

## ***Pulvinula johannis*, a new species from Sicily, Italy**

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A new species, *Pulvinula johannis* sp. nov., collected in the territory of the Iblei Mountains (south-eastern Sicily, Italy) is described and illustrated, examining the ecology and the relationship with similar species. The work is completed with line drawings of the microscopic characters.

Keywords: *Pezizales*, *Pyronemataceae*, morphology, taxonomy, chorology.

During several excursions aimed at widening the knowledge about the mycobiota of Sicily, an ascomycete representing a new species in the genus *Pulvinula* Boud. was collected in a locality named ‘Santa Maria’s wood’, a large mountainous area situated in the territory of the Iblei Mountains near Buccheri (Syracuse, Italy) at about 850 m altitude. This area is geologically characterized by the presence of tertiary basaltic volcanic rocks. The woodland vegetation is mainly constituted of *Quercus virgiliana* (Ten.) Ten. and *Quercus amplifolia* Guss., often combined with *Pinus* sp. and mixed with some *Cupressus sempervirens* L. This vegetal formation now appears reduced to small, degraded strips, principally because it is subjected to heavy grazing. From the bioclimatic point of view, the examined area belongs to the mesomediterranean strip of humid inferior ombroclimate (Brullo *et al.* 1996).

A thorough three-year study revealed that the species described below as *Pulvinula johannis* is a well-delimited taxon clearly distinguishable from similar species by its macromorphological and microscopic characteristics.

### **Material and methods**

From 2005 until present, frequent periodical observations have been carried out in the investigated area, taking several samples. The morphological, anatomical, distributional and ecological characteristics of every collection were evaluated. Morphological and microscopic examinations were always conducted with fresh material;

microscopic analysis was carried out using water as mounting fluid, and Melzer's reagent for testing the amyloidity of the asci and colour changes of pigments contained in the paraphyses.

Dimensions of microscopic elements belonging to the holotype and paratypes (see below) were obtained from the measurements of fifty ones, considering only the most mature fruiting bodies of the various collections, and were measured in water, using an Optika microscope (model BK 1301), with 40x or 100x (oil immersion) objectives.

All voucher specimens cited below were deposited in Herb. K(M), the mycological collection of the herbarium of the Royal Botanic Gardens, Kew.

## Results

***Pulvinula johannis* Lantieri sp. nov.** – Figs. 1–3.

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Apothecia autumnali tempore provecta crescentia, circulatim superimposita vel apposita, rarius remota, primo in tenuis forma acetabuli incomposite instructa, rarissime scutellata, ad postremum fere plana, aliquando mutue compressa, usque ad 5 mm lata. Caro densitatem cerae possidens, friabilis, roseola. Hymenium plerumque sinuosum, pallidum vel plus minusve roseofuscum. Frons glabra, concolor vel parum pallidior; margo eminens, sinuosa. Omnia exsiccata specimina lutescentia. Excipulum ectale 120–150  $\mu\text{m}$  crassum, textura globulosa, 15  $\mu\text{m}$  latis cum cellulis, compositum. Excipulum medullare (subhymenium indistinctum includens) 70–80  $\mu\text{m}$  crassum, textura intricata, 2–2.5  $\mu\text{m}$  latis cum hyphis, compositum. Hymenium 230  $\mu\text{m}$  circiter crassum. Paraphyses filiformes, 1–1.5  $\mu\text{m}$  latae, ascos valde excedentes, indivisae, leviter septatae, ad apicem curvae vel uncinatae, luteopallentibus pigmentis repletae. Asci cylindrati vel cylindrato-clavati, 170–200 x 12–14.5  $\mu\text{m}$ , inamyloidei, octospori, operculati, ad basim colligationibus unci-formibus bifurcati. Ascosporae sphaericae, 9–11  $\mu\text{m}$  diam., plerumque unam guttam, rarius aliquas guttulas, capientes.

Holotype (designated here): ITALY, Sicily, near Buccheri (Syracuse), 'Santa Maria's wood', on bare, humid ground in groups of several superposed individuals, in a mixed woodland mainly composed of *Cupressus sempervirens*, *Pinus* sp. and *Quercus amplifolia*, 29 Oct 2005, leg. et det. A. Lantieri, Herb. K(M) 155229.

Apothecia appearing in late autumn, densely aggregated or superposed, rarely isolated, at first slightly irregularly cup-shaped, occasionally saucer-shaped, finally almost flattened, sometimes deformed by mutual pressure, up to 5 mm in diam. Hymenium pale or more or less deep pink salmon. Outside glabrous, concolorous or faintly paler; margin evident, undulate. Flesh waxy, brittle, delicately rosy. The whole apothecium becomes orange on drying. Ectal excipulum 120–150  $\mu\text{m}$  thick, of textura globulosa, with subglobose cells up to 15  $\mu\text{m}$  in diam. Medullary excipulum (including the subhymenium) 70–80  $\mu\text{m}$  thick, of textura intricata,

composed of hyphae 2–2.5  $\mu\text{m}$  wide. Hymenium 230  $\mu\text{m}$  thick. Paraphyses very slender, thread-shaped (1–1.5  $\mu\text{m}$  wide), remarkably longer than asci, protruding about 25–30  $\mu\text{m}$  ( $n = 50$ ), curved or hooked in the upper part, simple (not forked), containing several small oil drops, with some weakly visible septa and very pale orange pigments. Asci operculate, cylindrical or cylindrical-clavate, 170–200  $\times$  12–14.5  $\mu\text{m}$  ( $n = 50$ ), with a distinctly forked base formed by a crozier, not amyloid, 8-spored. Ascospores spherical, 9–11 (11.5)  $\mu\text{m}$  in diam. ( $n = 50$ ), generally with a large and sometimes eccentric oil-drop, only rarely with some smaller ones, smooth, hyaline, uniseriate in the ascus.

**Etymology.** – This species is named after my father Giovanni (Johannes).

**Distribution.** – Known only from the type locality (see above).

**Paratype material** (*leg. et det.* A. Lantieri): 27 Nov 2005, K(M) 155232. – 26 Oct 2006, K(M) 155231. – 1 Nov 2006, K(M) 155230. – 15 Nov 2006, K(M) 155233.

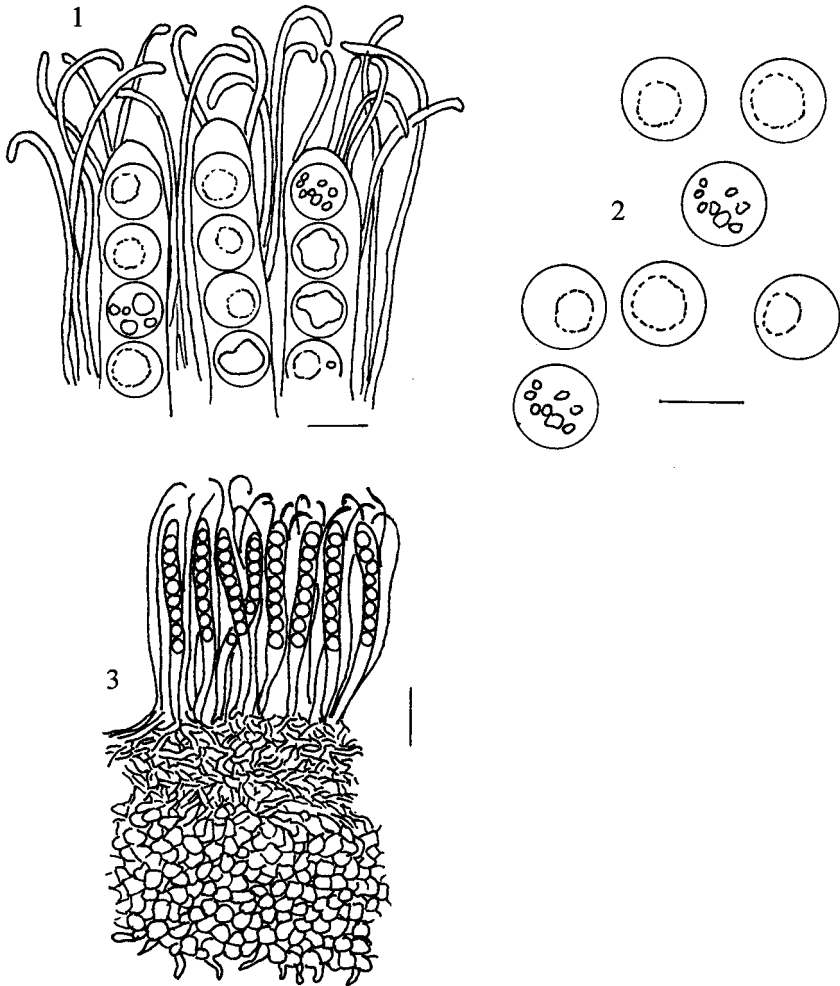
## Discussion

*Pulvinula johannis* has been found many times but only in the rather limited area mentioned above, where fruiting bodies were abundant. We never collected it in other localities, not even in the vicinity.

The analyses carried out on the various collections yielded some distinctive recurring characters: the rather small dimensions and the pale to deep pink salmon tinges of the apothecia (orange in dried specimens), the strong tendency to grow in groups of densely crowded, often overlapping apothecia, and the late autumnal phenology with a period of fruiting starting from late October and lasting during the entire November. Microscopically, this taxon is also well differentiated, mainly for its small ascospore dimensions and for the prominent croziers at the ascus bases. In the genus *Pulvinula* there are various species resembling *P. johannis*:

*Pulvinula archeri* (Berk.) Rifai is an uncommon fungus with apothecia of similar size. It differs by its orange to yellow-orange hymenium, smaller asci (135–150  $\times$  9.5–10  $\mu\text{m}$ ) and ascospores [8–9.5 (11.5)  $\mu\text{m}$  (own measurements)], and by its habitat (on soil with scarce mossy carpets and/or on burnt remains). According to Spooner (2004), this fungus generally develops on burnt ground and only seldom on some other kind of substrate.

*Pulvinula cinnabarina* (Fuckel) Boud. grows on humid ground, mostly near streams; it differs from *P. johannis* in having larger apothecia (up to 7 mm in diam.), orange in colour flushed with vermilion, wider ascospores [Dennis (1981): up to 18  $\mu\text{m}$ ; Medardi



**Fig. 1–7.** *Pulvinula johannis* (holotype). 1. Uppermost zone of the hymenium (tips of paraphyses and asci with ascospores) (Bar = 10  $\mu$ m). 2. Ascospores (Bar = 10  $\mu$ m). 3. Radial section through an apothecium showing (from top to bottom) protruding tips of paraphyses, asci with ascospores, medullary excipulum including subhymenium, and ectal excipulum. (Drawings: A. Lantieri; bar = 50  $\mu$ m)

(2006): 16–18  $\mu$ m] and longer asci [Dennis (1981); Medardi (2006): up to 320  $\mu$ m].

*Pulvinula constellatio* (Berk. & Broome) Boud. has apothecia up to 5 mm in diam., rosy-orange to pink-salmon, but, unlike *P. johannis*, wider ascospores (15–16.5  $\mu$ m), larger asci (250 x 17–18  $\mu$ m), and it shares the same habitat with *P. cinnabarina* (own measurements).

*Pulvinula convexella* (P. Karst.) Pfister differs in having yellow-orange apothecia up to 12 mm in diam., larger ascospores [(16) 18–

20 µm] and asci [230–255 (270) x 16–20 µm] (Pfister 1976) and, finally, in its habitat, generally humid ground, sometimes also with burnt residuals (Ahti *et al.* 2000, Medardi 2006).

*Pulvinula laeterubra* (Rehm) Pfister has similar-sized orange-pink salmon apothecia. It diverges from *P. johannis* in the larger ascospores [Medardi (2001, 2006): 11–14 µm; Peric (2006): 11–15 µm] and asci [Medardi (2001, 2006): 155–180 x 15–15 µm; Peric (2006): 142–200 x 12.5–15 µm]. *P. laeterubra* grows only on burnt remains.

*Pulvinula miltina* (Berk.) Rifai was initially reported from New Zealand and Australia (Rifai 1968), then from Central America (Pfister 1976), and afterwards also from Great Britain (Yao & Spooner 1996). It differs in having larger, orange apothecia (up to 11 mm in diam.) and wider ascospores (13.5–16 µm) and asci (200–250 x 16–20 µm); it grows on humid calcareous ground.

*Pulvinula salmonicolor* (Seaver) Pfister has been described by Pfister (1976) and so far reported only from Central America. It has yellow-orange to orange apothecia, 5–7 mm in diam., turning yellow-pink salmon if wet. It differs from *P. johannis* in having larger ascospores (20–23 µm), longer asci (242–286 x 22–23 µm), and because the fruiting bodies grow isolated from each other.

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