

Family I. Chroococcaceae, part 2

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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.

Recommended Citation

Drouet, Francis and Daily, William A. (1956) "Family I. Chroococcaceae, part 2," *Butler University Botanical Studies*: Vol. 12, Article 8. Available at: <http://digitalcommons.butler.edu/botanical/vol12/iss1/8>

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

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393, 13 Aug. 1930 (DA, FC). Wells county: in Kunkel lake 2 miles east of Bluffton, P. K. & W. A. Daily 2433, 16 Jun. 1951 (DA, FC).

WISCONSIN: Pleasant lake near Lauderdale lakes, G. W. Prescott 3W28, Aug. 1938 (FC); Razorback lake, E. J. Kryski 49, 26 Jul. 1938 (DA, FC). Burnett county: Fish lake, G. M. Smith 64 (FC). Dane county: laboratory cultures, R. Evans, G. Fitzgerald, 8 Jun., 25 Oct. 1949 (FC); Fourth lake, Madison, W. Trelease, 1882 (MO); Lake Mendota, Madison, Trelease, 1882 (FC, D, FH, MO), R. E. Blount, 2 Oct. 1886 (FC). Keosauqua county: Silver lake in Silver Lake, E. H. Ahlstrom, 5 Jun. 1932 (DA, FC). Polk county: North Twin lake, G. M. Smith 61, 22 Aug. 1917 (FC). Rock county: in small lake near Clear lake, J. B. Lackey, Aug. 1943 (FC). Vilas county: Alequash lake, Prescott W155, 2W268, 13 Aug. 1936, 11 Jul. 1937 (FC); High lake, Prescott 2W59, 22 Jun. 1937 (FC). Washburn county: Spooner lake, W. Trelease (MO). Waushara county: pond east of Wild Rose near Silver lake, Prescott 2W330, 19 Jul. 1937 (FC). ILLINOIS: Lake county: Diamond lake, Fox lake, Lake Marie, Petit lake, Pistakee lake, Slocum lake, and Lake Zurich, E. H. Ahlstrom, 5 Jun. 1932 (DA, FC); Grass lake and Slocum lake, M. E. Britton 924, 926, 24-25 Aug. 1939 (DA, FC). MINNESOTA: Fountain and Iowa lakes (western prairie lakes), C. B. Reif, 28 Jun. 1936, 26 Aug. 1938 (DA, FC). Aooka county: Rice lake, S. Eddy, 16 Aug. 1932 (DA, FC). Cass county: Cass lake, S. Eddy, 10 Sept. 1936 (DA, FC). Clearwater county: Lake Itasca and De Soto lake, Eddy, 29 Aug. 1935, 20 Aug. 1940 (DA, FC). Hennepin county: Bass pond, Eddy, 22 Sept. 1931 (DA, FC); Cedar lake, Eddy, 14 Aug. 1931 (DA, FC); Cross lake just north of Minneapolis, Reif, 22 Sept. 1936 (DA, FC); Long lake, B. T. Shaver & J. E. Tilden, 5 Sept. 1895 (as *Clatrocystis aeruginosa* in Tild., Amer. Alg. no. 194A, B, FC, MIN, NY, US); Lake of the Isles, Minneapolis, K. Damann, 18 Aug. 1936 (FC), F. Drouot 5594, 19 Aug. 1944 (FC); Lake Minnetonka at Spring Park, Drouot & A. A. & E. Coburn 5007, 5016, 8 Aug. 1943 (FC); Lake Nokomis, Eddy, 14 Aug. 1931 (DA, FC). Itasca county: Bowstring lake, Reif, 29 Jul. 1936 (DA, FC). Jackson county: Heron lake, Reif, 11 Jul. 1938 (DA, FC). Kandiyohi county: Kandiyohi lake, Reif, 7 Sept. 1938 (DA, FC). Ottertail county: Crystal, Little Pelican, Sand, Sauer, Sear, Spirit, and Wimer lakes, Eddy, Jul.—Aug. 1940 (DA, FC); Ottertail lake, Reif, 13 Sept. 1938 (DA, FC). Ramsey county: io lake, Como park, St. Paul, J. E. Tilden, 10 Aug. 1895 (as *Clatrocystis aeruginosa* in Tild., Amer. Alg. no. 194B, B, FC, MIN, NY, US); Lake Josephine, Eddy, 18 Jul. 1931 (DA, FC); in Keller lake north of St. Paul, Drouot & E. Coburn 5045, 5050, 9 Aug. 1943 (FC); McCarron's pond, Reif, 15 Aug. 1931 (DA, FC); Lake Owasso, Eddy, 15 Aug. 1931 (DA, FC); Round lake, Reif, 13 Jul. 1938 (DA, FC).

IOWA: Center lake, G. W. Prescott 317, 10 Jul. 1925 (D, NY); Des Moines river, Boone county, W. C. Starrett P34, P38, P47, P165, 18 & 29 Jul. 1946, 9 Aug. 1947 (FC); Lake Okoboji, M. S. Markle, Summer 1926 (DA, FC), Prescott 316, 338, 30 Jun. 1925, 24 Jun. 1926 (D), Prescott, 23 Aug. 1930 (FC). MISSOURI: in lake, Perle Springs, Warrensburg, Drouot 778, 26 Oct. 1930 (D); St. Louis, G. T. Moore, Aug. 1913 (D); Agriculture pond, Columbia, Drouot 990, 27 Jul. 1932 (D); laboratory culture (no. 1036 from Dr. Gerloff), University of Missouri, Columbia, V. W. Proctor, 31 Oct. 1952 (FC). ARKANSAS: Monticello, Drew county, D. Damarac 24557, 16 Jul. 1943 (FC); lake in Malvern, Hot Spring county, N. E. Gray 284, 9 Sept. 1939 (FC); artificial lake east of 1000 Drippings, Garland county, Gray 659, 3 Sept. 1940 (FC); Lake Hamilton, Garland county, Gray 134-35, 18 Aug. 1939 (FC). LOUISIANA: pond in pasture 1 mile northwest of Baton Rouge, G. W. Prescott La17, 20 Jun. 1938 (D). SASKATCHEWAN: lake near Prince Albert, F. Rising-Moore & O. H. Stiffs Brancoratho, 2 Aug. 1951 (FC). NORTH DAKOTA: Devils Lake, M. A. Brannon 1, Aug. 1913 (FC, UC). NEBRASKA: Arthur county: Haythorn lake, W. Kiener 15457—15460, 10 Sept. 1943 (FC, KI). Dawson county: Johnson lake south of Lexington, Kiener 24671, 24672a, 7 Jul. 1949 (FC, KI). Dodge county: sandpit lakes, Fremont, Kiener 19700, 23934, 15 Sept. 1945, 1 Jul. 1948 (FC, KI). Garden county: Crescent lake, Oshkosh, Kiener 16183, 16190, 4 Nov. 1943 (FC, KI). Cherry county: Hackberry, Dewey and Watts lakes, E. R. Walker & E. N. Anderson, Jul. 1912 (NEB); Hackberry lake, E. Palmisier, Jul. 1936 (NEB). Hall county: sandpit pond, Grand Island, Kiener 15176, 15177, 29 Aug. 1943 (FC, KI); gravel-pit pond southeast of Grand Island, Kiener 17176, 17 Aug. 1944 (FC, KI). Hitchcock county: lake 3 miles east of Stratton, Kiener 10470, 10477, 24 Jul. 1941 (FC, KI). Holt county: shore of Goose lake 25 miles south of O'Neill, Kiener 21390, 8 Aug. 1946 (FC, KI). Kimball county: Bennett reservoir east of Kimball, Kiener 22706, 18 Aug. 1947 (FC, KI). Lancaster county: Du Teau farm pond, Lincoln, Kiener 21431, 21 Aug. 1946 (FC, KI). Lincoln county: Sutherland reservoir, Sutherland, Kiener 24693, 24695, 11 Jul. 1949 (FC, KI); fish-hatchery ponds south of North Platte, Kiener 17261, 22 Aug. 1944 (FC, KI); Lake Maloney, North Platte, Kiener 24685, 24687, 24689—24691, 10 Jul. 1949 (FC, KI), Kiener 24029, 24031, 28 Jul. 1949 (FC, KI).

KANSAS: stagnant pond, Pittsburg, R. Patrick, 5 Sept. 1938 (FC). TEXAS: sewage disposal lakes at Camp Barkeley, Taylor county, W. L. Tolstead 7750, 29 Jan. 1944 (FC). COLORADO: Barr lake, Adams county, R. Prettyman, 30 Jul. 1939 (DA, FC). UTAH: Strawberry reservoir, Wasatch county, Utah Party P19, 17 Mar. 1934 (FC), A. S. Hazzard P16, 24 Aug. 1933 (FC).

ARIZONA: station 13, Mary's lake, Flagstaff, H. S. Colton, 28 Aug. 1923 (Type of *Microcystis aeruginosa* f. *occidentalis* W. R. Taylor, TA). BRITISH COLUMBIA: Deer lake, Burnaby, New Westminster county, J. E. Nielsen 84, 87, 7 Sept. 1924, 24 May 1925 (FC). WASHINGTON: Green lake, Seattle, N. L. Gardner, Dec. 1903 (as *Clathrocystis aeruginosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1153, FC, L, MICH, MIN, NEB, NY, TA, US); lake on Fidalgo island, L. E. Griffin, Summer 1938 (FC). CALIFORNIA: in Clear lake, 3 miles north of Lower Lake, Lake county, Gardner 7996, 25 Oct. 1936 (FC, UC); in Puddingstone lake near La Verne, Los Angeles county, G. J. Hollenberg 1527, 1646, 30 Sept. 1924, 13 Sept. 1936 (FC, UC); Sweetwater dam, San Diego county, B. Bostwick 72 (FC, UC); Laguna Puercas, San Francisco, K. Brandagee, Mar. 1913 (UC). MEXICO: in Lake Chapultepec, Mexico City, R. Patrick 148, 19 Jul. 1947 (FC, PH). GUATEMALA: Lake Amatitlan, W. A. Kullerman 5034, Jan. 1906 (FC), S. E. Mueh 1 (Type of *Clathrocystis robusta* Clark, FC [Fig. 11]), 9, 11, 12, 16, 21—23, 25, 26, 40, Jan., Feb. 1906 (FC); La Laguna one mile north of Jalapa, J. A. Sieyermark 32246, 30 Nov. 1939 (FC); Lago Atescatempa south of Asunción Mita, dept. Jutiapa, Sieyermark 31841, 17 Nov. 1939 (FC). COSTA RICA: Laguna del Misterio, al norte de San José, J. M. Orozco C. 35—37, 48—50, 52, 1935 (FC). PANAMA: Barro Colorado island, Canal Zone, A. M. Chickering, 5 Jul., 4 Aug. 1936 (D, FH, L, NY, S). BRAZIL: Ceará: Açude São Francisco, São Francisco, S. Wright, 2 Nov. 1937 (D, FH, NY); Açude Cedro near Quixadá, Wright & P. de Azevedo 1539, 31 Aug. 1935 (D, FH, MICH, NY); Lagoa Porangabuçu, Fortaleza, P. Drouet 1504, 3 Dec. 1935 (D, DT, NY). Pará: in small bays in Rio Tapajós, J. W. H. Trail 165 (Type of *Microcystis caerulea* Dickie, BM). Paraíba: Açudes Baixo de Pão, Lapa, Puxinana, Simão, and Velho, Campina Grande, Wright 1558, 1559, 1561, 1563, 1567, 1568, 1572—1574, 1578, 1587, 1589, 1592, 1606, 1608, 1967, 1985, 1992, 1998—2000, 2004, 2017, 2019, 2041 (D), 4258 (DA, FC), 1933—35; Açude Esperança near Esperança, Wright 1595, 1974, 2043, 12 Dec. 1933, 19 Sept. 1934 (D); Açude Linda Flor near Mojeiro de Baixo, Wright 1562, 24 Nov. 1934 (D, MICH, NY); açude near Serra Branca, Wright 1995, 6 Apr. 1934 (D). Rio Grande do Sul: Lagoa dos Quadros, H. Kleerekoper, Oct. 1941 (FC). ARGENTINA: Laguna Los Chilenos near Dufaur, Laguna Chascomus, and Laguna Blanca Grande, prov. Buenos Aires, S. Wright 2098, 2101, 2113, Nov. 1936, Jan. 1937 (D); Lagunas Garcia, Tala, and La China, prov. San Luis, Wright 2096, 2111, 2112, Dec. 1936 (D). PERU: Cocha Zapote, Rio Pacaya, Bajo Ucayalí, dept. Loreto, F. Anceja, July, 1947 (FC). FORMOSA: fish pond, Tainan, C. C. Chou, 11 May 1951 (D). PHILIPPINES: Pasig river, Manila, W. R. Shaw 347, Mar. 1909 (B, L, NY, US), E. Quisumbing 9, 1929 (TA); Laguna Bay, Laguna, R. Medina & G. T. Velasquez 375, 15 Jan. 1940 (FC, S). CHINA: Woo-Sung, Chekiang, J. E. Nielsen 63, 29 Jul. 1923 (FC); Tientsin, M. S. Clemens 6014, 22 Jul. 1913 (FC, UC); Tali lake, Yunnan, S. C. Hsiao, Nov. 1945—Feb. 1946 (FC). AUSTRALIA: Somerset dam, Queensland, A. B. Cribb, Jul. 1947 (FC). BURMA: Prome (S. Kurz) (Type of *Chroococcus indicus* Zell., L [Fig. 8]); Rangoon, L. P. Khanna 576, 589, Spring 1936 (FC); Cantonment Gardens, Rangoon, Khanna 332, 334, 9 May 1935 (FC). CAMBODIA: im Bien-ho (Toulé-Sap), O. Kuntze, 1875 (NY). INDIA: in einem Bassin der Victoria-Garden, A. Hansgirg, Nov. 1895 (in Hauck & Riche, Phyk. Univ. no. 748B, L, MIN, NY); Bombay, in horto Victoria Garden, Hansgirg, Sept. (Type of *Polycystis insignis* Beck in Mus. Vindob. Krypt. Exs. no. 227, W; isotypes, DT, FC [Fig. 10], L, NY). CEYLON: Perispan-pokuwa near Isurumunija temple at Anuradhapoora, P. E. Fritsch, 3 Oct. 1903 (Type of *Microcystis protozoicus* Crow in the collection of F. E. Fritsch; isotype D [Fig. 5]); Colombo, F. J. Philon & I. B. Warnock, Sept. 1934 (as *M. aeruginosa* in Tild., So. Pacific Pl., 2nd Ser., no 3, FC).

2. ANACYSTIS INCERTA Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Polycystis incerta* Lemmermann, Forschungsber. Biol. Sta. Plön 7: 132. 1899. *Microcystis incerta* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 76. 1907; Forti, Syll. Myxophyc., p. 86. 1907. *M. pulverea* var. *incerta* Crow, New Phytol. 22: 66. 1923. *M. pulverea* f. *incerta* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. *Diplocystis incerta* Drouet & Daily, Lloydia 11: 78. 1948. —Specimen from Lake Wombsjön, Sweden, determined by the author, designated here as the Type (S).

Polycystis elongata W. & G. S. West, Trans. Roy. Irish Acad. 32(B): 79. 1902. *Clathrocystis elongata* Forti, Syll. Myxophyc., p. 96. 1907. —Type from Lough Neagh, Ireland (BIRM).

Clathrocystis bolsatica Lemmermann, Forschungsber. Biol. Sta. Plön 10: 150. 1903. *Microcystis bolsatica* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 77. 1907. *M. pulverea* f. *bolsatica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —Specimen from Neudamm, Germany, determined by the author, designated here as the Type (B).

Microcystis minutissima West, Proc. Roy. Irish Acad. 31: 41. 1912. *Aphanosyce saxicola* f.

minutissima Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. —Type from Achill island, Ireland (BIRM).

Aphanocapsa elachista var. *conferta* W. & G. S. West, Journ. Linn. Soc. Bot. 40: 432. 1912. *Microcystis pulverea* f. *confertior* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —Type from Perthshire, Scotland (BIRM).

Microcystis pallida Migula, Crypt. Germ., Austr. & Helv. Exs. 52(Alg.): 264. 1931. *M. Migulae* J. de Toni, Archivio Bot. 15: 291. 1939. —Isotypes from Eisenach, Germany (B, FC, FH, NY, S, TA). FIG. 13.

Aphanocapsa minima Migula, Crypt. Germ., Austr. & Helv. Exs. 58(Alg.): 277. 1933. —Isotype from Marksuhl, Germany (FC, FH, NY, S, TA). FIG. 14.

Aphanobacca clathrata var. *rosea* Skuja, Symbolae Bot. Upsal. 9(3): 36. 1948. —Paratype received from the author from Gr. Plöner See, Germany (D). FIG. 12.

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:

Polycystis (Clathrocystis) reticulata Lemmermann, Bot. Centralbl. 76: 153. 1898. *Coolosphaerium reticulatum* Lemmermann, Krypt. Fl. Mark Brandenb. 3: 84. 1907. *Cyanodictyon reticulatum* Geitler in Pascher, Süßwasserfl. 12: 103. 1925. *Sphaerodictyon reticulatum* Geitler, Beih. z. Bot. Centralbl., II, 41: 231. 1925.

Coolosphaerium natans Lemmermann, Ber. Deutsch. Bot. Ges. 18: 309. 1900.

Microcystis incolora var. *elegans* Lemmermann, Forschungsber. Biol. Sta. Plön 10: 150. 1903.

Aphanocapsa delicatissima W. & G. S. West, Journ. Linn. Soc. Bot. 40: 431. 1912. *Microcystis pulverea* f. *delicatissima* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —The original sketches and notes are reproduced here from the West notes in the British Museum (Natural History): FIG. 15.

Microcystis pulverea f. *elongata* Crow, New Phytol. 22: 66. 1923.

Microcystis natans Lemmermann ex Skuja, Acta Horti Bot. Univ. Lav. 7: 45. 1934.

Plantae smaragdinae vel laete aerugineae, microscopicae, sphaericae, ovoideae, vel cylindricae, varie et irregulariter lobatae vel clathratae, saepe conferte confluentes, cellulis in divisione binis depresso—sub-sphaericis, aetate provecta globosis diametro 0.5—2 μ crassis, sine ordine per gelarium vaginale distributis; gelarino vaginale hyalino, homoganeo, diffuente; proroplasmare dilute aerugineo, pseudovacuas continente. FIGS. 12—15.

Developing sparsely in freshwater plankton, seldom the dominant species, and rarely forming conspicuous water blooms. One of the smallest of the Myxophyceae, this species may often be mistaken for coccoid bacteria. Its morphology, life-history, and synonymy have been discussed by Drouet & Daily in Field Mus. Bot. Ser. 20: 67—83 (1939).

Specimens examined:

SWEDEN: in lacu Wombsjön Scaniae, O. Nordstedt, Jun. 1901 (designated as Type of *Polycystis incerta* Lemm., S; isotypes, B, NY, UC); duck pond, Lovestad, B. Carlen-Nilsson, 15 Jul. 1934 (FC). POLAND: auf dem feuchten Schlamm ausgetrockneter Lachen auf dem Galgenberge, Hilsa, 1862 (as *Palmella hyalina* in Rabenh. Alg. no. 1525, FC, L, UC). GERMANY: Gr. Plöner See, W. Rohde, 15 Sept. 1950 (paratype—from the author—of *Aphanobacca clathrata* var. *rosea* Skuja, D [Fig. 12]); Teich bei Fürstenfelde bei Neudamm, *Itzigöhn & de Bary*, Sept. 1852 (designated as Type of *Clathrocystis holztracia* Lemm., B); Salzungsee, A. Rösa (as *Microbalon firma* in Rabenh. Alg. no. 453, NY); Marksuhl (Thüringen), in einem kleinen Teich, W. Migula, Sept. 1927 (isotypes of *Aphanocapsa minima* Mig. in Mig., Crypt. Germ., Austr., & Helv. Exs. Alg. no. 277, FC [Fig. 14], FH, NY, TA, S); Eisenach, im Plankton des Prinzenteiches, Migula, 24 Aug. 1931 (FH, S; isotypes of *Microcystis pallida* Mig. in Mig., Crypt. Germ., Austr., & Helv. Exs. Alg. no. 264, B, FC [Fig. 13], FH, NY, S, TA); Altenburger See, Thüringen, Migula, Sept. 1927 (as *Aphanobacca nidulans* in Mig., Krypt. Germ., Austr., & Helv. Exs. Alg. no. 228, TA). CZECHOSLOVAKIA: Starý Hospidár near Trebon, B. Post, 10 Jun. 1946 (FC). BRITISH ISLES: Loch Katrine, Perthshire, Scotland, W. & G. S. West, Mar. 1909 (Type of *Aphanocapsa elachista* var. *conferta* W. & G. S. West, BIRM); plankton, Lough Straheen, Achill island, county Mayo, Ireland, 11 June (Type of *Microcystis minutissima* West, BIRM); Lough Neagh, North Ireland, W. West, May 1900 (Type of *Polycystis elongata* W. & G. S. West, BIRM; isotypes, FC, UC). UNION OF SOUTH AFRICA: row-netting in channel, Barberspan, southwest Transvaal, Mrs. G. E. Hutchinson 4, 6 Apr. 1928 (D).

OHIO: Wehrle's pond on Middle Bass Island, Smith's pond on North Bass Island, and East Harbor near Catawba Island, Ottawa county, E. H. Ahlstrom, June, Jul. 1931—32 (DA, FC); in pond of fish hatchery, Newtown, Hamilton county, P. Brinley, 29 Oct. 1941 (DA, FC). KENTUCKY: reservoir of Walton, J. B. Lackey, Summer 1940 (FC). INDIANA: pond on Wisniewski farm east of Cook, Lake county, P. K. & W. A. Daily 2565, 29 Aug. 1951 (DA, FC). WISCONSIN: laboratory culture, University of Wisconsin, Madison, R. Evans, 8 Jun. 1949 (FC). ILLINOIS: Goose Lake northwest of Quincy, Adams county, T. C. Dorris 59, 6 Sept. 1950 (FC). MINNESOTA: with *Anacystis cyanea*, Heron Lake, Jackson county, Minnesota Fish Commission, Jul. 1938 (FC). NEBRASKA: floating in lake, Antioch, Sheridan county, W. Kiener 20613, 23 May 1946 (FC, KI). BRAZIL: with *A. cyanea*, Açude Velho near Campina Grande, Paraíba, S. Wright 1570, Mar. 1935 (D). PERU: Cocha Zapote, Rio Pacaya, Bajo Ucayali, dept. Loreto, P. Anceña, Jul. 1947 (FC).

3. *ANACYSTIS MARINA* Drouet & Daily, Lloydia 11: 77. 1948. *Aphanocapsa marina* Hansgirg in Foslie, Contrib. Knowl. Mar. Alg. Norway 1: 169. 1890. —Type from Pasvig, Norway (W). FIG. 376.

Aphanobacca nidulans Richter in Wittrock & Nordstedt, Alg. Exs. 14: 694. 1884; Bot. Not. 1884: 128. 1884; Hedwigia 23: 66. 1884. *A. saxicola* f. *nidulans* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. *Coccolithis nidulans* Drouet & Daily, Lloydia 11: 78. 1948. *Anacystis nidulans* Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. —Type from Anger near Leipzig, Germany (FC).

Microcystis parasitica var. *glacialis* Fritsch, Nat. Antarctic Exped. (1901—04), Nat. Hist. 6 (Freshw. Alg.): 15. 1912. —Type from McMurdo Bay, Antarctica (in the collection of F. E. Fritsch).

Aphanocapsa Lewisii Keefe, Rhodora 29: 41. 1927. —Type from Falmouth, Massachusetts (FH). FIG. 377.

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:

Aphanobacca pulverulenta Bachmann, Mitt. Naturf. Ges. Luzern 8: 10. 1921.

Aphanobacca Protobrydium Häyryén in Luther, Acta pro Fauna & Flora Fennica 52(3): 24. 1923.

Synechocystis parvula Perfiljev, Bull. Kom. Saproel. Leningrad 1: 61. 1923.

Aphanocapsa salina Woronichin, Bull. Jard. Bot. Princip. U. R. S. S. 28: 30. 1929.

Plantae laete aeruginæe, præcipue sphaericæ vel ovoideæ microscopiçæ, aut in strata gelatinosa macroscopica evolventes, cellulis in divisione binis depresso—sub-sphaericis, ætate provecta globosis diametro 0.5—2 μ crassis sine ordine (frequenter conferte) per gelatinum vaginale distributis; gelatino vaginale hyalino, homogæneo, (sæpe omnino) diffuente; protoplasmate aeruginæo, homogæneo. FIGS. 376, 377.

In old pools of standing fresh or brackish water, and among other algae on wet rocks, wood, and soil; often developing in cultures and in old aquaria. Plants of this species sometimes give the impression of having originated as growth-forms of *Anacystis montana* or *Entophysalis* spp. Coccoid bacteria may be easily confused with *Anacystis marina*.

Specimens examined:

NORWAY: [in a rock pool at or a little above high water mark.] Pasvig, M. Postle, 3 Aug. 1889 (Type of *Aphanocapsa marina* Hansg. in Hauck & Richt., Phyk. Univ. no. 468, W; isotypes, D [Fig. 376], FH, L, NY, UC). GERMANY: ad parietes caldarii in Anger prope Lipsiam, P. Richter, 2 Mar. 1882 (Type of *Aphanobacca nidulans* Richt. in Witt. & Nordst., Alg. Exs. no. 694, FC; isotypes, D, L, NY). NETHERLANDS: ten Noorden van Harlingen, Friesland, J. T. Koster 746, Aug. 1942 (L). MASSACHUSETTS: Salt pond, Falmouth, A. M. Keefe (Type of *Aphanocapsa Lewisii* Keefe, FH; isotype, D [Fig. 377]); freshwater pools, Angelica point near New Bedford, E. H. Battley, culture from A. W. Frenkel (FC). CONNECTICUT: laboratory culture, New Haven, R. A. Lewin, May 1948 (FC). QUEBEC: in a peat bog, St. Hubert, Chambly county, Bro. Irénée-Marie 469, 30 Oct. 1937 (FC). WISCONSIN: laboratory culture, Madison, R. Evans, 23 May 1949 (FC). ILLINOIS: laboratory culture, Urbana, R. C. Hecker, 29 Dec. 1947 (FC). NEBRASKA: culture from Whitetail creek near Keystone, Keith county, W. Kiener 15621, 16 Jul. 1944 (FC, KI); culture from creek south of Gretna, Sarpy county, Kiener 13683a, 16 July 1944 (FC, KI); culture from floodplain pond southeast of Grand Island, Hall county, Kiener 16396b, 11 July 1944

(PC, KI); culture from roadside ditch 9 miles east of North Platte, Lincoln county, *Kerner* 16870, 13 Jul. 1944 (PC, KI). ANTARCTICA: brick-colored ice 4 feet above frozen watercourse through "Penknife" ice, McMurdo Bay, *National Antarctic Expedition*, 13 Sept. 1902 (Type of *Microcystis parasitica* var. *glacialis* Fritsch in the collection of F. E. Fritsch; isotype, D). PHILIPPINES: on moist wall under leaking pipe, Iloilo Normal School, Iloilo City, *J. D. Soriano* 1559, 4 Jan. 1953 (PC, PUH).

4. ANACYSTIS MONTANA (Lightf.) Dr. & Daily.

Plantae aeruginosae, rubrae, roseae, violaceae, nigrae, vel decoloratae, microscopicae vel macroscopicae, libere natantes vel in strata inveniendes, cellulis in divisione binis depresso—sub-sphaericis (raro truncato-hemisphaericis), aetate protracta globosis diametro ad 6μ (ad 20μ ubi a fungis parasitatis) crassis, sine ordine aut in seriebus eucapsoideis per gelatinum vaginale distributis; gelatino vaginale homogeneo vel lamelloso, primum hyalino deinde (in f. *montana*) saepe partim vel omnino rubrescente vel coerulescente vel raro lutescente; protoplasmate aerugineo, homogeneo passim granuloso. FIGS. 16—99.

Key to forms of *Anacystis montana*:

Cells 2— 6μ in diameter, larger where parasitized by fungi; gelatinous matrix lamellose or homogeneous, becoming red, blue, or rarely yellowish-brown in subaerial and aerial situations 4a. f. MONTANA

Cells 2— 3μ in diameter; gelatinous matrix hyaline and homogeneous. 4b. f. MINOR

Cells 5— 6μ in diameter; gelatinous matrix hyaline and homogeneous 4c. f. GELATINOSA

4a. ANACYSTIS MONTANA f. MONTANA. *A. montana* Drouet & Daily, *Butler Univ. Bot. Stud.* 10: 221. 1952. *Ulva montana* Lightfoot, *Fl. Scot.* 2: 973. 1777. *Palmella alpicola* Lyngbye, *Tent. Hydrophyt. Dan.*, p. 206. 1819. *Conserua alpina* Lyngbye *pro synonym.*, loc. cit. 1819. *Meirettia alpicola* S. F. Gray, *Nat. Arr. Brit. Pl.*, p. 349. 1821. *Palmella montana* Agardh, *Syst. Algar.*, p. 15. 1824. *Coccochloris alpicola* Sprengel, *Linn. Syst. Vegetab.*, ed. 16, 4(1): 373. 1827. *Phytoconis alpicola* Meneghini, *Mem. R. Accad. Sci. Torino*, ser. 2, 5 (Sci. Fis. & Mat.): 53. 1843. *Sorospora montana* Hassall, *Hist. Brit. Freshw. Alg.* 1: 309. 1845. *Bichatia montana* Trevisan, *Sagg. Monogr. Alg. Coccor.*, p. 60. 1848. *Chaos alpicola* Bory *pro synonym.* ex Trevisan, loc. cit. 1848. *Bichatia alpicola* Kuntze, *Rev. Gen. Pl.* 2: 886. 1891. *Gloeocapsa alpicola* Borner in Wittrock, Nordstedt & Lagerheim, *Alg. Exs.* 32: 1540. 1903; *Bot. Not.* 1903: 140. 1903. *Gloeocapsa montana* Wille, *Nyt Mag. Naturvid.* 56(1): 45. 1918. —Type from Isle of Skye, Scotland (K).

Palmella sanguinea Agardh, *Syst. Algar.*, p. 15. 1824. *Haematococcus sanguineus* Agardh, *Icon. Algar. Eur.*, no. 24. 1828—35. *Microcystis sanguinea* Kützinger, *Linnaea* 8: 372. 1833. *Palmella crypophylla* Carmichael *pro synonym.* in Hooker, *Engl. Fl.* 5(1): 395. 1833; Hooker, *Brit. Fl.* 2: 395. 1833. *Protococcus sanguineus* Brébisson & Godey, *Mém. Soc. Acad. Sci., Arts & Belles-Lettres Falaise* 1835: 40. 1836. *Gloeocapsa sanguinea* Kützinger, *Phyc. Gener.*, p. 175. 1843. *Bichatia sanguinea* Trevisan, *Nomencl. Algar.* 1: 62. 1845. *Ephebe pubescens* & *versicolor* Flotow, *Bot. Zeit.* 8: 76. 1850. —Type from near Stockholm, Sweden (LD). FIG. 80.

Haematococcus frustulosus Harvey in Hooker, *Engl. Fl.* 5(1): 395. 1833; in Hooker, *Brit. Fl.* 2: 395. 1833. *Palmella frustulosa* Carmichael *pro synonym.* in Hooker, loc. cit. 1833. *Bichatia frustulosa* Trevisan, *Nomencl. Algar.* 1: 60. 1845. *Chlorococcus frustulosus* Rahenhorst, *Fl. Eur. Algar.* 3: 59. 1868. *Gloeocystis frustulosa* W. & G. S. West, *Trans. Yorks. Nat. Union* 4: 133. 1901. —Type from Scotland (K). FIG. 38.

Palmella livida Carmichael in Hooker, *Engl. Fl.* 5(1): 397. 1833; in Hooker, *Brit. Fl.* 2: 397. 1833. *Microcystis livida* Meneghini, *Mem. R. Accad. Sci. Torino*, ser. 2, 5 (Sci. Fis. & Mat.): 47. 1843. *Phytoconis livida* Brébisson *pro synonym.* in Meneghini, loc. cit. 1843. *Haematococcus lividus*

- Hassall, Hist. Brit. Freshw. Alg. 1: 332. 1845. *Bichatia livida* Trevisan, Nomencl. Algar. 1: 61. 1845. *Phycoconis sordida* Brébisson *pro synonym* in Trevisan, Sagg. Monogr. Alg. Coccor., p. 65. 1848. —Type from Scotland (K). FIG. 65.
- Protooccus magna* Brébisson in Brébisson & Godey, Mém. Soc. Acad. Sci., Arts & Belles-Lettres Falaise 1835: 40. 1836. *Pleurococcus magna* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 10, 43. 1843. *Gloeocapsa magna* Kützing, Tab. Phyc. 1: 17. 1846. —Type from Falaise, France (L).
- Anacyctis marginata* Meneghini, Consp. Algal. Eugao., p. 324. 1837. *Palmella marginata* Kützing, Phyc. Gener., p. 172. 1843. *Microcystis marginata* Kützing, Tab. Phyc. 1: 6. 1846. *Polycystis marginata* Richter ex Hansgirg, Prodr. Algenfl. Böhmen 2: 145. 1892. *Microcystis aetginosa* f. *marginata* Elenkin, Monogr. Algal. Cyanophyc., Pars Spec. 1: 106. 1938. —Type from the Euganean springs, Italy (L). FIG. 19.
- Pleurococcus communis* Meneghini, Consp. Algal. Eugao., p. 338. 1837. —Type from Padua, Italy (FI). FIG. 83.
- Palmella Ralfsii* Harvey, Man. Brit. Alg., p. 179. 1841. *Sporospora Ralfsii* Hassall, Hist. Brit. Freshw. Alg. 1: 310. 1845. *Gloeocapsa Ralfsiana* Kützing, Tab. Phyc. 1: 18. 1846. *Bichatia Ralfsii* Trevisan, Sagg. Monogr. Alg. Coccor., p. 59. 1848. *Gloeocapsa Ralfsii* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 65. 1907. —Type from Dolgelly, Wales (BM).
- Coccolobris muscicola* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 60. 1843. *Palmella muscicola* Kützing, Phyc. Germ., p. 149. 1845. *P. botryoides* var. *muscicola* Hansgirg, Prodr. Algenfl. Böhmen 1: 138. 1886. *Aphanocapsa muscicola* Wille, Nyt Mag. Naturvid. 56(1): 43. 1918. *Microcystis muscicola* Elenkin, Monogr. Algal. Cyanophyc., Pars Spec. 1: 132. 1938. —Type from the Euganean springs, Italy (FI). FIG. 79.
- Coccolobris parietina* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 61. 1843. —Type from the Euganean mountains, Italy (FI). FIG. 77.
- Microcystis nigra* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 75. 1843. *Bichatia nigra* Trevisan, Nomencl. Algar. 1: 61. 1845. *Gloeocapsa nigra* Grunow in Rabenhorst, Pl. Eur. Algar. 2: 36. 1865. —Type from the Euganean mountains, Italy (FI). FIG. 64.
- Protooccus jusco-ater* Kützing, Phyc. Gener., p. 168. 1843. *Cbroococcus jusco-ater* Rabenhorst, Fl. Eur. Algar. 2: 34. 1865. —Type from Nordhausen, Germany (L). FIG. 46.
- Palmella didyma* Kützing, Phyc. Gener., p. 172. 1843. *Gloeocapsa didyma* Kützing, Tab. Phyc. 1: 14. 1846. *Bichatia didyma* Trevisan, Sagg. Monogr. Alg. Coccor., p. 62. 1848. —Type from Padua, Italy (L).
- Gloeocapsa aeruginosa* Kützing, Phyc. Gener., p. 174. 1843. *G. aeruginosa* Kützing, Phyc. Germ., p. 151. 1845. *Bichatia aeruginosa* Trevisan, Nomencl. Algar. 1: 59. 1845. —Type from Nordhausen, Germany (L). FIG. 90.
- Gloeocapsa atrata* Kützing, Phyc. Gener., p. 174. 1843. *Ephedra pubescens* & *atra* Flotow, Bot. Zeit. 8: 76. 1850. —Type from Berne, Switzerland (L).
- Gloeocapsa sanguinolenta* Kützing, Phyc. Gener., p. 174. 1843. *Bichatia sanguinolenta* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from Sachswerfen, Thuringia, Germany (L). FIG. 61.
- Gloeocapsa coracina* Kützing, Phyc. Gener., p. 174. 1843. *Palmella placentalis* Wallroth *pro synonym* in Kützing, loc. cit. 1843. *Bichatia coracina* Trevisan, Nomencl. Algar. 1: 60. 1845. *Gloeocapsa coracina* β *placentalis* Kützing, Spec. Algar., p. 219. 1849. *G. coracina* var. *placentalis* Kützing ex Forti, Syll. Myxophyc., p. 56. 1907. —Type from Steigerthal, Thuringia, Germany (L).
- Gloeocapsa rosea* Kützing, Phyc. Gener., p. 174. 1843. *Bichatia rosea* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from Trieste (L).
- Gloeocapsa Shustleworthiana* Kützing, Phyc. Gener., p. 175. 1843. *Bichatia Shustleworthiana* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from M. Ben Gower, Ireland (L). FIG. 37.
- Gloeocapsa rubicunda* Kützing, Phyc. Gener., p. 175. 1843. *Bichatia rubicunda* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from Scadioavia (L).
- Protooccus pygmaeus* Kützing, Phyc. Germ., p. 144. 1845. —Type from Battaglia, Italy (L). FIG. 27.
- Haematooccus binalis* Hassall, Hist. Brit. Freshw. Alg. 1: 331. 1845. *Pleurococcus binalis* Trevisan, Sagg. Monogr. Alg. Coccor., p. 32. 1848. —Specimen from Erigal, county Donegal, Ireland, named by the author, designated here as the Type (BM).
- Haematooccus aeruginosus* Hassall, Hist. Brit. Freshw. Alg. 1: 333. 1845. *Palmella aeruginosa* Carmichael *pro synonym* in Hassall, loc. cit. 1845. *Bichatia Carmichaelii* Trevisan, Sagg. Monogr. Alg. Coccor., p. 65. 1848. —Type from Scotland (K). FIG. 84.
- Gloeocapsa conglomerata* Kützing, Tab. Phyc. 1: 16. 1846. *Bichatia conglomerata* Trevisan, Sagg. Monogr. Alg. Coccor., p. 64. 1848. *Gloeocapsa glomerata* Kützing ex Roumeguère, Alg. des Eaux Douces France, oo. 1016. —Type from the Harz mountains, Germany (L). FIG. 81.
- Gloeocapsa cryptococcoides* Kützing, Tab. Phyc. 1: 16. 1846. *Bichatia cryptococcoides* Trevisan, Sagg. Monogr. Alg. Coccor., p. 64. 1848. *Gloeocapsa gelatinosa* f. *cryptococcoides*

Rabenhorst, Fl. Eur. Algar. 2: 39. 1865. *G. gelatinosa* var. *cryptococcoides* Kützing ex Bizozero, Fl. Veneta Crittog. 2: 63. 1885. —Type from Abano, Italy (L).

Protococcus baematodes Kützing, Tab. Phyc. 1: 5. 1846. *GloeoCapsa baematodes* Kützing, Sp. Algar., p. 222. 1849. *Bichatia baematodes* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Domfront, Orne, France (L). FIG. 88.

GloeoCapsa rupestris Kützing, Tab. Phyc. 1: 17. 1846. *Bichatia rupestris* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Bichatia fuscescens* Lagerheim, Ber. Deutsch. Bot. Ges. 10: 526. 1892. *GloeoCapsa fuscescens* Lagerheim ex Forti, Syll. Myxophyc., p. 58. 1907. —Type from Calvados, France (L). Kützing's note, "an Felsen im Harze" with the original description is surely in error, since only de Brébisson's specimens are labeled thus in the Kützing herbarium.

GloeoCapsa compacta Kützing, Tab. Phyc. 1: 24. 1846. *Rhodocapsa violacea* β *compacta* Richter in Hansgirg, Österr. Bot. Zeitschr. 34: 315. 1884. *Bichatia compacta* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *GloeoCapsa violacea* β *compacta* Richter in Hansgirg, Prodr. Algenfl. Böhmen 2: 149. 1892. *G. violacea* var. *compacta* Richter ex Forti, Syll. Myxophyc., p. 40. 1907. —Type from Vire, France (L). FIG. 49.

GloeoCapsa violacea Kützing, Tab. Phyc. 1: 25. 1846. *G. lignicola* Rabenhorst, Fl. Eur. Algar. 2: 41. 1865. *Rhodocapsa violacea* Hansgirg, Österr. Bot. Zeitschr. 34: 315. 1884. *Bichatia lignicola* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *GloeoCapsa alpina* f. *lignicola* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 189. 1938. —Type from Paris, France (L). FIG. 42.

Palmella brunnea A. Braun in Kützing, Sp. Algar., p. 212. 1849. *Aphanocapsa brunnea* Nägeli, Gart. Einzell. Alg., p. 52. 1849. *Anacyrtis brunnea* Wolle, Fresh-w. Alg. U. S., p. 329. 1887. —Type from Freiburg, Baden, Germany (L). FIG. 87.

GloeoCapsa geminata Kützing, Sp. Algar., p. 219. 1849. *Oocystis geminata* Nägeli pro *synon.* in Kützing, loc. cit. 1849. *Oocystis minor* (*micrococca*) Izigsohn pro *synon.* in Rabenhorst, Fl. Eur. Algar. 3: 55. 1868. *Bichatia geminata* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Zürich, Switzerland (L). FIG. 33.

GloeoCapsa scopulorum Nägeli in Kützing, Sp. Algar., p. 220. 1849; Nägeli, Gart. Einzell. Alg., p. 51. 1849. *Bichatia scopulorum* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Microcystis scopulorum* Nägeli ex Wille, Nyt Mag. Naturvid. 62: 198. 1925. —Type from Schaffhausen, Switzerland (L). FIG. 16.

GloeoCapsa lanthina Nägeli in Kützing, Sp. Algar., p. 220. 1849. *Bichatia lanthina* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Zürich, Switzerland (L). FIG. 23.

GloeoCapsa versicolor Nägeli in Kützing, Sp. Algar., p. 220. 1849. *Bichatia versicolor* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Zürich, Switzerland (L). FIG. 50.

GloeoCapsa ambigua Nägeli in Kützing, Sp. Algar., p. 220. 1849; Nägeli, Gart. Einzell. Alg., p. 50. 1849. *G. ambigua* a. *fuscolutea* Nägeli, loc. cit. 1849. *G. fuscolutea* Kirchner, Krypt.-Fl. Schlesien 2(1): 260. 1878. *Bichatia ambigua* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *B. fuscolutea* Lagerheim, Ber. Deutsch. Bot. Ges. 10: 526. 1892. *GloeoCapsa ambigua* f. *fuscolutea* Nägeli ex Serchell & Gardner, Univ. Calif. Publ. Bot. 1: 179. 1903. *G. alpina* f. *ambigua* Hollerbach in Elenkin, Monogr. Alg. Cyanophyc., Pars Spec. 1: 189. 1938. —Type from Zürich, Switzerland (L).

GloeoCapsa ambigua β *rivularis* Nägeli in Kützing, Sp. Algar., p. 221. 1849. —Type from Zürich, Switzerland (L).

GloeoCapsa ambigua b. *violacea* Nägeli, Gart. Einzell. Alg., p. 50. 1849. *G. ambigua* var. *violacea* Nägeli ex Rabenhorst, Alg. Sachs. 61 & 62: 607. 1857. —Type from Zürich, Switzerland (L).

GloeoCapsa ambigua var. *pellucida* Nägeli, Gart. Einzell. Alg., p. 50. 1849. *G. ambigua* b. *pellucida* Nägeli ex Rabenhorst, Fl. Eur. Algar. 2: 42. 1865. *G. ambigua* f. *pellucida* Nägeli in Roumeguère, Alg. des Eaux Douces France, no. 825. —Type from Zürich, Switzerland (L).

GloeoCapsa opaca Nägeli in Kützing, Sp. Algar., p. 221. 1849; Nägeli, Gart. Einzell. Alg., p. 50. 1849. *G. magma* b. *opaca* Nägeli in Kirchner, Krypt.-Fl. Schlesien 2(1): 251. 1878. *G. magma* var. *opaca* Kirchner ex Hansgirg, Prodr. Algenfl. Böhmen 2: 147. 1892. *G. magma* f. *opaca* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 176. 1938. —Type from Zürich, Switzerland (L). Nägeli no. 378 as cited by Kützing with the original description is obviously a typographical error.

GloeoCapsa opaca β *pellucida* Kützing, Sp. Algar., p. 221. 1849. *G. opaca* var. *pellucida* Nägeli, Gart. Einzell. Alg., p. 50. 1849. *G. magma* b. *pellucida* Nägeli in Rabenhorst, Fl. Eur. Algar. 2: 43. 1865. *G. pellucida* Brébisson and *Protococcus pellucidus* Nägeli pro *synon.* in Roumeguère, Alg. des Eaux Douces France no. 410. *G. magma* var. *pellucida* Nägeli ex Hansgirg, Prodr. Algenfl. Böhmen 2: 147. 1892. —Type from Zürich, Switzerland (L).

GloeoCapsa punctata Nägeli in Kützing, Sp. Algar., p. 222. 1849; Nägeli, Gart. Einzell. Alg., p. 51. 1849. *Bichatia punctata* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Coelosphaerium Kuetzingianum* var. *punctatum* Playfair, Proc. Linn. Soc. New South Wales 39: 135. 1914. *C. punctatum* Playfair, Census New South Wales Pl. Suppl. 1: 260. 1917. —Type from Zürich, Switzerland (L).

Ephebe pubescens d. *cruentia* Flotow, Bot. Zeit. 8: 75. 1850. —Type from the Riesengebirge, Bohemia (S).

Monocapsa isegophila Itzigsohn in Rabenhorst, Alg. Sachs. 27 & 28: 263. 1853. *Gloeocapsa isegophila* Rabenhorst, Krypt.-Fl. Sachsen 1: 72. 1863. *Bichatia isegophila* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Neudamm, Germany (FC). FIG. 48.

Chroococcus cohaerens Nägeli in Rabenhorst, Alg. Sachs. 45 & 46: 446. 1855. —Type from Freiburg, Baden, Germany (FC). FIG. 78.

Gloeocapsa nigrescens Nägeli in Rabenhorst, Alg. Sachs. 63 & 63: 629. 1857. *Bichatia nigrescens* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa Corrensis* J. de Toni, Noter. Nomencl. Algol. 3: 1936. —Type from the Berner Oberland, Switzerland (ZT).

Gloeocapsa saxicola Wartmann in Rabenhorst, Alg. Sachs. 81 & 82: 813. 1859. *G. alpina* f. *saxicola* Rabenhorst, Fl. Eur. Algar. 2: 40. 1865. *Bichatia saxicola* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa alpina* var. *saxicola* Rabenhorst in Hansg. Prodr. Algenfl. Böhmen 2: 150. 1892. —Type from St. Gallen, Switzerland (FC). FIG. 22.

Gloeocapsa alpina Nägeli ex Cramer in Rabenhorst, Alg. Sachs. 87 & 88: 869. 1859. —Type from Engelberg, Unterwalden, Switzerland (FC). See Brand, Bot. Centralbl. 83: 224. 1900. FIG. 17.

Aphanocapsa montana Cramer in Wartmann & Schenk, Schweiz. Krypt. no. 134. 1862. *A. montana* var. *micrococca* Cramer pro synon., loc. cit. 1862. *A. montana* f. *micrococca* Cramer in Brügger, Jahresber. Naturf. Ges. Graubündens, N. F. 8: 244. 1863. *A. montana* b. *micrococca* Cramer ex Rabenhorst, Fl. Eur. Algar. 2: 50. 1865. —Type from Rigi, Switzerland (ZT).

Aphanocapsa montana var. *macrococca* Cramer in Wartmann & Schenk, Schweiz. Krypt. no. 134. 1862; Cramer in Brügger, Jahresber. Naturf. Ges. Graubündens, N. F. 8: 244. 1863. *A. montana* a. *macrococca* Cramer ex Rabenhorst, Fl. Eur. Algar. 2: 50. 1865. —Type from Trinser See, Switzerland (ZT).

Chroococcus violaceus Rabenhorst, Fl. Eur. Alg. 2: 32. 1865. —Type from Baden-Baden, Germany (L). FIG. 86.

Aphanocapsa violacea Grunow in Rabenhorst, Fl. Eur. Algar. 2: 51. 1865. —Type from Neehaus, Lower Austria (W).

Gloeocapsa Kalchbrenneri Grunow in Rabenhorst, Fl. Eur. Algar. 2: 41. 1865. *Bichatia Kalchbrenneri* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Badoczer Wiesen, Hungary (W).

Gloeocapsa Tisiana Grunow in Rabenhorst, Fl. Eur. Algar. 2: 47. 1865. *Bichatia Tisiana* Kuntze, Rev. Gen. Pl. 2: 866. 1891. —Type from the Euganean mountains, Italy (W).

Gloeocapsa Croauan fr. in Schramm & Mazé, Essai Clast. Alg. Guadeloupe, p. 29. 1865. —Type from La Guadeloupe (PC). FIG. 36.

Coccolithis tuberculosa Areschoug, Alg. Scand. Exs., Ser. Nov., 6: 292. 1866. *Aphanocapsa tuberculosa* Forti, Syll. Myxophyc., p. 79. 1907. —Type from Bursjön, Uppland, Sweden (S).

Chroococcus varius A. Braun in Rabenhorst, Alg. Eur. 246—248: 2451. 1876. *C. varius* f. *fuscoluteus* A. Braun ex Wille, Nyt Mag. Naturvid. 62: 181. 1925. *Gloeocapsa varia* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 208. 1938. *Pleurocapsa varia* Drouet & Daily in Daily, Amer. Midl. Nat. 27: 644. 1942. —Type from Poppelsdorf near Bonn, Germany (FC).

Aphanocapsa biformis A. Braun in Rabenhorst, Alg. Eur. 246—247: 2453b. 1876; A. Braun, Hedwigia 1879: 194. 1879. —Type from Berlin, Germany (FC). FIG. 30.

Aphanocapsa nebulosa A. Braun in Rabenhorst, Alg. Eur. 246—248: 2454. 1876. *Aphanocapsa caldariorum* Richter ex Hansg. Prodr. Algenfl. Böhmen 2: 136. 1892. *Gloeotheca caldariorum* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 255. 1938. —Type from Berlin, Germany (FC). FIG. 69.

Gloeotheca inconspicua A. Braun in Rabenhorst, Alg. Eur. 246—248: 2455. 1876. —Type from Berlin, Germany (FC).

Entophysalis magnoliae Farlow, Mar. Alg. New England, p. 29. 1881. —Type from Magnolia, Massachusetts (FH).

Gloeocapsa Iszigobnii Bornet in Zopf, Spaltpfl., p. 60. 1882. *G. magna* var. *Iszigobnii* Hansg. Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 137. 1891. *G. magna* f. *Iszigobnii* Hollerbach in Elenkin, Monogr. Algar. Cynophyc., Pars Spec. 1: 176. 1938. —Type from Versailles, France (FH).

Aphanocapsa Naegelii Richter, Hedwigia 23: 66. 1884. —Type from Anger near Leipzig, Germany (L).

Gloeotheca tepidariorum var. *cavernarum* Hansg. Bot. Centralbl. 37: 38. 1889. *G. rupestris* var. *cavernarum* Hansg. Prodr. Algenfl. Böhmen 2: 136. 1892. *G. palea* var. *cavernarum* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 49. 1907. —Type from Korno near Beroun, Bohemia (W). FIG. 68.

Anacystis Reinboldii Richter in Reinbold, Schrift. Naturw. Ver. Schleswig-Holst. 7(2): 180. 1889. *Microcystis Reinboldii* Forti, Syll. Myxophyc., p. 91. 1907. —Type from Friedrichsort, Germany (NY).

- Coelosphaerium anomalum* var. *minus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 19. 1890. —Type from Kuchelbad near Prague (W).
- Aphanocapsa fonticola* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 19. 1890. —Type from Hosin near Beroun, Bohemia (W).
- Gloeocephala alpina* var. *mediterranea* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 356. 1891. —Type from Pinguentre, Istria, Jugoslavia (W). FIG. 45.
- Aphanocapsa Richieriana* Hieronymus in Hauck & Richter, Phyk. Univ. 10: 485. 1892. —Type from Nimpsch in Silesia, Poland (L).
- Aphanosheca conferta* Richter in Hauck & Richter, Phyk. Univ. 10: 487. 1892. —Type from Oschatz, Saxony, Germany (L).
- Aphanocapsa iberialis* var. *minor* Hansgirg, Prodr. Algenfl. Böhmen 2: 159. 1892. *A. violacea* var. *minor* Hansgirg ex Forti, Syll. Myxophyc., p. 75. 1907. —Type from Karlshad, Bohemia (W). FIG. 71.
- Cbroococcus varius* var. *luteolus* Hansgirg, Prodr. Algenfl. Böhmen 2: 164. 1892. —Type from Smichov, Bohemia (W). FIG. 74.
- Aphanocapsa fuscolutea* Hansgirg, Prodr. Algenfl. Böhmen 2: 156. 1892. *Microcystis Hansgirgiana* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 130. 1938. —Type from Prague, Bohemia (W).
- Cbroococcus scbizodermaticus* West, Trans. Roy. Microsc. Soc. 1892: 742. 1892. —Type from Cantley, Yorkshire, England (BIRM). In the Type, the cells are much enlarged and parasitized.
- Plourocapsa muralis* Lagerheim in Wittrock, Nordstedt & Lagerheim, Alg. Exs. 23: 1097. 1893. —Isotypes from Quito, Ecuador (L, MIN, NY).
- Aphanocapsa nivalis* Lagerheim, Nuova Norarisia 1894: 652. 1894. —Type from Spitzbergen, Norway (DT).
- Aphanosheca saxicola* var. *sphaerica* W. & G. S. West, Trans. Roy. Microsc. Soc. 1894: 17. 1894. *A. saxicola* f. *sphaerica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. —Type from Snowdon, Wales (BIRM). FIG. 55.
- Gloeocephala gigas* W. & G. S. West, Journ. Linn. Soc. Bot. 30: 276. 1894. *Anacystis gigas* Gardner, Mem. New York Bot. Gard. 7: 15. 1927. —Type from St. Vincent, West Indies (BM).
- Aphanocapsa elachista* W. & G. S. West, Journ. Linn. Soc. Bot. 30: 276. 1894. *Microcystis pulvorea* f. *elachista* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —Type from Dominica, West Indies (BIRM).
- Cbroococcus minor* f. *minimus* W. & G. S. West, Journ. Linn. Soc. Bot. 30: 275. 1894. —Type from Dominica, West Indies (FC).
- Gloeocephala Holstii* Hieronymus in Engler, Pflanzenwelt Ostaf. C: 8. 1895. —Type from Usumbura, Ruanda Urundi (O).
- Gloeocephala Reicheltii* Richter in Hauck & Richter, Phyk. Univ. 13: 647. 1895; Hedwigia 34: 25. 1895; Sitzungsber. Naturf. Ges. Leipzig 19—21: 152. 1895. —Type from Leipzig, Germany (L).
- Cbroococcus alpinus* Schmidle in Simmer, Allgem. Bot. Zeitschr. 1899:194. 1900. —Type from the Kolbitzsch, Carinthia, Austria (Z).
- Cbroococcus decolorans* Migula, Crypt. Germ., Austr. & Helvet. Exs. 26 & 27(Alg.): 83. 1906. —Isotypes from Eisenach, Germany (MICH, NY, TA).
- Gloeocephala baematodes* var. *violaceus* Grunow ex Forti, Syll. Myxophyc., p. 38. 1907. —Type from Kulstein, Austria (W). FIG. 70.
- Microcystis densa* G. S. West, Journ. of Bot. 47: 246. 1909. —Type from Lake Albert Nyanza, Uganda (BIRM).
- Eucapsis alpina* Clements & Shantz, Minn. Bot. Stud. 4: 134. 1909. *Merismopoedia cubica* West, Proc. Roy. Irish Acad. 31(16): 42. 1912. —Type from near Pikes Peak, Colorado (US).
- Gloeocephala samoensis* Wille in Reehinger, Bot. & Zool. Ergebn. Samoa- & Salomoninseln, Süswasseralg., p. 6. 1914; Hedwigia 53: 144. 1913. —Type from Savaii, Samoa (O).
- Gloeocephala aeruginosa* f. *lignicola* Wille in Reehinger, Bot. & Zool. Ergebn. Samoa & Salomoninseln, Süswasseralg., p. 7. 1914. —Type from Upolu, Samoa (O).
- Gloeocephala rufescentis* Kütz. ex Wille, Nyr Mag. Naturvid. 62: 197. 1925. —Type from Palaise, France (L).
- Plourocapsa Mayorii* Setchell, Publ. Carnegie Inst. Wash. Dept. Mar. Biol. 20: 258. 1924. —Type from Rose atoll, Samoa (UC). FIG. 40.
- Chondrocystis Bracei* Howe, Bull. Torr. Bot. Club 51: 355. 1924. *Gloeocephala Bracei* J. de Toni, Not. Nomencl. Algol. 4. 1936. —Type from Long Cay, Bahama islands (NY). FIG. 82.
- Cbroococcus varius* f. *arvensis* A. Braun ex Wille, Nyr Mag. Naturvid. 62: 181. 1925. —Type from Poppelsdorf near Bonn, Germany (FC). FIG. 85.
- Gloeocephala multiisphaerica* Gardner, Univ. Calif. Publ. Bot. 14: 1. 1927. —Type from near Foochow, China (FH). FIG. 21.
- Gloeocephala minutula* Gardner, Univ. Calif. Publ. Bot. 14: 2. 1927. —Type from Huangchun, Foochow, China (FH).

- Aphanocapsa intertexta* Gardner, Mem. New York Bot. Gard. 7: 4. 1927. —Type from near Adjuntas, Puerto Rico (NY). FIG. 32.
- Chroococcus cubicus* Gardner, Mem. New York Bot. Gard. 7: 5. 1927. —Type from Santurce, Puerto Rico (NY). FIG. 31.
- Apbanothoece opaleiceni* Gardner, Mem. New York Bot. Gard. 7: 5. 1927. —Type from Maricao, Puerto Rico (NY). FIG. 28.
- Chroococcus muralis* Gardner, Mem. New York Bot. Gard. 7: 7. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 26.
- Gloeocapsa livida* var. *minor* Gardner, Mem. New York Bot. Gard. 7: 10. 1927. *G. livida minor* Gardner, New York Acad. Sci. Sci. Surv. Porto Rico 8: 258. 1932. —Type from Hato Arriba near Arecibo, Puerto Rico (NY). FIG. 52.
- Gloeocapsa calcicola* Gardner, Mem. New York Bot. Gard. 7: 11. 1927. —Type from Laguna Tortuguero, Puerto Rico (NY). FIG. 39.
- Gloeothoece endochromatica* Gardner, Mem. New York Bot. Gard. 7: 13. 1927. —Type from near Arecibo, Puerto Rico (NY). FIG. 53.
- Gloeothoece parvula* Gardner, Mem. New York Bot. Gard. 7: 14. 1927. —Type from Hato Arriba near Arecibo, Puerto Rico (NY). FIG. 35.
- Anacystis nigropurpurea* Gardner, Mem. New York Bot. Gard. 7: 18. 1927. —Type from near Arecibo, Puerto Rico (NY). FIG. 75.
- Anacystis nigroviolacea* Gardner, Mem. New York Bot. Gard. 7: 19. 1927. —Type from near Utuado, Puerto Rico (NY).
- Anacystis compacta* Gardner, Mem. New York Bot. Gard. 7: 20. 1927. —Type from Caguas, Puerto Rico (NY). FIG. 25.
- Anacystis magnifica* Gardner, Mem. New York Bot. Gard. 7: 21. 1927. —Type from San Juan, Puerto Rico (NY). FIG. 58.
- Anacystis distans* Gardner, Mem. New York Bot. Gard. 7: 21. 1927. —Type from Maricao, Puerto Rico (NY).
- Anacystis amphioesiculata* Gardner, Mem. New York Bot. Gard. 7: 22. 1927. —Type from Maricao, Puerto Rico (NY). FIG. 20.
- Anacystis gloeocapoides* Gardner, Mem. New York Bot. Gard. 7: 22. 1927. —Type from Mayaguez, Puerto Rico (NY). FIG. 44.
- Anacystis microsphaeria* Gardner, Mem. New York Bot. Gard. 7: 22. 1927. —Type from Coamo Springs, Puerto Rico (NY).
- Anacystis pulchra* Gardner, Mem. New York Bot. Gard. 7: 23. 1927. —Type from near Maricao, Puerto Rico (NY). FIG. 63.
- Anacystis nidulans* Gardner, Mem. New York Bot. Gard. 7: 23. 1927. —Type from Mayaguez, Puerto Rico (NY). FIG. 62.
- Anacystis Willisi* Gardner, Mem. New York Bot. Gard. 7: 24. 1927. —Type from Mayaguez, Puerto Rico (NY).
- Anacystis irregularis* Gardner, Mem. New York Bot. Gard. 7: 24. 1927. —Type from Coamo Springs, Puerto Rico (NY).
- Anacystis contortata* Gardner, Mem. New York Bot. Gard. 7: 25. 1927. —Type from Santurce, Puerto Rico (NY).
- Anacystis minutissima* Gardner, Mem. New York Bot. Gard. 7: 25. 1927. —Type from near Cabo Rojo, Puerto Rico (NY). FIG. 73.
- Anacystis radiata* Gardner, Mem. New York Bot. Gard. 7: 26. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 60.
- Anacystis radiata* var. *major* Gardner, Mem. New York Bot. Gard. 7: 26. 1927. *A. radiata major* Gardner, New York Acad. Sci. Sci. Surv. Porto Rico 8: 263. 1932. —Type from Coamo Springs, Puerto Rico (NY). FIGS. 51 and 56.
- Anacystis anomala* Gardner, Mem. New York Bot. Gard. 7: 26. 1927. —Type from Fajardo, Puerto Rico (NY).
- Endospora rubra* Gardner, Mem. New York Bot. Gard. 7: 28. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 57.
- Endospora olivacea* Gardner, Mem. New York Bot. Gard. 7: 29. 1927. —Type from Caguas, Puerto Rico (NY). FIG. 41.
- Endospora bicocci* Gardner, Mem. New York Bot. Gard. 7: 28. 1927. —Type from near Maricao, Puerto Rico (NY). FIG. 34.
- Endospora mellea* Gardner, Mem. New York Bot. Gard. 7: 28. 1927. —Type from near Utuado, Puerto Rico (NY). FIG. 29.
- Endospora nigra* Gardner, Mem. New York Bot. Gard. 7: 29. 1927. —Type from near Sabana Grande, Puerto Rico (NY). FIG. 24.
- Placoma Willisi* Gardner, Mem. New York Bot. Gard. 7: 29. 1927. —Type from Maricao, Puerto Rico (NY). FIG. 66.

Entophysalis violacea Gardner, Mem. New York Bot. Gard. 7: 30. 1927. *E. Willetii* Gardner, New York Acad. Sci. Sci. Surv. Porto Rico 8(2): 260. 1932. —Type from Haco Arriba near Arecibo, Puerto Rico (NY).

Aphanobacca uliginosa W. R. Taylor, Proc. Acad. Nat. Sci. Philadelphia 80: 86. 1928. —Type from Purcell range, British Columbia (TA).

Gloeocapsa Dvorakii Nováček, Zpravy Kom. Prirodov. Moravy a Slezka, Oddel. Bot., 7: 1. 1929. —Type from Mohelno, Moravia (D). FIG. 59.

Entophysalis auroviolacea Nováček, Prace Moravské Prirodov. Spolecn. 7(3): 1. 1932. —Type from Mohelno, Moravia (D). FIG. 18.

Gloeocapsa compacta var. *coeruleoatra* Nováček in Dvorák & Nováček, Sborn. Klub. Prirodov. Brne 15: 5. 1933. —Type from Mohelno, Moravia (D). FIG. 43.

Gloeocapsa pleurocapsioides Nováček in Dvorák & Nováček, Sborn. Klub. Prirodov. Brne 15: 5. 1933. —Type from Mohelno, Moravia (D). FIG. 89.

Chroococcidopsis thermalis Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Kadaj, Sumatra, Indonesia (in the collection of L. Geitler).

Gloeocapsa nigrescens f. *virens* Nováček, Mohelno 1934: 110, 144. 1934. —Type from Mohelno, Moravia (D). FIG. 47.

Gloeocapsa chroococcoides Nováček, Mohelno 1934: 100, 139. 1934. —Type from Mohelno, Moravia (D). FIG. 54.

Gloeobacca tophacea Skuja in Handel-Mazzetti, Symb. Sinicae 1: 15. 1937. —Type from Dschungdien, Yunnan, China (W).

Synechococcus ambiguus Skuja in Handel-Mazzetti, Symb. Sinicae 1: 16. 1937. —Type from Dschungdien, Yunnan, China (W). FIG. 67.

Coelosphaerium limnicola Lund, Journ. of Bot. 1942: 66. 1942. —Type from Richmond Park, Surrey, England (in the collection of J. W. G. Lund). FIG. 76.

Anacyclis hyalina Chu, Sinensia 15: 153. 1944. *Asterocapsa hyalina* Chu, Ohio Journ. Sci. 52: 100. 1952. —Type from Chin-Chen-Shan, Szechwan, China (FC).

Gloeocapsa incrustata Chu, Sinensia 15: 154. 1944. —Type from Chin-Chen-Shan, Szechwan, China (FC).

Entophysalis sinensis Chu, Sinensia 15: 154. 1944. —Type from Chin-Chen-Shan, Szechwan (FC).

Gloeobacca rhodochlamys Skuja, Nova Acta Reg. Soc. Sci. Uppsäl., ser. 4, 14(5): 18. 1949. —Type from Kyauktan, Rangoon, Burma (FC). FIG. 72.

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

Lepraria atra Acharius, Lich. Univ., p. 668. 1810. *Globulina atra* Turpin, Végét. Acot., pl. 6, fig. 2, in Dict. Sci. Nat., vol. 65. 1816—29; Turpin, Mém. Mus. d'Hist. Nat. Paris 14: 26, 63. 1827. *Protococcus ater* Kützing, Linnaea 8: 368. 1833. *Microcystis atra* Kützing, ibid. 8: 375. 1833. *Bicbatia atra* Trevisan, Nomencl. Alg. 1: 60. 1845.

Protococcus violaceus Corda in Sturm, Deutschl. Fl., II, 6: 37. 1833. *Microcystis violacea* Kützing, Linnaea 8: 373. 1833. *Haematococcus violaceus* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 9, 24. 1843. *Protosphaeria violacea* Trevisan, Sagg. Monogr. Alg. Coccot., p. 28. 1848. *Gloeocapsa violacea* Rabenhorst, Fl. Eur. Algar. 2: 41. 1865. *Bicbatia violacea* Kuntze, Rev. Gen. Pl. 2: 886. 1891.

Haematococcus alpestris Hassall, Hist. Brit. Freshw. Alg. 1: 328. 1845. *Planrococcus alpestris* Trevisan, Sagg. Monogr. Alg. Coccot., p. 34. 1848.

Haematococcus ibericus Hassall, Hist. Brit. Freshw. Alg. 1: 333. 1845. *Bicbatia iberica* Trevisan, Sagg. Monogr. Alg. Coccot., p. 58. 1848.

Synechococcus parvulus Nägeli, Gatt. Einzell. Alg., p. 56. 1849. —Nägeli's sketch and notes, in the Pflanzenphysiologisches Institut, Eidgenössische Technische Hochschule, Zürich, are reproduced here: FIG. 90A.

Chroococcus refractus Wood, Proc. Amer. Philos. Soc. 11: 122. 1869.

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

Sphaerogonium nigrum Rostafinski, Rozpr. Akad. Umiej. Krakow., Wyzd. Mat.-Przyr., 10: 300. 1883.

Polycystis amethystina Filarszky, Hedwigia 39: 139. 1900. *Microcystis amethystina* Forti, Syll. Myxophyc., p. 89. 1907.

Planosphaerula natans Borzi, Nuova Notarisa 1905: 20. 1905.

Gloeocapsa iberialis Lemmetmann, Engler Bot. Jahrb. 34: 614. 1905.

Gloeocapsa haematodes var. *brunnea* Kirchner ex Forti, Syll. Myxophyc., p. 38. 1907.

Clasbrocystis montana Teodorescu, Beib. z. Bot. Centralbl. 21(2): 106. 1907. *Microcystis montana* J. de Toni, Diagn. Algar. Nov. I., Myxophyc., 6: 570. 1939.

- Chroococcus aurantiacus* Bernard, Protococc. & Desmid. d'Eau Douce, p. 48. 1908. *C. Daionis* Bernard, Nova Guinea, Rés. de l'Exped. Sci. Néerl. à la Nouv. Guinée, 1907 & 1909, 8(2, Bot.): 259. 1910.
- Chroococcus Reehingeri* Wille in Reehinger, Denkschr. K. Akad. Wiss. Wien, Math.-Nat. Kl., 91: 160. 1915.
- Microcystis pulverea* var. *major* Elenkia, Estest.-Istoric. Koll. Gr. E. P. Sheremerevoi S. E. Mikhailovsk, Moskovskoi Gub. VI, Vodor. Okt. 1, Schizopbyc, p. 6. 1915.
- Microcystis amebystina* var. *vinosa* Printz, K. Norske Videnskab. Selsk. Skr. 1920(1): 33. 1920.
- Myxosarcina concinna* Printz, K. Norske Videnskab. Selsk. Skr. 1920(1): 35. 1920.
- Chroococcus minor* f. *violaceus* Wille in Hedin, Southern Tibet 6(3, Bot.): 165. 1922.
- Chroococcus cobarensi* var. *antarcticus* Wille, Deutsche Südpolar-Exped. 1901—02, 8: 382. 1924.
- Synochocystis Peralokii* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 77. 1925.
- Gloeo capsula alpina* var. *polyedrica* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 80. 1925.
- Gloeo capsula alpina* f. *violaceus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 80. 1925.
- Gloeo capsula bififormis* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 80. 1925.
- Gloeo capsula bififormis* f. *dermotrocha* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 81. 1925.
- Gloeo capsula bififormis* f. *punctata* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 81. 1925.
- Synochocystis minuscula* Woronichin, Arch. f. Hydrobiol. & Planktonk. 17: 642. 1926.
- Gloeo capsula lacustris* Huber-Pestalozzi, Arch. f. Hydrobiol. & Planktonk. 16: 162. 1926.
- Eucapsis alpina* var. *minor* Skuja, Acta Horti Bot. Univ. Larv. 1(3): 155. 1926. *E. minor* Elenkia, Acta Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Crypt. 1: 15. 1933.
- Aphanocapsa Grevillei* f. *densa* Strøm, Norweg. Mountain Alg., p. 148. 1926.
- Chroococcus sarcinoides* Huber-Pestalozzi, Verh. Int. Ver. Theor. & Ang. Limnol. 4: 366. 1929.
- C. Huberi* J. de Toni, Nouv. Nomencl. Algol. 3: 1936.
- Gloeo capsula strumpens* Beck-Mannagetta, Arch. f. Protistenk. 66: 9. 1929.
- Gloeoibece utulata* Beck-Mannagetta, Arch. f. Protistenk. 66: 9. 1929.
- Eniophysalis Perrieri* Frémy, Ann. Crypt. Exot. 3: 207. 1930.
- Chroococcus minor* f. *glomeratus* Frémy, Bull. Soc. Bot. France 77: 673. 1930. *Gloeo capsula minor* f. *glomerata* Frémy ex Hollerbach in Elenkia, Monogr. Algar. Cyanophyc., Pars Spec. 1: 239. 1938.
- Chroococcus verrucosus* Krieger, Hedwigia 70: 151. 1931.
- Chroococcus niger* Starmach, Acta Soc. Bot. Polon. 11: 293. 1934.
- Microcystis thermalis* Yoneda, Acta Phytotax. & Geobot. 7: 139. 1938.
- Aphanotheca rosaria* Frémy, Bull. Soc. Linn. Normandie, ser. 9, 3: 21. 1943.
- Anacystis trochiscoides* Jao, Sinensia 15: 75. 1944. *Asterocapsa trochiscoides* Chu, Ohio Journ. Sci. 52(2): 100. 1952.
- Anacystis purpurea* Jao, Sinensia 15: 76. 1944.
- Chroococcus limnaticus* var. *multicellularis* Chu, Ohio Journ. Sci. 52(2): 96. 1952.
- Gloeo capsula attingens* Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., 1, 163: 125. 1954.

Plantae aeruginosae, rubrae, nigrae, violaceae, vel olivaceae, in stratum gelatinosum vel libere inter alias algas evolventes, cellulis in divisione binis depresso—sub-sphaericis (raro truncato-hemisphaericis) aetate provecta globosis diametro 2—6 μ (ad 20 μ ubi a fungis parasitatis) crassis, per gelatinum vaginale sine ordine aut in seriebus eucapsoides distributis; gelatino vaginale homogeneo vel lamelloso, primum hyalino deinde vulgo partim vel omnino rubrescente vel coerulecente vel lutescente; protoplasmate aeruginosae, olivaceae, vel violaceae, homogeneo vel granuloso. FIGS. 16—90A.

In strata and among other algae on rocks, wood, and soil wet by rains, and especially in seepage; often found in temporary pools and on emergent shores. The red and blue pigments in the gelatinous matrix, apparently developing in response to desiccation and exposure to direct sunlight, seem to be influenced by the acidity or alkalinity of the substratum. According to Cramer in Rabenh. Alg. no. 869 (1859), Nägeli and Wartmann noted that mourning in acid solutions changes the color of the matrix from blue to red, and that this change can be reversed in alkaline solutions. The same was remarked by Wartmann in Rabenh. Alg. no. 813 (1859). It had long been our own observation that formalin-preserved material almost invariably exhibits red sheaths. O. Jaag & N. Gemisch in Verh.

Schweiz. Naturf. Ges. Locarno 1940: 158—159 (1940) and Gemsch in Beih. Schweiz. Bot. Ges. 53: 121—192 (1943) report careful observational and experimental work on this matter. Yellow and brown pigments are also produced in the gelatinous matrix; perhaps fungi are responsible for these.

Fungus hyphae often enter the protoplasts themselves, causing the cells to enlarge and to cease the secretion of gelatinous material. The hyphae of some fungi form conspicuous (often ornamented) walls about the protoplasts; this phenomenon is the basis for the reports of thick-walled spores in *Anacystis montana*. It has been observed that such parasitization results in the death of cells of *Anacystis montana*; future observations may disclose that there exist fungi which, parasitizing this alga, do not destroy it but continue to grow with it as a lichen.

Bacteria, palmelloid Chlorophyceae, *Entophysalis densa*, and dissociated cells of *Agmenellum* spp. and *Gomphosphaeria lacustris* may sometimes be confused with *Anacystis montana*.

Specimens examined:

SPITZBERGEN: "Chlamydococcus nivalis. Spitzberg. Ex herb. Zanardini." (Type of *Aphanocapsa nivalis* Lagerh., DT); King's bay, T. M. Prior, Aug. 1868 (S). FINLAND: Karis, R. Grönblad, Apr. 1935 (S). SCANDINAVIA?: with *Stigonema (Strosiphon) panniformis*, Kunze in herb. Kützing (Type of *Gloeocapsa rubicunda* Kütz., L.). NORWAY: K. Sprengel, as *G. rupicola* in herb. Kützing (L); in *Neckera oligocarpa* Schimp. ad latera saxorum prope pontem Snuelsboren, Ringehoe, Gudbrandsdalen, J. E. Zetterstedt & J. A. O. Wickbom, 22 Jun. 1870 (FC). SWEDEN: Hessingen ved Stockholm, 1823, in herb. Agardh (Type of *Palmella? sanguinea* Ag., LD [Fig. 80]; isotypes, K, S, UC); in lacu Bursjön in Uplandia, V. B. Wåstrock, Aug. (Type of *Coccolobus tuberculosa* Aresch. in Areschoug, Alg. Scand. Exs., Ser. Nov., no. 292, S; isotypes, FC, L, NY, UC); ad lapides in Lassby backar prope Upsaliam, G. Lagerheim, 28 Mar. 1882 (as *Gloeocapsa opaca* in Witr. & Nordst., Alg. Exs., no. 597, FC, L, S); in rupibus ad Danviken prope Holmiam, Lagerheim, Nov. 1881 (as *G. magna* in Witr. & Nordst., Alg. Exs. no. 500b, FC, L, S); ad Nacka quarvarn prope Stockholmiam, Lagerheim, Jun. 1883 (as *G. versicolor* in Witr., Nordst., & Lagerh., Alg. Exs. no. 1542, L, S); in aqueducta ad Nacka pr. Stockholmiam, N. Wille, Jun. 1884 (D, S); ad saxa humida prope Quickjock in Lapponia Lulensi, Lagerheim, Jul. 1883 (S; as *G. alpicola* in Witr., Nordst., & Lagerh., Alg. Exs. no. 1540, L, NY); Scania, J. Agardh, 1843 (L); Hammarbyssjön pr. Stockholmiam, Lagerheim, Jun. 1881 (S); Vassijokk, Torne Lappmark, O. Borge 105, 116, Jul. 1909 (S); Drottningholm, Borge, Mai 1920 (S); Möja, Borge 33/43, Aug. 1933 (S); Kullaborge, Skåne, Borge, Oct. 1898 (S); Arboga, O. F. Andersson, Nov. 1888 (S); Hederviken, Uppåla, Areschoug, Jul. 1857 (S), Aug. 1863 (S).

POLAND: Breslau, im Warmhaus des bot. Gartens, W. Migula, Feb. 1888 (S; as *Chroococcus varius* in Hauck & Richt., Phyk. Univ. no. 484, L, UC); Riesengebirge, Plotow, Sept. 1851 (S); Silesia, in herb. Kützing (L); feuchte Steinwand auf Burg Kynast, G. Hieronymus 746, Sept. 1887 (MICH; as *Chroococcus cohaerens* in Hauck & Richt., Phyk. Univ. no. 243, L); in caldario horti botanici, Breslau, B. Schröder, Nov. 1894 (S); bei Strehlen, Hiltse (as *Palmella testacea* in Rabenh. Alg. no. 1524, UC); an den Felswänden am Galgenberge bei Strehlen in Schlesien, Hiltse (as *Gloeocapsa opaca* in Rabenh. Alg. 1169, FC); an überrieselten Felswänden in Steinhüchen bei Gross-Willkau, Kreis Nimpsch in Schlesien, Hieronymus, 2 Okt. 1891 (TA; Type of *Aphanocapsa Richieriana* Hieron. in Hauck & Richt., Phyk. Univ. no. 485, L; isotypes, MIN, UC). ROMANIA: Bucuresti-Cotroceni, in caldario horti botanici ad muros, E. C. Teodorescu 1384, 23 Dec. 1903 (FC, W).

GERMANY: Schleswig-Holstein: auf Sand am Strande nördlich Friedrichsort, T. Reinhold, Sept. 1890 (Type of *Anacystis Reinholdii* Richt. in Hauck & Richt., Phyk. Univ. no. 447, NY; isotype, MIN); Kiel, Reinhold (DT). Brandenburg: Berliner bot. Garten, Palmhaus, G. Lagerheim, Oct. 1882 (S), ad parietem caldarium, Lagerheim, 9 Oct. 1882 (as *Gloeocapsa granulosa* in Witr. & Nordst., Alg. Exs. no. 595, FC, D, L, S), im Orchideenhaus, A. Braun, Nov. 1875 (Type of *Aphanocapsa nebulosa* A. Br. in Rabenh. Alg. no. 2454, FC [Fig. 69]; isotypes, S, TA; Type of *Gloeobace inconspicua* A. Br. in Rabenh. Alg. 2455, FC; isotype, D), Oct. 1875 (as *A. nebulosa* in Rabenh. Alg. 2454b, FC), Mai 1875 (Type of *A. biformis* A. Br. in Rabenh. Alg. no. 2455, FC, [Fig. 30]; isotypes, L, NY, TA, S; in Roumequère, Alg. de Fr. no. 616, L); an der Hinterwand des Warmhauses in Universitätsgarten zu Berlin, Braun, Dec. 1875 (as *A. biformis* in Rabenh. Alg. no. 2453b, FC, L, NY, S, TA); Neudamm, Ixigobn, Dec. 1852 (Type of *Monocapsa stegophylla* Ixigs. in Rabenh. Alg. no. 263, FC [Fig. 48]; isotype, L). Saxony: im Taubensbachthale bei der Schweizermühle, Biene, Mai 1862 (as *Gloeocapsa magna* in Rabenh. Alg. no. 1334, UC); Porphyrfelsen bei Grimma, G. Winter, 5 Apr. 1868 (UC); auf den steinernen Stufen zum Altarraum in der Kirche zu Döben bei Grimma, F. Richter (as *G. bituminosa* in Hauck & Richt.,

Phyk. Univ. no. 749, L. NY, S); an einem Brunnen in Königstein, *Richtst.*, Sept. 1880 (TA); Urewalde, *C. Cramer* (as *G. opaca* in Rabenh. Alg. no. 544, FC, FH, L), Aug. 1854 (FH); *Richtst.*, 26. Mai 1880 (as *G. sanguinea* in Witr. & Nordst., Alg. Exs. no. 499, FC, L, S), Jun. 1881 (TA), 29. Mai 1882 (as *G. quaternata* in Witr. & Nordst., Alg. Exs. no. 598, FC, D, L, S), 27. Mar. 1884 (as *G. sabulosa* in Witr. & Nordst., Alg. Exs. no. 698, FC, L, PC, S), without date (FC, UC); in der sächsischen Schweiz, an Felsen, *Hantzsch* (UC), an feuchten Felswänden (as *G. magma* in Rabenh. Alg. no. 84, FC, L, NY, TA); in Breutel, Alg. Exs. no. 328, L; as *G. ambigua* var. in Rabenh. Alg. no. 32, FC, L, NY, TA); in rupibus humectis ad Hohnstein prope Dresden, *Richtst.*, 28. Mai 1881 (as *G. magma* in Witr. & Nordst., Alg. Exs. no. 500, FC, L, S); an einer schwach überrieselten Steinwand in Steinbrüche zu Beucha bei Brandis um Leipzig, *H. Reichelt*, Sept. 1890 (Type of *G. Reicheltii* Richt. in Hauck & Richt., Phyk. Univ. no. 647, L; isotype, MIN); Moritzburg, auf Wasser schwimmend (as *Microcystis ichtyoblaba* in Rabenh. Alg. no. 16, FC); in einem Gewächshause, Oschatz, *E. May*, Feb. 1892 (Type of *Aphanotheca conferta* Richt. in Hauck & Richt., Phyk. Univ. no. 487, L; isotypes, MN, UC); Leipzig, an den Wänden des Gewächshauses im bot. Garten, *Richtst.* (UC); an einer feuchten Wand im Gewächshause der Dreyzehnerschen Gärtnerei in Anger bei Leipzig, *Richtst.*, Apr. 1888 (Type of *Aphanocapsa Naegolii* Richt. in Hauck & Richt., Phyk. Univ. no. 195, L; isotype, MIN); in einem Warmhause in Anger, *Richtst.*, Feb. 1879 (L, S), Apr. 1879 (TA); in patietes caldarii ad Anger, *Richtst.*, 12. Apr. 1881 (as *Chroococcus varius* and *Aphanocapsa bifurcata* in Witr. & Nordst., Alg. Exs. no. 600, FC, D, L, S); with *Protococcus grummosus* Richt. in Witr. & Nordst., Alg. Exs. no. 1090, FI). Thüringia: bei Gotha, *A. Braun* (NY); Kohnstein, herb. Kützing (L); an Steinen im Gehege, Nordhausen, *F. T. Kützing* (Type of *Protococcus suseco-ater* Kütz., L [Fig. 46]); Gypsberg, *Walleob* in herb. Kützing (L); an Gypsstein bei Sachswerfen, *Kützing*, Aug. 1839 (Type of *Gloeoecapsa sanguinolenta* Kütz., L [Fig. 61]; isotype, UC); "Palmella placenteris Wallr.", auf Gipsberge bei Steigerthal, *Walleob*, Apr. 1839 (Type of *G. coracina* Kütz., L); Hercynia, in herb. Kützing (Type of *G. conglomerata* Kütz., L [Fig. 81]; isotype, UC); Nordhausen, *Kützing* (Type of *G. aeruginosa* Kütz., L [Fig. 90]); isotype, UC); an Felsen beim Weissenfelsen-See, *F. Hauck*, 16. Aug. 1881 (L); Eisenach, Betonmauer des Nesselwehres, *W. Migula*, Sept. 1905 (Isotypes of *Chroococcus decolorans* Mig. in Migula, Crypt. Germ. Austr. & Helv. Exs. no. 83, MICH, NY, TA); Tambach, an feuchten Felsen der Talsperre, *Migula*, 7. Sept. 1928 (as *Gloeoecapsa dermatocroa* in Migula, Crypt. Germ. Austr. & Helv. Exs. no. 235, FC, NY, S, TA, Z). Bavaria: Beichresgaden, *P. Magnus*, Sept. 1874 (FH); Weg nach dem Königsee, Beichresgaden, *Magnus*, 1874 (NY); an der Wand eines Gewölbes der über den Rödelheim führenden Brücke des Donau-Mainkanals bei Erlangen, *P. Reinsch*, März 1864 (as *Gloeoecapsa atrata* with *Coccoloboris stagnina* Spreng. in Rabenh. Alg. no. 1914, FC); Oberstdorf, an feuchten Kalkfelsen, *Migula*, Juli 1926 (S); as *Gloeoecapsa sanguinea* in Migula, Crypt. Germ. Austr. & Helv. Exs. Alg. no. 258, FC, TA). Württemberg: Canstatt, am Raude einer Mineralwasser-Bassin, *G. Zeller* (as *Chroococcus minor* in Rabenh. Alg. no. 1143, FC). Rheinland: an der Wand eines Warmhauses zu Poppelsdorf bei Bonn, *C. Bouché*, Sept. 1875 (Type of *Chroococcus varius* A. Br. in Rabenh. Alg. no. 2451, FC; isotypes, L, S, TA), *A. Braun*, Sept. 1875 (Type of *C. varius* f. *atrovirens* A. Br. in Rabenh. Alg. no. 2452, FC [Fig. 85]; isotypes, L, S, TA, UC). Baden: Hieschensprung im Höllenthal, *B. Warmann*, Jun. 1854 (as *Palmella microspora* in Rabenh. Alg. no. 406, FC, L); Freiburg, *A. Braun*, Oct. 1847 (Type of *Palmella brunnea* A. Br., L [Fig. 87]; isotype, NY); an Mühlerädern, *A. Braun*, Apr. 1848 (FH, ZT), auf dem Mörtel alter plötzigeo Manern, *Braun 117*, Oct. 1848 (L); in Warmhause des bot. Gartens zu Freiburg, *Warmann*, Oct. 1854 (Type of *Chroococcus cohaerens* Näg. in Rabenh. Alg. no. 446, FC [Fig. 78]; isotypes, FH, L, NY); in den Thermalbrunnen, Badensweiler, *Braun 129*, Apr. 1848 (L), Aug. 1848 (L); Karlsruhe, *Braun*, Nov. 1845 (L), Apr. 1848 (UC); Karlsruhe, an den Mauern eines Gewächshauses, *W. Migula*, Feb. 1905 (as *Gloeoecapsa granosa* in Migula, Crypt. Germ. Austr. & Helv. Exs. Alg. no. 98, MICH, TA, Z); an den Speichen eines Wasserrades bei Konstanz, *E. Stizenberger*, Aug. 1857 (as *G. ambigua* var. *violacea* with *Coccoloboris stagnina* Spreng. in Rabenh. Alg. no. 607, FC, MIN, L, PC); in Jack, *Leiner & Stizenb.*, Kryptog. Badens no. 1, TA, UC); Baden, *W. P. R. Suringar 1072*, Sept. 1862 (Type of *Chroococcus violaceus* Rabenh., L [Fig. 86]).

CZECHOSLOVAKIA: Moravia: Mobeino, *J. Saza*, Jul. 1931 (Type of *Gloeoecapsa compacta* var. *coeruleoatra* Nov., D [Fig. 43]; isotype, FC), *F. Nováček*, 10. Mar. 1926 (Type of *G. nigrescens* f. *virens* Nov., D [Fig. 47]; isotype, FC), 21. Apr. 1926 (D, FC), May 1926 (D, FC), 31. Jul. 1926 (Type of *Entophyalis atroviolacea* Nov., D [Fig. 18]; isotype, FC), 9. Aug. 1926 (Type of *Gloeoecapsa chroococoides* Nov., D [Fig. 54]; isotype, FC), 24. Sept. 1926 (D, FC), 21. Oct. 1926 (Type of *G. pleurocapitoides* Nov., D [Fig. 89]; isotype, FC), 22. Oct. 1926 (D, FC), 19. Sept. 1927 (D, FC), 22. Sept. 1927 (D, FC), 4. Oct. 1928 (D, FC), 20. Oct. 1928 (Type of *G. Dvorakii* Nov., D [Fig. 59]; isotype, FC), 20. Oct. 1930 (D, FC), 17. Apr. 1932 (D, FC), 8. Mar. 1933 (D, FC), 11. Mar. 1933 (D, FC), 12. Mar. 1933 (D, FC). Slovakia: Felkenbal, an der Granaten-Wand, Tatra, *G. Hieronymus 736*, Aug. 1888 (MICH); as *G. Ralsiana* in Hauck & Richt., Phyk. Univ. no. 334, L). Bohemia: Belá, *A. Hansgirg*, Aug. 1883 (FC, W); Breno-Schiessnitz prope Böhmisch-Leipa, *Hansgirg*, Sept. 1890 (FC, W); Budnany, na klouzavce, *Hansgirg*, Jul. 1884 (FC, W); Chuchel, *Hansgirg*, Apr. 1884 (FC, W), Nov. 1884 (FC, W); Chvaneruby u Kralup, *Hansgirg*, Apr. 1888 (FC, W); Dittersbach—Hinter-Dittersbach, *Hansgirg*, Jul. 1889 (FC, W);

Dux, *Hansgirt*, Aug. 1883 (FC, W); Edmundsklamm prope Herrnskretchen, *Hansgirt*, Sept. 1890 (FC, W); Pampferbütte bei Eisenstein, *Hansgirt*, Aug. 1887 (FC, W); Friedland prope Reichenberg, *Hansgirt*, 1891 (FC, W); Habstein, *Hansgirt*, Jul. 1883 (FC, W); in lapidibus calcareis viaductus magni ad Hlubocep in agro Pragensi, *Hansgirt* (as *Gloeocapsa ruficola* in Fl. Exs. Austro-Hung. no. 3199, L, MO, S); Hohenfurth, *Hansgirt*, Aug. 1884 (FC, W); an Kalksteinen in offener Felsenbrunnen bei Hostin nächst Beroun, *Hansgirt*, Jul. 1888 (Type of *Aphanocapsa fonticola* Hansg., W; isotype, FC); teplá voda, Hradec Kralove, *Hansgirt*, Sept. 1883 (FC, W); horná část údolí u Karlíka pod Roblínem, *Hansgirt*, Jul. 1888 (FC, W); Mauern unter dem Sprudel, Karlsbad, *Hansgirt*, Jul. 1886 (FC, W); Karlsbad, am sog. kleinen Sprudel u. s. w. im Bette der Tepl unter der Sprudelkolonnade, *Hansgirt*, Aug. 1883 (Type of *A. ibomalis* var. *minor* Hansg., W [Fig. 71]; isotype, FC); Karlstein, u. hradu, *Hansgirt*, Jul. 1884 (FC, W); Koda prope Karlstein, Sedlec prope Lodenic, *Hansgirt*, May 1890 (FC, W); auf mässig beleuchteten Stellen der Kaskadenhöhle unterhalb Korno nächst Beraun, *Hansgirt*, Sept. 1888 (Type of *Gloeobuce tepidarium* var. *caevanarum* Hansg. and *G. rufestriv* var. *caevanarum* Hansg., W; isotype, FC [Fig. 68]); Krc, *Hansgirt*, Sept. 1886 (FC, W); Krumlov, *Hansgirt*, Aug. 1883 (FC, W), Aug. 1884 (FC, W); in den Sandgruben oberhalb Kuchelbad nächst Prag, *Hansgirt*, Apr. 1883 (Type of *Coelostbauerium anomalum* var. *minus* Hansg., W; isotype, FC); plovárna, Litomerice, *Hansgirt*, Jul. 1884 (FC, W); mlýny v Labi, Lovosice, *Hansgirt*, Jul. 1884 (FC, W); Peiperz-Maxdorf prope Bodenbach, *Hansgirt*, Sept. 1890 (FC, W); Vereinsgarten, Prag, *Hansgirt*, Jan. 1885 (FC, W); auf feuchten Fensterscheiben im Vermehrungshause des Prager Vereinsgartens, *Hansgirt*, Oct. 1884 (Type of *Aphanocapsa fuscolutea* Hansg., W; isotype, FC); Krumlov, Právník, *Hansgirt*, Sept. 1884 (FC, W); kameny studánka, Rovoč pod Pipem u Roudnice, *Hansgirt*, Jul. 1884 (FC, W); in rupibus madidis ad Selc in agro Pragensi, *Hansgirt*, Jun. 1886 (as *Gloeocapsa ambigua* in Witt. & Nordst., Alg. Exs. no. 1099, L, S); Selc u Prahy, *Hansgirt*, Sept. 1885 (FC, W), Nov. 1886 (FC, W); Křeski Zahradá, Smíchov, *Hansgirt*, Dec. 1883 (FC, W); im Vermehrungshause des k. k. botanischen Gartens am Smíchov, *Hansgirt*, Jan. 1884 (Type of *Chroococcus varius* var. *luteolus* Hansg., W [Fig. 74]; isotype, FC); Spindelmühle im Riesengebirge, *Hansgirt*, Nov. 1883 (FC, W); Spitzberg im Böhmerwalde (u. ranelu), *Hansgirt*, Aug. 1883 (FC, W); Stribro, *Hansgirt*, Aug. 1883 (FC, W); Supcic prope Tábor, *Hansgirt*, Aug. 1888 (FC, W); Tábor, *Hansgirt*, Aug. 1883 (FC, W); Riesengebirge, v. Flotow (Type of *Ephobe pubescens* d. *crvenia* Flot., S); skály pod Tetínem nad Berounkou, *Hansgirt*, Sept. 1888 (FC, W); viadukt na Sravnice, *Hansgirt*, Mar. 1883 (FC, W); Volsany u Nepomuk, *Hansgirt*, Aug. 1887 (FC, W); Zel. Brod, *Hansgirt*, Jul. 1885 (FC, W); Zleby prope Castov, *Hansgirt*, 1891 (FC, W). HUNGARY: in terra muscosa calce incrustata et aqua minerali humectata, Badoczer Wiesen, *Kalchbrenner* (Type of *Gloeocapsa Kalchbrenneri* Grun., W).

AUSTRIA: Lower Austria: in horto botanico Vindobonensi, *A. Kerner* (as *G. sanguinea* in Fl. Exs. Austro-Hung. no. 1196, L, S), *G. Lagerbeim*, 4 Oct. 1882 (as *G. compacta* in Witt. & Nordst., Alg. Exs. no. 596, FC, L, S); auf Leucodon bei Wien, ex herb. Grunow. (FH); in rupibus prope pagum Purkersdorf (in silva Wiener Wald), *K. de Keissler*, Mar. (as *G. sanguinea* in Mus. Vindob. Krypt. Exs. no. 2049, FC, L, S, Z); in rupibus vallis Krummbachgraben in monte Schneeberg, *G. de Beck*, Jul. (as *Aphanocapsa montana* in Mus. Vindob. Krypt. Exs. no. 146b, FC, L, NY, S); auf Holz in einem Brün in Neehaus, *A. Grunow*, Aug. 1858 (Type of *Aphanocapsa violacea* Grunow., W). Styria: Hortus Sackeli, Graz, *A. Hansgirt*, Sept. 1890 (FC, W); "äussere Wand der Wasserarche" prope Mürrzuschlag, *F. Pfeiffer & Schmula* (as *Gloeocapsa nigrescens* in Fl. Exs. Austro-Hung. no. 3198, FC, FH, L, MO, S, Z). Salzburg: in cortice arborum ad torrentes Gollinger Wasserfall, *C. de Keissler*, Jun. (as *G. alpina* in Mus. Vindob. Krypt. Exs. no. 228b, FC, L, NY, S, Z); Gastein, *Diesing* (FH); ad saxa irtorata et bumida prope Wildbad-Gastein, *G. de Beck*, Jun. (as *Aphanocapsa montana* in Mus. Vindob. Krypt. Exs. no. 146, FC, L, S). Carinthia: St. Veit-an-der-Glan, *Hansgirt*, Sept. 1889 (FC, W); Pontafel, *Hansgirt*, Aug. 1885 (FC, W); Kalk und Tuff am Kolbitsch, *H. Simmer* 1007, 29 Aug. 1898 (Type of *Chroococcus alpinus* Schmidle, Z; isotype, S); Kreuzeckgebiet, *Simmer*, Aug. 1898 (S), bei Rittersdorf, *Simmer*, Oct. 1898 (S), auf Zaunhölzern, *Simmer* 1058, 29 Aug. 1898 (Z), am Knoten, *Simmer*, Aug. 1897 (S), in Ameisengrube, *Simmer* 1056, 14 Apr. 1898 (Z), bei Zwickenberg auf feuchtem Sande, *Simmer* 1059, 31 Aug. 1898 (Z). Tyrol: Brixlegg, *A. Hansgirt*, 1891 (FC, W); Hall, *Hansgirt*, 1891 (FC, W); zwischen Hall und St. Magdalene, *Hansgirt*, 1891 (FC, W); Rothholz nächst Jenbach, *Hansgirt*, 1891 (FC, W); Kufstein, *Hansgirt*, 1891 (FC, W); Thierberg, Hechtsee, etc. bei Kufstein, *Hansgirt*, 1891 (FC, W); feuchte Felsen an Langenstein bei Kufstein, *Heußler*, Aug. 1860 (Type of *Gloeocapsa haematodes* var. *violascens* Grun., W [Fig. 70]); auf nassen Kalkfelsen bei Mühlau, *Kerner* (S).

JUGOSLAVIA: Slovenia: Bischoflack, *A. Hansgirt*, Aug. 1889 (FC, W); Brunndorf et Draga prope Laibach, *Hansgirt*, Sept. 1889 (FC, W); Franzdorf, *Hansgirt*, Aug. 1889 (FC, W); ex caverna (Jelenska Jerna), Franzdorf, *Hansgirt*, Aug. 1889 (FC, W); Marburg, *Hansgirt*, Aug. 1890 (FC, W); Podnart, *Hansgirt*, Aug. 1889 (FC, W); Tuffet, *Hansgirt*, Aug. 1890 (FC, W). Istria: in saxis calcareis ad fl. Quieto prope Pinguente, *Hansgirt*, 1891 (Type of *G. alpina* var. *mediterranea* Hansg., W; isotype, FC [Fig. 45]). Dalmatia: Cannosa—Valdinoco prope Ragusa, *Hansgirt*, 1891 (FC, W); Topla—Gruda prope Castelnuovo, *Hansgirt*, 1891 (FC, W); Lesina, herb. Kützing (L); St. Dombioia, Lesina, 1857, herb. Kützing (L). TRIESTE: *F. Hauck*, Sept. 1874 (S); in saxis in orio fluminis Quieto ad Citanova, *Hansgirt*, 1891 (FC, W); Pirano, *Hansgirt*, Apr. 1889 (FC, W);

Pisino, *Hansgirg*, Aug. 1889 (FC, W); in taxis prope Prosecco—Miramar, *Hansgirg*, 1891 (FC, W); with *Scytonema crustaceum* Ag., Monte Spaccato, Trieste, P. T. Kützing, Apr. 1835 (Type of *Gloeocapsa rosea* Kütz., L); Boschetto, Trieste, F. Hauck, Mar. 1884 (L). ALBANIA: Radhima, acqua di una fonte, G. de Toni 65a, 16 Jun. 1941 (FC, DT); Fushes-Dukati, roccia bagnata presso una sorgente, de Toni 75, 23 Jun. 1941 (FC, DT), pendici del Shendelluit, de Toni & L. Boldori 82, 6 Jul. 1941 (FC, DT). LIECHTENSTEIN: ad saxa calcarea supra Vaduz, G. de Beck (as *G. alpina* in Mus. Vindob. Krypt. Exs. no. 228, FC, L, NY, Z).

SWITZERLAND: an Felsen, Bodenhaus, Berner-Oberland, C. von Nägeli, 26 Jul. 1850 (ZT), an bespritzten Balken, with *Schizosiphon parietinus* var. *alpinus* Näg., von Nägeli, 20 Jul. 1850 (Type of *G. nigrescens* Näg., ZT); Bern, in herb. Kützing (Type of *G. arata* Kütz., L; isotypes, FI, UC); an feuchten Felswänden, Engelberg, Kt. Unterwalden, C. Cramer, Jul. 1859 (Type of *G. alpina* Näg., FC [Fig. 17]); with *Scytonema incrustans* Kütz., Erlenbacher Tobel, auf Felsen, von Nägeli, Oct. 1850 (ZT); Moose überziehend, Gäbris, Appenzell, B. Wartmann, Jul. 1862 (as *Aphanocapsa montana* var. *micrococca* in Wartm. & Schenk, Schweiz. Krypt. no. (134), MIN. ZT); St. Gotthardsstrasse oberhalb Göschenen, Uri, Cramer, 4 Jul. 1862 (as *Gloeocapsa opaca* in Wartm. & Schenk, Schweiz. Krypt. no. 235, Z); im stehenden Wasser vom schmelzenden Schnee auf der Gemmi, Wallis, R. J. Shustloworth 232, 22 Aug. 1841 (BM), 216, Aug. 1841 (BM); an Felsen, Maderanerthal, Uri, Cramer, Aug. 1876 (FC, FH); Maderanerthal along the Kerstelenbach, J. T. Kossior 1297, 28 Jun. 1948 (FC); on roots of *Hedera helix*, Meride-Serpiano, Ticino, R. A. Maas Geesteranus 3403, 30 May 1946 (FC); rochers calcaires, Meride-Tremona, Tessino, Maas Geesteranus 3261, 2 Jun. 1946 (FC); Rigi, Cramer, Sept. 1856 (Type of *Aphanocapsa montana* and var. *micrococca* Cramer in Wartm. & Schenk, Schweiz. Krypt. no. 134, ZT; isotype, MIN); Schaffhausen, in herb. Kützing (Type of *Gloeocapsa scopulorum* Näg., L [Fig. 16]; isotypes bearing variant labels: "Rheinfall, von Nägeli, Jul. 1847", M, and "ad Rheni cataractam, Nägeli", FI); am Nagelfluhsfelsen der Bernegg bei St. Gallen, Wartmann, 1858, 1861 (as *G. coracina* in Rabenh. Alg. no. 814, FC, L; as *G. coracina* in Wartm. & Schenk, Schweiz. Krypt. no. 35, Z), 21 Dec. 1858 (Type of *G. saxicola* Wartm. in Rabenh. Alg. no. 813, FC [Fig. 22]; isotypes, L, and in Wartm. & Schenk, Schweiz. Krypt. no. 345, Z); Trinser See auf Kalkfelsen, G. C. Brügger (Type of *Aphanocapsa montana* var. *macrococca* Cramer, ZT); ad *Populus pyramis* corticem, Zürich, G. Winter, Mar., Apr. 1877 (FC, L, M, S), Jul. 1878 (FC, S); ad terram arenosam humidam, Zürich, Winter, May 1878 (FC), Jan. 1879 (L); auf feuchtem Holz, Zürich, Nägeli 108 (Type of *Gloeocapsa verticolar* Näg., L [Fig. 50]; isotype, UC); an nassen Felsen, Zürich, Nägeli 216 (Type of *G. geminata* Kütz., L [Fig. 33]); Zürich, Nägeli 299 (Type of *G. ianthina* Näg., L [Fig. 23]; isotype, UC), Nägeli 301 (Type of *G. ambigua* Näg., var. *pellucida* Näg., and b. *violacea* Näg., L); an nassen Felsen, Küssnacher Tobel, Nägeli 302, Sept. 1847 (M); Zürich, Nägeli 304 (Type of *G. punctata* Näg., L; isotype, UC), Nägeli 364 (L), Nägeli 365 (Type of *G. ambigua* β rivularis Näg., L; isotype, UC), Nägeli 387 (Type of *G. opaca* Näg. and var. *pellucida* Näg., L; isotype, UC); an einem Felsen unten der Sihl, Zürich, von Nägeli, 27 Mai 1849 (ZT); an einem Brunnen bei Küssnacht unweit Zürich, Wartmann (as *G. nigrescens* in Rabenh. Alg. no. 629, FC, FH, L, TA).

ITALY: Venezia: Aquilegia, Biazolotto, 1850 (UC); Isonzo, A. Hansgirg, 1891 (FC, W); Götz, Hansgirg, 1891 (FC, W); Sagrado prope Götz, Hansgirg, 1891 (FC, W); Oliero, E. de Toni (DT); Conegliano, G. B. de Toni & D. Levi, 1887 (as *G. verticolar* in de Toni & Levi, Phyc. Ital. no. 85, UC; in Roumequère, Alg. de Fr., L); Nostoc no. 2, Padova, Meneghini (Type of *Palmella didyma* Kütz., L; isotype, UC); S. Pietro in thermis Euganeis, O. Beccari (B); with *Coccochloris stagnina* Spreng., Abano, thera Eugan., Meneghini (Type of *Gloeocapsa cryptococcoides* Kütz., L; isotypes, UC, S); Battaglia, Meneghini (Type of *Protococcus pygmaeus* Kütz., L [Fig. 27]); ubique super muros Patavii, Meneghini (Type of *Pleurococcus communis* Menegh., FI [Fig. 83]; isotypes or cotypes with variant labels, "ad muros humidus", FC, and "ad parietes humidus", W, FI); ad muscos ad rupes in udibus [Euganeorum], S. Elena, Meneghini, Sept. 1837 (Type of *Coccochloris muscicola* Menegh., FI [Fig. 79]; isotypes, L, UC); in Euganeis, Meneghini (Type of *C. parietina* Menegh., FI [Fig. 77]; isotypes, L, FC); in thermis Euganeis, Meneghini (Type of *Anacyctis marginata* Menegh., L [Fig. 19]; isotypes, FC, B, S), in Euganeis, Meneghini (Type of *Microcystis nigra* Menegh., FI [Fig. 64]; isotypes, L, LD, S, UC); in rupibus humidis in mont. eugan., Titius, 1853 (Type of *Gloeocapsa Titiana* Grun., W); Sterzing—Gossensass, Hansgirg, 1891 (FC, W); Ala, Hansgirg, 1891 (FC, W); S. Margarita prope Ala, Hansgirg, 1891 (FC, W); Auer, Hansgirg, 1891 (FC, W); Gossensass—Pfersch, Hansgirg, 1891 (FC, W); Kardaun—Blumau prope Bozen, Hansgirg, 1891 (FC, W). Lombardy: Bormio, su rupi umide presso la sorgente Pliniana, E. Levier, Aug. 1871 (as *Gloeocapsa rupestris* in Erb. Critt. Ital., Ser. II, no. 663, FC, L); in muris humidis, Bellagio, N. & G. Lagerheim, 17 Sept. 1882 (D, S). Piedmont: su muschi rupicolis lungo i torrenti di Val Intrasca al Lago Maggiore, De Notaris, Aug. 1865 (as *G. livida* in Erb. Critt. Ital., Ser. II, no. 340, UC). Liguria: ad Oleam vetustam, Varigotti, C. Sbarbaro, 28 Mar. 1950 (FC); ad rupes inter Porto Venete et Spezia, U. Martelli, Nov. 1890 (DT). Emilia: Ballata Bagnatori prope Bologna, C. Zumirogini, Aug. 1896 (DT). Tuscany: sulla scorza del *Diospyros virginiana* nell'Orto Botanico Pisano, Archangeli, Jan. 1883 (as *Gloeocapsa verticolar* in Erb. Critt. Ital., Ser. II, no. 1323, FC); Firenze (FH), sulla corteccia dei cipressi al Giardino di Boboli, G. Archangeli, Jan. 1878 (as *G. livida* in Erb. Critt. Ital., Ser. II, no.

664, FC, L, NY, UC, Z); Vallombrosa, *A. Borzi* (FH), comm. F. Ardissona (NY); sui muri umidi di un ponte presso Vallombrosa, *Borzi*, Oct. 1878 (as *Applanocapsa pulchra* in Erb. Critt. Ital., Ser. II, no. 784, FC, NY, S). Roma: Roma, *E. Piorini-Manzani* (PC). Campania: amphitheatr. Pozzuoli, *B. M. Davis*, May 1904 (MICH). Apulia: serra di Otranto, in herb. Kützing (L).

FAEROES ISLANDS: Faeroa, *Lyngbya*, as *Palmella alpicola* (FC, MO). SCOTLAND: "Palmella frustulosa Car." [Appin?], *Carmichael* (Type of *Haematococcus frustulosus* Harv., K [Fig. 38]; isotype?, "ex herb. Thwaites", BM); "Palmella livida C." [Appin?], *Carmichael* (Type of *Palmella livida* Carm., K [Fig. 65]); "Palmella aeruginosa Car." [Appin?], *Carmichael* (Type of *Haematococcus aeruginosus* Hass., K [Fig. 84]); Isle of Skye, *Lightfoot* (Type of *Ulex montana* Lightf., K); summit of Ben Arthur, Arrochar, *W. Borrer* (BM). ENGLAND: Cawley, Yorkshire, *W. West*, Aug. 1887 (Type of *Ceroococcus schizodermaticus* West, BIRM); Brant Fell, English Lake District, *G. S. West*, Aug. 1891 (UC); wet limestone rocks, Hella Pt., west Yorkshire, *G. S. West*, May 1897 (UC); Linn Gill, west Yorkshire, 12 Apr. 1895 (FC, UC); in river at Fairford, Gloucestershire, *W. L. Tolstead* 8496, 3 Oct. 1944 (FC); Upper Pen pood, Richmond Park, Surrey, *J. W. G. Lund* (Type of *Coolosphaerium kinnicola* Lund in the private collection of J. W. G. Lund; isotype D [Fig. 76]). WALES: Llyn Teyrn, Snowdon, *G. S. West*, Aug. 1891 (Type of *Applanocapsa saxicola* var. *sphaerica* W. & G. S. West, BIRM [Fig. 55]); Dolgellay, *J. Ralls* (Type of *Palmella Rallsii* Harv., BM); isotypes with variant label, "Welsh Mountains", L, UC). IRELAND: Ballinay, *D. Moore* (K); cavy white rocks, Portrush, county Antrim (FC, L); M. Ben Gower, *Shuttleworth* 65 (Type of *Gloeocapsa Shuttleworthiana* Kütz., L [Fig. 37]; isotype, C); wet rocks, Erigal, county Donegal, *G. Dickie*, Jul. 1852 (designated as Type of *Haematococcus binalis* Hass., BM). NETHERLANDS: Nieuwkoopse plas, *J. T. Kosters* 562, Jun. 1940 (L); on wall in hotbouse, Hortus Botanicus, Leiden, *Kosters* 220, 5 May 1938 (FC, S), *Kosters* 856, Nov. 1943 (L); in a small cement trench, hotbouse, Hortus Botanicus, Leiden, *P. Leenhouts*, 12 Oct. 1950 (FC); regen rotswanden, Valckenburg, *W. F. R. Swinger*, Jul. 1861 (L).

FRANCE: ad parietes cryptarum (as *Pleurococcus bisummosus* in Rabenh. Alg. no. 2188, L). Aime: sur les casemates, Berthencourt-par-Moy, *J. Mabille* 1, 3, May 1952 (FC). Alpes Maritimes: Antibes, *G. Thuret*, 9 Feb. 1869 (FH, L), 31 Jan. 1869 (PC), 9 Mar. 1870 (FC, NY), 21 Mar. 1870 (FC); grottes de Menton, *C. Flabault*, Apr. 1882 (PC), Aug. 1882 (S); rochers de la Croupelassière, *E. Bornet*, 20 Jan. 1872 (PC). Alsace: stagnes d'eau saumâtre, environs de Strasbourg, *C. Roumeguère* (as *Ceroococcus varius* in Roumeguère, Alg. de Fr. no. 507, L). Ardennes: sur rocher humide, Monthermé, *J. Mabille*, 1952 (FC). Ariège: *H. Filhol* (as "Gloeosapsa rufescens" in Roumeguère, Alg. de Fr. no. 517, L). Bouches du Rhone: Marseille, falaises d'Arene, *Thuret*, Nov. 1854 (PC). Calvados: Palaise, *A. de Brébisson* (D, FC, FH, L, NY, S, UC, ZT), 557 (L, UC), 815 (L), 979 (L), sur les rochers humides (Type of *Proiococcus magma* Bréb. in Desmaz., Pl. Crypt. de Fr. no. 213, L; isotype, FC); Falaise, de Brébisson (as *Gloeocapsa livida* in Desmaz., Pl. Crypt. de Fr. no. 1957, K, NY; in Rabenh. Alg. no. 2029, FC, K, L, UC); rochers granitiques et humides, Brébisson 172 (Type of *G. rufestris* Kütz., L); Falaise, *A. de Brébisson* (Type of *G. rufestris* Kütz. ex Wille, L; isotype, S); à St. Aubert, de Brébisson (as *G. rufestris* in Rabenh. Alg. no. 2030, FC, FH, L, NY); sur les rochers inondés, Falaise, de Brébisson (as *G. pellucida* in Roumeguère, Alg. de Fr. no. 410, L); Bayeux, de Brébisson 483, Sept. 1861 (L, UC); Vire, herb. Lenormand (Type of *G. compacta* Kütz., L [Fig. 49]; isotype, UC); sur un mur humide, Vire, *P. Frémy* 663, Jun. 1923 (NY). Cher: carrières calcaires, Bourges, *C. Ripart* 631, Jun. 1877 (S). Gironde: sur les pierres d'un fontaine à Cerons, *Duriou de Maisonneuve* (as *G. rufestris* in Roumeguère, Alg. de Fr. no. 956, L). Haute Garonne: sur les rochers de Luchon, *C. Fourcade*, 1886 (as *G. ambigua* f. *pellucida* in Roumeguère, Alg. de Fr. no. 825, L, TA). Hautes Pyrénées: sur rocher suintant, Cirque de Gavarnie, *J. Mabille*, Sept. 1951 (FC); rochers inondés au dessus de Cauteerets, *Lamy de la Chapelle* (as *G. ianibina* in Roumeguère, Alg. de Fr. 826, L, TA). Hérault: jardin botanique de Montpellier, *G. Lagerheim*, 1893 (S). Landes: Dax, muraille au nord du bassin émergé, *A. de Plors*, 16 Nov. 1886 (PC). Loire Inférieure: in fissuris rupium prope mare, Le Croisic, *E. Bornet*, 11 May 1877 (PC). Manche: Lepad, *A. de Brébisson* (FC, NY); rochers du Boule, *G. Thuret*, 5 Jan. 1853 (FH, S), *E. Bornet*, Jul. 1874 (FH, N); Cherbourg, *Thuret*, 5 Jan. 1853 (FC); mur de l'église de St. Pierre de Scmilly, *P. Frémy* 688, Oct. 1923 (NY); St. Lo, murs, Frémy 320, Feb. 1931 (NY), Mar. 1924 (NY); La Meauffe, sur rochers calcaires, Frémy, Mar. 1933 (NY); carrières de La Meauffe, Frémy, Mar. 1925 (NY). Orne: Domfront, *A. de Brébisson* (Type of *Proiococcus baematodes* Kütz., L [Fig. 88]; isotypes, S, and as *Gloeocapsa baematodes* in Rabenh. Alg. no. 2192, L, S). Seine: écorce de *Populus tremula*, Paris, Brébisson 452 (Type of *G. violacea* Kütz., L [Fig. 42]; isotypes, S, UC, and as *G. lignicola* in Rabenh. Alg. no. 2031, FC, L, NY, S, UC). Seine et Marne: in aquario ad Reuilly, *G. Thuret*, Jan. 1849 (FH, L, NY; as *Applanocapsa parietina* in Witt., Nordst., & Lagerh., Alg. Exs. no. 1547, L, NY); Ferrières, sur *Populus alba*, Versailles, *E. Bornet*, 6 Apr. 1850 (Type of *Gloeocapsa Itzigsohnii* Born., FH); La Ferré-Alais, *Thuret*, Jun. 1852 (NY). Seine Inférieure: mur humide, Le Havre, Dupray, Jan. 1887 (as *G. aeruginosa* in Roumeguère, Alg. de Fr. no. 824, K, L). Vosges: étang des Moines, Remiremont, *E. Demangeon* (as *G. magma* in Roumeguère, Alg. de Fr. no. 114, L); Jardin Grenille à Remiremont, Demangeon, Jan. 1852 (as *Ceroococcus fusco-ater* in Roumeguère, Alg. de Fr. no. 264, L); Vosges, ex herb. Lenormand (DT, FH, L, NY); in locis campestribus etc. (as *Colletia scotinum* in Moug. &

Nestl., Stirp. Crypt. Vogeso-Rhen. no. 637, FC); ad saxa granitosa quartzosaque Vogesorum (as *Gloeoapsa magma* in Moug. & Nestl., Stirp. Crypt. Vogeso-Rhen. no. 1291, TA). Yonne: rochers de Pondigny, Brébisson, Jan. 1852 (PC).

FRENCH SUDAN: Bamako, *M. Serpette* SU6, Aug. 1953 (D). UGANDA: in Lake Albert Nyanza, R. T. Leiper, July 1907 (Type of *Microcystis densa* G. S. West in slide collection, BIRM). TANGANYIKA: Amani, an Kalkwänden eines alten Gewächshauses bei den Saatbeeten, B. Schröder 19b, Aug. 1910 (S). RUANDA URUNDI: Usumbura, bei Kwambugu an Baumrinden in den Hochwäldern, *Holtz* 1436, Sept. 1892 (Type of *Gloeoapsa Holtzi* Hieron. in slide collection of N. Wille, O). MOZAMBIQUE: Matramwe lake, E. L. Stephens 36, 14 June 1928 (D). ANGOLA: Golungo Alto, ad saxa juxta cataractam riv. Congo prope Sange, F. Welwitsch 134, Sept. 1856 (FC, UC). ALGERIA: Amoureh, F. Debray, May 1891 (NY); a Calabona, stillicidii d'acqua calciferi (as *G. atrata* with *Schizosiphon crustiformis* in Marcucci, Un. Itin. Crypt. no. XXIII, FC). CANARY ISLANDS: Funchal, C. Lindman, 7 Jan. 1885 (D, S). AZORES: ad pumices pr. Furnas ins. San Miguel, K. Bohlin, Jul. 1898 (as *Gloeoapsa magma* in Witttr., Nordst., & Lagerh., Alg. Exs. no. 1612, L). BERMUDA: causeway between St. David's island and Hamilton island, A. J. Bernatowicz 51-826, 31 Jan. 1951 (FC); on flat rock near Hungry bay, F. S. Collins, 23 Apr. 1912 (as *G. lusco-lusae* in Coll., Hold., & Setch., Phyc. Bot.-Amer. no. 2153, D, FC, L); on inland cliff near Hillcrest, Collins, 15 Aug. 1913 (as *G. atrata* in Coll., Hold., & Setch., Phyc. Bot.-Amer. no. 2152, D, FC, L). GREENLAND: Maligiak, T. M. Pries, Jul. 1871 (S); Danmarks ø, N. Hartz, Mar. 1892 (FH).

NOVA SCOTIA: on littoral rocks, St. Margaret's Bay, Halifax county, T. A. & A. Stephenson NSM9b, Jul.—Sept. 1948 (FC). NEW BRUNSWICK: on ledges and rocks, Grand Falls, Victoria county, H. Haebe 10057, 10283, 10314, 10456, 10556, 10558, 10580, 10586, 10646, 10652, 10687, 10696, 10704, 10741, 10746, 13341, 13434, 13452, Jul. 1947—Sept. 1948 (FC, HA); twig in lake 8 miles south of Grand Falls, Haebe 11631, 22 June 1951 (FC, HA); on concrete tub at a spring, mouth of Salmon river, Victoria county, Haebe 11673, 11674, 24 June 1951 (FC, HA); ledge-pool at falls, Pokioki, York county, Haebe 11581, 11582, 6 June 1950 (FC, HA); on ledge, Point Wolf, Albert county, Haebe 11683, 26 July 1951 (FC, HA); Island lake, 40—50 miles due south of Dalhousie (in Northumberland county?), M. Le Mesurier 4, Aug. 1953 (FC). MAINE: Canton Point, Oxford county, Parlin, May 1935 (NY); Round Pond, Lincoln county, F. S. Collins 4118, July 1901 (NY); on rocks above high water-mark, Cape Rosier, Collins, July 1900 (FH; as *Entophyalis magnoliae* in Coll., Hold., & Setch., Phyc. Bot.-Amer. no. 1802, FC, L, MIN, TA, UC); in a pond, Hollis, York county, R. M. Whelden, 31 Aug. 1929 (D); sink hole, Hollis, F. C. Seymour, 11 Sept. 1938 (FC); edge of Basin pond, Mt. Katahdin, B. M. Davis 7, 1902 (FC, MICH). NEW HAMPSHIRE: Jackson, S. Higginson, 1888 (FC); at the Flume, W. G. Farlow, Sept. 1882 (PH), 1901 (MICH); top of Page bill, Chocorua, Farlow, Sept. 1909 (PH); Acworth, Sullivan county, B. M. Davis, 1903 (MICH). VERMONT: Rippon gorge, Addison county, W. G. Farlow, Sept. 1896 (FC, S).

MASSACHUSETTS: Magnolia, W. G. Farlow, Aug. 1877 (Type of *Entophyalis magnoliae* Farl., FH; isotype, PC); path, Fells station, Melrose, F. S. Collins 2503, Apr. 1893 (NY); on perpendicular wet rock, Middlesex Fells, Collins, 9 June 1895 (as *Gloeoapsa magma* in Coll., Hold., & Setch., Phyc. Bot.-Amer. no. 151, FC, L, MICH, TA), Collins 2565, May 1893 (NY); Siasconset, Nanucket, Collins 3394, 23 Aug. 1896 (PH, NY); Nobska pond, Woods Hole, W. Trelease, 1881 (MO); Saugus, Collins 1279, Apr. 1890 (NY); Marblehead, Collins 1296, Apr. 1889 (NY); Chelmsford, Russell (FC); on walls of greenhouse, Botanic Garden, Cambridge, Collins 3582, 12 Jan. 1899 (FC, UC; as *Chroococcus varius* in Coll., Hold., & Setch., Phyc. Bot.-Amer. no. 1202, FC, D, L, TA); Juniper point, Salem, Collins, 11 Aug. 1889 (FC, UC); South Quincy, F. C. Seymour, 3 Jul. 1943 (FC); on dripping masonry under railroad bridge, Melrose, Collins, 9 Aug. 1902 (as *Gloeoapsa imbricata* in Coll., Hold., & Setch., Phyc. Bot.-Amer. no. 1205, FC, L, TA). RHODE ISLAND: limerock quarry, Lincoln, Collins 5437, 19 Apr. 1906 (FC, UC). CONNECTICUT: abutment, Factory pond dam, Bridgeport, I. Holden 642, 19 Jul. 1892 (UC), Holden 776, 15 Dec. 1892 (UC); Sage's ravine, Bridgeport, Holden 1052, 14 Oct. 1894 (FC, UC), Salisbury, Holden 699, 22 Aug. 1892 (FC, UC); moist limestone, Gaylordsville, Holden, 30 Oct. 1898 (as *G. violacea* in Coll., Hold., & Setch., Phyc. Bot.-Amer. no. 551, FC, L, TA); on rocks, Round pond, Lantern Hill, North Stonington, W. A. Setchell 560, 13 Sept. 1892 (FC, UC); Sperry's falls, Sargeant's river, Woodbridge, Setchell 911, 21 Oct. 1894 (FC, UC), Setchell, 7 Nov. 1891 (FC, UC).

ARCTIC ARCHIPELAGO: Cornwallis island, J. Mitchen 1, 1949 (FC); in rock pools, Koojese inlet near Sylvia Grinnell river, upper Prohiber bay, Baifin island, H. A. Senn 3641a, 29 June 1948 (FC). LABRADOR: sur un rocher de la toundra, sur le ruisseau Nakvak, Monts Torngar, J. Roussseau 1096, 1—2 Aug. 1951 (FC). QUEBEC: fond d'un ruisseau, embouchure de la Korok, Baie d'Ungava, Roussseau 483, 22 Jul. 1951 (FC); fond de l'étang, au pied de Saglé, fourche de la Korok, Roussseau 996, 31 Jul. 1951 (FC); petite source tourbeuse, plateau au voisinage du Mt. Pyramid (57° 30' lat. N), Roussseau 823, 5 Aug. 1947 (FC); fond d'un lac, et sur rocher humide, embouchure de la Kogaluk, baie d'Hudson, Roussseau 209—211, 16 Jul. 1948 (FC); dans une tjaele et blocs de quartz, Baie Kayak (dans l'estuaire de la baie Payne),

Rousseau 1513, 1514, 19 Aug. 1948 (FC); sur un "ventre de boeuf" argilleux, portage entre le lac Tashwak et le lac Payne (entre la baie d'Hudson et la baie d'Ungava), *Rousseau* 785, 1 Aug. 1948 (FC); roche moutonnée, rivière Payne vers 70° 25' long. O., *Rousseau* 1134, 11 Aug. 1948 (FC); on rock in a small lake, cable-top of Mt. Albert, Gaspé, H. Hubeeb 1792, 28 Jun. 1951 (FC, HA); on wet rocks inside a cave, Ilet au Massacre, Le Bic, *Rousseau* 27015, 24 Aug. 1927 (FC); sur les rochers, carrière d'Outremont, Mont Royal près Montréal, C. Lanouette 100, 110, 123, Sept., Nov., 1940 (FC); carrière abandonnée, St. Vincent de Paul, Lanouette & R. Barabé 119, 3 Oct. 1940 (FC); Aqueduc lake, Rolland, Moutcaim county, P. Giraudon J179.2, 15 Jul. 1949 (FC); dans une petite caverne à l'embouchure du rivière Saguenay, T. L. Doré, Aug. 1949 (FC).

NEW YORK: Au Sable Chasm, Clinton county, C. J. Sprague, Aug. 1880 (FH); Niagara, P. Wollé, Oct. 1876 (FH); Kullum pond north of Warrensburg, Warren county, J. Bador 174, 4 Aug. 1938 (FC); walls of gorge below fall, Rensselaerville, M. S. Markle 16, 28 Jul. 1946 (FC); greenhouse, Barnard College, New York city, H. C. Bold B20, B21, B24, Feb. 1941 (FC). NEW JERSEY: Gardner's pond near Andover, Sussex county, E. T. Moul 7512, 16 Oct. 1952 (FC); on rocks in spray from a spring, Towaco, Morris county, F. Drouet & J. Kells 2067, 17 Jun. 1937 (D). PENNSYLVANIA: dripping rocks, Lehigh valley, F. Wollé (D, PENN, S); Glen Onoko, Carbon county, Wollé, Oct. 1875 (D, PENN); Bethlehem, an nassen Felswände, Wollé (as *Gloeocephala trizobanii* in Rabenh. Alg. no. 3529, FC, L. TA, UC); culture, University of Pennsylvania, Philadelphia, W. A. Cassel 14, 15, 14 Dec. 1951 (FC); on a wet brick wall, North Warren, T. Flanagan 70, 19 Jul. 1943 (FC); wet face of a dam along Cresheim creek, Fairmount park, Philadelphia, Drouet & C. Hodge 3892, 20 Jul. 1941 (FC); upper falls, Buck Hill Falls, Monroe county, B. M. Davis, 18 Jul. 1915 (FC, MICH). DELAWARE: pond in the dunes one mile south of Point Henlopen, north of Rehoboth Beach, Drouet & H. B. Loudorback 8522, 8563, 8575, Aug. 1948 (FC). MARYLAND: limestone cliff, Swallow falls of Deep creek, Garrett county, L. P. McCann, M. W. Woods, D. S. Stoddard, & Drouet 2334, 29 Aug. 1938 (D); shallow water of the abandoned Chesapeake & Ohio canal, Cabin John, Montgomery county, Drouet, E. P. Killip, & D. Richards 5539, 6 Aug. 1944 (FC, US); pool in rocks, south shore of Plummers island in the Potomac river west of Cabin John, Drouet, Killip, & Richards 5555, 6 Aug. 1944 (FC, US). VIRGINIA: rock, Bald Knob, Mountain Lake, Giles county, R. P. Smart 123, 31 Jul. 1938 (FC, ST); on concrete dam of Parrier's pond near Pembroke, Giles county, J. C. Strickland 515, 15 Aug. 1939 (FC, ST); wet cliff, summit of White Top mountain, Grayson county, Strickland 1072, 26 Aug. 1941 (FC, ST); limestone west of Dot, Lee county, Strickland & E. S. Luitrell 1361, 7 Aug. 1942 (FC, ST); dripping rock about 2 miles north of Pennington Gap, Lee county, Strickland & Luitrell 1347, 7 Aug. 1942 (FC, ST); on limestone about 5 miles north of Tazewell, Strickland & Luitrell 1272, 5 Aug. 1942 (FC, ST). NORTH CAROLINA: on rocks etc., Highlands, Macon county, H. C. Bold 3a, H91c, H228, H231, H246, Jul. 1938, Jun. 1939 (FC); on rocks, Cullasaja Gorge, Macon county, Bold H159, 17 June 1939 (FC); stonework, Fort Macon, Beaufort, C. S. Nielsen & W. L. Culbertson 1745, 1746, 1751, 1754, 1755, 1757, 1758, 1770, 1772, 25 Aug. 1949 (FC, T); Dry falls on U.S. route 64, Pisgah national forest, Nielsen & Culbertson 1909 (FC, T); rocky cliff on state route 209 south of Hot Springs, Nielsen & Culbertson 1820, 1 Sept. 1949 (FC, T). SOUTH CAROLINA: on wet cliffs, Eastcoast river, Pickens county, Bold H262, Jul. 1939 (FC); on damp clay and on *Gleditsia triacanthos*, Aiken, H. W. Ravenel 548, 554, Dec. 1884 (FC). GEORGIA: on abrk of *Maclura aurantiaca*, Savannah, Ravenel 1 (FH); on rocks, Tallulah Gorge, Rabun county, Bold 295a, 5 July 1939 (FC).

FLORIDA: on *Taxodium distichum* and other trees and on logs, Gainesville, Alachua county, Ravenel 9 (FH), 15, (FH), 18 (FH, UC), 34 (UC); Gainesville, M. A. Brannon 100, 325, Aug. 1942, May 1948 (FC, FC); on soil in greenhouse, U. S. Forestry Station, Olustee, Baker county, Brannon 226, 1 May 1944 (FC, PC); stones in pine woods about five miles northwest of Beacon Hill, Bay county, F. Drouet & C. S. Nielsen 11630, 31 Jan. 1949 (FC, T); on sand above high tide-mark, St. Andrews bay at west end of Hathaway bridge, west of Paoama City, Drouet & Nielsen 10930, 15 Jan. 1949 (FC, T); on an Australian pine tree south of South lake, Hollywood, Broward county, Drouet 10287, 29 Dec. 1948 (FC); Marco island, Collier county, P. C. Standley 92836, 14 Mar. 1946 (FC); Little Marco, O. Tollin, May 1886 (S); Flag pond about 2 miles east of Little Marco, Tollin, May 1886 (S); on cement wall 5 miles west of Goulds, Dade county, C. Jackson 1, 15 Jul. 1952 (FC, T); limestone, Aspalaga area, Gadsden county, M. H. Voth 6, 9, 3 Nov. 1950 (FC, T), Nielsen, G. C. Madsen, & D. Crowson 783, 12 Feb. 1949 (FC, T); on trees beside U. S. highway 90 four miles east of Quincy, Drouet, Nielsen, Madsen, & Crowson 10427, 4 Jan. 1949 (FC, T); Highlands county, P. C. Standley 92700, 15 Mar. 1946 (FC); wayside park one mile west of Cottontale, Jackson county, Nielsen & Madsen 851, 19 Feb. 1949 (FC, T); on limestone etc., Florida Caverns state park north of Marianna, Nielsen, Madsen, & Crowson 320, 31 Aug. 1948 (FC, T), Drouet, Nielsen, Madsen, & Crowson 10343, 10350, 10379, 10380, 10391, Jan. 1949 (FC, T); 2 miles south of Marianna, Nielsen, Madsen, & Crowson 336, Aug. 1948 (FC, T); Leesburg, Lake county, Brannon 330, 31 May 1948 (FC, PC); on trees, Hendry Creek, about 10 miles south of Fort Myers, Lee county, Standley 73196, 73239, Mar. 1940 (FC); Natural Well, Leon county, Nielsen 121, June 1948 (FC, T); Nymphaea lake on Meridian road 14 miles north of Tallahassee, Nielsen, Madsen, & Crowson 353, 31 Aug. 1948 (FC, T); on trees on the northwest

shore of Lake Iamonia, Leon county, *Drouot, H. Kurtz, & Nielsen* 11308, 24 Jan. 1949 (FC, T); edge of river, Rock Bluff, Liberty county, *J. E. Harmon* 4, 4 Oct. 1950 (FC, T); plaster on stairway, Fort Jefferson, Garden key, Dry Tortugas, *W. R. Taylor* 318, Jul. 1924 (TA); on trees and cement walks, Palm Beach, *Drouot & H. B. Louderback* 10214, 10216, 24 Dec. 1948 (FC); on a sand dollar in the dunes, Pensacola Beach, *Drouot, Nielsen, Madsen, Crowson, & A. Pates* 10611, 8 Jan. 1949 (FC, T); on a tree beside St. Marks river, Newport, Wakulla county, *Drouot, Madsen, & Crowson* 10824, 13 Jan. 1949 (FC, T); Log Sulfur spring, Newport, *Nielsen* 249, 252, Aug. 1948 (FC, T); spillway dam at Phillips Pool, St. Marks Wildlife Refuge, Wakulla county, *Nielsen, Madsen, & Crowson* 484, 9 Oct. 1948 (FC, T); on a tree, Wakulla Springs, *Drouot, Madsen, & Crowson* 11499, 27 Jan. 1949 (FC, T); Chipley, Washington county, *Nielsen & Madsen* 866, 19 Feb. 1949 (FC, T).

OHIO: Adams county, *W. A. Daily* 294, 25 May 1940 (DA, FC); road beyond White's Mill, the Plains near Athens, *A. H. Blickle & M. Wright*, 10 Jul. 1941 (DA, FC); cement wall, greenhouse, Ohio State University, Columbus, *Daily & F. K. Daily* 260, 29 Dec. 1939 (DA, FC); wet stone wall under bridge near Advoyston, Hamilton county, *L. Lillick & I. Lee* 705, 23 Sept. 1933 (DA, FC); stone wall, Eden Park reservoir, Cincinnati, *Daily* 408, 410, 3 Jul. 1940 (DA, FC); flower pot dish, Peterson's greenhouse, Cincinnati, *Daily* 438, 9 Jul. 1940 (DA, FC); pond in Arlington cemetery, Cincinnati, *Daily* 420, 5 Jul. 1940 (DA, FC); near Seven Caves, Highland county, *W. B. Cooke*, Aug. 1932 (DA, FC); rocks and cliffs, Seven Caves park, Paint, Highland county, *Daily & F. K. Daily* 313, 320, 321, 16 Jun. 1940 (DA, FC); on sandstone, Old Mans Cave state park, Hocking county, *Daily & F. K. Daily* 503, 504, 506—508, 517, 518, 520, 525, 526, 528, 529, 532, 540, 541, 545—547, 549, 555—557, 561, 27 Jul. 1940 (DA, FC); sandstone, Cantwell Cliff state park, *Daily & F. K. Daily* 683, 684, 687, 692, 699, 703, 31 Aug. 1940 (DA, FC), 708—710, 714, 1 Sept. 1940 (DA, FC); cliff at Ash Cave, Hocking county, *J. Wolfe*, 11 Oct. 1935 (DA, FC); on sandstone cliff, Rock Run, 3 miles northwest of Jackson, *Wolfe*, Nov. 1935 (DA, FC); *Cooke*, 1 May 1937 (DA, FC); cliff, White's Gulch, Jackson county, 2 May 1936, ex coll. Max Britton no. 33 (DA, FC); Kelly Isle quarry near Marblehead, Camwba island, Ottawa county, *Daily & F. K. Daily* 578, 584, 25 Jul. 1940 (DA, FC); limestone cliff, Gibraltar isle, Put-in-Bay, Ottawa county, *Daily & C. E. Tait* 665, 24 Jul. 1940 (DA, FC); stone in damp place in woodland near Apple Creek, Wayne county, *L. J. King* 2319, Aug. 1944 (EAR, FC).

KENTUCKY: on sandstone near Ohio river, Boone county, *Daily & J. A. Tucker* 352, 25 Jun. 1940 (DA, FC); Carter's caves, Carter county, *L. Walp*, Fall 1940 (FC), *D. Farker*, 16 May 1942 (FC, ST); on rock 4 miles east of Maysville, Mason county, *W. L. Culberson* 545, Aug. 1950 (FC); on sandstone rocks, Natural Bridge state park, Powell county, *Daily & F. K. Daily* 275, 14 Apr. 1940 (DA, FC), 365, 368, 369, 373, 374, 379—381, 386, 386a, 388—391, 394, 397—400, 30 Jun. 1940 (DA, FC), *H. K. Phinney* 533, 537, 541, Apr., May, 1939 (FC, PHI), *J. H. Hoskins*, 1938 (DA, FC), *B. B. McIntear* 1026, 1 Sept. 1939 (DA, FC), *MacFarland* 1088, 10 Jul. 1940 (DA, FC); sandstone, railroad tunnel, Sky Bridge road near Nada, Fowell county, *Daily & R. Kosanke* 841, 842, 6 Oct. 1940 (DA, FC); on wet moss, Cumberland Falls, Whitley county, *L. Lillick*, 5 May 1933 (DA, FC); sandstone overhang, Torrent, Wolfe county, *Daily, P. K. Daily, & Kosanke* 460, 467, 472, 474, 479, 481, 483, 490, 14 July 1940 (DA, FC); sandstone, Tight Holler, Fine Ridge, Wolfe county, *Daily, A. T. Cross & J. Tucker* 763, 764, 768, 769a—772, 774—776, 778, 779, 783, 784, 787, 788, 790, 798—801, 804—806, 808, 811, 812, 814—820, 822, 6 Sept. 1940 (DA, FC), *Daily* 839, 840, 840b, 844, 5 Oct. 1940 (DA, FC); *Daily & F. K. Daily* 848, 851—853, 25 May 1941 (DA, FC).

TENNESSEE: water tank, Scout Camp, Anderson county, *H. Silva* 2339, 25 Aug. 1950 (FC, TENN); rocks in spring, Valley Lake, Davidson county, *Silva* 1809, 20 Aug. 1949 (FC, TENN); Glen Echo Lake, Davidson county, *H. C. Bold* 3931, 19 Feb. 1939 (FC); concrete dam, Neuberts Springs, Knox county, *Silva* 1526, 1532, 20 Jul. 1949 (FC, TENN); fish pond at greenhouse, University of Tennessee, Knoxville, *Silva* 586, 5 Apr. 1947 (FC, TENN); limestone roof of Fosters Cave, Montgomery county, *Silva* 1402, 15 Jul. 1949 (FC, TENN); cliff near Rugby, Morgan county, *Silva* 1665, 6 Aug. 1949 (FC, TENN); rock in spray of fall, Centennial lake, Nashville, *Bold* 161, 14 Oct. 1938 (FC); Sprout's Spring, Obion county, *Silva* 1294, 12 Jul. 1949 (FC, TENN); wet rock, tunnel near Chimneys, Sevier county, *Silva* 454, 11 Jan. 1947 (FC, TENN); Little River trail, Sevier county, *Silva* 66, 18 Aug. 1941 (FC, TENN); Myrtle Point, Sevier county, *A. J. Sharp* 413, 4 Sept. 1941 (FC, TENN); rock wall, Greenbrier Cove, Sevier county, *H. H. Ilius* 2009, 1 Oct. 1947 (FC, TENN); rocks and cliffs, Ramsey Cascades, Sevier county, *Bold* H332a, H349, H356, H359, 18 Jul. 1939 (FC), *Silva* 413, 2350a, 29 Dec. 1946, 9 Sept. 1950 (FC, TENN); concrete bridge, highway no. 70, Shelby county, *Silva* 1086, 30 June 1949 (FC, TENN); seepage on concrete basin, Union county, *Silva* 309, 1 Nov. 1946 (FC, TENN). ALABAMA: Fort Morgan, Baldwin county, *R. L. Caylor* 51-7, Aug. 1953 (FC); on retaining wall beside Water street between Eslava and New Jersey streets, Mobile, *Drouot & H. B. Louderback* 10108, 19 Dec. 1948 (FC). MICHIGAN: on damp rocks, Wishing spring, West Shore drive, Mackinac island, *H. K. Phinney* 472, 25 Jul. 1943 (FC, PHI); in artesian spring, east shore of Burr lake, Cheboygan county, *Phinney* 501, 29 June 1943 (FC, PHI).

INDIANA: on limestone, Scenic Falls, near Hartsville, Bartholomew county, *P. K. & W. A. Daily*

1042, 1044, 11 Oct. 1942 (DA, FC); cement wall of Lake Shaffer dam, Monticello, Carroll county, *Daily* 868, 29 July 1941 (DA, FC); on limestone, Clifty Falls state park near Madison, Jefferson county, *Daily* & F. K. *Daily* 671, 672, 682, 4 Aug. 1940 (DA, FC); on limestone, Tunnel Mills, Vernon, Jennings county, F. K. & W. A. *Daily* 908, 909, 1113, 1753, 1754, 23 May 1942, 1 June 1947 (DA, FC); limestone, Muscatuck state park, Vernon, Jennings county, F. K. & W. A. *Daily* 912, 1104, 1105, 23 May 1942 (DA, FC); limestone in quarry, North Vernon, Jennings county, F. K. & W. A. *Daily* 1109, 23 May 1942 (DA, FC); limestone along Sand creek 6 miles west of Zania, Jennings county, C. M. Palmer, F. K. & W. A. *Daily* 982, 24 May 1942 (DA, FC); in a sink hole pool, Lawrence county, Palmer 1331d, 2 Sept. 1932 (D); on sandstone along trail no. 1, Shades state park, Waveland, Montgomery county, F. K. & W. A. *Daily* 966, 968, 970, 974, 976, 6 Jun. 1942 (DA, FC); on shale and sandstone, Pine Hills, Montgomery county, F. K. & W. A. *Daily* 1443, 1444, 11 May 1946 (DA, FC); on limestone, cement, etc., McCormicks Creek state park, Owen county, F. K. & W. A. *Daily* 1787, 1794, 1800—1806, 1809—1811, 1819, 1821, 1829, 9—10 Aug. 1947 (DA, FC); on sandstone, Turkey Run state park, Parke county, F. K. & W. A. *Daily* 1400, 1413, 1417, 1419, 1420, 1426, 1440, 10—11 May 1946 (DA, FC), 1841, 1848, 15 Aug. 1947 (DA, FC), Drouet & D. Richards 2475, 2478, 2481, 2487, 2498, 15—16 Jun. 1939 (FC); sandstone cliff, Blue Wells Hollow 5 miles east of Cannellton, Perry county, W. Welch 8198, 11 Jul. 1937 (DA, FC); on limestone wall, quarry at St. Paul, Shelby county, F. K. & W. A. *Daily* 886, 31 Aug. 1941 (DA, FC); wall under N. W. Fifth street bridge, Richmond, L. J. King 2334, Aug. 1944 (EAR, FC); railroad runnels, Richmond, King 61, 64, 76, 77, and *r. n.*, Aug. 1940, Oct. 1941 (EAR, FC); sediment in edge of Lake Wehi, Wayne county, M. S. Markle & King 737, 7 Sept. 1942 (EAR, FC); in a spring near Thistlethwaites falls north of Richmond, King, 21 Mar. 1941 (EAR, FC).

WISCONSIN: laboratory cultures A and C, University of Wisconsin, Madison, R. Evans, 9 Dec. 1949, 6 June 1952 (FC); in a pool in limestone one mile east of Prairie du Chien, Crawford county, Drouet 5079 (FC). ILLINOIS: laboratory cultures, University of Chicago, Chicago, F. D. Voth, 16 Jan., 20 & 29 Mar., 31 Jul., 1 Aug., 15 Sept. 1941 (FC); on cement walks in greenhouse, University of Chicago, Voth, J. M. Beal, & Drouet 2371, 5 Oct. 1938 (FC); ranks in greenhouse, J. A. Stoyermark, C. Shoop, & Drouet 2444, 30 Oct. 1938 (FC); on stone, Lake Shore park, Evanston, H. K. Pbinney 387, 18 Sept. 1943 (FC, PHI); Starved Rock state park, La Salle county, L. J. King 383, 5 May 1941 (EAR, FC), Stoyermark & P. C. Standley 40646, 4 Jul. 1941 (FC); plankton of Goose lake northwest of Quincy, T. C. Dorris 36, 18 Jul. 1950 (FC); Lake Glendale, Robbville recreational area in Shawnee national forest, Pope county, Pbinney 1062, 1 Sept. 1944 (FC, PHI). MISSISSIPPI: on the trunk of a tree at west limits of Biloxi, Harrison county, Drouet 995, 14 Dec. 1948 (FC). MINNESOTA: Gunflint, Cook county, B. Pink, July 1897 (UC); rocks of old dock, north arm of Lake Itasca, Clearwater county, H. F. Buell 462, 9 Jul. 1946 (FC); in sluggish stream, Minneapolis, J. E. Tilden, 10 Aug. 1894 (as *Palmella usaeiformis* in Tild., Amer. Alg. no. 49, FC); on limestone in a quarry by the greenhouses, University of Minnesota, Minneapolis, Drouet, E. C. Abbe, & J. W. Moore 4995, 5 Aug. 1943 (FC). IOWA: on shaded limestone, Fayette, B. Pink 7, 17 May 1906 (FC, UC); rocks in fish pond, Guttenberg, Clayton county, W. Kiener 21533, 15 Sept. 1946 (FC, KI). MISSOURI: in a salt spring, Chouteau Springs, Cooper county, Drouet & H. B. Louderback 5641b, 25 Aug. 1945 (FC); rocks in quarry, Hill park, Independence, Drouet 321, 25 Dec. 1928 (D); on limestone ledge by Mill creek north of Bigsprings, Montgomery county, Drouet 726, 9 Nov. 1930 (D, FH); top of bluff along Muddy creek 3 miles east of Newland, Pettis county, C. Shoop 339, 4 Oct. 1938 (FC); in stream from Elk Lick springs 7 miles southwest of Nelson, Saline county, Shoop 400, 6 Oct. 1938 (FC); on walls at entrance to Jam-up Bluff 6 miles northwest of Montier, Shannon county, J. A. Stoyermark 28843, 8 June 1941 (FC); ledges along White river 11½ miles southeast of Mincy, Taney county, Stoyermark 40107b, 20 June 1941 (FC); moist shaded cliff, Blackwell, Washington county, C. Russell 19, May 1900 (FC, UC).

ARKANSAS: still pool, Warren, Bradley county, D. Demaree 24813, 23 Oct. 1943 (FC); in a shaded bayou, Wilmar, Drew county, Demaree 24755, 9 Oct. 1943 (FC); on rock, Hot Springs mountain, Garland county, N. E. Gray 131, 18 Aug. 1939 (FC). LOUISIANA: on trunk of tree near Loranges, Tangipahoa parish, L. H. Flint, 21 Mar. 1953 (FC); on an epiphytic orchid, Varnado, Washington parish, Flint, 24 Jan. 1953 (FC); on trees east of Lacombe, St. Tammany parish, Drouet & Flint 9557, 2 Dec. 1948 (FC); on a tree beside Bayou du Large just north of Theriot, Drouet 9308a, 22 Nov. 1948 (FC); on the bank of the Intracoastal canal, Weeks Island, Iberia parish, R. P. Ehrhardt & Drouet 68, 15 Nov. 1948 (FC); on fence-post, Grand Isle, Jefferson parish, Drouet & P. Viosca Jr. 9523, 27 Nov. 1948 (FC). MANITOBA: Fort Churchill, J. M. Gillies 2005, 2092, 18 June, 15 July 1948 (FC). SOUTH DAKOTA: on quartz about 20 miles southeast of Rapid City, Custer county, F. A. Hayes & B. H. Williams 12208, 8 May 1941 (FC, KI); in a watering tank 2½ miles south of Freeman, Hutchinson county, P. D. Voth, 2 Jul. 1945 (FC). NEBRASKA: culture from sandpit north of David City, Butler county, W. Kiener 22391b, 10 Nov. 1947 (FC, KI); shallow fishpond, Valentine, Cherry county, Kiener 23799, 18 Jun. 1948 (FC, KI); rocks, Chadron state park, Dawes county, Kiener 11534a, 20273, 26 Aug. 1941, 15 May 1946 (FC, KI); fishponds, Rock Creek Hatchery, Dundy county, Kiener 19557, 19558, 3 Aug. 1945 (FC, KI);

culture from seepage, Blue creek north of Oshkosh, Garden county, *Kiener* 16219, 21719a, 4 Nov. 1945, 28 Oct. 1947 (FC, KI); culture from a spring, Lonergan creek, Lemoyne, Keith county, *Kiener* 23068, 20 Aug. 1948 (FC, KI); on flower pot, University greenhouse, Lincoln, *Kiener* 10122, 13671—13674, 23 May 1941, 13 Mar. 1943 (FC, KI); culture from tank of farm well, Gretna, Sargy county, *Kiener* 12624a, 16 Jul. 1944 (FC, KI); pebble 2 miles southwest of Orella, Sioux county, *Kiener* 22192, 24 May 1947 (FC, KI); culture from Dismal river near Halsey, Thomas county, *Kiener* 16750c, 7 Oct. 1945 (FC, KI).

OKLAHOMA: under wet bluff, Turner Falls, Murray county, *A. J. Sharp* OA-413, 21 Dec. 1940 (LA, TENN). TEXAS: trail to Boor Springs, Brewster county, Chisos mountains, *E. Whitehouse* 24634, 23 Dec. 1950 (FC); on *Prosopis juliflora* DC. in woodland northeast of Resaca park, Brownsville, *R. Runyon* 3722, 30 May 1944 (FC). WYOMING: bottom of Trail's Divide and Brooklyn lakes, Medicine Bow national forest, *W. G. Solheim* 61, 114, 30 June, 17 July 1933 (FC). COLORADO: in a pond at 12,000 feet, Bald Mt., a few miles south of Fikes Peak, *H. L. Shantz*, 17 Sept. 1904 (Type of *Eucapsia alpina* Clem. & Shantz, US; isotype, D); on siliceous cliff, Chasm gorge, Longs Peak, *W. Kiener* 1277, 18 Sept. 1934 (FC, KI); Middle St. Vrain valley, Boulder county, *Kiener* 6245, 11 Oct. 1937 (FC, KI); South Colony creek, Custer county, *Kiener* 10392, 10394, 9 Jul. 1941 (FC, KI); granite rock, Lily mountain, Larimer county, *Kiener* 13171, 26 Sept. 1942 (FC, KI). NEW MEXICO: Carlsbad Caverns, Eddy county, *Bailey*, Apr. 1924 (NY), *W. B. Lang*, 1944 (FC); in a hot spring, Montezuma (Hot Springs), San Miguel county, *Drouot & D. Richards* 2534, 12 Oct. 1939 (FC); on wet ground near the city park, Hot Springs, Sierra county, *Drouot & Richards* 2713, 26 Oct. 1939 (FC); Little Tesuque, vicinity of Santa Fe, *Bro. G. Ariene* 23304, 6 Apr. 1937 (D). ALBERTA: Middle hot springs, Banff, *W. A. Satchell*, 6 Aug. 1923 (FC, UC). UTAH: Zion canyon, Washington county, *N. E. Gray*, 13 Aug. 1941 (FC); in Quartzite falls, Mt. Timpanogos, Utah county, *A. O. Garrett* 56, 13 Aug. 1925 (FC, UC). ARIZONA: on rocks beside dam of pond in the Coyote mountains, 35 miles southwest of Tucson, Pima county, *Drouot, Richards, & R. & B. Darrow* 2757, 29 Oct. 1939 (FC); above falls in Emory canyon, Lake Mead, *E. U. Clover* 77a, 20 Apr. 1941 (FC, MICH). NEVADA: in water at 132° F., Wabuska, Lyon county, *I. La Rivers* 1800, 9 Jun. 1953 (FC); inside cold tank, Steamboat, Washoe county, *M. J. Groesbeck* 190, 375, 4 Sept. 1940, 3 Apr. 1941 (FC). YUKON: on *Hygrobynum palustre* in a spring, Dawson, *R. S. Williams*, 30 Jul. 1899 (FC). ALASKA: Juneau, *D. Saunders*, Jun. 1899 (UC); Prince William sound, *Saunders* (FH); Akutan island, *G. N. Jones* 9397, Aug. 1936 (TA); pool in swamp, Glacier valley, Unalaska island, *Satchell* 5023a, 7 Aug. 1899 (FC, UC); Mileposts 72, 83, 170 on Glenallen highway between Anchorage and Fairbanks, *D. E. Hilliard* 31, 45, 62, Sept. 1953 (FC). BRITISH COLUMBIA: Spillamacheen valley lakes near Bald mountain, Purcell range, Kootenay county, *W. R. Taylor*, Sept. 1925 (Type of *Aphanotheca uliginosa* W. R. Taylor, TA); dripping rocks, Fish lake south of Beavermouth, *Taylor* 14, 16, Sept. 1921 (TA); Cougar valley, Glacier, Kootenay county, *Taylor*, 1927 (TA). OREGON: in "hot springs" near Madras, Crook county, *L. E. Griffin*, 23 Apr. 1939 (FC).

CALIFORNIA: on a dripping water tank, Berkeley, *N. L. Gardner*, 20 Apr. 1894 (as *Synococystis aquatilis* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1206, FC, L, TA), 26 Feb. 1906 (as *Aphanotheca richteriana* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1801, FC, L, TA); Berkeley, *Gardner* 637, Mar. 1902 (UC); on floor in the greenhouse, Department of Botany, University of California, Berkeley, *Gardner* 6807, 6938, 10 Sept., 28 Nov. 1931 (FC, UC); on damp boards in the agricultural greenhouse, University of California, Berkeley, *Gardner* 7428, 7429, 24 July 1933 (FC, UC); in an aquarium in the courtyard of the Life Sciences building, University of California, Berkeley, *Gardner* 7883, 3 Nov. 1935 (FC, UC); culture (of algae collected by H. E. Parks) in the University of California, Berkeley, *Gardner* 7819 (FC, UC); on trunk of bay tree, Strawberry creek, Berkeley, *Gardner*, 8 Mar. 1903 (as *A. confertis* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1152, FC, L, TA); culture (from Eureka, Humboldt county, collected by H. E. Parks), *Gardner* 6569, 7203, 12 Jan. 1931, 22 Apr. 1933 (FC, UC); on rock in steam and spray, the Geysers, Inyo county, *M. J. Groesbeck* 140, 6 Sept. 1940 (FC); in cold stream, Keough hot springs, Inyo county, *Groesbeck* 230, 23 Nov. 1940 (FC); about vent, Hot Creek Geysers, Inyo county, *Groesbeck* 418a, 7 Jul. 1941 (FC); first spring south of Triangle spring, Death Valley, Inyo county, *J. & H. W. Grinnell* 7625, 24 Oct. 1933 (FC, UC); fountain, Miller's Patio cafe, Long Beach, *E. C. Jennings*, 28 Feb. 1937 (D); Old El Encino hot springs, Los Angeles county, *B. C. Tompkinson* 1a, Jul. 1944 (FC); Lagunitas creek, Marin county, *V. Duran* 6604, Jan. 1931 (FC, UC); culture (from Almonte, Marin county, collected by H. E. Parks), *Gardner* 6906, 16 Oct. 1931 (FC, UC); in a cavern above high tide line, Mendocino City, *M. A. Howe*, 7 May 1896 (UC); stone in overflow of hot artesian well on north shore of Mono lake, *Groesbeck* 129, 6 Sept. 1940 (FC); Hot Creek Geysers, Mono county, *Groesbeck* 202, 418, 25 Nov. 1940, 7 Jul. 1940 (FC); Bridgeport, Mono county, *Groesbeck* 256, 331, 24 Nov. 1940, 3 Apr. 1941 (FC); pure cultures (one from A. Frenkel, another from Tassajara hot springs, Monterey county) at Hopkins Marine Station, Pacific Grove, *M. B. Allen*, 29 Jan. 1952 (FC); wall of reservoir, Del Monte, Monterey county, *W. J. V. Osterhout*, 13 Sept. 1902 (as *Aphanotheca saxicola* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1203, FC, L); Calistoga, Napa county (*Gardner* no. 7832), *H. E. Parks*, 3256 (FC, UC); in an urn, Mountain View cemetery, Oakland, *Gardner* 8020, 19 Jan. 1927

(FC, UC); on quartz, Mountain Spring Camp northeast of Essex, San Bernardino county, *Drouot & J. F. Macbride* 4609, 12 Oct. 1941 (FC); hot water creek in a canyon, Arrowhead hot springs, San Bernardino county (Gardner no. 7835), *Parks* 3250, Dec. 1929 (FC, UC); Waterman hot springs, San Bernardino county, *Seibell* 1554, 19 Dec. 1896 (FC, UC); on the trunk of a palm tree, Needles, *Drouot & Macbride* 4598, 12 Oct. 1941 (FC, UC); Mountain lake, San Francisco, *Gardner* 743, Sept. 1902 (UC); Lake Merced, San Francisco, *Gardner* 1583, Nov. 1905 (UC); in the conservatory, Golden Gate park, San Francisco, *Gardner* 7259, 7264, 3 May 1933 (FC, UC); on sand in a pond, Golden Gate park, San Francisco, *Gardner* 1121, 15 Jul. 1903 (FC, UC); on stones in Feldt lake, Stanford farm, San Mateo county, *Gardner* 3437, 2 Aug. 1916 (FC, UC); on rocks at entrance to ice caves on south side of Mt. Shasta, Siskiyou county, *W. B. Cooke* 16673, 2 Jul. 1942 (FC); in warm water, the Geysers, Sonoma county, *Gardner* 7524, 8 Aug. 1933 (FC, UC); in shallow water of Tule river, Porterville, Tulare county, *Drouot & Groesbeck* 4451, 4 Oct. 1941 (FC); culture (from Exeter, Tulare county, collected by H. E. Parks), *Gardner* 7786, 28 July 1935 (FC, UC).

BAHAMA ISLANDS: New Providence, on bark, limestone, pipe of water tank, etc., *L. J. K. Brace* 197, 9624, 9684a, 9748, 9991, 10036(609), Oct.—Dec. 1918, Feb. 1919 (NY); on damp walls in a garden, Nassau, *Brace*, Dec. 1921 (NY); brackish marsh, rifle range, New Providence, *E. G. Britton* 3282, Feb. 1905 (NY); Moss Hill ponds, Long Cay, *Brace* 4235, Dec. 1905 (Type of *Chondrostictis Bracci* Howe, NY [Fig. 82]); freshwater lake off Stafford creek, Andros island, *A. D. Peggs*, 22 Aug. 1942 (FC). PUERTO RICO: on rocks, Arroyo de los Cochinos, Adjuntas to Jayuya, *N. Wille* 1718, Mar. 1915 (Type of *Aphanocapsa intertexta* Gardn., NY [Fig. 32]; isotype, FH); bark, Aibonito to Cayey, *Wille* 1904, Mar. 1915 (NY); on rocks, etc., Arecibo to Hatillo, *Wille* 1155a, 1372b, 1387a (Type of *Anacyctis nigropurpurea* Gardn., NY [Fig. 75]; isotype, FC), 1393 bis (NY); on rocks on walls in and near Arecibo, *Wille* 1337, 1363, 1368, 1457, Feb.—Mar. 1915 (NY); on limestone, Arecibo to Utuado, *Wille* 1465a (Type of *Gloeotheca endochromatica* Gardn., NY [Fig. 53]), 1476, 1476a, Mar. 1915 (NY); limestone between Cabo Rojo and San German, *Wille* 1194a, Feb. 1915 (Type of *Anacyctis minutissima* Gardn., NY [Fig. 75]); on trees, walls, etc., Caguas, *Wille* 439 (Type of *A. compacta* Gardn., NY [Fig. 25]), 444 (FC, NY), 460c, 462 (NY), 462a (Type of *Endospora olivacea* Gardn., NY [Fig. 41]), Jan. 1915; on walls, rocks, trees, etc., Coamo Springs, *Wille* 254a, 273, 277, 278, 299a (Type of *Anacyctis microsphaeria* Gardn., NY), 300 (Type of *A. irregularis* Gardn., NY), 300a, 300d, 301 (Type of *Chroococcus muralis* Gardn., NY [Fig. 26]), 303a, 304a, 307a, 308, 313, 321, 402b, 405, 1869e, 1869f (Type of *Anacyctis radiata* var. *major* Gardn., NY [Fig. 51, 56]), 1870c, 1901a (Type of *A. radiata* Gardn., NY [Fig. 60]), 1901c, 1901d, 1905c, 1916a (Type of *Endospora rubra* Gardn. NY [Fig. 57]), 1923a, Jan., Mar. 1915 (NY); Fajardo, *Wille* 656 (NY), 679b, 712 (FC, UC), 713, 713a, (NY), 717a (D, NY), 719a, 719b, (FC, UC), 732a (NY), 732b (Type of *Anacyctis anomala* Gardn., NY), 734a, 736a, Jan. 1915 (NY); on limestone, Coamo Springs, *N. L. & E. G. Britton* 9033, Mar. 1927 (NY); on bricks and bark, Guanica, *Wille* 1838, 1841a, Mar. 1915 (NY); on wood, stones, etc., Hacienda Catalina near Palmer, *Wille* 752, 755, (NY), 758 (FC, UC), 765 (NY), 768b (FC, UC), 791a (NY), Jan.—Feb. 1915; Hato Arriba near Arecibo, *Wille* 1397a, 1397b, 1399c, 1399d (NY), 1406a (Type of *Gloeocapsa livida* var. *minor* Gardn., NY [Fig. 52]), 1401b (Type of *Gloeotheca parvula* Gardn., NY [Fig. 35]), 1433 (Type of *Emphyssalis violacea* Gardn., NY), Mar. 1915; on Flyneblok, Humacao, *Wille* 572a, 573b, 577a, Jan. 1915 (NY); on stones, Jayuya, *Wille* 1770a, c, d, Mar. 1915 (NY); an Kalkfelsen bei Guanica, *Wille* 1843, 17 Mar. 1915 (FC, UC); Laguna Jopada, Mayaguez, *Wille* 1204, 1206 (FC, UC), 1207a (Type of *Anacyctis nidulans* Gardn., NY [Fig. 62]), 1209a (Type of *A. Willei* Gardn., NY), 1210 (FC, UC), 1304 (Type of *A. gloeocapsoides* Gardn., NY [Fig. 44]), 1307a, 1316d, Feb. 1915 (NY); Laguna Torruero, *Wille* 835a (FC, UC), 866 (Type of *Gloeocapsa calcicola* Gardn., NY [Fig. 39]), 871, 872 (NY), Feb. 1915; Maricao, *Wille* 1050, 1061 (NY), 1135 (FC, UC), 1144e (Type of *Aphanotheca opalescens* Gardn., NY [Fig. 28]), 1148b,c (NY), 1151a,b (FC, UC), 1155b (Type of *Anacyctis distans* Gardn., NY), 1153f, Feb. 1915 (NY); Mayaguez, *Wille* 981a,b, 982a,b, 985, 1000e (NY), 1012 (FC, UC), 1190, Feb. 1915 (NY); road to Monte Montoro, Maricao, *Wille* 1060, 1062, 1063d (NY), 1077e (Type of *Endospora bicoccus* Gardn., NY [Fig. 34]), 1073 (FC, UC), 1087 (NY), 1087a (Type of *Anacyctis amplivestimentata* Gardn., NY [Fig. 20]), 1904 (Type of *A. pulchra* Gardn., NY [Fig. 63]), 1094a (NY), 1109 (FC, UC); by "Campo", Maricao, *N. L. Britton* 1290c, Feb. 1915 (Type of *Placoma Willei* Gardn., NY [Fig. 66]); on a concrete basin near the experiment station, Rio Piedras, *Wille* 177, Dec. 1914 (NY); on logs north of Sabana Grande, *Wille* 925, Feb. 1915 (Type of *Endospora nigra* Gardn., NY [Fig. 24]); on a church wall, Sabana Grande, *Wille* 933b, 956, 957, 961b,d, 962b,c, Feb. 1915 (NY); on wall, Governor's Palace, San Juan, *Wille* 58b, Dec. 1914 (NY); on walls near San Juan, *Wille* 66a, 92b, Dec. 1914 (NY); on a wall at Calera de San Juan, *Wille* 66g, Dec. 1914 (NY); on walls, Fort San Cristobal, San Juan, *Wille* 1989c, 1991c, 1993, 1993a (NY), 1995 (FC, UC), 1998c, 1999, 2002, (NY), 2004 (FC, UC), 2004a,b,c, 2007, 2008, 2011, 2014c (NY), 2016a (Type of *Anacyctis magnifica* Gardn., NY [Fig. 58]), 2019 (FC, UC), 2021, 2023a (NY), 2025 (FC, NY); Santurce, *Wille* 2 (NY), 2c (Type of *A. consociata* Gardn., NY), 3 (Type of *Chroococcus ciliatus* Gardn., NY [Fig. 31]), 4a, 5 (NY), 38 (FC, UC), 56, 56j (NY), 141 (FC, UC), 142, 143a (NY), 149 (FC, UC), Dec. 1914; on bark at Utuado, *Wille* 1506a, Mar.

1915 (NY); on rocks and soil about 10 km. north of Utuado, *Wille 1533a* (Type of *Endospora mellea* Gardn., NY [Fig. 29]), 1553 (Type of *Anacyrtis nigroviolacea* Gardn., NY).

GUADELOUPE: Moule, grottes des falaises près le motne Aliard, *Mazé & Sebramm* (Type of *Gloeocephala tropica* Crouan, FC [Fig. 36]; isotype, K). ST. VINCENT: on damp wall of dam, Sharp's River, *W. R. Elliott 477* (Type of *G. gigas* W. & G. S. West, with *Cosmarium pseudopyramidalum*, in slide collection, BM). DOMINICA: on lime trees, Shanford Estate, *Elliott 901*, Nov.—Dec. 1892 (Type of *Chroococcus minor* f. *minimus* W. & G. S. West, with *Hassallia byssinoides* (Berk.) Hass., FC; isotype, UC); on trees, summit of Trois Poisons, *Elliott 903*, 15 Nov. 1892 (Type of *Aphomocapsa elachista* W. & G. S. West, BIRM).

JAMAICA: rocks, Cascade river east of Cinchona, *D. S. Johnson*, Jul. 1919 (NY); Port Antonio, *A. E. Wight* (PC); on rocks, Arorully, *C. R. Orcutt*, 7 Nov. 1928 (FC, US); "decayed Macromitrium", *Orcutt 5097* (BM, D); on wet rocks, *I. P. Lewis*, July 1906 (as *Gloeocephala versicolor* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2204, FC, D; as *Microcystis marginata* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2204, FC). MEXICO: gorge below dam east of San Miguel de Allende, Guanajuato, *M. C. Carlson 1344b*, 17 Jan. 1949 (FC); caverns of Cacabumilpa, Guerrero, *G. O. Lee*, Aug. 1938 (TA); rocks, Barranca de Oblatos, Guadaluajara, *W. Kiener 18199*, 21 Dec. 1944 (FC, KI); house wall, Rio Primavera, Guadaluajara, *Kiener 18293*, 18297, 18300, 27 Dec. 1944 (FC, KI); on a gravel bank 7 miles north of the village, Bahía Kino, Sonora, *F. Drouot & D. Richards 2892*, 9 Nov. 1939 (FC); crevices of cliffs in mountains on east side of Guaymas, Sonora, *Drouot & Richards 3087a*, 3 Dec. 1939 (FC).

GUATEMALA: Dept. Alta Verapaz: caves southwest of Lanquín, *J. A. Steyermark 44084*, 44085, 21 Feb. 1942 (FC); near Cobán, *P. C. Standley 71763*, Mar.—Apr. 1939 (FC); along Rio Carchá between Cobán and San Pedro Carchá, *Standley 90008*, Mar. 1941 (FC); wet cliff near Chirriacté on the Petén highway, *Standley 91880*, 9 Apr. 1941 (FC); on trunk of royal palm near Dolores, 1—2 miles northeast of Cubilguitz, *Steyermark 44861*, 8 Mar. 1942 (FC). Dept. Chiquimula: on cañon slopes on Sororro mountain southeast of Concepción de las Minas, *Steyermark 31119a*, 4 Nov. 1939 (FC). Dept. Huehuetenango: Rio Pucal about 14 km. south of Huehuetenango, *Standley 82335*, 4 Jan. 1941 (FC); on bark near crossing of Rio San Juan Ixtán east of San Rafael Petzal, *Standley 82952*, 9 Jan. 1941 (FC); entrance to cave, summit of Sierra de los Cochumatanes, Chémal, *Steyermark 50256*, 8 Aug. 1942 (FC); damp shaded bank north of Chiantla, *Standley 82585*, 6 Jan. 1941 (FC); Cerro Chémal, *Steyermark 50304D*, 8 Aug. 1942 (FC). Dept. Jalapa: rocks about 10 miles south of Jalapa, *Steyermark 32201*, 29 Nov. 1939 (FC). Dept. Sacatepéquez: on old bricks and on bark of *Bursera* near Antigua, *Standley 58523a*, 59832, Nov. 1938—Feb. 1939 (FC). Dept. San Marcos: on rock around thermal spring, Tajumulco, *Steyermark 36873*, 28 Feb. 1940 (FC); dry boulder just below summit of Volcán Tacaná, *Steyermark 36117*, 19 Feb. 1940 (FC). Dept. Santa Rosa: region of La Sepultura west of Chiquimulilla, *Standley 79340*, 5 Dec. 1940 (FC); on tree trunk, Guazacapan, *Standley 78641*, Nov.—Dec. 1940 (FC); on trees near Cuilapilla, *Standley 78111*, 78114, 23 Nov. 1940 (FC).

HONDURAS: Dept. Atlántida: on dead wood near Rio San Alejo south of San Alejo, *Standley 7989*, Apr. 1947 (FC). Dept. Comayagua: on plaster of uralin, Hotel Jerusalém, Comayagua, *Standley 5780*, Mar. 1947 (FC); on cliffs, Comayagua, *Standley 5689*, 5726, Mar. 1947 (FC); soil, sandstone, and fence rails, vicinity of Siguatepeque, *Standley 5518*, 6576, 6592, 6671, Mar.—Apr. 1947 (FC). Dept. Cortés: on *Citrus aurantiifolia*, vicinity of La Lima, *Standley & J. Chacón P. 7112*, Apr. 1947 (FC). Dept. El Paraíso: open sandy bank, Las Casitas, *Standley, L. Williams, & P. Allen 581*, 4 Dec. 1946 (FC). Dept. Morazán: on rocks and trees, El Zamorano, *Standley 189*, 215, 2171, 2365, 2396, Nov. 1946—Jan. 1947 (FC), 11708, Aug. 1947 (FC); on rocks, Quebrada de Santa Clara near Rio Yeguaré, *Standley & L. O. Williams 1614*, 17 Dec. 1946 (FC); on log, Agus Amarilla above El Zamorano, *Standley & Williams 21*, Nov. 1946 (FC); on old wood along Rio Yeguaré east of El Zamorano, *Standley 1073*, Dec. 1946 (FC). EL SALVADOR: on bark, San Vicente, *Standley & E. Padilla V. 3519*, Feb. 1947 (FC). NICARAGUA: on masonry and bark, Chichigalpa, dept. Chinandega, *Standley 11461*, 11536, July 1947 (FC); on tree trunks, Jinotepe, dept. Carazo, *Standley 8453*, 8494, 20 May 1947 (FC); on tree trunk, La Libertad, dept. Chontales, *Standley 8854*, May—Jun. 1947 (FC). COSTA RICA: Alrededores de San Ramón, *A. M. Broni 14937*, 4 Jan. 1932 (FC); Cerro de la Muerte, 5 km. above Millsville, Cordillera de Talamanca, prov. Cartago, *R. W. Holm & H. H. Illis 1005a*, July 1949 (FC); U. S. Department of Agriculture Rubber Experiment Station, Los Diamantes on Rio Santa Clara, 1.6 km. east of Guapiles, prov. Limón, *Holm & Illis 1021*, 11 July 1949 (FC). PANAMA: in ponte ligneo oppidi Colon, *G. Lagerheim*, Dec. 1892 (as *Gloeocephala magma* in Witt., Nordst., & Lagerh., Alg. Exs. no. 1541a, L); in ancient grinding stone, Panama City, *G. W. Prescott CZ19*, Aug. 1939 (FC); Juan Mina, Cbagres river (Canal Zone), *H. H. Barlett CZ198*, Sept. 1944 (FC); moist lime bluff near Salamanca Hydrographic Station in the gorge of Rio Pequeni, *C. W. Dodge, Steyermark, & P. H. Allen 16972*, 16975, 14 Dec. 1934 (D, MO).

VENEZUELA: Amazonas: on igneous rock, Sanariapo, *Steyermark 58509*, Sept. 1944 (FC). Anzoátegui: limey bluff along Rio Zumbador northeast of Bergantín, *Steyermark 61282*, Mar. 1945 (FC); on shaded bluff, Fila Grande between Bergantín and Cerro Peonia, *Steyermark 61350*, 19 Mar. 1945 (FC); bluff between Cerro San José and Cerro Peonia, *Steyermark 61567*, 20 Mar.

1945 (FC). Bolívar: on face of bluff, Parí-tepuí, *Sieyermark* 59881, 6 Nov. 1944 (FC); on hematite outcrops, Sotoropán-tepuí, *Sieyermark* 60130, 15 Nov. 1944 (FC); on rocks, summit of Mt. Roraima, *Sieyermark* 58820, 27 Sept. 1944 (FC). Disc. Federal: on concrete, house at Los Venados, *Sieyermark* 55120, 2 Jan. 1944 (FC). Sucre: hot springs near La Torna southeast of Cumana, *Sieyermark* 62863, 21 May 1945 (FC). BRAZIL: Ceará: in seepage water at base of dunes, Urubú, Fortaleza, *Drouet* 1381, 24 Aug. 1935 (D); pool below dam, Açude Boa Agua, Quixadá, *Drouet* 1404, 2 Sept. 1935 (D); pools in Rio Pacory 6 km. south of Aquiraz, *Drouet* 1453, 15 Oct. 1935 (D); Rio Pacory 20 km. southeast of Mecejana, Pacatuba, *Drouet* 1436, 18 Oct. 1935 (D); roadside pool near Primavera, Soure, S. Wright, 28 Oct. 1937 (D). Parahyba: Açude Bodocondo near Campina Grande, *Wright* 1583, 6 Aug. 1934 (D). Pernambuco: wall along street below monastery, Olianda, *Drouet* 1267, 17 Jun. 1935 (D). Rio Grande do Sul: H. Kleerekoper 28, 1941 (FC). URUGUAY: in saxis, Punta Carretas, dept. Montevideo, G. Herter 840, Sept. 1947 (MO, UC). ECUADOR: Quito, G. Lagerheim, May 1892 (Isotypes of *Pleurocapsa muralis* Lagerb. in Witt. & Nordst., Alg. Exs. no. 1097, L. MIN, NY); Puente de Chimbo, Lagerheim, Aug. 1891 (S; as *Gloeocapsa magma* in Witt., Nordst., & Lagerh., Alg. Exs. no. 1541b, L); in rupibus madidis ad San Nicolas prov. Pichincha, Lagerheim, Oct. 1891 (with *Scytonema mirabile* in Witt., Nordst., & Lagerh., Alg. Exs. no. 1320, FC). PERU: on rocks and "sobre tierra", A. Maldonado, Jul. 1950, 1952 (FC); agua mineral, Arequipa, Maldonado 6, 10, 12, Jul. 1950 (FC). CHILE: fuktige bergvagggar vid Eherhard, Magellanes, O. Borge, Mar. 1899 (S).

HAWAIIAN ISLANDS: damp cliff at west end of beach, Kalalau valley, Kauai, W. J. Newhouse 1953-5, 2 Jan. 1953 (FC); mud, Kaali spring, Nihoa, H. St. John 22837, 16 Aug. 1947 (FC); rocks, Rainbow falls near Hilo, Hawaii, W. A. Seitchell 3210, 14 July 1900 (FC, UC); culture, University of Hawaii, Honolulu, M. Lobman 8134, Oct. 1951 (FC). MARSHALL ISLANDS: "mesa" island on ocean side of Jam-Wa, Arno atoll, L. Horwitz 9617, 19 Aug. 1951 (FC); palm on Jiland island, Arno atoll, Horwitz 9104, 17 Jul. 1951 (FC); Airukiraru island, Bikini atoll W. R. Taylor 46-244a, Apr. 1946 (FC, MICH); water hole behind the site of the village, Bikini island, Bikini atoll, Taylor 46-567, 3 Jul. 1946 (FC, MICH); crust on coral sand, Lae islet, Lae atoll, F. R. Fosberg 34007, 6 Jan. 1952 (FC, US); on Pandanus, Majuro island, Majuro atoll, A. Spoehr, May 1947 (FC); on coral rocks in woods, Burok island, Rongelap atoll, Taylor 46-599, 18 Jul. 1946 (FC, MICH); on coral boulders in scrub, Ujae islet, Ujae atoll, Fosberg 34420, 13 Mar. 1952 (FC, US); open sand in scrub, Kabben islet, Wocho atoll, Fosberg 34432, 19 Mar. 1952 (FC, US). TUAMOTU ISLANDS: Ngarumova, Raroia atoll, M. S. Doty & J. Newhouse 11257, 2 Jul. 1952 (FC). SOCIETY ISLANDS: with *Coccolithus stagnina* Spreng., Tahiti, J. E. Tilden, Oct. 1909 (as *Aphanobacca microspora* in So. Pacific Alg. no. 3, MIN). SAMOA: on dead Tridacne shells, Rose atoll, A. G. Mayor 1055, 6 June 1920 (Type of *Pleurocapsa Mayorii* Setch., UC; isotype, FC [Fig. 40]); an Felsen, Savaii, K. H. Rechinger 2834 (Type of *Gloeotheca samoensis* Wille in the slide collection, O); auf Baumrinde, Upolu, Rechinger 3621 (Type of *Gloeocapsa aeruginosa* E. lignicola Wille in the slide collection, O). GILBERT ISLANDS: fish-ponds on Nikunau, Mrs. R. Catala 5, 10, July, 1951 (FC).

NEW ZEALAND: terrestrial, Rangitoto island, Waitemata, V. J. Chapman, Sept. 1947 (FC); Rotorua, L. A. Doore & A. Natb, Feb. 1935 (as *Aphanobacca thermalis* in Tild., So. Pacific Pl., 2nd Ser., no. 545, FC); hot springs, Tokano, S. Berggren 195, 199, 1878 (S); Rotorua, Ohinemuru, Capra A, B, Mar. 1909 (DT); cooking pool, native block, Ohinemuru, Rotorua, L. M. & M. H. Jones, 10 Feb. 1935 (Tild., So. Pacific Pl., 2nd Ser., no. 574, FC); in cold water, Great Geyser, and in steam, edge of Crystal Fool, Wairakei geyser valley, Taupo county, W. A. Seitchell 5962 (53), 5965 (56), May 1904 (FC, UC); on rocks in bot stream, Whakarewarewa, Rotorua, Seitchell, 1904 (FC, UC). JAPAN: Y. Tomaku in herb. A. Grunow (W); brook near Rogashima, Miyanoshiba, Hakone, H. M. Richards, May 1900 (FH). PALAU ISLANDS: on coralline limestone on the Peleliu airfield, A. C. Mason, 10 Feb. 1949 (FC).

PHILIPPINES: Manila and Rizal province: J. D. Soriano 783, 831, 874, Jan. & Apr. 1951 (FC, PUH); on walls of Malate church, Soriano 57-2, 17 Jun. 1948 (FC, PUH); on decaying organic matter kept moist by rain, third floor of Rizal building, University of the Philippines, Soriano 76, 29 June 1948 (FC, PUH); aquaria, University of the Philippines, Manila, G. T. Velasquez 444, 591, 21 Feb. 1940, 11 Jan. 1941 (FC); on cement walls, botany garden, University of the Philippines, Manila, Velasquez 445, 21 Feb. 1940 (FC); on walls, Reina Regente street, Manila (Binondo), Soriano 309, 17 Jul. 1949 (FC, PUH); on wall, Dapitan and Trabajo streets, Sampaloc, Soriano 405, 9 Oct. 1949 (FC, PUH); on adobe wall, Ermita, Soriano 200-3, 9 Nov. 1948 (FC, PUH); walls of ice plant, Marikina, Soriano 898, 27 Apr. 1952 (FC, PUH); cultivated at Fisheries experiment station, Dagat-Dagatan, Navotas, Velasquez 628, 19 Jan. 1941 (FC). Mindoro: bark of coconut, Tabinay Maliit, Puerto Galera, Velasquez 737, 7 Apr. 1941 (FC); hot spring at Bisayaan, Puerto Galera, Velasquez 1039, 26 Apr. 1941 (FC); Big Balatero, Puerto Galera, Velasquez 9, 15 Apr. 1953 (FC, PUH). Palawan: Araceli, Velasquez 2922, 2932, 15 Jun. 1951 (FC, PUH); Corona, Velasquez 2793, 3 June 1951 (FC, PUH); Cuyo, Velasquez 2801, 10 Jun. 1951 (FC, PUH). Panay island: on walls and fences, Iloilo City, Soriano 1009, 1020, 1056, Jun. Jul. 1952 (FC, PUH); dikes in Griños fishponds, Loganes, Iloilo prov., Soriano 1590, 11 Jan. 1953

(PC, PUH); walls of cemetery, Pototan, *Soriano* 1836, 23 Feb. 1953 (FC, PUH); on adobe walls, Passi, Iloilo province, *Soriano* 1066, 1073, 20 Jul. 1952 (FC, PUH); wall along road to the beach, San Jose, Antique province, *Soriano* 1525, 1 Dec. 1952 (FC, PUH). Sulu archipelago: Busbos, Jolo, *Velasquez* 3246, 3247, 22 May 1952 (FC, PUH). NEW CALEDONIA: lily pool, Ile Ouin, J. T. *Bachholz* 1667B, 8-9 Feb. 1948 (FC, UC).

CHINA: Fukien: on the wall of a hot spring, Huangchun, Foochow, H. H. *Chung* A433, Sept. 1926 (Type of *Gloeocephala minuscula* Gardn., FH; isotype, UC), A436, Sept. 1926 (D, FH); on wet rock, Kushan near Foochow, *Chung* A363c, Aug. 1926 (Type of *G. multiphorica* Gardn., FH; isotype, D [Fig. 21]). Hopeh: on stone by stream, Lyng Buddha Temple, Peiping, Y. C. H. *Wang* 195, 1930—31 (FC, UC); on rock, Jade Spring Hill, Peiping, *Wang* 287a, 1930—31 (FC, UC). Kiangsu: Suchau, N. G. *Gu* (NY); on rock at a spring pool, Tshishiasan, C. C. *Wang* 333, 20 Apr. 1930 (FC, UC); on rocks and walls, Nanking, Y. C. H. *Wang* 53, 60, 75, 95, 1930 (FC, UC); on rocks and walls, Nanking, C. C. *Wang* 302, 303, 332, Apr. 1930 (FC, UC); on tree bark, National Central University, Nanking, C. C. *Wang* 353, 357, 409, Apr. 1930, May 1931 (FC, UC). Szechwan: Chin-Chen-Shan, H. *Chu* 1343, 7 Aug. 1941 (Types of *G. incensata* H. *Chu*, *Entophyalis sinensis* H. *Chu*, and *Anacystis? hyalina* H. *Chu*, FC); on wet rocks, Omei, *Chu* 1015, 1353, 1363, 1389, 23—25 Aug. 1942 (FC); wet rock, Ko-Fu-Tung, Mt. King-Fu, Nan-chwan, *Chu* 849, 15 Apr. 1945 (FC); wet rock, Lung-chi bridge, Nanzehwan, *Chu* 716, 7 Aug. 1945 (FC). Yunnan: an den Sinterassen der Quelle von Bödö (Pei) se von Dschungdien, H. *Handel-Mazzetti* 4478, 4 Aug. 1914 (Type of *Gloeothece tophacea* Skuja, W; isotype, D); an Kalkfelsen bei der heissen Schwefelquelle unter Baoschi bei Dschungdien, *Handel-Mazzetti* 7729, 17 Aug. 1915 (Type of *Synechococcus ambigua* Skuja, W [Fig. 67]; isotype, D).

NEW GUINEA: on rocks along a stream, Finschhafen, Papua, L. B. *Martin*, Jun. 1945 (FC); Cyclopedberge, Lorenz, 11—15 Apr. (L). INDONESIA: groten rivier bij Pankadjene, A. *Wabor-van Bosse* 938, 939, 1899—1900 (L). Bira: grot, *Wabor-van Bosse* 879, 1899—1900 (FC, L). West Borneo: warme bron bij Moeka-Moeka, *Wabor-van Bosse* 674, 1888 (FC, L). Celebes: grof bij Maros, *Wabor-van Bosse* 789, Sept. 1888 (FC, L). Java: bij Kampong Ngljipe, zuidkust, P. *Groenburt* d, Oct. 1936 (L). Kangean: grof, *Wabor-van Bosse*, 1899—1900 (L). Sumatra: Ngalan bij Pajakambah, *Wabor-van Bosse* 704, 706, 1888 (FC, L); an Steinen, Frauenbadereich, Kadja, A. *Tienemann*, 7 Mar. 1929 (Type of *Chroococcidiopsis thermalis* Geirl., slide no. SKW2c in collection of L. Geitler). Talaud (Talaue) island: à l'embouchure de la rivière, Liroeng, Salebaboe island, *Wabor-van Bosse*, 1899—1900 (L). AUSTRALIA: Queensland: on tree trunk, Myors, A. B. *Cribb* G, 26 Feb. 1946 (FC); bottom of Day's lagoon, Moreton island, *Cribb* 143-I, 26 May 1951 (FC). BURMA: Cantroom Gardens, Rangoon, L. P. *Khanna* 335, 9 May 1935 (FC); Kyauktan, Rangoon, *Khanna* 451, 22 Aug. 1935 (Type of *Gloeothece rhodochlamys* Skuja, FC [Fig. 72]); Maymyo, Northern Shan States, *Khanna* 639, 12 May 1936 (FC). INDIA: Calcutta, H. B. C. (L); auf Steinen im Victoria-Garden in Bombay, A. *Hansgirg*, 20 Nov. 1895 (FC, W); Felsen vor Poona, *Hansgirg*, 20 Oct. 1895 (FC, W). MAURITIUS: sur les arbres, J. *McGregor*, Apr. 1819 (BM, D).

4b. ANACYSTIS MONTANA f. MINOR Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Aphanothece saxicola* β *aquatica* f. *minor* Wille, Öfvers. K. Sv. Vet.-Akad. Förh. 36(5): 22. 1879. *A. saxicola* f. *minor* Wille ex Forti, Syll. Myxophyc., p. 81. 1907. —Type from Matotchkin, Nova Zembla (S).

Microhaloa firma Kützing, Tab. Phyc. 1: 6. 1846. *Palmella firma* Brebisson & Lenormand pro synon. in Kützing, loc. cit. 1846. *Microhaloa firma* Kützing ex Trevisan, Sagg. Monogr. Alg. Coccol., p. 38. 1848. *Polycystis firma* Rabenhorst, Fl. Eur. Algar. 2: 53. 1865. *Coccoloboris firma* Richter in Hauck & Richter, Phyk. Univ. 13: 649A. 1894. *Microcystis firma* Schmidle, Engler Bot. Jahrb. 23: 57. 1902. *Anacystis firma* Drouet & Daily, Lloydia 11: 77. 1948. —Type from Falaise, France (L). Kützing's notation of the original specimen in Tab. Phyc. 1: 6 (1846) as "Heisse Bäder der Euganeen; Lenormand!" is obviously an editorial error. We can surmise that he intended to correct this mistake in Sp. Algar., p. 207 (1849), where he says simply, "Prope Falaise legit amic. Brebisson (Lenormand)".

Palmella hyalina γ *seriata* Kützing, Sp. Algar., p. 215. 1849. —Type from Falaise, France (L). FIG. 95.

Palmella sudetica Rabenhorst, Alg. Sachs. 11 & 12: 105. 1851. —Type from the Riesengebirge, Silesia (L). FIG. 94.

Aphanothece Trentepohlii Grunow in Rabenhorst, Fl. Eur. Alg. 2: 65. 1865. *Nostoc Trentepohlii* Mober pro synon. ex Grunow in Rabenhorst, loc. cit. 1865. *Coccoloboris Trentepohlii* Richter in Hauck & Richter, Phyk. Univ. 4: 194. 1888. —Type from Kiel, Germany (W).

Anacystis glauca Wille, Bull. Torr. Bot. Club 6: 182. 1877. *Microcystis glauca* Drouet & Daily, Field Mus. Bot. Ser. 20: 72. 1939. *Polycystis glauca* Drouet & Daily, Field Mus. Bot. Ser. 20: 125. 1942. —Type from Bethlehem, Pennsylvania (FC). FIG. 93.

Nostoc microscopicum var. *linguiforme* Hansgirg, Prodr. Algenfl. Böhmen 2: 65. 1892. —Type from Krummäu, Bohemia (W). FIG. 96.

Chroococcus parallelepipedon Schmidle, Engler Bot. Jahrb. 30: 242. 1901. —Type from Lake Nyasa, Tanganyika (ZT). FIG. 91.

Aphanocapsa elachista var. *irregularis* Boye Petersen, Bot. Icel. 2(2, 7): 265. 1923. *Microcystis pulvorea* f. *irregularis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —Type from Grimsa, Iceland (in the collection of J. Boye Petersen). FIG. 97.

Aphanocapsa Farlowiana Drouet & Daily, Field Mus. Bot. Ser. 20: 125. 1942. —Type from Falmouth, Massachusetts (D). FIG. 92.

Radiocystis geminata Skuja, Symbolae Bot. Upsal. 9(3): 43. 1948. —Type from Uppland, Sweden (in the collection of H. Skuja).

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:

Plenrococcus pulvereus Wood, Smiths. Contrib. Knowl. 241: 79. 1872. *Anacystis pulvorea* Wolle, Fresh-w. Alg. U. S., p. 329. 1887. *Polycystis pulvorea* Wolle ex Hansgirg, Prodr. Algenfl. Böhmen 2: 145. 1892. *Microcystis pulvorea* Forti, Syll. Myxophyc., p. 92. 1907; Migula ex Lemmermann, Krypt. Fl. Mark Brandenb. 2: 77. 1907.

Aphanocapsa Grevillei var. *microgranula* West, Journ. Linn. Soc. Bot. 29: 199. 1892.

Aplococcus natans Roze, Journ. de Bot. 10: 321. 1896.

Polycystis pallida Lemmermann, Bot. Centralbl. 76: 154. 1898. *P. stagnalis* Lemmermann, Ber. Deutsch. Bot. Ges. 18: 24. 1900. *Microcystis stagnalis* Lemmermann, Forschungsber. Biol. Sta. Plön 10: 150. 1903. *M. pulvorea* f. *stagnalis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938.

Microcystis stagnalis var. *pulchra* Lemmermann, Arch. f. Hydrobiol. & Planktonk. 5: 303. 1910. *M. pulvorea* f. *pulchra* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938.

Microcystis minima Bernard, Protococc. & Desmid. d'Eau Douce, p. 49. 1908.

Chroococcus dispersus var. *minor* G. M. Smith, Bull. Wisconsin Geol. & Nat. Hist. Surv. 57: 28. 1920. *Gloeoecapsa minima* f. *Smithii* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 242. 1938.

Aphanocapsa elachista var. *planctonica* G. M. Smith, Bull. Wisconsin Geol. & Nat. Hist. Surv. 57: 42. 1920. *Microcystis pulvorea* f. *planctonica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938.

Aphanocapsa endophytica G. M. Smith, Bull. Wisconsin Geol. & Nat. Hist. Surv. 57: 42. 1920. *Microcystis endophytica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 139. 1938.

Aphanocapsa siderosphaera Naumana, K. Sv. Vet.-Akad. Handl. 62(4): 18. 1921.

Aphanocapsa siderosphaera Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 18. 1921.

Aphanocapsa Koordersii Ström, Nyr Mag. Naturvid. 61: 128. 1923. *Microcystis Koordersii* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 140. 1938.

Microcystis exigua Zalesky, Rev. Gén. de Bot. 38: 34. 1926.

Microcystis pulvorea var. *racemiformis* Nygaard, K. Danske Vidensk. Selsk. Biol. Skr. 7(1): 183. 1949.

Planrae aeruginosae, aquaricae, cellulis in divisione binis depresso—sub-sphaericis, aereae protracta globosis diametro 2—3 μ crassis, sine ordine (saepe conferte) per gelatinum vaginale distributis; gelatino vaginale homogeneo, hyalino, firmo vel (saepe omnino) diffuente. FIGS. 91—97.

In shallow water of freshwater ponds, lakes, and streams, often in the plankton, seldom in brackish water.

Specimens examined:

NOVA ZEMBLA: Matotchkin, *P. Kjellman 24b*, 1875 (Type of *Aphanosyce saxicola* B. aquatica f. *minor* Wille, S). NORWAY: Valdres, in rupibus ad Skogstad, *N. Wille*, 31 Jul. 1879 (D, S); Aas pr. Kristiania, *Wille*, Aug. 1890 (S). SWEDEN: plankton, Uppland, *H. Skuja* (Type of *Radiocystis geminata* Skuja in plankton collection of H. Skuja); Grimstorp, Vestergötland, *O. Nordstedt*, Sept. 1867 (S); Vassijokko, Torne Lappmark, *O. Borge* 3, Jul. 1909 (S); Möja, *Borge*, Jun. 1931 (S); Lassby backar, Uppsala, *A. Grevillius*, May 1883 (S); in turfosis ad Stromsberg prope Jonköping, *Nordstedt*, Aug. 1879 (as *Cylindrospermum macrospermum* in Witt. & Nordst., Alg. Exs. no. 396a, FC); Dalsland, Hallan, *V. Wittrock*, 10 Jun. 1865 (D, S), 12 Jul. 1866 (D, S; as *Aphanocapsa Castagnoi* in Witt. & Nordst., Alg. Exs. no. 299, FC, L, NY, S); in stagno ad Kvikkjokk Lapponiae Luleensis, *G. Lagerheim*, Jul. 1883 (D, S). DENMARK: Markerup Moor, *L. Hansen* (MO, NY), *W. P. R. Suringar 127*, 3 Sept. 1849 (L). POLAND: Silesia: in stagno ad Falkenberg, *B. Schröder*, Jul. 1893 (D, S), *Schnula*, July 1893 (S); im Aquarium des Pflanzenphysiol.

Institut der Universität, Breslau, *Schröder*, Sept. 1892 (as *Coccolobis firma* in Hauck & Richt., Phyk. Univ. nn. 649B, L, MIN); in verlassenen Steinbrüchen am Galgenberge bei Strehlen, *Hüse*, Aug. 1860 (as *Palmella bostryoides* in Rabenh. Alg. no. 1037, L); Felswände am Zackenfall im Riesengebirge, *Peck* (Type of *Palmella indusica* Rabenh., in Rabenh. Alg. no. 105, L; isotypes, D, FC [Fig. 94]). GERMANY: Kiliae, *Mohr* (Type of *Aphanobaca Tremsepoplii* Grun., W; isotypes, BM, L, MO); bei Angela, Schleswig-Holstein (L); in Torfgruben bei Flensburg, R. Häcker (as *Coccolobis stagnina* in Breutel, Alg. Exs. no. 415, L, UC); im Rehwinkel (Brandenburg), *Izsigobn & Roibe*, Jul. 1852 (as *Microbaloa firma* in Rabenh. Alg. no. 203, FC, L, NY); Gr. Plöner See, W. Rohda, 15 Sept. 1950 (FC); im Teiche der Parthenquelle bei Schönbach um Colditz (Sachsen), P. Richter, Jul. 1892 (as *Coccolobis firma* in Hauck & Richt., Phyk. Univ. no. 649A, L, MIN, NY); Parkeiche in Erdmannsdorf bei Schmiedeberg (Brandenburg), G. Hieronymus 710, July 1887 (MICH), Aug. 1887 (as C. *Tremsepoplii* in Hauck & Richt., Phyk. Univ. no. 194, L); Münster (Westfalen), *Sandner*, Apr. 1850 (B); schwimmend in Titisee (Baden), A. Braun 127, May 1848 (L); im Moor bei Freiburg-im-Baden, Braun 128, Aug. 1848 (L).

CZECHOSLOVAKIA: Moravia: rybnik, P. Nováček, 16 Jul. 1934 (D, FC). Bohemia: Dessendorf, A. Hensig, Jul. 1885 (FC, W); am Urkalk bei Krummau, Hensig, Aug. 1884 (Type of *Noctua microscopium* var. *linguiforme* Hensig., W; isotype, FC [Fig. 96]); Plas propé Pilsen, Hensig, Aug. 1887 (FC, W); Pocatky, Hensig, Aug. 1888 (FC, W); Riesengrund—Petzer im Riesengebirge, Hensig, Jul. 1887 (FC, W). SWITZERLAND: in einem Sumpfe des Torfmoores zwischen Einsiedeln und dem Etzel, Schwyz, C. O. Harz (as *Polycystis firma* in Wartm. & Wint., Schweiz. Krypt. no. 845, MIN). SCOTLAND: in a hill loch near Faskally House, Pidochry, Perthshire, A. J. Brook, Autumn 1953 (FC). NETHERLANDS: in vijvers bij Beek, Noord Brabant, A. Weber-van Bosse 146, Apr. 1886 (L); plassen van Brenkelveen en Tienhoven, W. Verwoort, May 1942 (L); Nieuwkoopse plassen, S. J. van Ooststroom 7208, May 1937 (L). FRANCE: eaux tranquilles (as *Palmella byalina* in Desmaz., Pl. Crypt. Fr., ed. 2, no. 215, L). Calvados: Caen, A. de Brébisson, ex herb. Lenormand (FC, FH, L); Caen etc., eaux douces (as P. *byalina* in Chauvin, Alg. de Normand no. 130, L, UC); marais de Plainville, de Brébisson (NY); Vire, herb. Lenormand no. 111 (L), de Brébisson 812 (L); Falaise, ex herb. Chauvin no. 74 (UC); Falaise, ex herb. Lenormand (LD, UC); Falaise, de Brébisson 182 (L), 439 (Type of *Palmella byalina* γ *sortata* Kürz., L [Fig. 95]; isotype, UC), 533 (Type of *Microbaloa firma* Kürz., L; isotypes, B, D, FH, S, UC), 963 (FC). Manche: Mortain, de Brébisson (S), 782 (L). Seine: Lac du Bourget, Joly, 10 Mar. 1951 (FC, PC). Vosges: Bruyères, J. B. Mougnot (as *Palmella byalina* in Roumeguère, Alg. de Fr. no. 111, L). TANGANYIKA: am Seeufer, Langenburg am Nyassasee, W. Goetze 866, Apr. 1899 (Type of *Chroococcus parvileptopipedon* Schmidle, ZT [Fig. 91]). ICELAND: among Myriophyllum, stagnant water in a branch to Grimsá, Vallanes, J. Boye Petersen, 26 Jun. 1914 (Type of *Aphanocapsa elachista* var. *irregularis* Boye Petersen in collection of J. Boye Petersen; isotype, D [Fig. 97]). BERMUDA: pool near Harrington sound, F. S. Collins 7118, Apr. 1912 (NY).

MASSACHUSETTS: Bateman's pond, Concord, R. H. Howe Jr., Dec. 1908 (FH); Horn pond, Woburn, P. S. Collins 5376, 9 Sept. 1905 (FH); as *Aphanobacca taxicola* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1301, FC, D, L, TA); Hammond pond, Brookline, B. M. Davis, Oct. 1893 (MICH); Hammond pond, Newton, W. G. Parlow, Oct. 1890 (FC, TA, UC); in shallow water, Oyster pond, Falmouth, R. N. Webber & Dronet 2156, 16 July 1938 (Type of *Aphanocapsa Porlowiana* Dr. & Daily, D [Fig. 92]; isotypes, DA, FH, L, NY, S, UC), J. Bader 119, 30 July 1938 (D), V. Trombetta & Dronet 2184, 8 Sept. 1937 (D). RHODE ISLAND: Hope reservoir, Providence, Appleton, Dec. 1883 (FC, NY). QUEBEC: in a lake, Maniwaki, Hull county, J. Brunel 390, 7 Jul. 1933 (FC); Yamaska mountain, on cliffs, Brunel 234, 2 Jun. 1931 (FC); près du 17e portage de la Kogaluk, à environ 74 milles de la baie d'Hudson, boue d'un étang, J. Roussseau 517, 24 Jul. 1948 (FC); Lac Brennen, Rawdon, comté de Montcalm, S. M. J. Eudon 292-28, 29 Aug. 1941 (FC). NEW YORK: in Pond brook at Buffalo creek, Elma, Erie county, J. Blum 324, 23 Jul. 1949 (FC); in (middle) Leha springs, Williamsville, Erie county, Blum 173, 5 Feb. 1949 (FC). PENNSYLVANIA: in fonte rupium calcareorum ad Bethlehem, P. Wolle, 1884 (Type of *Amacyssis glauca* Wolle in Witr. & Nordst., Alg. Exs. no. 796, FC; isotypes, FI, L [Fig. 93], NY, UC); lime stone springs, Wolle (L). VIRGINIA: culture of plankton from York river at Yorktown, J. C. Strickland 1413, 24 Aug. 1942 (FC, ST). NORTH CAROLINA: rocks below Dry falls, Highlands, Macon county, H. C. Bold H215, H247, 29 Jun. 1939 (FC); in Lake Anthony, Pineola, Forest county, Bold H377, 25 Jul. 1939 (FC); on wet rocks, Cullasaja gorge, Macon county, Bold H157, H158, H161b, 17 Jun. 1939 (FC). SOUTH CAROLINA: in Alligator lake near Myrtle Beach, Horry county, P. J. Pbilson SC80, SC82, 21 Sept. 1938 (FC); Easttoe river, Pickens county, H. C. Bold, Jul. 1939 (FC). FLORIDA: Leesburg, M. A. Brannon 333, 31 May 1948 (FC, PC); Gainesville, Brannon 70, 268, 326, 1942—46 (FC, PC); sink[hole], Gainesville, R. K. Stearn 308, 10 May 1948 (FC, PC); Lake Mize, 16 miles northwest of Gainesville, Brannon 615, 15 May 1948 (FC, PC). OHIO: wet sandstone, Old Mans Cave state park, Hocking county, W. A. Daily & P. K. Daily 519, 536, 554, 27 Jul. 1940 (DA, FC); wet sandstone, Cantwell Cliff state park, Hocking county, Daily 713, 1 Sept. 1940 (DA, FC); Biddles pond, Athens county, A. H. Blicke, 6 May 1941 (DA, FC).

KENTUCKY: on rock in Mammoth Cave park, B. B. McInteer 1074, 11 Jun. 1940 (DA, FC). TENNESSEE: sluiceway just above last homestead from Elkmont to Blanket mountain, Sevier county, H. Silva 194, 28 Sept. 1941 (FC, TENN); in pond near Mason Hall, Obion county, Silva 1248, 8 Jul. 1949 (FC, TENN). INDIANA: outlet of Lost lake, Lake Maxinkuckee, Marshall county, H. W. Clark & B. W. Evermann 265, 27 Jul. 1906 (FC, US). WISCONSIN: Clear lake, Bradley, Lincoln county, F. C. Seymour, 17 Sept. 1951 (FC); Bolton lake, Vilas county, G. W. Prescott 2W243, 8 Jul. 1937 (FC). ILLINOIS: north shore of Lake Glendale, Robbville recreational area in Shawnee national forest, Pope county, H. K. Pbinney 1067, 1 Sept. 1944 (FC, PHI). MINNESOTA: in and near Itasca state park, K. C. Fan 10267, F. Drouet 12199, Jun., Jul. 1954 (D, MIN). ARKANSAS: from a large spring-slough, Imboden, Lawrence county, B. C. Marshall P, May 1931 (NY). NEBRASKA: culture from a roadside ditch 4 miles east of Maxwell, Lincoln county, W. Kiener 16463c, 1 Oct. 1944 (FC, KI). MONTANA: in Bitterroot slough below country club, Missoula, F. H. Rose 4117, 3 May 1941 (FC). COLORADO: pool, Peaceful valley slope, Boulder county, Kiener 1268, 5 Aug. 1934 (FC, KI). UTAH: Columbine falls, Mt. Timpanogos, Utah county, A. O. Garretts 32, 3 Aug. 1925 (FC, UC). ALASKA: Point Barrow, 1883 (FH); 124 and 229 miles south of Fairbanks on Richardson highway, D. Hilliard 3, 8, Sept. 1953 (FC). CALIFORNIA: in ditch by railroad, Emery, Alameda county, N. L. Gardner 1100, 20 Jun. 1903 (FC, UC); laboratory cultures, Berkeley, Gardner 6973, 7147 (FC, UC); plankton of Lily lake near Fallen Leaf lake, Eldorado county, W. A. Satchell 13, 12 Aug. 1908 (FC, UC); Benton hot springs, Mono county, V. Duran 7797, 13 Apr. 1935 (FC, UC); culture from an irrigation ditch southwest of Polson, Sacramento county, Gardner 7394, 30 June 1933 (FC, UC).

ECUADOR: in rubibus humidis, Baños, G. Lagerheim, Dec. 1891 (S). PERU: Lago de Pachacamac, A. Maldonado 73a, Jan. 1942 (FC). PHILIPPINES: aquarium, San Augustin College, Iloilo City, J. D. Soriano 1006, 20 Jun. 1952 (FC, PUH). CHINA: on a rope in a stream, Wuhsien (Soochow), Kiangsu, C. C. Wang 367, Apr. 1926 (FC, UC).

4c. *ANACYSTIS MONTANA* f. *GELATINOSA* Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Coccolchloris stagnina* f. *gelatinosa* Hennings, Phyk. March. 1: 43. 1893. *Aphanotheca gelatinosa* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 69. 1907. *A. stagnina* f. *gelatinosa* Hennings ex Forti, Syll. Myxophyc., p. 77. 1907. —Type from Berlin, Germany (S). FIG. 98.

Aphanocapsa Roeseana de Bary in Rabenhorst, Alg. Eur. 215—217: 2156. 1870; Hedwigia 1870: 74. 1870. *Microcystis Roeseana* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 129. 1938. *Anacystis Roeseana* Drouet & Daily, Lloydia 11: 77. 1948. —Type from Reibardsbrunn, Thuringia, Germany (L).

Synechocystis Willisi Gardner, Mem. New York Bot. Gard. 7: 2. 1927. —Type from Mayaguez, Puerto Rico (NY). FIG. 99.

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:

Aphanocapsa arctica Whelden in Polunin, Bot. Canadian Eastern Arctic 2: 21. 1947.

Synechocystis planctonica Proschkina-Lavrenko, Akad. Nauk S. S. R. Bot. Inst. Otd. Sporovykh. Rost. Bot. Mater. 6: 69. 1950.

Plantae aeruginosae, aquaticae, cellulis in divisione binis depresso—sub-sphaericis, aetate provecta globosis diametro 5—6 μ crassis, sine ordine per gelatinum vaginale distributis; gelatino vaginale homogeneo, hyalino, saepe omnino diffuente. FIGS. 98, 99.

In shallow water of permanent freshwater ponds, lakes, etc., seldom appearing in brackish water. That the type specimens concerned here are large forms of *Anacystis montana* is unquestionable. Some other specimens cited (Humm & Nielsen 1790, 1791, 1794, for example) may in the future prove to be actively dividing growth-forms of *Coccolchloris stagnina*, in which the cells do not become elongate before division begins again.

Specimens examined:

SWEDEN: Stockholm, Danviks krokar, G. Lagerheim, Jun. 1881 (D, S). GERMANY: in den Teichen bei Reibardsbrunn, Thüringen, A. de Bary (Type of *Aphanocapsa Roeseana* de Bary in Rabenh. Alg. no. 2156, L; isotypes, D, FC, UC); Teich in Berliner botanischen Garten, P. Honning,

Jul. 1891, Apr. 1892 (Type of *Coccochloris stagnina* f. *gelatinosa* Henn. in Henn., Phyk. March. no. 43, S; isotypes, FH, L, NY [Fig. 98]); Berlin, Hennings, Jan. 1892 (as *C. stagnina* f. *gelatinosa* in Hauck & Richt., Phyk. Univ. no. 747, L, MIN, NY, S); an einem Wassertroge in Königstein (Sachsen), W. Krieger, Sept. 1884 (TA). NORTH CAROLINA: Muller pond, Shackelford Banks near Beaufort, H. J. Humm & C. S. Nielson 1790, 1791, 1794, 23 Aug. 1949 (FC, T). TENNESSEE: seepage, Scottish Pike at L. & N. railroad overpass, Knoxville, H. Silva 477, 17 Jan. 1947 (FC, TENN). COLORADO: Howard lake, Boulder county, R. W. Pennak, 13 Jun. 1948 (FC). PUERTO RICO: Mayaguez, N. Wille 1318, Feb. 1915 (NY); 4 km. north of Mayaguez, Wille 1329 (NY), 1329b (Type of *Synechococcus Willei* Gardn., NY [Fig. 99]), Feb. 1915. TRINIDAD: Pitch lake, La Brea, H. Field, 25 Mar. 1942 (FC). MEXICO: plankton, Lago Patzcuaro, Michoacan, B. F. Osorio Tafall, 1941 (FC), E. S. Dacey, 10 Jul. 1941 (FC). GUATEMALA: in hot pool and in edge of lake, Lago Amatitlán, P. C. Standley 89443, 89472, 15 Mar. 1941 (FC). PHILIPPINES: submerged on quiet sides of Okoy river, Palinpinon, Oriental Negros, J. D. Soriano 1897, 6 Apr. 1953 (FC, PUH).

5. ANACYSTIS DIMIDIATA Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Trochiscia dimidiata* Kützing, Linnaea 8: 593. 1833. *Protococcus dimidiatus* Kützing, Phyc. Gener., p. 168. 1843. *Pleurococcus dimidiatus* Trevisan, Sagg. Monogr. Alg. Coccol., p. 33. 1848. *Chroococcus dimidiatus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *C. turgidus* var. *dimidiatus* Brébisson in Rabenhorst, Alg. Eur. 201—204: 2033. 1867. *Gloeocapsa dimidiata* Drouet & Daily, Lloydia 11: 78. 1948. —Type from Nordhausen, Germany (L). FIG. 105.

Pleurococcus thermalis Meneghini, Consp. Algal. Engan., p. 337. 1837. *Protococcus thermalis* Kützing, Tab. Phyc. 1: 5. 1846. *Chroococcus thermalis* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *C. turgidus* f. *thermalis* Rabenhorst, Fl. Eur. Algar. 2: 33. 1865. *Pleurococcus vulgaris* f. *thermalis* Brébisson in Mougeot & Roumèguère in Louis, La Département des Vosges, 1887: Algues, p. 18 of reprint. 1887. *Chroococcus turgidus* var. *thermalis* Rabenhorst ex Hansgirg, Prodr. Algenfl. Böhmen 2: 161. 1892. *C. turgidus* γ *thermalis* Rabenhorst ex Wille, Nyt Mag. Naturvid. 62: 180. 1925. —Type from Abano, Italy (FI).

Protococcus turgidus Kützing, Tab. Phyc. 1: 5. 1846. *P. turgidus* α *chalybeus* Kützing, loc. cit. 1846. *Pleurococcus turgidus* Trevisan, Sagg. Monogr. Alg. Coccol., p. 34. 1848. *Chroococcus turgidus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *C. chalybeus* Rabenhorst, Alg. Eur. 115—116: 1144. 1861. *C. aeruginosus* Rabenhorst pro synonym., loc. cit. 1861. *Pentococcus chalybeus* Kützing pro synonym. ex Rabenhorst, Krypt.-Fl. Sachs. 1: 69. 1863. *Chroococcus turgidus* α *chalybeus* Rabenhorst, ex Kirchner, Krypt.-Fl. Schlesien 2(1): 262. 1878. *Gloeocapsa turgida* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 211. 1938. —Type from Freiburg im Breisgau, Germany (L). FIG. 100.

Protococcus turgidus β *juvescens* Kützing, Tab. Phyc. 1: 5. 1846. *Chroococcus juvescens* Richter in Bot. Ergebn. Drygalski's Grönlandexped., A. Kryprog, 1: 3. 1897. *C. turgidus* var. *juvescens* Forri, Syll. Myxophyc., p. 13. 1907. —Type from Freiburg im Breisgau, Germany (L). FIG. 100. *Chroococcus thermophilus* Wood, Amer. Journ. Sci. & Arts, ser. 2, 46: 34. 1868. —Type from Benion hot springs, Mono county, California (PH).

Chroococcus turgidus var. *Hookeri* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 38. 1883. —Type from Kristineberg, Sweden (S). FIG. 102.

Chroococcus turgidus var. *tenax* Kirchner, Krypt.-Fl. Schlesien 2(1): 262. 1878. *C. tenax* Hieronymus, Beitr. Biol. Pf. 5: 483. 1892. *C. turgidus* β *tenax* Kirchner ex Wille, Nyt Mag. Naturvid. 62: 180. 1925. *Gloeocapsa tenax* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 210. 1938. —Material presumably seen by the author, designated as the Type (W).

Chroococcus turgidus var. *subnudus* Hansgirg, Prodr. Algenfl. Böhmen 2: 161. 1892. *C. turgidus* f. *subnudus* Hansgirg in Kerner, Fl. Exs. Austro-Hung. 2398. *C. turgidus* δ *subnudus* Hansgirg ex Wille, Nyt Mag. Naturvid. 62: 181. 1925. *Gloeocapsa turgida* f. *subnuda* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 212. 1938. —Type from Stechovic, Bohemia (W).

Chroococcus turgidus var. *submarinus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 230. 1892. —Type from Zaule, Trieste (W). FIG. 104.

Chroococcus giganteus West, Trans. Roy. Microsc. Soc. 1892: 741. 1892. *C. turgidus* var. *giganteus* Cedergrén, Bot. Not. 1926: 299. 1926. *Gloeocapsa gigantea* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 220. 1938. —Type from Westmorland, England (BIRM).

Chroococcus schizodermaticus var. *badio-purpureus* W. & G. S. West, Journ. of Bot. 35: 302. 1897. —Type from Golungo Alto, Angola (BM). FIG. 103.

Chroococcus (*Rhodococcus*) *inignis* Schmidle, Allgem. Bot. Zeitschr. 1897: 108. 1897. —Type from Freiburg im Breisgau, Germany (ZT). FIG. 101.