REVISED SYSTEMATICAL SURVEY

OF

THE MELOBESIEAE

BY

M. FOSLIE

DET KGL. NORSKE VIDENSKABERS SELSKABS SKRIFTER. 1900. NO. 5

AKTIETRYKKERIET I TRONDHJEM
1900

In Norw. Lith.[1]) I subsumed the genus *Lithophyllum* as a subgenus of *Lithothamnion* on the ground of the characters on which the limitation of these genera used to be founded, namely the development of the vegetative organs. At the time I did not posses any specimen of the proper type of the genus, *L. lichenoides,* but I took my stand on it pursuant to another and rather cognate representative, *L. Lenormandi.* I found it even to be matter of doubt whether *Lithophyllum* (as it was) only on the above mentioned foundation was to be considered a subgenus. At the same time I looked, however, upon *Melobesia* (as it was) as a genus the limits of which were rather well marked. But some time after the publication of Norw. Lith. I perceived certain peculiarities concerning the reproductive organs of some species, after which I was clear that the systematism of these calcareaus Algae in most essential respects was to be based only upon the reproductive organs, as suggested by Solms Laubach and other authors. This also in a large measure applies to the limitation of species which already has been indicated in Norw. Lith. On several motives I did not publish anything about this before the undermentioned Syst. Surv.

In 1891 when writing about fossil calcareous Algae, Dr. Rothpletz[2]) proposed three groups of Lithothamnia, namely *Archæolithothamnion, Lithothamnion* and *Lithothamniscum,* the former

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[1]) M. Foslie. The Norwegian Forms of Lithothamnion. — Det kgl. norske Videnskabers Selskabs Skrifter 1894. Trondhjem 1895.

[2]) Rothpletz, Fossile Kalkalgen. — Zeitschr. der Deutschen Geol. Ges. Bd. 43. 1891. Pag. 295.

based upon a hitherto unknown form of sporangia[1]) and the latter in the main corresponding to *Lithophyllum (Eulithophyllum)* as limited by me in Syst. Surv. and in another sense than formerly. The then genus *Lithophyllum* was, however, not hinted at in the system of Rothpletz. This work be it said, was not known to me till shortly before the publication of the said Syst. Surv.

In 1897 Mr. Heydrich[2]) set up a system chiefly based upon the development of the vegetative organs. — „Die bisherige Eintheilung wäre eine völlig genügende, wenn man danach die einzelnen Genera erkennen könnte; da dies nicht der Fall, möchte ich mir den Vorschlag erlauben, einfach mathematisch vorzugehen. Dies geschieht durch das auseinanderhalten der Zellschichten und Zellagen, sowie die Eingangs erwähnten Rhizoiden mit ihrer Anheftung". This system in as far considerably differs from the earlier ones founded upon the development of thallus, as both *L. Lenormandi* Aresch. and *L. cristatum* Menegh. are subsumed under *Lithothamnion,* while on the other hand *L. lichenoides* (Ell. et Sol.), *L. capense* (Harv.) and *L. Philippii* Fosl. *(L. decussatum* Solms nec Phil.) are considered to be *Lithophyllum, Melobesia Corallinae* also being subsumed under this genus.

In some notes[3]) on this system I again asserted that the systematical classification of the hereto pertaining genera could not be based upon the development of the vegetative organs, and remarked l. c. „Die Begrenzung der genannten genera *(Lithothamnion, Lithophyllum)* scheint daher meiner Ansicht nach keinen Schritt weitergeführt zu sein. — — Anhaltspunkte werden freilich in anderen Richtungen zu suchen sein".

After three months Mr. Heydrich[4]) set up a new system and

[1]) It seems that no accurate line can be drawn between these sporangia and the same of *Lithothamnion,* as they sometimes approach each other considerably, the partition perhaps excepted. Cp. Fosl. New or crit. calc. Alg. Trondhjem 1899. Pag. 5. Also in other species I have seen formations approaching the former.

[2]) F. Heydrich, Corallinaceae, insbesondere Melobesieae. Ber. der Deutsch. Bot. Ges. 1897. Pag. 34.

[3]) M. Foslie, Einige Bemerkungen über Melobesieae. Ber. der Deutsch. Bot. Ges. 1897. Pag. 252.

[4]) F. Heydrich, Melobesiae. Ber. der Deutsch. Bot. Ges. 1897. Pag. 403.

quotes l. c. p. 407: „Hierdurch kam ich zu dem Entschluss, dass ein sicheres Mittel zur Systematik nur in den Tetrasporangien liege. — — Freilich wollte ich die von mir vorgeschlagene mathematische Zellordnung beibehalten, dann musste nochmals ein neues Genus geschaffen werden, und zwar konnten nunmehr diejenigen, die ich S. 43 für *Melobesia* hielt, auch nur durch „Conceptakel" resp. „Sorus" getrennt werden. — — Merkwürdiger Weise blieben fast alle von mir früher zu *Lithophyllum* gezählten Melobesiae dabei, nur *Lithophyllum lichenoides* rückt zu *Lithothamnion* über". Cp. however above and the list of species in both papers. Moreover the species of the genera *Phymatolithon* and *Clathromorphum* of my Syst. Surv. are included in *Lithothamnion,* and *Goniolithon* and in part *Melobesia*[1]) as well included in *Lithophyllum.* Thus the said genera *(Lithothamnion* and *Lithophyllum)* were only limited through „Conceptakel" resp. „Sorus" and the vegetative organs, and the limit between these genera and *Melobesia* (resp. *Epilithon)* were still confined only to the thallus.

In my notes[2]) on this I quoted with regard to the sporangia as the foundation of the systematical classification: „Insofern sind wir einig; nur will ich hinzufügen, dass dies nicht nur von den Tetrasporangien gilt, sondern überhaupt von den Reproduktionsorganen".

I state this in order to show my earlier sentiment on the systematism of these Algae, as it has been a subject of misrepresentations on the part of Mr. Heydrich, the fact being that I only have pronounced against a systematism based on the development of the vegetative organs.

Not wishing to wait for a third system again within a short time, to which my notes perhaps might give rise, I published shortly after my last notes a provisional Syst. Surv.[3]), although this sy-

[1]) The consequence of subsuming for instance *Melobesia Corallinae* under *Lithophyllum* (as done by Mr. Heydrich) would be that these two genera must be merged into one. Cp. below and Solms, Corall. Monogr. where all the reproductive organs in this species are described and pictured.

[2]) M. Foslie, Weiteres über Melobesieae. Ber. der Deutschen Bot. Ges. 1897. Pag. 521. — In this paper are unfortunately some deceptive misprints.

[3]) M. Foslie, Systematical Survey of the Lithothamnia. Det kgl. norske Videnskabers Selskabs Skrifter. 1898. No. 2. Trondhjem 1898.

stem as yet was not thorougly worked. Therefore it also in part was based only upon the development of the sporangia, but in distribution of the species in List of Lith.[1]) due consideration was given to the carpospores, as I perceived the divergences in the development of the sporangia partly to correspond with a divergence in the development of the other organs which less frequently occur.

The genus *Lithophyllym* is in the said Syst. Surv. taken in quite another sense than formerly (also otherwise than in Mr. Heydrich's last system) by which little but the name remains. Almost all species formerly subsumed under this genus are to be included under *Lithothamnion*. Also the type of the genus in an earlier sense, *L. lichenoides,* is to be ranked with *Lithothamnion,* as already made before, while on the other hand the earlier type of *Lithothamnion, L. fasciculatum,* must be included under *Lithophyllum.*

In the following revised survey of Melobesieae[2]) as far as the reproductive organs are concerned, only sporangia and carpospores are referred to. The antheridia are as yet only known in the case of comparatively few species. In some genera these organs show a uniform development, in others on the contrary a divergent one, but this divergence seems as above indicated to correspond with a similar divergence in the other organs and will hardly have an influence upon the systematism. In a great number of species, however, only one kind of reproductive organs is known.

I find it unnecessary in this short survey to include thallus in the diagnoses of the genera.

The present survey differs somewhat from my earlier one, but chiefly only with regard to the genus *Goniolithon*, the limit of which has been modified. The subgenus *Lepidomorphum* really is found to be closely related to *Lithophyllum* and therefore subsumed under the latter. Whether *Lepidomorphum* is to be con-

[1]) M. Foslie, List of Species of the Lithothamnia. Det kgl. norske Videnskabers Selskabs Skrifter. 1898. No. 3. Trondhjem 1898.

[2]) With exception of *Mastophora;* but exclusive *Schmitziella* which in my opinion is not referrible to this section of Corallinaceae.

sidered an independent genus cannot be ascertained till future investigations will be set on foot. Under any circumstances it is difficult to draw an accurate line between the latter and *Eulithophyllum*. On the other hand the conceptacles of the said subgenus sometimes approach those of divers species of *Goniolithon* after the upper part of the conceptacles has been dropped in the latter.

In the above quoted List of Lith. published shortly after the said Syst. Surv. I included all species described at the time as separate ones and known to me, among them such as I already at the time considered to be identical with divers species earlier described, or such as ought to be subsumed as forms of other ones. I nevertheless quoted them independent mostly for want of type specimens. But later on several other species have been added, partly new, partly earlier described, but unknown to me at the time. Owing to this the list now is rather different from the former. Besides, several species are here put down in a parenthesis as being partly certain partly almost certain synonymes with the species under which they are subsumed, but in most cases with a subjoined interrogation point, because I as yet have not had the opportunity of making an exact comparison, or failing authentical specimens, or the species concerned only being known in a sterile state. A closer explanation on the subject will be offered later on.

Trondhjem, May 1900.

Gen. **Archæolithothamnion** (Rothpl.) Fosl.

Sporangia cylindric-bean-shaped to roundish ovate (unparted or cruciate?), grouped in zonate or conceptacle-like, subimmersed or superficial, more or less regular sori, each through an elongated tip corresponding with muciferous canals in the cover and isolated by enduring or sometimes at length destructible walls.

Carpospores in superficial, conical conceptacles with a coarse apical pore, arising from every part of the almost plain „conjugation cell".

Sect. I. Endosporæ Fosl.

The sporangia beds at length growing down into the frond.

1. A. cenomanicum (Rothpl.) Fosl.
2. A. turonicum (Rothpl.) Fosl.
3. A. gosaviense (Rothpl.) Fosl.
4. A. nummuliticum (Gümb.) Fosl.[1])
5. A. Aschersoni (Schw.) Fosl.
6. A. erythraeum (Rothpl.) Fosl. (= A. Aschersoni f.? Sporolithon ptychoides Heydr.)
   f. dura (Heydr.) Fosl.
   f. mollis (Heydr.) Fosl.
7. A. Rothpletzi (Trab.) Fosl.
8. A. mediterraneum (Heydr.) Fosl. (= A. Rothpletzi?)
9. A. Gümbeli Fosl. mscr. (L. torulosum Rothpl. ex parte).[2])
10. A.? Rosenbergi (K. Mart.) Fosl.

[1]) *L. nummuliticum* Gümb. appears also to include a true *Lithothamnion (L. torulosum?)*. Cp. Gümbel, Nullip. t. 1, fig. 2 e, which most probably represents conceptacles of sporangia of the latter genus.

[2]) It seems to be beyond doubt that the section of the type specimen of *Lithothamnion torulosum* Gümb. pictured by Rothpletz, Foss. Kalkalg.

Sect. II. Episporæ Fosl.

The sporangia beds not growing down into the frond.

11. A. mirabile Fosl.
12. A. Fosliei (Heydr.) Fosl.
13. A. crispatum (Hauck) Fosl. ex parte? Cfr. Fosl. Syst. Surv.

Gen. **Phymatolithon** Fosl.

1898. Syst. Surv.

Conceptacles of sporangia soriform, immersed, at length cup-shaped; sporangia[1]) between more or less destrubtible walls, through gelinated, at length loosening tips corresponding with muciferous canals in the roof.

Conceptacles of cystocarps slightly convex, at length cup-shaped, immersed, with a central pore; carpospores arising between paranemata.

1. Ph. polymorphum (L.) Fosl.
   f. tuberculata Fosl.
   f. valida Fosl.
   f. papillata Fosl.
2. Ph. ocellatum Fosl.
3. Ph. lævigatum Fosl.

Gen. **Clathromorphum** Fosl.

1898. Syst. Surv.

Conceptacles of sporangia soriform, immersed, the central part of the roof at first slightly convex or forming light dots on the

t. XVII, fig. 6 represents a true *Lithothamnion* with an overgrown conceptacle of sporangia and not any sexual organ of *Archæolithothamnion* or *Lithothamnion*. Cp. Rothpl. l. c. p. 318. The last named organs are superficial in both the said genera and do not (or very seldom?) grow down into the frond. Besides, in the latter case the shape of the conceptacle should be another. Nor does the said conceptacle resemble any of the reproductive organs in *Goniolithon* or *Lithophyllum*, while on the other hand it fully agrees with overgrown conceptacles of sporangia in *Lithothamnion*. Consequently fig. 2 l. c. represents another species, an *Archæolithothamnion*, for which I propose the above name.

[1]) The sporangia in this and the following genera are of a more or less oblong shape, convex-concave and zonate two-or four-parted.

surface of the frond, afterwards decorticated and at length forming an almost point-like deepening, the bottom of which intersected with a few muciferous canals; sporangia between early destructible walls, through gelinated, at length loosening tips corresponding with the muciferous canals in the roof.

Conceptacles of cystocarps unknown.[1])

Sect. I. **Endobotroideæ** Fosl.

Conceptacles of sporangia growing down into the frond.

1. Cl. compactum (Kjellm.) Fosl.
   f. typica.
   f. testacea Fosl. (L. testaceum Fosl. Norw. Lith.).
2. Cl. loculosum (Kjellm.) Fosl.

Sect. II. **Epibotroideæ** Fosl.

Conceptacles of sporangia not growing down into the frond.

3. Cl. circumscriptum (Strömf.) Fosl. (incl. L. durum Kjellm.).
   f. typica.
   f. coalescens Fosl. (L. coalescens Fosl. Norw. Lith.).
4. Cl. evanescens Fosl.

Gen. **Lithothamnion** Phil emend.

Conceptacles of sporangia soriform, superficial or subimmersed; sporangia between partly enduring partly destructible walls, through gelinated, at length loosening tips corresponding with muciferous canals in the roof.

[1]) It is as yet not quite certain whether this apparently well marked genus is to be considered a separate one or a subgenus of *Phymatolithon*. The conceptacles of sporangia have a great outward resemblance to those in *Eulithophyllum*, but the development of the sporangia accords in the main with *Phymatolithon* except as regards some diversities in the roof, as well as the walls between the sporangia disappearing in an earlier stage than in the latter. I have seen but a solitary, stunted and not certain specimen of *Cl. circumscriptum* only furnished with a couple of conceptacles of cystocarps in a rather young stage. From this it seems as if the genus approaches *Lithophyllum*, while on the other hand the sporangia show a close relation to *Phymatolithon*, which also in other respects probably in fact may be the case.

Conceptacles of cystocarps superficial or slightly immersed, conical or subconical, abruptly passing into a short, thin tip frequently soon disappearing, with an apical pore; carpospores arising from the peripherical portion of the „conjugation cell", the central parts of the latter with a few elongated paranemata which soon disappear.

Subgen. I. Eulithothamnion Fosl.[1])

Sect. I. Innatæ Fosl.

Conceptacles of sporangia at length growing down into the frond.

1. L. glaciale Kjellm.
   - f. typica.
   - f. verrucosa Fosl. (L. varians f. verrucosa Fosl. Norw. Lith.)
   - f.? flabellata (Rosenv.) Fosl.
2. L. Granii Fosl. (L. glaciale f.?)
3. L. boreale Fosl.
4. L. investiens Fosl.
   - f. genuina.
   - f. torosa Fosl. (L. glaciale f. torosa Fosl. Norw. Lith.)
5. L. japonicum Fosl.
6. L. colliculosum Fosl. (Norw. Lith. ex parte).
7. L. Battersii Fosl.
8. L. botrytoides Fosl.
9. (L. delapsum Fosl.)
10. L. Ungeri Kjellm.
    - f. intermedia (Kjellm.) Fosl.
    - f. nana Fosl.
    - f. typica.
    - f. flexuosa Fosl.
    - f. divergens Fosl. (L. divergens Norw. Lith.)
    - f. corymbiformis Fosl.
    - f.? breviaxe Fosl.
    - f.? fastigiata Fosl.
    - f.? glomerata Fosl.

[1]) *Litholh. album* and *Litholh. Esperii* Heydr. excluded as too uncertain species.

11. L. fornicatum Fosl. (incl. L. dehiscens Fosl.)
    f. sphærica Fosl. mscr. (Norw. Lith. pl. 12, fig. 1.)
    f. typica.
    f. tuberculata Fosl. mscr. (L. dehiscens f. grandifrons Norw. Lith.)
    f. robusta Fosl.
12. L. dimorphum Fosl.
13. L. apiculatum Fosl.
    f. typica.
    f. connata Fosl.
    f.? parvicocca Fosl.
    f.? patula Fosl.
14. L. ramosissimum (Reuss) Unger (= Lithoph. racemus ex parte?)
15. L. torulosum Gümb. (Rothpl. ex parte).
16. L. suganum Rothpl.
17. L. Propontidis Fosl.
18. L. brachycladum Fosl.
19. L. brasiliense Fosl.
    f. genuina.
    f. heteromorpha Fosl.
20. L. erubescens Fosl.
21. L. Dickiei Fosl. (L. imbricatum Dickie mscr. nec Zan.)
22. L. rugosum Fosl.
23. L. magellanicum Fosl. (incl. Lithoph. Schmitzii Har.?)
24. L. flavescens Kjellm.
25. L. foecundum Kjellm.

Sect. II. Evanidæ Fosl.

Conceptacles of sporangia superficial, not growing down into the frond.

26. L. tophiforme Unger.
    f. globosa Fosl.
    f. typica.
    f. squarrosa Fosl.

L. tophiforme f. affinis Fosl. mscr.[1])
f. alcicornis (Kjellm.) Fosl.
27. L. norvegicum Aresch.
f. pusilla Fosl. (f. genuina List of Lith.)
f. uncinata Fosl.
f.? saxatilis Fosl.
28. L. nodulosum Fosl.
f. genuina.
f.? gracilescens Fosl. (L. gracilescens Norw. Lith.)
f.? congregata Fosl. (L. congregatum Norw. Lith.)
29. L. fruticulosum (Kütz.) Fosl. (non Norw. Lith.) (= L. ramosissimum Reuss ex parte?)
f. typica (L. fasciculatum Hauck.)
f. ramulosa (Phil.) Fosl. mscr. (L. fasciculatum β fruticulosum Hauck.)
30. L. Meneghianum Vin. (= L. fruticulosum?)
31. L. coralloides Crn. (Fosl. Norw. Lith. ex parte.
f. flabelligera Fosl.
f. subvalida Fosl.
f. minuta Fosl.
32. L. effusum Gümb.
33. L. racemosum (Goldf) Gümb.
34. L. calcareum (Pall.) Aresch.
f. valida Fosl. mscr. (f. attenuata List of Lith.)
f. palmatifida Fosl.
f. squarrulosa Fosl. (L. ramulosum Solms ex parte).
f. subsimplex (Batt.) Fosl.
f. compressa (M'Calla) Fosl.
35. L. parisiense Gümb. (= L. calcareum?)
36. L. jurassicum Gümb.
37. L. palmatum Goldf.
38. L. australe Fosl.
f. americana Fosl. mscr. (L. coralloides f. australis Fosl. ex parte).

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1) A delicate form approaching *L. norvegicum* in habit.

f. Novæ Zelandiæ (Heydr.) Fosl. (Lithophyllum Novæ Zelandiæ Heydr.)

39. L. amphiroæformis Rothpl.
40. L. falsellum Heydr.
    f. genuina.
    f. plicata Fosl.
41. L. superpositum Fosl.
42. L. obtectulum Fosl.
43. L. macroblastum Fosl.
44. L.? mamillosum Gümb.
45. L.? tuberosum Gümb.
46. L. Borneti Fosl.
47. L. synanablastum Heydr.
    f. conspersa Fosl.
    f. speciosa Fosl.
48. L. Sonderi Hauck.
49. (L.? scabiosum Harv.)
50. L. Philippii Fosl. (L. decussatum (Solms) Fosl. Norw. Lith.)
    f. typica.
    f. funafutiensis Fosl.
51. L. Engelharti Fosl.
    f. umbonata Fosl.
    f. imbricata Fosl.
52. L. kerguelenum (Dickie) Fosl.
53. L. capense (Harv.) Fosl.
54. L. Mülleri Lenorm. (incl. Lithophyllum rhizomae Heydr.?)
    f. cingens Fosl.
    f. neglecta Fosl.
55. L. lichenoides (Ell et Sol.) Fosl.
    f. pusilla Fosl.
    f.? antarctica (Hook. et Harv.) Fosl.
    f. patena (Hook. fil. et Harv.) Fosl.
    f. depressa Fosl.
    f. agariciformis (Jonst. (Pall.?)) Fosl.
    f. heterophylla Fosl.
56. L. arcticum (Kjellm.) Fosl.

57. L. Lenormandi (Aresch.) Fosl.
f. sublævis Fosl.
f. typica.
f. squarrulosa Fosl. (L. squarrulosum Norw. Lith.)
58. L. læve (Strömf.) Fosl.
f. macrospora Fosl.
f. tenuis (Kjellm.) Fosl. (f. tenuissima Fosl.; L. tenue Kjellm.)
59. L. californicum Fosl.
60. L. scabriusculum Fosl.
61. L. tenuissimum Fosl.
62. L. myriocarpum Fosl.

Subgen. II. Epilithon (Heydr.) Fosl.

Thallus composed of a single layer of cells except in the neighbourhood of the conceptacles.

63. L. membranaceum (Esper) Fosl.
64. L. corticiforme (Kütz.) Fosl. (incl. Melobesia rosea (Kütz.) Rosan.? Non Crn.; Hapalidium Hildenbrandtioides Crn.)

Gen. Chætolithon Fosl.

1898. List of Lith.

Thallus parasitical, the hypothallic cells as rhizoids penetrate the tissue of other calcareous Algæ.

Conceptacles of sporangia soriform, subimmersed; sporangia between destructible walls, through gelinated at length loosening tips corresponding with muciferous canals in the roof.

Conceptacles of cystocarps unknown.

1. Ch. deformans (Solms) Fosl.

Gen. Goniolithon Fosl.

1898. List of Lith.[1]; emend.

Conceptacles of sporangia superficial or subimmersed, conical, with an elongated tip or constricted above the middle, this upper part often falling away before maturity of the sporangia and then

[1] Through mistake was in Syst. Surv. *L. byssoides* of *Lepidomorphum* placed as the type of the subgenus *Cladolithon* instead of *G. moluccense*.

the conceptacle being hemispheric or subconical, with a coarse apical pore; sporangia with elongated foot arising from any part of the almost plain disc, the latter connected with the roof by delicate filaments frequently disappearing towards maturity.

Conceptacles of cystocarps superficial, conical, constricted above the middle or with an elongated tip and a coarse apical pore; carpospores arising from any part of the almost plain or cup-shaped „conjugation cell".

1. G. brassica-florida (Harv.) Fosl. (incl. L. mamillosum Hauck?)
2. G. mamillosum (Hauck) Fosl. (L. Hauckii Rothpl., Fosl.; L. ramosissimum Reuss, ex parte?)
3. G. mamillare (Harv.) Fosl.
4. G. verrucosum Fosl.
5. G. frutescens Fosl.
   f. tyyica.
   f. flabelliformis Fosl.
6. G. moluccense Fosl. (incl. Lithoph. Tamiense et L. pygmaeum Heydr.?)
7. G. Setchelli Fosl. (incl. Lithoph. fibulatum Heydr.?)
8. G. Notarisii (Duf.) Fosl.
   f. genuina.
   f. propinqua Fosl.
9. G. Chalonii (Heydr.) Fosl. (= G. Notarisii f.?)
10. G.? insidiosum (Solms) Fosl. (= G. Notarisii?)
11. G.? rubrum (Vin.) Fosl. mscr. (= G. Notarisii?)
12. G.? disciforme (Vin.) Fosl. mscr. (= G. Notarisii f.?)
13. G. elatocarpum Fosl.

Gen. **Lithophyllum** Phil. emend.

Conceptacles of sporangia immersed or subprominent, the central parts of the roof at first convex, afterwards more or less decorticated, partly at length forming a depressed point-like deepening on the surface of the frond, with a central pore; sporangia arising around the periphery of the more or less overarched disc, the latter at first connected with the roof by a parenchymatic tap, the centre of which upwards ending through the roof in a cylindric gelinated

plug, afterwards the tap gets little by little dissolved, frequently at first in the middle and then upwards, leaving an annular border below the roof, the plug disappears and a single pore arises in the roof simultaneously with a decorticating of the whole superficial prominence or a part of it, or the disc connected with the roof by a central, attenuating plug and delicate filaments.

Conceptacles of cystocarps immersed or subprominent, the roof or a part of it forming convex prominences on the surface of the frond; carpospores arising around the periphery of the „conjugation cell", the central parts of the latter with a bundle of short paranemata.

Subgen. I. Eulithophyllum Fosl.

Conceptacles of sporangia immersed, at length forming depressed point-like deepenings on the surface of the frond; the disc frequently much overarched.

1. L. racemus (Lam.) Fosl. (incl. L. rhodica Unger?)
   - f. typica.
   - f. crassa (Phil.) Fosl.
   - f. Kaiserii (Heydr.) Fosl.
2. L. oblimans Heydr. (= L. racemus?)
3. L. pliocaenum (Gümb.) Fosl. (= L. racemus?)
4. L. Trabuccoi Fosl. mscr. (Lithoth. torulosum Trab. nec Gümb.)[1])
5. L. affine Fosl.
   - f. tuberosa Fosl.
   - f. complanata Fosl.
6. L. Andrusovi Fosl.
7. L. hyperellum Fosl.

[1]) In Soc. Tosc. Sc. Nat. Atti Mem. Vol. XIII, p. 204, Mr. Trabucco mentions a fossil calcareous Alga under the name of *Lithothamnion torulosum* Gümb. However, the picture l. c. t. IX, fig. 3 shows that this form cannot be referred to the said species, as the latter appears to be a true *Lithothamnion* (cp. the note p. 8 of the present paper), while on the other hand the form in question without doubt is a *Lithophyllum* nearly related to *L. racemus*. No measures are given of the cells, but considering the latter to be of the same size as in *Litholh. torulosum* Gümb. it differs in this respect so much from *Lithoph. racemus* that it must be considered a separate species. Therefore I may be allowed to propose the above name.

L. hyperellum f. fastigiata Fosl.
f. heteroidea Fosl.
8. L. proboscideum Fosl.
9. L. retusum Fosl.
10. L. Darwini (Harv.) Fosl.
11. L. craspedium Fosl.
f. compressa Fosl.
f. abbreviata Fosl.
12. L. platyphyllum Fosl.
13. L. africanum Fosl.
f. truncata Fosl.
f. intermedia Fosl.
14. L. fasciculatum (Lam.) Fosl.
f. incrassata Fosl.
f. divaricata Fosl.
f. compressa Fosl.
f. eunana Fosl.
f. subtilis Fosl.
15. L.? procaenum (Gümb.) Fosl. (= L. fasciculatum?)
16. L. Okamurai Fosl.
17. L. dentatum (Kütz) Fosl. (incl. L. Digueti Har.?)
f. aemulans Fosl.
f. gyrosa Fosl.
f. dilatata Fosl.
f. Macallana Fosl.
18. L.? perulatum (Gümb.) Fosl.
19. L. decussatum (Ell. et Sol.) Phil. (non Solms)
f. typica.
f. decumbens Fosl.
20. L. flabellatum Vin. (= L. decussatum?)
21. L. expansum Phil.
f. genuina.
f. stictaeformis (Aresch.) Fosl. mscr. (incl. f. foliacea Fosl.; Melobesia stictaeformis Aresch. ex parte, sec. spec.; Lithophyllum expansum β agariciforme Hauck).
f. repens Fosl.

L. expansum f. exigua Fosl.
(f. involvens Vin.)
22. L. incrustans Phil.[1]) (incl. L. ponderosum Fosl.?)
f. depressa (Crn) Fosl. (incl. f. flabellata Heydr.)
f. Harveyi Fosl. (incl. f. labyrinthica Heydr. saltem ex parte).
f. angulata Fosl. (incl. f. subdichotoma Heydr.)
f. lobata Fosl.
23. L. orbiculatum Fosl. (L. incrustans f.?)
24. L.? asperulum (Gümb.) Fosl.
25. L.? Goldfussi Gümb.
26. L.? Kotschyanum Unger.
27. L. grumosum Fosl.
28. L. onkodes Heydr. (excl. specim. cum „concept. cystoc.")
29. L. Crouani Fosl.
30. L. amplexifrons (Harv.) Rosan.

Subgen. II. Carpolithon Fosl.

Conceptacles of sporangia scarcely raised above the surface of the frond, the whole roof at length decorticated; the disc less overarched.

31. L. decipiens Fosl.
32. L. discoideum Fosl.

Subgen. III. Lepidomorphum Fosl.

Conceptacles of sporangia immersed or subprominent, forming convex prominences on the surface of the frond frequently equivalent only to a part of the roof, at length partly decorticated; the disc more or less overarched, connected with the roof by a central, attenuating plug and delicate filaments.[2])

[1]) Cfr. Lithothamnion polymorphum Vin.
f. incrustans.
f. confluens.
f. crustacea.
f. stalactitica.
f. tuberculata.
f. lata.

[2]) The bipores quoted l. c. especially in this subgenus formerly referred to *Goniolithon* are not to be considered as such and do not run through the roof.

33. L. congestum Fosl.
34. L. pallescens Fosl
35. L. byssoides (Lam.) Fosl.
36. L. Bamleri Heydr.
37. L. elegans Fosl. (incl. Lithoth. Margaritae Har.?)
    f. angulata Fosl.
    f. complanata Fosl.
38. L. tortuosum (Esp.) Fosl.
    f.? cristata (Menegh.) Fosl.
    f. undulosa (Bory) Fosl. (Tenarea undulosa Bory).
    f. crassa (Lloyd) Hauck.
    f. decumbens Fosl.
39. L. Carpophylli Heydr.
40. L. Marlothii Heydr.
41. L. Yendoi Fosl.
42. L. papillosum (Zan.) Fosl.
43. L. subtenellum Fosl.
44. L. zostericolum Fosl.
    f. tenuis Fosl.
    f. mediocris Fosl.

Gen. **Melobesia** Lamour. emend.

Conceptacles of sporangia superficial or slightly immersed, conical or hemispheric-conical, with an apical pore; sporangia with short foot arising from the almost plain disc, the latter connected with the roof by delicate filaments soon disappearing.

Conceptacles of cystocarps superficial, conical or hemispheric-conical (smaller than the preceding), with an apical pore; carpospores arising around the periphery of the „conjugation cell", the central parts of the latter with a bundle of short paranemata.

Subgen. I. **Eumelobesia** Fosl.

Thallus composed of a single layer of cells except in the neighbourhood of the conceptacles.

1. M. farinosa Lamour. (incl. M. inæquilaterata Solms? M. verrucata auct. ex parte; Hapalidium coccineum Crn. ex parte).

2. M. callithamnioides Falkbg. nec Crn. (M. farinosa f.?)
3. M. Lejolisii Rosan.[1])
4. M. confervicola (Kütz.) Fosl.
5. M. caspia Fosl.
6. M.? Novæ Zelandiæ Heydr.

Subgen. II. **Heteroderma** Fosl.

Thallus composed of more layers of cells.

7. M. Corallinae Solms (nec Crn.?)
8. M. coronata Rosan.
9. M. canescens Fosl.
10. M. zonalis (Crn.) Fosl. (incl. Hapalidium coccineum Crn. ex parte; H. confervoides Crn.; H. roseum Crn.? (non Kütz); Melobesia myriocarpa Crn.)
11. M.? Cystosirae Hauck.

Gen. **Dermatolithon** Fosl.

1898. Syst. Surv.

Conceptacles of sporangia subimmersed, hemispheric-conical with an apical pore; sporangia with short foot arising from the almost plain disc between club-shaped, free paraphyses.

Conceptacles of cystocarps subimmersed, hemispheric-conical, with an apical pore; carpospores arising around the periphery of the conjugation cell, the central parts of the latter with a bundle of short paranemata.

1. D. pustulatum (Lamour.) Fosl.
   f. typica.
   f. crinita Möb.
2. D. macrocarpum (Rosan.) Fosl.[1])
   f. faeroënsis Fosl.

[1]) I referred in List of Lith. this species to *Dermatolithon* according to Rosanoff's descricption of the conceptacles of sporangia. However, I have not found the sporangia accompanied by paraphyses and I am inclined to suppose, that the said organs pictured by Rosanoff, Melob. pl. 1, fig. 8 and 13 in fact are carpospores with paranemata.

[1]) Authentic specimen unknown to me. Cp. Fosl. Melob. in herb. Crouan, p. 14.

D. macrocarpum f. Laminariae (Crn.) Fosl.

3. D. hapalidioides (Crn.) Fosl.
   f. typica. (incl. Melob. simulans Crn.)
   f. confinis (Crn.) Fosl.
4. D.? adplicitum Fosl. (D. hapalidioides f.?)
5. D.? prototypus Fosl.

Gen. **Choreonema** Schm.

Thallus parasitical, the hypothallic cells as rhizoids penetrate the tissue of other calcareous Algæ.

Conceptacles of sporangia superficial, conical, with an apical pore; sporangia arising from a plain disc.

Conceptacles of cystocarps superficial, conical (smaller than the former), with an apical pore; carpospores arising around the periphery of the „conjugation cell", the central parts of the latter with a bundle of short paranemata.

1. Ch. Thureti (Born.) Schm.