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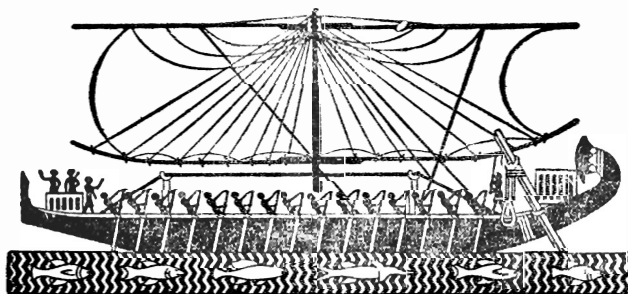
THE MARINE ALGÆ OF ALEXANDRIA

II.—A Study of the Occurrence of Some Marine
Algae on the Egyptian Mediterranean Coast
(with 6 Figures)

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A Study of the Occurrence of Some Marine Algæ on the Egyptian Mediterranean Coast

I.—Introduction

In the interval of the university examinations from May 18 to 27, 1938, the writer collected and studied some algæ from the shores of Alexandria. The number of algæ gathered in this period was very small, since the writer had not the opportunity to do any proper dredging: the launch El-Hoot of the Hydrobiological Institute was engaged in some military service at Mersa Matrooh at that time. It is more than probable that the small number of algæ collected was due to the poverty of the littoral belt at Alexandria in comparison with that of the European Mediterranean Coast. This was proved to be true when I recently studied the French Coast in the autumn of 1938 at the Zoological Station of the University of Paris at Villefranche sur-Mer. The great difference in the richness and poverty of both regions may be attributed mainly to the difference in the nature of the coast, which is an important factor influencing the algal associations and formations. The littoral belt at Villefranche is mostly rocky and emerged abruptly into the deep water of the open sea: the infra-littoral is of the Lithothamnion type and is more or less exposed to the waves, conditions favourable to algal growth. At Alexandria, however, the littoral belt is mostly sandy and sometimes muddy sand quite in accordance with the infra-littoral belt, a substratum favourable only for the growth of certain species of algæ and some phanerogams, e.g. *Caulerpa prolifera* and *Zostera marina*. A single patch only of *Posidonia* was found at Abu Qir Bay, just next to the fort; whereas the *Posidonia* is very common on the European Mediterranean Coast.

It was somewhat astonishing to find no trace of *Acetabularia mediterranea* at Alexandria at that time. The writer could only record another species of *Acetabularia*, but unfortunately not in good condition for identification, and it might be referable to *A. Wettsteinii* known formerly from the Mediterranean and which resembles very much *A. Möbii*, found by the writer (Nasr, 1939) in the Red Sea at Ghardaqa.

All the algæ mentioned in this paper were known from the western part of the Mediterranean, but it is interesting to add them to the list of marine algæ found in our own waters, namely : *Anadyomene stellata*, *Udotea petiolata*, *Gracilaria compressa*, *Porphyra leucosticta*, *Polysiphonia phleborhiza*, *Asterocytis ornata*, *Dilophus ligulatus* and *Botryocladia botryoides*.

The identification of these plants was carried out during the writer's visit to the Natural History Museum of Paris in the summer of 1938, where he compared his collection mostly with the types or co-types preserved in Thuret and Bornet Herbarium. I should like to take this opportunity of offering my acknowledgment to Prof. P. Allorge, the Director of the Cryptogamic Herbarium for allowing me to study my collection of algæ in this Herbarium and for putting the rare types at my disposal.

II.—Newly Recorded Species and their Description

I.—*Anadyomene stellata* (Wulf.) Ag.

C. Agardh, Spec. Alg. p. 400 : Hauck, Meeresalgen. p. 468 ; Ardissonne Phyc. Medit., p. 181 : Derbes et Solier, p. 3 ; Boergesen, Mar. Alg. D.W.L. Vol. II. p. 25 ; Hamel, Chlorophycées des cotes françaises, p. 113 ;

Uva stellata Wulfen, Cryptogama aquatica, p. 6.

The orbicular leaf-like thallus of this alga was found epiphytic on old stalks of *Sargassum linifolium* cast ashore during a strong gale. The plant is deep green in colour and attached firmly by rhizoids to the substratum.

The thallus is composed of large cells setting up on both sides smaller cells which all cohere to form the leafy frond in much the same way as the feature found in *Microdictyon* and quite in accordance with Boergesen (1913) ; but without the net-like structure characteristic of *Microdictyon*.

The chromatophores are polygonal and contain a single pyrenoid only.

The plant seems to occur in deep water on our coast, since it was only collected from material drifted ashore, most probably after a storm.

Locality. —Mariout Coast in March. (material preserved in alcohol).

Geogr. Distrib. —Mediterranean Sea, Adriatic Sea, West Indies.

2.—*Udotea petiolata* (Turra) Boerges

Boergesen, Mar. Alg. D.W.L., Vol. I, 1925, p. 86; Hamel, Chlorophycées des cotes françaises, p. 78, f. 25 a; Feldmann, Alg. Mar. de la cote des Albères, 1937, p. 98 :

Ulea petiolata Turra, Fl. Italiae Prodr. 1780, p. 68 :

Flabellaria Desfontainii Lamouroux, Montagne, Fl. d'Alger, p. 52 ;

Flabellaria petiolata Trevisan in Gepp, Siboga Expedition, p. 48, f. 29-31.

This is one of the well-known uncalcified species of *Udotea* which was placed under *Flabellaria* by Gepp in view of the absence of calcareous matter. The presence or absence of such calcified matter in the thallus of this alga is of secondary importance and is not of generic character according to Oltmann's Boergesen's and Hamel's views.

The plant (Fig. 1) is flabellate with somewhat lacerate margin, but the laceration of the thallus on the Egyptian plants is not so well marked as I have noticed it in European specimens. The filaments in the frond run parallel and cohere together by means of imbricate lobules forming a disappearing cortex. The supra-dichotomous constrictions are uneven.

While dredging at Abu Qir Bay among the *Caulerpa prolifera* vegetation, some specimens were gathered at a depth of 16 metres; but presumably they are present in greater depths. The Egyptian plant was never found near low water-mark, in contrast to the European specimens which I have collected near low water surface from shaded localities at Villefranche.

Locality.—Alexandria, Abu Qir ; (Herb. NASR. No. 449).

Geogr. Distrib. —Mediterranean Sea, Canary Islands, Cape of Verde Islands, Malayan Archipelago.

3. — *Dilophus ligulatus* (Kütz.) Feldm.

Feldmann. Algues Marines de la cote des Albères ; Rev. Algol.
p. 173. Figs. 66-65, 1937.

In referring the plant collected from our Mediterranean shore to the genus *Dilophus*, one should mention that this genus and *Dictyota* are very confusing at first sight and the study of the structure of the plant is important in assigning it to its genus. *Dilophus* is attached to substratum by means of stolons composed of many layered medullated cells, but in *Dictyota* this structure is absent.

The plant (Fig. 2) attains a height of about 6 centimetres and is much shorter than those from Banyuls. The frond is dichotomously branching with rounded apices in contrast to attenuated apices in *D. Fasciola*. The tetrasporangia are arranged in regular groups on the median portion of the frond and on both sides, a character which distinguishes it from *D. Fasciola*.

This species occurs on the upper infra-littoral belt, attached to rocks in exposed places.

Locality.— Alexandria (Camp Cèsar). (Herb. NASR. No. 414).

Geogr. Distrib. Mediterranean Sea. Atlantic Coast of Spain, France, England. Adriatic Sea.

4.— *Asterocylis ornata* (Ag.) Hamel.

Hamel, G. Floridées de France. p. 40 ; Boergesen, Marine Algæ from Canary Islands, 1925, p. 11 ;

Asterocylis ramosa Gobi in Rosenvinge, Mar. Alg. Denmark, p. 77, f. 17, 1909 ; Boergesen, Mar. Alg. D.W.I., Vol. II, p. 3.

According to the elaborate work of Gobi, Schmitz and Wille⁹ the genus *Asterocylis* can be distinguished from *Goniotrichum* the very related genus, by its blue colour, by the liberation of spores through the opening of the wall and lastly by the formation of akinetes.

The present species was generally known as *A. ramosa*, but it was due to Hamel (1924), who after examining an authentic specimen of *Micronema ornata* Ag. in Paris Museum, came to the conclusion that it was the species referred to above.

The filaments of this alga were found epiphytic on *Sphacelaria* sp. dredged at 16 metres deep in Abu Qir Bay. The Egyptian alga forms tufts of ramified filaments about 20 μ in diameter near the base, with, on the whole, a thick gelatinous sheath. The cells contain a single pyrenoid and are rectangular, ellipsoidal to irregularly rounded. Wille, Boergesen and Hamel found their plants in the sea, but Hamel recorded it in fresh water and in water of weak salinity. Zanardini, however, found it in fresh water only. The Egyptian plant, being found in Abu Qir Bay, in moderately salt water, approaches in this respect Hauck's habitat for this plant.

Locality. Alexandria (Abu Qir Bay).

Geogr. Distrib. Atlantic Coast of Europe, Canary Islands, North America, West Indies, Mediterranean Sea.

5.—*Porphyra leucosticta* Thur.

Thuret in Le Jolis, 1863; Hauck, Meeresalgen, p. 25; Hamel, Floridées de France, p. 27, f. V.

This alga agrees well with other Mediterranean specimens. It is of a delicate, fine structure, attached to rocks by the basal modified cells. It is as Hamel observed, very small when compared with the same species from the English Channel, a fact which seems to hold true. The northern species suffer reduction in size in their effort to establish themselves in southern latitudes. This was clearly observed by the writer in the Red Sea (Nasr, 1936). The specimens from Alexandria are considerably very small not exceeding 6 centimetres (Fig. 3).

The Egyptian plant was attached to *Corallina mediterranea* just above low water-mark in exposed places on the smooth stones of the break-water facing the windward side.

Locality. Alexandria (Eastern Harbour); (Herb. NASR, No. 422).

Geogr. Distrib. English Channel, Mediterranean Sea, Adriatic Sea.

6.—*Gracilaria compressa* (Ag.) Grev.

Greville, Algae Britannicae, p. 127, 1830; De Toni, Sylloge Algarum, Florid. II, p. 438; Hauck, Meeresalgen, p. 183, f. 78; Harvey, Phyc. Brit. pl. 205; Ardissonne, Phyc. Medit. p. 240; *Sphaerococcus compressus* Ag. Spec. Alg. p. 308.

This plant agrees with specimens collected from Trieste and kept in the Botanical Natural History Museum in Paris. Our alga is pale purple, gelatinous, soft and adheres pretty well to drying paper. It is freely branching unilaterally or between dichotomous and alternate (Fig. 4). The branchlets are tapering off at the apices and base.

It was dredged at 3-4 fathoms from the Eastern Harbour next to the Laboratory, where it was attached to rocks by a small disc.

Plants with cystocarps were gathered in June. These cystocarps are small, somewhat spherical bodies scattered irregularly on the whole plant thallus and open by a pore.

In transverse section the plant is characterised by having a small single layered cells which form the epidermis, in quite good agreement with the Adriatic specimens.

With regard to the plant distribution of this species, it is mentioned in De Toni that there is no record of it in the eastern part of the Mediterranean Sea.

Locality — Alexandria (Eastern Harbour), (Herb. NASR. Nos. 419 and 426).

Geogr. Distrib. — Atlantic Ocean, Mediterranean Sea, Adriatic Sea.

7. *Botryocladia botryoides* (Wulf.) Feldm.

Feldmann: *Algues Marines de la cote des Albères*, p. 274, 1937 :

Botryocladia botryoides (Wulf.) Kylin, *Rhodomecinales*, p. 17 :

Chrysiomena acaria (Wulf.) J. Ag., in Hauck, *Meeresalgen*, p. 160 ;

Goerresen, *Mar. Alg.* D.W.I. Vol. II, p. 402 f. 388 ; Harvey,

Nereis Bot. Americ. p. 191, pl. 20.

This species was commonly known as *Botryocladia acaria*, but it was Feldmann (1937), who found that it should be referable to *botryoides*. This alga is composed of a solid cylindrical stem, characteristic of the genus, furnished with scattered obovate vesicles. With regard to the plant habit (Fig. 5) it approaches specimens gathered from Antibes and Toloun and kept in Paris Museum : it is also fully identical with specimens collected by the writer from Villefranche.

The gland cells are often present, solitary, sometimes two, rarely three in some cells, facing the innermost walls of the thallus. Kuckuck (1912) on the other hand did not find such structures in specimens gathered from the Mediterranean Sea.

It was dredged at 16 metres at the western side of Abu Qir Bay.

Locality.—Abu Qir Bay.

Geogr. Distrib.—West Indies, Canary Islands, Mediterranean Sea.

8.—*Polysiphonia phleborhiza* Kütz.

Kütz. Phyc. p. 419 ; Sp. p. 808 ; Tab. Phyc. XIII. p. 42 ;
Ardissone, Phyc. Medit. p. 390.

De Toni (1903) mentioned this species as a synonym to *Polysiphonia opaca* (Ag.) Zanard.; but Ardissone in his Phycologia Mediterranea had separated it as a distinct species on the basis of its vegetative character. He said about *P. opaca* "*fronda diritti o quasi*" and about *P. phleborhiza* "*fronda repeute e rodicante*".

There are some fine specimens collected from Antibes in 1859 and identified as *P. phleborhiza* and kept in Thuret Herbarium with which the present writer compared his plants.

The Egyptian alga agrees very closely with the above species No. 4148. Our plant attains about 5–7 centimetres high and attaches itself to rocks mixed with sand by means of rhizoids. It is erect provided with short branchlets arising from the main axis and giving the plant a characteristic appearance (Fig. 6).

The thallus contains 15–17 pericentral cells which are not corticated. Its diameter is about 380–400 μ , with cells about 190 μ long and swollen at the nodes.

The cystocarps are sessile, sub-spherical bodies, about 450 μ long and 330–340 μ broad. The tetrasporangia are arranged on the branchlets in a chain and displaying a tendency to become helical.

This species grows on our coast in exposed sites at low water-mark.

Locality.—Abu Qir Fort ; (Herb. NASR, No. 438).

Geogr. Distrib.—Mediterranean Sea.

9.—*Heterosiphonia Wurdemanni* (Bail.) Falk.

Falkenberg, Rhodomelaceen, p. 639 ; De Toni, Sylloge Algarum, p. 1222 ; Preda, Flora Italica, p. 174, f. LVII ; Nasr : General study of the marine algæ on the Egyptian Red Sea Coast, 1936 ;

Dasya Wurdemanni Bail. in Harvey, Nareis Bor-Amer. II. p. 64 ;
J. Agardh Sp. II. p. 1191 ; Ardissoni, Phyc. Medit. I,
p. 427.

Very small and fine specimens of this alga were brought up by the dredge in Abu Qir Bay at a depth of 16 metres. It was epiphytic on *Caulerpa prolifera*.

Specimens with stichidia were gathered in May. The Mediterranean plants agree well with those collected by the writer from Ghardaqa. The only difference that might be mentioned here is the habitat of this alga. In the Red Sea it grows under projecting rocks on coral reefs, presumably hidden from the strong illumination of the almost vertical sun beams.

Locality. Abu Qir Bay ; (Herb. NASR, No. 448).

Geogr. Distrib. Atlantic Ocean, Mediterranean Sea, Red Sea.

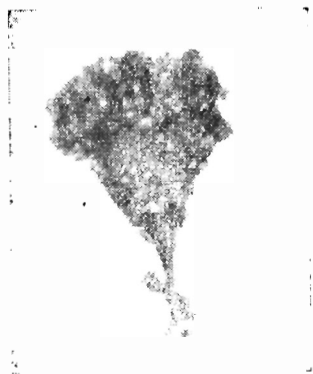
III.—Acknowledgment

The writer expresses his gratitude to the staff of Fouad I Institute of Hydrobiology at Alexandria in carrying out this work. Thanks are due to Dr. G. Hamel of Paris Museum for his great interest and help in the Egyptian specimens and to Prof. Chatton, the Director of Arago Laboratory at Banyuls in giving me the facilities for the study of some algae at Villefranche Zoological Station.

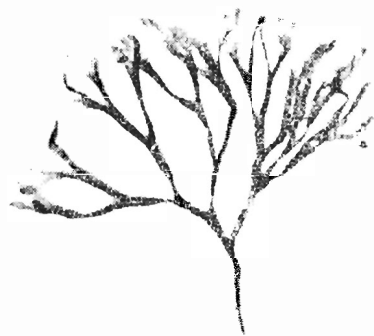
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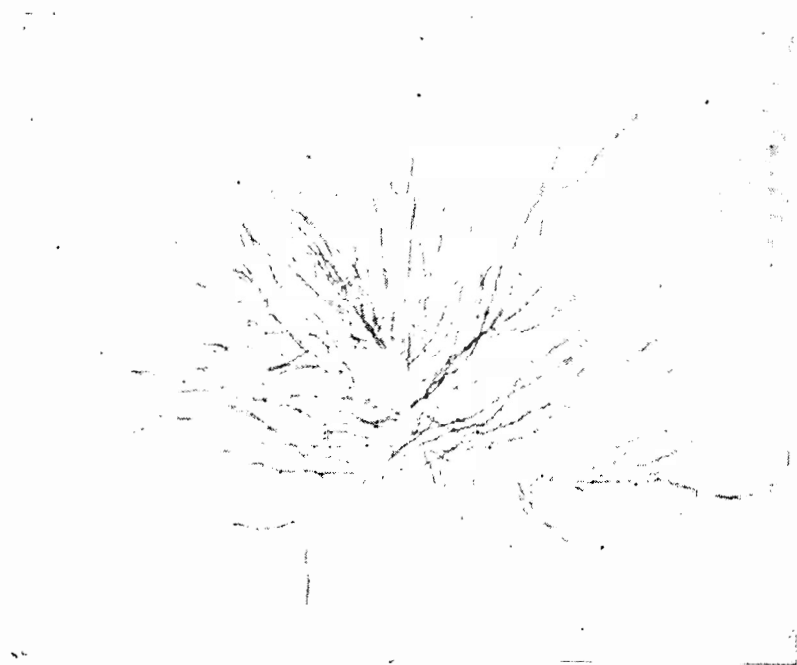
1.—*Cladonia petiolata* (Turra.)
Boergs. $\times \frac{1}{1}$



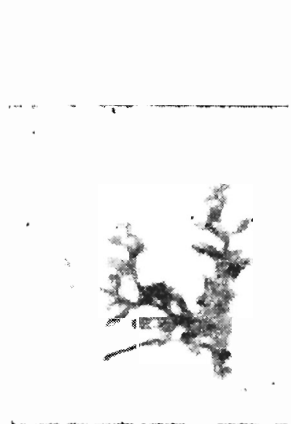
2.—*Cladonia figuratus* (Kütz.)
Feldm. $\times \frac{1}{1}$



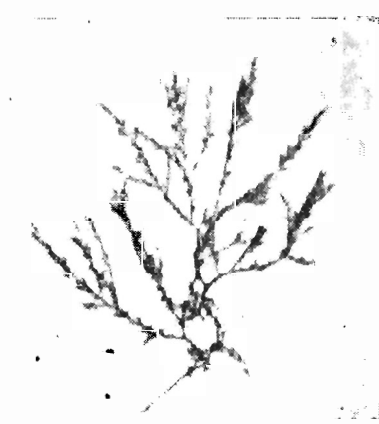
3.—*Porpita leucosticta*
Thur. $\times \frac{1}{1}$



4.—*Gracilaria compressa* (Ag.) Grev. $\times \frac{1}{2}$



5.—*Botryocladia botryoides*
(Wulf.) Feldm. $\times \frac{1}{4}$



6.—*Polysiphonia phleborhiza*
Kütz. $\times \frac{1}{1}$