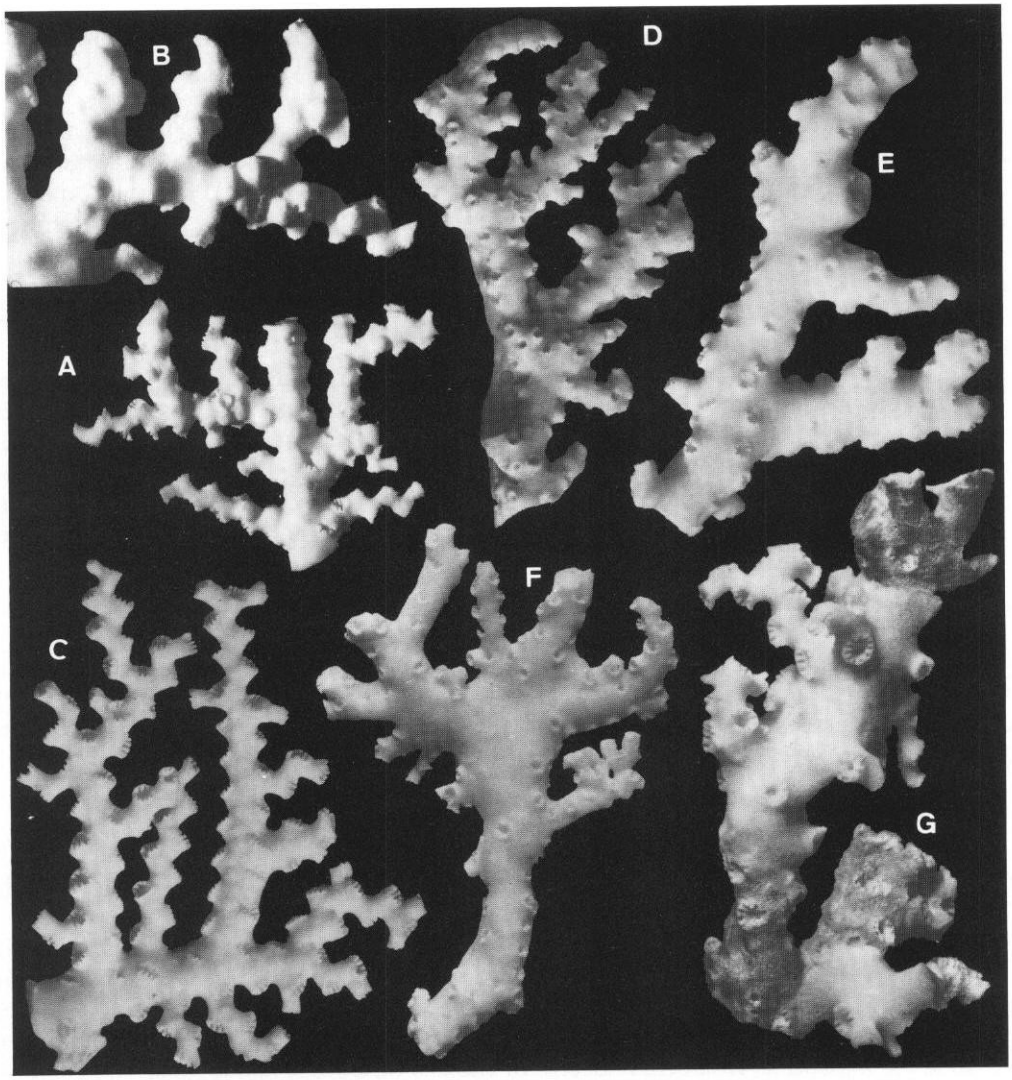

FIG. 29. — *Stylaster erubescens britannicus* (A-C, from southeast of Iceland, coll. C. WANDEL, ZMUK; D-E, from " *Porcupine* " stn 54, BMNH 1883.12.10.92, 1880.11.13.6; F, from " *John Murray* " site 4/dredge, BMNH 1986.11.5.1; G, from " *Thalassa* " Z-435, USNM 75614): A, female holotype (× 2.1); B, detail of A (× 3.2); C, male paratype (× 2.3); D-E, male paratypes (× 1.6, × 2.0, respectively); F, male paratype (× 1.8); G, paratype (× 3.6).

MATERIAL STUDIED

SE Iceland: 6 branches from Type locality (holotype + paratypes, ZMUK, USNM 75617). — " *Dana* " stn 6001, tiny poorly preserved colony, tentatively assigned to this subspecies (ZMUK).

N Faroes: " *Ingolf* " stn 144, fragment (paratype, ZMUK).

Between Faroes and Hebrides: " Porcupine " stn 54, 3 branches (paratypes, BMNH 1880.11.13.6/6a, 1883.12.10.92).

Rockall Trough: " *John Murray* ", site 4/dredge, male branch (paratype, BMNH 1986.11.5.1).

Celtic Sea: " *Thalassa* " stn Z-430, dead male branch (paratype, MNHN); stn Z-435, 2 branches (paratypes, MNHN, USNM 75614).

Description

Colonies uniplanar (Fig. 29 A-F), up to 43 mm high and 28 mm wide. Branches delicate, not thickened. Coenosteum white, composed of coarse granules (Fig. 30 B) 40-60 μm in diameter, some of which are fused into short strips up to 0.25 mm long. Smaller granules about 8 μm in diameter occur on lower edges of coarse granules.

Cyclosystems primarily on lateral and anterolateral branch edges (Fig. 29 A, C), although some occasionally present on anterior and posterior branch faces. Cyclosystems circular to elliptical, 0.9-1.4 mm in diameter. Based on 270 cyclosystems, there is a range of 7-12 dactylopores per cyclosystem, mean 9.34, and mode 9.

Gastrostyles lanceolate, up to 0.6 mm high and 0.32 mm wide ; H:W = 1.6-1.8. Lower half of style lacks spines or has only very short spines; midstyle greatly flared caused by long perpendicularly projecting spines; upper third of gastrostyle with large cylindrical spines (up to 66 μm long and 20 μm in diameter), which are directed upward (Fig. 30 F-G). Dactylotomes about 0.12 mm wide; dactylostyles robust. Pseudosepta one to two times width of dactylotome and composed of slender (20-30 μm), elongate, labyrinthine strips that are separated by very wide coenosteal slits (Fig. 30 E).

Female ampullae (Fig. 29 B) hemispherical, about 1.1 mm in diameter with an efferent pore diameter of 25-28 μm. Male ampullae (Fig. 29 C, 30 D) smaller, more irregularly shaped hemispheres, rapidly becoming internal with a slight increase in branch diameter; apical efferent pore.

Comparisons

S. erubescens britannicus is most easily distinguished from the other subspecies by its coarse coenosteum. Other distinctive characters are its low number of dactylopores per cyclosystem, distinctively shaped gastrostyle, unusual pseudoseptal architecture, and primarily internal male ampullae.

Remarks

The name given to the new subspecies refers to its geographic distribution around the British Isles.

The earliest record of *S. erubescens britannicus* in the northeastern Atlantic (Faroes – Hebrides area) was contemporaneous with the description of the nominotypical subspecies in the western Atlantic, but this record was not duly recognized until now. In fact, *S. erubescens britannicus* is one of the 4 species from one station identified by Duncan, first (1870) as *Allopora oculina*, then (1873) as *Stylaster gemmascens* (the other species of the mixture are *S. norvegicus, S. gemmascens*, and *Stenohelia maderensis*).

From the literature Broch (1914a) already presumed that *S. erubescens* (incorrectly synonymized with *S. roseus*) was included under *S. gemmascens* sensu Duncan (1873), but he incorrectly quoted the corresponding illustrations from Duncan (pl. 49, fig. 13-15, instead of fig. 8-10). Broch (1914a) had not seen specimens of *S. erubescens britannicus*, all his material (reported as *S. roseus*) being the other northern subspecies, *S. erubescens groenlandicus*.

Distribution and ecology

Geographically *S. erubescens britannicus* is nearest to *S. erubescens groenlandicus*. *S. erubescens britannicus* has been confidently identified from 6 stations ranging from southeast of Iceland (64°16′N) through the Faroes – Hebrides area and the Rockall Trough to the Celtic Sea (48°37′N), depth range 350-1080 m.

Unidentified *Stylaster* from Porcupine Bank (W of Ireland) may belong here. In a sedimentological study, Scoffin & Bowes (1988: 130) mentioned *Stylaster* sp., dredged and observed from the submersible "*Cyana*". The dredged material ("*Challenger II*" 1981, stn 30, BMNH

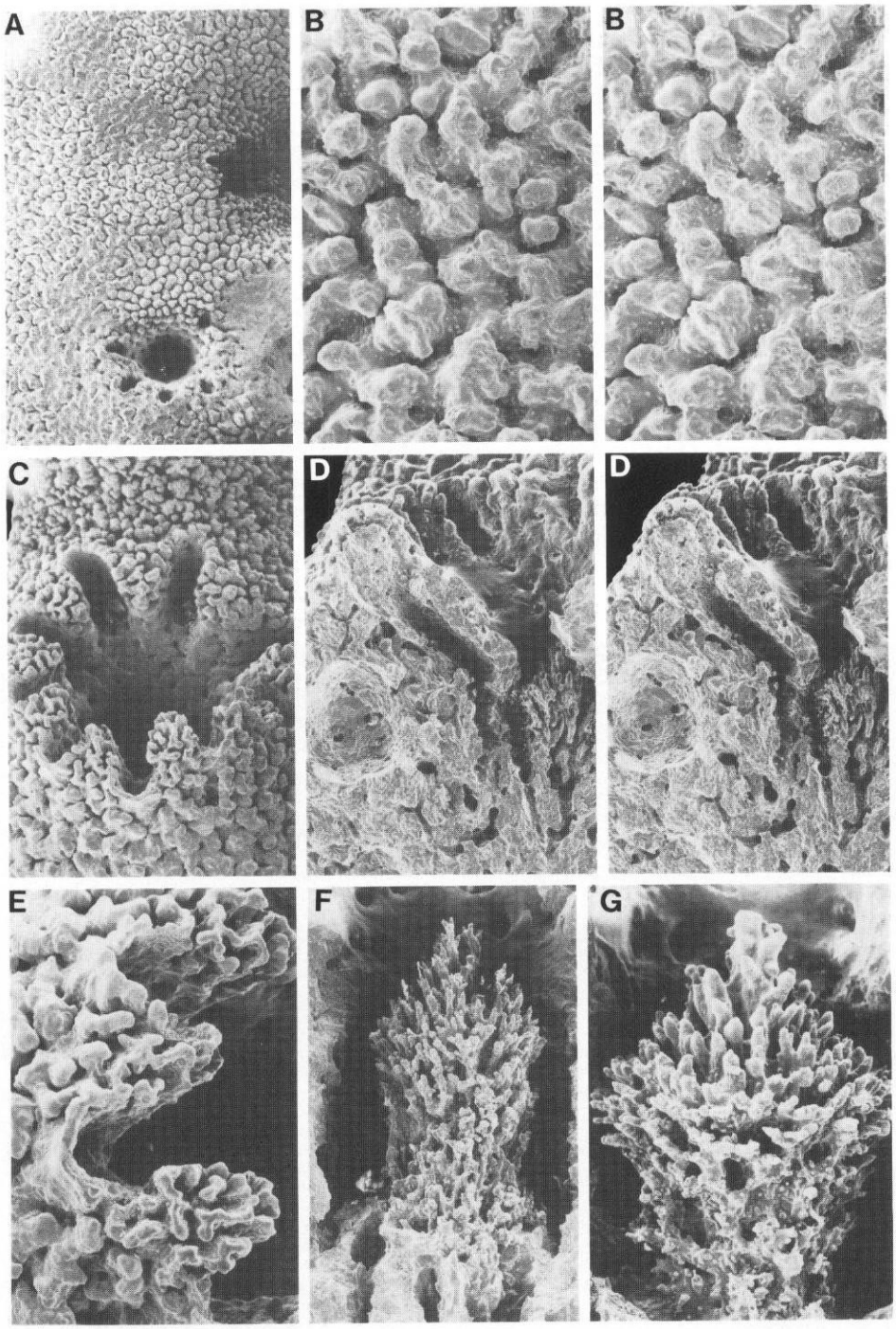

FIG. 30. — *Stylaster erubescens britannicus* (A, D, G, paratype from " *Thalassa* " Z-430, MNHN; B, male paratype from " *John Murray* " site 4/dredge, BMNH 1986.11.5.1; C, E, F, paratype from " *Porcupine* " stn 54, BMNH 1880.11.13.6): A, cyclosystem and coenosteal texture (× 17); B, coenosteal texture (× 71, stereo pair); C, cyclosystem (× 30); D, longitudinal fracture through cyclosystem revealing gastrostyle and internal male ampulla (× 38, stereo pair); E, pseudosepta (× 70); F-G, gastrostyles (× 71, × 116, respectively).

1989.6.16.2-3), which consists of two highly eroded pieces of larger colonies with poor traces of cyclosystems on partly anastomosing branches, cannot be identified to the species level. The photos from the " *Cyana* " dive referred to (cruise CYAPORC, dive 8, 22.7.1986, 50°42′N, 11°07′W, 700 m) unfortunately do not show the observed stylasterid colonies.

SYMBIONTS

A branch of *S. erubescens britannicus* from the Celtic Sea (" *Thalassa* " stn Z-430) shows a typical trace of *Pedicularia*.

Stylaster erubescens meteorensis new subspecies

Fig. 31 A-H, 32 A-H

TYPES

All available material from Great Meteor Seamount (" *Meteor* ", " *Chain* ") is given type status: a small male branch (11 mm high, 11 mm wide) with 19 cyclosystems, laterally overgrowing a pteropod shell, from " *Meteor* " stn 129/DD-94 is designated holotype (Fig. 31 E), all other specimens paratypes (see Material studied). Holotype and most paratypes deposited at ZSIM.

Type locality: " *Meteor* " cruise M 19, stn 129/DD-95, 17.2.1970, 29°59′N, 28°33′W, 290 m. Great Meteor Seamount.

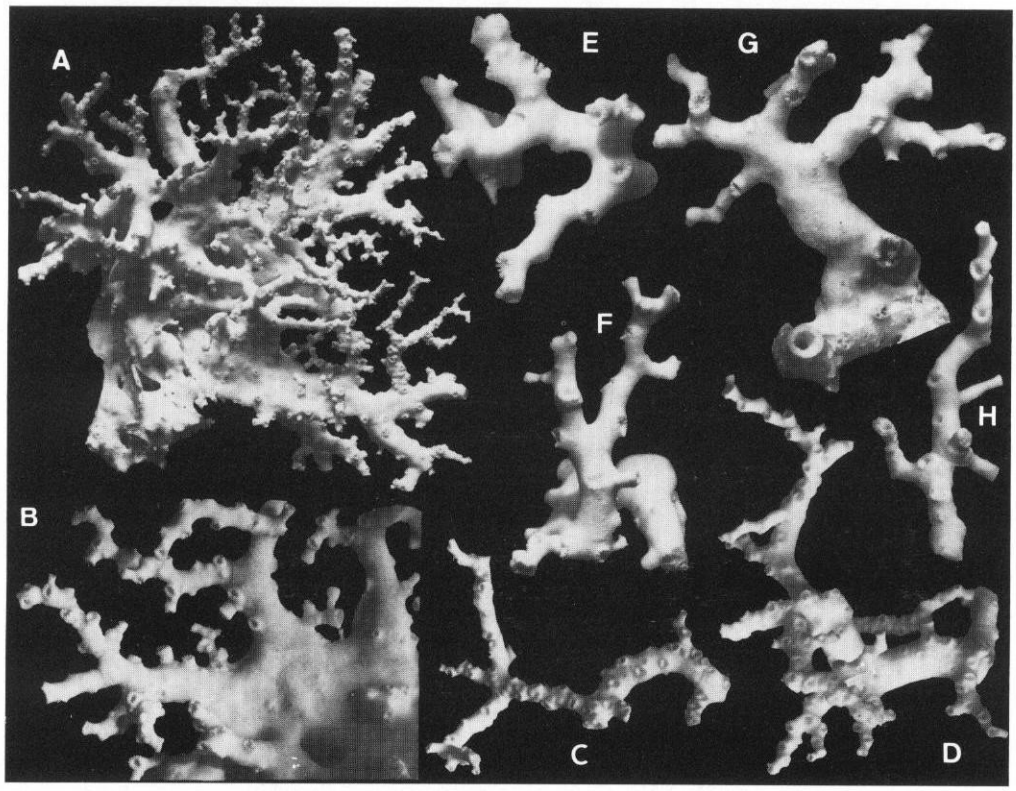

FIG. 31. — *Stylaster erubescens meteorensis* (A-D, from imprecise " *Tomiguel* " station, MNHN; E-H, from " *Meteor* " stn 129/DD-94, ZSM): A, large colony (× 0.8); B, detail from A (× 1.7); C-D, other branches (× 1.4, × 1.5, respectively); E, holotype (× 3.1); F-H, paratype colonies (× 2.3, × 2.4, × 2.2, respectively).

Material studied

Great Meteor Seamount: " *Meteor* " stn 129/DD-94, 129/DD-95, 131/DD-98, 20 small colonies and branches + minor fragments, male + female (holotype + paratypes, ZSIM). — " *Chain* " stn CH7/PD-24, small colony (paratype, USNM 75612).

Imprecise locality southwest of the Azores: said to come from seamount 260 miles (?) [475 km] southwest of Faial, ca. 500 m, fishing boat " *Tomiguel* ", coll. J.G. Pereira, Sept. 1976, several colonies + larger fragments, male + female (most MNHN; USNM 75611).

Description

Colonies from Great Meteor Seamount small and bushy (Fig. 31 E-H), up to 25 mm high; colonies from " *Tomiguel* " bushy (Fig. 31 A), up to 15.5 cm high and 10 cm wide. Branches slender (Fig. 31 C-D). Coenosteum white, composed of oddly shaped convex strips 65-75 µm wide. Strips highly anastomotic, forming a maze of interconnections, and characterized by symmetrical protuberances on either side of the strip (Fig. 32 B). Strips smooth (granules not present), producing a porcelaneous aspect.

Cyclosystems primarily on lateral branch edges but some occasionally present on anterior and posterior faces. Cyclosystems circular to irregular in shape, 0.9-1.2 mm in diameter (Fig. 32 A, C). Based on 206 cyclosystems, there is a range of 9-15 dactylopores per cyclosystem, a mean of 11.98, and a mode of 11.

Gastrostyles ovate, illustrated style (Fig. 32 G-H) 0.39 mm tall and 0.28 mm wide (H:W = 1.39). Style covered with extraordinarily long and often bifid spines, up to 120 µm long and 15 µm in diameter. The long closely spaced spines make the gastrostyle a very delicate structure. Dactylotomes about 0.11 mm wide; pseudoseptal width equal to or less than that of dactylotomes. Dactylostyles robust, composed of cylindrical elements up to 60 µm tall and 15 µm in diameter, arranged 3 or 4 across width of dactylostyle (Fig. 32 E-F).

Female ampullae superficial (Fig. 32 A), 0.6-0.8 mm in diameter, often with a short efferent tube leading to efferent pore, which is about 0.2 mm in diameter. Male ampullae superficial mounds 0.6-0.7 mm in diameter, each having 1 or 2 apical efferent pores 25 µm in diameter.

Comparisons

S. erubescens meteorensis is most easily distinguished from the other subspecies by its unique coenosteal texture and bushy colony shape. Other distinctive characters are its very long gastropore spines, high number of dactylopores per cyclosystem, and slender pseudosepta (Table 2).

Remarks

The name given to the new subspecies refers to its geographic distribution (Great Meteor Seamount).

Distribution and ecology

There is a wide geographic hiatus between *S. erubescens meteorensis*, the western Atlantic nominotypical subspecies, and the geographically nearest eastern Atlantic subspecies, *S. erubescens britannicus*.

The only precise locality from which *S. erubescens meteorensis* is known is the Great Meteor Seamount (300 m). The seamount (ca. 500 m) visited by the fishing boat " *Tomiguel* " could not precisely be identified with one of those situated between the Azores, the Mid-Atlantic Ridge, and Great Meteor Seamount.

No symbionts are known.

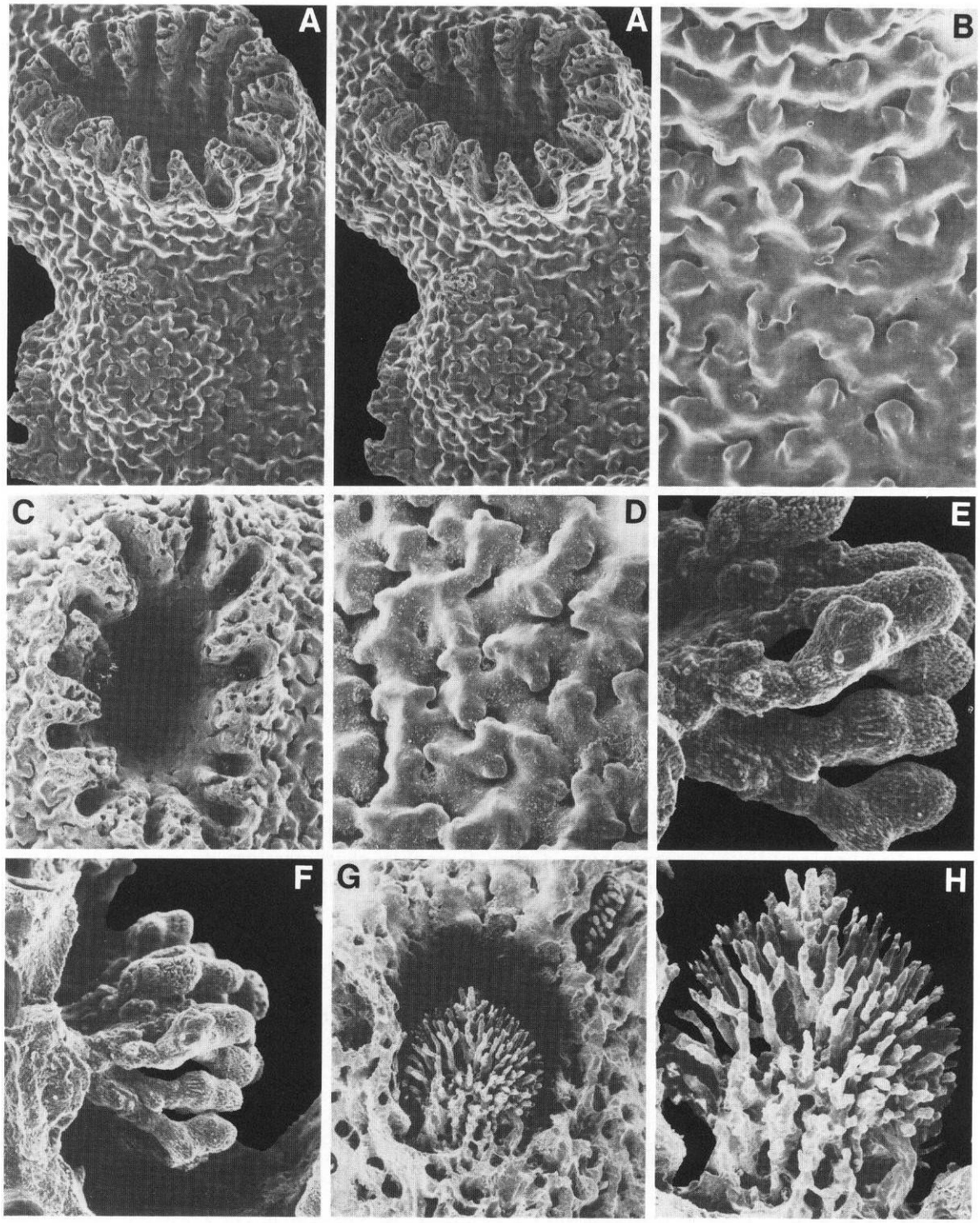

FIG. 32. — *Stylaster erubescens meteorensis* (A, D, female paratype from imprecise " *Tomiguel* " station, USNM 75611; B-C, E-H, male paratype from " *Meteor* " stn 129/DD-95, ZSM): A, cyclosystem and female ampulla (× 32, stereo pair); B, D, coenosteal texture (× 88, × 92, respectively); C, cyclosystem (× 36); E-F, dactylostyle viewed end-on, from above cyclosystem (× 745, × 418, respectively); G, gastrostyle and dactylostyle (× 62); H, gastrostyle (× 124).

Genus *STENOHELIA* Saville Kent, 1870

Diagnosis. — Gastro- and dactylopores arranged in cyclosystems, which occur exclusively on anterior branch face. Cyclosystems without lips or lids. Coenosteum white or light brown, either linear-imbricate or reticulate-granular in texture. Gastropores long and usually curved; gastrostyles present, usually encircled by a robust ring palisade. Dactylostyles rudimentary. Ampullae superficial, often clustered around base of cyclosystem. Ampullar efferent pores of both sexes usually well distinguished.

Type species: *Allopora maderensis* Johnson, 1862, from Madeira.

Genus represented in the study area by the type species and a poorly known form (unnamed) that appears to be a distinct species.

Stenohelia maderensis (Johnson, 1862)

Fig. 33 A-L, 34 A-J

Synonymy:

Allopora maderensis Johnson, 1862: 196, fig. 1-3.

Chresonymy:

Stenohelia maderensis — SAVILLE KENT, 1870: 120; 1871: 277, pl. 24, fig. 3, 3a-c. — BOSCHMA, 1957a: 31-32; 1964b: 64-65, 67, 68, 71, 72 (part: only eastern Atlantic), text-fig. 1a-g; 1964d: 80-84 (part: only eastern Atlantic); 1967: 325-329 (part: only eastern Atlantic), text-fig. 2a-b, pl. 1, fig. 3-4, pl. 2, fig. 3-4, pl. 2, fig. 3-4; 1968d: 437, 438 (part: only eastern Atlantic). — CAIRNS, 1983b: 431, 487-489, fig. 20 A-B, D-G.
Allopora madeirensis — STUDER, 1878: 633; 1879: 676.
Stylaster madeirensis — MOSELEY, 1879: 481.
Stenohelia madeirensis — MOSELEY, 1879: 503; 1881: 88. — GREEFF, 1886: 20. — STUDER, 1889: 6-7.
Allopora oculina — DUNCAN, 1870: 290, 295 (part).
Stylaster gemmascens — DUNCAN, 1873: 332 (part), pl. 49, fig. 13-15.
Stylaster tiliatus — HICKSON, 1912b: 461.

TYPES

Allopora maderensis: According to JOHNSON (1862) the unique figured colony (considered the holotype) on which the description was based was 89 mm high and 57 mm wide. Although the BMNH was indicated as depository, the specimen could not be found there and may be lost. A smaller colony (51 mm high, 29 mm wide) at the BMNH (1872.6.26.7, Madeira, J.Y. JOHNSON) registered as JOHNSON's type does not correspond to the larger holotype as previously figured, and may be a later acquisition from JOHNSON; it is here designated the neotype (Fig. 33 A). Fragment of the neotype USNM 75625.

Type locality: Madeira. No additional indications in JOHNSON's text.

MATERIAL STUDIED

Between Faroes and Hebrides: " *Porcupine* " stn 54, 2 small branches (BMNH 1880.11.13.10-11).

S Bay of Biscay — NW Spain: " *Thalassa* " stn T-503, small branch; stn X-340, fragment; stn X-341, 3 fragments; stn X-342, fragment; stn X-347, 3 fragments; X-352, 3 fragments; stn X-353, 5 fragments; stn X-362, 14 fragments; stn X-363, 7 fragments; stn Y-434, fragment (all MNHN). — Off Cabo Peñas 43°58.06′N, 5°43.95′W, 769 m (stn H-5), C. ALVAREZ-CLAUDIO, 10 small colonies and branches (USNM 85078).

Galicia Seamount: " *Noroit* " 1987, cruise SEAMOUNT 1 stn DW-108, 85 pieces, mainly branch

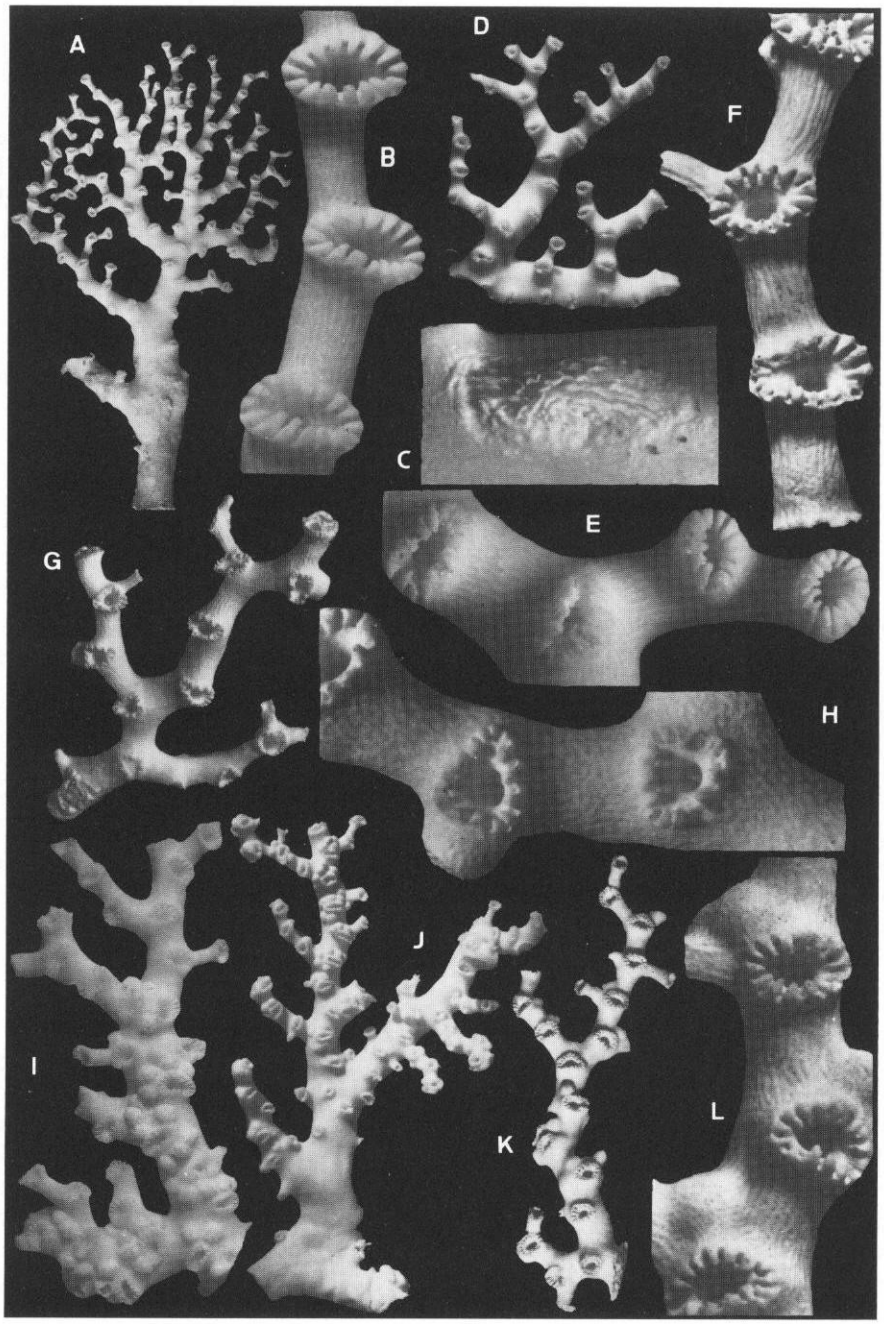

FIG. 33. — *Stenohelia maderensis* (A-C, from Madeira, BMNH 1872.6.26.7; D-E, from Madeira, BMNH 1873.7.9.6; F, from " *Jean Charcot* " 1966, stn 29, MNHN; G-H, from " *Thalassa* " T-503, MNHN; I, from " *Porcupine* " stn 54, BMNH 1880.11.13.10-11; J, from " *Talisman* " drag. 103, MNHN; K-L, from " *Gazelle* " stn 2, ZMB 1772): A, neotype (× 1.3); B, branch segment of neotype with three cyclosystems (× 18); C, *Pedicularia* trace on neotype (× 20); D, small incomplete colony (× 2.3); E, branch segment of D with four cyclosystems (× 15); F, branchlet illustrating cyclosystems (× 15); G, small colony (× 3.8); H, detail of G with gastrostyle visible in gastropore (× 14); I, colony with clustering female ampullae (× 3.5); J, colony with clustering female ampullae (× 3.2); K, branch (× 2.9); L, detail of K with ampullae near cyclosystems (× 14).

fragments with 1 to 6 cyclosystems, and a few tiny colonies with up to 3 cyclosystems (MNHN; USNM 88326); stn DW-116, tiny colony with 3 cyclosystems (MNHN).

Madeira Archipelago: Neotype. — Madeira, R.T. LOWE, colony (BMNH 1873.7.9.6). — " *Gazelle* " stn 2, 2 branches (ZMB 1772). — " *Jean Charcot* " 1966, stn 21, 7 fragments (MNHN); stn 29, 12 fragments (MNHN); stn 49, dead fragment (MNHN).

Cape Verde Islands: " *Talisman* " drag. 103, ca. 60 colonies, branches, fragments (most MNHN; branch USNM 75627; branch BMNH 1950.1.11.81). — " *Calypso* " 1959, stn 16, 4 branches (MNHN); stn 91, ca. 20 branches + fragments (most MNHN; 3 branches USNM 75626).

DESCRIPTION

Colonies uniplanar (Fig. 33 A, D, I-K), largest specimen known (JOHNSON's holotype of *Allopora maderensis*) 89 mm high and 57 mm wide; another incomplete colony 66 mm wide. Branches with inversed unifaciality of cyclosystem arrangement occasionally occur. Branches cylindrical and delicately branched, tapering to branch tips equalling diameter of cyclosystem. Coenosteum white, linear-imbricate in texture (Fig. 34 G). Strips 75-100 μm wide, bordered by deep continuous slits about 10 μm wide (Fig. 34 F). Platelets broad and corrugated, extending across width of strip. Coenosteal papillae occur on posterior face of some specimens.

Cyclosystems elliptical to irregular in shape (Fig. 33 B, E-F, H, L, 34 E), with greater axis perpendicular to branch axis. A typical gastropore measures 1.1 x 0.85 mm in diameter. Based on 727 cyclosystems, there is a range of 8-20 dactylopores per cyclosystem, mean 14.61, and mode 14. The component data for each of the 5 areas included are: Madeira Archipelago, 179 cyclosystems (from 5 stations), range 12-20, mean 14.80, and mode 15; Cape Verde Islands, 326 cyclosystems (from 3 stations), range 11-20, mean 14.75, and mode 14; Galicia Seamount, 89 cyclosystems (" *Noroit* " 1987, cruise SEAMOUNT 1 stn DW-108), range 8-20, mean 14.29, and mode 15; south of Bay of Biscay, 87 cyclosystems (off Cabo Peñas), range 11-18, mean 14.46, and mode 15; Faroes – Hebrides area, 46 cyclosystems (" *Porcupine* " stn 54), range 12-16, mean 13.70, and mode 14. As observed on material from Galicia Seamount, tiny colonies may have regular cyclosystems with a particularly low number of dactylopores.

Gastropores deep and curved, but gastrostyle tip always visible in undamaged cyclosystem (Fig. 33 H). Diffuse ring palisade at level of gastrostyle tip composed of irregularly shaped elements up to 43 μm in diameter and 60 μm tall, but elements more commonly only about 15 μm in diameter. Gastrostyle conical (Fig. 34 B-C), up to 0.40 mm tall and 0.16 mm in diameter, with H:W ratios ranging from 2.5-3.6. Style slightly ridged and very spinose, the long slender spines up to 55 μm long. Dactylotomes about 80 μm wide; pseudosepta one to two times dactylotome width; no diastemas. Dactylostyle composed of a row of cylindrical to clavate elements up to 46 μm tall and 14 μm in diameter (Fig. 34 D).

Female ampullae hemispherical (Fig. 33 I, 34 J), 0.70-0.85 mm in greater diameter, with 1 or 2 efferent pores, each 0.16-0.18 mm in diameter. Binary ampullae are elongate (elliptical in cross section), with one efferent pore occurring at each of the vertices. Male ampullae (Fig. 34 H-I) slightly less prominent superficial mounds 0.45-0.60 mm in diameter, with 1-3 apical efferent pores, each about 40 μm in diameter. Male ampullae often occur on posterior face opposite cyclosystems, whereas female ampullae are usually clustered on anterior face near a cyclosystem, often with their efferent pores directly adjacent to cyclosystems.

COMPARISONS

Of the 11 valid species of *Stenohelia* (see CAIRNS, 1983b, 1986a), 3 occur in the Atlantic. The western Atlantic *S. profunda* Moseley, 1881, and *S. pauciseptata* Cairns, 1986, are discussed and compared to *S. maderensis* by CAIRNS (1986a). To reiterate, *S. maderensis* differs from *S. profunda* by having a lower average number of dactylopores per cyclosystem, a shorter gastropore tube (allowing

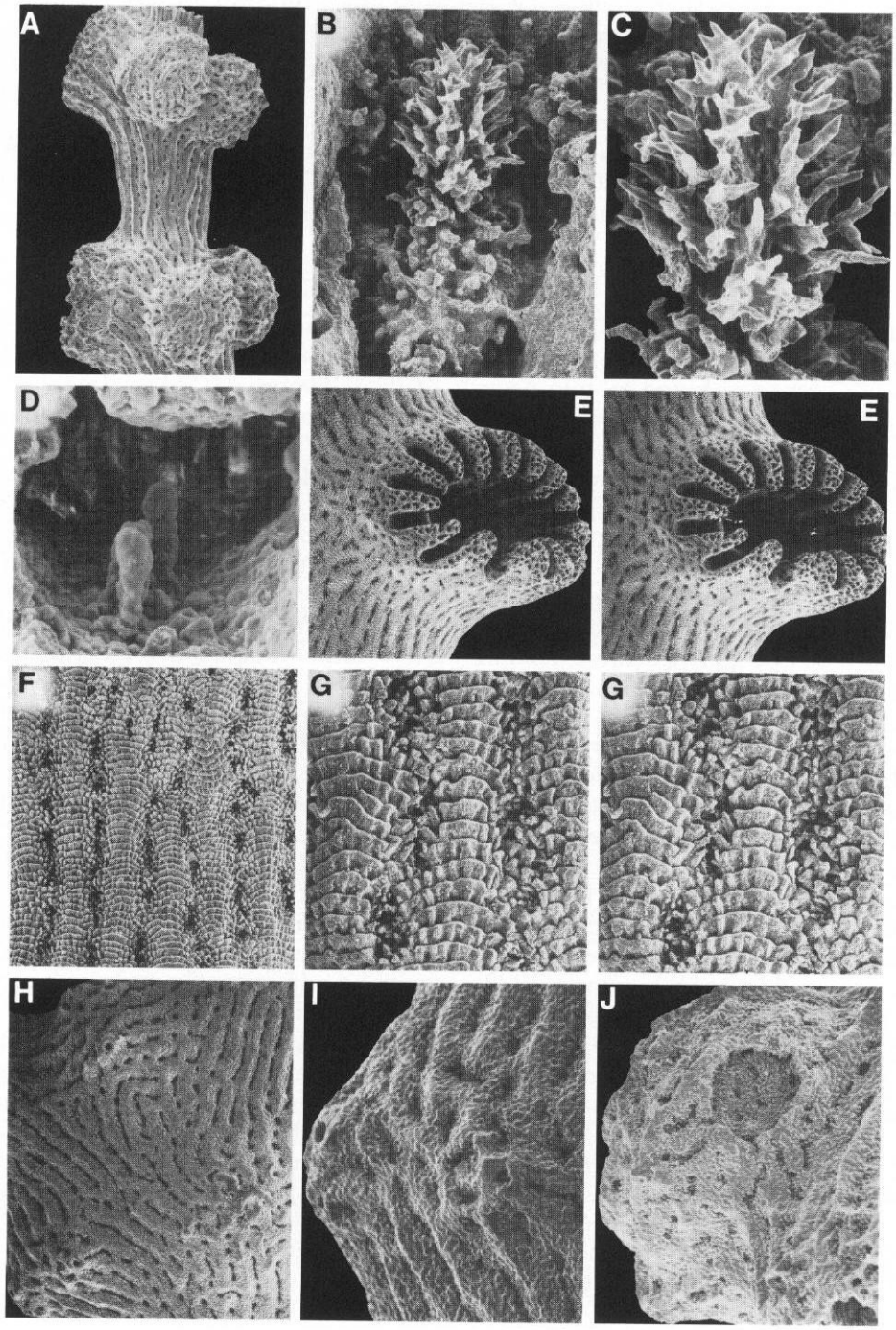

FIG. 34. — *Stenohelia maderensis*. — (A, D, J, female from " *Talisman* " drag. 103, BMNH 1950.1.11.81; B-C, H-I, male from " *Talisman* " drag. 103, BMNH 1950.1.11.81; E-G, male neotype fragment, USNM 75625): A, branch tip bearing four female ampullae (× 19); B-C, gastrostyle (× 83, × 167, respectively); D, dactylostyle (× 358); E, cyclosystem (× 26, stereo pair); F-G, coenosteal texture (× 65, × 183, respectively, G being a stereo pair); H, three male ampullae, each with two or three efferent pores (× 29); I, male ampullae with two efferent pores (× 78); J, female ampulla with efferent pore (× 68).

a view of the gastrostyle tip), smaller cyclosystems, and rugose ampullae. It differs from *S. pauciseptata* by having a higher average number of dactylopores per cyclosystem, a smaller H:W ratio, much larger gastrostyle spines, and larger ampullae.

Remarks

On the basis of Johnson's (1862) holotype from Madeira, Saville Kent (1870) emended the species description and erected the genus *Stenohelia*. Studer (1878, 1879, 1889) reported a new record from Madeira, and Saville Kent (1871) and Greeff (1886) new records from the Cape Verde Islands. Boschma (1964b) analyzed the descriptions by Johnson (1862) and Saville Kent (1870, 1871) and reproduced the figures contained in these papers.

By error, Hickson (1912b) referred material from the Cape Verde Islands (" *Talisman* ") to *Stenohelia tiliata* (Hickson & England, 1905), a species based on material from the Sulu Islands (southern Philippines). That misidentification was corrected by Boschma (1967), who examined Hickson's material and concluded that it was typical *S. maderensis*.

Although he had access to authentic *S. maderensis* from the eastern Atlantic, Boschma (1964b, 1964c, 1964d, 1967, 1968d) incorrectly included under *S. maderensis* a different species from the West Indies (well figured by him 1964b: pl. 1, fig. 13-14; 1964d, text-fig. 1a-c, pl. 2, fig. 1-4). As pointed out by Cairns (1986a), the western Atlantic species in question is *S. profunda* Moseley, 1879.

Boschma frequently used average numbers of dactylopores per cyclosystem and proportions of gastropore tube and gastrostyle in species diagnosis. It is therefore surprising that he did not take into account as significant the remarkably different values characerizing the eastern and western Atlantic *Stenohelia*. In one of Boschma's papers (1968d), *S. maderensis* (with an average of 13.50 dactylopores per cyclosystem) is said to come from the Azores. This was a lapsus; in fact, the material in question came from the Cape Verde Islands (" *Talisman* "; previously mentioned by Hickson, 1912b, under *S. tiliatus*).

Unfortunately, the holotype of *S. maderensis*, as characterized and figured by Johnson (1862), was not available for the present study, and additional material from Madeira is scarce: 2 small colonies at the BMNH (including designated neotype (Fig. 33 A-B); 2 small branches from the " *Gazelle* " expedition (Fig. 33 K-L); and a few small fragments collected by the " *Jean Charcot* " in 1966 (Fig. 33 F). These specimens appear conspecific with Johnson's missing holotype, and are herein considered as topotypic.

Material is much more abundant from the Cape Verde Islands and includes pieces from larger colonies (originally exceding 10 cm ?). Only small fragments (all dead, the largest comprising 11 cyclosystems) are available from the " *Thalassa* " stations off northwestern Spain and in the south of the Bay of Biscay (all sorted out from sediment samples) but live colonies up to 25 mm high and 30 mm wide are known from 2 stations off Cabo Peñas (cruises COCACE of the University of Oviedo in 1987; part of material studied here, the other station being 43°56.50′N, 5°48.90′W, 893 m; C. Alvarez-Claudio, *in litt.* 1990).

S. maderensis is one of the 4 species from between the Faroes and the Hebrides confused by Duncan, first (1870) as *Allopora oculina*, then (1873) as *Stylaster gemmascens* (the other species are *S. gemmascens, S. norvegicus*, and *S. erubescens britannicus*).

Distribution and ecology

S. maderensis is known from between the Faroes and the Hebrides (665 m; one old record; presence in the area to be confirmed), northwestern Spain and the south of the Bay of Biscay (490-910 m), Galicia Seamount (985-1125 m), Madeira Archipelago (depth recorded from 4 stations, 110-500 m; dead fragments from the deeper stations), and the Cape Verde Islands (150-400 m). This is a wide geographical range (from about 15°N to 60°N) and a wide depth and temperature range (ca. 7-15°C). The shallowest records are 110-128 m at Madeira, and 150 m in the Cape Verde Islands; the deepest

occurrences in the Bay of Biscay and on Galicia Seamount, comprising live specimens, appear correctly recorded. Greater depths are linked with higher latitudes, which would seem to be an anomaly.

In the Cape Verde Islands *S. maderensis* occurs together with the precious scleraxonian gorgonian *Corallium rubrum*. In 1883 the " *Talisman* " obtained abundant material of the stylasterid from several dredge hauls (150-275 m) in the area off São Tiago where the precious coral was commercially fished at that time (cf. ZIBROWIUS, MONTEIRO MARQUES & GRASSHOFF, 1984). GREEFF (1886), who in other papers reported on the red coral from the Cape Verde Islands, received a colony of *S. maderensis* at São Tiago, most likely from red coral fishermen. *S. maderensis* and *Corallium rubrum* have again been dredged together in the Cape Verde Islands by the " *Calypso* " in 1959 between Maio and Boavista (185 m).

A tiny fragment of *Stenohelia*, probably *S. maderensis*, is known from the Lower Pleistocene of Sicily (see Records of fossil stylasterids from Europe).

SYMBIONTS

In the Madeira Archipelago, *S. maderensis* is the host of *Pedicularia*. JOHNSON (1862) already noticed this association (2 specimens of the symbiont reported from the holotype colony). The neotype (BMNH 1872.6.26.7), another old colony from Madeira (BMNH 1873.7.9.6), and a small branch (" *Jean Charcot* " 1966, stn 29) each have one distinct trace of *Pedicularia* (Fig. 33 C).

Stenohelia sp. A

Fig. 35 A-H

MATERIAL STUDIED

Azores: " *Jean Charcot* " 1971, cruise BIAÇORES unknown station, small male colony now broken into 6 branches and fragments (most MNHN; 1 fragment USNM 77126).

DESCRIPTION

The only small colony available was irregular in shape, not uniplanar as typical *Stenohelia* colonies known so far, the deformation being due to the presence of a gall-tube induced by a polynoid polychaete. The colony has been broken in order to extract the polychaete; resulting fragments (Fig. 35 F-H) up to 25 mm tall, highly modified by cavernous polychaete tube. Individual branches with cyclosystems on anterior face only (Fig. 35 F), as typical for *Stenohelia*.

The coenosteum is linear-imbricate (Fig. 35 C-D) covered by broad flat corrugated platelets, but along the midline of every third or fourth strip is a prominent ridge or row of blunt spines, producing a distinctive carinate branch texture (Fig. 35 A). Cyclosystems are about 1.1 mm in diameter. Based on 62 cyclosystems, there is a range of 11-18 dactylopores per cyclosystem, mean 14.18, and mode 15. Male ampullae (Fig. 35 A-B) are large, about 0.8 mm in diameter, and covered with tall blunt spines; 1-3 apical efferent pores occur on each ampulla, each about 60 μm in diameter.

COMPARISONS

Stenohelia sp. A differs from *S. maderensis* primarily in its unusual carinate coenosteum and large spiny male ampullae. Commensal relationship with a polynoid polychaete may also be a distinctive character.

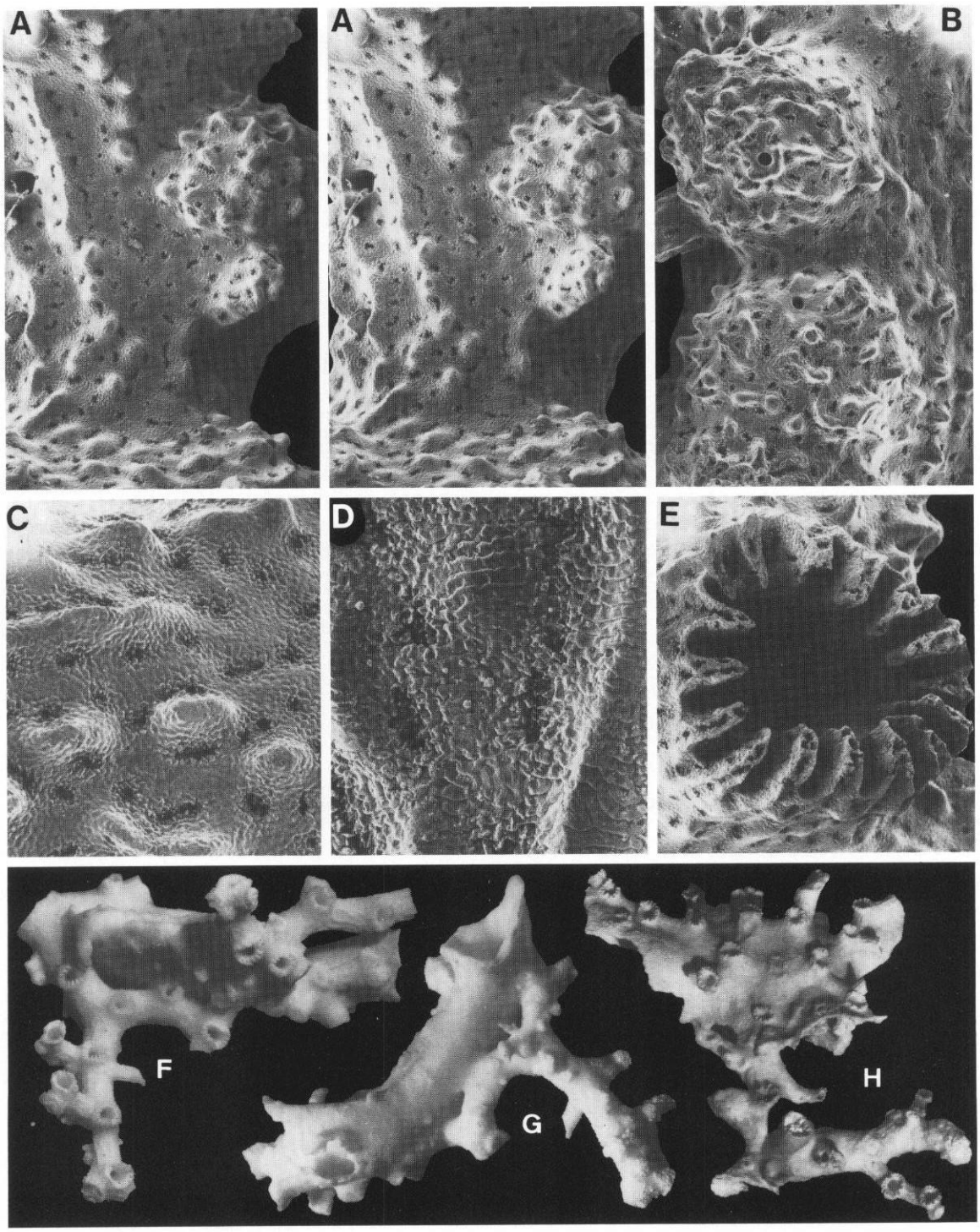

FIG. 35. — *Stenohelia* sp. A (A-H, male from " *Jean Charcot* " 1971, unknown station, Azores, MNHN): A, branch fragment illustrating coenosteal ridges and male ampulla (× 33, stereo pair); B, two male ampullae with efferent pores (× 37); C-D, coenosteal texture (× 80, × 150, respectively); E, cyclosystem (× 35); F-H, three fragments of original colony; G, illustrating gall tube induced by polynoid polychaete (× 3.7, × 3.7, × 2.9, respectively).

REMARKS

The form documented here is not identified as *S. maderensis*, but not enough material is present to justify the description as a new species.

DISTRIBUTION AND ECOLOGY

A single colony from the Azores, unknown locality and depth (bathyal).

SYMBIONTS

The single colony is deformed by a gall-tube (Fig. 35 G) induced by a polynoid polychaete (*Harmothoe* sp.).

Genus ***CRYPTHELIA*** Milne Edwards & Haime, 1849

Diagnosis. — Gastro- and dactylopores arranged in cyclosystems, which usually occur exclusively on anterior branch face. Cyclosystems partially or entirely covered by one or more fixed lids. Coenosteum white or light brown, linear-imbricate in texture, and often spinose as well. Nematopores usually present, especially on cyclosystem lids, pseudosepta, and ampullae. Gastropore double-chambered; no gastro- or dactylostyles. Ampullae usually superficial and large, occurring in various positions and with a variety of efferent pore locations. CAIRNS (1986b) described 3 female ampullar types and 8 male ampullar types, for 24 possible permutations; however only 9 combinations (not 12 as reported by CAIRNS, 1986b), have been discovered thus far: A-A1, A-A2, A-C4, B-B, B-C1, B-C2, B-C3, B-C4, C-D (as shorthand notations these are called ampullar formulae).

Type species: *Crypthelia pudica* Milne Edwards & Haime, 1849, from the western Pacific.

Genus represented in the study area by 4 species.

Crypthelia affinis Moseley, 1879

Fig. 36 A-I, 37 A-I

Synonymy:

Cryptohelia affinis Moseley, 1879: legend on pl. 42.
Cryptohelia moseleyi Hickson & England, 1905: 21.

Chresonymy:

Cryptohelia pudica - MOSELEY, 1876a: 548, 557 (part: 2798 m); 1879: 462-467, 482 (part: 2798 m), pl. 35, fig. 7, pl. 42 (with legend on plate *Cryptohelia affinis*), pl. 44, fig. 1, 3-8; 1881: 71-76, 82-83, 88 (part: " *Challenger* " stn 3, 2790/2798 m), pl. 2, fig. 7, pl. 9 (with legend on plate *Cryptohelia affinis*); pl. 11, fig. 1, 3-8, pl. 12, fig. 7. — THOMSON, 1877: vol.1, 271 (part: " *Challenger* " stn 3, 2790 m), fig. 65.
Cryptohelia affinis — MOSELEY, 1881: legend on pl. 9.
Crypthelia affinis - BOSCHMA, 1951b: 455-456; 1953c: 171-172; 1956b: F100, fig. 81.2; 1957a: 34; 1968a: 106 (part: NOT " TALISMAN "). — CAIRNS, 1983b: 431; 1986b: 24-25.
Crypthelia moseleyi — FISHER, 1938: 534. — BROCH, 1936: 94.

TYPES

Cryptohelia affinis: There is no original description, strictly speaking. The name *C. affinis* appears only on a plate published twice (MOSELEY, 1879, 1881) and is not used in the corresponding explanation or in the text, where the figured stylasterid (from " *Challenger* " stn 3) is incorrectly ascribed to *Cryptohelia pudica* Milne Edwards & Haime 1849. Since MOSELEY's species is different,

it has to be designated by the first available name. *C. affinis* Moseley, 1879, fullfills this condition, since this name is clearly associated with an illustration in which the species is recognizable.

MOSELEY (1879, 1881) did not indicate the number of specimens from " *Challenger* " stn 3, but 6 branches (5 collected alive, 1 dead) and some smaller fragments, here considered as syntypes (part of them figured herein, Fig. 36 F-G), are preserved at the BMNH (1880.11.25.188). The largest of the live pieces (45 mm high, 16 mm wide, 40 cyclosystems) was part of the larger piece figured by MOSELEY (1881, pl. 12, fig. 7) and together with another branch (20 cyclosystems) was part of the colony figured by THOMSON (1877: vol. 1, fig. 65; erroneously referred to stn 23).

Type locality: " *Challenger* " stn 3, 18.2.1873, 25°45'N, 20°12'W, 2790 m. Far southwest of the Canary Islands. Locality and depth doubtful (see below Distribution and ecology).

Crypthelia moseleyi: HICKSON & ENGLAND (1905) were right in considering *Crypthelia pudica* sensu MOSELEY (as described and figured from " *Challenger* " stn 3) as a distinct species. Being not aware of the availibility of *affinis*, they proposed the name *moseleyi*. The latter thus is an objective synonym of the former, each being based on the same name-bearing type material.

MATERIAL STUDIED

SW Canary Islands: syntypes of *Cryptohelia affinis* (see above).

Azores: Prince of Monaco stn 203, dead branch (MOM); stn 233, 4 dead branches + fragments (MOM). — " *Jean Charcot* " 1971, cruise BIAÇORES stn 25, dead branch (MNHN); stn 74, colony + fragment (MNHN); stn 102, dead colony (MNHN); stn 112, 5 colonies + branches (most MNHN; USNM 75624); stn 135, dead branch (MNHN); stn 180, 7 colonies + branches + fragments (MNHN); unknown station, dead female colony (MNHN).

DESCRIPTION

Colonies uniplanar, up to 53 mm high and 79 mm wide (Fig. 36 A-F). Branch anastomosis common. Branches with inversed unifaciality of cyclosystem arrangement occasionally occur (Fig. 36 B). Coenosteum primarily linear-imbricate (Fig. 37 F-G), becoming reticulate-imbricate near cyclosystems and on ampullae (Fig. 37 D). Strips 75-90 µm wide, covered by coarse, irregularly shaped platelets, producing a rough microtexture. Nematopores randomly scattered over branch coenosteum, pseudosepta, ampullae, and lids; nematopores about 65 µm in diameter.

Cyclosystems circular to slightly elliptical in shape, 1.4-1.8 mm in diameter (Fig. 36 G-H). Based on 88 cyclosystems from the syntypes (" *Challenger* " stn 3) there is a range of 12-18 dactylopores per cyclosystem, mean 14.51, and mode 15; based on 341 cyclosystems from specimens from the Azores (9 stations) the range is 12-22, mean 16.26, and mode 17.

Maximum width of upper gastropore chamber about 0.65 mm, which narrows to a gastropore ring constriction of about 0.50 mm in diameter. Lower chamber (Fig. 37 H) about 0.9 mm in greatest diameter and about 0.1 mm deep. Cyclosystem lid tongue-shaped and horizontal, covering 50-100 % of cyclosystem when viewed from above. Intact lid approximately 1 mm wide and quite thin in male colonies (Fig. 37 B) but invariably inflated in mature female cyclosystems (Fig. 37 C). Dactylotomes about 75 µm wide; pseudosepta of equal width and concave.

Each female cyclosystem has an ampulla consisting of a large swelling in proximal cyclosystem wall (Fig. 37 C), which often extends into lid and partially around the cyclosystem. Efferent pore circular and quite large (0.35 mm in diameter), occurring on lower wall of upper gastropore chamber in proximal cyclosystem region. Male ampullae consist of 1-5 less conspicuous swellings that encircle cyclosystem. Male ampullae most common on proximal cyclosystem wall adjacent to lid (Fig. 37 D). Each male ampulla bears a large apical steep sided concavity 0.20-0.25 mm in diameter, the center of which is an efferent pore about 45 µm in diameter. According to the classification of CAIRNS (1986b), the ampullar formula is B-C1, the most common of the nine known combinations, shared by five other species.

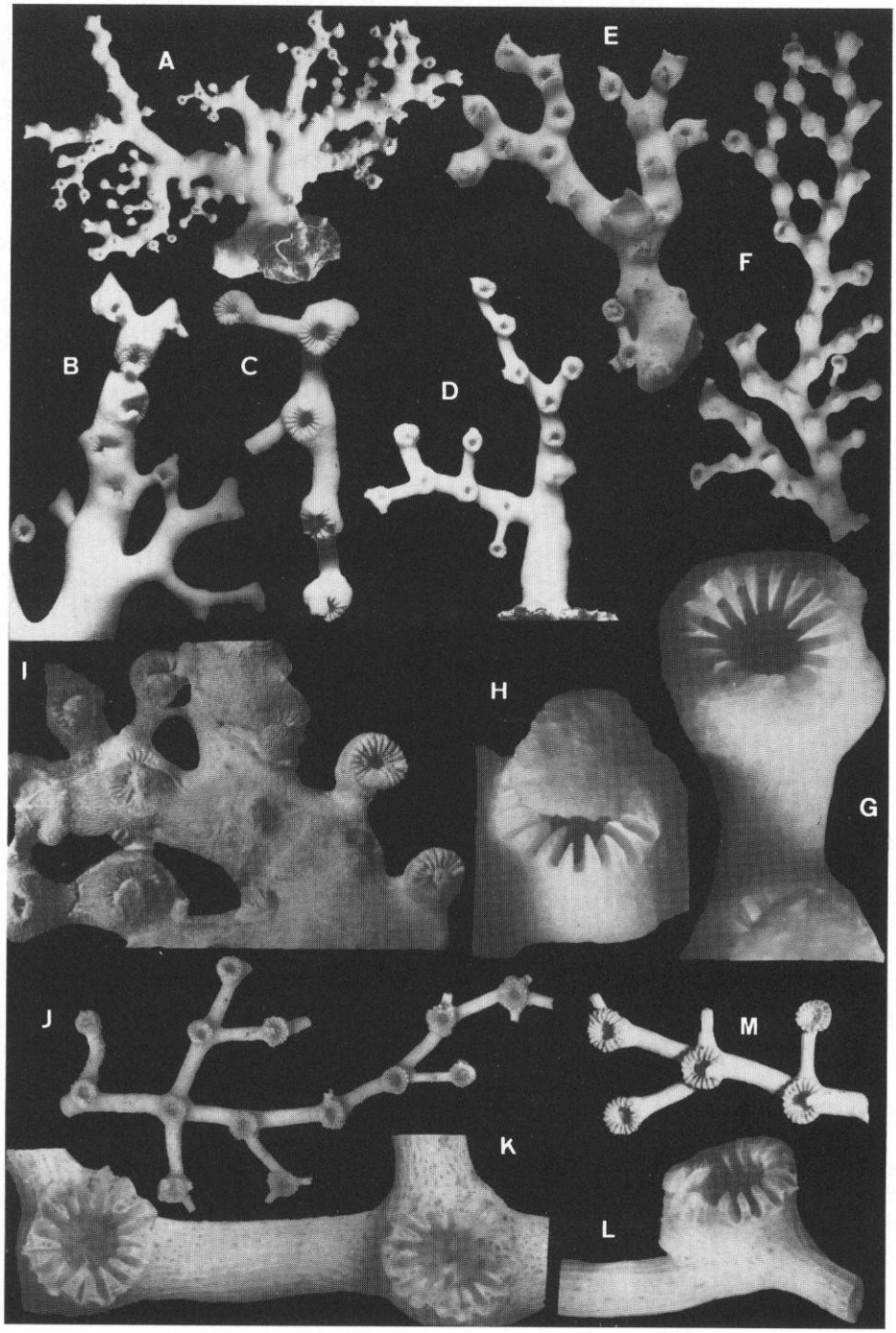

FIG. 36. — *Crypthelia affinis* (A, from " *Jean Charcot* " 1971, stn 74, MNHN; B-D, from " *Jean Charcot* " 1971, stn 112, MNHN; E-H, syntypes of *C. affinis*, BMNH 1880.11.25.188; I, from Prince of Monaco stn 233, MOM): A, colony (× 0.7); B, branch illustrating alternation of unifaciality of cyclosystem arrangement (× 2.4); C, branch (× 3.6); D, colony (× 1.8); E-F, colony fragments (× 2.0, × 1.6, respectively); G, syntype cyclosystem having lost the lid (× 15); H, syntype cyclosystem with lid intact (× 15); I, part of massive dead colony (× 3.6).

Crypthelia medioatlantica (J-L, holotype, ZMUK; M, paratype, MOM): J, colony still with soft tissues (× 2.8); K-L, branch segments of J with cyclosystems having lost their lids (both × 13); M, branch (× 4.8).

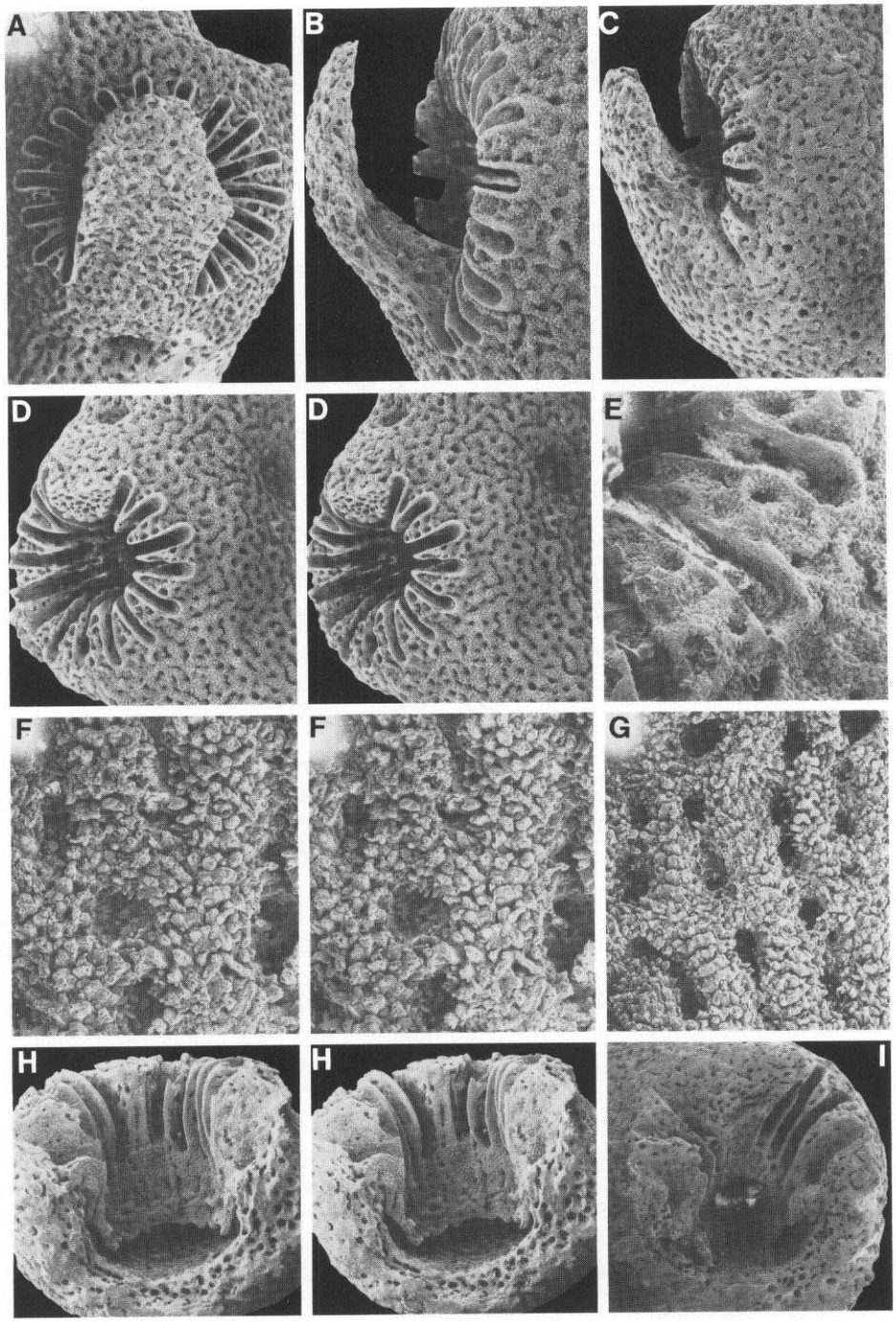

FIG. 37. — *Crypthelia affinis* (A-B, D, F-H, male from " *Jean Charcot* " 1971, unknown station, Azores, MNHN; C, E, I, female from " *Jean Charcot* " 1971, stn 112, USNM 75624): A-B, male cyclosystem viewed from above and from side (× 21, × 33, respectively); C, side view of female cyclosystem (× 35); D, male cyclosystem with broken lid, two efferent pore depressions in upper right (× 20, stereo pair); E, pseudosepta (× 75); F-G, coenosteal texture (× 148, × 97, respectively, F being a stereo pair); H, longitudinal section of male cyclosystem showing gastropore chambers (× 26, stereo pair); I, longitudinal section of female cyclosystem showing gastropore chambers and large efferent pore (× 19).

	C. affinis	*C. medioatlantica*
coenosteum: width + relief of strips; width of platelets	75-90 µm, sligthtly convex; platelets irregularly shaped, coarse	70-85 µm, sligthtly convex; narrow platelets (4-14 µm)
nematopores: size; location	65 µm, random on coenosteum, ampullae, lid, pseudosepta	absent
cyclosystem: average size and shape	1.4-1.8 mm, circular to slightly elliptical	1.2-1.4 mm, circular
dactylopores per cyclocystem: range mean, mode (N)	12-22, 16.54, 16 (420)	14-19, 15.86, 15 (22)
cyclosystem lid: shape; % cover of cyclosystem; inclination	tongue-shaped; 50-100 %; horizontal	digitiform; 0-20 %; inclined
pseudosepta: width relative to dactylostomes; concavity	esqual; concave	esqual; very concave
ampullar formula (see Cairns, 1986b and text)	B-C1	?-C1 (female ampullae unknown)
other diagnostic characters	female efferent pore opens quite low in gastropore chamber	male ampullae carinate

Comparisons

Within the Atlantic, *C. affinis* is most similar to *C. medioatlantica* and is compared to that species in the account of the latter and in Table 3.

Remarks

Samples of several species of *Crypthelia* collected by the " *Challenger* " at 4 stations (stn 3, Canary Islands, 2790 m; stn 24, West Indies, 713 m; stn 171, Kermadec Islands, 1097 m; stn 236, Japan, 1417 m) were all referred by Moseley (1876a, 1879, 1881) to *C. pudica*. Moseley's (1879, 1881) detailed descriptions and illustrations of what he believed to be *C. pudica* were based on the more abundant material from stn 3, part of which had been collected alive and provided the soft parts for an exemplary anatomical study.

A lapsus occurred in the sentence indicating the origin of the material (Moseley, 1879: 462; 1881: 71): " The specimens, the anatomy of which is here described, were dredged off the mouth of the La Plata ". This should read " off the Canary Islands ". In fact, Moseley did study the anatomy of other stylasterid species dredged at " *Challenger* " stn 320, in the Southwest Atlantic off the mouth of the Rio de la Plata, but no *Crypthelia* had been obtained there. In addition to the anatomical structures of the soft parts, Moseley figured a branch of the coral, the origin of which is clearly indicated in the explanation as being the Canary Islands station (Moseley, 1881: 226, pl. 12, fig. 7).

Throughout his text, Moseley (1879, 1881) uses the name *C. pudica*, but on a plate (pl. 42 of 1879, reprinted as pl. 9 of 1881) showing the anatomy of the soft parts, the name *C. affinis* occurs. In all probability, Moseley at first was convinced that the *Crypthelia* from the Canary Islands station belonged to a species different from *C. pudica* (the latter described from the West Pacific and type of the genus *Crypthelia*), and accordingly intended to name it *C. affinis*, whereas later he concluded that the Canary Islands material was conspecific with the type species. After his change of opinion the name *C. affinis* was superfluous, but already engraved on the plate and was not corrected.

TABLE 3. — Comparisons of eastern Atlantic *Crypthelia*

C. vascomarquesi	*C. tenuiseptata*
120 µm, slightly convex; broad (up to 68 µm) + flat	250-350 µm, convex to carinate; broad + flat or irregular around cyclosystem
85-120 µm; random on coenosteum, ampullae, lid + upper outer pseudosepta	220 µm; random on coenosteum and lid edge
2.1-2.6 mm, circular to elliptical	3.8 mm, circular to irregular
14-23, 19.38, 21 (47)	15-27, 19.75, 19 (529)
tongue-shaped; 30-40 %; horizontal + concave	tongue-shaped; 60-90 %; horizontal + concave
narrow (1/4 dactylotome width); sligthly concave	narrow (1/2 dactylotome width); not concave
B(?)-C4 + A2	A-C4 + A1
	female efferent pore enormous

HICKSON & ENGLAND (1905) were convinced that the species described in detail by MOSELEY was not *C. pudica*, and therefore renamed it *C. moseleyi*. In fact, it must bear the name *C. affinis*, which had already been ressurected by BOSCHMA (1951b) and subsequently used by him in other papers.

BOSCHMA (1956b) reproduced (partly) a figure from MOSELEY (1881: pl. 12, fig. 7) but erroneously indicated the distribution of *C. affinis* as the West Indies. Later (BOSCHMA, 1968a), when mentioning *C. affinis* as a distinct species of the eastern Atlantic, he mistakenly included material from " *Talisman* " drag. 128 (MNHN), which, in fact, is referable to *C. tenuiseptata* and *C. vascomarquesi*.

DISTRIBUTION AND ECOLOGY

C. affinis has been obtained from several stations in the Azores, depth 712-1557 m. Specimens were alive as deep as 1300 m.

According to MOSELEY (1879, 1881) the types of *C. affinis* (including live material) came from " *Challenger* " stn 3, far southwest of the Canary Islands, at a depth of 2790 m. This is the greatest depth ever recorded in the literature for a stylasterid coral, and about twice the depth at which *C. affinis* has been obtained in the Azores. The " *Challenger* " locality and depth should therefore be viewed with circumspection; a confusion of the collecting locality is not unlikely. Regardless, the types of *C. affinis* apparently came from the eastern Atlantic; the species is not known from the western Atlantic where several other representatives of the genus *Crypthelia* occur.

No symbionts are known.

Crypthelia medioatlantica new species

Fig. 36 J-M, 38 A-H

Types

Holotype (Fig. 36 J) a delicate subterminal male branch from " *Bartlett* " 1975, stn 14 (ZMUK). Originally 23 mm high and 6 mm wide, comprising 17 cyclosystems, it was subsequently fractured for SEM studies. Paratype (Fig. 36 M) a small branch with 5 cyclosystems from Prince of Monaco stn 242 (MOM).

Type locality: " *Bartlett* " 1975, stn 14, 16.12.1975, 36°50.9′N, 32°57.9′W, 1400-2200 m. Mid-Atlantic Ridge.

Material studied

Azores: Paratype.

Mid-Atlantic Ridge: At 36°50.9′N, Holotype. — " *Nautile* " 1988, cruise HYDROSNAKE dive HS-16, 3 small colonies, dead and manganese coated, largest 34 mm high, with 4, 5, 9 cyclosystems, respectively + 3 isolated cyclosystems (MNHN; USNM 88325).

Description

Only small pieces comprising a total of 42 well preserved cyclosystems (+ one incomplete), from 3 stations in 3 areas are available for the description of this species.

Colonies uniplanar, probably small and delicate. No complete colony available; largest specimen (holotype) with 17 cyclosystems. Subterminal branches only 0.45 mm in diameter. Coenosteum exclusively linear-imbricate in texture (Fig. 38 C-E). Strips 70-85 µm wide and slightly convex, covered with numerous quite narrow platelets 4-14 µm wide. Nematopores not observed.

Cyclosystems circular, 1.2-1.4 mm in diameter (Fig. 36 K-L). Based on 42 cyclosystems (from 3 stations), there is a range of 14-19 dactylopores per cyclosystem, mean 16.12, and mode 15.

Maximum width of upper gastropore chamber about 0.60 mm, which leads to a gastropore ring constriction of about 0.35 mm width (Fig. 38 G). Lower chamber about 0.65 mm wide at greatest diameter and about 0.10 mm deep. Cyclosystem lid digitiform and inclined upwards, covering 0-20 % of the cyclosystem (the lid is sometimes absent). Lid about 0.30 mm wide. Dactylotomes about 0.10 mm wide; pseudosepta of equal width and quite concave (Fig. 36 K-L, 38 A-B, H).

Male ampullae discrete, conspicuous hemispheres (Fig. 38 A-B, F) about 0.6 mm in diameter, 1-4 of which occur around each cyclosystem wall starting in the proximal cyclosystem area adjacent to lid (arrangement C1 of CAIRNS, 1986b). Ampullae covered by a reticulate system of carinae, about 60 µm high, which also extends to upper lid. At apex of each male ampulla is a shallow depression about 0.18 mm in diameter, in the center of which is a small raised papilla about 0.10 mm in diameter. The papilla has an apical pore 40 µm in diameter: the male efferent pore (Fig. 38 A). Female ampullae unknown; however, the 6 other species of *Crypthelia* with C1-type male ampullae all have B-type female ampullae, i.e. ampullae confined to proximal cyclosystem wall, with an efferent pore opening into upper gastropore chamber beneath lid.

Comparisons

Of the 9 Atlantic species of *Crypthelia* (see CAIRNS, 1986a), only one other has C1-type male ampullae: *C. affinis*. Both species are also similar in their average number of dactylopores per cyclosystem, coenosteal strip width, and morphology of pseudosepta and gastropore chamber.

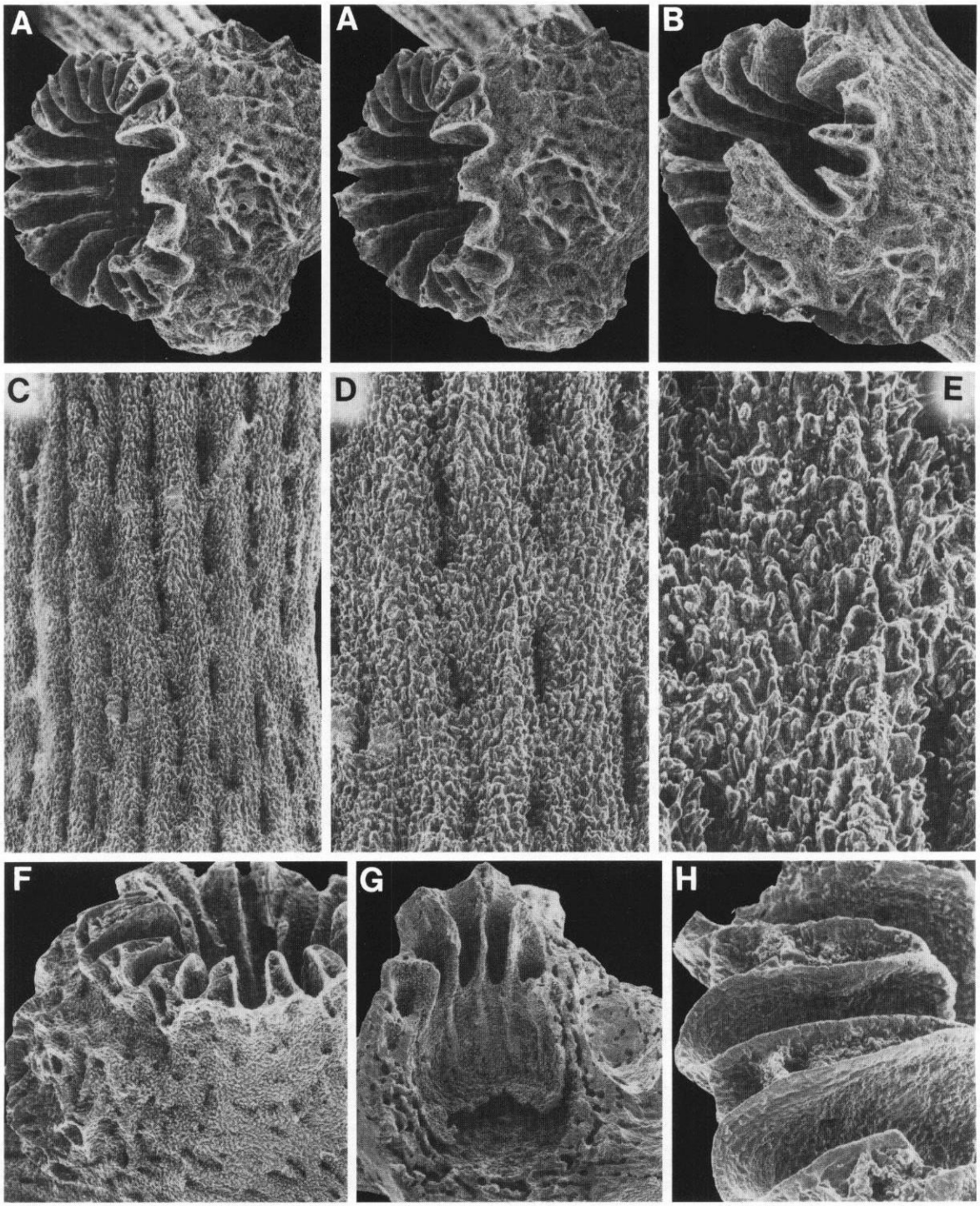

FIG. 38. — *Crypthelia medioatlantica* (A-H, part of holotype, ZMUK): A-B, cyclosystem surrounded by male ampullae, efferent pores visible, lid broken in A (× 34, × 38, respectively, A being a stereo pair); C-E, coenosteal texture (× 73, × 146, × 389, respectively); F, oblique view of cyclosystem and male ampulla (× 49); G, longitudinally fractured cyclosystem revealing gastropore chambers (× 37); H, pseudosepta (× 125).

C. medioatlantica is distinguished most readily by its smaller cyclosystems and branch diameter; its smaller, inclined lids; and its differently shaped platelets and male ampullae.

Remarks

The specific name given to the new species refers to its geographic distribution.

Distribution and ecology

C. medioatlantica is known only from the Azores (861 m) and from the Mid-Atlantic Ridge at 36°50.9′N (1400-2200 m) and at 23°31′N (2644 m).

No symbionts are known.

Crypthelia vascomarquesi new species

Fig. 39 A-J, 40 A-J

Chresonymy:

Crypthelia affinis — Boschma, 1968a: 106 (part: " *Talisman* ").

Crypthelia — Zibrowius & Cairns, 1982: 212 (" unnamed ", part: Hyères Seamount, Azores/part, Madeira).

Crypthelia tenuiseptata — Cairns, 1986a: 117 (part, not Hyères Seamount and Madeira).

Types

All specimens available from the Azores are given type status: " *Talisman* " drag. 128, 3 small subterminal branch fragments comprising 6, 4, and 4 cyclosystems, respectively, the largest one designated holotype (Fig. 39 C-D), the smaller ones paratypes (MNHN). — Prince of Monaco, stn 242, small branch with 7 cyclosystems (paratype, MOM). — " *Jean Charcot* " 1971, cruise BIAÇORES 1971, stn 232, 3 small dead fragments, with a total of 5 cyclosystems (paratypes, MNHN).

Type locality: " *Talisman* " drag. 128, 16.8.1883, 38°07′N, 27°11′45″W, 983 m. Azores, between São Miguel and Faial.

Material studied

Azores: Holotype and paratypes (see above).

Hyères Seamount: " *Calypso* " 1959, drag. 4, small branch with originally 7 cyclosystems (Fig. 39 A-B) subsequently fractured (5 cyclosystems MNHN; 2 cyclosystems USNM 75622).

Madeira Archipelago: " *Jean Charcot* " 1966, stn 12, small fragment with 1 cyclosystem (MNHN); stn 17, small branch with 4 cyclosystems (MNHN); stn 19, 6 small fragments with a total of 10 cyclosystems (MNHN).

Description

Only 16 small pieces comprising a total of 48 cyclosystems from 7 stations in 3 widely separated areas are available for the description of this species.

Colonies uniplanar, probably small and delicate; known only from subterminal branch fragments with one to a few cyclosystems (Fig. 39 A-J); tallest fragment about 15 mm, bifurcate, and comprising 7 cyclosystems. Subterminal branches very thin (0.5-0.7 mm in diameter), particularly relative to the large cyclosystems they support. Coenosteal strips broad and slightly convex (Fig. 40 B), some up to 0.12 mm wide. Platelets well defined and flat (Fig. 40 C),

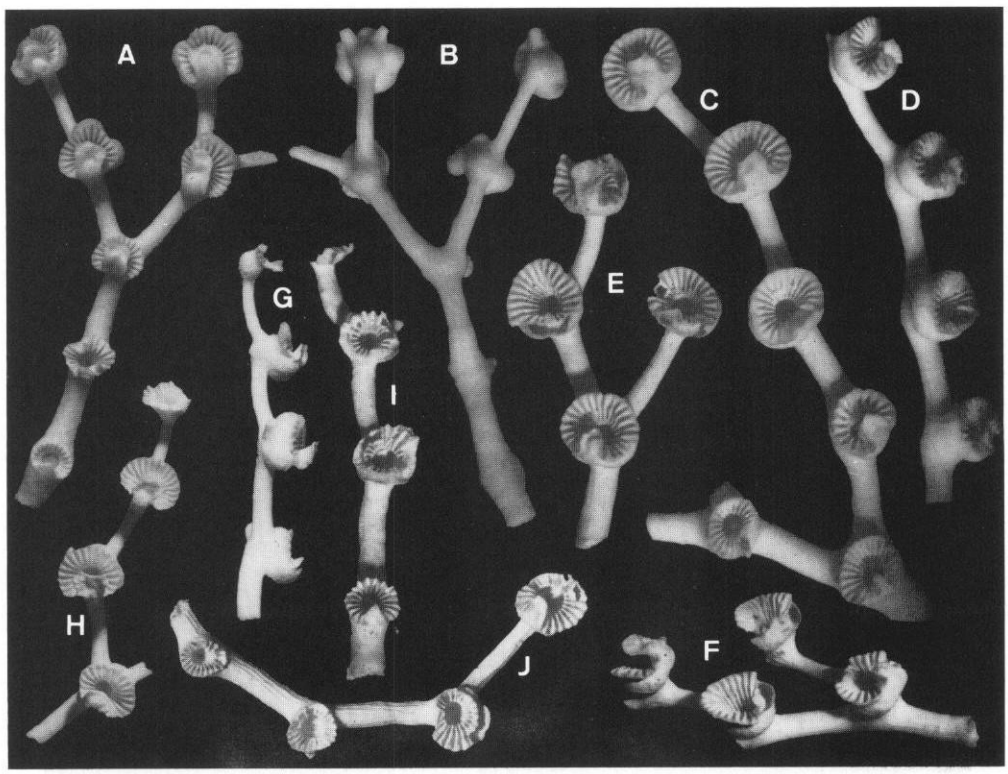

FIG. 39. — *Crypthelia vascomarquesi* (A-B, from " *Calypso* " 1959, drag. 4, MNHN; C-F, from " *Talisman* " drag. 128, MNHN; G-H, from Prince of Monaco stn 242, MOM; I, from " *Jean Charcot* " 1966, stn 19, MNHN; J, from " *Jean Charcot* " 1966, stn 17, MNHN): A-B, anterior and posterior branch faces with bulging female ampullae (both × 3.6); C, holotype (× 4.5); D, part of C, oblique side view (× 4.2); E-F, two views of paratype branch with four cyclosystems (× 4.5, × 4.2, respectively); G-H, two views of paratype branch (× 3.9); I, branch (× 4.2); J, branch (× 4.2).

10-68 μm wide. Large, shallow nematopores, 85-120 μm in diameter occur randomly over coenosteum, ampullae, and lids, and in a more orderly manner on almost every upper outer pseudoseptum (Fig. 40 A, H-I).

Cyclosystems circular to elliptical: circular cyclosystems 2.1-2.6 mm in diameter, elliptical ones about 2.2-2.5 × 1.6-2.0 mm. Cyclosystems very exsert on branch, being elevated by the underlying ring like ampullae (Fig. 39 B, D, F, 40 D, G-H). Based on 47 cyclosystems (out of 48), there is a range of 14-23 dactylopores per cyclosystem, mean 19.38, and mode 21.

Maximum width of upper gastropore chamber about 0.83 mm; gastropore ring constriction about 0.65 mm in diameter. Lower chamber about 1.0 mm wide, with very flat floor. Cyclosystem lid tongue-shaped and horizontal, covering 30-40 % of cyclosystem (Fig. 39 A, C). Lid up to 1.1 mm wide and highly concave. Dactylotomes wide (0.16 mm); pseudosepta correspondingly narrow, about 0.045 mm wide, and only slightly concave. Pseudoseptal edges slightly flared, overhanging underlying ampullar bulge (Fig. 40 H-I).

Male ampullae produce a continuous band encircling cyclosystem and also extend into proximal lid (Fig. 40 A, D-E). Each ampulla appears to be 0.55 mm in diameter, discrete in young cyclosystems but merging into a continuous band in mature cyclosystems. Each ampulla has an efferent pore about 70 μm in diameter, which opens into a contiguous dactylotome within the cyclosystem. Mature cyclosystems have efferent pores opening into almost every dactylotome (Fig. 40 F). Presumed female

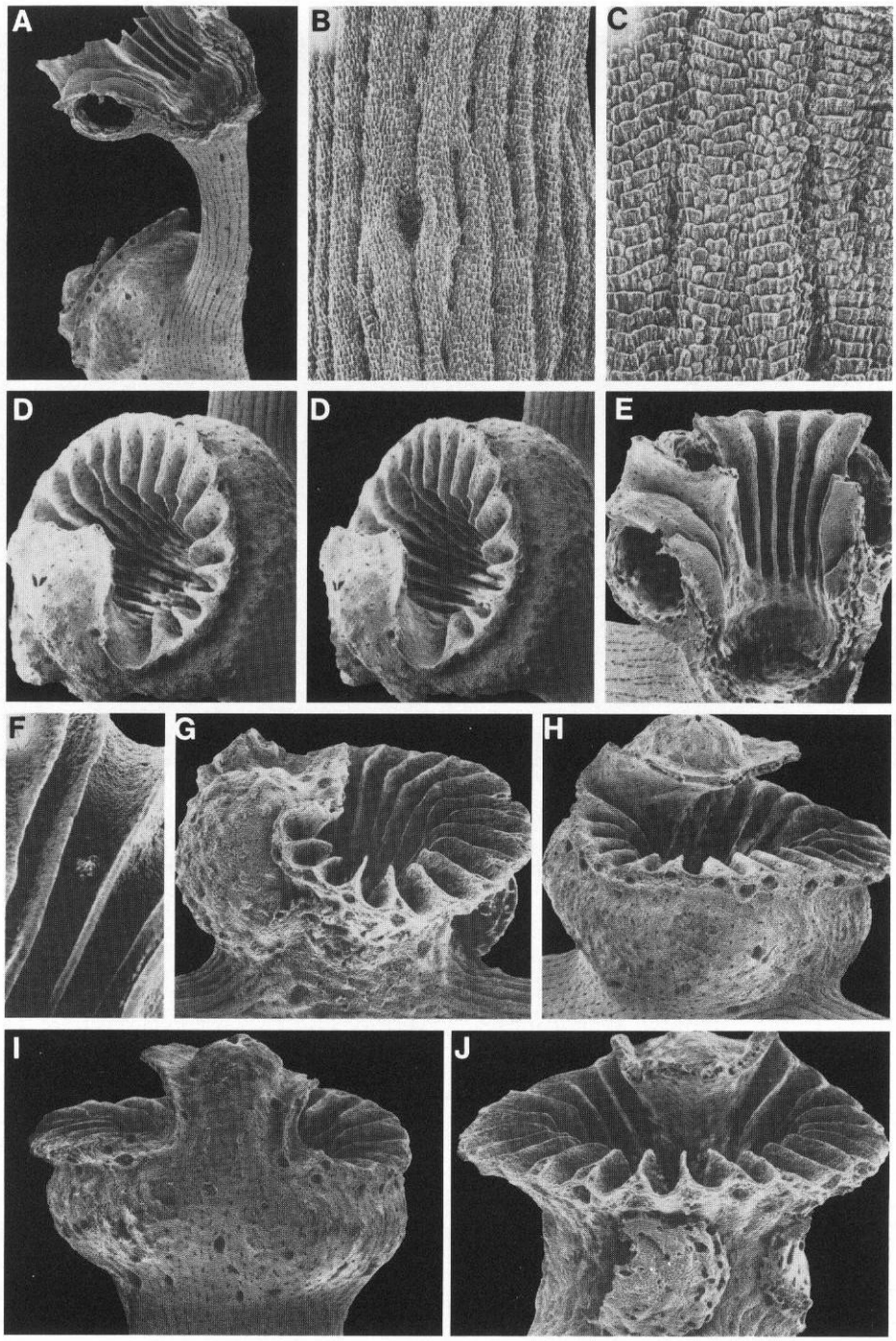

FIG. 40. — *Crypthelia vascomarquesi* (A, D-F, H-I, male paratype from " *Talisman* " drag. 128, MNHN; B-C, G, J, female (?) paratype from Prince of Monaco stn 242, MOM): A, distal branch with fractured cyclosystem encircled by male ampullae, pseudoseptal and coenosteal nematopores present (× 11); B-C, coenosteal texture (× 61, × 140, respectively); D, oblique view of male cyclosystem (× 20, stereo pair); E, longitudinally fractured cyclosystem revealing gastropore chambers and male ampullae (× 19); F, pseudoseptal area within cyclosystem showing male efferent pore in middle dactylotome (× 53); G, J, female (?) cyclosystems and ampullae (× 24, × 26, respectively); H, side view of male cyclosystem illustrated in D (× 19); I, side posterior view of cyclosystem illustrated in fig. D and H (× 19).

ampullae (Fig. 39 B, 40 G, J) more discrete, larger, hemispherical structures up to 1 mm in diameter. One to six female ampullae occur per cyclosystem, concentrating near proximal cyclosystem wall and proximal lid region. Female efferent pores also appear to open to a dactylotome within the cyclosystem; however, more specimens are needed to fully understand the ampullar arrangement of this species.

COMPARISONS

C. vascomarquesi can be distinguished from the other Atlantic congeners by its distinctive ampullar formula (B-C4 + A2) and various other characters (see Table 3). Within the Atlantic, it is most similar to the western Atlantic *C. glossopoma* Cairns, 1986, both species sharing the same ampullar formula (the only 2 of 28 species in the genus) and having similar cyclosystem lids, large nematopores, and very slender, flared pseudosepta. *C. vascomarquesi* is distinguished by its larger cyclosystems, thinner terminal branches, better defined platelet structure, and more prominent ampullae with male efferent pores occurring around the entire circumference of the cyclosystem.

REMARKS

This new species is named in memory of VASCO MONTEIRO MARQUES, Portuguese marine biologist (14.9.1953-19.12.1985).

Having previously resurrected the name *Crypthelia affinis* Moseley, 1879, for another eastern Atlantic stylasterid, BOSCHMA (1968a) incorrectly attributed to that species material from the " *Talisman* " expedition (drag. 128) preserved at the MNHN; in reality, this lot consisted of *C. vascomarquesi* and *C. tenuiseptata*.

Records of *C. vascomarquesi* from Hyères Seamount and Madeira Archipelago had previously been included under *C. tenuiseptata* by CAIRNS (1986a).

DISTRIBUTION AND ECOLOGY

C. vascomarquesi is known from the Azores, the Hyères Seamount, and the Madeira Archipelago, depths respectively 390-983 m, 600 m, and 990-1520 m.

The species is probably more widely distributed in the northeastern Atlantic. A small branch of *Crypthelia*, badly preserved, from near Selvagem Grande (" *Tydeman* " 1983, cruise CANCAP 3 stn 3.099, 585 m; RMNH) possibly belongs to *C. vascomarquesi*. Likewise, the unnamed Stylasteridae from Josephine Seamount (622 m) mentioned and schematically figured by LINDSTRÖM (1877: 15, pl. 2, fig. 25) could also be this species; unfortunately the tiny branch at the SMNH was found entirely decomposed into powder (R. OLERÖD *in litt.*, 1977).

No symbionts are known.

Crypthelia tenuiseptata Cairns, 1986

Fig. 41 A-J, 42 A-I

Synonymy:

Crypthelia tenuiseptata Cairns, 1986a: 115-117 (part, NOT Hyères Seamount, Madeira), fig. 52 A-G, 53 K.

Chresonymy:

[?] *Crypthelia pudica* — FILHOL, 1885: 268, pl. l.

Crypthelia affinis — BOSCHMA, 1968a: 106 (part: " *Talisman* ").

Crypthelia — ZIBROWIUS & CAIRNS, 1982: 212 (" unnamed ", part: Azores/part. NOT Hyères Seamount, Madeira).

Crypthelia tenuiseptata — CAIRNS, 1986b: 24-25.

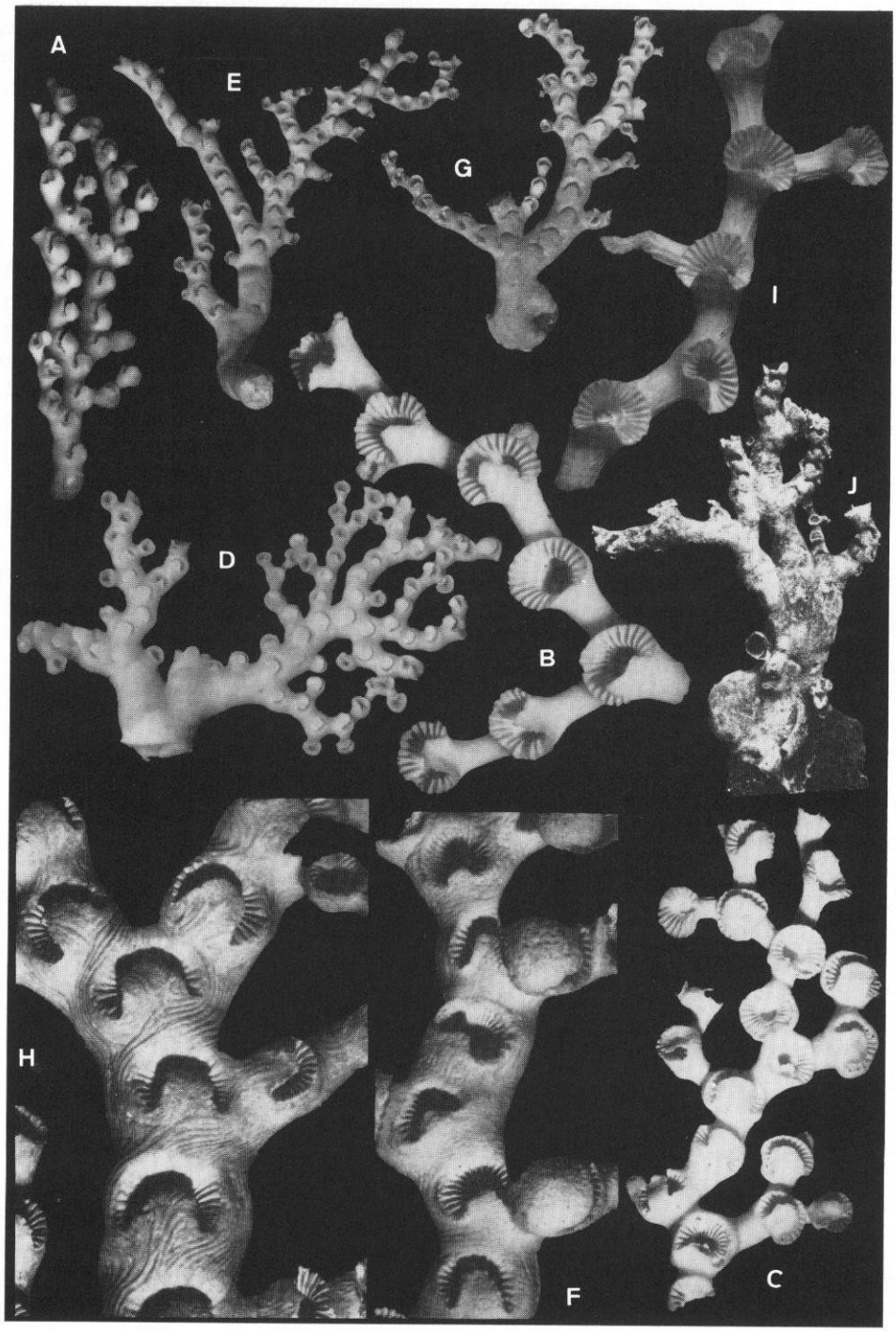

FIG. 41. — *Crypthelia tenuiseptata* (A-C, from " *Talisman* " drag. 128, MNHN; D, from " *Talisman* " drag. 127 ?, MNHN; E-I, from " *Jean Charcot* " 1971, stn 180, MNHN; J, from Prince of Monaco stn 233, MOM): A, female branch (× 1.3); B, peripheral branch (× 4.3); C, male branch (× 2.5); D, massive male colony (× 0.9); E, massive colony (× 0.8); F, detail of E (× 3.1); G, massive colony (× 0.8); H, detail of G (× 3.1); I, peripheral branch (× 4.0); J, detail of massive dead colony (× 0.6).

TYPES

Crypthelia tenuiseptata: The original description (CAIRNS, 1986a) is based on 3 small branches (up to 21 mm high and 25 mm wide) from 3 stations in the western Atlantic (" *Blake* " 1878/79, stn 131, Santa Cruz; stn 230, St. Vincent; stn 264, Grenada). These are the designated holotype (stn 264) and paratypes, all deposited at MCZ and USNM (71812 from stn 230).

Type locality: " *Blake* " stn 264, 1.3.1879, 12°03′15″N, 61°48′30″ E, 761 m. Grenada.

MATERIAL STUDIED

W Atlantic: holotype and paratypes of *Crypthelia tenuiseptata* (see above).

Azores: " *Talisman* " drag. 127 (?), 3 branches (MNHN); drag. 128, ca. 20 branches + minor fragments (MNHN). — Prince of Monaco, stn 203, 18 dead branches + fragments (MOM); stn 233, big colony (MOM); stn 616, 3 colonies + branches (MOM). — " *Jean Charcot* " 1971, cruise BIAÇORES stn 180, 10 colonies, branches + fragments (most MNHN; USNM 75623); stn 196, ca. 10 dead fragments (MNHN); unknown station, colony (MNHN).

DESCRIPTION

Colonies uniplanar (Fig. 41 A, D, E, G); well-preserved specimens up to 92 mm high and 69 mm wide; a poorly preserved incomplete colony (Prince of Monaco stn 233) was considerably larger: it is still 80 mm high and 72 mm wide, and measures 20 mm across the encrusting base and 12 by 15 mm in the lower part of the massive trunk (Fig. 41 J). Branches with inversed unifaciality of cyclosytem arrangement occasionally occur. Branches often anastomose; subterminal branch diameter about 0.9 mm. Coenosteal strips extremely wide (250-350 μm), and convex to carinate along strip midline (Fig. 41 H). Platelets broad and flat but sometimes irregular in size and shape near cyclosystems (Fig. 42 I). Nematopores extremely large and shallow (Fig. 42 C), about 220 μm in diameter, occurring randomly on branch coenosteum and along lid edge. Invariably there is a tiny coenosteal pit in the center of the nematopore.

Cyclosystems circular to irregular in shape, up to 3.8 mm in diameter. Old cyclosystems flush with coenosteum (Fig. 41 F, H); younger cyclosystems only slightly exsert (Fig. 41 B-C, I). Based on 502 eastern Atlantic (Azores) cyclosystems, there is a range of 15-27 dactylopores per cyclosystem, mean 19.75, and mode 19.

Maximum width of upper gastropore chamber about 1.1 mm; gastropore ring constriction about 0.8 mm in diameter. Lower, compressed chamber about 1.8 mm wide. Cyclosystem lid tongue-shaped and horizontal, covering 60-90 % of cyclosystem. Lid up to 2.3 mm wide and ordinarily quite thin and concave unless inflated with an ampulla. Dactylotomes quite wide (0.20 mm); pseudosepta narrow, about 0.1 mm wide, and not concave.

Female ampullae massive, restricted primarily to cyclosystem lid (Fig. 41 A, F, 42 B, E). Female efferent pores circular and extremely large (0.5 mm in diameter), opening on underside of vertical segment of lid. Male ampullae form a continuous, rather smooth bulge, encircling cyclosystem and occasionally extending into proximal lid. Male efferent pores circular, about 0.13 mm in diameter, opening into adjacent dactylotome within cyclosystem (Fig. 42 C). Some cyclosystems have one male efferent pore per dactylotome (Fig. 42 C). Also shown in Fig. 21 C is the apical efferent pore of the male ampulla in the lid.

COMPARISONS

C. tenuiseptata is distinguished from the other 8 Atlantic *Crypthelia* by its ampullar formula (A-C4 + A1); other characters are listed in Table 3 and by CAIRNS (1986a). Only one other species has an A-C4 ampullar formula: *C. gigantea* Fisher, 1938, from the Galápagos. They are also similar

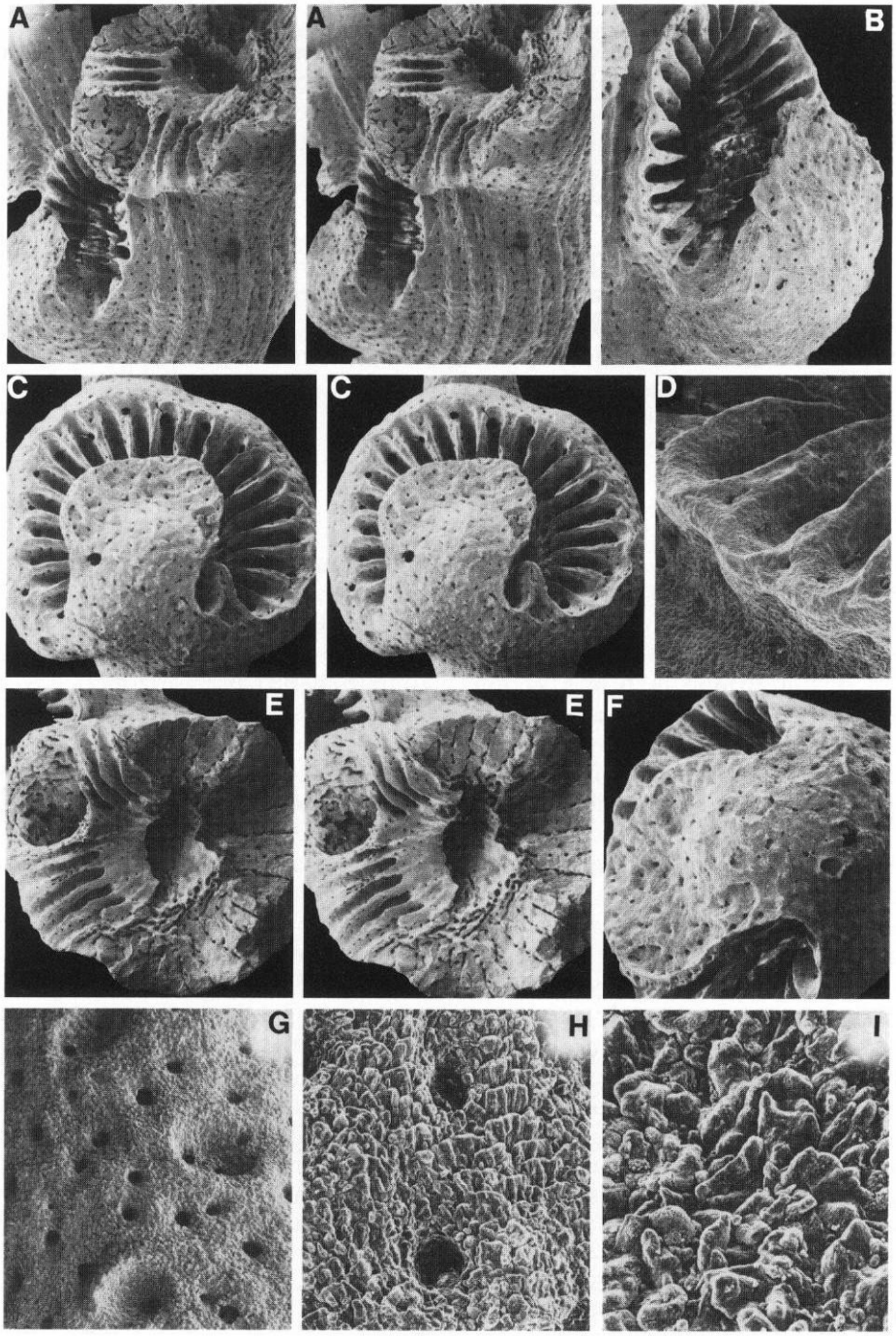

FIG. 42. — *Crypthelia tenuiseptata* (A-B, D-E, female from "*Jean Charcot*" 1971, stn 180, USNM 75623; C, F-I, male from "*Talisman*" drag. 127 ?, MNHN): A, branch segment illustrating cyclosystems, cyclosystem lid, gastropore chambers, and gross coenosteal texture (× 8.4, stereo pair); B, oblique view of female cyclosystems with ampullar bulge in lid (× 13); C, intact male cyclosystems showing numerous efferent pores opening into upper dactylotomes (× 11); D, pseudosepta (× 47); E, longitudinal fracture of female cyclosystem illustrating gastropore chambers and female ampulla (× 10, stereo pair); F, side posterior view of male cyclosystem of C (× 16); G, branch coenosteum with numerous coenosteal pores and three shallow nematopores (× 44); H-I, coenosteal texture (× 124, × 397, respectively).

in having massive coralla with very large cyclosystems, wide coenosteal strips, and relatively thin pseudosepta. *C. tenuiseptata* is distinguished from *C. gigantea* by its very large nematopores (*C. gigantea* has none), even broader coenosteal strips, and a lower average number of dactylopores per cyclosystem (see CAIRNS, 1986b).

REMARKS

C. tenuiseptata was described by CAIRNS (1986a) from 3 small branches from the western Atlantic, where larger colonies are still unknown. Previously, it had been mentioned by ZIBROWIUS & CAIRNS (1982) as an unnamed amphiatlantic species of *Crypthelia* from 3 areas in the eastern Atlantic (Azores, Hyères Seamount, Madeira). Although the species is amphiatlantic, the indicated distribution was partly incorrect because it included a second form now distinguished as *C. vascomarquesi*. In fact, in the eastern Atlantic the occurrence of *C. tenuiseptata* is confirmed only for the Azores, whereas *C. vascomarquesi* also occurs in the other areas (Hyères Seamount, Madeira Archipelago).

C. tenuiseptata, which had much earlier been collected in the Azores, had not been recognized as a distinct species by previous authors. A colony of unknown origin (" *Talisman* ", depth 800 m) figured by FILHOL (1885) and misidentified as *C. pudica*, may well belong to *C. tenuiseptata*, which indeed is represented in the " *Talisman* " collection by several large specimens.

Having previously resurrected the name *Crypthelia affinis* for another eastern Atlantic stylasterid, BOSCHMA (1968a) incorrectly attributed to that species material from the " *Talisman* " expedition (drag. 128) preserved at the MNHN; in reality, this lot consisted of *C. tenuiseptata* and *C. vascomarquesi*.

DISTRIBUTION AND ECOLOGY

C. tenuiseptata is noteworthy as one of the rare amphiatlantic stylasterids. It is known from the Virgin Islands, Lesser Antilles (761-1080 m), and from the Azores (983-1557 m). In the Azores live specimens were obtained as deep as 1257 m.

No symbionts are known.

Note added in press

We refer to a large collection of stylasterids (currently being studied by H.Z.) obtained around the Faroe Islands by the BIOFAR project (1987-1990), in fact the richest collection ever obtained in high latitudes of the North Atlantic. BIOFAR found all four species previously known from high latitudes but not all material is yet sorted: *Pliobothrus symmetricus* (8 stations), *Stylaster norvegicus* (45 stations), *Stylaster gemmascens* (21 stations), *Stylaster erubescens* (25 stations).

In addition, some samples of stylasterids from poorly collected areas (West Africa and Canary Islands) were discovered in the collections of the ZMUK and the Institute of Oceanographic Sciences (the latter samples now transferred to the BMNH).

Stenohelia maderensis

Sahara: " Discovery " stn 7975, 19.7.1972, 26°23.64′ N, 14°51.10′ W, 785-834 m, 5 dead fragments, the largest 11 mm high (BMNH); stn 7984, 20.7.1972, 25°26.00′ N, 16°10.25′ W, 811-890 m, 24 specimens (BMNH), ranging from a small incomplete colony with base (distal cyclosystems broken off), 13 mm high and 10 mm wide through branchlets to fragments with only very few or even one cyclosystem; few specimens alive, but some of the dead ones fresh-looking.

These records from the upper slope off West Africa fill in a wide gap of latitudinal distribution between the Cape Verde Islands and Madeira.

Crypthelia vascomarquesi

Canary Islands: " Dana " stn 4011, 25.3.1930 (coll. Th. MORTENSEN), 9 nautical miles SE of Las Palmas, Gran Canaria, 670-1100 m; small dead colony (ZMUK) with base, 11 mm high, with 5 cyclosystems, the basalmost being filled in by sclerenchyme; distal cyclosystems broken off (missing); two cyclosystems have 17 dactylopores, the other damaged ones also more than, respectively, 14 and 15.

This record from the " Dana " circumnavigation is the first confirmed record of a stylasterid from the Canary Islands. It extends the range of the species farther south (ca. 3 degrees of latitude).

LIST OF DEEP-WATER STATIONS FROM OCEANOGRAPHIC CRUISES

This is an inventory of stations from oceanographic cruises in the northeastern Atlantic Ocean, in the straits of Gibraltar, and in the Mediterranean from which stylasterid corals and/or their *Pedicularia* symbionts (or occasionally only the traces of *Pedicularia*), were available for the present study, or are quoted here from the previous literature.

Examples: " *Lepidopora eburnea* + trace of *Pedicularia* " means that only the trace, not the symbiont itself, was found on the stylasterid; " *Errina atlantica* + *Pedicularia* " means that the symbiont was found on its host; " *Errina dabneyi* + trace of *Pedicularia, Pedicularia* " means that only the trace was found on the stylasterid, but that *Pedicularia* from this station was no longer attached to a stylasterid host.

The vessels are listed in alphabetical order; under each vessel the cruises and stations are chronologically arranged, following the current station numbers, either continuous for the vessel, or distinct for each cruise. Prince of Monaco stands for all the cruises carried out by Albert I, Prince of Monaco, on several vessels. Whenever possible, the (main) depository of material is indicated for each vessel or cruise.

The present list summarizes the greater and more diversified part of the stylasterid records from the investigated area. Additional records not from these cruises are found under " material studied " of most species sections. These additional records comprise samples of imprecise origin in old museum collections, collections by fishermen, etc.

" *Al Mounir* " 1969 (collector J. STIRN; material in MNHN, USNM)
B6-D6: 2.7.1969, 35°55′00″N, 5°34′55″W, 350m, Straits of Gibraltar: *Errina aspera*
B8-D2: 5.7.1969, 35°54′15″N, 5°46′00″W, 365-390m, Straits of Gibraltar: *Errina aspera*
B10-D3: 21.7.1969, 33°43′30″N, 6°21′00″W, 200m, NW Morocco: *Errina aspera* + *Pedicularia*

" *Anton Dohrn* " (collector G. BEHRMANN; material in IMFB)
stat. ?: 10.3.1972, 68°30′N, 12°19′E, 300m, Norway: *Stylaster norvegicus*
stat. ?: 18.11.1973, 63°00′N, 6°30′W, 1040m, Faroes: *Stylaster norvegicus*
stat. ?: 19.11.1973, 62°07′N, 6°27′W, 75m, Faroes: *Stylaster norvegicus*

" *Bannock* " 1972, cruise JOTI 72: Straits of Messina (collector P. COLANTONI)
23: 7.1972, 38°14.56′N, 15°37.7′E, 95m: *Errina aspera* + *Pedicularia*
34: 7.1972, 38°12.7′N, 15°36.4′E, 220m: *Pedicularia* (*fide* SELLI *et al.*, 1980; stylasterid host not recorded, but undoubtedly *Errina aspera*)
47: 7.1972, 38°17.2′N, 15°44.0′E, 329m: *Pedicularia* (same remark as for stn. 34)

" *Bartlett* " 1975 (collector J. KNUDSEN; material in USNM)
2: 30.1.1975, 37°13.8′N, 28°44.5′W, 480m, Azores: *Lepidopora eburnea* + trace of *Pedicularia*
4: 3.2.1975, 38°09.8′N, 28°53.4′W, 750-800m, Azores: *Lepidopora eburnea* + trace of *Pedicularia*
14: 16.2.1975, 36°50.9′N, 32°57.9′W, 1400-2200m, Mid-Atlantic Ridge: *Errina dabneyi, Crypthelia medioatlantica*

" *Bartlett* " 1975 (collector BYERLY; material in USNM)
52C-5: 23.9.1975, 61°59.7′N, 26°35′-36′W, 585m, SW Iceland, Reykjanes Ridge: *Stylaster erubescens groenlandicus*

" *Calypso* " 1958 (material in MNHN)
SME-1277: 28.8.1958, approx. 36°30′N/11°30′W, 510m, Gorringe Seamount: *Lepidopora* sp. A
SME-1282: 30.8.1958, 35°54′N, 6°00′W, 110m, NW Morocco, Spartel Bank: *Errina aspera* + *Pedicularia*

" *Calypso* " 1959 (collector G. BELLAN; material in MNHN, USNM)
drag. 4: 13.8.1959, 31°26.6′N, 28°55.4′W, 600m, Hyères Seamount: *Pliobothrus gracilis, Crypthelia vascomarquesi*
drag. 6: 13.8.1959, 31°27.7′N, 28°55.6′W, 620-700m, Hyères Seamount: *Pliobothrus gracilis*

" Calypso " 1959: Cape Verde Islands (material in MNHN)
16: 17.11.1959, W São Tiago, NW Ponta Geneanes, 235-400m: *Stenohelia maderensis*
9l: 27.11.1959, 15°34.5′N, 23°11.5′W, 185m, between Maio and Boavista: *Stenohelia maderensis*

" *Chain* " 1959, cruise 7 (material in USNM)
PD-24: 31.7.1959, 30°00′N, 28°25′N, 295m, Great Meteor Seamount: *Stylaster erubescens meteorensis*

" *Challenger* " 1873 (material in BMNH)
3: 8.2.1873, 25°45′N, 20°12′W, 2795m, far SW Canary Islands: *Crypthelia affinis*
85: 19.7.1873, 28°42′N, 18°06′W, 2100m, Canary Islands, W Palma: *Lepidopora* sp. B

" *Challenger II* " 1977 (collector J.D. GAGE; material in BMNH)
6A-134: 9.4.1977, 54°05′N, 12°06′W, 800m, W Ireland: *Pliobothrus symmetricus*

" *Challenger II* " 1981 (collector T.P. SCOFFIN; material in BMNH)
30: 7.1981, 53°16.76′N, 14°35.47′W, 520m, Porcupine Bank: *Pliobothrus symmetricus, Stylaster* sp.

" *Cryos* " 1984, cruise BALGIM (collector H. ZIBROWIUS; material in MNHN)
DR-37: 1.6.1984, 36°17.8′N, 7°15.4′W, 860-868m, western approaches Straits of Gibraltar: *Pedicularia* (stylasterid host unknown, most likely *Errina aspera*)
DR-40: 2.6.1984, 35°49.9′N, 6°08.6′W, 362m, Straits of Gibraltar, W sill: *Errina aspera, Pedicularia*
DR-49: 3.6.1984, 35°53.0′N, 6°32.8′W, 524-578m, western approaches Straits of Gibraltar: *Errina aspera*
DW-50: 3.6.1984, 35°52.7′N, 6°31.9′W, 518-524m, western approches Straits of Gilbraltar: *Pedicularia* (stylasterid host unknown, most likely *Errina aspera*)
CP-95: 8.6.1984, 34°24.0′N, 7°39.3′W, 1378m, NW Morocco: *Lepidopora* sp. A, *Stylaster maroccanus*
DR-115: 11.6.1984, 35°47.5′N, 6°04.2′W, 332m, Straits of Gibraltar, W sill: *Errina aspera*
DR-116: 11.6.1984, 35°48.6′N, 6°04.2′W, 322-365m, Straits of Gibraltar, W sill: *Errina aspera*
DR-153: 17.6.1984, 35°55.8'S, 5°35.3′W, 568-604m, Straits of Gibraltar, E sill: *Pedicularia* (stylasterid host unknown, most likely *Errina aspera*)

" *Dana* " 1938 (material in ZMUK)
5835: 14.5.1938, 62°35′N, 7°52′W, 400m, W Faroes: *Stylaster gemmascens*
6001: 24.7.1938, 63°33′N, 11°25′W, 322m, SE Iceland: *Stylaster erubescens* (*britannicus* ?)
6005: 25.7.1938, 62°19′N, 8°51′W, 475-504m, W Faroes: *Stylaster gemmascens*
6009: 26.7.1938, 61°14′N, 7°04′W, 220m, S Faroes: *Stylaster gemmascens*

" *Gazelle* " 1874: Madeira Archipelago (material in ZMB)
2: 16.7.1874, S Madeira, 2 miles off shore, 110-128m: *Stenohelia maderensis*

" *Ingolf* " 1895-1896 (material in ZMUK)
1: 11.5.1895, 62°30′N, 8°21′W, 249m, W Faroes: *Stylaster gemmascens*
2: 12.5.1895, 63°04′N, 9°22′W, 493m, NW Faroes: *Stylaster gemmascens*
7: 17.5.1895, 63°13′N, 15°41′W, 1130m, SE Iceand: *Stylaster erubescens groenlandicus*
15: 4.6.1895, 66°18′N, 25°59′W, 621m, NW Iceand: *Stylaster norvegicus, S. gemmascens* (both *fide* BROCH, 1914a), *S. erubescens groenlandicus*
16: 5.6.1895, 65°43′N, 26°58′W, 471m, NW Iceland: *Stylaster gemmascens, S. erubescens groenlandicus*
17: 6.6.1895, 62°49′N, 26°55′W, 1403m, SW Iceland: *Stylaster norvegicus, S. erubescens* (*groenlandicus* ?) (both *fide* BROCH, 1914a)
52: 15.5.1896, 63°57′N, 13°32′W, 791m, SE Iceland: *Stylaster norvegicus, S. erubescens groenlandicus*
55: 19.5.1896, 63°33′N, 15°02′W, 595m, SE Iceland: *Pliobothrus symmetricus, Stylaster norvegicus* (both *fide* BROCH, 1914a)
57: 20.5.1896, 63°37′N, 13°02′W, 659m, SE Iceland: *Pliobothrus symmetricus* (*fide* BROCH, 1914a)
94: 26.6.1896, 64°56′N, 36°19′W, 384m, E Greenland, off Angmagssalik: *Stylaster gemmascens, S. erubescens* (*groenlandicus* ?) (*fide* BROCH, 1914)
144: 11.8.1896, 62°49′N, 7°12′W, 520m, N Faroes: *Stylaster erubescens britannicus*

" *Jean Charcot* " 1966, cruise ZARCO: Madeira Archipelago (material in MNHN)
12: 13.7.1966, 32°36.2′N, 17°07.7′W, 1520m, S Madeira: *Crypthelia vascomarquesi*

17: 15.7.1966, 32°58.5′N, 16°26.5′W, 1630-1690m, SW Porto Santo: *Crypthelia vascomarquesi*
19: 15.7.1966, 33°00.2′N, 16°20.0′W, 990m, SW Porto Santo: *Crypthelia vascomarquesi*
21: 15.7.1966, 33°01.2′N, 16°24.9′W, 220-290m, SW Porto Santo: *Stenohelia maderensis*
29: 16.7.1966, 33°01.4′N, 16°15.5′W, 300-340m, SW Porto Santo: *Stenohelia maderensis* + trace of *Pedicularia*
49: 18.7.1966, 32°27.3′N, 16°32.0′W, 450-490m, SW Deserta: *Pliobothrus symmetricus*?, *Stenohelia maderensis*

"*Jean Charcot*" 1971, cruise BIAÇORES: Azores (collector H. ZIBROWIUS; material in MNHN, USNM)
25: 9.10.1971, 38°21′N, 28°49.5′W, 800-1020m: *Crypthelia affinis*
34: 10.10.1971, 38°09.5′N, 29°15.0′W, 650-670m: *Pliobothrus symmetricus*
49: 12.10.1971, 37°56′N, 29°12′W, 215-225m: *Errina dabneyi* + trace of *Pedicularia, Pedicularia*
74: 15.10.1971, 38°28.5′N, 27°54.5′W, 1235-1310m: *Crypthelia affinis*
102: 19.10.1971, 39°30′N, 31°04.5′W, 712-750m: *Crypthelia affinis*
112: 20.10.1971, 39°34′N, 31°19.5′W, 806-825m: *Crypthelia affinis*
135: 25.10.1971, 39°24.5′N, 31°05.5′W, 760-860m: *Crypthelia affinis*
159: 31.10.1971, 37°26′N, 25°51′W, 525-600m: *Lepidopora eburnea*
161: 31.10.1971, 37°39.5′N, 25°50.5′W, 590m: *Lepidopora eburnea* + trace of *Pedicularia, Pliobothrus symmetricus*
180: 3.11.1971, 37°57.5′N, 25°33′W, 1069-1235m: *Crypthelia affinis, C. tenuiseptata*
196: 5.11.1971, 37°50′N, 24°55.5′W, 1146-1191m: *Crypthelia tenuiseptata*
197: 5.11.1971, 37°49.5′N, 25°01.5′W, 815m: *Pliobothrus symmetricus, Errina atlantica* + trace of *Pedicularia, Pedicularia*
212: 7.11.1971, 37°18′N, 24°45.5′W, 610m: *Errina atlantica*
213: 7.11.1971, 37°21.5′N, 24°32.5′W, 895m: *Lepidopora eburnea* + trace of *Pedicularia, Pliobothrus symmetricus*
218: 8.11.1971, 36°54′N, 25°08′W, 772-800m: *Pliobothrus symmetricus*
229: 10.11.1971, 37°01.5′N, 25°14′W, 600m: *Lepidopora eburnea* + trace of *Pedicularia, Pliobothrus symmetricus*
230: 10.11.1971, 36°54′N, 25°09.5′W, 665-712m: *Errina atlantica*
231: 10.11.1971, 36°55′N, 25°10′W, 380-440m: *Pliobothrus symmetricus*
232: 10.11.1971, 36°55′N, 25°11′W, 390-620m: *Pliobothrus symmetricus, Crypthelia vascomarquesi*
238: 11.11.1971, 37°25′N, 25°45′W, 506m: *Pliobothrus symmetricus*
240: 12.11.1971, 37°35′N, 25°32.5′W, 810-825m: *Pliobothrus* sp., *Errina atlantica* + *Pedicularia*
stat. ?: 1971, Azores: *Lepidopora eburnea* + trace of *Pedicularia, Stenohelia* sp. A

"*John Murray*" 1972 (collector E.J.W. JONES; material in BMNH)
site 4/dredge: 3./4.1972, 57°24′N, 10°45′W, 1500m, Anton Dohrn Seamount: *Stylaster erubescens britannicus*

"*Josephine*" 1869: Josephine Seamount (material in SMNH)
stat. ?: 1869, approx. 36°46′N/14°07′W, 622m: *Crypthelia* sp. (*fide* LINDSTRÖM, 1877)

"*Meteor*" 1970, cruise M19: Great Meteor Seamount (material in ZSM)
129/DD-94: 17.2.1970, 29°59′N, 28°33′W, 293-296m: *Stylaster erubescens meteorensis*
129/DD-95: 17.2.1970, 30°00′N, 28°31.5′W, 293m: *Stylaster erubescens meteorensis*
131/DD-98: 17.2.1970, 30°06′N, 28°33′W, 303m: *Stylaster erubescens meteorensis*

"*Michael Sars*" 1902: Faroes (material in VSM)
43: 4.7.1902, 62°31′N, 5°14′W, 320m, NE Faroes: *Stylaster gemmascens*
stn ?: 25.2.1904, 16 miles E Faroes, 376m: *Pliobothrus symmetricus*

submersible "*Nautile*" 1988, cruise HYDROSNAKE (material in MNHN, USNM)
HS-16: 5.7.1988, 23°31′N, 45°10′W, 2644m, Mid-Atlantic Ridge: *Crypthelia medioatlantica*

"*Noroit*" 1987, cruise SEAMOUNT (collector H. ZIBROWIUS; material in MNHN)
DW-8: 22.9.1987, 36°28.5′N, 11°37.1′W, 470-485m, Gorringe Seamount: *Lepidopora* sp. A
DE-10: 23.9.1987, 36°27.4′N, 11°35.0′W, 500-545m, Gorringe Seamount: *Lepidopora* sp. A, *Pedicularia*
CP-11: 23.9.1987, 36°26.4′N, 11°40.2′W, 805-830m, Gorringe Seamount: *Lepidopora* sp. A
CP-12: 23.9.1987, 36°24.2′N, 11°43.2′W, 1005-1040m, Gorringe Seamount: *Lepidopora* sp. A
DE-13: 23.9.1987, 36°23.0′N, 11°42.5′W, 1110-1180m, Gorringe Seamount: *Lepidopora* sp. A, *Errina atlantica*?
DW-21: 24.9.1987, 36°34.9′N, 11°28.4′W, 460-480m, Gorringe Seamount: *Lepidopora* sp. A, *Errina atlantica*?
CP-30: 26.9.1987, 36°44.3′N, 11°23.0′W, 1940-2075m, Gorringe Seamount: *Lepidopora* sp. A,

DW-56: 7.10.1987, 36°42.3′N, 14°21.6′W, 360-425m, Josephine Seamount: *Pliobothrus symmetricus*
DW-58: 7.10.1987, 36°45.9′N, 14°20.4′W, 340-380m, Josephine Seamount: *Pliobothrus symmetricus*
DW-78: 10.10.1987, 33°48.7′N, 14°22.6′W, 235m, Seine Seamount: *Lepidopora* sp. A
DE-98: 12.10.1987, 35°03.2′N, 12°55.4′W, 300-325m, Ampère Seamount: *Pedicularia* (stylasterid host unknown)
DW-108: 19.10.1987, 42°50.9′N, 11°53.1′W, 1100-1125m, Galicia Seamount: *Lepidopora* sp. A, *Stenohelia maderensis*
DW-111: 19.10.1987, 42°39.9′N, 11°35.8′W, 675-685m, Galicia Seamount: *Lepidopora* sp. A, *Pliobothrus symmetricus* ?, *Pedicularia*
DW-116: 20.10.1987, 42°52.44′N, 11°50.6′W, 985-1000m, Galicia Seamount: *Lepidopora* sp. A, *Stenohelia maderensis, Pedicularia*

submersible " *Pisces III* " 1973 (collector J.B. WILSON; material in BMNH)
P73-5: 24.6.1973, 57°54.9′N, 13°52.3′W, 160-190m, Rockall Bank: *Stylaster gemmascens*

" *Porcupine* " 1869: between Faroes and Hebrides (material in BMNH)
54: 1869, 59°56′N, 6°27′W, 665m: *Stylaster norvegicus, S. gemmascens, S. erubescens britannicus, Stenohelia maderensis*

" *Poseidon* " 1990, cruise 175/1: Denmark Strait (collector A. FREIWALD; material in SMF, USNM)
12/1: 18.10.1990, 65°26.76′N, 30°50.31′W, 477m: *Stylaster norvegicus, S. gemmascens, S. erubescens groenlandicus*
14/1: 18.10.1990, 65°29.70′N, 30°01.92′W, 433m: *Stylaster norvegicus, S. gemmascens, S. erubescens groenlandicus*

Prince of Monaco 1888-1905 (material in MOM)
203: 30.7.1888, 39°27′05″N, 30°55′05″W, 1557m, Azores: *Crypthelia affinis, C. tenuiseptata*
229: 16.8.1888, 38°22′N, 28°14′24″W, 736m, Azores: *Lepidopora eburnea, Pedicularia*
233: 18.8.1888, 38°33′21″N, 28°08′39″W, 1300m, Azores: *Crypthelia affinis, C. tenuiseptata, Pedicularia*
242: 22.8.1888, 38°48′30″N, 27°58′45″W, 861m, Azores: *Crypthelia medioatlantica, C. vascomarquesi*
247: 30.8.1888, 38°24′N, 28°01′25″W, 318m, Azores: *Errina dabneyi* + trace of *Pedicularia, Pedicularia*
553: 3.7.1895, 37°42′40″N, 25°05′15″W, 1385m, Azores: *Pedicularia* (stylasterid host unknown)
568: 11.7.1895, 37°54′N, 25°35′25″W, 550m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911)
584: 16.7.1895, 38°31′N, 26°49′15″W, 845m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911), *Pedicularia*
597: 23.7.1895, 38°27′N, 28°03′25″W, 523m, Azores: *Lepidopora eburnea, Pliobothrus symmetricus* (*fide* CALVET, 1911), *Pedicularia*
616: 1.8.1895, 38°47′40″N, 28°17′05″W, 1022m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911), *Crypthelia tenuiseptata*
618: 1.8.1895, 38°52′45″N, 28°06′00″W, 1142m, Azores: *Pliobothrus symmetricus* (*fide* CALVET,1911)
683: 7.7.1896, 38°20′N, 28°04′45″W, 1550m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911)
712: 24.7.1896, 39°39′40″N, 31°00′55″W, 1424m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911)
719: 27.7.1896, 39°11′N, 30°24′15″W, 1600m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911)
838: 22.7.1897, 37°55′N, 25°22′45″W, 880m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911)
866: 2.8.1897, 38°52′50″N, 27°23′05″W, 599m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911)
869: 3.8.1897, 39°03′N, 27°42′45″W, 1240m, Azores: *Pliobothrus symmetricus* (*fide* CALVET, 1911)
1349: 19.8.1902, 38°35′30″N, 28°05′45″W, 1250m, Azores: *Pedicularia* (stylasterid host unknown)
1713: 1.8.1904, 28°04′N, 16°49′30″W, 1320-1530m, Canary Islands, between Tenerife and Gomera: *Pedicularia* (stylasterid host unknown)
2210: 1.9.1905, 39°25′N, 31°22′30″W, 1229m, Azores: *Pedicularia* (stylasterid host unknown)

" *Talisman* " 1883 (material in MNHN, BMNH)
drag. 96: 15.7.1883, 19°19′N, 18°01′45″W, 2320-2330m, Mauritania: *Lepidopora* sp. A
drag. 103: 23.7.1883, Cape Verde Islands, S São Tiago, off Praia, 150-275m: *Stenohelia maderensis*
drag. 114: 30.7.1883, 16°51′N, 25°09′45″W, 598-633m, Cape Verde Islands: *Errina aspera* + trace of *Pedicularia*
drag. 123: 13.8.1883, 38°23′N, 28°49′45″W, 560m, Azores: *Lepidopora eburnea* + trace of *Pedicularia, Pliobothrus symmetricus, Errina dabneyi*
drag. 127: 15.8.1883, 38°38′N, 28°20′45″W, 1257m, Azores: *Crypthelia tenuiseptata*
drag. 128: 16.8.1883, 38°07′N, 27°11′45″W, 983m, Azores: *Lepidopora eburnea, Errina atlantica* + trace of *Pedicularia, Crypthelia vascomarquesi, C. tenuiseptata, Pedicularia*
drag.129: 16.8.1883, 38°00′N, 27°02′45″W, 2155-2220m, Azores: *Pedicularia* (confused, from drag. 128 ?; stylasterid host unknown)

" *Thalassa* " 1967-1973 (1972-1973 collector H. ZIBROWIUS; material in MNHN, USNM)
T-503: 10.8.1967, 44°00.7′N, 7°06.9′W, 490m, SW Bay of Biscay: *Stenohelia maderensis*
U-807: 18.8.1968, 44°11′N, 8°40,2′W, 450-500m, NW Spain: *Stylaster ibericus*
X-340: 16.10.1971, 44°07′N, 4°29.8′W, 860-910m, S Bay of Biscay, Le Danois Bank: *Stenohelia maderensis*
X-341: 16.10.1971, 44°07.3′N, 4°30.7′W, 800-840m, S Bay of Biscay, Le Danois Bank: *Stenohelia maderensis*
X-342: 16.10.1971, 44°07.5′N, 4°36.2′W, 700m, S Bay of Biscay, Le Danois Bank: *Stenohelia maderensis*
X-347: 16.10.1971, 44°07.3′N, 4°44′W, 640-910m, S Bay of Biscay, Le Danois Bank: *Stenohelia maderensis*
X-352: 17.10.1971, 44°06.5′N, 4°45.2′W, 545-580m, S Bay of Biscay, Le Danois Bank: *Stenohelia maderensis*
X-353: 17.10.1971, 44°06.8′N, 4°45.1′W, 635-655m, S Bay of Biscay, Le Danois Bank: *Stenohelia maderensis, Pedicularia*
X-362: 17.10.1971, 44°06.5′N, 4°50.9′W, 585-600m, S Bay of Biscay, Le Danois Bank: *Stenohelia maderensis*
X-363: 17.10.1971, 44°06′N, 4°53.2′W, 545-630m, S Bay of Biscay, Le Danois Bank: *Stenohelia maderensis*
Y-428: 4.9.1972, 44°11.8′N, 8°40.6′W, 500m, NW Spain: *Stylaster ibericus*
Y-430: 4.9.1972, 44°11.6′N, 8°40.6′W, 500m, NW Spain: *Stylaster ibericus* + *Pedicularia*
Y-431: 4.9.1972, 44°12.6′N, 8°40.7′W, 540m, NW Spain: *Stylaster ibericus*
Y-432: 4.9.1972, 44°12′N, 8°40.6′W, 515m, NW Spain: *Stylaster ibericus* + *Pedicularia*
Y-434: 4.9.1972, 44°12′N, 8°40.8′W, 620m, NW Spain: *Stylaster ibericus*
Y-436: 4.9.1972, 44°12.6′N, 8°40.8′W, 620m, NW Spain: base of tiny stylasterid, unidentified
Y-438: 4.9.1972, 44°12′N, 8°40.3′W, 545m, NW Spain: *Stylaster ibericus*
Y-440: 4.9.1972, 44°12.2′N, 8°40.2′W, 490m, NW Spain: *Stylaster ibericus* + trace of *Pedicularia*
Z-407: 23.10.1973, 47°43.6′N, 8°07.5′W, 1085-1115m, Celtic Sea: *Pliobothrus symmetricus*
Z-415: 24.10.1973, 48°07.2′N, 8°26.2′W, 380m, Celtic Sea: *Pliobothrus symmetricus* + trace of *Pedicularia*
Z-430: 25.10.1973, 48°37.0′N, 9°52.2′W, 1080m, Celtic Sea: *Stylaster erubescens britannicus* + trace of *Pedicularia*
Z-431: 25.10.1973, 48°38.2′N, 9°47.3′W, 800m, Celtic Sea: *Pliobothrus symmetricus*
Z-435: 26.10.1973, 48°39.7′N, 9°53.2′W, 1050m, Celtic Sea: *Pliobothrus symmetricus* + trace of *Pedicularia, Stylaster erubescens britannicus*

" *Thor* " 1904: W Iceland (material not located)
stn ?: 1904, 65°50′N, 26°53′W, 392m: Stylaster norvegicus, *Stylaster erubescens* (*groenlandicus* ?) (both *fide* BROCH, 1914a)

" *Travailleur* " 1882: S Bay of Biscay (material in MNHN)
drag.70: 28.8.1882, 43°59′N, 5°34′15″W, 1000m: *Pliobothrus symmetricus*

" *Triton* " 1882: between Faroes and Hebrides (material in BMNH, USNM)
3: 8.8.1882, 60°39′30″N, 9°06′W, 159m, SW Faroes Bank: *Stylaster norvegicus*

" *Tydeman* " 1977-1978, cruises CANCAP 2 and 3 (material in RMNH)
2.160: 10.9.1977, 27°36′N, 17°59′W, 550m, Canary Islands, S. Hierro: *Pedicularia* (stylasterid host unknown)
3.099: 23.10.1978, 30°07′N, 15°52′W, 585m, S Selvagem Grande: *Crypthelia* sp.

" *Vema* " 1961, cruise v17 (material in USNM)
RD-29: 9.4.1961, 60°27′N, 48°31′W, 326-366m, SW Greenland: *Stylaster erubescens groenlandicus*

" *Walther Herwig* " 1982, cruise 54 (coll. G. BEHRMANN; material in IMFB)
538-24: 24.9.1982, 65°25.2′N, 30°13.7′W, 700-713m, Denmark Strait: *Stylaster erubescens groenlandicus*

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