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Pleosporales in Japan (5): Pleomassaria, Asteromassaria, and Splanchnonema

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Abstract Eight species in Pleomassariaceae are described and illustrated. They are Pleomassaria maxima, Pl. swidae, Pl. siparia “type A,” Prosthemium canba, Asteromassaria macroconidica, A. pulchra, Splanchnonema mori, and S. argus. Of these, Pl. swidae on twigs of Swida controversa, Pr. canba on Betula ermanii, and A. macroconidica on twigs of Prunus ¥ yedoensis and an unknown woody plant are new. Three species, Pl. siparia “type A,” A. pulchra, and S. argus, are reported from Japan for the first time. A new combination, S. mori (= Massaria mori), is proposed.

Key words Ascomycetes · Corynespora · Myxocyclus · Shearia · Taxonomy

Introduction

The present article is the fifth in a series describing pleosporalean fungi in Japan. Eight species in Pleomassariaceae including three new species and one new combination are reported here.

The family Pleomassariaceae comprises taxa with medium- to large-sized sphaerioid or conoid ascomata, rounded or short papillate beak with a lysigenous ostiole, pseudoparenchymatous ascomal wall, usually with a weft of brown hyphae, narrowly cellular pseudoparaphyses embedded in gel matrix, and oblong to clavate bitunicate asci. The most characteristic feature in this family is found in the ascospores. They are large-sized, reddish- to dark brown, obovoid with bipolar asymmetry or fusoid to oblong with bipolar symmetry, one to several transversely septate or muriform, and usually surrounded by a conspicuous gelatinous sheath.

Species in the family are considered to be saprophytes on woody substrate, but their hosts are mostly restricted. Asteromassaria verruculosa Sivan. is only known as a folicolous species (Sivanesan 1988), although Barr (1993b) suggested that it belongs to Venturiaceae. Two Prosthemium Kunze species that are anamorph-states of Pleomassaria siparia (Berk. & Broome) Sacc. complex are reported as endophytes or phellophytes (Kowalski and Holdenrieder 1996; Kowalski and Kehr 1992).

There are several opinions about the members in this family. For example, Barr (1993b) recognized five genera in this family, but in the Dictionary of the Fungi (Kirk et al. 2001), three genera are listed in Pleomassariaceae. At present, we consider that the following seven genera may have relationships to Pleomassaria Speg., the type genus of the family: these are Asteromassaria Hohn., Endotryblidium Petr., Kirschsteiniothelia D. Hawksw., Peridiothelia D. Hawksw., Pleomassaria, Splanchnonema Corda, and Splanchospora Lar. N. Vassiljeva. Among these, Pleomassaria, Asteromassaria, and Splanchnonema are major groups in terms of species number, and they are treated here.

Pleomassaria, lectotypified by P. siparia, is characterized by large-sized (mostly more than 35 × 11 µm), ellipsoid to obovoid ascospores with both transverse and longitudinal septa (Barr 1982; Shoemaker and LeClair 1975). Barr (1993b) treated this genus as a synonym of Splanchnonema based on the similarities in most respects except for the ascospore septation. In this article, however, we consider that the differences in ascospores are enough to separate them as a natural group respectively. The ascospores of Pleomassaria species are dictyosporous and more nearly symmetrical than those in Splanchnonema. In Splanchnonema, by contrast, those are phragmosporous and mostly have a strongly submedian primary septum. Barr (1982, 1990) recognized seven North American species and one European species in Pleomassaria. Furthermore, some species previously described in Splanchnonema, such as S. arbuti M.E. Barr, S. vaccinii M.E. Barr (Barr 1993a), S. noliae A.W. Ramaley & M.E. Barr (Ramaley and Barr
Kalakadense A.W. Ramaley (Ramaley 1995), and S. dasylirionis are obviously related to Pleomassaria and must be transferred to this genus. Asteromassarina, typified by A. macrospora (Desm.) Höhn., is composed of 11 species (Barr 1982, 1993b; Boise 1985; Mehrotra and Sivanesan 1989; Sivanesan 1988). The ascospores of Asteromassaria are somewhat similar to those of Splanchnonema. In the former genus, those are symmetrically septate in both hemispores and with nearly median primary septum, whereas in the latter those are mostly asymmetrically septate and/or with more submedian primary septum.

Splanchnonema was established by Corda taking S. pustulatum Corda [now a synonym of S. foedans (Fr.) Kuntze] as the type species (Barr 1982; Shoemaker and LeClair 1975). Twelve species are described as Splanchnonema by Barr (1982), and later more than 10 species are additionally reported (Aptroot 1998; Barr 1993a,b; Hsieh et al. 1997; Leroy et al. 2000; Ramaley 1995; Ramaley and Barr 1995; Subramanian and Sekar 1987). These species, however, probably include Pleomassaria or Splanchnospora elements, and rearrangements are required. Splanchnonema can be distinguished from Splanchnospora by its phragmospores, rather than didymospores with a strongly submedian primary septum.

Barr (1982) stated that if information about the anamorphs is known for more of the taxa, this will clarify relationships among the species in the family. However, such knowledge is probably still insufficient. Shearia Petr. (Barr 1982; Sutton 1980) and Prosthemium (Hantula et al. 1998; Paavolainen et al. 2000) are reported as anamorphs of Pleomassaria species. In Asteromassaria, those are Scolicosporium Lib. ex Roum. (Sivanesan 1984; Spooner and Kirk 1982) and Macrodiplodiopsis Petr.-like (Barr 1993b). Myxococcus Riess, Stegosphoria Corda (Sivanesan 1984), Macrodiploidiopsis (Glawe 1985), and Helminthosporium Link (Subramanian and Sekar 1987) are known for anamorphs of Splanchnonema. The anamorphs in this family are generally coelomycetous, having holoblastically produced conidia with somewhat complex morphology. However, there are also species having hymenomycetous anamorphs with tretic conidia, such as Splanchnonema kalakadense Subram. & Sekar (Anam.: Helminthosporium) and Kirschsteiniothelia aethiops (Berk. & M.A. Curtis) D. Hawksw. (Anam.: Dendryphiopsis S. Hughes) (Subramanian and Sekar 1987).

The floristic work of Pleomassariaceae in Japan is only poorly known. Shearia fusca (Berk. & M.A. Curtis) M.E. Barr [an anamorphic state of Pleomassaria maxima Ellis & Everh. (Tubaki et al. 1983)], Splanchnonema phoricioides (I. Miyake) Leroy, Gauthier & M.E. Barr (Kimura 1975), and Kirschsteiniothelia elasterascus Shearer (Tsui et al. 2003) have been reported to date. Massararia moricola I. Miyake (Miyake 1916) most probably is a species of Asteromassaria, and it is close to A. olivaceohirta (Schwein.) M.E. Barr (Barr 1982; Shoemaker et al. 2003) on Morus spp. Besides, there are some mentions of Pleomassaria in the list of Hara (1954), but their occurrences in Japan are doubtful.

The methods of microscopic observation, single spore isolation and induction of anamorph/teleomorph formation in culture are the same as those described in Tanaka and Harada (2003). Specimens cited in this article were mainly kept at the Herbarium of Hiroshi University, Fungi (HHUF), and some isotype or paratype materials were preserved at TNS-F. All culture strains were deposited at the culture collections of MAFF and JCM.

### Taxonomy


   Anamorph: Shearia fusca (Berk. & M.A. Curtis) M.E. Barr, Mycotaxon 15: 373, 1982. Figs. 1–6, 74

Ascomata 550–850µm high, 650–1150µm in diameter, immersed, globose, with a papillate beak 150–250µm long. Ascomal wall composed of 2 zones; outer zone 42–100µm thick, composed of globose to rectangular cells 5–20µm in diameter; inner zone 22–33µm thick, composed of 5–7 layers of prismatic cells of 10–20 × 3.5–6.5µm. Pseudoparaphyses 1–2µm thick, septate, branched and anastomosed, with slime coating. Asci (185.5–207.5–283–(308) × 41.5–51(–55)µm (mean = 253.0 × 47.6µm, n = 28), fissitunicate, clavate, 8-spored. Ascospores (51–)59.5–75 (–83) × (18–)19.5–25µm (mean = 66.5 × 22.3µm, n = 80), L/W 2.6–3.5 (mean = 3.0, n = 80), fusiform to cylindrical, muriform, 7–11-transversely septate, with a primary septum submedian (0.52–0.57; mean = 0.54, n = 80), pale brown to dark brown, smooth, with a sheath 2–7µm thick.

Cultural characteristics: Colonies on potato dextrose agar (PDA; Difco, Detroit, MI, USA) 39–43mm in diameter after 4 weeks at 20°C in the dark, Orange Grey (5B2; Konnerup and Wanscher 1978) with Black to Grey (1C1) dots of conidiomata, with White (1A1) irregular margin; reverse Greyish Orange (5B5) to Orange White (5A2); no pigment produced. On rice straw agar (RSA; Tanaka and Harada 2003), the Shearia fusca-state formed within 2 months. Conidiomata 500–750µm high, 500–620µm in diameter, subglobose. Beak central, 220–380µm long. Wall 65–115µm thick at sides, composed of 2 zones; outer zone of angular cells 5–20µm in diameter, inner zone composed of 3–4 layers of rectangular cells of 12–23 × 5–8µm. Conidiogenous cells holoblastic, anellidic, 5–30 × 4–8.5µm, cylindrical to doliform. Conidia 67–98 × 22–27(–30.5)µm (mean = 81.5 × 25.2µm, n = 50), L/W 2.9–3.6 (mean = 3.2, n = 50), fusiform, 11–17-septate, truncate (5–6.5µm wide) at the base, with a basal sheath.

Specimens examined: On twigs of Magnolia praecocissima Koidz. var. borealis (Sarg.) Koidz.: Campus of Hokkaido University, Sapporo, Hokkaido, 41°20.5′E, 43°04.0′N, Apr. 19, 2000, KT. 104 (HHUF 28525); 171 (HHUF 28526); Apr. 20, 2000, KT. 172 (HHUF 28527); Apr. 24, 2000, KT. 110 (HHUF 28528); May 1, 2000, KT. 138–140 (HHUF 28529–28531); May 11, 2000, KT. 175 (HHUF 28532); May 26, 2000, KT. 216 (HHUF 28533); May