A REVISION OF THE GENUS *SINULARIA* MAY (OCTOCORALLIA, ALCYONACEA)

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With 68 text-figures and 38 plates

ABSTRACT

In this revision of the genus *Sinularia* 93 valid species are recorded. The type specimens of 13 species could not be examined, since the depository of the specimens is unknown; nevertheless it is possible to make notes on seven of them in this paper; three were discussed in former papers (*S. gyrosa, S. marenzelleri* and *S. rigida*), while the remaining three (*S. mayi, S. microspiculata* and *S. verrucosa*) could not be described in this paper. The holotypes of 24 species were described earlier by the present author and the reader is referred to the literature given. The results of the examination of two other species (*S. densa* and *S. larsonae*) will appear elsewhere (Records Aust. Mus. Sydney). Altogether 64 species are more or less fully described now; among them are three new species: *S. grandilobata, S. manaarensis,* and *S. portieri.* A list of invalid synonyms and species is added.

INTRODUCTION

The genus *Sinularia* May, 1898, has been revised by Lüttschwager (1914), Kolonko (1926), and Mrs. A. Tixier-Durivault (1945, 1951). However, a new revision is necessary for several reasons. First of all it must be pointed out that in the past the type specimens have often been insufficiently described. Drawings and/or photographs of the colonies and of the sclerites are frequently either wanting, or of poor quality and indistinct. The type specimens have only seldom been re-examined. As a result of this, later investigators have often made wrong identifications (*S. densa*!). In addition, after the last revision of 1951, many new species have been described. A survey of this new literature is not superfluous.

As regards the history and the diagnosis I refer to former authors. In this revision I confine myself to a discussion of three matters which are important for the identification. Firstly, the shape of the colony and its lobes. A good photograph is better than words to give an idea of this. Hence the large number of photographs in this paper, all at natural size. Secondly, the spiculation of the lobes and of the sterile stalk. The drawings in this paper have been made by means of the Reichert drawing-apparatus. Finally, I record the revised geographical distributions. This is necessary because

in many cases, subsequent identifications appear to have been wrong, and so I have omitted these new but incorrect localities from the reported distribution areas.

All information provided by former authors concerning, for example, the hardness or softness of the colony, the colour, the details of the polyps, etc., are usually not repeated here.

Acknowledgements

The main object of this study was the re-examination of type specimens of the genus *Sinularia*. Thanks to the co-operation of other people, I could trace nearly all the types. I am much obliged to Mrs. A. Tixier-Durivault and to Mrs. M.-J. d'Hondt, Muséum National d'Histoire Naturelle, Paris (MNHN), to Dr. P. F. S. Cornelius, British Museum (Natural History), London (BMNH), to Dr. J. Lowry, Australian Museum, Sydney (AMS), to Dr. D. H. H. Kühlmann, Museum für Naturkunde der Humboldt-Universität, Zoologisches Museum, Berlin (ZMB), and to Dr. M. Dzwillo, Zoologisches Museum Hamburg (ZMH), for their hospitality and valued assistance during my stay in the museums mentioned. I feel also indebted to Dr. C. B. Goodhart, University Museum of Zoology, Cambridge (UMZC), for the loan of a holotype, and to Miss Mary A. Garback, Academy of Natural Sciences of Philadelphia, U.S.A. (ANSP) for her (unfortunately unsuccessful) search for the holotypes of *S. conferta* (Dana) and *S. rigida* (Dana) (see pp. 31 and 113).

My stay at the museums of Paris, London, and Berlin was made possible by grants from the Alida Buitendijk Fonds and from the Jan Joost ter Pelkwijk Fonds; I want to express my gratitude to Dr. W. Vervoort, director of the Rijksmuseum van Natuurlijke Historie, Leiden, for his mediation in this.

Finally I am thankful to Mr. G. J. Vrijmoeth for making most of the photographs, to Mr. H. Nobbenhuis, who made the photographs of the specimens present in the British Museum, and to Mr. W. ter Spill for reading the manuscript.

General remarks

a. The shape of the colony and of the lobes. — More and more I have come to the conclusion that the shape of the colony and of its lobes is of great importance to taxonomy. In most cases it is impossible, however, to identify a colony by its outward appearance. Examination of the sclerites is always necessary.

In some cases the colony is so low and flat, sometimes dish-shaped, that

it is impossible to speak of a sterile "stalk"; sterile base or basal part might be better. And the colony should be called "encrusting", i.e. overlaying the substrate with a crust. It is not right to call a colony encrusting (French: encroûtant), when a distinct erect stalk is present.

b. The sclerites. — The surface layer of the lobes and of the sterile stalk usually contains club-shaped sclerites, consisting of a head and a handle or shaft. In a few cases these sclerites are more rod-shaped, a distinct, more or less thickened head being absent.

In this paper a typical form of clubs is called the *leptoclados*-type, named after the well-known and wide-spread *S. leptoclados*. The prominences composing the heads of these clubs are said to be foliaceous; the handles usually have one girdle of spines just above the base (see figs. 1 and 17). I had my doubts, however, about the foliaceous nature of the head-processes. For this reason Dr. Frederick M. Bayer, National Museum of Natural History — Smithsonian Institution, Washington, D.C., and Mr. Stevin Weinberg, Zoölogisch Museum, Amsterdam, at my request made SEM (scanning electron microscope) pictures of the clubs of *S. leptoclados* (pl. 1). Now we can see that the prominences consist of a thick basal part, a kind of stalk, and a swollen, knobby head. Of the foliaceous shape of the club heads very little remains. Seen under an ordinary microscope the clubs show, however, a typical shape, which I name the *leptoclados*-type. Those species which possess clubs of this type have been united in Group I (see below, under Groups and Keys).

It sometimes happens that the prominences composing the heads are less "foliaceous" and slightly more spiny (e.g. in *S. firma* Tixier-Durivault). In this case the species is nevertheless placed in Group I.

Other clubs have heads with a central wart, i.e. a terminal wart at the tip of the head and a zone of lateral warts below it (e.g. figs. 12a-c, 27a-c). The species with many of such clubs are to be found in Group II. I must point out, however, that not all clubs in any one of these species will have a central wart: they are often mixed with clubs without a central wart. In cases of doubt, one should also try the keys to Groups III and IV.

In the surface layer of the lobes and of the stalk, in addition to the clubs, there are always small spindles or rods. Their length depends on, and varies with, the length of the larger clubs in each species, and the shape and density of the processes agrees with the shape and density of the processes on the handles of the clubs. These spindles or rods are, therefore, of no taxonomic value, and they are only occasionally recorded in this paper.

It should be borne in mind that in investigating type specimens, I have

often studied only small fragments. Especially in the case of coenenchymal sclerites, the smallness of these fragments and the part of the colony from which these fragments were taken, may influence the results. Because of this it is quite possible that the original investigator may have reported the length of coenenchymal spicules as, for example "up to 5 mm", whereas in the fragment examined by me, the maximum length was 3.5 mm. The length of "up to 5 mm" might be correct. Consequently the order of magnitude is important; small differences will always be found.

The width of the sclerites has always been measured with the warts included.

As to the warts covering the coenenchymal sclerites I have found that their shape and arrangement, and especially their size, is of taxonomic value. In many species, the warts may be oval, or fused in a direction perpendicular to the longitudinal axis of the sclerite (figs. 5, 7). It is then necessary to measure the diameter of the warts (their processes and crenelles included) in a direction parallel to this axis. In all my drawings, this longitudinal axis runs from top to bottom of the page.

I describe as "small warts" those up to about 0.04 mm in diameter, "medium-sized warts" are 0.04 to 0.07 mm wide, and "large warts" have a diameter of more than 0.07 mm.

c. The siphonozooids. — In some species former authors have reported the presence of siphonozooids, describing them as "extremely degenerate" or "rudimentary", but I believe that in *Sinularia* siphonozooids are always absent. In my opinion these "rudimentary siphonozooids" are nothing but small vertical solenia. In the genus *Sinularia* the polyps are monomorphic.

Note on *Sinularia variabilis* Tixier-Durivault

Under the name *S. variabilis* Mrs. A. Tixier-Durivault described a number of colonies from different localities in the following years (the names of the collectors are added in parentheses):

1945, 1951: eight specimens from the Red Sea (6: Clot Bey, 1850; 2: Portier, 1844) and one from Gambier and Tuamotu Islands (Seurat, 1906);

1969: 13 specimens from Gambier Islands (12: Salvat, 1965; 1: Chevalier, 1965);

1970a: 2 specimens from New Caledonia (Ranson, 1953);

1970b: 2 specimens from Nha Trang (Ranson, 1953).

Of these samples I examined the following specimens: two from the Red Sea (1: Clot Bey; 1: Portier); one from Gambier and Tuamotu Is. (Seurat) and two from Gambier Is. (Salvat); one from Nha Trang (Ranson).

I found that in the shape (not in the size) of the clubs present in the surface layer of the lobes and of the stalk there is some similarity in all the colonies mentioned. But in the coenenchymal sclerites and in the shape of the colonies and their lobes there is so much dissimilarity, that assigning them to one species must be incorrect.

The specimens examined by me (I do not express an opinion on the other colonies present in the Paris Museum identified with *S. variabilis*) belong to three different species. Now the question arises which of them must be regarded as the holotype of *S. variabilis*. Mrs. M.-J. d'Hondt, Muséum National d'Histoire Naturelle, Paris, agreed that Mrs. A. Tixier-Durivault did not indicate, in the paragraph "Localité" (1945: 150), which of the nine colonies she chose as type. But in the collection of the Muséum she did set apart, with the mention "Type", the colony from Gambier and Tuamotu. This colony has been figured in Tixier-Durivault's Revision (1951, fig. 107). Therefore this specimen is here considered the holotype of *S. variabilis*.

Furthermore I found that the two specimens from Gambier Is., collected by Salvat in 1965, and also the type specimen of *S. pusilla* Tixier-Durivault (1969: 151), collected by Salvat in 1965 as well, must also be referred to *S. variabilis*. The colony from Nha Trang (Ranson, 1953) belongs to *S. arborea* Verseveldt, 1971.

The specimens from the Red Sea must be referred to a new species, which I name *S. portieri* sp. nov., after Portier, collector of two specimens in 1844.

Groups and keys

As an expedient in identifying *Sinularia* colonies I give five keys, each relating to a distinct Group of Species.

These groups are:

Group I. Clubs of the *leptoclados*-type.

Group II. Clubs with a central wart.

Group III. Clubs not having the characters of Group I or II; length of the clubs 0.06-0.12 mm.

Group IV. Clubs not having the characters of Group I or II; length of the clubs 0.12 mm and more.

Group V. No (or hardly any) clubs in the surface layer of the lobes.

In the keys, the term "clubs" means the clubs in the surface layer of the lobes. The coenenchymal sclerites mentioned are always those from the sterile stalk unless otherwise indicated.

Regarding Group II I again call attention to the rather frequent possibility that clubs provided with a central wart are mixed with clubs without such

a wart. In cases of doubt the keys to Groups III and IV should also be used.

The difference between Groups III and IV lies in the length of the clubs. In Group III the length of the clubs is 0.06 to 0.12 mm. This means that the majority of the clubs has a length of 0.06 to 0.12 mm, but a few larger clubs may also be present. A length of 0.12 mm and more does not preclude the presence of some smaller clubs. In case of doubt both keys should be consulted.

List of valid *Sinularia* species

In the following list the numbers I to V refer to the Groups and Keys to which the species belongs. The abbreviations RMNH, etc., refer to the museum in which the holotype is kept. The holotypes of new species described by the present author in former papers are kept in the Zoological Museum, Department of Zoology, Tel-Aviv University, Tel-Aviv, Israel (ZMTA), in the Bernice P. Bishop Museum, Honolulu, Hawaii (BPBM), in the Fisheries Laboratory, Mourilyan Harbour, Queensland, Australia (FLMH), in the Muséum National d'Histoire Naturelle, Paris (MNHN), and in the Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands (RMNH).

If in the following list a reference to the original description of the holotype is given behind the author's name (see, e.g., with *asterolobata*), the species in question was described a short time ago; in that case it is not found in the descriptive part of this paper, where the species are also discussed in alphabetical order.

abrupta Tixier-Durivault, 1970b; I; MNHN.
andamanensis Thomson & Simpson, 1909; no other particulars known.
arborea Verseveldt, 1971; IV; RMNH.
asterolobata Verseveldt, 1977c: 179-181, figs. 4, 40; V; FLMH.
brassica May, 1898; IV; ZMH.
capillosa Tixier-Durivault, 1970b; III; MNHN.
capitalis (Pratt, 1903); IV; BMNH.
ceramensis Verseveldt, 1977a: 304-305, fig. 1, pl. 1; II; RMNH.
compacta Tixier-Durivault, 1970a; I; MNHN.
compressa Tixier-Durivault, 1945; III; MNHN.
conferta (Dana, 1846); no other data available.
conferta var. *gracilis* Macfadyen, 1936; III; BMNH.
crassa Tixier-Durivault, 1945; IV; MNHN.
cristata Tixier-Durivault, 1969; III; MNHN.
cruciata Tixier-Durivault, 1970b; II; MNHN.
deformis Tixier-Durivault, 1969; II; MNHN.
densa (Whitelegge, 1897); the results of the re-examination of the holotype of this poorly described and consequently misinterpreted species will be published in the Records of the Australian Museum, Sydney, by Verseveldt & Alderslade; I; AMS.
depressa Tixier-Durivault, 1970b; II; MNHN.
discrepans Tixier-Durivault, 1970a; IV; depository unknown.

dissecta Tixier-Durivault, 1945; I; MNHN.
dura (Pratt, 1903); IV; BMNH.
elongata Tixier-Durivault, 1970a; IV; MNHN.
erecta Tixier-Durivault, 1945; I; MNHN.
exilis Tixier-Durivault, 1970b; I; MNHN.
facile Tixier-Durivault, 1970b; I: MNHN.
firma Tixier-Durivault, 1970a; I; MNHN.
fishelsoni Verseveldt, 1970b: 212-214, figs. 3, 4, pl. 2 fig. 2; I; ZMTA.
flexibilis (Quoy & Gaimard, 1833); V; MNHN.
flexuosa Tixier-Durivault, 1945; IV; MNHN.
foveolata Verseveldt, 1974b: 106-108, fig. 7, pl. 3 fig 1; III; RMNH.
frondosa Verseveldt, 1978: 52-55, fig. 2, pl. 3 fig. 1; IV; RMNH.
fungoides Thomson & Henderson, 1906; III; RMNH.
gardineri (Pratt, 1903); III; BMNH.
gaweli Verseveldt, 1978: 55, fig. 3, pl. 3 fig. 2; IV; RMNH.
gibberosa Tixier-Durivault, 1970b; II; MNHN.
grandilobata sp. nov.; II; ZMB.
granosa Tixier-Durivault, 1970b; III; MNHN.
gravis Tixier-Durivault, 1970a; IV; MNHN.
grayi Tixier-Durivault, 1945; III; MNHN.
gyrosa (Klunzinger, 1877). See: Verseveldt, 1977b: 26-28, fig. 20, pl. 6 fig. 1, pl. 7 fig. 1; Verseveldt, 1977c: 174 (listed only); II; depository unknown.
halversoni Verseveldt, 1974b: 108-111, figs. 8, 9, pl. 3 fig. 2; II; RMNH.
heterospiculata Verseveldt, 1970a: 165-168, figs. 1-3; Verseveldt, 1971: 48, pl. 12 fig. 1; V; RMNH.
hirta (Pratt, 1903); III; BMNH.
humesi Verseveldt, 1968: 54; 1971: 38-41, figs. 22-24, pl. 9 fig. 1; II; RMNH.
inelegans Tixier-Durivault, 1970b; I; MNHN.
inexplicita Tixier-Durivault, 1970b; IV; MNHN.
inflata Tixier-Durivault, 1970a; II; MNHN.
intacta Tixier-Durivault, 1970a; I; MNHN.
larsonae Verseveldt; the description of this new species will appear in the Records of the Australian Museum, Sydney; II; AMS.
leptoclados (Ehrenberg, 1834); I; depository unknown.
lochmodes Kolonko, 1926; III; ZMB.
macrodactyla Kolonko, 1926; III; ZMB.
macropodia (Hickson & Hiles, 1900); III; UMZC.
manaarensis sp. nov.; IV; BMNH.
marenzelleri (Wright & Studer, 1889). See: Verseveldt, 1972: 458-460, fig. 1, pl. 1 fig. 1; IV; depository unknown.
maxima Verseveldt, 1971: 50-53, figs. 34, 35, pl. 11 fig. 1; I; RMNH.
mayi Lüttschwager, 1914: 6. See: Burchardt, 1903: 666-667, pl. 54 fig. 8, pl. 56 fig. 8; not examined; presumably identical with *S. microclavata* Tixier-Durivault, see p. 90 in this paper.
microclavata Tixier-Durivault, 1970a; II; MNHN.
microspiculata Tixier-Durivault, 1970a: 255-256, figs. 90-92; not examined; I; depository unknown.
minima Verseveldt, 1971: 49-50, figs. 32, 33, pl. 11 fig. 2; II; RMNH.
mira Tixier-Durivault, 1970b; II; MNHN.
molesta Tixier-Durivault, 1970a; I; MNHN.
mollis Kolonko, 1926; V; ZMB.
muralis May, 1899; I; ZMB.
nanolobata Verseveldt, 1977a: 305-307, fig. 2, pl. 2; II; RMNH.

notanda Tixier-Durivault, 1966: 199-201, figs. 192-194. See: Verseveldt, 1976: 503-505, fig. 3, plate fig. 4; V; MNHN.
numerosa Tixier-Durivault, 1970a; II; MNHN.
ornata Tixier-Durivault, 1970a; III; MNHN.
ovispiculata Tixier-Durivault, 1970b; III; MNHN.
parva Tixier-Durivault, 1970b; II; MNHN.
pavida Tixier-Durivault, 1970b; III; MNHN.
peculiaris Tixier-Durivault, 1970a; IV; MNHN.
pedunculata Tixier-Durivault, 1945; III; MNHN.
polydactyla (Ehrenberg, 1834); II; depository unknown.
portieri sp. nov.; IV; MNHN.
prattae Verseveldt, 1974a: 17-19, figs. 10-13, pl. 6; III; BMNH.
procera Verseveldt, 1977b: 30-32, fig. 23, pl. 9 fig. 2; V; BPBM.
prodigiosa Verseveldt, 1977c: 182-183, figs. 6, 42b, c; IV; FLMH.
querciformis (Pratt, 1903); IV; BMNH.
ramosa Tixier-Durivault, 1945; III; MNHN.
rigida (Dana, 1846); II; depository unknown.
robusta Macfadyen, 1936; III; BMNH.
rotundata Tixier-Durivault, 1970a; I; MNHN.
sandensis Verseveldt, 1977b: 35-37, fig. 25, pl. 8 fig. 1; V; RMNH.
scabra Tixier-Durivault, 1970b; II; MNHN.
terspilli Verseveldt, 1971: 43-46, figs. 28, 29, pl. 7 fig. 2; III; RMNH.
triangula Tixier-Durivault, 1970a; III; MNHN.
variabilis Tixier-Durivault, 1945; IV; MNHN.
venusta Tixier-Durivault, 1970a; IV; MNHN.
verrucosa Tixier-Durivault, 1970b: 217-220, figs. 71-74; not examined; IV; depository unknown.
vervoorti Verseveldt, 1977b: 39-41, fig. 28, pl. 10 fig. 1; IV; BPBM.
vrijmoethi Verseveldt, 1971: 41-43, figs. 25-27, pl. 10 fig. 2; Verseveldt, 1974a: 20, figs. 14, 15, pl. 7; IV; RMNH.
whiteleggei Lüttschwager, 1914; IV; AMS.

Invalid synonyms and species

The following species and varieties are identical with other *Sinularia* species, or they do not belong to the genus *Sinularia*.

brongersmai Verseveldt, 1972 = *densa* (Whitelegge, 1897). See: Verseveldt & Alderslade, Records Aust. Mus. (in the press).
cervicornis Tixier-Durivault, 1970a = *brassica* May, 1898. Recently I examined the sclerites of the type specimen of *cervicornis*; they are identical with those of *brassica*. See p. 25 in this paper.
crispa Tixier-Durivault, 1970a = *numerosa* Tixier-Durivault, 1970a. See p. 96-100 in this paper.
dumosa Tixier-Durivaut, 1970b = *lochmodes* Kolonko, 1926. See p. 81 and 83 in this paper.
elegans Tixier-Durivault, 1970a = *querciformis* (Pratt, 1903). See p. 112 in this paper.
gonatodes Kolonko, 1926 = *leptoclados* (Ehrenberg, 1834). See p. 78-80 in this paper.
herdmani (Pratt, 1905) = *leptoclados* (Ehrenberg, 1834). See p. 78 in this paper.
leptoclados var. *gonatodes* Kolonko, 1926 = *leptoclados* (Ehrenberg, 1834). See *gonatodes* up here.
leptoclados var. *murale* May, 1899 = *muralis* May, 1899. See p. 94-96 in this paper.
palmata (Pratt, 1903) = *capitalis* (Pratt, 1903). See p. 27 in this paper.
partita Tixier-Durivault, 1970a = *lochmodes* Kolonko, 1926. See p. 81 in this paper

pinnulata (Shann, 1912) = *capitalis* (Pratt, 1903). See p. 27, 29 in this paper.
polydactyla var. *dialichana* Kolonko, 1926 = *polydactyla* (Ehrenberg, 1834). See p. 108 in this paper.
polydactyla var. *mollis* Kolonko, 1926 = *mollis* Kolonko, 1926. See p. 92-94 in this paper.
pusilla Tixier-Durivault, 1969 = *variabilis* Tixier-Durivault, 1945. See p. 119-123 in this paper.
ramulosa Tixier-Durivault ,1970b = *lochmodes* Kolonko, 1926. See p. 81 and 83 in this paper.
renei Tixier-Durivault, 1970a = *inflata* Tixier-Durivault, 1970a. See p. 75, 76 in this paper.
rigida var. *amboinensis* (Burchardt, 1903) = *rigida* (Dana, 1846). See: Verseveldt, 1977b: 32-35.
simpsoni Tixier-Durivault, 1945 = *erecta* Tixier-Durivault, 1945. See p. 49-51 in this paper.
triaena Kolonko, 1926 = *brassica* May, 1898. I examined the sclerites of Kolonko's holotype. They are quite identical with those of *brassica*. The enlargement of the colony represented by Kolonko (1926, pl. 1 fig. 4) is × 0.6. See p. 24 in this paper.
unilobata J. St. Thomson, 1921: 172-173, fig. 5. I examined holotype and paratype of this species present in BMNH, register no. 1962.7.20.52. I found that Thomson's description is very well done, but it is a pity that the drawings of the sclerites in his fig. 5 are not so good, and that he did not give a clear drawing of the typical non-retractile, cup-like calyces round the base of the polyps, consisting of white, clavate spicules (up to 1.05 mm long), of which the thickened heads project above the surface, forming a kind of palisade. At any rate the species does not belong to the genus *Sinularia*. The cylindrical, unbranched and unlobate shape of the colony reminds one of the genus *Bellonella*. In my opinion the correct name should be *Bellonella unilobata* (J. St. Thomson, 1921).
viride (*"Sclerophytum" viride*) Thomson & Henderson, 1906. Lüttschwager (1914: 2, 3) referred this species to the genus *Sarcophyton*. Moser (1919: 246, 249) identified it with *Sarcophyton trocheliophorum* Von Marenzeller, 1886. Re-examination of Thomson & Henderson's type specimen (BMNH register no. 1912.2.25.10) proved that Moser's identification is correct.

Keys

Group I: Clubs of the *leptoclados*-type

1. Colony dish-shaped, edge bent upwards; lobes few, widely spaced, irregular, flattened laterally . . . . . *facile* Tixier-Durivault
— Colony not dish-shaped, with numerous lobes 2
2. Coenenchymal sclerites in lobes with bizarre or branched forms . . 3
— Coenenchymal sclerites in lobes not or little branched 5
3. Most coenenchymal sclerites fantastically shaped; lobes up to 20 mm wide and 30 mm high; lobules 4-7 mm wide . . *fishelsoni* Verseveldt
— Coenenchymal sclerites branched 4
4. Lobes 3-4 mm wide, short, sometimes placed on parallel crests; smaller coenenchymal sclerites more or less lozenge-shaped . . . . . *erecta* Tixier-Durivault
— Lobes up to 8 mm wide, round or conical, densely arranged . . . . . *molesta* Tixier-Durivault

5. Lobes thin, flat, sinuous, very densely placed 6
— Lobes digitiform, knob-shaped, or wall-like 7
6. Lobes high (up to 50 mm), erect, wrinkled longitudinally . . . . . *dissecta* Tixier-Durivault
— Lobes short, irregular . . . . . *inelegans* Tixier-Durivault
7. Lobes distinctly digitiform 8
— Lobes knob-shaped or wall-like 10
8. Lobes robust, up to 120 mm high . . . . . *maxima* Verseveldt
— Lobes shorter 9
9. Lobes long, strongly branched; clubs usually 0.07-0.09 mm long, with distinct foliaceous heads . . . . . *leptoclados* (Ehrenberg)
— Lobes short, unbranched or with few, low knobs; clubs mostly 0.10-0.12 mm long, with more knotty or spiny heads . *firma* Tixier-Durivault
10. Colony with thick, crest- or wall-like lobes 11
— Colony with knob-shaped lobes 12
11. Base of club-handles with few knobs; warts on coenenchymal spicules up to 0.09 mm in diameter . . . . . *abrupta* Tixier-Durivault
— Base of club-handles with numerous rounded knobs; clubs in sterile base often very warty; warts on coenenchymal spicules 0.09-0.14 mm in diameter . . . . . *muralis* May
12. Lobules 2-3 mm wide; coenenchymal sclerites in lobes and stalk less than 2 mm long, slender . . . . *microspiculata* Tixier-Durivault
— Lobules wider; coenenchymal sclerites more than 2 mm long . . 13
13. Lobes and lobules 7-15 mm in their broad diameter . *densa* (Whitelegge)
— Lobes and lobules smaller, less than 10 mm wide 14
14. Clubs 0.10-0.12 mm long; coenenchymal sclerites in lobes up to 3.60 mm long, unbranched, with warts up to 0.09 mm in diameter . . . . . *compacta* Tixier-Durivault
— Clubs 0.08-0.10 mm long 15
15. In lobes, besides the small leaf-clubs, larger rods and spindles, 0.14-0.22 mm long, with a distinct waist (fig. 20f, g); clubs in stalk surface with compound warts; warts on coenenchymal sclerites up to 0.08 mm in diameter . . . . . *exilis* Tixier-Durivault
— In lobes, besides the small leaf-clubs, larger clubs, up to 0.25 mm long, with spiny or warty heads 16
16. Sterile stalk higher than wide; lobes up to 5 mm wide; coenenchymal sclerites up to 2.80 × 0.50 mm; warts up to 0.075 mm in diameter . . . . . *intacta* Tixier-Durivault
— Sterile stalk wider than high; lobes 5-7 mm wide; coenenchymal sclerites up to 4.00 × 0.70 mm; warts 0.03-0.05 mm in diameter . . . . . *rotundata* Tixier-Durivault

Group II. Clubs with a central wart

1. Clubs 0.06-0.10 mm, usually 0.08-0.10 mm long; longer clubs are scarce 2
— Length clubs 0.10 mm and more; shorter clubs are scarce . . . 8
2. Lobes very stout, up to 120 mm long and 30 mm wide at base . . . . . *grandilobata* sp. n.
— Lobes smaller, up to 40 mm high and 15 mm wide 3
3. Lobes strongly branched; lobules fingerlike 4
— Lobes less branched 5
4. Central wart often widening upwards fan-wise; coenenchymal spicules in stalk short and thick, up to 3.00 × 0.60 mm . *cruciata* Tixier-Durivault
— Central wart not widening fan-wise; coenenchymal spicules slender, up to 5.00 × 0.50 mm . . . . . *mira* Tixier-Durivault
5. Lobes and lobules voluminous 6
— Lobules crowded, rather small, knob-shaped, or conical to digitiform 7
6. Lobes up to 40 mm high and 10-14 mm in broadest diameter, flat, little ramified, not densely placed; clubs small, 0.06-0.09 mm long . . . . . *ceramensis* Verseveldt
— Lobes voluminous, with thick, sometimes flattened lobules; the latter often arranged in rosettes; clubs 0.08-0.15 mm long . . . . . *gibberosa* Tixier-Durivault
7. Lobules crowded, rounded; heads of longer clubs with high spines; internal spicules sometimes irregularly ramified, those in lobes up to 4.40 mm long . . . . . *depressa* Tixier-Durivault
— Lobules digitiform or conical; heads of clubs more warty; internal spicules slender, up to 2.60 mm long . . *microclavata* Tixier-Durivault
8. Coenenchymal sclerites short, stout, up to 2 mm long 9
— Coenenchymal sclerites longer 10
9. Lobes more or less wall-like, sinuous, rather densely crowded; coenenchymal sclerites often lozenge-shaped . . . . *gyrosa* (Klunzinger)
— Lobes crowded, with numerous very small, spherical lobules, 2-3 mm in diameter; coenenchymal sclerites irregularly shaped, with pointed prominences . . . . . *nanolobata* Verseveldt
10. Coenenchymal sclerites in stalk up to 10 mm long; lobes arborescent; clubs up to 0.24 mm long, with slender, nearly smooth handles . . . . . *larsonae* Verseveldt & Alderslade
— Coenenchymal sclerites rarely longer than 5 mm 11
11. Branched or furcated coenenchymal sclerites common 12
— Coenenchymal sclerites seldom branched or furcated 14

12. Clubs in lobes stout, up to 0.22 mm long, the heads often with high prominences; clubs in stalk bizarre, with grotesque wartlike prominences; lobes big, rather wide apart, flat . . . . *deformis* Tixier-Durivault
— Clubs in lobes shorter, up to 0.18 mm long, with narrow, warty heads; clubs in stalk not of bizarre shape 13
13. Colony low, encrusting; lobes unbranched or with few side-branches, remote . . . . . *rigida* (Dana)
— Colony with distinct stalk, sometimes encrusting; lobes crowded, arborescent, with fingerlike branches . . . . . *polydactyla* (Ehrenberg)
14. Lobes up to about 50 mm high 15
— Lobes (lobules) much shorter, rounded, or flattened, or compressed against one another 17
15. Lobes irregular, coarse; clubs 0.10-0.20 mm long, sometimes up to 0.27 mm; coenenchymal sclerites in stalk up to about 5 mm long; warts 0.06 mm in diameter, with high crenelles . . . *scabra* Tixier-Durivault
— Lobes flattened, not coarse; clubs either shorter or longer; coenenchymal sclerites in stalk up to 3 mm long; warts up to 0.10 mm in diameter . 16
16. Most clubs 0.09-0.14 mm long, few clubs up to 0.25 mm long; lobes thick, flat; coenenchymal sclerites in lobes slender, curved spindles . . . . . *halversoni* Verseveldt
— Most clubs 0.18-0.31 mm long; handles nearly smooth; coenenchymal sclerites in lobes wider spindles, the smaller ones with a distinct waist . . . . . *humesi* Verseveldt
17. Lobes (lobules) spherical, 3-7 mm wide 18
— Lobes not spherical, stouter 19
18. Colony low, encrusting; lobes not crowded; clubs up to 0.40 mm long, handles stout; warts on coenenchymal sclerites up to 0.06 mm in diameter . . . . . *parva* Tixier-Durivault
— Colony erect, with distinct stalk; lobes crowded; clubs up to 0.20 mm long, handles slender; warts on coenenchymal sclerites small, up to 0.045 mm in diameter . . . . . *minima* Verseveldt
19. Lobes (lobules) thick, very crowded, mutually compressed; internal sclerites in lobes with few, truncated cones . . *inflata* Tixier-Durivault
— Lobes (lobules) flat, less crowded, not compressed; internal sclerites in lobes with more or less densely placed warts . *numerosa* Tixier-Durivault

Group III. Most clubs 0.06-0.12 mm long, not of the *leptoclados*-type, and without central wart

1. Most coenenchymal sclerites in lobes and/or stalk branched, furcated, or fantastically shaped 2

— Branched or furcated coenenchymal sclerites scarce or absent . 7
2. Lobes with long, digitiform side-branches 3
— Lobes with short (less than 10 mm), round, mutually compressed, or slightly digitiform lobules 4
3. Colony erect, treelike, with many side-branches, the latter up to 25 mm long and 7 mm wide; coenenchymal sclerites in stalk thick, blunt spindles, up to 2.80 × 0.70 mm . . . . *ramosa* Tixier-Durivault
— Colony more encrusting; capitulum rather flat, with erect, laterally flattened lobes, up to 55 mm high; secondary and tertiary lobes 10 × 4-6 mm; coenenchymal sclerites in stalk pointed, rather slender, up to 5 mm long . . . . . *terspilli* Verseveldt
4. Colony with long sterile stalk, higher than broad 5
— Colony low, encrusting, or with stalk broader than high . . . 6
5. Lobules about 6 mm long and 4-5 mm wide; sclerites in surface layer of lobes and stalk of bizarre shape, a few are slightly club-shaped . . . . . *macropodia* (Hickson & Hiles)
— Lobules longer, up to 15 mm, crowded, erect; sclerites in surface layer of lobes and stalk distinctly clavate . . *pedunculata* Tixier-Durivault
6. Colony low, encrusting; lobes remote, erect, up to about 25 mm high; coenenchymal sclerites short and thick, up to 2.80 × 0.75 mm . . . . . *grayi* Tixier-Durivault
— Colony with distinct stalk; lobes covered with densely placed, small lobules, 2-4 mm wide; coenenchymal sclerites up to 3.60 mm long . . . . . *compressa* Tixier-Durivault
7. Coenenchymal sclerites small, shorter than 2.20 mm 8
— Coenenchymal sclerites longer than 2.20 mm 9
8. Lobes treelike, with long (up to 50 mm and more), slender, digitiform lobules, resembling those of *flexibilis*; coenenchymal sclerites up to 2.20 mm long, cylindrical, blunt . . . . *capillosa* Tixier-Durivault
— Lobes not branched treelike; lobules short, round, compressed one against the other, 5-10 mm wide; internal sclerites oval, up to 1.40 mm long; colony encrusting . . . . . *ovispiculata* Tixier-Durivault
9. Coenenchymal sclerites more than 6 mm long 10
— Maximum length of coenenchymal sclerites varies from 2.20 to 5 mm 11
10. Coenenchymal sclerites thick, in stalk up to 7.00 × 1.90 mm; stalk low; lobes high with a pock-pitted surface caused by the retracted polyps . . . . . *foveolata* Verseveldt
— Coenenchymal spindles slender, in stalk up to 7.00 × 0.70 mm; stalk high; polyps on slight elevations . *fungoides* (Thomson & Henderson)

11. Clubs triangular in general shape, heads wide, with big warts, handles short . . . . . *triangula* Tixier-Durivault
— Clubs not triangular 12
12. Lobes distinctly longer than wide, fingerlike 13
— Lobes short, not or hardly longer than wide, knob-shaped or flattened 18
13. Primary lobes very stout, up to 40 mm wide at base; branches up to 60 mm long and 5-8 mm wide; clubs in stalk strongly sculptured . . . . . *macrodactyla* Kolonko
— Lobes much smaller 14
14. Primary lobes robust, erect, sometimes wall-like, the summit round, notched or deeply cleft; coenenchymal sclerites up to almost 5 mm . . . . . *robusta* Macfadyen
— Lobes branched 15
15. Branches (twigs) slender, much longer than wide 16
— Branches short, digitiform or knoblike 17
16. Mode of branching resembles that of *flexibilis*; twigs up to about 20 mm long, 2-3 mm wide, usually narrowing distally; majority of clubs 0.06-0.07 mm long, often capstanlike; coenenchymal sclerites in stalk up to 2.80 mm long . . . . *conferta* var. *gracilis* Macfadyen
— Lobes strongly and irregularly branched; twigs rarely more than 10 mm long, the width is about 2 mm; majority of clubs 0.08-0.11 mm long, heads with blunt spines projecting in all directions; coenenchymal sclerites up to 5 mm long . . . . . *lochmodes* Kolonko
17. Capitulum cup-shaped; lobes long, slender, bearing on all sides knoblike to short digitiform lobules; coenenchymal sclerites in stalk thick, blunt, covered with round, weakly crenellated warts, 0.05-0.06 mm in diameter . . . . . *gardineri* (Pratt)
— Capitulum composed of closely set, flat lobes, which bear round or fingerlike lobules at their summits; coenenchymal sclerites in stalk smaller, with irregularly shaped warts . . . *pavida* Tixier-Durivault
18. Colony with variable height of stalk; lobes knob-shaped, covered with small, granular lobules; clubs in lobes with slender handles . . . . . *granosa* Tixier-Durivault
— Colony encrusting or distinctly stalked; lobules not granular . . 19
19. Colony low, encrusting; capitulum consisting or numerous, crowded lobules, mutually compressed, 3-6 mm wide; club heads with few, big warts; coenenchymal sclerites up to 3.20 mm long, with medium-sized warts (0.050-0.065 mm) . . . . . *ornata* Tixier-Durivault
— Colony erect, with distinct stalk 20
20. Sterile stalk high, longer than wide; lobules small, flat, with an inner

side set with polyps and an outer side without polyps . . . . . *prattae* Verseveldt

— Sterile stalk wider than high, growing broader upwards . . . 21

21. Primary lobes up to 22 mm high; secondary lobes small, often conical, 4-6 mm wide . . . . . *hirta* (Pratt)

— Lobes erect, flat, thin, crestlike; lobules few, along edge of crests . . . . . *cristata* Tixier-Durivault

Group IV. Length of most clubs 0.12 mm and more; clubs not of the *leptoclados*-type, and without central wart

1. Coenenchymal sclerites branched or of bizarre shape 2

— Coenenchymal sclerites not or little branched 10

2. Lobes erect, long, distinctly branched; branches and twigs about digitiform 3

— Lobes differently shaped 5

3. Lobes erect, longer than wide, with short, digitiform lobules . . . . . *inexplicita* Tixier-Durivault

— Lobes arborescent, with long, digitiform lobules (twigs) . . . 4

4. Lobes much branched; twigs up to 12 mm long and 3 mm wide; coenenchymal sclerites up to 6.50 × 0.90 mm, with medium-sized warts . . . . . *arborea* Verseveldt

— Lobes only slightly branched; branches up to 35 mm long and 6-9 mm wide; coenenchymal sclerites up to 1.80 mm long, with big warts . . . . . *vrijmoethi* Verseveldt

5. Lobes robust, 8-10 mm wide or much heavier 6

— Lobes small, 5-10 or 15 mm wide 8

6. Lobes heavy; lobules 2-5 × 2-3 mm, apically close together; clubs 0.15-0.25 mm long, with spiny heads; coenenchymal sclerites close on 5 mm long . . . . . *portieri* sp. n.

— Lobes robust, 8-10 mm wide, laterally compressed and sinuous, or erect and scarcely branched 7

7. Lobes erect, often flattened, irregular, not crowded; clubs with slender, weakly spined handles; coenenchymal sclerites very fantastically shaped . . . . . *capitalis* (Pratt)

— Lobes sinuous, densely placed; clubs with wide, warty handles; coenenchymal sclerites with some side-branches . . *gravis* Tixier-Durivault

8. Lobules short, stumpy, mutually compressed, 5-15 mm wide . . . . . *vervoorti* Verseveldt

— Lobules spherical or oblong, 5-10 mm wide, summits round . . . 9

9. Sclerites in surface layer of lobes sometimes clavate, but usually warty rods; coenenchymal sclerites of very bizarre shape, up to 5 mm long . . . . . *prodigiosa* Verseveldt
— Sclerites in surface layer of lobes warty clubs; internal sclerites: bigger ones rarely branched, smaller ones fantastically shaped . . . . . *peculiaris* Tixier-Durivault
10. Colony low, encrusting 11
— Colony distinctly stalked 14
11. Lobes unbranched, elongate, digitiform or leaflike, remote . . . . . *discrepans* Tixier-Durivault
— Lobes not elongate and digitiform; lobules either closely packed, thick knobs, or flattened and sinuous, or short digitiform 12
12. Lobes up to 35 mm high, the higher ones bear some rounded lobules, 6 mm wide . . . . . *gaweli* Verseveldt
— Lobes short, densely arranged; lobules big knobs, or flattened and sinuous 13
13. Lobules stout lobes, mutually compressed, often superficially grooved . . . . . *crassa* Tixier-Durivault
— Lobules erect, irregularly shaped, sinuous . *flexuosa* Tixier-Durivault
14. Colony erect; lobes transversely placed leaves, stiff but weak, at the edge 1 mm thick, at the base 5 mm; internal sclerites slender, up to 2.50 mm long, scarce . . . . . *frondosa* Verseveldt
— Lobes quite different 15
15. Club heads with a few, toothed branches, expanded in a characteristic manner 16
— Club heads warty or spiny 17
16. Colony with funnel-shaped capitulum; coenenchymal sclerites very wide or more slender, 5-7 mm long . . . . . *dura* (Pratt)
— Colony with erect, distally widening stalk; capitulum with rounded folds; coenenchymal sclerites up to 4.20 mm long . . . . *brassica* May
17. Most clubs 0.12-0.17 mm long or slightly shorter 18
— Most clubs 0.17-0.31 mm long 22
18. Coenenchymal sclerites short, up to 1.80 mm long; primary lobes 25 mm high; lobules rather crowded, usually simple, spherical, up to 9 × 7 mm wide . . . . . *whiteleggei* Lüttschwager
— Coenenchymal sclerites longer, 2.50 mm and more 19
19. Coenenchymal sclerites up to 5 mm long; lobules round, 5-7 × 5 mm; club heads spiny . . . . . *marenzelleri* (Wright & Studer)
— Coenenchymal sclerites up to about 2.50 mm long; club heads warty 20
20. Lobules round, about 4 mm wide, not crowded . *venusta* Tixier-Durivault

— Lobules smaller, less spherical 21
21. Lobules stretched, thin and flattened . . . *elongata* Tixier-Durivault
— Lobules short digitiform, rounded or slightly conical . . . . . *manaarensis* sp. n.
22. Lobes and lobules loosely arranged; club heads spiny; coenenchymal sclerites up to 6 mm long . . . . . *querciformis* (Pratt)
— Lobules rather densely or very densely arranged; club heads with warts, sometimes leaflike processes; coenenchymal sclerites up to 3.40 mm long . . . . . *variabilis* Tixier-Durivault

Group V. No (or hardly any) clubs in the surface layer of the lobes

1. Lobes stout, triangular or conical, extended in a stellate manner; clubs in stalk surface about triangular, 0.07-0.13 mm long, warty . . . . . *asterolobata* Verseveldt
— Lobes short, digitiform, or long and slender 2
2. Lobules short, digitiform 3
— Lobules long, slender 5
3. Most clubs in stalk surface 0.14-0.19 mm long; coenenchymal sclerites in lobes scarce or absent, in stalk fusiform, sometimes branched or bifurcated, up to 6.25 mm long . . . . . *mollis* Kolonko
— Coenenchymal sclerites in lobes numerous and of bizarre shape; sclerites in stalk spindles, a few branched or bifurcated 4
4. Clubs in stalk surface 0.11-0.16 mm long, thick, warty; coenenchymal sclerites in stalk 4-5 mm long . . . . . *notanda* Tixier-Durivault
— Clubs in stalk surface 0.17-0.23 mm long (distally shorter), handles pointed; coenenchymal sclerites in stalk up to 6.25 × 0.65 mm . . . . . *heterospiculata* Verseveldt
5. Lobules digitiform, not tapering distally, 10-15 mm long and 2 mm wide; clubs in stalk surface 0.15-0.21 mm long, heads warty, handles pointed; coenenchymal sclerites slender spindles, 5.25 × 0.55 mm . . . . . *sandensis* Verseveldt
— Lobules very slender, tapering distally 6
6. Sclerites in stalk surface 0.07-0.13 mm long, triangular to oval; coenenchymal sclerites in base of stalk up to 3.40 mm long . . . . . *flexibilis* (Quoy & Gaimard)
— Sclerites in stalk surface 0.05-0.07 mm long, oval or slightly clavate; coenenchymal sclerites in stalk irregular bodies, 1 mm long . . . . . *procera* Verseveldt

Descriptions

Sinularia abrupta Tixier-Durivault, 1970 (fig. 1, pl. 2)

Sinularia abrupta Tixier-Durivault, 1970b: 135-140, figs. 2-5; Verseveldt, 1977b: 18-20, figs. 12, 13, pl. 5 fig. 2.

Tixier-Durivault's fig. 2 (1970b) shows a portion of the holotype; the enlargement is × 0.65. Plate 2 represents a larger part of the specimen.

The foliaceous clubs in the surface layer of the lobes are of the *leptoclados*-type, the length is 0.08 to 0.10 mm (fig. 1a-d); a few are up to about 0.18 mm (fig. 1e, f). In the surface layer of the sterile stalk the leaf-clubs are slightly longer and wider, usually 0.10 to 0.13 mm long (fig. 1g-i), a few are up to 0.17 mm (fig. 1j).

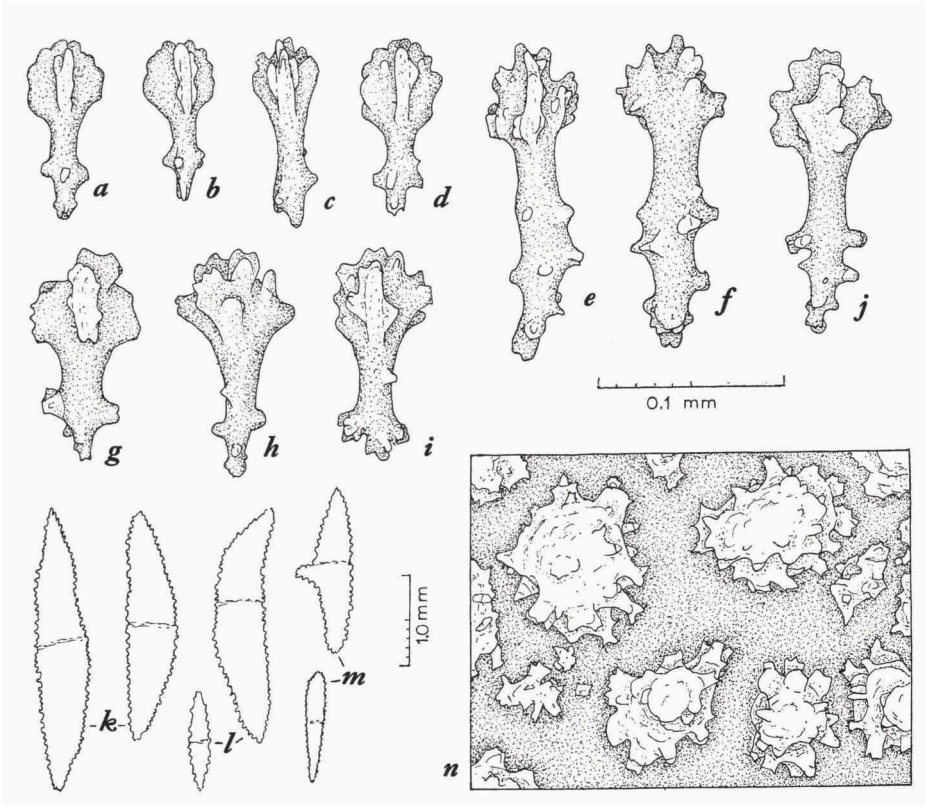

Fig. 1. *Sinularia abrupta* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-j, sclerites from surface layer of the stalk; k-m, spicules from coenenchyme of the stalk; n, tubercles on coenenchymal sclerite from the stalk. Enlargement of a-j and n indicated by 0.1 mm scale below f; that of k-m by 1.0 mm scale at m.

The coenenchymal spicules are spindles, not longer than 3.50 mm; in a few cases they bear a side-branch (fig. 1k-m). The warts are high, big, coarse, and irregular in shape, with high crenelles; they are rather densely placed (fig. 1n).

Geographical distribution. — Bay of Nha Trang (Vietnam), Fanning Atoll (Line Is.), Moku Manu I. (Hawaii Is.).

Sinularia andamanensis (Thomson & Simpson, 1909)

Sclerophytum andamanense Thomson & Simpson, 1909: 7, fig. 2.
Sinularia andamanensis; Lüttschwager, 1914: 15-16; Kolonko, 1926: 333.
Not *Sinularia andamanensis*; Tixier-Durivault, 1945: 59; Tixier-Durivault, 1951: 35-38, figs. 23A-C, 34-38; Tixier-Durivault, 1969: 140-142; Tixier-Durivault, 1970a: 258.

I could not find out in which museum or institution the holotype is kept, so a re-examination was impossible.

Thomson & Simpson's description is very incomplete. According to them the colony is low, encrusting, "the margin of the capitulum is very much convoluted". The colony is "fleshy and tough"; "there is an abundance of spicules in the stalk and central portion of the capitulum". That is all that is said about the spiculation. Further a description of the "autozooids" is given, and (fig. 2) a picture of a piece of the colony at natural size is presented.

Lüttschwager (1914) and Kolonko (1926) regarded the species as doubtful. As long as the holotype has not been carefully re-examined the species should indeed be regarded as uncertain. It is not included in any of the keys.

Tixier-Durivault (1945, 1951) gave a description of a colony, which she supposed to belong to *S. andamanensis*. I doubt the correctness of this identification. The stout lobes on the edge of the capitulum represented in Thomson & Simpson's fig. 2 differ widely from the sinuous, undulating lobes composing the capitulum of Tixier-Durivault's specimen, giving it the aspect of brains.

Sinularia arborea Verseveldt, 1971

Sinularia arborea Verseveldt, 1971: 46-48, figs. 30, 31, pl. 10 fig. 1; 1978: 50-51 (listed only).
Sinularia variabilis; Tixier-Durivault, 1970b: 217.

For description, see Verseveldt, 1971.

As said in the Note on *Sinularia variabilis* Tixier-Durivault (see p. 6, 7), one of the specimens of *S. variabilis* collected by Mr. Ranson at Vietnam in 1953 and described by Tixier-Durivault, 1970b: 217, must be referred to *S. arborea*.

Geographical distribution. — Madagascar, Guam, Vietnam.

Sinularia brassica May, 1898 (fig. 2, pl. 3)

Sinularia brassica May, 1898: 24-25; May, 1899: 101-102, pl. 1 fig. 12, pl. 5 fig. 4a, b; Kükenthal, 1906, 56-57, pl. 7 figs. 30-33; Thomson & Henderson, 1906: 416-417; Lüttschwager, 1914: 12; Kolonko, 1926: 327; Tixier-Durivault, 1945: 148-149; Tixier-Durivault, 1951: 78-79, figs. 91, 96.

May (1898, 1899) described this species for the first time. Kükenthal (1906) re-examined May's holotype. In the same year Thomson & Henderson gave a short and incomplete description of two other specimens, found near Zanzibar, just as May's type. Later authors did not examine the species themselves, so we can only rely on May's and Kükenthal's descriptions.

What struck me was the drawing of the clavate sclerite given by Kükenthal (1906, pl. 7 fig. 30). According to his description (p. 56), the clubs are 0.18 mm long. The handles of the clubs are pointed; the heads consist of two or three diverging, wide, toothed prominences; the width of the head is up to 0.1 mm. It is clear that May's drawing (1899, pl. 5 fig. 4b) does not

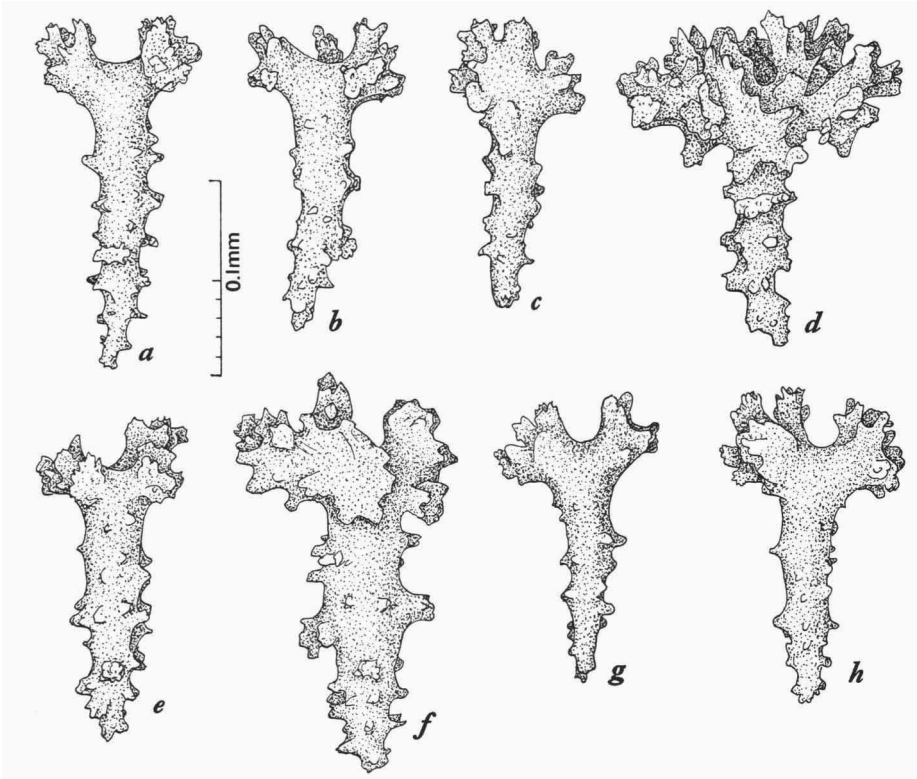

Fig. 2. *Sinularia brassica* May, holotype, ZMH no. C 2511. a-h, clubs from surface layer of a lobe. Enlargement indicated by 0.1 mm scale at a.

give a good idea of this remarkable club, and that Tixier-Durivault's copy (1951, fig. 96D) of Kükenthal's drawing does not show the essence of this sclerite.

Kükenthal's drawing just mentioned made me think of the peculiar clubs of *S. dura* (Pratt, 1903) (see Verseveldt, 1974b: 101-106, figs. 4-6). A relationship to, or even an identity with, *S. dura* was not unthinkable, but in this case with the lobate form of *S. dura*. A re-examination of May's type and an exact comparison with *S. dura* is needed before we can draw a conclusion.

Autumn 1979 I had the good fortune of finding May's holotype of *S. brassica* in the Hamburg Museum, register no. C 2511 (pl. 3 figs. 1, 2). A good description of this colony was given by May (1899) and Kükenthal (1906). In respect of the spiculation I make some additional remarks, and give new drawings of the clubs.

The surface layer of the lobes contains the typical clubs mentioned above (fig. 2a, b, e-h). The length varies from 0.15 to 0.20 mm; a few are smaller, about 0.12 mm, others are longer, 0.22 mm (fig. 2f). The heads strongly vary in width: "normal" clubs are usually 0.06 to 0.10 mm wide, but not seldom the head is much wider, 0.12 to 0.15 mm, and bears numerous processes (fig. 2d, f). The club depicted in fig. 2c bears a slight resemblance to the club represented by May (1899, pl. 5 fig. 4b). The clubs in the surface layer of the stalk are of nearly the same shape and length.

The same holds for the spicules in the interior of the lobes and the stalk. They are rather thick spindles, in my slides up to 3.25 mm long and 0.65 mm wide; Kükenthal (l.c.) records a length of 4.2 mm and a width of 0.85 mm (8.5 mm is a misprint, of course). The spindles are densely covered with warts, as described and figured by the present author (1974b: 105, fig. 6a, b). In Kükenthal's drawing (pl. 7 fig. 31) they are too widely spaced. (The enlargement of Kükenthal's fig. 30 must be about × 200 instead of × 142 as recorded in the explanation of pl. 7; and the enlargement of fig. 31 cannot be × 71.)

It appears that the spiculation completely agrees with that of *S. dura* (Pratt, 1903), and the most plausible inference would be to call May's specimen *S. dura*. But this is impossible since May's specific name *brassica* is the earlier name and thus has priority!

May's *S. brassica* is a lobate form, and the question again arises, whether the lobate forms and the funnel-, chanterelle- or cup-shaped forms of "*S. dura*" must still be united in one species. Till now so many distinct lobate and cup-shaped specimens have been found that in my opinion it is necessary to regard the two forms as two different species. The most obvious solution

then is to call the lobate forms *S. brassica* May, 1898, and the cup-shaped forms *S. dura* (Pratt, 1903).

In the following list I enumerate the lobate forms recorded in the literature, with the name under which the specimen was described, and the locality.

S. brassica: May, 1898: 24-25, one specimen, the holotype, Tumbatu. May, 1899: 101-102, pl. 1 fig. 12, pl. 5 fig. 4a, b, the same colony. Kükenthal, 1906: 56-57, pl. 7 figs. 30-33, the same colony. Thomson & Henderson, 1906: 416-417, one specimen, Wasin Channel, 10 fathoms.

S. dura: Pratt, 1903: 528, one specimen, Addu Atoll (Maldives), in shallow water. Thomson & Dean, 1931: 50-51, one specimen, Siboga Exped. Sta. 250, Kur (west of Kai Is.), reef. Macfadyen, 1936: 33-34, one colony, Low Is., Great Barrier Reef. Tixier-Durivault, 1951: 253, two specimens, New Caledonia. Verseveldt, 1974b: 102, 105, several colonies, New Caledonia. Verseveldt, 1978: 50, Palau, reef crest.

S. triaena: Kolonko, 1926: 304, Palawan.

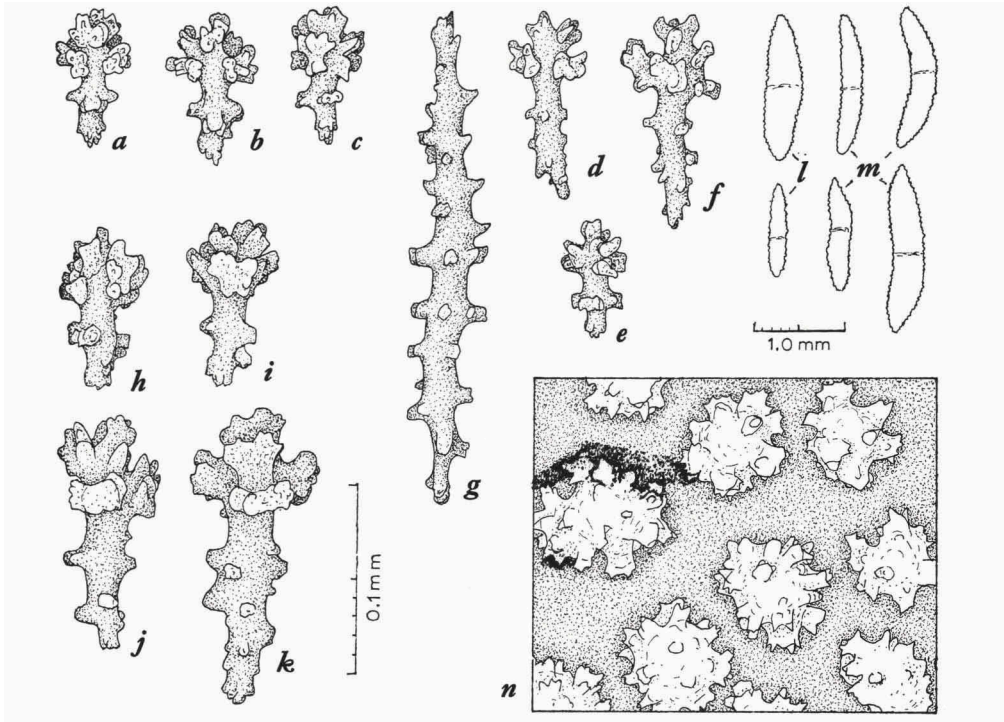

Fig. 3. *Sinularia capillosa* Tixier-Durivault, type specimen, MNHN. a-g, sclerites from surface layer of a lobe; h-k, sclerites from surface layer of the stalk; l, m, spicules from interior of the stalk; n, warts on coenenchymal sclerite from the stalk. Enlargement of a-k and n indicated by 0.1 mm scale at k; that of l, m by 1.0 mm scale below l.

S. cervicornis: Tixier-Durivault, 1970a: 288-289, figs. 142-144, three colonies, New Caledonia.

Geographical distribution. — See the above list.

Sinularia capillosa Tixier-Durivault, 1970 (fig. 3, pl. 4)

Sinularia capillosa Tixier-Durivault, 1970b: 140-141, figs. 6-8.

The enlargement of the fragment of the colony pictured by Tixier-Durivault (1970b, fig. 6) is × 0.7. Plate 4 shows a larger part of the colony (probably the holotype).

The surface layer of the lobes contains: (1) small clubs, 0.06 to 0.08 mm long, with warty heads and one girdle of warts on the handle (fig. 3a-c, e); (2) slightly larger clubs, up to 0.12 mm long, with more prominences on the shafts (fig. 3d, f); and (3) numerous thin spindles, 0.15 to 0.30 mm long, with pointed or blunt-ended processes (fig. 3g). The clubs in the outer layer of the sterile stalk are a little larger and wider; most of them are 0.08 to 0.12 mm long, a few are up to 0.19 mm long (fig. 3h-k).

In the coenenchyme of the lobes and of the stalk lie blunt-ended or slightly pointed, rarely branched sclerites, in the lobes up to 1.30 mm long and 0.34 mm wide, in the stalk up to 1.80 mm long and 0.43 wide (fig. 3l, m). The tubercles on these sclerites are about 0.06 mm in diameter; they are practically round, with many, high crenelles surrounding the summit (fig. 3n).

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia capitalis (Pratt, 1903) (fig. 4, pl. 5 figs. 1, 2)

Sclerophytum capitale Pratt, 1903: 520-521, pl. 28 fig. 8, pl. 29 figs. 15-17, pl. 30 fig. 19.
Sclerophytum palmatum Pratt, 1903: 525-527, pl. 30 fig. 26, pl. 31 fig. 27; Pratt, 1905: 255-256.
Not *Sinularia capitalis*; Cohn, 1908: 228-229; Tixier-Durivault, 1945: 147-148; Tixier-Durivault, 1951: 71-73, figs. 73, 84-88; Tixier-Durivault, 1970a: 254; Tixier-Durivault, 1970b: 141-144.
Sclerophytum pinnulatum Shann, 1912: 507-509, pl. 62 fig. 7, pl. 63 fig. 10.
Sinularia capitalis; Lüttschwager, 1914: 15.
?*Sinularia palmata*; Lüttschwager, 1914: 8.
Not *Sinularia polydactyla*; Kolonko, 1926: 325; Tixier-Durivault, 1945: 61-63; Tixier-Durivault, 1951: 50-56, figs. 43, 44, 57-66.

First I shall give a discussion of the colonies and the sclerites of *S. capitalis*. After that I will try to explain, why *S. palmata* (Pratt) and *S. pinnulata* (Shann) are referred to *S. capitalis*, why *S. capitalis* (and also *S. palmata*) is not identical with *S. polydactyla*, and why *S. capitalis* sensu Tixier-Durivault is not identical with *S. capitalis* (Pratt).

S. capitalis (Pratt, 1903). — In the British Museum (Natural History) there is a bottle labelled no. 1936.5.12.3, containing Pratt's holotype and two

fragments (paratypes), one of which is light brown-greyish in colour just as the holotype, while the other is dark grey.

The holotype is represented in Pratt's pl. 28 fig. 8 (enlargement × 2), and in our pl. 5 fig. 1.

In the lobes the clubs are 0.12 to 0.17 mm long. Sometimes the small heads are bi-ramous (fig. 4a, f), but usually the heads consist of a few knots or warts (fig. 4b-e). In the surface layer of the sterile stalk the clubs have about the same length, 0.10 to 0.18 mm, but they are wider (fig. 4g-k).

The interior of the lobes and of the stalk contains tuberculate spicules, which "vary considerably in shape as well as in size; regularly and irregularly

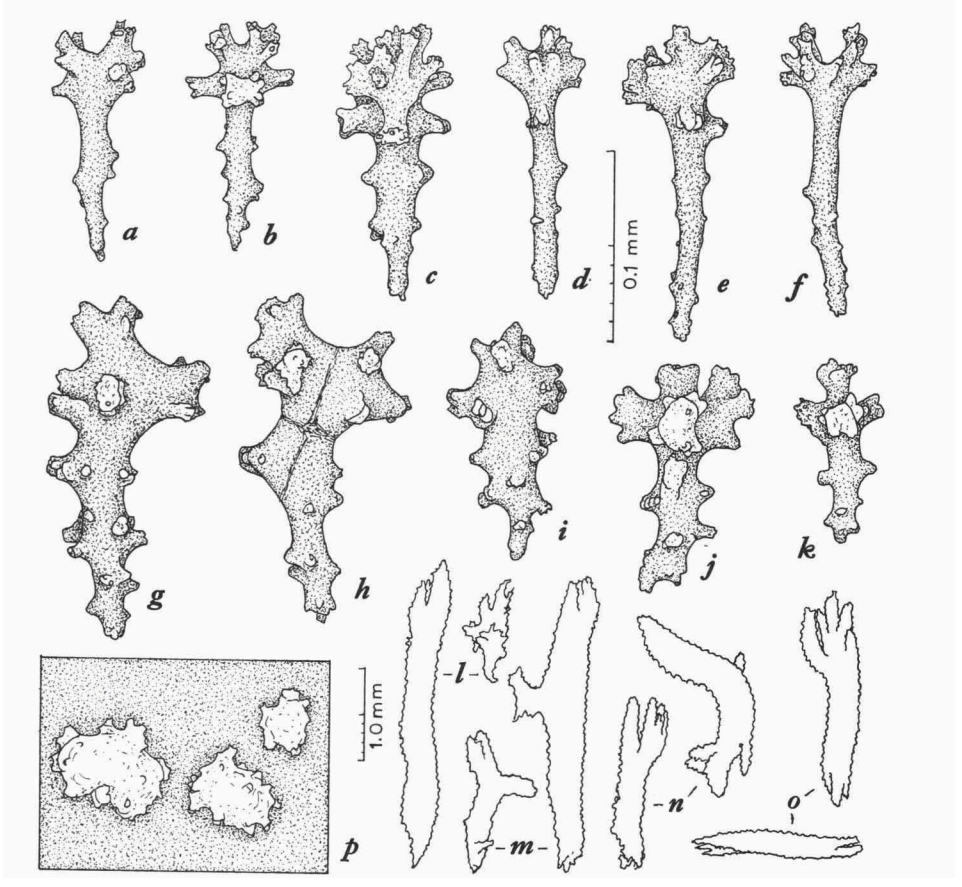

Fig. 4. *Sinularia capitalis* (Pratt), holotype, BMNH no. 1936.5.12.3. a-f, sclerites from surface layer of a lobe; g-k, sclerites from surface layer of the stalk; l-o, sclerites from coenenchyme of the stalk; p, warts on coenenchymal sclerite from the stalk. Enlargement of a-k and p indicated by 0.1 mm scale at d; that of l-o by 1.0 mm scale at left of l.

curved spindles are numerous" (Pratt, 1903: 520). Those in the stalk are longer, 3.30 mm, the width is up to 0.50 mm (fig. 4l-o; Pratt's fig. 16 shows the bizarre forms in an excellent manner). They have prominences, which vary from volcano-shaped processes to compound warts with flat, crenellated summits, and a diameter of up to 0.07 mm (fig. 4p).

S. palmata (Pratt, 1903) (BMNH no. 1962.7.20.97). — The shape of the colony differs from that of *S. capitalis* (see Pratt, 1903, pl. 30 fig. 26, and our pl. 5 fig. 2). But in other respects the two species resemble each other so closely (Pratt stated this already repeatedly), that I do not hesitate to refer *S. palmata* to *S. capitalis*. I found that the sclerites in both species are quite identical. According to Pratt (1903: 527) the differences are: "the mesenteries and mesenterial filaments are more strongly marked, the siphonozooids are more degenerate, and the canal system is not so clearly defined". In my opinion these differences are certainly insufficient to hold to the validity of *S. palmata*.

Pratt's fig. 17 represents a "surface view of a portion of the capitulum" (p. 538) of *S. capitalis*. When examining the type of *S. palmata* I saw just the same "arrangement of siphonozooids". The latter are nothing else but the "minute caeca" (Pratt, 1903: 526) visible through the thin ectoderm. I also found that the superficial sclerites (clubs and small sticks) do not occur in the separating walls between these caeca, but irregularly distributed in slightly deeper layers.

The two specific names *capitalis* and *palmata* are of the same age (1903). I have chosen the name *capitalis*, because of page-priority (*capitalis*, p. 520; *palmata*, p. 525).

S. pinnulata (Shann, 1912). — Shann (1912: 507-509) again and again compared *S. pinnulata* with *S. palmata*. He stated that there is a close resemblance in the form and mode of branching of the colony, in the colour, in the softness of the lobes, in the expanded state of the polyps ("autozooids"), in the canal-system and the minute diverticula (= caeca) of the superficial canals (the "rudimentary siphonozooids"), and last but not least in the spiculation. According to Shann (l.c.) the only difference between the two species lies in the polyps and the tentacles: in *S. palmata* the polyps are larger, the tentacles longer (0.70 mm instead of 0.55 mm) and almost of uniform breadth (not "length" as Shann has), and they have a double row of rudimentary pinnules down each side. I hold the view, however, that the first mentioned differences may be due to a different degree of contraction, and that the presence of two rows of pinnules in *S. palmata* is a dubious problem: Pratt's fig. 27 gives no decisive answer, and a re-examination seems necessary.

Summarizing I feel confident that *S. pinnulata* is identical with *S. capitalis* (= *S. palmata*) and so the specific name *pinnulata* must be dropped.

S. capitalis sensu Tixier-Durivault. — The colony pictured by Tixier-Durivault (1951, fig. 73) is quite unlike Pratt's holotype. The sclerites are different too. The clubs in the surface layer of the lobes of Tixier-Durivault's specimen are more slender and longer (0.10 to 0.20 mm) than those in the stalk, but in Pratt's holotype they have nearly the same length. In Tixier-Durivault's colony the clubs in the stalk are up to 0.13 mm long, but in Pratt's type they are 0.10 to 0.18 mm. The internal sclerites in lobes and stalk of Tixier-Durivault's colony are very wide (0.50 to 0.90 (!) mm) and unbranched; they are quite different from those represented by Pratt (1903, fig. 16) and by the present author (fig. 4l-o).

The incorrect identification with *S. polydactyla*. — Kolonko (1926: 325) was the first who identified *S. palmata* with *S. polydactyla* (Ehrenberg). He was followed in this by Tixier-Durivault (1951: 50).

There can be little doubt that this is incorrect. The spiculation is quite different. In *S. capitalis* the clubs have no central wart, and the coenenchymal sclerites have such bizarre forms that any resemblance is far to seek.

Geographical distribution. — Maldives, Singapore.

Sinularia compacta Tixier-Durivault, 1970 (fig. 5, pl. 14 fig. 1)

Sinularia compacta Tixier-Durivault, 1970a: 248-249, figs. 83-85; Tixier-Durivault, 1969: 142; Verseveldt, 1977b: 22-24, figs. 16, 17, pl. 5 fig. 1.

The enlargement of Tixier-Durivault's drawing of the holotype (1970a, fig. 83) is × 0.75. Pl. 14 fig. 1 shows the colony at natural size.

The surface layer of the lobes has clubs 0.10 to 0.32 mm long; the smaller ones are distinctly foliaceous (fig. 5a-c), they approach the *leptoclados*-type. The larger ones have warty heads (fig. 5d-g). In the outer layer of the sterile stalk the small clubs, 0.09 to 0.14 mm long, have wide heads with leaflike prominences (fig. 5h-j). The larger clubs, up to 0.30 mm long, have tuberculate heads (fig. 5k-m). Tixier-Durivault (1970a: 249) says the clubs are 0.08 to 0.13 mm long, but according to the scale added (220 × 2/3) the sclerites represented in her fig. 84M and R are about 0.26 and 0.30 mm long, respectively.

In the interior of the lobes and of the stalk there are curved spindles, in the stalk up to 3.60 mm long and 0.70 mm wide; those in the lobes are shorter and narrower (fig. 5n-q). They bear large, strongly crenellated tubercles (fig. 5r). Sclerites with bifurcated ends are scarce.

Geographical distribution. — New Caledonia, Gambier Is., Marotiri I. (= Bass I., Tubuai Is.).

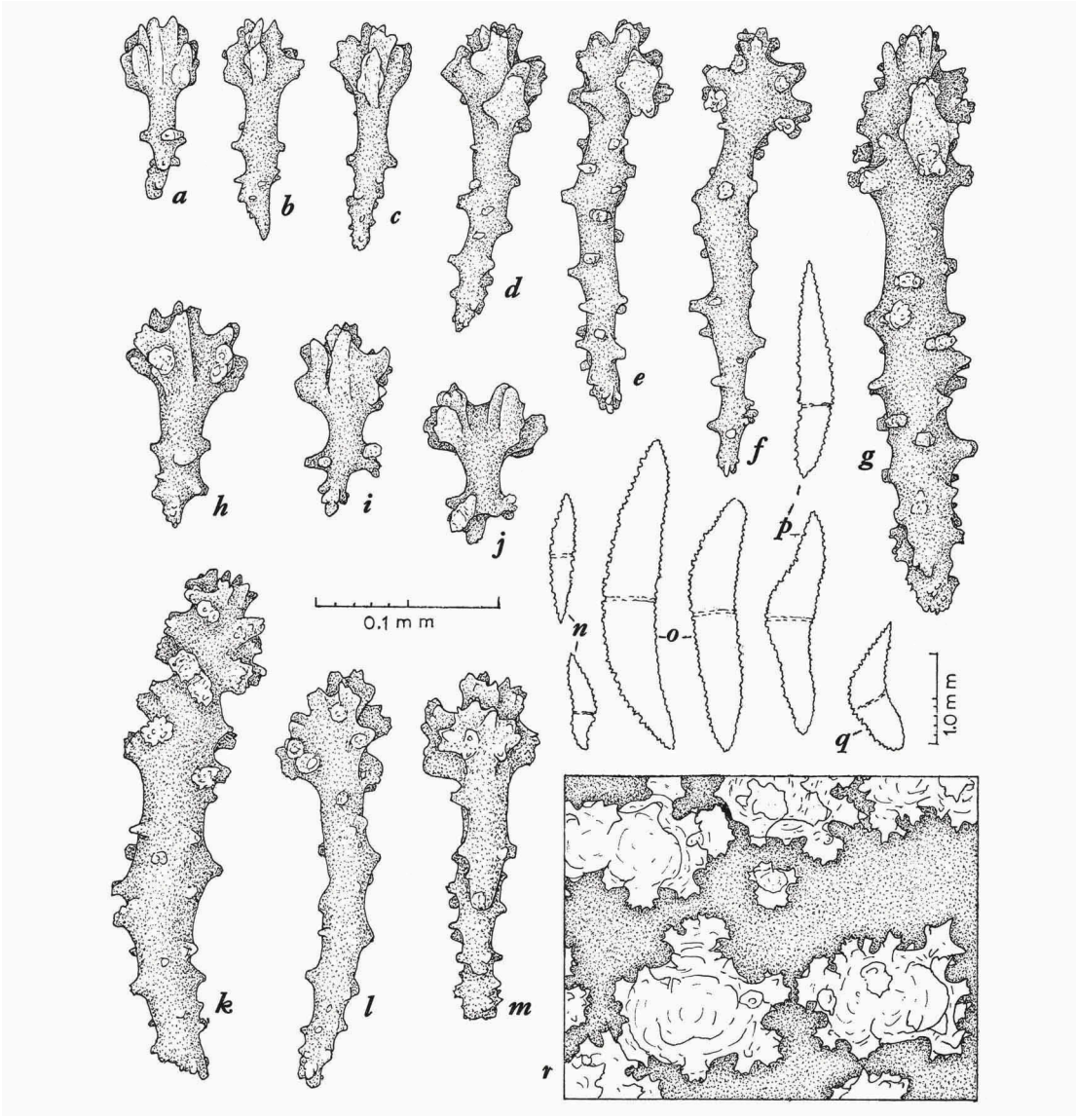

Fig. 5. *Sinularia compacta* Tixier-Durivault, holotype, MNHN. a-g, sclerites from surface layer of a lobe; h-m, sclerites from surface layer of the sterile stalk; n-q, spicules from interior of the stalk; r, warts on coenenchymal spicule from the stalk. Enlargement of a-m and r indicated by 0.1 mm scale below i; that of n-q by 1.0 mm scale at right of q.

Sinularia compressa Tixier-Durivault, 1945 (fig. 6, pl. 9 fig. 1)

Sinularia compressa Tixier-Durivault, 1945: 150; Tixier-Durivault, 1951: 89-92, figs. 109, 121-124; Verseveldt, 1978: 50 (listed only).

Tixier-Durivault (1951) described two colonies of this species, the first one smaller than the second. The dimensions of the first go better with the specimen represented in our pl. 9 fig. 1 than those of the second colony. I examined the first colony, which I take for the holotype. The enlargement of the lobe in Tixier-Durivault's fig. 109 must be about × 0.6.

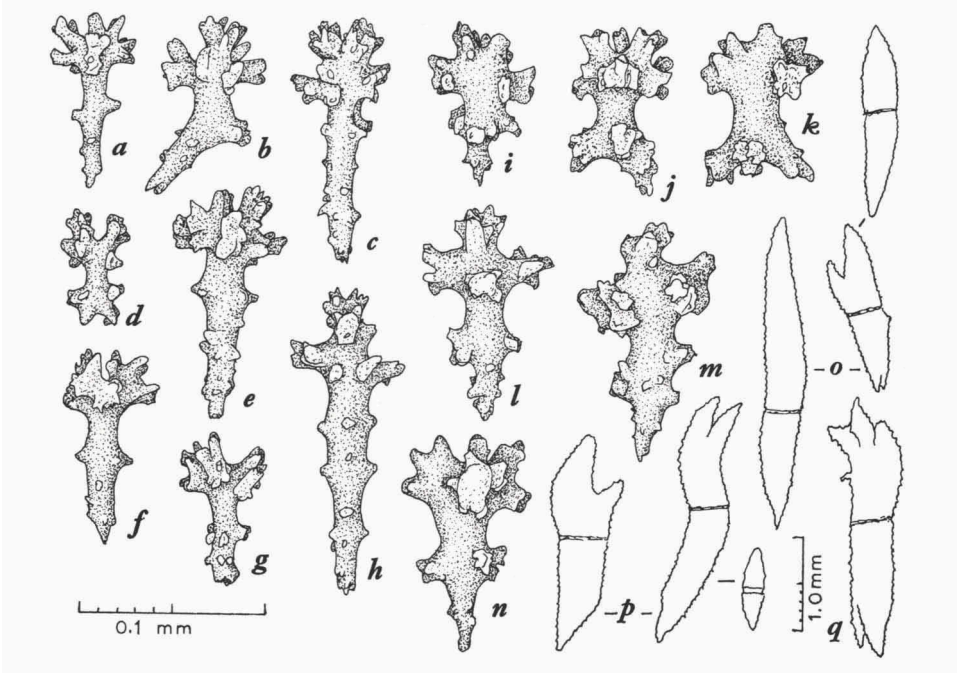

Fig. 6. *Sinularia compressa* Tixier-Durivault, type specimen, MNHN. a-h, sclerites from surface layer of a lobe; i-n, sclerites from surface layer of the stalk; o-q, sclerites from coenenchyme of the stalk. Enlargement of a-n indicated by 0.1 mm scale below g; that of o-q by 1.0 mm scale at q.

In the surface layer of the lobes lie small clubs 0.08 to 0.13 mm, sometimes up to 0.16 mm long, with warty heads and spiny handles (fig. 6a, c, e-h). The handle may be irregularly shaped. In many cases it terminates in one long, bent point, sometimes attended with a short one (fig. 6b). In addition to these there are a few dumb-bells, measuring 0.06 to 0.08 mm in total length, with two dissimilar, warty heads: the one has more and longer processes than the other (fig. 6d). The surface layer of the sterile stalk also contains two types of sclerites: (1) clubs, wider than those in the lobes,

0.08 to 0.12 mm long, with coarser warts (fig. 6i, l-n), in some cases the head with a central wart (fig. 6l), and (2) many dumb-bells, 0.08 to 0.12 mm long, with dissimilar, tuberculated heads (fig. 6j, k). Intermediate forms: clubs with very short handles are also met with.

The coenenchyme of the lobes contains pointed spindles, sometimes bifurcated at one end, up to 2 mm long and 0.36 mm wide, but usually not longer than 1.50 mm and not wider than 0.27 mm. They have small, crenellated warts standing wide apart; their diameter is 0.020 to 0.025 mm. In the stalk the coenenchymal spicules are thick spindles, up to 3.60 mm long and 0.60 mm wide (fig. 6o-q). Some of them are unbranched; others have a short side-branch, or terminate in two or more points. The small warts, 0.028 to 0.032 mm in diameter, are arranged in transverse rows.

Geographical distribution. — Red Sea, Guam.

Sinularia conferta (Dana, 1846) (figs. 7, 8, pls. 6-8)

Alcyonium confertum Dana, 1846: 621-622, pl. 57 figs. 7, 7a, 7b; Milne Edwards & Haime, 1857: 117.

Not *Lobophytum confertum*; Whitelegge, 1897: 218-219, pl. 11 figs. 5a-e.

Not *Sinularia conferta*; Tixier-Durivault, 1945: 61; Tixier-Durivault, 1951: 45-47, figs. 42, 52-55; Tixier-Durivault, 1969: 142-143; Tixier-Durivault, 1970a: 270.

?*Sinularia conferta*; Lüttschwager, 1914: 7; Kolonko, 1926: 313-314; Cary, 1931, pls. 5, 6; Boone, 1938: 63-64, text-fig. 3, pl. 14.

Dana (1846: 621) gave the following diagnosis (conversion of English measurements in mm by the present author):

"Four inches (= 102 mm) high, coriaceous, rigid, erect, very stout stipitate ($1^1/_3$ inches) (= 34 mm); branches crowded above, short and simple, or sparingly ramose, terete (= cylindrical), 2 to 2½ lines (= 4.2 to 5.3 mm) thick, and about ½ an inch (= 12 mm) long, rounded at apex; internal spicula much crowded; polyps minute, ¾ of a line (= 1.6 mm) apart".

As to the sclerites, Dana gave a picture of the coenenchymal spicules (pl. 57 fig. 7a), but did not mention the size. He did not say anything about the clubs in the surface layer.

I did not succeed in tracing Dana's type specimen. Boone (1938: 63) records: "Dana's type ... is deposited in the Philadelphia Academy of Natural Sciences". The other day I made inquiries at this Academy, but it appeared that the type is not to be found there. For the sake of completeness I give a photocopy of Dana's figure (1846, pl. 57 fig. 7) of the holotype (pl. 6 fig. 1).

The first to give more information on *S. conferta* was Whitelegge (1897). He described two specimens, which have been re-examined by me. The first one (pl. 7 fig. 1), brown in colour, and "with some hesitation" referred to *S. conferta* by Whitelegge, consists of a capitulum, cut off from the stalk,

which is completely absent (it is a mystery to me what Whitelegge (p. 218, 20th line from bottom) means by "the basal expansion"). The hard capitulum consists of some primary lobes, up to 50 mm high. Some short, finger- or knoblike lobes arise from the disc itself (pl. 7 fig. 1, at the bottom). Whitelegge (p. 218) gave a good description of the secondary lobes: "Along the sides of the primaries the secondaries form low ridges which extend in a more or less broken manner from the bases to the summits, they are about as high as broad. The apical and subapical lobes are very variable, scarcely any two being alike; they may be round, trigonous, or much compressed, with a slight longitudinal groove, and the margins folded towards each other; they are from 5 to 15 mm high, 3 to 10 mm in their broad, and 3 to 5 mm in their narrow diameter". The lobes as a whole show longitudinal ridges and grooves, typical of this colony, but they differ distinctly from the simple or sparingly branched lobes of Dana's type.

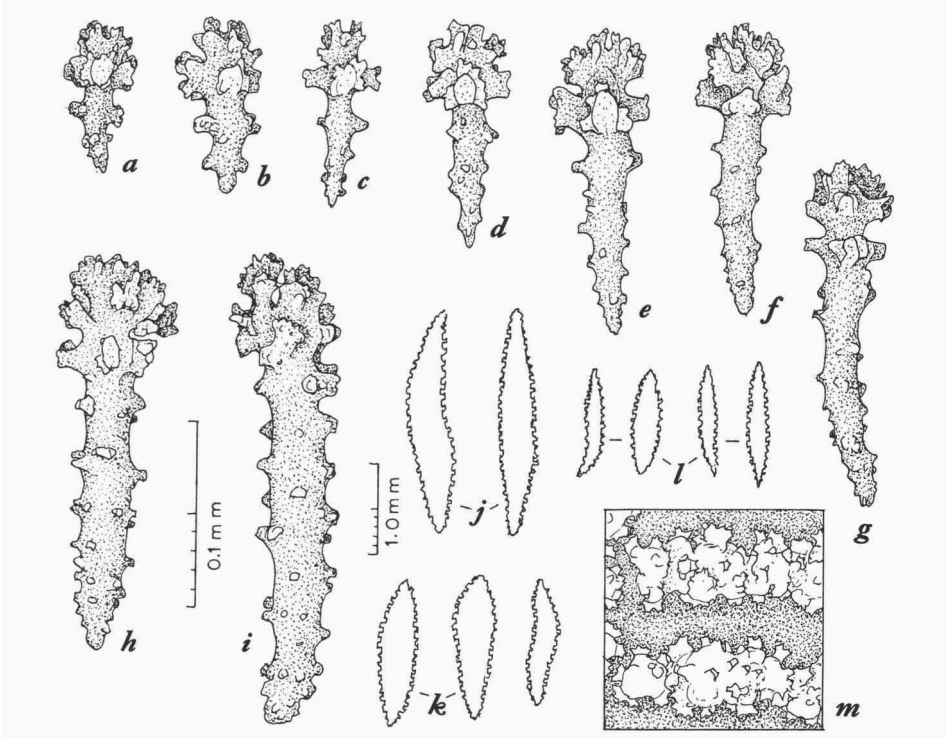

Fig. 7. *Sinularia "conferta"* (Dana) according to Whitelegge, AMS G. 1540. a-i, sclerites from surface layer of a lobe; j-l, spicules from interior of a lobe; m, warts on internal spicule from a lobe. Enlargement of a-i and m indicated by 0.1 mm scale at h; that of j-l by 1.0 mm scale at j.

The polyps are 1.10 to 1.60 mm apart (not 1 mm as Whitelegge says); in Dana's type the distance was 1.60 mm (see above).

The clubs in the surface layer of the lobes are 0.08 to 0.25 mm long, the length is usually 0.10 to 0.13 mm (fig. 7a-i; Whitelegge records only clubs with a length of 0.20 to 0.25 mm). The heads are tuberculate, in many cases a central wart is present (fig. 7c, e, g). The internal sclerites are unbranched, straight or slightly curved spindles, blunt or pointed, and up to 2.50 mm long (fig. 7j-l). The crenellated warts measure 0.030 to 0.045 mm in diameter. They are usually arranged in distinct transverse rows, in each row often joined together (fig. 7m).

Whitelegge's second specimen is "pale glaucus or sage green" (Whitelegge, p. 219); in alcohol, it is now grey. It has primary lobes standing upright and up to 35 mm high. On all sides they bear densely placed, more or less rounded lobules, which do not form longitudinal ridges (pls. 7 fig. 2). The basal part of the colony has been cut off, but a narrow strip of the surface of the sterile stalk is left.

In the surface layer of the lobes lie two sorts of clubs. First clubs with warty heads not unlike those in the brown specimen described above. And, secondly, clubs with weakly developed heads, composed of few, round prominences or with hardly any prominences; sometimes they are smooth rods. These "clubs" are all striated longitudinally. They gave the impression of being affected and damaged by some unknown cause. The coenenchymal sclerites do not differ from those in the brown colony.

To sum up, the shape of the lobes in Whitelegge's colonies so distinctly differs from that of the lobes of Dana's type, that they cannot be referred to *S. conferta*: in Dana's type the lobes are digitiform, sparingly branched or not, and averagely 12 mm long.

Cary (1931, pls. 5 and 6) gave photos of colonies of *S. conferta* from Tutuila (American Samoa). The author did not say how he arrived at this identification. The lobes of the colonies are digitiform, which is in accordance with Dana's type, but they seem to be more ramified. Any information about the sclerites is lacking.

Tixier-Durivault (1951: 45) examined three specimens from Mascate. Her fig. 42 represents part of a colony. In my opinion the shape of the lobes in this drawing is quite unlike that of Dana's type.

Pl. 8 shows one of her colonies. The lobes are very densely arranged, and apparently flattened laterally and not cylindrical. I examined the sclerites of this specimen. The surface layer of the lobes contains clubs, the majority of which is 0.07 to 0.12 mm long (fig. 8a-e). Most of them have a terminal wart, and below this a girdle of warts; the shafts have some blunt spines.

Longer clubs, measuring 0.14 to 0.19 mm in length, may have the same tuberculate heads (fig. 8f), but the longer the clubs, the fewer the warts (fig. 8g-i). In the coenenchyme of the lobes there are straight or curved, unbranched spindles, up to 2.20 mm long (fig. 8j-l). The warts are small, rarely more than 0.04 mm in diameter, and rather widely spaced; sometimes they are zoned (fig. 8m, n).

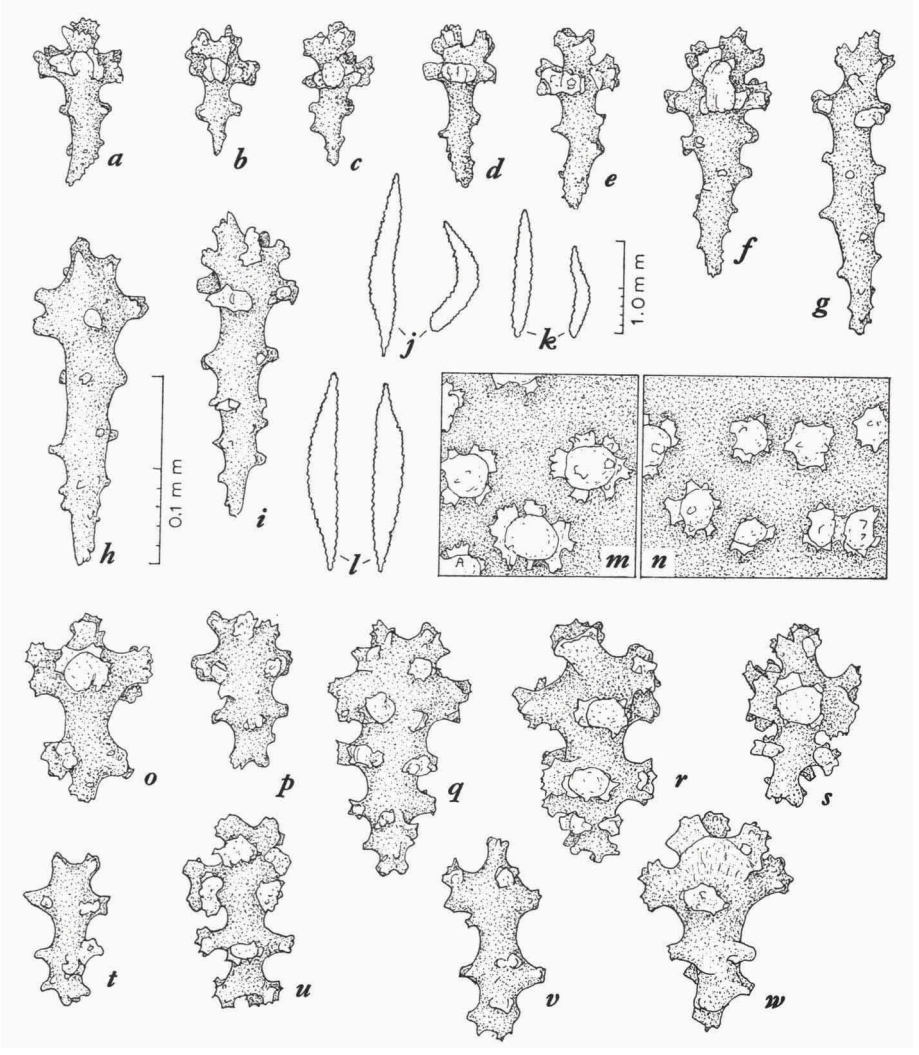

Fig. 8. *Sinularia "conferta"* (Dana) according to Tixier-Durivault, MNHN. a-i, sclerites from surface layer of a lobe; j-l, spicules from interior of a lobe; m, n, warts on internal spicule from a lobe; o-w, sclerites from surface layer of the stalk. Enlargement of a-i, m-w indicated by 0.1 mm scale at h; that of j-l by 1.0 mm scale at k.

The clubs in the surface layer of the sterile stalk are heavier, they bear stout warts, the length is 0.08 to 0.12 mm (fig. 8o-w). Massive clubs, 0.15 to 0.17 mm long, are transitional forms to coenenchymal sclerites. The latter are up to 2.80 mm long; they are spindles, rather densely covered with warts, up to about 0.055 mm in diameter, and usually irregularly distributed.

A comparison of the drawings of the clubs found in Tixier-Durivault's specimen (fig. 8a-i) with those in Whitelegge's brown specimen (fig. 7a-i) shows important differences in length and shape. The tubercles pictured in fig. 8m, n also differ markedly from those in fig. 7m. So we see that Whitelegge's brown specimen and Tixier-Durivault's colony differ not only in the shape of the lobes, but also in the spiculation.

As long as we do not have an exact description of Dana's type, especially of its sclerites, we cannot be certain of any identification.

Sinularia conferta var. **gracilis** Macfadyen, 1936 (fig. 9, pl. 5 fig. 3)

Sinularia conferta var. *gracilis* Macfadyen, 1936: 32-33, text-fig. 2, pl. 2 fig. 1; Tixier-Durivault, 1951: 47-50, fig. 56.

Pl. 5 fig. 3 shows Macfadyen's holotype (BMNH no. 1934.3.28.67). The sterile stalk is torn off. As regards the branching of the colony, the shape and the dimensions of the lobes I refer to Macfadyen's description (1936).

As to the spiculation I note that she did not distinguish between the sclerites in the lobes and in the sterile stalk, although I found that there are several differences. The surface layer of the lobes has (1) numerous small clubs, 0.06 to 0.07 mm long, with relatively large heads, composed of warts, sometimes with a central wart (fig. 9a-e); the handles are short, and usually have a group of prominences at their base; (2) clubs, 0.07 to 0.14 mm long, with heads, which hardly differ from those of the small clubs, but the handles are slender, rod-shaped (fig. 9f, g). There are also transitional forms to slender rods, which fill the interior of the lobules (see below). In the sterile stalk the clubs are stouter, 0.09 to 0.13 mm long; the heads are almost 0.07 mm wide, many of them have a central wart (fig. 9j-l). Longer clubs, 0.15 to 0.21 mm in length, with more or less distinct heads and thick, warty handles, are intermediate forms to coenenchymal sclerites (fig. 9i).

From this description it follows that the clubs represented by Macfadyen in her text-fig. 2 very probably belong to the surface layer of a lobe.

The interior of the lobules contains rods and fusiform spicules, rarely longer than 0.30 mm (fig. 9h). In the lobes the spicules are presumably longer (not examined by the present author). In the stalk there are straight or curved, unbranched spindles, pointed or blunt-ended, reaching a length of

2.80 mm (fig. 9m-o). They are densely covered with high, round, coarse warts, up to 0.075 mm in diameter (fig. 9p).

The question arises why Macfadyen considered her specimen a variety of *S. conferta* (Dana). Since hardly anything is known of the spiculation of *S. conferta*, she may have relied on the shape of the lobes.

Geographical distribution. — Great Barrier Reef.

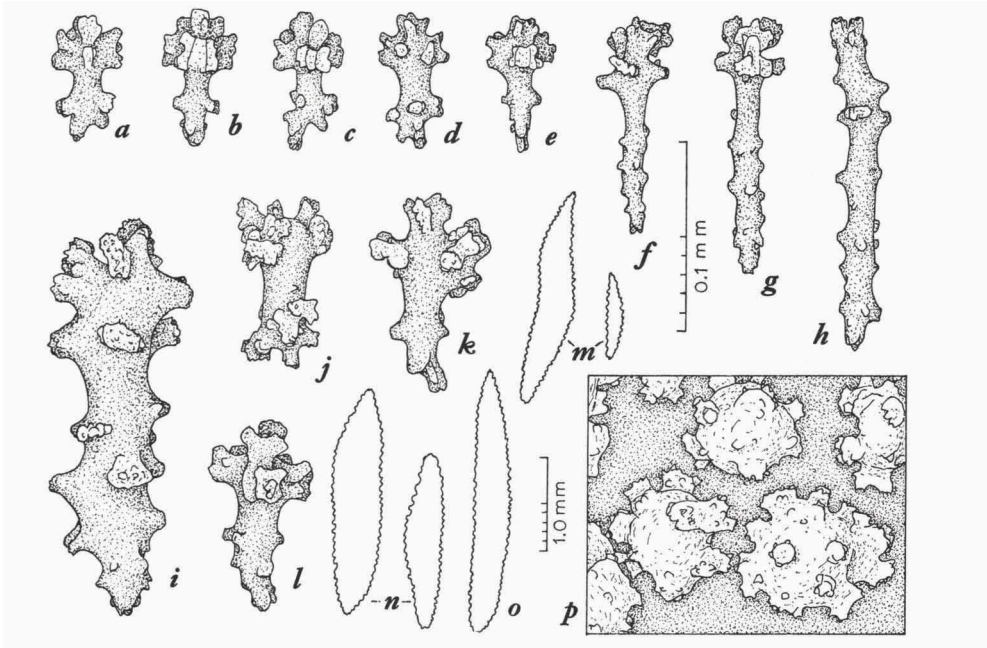

Fig. 9. *Sinularia conferta* var. *gracilis* Macfadyen, holotype, BMNH 1934.3.28.67. a-g, sclerites from surface layer of a lobe; h, spicule from interior of a lobe; i-l, sclerites from surface layer of the sterile stalk; m-o, spicules from interior of the stalk; p, warts on coenenchymal spicule from the stalk. Enlargement of a-l and p indicated by 0.1 mm at f; that of m-o by 1.0 mm at o.

Sinularia crassa Tixier-Durivault, 1945 (fig. 10, pl. 9 fig. 2)

Sinularia crassa Tixier-Durivault, 1945: 58; Tixier-Durivault, 1951: 26-30, figs. 21, 24-28; Tixier-Durivault, 1966: 176-179, figs. 169-171; Tixier-Durivault, 1969: 143; Tixier-Durivault, 1970a: 258; Tixier-Durivault, 1970b: 144; Tixier-Durivault, 1972: 20.

The lobe represented in Tixier-Durivault's fig. 21 (1951) is one of the eight primary lobes composing the capitulum of the holotype. This lobe can be discerned in pl. 9 fig. 2, uppermost lobe. The enlargement of Tixier-Durivault's drawing must be about × 0.45.

The surface layer of the lobes contains two types of clubs.

(1) The majority reach a length of 0.12 to 0.16 mm (fig. 10a-d), but some of them are slightly shorter (fig. 10f) or longer (fig. 10e). The heads are composed of projections, which vary in shape and size from simple, blunt processes, sometimes with a bifurcated end (fig. 10a, c, e), to prominences

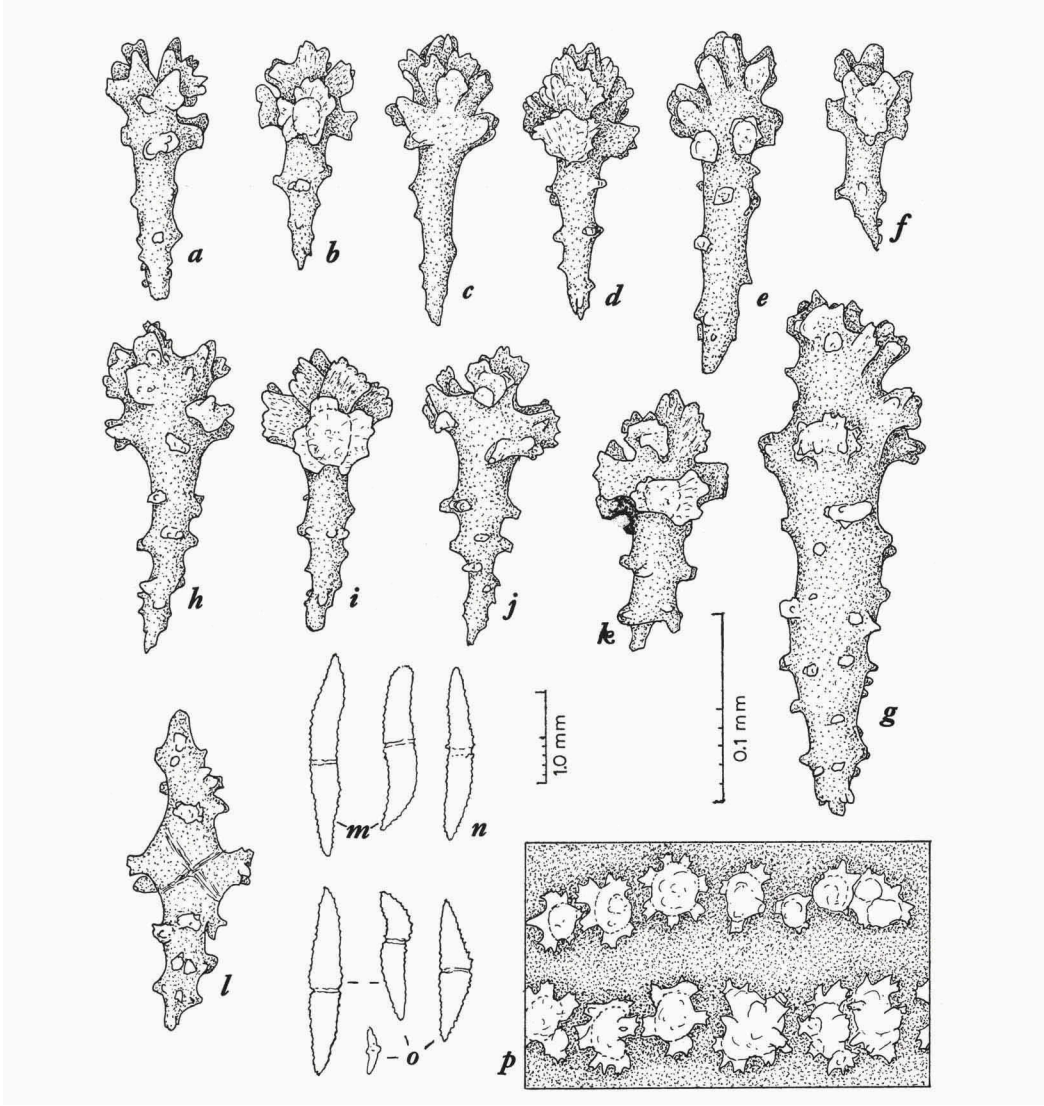

Fig. 10. *Sinularia crassa* Tixier-Durivault, holotype, MNHN. a-g, sclerites from surface layer of a lobe; h-l, sclerites from surface layer of the sterile stalk; m-o, spicules from coenenchyme of the stalk; p, warts on coenenchymal spicule from the stalk. Enlargement of a-l and p indicated by 0.1 mm scale at k; that of m-o by 1.0 mm scale at n.

terminating in a transversely placed, more or less leaflike broadening (fig. 10b, d, f). But the clubs are certainly not foliaceous of the *leptoclados*-type.

(2) A few big clubs, averaging about 0.25 mm in length, sometimes up to 0.35 mm (fig. 10g). A central wart is absent.

The clubs in the surface layer of the sterile stalk are wider; the length varies from 0.13 to 0.18 mm (fig. 10h-k). Here, too, two types of projections can be distinguished: simple, more or less wartlike processes (fig. 10h, j), and processes with a terminal, transversely placed expansion (fig. 10i, k). In some sclerites a central wart may be distinguished. Especially in the stalk, but also in the surface layer of the lobes, many spindles and clubs show two crossing bundles of very thin lines in the middle (fig. 10l).

Both in the lobes and in the stalk the coenenchymal spicules are spindles up to 2.30 mm long, straight or slightly curved, with a median constriction (fig. 10m-o). The tubercles are small, 0.03 to 0.05 mm in diameter, crenellated, and usually arranged in transverse rows (fig. 10p).

Geographical distribution. — Mauritius, Madagascar, Gambier Is., New Caledonia, Bay of Nha Trang (Vietnam).

Sinularia cristata Tixier-Durivault, 1969 (fig. 11, pl. 10 fig. 2)

Sinularia cristata Tixier-Durivault, 1969: 144; Tixier-Durivault, 1970a: 258-259, figs. 96-98 ("sp. nov."); Verseveldt, 1978: 50 (listed only).

The enlargement of the holotype represented by Tixier-Durivault (1970a, fig. 96) is × 0.65.

The sclerites in the surface layer of the lobes are clubs, usually 0.09 to 0.17 mm long (fig. 11a-f), but longer ones, up to 0.28 mm long, also occur (fig. 11g, h). The heads are composed of relatively few spines and small warts. Sometimes the head seems to be flat, leaflike (fig. 11b, e, g). Bluntly pointed spindles, 0.25 to 0.40 mm long, may have an accumulation of the spines and warts at one end, thus forming intermediate forms to normal spindles.

The clubs in the surface layer of the stalk are distinctly wider. The majority measures 0.11 to 0.15 mm in length (fig. 11i-l). The heads bear high prominences; in many cases they seem to be flat and leaflike. Larger clubs (fig. 11m) and warty pseudo-clubs (fig. 11n) are up to 0.27 mm long.

The coenenchymal sclerites in the lobes and in the stalk are up to 2.40 mm long (fig. 11o-q). They are pointed or blunt-ended spindles, usually curved, unbranched, rarely with a side-branch, and remotely covered with medium to large-sized, crenellated tubercles, 0.05 to 0.07 mm in diameter (fig. 11r).

Geographical distribution. — New Caledonia, Gambier Is., Guam.

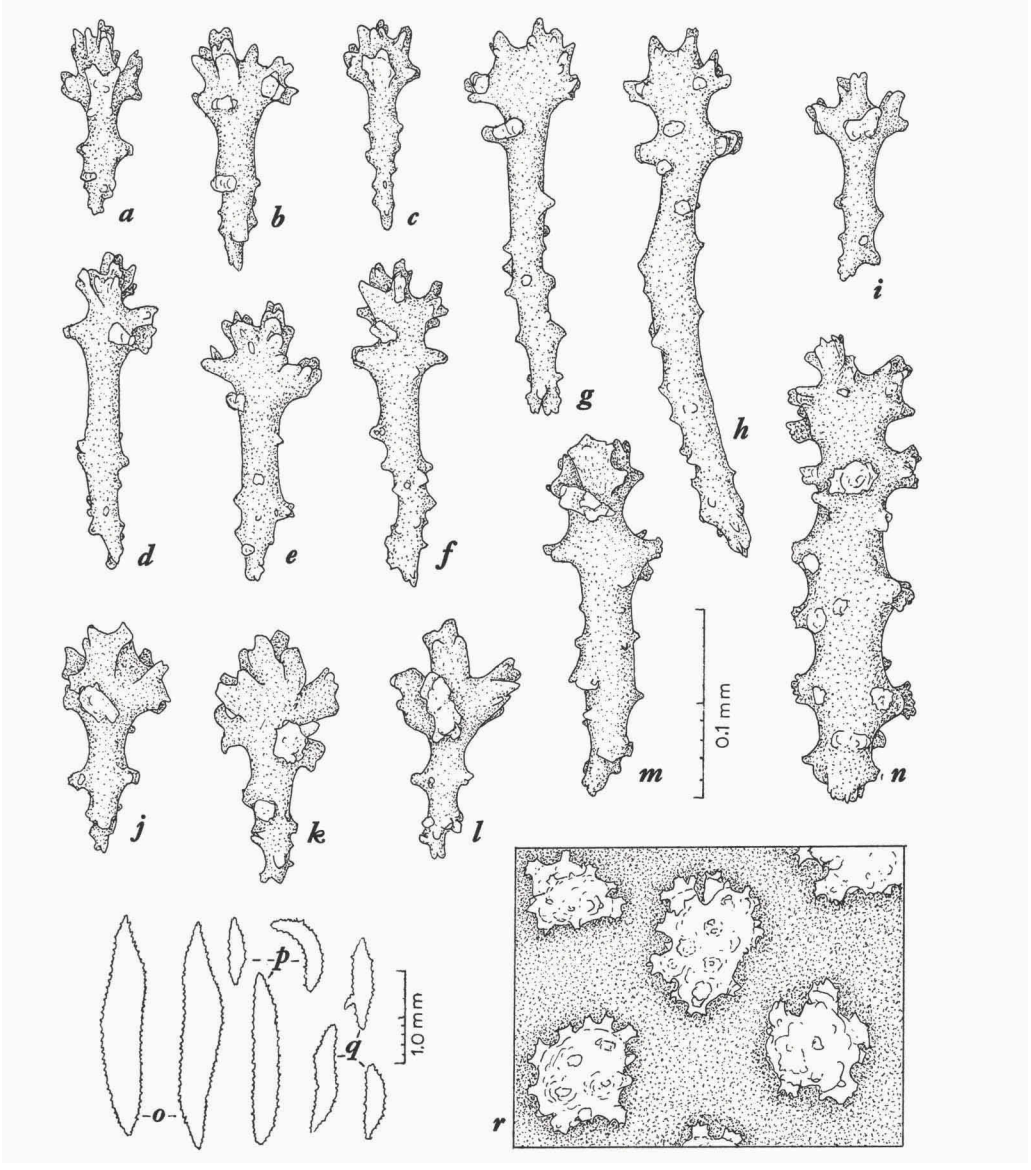

Fig. 11. *Sinularia cristata* Tixier-Durivault, holotype, MNHN. a-h, sclerites from surface layer of a lobe; i-n, sclerites from surface layer of the stalk; o-q, spicules from coenenchyme of the stalk; r, warts on coenenchymal sclerite from the stalk. Enlargement of a-n and r indicated by 0.1 mm scale at m; that of o-q by 1.0 mm scale at q.

Sinularia cruciata Tixier-Durivault, 1970 (fig. 12, pl. 11)

Sinularia cruciata Tixier-Durivault, 1970b: 144-145, figs. 9-12.

Tixier-Durivault's fig. 9 (1970b) gives a good idea of a portion of one of the colonies, most likely the holotype; the enlargement of the drawing is presumably about × 1.0. Our pl. 11 shows a greater part of the colony.

In the surface layer of the lobes there are clubs varying in length from 0.08 to 0.21 mm. The smaller ones, 0.08 to 0.12 mm long (fig. 12a-c, f), have warty heads, usually with a central wart and beneath that a girdle of warts projecting more or less at right angles. In many cases the central wart

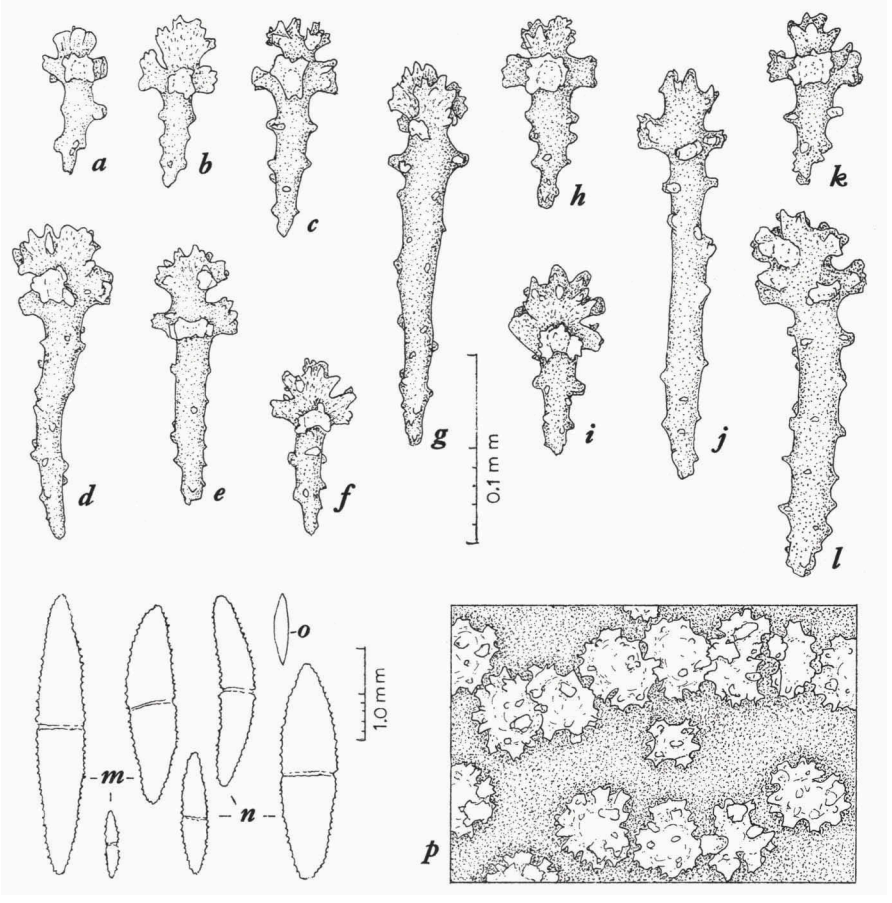

Fig. 12. *Sinularia cruciata* Tixier-Durivault, type specimen, MNHN. a-g, sclerites from surface layer of a lobe; h-l, sclerites from surface layer of the stalk; m-o, spicules from coenenchyme of the stalk; p, tubercles on coenenchymal spicule from the stalk. Enlargement of a-l and p indicated by 0.1 mm scale at g; that of m-o by 1.0 mm scale at o.

widens upwards fan-wise (fig. 12b, c, e); possibly Tixier-Durivault (1970b: 145), therefore, speaks of clubs with a foliaceous head ("massues minces à tête foliacée"). The longer clubs (fig. 12d, e, g) have a head either with a central wart or a head composed of some irregularly placed, sometimes slightly leaflike prominences; the handles are weakly spined.

In the surface layer of the sterile stalk the smaller clubs, 0.09 to 0.13 mm long, are wider than those in the lobes (fig. 12h, i, k). A good many of them have a central wart, which is sometimes fan-shaped. The longer clubs, measuring up to 0.23 mm in length, have slender, more or less weakly spined handles (fig. 12j, l).

The coenenchyme of the lobes and of the sterile stalk contains thick, blunt-ended spindles, up to 3.00 mm long and 0.60 mm wide (fig. 12m, n); those in the lobes are shorter, up to 2.40 mm. Most spindles bear tubercles, usually arranged in transverse rows; the diameter is 0.04 to 0.05 mm (fig. 12p). But other spindles are nearly smooth: a few are up to 2.00 mm long, most of them are averagely 0.75 mm long (fig. 12 o).

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia deformis Tixier-Durivault, 1969 (figs. 13, 14, pl. 12 fig. 2)

Sinularia deformis Tixier-Durivault, 1969: 144-146, figs. 4-6.

Tixier-Durivault's drawing of the colony (1969, fig. 4) is the left-hand half of the holotype represented in our pl. 12 fig. 2; the enlargement of the drawing mentioned is × 1.0.

The clubs in the surface layer of the lobes and of the stalk are highly varied in shape. The heads of those in the lobes may have (1) a central wart with a more or less distinct girdle of prominences below this (fig. 13a, g, h), or (2) the head may consist of a mass of compound warts (fig. 13b-d, f), or (3) the head is composed of a few high prominences with wartlike ends (fig. 13e, h). The heads may be relatively narrow (fig. 13a-c, g, i) or broad (fig. 13d, e, h). All sorts of deformed sclerites are met with; in fig. 13i a simple form is pictured. The length of all these clubs varies from 0.12 to 0.22 mm. Spindles, 0.22 to 0.31 mm long, with an accumulation of processes at one end are intermediate forms to coenenchymal sclerites.

In the surface layer of the sterile stalk the sclerites are even more varied. Some of them have a rather normal shape, with a spiny handle as represented in fig. 14e and g. But others have conspicuously long prominences, resulting in fantastically shaped sclerites. Most of them are more or less clavate (fig. 14a-d, f, g), others have bizarre forms (fig. 14e, h). The length is 0.11 to 0.20 mm.

The interior of the lobes contains spindles up to 3.30 mm long and 0.75 mm wide; they are straight, or curved and twisted, sometimes with a bifurcation at one end. The same sclerites occur in the coenenchyme of the stalk (fig. 14i-k), but here they seem to be shorter (up to 2.90 mm) and more slender (up to 0.60 mm wide). They are all covered with medium-sized tubercles, 0.045 to 0.060 mm in diameter; they are irregularly distributed or arranged in transverse rows (fig. 14l).

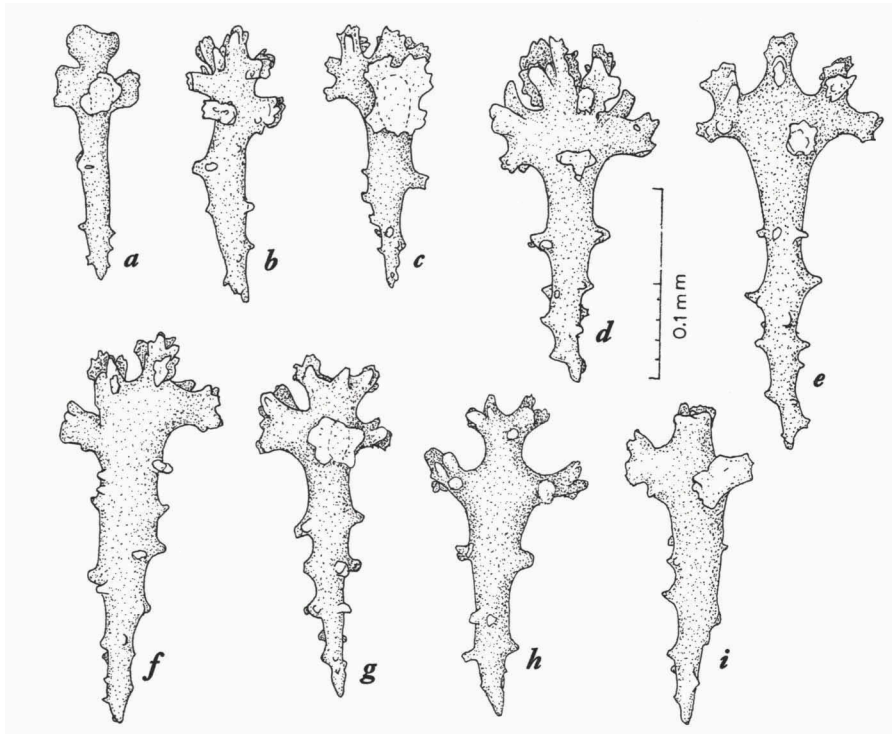

Fig. 13. *Sinularia deformis* Tixier-Durivault, holotype, MNHN. a-i, sclerites from surface layer of a lobe. Enlargement indicated by 0.1 mm scale at d.

According to Tixier-Durivault (1969: 146) the surface layer of the sterile stalk contains some warty rods, 0.38 mm long, numerous warty slender clubs, 0.27 to 0.30 mm long, regular and smaller clubs, and spiny rods (dimensions of clubs and rods not mentioned). Judging from my mounted slide, the vast majority of sclerites in that layer consists of the more or less bizarre clubs and aberrant forms (fig. 14a-h), whereas clavate rods and spindles up to 0.30 mm long are scarce.

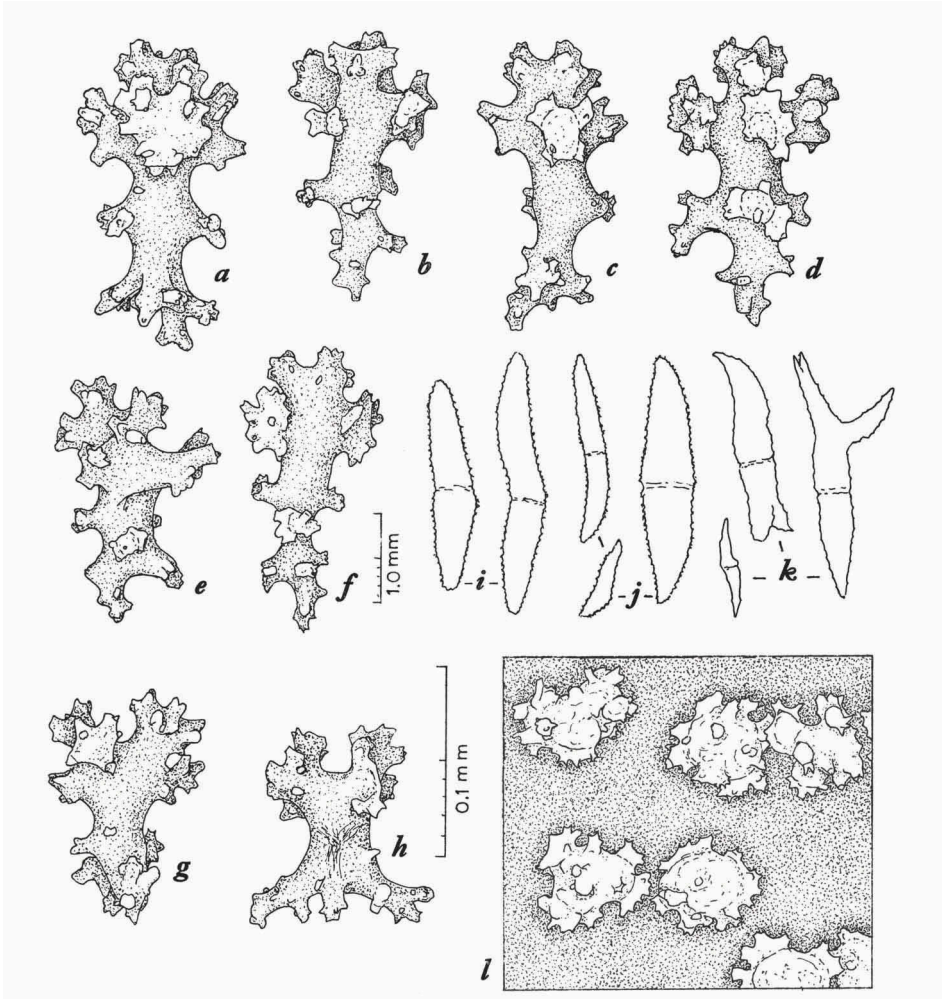

Fig. 14. *Sinularia deformis* Tixier-Durivault, holotype, MNHN. a-h, sclerites from surface layer of the sterile stalk; i-k, sclerites from interior of the stalk; l, tubercles on coenenchymal spicule from the stalk. Enlargement of a-h, and l indicated by 0.1 mm scale at h; that of i-k by 1.0 mm scale at left of i.

According to the text (Tixier-Durivault, 1969: 146) the spindles represented in her fig. 6A-G are 0.40 to 0.48 mm long. Of course this statement is wrong, but what are the real dimensions? For in the caption of fig. 6 (as in all other figures in this paper) the size of the enlargement has been omitted.

Geographical distribution. — Gambier Is.

Sinularia depressa Tixier-Durivault, 1970 (figs. 15, 16, pl. 12 fig. 1)

Sinularia depressa Tixier-Durivault, 1970b: 149-151, figs. 13-17.

The diameter of the capitulum of the holotype described by Tixier-Durivault (1970b: 149) is 130 mm. Consequently the colony represented in our pl. 12 fig. 1 must be one of the paratypes. The enlargement in Tixier-Durivault's fig. 13 is presumably × 1.0.

The clubs occurring in the surface layer of the lobes are 0.08 to 0.26 mm long (fig. 15a-h). The heads are tuberculate. In many cases a central wart

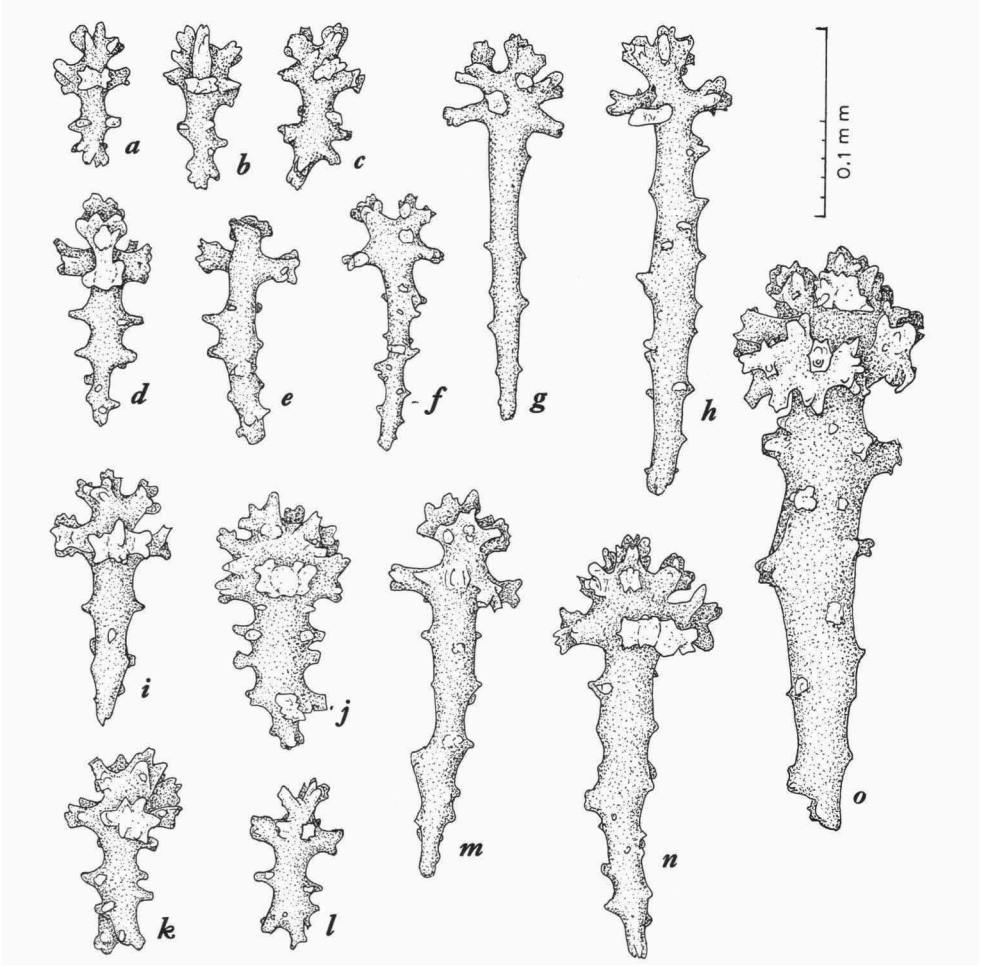

Fig. 15. *Sinularia depressa* Tixier-Durivault, holotype, MNHN. a-h, sclerites from surface layer of a lobe; i-o, sclerites from surface layer of the stalk. All enlargements are the same; scale 0.1 mm.

is present (fig. 15a, d, e, h). Heads with foliaceous processes are absent. The handles are slender and spiny, those of the long clubs are weakly spined (fig. 15g, h).

In the sterile stalk the clubs are wider, the tubercles composing the heads are coarser. A central wart is often present (fig. 15i, m); in this case the prominences just below it are strongly flattened transversely. Foliate processes are absent again. The length of the clubs varies from 0.08 to 0.32 mm (fig. 15i-o).

In the coenenchyme of the lobes there are spindles up to 4.40 mm long and 0.70 mm wide (processes included; 0.60 mm without processes) (fig. 16a-c). Irregularly curved forms and sclerites with split or bifurcated ends are common. In the sterile stalk the sclerites are shorter, up to 3.20 mm long (fig. 16d, e; in the specimen described by Tixier-Durivault, l.c., they are

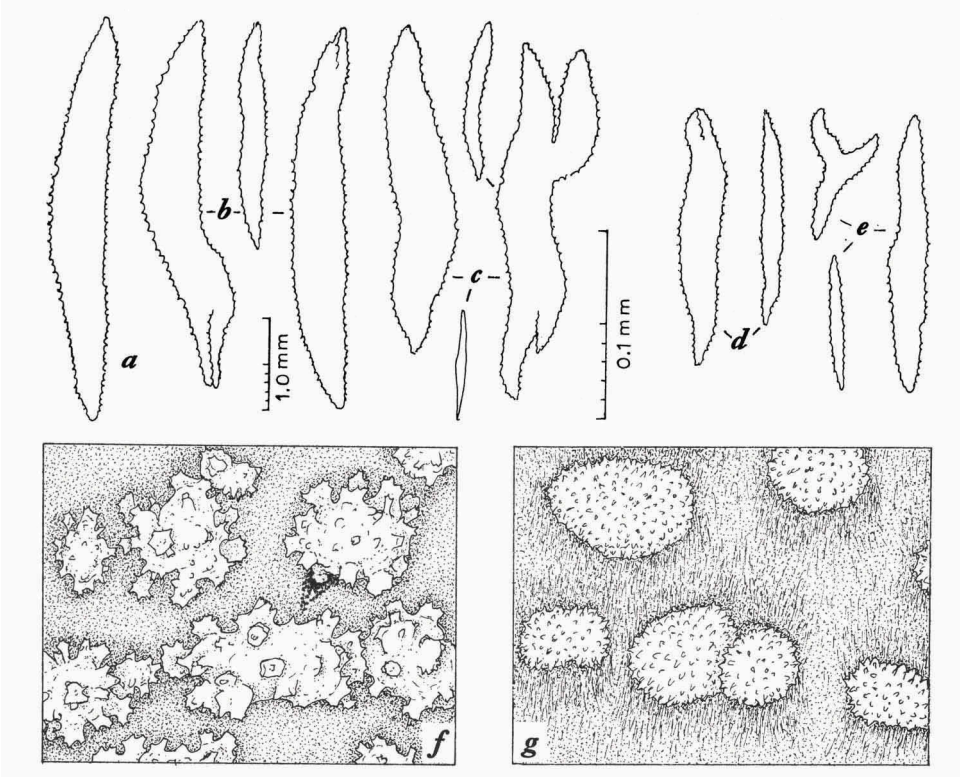

Fig. 16. *Sinularia depressa* Tixier-Durivault, holotype, MNHN. a-c, coenenchymal sclerites from a lobe; d, e, coenenchymal sclerites from the stalk; f, g, warts on coenenchymal sclerites from the stalk. Enlargement of a-e indicated by 1.0 mm scale at b; that of f, g by 0.1 mm scale between c and d.

longer, which may very well be correct, and narrower: up to 0.57 mm, processes included).

Curious is the presence of two kinds of processes on the coenenchymal sclerites: they are crenellated, irregularly shaped warts, 0.06 to 0.08 mm in diameter (fig. 16f), or they are thinly packed, round or oval in shape, and covered with numerous tiny spines (fig. 16g).

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia discrepans Tixier-Durivault, 1970

Sinularia discrepans Tixier-Durivault, 1970a: 260-262, figs. 99-101.

The type of this species was not present in the Paris Museum, so I must rely upon Tixier-Durivault's description.

According to the text the enlargement of the colony in her fig. 99 must be about × 0.8. The drawings of the sclerites are interchanged: the caption of fig. 100 ("Spicules basilaires ...") belongs to the figures to the right, and the caption of fig. 101 ("Spicules lobulaires ...") belongs to the figures to the left.

From the text it appears that the specimen belongs to Group IV.

Geographical distribution. — New Caledonia.

Sinularia dissecta Tixier-Durivault, 1945 (fig. 17, pl. 13 fig. 1)

Sinularia dissecta Tixier-Durivault, 1945: 151-152; Tixier-Durivault, 1951: 95-99, figs. 111, 130-132; Tixier-Durivault, 1970a: 270.

Pl. 13 fig. 1 shows the holotype at natural size. In Tixier-Durivault's fig. 111 (1951) the right-hand part of this colony is pictured; the enlargement of this drawing is × 0.6.

The surface layer of the lobes contains: (1) foliaceous clubs of the *leptoclados*-type, 0.07 to 0.09 mm long (fig. 17a-c), and (2) longer clubs, 0.12 to 0.23 mm long, with a narrow head composed of more or less foliate processes and a rod-shaped handle bearing cone-shaped prominences (fig. 17d-i). The surface layer of the stalk has the same clavate sclerites.

The coenenchymal spicules in lobes and stalk are spindles up to 3.00 mm long and 0.55 mm wide (fig. 17j), unbranched, usually blunt-ended, and covered with irregularly placed, exceptionally high, medium-sized warts, 0.040 to 0.065 mm in diameter; the crenelles are only weakly dentate (fig. 17k). In addition to these, the interior of the lobes contains many small spindles and rods, 0.15 to 0.35 mm long; they have low spines.

Geographical distribution. — Red Sea, New Caledonia.

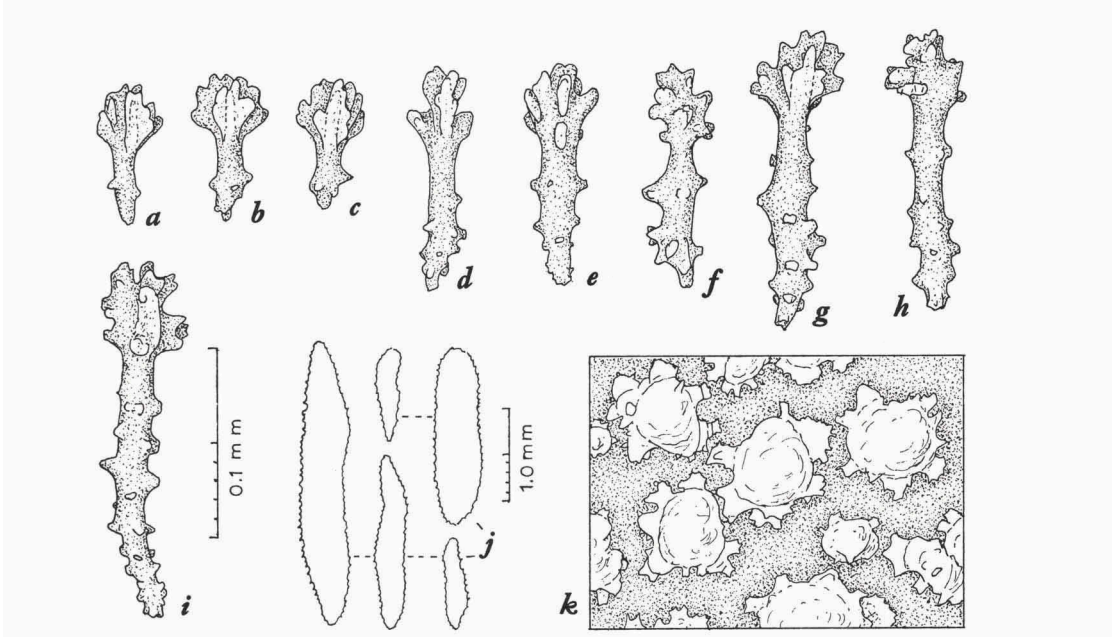

Fig. 17. *Sinularia dissecta* Tixier-Durivault, holotype, MNHN. a-i, sclerites from surface layer of a lobe; j, spicules from coenenchyme of the stalk; k, warts on coenenchymal spicule from the stalk. Enlargement of a-i and k indicated by 0.1 mm scale at i; that of j by the 1.0 mm scale at j.

Sinularia dura (Pratt, 1903)

Pratt (1903), Thomson & Dean (1931), Macfadyen (1936) and Verseveldt (1960, 1974b) were of the opinion that in *S. dura* two types of capitula could be found, namely a cup-shaped and a lobate one, though the present author (l.c.) had his doubts. After the examination of the holotype of *S. brassica* May (see this paper, p. 22) he is confident that the lobate forms of "*S. dura*" must be referred to *S. brassica*, and that the cup-shaped or funnel-shaped forms can be left with *S. dura*.

The cup-shaped colonies, recorded in the literature, are the following.

Pratt, 1903: 528-530; three colonies, Nilandu, 24 fathoms, Mahlos Atoll, in shallow water (both: Maldives).

Thomson & Dean, 1931: 50-51; Siboga Exped., Sta. 133: Lirung, Salibabu I., 36 m, one specimen; Sta. 299: 10°52'.4S 123°1'.1E, 34 m, five specimens.

Tixier-Durivault, 1951: 79-83; one colony, Djibouti (Gulf of Aden).

Verseveldt, 1978: 50; one colony, Yap (Micronesia), 13 m.

The following localities etc. are not recorded in the literature; the specimens have beer identified by the present author.

Pulau Gomunu, S. of Obi, Moluccas, 1°50'00"S 127°30'54"E, 10 m, 30 May 1975; A. G. Humes no. 1909.

Militat, Bismarck Sea, coastal reef, 10 m; Tursch no. SIN 54.

The same locality, outside barrier reef, 25 m; Tursch no. SIN 70.

Madang, Bismarck Sea, 20-25 m; Tursch no. SIN 59.

Geographical distribution. — See the above list.

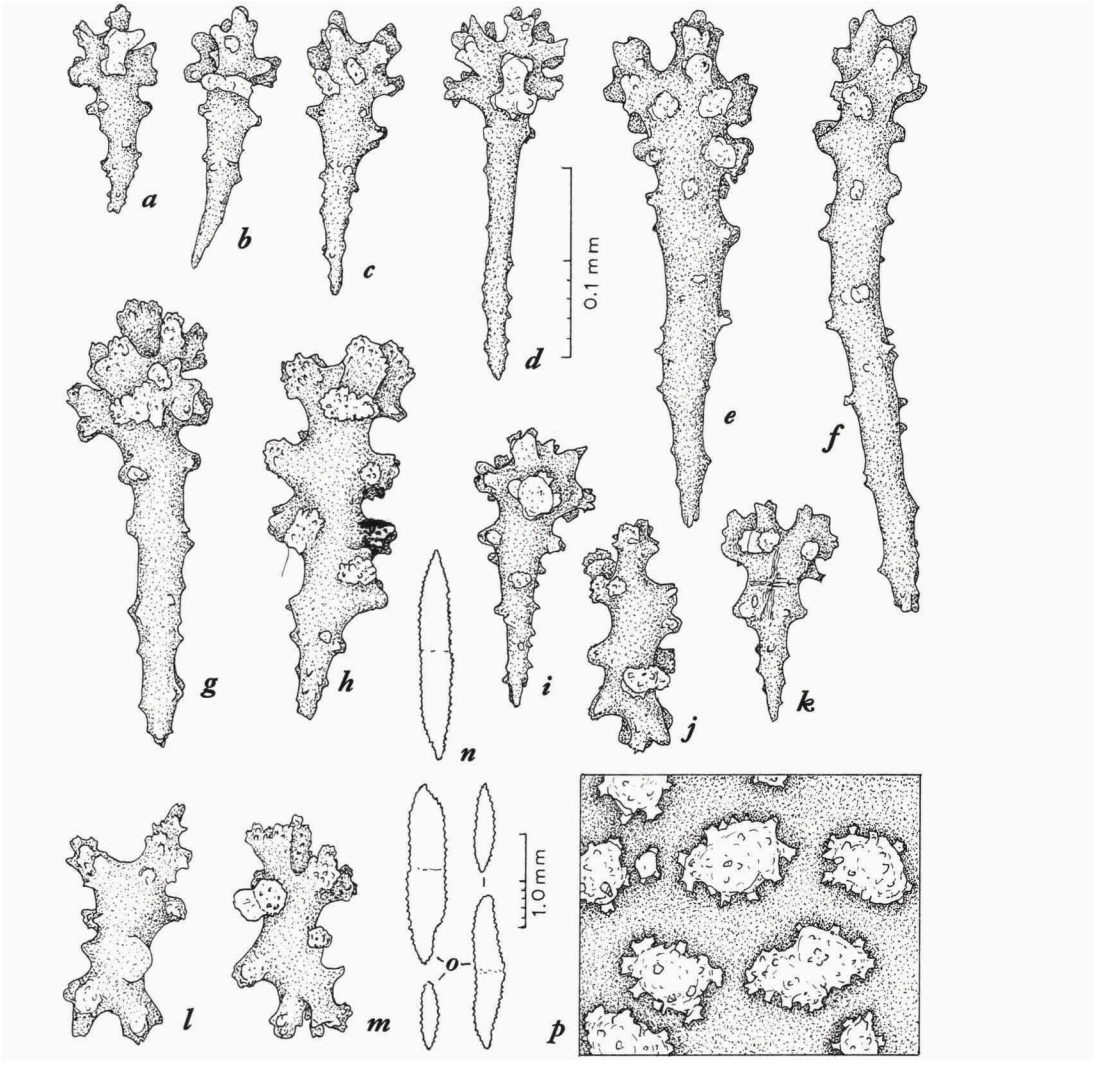

Fig. 18. *Sinularia elongata* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-m, sclerites from surface layer of the stalk; n, o, spicules from interior of the stalk; p, tubercles on coenenchymal spicule from the stalk. Enlargement of a-m and p indicated by 0.1 mm scale at d; that of n, o, by 1.0 mm scale at o.

Sinularia elongata Tixier-Durivault, 1970 (fig. 18, pl. 14 fig. 3)

Sinularia elongata Tixier-Durivault, 1970a: 256-258, figs. 93-95.

The dried holotype has been represented by Tixier-Durivault (1970a, fig. 93); the enlargement is × 0.7. Pl. 14 fig. 3 shows the same colony at natural size.

The sclerites in the surface layer of the lobes are clubs 0.12 to 0.32 mm long (fig. 18a-f). The warty heads and spiny shafts do not present peculiarities worth mentioning. The clubs in the surface layer of the sterile stalk, 0.10 to 0.26 mm long, are stouter; the warts have tiny spinules (fig. 18g-i, k). In addition to these clubs there are many rodlike or irregularly shaped bodies, on an average about 0.12 mm long, with high, more or less spiny warts (fig. 18j, l, m).

The coenenchyme of the lobes contains bluntly pointed, curved spindles, attaining a length of about 2.30 mm. They are covered with low, blunt spines or small warts. The spindles in the interior of the sterile stalk are similar, up to 2.50 mm long and 0.45 mm wide (fig. 18n, o). Sometimes there is a weakly developed median constriction. The crenellated warts are medium-sized, the diameter is about 0.05 mm (fig. 18p). In some cases they are arranged in cross rows.

Geographical distribution. — New Caledonia.

Sinularia erecta Tixier-Durivault, 1945 (fig. 19, pl. 15 figs. 1, 2)

Sinularia erecta Tixier-Durivault, 1945: 57; Tixier-Durivault, 1951: 20-23, figs. 7, 13-16; Tixier-Durivault, 1966: 170-172, figs. 163-165; Verseveldt, 1970b: 209 (listed only); Tixier-Durivault, 1972: 21.

Sinularia simpsoni Tixier-Durivault, 1945: 145; Tixier-Durivault, 1951: 60-62, figs. 67-70, 74; Tixier-Durivault, 1966: 188-189, figs. 181-183; Tixier-Durivault, 1972: 23; Verseveldt & Benayahu, 1978: 58 (listed only).

Tixier-Durivault (1951) described two colonies from the Red Sea under different names, viz., *S. erecta* and *S. simpsoni*. According to her the differences between these species are:

S. erecta	*S. simpsoni*
1. Lobes erect, cylindrical.	1. Lobes short, thin, flat, seem to be placed on parallel crests.
2. Foliaceous clubs in surface of lobes and base 0.07 mm long.	2. Foliaceous clubs in surface of lobes and base 0.05-0.08 mm long.
3. Sclerites in interior of base 0.80-1.60 mm long, with rounded ends.	3. Sclerites in interior of base 1-3 mm long, with rounded or furcated ends.
4. In interior of lobes the same sclerites as in the base.	4. In interior of lobes sclerites 0.80-1.20 mm long, with pointed or furcated ends.

In comparing the photos of the colonies (pl. 15 figs. 1 and 2), we see that in the right-hand part of the colony of *S. simpsoni* the lobes are not placed on ridges, just as in *S. erecta.* With regard to the length and the shape of the lobes there is also hardly any difference between the two species.

I examined the spiculation of the two holotypes. In both the foliaceous clubs of the *leptoclados*-type in lobes and base are exactly the same; their length varies from 0.07 to 0.10 mm (fig. 19a-e, h-k). Longer clubs, about 0.13 mm long, have heads with less leaflike prominences. Rods, 0.12 to 0.20 mm long, have often a more or less distinct median waist (fig. 19f, g).

In the interior of the lobes of *S. erecta* the sclerites are shorter (up to 1.35 mm) than in *S. simpsoni* (up to 1.90 mm). In the basal part the lengths are respectively 1.60 mm (fig. 19l-n) and 2.40 mm. In *S. simpsoni* these coenenchymal sclerites are slightly more irregularly shaped: they are often branched or furcated at one end. In *S. erecta* the warts are slightly bigger; they are often grown together, forming big, complex tubercles (fig. 19o, p).

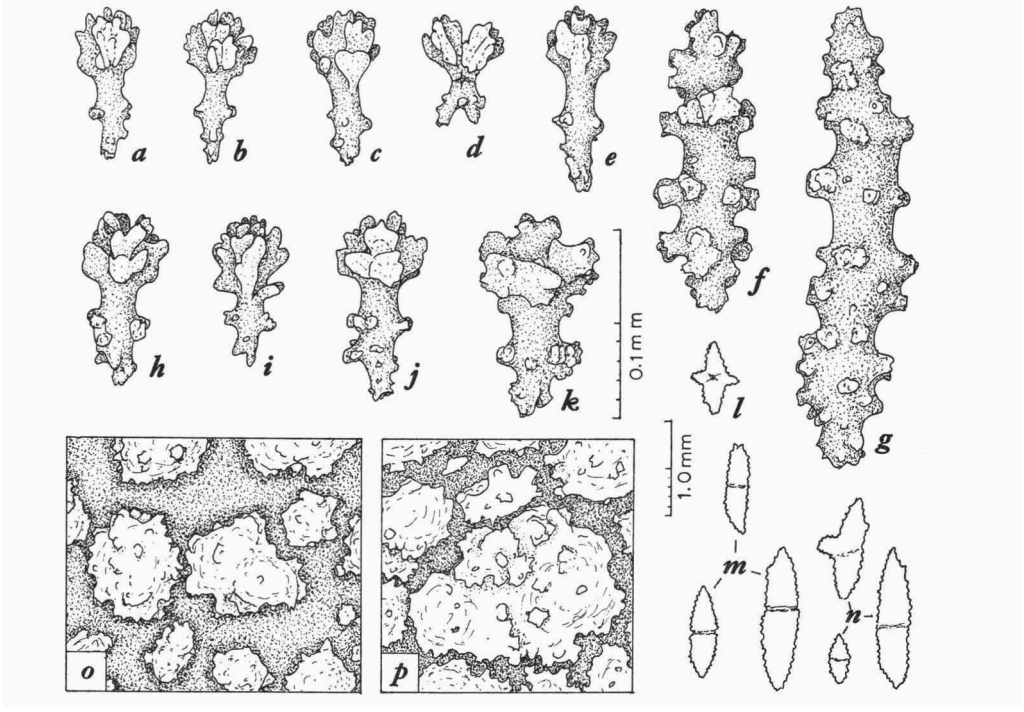

Fig. 19. *Sinularia erecta* Tixier-Durivault, holotype, MNHN. a-g, sclerites from surface layer of a lobe; h-k, sclerites from surface layer of the basal part of the colony; l-n, sclerites from coenenchyme of the basal part; o, p, warts on coenenchymal sclerites of basal part. Enlargement of a-k and o, p, indicated by 0.1 mm scale at k; that of l-n by 1.0 mm scale at l.

The differences mentioned are only gradual. The points of agreement, however, are so numerous that I feel confident that we have to do with one species. For the specific name I choose the first-published name *erecta.*

Geographical distribution. — Red Sea, Madagascar.

Sinularia exilis Tixier-Durivault, 1970 (fig. 20, pl. 14 fig. 2)

Sinularia exilis Tixier-Durivault, 1970b: 160-165, figs. 23-27.

Pl. 14 fig. 2 shows Tixier-Durivault's holotype. The left-hand part of the colony has been represented in her fig. 23 (1970b); the enlargement of this drawing is × 0.8.

The sclerites in the surface layer of the lobes are leaf-clubs of the

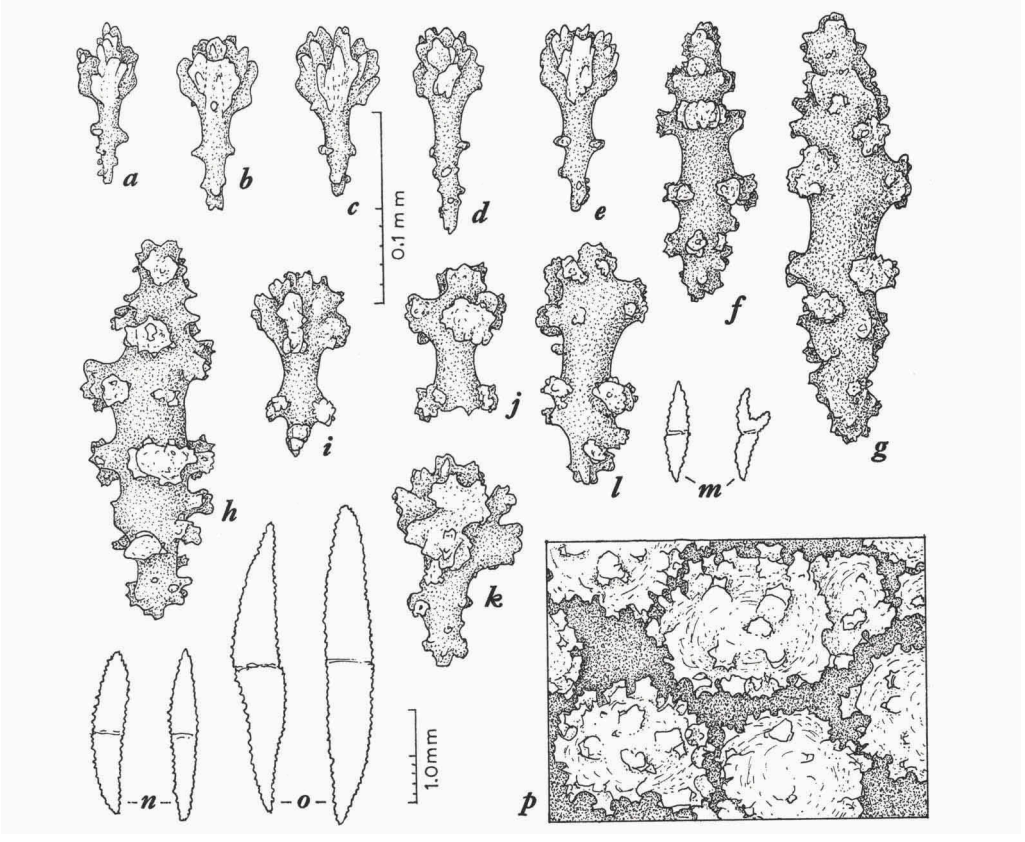

Fig. 20. *Sinularia exilis* Tixier-Durivault, holotype, MNHN. a-g, sclerites from surface layer of a lobe; h-l, sclerites from surface layer of the stalk; m-o, sclerites from interior of the stalk; p, warts on coenenchymal sclerites of the stalk. Enlargement of a-l and p indicated by 0.1 mm scale at c; that of m-o by 1.0 mm scale at o.

leptoclados-type, 0.08 to 0.12 mm long (fig. 20a-e), and warty rods and double-spindles, 0.14 to 0.23 mm long, with a distinct, more or less long median waist (fig. 20f, g). The clubs in the surface layer of the sterile stalk are also 0.08 to 0.12 mm long, but a good many are wart-clubs (fig. 20i-l). Warty spindles, provided with a median waist, are 0.14 to 0.23 mm long (fig. 20h).

The coenenchyme of lobes and sterile stalk contains spindles, up to 3.65 mm long and 0.60 mm wide (fig. 20m-o). They are straight or slightly curved, and rarely branched. Those in the lobes may be wider, up to 0.75 mm, and covered with blunt spines. All others are densely covered with big, compound, strongly crenellated warts, 0.05 to 0.08 mm in diameter (fig. 20p).

Geographical distribution. — Bay of Nha Trang (Vietnam).

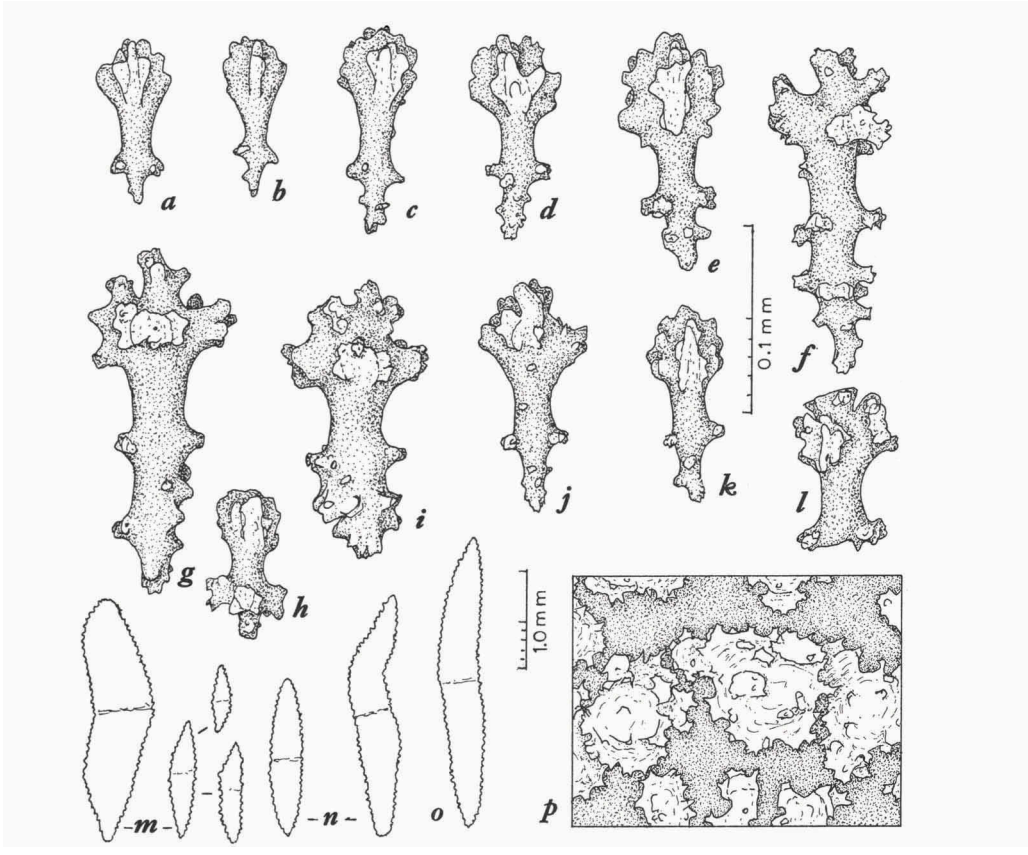

Fig. 21. *Sinularia facile* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-l, sclerites from surface layer of the stalk; m-o, spicules from coenenchyme of the stalk; p, tubercles on coenenchymal spicule from the stalk. Enlargement of a-l and p indicated by 0.1 mm scale at e; that of m-o by 1.0 mm scale at o.

Sinularia facile Tixier-Durivault, 1970 (fig. 21, pl. 13 fig. 3)

Sinularia facile Tixier-Durivault, 1970b: 165-168, figs. 28-30.

Tixier-Durivault's drawing (1970b, fig. 28) shows the holotype in reverse; the enlargement is × 0.7. Pl. 13 fig. 3 represents the colony at natural size.

The sclerites in the surface layer of the lobes are leaf-clubs of the *leptoclados*-type, 0.08 to 0.10 mm long, a few are up to 0.13 mm (fig. 21a-e). In addition to these there are some wart-clubs, 0.13 to 0.20 mm long (fig. 21f). In the surface layer of the sterile stalk the foliaceous clubs are in the minority; they measure 0.10 to 0.12 mm in length (fig. 21k). Most sclerites are wart-clubs, which reach a length of 0.19 mm (fig. 21g, i, j). Aberrant forms like those represented in fig. 21h, l are not uncommon.

The coenenchymal spiculation of the lobes consists of unbranched, straight or curved spindles, reaching a length of 2.60 mm. They are ornamented with processes, varying in shape from high, rounded prominences with inconspicuous spines to big, crenellated warts. The spindles occurring in the interior of the sterile stalk may be longer, up to 3.25 mm (fig. 21m-o). They are densely covered with high, crenellated warts, 0.075 mm in diameter (fig. 21p).

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia firma Tixier-Durivault, 1970 (fig. 22, pl. 13 fig. 2)

Sinularia firma Tixier-Durivault, 1970a: 289-292, figs. 145-147; Tixier-Durivault, 1972: 21; Verseveldt, 1974b: 95 (listed only); Verseveldt, 1977b: 21-22, fig. 15.

Pl. 13 fig. 2 shows the holotype at natural size. Tixier-Durivault's fig. 145 (1970a) is a drawing of the colony seen from the reverse side; the enlargement of this drawing is × 0.85.

The sclerites of the holotype are represented in fig. 22. The surface layer of the lobes contains clubs, which approach the *leptoclados*-type. However, the prominences composing the heads are less leaflike; they are more like blunt or truncated spines, or narrow leaves with a notch in the edge. The majority of them has a length of 0.10 to 0.12 mm, a few are shorter: 0.08 mm (fig. 22a-d). Longer clubs, about 0.17 to 0.21 mm long, have narrow heads with few, truncated or slightly wartlike processes. The handles are more or less cylindrical, and bear few spines (fig. 22e-g). Still longer clubs, 0.31 mm long, are transitional forms to coenenchymal sclerites. The clubs in the surface layer of the sterile stalk are wider; the length is 0.08 to 0.12 mm (fig. 22h, i). Stouter clubs, 0.20 to 0.25 mm long, are also present (fig. 22j).

In the interior of the lobes and of the stalk lie straight or slightly curved, unbranched spindles. Those in the stalk are longer, up to 4 mm (fig. 22k-q). The warts are strongly crenellated; the diameter is up to about 0.07 mm; sometimes they are arranged in transverse rows (fig. 22r).

Geographical distribution. — New Caledonia, Europe I. (W. of Madagascar).

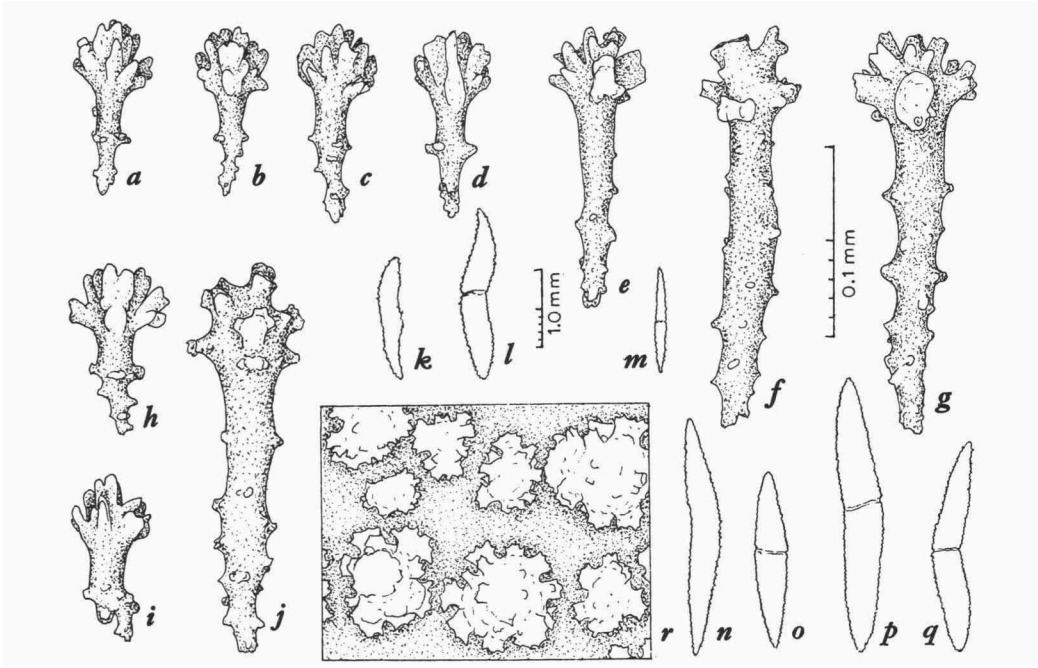

Fig. 22. *Sinularia firma* Tixier-Durivault, holotype, MNHN. a-g, sclerites from surface layer of a lobe; h-j, sclerites from surface layer of the stalk; k-q, spicules from interior of the stalk; r, warts on coenenchymal spicule from the stalk. Enlargement of a-j and r indicated by 0.1 mm scale at f; that of k-q by 1.0 mm scale at l.

Sinularia flexibilis (Quoy & Gaimard, 1833) (fig. 23)

Alcyonum (err. pro: *Alcyonium*) *flexibile* Quoy & Gaimard, 1833: 279, pl. 23 figs. 1-3.
Alcyonium flexile (err. pro: *flexibile*); Dana, 1846: 619-620, pl. 57 fig. 6.
Alcyonium flexibile; Milne Edwards & Haime, 1857: 117.
Danella flexibilis; Gray, 1869: 124.
Sinularia flexilis (err. pro: *flexibilis*); Lüttschwager, 1914: 11-12.
Sinularia flexibilis; Kolonko, 1926: 310-312, pl. 2 fig. 3; Thomson & Dean, 1931: 53, pl. 16 fig. 8, pl. 23 fig. 5; Roxas, 1933: 351-352, pl. 2 fig. 10; Macfadyen, 1936: 34; Tixier-Durivault, 1945: 249-250; Tixier-Durivault, 1951: 137-142, figs. 178A-C, 192-194, 98; Utinomi, 1956: 227; Verseveldt, 1960: 239-240; Tixier-Durivault, 1970a: 293-294; Tixier-Durivault, 1970b: 168-169; Verseveldt, 1977b: 3 (listed only); Utinomi, 1977: 24-25, fig. 5, pl. 6 figs. 1, 2.

This species is easy to identify by the long, slender, flabby, fingerlike or tubelike lobes. But it is necessary to make microscopic slides to be sure of the right identification, for there are a few more *Sinularia* species with long digitiform lobes, e.g. *S. procera* Verseveldt, 1977b, and *S. sandensis* Verseveldt, 1977b.

In the terminal lobes and lobules sclerites are absent. Basalwards the number increases. The surface layer of the sterile stalk contains clubs, more or less triangular in outline, since the wide head gradually tapers towards the base of the pointed handle (fig. 23c, e-h). But especially the smaller sclerites often have an oval outline (fig. 23a, b, d). They are all covered with stumpy warts. Most of the sclerites vary in length from 0.07 to 0.13 mm; longer ones, up to 0.17 mm and even up to 0.25 mm, are less abundant.

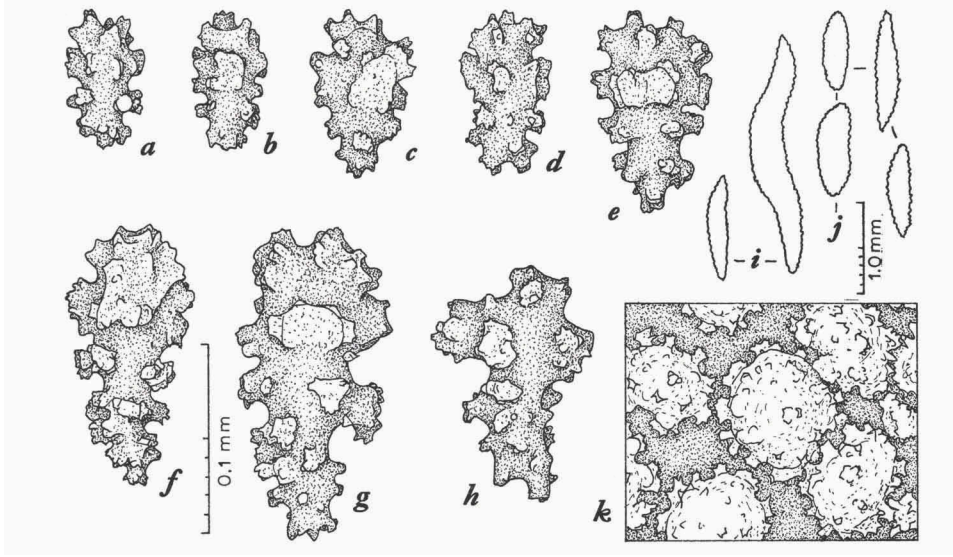

Fig. 23. *Sinularia flexibilis* (Quoy & Gaimard). a-h, sclerites from surface layer of the sterile stalk; i, j, spicules from coenenchyme of the stalk; k, warts on coenenchymal spicule from the stalk. Enlargement of a-h and k indicated by 0.1 mm scale at f; that of i, j, by 1.0 mm scale at j.

Depending on the place in the colony and on the length of the sterile stalk the coenenchymal spicules vary considerably in length. Distally, where the ramifications start, the sclerites are oval or slightly fusiform, and reach a length of 1.30 mm. More basally the length increases, up to 2.00 mm. But in a specimen with an extremely long sterile stalk coenenchymal sclerites were found up to 3.40 mm long and 0.50 mm wide, often irregularly curved, and sometimes bifurcated at one end (fig. 23i, j). The spicules are always

thickly set with crenellated, almost rounded warts, 0.05 to 0.07, sometimes up to 0.09 mm in diameter (fig. 23k).

Geographical distribution. — Vanokoro I. (Santa Cruz Is.). Fiji Is., Samoa, Philippines, Malay Archipelago, Great Barrier Reef, Vietnam, Palau Is., New Caledonia, Ryukyu Archipelago.

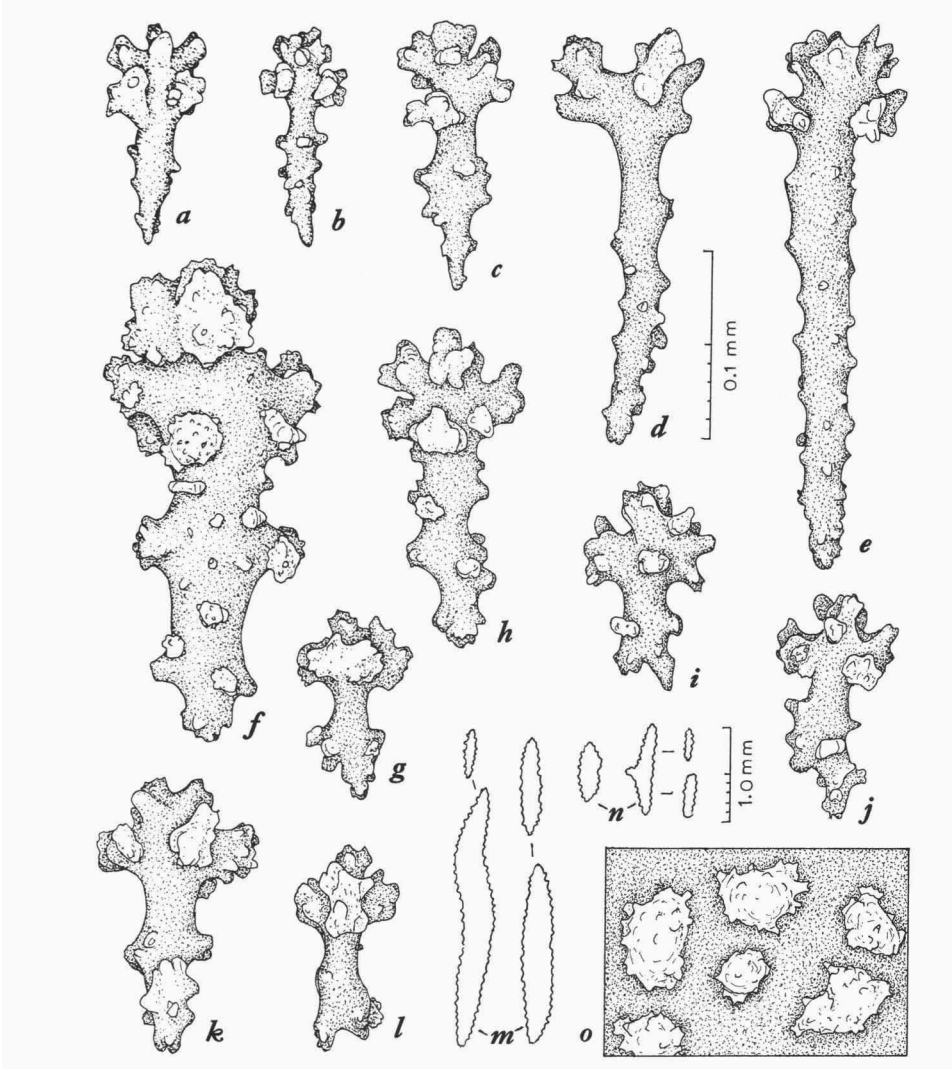

Fig. 24. *Sinularia flexuosa* Tixier-Durivault, holotype, MNHN. a-e, sclerites from surface layer of a lobe; f-l, sclerites from surface layer of the stalk; m, n, sclerites from coenenchyme of the stalk; o, warts on coenenchymal sclerite from the stalk. Enlargement of a-l and o indicated by 0.1 mm scale at d; that of m, n, by 1.0 mm scale at n.

Sinularia flexuosa Tixier-Durivault, 1945 (fig. 24, pl. 16 fig. 1)

Sinularia flexuosa Tixier-Durivault, 1945: 150; Tixier-Durivault, 1951: 86-89, figs. 108, 117-120; Tixier-Durivault, 1972: 12 (listed only).

The enlargement of the colony in Tixier-Durivault's fig. 108 (1951) is probably about × 0.5. Pl. 16 fig. 1 shows the whole holotype at natural size.

The sclerites in the surface layer of the lobes are relatively stout wart-clubs. The smaller ones, 0.12 to 0.16 mm long, have pointed handles (fig. 24a-c). The larger ones, 0.20 to 0.34 mm long, have blunt-ended handles (fig. 24d, e). In addition to these there are thick, warty, more or less clavate sclerites, 0.25 to 0.38 mm long, forming intermediates to coenenchymal sclerites. The clubs in the surface layer of the stalk are wider and coarser. As in the outer layer of the lobes, three types can be distinguished: (1) clubs 0.09 to 0.15 mm long, the heads with big tubercles, the handles irregularly shaped and warty (fig. 24g, i-l); (2) clubs 0.14 to 0.35 mm long, with long, warty handles (fig. 24h), and (3) clumsy, clavate sclerites, 0.23 to 0.26 mm long, covered with compound warts (fig. 24f).

The coenenchymal sclerites in the lobes are acute or blunt spindles, up to 2 mm long, usually irregularly curved, and sculptured with medium-sized, flat-headed, rather scattered tubercles. The interior of the stalk contains the same spindles; they may reach a length of 2.60 mm (fig. 24m-o). Many spindles show an indistinct median constriction.

Geographical distribution. — Red Sea, Madagascar.

Sinularia fungoides Thomson & Henderson, 1906 (fig. 25, pl. 22 fig. 4)

Sinularia fungoides Thomson & Henderson, 1906: 417-418, text-fig. 85; Lüttschwager, 1914: 14; Kolonko, 1926: 330; Verseveldt, 1971: 33-35, figs. 18, 19, pl. 8.

Not *Sinularia fungoides*; Tixier-Durivault, 1945: 60; Tixier-Durivault, 1951: 41-45, figs. 41, 49-51; Tixier-Durivault, 1970b: 169-170.

I examined Thomson & Henderson's holotype (BMNH no. 1912.2.25.9), pictured in their text-fig. 85; the colony has broken up in two parts now (see my pl. 22 fig. 4).

The surface layer of the lobes contains clubs, 0.08 to 0.22 mm long (fig. 25a-h). The wide heads consist of tubercles, which often seem to be flattened laterally. The handles are rather pointed. The clubs in the surface layer of the stalk are 0.08 to 0.17 mm long; they are slightly wider (fig. 25i-m).

In the coenenchyme of the lobes and of the stalk there are two types of sclerites: (1) slender, unbranched, large spindles, straight or slightly curved, in the lobes more than 4.50 mm long, in the stalk up to 6.80 mm (fig. 25o, p), and (2) small spindles, 0.17 to 0.32 mm long, with relatively high, often

truncated spines or small warts (fig. 25n, q, r); in many cases there is a distinct median waist (fig. 25q). Fig. 25n shows these small spindles at the same size as the large spindles, fig. 25o and p. These large spindles are covered either with scattered, low, volcano-shaped prominences or with small, irregularly shaped warts, standing wide apart, often in girdles, and up to 0.05 mm in diameter (fig. 25s).

It is clear that Tixier-Durivault's identifications are wrong. From her publication of 1945 (p. 60) I mention the following differences (in brackets the results of my examination of the holotype):

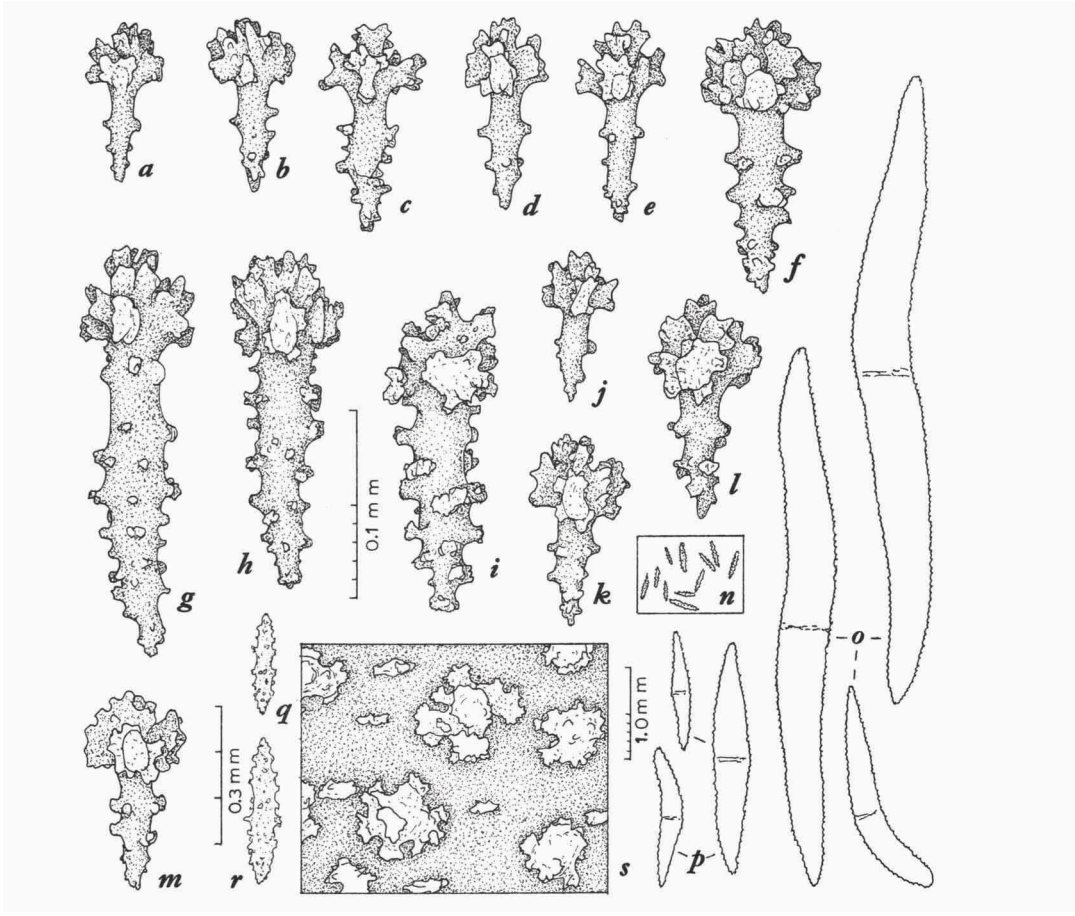

Fig. 25. *Sinularia fungoides* Thomson & Henderson, holotype, BMNH no. 1912.2.25.9. a-h, sclerites from surface layer of a lobe; i-m, sclerites from surface layer of the stalk; n-r, spicules from interior of the stalk; s, warts on coenenchymal spicule from the stalk. Enlargement of a-m and s indicated by 0.1 mm scale at h; that of n-p by 1.0 mm scale below k; that of q, r by 0.3 mm scale at r.

1. Coenenchymal spicules in stalk 1 to 2 mm long (up to 6.80 mm).
2. Warts densely placed (Thomson & Henderson (l.c.) also have "closely covered", which is incorrect: the warts are rather scattered).
3. Smaller spicules with scarce prominences (many prominences).
4. Clubs 0.07 mm long (0.08-0.22 mm in lobe; 0.08-0.17 mm in stalk).
5. Handles of clubs short (long, pointed).
6. Very few spicules in interior of lobes (numerous).
7. Length of these spicules 1.3 mm (more than 4.50 mm).

Geographical distribution. — Zanzibar, Madagascar.

Sinularia gardineri (Pratt, 1903) (fig. 26, pl. 16 fig. 2)

Sclerophytum gardineri Pratt, 1903: 527-528, pl. 31 fig. 28.
Not *Sclerophytum gardineri*; Pratt, 1905: 255; Thomson & McQueen, 1907: 53-54.
Not *Sinularia gardineri*; Thomson & Dean, 1931: 52-53, pl. 8 fig. 1, pl. 22 fig. 4, pl. 23 fig. 8; Macfadyen, 1936: 34-36; Tixier-Durivault, 1945: 245; Tixier-Durivault, 1951: 113-116, figs. 140, 158-162; Utinomi, 1954: 50-51; Utinomi, 1956: 228-229; Tixier-Durivault, 1966: 213.
Lüttschwager's (1914: 14, 15) and Kolonko's (1926: 333) information is unimportant.

I examined the holotype from Hulule, Male Atoll, Maldives (BMNH no. 1962.7.20.99). The photograph of the specimen (pl. 16 fig. 2) shows that the lobes are shorter than those pictured in Pratt's fig. 28 (pl. 31). They may have been broken off. The enlargement of Pratt's figure is about × 2.

Pratt did not depict the sclerites. She records (1903: 527): "Clubs and slender spindles, similar to those of other species and measuring .1-.2 mm. in length and .05-.06 mm. in breadth, are crowded near the surface. The tuberculate spicules are similar to those of other species, the majority are spindles about 3 mm. long and .8-1 mm. broad". It is not surprising that in consequence of this deficient information subsequent investigators have failed in their identifications.

I found that in the surface layer of the lobes there are (1) clubs 0.09 to 0.14 mm long, with wide heads composed of warts and spines grouped closely together, and spiny handles (fig. 26a-c); and (2) clubs 0.17 to 0.25 mm long, with the same complex heads and long, rodlike, spiny or warty shafts (fig. 26d, e). The surface layer of the stalk has clubs 0.13 to 0.26 mm long, wider than those in the lobes, the heads with compound tubercles (fig. 26f-i). Fig. 26j shows an intermediate form between a normal club and a coenenchymal sclerite; it is 0.31 mm long.

In the coenenchyme of the lobes and of the stalk lie heavy spindles up to 3.50 mm long and 0.65 mm wide (occasionally as wide as 0.75 mm), usually irregularly curved, pointed at one or at both ends, or blunt-ended (fig. 26k-n).

The prominences are high, rounded hillocks, weakly crenellated, the summits with tiny knobs. Those of the sclerites from the stalk are slightly bigger, up to 0.05 or 0.06 mm in diameter (fig. 260). They are usually arranged in transverse rows.

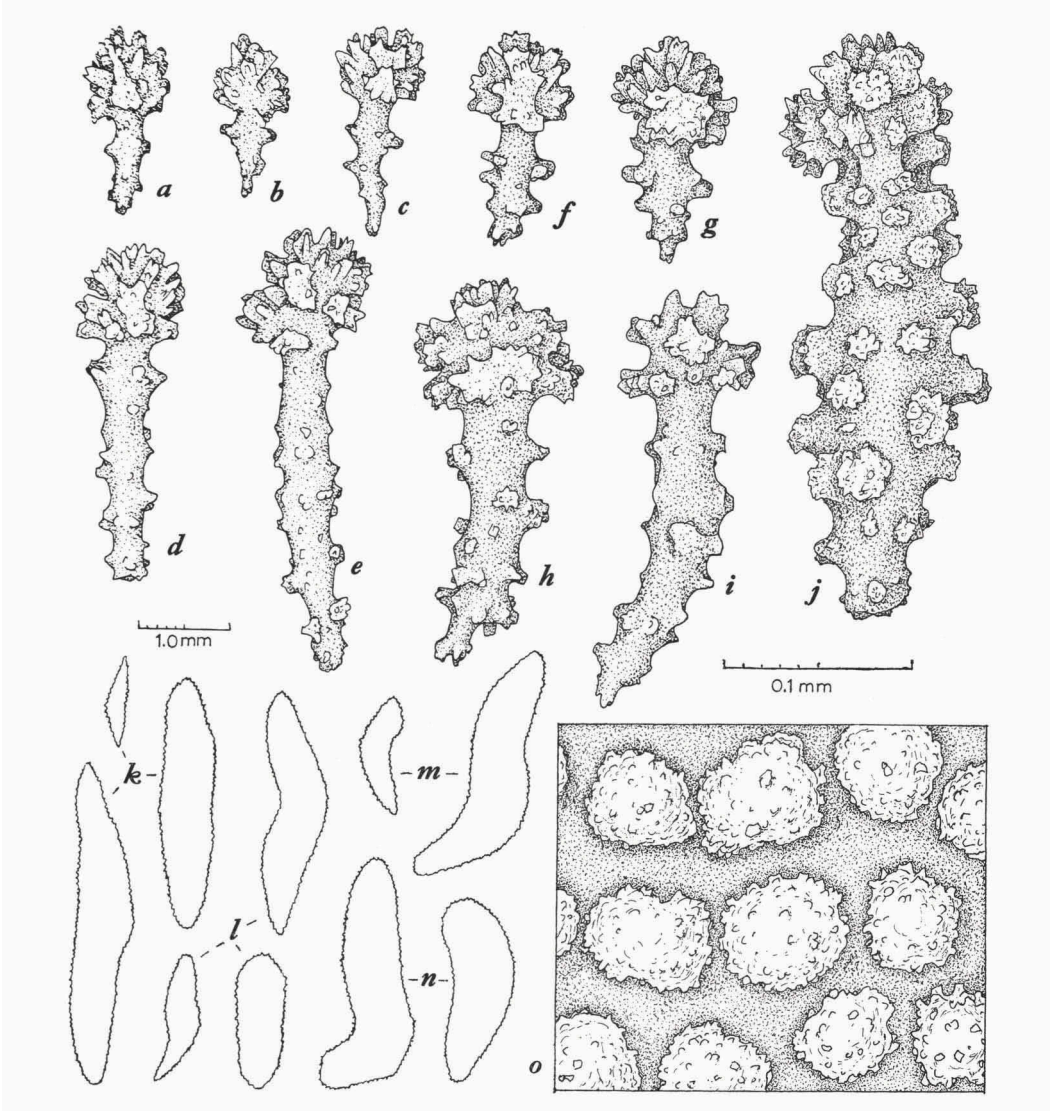

Fig. 26. *Sinularia gardineri* (Pratt), holotype, BMNH no. 1962.7.20.99. a-e, sclerites from surface layer of a lobe; f-j, sclerites from surface layer of the stalk; k-n, sclerites from interior of the stalk; o, warts on coenenchymal sclerite from the stalk. Enlargement of a-j and o indicated by 0.1 mm scale below j; that of k-n by 1.0 mm scale below d.

A small colony from the Gulf of Manaar, Ceylon (BMNH register no. 1936.5.12.2), has incorrectly been identified with *S. gardineri* by Pratt, 1905 (it is labelled as "type"!). I established a new species for it, *S. manaarensis*.

Macfadyen (1936: 34-36) did not describe colonies of *S. gardineri*, but of another (new?) species.

Thomson & Dean (1931: 52-53) identified two colonies with *S. gardineri*. These authors gave drawings (pl. 22 fig. 4) of clubs "with non-divaricate heads and a small whorl of knobs near the base of the handle". The clubs represented by Tixier-Durivault (1951, figs. 161 O, P and 162 D) and by Utinomi (1956, fig. 3h-l) bear an uncomfortable resemblance to those figured by Thomson & Dean. However, they are all quite unlike the warty-headed clubs of the holotype, and so the colonies described by these authors do not belong to *S. gardineri*.

The specimen described by Tixier-Durivault (1951: 113-116) is not a *S. gardineri* either. She recorded clubs in the surface layer of the sterile stalk provided with a central wart (not pictured in her figures), whereas the clubs in the surface layer of the lobes should have foliaceous heads. Neither of these statements fits in with my observations of the holotype.

Geographical distribution. — Maldives.

Sinularia gibberosa Tixier-Durivault, 1970 (fig. 27, pls. 17, 18)

Sinularia gibberosa Tixier-Durivault, 1970b: 170-172, figs. 31-33.
Alcyonium leptoclados var. *abbreviata*; May, 1899: 108.
Sinularia densa; Verseveldt, 1960: 233-235, pl. 7 fig. 4; Verseveldt, 1976: 498 (listed only).

The holotype has a height of 70 mm; the roughly three-cornered capitulum measures 130 mm in breadth (pl. 17). The sterile stalk is attached to a piece of stony coral. The capitulum consists of groups of lobes, which often form hillock-like rosettes. This reminds one of the capitulum of a colony, wrongly identified with *S. densa* by the present author (see Verseveldt, 1960: 233-234, pl. 7 fig. 4). In this paper he wrote: "The capitulum ... is beset with ... hillock-like rosettes, each of them being composed of several closely set, laterally flattened, undivided, rounded lobes arranged around the centre of the rosette. The whole reminds one of the rosettes of certain Crassulaceae, e.g., the genus *Sempervivum*". This description applies to the holotype of *S. gibberosa*. Tixier-Durivault (1970b, fig. 31) gave a drawing of one rosette.

The sclerites in the surface layer of the lobes show a rather great diversity of forms. Some of the clubs have heads with irregularly placed warts (fig. 27a). A good many have heads provided with a distinct central wart (fig. 27b, c, g, h). Others again have a bifurcated head (fig. 27e). There are also crosses with two heads and one or two shafts (fig. 27f), and bizarre,

more or less rod-shaped sclerites without a distinct head, and bearing high prominences (fig. 27d). They all vary in length from 0.08 to 0.15 mm. Stouter clubs, 0.15 to 0.23 mm long, have less tuberculate heads; the longer ones are transitional forms to coenenchymal spindles (fig. 27i, j). In the surface layer of the stalk, too, there is a great diversity of clubs (fig. 27k-p). Most of them are wider; clubs with a central wart are common (fig. 27k, p). The length is 0.08 to 0.17 mm.

The coenenchyme of the lobes and of the stalk contains spindles, up to 4 mm long and 0.75 mm wide; they are blunt and unbranched (fig. 27q, r).

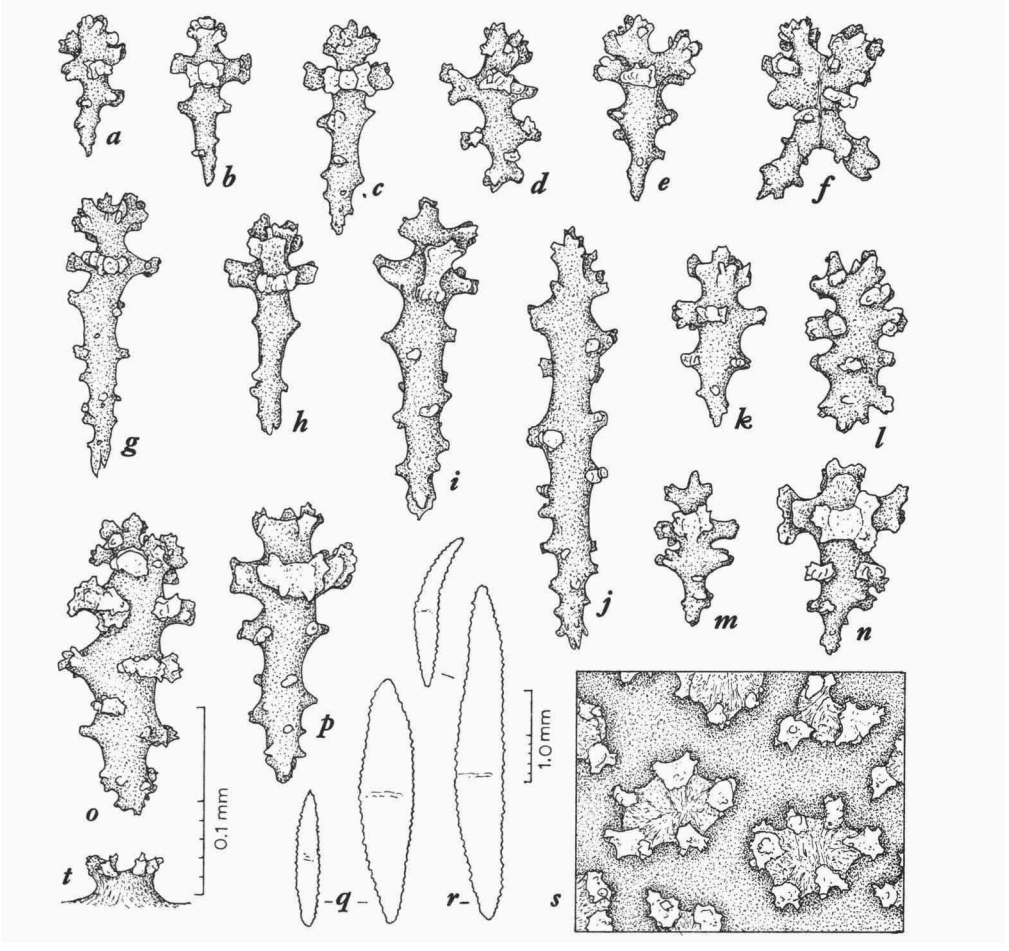

Fig. 27. *Sinularia gibberosa* Tixier-Durivault, holotype, MNHN. a-j, sclerites from surface layer of a lobe; k-p, sclerites from surface layer of the stalk; q, r, spicules from coenenchyme of the stalk; s, warts on coenenchymal spicule from the stalk. Enlargement of a-p and s, t indicated by 0.1 mm scale at o; that of q, r by 1.0 mm scale at r.

The tubercles have a remarkable shape: they are concave, with tiny warts on the edge (fig. 27s, t).

In Tixier-Durivault's description (1970b) of this species there are annoying errors. Comparing the width of the surface sclerites in the figures 32 and 33 I should say that the captions to both figures are right, but in that case the text (p. 170) is wrong. In the other case the caption to fig. 32 (p. 171) must be "Spicules capitulaires...", and that to fig. 33 (p. 172) "Spicules basilaires...". But now in the text (p. 170) the figure numbers 32 and 33 should be exchanged. Besides, the length of the coenenchymal spicules in the capitulum is more than "0.27 à 0.4 mm".

As said above, the present author incorrectly identified a colony with *S. densa* (Whitelegge). The mistake is a result of Whitelegge's incomplete description (see *S. densa*, p. 8 of this paper). A re-examination of the colony revealed that it belongs to *S. gibberosa*. Other samples, examined by me and collected near Nias Island and near the Seychelles (see Verseveldt, 1976: 498), must also be identified with *S. gibberosa*.

In the Berlin Museum I found four colonies (register nos. 2725, 2727, 2728 and 2729), collected near Ceylon, labelled Colombo Museum B, C, D, H, and identified by May (1899: 108) with *Alcyonium leptoclados* var. *abbreviata* Klunzinger. This identification is quite incorrect: the heads of the clubs in the surface layer of the lobes are not at all foliaceous; on the contrary they have a distinct central wart. Pl. 18 sufficiently shows the shape of the lobes. The colonies must be referred to *S. gibberosa*.

Geographical distribution. — Ceylon, Bay of Nha Trang (Vietnam), Nias I., Seychelles.

Sinularia grandilobata sp. nov. (fig. 28, pl. 19)

In the Berlin Museum there is a colony (register no. 6500), according to the label collected at Puerto Galera Bay, Mindoro, Philippines, and identified with *S. macrodactyla* by Roxas. With regard to the shape and the dimensions of the long, digitiform lobes this identification could be right, but the sclerites, and especially the clubs in the surface layer of lobes and stalk, are different from those of *S. macrodactyla*.

The colony (pl. 19, holotype) consists of a thick sterile stalk, up to 54 mm high, and a number of primary lobes, 11 to 30 mm wide at the base. Most of them ramify into long, fingerlike secondary lobes, about 8 mm wide and up to 35 mm long. The lobes are stiff, slightly flexible, and rather hard.

The polyps are not completely retracted. On the basal parts of the primary lobes the centres are 1.0 to 2.5 mm apart, on the branches 0.8 to 1.5 mm.

The clubs in the lobes are 0.08 to 0.10 mm long, rarely slightly longer

(fig. 28a-g). Most of the heads have a central wart, and below this a girdle of warts. The handles bear a few blunt spines. The clubs in the surface layer of the sterile stalk are 0.08 to 0.14 mm long (fig. 28h-o). They are much wider than those in the lobes. The heads are composed of a few compound warts; a central wart is often present. The handles are pointed or blunt, and bear some spines or small warts.

The coenenchymal sclerites in the lobes are straight, blunt spindles, up to 3.40 mm long and 0.70 mm wide. The sclerites in the stalk strongly vary in shape and size. A lot of them are nearly spherical or oval, 0.30 to 0.60 mm long (fig. 28p), others are blunt-ended spindles, up to 3.60 mm long (fig. 28q, r). They are densely covered with big warts, which are up to 0.10 mm in diameter (fig. 28s).

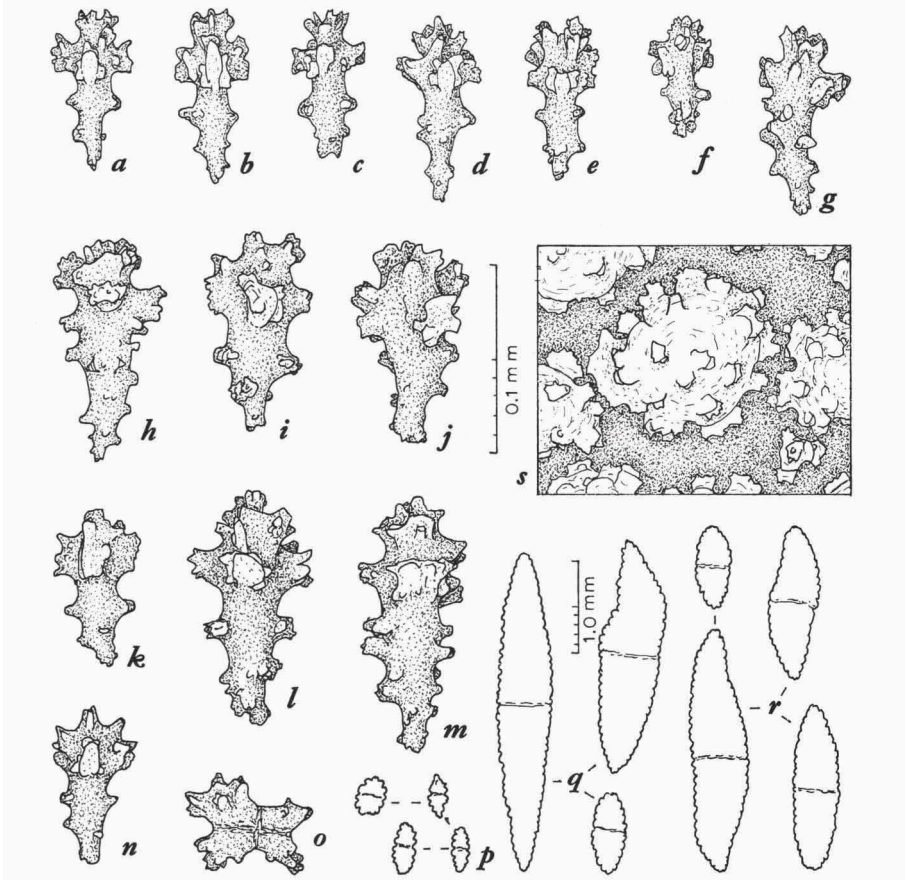

Fig. 28. *S. grandilobata* sp. nov. ZMB no. 6500. a-g, sclerites from surface layer of a lobe; h-o, sclerites from surface layer of the stalk; p-r, sclerites from coenenchyme of the stalk; s, tubercles on coenenchymal sclerite from the stalk. Enlargement of a-o and s indicated by 0.1 mm scale at j; that of p-r by 1.0 mm scale at q.

In alcohol the colour is light brown.

As mentioned above, *S. grandilobata* mainly differs from *S. macrodactyla* in the shape of the clubs. In *S. macrodactyla* the processes on the clubs are numerous, giving the club the appearance of dense bunches (Kolonko, 1926: 328: "Dornen traubenartig dicht"). In *S. grandilobata* the processes are few, not densely placed, the clubs often have a central wart.

Geographical distribution. — Mindoro (Philippines).

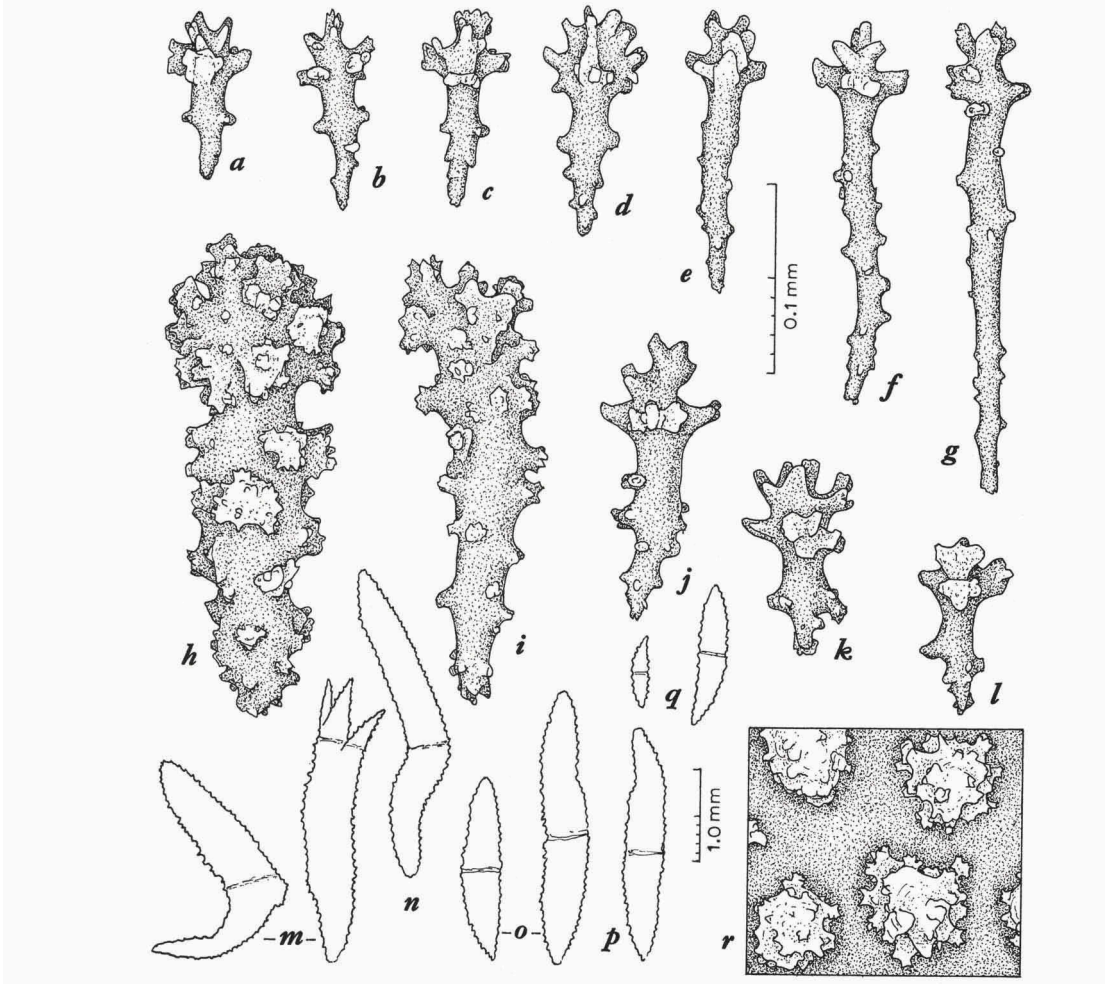

Fig. 29. *Sinularia granosa* Tixier-Durivault, type specimen, MNHN. a-g, sclerites from surface layer of a lobe; h-l, sclerites from surface layer of the stalk; m, n, sclerites from interior of a lobe; o-q, sclerites from interior of the stalk; r, tubercles on coenenchymal sclerite from the stalk. Enlargement of a-l and r indicated by 0.1 mm scale at e; that of m-q by 1.0 mm scale at p.

Sinularia granosa Tixier-Durivault, 1970 (fig. 29, pl. 20)

Sinularia granosa Tixier-Durivault, 1970b: 172-173, figs. 34-37.

It is difficult to establish the enlargement of the part of a colony represented in Tixier-Durivault's fig. 34. A comparison with our pl. 20 warrants the assumption that the enlargement is about × 1.

A good many of the clubs occurring in the surface layer of the lobes are 0.09 to 0.12 mm long (fig. 29a-d), but longer clubs with slender, weakly

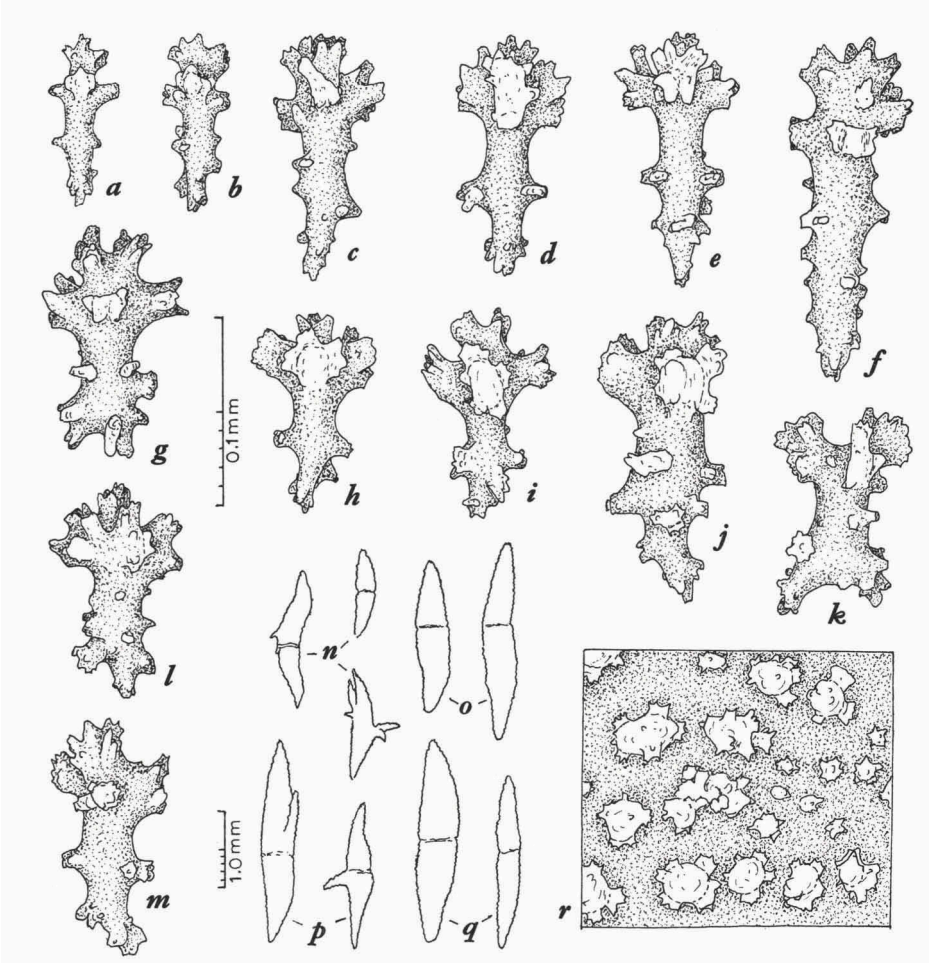

Fig. 30. *Sinularia gravis* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-m, sclerites from surface layer of the stalk; n-q, spicules from interior of the stalk; r, warts on coenenchymal sclerite from the stalk. Enlargement of a-m and r indicated by 0.1 mm scale at g; that of n-q by 1.0 mm scale at m.

spined shafts are far from scarce. They may reach a length of 0.27 mm (fig. 29e-g). The heads are composed of high, blunt spines or a few simple warts. In the surface layer of the sterile stalk wider clubs occur, 0.09 to 0.17 mm long, with the same spiny heads and thick, warty handles (fig. 29j-l). Stouter clubs, 0.23 to 0.26 mm long, bear coarse warts (fig. 29h, i).

In the interior of the lobes the sclerites are irregularly curved spindles, up to 3.40 mm long; they may be split at one end, or they may bear a side-branch (fig. 29m, n). The spindles in the coenenchyme of the sterile stalk are more regular in shape; the length is up to 3 mm (fig. 29o-q). They are rather densely covered with crenellated, medium-sized or big warts, 0.05 to 0.08 mm in diameter (fig. 29r).

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia gravis Tixier-Durivault, 1970 (figs. 30, 31, pl. 14 fig. 4)

Sinularia gravis Tixier-Durivault, 1970a: 249-252, figs. 86-89; Verseveldt, 1974b: 95 (listed only); Verseveldt, 1977b: 24-25, figs. 18, 19, pl. 4 fig. 1.

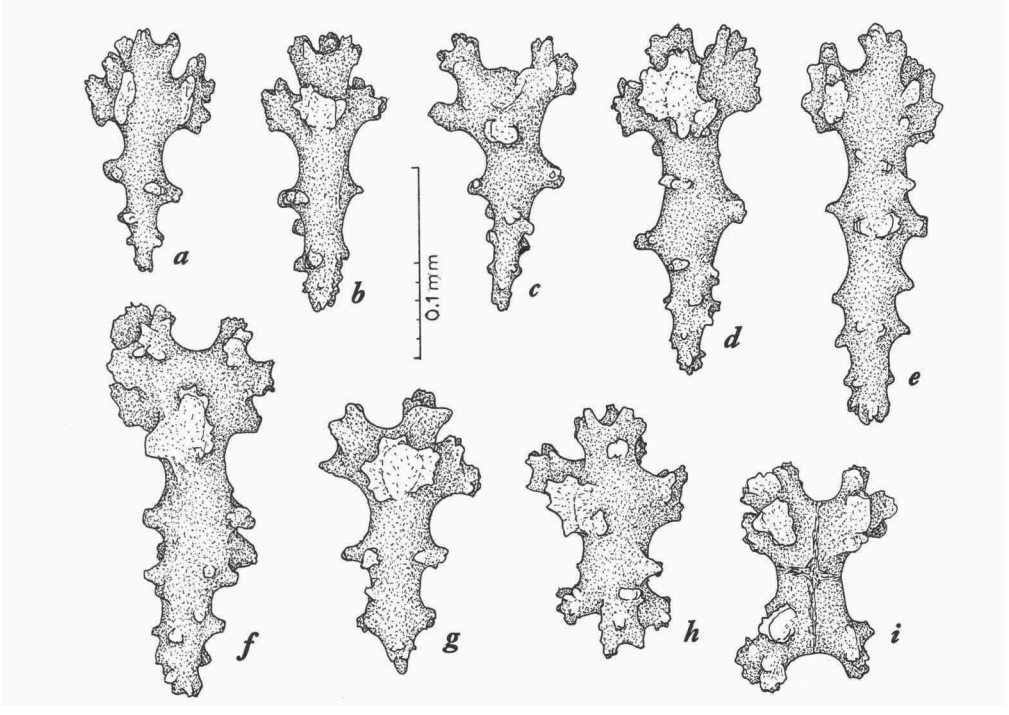

Fig. 31. *Sinularia gravis* Tixier-Durivault, holotype, MNHN. a-e, sclerites from surface layer of a lobe; f-i, sclerites from surface layer of the stalk. All enlargements are the same; scale 0.1 mm.

Tixier-Durivault's fig. 86 (1970a) gives a good impression of the shape of the holotype and its rounded, sinuous lobes; the enlargement is × 0.6. Pl. 14 fig. 4 is a photograph of the same colony, at natural size.

Fig. 30 is a reprint of fig. 19 in my paper of 1977 (b). As an amplification I give new pictures of clubs from the surface layer of the lobes (fig. 31a-e) and of the sterile stalk (fig. 31f-i). Most clubs are 0.13 to 0.17 mm long (fig. 30c-e, fig. 31a-d), but longer ones, 0.20 to 0.25 mm long, are not uncommon (fig. 31e); the longer they are, the more they are transitional forms to spindles. The small clubs represented in fig. 30a, b and about 0.10 mm long, are scarce.

In the stalk the clubs have the same length, but they are wider; the handles are more warty. Crosses and warty, more rod-shaped forms occur frequently (fig. 30g-m, fig. 31f-i).

In the coenenchyme of the lobes and of the stalk there are thick spindles, up to 3.10 mm long (fig. 30n-q). Many of them are irregularly branched or bifurcated. The prominences are distant, and sometimes arranged in transverse rows. They are small warts, up to 0.035 mm in diameter (fig. 30r), or volcano-shaped.

Geographical distribution. — New Caledonia, Tahiti.

Sinularia grayi Tixier-Durivault, 1945 (fig. 32, pl. 21 fig. 1)

Sinularia grayi Tixier-Durivault, 1945: 145-146; Tixier-Durivault, 1951: 62-65, figs. 71, 75-78; Verseveldt, 1965: 32-33, fig. 2, pl. 1 fig. 1; Tixier-Durivault, 1966: 189-192, figs. 184-186; Tixier-Durivault, 1969: 148; Verseveldt, 1970b: 210 (listed only); Tixier-Durivault, 1972: 21-22 (misprinted as *S. gravi*).

In comparing our pl. 21 fig. 1 with Tixier-Durivault's drawing (1951, fig. 71) one can easily form an idea of the shape of the holotype and the distribution of the lobes. The plate shows that the summits of some lobes are damaged. In the colony represented by me in 1965, pl. 1 fig. 1, the lobes are crowded, not placed in groups.

The surface layer of the lobes contains clubs, 0.08 to 0.23 mm long (fig. 32a-g). The heads are warty, or composed of high, blunt or slightly dentate prominences. With the smaller clubs the shaft has more processes near the base. In general the width of the clubs varies rather considerably. The clubs in the surface layer of the sterile stalk hardly differ from those in the lobes (fig. 32h-l).

In the lobes the internal, massive sclerites, up to 2.80 mm long and 0.75 mm wide, vary considerably in shape and size (fig. 32m-o); irregularly curved

and branched forms are numerous. In the stalk the irregular forms are apparently slightly less numerous (fig. 32p, q); the maximum dimensions are 2.40 × 0.60 mm. The medium-sized warts, 0.04 to 0.06 mm in diameter, are sometimes zoned (fig. 32r).

Geographical distribution. — Red Sea, Madagascar, Gambier Is.

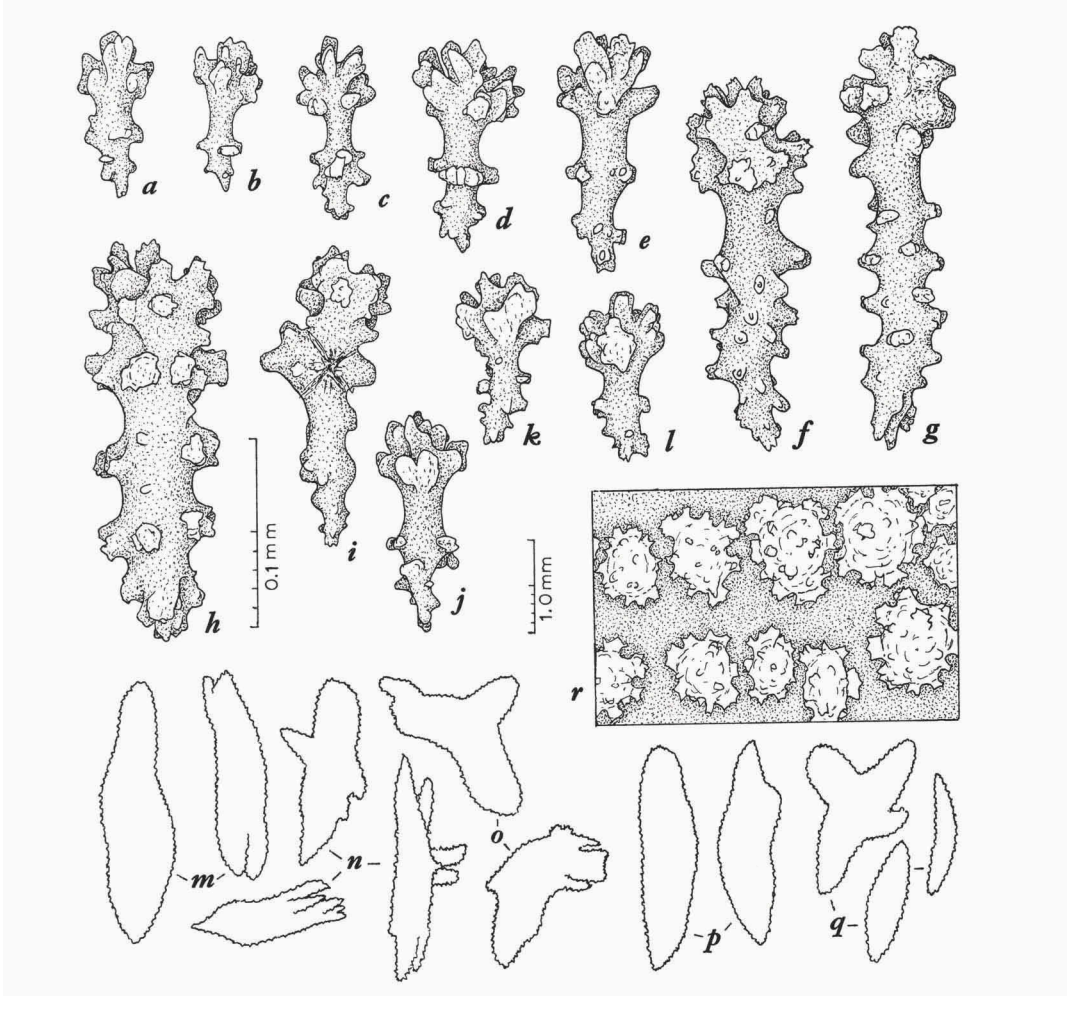

Fig. 32. *Sinularia grayi* Tixier-Durivault, holotype, MNHN. a-g, sclerites from surface layer of a lobe; h-l, sclerites from surface layer of the stalk; m-o, sclerites from coenenchyme of a lobe; p, q, sclerites from coenenchyme of the stalk; r, warts on coenenchymal sclerite from the stalk. Enlargement of a-l and r indicated by 0.1 mm scale at h; that of m-q by 1.0 mm scale at j.

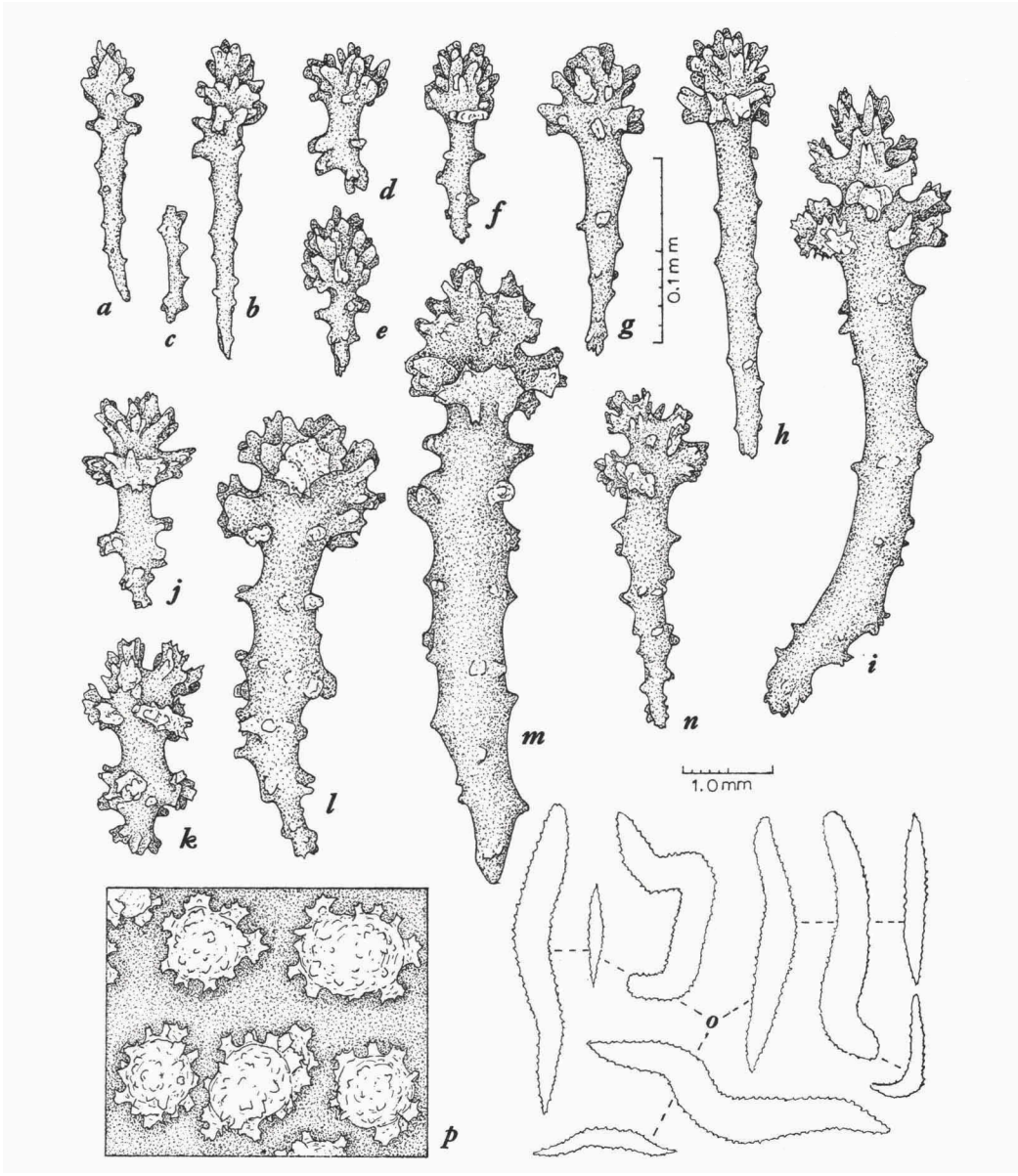

Fig. 33. *Sinularia hirta* (Pratt), holotype, BMNH no. 1936.5.12.4. a, b, anthocodial clubs; c, sclerite from a tentacle; d-i, sclerites from surface layer of a lobe; j-n, sclerites from surface layer of the stalk; o, sclerites from coenenchyme of the stalk; p, warts on coenenchymal sclerite from the stalk. Enlargement of a-n and p indicated by 0.1 mm scale at g; that of o by 1.0 mm scale below n.

Sinularia hirta (Pratt, 1903) (fig. 33, pl. 22 figs. 1, 2)

Sclerophytum hirtum Pratt, 1903: 522-524, pl. 30 figs. 23-25.
?*Sclerophytum hirtum*; Thomson & Henderson, 1906: 419-420; Thomson & Simpson, 1909: 5.
?*Sinularia hirta*; Lüttschwager, 1914: 9; Kolonko, 1926: 330-331.
Not *Sinularia hirta*; Tixier-Durivault, 1951: 65-71, figs. 72, 79-83; Tixier-Durivault, 1966: 192-195, figs. 187-189; Tixier-Durivault, 1970a: 252-253; Verseveldt, 1970b: 210-212, figs. 1, 2, pl. 1.

I examined Pratt's holotype (BMNH no. 1936.5.12.4), represented in her pl. 30 fig. 23. The enlargement of this drawing is about × 1.4. Our pl. 22 figs. 1, 2 show the colony at natural size.

The polyps protrude above the surface of the lobes like discs, 0.25 mm high and about 0.70 mm in diameter; they have eight radiating grooves caused by the tentacles being curved inward. The polyps are close-set, the centres are 0.70 mm apart (at least at the summit of the lobes; Pratt gives 1 to 1.5 mm; the distance may be greater more basally). In the narrowing just under the tentacles there is a crown of transversely placed, weakly spined spindles, 0.20 to 0.26 mm long. This crown, two to three rows deep, is superposed by eight points, each consisting of a number of slender clubs, 0.09 to 0.16 mm long (fig. 33a, b). In the distal parts of the tentacles lie scales, 0.05 to 0.08 mm long (fig. 33c).

The surface layer of the lobes contains clubs, varying in length from 0.08 to 0.34 mm. With regard to their shape and size three types can be distinguished:

(1) Small clubs, 0.08 to 0.10 mm long. The heads consist of numerous pointed or blunt-ended processes; the handles are pointed or irregularly branched, and bear some blunt spines or tiny warts (fig. 33d, e);

(2) Clubs, 0.10 to 0.25 mm long, with slender, weakly spined, pointed handles; the heads may have slightly fewer prominences (fig. 33f-h);

(3) Clubs, 0.28 to 0.34 mm long, with tuberculate heads and thick, straight or curved, rodlike handles (fig. 33i).

The clubs present in the surface layer of the sterile stalk are much the same as those in the lobes (fig. 33j-n).

In addition to these clubs the surface layer of lobes and stalk has many small rods, 0.08 to 0.12 mm long, with two girdles of spines or tiny warts and a terminal wartlike thickening; some of them tend to clavate forms.

In the coenenchyme of the lobes and of the stalk lie slender, unbranched, straight or irregularly curved, tuberculate spindles, up to 3.50 mm long and 0.45 mm, occasionally 0.55 mm wide (fig. 33o). The tubercles may be small, spinelike or cone-shaped, with tiny thorns at the summit, or they are larger,

dome-shaped, and crenellated (fig. 33p). These prominences are usually arranged in transverse rows.

In a few respects I disagree with Pratt's description (1903: 523). The tuberculate spicules are not "very densely set with warts". In my mounted slides I did not find any forked and "branched spicules ... similar to those of *Sc. capitale*". I do not know what to do with clubs that "may have from one to four tuberculate heads".

From my re-examination it appears that in some cases the correctness of subsequent identification remains doubtful, in other cases the identifications must be wrong, as in the case of Tixier-Durivault's publications (1951, 1966, 1970a) and that of the present author (1970b). Tixier-Durivault (1951) states the clubs to be up to 0.15 mm long (but in her drawings they are longer: the club pictured in her fig. 80P is 0.30 mm long); the coenenchymal spicules are too wide (up to 1 mm), branched (not in my slides, but Pratt (1903: 523) records branched spicules), and only slightly curved.

A comparison of the drawings of the sclerites in my earlier paper (1970b, figs. 1 and 2) with those of the type in the present paper shows that my identfication in the first-mentioned paper was incorrect.

Geographical distribution. — Naifaro Reef, Fadifolu Atoll (Maldives).

Sinularia inelegans Tixier-Durivault, 1970 (fig. 34, pl. 23)

Sinularia inelegans Tixier-Durivault, 1970b: 177-180, figs. 38-40.

Tixier-Durivault's fig. 38 (1970b) shows part of the holotype; the enlargement of the drawing is × 0.7. The whole, dried colony with its flat, irregular, closely set lobes is pictured in pl. 23.

The surface layer of the lobes has foliaceous clubs of the *leptoclados*-type. The length is 0.07 to 0.10 mm (fig. 34a-d). Longer clubs with a length of 0.10 to 0.13 mm have heads with leaflike prominences or high, rounded knobs (fig. 34e, f). The latter clubs are transitional forms to spiny, rather slender rods, varying in length from 0.12 to 0.28 mm; these rods are unusually numerous (fig. 34g, h). In the surface layer of the stalk there are foliaceous clubs of the same length as those in the lobes, but they are slightly stouter; the heads are sometimes more spiny or warty (fig. 34i-n). Instead of the slender rods there are thick, warty spicules (fig. 34o) and more or less clavate transitional forms (fig. 34p).

The coenenchyme of the lobes contains unbranched, straight or bent spindles, up to 2.00 mm long. In the stalk the same spicules occur, measuring

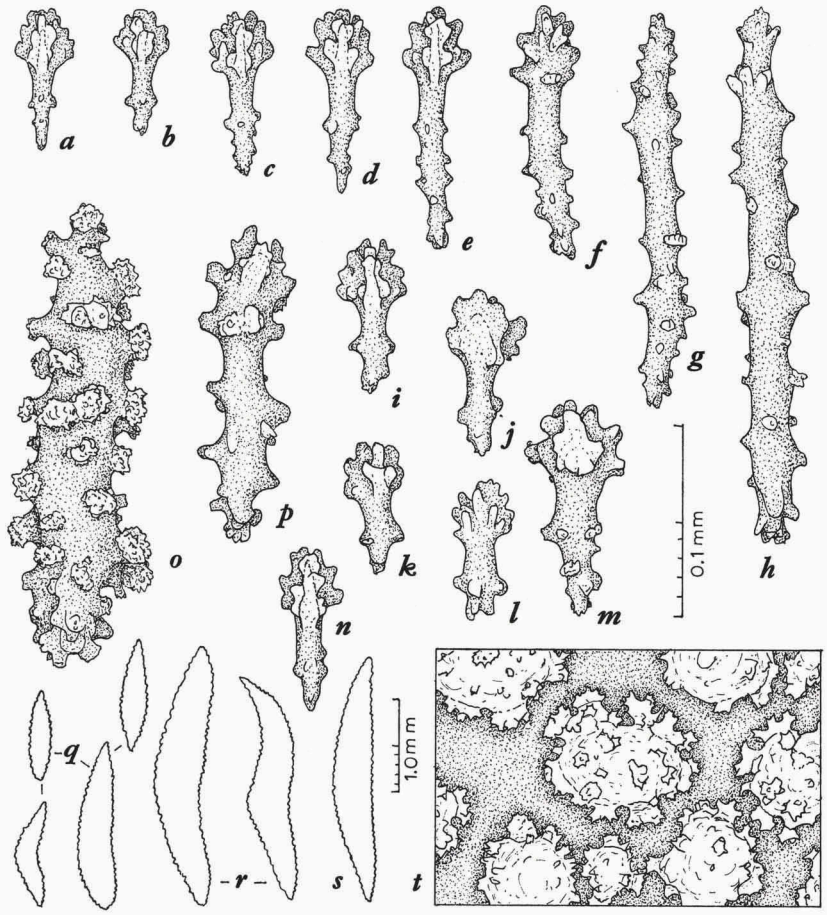

Fig. 34. *Sinularia inelegans* Tixier-Durivault, holotype, MNHN. a-h, sclerites from surface layer of a lobe; i-p, sclerites from surface layer of the stalk; q-s, spicules from interior of the stalk; t, tubercles on coenenchymal spicule from the stalk. Enlargement of a-p and t indicated by 0.1 mm scale at h; that of q-s by 1.0 mm scale at s.

up to 2.75 mm in length (fig. 34q-s). The strongly crenellated warts are 0.06 to 0.08 mm in diameter (fig. 34t); they are irregularly distributed.

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia inexplicita Tixier-Durivault, 1970 (fig. 35, pl. 24 fig. 1, pl. 29 fig. 1)

Sinularia inexplicita Tixier-Durivault, 1970b: 180-181, figs. 41-45.

Tixier-Durivault's fig. 41 (1970b) represents part of the holotype; the enlargement is × 0.85. Pl. 24 fig. 1 shows the whole colony.

The surface layer of the lobes contains stout clubs, 0.17 to 0.26 mm long (fig. 35a-d). The heads are composed of high, blunt spines or simple warts; not infrequently there are widened, foliate processes (fig. 35c). The pointed handles bear spines and small warts. In the surface layer of the sterile stalk

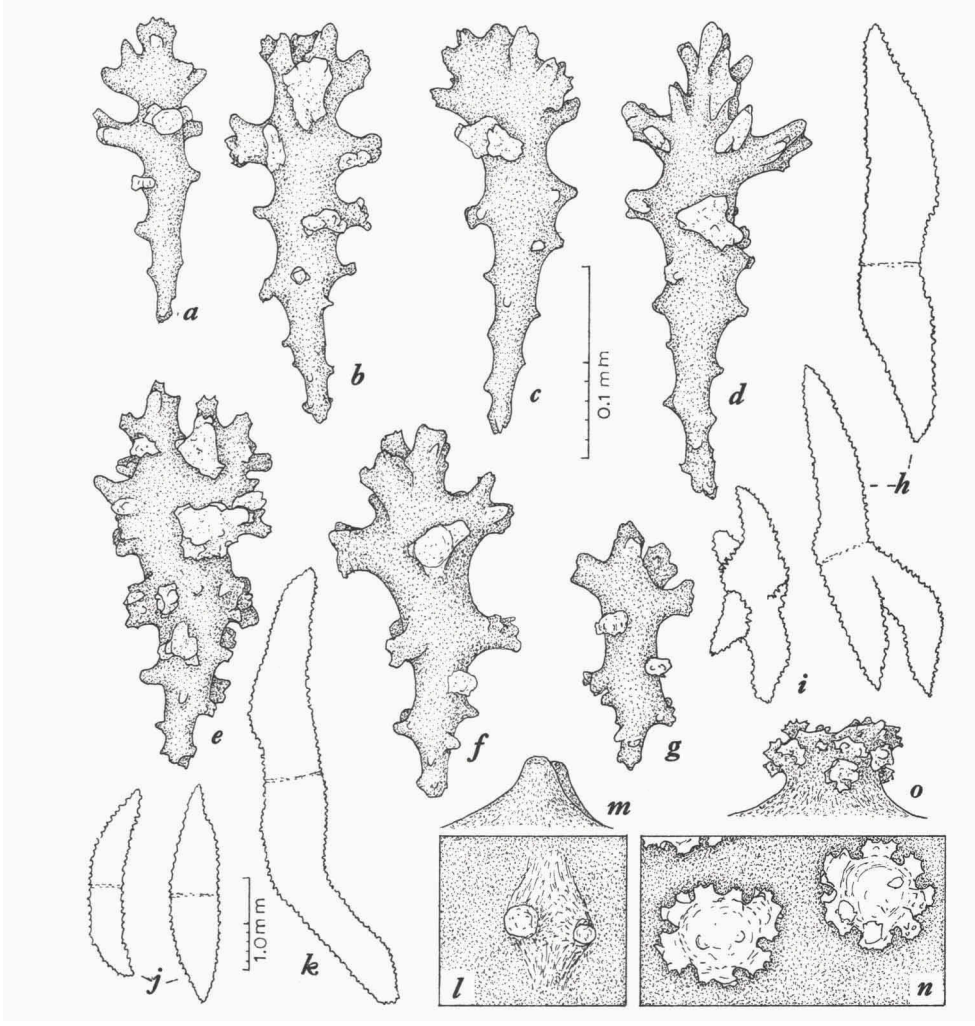

Fig. 35. *Sinularia inexplicita* Tixier-Durivault, holotype, MNHN. a-d, sclerites from surface layer of a lobe; e-g, sclerites from surface layer of the stalk; h, i, sclerites from coenenchyme of a lobe; j, k, sclerites from coenenchyme of the stalk; l-o, processes on coenenchymal sclerites from the stalk: volcano-shaped (l) with side-view (m), and wartlike (n) with side-view (o). Enlargement of a-g and l-o indicated by 0.1 mm scale at c; that of h-k by 1.0 mm scale at k.

the clubs are shorter and wider. The length varies from 0.13 to 0.21 mm; the prominences are slightly coarser (fig. 35e-g).

In the interior of the lobes lie sclerites, up to 4.40 mm long. Most of them are curved, pointed or blunt spindles, or they are irregularly branched (fig. 35h, i). The internal sclerites of the sterile stalk are apparently less branched; they reach 4.80 mm in length, the width is up to 0.88 mm. The widely spaced prominences are either vulcano-shaped, often with two summits (fig. 35l, m), or rather uniform, round, crenellated warts, with a diameter of 0.06 to 0.08 mm (fig. 35n, o).

The captions under Tixier-Durivault's figures 44 and 45 must evidently read "Spicules capitulaires..." instead of "Spicules basilaires...".

To the locality recorded by Tixier-Durivault (1970b: 181), viz., Cape Mui-Thom, Mieu I., Bay of Nha Trang, a new one can be added. A short time ago I received from Professor Willard D. Hartman, Yale University, curator of the Peabody Museum of Natural History, New Haven, Conn., U.S.A., an octocoral, the label of which read: "Great Barrier Reef, off Townsville, 1965; Alpha Helix Expedition". Professor Hartman wrote me: "It is a species from which an interesting zooxanthella has been isolated by Dr. Luigi Provasoli of this university".

An examination showed me that the colony belongs to *S. inexplicita*. A photograph of the colony is added (pl. 29 fig. 1).

Geographical distribution. — Bay of Nha Trang (Vietnam), Great Barrier Reef.

Sinularia inflata Tixier-Durivault, 1970 (fig. 36, pl. 22 fig. 3)

Sinularia inflata Tixier-Durivault, 1970a: 268-270, figs. 111-113.
Sinularia renei Tixier-Durivault, 1970a: 282, figs. 133-135.

Since the sterile stalk is practically absent, the holotype almost entirely consists of a capitulum, which is composed of some stout lobes (lobules). The enlargement of Tixier-Durivault's fig. 111 is × 0.9. Pl. 22 fig. 3 shows the same colony.

The surface layer of the lobes contains clubs, usually 0.13 to 0.17 mm long (fig. 36c-e), but some are shorter, 0.10 to 0.13 mm (fig. 36a, b), others are longer, up to 0.21 mm (fig. 36f). In most cases the head bears a central wart. The pointed handle has spines. Still longer, more or less clavate sclerites, averagely 0.25 mm long, are transitional forms to normal spindles.

The coenenchyme of the lobes has straight or weakly curved, unbranched spindles, up to 2.80 mm long; they have an indistinct median constriction (fig. 36g-i). The prominences are truncated cones (fig. 36k), often with a few tiny processes on the edge of the flat summit (fig. 36j).

The sterile stalk being nearly absent, a reliable description of its spiculation is impossible.

A comparison with the type of *S. renei* Tixier-Durivault (1970a: 282) revealed that there is no essential difference between the two species. The shape of the lobes and the spiculation are the same. According to Tixier-Durivault in *S. inflata* the coenenchymal spicules have a length of up to 2.36 mm and in *S. renei* up to 3.20 mm, but in my mounted slides the length is 2.80 and 2.60 mm, respectively. A further but perhaps adventitious circumstance is that in both type specimens the basal stalk is absent.

Geographical distribution. — New Caledonia.

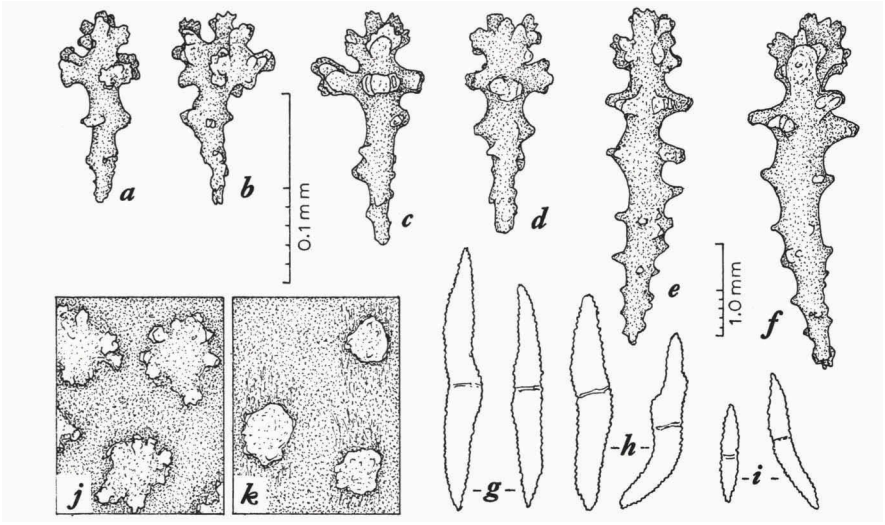

Fig. 36. *Sinularia inflata* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-i, spicules from interior of a lobe; j, k, tubercles on internal spicule from a lobe. Enlargement of a-f and j, k indicated by 0.1 mm scale at b; that of g-i by 1.0 mm scale at e.

Sinularia intacta Tixier-Durivault, 1970 (fig. 37, pl. 21 fig. 2)

Sinularia intacta Tixier-Durivault, 1970a: 271, figs. 114-116.

The enlargement of the holotype in Tixier-Durivault's fig. 114 (1970a) is × 0.8. Pl. 21 fig. 2 shows the same colony.

The surface layer of the lobes contains many small leaf-clubs. The smallest ones look like the *leptoclados*-type (fig. 37a, b) and their length varies from 0.08 to 0.09 mm. Longer ones (0.10 to 0.12 mm) usually have rather wide, more or less cylindrical shafts. The heads are sometimes weakly developed (fig. 37c-e). Still longer clubs, 0.12 to 0.25 mm long, have heads composed of more or less spine-shaped or wartlike processes (fig. 37f-h). The clubs

in the surface layer of the stalk are coarser and wider than those in the lobes. They have the same length, viz., 0.08 to 0.25 mm; the processes composing the heads are less foliate, and more wartlike (fig. 37i-n).

The coenenchymal sclerites in the lobes and in the stalk are straight or curved, rarely branched spindles, up to 2.50 or 2.80 mm long and 0.50 mm wide (fig. 37o, p). The warts, which are sometimes arranged in transverse rows, have diameters of up to 0.075 mm, but in a transverse direction they may be bigger (fig. 37q).

Geographical distribution. — New Caledonia.

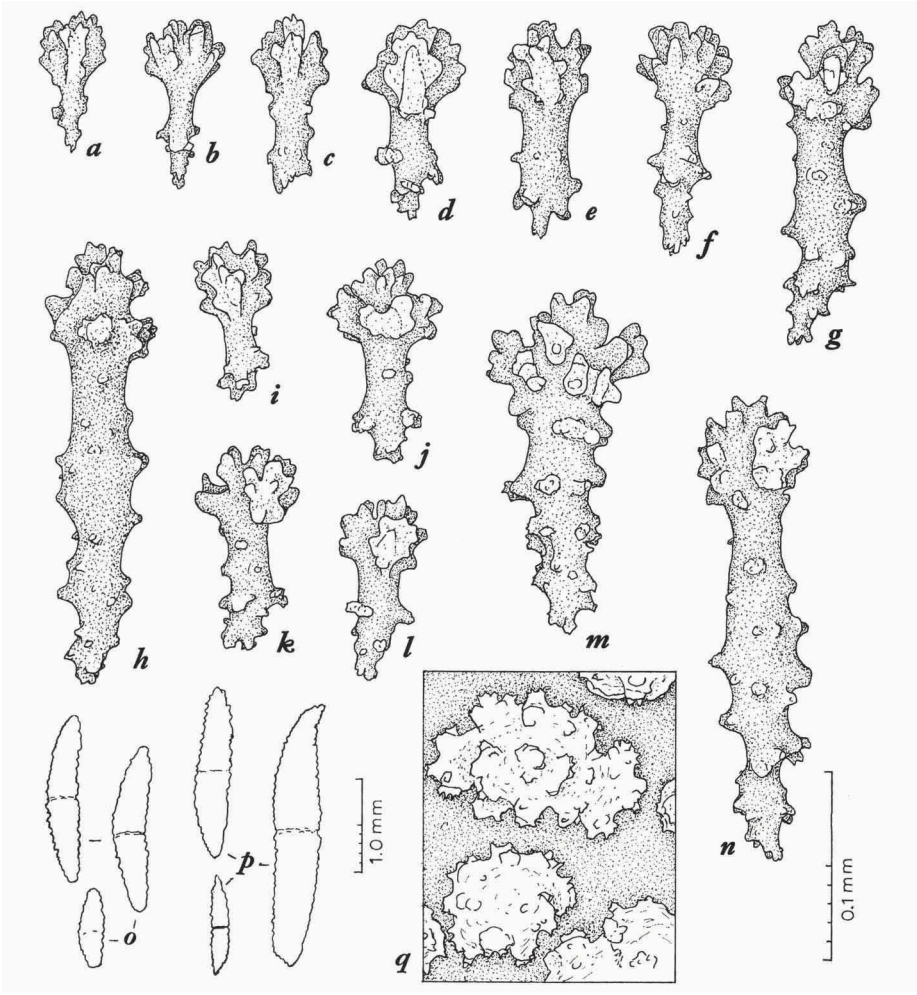

Fig. 37. *Sinularia intacta* Tixier-Durivault, holotype, MNHN. a-h, sclerites from surface layer of a lobe; i-n, sclerites from surface layer of the stalk; o, p, spicules from interior of the stalk; q, warts on coenenchymal spicule from the stalk. Enlargement of a-n and q indicated by 0.1 mm scale at n; that of o, p by 1.0 mm scale at p.

Sinularia leptoclados (Ehrenberg, 1834) (fig. 38)

Lobularia leptoclados Ehrenberg, 1834: 58.
Alcyonium leptoclados; Klunzinger, 1877: 26-27, pl. 1 fig. 7a-d; Burchardt, 1903: 661-663, pl. 54 fig. 6, pl. 56 fig. 4.
Sclerophytum herdmani Pratt, 1905: 253-254, pl. 2 figs. 8, 9.
Sinularia leptoclados; Lüttschwager, 1914: 3-4; Kolonko, 1926: 305-309, pl. 2 fig. 2; Thomson & Dean, 1931: 45-47, pl. 11 fig. 5, pl. 21 figs. 6, 9; Roxas, 1933: 350-351, pl. 2 fig. 8; Tixier-Durivault, 1951: 124-129, figs. 173-175, 179-181; Tixier-Durivault, 1966: 218, 222-225, figs. 212-214.
Sinularia leptoclados var. *gonatodes* Kolonko, 1926: 309-310, pl. 2 fig. 1; Roxas, 1933: 351 (the same data as in Kolonko).
Not *Sinularia gonatodes*; Tixier-Durivault, 1945: 249; Tixier-Durivault, 1951: 135-137, figs. 177, 187-191; Tixier-Durivault, 1966: 229-230, figs. 218-220; Verseveldt, 1974a: 5-8, pl. 2, text-figs. 2, 3; Verseveldt, 1977c: 174 (listed only).

The shape of the colony and of its lobes has sufficiently been described by previous authors.

The shape and the size of the clubs in the surface layer of lobes and stalk

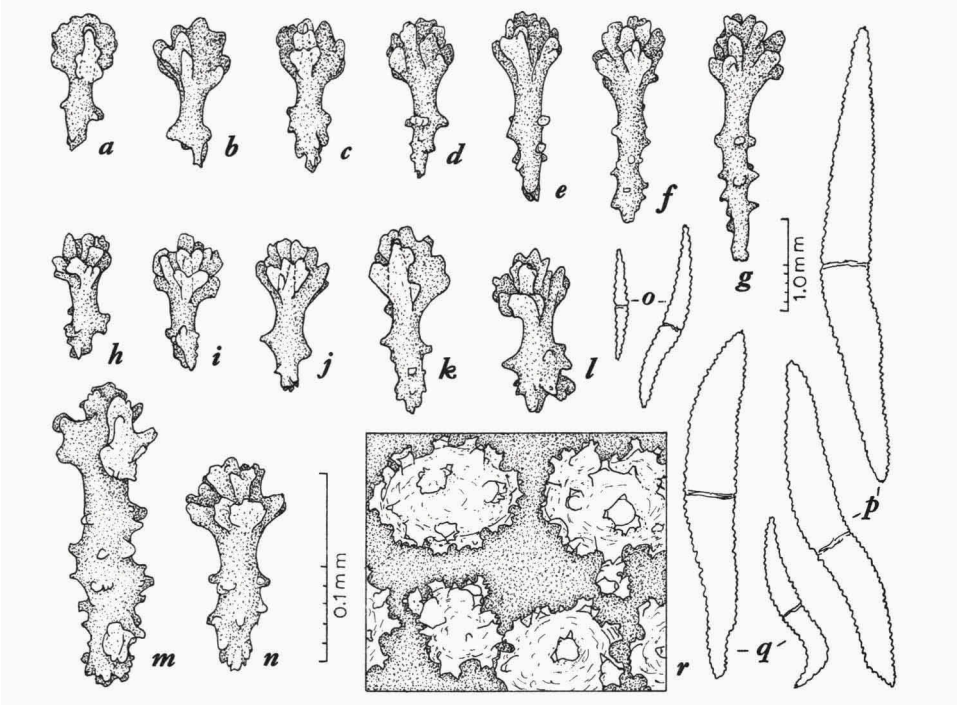

Fig. 38. *Sinularia leptoclados* (Ehrenberg), specimen from the Red Sea. a-g, sclerites from surface layer of a lobe; h-n, sclerites from surface layer of the stalk; o-q, sclerites from coenenchyme of the stalk; r, tubercles on coenenchymal spicule from the stalk. Enlargement of a-n and r indicated by 0.1 mm scale at n; that of o-q by 1.0 mm scale at g.

are also well-known. Nevertheless I give drawings of them, especially to show what is meant by a "foliaceous head" (fig. 38). To show the shape of the "foliaceous" prominences of the club-head photographs of the clubs are given, seen under different angles (pl. 1). Practically the same form is found with other *Sinularia* species. I name it the *leptoclados*-type; see also the General Remarks in this paper (p. 5).

For the rest a description of the sclerites of *S. leptoclados* is unnecessary.

Kolonko (1926: 309) established the new variety *gonatodes*. According to his diagnosis the variety has the following differential characters (commented on by the present author):

(1) The branches (lobes) are not so divergent as in the typical species. In view of the wide variability in the shape of the lobes of *S. leptoclados* this lesser degree of divergence cannot be a clear distinguishing feature.

(2) According to Kolonko the same small clubs are met with in the variety as in the type, so there is no difference.

(3) In the variety there are slightly stouter clubs, averagely 0.125 mm long; in the type such clubs are 0.08 to 0.15 mm long; in this respect there is no difference either.

(4) In the type the heads of these clubs have exactly the same shape as the smaller clubs, whereas in the variety the heads have the form of a knotty mass of processes grown together. I found, however, that in typical *leptoclados* specimens, too, such clubs with knotty heads are not uncommon.

(5) In the surface layer of both type and variety slender rods and spindles, 0.25 mm long, are found. And in the type, too, one end of such a spicule may be slightly thickened by an accumulation of tubercles.

(6) In the variety the coenenchymal spicules are 1 to 3 mm long (in the type up to 7 mm), but Kolonko himself found spindles of only 3 mm long in his specimens no. 1, 7 and 8 (p. 307), and even no more than 2 mm in his specimens 13 and 14 (p. 309).

(7) The warts, which cover the coenenchymal spicules, do not show any distinct difference.

(8) The colony of the variety is weak, especially the lobes are flexible, but Kolonko's specimens 6 and 9 (p. 307) are also weak.

Moreover, I examined Kolonko's holotype of *S. leptoclados* var. *gonatodes* (ZMB no. 6495), and I compared the sclerites with those of *S. leptoclados* (forma typica) from the Red Sea. I could not find any essential difference. In the stalk of the variety the coenenchymal spicules appear to have a length of up to 4 mm.

Summarizing I conclude that the variety *gonatodes* must be merged with the type species *S. leptoclados*.

Tixier-Durivault (1951, 1966) and the present author (Verseveldt, 1974a) attributed specimens from the Red Sea and the Seychelles to *S. gonatodes*. These identifications are incorrect; the specimens described do not agree with *S. leptoclados*.

Geographical distribution. — Widespread in the Red Sea and in the warm Indo-West Pacific area.

Sinularia lochmodes Kolonko, 1926 (figs. 39, 40, pls. 25-27)

Sinularia lochmodes Kolonko, 1926: 300-303, pl. 1 figs. 1-3; Roxas, 1933: 349 (not examined by Roxas himself); Macfadyen, 1936: 37-38, pl. 2 fig. 2; Tixier-Durivault, 1945: 243; Tixier-Durivault, 1951: 103-105, figs. 137, 143-147; Tixier-Durivault, 1970a: 282-283; Tixier-Durivault, 1970b: 186-187; Utinomi, 1977: 28.

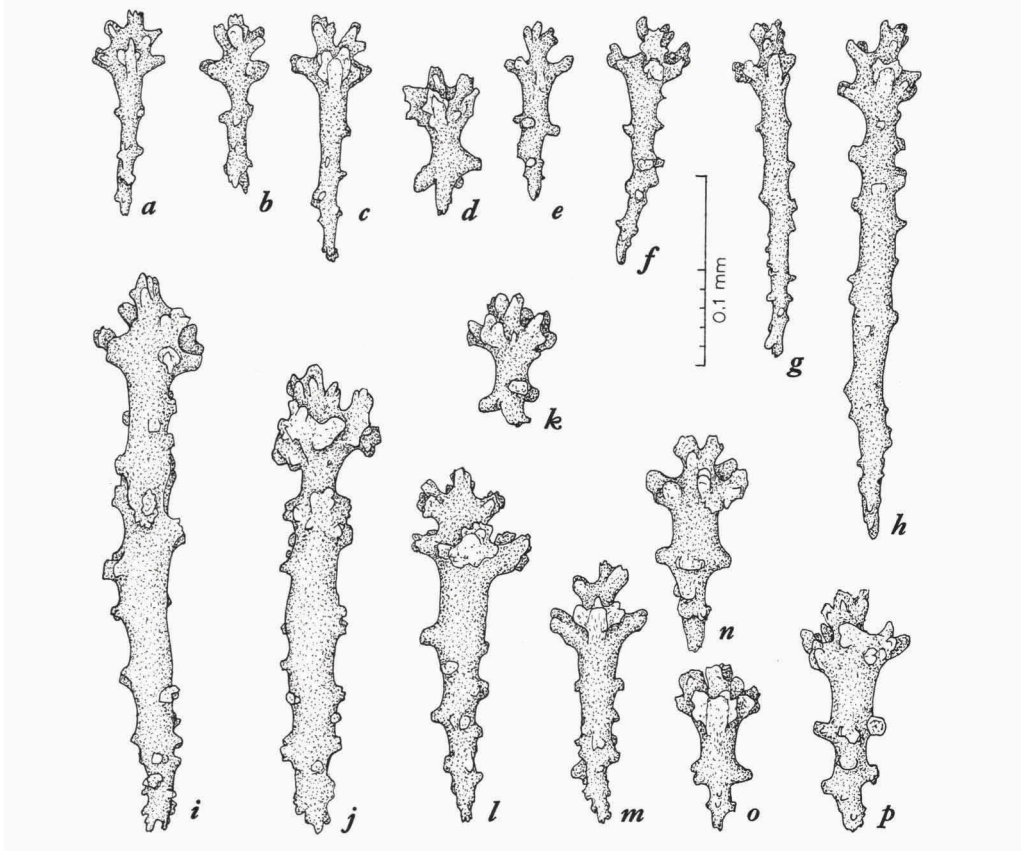

Fig. 39. *Sinularia lochmodes* Kolonko, type specimen, ZMB no. 6497. a-h, sclerites from surface layer of a lobe; i-p, sclerites from surface layer of the sterile stalk. All enlargements are the same; scale 0.1 mm.

Sinularia partita Tixier-Durivault, 1970a: 277-279, figs. 127-129.
Sinularia dumosa Tixier-Durivault, 1970b: 151, 154-155, figs. 18-22.
Sinularia ramulosa Tixier-Durivault, 1970b: 205-206, figs. 61-65.

I re-examined three colonies described by Kolonko, 1926. The colonies, labelled ZMB nos. 6497 and 6499, have been indicated as "types" (by Kolonko?). The specimen no. 6497 (pl. 25) is almost certainly Kolonko's fifth colony (1926: 303). Pl. 26 shows part of the big colony no. 6499; most probably it is Kolonko's sixth colony. His seventh specimen has been registered as no. 6498.

The lobes and digitiform lobules show small differences. In specimen no. 6497 the lobules are slightly stouter, not so densely arranged, and not so strongly branched as in specimen no. 6499. In specimen no. 6498 the lobules are short, rounded, about 3 mm wide.

In the spiculation they all agree with each other. In the specimen no. 6497 the surface layer of the lobes contains clubs, 0.08 to 0.11 mm long (fig. 39a, b, e). The heads usually consist of a few blunt spines directed obliquely upwards, and, below these, there is a girdle of blunt spines or simple warts, standing perpendicular to the handle. The handles are slender, pointed or blunt, sometimes bifurcated; they bear a few blunt processes. Longer clubs, up to 0.28 mm long (fig. 39c, f-h) are common. Sometimes short clubs, about 0.08 mm long, have a wide, short handle with a few prominences at the base (fig. 39d).

In the sterile stalk the clubs are wider; the length is the same (fig. 39i-p). Both in lobes and stalk there are clubs with a kind of central wart (fig. 39e, m). Despite this I refer the species to Group III.

In the coenenchyme of the lobes and of the stalk lie spindles, up to 5 mm long. Most of them are irregularly curved; in the lobes they may be bifurcated at one end. The prominent warts are voluminous, round, crenellated. The diameter is usually 0.07 to 0.09 mm, but bigger warts with diameters of 0.10 or 0.11 mm are not infrequent.

Tixier-Durivault (1970a and b) described three new species of *Sinularia*, viz., *S. partita, S. dumosa* and *S. ramulosa.* After a re-examination of the specimens in question I found that they all must be referred to *S. lochmodes*, this name having priority.

There is no valid reason to maintain *S. partita* Tixier-Durivault, 1970a. The part of the colony represented in her fig. 127 (the specific name *partita* is here and in the caption of fig. 128 misspelt as *partia*) suggests a different mode of branching, but the holotype of *S. partita* has quite the same branching and fingerlike lobules as *S. lochmodes.* The spiculation is also the same.

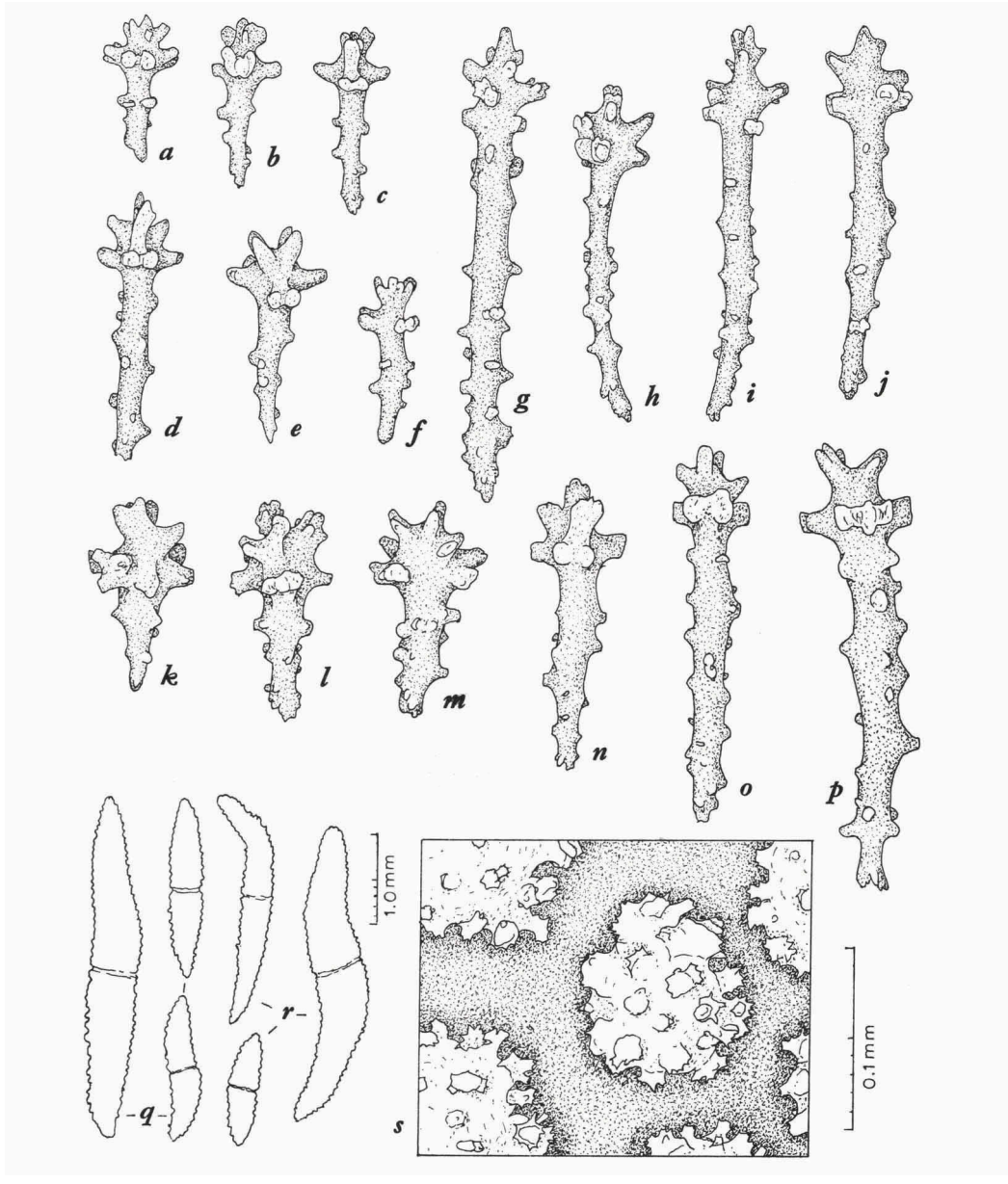

Fig. 40. *Sinularia lochmodes* Kolonko (= "*S. dumosa*" Tixier-Durivault, 1970b), MNHN. a-j, sclerites from surface layer of a lobe; k-p, sclerites from surface layer of the stalk; q, r, spicules from coenenchyme of the stalk; s, warts on coenenchymal spicule from the stalk. Enlargement of a-p and s indicated by 0.1 mm scale below p; that of q, r, by 1.0 mm scale at r.

S. dumosa Tixier-Durivault, 1970b, has just the same branching as *S. lochmodes* (*lochmodes*, Greek, = bushy; *dumosa*, Latin, = covered with thorn-bushes). Pl. 27 shows the holotype of *S. dumosa* Tixier-Durivault at natural size. This photograph bears a remarkable resemblance to Kolonko's specimen ZMB no. 6499 (see pl. 26). The sclerites, too, completely agree (fig. 40). In Tixier-Durivault's description some inaccuracies are found. The big warts on the coenenchymal sclerites are hardly ever arranged in transverse rows. The heads of the clubs in the surface layer of the stalk are not foliaceous, though the prominences sometimes seem to be flattened laterally. The spindles in the lobes are not 0.06 to 0.10 mm wide and 0.51 to 0.57 mm long (!), but 0.65 mm wide and 3.20 mm long. Possibly the spindles are even wider and longer, but I was unable to establish this with certainty, because I had only a small piece at my disposal.

S. ramulosa Tixier-Durivault, 1970b, is also nothing else but *S. lochmodes*. I regret to say, that in Tixier-Durivault's description annoying mistakes again occur. The rods in the surface layer of the lobes (her fig. 64E, I) are not 2.15 to 2.38 mm long, but averagely 0.40 mm. The heads of the clubs are not foliaceous.

Consequently the specific names *partita, dumosa* and *ramulosa* must be abandoned.

Geographical distribution. — Mindoro, Palawan (Philippines), Low Is. (Great Barrier Reef), Sunda Strait (Indonesia), New Caledonia, Bay of Nha Trang (Vietnam), Ryukyu Archipelago.

Sinularia macrodactyla Kolonko, 1926 (fig. 41, pl. 28)

Sinularia macrodactyla Kolonko, 1926: 328-329, pl. 3 fig. 4; Roxas, 1933: 354-355, pl. 2 fig. 9; Tixier-Durivault, 1945: 57; Tixier-Durivault, 1951: 23-26, figs. 8, 17-20; Tixier-Durivault, 1966: 172-176, figs. 166-168; Verseveldt, 1974a: 8-10, figs. 4, 5, pl. 3; Verseveldt, 1977b: 3 (listed only).

Pl. 28 shows Kolonko's holotype (ZMB no. 6501) at natural size. The same colony has been pictured by Kolonko (1926, pl. 3 fig. 4); the enlargement of this photograph is × 0.5.

The surface layer of the lobes contains clubs, 0.07 to 0.11 mm long (fig. 41a-g). The heads consist of irregularly placed, wartlike prominences. The handles are pointed and bear blunt spines. The clubs in the surface layer of the sterile basal part are 0.10 to 0.17 mm long (fig. 41h-l). The wide heads and handles are covered with many warts (Kolonko, 1926, p. 328: blunt, irregular spines, grouped together in dense bunches). Smaller clubs, 0.07 to 0.09 mm long, are also common (fig. 41m, n).

The internal sclerites are broad spindles and irregularly curved forms derivable from spindles; they are up to 3.60 mm long and 1.00 mm wide (fig. 410-r). There is an occasional bifurcation at one end. The spindles in the lobes have conical prominences or simple warts. Those in the disc are densely covered with big warts, up to 0.10 or 0.11 mm in diameter (fig. 41s, t).

Geographical distribution. — Philippines, Red Sea, Aldabra I. (N. of Madagascar), Fiji Is.

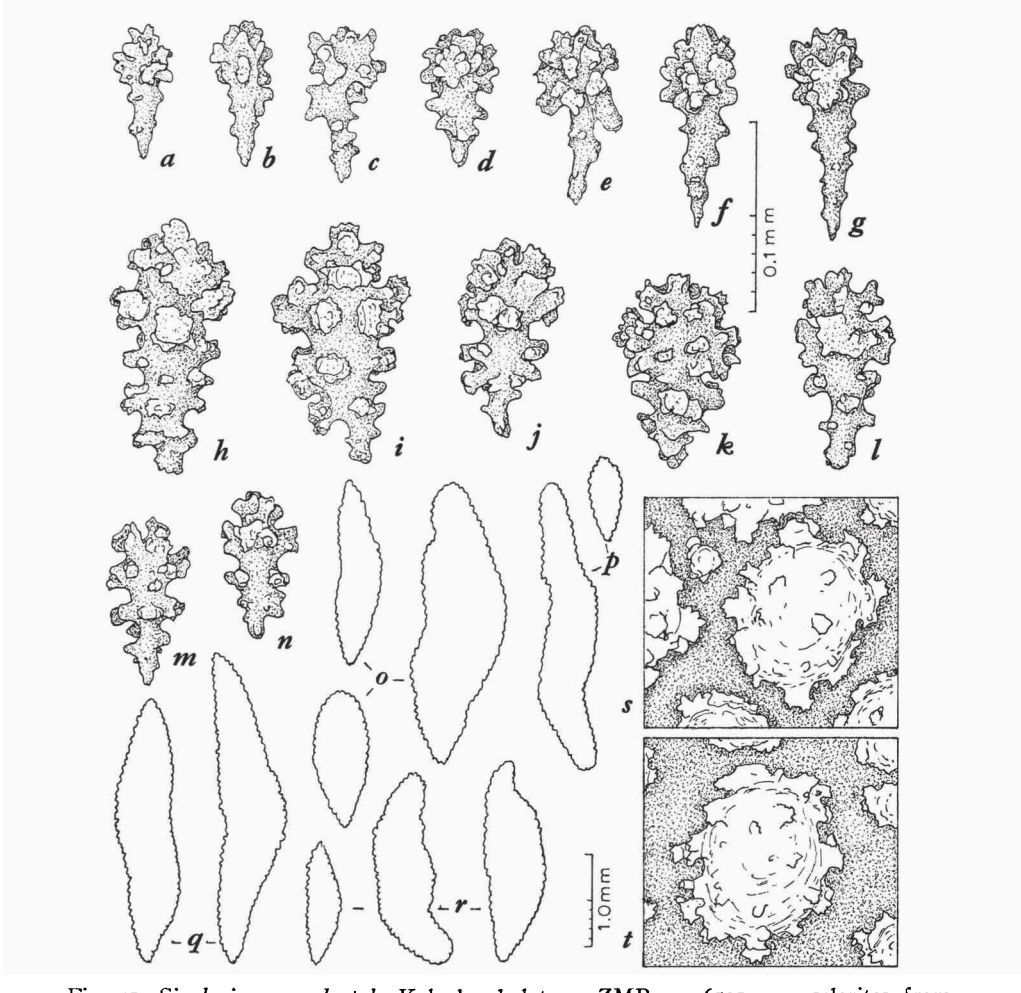

Fig. 41. *Sinularia macrodactyla* Kolonko, holotype, ZMB no. 6501. a-g, sclerites from surface layer of a lobe; h-n, sclerites from surface layer of the basal part of the colony; o-r, sclerites from coenenchyme of basal part; s, t, warts on coenenchymal sclerites from base. Enlargement of a-n, s and t indicated by 0.1 mm scale at f; that of o-r by 1.0 mm scale at right of r.

Sinularia macropodia (Hickson & Hiles, 1900) (fig. 42, pl. 21 figs. 3, 4)

Alcyonium macropodium Hickson & Hiles, 1900: 504, pl. 50 figs. 8-10.
Sinularia macropoda; Lüttschwager, 1914: 12; Kolonko, 1926: 332; Tixier-Durivault, 1945: 151; Tixier-Durivault, 1951: 92-95, figs. 110, 125-129; Tixier-Durivault, 1953: 319; Tixier-Durivault, 1966: 201, 204, figs. 195-197; Tixier-Durivault, 1969: 149-150; Tixier-Durivault, 1970a: 285; Tixier-Durivault, 1970b: 187; Utinomi, 1977: 30-31, pl. 4 fig. 1; Verseveldt, 1977c: 181-182, figs. 5, 41a; Verseveldt, 1978: 50 (listed only).

Pl. 21 figs. 3 and 4 show the holotype, which is kept in the University Museum of Zoology, Cambridge, England. Its total height is 48 mm, of

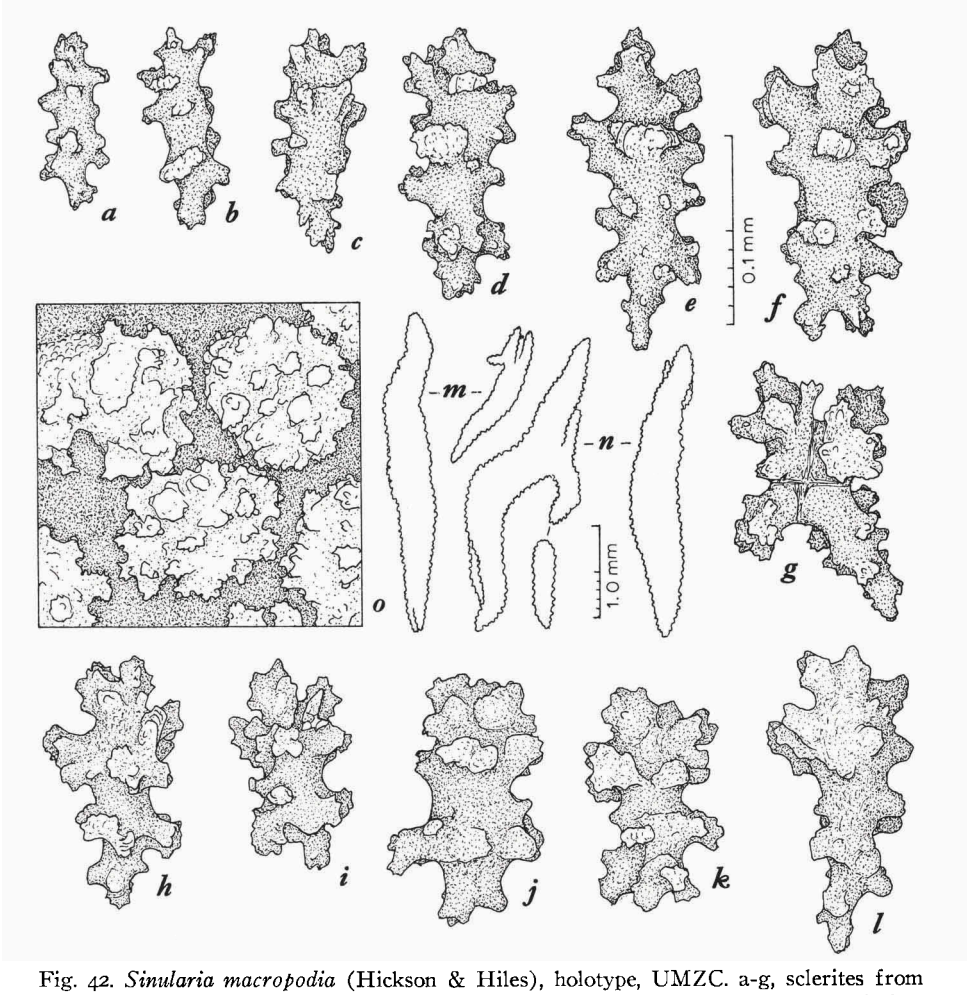

Fig. 42. *Sinularia macropodia* (Hickson & Hiles), holotype, UMZC. a-g, sclerites from surface layer of a lobe; h-l, sclerites from surface layer of the stalk; m, n, sclerites from interior of the stalk; o, warts on coenenchymal sclerite from the stalk. Enlargement of a-l and o indicated by 0.1 mm scale at e; that of m, n by 1.0 mm scale at n.

which 28 to 42 is taken up by the sterile stalk. The colony is flattened laterally. The stalk is 20 × 15 mm wide, the capitulum has dimensions of 42 × 20 mm. The latter consists of some lobes, up to 12 mm high. They branch into lobules, which are round, short, fingerlike, up to 7 mm long and 3 to 4.5 mm wide. The lobes and lobules are stiff but flexible, the sterile stalk is stiff but weak. The colour of lobes and lobules is brown, that of the stalk is greyish brown.

Some polyps are not entirely retracted. They protrude above the surface for a distance of about 0.40 mm. Others are more retracted, forming low domes. They measure 0.60 mm in diameter, the centres are 0.80 to 1.00 mm apart. The tentacles are curved inward. At their base the armature consists of some longitudinally arranged, smooth, rod-shaped spicules, 0.05 to 0.10 mm long.

The surface layer of the lobes is very thin with irregularly distributed sclerites; in some places they are very crowded, in others they are absent. Some of the sclerites are clavate (fig. 42e), others are short, irregular rods (fig. 42a-d, f). They all have high prominences, usually warts. The length of the sclerites is 0.10 to 0.18, rarely up to 0.22 mm. In many cases the base of the handle is bifurcated (fig. 42f); crosses are common (fig. 42g). In the surface layer of the stalk the same sclerites occur, but here, too, they are not equally distributed: in brown places and in the longitudinal grooves they are less numerous than in the grey areas. They may be slightly wider, the prominences are fantastically shaped, often high, compound warts (fig. 42h-l).

The coenenchyme of lobes and stalk contains irregularly curved rods, up to 3.60 mm long and 0.50 mm wide, usually blunt-ended, often furcated at one end, or bearing side-branches (fig. 42m, n). Most of them are covered with medium-sized warts, 0.045 to 0.060 mm in diameter, but bigger warts are not rare (fig. 42o); in this case they are densely placed.

The descriptions of subsequent authors do not agree in all details with the data mentioned above. Slender clubs with a length of 0.30 mm and more are recorded, but in the holotype I could not find these. For the present, however, I regard the identifications as correct.

Geographical distribution. — Blanche Bay (New Britain), Fiji Is., Madagascar, Mauritius, Gambier Is., New Caledonia, Bay of Nha Trang (Vietnam), Okinawa (Ryukyu Archipelago), Great Barrier Reef, Guam.

Sinularia manaarensis sp. nov. (fig. 43, pl. 16 fig. 3)

This new species is established for a small colony from the Gulf of Manaar, near Ceylon (BMNH register no. 1936.5.12.2). According to the enclosed label the specimen was collected by Herdman in 1902; it was recorded as "type" by Pratt and identified with *S. gardineri* (see Pratt, 1905: 255).

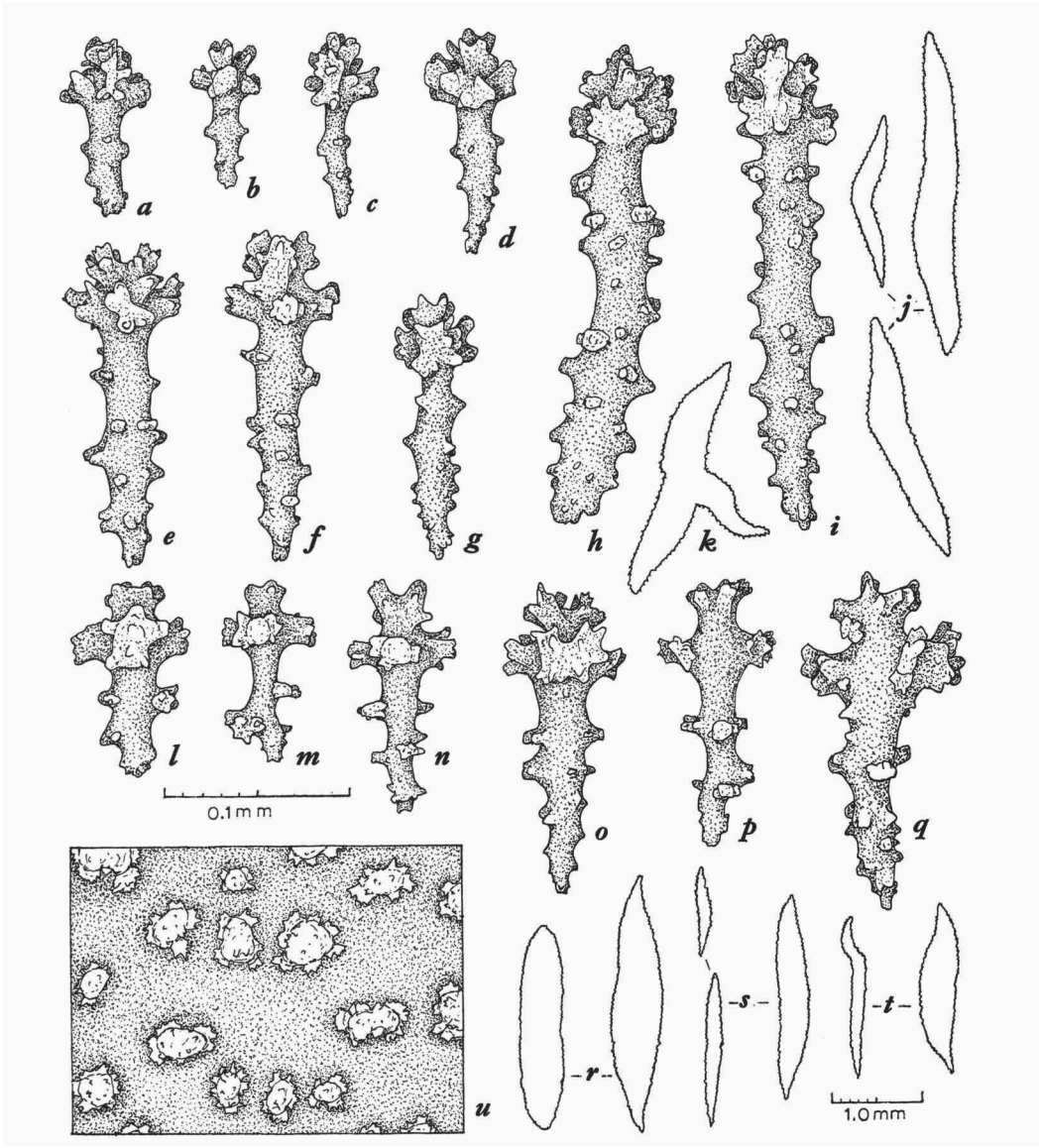

Fig. 43. *Sinularia manaarensis* sp. nov., holotype, BMNH no. 1936.5.12.2. a-i, sclerites from surface layer of a lobe; j, k, sclerites from interior of a lobe; l-q, sclerites from surface layer of the stalk; r-t, sclerites from interior of the stalk; u, tubercles on coenenchymal sclerite from the stalk. Enlargement of a-i, l-q and u indicated by 0.1 mm scale at m; that of j, k, r-t by 1.0 mm scale at t.

The colony measures 24 mm in height. It consists of a curved sterile stalk and some short, fingerlike or knoblike lobes (pl. 16 fig. 3).

The surface layer of the lobes contains: (1) clubs 0.08 to 0.18 mm long, with a tuberculate head, sometimes with an inconspicuous central wart (fig. 43a-g), and (2) clubs up to 0.29 mm long, with warted heads and handles, the latter are rodlike (fig. 43h, i). The clubs in the surface layer of the stalk are quite unlike those in the lobes. Most of them have heads with a distinct central wart at the tip and a zone of lower tubercles (fig. 43l-q). The length of these clubs varies from 0.10 to 0.17 mm.

The interior of the lobes and of the stalk is packed with pointed, sometimes branched spindles, in the lobes up to 3.30 mm long, in the stalk up to 2.70 mm, but these measurements are of little value, because the specimen examined was very small. The width of the spindles is up to 0.50 mm (fig. 43j, k, r-t). The shape of their small prominences is important: they have fair-sized crenelles (fig. 43u); the diameter is 0.03 to 0.04 mm (crenelles included). The prominences are distant, and irregularly distributed or arranged in girdles.

From this description it follows that this specimen from Ceylon is not identical with *S. gardineri*. Important differences are listed in the following table.

S. gardineri	*S. manaarensis*
1. Clubs in lobes: wide, coarse heads.	1. Heads less tuberculate.
2. Clubs in stalk: wide, densely tuberculate heads, without central wart, up to 0.26 mm long.	2. Distinct central wart, up to 0.17 mm long.
3. Coenenchymal sclerites: often blunt-ended, up to 0.65 or 0.75 mm wide.	3. Pointed, slender spindles, up to 0.50 mm wide.
4. Processes on coenenchymal sclerites: big hillocks, 0.05-0.06 mm in diameter, very weakly crenellated.	4. Tiny prominences, 0.03-0.04 mm in diameter, strongly crenellated.

Possible differences in the structure of the colonies could not be examined.

Geographical distribution. — Gulf of Manaar (Ceylon).

Sinularia microclavata Tixier-Durivault, 1970 (fig. 44, pl. 29 fig. 2)

Sinularia microclavata Tixier-Durivault, 1970a: 266-268, figs. 108-110.

The colony represented by Tixier-Durivault (1970a, fig. 108) and that by the present author (pl. 29 fig. 2) is probably the same specimen, but seen from different sides; the height is 50 mm. The enlargement of Tixier-Durivault's drawing is about × 1.0.

In the surface layer of the lobes there are small clubs, 0.08 to 0.13 mm long (fig. 44a-d). In many cases the heads are composed of a central wart and, below it, a whorl of spines or wartlike prominences. The handles are

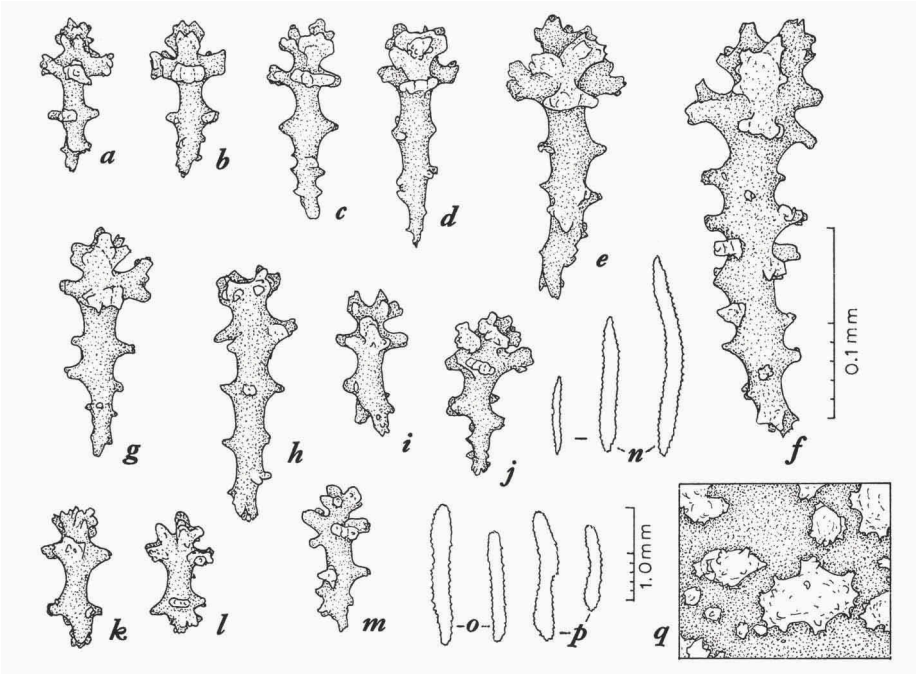

Fig. 44. *Sinularia microclavata* Tixier-Durivault, type specimen, MNHN. a-f, sclerites from surface layer of a lobe; g-m, sclerites from surface layer of the stalk; n, spicules from coenenchyme of a lobe; o, p, spicules from interior of the stalk; q, warts on coenenchymal sclerite of the stalk. Enlargement of a-m and q indicated by 0.1 mm scale at f; that of n-p by 1.0 mm scale at p.

more or less pointed, and bear some spines. In addition to these clubs there are stouter ones, up to about 0.23 mm long. The heads consist of irregularly placed warts and blunt spines (fig. 44e, f). The majority of the small clubs in the sterile stalk, 0.06 to 0.08 mm long, have more cylindrical handles (fig. 44i-m), not so pointed as those in the lobes. Larger clubs, 0.12 to 0.14 mm long, occur too (fig. 44g, h).

The internal sclerites in lobes and sterile stalk are slender, bluntly pointed, usually curved, rarely branched rods; those in the lobes attain a length of 2.30 mm (fig. 44n); those in the sterile stalk are shorter (fig. 44o, p). The width is up to 0.23 mm (processes included), but the spicules in the sterile stalk often have thickened ends, so the middle part is slightly narrower. The prominences are rather high warts, irregularly distributed, more accumulated

in the thickened ends, 0.03 to 0.04 mm in diameter, but many are much smaller (fig. 44q).

I suspect that *S. microclavata* is identical with *S. mayi* Lüttschwager, 1914 (= *S. polydactyla* (part.), low form, Burchardt, 1903). The capitulum of both species consists of crowded, low, conical, rounded lobes (cf. our pl. 29 fig. 2 of *S. microclavata* with Burchardt's pl. 56 fig. 8 and Kolonko's (1926) pl. 3 figs. 1-3). The sclerites also distinctly agree with each other. Only a re-examination of Burchardt's and/or Kolonko's specimens can bring a definitive solution. If it appears that the two species are indeed the same, the specific name *microclavata* must be abandoned.

Geographical distribution. — New Caledonia.

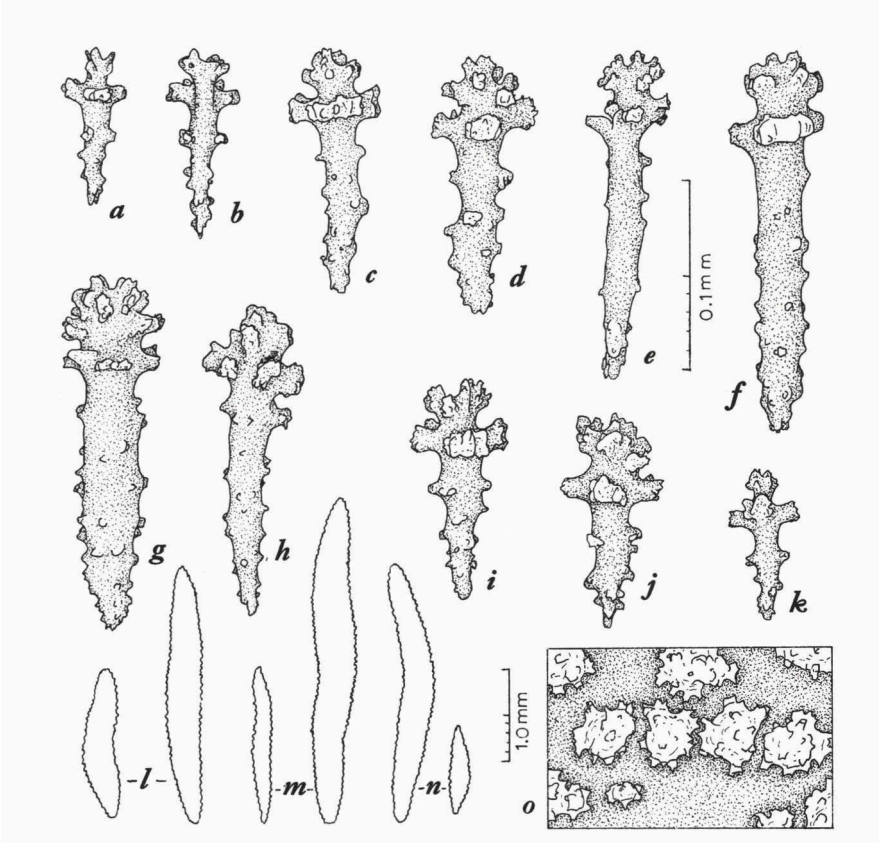

Fig. 45. *Sinularia mira* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-k, sclerites from surface layer of the stalk; l-n, spicules from coenenchyme of the stalk; o, tubercles on coenenchymal spicule from the stalk. Enlargement of a-k and o indicated by 0.1 mm scale at e; that of l-n by 1.0 mm scale at n.

Sinularia mira Tixier-Durivault, 1970 (fig. 45, pl. 29 fig. 4)

Sinularia mira Tixier-Durivault, 1970b: 188-192, figs. 46-49.

The part of the holotype represented by Tixier-Durivault (1970b, fig. 46) is the bottom-left part of the colony, which is shown complete in pl. 29 fig. 4. The enlargement of Tixier-Durivault's drawing is about × 1.0.

The surface layer of the lobes contains clubs, 0.08 to 0.20 mm long (fig. 45a-f). Practically all of them have a head with a central wart; especially in the larger clubs the central wart may be absent. The clubs in the sterile stalk have about the same length, but the handles may be wider, and the central wart is sometimes less distinct (fig. 45g-k).

In the coenenchyme of the lobes and of the stalk straight or curved, unbranched, blunt spindles occur; in the stalk they are longer, up to 3.60 mm (but Tixier-Durivault (l.c.) has 5.00 mm), and those in the lobes are 3.20 mm (fig. 45l-n). The warts are small, up to 0.04 mm in diameter; they are often arranged in transverse rows (fig. 45o).

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia molesta Tixier-Durivault, 1970 (fig. 46, pl. 29 fig. 3)

Sinularia molesta Tixier-Durivault, 1970a: 264-265, figs. 105-107.

On pp. 264 and 265 of Tixier-Durivault's publication (1970a) two different specific names are found. The captions to the figures have *molesta*, but the headline (p. 264, line 7) reads *modesta*. The list of species on p. 174 and the Index at the end of the book have *modesta* too. In the text nothing points to a preference for either of the two names. At my request Mrs. M.-J. d'Hondt, Muséum National d'Histoire Naturelle, Paris, has checked which name is recorded on the labels added to the holotype and the paratypes kept in the Paris Museum. She has informed me that the labels bear the name *Sinularia molesta*. She holds the view that the valid specific name is *molesta*, as given in the captions to the figures.

The holotype has been drawn by Tixier-Durivault (1970a, fig. 105) at natural size. Our pl. 29 fig. 3 shows the same colony attached to a stone; the enlargement is × 1.0.

The surface layer of the lobes has leaf-clubs of the *leptoclados*-type, 0.08 to 0.11 mm long (fig. 46a-e). Larger clubs, 0.15 to 0.26 mm long, have more warty heads (fig. 46f, g). The clubs in the surface layer of the sterile stalk are wider. Those with a length of 0.08 to 0.10 mm have foliate or wartlike processes (fig. 46j, k), the stouter ones, 0.15 to 0.20 mm long, have warty heads and spiny or warty shafts (fig. 46h, i).

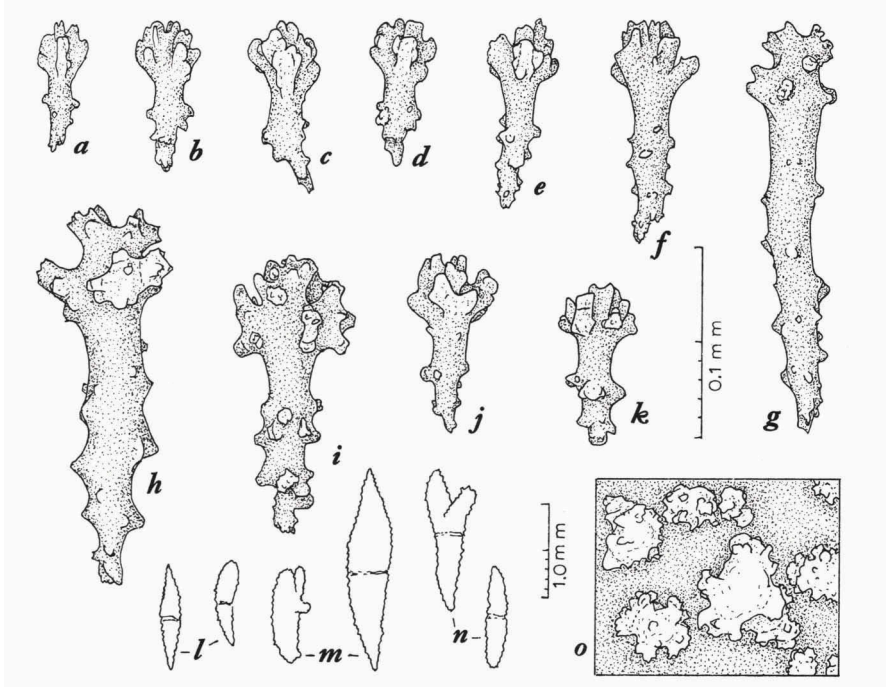

Fig. 46. *Sinularia molesta* Tixier-Durivault, holotype, MNHN. a-g, sclerites from surface layer of a lobe; h-k, sclerites from surface layer of the stalk; l-n, sclerites from interior of the stalk; o, tubercles on coenenchymal sclerite from the stalk. Enlargement of a-k and o indicated by 0.1 mm scale at k; that of l-n by 1.0 mm scale at n.

The coenenchyme of the lobes contains short, massive spindles, up to 2.40 mm long and 0.52 mm wide. They are pointed or blunt-ended, sometimes irregularly branched, and bearing densely placed, medium-sized warts or widely spaced, blunt spines. The spindles in the stalk have about the same length, width, and shape (fig. 46l-n). The crenellated warts, up to 0.06 mm in diameter, are either arranged in girdles or they are irregularly distributed and stand very closely together (fig. 46o).

Geographical distribution. — New Caledonia.

Sinularia mollis Kolonko, 1926 (fig. 47, pl. 24 figs. 2, 3)

Sinularia polydactyla var. *mollis* Kolonko, 1926: 326, pl. 4 figs. 4, 5; Roxas, 1933: 354; Utinomi, 1977: 26.

I examined two colonies kept in the Berlin Museum. First the specimen ZMB no. 6519. The label added to this specimen reads: "Kolonko det. 1918; Palawan; Light 5/12/1913", but in his description Kolonko (1926: 326)

records the Bantayan Islands (off the northwest coast of Cebu, Philippines) as locality and on p. 334 Griffin as the collector. Kolonko pictured this colony on his pl. 4 fig. 4; the enlargement of this photograph is × 0.65. Our pl. 24 fig. 2 shows the same colony at natural size.

The second specimen has register no. 6518. The label records "det. Roxas". The colony is represented in pl. 24 fig. 3.

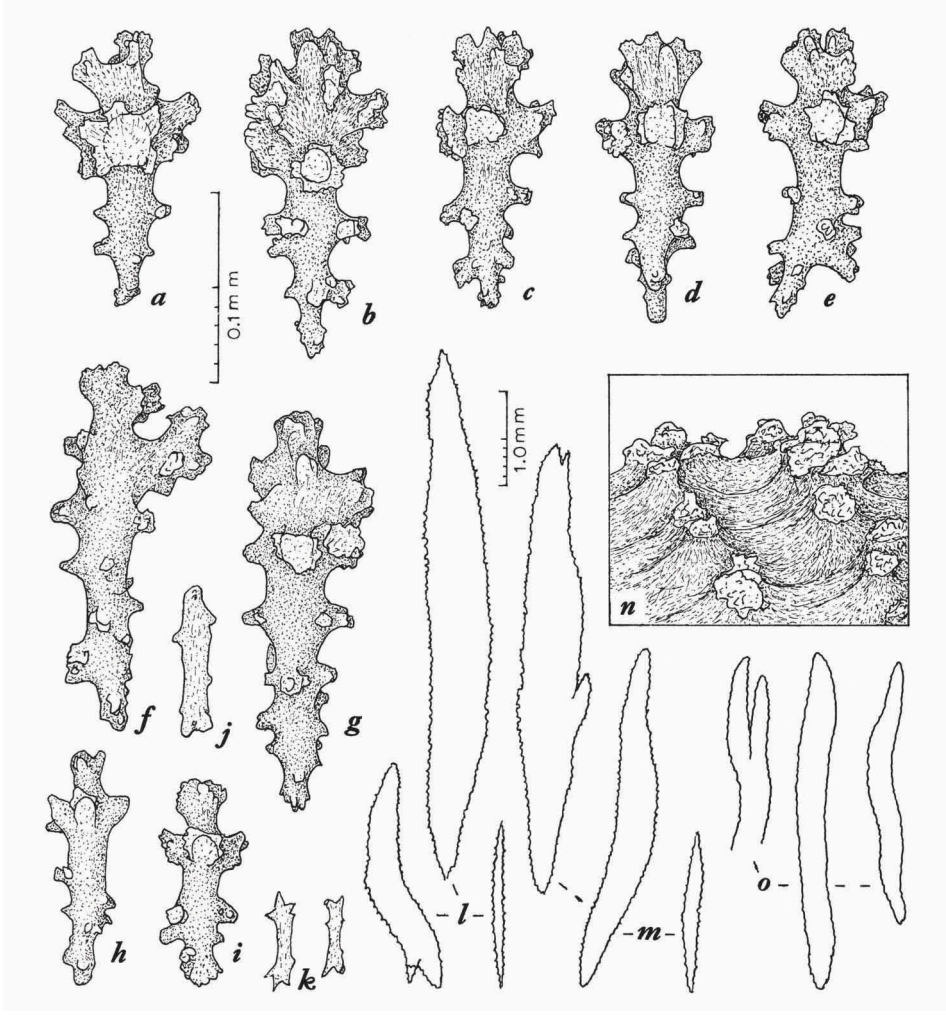

Fig. 47. *Sinularia mollis* Kolonko, ZMB no. 6519. a-i, sclerites from surface layer of the sterile stalk; j, k, sclerites from polyp; l, m, sclerites from interior of the stalk; n, warts on coenenchymal sclerite from the stalk; o, sclerites from interior of a lobe. Enlargement of a-k and n indicated by 0.1 mm scale at a; that of l, m and o by 1.0 mm scale below c.

The specimen ZMB no. 6519 has no sclerites in the surface layer of the lobes, but in the interior I found a few sclerites: curved rods, nearly smooth, one of them bifurcated at one end; they are up to 3.60 mm long and 0.18 to 0.35 mm wide (fig. 47o). The polyps, which are not fully retracted, have small rods, 0.05 to 0.08 mm long, with a few low processes (fig. 47j, k).

The spiculation of the surface layer of the sterile stalk consists of clubs, mostly 0.14 to 0.19 mm long; they have a wide, warty head and a warty or spiny shaft (fig. 47a-e). Sometimes there is a central wart (fig. 47c, d). Longer clubs, measuring up to 0.25 mm in length, have moderately developed heads (fig. 47f, g). Smaller clubs, 0.11 to 0.13 mm long, are often rod-shaped (fig. 47h, i). The interior of the stalk contains slender spindles, up to 5.60 mm long and 0.70 mm wide, pointed at both ends, sometimes bifurcated, or bearing a short side-branch. The warts are small, and usually arranged in transverse rows (fig. 47n).

Specimen ZMB no. 6518 hardly differs from that described above. In the only lobe that I could examine, sclerites are absent both in the surface layer and in the coenenchyme. In the interior of the stalk the longest spindle measured 6.25 mm in length and 0.80 mm in width.

From the above description it is clear that the colonies cannot be regarded as a variety of *S. polydactyla.* The principal reasons for this are the absence of sclerites in the surface layer of the lobes, and the fact that a lot of the clubs in the stalk are devoid of a central wart. Consequently I have decided to consider this variety to represent a good species.

Geographical distribution. — Bantayan Is. (Philippines), Okinawa (Ryukyu Archipelago).

Sinularia muralis May, 1899 (fig. 48, pl. 30)

Alcyonium leptoclados var. *murale* May, 1899: 108; Lüttschwager, 1914: 4; Kolonko, 1926: 310.

In the Berlin Museum two samples of this variety are kept (register nos. 2730 and 2731). No. 2730 is marked type. The label records: "*Sinularia leptoclados* var. *murale* May; type; Kolonko det. 1918; Colombo Museum, Ceylon, no. F; loc. Ceylon". The words "Kolonko det. 1918" are inconsistent with the word "type". The colony no. 2730 must be one of May's "3 Stücke aus Ceylon" (May, 1899: 108), the information "Colombo Museum Ceylon, no. F; loc. Ceylon" puts this beyond doubt. But who indicated the specimen as "type"? May or Kolonko?

The colony is represented in our pl. 30 at natural size. It is a piece of a big colony (no. 2731 is also a fragment), with a thick basal plate, from which

wide, wall-like, sinuous crests arise. The polyps are very numerous, they are retracted into distinct pits.

The surface layer of the crests contains clubs, 0.08 to 0.14 mm long.

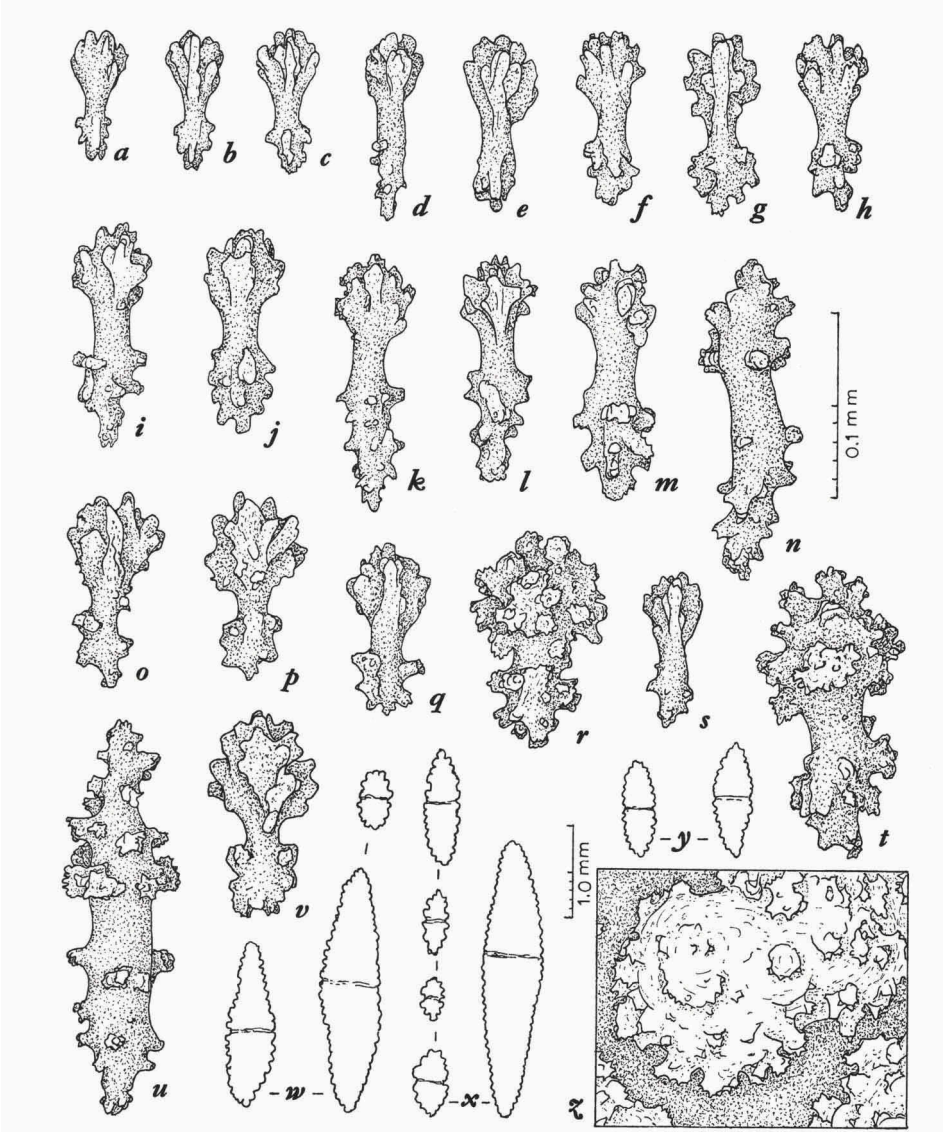

Fig. 48. *Sinularia muralis* May, type specimen, ZMB no. 2730. a-n, sclerites from surface layer of a crestlike lobe; o-v, sclerites from surface layer of the basal part of the colony; w-y, coenenchymal sclerites from the basal part; z, warts on coenenchymal sclerite from the base. Enlargement of a-v and z indicated by 0.1 mm scale at n; that of w-y by 1.0 mm scale below r.

The smaller ones are like the *leptoclados*-type (fig. 48a-h), though the base of the handle bears several rounded knobs and tiny, longitudinal ridges. The longer the clubs are, the less foliaceous are the heads, and the more prominences are found on the base of the handles (fig. 48i-m). Finally they change into rods, 0.15 to 0.20 mm long, with many blunt spines and small warts accumulated at both ends (fig. 48n).

The surface layer of the basal part of the colony (speaking of a sterile "stalk" is out of place here) has clubs of the same length (0.08 to 0.14 mm). Some of them are like those in the crests (fig. 48s), but most of them are wider and have voluminous heads (fig. 48o-q, v). In addition to these there are: (1) clubs, 0.12 to 0.16 mm long, with thick, warty heads and wide, warty handles (fig. 48r, t); (2) rods, 0.15 to 0.20 mm long, with simple warts, especially at the ends of the rods (fig. 48u); and (3) clavate or oval bodies, 0.20 to 0.25 mm long, very densely covered with warts. The latter sclerites are transitional forms to internal ones.

The coenenchyme of the crests and of the basal part of the colony contains straight, unbranched, pointed or blunt-ended, wide spicules, up to 3.20 mm long and 0.75 mm wide. Besides, in the basal part lie numerous small ovals (fig. 48w-y). All these sclerites are densely covered with very voluminous warts, usually measuring 0.09 to 0.11 mm, sometimes up to 0.14 mm in diameter (fig. 48z).

From the above description it appears that the colony cannot be considered a variety of *S. leptoclados*. The wall-like "lobes" and the different spiculation speak for themselves. I therefore raise the variety *murale* to the species level.

S. abrupta Tixier-Durivault, 1970, also has wall-like crests and clubs of the *leptoclados*-type, but the latter are of different shape.

Geographical distribution. — Ceylon.

Sinularia numerosa Tixier-Durivault, 1970 (figs. 49, 50, pl. 10 fig. 1, pl. 33 fig. 2)

Sinularia numerosa Tixier-Durivault, 1970a: 273-277, figs. 120-123; Tixier-Durivault, 1972: 22; Verseveldt, 1977b: 28-30, figs. 21, 22, pl. 8 fig. 2; Verseveldt, 1978: 50 (listed only).

S. crispa Tixier-Durivault, 1970a: 262-264, figs. 102-104; Tixier-Durivault, 1969: 143.

In a previous paper (Verseveldt, 1977b, fig. 22) I gave drawings of the sclerites of one of Tixier-Durivault's specimens of *S. numerosa*. For the sake of completeness the same figure is inserted here again (fig. 49). A re-description of the sclerites is superfluous. A photograph of one of Tixier-Durivault's specimens is added (pl. 33 fig. 2). The enlargement of Tixier-Durivault's drawing (1970a, fig. 120) is probably about × 0.7.

While examining the holotype of *S. crispa* I did not presume that this species could be identical with *S. numerosa*. I described the most important characters, and I made drawings of the sclerites. For completeness' sake they are published here.

Description of *S. crispa*. — Tixier-Durivault's drawing fig. 102 (1970a) shows a side-view of the holotype. The enlargement of this drawing is about × 0.65. Pl. 10 fig. 1 represents the colony as seen from above.

The surface layer of the lobes contains slender clubs, 0.09 to 0.18 mm long (fig. 50a-g). The heads are provided with a distinct central wart, but in the larger clubs this wart may be less distinct. In the surface layer of the sterile stalk the majority of the clubs is 0.10 to 0.15 mm long; they are wider than those in the lobes; a central wart is present (fig. 50k-m). Other clubs, 0.15 to 0.22 mm long, have warty heads with or without a central wart (fig. 50h-j).

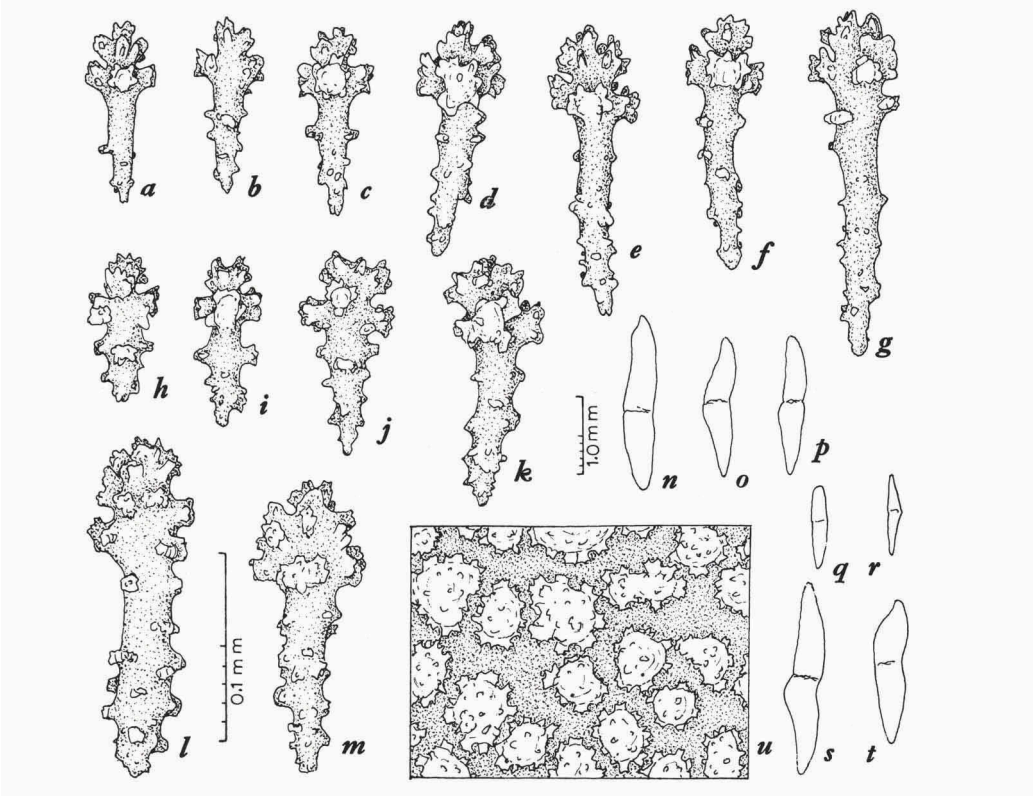

Fig. 49. *Sinularia numerosa* Tixier-Durivault, type specimen, MNHN. a-g, sclerites from surface layer of a lobe; h-m, sclerites from surface layer of the stalk; n-t, spicules from coenenchyme of the stalk; u, warts on coenenchymal spicule from the stalk. Enlargement of a-m and u indicated by 0.1 mm scale at l; that of n-t by 1.0 mm scale at left of n.

In the coenenchyme of the lobes and of the stalk lie straight or curved, unbranched spindles. In the lobes they are up to 3.10 mm long, in the stalk they may be up to 3.50 mm long and 0.40 to 0.58 mm wide (fig. 50n-p). They have an indistinct median constriction. The crenellated warts are medium-sized, 0.040 to 0.045 mm in diameter; sometimes they are arranged in transverse rows (fig. 50q).

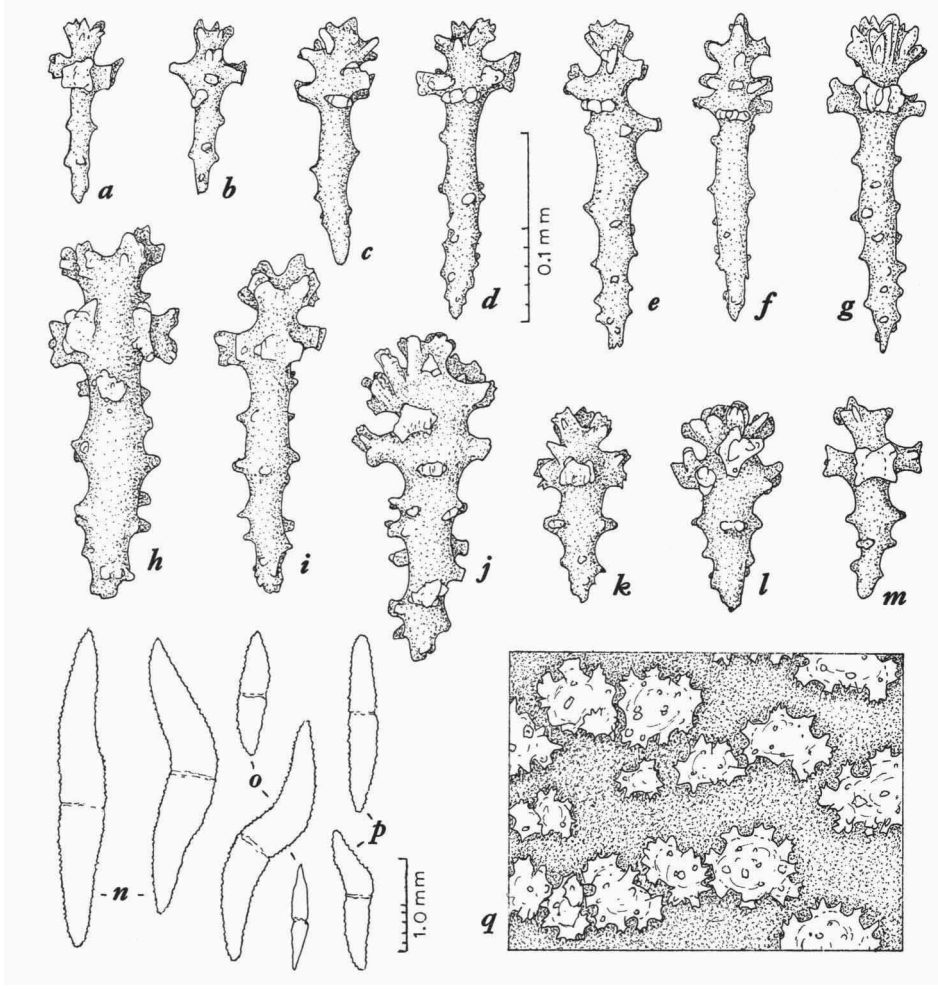

Fig. 50. *Sinularia numerosa* Tixier-Durivault, holotype of *S. "crispa"* Tixier-Durivault, MNHN. a-g, sclerites from surface layer of a lobe; h-m, sclerites from surface layer of the stalk; n-p, spicules from interior of the stalk; q, tubercles on coenenchymal spicule from the stalk. Enlargement of a-m and q indicated by 0.1 mm scale at d; that of n-p by 1.0 mm scale at p.

In comparing the above description with Tixier-Durivault's (type) specimen of *S. numerosa* mentioned above we notice agreement in practically all respects. In the shape of the lobes I do not see any essential differences. In *S. numerosa* the heads of the clubs in the surface layer of the lobes are slightly rougher, the warts are a little coarser than in *S. crispa*. According to Tixier-Durivault (1970a: 245 and 262) the coenenchymal spicules in the stalk of *C. crispa* are up to 2.70 mm long, but I found a length of 3.50 mm

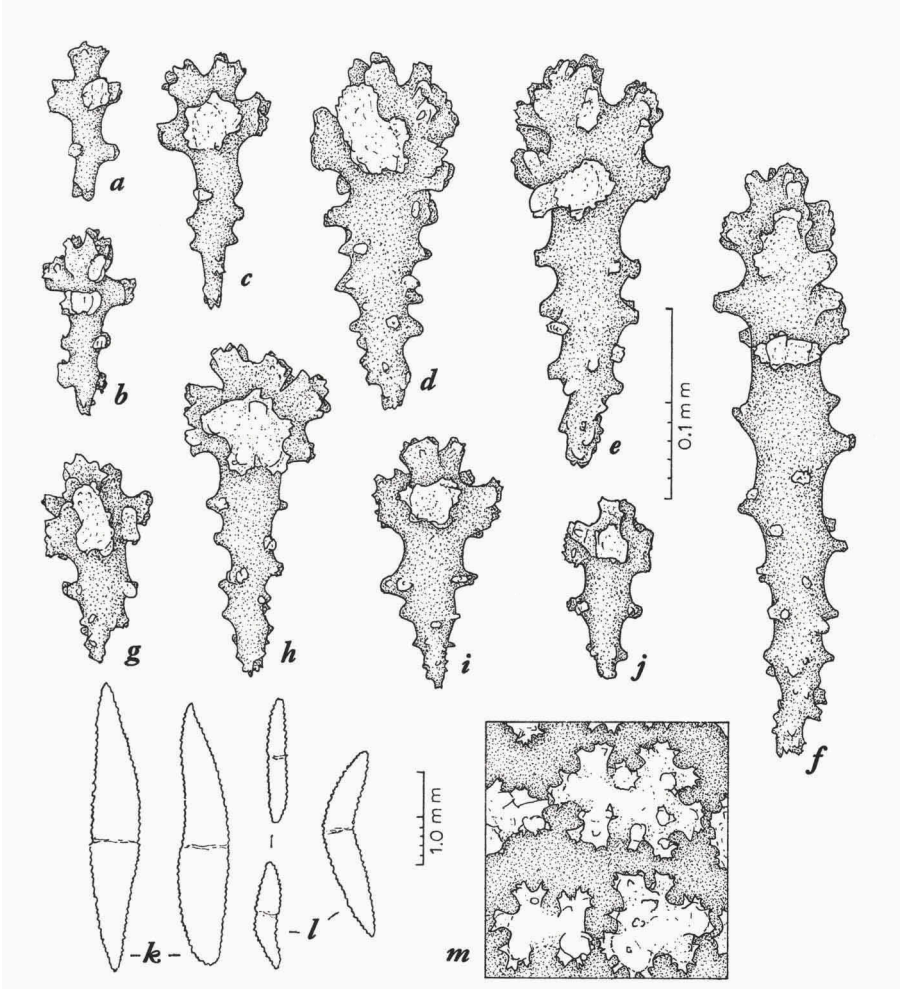

Fig. 51. *Sinularia ornata* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-j, sclerites from surface layer of the sterile stalk; k, l, spicules from interior of the stalk; m, tubercles on coenenchymal spicule from the stalk. Enlargement of a-j and m indicated by 0.1 mm scale at e; that of k, l by 1.0 mm scale at right of l.

(fig. 50n). Consequently *S. crispa* does not belong to Tixier-Durivault's group III ("Spicules basilaires en aiguilles courtes et minces", 1970a: 245), but to her group IV, just as *S. numerosa*. In *S. numerosa* the warts covering the coenenchymal spicules are more densely placed than those in *S. crispa*. In my opinion the differences mentioned are insufficient to maintain both species. I prefer the name *numerosa*, since this name has been used by me in previous papers. The name *crispa* then must be abandoned.

Geographical distribution. — New Caledonia, Gambier Is., Europe I. (West of Madagascar).

Sinularia ornata Tixier-Durivault, 1970 (fig. 51, pl. 33 fig. 4)

Sinularia ornata Tixier-Durivault, 1970a: 271-273, figs. 117-119; Tixier-Durivault, 1969: 150.

A comparison of Tixier-Durivault's fig. 117 (1970a) with our pl. 33 fig. 4 shows that the enlargement of the holotype in Tixier-Durivault's figure is × 0.7.

In the surface layer of the lobes there are warty clubs varying in length from 0.08 to 0.32 mm (fig. 51a-f); the smaller ones have a central wart. The clubs in the surface layer of the sterile stalk are 0.10 to 0.18 mm long (fig. 51g-j). The heads are voluminous and composed of big warts; the handles are thick and pointed. The most common form is represented in fig. 51i.

The sclerites in the coenenchyme of the lobes and of the sterile stalk are unbranched, both straight and curved spindles, up to 3.20 mm long; they have a median constriction (fig. 51k, l). In the lobes they bear spines or medium-sized warts. In the stalk the warts, 0.050 to 0.065 mm in diameter, are strongly crenellated (fig. 51m); they are often arranged in transverse rows.

Geographical distribution. — New Caledonia, Gambier Is.

Sinularia ovispiculata Tixier-Durivault, 1970 (fig. 52, pl. 31)

Sinularia ovispiculata Tixier-Durivault, 1970b: 192-196, figs. 50-53.

Tixier-Durivault's drawing (1970b, fig. 50) is a part of the holotype at about natural size. The part can be found in pl. 31, top-left.

In the surface layer of the lobes the clubs, 0.10 to 0.20 mm long, have spiny or warty heads, sometimes proportionally narrow, sometimes wide (fig. 52a-f); the thorny shafts are pointed or blunt. The surface layer of the

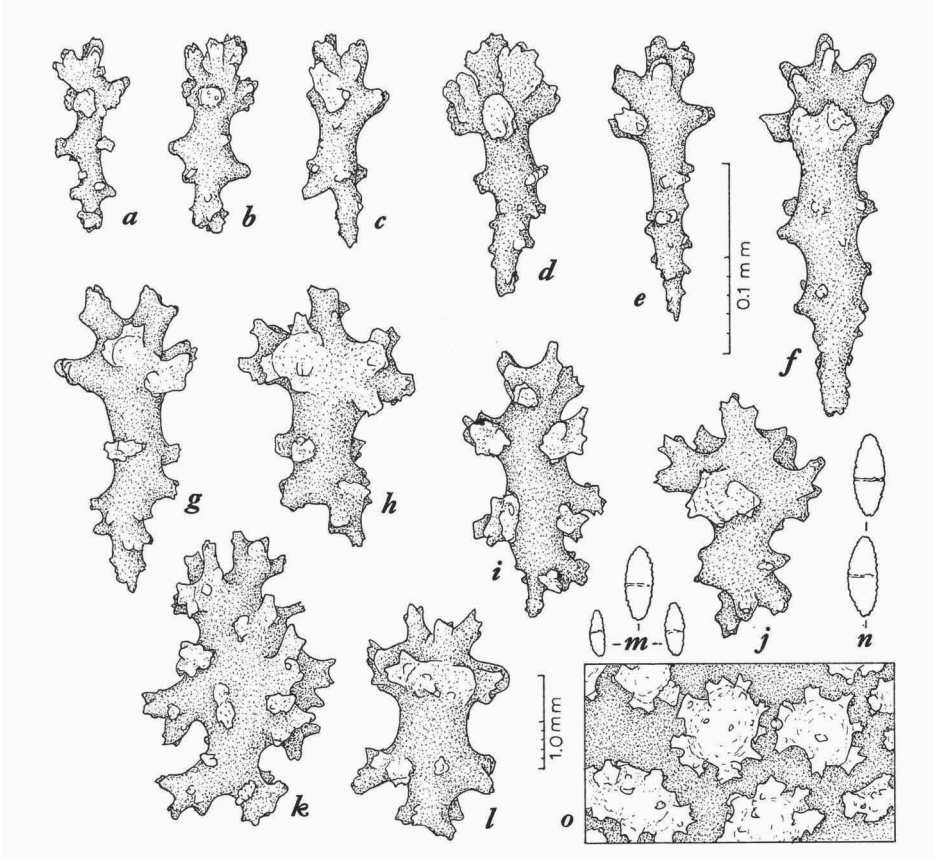

Fig. 52. *Sinularia ovispiculata* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-l, sclerites from surface layer of the stalk; m, n, sclerites from coenenchyme of the stalk; o, tubercles on coenenchymal sclerite from the stalk. Enlargement of a-l and o indicated by 0.1 mm scale at f; that of m, n by 1.0 mm scale at right of l.

sterile stalk contains quite different sclerites. Some of them are more or less clavate (fig. 52g, h, j), but most are short rods or cylinders (fig. 52i, l) or they are fantastically shaped (fig. 52k). They all bear high, often wartlike processes.

The coenenchymal sclerites in the lobes and in the sterile stalk are ovals, in the lobes up to 1.40 mm long, in the stalk 0.90 mm (fig. 52m, n). They have a median constriction, and they are densely covered with medium-sized warts (fig. 52o).

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia parva Tixier-Durivault, 1970 (fig. 53, pl. 33 fig. 1)

Sinularia parva Tixier-Durivault, 1970b: 196-199, figs. 54-56.

Tixier-Durivault's fig. 54 (1970b) and our pl. 33 fig. 1 represent the holotype; the enlargement of the first mentioned figure is × 1.0.

The surface layer of the lobes contains clubs varying in length from 0.08

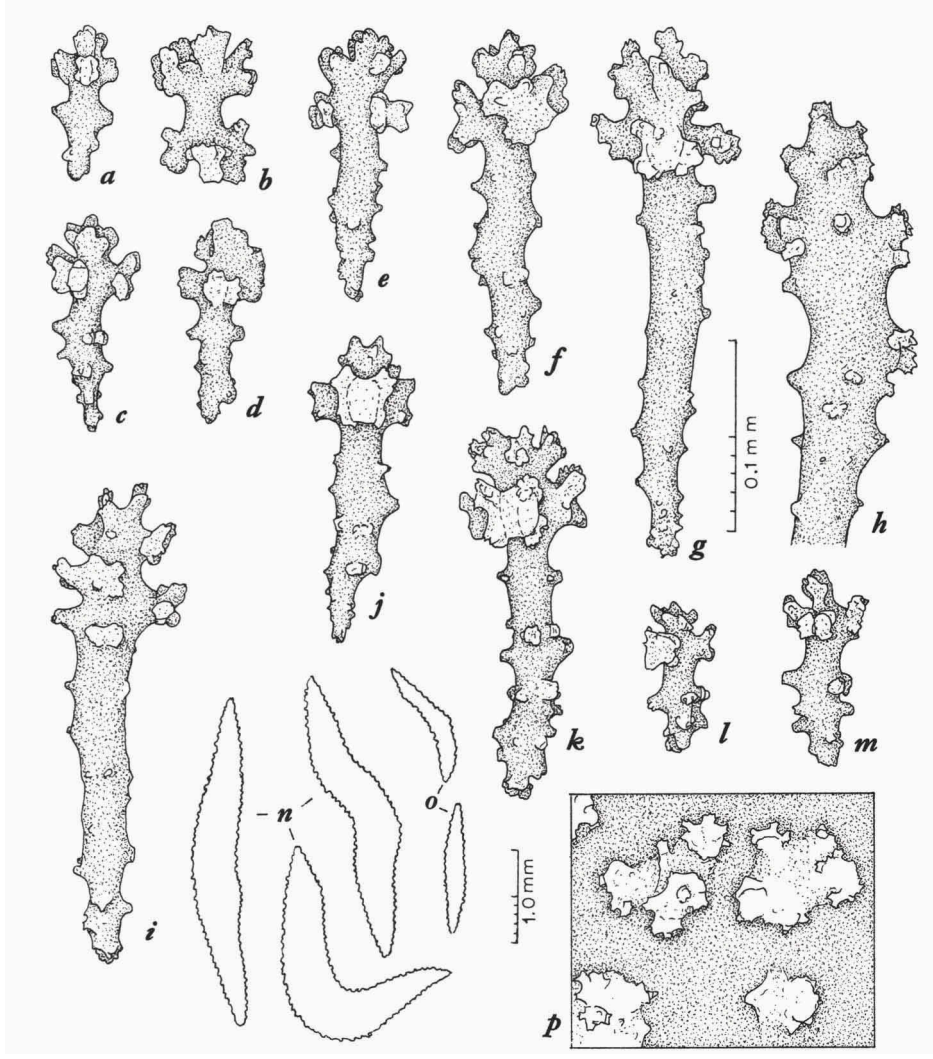

Fig. 53. *Sinularia parva* Tixier-Durivault, holotype, MNHN. a-h, sclerites from surface layer of a lobe; i-m, sclerites from surface layer of the stalk; n, o, sclerites from interior of the stalk; p, warts on coenenchymal sclerite from the stalk. Enlargement of a-m and p indicated by 0.1 mm scale at g; that of n, o by 1.0 mm scale at o.

to 0.40 mm. The smaller ones are few in number (fig. 53a; b is an aberrant form). The majority has a length of 0.12 to 0.23 mm (fig. 53c-f), but longer ones also occur (fig. 53g, h); clubs with a length of 0.40 and even 0.44 mm are transitional forms to spindles, which are usually about 0.20 to 0.40 mm long; the club pictured in fig. 53h has a length of 35 mm. All these clubs have warty heads; in many cases a rather distinct central wart is present (fig. 53a, c, e). The clubs in the surface layer of the sterile stalk scarcely differ from those in the lobes (fig. 53i-m).

The coenenchymal sclerites are curved, sometimes strongly bent spindles, in the lobes up to 2.60 mm long, in the stalk 3.60 mm long and 0.57 mm wide (fig. 53n, o). The distant warts are up to 0.055 or 0.060 mm in diameter; sometimes they seem to be a compound of a few smaller ones (fig. 53p).

Geographical distribution. — Bay of Nha Trang (Vietnam).

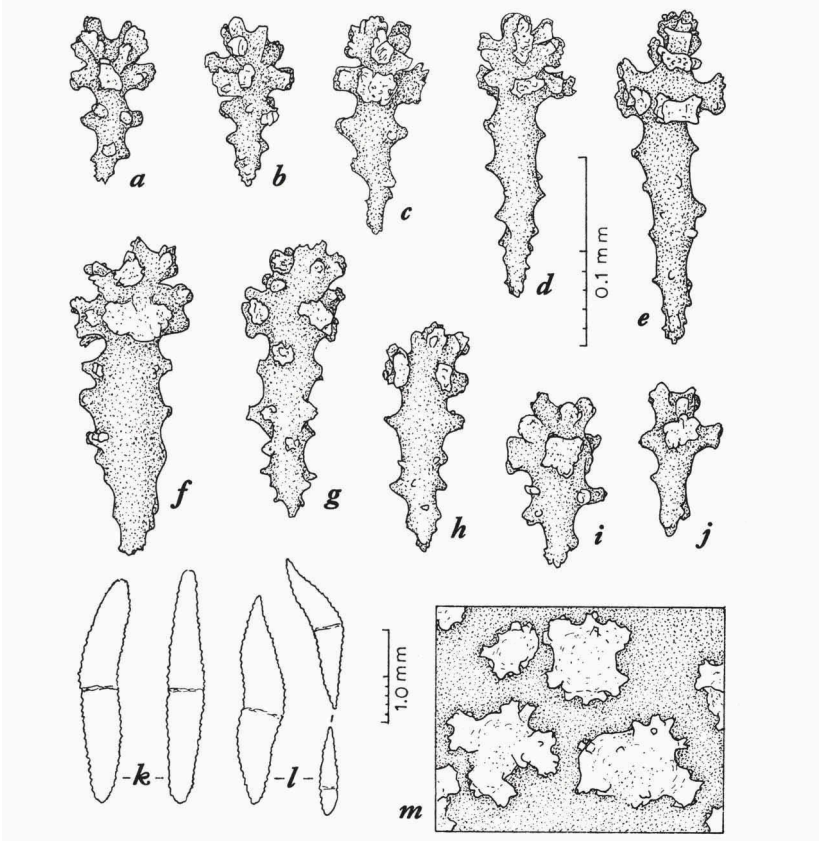

Fig. 54. *Sinularia pavida* Tixier-Durivault, MNHN. a-e, sclerites from surface layer of a lobe; f-j, sclerites from surface layer of the stalk; k, l, spicules from interior of the stalk; m, warts on coenenchymal sclerite from the stalk. Enlargement of a-j and m indicated by 0.1 mm scale at d; that of k, l by 1.0 mm scale at right of l.

Sinularia pavida Tixier-Durivault, 1970 (fig. 54, pl. 32)

Sinularia pavida Tixier-Durivault, 1970b: 199-203, figs. 57-60.

I think the portion of the colony figured by Tixier-Durivault (1970b, fig. 57) at about natural size corresponds with the bottom-left part of the specimen shown in our pl. 32.

The surface layer of the lobes has clubs 0.09 to 0.18 mm long, with warty heads and rather spiny, tapering shafts (fig. 54a-e). In the surface layer of the stalk there are numerous clubs, which have the same length, but they are usually wider (fig. 54f-j).

The coenenchymal sclerites in the lobes are straight or irregularly curved, acute or blunt spindles, covered with medium-sized, crenellated warts or truncated cones. Rarely a spindle is bifurcated at one end. The length is up to 3.50 mm, the width 0.75 mm. The spindles in the stalk are shorter and narrower (2.50 × 0.52 mm; fig. 54k, l). They are covered with distantly or more densely placed warts. Sometimes these warts are neat and round, regularly crenellated, averagely 0.05 mm in diameter; in other cases they are irregularly shaped (fig. 54m). Both in lobes and stalk the spicules have a distinct median constriction.

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia peculiaris Tixier-Durivault, 1970 (fig. 55, pl. 34 fig. 3)

Sinularia peculiaris Tixier-Durivault, 1970a: 279-280, figs. 130-132.

From Tixier-Durivault's description and the dimensions given of the holotype it follows that the "colony" represented in her fig. 130 is only a rather small fragment. Pl. 34 fig. 3 shows the whole specimen, which is in fact part of a colony as Tixier-Durivault already stated.

The surface layer of the lobes contains clubs, usually 0.09 to 0.17 mm long, a few are up to 0.22 mm (fig. 55a-f). They have wide heads; the processes are wartlike or they broaden leaflike with a toothed edge. The handles are thick, and spiny or warty. Also in the surface layer of the sterile stalk there are numerous clubs, varying in length from 0.12 to 0.18 mm, sometimes up to 0.25 mm (fig. 55g-j). Still longer, more or less clavate, tuberculate sclerites are transitional forms to coenenchymal spicules. Crosses with two distinct "heads" are common; they may derive from clubs (fig. 55k).

The internal sclerites are curved, unbranched, pointed or blunt-ended tuberculate spindles, rarely bifurcated at one end. In the lobes they attain a length of 2.40 mm, in the sterile stalk the maximum dimensions are 3.30 × 0.55 mm (fig. 55l, m). In addition to these, the stalk contains small, multi-

radiate and bizarre forms; average diameter or length 0.45 to 0.90 mm (fig. 55n, o). The crenellated warts are not crowded; their diameter varies from 0.035 to 0.070 mm (fig. 55p).

Geographical distribution. — New Caledonia.

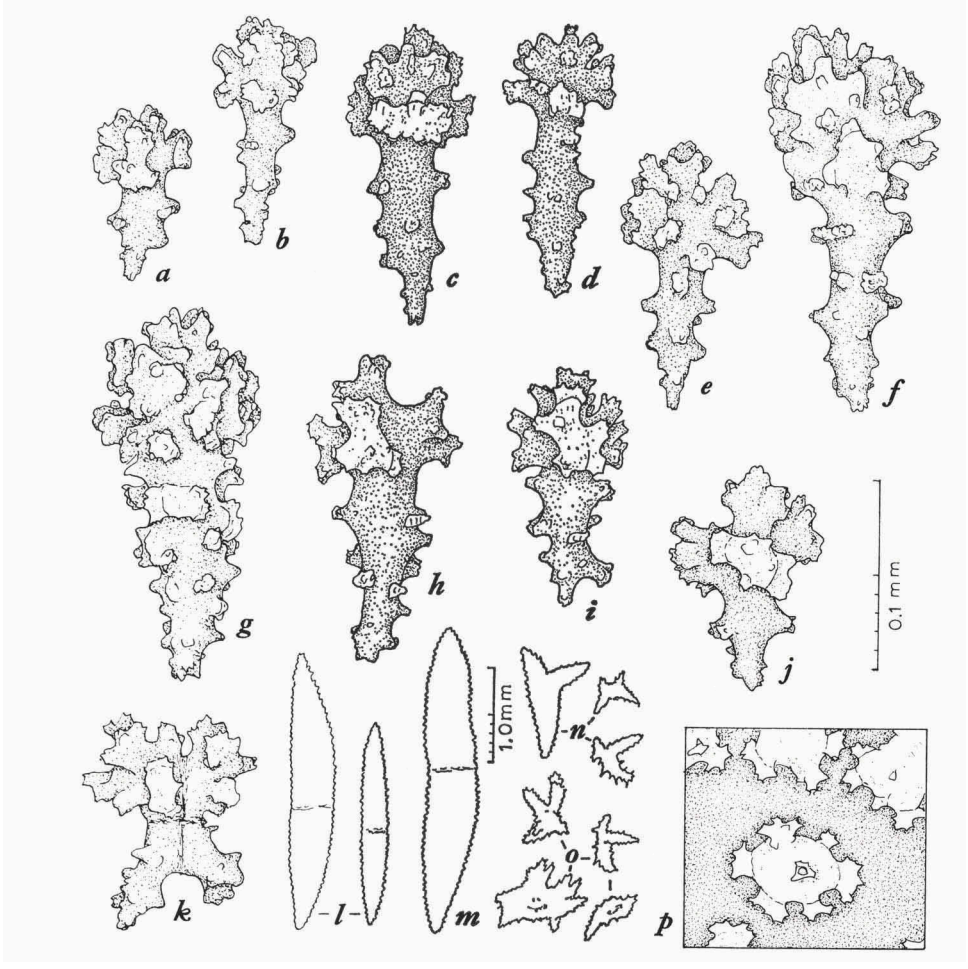

Fig. 55. *Sinularia peculiaris* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-k, sclerites from surface layer of the sterile stalk; l-o, sclerites from coenenchyme of the stalk; p, warts on coenenchymal sclerite from the stalk. Enlargement of a-k and p indicated by 0.1 mm scale at j; that of l-o by 1.0 mm scale at n.

Sinularia pedunculata Tixier-Durivault, 1945 (fig. 56, pl. 33 fig. 3)

Sinularia pedunculata Tixier-Durivault, 1945: 244; Tixier-Durivault, 1951: 109-113, figs. 139 (not 147A), 153-157; Tixier-Durivault, 1966: 208-213, figs. 201-203; Tixier-Durivault, 1970a: 283-285; Tixier-Durivault, 1970b: 203; Tixier-Durivault, 1972: 22.

The holotype has been represented by Tixier-Durivault twice, viz., in 1951, fig. 139 (enlargement a good × 0.6), and in 1966, fig. 201 (enlargement slightly more than × 1.5). Pl. 33 fig. 3 shows the same colony at natural size.

The surface layer of the lobes has clubs 0.09 to 0.23 mm long (fig. 56a-g). The heads have few prominences, which may be warts (fig. 56c, d), or broad, more or less flat branches (fig. 56a, b, e, f); sometimes a central wart is present. The handles, too, have few, low processes. The surface layer of the stalk contains clubs, 0.09 to 0.16 mm long. The heads consist of a few long, flat processes or distinct warts (fig. 56h-j, n). The handles are spiny or warty; in many cases they are irregularly shaped or rodlike (fig. 56k-m). Crosses also occur.

In the lobes and in the stalk the coenenchymal sclerites are tapering, curved spindles, up to 2.20 mm long and 0.40 mm wide (fig. 56o-q).

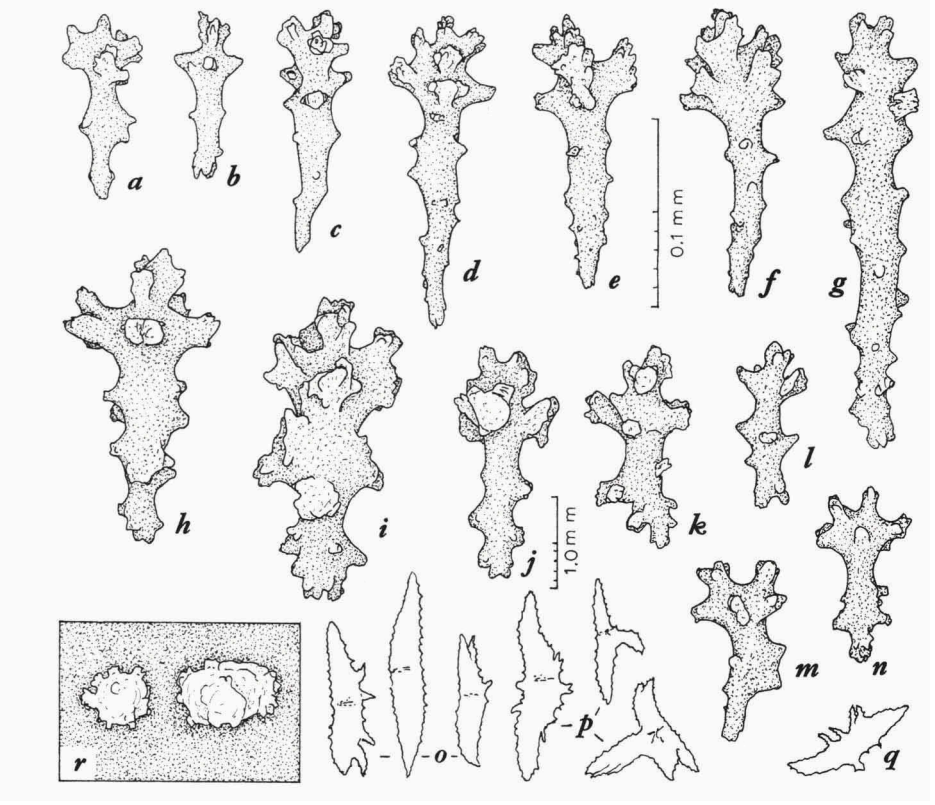

Fig. 56. *Sinularia pedunculata* Tixier-Durivault, holotype, MNHN. a-g, sclerites from surface layer of a lobe; h-n, sclerites from surface layer of the stalk; o-q, sclerites from interior of a lobe; r, warts on coenenchymal sclerite from the stalk. Enlargement of a-n and r indicated by 0.1 mm scale at e; that of o-q by 1.0 mm scale at j.

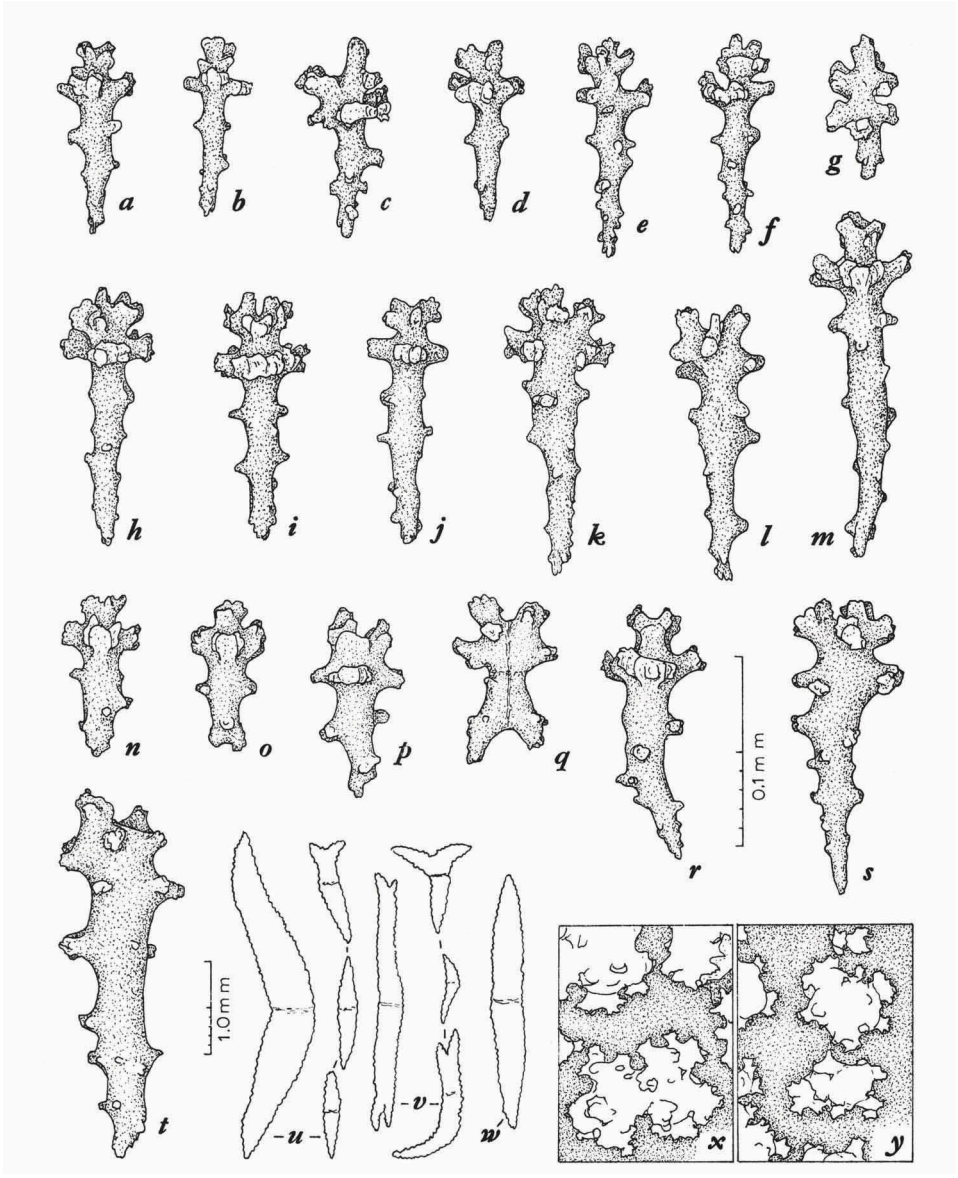

Fig. 57. *Sinularia polydactyla* (Ehrenberg), colony from Laing Island (N. coast of Papua-New Guinea). a-m, sclerites from surface layer of a lobe; n-t, sclerites from surface layer of the stalk; u-w, sclerites from coenenchyme of the stalk; x, y, warts on coenenchymal sclerite from the stalk. Enlargement of a-t, x and y indicated by 0.1 mm scale at r; that of u-w by 1.0 mm scale at u.

A large number of them, especially in the lobular region, have long, pointed processes and bizarre forms. They have a very indistinct median constriction. The warts strongly vary in size and shape, which has somehow to do with the numerous irregular protuberances typical of the sclerites. Fig. 56r shows simple warts; they are not densely placed, and sometimes they tend to lie in whorls.

Geographical distribution. — Madagascar, Wallis Is. (Samoa Is.), New Caledonia, Bay of Nha Trang (Vietnam), Rodrigues I.

Sinularia polydactyla (Ehrenberg, 1834) (fig. 57)

Lobularia polydactyla Ehrenberg, 1834: 58.
Alcyonium polydactylum; Burchardt, 1903, high form: 663-666, pl. 54 fig. 7, pl. 56 figs. 5-7.
Sinularia polydactyla; Kolonko, 1926: 319-325, pl. 4 figs. 1, 2; Thomson & Dean, 1931: 47-48, pl. 22 fig. 3; Roxas, 1933: 353, pl. 2 fig. 7; Macfadyen, 1936: 38-39, text-fig. 5, pl. 1 figs. 1-3, pl. 5 fig. 4; Tixier-Durivault, 1951: 50-56, figs. 43, 44, 57-66; Verseveldt, 1960: 240-241.
Sinularia polydactyla var. *dialichana* Kolonko, 1926: 325-326, pl. 4 fig. 3.

For a description of the colony and the great variability of the lobes I refer to the literature mentioned above. Some authors gave more or less useful pictures of the clubs and sometimes also of the other sclerites. In fig. 57 I give drawings of a number of clubs from the surface layer of the lobes (fig. 57a-m) and of the sterile stalk (fig. 57n-t), and, besides, drawings of sclerites from the interior of the stalk and of the warts covering them (fig. 57u-y). Many, but not all, clubs have a central wart. The length of the clubs varies, on an average, from 0.09 to 0.19 mm; the maximum length of the coenenchymal spicules is 3.00 to 5.50 mm.

I re-examined the two colonies of *S. polydactyla* var. *dialichana*, described by Kolonko, 1926: 325-326 (ZMB no. 6516 and 6517). Regarding the sclerites I could not find any distinct difference from the normal *polydactyla* specimens, nor are the shape and the divergence of the lobes of any importance, in view of the great variability found with *S. polydactyla*. In my opinion the var. *dialichana* must be abandoned.

Geographical distribution. — The species is wide-spread in the Indian and the Pacific Ocean.

Sinularia portieri sp. nov. (fig. 58, pl. 35)

In an earlier chapter in this paper, entitled "Note on *Sinularia variabilis* Tixier-Durivault" (p. 6) I explained the necessity for establishing a new species, *S. portieri*, for two colonies from the Red Sea. These colonies, both kept in MNHN, are:

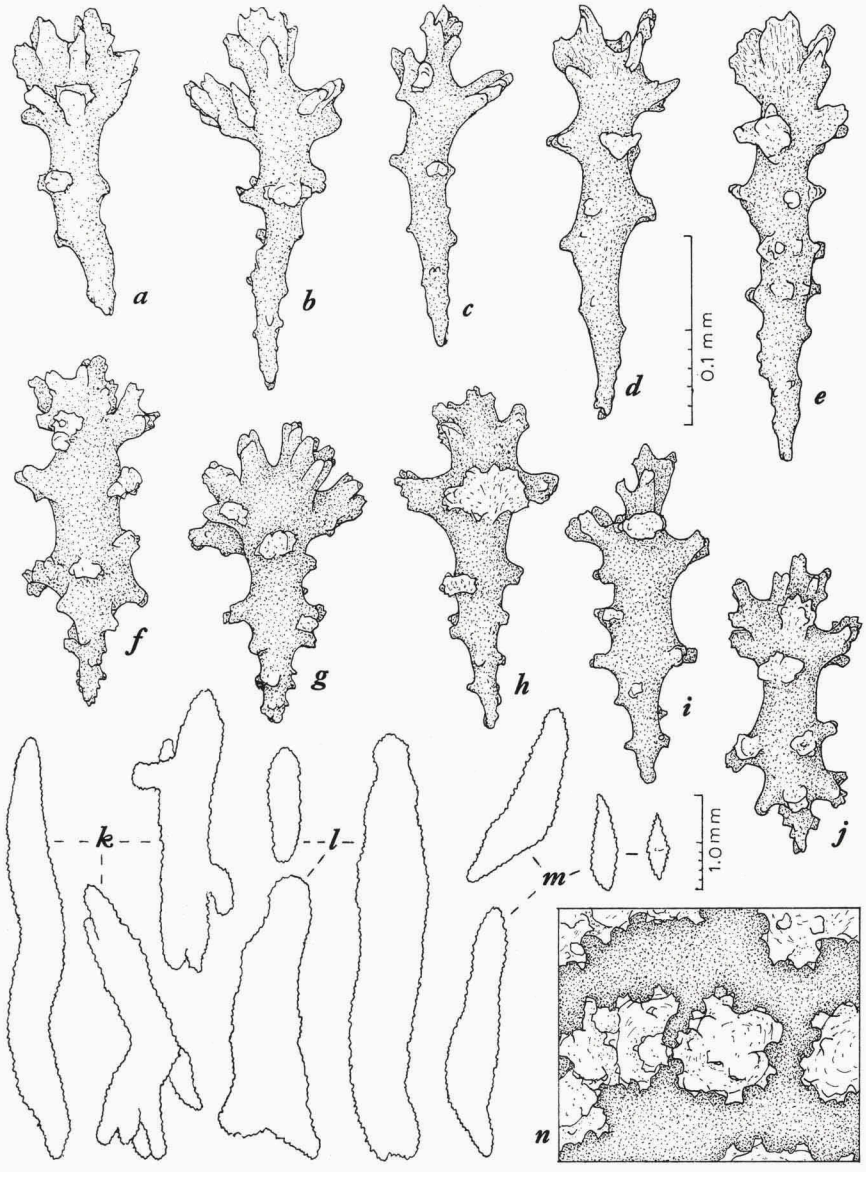

Fig. 58. *Sinularia portieri* sp. nov., holotype, MNHN. a-e, sclerites from surface layer of a lobe; f-j, sclerites from surface layer of the sterile basal part; k-m, sclerites from coenenchyme of the basal part; n, warts on coenenchymal sclerite from the base. Enlargement of a-j and n indicated by 0.1 mm scale at d; that of k-m by 1.0 mm scale at right of m.

(1) One colony, collected by Portier in 1844; I designate this colony as holotype;

(2) One colony, collected by Clot Bey in 1850; paratype.

Description of the holotype. — The colony (pl. 35) has diameters of 195 and 155 mm. In the central part it is thickest, 55 mm. An upper and an underside can be distinguished. With the irregular underside the colony must have been attached to some kind of substrate. The upper side is highest in the centre; towards the edge the colony becomes thinner, whereas the number of lobes increases in this direction. The lobes are heavy, blunt-tipped, simple or branched, 15 to 50 mm long. They bear numerous small lobules, 2 to 5 mm high and 2 to 3 mm wide. In the basal part of a lobe they are distant, apically they stand closely together (pl. 35; in Tixier-Durivault's drawing, 1951, fig. 94, two lobes with their lobules are depicted).

In the surface layer of the lobes there are large clubs, 0.15 to 0.25 mm long (fig. 58a-e). The heads are composed of processes, which may be leaflike (fig. 58a, e), or looking more like high, compound spines (fig. 58b-d). In many cases a kind of central wart can be distinguished, though this "wart" is often leaflike. The handles are pointed and bear a few prominences, sometimes arranged in girdles. The clubs in the outer layer of the sterile surface (a distinct stalk is, in fact, absent) are averagely 0.15 to 0.17 mm long, rarely up to 0.26 mm; they are wider, and in many cases a central wart is present (fig. 58f-j).

In the distal parts of the lobes and in the lobules the coenenchymal sclerites are few in number; the length is up to about 2 mm, and the surface is covered with medium-sized warts. In the basal parts of the lobes and in the sterile underside of the colony the sclerites, up to 4.60 mm long, are irregularly curved, sometimes slightly fusiform rods, or bizarre, ramified forms (fig. 58k-m). The crenellated warts are about 0.06 to 0.07 mm in diameter, and rather regularly placed in transverse rows (fig. 58n).

Colour. — The dried colony is brown.

Variability. — The paratype has the same brown colour. The shape is more or less triangular, and flat. One half of the triangle is occupied by the capitulum, which consists of a number of lobes covered with their lobules. The point of the triangle opposite to the capitulum was perhaps the base of the colony. The dimensions of the colony are 125 (the side of the capitulum) × 110 mm.

It is curious that this species has not been found again after 1850.

Geographical distribution. — Red Sea.

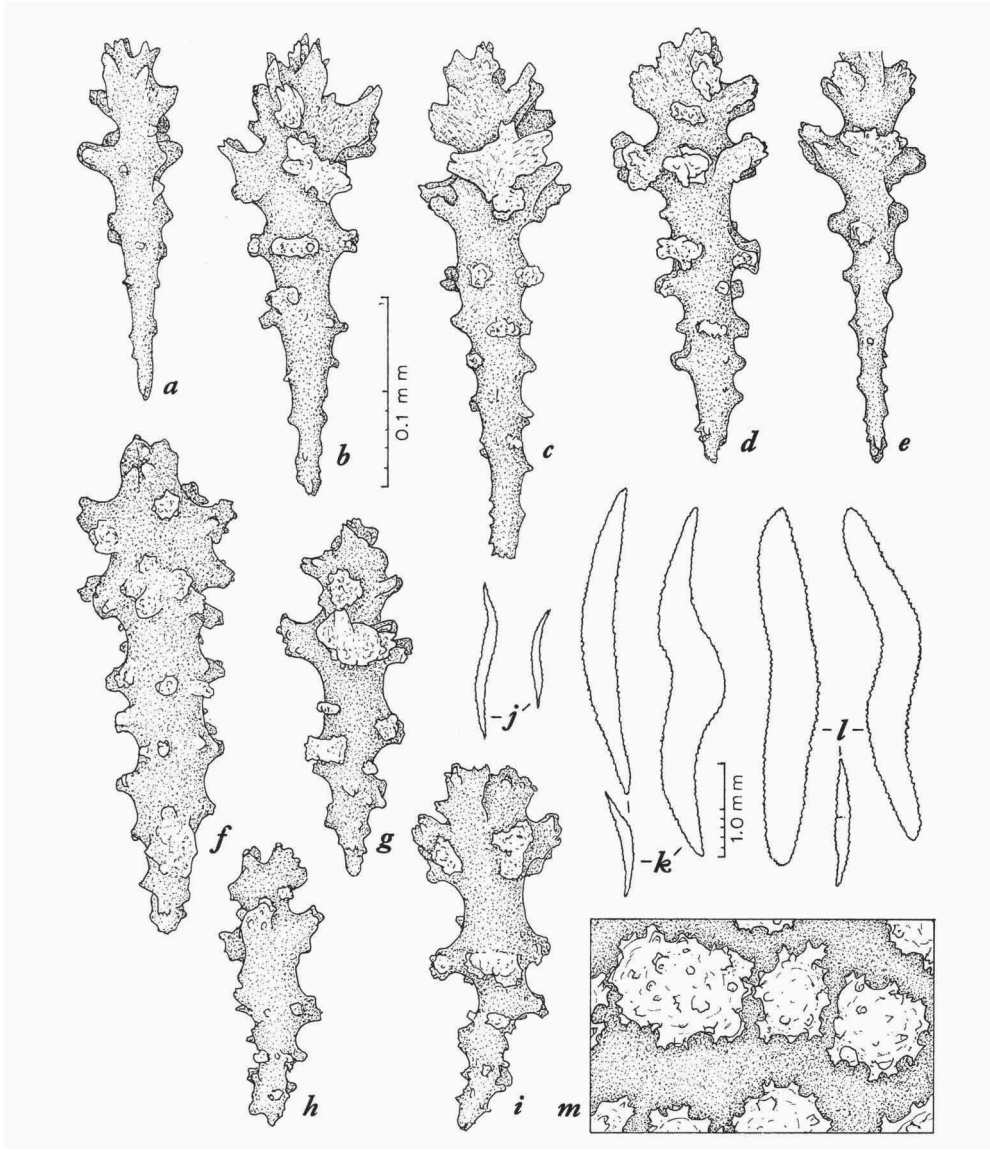

Fig. 59. *Sinularia querciformis* (Pratt) (holotype of "*S. elegans*" Tixier-Durivault, 1970a), MNHN. a-e, sclerites from surface layer of a lobe; f-i, sclerites from surface layer of the stalk; j, k, spicules from interior of a lobe; l, spicules from interior of the stalk; m, warts on coenenchymal spicule from the stalk. Enlargement of a-i and m indicated by 0.1 mm scale at b; that of j-l by 1.0 mm scale at k.

Sinularia querciformis (Pratt, 1903) (fig. 59)

For synonymy and description see: Verseveldt, 1974a: 10-16, figs. 6-9, pls. 4, 5.

To this list of synonyms must be added:

Sinularia elegans Tixier-Durivault, 1970a: 292, figs. 148-150.

Tixier-Durivault's holotype of *S. elegans* is represented at natural size in her fig. 148 (1970a). It closely resembles a colony of *S. querciformis* (Pratt, 1903) (see Verseveldt, 1974a, pls. 4 and 5). Also in respect of the spiculation there appears to be a great similarity. The surface layer of the lobes contains stout clubs, 0.19 to 0.28 mm long, with warty or spiny heads; the processes are high, often flat and leaflike; the shafts are pointed (fig. 59a-e). The clubs in the surface layer of the stalk are of about the same length, but they are wider and the warts are coarser (fig. 59f-i). The spicules in the interior of lobes and stalk are slender, usually pointed, curved spindles, up to 4 mm long (fig. 59j-l).

From my re-examination it appears that Tixier-Durivault's *S. elegans* must be abandoned.

In her "Rapports et différences" Tixier-Durivault (1970a: 292) points to the resemblance of the form of the colony of *S. elegans* to that of, among others, *S. querciformis*, but in her opinion the spiculation is different. In an earlier paper (1974a: 16) the present author explained, why some investigators, including Tixier-Durivault, have erred in their taxonomical work.

Geographical distribution. — Hulule (Male Atoll, Maldives), the Malay Archipelago, New Caledonia.

Sinularia ramosa Tixier-Durivault, 1945 (fig. 60, pl. 37 fig. 3)

Sinularia ramosa Tixier-Durivault, 1945: 248-249; Tixier-Durivault, 1951: 129-135, figs. 176, 182-186; Tixier-Durivault, 1966: 225-226, figs. 215-217; Tixier-Durivault, 1970a: 293; Tixier-Durivault, 1970b: 205.

The holotype has been represented by Tixier-Durivault, 1951, fig. 176 (enlargement about × 0.6), and 1966, fig. 215 (enlargement × 1.5). Pl. 37 fig. 3 shows the colony at natural size. Pace Tixier-Durivault (1951: 131) the colony and its manner of ramifying resembles neither *S. triaena* Kolonko, 1926 (= *S. dura* (Pratt, 1903)), nor *S. querciformis* (Pratt, 1903).

The surface layer of the lobes has clubs varying in length from 0.08 to rather more than 0.30 mm (fig. 60a-f). The smaller ones are ordinary clubs; the longer ones have slender, usually bent shafts with low spines, the heads are narrow. The clubs in the surface layer of the stalk are 0.08 to 0.20 mm long; irregular forms and crosses also occur (fig. 60g-k).

The internal sclerites in the lobes have not been re-examined. In the coenenchyme of the sterile stalk lie thick, blunt spindles, up to 2.80 mm long and 0.70 mm wide. Some of the smaller sclerites have irregular forms (fig. 60l, m). The spicules are densely covered with weakly crenellated, irregular, often compound warts (fig. 60n).

Geographical distribution. — Seychelles, New Caledonia, Bay of Nha Trang (Vietnam).

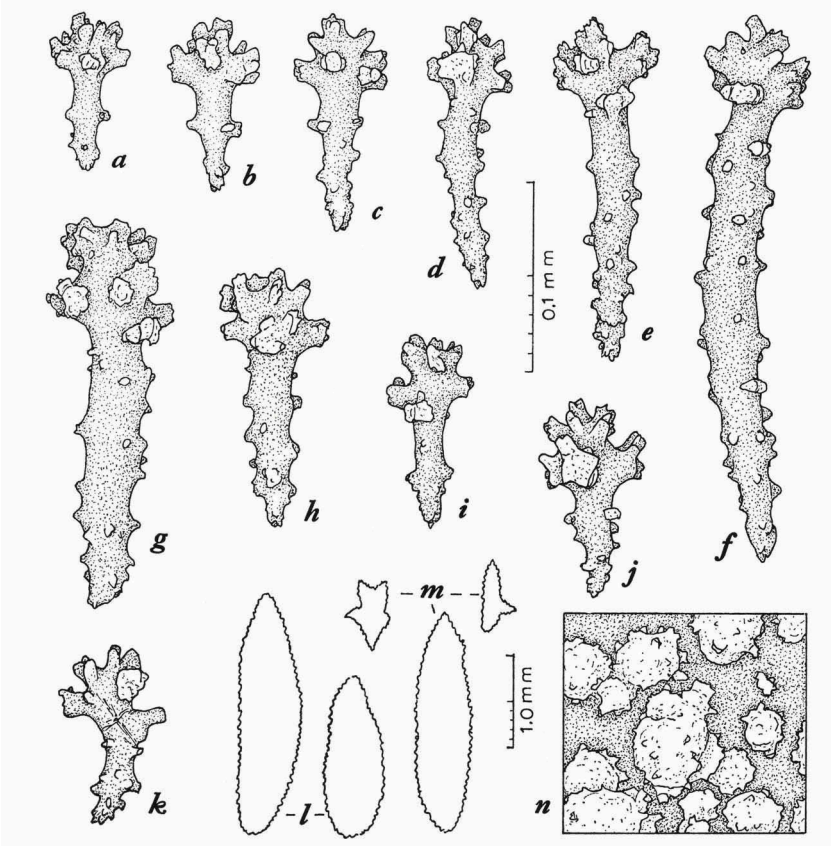

Fig. 60. *Sinularia ramosa* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-k, sclerites from surface layer of the stalk; l, m, sclerites from coenenchyme of the stalk; n, tubercles on coenenchymal sclerite from the stalk. Enlargement of a-k and n indicated by 0.1 mm scale at d; that of l, m by 1.0 mm scale at m.

Sinularia rigida (Dana, 1846) (pl. 6 fig. 2)

For synonymy and discussion see: Verseveldt, 1977b: 32-35, fig. 24, pl. 9 fig. 1.

It will not always be possible to research workers to examine Dana's original figures of *S. conferta* and *S. rigida*. I therefore present copies of these figures (pl. 6).

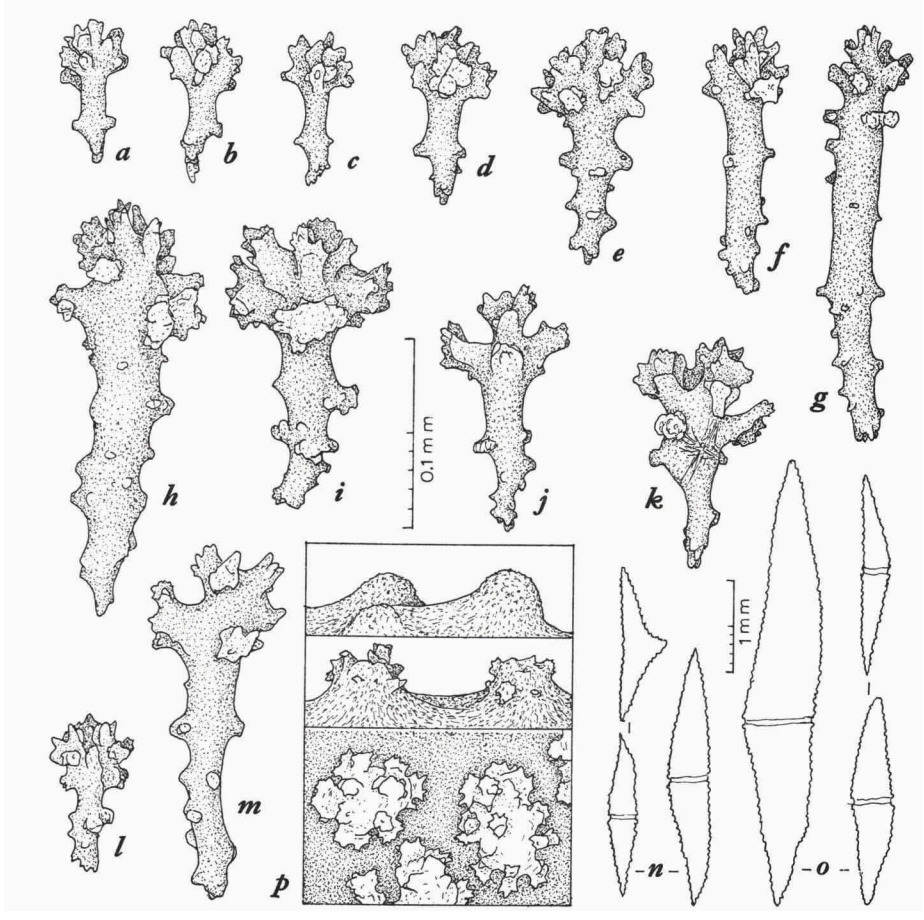

Fig. 61. *Sinularia robusta* Macfadyen, holotype, BMNH no. 1934.3.28.94. a-g, sclerites from surface layer of a lobe; h-m, sclerites from surface layer of basal part of colony; n, o, spicules from interior of a lobe; p, tubercles on coenenchymal spicule from a lobe. Enlargement of a-m and p indicated by 0.1 mm scale at i; that of n, o by 1.0 mm scale below k.

Sinularia robusta Macfadyen, 1936 (fig. 61, pl. 34 fig. 2)

Sinularia robusta Macfadyen, 1936: 39-41, text-fig. 6, pl. 4 fig. 6, pl. 5 figs. 1, 3; Tixier-Durivault, 1945: 147; Tixier-Durivault, 1951: 73-74.

?*Sinularia robusta*; Tixier-Durivault, 1953: 317-318, text-fig. p. 316; Tixier-Durivault, 1969: 155; Tixier-Durivault, 1970a: 253; Tixier-Durivault, 1970b: 211-212; Utinomi, 1977: 31, fig. 8, pl. 3 figs. 3, 4.

Sinularia robusta; Verseveldt, 1977c: 174 (listed only).

I examined Macfadyen's holotype, represented in her pl. 5 fig. 3 (BMNH no. 1934.3.28.94) (see our pl. 34 fig. 2).

The sclerites in the lobes are clubs, 0.08 to 0.22 mm long (fig. 61a-g). The heads, 0.04 to 0.06 mm wide, are composed of a number of wartlike processes, which are not foliaceous. The handles of the smaller clubs have one girdle of processes; those of the larger clubs bear more processes; they are cone-shaped. The clubs in the surface layer of the basal part of the colony (a distinct stalk is absent) are 0.08 to 0.24 mm long (fig. 61h-m). Most of them have noticeably wide heads, up to about 0.09 mm. They consist of coarse, long warts; sometimes a central wart is present (fig. 61j; cf. Macfadyen, l.c., text-fig. 6).

The coenenchyme of the lobes and of the basal part of the colony contains unbranched, nearly straight spindles, reaching a length of 4.85 mm (in the basal part shorter?). The most common type is widest in the middle, up to 0.80 mm, and from this middle they taper to a usually sharp point (fig. 61n, o). In the middle there is a distinct constriction. The spindles in the lobes bear either rounded hillocks (fig. 61p, upper most part), or crenellated warts with flat summits (fig. 61p, middle and basal part). All these prominences are distantly distributed.

I also examined a specimen from the London Museum, numbered BMNH 1934.3.28.93. This specimen is, however, not a *S. robusta* at all. The clubs have typical *leptoclados* forms; length 0.08 to 0.10 mm. I compared the sclerites of this specimen with those of the type of *S. abrupta*, for the shapes of the lobes of both species resemble each other. But in *S. abrupta* the shape of the clubs in the surface layer of the stalk differs from that in the specimen just mentioned, and the warts on the coenenchymal spicules are much bigger.

In 1953 Tixier-Durivault identified a colony from Tahiti with *S. robusta*. The figure on her page 316 shows the sclerites found in this specimen. A comparison of these figures and of the description of the colony reveals the following differences:

(1) The clubs in the surface layer of the lobes and of the stalk have foliate heads;

(2) The length of the clubs in the lobes is 0.14 or 0.16 mm; those in the stalk vary from 0.10 to 0.15 mm in length;

(3) The shape of the coenenchymal sclerites differs distinctly from that of the spicules in the type.

In my opinion the colony described by Tixier-Durivault cannot be referred to *S. robusta*.

The same holds true of a colony described by Utinomi, 1977: 31. The

sclerites represented by him (fig. 8) differ so considerably from those pictured in our fig. 61 that I doubt the correctness of his identification.

A re-examination of the specimens just mentioned must reveal their identity.

I agree with Macfadyen's statement (l.c.) that her *S. robusta* differs from *S. macropodia* in many particulars. Tixier-Durivault (1951: 74) thinks that *S. robusta* strongly approaches *S. capitalis*. The spiculation of *S. capitalis*, however, is distinctly different from that of *S. robusta*; cf. fig. 4 with fig. 61.

Geographical distribution. — Great Barrier Reef.

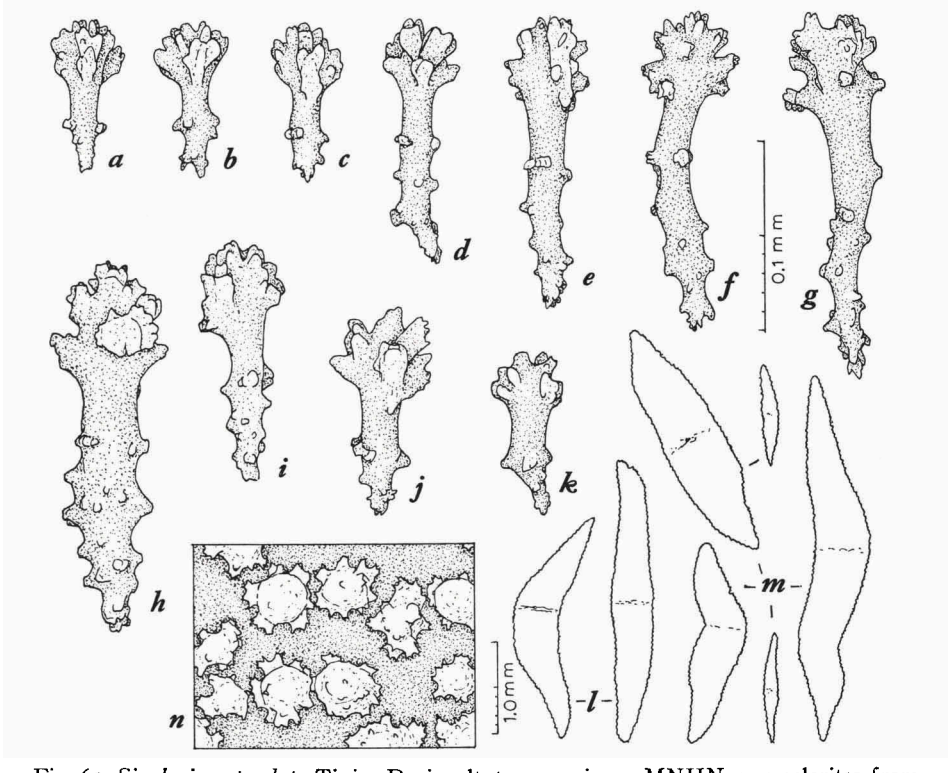

Fig. 62. *Sinularia rotundata* Tixier-Durivault, type specimen, MNHN. a-g, sclerites from surface layer of a lobe; h-k, sclerites from surface layer of the stalk; l, m, spicules from interior of the stalk; n, warts on coenenchymal spicule from the stalk. Enlargement of a-k and n indicated by 0.1 mm scale at f; that of l, m by 1.0 mm scale at l.

Sinularia rotundata Tixier-Durivault, 1970 (fig. 62, pl. 34 fig. 1)

Sinularia rotundata Tixier-Durivault, 1970a: 277, figs. 124-126.

The holotype has been represented by Tixier-Durivault in her fig. 124 (1970a) at natural size. Pl. 34 fig. 1 shows the paratype mentioned by Tixier-Durivault (1970a: 277).

The surface layer of the lobes contains clubs resembling those of the *leptoclados*-type, but the processes composing the heads are less leaflike. The length is usually only 0.08 to 0.09 mm (fig. 62a-c). Longer clubs, up to 0.22 mm, have narrow, spiny or warty heads (fig. 62d-g). The clubs in the surface layer of the sterile stalk have about the same length, but the processes

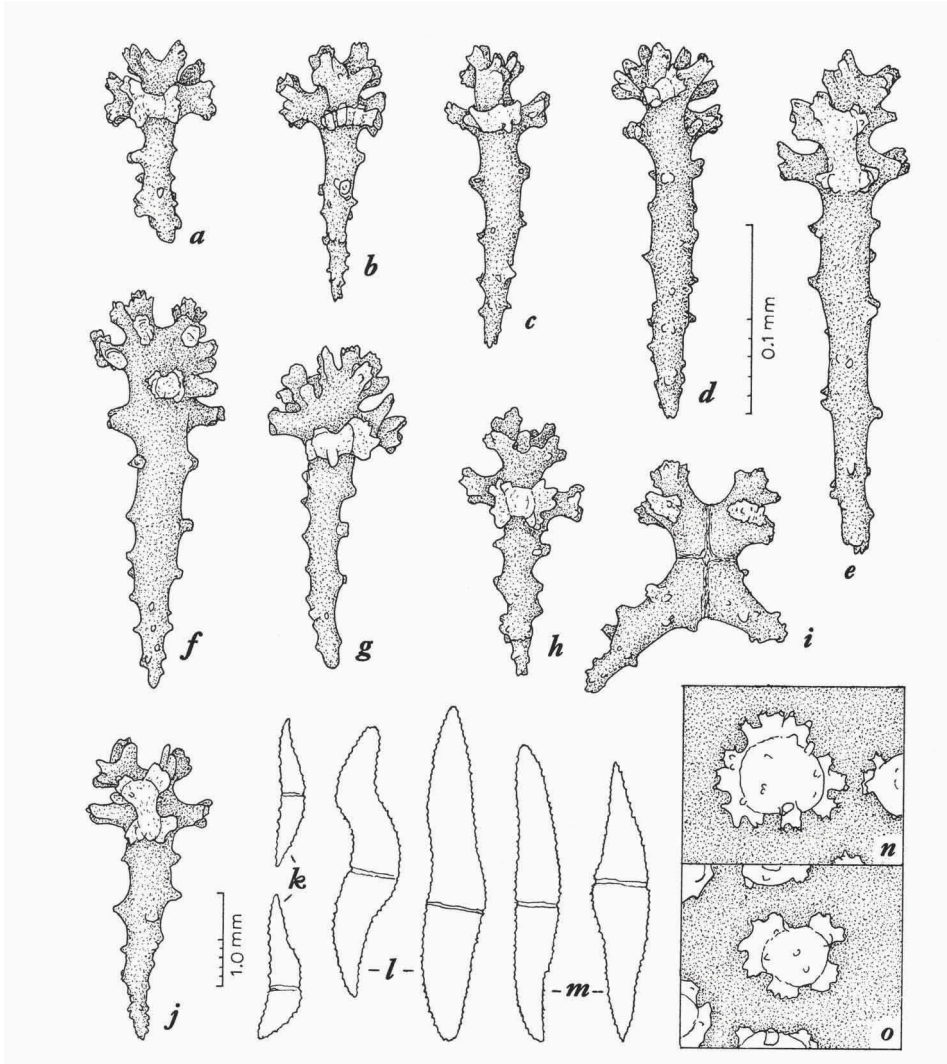

Fig. 63. *Sinularia scabra* Tixier-Durivault, type specimen, MNHN. a-e, sclerites from surface layer of a lobe; f-j, sclerites from surface layer of the stalk; k-m, spicules from coenenchyme of the stalk; n, o, tubercles on coenenchymal spicule from the stalk. Enlargement of a-j, n and o indicated by 0.1 mm scale at d; that of k-m by 1.0 mm scale at left of k.

in the heads are not foliaceous, but wartlike, and the handles are wider (fig. 62h-k).

The internal sclerites in the lobes and the sterile stalk are usually curved or strongly bent spindles, sometimes bifurcated at one end. Those in the lobes seem to be larger, up to 4 mm long and 0.70 mm wide (fig. 62l, m). The median constriction is indistinct. The crenellated warts are small, 0.03 to 0.05 mm in diameter, and often arranged in transverse rows (fig. 62n).

Geographical distribution. — New Caledonia.

Sinularia scabra Tixier-Durivault, 1970 (fig. 63, pl. 36)

Sinularia scabra Tixier-Durivault, 1970b: 212-217, figs. 66-70.

The fragment of the colony drawn by Tixier-Durivault in fig. 66 (1970b) (enlargement × 0.85) corresponds with the right-hand part of the capitulum shown in pl. 36.

In the surface layer of the lobes most of the clubs measure 0.10 to 0.20 mm in length; some reach a length of 0.27 mm (fig. 63a-e). The heads are warty; sometimes a rather distinct central wart is present (fig. 63c). The handles bear few spines. The clubs in the surface layer of the sterile stalk, 0.10 to 0.21 mm long, have wide, warty, branched heads; the handles have spines (fig. 63f-h, j). Crosses with two heads are not uncommon (fig. 63i).

In the coenenchyme of the lobes the sclerites are irregularly shaped, often curved spindles reaching 4.60 mm in length and 0.90 mm in width; a few branched sclerites are present. Most of the spindles are covered with low, distant cones, often arranged in rows; others have small warts. In the sterile stalk the internal sclerites show the same curved forms; they seem to be shorter than those in the lobes, up to 3.60 mm (fig. 63k-m). The distant warts are medium-sized, 0.050 to 0.065 mm in diameter. The edge of the crenelles either has diminutive points (fig. 63n) or these are absent (fig. 63o).

Geographical distribution. — Bay of Nha Trang (Vietnam).

Sinularia triangula Tixier-Durivault, 1970 (fig. 64, pl. 37 fig. 2)

Sinularia triangula Tixier-Durivault, 1970a: 285-288, figs. 139-141.

The holotype is part of a colony. Tixier-Durivault's fig. 139 shows the fragment seen from the outside; the enlargement is × 0.65. Pl. 37 fig. 2 represents the specimen as seen from the other side, in section.

The clubs in the surface layer of the lobes (fig. 64a-f) and of the sterile stalk (fig. 64g-l) have the same triangular form; the length, too, is the same:

0.08 to 0.16 mm. The heads are wide, the big warts on each head form one girdle. The handles are massive and taper towards the base.

The spicules in the coenenchyme of the lobes and of the sterile stalk are straight or weakly curved, unbranched spindles. In the lobes they are up to 5.20 mm long, in the stalk they reach 4.00 mm in length (fig. 64m). They have an indistinct median constriction. The crenellated warts are medium-sized, up to 0.07 mm in diameter, and often arranged in transverse rows (fig. 64n).

Geographical distribution. — New Caledonia.

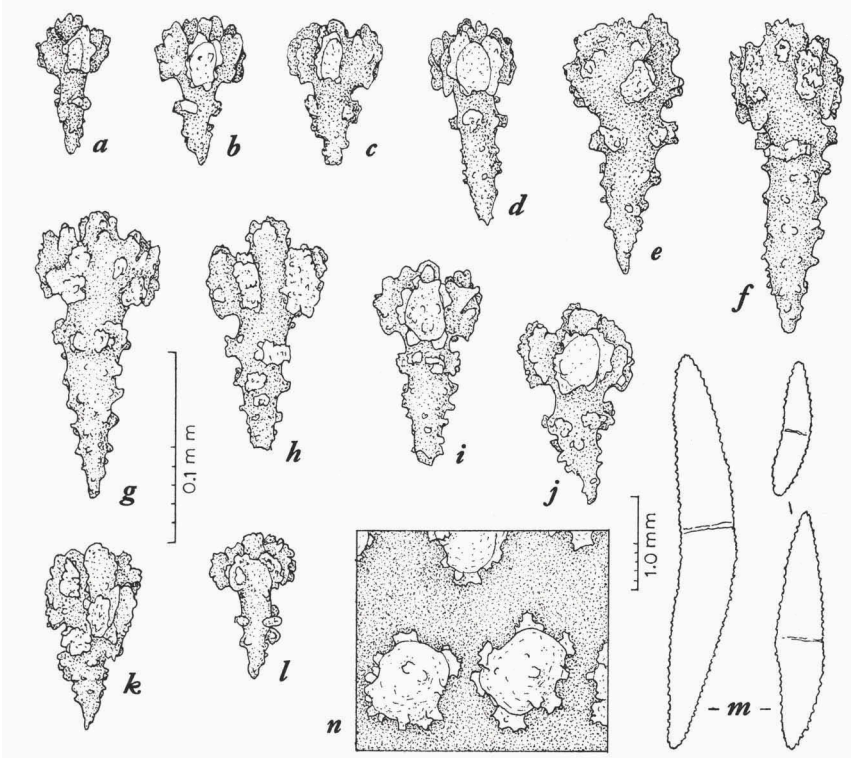

Fig. 64. *Sinularia triangula* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-l, sclerites from surface layer of the stalk; m, spicules from interior of the stalk; n, warts on coenenchymal spicule from the stalk. Enlargement of a-l and n indicated by 0.1 mm scale at g; that of m by 1.0 mm scale at m.

Sinularia variabilis Tixier-Durivault, 1945 (figs. 65, 66, pl. 38 figs. 1-4)

Sinularia variabilis Tixier-Durivault, 1945: 149-150; Tixier-Durivault, 1951: 83-86, figs. 94, 107, 114-116; Tixier-Durivault, 1969: 155-156; Tixier-Durivault, 1970a: 254; Tixier-Durivault, 1970b: 217; Verseveldt, 1974b: 95 (listed only).

Sinularia pusilla Tixier-Durivault, 1969: 151-154, figs. 7-9.

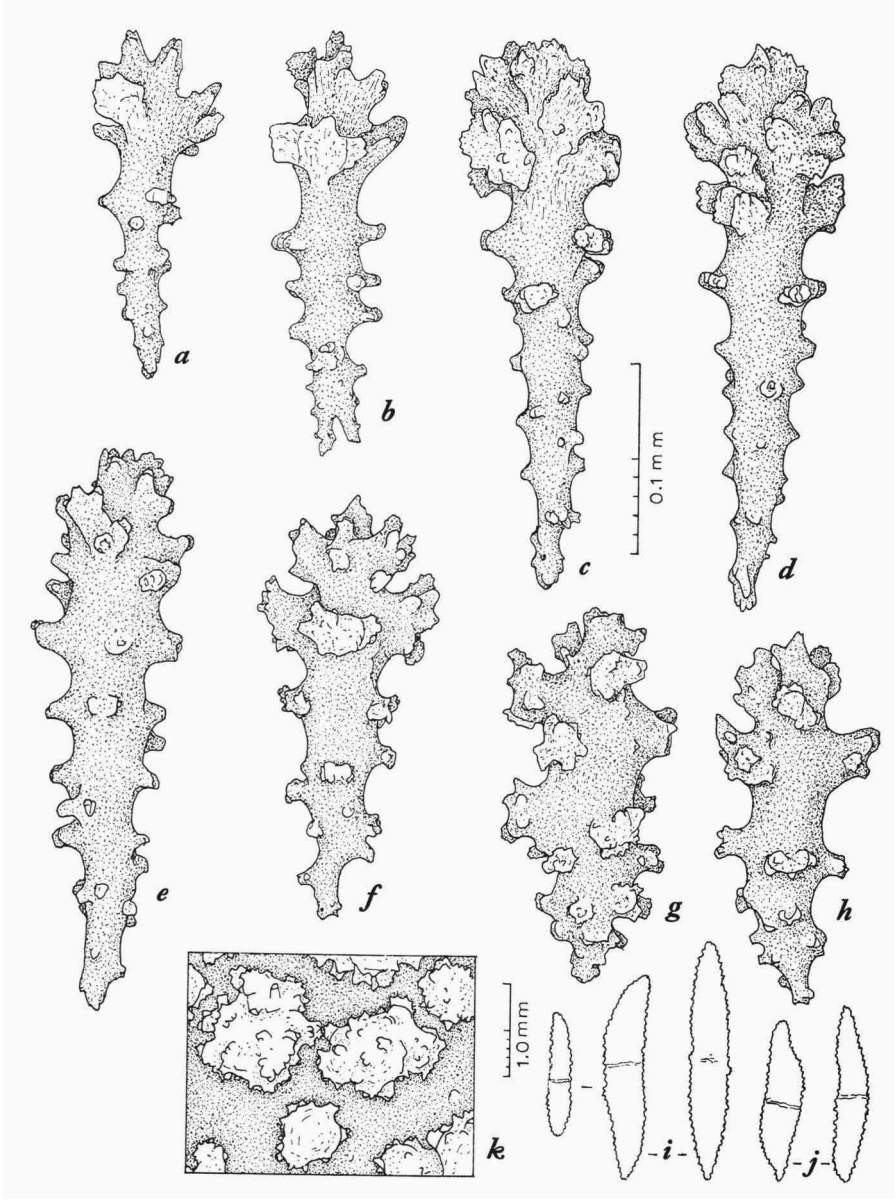

Fig. 65. *Sinularia variabilis* Tixier-Durivault, holotype, MNHN. a-d, sclerites from surface layer of a lobe; e-h, sclerites from surface layer of the stalk; i, j, spicules from coenenchyme of the stalk; k, warts on coenenchymal spicule from the stalk. Enlargement of a-h and k indicated by 0.1 mm scale at c; that of i, j by 1.0 mm scale at k.

In an earlier chapter in this paper, "Note on *Sinularia variabilis* Tixier-Durivault" (p. 6), I stated that in fact the species *S. variabilis* sensu Tixier-Durivault consists of three different species, viz., *S. variabilis* in a narrower sense, *S. arborea* Verseveldt, 1971, and *S. portieri* sp. nov.

The following colonies belong to *S. variabilis* in a narrower sense:

(1) The holotype from Gambier and Tuamotu Islands (Tixier-Durivault, 1945: 150; 1951, fig. 107); a description of it follows below.

(2) Two colonies from Gambier Is., collected by Salvat in 1965 and recorded by Tixier-Durivault (1969: 156). These specimens were re-examined by me; I have not seen the remaining ten samples collected by Chevalier, so I have no opinion as to their identity.

(3) The colony from Gambier Is., called *S. pusilla* by Tixier-Durivault (1969: 151-154, figs. 7-9).

The holotype is a hard colony; it is flattened laterally (pl. 38 fig. 1). The total height is 90 mm. On one side the sterile stalk is about 50 mm high, the capitulum is 40 mm high; on the other side the proportion is slightly different. The stalk is 30 mm wide; it has irregular, longitudinal grooves. The capitulum consists of some lobes, which are covered with numerous, closely set lobules. The latter are round knobs or short, fingerlike processes; their width is about 2 mm.

The surface layer of the lobules contains large clubs, 0.17 to 0.31 mm long. The heads have warty prominences, which occasionally seem to be leaflike. The pointed handles bear some spines and small warts (fig. 65a-d). The clubs in the surface layer of the stalk are usually slightly shorter, but wider (fig. 65e-h).

In the interior of the lobes lie some curved, unbranched, blunt or pointed spindles, up to 3.40 mm long and 0.75 mm wide. They are covered with high, strongly crenellated, big warts, with diameters of 0.06 to 0.09 mm. In the middle part of the stalk the internal spicules are shorter, up to 2.60 mm (fig. 65i, j). Most of them are blunt-ended, and have a distinct median constriction. In the base of the stalk the spindles are still shorter, up to 1.50 mm. The big warts are slightly less crenellated (fig. 65k).

In alcohol the specimen is grey.

Pl. 38 fig. 3 represents two colonies from Aukena, Gambier Is., collected by Salvat in 1965. These colonies are also flattened laterally. The spiculation agrees with that of the holotype.

Tixier-Durivault (1969: 151) described a colony from Aukena, Gambier Is., as *S. pusilla*. A re-examination of this colony proved that is was identical with *S. variabilis* (fig. 66). The enlargement of Tixier-Durivault's drawing of this specimen (1969, fig. 7) is × 1.25. Pl. 38 fig. 2 shows it more from

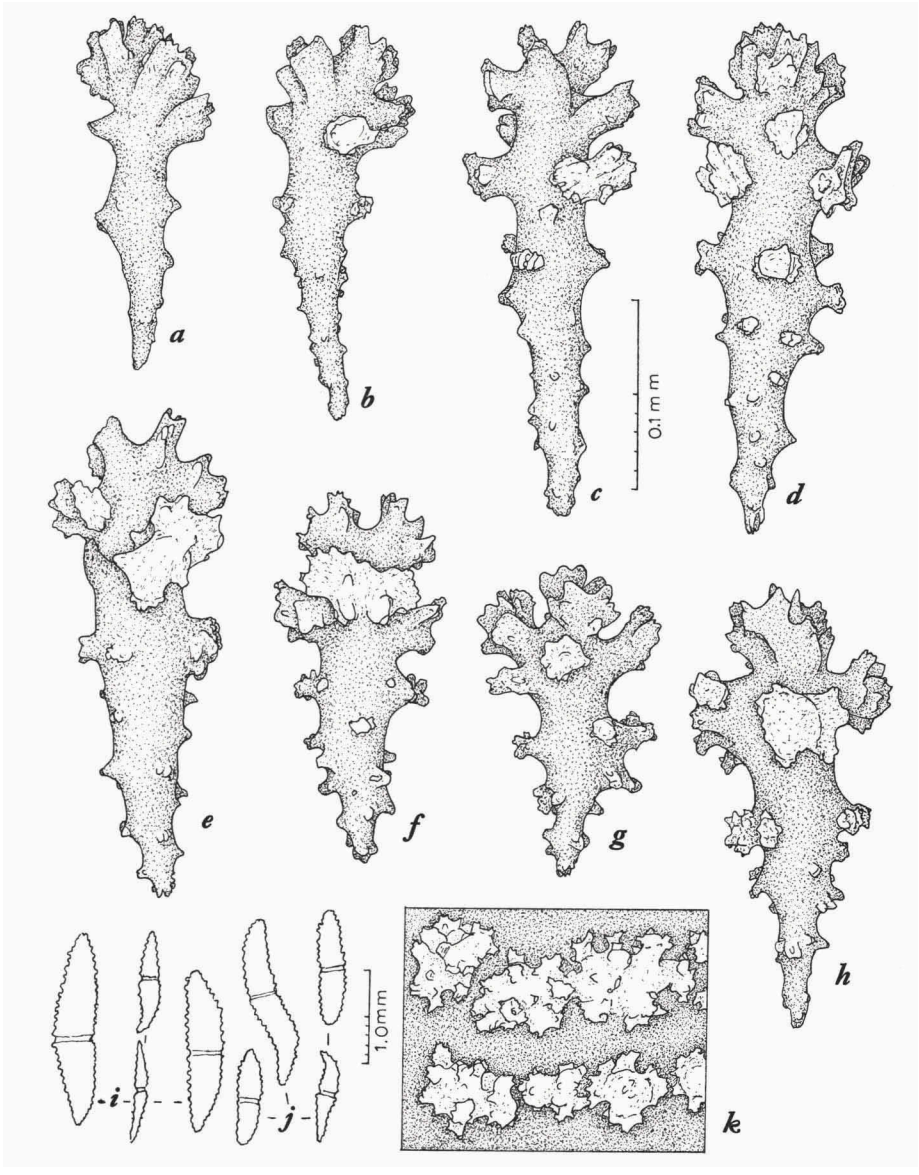

Fig. 66. *Sinularia variabilis* Tixier-Durivault (= "*S. pusilla*" Tixier-Durivault, 1969), MNHN. a-d, sclerites from surface layer of a lobe; e-h, sclerites from surface layer of the stalk; i, j, spicules from interior of the stalk; k, warts on coenenchymal spicule from the stalk. Enlargement of a-h and k indicated by 0.1 mm scale at c; that of i, j by 1.0 mm scale at j.

above and at natural size. As already stated, not any caption to the figures in Tixier-Durivault's publication of 1969 records the enlargements. In the text impossible dimensions are mentioned: "des aiguilles... 0.19 à 0.4 mm de long"; "aiguilles... 0.2 à 0.36 mm de long".

In previous papers (1960: 235-239; 1974b: 102) I explained that the identification of the Siboga specimens with *S. dura* by Thomson & Dean (1931: 50-51) is correct, and that they have nothing to do with *S. variabilis*, as Tixier-Durivault (1951: 83) supposed.

Geographical distribution. — Tuamotu Is., Gambier Is., New Caledonia.

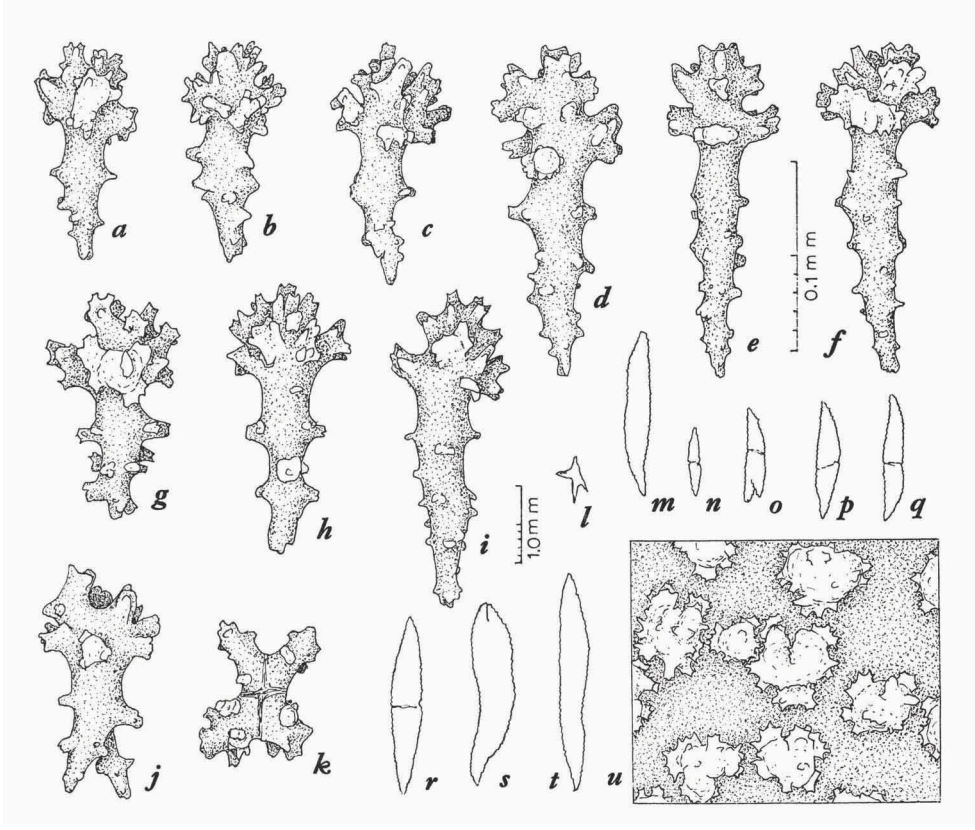

Fig. 67. *Sinularia venusta* Tixier-Durivault, holotype, MNHN. a-f, sclerites from surface layer of a lobe; g-k, sclerites from surface layer of the sterile stalk; l-t, sclerites from coenenchyme of the stalk; u, tubercles on coenenchymal sclerite from the stalk. Enlargement of a-k and u indicated by 0.1 mm scale at e; that of l-t by 1.0 mm scale at l.

Sinularia venusta Tixier-Durivault, 1970 (fig. 67, pl. 37 fig. 1)

Sinularia venusta Tixier-Durivault, 1970a: 283, figs. 136-138; Tixier-Durivault, 1972: 23; Verseveldt, 1977b: 37-39, figs. 26, 27, pl. 7 fig. 2.

The enlargement of the holotype in Tixier-Durivault's fig. 136 (1970a) is × 1.3. Pl. 37 fig. 1 shows the same colony at natural size.

In my paper of 1977(b) I gave a description of colonies from Wake Islands, and drawings of the sclerites of one of these colonies (fig. 26) and of Tixier-Durivault's holotype (fig. 27). There is no need for further explanation.

Geographical distribution. — New Caledonia, Réunion, Wake Is.

Sinularia whiteleggei Lüttschwager, 1914 (fig. 68, pl. 37 figs. 4, 5)

Lobophytum tuberculosum, Whitelegge, 1897: 217-218, pl. 11 figs. 3a-3f.
Sinularia whiteleggei Lüttschwager, 1914: 13; Kolonko, 1926: 329-330; Thomson & Dean, 1931: 52, pl. 8 fig. 5; Tixier-Durivault, 1945: 58-59; Tixier-Durivault, 1951: 30-33, figs. 22, 29-33; Tixier-Durivault, 1966: 179-181, figs. 172-174; Tixier-Durivault, 1969: 156; Tixier-Durivault, 1970a: 260; Tixier-Durivault, 1970b: 222; Tixier-Durivault, 1972: 23-24.

I examined the specimen AMS G1539, identified with *Lobophytum tuberculosum* Quoy & Gaimard by Whitelegge (1897). The grey colony measures 58 mm in length, 27 mm in width, and 33 mm in maximum height (pl. 37 figs. 4, 5). The basal part is cut off obliquely. The capitulum consists of numerous small lobules, a lot of which arise from a few primary lobes. The lobules are densely placed, often closely pressed together, low, rounded. They attain dimensions of 9 × 7 mm, but usually they are much smaller. They are covered with numerous polyps, which are retracted into distinct pits; their centres are 0.70 to 0.90 mm apart.

In the surface layer of the lobes lie clubs, usually 0.12 to 0.15 mm long (fig. 68a-f). Some of them have less distinct heads with few, rounded prominences or simple warts; others have a more warted head, sometimes with a kind of central wart. The handles are usually pointed, and bear few processes. In addition to these, there are stouter clubs, 0.17 to 0.20 mm long; some with a less developed head bearing few irregular prominences (fig. 68g, j); others with a strongly developed head, often composed of numerous rough warts (fig. 68h, i). Still stouter, warty clubs, up to about 0.25 mm long, are transitional forms to internal spicules.

The clubs in the surface layer of the sterile base hardly differ from those in the lobes. Smaller clubs, about 0.10 mm long, are also common (fig. 68k, l), but stouter clubs like those pictured in fig. 68g-j are absent.

The coenenchymal spicules in the lobes and in the sterile base are straight

or slightly curved, rarely branched spindles, up to 1.80 mm long and 0.40 mm wide (fig. 68m). They are pointed or blunt-ended, sometimes slightly clavate. They are covered with medium-sized, strongly crenellated warts, averagely 0.05 mm in diameter (fig. 68n).

Geographical distribution. — Funafuti, Sailus Ketjil (Paternoster Is., Flores Sea, Indonesia), Seychelles, Mauritius, Madagascar, Gambier Is., New Caledonia, Bay of Nha Trang (Vietnam).

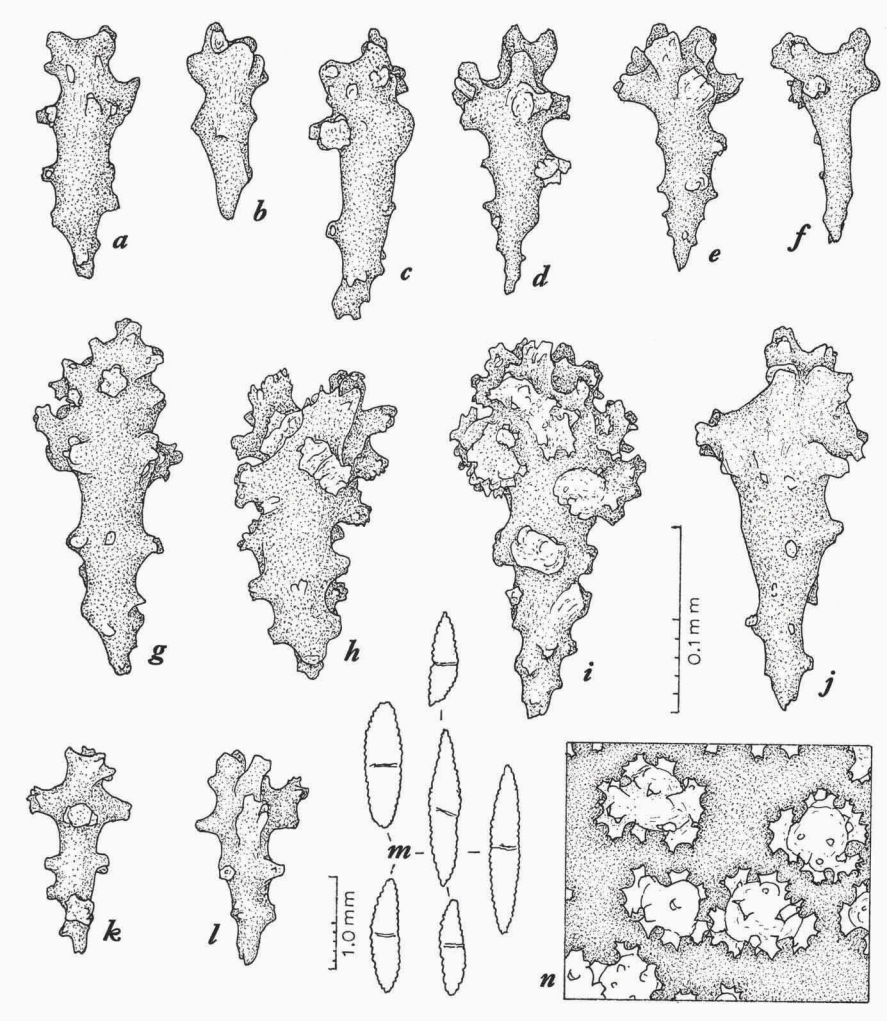

Fig. 68. *Simularia whiteleggei* Lüttschwager, AMS no. G1539. a-j, sclerites from surface layer of a lobe; k, l, sclerites from surface layer of the stalk; m, spicules from interior of the stalk; n, warts on coenenchymal spicule from the stalk. Enlargement of a-l and n indicated by 0.1 mm scale at i; that of m by 1.0 mm scale at m.

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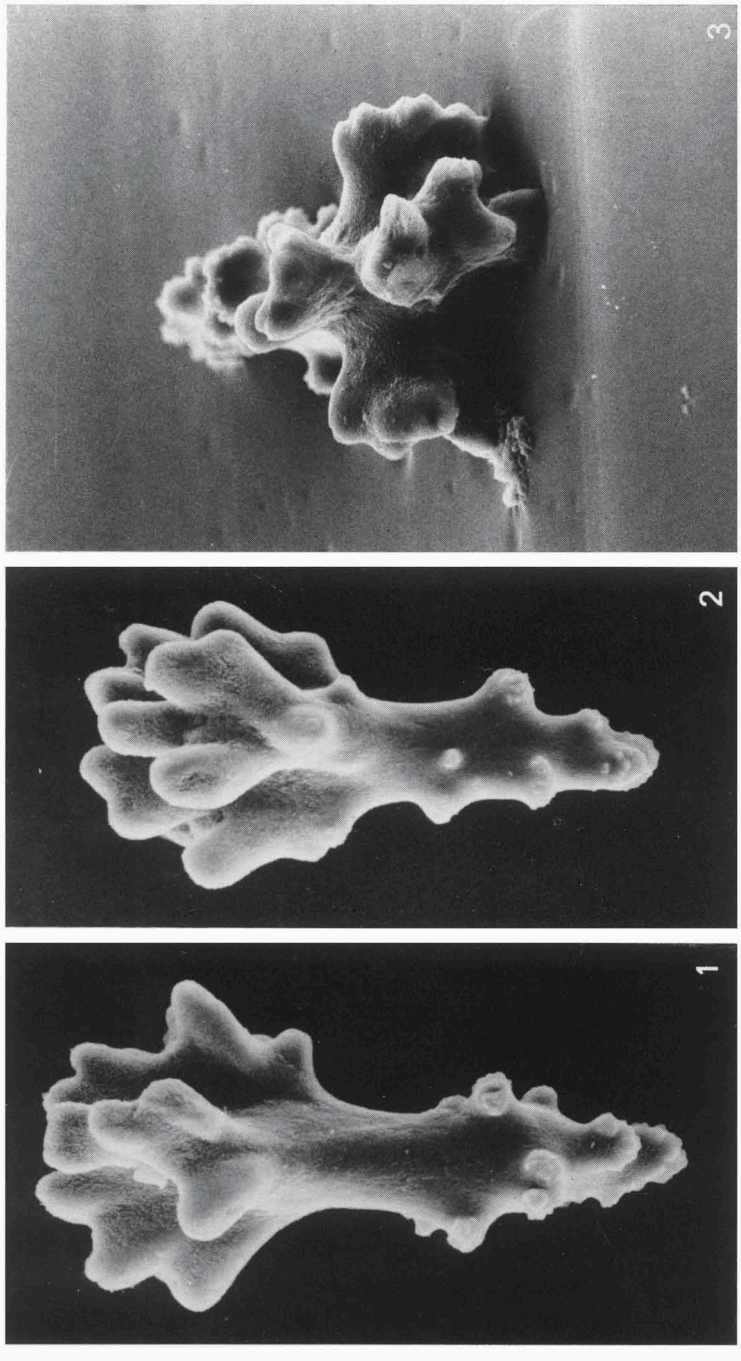
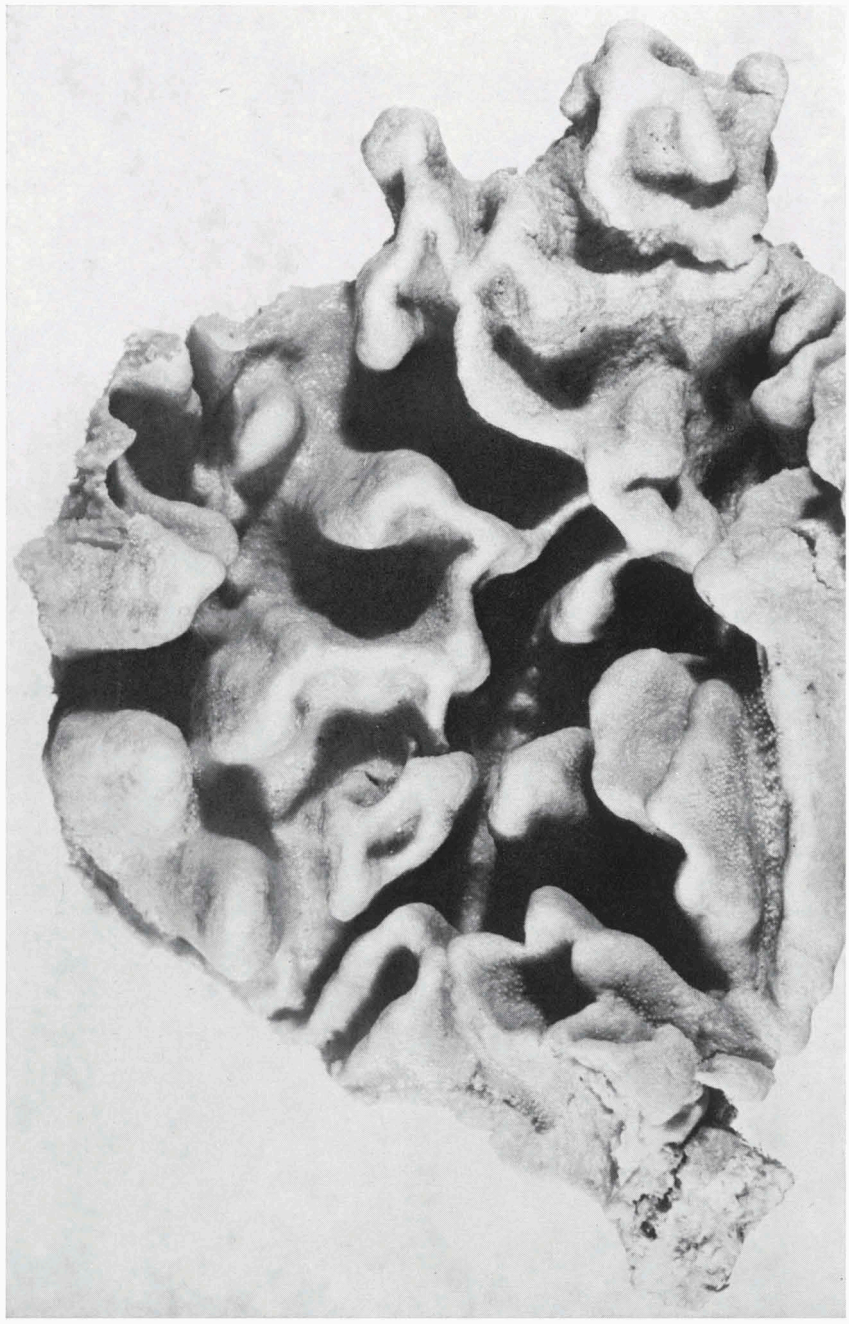
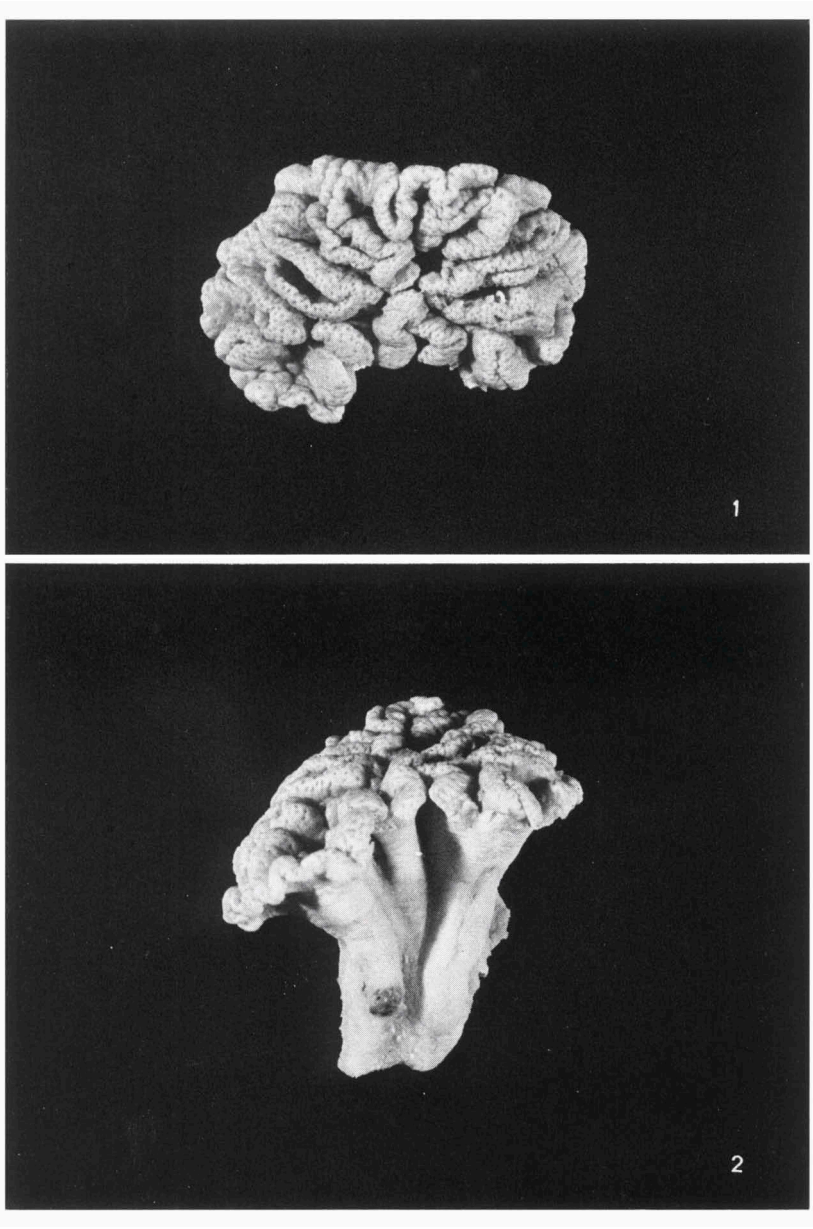


S. leptoclados (Ehrenberg), Red Sea, RMNH. Clubs from surface layer of a lobe. Figs. 1, 2, lateral view; fig. 3, club-head seen at an angle of 30 degrees with the longitudinal axis of the club. Scanning Electron Microscope pictures; enlargement × 1000. (Photographs figs. 1 and 2 made by Dr. Frederick M. Bayer, fig. 3 by Dr. Stevin Weinberg).



S. abrupta Tixier-Durivault, holotype, MNHN, × 1.



S. brassica May, holotype, ZMH C 2511, × 1.

S. capillosa Tixier-Durivault, holotype, MNHN, × 1.

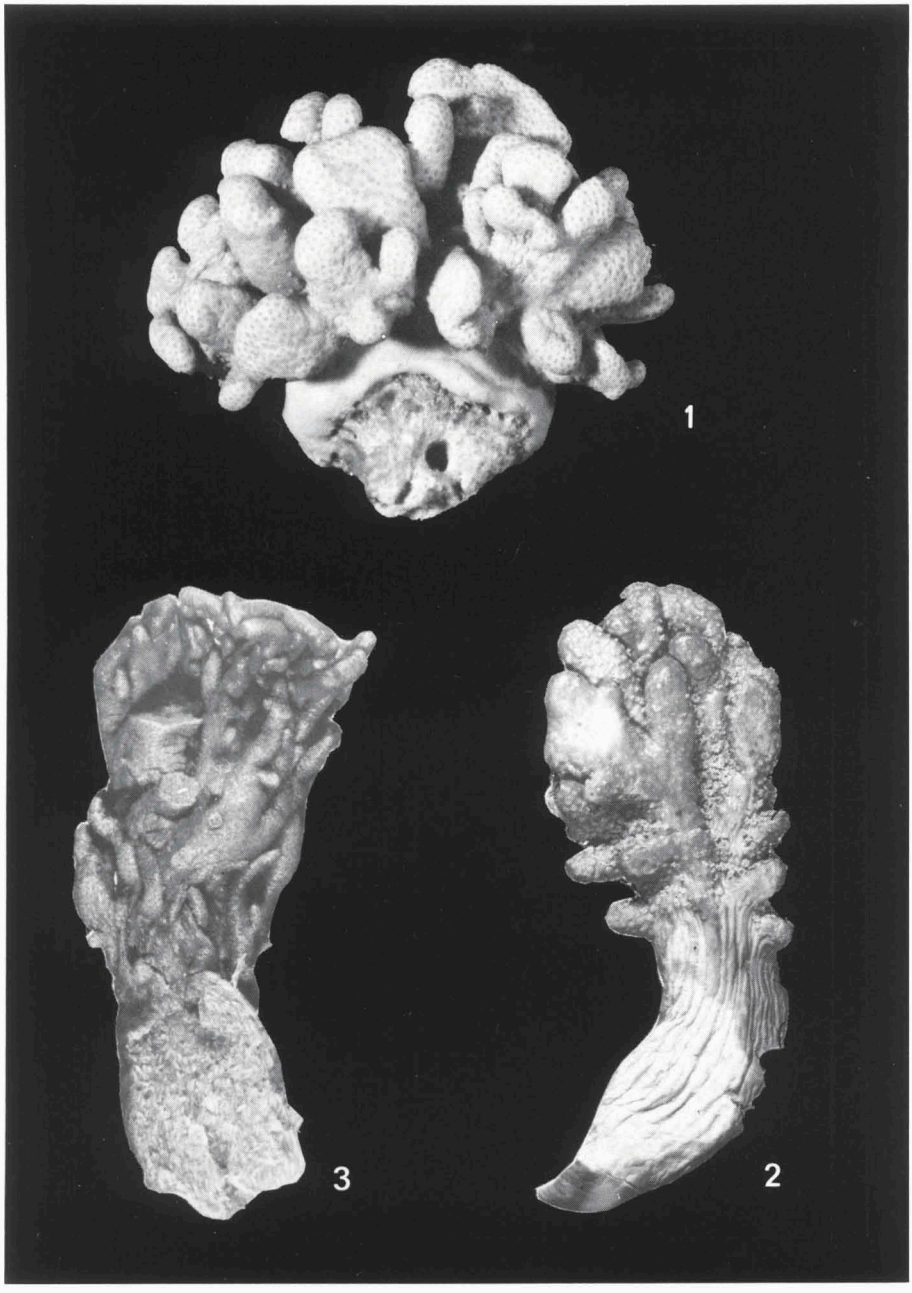


Fig. 1. *S. capitalis* (Pratt), holotype, BMNH no. 1936.5.12.3, × 1. Fig. 2. *S. capitalis* (Pratt), holotype of "*S. palmatum*" (Pratt), BMNH no. 1962.7.20.97, × 1. Fig. 3. *S. conferta* var. *gracilis* Macfadyen, holotype, BMNH no. 1934.3.28.67, × 1.

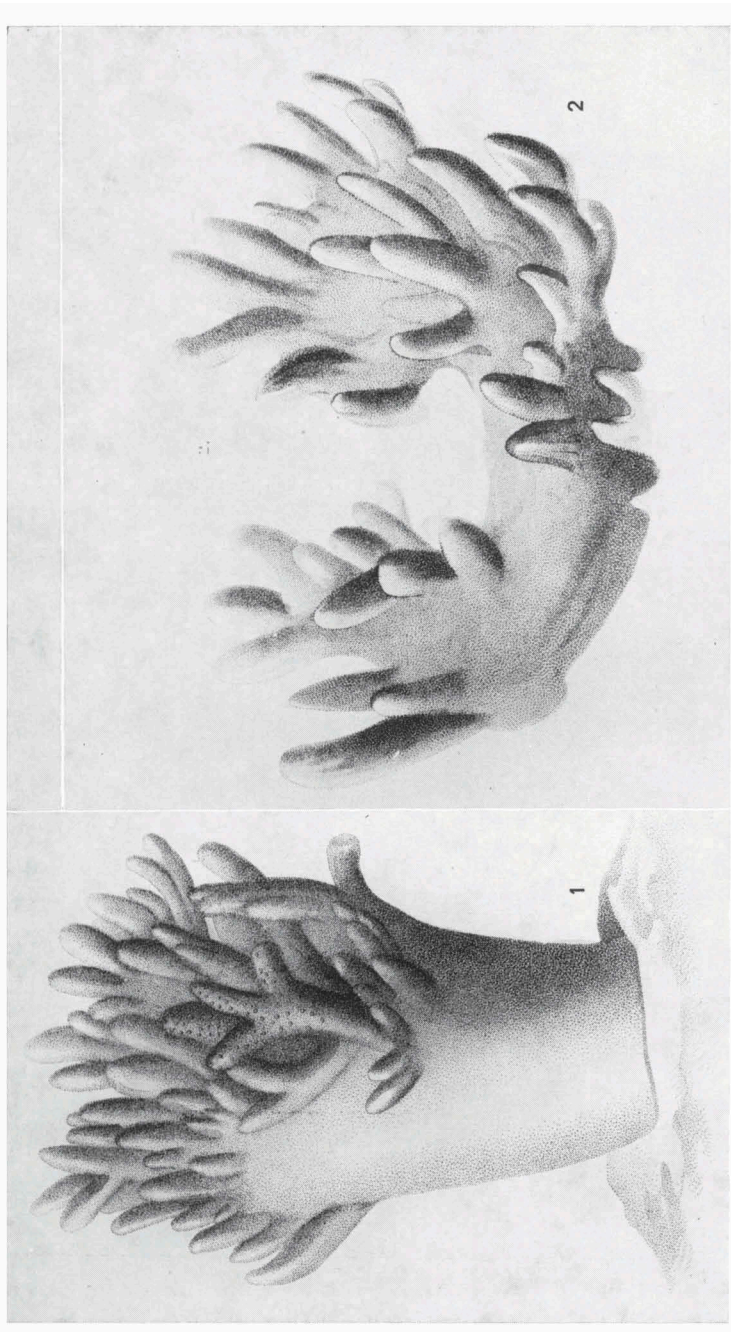
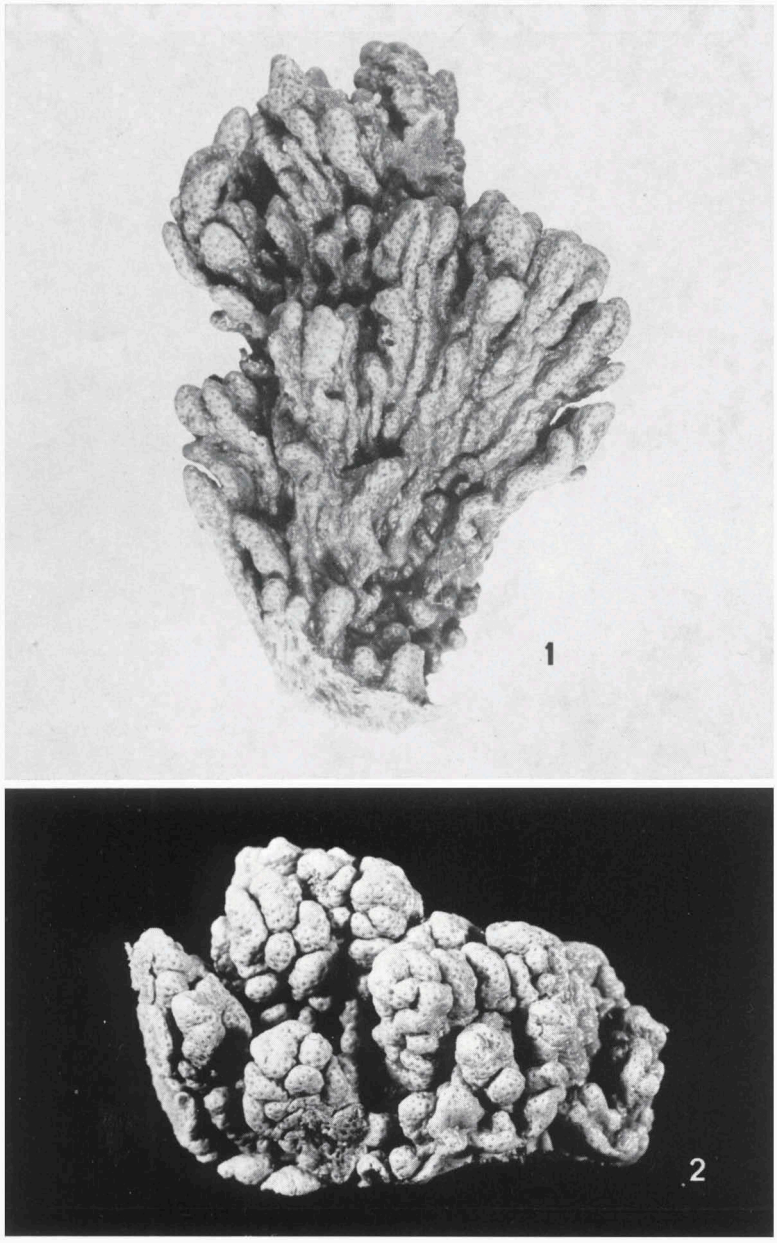
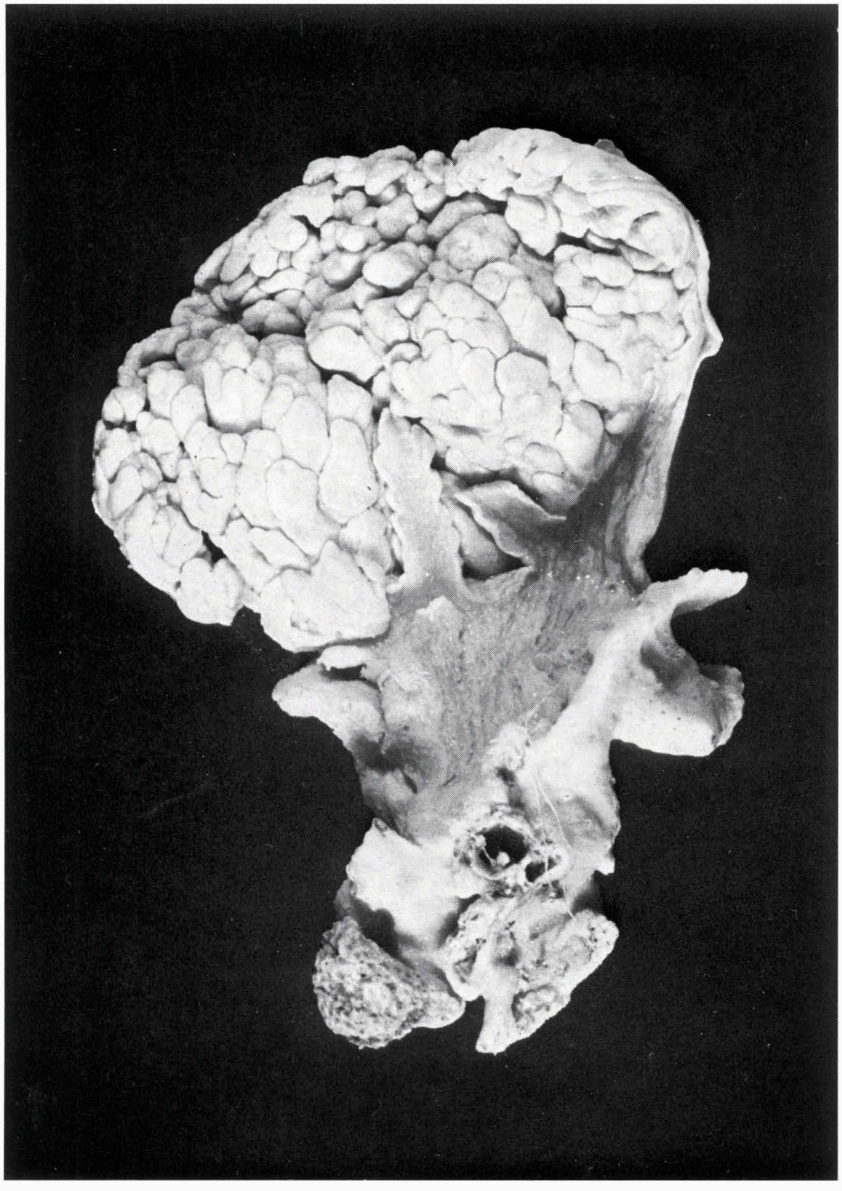


Fig. 1. *S. conferta* (Dana), holotype; photograph taken from Dana's drawing, pl. 57 fig. 7. × 1. Fig. 2. *S. rigida* (Dana), holotype; photograph taken from Dana's drawing, pl. 58 fig. 2. × 1. (Photographs made by Mr. E. L. M. van Esch, RMNH).



S. "conferta" according to Whitelegge; AMS G. 1540. Fig. 1: brown specimen; fig. 2: grey specimen; × 1.



S. "conferta" according to Tixier-Durivault; MNHN, × 1.

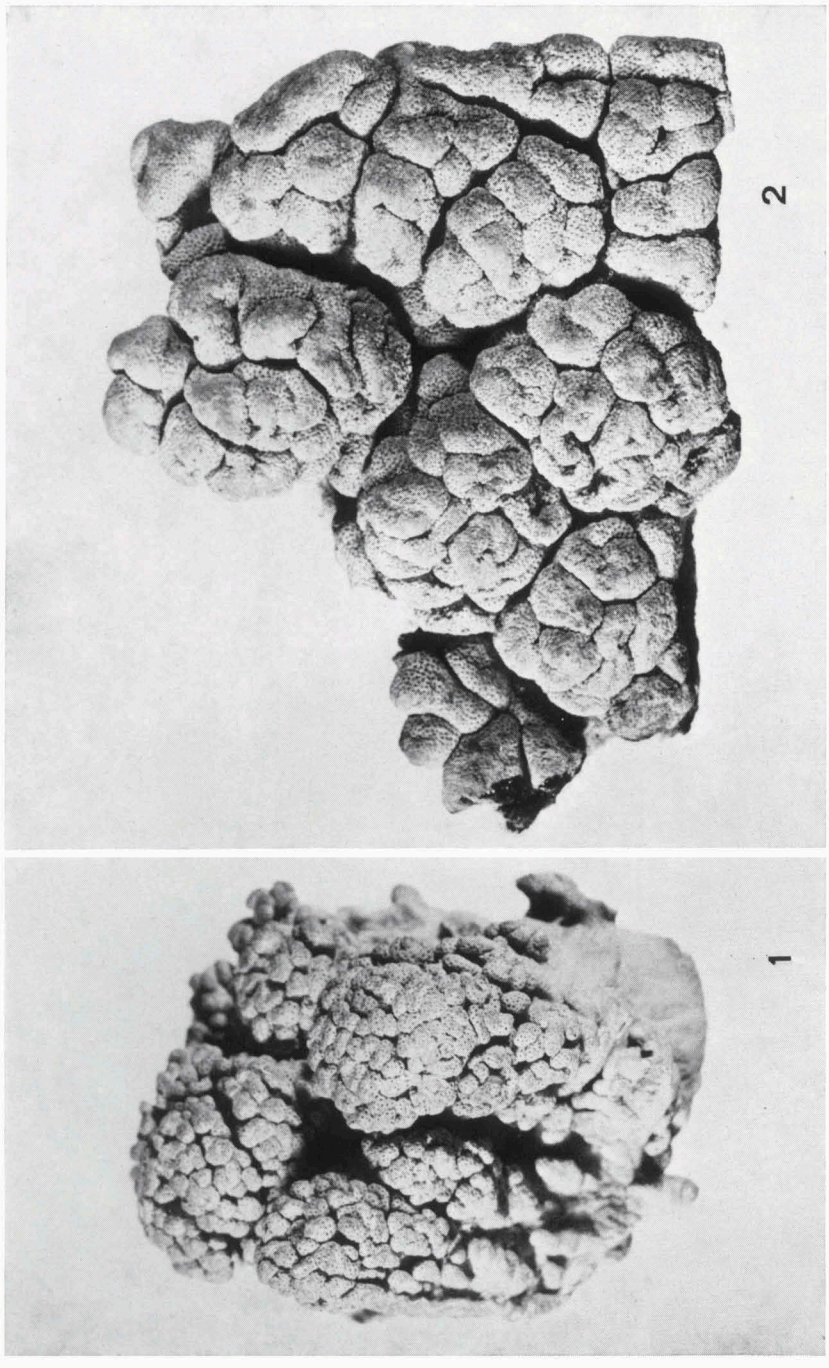


Fig. 1. *S. compressa* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. crassa* Tixier-Durivault, holotype, MNHN, × 1.

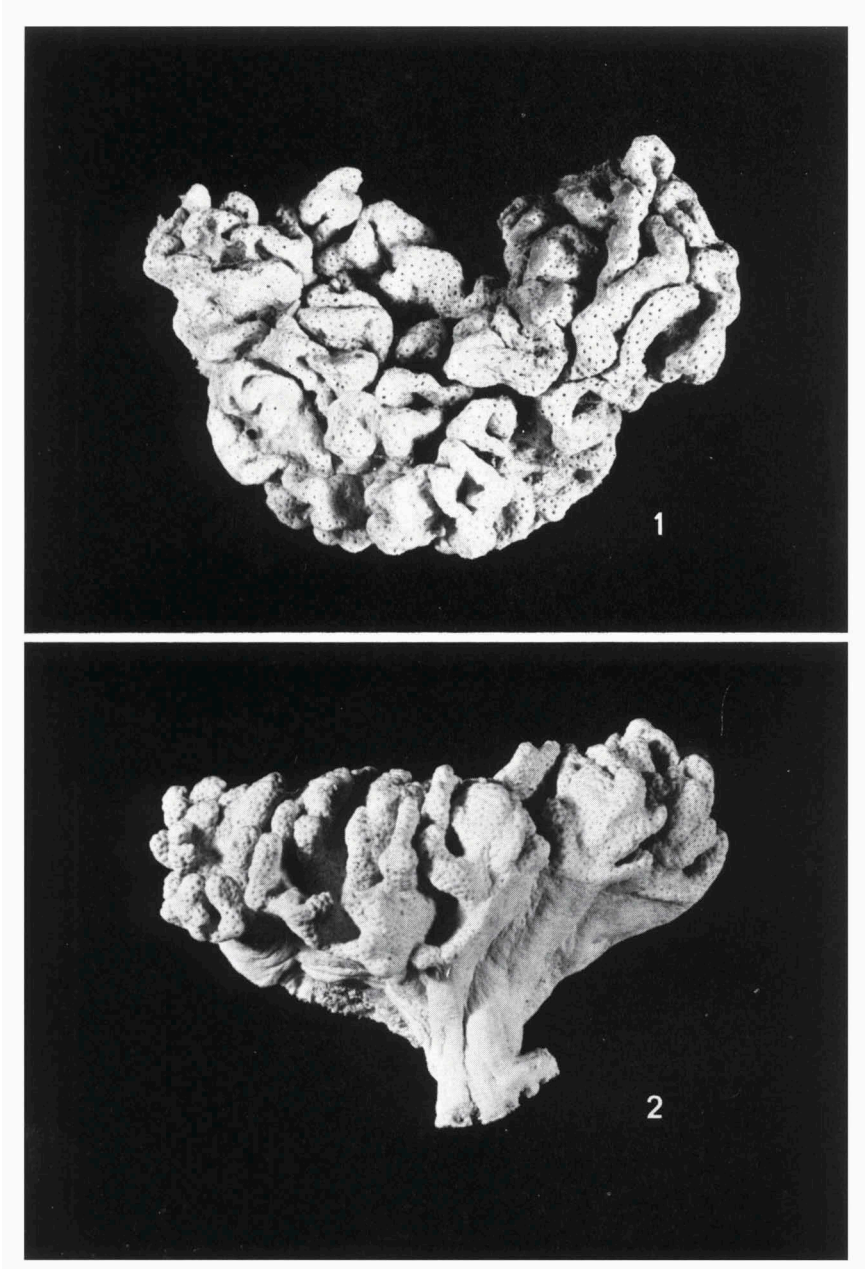
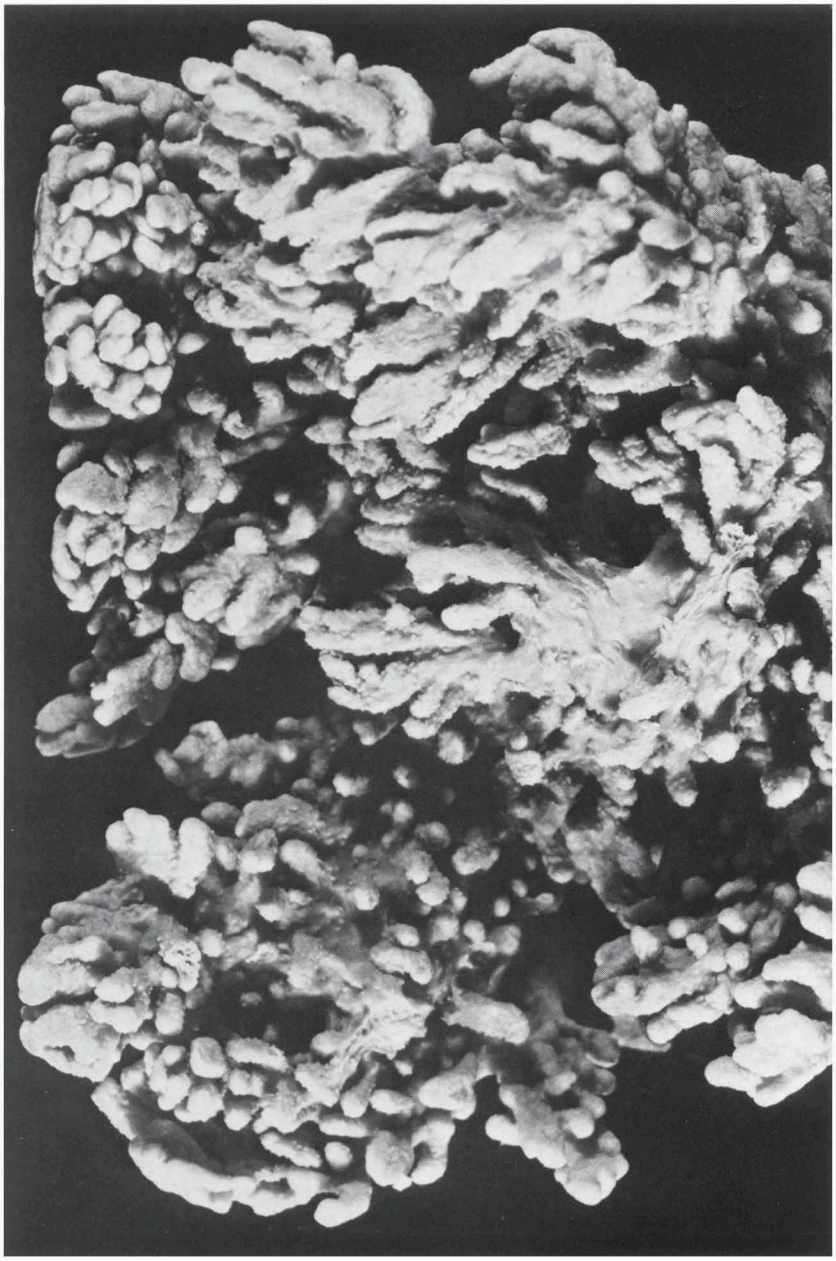


Fig. 1. *S. numerosa* Tixier-Durivault, holotype of *S. "crispa"* Tixier-Durivault, MNHN, × 1. Fig. 2. *S. cristata* Tixier-Durivault, holotype, MNHN, × 1.



S. cruciata Tixier-Durivault, holotype, MNHN, × 1.

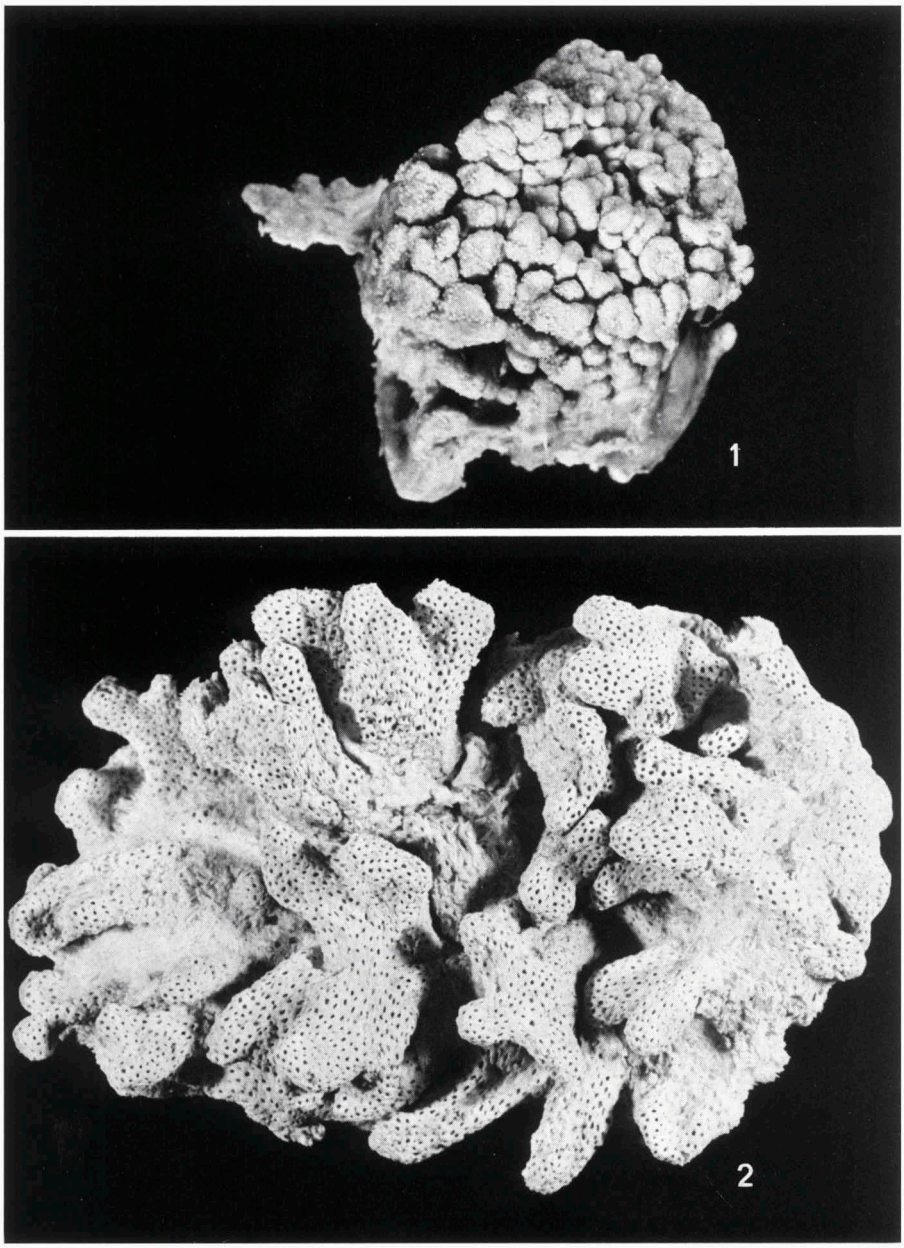


Fig. 1. *S. depressa* Tixier-Durivault, paratype, MNHN, × 1. Fig. 2. *S. deformis* Tixier-Durivault, holotype, MNHN, × 1.

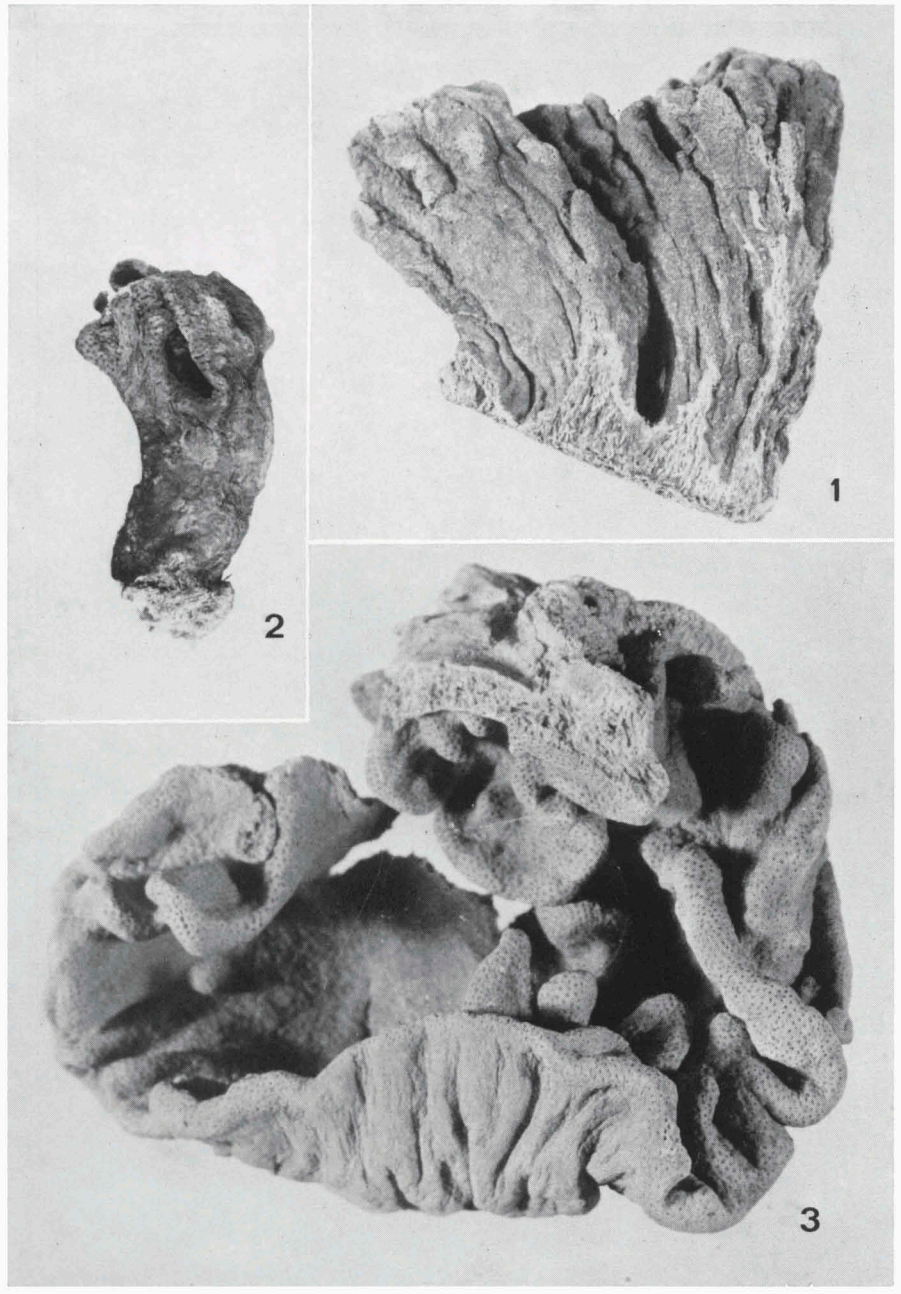


Fig. 1. *S. dissecta* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. firma* Tixier-Durivault, holotype, MNHN, × 1. Fig. 3. *S. facile* Tixier-Durivault, holotype, MNHN, × 1.

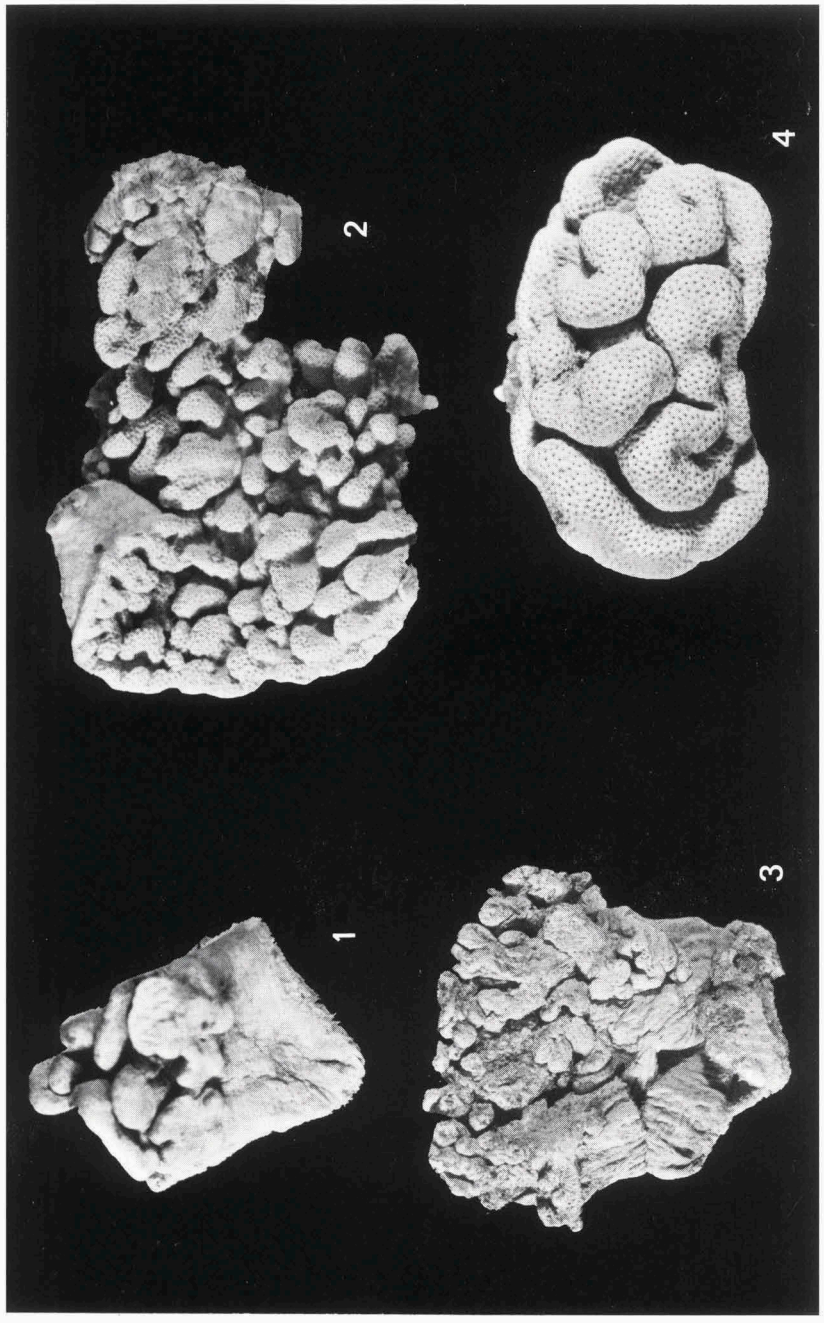


Fig. 1. *S. compacta* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. exilis* Tixier-Durivault, holotype, MNHN, × 1.
Fig. 3. *S. elongata* Tixier-Durivault, holotype, MNHN, × 1. Fig. 4 *S. gravis* Tixier-Durivault, holotype, MNHN, × 1.

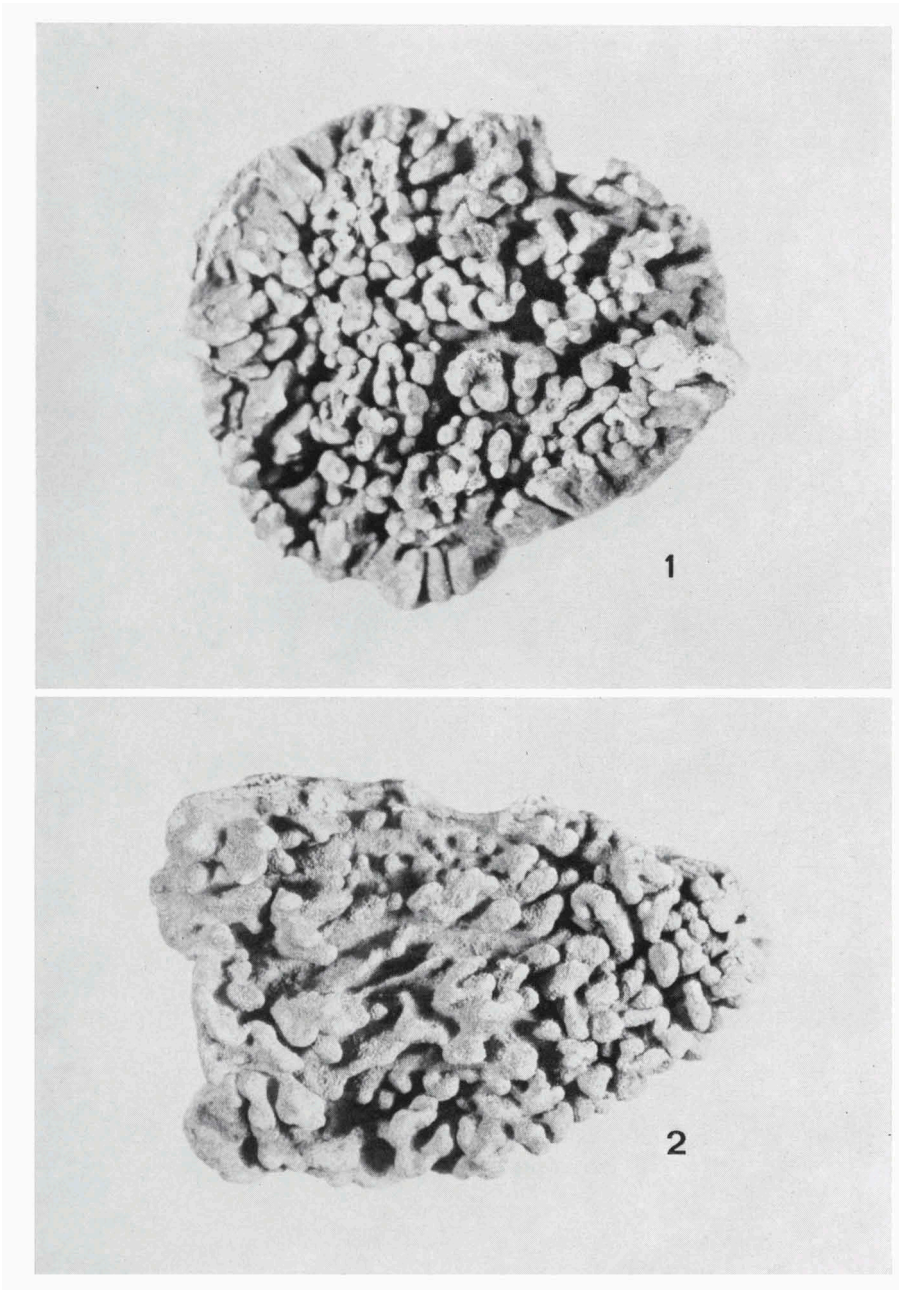


Fig. 1. *S. erecta* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. erecta* Tixier-Durivault, holotype of "*S. simpsoni*" Tixier-Durivault, MNHN, × 1.

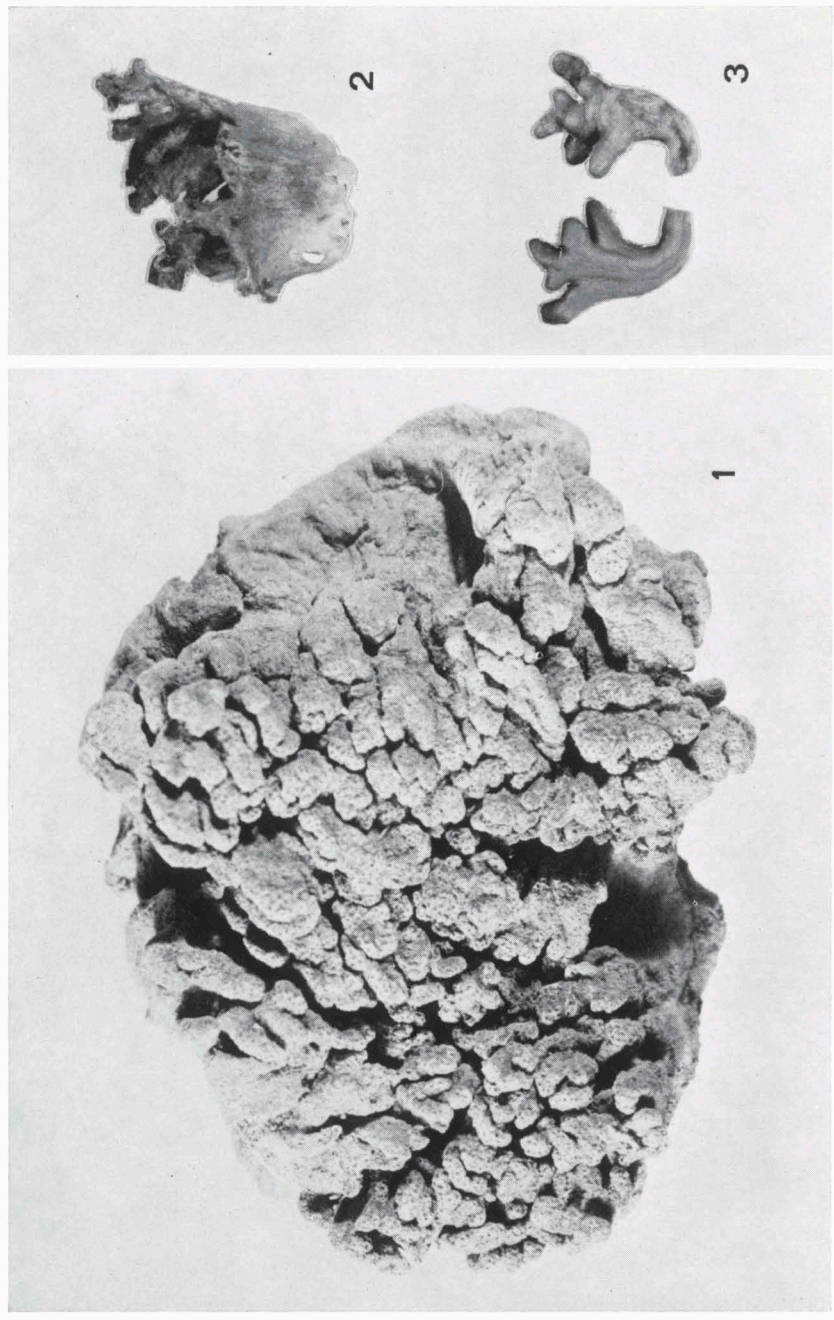
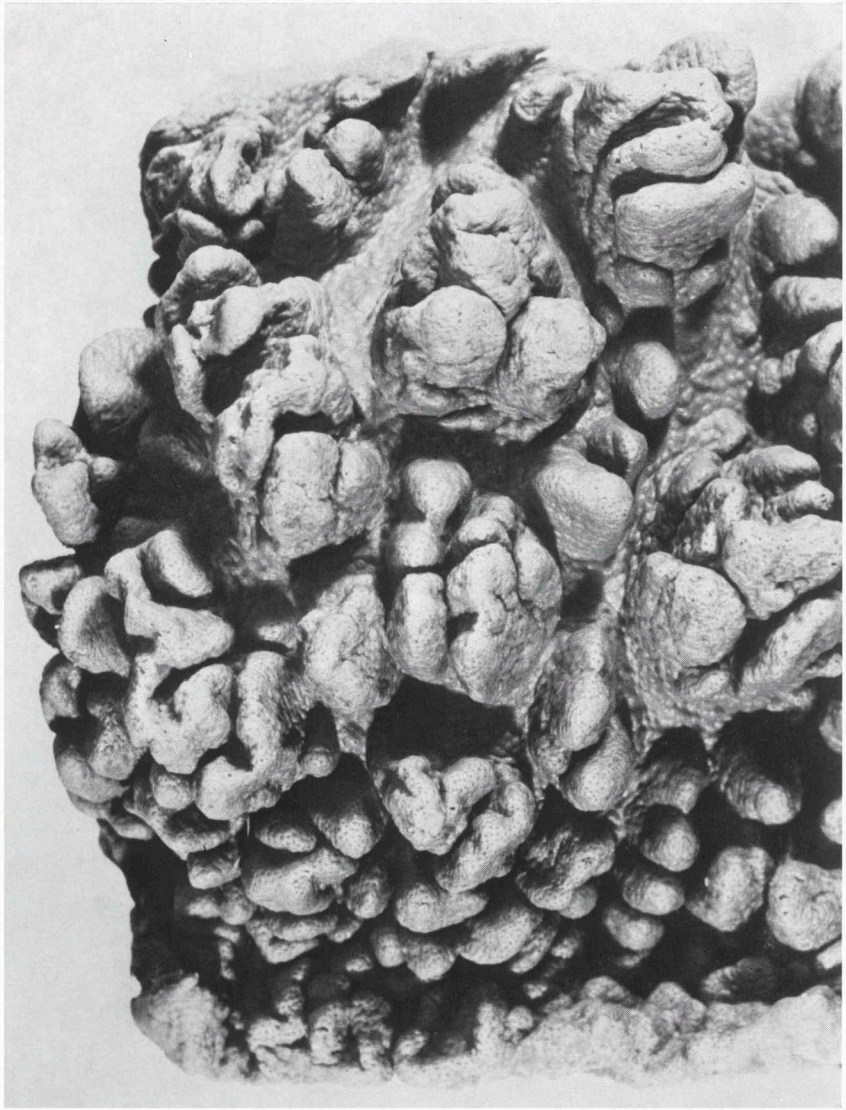
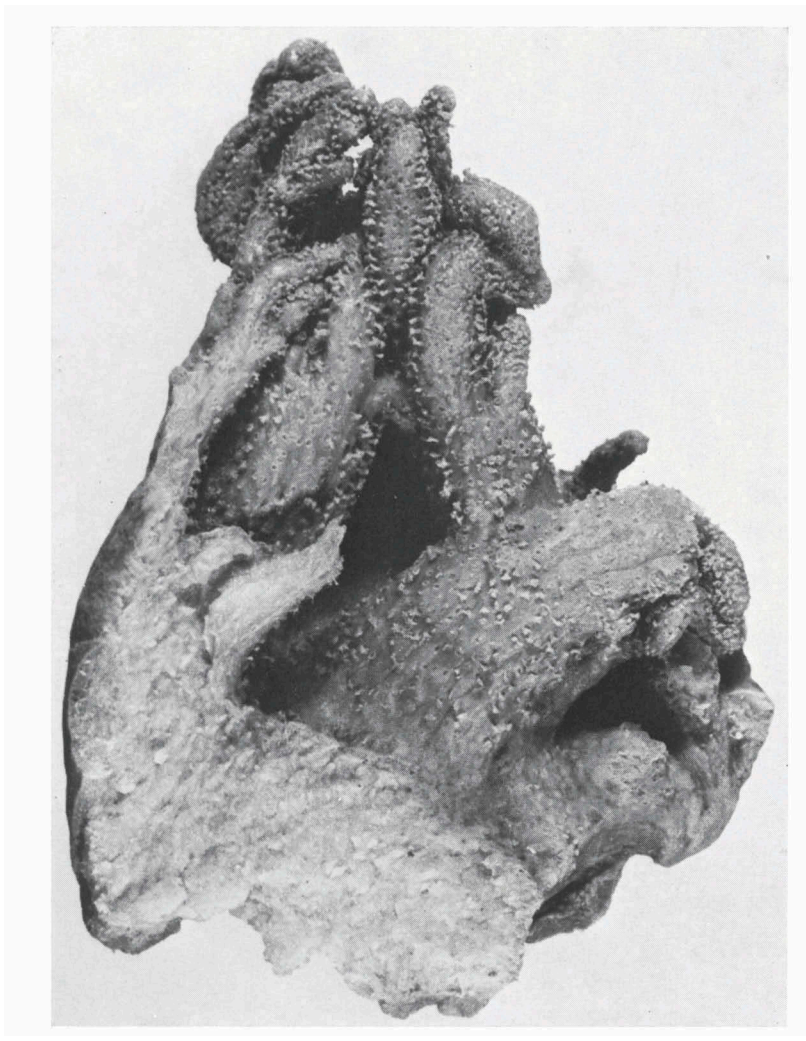


Fig. 1. *S. flexuosa* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. gardineri* (Pratt), holotype, BMNH no. 1962.7.20.99, × 1. Fig. 3. *S. manaarensis* sp. nov., holotype, BMNH no. 1936.5.12.2, × 1.

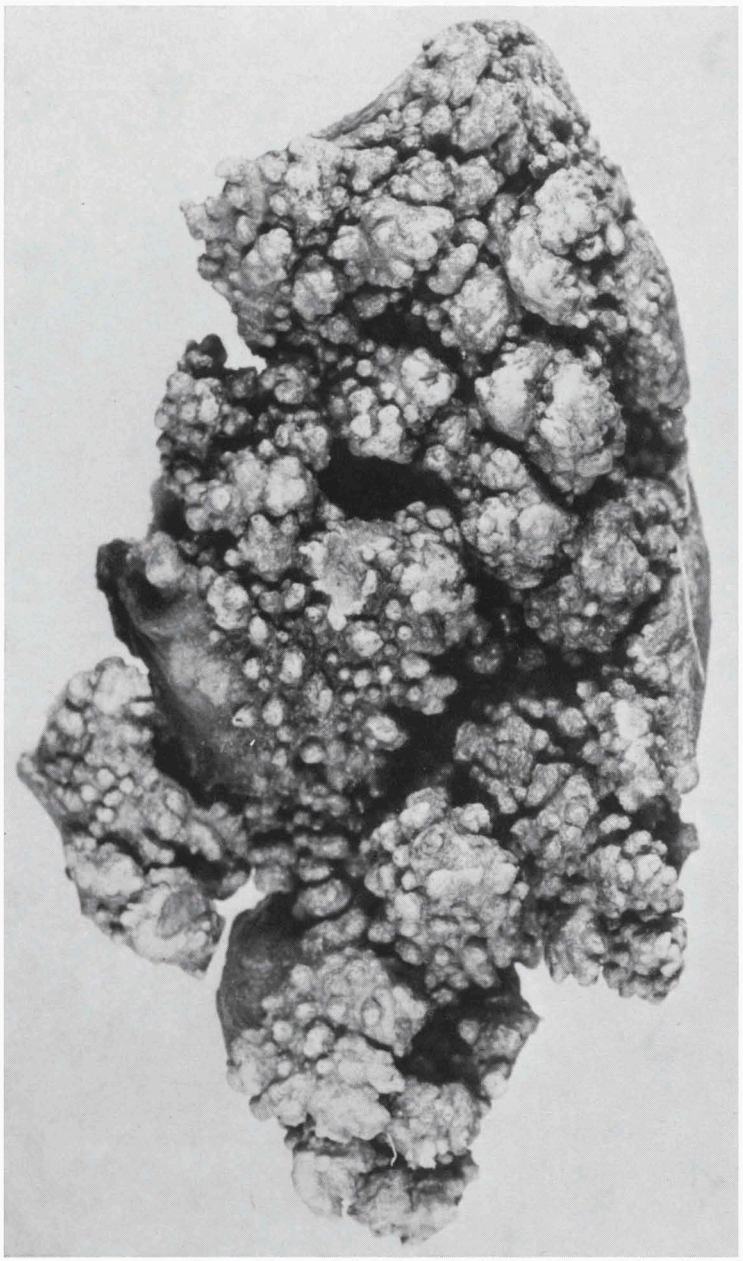
S. gibberosa Tixier-Durivault, holotype, MNHN, × 1.



S. gibberosa Tixier-Durivault, ZMB no. 2725, identified with *Alcyonium leptoclados* var. *abbreviate* by May, × 1.



S. grandilobata sp. nov., holotype, ZMB no. 6500, × 1.



S. granosa Tixier-Durivault, type, MNHN, × 1.

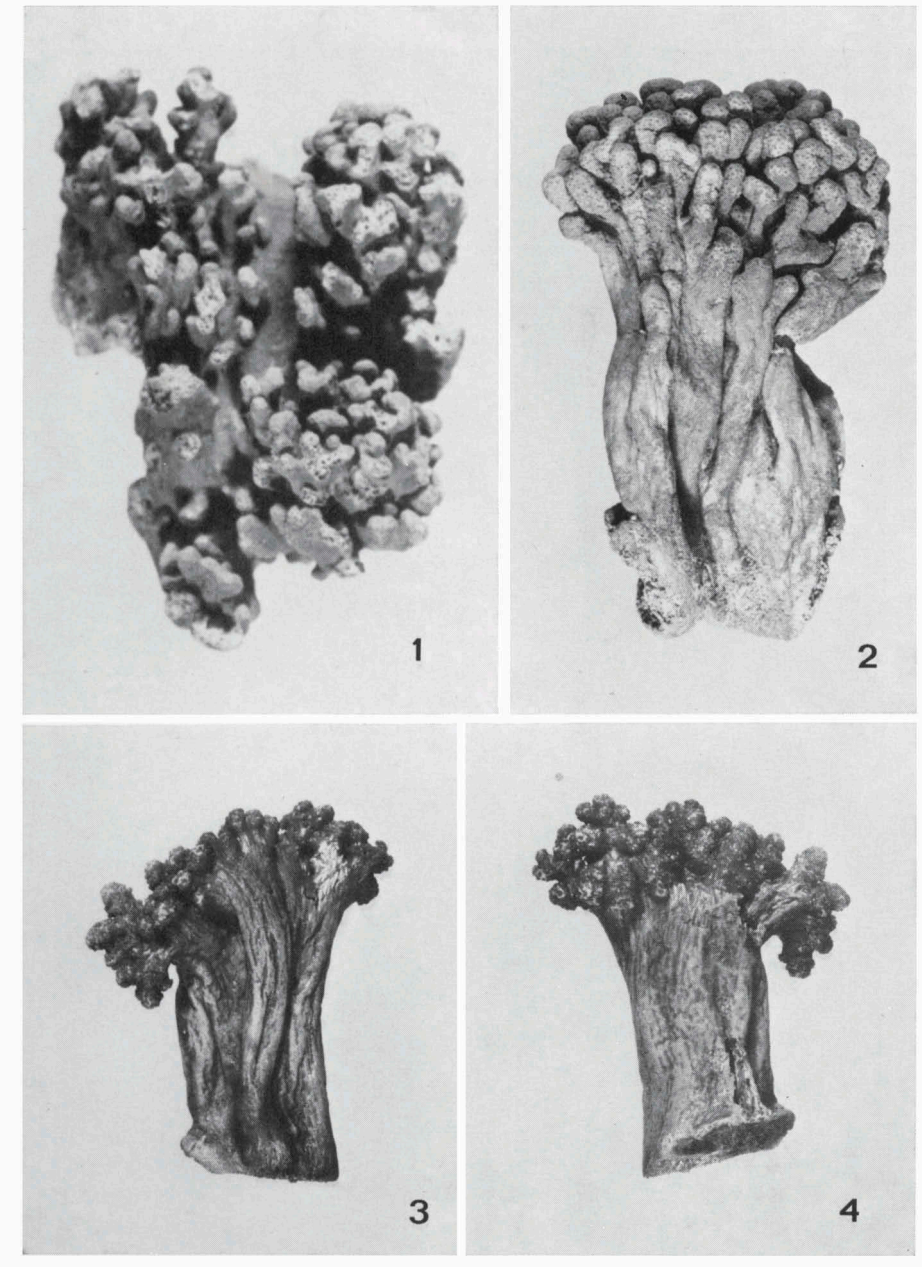


Fig. 1. *S. grayi* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. intacta* Tixier-Durivault, holotype, MNHN, × 1. Fig. 3. *S. macropodia* (Hickson & Hiles), holotype, UMZC, × 1. Fig. 4. The same colony, reverse side.

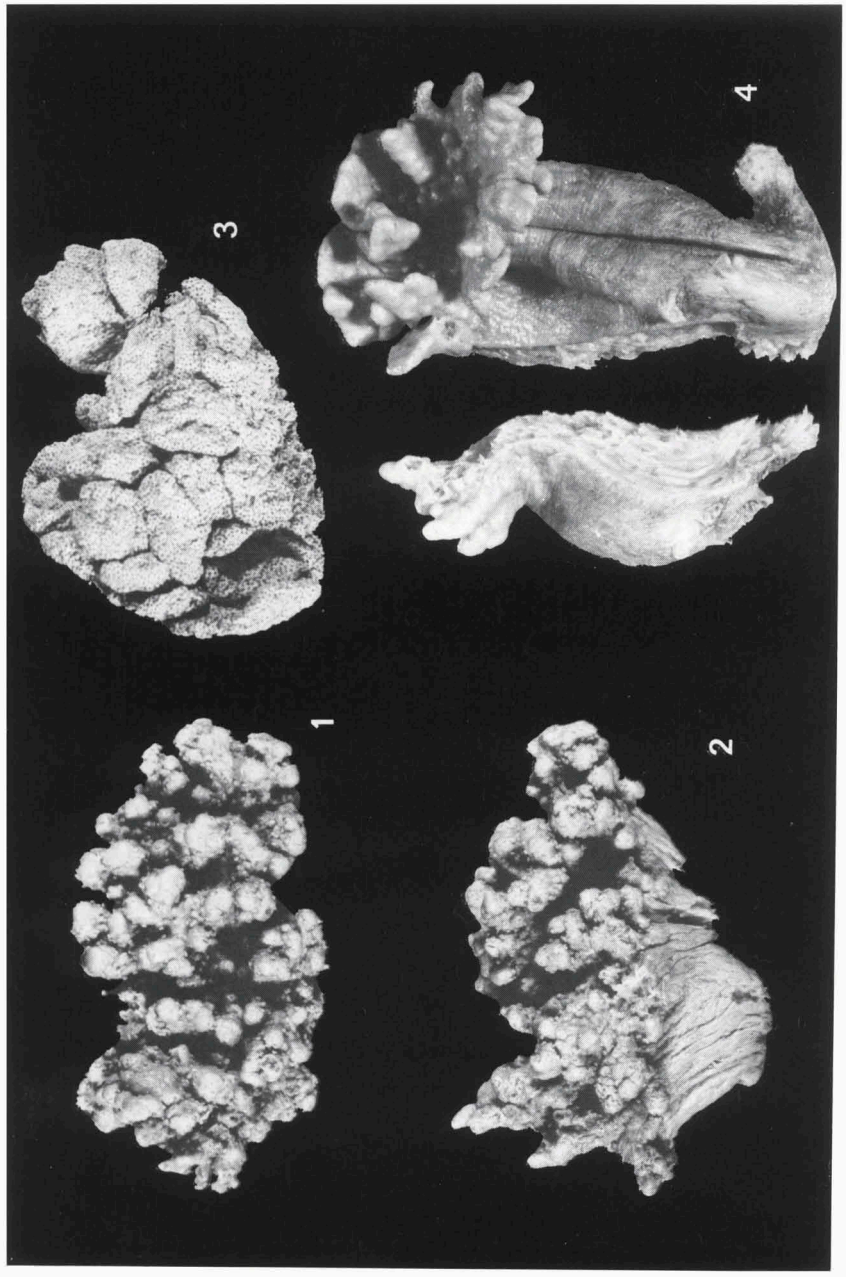
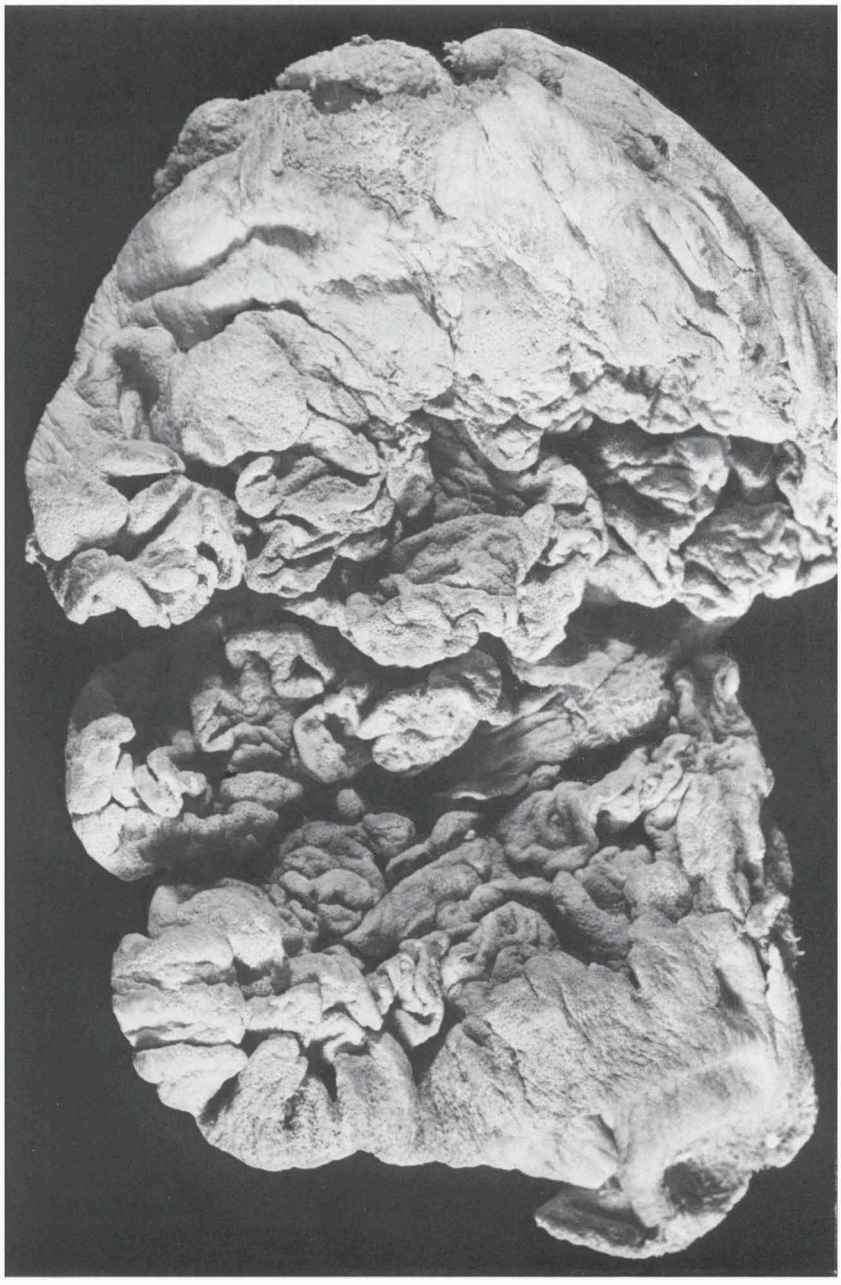


Fig. 1. *S. hirta* (Pratt), holotype, BMNH no. 1936.5.12.4, seen from above, × 1. Fig. 2. The same colony, lateral view. Fig. 3. *S. inflata* Tixier-Durivault, holotype, MNHN, × 1. Fig. 4. *S. fungoides* Thomson & Henderson, holotype, BMNH no. 1912.2.25.9, × 1.



S. inelegans Tixier-Durivault, holotype, MNHN, × 1.

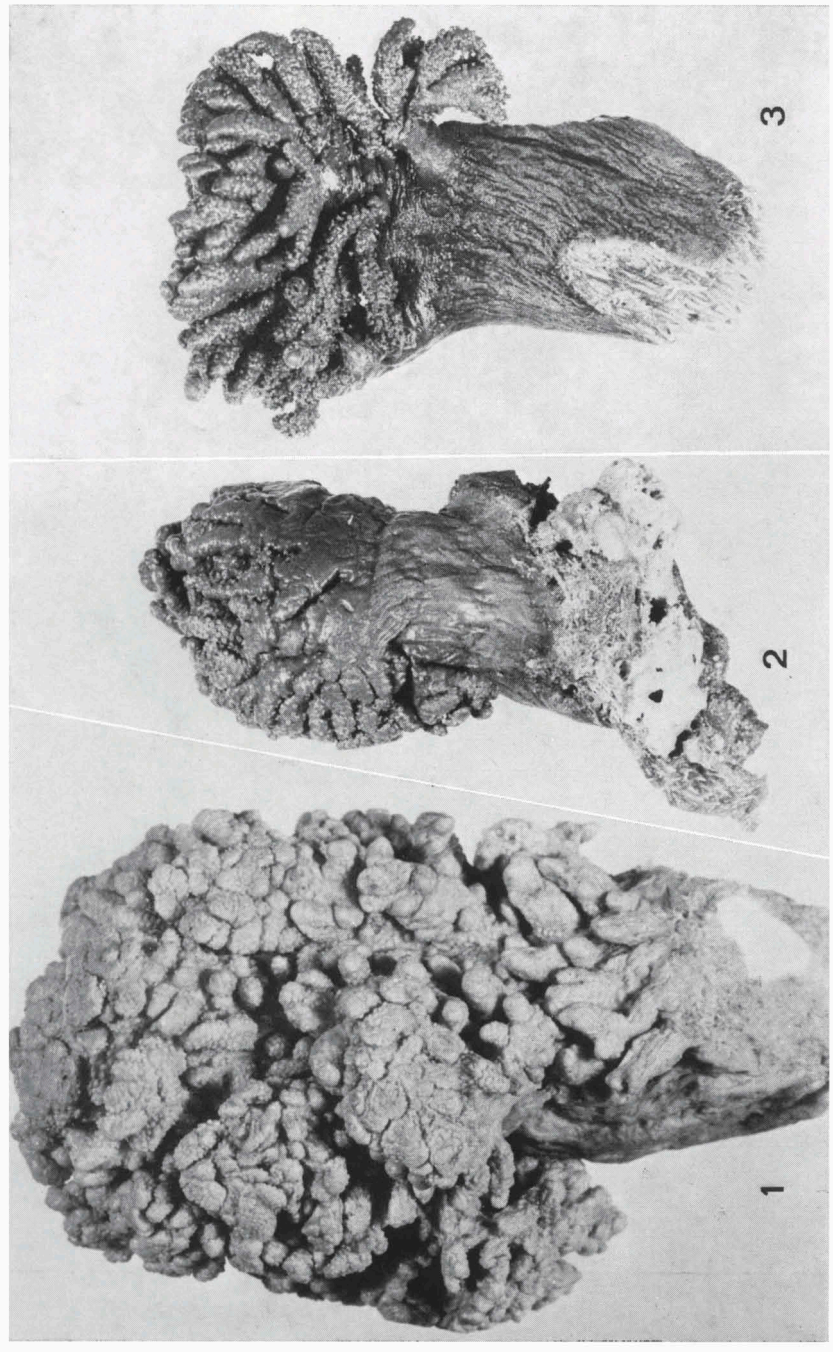
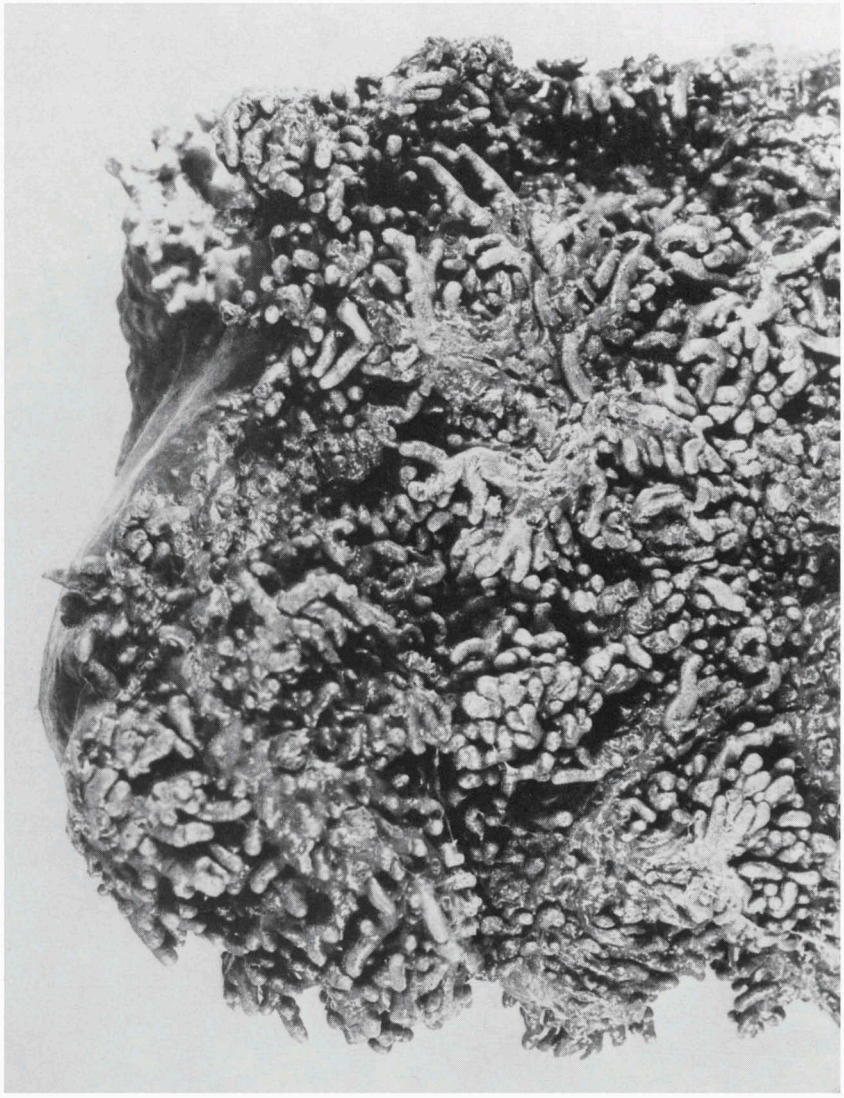
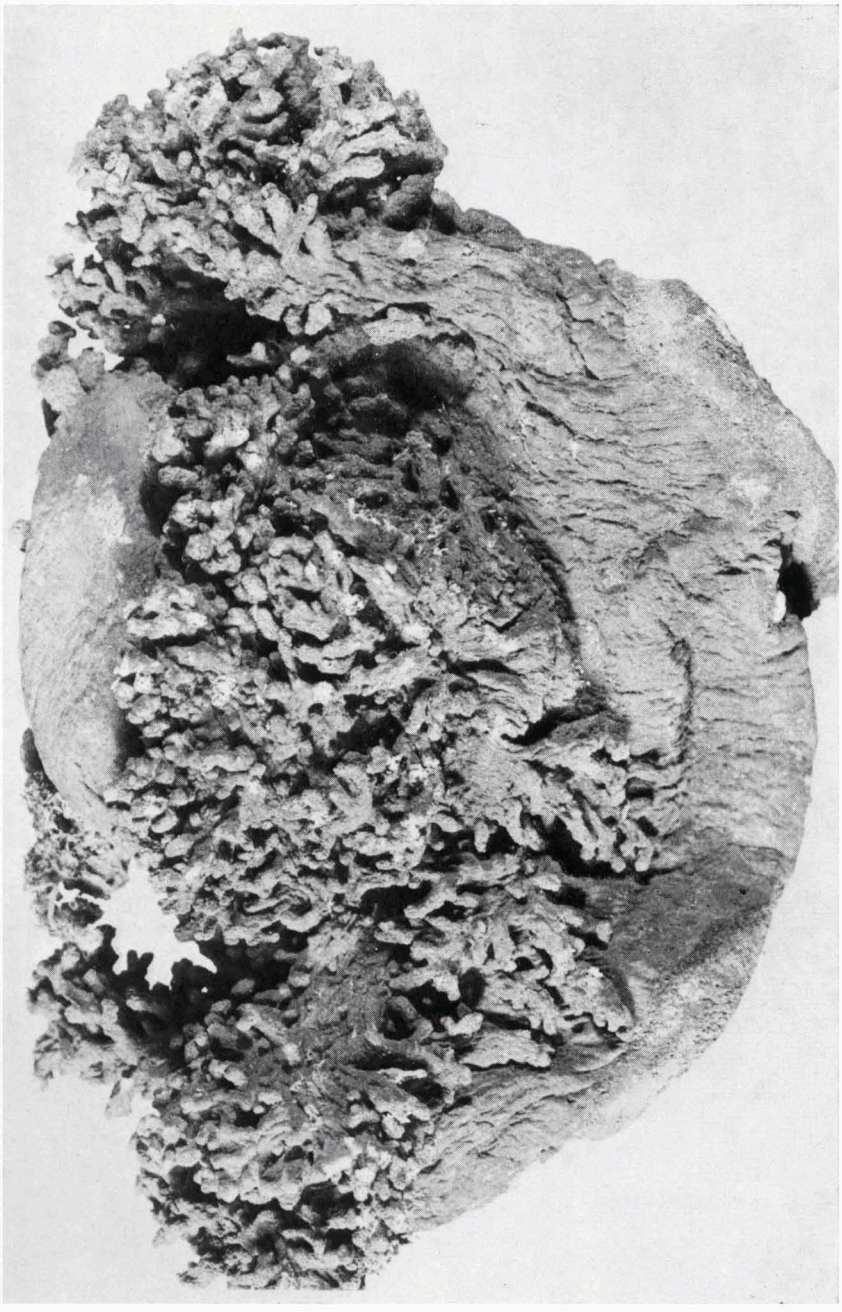


Fig. 1. *S. inexplicita* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. mollis* Kolonko, ZMB no. 6519, × 1. Fig. 3. *S. mollis* Kolonko, ZMB no. 6518, × 1.

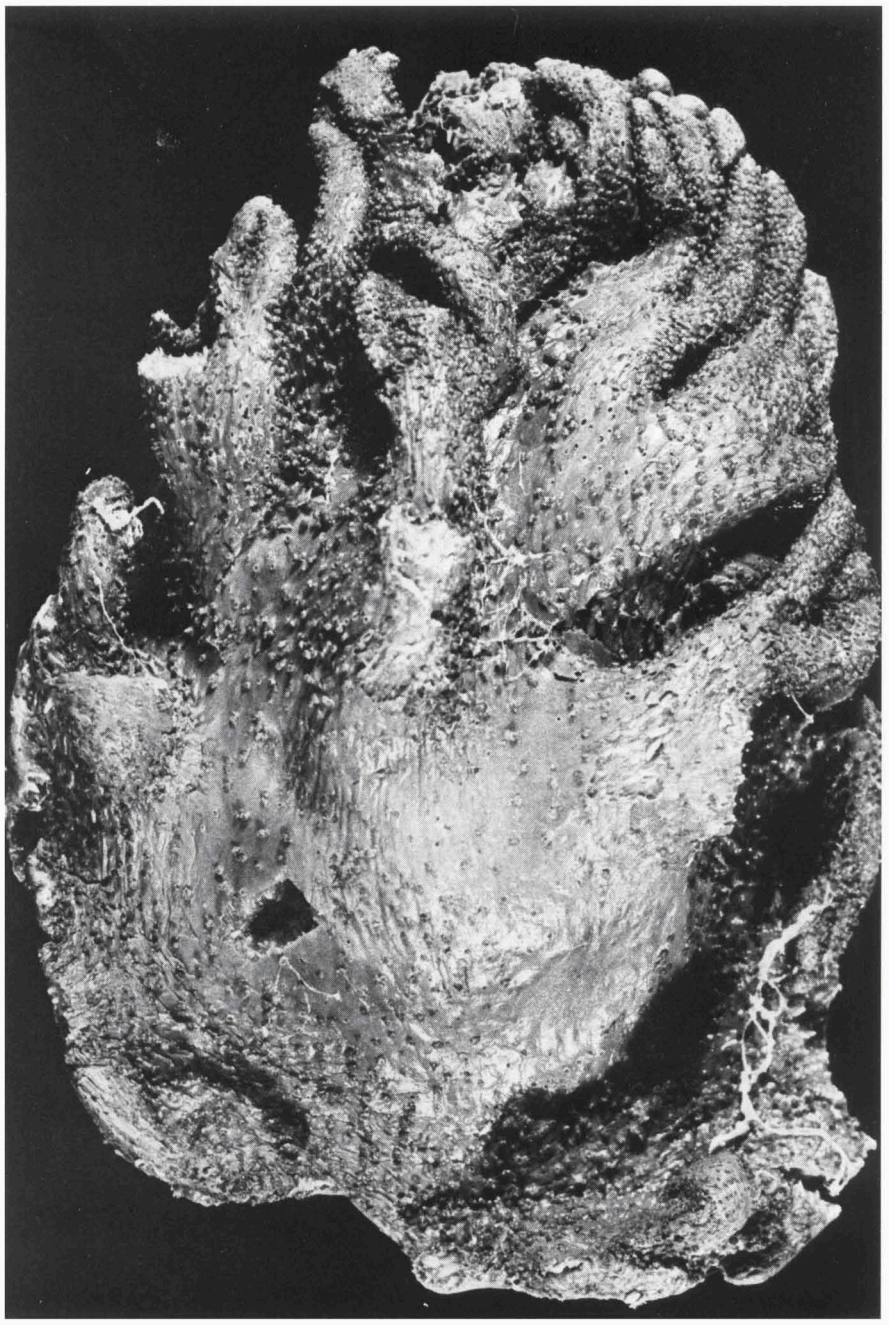
Fig. 1. *S. lochmodes* Kolonko, type, ZMB no. 6497, × 1.



S. lochmodes Kolonko, type, ZMB no. 6499, × 1.



S. lochmodes Kolonko, holotype of "*S. dumosa*" Tixier-Durivault, MNHN, × 1.



S. macrodactyla Kolonko, holotype, ZMB no. 6501, × 1.

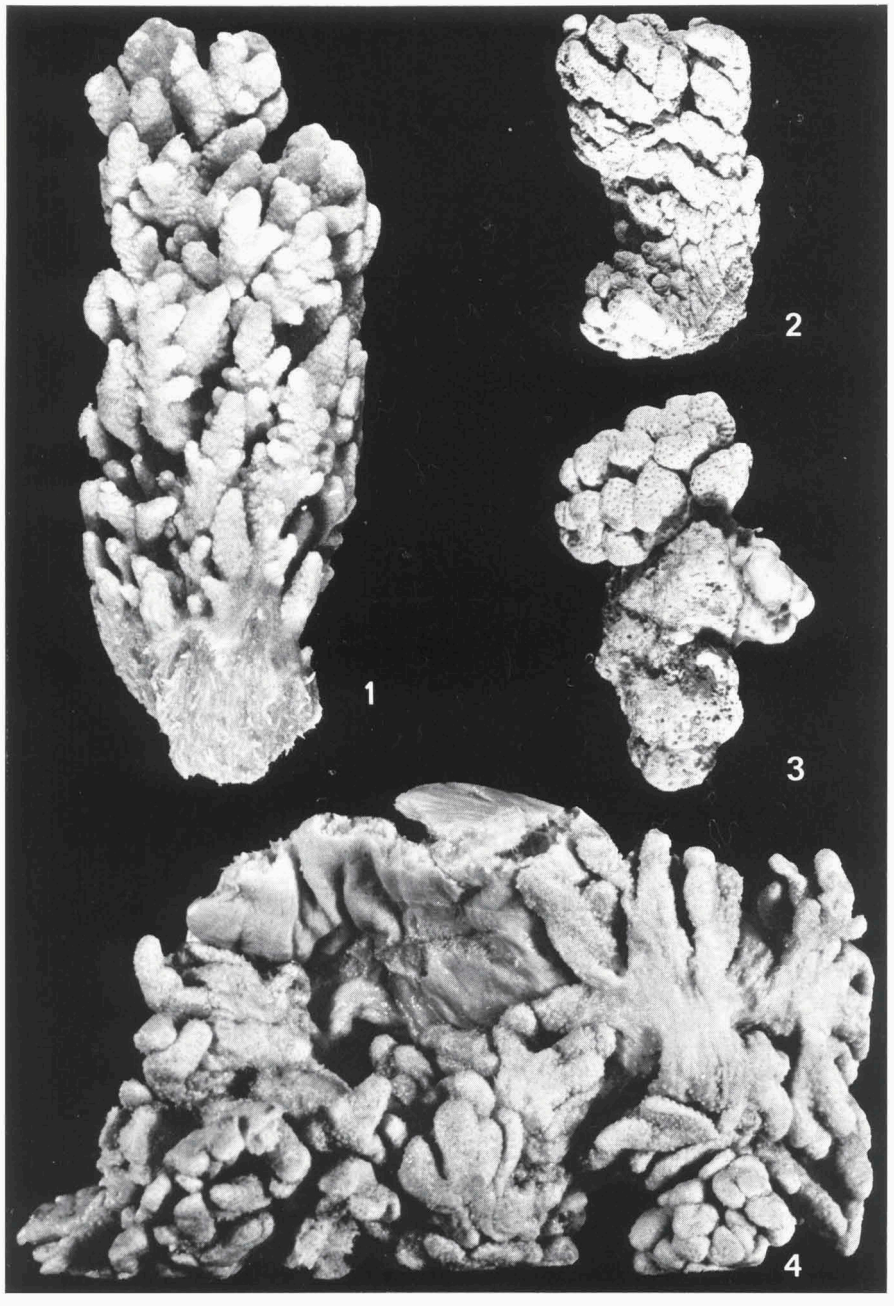
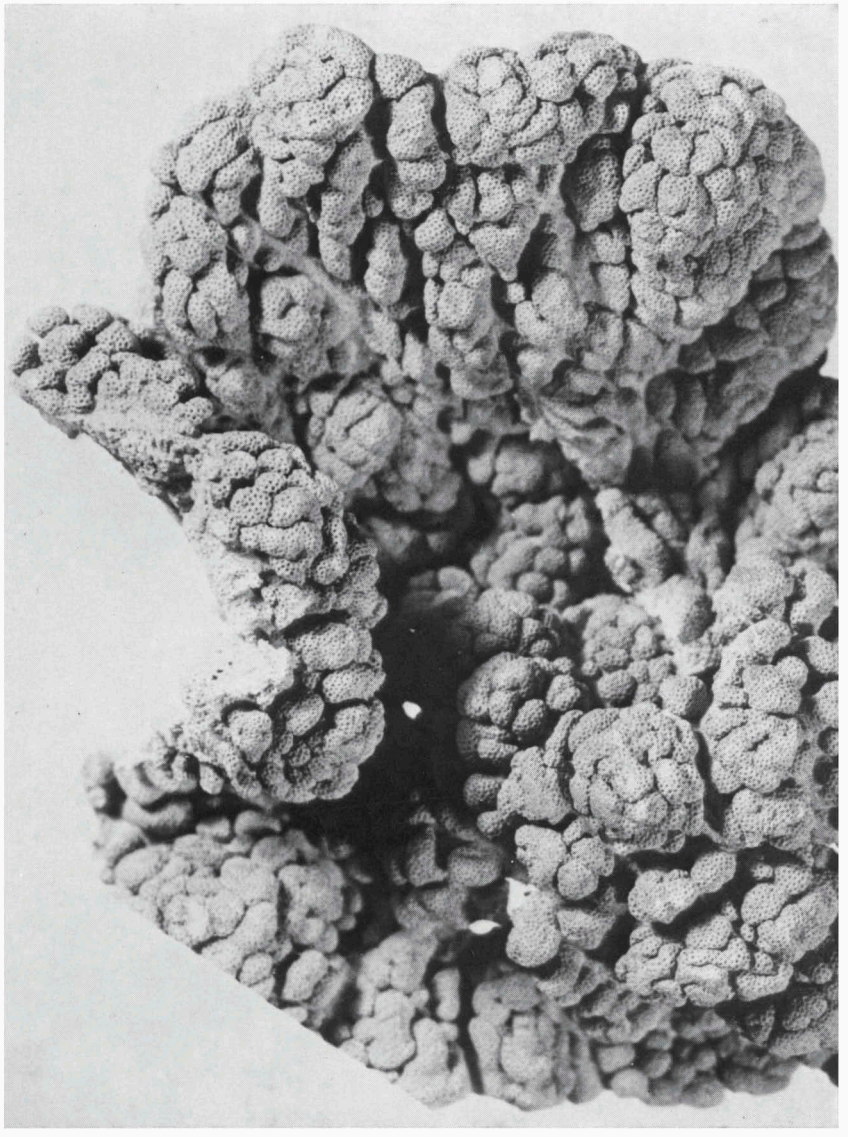
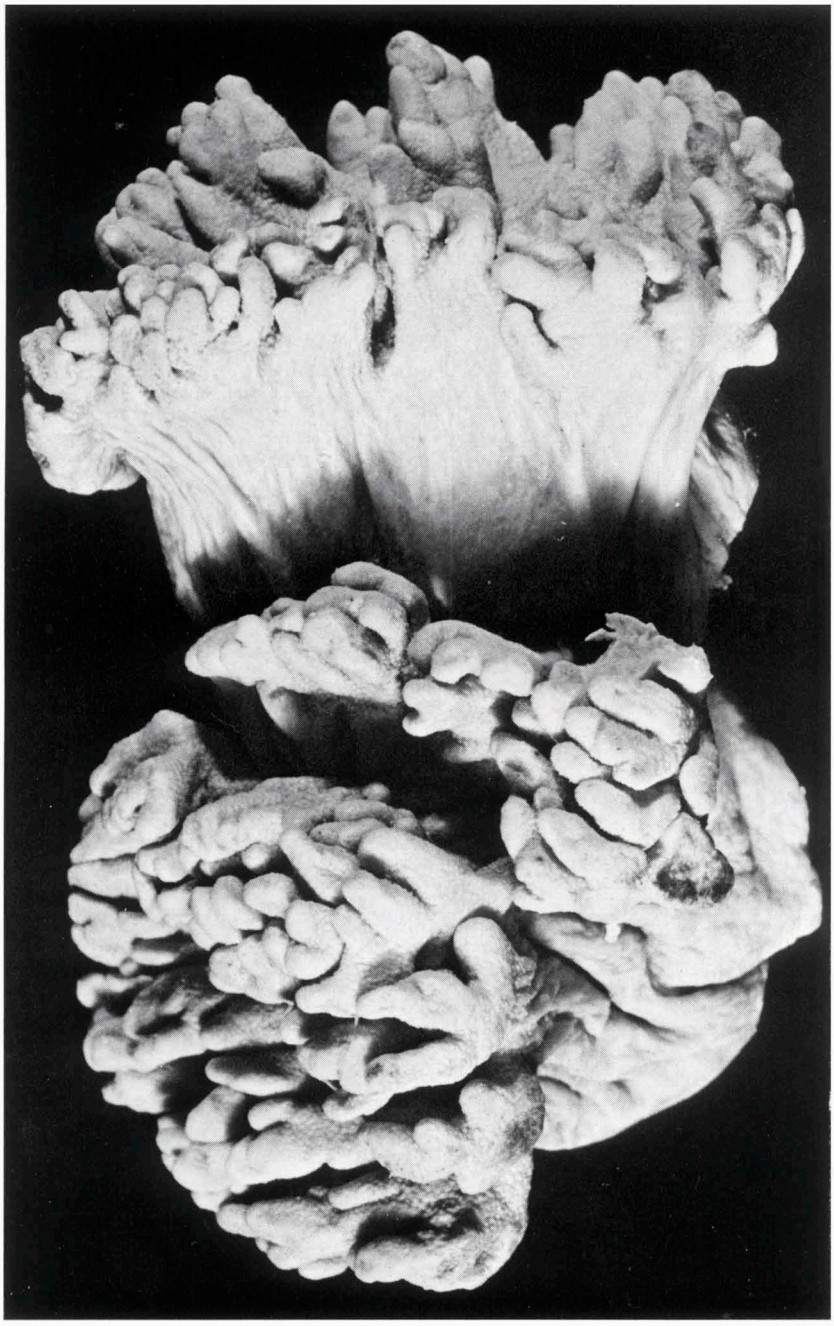


Fig. 1. *S. inexplicita* Tixier-Durivault, Great Barrier Reef, off Townsville; Peabody Museum, New Haven, Conn., U.S.A., × 1. Fig. 2. *S. microclavata* Tixier-Durivault, type, MNHN, × 1. Fig. 3. *S. molesta* Tixier-Durivault, holotype, MNHN, × 1. Fig. 4. *S. mira* Tixier-Durivault, holotype, MNHN, × 1.

S. muralis May, type, ZMB no. 2730, × 1.



S. ovispiculata Tixier-Durivault, holotype, MNHN, × 1.



S. pavida Tixier-Durivault, holotype (?), MNHN, × 1.

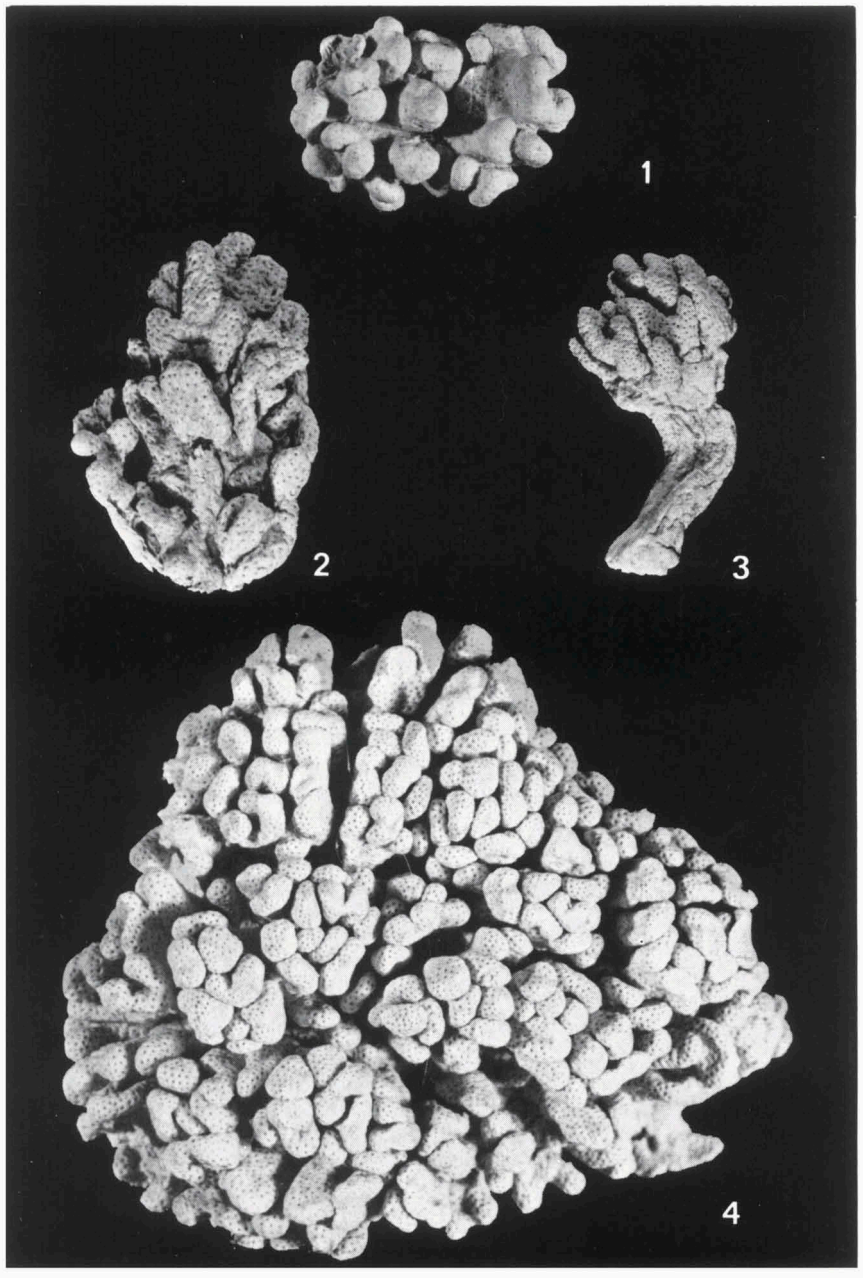


Fig. 1. *S. parva* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. numerosa* Tixier-Durivault, MNHN, × 1. Fig. 3. *S. pedunculata* Tixier-Durivault, holotype, MNHN, × 1. Fig. 4. *S. ornata* Tixier-Durivault, holotype, MNHN, × 1.

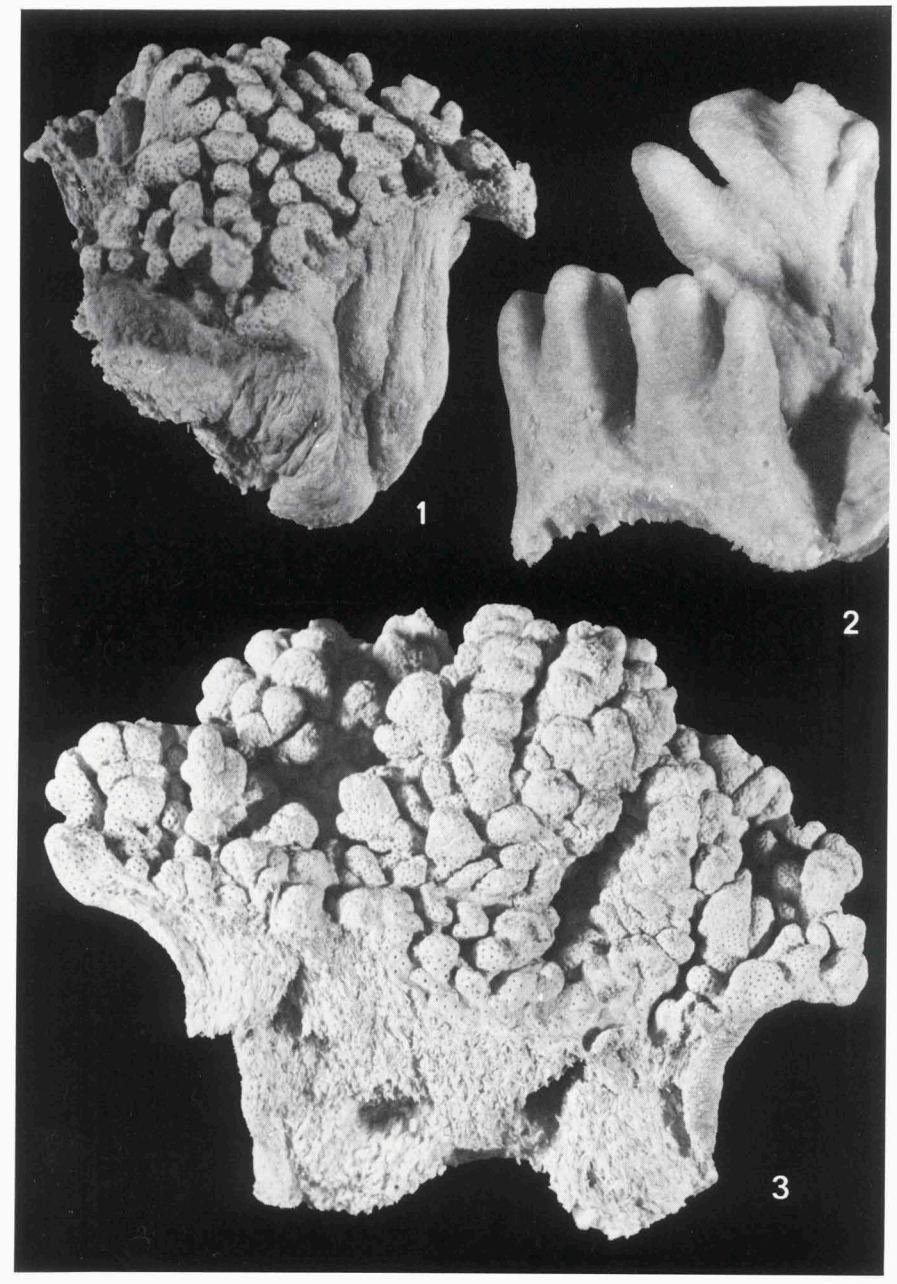
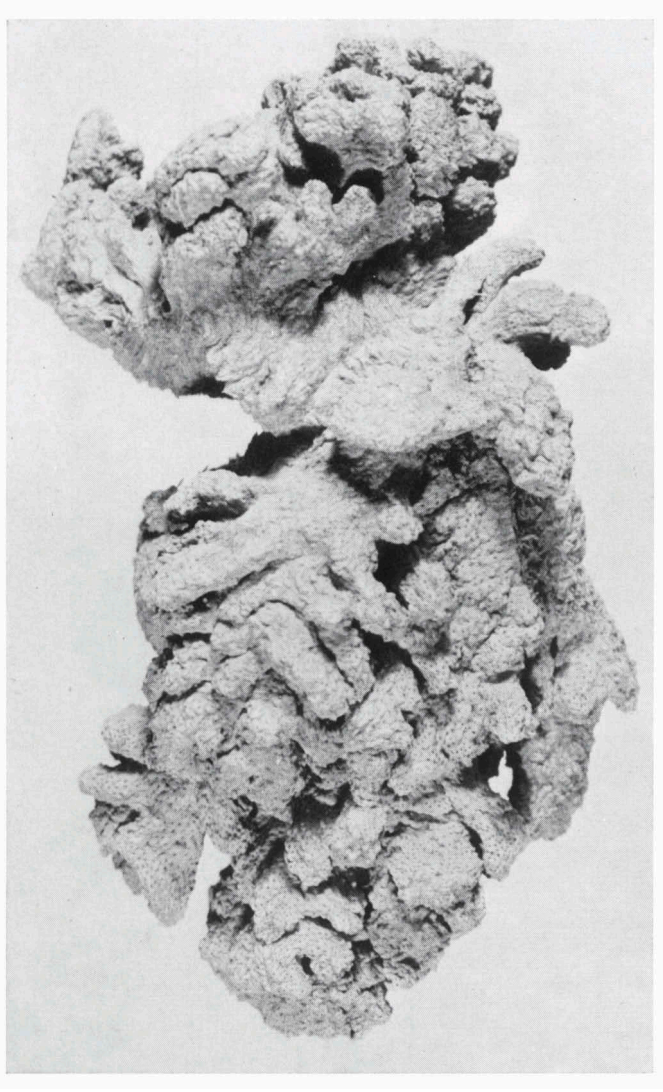


Fig. 1. *S. rotundata* Tixier-Durivault, paratype, MNHN, × 1. Fig. 2. *S. robusta* Macfadyen, holotype, BMNH no. 1934.3.28.94, × 1. Fig. 3. *S. peculiaris* Tixier-Durivault, holotype, MNHN, × 1.

S. portieri sp. nov., holotype, MNHN, × 1.



S. scabra Tixier-Durivault, type, MNHN, × 1.

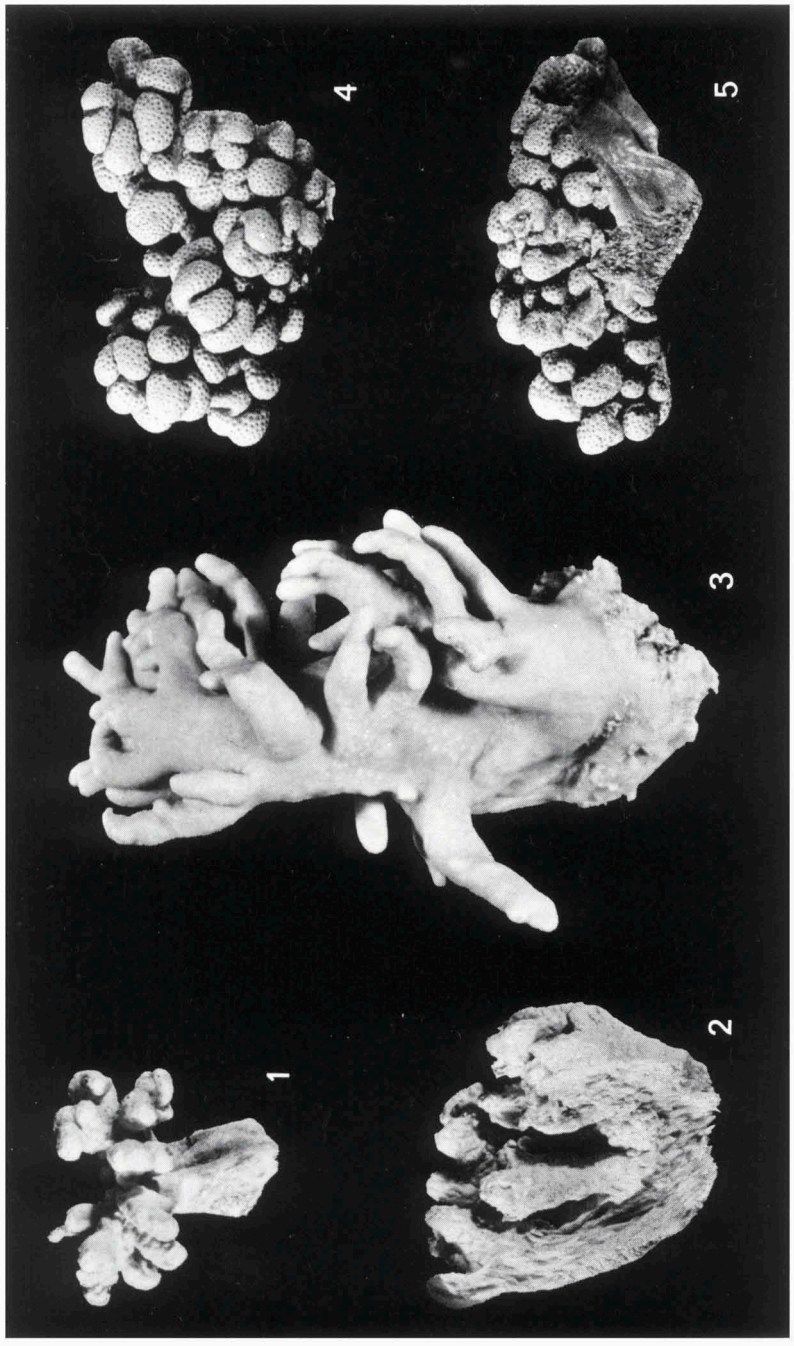


Fig. 1. *S. venusta* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. triangula* Tixier-Durivault, holotype, MNHN, × 1. Fig. 3. *S. ramosa* Tixier-Durivault, holotype, MNHN, × 1. Fig. 4. *S. whiteleggei* Lüttschwager, AMS G1539, seen from above, × 1. Fig. 5. The same colony, side-view.

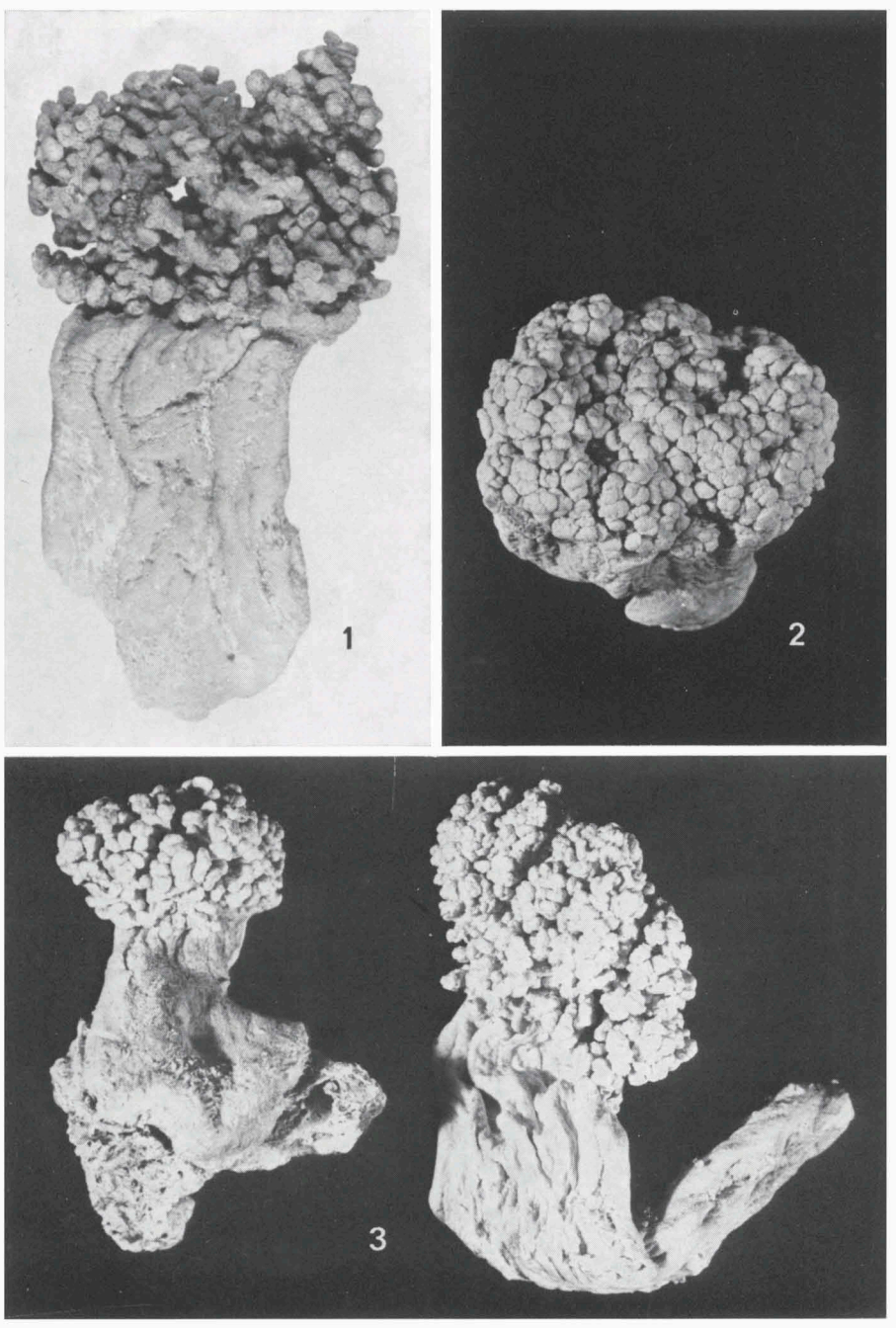


Fig. 1. *S. variabilis* Tixier-Durivault, holotype, MNHN, × 1. Fig. 2. *S. variabilis* Tixier-Durivault, holotype of "*S. pusilla*" Tixier-Durivault, MNHN, × 1. Fig. 3. *S. variabilis* Tixier-Durivault, from Gambier Is., collected by Salvat, 1965, × 1.