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STUDY ON THE MORPHOLOGY AND DISTRIBUTION OF GENUS AIOLOPUS (ACRIDIDAE: ORTHOPTERA) FROM SINDH, PAKISTAN

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ABSTRACT

Grasshoppers are those insects that have importance to carry out study to check the position of damage at agricultural crops and for to know their significance in insects taxonomy .During the present work orthopteran fauna in agricultural fields of Pakistan were investigated to collect the specimens of Genus Aiolopus to showing their morphology, and distribution.The many specimens have been collected from different provinces of Pakistan during the field studies. Three species namely *Aiolopus thalassinus thalassinus*, Fabricius, *A.thalassinus tumulus*, Fabricius, and *A.simulatrix simulatrix*, Walker, of subfamily Oedipodinae was collected and viewed. Furthermore, the most dominant and widely distributed species was exposing *Aiolopus thalassinus thalassinus* their distribution has been reported and confirmed throughout the country. As well as this investigations may be proved to determine and control the pest incidences at agricultural fields. Although studied species were recognized as serious pest of many valued crops in Pakistan. Besides this; some important morphological characters of male and female have also been studied. Present investigation has been carried out for the accurate description from this region.

1. INTRODUCTION

The genus Aiolopus was proposed by Fieber (1853) with *Gryllus thalassinus* Fabricius (1781) as the type species. Aiolopus is a genus of grasshoppers belonging to the family Acrididae. Subfamily Oedipodinae. The genus was revised by Hollis (1868) recognized seven species and sub species. More than thirteen species presently of *Aiolopus* are known worldwide according to taxonomic position by Eades and Otte (2008). Many scientist carried out investigation on characterization of arthropod's fauna i-e Kirby 1914, Mischenko 1936, Uvarov 1966, Dirish 1975, Ahmed, 1980, Ritchie 1981, on the basis of external morphology. During the present position work was carried on three species from Pakistan.

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(Cotes, 1893) and (Januja, 1957) reported the damaging status on rice nurseries and on other field crops. These species are known for their preference to live at agricultural fields, and they have economic importance in agriculture universe of Pakistan. This genus is closely related to *Platypygius* Uvarov in having general shape and the spurious median of the tegmina is close to M in the apical part but can easily be separated from the same in having elongated fastigium, fastigial foveolae elongated trapezoidal and male sub-genital plate is bluntly conical and by the other characters as noted in the keys and description. The Unique feature of the species was shown at the field visit; grasshoppers were feeding very fast on the leafy parts of plants. Such away they may cause serious infest on crops, when their population increased due to favorable climatic conditions.

Despite the importance of the distribution in insects, there is little information about external morphology. This study indicates characterizes existence of grasshoppers in diverse habitats.

2. MATERIALS AND METHODS

The grasshoppers were collected by netting and examined in the entomological laboratory. The adult grasshoppers were collected from agricultural fields, open grasses, herbs and shrubs;with the help of standard entomological net. The numbers of specimens were collected; that processed as the base for taking the current study. The following method has been adapted from Vickery and Kevan (1983). Specimens were killed by potassium cyanide in standard entomological bottles. The pinning of specimens was made within few hours as the specimens were flexible; and that the parts could be stretched as desired. 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. Naphthalene 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 (1961) method was adopted.

All the measurements are given in the millimeter. The scheme of measurement followed is that of Hollis (1965)and (1968).The terminology with regard to phallic complex and female genitalia is adopted from Dirsh (1956).

3. RESULTS

a) *Aiolopus Simulatrix Simulatrix* (Walker)

Adult Unique Description: Colour is usually light to dark brown but sometimes can be green. In profile the top of the head, thorax and wings in a straight line with the front of the head sloping down and back rather than vertical. Wing covers darker than the body and with a prominent lighter to white stripe on the leading lower edge, up to about half the length of the wings. Hind wings from almost clear to a light straw colour with an indistinct darker smogy outer. Hind tibia straw coloured. Body slim, throat peg absent. Head sub conical shorter than pronotum. Fastigium of vertex pentagonal, slightly longer than wide, moderately concave with well defined margins; forward angles narrowly rounded. Fastigial foveolae trapezoidal; frontal ridge wide coarsely and densely pitted. Pronotum relatively narrow, median carina stronger in prozona than in metazona; lateral carinae absent. Tegmina and wings well developed.

Distribution: Burma, India, Pakistan, Iran, Arabia, Turkey, East Africa, Egypt, and Tanzania.

Female: Cerci short, conical with obtuse apices. Ovipositor short; robust, valves curved.

Measurements in millimeters (mm)

Body Parameters	Male (n=7)		Female (n=9)	
	(Mean ± Sd)	(Range)	(Mean ± Sd)	(Range)
Length of Body	17.71 ±1.84	17-19	22.55 ± 2.04	22-24
Length of Antennae	4.57 ±1.29	4-5	6.55 ± .67	6-7
Length of Pronotum	2.42 ± 1.29	2-3	5.61±1.02	5.3-6
Length of Tegmina	18.57± 3.69	17-21	20.66 ± 1.41	20-21
Maximum width of Tegmina	2.28 ±1.17	2-3	3.21 ± 0.66	3.1-3.3
Length of hind Femur	8.35. ± 1.23	8-9	10.37 ± 1.31	11-0
Maximum width of hind Femur	2.27 ± 0.87	2-3	2.06 ± 0.43	2-2.1
Length of hind tibia	8.34 ±1.04	8-9	9.73± 2.27	9.2-10

***b) Aiolopus thalassinus thalassinus* (Fabricius)**

Adult Unique Description: Of small size. Antennae filiform, about 22-24 segments slightly longer than head and pronotum together. Head sub –conical, smaller than pronotum. Fastigium of vertex angular,with lateral carinulae extended posteriorly to apices of eyes and bent inwards, projected over frons roundly. Fastigial foveolae trapezoidal; frontal ridge wide, flattened and punctuate. Pronotum slightly saddle shaped ,narrowed in prozona, median carina slightly projected in prozona; lateral carinae absent. Tegmina and wings fully developed. Hind femur long, dorsal carina not serrated, dorsal genicular lobes rounded. Hind tibia slender thin with 10 -11 black tipped spines on either sides. Claws shorter. Arolium small.

Distribution: Pakistan, India, Australia, France, Southwest Africa, Japan and SriLanka.

Female: Cerci short, conical with obtuse apices. Ovipositor short, robust, valves curved, ventral valve with lateral projection.

Measurements in millimeters (mm)

Body Parameters	Male (n = 30)		Female (n = 30)	
	(Mean ± Sd)	(Range)	(Mean ±Sd)	(Range)
Length of Body	15.86±3.34	15-17	22.46 ±5.60	21-25
Length of Antennae	5.75 ±2.50	5.5-6.7	5.73 ±2.99	5-7
Length of Pronotum	3.12 ±1.12	3.0-3.5	4.22 ±1.85	4-5
Length of Tegmina	17.9±6.68	17.5-21.0	22.1±7.52	20-24
Maximum width of Tegmina	3.26 ±2.05	3-4	4.18 ±2.52	4-4.3
Length of hind Femur	9.63 ±5.30	9-11	11.83±3.14	11-13
Maximum width of hind Femur	2.44 ±2.14	2-3	3.15±1.84	3 -4
Length of hind tibia	8.36 ±2.26	8-9	9.7±3.20	9-11

c) *Aiolopus thalassinus tamulus* (Fabricius)

Adult Unique Description: Of small size, Antennae long, filiform, about 22-24 segments, slightly longer than head and pronotum together . Head sub-conical, shorter than pronotum. Fastigium of vertex angular, median carinula absent, lateral carinulae extended to anterior margin of eyes with straight apices. Fastigial foveolae trapezoidal; frontal ridge tapering gradually towards fastigium and with sharp margins.pronotum sub-saddle shaped,constricted in middle median carina well developed; lateral carinae absent. Tegmina and wings fully developed with obtuse rounded apices. Hind femur of medium size. Hind tibia slender with 10-11 black tipped spines. claws shorter. Arolium small.

Distribution: Pakistan, India, SriLanka, Australia, France, and Southwest Africa and Japan.

Female: Cerci short and conical. Ovipositor short, robust, valves stout with curved apices.

Measurements in millimeters (mm)

Body Parameters	Male (n=20)		Female (n=20)	
	(Mean ± Sd)	(Range)	(Mean ± Sd)	(Range)
Length of Body	22.45 ±5.90	21-25	23.3 ±6.49	24-26
Length of Antennae	4.25 ±1.51	4-5	5.26 ±1.71	5-6
Length of Pronotum	4.31 ±1.79	4-5	4.44±1.26	4-5.3
Length of Tegmina	20.2 ± 4.14	19-22	21.25±1.73	21-22
Maximum width of Tegmina	3.49 ±3.20	3-5	4.07± 1.03	4.1-4.3
Length of hind Femur	11.8 ±2.68	11-13	12.72±1.03	12.5-13
Maximum width of hind Femur	3.22 ±1.57	3-4	3.52± 1.74	3-4
Length of hind tibia	9.85 ±3.24	9-11	10.27±1.74	10-11

Fig.a:*Aiolopus simulatrix simulatrix* Walker

Fig.b:*Aiolopus thalassinus thalassinus* Fabricius

Fig.c:*Aiolopus thalassinus tamulus* Fabricius

4. DISCUSSION

Uvarov in a series of publications (1921,1929,1942) gave the description of various species belonging to subfamily Oedipodinae and (1925 & 1943) revised the genera Hilethera and Scintharista respectively. Mishchenko (1936) studied the genus Sphingonotus Fieber his material contains several specimens from various localities of Pakistan. Bei-Bienko and Mishchenko (1951 a, b) studied the grasshoppers and locusts of the Russia and its adjacent countries where as Willemse (1951) studied that of Indo Malayan region, the above authors included some localities from Pakistan. Hollis (1965,1968,) under took the revision of the genera Trilophidia Stal and Aiolopus Fieber respectively. Moeed(1966) studied the subfamilies acridinae and Oedipodinae(acrididae) of Hyderabad and its adjoining areas. Sajida (1967), Noushaba (1967) and Memon (1968) studied the male and female genitalia of some Oedipodine grasshoppers of Hyderabad . and its adjoining areas. Ritchie (1981, 1982) studied the genera Oedaleus and Gastrimargus respectively. Ahmed (1980) surveyed the grasshoppers fauna from the various provinces of Pakistan . He listed 36 species under subfamily Oedipodinae and his study did not include any determination keys for the separation of, genera and species. Furthermore, the description given for the various species were also inadequate. ***Aiolopus thalassinus tamulus*** is very closely related to A. femoralis Uvarov in having general body form but can easily be separated from the same in having the hind tibia shorter than hind femur with nine outer and ten inner spines, hind femur is less broad and tegmina will surpassing tip of hind femur and by the other characters as noted in keys and description. This subspecies has been collected from the cultivated fields of sugar, maize, rice vegetables and grasses in meadows and road sides of various parts of Pakistan. Earlier , Hollis (1968) and Ahmed (1980) from various provinces of Pakistan.

5. CONCLUSION

This group offer great diversity amongst the family Odepodinae more extensive work is needed on the molecular bases.

6. CONFLICT OF INTEREST

Author has declared that there is no conflict of interest regarding publication of this article.

REFRENCES

[1] Ahmed FU (1980). Survey of Grasshoppers in Arid and semi-Arid region of Pakistan Final Rep. Pl-480 No.P.K-ARS-20 (FG-Pa-21), pp. 500.

[2] Cotes ,E.C.(1893). A conspectus of the insects which affect crops in India. *Indian Mus. Notes* 2(6):145-176.

[3] Dirsh VM (1956). The Phallic complex in Acridoidea (Orthoptsa) in relation to taxonomy. Trans. R. Ent. Soc. Lond., 108(66): 223-256.

[4] Dirsh VM (1975). Classification of the Acridomorphoid Insects. Farringdon E.W. Classey Ltd., 8: 171.

[5] Eades,D.C., and D.Otte.2008. Orthoptera species File on line. Version 2.0/3.3. Available at<http:// orthoptera.species File.org>[accessed April 15,2008]

[6] Fabricius,J.C.1781.Species Insectorum exhibentes eorum differentias specificas, synonyma, auctorum, loca Natalia, metamorphosin adjectis observationibus, descriptionibus. Vol. IC.G Proft;Copenhagen.p.340-371.

[7] Fieber,F.X.1853. Synopsis der europ schen Orthopteran. Lotos 3:90-104.

[8] Hollis, D. 1965, A Revision of the genus *Trilophidia* stal.*Trans. R. ent. Soc*. Lond. 117(b): 245-262.

[9] Hollis, D.1968. A revision of the genus *Aiolopus* Fieber(Orthoptera:Acridoidea). Bulletin of the British Museum (Natural History) Entomology 22(7):307-335.

[10] Januja,N.A.(1957). Insect pests of paddy in Pakistan. *Agric. Pak*, 8:5-21.

[11] Kevan DKMcE, Kniper H (1961). Garad fluglerous Qstafrika (Orthopteriods. Dermapteroida and Blattopteroda) *Beitr.Ent.* (3): 356-413.

[12] Kirby WF (1914). Orthoptera (Acrididae) The fauna of British India including Ceylon and Burma London Taylor and Francis pp. 276.

[13] Mistchenko, L. L. 1936. .Revision of Palaearctic species of the genus Sphingonotus Fieber (Orth.Acrid).*Eos*. 12(3-4) : 65-282.

[14] Ritchie, J.M.1981, A taxonomic revision of the genus *Oedaleus* Fieber (Orthoptera Acrididae). *Bull.Brit.Mus. nat.Hist (Lond)* 42(3): 83-183.

[15] Uvarov BP (1966). Grasshoppers and Locusts. A hand book of general acridology Cambridge Univ.press (London) 1: Xii + 481.

[16] Vickery, V. R.1983, and Kevan, D. K. McE, Amonograph of the Orthopteroid Insects of the Canada Adjacent Regions, Mem. Lyman. Ent. Mus.Res.Lab.Vol : 1 & 2

Table: 1 Showing the distribution of grasshopper genus (*Aiolopus)* in various Districts of Sindh

Species	Thatta	Karachi	Hyderabad	Dadu	KN Shah	Sukkar	Khairpur	Larkana	Badin	Sanghar
	M . F	M. F	M. F	M . F	M . F	M . F	M . F	M . F	M . F	M . F
A. thalassinus thalassinus	6-9	7-3	4-5	8-10	9-12	15-10	11-7	6-14	8-10	13-9
A. thalassinus tamulus	1-2	--------	5-6	3-7	8-4	--------	3-2	7-9	10-12	6-4
A.. simulatrix simulatrix	--------	--------	3-2	2-1	4-3	1-1	--------	2-3	3-1	2-4