Pakistan J. Zool., pp 1-6, 2021. **DOI**: https://dx.doi.org/10.17582/journal.pjz/20200516150559

Short Communication

Extended List of Orthoptera Fauna of Cholistan Desert (Punjab, Pakistan)

Santosh Kumar[1]*, Riffat Sultana[2]* and Martin Husemann[3]

[1]*Department of Zoology, Cholistan University of Veterinary and Animal Sciences, Bahawalpur, Punjab, Pakistan*
[2]*Department of Zoology, University of Sindh, Jamshoro, Sindh, Pakistan*
[3]*Center for Natural History Entomology, University of Hamburg, Hamburg, Germany*

Article Information
Received 16 May 2020
Revised 30 June 2020
Accepted 28 July 2020
Available online 24 August 2021

Authors' Contribution
SK collected the samples. RS designed the study and MH identified the species.

Key words
Faunistics, Orthoptera, Cholistan

ABSTRACT

Cholistan has a diverse fauna and flora, but until now its orthopteran fauna is relatively unstudied. The survey was conducted during November 2018 to August 2019. We found 25 species of grasshoppers, crickets and tree crickets. Caelifera were more diverse than Ensifera with 16 and 9 species, respectively. This work is provided an extended list of Orthopterans registered from Cholistan desert for the first time.

The Cholistan desert is a part of the world's seventh largest desert, the Great Desert, which stretches along the south border of Punjab province, Pakistan (Rao *et al*., 1989). The total area of Cholistan desert is about 26,000 km^2; it lies between 27º 42' and 29º 45' North and 69º 52' and 75º 24' East at an altitude of about 112 m above sea level (Arshad *et al*., 2007). Topography, soil type and texture, and vegetation structure divide this desert into two distinct regions: the northern region (Lesser Cholistan) covers about 7,770 km^2 and the southern region (Greater Cholistan) about 18,130 km^2. Greater Cholistan extends from the most recent course of the extinct Hakra River to the border with India (Akhter and Arshad, 2006).

The high diversity of habitats also allows for high biodiversity, especially in insects. As insects, and especially grasshoppers, are known to be a major component of grassland biodiversity they play vital role in food webs, e.g. as primary herbivores ad abundant food resource for other animals, such as birds and reptiles (Quinn *et al*., 1993; Lockwood, 1996). Many species of grasshoppers are further known as pests, which may cause severe damage to crop and farmland. However, while some species are detrimental, many Orthoptera species have been strongly declining, even in remote regions (Hodjat *et al*., 2019). In order to recognize such decline, it is important to have lists of the local fauna. However, despite their importance for the food web, as well as their economic relevance as pests, Orthoptera diversity still is understudied in many regions, also in Cholistan. Therefore, we here provide a first list of Orthoptera species from the Cholistan desert based on field and literature surveys.

Material and methods

The study was conducted in Cholistan desert (27º 42' and 29º 45' N, 69º 52' and 75º 4'27º E). Cholistan, is a barren desert, bound on the north and west by the Hakra depression with ruins of old settlements along its high banks; it is still inhabited by nomads. It is located about 30 km from Bahawalpur. It covers an area of about 16,000 km^2 and extends into the Thar Desert of India. The region was once watered by the Hakra River, known as the Saravati in Vedic times. At one time there were 400 forts in the area and archaeological finds around the Darawar Fort, the only place with a perennial waterhole. The average annual rainfall is only 12 cm, and the only cultivation possible is supported by underground wells, drawn up by the camels.

Collected insects were brought to the laboratory and killed by means of potassium cyanide in standard entomological killing bottles. The specimens were not left too long (30 minutes) in cyanide because the color changed particularly that of green specimens. Specimens were pinned within few hours after sacrificing. Mounting was done according to the standard procedure described by McE-Kevan (1989). Dust and other extraneous matter were removed with the help of a dry camel hairbrush. The fully dried specimens were removed from stretching boards and were stored in standard entomological boxes with labels

* Corresponding author: santoshkumar@cuvas.edu.pk, riffat.sultana@usindh.edu.pk
0030-9923/2021/0001-0001 $ 9.00/0

showing locality, date of collection and collector name. Samples of *Schiozcomicus* were transferred into polythene bags and brought to the laboratory where they were put in small glass jars containing 90% ethanol with a few drops of glycerin. After a couple of weeks, fresh 90% ethanol was added in the glass jars.

Identification of samples was carried out by following Khattar (1972). Collected material was deposited in the Sindh Entomological Museum at the Department of Zoology, University of Sindh, Jamshoro.

Results and discussion

We were able to collect a total of 507 specimens and sorted out into 25 species of Orthoptera; these included 19 Caelifera (true grasshoppers) in the two families Acrididae and Pyrgomorphidae and 8 subfamilies (Acridinae, Cyrtacanthacridinae, Calliptaminae, Eyprepocnemidinae, Oxyinae, Spathosterinae, Oedipodinae and Pyrgomorphinae). Ensifera were less diverse with 9 species in 4 families (Gryllidae, Gryllotalpidae, Schizodactylidae and Tettigoniidae). During this study the more prominent group was Caelifera, which is mainly diurnal and particularly active in warm weather and sunshine. During field survey it was noted that grasshoppers we mainly caught on the ground or in low vegetation when the temperature was high. Generally, more individual-rich and more diverse catches were made in summer and spring, whereas numbers decline with a rise in temperature from February to October in Cholistan.

Number of species in all recognized families of different orders collected from Cholistan Desert were as follows:

Sub-order: Caelifera
Family: Acrididae
Sub-family: Acridinae
Species: *Acrida exaltata* (Walker, 1859)
Truxalis eximia eximia (Eichwald, 1830)
Sub-family: Cyrtacanthacridinae
Species: *Schistocerca gregaria* (Forskal, 1775)
Sub-family: Calliptaminae
Species: *Acorypha glaucopsis* (Walker, 1870)
Sphodromerus undulatus undulatus (Kirby, 1914)
Sub-family: Eyprepocnemidinae
Species: *Eyprepocnemis alacris alacris* (Audinet-Serville, 1838)
E. alacris impicta (Uvarov, 1933)
Sub-family: Oxyinae
Species: *Oxya hyla hyla* Audinet-Serville
O. velox (Fabricius, 1831)
Sub-family: Spathosterinae
Species: *Spathosternum prasiniferum* (Walker, 1871)
Sub-family: Oedipodinae
Species: *Acrotylus humbertians*, Saussure, 1884
A. longipes longipes, Charpentier, 1845
Aiolopus thalassinus thalassinus, (Fabricius, 1781)
A. thalassinus tamulus, (Fabricius, 1798)
Locusta migratoria (Linnaeus, 1758)
Sphingonotus savignyi Saussure 1884
Family: Pyrgomorphidae
Sub-family: Pyrgomorphinae
Species: *Chrotogonus tracypterus trachypterus* (Blanchard, 1836)
C. trachypterus robertsi Kirby, 1914
Pyrgomorpha bispinosa bispinosa (Walker, ,1870)
Poekilocerus pictus (Fabricius, 1775) (F.)
Sub-order: Ensifera
Family: Gryllidae
Sub-family: Gryllinae
Species: *Acheta domesticus* (Linnaeus, 1758)
Gryllus (Gryllus)bimaculatus Degeer, 1773
G. (Gryllus) campestris Linnaeus, 1758
Gryllodes sigillatus Walker, 1869
Family: Gryllotalpidae
Sub-family: Gryllotalpinae
Species: *Gryllotalpa africana* Palisot de Beauvois 1805
Gryllotalpa krimbasi Baccetti, 1992
Family: Schizodactylidae
Sub-family: Schizodactylinae
Species: *Schizocomicus* nov.gen Riffat 2019
Family: Tettigoniidae
Sub-family: Tettigoniinae
Species: *Phaneroptera spinosa,* Bei-Bienko, 1965
P. roseata, Walker, 1869

The current paper adds to the findings of Riffat *et al.* (2013), who reported 29 species of Orthoptera from the Thar Desert (N 24.8777°, E 70.2408°), of these 24 belonged to Acrididae, 4 to Pyrgomorphidae and a single species to the Tetrigidae. However, the authors were not able to report any single species of Ensifera from Thar. During this study we have reported 9 species of Ensifera of these 4 belong to family Gryllidae, 2 from Gryllotalpidae and Tettigoniinae and only single species from Schizodactyae.

The most important species in terms of conservation is the genus *Schizocomicus* Riffat (2019), which is endemic to Cholistan and Thar Desert of Pakistan. It is very interesting to note that during the present study 3 specimens of *Schizocomicus* were reported. Mostly they are burrow makers (both adults and nymphs). They hide themselves in burrows at day time while at night they came out from their burrows. The adults and nymphs usually dig

their burrows near or close to water channel. Although, all species of Schizodactylidae were believed to inhabit self-constructed burrows during the day. In our survey we just saw tracing of different burrows on different spots that were descending at an angle of 45-60 degree varying with the slope of the surface and the sands angle of repose. We determined the moisture content and particle size of the sand, but as we were not able to open any burrow we also could not observe the specimen inside. The specimens which are in our hands were incidentally captured at 3:30 AM at different dates.

During this study we have reported that a number of orthopterans live underground, but are not burrowers, and comprise a number of cavernicolous or hypogean species like *Schizocomicus* and *Gryllotalpa.* It was observed that the orthopterans had higher densities and diversities compared to other groups of insects (i.e. Mantidae, Phasmidae).

A most unusual habitat in which orthopterans particular small crickets (ant-loving or ant-inquiline crickets) are expected to be found is within ant nests. However, during this survey we couldn't register any member of ant-inquiline crickets. Present study strongly recommend that more extensive and regular surveys are needed in this region in order to explore the hidden wealth of this desert at globally.

Acknowledgment

Authors are grateful to the Higher Education Commission (HEC) Islamabad for a research grant under NRPU-2015 (Project No. 6737).

Statement of conflict of interest

The authors have declared no conflict of interest.

References

Akhter, R. and Arshad, M., 2006. *Pak. Vet. J.*, **29**: 85-92.

Arshad, M., Ashraf, M.Y., Ahamad, M. and Zaman, F., 2007. *Pak. J. Bot*., **39**: 1481-1488.

Hodjat, S.H., Saboori, A. and Husemann, M., 2019. *J. Crop Prot*., **8**: 135-142.

McE-Kevan, D.K., 1989. *Rev. Ecol. Biol. Sol.,* **26**: 267-289.

Khattar, N., 1972. *J. Nat. Hist*., **6**: 589-600. https://doi.org/10.1080/00222937200770521

Lockwood, J.A., 1996. *Grasshopper population dynamics: A prairie perspective*. In: *The bionomics of grasshoppers, katydids and their kin* (eds. S.K. Gangwere, M.C. Muralirangan and M. Muralirangan). CAB International, Wallingford, UK, pp. 103–127.

Rao, A.R., Arshad, M. and Shafiq, M., 1989. *Perennial grass germplasm of Cholistan desert and its phytosociology.* Cholistan Institute of Desert Studies, Islamia University, Bahawalpur, Pakistan, pp. 1-160.

Riffat, S. and Wagan, M.S., 2015. *Grasshoppers and locusts of Pakistan*. 1st ed. HEC-Pakistan. pp. 180.

Riffat, S., 2019. *Pakistan J. Zool.,* **51**: 1693-1697. http://dx.doi.org/10.17582/journal.pjz/2019.51.5.1693.1697

Quinn, M.A., Johnson, P.S., Butterfield, C.H. and Walgenbach, D.D., 1993. *Environ. Ent*., **22**: 993–1002. https://doi.org/10.1093/ee/22.5.993