THE MARINE ALGAE

OF THE ARCHIPELAGO OF MADEIRA

By Tore Levring*

The marine algal flora of the Archipelago of Madeira has never been investigated in the same way as the land vegetation of the islands. There are some notes published about algae from Madeira, but they mainly derive from occasional visitors and the number of species — about 50 — which have been listed hardly give a true picture of the algal vegetation of the area.

The Archipelago of Madeira consists of seven islands, apart from some small sherries: Madeira (the main island), Porto Santo, the three Deserta Islands (Ilhéu Chão, Deserta Grande, Bugio) and the Salvage Islands or Ilhas Selvagens (Selvagem Grande, Selvagem Pequena, Ilhéu de Fora). Of these seven islands only Madeira and Porto Santo are inhabited. These two and the Deserta Islands are also fairly close together. The Selvagens are situated about half way between Madeira and Tenerife at the Canaries.

From a phytogeographical point of view the knowledge of the flora of the different Atlantic Islands is of great interest. The marine algae of the Canaries and the Azores must be considered as fairly well known owing to the investigations of Börgesen (1925-36) and Schmidt (1931) and a study of the algae growing round the shores of the Madeiran Islands was, therefore, considered well worth while. My field studies started in 1968 and were followed by a number of short or long visits at all different seasons. My last visit was in June 1973. In all the following list contains 254 species (out of these four are new), but more may be found. I hope my list will give a good picture of the marine algal flora of the area.

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During my visits to Madeira I had my headquarters at the Museu Municipal in Funchal. I want to extend my sincere thanks to the director of the museum, Mr. G. E. Maul, who never failed to support my work in all possible ways. Thus I had working space in

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the museum and the boat of this institute was also at my disposal for long and short dredging and collecting tours. I also want to thank my companion on many of these dredging and diving tours Mr. Gregório Jesus de Sousa (assistent at the museum) for his valuable assistance.

Apart from the main island I have also stayed at Porto Santo. An expedition to the Desertas was arranged in 1971 by the «Delegação do Turismo» in Funchal. I am most grateful for this courtesy.

Finally some very valuable collections were made for me at the Salvage Islands on various occasions by Mr. Maul and Mr. de Sousa.

In connection with my work with the Madeiran algae material from the following herbaria has been studied. I am much obliged for these opportunities.

Botanical Museum, Copenhagen
Botanical Museum, Lund
Natural History Museum, Stockholm
Rijksherbarium, Leiden
Staatsinstitut für allgemeine Botanik, Hamburg.

EARLIER INVESTIGATIONS

As mentioned above earlier records are mainly based upon brief visits to Madeira or any of the other islands of the archipelago. Most of these publications (Barton 1897, Buch 1825, Gain 1914, Gain et Mirande 1912, Grunow 1870, Johnson 1885, Lowe 1869, Piccone 1884) do only contain a few species — mostly very common ones. These records are also mentioned in my own list. In a book by E. M. Taylor (1884), «Madeira, its scenery and how to see it», 47 species of algae are listed. Some of them are probably incorrectly determined, as their occurence in the area is most unlikely. The author herself says «the seaweeds of Madeira have not been carefully sought for, or studied with the attention which they deserve». Therefore I think it is justified to omit too uncertain records from my list.

An attempt to study the Madeiran marine algae was made at the end of the last century by Padre Ernesto João Schmitz, Rector at the Seminário in Funchal. A list (37 species) of his collections was published later by Menezes (1926). There is a small collection of marine algae in the Museu Municipal (Funchal), which probably — at least partly — derives from the collections of Padre Schmitz. According to the «Elucidário Madeirense» (Vol. 1 1965 p. 42) there should also be a collection in the museum of the Seminário containing 127 species. On a visit I paid to this institute this algal collection was searched for in vain. Finally about 40 species have been listed in a recent excur-

sion report from the University of Copenhagen (Baagoe et al. 1972). In the list of Menezes *(l. c.)* are two species: *Ascophyllum nodosum* (from Madeira and Porto Santo) and *Laminaria saccharina* (from Madeira) which I am sure do not belong to the algal flora of the area. They are drift specimens most likely deriving from North America. I myself have found a piece of *Ascophyllum* at Porto Santo and drift specimens of this species are also often found at the Azores. Both are species which no doubt are able to keep alive when loose for a very long time. As I am sure these two species do not belong to the flora of the area they have not been included in my list. A similar species, *Fucus elongatus (= Himanthalia)* has been recorded by Buch *(l. c.)* It is no doubt a drift specimen from other parts of the Atlantic.

THE ALGAL VEGETATION

The shores of the islands are mostly rough and often steep. They consist mostly of old lava streams and are broken up, so they are forming a good substratum for algal growth. Many small bays are filled with rounded lava stones polished by the sea. Sand beaches are rare and are practically only found at Porto Santo. The islands are surrounded by very deep water, about 3 000 m. Between Ponta de São Lourenço and Desertas is a shallow plateau (about 200 m.). The north coast of Madeira, and even more so the Desertas and Selvagens, are very exposed to the rolling ocean waves. The coast is here often very steep.

The tide varies during the year. The highest amplitudes (spring-tide) are in spring and autumn (February - April and September - October) and are then slightly exceeding 2 metres. In winter and summer it is less. The lowest tidal difference is about 80 cm. The tide, in connection with the rolling waves, produces the possibilities for a fairly well developed littoral zone. The lower limit for algal vegetation is about 100 metres. Below 70 - 100 m. no algae are obtained by dredging. As the water is extremely clear there ought to be light enough for algal growth even deeper down. But the bottom normally is muddy below 50 - 70 m. and thus unsuitable for the algae. It may be of interest to mention that some green algae thrive in 50 - 70 m. depth *(Caulerpa prolifera, Microdictyon boergesenii, Pseudochlorodesmis furcellata, Struvea ramosa)*. This is connected with the optical properties of the water. It can be assumed that transmittance for shortwave light is high thus enabling green algae to exist in deep water (cf. Levring 1969). It may also be of interest to mention that in some places — for instance at Cabo Girão — we have observed zones with practically no algal vegetation between ca. 10 - 20 m. The bottom was covered with large stones and sea-urchines were rather numerous. The algal vegetation was well developed above and below this zone.

TABLE 1.

Geographical distribution of the marine algae of the Madeira Archipelago

1	2	3	4	5	6	7	8	9	10
More or less cosmopolitan	N. Atlantic, W. Indies, Mediterran.	Mediterran. W. Europe (S. of Gr. Britain), Canaries	Mediterran. Morocco, Canaries	East. coast N. America, W. Indies Bermuda, Canaries	W. Europe (S. of Gr. Britain), Canaries	North Atlantic (E. and W. coast)	Canaries Madeira	Bermuda Madeira	Endemic
16 %	27 %	20.6 %	10.6 %	10 %	6.2 %	3.4 %	4.2 %	0.4 %	1.7 %

The following list, which has been assembled, contains 254 species (36 Chlorophyta, 46 Phaeophyta and 172 Rhodophyta). It is my intention some time later to analyse the composition of the flora in comparison with some of the adjacent areas. This question will therefore not be dealt with in detail here. To obtain an idea of geographical composition of the flora the species have been sorted in a few groups (table 1) and the percentage these groups represent of the total number of species has been calculated.

It is seen that the two first groups (more or less cosmopolitan and species with a wide distribution in the Atlantic) are large. Together they represent 43% — or nearly half — of the species. The two following ones are groups with Mediterranean algae with a more or less limited distribution outside this sea. Group number 5 is of great interest. It contains species occurring in the subtropical and partly tropical parts of Eastern America. Most of them are also found at Bermuda and the Canary Islands, but not in Western Europe or Africa. Group number 7 contains purely Atlantic species. Also number 8 is an interesting one with some species only found at the Canary Islands and in the Archipelago of Madeira. Associated with this group are naturally the 4 endemic species of Madeira.

CHLOROPHYTA

ULVALES

Fam. MONOSTROMATACEAE

Blidingia Kylin.

Blidingia minima (Näg. ex Kütz.) Kylin.

Bliding 1963 p. 23; *Enteromorpha minima* Näg. ex Kütz.

Found in the uppermost part of the littoral zone in more or less exposed places. This apparently widely distributed species seems to be fairly common and was collected in all seasons.

Hab.: Madeira: Funchal (Harbour, Lido, Clube Naval).
Porto Santo: Off Canning Factory, Fonte da Areia.

Geogr. distr.: Almost cosmopolitan.

Fam. ULVACEAE

Enteromorpha Link.

In working out the material of this very confusing genus, the excellent revision by Bliding (1963) has been followed. As a conse-

quense it is almost impossible to make any comparision with adjacent areas, as most of the species listed by different authors cannot simply be referred to those in Bliding's monograph. But most of them may have a rather wide distribution.

Enteromorpha prolifera (Müll.) J. Ag.

Bliding 1963 p. 45.

Only found a few times in pools and natural basins. The material agrees well with subsp. *prolifera* Typus II as described by Bliding *(l. c.)*.

Hab.: Madeira: Porto do Moniz.
Deserta Grande.

Geogr. distr.: Probably widely distributed.

Enteromorpha ahlneriana Bliding.

Bliding 1963 p. 61.

The material agrees well with the thin forms described by Bliding *(l. c.)* as Typus II. It was only collected a few times.

Hab.: Madeira: Funchal (Lido, Clube Naval), Porto do Moniz.

Geogr. distr.: Probably widely distributed.

Enteromorpha flexuosa (Wulfen ex Roth) J. Ag. subsp. **paradoxa** (Dillw.) Bliding.

Bliding 1963 p. 79.

Found in the littoral during different seasons together with other *Enteromorpha* species, *Cladophora*, etc.

Hab.: Madeira: Funchal (Harbour, Lido).
Deserta Grande.

Geogr. distr.: Probably widely distributed at least in western Europe.

Enteromorpha ramulosa (Smith) Hooker.

Bliding 1963 p. 119.

Found a few times in the littoral and in pools during the summer season.

Hab.: Madeira: Funchal (Clube Naval), Ponta de S. Lourenço, Porto de Santa Maria.

Geogr. distr.: Probably widely distributed.

Enteromorpha compressa (L.) Grev..

Bliding 1963 p. 132.

This seems to be the dominating *Enteromorpha* species of the area. It occurs the whole year round in the littoral zone and in pools. It has also been collected in the upper part of the sublittoral. My material agrees well with var. *compressa* (cf. Bliding *l. c.)*.

Hab.: Madeira: Funchal (Harbour, Lido, Clube Naval), Reis Magos, Ponta de S. Lourenço (Porto de Santa Maria), Porto do Moniz.
Deserta Grande.

Geogr. distr.: Widely distributed.

Ulva L.

Ulva rigida C. Ag.

Bliding 1968 p. 546.

Very common in the littoral zone down to a depth of about 5 metres. The species was found during all seasons and is very variable in size and shape dependant on exposure, depth, etc. From the investigations by Bliding *(l. c.)* it is obvious that *U. lactuca* does not belong to the algal flora of Madeira. What has been listed in earlier papers under this name belongs no doubt to *U. rigida* (Menezes 1926).

Hab.: Madeira: Funchal (Town Pier, Lido, Clube Naval, Baixa Larga), Reis Magos.

Geogr. distr.: Atlantic shores of Europe from the Channel to the Canaries, Madeira, Mediterranean. Probably almost cosmopolitan.

CHAETOPHORALES.

Fam. CHAETOPHORACEAE.

Entocladia Reinke.

Entocladia viridis Reinke.

Hauck 1885 p. 462.

Found growing in the walls of various algae *(Cladophora* etc.)

Hab.: Madeira: Funchal (Lido, Clube Naval), Ponta de S. Lourenço, Porto do Moniz.

Geogr. distr.: Probably almost cosmopolitan.

Phaeophila Hauck.

Phaeophila dendroides (Crouan) Batters.

Feldmann 1937 p. 40; *Ph. floridearum* Hauck 1885 p. 464.

Found once only endophytical in *Laurencia pinnatifida* in the littoral. The plant occurred in great quantities and was typically developed.

Hab.: Deserta Grande.

Geogr. distr.: Mediterranean, Atlantic coast of Europe, Canaries, Madeira, West Indies.

ACROSIPHONIALES.

Fam. ACROSIPHONIACEAE.

Urospora Aresch.

Urospora laeta (Thur.) Börg.

Börgesen 1925 p. 46.

Found once growing epiphytically on *Cladophora pellucida*.

Hab.: Deserta Grande.

Geogr. distr.: Morocco, Canaries, Madeira.

CLADOPHORALES.

Fam. CLADOPHORCEAE.

Chaetomorpa Kütz.

Chaetomorpha aerea (Dillw.) Kütz.

Hauck 1885 p. 438.

The plant forms large tufts up to about 25 cm. high. It occurs in the littoral in exposed places and is often found in pools where it may be the entirely dominating species. Found the year through.

Hab.: Madeira: Funchal (Lido, Clube Naval), Porto do Moniz.
Selvagem Grande (Gain et Mirande 1912).

Geogr. distr.: Widely distributed in warm and temparate waters all over the world.

Chaetomorpha pachynema Mont.

Börgesen 1925 p. 41; Schmidt 1931 p. 18.

Only found a few times. The specimens are up to 8 cm. high and 1 mm. thick. Littoral, exposed.

Hab.: Madeira: Funchal (Baixa Larga, rocks off Savoy Hotel), Porto do Moniz.

Geogr. distr.: Canaries, Madeira, Azores, Cape Verde Islands.

Chaetomorpha linum (Müll.) Kütz.

Hauck 1885 p. 439.

Found in various depths down to about 50 metres depth. I have earlier pointed out that this species probably is a loose form of *Ch. aerea* (cf. Levring).

Hab.: Madeira: Funchal (Lido, Clube Naval), Reis Magos.

Geogr. distr.: In most temperate and warm seas.

Chaetomorpha capillaris (Kütz.) Börg.

Börgesen 1925 p. 45; Feldmann 1937 p. 68; *Rhizoclonium capillare* Kütz., *Rh. tortuosum* Kütz.

The species was collected at some different localities. It forms generally entangled masses among other algae in the littoral.

Hab.: Madeira: Funchal (Baixa Larga, Lido, Clube Naval), Reis Magos. (Grunow 1870).

Geogr. distr.: Mediterranean and adjacent parts of the Atlantic, Canaries, Madeira, Azores.

Cladophora Kütz.

Cladophora repens (J. Ag.) Harv.

Harvey 1846 - 51 pl. 236; Taylor 1960 p. 82.

This species seems to occur fairly commonly in the lower part of the littoral and in tidal pools in more or less exposed places. It

forms small, dense cushions, often mixed with other smaller algae. The species seems to be rather variable in shape and size of the filaments and cells. Probably several other similar species cannot be separated from *C. repens*, but represent only ecological forms. (Cf. Börgesen 1925, Schmidt 1931, Grunow 1870).

Hab.: Madeira: Funchal (Clube Naval, Town Pier), Porto do Moniz, Porto da Cruz, Ponta de S. Lourenço.
Deserta Grande.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa), Selvagem Pequena (leg. Maul).

Geogr. distr.: British Isles - Morocco, Mediterrancan, Azores, Madeira, Ind. Ocean.

Cladophora boodleoides Börg.

Börgesen 1925 p. 56.

This small plant, hitherto only known from the Canary Islands, was found once growing on *Patella* in a few m. depth. My material corresponds very well with the original description given by Börgesen.

Hab.: Madeira: Funchal (off Jewish Cemetary).

Geogr. distr.: Canaries, Madeira.

Cladophora flexuosa (Müll.) Kütz.

Söderström 1963 p. 90.

Material of this species was obtained a few times. It was found in the littoral more or less loose and intermingled with other algae.

Hab.: Madeira: Porto da Cruz.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: North Atlantic shores.

Cladophora hutchinsiae (Dillw.) Kütz.

Söderström 1963 p. 126.

This species seems to be common and is found throughout the year in the littoral zone and in pools attached to rocks or other algae. It was also collected in greater depths — probably originally drift specimens with more or less abnorm appearence.

In its typical form this species, as it is found during the summer season, seems to be rather easy to distinguish. It varies, however, during the year and also under extreme ecological conditions. I have been able to study some populations at different seasons in exactly the same habitat. The specimens get darker green, coarser and slightly denuded during the winter months. During the early spring the old specimens often acquire a strange appearance being almost denuded fairly light-coloured and looking nearly like a *Chaetomorpha* as only a few branchlets are left.

Hab.: Madeira: Funchal (Lido, Clube Naval, off Jewish Cemetary), Reis Magos, Garajau.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Maul).

Geogr. distr.: Mediterranean, North Atlantic, Vancouver.

Cladophora fascicularis (Mont.) Kütz.

Taylor 1960 p. 91.

Like *C. hutchinsiae* this seems to be a fairly common species. It grows in the littoral zone on rocks and other algae. Normally it is well separated from the preceding species, but it varies rather much especially with the seasons and the ecological conditions.

Hab.: Madeira: Funchal (Harbour, Lido, Clube Naval), Reis Magos, Porto do Moniz.

Geogr. distr.: Canaries, Madeira, Bermuda, East coast of America from North Carolina to Uraguay.

Cladophora pellucida (Huds.) Kütz.

Kützing Tab. phyc. III pl. 83; Söderström 1963 p. 133.

Occurs in more or less exposed localities growing on rocks and in pools in the littoral among or as an epiphyte on other algae. It seems to be rather rare and has only been collected during spring and summer.

Hab.: Madeira: Funchal (Clube Naval, off Jewish Cemetary), Cabo Girão, Ponta de S. Lourenço (Baía d'Abra).

Deserta Grande.

Geogr. distr.: Mediterranean, Westcoast of Europe from the Channel to the Canaries, Madeira.

Cladophora prolifera (Roth) Kütz.

Kützing Tab. phyc. III pl. 82.

Is found during all seasons on rocks in the lower littoral and in pools mixed with other algae. Not uncommon. Also recorded by Menezes (1926).

Hab.: Madeira: Funchal (Clube Naval, Lido).

Geogr. distr.: Mediterranean, warm and temperate shores of the Atlantic.

SIPHONOCLADIALES.

Fam. VALONIACEAE.

Valonia Ginn.

Valonia utricularis (Roth). C. Ag.

Hauck 1885 p. 469.

Grows in shallow water in more or less exposed habitats on rocks, in caves etc. It often forms dense coverings together with various small algae and is found at all seasons. Also recorded by Grunow (1870) and Gain et Mirande (1912).

Hab.: Madeira: Funchal (Harbour, Clube Naval, Lido), Porto da Cruz.

Porto Santo: Fonte da Areia.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa) (Gain et Mirande *l. c.*).

Geogr. distr.: Mediterranea, adjacent parts of the Atlantic, Canaries, Madeira, W. Indies.

Ernodesmis Börg.

Ernodesmis verticillata (Kütz.) Börg.

Börgesen 1913 p. 66.

Only found twice. The specimens are fairly small, about 0.5 - 3 cm. high. 2 - 5 m. depth.

Hab.: Madeira: Reis Magos, Ponta de S. Lourenço.

Geogr. distr.: Florida, West Indies, Brasil, Madeira, Canaries.

Microdictyon Decaisne.

Microdictyon boergesenii Setch.

Setchell 1925 p. 106; 1929 p. 491; *M. umbilicatum* Börgesen 1913 p. 26; *M. agardhianum* Börgesen 1925 p. 116.

This interesting species was found twice. The specimens agree perfectly with the discription given by Setchell and Börgesen.

Hab.: Madeira: Figueirinhas (45 m.), Porto do Moniz (loose in pool).

Geogr. distr.: West Indies, Canaries, Madeira.

Struvea Sond.

Struvea ramosa Dickie.

Börgesen 1925 p. 72; Taylor 1960 p. 123.

Seems not to be uncommon, although never found in quantities. It occurs in all seasons in greater depths (35 - 80 m.) attached to shells, stones, *Lithothamnia,* etc. The specimens are well developed, 4 - 15 cm. tall.

Hab.: Madeira: Garajau (35 - 70 m.), Ponta de S. Lourenço (various places 40 - 50 m.), Reis Magos (40 - 50 m.), Figueirinhas (45 m.).

Geogr. distr.: Bermuda, West Indies, Madeira, Canaries (only once recorded from Lanzarote, Piccone 1884).

Fam. DASYCLADACEAE.

Dasycladus C. Ag.

Dasycladus vermicularis (Scopoli) Krasser.

Taylor 1960 p. 99; *D. clavaeformis* (Roth.) C. Ag.

Common all the year through in many localities, where it often forms dense coverings on more or less exposed rocks in the littoral zone but also further down.

Hab.: Madeira: Funchal (Harbour, Lido; also Britton 1897), Ponta de S. Lourenço (Porto de Santa Maria, Desembarcadouro), Porto do Moniz, Cabo Girão (2 - 5 m.) (Barton 1923 p. 370).

Porto Santo: Fonte da Areia.

Deserta Grande.

Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, Baía das Cagarras, leg. Sousa); Selvagem Pequena (leg. Maul.).

Geogr. distr.: Bermuda, Florida, West Indies, Brasil, Madeira, Canaries, Mediterranean.

CODIALES

Fam. DERBESIACEAE

Derbesia Sol.

Derbesia lamouroxii (J. Ag.) Sol.

Gayral 1958 p. 172.

Found twice in May on very exposed rocks in the lower littoral. The specimens are well developed and fertile.

Hab.: Madeira: Porto do Moniz.
Deserta Grande.

Geogr. distr.: SW France - Morocco, Mediterranean, Madeira, California.

Derbesia tenuissima (De Not.) Crouan.

Börgesen 1925 p. 107; Gayral 1958 p. 174.

Found once in littoral pools in an exposed locality, where it was common.

Hab.: Deserta Grande.

Geogr. distr.: British Isles - Morocco, Canaries, Madeira, Mediterranean.

Fam. CAULERPACEAE

Caulerpa Lamour.

Caulerpa webbiana Mont.

Weber von Bosse 1898 p. 269; Börgesen 1913 - 20 p. 125; 1925 p. 109 Taylor 1960 p. 139.

Found in the littoral in small pools etc.

Hab.: Madeira: Funchal (Harbour), Ponta de S. Lourenço (Porto de Santa Maria).
Porto Santo: Fonte da Areia.
Ilhas Selvagens: Baia das Cagarras, (leg. Sousa).

Geogr. distr.: Seems to occur in most warm seas. Florida, West Indies, Brazil, Madeira, Canaries, Red Sea, Japan.

Caulerpa prolifera (Forsk.) Lamour.

Weber von Bosse 1898 p. 278.

Only found in greater depths (15 - 70 m.) where it seems to be fairly common, growing on gravel, *Lithothamnia,* shells or on muddy bottom.

Hab.: Madeira: Ponta de S. Lourenço, Garajau, Cabo Girão, (40 - 50 m.), Reis Magos (40 - 50 m.), Funchal (Baixa Larga, 30 m. Off Lido, 15 - 20 m.), Figueirinhas (45 m.), off Pináculo.

Geogr. distr.: Mediterranean, Canaries, Madeira, Bermuda, North Carolina, West Indies, Brazil.

Fam. BRYOPSIDACEAE.

Bryopsis Lamour.

Bryopsis corymbosa J. Ag.

J. Agardh 1842 p. 21; Börgesen 1925 p. 100.

I have only found a few specimens 0.5 - 1 cm. high mixed with some other small algae. They were growing on rocks near low water line. Sterile. (October).

Hab.: Madeira: Funchal (Town Pier).

Geogr. distr.: Mediterranean, Canaries, Madeira.

Fam. CODIACEAE

Pseudochlorodesmis Börg.

Pseudochlorodesmis furcellata (Zanard.) Börg.

Börgesen 1925 p. 78; Feldmann 1937 p. 97.

Found twice (July) together with shells, calcareous algae etc. in the sublittoral.

Hab.: Madeira: Cabo Girão (dredging 40 - 50 m.).
Ilhas Selvagens: Baía das Cagarras (a few m. depth, leg. Sousa).

Geogr. distr.: Western Mediterranean, Canaries, Madeira, Azores.

Codium Stackh.

Codium adhaerens (Cabr.) C. Ag.

Schmidt 1923 p. 26; *C. intertextum* Collins and Hervey; Silva 1959 p. 500.

The species occurs rather commonly in the littoral in exposed places, on rocks, *Patella* etc. down to a few metres depth. It often forms extensive coverings. I am not able to find reason for separating *C. intertextum* in the western part of the tropical Atlantic from *C. adhaerens* in the eastern one.

Hab.: Madeira: Cabo Girão (on *Patella)*, Funchal (Clube Naval, off Reid's Hotel on *Patella,* Ponta de S. Lourenço (Baía d'Abra 2 - 5 m., Desembarcadouro 0 - 1.5 m.), Reis Magos.

Ilhas Selvagens: Baía das Galinhas (leg. Sousa); recorded by Gain and Miranda 1912 p. 480.

Porto Santo: Fonte da Areia (cover large surfaces ¼ m² or more).

Geogr. distr.: Atlantic coast of Europe from the Channel southward, Mediterranean, West Africa, Canaries, Madeira, Brazil, West Indies.

Codium tomentosum (Huds.) Stackh.

Silva 1955 p. 569; Schmidt 1923 p. 39, Menezes 1926.

Sublittoral, fairly common (2 - 50 m.).

Hab.: Madeira: Funchal (off Jewish Cemetary, Clube Naval, Porto do Moniz, Ponta de S. Lourenço several places Figueirinhas 45 m., Reis Magos 40 - 50 m.

Porto Santo: Fish canning factory.

Ilhas Selvagens (leg. M. de Nóbrega).

Geogr. distr.: British Isles, Southward to Morocco, Madeira, Canaries.

Codium decorticatum (Woodw.) Howe.

Schmidt 1923 p. 52, Silva 1960 p. 516; *C. elongatum* (Turn.) C. Ag.

Plants well developed, reaching a length of 1.5 m. The species seems to be rather common and is found in the upper part of the sublittoral.

Hab.: Madeira: Funchal (Clube Naval), Porto do Moniz, Reis Magos (2 - 5 m.).
Deserta Grande: (10 - 30 m.).

Geogr. distr.: Mediterranean, Canaries, Madeira, Bermuda, North and South Carolina, Florida, West Indies, Brazil, Uruguay, Azores.

Fam. CHAETOSIPHONIACEAE

Blastophysa Reinke.

Blastophysa rhizopus Reinke.

Reinke 188 pl. 23.

This interesting species was only found twice (April, May). It was growing endophytically in *Acrosymphyton* and *Thuretella* in 2 - 30 m. depth. and occurred in great quantities.

Hab.: Madeira: Caniçal.
Deserta Grande.

Geogr. distr.: North Atlantic shores, Madeira, West Indies, Western Mediterranean.

PHAEOPHYTA

ECTOCARPALES

Fam. ECTOCARPACEAE.

Ectocarpus Lyngbye.

Ectocarpus confervoides (Roth) Le Jolis.

Lund 1941 p.34 f. *penicillatus* (C. Ag.) Kjelm.

Found a few times in 10 - 40 m. depth (April) growing on old *Cystoseira abies marina* and *Sargassum*. The material, which is fertile, consists of small specimens only.

Hab.: Madeira: Reis Magos.

Geogr. distr.: North Atlantic, Mediterranean, Pacific etc.

Giffordia Batters

Giffordia mitchellae (Harv.) Hamel.

Hamel 1931 - 39 p. XIV; *Ectocarpus mitchellae* Harv.; *E. virescens* Thuret.

This species was found in various places during the summer season, growing on different algae and *Cymodocea* in pools and from low water mark down to 40 m.

H a b . : Madeira: Funchal (Clube Naval), Câmara de Lobos, Cabo Girão, Garajau, Reis Magos, Pináculo, Ponta de S. Lourenço (several places).

G e o g r . d i s t r . : Widely distributed in warmer seas.

Feldmannia Hamel.

Feldmannia irregularis (Kütz.) Hamel.

Hamel 1931 - 39 p. XVII; *Ectocarpus irregularis* Kützing Tab. phyc. V pl. 62; Börgesen 1926 p. 25.

Only found a few times and in small quatities mixed with various small algae. The filaments were characteristic and fertile. Sublittoral, epiphytical on seagrasses, *Cystoseira* etc.

H a b . : Madeira: Cabo Girão, Ponta de S. Lourenço (Baía d'Abra).

G e o g r . d i s t r . : British coasts and southwards to Portugal, Canaries, Madeira, Mediterranean, North America, West Indies and Indian Ocean, Pacific.

Kuetzingiella Kornmann.

Kuetzingiella battersii (Bornet) Kornmann.

Kornmann in Kuckuck 1956 p. 292; Kuckuck 1956 p. 314; Cardinal 1964 p. 65; *Ectocarpus battersii* Bornet.

Found once (April) epiphytical on old specimens of *Taonia* growing in a pool.

H a b . : Madeira: Funchal (Clube Naval).

G e o g r . d i s t r . : Western Europe (Gr. Britain to Canaries), Mediterranean.

Herponema (J. Ag.) Hamel.

Herponema minutum Levring nov. sp.

(Fig. 1 A-C, 2)

Frons e strato basali et filamentis erectis constitua. Stratum basale e filamentis repentibus, horizontalibus, irregulariter ramosis

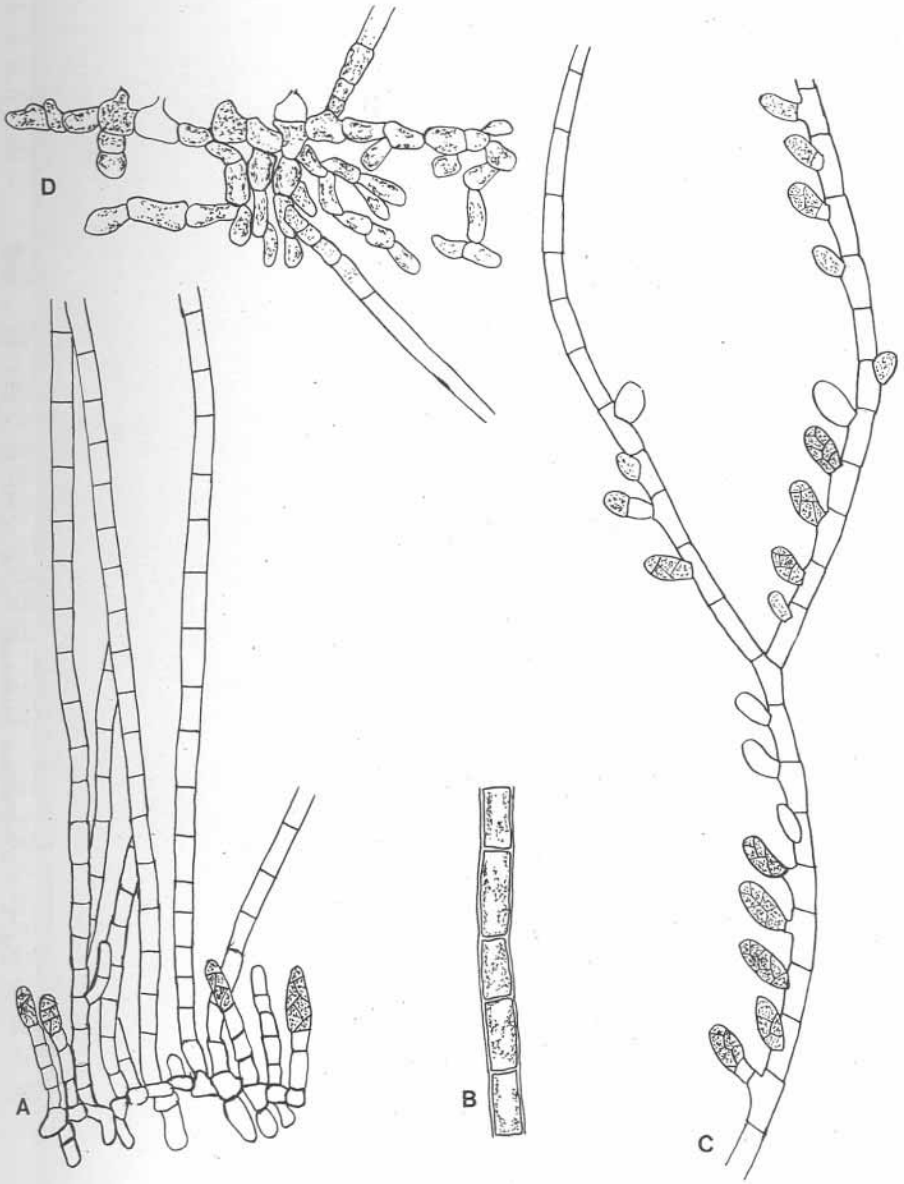

Fig. 1. — A - C *Herponema minutum*. — D *Mikrosyphar sphacelariae*. — A - C × 300; D × 500.

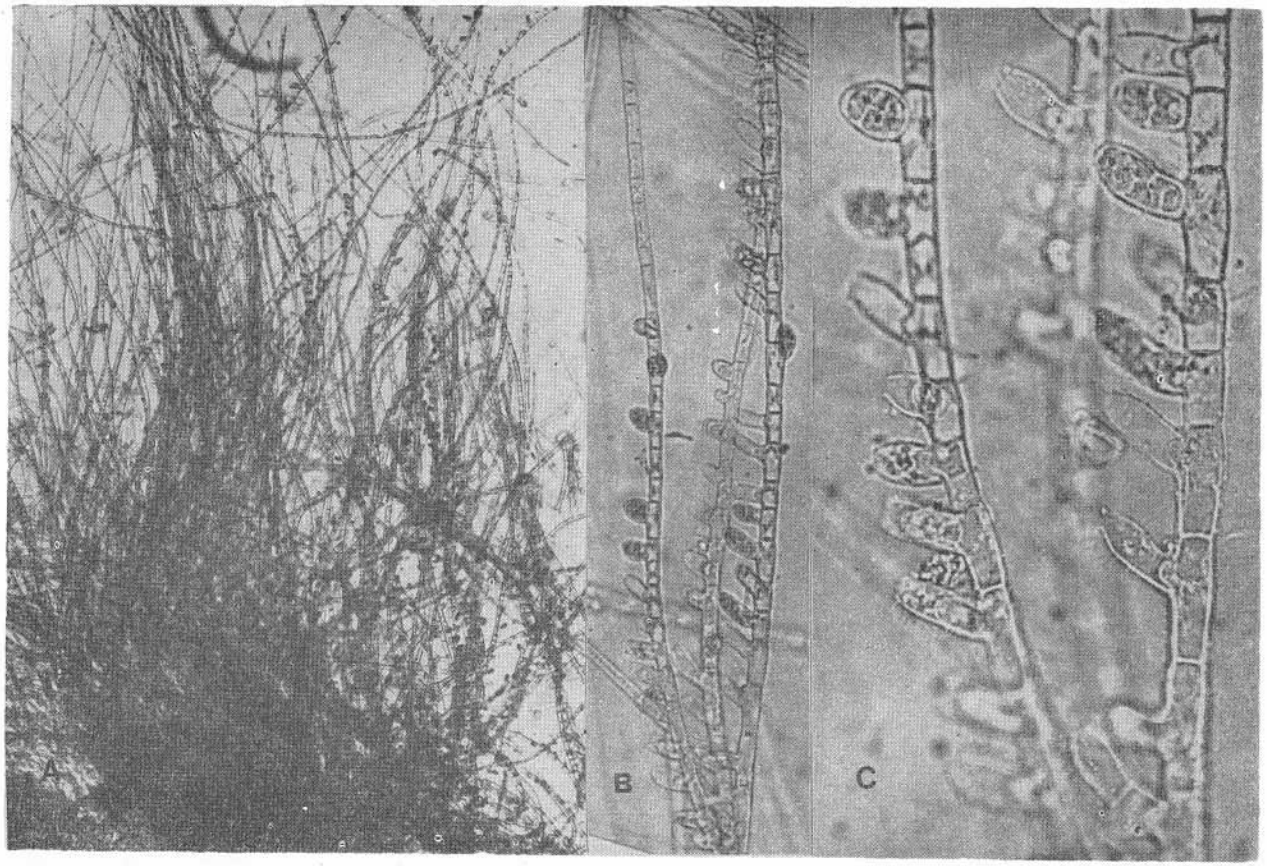

Fig. 2. — *Herponema minutum*. — A × 60, B × 230, C × 600.

compositum. Filamentis erectis, vage ramosis, 1 - 2 mm altis, 8 - 10 μ crassis, superne attenuatis in pilum transformatis. Articuli inferiore usque ad 2 - 3-plo longiores quam diametro, in pilis longior, Sporangia plurilocularia sessilia, interdum breve pedicellata, dispersa vel seriata, ovalia — clavata, 15 - 25 μ long., 10 - 13 μ lat.

This new taxa was found a few times (April 1969, and 1972) epiphytical on old specimens of *Cystoseira abies marina,* where it forms small felty patches.

The plant has a system of creeping irregular basal filaments, which more or less forms a pseudoparenchymateous basal disc and here and there penetrates into the superficial tissues of the host.

The erect filaments are about 1 - 2 mm. long, and consist of cylindrical cells, in the lower part of the filaments 10 - 11 μ thick and 2 - 3 times as long as wide. The upper parts get gradually thinner and hairlike with longer cells. The growth of the filaments takes place by cell-division in the middle and lower part of the filaments. Marked meristematic zones are seen at times, but never very distinct. The filaments are simple or slightly ramified — sometimes uniserrate — in their lower part.

Only plurilocular sporangia have been met with. They are oval-clavate in shape, 15 - 25 μ long, 10 - 13 μ wide, sessile or pedicellate and as a rule scattered or seriated on the filaments. Terminal sporangia on short filaments erecting from the basal portion do also occur.

The chromatophores are mostly feebly developed but in the cells of the lower part of the filaments they appear as irregularly formed plates.

This new species is no doubt related to *Herponema graniferum* Kuckuck (1956 p. 302) and *Herponema rhodochortonoideum* (Börg.) Levr [1]. The filaments of *Herponema graniferum,* which occur on *Cystoseira* species in the Mediterranean, are about twice as thick and the plant differs also in various details. *Herponema rhodochortonoides* was originally described by Börgesen from the West Indies and was later found by him at the Canary Islands. It occurred on old *Padina* and *Cymopolia.* This species differs especially in the shape of the sporangia, which are very characteristic.

Holotype: (Funchal: Clube Naval) 19.4.1972 in Herb. T. Levring, Marine

H o l o t y p e : (Funchal: Clube Naval) 19.4.1972 in Herb. T. Levring, Marine Botanical Institute, Göteborg.

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[1]) *Herponema rhodochortonoideum* (Börg.) Levr. nov. comb.; *Ectocarpus rhodochortonoides* Börgesen 1914 p. 170; 1926 p. 9. — It appears clearly from the description given by Börgesen, that this species has to be transferred into the genus *Herponema.*

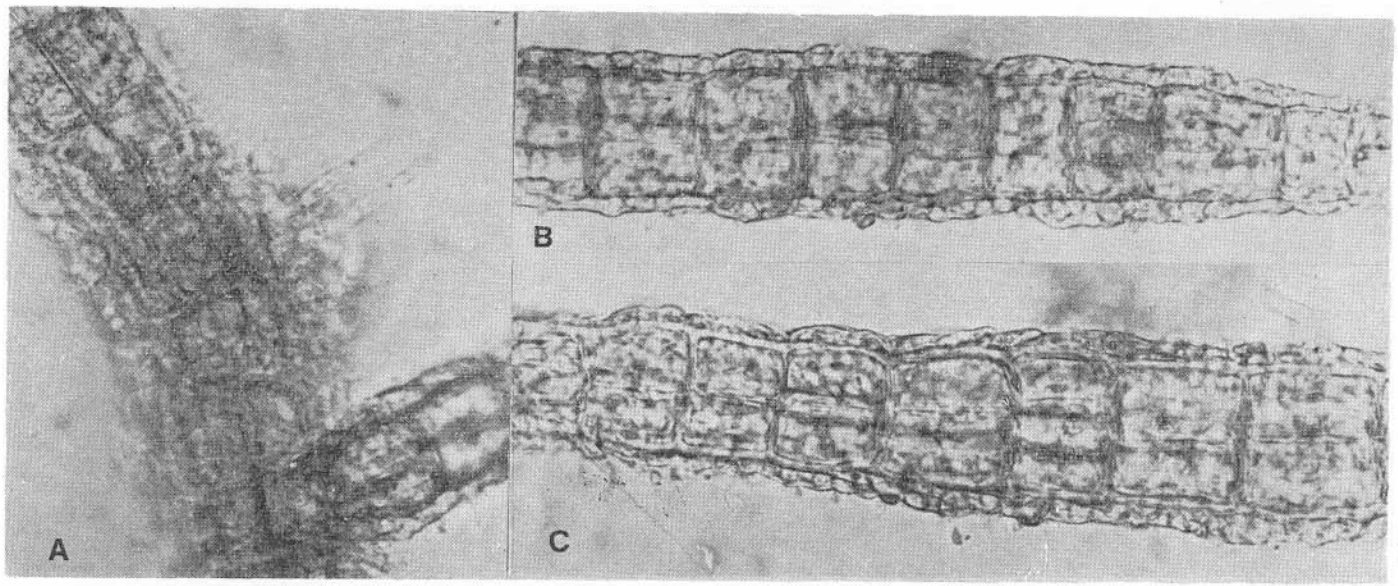

Fig. 3. — *Mikrosyphar sphacelariae*. — × 600.

Hab.: Madeira: Funchal (Lido, Clube Naval).

Geogr. distr.: Madeira.

Mikrosyphar Kuck.

Mikrosyphar sphacelariae Levr. nov. sp.

(Fig. 1 D, 3)

Fronde endophytica (in Sphacelaria hystrix) e filamentis repentibus, irregulariter ramosis compotisa. Cellulae 5-7 μ diam., 1-2-plo longiores. Pilis dispersis vel nullis.

Thallus consisting of creeping, monosiphonous, branched endophytic (in *Sphacelaria hystrix)* filaments which sometimes can be more or less pseudoparenchymatously united. Cells 5-7 μ in diameter, 1-2 times as long, with one or two plate like chromatophores. True phaeophycean hairs scattered or lacking. Sporangia with a few loculi are formed by transformation of vegetative cells in the same way as in other species of the genus.

This new taxa is closely related to the earlier known ones *(M. zosterae, porphyrae* and *polysiphoniae,* which have other hosts and differ in minor details. It was only found once (in April) in *Sphacelaria hystrix,* which was growing on *Cystoseira humilis* in great quantities in a littoral pool in an exposed habitat. However, the *Sphacelaria* was abundantly infected by the *Mikrosyphar.*

Holotype: Funchal (Clube Naval), 19.4.1972, in Herb. T. Levring, Marine Botanical Institute, Göteborg.

Hab.: Madeira: Funchal: Clube Naval.

Geogr. distr.: Madeira.

Fam. RALFSIACEAE

Ralfsia Berkeley.

Ralfsia verrucosa (Aresch.) J. Ag.

Kuckuck 1894 p. 241; Hamel 1931-39 p. 106; Kylin 1947 p. 44.

This species seems to be rare in the area. It was only found a few times and in small quantities. The material was gathered near low water line (on *Patella).*

Hab.: Madeira: Cabo Girão.

Geogr. distr.: W. coast of Europe from Norway southward to N. Africa, Mediterranean, Canaries, Madeira, E. coast of N. America (probably almost cosmopolitan).

Ralfsia bornetii Kuck.

Kuckuck 1894 p. 245; Kylin 1947 p. 44; Jaasund 1965 p. 61; Ardré 1970 p. 247.

This was found a few times growing on *Patella*-shells in the upper part of the sublittoral.

Hab.: Madeira: Cabo Girão, Reis Magos.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa.)

Geogr. distr.: Probably cosmopolitan.

SPHACELARIALES.

Fam. SPHACELARIACEAE.

Sphacelaria C. Ag.

Sphacelaria britannica Sauvag.

Sauvageau 1900 - 14 p. 56; Hamel 1931 - 39 p. 251.

Found only a few times on littoral rocks or in pools in exposed localities. The plant is about 1 cm. high and the filaments 20 - 35 μ thick. My specimens agree well with material from North Europe, which I have been able to study.

Hab.: Madeira: Funchal (Harbour, Clube Naval).
Porto Santo: Fonte da Areia.

Geogr. distr.: Great Britain, Scandinavia, Nova Scotia, Maine, Madeira.

Sphacelaria tribuloides Meneghini.

Sauvageau 1900 - 14 p. 123 - 237; Hamel 1931 - 39 p. 253.

This species is no doubt very rare. It was collected a few times in different seasons. It was growing in shaollw water and in pools on *Patella* or as an epiphyte on an old *Cladostephus verticillatus*. The specimens are about 5 mm. high and carry propagula.

Hab.: Madeira: Porto do Moniz, Funchal (Clube Naval); Ponta de S. Lourenço (Baía d'Abra), Reis Magos.
Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa).

Geogr. distr.: Widely distributed in warm seas.

Sphacelaria hystrix Suhr.

Sauvageau 1900 - 14 p. 173; Hamel 1931 - 39 p. 256.

Probably not uncommon as an epiphyte on *Cystoseira abies marina, discors,* and *tamariscifolia.* Found with sporangia in April-July. The species was also found once on old *Sargassum desfontainesii.* These specimens corresponded in all details with the others and carried sporangia and propagula. Recorded by Menezes 1926.

Hab.: Madeira: Porto do Moniz, Porto da Cruz, Reis Magos, Funchal (Lido, Clube Naval).

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: From the Atlantic coasts of France southward to the Canaries, Madeira, Azores.

Sphacelaria cirrosa (Roth.) C. Ag.

Hauck 1885 p. 344; Hamel 1931 - 39 p. 258.

Recorded for the archipelago by Menezes (1926 p. 74). I have not seen any material of this taxa myself.

Hab.: Madeira: Machico - Santa Cruz (Menezes *l. c.).*

Geogr. distr.: Widely spread along the shores of the North Atlantic, Mediterranean, Pacific.

Halopteris (Kütz) Sauvag.

Halopteris filicina (Grat.) Kütz.

Sauvageau 1900 - 14 p. 294; Hamel 1931 - 39 p. 261.

Only found a few times. This species is probably very rare. It was collected from a few m. depth downward and in a littoral pool of Deserta Grande. Recorded by Menezes 1926.

Hab.: Madeira: Funchal (Lido, Clube Naval, Baixa Larga), Porto do Moniz, Ponta de S. Lourenço.

Deserta Grande.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, Baía das Galinhas, leg. Sousa).

Geogr. distr.: Mediterranean, Great Britain, France, Azores, Madeira.

Halopteris scoparia (L.) Sauvag.

Sauvageau 1900 - 14 p. 349; Hamel 1931 - 39 p. 263. *Stypocaulon scoparium* Kütz.

This species is very common and occurs often in quantities. It is found all the year through on rocks and among other algae near low water mark down to 50 m. It also grows in pools and basins but seems to prefer more or less exposed localities. Recorded by Buch (1825), Grunow (1870), Menezes (1926).

Hab.: Madeira: Funchal (Harbour, Lido, Clube Naval, off Jewish Cemetary, Town Pier), Baixa Larga, Cabo Girão, Caniçal, Figueirinhas, Reis Magos, Porto do Moniz, Ponta de S. Lourenço.

Porto Santo: Fonte da Areia.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa, Maul., Baía das Galinhas leg. Sousa), Selvagem Pequena (leg. Maul).

Deserta Grande.

Geogr. distr.: East and West coasts of N. Atlantic, Mediterranean.

Cladostephus C. Ag.

Cladostephus verticillatus (Lightf.) Lyngb.

Sauvageau 1900 - 14 p. 488; Hamel 1931 - 39 p. 266.

Only found a few times (July, October) in some littoral pools and on rocks near low water mark.

Hab.: Madeira: Funchal (Clube Naval), Porto do Moniz, Porto da Cruz.

Porto Santo: Fonte da Areia, Pier; Penedo do Toro (leg. Con. Barreto 1942).

Geogr. distr.: Atlantic Ocean from Helgoland southward to North Africa, Canaries, Madeira, Azores and East coast of North America, Mediterranean.

Cladostephus spongiosus (Huds.) C. Ag.

Sauvageau 1900 - 14 p. 581;; Hamel 1931 - 39 p. 268.

This is no doubt a very rare species, only found in two localities at Porto Santo growing on rocks near low water mark. It is not recorded from the Canaries or Morocco, but seems no to be uncommon at the Azores. Recorded by Menezes 1926.

Hab.: Porto Santo: Town Pier and rocks near the fish-factory.

Geogr. distr.: Cold and temperate coasts of Western Europe, Azores, Madeira.

DICTYOTALES

Fam. DICTYOTACEAE.

Dilophus J. Ag.

Dilophus fasciola (Roth.) Howe.

Feldmann 1937 p. 169; Hamel 1931 - 39 p. 351.

Found in various places in rockpools and from the low water mark downwards.

Hab.: Madeira: Funchal (Clube Naval), Baixa Larga, Reis Magos, Porto do Moniz, Ponta de S. Lourenço (Porto de Santa Maria).
Porto Santo: Fonte da Areia.
Ilhas Selvagens: Baía das Galinhas, Baía das Cagarras, Selvagem Pequena (leg. Maul). (Gain et Mirande 1912 p. 480).
Deserta Grande.

Geogr. distr.: Mediterranean, Morocco, Canaries, Madeira.

Dictyota Lamour.

Dictyota dichotoma (Huds.) Lamour.

Hamel 1931 - 39 p. 347.

This species seems to be fairly common from low water mark and downwards to 70 m. As usual it is extremely variable in shape and size. The biggest specimens are about 15 cm. high. Recorded by Menezes (1926).

Hab.: Madeira: Câmara de Lobos; Funchal (Town Pier, Harbour, off Jewish Cemetary, Baixa Larga), Cabo Girão, Garajau, Reis Magos, Figueirinhas, Porto do Moniz, Ponta de S. Lourenço (several localities), Porto da Cruz.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, Baía das Galinhas, leg. Sousa).

Geogr. distr.: Widely distributed in warm temperate seas.

Dictyota linearis (C. Ag.) Grev.

Feldmann 1937 p. 349; Hamel 1931 - 39 p. 177.

Found in a number of localities from low water mark down to 45 m. as a rule entangled with other algae.
Hab.: Madeira: Funchal (Clube Naval), Figueirinhas, Porto do Moniz.

Porto Santo: Fonte da Areia.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, Baía das Galinhas, leg. Sousa).

Geogr. distr.: Mediterranean, Cadiz, Morocco, Canaries, Madeira, West Indies, Bermuda.

Padina Adans.

Padina pavonia (L.) Gailllon.

Hamel 1931 - 39 p. 343.

A very common species growing together with other algae on rocks, stones, shells etc. in pools, basins or near low water mark and downwards. It is common and very well developed in e few m. depth but has been collected down to at least 40 m. Found with reproductive organs in all seasons. Also recorded by Grunow (1879), Gain et Mirande (1912), Menezes (1926).

Hab.: Madeira: Funchal (Harbour, Lido, Clube Naval, off Jewish Cemetary) Baixa Larga, Reis Magos, Porto do Moniz, Ponta de S. Lourenço (several localities), Porto da Cruz.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa and Maul; Baía das Galinhas, from low water mark down to 5 m., leg. Sousa), Selvagem Pequena (leg. Maul).

Deserta Grande: Pools and down to 30 m.

Porto Santo: Off Fish-factory, Fonte da Areia.

Geogr. distr.: British Isles - N. Africa, Mediterranean, Canaries, Madeira, Azores, Bermuda.

Taonia J. Ag.

Taonia atomaria (Woodw.) J. Ag.

Hamel 1931 - 39 p. 336.

Only found on few occasions in a few m. depth by diving (April). Fertile.

Hab.: Madeira: Funchal (off Jewish Cemetary, Clube Naval), Baixa Larga, Reis Magos.

Geogr. distr.: West coast of Europe from Great Britain down to Morocco, Canaries, Madeira, Azores, Mediterranean.

Zonaria (Drap.) J. Ag.

Zonaria tournefortii (Lamour.) Monti.

Hamel 1931 - 39 p. 338.

Not uncommon in the sublittoral zone from low water mark down to 50 m. It is mostly found in a few m. depth attached to rocks and stones. All seasons. The plant is well developed, fullgrown specimens about 15 cm. high.

Hab.: Madeira: Funchal (Lido, Clube Naval, Baixa Larga), Machico, Caniçal, Ponta de S. Lourenço (Baía d'Abra), Porto da Cruz.
Ilhas Selvagens: Selvagem Grande (Lowe 1869).

Geogr. distr.: Mediterranean and adjacent Atlantic coasts, Canaries, Madeira, Azores, Brazil, North Carolina.

Pocockiella Papenfuss.

Pocockiella variegata (Lamour.) Papenfuss.

Zonaria variegata (Lamour.) C. Ag.; Hamel 1931 - 39 p. 341; *Z. lobata* C. Ag.; Börgesen 1926 p. 94.

Found in pools and basins or in the sublittoral zone from low water mark down to about 70 metres. Fairly common. Also recorded by Menezes (1926).

Hab.: Madeira: Funchal (Harbour, Clube Naval), Cabo Girão, Pontinha, Reis Magos, Garajau (60 - 70 m.), Figueirinhas, Porto da Cruz, Porto do Moniz.
Porto Santo: Fonte da Areia.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: In most warmer sees.

Dictyopteris Lamour.

Dictyopteris membranaceae (Stackh.) Batters.

Newton 1931 p. 216; Hamel 1931 - 39 p. 341; *D. polypodioides* Lamour.

This species was found on several occasions, but it is not common. The specimens are as a rule well developed and reach a length of about 15 cm. It was found in exposed localities on the rocks near low water mark. But most of the material was obtained by dredging in depths down to 70 metres.

H a b . : Madeira: Funchal (Harbour, Clube Naval, Baixa Larga), Figueirinhas, Garajau, Porto do Moniz, Ponta de S. Lourenço (Desembarcadouro), Porto da Cruz.
Porto Santo: Fonte da Areia.

G e o g r . d i s t r . : Widely distributed in warm seas.

CHORDARIALES

Fam. MYRIONEMATACEAE

Myrionema Grev.

Myrionema strangulans Grev.

Harvey 1846 - 51 tab. 290; *M. vulgare* Thur.; Sauvageau 1897 p. 185.

This species was found growing epiphytically on *Enteromorpha compressa* and *Ulva rigida* in the littoral zone and down to a few m. depth. It is probably fairly common during the summer season.

H a b . : Madeira: Funchal (Clube Naval), Reis Magos, Porto da Cruz.
Deserta Grande.

G e o g r . d i s t r . : Mediterranean, North Atlantic.

Myrionema corunnae Sauv.

Sauvageau 1897 p. 77; Hamel 1931 - 39 p. 91.

Only found once (April) growing on old seagrasses together with various other small algae. It was rather abundant.

H a b . : Madeira: Ponta de S. Lourenço (Baía d'Abra).

G e o g r . d i s t r . : North Atlantic shores.

Ascocyclus (Magnus) Sauv.

Ascocyclus orbicularies (J. Ag.) Magnus.

Hamel 1931 - 39 p. 101.

This species was only found a few times, but rather abun-

dantly growing on old seagrasses together with various other small algae.

Hab.: Madeira: Ponta de S. Lourenço (several places).

Geogr. distr.: Mediterranean, Canaries, Madeira, Bermuda.

Fam. ELACHISTACEAE

Elachista Duby

Elachista intermedia Crouan.

Feldmann 1937 p. 128; *E. neglecta* Kuck.

This species was only found once (July). It was growing on old *Cystoseira* in a pool. Fertile.

Hab.: Madeira: Porto da Cruz.

Geogr. distr.: Mediterranean, Atlantic coast of France, Madeira,

Fam. CHORDARIACEAE

Liebmannia J. Ag.

Liebmannia levillei J. Ag.

Hamel 1931 - 39 p. 166; *Mesogloia levillei* (J. Ag.) Menegh.; Hauck 1885 p. 365.

This seems to be a very rare species. Small specimens (3 - 5 cm. high) were found at Porto da Cruz in July. They were mainly sterile. Fairly well developed (5 - 9 cm. high) and fertile specimens were collected in May at two other places. The plant was found on rocks and stones in the mid littoral zone, in pools and in depths of 10 - 30 m. at Deserta Grande.

Hab.: Madeira: Funchal (Clube Naval), Porto da Cruz.
Deserta Grande.

Geogr. distr.: West coast of Europe from the Channel to Tangier, Madeira, Azores, Mediterranean.

Fam. SPERMATOCHNACEAE

Nemacystus Deb. et Sol.

Nemacystus hispanicus (Sauvag.) Kylin.

Kylin 1940 p. 47; *N. erythraeus* var. *hispanicus* Sauvageau 1897 p. 283. — Fig. 4 - 5.

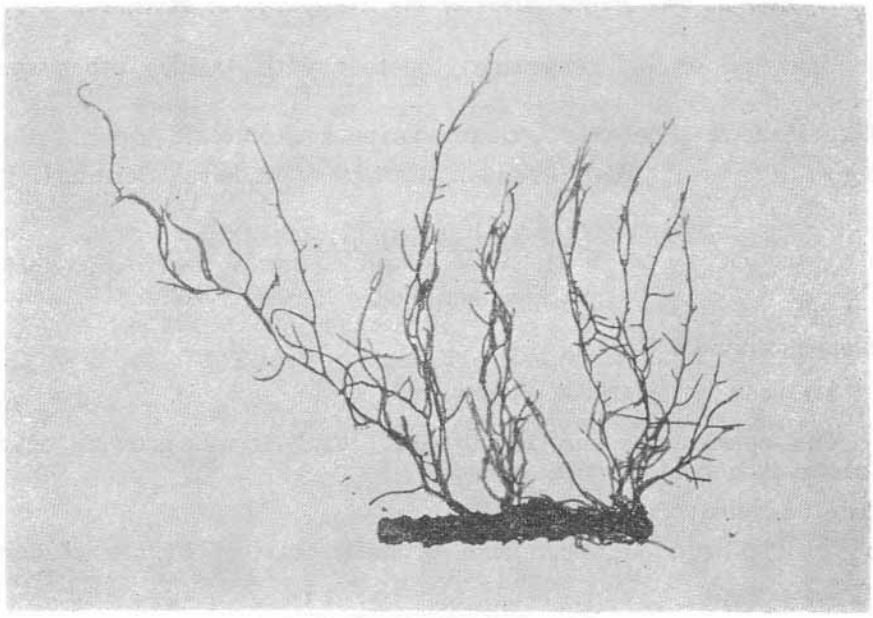

Fig. 4. — *Nemacystus hispanicus.* — × 1.

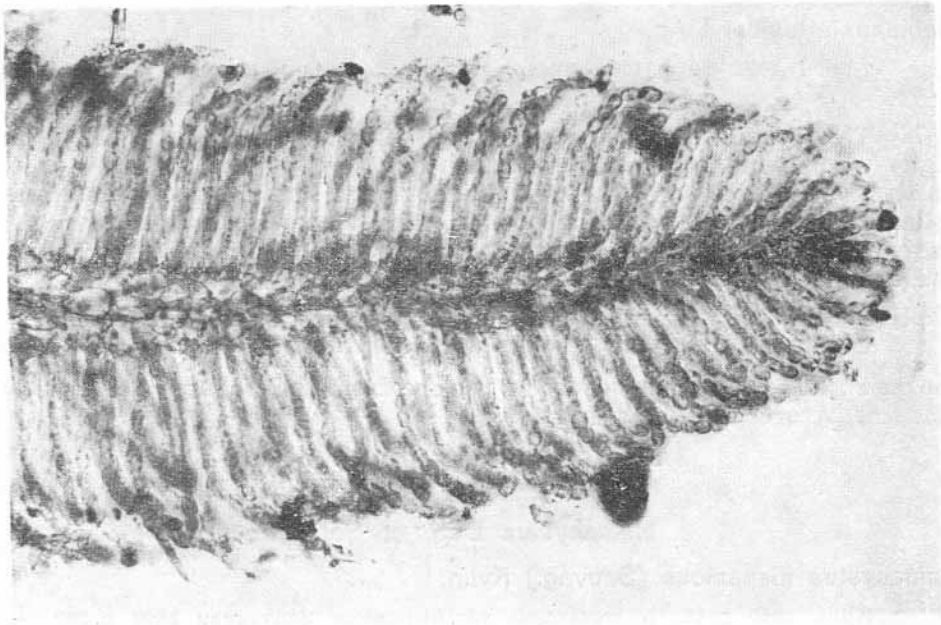

Fig. 5 — *Nemacystus hispanicus.* Tip of a branch. — × 150.

This species was only found once — June 1973. It was growing on old *Sargassum* leaves in a few m. depth.

Kylin *(l. c.)* has pointed out that the species is closely related to the Mediterranean *N. flexuosus* and *N. erythraeus* from the Red Sea. However, there are minor differences in the shape of the cells of the assimilatory filaments. My specimens are 5 - 8 cm. high.

Hab.: Madeira: Funchal (Baixa Larga).

Geogr. distr.: North coast of Spain, Madeira, Canaries.

SPOROCHNALES

Fam. SPOROCHNACEAE.

Sporochnus C. Ag.

Sporochnus pedunculatus (Huds.) C. Ag.

Hauck 1885 p. 276; Hamel 1931 - 39 p. 276.

This species was collected in a few localities by dredging in July. It grows attached to *Lithothamnia,* shells and stones in depths from 35 m. down to 75 m. The specimens are about 10 - 20 cm. high and fertile.

Hab.: Madeira: Garajau, Câmara de Lobos, Cabo Girão.

Geogr. distr.: West coast of Europe from Great Britain and Sweden, in the North to Portugal in the South, Mediterranean, Madeira.

Sporochnus bolleanus Mont.

Kützing Tab. IX tab. 81; Taylor 1960 p. 253.

This species was found in several localities in depths from 20 to 75 metres. It occurs attached to *Lithothamnia,* shells, stones etc. like *S. pedunculatus,* but it is no doubt more common. My specimens are about 1.5 - 6 dm. high, well developel and are found with reproductive organs from April to October.

The species was originally described by Montagne on material collected by Bolle at the Canary Islands (Isla de Lobos), but it was not found by Börgesen (1972 p. 67) himself in that area. The species is widely distributed in the western part of the tropical Atlantic.

Hab.: Madeira: Ponta de S. Lourenço (several places), Reis Magos, Figueirinhas, Garajau, Câmara de Lobos, Cabo Girão.

Deserta Grande (leg. Con. Barreto).

Geogr. distr.: Canaries, Madeira, Bermuda, Florida, Puerto Rico, Brazil.

DESMARESTIALES

Fam. ARTHROCLADIACEAE

Arthrocladia Duby.

Arthrocladia villosa (Huds.) Duby.

Hauck 1885 p. 381; Hamel 1931 - 39 p. 286.

This species is no doubt very rare. It was found twice by dredging (May, July) in 35 - 50 m. depth together with the two *Sporachnus*. It was attached to some small shells and *Lithothamnia*. Fertile.

Hab.: Madeira: Ponta de S. Lourenço, Garajau.

Geogr. distr.: North Sea, Atlantic coasts of USA (Massachusetts - North Carolina), Great Britain and France, Madeira, Mediterranean (as f. *australis*).

DICTYOSIPHONALES.

Fam. GIRAUDIACEAE.

Giraudia Derb. et Sol.

Giraudia sphacelariodes Derb. et Sol.

Hauck 1885 p. 334; Kylin 1947 p. 66.

This species was only found once (April) and in small quantities mixed with other filamentous algae. It was growing on old sea grasses in 10 - 15 m. depth. Sterile.

Hab.: Madeira: Ponta de S. Lourenço (Baía d'Abra).

Geogr. distr.: West coast of Europe (Scandinavia - Portugal), Madeira, Mediterranean.

Fam. PUNCTARIACEAE

Asperococcus Lamour.

Asperococcus echinatus Grev.

Hauck 1885 p. 388; Hamel 1931 - 39 p.222.

Collected from April - June. The specimens were fairly well developed and carried unilocular sporangia. Epiphytical on old *Cysto-*

seira, Halopitys etc. A few specimens were found on rocks. Also recorded by Menezes (1926).

Hab.: Madeira: Funchal (Clube Naval), Porto do Moniz.

Geogr. distr.: Atlantic Coasts of North and Western Europe, North Sea, Madeira.

Colpomenia Derb. et Sol.

Colpomenia sinuosa (Roth). Derb. et Sol.

Hamel 1931 - 39 p. 200.

It occurs not uncommonly on rocks with other algae near low water mark. It is also found lower down in the sublittoral zone (at least to about 30 m.). The latter ones are normally larger and can reach a size of several decimeters. Also recorded by Grunow (1870) and Barton (1897).

Hab.: Madeira: Funchal (Clube Naval, Jewish Cemetary), Baixa Larga, Ponta de S. Lourenço (Baía d'Abra), Porto do Moniz, Porto da Cruz.
Deserta Grande.
Porto Santo: off Fish-factory.

Geogr. distr.: Widely spread in all warmer seas.

Hydroclathrus Bory.

Hydroclathrus clathratus (Bory) Howe.

Hamel 1931 - 39 p. 202.

This species was collected in a few localities (in May, July and September). It is growing on rocks near low water down to a few metres depth in pools.

Hab.: Madeira: Funchal (Lido, Clube Naval), Reis Magos.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: Seems to occur in all warmer seas.

Fam. SCYTOSIPHONACEAE

Scytosiphon C. Ag.

Scytosiphon lomentaria (Lyngb.) J. Ag.

Hamel 1931 - 39 p. 194.

This species was only found at Clube Naval outside Funchal

in April and May. The specimens were well developed, 10 - 20 cm. high. The plant occured fairly abundantly on rocks near low water mark and in pools. This very widely distributed species is probably rare in the Madeira area. It is also recorded from the Azores and the Canaries.

Hab.: Madeira: Funchal (Clube Naval).

Geogr. distr.: Almost cosmopolitan.

FUCALES

Fam. CYSTOSEIRACEAE

Cystoseira C. Ag.

Cystoseira tamariscifolia (Huds.) Papenfuss.

Cystoseira ericoides (L.) C. Ag.; Sauvageau 1912 p. 381; Börgesen 1926 p. 99; Hamel 1931 - 39 p. 395.

This species is no doubt rare. It was found in a number of exposed localities where it forms small populations just above the *C. abies marina* zone. *C. ericoides* is — even from some distance — easily distinguished by its strong iridescence. The plant normally reaches a length of about 12 - 15 cm.

Hab.: Madeira: Funchal (Lido, Clube Naval), Porto do Moniz, Porto da Cruz, Ponta de S. Lourenço. Ponta Delgada (Menezes 1926).

Geogr. distr.: Atlantic coast of Europe and Africa from England to Morocco, Algiers, Canaries, Madeira.

Cystoseira abies marina (Turner) C. Ag.

Sauvageau 1912 p. 392; Börgesen 1926 p. 101.

This is the dominating species of the genus. It forms generally dense populations especially in exposed places from the lower part of the littoral zone several m. down. It has also been obtained by dredging or diving as far down as 50 m. It is often infested with different epiphytes such as *Sphacelaria hystrix* and *Ulva rigida* or mixed with algae. Also recorded by Grunow (1870).

C. abies marina is no doubt found in greater quantities than any other algae in the area.

Hab.: Madeira: Ponta de S. Lourenço (several places), Machico, Reis Magos, Funchal (Baixa Larga, Lido, Clube Naval), Porto do Moniz, Caniçal.

Ilhas Selvagens: Selvagem Grande (Lowe 1869, Gain et Mirande 1912).

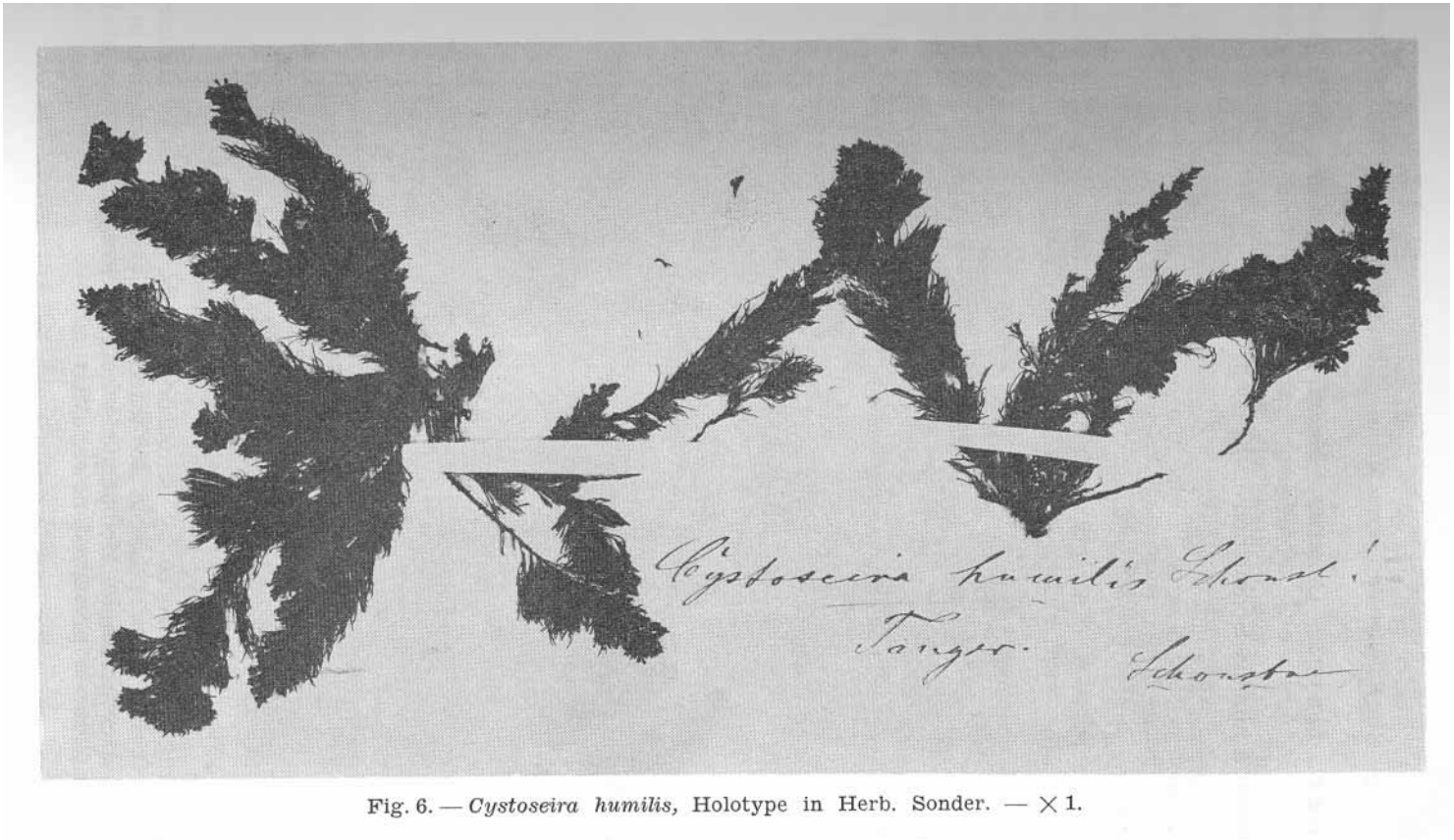

Fig. 6. — *Cystoseira humilis,* Holotype in Herb. Sonder. — × 1.

Geogr. distr.: Canaries, Madeira, Azores, Cape Verde Islands.

Cystoseira humilis Schousboe in Kützing.

Kützing Tab. phyc. X p. 18 pl. 50:II; Bornet 1892 p. 256; Sauvageau 1912 p. 399; Hamel 1931 - 39 p. 412; Ardré 1970 p. 321; *C. pumila* Kützing l. c. p. 18 pl. 50:I; *C. myriophylloides* Sauvageau l. c. p. 399; Hamel l. c. p. 413; *C. canariensis* Sauvageau l. c. 1912 p. 398; Börgesen 1926 p. 102.

There is a description with figure of this species in Kützing *(l.c.)*. It appears from the brief text that the type material was collect-

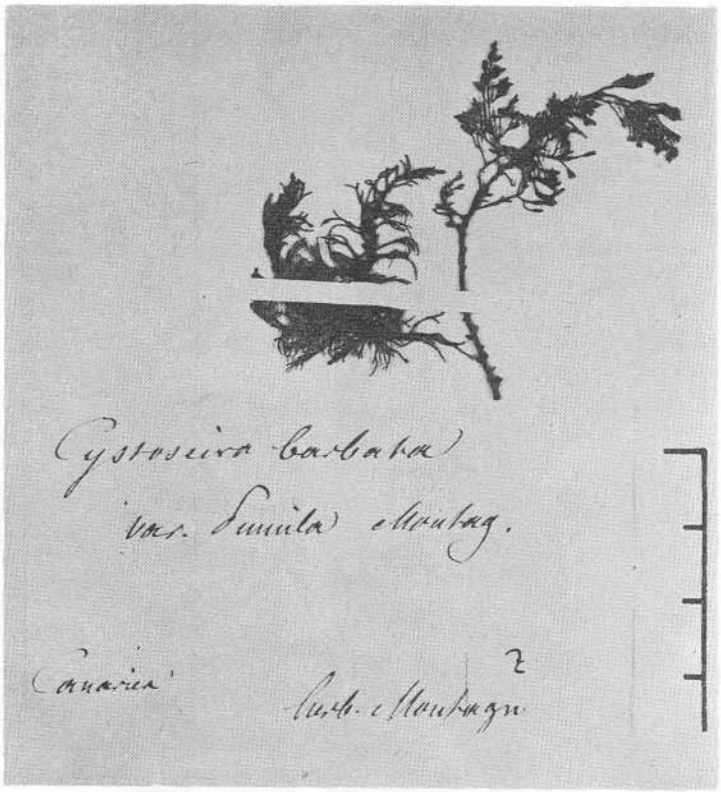

Fig. 7. — *Cystoseira pumila*, Holotype in Herb. Sonder. — × 1.

ed at Tanger in Morocco by Schousboe and is preserved in Herbarium Sonder. It has been possible to trace this original material in the National Herbarium in Melbourne, where at least great part of Herbarium Sonder is preserved nowadays.

The type material of *C. humilis* (Fig. 6) is mounted on a sheet together with a few other specimens under the name of *C. barbata* var. *pumila*. One of these other specimens is obviously the type ma-

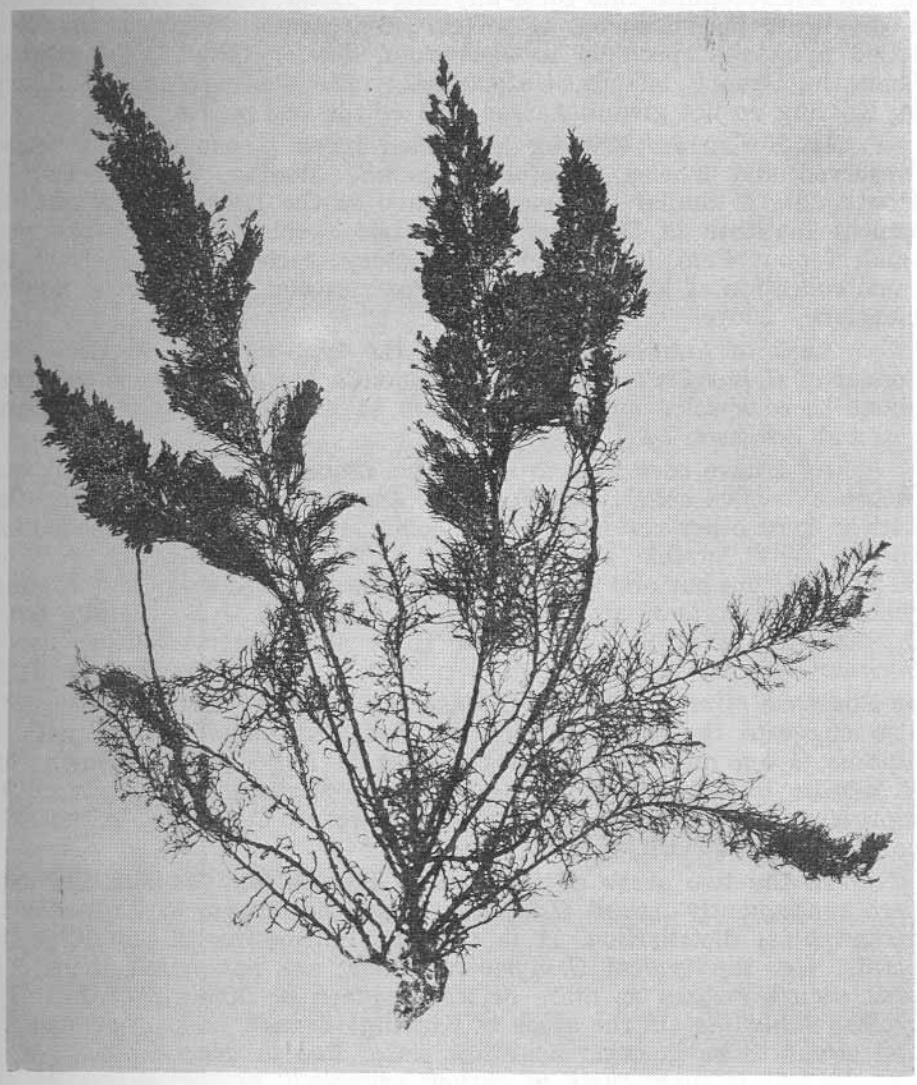

Fig. 8. — *Cystoseira humilis*, Madeira. — × 0.8.

terial of what Kützing *(l. c.* p. 18 pl. 50:I) described under the name of *C. pumila*. It appears also that this material derives from Montagne's

collections. According to Sauvageau *(l. c.)* Montagne has mentioned a *C. barbata* var. *pumila.* However, Montagne later on (in his Sylloge) does not mention this plant either as a species or as a variety. Probably he did not recognize this form any more. Later Kützig *(l.c.)* published a diagnosis and drawing of «*Cystoseira pumila* Montagne *in litt.*», based upon the specimen in Herbarium Sonder (Fig. 7), originating from the Canary Islands. Unfortunately the descriptions and figures by Kützing do not give any clear idea of the two plants.

In Herbarium Kützing in Leiden there is one single specimen preserved and labeled «*Cystoseira pumila* Montag, ad Canarias, Hb Montagne». A similar specimen is found in the Herbarium of the Botanical Institute in Hamburg. These two specimens, which are very small (about 4 cm. high) and fragmentary, derive obviously from the same collection of Montagne as the type material in Herbarium Sonder, mentioned above.

Lack of knowledge concerning the type material in Herbarium Sonder of *C. humilis* and especially *C. pumila* has caused some confusion about these species and their relation to some others *(cf.* Sauvageau *l. c.* and Börgesen *l. c.).*

As I have been able to study the «Sonder-material» and my own rather extensive collections from the Archipelago of Madeira together with various other material, I have come to the conclusion that the two species — *C. humilis* and *C. pumila* — figured by Kützing *(l. c.* on pl. 50:I - II) are one and the same thing. I would hardly say that either of them has the typical appearance of the plant, as it is generally found in Madeira (Fig. 8). The plant from the Canary Islands named *C. canariensis* by Sauvageau *(l. c.* p. 398) and also discussed in detail by Börgesen *(l. c.* p. 102) also belongs to *C. humilis.* Ardré (1970 p. 321) also suggests the amalgamation of *C. myriophylloides* Sauv. with *C. humilis.* I am quite convinced that she is right in her opinion that *C. humilis* is a reduced form of *C. myriophylloides,* which probably represents the fully developed plant (however, *C. humilis* is the older name and has priority).

In the two areas of the Canary Islands and Madeira the taxa, here consequently named *C. humilis,* is in the outermost limits for its geographical distribution. It is thus not surprising if any large-size plants, *i. e.* the typical *C. myriophylloides,* are not found there. The taxa occurs instead as more or less reduced or diverging forms. The typical *C. humilis* (in the sense of Kützing) is rare, at least at Madeira, and seems to be growing near low water line in very exposed places. The typical *C. canariensis* is rather commonn at the shores of the Canary Islands the same as in the Archipelago of Madeira. It is found near high water mark or especially in rockpools in or above the littoral, where it often forms a fringe above *C. discors.* The taxa shows a good

deal of variation — especially when growing in pools — obviously due to influence of changed ecological factors.

In his list Piccone (1884 p. 30) mentions *C. barbata* partly as var. *pumila* from Madeira, Selvagens and Isola Graciosa (Canaries). I have seen some of this material preserved in the Botanical Museum in Copenhagen. It all belongs to *C. humilis*.

Hab.: Madeira: Funchal (Clube Naval, Lido), Cabo Girão, Ponta de S. Lourenço, Porto do Moniz, Reis Magos.

Porto Santo: Fonte da Areia. Also recorded by Sauvageau *(l. c.* p. 341).

Deserta Grande.

Ilhas Selvagens: Selvagem Grande, Baía das Cagarras (leg. Sousa); Piccone *l. c.*, Gain et Miranda 1912.

Geogr. distr.: British Isles - N. Africa, Madeira Canaries, Cape Verde Islands.

Cystoseira discors (L.) C. Ag.

Sauvageau 1912 p. 402; Börgesen 1926 p. 103.

This species occurs in exposed places on rocks near low water mark and in rockpools (often below *C. humilis)*.

I have been able to compare my material with the type material in Herbarium Agardh in Lund. The conformity is very good. It is no doubt a very variable species, especially in tidal pools rather extreme ecological forms can be found. It also shows a good deal of seasonal variation.

Hab.: Madeira: Funchal (Lido, Clube Naval), Porto do Moniz, Porto da Cruz, Ponta de S. Lourenço.

Porto Santo: Fonte da Areia.

Geogr. distr.: Mediterranean, Cadiz, Canaries, Madeira.

Cystoseira fimbriata (Desf.) Börg.

Montagne 1846 p. 20, pl. 7; Hamel 1931 - 39 p. 418; *C. abrotanifolia* C. Ag.; Sauvageau 1912 p. 405.

No doubt very rare. It was only found a few times in about 2 - 3 m. depth. The specimens are hardly more thans 15 cm. high; some collected in July are fertile. The species has also been recorded from Madeira by Grunow 1870 p. 53.

Hab.: Madeira: Reis Magos, Ponta de S. Lourenço.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: Mediterranean, Cadiz, Morocco, Canaries, Madeira.

Fam. SARGASSACEAE.

Sargassum C. Ag.

Sargassum desfontainesii (Turn.) C. Ag.

C. Agardh. 1823 p. 25; Börgesen 1926 p. 105.

This species seems to be fairly common and is found in rockpools or in shallow water at somewhat sheltered places. Found fertile April-July.

Hab.: Madeira: Funchal (Lido, Clube Naval) Ponta de S. Lourenço (several places), Porto da Cruz.
Ilhas Selvagens: Selvagem Grande (Baía de Leste, leg. Nóbrega 1954).

Geogr. distr.: Canaries, Madeira, West Indies, Venezuela.

Sargassum vulgare C. Ag.

C. Agardh 1823 p. 3 Börgesen 1926 p. 106; Hamel 1931 - 39 p. 427.

This species seems to be common in the archipelago and is found in different varieties probably dependent on type of locality. It is found in rockpools and on rocks in shallow water, but also in deeper water down to 40 - 50 m. Also recorded by Grunow (1870).

Hab.: Madeira: Funchal (Town Pier, off Reid's hotel, Lido, Clube Naval), Reis Magos, Caniçal, Ponta de S. Lourenço (several places), Garajau, Figueirinhas, Porto do Moniz.
Deserta Grande.

Geogr. distr.: In most warm seas.

Sargassum natans (L.) Meyen.

Taylor 1960 p. 281; *Fucus natans* Buch 1825 p. 199; *Sargassum bacciferum* (Turn.) C. Ag.; Lowe 1869 p. 21; Menezes 1926 p. 74.

This pelagic species has been recorded for the archipelago by Buch, Lowe and Menezes *(l. c.)* I did not see any material myself.

Hab.: Madeira: Porto Novo, Ponta de S. Lourenço, and Ponta Delgada (Menezes, also recorded for Madeira by Buch).
Ilhas Selvagens: Selvagem Grande (Lowe).

Geogr. distr.: Pelagic in the Sargasso Sea and adjacent areas of the Atlantic.

RHODOPHYTA

BANGIOIDEA

GONIOTRICHALES

Fam. GONIOTRICHACEAE

Asterocytis Gobi.

Asterocytis ornata (C. Ag.) Hamel.

Hamel 1924 p. 40; *A. ramosa* Gobi.

Found one single time as epiphyte on *Cladophora fascicularis* (July).

Hab.: Madeira: Porto do Moniz.

Geogr. distr.: Probably cosmopolitan.

Goniotrichum Kütz.

Goniotrichum alsidii (Zanard.) Howe.

G. elegans (Chauv.) Le Jolis; Hauck 1885 p. 518.

Seems to be fairly common and was found growing on various filamentous algae and seagrass all through the year.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval, Lido) Porto do Moniz, Ponta de S. Lourenço (several places), Reis Magos.
Deserta Grande.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa), Selvagem Pequena (leg. Maul).

Geogr. distr.: Almost cosmopolitan.

Goniotrichum cornu cervi (Reinsch) Hauck.

Hauck 1885 p. 519.

Found once only epiphytical on *Halopteris* (April).

Hab.: Madeira: Funchal (Baixa Larga).

Geogr. distr.: Mediterranean, North Atlantic shores of Europe, Madeira.

BANGIALES

Fam. ERYTHROPELTIDACEAE.

Erythrocladia Rosenv.

Erythrocladia subintegra Rosenv.

Rosenvinge 1909 p. 73.

This minute plant is probably not uncommon. It was found together with other micro-epiphytes on various filamentous algae in the littoral and down to about 70 m. all through the year.

H a b. : Madeira: Funchal (Baixa Larga, Clube Naval, Harbour, Lido), Cabo Girão, Figueirinhas, Porto do Moniz, Reis Magos.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Maul).

G e o g r . d i s t r . : Probably cosmopolitan.

Erythrocladia irregularis Ronsev.

Rosenvinge 1909 p. 72.

This was found occasionally together with the preceding species.

H a b . : Madeira: Funchal (Baixa Larga, Lido), Figueirinhas, Porto do Moniz.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Maul).

G e o g r . d i s t r . : Probably cosmopolitan.

Erythrotrichia Aresch.

Erythrotrichia carnea (Dillw.) J. Ag.

Rosenvinge 1909 p. 67.

Probably not uncommon. It occurs together with other micro-epiphytes on various filamentous algae in the littoral and down to 70 m. all the year through.

H a b . : Madeira: Funchal (Baixa Larga, Clube Naval, Lido), Porto do Moniz, Reis Magos.

G e o g r . d i s t r . : Probably cosmopolitan.

Erythrotrichia obscura Berth.

Börgesen 1927 p. 6.

Found once only together with the preceding species on *Chaetomorpha capillaris* (April).

Hab.: Madeira: Funchal (Lido).

Geogr. distr.: Mediterranean, Canaries, Madeira.

Fam. BANGIACEAE

Porphyra C. Ag.

Porphyra leucosticta Thuret.

Rosenvinge 1909 p. 65; Kylin 1944 p. 11.

I only met this species once in the archipelago. It was found in June 1973 on the Town Pier of Funchal growing on the walls above low water mark. The specimens are fairly small, about 2 - 3 cm. high, and some are fertile. The taxa seems to be very rare in the area.

There are some earlier records of *Porphyra* found in Madeira. Buch (1825 p. 199) gives the record *Ulva umbilicalis* and Menezes (1926 p. 74) *P. laciniata,* Ag. — Ponta de S. Lourenço (?). According to Kristiansen (Baagöe et al. 1972) 1 - 2 cm. high, sterile *Porphyra* plants were found near Lido in January 1971. A completely reliable determination was not possible, but *P. leucosticta* is mentioned as a possibility. I have not seen any of this earlier material myself. But it probably all belongs to *P. leucosticta.* In former times a great deal of confusion existed in Europe with regard to the species of *Porphyra,* the records of Buch and Menezes may, therefore, not be quite reliable. *P. leucosticta* has been recorded for the Canary Islands. (Börgesen 1927 p. 3).

Hab.: Madeira: Funchal (Town Pier). (Lido ?, Ponta de S. Lourenço ?).

Geogr. distr.: Shores of N. Atlantic, Mediterranean.

FLORIDEAE

NEMALIONALES

Fam. ACROCHAETIACEAE

Acrochaetium Näg.

Acrochaetium crassipes Börg.

Börgesen 1915 - 20 p. 20; 1927 p. 12.

This species has been found on several occasions and is probably

not uncommon. It grows on various filamentous algae *(Cladophora, Polysiphonia,* etc.) and occurs occasionally *(Chaetomorpha capillaris)* in such large quantities that the host acquires a thin red felty cover from this very minute plant. It grows from the littoral down to about 70 m. all through the year.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval, Harbour, Lido), Porto da Cruz, Reis Magos .

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: West Indies, Canaries, Madeira.

Arochaetium parvulum (Kylin) Hoyt.

Börgesen 1927 p. 13.

This was only found a few times. It corresponds well with material from Scandinavian waters, from where it was originally described. Found on various filamentous algae in fairly shallow water.

Hab.: Madeira: Funchal (Clube Naval, Lido).

Geogr. distr.: Scandinavia, Atlantic coast of Europe and N. America, Canaries, Madeira.

Acrochaetium daviesii (Dillw.) Näg.

Börgesen 1927 p. 25.

This was only found a few times (in different seasons). It was growing epiphytically on old *Cladophora* etc. in fairly shallow waters and in pools.

Hab.: Madeira: Funchal (Clube Naval), Reis Magos.

Geogr. distr.: North Atlantic coast, Mediterranean, Pacific.

Acrochaetium thuretii (Bornet) Collins et Herv.

Kylin 1944 p. 21.

Only found once together with other micro epiphytes on *Scinaia* in 2 - 5 m. depth (July). Fertile.

Hab.: Madeira: Reis Magos.

Geogr. distr.: N. W. Europe, Massachusetts, Bermuda, Madeira.

Acrochaetium pulchellum Börg.

Börgesen 1915 - 20 p. 23. — Fig. 9 A - B.

This very Small species — hitherto only known from the Virgin Isles (West Indies) — was found once epiphytically on *Cladophora hutchinsiae* (November). My material corresponds very well with the description given by Börgesen. The cells are 5 - 6 μ in diameter, 7 - 10 μ long, and contain a star-shaped chromatophore with one pyrenoid. The sporangia are 5 - 7 × 9 - 10 μ.

Hab.: Madeira: Funchal (Clube Naval).

Geogr. distr.: West Indies, Madeira.

Acrochaetium canariense Börg.

Börgesen 1927 p. 17.

This species formerly only known from the Canary Islands was found a few times only but throughout the year. It was growing in shallow water on *Cladophora prolifera* and others.

Hab.: Madeira: Funchal (Clube Naval, Harbour, Lido), Cabo Girão.

Geogr. distr.: Canaries, Madeira.

Acrochaetium occidentale Börg.

Börgesen 1913 - 20 p. 44; 1927 p. 28.

This species was found a few times in 2 - 5 m. depth growing on different *Liagora* species. The material seems to be in good accordance with the description given by Börgesen.

Hab.: Madeira: Cabo Girão, Reis Magos.

Geogr. distr.: West Indies, Canaries, Madeira.

Acrochaetium robustum Börg.

Börgesen 1915 - 20 p. 12.

This species hitherto only known from the West Indies and North Carolina was only found once (April). It occured in great quantities on *Sargassum vulgare* and particularly on *Cystoseira abies marina,* which both were covered by a ca. 1 mm. thick, red felt formed by the plant. The cells are about 8 - 10 μ in diameter. Characteristic for this taxa is the very peculiar basal portion with a thick-walled cell penetrating into the host.

Hab.: Madeira: Funchal (Clube Naval).

Geogr. distr.: West Indies, North Carolina, Madeira.

Rhodothamniella Feldm.

Rhodothamniella codii (Crouan) Feldm.

Feldmann 1962 p. 220; *Achrochaetium codii* Hamel 1927 p. 124; *A. codicola* Börgesen 1927 p. 33.

I have found this taxa on different *Codium*-species and it is probably not uncommon. As far as I can see it is impossible to keep *A. codicola* — described by Börgesen from the Canary Islands — separate from the older *A. codii*. I have followed Feldmann's suggestion to transfer the taxa to the special genus *Rhodothamniella*.

Hab.: Madeira: Funchal (Clube Naval), Porto do Moniz, Reis Magos.

Deserta Grande.

Geogr. distr.: W. France, Portugal, Canaries, Madeira.

Rhodochorton Näg.

Rhodochorton floridulum (Dillw.) Näg.

Newton 1931 p. 376.

Found a number of times throughout the year growing on *Patella*-shells in a depth of about 2 - 3 m.

Hab.: Madeira: Funchal (Baixa Larga, off Jewish Cemetary), Reis Magos.

Geogr. distr.: British Isles and southward to Portugal, Madeira.

Fam. HELMINTHOCLADIACEAE

Helminthora J. Ag.

Helminthora divaricata (C. Ag.) J. Ag.

Hamel 1930 p. 11; *Nemalion divaricatum* Kützing Tab. phyc. XVI pl. 63; 65 c, d; Harvey 1846 - 51 pl. 110.

This taxa was only found once (July 1968). The material, which is sterile, consists of some small pieces only intermingled with *Dictyota dichotoma*. It was found in the uppermost part of the sublittoral.

Hab.: Madeira: Funchal (Baixa Larga, just outside the swimming pool of the Savoy Hotel).

Geogr. distr.: British Isles, W. France, Madeira.

Helminthocladia J. Ag.

Helminthocladia calvadosii (Lamour.) Setch.

Hamel 1930 p. 7; *H. purpurea* J. Ag..; Newton 1931 p. 257.

Only a few specimens were found in June 1973. They are all well developed, 30 - 45 cm. high, and fertile.

Hab.: Madeira: Ponta de S. Lourenço (Baía d'Abra).

Geogr. distr.: British Isles and southward to Morocco, Madeira, Açores.

Liagora Lamour.

Liagora ceranoides Lamour.

Lamouroux 1816 p. 239; Börgesen 1927 p. 58; Taylor 1960 p. 326 *L. pulverulenta* C. Ag.; *L. corymbosa* Börg.

This species was only collected a few times (April - July). It was found on exposed localities in shallow water. Fertile.

Hab.: Madeira: Cabo Girão, Porto do Moniz, Reis Magos.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: Florida, Bermuda, West Indies, Brazil, Canaries, Madeira, Red Sea, etc.

Liagora valida Harv.

Harvey 1853 p. 138; Börgesen 1913 - 20 p. 70; Taylor 1960 p. 327. — Fig. 9 C.

Several typical and well developed specimens were collected on some occasions in the period May - July at Clube Naval outside Funchal. They were growing in pools or on rocks 1 - 2 m. below low water mark. They are 5 - 10 cm. high and fertile. A branch of assimilatory filaments with a carpogonial branch is shown in fig. 00 The carpogonial branch is curved in a typical way. The gonimoblasts are covered with a few involucral filaments only.

Hab.: Madeira: Funchal (Clube Naval).

Geogr. distr.: Bermuda, Florida, West Indies, Madeira.

Liagora canariensis Börg.

Börgesen 1927 p. 48. — Fig. 9 D.

This species was first known from the Canaries only. It is no doubt closely related to *L. valida* and it may be difficult to tell them apart. I have a few specimens collected in some m. depth which no doubt are identical with the plant described by Börgesen. Fig. 00

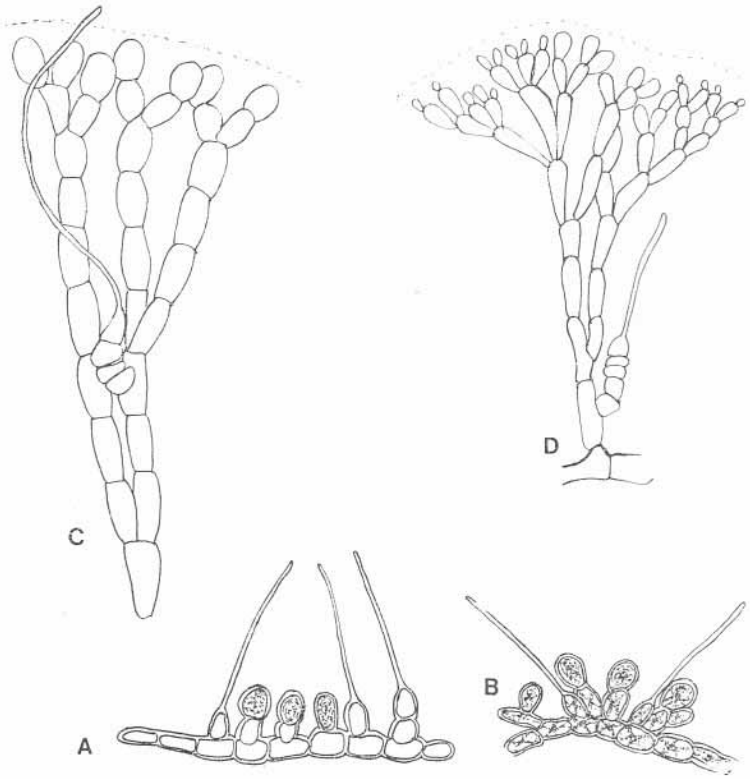

Fig. 9. — A - B *Acrochaetium pulchellum.* — C *Liagora valida,* assimilating filaments - with carpogonial branch. — D *Liagora canariensis,* ditto. — A - B × 500, C - D × 300.

shows a branch with assimilatory filaments and a carpogonial branch which here is straighter than those of *L. valida.* This character, however, is not always so obvious as pointed out by Börgesen. The involucral filaments of the gonimoblasts are also better developed.

Hab.: Madeira: Cabo Girão, Funchal (off Jewish Cemetary). Deserta Grande.

Geogr. distr. : Canaries, Madeira.

Liagora distenta (Mert.) C. Ag.

Hauck 1885 p. 65; Hamel 1930 p. 18.

Of all the *Liagora* species this is the most common one. It was collected by diving in the period April - July in shallow water down to about 5 m. The specimens are very well developed, 10 - 25 cm. high and fertile.

Hab. : Madeira: Funchal (Clube Naval), Porto da Cruz, Porto do Moniz, Ponta de S. Lourenço (Porto de S. Maria), Reis Magos.
Porto Santo: Fonte da Areia.
Ilhas Selvagens (Lowe 1869, as *L. complanata).*

Geogr. distr. : Mediterranean, Cadiz, Morocco, Canaries, Madeira.

Fam. CHAETANGIACEAE

Scinaia Bivona.

Scinaia furcellata (Turner) Bivona.

Setchell 1914 p. 90; Feldmann 1942 p. 224.

No doubt very rare. I only collected this species a few times (April - July) but the specimens are well developed and fertile. Those of July are covered with various micro-epiphytes. According to Börgesen (1927 p. 63) only one small specimen collected by Vickers is known from the area of the Canaries.
The species was found in depths of 2 - 15 m.

Hab. : Madeira: Funchal (off Jewish Cemetary, Clube Naval), Reis Magos.
Deserta Grande.

Geogr. distr. : West coast of Europe from Great Britain to Morocco, Madeira, Canaries, Mediterranean.

Scinaia complanata (Collins) Cotton.

Setchell 1914 p. 100; Feldmann 1942 p. 224; Taylor 1960 p. 334 pl. 42.

This is also a very rare species. But in those localities, where it was found many specimens were obtained. It seems to be more common than *S. furcellata.* The plant is also well developed (5 - 7 cm. high) often densely tufted. Fertile specimens found in May - July. It was found in various depths down to 70 m. The best developed specimens are from 10 - 30 m.

Hab.: Madeira: Funchal (Clube Naval, off Jewish Cemetary, Garajau, Ponta de S. Lourenço, Porto do Moniz, off Reis Magos.
Deserta Grande.

Geogr. distr.: West Indies, Florida, Bermuda, Madeira, Mediterranean, (Côte des Albères).

Galaxaura Lamour.

Galaxaura flagelliformis (Kjelm.) Börg.

Börgesen 1927 p. 65.

This species is well represented in the material from Ilhas Selvagens, where it obviously is not uncommon. Strangely enough it was not found in Madeira proper or any of the other islands. According to Börgesen *(l. c.)* it is common in the Canaries.
The material was collected in the upper part of the sublittoral.

Hab.: Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, Baía das Galinhas, leg. Sousa).

Geogr. distr.: Florida, West Indies, Canaries, Madeira, (Ilhas Selvagens).

Galaxaura oblongata (Ellis et Solander) Lamour.

Börgesen 1927 p. 71.

Like the preceding species it is well represented in the material from Ilhas Selvagens, but not found at any of the other islands. It occurs in the upper sublittoral.

Hab.: Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, Baía das Galinhas, leg. Sousa) (Lowe 1869).

Geogr. distr.: Mediterranean, Red Sea, West Indies, Canaries, Madeira (Ilhas Selvagens).

Fam. NACCARIACEAE

Atractophora Crouan.

Atractophora hypnoides Crouan.

Hamel 1931 p. 34; Newton 1931 p. 268.

A few specimens of this interesting taxa were found in June

1973 by diving in about 5 m. depth. They were about 10 - 12 cm. high and fertile.

Hab.: Madeira: Ponta de S. Lourenço (Baía d'Abra).

Geogr. distr.: British Isles, W. France, Madeira.

Fam. BONNEMAISONIACEAE

Asparagopsis Mont.

Asparagopsis armata Harv.

Harvey 1858 - 63 Tab. 192; Feldmann 1937 p. 229; 1963 p. 146; *Falkenbergia rufanolosa* (Harv.) Schm. (= tetrasporic phase).

According to Feldmann *(l. c.)* there has been some confusion concerning *A. delilei* and its occurrence in the Mediterranean. What was known under this name from that area earlier on seem to be forms of *A. armata. A. delilei* has also been recorded from the Azores by Schmidt (1931 p. 47: «it is one of the most common algae of the Azores»). I have not seen the material collected by Dr. Schmidt but according to my own studies of these islands (São Miguel) I only found *A. armata,* which is a very common species. The species seems to be common in Madeira, where it is found in the sublittoral zone from a few m. depth down to 40 m. The tetrasporophyte (earlier known as *Falkenbergia rufanolosa)* is also common.

Hab.: Madeira: Funchal (Baixa Larga, Lido), Porto da Cruz, Porto do Moniz, Ponta de S. Lourenço (several places), Reis Magos.
Deserta Grande.

Geogr. distr.: Australia, New Zealand, the Atlantic (Great Britain - Morocco), Mediterranean, Madeira, Azores.

Asparagopsis taxiformis (Delib.) Collins et Hervey.

Collins et Hervey 1917 p. 117, Börgesen 1913 - 20 p. 352; 1929 p. 79; Taylor 1960 p.348; Taylor and Bernatowicz 1969 p. 25.

This interesting species originally described from Bermuda seems to be fairly rare in Madeira itself. In the collections from Ilhas Selvagens there are several well developed specimens. According to Börgesen and others it is common in the Canaries.

Hab.: Madeira: Porto do Moniz.
Ilhas Selvagens: Selvagem Grande (leg. Sousa).
Deserta Grande.

Geogr. distr.: Bermuda, West Indies, Brazil, Canaries, Madeira.

GELIDIALES

Fam. GELIDIACEAE

Gelidiella Feldm. et Hamel.

Gelidiella tenuissima Feldm. et Hamel.

Feldmann et Hamel 1936 p. 226; *G. pannosa* (Bornet) Feldm. et Hamel.

This interesting species was only found a few times (April, July). It grows on *Patella*-shells (alive) in the uppermost part of the sublittoral. My material is fertile (tetraspores) and corresponds very well with the description given by Feldmann and Hamel *(l. c.)* The plants are about 2 - 4 mm. high and 50 - 90 μ thick.

H a b . : Madeira: Cabo Girão, Funchal (off Jewish Cemetary).

G e o g r . d i s t r . : From Biarritz and Portugal southward to Cape Verde, Madeira, Mediterranean.

Gelidiella ramellosa (Kütz.) Feldm. et Hamel.

Feldmann et Hamel 1934 p. 533; 1936 p. 222; *Acrocarpus ramellosus* Kütz.

It was quite interesting to find this species, which is well separated from the preceding one, in the material from the Ilhas Selvagens. The plant was growing on *Patella*-shells. With tetraspores.

H a b . : Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa).

G e o g r . d i s t r . : Tunis, Ilhas Selvagens.

Gelidium Lamour.

Gelidium crinale (Turn.) Lamour.

Feldmann et Hamel 1936 p. 240.

This alga seems to be uncommon. It was collected a few times only. It was growing in the lower littoral and in pools. My specimens are 1.5 - 4 cm. high. Also recorded by Menezes (1926).

H a b . : Madeira: Funchal (Baixa Larga), Ponta Delgada (Menezes), Porto da Cruz, Porto do Moniz.

Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa).

G e o g r . d i s t r . : Atlantic coast of Europe, N. Africa and N. America, Mediterranean, Red Sea.

Gelidium spathulatum (Kütz.) Born.

Börgesen 1927 p. 82; Feldmann et Hamel 1936 p. 239.

The plant was found a few times on exposed rocks in the lower littoral. It occurred together with *G. pusillum* and other small algae. No doubt rare.

Hab.: Madeira: Funchal (Baixa Larga).

Geogr. distr.: Mediterranean, Atlantic coast of S. France — Portugal, Canaries, Madeira.

Gelidium pusillum (Stackh.) Le Jol.

Börgesen 1927 p. 83; Feldmann et Hamel 1936 p. 236.

This small plant forms more or less dense tufts together with several other algae such as *Caulacanthus, Centroceras,* etc. It grows in exposed places on rocks in the lower littoral and seems to be fairly uncommon. Also recorded by Grunow (1870).

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval) Lido.
Deserta Grande.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: From Great Britain southward to Morocco, Canaries, Madeira, Azores, Mediterranean.

Gelidium corneum (Turn.) Lamour.

Taylor 1960 p. 356.

Recorded for Madeira by Grunow (1870), Menezes (1926). I have not seen any material myself.

Hab.: Madeira:

Geogr. distr.: Probably widely distributed.

Gelidium spinulosum (C. Ag.) J. Ag.

Feldmann et Hamel 1936 p. 252.

Recorded for Madeira by Grunow (1870) and Gain (1914). I have not seen any material myself.

Hab.: Madeira.

Geogr. distr.: Morocco, Madeira.

Pterocladia J. Ag.

Pterocladia capillacea (Gmel.) Born. et Thur.

Bornet et Thuret 1876 p. 57; Feldmann et Hamel 1936 p. 254.

This species seems to be very common in the district and occurs also in fairly great quantities. It grows in the uppermost part of the sublittoral where it often forms dense communitites. It is also found in deeper water down to 50 m.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval, Lido), off Pináculo, Porto do Moniz, Porto da Cruz, Ponta de S. Lourenço, Reis Magos.

Geogr. distr.: From Norway and Great Britain to North Africa, Mediterranean, Canaries, Madeira, Azores.

Fam. WURDEMANNIACEAE

Wurdemannia Harv.

Wurdemannia setacea Harv.

Börgesen 1915 - 20 p. 368; 1929 p. 77.

This interesting plant was only found once and in very small quantities. It was growing in the littoral in a very exposed place. My specimens are sterile.

Hab.: Madeira: Porto da Cruz.

Geogr. distr.: West Indies, Canaries, Madeira.

CRYPTONEMIALES

Fam. DUMONTIACEAE

Dudresnaya Crouan et Crouan

Dudresnaya verticellata (With) Le Jol.

Le Jolis 1863 p. 117; Newton 1931 p. 227; *D. coccinea* (C. Ag.) Crouan; Bornet et Thuret 1876 p. 35.

This species was only found on one single occasion (July). The specimens, which are well developed — about 12- 15 cm. high — and fertile were growing on shells and *Lithothamnia* in a depth of 40 - 50 m.

Hab.: Madeira: Ponta de S. Lourenço (Desembarcadouro 40 - 50 m. July).

Geogr. distr.: Mediterranean, Adriatic, West coast of Europe (Great Britain - Tanger), Madeira.

Acrosymphytum Sjöstedt.

Acrosymphytum purpuriferum (J. Ag.) Sjöstedt.

Sjöstedt 1926 p. 19; Kylin 1930 p. 22; Feldmann 1942 p. 236; *Dudresnaya purpurifera* J. Agardh; Berthold 1884 p. 24 pl. V: 1.

This rare species was found a number of times in April to July. The specimens are well developed, up to about 35 cm. high and fertile. They were obtained by dredging or diving in depths from 4 - 35 m. By diving at Clube Naval in 4 - 9 m. depth (June 1973) it was found that the species occurred in fairly great quantities and covered great patches of the bottom almost entirely.

Hab.: Madeira: Câmara de Lobos (35 m.), Funchal (Clube Naval, 4 - 9 m.).

Deserta Grande (10 - 30 m.).

Geogr. distr.: Western Mediterranean, Adriatic, Madeira.

Fam. GLOIOSIPHONIACEAE

Thuretella Schmitz.

Thuretella schousboei (Thur.) Schmitz.

Kylin 1930 p. 12; Crouania schousboei Thur. in Bornet et Thuret.

This apparently very rare species was found in localities in 1969 by diving in depths from 2 - 5 m. Several well developed and fertile specimens were obtained. They are about 10 - 20 cm. high.

Hab.: Madeira: Caniçal, Reis Magos.

Geogr. distr.: West coast of France, Mediterranean (Naples), Madeira.

Fam. SQUAMARIACEAE

Peyssonnelia Decaisne.

Peyssonnelia rubra (Grev.) J. Ag.

Hauck 1885 p. 35; Feldmann 1937 p. 244.

This species seems to be fairly common in the sublittoral zone

down to about 70 m. In depths between 30 - 70 m. it was often found together with various *Lithothamnia*.

Hab.: Madeira: Cabo Girão, Figueirinhas, Funchal (Lido, Clube Naval), Garajau, Ponta de S. Lourenço, Reis Magos.
Deserta Grande.

Geogr. distr.: Mediterranean; Temperate and subtropical shores of the Atlantic. Probably in all warm seas of the world.

Peyssonnelia dubyi Crouan.

Crouan 1867 p. 148; Kylin 1944 p. 34.

This species grows on stones and old shells etc. and was found from a few m. depth down to about 50 m. The material from Madeira corresponds well to what I have seen of the plant in northern waters. Fairly rare.

Hab.: Madeira: Cabo Girão, Figueirinhas, Funchal (Baixa Larga) Reis Magos.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).
Deserta Grande.

Geogr. distr.: Atlantic shores of Europe, Madeira, Mediterranean.

Cruoriopsis Dufour.

Cruoriopsis rosenvingii Börg.

Börgesen 1929 p. 11.

This species is no doubt very rare. It was only found on two occasions growing on some shells in fairly deep water (10 - 40 m.). It agrees well with Börgesen's description.

Hab.: Madeira: Funchal (Baixa Larga), Reis Magos.

Geogr. distr.: Mediterranean, Canaries, Madeira.

Fam. HILDENBRANDIACEAE

Hildenbrandia Nardo.

Hildenbrandia prototypus Nardo.

Hauck 1885 p. 38.

This wideley distributed species was only found once and is no doubt very rare in the district. It was growing on rocks in the lower

littoral together with *Lithothamnion lenormandii* and *Gelidium pusillum*. With tetraspores (December).

Hab.: Madeira: Funchal (Lido).

Geogr. distr.: Probably cosmopolitan.

Fam. CORALLINACEAE

Lithothamnion Phil.

Lithothamnion lenormandii (Aresch.) Foslie.

Foslie 1929 pl. 3; Suneson p. 5.

This species seems to be common in the archipelago. It grows on rocks, stones, shells etc. from the lower littoral down to 70 m. and in littoral pools. It shows the same range of variation as in Nordic waters. Most of the material belongs to f. *typica*. But f. *squamulosa* (cf. Suneson *l. c.)* is found.

Hab.: Madeira: Funchal (Clube Naval, off Jewish Cemetary), Cabo Girão, Garajau, Ponta de S. Lourenço (several places), Reis Magos, Figueirinhas.
Porto Santo: Fonte da Areia.
Deserta Grande.

Geogr. distr.: Shores of N. Atlantic and Arctic Sea, Mediterranean.

Lithothamnion sonderi Hauck.

Hauck 1885 p. 273; Foslie 1929 pl. 4; Suneson 1943 p. 9.

Obtained by dredging in 20 - 70 m. depth in various places. It grows on stones and old shells together with *Lithothamnion lenormadii* and others. It is not uncommon.

Hab.: Madeira: Cabo Girão, Ponta de S. Lourenço (several places), Reis Magos.
Deserta Grande.

Geogr. distr.: West coast of Europe to N. Africa, Mediterranean, Canaries, Madeira.

Lithothamnion calcareum (Pall.) Aresch.

Foslie 1929 pl. 16; Gayral 1966 p. 411.

Fairly common in deep water, especially where the bottom is covered with small stones, shells etc. The plant is very variable in the area — very thin, delicate and loose lying — coarser ones often attached to stones and old shells.

Hab.: Madeira: Cabo Girão, Garajau, Figueirinhas, Ponta de S. Lourenço (several places), Reis Magos.

Geogr. distr.: W. Europe (from Norway to Morocco), Canaries, Madeira, Mediterranean.

Mesophyllum Lemoine.

Mesophyllum canariense (Foslie) Lemoine.

Lemoine in Börgesen 1929 p. 31; *Lithophyllum canariense* Foslie 1905 p. 1.

Found several times in the sublittoral from a few m. down to about 70 m. The plant occurs especially in places where the bottom seems to be covered with small stones, shells, various *Lithothamnia,* etc.

Hab.: Madeira: (off Jewish Cemetary), Garajau, Ponta de S. Lourenço (several places), Reis Magos.

Geogr. distr.: Canaries, Madeira.

Epilithon Heydr.

Epilithon membranaceum (Esper) Heydr.

Suneson 1943 p. 21.

Common as epiphyte on various algae such as *Pterocladia, Cladophora prolifera*, etc.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval, Lido, off Jewish Cemetary), off Reis Magos, off Pináculo, Ponta de S. Lourenço (several places), Porto da Cruz, Porto do Moniz.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Maul).

Geogr. distr.: W. coast of Europe — N. Africa, Mediterranean, NE. coast of America, Pacific and Indian Ocean.

Lithophyllum Phil.

Lithophyllum incrustans Philippi.

Foslie 1929 pl. 58; Gayral 1966 p. 407.

Found a few times growing on exposed rocks near low water line or in pools.

Hab.: Madeira: Funchal (Clube Naval).

Geogr. distr.: From the Färoes southward to Portugal, Morocco, Cape Verde Islands, Madeira, Mediteranean.

Lithophyllum vickersiae Lemoine.

Lemoine in Börgesen 1929 p. 49.

Obtained by dredging in 40 - 50 m.

Hab.: Madeira: Cabo Girão, Ponta de S. Lourenço.

Geogr. distr.: Canaries, Madeira, Azores, SW. France — North Africa.

Crodelia Heydr.

Crodelia expansa (Phillippi) Kylin.

Kylin 1956 p. 208; *Lithophyllum expansum* Foslie 1929 pl. 60; *Pseudolithophyllum expansum* Lemoine.

Found a few times on exposed rocks near low water line and in pools.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval).

Geogr. distr.: Mediterranean, Morocco, Azores, Madeira.

Crodelia orbiculata (Fosl.) Kylin.

Kylin 1956 p. 208; *Lithophyllum orbiculatum* Foslie 1929 pl. 57; *Pseudolithophyllum orbiculatum* Lemoine; Suneson 1943 p. 34.

Found a few times on shells and stones in pools and uppermost part of the sublittoral.

Hab.: Madeira: Funchal (Baixa Larga, Lido), Ponta de S. Lourenço.

Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, Baía das Cagarras, leg. Sousa).

Geogr. distr.: Channel area — Portugal, Madeira, Mediterranean.

Dermatolithon Foslie.

Dermatolithon pustulatum (Lamour) Foslie.

Foslie 1898 p. 11; *Lithophyllum pustulatum* Foslie 1904 p. 3; Suneson 1943 p. 39.

Common epiphyte on various coarser algae such as *Pterocladia,*

Cystoseira, etc. Also recorded by Grunow (1870).

H a b . : Funchal (Baixa Larga, Clube Naval, Lido, off Jewish Cemetary, Town Pier), Porto do Moniz.

G e o g r . d i s t r . : Almost cosmopolitan.

Dermatolithon corallinae (Crouan) Foslie.

Foslie 1902 p. 402; *Lithophyllum pustulatum* (Lamour.) Fosl. f. *corallinae* (Crouan) Fosl.; *L. corallinae* Suneson 1943 p. 43.

Found a few times epiphytical on *Corallina.* It is probably rare.

H a b . : Madeira: Funchal (Baixa Larga, Lido, off Jewish Cemetary).
Porto Santo: Fonte da Areia.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

G e o g r . d i s t r . : Probably almost cosmopolitan.

Dermatolithon hapalidioides (Crouan) Foslie.

Foslie 1905 p. 128; Lemoine in Börgesen 1929 p. 45; *Lithophyllum hapalidioides* Foslie 1929 pl. 72.

Found near low water line down to a few m. depth in exposed places growing on *Patella,* stones etc. My material is variable but corresponds well to the different forms figured by Foslie *(l. c.)* and others .

H a b . : Madeira: Cabo Girão, Figueirinhas, Funchal (Baixa Larga), Porto do Moniz, Ponta de S. Lourenço, Reis Magos.
Porto Santo: Fonte da Areia.
Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa).

G e o g r . d i s t r . : W. Europe (Färoes - Morocco), Mediterranean, Canaries, Madeira, Azores.

Melobesia Lamour.

Melobesia farinosa Lamour.

Newton 1931 p. 300.

Epiphyte on various algae and seagrasses. Probably common in the archipelago.

H a b . : Madeira: Funchal (Clube Naval), Ponta de S. Lourenço (several places).

Geogr. distr.: Almost cosmopolitan.

Melobesa lejolisii Rosanoff.

Havery 1846 - 51 pl. 347; Suneson 1943 p. 23.

Found in one locality where it was common as epiphyte on seagrasses in 10 - 15 m. depth. Fertile throughout the year.

Hab.: Madeira: Ponta de S. Lourenço (Baía d'Abra).

Geogr. distr.: Almost cosmopolitan.

Melobesia minutula Fosl.

Foslie 1904 p. 8; Suneson 1943 p. 27.

This minute species is probably not uncommon. It occurs on various filamentous algae such as *Cladophora, Chaetomorpha, Microdictyon* and *Polysiphonia* from the littoral downwards to 70 m. It was found fertile all the year round.

Hab.: Madeira: Funchal (Clube Naval, Lido), Figueirinhas, Porto da Cruz, Porto do Moniz, Reis Magos.

Ilhas Selvagens: Selvagem Pequena (leg. Maul).

Geogr. distr.: Probably distributed along the west coast of Europe.

Choreonema Schmitz.

Choreonema thuretii (Bornet) Schmitz.

Newton 1931 p. 299; Suneson 1937 p. 53.

Found parasitic on *Jania longifurca* and *rubens*. This interesting minute species seems to be rare although the host *(Jaia)* is common.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval, Lido). Ponta de São Lourenço (Baía d'Abra, Porto de S. Maria), Porto do Moniz, Porto da Cruz.

Porto Santo: Off fish factory.

Deserta Grande.

Ilhas Selvagens: Selvagem Grande, Baía das Cagarras (leg. Sousa).

Geogr. distr.: Probably cosmopolitan.

Schmitziella Bornet et Batters.

Schmitziella endophloea Bornet et Batters.

Newton 1931 p. 298; Suneson 1944 p. 1.

Grows in the cellwalls of *Cladophora pellucida*. It was found once only. With conceptacles. (July).

H a b . : Madeira: Funchal (Clube Naval).

G e o g r . d i s t r . : Mediterranean, Atlantic coast of Europe from British Isles southward, Madeira.

Amphiroa Lamour.

Amphiroa cryptarthrodia Zanard.

Hauck 1885 p. 275; *A. verruculosa* Kütz.

I have not found this taxa myself. It has been recorded by Gain (1914 cf. Feldmann 1946 p. 425.).

H a b . : Madeira (Gain *l. c.)*.

G e o g r . d i s t r . : Mediterranean, Canaries, Madeira.

Amphiroa beauvoisii Lamour.

Taylor 1960 p. 405.

This species was collected several times throughout the year. It seems to prefer somewhat sheltered places and grows in the uppermost part of the sublittoral. My specimens are well developed, 3 - 9 cm. high and fertile (spring - summer).

H a b . : Madeira: Funchal (Baixa Larga, Clube Naval, off Jewish Cemetary), Porto do Moniz.

G e o g r . d i s t r . : Mediterranean, S. Portugal, Morocco, Canaries, Ma-

Amphiroa rigida Lamour.

Hauck 1885 p. 276.

Recorded for Madeira by Grunow (1870). I have not seen any material of this species myself.

H a b . : Madeira.

G e o g r . d i s t r . : Mediterranean.

Amphiroa fragilissima (L.) Lamour.

Kützing Tab. phyc. VIII pl. 39.

Recorded for Madeira by Grunow (1870). I have not seen any material myself. As the plant is known from quite different parts of the world, the correctness of the record seems very doubtful.

Hab.: Madeira (?)

Geogr. distr.: Peru, East India.

Corallina L.

Corallina officinalis L.

Harvey 1846 - 51 pl. 222; *C. mediterranea* Aresch.; *C. squamata* Ellis et Solander; Harvey *l. c.* pl. 201; *C. granifera* Ellis et Solander.

This species is common in the archipelago. The plant often forms dense tufts 1 - 5 cm. high in the littoral. It is generally more or less mixed with other small algae.

Dependent on type of habitat, degree of exposure etc. this taxa is very variable in shape and size. It has earlier been pointed out by van den Hoek and Donze (1966 p. 316) that the different forms cannot really be separated, as almost all intermediates are found. In the Madeira archipelago all the «species» listed above as synonyms of *C. officinalis* are found. To me it seems impossible to tell them apart as all possible intermediates are also found. The same observation has been made in other areas visited by the author. I therefore think it is justified to join all these *Corallina* forms under the specific name of *C. officinalis*.

The taxa has also been recorded by Grunow (1870), Barton (1897), Menezes (1926) and Kristiansen (Baagoe et al. 1972).

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval, Lido, off Jewish Cemetary), Câmara de Lobos.
Porto Santo: Fonte da Areia.
Deserta Grande.
Ilhas Selvagens: Selvagem Grande (leg. Sousa).

Geogr. distr.: W. coast of Europe - N. Africa, Mediterranean, Canaries, Madeira, Azores, Bermuda, N. Carolina - Uruguay.

Jania Lamour.

Jania rubens (L.) Lamour.

Harvey 1846 - 51 pl. 252; Sunesson p. 49; Gayral 1966 p. 399.

Common in more or less exposed places in the littoral and upper part of the sublittoral and in pools. It grows generally epiphytically on *Cystoseira, Sargassum, Cladostephus, Corallina,* etc. and is found throughout the year. Also recorded by Grunow (1870), Gain et Mirande (1912) and Menezes (1926).

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval, Lido, off Jewish Cemetary, Town Pier), Porto da Cruz, Porto do Moniz, Ponta de S. Lourenço (several places), Reis Magos.

Porto Santo: Fonte da Areia, off Fish-Factory, Pier.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Maul, Sousa; Baía das Galinhas, leg. Sousa), Selvagem Pequena (leg. Maul).

Geogr. distr.: Almost cosmopolitan.

Jania longifurca Zanard.

Gayral 1966 p. 403.

No doubt rare. Material of this species was only collected in one — somewhat sheltered — place in the upper part of the sublittoral.

Hab.: Madeira: Funchal (Baixa Larga), Reis Magos.

Geogr. distr.: Mediterranean, Atlantic coast of France - Morocco, Madeira.

Jania pumila Lamour.

Börgesen 1913 - 20 p. 191; Taylor 1960 p. 414.

Found in small quantities as an epiphyte on *Padina pavonia.*

Hab.: Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: West Indies, Madeira, Canaries.

Fam. GRATELOUPIACEAE

Halymenia C. Ag.

Halymenia floresia (Clemente) C. Ag.

Kützing Tab. phyc. XVI pl. 88 - 89; J. Agardh 1879 p.110 pl. 5; Berthold 1884 p. 19 pl. 1; Taylor 1960 p. 418.

This plant is no doubt very rare in the archipelago. Only a few specimens — about 4 - 8 cm. high — were found on three different

occasions in July. They were dredged together with *Lithothamnia,* shells and small stones in 40 - 50 m. depth. Sterile.

Hab.: Madeira: Ponta de S. Lourenço (Baía d'Abra, Desembarcadouro), Reis Magos.

Geogr. distr.: Mediterranean, warmer parts of the Atlantic, Canaries, Madeira, West Indies.

Cryptonemia J. Ag.

Cryptonemia lomation (Bertolini) J. Ag.

Hauck 1885 p. 130; *Euhymenia lactuca* Kützing Tab. phyc. XVII pl. 71.

Of this species only a few sterile specimens were found on one single occasion in April by dredging in a depth of 40 - 50 m.

Hab.: Madeira: Reis Magos.

Geogr. distr.: Mediterranean, Madeira.

Fam. KALLYMENIACEAE

Kallymenia J. Ag.

Kallymenia reniformis (Turner) J. Ag.

Harvey 1846 - 51 pl. 13; Newton 1931 p. 417.

This species was found a few times (in May and July) by dredging in depths from 40 - 70 m. Specimens were attached to shells, *Lithothamnia* and small stones. The best developed specimens were found in July and are about 5 - 10 cm. high. Some of them were fertile.

Hab.: Madeira: Cabo Girão, Garajau, Ponta de S. Lourenço (Desembarcadouro).

Geogr. distr.: Northeastern coasts of the Atlantic (Great Britain - Morocco), Madeira, Azores, Mediterranean.

Kallymenia microphylla J. Ag.

J. Agardh 1863 p. 288; Newton 1931 p. 417.

A few sterile specimens were dredged (April, July) in depths from 30 - 70 m. They are typically developed and about 1.5 - 2 cm. high.

Hab.: Madeira: Garajau (60 - 70 m.), Ponta de S. Lourenço (Baía d'Abra, 30 m.).

Geogr. distr.: British Isles and southward to Morocco, Madeira, Mediterranean.

Fam. NEMASTOMACEAE

Nemastoma J. Ag.

Nemastoma dichotoma J. Ag.

J. Agardh 1842 p. 91; 1879 pl. IV: 5; Hauck 1885 p. 117.

No doubt a very rare species in the archipelago. It was only found once by dredging in 45 m. depth (October). My material consists of two specimens only (with gonimoblasts) — the bigger one about 7 cm. high.

They are in very good accordance with original material from the Mediterranean in Herbarium Agardh.

Hab.: Madeira: Figueirinhas.

Geogr. distr.: Mediterranean, Madeira.

Nemastoma gelatinosum Howe.

Taylor 1960 p. 435.

This very rare species was found twice (May and July) at Ponta de São Lourenço in a depth of 40 - 50 m. The plant was attached to small stones and shells etc. The specimens are fertile and two are very well developed, 7 - 12 cm. high.

Hab.: Madeira: Ponta de S. Lourenço.

Geogr. distr.: Bermuda, Madeira.

Schizymenia J. Ag.

Schizymenia dubyi (Chauvin) J. Ag.

Newton 1931 p. 281.

This species is no doubt very rare in the area. A few specimens were collected on two occasions in the same locality (June 1973 and July 1968) in a depth of 20 - 25 m. The specimens are 2.5 - 8 cm. high, fertile, and — as usual — irregularly shaped.

Hab.: Madeira: Funchal (Baixa Larga).

Geogr. distr.: British Isles — Morocco, Mediterranean, Madeira.

Platoma Schmitz.

Platoma cyclocolpa (Mont.) Schmitz.

Schmitz 1889 p. 453; Taylor 1960 p. 437.

Only one specimen of this very rare taxa was found (July 1969). It was well developed, ca. 8 cm. high and with gonimoblasts. Only one small specimen has been collected off the Canary Islands by Montagne (cf. Börgesen 1929 p. 8).

Hab.: Madeira: Funchal (Baixa Larga).

Geogr. distr.: Mediterranean (Napoli), Canaries, Madeira, Bermuda, Gouadeloupe, Curaçao.

Fam. GRACILARIACEAE

Gracilaria Grev.

Gracilaria verrucosa (Huds.) Papenfuss.

Gayral 1966 p. 425; *G. confervoides* (L.) Grev.

Obtained by dredging in depths from 10 - 50 m. The specimens are rather thin, mostly 10 - 30 cm. long. It occurs generally attached to shells (often *Dentalium)* and small stones. Fertile specimens obtained from April throughout the summer. It does not seem to be uncommon but has never been obtained in any quantities.

Hab.: Madeira: Funchal (Baixa Larga, off Jewish Cemetary); Garajau, Pináculo, Reis Magos, Ponta de S. Lourenço.
Deserta Grande.

Geogr. distr.: Most warm seas.

Gracilaria armata (C. Ag.) J. Ag.

Hauck 1885 p. 182; Börgesen 1929 p. 82.

Only found once (May) in a few m. depth.

Hab.: Madeira: Ponta de S. Lourenço.

Geogr. distr.: Mediterranean, Spain, Canaries, Madeira.

Fam. PLOCAMIACEAE

Plocamium Lamour.

Plocamium coccineum (Huds.) Lyngb.

Lyngbye 1819 p. 9 pl. 9.

Only two specimens of this species were found. They were dredged in 40 - 50 m. depth together with various algae, shells, *Lithothamnia* etc. One of them is fairly well developed, about 10 cm. high. The other one is smaller.

H a b . : Madeira: Ponta de S. Lourenço.

G e o g r . d i s t r . : North Atlantic shores, Canaries, Madeira, Azores, Mediterranenan.

Fam. SPHAEROCOCCACEAE

Caulacanthus Kütz.

Caulacanthus ustulatus (Mert.) Kütz.

Kützing Tab. phyc. XVIII pl. 8.

This small plant occurs on more or less exposed rocks together with *Gelidium pusillum, Jania, Corallina* etc. It grows mainly in the mid-littoral and forms small dense, moss-like covers. It is probably not uncommon.

H a b . : Madeira: Funchal (Baixa Larga, Lido), Porto do Moniz.
Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa).

G e o g r . d i s t r . : Atlantic coast of Europe from Biarritz southward to Senegal, Mediterranean, Canaries, Madeira, Azores.

Sphaerococcus Stackh.

Sphaerococcus coronopifolius Stackh.

Harvey 1846 - 51 pl. 61; Newton 1931 p. 429.

This plant is no doubt very rare in the area. One single specimen about 10 cm. high, with cystocarps, was found in June 1973 by diving in about 5 m. depth.

H a b . : Madeira: Funchal (Clube Naval).

G e o g r . d i s t r . : W. Europe (Bristish Isles — Morocco), Mediterranean, Canaries, Madeira.

Fam. RHABDONIACEAE

Catenella Grev.

Catenella repens (Lightf.) Batt.

Newton 1931 p. 419; *C. opuntia* (Good. et Woodw.), Grev.

This small plant was only met with twice. It is no doubt very rare. It occurred on more or less shaded rocks near low water line. My material, which was collected in May 1971, is fertile.

Hab.: Madeira: Funchal (Clube Naval).
Deserta Grande.

Geogr. distr.: West coast of Europe from the Färoes to Morocco, Madeira, Azores, West Indies, Brazil.

Rhabdonia Harv.

Rhabdonia decumbens Grun.

Grunow in Askenasy 1888; Börgesen 1929 p. 17.

Recorded by Grunow for the area. I have never seen any material myself.

Hab.: Madeira (Grunow *l. c).*

Geogr. distr.: Canaries, Madeira, Cape Verde Islands.

Fam. RHODOPHYLLIDACEAE

Rhodophyllis Kütz.

Rhodophyllis madeirensis Levr. nov. sp.

Fig. 10-12.

Fronde decomposita dichotoma subflabellata, membranacea, 4 - 7 cm. alta. segmentis linearibus ± cuneatis, 1 - 8 mm latis, margine nudis, terminalibus acutis; cystocarpiis sub-marginalibus 0.8 - 1.0 mm. diam.; tetrasporangiis sparsis.

Thallus dark rose-red, about 4 - 7 cm. high, more or less dichotomously - flabellately divided from the base, veinless, membranaceous. Upper segments more or less linear, lower segments cuneate, apices acute 1 - 8 mm. wide, margine entire. Cystocarps sessile on the margine, 0.8 - 1.0 mm. in diameter; tetrasporangia scattered.

This new species seems to be fairly closely related to *Rh. appendiculata,* which occurs in northern waters and which differs in having the thallus fringed with leafy processes in a characteristic way.

Rh. madeirensis is probably not uncommon, but was never obtained in quantities. It occurs mainly in depths from 40 - 70 m. on bottoms covered with small stones, shells, *Lithothamnia,* etc., which are serving as substratum for the plant. It seems to occur throughout the year. Fertile material was found during the summer. The plant

corresponds well with *Rh. bifida* in anatomical respects.

H o l o t y p e : Ponta de S. Lourenço, 25.5.1971, in Herb. T. Levring, Marine Botanical Institute, Göteborg.

H a b . : Madeira: Garajau, Ponta de S. Lourenço (several places), Reis Magos.

Porto Santo: (Herb. Museu Municipal, Funchal).

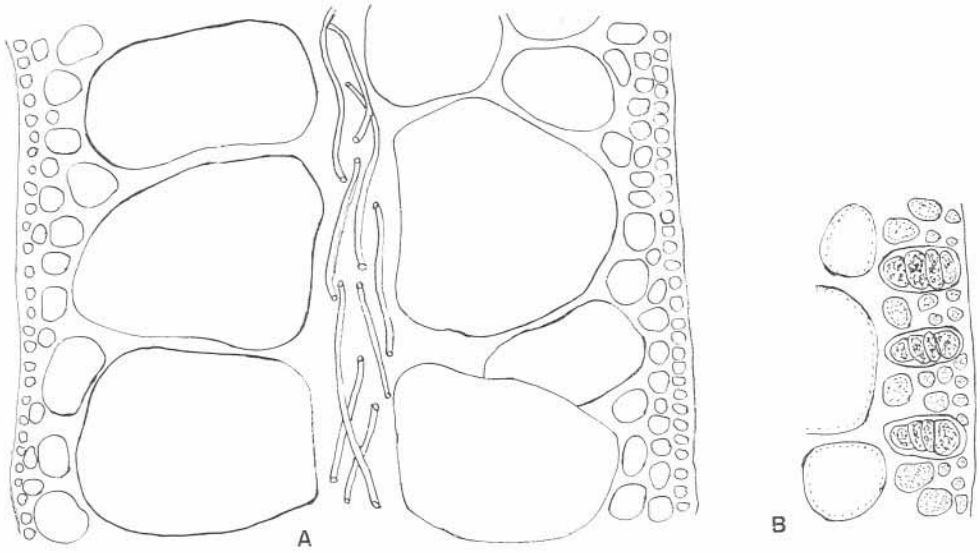

Fig. 10. — *Rhodophyllis madeirensis:* A Transversal section, B Ditto with tetrasporangia. — × 300.

Fam. HYPNEACEAE

Hypnea Lamour.

Hypnea musciformis (Wulfen) Lamour.

Kützing Tab. phyc. XVIII pl. 19; Börgesen 1929 p. 84; Taylor 1960 p. 467.

A common species, which was found the whole year round, generally epiphytic or entangled among other algae. It occurs in fairly shallow water.

H a b . : Madeira: Funchal (Baixa Larga, Lido, Clube Naval, Town Pier), Ponta de S. Lourenço (10 - 15 m.), Caniçal (2 - 4 m.), Cabo Girão, Pináculo, Porto do Moniz, Porto da Cruz.

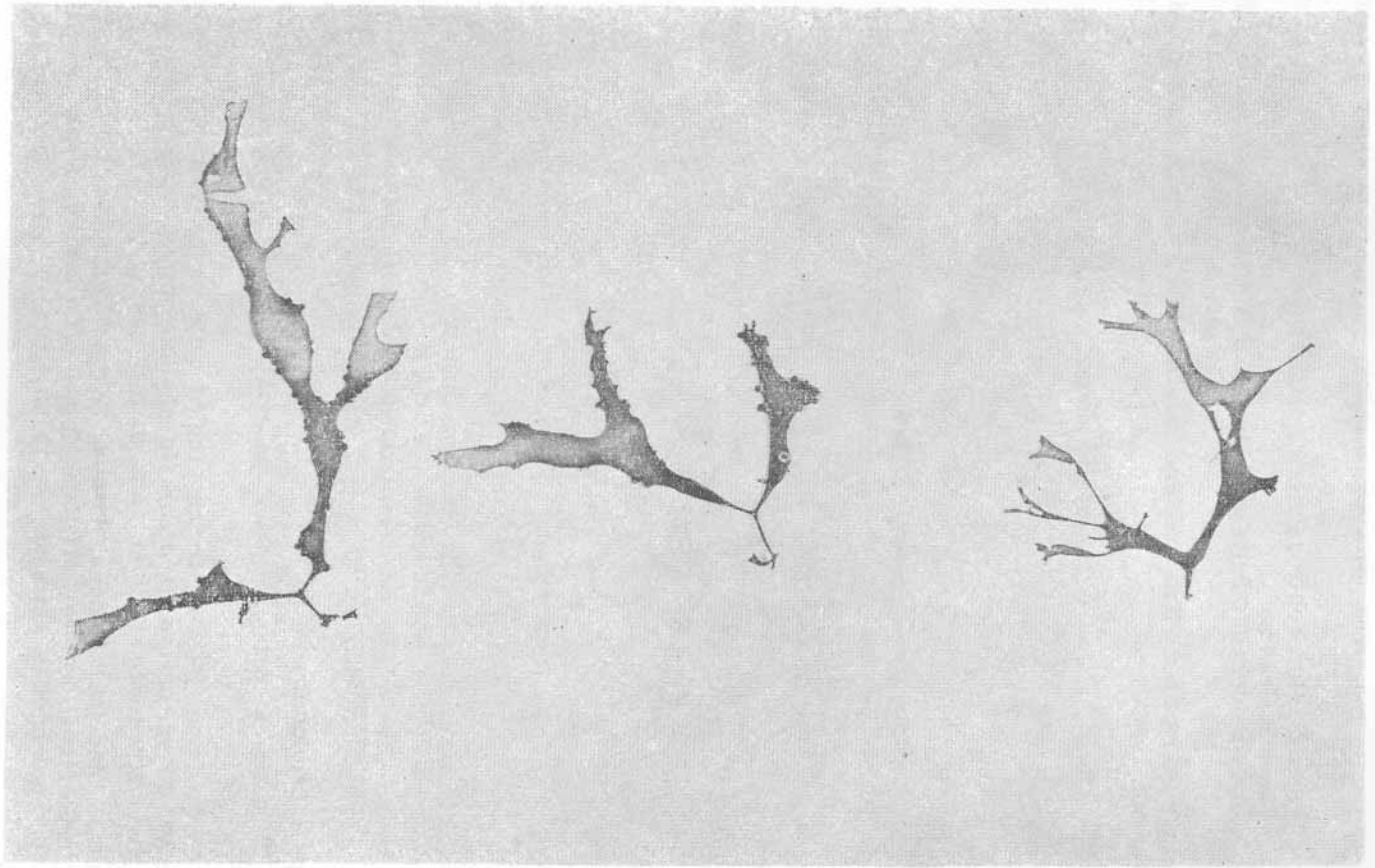

Fig. 11. — *Rhodophyllis madeirensis* (with cystocarps), Type. — × 1.

Porto Santo: Fonte da Areia, off fish factory.
Deserta Grande.
Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa).

Geogr. distr.: Tropical and subtropical Atlantic, Pacific, Mediterranean, Black Sea.

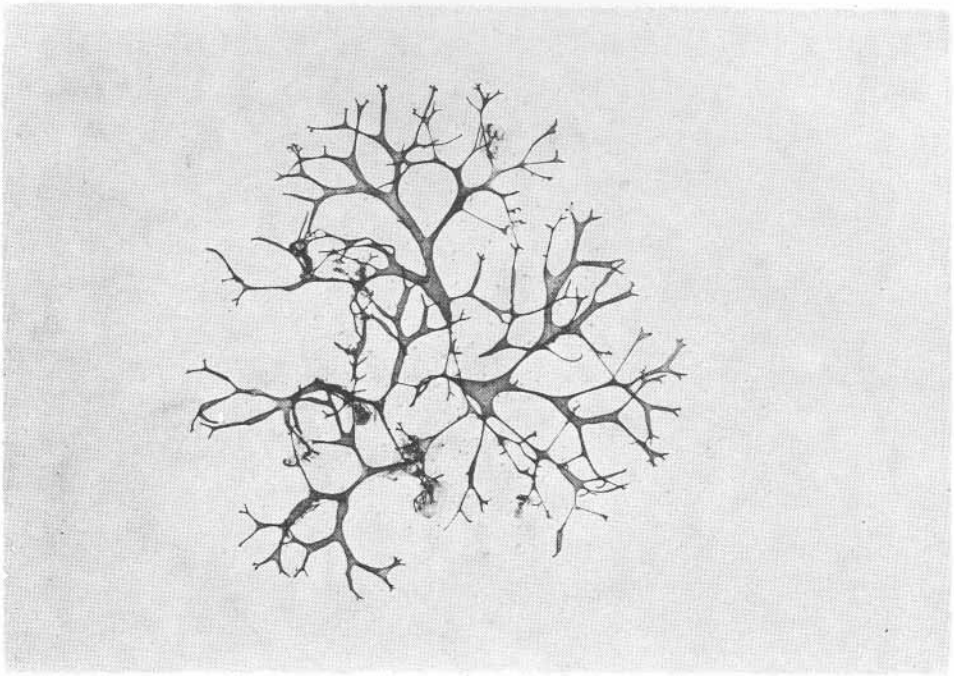

Fig. 12. — *Rhodophyllis madeirensis,* narrow and more branched form (with tetrasporangia). — × 1.

Hypnea cervicornis J. Ag.

J. Agardh 1852 p. 451; Börgesen 1915 - 20 p. 383; 1929 p. 84; Taylor 1960 p. 466.

Common. It often forms tangled tufts or mats which frequently are 10 - 25 cm. across. It occurs in shallow water down to about 5 m. (occasionally to about 40 m.) and in rock pools.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval, Town Pier), Porto do Moniz, Caniçal, off Reis Magos, off Pináculo, Ponta de S. Lourenço, Figueirinhas, Garajau, Porto da Cruz.

Porto Santo: Fonte da Areia.
Deserta Grande.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, Baía das Galinhas, leg. Sousa).

Geogr. distr.: East coast of America from Florida to Brazil, Bermuda, Canaries, Madeira.

Fam. PHYLLOPHORACEAE

Gymnogongrus Mart.

Gymnogongrus griffithsiae (Turn.) Mart.

Harvey 1846 - 51 pl. 108; Newton 1931 p. 412.

Probably very rare in the area. My material consists of a few small sterile specimens only. Also recorded by Grunow (1870).

Hab.: Madeira: Funchal (Clube Naval).
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: British Isles and southward to Portugal, Mediterranean, Canaries, Madeira, North America.

Fam. GIGARTINACEAE

Gigartina Stackh.

Gigartina acicularis (Wulf.) Lamour.

Kützing Tab. phyc. XVIII pl. 1; Harvey 1846 - 51 pl. 104.

This species was found on more or less exposed habitats together with *Gelidium, Jania* etc. on rocks a little above low water line. The specimens are fairly well developed.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval), Porto do Moniz, Reis Magos.

Geogr. distr.: From the British Isles southward to Portugal, Canaries, Madeira, Azores, Mediterranean, East coast of N. America, West Indies, etc.

Gigartina pistillata (Gmelin) Stackh.

Harvey 1846 - 51 pl. 232.

Only found once (July) growing on rocks near low water mark. The specimens are well developed.

Hab.: Madeira: Funchal (Lido).

Geogr. distr.: Great Britain to North Africa, Canaries, Madeira, Mediterranean.

RHODYMENIALES

Fam. RHODYMENIACEAE

Chrysymenia J. Ag.

Chrysymenia bullosa Levr. nov. sp.

Fig. 13-14

Fronde tenuissime membranacea obovata, 1 - 2.5 cm. alta, 5. 10 mm. diam. simplica non ramosa, stipes 2 - 2.5 mm. longus. Cystocarpia, hemisphaerica, 0.25 - 0.40 mm. diam. et tetrasporangia strato corticali immersa.

Thallus with a thin membrane, gelatinous, obovate, about 1 - 2.5 cm. high and 5 - 10 mm. in diameter with a short stipe, 2 - 2.5 mm. long. The rounded cystocarpia, 0.25 - 0.40 mm. in diameter, tetrasporangia are scattered over the surface of the thallus and immersed in the cortical layer. Colour: pink red.

There are some specimens of this plant in the herbarium of the Museu Municipal in Funchal. It is also mentioned in the list by Menezes (1926) and according to Schmitz named — but not described — *Chrysymenia saccata* n. sp. However, this name cannot be used as it is preoccupied by a different plant from New Zealand named *Ch. saccata* by J. Agardh. I have therefore chosen the new name *Ch. bullosa.*

An anatomical study of the plant shows that it is a true *Chrysymenia* in the sense the genus has been described by Kylin (1931, 1956). As far as I can see *Ch. bullosa* is fairly closely related to *Ch. enteromorpha* Harv. from the American side of the Atlantic. However, this species is much bigger and has numerous prolifications.

The membrane of the Madeiran plant is rather thin and delicate. It consists of a single layer of large cells which, above their transverse walls, are covered by a layer of small cortical cells. A transverse section shows the large rectangular cells with the small cortical cells on the outer side. Pyriform gland cells are found scattered in small groups (2 - 3 together) on the inner side of the large cells.

Ch. bullosa is no doubt rare. It has been found a number of times but always a few specimens only. It grows single or 2 - 3 together on small stones, shells, *Lithothamnia* etc. and was collected in different seasons in depths from 35 - 100 m.

Holotype: Ponta de S. Lourenço, 26.4.1966, in Herb. T. Levring, Marine Botanical Institute, Göteborg.

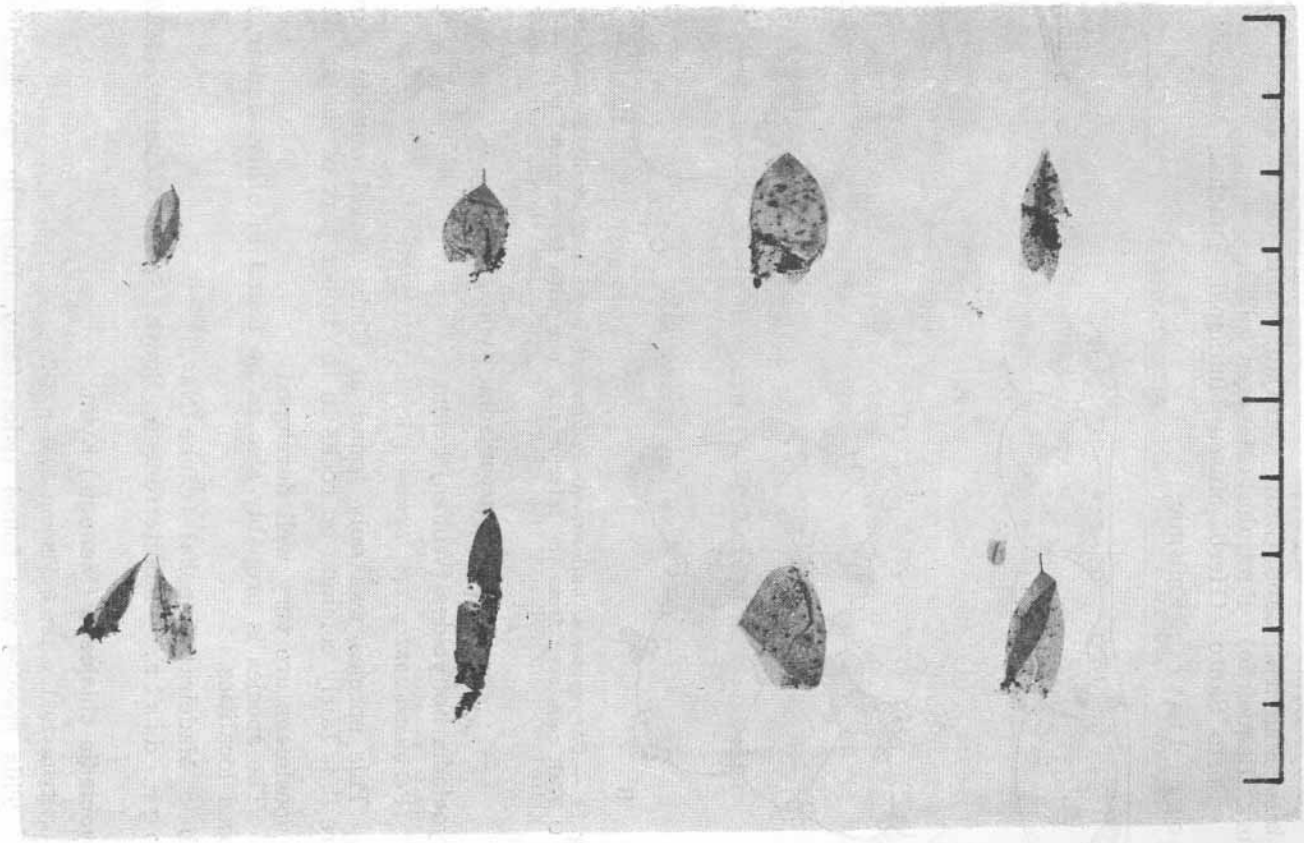

Fig. 13. — *Chrysymenia bullosa:* Type. — × 1.

Hab.: Madeira: Cabo Girão, Garajau, Ponta de S. Lourenço, Baía d'Abra, Boqueirão), Pontinha (Menezes 1926).

Porto Santo: (Herb. Museu Municipal, Funchal, Menezes *l. c.*).

Geogr. distr.: Endemic.

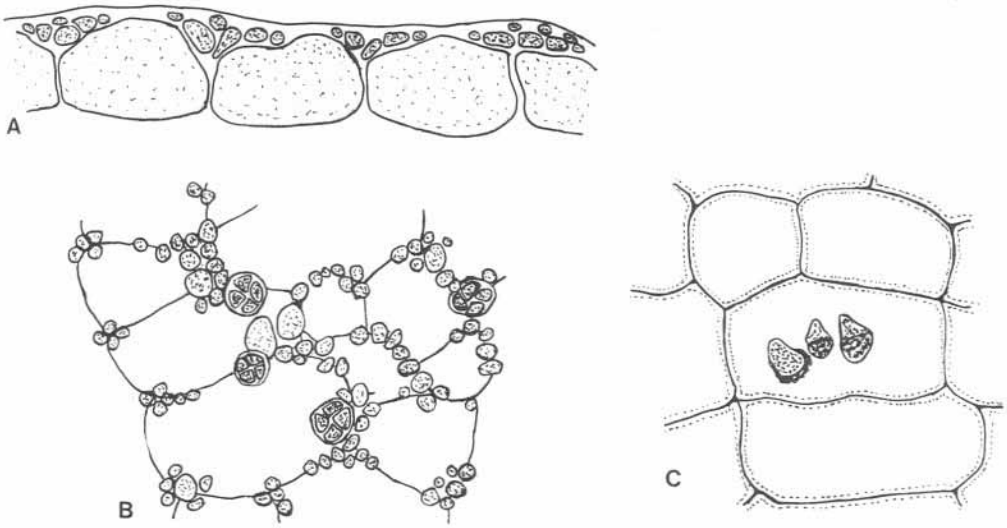

Fig. 14. — *Chrysymenia bullosa:* A Transverse section of wall; B Surface view; C Wall cells seen from the interior side, one with three gland cells. — × 150.

Botryocladia Kylin.

Botryocladia botryoides (Wulfen) Feldm.

Feldmann 1937 p. 296; *B. uvaria* Kylin 1931 p. 17.

This species was only found at Clube Naval outside Funchal, where it is fairly common on rocks in the upper part of the sublittoral. The specimens are very well developed.

The species is propably also to be found in other similar, fairly exposed localities.

Hab.: Madeira: Funchal (Clube Naval).

Geogr. distr.: Mediterranean, South Spain, Canaries, Madeira.

Botryocladia chiajeana (Menegh.) Kylin.

Kylin 1931 p. 18; Feldmann 1937 p. 299.

This species was found twice (May, July) in one locality. It

occurs on very exposed rocks just below water mark. The specimens are very well developed. With tetraspores in July.

Hab.: Madeira: Porto do Moniz.

Geogr. distr.: Mediterranean, Biarritz, Morocco, Canaries, Madeira.

Botryocladia microphysa (Hauck) Kylin.

Kylin 1931 p. 18; *Chrysymenia microphysa* Hauck 1885 p. 160; Kuckuck 1912 p. 209; Funk 1955 9. 83.

This interesting small plant was found once (in October) and in very small quantities. Kuckuck *(l. c),* particularly, has made a very detailed study of the taxa. My material agrees very well with his description and figures. My specimens are only 1 - 6 mm. high and were growing on old *Polysiphonia elongata* and shells in a depth of about 45 m. Sterile.

Hab.: Madeira: Figueirinhas, Reis Magos.

Geogr. distr.: Mediterranean (Adriatic sea, Naples-area).

Rhodymenia Grev.

Rhodymenia palmetta (Esper.) Grev.

Harvey 1846 - 51 pl. 134; Hauck 1885 p. 161.

Found a few times only. Some of the specimens are fairly well developed. Others are young or divergent forms. All are sterile. They were growing near low water line or dredged in depths from a few m. down to about 50 m.

Hab.: Madeira: Funchal (Clube Naval), Porto do Moniz, Ponta de S. Lourenço, Porto da Cruz, off Reis Magos.

Geogr. distr.: Western Europe, Canaries, Madeira, Azores, Mediterranean.

Fam. LOMENTARIACEAE.

Lomentaria Lyngbye.

Lomentaria articulata (Huds.) Lyngbye.

Newton 1931 p. 437.

Only found once. It occurs near low water mark in exposed habitats. Compared with specimens from nothern waters the Madeira plant is small, 1 - 2 cm. high only.

H a b . : Deserta Grande.

G e o g r . d i s t r . : Norway, Faeröes, Morocco, Mediterranean, Canaries, Madeira.

Champia Desv.

Champia parvula (C. Ag.) Harv.

Harvey 1853 p. 76; Newton 1931 p. 439.

This widely distributed plant was only collected a few times. It grows in the sublittoral from 2 - 3 m. down to 40 m. Specimens with tetraspores or cystocarps were found in April, May and October.

H a b . : Madeira: Funchal (Baixa Larga, Clube Naval), Pináculo, Reis Magos.
Deserta Grande.

G e o g r . d i s t r . : Warm parts of the Atlantic, Mediterranean, etc.

CERAMIALES

Fam. CERAMIACEAE

Crouania J. Ag.

Crouania attenuata (C. Ag.) J. Ag.

Harvey 1846 - 51 pl. 106; Börgesen 1915 - 20 p. 220; 1930 p. 60.

Only found in two very exposed localities slightly below low water line. It was growing together with other small algae and is no doubt very rare. The specimens, which were all collected in July 1969 and May 1971, are fertile.

H a b . : Madeira: Funchal (Clube Naval).
Deserta Grande.

G e o g r . d i s t r . : West coast of Europe from Great Britain to Morocco, Mediterranean, Canaries, Madeira, West Indies, Japan.

Antithamnion Näg.

Antithamnion spirographidis Schiffner.

Schiffner 1914 p. 139, Sundene 1964 p. 35; *A. sarniense* (Lyk) G. Feldmann 1940 p. 269; *Antithamnionella sarniense* Lyk.

Found once epiphytically on old *Wrangelia penicillata* in about 45 m. depth.

H a b . : Madeira: Figueirinhas.

G e o g r . d i s t r . : Great Britain southward to Portugal, Mediterranean, Madeira.

Antithamnion elegans Berth.

Börgesen 1930 p. 56.

This small plant was found growing on *Pterocladia,* etc. near low water mark (exposed) and down to 45 m. It seems to be rare in the area.

H a b . : Madeira: Funchal (Clube Naval).

G e o g r . d i s t r . : Mediterranean, S. W. coast of France, S. Portugal, Morocco, Canaries, Madeira .

Antithamnion cruciatum (C. Ag.) Näg.

Hauck 1885 p. 71; G. Feldmann 1940 p. 254.

This species seems to be rare. I only found a few small specimens growing together with some other filamentous algae on rocks and stones in a few m. depth and in low lying rock pools. Fertile material from April to July

H a b . : Madeira: Porto da Cruz (pools), Reis Magos (by diving).

G e o g r . d i s t r . : West coast of Europe, Mediterranean, Canaries, Madeira, Bermuda, North Carolina — Barbados.

Ceramium Roth.

Ceramium ciliatum (Ellis) Ducl.

Harvey 1846 - 51 pl. 139. G. Feldmann 1940 p. 322; Ardré 1970 p. 148.

This species occurs in the littoral mainly in exposed places but also in more sheltered habitats. It often forms dense tufts or mats together with *Corallina, Jania, Cladophora,* etc. and seems to be common. It was also found in 2 - 4 m. depth. Fertile material was collected at least from April throughout the summer. Also recorded by Grunow (1870) and Gain et Mirande (1912).

H a b . : Madeira: Funchal (Clube Naval, Lido, off Jewish Cemetary), Ponta de S. Lourenço, (several places), Reis Magos.

Porto Santo: Town Pier.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Maul), Selvagem Pequena (leg. Maul).

Geogr. distr.: Western Europe from the Faeröes southward to Morocco, Mediterranean, Canaries, Madeira.

Ceramium echionotum J. Ag.

Harvey 1846 - 51 pl. 141; *G. Feldmann* 1940 p. 319: Ardré p. 151.

It was found in the littoral zone in more or less exposed habitats, but also in deep water together with different other filamentous algae. The species was only met with a few times and is no doubt rare. Fertile specimens collected in March - Summer.

Hab.: Madeira: Funchal (Clube Naval, Lido), Reis Magos.
Porto Santo: Fonte da Areia.
Ilhas Selvagens: Selvagem Grande (Gain et Mirande 1912).

Geogr. distr.: From the British Isles southward to Portugal, Canaries Madeira, Mediterranean.

Ceramium diaphanum (Lightf.) Roth.

Harvey 1846- 51 pl. 193; G. Feldmann 1940 p. 306.

This species was collected in more or less exposed places in the littoral together with other small algae. It is probably not uncommon.

Hab.: Madeira: Funchal (Clube Naval, Lido).
Deserta Grande.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras).

Geogr. distr.: European and American coasts of the Atlantic, Mediterranean.

Ceramium strictum Harv.

Harvey 1846 - 51 pl. 193.

This species seems to be fairly rare. It was found in the littoral and down to some metres depth growing on stones, other algae, *Zostera* and in rockpools. Fertile specimens collected April - Summer.

Hab.: Madeira: Porto da Cruz, Porto do Moniz, Ponta de S. Lourenço, (Baía d'Abra).
Deserta Grande.

Geogr. distr.: Warmer parts of the Atlantic, Mediterranean.

Ceramium gracillimum (Kütz.) Griff. et Harv.

Harvey 1846 - 51 pl. 206; G. Feldmann 1940 p. 293; Ardré 1970 p. 1953; *C. transversale* Collins and Harvey 1917 p. 145.

This peculiar small species was found a number of times on seagrasses and other algae, but also on stones from a few m. depth down to 40 - 50 m. Fertile material from the period April - October.

Hab.: Madeira: Figueirinhas, Funchal (Baixa Larga, off Lido, Town Pier), Câmara de Lobos.

Geogr. distr.: From the British Isles southward to the Cape Verde Islands, Mediterranean, Canaries, Bermuda, West Indies, Bahamas, Venezuela, Brazil.

Ceramium rubrum (Huds.) C. Ag.

C. Agardh 1817 p. 60.

According to Menezes (1926) this species is to be found in Madeira. I have not seen it myself.

Hab.: Madeira: Funchal.

Geogr. distr.: Almost cosmopolitan.

Centroceras Kütz.

Centroceras clavulatum (C. Ag.) Mont.

G. Feldmann 1940 p. 336.

A fairly common species which is found in the lower part of the littoral and down. It generally forms more or less dense tufts, together with *Halopteris, Gelidium, Jania,* etc. It was collected throughout the year.

Hab.: Madeira: Caniçal, Funchal, (Baixa Larga, Clube Naval, Lido, off Jewish Cemetary), Porto da Cruz, Porto do Moniz, Reis Magos.

Geogr. distr.: In most warm seas.

Spyridia Harv.

Spyridia filamentosa (Wulfen) Harv.

Harvey 1846 - 51 pl. 46; Börgesen 1915 - 20 p. 233.

This species seems to be fairly common and occurs in the sublitto-

ral zone from low water line down to at least 40 m. depth. Also recorded by Menezes (1926).

Hab.: Madeira: Funchal (Baixa Larga, Lido), Garajau, Machico, Reis Magos, Ponta de S. Lourenço.
Porto Santo: Off fish factory.
Ilhas Selvagens: Baía das Galinhas, Baía das Cagarras.

Geogr. distr.: Great Britain, W. France, Mediterranean, West Indies, Red Sea, Indian Ocean.

Spyridia aculeata (Schimp.) Kütz.

Kützing 1843 p. 377; Tab. phyc. XII pl. 51; Börgesen 1915 - 20 p. 237.

A few specimens were found in the depths of 20 - 40 m. They are in good accordance with descriptions and material of this interesting species I have seen.

Hab.: Madeira: Figueirinhas, Funchal (Baixa Larga), Porto do Moniz, Reis Magos.

Geogr. distr.: West Indies, Canaries, Madeira, Morocco, Mediterranean, Red Sea.

Wrangelia C. Ag.

Wrangelia argus Mont.

Börgesen 1915 - 20 p. 233; 1927 p. 93; Taylor 1960 p. 502.

This interesting West Indian species is no doubt very rare in the area. It was found growing in the uppermost part of the sublittoral in two exposed localities.

Hab.: Madeira: Reis Magos, Porto do Moniz.

Geogr. distr.: West Indies, Madeira, Canaries.

Wrangelia penicillata C. Ag.

Börgesen 1915 - 20 p. 120; 1927 p. 94; Taylor 1960 p. 502.

This species seems to be slightly more common than *W. argus*. It was found in the uppermost part of the sublittoral in a number of exposed localities, but also in deep water down to 45 m. The specimens are well developed. Fertile material from April to October.

Hab.: Madeira: Figueirinhas, Funchal (Baixa Larga), Porto do Moniz, Ponta de S. Lourenço (Baía d'Abra), Reis Magos (20 - 40 m.).
Deserta Grande: Low water mark.

Geogr. distr.: West Indies, Bermuda, Madeira, Canaries, Mediterranean.

Callithamnion Lyngb.

Callithamnion byssoides Arnott.

Harvey 1846 - 51 pl. 262; *C. furcelariae* J. Ag.; *Aglaothamnion furcellariae* G. Feldmann 1940 p. 454.

This plant, which was found once only (May), was growing together with various other small algae in a rockpool in an exposed place. My specimens are about 1.5 cm. high.

Hab.: Madeira: Reis Magos.
Deserta Grande.

Geogr. distr.: Atlantic coasts of Europe and N. America, Morocco, Canaries, W. Indies, Mediterranean.

Callithamnion corymbosum (Smith) Lyngb.

Harvey 1946 - 51 pl. 272; G. Feldmann 1940 p. 475.

Of this plant I found a single specimen, which was dredged in about 30 m. depth (April).

Hab.: Madeira: Reis Magos.

Geogr. distr.: Atlantic coast of Europe and N. America, Mediterranean, Canaries, Madeira, Bermuda, Brazil.

Callithamnion brodiaei Harv.

Harvey 1846 - 51 pl. 129; Newton 1931 p. 379; Kylin 1944 p. 74; *Aglaothamnion brodiaei* G. Feldmann 1940 p. 452.

This no doubt very rare species was found once only (June 1973). The plant is about 2 cm. high, typically developed and with tetrasporangia. It was growing attached to older parts of *Pterocladia* somewhat below low water mark.

Hab.: Madeira: Funchal (Clube Naval).

Geogr. distr.: Western Europe (Scandinavia, British Isles, France), W. Mediterranean, Madeira.

Callithamnion tetragonum (With.) S. F. Gray.

Harvey 1846 - 51 pl. 136; Rosenvinge 1923 - 24 p. 317; Börgesen 1930 p.46.

I only found this plant once (June 1973). The specimens are about 0.5 cm. high and were growing on old *Pterocladia* near low water mark. According to Kristiansen (Baagoe et al. 1972) the taxa was also found in January at the Lido.

Hab.: Madeira: Funchal (Clube Naval, Lido).

Geogr. distr.: W. Europe - Morocco, Mediterranean, Canaries, Madeira, Azores.

Compsothamnion Näg.

Compsothamnion thuyoides (Smith) Nägeli.

Newton 1931 p. 385; G. Feldmann 1940 p. 390; *Gallithamnium thuyoides* Kützing Tab. phyc. VI pl. 74; Harvey Phyc. Brit. 1846 - 51 pl. 269.

This species was only collected twice (June 1973). It was found on other algae in the upper sublittoral. The specimens are well developed, 4 - 6 cm. high and fertile.

Hab.: Madeira: Funchal (Clube Naval), Porto do Moniz.

Geogr. distr.: From Great Britain southward to Portugal, Mediterranean, Canaries, Madeira.

Compsothamnion gracillimum (Harv.) Nägeli.

Newton 1931 p. 385; Kylin 1944 p. 75; *Callithamnium gracillimum* Kützing Tab. phyc. XI pl. 73; Harvey Phyc. Brit. 1846 - 51 pl. 5.

This beautiful species was found a few times — April - June — and is no doubt very rare. It was dredged in the sublittoral zone.

Hab.: Madeira: Funchal (Town Pier), Ponta de S. Lourenço, Reis Magos.

Geogr. distr.: N. Atlantic shores, Mediterranean, Madeira.

Pleonosporium Näg.

Pleonosporium borreri (Smith) Näg.

Newton 1931 p. 374; G. Feldmann 1940 p. 392.

This plant grows on rocks near low water mark or in tide pools,

where it forms dense tufts together with *Corallina, Halopteris, Laurencia,* etc. It was only collected in four very exposed places, where it was rather abundant. Fertile material in May. Also recorded by Grunow (1870).

H a b . : Madeira: Funchal (Baixa Larga, Clube Naval, outside), Porto do Moniz.
Deserta Grande.

G e o g r . d i s t r . : Atlantic shores of Europe and N. America, Brazil, Madeira.

Corynospora J. Ag.

Corynospora pedicellata (Smith) J. Ag.

Kylin 1956 p. 385; *Monospora pedicellata* Sol.; *Neomonospora pedicellata* G. Feldmann et Meslin.

No doubt a very rare species. Only one single specimen was collected. My material, which was growing on *Zonaria,* was found in April. It seems to belong to var. *tenuis* G. Feldmann (1940 p. 398). Sublittoral.

H a b . : Madeira: Caniçal.

G e o g r . d i s t r . : Mediterranean, Great Britain - Portugal, Canaries, Madeira.

Corynospora furcellata (J. Ag.) Levring comb. nov.

Griffithsia furcellata J. Ag.; G. arachnoidea C. Ag., Börgesen 1930 p. 29; *Neomonospora furcellata* (J. Ag.) G. Feldmann et Meslin 1939 p. 193; Funk 1955 p. 126.

As shown by Kylin (1956 p. 385) the genus earlier known as *Monospora* Sol. has to be named *Corynospora* J. Ag. (1851). Consequently the later generic name *Neomonospora* Setchell and Gardner (1937) is not valid. It was, therefore, necessary to make the new combination above.

This species was found several times during the spring and summer months. It grows on rocks, stones, shells etc. from low water line down to about 50 m. and also in low-lying littoral pools. My material is well developed, 3 - 8 (-10) cm. high.

H a b . : Madeira: Funchal (Clube Naval, Town Pier), Pináculo, Ponta de S. Lourenço (several places), Reis Magos.
Deserta Grande.

G e o g r . d i s t r . : From Brittany southward to Portugal and Morocco, Canaries, Madeira, Mediterranean.

Griffithsia C. Ag.

Griffithsia tenuis C. Ag.

Kützing Tab. Phyc. XII pl. 31; G. Feldmann 1940 p. 411.

The plant, which was collected on several occasions, grows near low water line down to a few m. depth. It is also found in low-lying littoral pools. Fertile specimens were obtained during the summer months but also in December.

Hab.: Madeira: Funchal (Lido, off Jewish Cemetary), Porto da Cruz, Porto do Moniz, Ponta de S. Lourenço (several places).
Porto Santo: Off fish factory.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: Mediterranean, Canaries, Madeira, Bermuda, N. Carolina, Florida, West Indies, W. Australia, New Guinea, Japan, Ceylon.

Griffithsia capitata Börg.

Börgesen 1930 p. 34.

This plant was only found once and in very small quantities. My material agrees well with the original description by Börgesen from the Canaries. My specimens, which were collected in October, are about 1 cm. high and carry tetrasporangia. They were growing on stones near low water mark.

Hab.: Madeira: Funchal (Town Pier).

Geogr. distr.: Canaries, Madeira.

Griffithsia schousboei Mont.

Kützing Tab. Phyc. XII pl. 27; Hauck 1885 p. 92; G. Feldmann 1940 p. 415.

Rare but was found in different seasons in several places in depths varying from 10 to 40 m. Fertile specimens were collected from April throughout the summer.

Hab.: Madeira: Figueirinhas, Garajau, Pináculo, Ponta de S. Lourenço (several places), Reis Magos.

Geogr. distr.: Mediterranean, Spain, Portugal, Morocco, Canaries, Madeira, Bermuda, West Indies.

Griffithsia opuntioides J. Ag.

Börgesen 1930 p. 40; G. Feldmann 1940 p. 419.

This species was only collected twice (July). It was growing on *Halopteris* and other algae near low water line and in the upper sublittoral.

H a b . : Madeira: Porto do Moniz, off Pináculo.

G e o g r . d i s t r . : Mediterranean, S. Portugal, Morocco, Canaries, Madeira.

Gymnothamnion J. Ag.

Gymnothamnion elegans (Schousboe) J. Ag.

G. Feldmann 1940 p. 354; Funk 1955 p. 121; *Callithamnion elegans* (Schousboe) Bornet et Thuret; *Plumaria schousboei* (Born.) Schmitz; Börgesen 1930 p. 48.

This species was only found once. It was growing in some littoral pools together with *Dasya ocellata* and other small algae. With tetraspores (July).

H a b . : Madeira: Porto da Cruz.

G e o g r . d i s t r . : Mediterranean, Atlantic coast of Spain, Portugal, Morocco, Canaries, Madeira, Bermuda, Florida, West Indies.

Fam. DELESSERIACEAE

Hypoglossum Kütz.

Hypoglossum woodwardii Kütz.

Kylin 1924 p. 9.

This species was found a few times growing near low water mark or by dredging in depths from about 35 to 50 m. and is no doubt very rare. All the specimens are small — about 3 - 5 cm. high — and the maximal width about 2 mm. They were collected in the months April - July and are all sterile.

H a b . : Madeira: Garajau, Ponta de S. Lourenço (between Baía d'Abra and Boqueirão), Reis Magos.

G e o g r . d i s t r . : West coast of Europe from Great Britain to Morocco, Madeira, Canaries, Azores, Mediterranean.

Apoglossum J. Ag.

Apoglossum ruscifolium (Turner) J. Ag.

Newton 1931 p.319.

Only a few specimens attached to small shells and stones were obtained on one single occasion (July) by dredging in 40 - 50 m. depth. They were well developed and are fertile (Cystocarps and tetraspores).

Hab.: Madeira: Ponta de S. Lourenço (Desembarcadouro).

Geogr. distr.: West coast of Europe, Madeira, Mediterranean.

Taenioma J. Ag.

Taenioma macrourum Thuret.

Tseng 1944 p. 224; Taylor 1960 p. 548; *T. perpusillum* Börgesen 1913 - 20 p. 338 (non J. Agardh).

This minute interesting species was only found once and in small quantities. It was growing on a *Patella*-shell in a few metres depth together with *Codium adherens, Ceramium gracillimum,* etc. Sterile.

It had earlier generally been accepted that *T. macrourum* and *perpusillum* were one and the same species. This was probably due to an incomplete knowledge about *T. perpusillum* from the Pacific coast of America. As shown by Thompson 1910, Tseng 1944, and Taylor 1960 the two species must be kept separate.

Hab.: Madeira: Reis Magos.

Geogr. distr.: Mediterranean, Canaries, Madeira, Bermuda, W. Indies.

Cottoniella Börg.

Cottoniella fusiformis Börg.

Börgesen 1930 p. 144.

This interesting species, which Börgesen originally described from the Canaries, seems not to be uncommon in Madeiran waters. I obtained most of my specimens by dredging in depths from 30 - 50 m., a few times by diving (2 - 5 m.) at Reis Magos. The specimens are well developed, 10 - 12 cm. high, and agree perfectly with the original description. Most of them were attached to small stones, *Lithothamnia,* shells, etc.

None of the *Cottoniella*-species seem ever to have been found fertile. The same was the case with my Madeira-material, which was collected in all seasons of the year.

Hab.: Madeira: Funchal (Baixa Larga), Figueirinhas, Garajau, Ponta de S. Lourenço (Desembarcadouro), Reis Magos.

Geogr. distr.: Canaries, Madeira.

Cottoniella filamentosa (Howe) Börg.

Börgesen 1915 - 20 p. 477; 1930 p. 152; Taylor 1960 p. 550.

This species, which no doubt is closely related to the preceding one, seems to be rare. I have only found a few specimens at various seasons in 40 - 70 m. depth (at Porto do Moniz some drift specimens). They were also all sterile.

Hab.: Madeira: Funchal (Town Pier), Figueirinhas, off Pináculo, Garajau, Ponta de S. Lourenço (between Baía d'Abra and Boqueirão) Porto do Moniz, Reis Magos.

Geogr. distr.: Florida, Cuba, Brazil, Bermuda, Madeira, Canaries.

Erythroglossum J. Ag.

Erythroglossum sandrianum (Zanard.) Kylin.

Hauck 1885 p. 172; Kylin 1924 p. 31; Ardré 1970 p. 181.

There are only a few specimens of this species in the collection obtained by dredging in 30 - 40 m. depth or by diving in May 1971. They were attached to some *Lithothamnia*-species. Ardré has made a recent study from Portugal of the species and my material, which is well developed, is in good accordance with her description and also with other material I have seen.

Hab.: Madeira: Ponta de S. Lourenço.

Geogr. distr.: West coast of Europe from Great Britain to Morocco, Madeira, Mediterranean.

Nitophyllum Grev.

Nitophyllum punctatum (Stackh.) Grev.

Kylin 1924 p. 69; Gayral 1966 p. 551.

Only a few specimens (dredging 40 - 50 m. and drift) of this

species were found. They are all small — only a few cm. high — and mixed with *Dictyota.*

Hab.: Madeira: Ponta de S. Lourenço (Desembarcadouro 40 - 50 m.), Porto do Moniz (drift).

Geogr. distr.: West coast of Europe (Norway - Morocco), Madeira, Azores, Florida, Venezuela, Mediterranean.

Acrosorium Zanard.

Acrosorium uncinatum (Turner) Kylin.

Kylin 1924 p. 78; Gayral 1966 p. 549.

This species was collected in various localities in different seasons. It was mainly found in depths of about 30 - 50 m., but also about 5 m. It is well developed and often mixed with *Dictyota* and other algae. It seems to be rather rare and was never obtained in any quantities. Also recorded by Menezes (1926).

Hab.: Madeira: Funchal (Baixa Larga), Figueirinhas, Ponta de S. Lourenço (Desembarcadouro, between Baía d'Abra and Boqueirão), Porto do Moniz, Reis Magos.

Geogr. distr.: Shores of North Atlantic, Madeira, Canaries, Azores, Mediterranean, California.

Cryptopleura Kütz.

Cryptopleura ramosa (Huds.) Kylin.

Newton 1931 p. 332; Gayral 1966 p. 547.

Only a few specimens were collected. They are all fairly small — up to about 5 cm. high. As pointed out by other authors this species can be difficult to separate from *Acrosorium uncinatum* when sterile. Fortunately there are some fertile specimens in the collection which guarantee the determination — one with cystocarps collected in October 1969 and some with tetraspores in October 1969 and May 1971. The latter were found in a very exposed locality in the upper part of the sublittoral, all the others are from deep water (45 - 70 m.) and were collected in different seasons.

Hab.: Madeira: Funchal (Town Pier, Clube Naval), Figueirinhas, Garajau, Ponta de S. Lourenço (between Baía d'Abra and Boqueirão), Porto do Moniz.
Deserta Grande.

Geogr. distr.: West coast of Europe from the Faeröes to Morocco, Madeira, Brazil.

Fam. DASYACEAE

Dasya C. Ag.

Dasya hutchinsiae Harv.

Dixon 1964 p. 73; *D. arbuscula* (Dillw.) C. Ag.; Harvey 1846 - 51 pl. 224.

Found growing on exposed rocks and in small tidepools in the lower part of the littoral zone and a little below. Fertile specimens were collected in the period April-July. Also recorded by Menezes (1926).

Hab.: Madeira: Funchal (Clube Naval, Lido).
Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa).

Geogr. distr.: West coast of Europe from Great Britain to Morocco, Canaries, Madeira.

Dasya ocellata (Grat.) Harv.

Harvey 1846 - 51 pl. 40; Kützing Tab. phyc. XVI pl. 61.

The species was found mixed with various other small algae growing on stones a little below low water line and in low-lying littoral pools. It was met with in different seasons, fertile specimens in July-October. It is no doubt very rare.

Hab.: Madeira: Funchal (Baixa Larga, off Jewish Cemetary), Porto da Cruz, Reis Magos.

Geogr. distr.: West Indies, Bermuda, Great Britain southward to Morocco, Canaries, Madeira, Mediterranean.

Dasya rigidula (Kütz.) Ardiss.

Taylor 1960 p. 558; *Eupogonium rigidulum* Kützing 1864 Tab. Phyc. XIV pl. 85.

This species was found a few times only. It was growing on stones, shells and seagrasses together with various small algae in the upper part of the sublittoral zone.

Hab.: Madeira: Funchal (Baixa Larga), Ponta de S. Lourenço (Baía d'Abra, 5 - 15 m.), Reis Magos (2 - 3.).

Geogr. distr.: Mediterranean, Portugal, Bermuda, Florida, West Indies, Madeira.

Dasya corymbifera J. Ag.

Hauck 1885 p. 253.

Obtained throughout the year in several places by dredging down to 70 m., occasionally also by diving in a few m. depth. The species occurs attached to stones, shells, etc., or mixed with larger algae such as *Cystoseira.*

Hab.: Madeira: Cabo Girão, Caniçal, Figueirinhas, Funchal (Baixa Larga, Clube Naval), Garajau, Ponta de S. Lourenço (Desembarcadouro), Reis Magos.

Geogr. distr.: From the British coast southward to the Canaries, Madeira, Mediterranean, Bermuda, West Indies, Florida.

Dasya pedicellata C. Ag.

Taylor 1960 p. 562; *D. elegans* Harv.

Found several times in the spring and summer months by dredging in 35 - 50 m. depth. Most of the specimes are large and very well developed. Fertile.

Hab.: Madeira: Cabo Girão, Garajau, Ponta de S. Lourenço.

Geogr. distr.: West coast of North America, West Indies, Bermuda, Madeira, Canaries, north-western Europe, Mediterranean.

Heterosiphonia Mont.

Heterosiphonia wurdemanni (Bail) Falkenb.

Falkenberg 1901 p. 638; Börgesen 1915 - 20 p. 324; 1930 p. 137.

The species does not seem to be uncommon. It occurs generally mixed with or attached to other alagae (often *Halopteris)* and is well developed. Most of the material was obtained in a 2 - 5 m. depth, but some by dredging at 30 - 40 m.

Hab.: Madeira: Funchal (Town Pier, Baixa Larga, Lido, Clube Naval), Porto do Moniz, Reis Magos.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: Mediterranean, Canaries, Madeira, Bermuda, Florida, West Indies, Venezuela.

Fam. RHODOMELACEAE

Polysiphonia Grev.

Polysiphonia macrocarpa Harv.

Börgesen 1930 p. 82; Gayral 1966 p. 583; Ardré 1970 p. 202; *P. pulvinata* Harv.

Found twice on rocks just below low water line. Fertile (April, July).

Hab.: Madeira: Funchal (Baixa Larga, Town Pier, off Jewish Cemetary), Reis Magos.
Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa; Baía das Cagarras, leg. Maul).

Geogr. distr.: British coast southward to Morocco, Mediterranean, Canaries, Madeira, Bermuda, North Carolina, Florida, West Indies.

Polysiphonia ferulacea (Suhr.) J. Ag.

Börgesen 1915 - 20 p. 277; Taylor 1928 p. 183; 1960 p. 578, Ardré 1970 p. 205; *P.breviarticulata* (C. Ag.) Harv.; Börgesen 1930 p. 90.

This species was collected in several localities throughout the year. The normal habitat seems to be the uppermost part of the sublittoral and exopsed.

Hab.: Madeira: Cabo Girão, Figueirinhas, off Pináculo, Porto do Moniz, Reis Magos.
Deserta Grande.

Geogr. distr.: Portugal, Canaries, Madeira, Bermuda, Florida, Gulf, West Indies, Bahamas, Venezuela.

Polysiphonia violacea (Roth) Spreng.

Harvey 1846 - 51 pl. 209; Rosenvinge 1923 - 24 p. 422; Börgesen 1930 p. 87.

This species was collected several times in exposed localities. Most of the material was found in the lower part of the littoral or in pools, some in 10 - 15 m. depth. Especially the specimens from the littoral are well developed and very similar to forms from exposed habitats in Scandinavia. Fertile specimens were obtained in April - May.

Hab.: Madeira: Funchal (Clube Naval, Lido), Reis Magos (10 - 15 m.).

Geogr. distr.: Atlantic coast of Europe, Canaries, Madeira.

Polysiphonia elongata (Huds.) Harv.

Harvey 1846 - 51 pl. 192.

This species was found in several places throughout the year in deep water (30 - 70 m.). It is attached to stones, shells etc. and it seems always to be the more or less denuded form, which (according to Piccone cf. Börgesen 1930 p. 93) apparently also was found in the Canaries. My specimens are mainly sterile, but some have tetraspores. Compared with material of the species from northern waters the Madeiran form is small and thin. It gives the impression of being reduced, which may be connected with the fact that the Madeira-archipelago belongs to the outer borders of the geographical area of the taxa.

H a b . : Madeira: Cabo Girão, Figueirinhas, Funchal (Lido): Garajau, Ponta de São Lourenço (several places), Reis Magos.

G e o g r . d i s t r . : West coast of Europe, East coast of N. America, Mediterranean.

Polysiphonia brodiaei (Dillw.) Grev.

Harvey 1846 - 51 pl. 195.

Found in June 1973 at Clube Naval. Also recorded for Selvagem Grande by Gain et Mirande (1912). I did not see any material myself.

H a b . : Madeira: Funchal (Clube Naval).
Ilhas Selvagens: Selvagem Grande.

G e o g r . d i s t r . : West coast of Europe, Selvagem Grande, Mediterranean.

Polysiphonia erythraea (Schousb.) J. Ag.

J. Agardh 1863 p. 996.

Recorded for Selvagem Grande by Gain et Mirande (1912). I did not see any material myself.

H a b . : Ilhas Selvagens: Selvagem Grande.

G e o g r . d i s t r . : S. Spain, Canaries, Selvagem Grande.

Polysiphonia nutans Mont.

Montagne 1840 p. 171; Kützing Tab. phyc. XIII pl. 58; Ardré 1970 p. 208.

This species was only found a few times in Madeira (June, July) growing exposed on rocks in the lower part of the littoral. The speci-

mens are 1.5 - 2 cm. high, and fertile. There is also some material from Selvagem Grande.

Hab.: Madeira: Funchal (Clube Naval), Porto do Moniz.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: Canaries, Madeira, Portugal.

Polysiphonia furcellata (C. Ag.) Harv.

Harvey 1846 - 51 pl. 7; Hauck 1885 p. 239.

Material of this species was obtained in a few very exposed localities. It was growing in the lower part of the littoral in small pools and on rocks.

Hab.: Madeira: Funchal (Clube Naval), Garajau, Porto do Moniz.
Deserta Grande.

Geogr. distr.: British Isles and southward to the Canaries and Madeira, Mediterranean.

Polysiphonia denudata (Dillw.) Grev.

Kützing Tab. phyc. XIII p. 90; Ardré 1970 p. 210; *P. variegata* (C. Ag.) Zanard.; Harvey 1846 - 51 p. 155.

This species was found a few times (July). The specimens are well developed (3 - 10 cm. high) and fertile. Most of them were collected on rocks near low water line in exposed habitats, but some in somewhat deeper water by dredging. Also recorded by Menezes (1926, as *P. divergens).*

Hab.: Madeira: Funchal (Harbour, Lido), Porto do Moniz, Reis Magos

Geogr. distr.: British coast and southward to Morocco, Mediterranean, Madeira, Bermuda, North Carolina, West Indies.

Polysiphonia opaca (C. Ag.) Zanard.

Hauck 1885 p. 246; Börgesen 1930 p. 104.

This peculiar species was found in the lower littoral and on exposed sublittoral rocks and in pools together with *Corallina,* etc. My specimens are about 1 cm. high.

Hab.: Madeira: Funchal (Clube Naval, Lido), Cabo Girão, Reis Magos.

Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa; Baía das Cagarras, leg. Maul).

Geogr. distr.: Mediterranean, Canaries, Madeira.

Alsidium C. Ag.

Alsidium corrallinum C. Ag.

Hauck 1885 p. 213.

This species was found growing all the year round in small rock pools in the littoral zone. Exposed.

Hab.: Madeira: Funchal (Clube Naval, Lido), Porto do Moniz.

Geogr. distr.: Mediterranean, Canaries, Madeira.

Lophocladia Schmitz.

Lophocladia trichoclados (Mert.) Schmitz.

Börgesen 1915 - 20 p. 302; 1930 p. 134; Taylor 1960 p. 590.

This species was found on two occasions. The specimens are very well developed, mostly 8 - 10 cm. high and rather densely tufted.

Hab.: Madeira: Porto do Moniz (upper sublittoral), Figueirinhas (40 - 50 m.).

Geogr. distr.: West Indies, Florida, Bermuda, Madeira, Canaries.

Dipterosiphonia (C. Ag.) Falkenb.

Dipterosiphonia dendritica (C. Ag.) Falkenb.

Falkenberg 1901 p. 324; Börgesen 1915 - 20 p. 292; 1930 p. 113.

Only found twice mixed with *Polysiphonia ferulacea, Corallina, Jania,* etc. in the sublittoral zone.

Hab.: Madeira: Figueirinhas.
Porto Santo: Fonte da Areia.

Geogr. distr.: West Indies, Brazil, Canaries, Madeira.

Herposiphonia Näg.

Herposiphonia secunda (C. Ag.) Näg.

Falkenberg 1901 p. 307; Börgesen 1915 - 20 p. 429; 1930 p. 111.

This species seems to be rare in the area. It was found a few times growing together with *Alsidium, Heterosiphonia wurdemanni* and others in the uppermost part of the sublittoral.

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval), Porto do Moniz, Reis Magos.

Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Sousa).

Geogr. distr.: Mediterranean and adjacent warmer parts of the Atlantic, Canaries, Madeira, West Indies. Probably widely spread in tropical and subtropical seas.

Herposiphonia tenella (C. Ag.) Näg.

Falkenberg 1901 p. 304; Börgesen 1915 - 20 p. 286; 1930 p. 110.

Found a few times in the uppermost part of the sublittoral. The small plants were mixed with *Heterosiphonia, Dictyota* etc.

Hab.: Madeira: Porto da Cruz, Porto do Moniz, Reis Magos, Ponta de S. Lourenço (Baía d'Abra, Porto de Santa Maria).

Geogr. distr.: Mediterranean, Morocco, Portugal, Canaries, West Indies. Probably spread in tropical and subtropical waters.

Lophosiphonia Falk.

Lophosiphonia obscura (C. Ag.) Falk.

Falkenberg 1901 p. 496; Ardré 1970 p. 217.

Found in very small quantities (sterile) together with *Wrangelia argus* and *Cladophora fascicularis* in the upper sublittoral. Very exposed.

Hab.: Madeira: Porto do Moniz, Reis Magos.

Geogr. distr.: Brittany to S. Spain, Madeira, Canaries, Red Sea, Black Sea, Australia, Viet Nam.

Lophosiphonia scopulorum (Harv.) Wom.

Womersley 1950 p. 188; Cribb 1956 p. 138; Ardré 1970 p. 215; *Polysiphonia scopulorum* Harv.; Hollenberg 1968 p. 79.

This interesting plant was found once only. It was growing in the littoral epiphytically on *Dasycladus* in a very exposed locality. The morphological features with dorsiventral structure of the thallus and the branches with endogenous origin makes it obvious that the species belongs to *Lophosiphonia*.

H a b . : Deserta Grande.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Maul), Selvagem Pequena (leg. Maul).

G e o g r . d i s t r . : Portugal, N. Spain, widespread in the Pacific.

Halopitys Kütz.

Halopitys incurvus (Huds.) Batt.

Newton 1931 p. 340; *H. pinastroides* (Gmelin) Kützing Tab. phyc. XV pl. 27.

This species was found in some very exposed habitats, where it grows near low water mark. My specimens are very well developed. The taxa is probably not uncommon in suitable habitats, where it may often be difficult to reach.

H a b . : Madeira: Funchal (Clube Naval), Cabo Girão, Porto do Moniz.
Porto Santo: Fonte da Areia.

G e o g r . d i s t r . : British Isles and southward to N. Africa, Mediterranean, Canaries, Madeira.

Rytiphlaea C. Ag.

Rytiphlaea tinctoria (Clem.) C. Ag.

Kützing Tab. phyc. XV pl. 13; Falkenberg 1901 p. 438.

Collected on some exposed localities where it forms more or less dense tufts near low water line or in low-lying littoral rock-pools It is probably not uncommon.

H a b . : Madeira: Cabo Girão, Porto da Cruz.
Porto Santo: Fonte da Areia.
Ilhas Selvagens: Baía das Galinhas.

G e o g r . d i s t r . : West of Europe from Brest to Morocco, Canaries, Madeira, Mediterranean.

Chondria Harv.

Chondria tenuissima (Good et Woodw.) C. Ag.

Hauck 1885 p. 210.

The species is no doubt very rare. Only a few steril specimens were obtained by dredging in 35 - 70 m. depth. Also recorded by Grunow (1870) and Gain et Mirande (1912).

Hab.: Madeira: Câmara de Lobos, off Pináculo, Garajau, Ponta de S. Lourenço (Desembarcadouro).
Ilhas Selvagens: Selvagem Grande.

Geogr. distr.: West coast of Europe from Great Britain southward to N. Africa, Canaries, Madeira, Mediterranean, West Indies, Florida, N. Carolina.

Chondria dasyphylla (Woodw.) C. Ag.

Hauck 1885 p. 210.

I only collected this plant a few times. It was found in the upper sublittoral. In the collections of the Museu Municipal in Funchal there is also some material of this species from Madeira but without any detailed information about locality. Also recorded for Madeira by Menezes (1926).

Hab.: Madeira: Figueirinhas.

Geogr. distr.: Warmer coasts of N. Atlantic, Mediterranean.

Chondria coerulescens (J. Ag.) Falkenb.

Falkenberg 1901 p. 205; Gayral 1966 p. 562; Ardré 1970 p. 223.

This species occurs in the lower part of the littoral together with *Caulacanthus, Centroceras, Ceramium ciliatum, Laurencia pinnatifida,* etc. and is probably not uncommon. The specimens are 2 - 3 cm. high.

Hab.: Madeira: Funchal (Clube Naval, Lido).

Geogr. distr.: Southward from the British Isles, to Portugal and Morocco, Madeira.

Laurencia Lamour.

Laurencia obtusa (Huds.) Lamour.

Harvey Phyc. Brit. 1846 - 51 p. 148; Newton 1931 pl. 338.

This species is fairly common and well developed. It occurs in the lower part of the littoral and a few m. down occasionally deeper. Fertile material was obtained in the months of May - October.

Hab.: Madeira: Funchal (Clube Naval, Lido), Figueirinhas, Porto do Moniz, Porto da Cruz, Ponta de S. Lourenço (Porto de Santa Maria).
Porto Santo: Fonte da Areia.
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, Baía das Galinhas, leg. Sousa). Also Gain et Mirande (1912).

Geogr. distr.: Warmer parts of the Atlantic, Mediterranean, Indian Ocean.

Laurencia hybrida (D. C.) Lenorm.

Newton 1931 p. 339.

This species was only collected once and is obviously very rare. Sterile.

Hab.: Madeira: Figueirinhas.

Geogr. distr.: West coast of Europe from Great Britain southward, Canaries, Madeira.

Laurencia pinnatifida (Huds.) Lamour.

Harvey 1846 - 51 pl. 55.

Only found a few times. It was growing in the lower littoral and pools. Most of the specimens are small and rather poorly developed. Also recorded by Grunow (1870) and Menezes (1926).

Hab.: Madeira: Funchal (Baixa Larga, Clube Naval).
Ilhas Selvagens: Selvagem Grande (Baía das Galinhas, leg. Sousa).
Deserta Grande.

Geogr. distr.: West coast of Europe (Norway - Morocco), Canaries, Madeira, Mediterranàen.

Laurencia perforata (Bory) Mont.

Kützing Tab. phyc. XV pl. 49; Börgesen 1930 p. 69.

I did not collect this plant myself. In the collection from the Salvage Islands there are some specimens which agree very well with this species originally described from the Canaries.

Hab.: Ilhas Selvagens: Selvagem Grande (Baía das Cagarras, leg. Maul).

Geogr. distr.: Canaries, Madeira.

Janczewskia Solms.

Janczewskia verrucaeformis Solms.

Hauck 1885 p. 524; Börgesen 1930 p. 71.

This interesting parasitic red alga was found on a few specimens of *Laurencia obtusa*. It is no doubt rare. The plants, which are fertile, were collected in exposed places in July and September.

H a b . : Madeira: Ponta de S. Lourenço (Porto de Santa Maria).
Ilhas Selvagens: Selvagem Grande (Baía das Cagarras).

G e o g r . d i s t r . : Mediterranean; Portugal, Morocco, Canaries, Madeira.

Ricardia Derb. et Sol.

Ricardia montagnei Derb. et Sol.

Börgesen 1930 p. 74.

This plant was recorded for Selvagem Grande by Gain et Mirande (1926 p.481). I have never seen any material myself from the archipelago.

H a b . : Ilhas Selvagens: Selvagem Grande.

G e o g r . d i s t r . : Mediterranean, Canaries, Selvagem Grande.

REFERENCES

Agardh, C. A. :
1817. Synopsis algarum Scandinaviae.
1820 - 28. Species algarum.

Agardh, J. G. :
1842. Algae maris Mediterranei et Adriatici.
1851 - 76. Species, genera et ordines algarum, Vol. II - III.
1872. Bidrag till Florideernas systematik. — *Lunds univ. årsskrift,* 8.
1879. Florideernas morfologi. — *K. Vet. Akad. handl.,* 15:6.

Ardré, F. :
1970. Contribution a l'étude des algues marines du Portugal. — *Portugaliae acta biol.* (B), 10.

Askenasy, E. :
1888. Algen der Forschungsreise S. M. S. Gazelle.

Baage, J. et al. :
1972. Rapport over botanisk studierejse til Madeira 1971. — Köbenhavn.

Barton, E. S. :
1897. Welwitsch's African marine algae. — *J. Bot.* 35, pp. 369-374.

Berthold, G. :
1884. Die Cryptonemiaceen des Golfes von Neapel. — *Fauna und Flora des Golfes von Neapel,* 12.

Bliding, C. :
1963. A critical survey of european taxa in Ulvales. I. — *Opera botanica,* 8:3.
1968. *Ibid.,* II. — *Bot. notiser,* 121.

Börgesen, F. :
1913 - 14. The marine algae of the Danish West Indies, I. — *Dansk bot. Arkiv,* 1 - 2.
1915 - 20. *Ibid.,* II. - 3.
1925 - 36. Marine algae from the Canary Islands, I - IV. — *K. Danske Vidensk. Selsk. Biol. Medd.* 5:3 (1925), 6:2 (1926), 6:6 (1927), 8:1 (1929), 9:1, (1930), 12:5 (1936).

Bornet, E. :
1892. Les algues de P. K. A. Schousboe récoltés au Maroc et dans la Méditerranée de 1815 à 1828. — *Mém. Soc. Sci. nat. et mathém. de Cherbourg,* 28.

Bornet, E., et Thuret, G. :
1876 - 80. Notes algologiques.

Buch, L. von :
1825. Physicalische Beschreibung der Canarischen Inseln. (Berlin).

Cardinal, A. :
1964. Étude sur les Ectocarpacées de la Manche. — *Beih. Nova Hedwigia,* 15.

Colins, F. S., and Hervey, A. B. :
1917. The algae of Bermuda. — *Proc. Amer. Acad. Arts. and Sc.,* 53.

Cribb, A. B. :
1956. Records of Marine algae from South-Eastern Quensland — II: Polysiphonia and Lophosiphonia. — *Univ. Queensl. papers, Bot.,* III:16.

Crouan, P. L., et H. M. :
1867. Florule du Finistère.

Dixon, P. :
1946. Taxonomic and nomenclatural notes on the Florideae, IV. — *Bot. not.,* 117 (pp. 56 - 78).

Falkenberg, P. :
1901. Die Rhodomelaceen des Golfes von Neapel und angrenzenden Meeresabschnitten. — *Fauna und Flora des Golfes von Neapel,* 26.

Feldmann-Mazoyer, G. et Meslin, R. :
1940. Recherches sur les Céramiacées de la Méditerranée occidentale.

Feldmann-Mazoyer, G., et Meslin R. :
1939. Note sur le Neomonospora furcellata (J. Ag.) comb. nov. et sa naturalisation dans la Manche. — *Rev. gén. bot.,* 51 (pp. 193 - 203).

Feldmann, J. :
1937. Recherches sur la végetation marine de la Méditerranée. — *Rév. alg.,* 10.
1942. Les algues marines de la côte des Albères. — *Ibid.* 11.
1946. La flore marine des îles Atlantides. — *Mém. Soc. Biogéogr.,* 8 (pp. 395 - 435).
1962. The Rhodophyta order Acrochaetiales and its classification. — *Proc. Ninth Pacific Sc. congr., 4, Bot.* (pp. 219 - 221).

Feldmann, J. et Hamel, G. :
1934. Observations sur quelques Gélidiacées. — *Rev. géner. bot.,* 46.
1936. Floridées de France. VII Gélidiacées. — *Rev. Alg.,* 9.

Foslie, M. :
1898. Systematical survey of the Lithothamnia. — *Norsk Vidensk Selsk. Skr.*
1902. Den botaniske samling. — *Ibid.*
1904. Algologiska notiser. — *Ibid.*
1905. New Lithothamnia and systematical remarks. — *Ibid.*
1929. Contributions to a monograph of the Lithothamnia (Edit. H. Printz). — *Norsk Vidensk Selsk. Museet.*

Funk, G. :
1955. Beiträge zur Kenntnis der Meeresalgen von Neapel. — *Pubbl. staz. zool. Napoli, 25 suppl.*

Gain, L. :
1914. Algues provenant des Campagnes de l'Hirondelle II (1911 - 1912). — *Bull. Inst. Oceanogr.,* 279:1 - 23.

Gain, L. et Mirande, R. :
1912. Notes sur les algues recuillies par M. L. Garreta aux îles Salvages et Canaries. — *Bull. Mus. Hist. Nat.,* 18:7 (pp. 479- 481).

Gayral, P. :
1958. Algues de la côte atlantique marocaine.
1966. Les algues des côtes françaises.

Grunow, A. :
1870. Die Algen . — *Reise der österrechischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859. Bot.* :1.

Hamel, G. :
1924. 1927. 1930. Floridées de France, 1 - 5. — *Rev. Alg.* 1 - 5.
1931 - 39. Phéophycées de France.

Harvey, W. H. :
1846 - 51. Phycologia Britannica, 1 - 4.
1853. Nereis Boreali - Americana, II.
1858 - 63. Phycologia Australica, 1 - 5.

Hoeck, C. van den and Donze, M. :
1967. Algal phytogeography of the European Atlantic coasts. — *Blumea,* 15.
1966. The algal vegetation of the rocky Cote Basque (SW France). — *Bull. Centr. Etud. Rech. sci. Biarritz,* 6:2 (pp. 289 - 319).

Hauck, F. :
1885. Die Meeresalgen Deutschlands und Österreichs. — Rabenhorst, Kryptogamenflora, 2.

Hollenberg, G. J. :
1968. An account of the species of Polysiphonia of the central and western tropical Pacific ocean, I. — *Pacific Sc.,* 22 (pp. 56 - 98).

Jaasund, E. :
1965. Aspects of the Marine algal vegetation of North Norway. — *Botanica Gothoburgensia* IV. $

Johnson, J. Y. :
1885. Madeira. Its climate and scenery (London).

Kuckuck, P. :
1894. Bemerkungen zur marinen Algenvegetation von Helgoland, I. — *Wissensch. Meeresunters. N. F.* 1.
1912. Beiträge zur Kenntnis der Meeresalgen, 13. — *Ibid.* 5, Abt. Helgoland.
1956. (Herausgegeben von P. Kornmann) Ectocarpaceen - Studien IV. — *Helgoländer Wiss. Meeresunters.,* V:3 (pp. 292 - 325).

Kützing, F. T. :
1843. Phycologia generalis.
1849 - 69. Tabulae phycologicae, 1 - 19.

Kylin, H. :
1924. Studien über die Delesseriaceen. — *Lunds Univ. Arsskr. N. F.* 2, 20.
1930. Über die Entwicklungsgeschichte der Florideen. — *Ibid.* 26.
1931. Die Florideenordnung Rhodymeniales. — *Ibid.* 27.
1940. Die Phaeophyceenordnung Chordariales. — *Ibid.* 36.
1944. Die Rhodophyceen der schwedischen Westküste. — *Ibid.* 40.
1947. Die Phaeophyceen der schwedischen Westküste. — *Ibid.* 43.
1956. Die Gattungen der Rhodophyceen.

Lamouroux, J. V. :
1816. Histoires des Polypiers coralligènes flexibles.

Le Jolis, A. :
1863. Liste des algues marines de Cherbourg. — *Mém. soc. sc. nat. Cherbourg,* 10.

Levring, T. :
1969. Light conditions, photosynthesis and growth of marine algae in coastal and clear oceanic water. — *Proc. sixth intern. seaweed symp.* (pp. 235 - 244).

Lund, S. :
1941. In Rosenvinge and Lund, The Marine algae of Denmark, Vol. II: 1. — *Kongl. Danske Vidensk. Selsk. Biol Skr.* 1:4.

Lyngbye, H. Ch. :
1819. Tentamen hydrophytologiae Danicae.

Lowe, R. Th. :
1819. Florulae Salvagicae tentamen, or a list of plants collected in the Salvages or Salvage Islands by Sr. Constantino Cabral de Noronha and communicated by the Barão do Castelo de Paiva. London (24 pp.).

Menezes, C. A. de :
1926. Contribuição para o estudo das Algas da Madeira. — *Brotéria,* Sér. bot. 22:2 (pp. 71 - 78).

Montagne, C. :
1846. Algues in Exploration scientifique de l'Algérie, Bot., 1.

Newton, L. :
1931. A handbook of the British seaweeds.

Piccone, A. :
1884. Crociera del «Corsaro» alla Isola Madera e Canaria del Capitano Enrico d'Albertis. Genova.

Reinke, J. :
1888. Einige neue braune und grüne Algen der Kieler Bucht. — *Ibid.* — *Ber. deutsch. bot. Ges.,* 6.
1889 - 92. Atlas deutscher Meeresalgen. — *Komm. wiss. Unters. deutsch. Meere (Berlin).*

Rosenvinge, L. K. :
1909 - 31. The marine algae of Denmark. — *K. Danske Vidensk. Selsk. Skr.* 7, *Naturv. Mathem.,* 7.

Sauvageau, C. :
1897. Sur quelques Myrionémacées. — *Ann. sc. nat., Bot.,* S. 8: 5.
1897. Note préliminaire sur les algues marines du Golfe du Gascogne. — *J. de bot.,* II, Paris.
1900 - 14. Remarques sur les Sphacélariacées. — *Jorn. de bot.,* 14 - 18.
1912. A propos des Cystoseira de Banyuls et de Guéthary. — *Bull. stat. biol. d'Archachon,* 14.

Schiffner, V. :
1915. Studien über die Algen des Adriatischen Meeres. — *Verhandl. zool. bot. Ges. Wien,* 65.

Schmidt, O. C. :
1923. Beiträge zur Kenntnis der Gattung Codium Stackh. — *Bibl. botanica,* 91.
1931. Die Marine Vegetation der Azoren in ihren Grundzügen dargestellt. — *Ibid.* 102.

Schmitz, F. :
1889. Systematische Übersicht der bisher bekannten Gattungen der Florideen. — *Sitzungsber. Akad. Wiss. Berlin.*

Setchell, W. A. :
1914. The Scinaia Assemblage. — *Univ. Calif. publ. bot.,* 6.
1925. The genus Microdictyon. — *Ibid.* 14.

Silva, F. A. da e C. A. de Menezes :
1965. Elucidário Madeirense, Vol. I.

Silva P. C. :
1959. Codium (Chlorophyta) in the Tropical Western Atlantic. — *Nova Hedwigia,* 1 (pp. 497 - 536).

Sjöstedt, L. G. :
1927. Floridean studies. — *Lunds Univ. Årsskr., N. F.* 2:22.

Söderström, J. :
1963. Studies in Cladophora. — *Botanica Gothoburgensia,* 1.

Sundene, O. :
1964. The conspecificity of Antithamnion sarniense and A. sprirographidis in view of culture experiments. — *Nytt Magasin Bot.,* 12.

Suneson, S. :
1937. Studien über die Entwicklungsgeschichte der Corallinaceen. — *Lunds Univ. Årsskr.,* N. F. 2: 33.
1943. The structure, Life-History and Taxonomy of the Swedish Corallinaceae. — *Ibid.* 39.
1944. Notes on Schmitziella endophloea. — *Fysiogr. Sällsk. förhandl. Lund,* 14.

Taylor, E. M. :
1882. Madeira, its scenery and how to see it. With letters of a year residence, and a list of trees, flowers, ferns and seaweeds.

Taylor, W. R. :
1928. The marine algae of Florida with special reference to the Dry Tortugas. — *Carneg. inst. publ.,* 379.
1960. Marine algae of the Eastern tropical and subtropical coasts of the Americas.

Taylor, W. R. and Bernatowiez, A. J. :
1969. Distribution of marine algae about Bermuda. — *Bermuda biol. stat., Spec. publ.,* 1.

Thompson, E. J. :
1910. The morphology of Taenioma. — *Bull. Torrey bot. club,* 37 (pp. 97 - 106).

Tseng, C. K. :
1944. Notes on the algal genus Taenioma. — *Madrono* 7 (pp. 215 - 226).

Weber van Bosse, A. :
1896. Monographie des Caulerpes.... — *Ann. Jard. bot. Buitenzorg,* 15.

Womersley, H. B. S. :
1950. The marine algae of Kangaroo Island III. — *Trans. Roy. Soc. S. Austr.,* 73.