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## Mushrooms of Kashmir IV

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**Abstract:** Five species of mushrooms of family Tricholomataceae have been described for the first time from Azad Jammu and Kashmir. These are *Collybia dryophila*, *C. earleae*, *Leucopaxillus masakanus*, *Marasmius delectan* and *Oudemansiella radicata*. Two species *Marasmius oreades* and *Mycena alcalina* are redescribed.

**Key words:** Tricholomataceae, order agaricales, species, mushrooms, Kashmir

### INTRODUCTION

Mushroom are fleshy, sometimes tough, umbrella-like sporophores that bear holobasidia of the chiastobasidial type on the surfaces of lamellae that hang down from the pileus or in so-called boletes, lining the sides of deep or shallow tubes formed on the undersurface of the pileus. As a group agarics occur in wide variety of habitats ranging from the arctic to the tropics. While some species are known only from the restricted areas, others exist in areas that are widely separated geographically. Even so, most species do seem to show, a preference for a certain type of habitat. Some are, for instance, found primarily in upland wooded areas, other exist in swamps and bogs. Still others prefer open areas such as gardens, lawns and pastures. Many species, particularly the mycorrhizal forms, are associated with certain types of vegetations. Within a certain habitat mushroom also show a preference for a particular substrate. Basidiocarps of some mushrooms are typically produced on the soil and generally are referred to as terrestrial forms others are formed on dead leaves (folicolous), on wood (Lignicolous), or dung (coprophilous). These species are usually saprobic in these substrates. A few grow on basidiocarps of other mushrooms and are termed fungicolous. The various habitats and substrates reflect the fact that agaricles contains parasitic, saprobic and mycorrhizal forms. The basidiocarps of many agarics serve as important food sources for a variety of animals ranging from insects to large mammals herbivores. Many flies and beetle lay their eggs in mushrooms. The fleshy basidiocarps of agarics also are "fair game" for a variety of other types of fungi (Alexopoulos *et al.*, 1996).

Stewart (1924) collected wild mushrooms in late summer at Sonamerg, Kashmir, at an elevation varying from nine to twelve thousand feet and described 25 species of mushrooms, belonging to different genera.

Ahmad (1952) studied gasteromycetes of Pakistan in detail and gave keys for their identification. Ahmad (1956) listed one thousand new species of fungi from Pakistan among which 265 were fleshy fungi. Khan (1962) described 39 wild mushrooms from Azad Jammu and Kashmir. Ahmad (1972) gave detailed account of basidiomycetes of west Pakistan and listed 225 species belonging to 95 genera and 25 families. Beg *et al.* (1974) recorded 167 species of higher fungi from 105 genera. Aslam (1976) described five species of wild mushrooms collected from Agricultural Research Institute, Tarnab, Peshawar. These are: *Ressuladelica*, *Coprinus micacenus*, *C. comatus*, *C. atramentarius* and *Inocybe fastigata*. Khanzada (1978) collected and identified 40 species of mushrooms from 25 different localities including forest area of Hyderabad division. Mirza and Qureshi (1978) listed 847 genera and 3383 species of fungi in "Fungi of Pakistan" out of which 47 genera were belonging to fleshy fungi. Ahmad (1980) contributed to the mushroom flora of Pakistan. He described 183 species belonging to 60 genera and 13 families of the order agaricales. Khan *et al.* (1980) reported four edible fungi from Baluchistan, these were: *Agaricus rodmani*, *Coprinus atramentarius*, *Phellorina inquinans* and *Podaxis pistillaris*. Solangi (1988) reported 41 species of fleshy fungi from Sind, Pakistan. Gardezi (1993) reported six species of the genus *Agaricus* from Rawalakot Azad Kashmir. Gardezi and Ayub (1996) reported three edible species of mushrooms for the first time from Azad Jammu and Kashmir. Gardezi and Khan (1999) collected and described five edible mushrooms from Azad Jammu and Kashmir. These are *Armillaria mellea*, *Cantharellus cibarius*, *Craterellus cornucopioides*, *Flammulina velutipes* and *Macrolwpiota procera*. Siddique and Gardezi (1999) described two edible species from Azad Jammu and Kashmir. Gardezi *et al.* (2002a) reported *Amanita elliptica*, *A. muscaria* var. *alba*, *Ramaria aurea*, *R. botrytis*, *Phallus impudicus*, *Morchella elata* and

*M. semilibra* from Kashmir. Gardezi and Ayub (2002b) reported seven species of mushrooms from Azad Jammu and Kashmir. These were *Amanita ceciliae*, *A. subglobosia*, *A. pantherina*, *A. pachycolea*, *A. virosa*, *Volvariella bombycina* and *V. speciosa*. In present studies their edibility, non edibility as well as distribution, habitat and taxonomic position is clarified.

## MATERIALS AND METHODS

Mushrooms were collected from Muzffarabad, Mirpur, Poonch, Kotli and Bagh in Azad Kashmir. Colour standard and nomenclature were used that of Rigway (1912). The specimens were identified by following the keys of Arora (1986), Gardezi (1986, 2000).

## RESULTS

**Family Tricholomataceae roze:** Bull. Soc. Bot. Fr. 23:51 (1876) (ut *Tricholomees*).

*Collybia* Kummer

Fuhr. Pilzk., pp: 26, 1871.

**Type species:** *Collybia tuberosa* (Bull. ex Fr.) Kummer

### Key to the Kashmiri species of the genus *Collybia*:

1. Pileus 3-9 cm diam, convex, soon plane, finally depressed at the centre, tawny to buff or clay, barker disc, non-striate, basidiospores 5.5-7 X 2-3.5 µm, subfusoid, .....*C. dryophila*
1. Pileus 3-6 cm diam umbonate soon inrolled, finally not depressed at the centre, ochraceous to hazal or chestnut, basidiospores 4.5-11 X 2-7 µm, elliptical.....*C. earleae*

*Collybia drophila* (Bull. Ex. Fr.) Kummer, Fuhr, Pilzk. 115 (1871).

(Til-chhatri)

*Agaricus dryophilus* Bull. ex. Fr. Syst. Myco., 1: 124 (1821).

*Marasmius dryophilus* (Bull. ex. Fr.) Karst., Finl. Basidsv: 103 (1989).

*Gymnopus dryophilus* Murr. No. Amer. Fl. 9: 362 (1961).

Pileus 3-9 cm broad, convex with an incurved margin when young, becoming broad convex to plane, depressed at the centre, slightly umbonate or with slightly depressed disc, margin even when young, soon undulate, translucent-striate when young and moist, surface glabrous, lubricious when moist, mate upon drying, hygrophanous, tawny ochraceous to hazal or chestnut,



Fig. 1: *Collybia arleae*



Fig. 2: *Leucopaxillus masakanus*





Fig. 3: *Marasmius delllectans*



Fig. 4: *M. oreades*

with thin white margin when fresh, soon fading overall to tawny ochraceous, ochraceous faintly ochraceous buff, buff or clay, with darker disc. Context white rarely changing, thin. Odour and taste fungoid or absent. Lamellae adnexed or almost free, very crowded. 5-7 lamellulae per mm at margin, narrow, thin, white, cream or cream buff, rarely yellow, sometimes staining ochraceous, edge even to fimbriate or slightly eroded with age. Stipe 3-11 cm long 2-4 mm broad, almost equal, compressed, rarely fluted or grooved, enlarge toward apex from with



Fig. 5: *Mycena alcalina*



Fig. 6: *Oudemansiella radicata*

white to yellowish or buff mycelium over base, occasionally longitudinally pulverulent-striate or sulcate-striate, sometimes tomentose, white to pale yellowish-

white near apex, becoming lack toward base, rhizomorph present, interior stuffed when immature, soon hollow. Spore print white when fresh, drying yellowish. Basidiospores 5.5-7 X 2-3.5  $\mu\text{m}$ , clavate, thin-walled, hyaline, non-guttulate, nonamyloid. Basidia 15-29 X 3-9  $\mu\text{m}$ , clavate, thin-walled, hyaline, four sterigmata usually short. Cheilocystidia 19-26 X 8-12  $\mu\text{m}$ , mostly inflated clavate or cylindric with a broad rounded apex, smooth or with short outgrowths, hyaline, thin-walled. Pleurocystidia absent. Lamella-edge 20-26 X 4-7  $\mu\text{m}$ , sterile, with crowded cheilocystidia, thin-walled, often bifurcate or variously branched, occasionally proliferating well beyond lamellae edge. Lamellar-trama interwoven to parallel, inamyloid, hyphae 4-10  $\mu\text{m}$ , pileus trama of less densely interwoven hyphae, nonamyloid, hyphae 5-13  $\mu\text{m}$  broad, thin-walled, hyaline. Pileus cuticle 200-250  $\mu\text{m}$  thick, nonamyloid, hyphae 5-12  $\mu\text{m}$  broad, cylindric, becoming inflated toward apex, thin-walled, smooth. Rhizomorphs consisting of interwoven, unbranched hyphae 25-60  $\mu\text{m}$  broad, cylindric, thin-walled, occasionally with scattered to dense, hyaline to yellow granular incrustation. Clamp connections present in all tissues.

Edibility: Edible

**Chemical composition (%):** Protein 24.92, Fiber 12.49, Moisture 10.92, Ash 12.42, Fat 1.2.

**Habitat and distribution:** Gregarious to caespitose on soil, leaf litter and well decayed wood throughout the warm seasons especially common under pine tress. Anyaree July 5, 1995. alt. 1640 m.

**Lectotype:** Gardezi 726. Dhirkot August 5, 1996. alt. 1676 m. Gardezi 727.

The specimens of the species agree with the published descriptions of Vilgalys and Miller (1983) except in its pileus becoming broad convex to plane in age. Closely related species is *C. butyracea* but it has buttery feel to the pileus and its spores are not white in mass.

**New record:** This species has been recorded for the first time from Azad Jammu and Kashmir.

**Type:** *Agaricus dryophilus* Bull. ex . Fr.

*Collybia earleae* (Murr.) Murr. Mycologia 8: 221, 1961.

**(Drag):** Pileus 3-5 cm broad, umbonate inrolled at first, soon convex, broadly convex with depressed disc in age, margin even or undulating, pale buff yellow when moist,

cinnamon rufous, hazel, ferruginous, ochraceous, soon fading ochraceous buff, pinkish buff, cream buff, buff remaining darker over disc. Context thin 0.5-2 mm at disc, pliant whitish to concolorous near cuticle. Odour fragrant or absent, taste absent, fungoid or bitter. Lamellae adnexed or nearly so, close to sub-distant 1.2 mm lamellulae at margin, with 2-3 tiers, moderately broad, thin, buff, to pinkish buff, ochraceous buff, orange buff, cream, margin even or slightly wavy. Stipe 1-9 cm broad, terete or slightly compressed, slightly fluted and flared at apex, with a small basal bulb attached to a ball of soil, plant fibrous, sometimes twisted striate, surface dry, nearly glabrous except for tawny, strigosity at base, buff to cream at apex, darkening below, interior hollow, pinkish buff, rhizomorph occasionally present. Odour and taste no distinct. Spore deposit white. Basidiospores 4.5-7 X 2-4  $\mu\text{m}$ , elongate to sphaerical, smooth, thin-walled, aguttulate, inamyloid. Basidia 14-30 X 3-6  $\mu\text{m}$ , clavate, thin-walled, four sterigmata. Pleurocystidia absent. Cheilocystidia inconspicuous, scattered to abundant, often collapsed or partially buried 13.5-37 X 4-11  $\mu\text{m}$ , filamentous or more usually inflated clavate to sphaeropedunculate, thin-walled, hyaline, inamyloid, Lamellar trama parallel, nonamyloid, hyphae 3-10  $\mu\text{m}$  broad, cylindric, thin-walled, non-encrusted. Pileus cuticle 35-95  $\mu\text{m}$  thick, nonamyloid possessing yellow brown to reddish brown pigments, hyphae 4-10  $\mu\text{m}$  broad, inflated at apex, hyaline, thin-walled, basal strigosity composed of interwoven, thin-walled hyphae 5-7  $\mu\text{m}$  broad, rhizomorph composed of interwoven hyphae 2-4  $\mu\text{m}$  broad, cylindric, unbranched, thin-walled or with fine rib-like to coarse grainy incrustation. Clamp connection present in all tissues (Fig. 1).

**Edibility:** Unknown.

**Habitat and distribution:** Single to gregarious, fruiting directly on bare soil in grassy area and in hardwood. Sudhan Gali Aug. 8, 1995, alt. 1902 m, **Lectotype:** Gardezi 728. Las Dana Sept. 2, 1996, alt. 1870 m, Gardezi 729.

This is a common species of sub-tropical highland of Kashmir. According to Halling (1980) Coker and Beardslee (1921) *C. earleae* possesses distinct tawny hairs at the base of the stipe and fruit on bare soil in woods. This combination of features is apparently absent in *C. agricola*, which only fruits in open usually in the grassy areas. Sterigose hairs are also reported to be absent in *C. agricola*. Halling (1980) has suggested that both these taxa may be conspecific. This species agrees with published descriptions of Vilgalys and Miller (1983) except in its pileus becoming even or undulating, pale buff yellow, eroded in age.

**New record:** This species has been recorded for the first time from Azad Jammu and Kashmir.

**Type:** *Collybia earleae* (Murr.) Murr.

*Leucopaxillus* Boursier

Bull. Soc. Myc. Fr. 41: 391. 1925.

**Type species:** *L. pseudoacerbus* (Cost and Duf.) Boursier [= *L. tricolor* (Peck) Kuhner].

*Leucopaxillus masakanus* Pegler. A preliminary Agaric Flora of East Africa pp 615 (1977).

(**Kuta mutar**)

Pileus 2-4 cm diam., thick, convex then expending, subumbonate, surface white to pale cream, smooth, glabrous, non-striate. Lamellae sub decurrent, white, narrow, 2 mm wide, crowded, with lamellulae of three lengths, edge white pruinose. Stipe 5-6 cm x 3-6 mm, cylindric, equal, solid, surface concolorous with the pileus, glabrous except for a white mycelial base. Context white, firm, up to 3 mm thick at the disc, of slightly inflated, thin-walled hyphae 4-8 µm diam. Odour and taste insignificant. Spore print pure white. Basidiospores 4-6 X 3-5 µm, subglobose to avoid, hyaline, thin-walled, With a verrucose to echinulate, amyloid. Basidia 20-28 X 4-7 µm, clavate, bearing four sterigmata up to four µm long. Lamellar edge sterile. Cheilocystidia hyphoid 26-40 X 3-4 µm, sinuous-cylindric, sometimes nodulose, hyaline, thin-walled. Pleurocystidia absent. Hymenophoral trama regular, hyaline, with parallel, slightly inflated hyphae 4-10 µm diam. Subhymenial layer interwoven, 4-6 µm diam. Pileal surface a repent

**Edibility:** Unknown.

**Habitat and distribution:** Found singly or scattered from forest floor. Rawalakot Aug. 5, 1995 alt. 1615 m,

**Lectotype:** Gardezi 734. Ali Sojal July 5. 1996, alt. 1901 m, Gardezi 735.

This species exactly tallys with published descriptions of Pegler (19977) except the following characters pileus thick, convex then expending. The species closely resembles with *L. gentianus* can usually be recognized by its dull, boring brown to reddish brown pileus

**New record:** This species has been recorded for the first time from Azad Jammu and Kashmir.

**Type:** *Leucopaxillus masakanus* Pegler

## 8. *Marasmius* Fr.

Gen. Hymen., p. 9. 1838.

**Type species:** *M. rotula* (L. ex Fr.) Fr.

## Key to the Kashmiri species of the genus *Marasmius*:

1. Pileus 2-5 cm diam, deep grooved, convex or broadly convex even overall when young, planoconvex or nearly plane in age, margin even., basidiospores 7.2-9.5 X 2-5 µm, ellipsoid, elongate-ellipsoid.....*M. delectans*

1. Pileus 8-15 cm diam., not deep grooved bell-shaped or umbonate when young, often obtuse umbo in age, margin incurved., basidiospores 9-12 X 3-5 µm, clavate, curved ..... *M. oreades*

*Marasmius delectans* Morgan, J. Mycol. 11: 206 (1915).

(**Kuta mutar**)

Pileus 2-5 cm diam., ivory drying white, deep grooved, convex or broadly convex, even overall when young, plano-convex or nearly plane in age, disc even or weakly rugulose in age, margin even, sometimes short striatulate in age, surface subvelutinous. Context 1-2 mm thick, buff. Lamellae shallow-attached, distant, moderately broad, thin, not forked nor intervenose, white at first, becoming pale yellow, white or cream in age, lamellulae 1-3 series. Stipe 3-7 cm, terete, equal, sometimes twisted, tough, cartilaginous, hollow, dry, shiny, glabrous, non-institious, coloured, Strigose mycelium, apex colour white, yellowish white or orange white, base coloured brown or reddish brown. Odour and taste not distinctive. Spore print. white. Basidiospores 7.2-9.5 X 2-5 µm, ellipsoid, elongate-ellipsoid, hyaline, nonamyloid, smooth. Basidia 19.5-30 X 5-7 µm, clavate, four spored. Cheilocystidia numerous 10-20 X 5-11 µm, cylindric, clavate, turbinate or irregular in outline, sometimes lobed, thin-walled or firm walled, hyaline or pale yellow. Pleurocystidia numerous, irregularly cylindric, fusoid, sub-clavate, ventricose or lageniform, often sterangulate, refractive, thin-walled, hyaline, rarely pale yellow, nonamyloid. Pileus trama interwoven. Lamellar trama regular hyphae 3-14 µm diam., cylindric, sometimes inflated up to 21 µm diam., smooth, non-gelatinous, thin-walled, hyaline, dextrinoid. Stipe tissue monomitic, cortical hyphae 3-9 µm diam., parallel, cylindric, smooth, yellow. Clamp connections present in all tissues. Fig. 3.

**Edibility:** Not edible.

**Habitat and distribution:** Found in groups, attached to the fallen leaves by wide white wooly mat. It is associated with medicinal plant *Viola* spp. Mujahid abad July 25, 1995 alt. 1840 m.

**Lectotype:** Gardezi 738. Sharda Aug, 2, 1996 alt. 1981 m. Gardezi 739.

A little known species from Azad Jammu and Kashmir is also reported by Courtenay and Burdsall (1982) from

USA. Close relative of this species *Marasmius candidus* reported by Arora (1986)

**New record:** This species has been recorded for the first time from Azad Jammu and Kashmir.

**Type:** *Marasmius delectans* Morgan

*Marasmius oreades* (Bolt. ex. Fr.) Fr. Epicr. Myc. 375 (1838).

(**Til-chhattri**)

*Agaricus oreades* Bolt. Hist. Fung. Halifax 3: 151 (1789).

*Agaricus oreades* Bolt. ex. Fr. Syst. Mycol. 1: 127 (1821).

*Collybia oreades* (Bolt. ex. Fr.) Kummer, Fuchr. Pilzk. 116 (1871).

*Scorteus oreades* (Bolt. ex. Fr.) Earle, Bull. New York Bot. Gard. 5: 415 (1909).

*Agaricus caryophylleus* Schaeffer, Fung. Bavaria 4: 38 (1774).

*Marasmius caryophylleus* (Schaeff.) Schroet in Cohn, Kryptogameenfl. Schlesien 3 (1) (1889).

Pileus 8-15 cm diam., bell-shaped or umbonate, convex or plane often obtuse umbo, surface hygrophanous. Expanding in age to plano-convex, margin more or less incurved, surface dull, dry opaque, subvelutinous, reddish brown, brownish orange or reddish orange. Context thin, white. Lamellae adnate, adnexed, very rarely with a thin, adherent, collar tissues at stipe apex, distant or remote, 7-11 complete lamellae, narrow, 1 mm broad, thin, seldom forked near pileus margin, rarely weakly intervenose, coloured white when young, becoming buff or pale yellowish white in age. Stipe 2-8 cm long 1-5 mm thick, equal, teretes, filiform, whirly, shiny, glabrous, strigose mycelium, apex coloured white when base brownish orange in age, concolorous with lamellar faces, base brown or dark brown. Odour and taste not distinctive. Spore print white. Basidiospores 9-12 X 3-5 µm, clavate, curved, hyaline nonamyloid, smooth. Basidia 17-25 X 6-9 µm, cylindric, fusoid, ventricose or irregular, thin-walled, hyaline, Cheilocystidia 10-18 X 4-9 µm, cylindric, clavate, thin-walled, verrucose, obtuse, subacute or acute, thin-walled or thick-walled, hyaline to orange. Pileus trama interwoven. Lamellar trama regular, hyphae 3-6 µm diam., cylindric or lightly inflated, smooth, non-gelatinous, thin-walled, hyaline. Stipe tissues monomitic, hyphae 4-6 µm diam., parallel, cylindric, smooth, hyaline or brown, dextrinoid. Clamp connections present in all tissues. Fig. 4.

Edibility: Edible.

**Chemical composition (%):** Protein 20.21, Fiber 12.90, Moisture 11.83, Ash 20.38, Fat 0.07

**Habitat and distribution:** Found singly or grouped in rings and arcs in grassy places. Pir Chanasi Aug. 11, 1995, alt. 1830 m, **Lecotype:** Gardezi 740. Tolipir Sept. 2, 1996, alt. 1930 m, Gardezi 741.

A very prominent and beautiful species found throughout the forests of Azad Jammu and Kashmir. Arora (1986) reported this species from USA. Gardezi (1986) reported this species from Kashmir. Its close relative *M. (=Collybia) strictipes* of eastern North America somewhat similar to this species but grows in wood and has a closer lamellae and a yellowish pileus.

**New record:** All the above localities.

**Type:** *Agaricus oreades* Bolt.

9. *Mycena* (Pers. ex Fr.) S.F. Gray

Nat. Arr. Brit. Pl. 1: 619. 1821.

Type species: *M. galericulata* (Scop. ex Fr) S.F. Gray

*Mycena alcalina* (Fr. ex. Fr.) Kummer, Fuhr. Pilzk. 109(1871).

(**Kuta mutar**)

*Agaricus alcalinus* Fr. ex. Fr. Syst. Mycol. 1: 142 (1821).

Pileus 2-6 cm diam., obtusely conical, more rarely convex or broadly umbonate, membranous, surface subhygrophanous, dull brownish to pale grayish drab, glabrous, striate to the disc at maturity, slightly sulcate at the margin. Lamellae adnexo-adnate or with a decurrent tooth, ascendant, white to cinereous 1-2 mm broad, moderately crowded, with lamellulae of two length, edge concolorous. Stipe 3-8 X 1-3 mm, cartilaginous, equal, cylindric or compressed, hollow, surface concolorous with the pileus, smooth and shiny, non-viscid, arising from a white strigose mycelium. Context thin, cartilaginous, white or grayish, strongly vinaceous in Melzer's reagent, hyphae 2-4 µm diam., much inflated to 25 µm diam. Odour not distinctive. Spore print white. Basidiospores 6.5-9.5 X 3-5 µm, ellipsoid to oblong cylindric, hyaline, weakly amyloid, thin-walled, with guttulate contents. Basidia 25-26 X 7-8 µm, clavate, bearing four sterigmata up to 7 µm long. Lamella edge sterile heteromorphous. Cheilocystidia abundant 48-58 X 8-15 µm, fusoid, ventricose, hyaline, thin-walled. Pleurocystidia numerous, 57-68 X 9-13 µm, fusoid, ventricose or mucronate, hyaline, thin-walled. Hymenophoral trama regular, hyaline, strongly vinaceous in Melzer's reagent, with pseudoparenchymatous. Pileus surface thin, repent, epicutis of radially parallel, slightly agutinated hyphae 3-7 µm. Fig. 5.

**Edibility:** Not edible.

**Habitat and distribution:** Found scattered, grouped or clumped on rotting conifers. Anyaree July 3, 1995, alt. 1640 m, **Lectotype:** Gardezi 742. Nar Sher Ali Khan Aut. 3, 1996, alt. 17770 m, Gardezi 743. Tolipir Aug. 10, 1996, alt. 1930 m, Gardezi 744.

The collected specimens of this species resemble the published descriptions of Courtenay and Burdsall (1982) with following striking characters Pileus membranous, surface subhygrophanous. Gardezi (1986) reported this species from Kashmir. Similar species to *Mycena alcalina* are *M. Subcana* and *M. Murina* without distinct odour.

**New record:** All the above localities.

**Type:** *Agaricus alcalinus* Fr. ex. Fr.

#### 10. *Oudemansiella spg*

An. Soc. Cient. Arg. 12: 24. 1881.

Type species: *O. Platensis* (Speg.) Speg.

*Oudemansiella radicata* (Rehl. ex. Fr.) Singer in Anm. Mycol., Berl. 34: 333 (1936).

(**Til-chhattri**)

*Agaricus radicans* Rehl. ex. Fr. Syst. Mycol. 1: 118 (1821).

*A. Megalus* Pers., Mycol. Europ. 3: 170 (1828).

*Collybia radicata* (Rehl. ex. Fr.) Kummer, Fuhr. Pilzk.: 117 (1871).

*Agaricus alveolata* Kalchbr. In Grevillea 9: 110 (1880).

*Collybia alveolata* (Kalchbr.) Sacc., Syll. Fung. 5: 202 (1887).

*Hygrophorus gigasporus* Cooke and Mass in Grevillea 16: 31 (1888).

*Agaricus macrourus* Scop. ex. Schroet. in Cohn., Kryptog.-Fl. Schles. 1: 783 (1889).

*Clitocybe megalospora* Clements in Bot. Surv. Nebraska 4: 18 (1896).

*Collybia macroura* (Scop. ex. Schroet.) Gramberg, Pilze Heim. 1: 38 (1913).

*Gymnopus radicans* (Rehl. ex. Fr.) Murr. In N. Amer. Fl. 9: 366 (1916).

*Mucidula radicata* (Rehl. ex. Fr.) Bours. in Bull. Soc. Mycol. Fr. 40: 333 (1924).

Pileus 3-11 cm diam., convex then applanate to depressed, umbonate, surface yellowish gray or paler to dark blister brown, viscid and translucent when moist, ridged rugose particularly at the umbo, margin thin straight. Lamellae adnate, white or pale cream, broad, ventricose, up to 12 mm wide, thick, moderately spaced distant. Stripe 5-8 cm X 6-18 mm, elongate, cylindric, attenuate above, fistulose then hollow, surface concolorous with pileus, much paler towards the apex, fibrillose-strigose, with a long pseudorrhiza. Veil absent. Context thin, unchanging, consisting of loosely interwoven hyphae 5-7 µm diam.,

strongly inflated to 28 µm diam., with small and at times inconspicuous. Basidiospores 14-18 X 10-13 µm, ovoid to ellipsoid, hyaline, smooth with a slightly thickened wall, consisting one to several refractive oil-guttules. Basidia 65-71 X 11-17 µm, clavate, filled with refractive oil-guttules, bearing four sterigmata 3-5 µm, long. Lamella edge sterile, or heteromorphous with cheilocystidia abundant to rare. Cheilocystidia 48-70 X 12-24 µm, clavate, at times constricted, thin-walled, hyaline, sometimes filled with a paler brown vascular pigment. Pleurocystidia 70-130 X 10-40 µm, cylindric to clavate or lageniform, with a pedicellate base, hyaline, thin walled or with a slightly thickened walled. Hymenophoral trama more or less regular, subgelatinous, hyaline, with thin-walled hyphae 2-4 µm diam., inflated 14 µm diam. Sybhymental layer poorly developed. Pileal surface hymenodermic, with a palisade of capitate hyphae, 30-60 X 9-24 µm, hyaline or often with a brown vacuolar pigment, forming an epithelium, embedded in a gelatinous matrix. Fig. 6.

**Edibility:** Edible.

Chemical composition (%) protein 20.23, Fiber 17.93, Moisture 11.15, Ash 14.75, Fat 1.74.

**Habitat and distribution:** Found singly or scattered under hard woods. Rawalakot July 13, 1996 alt. 1615 m, **Lectotype:** Gardezi 745. Chakar Aug. 2, 1996, alt. 1828 m Gardezi 746.

A very common temperature species in normally rate in tropical regions. All specimens examined were from Rawalakot and Chakar forests. The fungus is inhabitant of the area. The collections were typical in all respect of the European fungus. Courtenay and Burdsall (1982) reported this species from USA. *O. logipes* is similar in colour to *O. radicata* but slightly smaller species with a dry pileus and much smaller pores.

**New record:** This species has been recorded for the first time from Azad Jammu and Kashmir.

**Type:** *Agaricus radicans* Rehl. ex. Fr.

## DISCUSSION

The present investigation include the general survey and description of various species of mushrooms from Azad Jammu and Kashmir. The area is famous for mushrooms abundance and diversity. The investigation is first of its kind in the area, therefore, most of the species described are either reported or are studied in detail for the first time. The local species *Collybia dryophila* revealed the characters with Pileus 3-9 cm broad, convex



with an incurved margin when young, becoming broad convex to plane, shallow depressed sometimes in age. Lamellae adnexed or almost free and fluted grooved, enlarge toward apex from a basal bulb. Whereas the same species reported from USA with the following characters: Pileus 1-7 cm broad, broadly convex with an incurved margin, becoming plane or with an uplifted often wavy margin in age. Lamellae usually notched or adnexed. Stipe 2-8 cm long, 2-6 mm thick equal or with swollen base, slender, smooth, hollow rather tough and cartilaginous. This is edible mushroom, locally called til-chhatri, very delicious, collected by local communities and are eaten safely. (Arora, 1986). The local species of *Marasmius delectans* reported during the present survey found fruiting bodies attached to the fallen leaves and by wide wooly mat, stipe white, yellowish white or orange white, base coloured brown or reddish brown. Similar species reported from USA growing on hardwood leaves, with stipe pallid to yellowish above and dark brown yellowish below (Arora, 1986). This is a beautiful mushrooms but amateurs don't try it to eat because they have opinion that this is an poisonous mushroom and locally are called Kuta-mutar, *Marasmius oreades* obtained during present produced Pileus 8-15 cm diam., bell-shaped, or umbonate, convex or plane often obtuse umbo. Lamellae adnate, adnexed. Stipe 2-8 cm broad, filiform, whirly, glabrous, apex coloured white when young with base brownish orange in age. Whereas the same species reported during present collection showed following characters: Pileus 4-5 cm broad, fleshy through, convex, plane or subumbonate. Lamellae thick, distant, free. Stipe 4-5 cm long, pallid, solid, corticate (Krieger, 1967). This is an edible, delicious and beautiful mushroom, locally called til-chhatri and are eaten by the local communities. Local species *Mycena alcalina* collected during the following survey with Pileus 2-6 cm diam., obtusely conical more rarely convex or broadly umbonate. Lamellae adnexoadnate or with a decurrent tooth. Stipe 3-8 X 1-3 mm, cartilaginous, equal cylindrical or compressed, hollow, reported as pileus 1-4 cm broad, conical to bell-shaped or convex umbonate. Lamellae rather close, adnate to slightly decurrent. Stipe 3-10 cm or convex umbonate. Lamellae rather close, adnate to slightly decurrent. Stipe 3-10 long, 1.5-3 mm thick, equal, pallid to greyish or often sordid yellowish brown in age, fragile, hollow (Arora, 1986). Local species in poisonous and not recommended for eatable purposes are called Kuta-mutar. Arora (1986) reported *Oudemansiella radicata* with Pileus 2.5-12 cm broad, bell-shaped, becoming broadly convex to plane or with a broad umbo. Lamellae broad, fairly well-shaped, usually adnexed or notched. Stipe 5-25 cm long, 0.3-1.5 cm thick, usually thickest at or near ground level, with a tapered underground portion. The pileus observed in local

*Oudemansiella radicata* was approximately equivalent in size Pileus 3-11 cm diam., convex then applanate to depressed, umbonate. The lamellae adnate, broad, ventricose, moderately spaced or distant. Similar stipe was smaller in size 5-8 cm X 6-8 mm, elongate, cylindric, attenuate above. The presently collected species revealed the characters: Pileus 6-9 X 1.5-5.5 cm in smaller, at first spathulate then reniform, conchiform to dimidate. The lamellae adnato-decurrent and moderately crowded. Stipe absent. This is a phosphorescence species, locally called til-chhatri, delicious and the best for cooking purpose.

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