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Taxonomic Studies of the Subfamilies Tropicopolinae and Truxalinae (Acrididae: Orthoptera) from Pakistan

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Abstract: This study included, six grasshoppers species belonging to the subfamilies Tropicopolinae and Truxalinae have been collected from various localities of Pakistan and identified up to species level. The species *Tristria pulvinata* Uvarov has been recorded for the first time for this country, while the new locality records have been given for the species viz., *Tristria pulvinata* Uvarov, *Tropicopola cylindrica iranica* Uvarov, *Tropicopola congoensis graeca* Uvarov, *Truxalis grandis fitzgeraldi* Dirsh, *T. nasuta* (Linnaeus) and *T. axima axima* Eichwala. Measurements of various body parts, habitat and distribution of each species are also given in this paper.

Key words: Taxonomy, Tropicopolinae, Truxalinae, Acrididae, Orthoptera, Pakistan

Introduction

Grasshoppers belonging to the subfamilies Tropicopolinae and Truxalinae are purely graminivorous and attack on maize and different pulse crops (Harris, 1937; Bohlen, 1973). Species belonging to the genus *Truxalis* Fabricius are interesting in their body shape and behaviour. Their body are well adapted to long grasses and the enlarged head capsule is well developed for the large mandibular muscles required to attack dry and coarse grass and they also emit a crackling noise when flying, most pronounced in the males by the friction of the wings (Key, 1930). These subfamilies from Sub-Continent have been studied by Kirby (1914), Bei-Bienko and Mishchenko (1951) and Dirsh (1965), whereas, Ahmad (1958), Hollis (1970), Moeed (1971), Perwin and Ahmed (1983), Wagan (1990) and Mazhar *et al.* (1993) studied and described some species from Pakistan. All these workers treated the Truxalinae a separate taxon while Jago (1996) synonymized this subfamily under the subfamily Acridinae of the family Acrididae. As no detailed taxonomic work on these subfamilies has been done in Pakistan. In view of this scanty work, the present taxonomic studies have been initiated to explore the acridid grasshopper fauna alongwith its habitat and distribution in Pakistan.

The collected acridid specimens were killed in a cyanide bottle, pinned and their body parts set on appropriate setting boards. On drying, these were labelled and mounted in collection boxes. Naphthaline balls were kept in the boxes for the safety of the specimens. A revolving stage and a wild M3B binocular microscope (10X x 6.4X, 10X x 16X, 10X x 40X) were used for identifying the specimens up to the specific level. Deviating characters of these species, if any, from published descriptions by Kirby (1914), Bei-Bienko and Mishchenko (1951), Ahmad (1958) and Wagan (1990), measurements (max. length "L" and width "W") of various body parts and their collection data, are given in this paper. The meteorological data of the localities for each species are given in the Appendix.

Subfamily Tropicopolinae

1: Genus *Tristria* Stal

Type: *Tristria lacerata* Stal

A single collected species exactly tallies with the published description (Dirsh, 1965; Hollis, 1970; Johnsen, 1987) of this genus, except slight variation in measurements of various body parts given in the species (Table 1.1).

1.1: *Tristria pulvinata* (Uvarov)

1921. *Trapinophyma pulvinata* Uvarov, Ann. Mag. nat. Hist., 7(9):497.

1929. *Tristria pulvinata* Uvarov, Revue suisse Zool., 36:559.

Material examined: Islamabad 1 ♂, 28-VII-95; Lahore 1 ♂, 5-IX-95.

Table 1.1: Measurements(mm): (2 ♂)

	Male	Mean	S.D.
Body (L)	27.00-28.00	27.50	0.70
Pronotum (L)	4.50- 5.25	4.87	0.53
Pronotum (W)	3.00- 3.25	3.12	0.17
Tegmen (L)	16.25-19.50	17.87	2.29
Tegmen (W)	2.50- 3.00	2.75	0.35
Hind femur (L)	14.50-15.00	14.75	0.35
Hind femur (W)	3.50- 4.00	3.75	0.35

Habitat: Only male specimens have been collected from the grasses near maize and rice fields.

New record: Above localities. This species has been recorded for the first time from Pakistan.

2: Genus *Tropicopola* Stal

Type: *Tropicopola cylindrica* Marschall

The collected specimens exactly tally with the published description of Bei-Bienko and Mishchenko (1951), Dirsh (1965) and Wagan (1990) of this species, except slight variation in measurements of various body parts given in each species (Table 2.1, 2.2).

2.1: *Tropicopola cylindrica iranica* Uvarov

1836. *Gryllus cylindricus* Marschall, Ann. Wien Mus.,(2):210.

1853. *Opsomala cylindrica* Fieber, Lotos, 3:98.

1873. *Tropicopola fasciculata* Stal, Recens. Orth., 1:86.

Table 2.1: Measurements(mm): (26 ♂ 22 ♀)

	Male	Female	Mean	S.D.
Body (L)	31.00-33.00	39.00-40.50	35.69	3.31
Pronotum (L)	4.50- 5.50	5.50- 6.50	5.44	0.48
Pronotum (W)	2.50- 3.00	3.00- 3.50	3.11	0.35
Tegmen (L)	20.50-22.00	25.50-27.00	23.50	2.31
Tegmen (W)	2.75- 3.25	4.00- 4.25	3.53	0.53
Hind femur (L)	12.00-12.50	14.00-15.00	13.30	1.11
Hind femur (W)	2.00- 2.25	3.00- 3.25	2.59	0.47

Table 2.2: Measurements (mm): (17♂ 10♀)

	Male	Female	Mean	S.D.
Body (L)	31.50-32.50	37.50-38.50	34.37	2.84
Pronotum (L)	3.50- 4.00	4.25- 5.00	4.04	0.39
Pronotum (w)	2.00- 2.50	2.50- 3.00	2.40	0.53
Tegmen (L)	21.00-21.50	28.50-30.00	24.33	3.65
Tegmen (W)	2.25- 2.50	2.50- 3.00	2.52	0.16
Hind femur (L)	12.00-13.00	13.50-14.00	13.05	0.58
Hind femur (W)	1.75- 2.25	2.00- 2.50	2.11	0.22

Table 3.1: Measurements(mm): (4 ♂)

	Male	Mean	S.D.
Body (L)	34.25-39.00	36.37	2.48
Pronotum (L)	6.00- 6.50	6.18	0.23
Pronotum (W)	2.75- 3.25	3.12	0.25
Tegmen (L)	29.00-32.25	30.31	1.37
Tegmen (W)	3.50- 4.00	3.75	0.28
Hind femur (L)	22.00-25.00	23.75	1.50
Hind femur (W)	1.00- 1.50	1.18	0.23

Material examined: Jhang 2 ♂, 17-V111-95; Islamabad 2 ♂ 1 ♀, 28-V11-95; 2 ♂, 10-IX-95; Faisalabad 2 ♂ 1 ♀, 5-V11-96; Peshawar 2 ♂, 16-V11-96; Mardan 2 ♂ 2 ♀, 17-V11-96; Kharan 1 ♀, 12-V111-96; Badin (Tharparkar) 2 ♂ 2 ♀, 14-X96; Sukkur 1 ♂, 12-X-96; Quetta 1 ♂ 1 ♀, 10-V111-96; Zhob 1 ♂ 2 ♀, 18-V11-96.

Habitat: The specimens of this species have been collected from the grassy fields near vegetable, maize, tobacco and cotton fields.

1876. *Tropidopola cylindrica* (.Bolivar, Ann. Soc. esp. Hist. nat., 5:304.

1908. *Opsomala cylindrica* Werner, Zool. Jb. (Syst.), 27:128.

1933. *Tropidopola cylindrica iranica* Trudy, Zool. Inst. AN SSSR. 1:226.

Material examined: Islamabad 4 ♂ 1 ♀, 28-V11-95; 1 ♂ 10-IX-96; Jhang 2 ♂ 3 ♀, 12-V111-96; 2 ♂ 2 ♀, 5-X-95; Jhelum 2 ♂ 1 ♀, 17-V111-94; Faisalabad 2 ♂ 2 ♀, 5-V11-96; Warsak Dam (Peshawar) 3 ♂ 1 ♀, 16-V11-96; Mingora (Swat) 1 ♂ 1 ♀, 15-V11-96; Mansehra (Abbottabad) 1 ♂ 13-V11-96; Khuzdar 2 ♂ 2 ♀, 13-V111-96; Panjgur 1 ♂ 2 ♀, 17-V111-96; Kharan 1 ♀, 12-VIII-96; Nushki (Chaghai) 1 ♂ 1 ♀, 11-V111- 96; Quetta 1 ♂, 10-V111-96; Lasbela 1 ♀, 11-X-96; Badin (Tharparkar) 2 ♂ 3 ♀, 14-X-96; Hyderabad 1 ♂, 12-X-96; Makran coast 1 ♀, 8-1X-95.

Habitat: This species has been collected from the river banks as well as grassy fields near tea, maize, sugarcane, fodder and rice crops and rocky areas having grasses *and* bushes.

New record: The collection of this species during the present study constitutes the first record for Baluchistan and N.W.F.P. Earlier, Wagan (1990) recorded this species from Sindh and Mazhar *et al.* (1993) from the Punjab.

2.2: *Tropidopola longicornis graeca* Uvarov

1926. *Tropidopola longicornis graeca* Uvarov, Eos. Madr., 2:161,173.

New record: It has been recorded for the first time from Baluchistan and N.W.F.P. Earlier, Perwin *et al.* (1983) and Mazhar *et al.* (1993) reported this species from the Punjab, while Wagan (1990) from Sindh.

Subfamily Truxalinae

3: Genus *Truxalis* Fabricius

Type: *Truxalis nasuta* (Linnaeus)

Three species have been recorded in this genus. They entirely tally with the published description (Kirby, 1914; Bei-Bienko and Mishchenko, 1951; Dirsh, 1965; Wagan, 1990) of this genus, except slight variation in measurements of various body parts given in each species (Table 3.1, 3.2, 3.3).

3.1: *Truxalis grandis fitzgeraldi* Dirsh

1951. *Truxalis grandis fitzgeraldi* Dirsh, Eos. Madr., p.153.

Material examined: Faisalabad 1 ♂, 20-V111-93; Badin (Tharparkar) 1 ♂, 14-X-94; Khuzdar 1 ♂, 13-V111-94; Mingora (Swat) 1 ♂, 15-V11-94.

Habitat: This species has been collected from tall and lush vegetation of grasses along ditches and near the roadside.

New record: The collection of this species during the present study constitutes the first record for Baluchistan. It has already been recorded by Moeed (1971) and Wagan (1990) from Sindh, Mazhar *et al.* (1993) from the Punjab and Irshad *et al.* (1977) from the rice producing areas of Pakistan.

Table 3.2: Measurements(mm): (15 ♂ 18 ♀)

	Male	Female	Mean	S.D.
Body (L)	35.50-38.00	64.00-65.00	53.00	13.64
Pronotum (L)	5.50- 6.00	9.50-10.00	8.06	1.95
Pronotum (W)	3.00- 3.50	5.00- 5.25	4.33	0.89
Tegmen (L)	29.00-33.00	53.00-54.50	43.85	11.14
Tegmen (W)	3.50- 4.00	5.00- 5.25	4.54	0.60
Hind femur (L)	24.00-25.00	37.00-38.50	32.06	6.57
Hind femur (W)	1.25- 1.75	2.00- 2.25	1.87	0.22

Table 3.3: Measurements(mm): (4 ♂ 3 ♀)

	Male	Female	Mean	S.D.
Body (1-)	32.00-45.50	60.00-67.00	47.92	14.42
Pronotum (L)	5.00-6.50	9.00-10.00	7.35	1.93
Pronotum (W)	3.25-4.00	5.25-5.75	4.42	0.96
Tegmen (L)	28.50-32.50	49.00-58.00	40.28	12.25
Tegmen (W)	3.50-4.00	5.25-5.50	4.42	0.79
Hind femur (L)	24.00-27.00	36.00-47.50	31.57	8.50
Hind femur (W)	1.25-1.50	2.00-2.50	1.82	0.51

Appendix: Latitude, Longitude, Altitude, Temperature and Rainfall of the Grasshoppers collection localities of Pakistan

Collection locality	Latitude	Longitude	Altitude (m)	Mean Ann. Temp. (C)	Avg. precipitation mm
Abbottabad	43-10N	73-13E	1015	19.00	1400
Badin	24-85N	68-85E	30	26.00	210
Bahawalpur	29-25N	71-40E	115	26.50	162
Bhakkar	31-15N	72-18E	150	26.50	178
Chakwal	32-70N	72-38E	201	22.50	710
Chhanga Manga	31-35N	74-20E	210	22.50	405
Cholistan	28-25N	70-25E	83	26.50	112
D. G. Khan	30-02N	70-40E	125	26.50	165
D. I. Khan	31-50N	70-56E	215	25.00	290
Faisalabad	31-25N	73-06E	214	24.50	350
Hyderabad	25-24N	68-22E	30	26.50	162
Islamabad	33-45N	73-13E	530	20.50	1140
Jhang	31-16N	72-20E	153	26.00	178
Jhelum	32-56N	73-43E	233	23.50	800
Karachi	24-54N	67-08E	5	25.50	181
Kharan	32-02N	73-09E	749	21.00	148
Khuzdar	27-47N	66-37E	1140	21.50	240
Lahore	31-34N	74-20E	215	24.00	450
Lasbela	25-05N	66-52E	8	26.00	194
Lorali	30-22N	68-35E	1432	20.00	194
Makran Coast	26-01N	63-09E	89	26.50	198
Mardan	34-30N	72-10E	293	23.00	310
Mingora	35-45N	72-25E	990	18.50	1000
Multan	30-12N	71-30E	121	26.50	168
Murree	34-10N	73-40E	2300	12.50	1750
Nushki	29-18N	64-42E	1018	19.00	211
Panjgur	26-58N	64-09E	919	23.00	104
Peshawar	34-01N	71-35E	319	22.50	344
Quetta	30-13N	66-57E	1586	15.50	340
Rawalpindi	33-40N	73-15E	507	21.50	1120
Sukkur	27-42N	68-50E	49	26.50	94
Zhob	31-20N	69-27E	1384	19.00	304

Source:- Meteorology Department

3.2: *Truxalis nasuta* (Linnaeus)

1758. *Gryllus (Acrida) nasutus* Linnaeus, Syst. Nat., ed. 10, 1: 427.
1775. *Truxalis nasutus* Fabricius, Syst. Ent., p.279. 1789. *Gryllus nasutus* Poiret, Voy. Barb., 1:309.
1804. *Truxalis erythropterus* Latreille, Hist. Nat. Crust., Ins., 12: 148.
1815. *Truxalis annulatus* Thunberg, Mem. Acad. Sci. St-Petersb., 5:267.
1827. *Truxalis undatus* Thunberg, Nova Acta Soc. Sci. Upsal., 9:78, 82.
1830. *Truxalis eximius* Eichwald, Zool. Spec., 2:239. 1830. *Truxalis scalaris* Klug, Symb. Phys., pl. 15,f.3,4.
1835. *Tryxalis nasutus* Brulle, Hist. nat., (: 217.
1838. *Truxalis unguiculata* Rambur, Faun. etn. Andal., 2: 72.
1841. *Tryxalis nasuta* Charpentier, Germars Z. Ent.,3:305.
1846. *Troxalis nasuta* Fischer, Ent. Russ., p. 230.
1853. *Tryxalis klugii* Fieber, Lotos, 3:97.
1853. *Tryxalis unguiculata* Fischer, Orth. Eur., p.301.
1873. *Acrida nasuta* Stal, Recens, Orth., 1: 99.
1893. *Tryxalis (Acridella) unguiculata* I.Bolivar, Feuille. Jeun. Nat., 23(275): 163,164.
1893. *Acrida unguiculata* Saussure, Proc. U.S. nat. Mus., 16: 581.
1902. *Acrida variabilis* Burr, Trans. ent. Soc., p.158.
1902. *Acrida (Truxalis) unguiculata* Vosseler, Zool. Jb. (Syst.), 16: 353.
1907. *Acridella variabilis* Karny, S.B. Akad. Wiss. Wien, 116: 375.
1910. *Acridella nasuta* Kirby, Syn. Cat. Orth., 3(2): 95.
1913. *Acridella unguiculata* I.Bolivar, Novit. Zool., 20: 607.

Material examined: Faisalabad 2 ♂ 2 ♀, 4-111-97; 1 ♂ 2 ♀, 11-V1-98; Lahore 1 ♂ 1 ♀, 3-IX-97; 1 ♂, 5-XII-98; Jhelum 1 ♂ 1 ♀, 28-VII-97; Chakwal 1 ♂, 20-VII-98; Rawalpindi 1 ♂ 1 ♀, 5-IX-98; Murree 1 ♀, 5-IX-98; Quetta 1 ♂ 1 ♀, 10V111-98; Khuzdar 1 ♂ 2 ♀, 13-VIII-98; Panjgur 1 ♂ 1 ♀, 17VIII-98; Peshawar 1 ♂ 2 ♀, 16-VII-98; Mingora (Swat) 1 ♂, 15-VII-98; Mardan 1 ♂ 1 ♀, 17-VII-98; Badin (Tharparkar) 1 ♀, 14-X-98; Hyderabad 1 ♂ 2 ♀, 12-X-98.

Habitat: This species occurs in tall and lush vegetation near roadsides and cultivated fields of apple, maize and sugarcane.

New record: All above localities. Earlier, Mazhar *et al.* (1993) reported this species from Jhang.

3.3: *Truxalis axima axima* Eichwald

1830. *Truxalis axima axima* Eichwald, Zool. Spec., 2:230.

Material examined: Faisalabad 1 ♀, 17-111-98; Rawalpindi 1 ♂ 1 ♀, 3-XI-98; Hyderabad 112-X-98; Badin (Tharparkar) 2 ♂ 1 ♀, 14-X-98.

Habitat: This species occurs in the tall and lush vegetation of grasses along small ditches and near the roadsides.

New record: All above localities except Hyderabad. Earlier, Wagan (1990) reported this species from many districts of Sindh province.

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