



Acridoidea and Pyrgomorphoidea (Insecta: Orthoptera) of Rajaji National Park

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Abstract

37 species and subspecies belonging to 28 genera and 2 families of grasshoppers have been reported from Rajaji National Park of Uttarakhand. Key to superfamilies, subfamilies, genera and species have also been provided. Two species i.e., *Chrotogonus armatus* Steinmann and *Acrotylus insubricus inficitus* (Walker) have been reported from the state Uttarakhand for the first time.

Keywords: Acridoidea, Orthoptera, Pyrgomorphoidea, Rajaji National Park

Introduction

The Rajaji National Park has been created on August 12, 1983 by amalgamation of three sanctuaries- Rajaji sanctuary, Motichur sanctuary and Chilla sanctuary. The Park has been named after the name of renowned statesman and freedom fighter Sri C. Rajgopalachariya – The first and last Governor General of independent India popularly known as “Rajaji”. The Rajaji National Park is situated in the Siwalik Hills of the submountain Himalayan region representing Shivalik Eco-system. The Shivalik trail is 10 million year old and very rich in fossils. The park is spread over an area of 831.50 sq. km. in three Districts- Dehradun, Haridwar & Pauri Garhwal of Uttarakhand State, India. The district wise area in the park is: Dehradun, 248.15 sq. kms; Haridwar, 333.56 sq. kms; and that of Pauri Garhwal, 249.80 sq. kms. The Rajaji National Park lies between latitude 29°51’N-30°15’N and longitude 77°52’E-78°22’E. In general, The Rawson River and Delhi-Mohund-Dehradun National Highway form outer eastern and western boundaries, respectively. Rishikesh-Haridwar-Delhi National Highway passes through the park between Satyanarain (Song River) and Haridwar.

The forest in the park is deciduous, with sal (*Shorea robusta*), as the principal constituent contributing to

nearly 75% of the trees. The other main species of the plants in the park are Bakll (*Anogeissue latifolia*), Sain (*Terminalia tomentosa*), Haldu (*Adina cordifolia*), Bahera (*Terminalia ballerica*), Jhingan (*Lannea coromandelica*), Kharpot (*Garuga pinnata*), Phauri (*Lagerstromia parviflora*), Bula (*Kydia calycina*), Badal (*Stereospermum chelonoides*), Sofedsirus (*Albizzia procera*), Tun (*Cadrela tonna*), Gutel (*Trewia nudiflora*), Gular (*Ficus glomerata*) etc.

The park is home to the Tiger, Leopard, Himalayan Bear, Cheetal, Hog Deer, Barking Deer, Sambar, Wild Boar, antelopes such as the Nilgai, Goral, Jackal, Hyena, Jungle Cat, Leopard Cat, Civets, Himalayan Yellow-Throated Marten, Sloth Bears, Pythons, King Cobra, Common Krait, Indian Cobra and the Monitor Lizard and above All the Asian Elephant. 168 species of birds occur in the park. Birds like ducks, teals, cormorants, egrets, lapwing, pond herons, pea fowl, jungle fowl, various species of partridges and pheasants, common and king crows, owlets and nightjars, birds of prey are quite common. Twenty-eight species of snakes, 12 species of turtles and tortoises and 9 species of reptiles occur in the national Park.

Grasshoppers are widely distributed in all ecological regions. They constitute an interesting and agriculturally important group of insects. The order Orthoptera is

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one of the largest orders of insects, having over 20,000 species worldwide with about 10% of the total world species (1,750 species) recorded from India. Acridoidea is one of the most sought after superfamilies of the order Orthoptera. Short-horned grasshoppers are included in the superfamily Acridoidea. They constitute an interesting and agriculturally important group of insects. They are moderate in size, but range from less than 10 mm to 65 mm. The form of body shape, head and thorax are diverse; antennae are filiform but sometimes ensiform; tarsi three segmented; hind femora long, slender and thick towards base and adapted for leaping; wings are either fully developed or reduced or absent; forewings in the form of leathery tegmina; hind wings fan like; male external genitalia complex, symmetrical and concealed, when not in use, by the enlarged ninth abdominal sternum (Subgenital plate). Male of most of these insects produce sound by different methods; female, generally, do not produce sound. They are also well adapted for flight since both direct and indirect muscles work together during flight movements thus explaining the reason that these insect can cover long distances during swarming conditions that mainly result from overcrowding and scarcity of food.

Some workers have contributed to the Acridoidea fauna of Uttarakhand but no body has worked out the Acridoidea of Rajaji National Park. Tandon and Shishodia (1995) listed 97 species distributed over 11 families of Acridoidea, Grylloidea, Tettigonoidea and Tridactyloidea of Orthoptera from Western Himalaya (Uttarakhand). Tandon and Shishodia (1976) have given an account of 16 species under 15 genera and 2 families of Acridoidea from Grahwal region of Uttarakhand. Tandon *et al.* (1976) dealt with 12 species under 12 genera and 2 families of Acridoidea from Tons Valley. Singh and Bhargava (1979) have given an inventory of 34 species of Orthoptera which includes 28 species of Acridoidea from Corbett Tiger Reserve. Mandal *et al.* (2010) have given an account of 64 species distributed under 48 genera and 2 families of Acridoidea in Fauna of Uttarakhand. Sharma (2014) has given an account of 24 species belonging to 18 genera under 2 families from the Jhilmil Conservation Reserve, Uttarakhand. Sharma (2017) recorded 50 species under 38 genera of short horned grasshoppers from Dehradun district of Uttarakhand.

The present paper deals with 37 species belonging to 2 families and 28 genera of the superfamily Acridoidea.

Two species *i.e.*, *Chrotogonus armatus* Steinmann and *Acrotylus insubricus inficitus* (Walker) are recorded for the first time from the state Uttarakhand. Classification followed here is according to Uvarov (1966) and Shishodia *et al.* (2010).

Abbreviations Used: Coll.– Name of the Collector.

List of Taxa

Order ORTHOPTERA

Superfamily PYRGOMORPHOIDEA

Family PYRGOMORPHIDAE

1. *Chrotogous (Chr.) trachypterus trachypterus* (Blanchard)
2. *Chrotogonus armatus* Steinmann
3. *Atractomorpha crenulata* (Fabricius)
4. *Atractomorpha burri* Bolivar
5. *Aularches miliaris miliaris* (Linnaeus)

Superfamily ACRIDOIDEA

Family ACRIDIDAE

Subfamily GOMPHOCERINAE

6. *Mesopsis cylindricus* (Kirby)
7. *Aulacobothrus luteipes luteipes* (Walker)

Subfamily ACRIDINAE

8. *Acrida gigantea* (Herbst)
9. *Acrida exaltata* (Walker)
10. *Phlaeoba infumata* Brunner von Wattenwyl
11. *Phlaeoba panteli* Bolivar
12. *Orthochtha indica* Uvarov
13. *Ceracris nigricornis nigricornis* (Walker)
14. *Ceracris striata* Uvarov

Subfamily OEDIPODINAE

15. *Gastrimargus africanus africanus* (Saussure)
16. *Oedaleus abruptus* (Thunberg)
17. *Oedaleus senegalensis* (Krauss)
18. *Pternoscirta cinctifemur* (Walker)
19. *Aiolopus thalassinus tamulus* (Fabricius)
20. *Trilophidia annulata* (Thunberg)
21. *Acrotylus humbertianus* Saussure
22. *Acrotylus insubricus inficitus* (Walker)
23. *Sphingonotus longipennis* Saussure

Subfamily HEMIACRIDINAE

24. *Hieroglyphus banian* (Fabricius)
25. *Parahieroglyphus bilineatus* (Bolivar)

Subfamily SPATHOSTERNINAE

26. *Spathosternum prasiniferum prasiniferum* (Walker)

Subfamily OXYINAE

27. *Oxya hyla hyla* (Serville)28. *Oxya nitidula* (Walker)

Subfamily COPTACRIDINAE

29. *Eucoptacra praemorsa* (Stål)

Subfamily CALLIPTAMINAE

30. *Acorypha glaucopsis* Walker

Subfamily EYPREPOCNEMIDINAE

31. *Eyprepocnemis rosea* Uvarov32. *Tylotropidius varicornis* (Walker)

Subfamily CATANTOPINAE

33. *Choroedocus robustus* (Serville)34. *Choroedocus illustris* (Walker)35. *Diabolocatantops innotabilis* (Walker)36. *Xenocatantops humilis humilis* (Serville)37. *Stenocatantops splendens* (Thunberg)**SYSTEMATIC ACCOUNT**

Order ORTHOPTERA

Key to superfamilies

1. Foveolae of vertex contiguous, superior and forming the extremity of the fastigium; stridulatory mechanism absentPyrgomorpoidea

– Foveolae lateral or inferior, never forming the tip of fastigium; stridulatory mechanism present Acridoidea

Superfamily PYRGOMORPHOIDEA

Family 1. PYRGOMORPHIDAE

Key to genera

1. Anterior margin of prosternum strongly reflexed and dilated *Chrotogonus* Serville

– Anterior margin of prosternum neither reflexed nor dilated 2

2. Antennae remote from the eyes, placed in front of the ocelli *Atractomorpha* Saussure

– Antennae near the eyes and inserted below the ocelli *Aularches* Stål

Genus 1. *Chrotogonus* Serville, 1839**Key to species**

1. Body uniformly yellowish brown without white marking.....*trachypterus* Blanchard

– Body yellowish brown with metazoan of pronotum and outer mid of hind femur and upper surface white *armatus* Steinmann

1. *Chrotogonus* (Chr.) *trachypterus trachypterus* (Blanchard)

1836. *Ommexecha trachypterus* Blanchard, *Annl. Soc. ent. France*, 5: 618.

2008. *Chrotogonus trachypterus trachypterus*: Shishodia, *Faunal diversity of Jabalpur district, M.P.*, (Zool. Surv. India): 101.

Material examined: Ramgarh Range, Phandowala, 1 female, 28.i.2016, Regd. No. A- 13181 (Coll. N. Sharma & party)

Diagnosis: Body small to medium-sized, wings hyaline or occasionally faintly tinged with yellowish-brown but never infumated or infuscated, apparently always fairly well developed and always at least two-third as long as tegmina.

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

2. *Chrotogonus armatus* Steinmann

1965. *Chrotogonus changi* Steinmann, *Sb. faun. Prace ent. Odd. nar. Mus. Praze*, 36: 293.

Material examined: Gohri Range, 1 male, 28.iv.2015 (Coll. N. Sharma and party)

Diagnosis: Body yellowish brown; metazoan of pronotum and mid of hind femur outer and upper surface white; eleven segmented antennae, shorter than head and pronotum together; lateral carina of pronotum represented by weak lines only in metazoan; tegmina slightly reaching up to the apex of hind femur; hind tibiae with seven outer and eight inner spines.

Distribution: India: Bihar, Haryana, Jharkhand, Madhya Pradesh, Uttarakhand and Uttar Pradesh.

Remarks: This species is a new record from Uttarakhand.

Genus 2. *Atractomorpha* Saussure, 1862

Key to species

1. Body-form more slender and elongate; lateral pronotal lobe often with a membranous area near posterior margin..... *crenulata* (Fabricius)
- Body-form comparatively broad, stout, and rather short; lateral pronotal lobe always without a membranous area in metazona *burri* Bolivar

3. *Atractomorpha crenulata* (Fabricius)

1793. *Truxalis crenulatus* Fabricius, *Ent. Syst.*, 2: 28.
2008. *Trilophidia annulata*: Shishodia, *Faunal diversity of Jabalpur district, M.P.*, (Zool. Surv. India): 100.

Material examined: Kansrau Range, Kansrau, 2 female, 28.i.2015, Regd. No. A-12841-A-12842, 2 male, 31.viii.2015 (Coll. N. Sharma and party); Chilla Range, Chilla, 3 male, 30.ix.2014, Regd. No. A-13230-A-13232 (Coll. N. Sharma and party); Ramgarh Range, Phandowala, 2 male, 25.vii.2014 (Coll. N. Sharma and party); Dholkhand Range, Ganjarvan, 2 male, 28.viii.2014, 1 male, 1 female, 17.ix.2015, Regd. No. A-13138-A-13139, Dholkhand, 2 male, 5 female, 28.ii.2015 (Coll. N. Sharma and party); Beribara Range, Senthali, 3 male, 1 female, 17.ix.2015, Regd. No. A-13150-A-13153, (Coll. N. Sharma and party); Gohri Range, 3 male, 3 female, 28.iv.2015, Regd. No. A-12776-A-12781 (Coll. N. Sharma).

Diagnosis: Medium-sized, body elongated, ground colour green or pale; membranous area always present near posterior margin of lateral pronotal lobes; pronotal carinae ill defined; tegmina pointed, extending for one-

fourth of their length beyond the hind femora; wings red at base; abdomen smooth and rosy.

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

4. *Atractomorpha burri* Bolivar

1905. *Atractomorpha burri* Bolivar, *Bol. Soc. Espan. Hist. nat.*, 5: 197, 203.
1960. *Atractomorpha burri* : Banerjee and Keven, *Treubia*, 25: 177.

Material examined: Kansrau, Kansrau Range, 1 female, 28.v.2014 (Coll. N. Sharma and party)

Diagnosis: Medium-sized insects, broader, rather short; head and pronotum comparatively shorter; fastigium of vertex almost triangular, approximately as long as the eye; lateral lobes of pronotum without membranous area posteriorly; tegmina not pointed at apex; hind wings hyaline or rosy at base; outer face of femur convex and strongly keeled.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Orissa, Punjab, Tripura, Uttar Pradesh and West Bengal. *Elsewhere:* Bangladesh, Bhutan, S.W. China, Malaya, Myanmar, Nepal, Thailand.

Genus 3. *Aularches* Stål, 1873

5. *Aularches miliaris miliaris* (Linnaeus)

1758. *Gryllus (Locusta) miliaris* Linnaeus, *Syst. Nat.*, (10th ed.) 1: 432.
2007. *Aularches miliaris miliaris*: Mandal and Yadav, *State Fauna Series*, 5: *Fauna of Andhra Pradesh*, Part 3, Zool. Surv. India: 190.

Material examined: Chilla Range, Chilla, 1 female, 30.ix.2014, Regd. No. A-13229 (Coll. N. Sharma and party).

Diagnosis: Large in size; body stout; head large, smooth, pale or black; pronotum strongly tuberculate above, with two large contiguous humps in front, cut by all the three sulci, front hump black or yellow, the hinder area rugose and deeply pitted at the sides; tegmina light brown, thickly reticulated with yellow nervures and with variable number of large and small callous yellow spots; wings purplish brown, darker towards base; abdomen black with narrow yellow incisions.

Distribution: India: Andhra Pradesh, Assam, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere:* Bangladesh, Cambodia, Indonesia, Java, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Tibet, South Vietnam and West Malaysia.

Superfamily ACRIDOIDEA

Family ACRIDIDAE

Key to Subfamilies

1. Prosternal process usually absent; if present, then antenna ensiform and body strongly elongate 2
 - Prosternal process always present; antenna and body variable 4
2. Stridulatory file on inner side of the posterior femur absent 3
 - Stridulatory file present, in form of series of peg like hairs, along inner lower side of posterior femur **Gomphocerinae**
3. Head with a more acute profile. Face usually retreating and angulate, rarely subvertical and generally angulate at fastigio-facial angle, fastigium usually but little declivent; eyes generally longer than infraocular areas of genae; tegmen without intercalary vein (if present, weak, irregular and not serrated even in male) **Acridinae**
 - Head with a rounded profile. Face almost vertical, rarely oblique and generally broadly rounding over fastigio-facial angle into fastigial profile; fastigium usually strongly declivent; eyes shorter than infraocular portion of genae; tegmen always with an intercalary vein in medial area (mostly well developed) **Oedipodinae**
4. Radial area of tegmen with a series of regular, parallel stridulatory veinlets; tympanum present; if apterous, then body compressed and tympanum absent 5
 - Stridulatory veinlets of radial area of tegmen absent; if apterous, then tympanum (at least rudimentary) present 6
5. Prosternal tubercle or process conical.. **Hemiacridinae**
 - Prosternal tubercle or process spatulate **Spathosterninae**
6. Lower external lobe of posterior knee with spine-like apex **Oxyinae**
 - Lower external lobe of posterior knee with apex rounded, angular or subacute, but not spine-like 7
7. Last abdominal tergite in male usually with well developed furcula; supra-anal plate mostly attenuate or trilobate apex; subgenital plate with transverse fold **Coptacridinae**
 - Last abdominal tergite in male without well developed furcula; supra-anal plate variable; subgenital plate without transverse fold 8
8. Male cerci pincer-like, strong regularly incurved; epiphallus discoidal, without lophi **Calliptaminae**
 - Male cerci variable, but not pincer-like; epiphallus not divided or if divided, then with rather small loliform lophi 9
9. Dorsum of pronotum flat or weakly tectiform, with median and lateral carinae, linear (lateral carinae sometimes obliterated); male cerci with strongly compressed, lobiform or subacute, down-curved apex **Eyreprepnemidinae**
 - Dorsum of pronotum of variable shape; lateral carinae, if present, not linear; male cerci variable but not with strongly compressed, lobiform or subacute, down-curved apex **Catantopinae**

Subfamily GOMPHOCERINAE

Key to genera

1. Antennae ensiform; fastigium of vertex very long, extending as far beyond the eye as forward from pronotum; tegmina and wings long, narrow and pointed.....**Mesopsis** Bolivar
- Antennae filiform; fastigium of vertex not long, normal; tegmina and wings not long, narrow and pointed**Aulacobothrus** Bolivar

Genus 4. **Mesopsis** Bolivar, 19066. **Mesopsis cylindricus** (Kirby)

1914. *Aswatthamanus cylindricus* Kirby, *Fauna Brit. India, Orthopt* : 101.
1985. *Mesopsis cylindricus*: Bhowmik, *Rec. zool. Surv.India, Occ. Pap. No.*, **78** : 24.

Material examined: Motichur Range, Motichur, 1 male, 15.ix.1966 (Coll. A. Singh and party).

Diagnosis: Body long and cylindrical; head and pronotum smooth; head not raised; fastigium of vertex very long, extending as far beyond the eyes as the length of pronotum, narrowed and obtusely rounded at apex; frontal ridge narrow and sulcated; antennae much widened and flattened towards the base, and tapering towards apical part; tegmina and wings very long, narrow and pointed; front and middle legs are very short, hind legs very long and slender.

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Bihar, Himachal Pradesh, Madhya Pradesh, Orissa, Punjab, Sikkim Uttarakhand, Uttar Pradesh and West Bengal.

Genus 5. **Aulacobothrus** Bolivar7. **Aulacobothrus luteipes luteipes** (Walker)

1871. *Stenobothrus luteipes* Walker, *Cat. Derm. Salt. Brit. Mus.*, **5** Suppl.: 82.
1993. *Aulacobothrus luteipes luteipes* (Walker): Ingrish, *Ent. Scand.*, **24**(3):321.

Material examined: Kansrau Range, Kansrau, 8 male, 8 female, 28.v.2014 (Coll. N. Sharma and party); Chilla

Range, Chilla, 8 female, 30.ix.2014 (Coll. N. Sharma and party).

Diagnosis: Small-sized insects; antennae filiform; fastigium of vertex almost trapezoidal, with truncate apex; fastigial foveolae not visible from above; pronotum subcylindrical with nearly parallel lateral carinae which are weakly concave in the middle part; posterior part of pronotum nearly smooth and posterior margin obtusely angulate, median carina distinct; hind femora with three black bands on the dorsal surface and with a black one at distal end; hind tibiae reddish in the apical part.

Distribution: India: Andaman and Nicobar Islands, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Himachal Pradesh, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Bangladesh, China, Europe, Japan, Myanmar, Nepal, North America, Pakistan, Sri Lanka, Taiwan and Thailand.

Subfamily ACRIDINAE

Key to genera

1. Head conically ascending; hind femora with a spine on the dorso-external and dorso-internal genicular lobes**Acrida** Linnaeus
- Head not ascending; hind femora with rounded dorso-external and dorso-internal genicular lobes..... 2
2. Antennae filiform 4
- Antennae ensiform or sword-shaped **Phlaeoba** Stål
3. Dark-brown strip present behind the eye laterally which continue to pronotum and tegmina i.e.
..... **Orthochtha** Karsch
- No dark-brown strip present behind the eye laterally which continue to pronotum and tegmina.....
.....**Ceracris** Walker

Genus 6. **Acrida** Linnaeus, 1758

Key to species

1. Wing cells not centred with fuscous....**gigantea** Herbst

– Wing cells centred with fuscous..... *exaltata* Walker

8. *Acrida gigantea* (Herbst)

1794. *Truxalis gigantea* Herbst, *Fuessly Archiv.*, : 191.

2006. *Acrida gigantea* : Shishodia, *Bionotes*, **8**(1) : 11.

Material examined: Dholkhand Range, Dholkhand, 1 male, 1 female, 18.xii.2015 (Coll. N. Sharma & party).

Diagnosis: Head conically ascending; fastigium of vertex broad, laminate and truncate at apex; transverse sulcus of pronotum present about the middle of pronotal disc; subgenital plate comparatively long; tegmina extends little beyond the hind knee; wings shorter than tegmina; lateral carinae with black inner margins.

Distribution: India: Chhattisgarh, Haryana, Himachal Pradesh, Madhya Pradesh, Tamil Nadu, Tripura, Uttarakhand. *Elsewhere*: Africa and Nepal.

9. *Acrida exaltata* (Walker)

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

2008. *Acrida exalta*: Shishodia, *Faunal diversity of Jabalpur district, M.P.*, (Zool. Surv. India): 97.

Material examined: Kansrau Range, Kansrau, 1 female, 28.v.2014, Regd. No. A-13031 (Coll. N. Sharma and party); Chilla Range, Chilla, 2 male, 30.ix.2014, Regd. No. A-13030-A-13210 (Coll. N. Sharma and party); Ramgarh Range, Phandowala, 1 male, 25.vii.2014 (Coll. N. Sharma and party); Dholkhand Range, Ganjarvan, 5 male, 2 female, 17.ix.2015, Regd. No. A-13132-A-13137 (Coll. N. Sharma and party); Motichur Range, Motichur, 1 male, 6 female, 31.viii.2015, Regd. No. A-13098-A-13101 (Coll. N. Sharma and party). Beribara Range, Senthali, 2 male, 17.ix.2015, Regd. No. A-13154-A-13155 (Coll. N. Sharma and party); Gohri Range, 1 male, 1 female, 28.iv.2015, Regd. No. A-12782-A-12783 (Coll. N. Sharma and party).

Diagnosis: Head conically ascending, basal part narrow; fastigium of vertex broad, laminate and truncate at extremity; transverse sulcus of pronotum placed near the middle of disc; male subgenital plate, in profile, comparatively long, with more elongate part; tegmina without pointed apex, a little produced beyond the hind knees; wings slightly shorter than tegmina; hind femora without any peg-like structure on internal surface.

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, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, and West Bengal. *Elsewhere*: Afghanistan, Bangladesh, Iran, Pakistan, Saudi Arabia, S.E. Tibet, Sri Lanka, Yemen and West Aden.

Genus 7. *Phlaeoba* Stål, 1860

Key to species

1. Wings more or less fuscous at apex, pronotum rugose.
..... *infumata* Brunner

– Wings hyaline at apex, pronotum very rugose and striated *panteli* Bolivar

10. *Phlaeoba infumata* Brunner von Wattenwyl

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

2007. *Phlaeoba ifumata*: Chandra *et al.*, *Zoos' Print Journal*, **22**(5) : 2685.

Material examined: Kansrau Range, Kansrau, 2 male, 28.v.2014, 2 male, 3 female, 31.viii.2015, Regd. No. A-13203-A-13207 (Coll. N. Sharma and party); Chilla Range, Chilla, 1 male, 30.ix.2014, Regd. No. A-13222, Mandal, 4 male, 26.02.2016, Regd. No. A-13168-A-13171 (Coll. N. Sharma & party); Ramgarh Range, Phandowala, 1 male, 25.vii.2014, Regd. No. A-12955 (Coll. N. Sharma & party); Dholkhand Range, Ganjarvan, 2 male, 2 female, 28.viii.2014, Regd. No. A-12958-A-12960, 1 male, 2 female, 17.ix.2015, Regd. No. A-13142-A-13144 (Coll. N. Sharma and party); Motichur Range, Motichur, 3 male, 2 female, 31.viii.2015, Regd. No. A-13111-A-13115, (Coll. N. Sharma and party).

Diagnosis: Body medium-sized; colour brownish testaceous; fastigium of vertex above with a continuous median carina extending along the head and pronotum; antennae ensiform, as long as the head and pronotum together; pronotum with a rudimentary carina on each side between median and lateral carinae; tegmina and wings longer than abdomen; wings fusco-hyaline, infumated towards extremity; subgenital plate of male acute at apex.

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

11. *Phlaeoba panteli* Bolivar

1902. *Phlaeoba panteli* Bolivar, *Annls. Soc. ent. France*, **70**: 589.

2007. *Phlaeoba panteli* : Chandra *et al.*, *Zool. Print Journal*, **22** (5) : 2685.

Material examined: Chilla Range, Mandal, 5 male, 1 female, 26.02.2016, Regd. No. A-13172-A-13177 (Coll. N. Sharma & party); Ramgarh Range, Phandowala, 1 female, 28.v.2014, (Coll. N. Sharma & party);

Diagnosis : Colour ferruginous brown with scattered black dots; antennae ensiform and shorter than head and pronotum together, brown at apex; pronotum truncated in front, obtusely angulated behind; head and pronotum very rugose, the callosities being irregularly striated; wings narrow, bluish hyaline, with many of nervures greenish.

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Bihar, Himachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, and West Bengal. *Elsewhere:* Afghanistan.

Genus 8. *Orthochtha* Karsch, 1891

12. *Orthochtha indica* Uvarov

1942. *Orthochtha indica* Uvarov, *Ann. Mag. nat. Hist. London* **9** (11): 587.

2007. *Orthochtha indica*: Saini and Mehta, *Bionotes*, **9**(3) : 76.

Material examined: Gohri Range, 2 male, 1 female, 31.08.2015 (Coll. N. Sharma and party).

Diagnosis: General coloration very light yellowish ; a brownish-black lateral fascia runs along the sides of fastigium, behind the eyes, along the upper margin

of lateral pronotal lobes and along the basal-third of the radial veins; fastigium of vertex longer than wide; antennae very long, extending back beyond the base of hind femur, basal segments flattened, remaining rounded; pronotum long, laterally compressed, disc flat, slightly rounded in prozona, very weakly tectiform in metazona, all the carinae distinct, lateral carinae straight and parallel in prozona and weakly divergent in metazona; tegmina reaching a little beyond hind knees; last tergite with broad parabolic excision; supra-anal plate tongue shaped; cercus as long as plate; subgenital plate short, obtusely conical.

Distribution: India: Punjab, Delhi, Himachal Pradesh, Madhya Pradesh, Maharashtra, Meghalaya, Uttarakhand and Uttar Pradesh.

Genus 9. *Ceracris* Walker, 1870

Key to species

1. Face and pronotum coarsely punctured; hind femur externally with a narrow but always distinct blackish fascia just before the preapical pale ring *nigricornis* Walker
- Face and pronotum smooth; hind femur externally without distinct blackish fascia just before the preapical pale ring.....*striata* Uvarov

13. *Ceracris nigricornis nigricornis* (Walker)

1870. *Ceracris nigricornis* Walker, *Cat. Derm. Salt. Br. Mus.*, **4**: 791.

1923. *Ceracris nigricornis nigricornis* : Uvarov, *Ent. Mitt. Berl.*, **14**: 13.

Material examined: Motichur Range, Motichur, 15 male, 1 female, 16.ix.1966 (Coll. A. Singh and party); Ramgarh Range, Phandowala, 2 male, 28.v.2014, Regd. No. A-13208, A-12954 (Coll. N. Sharma and party).

Diagnosis: Ground colour brownish-green or olive green; face and pronotum coarsely punctured; black lateral fascia on the head and upper margin of pronotal lobes, not extending on the disc of metazona; tegmina with anal field green or olive-green; hind femora more or less reddish, especially below with a narrow pale pre-apical ring preceded by a narrow blackish ring; hind knee black but in female its lobes pale; hind tibiae dirty-bluish with

the base black, a pale post basal ring, followed by blackish ring.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, and West Bengal. *Elsewhere:* Afghanistan, China, Myanmar, Twian, Thailand, Vietnam.

14. *Ceracris striata* Uvarov

- 1923. *Ceracris striata* Uvarov, *Ent. Mitt.*, **14** : 16.
- 1985. *Ceracris striata* : Bhowmik , *Rec. zool. Surv. India, Occ. Pap. No.*, **78** : 10.

Material examined: Chilla Range, Chilla, 1 male, 1 female 30.ix.2014, Regd. No. A-13227-A-13228 (Coll. N. Sharma and party); Ramgarh Range, Phadowala, 1 male, 28.v.2014, Regd. No. A-13209 (Coll. N. Sharma & party); Motichur Range, Motichur, 4 male, 5 female, 31.viii.2015, Regd. No. A-13102-A-13110 (Coll. N. Sharma and party).

Diagnosis: Comparatively smaller insects; compressed; tegmina with only a sharp defined narrow sulphurous stripe in scapular area; anal area greenish or only lightly paler than the rest of the tegmina; metazona heavily punctured; hind femora without fascia before the pale ring; hind tibiae black below, blackish blue above with the usual colour pattern near the base.

Distribution: India: Arunachal Pradesh, Himachal Pradesh, Mizoram, Uttarakhand and Uttar Pradesh.

Subfamily OEDIPODINAE

Key to genera

- 1. Median carina of pronotum complete or cut by one sulcus..... 2
 - Median carina of pronotum cut by two or three sulci 5
- 2. Thorax rather short; pronotum without strong crest or not strongly tectiform..... 3
 - Thorax long.; pronotum strongly tectiform *Gastrimargus* Saussure
- 3. Wings with well marked fascia.....*Oedaleus* Fieber
 - Wings without well marked fascisa 4

- 4. Transverse veins in apical part of tegmina oblique, arranged zig-zag*Pternoscirta* Saussure
 - Transverse veins in apical part of tegmina erect, the cells square or oblong *Aiolopus* Fieber
- 5. Pronotum without very distinct crest..... 6
 - Pronotum with well marked crest, which when viewed sideways, is strongly bilobed in front . *Trilophidia* Stål
- 6. Pronotum short (as long as or shorter than its width), broadly rounded behind or very slightly angular, strongly tuberculate and sculptured; frontal ridge strongly constricted at apex *Acrotylus* Fieber
 - Pronotum never shorter than its width, distinctly angular behind, generally not tuberculate and usually not sculptured; frontal ridge not constricted at apex *Sphingonotus* Fieber

Genus 10. *Gastrimargus* Saussure, 1884

15. *Gastrimargus africanus africanus* (Saussure)

- 1888. *Oedaleus (Gastrimargus) marmoratus var. africanus* Saussure, *Mem. Soc. Phys. Hist. nat. Geneve*, **30** (1): 39.
- 2007. *Gastrimargus africanus africanus*: Chandra *et al.*, *Zoos' Print Journal*, **22**(5) : 2685.

Material examined: Motichur Range, Motichur, 5 male, 2 Female, 16.ix.1966 (Coll. A. Singh & party), 2 male, 2 female, 31.viii.2015, Regd. No. A-13199-A-13202 (Coll. N. Sharma and party), Chilla Range, Chilla, 1 male, 1 female, 30.ix.2014, Regd. No. A-13025-A-13026 (Coll. N. Sharma and party); Kansrau Range, Kansrau, 3 male, 28.v.2014 (Coll. N. Sharma and party); Dholkhand Range, Ganjarvan, 2 male, 17.ix.2015, Regd. No. A-13140-A-13141 (Coll. N. Sharma and party).

Diagnosis: Body medium to large size; fastigium of vertex concave; antennae as long as head and pronotum together or slightly larger; pronotum with median carina moderately arcuate, shallowly intersected by hind sulcus, hind margin sharply or bluntly angular, dorsum smooth with pale X-marking usually effaced and without pale striae; tegmina surpassing hind knees; wings with dark brown or black; hind femora blue-grey or blue black.

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

Genus 11. *Oedaleus* Fieber, 1853

Key to species

1. Pronotum more or less pointed behind*abruptus*
Thunberg

– Pronotum rounded behind*senegalensis* Krauss

16. *Oedaleus abruptus* (Thunberg)

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

2007. *Oedaleus abruptus* : Chandra *et al.*, *Zoos' Print Journal*, 22(5) : 2685.

Material examined: Ramgarh Range, Asarori, 4 male, 3.xii.1966 (Coll. A.Singh and party), Phadowala, 2 female, 28.v.2014, Regd. No. A-12836-A-12837, 1 female, 25.vii.2014, 2 female, 28.v.2014 (Coll. N. Sharma and party); Beribara Range, Bam, 1 female, 28.viii.2014 (Coll. N. Sharma and party).

Diagnosis: Small sized insects; fastigium of vertex almost flat; pronotum short with incomplete wide cruciform marks, strongly carinated and entire, the median sulcus visible on the sides of pronotum before the middle, pointed at hind margin; hind wings hyaline or pale yellow at the base, with a black transverse band, curving inwards to the anal angle; hind tibiae straw- coloured with dark basal ring and thicker sub-basal pale ring.

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

17. *Oedaleus senegalensis* (Krauss)

1877. *Pachytylus senegalensis* Krauss, *Akad. Wiss. Wien, Vienna*, 76(1): 56.

2007. *Oedaleus senegalensis*: Chandra *et al.*, *Zoos' Print Journal*, 22(5): 2685.

Material examined: Motichur Range, Motichur, 5 male, 5 female, 16.9.1966 (Coll. A.K.Singh), Satyanarain, 1 male, 15.9.1966 (Coll. A.K. Singh).

Diagnosis: Pronotum is shorter, the white lines are more slender, the principal sulcus is placed at or behind the middle and the hinder edge of the pronotum is rounded; the tegmina are long and narrow, subhyaline, with the base varied with light brown, two larger blotches being more conspicuous than the others; wings greenish hyaline towards the base; hind tibiae dark red.

Distribution: India: Andhra Pradesh, Bihar, Delhi, Jammu and Kashmir, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu, Uttarakhand and West Bengal. *Elsewhere:* Afghanistan, North Africa, Pakistan and Western U.S.S.R.

Genus 12. *Pternoscirta* Saussure, 1884

18. *Pternoscirta cinctifemur* (Walker)

1859. *Acridium cinctifemur* Walker, *Ann. Mag. nat. Hist.*, 4(3): 223.

2006. *Pternoscirta cinctifemur* : Mandal *et al.*, *State Fauna Series*, 13 : *Fauna of Arunachal Pradesh*, Part 2 , Zool. Surv. India.; 161.

Material examined: Ramgarh Range, Asarori, 5 male, 1 female 23.v.1968 (Coll. A. Singh and party).

Diagnosis: Size medium; rugulose head and pronotum; median carina of pronotum cut by one groove only; tegmina with transverse veins of apical part oblique and arranged in zig-zag way; basal half of the wings rosy, then clouded hyaline; hind femur buff with black spots, banded with black above and black on the inner side; hind tibiae black, banded blue beyond.

Distribution: India: Arunachal Pradesh, Assam, Goa, Kerala, Madhya Pradesh, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Elsewhere: Eastern Nepal and Sri Lanka.

Genus 13. ***Aiolopus*** Fieber, 1853

19. *Aiolopus thalassinus tamulus* (Fabricius)

1798. *Gryllus tamulus* Fabricius, *Ent. Syst., Suppl.* : 195.

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

Material examined: Kansrau Range, Kansrau, 1 male, 28.v.2014 (Coll. N. Sharma and party); Chilla Range, Chilla, 1 female, 30.ix.2014, Regd. No. A-13226 (Coll. N. Sharma and party); Ramgarh Range, Phandowala, 1 male, 1 female, 25.vii.2014 (Coll. N. Sharma and party); Dholkhand Range, Ganjarvan, 1 male, 28.viii.2014, 1 female, 17.ix.2015, Regd. No. A-13149 (Coll. N. Sharma and party); Beribara Range, Senthali, 2 amle, 17.ix.2015, Regd. No. A-13156-A-13157 (Coll. N. Sharma and party).

Diagnosis: Medium sized; fastigium with front angle more acute; foveolae narrowly trapezoid, about as long as wide; frontal ridge gradually narrowing and almost angular towards fastigial end, sparsely punctured; pronotum somewhat saddle-shaped, posterior margin rounded; posterior tibiae usually with red colouration in apical fourth and broadly separated from black band by a wide bluish grey band.

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

Genus 14. ***Trilophidia*** Stål, 1873

20. *Trilophidia annulata* (Thunberg)

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

2008. *Trilophidia annulata*: Shishodia, *Faunal diversity of Jabalpur district, M.P.*, (Zool. Surv. India) : 98.

Material examined: Kansrau Range, Kansrau, 1 male, 17. xii.1966 (Coll. A. Singh and party); Chilla Range, Chilla, 1 male, 1 female, 30.ix.2014, Regd. No. A-13213-A-13214 (Coll. N. Sharma and party); Ramgarh Range, Phandowala, 1 male, 25.vii.2014 (Coll. N. Sharma and party); Dholkhand Range, Ganjarvan, 1 male, 25.vii.2014, 1 male, 28.viii.2014, (Coll. N. Sharma and party); Beribara Range, Senthali, 1 male, 1 female, 17.ix.2015, Regd. No. A-13158-A-13159, Bam, 1 male, 28.viii.2014 (Coll. N. Sharma and party).

Diagnosis: Medium in size; body brown to grey with black markings, pubescent beneath; pronotum rugose with a high median carina, forming two teeth in front, and with lateral carina; wings yellow at base and brown or black beyond; hind tibiae brown with a pale band towards the base and with a little pale band beyond the middle.

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere:* Afghanistan, Bangladesh, Borneo, Hong Kong, Japan, Java, Korea, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sarawak, Singapore, South China, Sri Lanka, Sumatra, Taiwan, Thailand, Vietnam.

Genus 15. ***Acrotylus*** Fieber, 1853

Key to species

1. Tegmina with discoidal area hyaline beyond middle; lateral areas on posterior transverse sulcus of pronotum without callous spots; ovipositor valves with tips acute; legs with dense fine hairs..... ***humbertianus*** Saussure
- Tegmina with discoidal area having infuscated spots beyond middle; lateral areas on posterior transverse sulcus of pronotum with callous spots; ovipositor valves with tips blunt; legs with sparse fine hairs.....
..... ***insurbicus*** (Scopoli)

21. *Acrotylus humbertianus* Saussure

1884. *Acrotylus humbertianus* Saussure, *Mem. Soc. Phys. Hist. nat. Geneve*, **28** (9): 189.

2007. *Acrotylus humberianus* : Chandra *et al.*, *Zoos' Print Journal*, **22**(5) : 2685.

Material examined : Dholkhand Range, Ganjarvan, 1 female, 17.ix.2015, Regd. No. A-13148 (Coll. N. Sharma and party).

Diagnosis : Body pilose, small in size; antennae longer than head and pronotum together; the tip of vertex conical, concave, with a carina on each side; pronotum finely carinate; prozona with two fuscous fascia, the lateral margin white below; tegmina with two oblique white spots or fascia; wings hyaline, yellow at base, radial area with a semilumbar fuscous fascia.

Distribution: India: Andhra Pradesh, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Lakshadweep Island, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, and West Bengal. *Elsewhere*: Afghanistan, Bangladesh, Nepal, Pakistan and Sri Lanka.

22. *Acrotylus insubricus inficitus* (Walker)

1870. *Oedipoda inficita* Walker, *Cat. Derm. Salt. Brit. Mus.*, **4** : 472.

1993. *Acrotylus insubricus inficita*: Hazra *et al.*, *State Fauna Series*, **3** : *Fauna of West Bengal*, Part 4, Zool. Surv. India, : 301.

Material examined: Gohri Range, 4 male, 28.iv.2015 (Coll. N. Sharma & party).

Diagnosis: Brownish in colour, antennae black at tips; hind femur with two black patches on inner side; base of tegmen light brown; base of the wing bright red.

Distribution: India: Himachal Pradesh, Orissa, Uttarakhand and West Bengal. *Elsewhere*: Afghanistan, Africa, Central Asia, Russia and Sri Lanka.

Remarks: This species is a new record from the state Uttarakhand.

Genus 16. *Sphingonotus* Fieber, 1852

23. *Sphingonotus longipennis* Saussure

1878. *Sphingonotus longipennis* Saussure, *Mem. Soc. Phys. Hist. nat. Geneva*, **25** : 78.

2006. *Sphingonotus longipennis*: Mandal *et al.*, *State Fauna Series*, **13** : *Fauna of Arunachal Pradesh*, Part 2, Zool Surv. India, : 161.

Material examined: Ramgarh Range, Asarori, 2 male, 1.vii.1966, Phandowala, 1 male, 1 female, 13.xii.1966 (Coll. A. Singh and party).

Diagnosis: Body size larger than other species of the genus; dark band of the hind wings long, in the form of a quarter circle, nearly reaching the inner margin, base of wing sky-blue-greenish, sometimes nearly colourless; hind tibiae with two dark bands; hind femur short, stout, only 3.3 times longer than wide; sub-genital plate, in female, with a notch on the middle of posterior margin.

Distribution: India : Andhra Pradesh, Arunachal Pradesh, Assam, Haryana, Himachal Pradesh, Jammu & Kashmir, Manipur, Punjab, Rajasthan, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Africa, Bangladesh, Europe, Mongolia, Nepal, South East Tibet.

Subfamily HEMIACRIDINAE

Key to genera

1. Male supra-anal plate narrower than long, with sides excurved towards apex, male cercus medium sized, slightly curved and gradually narrowing, apex bifurcate *Hieroglyphus* Krauss
- Male supra-anal plate broader than long, with straight sides narrowing to acute-angular apex or trilobite at apex, with very small middle lobe; male cercus large trilobate with very large expanded middle lobe..... *Parahieroglyphus* Carl

Genus 17. *Hieroglyphus* Krauss, 1877

24. *Hieroglyphus banian* (Fabricius)

1798. *Gryllus banian* Fabricius, *Ent. Syst. Suppl.*, : 194.

1973. *Hieroglyphus banian*: Mason, *Bull. Brit. Mus. nat. Hist. (Ent.)*, **28**(7): 540.

Material examined: Motichur Range, Motichur, 2 male, 2 Female, 15.ix.1966 (Coll. A. Singh and party), 2 male, 2 female, 31.viii.2015, Regd. No. A-13195-A-13198 (Coll. N. Sharma and party).

Diagnosis: Medium in size; integument finely rugose and pitted; prozona of pronotum longer than metazona; pronotum with median carina weak, cross by three sulci, first sulcus present laterally, second centrally, third and posterior sulci entire; posterior margin of metazona obtuse-angular; prosternal process conical; cerci bifurcate, upper branch recurved anteriorly towards head and lower branch elongate and acute.

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

Genus 18. ***Parahieroglyphus*** Carl, 1916

25. *Parahieroglyphus bilineatus* (Bolivar)

1912. *Hieroceryx bilineatus* Bolivar, I., *Trab. Mus. Cienc. nat. Madr.*, **6** : 60.

1976. *Parahieroglyphus bilineatus*: Tandon, *Rec. zool. Surv. India, Occ.Pap. No.*, **3**: 5.

Material examined: Motichur Range, Satyanarain, 1 female 15.ix.1966 (Coll. A. Singh and party), Motichur, 2 male, 31.viii.2015 (Coll. N. Sharma and party)

Diagnosis: Large in size; body colour is buff with black markings; frontal ridge parallel sided or may diverge just below median ocellus; cerci very large, divided into three lobes.

Distribution: India: Himachal Pradesh, Madhya Pradesh, Maharashtra, Uttarakhand and West Bengal. *Elsewhere:* Bangladesh.

Subfamily SPATHOSTERNINAE

Genus 19. ***Spathosternum*** Krauss, 1877

26. *Spathosternum prasiniferum prasiniferum* (Walker)

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

2007. *Spathosternum prasiniferum prasiniferum*: Mandal *et al.*, *Pictorial handbook on Indian short-horned*

grasshopper pests (Acridoidea : Orthoptera) (Zool. Surv. India) : 23.

Material examined: Kansrau Range, Kansrau, 1 male, 17.iv.1967 (Coll. A. Singh and party), 3 male, 5 female, 28.v.2014, 2 male, 2 female, 28.i.2016 (Coll. N. Sharma and party); Chilla Range, Chilla, 4 male, 4 female, 30.ix.2014, Regd. No. A-13215-A-13221, Regd. No. A-13032, Mandal, 1 male, 26.ii.2016, A-13178 (Coll. N. Sharma and party); Ramgarh Range, Phandowala, 2 female, 28.vii.2014, 1 male, 3 female 28.i.2015, Regd. No. A-12834-A12837, 2 male, 28.i.2016, Regd. No. A-13182-A-13183 (Coll. N. Sharma and party); Dholkhand Range, Ganjarvan, 1 female, 28.viii.2014, 2 male, 2 female 17.ix.2015, Regd. No. A-13127-A-13130 (Coll. N. Sharma and party); Dholkhand Range; Dholkhand, 3 male, 4 female, 28.xii.2015 (Coll. N. Sharma and party).

Diagnosis: Body small in size; a dark brown stripe runs behind the lower part of eye and below the lateral carinae of pronotum on each side; central area of tegmen with a longitudinal black streak, generally almost obsolete in male and well marked in female; head considerably shorter than pronotum; antennae short; tegmina reaching distal end of hind femora; hind femora with a rounded genicular lobe.

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

Subfamily OXYINAE

Genus 20. ***Oxya*** Serville, 1831

Key to species (Male)

1. Supra-anal plate with a tubercle on each side of a median apical process.....***hyla hyla*** Serville
- Supra-anal plate without lateral tubercles
..... ***nitidula*** (Walker)

Key to species (Female)

1. Anterior margin of tegmen with a dense row of short bristles extending from costal bulge, almost to apex of abdomen; ovipositor valves with long teeth, the apical one curved *hyla hyla* Serville
- Anterior margin of tegmen only weakly or not at all spined; valves of ovipositor with short teeth
..... *nitidula* (Walker)

27. *Oxya hyla hyla* Serville

1831. *Oxya hyla* Serville, *Anns. Sci. nat. (zool)*, **22**: 287.
2007. *Oxya hyla hyla*: Mandal *et al.*, *Pictorial handbook on Indian short-horned grasshopper pests (Acridoidea : Orthoptera)*, Zool. Surv. India, : 28.

Material examined: Chilla Range, Chilla, 1 female, 30.ix.2014, Regd. No. A-13212 (Coll. N. Sharma and party).

Diagnosis: Body medium-sized, body finely rugose, shiney; antennae longer than head and pronotum together; supra-anal plate trapezoidal with triangular apical projection, a small tubercle present on both sides of supra-anal plate; cercus with subacute apex; in female subgenital plate with two longitudinal ridges extending forwards from posterior margin.

Distribution: India : Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujrat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Africa, Angola, Bangladesh, Ghana, Guinea, Iran, Kenya, Liberia, Madagascar, Nepal, Pakistan, Persia, Sri Lanka, Tanzania, Uganda, Zaire, Zambia.

28. *Oxya nitidula* (Walker)

1870. *Acrdium nitidulum* Walker, *Cat. Derm. Salt. Brit. Mus.*, **4**: 631.
1971. *Oxya nitidula* : Hollis, *Bull. Bri. Mus. nat. Hst. (Ent.)*, **26** (7): 315.

Material examined: Kansrau Range, Kansrau, 1 female, 28.v.2014 (Coll. N. Sharma and party).

Diagnosis: Medium-sized; pronotum narrowing forwards; posterior margin of metazona rounded; tegmina reaching the apex of hind femora; supraanal plate at apex roundly triangular with basal folds; cerci conical, with acutely truncate apex; ventral surface of subgenital plate of female, with a pair of well developed submarginal lateral spines, posterior margin with a single median spine and a pair of lateral spines.

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

Subfamily COPTACRIDINAE

Genus 21. *Eucoptacra* Bolivar, 1902**29. *Eucoptacra praemorsa* (Stål)**

1860. *Acridium (Catantops) praemorsum* Stål, *Kongl. Fregat. Eugen. Res. Omkring Jorden*, **3**: 330.
2006. *Eucoptacra praemorsa*: Mandal *et.al.*, *State Fauna Series*, **13** : *Fauna of Arunachal Pradesh*, Part 2, Zool. Surv. India, : 164.

Material examined: Dholkhand Range, Dholkhand, 1 male, 28.ii.2015 (Coll. N. Sharma and party).

Diagnosis: Medium-sized; frontal ridge between antennae about twice as broad as the interocular distance; fastigium of vertex parabolic, moderately narrow; antennae filiform; prosternal tubercle strongly widened apically, with slightly concave apical surface; tegmina with a faint indication of whitish callous fascia near the middle of median area; hind femur yellowish-brown or dark brown; male cerci in apical third incurved, down curved and laterally flattened; female subgenital plate with an angular projection on the posterior margin on either side of mid-line; male subgenital plate almost linear, compressed knife-like.

Distribution: India: Haryana, Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Elsewhere: China, Myanmar, Taiwan and Tenassaerim.

Subfamily CALLIPTAMINAE

Genus 22. *Acorypha* Krauss, 1877

30. *Acorypha glaucopsis* Walker

1870. *Caloptenus glaucopsis*, Walker, *Cat. Derm. Salt. Brit. Mus.* **4** : 702.

2009. *Acorypha glaucopsis*: Hemp, *Jour. Orth. Res.*, **18**(2) : 197.

Material examined: Ramgarh Range, Asarori, 2 male, 1.viii.1966 (Coll. A. Singh & party).

Diagnosis: The fastigium of vertex longer than broad, concave, with a slight median carina at the base; antennae rather longer than the head and pronotum together; pronotum with the sutures slightly marked, the hindmost placed just before the middle, hinder area thickly punctured, especially on the sides; hind femora white outside, the serrations black, the surface with three suffused, longitudinal submacular stripes, and a broken black line along the lower inner carina; hind tibiae yellow, with 7-9 black-tipped spines; prosternal tubercle thick, obtuse and slightly transverse.

Distribution: India: Andhra Pradesh, Bihar, Delhi, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu and Uttarakhand. *Elsewhere:* Iran and Saudi Arabia.

Subfamily EYPREPOCNEMIDINAE

Key to genera

1. Posterior femur moderately long, produced beyond abdomen, neither inflated basally nor strongly narrowing on apical half; prosternal tubercle with rounded or inflated apex *Eyprepocnemis* Fieber
- Posterior femur long, produced far beyond end of abdomen, inflated basally and strongly narrowed on apical half; prosternal process almost spatulate, with rounded, sometimes slightly inflated apex *Tylotropidius* Stål

Genus 23. *Eyprepocnemis* Fieber, 1853

31. *Eyprepocnemis rosea* Uvarov

1942. *Eyprepocnemis rosesus* Uvarov, *Ann. Mag. nat. Hist.*, **9** (11): 597.

2007. *Eyprepocnemis rosea*: Chandra *et al.*, *Zoos' Print Journal*, **22**(5) : 2686.

Material examined: Kansrau Range, Kansrau, 1 female, 28.v.2014 (Coll. N. Sharma and party); Chilla Range, Chilla, 2 male, 30.ix.2014, Regd. No. A-13223-A-13224 (Coll. N. Sharma and party); Dholkhand Range, Ganjarvan, 1 male, 28.viii.2014, Regd. No. A-12961, 1 male, 1 female, 17.ix.2015, Regd. No. A-13117-A-13118 (Coll. N. Sharma and party); Beribara Range, Bam, 1 male, 28.viii.2014, Regd. No. A-12785 (Coll. N. Sharma and party); Motichur Range, Motichur, 2 male, 1 female, 31.viii.2015, Regd. No. A-13192-A-13194 (Coll. N. Sharma and party).

Diagnosis: Medium sized insects; wings at the base with pinkish tinge in colour; posterior tibiae with red in colour.

Distribution: India: Andhra Pradesh, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Meghalaya, Uttarakhand and Uttar Pradesh. *Elsewhere:* Bangladesh, Myanmar, Pakistan and Thailand.

Genus 24. *Tylotropidius* Stål, 1860.

32. *Tylotropidius varicornis* (Walker)

1870. *Heteracris varicornis* Walker, *Cat. Derm. Salt. Brit. Mus.*, **4** : 667.

2007. *Tylotropidius varicornis* : Chandra *et al.*, *Zoos' Print Journal*, **22**(5) : 2686.

Material examined: Ramgarh Range, Asarori, 1 male, 15.vii.1966 (Coll. A. Singh & party); Dholkhand Range, Dholkhand, 2 male, 28.ii.2015 (N. Sharma & party).

Diagnosis: Pronotum brown with lateral carinae pale; antennae filiform, as long as head and pronotum together; prosternal tubercle compressed, truncated, bituberculate at apex; tegmina and wings longer than abdomen but shorter than posterior femora; tegmina with a row of triangular whitish spots upon the radial stripe in the costal area; wings bluish hyaline; hind femora thickened at the

base, very slender towards the tip; hind tibiae and tarsi dull blue; cerci straight, slightly compressed, acuminate.

Distribution: India: Andhra Pradesh, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Rajasthan, Tamil Nadu, Tripura, Uttarakhand and West Bengal. *Elsewhere:* Myanmar and Sri Lanka.

Subfamily CATANTOPINAE

Key to genera

1. Male cerus wide, compressed on apical half, apex rounded ***Choroedocus*** Bolivar
- Male cerus narrow, may be a little compressed at base, acute to subacute apex 2
2. Prosternal tubercle cylindrical and rounded at apex; pronotum subcylindrical ***Diabolocatantops*** Jago
- Prosternal tubercle neither cylindrical nor with rounded apex; pronotum not subcylindrical 3
3. Pronotum constricted; prosternal tubercle conical ***Xenocatantops*** Dirsh & Uvarov
- Pronotum not constricted; prosternal tubercle laterally compressed ***Stenocatantops*** Dirsh & Uvarov

Genus 25. ***Choroedocus*** Bolivar, 1914

Key to species

1. Tegmina unspotted ***robustus*** Serville
- Tegmina spotted ***illustris*** Walker

33. *Choroedocus robustus* (Serville)

1839. *Acridium robustum* Serville, *Ins. Orth.*, : 647.

1990. *Choroedocus robustus*: Bhowmik *et al. Rec. Zool. Surv. India*, **86** : 222.

Material examined: Dholkand Range, Ganjarvan, 1 female, 17.ix.2015, Regd. No. A-13125 (Coll. N. Sharma and party).

Diagnostic characters : Body moderately long; antennae filiform, median segments almost twice as long as wide; fastigium rounded in front; frontal ridge flat, narrowing between antennae, gradually widening towards clypeus; median carina of pronotum cut by all the three transverse sulci; prosternal tubercle gradually tapering apically, weakly incurved and pubescent; tegmina extending well beyond posterior knee, without spots; supra-anal plate tongue shaped, apex broadly rounded; subgenital plate gradually tapering apically; cerus wide, thick, strongly compressed, incurved and downcurved.

Distribution: India: Arunachal Pradesh, Andhra Pradesh, Assam, Haryana, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Tripura, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere:* Bangladesh.

34. *Choroedocus illustris* (Walker)

1870. *Heteracris illustris* Walker, *Cat. Derm., Salt. Brit. Mus.*, 4: 663.

2008. *Choroedocus illustris* : Gupta, *Bionotes*, **10**(3) : 89.

Diagnosis: Body large; fastigium of vertex distinctly depressed, obtusely and roundly angulate in front; pronotum with lateral carina distinct only up to end of prozona; prosternal process cylindrical, a little inclined back; subgenital plate conical, upcurved; posterior tibiae with more pilose.

Material examined: Ramgarh Range, Asarori, 1 male, 15.vii.1966, 1 male, 1 female, 16.viii.1966, (Coll. A. Singh & party), Phndowala, 1 female, 25.vii.2014 (Coll. N. Sharma & party); Chilla Range, Chilla, 1 male, 30.ix.2014, Regd. No. A-13225 (Coll. N. Sharma & party); Dholkand Range, Ganjarvan, 4 male, 1 female, 17.ix.2015, Regd. No. A-13120-A-13124 (Coll. N. Sharma & party); Beribara Range, Bam, 2 female, 28.viii.2014, Regd. No. A-12838, A-12786 (Coll. N. Sharma & party); Motichur Range, Motichur, 4 male, 2 female, 31.viii.2015, Regd. No. A-13186-A-13191 (Coll. N. Sharma & party).

Distribution: India : Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttarakhand and Uttar Pradesh.

Genus 26. *Diabolocatantops* Jago, 1984

35. *Diabolocatantops innotabilis* (Walker)

1870. *Acridium innotabile* Walker, *Cat. Derm. Salt. Brit. Mus.*, **4**: 629.

2007. *Catantops pinguis innotabilis*: Chandra *et al.*, *Zoos' Print Journal*, **22**(5) : 2686

Material examined: Chilla Range, Chilla, 1 female, 30.ix.2014, Regd. No. A-13027 (Coll. N. Sharma & party); Dholkhand Range, Ganjarvan, 1 female, 17.ix.2015, Regd. No. A-13119 (Coll. N. Sharma and party); Motichur Range, Motichur, 1 male, 1 female, 31.viii.2015, Regd. No. A-13184-A-13185 (Coll. N. Sharma and party).

Diagnosis: Medium-sized insects; antennae shorter than head and pronotum together; prosternal tubercle short and subcylindrical, weakly compressed at base; lateral lobe of pronotum without coloured pattern; external disc of hind femur without black median spot below the upper carinula; male cercus more upcurved, with more broadened apex and projecting upper apical angle.

Distribution: India: Punjab, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Lakshadweep Island, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Afghanistan, Bangladesh, Borneo, Cambodia, China, Hong Kong, Indo-China, Japan, Java, Korea, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Sumatra, Thailand, Yunan.

Genus 27. *Xenocatantops* Dirsh and Uvarov, 1953

36. *Xenocatantops humilis humilis* (Serville)

1839. *Acridium humile* Serville, *Ins. Orth.*, : 662.

2007. *Xenocatantops humilis humilis* : Chandra *et al.*, *Zoos' Print Journal*, **22**(5) : 2686.

Material examined: Ramgarh Range, Ramgarh, 1 male, 1 female, 3.xii.1966 (Coll. A. Singh and party), 1 male, 1 female, 28.i.2015, Regd. No. A-12956-A-12957 (Coll. N. Sharma and party); Chilla Range, Chilla, 2 male, 1 female, 30.ix.2014, Regd. No. A-13028-A-13029, A-13211 (Coll. N. Sharma and party).

Diagnosis: Antennae longer than head and pronotum together, median segments twice as long as broad; prosternal tubercle conicle, with obtuse apex, slightly inclined backwards; pronotum with a median weak carina, crossed by three sulci; prozona and metazona subequal; pronotal and thoracic markings much lighter with proportionately broader light oblique band on episternum III; male cercus single with rounded apex.

Distribution: India: Andaman and Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Bangladesh, Borneo, Indo-China, Lombok, Malaya, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Sumatra, Thailand, S. Tibet, Vietnam and Yunan.

Genus 28. *Stenocatantops* Dish and Uvarov, 1953

37. *Stenocatantops splendens* (Thunberg)

1815. *Gryllus splendens* Thunberg, *Mem. Acad. Sci. St.-Petersh.*, **5**: 236.

2007. *Stenocatantops splendens*: Chandra *et al.*, *Zoos' Print Journal*, **22**(5) : 2686

Material examined: Distt. Dehradun : Ramgarh, 1♀, 3.xii.1966 (Coll. A. Singh and party).

Dignosis: Medium to large sized insects, body slender, elongate, finely rugose; antennae thin, weakly compressed dorso-ventrally, longer than head and pronotum together; pronotum flat, punctured, moderately compressed laterally; prosternal tubercle strongly curved and inclined backwards; tegmina projecting beyond hind knees; subgenital plate weakly acute-conical; cercus slightly broadened at base, narrowing and incurved towards apex.

Distribution: India: Andaman and Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal. *Elsewhere*: Borneo, Celebes, China, Hainan, Java, Korea, Malaysia, Moluccus Islands, Myanmar, Philippines, Sri Lanka, Sumatra, Thailand.

Discussion

In Fauna of Rajaji National Park only four insect groups viz., Odonata (38 species under 23 genera), Isoptera (21 species under 8 genera), Lepidoptera (68 species under 50 genera) and Hymenoptera (14 species under 6 genera) have been dealt with (Arora, 1995). However, the study on the short horned grasshoppers (Orthoptera) has been made from the Rajaji National Park for the first time. Mandal *et al.* (2010) have given an account of 64 species distributed under 48 genera and 2 superfamilies of Acridoidea & Pyrgomorpoidea in Fauna of Uttarakhand. During the course of present studies 37 species under 28 genera of 2 superfamilies of Acridoidea & Pyrgomorpoidea have been reported from Rajaji National Park which constitute 57.8% species of short horned grasshoppers from the state Uttarakhand. Singh and Bhargava (1979) have reported 28 species of Acridoidea and Pyrgomorpoidea from Corbett National Park of Uttarakhand states which are 9 species less than Rajaji National Park. Sharma (2014)

has given an account of 24 species belonging to 18 genera under 2 families of short horned grasshoppers from the Jhilmil Conservation Reserve, Uttarakhand which is at a distance of approximately 22 Kms from Rajaji National Park. Hence, Rajaji National Park supports more number of species of superfamilies of Acridoidea & Pyrgomorpoidea as compare to Corbet National Park and Jhilmil Conservation Reserve. Two species *i.e.*, *Chrotogonus armatus* Steinmann and *Acrotylus insubricus inficitus* (Walker) collected from Rajaji National Park are the new records from the state Uttarakhand.

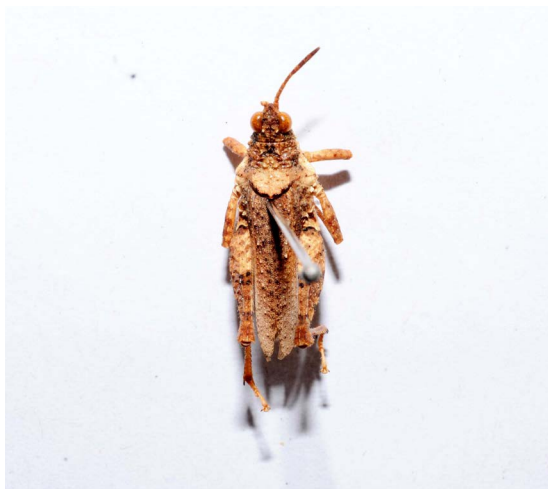
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PLATE 1



1. *Chrotogonus armatus* (Steinmann).



2. *Atractomorpha crenulata* (Fabricius).



3. *Aularches miliaris* (Linnaeus).



4. *Acrotylus insubricus infictius* (Walker).



5. *Spathosternun prasiniferum* (Walker).

PLATE 2



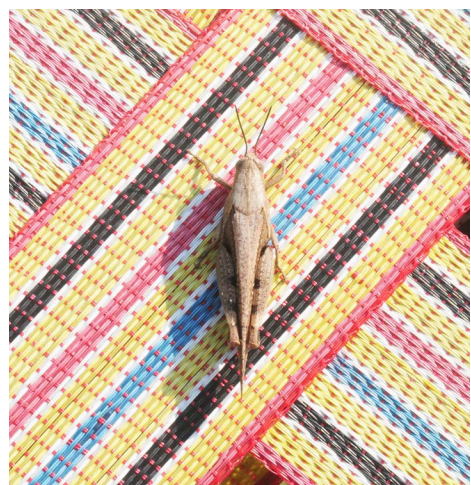
6. *Oxya hyla hyla* (Serville)



7. *Eyprepocnemis rosea* (Uvarov).



8. *Choroedocus robustus* (Serville)



9. *Diabolocatantops innotabilis* (Walker).



10. *Xenocatantops humilis* (Serville).