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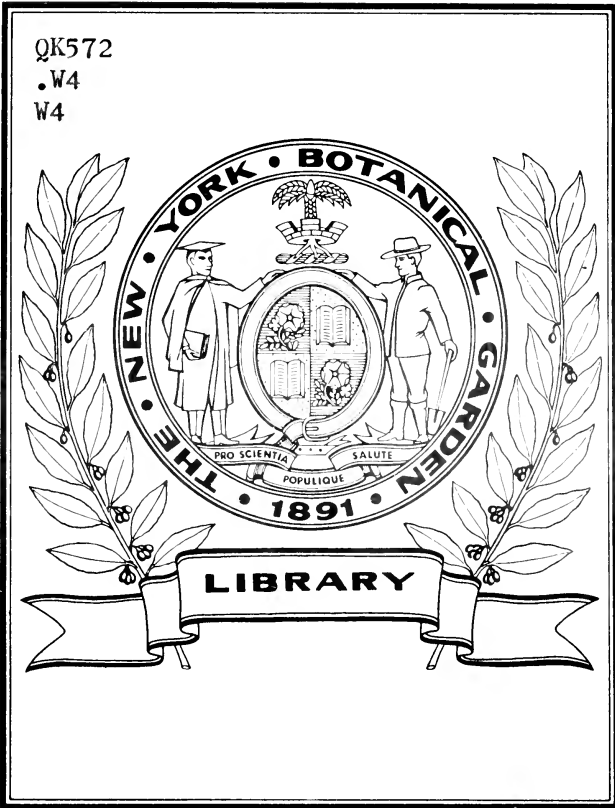
West, William

On some freshwater algae from
the West Indies.

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NEW YORK
BOTANICAL
GARDEN

On some Freshwater Algae from the West Indies. By Wm. West, F.L.S. assisted by G. S. West. (Read Est Feb. 1 94)

Plates VIII. -XVI.:

Through the kindness of Mr. George Murray, of the British Museum, I have been enabled to examine some Freshwater Algae which were collected by Mr. W. R. Elliott on the islands of Dominica and St. Vincent from the former in November and December 1892, and from the latter in May of the same year. The material was preserved in weak spirit, and has proved to be very interesting. The algae were in numbered bottles; these numbers are used throughout the paper, as both material and slides, with corresponding numbers, can be consulted in the Museum.

The strictly aquatic species were mostly from warm or hot streams. Three of the gatherings were from mossy trees; these latter must have been very moist, as several species of Desmidiaceae occurred amongst the various Cyanophyceae which formed the greater part of this material. Some of the species were very abundant, e. g. *Symploca cuspidata*, n. sp.; there were others intermingled with these, either in small patches or solitary, and very sparingly.

Varieties

Summary. Genera. Species. & Forms.

Confervaceae	2	2	
Chroolepideae	1	2	
Zygnemaceae	1	1	1
Desmidiaceae	5	6	1
Volvocineae	1	1	
Protococcaceae	2	2	
Nostocaceae	1	2	
Scytonemaceae	3	7	
Sirocophoniaceae	2	7	1
Oscillariaceae	3	4	1
Chroococcaceae	6	12	1
Diatomaceae	3	14	1
	<u>53</u>	<u>60</u>	<u>6</u>

Of the above, 11 species and 4 varieties are new

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“Crass. fl.” (as used in this paper) = the diameter of the sheath containing the trichomes.

“Crass. trich.” = the diameter of the cells without the sheath.

Class CONFEROIDEÆ ISOGAMÆ.

Ord. CONFERVACEÆ.

1. CONFERVA BOMBYCINA, *Ag.*, forma MINOR, *Wille.* (*Om Hvilceller hos Conferva*, p. 21, t. 1. figs. 36-40, t. 2. figs. 55, 56.)

Crass. fl. 6·5-7·5 μ .

Hab. In cold, warm, and hot streams, crater of Grande Soufrière, Dominica. Nos. 880, 883, 884, and 908.

2. RHIZOCLONIUM BERGGRENIANUM, *Hauck in Nordst. Freshw. Alg. of New Zeal. & Australia*, p. 17. Var. DOMINICENSE, nov. var. (Pl. XIV. figs. 17-24).

Var. filamentis dense intricatis, tenuior, articulis diametro 2-3plo longioribus; membrana cellularum 1 μ crassitudine.

Crass. cell. veget. 9-10 μ .

Hab. In hot stream in crater of Grande Soufrière, Dominica. No. 880.

In the more densely intricate portions almost every cell emitted a short lateral branch, usually consisting of one cell.

Ord. CHROOLEPIDÆÆ.

3. TRENTPOHLIA ODORATA, *Wittr.* (*Scand. Växter.* t. 4. p. 16.) [*Chroolepus odoratum*, *Ag. Syst. Alg.* p. 35.]

Crass. cell. veget. 12-20 μ ; crass. zoogonidang. 33-37·5 μ .

T. zoogonidangiis lateralibus, interdum terminalibus, subglo-bosis, sessilibus (hinc inde pedicellatis).

Hab. On bark, Bow-wood Hills (1580 ft.), St. Vincent. (8-12-91.) No. 23.—On trees, Government House, St. Vincent, 900 ft. (10-12-91.) No. 27.

4. T. VILLOSA, *De Toni.* (*Syll. Alg.* i. p. 239.) [*Chroolepus villosa*, *Kuetz. Phyc. gener.* p. 234; *Species Algarum*, p. 428.]

Crass. cell. veget. 18-23 μ .

Hab. On rocks, Soufrière, Dominica. (2-7-92.) No. 20.

Class CONJUGATÆ.

Ord. ZYGNEMACEÆ.

5. ZYGNEMA (ZYGOGONIUM) PACHYDERMUM, nov. sp. (Pl. XIII. figs. 1-16.)

Z. cæspitibus intricatis; filis flexuosis (et interdum genuflexuosis) dense intricatis, hinc inde ramulis brevibus irregularibusque cellularum 2-6; cellulis vegetativis diametro 2-2½plo (sæpe 3plo) longioribus (rarius æqualibus); membrana cellularum crassa vel crassissima; zygosporis in tubo conjugationis brevi inter cellulas sitis, subglobosis, subellipsoideis, plerumque irregularibus (sæpe constrictis); membrana zygosporarum crassissima, irregulariter lamellosa; azygosporis globosis subglobosisque, zygosporis similibus sed membrana tenuiore.

Crass. cell. veget. 16-23 μ (usque ad 26 μ et plerumque 20 μ); crass. membr. cellularum 1.5-5.5 μ ; long. zygosp. 25.5-33 μ (usque ad 40 μ); lat. zygosp. 19-26 μ (usque ad 30 μ); crass. membr. zygosp. 2.5-6.5 μ ; diam. azygosp. 23-26 μ ; crass. membr. azygosp. 1.9-3.8 μ .

Hab. In mud, warm stream, crater of Grande Soufrière, Dominica. No. 883; also in no. 908, and sparingly from no. 882.—This also occurred, without zygosporis, on old wall, Roseau, Dominica. (1-8-92.) No. 473.

This species has a thick membrane which at first sight reminds one of a *Rhizoclonium* or a large species of *Conferva*, the somewhat irregular filaments with short branches resembling the former especially. The many examples of conjugation examined were all scalariform, the zygosporis completely filling the short conjugating-tube, their variability being remarkable. Spores were seen (figs. 9-10) which were undoubtedly azygosporis, and these were regular in shape. One example was noticed where the zygosporis was double. The material was preserved in weak spirit; but the two chromatophores were in most examples distinct and in their normal position.

Var. CONFERVOIDES, nov. var. (Pl. XIV. figs. 1-6.)

Var. cellulis tenuior, diametro plerumque 1-1½plo (rarius 2½plo) longioribus.

Crass. cell. veget. 10-13 μ .

Hab. In mud, warm stream, crater of Grande Soufrière, Dominica. No. 883. Intermingled with the typical form, but not so abundant.

This variety has the cells of the filaments often somewhat doliform, and closely resembles a *Conferva*; it does not, however, break up in the peculiar manner of any species of *Conferva* (*vide* fig. 6). The binate chromatophores also put it out of this genus. Fig. 4 probably represents an attempt at conjugation.

Two cells are figured (fig. 5) which show an attempt at longitudinal division.

Ord. DESMIDIACEÆ.

6. *MESOTENIUM MICROCOCCUM*, *Kirchn. (Alg. Schles. p. 134.)*
[*Palmoglaea micrococca, Kuetz. Tabulæ phycolog. i. p. 20, t. 25. f. 5.*]

Long. cell. 15·5–17·3 μ ; lat. cell. 7·5–9 μ .

Hab. On trees among mosses, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904.—On Bow-wood Hills (1580 ft.), St. Vincent. (8–12–91.) No. 23.

7. *M. CHLAMYDOSPORUM*, *De Bary. (Conj. p. 75; Cooke, Brit. Desm. p. 47, pl. 18. f. 14; West, Freshw. Alg. of W. Ireland in Journ. Linn. Soc. vol. xxix. p. 131, pl. xxiv. f. 8.)*

Long. cell. 19–23 μ ; lat. cell. 12·5–14·5 μ .

Hab. On trees among mosses, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904.

8. *TETMEMORUS LEVIS*, *Ralfs. (Brit. Desm. p. 147, t. 24. f. 2.)*

Long. 57·5–65 μ ; lat. 19–20 μ ; lat. isthm. 17·5–18·5 μ .

Hab. In mud, warm stream, crater of Grande Soufrière, Dominica. No. 883.

9. *COSMARIUM PSEUDOPYRAMIDATUM*, *Lund. (Desm. Succ. p. 41, t. 2. f. 18.)*

Long. 46–48 μ ; lat. 24–25 μ ; lat. isthm. 9·5–12·5 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

**STENONOTUM*, *Nordst. in Wittr. et Nordst. Desm. et Ædog. in Ital. et Tyrol, p. 32, t. xii. f. 8. Forma MINOR, Racib. (Desmidya w podróży na oklo ziemi, p. 4, t. i. f. 32). (Pl. XIV. fig. 25.)*

Long. 36–36·5 μ ; lat. 23–24 μ ; lat. isthm. 6·5 μ ; crass. 13·5 μ .

Hab. With the typical form, but much more abundant.

10. *C. OBLIQUUM*, *Nordst. (Bidrag till kända. om Sydligare*

Norges Desm. p. 23, t. 1. f. 8). Forma MINOR, *Nordst.* (l. c.). (Pl. XIII. fig. 17.)

Long. 14.5μ ; lat. 11.5μ ; lat. isthm. 6.5μ ; crass. 9.5μ .

Hab. Amongst *Symploca cuspidata*, n. sp., on trees, summit of Trois Pitons (4500 ft.), Dominica. No. 904.

This interesting species seems to have a varied kind of habitat, occurring in small upland tarns and pools, on dripping subalpine rocks, and in the present instance on damp mossy trees.

11. COSMARIUM CUCURBITA, *Bréb.* (*Ralfs, Brit. Desm.* p. 108, t. 17. f. 7.)

Long. 40μ ; lat. 21μ ; lat. isthm. 19μ .

Hab. On trees among mosses, summit of Trois Pitons (4500 ft.), Dominica. No. 903.

Class CENOBIEÆ.

Ord. VOLVOCINEÆ.

12. EUDORINA STAGNALE, *Wolle.* (*Freshw. Alg. of U. S.* p. 160, pl. clii. figs. 11-21.)

Var. *cellulis parvis et distantibus.* (Pl. XVI. fig. 10.)

Diam. cell. $4.8-5.6 \mu$; diam. cænob. 63μ .

Hab. Amongst mosses on trees, with *Hapalosiphon intricatus*, n. sp., and *Symploca cuspidata*, n. sp., summit of Trois Pitons (4500 ft.), Dominica. No. 903.

Class PROTOCOCCOIDEÆ.

Ord. PROTOCOCCACEÆ (incl. *Palmellaceæ*).

13. UROCOCCUS INSIGNIS, *Kuetz.* [*Chlorococcus macrococcus*, *Rabh.*, et var. *aureus*, *Rabh. Fl. Europ. Alg.* ii. p. 33.]

Diam. cell. $23-31 \mu$; c. teg. 42μ .

Hab. On mossy trees, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904.

14. CERASTERIAS STAUASTROIDES, nov. sp. (Pl. XIV. fig. 16.)

C. quadriradiata e corpore distincto, radiis elongatis sensim attenuatis et minute granulatis, apice obtusis.

Diam. c. proc. $30-35 \mu$; diam. corpor. circ. $9-9.5 \mu$.

Hab. With *Scytonema javanicum*, Bornet, amongst mosses, on lime-trees, Shantford Estate, Dominica. No. 901.

The rough arms of this species remind one very forcibly of a small *Staurastrum*, and sufficiently characterize it.

Class PHYCOCHROMACEÆ.

Subclass NOSTOCHINEÆ.

Ord. NOSTOCACEÆ.

15. *NOSTOC HUMIFUSUM*, *Carm. ex Harvey in Hooker's Brit. Flora*, ii. p. 399. (*Kuetz. Species Algar.* p. 301; *Rabh. Fl. Europ. Alg.* ii. p. 183.)

Diam. cell. 2-3 μ ; diam. heterocyst. 3.5 μ .

Hab. On lime-trees, Shanford Estate, Dominica. No. 901.—
On trees, summit of Trois Pitons (4500 ft.), Dominica. No. 903.

16. *N. SPHERICUM*, *Vaucher.* (*Cooke, Brit. Freshw. Alg.* p. 231, t. 91. ff. 8-11; *Bornet et Flahault, Révis. des Nostoch. Hétérocyst.* p. 208.)

Diam. cell. 3.8 μ ; diam. heterocyst. 5-5.7 μ ; diam. thall. usque ad 10 mm.

Hab. On damp wall of dam in Sharp's River, St. Vincent. No. 477.

Ord. SCYTONEMACEÆ.

17. *MICROCHLETE TENUISSIMA*, nov. sp. (Pl. XIV. figs. 7-11.)

M. inter algas varias alias reperta; filis tenuissimis, subintricatis, contortis; vaginis hyalinis, achrois, amplis; articulis elongatis, diametro 5-9plo longioribus, articulis junioribus brevioribus (circiter diametro duplo longioribus) et crassioribus; heterocystis intercalaribus, subquadratis vel oblongis.

Crass. fil. 4.4-5.1 μ ; crass. trich. 1-1.8 μ ; crass. heterocyst. 2-2.4 μ ; long. heterocyst. 3.5-6.5 μ .

Hab. Amongst *Symploca cuspidata*, n. sp., on trees, summit of Trois Pitons (4500 ft.), Dominica. No. 904.

18. *SCYTONEMA JAVANICUM*, *Bornet (in Bornet et Thuret, Notes Algologiques*, p. 148; *Bornet et Flah. Révis. des Nostoch. Hétérocyst.* p. 95). [*Symphysiphon javanicus*, *Kuetz. Species Algarum*, p. 323; *Tabulæ phycolog.* ii. p. 13, t. 43. f. i.] (Pl. XIV. figs. 12-15.)

Crass. fil. 13-16 μ ; crass. trich. 8.5-11 μ .

Hab. On lime-trees, Shanford Estate, Dominica. No. 901.—
Anguilla, W. Indies. (23-3-92.) No. 70.—On the walls, Roseau, Dominica. (9-7-92.) No. 236.

The above agrees well with this species, the most notable dif-

ference being in the branches not being aggregate. The heterocysts vary from subquadrate to subrotund, and are rather numerous.

19. *SCYTONEMA AMPLUM*, nov. sp. (Pl. XVI. figs. 14-16.)

S. strato parvo, pannoso, 3-5 mm. lato, fusco; filis dense intricatis; pseudoramis sparsis plerumque geminatis sed interdum singulis, filo primario tenuioribus; vaginis amplissimis stratis parallelis formati, in parte exteriori gelatinoso-achrois vel subluteolis, in parte interiori abrupte luteo-fuscis; trichomatibus angustis, luteo-viridibus, ad apicem pseudo-ramulorum crassioribus et articulis brevioribus; articulis diametro $3\frac{1}{2}$ -6plo (plerumque 4plo) longioribus; heterocystis oblongis, diametro 3- $3\frac{1}{2}$ plo (rarius 2plo) longioribus.

Crass. fil. prim. 19-24 μ ; crass. ramul. 13.5-16 μ ; crass. trich. 3.5-4 μ .

Hab. On trees, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904.—Growing about and upon the surface of *Symploca cuspidata*, n. sp.

The nearest species to this with regard to the comparative length and breadth of the cells is *S. ambiguum*, Kuetz., from which it differs in its much larger size, stouter habit, comparatively broader sheath, and in the more unfrequent branches. The branches are usually geminate though not unfrequently single, and they are always thinner than the primary filament. The trichomes at the apices of the branches become almost twice as thick, the cells becoming very much shorter. *S. myochrous*, Ag., is somewhat similar though larger, and has not such a comparatively broad sheath, and the latter is ocreate.

20. *S. AMBIGUUM*, Kuetz. (*Species Algarum*, p. 894; *Tabulæ phycolog.* ii. p. 7, t. 26. f. ii.) (Pl. XV. figs. 11-15.)

Crass. fil. 9.5-11.5 μ ; crass. trich. 2-2.5 μ .

Hab. On trees, summit of Trois Pitons (4500 ft.), Dominica. No. 903.—On the ground, mostly in old Diablotia holes, Morne Anglais (2300 ft.) (15-7-92.) No. 493. Amongst *Symploca*.

The figure given by Kuetzing (*l. c.*) is very indistinct; but the specimens agreed well with the description given by Bornet and Flahault (*Révis. des Nostoc. Hétérocyst.* p. 100), excepting that the filaments were a little thicker (9.5-11.5 μ against 6-9 μ). The trichomes were, however, the same. One of its chief characters is its long and narrow cells, which get shorter and thicker (up to 3.8 μ) towards the apices of the young

branches; the sheath also becomes hyaline. The cells often appeared like the section of a biconcave lens, owing to the contraction produced by the dilute spirit in which the material was preserved.

21. SCYTONEMA FIGURATUM, *Agardh*. (*Syst. Algar.* p. 38.) [*Scytonema calotrichoides*, *Kuetz. Species Algarum*, p. 307; *Tabulæ phycolog.* ii. p. 6, t. 22. fig. ii.; *Rabh. Fl. Europ. Alg.* ii. p. 253.]

Crass. fil. 15·5–23 μ ; crass. trich. 18–13·5 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.—On trees, summit of Trois Pitons (4500 feet), Dominica. Nos. 903 and 904.

22. SCYTONEMA, sp.

Crass. fil. 28–36 μ ; crass. trich. 5–5·5 μ .

Hab. Amongst *S. javanicum*, Bornet, on lime-trees, Shanford Estate, Dominica. No. 901.

Only a small quantity of this was seen, which was insufficient for accurate determination. The characters were those of *S. densum*, Bornet, and it probably is a small variety of this species.

23. TOLYPOTHRIX TENUIS, *Kuetz.* (*Phycolog. gener.* p. 228; *Tabulæ phycolog.* ii. p. 9, t. 31. f. ii.) [*T. pygmæa*, *Kuetz.* *T. flaccida*, *De Bary.*]

Crass. fil. 7–7·7 μ ; crass. trich. 5·7 μ ; heterocyst. 7·7 \times 5·7 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

Ord. SIROSIPHONIACEÆ.

24. HAPALOSIPHON INTRICATUS, nov. sp. (Pl. XV. figs. 16–28.)

H. cæspitibus parvis, æruginosis; filis densissime intricatis et variabilibus, adultis vaginis aretis distinctis (interdum paullo indistinctis) e cellulis singulis formatis, sparsim ramosis; ramis singulis unilateralibus flexuosis, filo primario subsimilibus, vaginatis vel evaginatis; cellulis variabilibus, diametro 1½–3plo longioribus, sæpe æqualibus et subrotundis, interdum elongatis; heterocystis intercalaribus, subquadratis vel oblongis (diametro 1–3plo longioribus).

Crass. fil. 4–7 μ ; crass. heterocyst. 3·8–5·5 μ .

Hab. In little intricate tufts among the leaves of *Leucobryum*, on trees, summit of Trois Pitons (4500 ft.), Dominica. No. 903.

The nearest species to this hitherto described is *H. laminosus*, Hansg. ["Ueber den Polymorph. der Alg.," *Botan. Centralb.* 1885, p. 48 (*cf.* Bornet et Flah. *Révis. des Nostoc. Hétérocyst.* p. 55)], from which it differs, however, in not being calcified in any way, in being a little larger, in having its single and unfrequent branches of a similar thickness to the primary filaments without any attenuation, and in its peculiar habitat. The heterocysts are of the same breadth as that of the cells (or narrower), whilst those of *H. laminosus* are often broader. Like the latter, the threads are very variable, being sometimes similar to an *Anabaena*, sometimes like a *Lyngbya*, while at other times the cells are quite irregular and somewhat inflated. Some examples showed the rounded granulose bodies noted by Hansg. in *H. laminosus* (*Bemerkungen zur Systematik einiger Süßwasser-algen*, p. 18). These bodies when fully formed appear to be thick-walled (figs. 23-28) and have a diameter of 6-13 μ .

The cell of the primary filament immediately under a branch always projects more or less into the sheath of the branch.

25. *HAPALOSIPHON FLEXUOSUS*, Borzi. (*Alghe d'acq. dolci. d. Papua, in Nuovo Notarisa*, Apr. 1892, p. 43.)

Crass. fil. 7.5-8.5 μ ; crass. cell. 5.5-6 μ ; long. cell. 4-4.5 μ .

Hab. In stream, Grande Soufrière, Dominica. No. 884.

26. *H. ARBOREUS*, nov. sp. (Pl. XV. figs. 1-3.)

H. inter alias algas repertus; filis primariis flexuosis, passim ramosis uno latere e cellulis singulis formati, cellulis diametro 1-1½ plo (rarius 2 plo) longioribus, vagina arcta, tenui, et achroa; filis secundariis brevibus, crassitudine filis primariis similibus sed subtenuioribus, cellulis diametro subæqualibus; heterocystis quadrato-oblongis, intercalariis.

Crass. fil. 7-10 μ ; crass. cell. 7-9.5 μ ; heterocyst. 6-9 μ \times 9-11 μ .

Hab. On trees, summit of Trois Pitons (4500 ft.), Dominica. No. 903.

The nearest species to this is *H. flexuosus*, Borzi (*l. c.*), from which it differs in not possessing flexuose intricate branches on every side; it is also a rather larger species, with cells often a little longer than broad and never depressed.

27. *STIGONEMA HORMOIDES*, Bornet et Flah. (*Révis. des Nostoc. Hétérocyst.* p. 69.) [*Scytonema hormoides*, Kuetz. *Sirosiphon brevis*, Kuetz. *Botan. Zeit.* 1847, p. 196; *Tabulae phycolog.* ii.

p. 10, t. 34. f. ii. *Sirosiphon hormoides*, *Kuetz. Species Algar.* p. 316; *Tabulæ phycolog.* ii. p. 10, t. 34. f. iv.]

Crass. fil. 9-13 μ .

Hab. On trees, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904. Rather scarce.—On rocks, Roseau Valley (1000-2000 ft.), Dominica. (27-6-92.) No. 24.

Var. TENUE, nov. var. (Pl. XV. figs. 4-8.)

Var. minor, filis tenuioribus, 5.5-7 μ crassis.

Hab. With the typical form, but much more abundant. It was intermixed with *Symploca cuspidata*, n. sp., *Stigonema minuta*, Hass., *Scytonema ambigua*, Kuetz., &c.

28. *STIGONEMA PANNIFORME*, *Bornet et Flah. (Révis. des Nostoc. Hétérocyst. p. 71.)* [*Scytonema panniformis*, *Agardh*; *Sirosiphon panniformis*, *Kuetz.*]

Crass. fil. 23-26 μ .

Hab. With the preceding. Another gathering from the same locality had abundant hyphæ (an incipient lichen). No. 779. Crass. fil. 15-25 μ .

29. *S. MINUTUM*, *Hass. (Hist. of Brit. Freshw. Alg. i. p. 230, t. 67. ff. 3-4.)*

Crass. fil. 19-25 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.—On trees, summit of Trois Pitons (4500 ft.), Dominica, no. 903; and on lime-trees, Shanford Estate, Dominica, no. 901.

30. *S. INFORME*, *Kuetz. (Species Algar. p. 319; Tabulæ phycolog. ii. p. 11, t. 38. f. iii.)*

Crass. fil. 44-52 μ .

Hab. On trees, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904.

Ord. OSCILLARIACEÆ.

31. *SYMPLOCA CUSPIDATA*, nov. sp. (Pl. XVI. figs. 1-7.)

S. bryophila, late expansa, griseo-lutea; fasciculis erectis, angustis subulatis, aggregatis (passim densis), 8-15 mm. altis, æruginescentibus; trichomatibus ærugineis, flexuoso-intricatis, in strato strictioribus, apicibus versus fasciculorum, 1-3 in lata vagina inclusis, sæpe interruptis, distincte articulatis; articulis diametro 2-4plo longioribus; vaginis amplis, achrois, pellucidis

vel interdum stratis parallelis formatis, in ambitu sæpe subrugosis, apice angustioribus et sæpe ramosis.

Diam. trich. (s. vag.) 1·9–2·3 μ ; crass. trich. c. vag. 13·5–25 μ .

Hab. On trees, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904.

Var. LUTEOFUSCA, nov. var.

Var. ferruginea, strato denso, 1–2 mm. alto, fasciculis brevioribus, 4–6 mm. (interdum 10 mm.) altis, articulis crassioribus.

Crass. trich. 2·5–3·5 μ ; crass. vag. 15–40 μ .

This variety also often has two, three, or more threads in one sheath.

Hab. On rocks, Roseau Valley (1000–2000 ft.), Dominica. (27–6–92.) No. 24.—On bark, windward road to lake (1000–2000 ft.), Dominica. (25–8–92.) Nos. 513 and 514.—Also on the ground, mostly in old Diablotia holes, Morne Anglais (2300 ft.). (15–7–92.) No. 493. Thicker and coarser sheath.

The specimens preserved in liquid strongly reminded one of *Sphagnum cuspidatum*; they occurred amongst mosses in penicillate tufts which were subæruginose towards the apices, the sheaths, but not the trichomes, here becoming narrower. Many of the sheaths in the stratum were without trichomes; and in consequence of this, and the broader sheaths at the base, the stratum was paler than the erect fasciculi.

32. LYNGBYA PENICILLATA, *Kuetz.* (*Botan. Zeit.* 1847, p. 194.) [*Leibleinia penicillata*, *Kuetz. Species Algar.*; *Tabulæ phycolog.* i. p. 46, t. 81. f. ii.]

Crass. fil. 3–3·5 μ .

Hab. On bed of stream in crater of Grande Soufrière, Dominica. No. 881.

33. L. SUBTILE, *West.* (*Alg. of the Eng. Lake Distr. in Journ. Roy. Micr. Soc.* Dec. 1892, p. 741, pl. x. f. 58.)

Crass. fil. 1·4 μ .

Hab. With the preceding.

34. PHORMIDIUM LYNGBYACEUM, *Kuetz.* (*Phycol. gener.* p. 194; *Tabulæ phycolog.* p. 33, t. 46. f. iii.; *Rabh. Fl. Europ. Alg.* ii. p. 124.)

Crass. fil. 3·5–4 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.—On old wall, Dominica. (1–8–92.) No. 473.

The cells were about as long as broad (sometimes a little longer).

35. PHORMIDIUM, sp.

Crass. fil. 1·2–1·5 μ .

Stratum dense, thin, and dark æruginous.

Hab. On damp wall, Roseau, Dominica. (5–9–92.) No. 546.

Ord. CHROOCOCCACEÆ.

36. CHROOCOCCUS MINOR, *Naeg.* (*Gattung. einzell. Alg.* p. 47, t. 1 A. f. 4. *Rabh. Fl. Europ. Alg.* ii. p. 30.) [Protococcus minor, *Kuetz. Species Algar.* p. 198; *Tabulæ phycolog.* i. p. 3, t. 3.] (Pl. XVI. fig. 17.)

Diam. cell. 2·8–4 μ ; diam. fam. 11·5–30 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.—On trees, summit of Trois Pitons (4500 ft.), Dominica. No. 903.

Forma MINIMA. (Pl. XVI. fig. 18.)

Forma cellulis familiisque minoribus quam forma typica.

Diam. cell. s. teg. 1–1·9 μ ; diam. fam. 10–23 μ .

Hab. Along with the type from the above-named localities, and also on lime-trees, Shanford Estate, Dominica. No. 901.

37. C. COHÆRENS, *Naeg.* (*Rabh. Fl. Europ. Alg.* ii. p. 30.) [Pleurococcus cohærens, *Bréb.*, 1842. Protococcus cohærens, *Kuetz.*]

Diam. cell. 3·8–6·5 μ (usque ad 7·5 μ); diam. fam. 30–173 μ .

Hab. Amongst other algæ on trees, summit of Trois Pitons (4500 ft.), Dominica. No. 903.

This usually occurred in small families, but occasionally in very large ones, and now and then in solitary examples.

38. C. TURGIDUS, *Naeg.* (*Gatt. einzell. Alg.* p. 46. *Rabh. Fl. Europ. Alg.* ii. p. 32.) [Protococcus turgidus, *Kuetz. Tabulæ phycolog.* i. p. 5, t. 5. f. i.]

Diam. cell. s. teg. 7·5–10·5 μ , c. teg. 21–23 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

A rather small form.

39. C. SCHIZODERMATICUS, *West.* (*Alg. of the Eng. Lake Distr. in Journ. Roy. Micr. Soc.* Dec. 1892, p. 742, pl. x. ff. 61–63.) (Pl. XVI. fig. 19.)

Diam. cell. s. teg. 11·5–13 μ ; diam. c. teg. 23–28 μ .

Hab. With the preceding species, but much more abundant.

40. *GLÆOCAPSA MURALIS*, *Kuetz.* (*Tabulæ phycolog.* i. t. 21. f. i.; *Rabh. Fl. Europ. Alg.* ii. p. 36.)

Long. cell. s. teg. $5\cdot5$ – $7\cdot5$ μ ; lat. cell. s. teg. $2\cdot5$ – 3 μ ; diam. fam. 19 – 25 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

The cells were longer in relation to their breadth than those figured by Kuetzing (*l. c.*).

41. *G. GIGAS*, nov. sp. (Pl. XVI. figs. 11–13.)

G. familiis solitariis vel subaggregatis; cellulis magnis, subglobosis vel oblongis, 4–36 in familiis subglobosis consociatis, membrana cellularum læva vel subtiliter granulata (vide fig. 11), cytoplasmate ærugineo et granuloso; tegumentis subglobosis, ad exteriorem duris sæpe subrugosis, luteo-fuscescentis, lamellis extra cellulas indistinctis, paucis et pallide luteolis.

Diam. cell. s. teg. 9 – 15 μ (plerumque 11 μ); diam. fam. 44 – 115 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

This occurred amongst *Nostoc sphaericum*, Vauch., in no definite stratum; and it is sufficiently distinguished by its large cells and other characters.

42. *GLÆOCAPSA*, sp.

Crass. cell. s. teg. 2 – 3 μ . Nos. 23 and 24.

43. *GLÆOCAPSA*, sp.

Crass. cell. s. teg. $1\cdot5$ μ . No. 546.

44. *APHANOCAPSA ELACHISTA*, nov. sp. (Pl. XV. figs. 9, 10.)

A. tegumento minutissimo, subgloboso, firmo, gelatinoso non lamelloso, achroo; cellulis minutissimis, sphaericis, solitariis geminatisve, laxe dispositis; cytoplasmate homogæneo et æruginoso; tegumentis non aggregatis in thallo distincto.

Diam. cell. $1\cdot5$ – $1\cdot8$ μ (usque ad 2 μ); diam. teg. 26 – 38 μ .

Hab. On trees, summit of Trois Pitons (4500 ft.), Dominica. No. 903.—And in stream, Grande Soufrière, Dominica. No. 884.

This species seems characteristically distinct by reason of its minute cells in the very small globose colonies, which were scattered amongst other algæ.

45. *GLÆOTHECE LINEARIS*, *Naeg.* (*Gattung. einzell. Alg.* p. 58, t. 1 g. f. 2; *Rabh. Fl. Europ. Alg.* ii. p. 60.)

Long. cell. sine teg. $5\cdot5$ – $6\cdot5$ μ , c. teg. $13\cdot5$ μ ; lat. cell. sine teg. $1\cdot8$ μ , c. teg. $9\cdot5$ – $10\cdot5$ μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

Forma cellulis 5–6plo longius quam latius. (Pl. XIV. fig. 26.)

Long. cell. s. teg. $11\cdot5$ – $13\cdot5$ μ , c. teg. 21 μ ; lat. cell. s. teg. 2 – $2\cdot3$ μ , c. teg. $11\cdot5$ – $12\cdot5$ μ .

Hab. With the typical form.

46. GLÆOTHECE LUNATUM, nov. sp. (Pl. XVI. fig. 9.)

G. cellulis 2–4 in familiis consociatis, suberescentiformibus, 2plo longius quam latius, apicibus acutis; tegumentis universalibus, ovalibus vel ellipticis; cytoplasmate ærugineo et homogæneo.

Lat. cell. $2\cdot5$ – $2\cdot7$ μ ; apicibus cellularum $4\cdot8$ – $5\cdot7$ μ inter se distantibus; famil. $32\cdot5 \times 19$ μ .

Hab. With *Gl. linearis*, Naeg., but very scarce.

47. APHANOTHECE SAXICOLA, Naeg. (*L. c.* p. 59, t. 1 h. f. 2.)

Lat. cell. $1\cdot4$ – $1\cdot8$ μ .

Hab. In small masses of 70–120 μ in diameter, amongst mosses on trees, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904. Rather scarce.

48. A. MICROSCOPICA, Naeg. (*L. c.* t. 1 h. f. 1.)

Long. cell. $5\cdot5$ – $7\cdot5$ μ ; lat. cell. $3\cdot8$ – $4\cdot4$ μ ; diam. famil. 108–179 μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.—Amongst *Symplocos cuspidata*, n. sp., on trees, summit of Trois Pitons (4500 ft.), Dominica. No. 904.

49. TETRAPEDIA TRIGONA, nov. sp. (Pl. XVI. fig. 8.)

T. cellulæ triangulares, lateribus concavis, angulis subrotundatis; a latere visæ ellipticæ; cytoplasmate pallide ærugineo et homogæneo.

Lat. cell. $7\cdot2$ μ ; crass. $3\cdot6$ μ .

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

Class DIATOMACEÆ.

50. EPITHEMIA WESTERMANNI, Kuetz. (*Pritch. Infus.* ed. 1861, p. 760, t. 4. f. 2.)

Hab. In stream, crater of Grande Soufrière, Dominica. Nos. 881 and 908.

51. *EUNOTIA ARCUS*, *Ehrenb.* (*W. Sm. Brit. Diat.* ii. t. 33. f. 283.)

Hab. In stream, crater of Grande Soufrière, Dominica. No. 908.

52. *E. GRACILIS*, *Rabh.* (*Fl. Europ. Alg.* i. p. 72.) [*Himantidium gracile*, *Ehrnb.*, *W. Sm. Brit. Diat.* ii. p. 14, t. 33. f. 285.]

Hab. Amongst mosses, on trees, summit of Trois Pitous (4500 ft.), Dominica. No. 903.

53. *ODONTIDIUM MUTABILE*, *W. Sm.* (*Brit. Diat.* ii. p. 17, t. 34. f. 290.)

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

54. *DESMOGONIUM RABENHORSTIANUM*, *Grun.* (*Diat. ins. Banka*, p. 6, t. i. f. 1; *De Toni, Sylloge Algar.* vol. ii. p. 680.)

Hab. Abundant in stream (hot and cold), crater of Grande Soufrière, Dominica. No. 908.

55. *NITZSCHIA PARVULA*, *W. Sm.* (*Brit. Diat.* i. p. 41, t. 13. f. 106.)

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

56. *N. FLEXELLA*, *Suring.* (*Alg. Japon.* p. 11, t. 1. f. 12.)

Long. 33-44 μ ; lat. 3.8-4.8 μ .

Hab. In streams, Grande Soufrière, Dominica. Nos. 881 and 884.

57. *N. LINEARIS*, *W. Sm.* (*Brit. Diat.* i. p. 39, t. 13. f. 110.)

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.—And in streams, Grande Soufrière, Dominica. Nos. 881 and 908.

58. *N. MINUTISSIMA*, *W. Sm.* (*L. c.* p. 41, t. 13. f. 107.)

Hab. In stream, Grande Soufrière, Dominica. No. 884.

59. *NAVICULA CRYPTOCEPHALA*, *Kuetz.* (*W. Sm. l. c.* p. 53, t. 17, f. 155.)

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

60. NAVICULA BOREALIS, *Kuetz.* [*Pinnularia borealis*, *Ehrenb.*, *W. Sm. Brit. Diat.* ii. p. 94; *Rabh. Fl. Europ. Alg.* i. p. 216.]

Hab. With the preceding species.

61. N. MESOLEPTA, *Ehrenb.* [*Pinnularia mesolepta*, *W. Sm. Brit. Diat.* i. p. 58, t. 19. f. 182.]

Hab. On bed of stream in crater of Grande Soufrière, Dominica. No. 881.

62. FRUSTULIA RHOMBOIDES, *De Toni.* (*Sylloge Algar.* vol. ii. p. 227.) [*Navicula rhomboides*, *Ehrenb.*, *W. Sm. Brit. Diat.* i. p. 46, t. 16. f. 129.]

Hab. In stream, crater of Grande Soufrière. No. 908.

Var. SAXONICA, *De Toni.* (*L. c.*) [*Frustulia saxonica*, *Rabh. Navicula crassinervia*, *Bréb. in W. Sm. Brit. Diat.* i. p. 47, t. 31. f. 271.]

Hab. In streams (cold, warm, and hot), crater of Grande Soufrière, Dominica. Nos. 883 and 908.—Also amongst mosses on trees, summit of Trois Pitons (4500 ft.), Dominica. Nos. 903 and 904.

63. GOMPHONEMA TENELLUM, *Kuetz.* (*W. Sm. Brit. Diat.* i. p. 80, t. 29. f. 243.)

Hab. On damp wall of dam, Sharp's River, St. Vincent. No. 477.

EXPLANATION OF THE PLATES.

PLATE XIII.

Figs. 1-4. *Zygnema* (§ *Zyggonium*) *pachydermum*, n. sp. Conjugated specimens, 520/1.

5-8. Ditto. Four zygosporos, 520/1.

9, 10. Ditto. Two specimens, with azygosporos, 520/1.

11-15. Ditto, sterile filaments; fig. 11, 520/1; figs. 12-15, filaments, showing short branches, 120/1.

Fig. 16. Ditto, showing conjugation between three filaments, 120/1.

Fig. 17. *Cosmarium obliquum*, Nordst., f. *minor*, Nordst., 520/1.

PLATE XIV.

Figs. 1-6. *Zygnema pachydermum*, n. sp., var. *confervoides*, n. var. Figs. 1 & 2, filaments without cell-contents; fig. 3, filament with contents delineated; fig. 4, attempt at conjugation?; fig. 5, cells showing longitudinal division. Figs. 1-5, 520/1; fig. 6, 830/1.

7-11. *Microchaete tenuissima*, n. sp. 520/1.

12-15. *Scytonema javanicum*, Bornet. 520/1.

PLATE XIV. (continued).

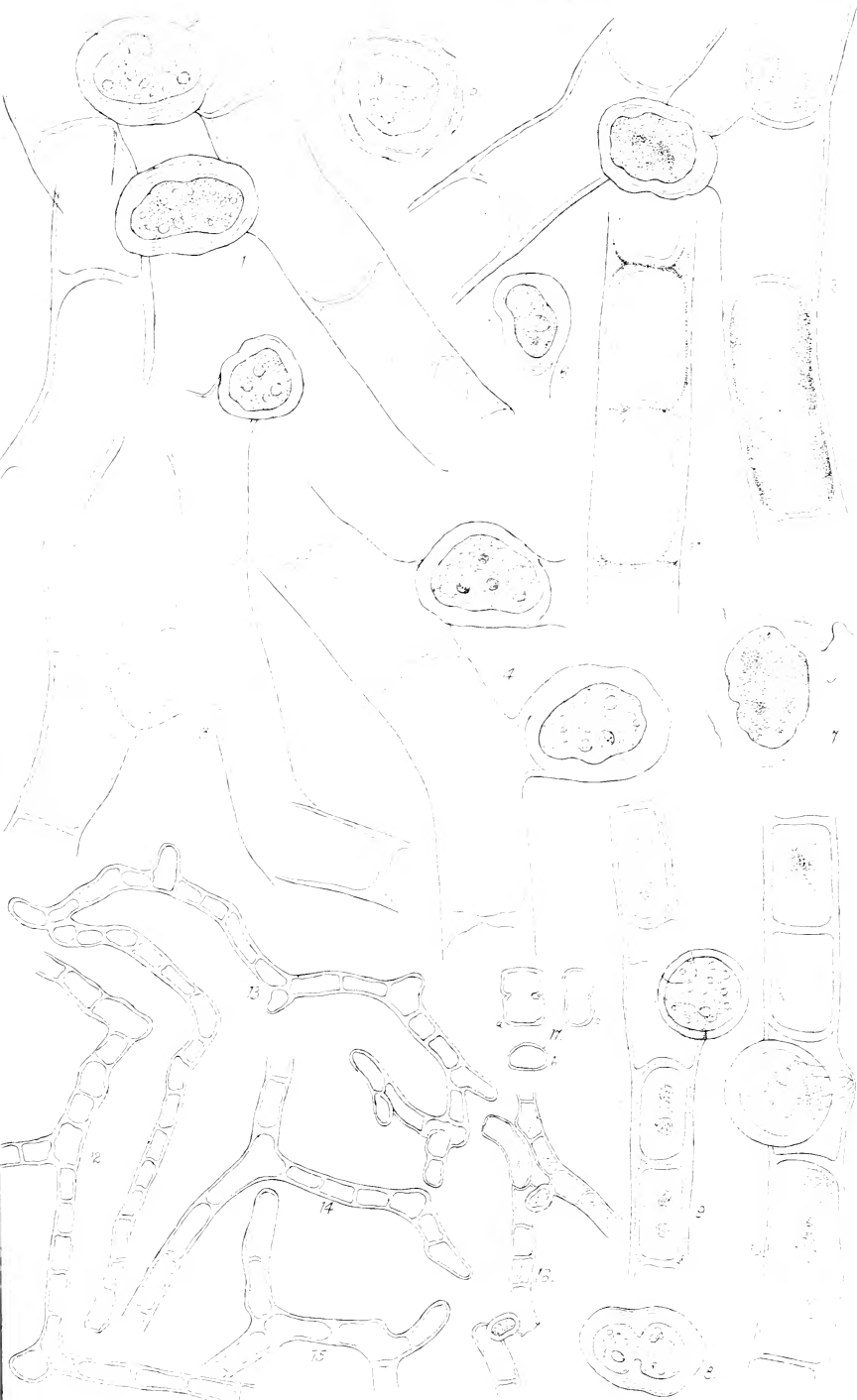
- Fig. 16. *Cerasterias staurastroides*, n. sp. 520/1.
 Figs. 17-24. *Rhizoclonium Berggrenianum*, Hauck, var. *dominicense*, n. var. 520/1.
 Fig. 25. *Cosmarium pseudopyramidatum*, Lund, **stenonotum*, Nordst., f. *minor*, Racib. 520/1.
 Fig. 26. *Glæothece linearis*, Naeg., forma. 520/1.

PLATE XV.

- Figs. 1-3. *Hapalosiphon arboreus*, n. sp. 520/1.
 4-8. *Stigonema hormoides*, Bornet et Flah., var. *tenue*, n. var. 520/1.
h, heterocysts.
 9-10. *Aphanocapsa elachista*, n. sp. 520/1.
 11-15. *Scytonema ambiguum*, Kuetz. 520/1.
 16-28. *Hapalosiphon intricatus*, n. sp. 520/1.

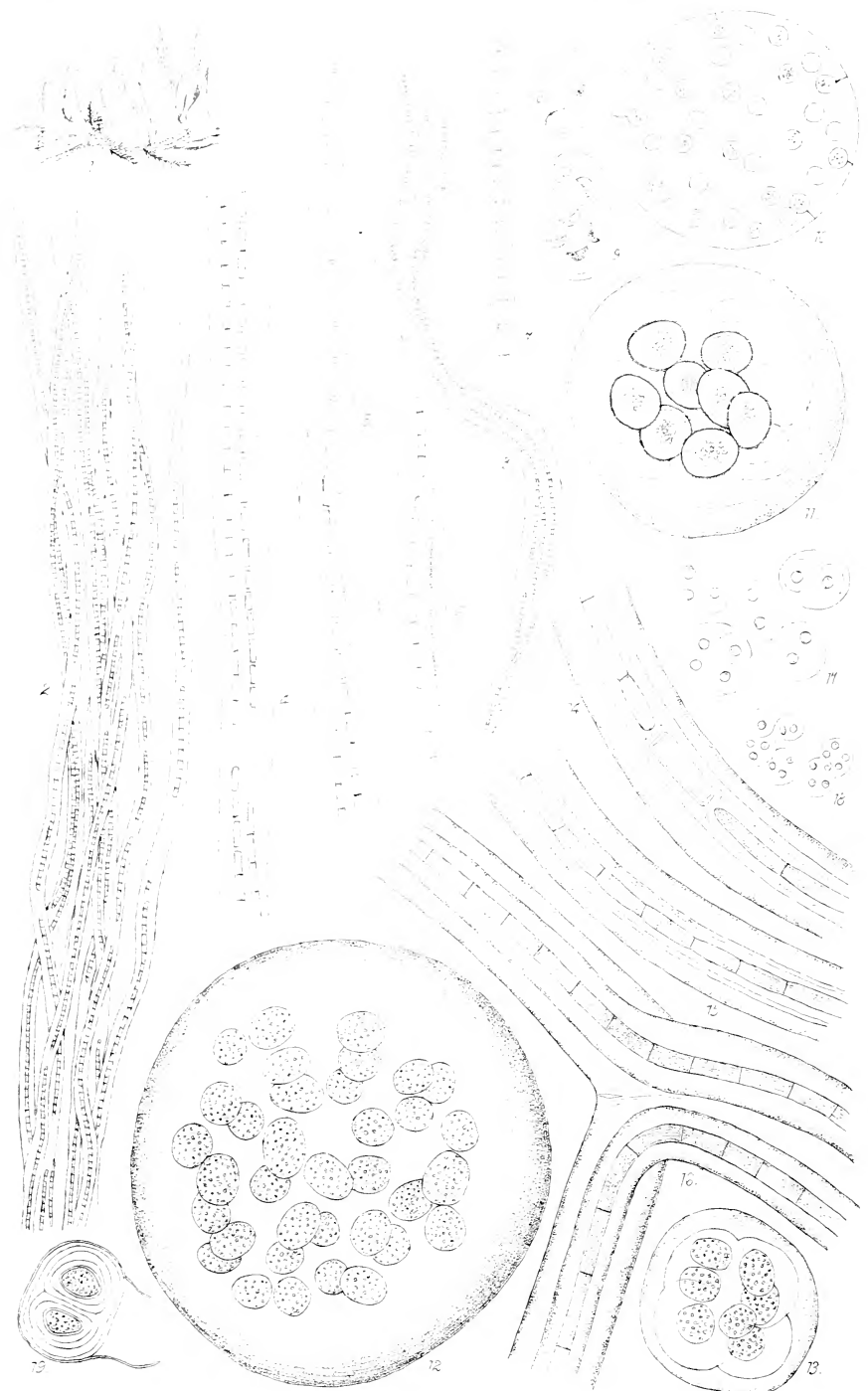
PLATE XVI.

- Figs. 1-7. *Symploca cuspidata*, n. sp. Fig. 1, natural size; fig. 2, a very small portion of one of the erect fasciculi, 120/1; fig. 3, a specimen showing three trichomes in one sheath, 120/1; figs. 4 & 5, examples with two trichomes in one sheath, 520/1; figs. 6 & 7, the apices of two filaments, showing in fig. 6 a broad sheath at the apex, and in fig. 7 a narrow one, 520/1.
 Fig. 8. *Tetrapedia trigona*, n. sp. 830/1.
 9. *Glæothece lunatum*, n. sp. 520/1.
 10. *Eudorina stagnale*, Wolle, var. 520/1.
 Figs. 11-13. *Glaucapsa gigas*, n. sp. 520/1. Fig. 11, an example having the cells with finely granulate walls; fig. 12, one where the lamellæ round the cells are not visible.
 14-16. *Scytonema amplum*, n. sp. 520/1.
 Fig. 17. *Chroococcus minor*, Naeg. 520/1.
 18. " " " f. *minima*. 520/1.
 19. " " *schizodermaticus*, West. 520/1.
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QK572.W4 W4 gen
West, William/On some freshwater algae f



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