REMARKS ON MELOBESIAE
IN HERBARIUM CROUAN

BY

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In List of Species of the Lithothamnia\(^1\) I quoted a number of species which were quite unknown to me, and others the range of which seemed to be rather uncertain. Among these are some species described by Crouan in Ann. sc. nat. and Fl. Finist. I have now, however, had the opportunity to examine as far as I know nearly all the unarticulated calcareous algae recorded by Crouan from the coast of France, thanks to the liberality of Dr. Bornet and Mr. Hariot, who have been so kind as to send me specimens for examination from Crouan's herbarium, or distributed by himself.

The species belonging to the genus *Lithothamnion* as formerly limited have been mentioned partly in Norwegian Forms of Lithothamnion partly in later papers. Therefore, I want here only to mention most of the species of *Melobesia* and *Hapalidium* as comprehended by Crouan, as well as a few species of other authors in connection with the former.

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**Hapalidium zonale** Crn.


= *Melobesia* (Heteroderma\(^3\)) zonalis (Crn.) Fosl.

A specimen of this species in Museum d'histoire naturelle distributed by Crouan that I have seen is attached to a piece of

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\(^1\) Det kgl. norske Videnskabers Selskabs Skrifter. 1898. No. 3.


\(^3\) *Heteroderma*, which is nearly connected with *Goniolithon*, includes species with more layers of cells, contrary to *Eumelobesia* with only one layer except where conceptacles are formed, and minute cortical cells each of which covering only a part of the basal cell. However, I am not yet sure as regards its relation to *Goniolithon*.\(^4\)
glass. It appears at first to have formed minute, irregular crusts, however soon becoming confluent, and at length forming crust-complexes of indefinite extent, partly approaching in habit fig. A. 1—2 partly fig. C. 14—15 l. c., here and there with small holes from a number of tumbling but not fully anastomosing crustlets. Seen from above the specimen partly is composed of at least two, probably more layers of cells over each other partly only a solitary layer here and there in the outer and young parts of the crust-complex. The latter cells are from above 4—10 μ long and 3—4 μ broad, and on the whole rather varying. In fig. A. 3 l. c. which is rather different from the primary layer of cells in the said specimen, small cortical cells are represented. I have not seen such, but here and there cells or groups of cells which are set off by darker contents than the adjacent ones, probably being such which are on the point of dividing. In parts of the crust with more than one layer of cells, the latter frequently are square or roundish seen from above, about 8 μ in diameter, or 7 by 9 μ, but on the whole also here rather varying. The conceptacles are numerous, 150—200 μ in diameter seen from above.

I have not had the opportunity to dissect the above specimen which perhaps is the only type in existence, but notwithstanding this I do not hesitate to identify it with a Melobesia from Plymouth, collected by Mr. Batters in 2—5½ fathoms water, and also this attached to glass. It in part agrees with Crouan's plant in habit, and the cells are similar to those in the latter, and so also as regards the conceptacles.

The present species appears on the whole to be very varying in shape. Sometimes it forms small orbicular crusts with crenulate margin, but on closer examination shown to be composed of several anastomosing, minute crusts, often without any perceptible limit, although here and there with small holes, sometimes and most frequently very irregular in outline, and now and then sending forth shorter or longer offshoots occasionally composed of only two or even one row of cells in the breadth. Besides it in a young state (1—2 mm.) often is almost radiating, sometimes nearly flabellate, or lobed, and giving the impression of Melobesia callitham-
niioides Falkbg., but even then becoming more and more confluent in an advanced state, here and there leaving holes as in old specimens. Occasionally are, on the other hand, to be seen young crusts which are almost reniform. Old crusts are up to about 3 cm. in diameter, however depending on the substratum.

A section of an old crusts shows a thickness of up to about 70 $\mu$, with up to 8 layers of cells. The basal cells frequently have their longest diameter in horizontal direction, or about 10 $\mu$, and upwards the cells are square or more or less rounded, and rather varying in size, however commonly 8—11 $\mu$ in diameter, now and then also here with the longest diameter in horizontal direction.

The conceptacles of sporangia are subconical, about 200 $\mu$ in diameter seen from above, with an apical pore, frequently crowded, and sometimes so densely that the roofs become angular. The sporangia are as quoted by Crouan four-parted, 45—60 $\mu$ long and 30—35 $\mu$ broad. The conceptacles of cystocarps are smaller than the latter, about 150 $\mu$, and less prominent.

Some rather young specimens attached to small shells of snails, the latter about 3 mm. long, I refer to the same species. They are also collected at Plymouth by Mr. Battens, but in another locality than the above mentioned. They differ from typical M. zonale by the crust being more continuous and more regular, with almost entire or slightly lobed margin, now and then furnished with some scattered conceptacles. On a section the crust is shown to be but 20 $\mu$ thick, with 2 layers of cells. However, the cells are here and there undivided, and then almost square, about 18 $\mu$ in diameter. Otherwise the basal cells frequently are 4—8 by 8—14 $\mu$, with the longest diameter in horizontal direction, occasionally nearly square, but on the whole rather varying.

The species is hitherto with certainty only known from Brest and Plymouth, but probably also occurring on the west coast of Ireland according to specimens not yet exactly examined.

Hapalidium coccineum Crn.


= Melobesia zonalis (Crn.) Fosl.
I have not seen any specimen according with the figures l. c., but another specimen from Crouan’s hands denominated as above. It forms a few minute crusts about 1 mm. in diameter on Rhodymenia palmata and Hydroids attached to the latter, provided with a couple of conceptacles. As I have not had the opportunity to examine any of these crusts more closely, I am not quite certain to which species they are to be referred, although, on the other hand, I scarcely think to be wrong in referring them to Melobesia farinosa. However, it is easy to be seen, that the plant described and delineated by Crouan l. c. does not represent the latter. On the contrary, I venture to suppose that also this species as at first apprehended by Crouan in fact represents a form of Melobesia zonalis. The said figures do not give any good idea of the species except fig. B. 8, although fig. B. 11 tolerably well represents a part of a young crust with one layer of cells.

Hapalidium conservoides Crn.
Fl. Finist p. 139; excl. syn.


= Melobesia zonalis (Crn.) Fosl.

I have seen a few very small and sterile crusts denominated as above by Crouan himself, attached to a fragment of glass. They are partly rather regular in outline, suborbicular, or nearly reniform, partly of irregular shape. Seen from above the cells accord well with those in M. zonalis, but I do not know with certainty whether these sterile crusts belong to the latter species, although probably being so. They seem to be most nearly connected with the form of this species attached to shells of snails mentioned above.

On the other hand, I am not in doubt that the above species as delineated in Ann. sc. natur. l. c. represents a rather old specimen of M. zonalis. However, in Fl. Finist. it seems to have been taken in a rather wide sense, perhaps including more than one species.

Crouan identifies his plant with Melobesia conservicola (Kütz.)
Fosl. mscr. 1) The latter appears, however, to be a separate species, according to a few very small and in part fragmentary crusts that I have seen, distributed in G. B. De Toni e David Levi, Phycotheca Italica, no. 15. They are according to the label from "Venezia, al Lido su una Chaetomorpha reietta dalle onde sulla spiaggia; dicembre". This species stands very near to Melobesia caspica Fosl. 2), as far as the very scanty material allows a careful examination, or perhaps it is but a young form of another species. The crust is about 50 μ thick, and, as in the last quoted species, the one crust sometimes stretches itself over the other. The basaj cells appear to be higher and more narrow than in the latter, apparently with small cortical cells. However, I do not exactly know the latter on a section. Seen from above they are very small, square or a little rounded, or sometimes a little longer than broad. The said minute crusts bear a couple of conceptacles, but I do not know whether they are those of sporangia, nor do they seem to be fully developed. They are comparatively large, subconical and 250—300 μ in diameter seen from above, with a rather delicate apical pore. The species needs a closer examination of better materials than that I at present possess, and also forms referred to it by other authors. So it seems to be very uncertain whether the plant recorded from Guadeloupe 3) under the name of Hapalidium confervicola really is identic with Kützing's species, and also as regards British specimens referred to the same species. Cp. below under Hapalidium roseum.

Hapalidium callithamniodes Crn.

= Rhodochorton sp?

   I considered l. c. this species to be in some respects related to Melobesia myriocarpa Crn., but I had not then the opportunity to compare it with the latter, nor with Melobesia confervicola.
It has generally been supposed, that the above plant as understood by Crouan was to be considered identic with the species recorded by Falkenberg under the name of *Melobesia callithamniioides*. However, so is not the case. Crouan’s plant of which I have seen an authentic specimen, is not any calcareous alga. The specimen agrees tolerably well with the quoted figures in Ann. sc. natur., and appears, as far as examined, to be creeping filaments of a young *Rhodochorton*. The threads are 8—12 μ thick. I have also seen one or two of the circular formations delineated in Fl. Finist. pl. 20, gen. 131, fig. 2, but they do not represent any alga, at least not in the specimen that I have seen. They appear to be an animal, somewhat like a Rhizopode.

_Hapalidium roseum_ Crn.
Fl. Finist. p. 149; excl. syn.

= *Melobesia zonalis* (Crn.) Fosl.

I have not seen any specimen of the above species from Crouan’s hands. Being inclined to consider also this plant identic with _M. zonalis_, I judge more from the substratum l. c. than from any other support for the determination, as Crouan does not give any description himself but only refers to Kützing with regard to this as yet rather uncertain species.

The plant that Rosanoff mentions under the name of _Melobesia rosea_ (Kütz.), and considers as a rather uncertain species, seems not unlikely to be identic with _Lithothamnion corticiforme_ (Kütz.). Through the kindness of Dr. Le Jolis I have had the opportunity to examine an authentic specimen, or a few very small crusts on _Boreotia secundiflora_ from Cherbourg. The type of _M. rosea_ has been found on _Bryopsis Lamourouxi_ (Balbisiana) in the Adriatic. Cp. Kütz. Spec. Alg. p. 695, and Tab. Phyc. 19, p. 33, t. 92. The said specimen almost fully agrees with _L. corticiforme_, being as in the latter composed of a number of minute crusts which soon become fully confluent. In comparing it with young specimens of this species, the cells are, seen from above, frequently only a little smaller, but they are rather varying as
remarked by Rosanoff himself, and so also in *L. corticiforme*. A great number of cells in the latter are found to be of the same shape and size as in *M. rosea*. The said specimen is provided with a few young conceptacles which scarcely may be separated from young conceptacles in *L. corticiforme*. It certainly needs closer examination but it appears, on the other hand, to be but little doubt as regards the identity.

The species described as *Melobesia inaequilaterata* Solms, Corall. Monogr. p. 12, t. III, f. 13—18 I should be much inclined also to consider identical either with *L. corticiforme* or perhaps more probably *M. farinosa*. It has been found on Hydrooids in the Gulf or Naples, but only quite young specimens are known, and such are always extremely difficult to identity with certainty in this group of algae. I have not seen any specimen, nor do I know the size of the cells.

So also with reference to *Lithocystis Allmanni* Harv. Phyc. Brit. pl. 165, and *Hapalidium conservoides* Batt. Mar. Alg. Berwick, p. 136, probably being identical with *L. corticiforme*. Nor have I seen any specimen of these. The latter has according to Batters l. c. been found on *Chylocladia rosea*, *Nithophyllum punctatum*, and other algae „washed ashore from deep water“.

*L. corticiforme* lives under the same conditions, although apparently not in any great depth, and I have seen certain specimens of it on *Rhodymenia palmata*, *Furcellaria fastigiata*, *Phyllophora rubens*, *Chondrus crispus*, *Laurencia obtusa* (the latter from the south coast of Norway), and *Gelidium corneum*.

Hapalidium Hildenbrandtioides Cm.
Fl. Finist. p. 149.

*Lithothamnion* (Epilithon) corticiforme (Kütz.) Fosl.

In herb. Mus. d'hist. natur. in Paris is to be found a well developed, authentic specimen attached to *Rhodymenia palmata*, and furnished with numerous conceptacles of sporangia. It coincides in every respect with typical *L. corticiforme*. 
Melobesia verrucata Crn.
Fl. Finist. p. 150.

= Melobesia farinosa Lamour.

I have seen a small specimen distributed by Crouan under the above name. It is attached to Phyllophora rubens. I have not had the opportunity of dissecting it, but a solitary conceptacle has been examined, subconical but rather blunt, about 150 μ in diameter, with four-parted sporangia 50—55 μ long and 25—30 μ broad. Therefore, I do not think to be wrong in referring it to M. farinosa. In habit it rather much approaches L. corticiforme. The form quoted by Crouan I. c. occurring on Fucus not unlikely belongs to Dermatolithon pustulatum.

Melobesia myriocarpa Crn.
Fl. Finist. p. 150.

= Melobesia zonalis (Crn.) Fosl.

The specimen of this species that I have seen almost covers a piece of porcelain about 3 by 2 cm. The crust is more continuous and more regular than the above mentioned specimen of M. zonalis, but otherwise fully agreeing with this, and provided with conceptacles similar to those in the latter. There is no doubt as regards the identity. It represents only a somewhat older specimen of the species. I keep the name M. zonalis, as this is recorded long before M. myriocarpa.

Melobesia hapalidioides Crn.

= Dermatolithon (Herpomenia\(^1\)) hapalidioides (Crn.)
Fosl. f. typica.

In Syst. Surv. Lith. I referred this species to a new genus owing to the sporangia being accompanied by paraphyses. In

\(^1\) Herpomenia contrary to Eudermatolithon corresponds with Heteroderma of the genus Melobesia.
herbarium Bornet I have seen a few specimens distributed by Crouan himself. One of these forms a thin crust on porcelain, about 1.5 cm. in diameter and rather irregular in outline. The crust is nearly smooth, with entire or crenulate margin. Three other specimens are attached to fragments of shells of mollusks, and one of these much approaches Lithothamnion leve in habit. They are older and in part more uneven than the above mentioned specimen, but otherwise agreeing with this.

The species also grows on shells of Balanides, rocks, a rather loose conglomerate of sand and shells, and once I have even seen it attached to Lithothamnion Lenormandi. Thus it sticks to quite different substrata, and, therefore, much varying in habit. Sometimes it reminds one of a young Goniolithon papillosum sometimes certain forms of G. Notarisii, but, on the other hand, rather approaching certain forms of L. Lenormandi in habit when growing on a loose substratum. In the latter case it forms small, more or less confluent and rather irregular crusts, here and there stretched over one another, and then quite different in habit from specimens growing on a smooth substratum. The latter form passes into the below mentioned f. confinis. However, also on a smooth substratum I have once seen a new crust stretched over a subjacent and even over a conceptacle of the latter.

The crust attains a thickness of about 400 μ, with up to 8 layers of cells. It is much varying also in structure. The basal cells are commonly high and more or less curved, 50—100 μ, or now and then shorter. In the upper layers the cells are also much varying, or 20—70 μ long. On the other hand, they are rather uniform in breadth, frequently about 12 μ.

The conceptacles of sporangia are prominent, subhemispheric or subhemispheric-conical, frequently 350—450 μ in diameter seen from above. The sporangia are bisporic, 70—120 μ long and 40—60 μ broad.

The present species is known from Brest (Crouan), Le Croisic, Loire inférieure (Bornet), Cap Antifer (Debray), Cherbourg (Le Jolis), Berwick-on-Tweed (Batters), and the west coast of Ireland, where I have collected specimens however not yet exactly determined.
Melobesia simulans Crn.
Fl. Finist. p. 150.

= Dermatolithon (Herpomenia) hapalidioides (Crn.)
f. typica.

A specimen of the above species distributed by Crouan himself, attached to a fragment of a shell of mollusk, almost fully coincides in every respect with one of the specimens mentioned above under *D. hapalidioides*. However, Crouan quotes the sporangia to be tetrasporic, but a solitary conceptacle examined by me contained only bisporic ones. According to remarks on the label, Dr. Bornet also found them to be bisporic.

Melobesia confinis Crn.
Fl. Finist. p. 150.

= Dermatolithon (Herpomenia) hapalidioides (Crn.)
f. confinis (Crn.) Fosl. mscr.

Crouan mentions the above species to be found "sur les Corallines, Patelles, etc." and Johnson 1) quotes it from the west coast of Ireland attached to the same substratum. I have not seen certain specimens attached to *Corallina*, and such as I have seen growing on shells accord with typical *D. hapalidioides*. A specimen from Crouan's herbarium collected at batterie du Diable, St. Anne, is on the contrary attached to *Gelidium corneum* and shells of Balanides to which the latter species sticks. So also as regards specimens from Cherbourg distributed by Le Jolis.

The present alga so closely coincides with *D. hapalidioides*, that it perhaps ought not to be maintained even as a denominated form of the species. On the one side it certainly differs very much in habit from the typical form but on the other hand even in this respect running especially into the above quoted form of *D. hapalidioides* growing on a loose substratum. A larger material perhaps will show, that also the latter ought to be regarded as f.

confinis, however more because of the habit than owing to other characters. The specimens of f. confinis which stick to Gelidium are much lighter than the typical form, of a greyish colour with a purplish shade, nearly according with the said form on loose substratum, but this is probably only due to local conditions. It spreads itself to Gelidium probably from the shells of Balanides which it in part also covers, the shells forming a part of the substratum of the said species. Such shells are to be found together with all the tufts of Gelidium that I have seen infested with the present alga. The form confinis partly surrounds the branches of the said host partly and more frequently only the half of the circumference of a branch, but often in its whole length, or stretches itself between the densely crowded and little by little almost decumbent branches, so that it at length nearly covers a tuft of the host.

In structure it agrees in the main with the typical form, and also as regards the conceptacles of sporangia.

Melobesia Laminariae Crn.
Fl. Finist. p. 150.

= Dermatolithon Laminariae (Crn.) Fosl. mscr. et Lithophyllum Crouani Fosl.

In Some new or cr. Alg. p. 17 I recorded an alga by the name of Lithophyllum Crouani, in part included in D. Laminariae, such as the latter has been apprehended by French algologues after Crouan. Judging from some small authentic crusts afterwards seen, it appears that both species also have been included by him, though the description l. c. in the main refers to the present species. However, the crusts are sterile and then the said two species sometimes are not easy to separate especially in a dried state, but at least one of them must be referred to L. Crouani, a species which nearly always grows in company with D. Laminariae, but on the whole more scarce than the latter. This species is closely related to D. hapatidioides.

A calcareous alga from the Faroe islands mentioned by
Børgesen\(^1\)) as *Melobesia* sp., and recorded by Simmonds\(^2\)) under the name of *M. macrocarpa* Rosan. stands very near to the present species. The latter remarks l. c. that this alga "wächst an den färöischen Küste auf *Gigartina mamillosa* die fast immer mit einer Melobesiakruste bedeckt ist. Auf *Chondrus crispus* fand ich sie nicht einmal, wenn diese beiden Algen zusammen wuchsen". Through the kindness of Mr. Børgesen I have had the opportunity of examining well developed specimens attached to the said host. Rosanoff met with his *M. macrocarpa* only on *Phyllophora rubens*, and Farlow quotes the same species from the coast of America attached to *Chondrus crispus*.

In List of Lith. I subsumed *M. macrocarpa* under *D. pustulatum*. Cp. some new or cr. Lith. p. 18. I have seen but a very small fragment of an authentic *D. macrocarpum* and if it in fact, as remarked by Rosanoff, differs from *D. pustulatum* only as regards the sporangia, it scarcely may be considered specifically distinct. However, judging from the said minute fragment with a solitary conceptacle I suppose that the specimens which underlie Rosanoff's description have been young, and a rather great difference between young and old specimens is often to be seen even within *Dermatolithen* as well as *Melobesia*, f. inst. *M. zonalis*.

The vertically elongated basal cells in *D. macrocarpum* are quoted to be but twice as long as broad. In the said form from the Faroe islands the crust is up to 300 \(\mu\) thick, with 6—8 layers of cells, and here the basal cells are as a rule considerably longer than broad, or 60—80 \(\mu\) high, but perhaps more varying than the examined parts of a specimen show. The upper cells appear not to be much varying, and are also vertically elongated. I found them frequently 20—30 \(\mu\) high. The conceptacles of sporangia are subconical though often but little prominent, frequently 450—550 \(\mu\) in diameter seen from above. The sporangia are bisporic, 90—140 \(\mu\) long by 50—75 \(\mu\). Thus the present form much dif-

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fers from *D. macrocarpum* as described by Rosanoff. Therefore, I propose to name it f. *faeroënsis* and refer it provisionally to the said species, as I at present do not venture to record it a separate species. It forms a link in a group of species which are mutually very nearly connected. The limits cannot, however, be decided till old and authentic specimens of *D. macrocarpum* have been examined. The form *faeroënsis* stands on the other hand near to *D. Laminariae*, but differs especially as regards the more regular and frequently shorter cells. Also the latter, however, should be more nearly compared with the said species.

In this connection I beg to remark, that *Melobesia Corallinae* Cmn. appears to have been taken in a wide sense, probably including more than one species. I have not seen any authentic specimen, but on the west coast of Ireland I have collected specimens which are very nearly connected with the last quoted forms or species, with bisporic sporangia. And from the Mediterranean I have seen specimens much approaching if not identical with *D. hapalidioides*. Moreover, *D. pustulatum* not unlikely also sticks to this host. I do not, however, mention them more precisely until *D. macrocarpum* is fully known.
Resuming the above remarks it appears, that at least most of the species quoted are to be recorded as follows.