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Taxonomic studies of orthopteran fauna from Udalguri district, BTR, Assam, India

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Abstract
A taxonomic survey was conducted on orthopteran insects across various locations in Udalguri district of Assam, situated within the Bodoland Territorial Region (BTR) on the Indo-Bhutan border in Northeast India. From 2020 to 2023, meticulous collection efforts yielded 325 specimens, identifying a total of 18 unique species, each belonging to a distinct genus. These fascinating insects represent the families Acrididae, Tettigoniidae, and Pyrgomorphidae. The survey provides a detailed discussion of each species, highlighting its distinct characteristics, economic significance, and bio-ecological data. This comprehensive study sheds light on the previously unknown diversity of orthopteran species in this region, offering valuable insights into their ecological roles and potential impacts on local ecosystems.

Keywords: Acrididae, bio-ecological, diversity, indo-bhutan, insect, specimens, taxonomy

Introduction

With over 28,000 species, Orthoptera is one of the largest insect orders (Cigliano *et al*. 2020) [2].

The order Orthoptera encompasses grasshoppers, crickets, katydids, and locusts. Orthopteran insects possess either fully developed wings, short wings, or no wings at all. These insects vary in size, ranging from little to enormous. The compound eyes are highly developed, and the mouthparts are adapted for biting and chewing. Furthermore, often there are one to three ocelli. Antennae can vary in size, ranging from small with only a few segments to lengthy and thread-like with several segments. The size of the prothorax is substantial. In order to execute a jump, the hind limbs undergo enlargement and modification. Upon reaching complete maturity, the forewings become lengthened, thicker, and develop a submarginal costal vein. The forewings frequently undergo modifications to serve as stridulatory organs. The hind-wings possess membranous structures and a sizable anal region. Female creatures typically possess highly developed ovipositors. During a state of relaxation, the sub genital plate, which is the larger 9th abdominal sternum, provides coverage for the male external genitalia organs, which exhibit bilateral symmetry. The subgenital plate may possess styles. The cerci are abbreviated and devoid of segments. Specialised auditory and stridulatory organs frequently form. Males typically engage in stridulation, while several species have females producing sound. The process of metamorphosis has inherent flaws. With over 28,000 species, it is one of the most extensive insect orders.

Orthopterans, such as grasshoppers and locusts, have significant economic importance due to their impact on a wide variety of crops, often causing substantial damage. The order Orthoptera is divided into two suborders, Ensifera and Caelifera, based on the length of their antennae. Ensifera is characterized by long antennae, while Caelifera has short antennae. The suborder Caelifera consists of eight superfamilies: Acridoidea, Eumastacoidea, Pneumoroidea, Proscopioidea, Tenoceroidea, Trigonopterygoidea, Pyrgomorphidae, and Tetrigoidea. Ensifera includes seven superfamilies: Gryllidae, Tettigoniidae, Gryllotalpidae, Hagloidea, Stenopalmatoidea, Rhaphidophoroidea, and Schyzodactyloidea.

The superfamily Acridoidea, which consists of 11 families, exhibits the highest diversity. In India, the families Acrididae and Pyrgomorphidae are widely distributed. There are over 800 genera within the 27 subfamilies of Acrididae. According to Cigliano *et al*. (2020) [2], this family is the most dominant and diverse within Orthoptera. Shishodia *et al*. (2010) [12] documented a total of 1,033 species of Orthoptera, encompassing 389 distinct taxa and 21 families. Pioneering research on Indian orthopterans was conducted by Kirby (1914) [5] and Chopard (1969) [1]. The first checklist of Indian Acridoidea was published by Tandon in "Fauna of British India" in 1976. Subsequent notable works include those by Bhowmik (1984), Hazra *et al*. (1993) [4], Tandon and Shishodia (1995) [13], Reshi *et al*. (2008) [9], Sharma and Mandal (2008) [11], Sharma (2011) [10], Rafi & Usmani (2013) [8], and Kumar and Usmani (2015) [6]. Dey and Hazra (2003) [3] focused on the taxonomy and ecology of this group.

Udalguri district, nestled within Assam's Bodoland Territorial Region (BTR) on the cusp of Northeast India, boasts a diverse geography. As noted by Van Hook (1971) [14], its latitude spans from 26°52'N to 26°81'N, and longitude stretches from 91°07'E to 92°02'E. The district shares borders with Bhutan to the north, West Kameng district of Arunachal Pradesh to the northeast, and Sonitpur, Baksa, and Darrang districts within Assam. Udalguri's unique location places it at the foothills of the majestic Eastern Himalayas, where the northern landscape transitions into the fertile southern plains. Major rivers like Suklai, Nonai, Kulsi, and Dhansiri originate from the Himalayas, carving their paths through the district before merging with the mighty Brahmaputra. The region thrives under a tropical monsoon climate, experiencing average summer temperatures between 35°C and 37°C, and cooler winters with temperatures ranging from 9°C to 10°C. Udalguri receives abundant rainfall, with an annual average exceeding 2000 mm.

Methods

A total of 330 adult grasshoppers, both male and female, were collected from various locations in the Udalgiri district for the current study. Each specimen was cataloged with reference numbers, locality, collection date, host plant names, and other relevant details. From 2020 to 2023, a comprehensive survey was conducted in diverse regions including agricultural fields, forests, and wetlands to gather grasshoppers, katydids, and crickets. Collection methods included manual selection and the use of bug nets, as well as excavation of the soil and sand beds along riverbanks. Specimens were euthanized using cyanide bottles.

Dry mounts were prepared to enhance understanding of specific attributes such as size, color, and texture. This process involved relaxing, elongating, affixing, and labeling the specimens. Pinned specimens were stored in boxes and cabinets as part of permanent collections for future examination of their morphological structures. Permanent slides were created for detailed examination of reproductive organs, using a microscope to thoroughly investigate the anatomy of the genitalia. Initial drawings were made with the aid of a camera lucida, with details completed through further microscopic examination.

Results

Specimen 1: The first specimen observed in this study belonged to the order Acrididae and was collected from Udalguri district in the Bodoland Territorial Region of Assam in India at coordinates 26°52'N and 92°01'E in 2021.

Taxonomic Account

Acrida exaltata (Walker, 1859)

Taxonomic Account

Order: Orthoptera
Suborder: Caelifera Ander, 1939
Family: Acrididae
Genus: *Acrida*
Species: *Acrida exaltata* (Walker, 1859)

The specimen exhibited distinct morphological features. The head is conically ascending and equal in length to the pronotum, with the body predominantly green. The fastigium is broad, laminate, and truncated at the apex. The pronotum shows a transverse sulcus located approximately at the midpoint of the pronotal disc. The male subgenital plate is notably long, and the tegmina extend slightly beyond the hind knee, while the wings are slightly shorter than the tegmina. Morphometric measurements of the male specimen exhibited body length of 31.7 mm, antenna length of 9.9 mm, pronotum length of 6.2 mm, tegmen length of 31.0 mm, hind femur length of 27.4 mm, and hind tibia length of 28.5 mm.

Specimen 2: The specimen was collected in the year 2020 from Udalguri district (26°74N and 92°05'E) in Bodoland Territorial Area of Assam, India and was taxonomically classified as-

Taxonomic Account

Order: Orthoptera
Family: Acrididae
Subfamily: Acridinae
Genus: Phlaeoba
Species: *Phlaeoba antennata* (Brunner von Wattenwyl, 1893)

This specimen *Phlaeoba antennata* Brunner von Wattenwyl, 1893, exhibits several diagnostic characteristics, including an oblique head, a uniformly tipped antenna, and a brown junction between the femur and tibia. The morphometric measurements of the male specimen include a body length of 24.01 mm, antenna length of 12.56 mm, pronotum length of 5.11 mm, hind femur length of 14.57 mm, and tegmina length of 18.51 mm. The species is found across India, Nepal, Myanmar, Thailand, Malaysia, Vietnam, and Indonesia. The examined specimen possesses all characteristic features of *Phlaeoba antennata*, confirming its conspecificity. This species is not harmful to humans and does not pose significant concerns.

Specimen 3: The specimen identified as a male orthopteran grasshopper, was collected from Udalguri, Bodoland Territorial Area of Assam, India (26°71'N and 92°05'E) in the month of June, 2021.

Taxonomic Account

Order: Orthoptera
Family: Acrididae
Subfamily: Acridinae
Genus: Phlaeoba
Species*: Phlaeoba infumata* (Brunner, 1893)

The specimen's color is a consistent shade of brown and features a short, blunt apex of the vertex with a concave shape on the upper side, and a continuous central carina extending from the head through the pronotum. The antennae are ensiform and measure as long as or longer than the combined length of the head and pronotum. The morphometric measurements of the specimen consists of body length 21.02 mm, tegmina length 14.9 mm, pronotum length 1.74 mm, and hind femur length 14.12 mm. The species is distributed across India (including Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Madhya Pradesh, and Manipur), Bangladesh, Nepal, China, and Myanmar. Upon comparison, the specimen was found to bear all the characteristic features of *Phlaeoba infumata*, confirming its conspecificity. In India, *Phlaeoba infumata* is recognized as a polyphagous pest (Mandal *et al*. 1982).

Specimen 4: Specimens were collected from near the town of Udalguri (26°59'N and 92°83'E), in the Bodoland Territorial Region (BTR) of Assam, India in the year 2020. This area is part of northeastern India and lies within the foothills of the Himalayas.

Taxonomic Account

Order: Orthoptera
Family: Acrididae
Subfamily: Acridinae
Genus: Phlaeoba
Species: *Phlaeoba tenebrosa* (Walker, 1871)

The diagnostic characters include tegmina without an intercalary vein, a vertex with a prominent median carinula, and a fastigium of the vertex that is depressed with median and lateral carinulae. Morphometric measurements for the male included body length 25.9 mm, tegmina 13.9 mm, pronotum 1.7 mm, and hind femur 18.1 mm. Their distribution includes Pakistan, India, Bangladesh, China,

Myanmar, and Laos. Upon comparison, the specimen was found to bear all characteristic features and is conspecific with *P. tenebrosa*. In India, it is a pest of alfalfa and fodder crops.

Specimen 5: Specimen was collected from Udalguri (26°59'N, 92°83'E), a district located in Assam of northeast India in the month of May, 2020.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Catantopinae
Genus: Xenocatantopus
Species: *Xenocatantopus humilis*

The body is medium with antennae longer than the head and pronotum together. The prosternal tubercle is acutely pointed with an obtuse apex, and the tegmina extend beyond the femur and tibial junction. Morphometric measurements for the male are as follows: body length 25.9 mm, tegmina 13.9 mm, pronotum 1.7 mm, hind femur 18.1 mm. The distribution includes India, Bangladesh, Myanmar, Thailand, Vietnam, Malaysia, Indonesia, and Papua New Guinea. Upon comparison, the specimen was found to bear all characteristic features and is conspecific with *X. humilis*. In India, it is a pest of alfalfa and fodder crops.

Specimen 6: Specimens collected from Udalguri (26°59'N, 92°83'E), a district located in Assam of northeast India in the month of August, 2020 were examined.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Catantopinae
Genus: *Choreodocus*
Species: *Choreodocus robustus*

The diagnostic characters of *Choreodocus robustus* include being moderately large and light greenish or yellowish brown with yellow stripes, a short and slightly obtuse head with a broad brown band running down beneath the eyes, a short fastidium, a flat frontal ridge with punctation, straight facial carina, slightly wider inter ocular space at the base of the fastidium, a dark brown vertex bordered with yellow on the sides, prosternal processes gradually tapering apically, dark brown pronotum, and tegmina without spots. Morphometric measurements are as follows: males—body length 46.5 mm, pronotal length 7.30 mm, tegmina length 35.6 mm, hind femur length 25.9 mm, hind tibia length 27.3 mm; females—body length 66.7 mm, pronotal length 11.10 mm, tegmina length 46.3 mm, hind femur length 35.8 mm, hind tibia length 37.3 mm. The distribution includes various regions in India (Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Tripura, West Bengal, Uttar Pradesh) and Bangladesh. Upon comparison, the specimen was found to bear all the characteristic features and is conspecific with *C. robustus*. The species is found during the monsoon in grasslands.

Specimen 7: Specimens examined were collected from, Udalguri (26°38'N, 92°57'E), Bodoland Territorial Region of Assam, India, in the month of May, 2020.

Taxonomic Account
Order: Orthoptera
Family: Gryllidae
Subfamily: Gryllinae
Genus: *Trilophidia*

Species: *Trilophidia annulata* (Thunberg, 1815)
The diagnostic characters of *Trilophidia annulata* include a body that ranges from dark brown to yellow, tegmen with the basal half brown featuring large yellow marks, hyaline wings with a yellow base, and a hind femur with two bands.. Morphometric measurements are as follows: males—body length 38.5 mm, pronotal length 9.50 mm, tegmina length 33.6 mm, hind femur length 23.9 mm, hind tibia length 29.3 mm; females—body length 61.7 mm, pronotal length 14.10 mm, tegmina length 42.3 mm, hind femur length 38.8 mm, hind tibia length 31.3 mm. The distribution includes Iran, Pakistan, India (all states), Sri Lanka, Bangladesh, Myanmar, Vietnam, Thailand, Indonesia, Malaysia, South Korea, Russia, and Japan. Upon comparison, the specimen was found to bear all characteristic features and is conspecific with *T. annulata*. The species is found during the monsoon and post-monsoon periods in grasslands

Specimen 8: Specimen collected and examined were all male. Specimen was collected from Udalguri (26°59'N, 92°83'E), a district located in Assam of northeast India in the month of May, 2020.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Oxyinae
Genus: Oxya
Species: *Oxya japonica* (Thunberg, 1824)

The diagnostic characters of *O. japonica* include antennae as long as or slightly longer than the head and pronotum together, lateral longitudinal ridges on the ventral surface of the female subgenital plate without spines except at the apices, ovipositor valves with short dents, a posterior ventral basivalvular sclerite with a large spine on its inner ventral margin, and a male cercus with a sub-acute or truncate apex. Three males were examined from India, Assam, Bodoland Territorial Area, Udalguri (26.38, 92.57), collected on 18.v.2020 by M. Narjari. Morphometric measurements are: males—body length 10.7 mm, tegmina length 18.9 mm, hind femur length 10.0 mm, pronotum length 6.9 mm; females—body length 13.9 mm, tegmina length 22.5 mm, hind femur length 13.9 mm, pronotum length 8.5 mm. The distribution spans India (including Assam, Uttar Pradesh, Rajasthan, Tamil Nadu, Tripura, West Bengal, Gujarat, Bihar, Manipur, Karnataka, Kerala, Punjab, Andaman & Nicobar Islands, Arunachal Pradesh, Bihar, Goa, Karnataka, Kerala, Maharashtra, Meghalaya), Bangladesh, Bali, Borneo, Celebes, China, Halmahera Island, Hawaii Island, Japan, Java, Lombok, Myanmar, Pakistan, Philippines, Palau Island, Singapore, Sri Lanka, Sula, Sumba, Sumatra, Taiwan, Thailand, Timor, Vietnam, and Malaysia. Upon comparison, the specimen was found to bear all the

characteristic features and is conspecific with *O. japonica*. This subspecies is widely distributed in India and the Indo-Malayan region and is a major pest of paddy crops

Specimen 9: Specimen collected and examined included male orthopterans. Specimen was collected from Udalguri (26°29'N, 92°73'E), a district located in Assam of northeast India in the month of September, 2020.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Oxyinae
Genus: *Oxya*
S**pecies**: *Oxya hyla* (Serville, 1831)

The specimen is a medium-sized insect with several distinctive features. Its antennae are filiform and can be longer, as long as, or shorter than the combined length of the head and pronotum. The fastigium is obtuse and transverse, with a sulcate frontal ridge. The dorsum of the pronotum is slightly flattened and crossed by three transverse sulci, with a weak median carina and absent lateral carina. The metazona is shorter than the prozona, and the posterior margin of the pronotum is rounded or obtusely angular. The tegmina are narrow and obtusely rounded. In females, the ovipositor valves are characterized by long, hook-like dents, and the posterior ventral basivalvular sclerites have very small spinelets on their inner ventral margins. The male cerci have a subacute or truncate apex. The morphometric details for males are as follows: body length 23.2 mm, antenna length 8.9 mm, tegmen length 17.3 mm, hind femur length 12.6 mm, and hind tibia length 9.1 mm. The species is distributed across India (including Punjab, Haryana, Bihar, Uttar Pradesh, Uttarakhand, Tamil Nadu, West Bengal, Assam, Meghalaya, and Manipur), as well as Mauritania, Mali, Niger, Chad, Sudan, Senegal, Guinea, Burkina Faso, Nigeria, Cameroon, Central African Republic, and the Democratic Republic of Congo. Upon comparison, the specimen matches all the diagnostic features of *O. hyla*. Ecologically, this species is known to be a reputed pest of paddy.

Specimen 10: The specimen examined included both males and females, collected from Udalguri (26°29'N, 92°73'E), a district located in Assam of northeast India in the month of September, 2020.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Catantopinae
Genus: *Oxya*
Species: *Oxya fuscovittata* (Marschall, 1836)

The specimen exhibits several notable diagnostic features. The posterior margin of the female subgenital plate is almost straight and smooth. In males, the supra-anal plate is distinguished by tubercles on each side of the median apical process, and the cercus is laterally compressed and of uniform width. The morphometric details for males are: body length 17.3 mm, antenna length 6.7 mm, pronotum length 3.6 mm, tegmen length 12.6 mm, hind femur length 10.7 mm, and hind tibia length 8.1 mm. For females, the measurements are: body length 22.7 mm, antenna length 7.7 mm, pronotum length 4.9 mm, tegmen length 17.4 mm, hind femur length 13.8 mm, and hind tibia length 10.9 mm. The species is distributed across Kazakhstan, Iran, Pakistan, Afghanistan, and India (Uttar Pradesh, Uttarakhand, West Bengal, Bihar, Jharkhand, and Punjab). Upon comparison, the specimens match all the diagnostic features of *Oxya fuscovittata*. Ecologically, this species is known to be a pest of paddy but is also found in grasslands.

Specimen 11: The specimen examined included both males and females, all collected from from Udalguri (26°29'N, 92°73'E), a district located in Assam of northeast India in the month of September, 2022.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Catantopinae
Genus: *Eupreponotus*
Species: *Eupreponotus inflatus* (Uvarov, 1921)

Diagnostic characters observed were- size was moderately large; deep velvety coloration of the head and pronotum; pronotum was not punctured; the lateral lobe was slightly higher than long; tegmina extended beyond posterior knees; cercus was short, more or less entirely coriaceous; apex of abdomen inflated; supra-anal plate of female tongue was shaped with medially a longitudinal grove. Morphometric analysis recorded in male a body length of 16.9mm; antenna length of 7.1 mm; pronotum length of 3.3 mm; tegmen length of 13.8 mm hind femur length of 14.7 mm; hind tibia length of 6.1 mm. In female a body length of 26.9 mm; antenna length of 9.6 mm; pronotum length of 5.1 mm; tegmen length of 16.3 mm; hind femur length of 14.1 mm; hind tibia length of 11.3 mm was observed. Upon comparison, the specimen was found to bear all the characteristic features and is a conspecific of *E. inflatus*. The distribution of this species is limited. Nymphs and adults are found in areas with tall, rough grass and shrubs. This species migrates to paddy fields as it reaches maturity. Nymphs begin to emerge from April onwards, while adults start to appear in August. Beyond the northeastern part of India it is distributed throughout the states of West Bengal and Uttar Pradesh states in India.

Specimen 12: Specimen examined included both male and female collected from Udalguri (26°29'N, 92°73'E), in Bodoland Territorial Area in Assam, India in September 2022.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Pyrgomorphinae
Genus: *Spathosternum*
Species: *Spathosternum nigrotaeniatum* (Stal, 1876)

The specimen is a moderately large insect with a deep velvety coloration on the head and pronotum. The pronotum is not punctured, and the lateral lobe is slightly higher than it is long. The tegmina extend beyond the posterior knees, and the cercus is short and mostly coriaceous. The apex of the abdomen is inflated, and in females, the supra-anal plate

is tongue-shaped with a longitudinal groove medially. The morphometric details are as follows: for males, body length 16.9 mm, antenna length 7.1 mm, pronotum length 3.3 mm, tegmen length 13.8 mm, hind femur length 14.7 mm, and hind tibia length 6.1 mm; for the female, body length 26.9 mm, antenna length 9.6 mm, pronotum length 5.1 mm, tegmen length 16.3 mm, hind femur length 14.1 mm, and hind tibia length 11.3 mm. The species is distributed in India, specifically in Uttar Pradesh and West Bengal. Upon comparison, the specimens exhibit all the characteristic features of *Eupreponotus inflatus*. Ecologically, this species is found in areas with tall, rough grass and shrubs and migrates to paddy fields as it matures. Nymphs begin to emerge from April, while adults start to appear in August.

Specimen 13: Specimen examined included both male and female collected from Udalguri (25°63'N, 99°73'E), in Bodoland Territorial Area in Assam, India in September, 2022.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Catantopinae
Genus: ***Spathosternum***
Species: *Spathosternum prasiniferum* (Walker, 1871)

The specimen is a small, cylindrical insect with a distinctive coloration and pattern. It features a broad blackish or dark green stripe running behind the lower part of the eyes and between the lateral carinae of the pronotum. The body is cylindrical, with a convex head that is shorter than the pronotum. The fastigium is rounded with slightly raised lateral carinulae. The filiform antennae are shorter than the pronotum. The prozona is longer than the metazona, and there is a dark brown band behind the eye that extends along the pronotum and tegmina. The cerci are short and cylindrical, and in females, the anterior ovipositor valves are long and hook-like. The body color is green, while the tegmina are brown or green with the middle areas being light brown and featuring longitudinal central pale patches. The hind femur and tibia are green, and the wings are hyaline. Males are smaller than females, with males measuring a body length of 1.6 mm, antenna length of 0.7 mm, tegmina length of 1.6 mm, hind wing length of 1.6 mm, hind femur length of 1.2 mm, and tibia length of 1.0 mm. Females are larger, with a body length of 2.7 mm, antenna length of 1.1 mm, tegmina length of 2.0 mm, hind wing length of 2.0 mm, hind femur length of 1.7 mm, and tibia length of 1.5 mm. The species is distributed across India (including Assam, Sikkim, Manipur, Bihar, Goa, Karnataka, Kashmir, Orissa, Rajasthan, Tamil Nadu, West Bengal, and Uttar Pradesh), as well as Bangladesh, Sri Lanka, Burma, Thailand, Vietnam, China, and Malaysia. Found in crop lands and short grasses, its primary food sources include various succulent grass weeds, especially *Cynodon dactylon*. It also feeds on broad-leaved plants when its normal food sources are unavailable, with *Pinus roxburghii* being noted in some regions of India. The specimen was compared and confirmed to be conspecific with *S. prasiniferum*.

Specimen 14: Specimen examined included both male and female collected from Udalguri (25°63'N, 99°73'E), in Bodoland Territorial Area in Assam, India in May, 2021.

Taxonomic Account
Order: Orthoptera
Suborder: Caelifera
Family: Acrididae
Subfamily: Catantopinae
G**enus**: *Chondracris*
Species: *Chondracris rosea* (De Geer, 1773)

The specimen exhibits several distinct diagnostic characteristics. The body is large, with a granulose integument. The antennae are filiform and longer than the combined length of the head and pronotum. The fastigium of the vertex is trapezoidal, and the frontal ridge is slightly narrowed at the apex. The pronotum is tectiform, crossed by three transverse sulci, with a raised median carina and no lateral carina present. The morphometry of the males is as follows: body length 68.6 mm, tegmina length 52.68 mm, hind femur length 33.5 mm, and pronotum length 17.1 mm. For females: body length 92.3 mm, tegmina length 70.45 mm, hind femur length 44.78 mm, and pronotum length 23.4 mm. The species is distributed across India (Meghalaya, Bihar, Jharkhand, Assam) and China. Upon comparison, the specimen matches all the diagnostic features and is conspecific with *C. rosea*.

Specimen 15: Specimens examined were males and collected from Udalguri (25°79'N, 89°86'E), in Bodoland Territorial Area in Assam, India in April, 2022.

Taxonomic Account
Order: Orthoptera
Family: Acrididae
Subfamily: Catantopinae
Genus: *Diabolocatantops*
Species: *Diabolocatantops innotabilis*

The specimen examined is a brown-bodied insect with a distinct coloration pattern. The antennae are paler towards the base, gradually darkening towards the apex. The tegmina are mottled with brown, featuring pale spots in the radial area, adding to its characteristic appearance. The hind femur is marked with two prominent oblique black bands on the upper surface, extending internally to the medial area. The pronotum shows slight puncturing, with a posterior margin that is rounded and obtuse-angular, while the median carina is weak and the lateral carina is absent. The morphometric details of the male specimens are as follows: body length of 56.9 mm, tegmina length of 35.68 mm, hind femur length of 43.5 mm, and pronotum length of 18.1 mm. The species distribution includes India, Pakistan, and Nepal. Upon comparison, the specimen exhibits all the diagnostic features of *D. innotabilis*, confirming its conspecific nature.

Specimen 16: Specimens examined included both males and females collected from Udalguri (25°79'N, 89°86'E), in Bodoland Territorial Area in Assam, India in April, 2022.

Taxonomic Account
Order: Orthoptera
Suborder: Caelifera

Family: Pyrgomorphidae
Subfamily: Catantopinae
Genus: Atractomorpha
Species: *Atractomorpha crenulata* (Fabricius, 1793)

The diagnostic characters of the specimen include a medium and slender body, a short fastigium of the vertex, and convex, prominent eyes. The lateral pronotal lobes have a distinct membranous area, especially in females. The hind femora are not clearly convex, while the tegmina are pointed and extend one-fourth of their length beyond the hind femora. The hind wings are normally pink to light mallow purple at the base. Morphometric details: male body length 16.9 mm, antennae length 6.2 mm, pronotum length 3.8 mm, tegmen length 15.8 mm, hind femur length 11.65 mm, hind tibia length 7.8 mm; female body length 28.2 mm, antennae length 6.0 mm, pronotum length 6.8 mm, tegmen length 22.7 mm, hind femur length 12.8 mm, hind tibia length 11.4 mm. Distribution includes India, Nepal, Sri Lanka, Myanmar, and Vietnam. Upon comparison, the specimen was found to exhibit all characteristic features and is confirmed to be conspecific with *A. crenulata*.

Specimen 17: Specimens examined included both males and females collected from Udalguri (25°79'N, 89°86'E), in Bodoland Territorial Area in Assam, India in June, 2022.

Taxonomic Account
Order: Orthoptera
Suborder: Caelifera
Family: Acrididae
Subfamily: Catantopinae
Genus: Tagasta
Species: *Tagasta indica* (Bolívar, 1905)

The diagnostic characters of the specimen include its greenish, punctuate body with an equilaterally triangular fastigium of the vertex. The antennae are inserted near the eye, with long, closely punctured joints, and the cheeks feature a row of large yellow granules behind each eye. The pronotum is obtusely angulated behind, and the tegmina are unspotted, with pinkish wings that are distinctly shorter than the tegmen. Morphometric details: male body length 26.75 mm, antenna length 9.75 mm, pronotum length 7 mm, tegmen length 18 mm, hind femur length 15 mm, hind tibia length 13.25 mm; female body length 33.5 mm, antenna length 11 mm, pronotum length 9.25 mm, tegmen length 24 mm, hind femur length 17.75 mm, hind tibia length 15 mm. Distribution includes India and Bhutan. Upon comparison, the specimen was found to exhibit all characteristic features and is confirmed to be conspecific with *T. indica*.

Specimen 18: Specimens examined included both males and females collected from Udalguri (25°79'N, 89°86'E), in Bodoland Territorial Area in Assam, India in April, 2022.

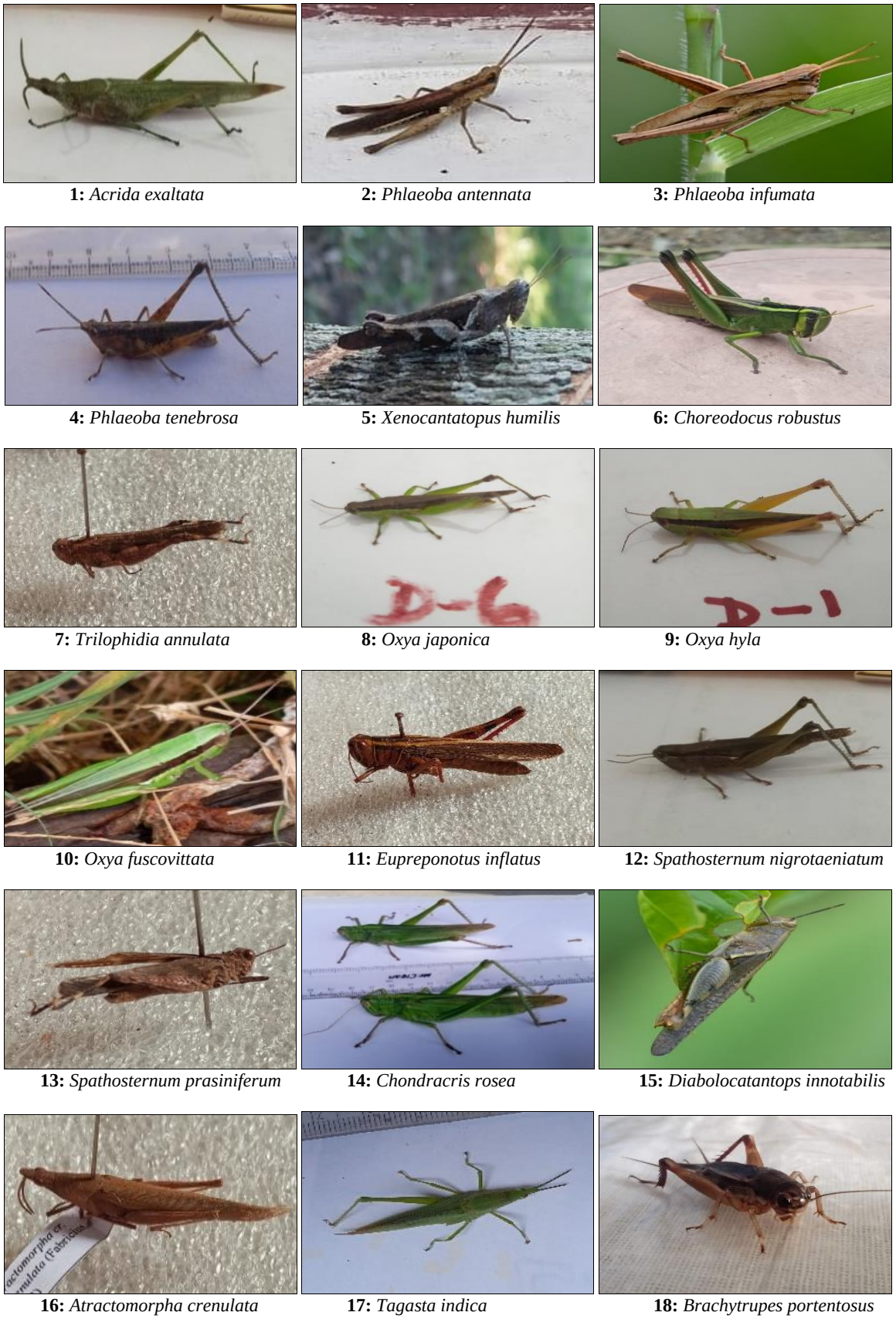
Taxonomic Account
Order: Orthoptera
Family: Gryllidae
Subfamily: Gryllinae
Genus: *Brachytrupes*
Species: *Brachytrupes portentosus* (Lichtenstein, 1796)

The diagnostic characters of the specimen are its large, robust, brown body with a head protruding prominently above the pronotum and a frontal rostrum more than twice the width of the first antennal segment. The pronotum strongly widens towards the front. Morphometric details: male body length 25.6 mm, length with wings 52.3 mm, pronotum length 6.3 mm, post femur length 20.9 mm; female body length 33.6 mm, wing length 52.1 mm, pronotum length 6.3 mm, post femur length 22 mm. Distribution includes India, Pakistan, Myanmar, Malaysia, Vietnam, China, Taiwan, and Nepal. Upon comparison, the specimen was found to exhibit all characteristic features and is confirmed to be conspecific with *B. portentosus*.

Conclusion

The order Orthoptera encompasses grasshoppers, crickets, katydids, and locusts. Orthopteran insects may possess fully developed wings, short wings, or no wings at all. These insects vary in size, ranging from very small to quite large. These insects vary greatly in size, ranging from small to enormous. Their compound eyes are highly developed, and their mouthparts are adapted for biting and chewing. Often, they have one to three ocelli. Antennae can vary in size, from small with only a few segments to long and thread-like with several segments. The prothorax is substantial in size. The hind limbs are enlarged and modified for jumping. Upon reaching maturity, the forewings become elongated, thicker, and develop a submarginal costal vein. The forewings often serve as stridulatory organs, while the hind-wings are membranous with a sizable anal region. Females typically have well-developed ovipositors. In a state of relaxation, the subgenital plate, which is the enlarged 9th abdominal sternum, covers the male external genitalia, which exhibit bilateral symmetry. The subgenital plate may have styles. The cerci are short and unsegmented. Specialized auditory and stridulatory organs are frequently present. Males typically engage in stridulation, though in some species, females also produce sound. Metamorphosis in these insects is incomplete. Orthopterans are found in all physiographic zones of the planet, with the exception of Antarctica. Their distribution is mostly influenced by the presence of specific vegetation types such as grasslands, woodlands, and agricultural fields. The distribution of grasshoppers is influenced by temperature, rainfall, and soil conditions. Additionally, they are dispersed in frigid regions of the nation, with numerous species inhabiting the Himalayan ranges. By examining the gathered specimens, we were able to identify a total of 19 distinct species. The grasshoppers were discovered to exhibit a predatory behaviour, where both nymphs and adult grasshoppers were found to be preyed upon by larger animals such as cats, birds, mantis, garden lizards, and even spiders.

Vegetation directly influences the distribution of Orthopteran species, which are found across all ecological zones, including grasslands, forests, and agricultural environments. The distribution of grasshoppers is affected by factors such as rainfall, soil conditions, and temperature. Orthopterans play a crucial role in maintaining the balance and functioning of grassland ecosystems. As primary consumers, or herbivores, they are essential prey for higher trophic levels. They also contribute to the formation of plant litter, which is vital for soil development, plant growth, and nutrient cycling.



1: *Acrida exaltata* **2:** *Phlaeoba antennata* **3:** *Phlaeoba infumata*

4: *Phlaeoba tenebrosa* **5:** *Xenocantatopus humilis* **6:** *Choreodocus robustus*

7: *Trilophidia annulata* **8:** *Oxya japonica* **9:** *Oxya hyla*

10: *Oxya fuscovittata* **11:** *Eupreponotus inflatus* **12:** *Spathosternum nigrotaeniatum*

13: *Spathosternum prasiniferum* **14:** *Chondracris rosea* **15:** *Diabolocatantops innotabilis*

16: *Atractomorpha crenulata* **17:** *Tagasta indica* **18:** *Brachytrupes portentosus*

Fig 1: Showing images of Orthopteran species

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