

## A reassessment of the *Xylaria* on *Liquidambar* fruits and two new taxa on *Magnolia* fruits

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*Xylaria liquidambar* sp. nov. is proposed for a common inhabitant of *Liquidambar* species fruits that is usually considered to be *X. persicaria*. The status of *X. persicaria* is discussed. *Xylaria jaliscoensis* sp. nov. is described from fruits of *Magnolia iltisiana* from Mexico. *Xylaria magnoliae* var. *microspora* var. nov. is described from fruits of *Magnolia* sp. from Thailand.

Keywords: *Liquidambar*, *Magnolia*, *Xylaria*, Xylariaceae.

Fruit- and seed-inhabiting species of *Xylaria* seem host-specific (Rogers, 1979), although *X. oxyacanthae* Tul. & C. Tul. apparently is occasionally found on hosts unrelated to its principal host, *Crataegus* (Stowell & Rogers, 1983). Herein we discuss a common inhabitant of *Liquidambar* fruits which, we believe, is host-specific, has been misinterpreted, and deserves the status of a new species. Two new taxa are described from fruits of *Magnolia* species.

### Materials and methods

Asci and ascospores were examined by differential interference microscopy (DIF) or bright field microscopy (BF) in mounts of water and Melzer's iodine reagent. Cultures were initiated from multiple ascospores plated on SME medium (Kenerley & Rogers, 1976). Resulting cultures were transferred to 2% Oatmeal agar (Difco) (OMA) and culture descriptions were made from colonies on this medium.

### Taxonomic part

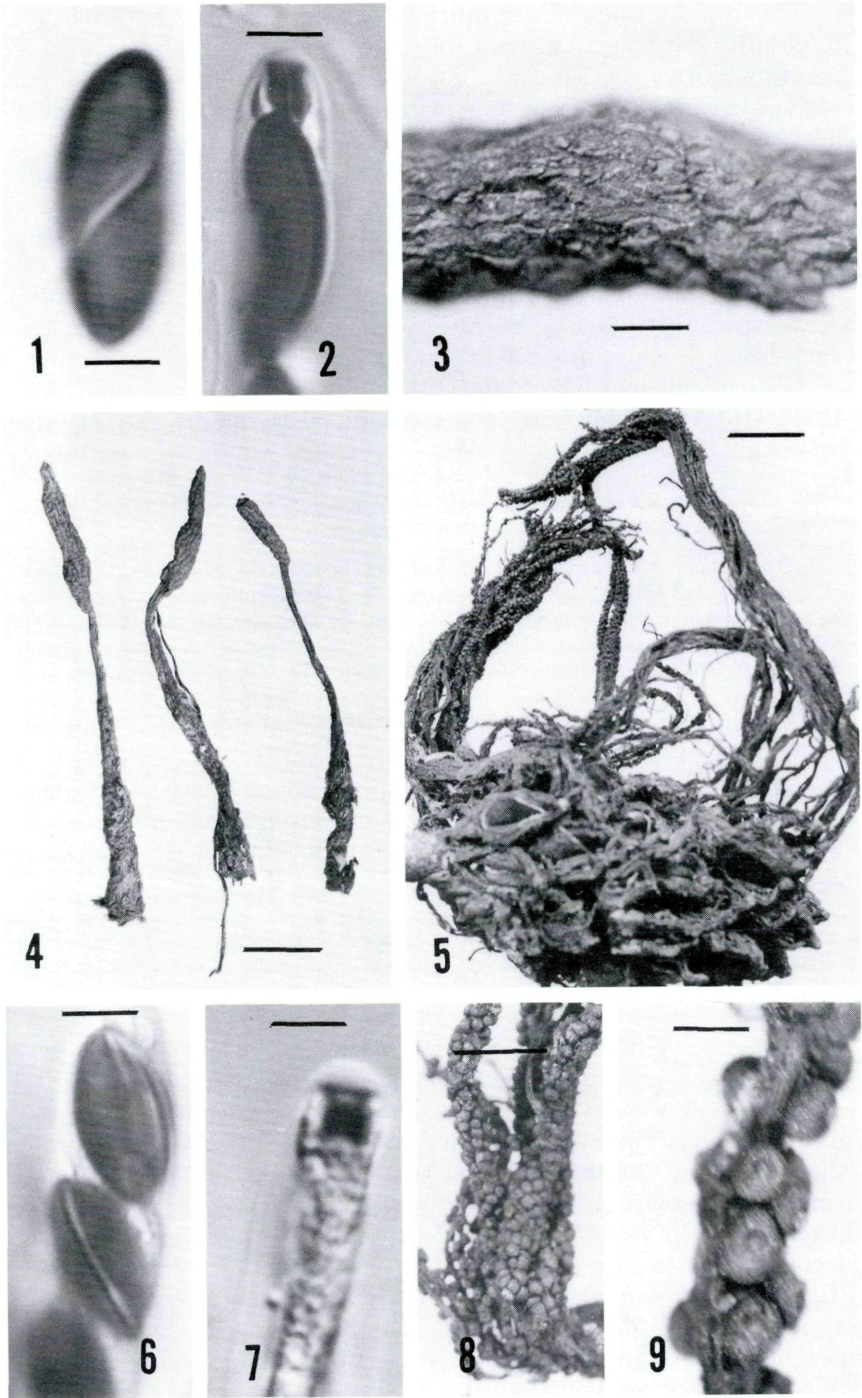
Schweinitz (1822) reported *Sphaeria carpophila* on fruits of *Liquidambar styraciflua* L. Over the years we have examined nume-

rous collections of *Xylaria carpophila* (Pers. : Fr.) Fr. and have found it only on fruits of *Fagus* spp. The *Xylaria* on *Liquidambar* differs morphologically from *X. carpophila* in having ascospores with a long spiraling germ slit (Rogers, 1979) and in cultural characteristics (Callan & Rogers, 1993). What, then, is the *Xylaria* constantly associated with *Liquidambar* fruits? Rogers (1979), following Miller (1941) and others, considered the *Xylaria* on *Liquidambar* fruits to be *X. persicaria* (Schwein. : Fr.) Berk. & M. A. Curtis. Schweinitz (1822) described *Sphaeria persicaria* from buried peach [*Prunus persica* (L.) Batsch] seeds or pits. Ellis and Everhart (1892) remarked that Schweinitz material of this fungus is immature, a finding corroborated by us after examination of the type from PH. Moreover, the immature Schweinitz specimen seems too robust to be conspecific with the fungus on *Liquidambar*. Finally, because seed- and fruit-inhabiting *Xylaria* species generally appear to be highly host-specific, it seems unlikely that a *Xylaria* that colonizes peach pits likewise regularly colonizes fruits of an unrelated genus. We cannot prove this by morphological analysis because critical type material lacks ascospores. The fungus on *Liquidambar*, however, requires typification and a valid name. We thus name and describe it here.

***Xylaria liquidambar* J. D. Rogers, Y.-M. Ju & F. San Martín, sp. nov. – Figs. 1–4.**

Stromata erecta, indivisa vel parce ramosa, singularia vel gregaria e fructu exorientia, in toto usque ad 6 cm alta. Pars fertilis cylindrica vel plus minusve conica plerumque apice acuto sterili, 0.5–3 cm alta × 1–3 mm crassa, peritheciis inclusis vel aliquantum prominentibus et striis longitudinalibus. Stipites glabri vel pubescentes basi pannoso, usque ad 1 mm crassi. Exterior partis fertilis primo brunnea demum nigra, stipitibus nigris; pars interior stromatis alba. Textura molliuscula. Perithecia 0.2–0.3 mm diam. Ostiola parum papillata. Asci octospori, stipitati, (115–)150–190 µm longitudine tota × 5–8 µm crassi, partibus sporiferis (80–)100–120 µm longitudine, annulo apicali in liquore iodato Melzeri cyanescenti, plus minusve cylindrico, 2–3 µm alto × 1.5–3 µm lato. Ascosporae brunneae, unicellulares, ellipsoideo-inequilaterales vel lunatae, leves, (10–)12–15(–16) × 4–6.5 µm, rima germinativa longa spirali praeditae. Paraphyses abundantes.

Figs. 1–9. – *Xylaria liquidambar* and *X. jaliscoensis*. – Figs. 1–4. *X. liquidambar*. – 1. Ascospore showing part of spiraling germ slit. – 2. Ascus apical ring with ascospore impinging on it from beneath. – 3. Portion of stroma showing surface features. – 4. Stromata. – Figs. 5–9. *X. jaliscoensis*. – 5. Stromata in rope-like aggregations arising from *Magnolia* fruit. – 6. Ascospores, one showing the germ slit. – 7. Immature ascus showing ascus apical ring. – 8, 9. Details of stromata. – Figs. 1 and 2 by BF – Figs. 3–5, 8, 9 by photomicrography. – Figs. 6, 7 by DIF – Figs. 1 and 6 from water mounts. – Figs. 2 and 7 from Melzer's iodine mounts. – Bars: 1 = 3.5 µm; 2 = 4 µm; 3 = 1 mm; 4 = 5 mm; 5 = 10 mm; 6 = 5 µm; 7 = 3 µm; 8 = 3 mm; 9 = 0.7 mm.





Stromata upright, unbranched or sparingly branched, solitary to cespitose arising from fruit, in total up to 6 cm high. – Fertile part cylindrical to conical, often with acute sterile apex, 0.5–3 cm high  $\times$  1–3 mm thick, bearing embedded to somewhat prominent perithecia and with longitudinal striations. – Stipes glabrous to pubescent from pannose base, up to 1 mm thick. Exterior of fertile part at first brown, becoming black, with black stipes. Interior white. Texture soft. – Perithecia 0.2–0.3 mm diam. – Ostioles slightly papillate. – Asci 8-spored, stipitate, (115–)150–190  $\mu$ m total length  $\times$  5–8  $\mu$ m diam, spore-bearing part (80–)100–120  $\mu$ m long, with ascus apical ring bluing in Melzer's iodine reagent, more or less cylindrical, 2–3  $\mu$ m high  $\times$  1.5–3  $\mu$ m broad. – Ascospores brown, one-celled, ellipsoid-inequilateral to crescent-shaped, smooth, (10–)12–15(–16)  $\times$  4–6.5  $\mu$ m, with long spiraling germ slit. – Paraphyses abundant.

Etymology. – For the host of the fungus.

Specimen examined. – UNITED STATES, Florida, Alachua Co., on fruit of *Liquidambar styraciflua* L., J. D. Rogers & J. W. Kimbrough, July, 1972, as *Xylaria persicaria* (Schwein. : Fr.) Berk. & M. A. Curtis, holotype, WSP 72081. Additional specimens examined and cited as *X. persicaria*, see Rogers (1979) and San Martín González & Rogers (1989).

Colony at ca. 20 °C under 12 h fluorescent light covering 9 cm diam Petri plate in 3 wk, with mycelium appressed, at first white becoming black with concentric zones, producing few to many stromata after 3–4 wk. – Stromata up to 2 cm high, tapering upward from 3–4 mm diam base, black tomentose at base, white toward apex. – No conidia observed.

Culture. – ATCC 42766 (as *X. persicaria*). Originated from the following collection: United States, Georgia, on fruit of *Liquidambar styraciflua* L., E. S. Luttrell, Aug 1975, herb. J. D. Rogers.

It is our opinion that a fungus equivalent to *X. persicaria* was at one time common along the Atlantic seaboard of the USA. According to Crosby (1986), the peach was probably introduced into Florida by the Spanish. When the English first penetrated into the interior of Carolina and Georgia, they found peach trees flourishing in American Indian orchards and many growing wild (Crosby, 1986). Hogs especially liked peaches and large orchards were planted to feed them (Crosby, 1986). Thus, it seems probable that *X. persicaria* was at one time more common owing to the abundance of peach pits, a situation that changed as fewer wild peaches were extant and orchard practices changed in such ways that fewer pits were available.

*Xylaria liquidambar* seems common on *Liquidambar styraciflua* in the United States and at higher elevations in Mexico (see Rogers, 1979; San Martín González & Rogers, 1989, cited as *X. persicaria*). It is also present in China on fruits of *Liquidambar* (?) *formosana* Hance (Rogers, 1979). Ascospores of *X. liquidambar* (as *X. persicaria*) were erroneously cited as  $10-13 \times 4-5 \mu\text{m}$  in Rogers (1979). They should have been cited as  $10-15 \times 4-6 \mu\text{m}$ , based on the material examined (Rogers, 1979). Rogers (1986) reported ascospores as  $10-15(-16) \times 4-6 \mu\text{m}$ , based upon examination of additional material.

***Xylaria jaliscoensis*** San Martín, J. D. Rogers & Y.-M. Ju, **sp. nov.** – Figs. 5–9.

Stromata conice elongata, usque ad 10 cm longa, e 3 mm diam base ad filiformia ad apice, interdum aliquot in funiformes structuras aggregata ubique tomentosa, cum peritheciis conspicuis dispersis vel constipatis praeter ad apice. Extus nigra, intus alba. Perithecia 0.3–0.7 mm diam, cum tumulis conspicuis. Ostiola papillata, interdum disco circumcincta. Asci octospori, stipitati,  $125-150 \mu\text{m}$  longitudine tota  $\times 6-8 \mu\text{m}$  crassi, partibus sporiferis  $70-75 \mu\text{m}$  longitudine, annulo apicali in liquore iodato Melzeri leviter cyanescenti, plusminusve cylindrico,  $3 \mu\text{m}$  alto  $\times 2.5 \mu\text{m}$  lato. Ascosporae brunneae, unicellulares, ellipsoideo-inequilaterales apicibus angustatis, laeves,  $10-11(-12) \times (5-6) 6.5-7 \mu\text{m}$ , rima germinativa longa recta in latere complanato praeditae. Paraphyses abundantes. Status amorphicus ignotus.

Stromata long conical, up to 10 cm long, from 3 mm diam at base to hair-like at apices, often several in rope-like aggregations, tomentose overall, bearing scattered or crowded aggregations of perithecia except at apex. Externally blackish, internally white. – Perithecia 0.3–0.7 mm diam with conspicuous outlines. – Ostioles papillate, sometimes surrounded by faint disc. – Asci 8-spored, stipitate,  $125-150 \mu\text{m}$  total length  $\times 6-8 \mu\text{m}$  broad, the spore-bearing part  $70-75 \mu\text{m}$  long, with apical ring bluing lightly in Melzer's iodine reagent, more or less cylindrical,  $3 \mu\text{m}$  high  $\times 2.5 \mu\text{m}$  broad. – Ascospores brown, unicellular, ellipsoid-inequilateral with narrow ends, smooth,  $10-11(-12) \times (5-6) 6.5-7 \mu\text{m}$ , with long germ slit on flattened side. – Paraphyses abundant. – Anamorph unknown.

**Etymology.** – For the Mexican State of Jalisco where the fungus was collected.

**Specimen examined.** – MEXICO, Jalisco State, Autlán municipality, Mahantlán Biosphere reserve, Las Joyas, alt. 1900 m, on fallen fruits of *Magnolia iltisiana* A. Vazquez, L. Guzmán-Davalos 2896, 14 Oct 1987, holotype WSP 70282; isotype XAL.

This fungus appears to be undescribed. It differs from *X. magnoliae* in having dark-colored ascospores with a prominent germ slit. It somewhat resembles *X. ianthino-velutina* (Mont.) Fr. (Rogers,

1979), but the stromata are less robust and that species usually occurs on fruits of Leguminosae. As mentioned earlier herein, seed- and fruit-inhabiting *Xylaria* species seem highly host-specific.

***Xylaria magnoliae*** J. D. Rogers var. ***microspora*** J. D. Rogers, Y.-M. Ju & A. J. S. Whalley, var. nov.

A varietate typica differt in ascosporis  $(8.5-9-10.5(-11) \times 3-4 \mu\text{m})$ .

Differs from the typical variety in ascospores  $(8.5-9-10.5(-11) \times 3-4 \mu\text{m})$ .

Specimens examined. – THAILAND, Chiangmai Province, Doi Inthanon Park on fallen fruit of *Magnolia* sp., R. J. Bandoni & T. W. Flegel 10812, 22 Sept 1994, holotype, WSP 70283; Same location, host, and date. A. J. S. Whalley 4964, herb. J. D. Rogers. This is probably part of the collection that is designated as holotype.

The present fungus seems nearly identical with *X. magnoliae* except for the smaller ascospores,  $(8.5-9-10.5(-11) \times 3-4 \mu\text{m})$  vs  $11-15(-17) \times 3-5(-6) \mu\text{m}$  (Rogers, 1979). Cultures of the two varieties are very similar, except that those of the typical variety cover a 9 cm diam Petri plate in 4 wk (Callan & Rogers, 1993). The present fungus did not cover a 9 cm diam Petri plate after 8 wk. Unfortunately, the culture died and is not deposited in a culture collection. To our knowledge, this is the only collection of either variety of *X. magnoliae* to have been reported from Asia.

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