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## New records of *Rhodothemis rufa* (Rambur, 1842) and *Lamelligomphus biforceps* (Selys 1878) (Odonata: Anisoptera) from Pakistan with redescription of *L. biforceps* (Selys 1878)

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### Abstract

The current status and distribution of the dragonflies (Anisoptera) of Pakistan were studied during 2005-2009. Two dragonfly species were identified for the first time from Pakistan. Among these, *Rhodothemis rufa* is a red, medium-sized dragonfly. *Lamelligomphus biforceps* is also reported for the first time from Pakistan and re-described owing to having minor taxonomic differences from that of Fraser's description. Some notes on the color, literature records and geographical distributions are summarized.

**Keywords:** *Crocothemis servilia*; dragonfly; habitat; geographical distribution; Bagh and Kotli

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### 1. Introduction

Forty-six species and subspecies belonging to 24 genera of 6 subfamilies of Anisoptera have been documented from Pakistan (Chaudhry et al. 2013). *Rhodothemis rufa* has previously been recorded from Australia (Rambur, 1842), Ceylon and Java (Kirby, 1890), India (Kirby, 1894), New Guinea (Van der Weele, 1909), Burma, Penang and Borneo (Ris, 1909), Celebes and Tonkin (Bartenef, 1915), Smarta (Schmidt, 1934), Phillipine (Lieftinck, 1942), Billiton and Singapore (Lieftinck, 1954). This is the first record of this species in Pakistan.

*Lamelligomphus* are medium sized dragonflies with yellow and black markings. Males have large anal appendages, superior anal appendages curled at apices, they are known as clubtail dragonflies. They breed in streams and particularly in open forests.

*Lamelligomphus biforceps* is very common in the Himalayan belt, reported from Uttarakhand (Prasad, 1974; Kumar and Mitra, 1998), Darjeeling (Laidlaw, 1922), Arunachal Pradesh (Mitra, 2002), India, Nepal (Asahina, 1955; St. Quentin, 1970; Mahato, 1988, 1989), Bhutan (Mitra, 2002) and Myanmar (Williamson, 1907; Fraser, 1924, 1934).

This study aims to provide new data on the presence of *Rhodothemis rufa* (Rambur, 1842) and *Lamelligomphus biforceps* (Selys, 1878) (Odonata: Anisoptera) in Pakistan with redescription of *L. biforceps* (Selys, 1878).

### 2. Methods and Materials

*Rhodothemis rufa* and *Lamelligomphus biforceps* were collected from Bagh and Kotli districts of Azad Jammu Kashmir, respectively. *Rhodothemis rufa* was collected from Bagh, Azad Jammu and Kashmir in the morning in June 2006. *Lamelligomphus biforceps* was collected from Panjera, Kotli district. Panjera is situated at Kotli Plandary road, about 15 kilometers west of Kotli city. It is a historic town in the Sarsawa valley of the Kotli district in Azad Kashmir. The Panjera is a scenic valley with streams, waterfalls and forests. The town is linked with Islamabad/ Rawalpindi through Sehensa and Pullandari Azad Pattan.

Two male specimens of *Rhodothemis* and six specimens of *Lamelligomphus* were collected from Bagh and Kotli, Azad Jammu & Kashmir respectively using a real net. Topographically, the entire Bagh district is mountainous area, generally sloping from northeast to southwest. The elevation is between 1500 and 2500 meters above sea level. Mountains are generally covered with coniferous forests. Mahl Nala in Bagh sub-division and Betar Nala in Haveli sub-division are the two main streams. According to the data regarding district profile published by Government of Pakistan, 2007, the annual temperature range is between 2°C to 40°C. May, June and July are the hottest months. Maximum and minimum temperatures during June are about 40°C and 22°C respectively. The annual

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precipitation is about 1500 millimeters.

The specimens were identified as *Rhodothemis rufa* (Rambur, 1842) and *Lamelligomphus biforceps* (Selys, 1878) using the Fraser's (1936) descriptions. The identified specimens were deposited in the Biosystematics Lab., Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi.

The illustrations of taxonomically important body parts observed under Nikon™ microscope and photographs were snapped with a Camera Lucida.

*Rhodothemis rufa* were medium sized dragonflies, wings transparent and body reddish in colour. Two collected specimens of this genus were in agreement with Fraser's (1936) description, Subramanian (2005) and Bedjanic et al. (2007) except in some minor differences such as yellow color Costa, two rows of cells in discoidal field at the beginning and traverse discoidal cells in hindwing (Fig. 1), with 11<sup>1/2</sup> antenodal, 9 postnodal and 9-8 antenodal, and 8 postnodal cross veins in forewings and hindwings, respectively. Fore wing length, 31 mm; Hind-wing length, 30 mm and abdomen length, 26 mm (Fig. 2). Material Examined: ♂ = 2



**Fig. 1.** *Rhodothemis rufa*, male, discoidal field in the forewing with 2 rows of cells, discoidal cells in hindwing traversed



**Fig. 2.** *Rhodothemis rufa* (Rambur, 1842)

**Table 1.** Comparison of *Rhodothemis rufa* with *Crocothemis servilia*

Wing apices	Wing base	Discoidal field	Species
Apices of wings hyaline	Very minute amber yellow spot at the base	Discoidal field in forewing with two rows of cells	<i>Rhodothemis rufa</i>
Apices of wings brown	Base of the wings with amber yellow	Discoidal field in forewing with three rows of cells	<i>Crocothemis servilia</i>

*Lamelligomphus biforceps* (Selys, 1878) are medium sized dragonflies, with black and yellowish green markings in color (Figs. 3 and 4). Six specimens were collected and identified using Fraser's (1936) taxonomic key. Specimens were confirmed with published descriptions of Fraser (1936) and Subramanian (2005). Material Examined: ♂ = 5 ♀ = 1



**Fig. 3.** *Lamelligomphus biforceps* Selys (Male)



**Fig. 4.** *Lamelligomphus biforceps* Selys (Female)

## 2. Results and Discussion

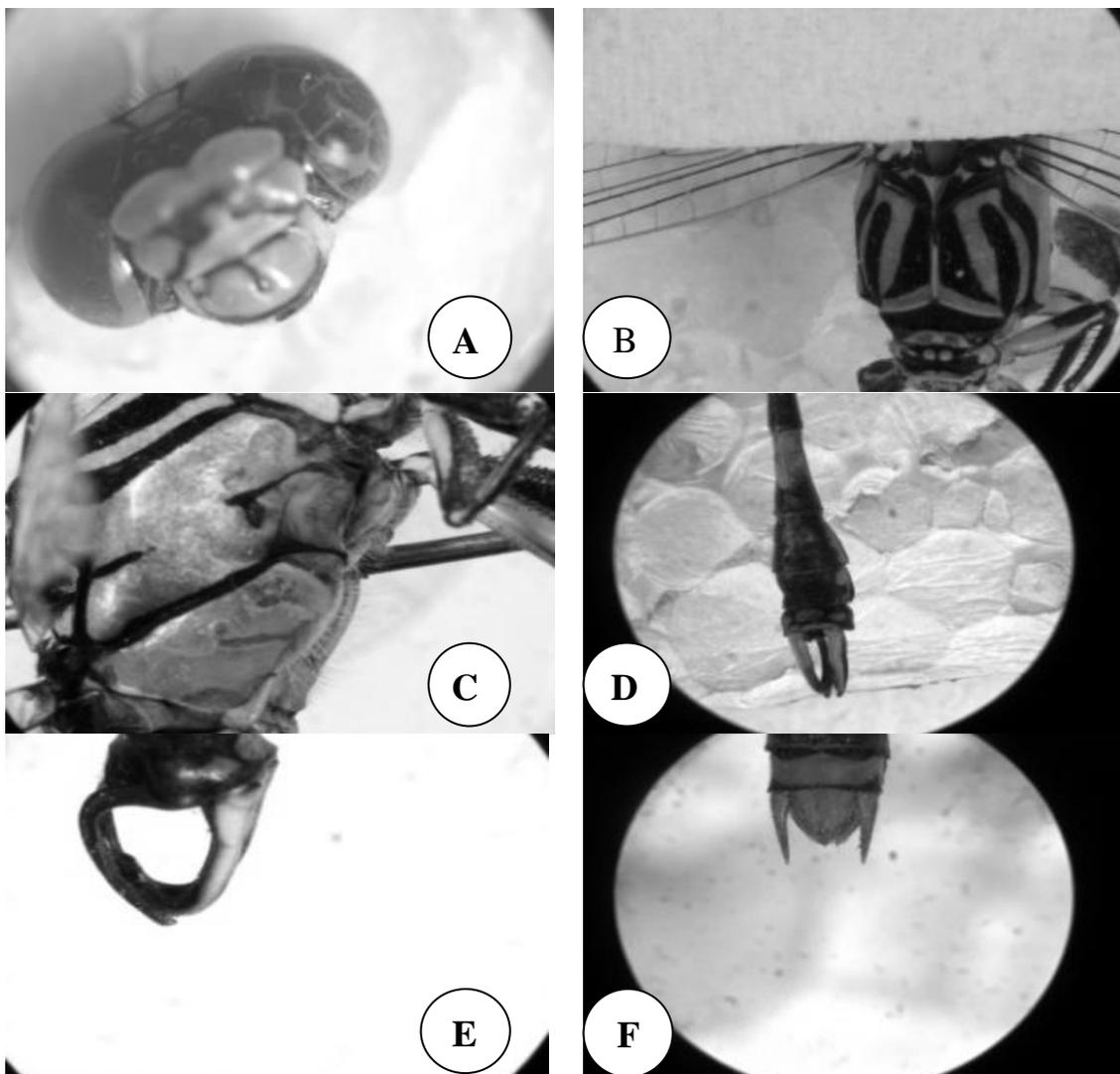
The specimens collected from Panjera consistently showed dissimilar head and thorax characteristics with Fraser's (1936) description.

Brief description (Male):

Abdominal length, 38 mm, Forewing, 31 mm

Hindwing, 30 mm. Head, light yellow, labium black, labrum light yellow with black markings on upper side and a black horizontal line in the middle of labrum up to middle of labrum. Mandibles black, anteclypeus yellow, postclypeus yellow with two black spots in the middle separated by yellow spot, frons yellow. Occiput yellow with black outer margins (Fig. 5A). Prothorax black with two dorsal yellow spots (Fig. 5B). Thorax black with yellow marks. Complete yellow mesothoracic collar confluent with a yellow stripe on lower part of mid-dorsal carina. Antehumeral stripes confluent with mesothorax collar, humeral stripe present. Humeral and antehumeral stripes confluent near the middorsal carina making an oval shape and not

confluent with mesothoracic collar. Anterior and posterior thoracic stripes are complete and black in colour, median thoracic stripe faded, almost washed out from the middle (Fig. 5C). Abdomen black, marked yellow, thin and cylindrical dilated from segment 8 to 10. Abdominal segments 8 to 10 with lateral yellow spots. Anal appendages, superior separated at base converging, covered by inferior anal appendages (Figs. 5D and 5E). Wings clear and transparent with 13-14 antenodal and 10-11 postnodal crossveins in forewings, 10 antenodal and 10 postnodal in hindwings. Females are almost similar to males in morphology with pure yellow anal appendages (Fig. 5F).



**Fig. 5.** *Lamelliogomphus biforceps*, A, head; B, prothorax; C, thorax, lateral view; D & E, male terminalia, ventral & lateral view; F, female terminalia, ventral view

### 2.1. Habitat Description

*Rhodothemis rufa* was collected maneuvering on small vegetation near the slow running streams (Lat. 33:59 and Long. 73:46, elevation 1256 m.). Average air temperature was 23°C and average humidity was 42 %. These species were also found in marshes, and weedy ponds. Females were usually found perched on riparian vegetation (such as aquatic herbs, trees and shrubs). Vegetation present in surroundings/at the locality has many layers because Bagh district has very rich and diversified flora. It includes “Shishum trees” (*Dilbergia sissoo*), Wild Mulberry trees (*Morus alba*), “Baru grass” (*Sorghum halepence*). Khabbal grass” (*Cynodon dactylon*), “Banafsha” (*Viola odorata*), “Patherchut” (*Berginia ciliata*), “Rattenjot” (*Potentilla nepalensis*) “Neeli Booti” (*Gentiana decumbens*) “Sumbulu” (*Berberis lycium*), “Chahl” (*Senecio chrysanthemoides*), etc. Males are difficult to identify during flight with other similar and coexisted red colour dragonflies. This species breeds in marshes and other similar habitats (Subramanian, 2005), weedy ponds, tanks, channels and lagoons in the lowlands (Bedjanic et al., 2007).

*Lamelligomphus biforceps* was recorded from Panjera, AJK (33:31 N, 73:53 E, elevation, 604 meters). Average air temperature was 27°C and relative humidity was 57%. The sampling location was on a slow running fresh water rocky stream in hilly area with well-established vegetation. The specimens were hovering over the water up to 10 feet high. Most of the specimens were collected in September-October. The average width of the stream is about 90 feet and is sloppy towards its center having small and big rocks in it. The inhabitants use the stream water for watering animals and lift out water with pumps for construction purposes. Domestic animals also visit the stream to drink and sit in. Soils of the surrounding agricultural fields are silty sand with gravels of various sizes. Major crops of the area are Maize and Wheat and to some extent Millets. Small scale water mills (local flour mills) are also installed there wherever sharp slope is available in water level. Vegetation present in surroundings /at the locality is in three layers. The top layer (15-20 feet high) includes “Shishum trees” (*Dilbergia sissoo*), Wild Mulberry trees (*Morus alba*) and wild fig (*Ficus insipida*). Middle layer (4-6 feet high) is comprised of “Gandeera” (*Nerium oleander*) and “Baru grass” (*Sorghum halepence*). The bottom layer (0.3 – 1 feet) includes “Khabbal grass” (*Cynodon dactylon*), and “Deela” (*Cyperus rotundus*) etc.

### 3. Conclusion

*Rhodothemis rufa* (Rambur, 1842) and *Lamelligomphus biforceps* (Selys, 1878) are additions to the fauna of dragonflies of Pakistan. These additions may be important in some faunal research of dragonflies in Pakistan such as faunistic, zoogeographic and ecological studies.

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