CHECK LIST OF AGARICS OF KAGHAN VALLEY-1

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Abstract

The list of Agarics of Kaghan valley includes 228 species belonging to 59 genera, placed in seven orders. Out of these, 24 species are edible. These were collected from Kaghan: Sharhan, Shogran, Naran and Lalazar ranging from 5000 feet to 9000 feet with thick forest cover. However, the forest become scanty in alpine region; at Babusar top (13684 feet) few Boletus species under Juniper bushes were reported.

Introduction

The Kaghan valley is one of the most beautiful places in Pakistan. It is subtropical contiguous to Hazara (Ahmad, 1969). It is situated between 34 30' to 35 15' latitude N and 73 18' to 74 5' longitude E. It extends over about 160 km rising from an elevation of 1,343 meters to its highest point, the Babusar Pass at 4150 meters (13684ft). This valley lies in the North of district Mansehra of Hazara Division, North West Frontier Province (N.W.F.P.). It is at its best in the summer months, with temperature between 3.3-12°c from the middle of May up to the middle of October. Champion et al., 1965 divided Hazara division into three major zones. Later Anwar (1971) divided the whole Kaghan valley into four Ecological zones: 1) Subtropical pine zone: including Balakot, Kewai, Mahandari, Bhunja sharif. 2) Temperate zone (Trans Himalayan): including Sharhan, Shogran, Sari hut, Bella, Kaghan. 3) Subalpine (Trans Himalayan): including Naran, Saif ul Malak, Lalazar, Batakundi, Burawai & Basal and 4) Alpine (TransHimalayan): including Lulusar lake, Gittidas, Babusar.

The Kaghan valley is drained by the River Kunhar originating from Lulusar Lake. The average rainfall for spring, summer and winter are 14.3, 25.8, and 7.5 inches respectively. The average snow fall received annually at Jared (5000 ft high) Kaghan: 662; Shogran: 7,749; Naran: 800 is 03, 08, 10 and 20 ft respectively. The reliable data for the other zones like sub alpine, alpine, and trans Himalayan are not available. This valley is at its best in the summer months from May to September.

Late Dr. Sultan Ahmad (1910-1983) being a pioneer, worked on the taxonomy of fungi of Pakistan and published over 170 research papers including monographs. In 1980 he published an account of order Agaricales of Pakistan containing 61 genera. He also recorded many agarics in his publications entitled Contributions to the fungi of Pakistan (1956, 1969). Khan (1975) studied wild and exotic mushrooms in Pakistan and reported 91 different mushrooms from different parts of the country. Mirza & Qureshi (1978) compiled all the published material in “The fungi of Pakistan”. Janmal (1982) studied the common Boletus and Amanita of Pakistan. Sultana et al., (1996) worked on edible mushrooms. The Japanese scientists during the Cryptogamic Expedition of Northern areas recorded many higher fungi alongwith micro fungi. Shibata (1992), Murakami (1993) also worked on fungi. The Fungi of Pakistan have been compiled by late Sultan Ahmad, Iqbal & Khalid, 1997. In addition to the above described literature the following books were also consulted for the identification: Marcel, (1987), Pegler, (1977), Smith, (1973), Svreck (1983). These studies show that the agaric flora of Pakistan is extremely rich. The described species seem to be a fraction of the fungal flora, which remain to be discovered.

Materials and Methods

The cited species were collected by the senior author herself and Muddassar Fida, Field Assistant. These were dried in the sun and identified by comparing the field data and microscopic characters with the existing literature. The mushrooms were deposited in the mycological herbarium of Pakistan Museum of Natural History (PMNH), H-7, Shakparian, Islamabad. Species recorded for the first time from Pakistan are indicated by an asterisks (*)

Results and Discussions

Order Boletales

Fruiting body fleshy, with pores and tubes

Family: Bolitaceae Singer

Hymenium tubular. Pores simple/compound, minute, broad or hexagonal, some times radial, elongated or nearly gill-like, spores mostly fusiform or elongated.

Subfamily: Bolitoideae

Cap thick and dome shaped. Pores small to medium, cap surface glabrous to greasy, neither distinctly velvety nor truly viscid. Clamps absent and trama divergent.

Genus: Boletus Dill. ex Fr.

Fruiting body thick, cap hemispherical with stout stipe, often reticulate surface, swollen in the middle or spindle-shaped. Spores smooth or only very obscurely ornamented.

Boletus edulis Bull., Edible

Cap 12-25 cm, fleshy, surface greasy, dark-brown, with slightly russet tint, margin persistently white. Pores surface changing to yellowish. Spores 15 x 5 μm. Under broad-leaved tree and conifers. It is known the best Boletus (delicious).


Boletus edulis f. appendiculatus Fr.

On ground, Kund, Nadi, Balakot, Iqbal & Khalid (1996).

Boletus erythrosus Pers.

=Boletus luridus var. erythrosus (Pers.) Fr.


Boletus fraternus Peck,

In the forest of Quercus trees, Murakami, (1993): 125.

*Boletus lupinus Fr.

On soil, Kalaiban, 10.7.89, PMNH 5775.
Boletus pulverulentus Optawski  

Boletus subvelutipes Peck.  

Boletus ustalis Berk.  
On the ground, Murree, Ahmad (1980).

Genus: *Tylopilus* Karst.  
Spores and pores pink and stipe with pink net.

*Tylopilus prophyrosporus* (Fr.) A.H. Smith  

Genus: *Krombholziella* L.Vass.  
Stipe cylindrical or spindle-shaped, finely scaly or rough, cap of dull coloured, Ferous (Fe) reaction gray to greenish.

*Krombholziella aurantiaca* (Bull.) R.Mre.  
Edible  
Commonly growing under conifers, spruce etc. on soil, Naran, 25.8.98, PMNH 8008.

*Krombholziella scabra* (Bull.) R. Mre.  
Spores 9.75-11.25 x 3.75-4.50 μm. On soil, Lalazar, 28.8.89, PMNH 8065.

Subfamily: *Xerocomoideae*  
Cap surface dry or velvety/cracking, pores often broad.

Genus: *Xerocomus* Quel.  
Pores yellow, regular to becoming gill like.  
*Xerocomus chrysenteron* (Bull.) Quel. Edible  
Spores 12-12 x 5-6 μm. On soil under conifer, Malakandi, 25.9.90, PMNH 8393.

*Xerocomus substomentosus* (L.) ex Fr. Quel.  
On soil under conifers, spruce, fir, 28.8.89, PMNH 8644.

Genus: *Strobilomyces* Berk.  
Ring present, pores grey, polygonal.

*Strobilomyces strobilaceus* (Scop.), Fr. Berk.  

Genus: *Phylloporus* Quel.  
Pores becoming gill-like.  
*Phylloporus rhodoxanthus* (Schw.) Bres.  
*Phylloporus bellus* (Mass.) Corner  
On soil, under broad-leaved trees. Sharhan 24.8.89, PMNH 7953.

Subfamily: *Suilloideae*  
Cap viscid, pores yellow to ochraceous or olivaceous, stipe sometimes with a ring, granulated surface, Trama diverging (*Boletus)*.

Genus: *Suillus* Mich. ex S.F.Gray,  
Fleshy, pores small/ large various, cap viscid, olivaceous; ring present or absent, membranous; stipe granular or without.

*Suillus collinitus* (Fr.) Kuntze. Edible  
= *Boletus tomentosus* Kauffm.  

*Suillus granulatus* (L.):Fr. O.Kanze.  
= *Boletus granulatus* L., = *Ixocomus granulatus* Fr. Quel  

*Suillus placidus* (Bonord.) Sing.  
It is found under 5-needle conifers (blue-pine), Shogran, 30.8.89, PMNH 8196, 8201; Murakami (1993):126; Iqbal & Khalid (1997).

*Suillus sibiricus* Singer & Singer,  

Order 2: *Russullales* (single family)  
Flesh granular, brittle, spore print white, creamy, ochraceous or yellow, spores with an amyloid ornamentations, sphaerocysts present.

Family: *Russulaceae*, Roze  
Same as above.

Genus: *Russula* (Pers.): Fr. S.F.Gray,  
No exudation of milky fluid when the flesh is broken. Gills horizontal, rarely at an angle, often forked. Length of stipe is almost equal to cap diameter.

*Russula adusta* (Pers.: Fr.):Fr.  

*Russula aurata* (With.) Fr.  

*Russula amara* Kucera, Edible  
Cap violaceous, umbonate, 8-10 cm diam, cuticle, shining, gills medium yellow, stipe 7 x 1 cm white, smell light like bitter fruit taste. Spores 9 x 7 μm, closely warted with an incomplete reticulum, sulfo anillin rection red. Under pine and on acidic soils.  
On soil, Shogran (Malakandi) 26.9.90, PMNH 8518.

*Russula amoënicolor* Romagn.  
On soil, Lalazar, 28.8.89, PMNH 8635.

*Russula badia* Quel.  
On soil, Shogran (Malakandi) 26.9.90, PMNH 8526; Iqbal & Khalid (1996).
Russula cyanoxantha (Schaef.) Fr.  

*Russula corminipes* Blum.  
On soil, Naran, 25.8.89, PMNH 8159.

*Russula consobrina* (Fr.) Fr.  
On soil, Naran, 30.8.89, PMNH 8113.

*Russula decipiens* (Sing.) K.R ex Svr.  
On oil, Shogran, 30.8.89, PMNH 7893.

Russula delica Fr.  

*Russula emetica* (Schaef.: Fr.) S.F. Gray.  

*Russula lepida* (Fr.) Fr.  
Under pine vegetation, Naran, 28.8.89, PMNH 8268.

*Russula maculata* Quel.  
Under pine vegetation, Lalazar, 28.8.89, PMNH 8155.

Russula nigricans Fr.  

*Russula paludosa* Britz.  
Under broad leaved bushes, Shogran, 27.8.89, PMNH 8086.

*Russula parzarea* J. Schaef.  
On soil, Malakandi (Shogran) 26.9.90, PMNH 8530.

*Russula pelargonia* Niolle.  
On soil, Kamalban, 24.9.90, PMNH 8435.

Russula queletii Fr.; Persoon,  

*Russula romellii* R.Mre.  
On soil, Lalazar, 28.8.89, PMNH 8656.

Russula rhodopoda Zvara  

*Russula torulosa* Bres.  

*Russula violacea* Quel.  
On soil, Kamalban, 24.9.90, PMNH 8425.

*Russula vinosa* Lindbl.  
Under Juniperous bushes, Babusar, 27.8.89, PMNH 8090.

Russula xerempelina (Sec.) Fr.  

Genus: **Lactarius** (Dc.) S.F. Gray.  
Flesh yielding milky fluid when broken, gills sloping to somewhat arched or decurrent

Lactarius akahatsu Tanaka  
On ground, Shogran, Shibata, (1992):149

*Lactarius atlanticus* Bon.  
On soil, Kamalban, 24.9.90, PMNH 8420 & 8441.

*Lactarius brunneoviolascens* Bon.  
On soil, Shogran, 30.8.89, PMNH 8657.

Lactarius badiosanguineus Kuhn. & Romagon,  

*Lactarius controversus* (Pers.) Fr. Edible  
On soil, Naran 25.8.89, PMNH 8634b.

Lactarius deliciousus (L.) S.F. Gray Edible  

Lactarius determinus Groger  
On soil, Kamalban 24.9.90, PMNH 8449.

Lactarius hatsudake Tanaka,  

Lactarius lacunarum Romagn. ex Hora  
On soil, Malakandi Shogran, 26.9.90, PMNH 8541.

*Lactarius obscuratus* (Lasch.) Fr. Edible  
On soil, Shogran, 30.8.89, PMNH 4145.

*Lactarius pergamenus* (Swartz) Fr. Edible  
On soil Lalazar, 28.8.89, PMNH 8264.

Lactarius piperatus (Scop.) S.F. Gray. Edible  

*Lactarius quietus* (Fr.) Fr.  
On soil, Lalazar, 25.9.90, PMNH 8461, Sharhan, 24.8.89, PMNH 8188.

*Lactarius rugatus* K.R.  
On the ground, Kamalban, 24.9.90, PMNH 8432.

Lactarius romagnesi Bon.  
On soil, Kamalban, 24.9.90, PMNH 8426.

*Lactarius sanguifluus* (Paul.) Fr.  
On soil, Naran, 25.8.89, PMNH 8198; on soil, Sari Hut, 26.9.90, PMNH 8540; on soil, on the way to Saiful Maluk 26.9.90, PMNH 8533.

*Lactarius scrobiculatus* (Scop.:Fr.)Fr.,  

*Lactarius semisanguifluus* Heim. & Lecl. Edible  
Naran, 25.8.89, PMNH 8241.

*Lactarius torminosus* (Sch.) S.F. Gray.  
On soil, Kamalban, 24.9.90, PMNH 8416.
*Lactarius uridus* (Fr.) Fr.  
On soil, Lalazar, 25.9.90, PMNH 8405.

*Lactarius vellereus* (Fr.) Fr. Edible  
On soil, Shogran, 26.9.90, PMNH 8476.

*Lactarius vietus* (Fr.) Fr. Edible  
On soil, Kamalban, 24.9.90, PMNH 8443.

*Lactarius violescens* (Otto) Fr.  
On soil, Shogran, 30.8.89, PMNH 7959, 8277, Lalazar, PMNH 8465, 8466.

Order 3: **Tricholomatales**  
Bon  
Gilled species with fibrous flesh, cap and stem running together, spores white.

Family: **Hygrophoraceae**  
Roze  
Gills distant, thick, with waxy consistency. Basidia elongated, inserted in various ways. Cap surface diverse, dry, scaly to smooth, greasy or very viscid. Stipe smooth viscid, rarely with ring or sheath.

Genus: **Hygrocybe** Kummer  
Generally vividly coloured mushrooms (Red tomato like). Gills with variable insertion and regular trama.

*Hygrocybe bresadolae* Quel.  

*Hygrocybe conica* (Scop. ex Fr.) Kummer  
=*Agaricus conica* Scop.  

*Hygrocybe nigrescens* (Quel.) Kuhn.  
Cap bright orange to tomato red, gills pale or yellowish 5-6 cm. Stipe fibrillose turning slaty to gray with age. Spores 10-11 x 5-7 μm. On soil, Shogran, Sharhan, 30.8.89, PMNH 8048, 8216.

*Hygrocybe alpa* (Berk. & Br.) Peglar & Rayner  
Spores smooth, 9-12 x 6.75-8.25 μm. On soil, Malakandi (Shogran) 26.9.90, PMNH 8527.

*Hygrocybe ovina* (Bull.) Kuhn.  
On soil, Shogran, 30.8.89, PMNH 8236.

*Hygrocybe persistens* (Brötz.) Sing.  
On soil, Kamalban, 24.9.90, PMNH 8423.

*Hygrocybe spadicea* (Scop.) Karst.  
On soil, Sharhan, 24.8.89, PMNH 8112.

Genus: **Hygrophorus** Fr.  
With adnate or decurrent gills, variously coloured but not bright. Trama bilateral or diverging.


Family: **Pleurotaceae**  
Stipe eccentric lateral or absent. Spore print white or pinkish, neither ochraceous nor rust colour

Genus: **Pleurotus** (Fr.)  
Large fleshy fungi with cylindrical spores.

*Pleurotus ostreatus* (Jacq.) Kumm. Edible  
=*Agaricus ostreatus* Jacq.  
Fruit body convex, fleshy with eccentric stipe, bluish grey to sometimes slaty with smooth surface; gills white, unbranched, smell fungoid, spores 11 x 3.5 μm, growing on dead trunks and branches of all kinds. Available late in the rainy season. On tree trunk, Naran, 25-8-89, PMNH 110; on ground, Malakandi, Shogran, Murakami, 1993:110; on trunk of *Juglan regia*, Ahmad (1980): 88.

*Pleurotus dryinus* (Pers.) Kumm. Edible  
On tree trunk, 24.8.89, PMNH 5259, Naran, Malakandi PMNH 8500.

Genus: **Asterophora** Ditm. ex Fr.  
Only confined on *Russula* fruiting bodies.

**Asterophora parasitica** (Bull. ex Fr.) Singer  

Genus **Omphalotus**, Fayod.  
Gills decurrent, forked and anastamosing, easily separable from flesh.

*Omphalotus olearius* (Dc. ex Fr.) Singer  

Family: **Tricholomataceae**, Roze  
Stipe central, cap fleshy and fibrous.

Tribe: **Clitocybeae**  
Gills decurrent to adnate, spores non - amyloid.

Genus: **Lyophyllum** Karst  
Lyophyllum carbonarium (Vel.) Moser in Gams.  

Lyophyllum decastus (Fr. : Fr.) Sing.  
=*Agaricus decastus* Fr.  

Lyophyllum nigrescens Hongo  

Genus: **Paxillus** Fr.  
Gills decurrent anastamosing, crowded. Spores ochraceous

*Paxillus panuoides* (Fr.) Fr.  

Genus: **Clitocybe** Kummer  
Fleshy fungi with decurrent or downward sloping gills and often funnel shaped cap. Spores smooth, print white, or tinged pink.

Clitocybe brunalis (Fr.) Gill.  
Cap small 2-4 cm. umbicate (depressed in the centre), olive grey, gills pale, decurrent. Stipe short, flesh whitish, odorless, under conifers, common during rainy season, around tree bases, occurring from July to October. On soils, Naran, 25.8.89, PMNH 8270.
Clitocybe dealbata (Fr.) Kummer,

Clitocybe flaccida Sowerb.

*Clitocybe fragrans* (With.) Kumm.
Cap small 2-4 cm, umblicate, margin striate, smell like pure aniseed. Common under conifers, Kamal -ban, 24.9.90, PMNH 8427.

Clitocybe gibba (Fries.) Kummer,

*Clitocybe infundibuliformis* (Schaeff ex Fr.) Quel.
On dead pines wood, Shogran, 30.8.89, PMNH 8296.

*Clitocybe mortuosa* (Fr.) Gill
On soil, 24.9.90, Kamal -ban, PMNH 8429, 8431.

*Clitocybe nebularis* (Batch) Kumm.
On soil, Malakandi 27.9.90, PMNH 8524

*Clitocybe squamulosa* (Pers.) Kumm.
On wood, Malakandi, 10.7.89, PMNH 8049.

*Armillaria* (Fr. ex Fr.) Staude.
Gills adnate or slightly decurrent. Cap scaly. Stipe with or without ring, around or on the trees in clusters.

*Armillaria tabescens* (Scop.) Emel.
Cap comparatively small and closely packed and soon depressed with brownish streaks, dotted with brown warts towards the center. Stipe slender, without ring. It is found in dense tufts. On pine wood, Lalazar 28.8.89, PMNH 8209.

*Armillariella* (Karst.) Karst.,
On tree, in bunch with prominent broad ring.

*Armillariella mellea* (Vahl.) Kumm.
= *Agaricus melleus* Vahl. ex Fr.
Cap 4-7 cm, umbonate, at the centre with small yellowish brown scales, margin incurred, gills arched or decurrent. Stipe in clustred 12 x 1 cm. Rhizomorph balckish brown. Spores 8 μm long elliptical. Clamps absent.

*Hypsizigus* Sing.
Growing alone or in pairs (sometimes in clusters of three). Cap: convex with a slightly involuted margin at first, becoming almost flat.

*Lepista inversa* (Scop.) Pat. Edible
Cap 5-9 cm becoming umbicate with incurved margin. Surface smooth, bright tawny to reddish brown or rusty orange. Gills deeply decurrent, ochraceous russet. Stipe 4-6 cm, smooth, similar colour, smells fungoid. Usually found under conifers. On soil, Kaghan, 11.7.89, PMNH 8311.

*Lepista nuda* (Bull.) Cke. Edible
Under conifers, common through out the rainy season. Malakandi, 27.9.90, PMNH 8414.

*Lepista obscura* (Sch.) Herink
On soil, Shogran, 26.9.90, PMNH 8529.

*Lepista silvestris* (Scop.) Pat. Edible
On soil, under conifers and broad leaved trees, Malakandi, 24.9.90, PMNH 8444.

*Repartite* (Fr.) Berk. & Br.
Gills horizontal with decurrent teeth, spores usually spiny.

*Laccaria amethystea* (Bull.) Murr. Edible
Cap medium, convex, then flat, margin wavy, bright and faded away with age, gills irregular; bright violet. Stipe long 6-8 cm. Spores sub-globose 7.5-8.25 x 4.5 um. Common during rainy season under the pine vegetation, edible. On soil, among grass, under conifers and walnut trees Malakandi, 26.9.90, PMNH 8532, Shogran, 30.8.89, PMNH 8234, 8253, Naran PMNH 8156.

*Laccaria bicolor* (R. Mre.) Orton.
On soil, Shogran, 26.9.90, PMNH 8513.

*Laccaria lacca* (Scop.) Berk. & Br.

*Laccaria lacca* var. *moelleri* (L.) Proximia.
Malakandi, 10.8.89, PMNH 7886a.

*Laccaria tortilis* (Bolt.) Cke.
On soil Naran, 9.7.89, PMNH 8102.

Tribe: *Tricholomataceae*
Gills horizontal, spores smooth, non amyloid, cystidia on the edge, visible under handens. Numerous clamp connection present.

*Tricholomopsis* Sing.
Gills fringed with large cystidia.

*Tricholomopsis rutilans* (Sch.) Sing.

*Lepista nuda* var. *moelleri* (L.) Proximia.
Tricholomopsis inamoenum (Fr.) Gill.  
Usually found under spruce at high altitude, on soil, Kamalban, 24.9.90, PMNH 8397.

Tricholomopsis nitellina (Fr. Sing.)  
On soil, under conifers, Kamalban, 24.9.90, PMNH 8428.

Tricholomopsis vaccinum (Sch.) Kumm.  
On soil, under Cedrus deodara, 25.8.89, PMNH 8074.

Genus: Tricholoma (Fr. ex Fr.) Kumm.  
Cap and stipe concolour with ring, orange colour.

Tricholoma aurantinum (Schaeff.: Fr.) Ricken,  

Tricholoma terreum (Schaef.: Fr.) Kummer,  
=Agaricus terreus Schaef.  

Tribe: Leucopaxilleae  
Spores amyloid.

Genus: Leucopaxillus 'Boursier  
Gills slightly decurrent (like Clitocybe) and easily separable from the flesh of cap.

Leucopaxillus gentianaceus (Quel.) Kotl.  

Leucopaxillus giganteus (Leyss.) Sing. Edible  
Fruiting body large, 20-40 cm, funnel shaped, margin wavy; gills decurrent; stipe short, spores smooth, flesh white to creamy, slightly aromatic, spores smooth, 6-7.5 x 4.5 μm with oil globules, growing among grass, lawns and wood, usually forming ring. On soils, under conifers, Malakandi, 26.9.90, PMNH 8471.

*Leucopaxillus paradoxus* (Cost. & Duf.) Boursier  
On soil, under walnut & conifer trees, Naran, 25.8.89, PMNH 8196.

Genus: Paxillus Fr.  
Gills decurrent, soft, separable from the cap; ochre.

Paxillus panuoides (Fr.) Fr.  

Genus: Oudemansiella 'Speg.  
Fruit body fleshy, with elongated shape, some with ring; cap-surface viscid, spores non amyloid.

Oudemansiella platyphylla (Pers.: Fr.) Moser.  

Oudemansiella radicata (Relh.) Sing.  
Fruiting body fleshy with a long stipe; cap convex 8-10 cm, viscid, white with greyish tinge. Stipe about 6 cm long. Spores 16 x 13 μm.  

Oudemansiella longipes (Kumm.) Moser.  
On soil and on tree trunk, under coniferous vegetation, Kamalban, 24.9.90, PMNH8451.

Family: Marasmiaceae  
Flesh thin, leathery, cartilaginous, shrivilling without rotting.

Genus: Baeospora Singer,  
Same as above but with dermatocystidia and growing on decaying cones of conifers.

Baeospora myosura (Fr.) Sing.  

Genus: Marasmius Fr.  
Deliicate, withering, cuticle wrinkled, become dry without rotting.

Marasmius alliaceus (Jacquin) Fr.  
Fruit body creamy, ochraceous, umbonate, surface whitish; gills distant. Spores 7.5 x 5.5 μm pale hyaline. Under broad leafed bushes, Sari Hüt, 26.9.90, PMNH 8537.

*Marasmius androsaceus* (L.) Fr.  
On pine needles, Kamalban, 24.9.90, PMNH 8488.

*Marasmius scorodonius* (Fr.) Fr.  
On wood, Sharhan, 24.8.89, PMNH 8063; Kamalban, 24.9.90, PMNH 8399.

Genus: Cirinipellis, Pat.  
Deliicate, small, pileus surface covered with concentric hairs.

*Cirinipellis stipitarius* (Fr.) Pat.  
On soil, among pine needles and grass, Kamalban, 24.9.90, PMNH 8411.

Genus: Strobilurus Sing.  
Pileus and stipe of brown colour, gills distant.

Strobilurus esculentus (Wulf.) Sing. Edible  
Fruit body small, usually on fallen leaves, branches & cones etc. Cap 2-3 cm dia, convex, light brown. Growing among logs; Naran, 9.9.89, PMNH 8109; Kamalban 24.9.90, PMNH 8492.

Genus: Marasmiellus, Murrill  
Small tough fungi, on woody substrates, with dry, downy caps, cuticle with lobed & inter locking hyphae.

*Marasmiellus ramealis* (Bull.) Sing.  
Fruit body small, cap hemispherical to flattened, light brown, cap & stipe of same colour, flesh tough. Cystidia and cuticular hairs some what lobed. spores 8 x 4 μm. Usually occur on fallen leaves under broad leafed trees and bushes, Sharhan, 24.8.89, PMNH 8188.

Genus: Megacollybia, Pers.  
It is very similar to Collybia & Tricholoma but bigger in size.

*Megacollybia platyphylla* Pers. Edible  
Cap is hemispherical to flattened, grayish, surface radiately streaky, fibrillose and sometimes cracking, darker and depressed in the center; 6–8(15) gills broad. Stipe smooth of same colour or lighter; spores ovoid, non- amyloid. On humus of pine needles, under conifer forest, Shogran, 26.9.90, PMNH 8638.
Genus: **Collybia**, Kumm.
Surface of the pileus is glaced, or elastic, smooth, cuticular hyphae filamentous, or with lobed cells.

Fruiting body small, being flesh to light brownish, stipe selender; cap 3-4 cm; gills whitish to pink, crowded; spores 5-7 x 4 μm. Growing among grass, Bella, 8.7.89, PMNH 8163. Sharhan, Ahmad (1969): 44.

* **Collybia distorta** (Fr.) Quel.
On soil, Kamalban, 10.7.89, PMNH 8105.

**Collybia dryophyila** (Bull.) Kumm. = *Agaricus dryophilus* Bull.

* **Collybia fusipes** (Bull.) Quel.
Fruit body orange brown, cap 4-10 cm; gills pale, margin wavy; stipe 5-10 cm of same colour. Spores 5 x 4 μm. On soil, Malakandi, 8.5.90, PMNH 7884.

* **Collybia kuehneriana** Sing.
On soil, Kamalban, 24.9.90, PMNH 8442.

**Collybia maculata** (As.) Kumm.

**Collybia peronata** (Bolt.) Kumm.
Around trees, Malakandi 8.5.90, PMNH7870.

Genus: **Mycena** (Pers.: Fr.) S. F. Gray
Stipe to some extent selender, with cap often hemispherical, and striate margin.

**Mycena vulgaris** (Pers.) Kumm.
Cap convex 1-1.5cm, grayish, gelatinous; gills arched to decurrent. Stipe 3-5 cm viscid, smell faint. Spore 7-10 x 4 μm. Cystidia clavate, brush like. Commonly found in beds of needles of conifers. On fallen logs / needles, Malakandi, 8.5.90, PMNH 7863.

* **Mycena haematopus** (Pers.: Fr.) Kummer,

**Mycena inclinata** (Fr.) Quel.
On branches, Bella, 8.7.89, PMNH 8098, 8104, 8106.

**Mycena leptoechophila** (Pers.) Gill.
On soil / needles, Sharhan, 24.8.89, PMNH 8152.

**Mycena pura** (Pers.: Fr.) Kummer, = *Agaricus pura* Pers.,

* **Mycena speirea** (Fr.) Gill.
On soil / debris, Kamalban, 24.9.90, PMNH 8484.

Order 4: **Pluteales**
Spores and gills pink or reddish to brick colour.
Family: **Entolomataceae**
=*(Rhodophyllaceae)*
Cap well-developed, gills adnate, decurrent, or almost free. Spores polyhedral or longitudinally angled.

Genus: **Resupinatus**, Nees ex S.F.Gray
Small, sessile, flesh gelatinous, cystidia not thick walled.

**Resupinatus applanatus** (Batsch ex Fr.) S.F. Gray

Genus: **Citopilus**, (Fr.) Kumm.
Gills decurrent; spores longitudinally angled.

**Citopilus creatus** (Berk. & Br.) Sacc.
Fruit body funnel-shaped but asymmetrical; gills pink, decurrent; stipe short. On ground 26.9.90, PMNH 8514.

Genus: **Rhodocybe**, Maire
Fleshy fungi with adnate & decurrent gills; spores warted.

* **Rhodocybe popinalis** (Fr.) Sing. Edible
Cap fleshy, unbonate, margin wavy, greyish brown 4–6 (7) cm; gills sloping; stipe variable 3-8 cm, smell aromatic to mealy; found in all type of forests, in lawn. On soil, Shogran, 30.8.89, PMNH 8276.

**Rhodocybe subgilva** (Berk. & Br.) Pegler,
On ground Balakot; Ahmad, (1980): 63.

* **Rhodocybe truncatus** (Gill.) Sing. Edible
On soil, Naran, PMNH 8010.

Genus: **Entoloma** (Fr.) Kumm.
Fruit body funnel shaped. Spores polyhedral.

* **Entoloma cetratum** (Fr.) Moser.
Cap 2-5 cm at first conical and expanding later on, central area like the pupil of an eye, yellowish brown, paler toward margin. Gills free; stipe stout; spores 13 x 8 μm with wavy margin. On wood, Kamalban, 10.7.89, PMNH 8013.

* **Entoloma mougeotii** (Fr.) Hesl.
On soil, Naran, 9.7.89, PMNH 8101.

* **Entoloma papillatum** (Bres.) Dennis
On soil, Shogran, 30.8.89, PMNH 8282.

Membranous cup shaped volva, resembling to *Pluteus*.

**Volvariella speciosa** (Fr.) Sing. Edible (Chinese mushroom) = *Agaricus speciosus* Fr.
Cap off-white, glistening, 6-12 cm, viscid; stipe about 10 cm or long, volva present at the base; spores, 10-16 um. Usually found on rotting straw / manured ground. Commonly found during rainy season, under all kinds of wood lands, among grass, Shogran, 30.8.89, PMNH 8251.

Order 5: **Cortinariales**
Spores and gills rusty or brownish to blackish at maturity; cap not easily separable from the stipe.

Family: **Cortinariaceae**
Spore print and gills rusty, not blackish, gills adnate or sinuate.
Genus: *Cortinarius* Fr.
Cap surface silky, velvety, light or dark color. Cortina net below the cap distinctive. Cystidia present.

*Cortinarius bulliardi* (Fr.) Fr.

*Cortinarius claricolores* (Fr.) Fr.
Cap fleshy, pale yellow; veil discontinous; gills white or pale, flesh pale with slight smell; spores 9 x 3 μm. Usually found under spruce, & decidous trees. Edibility not confirmed. On soil, Naran, 25.8.89, PMNH 8095.

*Cortinarius delibutus* Fr.
On soil, Lalazar, 25.9.90, PMNH 8463.

*Cortinarius elegantissimus* Hry.
Cap 5–10(12), striking yellow, centrally orange, gills bright yellow; stipe 8–10(12), concolour lighter, bearing slightly narrowing bulb at the base 3-4cm. Smell pleasant; KOH reaction Carmine red on cap. Spores 13–15 x 7–8 μm, strongly rough. On usually growing on chalky soil, Lalazar, 28.8.89, PMNH 8200, 8202.

*Cortinarius gentilis* (Fr.) Fr.
On soil, Sari – Hut (Shogran) 26.9.90, PMNH 8544.

*Cortinarius infectus* (Pers.) Fr.
On soil, under conifer trees, especially spruce, Shogran, 30.8.89, PMNH 8133.

*Cortinarius melanotus* Kalehbr.
On soil, Shogran, 30.8.89, PMNH 886, Lalazar, 25.9.90, PMNH 8459.

*Cortinarius percomis* Fr.
Cap pale yellow; gills bright; spores 6 7.50 x 4.5 6 μm. On soil, Malakandi, 26.9.90, PMNH8517.

*Cortinarius rufoolivaceus* (Pers.) Fr.
Cap 8–12 cm, purplish colour; gills olive colour; stipe long, bulbus at the base; smell faint; KOH reaction dark green. Spores 9 x 5 μm. On soil, under walnut trees / conifers, Naran, 25.8.89, PMNH 8267.

*Cortinarius subturbinatus* Hry. ex Orton
On soil, under conifer vegetation, Malakandi 27.9.90, PMNH 8407.

*Cortinarius sanguineus* (Wulf.) Fr.
On soil, under spruce and fir, Lalazar, 25.9.90, PMNH 8401.

*Cortinarius violaceus* (L.) Fr.
On humus soil, under spruce and fir, Naran, 28.8.89, PMNH 8153, Balakot, 23.8.89, PMNH 8260.

Genus: *Hebeloma* Kumm.
Cap viscid, dull brownish to whitish, pinkish brown, gills coffee color, spores rough.

*Hebeloma sinapizans* (Paul.) Gill.
On the ground, on broad leaved trees, Shogran, 30.8.89, PMNH 8114.

*Hebeloma truncatum* (Schaeff. ex Fr.) Quel.
On soil, under conifer & broad leaved trees, 25.8.89, PMNH 8193.

Genus *Naucoria* (Fr.) Kummer,
Fruiting body somewhat slender, light in colour.

*Naucoria bohemica* Vel.
On soil under Juniperous bushes, Babusar top, 27.8.89, PMNH 8262.

Genus: *Inocybe* (Fr.) Fr.
Fruiting bodies mostly small. Cap often conical, surface fibrillose to scaly or silky, often splitting radially; gills beige to tobacco brown, mostly toxic species containing muscarin.

*Inocybe adaequata* (Britz.) Sacc.
On humus of Pine needles, Lalazar, 28.8.89, PMNH 8038.

*Inocybe asterospora* Quel.

*Inocybe fibrosa* (Sow.) Gill.
On soil, Naran, 10.7.89, PMNH 8168.

*Inocybe fastigiata* Bull.

*Inocybe fuscidula* Vel.
On humus, Naran, 25.8.89, no 8245.

*Inocybe geophylla* (Bull.) Karst.
On humus, Naran, 9.7.89, PMNH 8039.

*Inocybe glabripes* Ricken.
On soil, Naran, 25.8.89, PMNH 8242.

*Inocybe hirtella* Bres.
On soil, Shahan, 24.8.89, PMNH 8031.

*Inocybe napipes* Lange.

*Inocybe patouillardii* Bres.

*Inocybe praetervisa* Quel.
On soil, Lalazar, 27.9.90, PMNH 8396.

*Inocybe pyriodora* (Pers.: Fr.) Quel.

*Inocybe vaccina* Kuhn.
On soil, upper Bella, 24.8.89, PMNH 8036; on Humus, Lalazar, 25.9.90, PMNH 8460.
Family: **Crepidotaceae**
  Spores and gills ochraceous to rust; gills decurrent to somewhat sinuate. Chrysocystidia absent. Spores smooth or warty, without germ pore. Hypheae of the cap filamentous or jointed.

Genus: **Gymnopilus** Karst
  Resembling *Tophaliota* but rust coloured with small size of scales on the cap. Saprophytic on wood.

_Gymnopilus hybridus* (Fr.:Fr.) Sing.,

Family: **Strophariaceae**
  Spores & gills violaceous.

Genus: **Stropharia** (Fr.) Quel.
  Stipe with a ring or bracelet. Cap lacking cellular hypodermis.

*Stropharia aeruginosa* (Curt.: Fr. ) Quel.
  = *Agaricus aeruginosus* Curt.

*Stropharia semiglebusta* (Batch.) Quel.

Genus: **Hypholoma** (Fr.) Kumm.
  Stipe with cortina, with or without cellular hypodermis.

*Hypholoma elongatum* (Pers.) Ricken
  On stumps and humus of conifer needles, Naran, 25.8.89, PMNH 8246.

*Hypholoma subviride* (BerK. & Curt.) Dennis.
  On wood, Malakandi, 27.9.90, PMNH 7872, Bella, PMNH 7883, Kawai, PMNH 8167, Sharhan, PMNH 5259.

Genus: **Psilocybe** (Fr.) Kummer,
  Neither ring nor cortina and volva present.

*Psilocybe merdaria* (Fr.) Ricken.
  = *Agaricus medinus* Fr.
  Cap 2-4cm, olivaceous ochre, fading with age; spores 10-13.4 x 5.6 μm. It is usually found on dung and on manured soil, during rainy season, cosmopolitan. On dung, Malakandi 24.9.90, PMNH 8438.

*Psilocybe semilanceata* (Fr.) Kumm.

Genus: **Pholiota** (Fr.) Kumm.
  Spores and gills dull brown or tobacco color, cap fleshy.

*Pholiota elongata* (Pers.) Ricken
  On stumps and humus of conifer needles, Naran, 25.8.89, PMNH 8246.

*Pholiota subviride* (BerK. & Curt.) Dennis.
  On wood, Malakandi, 27.9.90, PMNH 7872, Bella, PMNH 7883, Kawai, PMNH 8167, Sharhan, PMNH 5259.

*Pholiota tuberculosa* (Sch.) Kummer.
  On soil, Shogran, 30.8.89, PMNH 8255.

Family: **Agrocybe** Fayod
  Spores and gills dull brown or tobacco color, cap fleshy.

*Agrocybe arvalis* (Fr.) Sing.
  On soil, Sharhan, 24.8.89, PMNH 8250.

*Agrocybe verucula* (Fr.) Sing.
  On soil, Naran, 25.8.89, PMNH 8059.

Genus: **Panaeolus** (Fr.) Quel.
  Spores and gills dark brown to blackish, gills generally mottled.

_Panaeolus fimicola* (Pers.) Quel.
  On animal manured soil / blackish humus of pine needles and dung, Lalazar, 25.9.90, PMNH 8499.

*Panaeolus rickenii* Hora
  It has obtuse cap, powdered stipe. Common in grassy ground.

_Panaeolus acuminatus* Sensu Ricken non Sensu Fr.

Order 6: **Agaricales**
  Stipe separable from cap; spores and gills white or blackish.

Family: **Coprinaceae**
  Spores and gills dark, violaceous brownish to blackish; gills not mottled, somewhat fragile or deliquescent.

Genus: **Psathyrella** (Fr.) Quel.
  Cap flat or campanulate, non-deliquescent, not or slightly striate.

_Psathyrella arvalis* (Curt.: Fr.) Quel.
  On soil, Shogran, 30.8.98, PMNH 8116.

_Psathyrella atomata* (Fr.) Quel.
  On dung, Lalazar, 25.9.90, PMNH 8499.

*Psathyrella bipellis* (Quel.) A.H. Smith
  On soil Sharhan, 24.8.89, PMNH 8027.

*Psathyrella candoleana* (Fr.) R. Mre.
  Under Juniper bushes, Babusar slop (Chilas), 27.8.89, PMNH 8075.

*Psathyrella conopilus* (Fr.) Pear & Dennis
  Under Juniper bushes, Babusar slop (Chilas), 27.8.89, PMNH 8075.

*Psathyrella gracilis* (Fr.) Quel.

*Psathyrella hirta* Peck.
  On soil, Shogran, 30. 8. 89, PMNH 8026, Naran, 9.7.89, PMNH 8032.
Psathyrella spadiceo-grisea (Fr.) Maire.  
On the ground under Abies pindrow, Sharhan, Iqbal & Khalid (1996).

Genus: Coprinus Pers.  
Cap ovoid to conical, thin deliquescent at maturity; stipe hollow, easily separable from the cap, spores light brown to dark.

Coprinus atramentarius (Bull.) Fr.  
On soil, Shogran, 26. 9. 90, PMNH 8413.

Coprinus comatus (Muell. ex Fr.) S. F. Gray,  

*Coprinus lagopus (Fr.) Fr.  
On soil, Shogran, 30.8.89. PMNH 8301.

*Coprinus patuillardii (Quel.) Pat.  
On soil, Malakandi, 27.9.90. PMNH 8545; Shogran, 30.8.89, PMNH 8294.

*Coprinus setulosus Berk. & Br.  
On soil, Malakandi, Shogran, 30.8.90, PMNH 8176.

*Coprinus ochraceofulva Orton  
On soil, Malakandi, 24.9.90, PMNH 8458.

Genus: Lepiota (Pers.) S.F. Gray  
Small to medium size cap with central patch, commonly surrounded by scales in concentric way; stipe ringed; spores smooth, often with distinct germ pore. Several species are deadly poisonous.

Family: Amanitaceae  
Generally veil taking the form of basal volva or evanescent patches on the upper surface of cap, gills free.  
Genus: Amanita Pers. ex Hooker  
Universal veil membranous, pulverulent or with variable patches, poisonous but medicinal. Several species are deadly poisonous.

Genus: Phaeolepiota Mairre ex Konrm. & Maubl.  
Fruiting bodies large, of thick flesh usually orange in colour, ring on the stipe is funnel shaped.

*Phaeolepiota venenata Bon.  
On soil, Shogran, 30.8.89, PMNH 7953.
References


