

Research Article

**STUDIES ON MORPHOLOGY AND PHALLIC COMPLEX OF *OEDALEUS SENEGALENSIS* KRAUSS (ORTHOPTERA: ACRIDOIDEA) FROM PAKISTAN**

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**ABSTRACT**

The genus *Oedaleus* Fieber (1853) were considered economically pest. In present work *Oedaleus senegalensis* specimens has been collected from the cultivated fields, semi arid areas, along the sides of standing crops and rocky areas. This species have been found and that were described with four illustrations of Phallic complex and description also provided. The epiphallus bridge shaped, bridge comparatively wider, thickening and slightly curved. Anterior projections well marked, finger like with acute rounded boundries. This investigation was taken to understand the structural pattern of Phallic complex to update new research workers.

**Keywords:** Orthoptera; Phallic complex, Distribution, Pakistan.

**INTRODUCTION**

The study and significance of Orthopteroids, has been taken out previously by numerous authors, members of the super family Acridoidea are potentially the most important (Jago, 1979; Chek *et al.*, 1980; Bhowmik, 1986; Cheke, and Migrant, 1990; Colvin, 1997; Chandra, 1983; Chapman and Sword, 1993; Fielding and Brusven, 1993); Joern, 1982;). *Oedaleus senegalensis* (Krauss,1877) stands out as the most devastating species. This species is widely scattered throughout the tropical and sub tropical regions, as well as Africa north of the equator, Middle east and Indian sub continent and this species is often associated with mesoxerophilic habitats and can be categorized as graminivorous. Chopard (1963) remarks that it seems to be rare north of the sahara. Bolivar (1908) reported from the Congo; and (Bhatia and Ahluwalia 1966) reported that adults were found enormously in the crops (Descamps and Denshoff 1965) report their occurrence in Baluchistan area of Iran fully adults were seen most abundantly on slopes in sandy localities. During the current study of the field it is observed that *O. senegalensis* has a priority for semi arid areas. This grasshopper is known as a primary pest of crops and vegetations, damage pastures in country at every season when their population may increase. *O senegalensis* is considered as the much important pest species, due to its economic mode; In spite of this it has a certain importance because of the damage that it causes to consumer crops (maize, bajra, rice, and wheat), almost seedlings or nursery stages in fields. The pest also was reported in various parts of Pakistan and Asia, harming food crops and pastures.

**MATERIALS AND METHODS**

Adult specimens of *Oedaleus senegalensis* were collected from various provinces of Pakistan i.e. grassland, dry vegetation, rangelands, along the roadsides and rocky areas . The following method has been adapted from Vickery and Kevan (1983). The collection of grasshoppers was made with the help of insect net and was killed by potassium cyanide in standard entomological killing bottles. The specimens were not left too long (1/2 hours) in cyanide because the color of specimens may turned into black or they may be spoiled. The insect pins were inserted on the pronotum posterior to transverse sulcus an a little to the right of the median dorsal carina. The specimens were then stretched on the stretching board and attention was paid to the antennae, wings and legs in order to display important taxonomic characters. Dust particles and other undesirable matter were removed with the help of dry camel hairbrush.

The fully dried specimens were removed from stretching boards and were stored in standard entomological boxes with labels showing locality, date of collection and collector name. Nephthalene balls were placed in boxes to prevent the specimens from the attack of ants and other insects.

For the study of male genitalia Kevan *et al.* (1969) method was adopted. The method of softening the abdominal terminalia was not followed by immersing these in hot water, but by relaxing the whole insect over water in a small dessicator (to which a few drops of phenol / 70 % alcohol had been added) to prevent fungal growth was used. It may depend's upon the size of the insect, age and general state of preservation, the period of relaxing was

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usually about 24 hours. They were thoroughly washed in tap water and examined in glycerol on a cavity slide (without a cover glass), using a stereoscope dissecting binocular microscope. Finally the micro vials were pinned through their rubber stopper beneath the insects from which the phallic structure had originally been extracted.

For the study of female genitalia, Randell (1963) method has been adopted. The spermatheca lies just above the vagina was also removed. The dissected sub genital plate and spermatheca was then washed with 10 % potassium hydroxide solution and examined in water and stored as above. The diagrams were drawn with the help of "Ocular square Reticule" placed in right eye piece of the stereoscopic dissecting binocular microscope. All the measurements are given in the millimeter. The scheme of measurement followed is that of Hollis (1965). The terminology with regard to phallic complex and female genitalia is adopted from Dirsh (1956 and 1957).

**Description:** Of medium sized. Antennae filiform, 26-27 segmented longer than head and pronotum together. Head sub-globular, shorter than pronotum. Fastigium of vertex little longer than wide, narrowing anteriorly; margin raised. Fastigial foveolae short, triangular; frontal ridge flat and wide. pronotum tectiform and strongly constricted, median carina entire, not crossed by posterior sulcus, and not low. Tegmina well developed; wings hyaline towards base. Hind femur with three indistinct oblique transverse dark bands on outer upper marginal and medial areas extending onto inner surface. Hind tibia with dark basal ring, slender, slightly shorter than hind femur, with 13 inner and 12 outer black tipped spines. Claws shorter. Arolium small.

#### Phallic complex

Apical valve of Penis almost parallel to the valve of cingulum; valve of penis, thick, wider, tapered at apex with acute rounded apices. Valve of cingulum deep, slightly thin, narrowing at apex with sub acute obtuse rounded apices. Arch of cingulum large, stout, flattened.

Basal bridge fold with ventro expansions, knot like, rectangular. Apodemes of cingulum moderate, stout, thick and directed anteriorly with pointed acutangular apices. Zygoma visible, having furrow at margins. Rami thick vertically extending into the sheath dorsally lobe like. Gonopore process convex, incurved, widened anteriorly with truncated apices. Ejaculatory duct smaller and produced anteriorly.

#### Epiphallus

The epiphallus bridge shaped, bridge comparatively wider, thickening and slightly curved. Anterior projections well marked, finger like with acute rounded boundaries, reaching only one half of the ancorae; posterior projections with deep and shallow on inner and outer margins respectively. Lateral plates fairly wide. Ancorae straight upward, moderate, thick, wavy like, acutangular at apex, deep and rounded at base. Lophi laterally placed, elongated conical, produced anteriorly in finger like form, with acute apices, median lobes half times wider as outer lobes; ending in small with knob like projections, acutangular. Besides the lateral plates, small oval circular sclerites.

**Coloration:** Generally greenish brown in color. Pronotum with X-shaped markings of white and brown stripes. Tegmina with two brown bands at base and scattered tetragonal spots. Wings transparent, basal part yellowish green, dark band not touching their posterior margin in male the apices shadowed. Hind femur yellow on inside and without dark bands. Hind tibia light reddish on inner aspect and yellowish on outer aspect, with distinct apical yellowish band.

**Female:** Cerci short, conical, slightly compressed with angular apex. Ovipositor short, robust, valves stout and curved.

**Spermatheca:** The spermatheca with pre-apical diverticulum finger like, slightly larger, laterally placed, obtusely rounded at apex. Apical diverticulum sac like, broadened, elongated with rounded process at base.

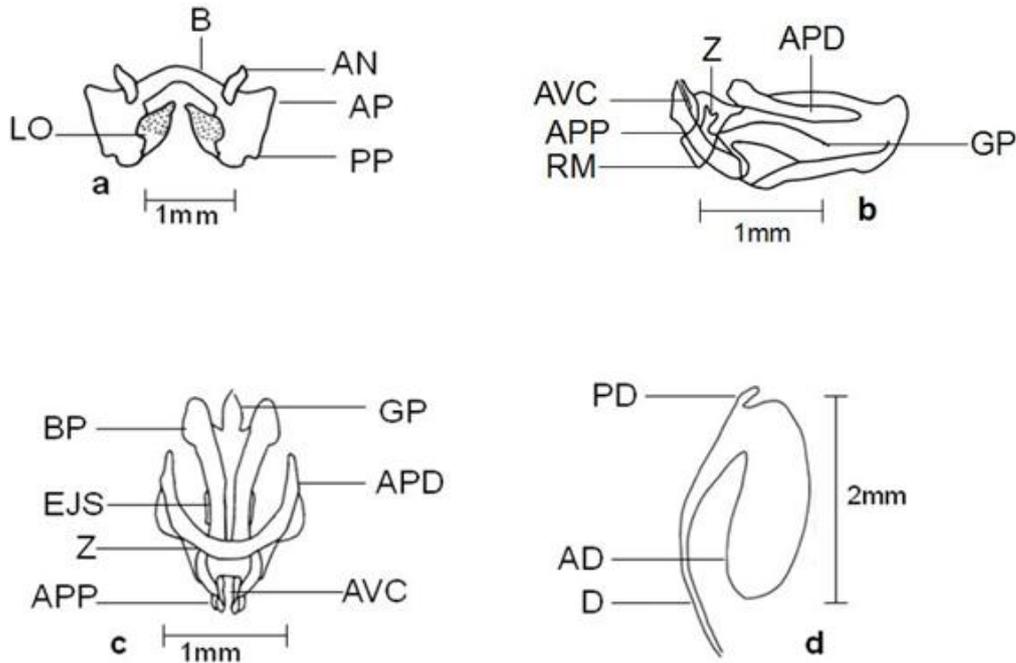
**Table 1.** Measurements in millimeters (mm) Showing the different body parameter *Oedaleus senegalensis* Krauss.

Body Parameters	Male (n = 9)		Female (n = 11)	
	(Mean ± Sd)	(Range)	(Mean ± Sd)	(Range)
Length of Body	21.55± 7.48	17-21	31.08±14.31	23-32
Length of Antennae	11.0± 4.24	9-12	12.45± 3.83	10-13
Length of Pronotum	4.55± 1.18	4.2-5	7.99± 5.46	5.3-9
Length of Tegmina	21.44±4.71	19-23	30.36 ±10.41	26-35
Maximumwidthhof Tegmina	4.61 ±10.39	4.3-5	6.12 ± 2.62	5.4-7
Length of hind Femur	14.55 ± 5.04	12-14	14.18 ±10.36	15-19
Maximumwidthhofhind Femur	3.46 ± 1.12	3.2-4	4.70± 1.27	4.2-5
Length of hind tibia	12.22 ± 2.34	11-13	16.09± 3.62	14-17

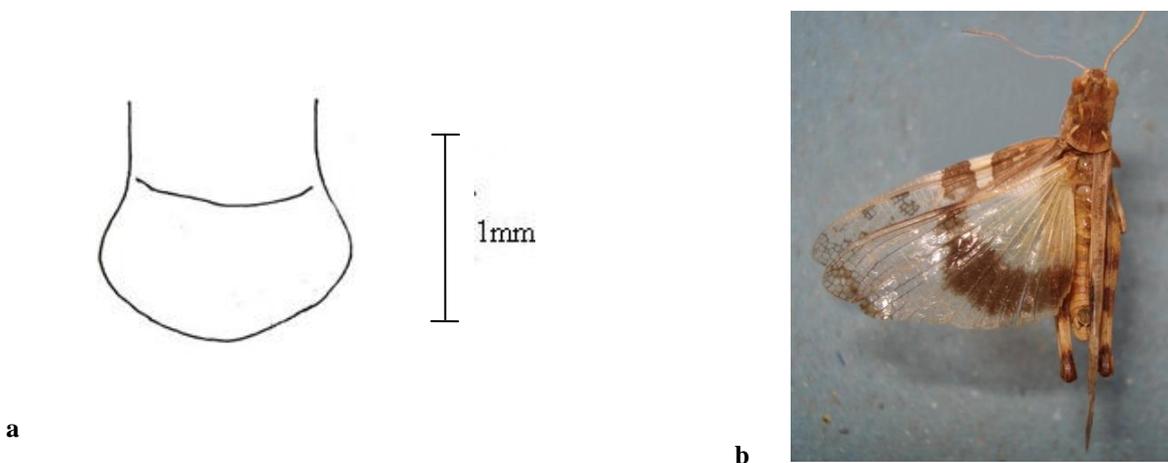
**Remarks of species:** This species is very closely related to *O. nigrofasciatus* (Degeer) in having general body form but can easily be separated by rounded sub acute pronotal shape. Whereas in *O. nigrofasciatus* it is oval and by the other characters as noted in the keys and description. This species has been collected from the cultivated fields of Jowar, maize and wheat. Ahmed (1980) recorded the species from all the provinces of

Pakistan except Punjab and Yousuf (1996) recorded this insect from the various parts of Pakistan. Mooed (1966), Wagan (1990) and Wagan and Solangi (1990), also reported this species from different parts of Sindh while Baloch (2000) recorded from the Punjab.

**Depository:** The type material has been deposited in the Museum of Entomology, Department of Zoology, University of Sindh Jamshoro, Pakistan.



**Figure 1.** a. Epiphallus, B. Endophallus and Cingulum lateral view, C. Same dorsal view and d. Spermatheca of male genitalia of *Oedaleus senegalensis*.



**Figure 2.** a. Pronotum, dorsal part and b. Pronotum, dorsal part, male genitalia of *Oedaleus senegalensis*.

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