

SOME NEW OR CRITICAL  
LITHOTHAMNIA

BY

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# LITHOMANIA

M. FOSTER

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LITHOMANIA I THOMAS

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Among collections of calcareous algæ that I got for examination I met with some species, not formerly described, as well as some varieties of species already known, but so well marked that they ought to be specially named. I will here give a preliminary description of these. Through those collections and especially a large and very interesting collection of Lithothamnion in Thuret's herbarium, which Dr. Bornet had the kindness to send me for examination, I got better acquainted with some species, the limits of which were but little known, or partly considered to be rather uncertain. One or two of these I also want to mention.

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Archæolithothamnion mirabile Fosl. mscr.

In Syst. Surv. of the Lith. I based the section *Episporæ* of *Archæolithothamnion* on a specimen from the Mediterranean Sea which seems to be identic with *Lithophyllum crispatum* Hauck; but I have not yet had the opportunity to decide whether this determination is right or not. However, I got specimens of another species, in which the superficial sporangia beds are even more typical for the section than those in the named species, or quite superficial and scarcely leaving any scar when the sporangia escape, viz. the above *A. mirabile*. It forms thin crusts on small stones, fragments of corals or other hard objects, at first being more or less orbicular, either with entire margin, or irregularly dentate or shallowly lobed; several crusts founded on the same substratum soon get confluent and at length often completely surround the object. The crust appears frequently to be about 1 mm. thick or less, but on the other hand occasionally attains a thickness of up

to 1.5 mm. The surface partly is smooth and somewhat shining, partly bearing small and irregular wartlike excrescences, some of which, however, are caused by extraneous objects or unevenness in the substratum. The colour is yellowish green, in part with a feebly pinkish shade.

In a cross section the cells are shown to be rather irregular, both in size and consecutive order. The hypothallic cells are unto about  $20 \mu$  long and  $10 \mu$  broad. The perithallic cells are frequently about  $10 \mu$  long and  $7 \mu$  broad, sometimes, however, larger sometimes smaller and now and then with the longest diameter in horizontal direction.

The sporangia beds are superficial, never growing down into the frond; partly, and most frequently, as soriform conceptacles in *Lithothamnion*, though less regular and often confluent. They are in general about  $400-500 \mu$  in diameter, circular, subcircular or oblong, intersected with about 30 canals, sometimes scattered over the whole frond, sometimes and more often in smaller groups. The cover is very thin and gets dissolved after or contemporary with the escape of the sporangia, generally leaving an indistinct scar on the surface of the frond. The sporangia are about  $60 \mu$  long and  $30 \mu$  thick (two-parted?).

The plant grows on a depth of 7-9, sometimes but 3-4 fathom and is hitherto met with in a single locality, where the tidal runs  $1\frac{1}{2}$  knots, viz. around the Phillips Island in Corner Inlet, east off Phillip Bay, Victoria, Australia. Coll. Mr. J. Gabriel.

#### *Lithothamnion Proponentidis* Fosl. mscr.

The present species grows fastened to stones, shells or other hard objects, forming rather extended crusts and often encompassing small stones. The crust attains a thickness of up to about 2 mm., frequently, however, not so much, in a rather early stage more or less rugged, afterwards carrying as a rule densely crowded, short and wartlike, knotty or, more seldom, longer and branchlike processes. The latter reach a height of up to 8 mm., generally furnished with one or two short, wartlike side-branches at or below the tip. The processes are 2-3, seldom 4 mm. thick, often ana-

stomosing at the base and sometimes even towards the apex. After the development of the processes the crust appears not to increase in thickness.

The plant is much burdened with extraneous bodies, and, as common in such species, new overgrowing hypothallium often appears. The perithallic cells are 9—11  $\mu$  long and 4—7  $\mu$ , most commonly 5—6  $\mu$  broad, often with somewhat rounded corners. The hypothallic cells are 11—15 or up to 22  $\mu$  long by a breadth of 5—9  $\mu$ .

Among a large number of specimens examined I only met with conceptacles of sporangia in a couple of rather young specimens. The conceptacles are but little prominent above the surface of the frond, with a slightly convex roof 190—220  $\mu$  in diameter seen from above, the central portions of the roof towards maturity often slightly depressed and here traversed by rather crowded muciferous canals 40—50 in number. The sporangia are four-parted, about 65  $\mu$  long and 22  $\mu$  broad. In some conceptacles examined I found the sporangia, in part isolated by walls running from the bottom to the roof, in part only fragments of such walls, but in most cases without any trace of walls, the latter probably dissolved in an earlier stage. The conceptacles grow down into the frond, but are seldom to be seen especially in older specimens.

The conceptacles of cystocarps are more common than those of sporangia, scattered or somewhat crowded here and there in the processes, subconical, 300—400  $\mu$  in diameter at the base, and now and then with a shortly elongated tip, which, however, soon falls away. The carpospores are 68—80  $\mu$  by 40  $\mu$ .

I had a doubt whether this species was to be referred to *Lith. suganum* Rothpl. or considered as a new species, although the cells frequently were shown to be a little smaller, or especially narrower than in the named species. The structure in some species of the Lithothamnia appears to be pretty constant, in others, however, and especially such ones, much attacked by animals, a rather great difference in the size of the cells or in the structure is to be seen in all, even within the same specimen. Therefore, a distinctive stress cannot in all cases be laid upon a slight diffe-

rence as to the size of the cells. In such cases at least a greater material of two so nearly connected species is required for comparison. I sent Dr. Rothpletz a couple of specimens for comparison with *L. suganum*. He kindly informed me that the latter is a species hitherto only known from an imbedded piece in limestone. He found the present species to be different from *L. suganum*, as the cells as a rule are narrower than in the latter. Afterwards I examined a couple of specimens, in which the processes are somewhat coarser and less knotty or rugged than in the other specimens considered as the type of *L. Propontidis*. Here I found the cells being frequently rather larger than in the former, although the specimens otherwise show transition to the typical form of the named species. They are sterile and are likely to be referred to a different species even nearer related to or perhaps identic with *L. suganum* Rothpl. or *L. torulosum* Gumb., both the latter scarcely being distinct species. Later a more careful examination will probably show the true relationship.

The species appears to be rather widely dispersed within the Marmora Sea as well as the Black Sea and is apparently very common. I got it from Mr. J. Nemetz, by him collected at San Stefano and at some distance south off it in the Marmora Sea, in different localities on a depth of about 1 fathom in „ruhiges Wasser, ausser bei Südwind“. Besides, I received some specimens from Professor N. Andrussow, collected in the Black Sea, near the Isle of Serpents, in 20 fathom's water. A couple of stunted specimens taken in the Marmora Sea near the Isle of Marmora on a depth of about 20 fathom I refer with doubt to the same species.

Lithothamnion squarrulosum Fosl. mscr.

*f. australis* Fosl.

*f. subsimplex* (Batt.) Fosl.

*f. palmatifida* Fosl. mscr.

The following forms are to be removed from *L. coralloides* Cr. in the sense the latter is taken by me in Norw. Lith. p. 62, viz. *f. australis*, *f. subsimplex*, *f. norvegica* and *f. saxatilis*. Cp. below under *L. coralloides* Cr. These forms are on the other hand

to be referred at least to two different species. I consider *f. australis* as the type of the one, to which I propose a new name, the above *L. squarrulosum*. In this the conceptacles of sporangia are of the same shape as those in *L. foecundum* Kjellm., 200—300  $\mu$  in diameter seen from above, with the central portions of the roof depressed or surrounded by an annular border and intersected with about 30 muciferous canals. The conceptacles grow down into the frond, but are seldom met with, and on the whole the species very seldom appears to produce reproductive organs. The form *subsimplex* seems to be near connected with the latter, but is hitherto only known in a sterile stage.

Through the kindness of Dr. Kolderup Rosenvinge I got a nice collection of Lithothamnia from the coast of Denmark for examination. Among these are some specimens from „Fladen, østl. Kattegat. No. 3387“, picked up from a depth of 13 fathom which I consider a form of the above species and propose to name *f. palmatifida*, although I have not yet examined the structure. It distinguishes itself by a fan-shaped ramification and more or less compressed branches unto 2.5 mm. broad. The largest specimens are in their longest diameter up to about 4 cm., frequently a little coarser than *f. australis*, but on the other side showing a full transition. The conceptacles of sporangia agree with those in the last named form, only a little larger. I have seen a similar form from the coast of Ireland, also provided with conceptacles of sporangia, only smaller and the branches often anastomosing, in habit somewhat approaching smaller specimens of *L. calcareum f. compressa*.

With regard to *f. norvegica* and *f. saxatilis* I want by a later occasion to give some dates as to the limitation of these, not unlikely different species, one of which probably is to be identified with another of the species mentioned in Norw. Lith.

Lithothamnion coralloides Cr.

*f. subvalida* Fosl. mscr.

*f. flabelligera* Fosl.

*f. minuta* Fosl. mscr.

In Norw. Lith. p. 62 I with some doubt drew together several forms under the species-name *Lithoth. coralloides* Cr. I was uncertain how the plant described by Crouan was to be apprehended, as both the latter and some of the other forms were known only in a sterile state, but on the other hand nearly connected with each other in habit. Afterwards I succeeded in finding conceptacles of sporangia in one of the specimens distributed by Crouan in Alg. mar. Finist. no. 242. This I consider as the type of *L. coralloides* Cr., and among the forms quoted in Norw. Lith. only *f. flabelligera* is to be retained, the other to be referred partly to *L. squarrulosum* mentioned above, partly to other species.

The present species is characterized by the conceptacles of sporangia being densely crowded at the tip of the branches and thereby the roof frequently gets more or less angular, but apparently often not sharply defined as in *L. fruticulosum* (Kütz.), the latter partly included in *L. fasciculatum* Solms, Corall. Monogr. p. 20.<sup>1)</sup> I consider the above *f. subvalida* to be either identical or very nearly connected with the named type, of which only smaller fragments are known. It has been found at Finistère and characterizes itself by its short axes up to about 2 mm. in thickness and approaches in habit sometimes *L. squarrulosum f. australis* (*L. coralloides f. australis* Fosl. l. c.) sometimes *L. divergens*, but is separated from both, especially as regards the conceptacles of sporangia. It appears to be more nearly related

<sup>1)</sup> The plant from northern Norway that I in Norw. Lith. referred to *L. fruticulosum* (Kütz.), then judging from sterile specimens in Hauck's herbarium, is not identical with this. Therefore, I keep the name *L. Ungerii* Kjellm. for the former, although I am still of opinion that it cannot be identical with the plant described and figured by Unger as *L. byssoides*, to which Kjellman refers. Cp. Norw. Lith. p. 59. As remarked l. c. p. 19 *L. Ungerii* often very much resembles *L. fruticulosum* in habit as well as structure. However, I have lately seen a specimen determined by Solms Laubach as *L. fasciculatum* and most probably belonging to the same series of forms as *L. fasciculatum*  $\beta$  *fruticulosum* Hauck (not Harv.), provided with conceptacles of sporangia densely crowded at the tip of the branches as in *L. coralloides*. This I suppose to be *L. fruticulosum* (Kütz.), thus differing from *L. Ungerii*, and in the sense taken by Hauck probably including more than one species. The limits are for the present rather uncertain.



to *L. fruticulosum* (Kütz.), the limits of which are not yet known. Nearly connected with *f. subvalida* is *f. flabelligera*, also provided with conceptacles of sporangia of the same shape and size as in the named type.

With some doubt I provisionally refer to this species a form from „Ile Holavre, dans le Golf du Morbihan“ mentioned in Norw. Lith. p. 65. This I name *f. minuta*. It bears conceptacles of sporangia coinciding with those in the above quoted forms, only a little smaller. It is, however, more delicate, the branches often but 1 mm. in thickness or even less, and somewhat reminding one of *L. amphiroæformis*, but with shorter axes. The structure is not yet examined.

Lithothamnion Bornetii Fosl. mscr.

I give the above name to a species represented by a specimen in Thuret's (Bornet's) herbarium, fragmentary, no doubt, but in my opinion quite characteristic. It is crustlike, about 1 by 1.5 cm. in diameter and about 0.5 mm. thick. The crust is rather uneven, which partly is caused by the substratum, here and there, however, bearing wartlike or irregular excrescences at the base occasionally confluent, unto 2 mm. high by a diameter of 2—3 mm.

The specimen collected at the end of November is richly furnished with conceptacles of sporangia. They are sometimes scattered, sometimes densely crowded everywhere in the crust or the excrescences, prominent, circular or oblong, 200—300  $\mu$  in diameter seen from above and 60—80  $\mu$  high, with the central portions depressed and here traversed by 20—35 rather coarse muciferous canals.

The colour is a pale purplish, here and there yellowish, probably having been darker when collected.

This species on the one side somewhat approaches *L. macroblastum* as regards the conceptacles, but on the other hand showing a rather great resemblance to *Clathromorphum evanescens*, and even the conceptacles somewhat approach those in the latter in a certain state. However, it distinguishes itself from that species particularly in the shape and development of the conceptacles,

which in the present alga always are more or less prominent, while they in *L. evanescens* at first are fully immersed, but afterwards by a decortication of the surrounding parts slightly prominent, though never as much as in the present species.

The only locality known is Cherbourg, here found on „murs déntree du Port Militaire“, Ed. Bornet.

Lithothamnion(?) kerguelenum (Dickie).

f.(?) *obtectula* Fosl. mscr.

In Journ. Bot. vol. 51, 1876, and in Trans. Royal Soc. vol. 168, 1879, p. 58 Prof. Dickie describes a calcareous alga from the Kerguelen Island by the name of *Melobesia kerguelena*. I should be inclined to refer to this species some specimens from the same place received through the kindness of Mr. H. Gundersen, Norwegian and Swedish consul in Melbourne. However, Prof. Dickie's description of the species is rather scanty, and it is difficult to have any decided opinion of what it may be. The species appears to have an even surface destitute of processes and suborbiculate in outline, although but a solitary specimen seems to have been almost complete; „there are fragments of others whose contour is less regular, probably through interference of external objects“. According to Prof. Dickie l. c. it is considered by Mr. Eaton that the species grows upon *Ballia* or *Ptilota*, but the former remarks „I should rather be disposed to suspect that it was attached to rocks“. Further it is supposed that the species has not been attached to the substratum by the whole of its lower part.

Therefore, I think the above *f. obtectula* at least ought to be considered a denominated form of the named species. I received several specimens, but all of them appear to have been washed ashore and laid on the beach for a long time. They are attached to shells (*Mytilus*), only one or two and small crusts fastened to stones. The crust is in a younger state suborbicular, but soon becoming irregular in outline, attached to the substratum by its whole lower part, unto about 1.5 mm. thick, plainly decreasing towards the margin, the latter dentate or irregularly lobed, with

irregular surface, partly on account of external objects, partly producing very irregular, small and most often wartlike processes, or now and then wavy and irregular ridges. Occasionally new crusts are formed upon the primary.

The colour agrees with that quoted by Prof. Dickie, a very pale buff or dull yellowish hue, varied with pale red tints, the latter probably coming nearest to that of fresh specimens.

The conceptacles of sporangia frequently are densely crowded, often occurring near to the margin, very little prominent above the surface of the frond, 300—350  $\mu$  in diameter seen from above and intersected with about 80 muciferous canals. Nearly all the conceptacles are dissolved apparently on account of external causes, and those with entire roof look as if a decortication has taken place, however, likely also decorticated by external causes. Therefore, with regard to the conceptacles the form appears to approach to *Clathromorphum* and especially *Cl. circumscriptum*, but I am inclined to suspect that better specimens will show a development typical to that in *Lithothamnion*. I did not succeed in meeting with sporangia.

Conceptacles of cystocarps occur in a couple of specimens in small numbers together with the former. They are of about the same size as those, bucklershaped-conical, with a single orifice.

Some other conceptacles resembling the latter in shape but only 100—125  $\mu$  in diameter seen from above I suppose to be those of antheridia.

#### *Goniolithon subtenellum* Fosl. mscr.

The plant is crustlike, at first forming thin, even, suborbiculate, purplish crusts on stones or shells, with dentate or shallowly lobed margin. Some crusts founded on the same substratum soon become confluent, the limits sometimes not to be seen, sometimes as more or less distinct ridges. The crust often is smooth even in a rather advanced state, developing numerous conceptacles of sporangia. But when older, it becomes, as a rule, more and more uneven, producing small wartlike excrescences, or trumbling crusts forming wavy ridges, or the unevenness caused by the substratum

or by covering up small extraneous objects. The excrescences sometimes are rather crowded, sometimes, and most commonly, scattered, attaining a height of up to about 2 mm., frequently less, by a thickness of 0.5—2.5 mm. The crust itself appears seldom to reach a thickness of more than about 0.5 mm.

In structure *G. subtenellum* stands near to *G. papillosum*, but differs particularly as regards the hypothallic cells which are much shorter than in the latter.

The species has been taken with reproductive organs in March, May and September. The conceptacles of sporangia are numerous especially in younger specimens, occupying the greater part of the crust. They much resemble those in *G. papillosum*, subhemispherical, low, about 300  $\mu$  in diameter seen from above, with a central chief-pore and in a certain state 20—30 small lateral pores. The latter often are difficult to detect. The sporangia are four-parted, about 75  $\mu$  long and 40  $\mu$  broad.

The conceptacles of cystocarps are of about the same size as those of sporangia and often difficult to separate in external shape, frequently, however, slightly higher and somewhat acute.

The conceptacles of antheridia are very small, crowded here and there in the crust, of the same shape as those of cystocarps, about 100  $\mu$  in diameter seen from above, sometimes a little smaller, sometimes larger.

The present alga is most nearly connected with *G. papillosum*, but is separated from the latter both in habit and structure. On the other hand, by a cursory examination it may be easily confounded with somewhat young specimens of certain forms of *Lithophyllum incrustans*, especially with such as bear young conceptacles of sporangia. The specimens that I have seen, most commonly, were growing together with other species, as *Lith. Lenormandi*, *L. Sonderi* and *Lithoph. incrustans*. Sometimes it covers partially *L. Lenormandi* or *L. Sonderi*, but is on the other hand often quite covered by *Lithoph. incrustans*. I have seen *L. Sonderi* in part overgrown by *G. subtenellum* and both almost quite covered with younger crusts of *Lithoph. incrustans*.

*G. subtenellum* has been found in different places on the coast

of Algeria in company with *L. incrustans*, but apparently rather scarce, Prof. F. Debray. Besides it has been taken at San Vicente de la Barquera (Spain) and at Guéthary (Basses Pyrénées), at the last named place growing together with *L. Lenormandi*, *L. Sonderi* and *Lithoph. incrustans*, Prof. Camille Sauvageau.

*Goniolithon platyphyllum* Fosl. mscr.

Among the collections of calcareous alga in the Riksmuseum at Stockholm, which I have had the opportunity to examine through the kindness of Prof. Dr. V. Wittrock is to be found a specimen representing an undescribed species, for which I propose the above name. It has been fastened to some hard object by the greater part of its lower side, a part of which, however, is wanting and has a diameter of about 14 by 9—11 cm. and 5—7 cm. in height. The species is densely branched with fastigate branches. The latter are repeatedly irregularly divided, in their lower part terete or subcompressed, soon upwards dilated frequently into broad, complanate, leaflike, somewhat folded or winded, crowded much anastomosing, erect expansions, with shallow or deep and often confluent lobes, most commonly 1—2 cm. broad by a thickness of 1.25—2 mm. Narrower branches or lobes occasionally show a slightly expanded summit, a little depressed in the middle

I refer this characteristic species with some doubt to *Goniolithon*, as I have seen but very young conceptacles considered to be those of sporangia. They scantily occur in the somewhat downwards turned side of the outer branches and are convex but little prominent, not sharply defined, 200—300  $\mu$  in diameter.

The species has been taken at St. Martin in West India, Cleve.

*Goniolithon congestum* Fosl. mscr.

Thallus fastened to rocks or corals by a crust about 1 mm. thick and but little extended, from which issue very densely crowded, fastigate branch-systems with short axes. The branches are in the lower part terete or subcompressed, 1—2 mm. thick, repeatedly irregularly divided, upwards frequently more compressed, rather bent, or more commonly, a short axe dilates itself upwards,

forming repeatedly, irregularly lobed, erect or bent expansions 3—8 mm. broad by a thickness of about 1 mm., the lobes more or less confluent, towards the blunt summit generally folded or winded, almost everywhere much anastomosing. Often a narrow summit or a part of a broad one is somewhat horizontally dilated and depressed in the centre.

New crusts are often formed from branch-systems, bending a little downwards and trumbling adjacent parts of the substratum or other hard objects. As soon as such new-formed crusts are a little extended they develop branch-systems which connect themselves with the older, and thereby the plant appears to be able to spread itself rather widely. The specimens that I have seen sometimes approach a subhemispherical shape, sometimes are very irregular in outline, the longest diameter 8—16 cm. by a thickness or height of 4—9 cm.

Conceptacles of sporangia, the only reproductive organs known, occur in the upper and especially outer branches, rather crowded, convex or approaching a subconical shape, but little prominent and not sharply defined, about 300  $\mu$  in diameter seen from above, with a central pore and about 20 delicate lateral pores. The latter are often very difficult to detect. I met with only two-parted sporangia, rather irregular in shape, 80—100  $\mu$  long and 55—75  $\mu$  broad.

The species seems to stand nearest to *G.*(?) *Bamleri* Heydr., from which, however, it separates itself especially by its densely crowded, anastomosing, fastigiate and shorter branches, never attaining the same breadth as those of that species. It has but little resemblance to the preceding species.

This species I also met with among the collections in the Riksmuseum at Stockholm, according to the label collected at St. Barthelemy in West India, A. von Goes.

*Goniolithon tortuosum* (Esp.) Fosl. mscr.

*f. decumbens* Fosl. mscr.

The plant generally adopted by algologists by the name of *Lithophyllum cristatum* Menegh. is by Bory<sup>1)</sup>, who describes

<sup>1)</sup> Bory de Saint Vincent, Notice sur les Polypiers de la Grèce. Expedition scientifique de Morée. Tome III. Pag. 204.

a form of it by the name of *Tenarea undulosa*, considered identic with *Millepora tortuosa* Esper, Pflanzenth. I p. 118, t. 22. In Journ. Bot. 9, p. 113 Mr. Hariot proposes to adopt the name given by Bory, but on the other hand has nothing to remark to the identily with the species described by Esper as considered by Bory himself. I agree that *M. tortuosa* Esp. without any doubt represents an old specimen of *L. cristatum f. crassa*. I have seen some very large specimens of this form both from the Adriatic and Mediterranean Sea. Therefore I keep the name given by Esper as the oldest.

The form named *f. decumbens* stands nearest to *f. crassa* but is seperated from the latter by the fact, that most of the branches and particulary the upper and younger ones are decumbent and often partly anastomosing with the underlying. This form has hitherto been found only in the Mediterranean Sea, at St. Eugène near Alger, Prof. Debray.

*Lithophyllum calcareum* (Pall.) Fosl.

*f. eunana* Fosl. mscr.

The present species is a true *Lithophyllum* in the sense in which the latter genus is taken by me in Syst. Surv., with the conceptacles of sporangia closely related to those in *L. racemus*. Some of the specimens specially mentioned under *L. calcareum* in On some Lith. p. 10—11 are to be referred to other species.

The form denominated above as *f. eunana* is nearly connected with *f. attenuata* and resembles this form in habit, but is much smaller and less branched, the longest diameter in general 15.—2 cm. The branches, being as a rule attenuating and rather clumsy, short, more or less spreading, scantily divided or simple, often knotty, are 2—4 mm. thick. Specimens taken in the middle of July are sparingly provided with conceptacles of sporangia.

This form is hitherto known from a single locality, Larne harbour, Antrim, Ireland, growing on a depth of 7 fathom together with *L. squarulosum*, here collected and kindly sent me by Mr. Henry Hanna.

*Lithophyllum Andrussowii* Fosl. mscr.

Professor N. Andrussow was kind enough to send me some calcareous algæ from the Black Sea and the Marmora Sea, forming in the main two undescribed species, one of which I formerly got from the Marmora Sea. The other I propose to denominate as above.

The species develops freely on the bottom. The thallus is 0.5–1.5 cm. in diameter, sometimes the longest diameter unto about 2 cm. From the solid central mass or very short main axis issue sometimes in all directions, sometimes chiefly upwards irregularly divided, more or less bent and very short branches. These are partly rather densely crowded, subfastigate, but seldom here and there anastomosing, partly more remoted, terete or feebly angulate, knotty or rugged, often here and there a little compressed, about 1.5 mm. thick. They are partly a little attenuating, partly and most generally with irregularly thickened ends which often are depressed in the centre.

The conceptacles of sporangia are innate, in a median vertical section 200–250  $\mu$  in diameter by a height of about 100  $\mu$ . Seen from the surface they at first form very feeble prominences about 100  $\mu$  in diameter which afterwards get decorticated, forming depressed point-like deepenings, the bottom of which is traversed by a single pore. I have not seen the sporangia. The species seems seldom to develop the named organs. Among numerous specimens examined I only met with a couple of not well developed conceptacles.

The colour of dried specimens is a yellowish white, in part with a pinkish shade.

The plant is most nearly related to *L. racemus* from which, however, it is distinguished by essential characteristics. Otherwise in habit it reminds one rather of small specimens of *L. squarulosum*.

It is hitherto only found in the Marmora Sea, at the entrance to the Dardanelles on a depth of about 15 fathom. Prof. N. Andrussow.



*Lithophyllum incrustans* Phil.*f. angulata* Fosl. mscr.

This species is one of the most varying and appears to have a rather rapid growth as well as a more distinct ability to accommodate itself to different external circumstances than most of the other crustlike calcareous algæ, and thereby, to a certain degree, to restrain the distribution of other and especially smaller species. It is extremely varying both in external shape, as well as partly also in structure, and in such respects the place of growth and circumstances connected with this appear to bear a signal part. It often seems as if they are distinct species, but on the contrary even between the most extreme forms the limit may be difficult to draw, as every transition appears. Perhaps a large material will show another result.

The above *f. angulata* is one of the more characteristic and extreme forms of the species. It characterises itself by a very hard consistency and numerous, rather densely crowded, small and wartlike or large and branchlike processes, which nearly always are more or less angulate, often knotty and confluent, now and then looking as if they were ground. These processes are very irregular in shape and size, unto about 6 mm. in height, partly rather attenuating with somewhat acute tips, partly and most commonly obtuse or even truncate. However, this irregularity is in some cases caused by the substratum or by covering up extraneous objects.

The present form occurs at different places in the Mediterranean Sea, on the European as well as the African coast.

*Lithophyllum Crouani* Fosl. mscr.

The alga which I propose to give the above name is in part included in *Melobesia Laminariæ* Cr., such as the latter has been apprehended by French algologists after Crouan. In Thuret's (Borner's) herbarium I have seen several specimens of the last named species, which also is distributed by Le Jolis in Alg. mar. Cherb. no. 255. I have not seen any original specimen. The greatest number of these specimens belong to the same species

that I consider to be the true *M. Laminariae* Cr.; but besides, there is to be found small fragments of another species quite different from the latter, the above *L. Crouani*. Both species are also met with on the coast of England, from where I got specimens collected by Mr. Batters, and along the coast of Norway, especially the western, they appear to be very common, nearly always growing gregarious on the same host, *Laminaria hyperborea*, but *Melobesia Laminariae* always in predominant number. One species often grows over the other.

*Melobesia Laminariae* forms suborbicular, at length irregularly extended crusts, often surrounding the stem of the host. The crusts are very brittle, crumbling and falling from the plant on which they are growing as the latter contracts when drying, unto 600  $\mu$  thick, frequently thinner and feebly decreasing in thickness towards the margin. The conceptacles of sporangia are hemispheric-conical, low, about 350  $\mu$  in diameter seen from above, with a single orifice. The whole roof frequently falls away when the sporangia escape. The latter are by Mr. Crouan (Fl. Finist. p. 150) quoted to be four-parted. In the specimens examined by me I only met with two-parted sporangia, 100—120  $\mu$  long and 60—75  $\mu$  broad. Perhaps they were not fully mature, or both two- and four-parted occur as in some other species, for inst. *Lithoth. Lenormandi* (fide Thuret in herb.), *Lithophyllum incrustans*, *Dermatolithon (Melobesia) pustulatum* and others.

I suppose *Melobesia macrocarpa* Kleen, Nordl. Alg. p. 11 (Kjellm. Alg. of the arctic Sea p. 105) belongs to *Melobesia Laminariae*. The true *D. pustulatum* f. *macrocarpa*<sup>1)</sup> has in other places never been found on *Laminaria hyperborea*, when on the other side I met with *M. Laminariae* rather far to the north on the named host, although I have not seen any specimen from Nordland. Mr. H. G. Simmons mentions with some doubt *M.*

<sup>1)</sup> In another place (List of species of the Lith.) I have subsumed *M. macrocarpa* as a form of *D. pustulatum*. However, it was probably more correct, as with doubt by Hauck, Meeresalg. p. 266, to consider it only as a synonyme of the latter, to which it most probably belongs. But as some authors (cp. Simmons, Meeres-Fl. Färøer p. 268) suppose it to be a separate species I for the present keep it as a denominated form of the named species.

*Laminariae* from the Faroe islands<sup>1)</sup> and Mr. Traill quotes it from the Orkney islands.<sup>2)</sup>

*Lithophyllum Crouani* forms orbicular or suborbicular crusts, smaller but generally thicker than those of *M. Laminariae*, never so extended as the latter, about 2 cm. in diameter by a thickness of about 700  $\mu$ , more regular in outline and by far not so brittle, with thicker margin. It is smooth and sometimes feebly shining. The colour is in fresh specimens a rather pale purplish, always paler than the brownish-purple colour in *M. Laminariae*, the latter in drying getting a little darker while *L. Crouani* on the contrary becomes lighter.

With regard to structure the present species rather resembles *M. Laminariae*, though the cells commonly are a little longer than in the last named. The perithallic cells are 16—21  $\mu$  long and 10—14  $\mu$  broad, the hypothallic ones 30—40  $\mu$  or unto 80  $\mu$  long.

Conceptacles of sporangia I have seen but in a solitary specimen, and not well developed. They appear to be crowded all over the frond except a narrow peripheral portion, innate, in a median vertical section about 110 by 90  $\mu$ . Seen from above they form lighter points 90—110  $\mu$  in diameter, afterwards feebly decorticated, with a single pore. In this state the plant rather reminds one of small specimens of *Cl. compactum* in habit. The sporangia are four-parted, about 75  $\mu$  long and 30  $\mu$  broad. The conceptacles at length become overgrown and are to be seen in series parallel to the surface of the frond.

The species is known from Cherbourg, Berwick-on-Tweed and along the western coast of Norway.

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1) Herman G. Simmons, Zur Kenntniss der Meeresalgen-Flora der Färøer. — Hedwigia. Bd. 36. 1897. Pag. 268.

2) G. W. Traill, The marine Algae of the Orkney Islands. — Trans. of the Bot. Soc. of Edinburgh. 1890. P. 36.

