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ON *HYPHODONTIA AUSTRALIS* (CORTICIACEAE, BASIDIOMYCOTA)

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Abstract

Hyphodontia australis is recorded and described from the *Nothofagus* forests of southern Argentina and from New Zealand. The species, previously known from Australia, is an odontioid to hydnoid taxon with orange to chestnut colored hymenial surface that readily turns violet upon the application of a drop of KOH solution. Specimens of *H. australis* from different areas are similar in all features except the spores, that vary from ellipsoid (Australian material including the type), broadly ellipsoid (New Zealand collections), to narrowly ellipsoid or subcylindric (Argentinian specimens). The inclusion of this taxon in *Hyphodontia* is supported by the presence of imperforate parenthesomes, hyphodontioid hyphae, basidia, leptocystidia, and by cultural features.

Key Words: Aphyllophorales, cultural characters, *Hyphodontia*, parenthesomes.

Introduction

During a survey of Corticiaceae *sensu lato* growing on *Nothofagus* spp. (Greslebin and Rajchenberg, 1997a, 1997b, 1998) in the subantarctic, southern forests of Argentina (Cabrera and Willink, 1980), we found the taxon *Hyphodontia australis* (Berk.) Hjortstam. This species was previously known only from Australia and has a particular hymenial surface colouration which, in addition, turns violet with drops of 5% KOH solution. The review of material housed at PDD herbarium also showed that the species is fairly well represented im New Zealand. The purpose of this work is to present full basidiocarp and cultural descriptions of *H. australis*, including the type of parenthesomes.

Materials and methods

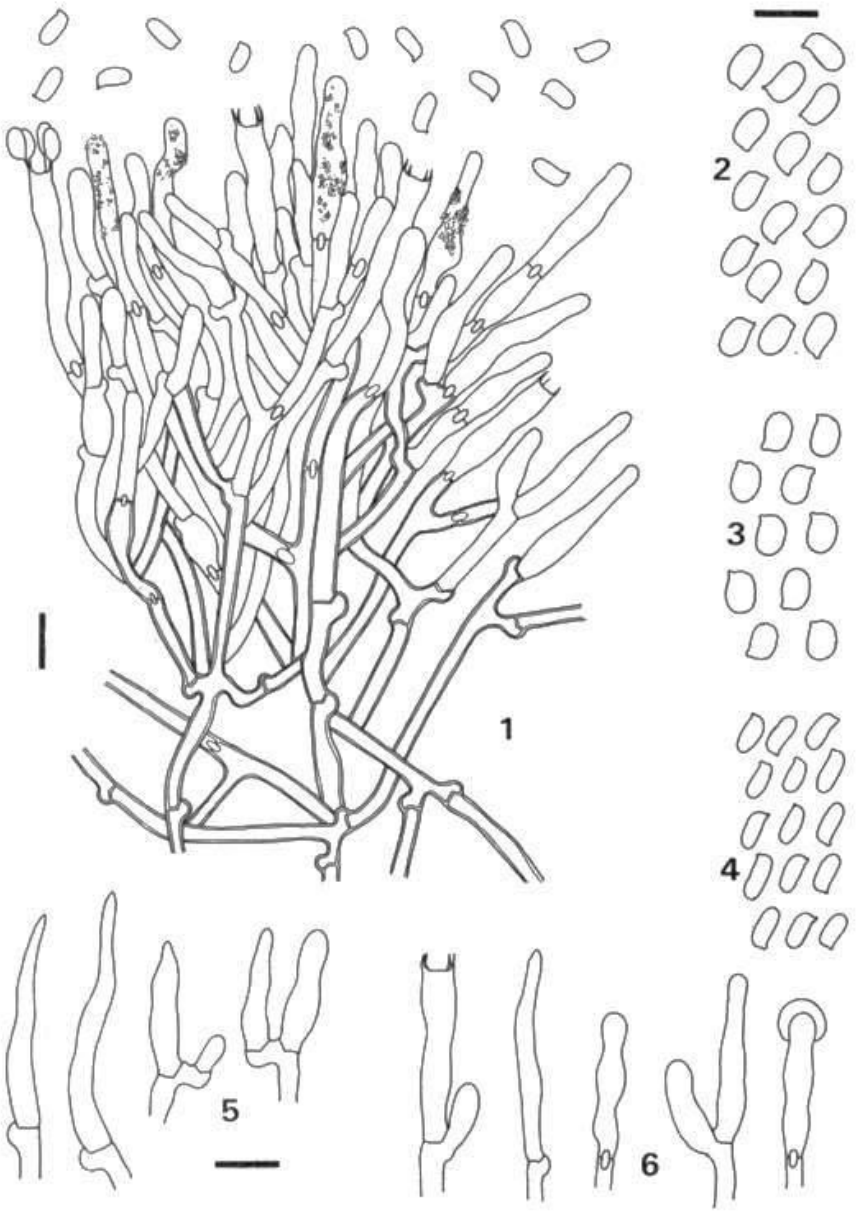
Freehand sections of both fresh and dried basidiomata were examined microscopically, mounted in 5% KOH and 1% aqueous phloxine, Melzer's reagent (reaction amyloid, dextrinoid or IKI-; Hawksworth *et al.*, 1995), lactophenol 0.1% cotton blue and 1% aqueous cresyl-blue. Color descriptions were taken from Munsell (1990) and herbarium designations from Holmgren *et al.* (1990). Cultures were obtained from context tissue of fresh basidiomata or isolated from the associated wood-rot, and are kept at the culture collection of the Centro Forestal CIEFAP. Cultural features were studied and described according to Nobles (1965). The species code describing the cultures follows the system of Nobles (1965) with the several modifications summarized by Nakasone (1990). Line drawings of microscopic features were made using a drawing tube on the microscope. Unless other wise indicated all specimens are kept at the Herbarium of the Centro Forestal CIEFAP.

For electron microscope studies a small inoculum of culture CIEFAP N° 226 was grown in liquid media; the growing hyphae were fixed in 2.5% glutaraldehyde buffered with sodium cacodylate and postfixed in 1% osmium tetroxide, stained in 0.5% uranylacetate, dehydrated and embedded in Spurr's low viscosity resin. Serial sections were made and stained with uranylacetate and lead citrate. Photographs were taken on a Jeol CX-II electron microscope.

Results

Hyphodontia australis (Berk.) Hjortstam, Mycotaxon 54: 187, 1995.
FIGS. 1-13
≡ *Grandinia australis* Berk., in Hooker's Bot. Antarct. Voy. Fl. Tasm. 2: 257, 1859.

Basidiocarp resupinate, broadly effused, densely felty, 120 to 1000 µm thick. Hymenophore odontioid or hydnoid, sometimes cracking in small patches upon drying, teeth cylindrical, 350-750 µm long. Hymenial surface orange chestnut, red chestnut to light brick red (10R 6/6, 2.5YR 6/6), turning violet in KOH solution, the original color being recovered upon the application of an acid solution. Margin brownish yellow (10YR 6/6), thinning out. Subiculum concolorous with the margin.
Hyphal system monomitic. Generative hyphae clamped, 3-5 µm in diam. Subhymenial hyphae with slightly thickened walls (up to 0.5 µm thick), occasionally thin-walled. Subicular hyphae with walls up to 1 µm thick. All hyphae are covered with fine, dark melleous to chestnut granular material, which colours the hymenium and subiculum and dissolves to turn violet in KOH solution.
Basidia narrowly clavate, subcylindric or slightly sinuous, with 4 sterigmata and a basal clamp.
Leptocystidia poorly differentiated, claviform, slightly moniliform, slightly subulate or capitate, when capitate sometimes with an apical yellowish resinous cap, rarely protruding beyond the hymenium. The basidia, basidioles, leptocystidia and subhymenial hyphae are heavily encrusted with small, hyaline crystals that persist in KOH solution.
Basidiospores narrowly ellipsoid or subcylindric, 5-7 x 2.3-3 µm (Argentinian



Figs. 1-6. *Hyphodontia australis*. 1. Section through the hymenium. 2. Spores of Australian specimen K 56442 (Type). 3. Spores of New Zealand specimen PDD 23692. 4. Spores of Argentinian specimens AG 730 and MR 11041. 5. Leptocystidia of Australian specimen K 56446 and 56443. 6. Leptocystidia of Argentinian specimens AG 730 and 1634. Bar=10 µm.

specimens), ellipsoid, (5.5-)6-6.5(-7) x (3.5-)4-4.5 µm (Australian specimens) or broadly ellipsoid 5-6.5(-7.5) x 4-4.5 µm (New Zealand specimens); hyaline, thin-walled, IKI-, with one or several guttulae in the cytoplasm.
Ultrastructure: Dolipore septa with imperforated parenthesomes (Fig.7).

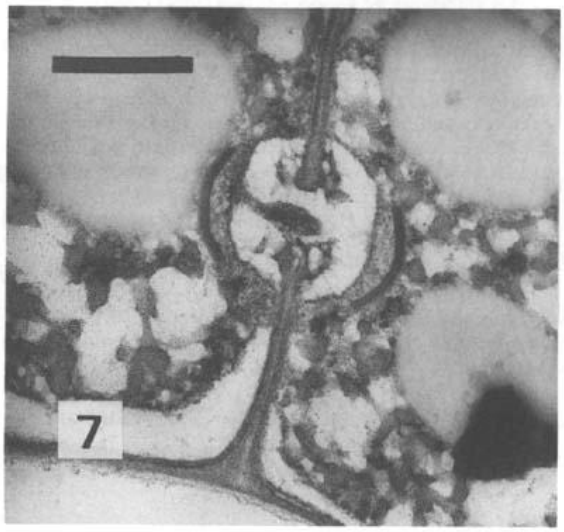


Fig. 7. *Hyphodontia australis*. Dolipore with imperforated parenthesomes. Bar=0.5 µm

Specimens examined. AUSTRALIA, TASMANIA, *ex herb. Berk. 1879* (Type of *Grandinia australis*, K 56442). Ibid., 1928, *leg. J.B. Cleland*, (K 56443). NEW SOUTH WALES, National Park, Sydney, *coll. W.N. Cheesman 1914* (K 56444). VICTORIA, Tarra Valley Park, on rotten trunk *Eucalyptus regnans* F. Muell., 22 Mar. 1956, *coll. K. Healy* (K 56446). NEW ZEALAND, COROMANDEL, Thames, Waiomo Valley, on *Coriaria arborea* Lindsay, 21 Mar. 1954, *leg. J.M. Dingley, det. G.H. Cunningham* (PDD 23692). GISBORNE Lake Waikaremoana, on *Nothofagus solandri* (Hook.) Oerst., Mar. 1949, *leg. P.M. Ambler, det. G.H. Cunningham* (PDD 23700). ARGENTINA, TIERRA DEL FUEGO, Ushuaia, Tolhuin, 3 km E from Hosteria Kaikén, 4 Nov. 1996, *leg. A. Greslebin 730*. Ushuaia, Paso Garibaldi, on fallen branches of *Nothofagus pumilio*, 27 Mar. 1998, *leg. ipse 1547*. Ibid., 27 Mar. 1998, *leg. ipse 1548*. RÍO NEGRO, Nahuel Huapi National Park, Puerto Blest, track to Los Cántaros, on fallen branch of *Nothofagus dombeyi* (Mirb.) Oerst., 9 Oct. 1995, *leg. M. Rajchenberg 11041*. CHUBUT, Los Alerces National Park, south arm of Lago Menéndez, on fallen branch of *N. dombeyi* in mixed forest with *Fitzroya cuppresoides* (Mol.) Johnston, 8 May 1998, *leg. R.M. Borges and A. Greslebin 1634*.

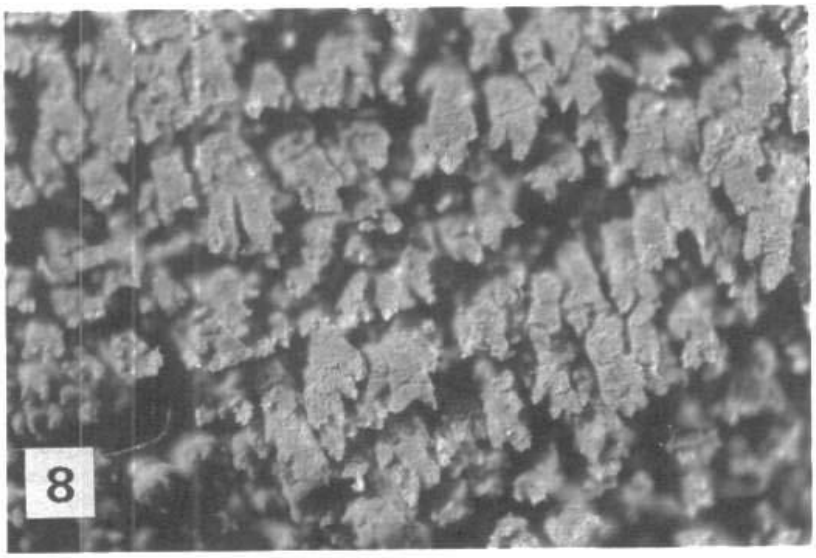


Fig. 8. *Hyphodontia australis*. Basidiocarp, collection MR 11041. 40 x.

Culture description.
Cultures studied. Nº 231, from associated decayed wood of basidiocarp AG 1548; Nº 226, from associated decayed wood of basidiocarp AG 730.

Macroscopic characters. Growth very slow, 6-6.6 cm by 6 wk. Margin regular, hyaline, submerged in the agar. Colony mostly sub-merged, with only few, cobwebby hyphae present on the agar. Aerial mat only around the inoculum, appressed, subfelty, inconspicuous, white, to 1.5 cm in radius, with irregular and cobwebby margin. Reverse unchanged. Odor sweet.

Oxidase reactions.
GAA: +++, tr; TAA: +++, tr

Microscopic characters. Marginal hyphae clamped, 2-3 µm diam, thin-walled and branched. In older parts, these hyphae are wider, to 4 µm in diam, with many guttulae; developing digitiform branches

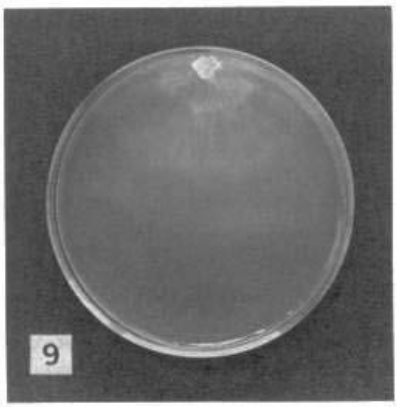
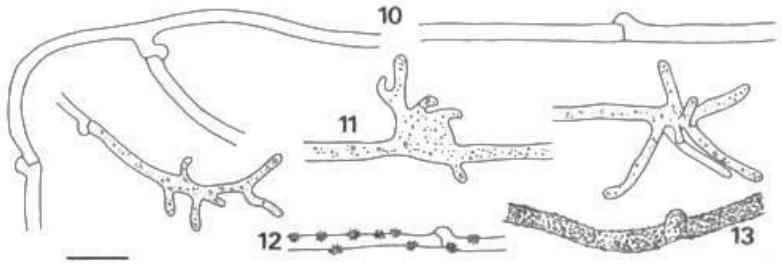


Fig. 9. Macroscopic aspect of culture at 6 wk, strain 231. Bar=2 cm.

either directly off regular hyphae or from intercalary hyphal swellings. Polyhedric, asteriform, hyaline crystals develop in the agar and on the hyphae. In older parts of the aerial mat some hyphae have a characteristic, chestnut colored encrustations that dissolves in KOH solution.

Species code. 2.3.7.32.36.(37).38.47.50.54.



Figs. 10-13. *Hyphodontia australis*. Microscopic cultural features. 10. Marginal hyphae. 11. Guttulate hyphae with digitiform branches. 12. Hyphae with hyaline polyhedric crystals. 13. Hyphae with chestnut colored granular material. Strain Nº 231. Bar=10 µm.

Discussion

Hyphodontia australis is a remarkable species within the genus because of its unusual hymenial color; all the other known species being white, cream, yellowish or ochraceous. It is also distinct by the presence of granular material on the hyphae that is responsible for the violet color change of the hymenial surface upon the application of 5% KOH solution. This reaction appears to be an acid-base reaction, as the application of an acid solution recovers the original hymenial color. This color change is recorded also in other corticioid species as *Phlebia chrysocreas* (Berk. & Curt.) Burds., *Odontia wrightii* (Berk. & Curt.) Burt, *Mycoacia uda* (Fr.) Donk, *Phanerochaete filamentosa* (Berk. & Curt.) Burdsall, *Phanerochaete radicata* (P. Henn.) Nakasone, Bergman & Burdsall and *Ceraceomyces americanus* Nakasone, Bergman & Burdsall (Cunningham, 1963; Lombard *et al.*, 1975; Nakasone *et al.*, 1994). In all cases it is related to the presence of dark melleous and chestnut colored substances encrusting the hyphal system. Thus, this reaction does not seem to show any phylogenetic relationsip. Most other features in *H. australis* agree with the generic concept of *Hyphodontia*, as proposed by Hjortstam (1995). In order to corroborate its inclusion in *Hyphodontia* the type of parenthesome was also studied. Langer (1994) showed that all the parenthesomes studied in species of the genus are of the imperforated type. This was corroborated on other species of the genus by Wu & Huang (1997) and is also the case in *H. australis*; thus, its inclusion in the genus is further supported by this ultrastructural feature. Hjortstam (1995) described relatively large, 40-60 µm long, subulate cystidia, but we were unable to find them in most of the specimens he examined, except K 56446 from Victoria (Australia) with leptocystidia 40-50 µm long. Cultures of *H. australis* did not develop either malocysts or drepanocysts, as is characteristic in some species of the genus (Hassan Kasim & David, 1983;

Nakasone, 1990). We observed that basidiospore shape and size were different in specimens from different areas, which may indicate a speciation process. Because we were unable to perform experimental studies to test this point and because all the other features were similar, we consider it appropiate to maintain all the specimens as a single taxon, with an austral distribution.

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