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A CONTRIBUTION

TO OUR

knowledge of the Freshwater Algæ of Columbia

BY

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Although we have a considerable general knowledge of the Alga-flora of the freshwaters of South America, nothing has been previously published on the freshwater Algæ of Columbia. The collections made by Dr. MAYOR in his Scientific Expedition of 1910 to the Columbian Andes have therefore proved of great interest. There were in all twenty-four tubes of algal material collected at altitudes varying from 1550 to 3600 metres. They were as follows :

- N^{os} 1 and 2. Laguna above Medellin, Department Antioquia, Central Andes. Altit. 2300 m.
- N^{os} 3 and 4. Laguna above Estrella near Medellin, Dep. Antioquia, Central Andes. Altit. 2500 m.
- N^o 5. Bog near the Laguna above Medellin, Dep. Antioquia, Central Andes. Altit. 2300 m.
- N^o 6. Ditches between Medellin and America, Dep. Antioquia, Central Andes. Altit. 1550 m.
- N^o 7. Ditch above America and near Medellin, Dep. Antioquia, Central Andes. Altit. 1850 m.
- N^{os} 8 and 9. Pool upon the Alto Don Elias near Angelopolis, Dep. Antioquia, Central Andes. Altit. 2100 m.
- N^o 10. Pool on the last slope of the Alto Don Elias near Angelopolis, Dep. Antioquia, Central Andes. Altit. 2100 m.
- N^{os} 11 and 12. Laguna Santa Rita near Angelopolis, Dep. Antioquia, Central Andes. Altit. 1600 m.

- Nº 13. Ditch, Col du Ruiz, Dep. Antioquia, Central Andes. Altit. 3700 m.
 Nºs 14, 15 and 16. Laguna de la Savane de Bogota, Dep. Cundinamarca, Eastern Andes. Altit. 2580-2600 m.
 Nºs 17, 18 and 19. Ditches near the Laguna de la Savane de Bogota, Dep. Cundinamarca, Eastern Andes. Altit. 2580-2600 m.
 Nº 20. Laguna Pedropalo, near Tena, Dep. Cundinamarca, Eastern Andes. Altit. about 2000 m.
 Nº 21. Plankton-collection from Laguna Pedropalo, near Tena, Dep. Cundinamarca, Eastern Andes. Altit. about 2000 m.
 Nº 22. Ditch above the slope of Tequendama, Dep. Cundinamarca. Eastern Andes. Altit. 2210 m.
 Nº 23. Laguna de Ubaque, Dep. Cundinamarca, Eastern Andes. Altit. 2066 m.
 Nº 24. Laguna de Paramo Cruz Verde above Bogota, Dep. Cundinamarca, Eastern Andes. Altit. 2700 m.

The most important previous publications on South American freshwater Algæ are those of NORDSTEDT, BÖRGESEN, BERGE and MÖBIUS on Algæ from Brazil, BERGE on Algæ from Bolivia, Paraguay, Uruguay and Argentina (including Patagonia), LAGERHEIM on the Algæ of Ecuador, RACIBORSKI on some Desmide from British Guiana, and O. MÜLLER on Diatoms from South Patagonia. Various other records of South American freshwater Algæ have also appeared in sundry publications dealing with tropical Algæ, and quite a number in WITTRICK, NORDSTEDT and LAGERHEIM's "Algæ Exsiccatae".

The collections from the Columbian Andes have yielded altogether 311 species, of which nearly half are Desmides, as may be seen from the following table.

	Genera	Species
Myxophyceæ	18	39
Peridiniæ	2	4
Bacillariæ	16	49
Chlorophyceæ		
<i>Isokontæ</i>	26	46
<i>Akontæ (Conjugatæ)</i>		
<i>Zygnemaceæ</i>	3	10
<i>Desmidiaceæ</i>	18	148
<i>Stephanokontæ</i>	2	8
<i>Heterokontæ</i>	4	7
Total	89	311

Of the above, 24 species (and also 11 varieties) are here described for the first time as new to science.

As the author has mentioned in many previous publications the Desmidiaceæ is *par excellence* the family of freshwater Algæ which shows definite geographical peculiarities,

and the Columbian collections contained several distinctive American types, amongst which should be mentioned *Desmidium æquale* W. and G. S. WEST, *Closterium turgidum* subsp. *giganteum* NORDST., *Euastrum attenuatum* WOLLE, *E. brasiliense* BORGE, *E. evolutum* (NORDST.) W. and G. S. WEST, *E. quadriceps* NORDST., *E. pictum* BÖRGES., *Staurastrum Rotula* NORDST. and *St. trihedrale* WOLLE.

There was also a plentiful sprinkling of more or less ubiquitous montane types of Desmides, probably to be accounted for by the altitude at which most of the collections were made.

The abundance of three species of *Coleochaete* (*C. scutata*, *C. pulvinata* and *C. Nitellarum*), all with spermatocarpes, from Laguna de Ubaque in the Department of Cundinamarca, is worthy of special mention.

Several Flagellates of the genera *Euglena*, *Phacus* and *Trachelomonas* were observed in the collections, but they were not satisfactorily determined.

There was one plankton-collection (N° 21) from Laguna Pedropalo (alt. 2000 mètres) in the Department of Cundinamarca. This collection contained numerous Copepods and Nauplii, a quantity of a sterile species of *Spirogyra*, *Anabæna flos-aquæ*, *Lyngbya* sp. (fragmentary, but probably *L. æstuari*), *Eunotia lunaris*, *Oocystis natans*, *Staurastrum paradoxum* var. *longipes* and *St. leptocladum* var. *elegans*.

Myxophyceæ.

Family Chroococcaceæ.

1. *Myxobactron hirudiformis* G. S. WEST in Ann. South African Mus. IX, 1912, p. 63, t. 2, f. 54-60. — Antioquia: n^{os} 1 and 2.

This Alga has only previously been seen from S. W. Africa.

2. *Chroococcus minor* (KÜTZ.) NÆG. — Antioquia: n° 10. Cundinamarca: n^{os} 23 and 24.

3. *Chroococcus minutus* (KÜTZ.) NÆG. — Antioquia: n° 3.

4. *Chroococcus cohærens* (BRÉB.) NÆG. — Cundinamarca: n° 24.

5. *Chroococcus turgidus* (KÜTZ.) NÆG. — Cundinamarca: n^{os} 23 and 24.

6. *Chroococcus macrococcus* (KÜTZ.) RABENH. — Cundinamarca: n° 24.

7. *Microcystis pallida* (FARLOW) LEMM. Diam. colon. 76-102 μ ; diam. cell. 5-6 μ . — Cundinamarca: n^{os} 14 and 23.

8. *Aphanothece microscopica* NÆG. — Antioquia: n° 7. Cundinamarca: n° 23.

9. *Aphanothece saxicola* NÆG. — Cundinamarca: n° 24.

10. *Merismopedia glauca* (EHRENB.) NÆG. — Cundinamarca: n° 24.

Family Oscillatoriaceæ.

11. *Oscillatoria amphibia* AG. — Antioquia: n^{os} 1, 2, 5, 6 and 13.

12. *Oscillatoria chlorina* KÜTZ. — Cundinamarca: n^o 19.

13. *Oscillatoria formosa* BORY. — Antioquia n^o 6.

14. *Oscillatoria limosa* AG. — Antioquia n^o 6.

15. *Oscillatoria splendida* GREV. — Cundinamarca: n^o 19.

The extremities of the filaments were much attenuated and capitate.

16. *Oscillatoria tenuis* AG. — Antioquia: n^{os} 1 and 2. Cundinamarca: n^{os} 16, 22, and 24.

Var. *tergestina* (KÜTZ.) RABENH. — Antioquia: n^o 13.

17. *Phormidium fragile* (MENEH.) GOM. — Antioquia n^o 10.

18. *Phormidium tenue* (MENEH.) GOM. — Cundinamarca: n^{os} 14 and 17.

19. *Lyngbya bipunctata* LEMM. — Antioquia: n^{os} 1 and 2; crass. fil. 1 μ .

20. *Lyngbya putealis* MONT. — Antioquia: n^o 4. Crass. fil. 9 μ ; crass. trich. 6-8 μ .

21. *Lyngbya major* MENEH. — Antioquia: n^o 6. Crass, fil. 19-20 μ ; crass. trich. 14,5 μ .

22. *Lyngbya* sp. ad *L. æstuarum* LIEBMAN accedens; crass. fil. 27 μ ; crass. trich. 22 μ . Cundinamarca: n^o 21 (plankton).

Only a few fragmentary filaments of this species were observed, and its exact identification was therefore uncertain.

Family Nostocaceæ.

23. *Nostoc paludosum* KÜTZ. — Antioquia: n^o 10. Cundinamarca: n^o 24.

24. *Anabæna flos-aquæ* (LYNGB.) BRÉB. — Cundinamarca: n^o 21 (plankton).

Several sterile species of *Anabæna* were observed from Antioquia (n^{os} 1 and 2) and Cundinamarca (n^o 24), but they were too fragmentary for certain identification.

25. *Cylindrospermum minimum* **sp. nov.**

C. filis in stagnis natantibus, non in strato aggregatis; trichomatibus pallide ærugineis, brevibus, subrectis vel leviter curvatis; cellulis cylindricis, diametro 1 $\frac{1}{2}$ -2-plo longioribus, polis rotundato-truncatis; heterocystis parvis, ellipsoideis vel ovoideis; sporis angustis et cylindrico-oblongis, episporio glabro.

Crass. cell. 1,8-2 μ ; crass. heterocyst. 2-2,2 μ ; long. heterocyst. 2,5-2,7 μ ; long. spor. 7,5-10 μ ; lat. spor. 3,3-3,7 μ ; long. tot. trich. (ut visis) 50-64 μ . (Pl. XXI, fig. 1-3).

Antioquia: Laguna above Estrella near Medellin, Central-Andes; altit. 2300 m. n^o 3.

This minute *Cylindrospermum* is the smallest of all the known species of the genus, and was observed in quantity floating freely among other Algæ. It is distinguished from

C. minutissimum COLLINS (in Erythea, 1896, p. 120) by its rather narrower trichomes, its smaller and ellipsoidal heterocysts, and the much smaller size of its spores. In fact, the mature spores are scarcely half the size of those of *C. minutissimum*, and COLLINS also states that in his species there are no constrictions between the vegetative cells. Another species with which *C. minimum* should be compared is *C. Goetzei* SCHMIDLE (in Engler, Botan. Jahrb. XXX, 1902, p. 245, t. 4, f. 5), from which it differs in its more slender trichomes, its shorter and more rounded heterocysts, and in the much smaller size of its spores.

26. *Cylindrospermum majus* Kürz. forma *minor*.

Crass. trich. 3-3,2 μ ; long. heterocyst. 7,5-8 μ ; lat. heterocyst. 3,5 μ ; long. spor. 19-21 μ ; lat. spor. 9 μ . Episorio minute papillato, fuscescente.

Cundinamarca: n^{os} 14 and 24.

This form was only seen in small quantity and does not appear to differ from *C. majus* except in its slightly smaller size.

27. *Nodularia turicensis* (CRAMER) HANSG. — Cundinamarca: n^o 14.

28. *Nodularia tenuis* G. S. WEST in TRANS. Linn. Soc. Bot. XXXVIII, 1907, p. 171.

Sporis oblongo-cylindricis, diametro $1\frac{1}{3}$ - $1\frac{1}{2}$ plo longioribus, seriatis. Crass. trich. 3-3,3 μ ; crass. heterocyst. 5,5-5,8 μ ; long. heterocyst. 7,2-8 μ ; long. spor. 10-14 (usque ad 18) μ ; lat. spor. 6-7 μ . (Pl. XXI, fig. 4-5).

Cundinamarca: n^o 17.

The South American form differed only from the African one in the slightly narrower trichomes and in the closer approximation of the heterocysts (36-64 μ apart). The spores were not observed from Africa.

In collection n^o 14 from the Department of Cundinamarca there were two other species of *Nodularia*, but neither were in a proper condition for satisfactory identification.

Family Microchætaceæ.

29. *Microchæte crassa* **sp. nov.**

M. in cæspitibus parvis (e filis paucis compositis) ad plantas aquaticas affixis; filis leviter flexuosis 2-2,5 mm. longis, cylindricis sed levissime attenuatis basin versus; vaginis achrois, hyalinis (non lamellosis), firmis et continuis; trichomatibus apicem versus paullo crassioribus, ad dissepimenta non constrictis et non granulatis; cellulis basin trichomatis versus diametro paullo longioribus, apicem versus diametro paullo brevioribus; cellula apicali depresso-conica; heterocystis plerumque basalibus, globosis.

Crass. fil. 13-16 μ ; crass. trich ad bas. 9-10,5 μ ; ad apic 12-13 μ ; diam. heterocyst. basal. 9-10,5 μ . (Text-fig. 1).

Cundinamarca: Laguna de la Savane de Bogota, Eastern Andes; altit. 2580-2600 m. n^o 14.

This Alga formed small tufts consisting of from seven to twelve filaments attached to the leaves and stems of aquatic macrophytes. The filaments are rather rigid and fairly straight, although gently undulated from base to apex, and the base of each filament is a little decumbent.

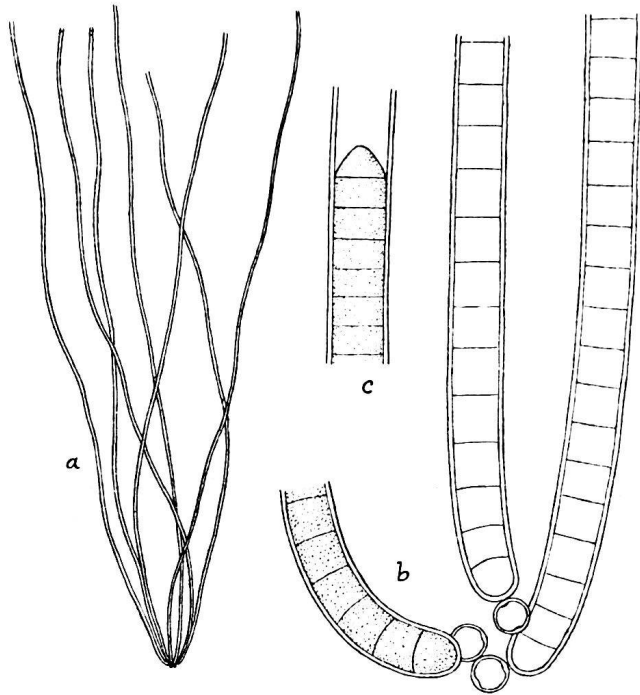


Fig. 1. — *Microchaete crassa* sp. nov.
a, tuft of filaments, $\times 40$; b, bases of three filaments, $\times 500$;
c, apex of filament, $\times 500$.

It stands nearest to *M. robusta* SETCHELL and GARDNER (Algae of N. W. America, Univ. Calif. Publ. Bot. 1903, p. 194), from which it differs in the smaller tufts of shorter and narrower filaments, which are wider at the base than at the apex. Moreover, so far as could be observed even the sheaths of the oldest filaments were not lamellose.

M. crassa might also be compared with *M. calotrichoides* HANSG., a species in which the filaments are much more densely aggregated and the trichomes considerably narrower. The latter are also attenuated at

the apices and sometimes piliferous, a character which at once distinguishes it from *M. crassa*.

Family Scytonemaceæ.

- 30. *Tolypothrix lanata* WARTMANN. — Cundinamarca : n° 23.
- 31. *Scytonema crispum* (AG.) BORNET. — Cundinamarca : n° 20.

Family Stigonemaceæ.

- 32. *Hapalosiphon hibernicus* W. and G. S. WEST. — Antioquia : n° 4. Cundinamarca : n° 24.
- 33. *Hapalosiphon intricatus* W. and G. S. WEST. — Cundinamarca : n° 24.
- 34. *Stigonema ocellatum* (DILLW.) THURET. — Cundinamarca : n° 24.

Family Rivulariaceæ.

35. *Calothrix parietina* (NÆG.) THURET. — Cundinamarca : n^{os} 14, 17 and 20.

Crass. fil. 15-18 (usque ad 24) μ ; crass. trich. 9-12 μ .

36. *Calothrix brevissima* G. S. WEST in Journ. Linn. Soc. Bot. XXXVIII, 1907, p. 180, t. 10, f. 8.

Forma trichomatibus paullo latioribus ; crass. fil. 6-8,5 μ ; crass. trich. 4,5-7,5 μ ; long. tot. trich. 36-42 μ . (Pl. XXI, fig. 8-9).

Cundinamarca : n^o 14.

37. *Calothrix columbiana* **sp. nov.**

C. parva, filis gregariis, ad plantas varias submersas affixis, usque 350 μ longis, subrectis vel leviter flexuosis, ad basin sæpe decumbentibus, apicem versus gradatim attenuatis ; vagina arcta achroa et submucosa, non lamellosa ; trichomatibus pallide ærugineis, inter cellulas non constrictis ; cellulis basin versus subquadratis vel diametro paullo longioribus, cellulis apicem versus subcylindricis, diametro circiter 3-plo longioribus ; heterocystis solitariis, basilaribus et subsphæricis ; sporis solitariis ellipsoideis, polo juxta cellulas vegetativas subtruncato et incrassato, episporio glabro et achroo.

Crass. trich. ad bas. 6-8 μ , ad med. circiter 4-5 μ ; diam. heterocyst. 6 μ , long. spor. 12-14,5 μ ; lat. spor. 10 μ . (Pl. XXI, fig. 10-12).

Cundinamarca : Laguna de Ubaque, Eastern Andes ; altit. 2066 m. N^o 23.

This species is a close ally of *C. stagnalis* GOMONT (in Journ. de Botanique, 1895, p. 197, cum fig.), but differs in its shorter filaments, its solitary heterocysts, its cylindrical cells with entire absence of intercellular constrictions, and in its shorter and differently shaped spores.

38. *Calothrix* sp. ad *C. stagnalem* accedens.

Crass. trich. ad bas. 6,8-8 μ ; diam. heterocyst. 6,5-7 μ . Cundinamarca : n^o 14.

Very little of this species was seen. It is epiphytic on various aquatic macrophytes. From *C. stagnalis* it differs in its solitary heterocysts and (in the few specimens observed) in the absence of spores.

39. *Calothrix clavata* **sp. nov.**

C. minuta, filis solitariis vel subgregariis, ad plantas submersas epiphyticis, usque 100 μ longis, subrectis vel leviter flexuosis, ad basin inflatis, supra basin subiter attenuatis et deinde gradatim attenuatis apicem versus ; vagina arcta, achroa et tenuissima ; trichomatibus pallide ærugineis, inter cellulas latiores basales leviter constrictis ; cellulis ad basin brevibus et discoideis, in parte superiori cylindricis cum diametro 2-3-plo longioribus ; heterocystis solitariis, basilaribus et hemisphæricis.

Crass. fil. ad bas. 7 μ ; crass. trich. ad bas. 5,5-5 μ ; crass. trich. ad med. 2,5 μ . (Pl. XXI, fig. 6-7).

Cundinamarca : Laguna de la Savane de Bogota, Eastern Andes ; altit. 2580-2600 m.
N^o 14.

This tiny species is characterized by its very short filaments which are conspicuously clavate at the base. It might be compared with *C. Kawraiskyi* SCHMIDLE (Algen aus den Hochseen des Kaukasus, 1897, p. 9), but differs in its very much shorter filaments which do not form a stratum.

Peridinieæ.

Family Peridiniaceæ.

- 40. *Glenodinium uliginosum* SCHILLING. — Antioquia : n^o 4.
- 41. *Peridinium inconspicuum* LEMM. — Antioquia : n^o 10. Cundinamarca : n^o 24.
- 42. *Peridinium pusillum* (PENARD) LEMM. — Antioquia : n^{os} 1, 2 and 3.
- 43. *Peridinium Willei* HUITF.-KAAS. — Antioquia : n^{os} 1, 2 and 3.

Bacillarieæ.

Family Melosiraceæ.

- 44. *Melosira varians* AG. — Antioquia : n^o 6.

Family Tabellariaceæ.

- 45. *Tabellaria flocculosa* (ROTH) Kütz. — Cundinamarca : n^o 23.

Family Fragilariaceæ.

- 46. *Synedra radians* (KUTZ.) GRUN. — Cundinamarca : n^o 19.
- 47. *Asterionella formosa* HASS. — Cundinamarca : n^o 24.

Family Eunotiaceæ.

- 48. *Eunotia lunaris* (EHRENB.) GRUN. — Antioquia : n^{os} 6 and 10. Cundinamarca : n^{os} 14, 16, 18 and 21.
- 49. *Eunotia triodon* EHRENB. — Antioquia : n^o 5.
- 50. *Eunotia robusta* RALFS var. *octodon*. — Cundinamarca : n^o 24.
- 51. *Eunotia prærupta* EHRENB. var. *bidens* (W. SM.) GRUN. — Cundinamarca : n^o 22.
- 52. *Eunotia major* (W. SM.) RABENH. — Antioquia : n^o 5.

Family Achnanthaceæ.

53. *Achnanthes hungarica* GRUN. — Cundinamarca : n^{os} 17 and 18.
54. *Achnanthes lanceolata* BRÉB. — Cundinamarca : n^o 22.
55. *Achnanthes (Achnanthidium) inflatum* CLEVE. — Cundinamarca : n^o 23.

Family Naviculaceæ.

56. *Navicula Amphigomphus* EHRENB. -- Cundinamarca : n^o 24.
57. *Navicula appendiculata* KÜTZ. — Antioquia : n^{os} 1, 2 and 10.
58. *Navicula borealis* EHRENB. — Antioquia : n^{os} 5 and 13. Cundinamarca : n^o 22.
59. *Navicula Brébissonii* KÜTZ. — Cundinamarca : n^{os} 22 and 24.
Var. *subproducta* VAN HEURCK. — Antioquia : n^o 8.
60. *Navicula cryptocephala* KÜTZ. — Antioquia : n^o 6.
61. *Navicula elliptica* KÜTZ. — Antioquia : n^{os} 6, 11 and 12. Cundinamarca :
n^o 22.
62. *Navicula gracilis* KÜTZ. — Cundinamarca : n^{os} 22 and 24.
63. *Navicula Rabenhorstii* (RALFS) GRUN. — Antioquia : n^o 6. Cundinamarca : n^o 18.
64. *Navicula Iridis* EHRENB. var. *affinis* (EHRENB.) VAN HEURCK. — Antioquia : n^{os} 6
and 13.
65. *Navicula major* KÜTZ. — Antioquia : n^{os} 5 and 10. Cundinamarca : n^{os} 14, 22
and 23.
66. *Navicula Pupula* KÜTZ. — Antioquia : n^o 6. Cundinamarca : n^o 23.
67. *Navicula rhynchocephala* KÜTZ. — Cundinamarca : n^{os} 19 and 24.
68. *Navicula stauroptera* GRUN. — Cundinamarca : n^{os} 23 and 24.
Var. *parva* (EHRENB.) VAN HEURCK. — Cundinamarca : n^o 22.
69. *Navicula Tabellaria* EHRENB. — Antioquia : n^o 6. Cundinamarca n^o 23.
70. *Navicula viridis* KÜTZ. — Antioquia : n^{os} 5, 6, 8 and 13. Cundinamarca : n^o 17.
71. *Navicula viridula* KÜTZ. var. *slesvicensis* (GRUN.) VAN HEURCK. Cundinamarca : n^o 22.
72. *Stauroneis anceps* EHRENB. — Antioquia : n^o 6.
73. *Vanheurckia rhomboides* (EHRENB.) BRÉB. — Cundinamarca : n^o 24.
Var. *saxonica* (RABENH.) G. S. WEST, 1897. — Antioquia : n^{os} 1, 2 and 10. Cundina-
marca : n^o 24.

Some very large forms (long. valv. usque 120 μ) were observed from the last-men-
tioned locality (Laguna du Paramo Cruz Verde above Bogota).

Family Gomphonemaceæ.

74. *Gomphonema Augur* EHRENB. — Antioquia : n^o 6.

In all the specimens observed the valves were inflated at the sides; long. valv.
33-36 μ ; lat. valv. 13,5-14,5 μ .

75. *Gomphonema parvulum* KÜTZ. — Cundinamarca: n° 18.
76. *Gomphonema intricatum* KÜTZ. — Antioquia: n° 6. Cundinamarca: n° 18.
77. *Gomphonema olivaceum* KÜTZ. var. *tenellum* (KÜTZ.) CLEVE. — Antioquia: n°s 6 and 8.
78. *Gomphonema gracile* EHRENB. — Antioquia: n°s 5, 7 and 8. Cundinamarca: n°s 18 and 24.

Family Cocconemaceæ.

79. *Cocconema gracile* (RABENH.) G. S. WEST. — Antioquia: n°s 1 and 2. Cundinamarca: n° 23.
80. *Cocconema læve* (NÆG.) G. S. WEST. — Cundinamarca: n°s 22 and 23.
81. *Cocconema turgidum* (GREG.) G. S. WEST. — Cundinamarca: n° 19.
82. *Cocconema cuspidatum* (KÜTZ.) G. S. WEST. — Cundinamarca: n° 22.
83. *Epithemia turgida* (EHRENB.) KÜTZ. — Cundinamarca: n° 23.
84. *Epithemia Argus* KÜTZ. var. *amphicephala* GRUN. — Cundinamarca: n° 23.
85. *Rhopalodia gibberula* (EHRENB.) O. MÜLL. var. *producta* (GRUN.) O. MÜLL. Cundinamarca: n° 23.

Family Nitzschiaceæ.

86. *Nitzschia linearis* (AG.) W. SM. var. *tenuis* GRUN. — Antioquia: n° 6.
87. *Nitzschia subtilis* GRUN. var. *paleacea* (GRUN.) VAN HEURCK. — Antioquia: n°s 3. Cundinamarca: n° 24.
88. *Nitzschia Palea* (KÜTZ.) W. SM. — Antioquia: n°s 1, 2, 6 and 7. Cundinamarca: n°s 18 and 22.
Var. *tenuirostris* VAN HEURCK. — Cundinamarca: n° 22.
Var. *debilis* VAN HEURCK. — Antioquia: n°s 1, 2 and 6. Cundinamarca: n° 18.
89. *Nitzschia Sigma* W. SM. — Antioquia: n° 5.
90. *Nitzschia curvula* (EHRENB.) W. SM. — Cundinamarca: n° 24.
91. *Hantzschia Amphioxys* (EHRENB.) GRUN. — Antioquia: n° 6. Cundinamarca: n°s 18 and 22.

Family Surirellaceæ.

92. *Surirella plana* G. S. WEST in Journ. Linn. Soc. Bot. XXXVIII, 1907, p. 165, t. 8, f. 5. — Cundinamarca: n° 24.
Long. valv. 86-89 μ ; lat. valv. 29-36 μ ; costis $3\frac{1}{2}$ -4 in 10 μ .

Chlorophyceæ.

Division I. ISOKONTÆ.

Family Volvocaceæ.

93. *Chlamydomonas Debaryana* GOROSCH. — Antioquia n° 13.
Long. cell. 18-20 μ ; lat. cell. 14,5-16 μ .
94. *Eudorina elegans* EHRENB. — Cundinamarca: n° 14.
95. *Volvox aureus* EHRENB. — Cundinamarca: n°s 16 and 23.

Family Palmellaceæ.

96. *Palmodactylon varium* NÆG. — Cundinamarca: n° 24.
97. *Apiocystis Brauniana* NÆG. — Cundinamarca: n° 14.
The colonies were very large, the pyriform gelatinous envelope attaining a length of 290 μ ; diam. cell. 8-12 μ .
98. *Glœocystis gigas* (KÜTZ.) LAGERH. — Antioquia: n° 6. Cundinamarca: n°s 14, 19 and 23.

Family Protococcacæ.

99. *Protococcus fuscatus* **sp. nov.**

P. parvis et aquaticis, epiphyticis ad algas filamentosas majores; cellulis angulari-globosis, plerumque 2, 4, 8, 16, 32 vel 64 in familiis consociatis, ad membranam algæ filamentosæ arcte adhærente; chromatophora singula parietali, magna et lobata, sine pyrenoide; membrana cellularum firma et fuscata. Multiplicatio cellularum vegetativarum divisione in duas directiones alternante.

Diam. cell. 7-14 μ ; diam. fam. parv. (4 cell.) 16-22 μ . (Pl. XXI, fig. 13).

Cundinamarca: Attached to *Ædogonium* sp., Laguna de la Savane de Bogota, Eastern Andes; altit. 2580-2600 m., n° 14. Attached to *Ædogonium fabulosum* var. *columbianum* and *Æ. taphrosporum*, Laguna de Ubaque, Eastern Andes; altit. 2066 m. n° 23.

The epiphytic habit of *Protococcus fuscatus* is truly remarkable. In all cases the host was a species of *Ædogonium* and the larger families of 32 or 64 cells formed a compact stratum of one layer in thickness. The attachment to the wall of the *Ædogonium* is so firm that it must be due to some definite secreted substance. The most

conspicuous feature of *Protococcus fuscatus* is the colour of the cell-walls. They are of a dull dirty brown, and when several cells are seen in mass, as at the edge of an *Edogonium*-filament they appear very dark brown or almost black.

In size *P. fuscatus* is similar to *P. viridis* (= *Pleurococcus vulgaris* auct.; *Pleurococcus Nägelii* CHODAT), but the species is at once distinguished by its habit and by the dull brown cell-walls.

Wille has recently shown (cfr. Nyt Magazin for Naturvidensk. Christiania, 1913, Bd. 51) that *Protococcus viridis* AG. must be regarded as the correct name of the common Alga so long placed as « *Pleurococcus vulgaris* ».

100. *Trochiscia reticularis* (REINSCH.) HANSG. — Antioquia: n° 4.

Family Autosporeæ.

101. *Oocystis elliptica* W. and G. S. WEST. — Cundinamarca: n°s 14 and 23.

102. *Oocystis parva* W. and G. S. WEST. — Cundinamarca: n° 23.

103. *Oocystis natans* (LEMM.) WILLE. — Cundinamarca: n° 21 (plankton). Long. cell. 18 μ ; lat. 12 μ .

104. *Nephrocytium lunatum* W. WEST. — Cundinamarca: n° 23.

105. *Eremosphæra viridis* DE BARY. — Cundinamarca: n° 24. Diam. cell. 142-156 μ .

106. *Tetraëdron enorme* (RALFS) HANSG. — Antioquia: n°s 1 and 2. Diam. cell. sine spin. 12-16 μ , cum spin. 21-27 μ .

107. *Tetraëdron bifurcum* (WILLE) LAGERH. — Antioquia: n° 4. Diam. cell. cum spin. 29-34 μ .

This species has a wide distribution in both the eastern and western tropics.

108. *Ankistrodesmus falcatus* (CORDA) RALFS. — Antioquia: n° 4.

Var. *acicularis* (A. BR.) G. S. WEST. — Cundinamarca: n° 14.

109. *Ankistrodesmus* sp. Cellulæ lanceolatæ, 2 vel 4 in tegumento mucoso aggregatæ, polis acutis; chromatophora cum pyrenoide singulo. Long. cell. 20-21 μ ; lat. 3,5-4,3 μ .

Cundinamarca: n° 23.

Only two colonies of this Alga were observed. It is probably a new species, but it is essential that more specimens should be examined.

110. *Ankistrodesmus Mayori* sp. nov.

A. minutissimis, inter alias algas libere natantibus; cellulis solitariis, angustis, polos acutissimos versus gradatim attenuatis, valdissime spiraliter contortis, anfractibus proximis duobus; chromatophora pallide viride, pyrenoidibus nullis.

Lat. cell. 0,9-1,3 μ ; diam. anfract. 5,5-7,5 μ ; anfract. inter se distantibus 2-2,8 μ (Pl. XXI, fig. 22-23).

Cundinamarca: Laguna de Ubaque, Eastern Andes; altit. 2066 m. n° 23.

This minute species is twisted into two complete turns of a spiral, which are so close together that the general aspect of the cell is ring-like. The actual extremities of the cell are bent away from the plane of the spiral in opposite directions.

A. Mayori should be compared with *A. convolutus* CORDA (consult G. S. West in Ann. South African Museum, IX, 1912, t. 1, fig. 5-13), from which it is distinguished by its smaller size, its relatively narrower cells, its two spiral turns, and the peculiarly compact way in which the spiral is twisted.

111. *Reinschiella obesa* W. and G. S. WEST in Botan. Tidsskrift, XXIV, 1901, p. 100, t. 4, f. 53, 54.

Chromatophora singula, parietali, leviter lobata, sine pyrenoide.

Long. cell. c. spin. 33-37 μ ; lat. cell. 13-14 μ .

Cundinamarca: n^o 14.

In the specimens observed the chloroplasts were well preserved. Each cell possessed one parietal chloroplast occupying most of the side walls except at the poles. Its margins were somewhat lobed and pyrenoids were absent. The species was first observed from the island of Koh Chang in the Gulf of Siam.

There is no doubt that the organism described as *Reinschiella siamensis* W. and G. S. WEST., *l. c.* p. 99, t. 4, f. 52 [from the same locality in the East] is an encysted state of one of the Peridinieæ.

112. *Scenedesmus bijugatus* (TURP.) KÜTZ. — Antioquia: n^{os} 1, 2 and 10.

113. *Scenedesmus obliquus* (TURP.) KÜTZ. — Antioquia: n^{os} 1, 2, 3, 6 and 8.

114. *Scenedesmus denticulatus* LAGERH. var. *linearis* HANSG. — Antioquia: n^{os} 6 and 8. Cundinamarca: n^o 23.

Var. *lunatus* W. and G. S. WEST. — Antioquia: n^o 6.

115. *Scenedesmus quadricauda* (TURP.) BRÉB. — Antioquia: n^o 7. Cundinamarca: n^o 14.

Var. *maximus* W. and G. S. WEST. — Cundinamarca: n^o 24.

Var. *rectangularis* var. **nov.**

Cœnobiis e cellulis 2 vel 4 formatis, compactis, a latere visis plerumque curvatis; cellulis rectangularibus, lateribus rectis, polis leviter convexis; spinis ad angulos exteriores cellularum terminalium brevibus et incurvatis et sæpe cum spinis additionibus brevioribus ad cellulas ullas irregulariter dispositis.

Long. cell. 14-21 μ ; lat. cell. 6-10 μ (Pl. XXI, fig. 14-21).

Antioquia: Laguna Santa Rita near Angelopolis, Central Andes; altit. 1600 m. Nos 11 and 12.

This variety occurred in great quantity from the above-mentioned locality. No other described variety of *Scen. quadricauda* possesses cells of the same shape as those of var. *rectangularis*. In outline they remind one of the cells of *Scen. perforatus* LEMM., but in other respects the colonies are quite different.

116. *Scenedesmus acutiformis* SCHRÖDER var. *brasiliensis* (BOHLIN) W. and G. S.

WEST in Trans. Bot. Soc. Edinburgh XXIII, 1905, p. 30, t. 1, fig. 8, 9 (= *Sc. brasiliensis* BOULIN, 1897; *Sc. acutiformis* var. *spinuliferum* W. and G. S. WEST., 1901). — Antioquia: n° 3.

117. *Cœlastrum sphæricum* NÆG. — Antioquia: n° 6.

118. *Cœlastrum cambricum* ARCHER. (= *C. pulchrum* SCHMIDLE.) — Antioquia: n° 4. Cundinamarca: n° 23.

In all the colonies observed the cells were 4-angled. The largest colonies were 108 μ in diameter with cells up to 28 μ in diameter.

119. *Sorastrum spinulosum* NÆG. — Antioquia: n° 5.

Family Chaetopeltidaceæ.

120. *Chætosphæridium Pringsheimii* KLEBAHN. — Antioquia: n° 10. Cundinamarca: n° 14.

Family Hydrodictyaceæ.

121. *Pediastrum Tetras* (EHRENB.) RALFS. — Cundinamarca: n° 23.

122. *Pediastrum* sp. (= *P. biradiatum* RALFS, Brit. Desm. 1848, t. 31, f. 3a et b). — Cundinamarca: n° 24.

123. *Pediastrum Boryanum* (TURP.) MENEGH. var. *granulatum* (KÜTZ.) A. BR. — Antioquia: n° 5.

124. *Pediastrum duplex* MEYEN var. *clathratum* A. BR. — Antioquia: n° 6.

Family Ulothrichaceæ.

125. *Geminella mutabilis* (BRÉB.) WILLE (= *Hormospora mutabilis* BRÉB.). — Antioquia: n° 5.

126. *Geminella ordinata* (W. and G. S. WEST.) **nov. comb.** (= *Hormospora ordinata* W. and G. S. WEST in Journ. Bot. Sept. 1898, p. 330).

Long. cell. 8-12,5 μ ; last. cell. 5-6 μ . — Cundinamarca: n° 24.

127. *Geminella irregularis* WILLE. — Cundinamarca: n° 24.

Long. cell. 5-7 μ ; lat. cell. 10-12 μ .

128. *Ulothrix subtilis* KÜTZ. — Cundinamarca: nos 18 and 22.

129. *Ulothrix tenuissima* KÜTZ. in Flora, XVI, 1833, p. 518; Hazen in Bull. Torr. Bot. Club, XI, n° 2, 1902, p. 149, t. 20, fig. 5, 6.

Forma filis crassioribus, usque 30 μ diam.; long. cell. 16-18 μ ; chromatophora cum pyrenoide singulo.

Antioquia: n° 6.

Very few filaments of this Alga were observed, but they agreed with *Ulothrix*

tenuissima except for their slightly greater diameter and the presence of only one pyrenoid in the chloroplast. The filaments were equal in diameter to those of many forms of *U. zonata*, but in other respects were quite unlike that species.

130. *Uronema confervicolum* LAGERH. — Antioquia: n° 6.

Family Microsporaceæ.

131. *Microspora amœna* (Kütz.) RABENH. — Antioquia: nos 1 and 2. Cundinamarca: n° 24.

132. *Microspora pachyderma* (WILLE) LAGERH. — Cundinamarca: n° 18

133. *Microspora tumidula* HAZEN. — Cundinamarca: n° 14.

Family Microthamniaceæ.

134. *Microthamnion Kützingianum* NÆG. — Cundinamarca: n° 22.

Family Aphanochaetaceæ.

135. *Aphanochæte repens* A. BR. — Cundinamarca: n° 14.

Family Coleochaetaceæ.

136. *Coleochæte scutata* BRÉB. — Cundinamarca: n° 23; abundant on various aquatic macrophytes. Many of the specimens with spermocarps.

137. *Coleochæte Nitellarum* JOST. — Cundinamarca: n° 23; very abundant on *Nitella* sp., and mostly with spermocarps.

138. *Coleochæte pulvinata* A. BR. — Cundinamarca: n° 23; abundant on various aquatic macrophytes and also around the tips of the leaf-segments of *Nitella* sp. Many specimens with spermocarps.

Division II. AKONTÆ

Family Zygnemaceæ.

139. *Mougeotia* sp. (sterile). Lat. cell. 26-28 μ ; diametro 5-6 plo longioribus. — Cundinamarca: n° 16.

140. *Mougeotia recurva* (HASS.) DE TONI. — Antioquia: n° 1. Lat. cell. veget. 13-14 μ ; diam. spor. 33 μ .

141 *Mougeotia* (*Gonatonema*) *Mayori* sp. nov.

M. (G.) cellulis vegetativis valde elongatis, diametro circiter 18-21-plo longioribus, chromatophora cum pyrenoidibus 11-14 in serie subirregulare; aplanosporis oblique

ellipticis, margine uno convexo, margine altero valde convexo, polis subtruncatis; membrana sporarum subcrassa, luteola et dense punctata.

Lat. cell. veget. 13-15 μ ; long. aplanospor. 34-38 μ ; lat. aplanospor. 24-26 μ . (Pl. XXI, fig. 24.)

Antioquia: Laguna above Estella near Medellin, Central Andes; altit. 2500 m. n° 4.

This species seems well characterized by the great length of its vegetative cells, the numerous pyrenoids in the chloroplast, and the shape of the aplanospores. The chloroplast only occupies about three-quarters of the length of the vegetative cell and the pyrenoids are arranged in an irregular series. The wall of the mature aplanospore is fairly thick, of a yellow or yellowish brown colour, and finely punctate.

142. *Mougeotia (Gonatonema) tenerrima* sp. nov.

M. (G.) cellulis vegetativis tenerrimis, diametro circiter 25-30-plo longioribus, chromatophora cum pyrenoidibus 6 in serie singulo; aplanosporis ellipticis vel leviter oblique ellipticis, diametro circiter duplo longioribus, polis leviter productis et submamillatis, membrana glabra.

Lat. cell. veget. 4,5 μ ; long. aplanospor. 24-25 μ , lat. 12-13 μ . (Pl. XXI, fig. 25.)

Antioquia: Laguna above Medellin, Central Andes; altit. 2300 m. Nos 1 and 2.

This Alga should be compared with *Mougeotia (Gonatonema) Boodlei* (W. and G. S. WEST) COLLINS (cfr. W. and G. S. WEST in Trans. Roy. Micr. Soc. 1897, p. 476; Ann. Bot. XII, 1898, t. 4, f. 1-9), from which it differs in its narrower and proportionately longer cells, and in the shape of the aplanospores. The latter are relatively narrower and possess submamillate polar thickenings.

143. *Mougeotia* sp. ad *M. minutissimam* LEMM. accedens. Lat. cell. veget. 3,5 μ ; long. cell. 54-58 μ ; chromatophora cum pyrenoidibus 5-6; sporis non visis. — *Antioquia*: n° 10.

144. *Zygnema* sp. (sterile). Crass. cell. veget. 16,5-19 μ ; inter cellulas leviter contractum. — *Antioquia*: n° 4.

145. *Zygnema* sp. (sterile). Crass. cell. veget. 22-23 μ . — *Antioquia*: nos 1 and 2.

146. *Zygnema ericetorum* (KÜTZ.) HANSG. — *Antioquia*: nos 1 and 2.

147. *Spirogyra decimina* (MÜLL.) KÜTZ. forma *tropica* G. S. WEST in Journ. Linn. Soc. Bot. XXXVIII, 1907, p. 106. *S. decimina* forma W. and G. S. WEST in Botan. Tidsskrift, XXIV, 1901, p. 161.

Crass. cell. veget. 48-53 μ ; long. zygosp. 90-107 μ ; lat. zygosp. 48-49 μ .

Antioquia: n° 8.

This form agreed in all respects with the Asiatic and African specimens previously described.

148. *Spirogyra splendida* spec. nov.

Sp. maxima, cellulis vegetativis diametro 1 $\frac{1}{3}$ -2-plo longioribus, membrana 4 μ crassa, extremitatibus non replicatis; chromatophoris 5-6 (plerumque 6) dense aggregatis, latis cum marginibus irregulariter asperis, pyrenoidibus magnis subconferte ordinatis, anfrac-

tibus arctis $1-1\frac{1}{2}$; conjugatione scalariformi (et laterali?), cellulis fructiferis non inflatis; zygosporis ellipticis, diametro $1\frac{3}{5}$ -plo longioribus, polis subacute rotundatis, membrana $6\ \mu$ crassa, luteo-brunnea et glabra.

Crass. cell. veget. $158-166\ \mu$; long. zygosp. $216\ \mu$; lat. zygosp. $135\ \mu$. (Text fig. 2).

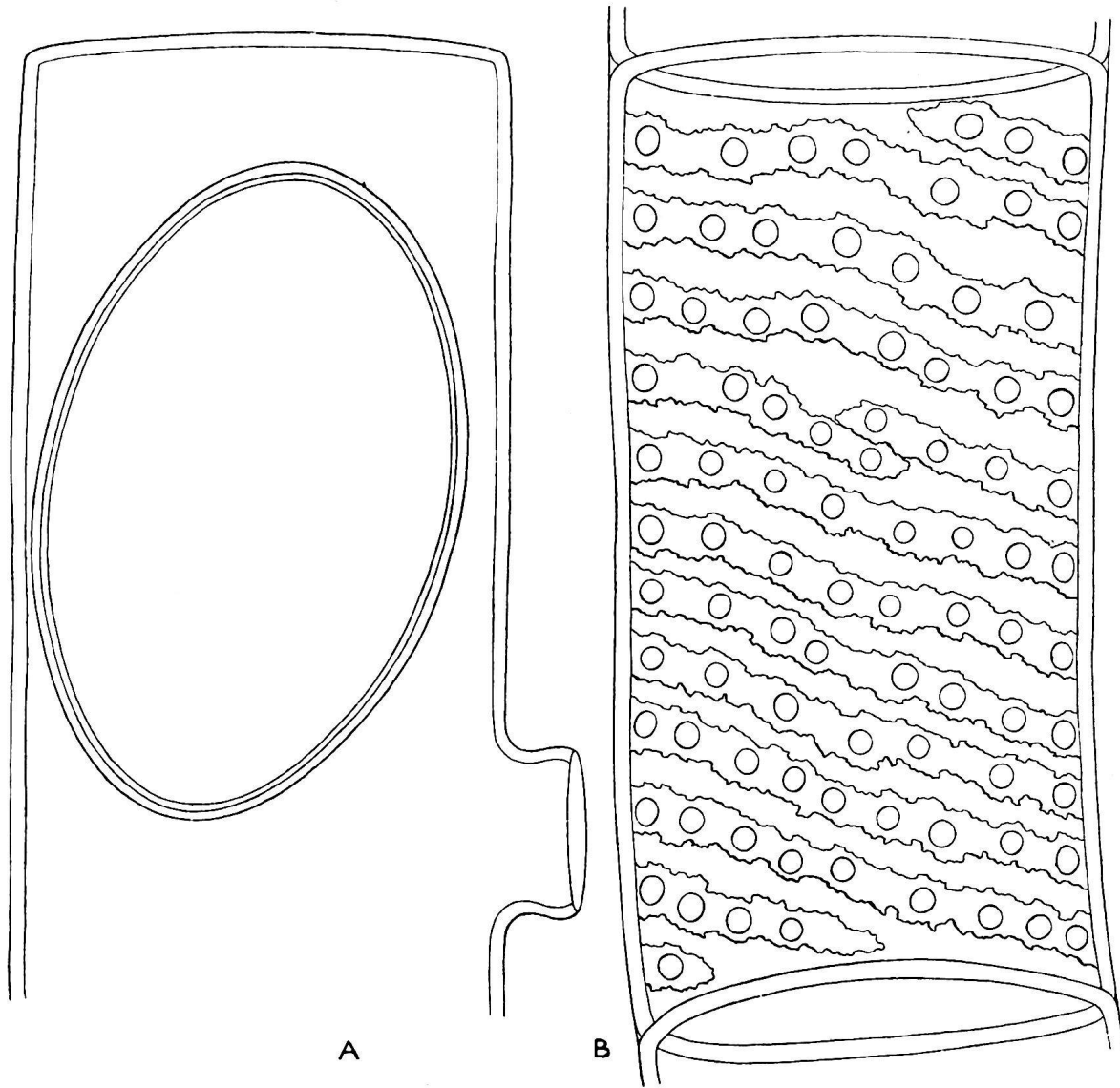


Fig. 2. — *Spirogyra splendida* sp. nov. a, vegetative cell; b, gametangium with zygospore. $\times 400$.

Cundinamarca: Laguna de Ubaque, Eastern Andes; altit. 2066 m. N° 23.

This large species occurred along with *Edogonium fabulosum* var. *columbianum* and *Edogonium taphrosporum* among a small species of *Nitella*. The only known species of the same size is *Sp. polytaeniata* STRASB., from which *Sp. splendida* is easily distinguished

by its fewer chloroplasts, which are not so straight, and by the proportionately larger zygospores. The latter are elliptic, with somewhat pointed poles, whereas those of *Sp. polytaeniata* are much more rounded and not infrequently spherical.

Other species of *Spirogyra*, all of which were sterile, were observed from Antioquia: nos 6 and 7; and Cundinamarca: nos 14, 15, 16, 19, 20 and 24.

Family Desmidiaceæ.

149. *Gonatozygon monotænium* DE BARY. — Antioquia: nos 1, 2 and 6.

Var. *pilosellum* NORDST. — Antioquia: nos 1 and 2.

150. *Gonatozygon pilosum* WOLLE. — Antioquia: n° 4.

151. *Cylindrocystis Brébissonii* MENEGH. — Antioquia: nos 1 and 2.

152. *Netrium Digitus* (EHRENB.) ITZIGS. and ROTHE. (= *Penium lamellosum* Kütz.; *P. navigium* TURNER; *P. elegans* BERNARD). — Antioquia: nos 3, 4 and 5. Cundinamarca: nos 23 and 24.

Var. *constrictum* W. and G. S. WEST. — Antioquia: n° 3.

153. *Netrium Nägelii* (BRÉB.) LÜTKEM. — Cundinamarca: n° 24.

154. *Penium Cylindrus* (EHRENB.) BRÉB. — Cundinamarca: n° 24.

155. *Closterium abruptum* W. WEST. — Cundinamarca: n° 24.

156. *Closterium angustatum* KÜTZ. — Antioquia: n° 3.

157. *Closterium columbianum* **spec. nov.**

Cl. submediocre, cellulis diametro $6\frac{1}{3}$ -plo longioribus, subrectis, leviter attenuatis polos versus, dorso leviter convexo, ventre recto, polis crassis et subtruncatis; membrana lutea vel fuscescente, valde costata, costis visis 7, juxta apices punctata; chromatophoris

Long. 208 μ ; lat. 33 μ ; lat. apic. 18 μ . (Pl. XXIII, fig. 59).

Antioquia: Laguna above Estrella near Medellin, Central-Andes; altit. 2500 m. N° 4.

Only empty cells of this species were seen, in consequence of which no statement can be made with regard to the nature of the chloroplasts. The general proportions of the cell, along with its straightness and the few strong costae, afford characters which are quite diagnostic.

In general outline this species bears much resemblance to the Desmid described from Singapore as *Cl. Legumen* W. and G. S. WEST (in Journ. Linn. Soc. Bot. XXXIII, 1897, p. 158, t. 8, f. 5-7), but the latter has a thin and perfectly smooth cell-wall.

158. *Closterium didymotocum* CORDA. — Cundinamarca: n° 24.

159. *Closterium excavatum* BERGE in Bih. till K. Sv. Vet.-Akad. Handl. Bd. 27, Afd. III, n° 10, p. 19, t. 2, f. 7-9.

Long. 155-194 μ ; lat. 27-29 μ .

Antioquia: n° 7.

This species was originally described from South Patagonia.

160. *Closterium juncidum* RALFS. — Antioquia: n° 3.

161. *Closterium Leibleinii* KÜTZ. — Antioquia: n° 6.

162. *Closterium Libellula* FOCKE var. *intermedium* (ROY and BISS.). (= *Penium Libellula* var. *intermedium* ROY and BISS., 1894.)

Zygosporæ subglobosæ, glabræ; membrana aureo-fusca.

Long. 92-96 μ ; lat. 19-24 μ ; lat. apic. 7-8 μ ; diam. zygosp. 34-38 μ (Pl. XXXIII, fig. 60-61).

Antioquia: n° 4.

About a dozen zygosporæ of this variety were seen.

163. *Closterium littorale* GAY var. *crassum* W. and G. S. WEST in Journ. Bot. 1896, p. 378, t. 361, f. 18.

Long. 212 μ ; lat. 33 μ ; lat. apic. 5,5 μ .

Antioquia: n° 7.

164. *Closterium moniliferum* (BORY) EHRENB. — Cundinamarca: n° 18.

165. *Closterium Navicula* (BRÉB.) LÜTKEM. — Antioquia: nos 1 and 2. — Cundinamarca: N° 24.

166. *Closterium parvulum* NÆG. — Antioquia: nos 10, 11 and 12.

Var. *angustum* W. and G. S. WEST.

Forma cellulis tenuioribus; lat. cell. 6 μ ; apicibus inter se distantibus 115 μ . — Cundinamarca: n° 23.

Var.? (Pl. XXIII, fig. 58).

Cellulis minus curvatis, polos versus plus minusve subiter attenuatis, polis rotundatis. Lat. 11 μ ; apicibus inter se distantibus 132 μ .

Cundinamarca: n° 24.

Each chloroplast possessed three pyrenoids and the apical locellus contained from two to three gypsum granules. Only one specimen of this form was observed and it is quite probable that it should be referred elsewhere.

167. *Closterium prælongum* BRÉB. forma *brevior* W. WEST. — Antioquia: n° 6.

168. *Closterium Pritchardianum* ARCHER. — Antioquia: n° 6.

169. *Closterium Ralfsii* BRÉB. var. *hybridum* RABENH. — Antioquia: n° 6. Cundinamarca: n° 24.

Long. 504 μ ; lat. 52 μ ; lat. apic. 8,5-9 μ .

170. *Closterium regulare* BRÉB. — Cundinamarca: n° 24.

171. *Closterium setaceum* EHRENB. — Cundinamarca: n° 23.

172. *Closterium tumidum* JOHNSON. — Antioquia: nos 7 and 8.

Long. 94-110 μ ; lat. 14-15,5 μ ; lat. apic. 3-3,5 μ .

173. *Closterium turgidum* EHRENB. — Antioquia: nos 6 and 7.

Long. 756 μ ; lat. 72 μ .

Var. *giganteum* NORDST.

Antioquia: nos 6, 9 and 10. Long. 1084-1193 μ ; lat. 79-82 μ ; lat. apic. 20-21 μ .

Cundinamarca: no 23. Long 1380-1495 μ ; lat. 102-108 μ ; lat. apic. 30 μ .

This variety of *Cl. turgidum* is one of the largest known Desmids and is apparently confined to South America. It was first described from Brazil, but has since been found in Bolivia, Paraguay and Ecuador. It was abundant in Laguna de Ubaque, Cundinamarca (no 23), and the specimens were exceptionally fine.

174. *Closterium Ulna* FOCKE. — Cundinamarca: no 24.

175. *Pleurotænium eugeneum* (TURN.) W. and G. S. WEST, Monogr. Brit. Desm. I, 1904, p. 202.

Forma cellulis paullo angustioribus; semicellulis ad basin 4-undulatis, ad apicem tuberculis 16 (9 visis).

Long. 760-820 μ ; lat. ad. bas. semicell. 36,5-39 μ ; lat. apic. 27-28 μ (Pl. III, fig. 62).

Cundinamarca: no 23.

176. *Pleurotænium Trabecula* (EHRENB.) NÆG. — Cundinamarca: no 22.

177. *Pleurotænium maximum* (REINSCH) LUND. — Antioquia: no 6. Cundinamarca: no 14.

Long. 920 μ ; lat. bas. inflat. semicell. 53 μ ; lat. med. semicell. 48 μ .

178. *Euastrum attenuatum* WOLLE, 1881; Desm. U. S. 1884, p. 103, t. 26, f. 17; W. and G. S. West, char. emend. in Trans. Linn. Soc. Bot. ser. 2, V, 1896, p. 243, t. 14, f. 20-21. *E. Hastingsii* WOLLE, Desm. U. S. new edit. 1892, p. 113, t. 42, f. 16, 17. *E. pectinatum* BRÉB var. *porrectum* BERGE in Bih. till K. Sv. Vet. Akad. Handl. Bd. 27, Afd. III, no 10, 1901, p. 27, t. 1, f. 10.

Antioquia: no 5.

This characteristic Desmid was frequent among *E. evolutum*, *E. quadriceps*, *E. pictum*, etc. It is a very distinctive American type. It has no near relationship to *E. pectinatum*, having a polar lobe which is almost unique in the whole genus (cfr. W. and G. S. WEST, *l. c.*).

179. *Euastrum binale* (TURP.) EHRENB. forma *Gutwinskii* SCHMIDLE. — Antioquia: no 5. Cundinamarca: no 24.

Var. *subelobatum* W. WEST. — Antioquia: no 6.

180. *Euastrum brasiliense* BERGE in Arkiv för Botanik utgifr. af K. Sv. Vet.-Akad. I, 1903, p. 112, t. 5, f. I.

Forma *minor*.

Long. 54 μ ; lat. 29 μ ; lat. lob. polar. 17 μ ; lat. isthm. 10 μ ; crass. 22 μ (Pl. XXII, fig. 37).

Cundinamarca: no 24.

This species is very closely allied to *E. ansatum* RALFS, but differs in the relatively more massive lower half of the semicell, and in the shorter and wider polar lobe. The protuberances on the front of the semicell are very similar, but the one immediately above the isthmus is somewhat more prominent and the two upper ones less prominent in *E. brasiliense* than in *E. ansatum*.

181. **Euastrum columbianum spec. nov.**

E. submediocre, pæne $1\frac{1}{2}$ -plo longius quam latum, profundissime constrictum, sinu angusto-lineari extremo leviter dilatato; semicellulæ trilobæ, incisuris inter lobos laterales et lobum polarem apertis et rotundatis; lobis lateralibus bilobulatis, incisura mediana rotundato-excavata, lobulis truncatis, lobulo superiori tridentata, lobulo inferiori minus conspicue tridentata; lobo polari latissime cuneato-truncato, apice recto, incisura mediana subprofunda et aperta, lateribus sursum divergentibus, angulis dente majore et angulis incisuræ medianæ dente minore instructis, infra marginem apicalem cum dentibus 4; in centro semicellularum tumore magno cum annulo granulorum subirregulariter dispositio, dente obtuso intra lobulos inferiores juxta sinum; a vertice visæ oblongo-ellipticæ, tumore magno granulato in medio utrobique, polis rotundatis cum dentibus parvis et lobo tridentato utrobique, lobo polari subrectangularibus cum dentibus majoribus 6 utrobique et dente majore uno in medio lateris terminalis uniuscujusque; a latere visæ rectangulari-trapeziformes, tumore magno granulato ad basin utrobique, angulis apicalibus dentatis, apice recto.

Long. 72 μ ; lat. 54 μ ; lat. apic. 42 μ ; lat. isthm. 11 μ ; crass. 35-37 μ (Pl. XXII, fig. 34).

Cundinamarca: Laguna du Paramo Cruz Verde above Bogota, Eastern Andes; altit. 2700 m. N^o 24.

E. columbianum appears to be a very characteristic species which is perhaps nearest to *E. incudiforme* BÖRGESEN (in Vidensk. Medd. naturh. Foren. Kjöbenh. 1890, p. 940, t. 3, f. 22). It differs, however, in the nature of its central protuberance, in the divided character of the upper lateral lobules, and in the general rectangular form of the polar lobe (as seen in vertical view).

The lower lateral lobules of *E. columbianum* are entire, whereas the upper ones are divided into two subtruncate lobules (*vide* vertical view). The polar lobe, which is rectangular in vertical view, is fringed all round with large teeth, differing in this respect from any of the allied species.

182. **Euastrum crassum** (BRÉB.) KÜTZ. var. **scrobiculatum** LUND. — Antioquia: n^o 5 (abundant).

183. **Euastrum crispulum** (NORDST.) W. and G. S. WEST, Monogr. Brit. Desm. II, 1905, p. 72. (= *E. sublobatum* var. *crispulum* NORDST., 1873; *E. pyramidatum* W. WEST, 1892).

Long. 28 μ ; lat. 18-19 μ ; lat. isthm. 4,5 μ .

Antioquia: n^o 5 (abundant). Cundinamarca: n^o 24.

184. **Euastrum denticulatum** (KIRCHN.) GAY. — Antioquia: n^o 5.

185. **Euastrum elegans** (BRÉB.) KÜTZ.

Forma angulis basalibus semicellularum ut in *E. fisso* W. and G. S. WEST, ceteris ut in *E. elegante* typico.

Long. 32 μ ; lat. 22 μ ; lat. isthm. 5 μ .

Cundinamarca : n° 23 (frequent).

The main feature of this form lies in the dilatation of the lower part of the semicells immediately above the basal angles; there is also a slight thickening of the cell-wall at the apex of the dilatation.

186. *Euastrum evolutum* (NORDST.) W. and G. S. WEST. — Antioquia : n° 5 (frequent).

187. *Euastrum inerme* LUND. — Antioquia : n° 5.

188. *Euastrum insulare* (WITTR.) ROY. — Cundinamarca : n° 24.

189. *Euastrum personatum* W. and G. S. WEST var. *columbianum* var. **nov.**

Var. *angulis lobulorum lateralium inferiorum spina minuta suberecta præditis*; in centro semicellularum scrobiculis nullis; granulis intra margines laterales carentibus.

Long. 42 μ ; lat. 29 μ ; lat. lob. polar. 18 μ ; lat. isthm. 6,5 μ (Pl. XXII, fig. 38).

Antioquia: In ditches between Medellin and America, Central Andes; altit. 1550 m. N° 6.

The type form of this species is known from Central Africa, Madagascar and Ceylon.

190. *Euastrum pictum* BÖRGESSEN in Vidensk. Medd. naturh. Foren. Kjöbenhavn, 1890, p. 939, t. 3, f. 19.

Long. 58-64 μ ; lat. 40-41 μ ; lat. lob. polar. 31-38 μ ; lat. isthm. 10-11 μ (Pl. XXII, fig. 35-36).

Antioquia: n° 5.

The specimens agreed very well with BÖRGESSEN's original description and figure. They were a little smaller and there was a trivial difference in the basal angles of the semicells, which were constantly (even if only slightly) bilobulate, each lobule being emarginate.

191. *Euastrum pinnatum* RALFS. — Antioquia: nos 3, 4 (very abundant) and 5. Cundinamarca: n° 24.

192. *Euastrum quadriceps* NORDST. in Vidensk. Medd. naturh. Foren. Kjöbenhavn, 1870, p. 216, t. 2, f. 5.

Long. 112-120 μ ; lat. 58-64 μ ; lat. lob. polar. 24,5-26 μ ; lat. isthm. 17-19,5 μ ; crass. 33-36 μ (Pl. XXII, fig. 40).

Antioquia: n° 5 (frequent).

This species was first described from Brazil, and the Columbian specimens were quite typical. The three basal protuberances of each semicell were especially well marked and the general rectangular character of the vertical view was as pronounced as in the Brazilian form.

The specimen figured by BORGÈ (in Arkiv för Botanik utgifr. K. Sv. Vet.-Akad. Bd. I, 1903, t. 4, f. 21) from Paraguay is by no means typical in vertical view, being elliptic rather than rectangular.

193. *Euastrum sublobatum* BRÉB. forma *minor*.

Long. 16 μ ; lat. 11,5 μ ; lat. apic. 11 μ ; lat. isthm. 2,5 μ ; crass. 9,5 μ . — *Antioquia*: n° 5.

Except for size the specimens were quite typical.

194. *Euastrum Turneri* W. WEST, forma.

Long. 37-38 μ ; lat. 26-27 μ ; lat. apic. 18-20 μ ; lat. isthm. 6,5-7 μ (Pl. XXII, fig. 39).

Antioquia: n° 5.

195. *Micrasterias rotata* (GREV.) RALFS. — Cundinamarca: n° 24.

196. *Micrasterias truncata* BRÉB. var. *pusilla* var. **nov.**

Var. subduplo minor quam forma typica; cellulis in ambitu subcircularibus; sinu extrorsum leviter aperto.

Long. 58-61 μ ; lat. 58-61 μ ; lat. lob. polar. 40-42 μ ; lat. isthm. 11-12 μ (Pl. XXII, fig. 42-43).

Antioquia: Bog near the Laguna above Medellin, Central Andes; altit. 2300 m. N° 5 (abundant).

This variety is much less than the average size of *M. truncata*, and the outline of the cell is more rounded than in most forms of this species. *M. truncata* var. *minor* WOLLE (Desm. U. S. 1884, t. 38, f. 9) differs in many ways from the Columbian variety, in its general external form, in the shape of its polar lobe, and in the lobulation of the lateral lobes.

197. *Micrasterias Sol* (EHRENB.) KÜTZ. var. *ornata* NORDST.

Forma elegantior; long. 172 μ ; lat. 168 μ ; lat. max. lob. polar. 24 μ ; lat. isthm. 15 μ (Pl. XXII, fig. 44).

Cundinamarca: n° 23.

198. *Micrasterias americana* (EHRENB.) RALFS. — Cundinamarca: n° 24.

Long. 128-136 μ ; lat. 100-109 μ ; lat. isthm. 21-23 μ .

199. *Cosmarium adelochondrum* (ELFV.) LÜTKEM. (= *Penium adelochondrum* ELFV.). — Antioquia: n°s 1, 2 and 5.

200. *Cosmarium adoxum* W. and G. S. WEST in Journ. Roy. Micr. Soc. 1897, p. 478, t. 7, f. 24.

Var. *denticulatum* var. **nov.**

Var. sinu angusto-lineari ad extremum non ampliato; angulis basalibus rotundo-truncatis semicellularum cum denticulis minutissimis 1-3 irregulariter ordinatis, angulis apicalibus cum denticulis minutissimis 1-2.

Long. 11 μ ; lat. 10 μ ; lat. isthm. 2,6 μ ; crass. 8 μ (Pl. XXII, fig. 50).

Antioquia: Laguna above Medellin, Central Andes; altit. 2300 m. N°s 1 and 2. Also Laguna above Estrella near Medellin, alt. 2500 m. N° 3.

This tiny *Cosmarium* differs from typical *C. adoxum* in its linear sinus and in the presence of the exceedingly minute and very delicate denticulations. The central papilla of the semicells is also a little smaller. In general outline it is very similar to *C. geometricum* var. *adoxoides* G. S. WEST (in Ann. S. African Mus. IX, 1912, p. 86, t. 2, f. 47), and it is highly probable that *C. adoxum* var. *denticulatum* and *C. geometricum* var. *adoxoides* are intermediate forms between *C. adoxum* and *C. geometricum*.

201. *Cosmarium angulosum* BRÉB. var. *concinnum* (RABENH.) W. and G. S. WEST.
— Cundinamarca: n° 23.

202. *Cosmarium antioquiense* **sp. nov.**

C. minutissimum, circiter $1\frac{1}{6}$ -plo longius quam latum, modice constrictum, sinu valde aperto et rotundato; isthmo elongato; semicellulæ obreniformes, apice concavo et glabro, margine rotundato laterali unoquoque (et parte parva apicis) cum granulis conspicuis 4, et intra partem lateralem unumquemque semicellulæ granulis 4 vel 5 instructæ; cellulæ a latere visæ oblongæ, vix constrictæ, parte superiori semicellulæ granulata; a vertice visæ oblongæ, lateribus rectis, polis rotundatis et conspicue granulatis.

Long. 14 μ ; lat. 12 μ ; lat. isthm. 7,5 μ ; crass. 6,5 μ . (Pl. XXIII, fig. 64).

Antioquia: Laguna above Medellin, Central Andes; altit. 2300 m. N^{os} 1 and 2.

This minute species should be carefully compared with *C. Novae Semliae* WILLE, and its var. *sibericum* BOLDT, from both of which it is distinguished by the more rounded lateral angles of the semicells, which are furnished with bluntly rounded granules (not acute denticulations), by the absence of the central papilla of the semicells, and by the oblong vertical view with parallel sides.

203. *Cosmarium bacillare* LÜTKEM. (= *Penium inconspicuum* W. and G. S. WEST).
— Antioquia: n° 5.

Long. 15,5 μ ; lat. 4,7 μ .

204. *Cosmarium bireme* NORDST. — Cundinamarca: n° 23.

Long. 10 μ ; lat. 10,5 μ ; lat. isthm. 2 μ ; crass. (c. papill.) 7 μ .

205. *Cosmarium Blyttii* WILLE. — Antioquia: n° 5.

206. *Cosmarium Clepsydra* NORDST. (= *C. Bicardia* REINSCH). — Antioquia: n° 5 (frequent).

207. *Cosmarium columbianum* **sp. nov.**

C. subparvum, circiter $1\frac{1}{5}$ -plo longius quam latum, profunde constrictum, sinu angusto-lineari extremo levissime ampliato; semicellulæ pyramidato-trapeziformes, angulis inferioribus rotundatis, lateribus in parte superiori levissime concavis, in parte inferiori triundulatis, angulis superioribus paullo rotundatis et vix emarginatis, apice recto vel levissime convexo et biundulato, intra angulum inferiorem unumquemque granulis 4 vel 5, et infra apicem serie transversa granulorum 4 (granulis binis in medio majoribus), in centro semicellularum leviter incrassato; a vertice visæ ellipticæ, polis leviter 5-undulatis et cum granulis paucis intra polos, lateribus leviter tumidis et incrassatis; semicellulæ a latere visæ subglobosæ.

Long. 45-47 μ ; lat. 36-38 μ ; lat. apic. 20-21 μ ; lat. isthm. 11-11,5 μ ; crass. 24-25 μ . (Pl. XXIII, fig. 68-69).

Cundinamarca: Laguna de Ubaque, Eastern Andes; altit. 2066 m. N° 23.

This species was frequent amongst large numbers of *C. Quadrum*. The form of the semicells and the nature of the granulation are quite distinctive. In general outward

form the cell is somewhat similar to *C. eductum* ROY and BISS. It might also be compared with *C. bigemma* RACIB.

208. *Cosmarium dichondrum* W. and G. S. WEST. — Antioquia: n° 4.

209. *Cosmarium distichoides* **sp. nov.**

C. parvum, paullo longius quam latum, profundissime constrictum, sinu angustolineari extremo leviter ampliato; semicellulae semicirculari-trapeziformes, lateribus convexis 4-5-undulato-granulatis et cum granulis sparsis 2 vel 3 intra sed juxta marginem, angulis basalibus leviter rotundatis, angulis apicalibus vix rotundatis, apice recto, intra ambitu semicellulae serie granulorum majorum 8, in centro supra isthmum granulis binis transverse ordinatis instructae; a vertice visae ellipticae, polis granulatis, granulis binis majoribus ad medium utrobique; membrana punctata.

Long. 35-37 μ ; lat. 30-33 μ ; lat. isthm. 10 μ ; crass. 18-19 μ . (Pl. XXIII, fig. 65-66).

Antioquia: Bog near the Laguna above Medellin, Central Andes; altit. 2300 m. N° 5. *Cundinamarca*: Laguna du Paramo Cruz Verde above Bogota, Eastern Andes; altit. 2700 m. N° 24.

This species seems well characterized by the nature and disposition of its granules. It should be compared with *C. distichum* NORDST., *C. distichum* var. *irregulare* EICHL. and RACIB., *C. septenarium* EICHL. and RACIB., *C. Jundzillii* RACIB. var. *podlachicum* EICHL. and RACIB. and *C. areguense* BORGE, from all of which it is easily distinguished.

210. *Cosmarium docidioides* LÜTKEM. (= *Penium minutum* (RALFS) CLEVE; *Docidium minutum* RALFS). — Antioquia: nos 1, 2 and 5.

211. *Cosmarium floriferum* **sp. nov.**

C. parvum, tam longum quam latum, profunde constrictum, sinu angustolineari extremo leviter ampliato; semicellulae transverse oblongo-semicirculares, angulis basalibus late rotundatis, parte superiori infra apicem marginis lateralis uniuscujusque leviter retusa, angulis superioribus leviter rotundatis, apice recto; membrana verrucosa, verrucis multe depressis cum marginibus minute granulatis, verrucis granulatis 4 ad marginem lateralem unumquemque, 4 ad apicem, 9 intra marginem semicellulae, et serie singula verrucarum 5 vel 6 trans semicellulam; a latere visae depresso-circulares; a vertice visae ellipticae, polis late rotundatis, lateribus cum tumore lato utrobique.

Long. 25-28 μ ; lat. 26-28 μ ; lat. apic. 12-14 μ ; lat. isth. 9-9,5 μ ; crass. 16-17 μ . (Pl. XXIII, fig. 70-71).

Antioquia: Laguna above Medellin, Central Andes; altit. 2300 m. Nos 1 and 2.

This pretty little *Cosmarium* should be compared with *C. ornatum* RALFS forma BÖRGESEN (in Vidensk. Medd. naturh. Foren. Kjöbenhavn, 1890, p. 944, t. 4, f. 29) and *C. ornatum* forma BORGE (in Bih. till K. Sv. Vet-Akad. Handl. Bd. 24, Afd. III, n° 12, 1899, p. 23, t. I, f. 26). Although in the outline of the cell *C. floriferum* closely resembles *C. ornatum*, it is considerably smaller than any form of the latter species and the granulation is of a totally different character. The granules are themselves much more minute and are arranged in groups of from 4 to 6 at the margins of greatly flattened

warts. Moreover, some of these warts or verrucæ are arranged right across the front of the semicell, a disposition of markings which is never observed in any form of *C. ornatum*. *C. floriferum* might also be compared with the various forms of *C. ordinatum* (BÖRGESEN) W. and G. S. WEST.

212. *Cosmarium globosum* BULNH. — Cundinamarca : n° 24.

213. *Cosmarium humile* (GAY) NORDST. — Antioquia : n° 6.

214. *Cosmarium impressulum* ELFV. — Antioquia : nos 1, 2 and 5. Cundimarca : n° 23.

215. *Cosmarium læve* RABENH. — Cundinamarca : n° 14.

216. *Cosmarium Lundellii* DELP. — Cundinamarca : n° 32. Long. 77 μ ; lat. 58-62 μ ; lat. isth. 21 μ .

217. *Cosmarium Mayori* **sp. nov.**

C. subparvum, tam longum quam latum, profunde constrictum, sinu angusto-lineari extremo leviter ampliato; semicellulæ transverse oblongo-trapeziformes, apice subrecto et glabro, lateribus leviter convexis, verruca conica prope sed supra angulum inferiorem unumquemque, et verruca conica singula in medio marginis lateralis uniuscujusque, angulis superioribus minutissime productis et acutis, cum serie singula verrucarum rotundatarum 6 juxta sed infra apicem, et seriebus subcurvatis duobus granulorum trans medium semicellulæ; scrobiculis minutis inter granula; a vertice visæ ellipticæ, polis verruca conica singula instructis, serie verrucarum rotundatarum 6 juxta sed intra marginem lateralem unumquemque; semicellulæ a latere visæ obovatæ, apice leviter convexo, parte superiori marginis lateralis uniuscujusque triverrucosa. Pyrenoidibus binis.

Long. 37-38 μ ; lat. 36-37 μ ; lat. isthm. 10-11 μ ; crass. 22-24 μ . (Pl. XXIII, fig. 67).

Cundinamarca : Laguna de Ubaque, Estern Andes; altit. 2066 m. N° 23.

This species was rather infrequent among large numbers of *C. Quadrum*. Its characters are so distinctive that it is not necessary to compare it closely with any other.

218. *Cosmarium minimum* W. and G. S. WEST. — Antioquia : n° 5. Long. 9-9,5 μ ; lat. 8-8,5 μ ; lat. isthm. 3,5-4 μ ; crass. 5-5,3 μ . (Pl. XXII, fig. 52).

219. *Cosmarium moniliforme* (TURP.) RALFS. — Antioquia : nos 5 and 10.

220. *Cosmarium nitidulum* DE NOT. forma *minima*.

Forma cellulis multe minoribus, profundissime constrictis.

Long. 13 μ ; lat. 10 μ ; lat. isthm. 1,8 μ ; crass. 6,5 μ .

Antioquia : n° 5.

221. *Cosmarium obtusatum* SCHMIDLE. — Antioquia : n° 5.

Only one specimen was observed and it was decidedly smaller than the average for this species. Long. 46 μ ; lat. 40 μ ; lat. isthm. 12-5 μ .

222. *Cosmarium ornatum* RALFS. — Cundinamarca : n° 24.

223. *Cosmarium propinquum* **sp. nov.**

C. parvum, circiter $2\frac{1}{3}$ -plo longius quam latum, subprofunde constrictum, sinu lineari extremo ampliato; semicellulæ longitudinaliter oblongo-rectangulares, angulis

basalibus rectangularibus et leviter rotundatis, lateribus subparallelis et subrectis (levissime convexis), angulis apicalibus late rotundatis, apice leviter emarginato-retuso in medio; a latere visæ oblongæ, lateribus parallelis, apice late rotundato; a vertice visæ ellipticæ; membrana punctata. Pyrenoide singulo.

Long. 37-39 μ ; lat. 15-16 μ ; lat. isthm. 7-8 μ ; crass. 11-11,5 μ . (Pl. XXII, fig. 48-49).

Antioquia: Bog near the Laguna above Medellin, Central Andes; altit. 2300 m.
Nº 5.

This small species occurred in abundance and exhibited very constant characters. It is a close ally of *C. decedens* (REINSCH) RACIB. and its var. *sinuosum* (LUND.) RACIB., from which it is primarily distinguished by the subparallel (and slightly convex) sides of the semicells and the broadly rounded apical angles. It is also proportionately longer and the apices of the semicells are retuse in the middle only (not widely retuse as in all forms of *C. decedens*). Moreover, both side and vertical views are quite different, especially the latter, in which there is no trace of the submamillate poles so characteristic of *C. decedens*.

C. propinquum should also be compared with *C. subquadratum*, NORDST., from which it differs in its smaller size, its proportionately greater length, its wider isthmus, the emarginate-retuse apices of the semicells, and in the form of the side view.

224. *Cosmarium pseudamœnum* WILLE. — *Antioquia*: n^{os} 3, 4 (abundant and 5.

225. *Cosmarium pseudexiguum* RACIB.; W. and G. S. WEST., Monogr. Brit. Desm. III, 1908, p. 65, T. 70, f. 25, 26.

Forma *brevior*. Forma cellulis brevioribus, ceteris ut in forma typica. Long. 22 μ ; lat. 15 μ ; lat. isthm. 3 μ .

Cundinamarca: n^o 24.

As in other forms of this species the isthmus was exceedingly narrow. *C. pseudexiguum* appears to be one of the most deeply constricted species of the genus.

226. *Cosmarium pseudoconnatum* NORDST. — *Antioquia*: n^o 5.

227. *Cosmarium pseudonitidulum* NORDST. — *Antioquia*: n^o 5.

228. *Cosmarium pseudoprotuberans* KIRCHN. forma. Long. 32 μ ; lat. 27-28; lat. isthm. 8 μ ; crass. 19 μ .

Cundinamarca: n^o 23.

229. *Cosmarium pseudopyramidatum* LUND. — *Antioquia*: n^o 5.

230. *Cosmarium pyramidatum* BRÉB. — *Antioquia*: n^{os} 1, 2 4 and 5. Cundinamarca: n^o 24.

231. *Cosmarium Quadrum* LUND. — Cundinamarca: n^o 23.

This species occurred in great abundance. All the specimens were rather small, but not quite small enough to be placed under var. *minus* NORDST.

Long. 57-64 μ ; lat. 48-53 μ ; lat. isthm. 18-20 μ ; crass. 26-27 μ .

232. *Cosmarium Regnellii* WILLE. — Cundinamarca: n^o 23.

233. *Cosmarium Regnesi* REINSCH. — *Antioquia*: n^{os} 1, 2 and 5.

Var. *montanum* SCHMIDLE. — Antioquia: nos 1 and 2.

234. *Cosmarium repandum* NORDST. forma *minor* W. and G. S. WEST (= *C. edon-
topeurum* ROY and BISS.). — Antioquia: no 4.

235. *Cosmarium retusiforme* (WILLE) GUTW. forma *abscissa* (SCHMIDLE) Borge. —
Antioquia: nos 1 and 2. Cundinamarca: no 23.

236. *Cosmarium retusum* (PERTY) RABENH. var. *inaequalipellicum* W. and G. S.
WEST. Monogr. Brit. Desm. III, 1908, p. 267 (= *C. inaequalipellicum* W. and G. S.
WEST, 1895). — Antioquia: nos 1, 2, 3, 4 and 8.

237. *Cosmarium subæquale* **sp. nov.**

C. submediocre, circiter 1 $\frac{1}{2}$ -plo longius quam latum, profundissime constrictum,
sinu angusto-lineari ad extremum subampliato; semicellulae triangulares, base recta,
angulis inferioribus late rotundatis et in parte superiori cum undulo vix conspicuo, late-
ribus concavis, angulo apicali late rotundato et ad apicem cum membrana incrassata; in
centro semicellularum tumoribus parvis tribus, tumore uno juxta isthmum et tumoribus
binis superioribus horizontaliter dispositis; a latere visæ ovato-pyramidatae, angulis
basalibus rotundatis, lateribus cum tumore depresso et parvo infra medium, apice late
rotundato; a vertice visæ ellipticae, polis rotundatis, tumoribus parvis tribus utrobique;
membrana punctata, punctis ad angulos semicellularum majoribus. Pyrenoidibus binis.

Long. 64 μ ; lat. 39 μ ; lat. apic. 14 μ ; lat. isthm. 13 μ ; crass. 28 μ . (Pl. XXIII,
fig. 63).

Antioquia: In ditches between Medellin and America, Central Andes; altit. 1550 m.
No 6.

This species is a close ally of *C. aequale* TURNER (in K. Sv. Vet. Akad. Handl.
Bd. XXV, no 5, 1893, p. 64, t. 11, f. 31), but is distinguished by its larger size, its
proportionately longer cells, its three central tumours (which cause the side and vertical
views to be entirely different), and by its conspicuously punctate cell-wall. BERGE has
recorded *C. aequale* from Argentina (cfr. Arkiv för Botanik utgifv. K. Sv. Vet.-Akad.
Bd. VI, 1906, p. 7 c. fig.) and he describes and figures the semicells as having a chloro-
plast with one central pyrenoid. In *C. subaequale* there are two pyrenoids in each
semicell.

238. *Cosmarium subarctoum* (LAGERH.) RACIB.; W. and G. S. WEST, Monogr.
Brit. Desm. III, 1908, p. 31, t. 68, f. 6-8.

Var. *minutissimum* **var. nov.**

Cellulae minutissimae, semicellulae, ad isthmum plus minusve tortae.

Long. 6,5-6,8 μ ; lat. 5,6-6 μ ; lat. isthm. 2,8 μ ; crass. 3,4-3,7 μ . (Pl. XXII, fig. 46-47).

Antioquia: Laguna above Medellin, Central-Andes; altit. 2300 m. nos 1 and 2.

This variety is one of the very smallest of known Desmids. It is about one-third
the size of typical *C. subarctoum*, but is otherwise in no way different from that species,
the cells of which, as in this Columbian variety, are often slightly twisted at the isthmus.

Among other minute species of *Cosmarium* should be mentioned *C. suevicum* KIRCHNER

(in Jahreshefte Verein. für vaterl. Naturk. in Württ. 1902, p. 347 c. fig.), which has a length of 6,5-7,5 μ and a breadth of 5-6 μ ; and *C. bireme* var. *barbadense* G. S. WEST (in Journ. Bot. XLII, 1904, p. 286, t. 464, f. 17) with a length of 7,3-7,7 μ and a breadth of 7,4-8 μ . With neither of these tiny forms can the present variety be confused.

239. *Cosmarium subcostatum* NORDST. forma.

Forma semicellulis altis ut in var. *Beckii* sed granulis centralibus ut in forma *minore*.

Long. 33 μ ; lat. 28 μ ; lat. isthm. 9 μ .

Cundinamarca: n^o 22.

240. *Cosmarium subtile* (W. and G. S. WEST) LÜTKEM. in Verhandl. der k. k. zool.-botan. Ges. Wien, 1910, p. 494. *Penium subtile* W. and G. S. WEST in Journ. Roy. Micr. Soc. 1897, p. 479, t. 6, fig. 8, 9; Monogr. Brit. Desm. I, 1904, p. 92, t. 8, f. 27-29.

Forma membrana cellularum crassiore.

Long. 18 μ ; lat. 11,5 μ ; lat. isthm. 11 μ (Pl. XXII, fig. 51).

Cundinamarca: n^o 24.

241. *Cosmarium subtilissimum spec. nov.*

C. minimum, delicatissimum, duplo longius quam latum, levissime constrictum, sinu vix conspicuo; semicellulae semi-oblongae, lateribus subparallelis (levissime sursum divergentibus), apice late rotundatis; a vertice visae circulares; membrana tenuissima et glabra; chromatophora singula in cellula unaquaque cum pyrenoide singulo.

Long. 15-15,5 μ ; lat. 7,5-8 μ ; lat. isthm. 6,2-6,7 μ ; crass. 7,3-8 μ (Pl. XXII, fig. 45).

Antioquia: Bog near the Laguna above Medellin, Central Andes; altit. 2300 m. N^o 5.

This species should be compared with *C. perminutum* nob. (= *Cylindrocystis minutissima* TURNER), from which it differs in its more cylindrical cells, in which the semicells are slightly wider at the apex than the base, and in the single chloroplast (with one central pyrenoid) in each cell. The cell-wall is also much more delicate.

242. *Cosmarium subtriordinatum* W. and G. S. WEST. — *Antioquia*: n^{os} 1 and 2.

243. *Cosmarium subtumidum* NORDST. — *Antioquia*: n^{os} 5 and 6. Cundinamarca: n^{os} 14 and 23.

244. *Cosmarium tinctum* RALFS. — Cundinamarca: n^o 24.

245. *Cosmarium trachypolum* W. and G. S. WEST. — *Antioquia*: n^{os} 1, 2, 3 and 4.

246. *Cosmarium venustum* (BRÉB.) ARCH. var. *hypohexagonum* W. WEST. — *Antioquia*: n^o 5.

247. *Xanthidium armatum* (BRÉB.) RABENH. — *Antioquia*: n^o 5 (abundant).

248. *Xanthidium Mayori spec. nov.*

X. mediocre, circiter $1\frac{1}{5}$ -plo longius quam latum (sine spinis), profunde constrictum, sinu lineari extrorsum ampliato; semicellulae transverse oblongo-hexagonae, lateribus inferioribus et superioribus leviter convexis, apice recto, angulis lateralibus et apicalibus spinis subulatis leviter curvatis binis instructis, etiam spinis similibus in medio marginum lateralium superiorum et in medio apicis; in centro semicellularum verrucis binis trans-

verse dispositis, et cum annulo scrobiculorum minorum 9-10 circa verrucam unumquemque; a vertice visæ subellipticæ, polis truncatis, ad angulum unumquemque spina subulata leviter curvata paullo divergente, lateribus convexis, verrucis rotundatis binis ad medium utrobique, serie subirregulariter disposita spinarum 4 intra marginem lateralem unumquemque; membrana delicate punctulata.

Long. sine spin. 73 μ , c. spin. 92 μ ; lat. sine spin. 60 μ , c. spin. 85 μ ; lat. isthm. 21 μ ; crass. 42 μ (Pl. XXII, fig. 41).

Cundinamarca: Laguna de Ubaque, Eastern Andes; altit. 2066 m. N^o 23.

In this species there are seven pairs of spines on each semicell, one pair at each of the lateral and apical angles, one pair in the middle of the apex, and one pair in the middle of each upper lateral margin.

The general outline of the cell resembles that of *X. antilopaeum* (BRÉB.) KÜTZ., from which *X. Mayori* differs in the three additional pairs of spines and in the presence of the binate central verrucæ.

249. *Arthrodesmus Incus* (BRÉB.) HASS. forma **minor** W. and G. S. WEST. — Antioquia: n^{os} 1 and 2.

250. *Arthrodesmus controversus* W. and G. S. WEST. — Antioquia: n^o 8.

251. *Arthrodesmus convergens* EHRENB. — Antioquia: n^o 5.

252. *Arthrodesmus bifidus* BRÉB. — Antioquia: n^o 5.

253. *Staurastrum antioquiense* **spec. nov.**

S. minutissimum, circiter tam longum quam latum (cum processibus), profunde constrictum, sinu valde aperto ad extremum acuminato; semicellulæ transverse ellipticæ, polis in processus brevissimos submamillatos bispinatos horizontaliter dispositos productis, ad apicem convexum processibus brevissimis submamillatis bispinulatis 3 præditæ; a vertice visæ sexangulares, lateribus concavis, angulis rotundato-mamillatis et bispinatis, intra sed juxta margines processibus brevissimis bispinulatis 3; membrana tenuissima et glabra.

Long. sine proc. 13,5 μ , c. proc. 17,5 μ ; lat. (c. proc.) 16-17,5 μ ; lat. isthm. 5,3 μ (Pl. XXI, fig. 29).

Antioquia: Laguna above Medellin, Central Andes; altit. 2300 m. N^{os} 1 and 2.

This minute *Staurastrum* resembles in its front view some of the smaller forms of *St. furcatum* EHRENB., but is much less. The vertical view is at once distinctive, since it is 6-angular, with six equal mamillate processes in the lower whorl and only three apical ones, one of the latter occurring just within each alternate concave side.

254. *Staurastrum arcuatum* NORDST.

Forma semicellulis robustioribus, angulis crassioribus; isthmo latiori. Long. sine spin. 28 μ ; lat. c. spin. 46 μ ; lat. isthm. 12 μ . — Antioquia: n^{os} 1 and 2.

255. *Staurastrum brachiatum* RALFS. — Antioquia: n^{os} 1 and 2.

256. *Staurastrum brevispinum* BRÉB. var. **inermis** WILLE.

Long. 66-74 μ ; lat. 54-60 μ ; lat. isthm. 14-15 μ .

Cundinamarca: n^o 24 (frequent).

All the specimens seen possessed an axile chloroplast (with a central pyrenoid) in each semicell exactly as in typical *St. brevispinum*. In outline the vertical view was exactly like that of the typical form, except for the mucros at the angles. The constriction was in all cases deeper than indicated by Wille, but not more so than in the typical form.

257. *Staurastrum contectum* TURNER. — Antioquia : n° 5.

258. *Staurastrum cosmarioides* NORDST. — Cundinamarca : n°s 21 and 22.

Long. 56-60 μ ; lat. 32-36 μ ; lat. isthm. 10-12 μ .

259. *Staurastrum cuspidatum* BRÉB. var. *columbianum* var. nov.

Var. minus et delicatulum, angulis semicellularum leviter inflatis; a vertice visis lateribus concavioribus.

Long. 16-17 μ ; lat. sine spin. 14-16 μ ; lat. c. spin. 23-25 μ ; lat. isthm. 4,5 μ (Pl. XXI, fig. 28).

Antioquia : Laguna above Medellin, Central Andes; alt. 2300 m. N°s 1 and 2.

This is the most delicate variety of *St. cuspidatum* yet described, and in the front view it recalls in some respects *St. subscolapacinum* W. and G. S. WEST (in Trans. Linn. Soc. Bot. ser. 2, V, 1896, p. 256, t. 16, f. 11).

260. *Staurastrum cyrtocerum* BRÉB. — Antioquia : n° 5.

261. *Staurastrum dejectum* BRÉB. — Antioquia : n° 4.

262. *Staurastrum denticulatum* (NÆG.) ARCH. — Antioquia : n° 6.

263. *Staurastrum Dickiei* RALFS var. *minutum* var. nov.

Var. *minutum*, cellulis profundissime constrictis.

Long. 15 μ ; lat. sine spin. 16 μ ; lat. c. spin. 20 μ ; lat. isthm. 3,6 μ (Pl. XXI, fig. 27)

Antioquia : Bog near the Laguna above Medellin, Central Andes; altit 2300 m. N° 5.

A small form of this species was described by SCHMIDLE (in Oesterr. botan. Zeitschr. 1895-6, p. 24, t. 16, f. 29) as forma *parva*, but this form cannot in any way be confused with var. *minutum*, and its wide isthmus and peculiar vertical view make it doubtful whether it is really a form of *St. Dickiei*.

It is a noteworthy fact that the largest forms of *S. Dickiei* also occur in America, the North American specimens of *St. Dickiei* var. *maximum* W. and G. S. WEST attaining a length of 69 μ and a breadth (with spines) of 86 μ . (Vide W. and G. S. WEST in Trans. Linn. Soc. Bot. ser. 2, V, 1896, p. 255, t. 18, f. 13).

264. *Staurastrum dilatatum* EHRENB. — Antioquia : n° 3. Cundinamarca : n° 24.

265. *Staurastrum distentum* WOLLE, 1882; Desm. U. S. 1834, p. 149, t. 41, f. 15, 16; char. emend. W. and G. S. WEST in Journ. Linn. Soc. bot. XXXIII, 1898, p. 316, fig. xylogr. 6 d-f.

Var. *columbianum* var. nov.

Var. *circiter* tam longum quam latum, spina simplice parva ad basin processuum uniuscujusque utrobique.

Long. 24,5 μ ; lat. cum proc. 25 μ ; lat. isthm. 9 μ . (Pl. XXI, fig. 33).

Antioquia: Bog near the Laguna above Medellin, Central Andes; altit. 2300 m. N° 5.

This variety should be compared with *St. subpolymorphum* BORGÉ, described from Brazil in 1903. It seems scarcely possible to regard BORGÉ's species as other than a form of *St. distentum*.

266. *Staurastrum gemelliparum* NORDST. forma *minor*. Long. cum proc. 20 μ ; lat. cum proc. 18 μ . — Antioquia: n° 1 and 2.

267. *Staurastrum gyratum* W. and G. S. WEST in Ann. Roy. Botan. Gard. Calcutta, VI, 1907, p. 219, t. 15, f. 27.

Var. *divergens* var. **nov.**

Var. corpore semicellularum paullo minore; processibus validioribus et crassioribus.

Long. sine proc. 8 μ , cum proc. 18-19 μ ; lat. sine proc. circ. 7,5-8 μ , cum proc. 23-26 μ ; lat. isthm. 4 μ . (Pl. XXI, fig. 30).

Cundinamarca: Laguna de Ubaque, Eastern Andes; altit. 2066 m. N° 23.

268. *Staurastrum hirsutum* (EHRENB.) BRÉB. — Cundinamarca: n° 24.

269. *Staurastrum illusum* **spec. nov.**

St. minutum, paullo latius quam longum, profundissime constrictum, sinu acutangulo et leviter aperto; semicellulae transverse elliptico-oblongae, dorso convexiori quam ventro, angulis lateralibus late rotundatis; a vertice visae triangulares, angulis rotundatis, lateribus valde concavis; membrana tenuissima et punctata.

Long. 19-20 μ ; lat. 21 μ ; lat. isthm. 5-6 μ . (Pl. XXI, fig. 26).

Antioquia: Laguna above Estrella near Medellin, Central Andes; altit. 2500 m. N° 3 (abundant).

It is only after careful deliberation that I venture to describe this Desmid as a new species. Its allies are *St. muticum* BRÉB. and *St. lanceolatum* ARCH., but there is little doubt that it would be quite wrong to refer it to either of those species. It is much more delicate than *St. muticum*, with more depressed semicells, with narrower angles in the vertical view, and a very distinctly punctate cell-wall. From *St. lanceolatum* var. *compressum* it differs in the rounded lateral angles of the semicells, in the more concave sides of the vertical view, and in the punctate cell-wall.

270. *Staurastrum inconspicuum* NORDST. — Cundinamarca: n° 24:

271. *Staurastrum leptocladum* NORDST. forma *africanum* G. S. WEST in Journ. Linn. Soc. Bot. XXXVIII, 1907, p. 129, t. 6, f. 12.

Semicellulae a vertice visae corpore rhomboides-rotundato. Long. 40-42 μ ; lat. sine proc. circ. 20-21 μ , cum proc. 136-148 μ ; lat. bas. semicell. 10-10,5 μ ; lat. isthm. 7 μ ; crass. 17 μ . — Cundinamarca: n° 23.

Except for the rhomboidal shape of the body of the semicells as seen in vertical view the specimens were identical in all respects with those originally described from Nyasa and Victoria Nyanza.

Var. elegans var. nov.

Var. processibus valde et eleganter curvatis sursum; ceteris ut in forma typica.

Long. sine proc. 38 μ , cum proc. 69 μ ; lat. sine proc. circ. 18 μ , cum proc. 70 μ ; lat. isthm. 8,5 μ ; crass. 16 μ (Pl. XXI, fig. 31).

Cundinamarca: In the plankton of Laguna Pedropalo near Tena, Eastern Andes; altit. 2000 m. N° 21.

A 'var. *divergens*' of *St. leptocladum* was figured by WOLLE (Desm. U. S. 1884, t. 44, f. 5) but the Columbian form appears to be something quite different. The outward curvature of the processes is exactly the same as in *St. leptocladum* var. *insigne* W. and G. S. WEST.

272. Staurastrum Mayori spec. nov.

St. parvum, paullo longius quam latum, submodice constrictum, sinu aperto et semi-elliptico; semicellulæ oblongo-subsemicirculares, apice subtruncato, ad angulos basales et in medio marginis lateralis uniuscujusque verruca truncata instructæ, etiam ad apicem latum (et partim infra marginem) cum verrucis truncatis 4, seriebus duabus verrucarum trans semicellulam; a vertice visæ triangulares, angulis verruca truncata instructis, lateribus leviter convexis cum verrucis truncatis 2. Dispositio verrucarum in seriebus horizontalibus tribus, in serie infima 9, in serie mediana 9, in serie superiori 6.

Long. cum verruc. 23,5-24,5 μ ; lat. cum verruc. 21-22 μ ; lat. isthm. 13 μ (Pl. XXI, fig. 32).

Antioquia: Bog near the Laguna above Medellin, Central Andes; altit. 2300 m. N 5.

This species appears to be very distinct by reason of the nature and disposition of its truncate verrucæ, of which there are three horizontal series on each semicell: 9 in the basal series, 9 in the median series, but only 6 in the upper or apical series.

In the *outline* of the cell *St. Mayori* resembles the New Zealand *St. dorsuosum* NORDST., but the verrucæ on the two species are of a totally different character.

273. *Staurastrum muticum* BRÉB. — *Antioquia*: nos 1 and 2.

274. *Staurastrum O'Mearii* ARCHER. — *Antioquia*: n° 3.

275. *Staurastrum orbiculare* RALFS. — *Antioquia*: n° 5.

Var. *denticulatum* NORDST. — *Antioquia*: n° 4.

276. *Staurastrum paradoxum* MEYEN var. *longipes* NORDST. — *Cundinamarca*: n° 21 (plankton).

277. *Staurastrum pterosporum* LUND. — *Antioquia*: nos 3 and 5.

278. *Staurastrum quadrangulare* BRÉB. forma *trigona*. Long. 26-28 μ ; lat. 25-28 μ ; lat. isthm. 8-9 μ .

Antioquia: n° 5.

279. *Staurastrum retusum* TURN. (inclus. var. *punctulatum* Gutw.) — *Antioquia*: nos 1 and 2.

280. *Staurastrum Rotula* NORDST. — *Antioquia*: n° 5 (abundant).

281. *Staurastrum senarium* (EHRENB.) RALFS; G. S. West in Journ. Linn. Soc. Bot. XXXIX, 1909, p. 68, t. 6, f. 13. — *Antioquia*: n° 5.

282. *Staurastrum spicatum* W. and G. S. WEST in Journ. Bot. XXXIII, 1895, p. 70; in Trans. Linn. Soc. Bot. ser. 2, V, 1896, p. 258, t. 16, f. 23. *St. dubium* EICHL. and GUTW., 1894 (non *St. dubium* W. WEST, 1890).

Forma spinis ad angulos superiores semicellularum brevioribus et spinis ad angulos inferiores longioribus.

Long. sine spin. 22 μ , cum spin. 29 μ ; lat. sine spin. 24 μ , cum spin. 30-31 μ ; lat. isthm. 7 μ . — Antioquia: n° 3.

283. *Staurastrum tetracerum* RALFS. — Antioquia: n°s 3, 4 and 5.

284. *Staurastrum trihedrale* WOLLE, 1883; Desm. U. S. 1884, p. 123, t. 40, fig. 12, 13; char. emend. W. and G. S. WEST. in Trans. Linn. Soc. Bot. ser. 2, V, 1896, p. 610, t. 16, f. 29.

Long. 47 μ ; lat. 33 μ ; lat. isthm. 12 μ .

Antioquia: n° 5 (frequent). Cundinamarca: n° 24.

285. *Sphærozozma granulatum* ROY and BISS. — Antioquia: n°s 1 and 2.

286. *Onychonema filiforma* (EHRENB.) ROY and BISS. — Antioquia: n° 5.

287. *Spondylosium tetragonum* W. WEST in Journ. Linn. Soc. Bot. XXIX, 1892, p. 115, t. 19, f. 2.

Forma paullo minor, cellulis leviter angustioribus. Long. 7,5-8,5 μ ; lat. 7-7,2 μ ; lat. isthm. 6 μ ; crass. 4,5-5 μ (Pl. XXIII, fig. 55).

Forma *trigona*; cellulis a vertice visis triangularibus, angulis rotundatis, lateribus concavis. Long. 8-9 μ ; lat. 6-8,3 μ ; lat. isthm. 5-5,7 μ (Pl. XXIII, fig. 56-57).

Cundinamarca: n° 24 (both forms frequent).

It would appear that *Spondylosium Treubii* BERNARD (in Bull. Dép. de l'Agric. Indes-Néerl. 1909, p. 21, t. 1, f. 16) is only a form of *Sp. tetragonum*.

288. *Spondylosium ossiculorum spec. nov.*

S. parvum, filis non tortis, sine vagina mucosa; cellulæ circiter $1\frac{1}{3}$ -plo longius quam latum, subprofunde constrictum, sinu valde aperto et semicirculari; semicellulæ subellipticæ, apice late convexo, serie singulo punctorum (= pororum) transmedium semicellulæ uniuscujusque; semicellulæ a vertice visæ late ellipticæ, a latere visæ depresso-subcirculares.

Long. cell. 12-13,5 μ ; lat. 9,5-10,3 μ ; lat. isthm. 5-5,5 μ ; crass. 7-8 μ (Pl. XXIII, fig. 54).

Antioquia: Laguna above Estrella near Medellin, Central Andes; altit. 2500 m. N° 3 (frequent).

This is apparently a very distinct species. The single row of conspicuous punctæ across the middle of each semicell really represents a transverse row of large pores in the cell-wall.

289. *Hyalotheca dissiliens* (SM.) BRÉB. — Antioquia: n°s 1, 2, 3, 4 and 5. Cundinamarca: n°s 22 and 24.

Large specimens of forma *tridentula* occurred from n° 3, and the specimens from n° 5 were all very small.

290. *Hyalotheca burmensis* W. and G. S. WEST. — Cundinamarca : n° 23.
Long. 19-20 μ ; lat. 27-28 μ .
291. *Desmidium Baileyi* (RALFS) NORST. — Antioquia : nos 1, 2, 3 and 5. All the specimens observed were tetragonal.
292. *Desmidium aptogonum* BRÉB. — Antioquia : nos 1, 2 and 5.
293. *Desmidium Swartzii* AG. Cundinamarca : n° 22.
Var. *quadrangulare* (Kütz.) ROY and BISS. (= *D. quadrangulatum* RALFS). — Cundinamarca : n° 22 and 23.
294. *Desmidium æquale* W. and G. S. WEST.
Long. cell. 17-19 μ ; lat. 38-40 μ ; crass. 32-33 μ (Pl. XXIII, fig. 53).
Antioquia : n° 10 (abundant). Cundinamarca : n° 23.
This species has only previously been observed from the United States.
295. *Desmidium cylindricum* GREV. — Cundinamarca : nos 14, 23 and 24.
296. *Gymnozyga moniliformis* EHRENB. — Cundinamarca : n° 24.

Division III. STEPHANOKONTÆ

Family Ædogoniaceæ

297. *Ædogonium Borisianum* (LE CL.) WITTR.
Crass. cell. veget. 17-17,5 μ ; altit. 4-5 plq major;
» oogon. 33-38 μ ; » 48-78 μ ;
» oospor. 32-36 μ ; » 47-63 μ .
Antioquia : n° 9. Cundinamarca : n° 23.
The form observed was rather more slender than the average for this species. The oogonia were solitary or up to four seriate.
298. *Ædogonium undulatum* (BRÉB.) A. BR. — Cundinamarca : n° 14.
299. *Ædogonium plusiosporum* WITTR.
Forma oosporis paullo minoribus oogoniis minus complentibus.
Crass. cell. veget. 12-13 μ ; altit. 3-4-plo major;
» oogon. 28 μ ; » 38 μ ;
» oospor. 25 μ ; » 25 μ .
Cundinamarca : n° 16.
300. *Ædogonium tapeinosporum* WITTR. forma oogonia binis.
Crass. cell. veget. 3,5-5 μ ; altit. 3 1/2 6-plo major;
» oogon. 16-17 μ ; » 13-14 μ ;
» oospor. 13-14 μ ; » 12 μ (Text-fig. 3 A).
Antioquia : n° 10.

301. *Ædogonium inconspicuum* HIRN.
Crass. cell. veget. 3-3,4 μ ; altit. 4-5-plo major ;

Crass. oogon. 15-18 μ ; altit. 13-20 μ ;
» oospor. 14-17 μ ; » 10,5-12 μ
(Text-fig. 3 B and C).

Antioquia: n^o 9 (abundant).

The filaments were mostly short and each with one oogonium. They were thickly attached to a large species of *Spirogyra*.

302. *Ædogonium fabulosum* HIRN
var. *columbianum* var. nov.

Var. cellulis vegetativis tenuioribus, diametro plerumque 5-6-plo longioribus ; oogoniis paullo longioribus et tumidioribus.

Crass. cell. veget. 56-70 μ ; altit. 4 $\frac{1}{2}$ -6 $\frac{1}{2}$ -plo major ;

Crass. oogon. 98-100 μ ; altit. 163-174 μ ;

Crass. oospor. 81-84 μ ; altit. 124-128 μ
(Text-fig. 3 D).

Cundinamarca : Laguna de Ubaque, Eastern Andes ; altit. 2066 m. N^o 23 (common amongst *Nitella* sp.).

Originally described from the Matto Grosso province of Brazil (cfr. Hirn in Acta Soc. Sci. Fennicæ, XXVII, n^o 1, 1900, p. 114, t. 11, fig. 59), *Æ. fabulosum* is the largest of all known species of the genus. The Columbian specimens belong to a distinct variety characterized by the more slender filaments, with proportionately longer cells, and the more tumid oogonia with more ellipsoid oospores.

Another variety of this species — var. *maximum* (W. and G. S. WEST) HIRN — is known from Koh Chang in the Gulf of Siam.

303. *Ædogonium taphrosporum* NORDST. and HIRN in Hirn. *l. c.*, 1900, p. 133, t. 16, f. 91.

Crass. cell. veget. 19-22 μ ; altit. 8-12-plo major ;

» oogon. 68-70 μ ; » 78-92 μ ;

» oospor. 58-68 μ ; » 58-68 μ .

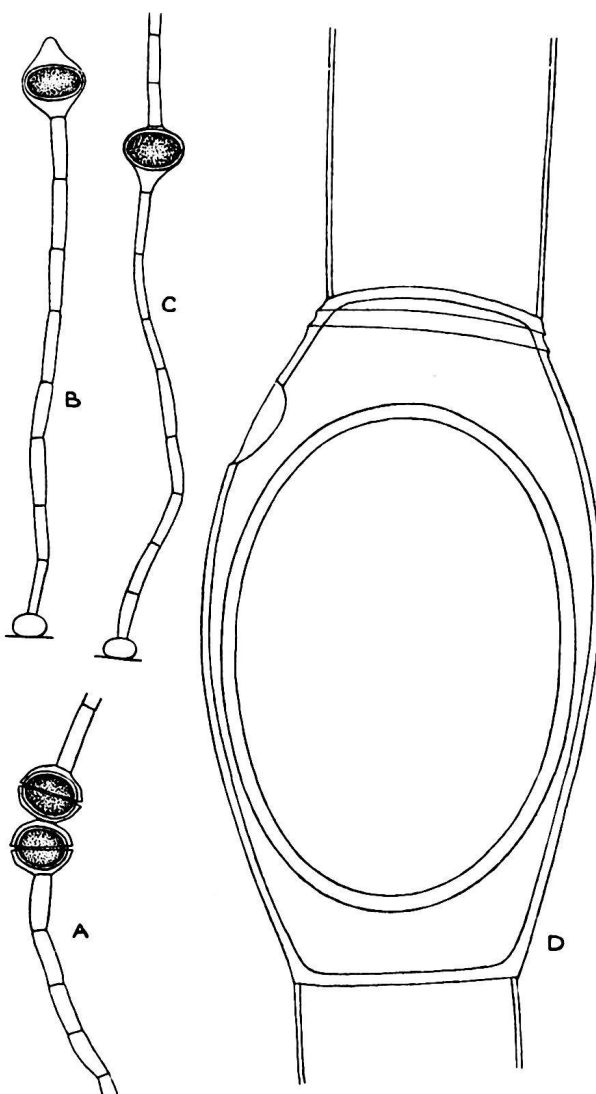


Fig. 3. — A, *Ædogonium tapeinosporum* Wittr.
B and C, *Æ. inconspicuum* Hirn.
D, *Æ. fabulosum* Hirn var. *columbianum* var. nov. All $\times 500$.

Cundinamarca : n° 23.

This characteristic *Ædogonium* was mixed with the preceding species. The vegetative cells are rather long and the cell-walls are very thick and strong. The apical cell is bluntly rounded; the basal cell is elongate, slightly tumid, and with a strongly developed disc of attachment.

Known previously only from Brazil.

304. *Bulbochæte intermedia* DE BARY forma *americana* HIRN. — Cundinamarca : n° 23.

Other sterile species of *Ædogonium* were noticed from Antioquia : nos 5, 6, 7 and 8 ; Cundinamarca : nos 14, 15, 16, 18, 19, 22 and 24.

Division IV. HETEROKONTÆ

Family Botryococcaceæ.

305. *Botryococcus Braunii* Kütz. — Cundinamarca : nos 14 and 23.

Family Ophiocytaceæ.

306. *Ophiocytium parvulum* (PERTY) A. BR. — Cundinamarca : nos 14, 18 and 23.

307. *Ophiocytium majus* NÆG. — Antioquia : n° 6. Cundinamarca : nos 16, 17 and 19.

308. *Ophiocytium graciliceps* A. BR. — Cundinamarca : n° 18.

Long. cell. usque 350 μ ; long. stip. 8-11 μ .

This Alga occurred in great quantity. The stalk of attachment was rather shorter than usual, but possessed a well-marked basal disc.

309. *Centrtractus belanophorus* (SCHMIDLE) LEMM. — Cundinamarca : n° 23.

Long. cell. sine spin. 16,5-18 μ , cum spin. 72-76 μ ; lat. cell. 9 μ .

Family Tribonemaceæ

310. *Tribonema bombycina* (AG.) DERB. and SOL. forma *minor* (WILLE) G. S. WEST. — Antioquia : n° 8. Cundinamarca : n° 22.

311. *Tribonema affine* (Kütz.) G. S. WEST. — Cundinamarca : nos 14 and 22.

EXPLANATION OF PLATES

a, a' = cells from the front view (a fronte visa). *c* = cells from the side view (a latere visa).
b = cells from the end view (a vertice visa). *d* = semicells from the basal view (a basi visa).

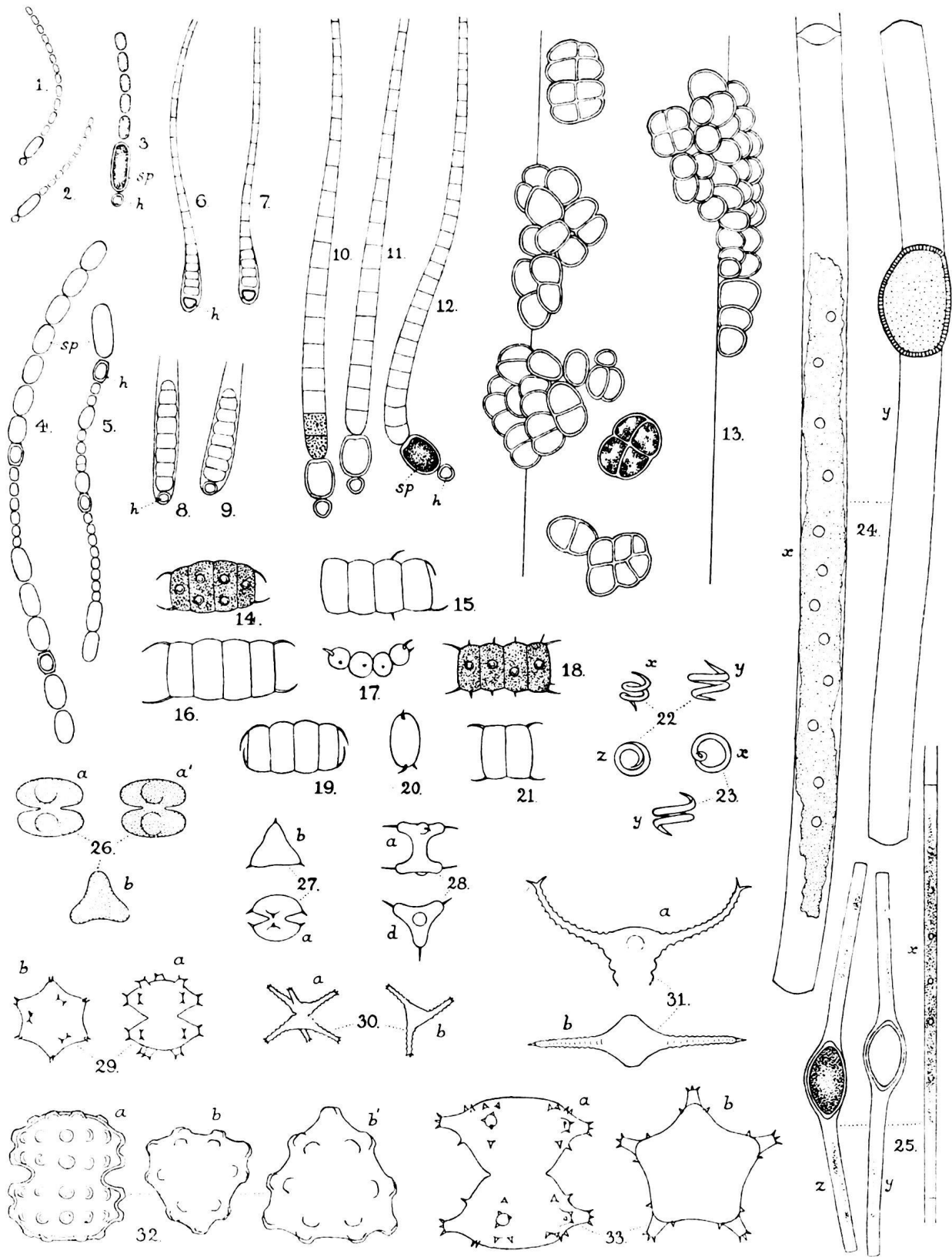
PLATE XXI.

- Fig. 1-3. *Cylindrospermum minimum* sp. n. 1 and 2, $\times 500$; 3, $\times 1000$.
» 4-5. *Nodularia tenuis* G. S. WEST. $\times 500$.
» 6-7. *Calothrix clavata* sp. n. $\times 500$.
» 8-9. *Calothrix brevissima* G. S. WEST forma. $\times 500$.
» 10-12. *Calothrix columbiana* sp. n. $\times 500$.
» 13. *Protococcus fuscatus* sp. n. $\times 500$.
» 14-21. *Scenedesmus quadricauda* (TURP.) BRÉB. var. *rectangularis* var. n. $\times 500$.
» 22-23. *Ankistrodesmus Mayori* sp. n. $\times 1000$.
» 24. *Mougeotia (Gonatonema) Mayori* sp. n. $\times 500$.
» 25. *Mougeotia (Gonatonema) tenerrima* sp. n. $\times 500$.
» 26. *Staurostrum illusum* sp. n. $\times 500$.
» 27. » *Dickiei* RALFS var. *minutum* var. n. $\times 500$.
» 28. » *cuspidatum* BRÉB. var. *columbianum* var. n. $\times 500$.
» 29. » *antioquiense* sp. n. $\times 850$.
» 30. » *gyratum* W. and G. S. WEST var. *divergens* var. n. $\times 500$.
» 31. » *leptocladum* NORDST. var. *elegans* var. n. $\times 500$.
» 32. » *Mayori* sp. n. *a* and *b*, $\times 850$; *b*, $\times 1000$.
» 33. » *distentum* WOLLE var. *columbianum* var. n. $\times 1000$.

PLATE XXII.

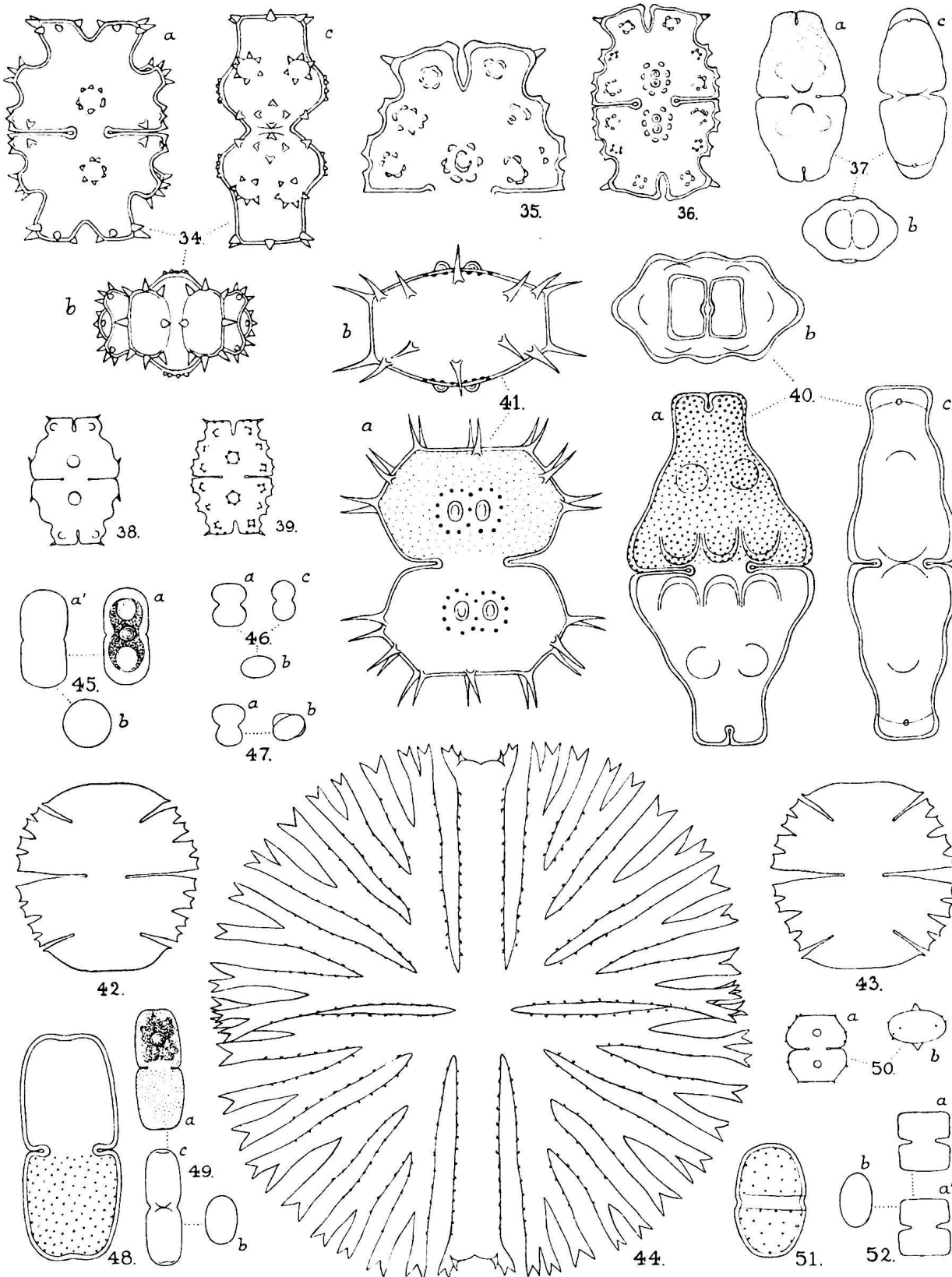
- Fig. 34. *Euastrum columbianum* sp. n. $\times 500$.
» 35-36. » *pictum* BÖRGESEN. 35, $\times 850$; 36, $\times 500$.
» 37. » *brasiliense* BERGE forma *minor*. $\times 500$.
» 38. » *personatum* W. and G. S. WEST var. *columbianum* var. n. $\times 500$.
» 39. » *Turneri* W. WEST forma. $\times 500$.
» 40. » *quadriiceps* NORDST. $\times 500$.
» 41. *Xanthidium Mayori* sp. n. $\times 500$.
» 42-43. *Micrasterias truncata* BRÉB. var. *pusilla* var. n. $\times 500$.
» 44. » *Sol* (EHRENB.) KÜTZ. var. *ornata* NORDST. $\times 500$.
» 45. *Cosmarium subtilissimum* sp. n. $\times 1000$.
» 46-47. » *subarctoum* (LAGERH.) RACIB. var. *minutissimum* var. n. $\times 1000$.
» 48-49. » *propinquum* sp. n. 48, $\times 1000$; 49, $\times 500$.
» 50. » *adoxum* W. and G. S. WEST var. *denticulatum* var. n. $\times 1000$.
» 51. » *subtile* (W. and G. S. WEST) LÜTKEM. forma. $\times 1000$.
» 52. » *minimum* W. and G. S. WEST. $\times 1000$.

PLANCHE XXI.



G.S West ad nat. del

PLANCHE XXII.



G.S. West ad nat. del.

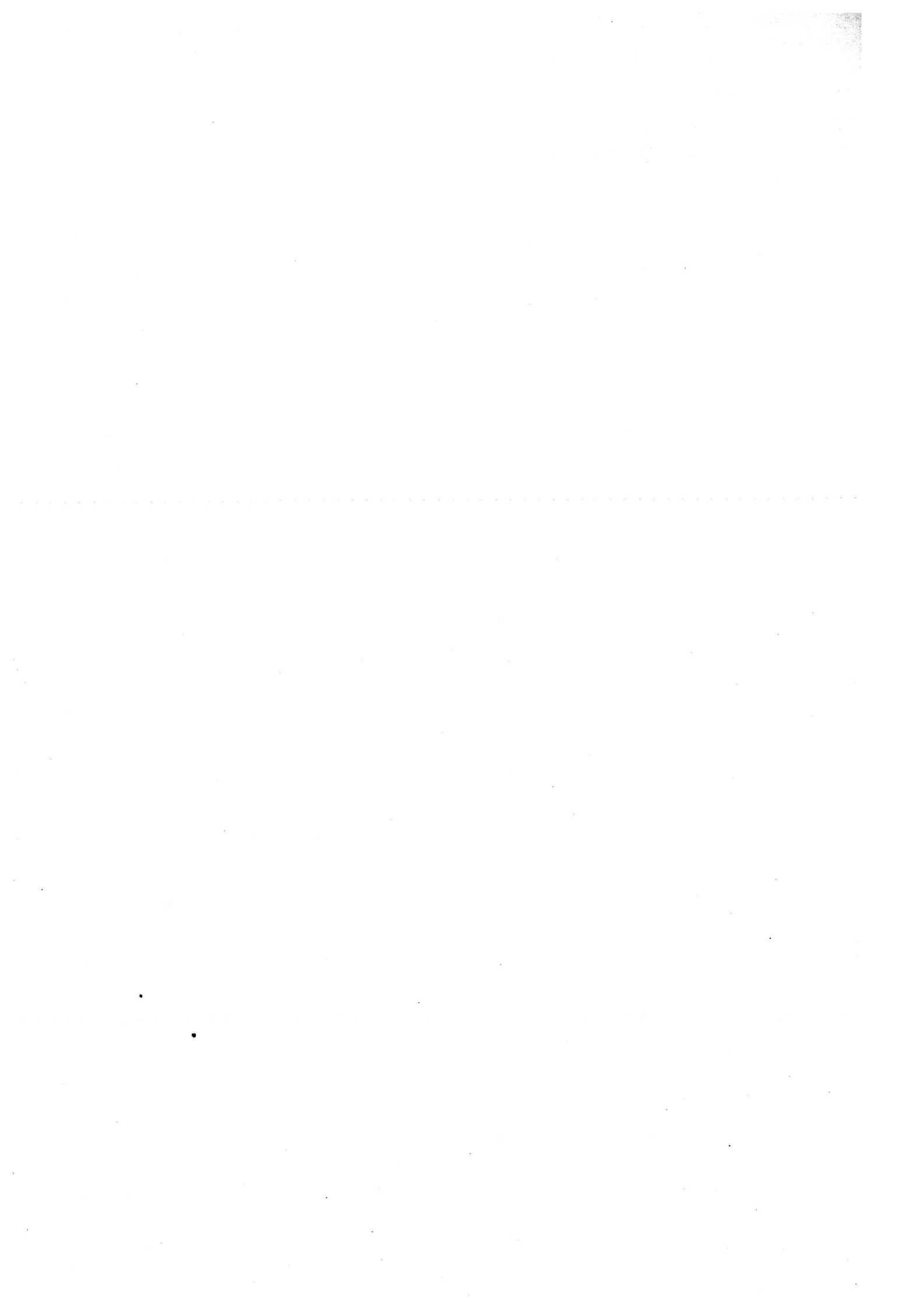
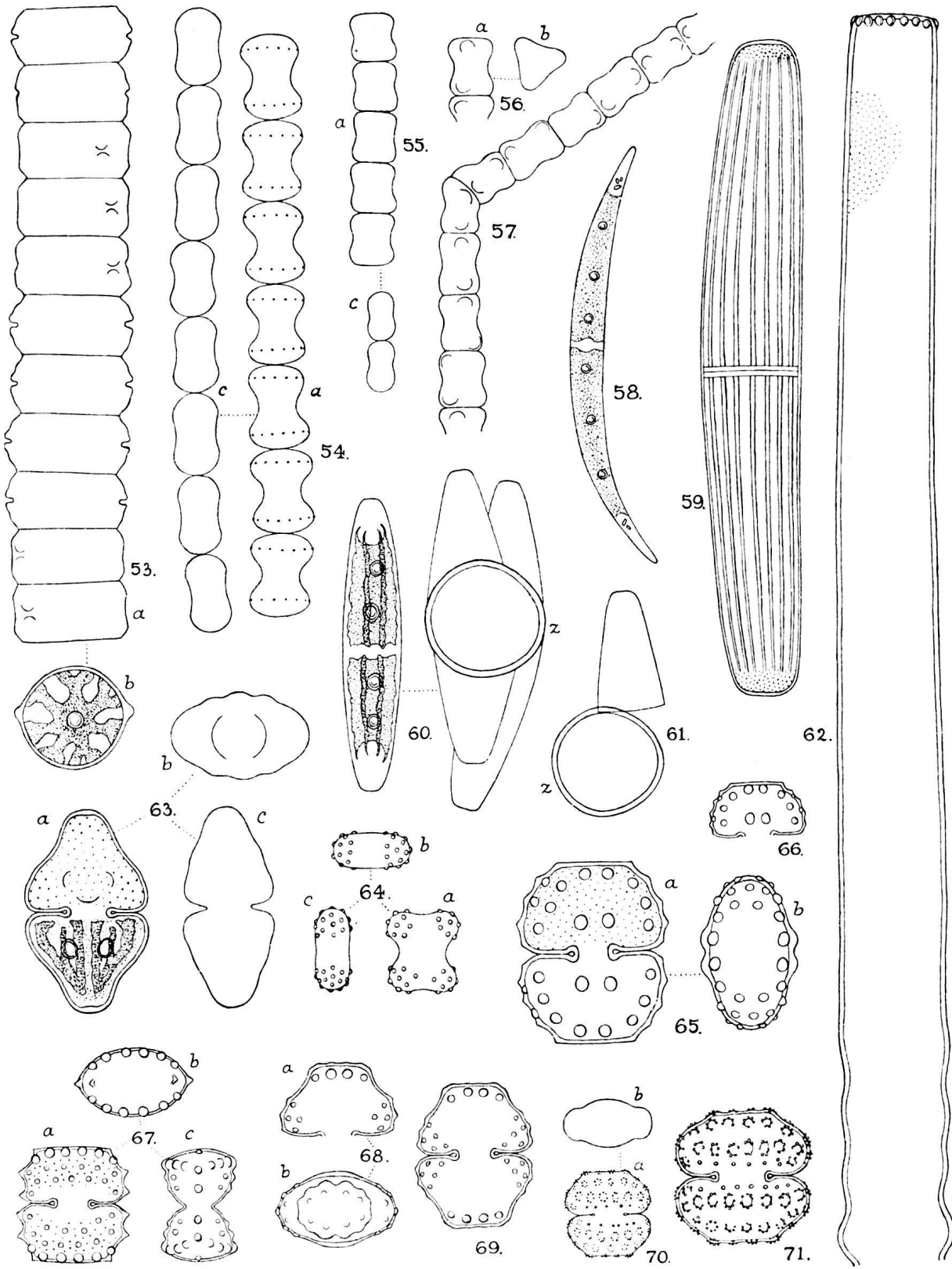


PLANCHE XXIII.



G.S. West ad nat. del.

PLATE XXIII.

- Fig. 53. *Desmidium æquale* W. and G. S. WEST. × 500.
" 54. *Spondylosium ossiculorum* sp. n. × 1000.
" 55. " *tetragonum* W. WEST. × 1000.
" 56-57. " " forma *trigona*. × 1000.
" 58. *Closterium parvulum* NÆG. forma ? × 500.
" 59. " *columbianum* sp. n. × 500.
" 60-61. " *Libellula* FOCKE var. *intermedium* ROY and BISS. × 500.
" 62. *Pleurotaenium eugeneum* (TURN.) W. and G. S. WEST forma. × 500.
" 63. *Cosmarium subæquale* sp. n. × 500.
" 64. " *antioquiense* sp. n. × 1000.
" 65-66. " *distichoides* sp. n. 65, × 850; 66, × 500.
" 67. " *Majori* sp. n. × 500.
" 68-69. " *columbianum* sp. n. × 500.
" 70-71. " *floriferum* sp. n. 70, × 500; 71, × 850.
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