CHAPTER 44

GEOLEGNIA Coker
In, Harvey, J. Elisha Mitchell Sci. Soc. 41:153. 1925

Monoecious. Sporangia elongate, cylindrical or swollen at intervals; Nonseptate, renewed sympodially. Spores nonmotile; large, spherical, oval, or elongate; encysting within the sporangium, and developing a thick wall; released on deliquescence of the sporangium wall. Gemmae lacking. Oogonia lateral, sometimes intercalary; predominantly spherical. Oogonial wall unpitted, smooth. Oogonial stalks of various lengths, generally slightly irregular and sometimes sparingly branched. Oospores eccentric; single. Antheridial branches androgynous, rarely diclinous. Antheridial cells apically and often narrowly appressed.

Type species: *Geolegnia inflata* Coker and Harvey, *in*, Harvey, J. Elisha Mitchell Sci. Soc. 41:154, pls. 12-15. 1925.

Species in this well-defined genus produce large, nonmotile, thick-walled spores in filamentous, sometimes swollen sporangia. Upon release, these spores produce a new mycelium directly without an intervening motile stage. The morphology of sporogenesis in species of *Geolegnia* is detailed in Chapter 7.

Members of *Geolegnia* are thought to be rare, but this may well be illusory. Since the individuals do not release motile spores specimen are not recovered in gross culture unless the bait is placed in direct contact with the soil samples. It is possible also that the more rapidly developing members of the family prove to be too competitive for the slower-growing Geolegnias, and the latter simply fail to form recognizable, vigorous colonies on the bait.

Key to the species of *Geolegnia*

1. Spores generally spherical or ovoid; sporangium wall swollen at intervals, the swellings generally containing only one spore . . . . . .*G. inflata* (p. 740)
1. Spores generally elongate, fusiform, broadly ellipsoidal, or cylindrical; sporangium wall not swollen at intervals . . . . . G. *septisporangia* (p. 742)

Geolegnia inflata Coker and Harvey
In, Harvey, J. Elisha Mitchell Sci. Soc. 41:154, pls. 12-15. 1925
(Figure 111 A-G)

Geolegnia intermedia Höhnk, Veroff. Inst. Meeresf., Bremerhaven 1:127. 1952.

Monoecious. Mycelium limited, very dense; hyphae slender, sparingly branched. Sporangia at first cylindrical or broadly filiform, then becoming swollen at intervals, and spores developing within the expanded portions; renewed in a basipetalous manner or by new sporangia developing on the distal portion of lateral branches that may originate sympodially; 70-380 (-655) x 8-29 μm. Spores nonmotile; spherical to oval or ovate, seldom elongate; released upon deliquescence of sporangium wall; formed always in a single row; at germination producing a new mycelium directly; spherical ones (13-) 14-17 (-19) μm in diameter, oval to ovate ones (12-) 15-18 (-26) x (6-) 11-14 (-15) μm. Gemmae lacking. Oogonia lateral; spherical or subspherical, occasionally obpyriform; (14-) 18-22 (-33) μm in diameter. Oogonial wall thin, unpitted; smooth. Oogonial stalks ($^1/_2$-) 1–1$^1/_2$ (-4) times the diameter of the oogonium, in length; slender, curved, bent, twisted or irregular; unbranched or once-branched. Oospores eccentric; spherical; single, and predominantly filling the oogonium; (13-) 15-20 (-28) μm in diameter; at germination forming an unbranched germ hypha with or without a sporangium. Antheridial branches predominantly androgynous, infrequently monoclinous, rarely diclinous; slender, sometimes irregular; unbranched or once-branched; persisting. Antheridial cells simple; generally clavate, usually strongly bent; persisting; apically attached, rarely laterally appressed; fertilization tubes not observed.

Geolegnia inflata is recognized by the catenulate aspect of its mature sporangia (Fig. 111 A). The sexual apparatus in this species (Fig. 111 D, G) is basically similar to that of *G. septisporangia* (Fig. 111 J, O) and it is doubtful that the two species can be separated with any degree of confidence on the structure of the oogonia and antheridia alone. *Geolegnia inflata* generally has shorter oogonial stalks than *G. septisporangia*, but this characteristic is not always readily apparent in old specimens.

The specimens we have recovered differ little from those characterized by Coker and Harvey (J. V. Harvey, *loc. cit*.). In our specimens, the oogonia and oospores are slightly larger than Coker and Harvey reported.

Geolegnia intermedia was described by Höhnk (*loc. cit*.) as a species near *G. inflata*, but differing in having slightly larger oogonia and oospores. The sporangium structure in Höhnk's species is identical to that of *G. inflata*, as is the configuration of the sexual apparatus. The oospores of *G. intermedia* are (Höhnk, 1952a) 16-19 μm in diameter, but only 13-15 μm in diameter in *G. inflata* (J. V. Harvey, *loc. cit*.). The oospores in our specimens of *G. inflata* were occasionally 20-22 μm in diameter (although this was not the most frequently occurring range). It appears that oospore size is much too inconstant among isolates to be of value taxonomically. For this reason, *G. intermedia* is merged with *G. inflata*.

CONFIRMED RECORDS: -- CZECHOSLOVAKIA: Cejp (1959a:262, fig. 100 c-f). GERMANY: Höhnk (1952a:80, 81, pl. 14); Richter (1937: 260, fig. 18). REPUBLIC OF CHINA: Chiou *et al*. (1975:170, pl. 3, figs. 31, 32). SOUTH AMERICA: Milanez (1970:30, figs. 20-28). UNITED STATES: Beneke (1948b:139); R. L. Butler (1975: figs. 205-208); J. N. Couch (1927:233, pl. 43); J. V. Harvey (*loc. cit*.); Milanez (1966:97, pl. 11); Milanez and

Beneke (1968:17, pl. 2, figs. 5-7); Wolf (1944:42, pl. 5, fig. 34); A. W. Ziegler (1948b:27, pl. 6, figs. 17-23; 1952:15, pl. 1, fig. 8; pl. 6, fig. 8).

RECORDED COLLECTIONS: -- BRITISH ISLES: Dick (1963, 1966); Dick and Newby (1961). DENMARK: A. Lund (1978). GERMANY: Höhnk (1935a). UNITED STATES: Beneke and Schmitt (1961); Coker (1927); Coker and Braxton (1926); J. V. Harvey (1925b; 1927b, c; 1930; 1942; 1952); T. W. Johnson (1956a); V. D. Matthews (1927); Pendergrass (1948); K. B. Raper (1928); Schmitt and Beneke (1962); Scott (1960b); A. W. Ziegler (1958b). USSR: Dudka (1965).

SPECIMENS EXAMINED: -- NORWAY (1), TWJ, UNITED STATES (3), RLS.

Geolegnia septisporangia Coker and Harvey
In, Harvey, J. Elisha Mitchell Sci. Soc. 41:155, pl. 16. 1925.
(Figure 111 H-P)

Monoecious. Mycelium limited, very dense; hyphae slender, moderately branched. Sporangia cylindrical to broadly filiform, usually curved and somewhat sinuous; renewed in a basipetalous fashion or sympodially; 38-187 x 10-24 μm. Spores nonmotile; predominantly cylindrical, fusiform, or broadly ellipsoidal, infrequently to rarely oval; released upon deliquescence of sporangium wall; formed always in a single row; at germination producing a new mycelium directly; 13-67 x 9-21 μm. Gemmae very rare; clavate to broadly obpyriform; single, terminal. Oogonia lateral, infrequently terminal; spherical to obpyriform; (15-) 24-30 (-38) μm in diameter. Oogonial wall thin, unpitted; smooth. Oogonial stalks ($^1/_2$-) 1-3 (-5) times the diameter of the oogonium, in length; slender; straight or curved, but usually somewhat irregular; unbranched. Oospores eccentric; spherical; single, and usually filling the oogonium; (13-) 22-29 (-36) μm in diameter; germination not observed. Antheridial branches androgynous, rarely monoclinous; slender, generally twisted and irregular; unbranched or once-branched; persisting. Antheridial cells simple; short, tubular to clavate, sometimes strongly bent; persisting; usually apically appressed, with portion nearest oogonial wall occasionally constricted into a neck-like extension; infrequently laterally attached; fertilization tubes present or absent.

See comments under *Geolegnia inflata*.

In their account of *Geolegnia septisporangia* Coker and Harvey (J. V. Harvey *loc. cit*.) stated that the sporangia of this species became septate after the basal septum delimited them from the subtending hyphae. The account by J. N. Couch (1927:235, 236, pl. 42, figs. 8-23) of spore and sporangium development in this species disproves this view, as was recognized by Coker and Matthews (1937:58f).

CONFIRMED RECORDS: -- GERMANY: Höhnk (1952a:84). UNITED STATES: Coker and Harvey (*loc. cit*.); J. N. Couch (1927:235, pl. 42, figs. 8-23).

RECORDED COLLECTIONS: -- AFRICA: Alabi (1967, 1971b, 1973). BRITISH ISLES: Dick (1966). DENMARK: A. Lund (1976). UNITED STATES: Coker (1927); Coker

and Braxton (1926); J. V. Harvey (1925b, 1927b, c; 1930, 1942, 1952); Höhnk (1935a); T. W. Johnson (1956a); K. B. Raper (1928).

SPECIMENS EXAMINED: -- AFRICA (1), UNITED STATES (3), RLS. MWD (1).

Geolegnia sp.

BRITISH ISLES: Barnes and Melville (1932). GERMANY: Bock (1956:41); Höhnk (1935a). UNITED STATES: G. C. Hughes (1959, 1962).