

## Research Article

# Altitudinal diversity of tribe Bombini (Hymenoptera: Apidae) from district Shigar, Gilgit Baltistan

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### Abstract

Bumble bees play an important role in pollination of crops and environmental indicators. Identification of bumble bees are also important as different species play various roles in an ecosystem. Present study was conducted to know the altitudinal diversity of tribe Bombini. Samples were collected from various localities of district Shigar of Baltistan Division. Identification was done at Insect Systematic Laboratory of Entomology department, Sindh Agriculture University Tandojam. During present study 7 species are recorded under single genus *Bombus*, from the collection sites viz, *B. asiaticus* (Morawitz, 1875), *B. melanurus* (Lepeletier, 1835), *B. semenovianus* (Skorikov, 1914), *B. tunicatus* (Smith, 1852), *B. ferganicus* (Radoszkowski, 1893), *B. lucorum* (Linnaeus, 1761) and *B. rufofasciatus* (Smith, 1852). The list of host plants are recorded as, *Euphorbia wallichia*, *Cirsium arvense*, *Carduus edelbergii*, *Lavatera cashmeriana*, *Cirsium arvense*, *Melilotus officinale*, *Taraxacum officinale*, *Ipomea tricolor*, *Helianthus annuus*, *Digitalis purpurea*, *Zinnia elegans* and *Fagopyrum esculentum*. This study will prove helpful to recognize the bumble species as pollinators of different crops of the region for conservation.

**Keywords:** Bombini; Bumble bees; *Bombus*; Pollinators; Shigar

### Introduction

The Bombini are a tribe of large bristly apid bees which contain a single living genus, *Bombus*, the bumblebees, and some extinct genera such as *Calyptapis* and *Oligobombus*. The tribe was described by Latreille in 1802. The genus *Bombus*, includes around 260 species of eusocial bees, mostly distributed in temperate and cold regions of the northern hemisphere [1]. Agricultural crops vary in their pollination requirements and rely on different insect pollinator species [2, 3]. Bumblebees play an important role as pollinators in

functioning of agricultural ecosystems of crops and wild flowers. Plants pollinated by bees contribute 30% of food consumption by humans in America. [4]. Thirteen species reported in Pakistan [13] all of them are indigenous to northern Pakistan, having the elevation ranges from 2291m to 5344m both from agricultural and non-agricultural land [5]. Species of tribe Bombini can feed in hostile weather conditions, which are not suitable to honeybees and solitary bees [6]. These perform an important role in ecological services in high altitude areas of Pakistan [7]. From Himalayan region 160

floral host plants has been recorded [8]. Tribe Bombini are mostly found in high altitude regions [12]. Species of tribe Bombini can be found from 1000m-5500m. Bumble bees construct nest in different habitat, often in abandoned rodent burrows, in the ground, above ground and in tall grasses [9]. Shigar district is located in the north of Skardu. It is part of the central Karakorum ranges. It lies at 25° 25'32" N

latitude and 75° 42'59" E longitude and covers an area of 4373 sq. km. Elevation above sea level is 2,260 to 8611 m (Fig. 1) [10]. It borders with China surrounded by K2 between the territories [11]. Present study was conducted to explore the bumble bee fauna as pollinator, since identification plays a vital role towards the knowledge of pollinating species behavior and their extent of benefits.

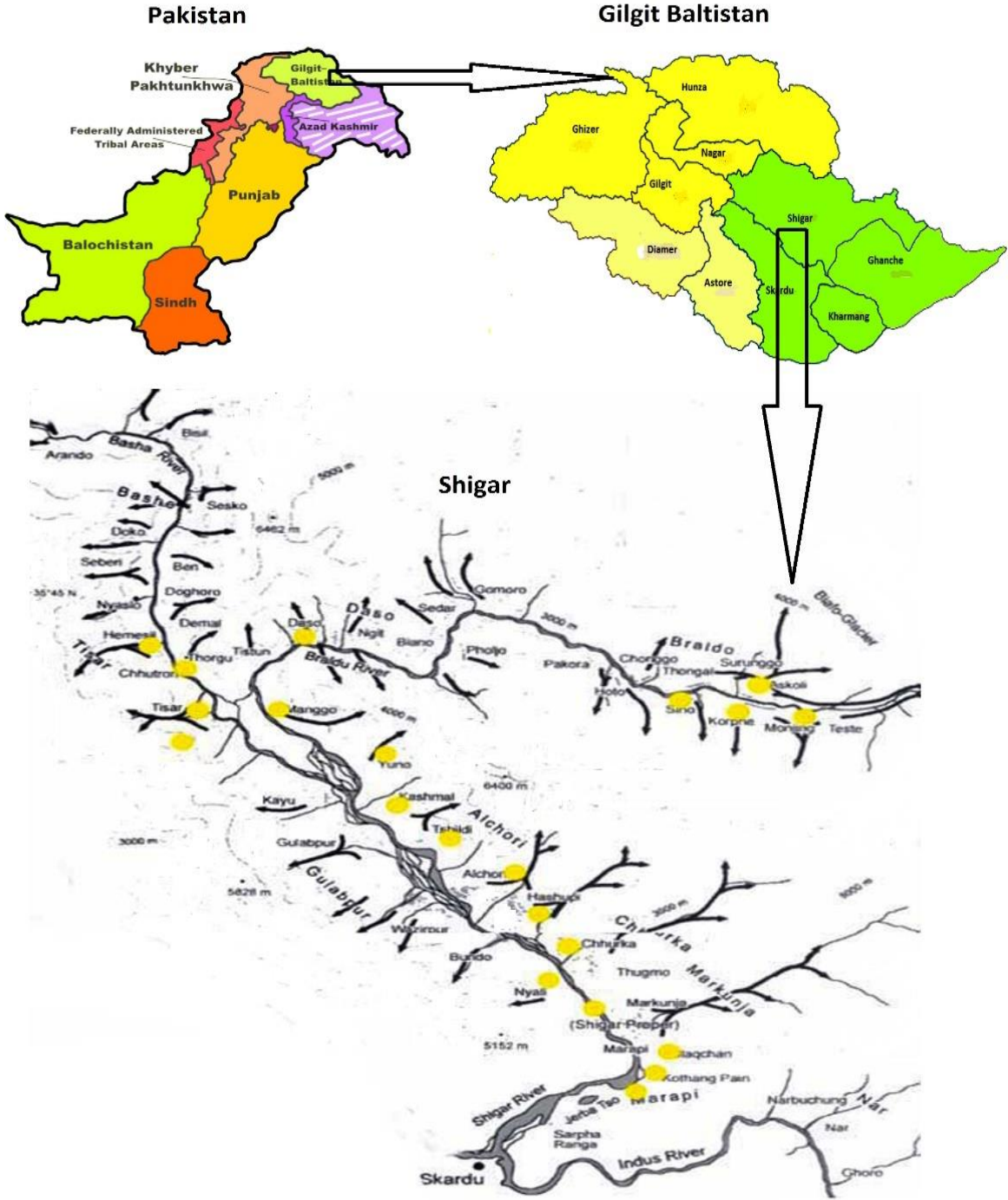


Figure 1. Map of study area

## Materials and Methods

For present research, bumble bees were collected through sweep net from various localities of district Shigar, Gilgit Baltistan. Specimens were killed by using potassium cyanide and pinned by standard entomological pins. After pinning, they were labeled with information of locality, collection date, collector name, and the host tree. Identification were done at Insect Systematic Laboratory, Department of Entomology, Sindh Agriculture University Tandojam by [15] colour pattern key of [16].

Images of habitus (adult) were taken by using high pixel camera, and 350 k pixel, USB camera fitted on microscopes Labomed CSM2 (20X and 40X), used for genitalia images.

## Results

### 1. *Bombus asiaticus* Morawitz, 1875

#### Diagnosis

Body densely robust with pubescence, head with black pubescence; antennae elbow shape, thorax with white pubescence and black in middle; forewings light brown and transparent hindwings, abdomen with sparse orange setae, densely black in middle and proximal end of abdomen yellowish orange pubescence [15].

#### Material examined

Pakistan: 23♀, Gilgit Baltistan Prov., Alchori, Askoli, Kashmal, Kurfy, Monjong, Sildi, Sinu, Thadoro, Tissar, Yono, 24.Vii.2019, S.Ali,

#### Host plants

Wild Flower, *Ipomea tricolor*, *Lavatera cashmeriana* and *Zinnia elegans*.

### 2. *Bombus ferganicus* Radoszkowski, 1893

#### Diagnosis

Head and thorax with yellow ochraceous pubescence, tarsi yellow coloured, and abdomen black dorsally, last segments yellow ochraceous laterally. Hindwings brownish

#### Material examined

Pakistan: 8♀, Gilgit Baltistan Prov., Askoli, Kurfy, Monjong 12.Viii.2019, S.Ali,

## Host plants

*Euphorbia wallichia*, *Cirsium arvense*, *Carduus edelbergii* and *Lavatera cashmeriana*

### 3. *Bombus lucorum* (Linnaeus, 1761)

#### Diagnosis

Head black, thorax proximal portion yellow and mid with black pubescens. Upper 1/3 of abdomen yellow ochraceous, blackish in the middle and with white pubescence at the posterior end of abdomen. Hind and forewings light brown and transparent.

#### Material examined

Pakistan: 20♀, Gilgit Baltistan Prov., Chutron, Haiderabad, Molto, Tissar, 24.Viii.2019, S.Ali,

#### Host plants

*Melilotus officinale*, *Taraxacum officinale*, *Ipomea tricolor*, *Helianthus annuus*, *Digitalis purpurea*, *Euphorbia wallichia*, *Cirsium arvense*, *Carduus edelbergii*, *Lavatera cashmeriana* and *Zinnia elegans*

### 4. *Bombus melanurus* Lepeletier, 1835

#### Diagnosis

Head black, thorax completely yellowish, half of the abdomen yellow with blackish brown markings in center, half of the abdomen posteriorly black. Forewing and hindwings light brown.

#### Material examined

Pakistan: 20♀, Gilgit Baltistan Prov., Chutron, Haiderabad, Molto, Tissar 24.Viii.2019, S.Ali,

#### Host plants

Wild Flower *Melilotus officinale* and *Taraxacum officinale*.

### 5. *Bombus rufofasciatus* Smith, 1852

#### Diagnosis

Head pubescence black, thorax with row of white long setae at the anterior margin, rest of the thorax complete black. Half of the abdomen black, posterior half of the abdomen with row of white setae, yellow and some orange setae present posteriorly. Legs with long dense setae. Forewing and hindwing light brown and transparent.

#### Material examined

Pakistan: 8♀, Gilgit Baltistan Prov., Askoli, Kurfy, Monjong, 12.Viii.2019, S.Ali,

**Host plants**

*Fagopyrum esculentum*, *Euphorbia wallichia*, *Carduus edelbergii* and *Taraxacum officinale*.

**6. *Bombus semenovianus* (Skorikov, 1914)****Diagnosis**

Head black, thorax with yellow dense pubescence, 2/3 of the abdomen at the anteriorly blackish, whereas, 1/3 of posterior portion of abdomen orange.

**Material examined**

Pakistan: 16♀, Gilgit Baltistan Prov., Askoli, Kurfy, Monjong, Sinu Tissar. 11. Viii. 2019, S.Ali,

**Host plants**

*Fagopyrum esculentum*, Wild Flower. *Euphorbia wallichia*, *Cirsium arvense* and *Digitalis purpurea*

**7. *Bombus tunicatus* Smith, 1852****Diagnosis**

Head with white pubescence, thorax with black pubescence proximally, distally with white setae. Major portion of the abdomen covered with black setae, posterior part of the abdomen orange.

**Material examined**

Pakistan, 30♀, Gilgit Baltistan Prov., Alchori, Askoli, Braqchan, Churka, Chutron, Haiderabad, Hashupi, Kashmal, Kurfy, Monjong, Sildi, Sinu, Tissar,. 11. Viii.2019, S.Ali,

**Host plants**

*Fagopyrum esculentum*, Wild Flower. *Euphorbia wallichia*, *Cirsium arvense* and *Digitalis purpurea*

**Elevation wise distribution of Bumble bees in Shigar district**

Five species were collected at the height of 9000 to 10000 ft include; *Bombus semenovianus*, *Bombus rufofasciatus*, *Bombus asiaticus*, *Bombus melanurus*, *Bombus ferganicus*; and four species from 8000 to 9000; *Bombus semenovianus*, *Bombus lucorum*, *Bombus asiaticus*, *Bombus tunicatus*; lastly, three species were recorded at the low altitude of 7000 – 8000; *Bombus tunicatus*, *Bombus asiaticus*, *Bombus lucorum*.

**Discussion**

The present study area was ranged at the altitude of 7000-10000 feet, the climate at various height also varies, and the vegetation is also varies at different altitudes. During present study 7 species of tribe Bombini were recorded from different locations of district Shigar. Collection were done in different timings from 8am to 5pm. Most of them were active after 12pm. *B. rufofasciatus* forages heavily in the afternoon, with restricted activity in the early morning and late in the evening at high altitudes [17]. All species are previously reported from different localities of Gilgit Baltistan. Previously the bumble bee fauna of present study area was not extensively studied. This study carried out to explore the bumble bee fauna of district Shigar. [18] Reported 9 species from Hashupi, Shigar. *Bombus branickii* new addition in bumble bee fauna of Pakistan was reported from Kharmang, Gilgit Baltistan [19]. Previously 13 species of bumble bee was recorded by [13] from Gilgit Baltistan. [14] Reported *Bombus rufofasciatus*, *B. subtypicus*, *B. kashmirensis*, *B. trifasciatus*, and *B. haemorrhoidalis* first time from Naran Kaghan valley, Pakistan. Species recorded during present study were collected from high elevations. Previously reported bumble bees of Pakistan was recorded from high altitude regions like Gilgit Baltistan, Azad Kashmir and Swat Pakistan. Three species of bumble bees namely *Bombus rufofasciatus*, *Bombus asiaticus* and *Bombus haemorrhoidalis* from swat. [20]. The study will proved helpful to identify the bumble bee as pollinator and conservation in respective region.

**Conclusion**

Present study revealed the occurrence of 7 species of bumble bees in surroundings of district Shigar, Gilgit Baltistan. They prefer higher elevation and the raining seasons effect their active time, especially for collections.

### Authors' contributions

Conceived and designed the experiments: S Ali & I Khatri, Performed the experiments: S Ali & SA Shah, Analyzed the data: S Ali & I Khatri, Contributed materials/ analysis/ tools: A Rajput, GQ Junejo & R Hussain, Wrote the paper: S Ali & I Khatri.

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