965, p. 205; figs. 139, 141 B,D; pl. XXXVI figs. 2-5,7. NETO and LOURENÇO 1973, p. 32-33; figs. 33-36. RENGARAJAN 1973, p. 148-150; figs. 13-14a. DANIEL 1974, p. 177-180; fig. 14 E-G. CASANOVA 1980, p. 19; fig. 2. ALVARIÑO 1981, p. 430-431; fig. 174-82. ALVARIÑO *et al.*, 1990, p. 50; fig. 76; map. A266-A267, B57.

Material examined: VALDIVIA I: V-30 P-85, IKMT 11, 26-5-1982, 27°02'S 14°07'E (1).

Description: Polygastric stage; anterior nectophore rectangular, laterally compressed, 5.2 mm high. Apical surface flat, hexagonal. Ventral surface elongate, narrow, fusiform. Nectosac, hydroecium, and somatocyst high, cylindrical, apices all at the same level, quite near the apex of the nectophore. Lateral ridges in a more ventral position than in other species of the genus, progressively approaching the dorsum as they descend, without reaching the basal margin.

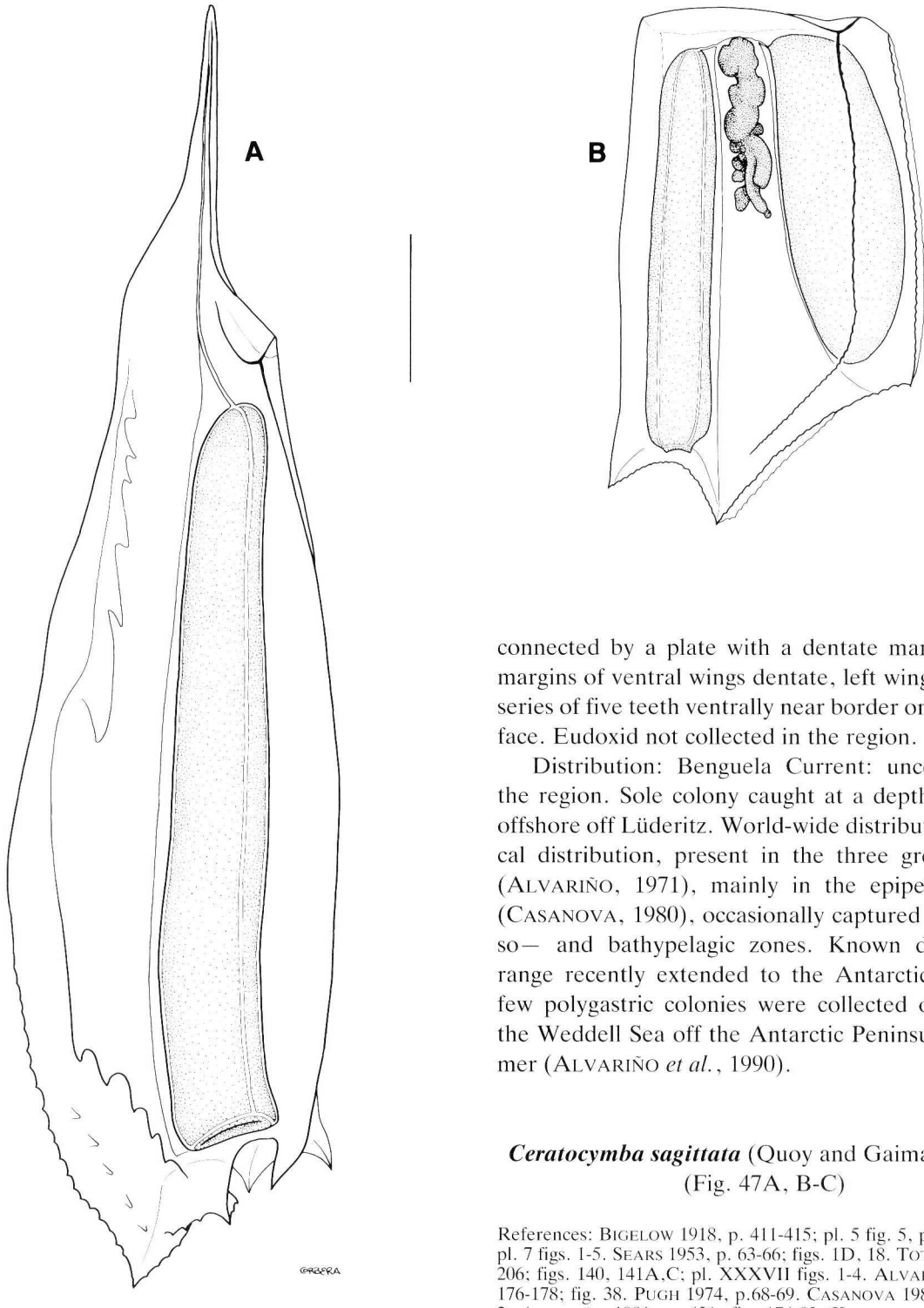

FIG. 46. — Nectophores of *Ceratocymba leuckarti*; A posterior, B anterior (lateral views). Scale bar = 2 mm.

Posterior nectophore fusiform, up to 13.2 mm high, laterally compressed, with a conspicuous apophysis. Right ventral wing bearing a comb with five teeth. Basal tooth on left wing more elongate than the rest but not as much as in *C. sagittata*. Ventral basal teeth connected by a plate with a dentate margin. Basal margins of ventral wings dentate, left wing bearing a series of five teeth ventrally near border on inner surface. Eudoxid not collected in the region.

Distribution: Benguela Current: uncommon in the region. Sole colony caught at a depth of 200 m offshore off Lüderitz. World-wide distribution: tropical distribution, present in the three great oceans (ALVARIÑO, 1971), mainly in the epipelagic zone (CASANOVA, 1980), occasionally captured in the meso— and bathypelagic zones. Known distribution range recently extended to the Antarctic, where a few polygastric colonies were collected offshore in the Weddell Sea off the Antarctic Peninsula in summer (ALVARIÑO *et al.*, 1990).

Ceratocymba sagittata (Quoy and Gaimard, 1827) (Fig. 47A, B-C)

References: BIGELOW 1918, p. 411-415; pl. 5 fig. 5, pl. 6 figs. 1-3, pl. 7 figs. 1-5. SEARS 1953, p. 63-66; figs. 1D, 18. TOTTON 1965, p. 206; figs. 140, 141A,C; pl. XXXVII figs. 1-4. ALVARIÑO 1971, p. 176-178; fig. 38. PUGH 1974, p.68-69. CASANOVA 1980, p. 19; fig. 2. ALVARIÑO 1981, p. 431; fig. 174-83. KIRKPATRICK and PUGH 1984, p. 130-131; fig. 57.

Material examined: SNEC II: E-47 P-5 (1), E-52 P-5 (1), E-60 P-2 (1), E-71 P-3 (1), E-73 P-5 (1), E-92 P-4 (1).

Description: Polygastric stage: anterior nectophore pyramidal, elongate, up to 17.2 mm high. Large, tapered apical process called a pyramidal process. Four ridges converging at the apex. Characteristic apical surface of the Family Abylinae no longer pre-

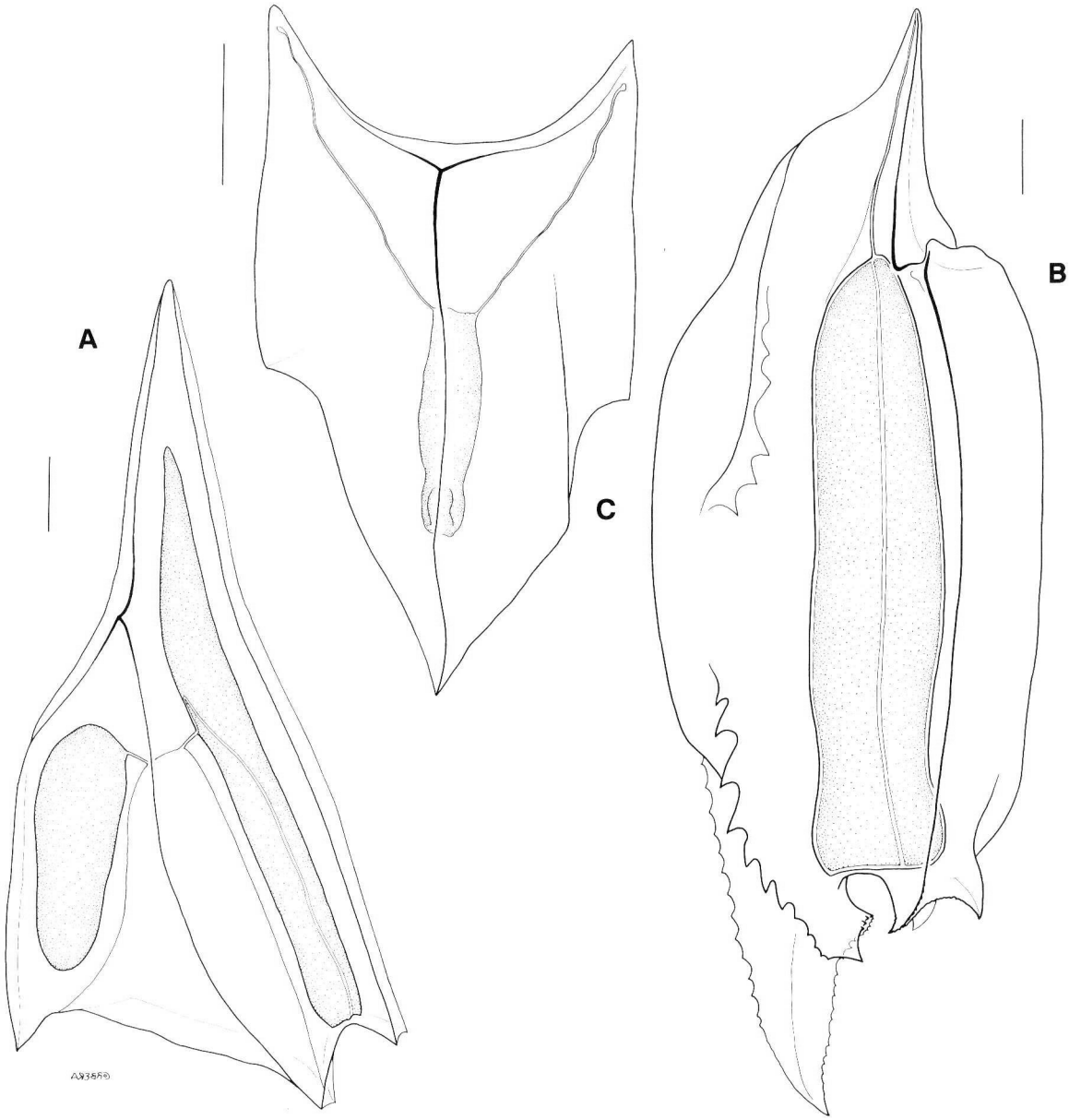

FIG. 47. — *Ceratocymba sagittata*: A anterior nectophore (lateral view), B posterior nectophore (lateral view), C bract (dorsal view). Scale bar = 2 mm.

sent. Hydroecium bell-shaped, with a large opening, in the centre of the base of the nectophore. Nectosac narrow, high, reaching almost to the apex of the nectophore. Lateral radial canals ascending over a short segment of the nectosac from the pedicular canal, describing a very tight arc and then descending towards the ostial canal. Somatocyst oval, positioned between the dorsal surface of the nectophore and the dorsal surface of the hydroecium; not extending past the apex of the hydroecium. Posterior nectophore elongate, up to 21.2 mm high. Left ventral wing ending in a characteristic prominent, elongate basal tooth. Comb on right ventral wing bearing six teeth; inferior margins of both wings dentate. Bract triangular, with two supra-lateral horns and a dorsal ridge ending in a point basally. Up to 15.0 mm high. Apical surface triangular, concave. Characterized by a right lateral ridge, originating at the lower margin, stopping before it reaches the apico-dorsal ridge. Phyllocyst cylindrical, with two filiform lateral projections and a basal tip recurved upwards. Gonophore with basal teeth varying in size. A relatively short, inconspicuous hook issuing from one of the ventral ridges, curving towards the base of the hydroecium. Teeth located above the hook on the ventral margin of the opposite wing. A small dorsal tooth. Lateral ridge near the bracteal wall deeper than the opposing ridge at the apex.

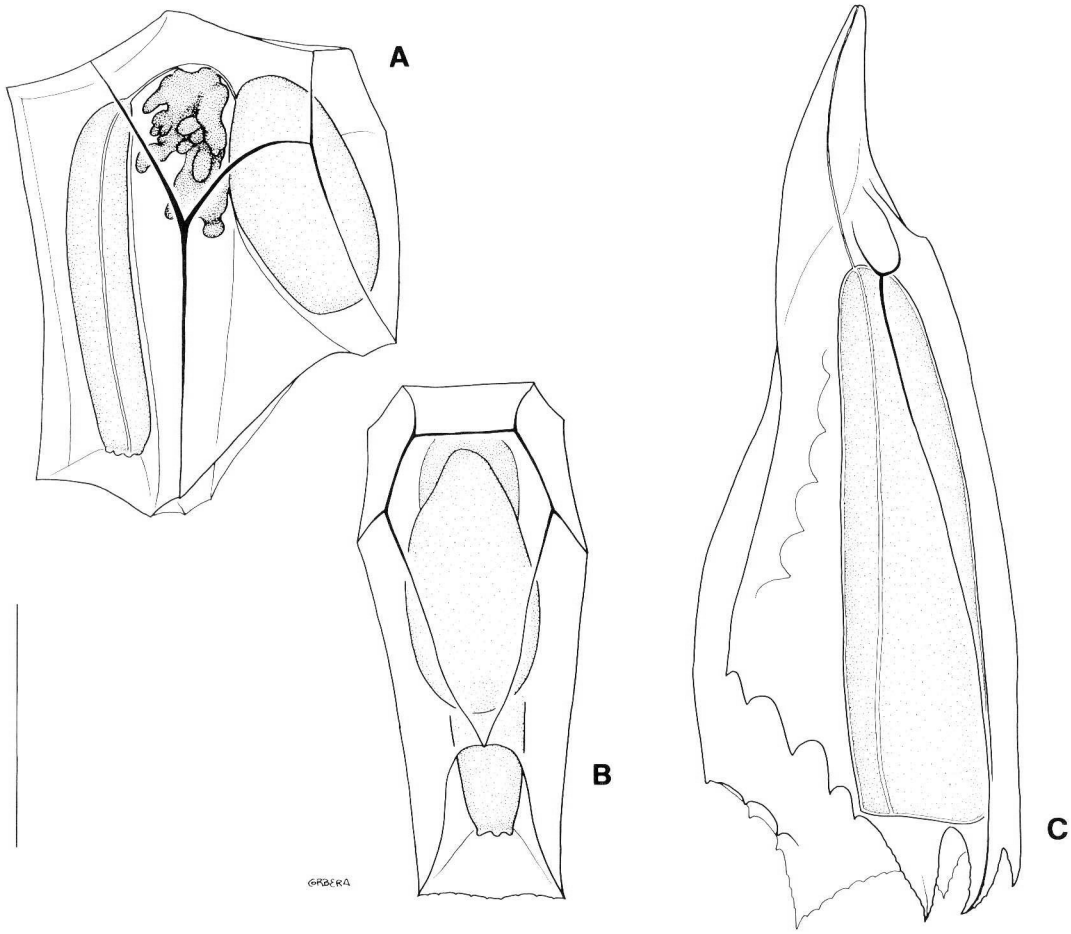

FIG. 48. — *Abyla ingeborgae*; anterior nectophore (A lateral view, B ventral view), C posterior nectophore (lateral view). Scale bar = 5 mm.

Distribution: Benguela Current: occasionally present, normally the eudoxid stage, collected offshore between Möwe Point and the Cunene River in the northern Benguela. Vertical distribution spanning the entire epiplanktonic zone in the water column. World-wide distribution: widely distributed in the Atlantic Ocean, where its is range very broad. Also present in temperate regions in other seas and in the Mediterranean (ALVARIÑO, 1971). Epipelagic distribution (CASANOVA, 1980).

Abyla ingeborgae Sears, 1953
(Fig. 48A, B-C)

References: SEARS 1953, p. 42-44; figs. 11C, 12E, 13E, 14E. TOTTON 1954, p. 152; figs. 58 A-B. TOTTON 1965, p. 211; figs. 144, 145 A,B. NETO and LOURENÇO p. 34-35; figs. 37-39. ALVARIÑO 1981, p. 428; fig. 174-77.

Material examined: SNEC II: E-83 P-3 (1).

Description: Polygastric stage; anterior nectophore polyhedral, characteristic of the genus *Abyla*, 8.6 mm in height, 3.3 mm in width, and 5.4 mm in dorso-ventral length. Differentiated from the other species by a conspicuous pentagonal ventral surface, very straight sides, and basal ventrolateral ridges much longer than the apical ventrolateral ridges, unlike *A. haeckeli*, in which the ventral surface is a rather regular pentagon. Viewed ventrally, the transverse or upper ridge of the pentagon is located just above the apex of the somatocyst. Dorsal surface nearly a perfect rectangle. Lateral processes, that is, the cusps marking the maximum width when viewed dorsally or ventrally, not very prominent. Posterior nectophore up to 14.6 mm in height by 5.2 mm in dorso-ventral length, including the ventral wings. Comb with five teeth on the right ventral wing. Dorsal tooth not prominent.

Distribution: Benguela Current: first record for the region. Caught at depths between 100 and 60 m at

an oceanic station off the Cunene River. World-wide distribution: uncommon and infrequently cited. Collected in the Atlantic from the oceanic zone at 07°34'5" S, 08°84' E ??, east of Ascension Island, at 08°13' S, 02°54' E, and offshore off Angola (SEARS, 1953), Sierra Leone, west and southeast of the Cape Verde Islands, and north of Fernando de Noronha at 03°26'2" S, 32°08'3" W (TOTTON, 1954). NETO and LOURENÇO (1973) studied some specimens collected in the surface layer inshore off the Cape Verde Islands. Cited in the Indian Ocean northwest of the Seychelles (01°12' N, 62°19' E; 03°36' S, 58°19' E), north of Madagascar (11°18' S, 50°03' E), and off Mozambique (25°19' S, 36°13' E) (SEARS, 1953).

Abyla tottoni Sears 1953
(Fig. 49A, B-C)

References: SEARS 1953, p. 47-48; fig. 12B, 13B, 14B, 15 B. TOTTON 1954, p. 151; pl. IX. TOTTON 1965, p. 214-215; pl. XXXIX. ALVARIÑO 1971, p. 146. NETO and LOURENÇO 1973, p. 35-36; figs. 40-42. PAGÈS and GILI, 1991b tab. 1 as *A. schmidti*.

Material examined: BENGUELA III: E-46 P-37 (1). SNEC II: E-78 P-6 (1).

Description: Polygastric stage: anterior nectophore more cubical than in the other species of the genus. Upper half more swollen, with less pronounced ridges and more rounded margins. Largest specimen examined measuring 9.3 mm in height, 6.6 mm in

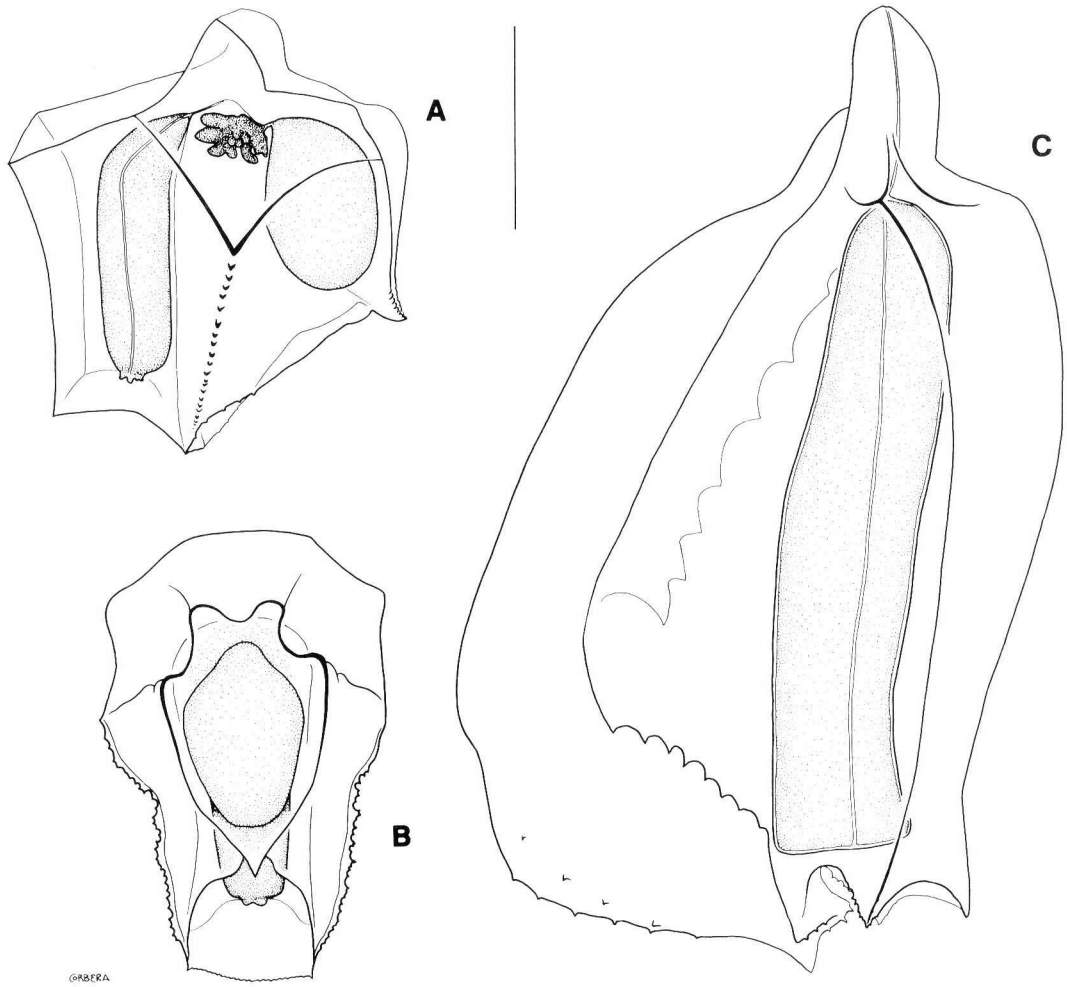

FIG. 49. — *Abyla tottoni*; anterior nectophore (A lateral view, B ventral view), C posterior nectophore (lateral view). Scale bar = 5 mm.

width, and 7.3 mm in dorso-ventral length. Margins of apico-transverse ridge rounded, two rounded protuberances ventrally in place of the transverse ridge. Lateraly projections more prominent than in other members of the genus, with a depression on the ventral portion, just below the transverse apical ridge. Apico-dorsal surface large, larger than the apico-ventral surface. Largest posterior nectophore 20.0 mm in height, including the apophysis, and measuring 10.6 mm in width at the point of maximum width on the left wing. Upper half of left wing curved, lower half straighter, though this character is variable. Basal margin of the left wing bearing between four and eight small teeth. Parallel to the basal margin a row of five or six teeth on the inner surface of the left wing. Basal margin of right wing bearing between 8 and 10 teeth. Comb located on the upper half of the right wing, consisting of seven or eight teeth. "Dorsal" ridge according to SEARS (1953), "right" ridge according to TOTTON (1965) enlarged towards the apex and curving before ending at the apophysis.

Distribution: Benguela Current: first record for the region. The two specimens examined were collected offshore in the northern Benguela off the Cunene River and between Möwe Point and Palgrave Point. The depth intervals suggest that this species inhabits the surface layers. World-wide distribution: very seldom encountered, inhabiting the surface layers in the Atlantic and Pacific oceans. In the Atlantic cited by SEARS (1953) near Saint Helena (15°41' S, 05°50' W), between Ascension Island and Saint Helena (11°00' S, 07°36' W), and east of Ascension Island (07°34' S, 08°48' W). TOTTON (1954) cited this species near Saint Helena (14°25'9" S, 02°51'5" W) and off Brazil (11°02'1" S, 29°51' W). NETO and LOURENÇO (1973) recorded it in the surface layer off the Cape Verde Islands. In the Pacific reported by SEARS (1953) between Timor and New Guinea (05°28' S, 130°39' E) and by ALVARIÑO (1971) in the Philippines, Indonesia, and east of Japan.

Abylopsis tetragona (Otto,1823)
(Fig. 50A,B-C)

References: BIGELOW 1911b, p. 224-226; pl. 14 figs. 6-7, pl. 15 fig. 2. TOTTON 1932, p. 333-335; figs. 14B, 15B. SEARS 1953, p. 80-84; figs. 25 A,C,D, fig. 26 D. TOTTON 1954, p. 155-157; figs. 82-83. TOTTON 1965, p. 216-218; figs. 149-150; pl. XL figs. 1,3. CARRÉ 1967b, p. 185-192; figs. 1-2; pls. I-II. ALVARIÑO 1971, p. 155-162; fig. 33; NETO and LOURENÇO 1973, p. 36-38; figs. 43-46. PALMA 1973, p. 54-57; pls. XXX-XXXIII. PUGH 1974, p. 69-70. BONE and TRUEMAN 1982, p. 315-327; figs. 1B, 2A, 3 A-C, 5 A-F, 6A; tab. 1. GILI 1986, p. 280-281; figs. 4.53 D-F, 4.63 a,e,i. GILI *et. al.*, 1987a, p. 333; figs. 2,8. ALVARIÑO *et. al.*, 1990, p. 54; fig. 81; maps. A272, B61.

Material examined: SWAPELS December 1982: 10-04 (1), 10-14 (1), 16-06 (2), 16-08 (15), 16-10 (16), 16-12 (4), 22-06 (1), 22-08 (2), 22-12 (2), 22-14 (1), 28-14 (17), 34-12 (1), 70-14 (1), 76-10 (1), 76-14 (1), 82-10 (4), 82-12 (2), 82-14 (13), 88-03 (1), 88-14 (4), 94-10 (1), 94-12 (1), 94-14 (7). SWAPELS January 1982: 04-08 (1), 04-10 (1), 04-12 (1), 10-04 (2), 10-12 (11), 10-14 (22), 16-12 (7), 16-14 (4), 22-14 (1), 28-14 (1), 46-14 (7), 64-14 (2), 70-10 (1), 70-12 (3), 70-14 (27), 76-10 (1), 76-12 (2), 76-14 (1), 82-06 (1), 82-08 (4), 82-10 (4), 82-12 (3), 82-14 (14), 88-12 (1), 88-14 (30). SWAPELS February 1982: 04-12 (5), 04-14 (2), 10-12 (1), 10-14 (6), 16-08 (2), 16-10 (5), 16-12 (17), 16-14 (16), 28-08 (2), 28-10 (2), 28-12 (3), 28-14 (4), 34-10 (1), 34-12 (2), 34-14 (2), 40-12 (3), 40-14 (8), 46-12 (1), 46-14 (2), 76-08 (2), 76-10 (5), 76-12 (3), 76-14 (2), 82-10 (28), 88-10 (4), 82-12 (6), 94-14 (2). SWAPELS March 1982: 04-08 (1), 04-12 (4), 04-14 (4), 10-06 (10), 10-08 (3), 10-10 (5), 10-12 (3), 10-14 (6), 16-06 (6), 16-10 (2), 16-12 (4), 16-14 (2), 22-10 (4), 22-12 (1), 22-14 (2), 28-12 (2), 34-10 (1), 34-12 (1), 46-12 (1), 46-14 (1), 52-12 (1) 76-12 (6), 76-14 (6), 82-08 (7), 82-10 (5), 82-12 (10), 82-14 (19), 88-10 (4), 88-12 (28), 88-14 (29). SNEC II : E-16 P-6 (1), E-17 P-3+4 (1), E-17 P-6 (1), E-18 P-6 (1), E-25 P-5 (1), E-25 P-6 (121), E-26 P-5 (35), E-26 P-6 (23), E-27 P-5 (1), E-27 P-6 (36), E-29 p-5 (6), E-36 p-2 (4), E-36 P-5 (2), E-36 P-6 (23), E-37 P-5 (1), E-43 P-6 (2), E-44 P-6 (13), E-45 P-5 (9), E-45 P-6 (19), E-46 P-6 (3), E-47 P-6 (1), E-49 P-2 (1), E-49 P-6 (2), E-51 P-6 (2), E-52 P-5 (5), E-52 P-6 (6), E-53 P-4 (5), E-53 P-5 (2), E-53 P-6 (3), E-57 P-6 (1), E-58 P-6 (7), E-59 P-5 (9), E-59 P-6 (8), E-60 P-2 (3), E-60 P-6 (1), E-61 P-2 (3), E-61 P-3 (2), E-61 P-6 (8), E-66 P-3 (1), E-66 P-5 (1), E-68 P-5 (3), E-68 P-6 (14), E-69 P-4 (1), E-69 P-5 (2), E-69 P-6 (14), E-71 P-3 (2), E-71 P-4 (1), E-71 P-5 (9), E-71 P-6 (30), E-72 P-5 (17), E-72 P-6 (45), E-73 P-5 (6), E-73 P-6 (14), E-76 P-3 (1), E-76 P-5 (1), E-76 P-6 (8), E-77 P-5 (1), E-77 P-6 (21), E-78 P-2 (2), E-78 P-3 (1), E-78 P-6 (16), E-80 P-5 (4), E-80 P-6 (14), E-81 P-6 (13),E-83 P-3 (1), E-83 P-5 (1), E-85 P-6 (11), E-86 P-5 (1), E-86 P-6 (1), E-88 P-5 (4), E-88 P-6 (12), E-90 P-6 (12), E-91 P-6 (4), E-92 P-5 (7), E-92 P-6 (2). WCHB July 1983: A0651 B03 (2), A0662 B04 (2), A0666 B05 (3), A0669 B06 (5), A0678 B09 (4), A0683 B10 (1), A0700 B17 (2), A0705 B18 (2). WCHB July 1984: A1567 B10 (3), A1572 B11 (3), A1580 B13 (1), A1583 B16 (2), A1596 B17 (1), A1611 B21 (2), A1641 B21 (2), A1641 B28 (1), A1664 B34 (1). CELP August 1977: 24-12 (1), 32-10 (1), 56-10 (1), 56-12 (1), 60-10 (1), 64-08 (1). CELP January 1978: 28-12 (1), 32-06 (1), 32-08 (1), 40-10 (2), 40-12 (3), 48-10 (2), 48-12 (15), 52-08 (1), 52-10 (2), 52-12 (1), 56-02 (1), 56-06 (2), 56-08 (1), 56-10 (10), 60-08 (1), 60-10 (2), 60-12 (5), 64-12 (4), 68-08 (1), 68-10 (4), 68-12 (1), 84-04 (1).

Description: The polygastric stage of this species clearly distinguishable from that of *A. eschscholtzi* by the greater length of the posterior nectophore in relation to the anterior nectophore, approximately four to five times in *A. tetragona* and 1.5-2.5 times in *A. eschscholtzi*. Anterior nectophore a polyhedral with seven faces, ventral and dorsal surfaces pentagonal, the latter higher, up to 4.6 mm in height. Hydroecium deep, reaching nearly to the midpoint of the nectophore. Radial canals of nectosac originating at the junction with the pedicular canal and rising towards the upper end, forming an arc, and then descending to the circular canal. Somatocyst globular, with an apical diverticulum at the level of the nectosac. Posterior nectophore rectangular, up to 18.0 mm high by 6.6 mm wide, with a prominent apophysis. Four radial canals in the upper half, five in the lower half, because the left ventral canal has a blind termination halfway up and a little above that the origin of a new canal forming a right angle and directed towards the ostial canal. A "rete" at the base of the right ventral canal, from which a short, blind ventral

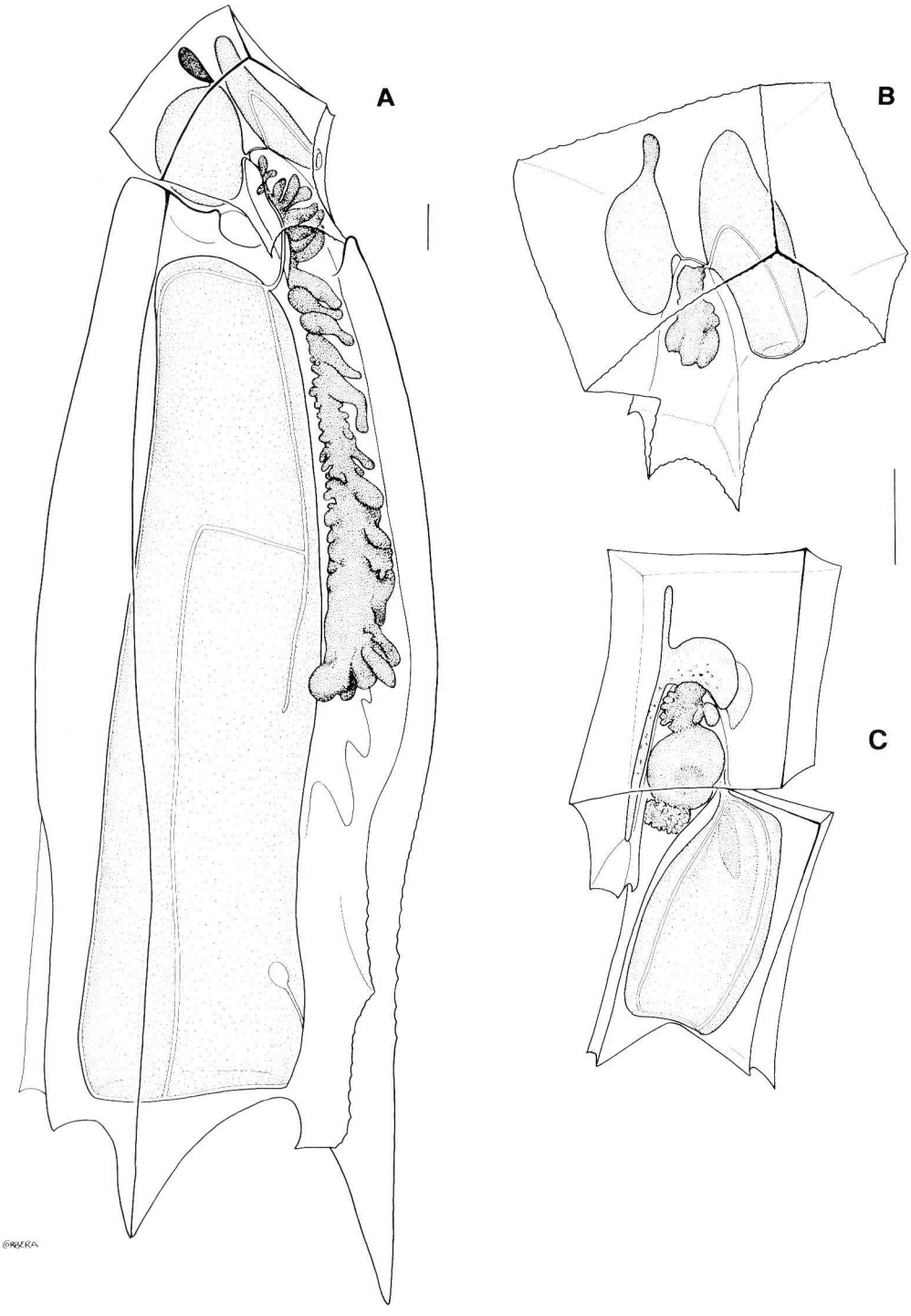

FIG. 50. — *Abylopsis tetragona*; A polygastric stage (lateral view), B anterior nectophore (latero-dorsal view), C eudoxid (lateral view). Scale bar = 1 mm.

canal issues towards the left. Upper half of the right wing of hydroecium bearing a comb-like structure with nine teeth. Lower portion bearing five basal teeth varying in size, right ventral tooth largest. Bract cuboidal. Dorsal surface pentagonal, up to 4.0 mm high. Upper half of phyllocyst bearing two thick, lateral processes above the hydroecium and extending towards the apical surface in the form of a narrow diverticulum. Hydroecium deep, with a concave apex, reaching halfway up the bract. Gonophore in the shape of a rectangular prism 4.6 mm high with four distinct ridges ending in four acute basal cusps, the ventral cusps somewhat larger than the dorsal cusps. Apophysis large and pedicular canal distinctly visible.

Distribution: Benguela Current: common, highly abundant throughout the system, mainly far offshore.

Level of abundance constant all year long, eudoxids always more abundant than the polygastric stage. Present throughout the epipelagic zone, forming aggregations in the surface layers, where eudoxids abound. World-wide distribution: quite common in the temperate regions in all seas, and in the Mediterranean (ALVARIÑO, 1971). Epipelagic (PUGH, 1974), but also present in the mesopelagic zone (GILI *et al.*, 1987a). One of the most abundant siphonophores in all seas.

Abylopsis eschscholtzi (Huxley, 1859) (Fig. 51A-B)

References: BIGELOW 1911b, p. 226-229; pl. 14 figs. 1-5; pl. 15 fig. 1. MOSER 1925, p. 334-339; pl. XX figs. 5-6, pl. XXI figs. 1-2,5. LELOUP and HENTSCHEL 1935, p. 20; fig. 5. SEARS 1953, p. 84-87; figs. 2D, 25B, E. TOTTON 1965, p. 218-219; pl. XL figs. 2,4,6. ALVARIÑO 1971, p. 149-154; fig. 32. DANIEL 1974, p. 200-203; fig. 17 J-R. PUGH 1974, p. 70. ALVARIÑO 1981, p. 431-432; fig. 174-84C. GILI 1986, p. 281-282; figs. 4.53 A-B, 4.63 d-e,i.

Material examined: WCHB July 1983: A0649 B01 (18), A0651 B03 (27), A0662 B04 (10), A0666 B05 (17), A0669 B06 (6), A0677 B08 (2), A0678 B09 (8), A0683 B10 (1), A0684 B11 (6), A0694 B14 (2), A0695 B15 (6), A0699 B16 (2), A0700 B17 (2), A0705 B18 (6), A0716 B22 (1), A0732 B25 (1). WCHB July 1984: A1529 B02 (12), A1552 B06 (12), A1556 B07 (1), A1558 B08 (4); A1567 B10 (7), A1572 B11 (6), A1574 B12 (2), A1580 B13 (2), A1588 B15 (3), A1593 B16 (4), A1602 B18 (2), A1611 B21 (3), A1641 B28 (6), A1649 B30 (4), A1661 B33 (2), A1664 B34 (1). CELP August 1977: 08-08 (1), 24-08 (2), 24-12 (1), 32-10 (3), 44-02 (1), 52-10 (2), 56-06 (1), 56-08 (2), 56-10 (2), 60-08 (1), 60-10 (1), 64-08 (3), 64-10 (8), 64-12 (5), 68-04 (1), 68-08 (2), 68-12 (1), 72-06 (1), 72-08 (2), 72-10 (2), 76-10 (1), 76-10 (1), 80-02 (1), 84-10 (1). CELP January 1978: 28-10 (2), 28-12 (10), 32-08 (1), 32-12 (3), 36-08 (2), 36-10 (2), 36-12 (1), 40-12 (3), 44-08 (1), 44-12 (1), 48-04 (4), 48-06 (6), 48-08 (10), 48-10 (5), 48-12 (14), 52-12 (1), 56-08 (4), 56-10 (18), 56-12 (4), 60-10 (7), 60-12 (6), 64-06 (1), 64-12 (1), 68-04 (1), 68-06 (9), 68-08 (5), 68-10 (6), 68-12 (3), 72-04 (1), 72-06 (5), 72-08 (1), 72-10 (3), 76-06 (2), 76-08 (4), 76-10 (2), 80-04 (4), 80-06 (4), 80-08 (3), 80-10 (1), 80-12 (2), 84-06 (2), 84-08 (3).

Description: Polygastric stage rigid, with more pronounced serrate ridges than in *A. tetragona*. Anterior nectophore quite similar to that of *A. tetragona*, with the same external structure and the same number of faces and placement of ridges. Differentiated by radial canals forming a right angle from the pedicular canal and directed towards the ostial canal, rather than forming an arc directed at the apex as in *A. tetragona*. Posterior nectophore relatively much shorter than that of *A. tetragona*, height less than twice the width. Apophysis larger and more robust than in *A. tetragona*. Each hydroecial wing bearing a secondary wing whose inner margins are fused. Between four and eight teeth on the curve on the left wing, three or four on the right wing. Five basal teeth not as prominent as in *A. tetragona*. Dorsal surface of bract an equilateral pentagon. Baso-sagittal ridge much larger than in *A. tetragona*.

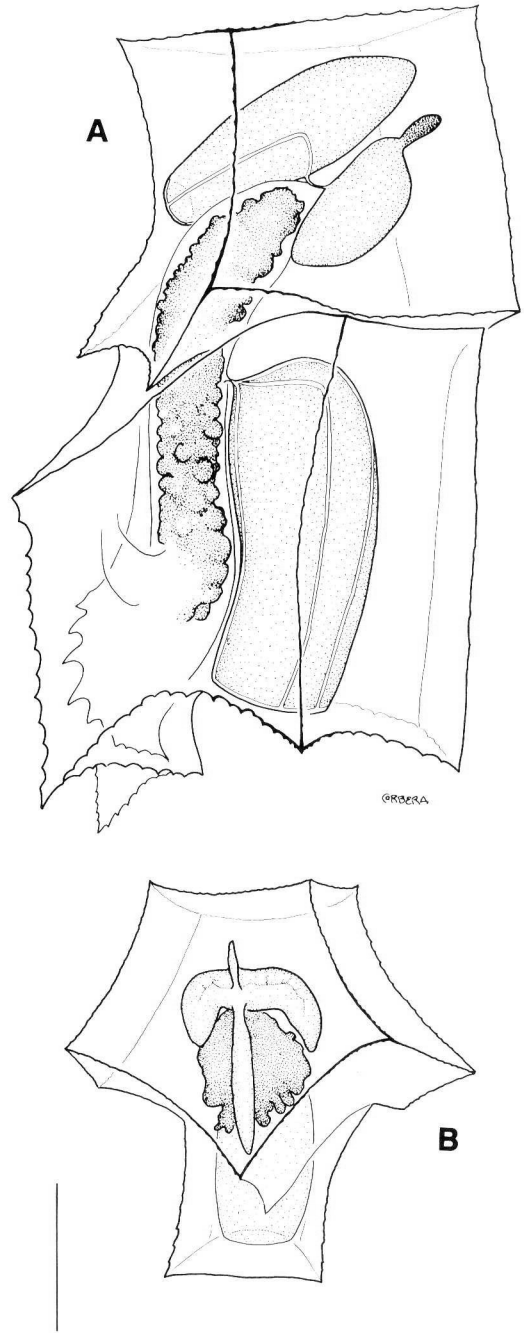

FIG. 51. — *Abylopsis eschscholtzi*; A polygastric stage (lateral view), B eudoxid (dorsal view). Scale bar = 1 mm.

Distribution: Benguela Current: cited by LELOUP and HENTSCHEL (1935) west of the Cape of Good Hope. Oceanic species caught only in the southern Benguela, where it is common and relatively abundant. Eudoxids more abundant than the polygastric stage, and the horizontal distributions overlap. World-wide distribution: common and abundant in the warm and temperate regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971). Epipelagic distribution (PUGH, 1974).

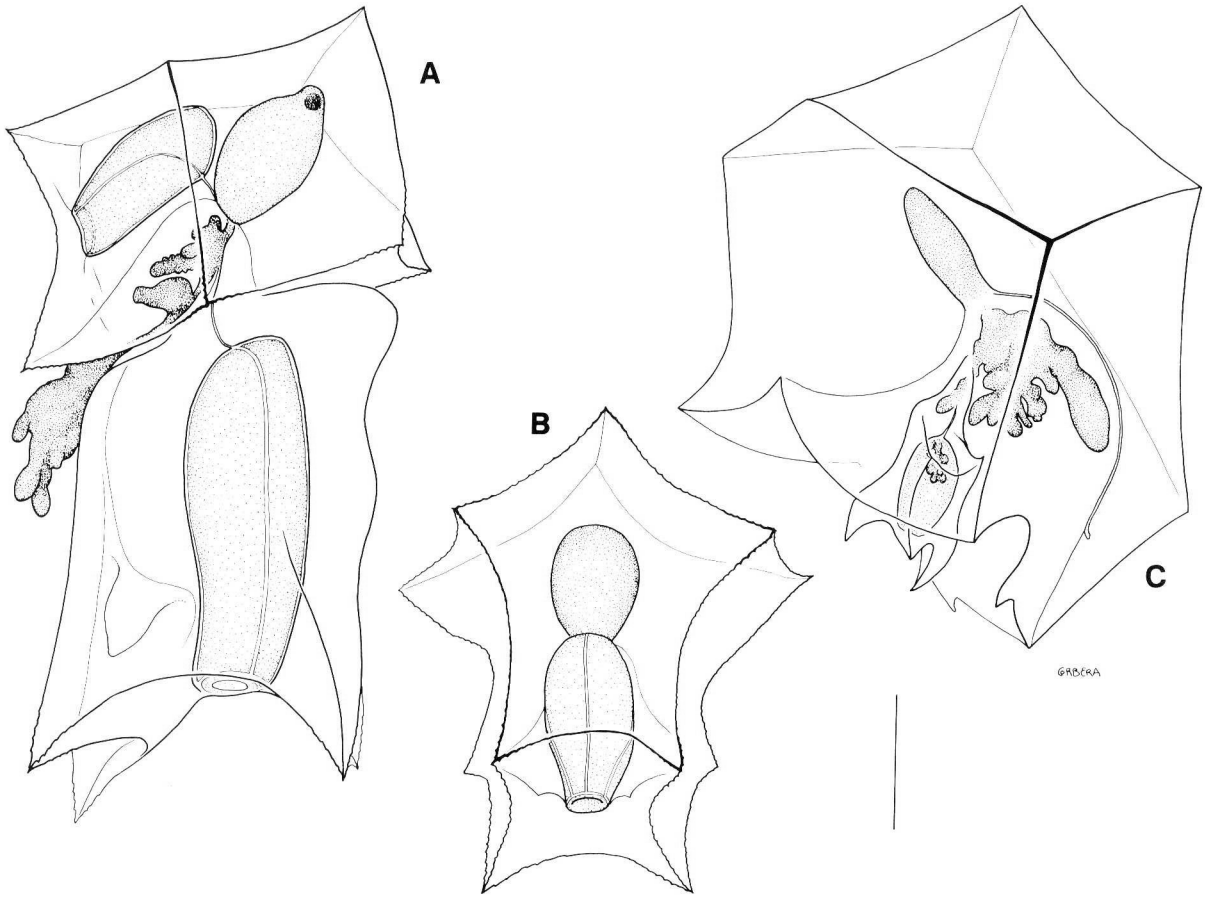

FIG. 52. — *Bassia bassensis*; A polygastric stage (lateral view), B anterior nectophore (dorsal view), C eudoxid (latero-ventral view). Scale bar = 1 mm.

Bassia bassensis (Quoy and Gaimard, (1833) 1834) (Fig. 52A,B-C)

References: BIGELOW 1911b, p. 229-231; pl. 12 fig. 8, pl. 14 fig. 9. MOSER 1925, p. 347-355; pl. XXI figs. 6-7, pl. XXII. TOTTON 1932, p. 339-340; fig. 18. BIGELOW and SEARS 1937, P. 26-28. SEARS 1953, p. 94-98; fig. 2F, 28 B-C. CERVIGÓN 1958, p. 43; figs 32-36. TOTTON 1965, p. 219-220; fig. 151, pl. XL fig. 5. ALVARIÑO 1971, p. 163-169; fig. 34; NETO and LOURENÇO 1973, p. 42-43; figs. 58-60. PALMA 1973, p.57-60; pls. XXXIV-XXXVII. DANIEL 1974, p.204-208; fig. 18 A-G. PUGH 1974, p. 70-72; fig. 11. ALVARIÑO 1981, p. 433-434; fig. 174-86. KIRKPATRICK and PUGH 1984, p. 134; fig. 60. GILI 1986, p. 281-282 ;figs. 4.53 A-B, 4.65 e,d,i.

Material examined: SWAPELS December 1981: 10-10 (1), 16-06 (3) 16-08 (1), 16-10 (4), 16-12 (2), 28-14 (7), 34-12 (1), 34-14 (7), 76 14 (2), 82-10 (1), 82-12 (4) 88-12 (3), 94-10 (2), 94-14 (2). SWAPELS January 1982: 04-12 (7), 10-04 (4), 10-12 (7), 10-14 (6), 16-10 (7), 16-12 (44), 16-14 (73), 22-14 (24), 28-04 (1), 46-12 (1), 46-14 (48), 52-14 (2), 64-14 (4), 70-12 (1), 70-14 (170), 76-14 (1), 82-08 (2), 82-10 (3), 82-12 (3) 82-14 (70), 88-10 (1), 88-14 (12). SWAPELS February 1982: 10-10 (1), 10-12 (2), 16-08 (6), 16-14 (61), 28-12 (1), 28-14 (3), 34-12 (5), 34-14 (5), 40-10 (2), 40-12 (5), 40-14 (26), 46-12 (13), 46-14 (9), 76-08 (1), 76-10 (4), 76-12 (1), 82-10 (26), 82-14 (50), 88-10 (3), 88-12 (6), 88-14 (63), 100-14 (10). SWAPELS March 1982: 10-04 (2), 10-06 (28), 10-08 (4), 16-06 (2), 16-08 (2), 16-10 (24), 16-12 (56), 16-14 (6), 22-12 (2), 22-14 (1), 28-10 (1), 28-12 (3), 28-14 (1), 40-08 (1), 46-12 (2), 52-12 (5), 52-14 (4), 76-12 (5), 76-14 (5), 82-12 (6), 82-14 (38), 88-12 (189), 88-14 (42). SNEC II: E-25 P-6 (4), E-26 P-5 (4), E-27 P-6 (5), E-28 P-5 (1), E-36 P-2 (2), E-36 P-5 (4), E-36 P-6 (20), E-41 P-5 (1), E-43 P-6 (1), E-44 P-5 (4), E-44 P-6 (17), E-45 P-5 (47), E-45 P-6 (29), E-46 P-6 (2), E-47 P-6 (1), E-52 P-4 (1), E-52 P-6 (15), E-58 P-6 (2), E-59 P-5 (2), E-59 P-6 (2), E-60 P-6 (1), E-61 p-3 (1), E-61 P-4 (1), E-61 P-5 (1), E-66 P-6 (1), E-68 P-3 (1), E-68 P-5 (1), E-68 P-6 (38), E-69 P-4 (1), E-69 P-5 (4), E-69 P-6 (19), E-71 P-5 (10), E-71 P-6 (12), E-72 P-5 (7), E-72 P-6 (30), E-73 P-6 (8), E-75 P-6 (5), E-76 P-6 (4), E-77 P-2 (1), E-77 P-6 (8), E-78 P-4 (1), E-78 P-6 (6), E-80 P-5 (2). E-80 P-6 (16), E-81 P-6 (12), E-83 P-4 (1), E-85 P-4 (1), E-85 P-5 (2), E-85 P-6 (6), E-86 P-5 (1), E-86 P-6 (1), E-88 P-5 (1), E-88 P-6 (6), E-90 P-5 (1), E-90 P-6 (7), E-91 P-6 (1), E-92 P-5 (4), E-92 P-6 (4). WCHB July 1983: A0649 B01 (37), A0651 B03 (18), A0662 B04 (2) A0666 B05 (12), A0669 B06 (4), A0677 B08 (2), A0678 B09 (9), A0683 B10 (1), A0684 B11 (6), A0694 B14 (4), A0695 B15 (3), A0699 B16 (1), A0700 B17 (2), A0705 B18 (3), A0707 B19 (3). WCHB July 1984: A1529 B02 (6), A1534 B03 (29), A1544 B04 (1), A1552 B06 (3), A1556 B07 (5), A1558 B08 (4), A1567 B10 (13), A1572 B11 (5), A1574 B12 (4), A1580 B13 (2), A1588 B15 (2), A1594 B16 (3), A1596 B17 (2), A1611 B21 (5), A1641 B28 (1). CELP August 1977: 52-04 (2), 52-08 (2), 56-08 (2), 56-10 (4), 56-12 (1), 60-10 (1), 60-12 (2), 64-02 (2), 64-08 (3), 64-10 (5), 64-12 (3), 68-12 (1), 72-06 (1). CELP January 1978: 28-12 (3), 32-08 (3), 32-12 (3), 40-12 (2), 44-08 (5), 48-04 (11), 48-06 (18), 48-08 (3), 48-10 (4), 48-12 (5), 52-08 (1), 52-12 (4), 56-10 (20), 56-08 (51), 56-06 (5), 56-12 (3), 60-08 (2), 60-10 (8), 60-12 (3), 64-06 (5), 64-08 (13), 64-12 (3), 68-02 (1), 68-04 (2), 68-06 (15), 68-08 (62), 68-10 (12), 68-12 (11), 72-04 (2), 72-06 (14), 72-10 (9), 72-12 (1), 76-06 (38), 76-08 (57), 76-10 (1), 76-12 (1), 80-02 (3), 80-04 (4), 80-06 (6), 80-10 (3), 80-08 (18), 84-04 (5), 84-06 (14), 84-08 (1).

Description: Polygastric stage — ridges on specimens fixed in formalin taking on a bluish-white hue (same applies to eudoxids). Anterior nectophore a

seven-sided polyhedral with pentagonal dorsal and ventral surfaces. Two quadrangular apico-lateral surfaces joined by a central apical ridge. Two large baso-lateral surfaces separated from the apico-lateral surfaces by a horizontal ridge. Hydroecium deep, reaching to the midpoint of the nectophore, with a large quadrangular opening. Nectosac relatively small, with lateral radial canals running from the ostial canal to the junction with the pedicular canal, with only a slight curve instead of an arc. Apices of hydroecium and nectosac more or less at the same level. Somatocyst globular, devoid of diverticulum or apical projection. Posterior nectophore higher than the anterior nectophore, up to 5.0 mm high. Consisting of four ridges, not as thin as in the anterior nectophore. Bases of ventral ridges comprising two prominent teeth, right tooth larger than left tooth. Bract in the form of a seven-sided polyhedral with well-developed ridges. Dorsal surface rhomboidal, ventral surface in the shape of a five-pointed star. Apico-lateral surfaces quadrangular. Baso-ventral margins of lateral surfaces describing a curve ending in a medial tooth. Hydroecium large, deep, hook-shaped, reaching to the midpoint of the bract. Phyllocyst short and finger-shaped.

Distribution: Benguela Current: common and very abundant in the oceanic region, distributed throughout the system all year round. Vertical distribution spanning the entire epiplanktonic zone in the water column, but population more abundant at the surface, where eudoxids aggregate. World-wide distribution: cosmopolitan species present in the temperate regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971).

Enneagonum hyalinum Quoy and Gaimard, 1827 (Fig. 53A-B)

References: CHUN 1892, p. 135-161; pl. X figs. 10-11, pl. XI figs. 1-7, pl. XII figs. 1-3, as *Halopyramis adamantina* y *Cuboides adamantina*. TOTTON 1932, p. 335-338; figs. 16, 17D. BIGELOW and SEARS 1937, p. 20-23; figs. 21-25. TOTTON 1965, p. 221; fig. 153. ALVARIÑO 1971, p. 179-181, fig. 31; NETO and LOURENÇO 1973, p. 44-47; figs. 58-60. DANIEL 1974, p. 208-212; figs. 18 H-M. PUGH 1974, p. 72-73; fig. 12. ALVARIÑO 1981, p. 434; fig. 174-87. KIRKPATRICK and PUGH 1984, p. 135-136; fig. 59. GILI 1986, p. 278, figs. 4.53 G-H, 4.63 f,l.

Material examined: SWAPELS December 1981: 88-12 (1). SWAPELS February 1981: 04-02 (1), 10-10 (1), 16-14 (1). SWAPELS March 1981: 04-08 (2), 16-06 (2), 22-12(1). SNEC II: E-49 P-6 (2), E-58 P-6 (1), E-59 P-5 (1), E-60 P-2 (1), E-66 P-1 (1), E-72 P-4 (1), E-80 P-6 (2), E-85 P-6 (1), E-88 P-6 (1), E-90 P-6 (1), E-91 P-6 (1), E-92 P-5 (2). WCHB July 1983: A0662 B04 (2), A0695 B15 (1), A0700 B17 (1), A0707 B19 (2). WCHB July 1984: A1567 B10 (1), A1572 B11 (1). CELP August 1977: 64-10 (1), 64-12 (1), 68-12 (1). CELP January 1978: 32-06 (2), 32-08 (1), 36-04 (1), 36-08 (1), 36-10 (1), 40-08 (1), 40-10 (1), 40-12 (1), 48-12 (2), 56-08 (1), 60-12 (1), 72-04 (1), 76-08 (1).

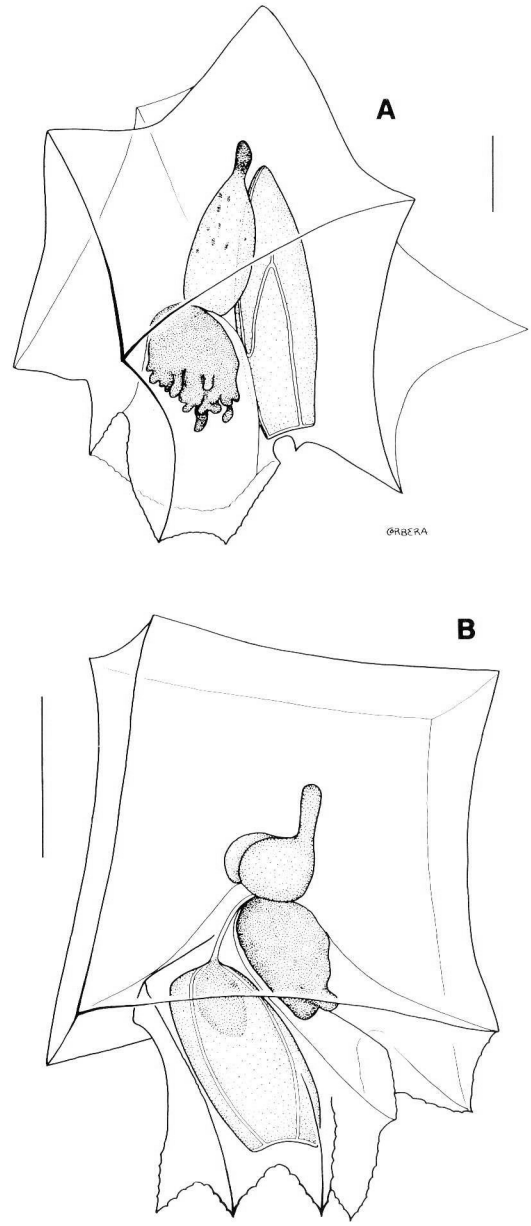

FIG. 53. — *Enneagonum hyalinum*; A polygastric stage and nectophore (lateral view), B eudoxid (lateral view). Scale bar = 1 mm.

Description: Polygastric phase — a single nectophore only. Nectophore pyramidal, up to 6.6 mm high. All surfaces homologous to those in other Abylopsinae, except that in *E. hyalinum*, there is a median ridge subdividing what is equivalent to the dorsal surface in other Abylopsinae. The two dorsal surfaces and the two apico-lateral surfaces visible when viewed from the apex. A triangular basal surface beneath the dorsal surfaces, the two baso-lateral surfaces, and the ventral surface all visible when viewed basally. Ridges and basal margins slightly dentate. Somatocyst elongate, with a constriction at the level of the apex of the nectosac. Arc followed by the late-

ral radial canal including a blind diverticulum. Bract cuboidal, 4.0 mm high. Five surfaces: apical, dorsal, ventral, and two lateral. No baso-lateral surfaces, the entire space being occupied by the large hydroecial opening. Somatocyst consisting of two thickened lateral processes and an apical diverticulum, lacking a descending dorsal segment, differentiating it from the somatocysts of the rest of the members of the family Abylidae. Gonophore with a well-developed apophysis occupying nearly a third of the gonophore.

Distribution: Benguela Current: relatively common in the region, present throughout the system, primarily offshore in the oceanic zone. Vertical distribution indicating that the species is epipelagic, forming concentrations in the surface layers. World-wide distribution: common in warm and temperate regions in the three great oceans, and in the Mediterranean (ALVARIÑO, 1971). Epipelagic but also abundant in the mesopelagic zone down to a depth of 1 000 m (PUGH, 1974).

ACKNOWLEDGEMENTS

We sincerely thank Dr. E. Macpherson, Director of the Project "The study of the Austral Fisheries" for his encouragement and financial support. The Director of the Fisheries Research Institute in Cape Town is thanked too for facilities offered to F.P. during his stay in Cape Town. F.P. particularly thanks Dr. A. I. L. Payne for his constant support and encouragement during his stay in Cape Town. We also gratefully acknowledge to the South African Museum and particularly to Mrs. Liz Hoenson and Mrs. Michelle van der Merwe for the facilities given for studying the planktonic cnidarian collection. Valuable comments regarding the manuscript were generously given by Dr. P. R. Pugh. For his time and suggestions we are most appreciative. Mr. R. Sacks is thanked for preparing the English version. Finally we are greatly grateful to Mr. Jordi Corbera for the excellent drawings which illustrate this monography. To draw the morphological and anatomical features of these transparent organisms is a difficult task and his drawing help considerably in the identification.

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Scient. ed. E. Macpherson