



A New Species of Genus *Sphingonotus* (Oedipodinae: Acrididae: Orthoptera) from Pakistan

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Abstract: *Sphingonotus sindhensis* n.sp is described from Sindh Province of Pakistan.

Key words: New species, *Sphingonotus sindhensis*, Sindh

1. **INTRODUCTION**

The genus *Sphingonotus* and its species described by Mistchenko in 1936. The members of this genus are widely distributed through out the tropical and sub tropical regions. They are of small to medium in size, slender and bullet shaped various in coloration. Integument finely rugose. Antennae filiform longer than head and pronotum together. Head shorter than the pronotum, fastigium of vertex slightly sloping forwards, concave with lateral carinulae, fastigial foveolae present, some times indistinct, frons vertical. Pronotum slightly saddle shaped constricted in prozona with linear median carina, lateral carinae absent, dorsum crossed by three sulci, metazona longer than prozona its posterior margin obtuse angular with almost rounded apex. Mesosternal interspace wider than its length. Metasternal interspace open. Tegmina and wings fully developed; apical membrane of tegmina semitransparent, wings hyaline, generally with a brightly colored black band. This species is related to *Sphingonotus longipennis* saussure (1936) but 2mm smaller and the hind femur is without any band from the inner side. In this new species the black band of hind wing is well developed and is spread from one end to the other end. Where as in *Sphingonotus longipennis* the black band is far from reaching the inner margin.

2. **MATERIALS AND METHODS**

Adult specimens of *Sphingonotus sindhensis* n.sp have been collected from rocky areas of Jamshoro Sindh, Pakistan. 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 turn into

black or they may be spoiled. Moreover the pinning of specimens was made within few hours as the specimens were flexible and there was little danger of loosing any part through necessary manipulation, and that the parts could be stretched as desired. The insect pins were inserted on the pronotum posterior to transverse sulcus 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 hair brush. 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 genitalia Kevan *et al.*, (1961) 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 usually about 24 hours. For the study of female genitalia. Randell (1963) method has been adopted. After relaxing the insect as per method mentioned above with the help of fine scissors an incision was made on each side of the abdomen where the tergum meets the sub genital plates, and continued for enough anteriorly to allow removed of the extra plate in the neat operation . The sub genital plate was then depressed with forceps and a third cut made at its base were removed with the sub genital plates. 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. Identification of specimens was carried out under the stereoscopic dissecting binocular microscope. 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 & 1957).

Diagnosis:

Body of small to medium size, slender, integument smoothly rugose. Antennae filiform 20-22 segmented longer than the head and pronotum together. Pronotum saddle shaped Transverse furrows run across the disk and down the lateral lobes. Head strongly globular fastigium of vertex slightly raised, but roundly sloping over the frons, concave rounded at middle part. Ovipositor short with moderately robust curved valves, lower valve with external tooth like projection.

Description of female Holotype

Body of small to medium size, slender, integument smoothly rugose. Antennae filiform 20-22 segmented longer than the head and pronotum together. Head strongly globular fastigium of vertex slightly raised, but roundly sloping over the frons, concave rounded at middle part, median carinulae present, fastigial foveolae irregular in seen, lateral foveolae spherical and well developed, frontal ridge remarkable with lateral carinae but flat and tapered above the clypeus. Eyes oval rounded. Pronotum saddle shaped smoothly punctured, constricted in prozona, median carina indistinct in prozona, crossed by three sulci, angle of the hind margin rounded. Tegmina and wings fully developed reaching to the posterior part of the hind tibia, obtuse rounded at apex. Hind femur slender and stout, dorsal carinae sharp, with upper lateral genicular plate acute rounded, lower genicular part becomes tapered. Hind tibia stout, elongated with 12 inner and 10 outer black tipped spines. Arolium small. Costal vein of fore wing thick and rod like in form, and few curved at near the base. Mesosternal inter space half time wider than the metasternal interspace with rounded acute apices at apex. Larger in size, supra anal plate broad and elongated with obtuse rounded apex. Cerci conical with obtuse rounded apices. Ovipositor moderately short, valves curved ventral valve at base with lateral projection, sub genital plate some what elongated, flat with slightly indistinct median carina, having rounded apex.

Spermatheca: The spermatheca cylindrical elongated and convex towards the apex. Pre-apical diverticulum smaller and finger like in form, apical diverticulum sac like, smoothly rounded at base. Spermatheca is a coiled duct of ectodermal origin. It is of varying sizes and shapes. The spermatheca usually dilates to form a sac like structure, for storing the sperms which enter during copulation.

Coloration : Light grey or light brown with whitish coloration. Tegmina semitransparent with two paler brown bands, distal part of the tegmina arranged with smaller speckles. Wings band of hind is well developed and is spread from anterior to posterior margin of the costal vein. Hind femur with light yellowish on inner sides, but is without any band from the inner side. Hind tibia slightly yellowish in color.

Measurements in millimeters(mm)

Body Parameters	Holotype	Paratype
Length of Body	30.0	30.0
Length of Antennae	8.0	8.0
Length of Pronotum	6.0	6.5
Length of Tegmina	33.0	32.0
Maximum width of Tegmina	7.0	6.5
Length of hind Femur	15.0	14.3
Maximum width of hind Femur	4.0	4.0
Length of hind tibia	14.0	13.5

Etymology

The new species is named after the Sindh province. Type material is deposited in the museum Department of Zoology, University of Sindh Jamshoro.

Material Examined

Jamshoro. Sindh 7.vii.1999.2, Females (Barkat and M.S .Wagan). The specimens were collected from the rocky areas.

Distinctive characteristics

This new species is related to *Sphingonotus longipennis* saussure (1936) but 2.mm smaller and the hind femur is without any band from the inner side. In this new species the black band of hind wing is well developed and is spread from one end to the other end. Where as in *Sphingonotus longipennis* the black band is far from reaching the inner margin.

3. RESULTS AND DISCUSSION

The grasshoppers of this genus are widely distributed through out the tropical and sub tropical

regions of the world. They are of small to medium in size, slender shaped various in coloration. Kirby's (1914) faunistic studies on acrididae still form the basis for distribution and identification of grasshopper's species. There are two contradictory views on Kirby's fauna. Roonwal (1958) found it still useful whereas Uvarov (1977) considered it as outdated. In fact Kirby's description covered those grasshoppers' species, which were mostly found in plains of India; particularly in its southern parts. It also included studies on some grasshopper's species occurring in areas, which are now part of Pakistan. Walker (1919) first accepts the status of Oedipodinae as family level. Hence it has been considered as a family or sub family. Kirby(1914) and Bei-Bienko and Mistchenko (1951) considered it as a sub family. Dirsh (1956) included it in sub-family Acridinae. Where as Uvarov (1966) separated this subfamily from Acridinae since it has been regarded as subfamily by (Dirsh 1975).

In fact the systematic position of various groups of insects including Orthoptera has been discussed during the past decades on the basis of external morphological characters alone. As well as in recent years it has been realized by the insect taxonomists in general and; Orthopterist in particular that the external features are greatly influenced by the environmental factors and there fore these do not provide much more an authentic distinctive features that may separate the species from one an other. In addition the male and female genital armature being mostly internal structures, are known characters that may be least influenced by the environment. Anatomical phase including phallic structures, taxonomy and cytology have discussed by many workers in past time, for example by Slifer (1940 a, b; 1943) Roberts (1941), Powers (1942), Uvarov (1942,a,b), Dirsh (1956; 1961a), (Helwig, 1958 and Eades 2000).

We have studied morphological and genital structure as a basis of classification of the *Sphingonotus* . This studies is an attempt to discuss the variation and similarity of species in the members same sub family and comparison out on the basis of morphological and internal genital characters The spermatheca of *Sphingonotussindhensis* possesses a long tube and opens on the dorsal wall of the genital cavity, opposite the genital opening. Pre-apical diverticulum moderate, laterally up warded with rounded apex. Apical diverticulum fairly convex,cylindrical slightly narrow and oval rounded at base. Roberts (1941) that Slifer's (L. C.) Scheme is erroneous and further suggested that, if the order of importance reversed, i.e. the form of spermatheca , rather than the presence of glandular pouches, is

considered to be of primary importance ,similarities would be presented and this will shows the relation ship between the members of subfamily. Dirsh (1957) Consider the spermatheca characters to support of identification in taxonomic point of view. Male and Female genitalia characteristics have significant pattern in nature (Eberhard, 1985) On the base of present findings it is known that shape and size of spermatheca is different in members of the sub-family Oedipodinae; Although the characters are useful for identify and in separating species. In many insects whose external morphology is similar, differences in genitalia characters are considered as reliable species diagnostic tool. We confirmed the close relationship between the species of *Sphingonotus* by morphological and genital characters; these structures can be used as diagnostic character in insect taxonomy. This investigation suggests that structural features of spermatheca should be considered for identification

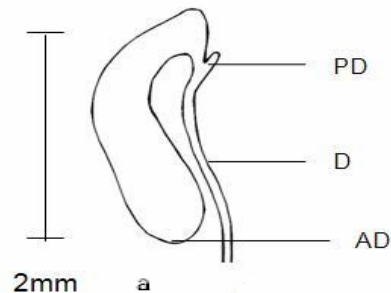


Fig. a) Spermatheca. b) *Sphingonotus sindhensis* n.sp Female. c) lateral view of Pronotum.

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