

Garhwal Boletes I. The Genus *Leccinum*

Shweta Kukreti¹, R. P. Bhatt²

Abstract: Three species belonging to Genus *Leccinum* are described. These species were most frequently associated with *Betula* spp. and few with *Rhododendron*. These species of *Leccinum* were collected mainly from Pauri and Chamoli District of Garhwal Himalaya.

Keywords: *Leccinum*, boletes, *Betula* spp, *Rhododendron*, Garhwal boletes

1. Summary

The given genus *Leccinum* belongs to the family Boletaceae. The genus are most readily recognized by the fibrillose scales on the surface of the stipe. These are collected from Pauri and Chamoli District of Garhwal Himalaya. All the three species of *Leccinum* are collected and presented for the first time from Garhwal Himalaya. In India it is reported from Himanchal Pradesh by T.N. Lakhanpal in his book Mushrooms of India Boletaceae Vol. 1 in 1996.

LECCINUM S.F. Gray

Nat. Art. Brit. Pls. I:640.1821.Emended Snell, 1962

Type species: *Leccinum aurantiacum* (Bull. ex St. Amans) S.F. Gray. Nat. Arr. Brit. Pls. I:646, 1821

Fruit body large and fleshy, cap convex, becoming broadly convex, dry to humid, usually becoming viscid to some degree with age; stem central, most frequently obclavate broadened below, not bulbous-ventricose in the manner of *Boletus*, ornamented with lines, points, dots or squamules which may be pallid or variously coloured at first but at maturity becoming darker, usually dark brown to black or in some species these colours are present from the beginning; hymenophore grayish white or pallid to yellowish white, depressed around the stipe; pores very fine to small (less than 1mm in diameter), pores rarely discolourous; tube trama truly bilateral divergent of the *Boletus* subtype, spore print ochraceous buff to olive brown, spores cylindrical to subfusoid, usually longer than 13 μ m; cap cuticle filamentous, cystidioid or cellular, clamp connections absent; on ground, usually ectomycorrhizic.

Singer (1962, 1975) divided the genus into four sections i.e. *Luteoscabra*, *Roseoscabra*, *Leccinum* and *Exima*, mainly on the basis of spore print colour and the colour of the stipe. Smith and Thiers (1971) recognised only three sections in *Leccinum* i.e. *Leccinum*, *Luteoscabra* and *Scabra*, on the basis of pileus cuticle, anatomy and margin of the pileus. They transferred some species of section *Luteoscabra* Sing. to *Boletus* and those of section *Roseoscabra* Sing. and *Exima* Sing. to genus *Tylopilus*.

The genus has been revised recently in North America and Europe (Smith, Thiers and Watling, 1966, 1967; Blum, 1968).

2. Distribution

From the arctic regions to subtropics, according to Corner (1972) and Heinemann (1954) also in the Asiatic and African tropics, but most species and individuals in the north temperate zone.

Key to the species

1. Pileus surface smooth to finely tomentose, irregularly appressed fibrillose, areolated; context white, becoming brownish, lilaceous on cutting or exposure.....2
2. Pileus surface glabrous; context white, unchanging on exposure and bruising; taste and Smell pleasant; sporemass light brownish and spores 13.5-18x4.5-6.3 μ m..... *L.scabrum* var. *scabrum*
3. Pileus 30-90mm brown; surface smooth to finely tomentose, irregularly appressed fibrillose; margin regular, fertile; context whitish first, slowly orange brown to brownish on exposure; spores 15-19.8x4.5-7 μ m..... *L.oxybabile*
4. Pileus 50-100mm broad; surface areolated; margin appendiculate; context white, soon staining lilaceous then lilac-fuscous, lacking a red stage; spores 14-16x3.5-5 μ m..... *L.areolatum*

Leccinum areolatum Smith & Thiers, The Boletes of Michigan, p.154, 1971.

Pileus 50-120mm broad, convex when young, becoming broadly convex to nearly plane, surface dry but soft, conspicuously areolate by maturity, dull pinkish cinnamon on the areolae, paler between, margin appendiculate. **Context** 6-10mm thick at disc, white when cut but soon staining lilaceous then lilac-fuscous, lacking a red stage; taste and odour not distinctive **Tubes** 8-15 mm deep, depressed around the stipe, staining fuscous when cut, pores minute, roundish, yellowish overall at maturity or brownish over some areas, staining fuscous if severely bruised. **Stipe** 60-100x11-20 mm, clavate, solid, surface pallid at the base, midportion covered by dark brown coarse ornamentation as streaks or point, apex pallid and ornamentation finer. Interior staining like the pileus context, **Sporemass** not obtained.

Basidiospores 14-16x3.5-5 μ m, smooth, apex lacking an apical pore or thin spot, shape in face view fusiform, in profile somewhat inequilateral, ochraceous-brown in KOH and not much different in Melzer's. **Basidia** 18-36x7-9 μ m, clavate, 4 spored, hyaline in KOH and yellowish in Melzer's. **Pleurocystidia** 36-63x9-15 μ m, scattered, fusoid ventricose, thin walled, dark reddish brown in Melzer's. **Cheilocystidia** 26-54x7-13.5 μ m, more or less like the pleurocystidia but smaller. **Tube trama**, the divergent

hyphae distinctly gelatinous content as revived in either KOH or Melzer's. **Pileus cutis** of appressed interwoven hyphae, 4-9.5 μ wide, tube or nearly so walls thin and typically smooth, end-cells tubular to weakly cystioid, cells disarticulating to some extent. **Caulocystidia** small, clavate-mucronate to fusoid-ventricose, less commonly the wall over the apex thickened to form a cap, smooth, content snuff-brown to bistre in KOH and the subiculum hyphae also often coloured similarly; clamp connections absent;

Macrochemical Tests

On pileus context : KOH- negative , FeSO₄-bluish; *On stipe context*; KOH-negative , FeSO₄- bluish.

Habit and Habitat

Solitary to scattered with *Betula* and some scattered trees of *Rhododendron*.

Material examined

India: Uttarakhand – Chamoli, Chopta (Mandal), July 9, 2001, GUH- M 24111; Bharsar , Aug 25, 2001, GUH-M-24127; Chamoli, Mandal, July 27, 2002, GUH-M-24144.

Comments

The species is characterized by its medium to large fruit bodies, conspicuously areolate pileus, pinkish cinnamon colour, lacks of a reddish stage in the context when cut, the presence of coarse dark brown stipe ornamentation and the thick walled apex of many of the caulocystidia . All these characters key these populations to *Leccinum areolatum* Smith and Theirs as described by Smith and Theirs (1971). This species is very similar to *L.pellstonianum* but differs significantly in the pileus features, colour changes and in having capped caulocystidia.

Leccinum oxydabile (Singer) Singer. Amer. Midl. Nat. 37:123.1947

Krombholtzia oxydabilis Singer, Schweiz Zeitschr. Pilzle. 16: 136. 1938

Pileus 30-90 mm broad, globose to parabolic when young, expanding to convex to broadly convex when mature, reddish brown in young , then light brownish, fading to yellowish brown in age, surface dry, viscid when wet. Smooth to finely tomentose, irregularly appressed fibrillose, uneven, margin regular, smooth, fertile, cracking at the periphery in mature specimens. **Context** 8-15 mm thick at disc, firm, whitish first, slowly orange brown to brownish on exposure; taste and odour indistinct. **Tubes** 12-20mm deep, deeply depressed around the stipe, whitish when young to yellowish white in age, light brownish on exposure, pores roundish, whitish at first, pale white to light yellowish, yellowish brown finally. **Stipe** 70-120x15-40 mm, central, gradually tapering upwards, whitish first, yellowish brown in age, with dark brown scabers at the apex, grading into darker scales below, base with a whitish mycelium; flesh pale yellow, reddish brown on exposure. **Sporemass** brownish.

Basidiospores 15-20x4.5-7 μ m, elliptical, elongate, narrowly inequilateral in profile, yellowish brown in KOH, inamyloid, some occasionally dextrinoid. **Basidia** 26-

36x11-14.5 μ m clavate, 4- spores, hyaline in KOH, guttulate. **Pleurocystidia** 54-72x9-12.5 μ m, fusoid ventricose with elongate apex, hyaline in KOH, pale in Melzer's **Cheilocystidia** similar to pleurocystidia, 36-54x7-11 μ m, hyaline in KOH, yellowish in Melzer's. **Tube trama** bilateral, divergent. **Pileus cutis** composed of trichodermium of hyphae in which the terminal cells are inflated and measure 10-18.5 μ m, pale in KOH, yellowish in Melzer's. **Stipe cutis** of parallel hyphae with scattered clusters of caulocystidia and caulobasidia. **Caulocystidia** with brownish contents, narrowly fusoid ventricose, clavate mucronate ones also observed.

Macrochemical Tests

On pileus context : KOH- yellowish, NH₄OH – grayish yellow, FeSO₄ – greenish, HCL- yellowish brown, Melzer's- reddish brown, *On pileus cutis*: KOH- brownish, NH₄OH – brownish, FeSO₄ – negative, HCL- negative, Melzer's Reagent – reddish brown,

Habit and Habitat

Solitary, scattered; on ground in association with the tree of *Betula*.

Material examined

INDIA: Uttarakhand, Pauri Garhwal, Bharsar, July 25, 2001, GUH-M-24105; Chamoli, Mandal, July 18, 2003, GUH-M-24200; Mandal Aug. 10, 2003, GUH-M-24217.

Comments

The population from Garhwal Himalaya are characterized by reddish brown pileus fading to yellowish brown in age, lacking appendiculate margin, showing marginal cracks at maturity, flesh whitish to pale, reddening slightly on exposure and becoming orange brown to reddish brown, trichodermium of the pileipellis with inflated terminal cells and its association with Birch. All these features Key these specimens to *Leccinum oxydabile* (Singer) Singer as described by Watling (1970).

The present species can easily be distinguished from *L. scabrum* on account of its firm flesh, the change of colour on exposure and bruising and cap cutis a trichodermium.

Edibility:

Edible but not worthwhile Phillips (1991). This species is not consumed in Garhwal. Uttarakhand

Leccinum scabrum var. *scabrum* (Fr.) S.F. Gray, Nat. Arr. Brit. Pis. 1:647.1821

Boletus scaber (Fries), Systema Mycologicum 1:393.1821

Pileus 65-90 mm broad, convex to parabolic, light grayish brown in the centre, fading to yellowish brown toward the periphery, surface dry, viscid when wet, glabrous and often with depression in age, margin even and not projecting beyond the tubes. **Context** 8-10 mm thick at disc, white, unchanging on exposure and bruising; taste and odour pleasant. **Tubes** 4-15 mm deep, deeply depressed around the stipe, white when mature, pores minute, 2-3mm, roundish, whitish cinnamon brown when to light cinnamon brown in age, unchanging on bruising, light brown at the

opening of larval tunnels. **Stipe** 70-125x15-20 mm, gradually tapering upward, white to yellowish white with grayish black to almost black scabers, base with whitish mycelium; context whitish yellow to pale yellow, bluish green near the base, slowly brownish on exposure. **Sporemass** light brownish.

Basidiospores 13.5-18x4-6 μm , elongate, elliptical to subfusiform, narrowly inequilateral in profile, thin walled, smooth, yellowish in Melzer's, occasionally dextrinoid. **Basidia** 27-45x11-14.5 μm , clavate, 4 spored, thin walled, guttulate, hyaline in KOH, yellowish in Melzer's. **Pleurocystidia** rare to scattered, 54-72x9-18 μm , thin walled, fusoid ventricose with a long tapering neck, hyaline in KOH. **Cheilocystidia** 27-54x7-12 μm , fusoid ventricose thin walled. **Pileus cutis** composed of interwoven hyphae with light brown content, cellular, 6-8 μm wide, hyphae suberect. **Caulocystidia** 38-61x9.5-13 μm numerous, fusoid with light brown contents; clamp connection absent.

Macrochemical Tests

On pileus context : KOH- yellowish brown, NH₄OH- light brown, FeSO₄-colour fades slightly, HCL- negative; *On pileus cutis* : KOH- light brownish, NH₄OH- light brown, FeSO₄- negative HCL- negative.

Habit and Habitat

Solitary to scattered with Betula and a few scattered trees of Rhododendron.

Material examined

INDIA: Uttarakhand, Pauri Garhwal, Bharsar, July 9, 2001, GUH-M- 24110; Chamoli, Mandal, Aug. 20, 2002, GUH-M-24168; Bharsar, **Comments:**

This species is characterized by its glabrous, grayish brown cap, fading to yellowish brown, margin even and not projecting beyond the tubes, flesh unchanging, tubes whitish to light cinnamon brown, stipe white to yellowish with grayish black to almost black scabers, spore colour in mass light brownish, spores 13.5-18x4-6.5 μm . and its association with Birch. All these features key these populations to *L.scabrum*. (Fries) S.F Gray as described by Smith et al. (1967) and Smith and theirs (1971). Smith et.al. (1966) observed no pleurocystidia in the Michigan populations but these are rarely present in the Himalayan populations.

The present taxon differs from *L. scabrum* var. *coloratipes* (Singer) Singer in the lack of grayish pores, staining yellow on bruising and the stipe is also not flushed red beneath the fine brown ornamentation in the lower part.

Edibility: Edible but not worthwhile

Krieger (1967), Lincoff (1981); Miller (1981); Arora (1986); Phillips (1991)

3. Acknowledgement

The authors are grateful to the Head of the Department of Botany, H.N.B. Garhwal University Campus Pauri for providing the necessary laboratory facilities used during the course of study described herein.

References

- [1] Arora, D. 1986. Mushroom Demystified. Ten speed press, Berkeley California
- [2] Blum, J. 1968 *Russules* and *Boletes* are Salon des Chaampignons de 1967. Rev. Mycol. 33:114-136
- [3] Corner, E.J.H. 1972 *Boletus* in Malaysia. Govt. Printers, Singapore.
- [4] Heinmann, P. 1954. Flore Iconographia Chamignous du Congo. Fasc. 3. Boletineae, Belgique.
- [5] Krieger, L.C.C. 1967. The Mushroom Hand Book. Dover publication, INC m New York.
- [6] Lincoff, G.H. 1981. The Audubon Society field guide to North American Mushrooms. Alfred A. Knopf, New York.
- [7] Miller, O.K. Jr. 1981. Mushrooms of North America, E.P. Dutton, New York.
- [8] Phillips, R. 1991. Mushrooms of North America. Little Brown and Company (Canada) Limited.
- [9] Singer, R. 1962. The Agaricales in Modern Taxonomy (ed.) J. Cramer, Weinhein.
- [10] Singer, R. 1975. Agaricales in modern Taxonomy (3rd ed.). J. Cramer, Vaduz.
- [11] Smith, A.H. and Theirs, H.D. 1971. The Boletes of Michigan. Univ. of Michigan press, An Arbor.
- [12] Smith, A.H. Theirs, H.D. and Watling, R. 1966. A preliminary account of the North American species of *Leccinum*. Sect. *Luteoscabra* and *Scabra* Michigan Botanist 6:107-154.
- [13] Watling, R. 1970. *Boletaceae*, *Gomphidiaceae* and *Paxillaceae*, In Brithis Fungus Flora, (eds. D.W. Henderson, P.D. Orton and R. Watling), Edignburh 1-124.