NEW MELOBESIEAE

BY

M. FOSLIE

DET KGL. NORSKE VIDENSKABERS SELSKABS SKRIFTER. 1900. NO. 6

AKTIETRYKKERIET I TRONDHJEM
1901

Lithothamnion Phil. emend.

L. erubescens Fosl.

New or crit. Lith. p. 9.

f. *prostrata* Fosl. mscr.

Less branched than the typical form, branches more or less compressed and decumbent.

The typical form of this species was hitherto but known from Chaloup Bay, Fernando do Noronha (Brazil). In a collection of calcareous Algæ chiefly from America that Prof. W. G. Farlow had the kindness to send me is a couple of specimens from Bermuda which accord with the said form except that the branches are slightly thinner and the cells often a little smaller, bearing numerous sporangia in January. There cannot be any doubt as regards the identity with the above species.

In the same collection is a couple of other specimens also from Bermuda which must be considered as a denominated form of the above species, f. *prostrata*. It differs from f. *typica* being less branched, the branches frequently compressed and more or less decumbent, not so crowded but of about the same thickness as in the said form. It agrees in the main with the latter also with reference to the conceptacles as well as in structure. This form somewhat approaches *L. Dickiei*.

The typical form known from the coast of Brazil, and from Bermuda, herb. Farlow, no. XII, and f. *prostrata* only from Bermuda, herb. Farlow, no. XVIII.

L. rugosum Fosl.

Calc. Alg. Fuegia p. 66.

f. *genuina*.

L. rugosum l. c.

f. *valida* Fosl. mscr.

The crust about 3 mm. thick, with crowded and rather anastomosing, simple or subsimple branches about 10 mm. long and 3—6 mm. thick.

f. *crassiuscula* Fosl. mscr.

The crust about 2 mm. thick, with knotty and rugged surface or rather densely crowded excrescences or short branches 2—4 mm. thick. Conceptacles of sporangia convex but very little prominent, 350—400 μ in diameter.

The form *valida* differs from the typical form by thicker crust and coarser branches which besides are more anastomosing than in the latter. In structure it accords in the main with the said form, and so also with reference to the conceptacles of sporangia except that the latter are not always so decidedly disk-shaped in f. *valida*, but sometimes only the central parts being flattened. This form rather approaches *L. brachycladum* in habit, and on the other hand in part also *Lithophyllum grumosum*.

It is as yet uncertain whether f. *crassiuscula* is to be considered a form of the above species, or a separate species. I have seen but a solitary well developed specimen, and at any rate being closely related to *L. rugosum* I provisionally adopt it a form of the latter. It forms an about 2 mm. thick crust which is knotty and rugged, or in a somewhat advanced stage developing numerous more or less densely crowded excrescences or short and often rugged branches 2—4 mm. long and of about the same thickness, occasionally confluent. New crusts are formed upon the primary, or scaly thickenings here and there are formed.

In structure it shows an almost coaxilate development, with elongated but rather narrow hypothallic cells up to about 25 μ long. The cells of the perithallic layer are rather varying both in shape and size. They are partly square or rounded, 5—9 μ in diameter partly vertically elongated and up to $1^1/_2$ or occasionally

2 times longer than broad, or 7—15 μ long and 6—10 μ broad, frequently with much thinner walls than in the typical form and often a rather distinct stratification.

The conceptacles of sporangia are somewhat crowded in the excrescences or branches, convex but very little prominent, not sharply defined but frequently at length flattened in the central parts, 350—400 μ in diameter seen from above. The roof is intersected with about 30 muciferous canals. The sporangia are four-parted, 140—180 μ long and 60—80 μ broad, most frequently with enduring interwalls.

This form rather approaches in habit coarse specimens of *L. Sonderi*, a species also met with in the same place as the present form, but differs as regards the conceptales as well as in structure.

The form *genuina* is known from Fuegia; f. *valida* from San Diego, California (H. Hemphill — Herb. Farlow, no. X); f. *crassiuscula* from White's Point, San Pedro, California, on pebles moving freely with the wave motion (Setchell, no. 1149), and in tide pools San Pedro (Setchell, no. 1496 A).

L. mesomorphum Fosl. mscr.

Thallus leaf-like or lamellate, partly attached, horizontally extended, at length irregularly lobed and prolificating; profilications semicircular or irregular, loosely spreading over each other, 300—500 μ thick. Conceptacles of sporangia convex, subprominent, not sharply defined, 350—600 μ in diameter.

This species closely approaches *L. lichenoides* f. *heterophylla* in appearance, with frequently irregular and rather large prolifications or lamels, the latter however more horizontal than generally to be seen in the said form, partly with the edges bent a little upwards partly downwards. The longest diameter of the specimens that I have seen is 5—6 cm.

On a section the central or lower cell-rows are rather regular, the cells $1^1/_2$—3 times longer than broad, or 12—20 μ long and 5—8 μ broad with rather thick walls, sending forth upwards a vigorous perithallic layer the cells of which are square or more

frequently rounded, 4—7 μ in diameter, apparently seldom also sending a very feeble layer downwards.

The conceptacles of sporangia are more or less crowded in any part except the peripherical portions, convex, subprominent, not or but now and then sharply defined, often rather indistinct, 350—600 μ in diameter seen from above. On a median vertical section they are shown to be up to 750 μ in diameter. The roof is intersected with a number of scattered muciferous canals. The sporangia are four-parted, 100—140 μ long by 60 μ, with enduring interwalls.

The present species separates itself from *L. lichenoides* especially with reference to the conceptacles of sporangia and in structure.

It is only known from Bermuda, herb. W. G. Farlow, no. XI.

L. syntrophicum Fosl. mscr.

Thallus crustlike or lamellate, rather closely surrounding other calcareous Algæ or divers other objects, new lamels repeatedly formed over each other, irregularly and loosely clinging to the subjacent, 200—800 μ thick, forming at length small and irregular, knotty nodules. Conceptacles of sporangia convex, subprominent, 400—600 μ in diameter.

The species surrounds fragments of other calcareous Algæ, tubes of divers animals and other objects. The specimens seen are but 2—3 cm. in diameter and not quite entire, but appear to have been lying loose at the bottom.

On the one side it rather resembles *L. Philippii* in appearance and on the other hand closely allied to *L mesomorphum*. In fact it appears to stand in the same relation to the latter as *L. Philippii* to *L. lichenoides*, although the specimens at hand more approach *L. mesomorphum* than the mutual connection ever is to be seen between *L. Philippii* and *L. lichenoides*. However, in habit it only approaches such specimens of *L. mesomorphum* which are burdened with other Algæ or extraneous objects giving rise to a more irregular development than in typical specimens. Therefore, I consider it a separate species somewhat differing in structure too.

The hypothallic layer is composed of cells which are more or

less thin-walled, 12—25 μ long and 6—9 μ broad. The cells of the rather vigorously developed perithallic layer are square or rounded, 4—7 μ in diameter, or sometimes a little vertically elongated.

The conceptacles of sporangia much resemble those in *L. mesomorphum*, 400—600 μ in diameter, not sharply defined but sometimes slightly flattened in the central parts. They frequently grow down into the frond. The sporangia are four-parted, about 120 μ long by 60 μ, generally with enduring interwalls.

The present species has been gathered on the coast of Bermuda, herb. W. G. Farlow, no. XIII.

L. fumigatum Fosl. mscr.

Thallus crustlike, of indefinate shape and extent, up to about 4 mm. thick, with crowded, small wartlike excrescences. Conceptacles of sporangia 250—300 μ in diameter, slightly prominent and frequently depressed in the central parts. Sporangia two-parted, 80—100 μ long by 30—50 μ.

The species sticks to shells. In the thickest part the crust is about 4 mm. thick, decreasing towards the rather thin peripherical portion. The surface is uneven, provided nearly everywhere with rather densely crowded, small, wartlike or irregular excrescences which frequently are 1—2 mm. in diameter.

With reference to structure the feebly developed hypothallus is composed of up to 22 μ long and thinwalled cells, frequently however shorter, and about 6 μ thick. It sends forth perithallic but rather irregular rows the cells of which are square or rounded, 4—7 μ in diameter, or a little vertically elongated, occasionally up to $1^1/_2$ times longer than broad, or up to about 12 μ long.

The conceptacles of sporangia are scattered or somewhat crowded almost in any part of the crust, partly scarcely raised above the surface of the frond, partly and more frequently a little prominent and disc-shaped, at length nearly always a little depressed in the central parts. The roof is traversed by about 20 muciferous canals. In the examined conceptacles I only met with two-parted sporangia (and a solitary three-parted), partly with enduring inter-

walls partly not. The conceptacles at length grow down into the frond in great numbers.

This species rather reminds one partly of *Goniolithon elatocarpum* partly *Lithothamnion Sonderi* in habit. Otherwise it seems to stand nearest to *L. funafutiense.* As regards the conceptacles it shows some relation partly to *L. obtectulum* partly *L. Engelhartii.* Young specimens much approach certain forms of *L. Lenormandi* both in habit and structure.

Only known from the southern coast of Australia, gathered in Half-moon Bay, Port Phillip Bay, Victoria by Mr. J. Gabriel.

L. Lenormandi (Aresch.) Fosl.

Norw. Lith. p. 150; Melobesia Lenormandi Aresch. in J. Ag. Spec. Alg. 2 p. 514.

f. *australis* Fosl. mscr.

The crust as in f. *sublævis,* but frequently thicker, the conceptacles of sporangia less prominent, and the hypothallic cells a little larger.

A number of crustlike calcareous Algæ which I got from the southern coast of Australia shows that the above species is more widely dispersed than hitherto known, but on the other hand even more varying than hitherto considered, partly approaching one partly another crustlike species, in southern waters especially *L. tenuissimum, L. siamense* and *L. fumigatum.* Although each of them in their typical development is easily recognisable and in fact much differing, partly one partly the other assumes forms which approach each other. This is especially due in localities where the said species grow gregarious. Here two or three species often grow together on the same substratum and anastomose with each other, or the one species more or less covers the other, and in connection with disturbing influence of animals attached to the same substratum, or to the Algæ, or penetrating the latter, the limits between the species may be extremely difficult to draw.

With reference to the hitherto established forms of *L. Lenormandi* there is a considerable difference between typical specimens of f. *sublævis* and f. *squamulosa,* the latter when first met with

in a steril stage considered to be a separate species. In f. *sublævis* the crust is thin and smooth or almost so, firmly adhering to the substratum, the peripherical portion concentric zonate, with more or less entire margin and a whitish brim. More crusts founded on the same substratum at length become fully confluent, now and then especially towards the margin sometimes showing small elevated edges where two crusts trumble. The conceptacles of sporangia are frequently less prominent than in the typical form, more flattened and often larger, in this respect on the one side approaching *L. Sonderi* and on the other hand *L. læve.* In f. *squamulosa* the scaly and more or less irregular thallus-leaflets are rather loosely formed over each other, at length forming an irregular crust-complex up to about 7 mm. thick and almost loosening itself from the substratum. The conceptacles of sporangia in this form resemble those in f. *typica,* in which they are frequently hemispheric, or when the roof being on the point of dissolving somewhat flattened or depressed in the central parts. The latter and well-known form shows transitions partly to f. *sublævis* partly to f. *squamulosa* which such in fact are nearly connected, but on the other hand must be considered as tolerably well marked forms.

The form *australis* shows variation in another extreme direction than the curious f. *squamulosa,* or to be considered as a further developed f. *sublævis,* with frequently thicker crust than the latter, and the conceptacles even less prominent. The hypothallic, more or less horizontal cell-rows are less in number than in the said form, the cells a little larger and frequently with thicker walls, sending forth a rather vigorous perithallic layer the cells of which resemble those in the typical form, however not so frequently a little vertically elongated, seldom up to $1^1/_2$ times longer than broad, and occasionally with the longest diameter in horizontal direction as in f. *typica.*

The form *australis* has been found in Half-moon Bay, Port Phillip Bay, Victoria, and a solitary specimen agreeing with f. *sublævis* has been gathered at Port Phillip Inlet, east of Port Phillip Bay, both by Mr. J. Gabriel.

Lithophyllum Phil. emend.

Subgen. Eulitophyllum Fosl.

L. craspedium Fosl.

New or crit. calc. Alg. p. 26; Calc. Alg. Funaf. p. 7.

f. *subtilis* Fosl. mscr.

Thallus as in f. *abbreviata*, but more delicate. Branches short, crowded, terete or subcompressed, 2—3.5 mm. thick.

This form in the main accords with f. *abbreviata*, but the branches are only of about half the thickness of those in the latter and several times thinner than in f. *compressa*. They are 2—3.5 mm. thick and in part rather compressed. I have seen but a solitary specimen, and transitions probably occur. It is no doubt a form of the above species, coinciding with this in structure as well as the reproductive organs, but ought on the other hand to be considered a denominated form.

According to the label f. *subtilis* appears in lagoon platform and shoals on Malepe Re, Funafuti. Herb. British Museum.

L. subreduncum Fosl. mscr.

Thallus forming small balls or irregular masses apparently freely developed at the bottom, irregularly branched, branches short, about 3 mm. thick, terete or subcompressed, verrucate and knotty, somewhat crowded and anastomosing, upwards often rather hooked, with rounded ends, or occasionally almost truncate and depressed in the centre. Conceptacles of sporangia forming very small convex prominences or depressed point-like deepenings on the surface of the branches, on a median-vertical section 300—375 μ in diameter.

This species stands near to *Lithophyllum fasciculatum* and almost fully coincides in habit with certain forms of the latter, especially f. *divaricata*, about 3—5 cm. in diameter, and appears like this to develop itself freely at the bottom. The branches are however shorter and even more irregular than frequently in the said species. Besides, it is plainly distinct in structure. The pith-layer is on a median-longitudinal section composed of alternating long and short cells, though not quite regular, the former 22—36

μ long and 9—14 μ broad, the latter 11—18 μ long, and always thin-walled. The perithallic layer is vigorous, with square or up to $1^1/_2$ times longer than broad cells, or 8—18 μ long and 8—11 μ broad.

The species is only known from the Sandwich Islands. Herb. W. G. Forlow, no. XXXI in part.

L. dentatum (Kütz.) Fosl.

List of Lith. p. 10.

f. *sandvicensis* Fosl. mscr.

Thallus resembling f. *aemulans* except the lower branches occasionally being almost terete, the upper and frequently flabellate ones a little thicker, and the central cells shorter than in the said form.

The solitary and fragmentary specimen that I have seen of this form almost coincides in habit with specimens of f. *aemulans* collected by me on the west coast of Ireland. However, it differs from typical f. *aemulans* the lower branches occasionally being almost terete, and the upper which are compressed, more or less broad and flabellate are a little thicker than frequently in the said form.

With reference to structure the central cells are on a longitudinal section frequently shorter than in *L. dentatum*, and more gradually passing into the perithallic layer.

L. dentatum is a species very much varying even in structure and, therefore, I am most inclined to consider f. *sandvicensis* only as an extreme form of the species. I possess a specimen from the coast of California which in habit almost fully accords with typical *L. dentatum* f. *aemulans* and in structure stands between that of the latter and f. *sandvicensis*.

The present from has been gathered on the Sandwich Islands by Mr. J. M. Barnard in 1858, herb. W. G. Farlow, no. XXX.

Subgen. Lepidomorphum Fosl.

L. torquescens Fosl. mscr.

Thallus forming subhemispheric or irregular masses of repeatedly subdichotomous or irregularly divided branches with very

short axes, tangled, curved or suberect, rather crowded and anastomosing, subfastigiate, terete or subcompressed, in the lower part 2—3 mm., upwards attenuating, 1.5—2 mm. thick. Conceptacles of cystocarps convex, subprominent, 250—300 μ in diameter.

I have seen but two specimens of this species. The one is 5—6 cm. in diameter and 3 cm. thick, the other about 10 cm. long, 3—4 cm. broad and 3 cm. thick, the latter apparently being two specimens which have anastomosed.

On a longitudinal median section of the upper part of a branch the pith layer is composed of regularly alternating long and short cells. The former are 34—46 μ long and 6—8 μ broad, the latter 15—25 μ long, and thinwalled. The cells of the rather vigorous perithallic layer are square or frequently elongated, up to twice as long as broad, or 7—15 μ long.

The conceptacles of cystocarps are somewhat crowded in the upper part of the branches, convex, subprominent, with a single orifice, 250—300 μ in diameter seen from above. On a section they sometimes appear almost half-moon shaped. Conceptacles of sporangia are unknown.

The present species seems to stand nearest to *L. byssoides*, but is a little coarser and the branches frequently more curved. In structure it differs much from the latter and rather approaches *Lithoph. moluccense*.

The place of growth of this easily recognisable species unfortunately is not known with certainty, however either being Mauritius or the West Indies. A specimen is labelled „Mauritius? Coll. Agassiz", herb. Farlow, no. XXXIV, and another one „locality unknown, coll. Agassiz", herb. Farlow, no. XXXV, but the latter most probably has been gathered in the same place as the former.

L. Farlowii Fosl. mscr.

Thallus forming up to about 1 mm. thick crusts on stones, with numerons irregular, about 1 mm. thik but often anastomosing tubercles or short branches. Conceptacles of sporangia subprominent, subhemispheric, with an apical pore. Sporangia four-parted, 90—100 μ long by 50—60 μ.

In New or crit. calc. Alg. p. 26 I referred a fragmentary specimen in Thurets (Bornet's) herbarium from California to *L. Yendoi,* and shortly after I considered two young specimens also from the Californian coast, collected by Dr. De Alton Saunders, as belonging to the same species. In the said collection of calcareons Algae that Prof. W. G. Farlow kindly sent me I met with older specimens of the same form. It is closely allied to *L. Yendoi,* and young specimens are next to impossible to separate from the latter. The diflerences are however shown to be considerable enough to keep it distinct and, therefore, I allow myself to propose the above name.

As lately seen in specimens from the Gulf of Siam, *L. Yendvi* in fact shows no tendency to develop excrescences. Very small ones sometimes are formed, or the crust becomes somewhat uneven in an old stage, partly however by growing over small extraneous objects partly trumbling crusts forming small and irregular ridges.

In *L. Farlowii* on the other hand the crust develops small tubercles even in a young stage, and older they become more and more numerons, at length densely crowded but rather irregular, and often anastomosing, attaining a height of about 2 mm. In an old stage the said tubercles or short branches occasionally are provided with fungously thickened ends, or irregular new formations are formed, in part however caused by covering up extraneous objects. The species then differs much from *L. Yendoi* [1]) in habit and approaches *L. Marlothii,* the latter however being coarser and differing in structure.

Also with reference to structure the present species is very nearly related to *L. Yendoi.* The perithallic cells are partly square or rounded, 5—7 or up to 9 μ in diameter, partly vertically or horizontally elongated, 5—10 μ, or occasionally up to 12 μ long by 4—6 μ. The corresponding cells in *L. Yendoi* are sometimes a little larger than the average of size quoted l. c., but in *L. Far-*

[1]) It is on the other hand a question wehther *L. Yendoi* and *L. decipiens* must not be considered as forms of one and the same species. Some specimens from the West Indies seem to point in this direction.

lowii they are on the whole a little larger than in the former, and more often vertically elongated.

The conceptacles of sporangia are subprominent, subhemispheric, with a central pore, about 220 μ in diameter seen from above, and the roof at length somewhat decorticated. The sporangia are four-parted 90—100 μ long and 50—60 μ broad.

The species is known from California, Monterey, Farlow in herb. Bornet, and herb. Farlow no. I; Pacific Grove, Dr. De Alton Saunders, no. 436 a. Besides a young specimen most probably belonging to the same species has been collected on Baranoff Island, Dr. De Alton Saunders, no. 438.

Goniolithon Fosl.

Subgen. Cladolithon Fosl.

Thallus branchy. Conceptacles of sporangia almost superficial with rather short tip, not growing down into the frond.

Tppe: *G. frutescens* Fosl.

G.? strictum Fosl. mscr.

Thallus forming large masses repeatedly subdichotomously branched, branches in the lower part of the frond somewhat spreading and curved, terete or occasionally slightly compressed, up 2 mm. thick, rather anastomosing, here and there with side-branches isssuing at right angles, upwards densely crowded, erect, fastigiate and straight or sometimes a little curved, terete and feebly tapering, 1—1,5 mm. thick, with rounded ends.

The solitary and somewhat fragmentary specimen that I have seen appears to have been attached, and is about 14 cm. 10 cm. broad and 6 cm. thick. It is of a loose consistency and very brittle.

A mediam longitudinal section of a branch shows a pith layer composed of rather regular radiating cell-rows the cells of which are frequently 2—3 times longer than broad, 35—55 μ long and 15—25 μ broad, with thin walls. The perithallic layer is composed of less regular cells wich are partly square or somewhat roun-

ded, partly vertically elongated, 12—25 μ long and 12—20 μ broad. Besides are here to be found more or less numerous large cells which are considered to be heterocysts.

Although the specimen is steril I do not hesitate to adopt it as a new species, but I am not certain whether it in fact is referrible to *Goniolithon* or *Lithophyllum (Lepidomorphum)*. However, I am most inclined to refer it to the former genus, as heterocysts are present. Such are commonly to be found in the said genus, but hitherto at least never met with in *Lithophyllum*, nor in *Lithothamnion*. The species stands nearest to *G. frutescens*, which it approaches especially in structure.

The present species is with certainty only known from Florida, A. Agassiz in herb. Farlow, no. XX.

Some fragments of a steril specimen gathered in Bahamas, herb. Farlow, no. XXIV, seem however to belong to the same species. The branches are more diverging and on the whole more irregular than in any part of the type, though nearly allied to those in the lower part of the latter and, therefore, probably being fragments of a younger specimen of the species in question.

G.? intermedium Fosl. mscr.

Thallus forming almost obpyramidal masses of rather erect, crowded, subdichotomously divided branches with short axes not curved or slightly so, rather anastomosing, with small and wart-like or longer and branch-like side branches, the latter sometimes issuing at nearly right angles. Branches $1^1/_2$—2 mm. thick, terete or subcompressed, slightly attenuating upwards or not, with obtuse or almost truncate ends occasionally depressed in the centre.

The only specimen hitherto seen is 6 cm. high by a diameter in the thickest part of 3—4 cm.

On a median longitudinal section of the upper part of a branch the cells of the pith layer are $1^1/_2$—3 times longer than broad, or 25—38 μ long and 10—18 μ broad, with rather thin walls. In the very feebly developed perithallic layer occur scattered heterocysts.

The said specimen is steril, but notwithstanding this I venture to consider it specifically distinct from *G. strictum*, to which it

appears to be closely allied, or standing between this and *G. spectabile*. It is separated from the former especially by its shorter axes and smaller cells. It differs much in habit from the latter and distinguishes itself especially by its erect and more or less straight branches and frequently narrower cells with thinner walls.

The species is only known from Bermuda, M. Wadsworth in herb. Farlow, no. XXI.

G.? spectabile Fosl. mscr.

f. *typica*.

Thallus forming subhemispheric masses irregularly subdichotomously branched with frequently short axes, branches somewhat curved, crowded, terete or subterete, 1.5—2.5 mm. thick, subfastigiate.

f.? *brevifulta* Fosl. mscr.

Thallus forming small nodules or irregular masses branched as in f. *typica*, branches however less crowded, sometimes rather diverging, and knotty.

In Riksmuseum in Stockholm is to be found a large but steril specimen of a calcareous Alga from Bermuda which has been collected some years ago by Mr. C. V. Forsstrand. At first I considered it identic with *Lithophyllum byssoides*. It rather approaches certain forms of this species in appearance, but is on the whole coarser than any form of the latter, and the structure is different. Besides it probably belongs to the genus *Goniolithon*. On the other hand it approaches certain forms of *Lithothamnion Ungeri* in habit, but otherwise being quite different from the latter. Although steril I venture, however, to consider it an undescribed species.

The said specimen, the above f. *typica*, is subhemispheric, about 32 cm. long, 24 cm. broad in the broadest part, and about 12 cm. thick. It seems at first to have been attached, showing however a tendency little by little to loosen itself from the substratum. It is repeatedly but irregularly subdichotomously branched, with frequently short axes. The branches are somewhat curved, much anastomosing especially in the lower part of the frond, crowded, upwards however more free and here and there some-

what diverging, terete or subterete, 1.5—2.5 mm. thick, occasionally knotty, and slightly attenuating with rounded ends.

Another and smaller specimen about 12 cm. in diameter and 5 cm. thick was also collected in the same place. It is rather rubbed in the part turning upwards.

In structure the species stands near *G. strictum.* On a median vertical section the cells of the pith layer are frequently $1^1/_2$—$2^1/_2$ times longer than broad, or 25—40 μ long and 12—20 μ broad, most often with rather thick walls. In the rather vigorously developed perithallic layer the cells are square or more or less vertically elongated, however rather irregular in size, frequently 12—25 μ long and 12—18 μ broad, and here are to be found rather numerous large cells considered to be heterocysts.

A small specimen 4—5 cm. in diameter also from Bermuda (herb. Farlow, no. XIX) seems to belong to the same species. It is more irregular and the branches are more diverging than frequently in the typical form of the species, upwards now and then compressed and somewhat approaching a specimen from the same place delineated by Nelson and Duncan, Hist. Corall. pl. 27, fig. 10.[1]) It almost fully accords in structure with the present species, and is probably to be regarded as a form of it, but also this unfortunately being steril.

Still another, small and fragmentary, somewhat stunted specimen from Bermuda (herb. Farlow, no. XVII) is nearly connected in habit with the typical form, but in structure it somewhat approaches *G. strictum,* with a little longer cells with thinner walls than frequently in the present species.

A specimen from Florida, collected by A. Agassiz (herb. Farlow, no. XXIII) stands very near the present species, but I am not sure whether it is really to be considered a denominated form or perhaps a separate species. It has almost the shape of a low bush about 5 cm. high and 5—6 cm. in diameter, with less crowded or somewhat spreading branches, here and there with

[1]) Nelson and Duncan, On some Points in the Histology of certain Specie of Corallinaceae. Trans. Linn. Soc. Ser. 2. Bot. Vol. 1, p. 197. London 1876

rather numerous short side-branches. The branches are in the lower part occasionally a little thicker than in *G. spectabile,* up to about 3 mm., and sometimes a little more attenuating upwards. In structure it almost fully coincides with the latter, however here and there with a little longer cells and thinner walls. The specimen appears at any rate to be closely allied to the species in question. It bears a solitary conical conceptacle about 800 μ in diameter at the base.

A steril specimen from Mauritius, herb. Prof. Jadin, no. 549, also represents a form closely related to *G. spectabile,* the above f. *brevifulta,* but also this being steril I do not know whether it perhaps is a separate species. It surrounds a piece of a branch of a Coral, forming a somewhat irregular nodule about 7 by 4 cm. It is branched in the same manner as f. *typica,* the branches of about the same thickness, but less crowded, in part rather diverging, rather curved and knotty.

The latter form in the main coincides in structure with f. *typica,* only the cells of the pith layer frequently being slightly shorter and the perithallic layer not so vigorously developed, sometimes with a thin layer of subhyaline cells.

Two other and small specimens labelled Mauritius? — herb. Farlow, no. XXXII—XXXIII, on the one side stand near to the above mentioned small specimen from Bermuda, herb. Farlow, no. XIX, and on the other hand closely related to f. *brevifulta* are probably to be referred to the latter.

The typical form of the species in question is with certainty only known from Bermuda, and f. *brevifulta* only known from Mauritius.

Subgen. Herpolithon Fosl. mscr.

Thallus crustlike. Conceptacles of sporangia subimmersed with elongated tip or constricted above the middle, the latter part frequently at length falling away. Conceptacles growing down into the frond.

Type: *G. Notarisii* (Duf.) Fosl.

G. elatocarpum Fosl.

New or crit. calc. Alg. p. 23.

f. *australasica* Fosl. mscr.

Thallus more smooth than in the typical form, and the cells smaller.

This form assumes suborbicular crusts on a plain substratum, or almost surrounds small stones. It is up to about 2 mm. thick, here and there with very small excrescences. Also in structure it is closely related to the typical form, but the cells are frequently a little smaller than in the latter. The conceptacles look small and not well marked after the upper part has fallen away.

The present form partly approaches certain forms of *G. Notarisii* partly rather resembles *Lithothamnion funafutiense* f. *purpurascens* in habit. On the other hand, *G. Notarisii* sometimes may be difficult to separate from specimens of *Lithothamnion Philippii* not furnished with conceptacles of sporangia, and even in structure the limits are not always easy to draw. The conceptacles of sporangia in the genus *Goniolithon* in certain stages rather approach in shape those of cystocarps in *Lithothamnion*, and, therefore, such specimens of the said species may also be confounded without closer examination.

The typical form of the present species is only known from the south coast of Africa; f. *australasica* has been picked up from a depth of 3—5 fathoms in Western port, Victoria, and kindly communicated to me by Mr. J. Gabriel.

G. Börgesenii Fosl. mscr.

Thallus forming irregular, 2—5 mm. thick crusts on Corals, with wartlike or irregular excresences frequently 3—5 mm. in diameter. Conceptacles (of sporangia?) subhemispheric with a central pore, 300—400 μ in diameter.

The crust develops more or less numerous, smaller or larger, wartlike or irregular excresences which sometimes are crowded and anastomosing. However, these excrescences not seldom are due partly to the uneveness of the substratum partly to their co-

vering up extraneous objects. Besides, in most of the specimens seen a great number of Bryozoa and other animals contribute to the irregularity in the development of the plant, and in part also appear to contribute to divergences in structure. In this respect it rather reminds one of *Lithothamnion funafutiense,* the league between plant and animal almost amounting to symbiosis.

With reference to structure the species is more irregular than any other one known to me. In a couple of sections examined I have not seen any real hypothallic layer, but it may be remarked that the crusts often almost alternate with Bryozoa or other animals, and the lower parts of a crust sometimes at least are almost mouldered. The basal cells seem to be elongated and vertically oblique. Otherwise the layers of tissue are very irregular. The cells are frequently rounded, seldom a little vertically elongated, partly small, 5—10 μ in diameter, partly and more frequently larger, 10—18 μ, or sometimes 25, occasionally up to 30 μ in diameter. Here and there on a section are to be seen short or longer, horizontal or feebly curved but indistinct rows of minute cells at intervals of 3—6 layers of large cells. In the cortical layer are some scattered and large ones which appear to be heterocysts.

The conceptacles are subhemispheric or subhemispheric-conical, 300—400 μ in diameter seen from above, and perhaps being those of sporangia with the upper part fallen away, if not in fact stunted organs of one or other kind without developed spores. I have examined a rather great number of these conceptacles, but I have not succeeded in finding any trace of spores, partly being empty partly filled with carbonate of lime in compact masses, or animals, or sometimes even hard and reddish masses apparently of some animal origin. On a section the conceptaeles most nearly agree with those in *Goniolithon.*

However, I am not sure whether the species in fact is a *Goniolithon* or perhaps *Lithophyllum (Lepidomorphum).* Here I refer it to the former because it in several respects stands nearest to *G. Notarisii,* although rather differing in habit, in which respect

it approaches *Lithoph. verrucosum,* the latter hitherto only known from Australia. *G. Notarisii* is an extremely varying species, and the limits of it appear to be difficult to draw judging from the material at my disposal. I venture however to adopt the present plant as a new species especially on account of the structure which certainly rather approaches forms of *G. Notarisii,* but on the other hand it cannot be referred to this.

The species has been collected at St. Croix, West India, by Mr. F. Börgesen. Here it grows together with a somewhat stunted form of *G. mamillare.* A. yong specimen on a Coral from Barbados (Prof. G. Lagerheim) seems to belong to the same species.

G. Udoteae Fosl. mscr.

Thallus crustlike, of indefinite shape and extent, 150—200 μ thick, with almost smooth surface. Conceptacles (of sporangia?) conical, 800 μ in diameter at the base.

The species forms light rosy, suborbicular, at length confluent crusts of indefinite shape and extent on *Udotea,* 150—200 μ thick. New crusts are occasionally formed upon the primary, or when trumbling the one crust sometimes stretches itself over the other but loosely clinging to the subjacent. The surface is smooth or slightly rugged, in the latter case mainly caused by covering up small extraneous objects.

A section of the crust shows a proportionally vigorous hypothallic layer occupying almost the lower half of the crust. It is composed of rather irregular cells which are frequently elongated and up to twice as long as broad, or 15—30 μ long and up to 15 μ broad. The lower rows are almost horizontally stretched over the substratum. The perithallic cells are rounded, 7—15 μ in diameter, sometimes however square or a little vertically elongated. Heterocysts are rather numeraus and large, about 36 μ long.

I have seen but a couple of not well developed conceptacles on specimens taken in January—March, and I am not sure whether they are those of sporangia or perhaps cystocarps. They are

conical, about 800 μ in diameter at the base and of about the same height

This species stands near to *G. Notarisii*, but is distinguished both in habit and structure.

It is hitherto only known from West India, on *Udotea flabellata* at St. Croix, Little Princess, collected by Mr. F. Börgesen.

Melobesia Lamour. emend.

Subgen. Eumelobesia Fosl.

M. bermudensis Fosl. mscr.

Thallus forming delicate patches of indefinite shape and extent on stones, about 30 μ thick, superposing at length up to 150 μ thick. Conceptacles of sporangia superficial, hemispheric-conical, 150—180 μ in diameter. Sporangia four-parted, 55 μ long by 30 μ.

The species forms small or larger, more or less irregular patches on a kind of loose limestone, at length confluent or nearly so, of indefinite shape and extent, with entire or crenulate margin. The crust is not quite smooth which however apparently depends on the uneveness of the substratum. It is dull, and the colour is in a dried state a greyish-white, only a little differing from that of the substratum, however here and there with a feeble rosy shade.

On a vertical section of the crust the basal cells are shown to be square or most frequently vertically elongated, 10—18 μ high by 10—12 μ, with rather thick walls and very small cortical cells. A solitary layer of a crust frequently has a thickness of about 30 μ, but very often the one crust stretches itself over the other, and up to 5 or 6 superposing crusts are sometimes to be found by a thickness of up to about 150 μ, each of them partly loosely partly closely clinging to the subjacent.

The conceptacles of sporangia frequently are densely crowded especially in somewhat extended crust-complexes, superficial and hemispheric-conical, 150—180 μ in diameter at the base. The sporangia are four-parted, about 55 μ long by 30 μ.

The species stands on the one side near to *Melobesia caspia*

Fosl. and on the other *M. confervicola* (Kütz.) Fosl. It much resembles the former in habit, but differs especially as regards the conceptacles as well as in structure, and so also in part as regards the latter but hitherto not well known species.

The present species is only known from Bermuda. Herb. W. G. Farlow, no. XXVII.

M. Cymodoceae Fosl. mscr.

Thallus at first forming almost orbicular, afterwards confluent patches of irregular shape and extent on the leaves of *Cymodocea*, composed of a solitary layer of cells except in the neighbourhood of the conceptacles. Conceptacles of sporangja partly solitary, subhemispheric or subhemispheric-conical 200—280 μ in diameter, partly confluent in short streaks or small whorls. Sporangia four-parted, 110 μ long by 55 μ.

In a young stage the species forms scaly, almost orbicular or sometimes reniform patches which in a more advanced stage often are crenate or irregularly lobed, afterwards more or less confluent and of indefinite extent, frequently however with rather visible limits between each crust. The one crust sometimes stretches itself over the other, or cuniform between each other, and at length almost covering the leaves of the host. The colour is in a dried state greyish with a rosy shade, or light rosy.

On a vertical section the basal cells are up to about $1^1/_2$ times higher than broad, or 10—12 by about 7 μ, with rather thick walls. Seen from above the cells are in the monostromatic part 12—18 μ long and 8—12 μ broad, with small cortical cells.

The conceptacles of sporangia are much varying in external appearance, occupying the greatest part of the crust, partly solitary but frequently crowded, subhemispheric or subhemispheric-conical, 200—280 μ in diameter, partly and more frequently confluent, forming short streaks on the surface of the frond, or very often small whorls composed of 4—6 confluent conceptacles looking like a large and solitary one with depressed centre, or now and then small flattened wartlike prominences reminding one of a rather

large sorus with almost whorled orifices. The sporangia are four-parted with a very short foot, about 110 μ long by 55 μ.

The species grows on the leaves of *Cymodocea antarctica* and is hitherto only known from the southern coast of Australia, gathered in Port Phillip, Victoria, by Dr. F. v. Müller according to specimens in herb. Prof. N. Wille. Specimens long ago received from the late Prof. Areschoug labelled Victoria are probably from the same locality as the above.

Printed 18 II 1901.