CONFERVA BOMBYCINA.

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The Confervaceæ form a section of the great family of the Algæ, better known to us as sea weeds, although a large proportion of them inhabit fresh and brackish water, as well as the ocean. None of the Algæ are highly constituted, consisting as they do purely of cellular matter without a trace of vascular tissue. In fact they stand at the very bottom of nature's ladder; varying, however, greatly in point of size from the microscopic speck to the huge Gulf weed, whose tangle branches reach for hundreds of feet in extent.

Smallest of all plants probably, and simplest in its organisation is *Protococcus nivalis*, which, however, makes up for its minuteness by the marvellous abundance of the individual plants, and is well known to voyagers in the extreme North under the name of Red Snow. The red snow in fact consisting of snow, whose surface is covered for miles with this almost infinitesimally minute Algæ. Each plant is composed of a single cell, which multiplies by division, each new cell separates, and again divides into other cells, the division (be it observed), always occurring in multiples of *four*. As this process takes place with extreme rapidity (under favourable circumstances) the surface of the snow is speedily stained by these tiny organisms with a rich crimson hue.

Another form of these lowly organised plants is common enough in the old country, where it shows itself on gravel paths, and like hard rough soils, as a lightish brown amorphous mass, not unlike a lump of olive coloured jelly This only occurs after *rain*, in dry weather the plant shrinks. up and occupies so small a space as to be quite invisible. The Algæ indicated is a species of Nostoc, and when examined under the microscope it proves to be composed of an infinite number of filaments; each filament being moniliform, or having the appearance of numerous beads attached to each other in a regular series—the system of filaments being enveloped in a gelatinous pellicle. Nostoc, like most of the lower Algæ, propagates by division, the filaments breaking up into separate parts, and each part becoming the nucleus of a new mass of gelatine.

Nearly allied to these are to widely dispersed groups, well known to microscopists under the names of Desmids or Diatoms. These consist of infinitely minute unicellular algæ which are as varied in form as they are abundant in individuals. Scarcely a drop of standing water can be examined without a specimen being found, and the muddy banks of tidal rivers are often coloured a light brown, for miles together, by their presence. The almost boundless variety and elegance of form by which Desmids and Diatoms are characterised, together with the great beauty of the sculptured siliceous coat, by which the latter are enveloped, have always rendered these tiny plants favourite objects for the microscope.

A step higher in the scale is occupied by the Oscillatoria. These are filamentous in their structure, the filaments (as the name Oscillatoria implies), being endowed with a peculiar wavy motion; the different parts bending from one side to the other with a never ceasing action. Indeed this capability of motion is one of the most singular and most mysterious characteristics of these minute organisms. For all or nearly all of them possess it, either in the whole plant, or some portion of it. The hair-like filaments of the Oscillatoria, as I have just said, wave to and fro with a slow graceful motion: the filaments of Nostoc are also said to have a slight movement in water, but I have never seen it myself, though I have often examined them. In another nearly allied section the Volvocinea, the members (which are globular in form), swim merrily in their drop of water, and as they at the same time revolve on their own axis, the sight is one to be remembered. Not less interesting is the passage of a Desmid or a diatom across the field of the microscope, conducted however in a much quieter and more sober fashion than are the wild gambols of volvox and its near relatives. A Diatom, whatever its form, moves steadily through the water, turning neither to the right hand nor to the left. If it meets with a fellow diatom or with any like obstacle (as is often the case), it pushes blindly on until the obstacle is removed, or it is itself shunted on one side, in which case its apparently purposeless journey is again resumed. What the object of this gift of motion may be or how it is effected, is entirely unknown. All sorts of conjectures have been indulged in and theories raised, each one in turn to be laid aside. Anyone, however, with a decent microscope may watch the process I speak of at almost any season of the year, and he would prove a genuine benefactor to science, who succeeded in penetrating the mystery of motion in these lowly organisms.

The case is different with the *higher* Algæ, among which the specimen before us may be reckoned. Here the plant itself is at rest, rooted (or rather *fixed*, for it has no proper roots) to some bulkier object. In lieu of itself being a wanderer, the plant discharges from special receptacles a vast number of Zoospores, which I may liken for simplicity's sake to the *seeds* of more highly developed plants ; though in reality there is no sort of analogy between them. These Zoospores are pear-shaped bodies, of the simplest possible structure, and at the apex of each are either *two* or *four* cilia or short thread, like processes. (You will observe, by the way, how the parts of these simple plants always seem to run into some multiple of *four* : just as in the far more complicated endogens the multiple of *three* and in the exogens of four or five, is the rule.)

As soon as the Zoospoore is at liberty, it begins to rove rapidly about by means of its cilia, which are lashed violently and so produce a current in the water. After a time, (when I suppose it has sown a sufficiency of wild oats) it settles down on some fixed object, attaches itself by its pointed end, drops its cilia, and at once vegetates into an Algæ—thus affording in its life history a striking parallel to that of the Cirrhipeds (or Barnacles), among Crustaceans which have so long been a stumbling block to the disciples of Darwin.

Rising by gradual stages from the Oscillatores and their allies we reach the Confervacea—a conspicuous member of which is the matted specimen on the table. The members of this order consist of simple or branched filaments, divided into or rather made up of numerous cells of simple construction, filled with granular bodies, often disposed in elegant patterns, as may be seen in the species of Spirogyra, very common in our lagoons and waterholes. Confervacea exist in abundance in both fresh and sea waters, where they may be seen either in large shapeless masses or waving in the stream like bundles of light green silk.

How many species we may have in Tasmania, I know not, as the subject has never been investigated, though one well worthy the attention of some microscopist with plenty of time and patience at his command. Dr. Hooker (in his great work on the Tasmanian flora), mentions three *marine* Confervæ ; and adds, " We have received specimens of several *freshwater* Conferva from Mr. Gunn unfortunately not in a state fit for examination or description."

Two species are common in Great Britain. and are (I believe), universally distributed throughout Europe, viz.:—*Conferva bombycina* and *Conferva floccosa*, both determined by the great Swedish Algologist Agardh. It is to one of these, as we have seen by his letter, that Baron von Mueller is inclined to refer our specimen.

And if we are ignorant of the *species*, equally so are we of the cause of the combining together of the filaments into the curious paper like structure, which you see before you. I have often found on the edges of ponds and slow streams in England the thick blanket like strata of matted Conferva, to which the Baron draws our attention, and which are vulgarly styled "water flannel" in the old country. But these are coarse and almost shapeless masses, and very different in appearance to the delicate sheets and ribbons, which the Tasmanian conferva weaves from its dead or dying filaments.

How this weaving process is carried out, or why the sheets should always present the same form and appearance is altogether unknown.

The following is the letter from Baron von Müeller alluded to in the above paper:—

"So far as I can judge from the bleached and partly decayed state of the specimens sent by you, the matted algic substance occurring in fresh water at Hobart Town is either Agardh's *Conferva bombycina* or a species allied to it. The cells or joints are almost double the size of those of *C. bombycina* in its ordinary state, but I possess Danish specimens quite as large. The discovery of *C. bombycina* would not come suprisingly in Australia, as I have shown many years ago the likewise widely distributed *C. floccosa* to occur in fresh waters near Adelaide. The limits of allied species are not well defined in reference to cell contents; nor do your specimens admit of close examination in that respect. Your conferva is evidently also nearly allied to *C. Sandvicensis* of Gaudichaud. The internal organisation of the cell serves probably better for distinction than the size and form of the cell walls, which I found always very variable, as might be expected from the varied circumstances under which such kind of plants occur; whether temperature, or depth, or pureness of water is concerned.

"Possibly among the matted masses sent by you may be remnants of a Cladophora and also sterile portions of an Oedogonium.

"I have found here occasionally enormous sheets of similar constitution to what you sent, in swamps; these masses in dry seasons, after the evaporation of all water, would cover the bottoms of lagoons with a thick felt, so much so that I could obtain it by cartloads, finding the substance excellent for being converted into the best of filtering paper.

"Ferd. Von Mueller."