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On a collection of Orthoptera from Prayagraj District, Uttar Pradesh, India

Orthoptera is a group of economically important insects including locusts, grasshoppers, katydids, and crickets. Prayagraj is a district of Uttar Pradesh which is situated in the northern region of India. Most of the population in the state is engaged in agriculture. Being a pest of agricultural crops, studies on taxonomy, distribution, and diversity of Orthoptera in this region were carried out by different workers. Shishodia et al. (2010) reported 100 species belonging to 67 genera under nine families from Uttar Pradesh. Usmani et al. (2010), Sharma (2011), and Rafi & Usmani (2013) studied acridid fauna in different regions of Uttar Pradesh. Four species of Orthoptera were reported as endemic to Uttar Pradesh (Chandra & Gupta 2013). Farooqi & Usmani (2016) prepared a checklist of Tettigoniidae of Uttar Pradesh. Recently, Mobin et al. (2017) compiled a checklist of acridids from Uttar Pradesh. In the present document, identification of orthopteran species found in Sam Higginbottom Institute of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh is provided with a key to species and photographs.The specimens of Orthoptera were collected from Sam Higginbottom Institute of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh (25.41351N 81.84686E, 96 m) during a survey conducted in connection with the green skill development programme on 25 August 2017. The collection was made with the help of sweeping net and by direct hand picking. For the morphological studies, specimens were relaxed, stretched, pinned, and labeled. Identification was done with the help of literature. Photographs were taken by a Nikon digital camera (D-7000). All the specimens were collected by H. Kumar and party and deposited in the National Zoological Collection of Zoological Survey of India, Kolkata, India (NZSI).

Altogether, 34 specimens were collected, which revealed the identification of 20 species belonging to 17 genera and 12 subfamilies under four families of Orthoptera. The maximum numbers of specimens belong to family Acrididae. In terms of species richness, subfamily Oedipodinae was the maximum (25%) followed by Acridinae, Hemiacridinae, Oxyinae and Pyrgomorphinae, all of them are represented by 10%. If numbers of specimens are considered, *Spathosternum prasiniferum prasiniferum* (Walker, 1871) was found to be maximum.

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Taxonomic account

	Species	No. of males	No. of females
	Order Orthoptera Olivier 1789 A. Suborder Ensifera Ander 1939 a. Superfamily Tettigonioidea Krauss 1902 I. Family Tettigoniidae Krauss 1902 i. Subfamily Phaneropterinae Burmeister 1838		
1.	*Himertula kinneari* (Uvarov 1923) (Image 1)	1	-
	b. Superfamily Grylloidea Laicharting 1781 I. Family Gryllidae Laicharting 1781 i. Subfamily Gryllinae Laicharting 1781		
2.	*Velarifictorus* (*Velarifictorus*) *aspersus* (Walker 1869) (Image 2)	1	1
	B. Suborder Caelifera Ander 1939 a. Superfamily Pyrgomorphoidea Brunner von Wattenwyl 1874 I. Family Pyrgomorphidae Brunner von Wattenwyl 1874 i. Subfamily Pyrgomorphinae Brunner von Wattenwyl 1874		
3.	*Chrotogonus* (*Chrotogonus*) *trachypterus trachypterus* (Blanchard 1836) (Image 3)	-	1
4.	*Atractomorpha crenulata crenulata* (Fabricius 1793) (Image 4)	1	-
	b. Superfamily Acridoidea MacLeay 1821 I. Family Acrididae MacLeay 1821 i. Subfamily Gomphocerinae Fieber 1853		
5.	*Aulacobothrus sinensis* (Uvarov 1925) (Image 5)	-	1
	ii. Subfamily Acridinae MacLeay 1821		
6.	*Acrida exaltata* (Walker 1859) (Image 6)	2	-
7.	*Phlaeoba infumata* Brunner von Wattenwyl 1893 (Image 7)	1	-
	iii. Subfamily Oedipodinae Walker 1871		
8.	*Trilophidia annulata* (Thunberg 1815) (Image 8)	1	
9.	*Aiolopus simulatrix simulatrix* (Walker 1870) (Image 9)	1	1
10.	*Aiolopus thalassinus tamulus* (Fabricius 1798) (Image 10)	-	1
11.	*Gastrimargus africanus africanus* (Saussure 1888) (Image 11)	-	1
12.	*Ceracris nigricornis nigricornis* Walker 1870 (Image 12)	1	1

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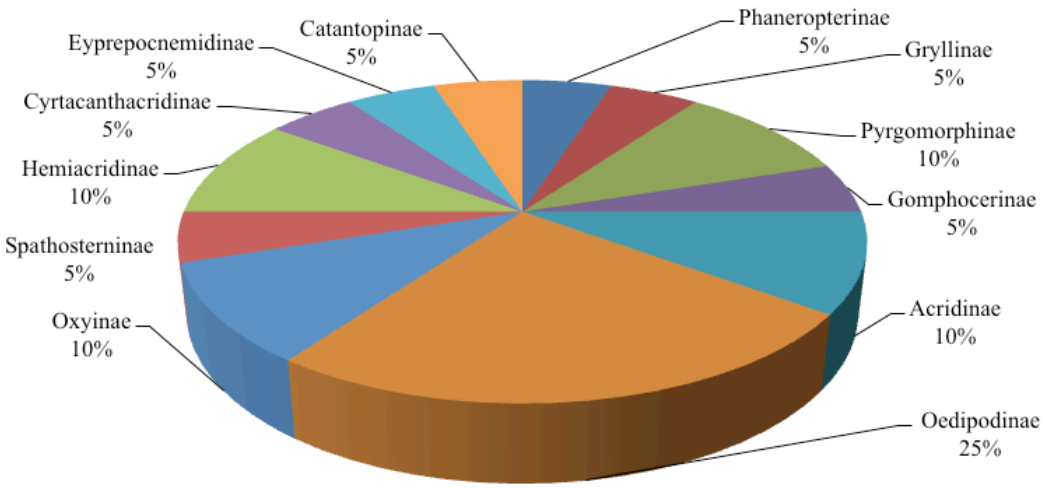
	Species	No. of males	No. of females
	iv. Subfamily Oxyinae Brunner von Wattenwyl 1893		
13.	*Oxya velox* (Fabricius 1787) (Image 13)	1	1
14.	*Oxya japonica japonica* (Thunberg 1815) (Image 14)	-	1
	v. Subfamily Spathosterninae Rehn, 1957		
15.	*Spathosternum prasiniferum prasiniferum* (Walker 1871) (Image 15)	5	2
	vi. Subfamily Hemiacridinae Dirsh 1956		
16.	*Hieroglyphus banian* (Fabricius 1798) (Image 16)	2	
17.	*Hieroglyphus nigrorepletus* Bolívar 1912 (Image 17)	-	2
	vii. Subfamily Cyrtacanthacridinae Kirby 1910		
18.	*Cyrtacanthacris tatarica tatarica* (Linnaeus 1758) (Image 18)	2	-
	viii. Subfamily Eyprepocnemidinae Brunner von Wattenwyl 1893		
19.	*Eyprepocnemis alacris alacris* (Serville 1838) (Image 19)	1	-
	ix. Subfamily Catantopinae Brunner von Wattenwyl 1893		
20.	*Choroedocus illustris* (Walker 1870) (Image 20)	-	1



Percentage occurrence of different subfamilies of Orthoptera.

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Key to species

1. Antennae shorter than body with fewer than 30 segments; tympanal organ if present at the base of abdomen; stridulatory apparatus varied or absent but typically femoro-allary; ovipositor when present short and robust, with inner valves reduced …… **3**
- Antennae about as long as body with many segments; tympanal organ if present on the fore tibia; stridulatory apparatus when present usually tegminal; ovipositor when present usually more or less elongate …… **2**
2. Tarsi 4-segmented .... ***Himertula kinneari*** (Uvarov 1923)
- Tarsi 3-segmented ..... ***Velarifictorus* (*Velarifictorus*) *aspersus*** (Walker 1869)
3. Head of variable shape, but not acutely conical; fastigial furrow absent …… **5**
- Head acutely conical, with regularly incurved frons; fastigial furrow present …… **4**
4. Body depressed and usually rather strongly rugose; tegmina with small nodules on main veins; prosternum with reflexed, collar-like anterior margin ..... ***Chrotogonus* (*Chrotogonus*) *trachypterus trachypterus*** (Blanchard 1836)
- Bodyless robust, not depressed, or, if slightly so (some females); tegmina without nodules on main veins; prosternum without reflexed, collar-like anterior margin …… ***Atractomorpha crenulata crenulata*** (Fabricius 1793)
5. Prosternal process present; hind tibia with or without external apical spine ……**13**
- Prosternal process usually absent, if present, body strongly elongate and antennae ensiform; hind tibia without external apical spine …… **6**
6. Stridulatory serration on inner side of hind femur absent …… **7**
- Stridulatory serration on the inner side of hind femur present …… ..... ***Aulacobothrus sinensis*** (Uvarov 1925)
7. Body rather sturdy; frons usually vertical; medial area of tegmen with intercalary vein usually serrated …… **9**
- Body usually slender; frons oblique; medial area of tegmen usually without intercalary vein, if present, never serrated in both sexes …… **8**
8. Head elongate; hind femur very long and slender …… ***Acrida exaltata*** (Walker 1859)
- Head never elongate; Hind femur never very long and slender …… ... ***Phlaeoba infumata*** Brunner von Wattenwyl 1893
9. Pronotum with median carina crossed by one transverse sulcus or not crossed at all …… **10**
- Pronotum with median carina crossed by two transverse sulci …… ..... ***Trilophidia annulata*** (Thunberg 1815)
10. Pronotum with median carina well developed ..... …… **12**
- Pronotum with median carina weak …… **11**
11. Hind femora short and stout, as wide as width of tegmina; pronotum weakly narrowed and moderately constricted in prozona ..... ***Aiolopus simulatrix simulatrix*** (Walker 1870)
- Hind femora long and slender, narrower than width of tegmina; pronotum saddle-shaped, distinctly narrowed and constricted in prozona …… ..... ***Aiolopus thalassinus tamulus*** (Fabricius 1798)
12. Pronotum with lateral carina weak or absent …… ***Gastrimargus africanus africanus*** (Saussure 1888)
- Pronotum with lateral carina well developed .... ***Ceracris nigricornis nigricornis*** Walker 1870
13. Lower knee lobe of hind femur never spined; valves of ovipositor never serrate or spined; hind tibia never flattened ……**15**
- Lower knee lobe of hind femur spined; valves of ovipositor serrate or spined; hind tibia flattened .. **14**
14. Posterior ventral basivalvular sclerites of ovipositor without any well-defined spines on its lower inner margin ……

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Image 1. *Himertula kinneari* (Uvarov 1923)

Image 2. *Velarifictorus (Velarifictorus) aspersus* (Walker 1869)

Image 3. *Chrotogonus (Chrotogonus) trachypterus trachypterus* (Blanchard 1836)

Image 4. *Atractomorpha crenulata crenulata* (Fabricuius 1793)

Image 5. *Aulacobothrus sinensis* (Uvarov 1921)

Image 6. *Acrida exaltata* (Walker 1859)

Image 7. Phlaeoba infumata
Brunner von Wattanwyl 1893

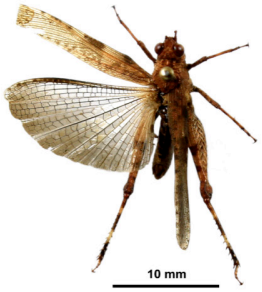

Image 8. *Trilophidla annulata* (Thunberg 1815)

Image 9. *Aiolopus simulatrix simulatrix* (Walker 1870)

Image 10. *Aiolopus thalassinus tamulus* (Fabricius 1798)

Image 13. *Oxya velox* (Fabricius 1787)

Image 14. *Oxya japonica japonica* (Thunberg 1815)

Image 11. *Gastrimargus africanus africanus* (Saussure, 1888)

Image 12. *Ceracris nigricornis nigricornis* (Walker 1870)

Image 15. *Spathosternum prasiniferum prasiniferum* (Walker 1871)

Image 16. *Hierogtyphus banian* (Fabricius 1798)

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Image 17. *Hierogryphus nigroreletus* (Bolivar 1912)

Image 18, *Cyrtacanthacris tatarica tatarica* (Linnaeus 1758)

Image 19. *Eyprepocnemis alacris alacris* (Serville 1838)

Image 20. *Choroedocus illustris* (Walker 1870)

..... ***Oxya velox*** (Fabricius 1787)
- Posterior ventral basivalvular sclerites of ovipositor with one or two tooth-like spines on its inner ventral margin .... ***Oxya japonica japonica*** (Thunberg 1815)
15. Radial area of tegmen without transverse stridulatory veinlets; valves of aedeagus flexure; arolium of variable size **18**
- Radial area of tegmen with a series of regular, parallel, thickened, transverse stridulatory veinlets; valves of aedeagus divided or connected by small or indistinct flexure; arolium large **16**
16. Prosternal process transverse, lamellate, subquadrate or approximately so in outline; apical abdominal tergite with well indicate or subobsolete furcular lobes .....
..... ***Spathosternum prasiniferum prasiniferum*** (Walker 1871)
- Prosternal process usually conical; apical abdominal tergite without furcular lobes **17**
17. Dorsum of pronotum without bands connecting all sulci; male cercus more or less bilobate or bifurcated ... ***Hieroglyphus banian*** (Fabricius 1798)
- Dorsum of pronotum with two broad black parallel bands connecting all sulci; male cercus truncated and pointed .....
..... ***Hieroglyphus nigrorepletus*** Bolívar 1912
18. Mesosternal lobes rounded; ancorae well developed and curved; pronotum with median carina never raised; spermatheca with apical diverticulum moderately long **19**
- Mesosternal lobes rectangular; ancorae small or indistinct; pronotum with median carina slightly raised; spermatheca with apical diverticulum very long and slender .....
. ***Cyrtacanthacris tatarica tatarica*** (Linnaeus 1758)
19. Pronotum with lateral carinae linear; apex of male abdomen normal .....
..... ***Eyprepocnemis alacris alacris*** (Serville 1838)
- Pronotum without lateral carinae, if present, never linear; apex of male abdomen inflated .....
..... ***Choroedocus illustris*** (Walker 1870)

Although 100 species of Orthoptera were reported by Shishodia et al. (2010) from Uttar Pradesh, 15 species belonging to 12 genera in five subfamilies of Tettigoniidae were recorded by Farooqi & Usmani (2016) and 78 species/subspecies belonging to 49 genera in 12 subfamilies of Acrididae were recorded by Mobin et al. (2017). These recent publications showed that in Uttar Pradesh Acrididae is the most dominant family of Orthoptera. Presence of 16 species of Acrididae out of total 20 species of Orthoptera in the collection again shows the dominance of Acrididae in Uttar Pradesh.

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