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Family II. Chamaesiphonaceae

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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.

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Butler University Botanical Studies

(1929-1964)

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, Daubenmire, Potzger, and Billings served as Presidents of the Ecological Society of America.

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1937 (as *G. aponina* var. *multiplex* in Okada, Alg. Aq. Japon. no. 2, FC). INDONESIA: Lake Oboitiel, Kai islands, *H. Jensen & O. Hagerup*, 1922 (Type of *G. aponina* var. *multiplex* Nyg. in the slide collection of G. Nygaard). WESTERN TIBET: in Kyum 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 Geitler, Beih. z. Bot. Centralbl., II, 41: 238. 1925. *Chamaesiphonaceae* Subfam. *Cystogoneae* Hansgirg, Notarisia 3: 588. 1888. —Type genus: *Pleurocapsa* Thur.

Entophysalidaceae Geitler, Beih. z. Bot. Centralbl., II, 41: 235. 1925. —Type genus: *Entophysalis* Kütz.

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

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

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

Xenococcaceae Ercegovic, Bull. Int. Acad. Yougosl. Sci. & Arts, Cl. Sci. & Math., 26: 38. 1932. —Type genus: *Xenococcus* 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 macrascopicae, 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 bullose) 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. *Brachythrix* A. Braun *pro synon.* in Rabenhorst, loc. cit. 1865. *Chamaesiphon* Sectio *Brachythrix* A. Braun ex Hansgirg, Prodr. Algenfl. Böhmen 2: 124. 1892. *Chamaesiphon* Subgenus *Brachythrix* 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.

Sphaenotiphon 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 Rostafinski, Rozpr. Akad. Umiej, Krakow., Wydz. Mat.-Przyr., 10: 304. 1883. *Chamaesiphon* Sectio *Sphaerogonium* Rostafinski ex Hansgirg, Prodr. Algenfl. Böhmen 2: 123. 1892. *Chamaesiphon* Subgenus *Sphaerogonium* Hansgirg 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* Hansgirg, Notarisia 3: 588. 1888. —Type species: *Cyanoderma rivulare* Hansg.

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* Hansg.

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

Guyotia 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.

Radaisiella Geitler, Beih. z. Bot. Centralbl., II, 41: 242. 1925. *Geitleriella* J. de Toni, Notes. Nomencl. Algol. 8. 1936. —Type species: *Radaisia submimersa* 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. gigantea* Geitl.

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

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

Cyanodermatium 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 Borzì, N. Giorn. Bot. Ital. 14: 314. 1882. —Type species: *C. versicolor* Borzì.

Askenasya Möbius, Ber. Deutsch. Bot. Ges. 5: lxii. 1887. —Type species: *A. polymorpha* Möb.

Chondrocystis Lemmermann, Abh. Nat. Ver. Bremen 16: 353. 1899. *Gloeocapsa* 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: *Chamaesiphon hemisphaericus* Lemm.

Lithocapsa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 82. 1925. —Type species: *L. fasciculata* Erceg.

Lithococcus 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.

Solensia 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.

Tryponema Ercegovic, Arch. f. Protistenk. 66: 168. 1929. —Type species: *T. endolithicum* Erceg.

Scopulonema Ercegovic, Arch. f. Protistenk. 71: 365. 1930. —Type species: *S. Hanngirgianum* Erceg.

Podocapsa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 33. 1931. —Type species: *P. pedicellatum* Erceg.

Brachynema Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 35. 1931. *Ercegovicia* J. de Toni, Noter. Nomencl. Algol. 8. 1936. —Type species: *Brachynema litorale* Erceg.

Epilithia Ercegovic, Rad. Jugoslov. Acad. 244 (Razr. Mat.-Prirod. 75): 141. 1932. —Type species: *E. adriatica* Erceg.

Plantae primo microscopicae aetate provecta macroscopicae, supra et intus substratum increscentes, cellulis solitariis forma diversis; cellulis pulvini sphaericis, ellipticis, cylindraceis, vel polyhedroideis, in seriebus indistincte radialibus vel erectis ordinatis; cellulis filorum intus substratum penetrantinm 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 solirary vegetative cells are familiar; in *E. endophytica, E. deusta, E. conferta,* and *E. rivularis* the penetrating filaments are often found.

Key to species of Enrophysalis:

1. Marine ..... 2.
1. Freshwarer ..... 4.
2. On rocks, wood, and shells ..... 1. E. DEUSTA
2. On larger algae and living animals ..... 3.
3. Cells 1—2μ in diamerer; plants yellowish in color ..... 2. E. ENDOPHYTICA
3. Cells larger; plants blue-green, violet, or red ..... 3. E. CONFERTA

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. Medit. & Adriat., 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. *Brachtia mediterranea* Trevisan, Sagg. Monogr. Alg. Coccot., p. 58. 1848. *Palmella submarina* Crouan fr., Fl. Finistère, p. 109. 1867. —Type from Naples, Italy (L). FIG. 193.

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

Protococcus 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, Noter. 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. Finistère, p. 110. 1867; Crouan fr. in Desmazières, Pl. Crypog. 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 fuliginosa 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 atrochalybeus Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 230. 1892. —Type from Orsera, Istria, Jugoslavia (W). FIG. 194.

Hyella caespitosa var. *nitida* Barters, 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 pararypes from near Aaelesund, 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 Listorinae 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).

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

Pleurocapsa gloeocapsoides Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 465. 1918. *Gloeocapsa gloeocapsoides* Geitler ex J. de Toni, Diagn. Alg. Nov., I. Myxophyc 2: 135. 1937. —Type from Alameda, California (UC).

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

Entophysalis violacea Collins, in Britton & Millspagh, Bahama Fl., p. 619. 1920. *E. Collinsii* J. de Toni, Noter. 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).

Dermocarpa 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).

Pleurocapsa Deeveyi Drouet, Field Mus. Bot. Ser. 20: 126. 1942. —Type from Willacy county, Texas (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:

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

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

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

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

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

Aphanocapsa litoralis var. *natans* Wille in Hansen, Ergebn. Plankton-Exped. Humboldt-Stift. 4Mf, Schizopbyceen, p. 47. 1904.

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

Solentia 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 huaensis Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 4: 39 . 1929.

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

Tryponema ondolithicum Ercegovic, Arch. f. Protistenk. 66: 168. 1929.

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

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

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

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

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

Brachynema litorale 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.

Pleurocapsa fissurarum 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 Hanigirgianum 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 litoralis Ercegovic, Rad Jugoslov. Akad. 244(Razr. Mat.-Prirod. 75): 151. 1932.
Solentia 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.
Pleurocapsa minuta Geitler, Rabenh. Krypt.-Fl. 14: 355. 1932. *Scopulonema minutum* 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.
Nematoradaisia gasteropodum Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 438. 1947.
Aspalatia andalousica 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 solitatiis 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, homogeneo vel lamelloso; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, vulgo homogeneo. 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 *Entophysalis 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 parasitizarion.

Specimens examined:
NORWAY: Tromsö, *M. Foslie*, 10 Jun. 1887 (PC); in conchis Balanorum, Sliningen prope Aalesund, *N. Wille* (topotype and paratype of *Hyella Balanii* Lehm. in Mus. Vindob. 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 Euxini, *E. C. Teodorescu 485*, Apr. 1897 (W). JUGOSLAVIA: Istria: insula Brioni, *Biatoletto* (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. ä. Schalen an der Flutgrenze selten bei Orsera, *Hansgirg*, Apr. 1889 (Type of *Chroococcus atrochalybeus* Hansg., W; isotype, FC [Fig. 194]); auf Steinen in einem Bache, welcher in adriatisches Meer fliesst und angesalzines Wasser führt, zwischen Parenzo und Orsera, *Hansgirg*, Apr. 1889 (Type of *Pleurocapsa fluviatilis* var. *subsalsa* Hansg., W; isotype, FC [Fig. 188]); im adriatischen Meere, Umgebung von Pola, *Hansgirg*, Apr. 1889 (Type of *Aphanocapsa concharum* Hansg., W; isotype, FC [Fig. 247]); auf unreinen Molosteinen zwischen Flut- und Ebberspiegel bei Pola, *Hansgirg*, Aug. 1888 (Type of *A. litoralis* 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). Dalmatia: Castelnuovo, Cannosa prope Ragusa, Gravosa prope Ragusa, *Hansgirg*, 1891 (FC, W); op kleine kalkrorsen, 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 Spalatum, *F. T. Kützing*, 1835 (Type of *Entophysalis granulosa* Kütz., L [Fig. 187]; isotype, PC); Spalato, *Hansgirg*, Aug. 1889 (FC, W); Stagno Piccolo, *Hansgirg*, 1891 (FC, W); Zara, *Hansgirg* (PC); am Meeresufer bei Zara, *Hansgirg*, Aug. 1888 (Type of *Xenococcus conchorum* Hansg., W; isotype, FC [Fig. 192]). TRIESTE: ad Miramar prope Triest, *F. Hauck*, Sept. 1878 (as *Entophysalis granulosa* in Wittr. & 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 litoralis* var. *macrococca* Hansg., W; isotype, FC); Servola, *Hauck*, Mar. 1883 (L; as *Entophysalis granulosa* in Hauck & Richt., Phyk. Univ. no. 241a, L, MIN, PC); St. Andrea, *Hansgirg*, 1891 (FC, W); salinae ad Strogniano, *Hansgirg*, Apr. 1889 (FC, W); Triest, *Hauck* (Type of *Pleurocapsa fuliginosa* Hauck, L [Fig. 189]; isotype, UC).

ITALY: Genova, *Meneghini* (Type of *Coccochloris deusta* Menegh., FI; isotypes, L [Fig. 191], PC, UC); Mergellina bij Napels, *J. T. Koster 205*, Apr. 1939 (L); Principia di Posilippo, *Koster 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 Bosse 1228*, Sept. 1893 (L); Sloedam, *Brakman 63*, Sept. 1940 (L); zeedijk, Walcheren, *Brakman 62*, Feb. 1941 (L); Zuid-Sloe, Walcheren, *Brakman 345a*, May 1942 (L); Vlieland, *Weber-van Bosse*, 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), ad lapides submersas in limite maris, *Bornet*, Dec. 1875 (as *Entophysalis granulosa* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1200, L, MIN, S); in testis Balanorum ad Trayas, *G. Lagerheim*, Feb. 1893 (as *Hyella caespitosa* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1199, L, WU). Basses Pyrenées: 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, PC), 5 Jun. 1870 (FC); à Guethary, *C. Sauvageau*, Jul.-Aug. 1896 (PH, NY); Saint 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 faience 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. Flahault*, Jun. 1882 (FH, S), 25 Dec. 1887 (PC), *Flahault 165*, 13 Jan. 1882 (PC). Ille et Vilaine: au quai de la plage des bains, St. Malo, *Bornet*, 19 Jun. 1972 (PC). Loire Inférieure: Le Croisic, *Bornet*, Sept. 1887 (Type of *Hyella caespitosa* Born. & Flah., 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 *Gloeocapsa crepidinum* in Wittr. & 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 Setubal, *L. G. M. Baas Becking*, Sept. 1937 (L). TUNISIA: cote 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: Teshie, *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. Symoens 430* (FC). CAPE OF GOOD HOPE: Knysna, *A. Weber-van Bosse*, 1894-95 (FC, L);

Mossel bay, *W. A. Setchell*, 12 May 1927 (PC, UC); on rocks, Muizenberg, *Setchell*, 19 May 1927 (PC, UC). BERMUDA: intertidal, Castle island, *T. A. & A. Stephenson BRCA6, BRCA7*, 22 Jul. 1952 (PC); on limestone and concrete, west end of the Causeway between St. Davids and Hamilton islands, *A. J. Bernatowicz 50-528*, 27 Dec. 1950 (PC); Cobbler's island, *Stephenson BRC13*, 4 Jul. 1952 (PC); Gibbet island, *Stephenson BRG3*, 6 Jul. 1952 (PC); crusts in pools, Gravelly bay, Hamilton island, *Bernatowicz 49-1584*, 5 May 1949 (FC); North Rock, *Stephenson BRN7*, 7-8 Jul. 1952 (PC); Smiths island, *Stephenson BRS2*, 7 Aug. 1952 (PC); Whalebone bay, St. Georges island, *Bernatowicz 49-91, W. R. Taylor & Bernatowicz 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 NSP1a*, Jul.—Sept. 1948 (FC); in tidepool and on shells, *R. A. Lewin*, 3 Oct. 1952, Jul. 1953 (FC). MAINE: Eastport, *W. G. Farlow* (PC, FH, L, NY, PC); on shell, South Harpswell, *F. 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 cohaerens* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 701, FC, FH, L, NY, TA), Jul. 1896 (as *Gloeocapsa 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* (FH, 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); Sconticut Neck, Fairhaven, *Taylor*, Jul. 1941 (TA); on rocks, Quisset Harbor, Falmouth, *F. Drouet 1919*, 17 Aug. 1936 (D); in pools between Chara pond and Vineyard sound, Falmouth, *Drouet 2187*, 8 Sept. 1937 (D, FH, NY, S, UC); Gloucester, *W. G. Farlow* (FH, L, NY, S; as *Gloeocapsa crepidinum* in Farl., Anders., & Eat., Alg. Exs. Amer. Bor. no. 180, FC, NY, PC, UC); Kettle island, Magnolia, *Farlow*, Sept. 1903 (FH, WU); on Balanus and rocks near exit of drain pipe, Magnolia Point, *Farlow*, 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. Doty 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* (NY); Woods Hole, *Farlow*, Aug. 1876 (FH); in shells on beach, *W. A. Setchell 837*, 25 Aug. 1894 (FC, UC). RHODE ISLAND: on rocks, Grove point, Block island, *Drouet 3658*, 13 Jul. 1941 (FC); bottom of pool, Bateman's beach, Newport, *Farlow*, 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 fuliginosa* 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, *Setchell 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, *Setchell 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. Morse*, 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, Fairmount, *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, BSB8*, 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* (FC).

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: Cocoanut Grove, Soldier's key, and Cape Florida, *R. Thaxter*, 1897 (FH); Biscayne bay, Cutler, *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, & Pates 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, 11155, 11158a, 11164, 11177, 11193*, 22 Jan. 1949 (FC, T). Monroe county: saline flats, Big Pine key, *E. P. Killip & J. P. Macbride*, Apr. 1951 (FC), *Killip 41765, 41810, 41858, 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 LSI—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 PKIIA*, Jan.—Mar. 1947 (FC, UC); Saddlebunch keys, *J. A. Steyermark 63207b, 63208a*, 11 Mar. 1946 (FC); Soldier key, *Stephenson SKIIIC, SKIIICa*, 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, & Pates 10637*, 9 Jan. 1949 (FC, T); in Santa Rosa sound, Fort Walton, *Drouet, Nielsen, Madsen, Crowson, & Pates 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, Pates, & S. Parker 2035, 2036a*, 2 Jan. 1950 (FC, T); beach, northeast side of Anastasia island, *Madsen, Pates, & M. E. Thomas 2043*, 2 Jan. 1950 (FC, T). Taylor county: shore of Steinhatchee river, Steinhatchee, *Drouet & Nielson 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 MIB*, 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 Prien, *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 Pontchartrain, Mandeville, *Drouet & L. H. Flint 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,f*, 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 *Pleurocapsa 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. Osterhout & 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 *Pleurocapsa 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 *Myxohyella teriata* 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 *Littorina planaxis*, Carmel, *Gardner*, Dec. 1915 (as *Hyella Littorinae* Setch. & Gardn. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2255, FC, TA), *Gardner 3108*, Dec. 1916 (Type of *H. Littorinae* Setch. & Gardn., UC; isotype, FC, L, TA); on *Acinaea patina*, Carmel, *Gardner 4531*, Dec. 1919 (FC, UC); on rocks, Carmel bay, *Setchell & R. E. Gibbs 3219*, 12 Jan. 1899 (Type of *Pleurocapsa 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); Chatauqua beach, Monterey, *Setchell 1639*, 15 May 1897 (FC, UC). San Mateo county: on *Littorina* 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); Presidio, *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. Kaye*, 1950 (D). GUADELOUPE: shore, Vieux Bourg, *A. Questel 255*, 22 Feb. 1944 (FC, TA). JAMAICA: on walls of caverns below Fort 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. Pork 1595a*, 14 Apr. 1946 (FC); reef ar 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 ar entrance to harbor, Guaymas, *P. Dronet & D. Richards 3085, 3085a,b*, 2 Dec. 1939 (FC); shore of harbor near west end of the Paseo, Guaymas, *Dronet & Richards 3119*, 4 Dec. 1939 (FC); mangrove swamp ar mouth of Rio de Sonora, Bahia Kino, *Dronet & 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 Yavaros, southwest of Huatabampo, *Dronet & Richards 3194, 3216*, 11 Dec. 1939 (FC). COSTA RICA: Braxillito bay, *J. T. Howell 778a*, 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, Tabnga island, Bahia 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 sphaerica* var. *galapagensis* Setch. & Gardn., CAS; isocypes, 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. Chancai, *Maldonado 80, 89, 94, 95a*, Feb. 1942 (FC); Las Salinas, Lago Chilca, dept. Lima, *Maldonado 62, 69*, Jan. 1942 (FC). URUGUAY: La Paloma, dept. Rocba, *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, *F. 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. Horwitz 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, Giriinien 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, Utirik islet, Utirik atoll, *Fosberg 33718*, 3 Dec. 1951 (FC, US); beach rock, Wotho and Enejelto 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. 347h, 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. Umezaki 1473*, 19 Jun. 1954 (D). INDOCHINA: Bay Mien (Baichua), *Station Maritime de Cauda 147*, Jun. 1937 (L). INDONESIA: Dobo, Gisser, Kangean, Noesa-Jaut, Roma, 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); Noimini-bocht (Timor), Elat (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); zuidkuist Ost-Java bij Kampong Nglijip, *P. Groenhart 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. Doore*, 2 Jan. 1935 (with *Rivularia atra* Roth in Tild., So. Pacific Pl. 2nd ser., no. 325, FC); in Lithophyllum, 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 (PC).

2. ENTOPHYSALIS ENDOPHYTICA Drouet & Daily, Lloydia 11: 79. 1948. *Chlorogloea endophytica* Howe, Mem. Torr. Bot. Club 15: 13. 1914. *Myxohyella Howei* Geirler, Beih. z. Bot. Centralbl., II, 41: 247. 1925. —Type from Bay of Sechura, Peru (NY).

Chlorogloea lutea Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 434. 1918. *Myxohyella lutea* Geitler, Beih. z. Bot. Centralbl., II. 41: 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 filorum penetrantium praecipuius multiseriatorum sphaeroideis vel polyhedroideis, diametro 1—2μ crassis; endosporangiis quaerendis; gelatino vaginale hyalino, homogeneo; 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 *Chloroglea lutea* Setch. & Gardn., UC; isotype, FC [Fig. 195]); on *Iridaea laminarioides*, Pyramid point, Monterey county, *W. A. Setchell 5464*, 16 Jun. 1901 (FC, UC). PERU: in *Leptocladia peruviana*, Bay of Sechura, *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 Drouet & Daily, Lloydia 11: 79. 1948. *Palmella conferta* Kützing, Phyc. Germ., p. 149. 1845. *Cagniardia conferta* Trevisan, Sagg. Monogr. Alg. Coccot., 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, Verh. K. K. Zool.-Bot. Ges. Wien 11: 420. 1861. *Oncobyrsa marina* Rabenhorst, Fl. Eur. Algar. 2: 68. 1865. *Placoma marina* Borner & 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, Rabenh. 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* Borner in Borner & 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 Leibleiniae Reinsch, Contrib. Algol. & Fungol. 1: 103. 1874. *Dermocarpa Leibleiniae* Borner in Borner & Thuret, Notes Algol. 2: 73. 1880. —Type from Adantic North America (K).

Xenococcus Schousboei Thuret in Borner & Thuret, Notes Algol. 2: 73, 75. 1880. *Coleonema arenijera* Schousboe *pro synon.* in Borner & 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).

Pleurocapsa amethystea Rosenvinge, Meddel. om Grønl. 3: 967. 1893. *Chroococcopsis amethystea* Geitler, Beih. 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 fucicola Saunders, Proc. Washington Acad. Sci. 3: 397. 1901. —Type from near Seattle, Washington (FH).

Hyella endophytica Børgesen, Bot. Faeroes 2: 525. 1903. *Myxohyella endophytica* Geitler, Beih. z. Bot. Centralbl., II, 41: 247. 1925. —Type from Thorshavn, Faeroes islands (in the collection of F. Børgesen).

Dermocarpa Parlowii Børgesen, Bot. Faeroes 2: 525. 1903. —Isotype from Suderø, Faeroes islands (UC).

Pleurocapsa amethystea var. *Schmidtii* Collins in Collins, Holden & Setchell, Phycotheca Boreali-Americana 35: 1704. 1911. —Type from Einarslon, 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. Pub. Bot. 6: 440. 1918. —Type from Moss Beach, San Mateo county, California (UC).

Dermocarpa sphaeroidea 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. *Myxohyella linearis* Geitler, Beih. 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. *Myxohyella socialis* Geitler, Beih. 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, Beih. z. Bot. Centralbl., II, 41: 242. 1925. —Type from San Francisco, California (UC). FIG. 204.

Radaisia clavata Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 445. 1918. —Type from San Francisco, California (UC).

Radaisia submersa Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 446. 1918. *Radaisiella submersa* Geitler, Beih. z. Bot. Centralbl., II, 41: 242. 1925. *Geitleriella submersa* 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 acervatus 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 regularis 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 Francisquito bay, Baja California (CAS).

Pleurocapsa 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 simulans Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 66. 1937. —Type from North Seymour island, Galapagos islands (CAS).

Xenococcus angulatus 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 Enteromorphae 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 sublitoralis 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* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 106. 1942.

Dermocarpa Leibleiniae var. *pelagica* Wille in Hansen, Ergebn. Plankton-Exped. Humboldt-Stift. 4Mf., Schizophyc., p. 50. 1904.

Xenococcus kaysanensis Lemmermann, Engler Bot. Jahrb. 34: 618. 1905.

Dermocarpella incrassata Lemmermann, Engler Bot. Jahrb. 38: 350. 1907. *Dermocarpa incrassata* Geitler, Beih. z. Bot. Centralbl., II. 41: 248. 1925.

Dermocarpa minima Geitler, Rabenh. Krypt.-Fl. 14: 392. 1932.

Microcystis minuta var. *aeruginosa* Lindstedt, Fl. Mar. Cyanophyc. Schwed. Westküste, p. 17. 1943.

Myxobyolla 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 provecta in stratum vel pulvinum olivaceum, aerugineum, violaceum, vel rubrum increscentes, 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, homogeneo 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 *Entophysalis 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 bullose cushions are rarely found, since they develop on perennial algae in quiet waters.

Specimens examined:

NORWAY: paa *Fucus vesiculosus*, Biologisk Station, Dröbak, *N. Wille*, Apr. 1917 (S); in *Laminaria digitata* ad Dröbak, *H. G. Simmons*, Apr. 1898 (S). SWEDEN: in *Cladophora rupestri* epiphytica ad Väderö Storö in Bahusia, *G. Lagerheim*, Aug. 1882 (as *Dermocarpa violacea* in Wittr. & 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 toporypes 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 Rothii*, 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 *Sphaenosiphon prasinus* Reinsch, K); in *Sargasso obtusato*, herb. Reinsch (Type of *Sphaenosiphon cuspidatus* Reinsch, K). TRIESTE: *P. Hauck*, Oct. 1879 (Type of *Oncobyrsa adriatica* Hauck, L [Figs. 208, 209]); on Lyngbya, *Hauck* (L); in *Catenella Opuntia* (Gooden. & Woodw.) Grev., *Hauck* (as *Dermocarpa pratina* in Wittr. & Nordst., Alg. Exs. no. 693, FC, L, NY, S); Servola, *Hauck*, Mar. 1883 (L); Salinen, Zaule, *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 roseus* var. *major* Hansg., W; isotype, FC [Fig. 196]). JUGOSLAVIA: Istria: auf *Catenella Opuntia* bei Mostecnice, *V. Nubelek*, 26 Jul. 1914 (WU); Portalbona (Porto Rabaz), *Catenellae Opuntiae* 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 *Oncobyrsa 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, *Mazziari 1912* (Type of *Hydrococcus marinus* Grun., W).

MEDITERRANEAN SEA: in *Hypnea musciformis*, herb. P. Reinsch (K). ITALY: Porto Maurizio, *Strafforello*, 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 *Rhodochorion Rothii*, *Koster 1660*, 5 Jun. 1950 (L), op *Elachista fucicola*, *M. Weber 201*, Jun. 1885 (L); op *Polysiphonia urceolata* en *Chaetomorpha aerea*, Hoek van Holland, *Koster 192*, Feb. 1938 (L); op *Rhodochorion Rothii*, Condorpe bij Ellewoutsdijk, Westerschelde, *C. Brakman 65*, Feb. 1941 (L); on *Enteromorpha clathrata*, Koffiehoek, island of Tholen, *C. den Hartog & A. F. Mulder*, 27 Nov. 1951 (D, FC, L); op *Polysiphonia urceolata* etc., Oosterschelde, bij Kattendijke, Zuid-Beveland, *J. J. R. Walrecht*, 10 Aug. 1951 (FC, L); on *Polysiphonia fastigiata* (Roth) Grev., harbor, Zoological Station, den Helder, *Koster*, 2 Dec. 1936 (D, FH, L). FAEROES ISLANDS: on *Rhodochorton Rothii*, Hojirj, Strømø, *F. Børgesen 202*, 24 Jun. 1895 (K); Trangiscaafjorder, Suderø, *Børgesen 546*, May 1896 (FH, UC); Krivig, Strømø, *Børgesen 757*, 31 May 1896 (C, D, DT); in *Polysiphonia fastigiata*, Tveraa, Suderø, *Børgesen 536*, May 1896 (isotype of *Dermocarpa Farlowii* Børges., UC); in *Laminaria hyperborea* (Gunn.) Fosl., Thorshavn, Strømø, *H. Jonsson*, 20 Nov. 1897 (Type of *Hyella endophytica* Børges., slide in the collection of F. Børgesen; isotype, C). GREAT BRITAIN: Scotland: op *Ectocarpus* sp., haven van Leith, *J. T. Koster 129*, Aug. 1936 (L). England: on *Catenella Opuntia*, seaside rocks, Devonsbire (in M. Wyatt, Algae Danmonienses no. 126, FC); on *Polysiphonia fastigiata* on *Fucus nodosus*, Devonshire (in Wyatt, 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 Rothii* 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. Fritsch; isotypes,

D [Figs. 198, 199]). IRELAND: on *Rhodochorton floridulum*, Clare 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 Lynghya, Biarritz, *E. Bornet*, 8 Jun. 1870 (FC, FH, NY, PC, UC), 6 Aug. 1870 (PC); Biarritz, *L. K. Rosenvinge 527b*, Mar. 1885 (PC); sur *Fucus platycarpus* Thur., Port Vieux, Guéchary au Phare de Biarritz, *Sauvageau*, 20 Feb.—25 Mar. 1894 (Type of *Radaisia Gomontiana* Sauvag., PC; isotype, FC); sur Sargassum rejeté au Port Vieux, Guéthary au Phare de Biarritz, *Sauvageau*, 20 Feb.—25 Mar. 1894 (Type of *Dermocarpa biscayensis* Sauvag. and *D. strangulata* Sauvag., PC); Cherbourg, sur *Catenella Opuntia*, *Bornet*, 11 Aug. 1874 (FC, FH, PC); Fouras (Charente 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 Mediteraneum, Marseille, herb. Reinsch (Type of *Sphaenosiphon 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 *Cystoseira 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 *Laurencia obtusa* Ag. crescente, herb. P. Reinsch (Type of *Sphaenosiphon smaragdinus* Reinsch, K); in *Golidio corneo*, herb. P. Reinsch (Type of *Sphaenosiphon roseus* Reinsch, K). MOZAMBIQUE: auf Rhizoclonium in Quilimanefluss bei der Insel Pequene, *Stuhlmann 83*, Feb. 1889 (as *Xenococcus Kerneri* 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.) Bøtges., Plettenberg bay, *Weber-van Bosse 18*, 1894 (FC, L); on *Lyngbya confervoides* Ag. on rocks, Muizenberg, *W. A. Setchell*, 19 May 1927 (FC, UC).

ICELAND: on *Rhodochorton Rothii*, Einarslon, *H. Jonsson 728*, 20 Jul. 1897 (Type of *Pleurocapsa amethystea* var. *Schmidtii* Coll., C). BERMUDA: on mangrove near Flats bridge, *F. S. Collins 7262*, May 1912 (NY); on Bostrychia, Gravelly bay, *A. B. Hervey* (UC); on *Spermothamnion gorgoneum* and *Ceramothamnion 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 intestinalis* in ditch in South Shore meadows, *Collins*, 1 Sept. 1913 (as *Chroococcus membraninus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2151, FC, D, L). CANARY ISLANDS: Puerto Orotava, *C. Sauvageau*, Jan. 1905 (PC). FERNANDO DE NORONHA: on Rhizocloonium 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: Fiskernaes, *L. K. Rosenvinge*, 31 May 1888 (Type of *Pleurocapsa amethystea* Rosenv., C). ATLANTIC NORTH AMERICA: in Leibleinia in Plocamio, herb. P. Reinsch (Type of *Sphaenosiphon Leibleiniae* Reinsch, K). SAINT PIERRE & MIQUELON: on Cladophora, Pointe Blanche, *P. Le Gallo 5*, 30 Oct. 1945 (FC, TA). NOVA SCOTIA: Sydney, *F. S. Collins*, Sept. 1899 (NY, UC); on Cladophora in tidepool, Prospect, *R. A. Lewin*, 1 Oct. 1952 (PC). MAINE: on *Polysiphonia fastigiata*, Pond Cove, *W. R. Taylor*, Feb. 1928 (TA); Inner Marsh island, Casco bay, *Collins*, Aug. 1903 (NY, UC); on *Rhodochorton Rothii*, 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 4805*, 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. Louderback & C. Graham*, 5 July 1949 (D, PC). 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. Setchell*, 20 Apr. 1889 (FC, NY, TA, UC); on Cladophora in upper tide pool, rocky shore, Cohasset, *Collins*, 12 Oct. 1901 (as *Xenococcus Kerneri* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 952, FC, L, UC); on *Polysiphonia fastigiata*, Little Nahant, *W. A. Setchell 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 Rothii*, Little Nahant, *Setchell 292*, Nov. 1890 (UC); on *R. Rothii*, 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, *Setchell*, Jun. 1889 (UC); on *Rhizoclonium riparium*, Nahant, *Collins*, 17 Aug. 1889 (FC, FH, NY, UC); on *Rhodochorton*

Rothii, 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 Rothii*, Eel pond, Woods Hole, *E. T. Rose*, 16 Jul. 1936 (D); on *Lyngbya confervoides* Ag., steamboat wharf, Woods Hole, *R. N. Webster & F. Drouet 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. nn. 556, FC, L, NY, TA, UC). CONNECTICUT: on *Rhodochorton Rothii*, 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. Martindale*, 12 Dec. 1886 (FH, UC); on Enteromorpha, Atlantic City, *J. N. Rose 19590*, Aug. 1925 (NY). NORTH CAROLINA: on Gelidium, Beaufort, *W. D. Hoyt* (NY); on *Lyngbya semiplena* on piling at west end of Shackleford Banks, Beaufort, *H. J. Humm 12*, 15 Sept. 1947 (FC); on *Calothrix 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, *F. Drouet & H. B. Louderback 10327*, 28 Dec. 1948 (FC); 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, *Drouet & 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, *Drouet & R. L. Caylor 9904*, 12 Dec. 1948 (FC); on Bostrychia, Mississippi sound between Bay St. Louis and Waveland, *Drouet 9807, 9811*, 8 Dec. 1948 (FC); on Bostrychia in St. Louis bay, Bay St. Louis, *Drouet 9853*, 9 Dec. 1948 (FC). LOUISIANA: on *Lyngbya semiplena*, *L. confervoides*, and *Bostrychia* sp., Grand Isle, Jefferson parish, *L. H. Flint*, 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, *Drouet & P. Viosca 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 Gilkeyae* 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 (PC); 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 evanescens*, San Juan island, *W. C. Muenscher 1389*, Jun. 1915 (TA); on Fucus, Seattle, *D. Saunders* (UC); on *F. evanescens* f. *microcephalus* near Seattle, *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 Seattle, *Gardner 7982*, Jul. 1936 (FC, UC); on Gelidium, Channel rocks, West Seattle, *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 Rothii*, 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 acervatus* Setch. & Gardn., UC; isotype, PC [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 pulcher* Hollenb. in herb. G. J. Hollenberg;

isotypes, FC [Fig. 202], D); on Gigartina, Point Vincente, *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. Bush*, 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 Schousboei* 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 subimmersa* 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 fuciola* 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 furcatus*, 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, 1533s*, 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 sphaeroidea* 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*, Bushnells 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 sulfulia* 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*, Forneys 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*, Gaujataca, *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, *F. Børgesen 15x*, 1892 (UC). BARBADOS: on *Dictyopteris delicatula*,

Valentia, *A. Vickers*, 17 Jan. 1899 (FC, UC), Jun. 1899 (Type of *Dermocarpa Vickersiae* Coll., NY; isotypes in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1602, FC [Fig. 214], FH, L, TA). JAMAICA: Northeast cay, Morant cays, *C. B. Lewis A1172*, Jun. 1950 (FC). MEXICO: Baja California: on *Gracilaria Cunninghamii*, Cabo Colnett, *E. Y. Dawson 5241*, 4 Sept. 1948 (FC); on *Lyngbya semiplena* on pilings, southeast side of Cerros island, *W. R. Taylor 39-2*, 14 Mar. 1939 (FC, MICH); Ensenada, *N. L. Gardner 4994f* (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 Francisquito bay, *I. M. Johnston 13a* (Type of *Xenococcus deformans* Setch. & Gardn., CAS; isotype, UC); in *Callymenia angustata*, Santa Maria bay, *Howell 739a*, 12 Aug. 1932 (Type of *Xenococcus angulatus* Setch. & Gardn., CAS); Santa Rosalia, *Marchant 108* (Type of *Dermocarpa Marchantae* 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 *Chlorogloea 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. Drouet & D. Richards 3352*, 21 Dec. 1939 (FC); on *Lyngbya confervoides*, Playa Miramar, Guaymas, *Drouet & Richards 3139*, 5 Dec. 1939 (FC); in tide-pool, Punta San Pedro, Guaymas, *Drouet & 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, dept. 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 Joly 490*, 8 Feb. 1951 (FC); on Cladophora, Caiobá, *Brandão Joly 492, 528*, 9 Feb. 1951 (FC); on Gelidiella, Praia Medanha, *Brandão Joly 513*, 11 Feb. 1951 (FC); on *Lyngbya confervoides* and Pylaiella, Punta das Caieiras, *Brandão Joly 518, 519, 525*, 12 Feb. 1951 (FC). São Paulo: São Vicente near Santos, *F. Rawitscher 43*, 1941 (FC, TA); on Cladophora, Guarujá (Santos), *A. Fadala 331*, 20 Oct. 1950 (FC); Praia de Parnapoan, S. Vicente, *Joly 150*, 7 Oct. 1953 (D); on *Lyngbya confervoides*, Peruíbe, *Brandão Joly 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, Villemil, Albemarle island, *Howell 418*, 27 Apr. 1932 (FC, UC). PERU: on *Sireblocladia spicata*, Pisco, *R. E. Coker 465*, Jul. 1908 (NY); Chincha 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. Seichell 5595*, Jul. 1900 (FC, UC). PHOENIX ISLANDS: on *Lyngbya confervoides*, southeast side of Canton island, *O. Degener 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 Enteromorpha, 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, *Yataba*, Feb. 1878 (FH, PC); on *Myelophycus caespitosus*, Japan, *K. Yendo*, Dec. 1898 (D, FC, UC); Shimoda, *Yendo*, Feb. 1907 (D, FC, UC); in *Gymnogongrus* sp., Aburatsubo, and in *Carpopeltis* sp., Jyoga-shima, Mitura 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. Velasquez 144*, Dec. 1953 (D); on *Chaetomorpha brachygona* in fishponds at Dagat-Dagatan, Rizal, *Velasquez 624*, 19 Jan. 1941 (FC); on *Lyngbya aestuarii*, Paraõaque, 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 *Lyngybya confervoides*, Endek, Flores, *A. Weber-van Bosse 1124*, Dec. 1888 (L); Banda, Kai islands, on Cladophora, *T. Mortensen VIII*, 10 Jun. 1922 (Type of *Radaisia pusilla* Weber-van Bosse, C); drijvende op rif, Sanana, Soela Besi, *Weber-van Bosse*, Sept. 1899 (L); strand, Adja-Toening, Nieuw Guinea, *Weber-van Bosse*, 1899—1900 (L). AUSTRALIA: on *Calothrix 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, PC); auf *Sphacelaria furcigera* auf *Sargassum Peronii*, Nordwest-Australien, *Gazellen-Expedition B312*

(137)a, 26 Apr. 1875 (B); on *Calothrix crustacea*, Emu bay, Kangaroo island, South Australia, *H. B. S. Womersley O*, 10 Jan. 1946 (FC). ISRAEL: on *Lyngbya confervoides*, Tel Aviv, *T. Rayss 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 cylindraceis, diametro 2—8μ crassis; cellulis superioribus praecipue sphaeroideis vel post divisiones polyhedroideis; cellulis filorum intus substratum penetrantium ovoideis, sphaericis, cylindraceis, vel polyhedroideis, diametro (1—)2—15μ crassis; endosporangiis sphaericis vel ovoideis, diametro ad 30μ crassis; gelatino vaginale primum hyalino demum lutescente vel raro rubrescente seu coerulescente, homogeneo vel lamelloso; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, homogeneo 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* Kützing, 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* Kützing, Sp. Algar., p. 198. 1849. *Chroococcus julianus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *Gloeocapsa juliana* Kützing ex Rabenhorst, Fl. Eur. Algar. 2: 42. 1865. *Bichatia juliana* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from the Julian springs, 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 Kützing, Phyc. Gener., p. 172. 1843. *Cagniardia duriuscula* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1948. —Type from Schleusingen, Germany (L). FIG. 220.

Hydrococcus ulvaceus Kützing, 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 Kützing, Phyc. Germ., p. 146. 1845. —Type from Silesia (L).

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

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

Gloeocapsa dermochroa Nägeli in Kützing, Sp. Algar., p. 224. 1849; Nägeli, Gatt. Einzell. Alg., p. 51. 1849. *Bichatia dermochroa* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Pleurococcus dermochrous* Nägeli *pro synon.* 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*

Forti, 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). PIG. 226.

Cyanoderma rivulare 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 Pocatek, 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). PIG. 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 anodontae Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 99. 1891. *Microcystis anodontae* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 138. 1938. —Type from near Roztok, Bohemia (W).

Chamaesiphon fuscus var. *auratus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 538. 1891. —Type from Martinscica near Fiume, Jugoslavia (W).

Aphanocapsa anodontae 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 Flahaultii 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 Forti, 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.

Coelosphaerium holopediforme Schmidle, Beih. z. Bot. Centralbl. 10: 180. 1901. —Type from Schwenningen, Württemberg (ZT). FIG. 227.

Placoma africana Wille, Oesterr. Bot. Zeitschr. 53: 90. 1903. —Type from the Kachembe river, South Africa (O).

Hyellococcus 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). PIG. 222.

Palmophyllum foliaceum G. S. West, Journ. Linn. Soc. Bot. 38: 145. 1907. —Type from Niamkolo, 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 Rechinger, Bot. & Zool. Ergebn. Samoa- & Salomoninseln, Süsswasseralg., p. 7. 1914. —Type from Savaii, Samoa (O).

Aphanocapsa constructrix Bremekamp, Teysmannia 25: 73. 1914. —Type from Idjen mountain in eastern Java, Indonesia (in the Mineralogisch-Geologisch Instituut, University of Utrecht).

Chroococcopsis gigantea Geitler, Arch. f. Protistenk. 51: 342. 1925; Beih. z. Bot. Centralbl., II, 41: 241: 1925; in Pascher, Süsswasserfl. 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). PIG. 232.

Entophysalis chlorophora Gardner, Mem. New York Bot. Gard. 7: 30. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 233.

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

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

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

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

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

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

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

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

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

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

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

Dermocarpa Setchellii Drouet, Field Mus. Bot. 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:

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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 subglobosus* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 98. 1907.

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

Atkenaiya 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* Nadson, Scripta Bot. Hort. Univ. Imp. Petropol. 18: 27. 1900.

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

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

Pleurocapsa salevensis Chodat, Étude sur de Polymorpb. des Alg., p. 133. 1909.

Oncobyrsa sarcinoides Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 11. 1923. *Chroococcus sarcinoides* Wislouch *pro synon.* in Elenkin, loc. cit. 1923; Wislouch, Acta Soc. Bot. Polon. 2: 110. 1924. *Chlorogloea sarcinoides* Troitzkaja, Dnevn. Vsesoiuzn. Sezda Bot., p. 162. 1928.

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

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

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

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

Oncobyrsa 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. *Glaeocapsa 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. *violacescens* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 82. 1925.
Aphanocapsa distans Zalessky, Rév. Gén. de Bot. 38: 35. 1926.
Hyella 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. Latv. 4: 14. 1929.
Radaisia violacea Frémy, Arch. de Bot. Caen 3(Mém. 2): 56. 1930.
Pleurocapsa aurantiaca Geitler, Rabenh. Krypt.-Fl. 14: 354. 1931. *Scopulonema aurantiacum* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 93. 1942.
Myxosarcina 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 *Amphithrix janthina* (Mont.) Born. & Flah. have also been mistakenly identified with this form.

Specimens examined:
NORWAY: in rivulo frigido prope Giövik in praefectione tromsoensi lapidibus affixum, *G. Lagerheim*, Sept. 1893 (as *Sphaerogonium fuscum* in Wittr., Nordst., & Lagerb., Alg. Exs. no. 1611, FC, L, MIN, NY). POLAND: Galicia: na granitach wyścielających 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. Flotow*, 29 Feb. 1844 (Type of *Protococcus carneus* Kütz., L). GERMANY: Saxony: an Pflanzenstengeln im Salzsee bei Halle, *P. Richter* (UC). Thuringia: an Brünnenufern, Schleusingen, *F. T. Kützing* (Type of *Palmella durinscula* Kütz., L [Fig. 220]; isotype, UC); in rivulo prope Hirschbach, Schleusingen, *Kützing*, 1830 (Type of *Hydrococcus rivularis* Kütz., L [Fig. 217]; isotype, UC). Württemberg: Neckar [-quelle bei Schwenningen], *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 Tanowaldu, *Hansgirg*, Jul. 1885 (FC, W); Dux, *Hansgirg*, Aug. 1883 (FC, W); Elbfall im Riesengebirge, *Hansgirg*, Sept. 1883 (FC, W); Hluboceny, *Hansgirg*, Jun. 1885 (FC, W); in lapidibus calcareis viaductus magni ad Hluboceny, *Hansgirg* (as *Gloeocapsa rupicola* in Kerner, Fl. Exs. Austro-Hung. no. 3199, Z); Johannisbad, *Hansgirg*, Jul. 1885 (FC, W); Karlovary, Studeň, *Hansgirg*, Aug. 1883 (FC, W); ad rupes thermarum Carolinarum, *Welwitsch* (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); Panzschefall, *Hansgirg*, Sept. 1883 (FC, W); ad lapides in rivulo prope Pocarek, *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); Stříbro, *Hansgirg*, Aug. 1883 (FC, W); Tábor, *Hansgirg*, Aug. 1883 (FC, W); in Bergbachen an Steinen, Tannwald, *Hansgirg*, Jul. 1885 (Types of *Chroococcus fuscoater* var. *fuscoviolaceus* Hansg. and *C. fuscoviolaceus* var. *cupreofuscus* Hansg., W; isotypes, FC [Figs. 216, 226]); an alten Schalen von Anodonta, Tuchomeric—Ounetic 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 Grundlsee, *K. & L. Rechinger*, Sept. (as *Chamaesiphon polonicus* in Mus. Vindob. Krypt. Exs. no. 1760, FC, L, S, WU), *L. & K. Rechinger 31*, Sept. 1909 (FC, W); ad ostium 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, und Jenbach, *A. Hansgirg*, 1891 (FC, W). JUGOSLAVIA: Slovenia: Fodnart, Kaltenbrunn (prope Laibach), and Steinbrück, *Hansgirg*, Aug. 1890 (FC, W); an Schalen von Süsswasserschnecken bei Tremersfeld nächst Cilli, *Hansgirg*, Aug. 1890 (Type of *Aphanocapsa anodontae* var. *major* Hansg., W; isotype, FC [Fig. 219]). Istria: Pisino, *Hansgirg*, Aug. 1889 (FC, W); in aqua dulci, Parenzo, *Hansgirg*, Apr. 1889 (FC, W). Croatia: in aqua dulce, Fiume, *Hansgirg*, 1891 (FC, W); auf in schnell fliessendem Wasser untergetauchten Steinen in Bächen bei Martinscica nächst Fiume, *Hansgirg*, 1891 (Type of *Chamaesiphon fuscus* var. *auratus* Hansg., W; isotype, FC). Dalmatia: ad cataractam fluminis Kerkae ad Scardonam, *Hansgirg*, Aug. 1888 (FC, W); Clissa prope Spalato, *Hansgirg*, Aug. 1889 (FC, W); Cannosa—Valdinoce prope Ragusa, Castelnuovo, Metkovic, Ombla prope Ragusa, Ragusa, & Topla—Gruda prope Castelnuovo, *Hansgirg*, 1891 (FC, W). ALBANIA: Karbounara presso Lushnjë (prov. Berat), corassa cornea di tartaruga palustre, presso la sorgente di H_2S, *G. de Toni 47*, 30 May 1941 (D, DT, FC); Fushes-Dukati (prov. Valona), m. Sbendelliut, 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 *Glococapsa rubiginosa* Näg., with *Leptothrix muralis*, ZT): Zürich, Pfiffens in einer Brunnen, *Nägeli*, Sept. 1845 (Type of *Exococcus ovatus* Näg., ZT); Zürich, [Küsnacht], *Nageli 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. Margarita prope Ala, Auer, and Brixen, *A. Hansgirg*, 1891 (FC, W); fontana della piazza del Borghetti (Tirolo italiano), *D. Clementi* (Type of *Pleurococcus glomeratus* Menegh., FI [Fig. 234]); in fluvio Timavo prope Monfalcone, *F. T. Kützing, Thomasini, & Bratoletto*, 23 Apr. 1835 (Type of *Hydrococcus ulvaceus* Kütz., L [Fig. 223]); fons prope Monfalcone, *Hansgirg*, Aug. 1889 (FC, W); nel bagno freddo thermarum Julianarum, *J. Corinaldi 33* (Type of *Pleurococcus julianus* Menegh., FI [Fig. 225]; isotypes, L, S, W).

NETHERLANDS: in kanaal achter de dijk ten Linden van Roptazijl, *J. T. Koster 750*, Aug. 1942 (L). ENGLAND: on stones in rather slow-flowing Badgeworthy Water, Devonshire, *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 Devonshire, *Fritsch*, 1 Sept. 1920 (Type of *Chroococcopsis fluminensis* Fritsch and *Pseudoncobyrsa fluminensis* Fritsch in the collection of F. E. Fritsch; isotype, D). FRANCE: carrières, Falaise, *A. de Brébisson 526* (Type of *Palmella Brebissonii* Kütz., L; isotype, UC); environs de Paris, *M. Cornu*, 1878 (D, FH); sources du Lez près Montpellier, *F. Jadin*, Jan. 1892 (Type of *Hyella fontana* Hub. & Jad., PC), Jul. 1894 (FC); source de Font Méjane près Montarnaud (Hérault), *J. Huber & F. Jadin*, May 1893 (PC); Montpellier, *C. Flahault 150* (PC); dans une source fraiche se jetent 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'Aïn Oumach près Biskra, *Sauvageau*, Apr. 1892 (Types of *Dermocarpa Flahaultii* Sauvag. and *Entophysalis Cornuana* Sauvag., PC; isotypes D [Fig. 218]). TANGANYIKA: with *Cladophora inconspicua* G. S. West on stones, shore, Niamkolo, *W. A. Cunnington* (Type of *Palmophyllum foliaceum* G. S. West, in slide collection, BM). SOUTH AFRICA: im Flussbette der Kachembe, *J. Menyhardt 335* (Type of *Placoma 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 fluviatilis* in Coll., Hold., & Setch., Phyc. Bor.-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. Setchell & I. Holden*, 24 Aug. 1895 (as *Hyella fontana* in Coll., Hold., & Setch., Phyc. Boc.-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: Cattaraugus 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, *I. 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. Wolle*, 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. Madson, & D. Crowson 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, Crowson, & R. Thornton 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. McInteer 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, Ijam'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. Phinney 12M41J7, 206, 208*, 24 Jul. 1941, 11 Aug. 1942 (FC, PHI); on pilings, Pigeon river near Indian River, *Phinney 518*, 11 Aug. 1943 (FC, PHI). Presque Isle county: on pipe of artesian spring, Cliff's place, Ocquioc Lake, *Phinney 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, Thistlethwaites 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. Voth*, May 1945 (FC); on tank in greenhouses, University of Chicago, *Voth, 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. Phinney, F. A. Barkley, & D. Richards*, 17 Mar. 1945 (FC). Kane county: in a fountain in Pottawatomie 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, Pontiac, *Drouet & Louderback 5201, 5211a, 5248*, Sept.—Oct. 1943 (FC). MISSISSIPPI: outlet of the Ireshwater reservoir in the western part of Gulfport, *Drouet & R. L. Taylor 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 southeast of Mincy, Taney county, *J. A. Steyermark 40099*, 20 Jun. 1941 (FC). LOUISIANA: on turtle, Baton Rouge, *L. H. Flint*, 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 Minnechaduza 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). Dawes county: rock in Chadron creek, Chadron state park, *Kiener 20370, 20370a, 20371a, 20375a, 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. Flint 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. Piranian*, 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. Genoway*, 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. Setchell 1560*, 19 Dec. 1896 (Type of *Dermocarpa Setchellii* 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 *Pleurocapsa concharum* in Coll., & Setch., 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. Macbride 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*, 5 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 *Radaisia Willei* Gardn., NY; isotypes, D, UC); in a fountain in the woods near Maricao, *Wille 1076*, Feb. 1915 (Type of *Radaisia confluens* Gardn., NY [Fig. 228]; isotypes, D, UC). MEXICO: from rocks, lower hot springs, Baños de Agua Caliente, Hildalgo, *R. Patrick 95*, 15 Jul. 1947 (FC, PH); spring, San José de Purua, 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 Petexbatún south of Sayaxché, dept. Petén, *J. A. Steyermark 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 Bergantín, Anzoátegui, *Steyermark 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. Doty 12491*, 3 Aug. 1954 (D). SAMOA ISLANDS: [auf Felsen, Insel Savaii] *K. H. Rechinger 2834* (Type of *Entophysalis samoensis* Wille in the slide collection of N. Wille, O). NEW ZEALAND: in basin, Black Terraces, Taupo (East Taupo), *Setchell 6010a(101)*, 13 May 1904 (FC, UC). INDONESIA: in oolithis in fonte Tjeding in monte Idjen in Java Orientali, *C. E. B. Bremekamp* (Type of *Aphanocapsa constructrix* Bremek. in the collections of the Mineralogisch-Geologish Instituut of the University of Utrecht); Tjibodas, Java, *Ruttner* (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, *Ruttner*, 3 Jun. 1929 (Type of *Chlorogloea major* Geitl., slide no. D6bc in the collection of L. Geitler); Nostoc-Lager, Umgebung des T. Pasir, Wasserfall des Pagarede [Pasergede], Java, *Ruttner*, 9 Dec. 1928 (Type of *Chamaesiphon Jallax* Geitl., slide no. SW1bβ in the collection of L. Geitler); Stein aus dem Mittellauf des Quellbaches, starke Quelle am SE-Ufer, Ranu Pakis, Java, *Ruttner*, 29 Oct. 1928 (Type of *Chlorogloea purpurea* var. *minutissima* Geitl., slide no. KPQ1d in the collection of L. Geitler); Ranau-See, Süd-Sumatra, *Ruttner*, 1929 (paratype of *Chroococcopsis gigantea* Geitl., slide no. R4hα 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. R5aβ 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 Steinen im unteren Becken, Bukit Kili, Sumatra, *Thienemann*, 2 Mar. 1929 (Type of *Myxosarcina speciabilis* Geitl., slide no. SkW1b in the collection of L. Geitler). INDIA: auf Schneckenschalen in einem See in der Stadt Poona, *A. Hansgrg* (Type of *Chroococcus Hansgirgii* Schmidle, ZT [Fig. 229]). EGYPT: Sinai[halbinsel, am Fusse des Dschebel Hamân, *A. Kneucker*, 16 Apr. 1904] (Type of *Guyotia singularis* Schmidle, ZT [Fig. 222]).

4b. ENTOPHYSALIS RIVULARIS f. PAPILLOSA (Kütz.) Drouet & Daily, STAT. NOV. *Palmella papillosa* Kützing, 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.-Przyr., 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. *Oncobyrsa britannica* Fritsch *pro synon.*, 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 Geitleri H. Luther, 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-usenj, *N. N. Woronichin*, 31 Aug. 1929 (FC, FH). POLAND: zbierane na kamykach granitowych w wywierzysku Dunajca Bialego 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 Wittr. & 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. Habeeb 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. Wille 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—6μ crassis, erectis vel varie curvatis cellulis pulvini juvenilis ellipticis vel cylindricis erectis, in pulvinis maturis sphaericis, ovoideis, vel polyhedroideis, diametro 2—8μ crassis; endosporangiis sphaericis, ovoideis, vel pyriformibus, diametro ad 25μ crassis; gelatino vaginale primum hyalino demum lutescente, homogeneo vel laminoso; protoplasmate aerugineo, olivaceo, violaceo, vel roseo, homogeneo. FIGS. 221, 235—246.

The commonly encounrered 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, Apercu d'Hist. Nat., p. 28. 1833. *Oncobyrsa Lemaniae* Gomont, Bull. Soc Bot. Fr. 43: 377. 1896. *Hydrococcus Lemaniae* Bornet *pro synon.* 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 fluviatile* Brébisson *pro synon.* in Meneghini, loc. cit. 1843. *Hydrococcus Brebissonii* Kützing, 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 Cesatii Rabenhorst, Alg. Sachs. 93 & 94: 922. 1860. *Oncobyrsa Cesatiana* 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. *Brachybrix confervicola* A. Braun *pro synon.* 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 incrustans Grunow in Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. *Sphaerogonium*

incrustans Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-przyr., 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 Vöcklabrück, Upper Austria (W).

Sphaenosiphon aquae-dulcis Reinsch, Contrib. Algol. & Fungol. 1: 15. 1874. *Dermocarpa aquae-dulcis* Geitler in Pascher, Süsswasserfl. 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.-Przyr., 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. *elongatus* 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 aggregatus* Geitler in Pascher, Süsswasserfl. 12: 157. 1925. —Type from Krakow, Poland (PC).

Xenococcus Kerneri Hansgirg, Physiol. & Algol. Stud., p. 111. 1887. *Dermocarpa Kerneri* Hansgirg, Physiol. & Phycophyt. Unters., p. 234. 1893. *Pleurocapsa Kerneri* Drouet, Field Mus. Bot. Ser. 20: 125. 1942. —Type from Eisenbrod, Bohemia (FH).

Chamaesiphon incrustans 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.

Oncobyrsa hispanica Lewin, Bih. t. Sv, Ver.-Akad. Handl., Afd. 3, 14(1): 4. 1888. —Type from Yunquera (Malaga), Spain (S).

Dermocarpa depressa W. & G. S. West, Journ. of Bot. 35: 301. 1897. —Type from Sassanga island, Loanda, Angola (BM). PIG. 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. *subviolaceus* 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 Willei 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. minutus* 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 Danau 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* Geitler in Pascher, Süsswasserfl. 12: 142. 1925.

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

Sphaerogonium amethystinum Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-Przyr., 10: 291. 1883. *Chamaesiphon amethystinus* 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 minimus Schmidle, Engler Bot. Jahrb. 30: 62. 1901. *C. africanus* var. *minimus* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 99. 1907.

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

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

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

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

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

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

Chamaesiphon oncobyrsoides 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 Plectonematis Frémy, Ann. de Bot. Caen 3(Mem. 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. *subsalsa* Proscbkina-Lavrenko, Akad. Nauk S. 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, *Schübeler*, 1846 (FC). SWED-

EN: in muscis aquaticis, Nacka, *G. Lagerheim*, Jun. 1883 (S); in rivulis Scaniae, *C. A. Agardh*, 1824 (Type of *Nostoc Lomaniae* Ag., PC [Fig. 239]); in *Cladophora fracta* in Lacu Valloxen Uplandiae, *V. Wittrock*, 27 Oct. 1878 (as *Chamaesiphon confervicola* in Wittr. & Nordst., Alg. Exs. no. 293, FC, L, S). POLAND: sur le Batrachospermum, Cracovie, *E. Janczewski*, 20 Apr. 1883 (Type of *Godlewskia aggregata* Jancz., PC), 22 Aug. 1885 (PC). ROMANIA: ad Cladophoram apud Baneasa prope Bucuresti, *Dna. O. Malinescu 1056*, 18 May 1896 (FC, W). GERMANY: Freiburg in Breisgau, *G. Lagerheim*, Jul. & Dec. 1887 (Type of *Plenrocapsa fluviatilis* Lagerh., DT [Fig. 240]); auf *Fontinalis antipyretica* L., Laubach (Hesse), *G. Roth*, Jul. 1908 (FC); auf *Cladophora glomerata* var. *intricata*, Giessen (Hesse), *A. Braun*, Dec. 1850 (Type of *Chamaesiphon confervicola* A. Br. and f. *elongatus* Rabenh., NY; isotypes, FH, PC, S); auf Chantransia, Leipzig, *P. Richter* (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 Kerneri* Hansg. on *Scytonema cincinnatum* in Kerner, Fl. Exs. Austro-Hungar. no. 1596, FH); auf Chantransia 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 *Calothrix Wrangelii* auf Steinen im Moosbache bei Milchdorf, *Schiedermayr* (Type of *Chamaesiphon Schiedermayeri* Grun., W); auf *Calothrix Brebissonii*, Vöcklabrück, *von Mörl* (Type of *Chamaesiphon Schiedermayeri* f. *subclavatus* Grun., W); Seebach am Gleinkersee bei Windisch-Garsten, *Schiedermayr*, Nov. 1865 (Type of *C. incrustans* Grun., W. isotypes in Rabenh. Alg. no. 1944, PH, PC). Lower Austria: auf *Cladophora puteolit* in einem Brunnen zu Hörnstein, *A. Grunow*, Jul. 1864 (as *Chamaesiphon confervicola* in Rabenh. Alg. no. 1726, FH, PC); insidentes muscis sub aqua decavente canalis molendarii rivi Fischadagnitz ad Unter-Waltersdorf, *S. Stockmayer* (as *Oncobyrsa rivularis* in Mus. Vindob. Krypt. Exs. no. 744, FC, L, WU); auf Cladophora in einem Kulturglas, Wien, *L. Geitler* (Type of *Dermocarpa chamaesiphonoides* Geitl. and *Xenococcus minimus* Geitl., W [Figs. 237, 241]).

JUGOSLAVIA: Slovenia: in *Lemanea fluviatili*, Kaltenbrunn prope Laibach, *A. Hansgirg*, Aug. 1889 (FC, W); in *Tolypothrice penicillata* in fonte parvo prope Kronau, *K. de Keissler* (as *Chamaesiphon minutus* in Mus. Vindob. Krypt. Exs. no. 1949, FC, L, NY, S). Croatia: Mühlbach in Marinscica bei Fiume, *F. Hauck*, Sept. 1878 (L). Dalmatia: in Cinclidoto unacum *Chantransia violacea*, herb. P. Reinsch (Type of *Sphaeniosiphon aquae-dulcis* Reinsch, K); Knin, *Hansgirg*, Aug. 1888 (FC, W); Ombla prope Ragusa et Topla—Gruda prope Castelnuovo, *Hansgirg*, 1891 (FC, W). TRIESTE: Zaule, *Hauck 1558*, 18 Mar. 1870 (FC, FH, PC). ITALY: on mosses, Treviso, *G. Venturi*, 1857 (FC); Roveredo, *A. Hansgirg*, 1891 (FC, W); ad *Fontinalem 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 Hueseden*, 30 Jul. 1940 (FC, L). BELGIUM: in *Fontinali squamosa* var. *tumida* submersa in rivo Amblève 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*, Westmorland, *P. Dreesin*, 1873 (FC); on *Cladophora glomerata*, East Lyn, north Devon, *F. 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 Brebissonni* 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 Brébisson* (FC); Courteilles (Calvados), *Brébisson*, May 1839 (PC); Falaise (Calvados), *Brébisson* (Type of *Oncobyrsa Brebissonii* Menegh., L [Fig. 245]; isotypes, NY, UC); sur *Fontinalis antipyretica*, Mte. Rotondo (Corsica), *Solierol 5035* (FC); sur *Cinclidotus fontinaloides*, moulin de Kerauffray près Guingamp (Côtes du Nord), *E. Jeanpert*, 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 Ferraudière*, 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 & P. Camus* (FC).

SPAIN: Nacimiento del Rio Grande, nahe Yunquera in Serrania de Ronda (Malaga), *H. Nilsson 24*, 28 May 1883 (Type of *Oncobyrsa hispanica* M. Lewin, S). ANGOLA: Loanda, supra *Pithophoram radiantem* in aquariis aquae subdulcis insulae Cassanga prope Morro da Cruz, *F. 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, Nosi-bé, *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 Peters. in the collection of J. Boye Petersen; isotype, D [Fig. 238]). NEW BRUNSWICK: on *Tolypothrix 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. Setchell 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 Lescurii,* Bowls and Pitchers, Shelburne, *W. G. Farlow,* Oct. 1899 (FC, FH); on *Hydrothyria venosa,* Ingalls brook, Shelburne, *E. Paxon,* 2 Sept. 1886 (D, FH). MASSACHUSETTS: on *Lemanea fucina,* Waverley, *W. H. Weston Jr.,* 1 Jun. 1923 (FC, TA); Gosnold pond, Cuttyhunk, *I. F. Lewis & R. H. Colley,* 5 Jul. 1915 (as *Chamaesiphon incrustans* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2101, FC, L). CONNECTICUT: on Stigonema, Stony brook, Montville, *W. A. Setchell 102,* 30 Jun. 1890 (FC, UC); Stony brook, Mohegan, *Setchell,* 9 Sept. 1892 (FC, UC); among Confervae, New Haven, *W. C. Sturgis,* 30 May 1889 (FC, UC). QUEBEC: submergé, Rivière Payne vers 71° 5″ long, O., Ungava, *J. Rousseau 1175,* 11 Aug. 1948 (FC); sur *Podostemon Ceratophyllum* dans les rapides près de l'Eglise, Saint Joseph, Rivière des Rapides, *F. Marie-Victorin & Rolland-Germain 33998,* 9 Sept. 1930 (FC). NEW YORK: on Oedogonium in aquarium in Barnard College, New York City, *H. C. Bold B71,* 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 Bushkill, 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, PH1). NORTH CAROLINA: on *Fontinalis dalecarlica* in stream, Soco falls, Soco Gap, Jackson county, *W. H. Welch 2221,* 17 Jun. 1936 (FC); on *F. dalecarlica,* Montreat, Buncombe county, *F. C. Standley & H. Bollman 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 *Lyngbya aestuarii,* West Lake, *J. H. Davis Jr.,* summer 1937 (D). Hernando county: on *Rhizoclonium Jonianum, 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. Madson, & 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, Madsen, & Crowson 538,* 30 Oct. 1948 (FC, T). Marion county: Rainbow Springs near Dunnellon, *Brannon 375,* 20 Oct. 1946 (FC, PC), *Madsen, 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. Schallert 2278,* 1 Jun. 1951 (FC). Seminole county: on *P. Wollei,* Rock Springs, *E. M. Davis,* May 1939 (FH). Taylor county: on Chantransia 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 Chantransia 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); on *Desmonema Wrangelii* 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, PH1). 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. Louderback & 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 92845,* 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 Hahatonka, Camden county, *Drouet 145,* 9 Aug. 1928 (D); on *R. hieroglyphicum,* Chouteau Springs, Cooper county, *Drouet & Louderback 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. Flint 5*, 18 Apr. 1945 (FC). NEBRASKA: on *R. hieroglyphicum* 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 Bordeaux 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 *Basicladia Chelonum* 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. Flint 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 16T469*, 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 *Hygrohypum Bestii* in Adair creek, Custer district, Custer county, *P. A. Mac Fadden 18707*, 7 Aug. 1941 (FC); on hepatic with *Fontinalis antipyretica*, Little creek bridge, road from Deer Park to Idaho City, *Mac Fadden 19297*, 18 Oct. 1942 (FC). UTAH: on *Lemanea fucina* 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 Chantransia, Fifryfoot 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, Pit river, *H. W. Shepherd 7975*, 15 Aug. 1936 (FC, UC). Tulare county: on *Desmonema Wrangelii* in Marble Rock creek, Sequoia national park, *R. Prettyman*, 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 *Pleurocapsa epiphytica* Gardn., NY), *1323x* (NY), Feb. 1915. JAMAICA: on Chantransia, Seaman's Valley, Portland, *W. R. Maxon & E. P. 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, Guadalajara, *W. Kiener 18130*, 21 Dec. 1944 (FC, KI); on turtle in a pool near the bridge, Unión, Hermosillo, Sonora, *F. Drouet & 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 Guacalate, dept. Escuinla, *Standley 60142*, 16 Dec. 1938 (FC); on Cladophora, *Marathrum foeniculaceum*, and *Tristicha hypnoides*, vicinity of Santa María de Jesús, dept. Quezaltenango, *Standley 87046*, 12 Feb. 1941 (FC), *J. A. Steyermark & A. E. Vaster 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. Muenscher 12035*, 4 May 1937 (FC); on Oedogonium in small stream, Zacapa, *Standley 74268*, Oct. 1940 (FC). COSTA RICA: on *Marathrum Schiedeanum* in stream, San José, *Standley 41213*, Dec. 1925—Feb. 1926 (FC). PANAMA: on Chantransia in stream bed, Shannon trail, Barro Colorado island, Canal Zone, *G. W. Prescott CZ46*, Aug. 1939 (FC). VENEZUELA: on mosses in stream along Rio Karuai at base of Sororopán-tepuí west of La Laja, Bolívar, *Steyermark 60774*, 29 Nov. 1944 (FC). BRAZIL: on Oedogonium 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 arcuifera*, Rio Bengala entre le Alto et Novo Friburgo (état de Rio de Janeiro), *A. Glaziou 13147*, 10 Aug. 1881 (FC). PARAGUAY: on Chantransia, Colonia Risso, *G. A. Malme 92, 94B*, 14 & 18 Oct. 1893 (FC, S). ARGENTINA: in *Rhizoclonium hieroglyphicum* in aqua subsalsa, Laguna Colorada, 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. Paita, dept. Piura, *C. C. Sanborn*, Sept. 1943 (FC).

HAWAIIAN ISLANDS: Hawaii: on Pithophora, Punaluu, *J. E. Tilden*, 3 Jul. 1900 (FC), *M. Doty 8004*, 9 Sept. 1950 (FC). Kauai: on *Cladophora crispata* in a brook, Kumuela camp, *M. Reed*, 21 Jul. 1908 (FC, UC). Oahu: in *Cladophora longiarticulata* in piscinis in convalle Nuanu prope Honolulu, *S. Berggren*, 1875 (Types of *Chamaesiphon curvatus* Nordst. and f. *elongatus* Nordst., PC; isotypes on *Cladophora longiarticulata* in Wittr. & 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 dist., Ponape, *S. F. Glaisman 2763*, 2 Aug. 1949 (FC). SAMOA ISLANDS: Savaii, Flussbette, *K. H. Rechinger 2969*, Jul. 1905 (Type of *Chroococcus turgidus* var. *subviolaceus* Wille in the slide collection of N. Wille, O); Upolu, *Rechinger 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 Cladophoris in Tokano river, *Berggren 319b*, Jan. 1875 (as *Sphaerogonium incrustans* and *"Xenococcus?* vel *Oncobrysa?"* in Wittr. & Nordst., Alg. Exs. no. 899, FC, L, NY, PC, S, UC); on *Cladophora glomerata* in cold stream, Wairakei geyser valley, Taupo county, *W. A. Setchell 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*, waterfall 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, *Ruttner*, 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 triefender Wand, Wasserfälle von Tjibeureum, Gebiet von Tjibodas, *Ruttner*, 9 Jul. 1929 (Type of *Chamaesiphon subglobosus* var. *major* Geitl., slide no. Tj2Iacc in the slide collection of L. Geitler); auf Lyngbya aus 5 m. Tiefe, Ranu Bedali, *Ruttner*, Nov. 1928 (Type of *Dermocarpa clavata* Geitl., slide no. KB2δ in the collection of L. Geitler; Type of *D. xenococcoides* Geitl., slide no. KB2δ in the collection of L. Geitler); Tengger, *Ruttner*, 25 Jun. 1929 (slide no. TG1d in the collection of L. Geitler). Sumatra: Dana Manindjau, *Ruttner*, 1929 (paratype of *Xenococcus minimus* var. *Starmachii* Geitl., slide no. FM2bcc in the slide collection of L. Geitler); auf Cladophoraceae, von Strauchwerk tief beschattete Stelle am Ufer, Hauptzufluss des Ranau-Sees bei Kota Baru, *Ruttner* (Type of *Pleurocapsa subgelatinosa* Geitl., slide no. RE3acc in the collection of L. Geitler); auf Hydrella aus 7 m. Tiefe, Profil vor Panjingahan am Westufer des Singkarak-Sees, *Ruttner*, 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, *Ruttner*, 7 May 1929 (slide no. M4gβ in the collection of L. Geitler). WESTERN TIBET: stream just below Phohrang, running into northwest end of Pang-goug Tso, *G. E. Hutchinson L46*, 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. Crypt. 1: 81. 1933.

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

Cellulae solitariae primum sphaericae aetate provecta lineari-cylindricae vel lineari-tubaeformes, 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. Diguetii* 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. Nordstedt*, 17 Aug. 1878 (PC). SWEDEN: in *Fontinalis dalecarlica*, Kvarnbaacken, Högsjö, Angermanland, *A. Arvén*, 14 Jul. 1914 (FC). MASSACHUSETTS: with *Chantransia Hermannii* on mosses in brook, Sharon, *F. S. Collins*, May 1890 (in Collins, N. Amer. Alg. 153, D), Massapoag brook, Sharon, *W. A. Setchell 26*, 4 May 1890 (D). QUEBEC: sur les mousses au bord de la Rivière Payne, vers 73° 7′ long. O., Ungava, *J. Rousseau 937*, 6 Aug. 1938 (FC). LOUISIANA: stream near Husser, Tangipahoa parish, *L. H. Flint*, 21 Mar. 1953 (FC).

FAMILY III. CLASTIDIACEAE

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

Plantae microscopicae, solitariae, epiphyticae, primum sphaericae aetate provecta cylindricae, 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 adhaerenre; 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. setigerum* Kirchn.

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