

## A study of genus *Ramaria* from Ayubia National Park, Pakistan

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### Abstract

*Ramaria* comprises of many species of coral fungi, and serves as a good example of the macrofungal genera which are being affected by the changing climate pattern. Ayubia National Park was used to be considered as heaven for the various macro as well as micro fungi. A number of species of this genus have already been reported from the park. The present study attempts to enlist some new species of the genus *Ramaria* (family *Gomphaceae*) reported from the same park, and to provide their morphological description

**Key words:** , Ayubia National Park, Genus *Ramaria*, Moist Himalayan Forest.

### Introduction

Four phytogeographical regions are recognized in Pakistan, which help to explain the richness of its flora. 70% species are uniregional and about 30% of the species are bi or pluri-regional. Ayubia National Park is designated as a small national park in the Murree Hills, in the moist Himalayan temperate forests of Pakistan. Such forests extend all along the entire length of the outer Himalayan ranges. They merge with subtropical pine forests in their upper limits. Initially the area embarked for the park was 1,684 ha, which was later on expanded through a northern extension in 1998 to make a total of 3,312 ha. The geographical location of the park is 33<sup>o</sup>-52' N- 73<sup>o</sup>-90' E (WWF Data). The park is surrounded by seven major villages and three small towns including Nathiagali, Ayubia and Khanspur. Geographically, Khanspur is a part of the Ayubia National Park and a reserve forest. Terraced agricultural fields are located mostly on valley bottoms. Most, if not all, of the vegetation in and around the Ayubia National Park and reserve forest is heavily influenced by the human activities. The vegetation of the park is dominated by coniferous species, principally pine and fir with scattered individual broad leaved trees, such as oak.

Due to overexploitation, overgrazing and recreation at the expense of environment, the natural habitat of certain macromycetes has been transformed unfavorably for them. It is contended that the highly unique and endemic macrofungal biodiversity is being pushed towards local

extinction and many new species are establishing to the detriment of the native ones (Nasim, 2006; Nasim, 2008).

Several species are edible, such as *Ramaria flava*, and can be picked near the mountain resort town of Khanspur and its surroundings, though they are easily confused with several mildly poisonous species, including *R. formosa* and *R. pallida* which are capable of causing nausea, vomiting and diarrhea. The name *Ramaria* is derived from the latin word *ramus*, meaning 'branch', while the specific epithet comes from the latin '*formosus*' meaning beautiful.

The present survey focus on the revision of the genus *Ramaria* from Ayubia National Park.

### Materials and Methods

The park was visited twice a year and fungi collected were identified following the authentic literature available (Ahmed *et al.*, 1997; Peterson and Olexia, 1967; Peterson, 1969, 1972, 1974, 1975). A synoptic key was developed to facilitate the process of identification and characterization in the field.

### Results and Discussion

The description of six species of *Ramaria* previously reported from Pakistan are described below. These species are now rarely being observed in this area. Instead, four previously undocumented species have been discovered and are reported here as new record from the area.

### Previously reported species of *Ramaria*

#### 1. *Ramaria stricta* (Murree, Sultan *et al.*, 1997)

Fruiting body up to 12 cm tall, 4-8 cm broad, composed of erect, more or less parallel branches with slender, pointed tips; surface glabrous, pinkish-buff, the branch tips pale-yellowish, becoming vinaceous-brown where bruised; context buff-brown, pliant, darkening when injured; odor indistinct to slightly aromatic, taste usually bitter. Stipe 1-2 cm long, 0.5-1.5 cm broad, sometimes lacking; when present, pallid, tomentose, context tough, discoloring light-brown when bruised. Spores 7-9.5  $\mu\text{m}$ , ellipsoid, slightly warted; spore print not seen. (Exeter *et al.*, (2006). Solitary in small groups on fallen conifer/hardwood logs; fruiting from late fall to mid-winter. (Sultan *et al.*, 1997; Peterson and Olexia, 1967; Peterson, 1969, 1972, 1974, 1975).

#### 2. *Ramaria subaurantiaca* (Nathia gali, Sultan *et al.*, 1997)

Fruiting body light yellowish color which does not alter with age. Branches are densely crowded and fused at the base.

#### 3. *Ramaria flava* (Murree, Sultan *et al.*, 1997)

Fruiting body 10-20 cm high, 7-15 cm wide, lemon to sulphur yellow becoming more ochraceous with age, with numerous densely crowded branches. Stem 50-80 x 40-50 mm with whitish base which often bruises reddish brown especially with age. Flesh white to pale yellowish. Taste mild. Spores pale ochraceous, elliptic, roughened, 11-18 x 4-6.5  $\mu\text{m}$ . Grow on the ground in mixed woods. Fruiting season is autumn. Edible but has laxative effect on some people.

#### 4. *Ramaria flaccida* (Swat, Sultan *et al.*, 1997)

Fruiting bodies slender and weak with one or more branches often splitting away from the stipe, or bending to touch the substrate; stipe neither staining nor bruising; branch tips tan to golden.

#### 5. *Ramaria apiculata*

Fruiting body is highly branched, 4-10 cm tall, rounded to fan shaped with dull, Buffy, tan of

darker branches. Branches terminate with one or more dentate tips. Flesh tough, solid, white and darkening when cut. Spores minutely roughened, with cyanophilous warts; ellipsoid with a squared tip; 7-10x3.5-5  $\mu\text{m}$ . grows in spares to dense clusters on wood or on the ground in association with rotting coniferous debris such as cones, twigs and needles.

### Newly reported species

#### 1. *Ramaria abietina*

Fruiting body 2-5 cm tall, rounded; branches thin, yellow-brown to olive-brown, darker in age, irregularly divided, the tips relatively short; branches sometimes bruising bluish-green or developing greenish tones in age; flesh tough; taste bitter. Stipe 1-2 cm tall, solid or consisting of partially fused branches, yellow-brown to olive brown, bruising green at the base; rhizomorphs frequently found at the base. Spores 5.5-7.5x3-4  $\mu\text{m}$ , elliptical, warted; spores yellow brown in deposit. Gregarious, sometimes in arcs, *i.e.* partial fairy rings, in duff under conifers. (Exeter, Ronald L., Norvell, Lorelei & Cazares, Efen 006).

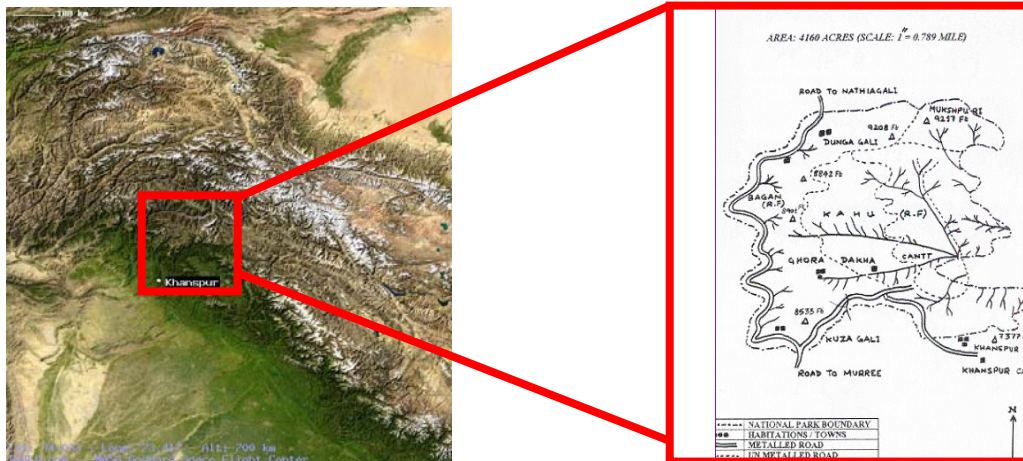
#### 2. *Ramaria flavescens*

It is native to United Kingdom. Natural habitats are parks and their surroundings. Stem large, up to 6.6 cm; young fruit bodies with yellowish branches; mature fruit bodies with pale pinkish buff to pinkish buff branches. Fruit bodies to 18.18 cm; clamps present. Stem small, typically less than 2.2 cm or fruit body from the base; young fruit body with pink to reddish branches; mature fruit bodies with pinkish buff to salmon branches.

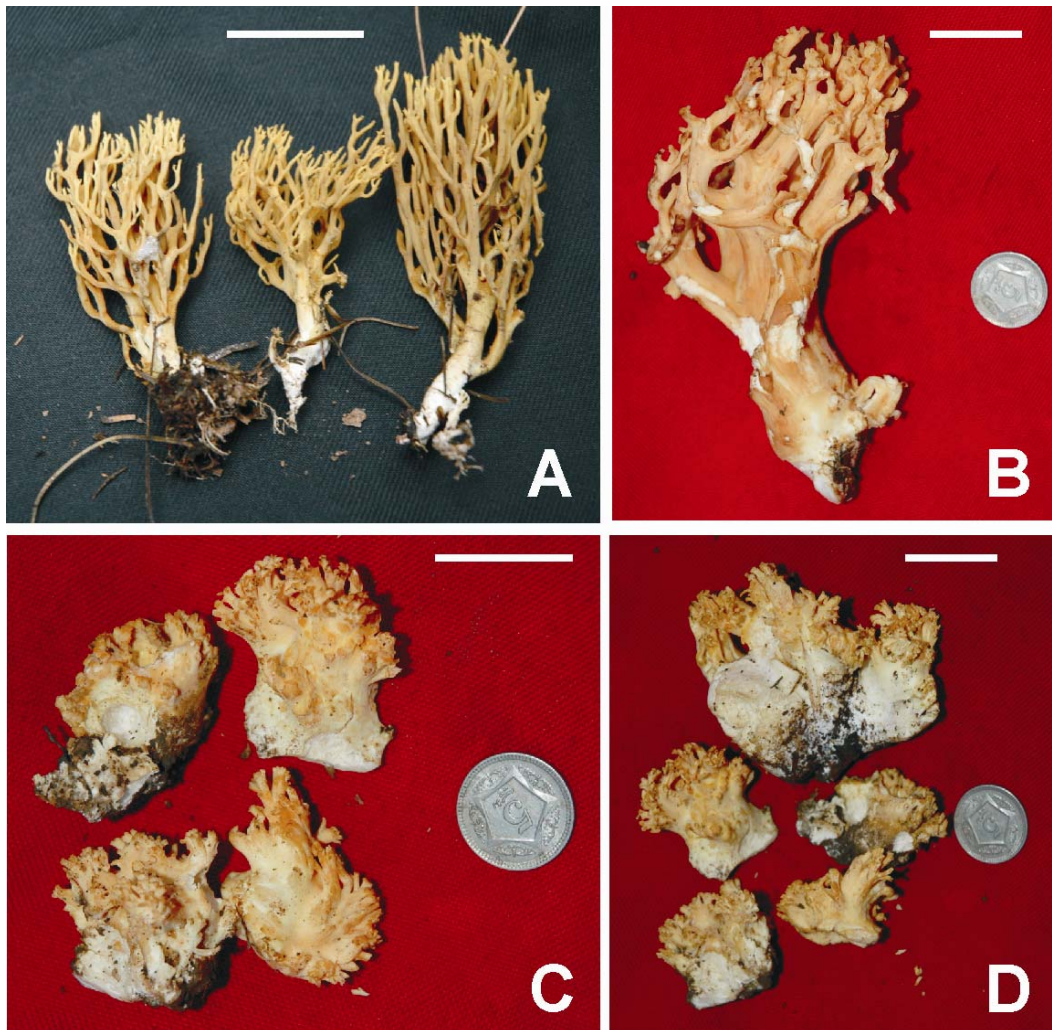
#### 3. *Ramaria formosa*

The fruit body grows to a height of 20 cm; it is highly branched coral like structure, the yellow tipped pinkish branches arising form a thick base. Terminal branches are less than 0.5 cm in diameter. The flesh is white, an important feature as edible members of the genus have yellowish flesh. The spore print is yellow. The smell is pleasant but the taste is bitter.

Location map



**Plate 1:** Geographical map of Khanuspur, in the Moist Himalayan Temperate Forest Belt.



**Plate 1:** Species of *Ramaria*; **A:** *Ramria flavescens*; **B:** *R. abietina*; **C&D:** *Ramaria formosa* (Bar=2.5cm)



**Key to the species of *Ramaria***

- Basidiocarp composed of erect branches with pointed tips.....*Ramaria stricta*
- Basidiocarp composed of branches without pointed tips
  - ✚ Edible but have laxative effect on human physiology.....*R. flava*
  - ✚ Mostly not edible and medicinal to some extent
    - ❖ Branches splitting from the stipe touching substrate.....*R.flaccida*
    - ❖ Branches mostly small, not up to the substrate
      - ✓ Fruiting body almost fan shaped.....*R.apiculata*
      - ✓ Fruiting body coral like
        - Color does not change with age.....*R.subaurantiaca*
        - Color changes with the age
          - ✚ Base become greenish when bruised.....*R.abietina*
          - ✚ Base doesn't change color when bruised
            - Large stem with clamps.....*R.flavescens*
            - Stem small without clamps.....*R.formosa*

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