

# Diversity of short-horned grasshoppers (Insecta: Orthoptera) in the Sunderban Biosphere Reserve, West Bengal, India

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## Abstract

The present study aimed to establish the diversity of short-horned grasshoppers in the Sunderban Biosphere Reserve. The survey was conducted from April 2011 to March 2013 at 29 different localities of Sunderbans. Altogether 19 species of Acridoidea and Pyrgomorpoidea under 16 genera belonging to 13 tribes of 9 subfamilies spread over 2 families from Sunderban Biosphere Reserve are reported. The distribution of some species differed markedly from one site to another. Among the two families, Acrididae holds the highest number of species, followed by family Pyrgomorphidae. Among them, *Gastrimargus africanus africanus* (Saussure, 1888), *Heteracris pulchra* (Bolivar, 1902), *Hieroglyphus banian* (Fabricius, 1798) and *Tristria pulvinata* (Uvarov, 1912) are reported for the first time from Sunderban Biosphere Reserve.

**Keywords:** Acridoidea, Distribution, New Record, Pyrgomorpoidea

## Introduction

The Orthopterans are distributed throughout the physiographic zones of the world but their distribution largely depends on the vegetations prevailing in grass fields, forests, and agricultural lands. Temperature, seasonal rainfall and soil conditions are some important factors that also determine the distribution of grasshoppers. The members of Acridoidea and Pyrgomorpoidea are commonly known as short-horned grasshoppers. They have high taxonomic importance and are primitive insect groups with unspecialized wings.

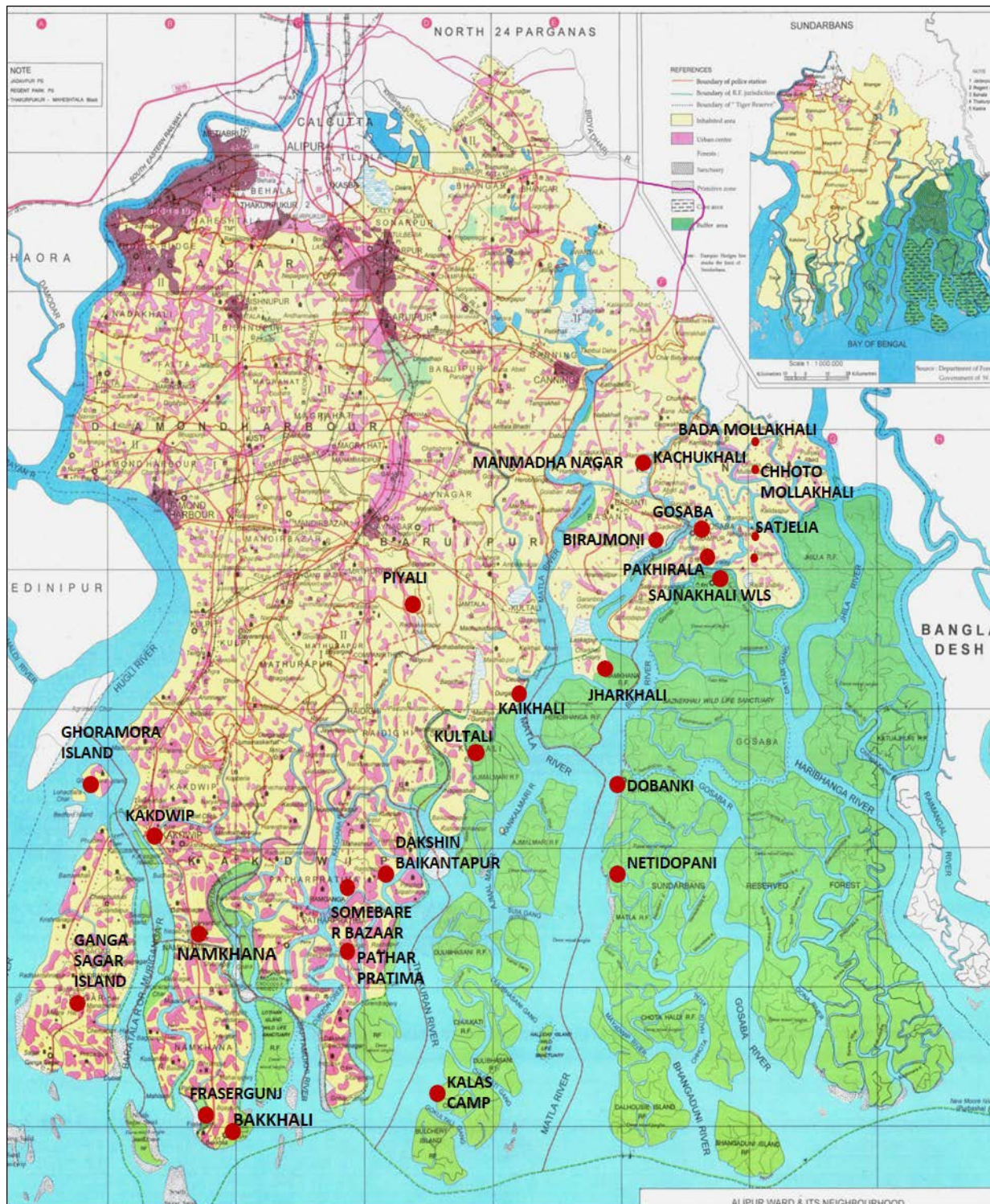
The Sundarbans Forest is about 10,000 sq km across India and Bangladesh. Almost 60 % of these mangrove forests lies in Bangladesh and the rest are in West Bengal, India. Sunderban Biosphere Reserve, situated in the state of West Bengal (21°30' to 22°15' N and 88°10' to 89°10' E), India, is considered one of the most important wetlands globally and has almost 9600 sq. km. area (4200 sq. km. of reserve forest and 5400 sq. km. of the non-forest inhabited region) (Mitra *et al.*, 2016). Due to its unique and enriched ecosystem, this region holds unique biodiversity. The taxonomic study on the order Orthoptera in Sunderbans is very poor. In series of

contributions, Bhowmik (1986), Mandal & Nandi (1989), Agrawal & Ghose (1995) and Barman (1993) enriched the orthopteran fauna of this area. An enlightened work has been made on the population fluctuation of grasshopper fauna in the Sunderban region by Sharma (2012). Mitra *et al.*, (2014) has also been incorporated two more orthopteran species of the family Gryllidae as new records from Sunderban. Apart from that Das *et al.*, (2016) reported 38 species of Orthoptera with 17 new records to Sunderban Biosphere Reserve.

## Material and Methods

The study was conducted from April 2011 to March 2013 at 29 different localities of Sunderbans (Table 1) *viz.* Gosaba, Bidya beat, Sajnakhali Wildlife Sanctuary, Pakhiralla village, Dobanki, Netidopani, Satjalia, Chotta Mollakhali, Amtali village, Kotchukhali Mansatala, Kotchukhali 3 no. village, Beltalia, Manmadhanagar, Birajmoni, Jharkhali, Kaikhalli, Somebarer bazaar, Pathar Pratima, Dakshin Baikantapur, Kalas camp, Katamari village, Kella, Piyali, Ganga Sagar island, Ghoramora island, Kakkdweep, Bakkhali, Fraserganj, and Henry island, (Figure 1). The specimens were collected either by hand or by sweeping

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net in the daytime from the different areas of Sunderbans. In the nighttime, the collection was made using light of 100 watts mercury vapour lamp in front of white cloth (2 x 2 meters). The grasshoppers were collected mainly from

the grass field, low vegetation, bare ground, vegetations by the side of the aquatic body, nearby mangrove plants, shrubs, rice fields, and also handpicked some grasshoppers found inside the soil cervices. The specimens were studied

with the help of a Stereo Zoom Binocular Microscope. The Checklist of Indian Orthoptera by Shishodia *et al.*, (2010) has been followed for the classification, taxonomic and distributional details. All the material used in this work has been collected by D. S. Chand and party from different parts of Sunderban, West Bengal and deposited in Orthoptera section of Zoological Survey of India, Kolkata.

## Systematic Account

Order ORTHOPTERA

Suborder CAELIFERA

I. Superfamily ACRIDOIDEA Macleay, 1821

Family ACRIDIDAE Macleay, 1821

Subfamily ACRIDINAE Macleay, 1821

Tribe **Acridini** MacLeay, 1821

Genus **Acrida** Linnaeus, 1758

**Table 1.** Details of Surveys conducted in different localities of Sunderban Biosphere Reserve, district South 24 Parganas, West Bengal.

S. No.	Locality	Habitat	Long./ Lat. (in degree decimals)
1	Gosaba Island	Grassland, Agricultural Field	22°10.455' N; 88° 39.117' E
2	Bidya Beat	Aquatic, Mangrove Forest	22°09.956' N; 88° 47.665' E
3	Sajnekhali Wildlife Sanctuary	Aquatic, Mangrove Forest	22°07.477' N; 88° 49.816' E
4	Pakhiralla Village	Aquatic, Grassland, Agricultural Field	22°07.806' N; 88° 49.310' E
5	Dobanki	Grassland, Aquatic, Mangrove Forest	22°59.338' N; 88° 45.320' E
6	Netidopani	Grassland, Aquatic, Mangrove Forest	22°55.145' N; 88° 44.797' E
7	Satjalia	Grassland, Agricultural Field	22°10.082' N; 88° 52.641' E
8	Chotta Mollakhali	Grassland, Aquatic and Agricultural Field	22°09.976' N; 88° 52.753' E
9	Amtali Village	Grassland, Agricultural Field	22°14.771' N; 88° 53.998' E
10	Kotchakhali Mansatalla	Grassland, Agricultural Field	22°12.367' N; 88° 49.581' E
11	Kotchakhali Mansatalla, 3 No. Village	Grassland, Agricultural Field	22°12.728' N; 88° 49.818' E
12	Beltalia	Grassland, Agricultural Field	22°12.028' N; 88° 48.825' E
13	Manmadha Nagar	Grassland, Agricultural Field	22°12.112' N; 88° 48.825' E
14	Birajmoni	Grassland, Agricultural Field	22°09.698' N; 88° 47.540' E
15	Jharkhali	Grassland, Aquatic, Agricultural Field, Mangrove Forest	22°01.314' N; 88° 96.847' E
16	Kaikhali	Grassland, Aquatic, Agricultural Field, Mangrove Forest	22°59.093' N; 88° 32.724' E
17	Attastalla	Grassland, Agricultural Field	22°01.670' N; 88° 36.900' E
18	Somebarer Bazar	Grassland, Agricultural Field	21°58.300' N; 88° 35.920' E
19	Dakshin Baikantapur	Grassland, Agricultural Field	21°52.043' N; 88° 32.358' E
20	Pathar Pratima	Grassland, Agricultural Field	21°47.435' N; 88° 22.991' E
21	Kalas Camp	Grassland, Mangrove Forest	21°41.471' N; 88° 34.096' E
22	Katamari Village	Grassland, Agricultural Field	21°53.076' N; 88° 35.342' E
23	Kella	Grassland, Agricultural Field, Mixed vegetation, Aquatic	22°07.940' N; 88° 34.944' E
24	Piyali	Grassland, Agricultural Field	22°09.182' N; 88° 36.126' E
25	Gangasagar Island	Grassland, Agricultural Field	21°68.553' N; 88° 25.512' E

26	Ghoramora Island	Grassland, Agricultural Field	21°54.148' N; 88° 07.769' E
27	Kakdwip	Grassland, Agricultural Field	20°07.361' N; 88° 49.064' E
28	Bakkhali	Aquatic and Agricultural Field	20°08.584' N; 88° 49.385' E
29	Fraserganj	Aquatic and Agricultural Field	20°08.141' N; 88° 34.170' E

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

1859. *Truxalis exaltata* Walker, *Ann. Mag. nat. Hist.*, 4(3): 222.  
1969. *Acrida exaltata* : Tandon & Shishodia, *Oriental Ins.*, 3(3): 267.

*Material examined*: 1 ex, Gosaba, 18.ix.2011; 1 ex, Beltalia, 25.ix.2011; 1 ex, Birajmoni, 26.ix.2011; 1 ex, Kaikhali, 3.iv.2012; 1 ex, Dakshin Baikantapur, 4.xi.2012; 1 ex, Kaikhali, 9.xi.2012; 1 ex, Kakdweep, 12.iv.2013.

*Distribution*: India: Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Bangladesh, Iran, Pakistan, Saudi Arabia, South East Tibet, Sri Lanka, Yemen and West Aden.

*Remarks*: This species was listed from Sunderban by Mandal and Nandi (1989).

Tribe **Phlaeobini**, Brunner von Wattenwyl, 1893

Genus **Phlaeoba** Stal, 1861

### 2. *Phlaeoba infumata* Brunner von Wattenwyl, 1893

1893. *Phlaeoba infumata* Brunner von Wattenwyl, *Ann. Mus. Genova*, 33(2): 124.

*Material examined*: 1 ex, Pakhiala, 20.ix.2011; 1 ex, Satjalia, 22.ix.2011; 1 ex, Gosaba Island, 0.iv.2012.

*Distribution*: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. *Elsewhere*: Bangladesh, East Nepal, Hainan Islands, Myanmar, South and North Malacca, South China, Tenasserim and Yunnan.

*Remarks*: This species was reported from Sunderban by Hazra *et al.* (1993).

Subfamily EYPREOCNEMIDINAE Brunner von Wattenwyl, 1893

Tribe **Eypreocnemidini** Brunner von Wattenwyl, 1893

Genus **Eypreocnemis** Fieber, 1853

### 3. *Eypreocnemis alacris alacris* (Serville, 1839)

1839. *Acridium alacre* Serville, *Ins. Orth.*: 682.  
1969. *Eypreocnemis alacris alacris*: Tandon & Shishodia, *Oriental Ins.*, 3(3): 266.

*Material examined*: 1 ex, Chotta mollakhali, 23.ix.2011; 1 ex, Kella, 10.xi.2012.

*Distribution*: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Manipur, Maharashtra, Meghalaya, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Bangladesh, Iran, Iraq, Pakistan and Sri Lanka.

*Remarks*: This species was listed from Sunderban by Mandal and Nandi (1989).

Genus **Heteracris** Walker, 1870

### 4. *Heteracris pulchra* (Bolivar, 1902)

1902. *Eypreocnemis pulcher* Bolivar, *I. Ann. Soc. Ent. Fr.*, Paris, 70: 630.  
2007. *Heteracris pulcher*, Bhowmik, *Zool. Sur. India*, 6(1-3):52.

*Material examined*: 1 ex, Kaikhali, 3.iv.2012; 1 ex, Kella, 10.xi.2012.

*Distribution*: India: Andhra Pradesh, Bihar, Delhi, Odisha, Tamil Nadu, Uttarakhand and West Bengal. *Elsewhere*: Sri Lanka.

*Remarks*: This is the first report of this species from Sunderban Biosphere Reserve.

Subfamily GOMPHOCERINAE Fieber, 1853

Tribe **Dociostaurini** Mishchenko, 1974

Genus **Leva** Bolivar, 1909

### 5. *Leva indica* (Bolivar, 1902)

1902. *Gymnbothrus indicus* Bolivar, *Ann. Soc. ent. Fr.*, Paris, 70: 596.  
1921. *Leva indica*: Uvarov, *Ann. Mag. nat. Hist. London*, 7(9): 485.

*Material examined*: 1 ex, Amtali, 24.ix.2011; 1 ex, Kotchukhali mansatalla, 24.ix.2011; 1 ex, Jharkhali, 2.iv.2012; 1 ex, Kaikhali, 4.iv.2012.

*Distribution:* India: Andhra Pradesh, Bihar, Chhattisgarh, Delhi, Karnataka, Madhya Pradesh, Odisha, Rajasthan, Tamil Nadu, Tripura and West Bengal. *Elsewhere:* Sri Lanka.

*Remarks:* This species was listed from Sunderban by Mandal and Nandi (1989).

Subfamily OEDIPODINAE Walker, F. 1871

Tribe **Epacromiini** Brunner von Wattenwyl, 1893

Genus **Aiolopus** Fieber, 1853

**6. *Aiolopus thalassinus tamulus*** (Fabricius, 1798)

1798. *Gryllus tamulus* Fabricius, *Entomologia systematica Suppl.*: 195.

1968. *Aiolopus thalassinus tumulus*: Hollis, *Bull. Br. Mus. nat. Hist., (Ent.)*, 22(7): 347.

*Material examined:* 2 ex, Gosaba, 18.ix.2011; 1 ex, Bidya beat, 19.ix.2011; 3 ex, Dobanki beat, 19.ix.2011; 1 ex, Netidopani beat, 20.ix.2011; 1 ex, Pakhiralla, 20.ix.2011; 2 ex, Satjallia, 23.ix.2011; 1 ex, Chotta mollakhali, 23.ix.2011; 1 ex, Boda mollakhali, 24.ix.2011; 1 ex, Sajnekhali WLS, 18.ix.2011; 1 ex, Amtali, 24.ix.2011; 1 ex, Kotchakhalli Mansatalla, 24.ix.2011; 1 ex, Beltalia, 25.ix.2011; 2 exes, Jharkhali, 2.iv.2012; 2 exes, Kaikhali, 3.iv.2012; 1 ex, Dakshin Baikantapur, 4.xi.2012; 2 ex, Patharpratima, 5.xi.2012; 4 exes, Kalas Camp, 5.xi.2012; 1 ex, Piyali, 11.xi.2012; 1 ex, Bakkhali, 6.iv.2013; 1 ex, Frasergunj, 7.iv.2013.

*Distribution:* India: Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Bihar, Chhattisgarh, Delhi, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere:* Australia, Bangladesh, Borneo, Brunei, Celebes, China, Hainan, Hong Kong, Indonesia, Japan, Java, Lombok, Malaysia, Myanmar, New Guinea, Pakistan, Papua, Philippines, Singapore, Sri Lanka, Sumatra, Taiwan, Thailand and Timor.

*Remarks:* This species was listed from Sunderban by Mandal and Nandi (1989).

Tribe **Locustini** Kirby, 1825

Genus **Gastrimargus** Saussure, 1884

**7. *Gastrimargus africanus africanus*** (Saussure, 1888)

1888. *Oedaleus (Gastrimargus) marmoratus* var. *africana* Saussure, *Mem. Soc. Phys. Hist. Nat. Geneve* 30(1): 39.

1982. *Gastrimargus africanus africanus* : Ritchie, *Bull. Br. Mus. (Nat. Hist.) Ent.*, 44(4): 248.

*Material examined:* 1 ex, Jharkhali, 2.iv.2012; 1 ex, Kaikhali, 3.iv.2012.

*Distribution:* India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Odisha, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere:* Africa; Myanmar; Nepal; Pakistan; Saudi Arabia; Sri Lanka; Thailand; Tibet and Yemen.

*Remarks:* This is the first report of this species from Sunderban Biosphere Reserve.

Genus **Oedaleus** Fieber, 1853

**8. *Oedaleus abruptus*** (Thunberg, 1815)\*

1815. *Gryllus abruptus* Thunberg, *Mem. Acad. Sci. St. Petersb.*, 5: 233.

1884. *Oedaleus abruptus*: Saussure, *Mem. Soc. Phys. Hist. Nat. Geneve*, 28(9): 110, 117.

*Material examined:* 2exs, Ganga Sagar Island, 1.iv.2013; 1 ex, Kakdweep, 5.iv.2013; 1 ex, Patharpratima, 10.iv.2013.

*Distribution:* India: Andhra Pradesh, Arunachal Pradesh, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Puducherry, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere:* Afghanistan, Bangladesh, China, Indo- China, Myanmar, Nepal, Pakistan, Sri Lanka, Taiwan, Thailand and Vietnam.

*Remarks:* This has been reported by Das *et al.*, in 2016 from Sunderban Biosphere Reserve.

Tribe **Trilophidiini** Shumakov, 1963

Genus **Trilophidia** Stal, 1873

**9. *Trilophidia annulata*** (Thunberg, 1815)

1815. *Gryllus annulatus* Thunberg, *Mem. Acad. Sci. St. Petersb.*, 5: 234.

1905. *Trilophidia annulata* : Bolivar, I. *Mem. Soc. espan. Hist. nat.*, 1: 224.

*Material examined:* 1 ex, Pakhiralla, 20.ix.2011; 1 ex, Birajmoni, 28.ix.2011; 1 ex, Chulkati, 9.iv.2012; 1 ex, Somebarer bazar, 3.xi.2012.

*Distribution:* India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland,

Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Bangladesh, Borneo, China, Hong Kong, Japan, Java, Korea, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sarawak, Singapore, Sri Lanka, Sumatra, Taiwan, Thailand and Vietnam.

*Remarks*: This species was listed from Sunderbans by Mandal and Nandi (1989).

Subfamily HEMIACRIDINAE Dirsh, 1956

Tribe **Hieroglyphini** Bolivar, 1912

Genus **Hieroglyphus** Krauss, 1877

**10. Hieroglyphus banian** (Fabricius, 1798)

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**.

*Material examined*: 1 ex, Kaikhali, 3.iv.2012.

*Distribution*: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan; Bangladesh; Bhutan; China; Myanmar; Nepal; Thailand and Vietnam.

*Remarks*: This species is reported for the first time in Sunderban Biosphere Reserve.

Subfamily OXYINAE Brunner von Wattenwyl, 1893

Tribe **Oxyini** Brunner von Wattenwyl, 1893

Genus **Gesonula** Uvarov, 1940

**11. Gesonula punctifrons** (Stal, 1861)

1861. *Acridium (Oxya) punctifrons* Stal, *Kong I. Svensk. Fregat Eugen. Res. Omkring Jorden*, **3**: 336.

1975. *Gesonula punctifrons*: Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)*, **31**: 209.

*Material examined*: 1 ex, Gosaba, 18.ix.2011; 2 exes, Kaikhali, 5.iv.2012; 1 ex, Sajnekhali WLS, 18.ix.2011; 1 ex, Kaikhali, 1.xi.2012; 1 ex, Kakdweep, 5.iv.2013; 1 ex, Bakhali, 6.iv.2013; 1 ex, Fraserganj, 7.iv.2013.

*Distribution*: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal. *Elsewhere*: Bangladesh, Borneo, China, Hainan, Japan, Java, Kalimantan, Malacca, Myanmar, North Vietnam, Philippines, Sri Lanka, Taiwan, Thailand and Tongking.

*Remarks*: This species was listed from Sunderbans by Mandal & Nandi (1989).

Genus **Oxya** Serville, 1831

**12. Oxya fuscovittata** (Marschall, 1836)

1836. *Gryllus fuscovittatus* Marschall, *Ann. Wien. Mus.*

*Vienna*, **1**(2): 211.

1971. *Oxya fuscovittata*: Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)*, **26**(7): 322.

*Material examined*: 1 ex, Gosaba, 18.ix.2011; 1 ex, Pakhiralla, 20.ix.2011; 1 ex, Satjallia, 23.ix.2011; 1 ex, Chotta mollakhali, 23.ix.2011; 1 ex, Jharkhali, 2.iv.2012; 2 exes, Kaikhali, 3.iv.2012; 1 ex, Dakshin Baikantapur, 4.xi.2012; 2 ex, Patharpratima, 5.xi.2012; 1 ex, Katamari village, 9.xi.2012; 1 ex, Bakkhali, 6.iv.2013.

*Distribution*: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Bangladesh, Nepal, Pakistan.

*Remarks*: This species was listed from Sunderbans by Mandal and Nandi (1989).

**13. Oxya hyla** Serville, 1831

1831. *Oxya hyla* Serville, *Ann. Sci. nat. (Zool.) Paris*, **22**: 287.

*Material examined*: 1 ex, Gosaba, 18.ix.2011; 1 ex, Bidya beat, 19.ix.2011; 8 exes, Pakhiralla, 20.ix.2011; 2 ex, Satjallia, 23.ix.2011; 3 exes, Chotta mollakhali, 23.ix.2011; 1 ex, Boda mollakhali, 24.ix.2011; 1 ex, Kotchakhalli Mansatalla, 24.ix.2011; 3 exes, Jharkhali, 2.iv.2012; 10 exes, Kaikhali, 3.iv.2012; 2 ex, Dakshin Baikantapur, 4.xi.2012; 2 ex, Patharpratima, 5.xi.2012; 1 ex, Kalas, 7.xi.2012; 1 ex, Piyali, 11.xi.2012; 1 ex, Bakkhali, 6.iv.2013; 1 ex, Fraserganj, 7.iv.2013.

*Distribution*: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Mrica, Angola, Bangladesh, Benin, Cameroun, Chad, Central African Republic, Cote d'ivoire, Iran, Fernando, Gabon, Gambia, Ghana, Guinea, Iran, Kenya, Liberia, Madagascar, Maldives Island, Mali,

Malawi, Nepal, Niger, Nigeria, Pakistan, Sao Thome, Senegal, Sierra Leone, Sudan, Sri Lanka, Tanzania, Uganda, Zaire and Zambia.

*Remarks:* This species was listed from Sunderbans by Mandal and Nandi (1989).

#### 14. *Oxya nitidula* (Walker, 1870)

1870. *Acridium nitidulum* Walker, *Cat. Derm. Salt. Brit. Mus.*, 4: 631.

1971. *Oxya nitidula* : Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)*, 26(7): 315.

*Material examined:* 1 ex, Gosaba, 18.ix.2011; 1 ex, Pakhiralla, 20.ix.2011; 1 ex, Satjallia, 23.ix.2011; 1 ex, Chotta mollakhali, 23.ix.2011; 1 ex, Boda mollakhali, 24.ix.2011; 1 ex, Jharkhali, 2.iv.2012; 2 exes, Kaikhali, 3.iv.2012; 1 ex, Piyali, 11.xi.2012.

*Distribution:* India: Andhra Pradesh, Bihar, Chhattisgarh, Goa, Karnataka, Kerala, Madhya Pradesh, Manipur, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura and West Bengal. *Elsewhere:* Sri Lanka.

*Remarks:* This species was listed from Sunderbans by Mandal and Nandi (1989).

#### 15. *Oxya velox* (Fabricius, 1787)

1787. *Gryllus velox* Fabricius, *Mantissa Insectorum stens eorum species nuper detectas adjectis characteribus genericis, differentiis specificis, emendationibus, observationibus*, 2(1): 239.

2010. *Oxya velox*: Shishodia *et al.*, *Rec. zool. Surv. India, Occ. Paper No.*, 314: 112.

*Material examined:* 1 ex, Pakhiralla, 20.ix.2011; 1 ex, Patharpratima, 5.xi.2012; 1 ex, Ganga Sagar Island, 1.iv.2013.

*Distribution:* India: Andhra Pradesh, Arunachal Pradesh, Bihar, Assam, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Madhya Pradesh, Manipur, Maharashtra, Meghalaya, Nagaland, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere:* Bangladesh, China, Myanmar, Pakistan, Singapore, Sri Lanka and Thailand.

*Remarks:* This has been reported by Das *et al.*, in 2016 from Sunderban Biosphere Reserve.

Subfamily SPATHOSTERNINAE Rehn, 1957

Tribe **Spathosternini** Rehn, 1957

Genus **Spathosternum** Krauss, 1877

#### 16. *Spathosternum prasiniferum prasiniferum* (Walker, 1871)

1871. *Heteracris prasiniferum* Walker, *Cat. Derm. Salt. Brit. Mus.*, 5: 65.

2010. *Spathosternum prasiniferum prasiniferum*: Shishodia *et al.*, *Rec. zool. Surv. India, Occ. Paper No.*, 314: 114.

*Material examined:* 3 exes, Gosaba, 18.ix.2011; 1 ex, Sajnekhali WLS, 18.ix.2011; 1 ex, Bidya beat, 19.ix.2011; 1 ex, Dobanki beat, 19.ix.2011; 1 ex, Netidopani beat, 20.ix.2011; 1 ex, Pakhiralla, 20.ix.2011; 2 ex, Satjallia, 23.ix.2011; 3 exes, Chotta mollakhali, 23.ix.2011; 1 ex, Boda mollakhali, 24.ix.2011; 1 ex, Amtali, 24.ix.2011; 1 ex, Kotchakhalli Mansatalla, 24.ix.2011; 1 ex, Beltalia, 25.ix.2011; 2 exes, Jharkhali, 2.iv.2012; 2 exes, Kaikhali, 3.iv.2012; 2 exes, Sajnekhali WLS, 6.iv.2012; 1 ex, Chulkati, 11.iv.2012; 1 ex, Dakshin Baikantapur, 4.xi.2012; 2 ex, Patharpratima, 5.xi.2012; 1 ex, Piyali, 11.xi.2012; 1 ex, Bakkhali, 6.iv.2013; 1 ex, Frasergunj, 7.iv.2013.

*Distribution:* India: Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere:* Bangladesh, Hainan, Myanmar, Nepal, Pakistan, South and East China, Sri Lanka, Thailand, Vietnam and West Malaysia.

*Remarks:* This species was listed from Sunderbans by Mandal and Nandi (1989).

Subfamily TROPIDOPOLINAE Jacobson, 1905

Tribe **Tristriini** Mishchenko, 1945

Genus **Tristria** Stål, 1873

#### 17. *Tristria pulvinata* (Uvarov, 1921)

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

1929. *Tristria pulvinata* : Uvarov, *Rev. Suisse Zool.*, 36: 559.

*Material examined:* 1 ex, Pakhiralla, 20.ix.2011; 1 ex, Patharpratima, 5.xi.2012; 1 ex, Ganga Sagar Island, 1.iv.2013.

*Distribution:* India: Andhra Pradesh, Assam, Bihar, Delhi, Haryana, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Punjab, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere:* Sri Lanka.

*Remarks:* This species is reported for the first time in Sunderban Biosphere Reserve.

Superfamily PYRGOMORPHOIDEA Brunner von Wattenwyl, 1874

II. Family PYRGOMORPHIDAE Brunner von Wattenwyl, 1874

Subfamily PYRGOMORPHINAE Brunner von Wattenwyl, 1874

Tribe **Atractomorphi** Bolivar, 1905

Genus **Atractomorpha** Saussure, 1862

**18. *Atractomorpha crenulata crenulata*** (Fabricius, 1793)

1793. *Truxalis crenulatus* Fabricius, *Ent. Syst.*, 2: 28.

2010. *Atractomorpha crenulata crenulata*: Shishodia *et al.*, *Rec. zool. Surv. India, Occ. Paper No.*, 314: 129.

*Material examined*: 2 exes, Gosaba, 18.ix.2011; 1 ex, Sajnekhali WLS, 18.ix.2011; 3 ex, Dobanki beat, 19.ix.2011; 1 ex, Netidopani beat, 20.ix.2011; 3 exes, Pakhiralla, 20.ix.2011; 2 ex, Satjallia, 23.ix.2011; 3 exes, Chotta mollakhali, 23.ix.2011; 1 ex, Boda mollakhali, 24.ix.2011; 1 ex, Amtali, 24.ix.2011; 2 exes, Kotchakhalli Mansatalla, 24.ix.2011; 1 ex, Beltalia, 25.ix.2011; 3 exes, Jharkhali, 2.iv.2012; 9 exes, Kaikhali, 3.iv.2012; 1 ex, Chulkati, 11.iv.2012; 1 ex, Dakshin Baikantapur, 4.xi.2012; 2 ex, Patharpratima, 5.xi.2012; 6 exes, Kalas Camp, 5.xi.2012; 1 ex, Piyali, 11.xi.2012; 1 ex, Bakkhali, 6.iv.2013.

*Distribution*: India: Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Lakshadweep Island, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere*: Bangladesh, Cambodia, Laos, Maldives Island, Malaya, Myanmar, Nepal, Pakistan, Sri Lanka, Sumatra, South Vietnam and Thailand.

*Remarks*: This species was listed from Sunderbans by Mandal & Nandi (1989).

Tribe **Chrotogonini** Bolivar, 1904

Genus **Chrotogonus** Serville, 1838

**19. *Chrotogonus (Chrotogonus) trachypterus trachypterus*** (Blanchard, 1836)

1836. *Ommexechea trachypterus* Blanchard, *Ann. Soc. ent. France*, 5: 618.

2010. *Chrotogonus (Chrotogonus) trachypterus trachypterus*: Shishodia *et al.*, *Rec. zool. Surv. India, Occ. Paper No.*, 314: 134.

*Material examined*: 1 ex, Kaikhali, 3.iv.2012.

*Distribution*: India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Bangladesh, Iran, Nepal and Pakistan.

*Remarks*: This species was listed from Sunderbans by Mandal and Nandi (1989).

## Discussion

The grasshoppers are widely distributed in different localities of Sunderbans because of human inhabitation and agricultural practices. However, in the mangrove, very few grasshoppers were observed because it is not their main source of food. The most commonly grown crops in almost all the localities were paddy (*Oryza sativa* Linn.), pea (*Pisum sativum*), gram (*Cicer esculentus*) and vegetables like cauliflower (*Brasica oleracea*), Cabbages (*Brasica aleracea*), chilly (*Capsicum frutescens*), brinjal (*Solanum melongena*), ladies finger (*Abelmoschus esculentus*), besides grasses and sedges like *Cynodon dactylon* Pers., and *Panicum maximum*. In April 2009, there was a severe cyclonic storm named *Aila*, which had a speed of over 200kmph. As a result of which the entire area of the Sunderban belt was drenched with over 8-15 feet in seawater. These resulted in the deposition of salt in the soil, and as a result of which it was difficult for the farmers to grow any crops. Such a situation resulted in the decline of the grasshopper and other insect populations. During our first survey in September 2011, we could hardly get any good number of grasshopper populations. But subsequently, the population increased in number over the years. *A. thalasinus tumulus*, and *S. prasiniferum* along with other species such as *O. velox* were observed in huge numbers. Nineteen species of grasshoppers were recorded from 29 different localities and their distribution is presented in the material examined. The distribution of grasshoppers in the state of West Bengal has been studied earlier by Bhowmik (1986), Hazra *et al.* (1992), and Hazra *et al.* (1993) where they reported 56 species of grasshoppers under 45 genera and 69 species belonging to 40 genera respectively. Dey & Hazra, (2003) studied the Diversity and distribution of grasshopper fauna of greater Kolkata with notes on their ecology. They recorded 35 species of grasshoppers under 29 genera of



the families Pyrgomorphidae and Acrididae. They had concluded that vegetation is a vital factor for regulating the distribution of grasshoppers in the greater Kolkata area. Similarly, the inhabited islands of Sunderbans had great variation in vegetation with rice as their main crop and accompanied by other vegetable crops, which kept the grasshopper dwindling and increase in number since the last cyclonic storm came in 2009. More knowledge concerning ecological factors and the biology of the grasshoppers could give more comprehensive know-how about the abundance and distribution of grasshoppers in Sunderbans.

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