

Oedipodinae (Acrididae: Orthoptera) of Azad Jammu and Kashmir, Pakistan

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Abstract.- Oedipodinae is the largest subfamily of Acrididae. Due to their greater economic importance this study was planned to explore the fauna of Oedipodinae from region of Azad Kashmir. In the present study sixteen species of Oedipodinae have been collected and identified from Azad Jammu and Kashmir, Pakistan. In addition the keys for local genera and species are also provided.

Keywords: Grasshoppers, Orthoptera, Oedipodinae.

INTRODUCTION

The state of Azad Jammu and Kashmir is situated between 73°-75° East longitudes and 33°-36° North latitudes in the north east of Pakistan as foot hills of the western Himalayas. It has subtropical to moist temperate climate with green grasslands, forests and croplands. The cereal crops are wheat, rice and maize while fruit orchards consist of stone fruits and palm fruits. The main canopy consists of deodar, pine, blue pine and walnut.

Grasshopper species belonging to family Oedipodinae are of extensive economic importance and continuously cause damage to pastures and different crops in rain-fed and irrigated areas. Oedipodinae is distributed throughout the world with approximately 185 genera (Bughio *et al.*, 2012) and about 900 species, some of them are known as most notorious pests in the world (COPR, 1982). Members of Oedipodinae occur throughout Pakistan due to their diversity of habitats such as agricultural crops, hilly areas and desert like plain. Swarm of *Locusta migratoria* causes huge losses throughout the world (Vickery and Kevan, 1983). Species of genus *Gastrimargus* and *Oedaleus* are considered as major pest of agriculture (Samways and Lockwood, 1998). *Gastrimargus* spp. have also been found in semi arid areas of Azad Jammu and Kashmir

causing damage to green grass in range lands where the farmers use the grasses as hay during winter season for cattle feeding. Similarly, in Azad Jammu and Kashmir *Hieroglyphus* species out breaks were frequently found in last ten years in the areas situated below 5000ft from sea level causing considerable damage to maize, millet and rice crops (Personal observation). The crop loss done for such out breaks have not been yet documented but significant material resources have been applied by farmers for control strategies. So, it is the need of time to identify the species of Oedipodinae of study area which shall be helpful in making control strategy in future. Some earlier works (Kirby, 1914; Bei-Bienko and Mishchenko, 1951; Kevan and Chen, 1969; Uvarov, 1977; Bhowmik, 1985; Willemse, 2001; Mahmood *et al.*, 2008) have described Oedipodinae of Indo-Malaysian region. Mahmood and Yousuf (1999) provided a list of eleven species under nine genera of Oedipodinae from this area yet its ecological environment such as geographical situation, climatic pattern and environmental correspondence needs more comprehensive surveys. To the grasshopper fauna, five more species have been added as new records in this area, which makes a total of sixteen species of Oedipodinae recorded from this region. In addition, key to genera and species has been rearranged as the taxonomic tool for this area.

MATERIALS AND METHODS

Eighteen collection sites from 3 administrative divisions of Azad Jammu and Kashmir showing different ecological conditions

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were selected for adult grasshoppers. The plant species composition of the study area was not identified and calculated due to lack of expertise. From each site grasshoppers were collected by sweep net during 2009 and 2010. Repetitive surveys were made from March to October each year ensuring maximum collection. Collected specimens were killed in cyanide bottle and brought to the Entomology laboratory. The specimens were photographed using Cyber-short 7.2 mega pixels digital still camera with compact-macro lens, examined with the use of a Leica MZ6 microscope. For identification already published keys (Kirby, 1914; Bei-Bienko and Mischchenko, 1951; Eades *et al.*, 2011; Mahmood and Yousuf, 1999) were used. The identified specimens of grasshoppers were deposited in the Department of Entomology, University of Poonch Rawalakot, Azad Kashmir.

RESULTS

A total of 16 species belonging to 13 genera of the subfamily Oedipodinae were collected from three divisions of study area.

KEY TO GENERA OF SUBFAMILY OEDIPODINAE FROM AZAD JAMMU AND KASHMIR, PAKISTAN

1. Median carina of pronotum intersected by one transverse groove2
- Median carina of pronotum intersected by 2- 3 grooves10
2. Pronotum with median carina raised tectiform3
- Pronotum with median carina linear not raised; pronotum saddle shaped6
3. Body large; wings transparent at base; body ventrally covered with dense long hairs*Locusta* Linnaeus
- Body medium size; wings colored at base; body ventrally covered with sparse short hairs.....4
4. Head and pronotum with deep pits and rugae; wings without dark bands, rosy red at base, apically smoky.....*Pternoscirta* Saussure
- Head and pronotum with shallow pits, without rugae; wings without complete dark bands, colored at base, apically transparent5
5. Wings yellow at base, tegmina less densely reticulated in the basal half; dark brown with two yellow bands*Gastrimargus* Saussure
- Wings purple red at base; tegmina very densely reticulated in the basal half light brown without any bands.....*Scintharista* Saussure
6. Hind femur with ledge at its posterior end; wings brick

- red at base.....*Oedipoda* Latreille
- Hind femur without ledge at its posterior end; wings not brick red at base 7
7. Pronotum with x- shaped markings; spurious vein present equidistant to media and cubitus*Oedaleus* Fieber
- Pronotum without x- shaped markings; spurious vein present closer to media 8
8. Median field in front of spurious median vein with strongly slopping cross veins; metazona of pronotum golden yellow dorsally and laterally.....*Heteropternis* Stål
- Median field in front of spurious median vein without slopping cross veins; metazoan of pronotum not colored..... 9
9. Foveolae long, trapezoidal reaching at the end of fastigium; mesosternal interspaces significantly wider than long.....*Aiolopus* Fieber
- Foveolae triangular hardly reaching the fastigium of vertex; mesosternal interspaces hardly wider than long or narrow than long.....*Epacromius* Uvarov
10. Median carina of pronotum deeply intersected, look bifid; occiput with pair of tubercles.....*Trilophidia* Stål
- Median carina of pronotum not deeply intersected not bifid; occiput without pair of tubercles11
11. Wings blue at basal half, wings with well marked transverse bands, body dusty blue.....*Sphingonotus* Fieber
- Wings slightly bluish or yellowish at base with light dark bands medially; body medium size12
12. Head and pronotum with white lateral bands on ventral margin; inner pair of spurs of hind tibia longer than the first segment of tarsus.....*Leptopternis* Saussure
- Head and pronotum without white lateral bands on ventral margin; inner pair of spurs of hind tibia shorter than first segment of tarsus *Acrotylus* Fieber

SYSTEMATIC ACCOUNT

Genus *LOCUSTA* Linnaeus

Type species: *Gryllus migratorius* Linnaeus

Locusta migratoria migratoria (Linnaeus)

The collected specimens completely agree with the published description (Bei Bienko and Mishchenko, 1951; Shahid, 1964; Wagan, 1990; Mahmood *et al.*, 2008; Azim *et al.*, 2010; Usmani and Naeem, 2012) of this species. The specimens compared with previous description showed a marked difference of 13mm in body length, 18 mm of tegmen length in male while in case of female 7mm in body length, 13mm of tegmen length and 7mm of hind femur length was recorded.

Measurements 5 ♂ and 5 ♀ (mm)

Male: Body length, 19-37, pronotum length, 8, tegmen length, 37-38, hind femur length, 19-22, tibial length, 17-20.

Female: Total body length, 45-48, pronotum length, 8-11, tegmen length, 39-48, hind femur length, 23-25, tibial length, 21-25.

Material examined

♀6 ♂6 shounter nala 8325 ft 34°54'26.40" N 74°24'49.57"E (A. Tamkeen) 12.9.2007; ♂1 Dadyal 3198 ft 33°19'45.44" N 73°41'56.87"E (A. Tamkeen) 19.8.07; ♂1 Rawalakot 5500ft 33°35'21.64" N 73°56'17.89"E (A. Tamkeen) 22.8.2008.

Habitat

This species have been collected from range land.

Geographical distribution

Pakistan, India, China, Africa, Kazakhstan, Australia. Temperate and tropical parts of the Eastern Hemisphere, from the Canaries and the Azores in the West to Japan and New Zealand in the East.

Genus *PTERNOSCIRTA* Saussure

Type species: *Acrydium cinctifemur* Walker

Pternoscirta cinctifemur (Walker)

The collected specimens completely agree with the published description (Kirby, 1914; Mahmood *et al.*, 2008) of this species.

Measurements 2 ♂ and 2 ♀ (mm)

Male: Body length, 25-26, pronotum length, 6-6.5, tegmen length, 26-29, hind femur length, 10-15, tibial length, 12-13.

Female: Total body length, 30, pronotum length, 6.3-7.5, tegmen length, 29-30, hind femur length, 17-18, tibial length, 15.

Material examined

♀1 Bagh 3781ft 33°58'28.95" N 73°47'29.49"E (A. Tamkeen) 18.8.2008, ♀1 Rawalakot 5500ft 33°35'21.64" N 73°56'17.89"E (A. Tamkeen) 2.7.2008; ♂2 Pir gali 1854 ft

33°16'37.04" N 73°52'06.02"E (A. Tamkeen) 18.8.2008.

Habitat

The specimens have been collected from maize field and grasses.

Distribution

Asia, Tropical (Indian Subcontinent), China

Genus *GASTRIMARGUS* Saussure

Type species: *Gryllus virescens* Thunberg

The collected species with two subspecies exactly agree with published description (Bei-Bienko and Mishchenko, 1951; Ritchie, 1982) of this genus.

**KEY TO THE LOCAL SUBSPECIES OF
GASTRIMARGUS AFRICANUS (SAUSSURE)**

1. Wings basally yellowish green.....
..... *africanus sulphureus* Bei-Bienko
- Wings bright yellow at the base.....
..... *africanus africanus* (Saussure)

Gastrimargus africanus sulphureus Bei-Bienko

The collected specimens exactly similar with the published description (Bei-Bienko and Mishchenko, 1951; Ritchie, 1981; Mahmood *et al.*, 1999; Azim *et al.*, 2010) of this species.

Measurement 5 ♀ and 5 ♂ (mm)

Male: Body length, 19-28.2, pronotum length, 6-8, tegmen length, 21.2-28, hind femur length, 10-19, tibial length, 10-17.

Female: Total body length, 30-40, pronotum length, 9-10, tegmen length, 29-36, hind femur length, 20-25, tibial length, 19-21.

Material examined

♀60 ♂106 Tau But 6878 ft (A. Tamkeen) 10.9.2007; ♀18 ♂108 Surgon (Altaf) 8.9.2007; ♀10 ♂14 Doba 10150ft (A. Tamkeen) 13.9.2007; ♂1 Garhi Dopatta 2692 ft, 24 km from Muzaffrabad (Khalid) 22.8.2007; ♂9 Kel 7137 ft 34°49'29.37"N 74°21'43.94"E 19 km from sharda (A. Tamkeen) 12.9.2007; ♂6 ♀5 Halmat 7540ft (A. Tamkeen) 10.9.2007; ♂9 Cami forest 5425 ft (A. Tamkeen)

7.9.2007; ♂1 Komi Kot 9590 ft (Khalid) 18.8.2007; ♂3 ♀2 Shounter Nala 6326ft 34°54'26.40" N 74°24'49.57"E (A. Tamkeen) 9.9.2007.

Habitat

The specimens of this species have been collected from range lands and grasses.

Distribution

Kashmir, Pakistan, India, Nepal.

Gastrimargus africanus africanus (Saussure)

The collected specimens exactly tally with published description (Ritchi, 1982; Mahmood *et al.*, 1999) of this species.

Measurements 5♂ and 5♀ (mm)

Male: Body length, 19.2-28, pronotum length, 6.3-8, tegmen length, 25-30.3, hind femur length, 14-17.3, tibial length, 10-16.

Female: Total body length, 34-38, pronotum length, 8-10, tegmen length, 33-38, hind femur length, 19-23, tibial length, 18-21.

Material examined

♂12 ♀7 Mirpur 1506 ft 33.14°N 73.77°E (A. Tamkeen) 8.10.2007; ♂10 ♀14 Kotli 3280ft 33.52°N 73.29°E (A. Tamkeen) 9-10-2007; 2♂1♀ Rawalakot 5500 ft 33°35'21.64" N 73°56'17.89"E (Muhammad Asif) 25.6.2008; 1♂1♀ Chakothi 3719 ft 34°06'46.40" N 73°52'57.34"E, 59 km from Muzaffrabad (A. Tamkeen) ♀7 Abbaspur 4270ft 33°48'52.64" N 73°58'32.48"E; ♀11♂1 Bagh 4920ft 33°35'21.64" N 73°56'17.89"E; ♀1 Garidoppata 2692ft, 24 km from Muzaffrabad (A. Tamkeen) 18.8.2006; ♂2 ♀2 Bhimber 1508 ft 33°58'35.07" N 73°04'47.83"E, 50 km from Mirpur (Idrees Ahmed Tahir) 18.8.2006; ♂2 Plandri 4325ft 33°42'45.55" N 73°41'19.94"E (A. Tamkeen) 3.10.2010; ♂6 Bagh 4920ft 33°35'21.64" N 73°56'17.89"E (A. Tamkeen) 8.9.2008; ♂1 Hajeera 3111ft 33°46'17.96" N 73°53'45.42"E 29 km from Rawalakot (A. Tamkeen) 18.9.2008.

Habitat

The subspecies have been collected from range land and grasses.

Distribution

Pakistan, Kashmir, India, Sri Lanka, Africa.

Genus *SCINTHARISTA* Saussure

Type species: *Scintharista brunneri* Saussure

Scintharista notabilis notabilis (Walker)

The collected specimens exactly similar with published descriptions (Bei-Bienko and Mishchenko, 1951) of this species.

Measurements 5♀ (mm)

Female: Body length, 39-48, pronotum length, 9.5-11.5, tegmen length, 38-41, hind femur length, 23-25.5, tibial length, 19-21.2.

Material examined

♀4 Kafful Garh 6497 ft (A. Tamkeen) 24.8.06; 6♀ Bagh 3781 ft 33°58'28.95" N 73°47'29.49"E (A. Tamkeen) 18.8.2008; ♀3 Kahuta 4870 ft 33°53'50.76" N 73°06'30.76"E (A. Tamkeen) 4.9.2010; ♀4 Hajeera 3111ft 33°46'17.96"N 73°53'45.42"E 29 from Rawalakot (A. Tamkeen) 4.10.2010.

Habitat

These species have been collected from grasses and near road side bushes.

New record

The species has been collected for the first time from Azad Jammu and Kashmir.

Distribution

Kashmir, Pakistan, India, Spain.

Genus *OEDIPODA* Latreille

Type species: *Gryllus caerulescens* Linnaeus

Oedipoda neelumensis Mahmood and Yousuf

The collected specimens of a single species exactly tally with published description (Mahmood and Yousuf, 1999) of this species.

Measurements 3♂ and 5♀ (mm)

Male: Body length, 23-24, pronotum length, 6-6.4, tegmen length, 16-18.2, hind femur length, tibial length, 11-12.

Female: Total body length, 17.1-18.3, pronotum length, 4.3-5, tegmen length, 22-23, hind femur length, tibial length, 9-10.

Material examined

♀6, 3♂ Neelum 6878ft.

Habitat

These species have been collected from thorny bushes and grasses.

Distribution

Kashmir.

Genus *OEDALEUS* Fieber

Type species: *Acrydium decorus* Germar

Oedaleus abruptus (Thunberg)

The collected specimens exactly similar with the published description (Bei-Bienko and Mishchenko, 1951; Dirsh, 1965; Ritchie, 1981; Mahmood *et al.*, 1999; Azim *et al.*, 2010) of this species.

Measurements 5♂ and 5♀ (mm)

Male: Body length, 15-18, pronotum length, 4.4-5, tegmen length, 16-18, hind femur length, 11-13, tibial length, 10-11.3.

Female: Total body length, 20-30, pronotum length, 4.5-5.4, tegmen length, 20-22, hind femur length, 11.5-15, tibial length, 11-13.

Material examined

♀21♂2 Bagh 4920ft 33°35'21.64" N 73°56'17.89"E (A. Tamkeen) 8.9.2008, ♂2 Senhsa 2962ft 33°29'05.15" N 73°54'22.15"E (A. Tamkeen) 14.10.2008; ♀1♂1 Chakswari 1500 ft 4939ft 33°15'16.55" N 73°46'04.16"E 44 km from Mirpur (A. Tamkeen) 5.7.2008, ♀1 Choch (Kotli) 2624 ft 33°28'16.30" N 73°52'57.41"E (A. Tamkeen) 27.9.2008; ♀5 ♂4 Dadyal 3198ft 33°19'45.44" N 73°41'56.87"E (A. Tamkeen) 20-9-2007, ♀29 ♂8 Rawalakot 5500ft 33°35'21.64" N 73°56'17.89"E (A. Tamkeen) 7.10.2009; ♀1 Bhimber 1508 ft 32°58'35.07" N 74°04'47.83"E, 50 km from Mirpur (A. Tamkeen) 5.10.2006.

Habitat

The specimens of this species have been

collected from mixed vegetation, herbs and shrubs, maize and sorghum fields.

Distribution

Kashmir, India, China, Nepal, Thailand, Myanmar, Sri Lanka.

Genus *HETEROPTERNIS* Stål

Type species: *Heteropternis pyrrhoscelis* Stål

Heteropternis thoracica (Walker)

The specimens exactly similar with published description (Kirby, 1914; Mahmood, 1999) of this species. The given species previously reported from Azad Kashmir by (Mahmood, 1999) as *Heteropternis partita* (Walker) which according to OSF placed under *Heteropternis thoracica*. Comparison of measurements showed that a marked difference of 29mm was found in tegmen length that may be because of ecological variations.

Measurements 5 (mm)

Female: Body length, 24-30, pronotum length, 5-5.4, tegmen length, 25-26, hind femur length, 14-16, tibial length 11.3-12,.

Material examined

♀ 3 Kahuta 4270 ft 33°53'50.76" N 74°06'30.76"E (Muzaffar) 6.8.2010, ♀11 Rawalakot 5500ft 33°35'21.64" N 73°56'17.89"E (Tamoore) 6.8.2010; ♀ 3 Plandri 4325ft 33°42'45.55" N 73°41'19.94"E (Saad) 3.8.2010.

Habitat

The specimens have been collected from grasses near road sides.

Distribution

Africa, Asia (Indian subcontinent)

Genus *AILOLOPUS* Fieber

Type species: *Gryllus thalassinus* Fabricius

Aiolopus thalassinus tamulus (Fabricius)

The collected specimens totally agree with published description (Bei-Bienko and Mishchenko, 1951; Mahmood, 1999; Azim *et al.*, 2010; Usmani and Naeem, 2012) of this species.

Measurements 5♂ and 5♀ (mm)

Male: Body length, 16.1-19, pronotum length, 4-4.1, tegmen length, 17-20, hind femur length, 3-4, tibial length, 9-11.

Female: Total body length, 20.1-24, pronotum length, 4.2-5, tegmen length, 21.3-24.4, hind femur length, 12.4-13.3, tibial length, 11-11.3.

Material examined

♀7 Rawalakot 5500ft 33°35'21.64" N 73°56'17.89"E (Rehan)25.6.2010; ♀2♂3 Mirpur 1500ft 33°02'07.90" N 73°50'46.17"E (A. Tamkeen) 26.9.2007; ♀1 ♂2 Choch Kotli 2624ft 33.52°N 73.29°E (A. Tamkeen) 27.9.2007; ♀2 Smahni 3198ft 33°35'21.64" N 73°56'17.89"E, 30 km in the North East of Mirpur (A. Tamkeen)14.8.2007; ♀1 Hajera 3111ft, 33°46'17.96"N 73°53'45.42"E 29 km in East of Rawalakot (A.Tamkeen)18.9.2008; ♂3 Dadyal 3198ft 33°19'45.44" N 73°41'56.87"E (A.Tamkeen) 9.10.2007.

Habitat

This species have been collected from pastures, range lands and bushes.

Distribution

Kashmir, India, U.S.S.R, tropical and subtropical of Old World.

Genus *EPACROMIUS* (Uvarov)

Type species: *Gryllus tergestinus* Charpentier

**KEY TO THE LOCAL SPECIES OF GENUS
*EPACROMIUS***

1. Empodium between tarsal claws large
..... *coerulipes* (Ivanov)
- Empodium between tarsal claws small
..... *tergestinus tergestinus* (Charpentier)

Epacromius coerulipes (Ivanov)

The collected specimens exactly similar with published description(Bei-Bienko And Mishchenko, 1951; Azim *et al.*, 2010) of this species.

Measurements 1♂ and 1♀(mm)

Male: Body length, 19, pronotum length, 4.5, tegmen length, 20, hind femur length, 11.1, tibial length, 10.

Female: Total body length, 26.2, pronotum length, 6.2, tegmen length, 25.1, hind femur length, 14.3, tibial length, 11.3.

Material examined

♀1 Smahni 3198ft 33°35'21.64" N 73°56'17.89"E 30 km in the North East of Mirpur (A.Tamkeen) 20.9.2007; ♀1 Tatta Pani 2237ft 33°35'21.64" N 73°56'17.89"E, 29 km from Hajeera (A.Tamkeen) 4.10.2010.

Habitat

The specimens of this species have been collected from maize, dry grasses.

Distribution

India, Kashmir, Europe, Korea, Mongolia, Australia, Kazakhstan.

Epacromius tergestinus tergestinus (Charpentier)

The 2 collected male specimens exactly tally with published description (Bei-Bienko and Mishchenko, 1951) of this species.

Measurements 2♂ (mm)

Male: Body length, 17-18.1, pronotum length,4, tegmen length,18-19.1,hind femur length,11.2-16, tibial length,9.2-10.

Material examined

♂2 Plandri 4325ft 33°42'45.55" N 73°41'19.94"E (A. Tamkeen) 8.10.2010.

Habitat

The given species have been collected from grasses and pastures.

Distribution

Kashmir, Japan, U.S.S.R.

Genus *TRILOPHIDIA* (Stål)

Type species: *Oedipoda cristella* Stål

**KEY TO THE LOCAL SPECIES OF GENUS
*TRILOPHIDIA***

1. Wings transparent at the base, body black densely covered ventrally.....*annulata* (Thunberg)

- Wings yellowish at base, body yellowish with sparse hairs*turpis* Walker

Trilophidia annulata (Thunberg)

The collected specimens exactly tally with published description (Kirby, 1914; Wagan, 1990; Mahmood, 1995; Azim *et al.*, 2010; Usmani *et al.*, 2012) of this species.

Measurement 5 ♀ and 5 ♂ (mm)

Male: Body length, 15-16.2, pronotum length, 4-5, tegmen length, 16-17, hind femur length, 9-10, tibial length, 34-38.

Female: Total body length, 16-29, pronotum length, 4.5-5.5, tegmen length, 19.2-22, hind femur length, 10.3-11.2, tibial length, 42.2-45.

Material examined

♀4 Senhsa 2962 ft 33°29'05.15" N 73°54'22.15"E, 35 km from Kotli (A. Tamkeen) 4.10.2007; ♀3 Bagh 3781ft 33°58'28.95" N 73°47'29.49"E (A. Tamkeen) 5.9.2008; ♀4 Rawalakot 5500ft 33°35'21.64" N 73°56'17.89"E (A. Tamkeen) ♀2♂2 Kotli (A. Tamkeen) 5.10.2010; ♀2 Tatta pani 2385 ft 33°35'21.50" N 73°56'17.89"E, 29 km from Hajeera (A. Tamkeen) 5.10.2010; ♀1♂1 Bagh 3781ft 33°58'28.95" N 73°47'29.49"E (A. Tamkeen) 20.10.2010; ♂4 Senhsa 2962 ft 33°29'05.15" N 73°54'22.15"E, 35 km from Kotli (A. Tamkeen) 12.10.2008; 1♂ Dadyal 3198 ft 33°19'45.44" N 73°41'56.87"E (A. Tamkeen) 9.10.2007; ♂1 Mirpur 1500 ft 33.14°N 73.77°E; ♂20 Kotli 3280ft 33.52°N 73.29°E; ♂1 Bhimber 1508 ft 32°58'35.07" N 74°04'47.83"E, 50 km from Mirpur (A. Tamkeen) 10.10.2007; ♂5 Rawalakot 5500ft 33°35'21.64" N 73°56'17.89"E (A. Tamkeen); ♂2 Smahni 3198ft 33°35'21.64" N 73°56'17.89"E; 30 km in the North East of Mirpur (A. Tamkeen) 8.9.2008; ♂1 Hajeera 3111ft 33°46'17.96"N 73°53'45.42"E 29 km in East of Rawalakot (A. Tamkeen) 4.10.2010; ♂3 Mirpur 1500ft 33.14°N 73.77°E (A. Tamkeen) 5.10.2010.

Habitat

The specimens of this species have been collected from thorny vegetation and grasses.

Distribution

Pakistan, India, China, Japan, Sri Lanka, Bangladesh, South East Asia.

Trilophidia turpis (Walker)

Taxonomic note

The collected species totally agree with the published description (Kirby, 1914) with some exception in body measurements. According to Kirby our specimen key out in two species viz. *Trilophidia annulata* and *Trilophidia turpis*. Eades *et al.*, 2011, have synonymised *Trilophidia turpis* under *Trilophidia annulata*. The DNA barcoding result has given a significant difference between these two species. Following the DNA barcoding difference we treat the *Trilophidia turpis* as valid species.

Measurements 4 ♂ and 5 ♀ (mm)

Male: Total body length, 15-16, pronotum length, 3.2-3.4, tegmen length, 17-17.3, hind femur length, 9-10, tibial length, 8-8.3.

Female: Total body length, 17.2-21.3, pronotum length, 3.2-4.4, tegmen length, 17-19.4, hind femur length, 9.3-10.2, tibial length, 8-9.4.

Material examined

♀1♂1 Samahni 3198ft 33°35'21.64" N 73°56'17.89"E (A. Tamkeen) 8.9.2008; ♀1 Hejeera 3111ft 33°46'17.96"N 73°53'45.42"E 29 km in East of Rawalakot (A. Tamkeen) 4.10.2010; ♀1 Jatlan 1500 ft 33°02'07.90" N 73°50'46.17"E 10 km from Mirpur (A. Tamkeen) 8.7.2007; ♀1♂1 Bagh 3781ft 33°58'28.95" N 73°47'29.49"E (A. Tamkeen) 14.7.2008; ♂1 Kotli 2334 ft 33°28'16.30" N 73°52'57.41"E (A. Tamkeen) 5.10.2010; ♂ 2 Rawalakot 5500ft 33°35'21.64" N 73°56'17.89"E (Ansa Tamkeen) 8.10.2010.

Habitat

The specimens have been collected from thorny vegetation, maize and grassy fields.

Distribution

India, Kashmir.

Genus *SPHINGONOTUS* (*SPHINGONOTUS*)

Fieber

Type species: *Gryllus caerulans* Linnaeus
Sphingonotus (*Sphingonotus*) *longipennis* Saussure

The collected specimens exactly tally with published description (Kirby, 1914; Bei-Bienko and Mishchenko, 1951; Mahmood, 1999; Azim *et al.*, 2010) of this species.

Measurements ♂5 and 5 ♀ (mm)

Male: Body length, 26-27.1, pronotum length, 5.4-6.3, tegmen length, 28.1-31, hind femur length, 13-14.3, tibial length, 11.2-11.4.

Female: Total body length, 25-34, pronotum length, 6-7.1, tegmen length, 25-36.4, hind femur length, 15-17.2, tibial length, 12.1-15.2.

Material examined

♀13 ♂7 Degwar 4592 ft (A. Tamkeen) 14.7.2008; ♀1 Kahuta 4270 ft, 33°54'20.05"N 74°06'27.73"E (A.Tamkeen) 14.7.2008.

Habitat

The specimens of this species have collected from the barren stony soil.

Distribution

Pakistan, India, Europe, Africa, Kashmir, Himalayas, Southeastern Tibet.

Genus *LEPTOPTERNIS* Saussure

Type species: *Oedipoda gracilis* Eversmann
Leptopternis gracilis (Eversmann)

The collected specimens agree with the published description (Bei-Bienko and Mishchenko, 1951; Mahmood, 1999; Azim *et al.*, 2010) of this species.

Measurements 1♂ and 5 ♀ (mm)

Male: Body length, 17, pronotum length, 3.2, tegmen length, 16, hind femur length, 10, tibial length, 9.

Female: Total body length, 22-23.4, pronotum length, 4-4.1, tegmen length, 19-20, hind femur length, 12-13, tibial length, 10-11.

Material examined

♀7♂1 Kahuta 4270ft 33°54'20.05"N 74°06'27.73"E (A.Tamkeen) 14.7.2008.

Habitat

These species have been collected from pastures.

Distribution

Pakistan, India, Kashmir, Mongolia, Dzungaria to Sahara, U.S.S.R.

Genus: *ACROTYLUS* Fieber

Type species: *Gryllus insubricus* Scopoli
Acrotylus humbertianus Saussure

These species exactly tally with published description (Kirby, 1914; Bei-Bienko and Mishchenko, 1951; Wagan, 1990; Suhail, 1994; Mahmood and Yousuf, 1999; Azim *et al.*, 2010) of this species. There were some minor differences in body measurements of male whereas a marked difference of 12.2mm in Female tegmen length was recorded.

Measurement 5 ♀ and 1♂ (mm)

Male: Body length, 16.3, pronotum length, 3.1, tegmen length, 18, hind femur length, 9.3, tibial length, 9.

Female: Total body length, 18.3-20.2, pronotum length, 3.3-5.2, tegmen length, 20-22.2, hind femur length, 11-14, tibial length, 9-11.5

Material examined

♀1 Dadyal 3198ft 33°19'45.44" N 73°41'56.87"E (A.Tamkeen) 9.10.2007, ♀1 Hajeera 3111ft 33°46'17.96"N 73°53'45.42"E 29 km from Rawalakot (A. Tamkeen) 4.10.2010; ♀ 4 Bagh 3781ft 33°58'28.95" N 73°47'29.49"E (A.Tamkeen) 14.7.2008, ♀2 Kotli 2334 ft 33°28'16.30" N 73°52'57.41"E (A.Tamkeen) 5.10.2010; ♀1 ♂1 Mirpur 1500 ft 33.14°N 73.77°E (A.Tamkeen) 26.9.2007.

Habitat

The specimens of this species have been collected from barren fields having less vegetation along with the stream.

Distribution

Pakistan, India, Afghanistan, Sri Lanka.

DISCUSSION

In the present study out of sixteen species thirteen species were present in Poonch, seven species were found in Mirpur and six species were found in Muzaffarabad division. Mahmood and Yousuf (1999) published 11 species of Oedipodinae from this area and in the present study number of the species of Oedipodinae raised to sixteen species. Nazir *et al.* (2014) also reported six species of Oedipodinae from Poonch division of Azad Kashmir which are *Gastrimargus africanus africanus* (Saussure, 1888), *Gastrimargus africanus sulphureus* (Bie-Bienko, 1951) *Aiolopus thalassinus tamulus* (Fabricius, 1798), *Trilophidia japonica* (Saussure, 1888), *Trilophidia turpis* (Walker, 1870), *Sphingonotus longipennis* (Saussure, 1884). Uvarov (1925) described the genus *Heliethera* of Oedipodinae from this region. *Sphingonotus sindhensis* sp. nov. reported from Sindh Province of Pakistan (Bughio *et al.*, 2011). Bughio *et al.* (2012) also reported a new species of genus *Heliethera* from Balochistan province of Pakistan. Bughio *et al.* (2014) reported three species namely *Aiolopus thalassinus thalassinus* (Fabricius, 1781) *A. thalassinus tamulus* (Fabricius, 1798) and *A. simulatrix simulatrix* (Walker, 1870) for the first time from different provinces of Pakistan.

REFERENCES

- AHMED, F.U., 1980. *Survey of grasshoppers in arid and semi arid region of Pakistan*. Final Rep. Pl-480 No.P.K-ARS-20 (FG-Pa-21), p. 500.
- AZIM, M.N., RESHI, S.A. AND AJAZ, H.R., 2010. Biodiversity of the short horned grasshoppers of the tribe Oedipodinae (Orthoptera: Acrididae: Acridinae) in Kashmir Himalayas. *Halteres Int. Res. J.*, **1**: 7-23
- BEI-BIENKO, G.Y. AND MISHCHENKO, L.L., 1951. *Locusts and grasshoppers of USSR and adjacent countries*. Pt.I and II. S. Monson, Jerusalem.
- BHOWMIK, H.K., 1985. *Outline of distribution with an index catalogue of Indian grasshoppers (Orthoptera: Acrididae)*. Record of Zoological Survey of India.
- BUGHIO, B. A., WAGAN, M. S. AND SULTANA, R., 2011. A New Species of Genus *Sphingonotus* (Oedipodinae: Acrididae: Orthoptera) from Pakistan. *Sindh Univ. Res. J. (Sci. Ser.)*, **43**: 195-198.
- BUGHIO, B. A., SULTANA, R. AND WAGAN, M. S., 2012. A new species of the genus *Heliethera* Uvarov (Oedipodinae: Acrididae: Orthoptera) from Pakistan. *J. Cell Anim. Biol.*, **6**: 29-32.
- BUGHIO, B. A., SULTANA, R., RIND, M. A. AND WAGAN, M. S., 2014. Some studies on the taxonomic status of the genus *Aiolopus* Fieber (Acrididae: Acridoidea: Orthoptera) from Pakistan. *J. Biodiv. environ. Sci.*, **4**: 410-417.
- COPR, 1982. *The locust and grasshopper agricultural manual*. Centre for Overseas Pest Research, London.
- COTES, E.C., 1893. A conspectus of the insects which affects crop in India. *Indian Mus. Notes*, **2**: 145-176.
- DIRSH, V.M., 1965. *The African genera of Acridoidea*. Cambridge University Press, London.
- EADES, D.C., OTTE, D., CIGLIANO, M.M. AND BRAUN, H., 2011. *Orthoptera species file*. Version 5.0/5.0. <http://Orthoptera.SpeciesFile.org>.
- GUPTA, P., MAHAJAN, N., GUPTA, R., GUPTA, P., CHOWDHARY, I., SINGH, P., GUPTA, A.K. AND KAKKAR, M., 2013. Cardiotoxicity profile of snake bite. *JK Science*, **15**: 169-173.
- JAGO, N.D., 1998. The world wide magnitude of Orthoptera as pests. *J. Orthopt. Res.*, **7**: 117-124.
- KEVAN, D.K. AND CHEN, Y.C., 1969. A revised synopsis of the genus *Attractomorpha* saussure, 1862, with an account of the African aberrans group. *Zool. J. Lin. Soc.*, **48**: 141-198.
- KIRBY, W.F., 1914. *Orthoptera (Acrididae) fauna of British India including Ceylon and Burma*. Taylor and Francis Ltd., London.
- LOCKWOOD, J.A., 1997. Rangeland grasshopper ecology. In: *Bionomics of grasshoppers* (eds. S.K. Gangewere, M.C. Muralirangan and M. Muralinrangan). Katydid and their Kins, CABI, London, pp. 83-102.
- MAHMOOD, K., 1995. *Taxonomic studies of Acridoidea (Orthoptera) of Azad Jammu & Kashmir*. Ph.D. thesis., University of Agriculture, Faisalabad, Pakistan.
- MAHMOOD, K. AND YOUSUF, M., 1999. New record of Oedipodinae (Acrididae: Orthoptera) from Azad Jammu and Kashmir with the description of new species. *J. Orthopt. Res.*, **8**: 271-275
- MAHMOOD, K., SAMIRA, D., SALMAH, Y. AND IDRIS, A.B., 2008. Systematic account of Oedipodinae (Acrididae: Orthoptera) of Malaysia with the description of new species. *Pakistan J. Zool.*, **40**: 371-377.
- MOOED, A., 1966. *Taxonomy of Tetrigidae (Tetrigoidea, Orthoptera) and Acridinae and Oedipodinae (Acrididae, Acridoidea, Orthoptera) of Hyderabad region*. M.Sc. thesis, University of Sindh, pp. 260.
- NAZIR, N., MAHMOOD, K., ASHFAQ, M. AND RAHIM, J., 2014. Morphological and molecular identification of

- Acridid (Acrididae: Orthoptera) from Poonch Division, Azad Kashmir, Pakistan. *J. Threat. Taxa*, **6**:5544-5552.
- RITCHIE, J., 1981. A taxonomic revision of the genus *Oedaleus* Fiber. *Bull. Br. Mus. (Nat. Hist.) Ent.*, **42**:83-183.
- SAMWAYS, M.J. AND LOCKWOOD, J.A., 1998. Orthoptera conservation: pests and paradoxes. *J. Insect Conserv.*, **2**: 143-149.
- SHAHID, M., 1964. *Taxonomic study of Acrididae with illustrated key to genera and species*. M.Sc. thesis, Colorado State University, Colorado, USA.
- SUHAIL, A., 1994. *Taxonomic studies on Acridoidea (Orthoptera) of Pakistan*. Ph. D. thesis, Department of Entomology, University of Agriculture, Faisalabad, Pakistan.
- USMANI, M.K. AND NAEEM, M.R., 2012. Studies on taxonomy and distribution of Acridoidea (Orthoptera) of Bihar, India. *J. Threat. Taxa*, **4**: 3190-3204.
- UVAROV, B .P., 1925. The genus *Hilethera* Uv and its species (Orth: Acrid). *Eos*, **1**: 33-42.
- VICKERY, V.R. AND KEVAN, D. K. M., 1983. Note: Xabeinae. *Lyman ent. Mus. Res. Lab.*, **13**:649.
- WILLEMSE, L.P.M., 2001. *Fauna Malesiana to the pest Orthoptera of Indo-Malayan Region*. Backhuys Publishers, Lieden, Neitherland, 160p.
- WAGAN, M.S., 1990. *Grasshopper (Acrididae) of Sindh*. Pakistan Science Foundation Islamabad, Pakistan.
- WAGAN, M.S. AND SOLANGI, S. M., 1990. Distribution and incidence of grasshoppers (Acrididae) of Sind. *Biol. San. Veg. Plagas*. (Fuera de serie), **20**: 125-129.

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