# *Endophragmiella multiramosa* a new dematiaceous anamorphic ascomycete from Taiwan

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During a survey of anamorphic ascomycetes in Taiwan, an undescribed fungus belonging to the dematiaceous ascomycetes was found on rotten twigs. This fungus, which is described and illustrated here as *Endophragmiella multiramosa*, is characterized by producing compactly branched conidiomata with percurrent conidiogenous cells and obovoid, ellipsoidal or pyriform, 0-1-septate, pigmented conidia with basal frills. Its delimitation is discussed and a key for the discussed species is added.

Keywords: anamorphic fungi, dematiaceous hyphomycetes, new species, key.

The genus *Endophragmiella* was established by Sutton (1973) with two species, *E. pallescens* Sutton (type species) and *E. canadensis* (Ell. et Everh.) Sutton (= E. subolivacea [Ell. et Everh.] Hughes). *Endophragmiella* is characterized by macronematous, mononematous, erect, straight or flexuous, pale brown, branched irregularly, septate, smooth, thin-walled conidiomata with monoblastic, integrated, terminal, determinate or percurrent conidiogenous cells, and by solitary, acrogenous, simple, pale brown, septate, thin-walled conidia (Sutton 1973). Hughes (1979) revised the generic concept of *Endophragmiella* and accepted 33 species. Kirk (1985) provided a key to the 46 described species of this genus. Holubová-Jechová (1986) also published several new species in *Endophragmiella* and administered a key to the species of *Endophragmiella* occurring in Czechoslovakia. Subsequently, the total number of species in *Endophragmiella* has increased to 72 (Castañeda 1987, 1988; Castañeda and Kendrick 1990; Castañeda *et al.* 1995, 1998; Hyde *et al.* 1998, Monoharachary and Agarwal 2003, Matsushima 1989, 1993, 1996; Mercado Sierra *et al.* 1995, Révay 1987, Sharma 1985, Tsui *et al.* 2001, Tzean and Chen 1989, Wu and

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Zhuang 2005). On the survey of hyphomycetes in Taiwan, many new species have been recovered from various decaying stems or leaves; one of them is *Endophragmiella multiramosa* sp. nov., which is described and illustrated here in detail.

## Materials and Methods

Samples collected from various rotten plant parts were incubated in moist chambers (plastic boxes, 30 x 20 x 12 cm, with three layers of moistened papers) for fungal sporulation. The macroscopic characteristics of the fungus on natural substrate were photographed using a Leica stereomicroscope (MZ125). Anatomical details of the fungus on natural substratum were recorded, photographed and illustrated using an Olympus light microscope (BX50) with attached drawing tube. Twenty conidia, ten conidiomata, and ten conidiogenous cells were measured for the size ranges given in the descriptions. Measurements are given as follows: (minimum) mean $\pm$ standard deviation (maximum), (n = sample size). The Methuen Handbook of Colour was used for color description (Kornerup and Wanscher 1978). Dried specimens are deposited in the National Museum of Natural Science (NMNS), Taichung, Taiwan.

## Taxonomy

***Endophragmiella multiramosa*** J.L. Chen **sp. nov.** – Figs. 1–5.

**MycoBank no.: MB 512267**

Coloniae effusae, cristatae, bruneae ad atratae bruneae. Mycelium immersum. Conidiophora macronemata, mononemata, clare caespitosa, presse ramose, recta vel flexuosa, septata, laevia, brunnea, ad apicem pallidiora, (57.6) 62.3–83.9 (88.0) x (2.8) 3.3–5.2 (5.6) µm, ad apicem usque ad 6 proliferationibus percurrentibus induta. Cellulae conidiogenae monoblasticae, terminales, percurrentes, in conidiophoris incorporatae, cylindricae vel clavatae, (6.2) 9.1–15.4 (16.8) x (2.6) 2.8–3.9 (4.4) µm. Conidia acrogena, solitaria, obovoidea, ellipsoidea vel pyriformia, fere 1-septata, laevia, pallide brunnea ad basilaibus cellulis, brunnea ad apicalibus cellulis, (9.2) 10.3–12.6 (13.3) x (5.6)6.3–7.5 (7.8) µm, raro 0-septata, laevia, pallide brunnea vel brunnea, (8.0) 8.4–10.4 (11.2) x (5.4) 5.5–6.8 (7.2) µm, frequenter cum cicatrico ad base praedita, 0.8–1.2 x 1.0–1.2 µm. Teleomorphis ignota.

Holotypus. – In caulibus putridis, Taiwania, J.L. Chen lectus (TNM F21431 in NMNS)

Colonies effuse, tufted, brown to dark brown. Mycelium immersed. Conidiomata macronematous, mononematous, conspicuously caespitose, compactly branched, straight or flexuous, septate, smooth, smooth, thick-walled at the base, brown, paler towards apex, (57.6) 62.3–83.9 (88.0) x (2.8) 3.3–5.2 (5.6) µm (n = 10),

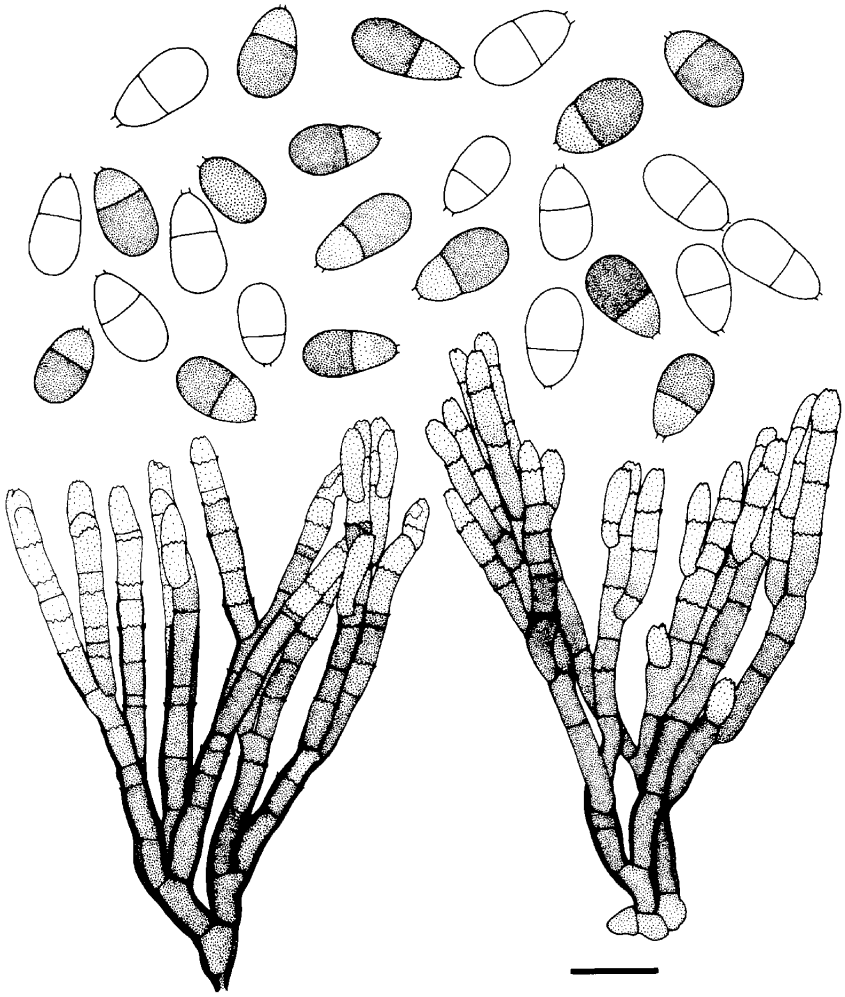
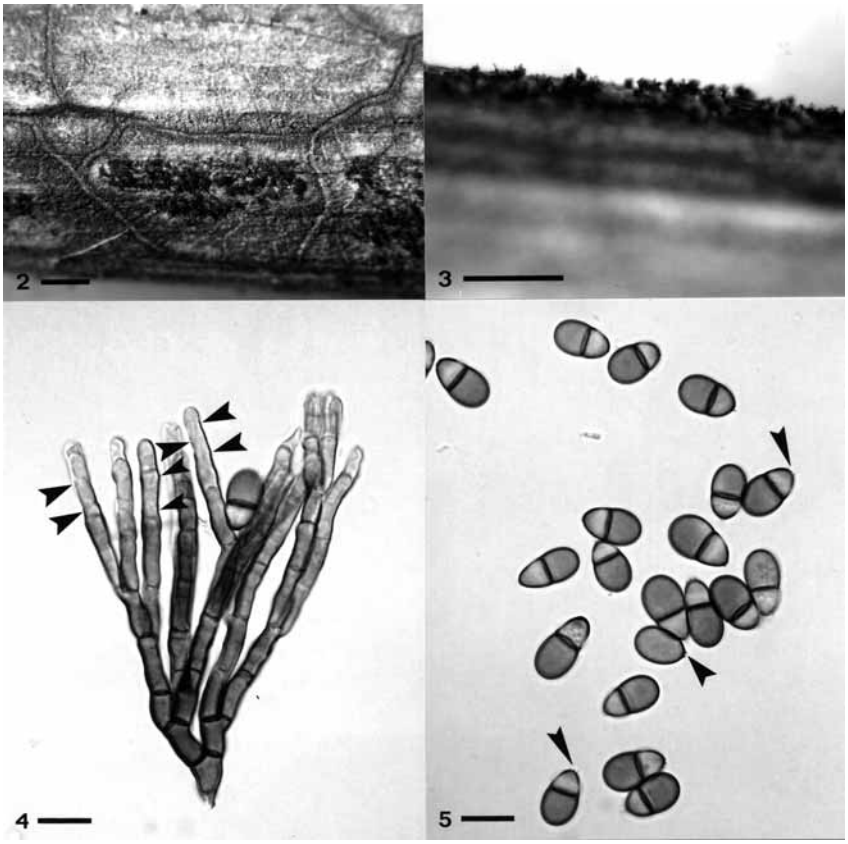


**Fig. 1.** – *Endophragmiella multiramosa*. Compactly branched conidiomata and obovoid, ellipsoidal or pyriform conidia with basal frills. Bar 10 µm.

with percurrent proliferations. Conidiogenous cells monoblastic, percurrent, integrated, terminal, cylindrical or clavate, (6.2) 9.1–15.4 (16.8) x (2.6) 2.8–3.9 (4.4) µm (n = 10). Conidia solitary, acrogenous, obovoid, ellipsoidal or pyriform, usually 1-septate, smooth, pale brown at the basal cell, brown at the apical cell, (9.2) 10.3–12.6 (13.3) x (5.6) 6.3–7.5 (7.8) µm (n = 20), rarely 0-septate, smooth, pale brown or brown, (8.0) 8.4–10.4 (11.2) x (5.4) 5.5–6.8 (7.2) µm (n = 10), often with basal frills, 0.8–1.2 x 1.0–1.2 µm. Teleomorph absent.




**Figs. 2–5.** – *Endophragmiella multiramosa.* **2, 3.** Partial view of colony on natural substrate. **4.** Compactly branched conidiomata with percurrent proliferations (arrows). **5.** Obovoid, ellipsoidal or pyriform, smooth, 0- or 1-septate conidia with basal frills (arrows). Bars: 2, 3 – 500 μm; 4, 5–10 μm.

Etymology. – The specific epithet, multiramosa, refers to the numerously branched conidiomata.

Habitat. – Saprophytic on a rotten twig.

Distribution. – Taiwan.

Material examined. – *Endophragmiella multiramosa* J. L. Chen: TAIWAN, Tainan City, National Cheng Kung University campus, on a rotten twig, 24 Mar 2006, *leg.* J.L. Chen, 950324CFC-8 (Holotype: TNM F21431). No culture obtained despite several attempts.

Holotype. – On a rotten twig, National Cheng Kung University campus, Tainan City, TAIWAN, 24 Mar 2006, *leg.* J.L. Chen (TNM F21431 in NMNS).

**Key to *Endophragmiella multiramosa* and four closely related *Endophragmiella* species**

1 Conidiomata branched . . . . . 2
1* Conidiomata unbranched . . . . . 3
2 Conidiomata loosely branched and conidia 1-septate . . . . . *E. cambransis*
2* Conidiomata compactly branched, and conidia 0- or 1-septate . . . . . *E. multiramosa*
3 Conidial apical cell pale brown, basal cell very pale brown . . . . . *E. resinae*
3* Apical cell darker: mid brown, brown or dark brown; basal cell pale brown . . . . . 4
4 Conidia 9–17 x 7–10µm . . . . . *E. uniseptata* var. *pusilla*
4* Conidia 13–27 x 9–13 µm . . . . . *E. uniseptata* var. *uniseptata*

## Discussion

The new species is most closely related to *E. resinae* P. K. Kirk (1981) from an injured site of *Picea sitchensis*, collected in UK, *E. uniseptata* (Ellis) Hughes (1979) from rotten wood of sweet chestnut and beech, collected in UK [as *E. uniseptata var. uniseptata* (Ellis) Hughes by Hol.-Jech. (1986)] and *E. uniseptata* (Ellis) Hughes var. *pusilla* Hol.-Jech. (1986) from a rotten trunk of *Fraxinus excelsior*, collected in Czechoslovakia, all of them having similarly shaped and pigmented conidia. *Endophragmiella multiramosa* can easily be distinguished from these two species (incl. varieties) because of its conidia, which are 0- or1-septate, smaller, and lacking a wide or dark brown septum. In addition, the conidiomata of *E. multiramosa* are distinctly shorter and more branched than those in *E. resinae* and *E. uniseptata*. *Endophragmiella cambransis* M.B. Ellis (1979), found on rotten wood (UK), also can be easily distinguished from our new species by its loosely branched conidiomata and obovoid or clavate, dark brown, 1-septate conidia. A comparative summary of the important characteristics of *Endophragmiella multiramosa* and the three closely related *Endophragmiella* species mentioned above is presented in Table 1.

*Endophragmiella pallescens* Sutton (1973) from stromata of *Cytospora chrysosperma* on *Populus tremuloides* collected in Canada, and *E. ramificata* Hol.-Jech. (1986) from a rotten *Carpinus betulus* trunk, collected in Czechoslovakia, exhibit a conidiomatal and conidial development similar to that of *E. multiramosa*, but the former has ellipsoidal, 1-2-septate, pale brown conidia, and the second has broadly ellipsoidal to slightly ovoid, 1-septate, pale brown to brown conidia with a dark, thick septum.

**Tab. 1.** – Comparative summary of the important characteristics of *Endophragmiella* multiramosa and three closely related *Endophragmiella* species.

| Species | Microscopic characters | | |
|---|---|---|---|
| | Conidiomata | Conidia | Source |
| *E. cambransis* | Loosely branched, branched flexuous with 0–2 percurrent proliferations, up to 100 µm long, 3–4 µm thick | Obovoid or clavate, 1-septate, dark brown, 13–18 x 8–10 µm | Ellis (1976) |
| *E. uniseptata* var. *uniseptata* | Singly or in groups of 2–3, erect or ascending, simple, with up to 15 successive terminal proliferations, up to 220 µm long, 4–7 (10) µm wide | Obovoid or pear-shaped, 1-septate, upper cell brown or dark brown, lower cell pale brown or brown, 13–27 x 9–13 µm | Hughes (1979) |
| *E. uniseptata* var. *pusilla* | Crowded or single, erect, ascending, unbranched, with several successive percurrent proliferations, 40–180 µm long, 5–7 µm wide near the base, 2.5–4 µm wide in the middle and the upper part | Ellipsoidal to obovoid to pyriform, 1-septate, mid brown to brown, septum wide and dark brown, occasionally the upper cell darker and the lower cell paler, 9–17 x 7–10 µm | Hol. -Jech. (1986) |
| *E. resinae* | Arising singly, simple, with 1–6 percurrent proliferations, 140–210 µm high, 3.5–4.5 µm wide, 6–12 µm wide at the base | Obovoid to pyriform, 1-septate, basal cell very pale brown, apical cell pale brown, 17–22 x 9–10.5 µm | Kirk (1981) |
| *E. multiramosa* | Conspicuously caespitose, compactly and numerously branched, brown, paler towards the apex, with several successive percurrent proliferations, 57.6–88.0 x 2.8–5.6 µm | Obovoid, ellipsoidal or pyriform, usually 1-septate, basal cell pale brown, apical cell brown, 9.2–13.3 x 5.6–7.8 µm, rarely 0-septate, pale brown, 8.0–11.2 x 5.4–7.2 µm | Present study |

*Endophragmiella multiramosa* differs from E. arranensis P.M. Kirk (1983) (on rotten wood, UK) as the latter produces conidia that are broadly ellipsoid to ovoid or obovoid, 1-septate, 6.5–9.5 x 4–5 μm, and pale brown to brown.

Regarding conidium morphology, *E. multiramosa* may appear to be related also to *E. taxi* (Ellis) Hughes (1979) (from dead leaves of *Taxus*, USA). But *E. taxi* forms larger conidia with dark blackish brown septa on shorter and more slender conidiomata, which grow singly or in groups of two or three.

*Endophragmiella ovoidea* P.K. Kirk (1981) (on dead wood, UK) differs from *E. multiramosa* in the shape, size, and pigmentation of conidia which are always ovoid to obclavate or ellipsoid, 1-septate, constricted at the septum, with brown to dark brown basal cells, and apical cell pale brown.

*Endophragmiella boewei* (Crane) Hughes (1979) from decaying plant materials (USA) resembles *E. multiramosa* in the shape of the conidia, but its simple conidiomata appear singly or in small groups forming pyriform, 1-septate, and subhyaline to light brown conidia measuring 13.8–20.8 x 7.7–11.5 μm.

*Endophragmiella globulosa* (B. Sutton) Hughes (1979) (on dead wood, Canada) resembles *E. multiramosa* in the pigmentation of its conidia, but their shape and size are distinctly different: conidia globose to broadly pyriform, 15–17 x 10–13 μm.

A key to *Endophragmiella multiramosa* and three closely related *Endophragmiella* species is provided.

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