New species of pyrenomycetes from eastern Russia: *Endoxylina rufula* (Diatrypaceae)

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Vasilyeva LN 2010 – New species of pyrenomycetes from eastern Russia: *Endoxylina rufula* (Diatrypaceae). Mycosphere 1(2), 163–166.

Endoxylina rufula is described and illustrated based on a collection found in eastern Russia. Its distinctive features are the rusty-colour of stromata studded with black and rounded ostioles, as well as comparatively small and fusiform ascospores. Asci in the same fascicles always contain ascospores of two kinds: non-septate *Barrmaelia*-like and septate *Endoxylina*-like; the former do not look like the immature state of the latter.

Key words – ascomycetous fungi – *Diatrypales* – taxonomy

Article Information
Received 4 April 2010
Accepted 10 May 2010
Published online 3 August 2010
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Introduction

The most recent comparative discussion of species placed in the genus *Endoxylina* Romell is found in Chacón (2002). The concept of the genus is rather broad, and it is characterized as having uni- to triseptate ascospores and stromata of valsoid or eutypoid configurations (Ju et al. 1996). Two groups of species have been segregated (Sivanesan 1977, Chacón 2002), one possessing ellipsoid, subfusoid to ovoid ascospores, and another having cylindrical to allantoid ascospores.

A species from the Russian Far East falls into the first group, which consists of only four species. Two of these, *Endoxylina citricola* Ou and *E. mori* Sawada, were described from tropical regions of eastern Asia, in southern China (Teng 1938) and Taiwan (Sawada 1959), respectively. *Endoxylina dilabentispora* Frolov is only known from the type locality in Turkmenistan (Frolov 1970), whereas *E. indica* Mhaskar & V.G. Rao is found in Asia as a whole.

Species of the second group—*Endoxylina astroidea* (Fr.) Romell, *E. anserina* (Pers. :Fr.) E. Müll., *E. crocea* Kirschst., *E. pini* Sivan., *E. polyspora* E. Müll.—with cylindrical to allantoid ascospores are mostly European, except for North American *E. allantospora* (Ellis & Everh.) Shoemaker & Egger and Mexican *E. tehuacanensis* S. Chacón. Both latter taxa deviate from European species in having either valsoid stromata (*E. allantospora*) or 3-septate ascospores (*E. tehuacanensis*).

Methods

Microscopic analyses were carried out using standard techniques. Observations, measurements, and photographs of asci and ascospores were made using a Zeiss Primo Star microscope, G10 digital camera, and Axio-

Vision microsoft. The photographs of stromata were taken using a Nikon D40x digital camera.

Results

Endoxylina rufula Lar.N. Vassiljeva, **sp. nov.** Figs 1–9

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Etymology – *rufula* refers to the rust-colored surface of stromata.

Stromata 3–15 × 2.5–5 mm, ligno immersa, ex parte erumpentia, intus et extus rufula, ostilis nigris et globosis, 300–450 µm diam. adspersa; peritheciis profunde immersis, nigris, 400–600 µm diam. Asci fasciculati, paraphysati, cylindrici, p. sp. (57–)60–80(–83) × 5–7 µm, cum annulus apicalis J-negativus, stipitibus (24–)30–40(–44) longitudine. Ascosporae uniseriatae, fusoideae, 1-septatae, interdum leviter constrictae, fuscae, (8.5–)9–13(–13.8) × 2.7–3.7(–4) µm.

Holotypus – VLA P-2492.

Stromata 3–15 × 2.5–5 mm, immersed in wood, partly erumpent with upper portion that is often rust-coloured and studded with black and rounded tops of perithecial necks 300–450 µm diam.; perithecia deeply immersed in wood, black, 400–600 µm diam. Asci cylindrical, spore bearing parts (57–)60–80(–83) × 5–7 µm, apical apparatus J-negative, stalks (24–)30–40(–44) µm long; paraphyses numerous. Ascospores uniseriate, fusiform, 1-septate, sometimes slightly constricted at the septum, brown, (8.5–)9–13(–13.8) × 2.7–3.7(–4) µm; 1-celled ascospores (in the same perithecia) light brown, (10.3–)11–13 × (3.6–)4–5(–5.4) µm.

Holotype – Russia, Primorsky Territory, Vladivostok vicinity, on wood, 8 Oct 2000, L. Vasilyeva, VLA P-2492.

Discussion

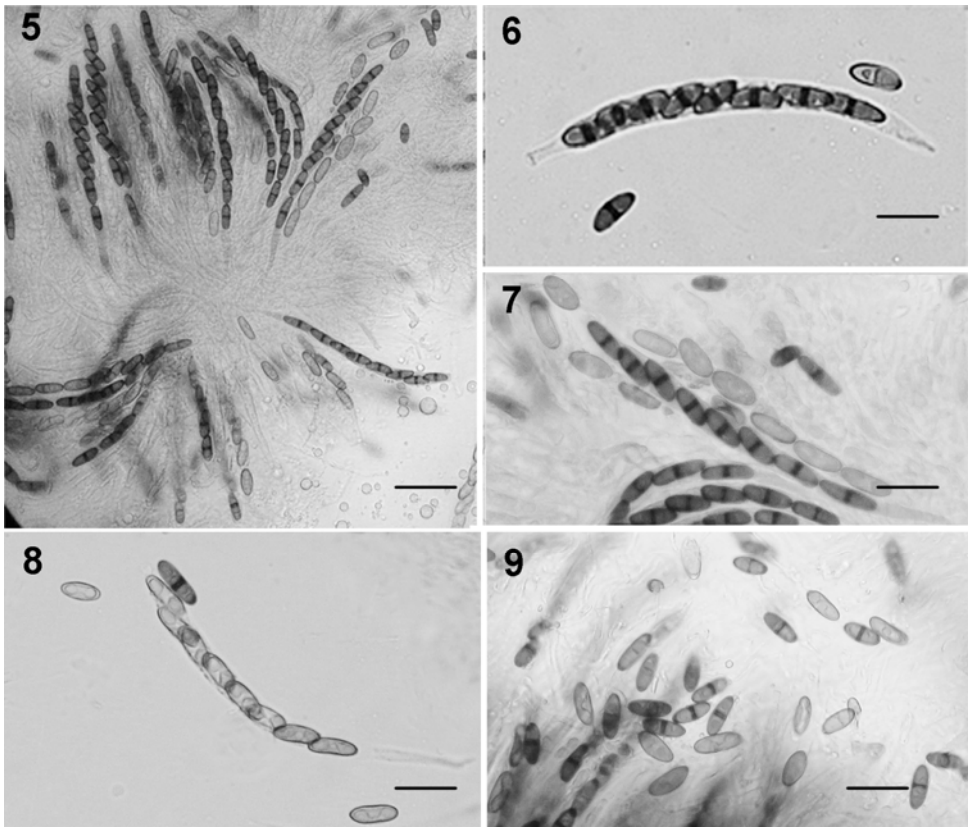
In contrast to *Endoxylina rufula*, other Asian species have larger ascospores: 15–22 × 4.5–10 µm (*E. mori*), 27–34 × 12–14 µm (*E. citricola*), 30–36 × 12–13 µm (*E. dilabentispora*). Also, these species lack the rusty coloured tissue of the upper part of stromata.

The very distinctive feature of *E. rufula* is the large and round tops of perithecial necks ('ostioles') at the surface of stromata. This seems to be at odds with the genus position within a taxonomic system, since "the presence of cruciform ostioles on the perithecia, along with the characteristically dark, septate, oblong-allantoid spores, are sufficient reasons to ratify the genus *Endoxylina* within the order Diatrypales" (Chacón 2002: 61). However, several diatrypaceous fungi (*Diatrype hypoxyloides* De Not., *D. caryae* Lar.N. Vassiljeva & S.L. Stephenson, *Eutypa lata* (Pers.) Tul. & C. Tul., *Eutypella bonariensis* (Speg.) Sacc.) do not have cruciform ostioles, and this feature serves for delineation only at the species level. Therefore, the lack of cruciform ostioles in *Endoxylina rufula* allows us to recognize a new species within the genus. On the other hand, ascospore septation (or non-septation) was often considered to be of generic importance. That is why *Endoxylina* might be distinguished from *Eutypa* Tul. & Tul. (cf. Rappaz 1987), but the placement of both genera within the separate order Diatrypales should be based upon other features.

Romero & Minter's (1988) suggestion that the Diatrypaceae should be recognized as distinct at the ordinal level, based on the organization of their ascogenous cells, is of interest. My impression that precisely such organization of ascogenous system entails the connection of asci in characteristic fascicles observed in many diatrypaceous fungi when ascomata are squashed. This might oppose these fungi as having fasciculate asci to xylariaceous fungi with hymenial asci, despite all the pyrenomycetes were considered to be ascohymenial and once placed into the group Ascohymeniales (Nannfeld 1932). Although the Diatrypaceae are included within the Xylariales (Kirk et al. 2008) so far, the different types of ascomatal ontogenies ("Eutypa"-type and "Xylaria"-type) were recognized for the Diatrypaceae and the Xylariaceae (Parguey-Leduc 1970, 1971).

The large and semiglobose 'ostioles' of *Endoxylina rufula* are even similar to ascomata of some superficial pyrenomycete. In this respect, one might remember the ascomata of *Scotiosphaeria endoxylinae* Sivan. parasitizing stromata of *Endoxylina pini* (Sivanesan 1977): both host and parasitic fungi are similar in having 1-septate brown ascospores which differ in shape and size. Nothing of this kind is observed in the stromata of *Endoxylina rufula*, but here the same ascal fascicles consist of asci with two types of ascospores, so one might

Figs 1–4 – *Endoxylina rufula*. **1, 2–4** Appearance of stromata on the wood. **3** Stroma at the cross section – Bars **1**: 1.1 mm; **2, 3**: 0.9 mm; **4**: 1.4 mm.



Figs 5–9 – *Endoxylina rufula*. **5** Paraphysate fascicle of asci. **6** Ascus with *Endoxylina*-like ascospores. **7, 9** Mixture of *Endoxylina*- and *Barrmaelia*-like asci and ascospores. **8** Ascus with *Barrmaelia*-like ascospores – Bars **5**: 20 µm, **6**: 11 µm, **7–9**: 13 µm.

have an impression that one fungus parasitizes another.

Some asci contain 2-celled, dark brown ascospores characteristic of *Endoxylina*, others are filled with 1-celled light brown ascospores, which are usual in *Barrmaelia* Rappaz. The latter genus is described as having eutypoid stromata and *Libertella* anamorphs (Rappaz 1995), and these are hints of the diatrypaceous affinity. Somehow, *Barrmaelia*-like ascospores do not look as immature ancestors of *Endoxylina* ascospores, they are sometimes even wider, although the sizes are roughly comparable (Figs 7–9). It is my guess that ascospores in some asci acquire a septum when maturing, while in others they remain aseptate. If all ascospores become septate, one observes the typical member of *Endoxylina*, whereas if all ascospores remain aseptate, we deal with *Barrmaelia* species. This hypothesis might put *Endoxylina rufula* at the starting point of the divergence of *Barrmaelia* and *Endoxylina* lineages. In fact, if asci of *E. rufula* really produce two kinds of ascospores, the species might be assigned to a separate genus, but it is better to wait for further observations.

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