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***Arrasia rostrata* (Basidiomycota), a new corticioid genus and species from Italy**

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ABSTRACT — An unusual corticioid species with distinctive large basidiospores that develop a distal refractive rostrum when fully mature is described as new. It grows on living bark of *Juniperus phoenicea* on the Italian island of Sardinia. Because it is morphologically distinct from any known genus of corticioid fungi, the new genus *Arrasia* is proposed to accommodate it.

KEY WORDS — dendrotheloid fungi, Italy

Introduction

Many new species of polypores and corticioids have recently been described from Sardinia: *Aleurodiscus ilexicola* Bernicchia & Ryvardeen, *Antrodiella ichnusana* Bernicchia et al., *Antrodia sandaliae* Bernicchia & Ryvardeen, *Echinodontium ryvardeenii* Bernicchia & Piga, *Neolentiporus squamosellus* (Bernicchia & Ryvardeen) Bernicchia & Ryvardeen, *Phellinus juniperinus* Bernicchia & S. Curreli, and *Vararia maremmana* Bernicchia. Sardinia may be a refugium from the last glacial period, as demonstrated by the presence of *Piloporia sajanensis* (Parmasto) Niemelä, previously known as a boreal species, or the occurrence of *Echinodontium ryvardeenii*, while other species of *Echinodontium* Ellis & Everh. are known from North America and Asia.

Conservation International (CI 2007) lists the Mediterranean Basin as a “Biodiversity Hotspot.” Several basidiomycete species associated with Mediterranean juniper forests are *Echinodontium ryvardeenii*, *Hyphoderma etruriae* Bernicchia, *Lenzitopsis oxycedri* Malençon & Bertault, *Peniophora*

junipericola J. Erikss., *Phellinus juniperinus*, *Trametes junipericola* Manjón et al., and *Vararia maremmana*. Recently, a striking corticioid species was discovered from Sardinia growing on living bark of *Juniperus phoenicea* L. (*Cupressaceae*). This new species is here fully described and illustrated; because it has no close relatives in any described corticioid genus, a new genus is proposed.

Materials & methods

For light microscopic studies, samples were mounted in 3% potassium hydroxide (KOH), Melzer's reagent (IKI), and 0.1% cotton blue in 60% lactic acid to determine cyanophily of basidiospore walls. Crystalline deposits were dissolved in a 50% HCl solution to individualize microscopical elements. Line drawings were made with a camera lucida attachment. Specimens are deposited in HUBO, CFMR, and SALA.

Taxonomy

Arrasia Bernicchia, Gorjón & Nakasone, **gen. nov.**

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Basidiomata effusa, adnata, tenuissima, levia, tenuiter farinosa, margine distincto. Systema hypharum monomiticum; hyphae generativae fibulatae, tenuitunicatae et ramosae. Dendrohyphidia filamentosa, ramosa, fibulata. Basidia suburniformia deinde subclavata, flexuosa, fibulata, tetraspora. Basidiosporae hyalinae, leviter crassitunicatae, leves, cyanophylae, inamyloideae, indextrinoideae, subfusioideae vel biapiculatae, parte distali se extendente ad rostrum crassitunicatum et refractivum.

TYPE SPECIES: *Arrasia rostrata* Bernicchia, Gorjón & Nakasone

ETYMOLOGY: the genus is dedicated to Luigi Arras, mycologist and friend, who is always present during the mycological excursions across Sardinia.

BASIDIOMATA effuse, adnate, thin, white, smooth, finely farinaceous, with a distinct margin.

HYPHAL SYSTEM monomitic, hyphae clamped. **DENDROHYPHIDIA** filamentous, branched, clamped. **BASIDIA** suburniform at first, then flexuous, clavate to obclavate, sometimes with a basal lobe, basally clamped, with 4 sterigmata. **BASIDIOSPORES** broadly subfusiform to biapiculate, distal end elongating into a thick-walled rostrum, walls hyaline, slightly thickened, smooth, cyanophilous, inamyloid, nondextrinoid.

REMARKS — The distinctive feature of the new genus is the rostrate basidiospores.

Arrasia rostrata Bernicchia, Gorjón & Nakasone, **sp. nov.**

PLATES 1–4

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Basidiomata resupinata, effusa, adnata, tenuissima, 30 mm longa et 5 mm lata, laevia sed farinosa vel subgausapata in maturitate, subalba vel albocinerea, margine distincto. Systema hypharum monomiticum; hyphae generativae tenuitunicatae, fibulatae, 1.8–2.3 µm latae. Dendrohyphidia filamentosa, ramosa, fibulata ad basim. Cystidia desunt. Basidia primo suburniformia deinde subclavata, flexuosa, fibulata ad basim, tenuitunicata,



PLATE 1. *Echinodontium ryvardenii* (center) surrounded by circular to linear patches of *Arrasia rostrata* (Bernicchia 8087, holotype). Scale bar = 5 cm.

50–90 × 10–16 μm , tetraspora. Basidiosporae hyalinae, laeves, leviter crassitunicatae, cyanophylae, inamyloideae, indextrinoideae, late subfusoidae vel biapiculatae, parte distali se extendente ad rostrum crassitunicatum et refractivum, 27–40 × 10–15 μm . Ad corticem arborum coniferarum viventis.

TYPE: Italy, Sardinia, Nuoro province, Lanaittu valley, 180 m a.s.l., on bark in trunk and old branches of living *Juniperus phoenicea*, 30.III.2010, leg. A. Bernicchia, coll. 8087. Holotype in HUBO. Isotype in SALA et CFMR.

ETYMOLOGY: the name *rostrata* refers to the long refractive rostrum on the basidiospores.

BASIDIOMATA resupinate, effuse, small, circular to linear patches, becoming confluent, up to 30 × 5 mm, thin, up to 180 μm thick, soft, white, smooth, initially finely farinaceous to subfelty, finally thickly farinaceous; margin abrupt, distinct.

HYPHAL SYSTEM monomitic with clamped generative hyphae. Subiculum thin, a dense tissue of hyphae and crystals; subicular hyphae 1.8–2.3 μm in diam., clamped, moderately branched, walls hyaline, thin, encrusted with hyaline crystals. Subhymenium not observed. Hymenium a palisade of dendrohyphidia, basidia, and indistinct, collapsed hymenial elements obscured by crystals. DENDROHYPHIDIA filamentous, irregular, with short branches near

apex, 40–62 × 1.5–2 µm, clamped at base, walls hyaline, thin. CYSTIDIA absent. BASIDIA obclavate to suburniform at first, then flexuous, narrowly clavate to obclavate, occasionally with a lateral lobe near base, 50–90 × 10–16 µm, clamped at base, containing resinous globules, often lower part collapsed below a secondary septum, walls hyaline, thin, smooth, (2–)4-sterigmate, sterigmata stout, up to 29 × 5 µm. BASIDIOSPORES broadly subfusiform to bi-apiculate, initially distal end obtuse, later developing an extended, thick-walled, refractive rostrum or beak, 27–40 × 10–15 µm, rostrum 8–14 × 1.2–2 µm long, with a distinct, refractive, thick-walled apiculus, containing resinous material, walls hyaline, with distinct walls to slightly thick-walled, smooth, cyanophilous, not reacting in Melzer's reagent.

HABITAT AND DISTRIBUTION — Known from Sardinia growing on bark of living *Juniperus phoenicea*, frequently in association with *Echinodontium ryardenii*.

ADDITIONAL SPECIMENS EXAMINED — ITALY. SARDINIA, NUORO PROVINCE, Lanaittu valley, 180 m a.s.l., on trunk and old branches of living *Juniperus phoenicea*, 14.XI.2009 leg. A. Bernicchia, coll. 8086, 8097; 03.II.2010, leg. L. Arras coll. 8557; 30.III.2010: leg. A. Bernicchia, coll. 7998, 8070, 8071, 8072, 8073, 8074, 8075, 8076, 8077, 8080, 8085.

COMMENTS — The most remarkable feature of *Arrasia rostrata* is its large, beaked basidiospores. In developing basidiospores still attached to the basidium, a distal knob forms that will develop into the rostrum. When fully mature, the rostrum is a straight, thick-walled, refractive structure. By the time the basidiospore is mature and the rostrum is fully developed, the basidium is empty and collapsed. The indistinct remnants of post-mature basidia can be observed if the crystalline matter is dissolved. The apiculus of mature basidiospores is refractive and thick-walled with a notched appearance.

Arrasia rostrata is probably related to the corticioid genus *Dendrothele* Höhn. & Litsch., which shares the same ecology (inhabiting bark of living trees), crustose basidiomata, suburniform basidia, and hymenial structure with many dendrohyphidia and abundant crystalline deposits (possibly an adaptation to dry and exposed habitats). *Dendrothele* is a polyphyletic genus with species distributed among several lineages in the hymenochaetoid, russuloid, corticioid, and agaricoid clades (Goranova 2003, Goranova et al. 2003, Bodensteiner et al. 2004). The type species, *Dendrothele papillosa* Höhn. & Litsch. [= *D. griseocana* (Bres.) Bourdot & Galzin], is included in the *Niaceae* Jülich within the *Agaricales* Underw. and closely related to the cyphelloid genera *Lachnella* Fr. and *Cyphellopsis* Donk. Recently, Nakasone & Burdsall (2011) and Gorjón et al. (2011) observed navicular basidiospores in *Dendrothele* species from New Zealand and Argentina, a feature previously also known in some cyphelloid genera. Convergences in morphological traits and habit seem to have occurred repeatedly, characterizing the artificial dendrotheloid group. However, no other

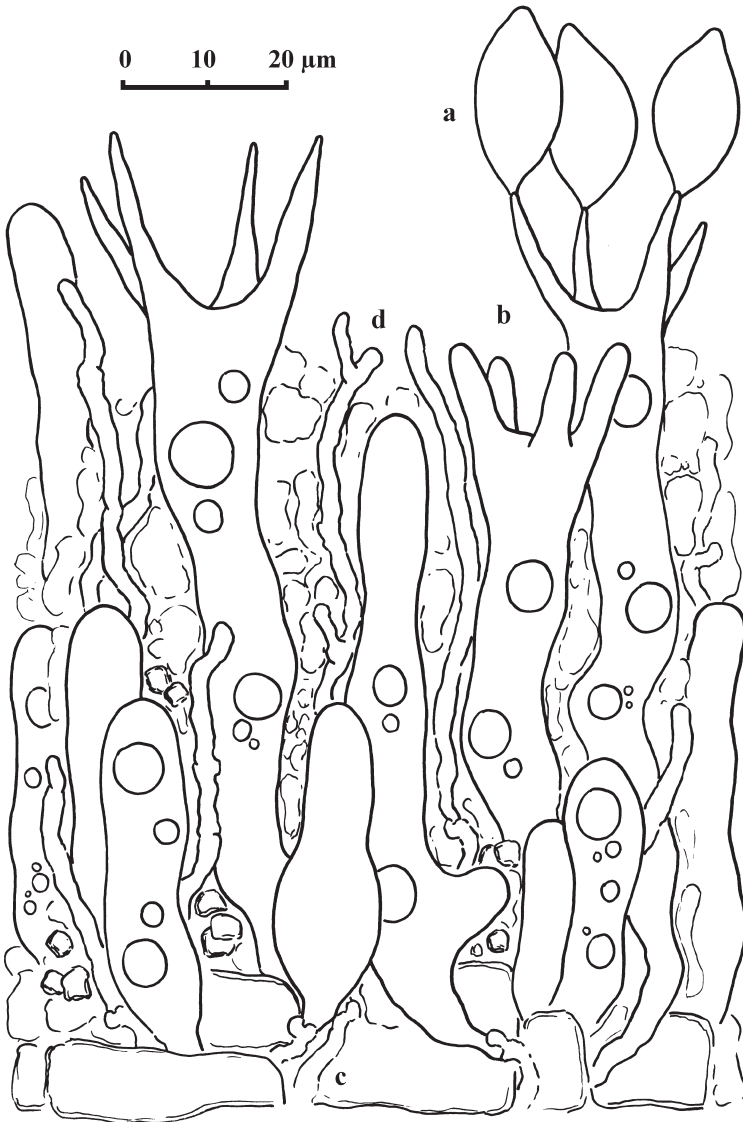


PLATE 2. *Arrasia rostrata*. Hymenial elements (Bernicchia 8087, holotype).
a) immature basidiospores, b) basidia, c) generative hyphae, d) dendrohyphidia

basidiospores with a refractive rostrum are known in *Dendrothele* or any other corticioid species.

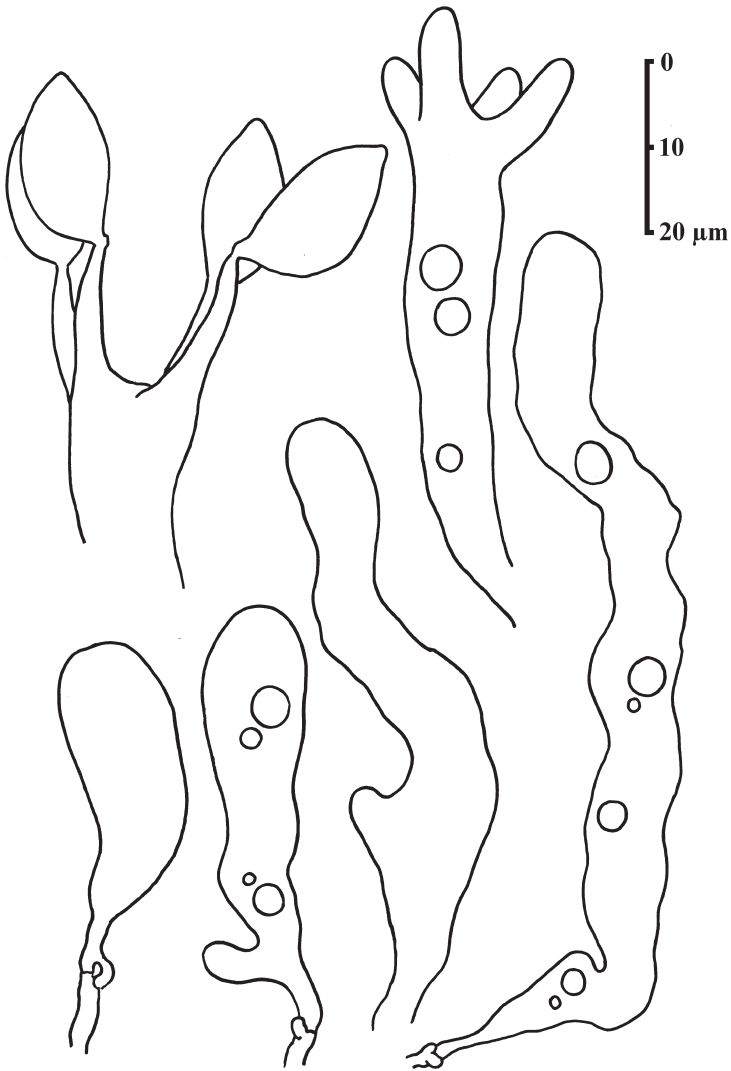


PLATE 3. *Arrasia rostrata*. Basidia and immature basidiospores.
(Bernicchia 8087, holotype)

It is also interesting to note that some basidiospores in *Vararia* P. Karst. (such as in *Vararia investiens* (Schwein.) P. Karst.) develop an empty amyloid part separated by a septum in the proximal region (close to the sterigma attachment). The biological function, if any, of this structure is unknown.

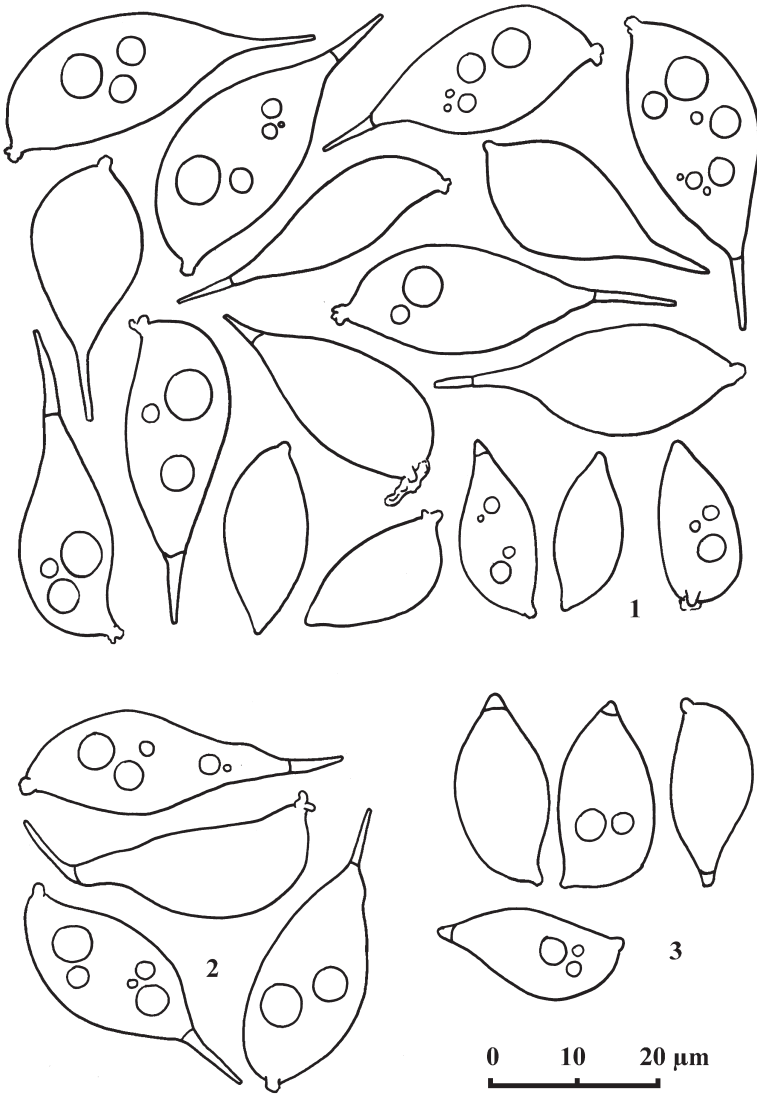


PLATE 4. *Arrasia rostrata*. Mature basidiospores with a well developed rostrum and immature (right and center right) basidiospores. (1: Bernicchia 8087, holotype; 2: Bernicchia 8074; 3: Bernicchia 8071)

Morphological similarities may also be drawn with some genera belonging to *Vuilleminiaceae* Maire, *Punctulariaceae* Donk, and *Corticaceae* Herter. Among the *Vuilleminiaceae*, *Vuilleminia* Maire, *Australovuilleminia* Ghobad-Nejhad & Hallenb., and *Cytidia* Quéf. all share the saprophytic habit growing on attached recently dead angiosperm wood (not known from coniferous substrata), basidiomes that are usually gelatinous and decorticating, and allantoid to ellipsoid basidiospores. Members of the *Punctulariaceae*, *Punctularia* Pat., *Punctulariopsis* Ghobad-Nejhad, and *Dendrocorticium* M.J. Larsen & Gilb., grow on fallen angiosperm wood and all species have ellipsoid basidiospores. Genera in the *Corticaceae*, as delimited by Ghobad-Nejhad et al. (2010), show a more ecological and morphological complexity, but none display the features that characterize *Arrasia rostrata*. Preliminary molecular studies indicate that *Arrasia rostrata* fits no existing homobasidiomycete genus or order thus far recognized (data not shown); further analyses are still required.

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