

THREE HITHERTO UNREPORTED MACRO-FUNGI FROM KASHMIR HIMALAYA

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Abstract

The Himalayan state, Jammu and Kashmir due to its climate ranging from tropical deciduous forests to temperate and coniferous forests provides congenial habitat for the growth of diverse macro fungal species which in turn gives it the status of 'hub' of macro-fungal species. The macro fungal species richness of the state is directly related to its expansive forest communities and diverse weather patterns, but all the regions of the state have not been extensively surveyed till now. In this backdrop, a systematic survey for exploration and inventorization of macro fungal species of Western Kashmir Himalaya was undertaken during the year 2009 and 2010, which in turn resulted identification of the three species viz., *Thelephora caryophyllea* (Schaeff.) Pers., *Coltricia cinnamomea* (Pers.) Murr., and *Guepinia helvelloides* Fr. as new reports from the Kashmir. These species were identified on the basis of macro and microscopic characters and also the aid of taxonomic keys, field manuals, mushroom herbaria and help from expert taxonomists in the related field was taken into account.

Introduction

Since the dawn of civilizations, mushrooms have been fascinating man due to their unusual characters like sudden appearance in isolated places in groups, rings and in different geometrical shapes. Geologically speaking mushrooms have been existing on earth prior to humans and has been used as food by man since the hunting and gathering period of human history (Cook, 1977). Mushrooms belong to the kingdom fungi, which constitutes the most diverse group of organisms after insects on this biosphere. Defining the exact number of fungi on the earth has always been a point of discussion and several studies have been focussed on enumerating the World's fungal diversity (Crous, 2006). The number of existing fungi worldwide has been estimated to 1.5 million species (Hawksworth, 2004) and about 15,000 of them are mushrooms of which about 7,000 are known to possess varying degrees of edibility and more than 3,000 species may be considered prime edible and 2,000 species have been suggested having medicinal importance (Chang & Miles, 2004). Only a fraction of total fungal wealth has been subjected to scientific scrutiny and mycologists continue to unravel the unexplored and hidden wealth, as many macro-fungi are becoming extinct or facing threat of extinction because of habitat destruction and global climate change (Swapana *et al.*, 2008). Jammu and Kashmir possess a prime place in the variety and galaxy of macro-fungi due to wide agro-climatic variations diverse physiography and undulating topography, but understanding of the macro-fungal flora of the Kashmir is still in an exploratory or pioneer stage and undoubtedly there are many more species to be recorded (Watling & Abraham, 1992). Watling & Gregony (1980) recorded 119 taxa of macro-fungi from Kashmir. The list has been extended to 145 species (Beig *et al.*, 2008), 150 (Dar *et al.*, 2009) from Kashmir and 250 from whole Jammu and Kashmir (Dar *et al.*, 2009b). Four new species viz. *Russula aurea*, *Russula atropurpurea*, *Suiillus variegates* and *Boletus rhodoxanthus* has been added to the list (Dar

et al., 2010). The present communication describes the general distribution, brief morphological description, macro and microscopic details and edibility of three newly reported species of macro-fungi from Kashmir Himalaya.

Materials and Methods

Field trips were carried to different places/sites of Western Kashmir Himalaya like Gulmarg, Ferozpur, Doodhpathri, Uri, Yusmarg, Chadoora and Kellar (Fig. 1) coniferous forests, usually 3-4 times per month. These field trips were organised according to the method given by R E Hailling (1996). Standard method of collection, preservation, macro and microscopic studies were followed (Kumar *et al.*, 1990; Atri *et al.*, 2003) and the shape, size and colour of fresh specimen were recorded before preservation. The spore prints were taken according to the guidelines given by Michel Kuo (2001), then the spore morphology such as shape and size were recorded and photographed with the aid trinocular microscope in University Scientific Instrumentation Centre. Reagents used for preparation of spore slides were 3% KOH, cotton blue, lactophenol and Melzer's reagent. Photographs of the specimens in the natural habitat were taken using Cyber shot Sony 10.1 megapixel Camera. The fungal specimens were also preserved in FAA (Formaldehyde acetic acid), and formaline for herbarium purposes, in fungal collection of KASH herbarium of Plant Taxonomy, Division of Botany Kashmir University.

Results and Observations

During the survey carried out to different sites of Western Kashmir Himalaya, three species of macro-fungi were first time noticed from the whole Jammu and Kashmir, their names and description along with photographs is given below;

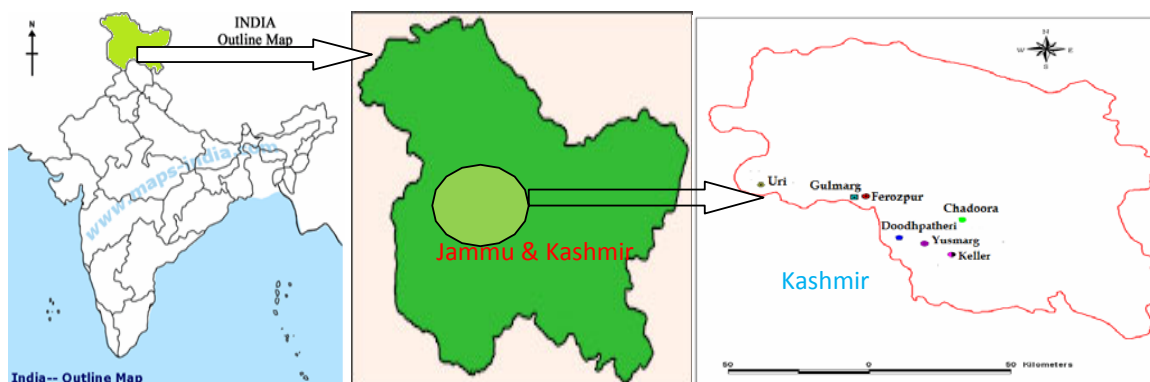


Fig. 1. Area of study.

***Thelephora caryophyllea* (Schaeff.) Pers.** (Fig. 2: a, b and c)

Synonyms: *Helvella caryophyllea*, *Merulius caryophylleus*, *Phylacteria caryophyllea*, *Scyphopilus caryophylleus*, *Helvella caryophyllea*, *Auricularia caryophyllea*.

Common name: An earthfan

Local name: Pateri hadur

Accession no.: SH.KASH-28768

Site of collection: Doodhpathri, Uri and Yusemarg

Classification: Kingdom-Fungi; Division-Basidiomycota; Class-Basidiomycetes; Order-Thelephorales; Family-Thelephoraceae; Genus - *Thelephora*; Species - *T. caryophyllea*

Description

Fruiting body: 1.5-5 cm tall, up to 5 cm across, infundibuliform (funnel-shaped), with a central stalk (mesopodial) or occasionally almost absent, leathery, pliant, purple-brown, radially ridged surface with dark fibres, fimbriate margins, with secondary caps or lobes

developing inside the primary cap to give the carnation-like appearance on which the species name is based, . Flesh brown, thin, coriaceous; Spores: umber purple, 6-9 x 5-7 μm , ellipsoid, angular, more or less lobate; Habitat: Growing on ground both in coniferous and deciduous forests; Season: April to August; Edibility: Not known; Mode of nutrition: Ectomycorrhizal.

***Coltricia cinnamomea* (Pers.) Murr.** (Fig. 3: d, e and f)

Synonyms: *Boletus cinnamomeus*, *Coltricia oblectans*, *Coltricia parvula*, *Polyporus baudysii*, *Polyporus bulbipes*, *Polystictus perennis* and *Strilia cinnamomea*.

Common names: Shiny cinnamon polypore

Local name: Dalchen hadur

Accession no.: SH.KASH-28761

Site of collection: Keller

Classification: Kingdom-Fungi; Division-Basidiomycota; Class-Basidiomycetes; Order-Hymenochaetales; Family-Hymenochaetaceae; Genus-*Coltricia*; Species-*C. cinnamomea*

Description

Fruiting bodies: 1.5-6 cm in height, 1-4 cm wide, vase like or infundibuliform at early stage, but latter becomes flat, cinnamon brown colored; Cap: 1- 5 cm across, single but often joined to other fruiting bodies, circular, flat to funnel-shaped, with a thin lined or slightly fringed margin; brown to deep reddish brown with concentric bands of color, dry, velvety, shiny. Tubes up to 3mm

deep, narrow, pliant and fibrous, rusty to reddish brown. Pores 2-4 per mm, thin-walled, angular to circular, cinnamon brown; Stem: 1-5 cm long, 1-4 mm thick, central, more or less equal, tough, brown to cinnamon brown, finely velvety; Flesh: thin, reddish brown; Spores: Yellowish brown, oblong to ellipsoid, smooth, 6-10 x 4-7 μm ; Habitat: Found in forest regions near the roots of higher plants; Season: June to October. Edibility: Inedible; Mode of Nutrition: Apparently mycorrhizal,

***Guepinia helvelloides* Fr.** (Fig. 4: g, h and i)

Synonyms: *Phlogiotis helvelloides*, *Guepinia rufa*, *Gyrocephalus helvelloides*, *Gyrocephalus rufus*, *Phlogiotis rufa*, *Tremella helvelloides*, *Tremella rufa*, and *Tremiscus helvelloides*



Fig. 2. *Coltricia cinnamomea* (a- Dorsal view, b- Ventral view, c- Spores).



Fig. 3. *Thelephora caryophyllea* (d- Dorsal view, e- Ventral view, f- Spores)

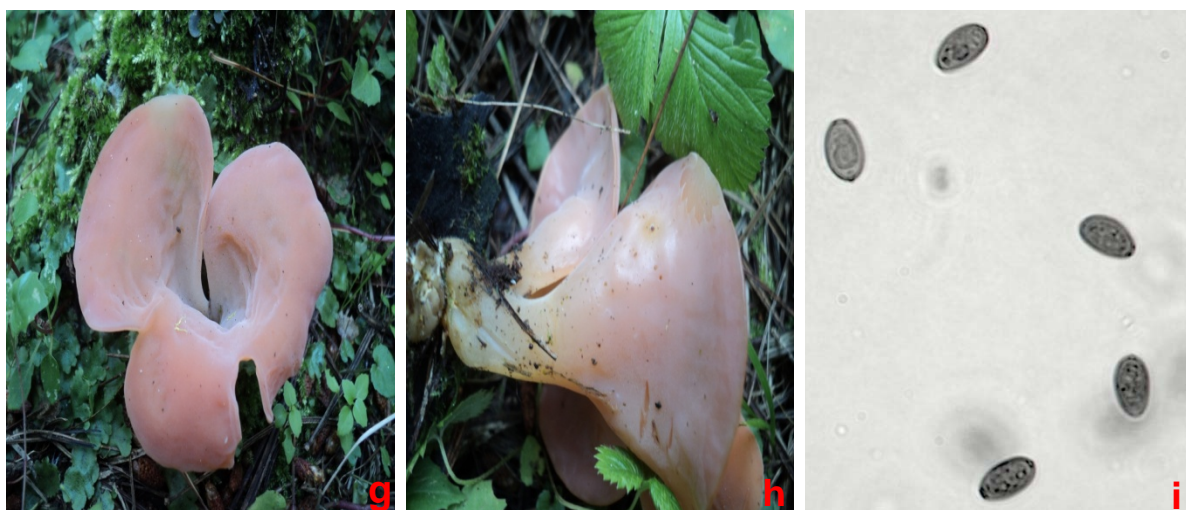


Fig. 4. *Guepinia helvelloides* (g- Dorsal view, h- ventral view, i- spores).

Common name: Apricot jelly
 Local name: Rudh papad
 Accession no.: SK.KASH-28757
 Site of collection: Gulmarg and Ferozpur
 Classification: Kingdom-Fungi; Division-Basidiomycota; Class-Basidiomycetes; Order-Auricularales; Family-Exidiaceae; Genus-*Guepinia*; Species-*G. helvelloides*

Description

Fruiting body: 2-12 cm high, 3-10 cm wide, with a confluent cap and stem, though the dividing line between them is hard to pin down; Cap: Funnel-shaped or spoon shaped with a lobed margin, often with a slit down one side, inner surface smooth, pinkish orange while outer surface smooth or wrinkled, colored like the inner surface (or paler); Stem: Short, central or off-center, colored like the outer surface except for a whitish base; Flesh: Gelatinous, rubbery; Spore: White to creamy yellowish, 9-12 x 4-6 μ , elliptical; Habitat: Grows on rotting wood or on the ground under conifers; Season: May to August; Edibility: Edible used by local people either raw or after cooking; Mode of nutrition: Saprobic growing on wood.

Discussion

Mushrooms form the rich mycotic flora of Kashmir. The most of macro-fungi collected from different areas of world belong to Basidiomycetes class of fungi. Different researchers have worked out the macro-fungal diversity of different parts of Kashmir and other parts of Asia. Watling & Abraham (1992) worked out the ectomycorrhizal macrofungal wealth of India and Kashmir. Karwa & Rai (2010) reported seven different species of genus *Agaricus* from Central India. Sultana *et al.*, (2011) prepared a complete check list of Agarics of Kaghan Valley. Razaq & Saleem (2012) reported two species of *Lactarius* viz., *Lactarius pubescens* and *L. helvus* first time from Pakistan. While surveying thoroughly various sites of Kashmir Himalayas over a period of two years large number of macro fungi belonging to Ascomycetes and Basidiomycetes come across, but three species namely *Thelephora caryophyllea*, *Coltricia cinnamomea* and *Guepinia helvelloides* were first time reported from the Jammu and Kashmir, although already known from other parts of the world like America and Europe (Mcknight & Mcknight, 1987). *Guepinia helvelloides*, a monotypic genus, containing the single species (named after French mycologist Jean-Pierre Guépin) has been found in temperate North America associated with coniferous forests (Guzman, 1973), Canada to Mexico, Europe (Jordan, 2004), Iran (Saber, 1997), Turkey (Turkoglu, 2007), Brazil & Puerto Rico (Lowy, 1871). The fungus has also been collected from the Qinling region of China (Shen *et al.*, 2009). The *Coltricia cinnamomea*, a rare but cosmopolitan in distribution (Ryvarden, 2004) is known from Brazil (Baltazar, 2010), Asia (China, Mongolia) Europe, North America (Canada, USA) and Central America (Dai & Niemela, 2006). *Thelephora caryophyllea*, first reported in 1774 as *Helvella caryophyllea* by Schwaeff and later in 1801 named as by Persoon, is also known from north America, Europe and

Asia (Cannon, 2007). Macrofungi play an important ecological role because of their ectomycorrhizal and saprophytic nature, thereby are associated with health maintenance of the ecosystem. Out of the three newly reported species, *Thelephora caryophyllea* and *Coltricia cinnamomea* were found to be mycorrhizal (in symbiotic association with roots of *Pinus* and *Abies* species), while as *Guepinia helvelloides*, a threatened species (Assvov, 2010) was found on dead decayed wood of conifers. *G. helvelloides* being an edible macro-fungus is used medicinal purposes also (Assvov, 2010). Further the occurrence of these three species in different areas of the world which are far away from the selected site i.e., Kashmir suggest the possible role of wind in the dispersal of fungal spores, as air borne fungal spore are an important source of fungal inoculum in alpine areas (Ebner *et al.*, 1992).

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