



E-ISSN: 2320-7078  
P-ISSN: 2349-6800  
JEZS 2017; 5(2): 1100-1104  
© 2017 JEZS  
Received: 24-01-2017  
Accepted: 25-02-2017

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## Taxonomy of genus *Decticus* Serville, 1831 (Decticinae: Tettigoniidae: Orthoptera)

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### Abstract

The recent growing interest on the *Decticus* Serville, 1831 fauna of Pakistan in particular has enabled the discovery of two species i-e: *Decticus verrucivorus* (Linnaeus, 1758) and *Decticus albifrons* (Fabricius, 1775). *Decticus* species are having significant biometrical and morphological differences with each other. In *D. albifrons* genital plate transverse with thickened posterior margin with small median cerci in *D. verrucivorus* restrain with denticles near middle. All morphological differences were highlighted by appropriate illustration and digital photograph. Furthermore, the species of *Decticus* are having jumping capacity when approached. Collection of these two species from Pakistan constructed new records. In addition to this, a simplified taxonomic key for the separation of species has also been provided here.

**Keywords:** Taxonomy, morphology, illustration, new records, keys

### Introduction

Subfamily Decticinae or shield-backed katydids are almost confined to Palearctic and Nearctic faunal region. A few genera narrowly extend southward into Mexico and several isolated genera known from South America. Many Nearctic forms show relationships with Palearctic species and may even be congeneric with them. The geographical conditions of Pakistan are of great importance with its intermingling of Oriental, Palearctic and Afro-tropical elements and present an ideal situation for the study of Decticinae fauna<sup>[19]</sup>.

Unfortunately, information available about the species of Decticinae and their distribution are quite inadequate. Study on the taxonomy of Decticinae (Ensifera) of Pakistan is difficult due to the lack of modern taxonomic literature and correct diagnosis. Even for large insects as katydids (Decticinae), our knowledge about their taxonomic work is limited. The present study was planned to contribute little knowledge of taxonomic status of Decticinae in Pakistan. Earlier many workers<sup>[4-32]</sup> have carried significant work on the taxonomic status of Tettigoniidae from many parts of world including Pakistan but there is no availability of quantitative data about Decticinae from Pakistan. The aim of present study is to contribute the knowledge of Decticinae from this region.

### Material and Methods

In the result of recent survey 02 species of Decticinae were collected during the year 2013-2014. The material was killed and preserved by adopting conventional method described by<sup>[19]</sup>. The material is deposited at Sindh Entomological Museum (SEM) at Department of Zoology, University of Sindh Jamshoro Pakistan. Identification of specimen was carried out under the Stereoscopic Dissecting Binocular Microscope with the help of keys and description available in literature and on the Orthoptera Species File Online<sup>[6, 19]</sup>. The genitalia was dissected out by using standard method supported by<sup>[5]</sup>, the abdomen was detached with micro-scissors and was transferred to a test tube containing 10 percent KOH, then slightly heated and later transferred to a glass cavity block with tape water. The processed soft tissues were removed by repeated washings with water and finally placed in glass cavity with few drops of glycerine. Subsequently, muscular tissues were removed gently and genitalia was examined and parts were then preserved in a glass vial containing few drops of glycerine and was labelled. The diagrams were drawn with the help of "Ocular Square Reticule" graph fitted in Binocular dissecting microscope. Further, editing was done with help of Adobe Illustrator CS3. All measurements are given in (mm).

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**Results**

**Taxonomy**

**Genus *Decticus* Serville, 1831**

**Type species:** *Gryllus verrucivorus* Linnaeus, C.N. (= *Decticus verrucivorus verrucivorus*)

**Generic diagnosis.** Pronotum dorsally flat or convex, with well-marked median carina or without median longitudinal carina or with median keel running its entire length. Prothorax ventrally without a pair of spines. Four ventral spurs on the hind tibiae. Moveable flaps of hind tarsi shorter than 1<sup>st</sup> tarsal segment or Plantulae of 1<sup>st</sup> segment of hind tarsi is slightly less or more than half as long as the segment. Tegmina fully developed usually with dark spots. Cerci in male each with an inward facing peg. Ovipositor curves slightly upward and crenulated at apex.

A single genus with two species studied and is given under:

**Key to species of genus *Decticus* occurring in Pakistan**

1. Subgenital plate sloping with thickened lateral margin without median notch.....*D. verrucivorus* (Lin.)
2. Subgenital plate transverse with thickened posterior margin with small median notch.....*D. albifrons* (Fab.)

***Decticus verrucivorus* (Linnaeus, 1758)**

*Decticus hastatus* (Fischer von Waldheim, 1839)

*Decticus radiata* (Fischer von Waldheim, 1846)

*Decticus deliae* Fritze, 1918

*Decticus rubicundus* (Goeze, 1778)

**(Figure. 1; Plate. I)**

**Material Examined.** (7 ♂ Specimens) Pakistan (Khyber Pakhtunkhwa: Jaglot) 2.vi.2014, Coll. Riffat Sultana (Jaglot); 7.x.2013, Coll. Waheed Ali Panhwar (Jaglot).

**Measurements (mm).**♂: pronotum, 9; tegmina, 39; femur, 11; tibia, 13; total body length, 27.

**Description of Male.** Body of medium size with brownish coloration. Tegmina fully developed usually reaching hind genua, with dark spots. Wings extending less than 3<sup>rd</sup> of their length out over the apex of abdomen. Fore-wings do not surpass the hind knees.Lateral keels on the pronotum present. Plantulae of 1<sup>st</sup> segment of hind tarsi slightly less than half as long as the segment. Sub-genital plate sloping with thickened lateral margin without median notch. The inner dent is present at the middle of the cerci in male.

**Female.** Not in our collection. However, we did not collect the female and observed it closely. But it escaped before we could process the live specimens.

**Remarks.** 02 males were reported from Berlin and Germany and stated that this species is very common and have jumping capacity when approached [7]. Further, he reported 09 males and 09 females from opening spruce of forest in France. Moreover, he reported 06 males and 04 females in high grasses from Switzerland. This species was reported from U.S.S.R [1, 2]. However, at the present, we have reported seven male of this species from Jaglot Pakistan and considered as new record for this region.

**Habitat.** During the field examination it has been noted these varieties of plantations i-e: *Ephedra gerardiana*, *Thymus serpyllum*, *C. dactylon*, *Plantago* and *Desmostachya-Brachiaria cynodon* were cultivated in Jaglot because they have good adaptability to local climates. The specimen at hand has been collected from rice field.

***Decticus albifrons* (Fabricius, 1775)**

*Decticus aeolicus* Guarino, 1935

*Tettigonia albifrons* Kirby, W.F. 1906

**(Figure. 2; Plate. II)**

**Material Examined.** (12♀ Specimens) Pakistan (Khyber Pakhtunkhwa: Jaglot) 2.vi.2014Coll. Waheed Ali Panhwar (Jaglot); 7.x.2013, Coll. Riffat Sultana (Jaglot).

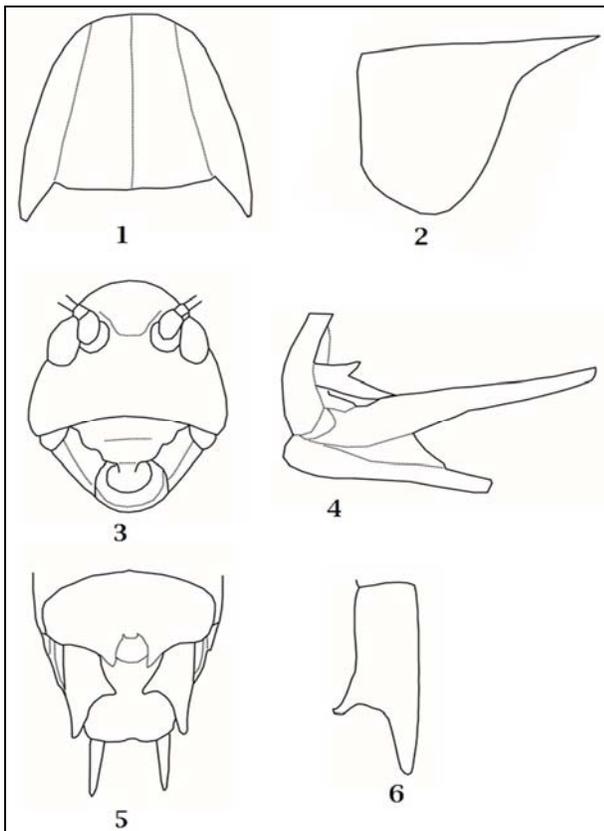
**Measurements (mm).** ♀: pronotum 11, tegmina 46, femur 38, tibia 40, ovipositor 25, total body length 30.

**Description of Female.** Body brown in colour. Tegmina much longer than abdomen, with brownish spots. The fore-wings surpass the hind knees.Pronotum with lateral keel. Plantulae of 1<sup>st</sup> segment of hind tarsi is slightly more than half as long as the segment. Female genital plate transverse with thickened posterior margin with small median notch. Ovipositor is straight and serrated from the middle to the apex.

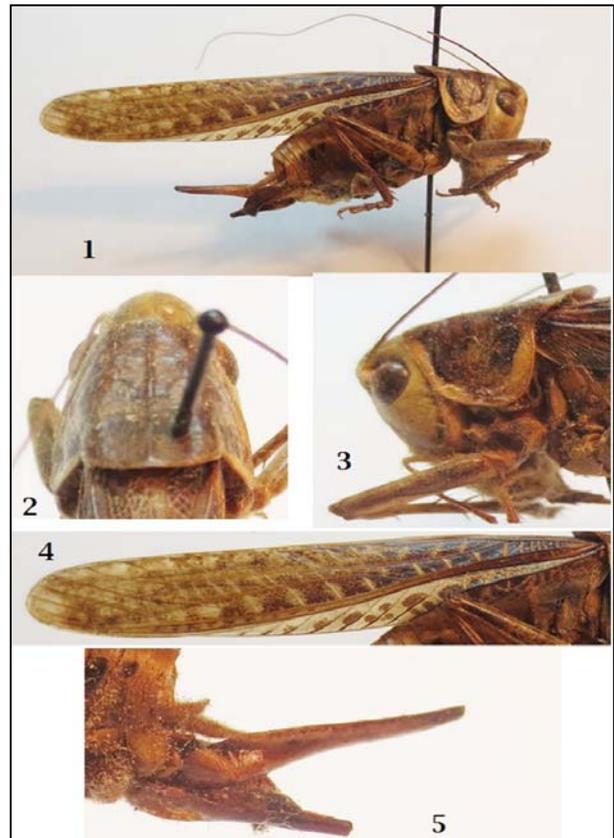
**Male.** Not available

**Remarks.** Data base collection shows that holotype of this species is lost now while [1] provided detail description of this species from U.S.S.R. More recent, this species was reported from France [3]. Beside this, they stated that these species are widely distributed near the thick vegetation in forests. At the present, we have reported females of this species from Jaglot Pakistan like *D. verrucivorus* it is also new record for Pakistan.

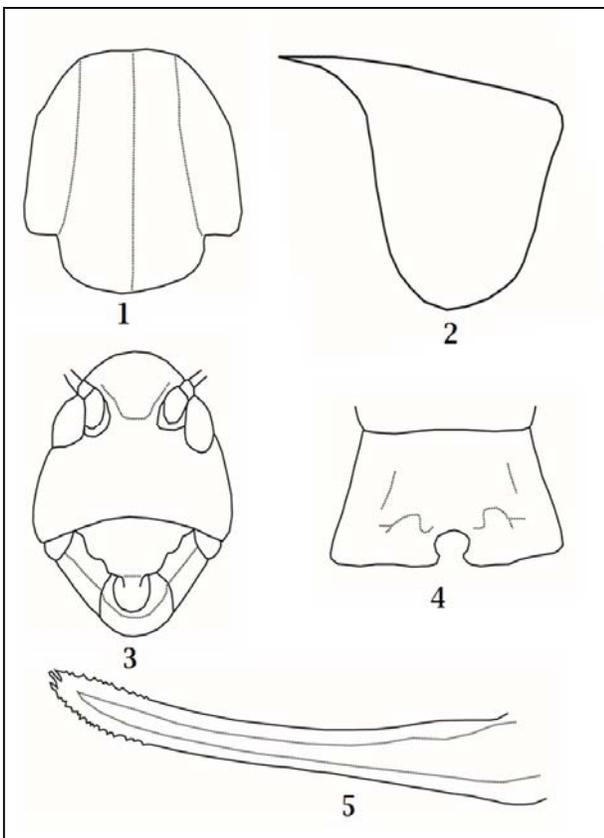
**Habitat.** The Northern areas of Pakistan are considered as host to three of the world's biggest and amazing mountain ranges i-e: Himalaya, Karakoram and Hindukush. The junction of these magnificent ranges are joining together of Indus and Gilgit rivers near Jaglot (a small town 40 Kilometer to South of Gilgit) that create a unique geographical attribute on earth. Despite, harsh geographic and climatic conditions the mountainous regions are heavily inhabited by huge flora and fauna. Nevertheless, the particular ecological conditions and solitude of mountain ranges supports a unique biodiversity of enormous variety of plants and animals species. On the other hand these areas are home to rare species due to thick vegetation which provide protection from natural enemies. During the field survey it has been noted that these ranges were dominated by *Helianthus annuus*, *Penicum tergidum*, *Echino chloacolonum*, *C. Dactylon* and *Desmostachya-Brachiaria cynodon*.



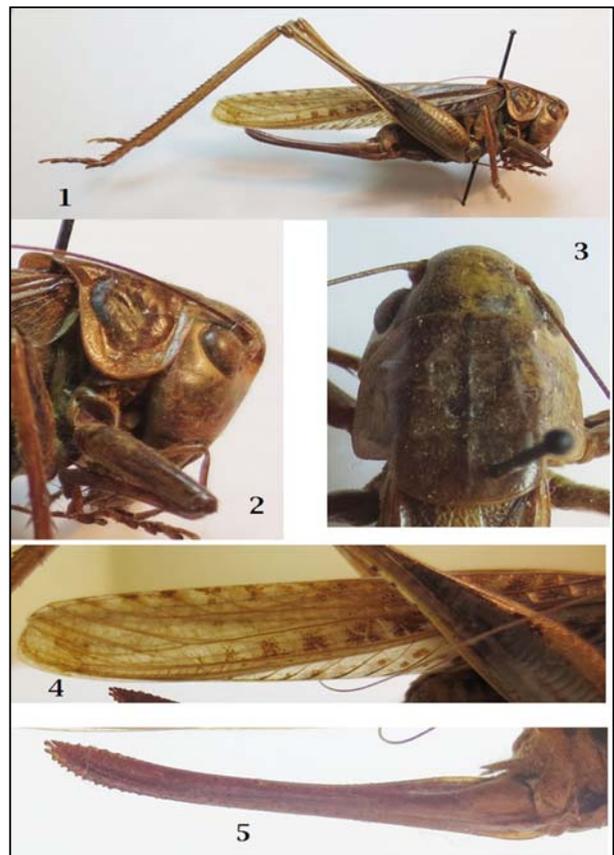
**Fig 1:** *Decticus verrucivorus* (Linnaeus, 1758) Male 1-6: 1. Dorsal view of pronotum; 2. Lateral view of pronotum; 3. Fastigium of vertex; 4. Lateral view of genital plate; 5. Ventral view of genital plate; 6. Lateral view of cerci



**Plate I:** *Decticus verrucivorus* (Linnaeus, 1758) Male 1-5: 1. Male habitus; 2. Dorsal view of pronotum; 3. Lateral view of pronotum; 4. Tegmina; 5. Lateral view of genital plate



**Fig 2:** *Decticus albifrons* (Fabricius, 1775) Female 1-5: 1. Dorsal view of pronotum; 2. Lateral view pronotum; 3. Fastigium of vertex; 4. Ventral view of genital plate; 6. Lateral view of ovipositor



**Plate II:** *Decticus albifrons* (Fabricius, 1775) Female 1-5: 1. Female habitus; 2. Lateral view of pronotum; 3. Dorsal view of pronotum; 4. Tegmina; 5. Lateral view of ovipositor

## Discussion

Pakistan is diversified region, having varieties of biogeographical and ecological zones that include: Alpine; sub-Alpine; tropical; sub-tropical; semi-desert; desert saline to down to ocean. The Ensifera fauna of Pakistan is rich, varied and well-marked. This is classified into two main groups 1. Caelifera (Commonly known short-horned) 2. Ensifera (Mostly termed long-horned) [20]. Pakistan is of great importance with its intermingling of Oriental, Palaearctic and Afro-tropical elements and present an ideal situation for the study of Decticinae fauna [19]. Study on taxonomy of *Decticus* Serville, 1831 fauna of Pakistan resulted in particular discovery of two species i-e: *Decticus verrucivorus* (Linnaeus, 1758) and *Decticus albifrons* (Fabricius, 1775). *Decticus* species are having significant biometrical and morphological differences with each other. In *Decticus albifrons* genital plate transverse with thickened posterior margin with small median cerci in *D. verrucivorus* restrain with denticles near middle. Furthermore, the species of *Decticus* are having jumping capacity when approached. 02 males *D. verrucivorus* were reported from Berlin and Germany and stated that this species is very common and have jumping capacity when approached [7]. Tettigoniidae occupies wide variety of agricultural crops and may become pest of vulnerable crops [20] Finding of both species from Pakistan constructed new records in the biodiversity of insect fauna.

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