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IX.—Observations on Fucus Labillardierii, Turner

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latter and *Obisium*. There is one point of importance which yet remains to be ascertained, and the more so from its having been taken as a primary character in the classification of the Arachnida,—the means by which the above animals respire. Treviranus has described two rows of puncta as occurring both upon the upper and under segments of the abdomen in *Chelifer*, which he regards as stigmata, but states also that he was unable to detect either tracheæ or pulmonary sacs in their situation. It is most probable therefore that they were merely impressed points, serving, as in others of the class, for the attachment of muscles. Be that as it may, I have been unable to discover any indications of such external openings in *Obisium*, or to arrive for the present at any satisfactory conclusion in regard to the existence of an internal respiratory apparatus; but I introduce these remarks here for the purpose of inquiring whether, if we knew the precise conditions under which the breathing of these animals was effected, it is then a function of sufficient value to be adopted in the arrangement of the Arachnida, since it has been already invalidated by the co-existence of pulmonary sacs and tracheæ in the genera *Segestria* and *Dysdera*; whether, in a word, until more is made out of the anatomy of *Obisium* to establish its further affinity to the *Scorpionida*, its present position among the Trachearia may not be regarded as a provisional one? As yet, I am strongly disposed to believe that subsequent facts will prove that the present and allied forms are the true dwindled acaudal representatives in this country of the gigantic and formidable species which infest the tropics.

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IX.—Observations on *Fucus Labillardierii*, *Turner*. By the Rev. M. J. BERKELEY. *In a Letter to R. Taylor, Esq.*

MY DEAR SIR,

THE following extracts from a letter with which I have been favoured by Dr. Montagne relate to a subject of much interest as regards the physiology of Algæ, and are in themselves so excellent that they cannot fail to be acceptable to many of your readers. The plant to which they principally refer is *Fucus Labillardierii*, Turn., which was improperly referred by J. Agardh to *Sulria*, and has lately been raised to the rank of a genus, under the name of *Ctenodus*, by Kützinger, on characters taken almost entirely from the structure of the frond, without reference to any peculiarities in the fructification. The genus *Calocladia*, Grev., founded upon an Alga supposed to be identical with Turner's plant, though in reality very different, is, it appears, the same with *Delisea*, Lamouroux. Mr. Harvey had ascertained the real

structure of Labillardière's Alga, respecting which he writes to me as follows :—" In a paper which I have had in MS. for the last three years, I have proposed *Fucus Labillardierii* as the type of a new genus, which I purposed to call *Scirospora*. Its fruit is altogether unlike that of any other *Floridea*, and more resembles that of a *Fucoidea* than anything else. It is a receptacle containing a number of cells, each communicating with the surface by a pore, and filled with linear four-jointed sporules!"

Having premised so far, I proceed to my extracts from Dr. Montagne's letter :—

" More than a year since I made an analysis of *Fucus Labillardierii*, of which my specimen left no room for doubt, as it came out of the herbarium of the illustrious traveller. I then discovered the singular disposition of the tetraspores, which has been also recognised, as you inform me, by Mr. Harvey. Soon after making this important discovery, I begged you to procure me, if possible, from Dr. Greville, conceptaculiferous individuals. I then told you that the theory of M. Decaisne must fall before the fact of tetraspores contained in conceptacula exactly after the fashion of real spores, and, what is equally curious, converging as the spores of *Fucaceæ*, from the periphery to the centre. I compared this singular disposition to what I found in my new genus *Nothogenia* (*Chondrus variolosus*, Prodr. Phyc. olim), a *Floridea* in whose conceptacula the true spores are also convergent. I had purposed to dedicate this new genus to Lenormand, who has done so much for science by his bountiful distribution of species in all parts of Europe, but my intention was arrested by the publication of this species under the name of *Ctenodus* by Kützinger. After having described minutely the singular fructification of this Alga in my 'Cryptogamie du Voyage de la Bonite,' which is at this moment in the press, I immediately drew up the article *Ctenodus* for the 'Dictionn. Univ. d'Hist. Nat.,' which is on the eve of being published. I have copied both these articles for you, to make you completely master of a question of great interest. This is much increased by the Alga you have sent me from Dr. Greville. It confirms a doubt which I have thrown out under the word *Delisea* (which is not, however, printed at present), that *Calocladia*, Grev., does not differ from *Delisea*, Lamx. Dict. Class. The Alga, though received from Dr. Mertens, is most certainly not *Fucus Labillardierii*, Turn., but *Delisea fimbriata*, Lamx. There is the same conceptacular fructification as I have figured in my 'Cryptogamie des Canaries' under my genus *Asparagopsis*, and in my 'Cryptogamie de Cuba' under *Thamnophora*; but what will surprise you not a little is that I possess tetrasporic individuals whose tetraspores resemble those of *Ctenodus*, with this difference,—that they are not convergent,

but radiating from a basilar or axillary placenta. These plants agree indeed in external habit and in the form of the tetraspores, though not in their disposition, but their internal structure forbids their association in the same tribe. *Delisea*, by the structure of the frond and conceptacula, must be arranged with *Chondria*; and as *Ctenodus* cannot be arranged in any of the tribes hitherto established amongst *Florideæ*, I am compelled to form a distinct tribe for it, under the name of *Ctenodontées*, on which I purpose shortly to present a memoir to the Institute.

"The tetrasporic fruit consists of oblong or spheroidal, shortly pedicellate receptacles (*polythecia*) situated at the axillæ of the pinnules which fringe its branches. The most curious point is, that these receptacles contain not spores but tetraspores, altogether analogous to the compound sporidia of certain genera of lichens, or even Fungi. I have no hesitation in asserting that this mode of fructification is of very high importance for science and very instructive. The interior disposition of the tetraspores is as follows:—The capituliform summit of the fructifying ramule (or, in other words, the receptacle,) is divided into peripheral, ovoid, or spherical cavities. In a vertical section passing through the axis five or six of these cavities are observed, and the number in the whole receptacle amounts perhaps to fifteen or twenty. These cavities have a great analogy with those of *Fucaceæ*, by the place the tetraspores occupy, by the form of these tetraspores (with the exception of their articulation), and, what is still more worthy of attention, by their convergent direction, which are accompanied by paraphyses, or, in other words, by abortive tetraspores. The question indeed would not be one of analogy but of perfect resemblance, if the spores were simple instead of being compound. Short continuous filaments converging towards their centre proceed from all points of the cavities, at least in the first stages of evolution, for in the adult state the portion of the cavity corresponding with the cortical stratum of the receptacle is unoccupied. The greater part of these filaments, which are clavate and branched at the base only, remain sterile and transparent (*paraphyses*); a few privileged individuals undergo a metamorphose of the granular line which occupies their axis, in virtue of which they become compound spores. At first simple and continuous, oblong and conformable to the tube of the thread which performs the functions of a perispore, the tetraspore is gradually furrowed by three transverse lines, by which at maturity it is divided into four spores. These separate, fall into the cavity, and probably are not dispersed before the decay of the receptacle, for I have not been able to find any pore which may serve as a natural outlet. In this singular fructification we see most evidently that the filaments in

which the tetraspores are developed are the termination and expansion of those which traverse the axis of the frond, and constitute its medullary stratum; a fact which contradicts in the most formal way the assertion of M. J. Agardh, 'Si denique vera sunt quæ de utriusque organi diversitate attulimus, nimirum utraque in eodem individuo nunquam obvenire, evolutionem utriusque esse plane contrariam, alterum vero exterioris strati productum,' &c. (Alg. Medit., p. 62.) On the other hand, it is easy to convince oneself, that from the beginning the compound spore is contained in a linear or slightly clavate filament, and that, though at first simple, it is by insensible degrees only that it is divided into four spores. These at length become free by bursting the common perispore in which they are formed. Would we consider these compound spores as simple spores formed in the endochrome of radiating moniliform filaments, as in the tribe *Spharococcoideæ*, I reply, that the assimilation in question not only appears contestable but is absolutely untenable, since the conceptacula of this last-mentioned tribe offer threads radiating from a sort of basilar or axillary placenta; but we have here a disposition exactly the reverse. I have indeed found something analogous in a *Floridea*, of which I have made a genus, under the name of *Nothogenia*. [Vide 'Ann. d. Sc. Nat.,' Oct. 1843; and plate 10. fig. 3. of the 'Cryptogamic Atlas of the Voyage to the South Pole.'] This Alga presents, like *Ctenodus*, filaments which converge from all points of the conceptacle towards its centre; but as these filaments are articulate and moniliform, the spores contained in each endochrome, of which they are a transformation, are simple and not compound spores; in other words, they are not tetraspores.

"We have then a *Floridea*, containing,—not in a single cavity but in a plurilocular receptacle, which I call *polythecium*, for each of these cavities is as it were an introverted *Namathecium*,—compound spores accompanied by paraphyses, as the simple spores of *Fucaceæ*, or the compound spores or asci of Lichens and of various Fungi, which are isolated at maturity and fall into the middle of the cavity. This curious *Floridea* shows us then—1st, The profound analogy and, as it were, confluence of two kinds of reproductive bodies. 2nd, Their common origin (at least in the present Alga, contrary to the assertion of J. Agardh). 3rd, A second example in *Florideæ* of the convergent direction of the sporiferous filaments,—a direction hitherto supposed to be peculiar to *Fucaceæ*.

"These are the most important observations I have recorded, and you will at once see what bearing they have on the division into Aplospores and Chorispores. I do not recognise a specific difference in the two Algæ which Mr. Harvey has so kindly com-

municated at your solicitation. It would be curious, however, to establish the fact that this Alga has but one form of fructification : we should then have a perfect confluence and assimilation of the two kinds of fruits."

I shall only add, that Dr. Montagne showed me his sketches when I was with him last summer, at which time he had not the slightest notion that Mr. Harvey had made similar observations.

I am, my dear Sir, yours very faithfully,

King's Cliffe, Dec. 15, 1843.

M. J. BERKELEY.

BIBLIOGRAPHICAL NOTICES.

Phycologia generalis ; oder Anatomie, Physiologie und Systemkunde der Tange, bearbeitet von F. T. Kützing. 4to, tab. 80. Leipzig, 1843.

FRIES remarked in his 'Systema Orbis Vegetabilis,' published in 1825, that the study of aquatic Algæ was in the same condition as that of Fungi a century, or that of Lichens half a century before. The characters were principally taken from outward form, without proper attention to differences of structure. It was certainly matter of great difficulty to obtain clear views of structure with the older microscopes, and the analyses by Sir W. J. Hooker given in Turner's 'Fuci,' which were admirable for the time, lost a great deal of their sharpness in engraving, and the greater part of the copies of that excellent work do not exhibit them so clearly as might be wished, the difference between early and later impressions being very considerable.

This opinion of the great Swedish mycologist appeared to many harshly expressed, but it was nevertheless not far from truth, as the labours of modern algologists have clearly demonstrated.

Attention has been drawn to the subject, more especially during the last two or three years, by the memoirs of Decaisne, Chauvin, J. Agardh, Montagne, &c. ; and though these are in many cases accompanied by admirable analyses, a larger mass of illustrations was most desirable, which is exactly what the work of Kützing supplies.

The figures are admirably drawn and engraved by the author himself, and we can answer for their general correctness from having had the advantage of inspecting a large quantity of precisely similar analyses in the herbarium of Dr. Montagne. The engraving is so minute, that frequently it is really useful to examine it with the help of a lens. The illustrations are very various, entering into the most minute details of structure both of the frond and fruit, and where possible of the germination, and they present such a mass of facts and such valuable materials for students as perhaps were never before collected in a single volume.

It is exactly analogous to the work of Corda on Fungi, having the same excellences and the same faults. The text in most cases does not answer one's expectation so fully as the plates would promise. The arrangement on the whole is good and natural ; the prefatory