

On a collection of orthoptera from the Aligarh district of Uttar Pradesh, India

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Abstract

During the insect survey conducted in the Aligarh district of Uttar Pradesh State in India, a total of 68 Orthoptera specimens were gathered. These specimens included 12 different species from 9 genera across 3 families of Orthoptera. An identification key for each species, along with accompanying photographs, has been included for reference.

Keywords: Grasshoppers, katydids, crickets, distribution

Introduction

The Orthoptera order can be found in all corners of the world and is home to approximately 29,225 known species worldwide, according to research by Cigliano *et al.* (2024) [2]. In India alone, researchers like Chand *et al.* (2024) [1] have identified 1,274 species. These Orthopteran species are mainly found in tropical regions, but they also have a presence in temperate zones, demonstrating their ability to thrive in diverse climates. The Orthoptera order is divided into two suborders: Caelifera, which includes grasshoppers and locusts, and Ensifera, which consist of katydids and crickets. Orthopterans go through incomplete metamorphosis and typically have long, cylindrical bodies ranging from medium to large in size (up to 12cm long). They possess oversized hind legs used for jumping. These insects have downward-facing mouths with chewing mouthparts and well-developed compound eyes; they may or may not have simple eyes called ocelli. Their antennae are made up of multiple segments. The front part of their thorax is large, forming a shield-like structure that covers the sides; the middle part is small, and the rear part is large. Their front wings are thin and leathery, while their back wings are broad and have a complex network of veins, tucked under the front wings by folding. Some species may not have wings at all or have short wings. Their legs are often long and thin, with large hind legs designed for jumping; the feet have 1-4 segments. The abdomen is made up of 8-9 visible segments, with the last couple of segments reduced in size. Female Orthopterans have a well-developed egg-laying appendage. Their cerci are made up of a single segment. The current research focuses on a limited group of orthopteran insects that were gathered in the vicinity of Aligarh, Uttar Pradesh.

Materials and Methods

From August 2023 to May 2024, researchers conducted surveys in various agricultural and horticultural areas in Aligarh to collect orthopteran insects. These insects were captured using a sweep net and then euthanized with ethyl acetate fumes before being taken back to the laboratory for further analysis. Detailed records including the location, collection date, and host plant names were meticulously maintained during the study. The identification of the orthopteran specimens was carried out based on their morphological characteristics, following the guidance provided by several experts such as Uvarov (1921) [11], Rehn (1952) [8], Dirsh (1954) [3], Hollis (1971) [5], Kumar Usmani (2015) [6], Tan (2016) [10], Farooqi & Usmani (2018) [4], and Kumar *et al.* (2023) [7]. The species distribution in India was referenced from Shishodia *et al.* (2010) and the nomenclature followed the guidelines set by Cigliano *et al.* (2024) [2].

Results

In total, 68 Orthoptera specimens were gathered and identified, revealing the existence of 12 species across 9 genera within 3 families of Orthoptera. The majority of species (8) were found in the Acrididae family.

Taxonomic account

Order Orthoptera Olivier, 1789

Suborder Caelifera Ander, 1936

Superfamily Acridoidea MacLeay, 1821

Family Acrididae MacLeay, 1821

Subfamily Acridinae MacLeay, 1821

Tribe Acridini MacLeay, 1821

Genus *Acrida* Linnaeus, 1758



Fig 1



Fig 2

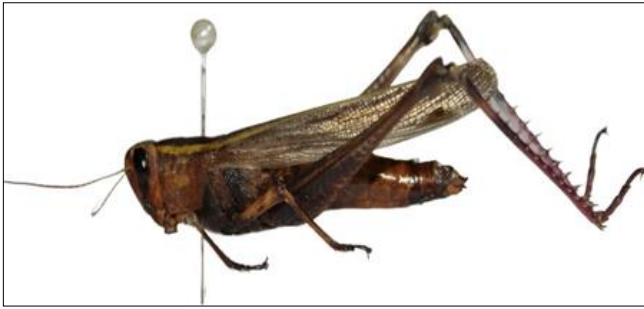


Fig 3



Fig 4

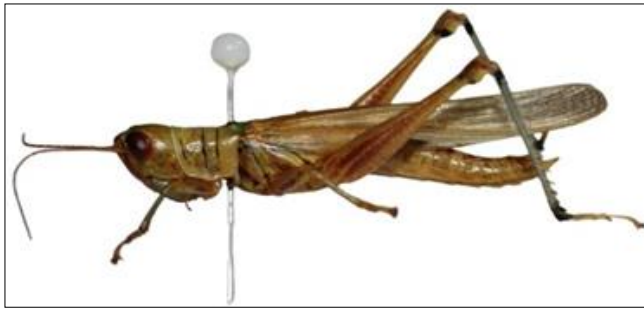


Fig 5

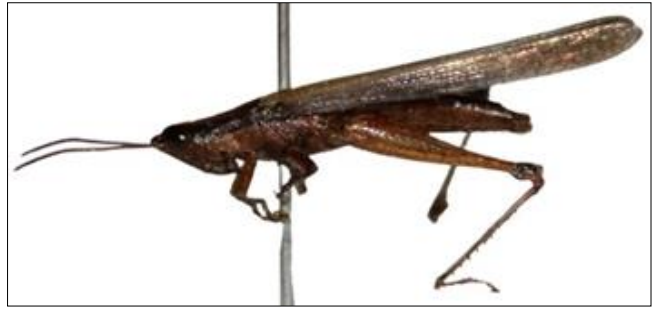


Fig 6



Fig 7



Fig 8



Fig 9

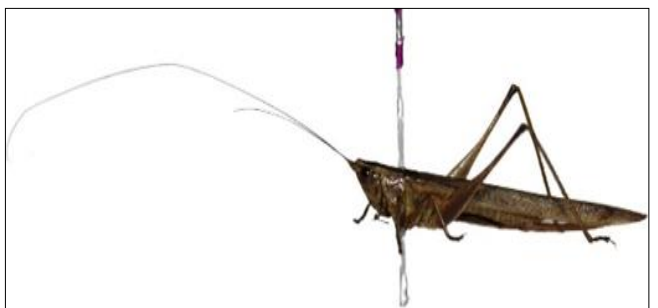


Fig 10

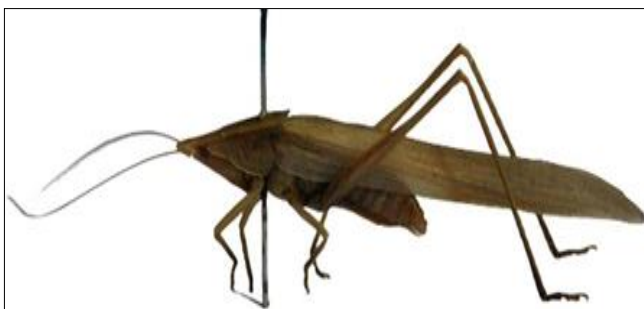


Fig 11



Fig 12

1. *Acrida exaltata* (Walker, 1859)**(Fig. 1)**

1859. *Truxalis exaltata* Walker, *Ann. Mag. nat. Hist.*, 3(4): 222.

1910. *Acrida exaltata*: Kirby, *A Synonymic Catalogue of Orthoptera (Orthoptera Saltatoria, Locustidae vel Acridiidae)*, 3(2): 94.

Diagnosis: Body elongated. Head acutely conical. Antennae flattened. Transverse sulcus of pronotum about or before the middle of the pronotal disc. Lateral carinae of pronotum incurved in prozona. The hind femur is long and narrow. The internal upper lobe of the hind knee is markedly longer than the external one. Hind knee with acute lobes on both sides.

Materials examined: India, Uttar Pradesh, Aligarh, 1♂, 06-VIII-2023, on paddy, Coll. Azhar Ali

Distribution: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

2. *Acrida gigantea* (Herbst, 1786)**(Fig. 2)**

1786. *Truxalis giganteus* Herbst, *Archiv der Insectengeschichte. Herausgegeben von Johan Caspar Fuessly*, 7-8: 191.

1910. *Acrida gigantea*: Kirby, *A Synonymic Catalogue of Orthoptera (Orthoptera Saltatoria, Locustidae vel Acridiidae)*, 3(2): 93.

Diagnosis: Body elongated. Head acutely conical. Antennae flattened. Lateral carinae of pronotum with black marking on inner margins. The hind femur is long and narrow. The internal upper lobe of the hind knee is markedly longer than the external one. Hind knee with acute lobes on both sides.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 2♀♀, 10-IX-2023, on grasses, Coll. Azhar Ali

Distribution: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Kerala, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Subfamily Eyprepocnemidinae Brunner von Wattenwyl, 1893

Genus *Choroedocus* Bolívar, 1914

3. *Choroedocus robustus* (Serville, 1838)**(Fig. 3)**

1838. *Acridium robustum* Serville, *Histoire naturelle des insectes. Orthoptères*, 647.

1921. *Choroedocus robustus*: Uvarov, *Trans. Entomol. Soc. London*: 109.

Diagnosis: Large sized. Antennae are longer than the head and pronotum together. The dorsum of the pronotum flat,

crossed by three transverse sulci, median and lateral carinae distinct, metazona about as long as prozona, posterior margin rounded. The prosternal process short, slightly bent backwards. Tegmina fully developed without dark spots.

Materials examined: India, Uttar Pradesh, Aligarh, 1♂, 16-VIII-2023, on grasses, Coll. Azhar Ali

Distribution: Arunachal Pradesh, Andhra Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Tribe Eyprepocnemidini Brunner von Wattenwyl, 1893

Genus *Heteracris* Walker, 1870

4. *Heteracris littoralis* (Rambur, 1838)**(Fig. 4)**

1838. *Gryllus littoralis* Rambur, *Faune entomologique de l'Andalousie 3 (Orth. 2)*: 78.

1959. *Heteracris littoralis*: Davey, Descamps & Demange, *Bull. IFAN (A)* 21(1-2): 60.

Diagnosis: Medium sized. Antennae moderately long, filiform. Head pointed, with a well-developed fastigium of the vertex that is continuous with the frontal ridge. Pronotum slightly compressed with a distinct median carina. Tegmina narrow, elongated; hindwings well-developed.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 2♂♂, 12-X-2023, on sorghum, Coll. Azhar Ali

Distribution: Bihar, Delhi, Rajasthan, Uttar Pradesh and Uttarakhand.

Subfamily Hemiacridinae Dirsh, 1956

Tribe Hieroglyphini Bolívar, 1912

Genus *Hieroglyphus* Krauss, 1877

5. *Hieroglyphus banian* (Fabricius, 1798)**(Fig. 5)**

1798. *Gryllus banian* Fabricius, *Supplementum Entomologiae Systematicae Suppl*: 194.

1909. *Hieroglyphus banian*: Maxwell-Lefroy, *Indian Insect Life: A Manual of the Insects of the Plains (Tropical India)* 87.

Diagnosis: Fastigium of vertex broad, pronotum black with four black coloured sulci, narrowly lined, 1st sulci present only laterally, second present on medially and the last two continuous; tegmina and wings are shorter or longer than abdomen, supra anal plate longer than wide in apical area with two ridges like elevation; hind tibiae blue, with black tipped spines.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 1♂, 21-VIII-2023, on paddy, Coll. Azhar Ali

Distribution: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal.

Subfamily Oxyinae Brunner von Wattenwyl, 1893

Tribe Oxyini Brunner von Wattenwyl, 1893

Genus *Gesonula* Uvarov, 1940

6. *Gesonula punctifrons* (Stål, 1861)**(Fig. 6)**

1861. *Acridium (Oxya) punctifrons* Stål, *Kongliga Svenska fregatten Eugenie Resa omkring jorden under befäl af C.A. Virgin åren 1851-1853 (Zoologi)* 2(1): 336.

1951. *Gesonula punctifrons*: Bey-Bienko & Mistshenko, *Locusts and Grasshoppers of the U.S.S.R. and Adjacent Countries*, 1: 172 [182].

Diagnosis: Medium-sized, elongated body; pronotum slightly compressed with a distinct but shallow median carina; antennae long, filiform; head slightly pointed, with a well-developed fastigium of the vertex; fine punctuations on the frons, giving the species its name; tegmina narrow, elongated, slightly leathery, covering the well-developed hindwings.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 1♂, 1♀, 25-IV-2024, on grasses, Coll. Azhar Ali

Distribution: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal.
Genus *Oxya* Serville, 1831

7. *Oxya hyla* Serville, 1831**(Fig. 7)**

1831. *Oxya hyla* Serville, *Ann. Sci. nat.*, 22(86): 28-65, 134-167, 262-292.

Diagnosis: Robust, slightly compressed body; short, broad head with a well-developed fastigium; antennae relatively short, filiform; pronotum smooth with a weakly developed median carina; tegmina are elongated, narrow, and leathery, covering the fully developed hindwings that facilitate strong flight.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 2♂♂, 3♀♀, 19-III-2024, on grasses, Coll. Azhar Ali

Distribution: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

8. *Oxya japonica japonica* (Thunberg, 1824)**(Fig. 8)**

1824. *Gryllus japonicus* Thunberg, *Mem. Acad. Imp. Sci. St. Peterburg*, 3: 400, 429.

1929. *Oxya japonica*: Bey-Bienko, *Ann. Mag. nat. Hist.*, 10(4): 550.

Diagnosis: Medium-sized body; antenna long, filiform; fastigium of vertex short, less concave; frons oblique; pronotum relatively flat; hind tibiae straight, flattened distally with two rows of dorsal spines, nine dorso external while eleven dorso internal spines; arolium moderate size.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 1♂, 14-V-2024, on bushes, Coll. Azhar Ali

Distribution: Andaman & Nicobar Islands, Assam, Arunachal Pradesh, Bihar, Goa, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Tripura and Uttar Pradesh.

Suborder Ensifera Chopard, 1921

Superfamily Gryllotalpoidea Leach, 1815

Family Gryllotalpidae Leach, 1815

Subfamily Gryllotalpinae Leach, 1815

Tribe Gryllotalpini Leach, 1815

Genus *Gryllotalpa* Latreille, 1802

9. *Gryllotalpa orientalis* Burmeister, 1838**(Fig. 9)**

1838. *Gryllotalpa orientalis* Burmeister, *Handbuch der Entomologie* 2 2(I-VIII): 739.

Diagnosis: Medium to large sized cylindrical body with yellowish-brown, paler beneath in coloration; antennae short filiform, forelegs designed for digging; pronotum large oblong; hind tibiae with three to four dorsal spurs on internal side; tegmen shorter than the hind wings; hind wings usually projecting slightly from beneath of the forewings; denticles found on stridulatory file, distributed in a series.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 1♂, 10-VIII-2023, on grasses, Coll. Azhar Ali

Distribution: Uttarakhand.

Superfamily Tettigoniioidea Krauss, 1902

Family Tettigoniidae Krauss, 1902

Subfamily Conocephalinae Kirby & Spence, 1826

Tribe Conocephalini Kirby & Spence, 1826

Genus *Conocephalus* Thunberg, 1815

10. *Conocephalus (Anisoptera) rentzi* Farooqi & Usmani, 2018^[4]**(Fig. 10)**

2018. *Conocephalus (Anisoptera) rentzi* Farooqi & Usmani, *Zootaxa*, 4461(3): 386.

Diagnosis: Small-sized slender body; fastigium of vertex compressed laterally; prosternum armed with a pair of spines. Tenth abdominal tergite slightly broad and triangular. Supra-anal plate triangular. Subgenital plate moderately long. Cerci stout, broad, slightly compressed. Tenth abdominal tergite with apical margin rounded. Supra-anal plate triangular. Subgenital plate slightly broader than long; apex with distinct triangular excision. Cerci conical and straight. Ovipositor slightly upcurved.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 1♂, 1♀, 18-VIII-2023, on paddy, Coll. Azhar Ali

Distribution: Uttar Pradesh.

Tribe Copiphorini Karny, 1912

Genus *Euconocephalus* Karny, 1907

11. *Euconocephalus nasutus* (Thunberg, 1815)**(Fig. 11)**

1815. *Conocephalus nasutus* Thunberg, *Mem. Acad. Imp. Sci. St. Peterburg*, 5: 273.

1922. *Euconocephalus nasutus*: Hebard, *Proc. Acad. Nat. Sci. Philad.*, 74: 240.

Diagnosis: Large-sized slender body. Prosternum armed with a pair of spines. Tegmina longer than hind wings but not extending beyond the hind wings. tympanum on fore tibia bilaterally closed. Male tenth abdominal tergite with two excisions on apical margin and one triangular excision between them; supra-anal plate triangular; sub-genital plate long with triangular excision; tenth tergite with shallow median elongated furrow; supra-anal plate triangular; sub-genital plate trapezoidal; cerci conical, slightly upcurved; ovipositor almost straight, length of ovipositor shorter than hind femur.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 1♀, 10-IX-2023, on paddy, Coll. Azhar Ali

Distribution: Chhattisgarh, Himachal Pradesh, Mizoram, Tripura and Uttar Pradesh.

12. *Euconocephalus pallidus* (Redtenbacher, 1891) (Fig. 12)

1891. *Conocephalus pallidus* Redtenbacher, *Verh. der Zoologisch-Botanischen Gesellsch. Wien*, 41: 383, 414.
1912. *Euconocephalus pallidus*: Karny, *Genera Insectorum*. 139: 35.

Diagnosis: Large-sized slender body. Prosternum armed with a pair of spines. Tegmina longer than hind wings. Male tenth abdominal tergite slightly broad with triangular excision; sub-genital plate long with moderate triangular excision; supra-anal plate triangular, with dorsal a groove; sub-genital plate trapezoidal with weak apical excision; cerci conical, slightly upcurved; ovipositor straight and not surpassing the wings when straightened; length of ovipositor longer than hind femur.

Materials examined: INDIA, Uttar Pradesh, Aligarh, 1♀, 17-VIII-2023, on paddy, Coll. Azhar Ali

Distribution: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Kerala, Meghalaya, Mizoram, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Tentative key to species

1. Antennae shorter than body; tympanal organ if present at the base of abdomen.....5
Antennae about as long as or longer than body; tympanal organ if present on the fore tibia.....2
2. Tarsi 4-segmented.....3
Tarsi 3-segmented.....*Gryllotalpa orientalis* Burmeister, 1838
3. Fastigium of vertex produced forward as a cone or spine.....4
Fastigium of vertex not produced as a cone or spine.....*Conocephalus (Anisoptera) rentz* i Farooqi & Usmani, 2018^[4]
4. Fastigium of vertex with apex blunt; anterior external margin of the elytra is pale or translucent.....*Euconocephalus nasutus* (Thunberg, 1815)

- Fastigium of vertex with apex rounded; anterior external margin of the elytra is brownish black.....*Euconocephalus pallidus* (Redtenbacher, 1891)
5. Prosternal process present.....7
Prosternal process absent.....6
 6. Lateral carinae of pronotum edged within with a black line.....*Acrida gigantea* (Herbst, 1786)
Lateral carinae of pronotum not edged within with a black line.....*Acrida exaltata* (Walker, 1859)
 7. Lower knee lobe of hind femur never spined.....10
Lower knee lobe of hind femur spined.....8
 8. Radial area of tegmen without transverse stridulatory veinlets.....9
Radial area of tegmen with a series of regular, parallel, thickened, transverse stridulatory veinlets.....*Gesonula punctifrons* (Stål, 1861)
 9. Ovipositor valves with long hook like dents; posterior ventral basivalvular sclerites with very small spinelets on its inner ventral margin.....*Oxya hyla* Serville, 1831
Ovipositor valves with short dents; posterior ventral basivalvular sclerites with a large spine on its inner ventral margin.....*Oxya japonica japonica* (Thunberg, 1824)
 10. Radial area of tegmen without transverse stridulatory veinlets.....11
Radial area of tegmen with a series of regular, parallel, thickened, transverse stridulatory veinlets.....*Hieroglyphus banian* (Fabricius, 1798)
 11. Apex of male abdomen inflated.....*Choroedocus robustus* (Serville, 1838)
Apex of male abdomen not inflated.....*Heteracris littoralis* (Rambur, 1838)

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