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Plants' used it for his two subtribes of *Arethuseæ*. I am inclined to re-establish Blume's *Epiphanes*, which differs in habit from *Gastrodia sesamoides*, R. Br., as figured in Hooker's 'Tasmanian Flora.' The fruit, too, seem to be different, though those of the Australian plant are only insufficiently known. *Gastrodia* is said to be epiphytical, whilst *Epiphanes* is certainly terrestrial.

I must leave it an open question whether *G. Javanica*, Lindl., and *G. Hasseltii*, Bl., are distinct species or not, not having that part of Blume's work to refer to. According to the diagnosis in Miq. Fl. Ind. Bat., however, the Griffithian plant should be referred to *G. Hasseltii*, this having a rugulous crista. The characters of the more or less acuminate sepals appear of doubtful importance, our Bengal plants having them both acute and obtuse. Thwaites refers his Ceylon plant to *G. Javanica*, and I think correctly.

If *Epiphanes* should be incorporated with *Gastrodia*, the sections would be better defined by relying upon the situation of the stigma rather than the labellum, as Professor Miquel has done.

Highly interesting are the pedicels of *D. pallens*. Originally they are only 2-6 lin. long, but when the fruit becomes fully ripe, they elongate and are often twice as long as the whole plant. I measured one more than a foot long and rather thicker than the scape. The bracts vary much, and they are largest in the smaller plants.

The plant varies in height from 2 to 10 inches; and if my identification of *G. Javanica* and *Hasseltii* proves correct, it ranges over Java, Bengal, Ceylon, and Coorg.

*Botanic Garden, Calcutta, Nov. 30, 1865.*

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## ON ANADYOMENE AND MICRODICTION, WITH THE DESCRIPTION OF THREE NEW ALLIED GENERA, DISCOVERED BY MENZIES IN THE GULF OF MEXICO.

BY DR. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S.

The subject of this paper has interested me for nearly half a century. I was so struck with the figure of the genus in Lamouroux's work, that I was very anxious to be able to examine it. My late dear friend



Edward Bennett and I, purchased all the "*Mousse de Corse*" we could find in London, and searched it most industriously, but without effect. I was therefore greatly pleased when, many years after, Professor Harvey most kindly gave me a series of the species he had found in Florida, which I could study at my leisure, and I found it as beautiful as I had anticipated.

Having recently had occasion to examine the specimens of the genera *Anadyomene* and *Microdictyon*, in the botanical collection of the British Museum, I was much interested in two specimens which were collected by my very kind friend, Mr. Archibald Menzies, in the Gulf of Mexico, in the year 1802, which appear to this time to have been undescribed. One is allied to, but very distinct from, the genus *Anadyomene* of Lamouroux, and is a giant of the tribe. The other is allied to *Microdictyon*, a genus established by M. Decaisne, but differs from it in the frond being free, and on a filiform conferva-like branched stem, the leaf-like frond bearing a resemblance to the frond of *Struvea* of Sonder and Harvey.

The *Anadyomene* has long been known; it was figured by Dillenius; Wulfen described it as an *Ulva*, and the genus was established by M. Lamouroux as a zoophyte, from some specimens which he found in the "*Mousse de Corse*" in the stock of a druggist in Normandy. It is now well known to be an *Alga*.

The form and structure of *Microdictyon* was well described and figured by Colonel Velley in 1799, and his figure is the best, except Harvey's, that we yet have; but he referred it to *Conferva*—that magazine for the articulated *Algæ*.

Professor Endlicher, in the third supplement to his 'Genera Plantarum,' formed the genus *Anadyomene* into a subtribe, under the name *Anadyomeneæ*, p. 18.

Kützing, in his 'Species Algarum,' 1847, forms of the genera *Anadyomene* and *Microdictyon* a family, under the name of *Anadyomeneæ*, p. 371, referring to it the genus *Talarodictyon* of Endlicher, but with doubt. I do not know the latter genus; indeed, it is only described from a figure in the MS. of *Tilesius*.

Professor Harvey, in his very useful 'Index Generum Algarum,' 1860, refers the genera *Microdictyon* and *Anadyomene* with *Struvea*, as genera of the family *Valoniaceæ*, p. 13.

There can be no doubt that the two genera belong to two very dis-



inct groups, perhaps to distinct families, but this cannot be determined until the fructification and habits of the two genera have been studied; the chief difference between the two groups being that one has the lines of cells united by their sides, so as to form a membranaceous frond, and the other the cells isolated from each other, forming a net with open polygonal meshes, as pointed out by M. Montagne.

There is a certain amount of resemblance between the fronds of the *Microdictyoneæ* and those of *Struvea*; but the cells which form the frond of *Microdictyon* and the stem especially from which the frond of *Phyllodictyon* arises, are much more like the cells of the filament of a *Conferva* than of a *Dasycladus*; on the other hand, *Struvea*, in its structure and mode of growth, is very nearly allied to the unicellular *Algæ*. The stipes and the midrib or axis of the frond is a simple one-celled continuous tube, very unlike the slender articulated stem and midrib of *Microdictyon* and *Phyllodictyon*. Indeed, it appears to me that the stem, the midrib, and the cells that form the reticulation of these two genera are very similar to the cells which form the filament of *Cladophora*, and it would appear that the tribe is more allied to *Confervaceæ* than *Valoniaceæ*.

GROUP I. ANADYOMENEÆ.—*The frond membranaceous, formed of articulated forked or digitate proliferous filaments, the interspaces between the branches filled with polygonal cells.*

This group consists of three genera: one, the *Anadyomene* of Lamouroux; one, very like the former genus in appearance, discovered in Australia by Mr. R. Brown; and the third, founded on a beautiful *Alga*, which the late Mr. Menzies discovered in the Gulf of Mexico, and named *Anadyomene Menziesii* by Dr. Harvey.

This *A. Menziesii* has the interspaces filled up, as in *Anadyomene*, but in that genus the main ribs of the frond are formed of a single series of articulations like a *Conferva*, while in the *Conferva umbilicata* of Menzies the main stem is formed of several transverse series of cells condensed into a midrib, differing in this respect from all the other genera of marine *Algæ*.

The genus is evidently the plant referred to by Professor Harvey in the following terms:—"The largest specimen I possess was given to me by the late Mr. Menzies, as having been dredged in twenty fathoms in the Gulf of Mexico. This specimen measures 6 inches, and its



venation offers some peculiarities which perhaps may lead to its specific separation. In our Key-West plants the seriated cells of the principal veins stand apart from each other, or are in single file, having wedge-shaped spaces between. In Mr. Menzies' specimen the principal veins are partly unicellular, partly formed of several parallel closely-placed cells without interspaces; the structure is easily seen, but difficult to describe in intelligible language. Should subsequent observation establish this plant as a species, it may be called *A. Menziesii*." (Harvey, *Nereis Boreali-Americana*, iii. 50.) I did not discover this observation until after I had described the genus; and I may observe that the simple series of cells is only found, in the larger specimens in the British Museum, in one or two of the smaller lateral branches near the circumference of the frond; all the others are formed of fan-shaped series of cells, from three to five being in each cross-series, and I am more confirmed in this opinion, as I believe there are more than one species of the same form with the typical *Anadyomene* from very different localities, which may be characterized by the form of the cells, and all these species agree in having the main stem formed of a single series of cells very unlike the many-cellular midribs of Mr. Menzies' species from Mexico.

It is to be observed that Montagne, when he first observed the *Microdictyon*, called it a second species of *Anadyomene*, and the character that he gave to distinguish the species was used by Decaisne to separate the two genera, and it is quoted by Kützing as the specific character of the species of *Microdictyon*, although it was drawn up to distinguish it from *A. stellata*.

I may perhaps be regarded as unwise in forming a genus of a plant that Professor Harvey regards even as a doubtful species. I have not done so without great consideration; but when I know that there are at least four, if not more specimens of Mr. Menzies' Mexican plant in collections, viz. the one in the British Museum, one at Kew, one in Dr. Harvey's collection at Trinity College, Dublin, and one or more in Mr. Menzies' own collection, which he left to the Edinburgh Botanic Garden, I cannot but regard it as a distinct form; indeed, Professor Harvey, in a note lately received from him, admits its being so.

Now, if it is a distinct plant, as it presents a very different organization to the other species, which it undoubtedly does, surely that is enough to form it into a genus. I believe that it is a genus likely to meet with



the approval of botanists, or I should not give to it the generic name of *Grayemma*, which, at the suggestion of Mr. Bennett, I propose to do,—that being a combination of the two names of my wife, who has been my companion and helper in all my studies for forty years, and who has some claims to be regarded as a botanist, as for several years she has studied seaweeds not only in the herbarium but in the living state, and has acquired such a knowledge of them that the late Sir W. Hooker entrusted her to arrange the British *Algæ* in the Kew collection; and Mr. Bennett, first to arrange the British, and then the general collection of *Algæ* in the Herbarium of the British Museum. The combination of the two names as a generic one is almost a novelty, but it appears to me that the termination of *-emma* is as pleasant-sounding as the usual diminutive of *-ella*, and in this case more determinative. The name of *Grayia* has been already used in honour of Professor Asa Gray.

#### SYNOPSIS OF THE GENERA.

Genus 1. CALOMENA.—Filament of frond formed of linear joints, furcately-branched to the end of the frond; disk of the frond minutely cellular.

Genus 2. ANADYOMENE.—Filament of the frond formed of ovate cells with diverging cells on the tip, some of which are proliferous, and with cells on the sides; the disk of the frond with regularly disposed small cells.

Genus 3. GRAYEMMA.—Midrib of the frond formed of several parallel series of cells, the terminal bearing radiated cells on their tip, and the disk of the frond formed of diverging cells.

#### Genus 1. CALOMENA.

The frond coriaceous, flabellate, imbricate at the base, formed of a succession of single elongated cylindrical cells which separate at the tip into two or rarely three similar cells, and forming a succession of forked (rarely at the lower part of the frond trifid) branches to the margin of the frond; the cells diminishing in length as they approach the margin; the interspaces between the cells minutely cellular.

This genus is most distinct from *Anadyomene*. It is like the furcately-branched *Valonia*, called *Ascothamnion*, expanded and united together into a frond, but the disk of the frond shows none of the



beautiful regularly-placed cells that are to be seen in *Anadyomene*. This genus resembles *Udotea* in the form of its filaments, but differs in the branches being separated by a cellular expansion of the frond, instead of being close side by side. In this respect it is intermediate between *Udotea* and *Anadyomene*.

1. *C. Brownii*, n. s.

HAB. Australia, *R. Brown* in Brit. Mus. A small fragment in my own collection from among Australian weeds. I have sent a portion of the latter to Dr. Harvey for his herbarium at Trinity College, Dublin. This is not the *A. plicata* of Agardh, described as having only a few cells of large size.

Professor Agardh describes another species, with doubt, under the name of *A. obscura*, thus:—"fronde cuneata, venis obsoletis, in mari australi ad insulam Graham; specimen dedit Gaudichaud. *Radix* subglobosa. *Frons* ex angustiori basi (quasi stipula) dilatata, cuneata, longitudine digitalis, unciam lata, sublobata; venæ uniplicatæ, sparsæ, obsolete rubræ. *Color* viridescens, luridus; substantia stipitis firmior, crassior, partis superioris membranacea."—*C. A. Agardh, Species Algarum*, i. 400 (1823); *Kütz. Spec. Algarum*, p. 511.

This may be allied to *Calomena*.

## Genus 2. ANADYOMENE.

The frond flabellate, stipitate, often imbricate at the base, formed of a succession of single ovate cells with minute cells in the interspaces; midrib trifid or radiately branched; the primary cell with a series of diverging cells at the tip like a fan, all or three or five of the largest of which bear at their tip a similar series of diverging cells and branches. The upper part of the side of the main cells with a series of small cells on each side placed at right angles with the main cell; the disk of the frond formed of numerous small cells; the margin of the frond formed of fan-like series of cells.

*Anadyomene*, Lamouroux, Pol. Flex. 365; Agardh, Spec. Algarum, 401; Kützing, Phyt. Gener. 254; Species Algarum, 511; Harvey, Nereis Bor. Am. iii. 49.

This genus appears to have a very extensive distribution; Wulfen and Lamouroux found it on the coasts of Europe, Webb and Berthelot at the Canaries, Professor Harvey in Australia, Gaudichaud in Rawak and the Sandwich Islands, La Sagra in Cuba, and Martius in the



Brazils. It is to be regretted that the specimens from these different localities have not been critically examined.

Dr. Harvey's character is excellent, viz. root fibrous; frond stipitate, membranaceous, leaf-like, flabellately veined; the veins confluent, radiating from the base to the margins pedately multifid, excessively branched, and everywhere closely anastomosing; fructification unknown.

"As Professor J. Agardh remarks (Alg. Medit. 24), it is related to *Valonia*, from which it differs chiefly in the lateral cohesion of the branches of the generating filament, and to which it bears the same relation that *Codium* does to *Vaucheria*. It is still more nearly related to *Microdictyon*, where the frond orms an open network." Harvey l. c. 49.

Professor Harvey gives an interesting account of the development of the Florida specimens in his 'Nereis Boreali-Americana,' vol. iii. 49.

1. *A. stellata*; frond coriaceous, the cells ovate, narrow at the base, with several diverging cells at the tip, some of which elongate, and are proliferous at their apex; the upper part of the sides of the basal cell, with some large cells placed at right angles with the principal cells; the frond between the main fibres formed of numerous variously-sized cells. — *Lichenoides gelatinosum tenue reticulatum*, Dillen. Musc. 138. t. 19. f. 21. *Ulva stellata*, Wulfen, Cr. Aquat. 6; Jacq. Collec. i. 321; Roth, Cat. Bot. ii. 243, 325. *Anadyomene flabellata*, Lamx. Pol. Flex. t. 11. f. 3; Bory, Nouv. Fl. Pélop. 78. t. 41. f. 5; Kützinger, Sp. Alg. 511. *A. stellata*, C. A. Agardh, Sp. Alg. i. 400; Syst. 191; Mart. Fl. Bras. i. 25; Montag. in La Sagra, Cuba, 22; Webb and Berth. Fl. Canar. iv. 180.

HAB. Mediterranean, *Wulfen, spec. in Brit. Mus.* Coast of France, *Lamouroux*.

Var. *Floridana*; larger; midrib more branched; cells oblong, more ovate, not so narrow below.—*A. flabellata*, Harvey, Nereis Boreali-Americana, iii. 48. t. 44; excellent.

HAB. Florida: Key West, *Herb. Harvey and Gray*.

I am by no means certain that the specimens from the coast of France, Florida, Cuba, and Brazil, combined in the above synonyma, are the same species, but I have not sufficient specimens at my command to determine the question.

I have only seen two small fragments of Wulfen's from the Mediterranean that were given to the Banksian collection by Dawson Turner,



and a series of specimens from Florida collected by Professor Harvey, which he most kindly presented to me.

If I could regard these Mediterranean specimens as fair types of the plant usually found there, I should decide that it was distinct from those from Florida. These small fronds only contain a very few large cells, very different in this respect from the Florida specimens, but, on the other hand, the specimen figured by Lamouroux, found in the "Mousse de Corse," more nearly resembles those from Florida, and one can hardly believe that the *Corsican Algæ* he examined could have come from the coast of America.

2. "*A. plicata*; frond plicate; veins subtrichotomous."—C. A. Agardh, Sp. Alg. i. 400; Kützing, Sp. Alg. 511.

HAB. Island of Rawak, *Gaudichaud*.

"Differt a præcedente (*A. stellata*) statura minore, fronde maxime plicata, *venis paucioribus* trichotomis, cum in illa frons tota venis occupata est, hæc magis continua venis quibusdam membranam percurrentibus; habitus omnino *Collematis*."—C. A. Agardh, *Species Algarum*, i. 400, 1823.

3. *A. Cutleriæ*; frond membranaceous; the cells oblong, nearly as wide at the base, with several diverging cells at the upper part, each bearing a similar series of diverging cells at the apex; the frond between the main cells filled up with one or two series of large cells at right angles with their margin.

HAB. Bermuda.

Described from a fine specimen received by Miss Cutler from Bermuda, and presented by that lady to me with the rest of her exotic *Algæ*. I have divided the specimen between the British Museum, Dr. Harvey, and my own collection.

4. *A. Wrightii*; frond imbricated, coriaceous; joints linear-elongate, several times longer than broad, with a radiating group of cylindrical branches at the tip, two to four of which are longer than the rest and proliferous at the tip; the branchlets near the margin five or six, shorter, radiating, of nearly equal length; the interspaces between the branches wide, and filled up with small subequal cells.—*A. Wrightii*, Harvey, mss.

HAB. Loochoo Islands, *C. Wright*, *King's and Rogers's Exploring Expedition*, 1853 and 1856.

Professor Harvey most kindly sent me this species to compare with



*Anadyomene Brownii*. Its study induces me to propose to divide the genus into two subgenera, thus :—

1. The cells of main stem linear; interspaces between the main filaments and cells close on their sides, filled up with nearly equal-sized minute cells.—STENO CYSTIS, for *A. Wrightii*.

2. The cells of main stem ovate; interspaces between the main filaments filled up with large very different-sized cells.—ANADYOMENE, for *A. stellata* and *A. Cutleriæ*.

*Stenocystis* is somewhat intermediate between *Anadyomene* and *Calomena*, but it evidently belongs to the genus to which I have referred it, as instead of the main filament being only forked, it is provided with radiating cells at the top.

### Genus 3. GRAYEMMA.

Frond fan-shaped from a central root; the main stem and branches in the centre of the frond and lobes formed of three or four parallel close series of short cells in transverse bands.

This genus is very different in its structure from *Anadyomene*. In the latter, the series of cells that form the axis of the frond and its lobes is single, one cell on the end of the other like a *Conferva*, the end cell being crowned with a radiating group of cells.

In *Grayemma* the frond and its lobes are supported by a broad midrib, which is formed of several close parallel longitudinal series of cells, the cells on the side of the midrib giving off radiating groups of cells. The end of the midrib is branched, and is elongated by the development of a radiating group of cells at the end of the former one, and this is how the many series of cells in the midrib are formed, and why they look like what they really are, a continued succession of radiating groups of cells forming a thick midrib; the parietes of the cells are so thin that in the dry specimen the outer surface of the cell is sunk in leaving the side-margin elevated; from the side of the midrib arises a group of diverging cells, and on the apex of these are formed another series as the frond enlarges: thus the branches on the midrib are gradually formed and lengthened.

The disk of the frond between the midribs is filled up with a very numerous series of cells much smaller in size and more numerous than in *Anadyomene*, consequently there is a much greater difference between



the disk of the frond and the main stems than there is between the cells in *Anadyomene*, which is, as it were, all composed of numerous diverging cells only differing in size.

The cells on the upper part of the sides of the main series in *Anadyomene* are furnished with a series of rather large cells placed at right angles with them; there are only a very few very small cells so placed in *Grayemma*, and they are not to be seen except in a few places on the frond.

If the chain of cells of the two genera are compared, it will be found that in *Anadyomene* each cell gives off at the tip a radiating series of cells, some of which being larger than the rest form a branch which at its apex again gives off a radiating group of cells, some of which are similarly elongated and are proliferous, so that the frond is composed of a succession of trifid and in some rare instances four- or more numerous-divided branches. In *Grayemma*, on the contrary, the series of cells remain unbranched as long as they are parallel, and after being parallel for a time some diverge to the left or to the right, and then form another stem, giving off diverging series of cells.

In *Grayemma* the midribs extend almost up to the edge of the frond with a single group of cells, forming a fan at the top quite close to the edge, which is very different from the structure seen in *Anadyomene*.

All the midribs and branches of the specimens I have been able to examine are formed of several parallel close series of cells, except the tips of some of the smaller branchlets, which consist of a series of two or three cells placed one on the other, and ending in cells diverging from the tip of the last one like a fan, except in two cases, one a slender branch, which starts from the midrib and extends to the margin; this branch consists of a single series of cells as in *Anadyomene*, about twice as long as they are broad; and only giving off a short single branch, not dividing into branchlets as in *Anadyomene*. The second example of a single series of cells occurs in a simple branch that runs parallel to the main stem, and at length becomes united to it, and then assumes a compound form. This branch can only be considered as a series of cells that has been accidentally diverted from its proper position in the growth of the plant, and assumes it again, but it shows that the main stems are composed of many single series of cells united into a bundle to form the thick midribs.



1. *G. Menziesii*.*Anadyomene Menziesii*, Harvey, Boreali-Amer. iii. 52.HAB. Gulf of Mexico, *Archibald Menzies, Esq.*, 1802, in *B. Mus.*

(To be concluded in our next.)

A FEW CRITICAL, LITTLE KNOWN, OR OTHERWISE  
INTERESTING PLANTS.

BY H. F. HANCE, PH.D., ETC.

1. *Capsella pauciflora*, Koch.—This exceedingly rare little thing was first distinguished by the late Professor Koch, who considered it as very different from *E. elliptica*, C.A.M., by its abbreviated few-flowered subumbellate racemes, with a much more slender rachis, its longer fruit-pedicels, and its more branching stem, with the branches bearing from their base leaf-opposed partial racemes. Bertoloni, who belonged to the old school of botanists, and was very cautious in admitting species except on well-marked characters, nevertheless considered this as one, though there is little in his distinguishing phrase (*Fl. Ital.* vi. 572), to support the opinion. I have not access to Hausmann's Tyrolese Flora, and do not therefore know what are his views with regard to this plant; but I am not aware that, since it was first characterized, any botanist has contested its claim to specific rank, except my friend Dr. Ferdinand Mueller, who writes (*Plants Indig. to Victoria*, p. 44, sub *Capsella elliptica*), *C. pauciflora*, Koch, seems merely a few-flowered "variety of this species." A careful examination of excellent specimens from the Val Vestina, in the Italian Tyrol, for which I am indebted to the kindness of Professor Parlatore, certainly inclines me to agree with Dr. Mueller; indeed, I can find nothing noteworthy to separate the two so-called species. It is true that *C. elliptica* is usually taller and less branched from the base, but Heldreich's specimens from the Phaleron, near Athens, are quite as ramose from the very column. With regard to the tenuity of the rachis, and the length of the fruit-pedicels, I can detect no difference whatever between the Tyrolese plant and authentic German specimens of *C. elliptica*,  $\gamma$ . *integrifolia*, given me by Professor Mettenius. The few-flowered racemes, upon which stress is chiefly laid, certainly cannot







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(Concluded from p. 51.)

(PLATE XLIV.)

Group II. MICRODICTIONEMÆ.—*Frond reticulated, formed of a number of regularly-disposed anastomosing cells, leaving four-sided apertures between them, each side being formed of a single cell; the main filament articulated, each joint throwing out opposite branches at right angles to each other, which are similarly branched; the cells containing endochrome.*

I have already stated that I believe this group to be nearly related to *Cladophora* among the *Confervaceæ*.

The filiform stem and the filiform axis or midrib of the frond in both genera give off opposite branches; the midrib and its branches in the frond give off cells on each side, placed opposite each other on the sides of the stalk, and the spaces between these cells are filled up with cells like those of which the joints of the filament are composed, making the whole frond into a beautiful net with polygonal open meshes.

M. Montagne figured *A. Calodictyon* on t. 8. f. 1 of Webb and Berthelot's work, 1850. He observes, "La couleur et la nature des filaments articulés et anastomosés qui forment toute cette algue ont beaucoup d'analogie avec celles des filaments de la *Conferva prolifera*; je vois quelque analogie entre ce genre et le genre *Flabellaria*, Lamx., que je crois très-bon à conserver." M. Montagne figured a central part of the *Alga*, and also a part near the circumference of the frond, showing that the terminal ramifications are free, forming "un bord déchiqueté et frangé," gradually anastomosing upon it; see t. 8. f. 1. *c'*, *c''*.

The group consists of two genera:—

Genus 1. MICRODICTION.—Frond funnel-shaped or lobed, and proliferous, attached by a subcentral disk; the main filament radiating from centre to centre.

Genus 2. PHYLLODICTION.—Frond oblong, free, arising from a



slender branched articulated filament; the main filament simple or forked.

### Genus 1. MICRODICTYON.

The frond broad, expanded, concave, umbilicate; affixed by a central disk, often proliferous, supported by slender articulated filaments, which give off branches radiating from one centre to another, forming a large network, the intermediate spaces between the filaments being filled up with a network of anastomosing cells, each side of the mesh being formed by a single cell.

*Microdictyon*, Decaisne, Arch. du Mus. ii. 115; Kützing, Syst. Alg. 511.

This genus has an extensive geographical distribution; specimens have been described from the Canary Islands in the Atlantic, the Red Sea, the coast of Natal, and various parts of the Australian seas.

“*Microdictyon* is generally a deep-water production, lying at the bottom in 5–10 fathoms, but it sometimes occurs at low-water mark. The species of it are all very similar to each other, and have been found in the tropics of both hemispheres and in the Mediterranean; one is very abundant in Port Jackson, Australia.”—*Harvey, Nereis Bor. Amer.* iii. 402.

Dr. Harvey, in his generic character, describes “the endochrome as green, thin and watery.” Probably he is the only algologist who has observed them growing.

Montagne, in his text to Webb and Berthelot’s Hist. Nat. des Iles Canaries, vol. v. 180, describes two species of *Anadyomene* under the name of *A. stellata* and *A. Calodictyon*, and in his specific characters of these species gives the generic distinction of the genera *Anadyomene*, Lamouroux, and *Microdictyon*, Decaisne, viz. “Venis membrana tenuissima connexis,” and “Venis membrana nulla connexis.”

M. Decaisne proposed the genus *Microdictyon* in a paper on the specimens collected by M. P. E. Botta in Arabia Petræa, in the ‘Archives du Muséum,’ vol. ii. 115, 1841, for a species which he calls *M. Agardhianum* found in the Red Sea near Djedda. He observes, “C’est à ce genre et peut-être à la même espèce qu’il faudra, ce me semble, rapporter l’*Anadyomene Calodictyon*, Montagne. S’il n’en était pas ainsi, le genre *Microdictyon* se composerait de trois espèces, l’une



anciennement décrite par Velley et dont le Muséum possède un fragment rapporté des Iles Sandwich par M. Gaudichaud, à laquelle on pourrait appliquer le nom spécifique de *Velleyanum*, pour rappeler celui du botaniste qui le premier l'a bien fait connaître; l'autre, signalé comme variété du *C. umbilicata*, par M. Agardh, conserverait le nom de *M. tenuius*. Ces changements me paraissent d'autant plus motivés que le caractère tiré de la fronde ombiliquée peut s'appliquer indistinctement à chacune des espèces, aujourd'hui connues, et qui sont : 1. *Hydrodictyon umbilicatum*, var. *tenuius*, Ag. Syst. Alg. 85; 2. *Conferva umbilicata*, Velley, Linn. Trans. v. 169. t. 7; 3. *Anadyomene Calodictyon*, Mont. Pl. Cell. Canar. 180." In the Ann. des Sciences Naturelles, série 2. xvii. 327, M. Decaisne quotes—1. *M. Agardhianum*; 2. *M. Velleianum*; 3. *M. tenuius*.

Endlicher, in his 'Mantissa Botanica, sistens Generum Plantarum Supplementum Tertium,' 1843, places the genus *Microdictyon* with the genera *Hydrodictyon* and *Talarodictyon*, in the family *Hydrodictyæ*, but the fructification of *Microdictyon* is unknown, and there is no reason to believe that the cells produce perfect netted plants as in the freshwater genus.

Endlicher also refers to the genus *Dictylema* of Rafinesque, *Somologia*, n. 54, as a synonym of the genus.

Professor Endlicher refers to three species of the genus:—

1. *M. Agardhianum*, Dec. 64.—*Hydrodictyon umbilicatum*, var. *tenuius*, Agardh, Syst. 85. Mare Rubrum.

2. *M. Velleyanum*, Decaisne, l. c.—*Conferva umbilicata*, Velley in Linn. Trans. v. 169. t. 7, ad insulas Sandwichenses.

3. *M. Montagneanum*.—*Anadyomene Calodictyon*, Montagne, Flora Can. Plant. Cell. 180. Mare Atlanticum.

It is to be observed here, that though the names of two are quoted as Decaisne's, he has changed two of them.

M. Decaisne, in his paper above quoted, believes there are three species, but he does not attempt to give any characters to distinguish them, except the localities where they are found; and Professor Harvey, though he found three species, gives a name only to one of them, which he regards as similar to those described by Montagne from the Canaries. Kützing, in his Species, in p. 512, gives specific characters for *M. Agardhianum* and *M. Calodictyon*, copied from Montagne, who gives it to distinguish from his *Anadyomene*. Unfortunately I am



not able to examine either the species discovered by Botta in the Red Sea or the one found in the Canaries, as there are no specimens of them in the British Museum or my own collection, which only contains the species discovered in Natal by Dr. Krauss, and the three species collected by Professor Harvey in Australia and the Tongan Islands.

The four specimens in the British Museum appear to be very distinct species, but it is very difficult to distinguish them in words; this difficulty partly arises from the very imperfect state in which they are,—a defect generally incidental to Chlorospermous *Algæ* in a dried state, and especially to *Algæ* of such a tender and fragile nature as the genus under consideration.

In the following schedule I commence with the three species named by Decaisne, of which I know nothing except what is contained in the works quoted.

\* *Fronde umbilicate, affixed by the centre.*

1. *M. Velleyanum*; frond expanded, fan-shaped, fixed in the centre; filaments very minute, slender; cells longer than broad; the colour blackish when dry, sombre green when fresh.—*C. umbilicata*, Velley, Linn. Soc. v. 169. t. 7. (1799). *Hydrodictyon umbilicatum*, Agardh, Syst. 83. *M. Velleyanum*, Decaisne, Arch. du Mus. ii. 117 (1834); Ann. Soc. Nat. ser. 2, xvii. 327; Endlicher, Mantissa, ii. 1843. *M. Agardhianum*, Decaisne; Harvey, Algæ Austral. Exsiccatae, n. 568.

HAB. Australia: New South Wales, on the stem of a large fucus, Governor Hunter, *Velley*; Harvey, 'Phycologia Australica,' t. 50. Sandwich Islands, *Gaudichaud*; abundant in Port Jackson and Parramatta River, *Harvey*.

Decaisne established this species from Colonel Velley's figures and descriptions, and from a fragment that M. Gaudichaud brought from the Sandwich Islands, which is in the herbarium of the Jardin des Plantes at Paris.

2. *M. Calodictyon*; filaments moderately thick.—“Fronde solitaria, suborbiculari e viridi fusco nigrescente, cribrosa, margine dissecta lobataque; venis quinque, mediis erectis, binis inferioribus patentibus (vel deflexis) membrana nulla annexis. *Discus* mamillatus scutatus, excentricus, hinc *Alga* umbilicata. *Frons* solitaria, planiuscula, diametro uncialis, margine erosa et irregulariter dissecta, tenuissima, tota venis compositis, pellucidis, confervoideis, primariis quinque, quorum tres medianæ exsertæ, binæ venæ inferiores horizontali-patentes cum secundariis quam



plurimis inter seseque anastomosant, nec ut solenne est in congeneribus membrana ulla conjuncta sunt.—*Montagne in l. c.* *A. Calodictyon*, Montagne in Webb and Berthelot, Fl. Canar. iv. 180. t. 8. f. 1 (1850). *M. Agardhianum*, Decaisne, Arch. du Mus. ii. 115, 117, not Endl. *M. Montagneanum*, Endlicher, Mantissa, ii. 14. *M. Calodictyon*, Decaisne; Kützing, Sp. Alg. 512.

HAB. Atlantic Ocean, Canaries, *Webb and Berthelot*.

2. *M. Montagnei*; filaments moderately thick, the colour white or yellowish when dry.—“*Microdictyon Montagnei*,” Harvey, Algæ Insul. Amicorum Exsicc. n. 89.

HAB. Friendly Islands, *Harvey, Herb. Brit. Mus.*

The specimen of *M. Montagnei*, no. 89, from Professor Harvey's collection, of specimens of Australian *Algæ* in the British Museum, is very distinct in the large size of the cells, in the distribution of the branches, and in the colour of the dried specimens, from the other Australian and the Natal specimens in the Museum.

3. *M. Kraussii*; filaments very slender, filiform; frond flat, divided into wedge-shaped lobes from a central disk, having several more or less imbricate lobes at the centre; colour blackish when dry; *Calodictyon*.—*M. Velleyanum*, “Decaisne;” Krauss, Pflanzen des Cap- und Natal-landes in Flora, 1846, 215, “in Batav. 210.”

HAB. S. Africa: Natal, *Krauss*, n. 273, *Herb. Brit. Mus.*

\*\* *Frond flat, foliaceous, imbricate at the base.*

4. *M. tenuius*.—*Hydrodictyon umbilicatum*, var. *tenuius*, Agardh, Syst. Alg. 85. *M. tenuius*, Decaisne, Ann. Sc. Nat. 2 ser. xvii. 327. *M. Agardhianum*, Endlicher, Mantissa, 14, not Decaisne.

HAB. Red Sea, Djedda, *Botta, Herb. Paris.*

“The specimens from the Red Sea are smaller than that described by Velley, forming a kind of simple, foliaceous, flat expansion, at the centre of which grows a considerable number of lamellæ.”—*Decaisne, Arch. du Mus.* ii. 116.

## Genus 2. PHYLLODICTYON, n. g.

The frond oblong, free, lobed or confluent?, arising from a slender-branched articulated filament; the basal filament elongate, with opposite branches, each ending in a frond with a central rib, giving off close opposite branches at right angles to the main stem and each other.



This genus is described from a single specimen in the British Museum, collected by Mr. Menzies; it has evidently been torn by the waves on the edges, and is not in such a good state as one might wish. There are three, or rather the parts of three, oblong fronds, a smaller one from each side of the base of the larger, each of the three supported by a thin articulated filament, arising from an elongated stem an inch or so in length, with opposite branches.

As fixed on the paper with gum, the three fronds seem to coalesce at the edge, where they touch or overlap, but this may be only from the manner in which the specimen is mounted, and I fear that if it were attempted to be re-spread, the specimen might be injured, so we must wait until more specimens are obtained to settle the form of the edges of the frond and other particulars relating to it.

There can be no doubt that its habit is very different from that of the species of the genus *Microdictyon*, and that it is a beautiful *Alga*.

I can hardly understand how it has remained so long undescribed, but I cannot find any reference to it in any work within my reach.

1. *Phyllodictyon pulcherrimum*.

HAB. Gulf of Mexico, *Archibald Menzies, Esq.*, 1802, *Herb. Brit. Mus.*

The fronds are ten inches long and about three inches wide.

The *Cladophora* (?) *anastomosans*, Harvey, 'Phycologia Australica,' t. 101, is nearly allied to this genus. It must form a genus to which the name of *Pterodictyon* may be applied. It differs from *Phyllodictyon*, in which all the joints of the oblong frond are of nearly the same length, in the broad triangular shape of the frond, produced by the different length of the joints of the stipes and of the main branches. These joints gradually and regularly diminish in length as they approach the margin of the frond, "the former is stipitate, dichotomously bi-tripinnate, the pinnæ and pinnulæ opposite and horizontally patent, the alternate pinnules here and there anastomosing," and "arising from a wall of *irregular* branched filaments." Dr. Harvey believes the single specimen described and figured, which was cast ashore near Fremantle, Swan River, to be the young state of a species that is more netted in its adult age; the form of the frond and the length of the basal joint cannot be altered in the growth, and therefore *Pterodictyon anastomosans* must always be easily distinguished from *Phyllodictyon*.

Dr. Harvey mentions *Cladophora composita*; this is a section of the



genus, or a species, that has neither occurred to me in any work nor herbarium.

#### ADDITIONAL NOTES ON ANADYOMENE.

Since the printing of the first portion of this paper, Dr. Harvey has kindly sent me some notes on it, and some additional specimens for my collation and for examination.

His specimen of *Grayemma Menziesii* is much smaller than the one in the British Museum, and a considerable number of the filaments are formed of a single series of cells, but all these simple lines of single cells are continued for the length of several cells, without giving out any branches; they terminate in three or four equal cells, which are continued side by side according to what I consider the normal structure of the plant, or, after one or two such groups of cells, they split off again into long threads, formed of a single series of long linear cells, one on the end of the other. These varieties confirm me in the distinctness of the plant as a genus for the *Anadyomene*.

Dr. Harvey has also sent me some specimens of an *Anadyomene* from West Florida and from Bermuda, which certainly show that this species is variable in the size and form of the cells; and there is one specimen which seems in his opinion to combine the two species. He says the soft rigid state of the frond depends partly on the age of the specimen, partly on the length of time it is steeped in fresh water, and partly on the manner of drying. "The Key West plants, which are as common as *Ulva* are here, also differ greatly in the length of the joints of the generating filaments in different parts of the plant."

Amongst the specimens which Dr. Harvey has so kindly sent me is one named "*Anadyomene* (?) *Leclancheri*, Decaisne," from the Sooloo Archipelago. This plant shows that the characters which I have given to the tribe must be modified, and that the genera should be arranged into two groups, the *first* containing the genera I have described; they have the interspaces between the generating filaments filled up with smaller cells, making a continuous frond. The *second* has part of the interspaces between the filaments void, forming a netted frond, pierced with roundish holes or spaces between the meshes.

The *Algæ* of this group, though it has the netted frond, as in *Microdictyon*, cannot be confounded with that genus, as the mesh is formed of many different-sized and very variously-disposed cells, some



of them radiating from a centre, while in *Microdictyon* each side of the mesh is formed of a single conferva-like cell.

On this account I propose to call the genus *Cystodictyon*.

#### CYSTODICTYON.

The frond netted with rounded holes or spaces between the meshes, formed of elongate subcylindrical joints, giving out at certain distances a radiating fan-like series of cells, the interspaces between the longitudinal filament and the fan-like cells being filled up with unequal small cells.

*Cystodictyon Leclancherii*, t. f.—*Anadyomene* (?) *Leclancherii*, De-caisne.

HAB. Sooloo Archipelago, *Herb. Harvey and Gray*.

#### EXPLANATION OF PLATE XLIV.

Fig. 1. *Grayemma Menziesii*, nat. size; 2, magnified section of ditto; 3, magnified section of *Calomena Brownii*; 4, magnified section of *Anadyomene Cutleriae*; 5, magnified section of *Anadyomene Wrightii*; 6, magnified section of *Cystodictyon Leclancherii*.

### THIRSK BOTANICAL EXCHANGE CLUB.

(CURATOR'S REPORT FOR 1865.)

BY J. G. BAKER, ESQ., AND WILLIAM FOGGITT, ESQ.

As in previous years, we propose to give here a brief notice of the more interesting plants that have come before us during the past year, restricting such notice, as will be seen, to plants of which specimens have passed through our hands, notable either on the score of critical interest, or as having been found in tracts whence they are not registered in the 'Cybele Britannica' and its Supplement.

*Thalictrum flexuosum*, var. Through the kindness of Mr. William Richardson in sending a bundle of roots and living specimens of the *Thalictrum* of the exposed basaltic crags of Kyloe, near Belford, Northumberland, we are enabled to furnish the following description:—Stem 1 foot to 18 inches in height, green or purplish, leafy to the base, zigzag, hollow in the centre, not compressible, subterete, hardly striated towards the base, but marked in the upper part, especially below the sheaths, slightly glandular. Lower stipules with adpressed, upper with reflexed auricles. Leaves bipinnate; the leaflets pale green