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phanee by Hampe are characterized, just as in the Sphagnece, by peculiarities in the structure of the leaf, which consists of two different species of cells, some narrow and filled with chlorophyll, others wider, transparent, and perforated with pores which afterwards pass into holes. The differences depend, with the exception of the structure of the sides of the cells, particularly upon the arrangement of these two species of cells. In Sphagnece both lie more or less in one plane, and so form but one layer, of which the whole leaf consists; in Leucophanee the green cells are always covered on both sides with 1, 2, or 3 layers of the large transparent perforated cells. From this arrangement, by which the green cells are greatly obscured, results that glaucous colour which characterizes the whole tribe at first sight, together with its peculiar quickly drying and brittle as well as moist and flexible habits.


July 25, 1838.—Late in the autumn of 1837 I observed patches of a singular looking blueish green scum at the edge of Ballydrain Lake—a beautiful and picturesque sheet of water situated a few miles from Belfast*—but being hurried at the time, I did not procure specimens for examination. This I had intended to do a few days afterwards, but circumstances prevented its accomplishment at that time, and when I soon afterwards returned the plant had disappeared. On visiting

* Ballydrain Lake covers about twenty acres of a sandy and peaty soil, and its elevation above the sea is perhaps forty feet. It is of various depth, is fed by springs, and has an outlet in but one small brook. During winter it is the daily haunt of great numbers of wild fowl (Anatidae) of various species, that resort to it as a secure asylum; and I am happy to say not in vain, for agreeably to the good taste of its proprietors, a shot is not permitted to be fired upon it; but, notwithstanding, these most attractive birds have been on the decrease for the last few years. In fishes, mollusca, or other plants than those here treated of (unless more microscopic species remain to be discovered), it possesses no peculiarities. Myriophillum, buck-bean (Menyanthes), and the larger phenogamic plants generally, have much increased of late years, to the detriment of pike-fishing, the vegetation near the edges being so dense as to conceal the bait placed on night lines for the capture of these fish.
the lake today for the purpose of investigating this *Alga*, for to some minute tribe of this order of plants I was satisfied that the substance noticed did belong, I found that the whole body of water was tinged with a dull faintly glaucous hue. On going out in a boat to ascertain the cause of this appearance, I saw that the water was everywhere filled with extremely minute particles, which might be compared to the motes in a sun-beam. To the unassisted eye they seemed as delicate as the finest human hair and of a spiral form: with the aid of a lens they were seen to be a vegetable production. Around the boat, which was stationary, their motion was not very rapid, but those on the mere surface moved in an opposite direction from the particles beneath, and the latter the more quickly. Their present appearance, together with the recollection of the floating masses observed last autumn, at once brought to mind the *Oscillatoria aerugescens* discovered in 1837 by my friend Dr. J. L. Drummond in Glaslough (county of Monaghan*), and where, as in the present instance, that plant performs a similar part in giving a colour, &c. to the water. Until the microscope be resorted to, there seems indeed the strongest analogy between them, but this instrument proves that the alga under consideration does not belong to the genus *Oscillatoria*.

On inquiry from some relatives, whose demesne is situated on the borders of the lake, I learned that the appearance described had been observed only for the last four or five years, and for about three months in each year: one of my friends had looked upon its approach with dread, as it interfered so much with his angling that during the period of its continuance this sport had to be abandoned. Eels, pike, and perch, especially the latter, are abundant in the lake, but when the water is clouded by this plant, the diminution in the number of perch taken is said to be not less than about one to fifty—the difference is attributed to the fish being unable to see the bait. About the 1st of this month I am informed that the water was perfectly clear.

July 30.—I visited Ballydrain and found the entire lake tinged with this plant, but unequally so; in some parts, where

* See Annals Nat. Hist. vol. i.
the water was two feet deep, the bottom could be seen; in others it was invisible at one fourth of this depth: at the lee-ward and windward sides there was but little difference, except that at the latter it was occasionally observed to give a pale green tinge to the surface, where the water circling gently in, congregated it together and threw it thence in a broken cloudy form for a moment, when it was again dispersed: since the 25th I should say that it has increased by at least one third. The lake has at first sight the appearance which Dr. Drummond ascribed to Glaslough, of being “greened” by the reflection of trees: from eminences at some little distance the green tinge of the water is most conspicuous, and particularly so at the further side. In some places the colour is of a pale dull green, in others greenish brown; thus imparting to this fine sheet of water, in place of its wonted appearance of coolness and freshness, the dull dead aspect of a Dutch canal.

When viewed at the distance of a few paces from the margin the plant is apparent during sunshine, as it likewise is at such times in water lifted in the hand*.

Sept. 16.—I again went to the lake, and found it to be much more densely coloured than on the 30th of July. The day being perfectly calm, the surface of the water was covered to some extent, where the depth appeared to be about five or six feet, with an alga of a pale but rich green hue. When attentively observed it was seen moving in currents presenting the form of what is technically called “the feather” in the most admired mahogany, now moving round a centre or “knot,” and again diverging from it rapidly and in the most graceful forms, the water appearing through the moving masses of the plant so as to take the place of the darkest hues and knots in the wood. It was perhaps an appearance similar to this, that MM. Engelhardt and Treschel have described the Oscillatoria rubescens,—a minute alga which tinges with a red colour the lake of Morat in Switzerland,—occasionally to assume, when,

* A quantity of the alga brought home today in a phial of water remained scattered through it for twelve hours; in twenty-four it had all risen to the surface: in another instance it on the third day covered the bottom of the vessel.
to use their own words, it presents "figures assez semblables à celles produites par l'électricité positive sur l'électrophore*."

In sheltered places there were floating pale blue tufts or small masses, such as I saw here last autumn; but endeavouring to secure them by carefully putting beneath a sheet of paper on which to lift them, I was surprised to find, that notwithstanding their apparent consistency, they floated off in the water with which they were brought up, not even leaving behind a tint of their colour. Some specimens from deep water, brought home today, when viewed under the microscope, exhibited precisely the appearance the plant did in July.

Sept. 26.—On visiting the lake this afternoon, which was fine, though dull and without sunshine, (as the earlier part of the day had been,) I remarked that the water generally had lost some degree of its opacity and looked clearer than on the 16th. Instead of the beautiful appearance which the surface presented upon that day, there was in some places merely a little scum, which excepting its very pale greenish tinge, resembled precisely the appearance remaining on the surface of water in which ice has been dissolved. Towards the edge of the lake, there were in some places, as on the 16th, gelatinous tufts of a pale blue colour; in one place crowded together in a mass which covered an area a few yards in extent. These were generally of greater consistence than on the 16th. The portion nearest the edge had, apparently from decay, become ferruginous, and strongly tinged with rust colour the paper on which it was placed, but with the greatest pains I could hardly obtain a trace of the blue colour. The masses, both blue and ferruginous, were very slippery to the touch, about an inch in thickness, and of considerable consistence, more so than sea-jellies or Medusæ generally are, or like that of an oyster; and on being lifted out of the water in a wire-gauze net, remained there without diminution by dripping off or otherwise: their weight too was great. When brought near they had somewhat of the offensive smell of water in which flax had been steeped, and at a short distance from one part of the lake this disagreeable odour was sensibly perceived.

Sept. 27.—I went out this morning (which was beautiful and with bright sunshine) soon after eight o’clock to observe this plant further, and from a greater display of it upon the surface than yesterday, considered that the heat of the sun might have attracted it thither. I had previously observed, that in perfectly calm weather, it, like the Oscillatoria aerugescens, &c., is disposed to ascend to the surface; it was now evidently beginning to assume the graceful and attractive forms remarked on the 16th. By fixing a phial to my net and skimming the greenish surface with it, I ascertained to a certainty that this surface plant was of the species under consideration. In addition to what was mentioned yesterday of the water of the lake having lost some of its opacity, it may be stated, that where a foot in depth it now in some places is perfectly clear, but in others where it is from two to three feet, it appears when the sun shines upon it of a very pale blue; whether this be an optical deception or be owing to the plant in progress of decomposition, I cannot presume to state.

Oct. 7.—This plant and the Aphanizomenon (hereafter to be particularly noticed), both of which were obtained on the 27th Sept., have now entirely disappeared from the lake, the water throughout its depth as well as at the surface being clear and pure: since the day last named there has been no change of weather to produce this effect, the days having been uniformly warm and fine, and the nights with very little frost for this advanced period of the year.

The following additional notes were made in 1839.

July 3.—I was rowed all over the lake, and observed the alga dispersed throughout the entire water, but rather sparingly, and not to such an extent as to tinge or conceal the bottom in any place; it appeared like metallic points wherever the sun shone upon it; for some weeks it has been observed, and was first noticed about the 6th of June. On the present occasion I had the pleasure of being accompanied by P.J. Selby, Esq. and the Rev. Edward Bigge, of Merton College, Oxford.

Sept. 23.—The lake was quite clear, and in a few places the remains only of the blueish masses which indicate the disappearance of the plant for the season were visible, and these
were in sheltered spots in the midst of a flotilla of *Aphanizomenon*, which was still abundant in a few creeks.

Sept. 25.—With the desire that my friend Mr. W. H. Harvey, now in Dublin, should have the opportunity of investigating both plants in a recent state, I visited the lake in the hope of procuring them. The water looked perfectly clear as on the 23rd, but going into the boat I at once saw on looking down into the lake where the sun struck upon it, that the spiral alga was still there, though very sparingly; I brought some up in phials. The water was slightly agitated today and consequently none of the *Aphanizomenon* was obtained.

I have been thus particular in noting the observations on this plant just as they were made from time to time, chiefly to show that the species undergoes no change whatever either in size or otherwise from its first appearance as a colouring matter until about three months afterwards, when decomposition ensues and it is utterly dissolved. In consequence of the great changes that some species of *Algae* do really undergo, and the conjectures of botanists that others which have not been investigated are likewise subject to them, I took much interest in attending to this point during the time that this alga plays such a prominent part in the waters of the lake.

On examining this plant when first obtained, I could only say that it did not belong to any British genus with which I was acquainted, and no further attention was then given to it. M. Morren, Professor of Botany in the University of Liége, and well known to have successfully studied the freshwater *Algae* of Flanders, on his visit to Dublin in the following month (Aug. 1838) was shown some sketches of the plant which I had communicated to Miss Ball—a lady who has given much attention to the *Algae* of Ireland, and made therein some interesting discoveries—and he referred them to the genus *Anabaina* of Bory St. Vincent. With the genus *Sphaeroplea*, Ag., in its last or free state, my species would however as well agree as with *Anabaina*. Except in the specific difference of being much more minute and more regularly spiral, it resembles the *Sphaeroplea crispa*, Berk.* in this state, but

* The specific characters of this species are—"Threads erect, short, green, mucous, crisp, simple, at first with articulations as broad as long, filled with minute distinct granules, then with parallel rings, which at length become
whether like that plant it be originally fixed I am unable to say.

As my species does not correspond with any Anabaina of Bory’s, I venture to characterize it as follows:

Anabaina? spiralis, mihi. A. consisting of an extremely minute moniliform thread of a rich green colour, and regularly spiral like a corkscrew; globules of equal size throughout its entire length.

The specimens obtained were invariably of similar breadth and rarely presented more than four spiral turns, and when of this size were \( \frac{3}{10} \) of an inch in length. The species at first, when mingling with the water, is of a dark green colour: when in calm weather it ascends to the surface in separate particles, it appears pale green; when it does so en masse (the earliest symptom of decay), it is of a pale blue; and in the last stage of decomposition, ferruginous. Having on the 27th Sept. brought home in several phials specimens of what I had presumed to be this plant in all its stages (i.e. from its first to last appearance as a colouring matter), I was much pleased to have the conjecture verified by microscopical examination. A portion taken from the surface when it appeared pale green, was under the microscope of as dark a hue as in July, whilst the blue and ferruginous colours exhibited different stages of decomposition. When in the most perfect state in which the plant has occurred to me, the globules appear entirely filled with granules, but when very highly magnified are each found to be surrounded by a hyaline membrane. The blue and ferruginous tufts exhibited generally the empty globules and the escaped granules scattered all about, but the former were seen in every state from full to empty: some had granules only in the centre, others were half-full, and some separate globules were entirely filled with the granular mass.

When two of the spiral portions come in contact, they have an elastic power, by which they can, though slowly, disentangle themselves and separate from each other,—a fact which

globular and escape in moniliform threads.” It grows “on stones, aquatic plants, and the boards of sluices in early spring, forming a tuft of small crisped somewhat intricate bundles of filaments, of a beautiful deep green.”

—Berkeley’s ‘Gleanings of British Algae.’
I witnessed in various instances; but under such circumstances only did I ever perceive any motion in this alga*.

In some respects the *Anab. spiralis* resembles the *Anab. impalpabilis*, Bory, as described in the "Encyclopédie Méthodique," but its dull green unlustrous hue on paper is quite opposed to that of the species just named, which is described—"Préparé sur le papier, où on a facilité son développement, elle est de la teinte de la plus brillante, tirant sur celle de l'oxide de cuivre, et luisante comme si on l'eut enduite d'eau de gomme." Besides, were this species of the exact spiral form of that under consideration, this character would not I conceive have been unnoticed in the description.

*Anabaina flos-aquae*, Bory. *Byssus flos-aquae*, L. This species may here be noticed, after having passed the judgement of my friend W. H. Harvey, Esq. It attracted my attention when tinged with its delicate green hue the margin of the smallest of the lochs Maben in Dumfries-shire, or that nearest to Jardine Hall (on the road from the village of Lochmaben), as I drove thither on the 15th Aug. 1838; the day was calm and bright. My specimens tinge the paper with a verdigris colour, and are quite dull or wanting in any lustrous appearance. This species is introduced here on account of its having been erased of late years from the British Flora. Hudson and Lightfoot included it, but without assigning to it any British station or locality.

*Aphanizomenon recurvum*, Morren. On the 25th July 1838, I observed on the surface of sheltered creeks in Ballydrain Lake a very minute *Alga* having the appearance of powdered verdigris. On examining it after I had reached home, I could merely, as in the instance of the *Anabaina* procured on the

* Bory St. Vincent remarks of the genus *Anabaina*—"Leur mouvement offre un espèce de rapport avec ceux au moyen desquels ambulent les lombries; ils sont progressifs, et les courbures qu'ils déterminent sont d'une extrême lenteur. C'est à l'aide de cette faculté ambulatoire que l'on voit surtout les espèces aquatiques s'élever à la surface de l'eau, le long des Conferves et des débris des végétaux, ramper à la surface des roseaux et des carex, pénétrer la vase et les Oscillaires, en les surmontant, ce que leur a mérité le nom tiré du grec, par lequel nous avons proposé de les désigner."—Ency. Méthod. This author ranked the *Anabaina* in the animal kingdom.
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same occasion, consider it as belonging to a genus that had not been recognised as British. Having preserved a quantity of the plant I communicated specimens to Dublin, where on the following month they were seen in Miss Ball’s collection by Professor Morren, who was highly gratified to recognise them as the alga discovered by himself in Flanders, and for which he constituted a new genus—Aphanizomenon—that was announced to the Royal Academy of Brussels in the preceding month of December.

M. Morren observes in reference to this species—“Vers le milieu du mois de Mai jusqu’au mois de Juillet, on trouve des étangs, des mares, des bassins, qui environnent les maisons de campagne en Flandre, dont l’eau offre des flocons d’un vert blanchâtre et de la grosseur qui varie de celle d’un petit pois à celle d’un melon. Ces flocons, qui paraissent nuageux de loin, sont placés à distance les uns des autres; on les dirait immobiles, mais vus de plus près, ils jouissent d’une véritable locomotilité, qui permet de les rencontrer à toutes les hauteurs dans l’eau. J’en ai observé cette année encore, prodigieuse quantité à Gentbrugghe, près de Gand.”

In Ballydrain Lake I have, both in 1838 and 1839, remarked its presence in very calm days, for it is only at such times visible, during the months of July, August, and September, and then it appears in the most sheltered creeks only, floating in patches of various dimensions.

Under the separate heads of “Organologie” and “Physiologie de l’Aphanizomène,” highly interesting details, which I must content myself with referring to, will be found in M. Morren’s Memoir; as however this may not be accessible to all British botanists, it seems to me desirable that the following at least should be copied from it*.

“APHANIZOMENON†.

Filamenta simplicia, cylindrica, flexilia, membranacea, vitrea, articulata, articulis in lamellis planis, apice laciniatis, coadnatis, rectis aut hic et illic inflatis, materia viridi faretis, oscillantibus, sponte dissilentibus.

* I have only seen a separate copy of this memoir which was sent by the author to Miss Ball. It was printed at Brussels in 1838, but whether as part of the Transactions of the Royal Academy of that capital is not stated.
† De ἀφανιζόμενον, qui se dissipe.
Species unica.

Aphanizomenon incurvum, Nobis, vid. tab. fig. 1—12.
Lamella plana, alba-viridi, incurva, filis coadnatis, articulis 2—8 duplo longioribus, discretis, caeruleo-viridibus.
Habitat in fossis et stagnis aquae dulcis in Flandria, mense Maio ad Julium.

"Il est évident que ce genre lie les conjugées vrais aux zygémées, par un accouplement bien prononcé chez ces derniers, mais devenant une simple soudure chez les aphanizomènes. Il met en rapport les conjugées avec les laminaires des eaux marines, par la forme de la lamelle qui résulte de la soudure des filets. Il établît une analogie entre les oscillariées et les confervées, en démontrant qu'un mouvement de reptation, de nata- tion ou d'oscillation, peut appartenir aussi bien à l'organisation des conferves qu'à celle des oscillatoires, dans lesquels on croit reconnaître les caractères de l'animalité. Les vési- cules renflées ramènent l'aphanizomène à la Conferva vesicata d'Agardh, et les articles, comme l'organisation des filets elle- même, lui conservent avec les confervées vrais des rapports si clairs, qu'il serait hors de propos de placer ailleurs que parmi elles ce genre nouveau."

1. Appearance of Anabaina spiralis under a low power of microscope.

2. Its appearance considerably magnified—when consisting of this number of spiral folds 3\(\frac{1}{4}\) of an inch in length.

3. Different appearance of granules as noted in description on Sept. 27.

XI.—Contributions towards a knowledge of the Mollusca Nudibranchia and Mollusca Tunicata of Ireland, with Descriptions of some apparently new Species of Invertebrata. By Wm. Thompson, Esq., V.P.N. Hist. Society of Belfast.

[With a Plate.]

Mollusca Nudibranchia, Cuv.


In the late Mr. Templeton's Journal, "Doris argo, Penn., Brit. Zool. p. 22," is mentioned as twice found by him in

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