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TRANSACTIONS OF THE SOCIETY.

I.—*Freshwater Algæ and Schizophyceæ of Hampshire and Devonshire.*

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PLATE I.

THE gatherings of which the results are given in this paper were made in August 1888 and August 1889; the species observed in Hampshire are indicated by the letter H, those in Devonshire by D. Unless otherwise stated, the locality for the former is bogs and streams in the New Forest, in the neighbourhood of Lyndhurst; for the latter the south-eastern corner of Dartmoor and its outskirts, in the neighbourhood of Bovey Tracey and Buckfastleigh. Both in Desmids and in other families of Algæ the Hampshire localities were decidedly the richer, and I am unable to account for the comparative poverty of the Dartmoor gatherings, both in individuals and in species. The most

EXPLANATION OF PLATE I.

(All multiplied 200 diameters unless otherwise stated.)

- Fig. 1.—*Glochiococcus insignis* (De Ton.) Reinsch.
" 2.—*Schizothrix anglica* n. sp. (× 400).
" 3.—*Scytonema figuratum* Ag. (× 300); a, hormogone.
" 4.— " " (× 400); b, heterocyst.
" 5.—*Stauroneis rectangularis* A. Br.
" 6.—*Rhizoclonium geminatum* n. sp. (× 100).
" 7.— " " (× 600).
" 8.—*Micrasterias denticulata* Bréb. var. *intermedia* n. var.
" 9.— " *rotata* Ralfs var. *urnigera* n. var.
" 10.— " *truncata* Bréb. var.
" 11.— " *crenata* Bréb. var.
" 12.— " " Bréb. var.
" 13.— " *crux-melitensis* Men.
" 14.—*Euastrum crasso-humerosum* n. var.
" 15.—*Cosmarium homalodermum* Nordst.

fruitful locality in the New Forest was the bog between Lyndhurst and Christchurch, so well known to botanists as the habitat of the rare *Spiranthes æstivalis*.

Very little work has been done with the Freshwater Algæ of the South-west of England since the time of Hassall, Ralfs, and Jenner. The only recent papers of importance with which I am acquainted are by Mr. E. D. Marquand, on "The Desmids and Diatoms of West Cornwall," and on "The Freshwater Algæ of the Land's End District," in the 'Transactions of the Penzance Natural History and Antiquarian Society' for 1882-3 and 1885-6; and by Mr. E. Parfitt on "Devon Freshwater Algæ," in the 'Transactions of the Devonshire Association for the Advancement of Science, Literature, and Art' for 1886. As in previous papers, I have excluded diatoms from the list. Species for which I could find no previously recorded locality in these islands are printed in italics; and new species or new varieties in small capitals. To the names of those desmids not previously recorded from the southern counties of England an * is prefixed.

PROTOCOCCACEÆ.

Eremosphæra viridis DBy., H, D.

Gloeocystis vesiculosa Näg., D.

" *rupestris* Rbh., D.

Botryococcus Braunii Ktz., H.

Rhaphidium falcatum Cke., H.

Chlorococcum gigas Grün., H.

Schizochlamys gelatinosa A. Br., D.

Scenedesmus acutus Mey., H.

" *obtusum*, Mey., H, D.

Glochiococcus insignis (De Ton.) Reinsch (*Acanthococcus insignis* Reinsch, Ber. Deutsch. Bot. Gesell., iv. 1886, pl. xii. f. 22), H. Fig. 1.

This interesting organism was observed very rarely in bog-pools near Lyndhurst. It corresponds very closely with Reinsch's description and figure. The total diameter of the cell is about $67.5\ \mu$. The cell-wall is exceedingly thick, as much as one-fourth the diameter of the cell, and consists of a large number of plicated layers, the cell-cavity filled with granular protoplasm and containing large chromatophores. I have already recorded (Journ. R. Micr. Soc., 1888, p. 2, pl. i. f. 4) the occurrence in this country of a spiny species of this genus, which I have described as a new species under the name *Acanthocladus anglicus* mihi,* which may, however, be but a form of this.

CHARACIACEÆ.

Nephrocystium Nägelii Grün., Beaulieu, H.

* See Note at the end of this paper.

CHROOCOCCACEÆ.

Chroococcus turgidus Näg., H.
Aphanocapsa virescens Rbh., H.
Merismopedia glauca Näg., H, D.

OSCILLARIACEÆ.

Oscillaria tenerrima Ktz., H.
 „ *princeps* Vauch., H.
SCHIZOTHRIX *ANGLICA* n. sp., H. Fig. 2.

Trichomes very long and slender, unbranched, about 5 μ in diameter; two or more inclosed in a common mucilaginous sheath. Sheath 6–10 times as broad as the trichomes, pale yellow, diffuent (ultimately brown?), somewhat lamellose. This interesting genus of Oscillariaceæ is new to Britain; the submarine species, *Schizothrix Creswellii*, described by Harvey, and found by him, and again recently by Parfitt, at Sidmouth, being referred by Thuret, no doubt correctly, to *Inactis*. The organism was found sparingly in a bog-pool near Lyndhurst. It does not seem to me to agree fully with any species hitherto described, differing from them in the extreme fineness of the trichomes. It comes nearest to *S. Müllerii* Näg., apparently known only from the neighbourhood of Zürich; but may very probably be identical with *Dasygloia amorphia* Thw., found in England by Berkeley, the descriptions of which are very imperfect. Bornet (*in litt.*) is inclined to sink both *Schizothrix* and *Dasygloia* in *Microcoleus*, characterized by the inclusion of a number of trichomes in the same general sheath. They present the peculiarity of the narrowing of the common sheath at the lower end into a kind of tube, from which portions of the trichomes escape in the form of hormogones.

SCYTONEMACEÆ.

Stigonema minutum Hass., H, D.
Scytonema figuratum Ag. (*S. calothrichoides* Ktz.), H.
 Figs. 3, 4.

Sheath translucent, pale yellow throughout, about 25 μ in diameter. Trichomes green, composed of pseudocysts, about 4 μ broad, and about as long as broad, or longer in the lower part of the trichome; heterocysts elliptical, about twice as long as broad, 20 $\times$ 10 μ . Branches always geminate, usually short, and of somewhat less diameter than the main filament. A slenderer species than *S. myochrous* Ag., which has been recorded from Cornwall by Marquand. Bogs, Lyndhurst. A widely distributed species, not mentioned in Cooke's 'British Freshwater Algæ,' stated to have occurred in England by Bornet and Flahault on the authority of Berkeley, but without any locality.

Tolypothrix lanata Wartm., H.

Trichome very slender, single, or sometimes two more or less parallel included in a sheath; not more than $10\ \mu$ in diameter; pseudocysts about as long as broad; heterocysts few and distant. Sheath varying greatly in width, pale yellow, ultimately brown. Trichome often projecting a long way beyond the sheath. Floating on moor-pools, or attached to aquatic vegetation. Under this species Bornet and Flahault include *T. flaccida* Ktz., *T. muscicola* Ktz., *T. coactilis* Ktz., *T. pulchra* Ktz., *T. ægagropila* Rbh., and others.

NOSTOCACEÆ.

Aphazinomenon flos-aquæ Ralfs, H.

Cylindrospermum macrospermum Ktz., H.

Nodularia sp., H.

A species of this chiefly brackish-water genus was seen occasionally in bog-pools in the New Forest; but, as neither spores nor heterocysts were observed, specific determination was impossible.

PEDIASTREÆ.

Pediastrum Boryanum Turp., H.

„ rotula A. Br., H.

Staurogoneis rectangularis A. Br., H. Fig. 5.

This rare organism was only very seldom seen in a gathering from a pool near Beaulieu. Of its systematic position I am very doubtful. It seems to me not improbable that it may be an early stage of a *Pediastrum*, and it is placed near this genus by Braun, but his description (*Alg. Unicell.*, p. 70) is very imperfect. It bears some resemblance to *Merismopedia*, but the colour of the endochrome is chlorophyll-green, not blue-green. It agrees fairly well with Cooke's description ('*Freshwater Algæ*,' i. p. 46, pl. xviii. f. 3); but the cœnobe is certainly not "cubical." The colony is tabular, like that of *Pediastrum*, about $110 \times 75\ \mu$, elliptical with truncated ends, and contains, in the specimens observed, sixteen pseudocysts, arranged in four subfamilies of four each, the whole inclosed in hyaline jelly. The pseudocysts are oblong and somewhat curved, or bean-shaped, about $20\text{--}22.5 \times 10\ \mu$. It was first observed in these islands by Archer, but he gives no locality; the only British habitat yet recorded of which I am aware is by Marquand, near the Land's End, Cornwall.

PANDORINEÆ.

Eudorina elegans Ehrb., H.

Gonium pectorale Müll., H, D.

ULOTRICHACEÆ.

Ulothrix zonata Ktz., H, D.

CONFERVACEÆ.

Draparnaldia glomerata Ag., H.
Stigeoclonium protensum Ktz., H.

Filament somewhat moniliform, about 12.5μ broad in its broadest part; cells rather longer than broad, and slightly constricted at the septa in the lower part of the filament; those towards the apex of the branches much longer. Each branch terminating in a hyaline filament of very great length, as much as 380μ , septated at long intervals; the branches themselves sometimes again branching. Small stream near Lyndhurst.

RHIZOCLONIUM GEMINATUM n. sp., H. Figs. 6, 7.

Filaments long, slender, curving and interlaced; cells about $20 \times 12.5\mu$, with very thin cell-walls. From the filaments are put out here and there short root-like processes filled with green endochrome; these are sometimes solitary, but more often two proceed from adjacent cells, or even two from the same cell; and these are then curved and interlace with those of an adjoining filament, but without any actual conjugation. A ball of flocculent matter commonly collects round these protuberances, firmly welding the filaments together. Forming, with the preceding, a flocculent scum on a small slow stream near Lyndhurst. Most of the species of the genus grow in brackish water.

DESMIDIACEÆ.

Hyalotheca dissiliens Sm., H.
„ *mucosa* Ehrb., H.
Desmidium Swartzii Ralfs, H.
Docidium Ehrenbergii Ralfs, H.
Cylindrocystis diplospora Lund., H, D.
* „ *crassa* DBy., H.
Penium cylindrus Ehrb., H.
„ *digitus* Ehrb., H, D.
„ *closterioides* Ralfs, H, D.
„ *Brebissonii* Ralfs, H, D.
„ *didymocarpum* Lund., D.
Tetmemorus Brebissonii Men., H, D.
„ *granulatus* Bréb., H.
„ *lævis* Ralfs, H, D.
Spirotænia condensata Bréb., H, D.

- Closterium didymotocum* Cord., H, D.
 „ *lunula* Ehrb., H.
 „ *turgidum* Ehrb., H.
 „ *Ehrenbergii* Men., D.
 „ *Dianæ* Ehrb., H, D.
 „ *angustatum* Ktz., H, D.
 „ *rostratum* Ehrb., H.
 „ *setaceum* Ehrb., H, D.
 * „ *Kützingeri* Bréb., H.

Although given in Cooke's 'British Desmids,' no locality is recorded for this species.

- Closterium intermedium* Ralfs, D.
 „ *cornu* Ehrb., H.
 „ *acutum* Bréb., H.
 „ *aciculare* West, D.
 „ *linea* Pert., H.

Micrasterias denticulata Bréb., H, D.

„ „ var. *INTERMEDIA* n. var., D. Fig. 8.

Length of frond about 200 μ , breadth about 180 μ . This variety appears to be intermediate between *M. denticulata* Bréb. and *M. Thomasiana* Arch. The size and the segmenting correspond closely to those of the typical form, the dentation of the edge being decidedly more apiculate, resembling that of *M. Thomasiana*; but it is destitute of the "apiculate elevations" and remarkable "divergent projections" in the centre described as characteristic of this species. It is, however, very doubtful whether *M. Thomasiana* should be retained as a distinct species. Its extreme form appears to have been seen by no one but its discoverer. Jacobsen (Desm. Denm., in Bot. Tidskr., 1874, p. 186) regards it as a variety of *M. denticulata*, and describes a series of intermediate forms with the projections more or less developed. The present variety occurred in bog-pools on Dartmoor.

Micrasterias rotata Ralfs, H, D.

„ „ var. *URNIGERA* n. var., H. Fig. 9.

This beautiful desmid differs from the typical form in its larger size, and in the urn-like form of its central lobe, which projects as much as 25 μ beyond the lateral ones. In this respect it resembles Ralfs's drawing more nearly than Cooke's. Wolle (Desmids U.S., pl. xxiv. f. 1) also depicts the central lobe as projecting considerably. The surface of the frond is covered with inflated protuberances. The extreme length, including the projection, is 325 μ , the greatest breadth 250 μ ; but in the specimens observed the two halves were of very unequal size. Bog near Lyndhurst.

Micrasterias papillifera Bréb., H.
 „ *truncata* Bréb., H.
 „ „ Bréb. var. *TRIDENTATA* n. var., H.
 Fig. 10.

A variety with the lateral lobes tridentate instead of bidentate.

Micrasterias crenata Bréb., H, D. Figs. 11, 12.

Two forms of this variable species. De Wildeman has shown (Bull. Roy. Soc. Belg., 1888; Obs. sur quelques Desm., p. 2) how closely this species is linked with the preceding by intermediate forms.

Micrasterias crux-melitensis Men., H. Fig. 13.

The form observed (but only very rarely) of this rare and beautiful desmid in the New Forest bears a much closer resemblance to that which occurs in America (Wolle, Desm. U.S., t. xxxv. f. 3) than to any hitherto recorded from Great Britain, the lobing not being nearly so deep. The outline of the frond is very nearly circular, about 140 μ in length and breadth; its surface is covered with small protuberances. The species has been gathered hitherto, in the south of England, as far as I am aware, only by Jenner.

Euastrum oblongum Grev., H.
 „ *crassum* Ktz., H, D.
 „ *CRASSO-HUMEROSUM* n. var., D. Fig. 14.

This interesting variety or possible hybrid is described at length elsewhere ('Annals of Botany,' vol. iv. p. 171).

* *Euastrum pinnatum* Ralfs, H.
 „ *humerosum* Ralfs, H, D.
 * „ *ventricosum* Lund., D.
 „ *affine* Ralfs, D.
 „ *ampullaceum* Ralfs, D.
 „ *insigne* Hass., D.
 „ *didelta* Ralfs, H, D.
 „ *cuneatum* Jenn., H.
 „ *ansatum* Ralfs, H, D.
 „ *circulare* Hass., H, D.
 „ *pectinatum* Bréb., H, D.
 „ *rostratum* Ralfs, H.
 „ *binale* Ralfs, H.
 * „ *erosum* Lund., H, D.
 * „ *ornithocephalum* Benn., H.
Cosmarium quadratum Ralfs, D.
 * „ *homalodermum* Nordst., D. Fig. 15.

Nearly circular in outline; length and greatest breadth about 70 μ ; two conspicuous protuberances on each half-cell. Bog-pools,

Dartmoor. No locality is given in Cooke's 'Brit. Fresh-water Algæ,' but Mr. West has gathered it in Yorkshire.

- Cosmarium cucumis Cord., H, D.
- „ Ralfsii Bréb., H, D.
- * „ pachydermum Lund., D.
- „ pyramidatum Bréb., H, D.
- „ pseudo-pyramidatum Lund., H.
- „ Brebissonii Men., H, D.
- „ margaritifera Men., H.
- „ botrytis Men., H, D.
- * „ præmorsum Bréb., H.
- * „ ochthodes Nordst., H.
- „ ornatum Ralfs, H.
- „ Broomei Thw., H.

This is certainly a true freshwater species.

- Cosmarium speciosum Lund., H.
- * „ prægrande Lund., H.

See Note at the end of this paper.

- *Cosmarium globosum Buln., H, D.
- „ cucurbita Bréb., H.
- „ attenuatum Bréb., D.
- „ turgidum Bréb., H.
- Xanthidium armatum Bréb., H, D.
- „ aculeatum Ehrb., H.
- Arthrodesmus incus Hass., H.
- Staurostrum cuspidatum Bréb., D.
- „ avicula, Bréb., H.
- „ Reinschii Roy, D.
- „ hirsutum Bréb., H.
- „ teliferum Ralfs, H, D.
- „ Pringsheimii Reinsch, H, D.

This appears to be a widely distributed species.

- Staurostrum spongiosum Bréb., H.
- „ muticum Bréb., H, D.
- „ alternans Bréb., H.
- „ polymorphum Bréb., H.
- „ proboscideum Arch., H.

ZYGNEACEÆ.

Spirogyra longata Vauch., H.

Seen in lateral conjugation.

Spirogyra porticalis Vauch., H.

MESOCARPACEÆ.

Mesocarpus pleurocarpus DBy., H.

Staurospermum gracillimum Hass., Beaulieu, H.

SIPHONÆ.

Vaucheria sessilis Vauch. Wet rock, Buckfastleigh, D.

NOTE.

I have to add a few words in reference to my previous papers of this series.

Nostoc hyalinum mihi (Journ. R. Micr. Soc., 1886, p. 4, pl. i. figs. 2, 3). Bornet and Flahault point out that this specific name has already been appropriated by Roemer. I propose, therefore, that it shall in future be known as *N. opalinum* Benn. Those eminent algologists think that my species, if distinct, is most nearly allied to *N. microscopicum* Carm.

Xanthidium spinulosum mihi, tom. cit., p. 10, pl. ii. f. 17. I am now convinced that the peculiarities on which I founded this species are due merely to a peculiar condition of the gelatinous envelope, and that it is simply a form of *X. fasciculatum* Ehrb. The name should therefore be abolished.

Oscillaria princeps Vauch., op. cit., 1887, p. 11, pl. iv. f. 4. On the (negative) authority of Cooke's 'British Freshwater Algæ,' this species was recorded as new to Britain. Marquand had, however, previously observed it in Cornwall (Trans. Penzance Nat. Hist. Soc., 1885-6); and Mr. Roy informs me that he had gathered it earlier than that in three or four places on Deeside, Scotland. It is probably not uncommon, at all events in the southern counties.

Apiocystis Brauniana Næg., tom. cit., p. 9, pl. iii. f. 1. This has been long known in Aberdeen, according to Roy (*in litt.*). Mr. S. Le M. Moore has also found it in this country, and has been more successful than previous observers in detecting its mode of reproduction (Journ. Linn. Soc., vol. xxv. p. 362). Mr. West also records it from Yorkshire.

Aphanothece microscopica Næg., tom. cit., p. 10, pl. iii. f. 3. Has been familiar to Mr. Roy for many years in the neighbourhood of Aberdeen.

Pediastrum integrum Næg., tom. cit., p. 12, pl. iv. figs. 11-13. Occurs in the neighbourhood of Aberdeen, according to Mr. Roy, but is rather uncommon.

Cœlastrum cubicum Næg., tom. cit., p. 13, pl. iv. f. 14. Has been gathered repeatedly by Mr. Roy in the neighbourhood of Aberdeen. He records also *C. microsporum* Næg. from the same locality, and Mr. West adds a Yorkshire habitat.

Cosmarium sphericum mihi, tom. cit., p. 17, pl. iv. f. 22. This

appears to be identical with *C. prægrande* Lund., Desm. Suec., p. 54, pl. iii. f. 21. I have observed it in Cumberland, Cornwall, and Hampshire.

Zygnema peliosporum Wittr. was omitted from my list of species from North Cornwall, where it is not uncommon in bog-pools. I am not aware of its having before been gathered in these islands, except by Marquand in West Cornwall. It is not given in Cooke.

Homospora mutabilis Bréb., op. cit., 1888, p. 2, pl. i. f. 1. Has also been observed by Marquand in Cornwall.

Acanthococcus anglicus mihi, tom. cit., p. 2, pl. i. f. 4. De Toni having pointed out that the name *Acanthococcus*, given to this genus by Reinsch, had been previously appropriated to a genus of Florideæ, and proposed the substitute *Glochiococcus*, this species must now be known as *Glochiococcus anglicus* (De Ton.) Benn.