

Family II. Chamaesiphonaceae

Francis Drouet

William A. Daily

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Butler University
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Edited by

J. E. Potzger

The *Butler University Botanical Studies* journal was published by the Botany Department of Butler University, Indianapolis, Indiana, from 1929 to 1964. The scientific journal featured original papers primarily on plant ecology, taxonomy, and microbiology. The papers contain valuable historical studies, especially floristic surveys that document Indiana's vegetation in past decades. Authors were Butler faculty, current and former master's degree students and undergraduates, and other Indiana botanists. The journal was started by Stanley Cain, noted conservation biologist, and edited through most of its years of production by Ray C. Friesner, Butler's first botanist and founder of the department in 1919. The journal was distributed to learned societies and libraries through exchange.

During the years of the journal's publication, the Butler University Botany Department had an active program of research and student training. 201 bachelor's degrees and 75 master's degrees in Botany were conferred during this period. Thirty-five of these graduates went on to earn doctorates at other institutions.

The Botany Department attracted many notable faculty members and students. Distinguished faculty, in addition to Cain and Friesner, included John E. Potzger, a forest ecologist and palynologist, Willard Nelson Clute, co-founder of the American Fern Society, Marion T. Hall, former director of the Morton Arboretum, C. Mervin Palmer, Rex Webster, and John Pelton. Some of the former undergraduate and master's students who made active contributions to the fields of botany and ecology include Dwight W. Billings, Fay Kenoyer Daily, William A. Daily, Rexford Daudenmire, Francis Hueber, Frank McCormick, Scott McCoy, Robert Petty, Potzger, Helene Starcs, and Theodore Sperry. Cain, Daudenmire, Potzger, and Billings served as Presidents of the Ecological Society of America.

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1937 (as *G. aponina* var. *multisplex* in Okada, Alg. Aq. Japon. no. 2, FC). INDONESIA: Lake Obotiel, Kai islands, H. Jensen & O. Hagerup, 1922 (Type of *G. aponina* var. *multisplex* Nyg. in the slide collection of G. Nygaard). WESTERN TIBET: in Kyam Spring, in Chang-chenmo valley north of Pang-gong Tso, G. E. Hutchinson L58, 19 Jul. 1932 (D, DT, FH, L, NY).

FAMILY II. CHAMAESIPHONACEAE

Borzi, N. Giorn. Bot. Ital. 10(3): 298. 1878. *Chamaesiphonaceae* Subfam. *Euchamaesiphonaceae* Hansgirg, Notarisia 3: 588. 1888. —Type genus: *Chamaesiphon* A. Br. & Grun.

Pleurocapsaceae Geider, Beih. z. Bot. Centralbl., II, 41: 238. 1925. *Chamaesiphonaceae* Subfam. *Cystogoneae* Hansgirg, Notarisia 3: 588. 1888. —Type genus: *Pleurocapsa* Thur.

Eniophyalidaceae Geider, Beih. z. Bot. Centralbl., II, 41: 235. 1925. —Type genus: *Eniophyalis* Kütz.

Chlorogloeaceae Geider, Beih. z. Bot. Centralbl., II, 41: 236. 1925. —Type genus: *Chlorogloea* Wille.

Dermocarpaceae Geider, Beih. z. Bot. Centralbl., II, 41: 247. 1925. —Type genus: *Dermocarpa* Crouan fr.

Siphononemataceae Geider, Beih. z. Bot. Centralbl., II, 41: 251. 1925. —Type genus: *Siphononema* Geid.

Xanococcaceae Ercegovic, Bull. Int. Acad. Yougosl. Sci. & Arts, Cl. Sci. & Math., 26: 38. 1932. —Type genus: *Xanococcus* Thur.

Hyellaceae Ercegovic, Bull. Int. Acad. Yougosl. Sci. & Arts, Cl. Sci. Math. & Nat., 26: 38. 1932. —Type genus: *Hyella* Born. & Flah.

Original specimens of the type species of the type genus of the following family have been unavailable for our study:

Scopulonemataceae Ercegovic, Bull. Int. Acad. Yougosl. Sci. & Arts, Cl. Sci. Math. & Nat., 26: 38. 1932. —Type genus: *Scopulonema* Erceg.

Plantae uni—multi-cellulares, aquaticae, microscopicae vel macroscopicae, cellulis primum solitariis basim ad substratum affixis, unaquidque seriatim in cellulas-filias primo inaequales deinde aequales dividente et mox ab aliis cum gelatino vaginale se separante, deinde sursum supra superficiem substrati radiatim in stratum vel pulvinum solidum et deorsum intus substratum in fila ramosa increscentibus; cellulis quibuspiam se amplificare atque interne in paucas vel multas endosporas se dividere potentibus; reproductione a fragmentatione vel ab endosporis.

In this family, the plants, originally unicellular, grow eventually into strata or cushions from which filaments of cells penetrate the substratum. The solitary cells are basally attached to the substratum by a sheath of gelatinous material; cell division proceeds, at right angles to the axis of the cell, in an unequal fashion: the apical daughter cell is as a rule much smaller than the basal daughter cell. The upper part of the sheath is burst open, and the small daughter cell passes out of the mother cell sheath or develops *in situ* within the open sheath. By aggregate growth of these solitary cells and/or by successive equal divisions of the daughter cells in three planes perpendicular to each other, first a stratum, then a cushion (sometimes large and bulbose) of vaguely radial structure is formed. The basal cells of these cushions and strata elongate and grow as uni- or pluriseriate, often branched, filaments downward into the substratum. Any of the solitary cells and any of the cells in the superficial layers of the stratum or cushion may enlarge and divide internally, wholly or in part, into numerous small cells (endospores), each of which is capable of growing as a solitary cell or as an endosporangium. Reproduction takes place also by fragmentation of the cushions. The gelatinous matrix of the cushion often becomes hydrolyzed, and the cells are thus dissociated.

One genus:

Kützing, Phyc. Gener., p. 177. 1843. *Gloeocapsa* Subgenus *Entophysalis* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 69. 1923. —Type species: *Entophysalis granulosa* Kütz.

Hydrococcus Kützing, Linnaea 8: 380. 1833; non Link, 1833. *Chroococcus* Subgenus *Hydrococcus* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 68. 1923. —Type species: *Hydrococcus rivularis* Kütz.

Exococcus Nägeli, Die Neuern Algensyst., p. 170. 1847. —Type species: *E. ovatus* Näg.

Thaumaleocystis Trevisan, Sagg. Monogr. Alg. Coccot., p. 79. 1848. —Type species: *Coccochloris deusta* Menegh.

Dermocarpa Crouan fr., Ann. Sci. Nat. IV. Bot. 9: 70. 1858. —Type species: *D. violacea* Crouan fr.

Chamaesiphon A. Braun & Grunow in Rabenhorst, Fl. Eur. Algar. 2: 148. 1865. *Brachytrix* A. Braun pro synon. in Rabenhorst, loc. cit. 1865. *Chamaesiphon* Sectio *Brachytrix* A. Braun ex Haasg. Prodr. Algenfl. Böhmen 2: 124. 1892. *Chamaesiphon* Subgenus *Brachytrix* A. Braun ex Forti, Syll. Myxophyc., p. 138. 1907. *Chamaesiphon* Sectio *Enchamaesiphon* Geitler, Beih. z. Bot. Centralbl., II, 41: 250. 1925. —Type species: *Chamaesiphon confervicola* A. Br.

Sphaerosiphon Reinsch, Contrib. Algol. & Fungol. 1: 15. 1874. —Type species: *S. cuspidatus* Reinsch.

Placoma Schousboe & Thuret in Bornet & Thuret, Notes Algol. 1: 2. 1876. *Gloeocapsa* Subgenus *Placoma* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 69. 1923. —Type species: *Placoma vesiculosa* Schousboe & Thur.

Xenococcus Thuret in Bornet & Thuret, Notes Algol. 2: 73, 75. 1880. —Type species: *X. Schousboei* Thur.

Sphaerogonium Rosafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-Przyr., 10: 304. 1883. *Chamaesiphon* Sectio *Sphaerogonium* Rosafinski ex Haasg. Prodr. Algenfl. Böhmen 2: 123. 1892. *Chamaesiphon* Subgenus *Sphaerogonium* Haasg. ex Forti, Syll. Myxophyc., p. 136. 1907. —Type species: *Chamaesiphon incrustans* Grun.

Godlewskia Janczewski, Ann. Sci. Nat. VI. Bot. 16: 227. 1883. *Chamaesiphon* Sectio *Godlewskia* Geitler, Beih. z. Bot. Centralbl., II, 41: 250. 1925. —Type species: *Godlewskia aggregata* Jancz.

Pleurocapsa Thuret in Hauck, Meeresalg., p. 515. 1885. —Type species: *P. fuliginosa* Hauck.

Hyella Bornet & Flahault, Journ. de Bot. 2: 163. 1888. —Type species: *H. caespitosa* Born. & Flah.

Cyanoderma Subgenus *Myxoderma* Haasg. Notarisia 3: 588. 1888. —Type species: *Cyanoderma rivulare* Haasg.

Radaisia Sauvageau, Journ. de Bot. 9: 374. 1895. —Type species: *R. Gomontiana* Sauvag.

Chlorogloea Wille, Nyt Mag. Naturvid. 38(1): 5. 1900. *Chroococcus* Subgenus *Chlorogloea* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 68. 1923. —Type species: *Palmella tuberculosa* Haasg.

Hyellococcus Schmidle, Allgem. Bot. Zeitschr. 1905: 64. 1906. —Type species: *H. niger* Schmidle.

Guyatia Schmidle, Allgem. Bot. Zeitschr. 1905: 64. 1906. —Type species: *G. singularis* Schmidle.

Siphononema Geitler, Beih. z. Bot. Centralbl. II, 41: 251. 1925; Arch. f. Protistenk. 51: 332. 1925. —Type species: *Pleurocapsa polonica* Racib.

Gloeocapsopsis Geitler, Beih. z. Bot. Centralbl. II, 41: 229. 1925. —Type species: *Protococcus crepidinum* Thur.

Myxohyella Geitler, Beih. z. Bot. Centralbl., II, 41: 246. 1925. —Type species: *Hyella socialis* Setch. & Gardn.

Nematoradaisia Geitler, Beih. z. Bot. Centralbl., II, 41: 242. 1925. —Type species: *Radaisia laminariae* Setch. & Gardn.

Radasiella Geitler, Beih. z. Bot. Centralbl., II, 41: 242. 1925. *Geitleriella* J. de Toni, Noter. Nomencl. Algol. 8. 1936. —Type species: *Radaisia subimmersa* Setch. & Gardn.

Chroococcopsis Geitler, Arch. f. Protistenk. 51: 342. 1925; Beih. z. Bot. Centralbl., II, 41: 241. 1925; in Pascher, Süßwasserfl. 12: 125. 1925. —Type species: *C. gigonsea* Geitl.

Chamaesiphon Sectio *Brachytrix* Geitler, Beih. z. Bot. Centralbl., II, 41: 250. 1925. —Type species: *Sphaerogonium fuscum* Rosaf.

Chamaesiphonopsis Fritsch, New Phytol. 28: 173. 1929. —Type species: *Xenococcus britannicus* Fritsch.

Cyanodermaium Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 627. 1933. —Type species: *C. gelatinosum* Geitl.

The following generic names have type species for which no original specimens have been available to us:

- Cyanocystis* Borzi, N. Giorn. Bot. Ital. 14: 314. 1882. —Type species: *C. versicolor* Borzi.
Arkenarya Möbius, Ber. Deutsch. Bot. Ges. 5: 1xii. 1887. —Type species: *A. polymorpha* Möb.
Chondrocystis Lemmermann, Abh. Nat. Ver. Bremen 16: 353. 1899. *Gloeo capsia* Subgenus *Chondrocystis* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 69. 1923. —Type species: *Chondrocystis Schauinslandii* Lemm.
Dermocarpella Lemmermann, Engler Bot. Jahrb. 38: 349. 1907. —Type species: *Cbamaesiphon hemisphaericus* Lemm.
Liobocapsa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 82. 1925. —Type species: *L. fasciculata* Erceg.
Liobococcus Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 83. 1925. —Type species: *L. ramosa* Erceg.
Pseudocapsa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 95. 1925. —Type species: *P. dubia* Erceg.
Solenia Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 78. 1927. —Type species: *S. striatosa* Erceg.
Aspalatia Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 81. 1927. —Type species: *A. crassior* Erceg.
Hormathonema Ercegovic, Arch. f. Protistenk. 66: 165. 1929. —Type species: *H. paulocellulare* Erceg.
Dalmatella Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 4: 39. 1929. —Type species: *D. buaensis* Erceg.
Trypanema Ercegovic, Arch. f. Protistenk. 66: 168. 1929. —Type species: *T. endolithicum* Erceg.
Scopulonema Ercegovic, Arch. f. Protistenk. 71: 365. 1930. —Type species: *S. Hansgirgianum* Erceg.
Podocapsa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 33. 1931. —Type species: *P. podicellatum* Erceg.
Brachynema Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 35. 1931. *Ercegovicia* J. de Toni, Noter. Nomencl. Algol. 8. 1936. —Type species: *Brachynema littorale* Erceg.
Epilithia Ercegovic, Rad. Jugoslov. Acad. 244 (Razr. Mat.-Prirod. 75): 141. 1932. —Type species: *E. adriatica* Erceg.

Plantae primo microscopicae aetate proventa macroscopicae, supra et intus substratum increcentes, cellulis solitariis forma diversis; cellulis pulvini sphaericis, ellipticis, cylindraceis, vel polyhedroideis, in seriebus indistincte radialibus vel erectis ordinatis; cellulis filorum intus substratum penetrantium cylindricis, hemisphaericis, sphaericis, ovoideis, vel polyhedroideis; endosporangiis diversiformibus; membrana endosporangii tenue.

All the species of Entophysalis are aquatic in at least relatively permanent bodies of water; none appears to survive long in habitats which dry out periodically. The growth-forms commonly encountered differ with the species: in *E. deusta* and *E. rivularis* the strata and cushions are most often seen; in *E. conferta* the endosporangia are the most generally collected growth-forms; in *E. Lemaniae* and *E. rivularis* the solitary vegetative cells are familiar; in *E. endophytica*, *E. deusta*, *E. conferta*, and *E. rivularis* the penetrating filaments are often found.

Key to species of Entophysalis:

- | | |
|--|--------------------------|
| 1. Marine | 2. |
| 1. Freshwater | 4. |
| 2. On rocks, wood, and shells | 1. <i>E. DEUSTA</i> |
| 2. On larger algae and living animals | 3. |
| 3. Cells 1—2 μ in diameter; plants yellowish in color .. | 2. <i>E. ENDOPHYTICA</i> |
| 3. Cells larger; plants blue-green, violet, or red | 3. <i>E. CONFERTA</i> |

4. On rocks, wood, and shells 4. E. RIVULARIS
 4. On larger plants 5. E. LEMANIAE

1. ENTOPHYSALIS DEUSTA Drouet & Daily, Lloydia 11: 79. 1948. *Coccochloris deusta* Meneghini, Atti 2. Riun. Sci. Ital. Torino 1840: 173. 1841. *Microcystis deusta* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 81. 1843. *Bichatia deusta* Trevisan, Nomencl. Algar. 1: 60. 1845. *Thaumaleocystis deusta* Trevisan, Sagg. Monogr. Alg. Coccot., p. 79. 1848. *Gloeocapsa deusta* Kützing, Sp. Algar., p. 224. 1849. —Type from Genoa, Italy (FI). FIG. 191.

Myrionema crustaceum J. Agardh, Alg. Mar. Medic. & Adriar., p. 32. 1842. *Entophysalis crustacea* Drouet & Daily, Butler Univ. Bot. Stud. 10: 222. 1952. —Type from Brioni island, Istria, Jugoslavia (LD). FIG. 250.

Palmella mediterranea Kützing, Phyc. Gener., p. 171. 1843. *Brachia mediterranea* Trevisan, Sagg. Monogr. Alg. Coccot., p. 58. 1848. *Palmella submarina* Crouan fr., Fl. Finisère, p. 109. 1867. —Type from Naples, Italy (L). FIG. 193.

Entophysalis granulosa Kützing, Phyc. Geuer., p. 177. 1843. *Corynephora granulosa* Kützing pro synonym., loc. cit. 1843. —Type from Split, Jugoslavia (L). FIG. 187.

Protococci crepidinum Thuret, Mém. Soc. Nat. Sci. Nat. Cherbourg 2: 388. 1854.

Pleurococcus crepidinum Rabenhorst, Fl. Eur. Algar. 3: 25. 1868. *Gloeocapsa crepidinum* Thuret in Bornet & Thuret, Notes Algol. 1: 1. 1876. *Chroococcus crepidinum* Hansgirg, Physiol. & Algol. Stud., p. 97. 152. 1887. *Pleurocapsa crepidinum* Ercegovic, Arch. f. Protistenk. 71: 364. 1930. *P. Ercegovicii* J. de Toni, Notes. Nomencl. Algol. 1: 7. 1934. —Type from Cherbourg, France (PC). FIG. 186.

Dermocarpa violacea Crouan fr., Ann. Sci. Nat. IV. Bot. 9: 70. 1858. —Type from Brest, France (PC).

Palmella oceanica Crouan fr., Fl. Finisère, p. 110. 1867; Crouan fr. in Desmazières, Pl. Cryptog. France, ed. 2, no. 535. —Type from near Brest, France (PC). FIG. 190.

Placoma vesiculosa Schousboe & Thuret in Bornet & Thuret, Notes Algol. 1: 2. 1876. —Type from Tangier (FC).

Pleurocapsa juliginosa Hauck, Meeresalg. Deutschl. & Oesterr., p. 515. 1885. —Type from Trieste (L). FIG. 189.

Hyella caespitosa Bornet & Flahault, Journ. de Bot. 2: 163. 1888. —Type from Le Croisic, France (PC).

Xenococcus concharum Hansgirg, Oesterr. Bot. Zeitschr. 39: 5. 1899. —Type from Zadar, Jugoslavia (W). FIG. 192.

Pleurocapsa fluviatilis var. *subsalsa* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 18. 1890. *Oncobyrsa rivularis* var. *subsalsa* Hansgirg ex Forti, Syll. Myxophyc., p. 115. 1907. —Type from near Parenzo, Istria, Jugoslavia (W). FIG. 188.

Aphanocapsa concharum Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 19. 1890. —Type from Pola, Jugoslavia (W). FIG. 247.

Hyella caespitosa var. *spirorbicola* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 226. 1892. —Type from Ragusa, Jugoslavia (W).

Aphanocapsa litoralis Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 229. 1892. —Type from Pola, Jugoslavia (W). FIG. 248.

Aphanocapsa litoralis var. *macrococca* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 229. 1892. —Type from Pirano, Trieste (W).

Chroococcus atrohalybens Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 230. 1892. —Type from Orsera, Istria, Jugoslavia (W). FIG. 194.

Hyella caespitosa var. *nitida* Barrens, Journ. of Bot. 34: 385. 1896. —Type from Plymouth, England (BM).

Pleurocapsa crepidinum Collins, Rhodora 3: 136. 1901. —Type from Magnolia, Massachusetts (FH).

Hyella Balanii Lehmann, Nyt Mag. Naturvid. 41: 85. 1903. —Topotypes and paratypes from near Aalesuod, Norway (D, FC, L, NY, WU). FIG. 185.

Entophysalis violacea Weber-van Bosse, Siboga Exped., Liste des Algues 1: 7. 1913. —Type from Solor island, Indonesia (L).

Pleurocapsa magna Weber-van Bosse, Siboga Exped., Liste des Algues 1: 9. 1913. —Type from Solor, Indonesia (L).

Hyella Litorinae Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 441. 1918. —Type from Carmel, California (UC).

Placoma violacea Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 456. 1918. —Type from Neah bay, Washington (UC).

Plourocapsa entophysaloides Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 463. 1918. —Type from Carmel bay, California (UC).

Plourocapsa gloocapsoides Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 465. 1918.

Gloocapsa gloocapsoides Geitler ex J. de Toni, Diagn. Alg. Nov., I. Myxophyc. 2: 135. 1937. —Type from Alameda, California (UC).

Gloocapsa bahamensis Collins in Britton & Millspaugh, Bahama Fl., p. 619. 1920. —Type from Mariguana, Bahama islands (NY).

Entophysalis violacea Collins, in Britton & Millspaugh, Bahama Fl., p. 619. 1920. *E. Collinsii* J. de Toni, Nover. Nomencl. Algol. 1: 6. 1934. —Type from Arwood cay, Bahama islands (NY).

Polycystis clarionensis Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 66. 1937.

Microcystis clarionensis J. de Toni, Diagn. Algar. Nov., I. Myxophyc. 5: 494. 1938. —Type from Clarion island, Revilla Gigedo islands, Mexico (CAS).

Dormocarpa sphaerica var. *galapagensis* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 67. 1937. —Type from Narborough island, Galapagos islands (CAS).

Chroococcus calcicola Anand, Journ. of Bot. 1937 (Suppl. 2): 37. 1937. —Type from Westgate, England (in collection of F. E. Fritsch). FIG. 249.

Myxohyella seriata Hollenberg, Bull. Torr. Bot. Club 66: 489. 1939. —Type from San Pedro, California (in the herbarium of G. J. Hollenberg).

Entophysalis marginalis Hollenberg, Bull. Torr. Bot. Club 66: 490. 1939. —Type from San Pedro, California (in the herbarium of G. J. Hollenberg).

Microcystis splendens Hollenberg, Bull. Torr. Bot. Club 66: 493. 1939. —Type from culture at La Verne, California (in the herbarium of G. J. Hollenberg).

Microcystis ovalis Hollenberg, Bull. Torr. Bot. Club 66: 493. 1939. —Type from culture in La Verne, California (in the herbarium of G. J. Hollenberg).

Plourocapsa Deceyvi Drouot, Field Mus. Bot. Ser. 20: 126. 1942. —Type from Willacy county, Texas (PC).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Haematococcus dalmaticus Zanardini, Sagg. di Class. d. Ficee, p. 64. 1843. *Protosphaeria dalmatica* Trevisan, Sagg. Monogr. Alg. Coccot., p. 28. 1848.

Protococcus glaucus Crouan fr., Fl. Finistère, p. 109. 1867. *Plourococcus glaucus* Crouan fr. ex de Toni, Syll. Algar. 2: 692. 1889.

Palmella crustacea Zanardini, N. Giorn. Bot. Ital. 10: 40. 1878.

Hyella volucicola Chodat, Bull. Herb. Boissier, ser. 1, 5: 716. 1897.

Chondrocystis Schauinslandii Lemmermann, Abh. Nat. Ver. Bremen 16: 353. 1899.

Aphanocapsa littoralis var. *naamsi* Wille in Hansen, Ergebn. Plankton-Exped. Humboldt-Stift. 4Mf, Schizopyceen, p. 47. 1904.

Solenita stratosa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 78. 1927.

Solenita intricata Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 80. 1927.

Aspalatia crassior Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 81. 1927. *A. crassa* Ercegovic ex J. de Toni, Diagn. Algar. Nov. I. Myxophyc. 4: 351. 1938.

Aspalatia tenuior Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 82. 1927.

Dalmatella buensis Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 4: 39. 1929.

Hormatbonema paulocellulare Ercegovic, Arch. f. Protistenk. 66: 165. 1929.

Trypanonema ondoliticum Ercegovic, Arch. f. Protistenk. 66: 168. 1929.

Scopulonema Hanjirgijunum Ercegovic, Arch. f. Protistenk. 71: 365. 1930.

Hormatbonema luteo-brunneum Ercegovic, Arch. f. Protistenk. 71: 372. 1930.

Hormatbonema violaceo-nigrum Ercegovic, Arch. f. Protistenk. 71: 372. 1930.

Solenita foveolarum Ercegovic, Arch. f. Protistenk. 71: 374. 1930.

Podocapsa pedicellatum Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 33. 1931.

Brachynema littorale Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 35. 1931.

Synechococcus marinus Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 138. 1932.

Chroococcus membraninus var. *salinus* Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 138. 1932.

Entophysalis major Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 139. 1932.

Plourocapsa fissuratum Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 140. 1932.

Epilithia adriatica Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 141. 1932.

Scopulonema mucosum Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 144. 1943.

Scopulonema Hanjirgijunum f. *roseum* Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 144. 1932.

Scopulonema brevissimum Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 145. 1932.

Hyella dalmatica Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 147. 1932.

Hyella tenuior Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 147. 1932.

Dalmatella polyformis Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 149. 1932.

- Dalmatella violacea* Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 150. 1932.
Dalmatella anomala Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 151. 1932.
Dalmatella lioralis Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 151. 1932.
Solenia achromatica Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 153. 1932.
Hormathonema sphaericum Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 155. 1932.
Hormathonema longicellulare Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 155. 1932.
Hormathonema epilithicum Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 155. 1932.
Plonocapsa minus Geitler, Rabenh. Krypt.-Pl. 14: 355. 1932. *Scopulonema minus* Geider in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb: 93. 1942.
Aphanocapsa Roberti-Lamii Frémy, Mém. Soc. Nat. Sci. Nat. & Math. Cherbourg 41: 16. 1934.
Aphanocapsa endolithica var. *marina* Frémy, Mém. Soc. Nat. Sci. Nat. & Math. Cherbourg 41: 17. 1914.
Myxosarcina salina Frémy in J. de Toni, Diagn. Algar. Nov. I, Myxophyc. 8: 702. 1946.
Nematoradaiisia gastropodum Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 438. 1947.
Algalasia andaloussica Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 438. 1947.
Xenococcus gaditanus Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 438. 1947.
Dermocarpa gaditana Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 442. 1947.

Plantae in stratum aut pulvinum microscopicum vel macroscopicum aerugineum, olivaceum, violaceum, roseum, brunneum, vel nigrum, firmum vel molle vel dissolvens increscentes, cellulis solitariis sphaericis, ovoideis, vel pyriformibus, diametro ad 10μ crassis; cellulis pulvini sphaeroideis, post divisiones praecipue polyhedroideis, diametro (1—)3— 6μ crassis; cellulis filorum intus substratum penetrantium ovoideis, sphaericis, cylindraceis, vel polyhedroideis, vulgo uniseriatis interdum multiseriatis, diametro (1—)2— 15μ crassis; endosporangiis sphaericis vel ovoideis, diametro ad 30μ crassis; gelatino vaginale primum hyalino demum lutescente vel raro rubrescente vel coerulescente, homoganeo vel lamelloso; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, vulgo homoganeo. FIGS. 185—194, 247—250.

Intertidal or below low tide mark on marine rocks, shells, wood, and soil, and on similar substrata in brackish water. If the substratum has been transported to a freshwater habitat, apparently this alga persists for a considerable period. The stratum or cushion type of growth-form, often with well developed filaments penetrating the substratum, is most usually encountered in *Entophysis deusta*. On limestone and shells, a profusion of basal filaments is formed; whereas on igneous rocks and wood, these structures are either not produced or are restricted to elongated cells at the base of the stratum or cushion. Where the species persists after being introduced into freshwater habitats, the plants often simulate *Anacystis montana*. Strata on intertidal soil may sometimes appear very similar to those of *Coccochloris stagnina*. Below low tide level and in tide pools and brackish ponds, the gelatinous matrix of the upper layers of the stratum or cushion may hydrolyze, and the cells may appear very much like those of *Anacystis aeruginosa*. Fragments of the stratum or cushion may be mistaken as plants of *Anacystis dimidiata*, *A. thermalis*, *A. montana*, or *Palmogloea protuberans* (Sm. & Sow.) Kütz.

Fungi are often found parasitizing the cells; and according to Bornet & Thuret, Notes Algol. 1: 2 (1876), species of *Verrucaria* result from such parasitization.

Specimens examined:

NORWAY: Tromsø, *M. Foslie*, 10 Jun. 1887 (PC); in conchis Balanorum, Sliningen prope Aalesund, *N. Wille* (topotype and paratype of *Hyella Balanii* Lehm. in Mus. Viendob. Krypt. Exs. no. 2050, D (Fig. 185), FC, L, NY, WU). SWEDEN: Graen, Landskrona, Scania, *O. Nordstedt*, 1879

(D, S). DENMARK: in herb. Lyngbye (C). ROMANIA: apud Constanta, ad scopulos Ponti Euxiai, E. C. Teodorescu 485, Apr. 1897 (W). JUGOSLAVIA: Istria: insula Brioni, *Biarolito* (Type of *Myrionema crustaceum* J. Ag., LD [Fig. 250]); Fasana bei Pola, A. Hansgirg, Apr. 1889 (FC, W); Lussin, Hansgirg, Aug. 1888 (FC, W); auf Patella u. al. Schalen an der Fluggrenze selten bei Orsera, Hansgirg, Apr. 1889 (Type of *Chroococcus atrocalybeus* Hansg., W; isotype, FC [Fig. 194]); auf Steinen in einem Bache, welcher in adriatisches Meer fließt und angezartes Wasser führt, zwischen Parenzo und Orsera, Hansgirg, Apr. 1889 (Type of *Pleurocapta flavitilis* var. *subialis* Hansg., W; isotype, FC [Fig. 188]); im adriatischen Meere, Umgebung von Pola, Hansgirg, Apr. 1889 (Type of *Aphanocapsa conchavum* Hansg., W; isotype, FC [Fig. 247]); auf unreinen Molosteinen zwischen Flur- und Ebberspiegel bei Pola, Hansgirg, Apr. 1888 (Type of *A. littoralis* Hansg., W; isotype, FC [Fig. 248]); Pola, Hansgirg, Apr. 1889 (FC, W); Rovigno, Hansgirg, Apr. 1889 (FC, W); Volosca, Hansgirg, Aug. 1885 (FC, W). Croatia: Piume, Hansgirg, Aug. 1885 (FC, W). Dalmaña: Castelnuovo, Cannosa prope Ragusa, Gravosa prope Ragusa, Hansgirg, 1891 (FC, W); op kleine kalkrotsen, Promaina, noord van Makarska, J. J. ter Pelkwijk, 21 Jul. 1939 (FC, L); an Spirorbis-Schalen bei Ragusa, Hansgirg, 1891 (Type of *Hyella caespitosa* var. *spirorbicola* Hansg., W; isotype, FC); ad rupes maritimas prope Spalacum, F. T. Kützing, 1835 (Type of *Entophyalis granulosa* Kütz., L [Fig. 187]; isotype, PC); Spalato, Hansgirg, Aug. 1889 (FC, W); Sragno Piccolo, Hansgirg, 1891 (FC, W); Zara, Hansgirg (PC); am Meeresufer bei Zara, Hansgirg, Aug. 1888 (Type of *Xenococcus conchavum* Hansg., W; isotype, FC [Fig. 192]). TRIESTE: ad Miramar prope Triest, F. Hauck, Sept. 1878 (as *Entophyalis granulosa* in Witt., & Nordst., Alg. Exs. no. 294, FC, L, MIN); Muggia, Hauck, 19 Mar. 1879 (L, PC), 2 Oct. 1887 (DT, FH; as *E. granulosa* in Hauck & Richt., Phyk. Univ. no. 241b, L, MIN, PC); auf unreinen Molosteinen bei Pirano, Hansgirg, Apr. 1889 (Type of *Aphanocapsa littoralis* var. *macrococa* Hansg., W; isotype, FC); Servola, Hauck, Mar. 1883 (L; as *Entophyalis granulosa* in Hauck & Richt., Phyk. Univ. no. 241a, L, MIN, PC); St. Andrea, Hansgirg, 1891 (FC, W); salinae ad Srogniano, Hansgirg, Apr. 1889 (FC, W); Triest, Hauck (Type of *Pleurocapta fuliginosa* Hauck, L [Fig. 189]; isotype, UC).

ITALY: Genova, Meneghini (Type of *Coccolithis densa* Menegh., FI; isotypes, L [Fig. 191], FC, UC); Mergellina bij Napels, J. T. Koester 205, Apr. 1939 (L); Principia di Posilippo, Koester 281, May 1939 (L); Neapel, F. T. Kützing (Type of *Palmella mediterranea* Kütz., L [Fig. 193]; isotype, UC). NETHERLANDS: zeedijk van Morsele, Zuid Beveland, C. Brakman 64, Jan. 1941 (L); Ymuiden, A. Weber-van Boisse 1228, Sept. 1893 (L); Sloedam, Brakman 63, Sept. 1940 (L); zeedijk, Walcheren, Brakman 62, Feb. 1941 (L); Zuid-Sloe, Walcheren, Brakman 343a, May 1942 (L); Vlieland, Weber-van Boisse, May 1891 (L). BRITISH ISLES: Plymouth, E. A. Batters, Feb. 1896 (Type of *Hyella caespitosa* var. *nitida* Batt., in the slide collection, BM); chalk cliffs at Westgate, Anand, Dec. 1935 (Type of *Chroococcus calcicola* Anand in the collection of F. E. Fritsch; isotype, D [Fig. 249]); Point of Ayr, Flintshire, Batters, 20 Jul. 1886 (PC). FRANCE: Alpes Maritimes: Antibes, baie de l'Olivette, E. Bornet, 1 Mar. 1872, 23 Dec. 1875 (PC), Plage des Mielles, Bornet, 17 Jan. 1872 (PC), ad rupes maritimas, Bornet, 2 & 5 Mar. 1872 (FH, L, UC), & lapides submersas in limite maris, Bornet, Dec. 1875 (as *Entophyalis granulosa* in Witt., Nordst., & Lagerh., Alg. Exs. no. 1200, L, MIN, S); in testis Balanorum ad Trayas, G. Lagerheim, Feb. 1893 (as *Hyella caespitosa* in Witt., Nordst., & Lagerh., Alg. Exs. no. 1199, L, WU); Basses Pyrénées: Biarritz, Bornet & G. Thuret, 19 Jun. 1868 (FC, L, PC), 19 Jul. 1870 (FC, FH, NY, PC), Jul. 1870 (as *Placoma vesiculosa* in Lloyd, Alg. de l'Ouest de Fr. no. 461, FC), 5 Jun. 1870 (FC); à Guethary, C. Sauvageau, Jul.-Aug. 1896 (PH, NY); Saur Jean de Luz, Jetée Sainte Barbe, J. Feldmann (as *P. vesiculosa* in Hamel, Alg. de Fr. no. 1, MICH). Calvados: Arromanches (DT), Lebel 431 (L). Finistère: sur des fragments de faïence dans le rade de Brest, Crouan (Type of *Dermocarpa violacea* Crouan fr., PC); sur les bords de la rivière marine de Penfield près Brest, Crouan (Type of *Palmella oceanica* Crouan fr., PC [Fig. 190]; isotype in Desmaz., Pl. Cryptog. Fr., ed. 2, no. 535, UC), 3 Nov. 1855 (FC); Brest, Le Dantec, 1888 (PC); Roscoff, G. Thuret, Oct. 1887 (PC). Hérault: Port de Cette, C. Flabault, Jun. 1882 (FH, S), 25 Dec. 1887 (PC), Flabault 163, 13 Jan. 1882 (PC). Ille et Vilaine: au quai de la plage des bains, St. Malo, Bornet, 19 Jun. 1972 (PC). Loire Inférieure: Le Crisic, Bornet, Sept. 1887 (Type of *Hyella caespitosa* Born. & Flab., PC; isotype, LD). Manche: Cherbourg, herb. Lebel no. 636 (FC); Cherbourg, sur les murs des quais, G. Thuret, 2 May 1854 (Type of *Protococcus crepidinum* Thur., PC; isotypes, FC, FH, L [Fig. 186]), and as *Gloeoopsis crepidinum* in Witt., & Nordst., Alg. Exs. no. 1100, L, S; as *Protococcus crepidinum* in Rabenh. Alg. no. 2032, FC, FH, L, PC, UC; as *P. crepidinum* in Le Jolis, Alg. Mar. de Cherbourg no. 16, L, PC); Cherbourg, A. Le Jolis 449 (L, NY), 589 (L), 1561 (L), 1562 (DT, FH), 1563 (FH, L), May 1850—59.

SPAIN: San Vicente de la Barquera, C. Sauvageau, Sept. 1896 (PC). PORTUGAL: cultures from Serubal, L. G. M. Baas Becking, Sept. 1937 (L). TUNISIA: core à Monastir, M. Serpente T6, Mar. 1947 (D). TANGIER: Tingi, P. K. A. Schousboe, Mar. 1827 (Type of *Placoma vesiculosa* Schousb. & Thur., PC; isotype, C); Algah et Dar Hamra prope Tanger, Schousboe, Mar., Dec. 1827 (PC, S). SIERRA LEONE: marine, Goderich, Freetown, G. W. Lawson A628, 6 Jul. 1953 (FC). GOLD COAST: Testie, Lawson A339, 29 Jan. 1952 (FC); Sekondi, Lawson A447, 15 Dec. 1952 (D); Accra Beach, Lawson A553, 13 Mar. 1953 (FC). BELGIAN CONGO: crusts in salt water, J. J. Symoons 430 (FC). CAPE OF GOOD HOPE: Knysna, A. Weber-van Boisse, 1894-95 (FC, L);

Mossel bay, *W. A. Seitchell*, 12 May 1927 (FC, UC); on rocks, Muizenberg, *Seitchell*, 19 May 1927 (FC, UC). BERMUDA: intertidal, Castle island, *T. A. & A. Stephenson BRCA6, BRCA7*, 22 Jul. 1952 (FC); on limestone and concrete, west end of the Causeway between St. Davids and Hamilton islands, *A. J. Bernalowicz 50-528*, 27 Dec. 1950 (FC); Cobblers' island, *Stephenson BRCl3*, 4 Jul. 1952 (FC); Gibbet island, *Stephenson BRG3*, 6 Jul. 1952 (FC); crusts in pools, Gravelly bay, Hamilton island, *Bernalowicz 49-1584*, 5 May 1949 (FC); North Rock, *Stephenson BRN7*, 7-8 Jul. 1952 (FC); Smichs island, *Stephenson BR52*, 7 Aug. 1952 (FC); Whalebone bay, St. Georges island, *Bernalowicz 49-91*, *W. R. Taylor & Bernalowicz 49-95*, 26 Feb. 1949 (FC), *Stephenson BRW5a,c,d*, 12 Jul. 1952 (FC). NOVA SCOTIA: on littoral rocks, Peggy's Cove, Halifax county, *T. A. & A. Stephenson NSPlA*, Jul.—Sept. 1948 (FC); in tidepool and on shells, *R. A. Lewis*, 3 Oct. 1952, Jul. 1953 (FC). MAINE: Eastport, *W. G. Farrow* (FC, FH, L, NY, PC); on shell, South Harpswell, *P. S. Collins 4704*, Jul. 1903 (NY); Harpswell, *Collins 4813* (NY); in tidepool, Center, *Collins*, Jul. 1892 (FH); Cutler, *Collins 4350*, Jul. 1902 (UC); Portland, *Collins 3*, Jul. 1881 (FH); Seal cove, Mount Desert island, *W. R. Taylor*, Sept. 1920 (TA); on Spirorbis, Spectacle island, *Collins* (PH); in dead shells, Spectacle island, *Collins*, Jul. 1894 (as *Hyella caespitosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 302, L, TA, WU); Eagle island, Penobscot bay, *Collins*, Jul. 1892 (as *Chroococcus cobarens* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 701, FC, FH, L, NY, TA), Jul. 1896 (as *Gloeocephala crepidinum* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 351, FC, D, L, NY, TA), *Collins 701* (PH), 2137, 2138 (NY), 2139 (NY, UC), Jul. 1891; Cape Rosier, *Collins 1132, 2442* (PH, NY), 2695 (NY), *Collins*, Jul. 1894 (as *Entophysalis granulosa* in Coll., N. Amer. Alg. no. 1, NY), Jul. 1895 (as *E. granulosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 152a, FC, FH, L, NY, TA), Jul. 1896 (as *Polycystis elabens* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1101, FC, FH, NY, TA), 14 Jul. 1898 (as *Chroococcus minutus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 951, FC, D, L, MICH).

MASSACHUSETTS: Lackey's bay, Elizabeth islands, *W. R. Taylor*, Jul. 1938 (TA); in shells, Black Rock, Fairhaven, *Taylor*, 27 Jul. 1938 (FC, TA); Sconcut Neck, Fairhaven, *Taylor*, Jul. 1941 (TA); on rocks, Quisset Harbor, Falmouth, *F. Drouet 1919*, 17 Aug. 1936 (D); in pools between Chaster pond and Vineyard sound, Falmouth, *Drouet 2187*, 8 Sept. 1937 (D, FH, NY, S, UC); Gloucester, *W. G. Farrow* (FH, L, NY, S); as *Gloeocephala crepidinum* in Farrow, Anders., & Eat., Alg. Exs. Amer. Bor. no. 180, FC, NY, PC, UC); Kettle island, Magnolia, *Farrow*, Sept. 1903 (FH, WU); on Balanus and rocks near exit of drain pipe, Magnolia Point, *Farrow*, Sept. 1903 (Type of *Pleurocapsa crepidinum* Coll., FH; isotypes, FC, PC, and in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1157, FC, FH, L, TA, WU); Marblehead, *Collins*, 17 Jun. 1902 (FC, UC); on rock in marsh pool, *Collins*, Sept. 1902 (NY, UC); Medford, *Collins*, May 1887 (NY); Kettle cove, Naushon island, *I. F. Lewis*, Aug. 1921 (TA); in shells, Meganset Beach, North Falmouth, *Taylor*, 21 Jul. 1931 (FC, L, TA); Penikese island, Gosnold, *M. S. Doy et al. 7018, 7283-7285, 7295*, Jul.—Sept. 1947, *Taylor et al. 7273, 7279, 7300, 3 Aug. 1947* (FC); in marsh pool, Point of Pines, Revere Beach, *Collins 4661*, 8 May 1904 (FC, UC); Rockport, *Collins 1525*, Apr. 1890 (NY); Bakers island, Salem, *Collins 1865*, Jul. 1890 (NY); on bridge over ditch, Wellington, *Collins 1894* (FC, UC). RHODE ISLAND: on rocks, Grove point, Block island, *Dronoi 3658*, 13 Jul. 1941 (FC); bottom of pool, Bateman's beach, Newport, *Farrow*, Jul. 1878 (FH); Silver Spring, *Collins 5404*, Apr. 1906 (NY); rocks, Newport, *Collins*, Jun. 1883 (NY, UC), *Collins 4495* (FC, NY, UC), 4497, 4498 (FC, UC), May 1904.

CONNECTICUT: on stones and woodwork, Bridgeport, *I. Holden 906, 907*, 25 Dec. 1893 (C; as *Pleurocapsa juliginosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 101a,b, FC, L, TA, WU), *Holden 596*, May 1892 (FH, NY), *Holden 968*, Aug. 1894 (UC); Seaside park, Bridgeport, *Holden 766* (NY, UC), 770 (UC), 773 (NY, UC), 778 (NY), Nov. Dec. 1892, *Seitchell 733*, 22 Oct. 1893 (FC, UC); Middle Ground light, Bridgeport, *Holden*, Sept. 1890 (FH); Fairfield, *L. N. Johnson 1022*, 30 Aug. 1893 (FC); on shells, Ram island, *Seitchell 711*, 13 Sept. 1893 (FC, UC); Stratford, *Johnson*, Aug. 1893 (FH); on stones, Fresh pond, Stratford, *Holden 709*, Sept. 1892 (FH), *Holden 870* (FH), *Holden 1132*, 11 Aug. 1895 (FH; as *Entophysalis granulosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 152b, FC, D, L, TA). NEW JERSEY: Atlantic City, *S. R. Morris*, Apr. 1888 (NY, PC), Jun. 1888 (L), *Collins*, Spring 1891 (FC, UC), *Collins 2088-2091*, May 1891 (NY); beach on Delaware bay, Cape May point, *W. R. Taylor*, Apr. 1922 (TA). DELAWARE: on wooden jetty near Hotel Henlopen, Rehoboth Beach, *Drouet & H. B. Louderback 8562*, 24 Aug. 1948 (FC). MARYLAND: on hardened soil, shore of Tangier sound near Prickly point, Fairmont, *Drouet & P. W. Wolle 3642*, 23 Jul. 1940 (FC); on mud, Wenona, Somerset county, *Wolle & Drouet 2275*, 22 Aug. 1938 (D); in Patuxent river, Solomons Island, *Drouet, E. P. Killip, & P. R. Fosberg 3995, 3995a*, 26 Jul. 1941 (FC, US); salt marsh flat, Chesapeake Beach, Calvert county, *E. C. Leonard 18741*, 17 Aug. 1939 (FC, US). VIRGINIA: York river at Yorktown, *J. C. Strickland 1218*, 22 Jul. 1942 (FC, ST), *H. J. Humm*, 2 Mar. 1948 (FC). NORTH CAROLINA: on wooden breakwater, Wrightsville Beach, New Hanover county, *H. J. Humm C*, 24 May 1946 (FC); near Beaufort, *T. A. & A. Stephenson BM(S)11, BSBB*, Apr.—May 1947 (FC, UC); Shackleford breakwater, Beaufort, *C. S. Nielsen & Humm 1645*, 6 Aug. 1949 (FC, T); beach near Duke University Laboratory pier, Beaufort, *Humm*, 15 Jan. 1949 (FC); on shells, Pivers island,

Beaufort, H. L. *Blomquist* 13697, 26 Jun. 1945 (FC); breakwater, Bogue sound north of Fort Macon, Beaufort, *Humm*, 28 Apr. 1947 (FC); Harkers Island, Carteret county, *Blomquist* 13702, 25 Aug. 1935 (FC), *Humm* & *Nielsen* 1728, 10 Aug. 1949 (FC, T). GEORGIA: salt creeks, Darien, H. W. *Ravenel* 308 (PC).

FLORIDA: Bay county: St. Andrews bay, Cove Hotel, Panama City, *Drouet* & *Nielsen* 11626, 30 Jan. 1949 (FC, T); St. Andrews bay at Hathaway bridge west of Panama City, *Drouet* & *Nielsen* 10927, 15 Jan. 1949 (FC, T). G. C. *Madsen*, A. L. *Pates*, M. N. *Hood*, & L. *Elias* 1941, 11 Sept. 1949 (FC, T). Broward county: in the Intracoastal waterway, Dania Beach, *Drouet* & H. B. *Louderback* 10265, 28 Dec. 1948 (FC); in mangrove swamp south of South lake, Hollywood, *Drouet* 10306, 10311, 29 Dec. 1948 (FC). Collier county: Marco Island, P. C. *Standley* 92803, 92818, 92820, 92822, 92823, 92840, 14 Mar. 1946 (FC). Dade county: Coconut Grove, Soldier's key, and Cape Florida, R. *Thaxter*, 1897 (FH); Biscayne bay, Cuder, H. J. *Humm*, 10 & 13 Jan. 1946 (FC); on coral among mangroves, Miami, M. A. *Howe* 2794, Mar. 1904 (D, NY). Duval county: jetty of St. Johns river mouth and pier 2 miles south, *Humm*, 19 Mar. 1948 (FC). Escambia county: on shells in Pensacola bay north of the bridge on U. S. highway 98, Pensacola, *Drouet*, *Nielsen*, *Madsen*, D. *Crowson*, & *Pater* 10619a, 8 Jan. 1949 (FC, T). Franklin county: on the west side of East point, southwest of Eastpoint, *Drouet* & *Nielsen* 11668, 31 Jan. 1949 (FC, T), *Madsen*, *Pates*, *Hood*, & *Elias* 1951, 11 Sept. 1949 (FC, T); shore west of Apalachicola, *Drouet* & *Nielsen* 11655, 31 Jan. 1949 (FC, T); docks in New river, Carrabelle, *Drouet* & *Nielsen* 10968, 16 Jan. 1949 (FC, T); at the mouth of New river, Carrabelle, *Drouet* & *Nielsen* 11674, 31 Jan. 1949 (FC, T); shore in southeast part of Apalachicola, *Drouet* & *Nielsen* 11001b, 16 Jan. 1949 (FC, T); north shore of St. Vincent sound about 10 miles west of Apalachicola, *Drouet* & *Nielsen* 10973, 16 Jan. 1949 (FC, T). Gulf county: shore in the municipal park, Fort St. Joe, *Drouet* & *Nielsen* 10946a, 15 Jan. 1949 (FC, T). Lee county: Bonita Beach, *Standley* 92797, 10 Mar. 1946 (FC). Levy county: on shell, Cedar keys, M. A. *Brannon* 301, 6 Jun. 1945 (FC, PC); Way key, Cedar keys, *Drouet* & *Nielsen* 11105, 11118, 11147a, 11153, 11158a, 11164, 11177, 11193, 22 Jan. 1949 (FC, T). Moore county: saline flats, Big Pine key, E. P. *Killip* & J. P. *Macbride*, Apr. 1951 (FC), *Killip* 41765, 41810, 41838, 41950, Jan.—Feb. 1952 (FC, US); plaster on stairway, Fort Jefferson, Garden key, Dry Tortugas, W. R. *Taylor* 318, 21 Jul. 1924 (FC, TA); corals and conch shells, Loggerhead and Garden keys, Dry Tortugas, *Taylor* 505, 1061, Jun. 1924, 1925 (TA); beachrock, west side of Loggerhead key, R. N. *Ginsburg* 501, Apr. 1952 (FC); Key Largo and North Key Largo, *Ginsburg* LSJ—3, 1952 (FC); Largo sound, L. B. *Isham* 26, Nov. 1952 (FC); in brackish pond, Key West, M. A. *Howe* 1736, 14 Nov. 1902 (D); Plantation key, T. A. & A. *Stephenson* PK11A, Jan.—Mar. 1947 (FC, UC); Saddlebunch keys, J. A. *Seyenmark* 63207b, 63208a, 11 Mar. 1946 (FC); Soldier key, *Stephenson* SK111C, SK111Ca, Jan.—Mar. 1947 (FC, UC); Teatable key, *Isham* 24, 1952 (FC); brackish pond, Key Vaca near Marathon, *Ginsburg* NM1, NM2, Apr. 1952 (FC). Okaloosa county: in Choctawhatchee bay at east end of Santa Rosa island, *Drouet*, *Nielsen*, *Madsen*, *Crowson*, & *Pater* 10637, 9 Jan. 1949 (FC, T); in Santa Rosa sound, Fort Walton, *Drouet*, *Nielsen*, *Madsen*, *Crowson*, & *Pater* 10655a, 9 Jan. 1949 (FC, T). Palm Beach county: in Lake Worth, West Palm Beach, *Drouet* & *Louderback* 10193, 10196a, 10197, 23 Dec. 1948 (FC); in Lake Worth, Palm Beach, *Drouet* & *Louderback* 10219, 24 Dec. 1948 (FC). St. Johns county: bay between Fort Marion and bridge in St. Augustine, *Madsen*, *Pater*, & S. *Parker* 2035, 2036a, 2 Jan. 1950 (FC, T); beach, northeast side of Anastasia island, *Madsen*, *Pater*, & M. E. *Thomas* 2043, 2 Jan. 1950 (FC, T). Taylor county: shore of Steinhatchee river, Steinhatchee, *Drouet* & *Nielsen* 11231, 23 Jan. 1949 (FC, T). Volusia county: in shells, Mosquito inlet, New Smyrna beach, *Humm* 9, 28 Feb. 1946 (FC); Marineland, Daytona Beach, T. A. & A. *Stephenson* M1B, 20—29 Mar. 1947 (FC). Wakulla county: jetty, St. Marks lighthouse, *Nielsen* & *Crowson*, May 1949 (FC, T); Live Oak point, *Nielsen*, R. W. *Hanks*, & H. *Kurz*, 16 Jan. 1953 (FC, T), G. *Grice*, 10 Oct. 1953 (FC, T).

ALABAMA: on pilings in Mobile Bay, Point Clear, Baldwin county, *Drouet* & *Louderback* 10162, 20 Dec. 1948 (FC). MISSISSIPPI: shore of Mississippi sound between Bay St. Louis and Waveland, *Drouet* 9809, 9813, 9821a, 8 Dec. 1948 (FC); shore west of the lighthouse, Biloxi, *Drouet* 9951, 13 Dec. 1948 (FC); in Biloxi bay at Biloxi Oyster Laboratory, Biloxi, *Drouet* & A. J. *Bajkov* 10051, 10067a, 10068, 10074a, 10081, 10083, Dec. 1948 (FC); at the municipal docks, Ocean Springs, *Drouet* & R. L. *Caylor* 9898, 12 Dec. 1948 (FC); Pascagoula Beach, *Nielsen* 1390, 17 Jun. 1949 (FC, T). LOUISIANA: Calcasieu parish: in a cove in the southeast part of Lake Fren, *Drouet* 8777, 30 Oct. 1948 (FC); on the beach, north shore of Lake Charles, Lake Charles, *Drouet* 8766, 28 Oct. 1948 (FC). Cameron parish: in a pool beside Calcasieu river southwest of the school, Cameron, *Drouet* 8807, 2 Nov. 1948 (FC); Broussard's beach on the Gulf of Mexico east of Cameron, *Drouet* 8874, 3 Nov. 1948 (FC). Jefferson parish: in the bayou at Collins Camp west of Chenier Caminada, *Drouet* & P. *Viosca* Jr. 9460, 9462, 9463, 26 Nov. 1948 (FC); in Marais Cochon and the Gulf of Mexico southwest of Chenier Caminada, *Drouet* & *Viosca* 9480, 9484, 27 Nov. 1948 (FC). Lafourche parish: in the salt marshes between Leeville and Chenier Caminada, *Drouet* & *Viosca* 9450, 26 Nov. 1948 (FC). St. Tammany parish: on concrete-work, shore of Lake Ponchartrain, Mandeville, *Drouet* & L. H. *Plint* 9543, 2 Dec. 1948 (FC). Vermilion parish: in Vermilion river in the west part of Abbeville, *Drouet* & R. P.

Ehrhardt 9097, 13 Nov. 1948 (FC). TEXAS: Cameron county: on jetty, Brazos Santiago, R. Runyon 3949a, 7 Jun. 1945 (FC); in Laguna Madre at Point Isabel, Runyon 3924, 3964a, 3965, 3965d, 30 Jun. 1944, 17 Jul. 1945 (FC). Hidalgo county: La Sal del Rey, E. S. Deevey, 27 Nov. 1941 (FC). Willacy county: La Sal Viejo, Deevey, 29 Jan. 1941 (Type of *Plourocapsa Deeveyi* Dr., FC). BRITISH COLUMBIA: Brandon island, Departure bay, near Nanaimo, T. A. & A. Stephenson NB66, Summer 1947 (FC). WASHINGTON: Neah Bay, N. L. Gardner, May 1917 (FC, L), Gardner 3829a, Jun. 1917 (Type of *Placoma violacea* Setch. & Gardn., UC; isotype, D).

CALIFORNIA: Alameda county: on logs in salt water, Alameda, W. J. V. Ossebooi & Gardner, 26 Sept. 1903 (as *Gloeocapsa crepidinum* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1151, FC, L, TA), Gardner 4119, Oct. 1917 (Type of *Plourocapsa gloeocapsoides* Setch. & Gardn., UC; isotypes, FC, L, TA); in jar of salt water, physiological laboratory, University of California, Berkeley, Gardner 1702, May 1906 (FC, UC); on shells, Bay Farm island, Alameda, W. A. Setchell, 6 Oct. 1898 (as *Hyella caespitosa* in Coll., Hold., Setch., Phyc. Bor.-Amer. no. LI, FC, L, TA, WU), Setchell 2040—2043, 3—6 Oct. 1898 (FC, UC), Gardner 1195, Sept. 1903 (FC, L, TA, UC), Gardner 3683, 2 Mar. 1917 (FU, UC). Humboldt county: on piles, Humboldt bay, Eureka, Gardner 7843, 1 Jun. 1934 (FC, UC). Los Angeles county: San Pedro, Setchell, Dec. 1905 (FC, UC); in old salt water cultures, La Verne, G. J. Hollenberg 2179CD, 14 Dec. 1937 (Type of *Microcystis ovalis* Holleob. and *M. splendens* Hollenb. in herb. G. J. Hollenberg; isotype, FC); Point Pirmin, San Pedro, Gardner 1906, 17 Jan. 1908 (FC, UC); on municipal breakwater, Cabrillo beach, San Pedro, Hollenberg 1562a, 3 Oct. 1936 (Type of *Entophysalis marginalis* Hollenb. in herb. G. J. Hollenberg; isotypes, FC, D), Hollenberg 2379B, 22 Oct. 1938 (Type of *Myxobryella seriata* Hollenb. in herb. G. J. Hollenberg; isotype, FC); rocky shore at Long point, Santa Catalina island, E. Y. Dawson, 30 Nov. 1948 (FC). Marin county: on shells, Bolinas, Setchell & M. B. Nichols 6400a, 16—19 Nov. 1906 (FC, UC). Monterey county: on *Listorina planaxis*, Carmel, Gardner, Dec. 1915 (as *Hyella Listorinae* Setch. & Gardn. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2255, FC, TA), Gardner 3108, Dec. 1916 (Type of *H. Listorinae* Setch. & Gardn., UC; isotype, FC, L, TA); on *Acinacea patina*, Carmel, Gardner 4531, Dec. 1919 (FC, UC); on rocks, Carmel bay, Setchell & R. E. Gibbs 3219, 12 Jan. 1899 (Type of *Plourocapsa entophysaloides* Setch. & Gardn., UC; isotypes as *P. fuliginosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 704, FC, L, TA, UC, WU), C. P. B., 17 May 1897 (D, UC), Gardner 4527, Dec. 1919 (FC, UC); rocks near Pebble Beach, Carmel bay, Gardner 6405, Dec. 1927 (FC, UC); Mussel point, T. A. & A. Stephenson PGM100, Aug.—Nov. 1947 (FC); Point Labos, Stephenson PGL13, Aug.—Nov. 1947 (FC); dredged 0.5 mile east of Monterey, Hollenberg 3018, 11 Aug. 1939 (FC); Chataqua beach, Monterey, Setchell 1639, 15 May 1897 (FC, UC). San Mateo county: on *Listorina* sp., Moss Beach, Gardner 2101, Dec. 1909 (FC, UC). San Francisco: on piles, U. S. Life Saving Station, North beach, Setchell 1100, Dec. 1895 (UC); Lands End, Gardner 4392, 25 Jan. 1919 (FC, UC), Gardner 4480, Nov. 1919 (FC, TA, UC); Ptesidio, Gardner 4479, Nov. 1919 (FC, L, UC), Gardner 7033, 1 Oct. 1932 (FC, UC); Fort Point, Gardner 4894, Feb. 1924 (FC, TA), Gardner 6179, 6180, Apr. 1926 (FC, UC). Santa Barbara county: mouth of Cañada Lobos, Santa Rosa island, P. C. Silva 3937, 26 Jan. 1949 (FC, UC); Willows Anchorage, Santa Cruz island, Silva 6019, 11 Mar. 1950 (FC, UC). Sonoma county: Fort Ross, Setchell 714 (UC).

BAHAMA ISLANDS: on rocks, Arwood (Samana) cay, M. A. Howe 5282, 3 Dec. 1907 (Type of *Entophysalis violacea* Coll., NY; isotypes, D, UC); roof of cavern, Lignum Vitae cay, Berry islands, Howe 3654, 2 Feb. 1905 (FC, NY); rocks on ocean beach west of Lerner Laboratory, Bimini island, H. J. Humm 4, 15, Apr. 1948 (FC); border of a salt pond at eastern end of Mariguana, Howe 5538, 12 Dec. 1907 (Type of *Gloeocapsa bahamensis* Coll., NY; isotypes, FC, UC). BRITISH WEST INDIES: on pneumatophores of *Avicennia*, Cockburn Harbor, South Caicos, Howe 5583, Dec. 1907 (FH). PUERTO RICO: auf Kalksteinmauer beim Meere in Park, Santurce, N. Wille 35, 25 Dec 1914 (FC, UC); Sardinera, Mona island, C. A. Keys, 1950 (D). GUADELOUPE: shore, Vieux Bourg, A. Quessel 255, 22 Feb. 1944 (FC, TA). JAMAICA: on walls of caverns below Port Clarence, Kingston, Howe 4652, 4653, 21 Dec. 1906 (D, NY); on coral, Drunkenman's cay near Kingston, Howe 4734, 29 Dec. 1906 (D, NY); littoral cavern, Montego Bay, Howe 4898, 4899, 8 Jan. 1907 (D, NY); Beach Rock, Middle cay, Morant cays, V. J. Chapman 4, 4a, 1939 (FC). NETHERLANDS WEST INDIES: Bonaire & Klein Bonaire, P. Wagenaar Hummelinck, 1930 (L). MEXICO: Baja California: Ojito near Punta Maria, E. Y. Dawson & D. Park 1595a, 14 Apr. 1946 (FC); reef at southern tip of Melpomene cove (South Anchorage), Guadalupe island, P. C. Silva, 1 Feb. 1950 (FC, UC); Cape San Lucas, Dawson 7255, 1 Apr. 1949 (FC); Guadalupe island, Dawson 8208, 17 Dec. 1949 (FC). Chiapas: in small marine estuary, Barra de Cahuacan, Dawson 3833, 16 Jan. 1947 (FC). Colima: on rocks, Clarion island, Sulphur bay, Revilla Gigedo islands, J. T. Howell 569a, 24 Mar. 1932 (Type of *Polycystis clarionensis* Setch. & Gardn., CAS), Howell 335 (FC, UC). Sonora: shore of island at entrance to harbor, Guaymas, P. Drouet & D. Richards 3085, 3085a,b, 2 Dec. 1939 (FC); shore of harbor near west end of the Pasco, Guaymas, Drouet & Richards 3119, 4 Dec. 1939 (FC); mangrove swamp at mouth of Rio de Sonora, Bahia Kino, Drouet & Richards 2897a, 9 Nov. 1939 (FC); rocks on south side of Isla Patos, Dawson 651, 17 Feb. 1946 (FC); rocks at Puerto Lobos, Bahia Tepoca,

Dawson 814, 19 Feb. 1946 (FC); tidal flats of Rio Mayo on north side of Yavros, southwest of Huatabampo, *Dronel & Richards* 3194, 3216, 11 Dec. 1939 (FC). COSTA RICA: Braxillio bay, J. T. Howell 778e, 2 Jul. 1932 (FC, UC); on rocks and shells, Port Parker near Salinas bay, W. R. Taylor 39-81, 39-88, 24-25 Mar. 1939 (FC, MICH). PANAMA: rocky shore near the anchorage, Taboga island, Bahía de Panama, Taylor 39-622, 2 May 1939 (FC, MICH).

VENEZUELA: Golfo de Cariaco, herb. W. F. R. Suringar, (D. L.). COLOMBIA: on rocks in the bay near Cartagena, F. A. Barkley 188002c, 10 Jul. 1948 (FC). ECUADOR: on southeast side of Narborough island, Galapagos islands, J. T. Howell 576, 1 Jun. 1932 (Type of *Dermocarpa spbaerica* var. *galapagensis* Stch. & Gardn., CAS; isotypes, FC, UC); on rock, Osborne islet in Gardiner bay, Hood island, Galapagos islands, W. R. Taylor, 31 Jan. 1934 (D. TA); on lava in brackish lagoon, Punta Albemarle, Isla Isabela, Galapagos islands, Taylor 34-95, 12 Jan. 1934 (FC, MICH). PERU: Lima, A. Maldonado 11, Dec. 1940 (FC); in salt lakes, Huacho, prov. Chancay, Maldonado 80, 89, 94, 95a, Feb. 1942 (FC); Las Salinas, Lago Chilca, depr. Lima, Maldonado 62, 69, Jan. 1942 (FC). URUGUAY: La Paloma, dept. Rocha, W. G. Herter 95007, Nov. 1934 (FC). HAWAIIAN ISLANDS: Kaneohe bay, Oahu, M. S. Doty 8823, 10695, 22 Apr. 1951, 9 May 1953 (FC); on breakwater, beach laboratory, University of Hawaii, Honolulu, Doty 995, 1952 (FC). CHRISTMAS ISLAND: lagoon bottom, Paris, P. R. Fosberg 13260a, 28 Aug. 1926 (FC). TUAMOTU ARCHIPELAGO: beach sand and rocks, Raroia atoll, Doty & J. Newhouse 11351, 11146, 11832, Jul.—Aug. 1952 (FC); cultures from beach rock and sand, Raroia, Doty & Newhouse 11286, 11303, 11445, 11671, 11876, 11877, 29 Sept. 1953 (FC). SOCIETY ISLANDS: on rocks near Huau, Tahiti, W. A. Setchell & H. E. Parks 5112, 5 Jun. 1922 (UC). WAKE ISLAND: J. Randall 53-83, 53-92, 53-95, 6 Jun. 1953 (FC). MARSHALL ISLANDS: lagoon reef and shore, Ine island, Arno atoll, L. Horowitz 9074, 9569, 9571, 15 Jul., 16 Aug. 1951 (FC); tidepools, Eniirikku island, Bikini atoll, W. R. Taylor 46-53, Mar. 1946 (FC, MICH); tidepools, Erik island, Bikini atoll, R. F. Palumbo Y8a, 1 Aug. 1949 (FC); pool back of beach rock, Giriin island, Eniwetok atoll, Taylor 46-339, 28 May 1946 (FC, MICH); on rocks, Runit island, Eniwetok atoll, Palumbo 52-16, 22 Oct. 1952 (FC); on rocks, Kwajalein islet, Kwajalein atoll, G. J. Hollenberg 48C1, 2 Jul. 1948 (FC), F. R. Fosberg 34422, 15 Mar. 1952 (FC, US); coral boulder on lagoon beach, Sibylla islet, Pokak atoll, Fosberg 34501, 21 Jul. 1952 (FC, US); beach rock, Utrik islet, Utrik atoll, Fosberg 33718, 3 Dec. 1951 (FC, US); beach rock, Wotho and Enejeito islets, Wotho atoll, Fosberg 34423, 34425a, 18—19 Mar. 1952 (FC, US). PHOENIX ISLANDS: coral rock, Canton island, O. Degener 21344b, Apr. 1951 (FC).

NEW ZEALAND: vertical cliff face, Scott's Point, V. J. Chapman, 1949 (FC), V. W. Lindauer 2830, 26 Dec. 1942 (D); Bay of Islands, V. W. Lindauer 26, 20 Mar. 1938 (FC); shell-boring, Parua bay near Whangarei, W. A. Setchell 6158, 6160, 1904 (FC, UC); Oneroa Bay of Islands, L. M. Jones, 18 Jan. 1935 (as *Entophysalis crustacea* in Tild., So. Pacific Pl., 2nd Ser., no. 374, FC); Tahapuke bay, Bay of Islands, A. & V. K. Nash, 15 Jan. 1935 (as *E. crustacea* in Tild., So. Pacific Pl., 2nd Ser., no. 347b, FC); rocks, Taharanui bay, North island, Lindauer 1996, 1997, 14 Dec. 1940 (FC); rocks below lighthouse, Half Moon bay, Stewart island, I. B. Warnock, 23 Feb. 1935 (as *E. crustacea* in Tild., So. Pacific Pl., 2nd Ser., no. 734, FC); Bounty islands, Chapman (FC); salt water, Bay of Islands, Lindauer 675, Jun. 1937 (UC); Long Beach, Bay of Islands, Lindauer A84, Feb. 1936 (UC). JAPAN: Tsuro, Cape Ashizuri, Kochi pref., I. Unozaki 1473, 19 Jun. 1954 (D). INDOCHINA: Bay Mien (Baichua), *Station Marisme de Caudo* 147, Jun. 1937 (L). INDONESIA: Dobo, Gisser, Kangean, Noesa-Jaut, Rôma, Saleyer, Seget (New Guinea), Bima (Soembawa), Lamakwera (Solor), A. Weber-van Bosse, 1899—1900 (FC, L); Lamakwera, Solor, *Weber-van Bosse* (Types of *Entophysalis violacea* Weber-van Bosse and *Pleurocapsa magna* Weber-van Bosse, L); Noimimi-bocht (Timor), Elae (Kei islands), *Weber-van Bosse*, 1899—1900 (L); Binnenmeer, Roesa Linguette island, van der Sande, 21 Jul. 1908 (FC, L); noorden van Kampong Gersik Poetik, Madoera, L. G. M. Baas Becking, Jul. 1936 (L); zuidkust Ost-Java bij Kampong Nglijip, P. Groenbart e, Oct. 1936 (L). AUSTRALIA: marine on rocks at Miami, Queensland, A. B. Cribb D, 4 Jan. 1949 (FC); Long Reef, Collaroy, New South Wales, C. M. Crosby & L. A. Doors, 2 Jan. 1935 (with *Rivularia stri* Roth in Tild., So. Pacific Pl. 2nd ser., no. 325, FC); in Lichophyllum, Pt. Puer, Port Arthur, Tasmania, Cribb 39.6, 8 Mar. 1950 (FC); on shells, Pelican island, Southport, Tasmania, Cribb 44.3, 21 Mar. 1950 (FC); Mangrove Point, Spencers Gulf, South Australia, H. B. S. Womersley A15046, 31 Dec. 1950 (FC). PALESTINE: plage, Jaffa, R. Joffé 152, Jan. 1897 (FC).

2. ENTOPHYSALIS ENDOPHYTICA Drouer & Daily, Lloydia 11: 79, 1948. *Chlorogloea endophytica* Howe, Mem. Torr. Bot. Club 15: 13, 1914. *Myxohyella Howei* Geirler, Beih. z. Bot. Centralbl., II, 4f: 247, 1925. —Type from Bay of Secura, Peru (NY).

Chlorogloea lutea Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 434, 1918. *Myxohyella lutea* Geirler, Beih. z. Bot. Centralbl., II, 4f: 247, 1925. —Type from Carmel bay, California (UC). FIG. 195.

Plantae endophyticae, microscopicae, olivaceae vel luteolae, cellulis solitariis sphaericis, diametro ad 2μ crassis; cellulis pulvini et florum penetrantium praecipuius multiseriatorum sphaeroideis vel polyhedroideis, diametro 1— 2μ crassis; endosporangiis quaerendis; gelatino vaginale hyalino, homoganeo; protoplasmate luteolo, luteo, vel olivaceo. FIG. 175.

In the superficial layers of various large marine algae (*Iridophycus*, *Zanardinula* spp., etc.). The penetrating filaments and small cushions are the usual growth-form seen in *Entophysalis endophytica*. Endosporangia have not been observed in the specimens available.

Specimens examined:

CALIFORNIA: on *Iridaea minor*, Carmel bay, Monterey county, N. L. Gardner 2981a, May 1915 (Type of *Chlorogloea lutea* Seib. & Gardn., UC; isotype, FC [Fig. 195]); on *Iridaea laminarioides*, Pyramid point, Monterey county, W. A. Setchell 5464, 16 Jun. 1901 (FC, UC). FERU: in *Leptocladia peruviana*, Bay of Secura, R. E. Coker 157, Apr. 1907 (Type of *Chlorogloea endophytica* Howe, NY); in *Chondrus canaliculata* and *Gymnogongrus furcellata*, Chincha islands, Coker 192, 193, Jun. 1907 (NY); on Gigartina, Chincha Norte island, W. Vogt, 1941 (FC); on *Lessonia nigrescens*, Pescadores islands near Ancon, Coker 09150, Feb. 1907 (NY); on *Gymnogongrus furcellatus*, Callao, Coker 17, Dec. 1906 (NY). HAWAIIAN ISLANDS: on *Chnoospora fastigiata*, Makua, Oahu, M. Reed 197, 14 Apr. 1905 (FC, UC).

3. ENTOPHYSALIS CONFERTA Drouer & Daily, Lloydia 11: 79. 1948. *Palmella conferta* Kützing, Phyc. Germ., p. 149. 1845. *Cagniardia conferta* Trevisan, Sagg. Monogr. Alg. Coccor., p. 50. 1848. *Pleurocapsa conferta* Setchell, Univ. Calif. Publ. Bot. 4: 229. 1912. *Chlorogloea conferta* Setchell & Gardner, in Gardner, Univ. Calif. Publ. in Bot. 6: 432. 1918. *Microcystis conferta* Geitler ex J. de Toni, Diagn. Algar. Nov., I. Myxophyc. 2: 105. 1937. —Type from Cuxhaven, Germany (L). FIG. 211.

Hydrococcus marinus Grunow, Verb. K. K. Zool.-Bot. Ges. Wien 11: 420. 1861. *Oncobyrsa marina* Rabenhorst, Fl. Eur. Algar. 2: 68. 1865. *Placoma marina* Bornet & Thuret, Mém. Soc. Nat. Sci. Nat. Cherbourg 28: 179. 1892. —Type from Leucadia, Greece (W).

Sphaenosiphon cuspidatus Reinsch, Contrib. Algol. & Fungol. 1: 15. 1874. *Dermocarpa cuspidata* Geitler, Rabenb. Krypt.-Fl. 14: 391. 1932. —Type from the Adriatic sea (K).

Sphaenosiphon smaragdinus Reinsch, Contrib. Algol. & Fungol. 1: 16. 1874. *Dermocarpa smaragdina* Tilden, Minn. Alg. 1: 54. 1910. —Type from central Africa (K).

Sphaenosiphon prasinus Reinsch, Contrib. Algol. & Fungol. 1: 17. 1874. *Dermocarpa prasina* Bornet in Bornet & Thuret, Notes Algol. 2: 73. 1880. —Type from the Adriatic sea (K).

Sphaenosiphon olivaceus Reinsch, Contrib. Algol. & Fungol. 1: 17. 1874. *Dermocarpa olivacea* Tilden, Minn. Alg. 1: 55. 1910. —Type from Marseilles, France (K).

Sphaenosiphon incrustans Reinsch, Contrib. Algol. & Fungol. 1: 17. 1874. *Dermocarpa prasina* var. *incrustans* Holmes & Batters ex Forti, Syll. Myxophyc., p. 132. 1907. —Type from St. Lawrence river, Quebec (K).

Sphaenosiphon roseus Reinsch, Contrib. Algol. & Fungol. 1: 18. 1874. *Dermocarpa rosea* Batters, Hist. Berwickshire Nat. Club 12: 141. 1889. *Chamaesiphon roseus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 227. 1893. *Dermocarpa violacea* var. *rosea* Holmes & Batters ex Forti, Syll. Myxophyc., p. 130. 1907. —Type from central Africa (K).

Sphaenosiphon Leibliniae Reinsch, Contrib. Algol. & Fungol. 1: 103. 1874. *Dermocarpa Leibliniae* Bornet in Bornet & Thuret, Notes Algol. 2: 73. 1880. —Type from Atlantic North America (K).

Xenococcus Schousboei Thuret in Bornet & Thuret, Notes Algol. 2: 73, 75. 1880. *Coleonema aronifera* Schousboe pro synonym. in Bornet & Thuret, ibid. p. 74. 1880. *Dermocarpa Schousboei* Bornet in Batters, Hist. Berwickshire Nat. Club 12: 11. 1889. —Type from Tangier (PC). FIG. 210.

Oncobyrsa adriatica Hauck, Meeresalg. Deutschl. & Oesterr., p. 515. 1885. —Type from Trieste (L). FIGS. 208, 209.

Chamaesiphon roseus var. *major* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 227. 1893. *Dermocarpa rosea* var. *major* Hansgirg ex Forti, Syll. Myxophyc., p. 130. 1907. —Type from St. Andrea, Trieste (W). FIG. 196.

Oncobyrsa adriatica var. *micrococca* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 228. 1893. —Type from Zengg, Croatia, Jugoslavia (W).

- Palmella tuberculosa* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 240. 1893. *Chlorogloea tuberculosa* Wille, Nyt Mag. Naturvid. 38(1): 5. 1900. —Type from Ragusa, Jugoslavia (W).
- Pluocapsa amethystea* Rosenvinge, Meddel. om Grønl. 3: 967. 1893. *Chroococcopsis amethystea* Geitler, Beib. z. Bot. Centralbl. II., 41: 241. 1925. —Type from Fiskernaes, Greenland (C).
- Radaisia Gomontiana* Sauvageau, Journ. de Bot. 9: 374. 1895. —Type from Biarritz, France (PC).
- Dermocarpa biscayensis* Sauvageau, Journ. de Bot. 9: 403. 1895. —Type from Biarritz, France (PC).
- Dermocarpa strangulata* Sauvageau, Journ. de Bot. 9: 403. 1895. —Type from Biarritz, France (PC).
- Pringsheimia scutata* f. *Cladophorae* Tilden, Amer. Alg. 4: 382. 1900. *Xenococcus Cladophorae* Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 461. 1918. —Isotypes from Baird point, Vancouver island, British Columbia (D, FC).
- Dermocarpa juvicola* Saunders, Proc. Washington Acad. Sci. 3: 397. 1901. —Type from near Seattle, Washington (FH).
- Hyella endophytica* Børgeesen, Bot. Faeroës 2: 525. 1903. *Myxobryella endophytica* Geitler, Beib. z. Bot. Centralbl., II, 41: 247. 1925. —Type from Thorshavn, Faeroes islands (in the collection of F. Børgeesen).
- Dermocarpa Parlouii* Børgeesen, Bot. Faeroës 2: 525. 1903. —Isotype from Suderøp, Faeroes islands (UC).
- Pluocapsa amethystea* var. *Schmidii* Collins in Collins, Holden & Setchell, Phycotheca Boreali-Americana 35: 1704. 1911. —Type from Einarston, Iceland (C).
- Dermocarpa Vickersiae* Collins, Rhodora 13: 184. 1911. —Type from Valentia, Barbados (NY). FIG. 214.
- Dermocarpa solitaria* Collins & Hervey, Proc. Amer. Acad. Arts & Sci. 53: 17. 1917. —Type from Bermuda (NY). FIG. 197.
- Xenococcus Chaetomorphae* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 436. 1918. —Type from Cypress point, Monterey county, California (UC). FIG. 213.
- Dermocarpa hemisphaerica* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 438. 1918. —Type from Moss Beach, San Mateo county, California (UC). FIG. 201 (paratype from Monterey county, California, FC).
- Dermocarpa pacifica* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 439. 1918. —Type from Cypress point, Monterey county, California (UC). FIG. 207.
- Dermocarpa suffulta* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 440. 1918. —Type from Moss Beach, San Mateo county, California (UC).
- Dermocarpa sphaeroides* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 440. 1918. —Type from San Francisco, California (UC).
- Hyella linearis* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 442. 1918. *Myxobryella linearis* Geitler, Beib. z. Bot. Centralbl., II, 41: 247. 1925. —Type from Coos bay, Oregon (UC). FIG. 206.
- Hyella socialis* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 443. 1918. *Myxobryella socialis* Geitler, Beib. z. Bot. Centralbl., II, 41: 246. 1925. —Type from Carmel bay, California (UC).
- Radaisia Laminariae* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 444. 1918. *Nematoradaisia Laminariae* Geitler, Beib. z. Bot. Centralbl., II, 41: 242. 1925. —Type from San Francisco, California (UC). FIG. 204.
- Radaisia clovata* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 445. 1918. —Type from San Francisco, California (UC).
- Radaisia subimmersa* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 446. 1918. *Radaisiella subimmersa* Geitler, Beib. z. Bot. Centralbl., II, 41: 242. 1925. *Geilariella subimmersa* J. de Toni, Noter. Nomencl. Algol. 8. 1930. —Type from Carmel bay, California (UC). FIG. 215.
- Radaisia epiphytica* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 447. 1918. —Type from Carmel Bay, California (UC). FIG. 205.
- Dermocarpa protea* Setchell & Gardner, Univ. Calif. Publ. Bot. 5: 456. 1918. —Type from Whidbey island, Washington (UC). FIG. 200.
- Dermocarpa sphaerica* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 457. 1918. —Type from San Pedro, California (UC).
- Xenococcus aceruatus* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 459. 1918. —Type from Berkeley, California (UC). FIG. 212.
- Xenococcus Gilkeyae* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 462. 1918. —Type from Sitka, Alaska (UC).
- Xenococcus pyriformis* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 463. 1918. —Type from Coos bay, Oregon (UC).
- Chlorogloea rugularis* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 12: 698. 1924. —Type from Tortuga island, Baja California (CAS).

- Dermocarpa Reinschii* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 12: 699. 1924. —Type from Tortuga island, Baja California (CAS).
- Dermocarpa Marchantiae* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 12: 700. 1924. —Type from Santa Rosalia, Baja California (CAS).
- Xenococcus deformans* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 12: 701. 1924. —Type from San Francisco bay, Baja California (CAS).
- Plourocopsis violacea* Weber-van Bosse, Vidensk. Medd. Dansk Naturh. Foren. Kjøbenhavn 81: 61. 1926. —Type from Aroi islands, Indonesia (C).
- Radaisia pusilla* Weber-van Bosse, Vidensk. Medd. Dansk Naturh. Foren. Kjøbenhavn 81: 62. 1926. —Type from Kai islands, Indonesia (C).
- Chamaesiphon clavatus* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 19: 118. 1930. —Type from Guadalupe island, Baja California (CAS).
- Dermocarpa similans* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 66. 1937. —Type from North Seymour island, Galapagos islands (CAS).
- Xenococcus unguatus* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 67. 1937. —Type from Santa Maria bay, Baja California (CAS).
- Xenococcus endophyticus* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 67. 1937. —Type from Albermarle island, Galapagos islands (CAS).
- Xenococcus violaceus* Anand, Journ. of Bot. 1937 (Suppl. 2): 38. 1937. —Type from Westgate, England (in the collection of F. E. Fritsch). FIG. 199.
- Dermocarpa Enteroformis* Anand, Journ. of Bot. 1937 (Suppl. 2): 42. 1937. —Type from Westgate, England (in the collection of F. E. Fritsch). FIG. 198.
- Microcystis minuta* Kylin, K. Fysiograf. Sällsk. i Lund Förh. 7(12): 22. 1937. —Paratype and topotype from Kristineberg, Sweden (D).
- Dermocarpa suecica* Kylin, K. Fysiograf. Sällsk. i Lund Förh. 7(12): 23. 1937. —Paratype and topotype from Kristineberg, Sweden (D).
- Xenococcus pulcher* Hollenberg, Bull. Torr. Bot. Club 66: 492. 1939. —Type from San Pedro, California (in the herbarium of G. J. Hollenberg). FIG. 202.
- Dermocarpa sublioralis* Lindstedt, Fl. Mar. Cyanophyc. Schwed. Westküste, p. 30. 1943. —Isotype from Kristineberg, Sweden (D). FIG. 203.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens are found:

- Chamaesiphon hemisphaericus* Lemmermann, Abh. Nat. Ver. Bremen 16: 353. 1900.
- Dermocarpella hemisphaerica* Lemmermann, Engler Bot. Jahrb. 38: 349. 1907. *Dermocarpa Lemmermannii* Geider in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 106. 1942.
- Dermocarpa Leibliniae* var. *poligica* Wille in Hansen, Ergebn. Plankton-Exped. Humboldt-Stift. 4Mf., Schizophyc., p. 50. 1904.
- Xenococcus laysanensis* Lemmermann, Engler Bot. Jahrb. 34: 618. 1905.
- Dermocarpella incrassata* Lemmermann, Engler Bot. Jahrb. 38: 350. 1907. *Dermocarpa incrassata* Geider, Beih. z. Bot. Centralbl., II, 41: 248. 1925.
- Dermocarpa minima* Geider, Rabenh. Krypt.-Fl. 14: 392. 1932.
- Microcystis minuta* var. *aeruginosa* Lindstedt, Fl. Mar. Cyanophyc. Schwed. Westküste, p. 17. 1943.
- Myxobrylla Cavanillesiana* Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 247. 1946.
- Dermocarpa Cavanillesiana* Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 249. 1946.

Plantae epi- vel endophyticae, microscopicae vel macroscopicae, primo unicellulares aetate protracta in stratum vel pulvinum olivaceum, aeruginosum, violaceum, vel rubrum incrementis, cellulis solitariis sphaericis vel ovoideis vel pyriformibus, diametro ad 20μ crassis; cellulis strati vel pulvini sphaeroideis, post divisiones praecipue sphaericis vel polyhedroideis, diametro (1—)3— 6μ crassis; cellulis filorum penetrantium sphaericis, ovoideis, cylindraceis, vel polyhedroideis, diametro 3— 8μ crassis; endosporangiis sphaericis, obovoideis, cylindraceis, pyriformibus, vel tubaeformibus, diametro ad 50μ crassis, solitariis vel disciformiter aggregatis; protoplasmate aerugineo, olivaceo, violaceo, vel roseo, homoganeo vel tenuigranuloso. FIGS. 196—215.

Epiphytic and endophytic on larger algae of marine and brackish waters, the smaller growth-forms developing on ephemeral hosts, the more massive growth-

forms on perennial hosts. Unicellular and few-celled growth-forms of *Entophysis conferta* appear in a great variety of shapes on the larger annual algae of tide pools; many of the cells grow directly into endosporangia. Disc-like groups of new single-celled plants, often developing directly into endosporangia, grow from the released endospores. In some cases the endospores penetrate the outer layers of the cell walls of the host and grow there as endosporangia or as single—many-celled vegetative plants. On perennial algae, especially those subject to wave action, the penetrating filaments are often well developed. Large and bulbose cushions are rarely found, since they develop on perennial algae in quiet waters.

Specimens examined:

NORWAY: paa *Fucus vesiculosus*, Biologisk Station, Drøbak, N. Wille, Apr. 1917 (S); in *Laminaria digitata* ad Drøbak, H. G. Simmons, Apr. 1898 (S). SWEDEN: in *Cladophora rupestris* epiphytica ad Väderö Storö in Bahusia, G. Lagerholm, Aug. 1882 (as *Dermocarpa violacea* in Witt. & Nordst., Alg. Exs. no. 900, FC, L, NY, S, UC); on Membranipora on *Laminaria Cloustonii* and *L. saccharina*, Kristineberg, A. Lindstedt, 8 Jul. 1950 (paratypes and topotypes of *Microcystis minuta* Kylin and *Dermocarpa suecica* Kylin, D); culture from Kristineberg, A. Lindstedt, 1950 (isotype of *D. sublitoralis* Lindst., D [Fig. 203]). GERMANY: Helgoland, F. Hauck (L); auf *Callithamnion Rosbii*, Cuxhaven, F. T. Kützing (Type of *Palmella conferta* Kütz., L [Fig. 211]). ADRIATIC SEA: in Sphacelaria in *Sargasso obtusato*, Adria, herb. P. Reinsch (K); in Laurencia in Rhodophyc. major. cresc., herb. Reinsch (Type of *Sphaerosiphon prasinus* Reinsch, K); in *Sargasso obtusato*, herb. Reinsch (Type of *Sphaerosiphon cuspidatus* Reinsch, K). TRIESTE: F. Hauck, Oct. 1879 (Type of *Oncobrya adriatica* Hauck, L [Figs. 208, 209]); on Lyngbya, Hauck (L); in *Catenella Opuntia* (Goode. & Woodw.) Grév., Hauck (as *Dermocarpa prasina* in Witt. & Nordst., Alg. Exs. no. 693, FC, L, NY, S); Servola, Hauck, Mar. 1883 (L); Salinen, Zaula, Hauck (L); on *Lyngbya luteo-fusca*, Umago, Hauck, 15 Jun. 1879 (D, FH); an *Enteromorpha fucicola* bei St. Andrea nächst Triest, A. Hansgirg (Type of *Chamaesiphon rosens* var. *major* Hansg., W; isotype, FC [Fig. 196]). JUGOSLAVIA: Istria: auf *Catenella Opuntia* bei Mostecnice, V. Nabelek, 26 Jul. 1914 (WU); Portabona (Porto Rabaz), *Catenella Opuntia* insidens, J. Baumgartner (as *Dermocarpa prasina* in Mus. Vindob. Krypt. Exs. no. 3138, FC, L, NY, S, UC); prope Rovingo in *Catenella Opuntia*, J. N. P. Wille (as *Dermocarpa prasina* in Mus. Vindob. Krypt. Exs. no. 1518, FC, L, NY, S). Croatia: auf *Catenella Opuntia*, Insel Veglia bei der Stadt Veglia, M. Lusina, 28 Apr. 1915 (WU); an der Fluthgrenze bei Zengg, Hansgirg, 1891 (Type of *Oncobrya adriatica* var. *micrococca* Hansgirg, W; isotype, FC). Dalmatia: auf Halimeda, Spalato, Hauck (L); bei Ragusa, auf *Gelidium capillaceum*, Hansgirg, 1891 (Type of *Palmella tuberculosa* Hansg., W; isotype, FC). GREECE: ad *Cladophoram catenatam* e portu Leucadiae, Mazzieri 1912 (Type of *Hydrococcus marinus* Grun., W).

MEDITERRANEAN SEA: in *Hypnea musciformis*, herb. P. Reinsch (K). ITALY: Porto Maurizio, Safforello, Jun. 1874 (PC); Villa Rocco Romano, Posilippo, Napels, J. T. Koster 422, Apr. 1939 (L); Santa Lucia, Napels, Koster 420, May 1939 (L); Villa d'Ambra, Posilippo, Napels, Koster 423, Apr. 1939 (L); Palazza Donn'Anna, Posilippo, Napels, Koster 416, May 1939 (L). NETHERLANDS: Delfszijl, op *Rhodochorton Rosbii*, Koster 1660, 5 Jun. 1950 (L), op *Elachista fucicola*, M. Weber 201, Jun. 1885 (L); op *Polysiphonia urceolata* en *Chamaesiphonia aerea*, Hoek van Holland, Koster 192, Feb. 1938 (L); op *Rhodochorton Rosbii*, Condorpe bij Ellewoutsdijk, Westerschelde, C. Brakman 65, Feb. 1941 (L); on *Enteromorpha clausura*, Koffiehoek, island of Tholen, C. den Hartog & A. F. Mulder, 27 Nov. 1951 (D, FC, L); op *Polysiphonia urceolata* etc., Oosterschelde, bij Katendijke, Zuid-Beveland, J. J. R. Walrecht, 10 Aug. 1951 (FC, L); on *Polysiphonia fastigiata* (Roth) Grév., harbor, Zoological Station, den Helder, Koster, 2 Dec. 1936 (D, FH, L). FAEROES ISLANDS: on *Rhodochorton Rosbii*, Høijr, Sjørupph. F. Børjesen 202, 24 Jun. 1895 (K); Trangiscafjorder, Suderph, Børjesen 546, May 1896 (FH, UC); Krivig, Sjørupph. Børjesen 757, 31 May 1896 (C, D, DT); in *Polysiphonia fastigiata*, Tveraa, Suderph. Børjesen 536, May 1896 (isotype of *Dermocarpa Farlowii* Børjesen, UC); in *Laminaria hyperborea* (Gunn.) Postl., Thorshavn, Sjørupph. H. Jonsson, 20 Nov. 1897 (Type of *Hyella endophytica* Børjesen, slide in the collection of F. Børjesen; isotype, C). GREAT BRITAIN: Scotland: op *Ectocarpus* sp., haven van Leith, J. T. Koster 129, Aug. 1936 (L). England: on *Catenella Opuntia*, seaside rocks, Devonshire (in M. Wyart, Algae Danmonienses no. 126, FC); on *Polysiphonia fastigiata* on *Fucus nodosus*, Devonshire (in Wyart, Algae Danmonienses no. 177, FC); Hastings, E. Batters, Apr. 1883 (L), Batters 64, 1886 (PC); Berwick-on-Tweed, Batters 92, 106 (PC), 129 (PC, UC), Feb. 1887, Jan. 1889; Sidmouth, G. W. T., Feb. 1886 (NY); Yarmouth, Batters 124, Jul. 1888 (PC); Muirhead, E. M. Holmes, Jan. 1887 (PC); on *Callithamnion Rosbii* on buttresses of iron wall, Teignmouth, Holmes, 1 Jan. 1880 (PC); in *Catenella Opuntia*, Corvallis, herb. P. Reinsch (K); on *Enteromorpha*, chalk cliffs at Westgate, Anand, Oct. 1934 (Types of *Xenococcus violaceus* Anand and *Dermocarpa Enteromorphae* Anand in the collection of F. E. Friess; isotypes,

D [Figs. 198, 199]). IRELAND: on *Rhodochorton floridulum*, Clate island, A. D. Cotton, 1910—11 (NY).

FRANCE: sur *Lyngbya confervoides*, Banyuls-sur-Mer (Pyrenées Orientales), J. Feldmann 2659, Sept. 1932 (L, NY, S, TA); sur *Lyngbya*, Biarritz, E. Bornet, 8 Jun. 1870 (FC, FH, NY, PC, UC), 6 Aug. 1870 (PC); Biarritz, L. K. Rosenzweig 527b, Mar. 1885 (PC); sur *Pucus platycarpus* Thur., Port Vieux, Guéthary au Phare de Biarritz, Sauvageau, 20 Feb.—25 Mar. 1894 (Type of *Radaisia Gomontiana* Sauvag., PC; isotype, FC); sur *Sargassum rejete* au Port Vieux, Guéthary au Phare de Biarritz, Sauvageau, 20 Feb.—25 Mar. 1894 (Type of *Dermocarpa biscayensis* Sauvag. and *D. utangulata* Sauvag., PC); Cherbourg, sur *Catenella Opuntia*, Bornet, 11 Aug. 1874 (FC, FH, PC); Fouras (Cbarente Inférieure), L. Marchand, 15 Sept. 1879 (PC); Le Croisic, Bornet, Aug. 1873 (PC), Sept. 1873 (FH, L, NY, PC), Apr. 1877 (L), May 1877 (FC, L, NY, PC); as *Dermocarpa prasina* in Lloyd, Alg. de l'Ouest de la France no. 389, PC; in *Chorda filum*, Mare Mediterraneum, Marseille, herb. Reinsch (Type of *Sphaerosiphon olivaceus* Reinsch, K); St. Malo, le Grand Bey, Bornet, 4 Jul. 1872 (PC); ile Ste. Marguerite près Cannes, G. Thuret, 20 Apr. 1856 (PC). SPAIN: sur *Cystosira ericoides* à Rivadeo, C. Sauvageau, Oct. 1895 (PC); La Corogne, Sauvageau, Oct.—Nov. 1895 (PC). TANGIER: Tingi, P. K. A. Schousboe, Dec. 1825 (Type of *Xenococcus Schousboei* Thur., PC; isotypes, FH, L [Fig. 210], UC). SIERRA LEONE: on *Lyngbya confervoides* Ag., Freetown and Kent, G. W. Lawson A622, A632, 4 & 7 Jul. 1953 (FC). GOLD COAST: on *L. confervoides* Ag., Axim, Lawson A472, 17 Dec. 1952 (FC); Dixcove, Lawson A292, 29 Dec. 1951 (D); marine, Christiansborg, Lawson A573, 27 Mar. 1953 (FC). CENTRAL AFRICA: in *Leibleinia capillacea* Kütz. in *Lunrencia obtusa* Ag. crescente, herb. P. Reinsch (Type of *Sphaerosiphon smaragdinus* Reinsch, K); in *Golidia corneo*, herb. P. Reinsch (Type of *Sphaerosiphon roseus* Reinsch, K). MOZAMBIQUE: auf Rhizoclonium in Quilimaneffluss bei der Insel Pequene, Stuhlmann 83, Feb. 1889 (as *Xenococcus Kernerii* in Hauck & Richt., Phyk. Univ. no. 685, L). UNION OF SOUTH AFRICA: Cape of Good Hope: on Dictyota, Knysna, A. Weber-van Bosse, 1894 (L); on *Platysiphonia intermedia* (Grun.) Børges., Pieterberg bay, Weber-van Bosse 18, 1894 (FC, L); on *Lyngbya confervoides* Ag. on rocks, Muizenberg, W. A. Seebell, 19 May 1927 (FC, UC).

ICELAND: on *Rhodochorton Roibii*, Einarston, H. Jonsson 728, 20 Jul. 1897 (Type of *Platocapsa amethystea* var. *Schmidtii* Coll., C). BERMUDA: on mangrove oar Flacs bridge, P. S. Collins 7262, May 1912 (NY); on *Bostrychia*, Gravelly bay, A. B. Hervey (UC); on *Sporosiphonia gorgoneum* and *Ceramobambion Codii*, Harrington sound, Hervey, Dec. 1914 (Type of *Dermocarpa solitaria* Coll. & Herv. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2155, NY; isotypes, FC [Fig. 179], D, L, UC); on *Catenella Opuntia*, Hungry bay, Hervey 27, Feb. 1909 (UC), Collins 7202, May 1912 (UC), Collins, 2 May 1913 (as *Dermocarpa prasina* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2051, FC, L, NY); epiphyte, Red Hole, eastern St. Davids island, W. R. Taylor 49-1888, 27 May 1949 (FC, MICH); Shelly beach, Collins, Aug. 1912 (FH); on *Lyngbya confervoides* in ditch back of Shelly bay, Collins, 15 Aug. 1913 (as *Xenococcus Schousboei* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2052, FC, L, NY, TA); on *Enteromorpha intussinaki* in ditch in South Shore meadows, Collins, 1 Sept. 1913 (as *Cbroococcus membraninus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2151, FC, D, L). CANARY ISLANDS: Puerto Orotava, C. Sauvageau, Jan. 1905 (FC). FERNANDO DE NORONHA: on Rhizoclonium on rocks, L. G. Williams, Mar. 1945 (FC). FALKLAND ISLANDS: sur *Dumontia fastigiata* (in Hohenacker, Alg. Mar. no. 282, PC; in herb. Reinsch, K). GREENLAND: Fiskeruaes, L. K. Rosenzweig, 31 May 1888 (Type of *Platocapsa amethystea* Rosenw., C). ATLANTIC NORTH AMERICA: in *Leibleinia* in Plocamio, herb. P. Reinsch (Type of *Sphaerosiphon Leibleiniae* Reinsch, K). SAINT PIERRE & MIQUELON: on Cladophora, Pointe Blanche, P. La Gallo 5, 30 Oct. 1945 (FC, TA). NOVA SCOTIA: Sydney, P. S. Collins, Sept. 1899 (NY, UC); on Cladophora in tidepool, Prospect, R. A. Lewin, 1 Oct. 1952 (FC). MAINE: on *Polysiphonia fastigiata*, Pond Cove, W. R. Taylor, Feb. 1928 (TA); Inner Marsh island, Casco bay, Collins, Aug. 1903 (NY, UC); on *Rhodochorton Roibii*, Eagle island, Collins 2113, Jul. 1891 (NY), Collins 2702, Jul. 1893 (NY); Casco bay, Collins, Aug. 1903 (NY); Long island, Casco bay, Collins, Sept. 1902 (NY); Northport, Collins 1012, Aug. 1887 (NY); Cutler, Collins, Jul. 1902 (NY); Buck island, Collins 2942, Jul. 1894 (NY); Harpswell, Collins 4803, 13 Jul. 1903 (FH, NY), Collins 5080, Jul. 1904 (NY); Seal Harbor, Collins, Jul. 1899 (NY); on *Polysiphonia fastigiata*, Seguin island, M. A. Howe 1125, Aug.—Sept. 1900 (FH, NY); Pemaquid Point, H. B. Loundback & C. Graham, 5 July 1949 (D, FC). NEW HAMPSHIRE: Appledore, Isles of Shoals, W. G. Farlow, Sept. 1900 (FH); Newcastle, Collins 3727, May 1900 (NY).

MASSACHUSETTS: on *Polysiphonia fastigiata*, Clifton, Collins & W. A. Seebell, 20 Apr. 1889 (FC, NY, TA, UC); on Cladophora in upper tide pool, rocky shore, Cohasset, Collins, 12 Oct. 1901 (as *Xenococcus Kernerii* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 952, FC, L, UC); on *Polysiphonia fastigiata*, Little Nahant, W. A. Seebell 319, 18 Apr. 1891 (FC, UC); as *Dermocarpa prasina* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1, FC, L, NY, TA, UC); on *Rhodochorton Roibii*, Little Nahant, Seebell 292, Nov. 1890 (UC); on R. *Roibii*, Marblehead, Collins, 17 Jun. 1902 (FH), Aug. 1902 (NY, UC); on Cladophora, Magnolia, Farlow, Sept. 1903 (FC, FH); on *Polysiphonia fastigiata*, Nahant, Farlow (FH, PC), Collins, Apr. 1895 (as *Dermocarpa prasina* in Collins, N. Amer. Alg. no. 3, D, NY); on Porphyra, Nahant, Seebell, Jun. 1889 (UC); on *Rhizoclonium riparium*, Nahant, Collins, 17 Aug. 1889 (FC, FH, NY, UC); on *Rhodochorton*

Roebii, Nahant, Collins 1518, 30 Mar. 1890 (FC, UC), L. N. Johnson 821, 7 May 1892 (FC); on *Polysiphonia fastigiata*, Swampscott, Collins 2032, Apr. 1891 (NY, UC); on *Chaetomorpha aerea*, Woods Hole, Setchell 815, 16 Aug. 1894 (FC, UC); on *Rhodochorton Roebii*, Eel pond, Woods Hole, E. T. Ross, 16 Jul. 1936 (D); on *Lyngbya confervoides* Ag., steamboat wharf, Woods Hole, R. N. Webster & F. Drouot 2150, 7 Jul. 1938 (D). RHODE ISLAND: on *Lyngbya semiplena*, Newport, Collins 4221, Aug. 1901 (FH, NY, UC); on *Polysiphonia fastigiata*, Newport, H. M. Richards, Dec. 1890 (UC); on *Enteromorpha intestinalis*, Easton's point, Newport, Mrs. W. C. Simmons, Nov. 1896 (NY), Sept. 1898 (as *Dermocarpa violacea* in Coll., Hold., & Setch., Phyc. Bor. Amer. no. 556, FC, L, NY, TA, UC). CONNECTICUT: on *Rhodochorton Roebii*, Seaside park, Bridgeport, I. Holden, 4 Jul. 1892 (FH), Holden 768, 11 Dec. 1892 (FH, NY); Black Rock, Bridgeport, Holden 667, 28 Jul. 1892 (FH); on *Cladophora*, Mill river, Fairfield, L. N. Johnson 194, 12 Sept. 1891 (FC); culture from Long Island sound, New Haven, R. A. Lewin C., 29 Feb. 1948 (FC). LABRADOR: in *Plocamio coccineo*, herb. Reinsch (K). QUEBEC: in *Polysiphonia fastigiata*, St. Lawrence river, herb. Reinsch (Type of *Sphaenosiphon incrustans* Reinsch, K). NEW YORK: on *Cladophora expansa* in tide pools, Cold Spring Harbor, Long island, Johnson 1055, 14 Aug. 1894 (FC). NEW JERSEY: on *Lyngbya*, Atlantic City, I. C. Marincola, 12 Dec. 1886 (FH, UC); on *Enteromorpha*, Atlantic City, J. N. Rose 19590, Aug. 1925 (NY). NORTH CAROLINA: on *Gelidium*, Beaufort, W. D. Hoys (NY); on *Lyngbya semiplena* on piling at west end of Shackleford Banks, Beaufort, H. J. Humm 12, 15 Sept. 1947 (FC); on *Calobrix prolifera* on wooden breakwater, Wrightsville Beach, Humm, 24 May 1946 (FC).

FLORIDA: on *Ceramium* washed up on the Atlantic ocean beach between Dania Beach and Hollywood Beach, Broward county, P. Drouot & H. B. Loundorback 10327, 28 Dec. 1948 (FC); on pilings 2 miles south of St. Johns river mouth, Jacksonville Beach, Humm 3, 19 Mar. 1948 (FC); on hydroid dredged 12 miles southeast of Alligator point, Franklin county, Humm, 27 Dec. 1952 (FC); Hendry creek about 10 miles south of Fort Myers, P. C. Standley 73256, Mar. 1940 (FC); on *Bostrychia* and *Cladophora*, Way key, Cedar keys, Drouot & C. S. Nielson 11127, 11181, 22 Jan. 1949 (FC, T); on *Padina*, moat, Garden key, Dry Tortugas, W. R. Taylor 422b, Jun. 1924 (NY, TA); on *Chaetomorpha*, Marineland, Humm, 19 Nov. 1950 (FC); on an ascidian on *Sargassum cymosum* dredged about 4 miles ESE of St. Marks Lighthouse, Wakulla county, Humm, 17 Aug. 1952 (FC). MISSISSIPPI: on *Bostrychia* on pilings, Gulf Coast Research Laboratory, Ocean Springs, Jackson county, Drouot & R. L. Caylor 9904, 12 Dec. 1948 (FC); on *Bostrychia*, Mississippi sound between Bay St. Louis and Waveland, Drouot 9807, 9811, 8 Dec. 1948 (FC); on *Bostrychia* in St. Louis bay, Bay St. Louis, Drouot 9853, 9 Dec. 1948 (FC). LOUISIANA: on *Lyngbya semiplena*, *L. confervoides*, and *Bostrychia* sp., Grand Isle, Jefferson parish, L. H. Plint, 2 Dec. 1945, 15 Aug. 1947, 13 Mar. 1953 (FC); on *Lyngbya semiplena* in Lake Pontchartrain at the south end of R. S. Maestri bridge, Orleans parish, Drouot & P. Viozca Jr. 9324, 24 Nov. 1948 (FC). TEXAS: on *L. confervoides* and *L. semiplena* on jetty, Brazos Santiago and South Padre island, Cameron county, R. Runyon 3950, 3972, 7 Jun., 18 Jul. 1945 (FC); on *Gracilaria foliifera* on jetty, Port Aransas, H. Hildebrand, 31 Dec. 1952 (FC). ALASKA: Sitka, N. L. Gardner 3962, Jul. 1917 (Type of *Xenococcus Gillebyae* Setch. & Gardn., UC); on *Fucus*, Sitka, D. Saunders (UC). BRITISH COLUMBIA: on *Cladophora* in tide-pool, Baird point, strait of Juan de Fuca, J. E. Tilden, 3 Aug. 1898 (isotype of *Pringsheimia scutata* f. *Cladophorae* Tild. in Tild., Amer. Alg. no. 382, FC); on *Cladophora*, Nootka sound, Vancouver island, W. A. Setchell & H. E. Parks, 24 Jun. 1930 (FC, UC). WASHINGTON: on *Gigartina papillata*, Port Townsend, ex herb. Farlow (FC); on *Cladophora*, Port Townsend, Miss Cooley, Aug. 1891 (FH); on hairs of Phoca (the harbor seal), Puget sound, J. W. Slipp, Jul. 1942 (TA); on *Iridaea laminarioides*, Puget sound, herb. D. Saunders (FH); on *Fucus evanescons*, San Juan island, W. C. Muenscher 1389, Jun. 1915 (TA); on *Fucus*, Searle, D. Saunders (UC); on *F. evanescons* f. *microcephalus* near Searle, D. Saunders, Jun. 1899 (Type of *Dermocarpa fucicola* Saund. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 801, FH; isotypes, FC, L, MICH, TA); Three Tree point, 15 miles south of Searle, Gardner 7982, Jul. 1936 (FC, UC); on *Gelidium*, Channel rocks, West Searle, Gardner 534 (FC, UC); on *Spongomorpha*, west coast of Whidbey island, Gardner 467, Jul. 1901 (Type of *Dermocarpa protea* Setch. & Gardn., UC; isotypes, FC [Fig. 200], FH, TA); on *Iridaea laminarioides*, Whidbey island, Setchell & Gardner 92a, 291 (UC); Whidbey island, Setchell & Gardner 301, 670 (UC). OREGON: on *Rhodochorton Roebii*, North Bend, Coos county, Gardner 2756, May 1914 (Type of *Xenococcus pyriformis* Setch. & Gardn., UC; isotypes, FC, TA); on *Prionitis*, Sunset Beach near the mouth of Coos bay, Gardner 2769, May 1914 (Type of *Hyella linearis* Setch. & Gardn., UC; isotype, FC [Fig. 206]).

CALIFORNIA: on *Gigartina*, W. G. Farlow (FH); herb. D. Saunders (FH); N. L. Gardner 7315 (FC, UC). Alameda county: on *Enteromorpha* in pools in salt marsh near Berkeley, Gardner 1580, 15 Nov. 1905 (Type of *Xenococcus acrovastus* Setch. & Gardn., UC; isotype, FC [Fig. 212], L, and as *Pleurocapsa amethystea* var. *Schmidtii* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1704, FC, L). Los Angeles county: on *Dichothrix*, Cabrillo Beach, San Pedro, G. J. Hollenberg 1574, 3 Oct. 1936 (FC, UC); on *Chaetomorpha* on piling, Cabrillo Beach, San Pedro, Hollenberg 2145, 30 Oct. 1937 (Type of *Xenococcus pulcherr* Hollenb. in herb. G. J. Hollenberg;

isotypes, FC [Fig. 202], D); on Gigartina, Point Vicente, W. G. Farlow (FH); San Pedro, Gardner 1906, Jan. 1908 (Type of *Dermocarpa sphaerica* Setch. & Gardn., UC; isotype, TA); on Gelidium, Chaetomorpha, and Calothrix on breakwaters, San Pedro, Hollenberg 486, 1576, 1579, 2 Oct. 1934, 3 Oct. 1936 (D); on Gelidium, San Pedro, W. A. Setchell, Dec. 1895 (FC, UC); on *Hesperophycus Harveyanus*, Catalina harbor, Santa Catalina island, P. C. Silva 4649, 14 Feb. 1949 (FC, UC); Santa Catalina island, E. Y. Dawson 5490, 30 Oct. 1948 (FC). Marin county: on *Lyngbya confervoides*, Duxbury reef, Bolinas bay, Setchell 1038, Nov. 1895 (FC, UC); on Fucus, Bolinas, Gardner 4599, May 1920 (UC). Monterey county: on *Rhodochorton Rothii*, Setchell 5489, June 1901 (UC); on *Gelidium Coulteri*, Monterey, Mrs. A. E. Busb, Dec. 1885 (FH); on *Endocladia muricata* and *Iridaea laminarioides*, Pyramid point, Monterey, Setchell 5464, 5456, Jun. 1901 (UC); on *Iridophycus*, north end of beach, Carmel, Gardner 7783, 7783a, 18 Jul. 1935 (FC, UC); on *Calothrix crustacea*, Carmel bay, Setchell & R. E. Gibbs, 12 Jan. 1899 (as *Xenococcus Schouboei* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 554, FC, L, TA, UC); on *Iridaea*, Carmel bay, Gardner 2981, May 1915 (Type of *Hyella socialis* Setch. & Gardn., UC; isotype, FC); on *Rhodochorton Rothii*, Carmel bay, Gardner 2992, May 1915 (FC [Fig. 201], UC; as *Dermocarpa hemisphaerica* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2253, FC, L, MICH., TA); on *Rhodymenia*, Carmel bay, Gardner 3350a (Type of *Radaisia subimmera* Setch. & Gardn., UC; isotype, FC [Fig. 215]); on *Iridaea minor*, Carmel bay, Gardner 3687, May 1916 (Type of *Radaisia epiphytica* Setch. & Gardn., UC [Fig. 205]; isotype, TA); on Gelidium, Point Carmel, Setchell, 3 Jun. 1901 (as *Dermocarpa fucicola* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1251, FC, D, L, MICH., TA); on *Gastroclonium ovale*, Point Carmel, Setchell 5448, Jun. 1901 (UC); Carmel point, I. F. Lewis, 8 Jul. 1929 (FC); on *Chaetomorpha aerea* near Cypress point, Gardner 3580, Jan. 1917 (Types of *Xenococcus Chaetomorphae* Setch. & Gardn. and *Dermocarpa pacifica* Setch. & Gardn., UC; isotypes, FC [Fig. 207, 213], L, TA, UC); Cypress point, Gardner 4528 (FC, L, TA, UC), 4543 (FC, L, TA, UC), 4656 (FC, UC), 4657 (FC, UC), 4694 (FC, UC), Dec. 1919, 1920; on *Rhodymenia californica*, Del Monte bay, R. A. Lewin, 19 Jul. 1948 (FC); on *Gelidium Coulteri* and *Gymnogongrus linearis*, Pacific Grove, Setchell 5409 (FC, UC), May, Jun. 1901; on *Fucus surcatus*, Pacific Grove, Gardner 4665, Dec. 1920 (FC, UC); on *Bornetia secundiflora* near Pacific Grove, J. M. Weeks 118a, Mar. 1897 (UC); on *Chaetomorpha aerea*, mouth of Carmel river, Pacific Grove, R. D. Wood, 2 Jul. 1946 (FC); on *Gelidium Coulteri*, Pebble beach, Carmel bay, Setchell 5482, 17 Jun. 1901 (FC, UC); on *Chondrus canaliculatus*, Pebble beach, Carmel bay, Gardner 7286, May 1933 (FC, UC); on *Rhodochorton Rothii* in a cave, Pebble beach, Pacific Grove, R. D. Wood, 29 Jun. 1946 (FC). Orange county: on *Lyngbya aestuarii* in brackish water west of Newport Beach, G. J. Hollenberg 1533, 1533c, 26 Sept. 1934 (FC, D); on Gelidium, Laguna Beach, Hollenberg 3094, 20 Mar. 1940 (FC). San Diego county: on Dictyota, San Diego, W. G. Farlow (FH); on *Calothrix scopulorum*, La Jolla, T. A. & A. Stephenson JBN41, 1947 (FC); on Laurencia, La Jolla, Hollenberg 2016, 26 Dec. 1936 (D). San Francisco: on *Laminaria Sinclairii*, Fort point, Setchell 2075, 16 Nov. 1898 (FC, UC), Gardner, 25 Dec. 1905, Dec. 1918 (as *Radaisia Laminariae* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2254 a & b, FC [Fig. 204], TA), Gardner 3158 (FC, L, TA), 3159 (D, FC), 3675 (Type of *Radaisia Laminariae* Setch. & Gardn., UC); on *Gymnogongrus linearis*, Fort point, Setchell 6403, 30 Nov. 1906 (FC, UC); on *Iridaea laminarioides*, Fort point, Gardner 4482, Nov. 1919 (FC, UC); on Ulva, Lands End, Setchell & Gardner 1539, 28 May 1905 (FC, UC); on various algae, Lands End, Gardner 1538, Aug. 1903 (FC, UC), 3706a (Type of *Radaisia clavata* Setch. & Gardn., UC), 3710, Apr. 1917 (Type of *Dermocarpa sphaeroides* Setch. & Gardn., UC), 4447, Apr. 1919 (FC, L, TA), 4780, 25 May 1922 (FC, UC), 4857, Oct. 1923 (FC, UC); on *Rhodochorton* in cave south of Point Lobos, I. F. Lewis, 22 Jul. 1929 (FC). San Luis Obispo county: on *Gymnogongrus linearis*, Bushnell's beach, R. S. Reed, Jul. 1917 (UC); on *G. leptophyllus*, Cayucos, P. C. Silva 2299, 29 Nov. 1947 (FC, UC); on *Gelidium Coulteri*, Port San Luis, Silva 2476, 22 Feb. 1948 (FC, UC). San Mateo county: on *Rhodochorton Rothii*, Moss Beach, Gardner 2183, Apr. 1910 (Types of *Dermocarpa suffulta* Setch. & Gardn. and *D. hemisphaerica* Setch. & Gardn., UC; isotypes, FC, L, TA, UC), Gardner 6258, Apr. 1927 (FC, L, TA); Moss Beach, Gardner 4308, Jul. 1918 (FC, UC). Santa Barbara county: on *Gigartina Harveyana*, Point Arguello coast guard station, P. C. Silva 2549, 28 Dec. 1947 (FC, UC); on *Rhodochorton Rothii* in cave, Lady's harbor, Santa Cruz island, Hollenberg 1311, 19 Apr. 1936 (D); on *Corallina gracilis*, Forney's cove, Santa Cruz island, Silva 5925, 8 Mar. 1950 (FC, UC); on *Corallina*, *Chaetomorpha*, and *Chondria*, Santa Rosa island, Silva 4069, 4079, 4142, 27 Jan. 1949 (FC, UC). Sonoma county: on *Laurencia pinnatifida*, Fort Ross, Setchell 1717, Dec. 1897 (FC, UC).

BAHAMA ISLANDS: on Catenella, Little Harbor cay, Berry islands, M. A. Howe 3592b, 31 Jan. 1905 (D, NY). PUERTO RICO: on *Cladophoropsis membranacea*, Point Borinquen near Aguadilla, Howe 2459b, Jun. 1903 (NY); on *Lyngbya semiplena* on cement, Santurce beach, H. L. Blomquist 12785, 25 Feb. 1942 (FC); on *L. sordida*, Gaujaracca, Blomquist 12923, 21 Mar. 1942 (FC); on *Calothrix pilosa*, west side of Guanica bay, Blomquist 13013, 21 Mar. 1942 (FC); on *Rhizoclonium* on mudflat, Las Marias, Blomquist 13099a, 21 Mar. 1942 (FC). VIRGIN ISLANDS: Lt. Princess, St. Croix, P. Børgesen 15x, 1892 (UC). BARBADOS: on *Dictyopteris delicatula*,

Valencia, A. Vickers, 17 Jan. 1899 (FC, UC), Jun. 1899 (Type of *Dermocarpa Vickersiae* Coll., NY; isotype in Coll., Hold., & Secht., Phyc. Bor.-Amer. no. 1602, FC [Fig. 214], FH, L, TA). JAMAICA: Northeast cays, Morant cays, C. B. Lewis 11172, Jun. 1950 (FC). MEXICO: Baja California: on *Gracilaria Cunninghamii*, Cabo Colnett, E. Y. Dawson 5241, 4 Sept. 1948 (FC); on *Lyngbya simplicata* on pilings, southeast side of Cerros island, W. R. Taylor 39-2, 14 Mar. 1939 (FC, MICH); Ensenada, N. L. Gardner 4944 (FC, UC); Guadalupe island, H. L. Mason 63 (Type of *Chamaesiphon clavatus* Setch. & Gardn., CAS; isotype, UC); Punta Baja near Rosario, Dawson 1196, 1199, 1200, 9 Apr. 1946 (FC); San Bartolome bay, J. T. Howell 759, 14 Aug. 1932 (FC, UC); San Francisco bay, I. M. Johnston 13a (Type of *Xenococcus deformans* Setch. & Gardn., CAS; isotype, UC); in *Calymmonia angustata*, Santa Maria bay, Howell 759a, 12 Aug. 1932 (Type of *Xenococcus angulatus* Setch. & Gardn., CAS); Santa Rosalia, Marchant 108 (Type of *Dermocarpa Marchantii* Setch. & Gardn., UC); on *Hesperophycus Harveyanus*, South island, Isla de Todos Santos, P. C. Silva 4833, 24 Feb. 1949 (FC, UC); Tortuga island, Gulf of California, Johnston 34c (Type of *Dermocarpa Reinschii* Setch. & Gardn., CAS), Johnston 135a (Type of *Chloroglossa regularis* Setch. & Gardn., CAS). Guerrero: on *Sertularia*, Acapulco, Dawson 3853, 3 Feb. 1947 (FC). Jalisco: on *Lyngbya confervoides*, Barra Navidad, Dawson 3745, 25 Dec. 1946 (FC). Oaxaca: on *Chaetomorpha*, Salina Cruz, Dawson 3784, 9 Jan. 1947 (FC). Sonora: shore of island at entrance of harbor, Guaymas, P. Drouot & D. Richards 3352, 21 Dec. 1939 (FC); on *Lyngbya confervoides*, Playa Miramar, Guaymas, Drouot & Richards 3139, 5 Dec. 1939 (FC); in tide-pool, Punta San Pedro, Guaymas, Drouot & Richards 3382, 22 Dec. 1939 (FC); on *Chaetomorpha*, Isla Patos, Dawson 652, 17 Feb. 1946 (FC).

GUATEMALA: on *Chaetomorpha*, Bay of Santo Tomás between Escobas and Santo Tomás, depre. Izabal, J. A. Steyermark 39340, 13 Apr. 1940 (FC). PANAMA: on *Lyngbya sordida* in tide-pools, Islas Secas near Puerto Nuevo, W. R. Taylor 39-123, 26 Mar. 1939 (FC). BRAZIL: Paraná: on *Lyngbya confervoides*, Ilha de Farol, Caiobá, A. Brandão July 490, 8 Feb. 1951 (FC); on *Cladophora*, Caiobá, Brandão July 492, 528, 9 Feb. 1951 (FC); on *Gelidella*, Praia Medanha, Brandão July 513, 11 Feb. 1951 (FC); on *Lyngbya confervoides* and *Pylaiella*, Punta das Caieiras, Brandão July 518, 519, 525, 12 Feb. 1951 (FC). São Paulo: São Vicente near Santos, P. Rawitscher 43, 1941 (FC, TA); on *Cladophora*, Guarujá (Santos), A. Fudala 331, 20 Oct. 1950 (FC); Praia de Parnapoan, S. Vicente, July 150, 7 Oct. 1953 (D); on *Lyngbya confervoides*, Perube, Brandão July 399, 459, 29 Dec. 1950, 1 Jan. 1951 (FC). URUGUAY: on *L. confervoides*, Punta del Este, Maldonado, D. Legrand 2, Mar. 1945 (FC, TA). ECUADOR: Galapagos Islands: among *Rhizoclonium robustum*, North Seymour island, J. T. Howell 170b, 11 Jun. 1932 (Type of *Dermocarpa simulans* Setch. & Gardn., CAS; isotypes, D, UC); on *Rhizoclonium riparium* in a tide-pool 5 miles northeast of Webb cove, Albemarle island, Howell 429b, 22 May 1922 (Type of *Xenococcus endophyticus* Setch. & Gardn., CAS; isotypes, D, UC); on *Gelidium* and mangrove, southeast side of Narborough island, Howell 344, 387, 1 & 2 June 1932 (FC, UC); tide-pool, Villediel, Albemarle island, Howell 418, 27 Apr. 1932 (FC, UC). PERU: on *Sirobiodadia spicata*, Pisco, R. E. Coker 465, Jul. 1908 (NY); Chíncha Norte island, W. Vogt, 1941 (FC); Lima, A. Maldonado 13, Dec. 1930 (FC); on *Rhizoclonium*, Lago Chilca and Laguna Saraja, Maldonado 65, 93, Jan.—Feb. 1942 (FC). HAWAIIAN ISLANDS: Waikiki near Honolulu, W. A. Seebell 5595, Jul. 1900 (FC, UC). PHOENIX ISLANDS: on *Lyngbya confervoides*, southeast side of Canton island, O. Degenor 21343, Apr. 1951 (FC). GUAM: on the reef at the mouth of Pago river, eastern coast, A. E. Vatter Jr. 4, 25 Jan. 1946 (FC). NEW ZEALAND: on *Cladophora* on floor of cave, Island, Half Moon bay, Stewart island, I. B. Warnock 700A, 19 Feb. 1935 (in Tild., So. Pacific Pl., 2nd ser. no. 700A, FC); New Zealand, on *Rhizoclonium*, V. J. Chapman, Dec. 1948 (FC); on *Euteromorpha*, Auckland, Chapman, Jun. 1946 (FC); Bay of Islands, Chapman 9060b, 1947 (FC); on *Rhodochorton*, Long Beach, Bay of Islands, V. W. Lindauer 1725, 26 Jan. 1940 (FC, UC).

JAPAN: on *Chordaria simplex*, Tokyo, Yatabe, Feb. 1878 (FH, PC); on *Myslophycus caniposus*, Japan, K. Yendo, Dec. 1898 (D, FC, UC); Shimoda, Yendo, Feb. 1907 (D, FC, UC); in *Gymnogongrus* sp., Aburatsubo, and in *Carpopellis* sp., Jyoga-shima, Miura peninsula, Misaki, I. Umezaki 985, 987, 29, 30 Mar. 1953 (D). PHILIPPINES: on *Lyngbya aestuarii* in fishponds, Manila, E. D. Merrill 7458 (D, FC, UC), Aligaen near Manila, G. T. Velosquez 144, Dec. 1953 (D); on *Chaetomorpha brachygonia* in fishponds at Dagat-Dagatan, Rizal, Velosquez 624, 19 Jan. 1941 (FC); on *Lyngbya aestuarii*, Parañaque, Rizal, M. T. Cruz 19555, Aug. 1933 (FC, UC). VIET NAM: on *Lyngbya confervoides* on jetty, Cauda, Bay of Nhatrang, E. Y. Dawson 11300, 10 Feb. 1953 (FC). INDONESIA: with *Bostrychia tenella*, Aroi Eilanden (Manumbai), H. Jewell 234, 1914—16 (Type of *Pleurocapsa violacea* Weber-van Bosse, C); on *Lyngbya confervoides*, Endeck, Flores, A. Weber-van Bosse 1124, Dec. 1888 (L); Banda, Kai islands, on *Cladophora*, T. Mortensen VIII, 10 Jun. 1922 (Type of *Radaisia puilla* Weber-van Bosse, C); drijvende op rif, Sanana, Soela Besi, Weber-van Bosse, Sept. 1899 (L); strand, Adja-Toening, Nicuw Guinea, Weber-van Bosse, 1899—1900 (L). AUSTRALIA: on *Calobrix pilosa*, Brampton island off Mackay, Queensland, V. May 2701, 16 Jun. 1948 (FC); in mari, Sydney, New South Wales, A. Grunow 022, Aug. 1884 (PC); on *Lyngbya confervoides* in rock pools, Warramolla, New South Wales, May 214, 26 Aug. 1944 (D, FC); auf *Sphacelaria Incisera* auf *Sargassum Peronii*, Nordwest-Australien, Gazellen-Expedition B312-

(137)a, 26 Apr. 1875 (B); on *Calotrix crustacea*, Emu bay, Kangaroo island, South Australia, H. B. S. Womersley O, 10 Jan. 1946 (FC). ISRAEL: on *Lyngbya confervoides*, Tel Aviv, T. Rabys 1, Dec. 1943 (FC). MAURITIUS: on *L. confervoides*, Flacq, Baie de 4 Cocos, N. Pike, 23 Jan. 1870 (FC).

4. ENTOPHYSALIS RIVULARIS (Kütz.) Dr.

Plantae primum microscopicae aetate provecta in stratum aut pulvinum macroscopicum aerugineum, olivaceum, brunneum, violaceum, rubrum, vel nigrum increscentes, cellulis solitariis et ad basem strati aut pulvini sphaericis, ellipsoideis, obovoideis, vel cylindraceutis, diametro 2—8 μ crassis; cellulis superioribus praecipue sphaeroideis vel post divisiones polyhedroideis; cellulis filorum intus substratum penetrantium ovoideis, sphaericis, cylindraceutis, vel polyhedroideis, diametro (1—)2—15 μ crassis; endosporangiis sphaericis vel ovoideis, diametro ad 30 μ crassis; gelatino vaginale primum hyalino demum lutescente vel raro rubrescente seu coeruleo, homoganeo vel lamelloso; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, homoganeo vel sparse grossi-granuloso. FIGS. 216—220, 222—234, 374, 375.

Strata and cushions are the most familiar growth-forms of *Entophysalis rivularis*. On limestone and shells, the basal penetrating filaments develop copiously; but they are absent or represented only by elongated and curved cells on non-calcareous rocks and on wood.

Key to forms of *Entophysalis rivularis*:

Solitary and basal cells ovoid or spherical f. RIVULARIS
Solitary and basal cells cylindrical f. PAPILLOSA

4a. ENTOPHYSALIS RIVULARIS f. RIVULARIS. *E. rivularis* Drouet, Amer. Midl. Nat. 30: 671. 1943. *Hydrococcus rivularis* Kützting, Linnaea 8: 380. 1833. *Oncobyrsa rivularis* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Math.): 47, 96. 1843. —Type from Schleusingen, Germany (L). FIG. 217.

Pleurococcus julianus Menegh., Giorn. Toscano Sci., Med., Fis. e Nat. 1: 186. 1840. *Protococcus julianus* Kützting, Sp. Algar., p. 198. 1849. *Chroococcus julianus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *Gloeocapsa juliana* Kützting ex Rabenhorst, Fl. Eur. Algar. 2: 42. 1865. *Bichatia juliana* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from the Julian sprigs, Italy (FI). FIG. 225.

Pleurococcus glomeratus Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 40. 1843. *Chroococcus glomeratus* Forti, Syll. Myxophyc., p. 20. 1907. —Type from the Italian Tyrol (FI). FIG. 234.

Palmella duriuscula Kützting, Phyc. Gener., p. 172. 1843. *Cagniardia duriuscula* Trevisan, Sagg. Monogr. Alg. Coccor., p. 50. 1948. —Type from Schleusingen, Germany (L). FIG. 220.

Hydrococcus ulvaceus Kützting, Phyc. Gener., p. 177. 1843. *Oncobyrsa ulvacea* Rabenhorst, Fl. Eur. Alg. 2: 67. 1865. *O. rivularis* var. *ulvacea* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 93. 1891. —Type from Monfalcone, Italy (L). FIG. 223.

Protococcus carneus Kützting, Phyc. Germ., p. 146. 1845. —Type from Silesia (L).

Palmella Brebissonii Kützting, Tab. Phyc. 1: 24. 1846. —Type from Falaise, France (L).

Exococcus ovatus Nägeli, Die Neuere Algensyst., p. 170. 1847. —Type from Zürich, Switzerland (ZT).

Gloeocapsa dermochroa Nägeli in Kützting, Sp. Algar., p. 224. 1849; Nägeli, Gatt. Einzell. Alg., p. 51. 1849. *Bichatia dermochroa* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Pleurococcus dermochroa* Nägeli pro synonym. ex Wille, Nyt Mag. Naturvid. 62: 186. 1925. —Type from Zürich, Switzerland (L).

Gloeocapsa rubicunda Nägeli, Die Stärkekörner (Pflanzenphys. Unters. 2), p. 282. 1858. —Type from St. Moritz, Switzerland (ZT).

Polycystis fuscolutea Hansgirg, Oesterr. Bot. Zeitschr. 38: 87. 1888. *Microcystis fuscolutea*

- Fori, Syll. Myxophyc., p. 92. 1907. —Type from Modran, Bohemia (W).
- Chroococcus fuscoater* var. *fuscoviolaceus* Hansgirg, Oesterr. Bot. Zeitschr. 38: 115. 1888.
- C. fuscoviolaceus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 20. 1890.
- Chamaesiphon fuscoviolaceus* Margalef, Collect. Bot. (Barcelona) 3(2): 221. 1952. —Type from Tannwald, Bohemia (W). FIG. 226.
- Cyanoderma rivularis* Hansgirg, Notarisia 4: 658. 1889. *Pleurocapsa rivularis* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 91. 1891. *Xenococcus rivularis* Geitler, Beih. z. Bot. Centralbl., II, 41: 245. 1925. —Type from Pocarek, Bohemia (W). FIG. 231.
- Chroococcus fuscoviolaceus* var. *cupreofuscus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 20. 1890. *Pleurocapsa cuprea* Hansgirg, Prodr. Algenfl. Böhmen 2: 128. 1892. —Type from Tannwald, Bohemia (W). FIG. 216.
- Pleurocapsa minor* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 89. 1891. *Scopulonema minus* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 93. 1942. —Type from Kuchelbad, Bohemia (W). FIG. 224.
- Pleurocapsa concharum* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 90. 1891. *Scopulonema concharum* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 93. 1942. —Type from near Roztok, Bohemia (W).
- Aphanocapsa anodoniae* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 99. 1891. *Microcystis anodoniae* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 138. 1938. —Type from near Roztok, Bohemia (W).
- Chamaesiphon juscus* var. *auratus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 538. 1891. —Type from Martinscica near Fiume, Jugoslavia (W).
- Aphanocapsa anodoniae* var. *major* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 358. 1891. —Type from near Cilli, Slovenia, Jugoslavia (W). FIG. 219.
- Entophysalis Cornuana* Sauvageau, Bull. Soc. Bot. Fr., ser. 2, 14: cxvii. 1892. *Radaisia Cornuana* Sauvageau, Journ. de Bot. 9: 376. 1895. —Type from near Biskra, Algeria (PC). FIG. 218.
- Dermocarpa Flabathlii* Sauvageau, Bull. Soc. Bot. Fr., ser. 2, 14: cxix. 1892. —Type from near Biskra, Algeria (PC). FIG. 218.
- Hyella fontana* Huber & Jadin, Journ. de Bot. 6: 279. 1892. *H. fonticola* Huber & Jadin ex Fori, Syll. Myxophyc., p. 127. 1907. —Type from near Montpellier, France (PC).
- Chroococcus (Rhodococcus) Hansgirgii* Schmidle, Allgem. Bot. Zeitschr. 6: 79. 1900; Hedwigia 39: 189. 1900. —Type from Poona, India (ZT). FIG. 229.
- Coelosphaeium holopodiforme* Schmidle, Beih. z. Bot. Centralbl. 10: 180. 1901. —Type from Schwanningen, Württemberg (ZT). FIG. 227.
- Placoma africana* Wille, Oesterr. Bot. Zeitschr. 53: 90. 1903. —Type from the Kachembe river, South Africa (O).
- Hyalococcus niger* Schmidle, Allgem. Bot. Zeitschr. 1905: 64. 1906. —Type from Mammern, Switzerland (ZT). FIG. 230.
- Guyotia singularis* Schmidle, Allgem. Bot. Zeitschr. 1905: 64. 1906. —Type from the Sinai peninsula, Egypt (ZT). FIG. 222.
- Falmophyllum foliaceum* G. S. West, Journ. Linn. Soc. Bot. 38: 145. 1907. —Type from Niampolo, Tanganyika (BM).
- Pleurocapsa polonica* Raciborski, Phyc. Polon. 1: 11. 1910. *Siphononema polonicum* Geitler, Beih. z. Bot. Centralbl., II, 41: 251. 1925; Geitler, Arch. f. Protistenk. 51: 332. 1925. *Scopulonema polonicum* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 93. 1942. —Type from Morskiem Okiem, Galicia, Poland (WU).
- Entophysalis samoensis* Wille, Hedwigia 53: 144. 1913; in Reehinger, Bot. & Zool. Ergebn. Samoa- & Salomoninseln, Süswasseralg., p. 7. 1914. —Type from Savaii, Samoa (O).
- Aphanocapsa construcix* Bremekamp, Teysmannia 25: 73. 1914. —Type from Idjen mountain in eastern Java, Indonesia (in the Mineralogisch-Geologisch Insituur, University of Utrecht).
- Chroococcopsis gigantea* Geitler, Arch. f. Protistenk. 51: 342. 1925; Beih. z. Bot. Centralbl., II, 41: 241. 1925; in Pascher, Süswasserfl. 12: 125. 1925. —Paratype named by the author, from Ranau lake, Sumatra (in the collection of L. Geitler).
- Chamaesiphon polymorphus* Geitler, Arch. f. Protistenk. 51: 327. 1925. —Paratype named by the author from Tjibodas, Java (in the collection of L. Geitler).
- Chroococcus minutissimus* Gardner, Mem. New York Bot. Gard. 7: 8. 1927. —Type from near Arecibo, Puerto Rico (NY). FIG. 232.
- Entophysalis chlorophora* Gardner, Mem. New York Bot. Gard. 7: 30. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 233.
- Radaisia Willoi* Gardner, Mem. New York Bot. Gard. 7: 32. 1927. —Type from near Humacao, Puerto Rico (NY).
- Radaisia confluens* Gardner, Mem. New York Bot. Gard. 7: 32. 1927. —Type from Maricao, Puerto Rico (NY). FIG. 228.

Chamaesiphon ferrugineus Fritsch, New Phytol. 28: 178. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch).

Pseudonocobrysa luminensis Fritsch, New Phytol. 28: 181. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch). The young, largely unicellular, hormogonia of *Amphibrix jansbina* (Mont.) Born. & Flah. make up a large part of this specimen; they account for at least part of the author's description.

Chroococcopsis luminensis Fritsch, New Phytol. 28: 183. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch).

Chlorogloea purpurea var. *minutissima* Geider, Arch. f. Hydrobiol., Suppl. XII, 4: 623. 1933. —Type from Ranau Pakis, east Java (in the collection of L. Geider).

Chlorogloea major Geider, Arch. f. Hydrobiol., Suppl. XII, 4: 623. 1933. *C. minor* Geider, ibid., Suppl. XIV., 6: 386. 1935. —Type from Dijeng plateau, Java (in the collection of L. Geider).

Myxosarcina spectabilis Geider, Arch. f. Hydrobiol., Suppl. XII, 4: 624. 1933. —Type from Bukit Kili, Sumatra (in the collection of L. Geider).

Chamaesiphon fallax Geider, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Pasergede, Java (in the collection of L. Geider).

Radaisia gigas Geider, Arch. f. Hydrobiol., Suppl. XII, 4: 626. 1932. —Type from Ranau lake, Sumatra (in the collection of L. Geider).

Cyanodermatium gelatinosum Geider, Arch. f. Hydrobiol., Suppl. XII, 4: 627. 1933. —Type from Ranau lake, Sumatra (in the collection of L. Geider).

Cyanodermatium violaceum Geider, Arch. f. Hydrobiol., Suppl. XII, 4: 627. 1933. —Type from Ranau lake, Sumatra (in the collection of L. Geider).

Dermocarpa Gardineriana Drouet, Field Mus. Bor. Ser. 20: 128. 1942. —Type from San Francisco, California (FC).

Dermocarpa Setchellii Drouet, Field Mus. Bor. Ser. 20: 129. 1942. —Type from Harlem hot springs, San Bernardino county, California (FC).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens are found:

Microcystis pulchra Florow, Nova Acta Acad. Caes. Leop.-Car. Nat. Cur. 20(2): 478. 1842. *Protococcus pulcher* Kützting, Phyc. Germ., p. 147. 1845. *Pleurococcus pulcher* Trevisan, Sagg. Monogr. Alg. Coccol., p. 32. 1848.

Palmella dura Wood, Smiths. Contrib. Knowl. 241: 80. 1872.

Chroococcus rubrapunctis Wolle, Bull. Torr. Bot. Club 6: 181. 1877.

Sphaerogonium subglobosum Rostafinski, Rozpr. Akad. Umiej. Krakow, Wydz. Mat.-Przyr., 10: 291. 1883. *Chamaesiphon subglobosum* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 98. 1907.

Sphaerogonium polonicum Rostafinski, Rozpr. Akad. Umiej. Krakow, Wydz. Mat.-Przyr., 10: 299. 1883. *Chamaesiphon polonicus* Hansgirg, Oester. Bot. Zeitschr. 37: 100. 1887.

Aikemayia polymorpha Möbius, Ber. Deutsch. Bot. Ges. 5: lxii. 1887. —See Möbius, ibid. 6: 358. 1888.

Hyella jurana Chodat, Bull. Herb. Boissier 6: 446. 1898. *H. fontana* var. *rubra* Nadsou, Scripta Bot. Hort. Univ. Imp. Petropol. 18: 27. 1900.

Chroococcus Goutzei Schmidle, Engler Bot. Jahrb. 30: 242. 1901.

Coelosphaerium Goutzei Schmidle, Engler Bot. Jahrb. 30: 243. 1901.

Pleurocapsa salovensis Chodat, Étude sur de Polymorph. des Alg., p. 133. 1909.

Oncobrysa sarcinoides Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 11. 1923.

Chroococcus sarcinoides Wislouch *pro synonym.* in Elenkin, loc. cit. 1923; Wislouch, Acta Soc. Bot. Poloa, 2: 110. 1924. *Chlorogloea sarcinoides* Troitzkaja, Dnev. Vsesoiuzn. Sezda Bot., p. 162. 1928.

Oncobrysa sarcinoides var. *sparsa* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Oncobrysa sarcinoides var. *fulvo-cubica* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Oncobrysa sarcinoides var. *irregulariter-consociata* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Oncobrysa sarcinoides var. *irregulariter-consociata* f. *pallida* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Oncobrysa sarcinoides var. *irregulariter-consociata* f. *fusca* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Chroococcus lithophilus Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 75. 1925. *Gloeoapsa lithophila* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 207. 1938.

Chroococcus lithophilus f. *achromaticus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 76. 1925. *Chroococcus lithophilus* f. *coloratus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 76. 1925.

Chroococcus schizodermaticus f. *pallidus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 77. 1925. *Lithocapsa fasciculata* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 82. 1925.

- Lithococcus ramosus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 83. 1925.
Pseudocapsa dubia Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 95. 1925.
Chlorogloea microcystoides Geitler, Arch. f. Protistenk. 51: 357. 1925.
Aphanocapsa endolithica Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 81. 1925.
Aphanocapsa endolithica var. *violascens* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 82. 1925.
Aphanocapsa distans Zalesky, Rev. Gén. de Bot. 38: 35. 1926.
Hyeila fontana var. *maxima* Geitler, Arch. f. Protistenk. 62: 100. 1928.
Aphanocapsa endolithica var. *rivulorum* Geitler, Arch. f. Protistenk. 60: 441. 1928.
Pleurocapsa cuprea f. *pirinica* Petkoff, Bull. Soc. Bot. Bulgarie 3: 37. 1929.
Chlorogloea microcystoides f. *pallida* Skuja, Acta Horti Bot. Univ. Larv. 4: 14. 1929.
Radaisia violacea Frémy, Arch. de Bot. Caen 3 (Mém. 2): 56. 1930.
Pleurocapsa aurantiaca Geitler, Rabenb. Krypt.-Fl. 14: 354. 1931. *Scopulonema aurantiacum* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 95. 1942.
Myxozarcina spectabilis f. *regularis* Geitler ex J. de Toni, Diagn. Algar. Nov., I. Myxophyc. 9: 849. 1946.

Cellulae solitariae et ad basem strati aut pulvini sphaericae vel ovoideae. FIGS. 216—220, 222—234.

On rocks, shells, woodwork, backs of turtles, etc. in fresh water, mostly in clear streams, springs, fountains, and watering-tanks. The upper cells of the stratum, or cushion, especially where the gelatinous matrix has hydrolyzed, often simulate those of *Anacystis montana*, *Coccochloris elabens*, certain small growth-forms of *C. stagnina*, and *Palmogloea protuberans* (Sm. & Sow.) Kütz. The unicellular primordia of *Amphitrix janthina* (Mont.) Born. & Flah. have also been mistakenly identified with this form.

Specimens examined:

NORWAY: in rivulo frigido prope Giövik in praefectione tromsøensi lapidibus affixum, G. Lagerheim, Sept. 1893 (as *Sphaerogonium fuscum* in Witt., Nordst., & Lagerb., Alg. Exs. no. 1611, FC, L, MIN, NY). POLAND: Galicia: na granitach wycielajacych brzegi Czarnego stawu nad Morskiem Okiem, M. Raciborski, 5 Oct. 1909 (Type of *Pleurocapsa polonica* Racib. in Racib., Phyc. Polon. no. 11, WU; isotype, FH). Silesia: in einem Flasche Brunnenwasser, v. Florschütz, 29 Feb. 1844 (Type of *Protococcus carneus* Kütz., L). GERMANY: Saxony: an Pflanzenstengeln im Salzsee bei Halle, P. Richter (UC). Thuringia: an Brunnenufern, Schleusingen, F. T. Kützing (Type of *Palmella duriuscula* Kütz., L [Fig. 220]; isotype, UC); in rivulo prope Hirschbach, Schleusingen, Kützing, 1850 (Type of *Hydrococcus rivularis* Kütz., L [Fig. 217]; isotype, UC). Württemberg: Neckar [-quelle bei Schweningen], G. Schmidle, Aug. 1900 (Type of *Coelosphaerium holopediforme* Schmidle in the Schmidle collection, ZT [Fig. 227]). CZECHOSLOVAKIA: Moravia: Oslava, F. Nováček, 29 Aug. 1933 (FC). Bohemia: Chotzen, A. Hansgirg, Jul. 1887 (FC, W); Desná u Tanovaldu, Hansgirg, Jul. 1885 (FC, W); Dux, Hansgirg, Aug. 1883 (FC, W); Elbfall im Riesengebirge, Hansgirg, Sept. 1883 (FC, W); Hlubočep, Hansgirg, Jun. 1885 (FC, W); in lapidibus calcareis viaductus magni ad Hlubočep, Hansgirg (as *Gloeocephala rupicola* in Kerner, Fl. Exs. Austro-Hung. no. 3199, Z); Johannsbad, Hansgirg, Jul. 1885 (FC, W); Karlovary, Studeň, Hansgirg, Aug. 1883 (FC, W); ad rupes thermarum Carolinarum, Walwitsch (DT); Koda prope Karlstein, Sedlec prope Lodenic, Hansgirg, May 1890 (FC, W); in offenen Quellen an Steinen oberhalb Kuchelbad nächst Prag, Hansgirg, 3 May 1884 (Type of *Pleurocapsa minor* Hansg., W; isotype, FC [Fig. 224]); an von lauwarmen Wasser bespritzten Steinen und Eisenplatten in der Moldau bei der Zuckerraffinerie bei Modran nächst Prag, Hansgirg, Nov. 1887 (Type of *Polycystis fuscolutea* Hansg., W; isotype FC); Mummelfall bei Harrachsdorf, Hansgirg, Jul. 1886 (FC, W); Pančszchfall, Hansgirg, Sept. 1883 (FC, W); ad lapides in rivulo prope Pocatek, Hansgirg, Aug. 1888 (Type of *Cyanoderma rivulare* Hansg., W; isotype, FC [Fig. 231]); Praha, na stenach verej. vodovodu i v pissoirech, Hansgirg, Apr. 1883 (FC, W); Praha, stoky, Hansgirg, Feb. 1886 (FC, W); St. Paka, Hansgirg, Nov. 1883 (FC, W); Skt. Wenzens Brunnen, Prag, Hansgirg, Feb. 1884 (FC, W); Seegrund bei Eichwald, Hansgirg, Jul. 1883 (FC, W); Spindelmühle im Riesengebirge, Hansgirg, Nov. 1883 (FC, W); skály proti Srbsku u Karlsteina, Hansgirg, Jul. 1884 (FC, W); Strážbro, Hansgirg, Aug. 1883 (FC, W); Tábor, Hansgirg, Aug. 1883 (FC, W); in Bergbächen an Steinen, Taanwald, Hansgirg, Jul. 1885 (Types of *Crobooccus fuscoater* var. *fuscoviolaceus* Hansg. and *C. fuscoviolaceus* var. *cupreofuscus* Hansg., W; isotypes, FC [Figs. 216, 226]); an alten Schalen von Anodontia, Tuchermeric—Ouaetic nächst Roztok, Hansgirg, Jun. 1890 (Types of *Pleurocapsa concharum* Hansg. and *Aphanocapsa anodontae* Hansg., W; isotypes, FC); Vöslau, Hansgirg, May 1887 (FC, W); Zel. Brod, Hansgirg, Jul. 1885 (FC, W).

AUSTRIA: Styria: in rivulo Gaiswinkelbach prope Grundsee, K. & L. Reebinger, Sept. (as *Chamaesiphon polonicus* in Mus. Vindob. Krypt. Exs. no. 1760, FC, L. S. WU), L. & K. Reebinger 31, Sept. 1909 (FC, W); ad osium lacus Leopoldsteiner See, K. de Keissler, Jul. (as *C. polonicus* in Mus. Vindob. Krypt. Exs. no. 1760b, FC, L. NY, S. WU). Tyrol: Hall, Innsbruck, and Jenbach, A. Hantsgirt, 1891 (FC, W). JUGOSLAVIA: Slovenia: Fodnart, Kaltenbrunn (prope Laibach), and Seibrück, Hantsgirt, Aug. 1890 (FC, W); an Schalen von Süßwasserschnecken bei Trerersfeld nächst Cilli, Hantsgirt, Aug. 1890 (Type of *Aphanocapsa anodontae* var. *major* Hantsg., W; isotype, FC [Fig. 219]). Istria: Pisino, Hantsgirt, Aug. 1889 (FC, W); in aqua dulci, Parenzo, Hantsgirt, Apr. 1889 (FC, W). Croatia: in aqua dulcis, Fiume, Hantsgirt, 1891 (FC, W); auf in schnell fließendem Wasser untergetauchten Steinen in Bächen bei Martinsica nächst Fiume, Hantsgirt, 1891 (Type of *Chamaesiphon fuscus* var. *auratus* Hantsg., W; isotype, FC). Dalmatia: ad castram Iuminis Kerkae ad Scardonam, Hantsgirt, Aug. 1888 (FC, W); Clissa prope Spalato, Hantsgirt, Aug. 1889 (FC, W); Cannosa—Valdinoce prope Ragusa, Castelnuovo, Metkovic, Ombla prope Ragusa, Ragusa, & Topla—Gruda prope Castelnuovo, Hantsgirt, 1891 (FC, W). ALBANIA: Karbounara presso Lushnjë (prov. Berat), corassa cornea di tararuga palustre, presso la sorgente di HaS, G. de Toni 47, 30 May 1941 (D, DT, FC); Fushes-Dukati (prov. Valona), m. Sbedellit, velo d'acqua nella sorgente, in cavità naturale, G. de Toni & L. Boldori 81, 6 Jul. 1941 (D, DT, FC). SWITZERLAND: St. Moritz, an einem hölzernen Trog, C. von Nägeli, Jul. 1849 (Type of *Gloeocapsa rubicunda* Näg., with *Leptoihris muralis*, ZT); Zürich, Pfähnen in einer Brunnen, Nägeli, Sept. 1845 (Type of *Exococcus ovalis* Näg., ZT); Zürich, [Küsnacht], Nägeli 107, Jul. 1847 (Type of *Gloeocapsa dermochroa* Näg. in herb. Kützing, L; isotypes, FI, M, UC); auf Steinen am Bodenseeufer bei Mammern, G. Schmidle, Mar. 1905 (Type of *Hyellococcus niger* Schmidle, ZT [Fig. 230]). ITALY: acqua santa near Rome (L); S. Margherita prope Ala, Auer, and Brixen, A. Hantsgirt, 1891 (FC, W); fontana della piazza del Borghetti (Tirol italiano), D. Clemenis (Type of *Pleurococcus glomeratus* Menegb., FI [Fig. 234]); in Buvio Timavo prope Monfalcone, P. T. Kützing, Thomassin, & Biatoleto, 23 Apr. 1835 (Type of *Hydrococcus ulvaceus* Kütz., L [Fig. 223]); fons prope Monfalcone, Hantsgirt, Aug. 1889 (FC, W); nel bagno freddo thermanum Julianarum, J. Corinaldi 33 (Type of *Pleurococcus julianus* Menegb., FI [Fig. 225]; isotypes, L, S, W).

NETHERLANDS: in kanaal achter de dijk ten Linden van Roptazijl, J. T. Kostar 750, Aug. 1942 (L). ENGLAND: on stones in rather slow-flowing Badgeworthy Water, Devonsbire, F. E. Fritsch, 3 Sept. 1918 (Type of *Chamaesiphon ferrugineus* Fritsch in the collection of F. E. Fritsch; isotype, D); on smooth rock-surfaces in the midst of the rushing torrent in the East Lyn, north Devonsbire, Fritsch, 1 Sept. 1920 (Type of *Cbroococopsis fluminensis* Fritsch and *Pseudonobryzia fluminensis* Fritsch in the collection of F. E. Fritsch; isotype, D). FRANCE: carrières, Falaise, A. de Brébisson 526 (Type of *Palmella Brébissonii* Kütz., L; isotype, UC); environs de Paris, M. Cornu, 1878 (D, FH); sources du Lez près Montpellier, P. Jadin, Jan. 1892 (Type of *Hyella fontana* Hub. & Jadin, PC), Jul. 1894 (FC); source de Font Méjane près Montarnaud (Hérault), J. Huber & P. Jadin, May 1893 (PC); Montpellier, C. Plahault 150 (PC); dans une source fraîche se jettent dans le Lac (Lauvitel) près le Bourge d'Oisans, C. Sauvageau, Aug. 1900 (PC). TUNISIA: Tozeur, M. Serpette TL59, 26 Mar. 1948 (D). ALGERIA: source d'Ain Oumach près Biskra, Sauvageau, Apr. 1892 (Types of *Dermocarpa Plahaullii* Sauvag. and *Entophyidiis Cornuana* Sauvag., PC; isotypes D [Fig. 218]). TANGANYIKA: with *Cladophora inconspicua* G. S. West on stones, shore, Niamkolo, W. A. Cunningham (Type of *Palmophyllum foliaceum* G. S. West, in slide collection, BM). SOUTH AFRICA: im Flussbeete der Kachembe, J. Menyhardt 335 (Type of *Placomma africana* Wille, in the slide collection of N. Wille, O).

NEW BRUNSWICK: boulder in stream, Grand Falls, H. Habeeb 10159, 20 Jul. 1947 (FC, HA); in Little river, Grand Falls, Habeeb 10424, 10562, 17 Jul., 16 Aug. 1948 (FC, HA); ledges in canyon, Grand Falls, Habeeb 10379, 10707, 12 Jul., 3 Sept. 1948 (FC, HA); shore of lake 8 miles south of Grand Falls, Habeeb 11664, 22 Jun. 1951 (FC, HA); in Rapide de Femme brook, fish hatchery, Grand Falls, Habeeb 10447, 21 Jul. 1948 (FC, HA); in Falls brook, Grand Falls, Habeeb 10453, 10500, 10667, 13353, 13372, 13373, 13375, 13405, Jun.—Aug. 1948 (FC, HA). MASSACHUSETTS: on stones, shore of Spot pond, Medford [parasitized material], F. S. Collins, 14 Aug. 1892 (as *Pleurocapsa fluvialis* in Coll., Hold., & Serch., Phyc. Bot.-Amer. no. 555, FC, D, L, WU); in stone watering-trough, corner of Washington and Cedar streets, Woburn, Collins 5381, 9 Sept. 1905 (D, NY). RHODE ISLAND: on wet rocks, Mackerel cove, Conanicut island, Collins, 21 Apr. 1898 (FC, UC). CONNECTICUT: in shells, Twin lakes, Salisbury, W. A. Sessell & L. Holdon, 24 Aug. 1895 (as *Hyella fontana* in Coll., Hold., & Serch., Phyc. Bot.-Amer. no. 303, FC, L, WU). QUEBEC: on ledge in falls of Camp No. 3 river, 10.5 miles north of the hotel, road to Mr. Albert, Gaspé, H. Habeeb 1967, 29 Jun. 1951 (FC, HA). NEW YORK: Cararaugus county: in Beeline creek near lake, Allegany state park, J. Blum 185 (H153), 29 Dec. 1948 (FC). Erie county: on wet sandstone, McKinley monument, Buffalo, J. Knobloch 80020, 16 Sept. 1944 (FC); escarpment below Busti avenue, Buffalo, Blum 171 (H167), 20 Jan. 1949 (FC); in south branch of Smoke creek at highway no. 20A near Orchard Park, Blum 209 (H192), 18 Feb. 1949 (FC). Genesee county: in Tonawanda creek at Indian Falls, Blum 330 (H273), 28 Jul. 1949 (FC). Ontario county: in Reed's creek, D. Haskins 42, 47a, 62, 1944 (FC). NEW JERSEY:

on a water-tank, Tricker's Water Gardens, Saddle River, Bergen county, *F. Drouet, H. Bold, & J. Rubinstein* 3869, 9 Jul. 1941 (FC); in the edge of Toms river at Toms River, Ocean county, *J. C. Bador* 206, 10 Sept. 1938 (FC). PENNSYLVANIA: Dauphin county: on submerged stems in spring, Derry Church, *F. Wolfe*, 21 Oct. 1887 (FC, D). Lancaster county: *J. L. Blum* 113A, 18 Aug. 1948 (FC, PH); springs in Springs park, Lititz, *Blum* 106, *J. Wallace* 107, 9 Aug. 1948 (FC, PH), *R. Patrick* 106, Oct. 1948 (FC, PH); Lititz run and tributary east of Lititz, *Blum* 95, 110B, 5 & 6 Jul. 1948 (FC, PH); Mill creek 2.5 miles south of New Holland, *Blum* 88, 28 Jun. 1948 (FC, PH). Philadelphia: in basins of Wm. Leonidas springs and a spring at Strawberry Mansion bridge, Fairmount Park, *Drouet, Patrick, D. Richards, & C. Hodge* 5523, 5526, 5 Aug. 1944 (FC).

VIRGINIA: in stream entering Lake Matoaka, Williamsburg, *J. C. Strickland* 1240, 1239, 28 Jul. 1942 (FC, ST); on rocks in Moormans river below Sugar Hollow, Albemarle county, *Strickland* 657, 6 Oct. 1940 (FC, ST); on rock in Crab run west of McDowell, Highland county, *E. S. Luttrell & Strickland* 936, 26 Jul. 1941 (FC, ST); on rock in spring at Hawksbill Gap on Skyline drive, Madison county, *Luttrell* 3400, 25 Apr. 1942 (FC, ST). FLORIDA: Gainesville, *M. A. Brannon* 40, 160, 16 Feb. 1942, 11 Apr. 1943 (FC, PC); St. Marks river at Little Natural Bridge, *C. S. Nielsen, G. C. Madison, & D. Crouson* 559, 30 Oct. 1948 (FC, T); Log Sulphur springs, Newport, Wakulla county, *Nielsen* 251, Aug. 1948 (FC, T); on stones in a large spring bathing pool north of Newport, *Drouet, Crouson, & R. Thornston* 11400a, 25 Jan. 1949 (FC, T). OHIO: in Lake Erie on the south end of South Bass island, Ottawa county, *J. Blum* 300 (H244), 15 Jun. 1949 (FC); on cement wall, Lakeview fish hatchery, Cincinnati, *W. A. Daily* 195, 31 Oct. 1939 (DA, FC). KENTUCKY: concrete aquarium in greenhouse, University of Kentucky, Lexington, *B. B. McInnes* 1045, 19 Sept. 1939 (DA, FC). TENNESSEE: on concrete of pond, Mack's, 5 miles east of Knoxville, *H. Silva* 854, 18 Jun. 1949 (FC, TENN); concrete in lake outflow, Chilowee park, Knoxville, *Silva* 831, 18 Jun. 1949 (FC, TENN); concrete sides of fishpool, Iam's place, Knoxville, *Silva* 1510, 20 Jul. 1949 (FC, TENN); rock in spring, Shadow farm near Decatur, Meigs county, *Silva* 961, 28 Jun. 1949 (FC, TENN); rock, Road Prong, Sevier county, *Silva* 448, 11 Jan. 1947 (FC, TENN); in drinking fountain, Newfound Gap, Sevier county, *Silva* 60, 317, 1891, 25 Aug. 1941, 3 Nov. 1946, 10 Sept. 1949 (FC, TENN); rocks in spray of falls, State Teachers College campus, Johnson City, Washington county, *Silva* 462, 14 Jan. 1947 (FC, TENN). MICHIGAN: Cheboygan county: in Black lake, *H. K. Phipps* 12M4177, 206, 208, 24 Jul. 1941, 11 Aug. 1942 (FC, PHI); on pilings, Pigeon river near Indian River, *Phipps* 518, 11 Aug. 1943 (FC, PHI). Presque Isle county: on pipe of artesian spring, Cliff's place, Ocqueoc Lake, *Phipps* 509, 29 Jul. 1943 (FC, PHI). INDIANA: Lowell, Lake county, *M. A. Brannon* 313, 10 Sept. 1945 (FC, PC); on dam and in mill race, Avoca state fish hatchery, Lawrence county, *F. K. & W. A. Daily* 2280, 2296, 2299, 1 Aug. 1950 (DA, FC); laboratory culture, Indiana University, Bloomington, *R. C. Starr*, 29 Jan. 1953 (FC); in Canyon creek near old quarry and in small falls of Echo canyon, McCormicks Creek state park, Owen county, *F. K. & W. A. Daily* 1772, 1792, 9 Aug. 1947 (DA, FC); in spring and fountain, Dunes state park, Porter county, *L. J. King*, 17 Sept. 1941 (FC); in a stream north of Whiting Boy Scout Camp, Dunes state park, *Drouet & H. B. Louderback* 5634a, 15 Jul. 1945 (FC); in the fountain at the courthouse, Richmond, *King*, 10 Nov. 1940 (EAR, FC); on rock, Thistedwaires falls, Richmond, *King*, 3 Oct. 1940 (EAR, FC).

WISCONSIN: Madison: in fountain in B. B. Clarke park, *Louderback & Drouet* 5498, 23 Jul. 1944 (FC); dredged, Lake Mendota, *Forbes & A. B. Seymour*, Sept. 1885 (FC); in the source of Yahama river, Tenney park, *Louderback & Drouet* 5519, 5519a,b, 23 Jul. 1944 (FC). ILLINOIS: Cook county: in drinking fountains (Chicago & Michigan avenues, Jackson park, Grant park, Lincoln park), Chicago, *Drouet & Louderback* 5228, 5236, *Louderback* 4, Oct. 1943, 18 Jul. 1944 (D, FC), *K. C. Fan* 10630, 10640, 10645, 10646, 12 Sept. 1954 (D); laboratory culture, University of Chicago, *P. D. Voib*, May 1945 (FC); on tank in greenhouses, University of Chicago, *Voib, J. M. Beal, & Drouet* 2375, 5 Oct. 1938 (FC); rocks in quarry at Sag Bridge at 111th street, *King & J. O. Young* 457, 3 Aug. 1941 (FC); on a sink in the greenhouse, Northwestern University, Evanston, *Drouet, H. K. Phipps, F. A. Barkley, & D. Richards*, 17 Mar. 1945 (FC). Kane county: in a fountain in Fortwatomie park and in a shell in Fox river south of Main street, St. Charles, *Louderback & Drouet* 5313, 5333, 14-15 Apr. 1944 (FC). Livingston county: in shells in Vermilion river near Mill street, Ponnac, *Drouet & Louderback* 5201, 5211a, 5248, Sept.—Oct. 1943 (FC). MISSISSIPPI: ouder of the Ireshwater reservoir in the western part of Gulfport, *Drouet & R. L. Caylor* 9944a, 9945, 12 Dec. 1946 (FC). MINNESOTA: Mississippi river headwaters, Itasca state park, *Drouet, Fan & J. Rowley* 11974, *Fan* 10160, 21 June 1954; in Sucker creek west of Lake Itasca post office, Clearwater county, *Drouet, T. Morley & Fan* 11901, 17 June 1954 (D, MIN). IOWA: in a drinking fountain in the city park, McGregor, Clayton county, *Drouet & Louderback* 5162, 20 Aug. 1943 (D, FC). MISSOURI: on rocks in Gravois springs, Gravois Mills, Morgan county, *F. Drouet* 1234, 1237, 19 Aug. 1934 (D); on rocks in spring, Monegaw Springs, St. Clair county, *Drouet* 730, 4 Oct. 1930 (D); on pebbles in White river south-east of Mincy, Taney county, *J. A. Steyermark* 40099, 20 Jun. 1941 (FC). LOUISIANA: on turtle, Baton Rouge, *L. H. Plini*, 13 Oct. 1947 (FC).

NEBRASKA: Banner county: rock in streamlet north of Harrisburg, *W. Kiener* 22142, 22 May

1947 (FC, KI). Cherry county: pebbles in Minnehaduzza creek, fish hatcheries, Valentine, *Kiener* 23825, 18 Jun. 1948 (FC, KI). Cheyenne county: rocks in Lodgepole creek east of Potter, *Kiener* 22613a, 22614, 22615, 22618a, 22621, 16 Aug. 1947 (FC, KI). Dakota county: back of Mississippi Map Turtle, Crystal lake, Dakota City, *Kiener* 21778, 21778b, 17 Feb. 1947 (FC, KI). Daws county: rock in Chadron creek, Chadron state park, *Kiener* 20370, 20370a, 20371a, 20373a, 20413, 20415, 15 May 1946 (FC, KI). Dundy county: on pebbles in creek 8 miles north of Max, *Kiener* 10595, 29 Jul. 1941 (FC, KI); pebbles in outlet of fishponds, Rock Creek Hatchery, *Kiener* 19566, 3 Aug. 1945 (FC, KI); on rock and bark in water, Rock Creek Lake state park, 25064, 25115b, 25161, 21 May 1947, 21—22 Nov. 1949 (FC, KI); rocks in seepage near park north of Parks, *Kiener* 21886, 28 Mar. 1947 (FC, KI). Garden county: pebbles in Blue creek north of Oshkosh, *Kiener* 23106, 23108, 2 Apr. 1948 (FC, KI). Keith county: on rock in Otter creek northwest of Ogallala, *Kiener* 21056, 6 Jul. 1946 (FC, KI); pebbles, Lonergan creek springs, Lemoyne, *Kiener* 23389, 23408, 4 May 1948 (FC, KI). Lancaster county: watering-tank 9 miles northwest of Lincoln, *Kiener* 12937, 20 Aug. 1942 (FC, KI); on wood in runoff of tank 14 miles northwest of Lincoln, *Kiener* 12979b, 29 Aug. 1942 (FC, KI); bird fountain, Lincoln, *Kiener* 23915, 28 Jun. 1948 (FC, KI); on turtle, Lincoln, *Kiener* 24101, 10 Aug. 1948 (FC, KI). Morrill county: pebbles in Lawrence Fork creek, southwest of Redington, *Kiener* 22737a, 22738, 21 Aug. 1947 (FC, KI); drainage ditch, west edge of Bayard, *Kiener* 25136, 23 Nov. 1949 (FC, KI). Scotts Bluff county: pebbles in marsh pond northeast of Morrill, *Kiener* 22793, 24 Aug. 1947 (FC, KI); rocks in Akers Draw, Morrill, *Kiener* 22124b, 22126a, 25063, 25064, 25115b, 25161, 21 May 1947, 21—22 Nov. 1949 (FC, KI); rocks in seepage near Mitchell, *Kiener* 25161, 25164, 21 Nov. 1949 (FC, KI).

TEXAS: rocks from shallow stream, Austin, P. A. *Barkley* T1004, 5 Dec. 1942 (FC, TEX); New Braunfels, L. H. *Plins* 3, 18 Nov. 1954 (D); on tub and rocks at bath house, Hot Springs, Brewster county, E. *Whitehouse* 24643, 24645, 24 Dec. 1950 (FC). MONTANA: rocks in running water 0.5 mile east of Potter canyon slaughterhouse, Missoula county, S. R. *Ames* & P. A. *Barkley* 18, 26 Aug. 1940 (FC). COLORADO: wet cliff, Chasm gorge, Long's Peak, W. *Kiener* 4187a, 21 Sept. 1936 (FC, KI); culture from cold streamlet, Granite Basin, Longs Peak, *Kiener* 1281, 21 Mar. 1943 (FC, KI); in drinking fountains, Denver, *Drouet*, D. *Richards*, & J. *Rubinstein* 4097, 6 Sept. 1941 (FC). *Drouet* & H. B. *Louderback* 5731, 18 Aug. 1946 (FC). *Louderback* 5, 22 Aug. 1947 (FC). NEW MEXICO: on rocks in a pond in the lava-beds 6—8 miles east of Grant, Valencia county, A. A. *Lindsey* 2E, 26 Aug. 1944 (FC). UTAH: on rock in pothole at falls, Mt. Timpanogos, Utah county, A. O. *Garrett* 73, 16 Aug. 1925 (FC, UC); in fountain in front of main building, Utah Agricultural college, Logan, G. *Piranion*, 30 Sept. 1933 (FC). NEVADA: in a drinking-fountain in the park along the Truckee river, Reno, *Drouet* & *Richards* 4112, 9 Sept. 1941 (FC). WASHINGTON: in Columbia river, Richland, R. *Gemoway*, 15 Dec. 1952 (FC). CALIFORNIA: Alameda county: in a brook, Lake Chabot, San Leandro, W. J. V. *Osterhout* & N. L. *Gardner* 541, 28 Jun. 1902 (FC, UC); water-trough, Oakland, *Gardner* 20, Oct. 1900 (UC). Napa county: on a cement runway, Seigler hot springs, *Gardner* 7474, 7 Aug. 1933 (FC, UC). San Bernardino county: Harlem hot springs, W. A. *Seebell* 1560, 19 Dec. 1896 (Type of *Dermocarpa Seebellii* Dr., FC; isotype, UC). San Francisco: culture from Lake Merced, *Gardner* 6837, 2 Oct. 1931 (Type of *D. Gardneriana* Dr., FC, isotype, UC); on shells, Mountain lake (parasitized material), *Osterhout* & *Gardner* 545, 24 June 1902 (FC, UC; as *Pleurocapia concharum* in Coll. & Sech., Phyc. Bor.-Amer. no. 1051, FC, L, UC, WU); culture from a dripping water-pipe, Golden Gate park, *Gardner* 890a, 21 Feb. 1933 (FC, UC). Santa Clara county: in rapids of Coyote creek, San José, J. P. *Macbrido* 7806a, Sept. 1944 (FC). Siskiyou county: in seepage at the base of a cliff along Sacramento river, Dunsmuir, *Drouet* & *Richards* 4203, 15 Sept. 1941 (FC). Sonoma county: on dripping rocks in hot water, the Geysers, *Gardner* & *Bonar* 7519, 7519a, 8 Aug. 1933 (FC, UC). Tulare county: in Tule river, Porterville, *Drouet* & M. J. *Groesbeck* 4443, 4 Oct. 1941 (FC); in a water-fountain, Burnett park, east of Porterville, *Drouet* & *Groesbeck* 4496a, 3 Oct. 1941 (FC).

PUERTO RICO: on limestone, waterfall between Arecibo and Utuado, N. *Wille* 1458b, 4 Mar. 1915 (Type of *Chroococcus minutissimus* Gardn., NY [Fig. 232]); Morrillo de Cabo Rojo, N. L. *Britton* 4375, Feb. 1915 (UC); on pebbles in a stream of warm water by the hot spring, Coamo Springs, *Wille* 381, 12 Jan. 1915 (Type of *Entophysalis chlorophora* Gardn., NY [Fig. 233]; isotype, D, UC); auf Steine im Flusse bei Fajardo, *Wille* 680a, 684, 26 Jan. 1915 (FC, NY); on stones in a brook west of Humacao, *Wille* 593, Jan. 1915 (Type of *Radassia Willei* Gardn., NY; isotypes, D, UC); in a fountain in the woods near Maricao, *Wille* 1076, Feb. 1915 (Type of *Radassia confluens* Gardn., NY [Fig. 228]; isotypes, D, UC). MEXICO: from rocks, lower hot springs, Baños de Agua Caliente, Hidalgo, R. *Patrick* 95, 15 Jul. 1947 (FC, PH); spring, San José de Purun, Michoacan, *Patrick* 427, 4 Aug. 1947 (FC, PH). GUATEMALA: on pebbles in small stream, Quebrada Shusho above Chiquimula, P. C. *Standley* 74337, 14 Oct. 1940 (FC); on rocks in sulfur spring, shore of Laguna Petexbatón south of Suyaxché, dept. Petén, J. A. *Stoyrmark* 46232a,b, 3 May 1942 (FC). HONDURAS: on metal water tanks, Comayagua, *Standley* & J. *Chacón* P. 5632, 5781, Mar. 1947 (FC); on side of hydrant, La Lima, dept. Cortés, *Standley* &

Chacón P. 7150, Apr. 1947 (FC). EL SALVADOR: in very warm water from sulfur spring, Ahuachapán, *Standley & E. Padilla* V. 2451, Jan. 1947 (FC); in shallow pool of stream, Metapán, dept. Santa Ana, *Standley & Padilla* V. 3256, 29 Jan.—1 Feb. 1947 (FC). VENEZUELA: dripping cave in lime bluff along Rio Zumbador near base of Piedra Blanca, northeast of Bergantina, Anzoátegui, *Sisymbark* 61284, 1—2 Mar. 1945 (FC). PERU: La Encantada, Lago Chilca, A. Maldonado 60, Jan. 1942 (FC).

HAWAIIAN ISLANDS: Kaelepuhu stream, Kailua, Oahu, M. S. Doy 12491, 3 Aug. 1954 (D). SAMOA ISLANDS: [auf Felsen, Insel Savaii] K. H. Reckinger 2834 (Type of *Entophysalis samoensis* Wille in the slide collection of N. Wille, O). NEW ZEALAND: in basin, Black Terraces, Taupo (East Taupo), *Seschell* 6010a(101), 13 May 1904 (FC, UC). INDONESIA: in oolithis in fonte Tjedjing in monte Idjen in Java Orientali, C. E. B. Bremekamp (Type of *Aphanocapsa constructrix* Bremek. in the collections of the Mineralogisch-Geologisch Instituut of the University of Utrecht); Tjibodas, Java, *Rutiner* (paratype of *Chamaesiphon polymorphus* Geitl., slides Tj21e and Tj211c α in the collection of L. Geitler); Steine in Spritzwasser der Rinne, in der Bambu-Abflussrinne des Beckens, Gefasste Quelle am linken Seraju-Ufer, oberhalb der Dessa Patakbanteng, Dijeng-Plateau, Java, *Rutiner*, 3 Jun. 1929 (Type of *Chlorogloea major* Geitl., slide no. D6be in the collection of L. Geitler); Nostoc-Lager, Umgebung des T. Pasir, Wasserfall des Pagaredé [Pasergede], Java, *Rutiner*, 9 Dec. 1928 (Type of *Chamaesiphon Jallax* Geitl., slide no. SW1b β in the collection of L. Geitler); Stein aus dem Mittellauf des Quellbaches, starke Quelle am SE-Ufer, Ranu Pakis, Java, *Rutiner*, 29 Oct. 1928 (Type of *Chlorogloea purpurea* var. *minutissima* Geitl., slide no. KPQ1d in the collection of L. Geitler); Ranau-See, Süd-Sumatra, *Rutiner*, 1929 (paratype of *Chroococcopsis gigantea* Geitl., slide no. R4h α in the collection of L. Geitler), 27 Jan. 1929 (Type of *Cyanodermatium violaceum* Geitl., slide no. RA2 in the collection of L. Geitler), 28 Jan.—5 Feb. 1929 (Type of *Radaisia gigas* Geitl., slide no. R5a β in the collection of L. Geitler), 1—5 Feb. 1929 (Type of *Cyanodermatium gelatinosum* Geitl., slide no. R4d in the collection of L. Geitler); an Stein in im unteren Becken, Bukit Kili, Sumatra, *Tbienenmann*, 2 Mar. 1929 (Type of *Myxosarcina speciosa* Geitl., slide no. SKW1b in the collection of L. Geitler). INDIA: auf Schnecken-schalen in einem See in der Stadt Poona, A. Hamigirg (Type of *Chroococcus Hamigirgii* Schmidle, ZT [Fig. 229]). EGYPT: Sinai[halbinsel, am Fusse des Oschebel Hamán, A. Knoucker, 16 Apr. 1904] (Type of *Guyoria singularis* Schmidle, ZT [Fig. 222]).

4b. *ENTOPHYSALIS RIVULARIS* f. *PAPILLOSA* (Kütz.) Drouet & Daily, STAT. NOV. *Palmella papillosa* Kützling, Phyc. Germ., p. 149, 1845. *Polycoccus papillosus* Roemer, Alg. Deutschl., p. 65, 1845. *Cagniardia papillosa* Trevisan, Sagg. Monogr. Alg. Coccor., p. 50, 1848. *Entophysalis papillosa* Drouet & Daily, Lloydia 11: 79, 1948. —Type from the Harz mountains, Germany (L). FIG. 375.

Sphaerogonium fuscum Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Math.-Przycz., 10: 295, 1883. *Chamaesiphon fuscus* Hansgirg, Oesterr. Bot. Zeitschr. 38: 117, 1888. —Topotypes from Kalarowkach, Poland (FH, WU).

Xenococcus britannicus Fritsch in West & Fritsch, Brit. Freshw. Alg., p. 467, 1927. *Oncobrysa britannica* Fritsch pro synonym., loc. cit. 1927. *Chamaesiphonopsis regularis* Fritsch, New Phytol. 28: 173, 1929. *Chamaesiphon regularis* Geitler, Rabenh. Krypt.-Fl. Eur. 14: 440, 1932. —Type from Devonshire, England (in the collection of F. E. Fritsch).

Chamaesiphon pseudo-polymorphus Fritsch, New Phytol. 28: 176, 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch).

The original specimen of the following has not been available to us; its original description is designated as the Type until the specimen can be found:

Chamaesiphon Geileri H. Luthet, Acta Bot. Fennica 55: 33, 1954.

Cellulae solitariae et ad basem strati aut pulvini cylindricae vel longi-ellipsoideae. FIGS. 374, 375.

On rocks, shells, woodwork, etc. in fresh water, chiefly in clear streams, springs, and fountains. *Entophysalis rivularis* f. *papillosa* may eventually prove to be only a growth-form of f. *rivularis* developing under special environmental conditions.

Specimens examined:

CRIMEA: in rivulo Ulu-usenji, N. N. Woronichin, 31 Aug. 1929 (FC, FH). POLAND: zhierane na kamkach granitowych w wywierzysku Dunajca Białego w Kalatówkach, M. Raciborski, Oct. 1909 (topotype of *Sphaerogonium fuscum* Rostaf. as *Chamaesiphon fuscus* in Racib., Phyc. Polon. no. 10, FH).

WU). GERMANY: in rivulis montium ad saxa, Freiburg im Breisgau, *A. Braun* 41, 1848 (L, NY), 1849 (PC); in Bäche des Oberbarzes, *Römer* 148 (Type of *Palmella papillosa* Kütz., L [Fig. 375]; isotype, UC). CZECHOSLOVAKIA: Bohemia: am Wege von Deffernik zu Lackasee bei Eisenstein, *A. Hansgirg*, Aug. 1887 (FC, W); in aquaeductu ligneo fontis ad Deffernik prope Eisenstein, *Hansgirg*, 25 Aug. 1887 (as *Oncobyrsa rivularis* in Witttr. & Nordst., Alg. Exs. no. 999, FC, L, WU). ENGLAND: River Heddon, Devon, *F. E. Fritsch*, 5 Sept. 1920 (Type of *Chamaesiphon pseudopolymorphus* Fritsch in the collection of F. E. Fritsch [Fig. 374]; isotype, D); East Lyn, north Devon, *Fritsch*, 2 Sept. 1918 (Type of *Xenococcus britannicus* Fritsch in the collection of F. E. Fritsch; isotype, D). NEW BRUNSWICK: on rocks in a spring, Alma, Albert county, *H. Haeberl*, 11681, 26 Jul. 1951 (FC, HA). NEW YORK: on rusty pipe in Hudson river, Warrensburg, *J. Bader* 183, 5 Aug. 1938 (FC). PUERTO RICO: on twigs in a stream near Maricao, *N. Willis* 1260, Feb. 1915 (NY).

5. ENTOPHYSALIS LEMANIAE (Ag.) Dr. & Daily.

Plantae primum microscopicae (saepius cellulae solitariae) deinde in pulvina macroscopica aeruginea, olivacea, brunnea, violacea, vel rubra increscentes, cellulis solitariis primo sphaericis aetate provecta ovoideis, cylindraceis, cylindraceo-ellipsoideis, vel lineari-tubaeformibus, diametro 1—6 μ crassis, erectis vel varie curvatis cellulis pulvini juvenilis ellipticis vel cylindricis erectis, in pulvinis maturis sphaericis, ovoideis, vel polyhedroideis, diametro 2—8 μ crassis; endosporangiis sphaericis, ovoideis, vel pyriformibus, diametro ad 25 μ crassis; gelatino vaginale primum hyalino demum lutescente, homoganeo vel laminoso; protoplasmate aerugineo, olivaceo, violaceo, vel roseo, homoganeo. FIGS. 221, 235—246.

The commonly encountered growth-forms of *Entophysalis Lemaniae* are the solitary cells which develop in profusion on filamentous algae (*Cladophora* spp., *Oedogonium* spp., *Plectonema Wollei* Farl., etc.) and other plants which persist throughout a season in a habitat. On perennial vegetation, such as *Lemanea* spp., bryophytes, and certain Podostemaceae, the microscopic cushion-shaped masses are sometimes found; their rarity, however, may in large part be due to their destruction by fungi.

Key to forms of *Entophysalis Lemaniae*:

- Solitary cells spherical to cylindrical f. LEMANIAE
 Solitary cells linear-cylindrical and long-stipitate f. ELONGATA

5a. ENTOPHYSALIS LEMANIAE f. LEMANIAE. E. LEMANIAE (Agardh) Drouet & Daily, COMB. NOV. *Nostoc Lemaniae* Agardh, Syst. Algar., p. 20. 1824. *Nostocella Lemaniae* Gaillon, Aperçu d'Hist. Nat., p. 28. 1833. *Oncobyrsa Lemaniae* Gomont, Bull. Soc. Bot. Fr. 43: 377. 1896. *Hydrococcus Lemaniae* Bornet *pro synonym.* in Gomont, loc. cit. 1896. —Type from Scania, Sweden (PC). FIG. 239.

Oncobyrsa Brebissonii Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 96. 1843. *Nostoc stunitale* Brébisson *pro synonym.* in Meneghini, loc. cit. 1843. *Hydrococcus Brebissonii* Kütz., Tab. Phyc. 1: 23. 1846. *Oncobyrsa rivularis* var. *Brebissonii* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 93. 1891. *Entophysalis Brebissonii* Drouet & Daily, Lloydia 11: 79. 1948. —Type from Falaise, France (L). FIG. 245.

Hydrococcus Cosatii Rabenhorst, Alg. Sachs. 93 & 94: 922. 1860. *Oncobyrsa Costiana* Rabenhorst, Fl. Eur. Algar. 2: 68. 1865. —Type from Oropa, Piedmont, Italy (D). FIG. 221.

Chamaesiphon confervicola A. Braun in Rabenhorst, Fl. Eur. Algar. 2: 148. 1865. *Brachybrrix confervicola* A. Braun *pro synonym.* in Rabenhorst, loc. cit. 1865. —Type from Giessen, Germany (NY).

Chamaesiphon confervicola f. *elongatus* Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. —Type from Giessen, Germany (NY).

Chamaesiphon incurvatum Grunow in Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. *Sphaerogonium*

- incrustus* Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-przrz., 10: 282. 1883. —Type from Windisch-Garsten, Upper Austria (W).
- Chamaesiphon Schiedermayeri* Grunow in Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. *C. confervicola* var. *Schiedermayeri* Borzi ex Hansgirg, Prodr. Algenfl. Böhmen 2: 124: 1892. —Type from Milchdorf, Upper Austria (W).
- Chamaesiphon Schiedermayeri* f. *subclavatus* Grunow in Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. —Type from Vöcklabruck, Upper Austria (W).
- Sphaerosiphon aquae-dulcis* Reinisch, Contrib. Algol. & Fungol. 1: 15. 1874. *Dermocarpa aquae-dulcis* Geitler in Pascher, Süswasserfl. 12: 142. 1925. —Type from Dalmatia (K).
- Chamaesiphon curvatus* Nordstedt, Alg. Aq. Dulc. & Charac. Sandvicens., p. 4. 1878. *Sphaerogonium curvatum* Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Math.-Przrz., 10: 292. 1883. *Chamaesiphon confervicola* var. *curvatus* Borzi ex Hansgirg, Prodr. Algenfl. Böhmen 2: 124. 1892. —Type from near Honolulu, Hawaiian islands (PC).
- Chamaesiphon curvatus* f. *alongatus* Nordstedt, Alg. Aq. Dulc. & Charac. Sandvicens., p. 4. 1878. *C. curvatus* var. *elongatus* Nordstedt ex Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 100. 1907. —Type from near Honolulu, Hawaiian islands (PC).
- Godlewskia aggregata* Janczewski, Ann. Sci. Nat. VI. Bot. 16: 229. 1883. *Chamaesiphon aggregata* Geitler in Pascher, Süswasserfl. 12: 157. 1925. —Type from Krakow, Poland (PC).
- Xenococcus Korneri* Hansgirg, Physiol. & Algol. Stud., p. 111. 1887. *Dermocarpa Korneri* Hansgirg, Physiol. & Phycophyt. Unters., p. 254. 1893. *Pleurocapsa Korneri* Drouet, Field Mus. Bot. Ser. 20: 125. 1942. —Type from Eisenbrod, Bohemia (FH).
- Chamaesiphon incrustus* f. *minor* Möbius, Hedwigia 27: 246. 1888. —Topotypes and paratypes from Coamo, Puerto Rico (D, MO, FC).
- Pleurocapsa fluviatilis* Lagerheim, Notarisia 3: 430. 1888. *Xenococcus fluviatilis* Geitler, Beih. z. Bot. Centralbl., II, 41: 245. 1925. —Type from Freiburg in Breisgau, Germany (DT). FIG. 240.
- Oncobyssa hispanica* Lewin, Bih. t. Sv. Vet.-Akad. Handl., Afd. 3, 14(1): 4. 1888. —Type from Yunqueira (Malaga), Spain (S).
- Dermocarpa depressa* W. & G. S. West, Journ. of Bot. 35: 301. 1897. —Type from Sassanga island, Loanda, Angola (BM). FIG. 244.
- Chroococcus varius* f. *samoensis* Wille, Hedwigia 53: 144. 1913. *C. varius* var. *samoensis* Wille ex J. de Toni, Diagn. Alg. Nov. I. Myxophyc. 3: 292. 1938. —Type from Upolu, Samoa (O).
- Chroococcus turgidus* var. *subvillosus* Wille, Hedwigia 53: 144. 1913. —Type from Savaii, Samoa (O).
- Xenococcus minimus* Geitler, Ber. Deutsch. Bot. Ges. 40: 284. 1922. —Type from Vienna, Austria (W). FIG. 241.
- Dermocarpa chamaesiphonoides* Geitler, Ber. Deutsch. Bot. Ges. 40: 283. 1922. —Type from Vienna, Austria (W). FIG. 237.
- Chamaesiphon cylindricus* Boye Petersen, Bot. Icel. 2(2): 272. 1923. —Type (in the collection of J. Boye Petersen) from Husavik, Iceland. FIG. 238.
- Pleurocapsa epiphytica* Gardner, Mem. New York Bot. Gard. 7: 31. 1927. *Radaisia epiphytica* Gardner, New York Acad. Sci. Sci. Surv. Porto Rico 8(2): 264. 1932. —Type from near Mayaguez, Puerto Rico (NY).
- Xenococcus Willoi* Gardner, Mem. New York Bot. Gard. 7: 33. 1927. —Type from near Coamo, Puerto Rico (NY). FIG. 236.
- Chamaesiphon portoricensis* Gardner, Mem. New York Bot. Gard. 7: 33. 1927. *C. minimus* var. *major* Geitler, Rabenh. Krypt.-Fl. Eur. 14: 429. 1932. —Type from Coamo Springs, Puerto Rico (NY). FIG. 243.
- Xenococcus chroococcoides* Fritsch, New Phytol. 28: 186. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch). FIG. 242.
- Xenococcus minimus* var. *Starmachii* Geitler, Rabenh. Krypt.-Fl. 14: 333. 1932. —Paratype named by the author from Danao Manindjau, Sumatra, Indonesia (in the collection of L. Geitler).
- Dermocarpa clavata* Geitler, Rabenh. Krypt.-Fl. 14: 406. 1932. *D. clavata* var. *aquae-dulcis* Geitler, ibid. 14: 1173. 1932. —Type from Ranau Bedali, Java, Indonesia (in the collection of L. Geitler). Both of these names appear to be based upon the same type.
- Dermocarpa xenococcoides* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Ranau Bedali, Java, Indonesia (in the collection of L. Geitler).
- Chamaesiphon minutus* var. *gracilior* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Singkarak lake, Sumatra, Indonesia (in the collection of L. Geitler).
- Chamaesiphon subglobosus* var. *major* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Tjibodas, Java, Indonesia (in the collection of L. Geitler).
- Pleurocapsa subgelatinosa* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 626. 1933; ex Borge, Ark. f. Bot. 25A(17): 5. 1933. —Type from Kota Batu, Sumatra, Indonesia (in the collection of L. Geitler).

Chamaesiphon mollis Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 626. 1933. —Type from Tjibodas, Java, Indonesia (in the collection of L. Geitler).

Dermocarpa Hollenbergii Drouet, Field Mus. Bot. Ser. 20: 129. 1942. —Type from Mojave desert, California (D). FIG. 235.

Dermocarpa Solheimii Drouet, Field Mus. Bot. Ser. 20: 129. 1942. —Type from Medicine Bow national forest, Wyoming (FC).

Dermocarpa minuta Drouet, Field Mus. Bot. Ser. 20: 130. 1942. —Type from Tiburon, California (FC).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Linckia fragiformis Roth, Catal. Bot. 3: 345. 1806. —See Brébisson in Hedwigia 9: 65 (1870) and Hansgirg, Prodr. Algenfl. Böhmen 2: 130. 1892.

Chamaesiphon torulosus Borzi, N. Giorn. Bot. Ital. 14: 313. 1882.

Cyanocystis versicolor Borzi, N. Giorn. Bot. Ital. 14: 314. 1882. *Dermocarpa versicolor* Geider in Pascher, Süswasserfl. 12: 142. 1925.

Sphaerogonium minutum Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-Przyr., 10: 290. 1883. *Chamaesiphon minutum* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 98. 1907.

Sphaerogonium amethystinum Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-Przyr., 10: 291. 1883. *Chamaesiphon amethystinum* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 99. 1907.

Chamaesiphon incrustans var. *laxus* Reinsch, Deutsche Polar Exped. 2: 334. 1890.

Xenococcus gracilis Lemmermann, Abh. Nat. Ver. Bremen 14: 510, footnote. 1898.

Chamaesiphon minutum Schmidle, Engler Bot. Jahrb. 30: 62. 1901. *C. africanus* var. *minutum* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 99. 1907.

Chamaesiphon africanus Schmidle, Engler Bot. Jahrb. 30: 62. 1901.

Chamaesiphon sphaenicola Maillefer, Bull. Herb. Boissier, ser. 2, 7: 44. 1906. *Dermocarpa sphaenicola* Geitler in Pascher, Süswasserfl. 12: 143. 1925.

Chamaesiphon curvatus var. *Turneri* Porri, Syll. Myxophyc., p. 140. 1907.

Cyanocystis parva Conrad, Ann. Biol. Lac. 7: 130. 1914. *Dermocarpa parva* Geitler in Pascher, Süswasserfl. 12: 142. 1925.

Chamaesiphon incrustans f. *asiaticus* Wille in Hedin, Southern Tibet 6(3, Bor.): 166. 1922.

Chamaesiphon incrustans f. *longissimus* Wille in Hedin, Southern Tibet 6(3, Bor.): 167. 1922.

Chamaesiphon oncobyroides Geitler, Arch. f. Protistenk. 51: 330. 1925.

Chamaesiphon incrustans var. *elongatus* Starmach, Spraw. Kom. Fizjog. Polsk. Akad. Umiej. 1926: 110. 1927.

Dermocarpa aquae-dulcis var. *tatrensis* Starmach, Spraw. Kom. Fizjog. Polsk. Akad. Umiej. 62: 10. 1928.

Chamaesiphon carpaticus Starmach, Acta Soc. Bot. Polon. 6: 34. 1929.

Chamaesiphon sideriphilus Starmach, Acta Soc. Bot. Polon. 6: 32. 1929.

Dermocarpa Plectonemalis Prévyn, Ann. de Bot. Caen 3(Mém. 2): 66. 1930.

Chamaesiphon sideriphilus var. *glabrus* B. Rao, Proc. Indian Acad. Sci. 6: 347. 1937.

Xenococcus Lyngbyae Jao, Sinensia 10: 180. 1939.

Chamaesiphon clavatus Jao, Sinensia 10: 181. 1939.

Chamaesiphon Duran-Mileri Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 249. 1946.

Dermocarpa versicolor var. *subsalsia* Proschkina-Lavrenko, Akad. Nauk S. S. R. Otd. Sporovykh. Rost. Bot. Marer. 6: 70. 1950.

Chlorogloea sinensis Chu, Obio Journ. Sci. 52(2): 101. 1952.

Cellulae solitariae primum sphaericae aetate provecta ovoideae, cylindricae, vel cylindraceo-ellipsoideae. FIGS. 221, 235—245.

On larger algae, mosses, and other plants in clear running fresh water of permanent streams, lakes, springs, and fountains. In old cultures containing this form, the endospores and the daughter cells produced by the solitary cells are often seen covering the walls of whatever larger plants are present. The solitary cells may be confused with those of *Clastidium setigerum*, *Stichosiphon sansibaricus*, and *Crenothrix polyspora* Cohn.

Specimens seen:

FINLAND: on *Fontinalis antipyretica* L. in stream 20 km. northwest of Helsingfors, Collander & W. H. Welch 5660, 8 Jul. 1938 (FC); in *Hygroamblystegio fluviatili* ad saxa submersa amnis Pusulanjoki, par. Pusula (Nylandia), V. F. Brotherus, 7 Jul. 1916 (FC). NORWAY: with *Schizothrix tinctoria* (Ag.) Gom. on *Fontinalis antipyretica*, Lillesand, Schübel, 1846 (FC). SWED-

EN: in muscis aquaticis, Nacka, *G. Lagerheim*, Jun. 1883 (S); in rivulis Scaniae, *C. A. Agardh*, 1824 (Type of *Noctic Lomania* Ag., PC [Fig. 239]); in *Cladophora fratica* in Lacu Vallohex Uplandiae, *V. Wisnrock*, 27 Oct. 1878 & *Chamaesiphon confervicola* in Wirtz. & Nordstr., Alg. Exs. no. 293, FC, L, S). POLAND: sur le Bacrachospermum, Cracovie, *E. Janowski*, 20 Apr. 1883 (Type of *Godlowski aggregata* Jancz., PC), 22 Aug. 1885 (PC). ROMANIA: ad Cladophoram apud Baneca prope Bucaresti, *Dna. O. Malinovicu* 1036, 18 May 1896 (FC, W). GERMANY: Freiburg in Breisgau, *G. Lagerheim*, Jul. & Dec. 1887 (Type of *Pleurocapsa fluvialis* Lagerh., DT [Fig. 240]); auf *Fontinalis antipyretica* L., Laubach (Hesse), *G. Reib*, Jul. 1908 (FC); auf *Cladophora gossypina* var. *intricata*, Giessen (Hesse), *A. Braun*, Dec. 1850 (Type of *Chamaesiphon confervicola* A. Br. and f. *elongatus* Rabenh., NY; isotypes, FH, PC, S); auf Chantansia, Leipzig, *P. Richtier* (UC); auf *Cinclidotus aquaticus* in Gebirgsbächen im Schwarzwald (Württemberg), *P. Reinsch* (FC). CZECHOSLOVAKIA: Bohemia: Dobrá Voda u Budejovic, *A. Hansgirg*, Aug. 1883 (FC, W); in canalibus molarum ligneis ad Eisenbrod, *Hansgirg* (Type of *Xenococcus Kernerii* Hansg. on *Scytonema cinnatum* in Kerner, Fl. Exs. Auströ-Hungar. no. 1596, FH); auf Chantansia und Cladophora, Kaplitz, *Hansgirg*, Sept. 1885 (FC, W); Stribro & Tábor, *Hansgirg*, Aug. 1883 (FC, W); Zel. Brod, *Hansgirg*, Jul. 1885 (FC, W). AUSTRIA: Upper Austria: auf *Calobrix Wrangelii* auf Steinen im Moosbache bei Milchdorf, *Schiedermayer* (Type of *Chamaesiphon Schiedermayeri* Grun., W); auf *Calobrix Brebissonii*, Vöcklabruck, von Mörl (Type of *Chamaesiphon Schiedermayeri* f. *subclavatus* Grun., W); Seebach am Gleinkersee bei Windisch-Garsten, *Schiedermayer*, Nov. 1865 (Type of *C. incurvatus* Grun., W. isotypes in Rabenh. Alg. no. 1944, FH, PC). Lower Austria: auf *Cladophora putealis* in einem Brunnen zu Hönstein, *A. Grunow*, Jul. 1864 (as *Chamaesiphon confervicola* in Rabenh. Alg. no. 1726, FH, PC); insidentes muscis sub aqua decavente canalis molendarii rivis Fischadagnitz ad Unter Waltersdorf, *S. Stockmayer* (as *Oncobrysa rivularis* in Mus. Vindob. Krypt. Exs. no. 744, FC, L, WU); auf *Cladophora* in einem Kulturglas, Wien, *L. Geisler* (Type of *Dermocarpa chamaesiphonoides* Geidl. and *Xenococcus minimus* Geidl., W [Figs. 237, 241]).

JUGOSLAVIA: Slovenia: in *Lemanea fluvialis*, Kaltenbrunn prope Laibach, *A. Hansgirg*, Aug. 1889 (FC, W); in *Tolytophrix penicillata* in fonte parvo prope Krönau, *K. de Keisler* (as *Chamaesiphon minus* in Mus. Vindob. Krypt. Exs. no. 1949, FC, L, NY, S). Croatia: Mühlbach in Marunzica bei Fiume, *F. Hauck*, Sept. 1878 (L). Dalmatia: in Cinclidoto unacum *Chamaesiphon violacea*, herb. *P. Reinsch* (Type of *Sphaeosiphon aquae-dulcis* Reinsch, K); Knin, *Hansgirg*, Aug. 1888 (FC, W); Ombla prope Ragusa et Topla—Gruda prope Castelnuovo, *Hansgirg*, 1891 (FC, W). TRIESTE: Zaula, *Hauck* 1558, 18 Mar. 1870 (FC, FH, PC). ITALY: on mosses, Treviso, *G. Venturi*, 1857 (PC); Roveredo, *A. Hansgirg*, 1891 (FC, W); auf *Fontinale antipyreticam* in rivulis per prata excurrentibus all'Oropa, dition. Bugellens. (Piedmont), *Cesati*, Aug. 1859 (Type of *Hydrococcus Cesatii* Rabenh. in Rabenh. Alg. no. 922, D; isotypes, FC [Fig. 221], L WU). NETHERLANDS: in tropical aquarium, Hilversum, *Veldhuizen van de Wit*, 5 Mar. 1950 (L); on *Cladophora crispata*, waterworks filter, Aarden hout near Amsterdam, *G. J. van Heudon*, 30 Jul. 1940 (FC, L). BELGIUM: in *Fontinalis squamosa* var. *sumida* submersa in rivo Amblyve Arduennae, *F. Verdoorn*, Aug. 1927 (FC). GREAT BRITAIN: on *Cinclidotus fontinaloides* on stony bottom of Hellgill (Scotland), *G. Dixon*, 5 Mar. 1852 (FC); on *Cladophora glomerata* in River Coln at Fairford (Gloucester), *W. L. Tolstead* 8472, 8504, 24 Sept., 7 Oct. 1944 (FC); Baunton stream, Cirencester (Gloucester), *W. Joshua* (FC); on *Fontinalis squamosa*, Wesmorland, *P. Drevin*, 1873 (FC); on *Cladophora glomerata*, East Lya, north Devon, *P. E. Fritsch*, 2 Sept. 1918 (Type of *Xenococcus chroococcoides* Fritsch in the collection of F. E. Fritsch; isotype, D [Fig. 242]); on *Cinclidotus fontinaloides*, Plymouth, *Holmes*, 1867 (FC). FRANCE: sur les Lemanea et sur la mousse (as *Hydrococcus Brebissonii* in Desmazières, Pl. Cryptog. Fr., ser. 2, no. 1960, NY); sur *Trichostomum fontinaloides*, in rivulis ad saxa calcarea Jurassa, *J. B. Mougeot* (FC); with *Inactis tinctoria*, Vosges, ex herb. Lenormand (D); sur *Cladophora*, Berthenicourt-par-Moy (Aisne), *J. Mabille* 7, Aug. 1952 (FC); Vire (Calvados), *A. de Brebisson* (FC); Courteilles (Calvados), *Brebisson*, May 1839 (PC); Falaise (Calvados), *Brebisson* (Type of *Oncobrysa Brebissonii* Menegh., L [Fig. 245]; isotypes, NY, UC); sur *Fontinalis antipyretica*, Mte. Rotondo (Corsica), *Solierot* 5035 (FC); sur *Cinclidotus fontinaloides*, moulin de Kerauffray près Guingamp (Côtes du Nord), *E. Jeannot*, 24 Jul. 1901 (FC); sur la *Lemanea incurvata* sur une écluse de la petite Vienne, Limoges (Haute Vienne), *Lamy de la Chapelle* (PC); sur *Cinclidotus aquaticus*, St. Guilhem (Hérault), *La Foraudière*, 11 Jun. 1857 (FC); Lozère, *Duby* (L); sur *Fontinalis Camusii* dans de lit de la Sèvre-Nantaise et de la Maine à Boussay et Aigrefeuille (Loire Inférieure), *E. Bureau & F. Camus* (FC).

SPAIN: Nacimiento del Rio Grande, nahe Yunquera in Serrania de Ronda (Malaga), *H. Nilsson* 24, 28 May 1883 (Type of *Oncobrysa hispanica* M. Lewin, S). ANGOLA: Loanda, supra *Pisthophoram radiantem* in aquariis aquae subdulcis insulae Cassanga prope Morro da Cruz, *P. Welwitsch* 197, Apr. 1854 (Type of *Dermocarpa depressa* W. & G. S. West, BM; isotypes, BIRM, D [Fig. 244], FC, UC). MADAGASCAR: auf *Rhizoclonium hieroglyphicum* in Süßwasser, Nosibé, *J. M. Hildebrandt* 2, Sept. 1879 (FC). ICELAND: on a lake-margin above Húsavik (North Amt), *J. Boye Petersen*, 26 Jul. 1914 (Type of *Chamaesiphon cylindricus* Boye Petersen in the collection of J. Boye Petersen; isotype, D [Fig. 238]). NEW BRUNSWICK: on *Tolytophrix penicillata* in brooklet 1 mile up Little river from Grand Falls, *H. Habeeb* 10407, 14 Jul. 1948 (FC, HA). NEW HAMP-

SHIRE: on *Fontinalis antipyretica* var. *gigantea*, C. G. Pringle, 22 Jun. 1880 (FC); in a brook, Glen Road, White mountains, W. A. Seibell 364, 9 Sept. 1891 (FC, UC); on mosses in stream on west slope of Moose mountain, Hanover, L. H. Flint, 12 Aug. 1945 (FC); on *Hypnum Lascaris*, Bowls and Pitchers, Shelburne, W. G. Farrow, Oct. 1899 (FC, FH); on *Hydrothyrta venosa*, Iagalls brook, Shelburne, E. Paxson, 2 Sept. 1886 (D, FH). MASSACHUSETTS: on *Lemanea fucina*, Waverley, W. H. Weston Jr., 1 Jun. 1923 (FC, TA); Gosnold pond, Curyhunk, I. P. Lewis & R. H. Colley, 5 Jul. 1915 (as *Cbamaesphion incrustans* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2101, FC, L). CONNECTICUT: on *Stigonema*, Stony brook, Montville, W. A. Seibell 102, 30 Jun. 1890 (FC, UC); Stony brook, Mohegan, Seibell, 9 Sept. 1892 (FC, UC); among *Confervae*, New Haven, W. C. Sturgis, 30 May 1889 (FC, UC). QUEBEC: submerged, Rivière Payne vers 71° 5" long, O., Ungava, J. Rousseau 1175, 11 Aug. 1948 (FC); sur *Podostemon Ceratophyllum* dans les rapides près de l'Église, Saint Joseph, Rivière des Rapides, P. Marie-Victorin & Rolland-Germain 33998, 9 Sept. 1930 (FC). NEW YORK: on *Oedogonium* in aquarium in Barnard College, New York City, H. C. Bold 871, 1 May 1941 (FC); on *Cladophora crispata* in Green lake near Kirksville, W. R. Maxon 6048, 21 Oct. 1914 (FC, US). PENNSYLVANIA: on *C. glomerata* in Little Conestoga creek, Hempfield township, Lancaster county, R. Patrick 63, 30 Sept. 1948 (FC, PH); on *Podostemon Ceratophyllum f. chondroides*, Winona falls near Buskill, Pike county, N. C. Fassett & H. H. Calvert 19488, 6 Sept. 1938 (FC).

VIRGINIA: James river, Richmond, W. E. Wade, 27 Jul. 1951 (DA); on *Fontinalis dalecarlica*, Dickey creek, Smyth county, J. K. Small 514, 17 Jun. 1892 (FC). WEST VIRGINIA: on *Audouinella violacea* on dripping rocks above Buckhannon river 5 miles below Buckhannon, Upshur county, H. K. Phinney 530, 30 Aug. 1938 (FC, PHI). NORTH CAROLINA: on *Fontinalis dalecarlica* in stream, Socco falls, Socco Gap, Jackson county, W. H. Welch 2221, 17 Jun. 1936 (FC); on *F. dalecarlica*, Montreat, Buncombe county, F. C. Standley & H. Bolman 10123, 3 Aug. 1913 (FC); near Round Bottom CCC camp, Swain county, H. Silva 200, Nov. 1941 (FC, TENN). SOUTH CAROLINA: on logs at 1st and 2nd dikes, Savannah river, Barnwell county, J. H. Wallace 64, 30 Jun. 1951 (DA). FLORIDA: Hamilton county: on *Lynghya aestuarii*, West Lake, J. H. Davis Jr., summer 1937 (D). Hernando county: on *Rhizoclonium lontanum*, M. A. Brannon 574, 23 Oct. 1948 (FC, PC); on moss, Weekiwachee Springs, Standley 92737, 6 Mar. 1946 (FC). Jackson county: on mosses in stream on highway no. 71 five miles south of Marianna, C. S. Nielsen, G. C. Maddox, & D. Crowson 347, 31 Aug. 1948 (FC, T). Leon county: Nielsen 130, Jun. 1948 (FC, T); Little Natural Bridge sink, Nielsen 134, 136, 137, Jun. 1948 (FC, T); St. Marks river at Little Natural Bridge, Nielsen, Maddox, & Crowson 538, 30 Oct. 1948 (FC, T). Marion county: Rainbow Springs near Dunnellon, Brannon 375, 20 Oct. 1946 (FC, PC), Maddox, A. L. Pates, & M. N. Hood 1954, 27 Nov. 1949 (FC, T). Orange county: on *Plectonema Wollei* in Rock spring at Kelly Park, P. O. Schaller 2278, 1 Jun. 1951 (FC). Seminole county: on *P. Wollei*, Rock Springs, E. M. Davis, May 1939 (FH). Taylor county: on *Chantrea* in a stream 1 mile northwest of Perry, P. Drouet & Nielsen 10751, 11 Jan. 1949 (FC, T). Wakulla county: on mosses in the outlet of a large sulfur spring bathing pool about one mile north of Newport, Drouet, Crowson, & R. Thornton 11386, 25 Jan. 1949 (FC, T). ONTARIO: St. Lawrence river, Kingston, J. H. Wallace 22, Jul. 1953 (D, PH). OHIO: on *Cladophora crispata* in Plum creek at the golf course, Oberlin, P. Smith 2, 29 Oct. 1938 (FC); on *Chantrea* on rock in the Scioto river, Chillicothe, L. J. King 410, 27 Jul. 1941 (FC, EAR). TENNESSEE: Sevier county: on moss in stream, Greenbrier cove, H. Silva 418, 28 Dec. 1946 (FC, TENN); nu *Desmonema Wrengeii* in Buck Fork, Silva 643, 21 Apr. 1947 (FC, TENN); muddy stream at Sugarlands camp, Silva 20, 11-16 Aug. 1941 (FC, TENN); Ramsey Prong, Silva 366, 425, 2353, 3 Nov., 29 Dec. 1946, 9 Sept. 1950 (FC, TENN). MICHIGAN: on *Fontinalis antipyretica* var. *gracilis* in a brook near Bear Lake, Manistee county, E. J. Hill 216, 23 Aug. 1880 (FC); on *Oedogonium*, Moloney lake, Cheboygan county, H. K. Phinney 79M4/5, 15 Aug. 1941 (FC, PHI). INDIANA: on *Pithophora* in pool, Evansville College, Evansville, R. K. Zuck, May 1944 (FC). WISCONSIN: on *Cladophora*, Waunona (Monona) lake, Madison, V. A. Latham, 27 Apr. 1943 (FC); on *Cladophora* in the source of the Yahara river, Tenney park, Madison, H. B. Linderback & P. Drouet 5516, 23 Jul. 1944 (FC); on moss in Weber lake, Vilas county, G. W. Prescott 3W104, 21 Aug. 1938 (FC). ILLINOIS: on *Cladophora* in small stream, Biltmore subdivision near Barrington, P. C. Standley 92843, 19 May 1946 (FC); on *Pithophora oedogonia* in laboratory culture, Chicago Natural History Museum, Chicago, P. A. Barkley 151117, 24 Aug. 1945 (FC).

MINNESOTA: on *Lemanea torulosa*, Lester river, Duluth, E. Butler, Aug. 1902 (FC, FH); Mary lake and La Salle creek, Itasca state park, Drouet 12172, K. C. Pan 10146, 1954 (D). MISSOURI: on *Rhizoclonium hieroglyphicum* in Lake Haharouka, Camden county, Drouet 145, 9 Aug. 1928 (D); on *R. hieroglyphicum*, Chouteau Springs, Cooper county, Drouet & Linderback 5648, 25 Aug. 1945 (FC); on *Fontinalis* in Fishing spring beside Meramec river 2 miles northwest of Steelville, Crawford county, J. A. Steyermark 41394, 16 Jun. 1941 (FC); Gravois spring, Gravois Mills, Morgan county, Drouet 682, 882, 7 Sept. 1930, 3 May 1931 (D); on *Rhizoclonium hieroglyphicum* in the creek below Roubidoux spring, Waynesville, Pulaski county, Drouet 599, 18 May 1930 (D). ARKANSAS: on *R. hieroglyphicum* in Saline river, Warren, Bradley county,

D. Demaree 24811, 24817, 23 Oct. 1943 (FC). LOUISIANA: in tank by Engineering laboratories, Louisiana State University, Baton Rouge, *L. H. Plini* 5, 18 Apr. 1945 (FC). NEBRASKA: on *R. bieroglyphicum* in culture from floodplain pond, Platte river south of Kearney, Buffalo county, *W. Kiener* 16496d, 6 Nov. 1945 (FC, KI); on *Cladophora glomerata* in Little Bourdeaux creek near Chadron, Dawes county, *Kiener* 20570, 22 May 1946 (FC, KI); on *Cladophora* in floodplain creek, Platte river near Sutherland, Lincoln county, *Kiener* 14875, 1 Aug. 1943 (FC, KI); on *Cladophora* in culture from Pawnee slough 9 miles east of North Platte, *Kiener* 16451a, 16 Jul. 1944 (FC, KI); on *C. crispata* in drainage ditch, Northport, Morrill county, *W. Kiener* 23056, 4 Mar. 1948 (FC, KI); on *Basidiella Chelonom* on snapping turtle, 3 miles north of Henry, Sioux county, *Kiener* 23524, 11 May 1948 (FC, KI). TEXAS: swift stream at New Braunfels, *L. H. Plini* 4, 18 Nov. 1954 (D); Barton spring southwest of Austin, *E. M. Harper & P. A. Barkley* 13229, 23 Jul. 1943 (FC, TEX); *B. C. Tharp & Barkley* 44alg11, 5 Aug. 1944 (FC, TEX); on *Pithophora oedogonia* in Tucker lake, Brownsville, *R. Runyon* 3865, 18 Nov. 1944 (FC); on *Plectonema Wollei* in the head of the San Marcos river, Hays county, *C. M. Rowell & Barkley* 167469, 2 Aug. 1946 (FC, TEX); on *Vaucheria* in running water, San Marcos, *G. L. Fisher* 49233, 24 Apr. 1949 (FC); on *Pithophora* in stream at sulphur spring, Palmetto state park near Gonzales, *B. P. Plummer & Barkley* VII, 22 May 1943 (FC, TEX); on *Cladophora glomerata*, Tunis Springs, about 20 miles east of Fort Stockton, Pecos county, *E. Whitehouse* 25153, 10 May 1951 (FC). MONTANA: on *Cladophora crispata* between Bowman lake and Mount Chapman, northwestern part of Glacier national park, *C. E. Pix*, Aug. 1949 (FC).

WYOMING: on *Scytonema* and mosses in creek near Emerald pool. Upper geyser basin, Yellowstone national park, *W. A. Setchell* 1958a, 6138, 28 Aug. 1898, 29 Jul. 1905 (FC, UC); on *Vaucheria* etc. in stream in an open meadow above University Camp, Medicine Bow national forest, *W. G. Solheim* 53, 27 Jun. 1933 (Type of *Dermocarpa Solheimii* Dr., FC), *Solheim* 108, 11 Jul. 1933 (FC). COLORADO: in shallow pool, Longs Peak, *W. Kiener* 161, 16 Sept. 1933 (FC, KI); on *Pontinalis antipyretica* in Cabin creek, Longs valley, *Kiener* 4696, 13 Oct. 1935 (FC, KI); in Alpine brook, Longs Peak valley, *Kiener* 13126, 20 Sept. 1941 (FC, KI). NEW MEXICO: on a liverwort in a small stream in the mountains near Santa Fe, *J. B. Rontien*, Aug. 1945 (FC). IDAHO: on *Hygrohypnum Bestii* in Adair creek, Custer district, Custer county, *F. A. Mac Fadden* 18707, 7 Aug. 1941 (FC); on hepatic with *Pontinalis antipyretica*, Little creek bridge, road from Deer Park to Idaho City, *Mac Fadden* 19297, 18 Oct. 1942 (FC). UTAH: on *Lomania fusca* in small stream near head of small canyon above Brighton, Salt Lake county, *Prof. Vorhies*, Aug. 1910 (FC, UC); on *Vaucheria*, Twin creeks, Fish lake, Sevier county, *S. Wright*, 20 Aug. 1938 (FC). ARIZONA: on Chantrelia, Fiftyfoot falls, Havasupai canyon, Coconino county, *E. U. Cloner*, 1 Aug. 1940 (FC, MICH). NEVADA: on *Plectonema Wollei*, Rogers Spring, Lake Mead, Clark county, *R. Sumner* 1614, 12 Jul. 1952 (FC). ALASKA: on mosses in brook near Iliuliuk, Unalaska, *W. A. Setchell & A. A. Lawson* 5036, 9 Jun. 1899 (FC, UC). OREGON: on *Aneura pinnatifida*, Salem, *E. Hall*, 1871 (FC). CALIFORNIA: Alameda county: on *Cladophora* in laboratory cultures, University of California, Berkeley, *N. L. Gardner* 3200, 3216, Jan. 1915, 1916 (FC, UC); on *Oedogonium* in an aquarium in the courtyard of the Life Sciences building, Berkeley, *Gardner* 8012, 28 Nov. 1936 (FC, UC); on *Cladophora* in a fountain, campus, University of California, Berkeley, *Gardner*, Oct. 1905 (as *Chamaesiphon confervicola* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1705, FC, L, TA). Inyo county: on *Plectonema Wollei*, Furnace creek, Death valley, *S. B. Parish* 10465, 16 May 1915 (UC). Los Angeles county: Old El Eocino hot springs, *B. C. Templeton* 1, Jul. 1944 (FC). Marin county: on moss in rapidly running stream, Mill Valley, *Gardner* 1785, 21 Jul. 1906 (FC, UC); laboratory culture from Tiburon (collected by H. E. Parks), *Gardner* 6916, 16 Oct. 1931 (Type of *Dermocarpa minuta* Dr., FC; isotype, UC). San Bernardino county: on *Rhizoclonium* in small pond at Old Woman Springs, Mojave desert, *G. J. Hollenberg* 2084, 2 May 1937 (Type of *Dermocarpa Hollenbergii* Dr., D [Fig. 235]). Shasta county: Pittsville bridge, Pitt river, *H. W. Shepherd* 7975, 15 Aug. 1936 (FC, UC). Tulare county: on *Desmonema Wrangelii* in Marble Rock creek, Sequoia national park, *R. Pretyssim*, 30 Jul. 1938 (FC).

Puerto Rico: Coamo, in den warmen Quellen von los Baños, *P. Sintenis* A42, 23 Dec. 1885 (topotype and paratype of *Chamaesiphon incrustans* f. *minor* Möb., MO, FC); Little Springs, Minillas, Mayaguez, *L. R. Almodovar* 199, 27 Jul. 1954 (D, T); in a ditch by the hot spring, Coamo Springs, *N. Wille* 396, Jan. 1915 (Type of *C. portoricensis* Gardn., NY [Fig. 243]; isotypes, PH, UC) on *Plectonema Wollei* in river 5 km. east of Coamo, *Wille* 221e, Jan. 1915 (Type of *Xenococcus Willei* Gardn., NY [Fig. 236]); in Tümpel, Jayuya, *Wille* 1757, 15 Mar. 1915 (FC, NY); in a pool about 4 km. north of Mayaguez, *Wille* 1323b (Type of *Pleuracapsa epiphytica* Gardn., NY), 1323x (NY), Feb. 1915. JAMAICA: on Chantrelia, Seaman's Valley, Portland, *W. R. Maxon & E. F. Killip* 27, 14 Feb. 1920 (FC); on *Pithophora oedogonia*, Salt river, St. Catherine, *C. B. Lewis* A1236a, 17 Jul. 1950 (FC). MEXICO: on *Plectonema Wollei*, Riito de Santa Rosa, Coahuila, *A. Schott* 28, Nov. 1852 (FC); on moss, waterfall, Barranca de Oblatos, Guadaluajara, *W. Kiener* 18130, 21 Dec. 1944 (FC, KI); on turtle in a pool near the bridge, Unión, Hermosillo, Sonora, *F. Drowel & Richards* 3020, 24 Nov. 1939 (FC). GUATEMALA: on *Cladophora* in small stream, Quebrada Shusho above Chiquimula, *P. C. Standley* 71933, 22 Apr. 1939 (FC); on *C. crispata* in stream,

Rio Guacalace, dept. Escuinta, Standley 60142, 16 Dec. 1938 (FC); on *Cladophora*, *Marathrum joemiculaceum*, and *Tristicha hypnoides*, vicinity of Santa María de Jesús, dept. Quezaltenango, Standley 87046, 12 Feb. 1941 (FC), J. A. Steyermark & A. E. Vauser 33240, 33363, 33368, 33576, 31 Dec. 1939, 1—5 Jan. 1940 (FC); on *T. hypnoides* on rocks in river, Retalhuleu, Standley 88817, Feb.—Mar. 1941 (FC); on *Marathrum* in Rio Lima, Mazatenango, W. C. Muenchinger 12035, 4 May 1937 (FC); on *Oedogonium* in small stream, Zacapa, Standley 74268, Oct. 1940 (FC). COSTA RICA: on *Marathrum Schiedeianum* in stream, San José, Standley 41213, Dec. 1925—Feb. 1926 (FC). PANAMA: on *Chantrelia* in stream bed, Shannon trail, Barro Colorado island, Canal Zone, G. W. Prescott CZ46, Aug. 1939 (FC). VENEZUELA: on mosses in stream along Rio Kariuai at base of Sororopán-tepuí west of La Laja, Bolívar, Steyermark 60774, 29 Nov. 1944 (FC). BRAZIL: on *Chantrelia* and *Pithophora* in jars of fish in the biology laboratory, Baptist College, Rio de Janeiro, E. C. Jennings 21, 22, 10 Aug. 1935 (D); sur *Lophogyne atenuifera*, Rio Bengala entre le Alto et Novo Friburgo (état de Rio de Janeiro), A. Glaxion 13147, 10 Aug. 1881 (FC). PARAGUAY: on *Chantrelia*, Colonia Rizzo, G. A. Malme 92, 94B, 14 & 18 Oct. 1893 (FC, S). ARGENTINA: in *Rhizoclonium hieroglyphicum* in aqua subsalsa, Laguna Colorado, prov. Jujuy, R. E. Fries 26 (S). PATAGONIA (Chile?): Rio & Sierra Bagoales, O. Borge 365, 367, Mar. 1899 (S); Kark, Borge 383, Mar. 1899 (S). PERU: sobre *Pithophora oedogonia*, Salaverry, Trujillo, N. Ibañez H. "P", 18 May 1952 (FC); on *Rhynchostegium aquaticum* in irrigation ditch, Santa Eulalia, Chosica, G. S. Bryan 9a, 11—13 Mar. 1923 (FC); on *Rhizoclonium hieroglyphicum*, head of Mogollon quebrada in the Amotape mountains, prov. Paica, dept. Piura, C. C. Sanborn, Sept. 1943 (FC).

HAWAIIAN ISLANDS: Hawaii: on *Pithophora*, Punaluu, J. E. Tilden, 3 Jul. 1900 (FC), M. Dory 8004, 9 Sept. 1950 (FC). Kauai: on *Cladophora crispata* in a brook, Kumuela camp, M. Reed, 21 Jul. 1908 (FC, UC). Oahu: in *Cladophora longiraculata* in piscinis in convalle Nuauu prope Honolulu, S. Berggren, 1875 (Types of *Chamaesiphon curvatus* Nordst. and *f. elongatus* Nordst., FC; isotypes on *Cladophora longiraculata* in Witr. & Nordst., Alg. Exs. no. 213, FC, MIN); on *Pithophora oedogonia* in a fishpond, Peninsula, Pearl City, Tilden, 6 Jun. 1900 (FC). CAROLINE ISLANDS: on *P. oedogonia* in Sapalap river, Sapalap, Metalanum distr., Ponape, S. F. Glassman 2763, 2 Aug. 1949 (FC). SAMOA ISLANDS: Savaii, Flussbette, K. H. Reehinger 2969, Jul. 1905 (Type of *Chroococcus turgidus* var. *subvioletaceus* Wille in the slide collection of N. Wille, O); Upolu, Reehinger 3165, 25 Jun. 1905 (Type of *C. varius* f. *samoensis* Wille in the slide collection of N. Wille, O). NEW ZEALAND: S. Berggren 145 (PC); Taupo lake, Berggren 146, 1875 (L, S); Roto-aira lake, Berggren 267, 1876 (S); in *Cladophora* in Tokano river, Berggren 319b, Jan. 1875 (as *Sphaerogonium incrustans* and "*Xenococcus?* vel *Oncobrysa?*" in Witr. & Nordst., Alg. Exs. no. 899, FC, L, NY, PC, S, UC); on *Cladophora glomerata* in cold stream, Wairakei geyser valley, Taupo county, W. A. Seebell 5967(58), 5 May 1904 (FC, UC); Whakarewarewa, Rotorua, J. E. Tilden, Nov. 1909 (as *Gloeocapsa gelatinosa cryptococcoides* in Tild., So. Pacific Alg. no. 2, L, N, UC). PHILIPPINES: on *Plectonema Wollei*, waterial at Bisayaan, Puerto Galera, Mindoro, G. T. Velasquez 1518, 12 Apr. 1948 (FC, PUH); on *P. Wollei* in swimming pool, Pansol, Calamba, Laguna, Velasquez 464, 25 Feb. 1940 (FC). CHINA: small pond, Nine-Old-Men Cave, Omei, Szechwan, H. Chu 1354, 23 Aug. 1942 (FC). INDONESIA: Java: auf Moosen im fliessenden Wasser, Quelle bei Kandang Badak, Gebiet von Tjibodas, Rutner, 12 Jul. 1929 (Type of *Chamaesiphon mollis* Geitl., slide no. TJ5b in the collection of L. Geitler; cotype, slide no. TJ5c in coll. L. Geitler); auf *Oedogonium* an tiefender Wand, Wasserfälle von Tjibeureum, Gebiet von Tjibodas, Rutner, 9 Jul. 1929 (Type of *Chamaesiphon subglobosus* var. *major* Geitl., slide no. Tj2la in the slide collection of L. Geitler); auf Lyngbya aus 5 m. Tiefe, Ranu Bedali, Rutner, Nov. 1928 (Type of *Dormocarpa clavata* Geitl., slide no. KB28 in the collection of L. Geitler; Type of *D. xonococcoides* Geitl., slide no. KB28 in the collection of L. Geitler); Tengger, Rutner, 25 Jun. 1929 (slide no. TG1d in the collection of L. Geitler). Sumatra: Dana Manindjau, Rutner, 1929 (paratype of *Xenococcus minimus* var. *Starmachii* Geitl., slide no. FM2ba in the slide collection of L. Geitler); auf *Cladophoraceae*, von Strauchwerk tief beschattete Stelle am Ufer, Hauptzufluss des Ranau-Sees bei Kota Baru, Rutner (Type of *Pleurocapsa subgelatinosa* Geitl., slide no. RE3ac in the collection of L. Geitler); auf *Hydrella* aus 7 m. Tiefe, Profil vor Panjingahan am Westufer des Singkarak-Sees, Rutner, 22 Feb.—15 Mar. 1929 (Type of *Chamaesiphon minutus* var. *gracilior* Geitl., slide no. SK4d in the collection of L. Geitler); auf *Cladophoraceae*, Stromgebiet der Musi, Suban Ajer Panas, Rutner, 7 May 1929 (slide no. M4gB in the collection of L. Geitler). WESTERN TIBET: stream just below Phohraag, running into northwest end of Pang-goug Tso, G. E. Hutchinson 146, 8 Jul. 1932 (D, FH, L, NY, YU). INDIA: on *Oedogonium* in the Jumna, Allahabad, P. Maheshwari 99, 138, Apr. 1938 (FH).

5b. ENTOPHYSALIS LEMANIAE f. ELONGATA (Wille) Drouet & Daily, COMB. NOV. *Chamaesiphon gracilis* f. *elongatus* Wille, Bih. t. K. Sv. Vet.-Akad. Handl. 8(18): 28. 1884. *Entophysalis elongata* Drouet & Daily, Butler Univ. Bot. Stud. 10: 223. 1952. —Type from Nova Zembla (S). FIG. 246.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Chamaesiphon macer Geitler, Arch. f. Protistenk. 51: 331. 1925.

Chamaesiphon curvatus f. *polysporinus* Schirschov, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Cryp. 1: 81. 1933.

Chamaesiphon cylindrosporus Skuja, Symbolae Bot. Upsal. 9(3): 45. 1948.

Cellulae solitariae primum sphaericae aetate provecta lineari-cylindrica vel lineari-tubaeformis, pulvinis et endosporangiis quaerendis. FIG. 246.

On larger, chiefly perennial, algae and other plants in clear freshwater streams and lakes. The well developed solitary cells have the general aspect of plants of *Lyngbya versicolor* (Wartm.) Gom. and *L. Dignatii* Gom. *Crenothrix polyspora* Cohn may sometimes be confused with this form.

Specimens examined:

NOVA ZEMBLA: Norra Gäskap, F. Kjellman 29b, 1875 (Type of *Chamaesiphon gracilis* f. *elongatus* Wille, S [Fig. 246]). NORWAY: Olden in Nordfjord, O. Nordstadi, 17 Aug. 1878 (PC). SWEDEN: in *Fontinalis dalecarlica*, Kvarnbaacken, Högsjö, Angermanland, A. Arvén, 14 Jul. 1914 (FC). MASSACHUSETTS: with *Cbontrensia Hermannii* on mosses in brook, Sharon, F. S. Collins, May 1890 (in Collins, N. Amer. Alg. 153, D), Massapoag brook, Sharon, W. A. Seitchell 26, 4 May 1890 (D). QUEBEC: sur les mousses au bord de la Rivière Payne, vers 73° 7' long. O., Ungava, J. Rousteau 937, 6 Aug. 1938 (FC). LOUISIANA: stream near Husser, Tangipahoa parish, L. H. Flint, 21 Mar. 1953 (FC).

FAMILY III. CLASTIDIACEAE

Drouer & Daily, Burler Univ. Bot. Stud. 10: 223. 1952. —Type genus: *Clastidium* Kirchn.

Plantae microscopicae, solitariae, epiphyticae, primum sphaericae aetate provecta cylindrica, basim affixae, primum unicellulares demum interne in catenam cellularum sphaericarum, ovoidearum, vel cylindricarum uniseriatim (raro parce pauciseriatim) dividentes; vagina tenue, ad apicem clausa, ad basem incrassata, ad substratum adhaerente; reproductione a dissolutione vaginae demum catenae cellularum.

Plants of this family are elongate epiphytic unicells contained in thin gelatinous sheaths. The entire protoplast divides into a uniseriate (rarely few-seriate in part) chain of rounded cells which often remain united by their membranes after the hydrolyzation of the sheath. The cells, upon separation from each other, elongate and secrete new gelatinous sheaths.

Key to genera:

- Plant terminating above in a hair-like extension of the sheath 1. CLASTIDIUM
Plant smooth at the apex 2. STICHOSIPHON

GENUS I. CLASTIDIUM

Kirchner, Jahresh. Ver. Vaterl. Naturk. Württemberg 36: 195. 1880. —Type species: *C. seligerum* Kirchn.

Plantae microscopicae, solitariae, erectae, epiphyticae, primum sphaericae aetate provecta cylindrica, basim affixae, unicellulares demum interne in catenam