

## Boletales –Boletaceae

(draft, R. E. Halling, April 2005)

### ***Austroboletus*** (Corner) C. B. Wolfe

Pileus viscid or dry, tomentose to subtomentose, microscopically a trichodermium or ixotrichodermium, sometimes with appendiculate remnants at margin. Context white or yellow, unchanging. Hymenophore tubulose, adnexed, white at first, pinkish flesh colored to brownish pink with maturity (rarely yellow), sometimes staining light brownish to pinkish brown. Stipe central, pruinose to alveolate-reticulate, dry or sometimes glutinous-viscid, not staining; basal mycelium white. Spores vinaceous pink in deposit, pitted to sinuous pitted, sometimes equatorially verrucose, elongate-fusoid, inamyloid or dextrinoid. Hymenial cystidia usually present. Clamp connections absent. KOH & NH<sub>4</sub>OH reactions negative.

Ectomycorrhizae with Pinaceae, Fagaceae, Myrtaceae, Dipterocarpaceae, Casuarinaceae. Mostly Asia, SE Asia, to Australia, New Zealand, some temperate New World, 3-4(5-6?) in Neotropics.

### ***Boletellus*** Murrill

Pileus typically dry, rarely subviscid, scaly or tomentose, microscopically a trichodermium, sometimes with appendiculate remnants at margin. Context white or yellow, often changing to blue. Hymenophore tubulose, adnexed, sometimes white at first, soon yellow, often staining blue. Stipe central, usually pruinose, rarely with an apical reticulum, dry, sometimes staining blue; basal mycelium white, very rarely yellow. Spores olive brown in deposit, longitudinally ribbed, ridged to winged or slightly veined, sometimes with cross striae on ribs, inamyloid or rarely dextrinoid. Hymenial cystidia usually present. Clamp connections usually absent, rarely present (one sp., *B. fibuliger*). KOH & NH<sub>4</sub>OH reactions negative (more species need testing). Ectomycorrhizae with Pinaceae, Fagaceae, Myrtaceae, Dipterocarpaceae, Casuarinaceae (?), possibly with Caesalpinoid Leguminosae.

Mostly N. hemisphere, apparently not in S. Hemisphere (except Australia), E Asia, SE Asia, Africa, Mesoamerica, Andean Colombia, one sp. in Venezuela (*B. fibuliger*).

### ***Boletochaete*** Singer

Pileus velutinous, bay-colored, microscopically a palisade with conical terminal elements. Context white, unchanging. Tubes gray. Stipe brownish, nearly smooth. Spore cinnamon brown in deposit, ovoid, smooth, inamyloid. Seta-like or pseudocystidia-like hymenial cystidia present. Clamp connections absent. Not well studied.

Ectomycorrhizae not determined with certainty (possibly Caesalpinoid Leguminosae and/or Dipterocarpaceae).

Two species known from the paleotropics (Africa, SE Asia).

### ***Boletus*** Dill. ex Fr. (including *Xerocomus*)

Pileus dry to subviscid, glabrous to tomentose to fibrillose, microscopically a trichodermium or ixotrichodermium. Context white to yellow, staining blue or not changing. Hymenophore adnexed to adnate to subdecurrent, white to yellow to greenish yellow, staining blue to blue-green or not changing with pores concolorous or sometimes red to brownish red. Stipe dry, rarely viscid, glabrous to subpruinose to reticulate or sometimes alveolate, with basal mycelium variously colored. Spore deposit olive brown. Spores smooth, fusoid. Hymenial cystidia present. Clamp connections absent.

Ectomycorrhizae with Pinaceae, Fagaceae, Betulaceae, Dipterocarpaceae, Myrtaceae, Casuarinaceae, Caesalpinoid Legumes.

Global in temperate and tropical zones.

Note: This genus remains as the basic genus after all others have been separated based on idiosyncratic features. It may not be homogeneous or monophyletic.

### ***Chalciporus*** Bat.

Pileus dry or subviscid, glabrous, microscopically a trichodermium. Context pale yellow or white or rarely pale pinkish, staining blue in some. Hymenophore adnate to subdecurrent, dull red, cinnamon brown, carmine to salmon pink, not staining or rarely staining blue. Stipe dry, pruinose to glabrous, with bright yellow basal mycelium. Spore deposit brown. Spores fusoid or short ellipsoid, smooth. Hymenial cystidia present. Clamp connections absent. Ectomycorrhizae with Pinaceae and Fagaceae. North temperate, south temperate (Australia) and pantropical.

***Fistulinella*** Henn.

Pileus dry or viscid, glabrous, fibrillose or tomentose, often scrobiculate, microscopically a trichodermium, cutis, ixotrichodermium, or ixocutis. Context white, unchanging. Stipe dry or viscid, glabrous or pruinose. Spore deposit brownish pink. Spores smooth, fusoid. Clamp connections absent. Ectomycorrhizae possible in some species with Fagaceae, Nothofagaceae, Leguminosae, Sapotaceae, Myrtaceae; doubtfully present in others. E North America, Mexico, Caribbean, Brazil, Africa, Australia, New Zealand, Japan, Indonesia.

***Gyrodon*** Opatowski (incl. *Boletinellus*)

Pileus glabrous or rarely subsquamose, dry, microscopically a trichodermium. Context pale yellow to whitish. Hymenophore decurrent, with tubes and pores radially elongated, staining blue. Stipe central to eccentric, often curved and short. Spore deposit olive brown to brown. Spores smooth, short-ellipsoid to phaseoliform. Hymenial cystidia present to rarely present. Clamp connections present. Ectomycorrhizae with *Quercus* and *Alnus*, otherwise absent. North temperate, pantropical, apparently rare in Australia.

***Gyroporus*** Quélet

Pileus dry, glabrous to fibrous-subsquamose, microscopically a trichodermium. Context white to pale yellow, staining blue in some. Hymenophore adnexed, white then pale yellow. Stipe dry, glabrous or fibrous-subfurfuraceous, hollow or solid, composed of circumferentially arranged hyphae (not longitudinal). Spore deposit yellow. Spores smooth, ellipsoid. Hymenial cystidia present. Clamp connections present. Ectomycorrhizae with Pinaceae, Fagaceae, possibly with Myrtaceae. North temperate and pantropical; rare to absent in the south temperate zone.

***Heimioporus*** Horak (= *Heimiella*)

Pileus dry, subtomentose, microscopically a palisadic trichodermium. Context white to yellow, not staining. Hymenophore adnexed, yellow, sometimes staining blue. Stipe dry, pruinose to reticulate, with white basal mycelium. Spore deposit olive brown. Spores alveolate-reticulate to reticulate or with pit-like perforations, elongate-ellipsoid to short ellipsoid. Hymenial cystidia present. Clamp connections absent. Ectomycorrhizae with Fagaceae, Dipterocarpaceae, ?Myrtaceae. Eastern N America, E Asia, SE Asia, Australia, Mexico, Belize, and Costa Rica.

***Leccinum*** S.F. Gray

Pileus viscid or dry, glabrous to subtomentose, microscopically a trichodermium or hymeniform. Context white or pale yellow, unchanging or staining red, pink, gray, or blue to blue-green. Hymenophore adnexed, white to tan to yellow, often staining pale brown. Stipe dry, scabrous. Spore deposit brown or olive brown. Spores smooth, fusoid. Hymenial cystidia present. Clamp connections absent. Ectomycorrhizae with Pinaceae, Fagaceae, Betulaceae, Caesalpinoid legumes and possibly Dipterocarpaceae. North temperate, montane neotropics, Asian and African tropics, Australia.

***Paragyrodon*** (Singer) Singer

Pileus viscid, microscopically an ixocutis. Context white to yellowish, staining brown. Hymenophore adnate to decurrent, bright yellow then brown, staining bright brown. Peronate veil

present, forming an annulus. Stipe central to eccentric. Spore deposit olive to mustard brown. Spores smooth, globose to subglobose. Hymenial cystidia present. Clamp connections present. Ectomycorrhiza with *Quercus* suspected but not confirmed. Well known species (*P. sphaerosporus*) in north central N America, but of controversial disposition.

***Phlebopus*** (Heim) Singer

Pileus dry to subviscid, glabrous, microscopically trichodermium. Context white or pale yellow, unchanging or staining blue. Hymenophore adnate, staining blue or not. Stipe dry, glabrous. Spore deposit olive brown. Spores smooth, short-ellipsoid. Hymenial cystidia (?). Clamp connections present.

Ectomycorrhizae absent or facultative with Leguminosae.

Pantropical and subtropical (Austral).

***Phylloboletellus*** Singer

Pileus dry. Context changing to blue when exposed (white?). Hymenophore lamellate, decurrent, somewhat intervenose. Spores olive brown in deposit, ovoid, longitudinally winged/ridged, inamyloid. Clamp connections present or absent (??).

Ectomycorrhizae not determined with certainty.

One species (*P. chloephorus*) from Mexico and Argentina.

***Phylloporus*** Quélet

Pileus dry, tomentose to subtomentose, microscopically a trichodermium or a modified hymeniform layer. Context usually white, sometimes yellow, sometimes changing to blue when exposed. Hymenophore lamellate to subtubulose to radically boletinoid, sometimes changing to blue when bruised. Stipe central, rarely slightly eccentric, usually pruinose; basal mycelium white or yellow (IMPORTANT!). Spore deposit olive brown, smooth, fusoid or ovoid, dextrinoid. Hymenial cystidia present. Clamp connections absent (present in 1 or 2 species). NH<sub>4</sub>OH reactions negative or positive (blue or blue green – IMPORTANT!).

Ectomycorrhizae with Pinaceae, Fagaceae, Myrtaceae, Dipterocarpaceae, Casuarinaceae.

Several species in the neotropics, paleotropics, only a few in north temperate zone; diversity yet to be determined in south temperate zone.

***Pulveroboletus*** Murrill

Pileus dry or barely subviscid, glabrous, microscopically a collapsed trichodermium. Context white to pale yellow, slowly staining blue. Hymenophore adnate to adnexed, yellow, staining blue. Peronate veil present, collapsing to form annular zone. Stipe dry to sticky, apparently glabrous. Spore deposit olive brown. Spores smooth, fusoid. Hymenial cystidia present. Clamp connections absent. Ectomycorrhizae with Fagaceae, Myrtaceae, possibly Dipterocarpaceae, Casuarinaceae, Caesalpinoid Legumes.

North America, E Asia, SE Asia, Australia, Africa, montane neotropics.

***Strobilomyces*** Berkeley (incl. *Afroboletus*)

Pileus dry, coarsely fibrillose to squamulose, black, often with appendiculate veil remnants, microscopically a trichodermium. Context white, staining red then black. Hymenophore adnexed, white then black, staining red then black. Peronate veil present. Stipe dry, squamose, annulate, white to gray to black. Spore deposit black. Spores globose, reticulate to irregularly echinate or sparrasoid, rarely longitudinally ridged with intercostal veins (sometimes referred to a separate genus: *Afroboletus*). Hymenial cystidia present. Clamp connections absent.

Ectomycorrhizae with Fagaceae, Myrtaceae, possibly Dipterocarpaceae, Caesalpinoid Legumes.

North temperate zone, montane neotropics, SE Asia, Australia, Africa.

***Suillus*** Micheli ex S.F. Gray

Pileus viscid and glabrous or dry and squamulose, sometimes with appendiculate remnants, microscopically an ixotrichodermium or a trichodermium. Context white or pale yellow, unchanging or sometime staining a pale reddish. Hymenophore adnate to adnexed, yellow or

pale cinnamon brown. Stipe dry, annulate or not, typically with glandular dots or smears. Spore deposit pale cinnamon brown. Spores smooth, short fusoid. Hymenial cystidia usually clustered, with amorphous brown pigmentation at the base. Clamp connections absent.

Obligate ectomycorrhizae with Pinaceae.

North temperate and southward into the tropics to the southern limit of Pinaceae. Absent in Africa.

#### ***Tuboseta*** Horak

Pileus dry, subvelutinous to tomentose, microscopically a trichodermium or subhymeniform. Context white. Hymenophore adnate to adnexed, olive yellow, staining ???. Stipe dry, subvelutinous to glabrous. Spore deposit brownish yellow. Spores smooth, fusoid. Hymenial cystidia present as thick-walled, pigmented setae. Clamp connections absent.

Ectomycorrhizae with Caesalpinoid legumes, possibly Fagaceae or Dipterocarpaceae.

Africa and Indomalaya.

#### ***Tylophilus*** P. Karsten (includes *Porphyrellus* Gilbert)

Pileus dry, glabrous to subtomentose, microscopically a trichodermium or subhymeniform. Context white, unchanging or staining pale brown, red then black, or rarely blue. Hymenophore adnexed, white then pinkish flesh colored to purplish brown to rusty brown, staining brown. Stipe dry, pruinose to glabrous to reticulate, to finely scabrous. Spore deposit pinkish flesh colored to purplish brown, to rusty brown. Spores smooth, fusoid. Hymenial cystidia present, usually as pseudocystidia. Clamp connections absent.

Ectomycorrhizae with Pinaceae, Fagaceae, Betulaceae, Myrtaceae, Casuarinaceae, Caesalpinoid Legumes.

North temperate zone, montane neotropics, northern South America, E Asia, SE Asia, Australia, New Zealand, Africa.

#### ***Veloporphyrellus*** Gómez & Singer

Pileus dry, tomentose, lacking pigmentation, microscopically a trichodermium. Context white, pale burgundy red. Hymenophore white to pinkish flesh color, unchanging. Veil present. Stipe white, annulate. Spore deposit possibly purplish brown (?). Spores smooth, fusoid. Hymenial cystidia present. Clamp connections absent. Very rare and many characteristics not completely known.

Ectomycorrhiza with *Quercus*.

One species known (*V. pantoleucus*) from Costa Rica.

#### ***Xanthoconium*** Singer

Pileus dry, subtomentose, often wrinkled, microscopically hymeniform. Context white, unchanging. Hymenophore adnate or adnexed, white to straw yellow, not staining or staining brownish yellow. Stipe dry, glabrous. Spore deposit bright rusty brown. Spores smooth, fusoid to cylindrical. Hymenial cystidia present. Clamp connections absent. Often NH<sub>4</sub>OH (+), greenish blue.

Eastern North America to southern Colombia, E Asia, SE Asia to possibly Australia. Ectomycorrhizae with dicotyledonous Angiosperms (Fagaceae with certainty and likely others to be determined), possibly with some Pinaceae.