STUDIES ON THE TAXONOMY OF OXYINAE (ORTHOPTERA: ACRIDOIDEA: ACRIDIDAE) FROM NORTH-EASTERN STATES OF INDIA

Mohd. Imran Khan*, Mohd. Kamil Usmani and Shahnila Usmani*****

* Section of Entomology, Department of Zoology, Aligarh Muslim University, Aligarh-202002 U.P INDIA. E-mail: mikhanalig@gmail.com
** Section of Entomology, Department of Zoology, Aligarh Muslim University, Aligarh-202002 U.P INDIA. E-mail: usmanikamil94@gmail.com
*** Section of Entomology, Department of Zoology, Aligarh Muslim University, Aligarh-202002 U.P INDIA.

[Khan, M. I., Usmani, M. K. & Usmani, S. 2016. Studies on the taxonomy of Oxyinae (Orthoptera: Acridoidea: Acrididae) from North-Eastern states of India. Munis Entomology & Zoology, 11 (1): 202-218**]**

ABSTRACT: From a survey of North Eastern states of India, eleven species belonging to six genera of subfamily Oxyinae were isolated. In addition to conventional morphological characters, the detailed structure of male and female genitalia were also studied. All the species are described and illustrated. A key to the known genera of subfamily Oxyinae is also provided.

KEY WORDS: Acrididae,Oxyinae, Key, North-East, India.

The genus *Oxya* was proposed by Serville (1831) for *Oxya hyla* Serville. Species of the genus are well known pests of paddy, sugarcane, betel and other crops in India. Hollis (1971) reviewed the species of *Oxya* and recognized 18 species. Tandon (1976) listed 10 species from the Indian region: *bidentata* Willemse, *chinensis* (Thunberg), *diminuta* Walker, *fuscovittata* (Marschall), *grandis* Willemse, *hyla* Servile, *japonica* (Thunberg), *nitidula* (Walker), *paravicina* Willemse, and *velox* (Fabricius). Hollis (1975) placed *diminuta* and *peravicina* in the genus *Caryanda* Stal and *bidentata* in a new genus *Oxyina*. At sub-familial level Oxyinae was found to be the most diverse subfamily in Assam, Manipur, Meghalaya, Nagaland and Tripura. This may be due to the fact that the members of this subfamily prefer feeding on paddy cultivation and grasses, which were found prevalent during the survey period.

MATERIAL AND METHODS

A survey for collection of Acridid specimens during 2008-2011 from grasslands and agricultural fields of north-eastern states was made. Specimens were handpicked or collected by sweeping net. Collected specimens were preserved in 70% ethyl alcohol. Specimens were stretched and photographed. For genitalic studies apical tip of abdomen was cut and boiled in 10% KOH solution and genital structures were isolated. All drawings were prepared under Camera lucida attached to standard microscopes. Descriptions of phallic complex follows the terminologies used in Dirsh (1956).

SUBFAMILY OXYINAE BRUNNER, 1893

Oxyinae Brunner von Wattenwyl. 1893. Ann. Mus. Civ. Stor. Nat. Genova, 213 (33): 1-230.

Diagnosis: Body small to medium size; pronotum cylindrical or weakly flattened, median carina weak or absent, lateral carinae absent; prosternal process present; mesosternal interspace open and usually longer than wide; tegmina and wings fully developed, reduced or absent; radial area of tegmina

usually without series of regular, parallel transverse stridulatory veinlets; tympanum present; hind femur with lower basal lobe shorter than upper one, lower genicular lobe produced posteriorly into a spine; hind tibia usually expanded in apical half or third, external apical spine usually present; arolium large; apical abdominal sternites with tuft of short hairs; male cercus usually conical.

The subfamily is represented by six genera from this region. A key for their separation is given below:

Key to the genera of the subfamily Oxyinae Brunner, 1893 recorded from North Eastern States of India

1. Tegmina without series of regular, parallel transverse stridulatory veinlets on radial area; female ovipositor valves long and slender; male epiphallus with indistinct or short ancorae.....2
- Tegmina with series of regular, parallel transverse stridulatory veinlets on radial area; female ovipositor valves short; male epiphallus with long ancorae...***Gesonula*** Uvarov, 1940
2. Hind tibia expanded in apical half.....3
- Hind tibia not expanded in apical half; male epiphallus with one pair of outer lophi and two pairs of inner lophi.....***Caryanda*** Stal, 1878
3. Fully winged or brachypterous species.....4
- Micropterous species.....5
4. In male 10th abdominal tergite with fercula.....***Pseudoxya*** Yin & Liu, 1987
- In male 10th abdominal tergite without fercula.....***Oxya*** Serville, 1831
5. In male 10th abdominal tergite without fercula.....***Cercina*** Stal, 1878
- In male 10th abdominal tergite with fercula.....***Lemba*** Huang, 1983

Genus *Oxya* Serville, 1831

Oxya Serville, 1831. Ann. Sci. nat., 22 (86): 264, 286. Type-species: *Oxya hyla* Serville, 1831.

Zulua Ramme, 1929: 327. (Hollis), 1975. Bull. Br. Mus. Nat. Hist. (Ent.), 220. Type-species: *Zulua glabra* Ramme, 1929.

Diagnosis: Body of medium size; antennae filiform, longer than, as long as, or shorter than head and pronotum together; fastigium of vertex short, without mid-longitudinal carinula; frontal ridge sulcate; dorsum of pronotum slightly flattened, crossed by three transverse sulci, median carina weak, lateral carinae absent; metazona shorter than prozona, posterior margin rounded or obtusely angular; prosternal process conical with rounded or subacute apex, often slightly bent backwards; mesosternal interspace open; tegmina fully developed or shortened, radial area without series of regular, parallel transverse stridulatory veinlets; hind femur slender with lower genicular lobe spined; hind tibia expanded in apical half, external apical spine present.

The genus is represented by five species from this region. A key for their separation is given below:

Key to the species of the genus *Oxya* Serville, 1831

1. Posterior ventral basivalvular sclerites of ovipositor with one or two tooth like spines on its inner ventral margin.....2
- Posterior ventral basivalvular sclerites of ovipositor without any well defined spines on its lower inner margin.....***O. velox*** Fabricius, 1787
2. Ventral surface of subgenital plate with a broad median longitudinal groove running from posterior margin at least two middle of plate, with or without longitudinal ridge on each side.....3
- Ventral surface of subgenital plate convex, flat or, at most, with a weak apical concavity....4
3. Ovipositor valves with long hook like dents, posterior ventral basivalvular sclerites with very small spinelets on its inner ventral margin. Male cercus with subacute or truncate apex. .....***O. hyla hyla*** Serville, 1831

- Ovipositor valves with short dents, posterior ventral basivalvular sclerites with a large spine on its inner ventral margin. Male cercus with bifid apex..... ..... ***O. japonica vitticolis*** Blanchard, 1853

4. Posterior margin of female subgenital plate with one or two spines medially. Male supra anal plate without lateral tubercles, cercus never much compressed, narrowing apically.....5
- Posterior margin of female subgenital plate almost straight and smooth. Male supra anal plate with a tubercles on each side of median apical process, cercus laterally much compressed and of uniform width.....***O. fuscovittata*** Marschall, 1836

5. Posterior margin of female subgenital plate with a single spine medially. Male supra anal plate usually with well developed basilateral folds.....6
- Posterior margin of female subgenital plate with a pair of spines medially. Male supra anal plate relatively flat, without basilateral folds.....***O. chinensis*** Thunberg, 1815

Oxya fuscovittata (Marschall, 1836)

(Plate 1; Fig. 1)

Gryllus fuscovittatus Marschall, 1836. Ann. Naturhist. Mus. Wien, 1 (2): 211.
Oxya turanica Uvarov, 1912. Trudy Russk. Entomol. Obshch., 40 (3): 28.
Oxya oryzivora Willemse, C. 1925. Tijdschr. v. Entomologie, 68: 25. Syn. by Hollis. 1971. Bull. Br. Mus. (Nat. Hist.) Ent., 26 (7): 289.
Oxya uvarovi Willemse, C. 1925. Tijdschr. v. Entomologie, 68: 11, 22. Syn. by Hollis. 1971. Bull. Br. Mus. (Nat. Hist.) Ent., 26 (7): 289.
Oxya fuscovittata (Marschall); Mishchenko, 1965. Fauna of Russia Orthopt.: 148 [125].

Male genitalia: Supra-anal plate triangular, trapezoid, lateral tubercles prominent, posterior lobe slightly less developed, cercus broad, strongly compressed, apex bifid. Sub genital plate broad, lateral margin straight, narrowing apically, apex rounded, setose confined to apical margin (centrally). Epiphallus with narrow bridge, without an ancorae and with tooth like lophi; valvular plate of cingulum with shallow structure; apical valve of aedeagus is thickened.

Female genitalia: Supra-anal plate short, broad, wider than long, lateral margins converging invert, apical margins narrowing and making apex rounded, cercus wide uniformly broad, one and half times as long as wide, apex truncated. Sub genital plate with very broadly flattened ventral surface. Posterior margin emerginates medially straight or with two very small medial spines. Spermatheca short, apical diverticulum short and pre-apical diverticulum is double the size of apical diverticulum and forms an inverted 'L' shaped loop. Valve of ovipositor with tooth like marginal spines.

Material Examined: Meghalaya, Nongstoin, 15-I-2011, on grasses, 3♀♀. Shillong, Ladmawphlong, 23-X-2008, on grasses, 2♀♀. Arunachal Pradesh, East Siang, Pasighat, 31-I-2009, on grasses, 1♀. Mizoram, Aizwal, Selesih, 11-II-2009, on grasses, 5♀♀, 2♂♂. Manipur, West Imphal, 15-X-2009, on grasses, 2♀♀. Nagaland, Dimapur, 19-X-2009, on grasses, 7♀♀, 3♂♂.

Morphometry: (length in mm)
Male: Body length 20.15, Tegmina 16.43, Pronotum 1.61, Hind femur 12.92
Female: Body length 25.0, Tegmina 20.05, Pronotum 1.75, Hind femur 15.84

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chattisgarh, Delhi, Goa, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Uttar Pradesh and West Bengal. **Elsewhere:** Afghanistan, Bangladesh, Nepal, Pakistan and USSR (Southwest).

Oxya japonica vitticolis (Blanchard, 1853)

(Plate 2; Fig. 2)

Acridium vitticole Blanchard, 1853. In Hombron & Jacquinot [Ed.]. Voyage au Pole Sud et dans l' Océanie sur les Corvettes l' Astrolabe et la Zélée exècuté par ordre du roi pendant les années 1837-1838-1839-1840 371, 373.

Heteracris gavisa Walker, F. 1870. Catalogue of the Specimens of Dermaptera Saltatoria in the Collection of the British Museum, 4: 669. Syn. by Key. 1986. CSIRO Entomol. Tech. Paper, 24: 10.

Oxya japonica vitticolis (Blanchard); Hollis, 1971. Bull. Br. Mus. (Nat. Hist.) Ent., 26 (7): 307.

Female genitalia: Supra-anal plate longer than wide, lateral margins highly diverging posteriorly, apex broadly rounded. Cercus broad basally and narrowing apically, two times as long as wide, apex conical. Sub genital plate, lateral margin straight, posterior margin concave with two notches medially, jannone's organ present, two in number. Egg-guide broad basally, gradually narrowing apically, apex pointed, three times as long as wide. Spermatheca, apical diverticulum slender, moderately broad, much longer than pre-apical diverticulum, pre-apical diverticulum elongate narrow. Ovipositor valves long and slender, slightly less than two times as long as wide, dorsal valve with edges serrated, apex obtusely rounded, ventral valve with edges denticulate, apex conical, lateral apodeme short and narrow.

Material Examined: Meghalaya, East Khasi Hills, CPRS, 14- X-2009, on grasses, 5♀♀.

Morphometry: (length in mm)

Female: Body length 21.0, Tegmina 15.5, Pronotum 4.3, Hind femur 12.1

Distribution: India: Meghalaya.

Oxya velox (Fabricius, 1787)

(Plate 3; Fig. 3)

Gryllus velox Fabricius, 1787. Mantissa insectorum exhibens species nuper in Etruria collectas a Ptro Rossio, 1: 239.

Heteracris apta Walker, F. 1870. Catalogue of the Specimens of Dermaptera Saltatoria in the Collection of the British Museum, 4: 666. Syn. by Hollis. 1971. Bull. Br. Mus. (Nat. Hist.) Ent., 26 (7): 297.

Oxya velox (Fabricius); Kirby, 1910. A Synonymic Catalogue of Orthoptera, London: 393.

Oxya velox (Fabricius); Hollis, 1971. Bull. Br. Mus. Nat. Hist. (Ent.): 297.

Male genitalia: Supra-anal plate rounded, triangular posterior portion, cercus conical with subacute apex. Sub genital plate wide basally, narrowing apically, apex truncated setae, confined to apically. Epiphallus with narrow bridge, without ancorae, vulvular plate of cingulum large, upcurved, apex enlarged, apodeme is long, flat, curved at the anterior end, vulvular plate of cingulum more or less bean shaped. Aedeagus, apical valve much narrow, elongate, apex blunt, basal valve narrowing apically and broad at base almost as long as apical valve.

Female genitalia: Supra-anal plate short, broad, wider than long, lateral margins converging invert, apical margins narrowing and making apex rounded, cercus elongate narrow, narrowing apically, two and half times as long as wide, apex bluntly rounded. Ventral surface of sub genital plate in posterior half with median longitudinal concavity bordered on each side by lateral longitudinal ridge. Median pair is spiny on posterior margin, widely spread. Spermatheca of medium size, apical diverticulum bent downwards and pre-apical diverticulum narrow, more or less straight and coiled at the anterior end, pre-apical diverticulum broadly tubular and curved, as long as apical diverticulum. Ovipositor, dorsal valve slightly less than twice the length of lateral apodeme, dorsal margin with small and uniform blunt dents, ventral valve with small uneven blunt dents. Valve of ovipositor with tooth-like spiny structures.

Material Examined: Tripura, Agartala, Mohanpur, 15-II-2009, on grasses, 5♀♀, 7♂♂. Manipur, West Imphal, 15-X-2009, on grasses 8♀♀, 3♂♂. Nagaland, Kohima, 21-X-2009, on grasses, 9♀♀, 3♂♂.

Morphometry: (length in mm)

Male: Body 22.4, Pronotum 6.1, Tegmina 19.4, Hind femur 14.4

Female: Body 26.6, Pronotum 6.4, Tegmina 23.0, Hind femur 17.6
Distribution: India: Andhra Pradesh, Arunachal Pradesh, Bihar, Assam, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Orissa, Rajsthan, Sikkim, Tamil Nadu, Tripura, Uttrakhand, Uttar Pradesh and West Bengal.

Oxya chinensis (Thunberg, 1815)

(Plate 4; Fig. 4)

Gryllus chinensis Thunberg, 1815. Mem. Acad. Imp. Sci. St. Peterburg, 5: 253, 254.
Oxya vicina Brunner, 1893. Ann. Mus. Civ. Stor. Nat. Genova, 213 (33): 152.
Oxya adentata Willemse, C. 1925. Tijdschr. v. Entomologie, 68: 26.
Oxya shanghaiensis Willemse, C. 1925. Tijdschr. v. Entomologie, 68: 54.
Oxya chinensis (Thunberg); Uvarov, 1926. Bull. Ent. Res., 17**:** 48.
Oxya manzhurica Bei-Bienko, 1929. Konowia, 8: 105.
Oxya rammei Tsai, P. 1931. Mitt. Zool. Mus. Berlin, 17: 439. Syn. by Hollis. 1971. Bull. Br. Mus. (Nat. Hist.) Ent., 26 (7): 322.
Oxya manzhurica nakii Furukawa. 1939. Rep. First scient. Exped. Manchoukuo Sect. V, Div., 15 (16): 84, 164.
Oxya sinuosa Mishchenko, 1951. In Bei-Bienko & Mishchenko. Keys to the Fauna of the U.S.S.R. [1963 English translation no. 38]. Locusts and Grasshoppers of the U.S.S.R. and Adjacent Countries, 1: 167 [177].
Oxya sianensis Zheng, Z. 1964. Acta Entomol. Sin., 13 (6): 885.

Male genitalia: Supra-anal plate broad, wider than long, lateral margins diverging apically, apex rounded. Cercus long and slender, slightly narrowing apically, almost three times as long as wide, apex rounded. Sub genital plate triangular, lateral margin forming blunt apex. Epiphallus with bridge divided medially, lophi well developed. Aedeagus with apical valve long, narrow, much longer than basal valve broad. Apical valve strongly curved downward.

Female genitalia: Supra-anal plate broad basally, lateral plates diverging apically, longer than wide, apex bluntly rounded. Cercus broad basally, narrowing basally incurved, apex blunt. Sub genital plate with lateral margin straight, posterior margin wavy, concave medially, jannone's organ present with two small patches. Egg-guide elongate narrow, more than three times as long as wide, apex pointed. Spermatheca, apical diverticulum narrower than pre-apical diverticulum, basal half broad with protuberance, apical half long, elongate narrow. Ovipositor, dorsal valve broad, robust, slightly shorter than lateral apodeme, dorsal edge dentate, apex pointed, ventral valve long and slender, edge dentate, apex acutely rounded.

Material Examined: Assam, Diphu, Karbi Anglong, 13-II-2011, on grasses, 15♀♀, 17♂♂. Assam, Morigaon, Moirabari, 13-IV-2010, on grasses, 13♀♀, 7♂♂.

Morphometry: (length in mm)
Male: Body 20.4, Pronotum 3.4, Tegmina 15.9, Hind femur 13.5
Female: Body 20.75, Pronotum 5.4, Tegmina 21.4, Hind femur 13.3

Distribution: India: Kerala and Meghalaya. **Elsewhere:** China, Japan, Korea, Taiwan,Vietnam and USSR.

Oxya hyla hyla Serville, 1831

(Plate 5; Fig. 5)

Oxya hyla Serville, 1831. Ann. Sci. nat., 22 (86): 28-65, 134-167, 262-292.
Heteracris viridivitta Walker, F. 1870. Catalogue of the Specimens of Dermaptera Saltatoria in the Collection of the British Museum, 4: 605-801. Syn. by Johnston, Henry Bennett. 1956. Annotated catalogue of African grasshoppers 251.
Oxya serrulata Krauss, 1890. Zoologische Jahrbücher. Abt. Syst. Geogr. und Biol. der Tiere, 5 (4): 662.
Oxya serrulata minor Sjöstedt. 1910. In Sjöstedt [Ed.]. Abteilung 15-22. Wissenschaftliche Ergebnisse der schwedischen zoologischen Expedition nach dem

Kilimandjaro, dem Meru und den umgebenden Massaisteppen Deutsch-Ostafrikas, 1905-1906 unter Leitung von Prof. Dr. Yngve Sjöstedt, 3: 185, 196.
Oxya acuminate Willemse, C. 1925. Tijdschr. v. Entomologie, 68: 44.
Female genitalia: Supra-anal plate broadly angular, wider than long, apex broadly rounded; apex elongate, incurved, twice as long as wide, apex rounded. Sub genital plate with posterior margin truncated in middle; posterior marginal setae absent; jannone's organs present; egg-guide broad at base, long and narrow apically. Spermatheca with apical diverticulum long, bearing a small protuberance as its apical one-fifth; pre-apical diverticulum broad and curved, thrice the width of apical diverticulum. Ovipositor with dorsal valve long and narrow, five and a half times as long as wide, longer than lateral apodeme, dorsal edge with acute spines, basal sclerite narrow and serrated.
Material Examined: Tripura, South Tripura, Udaipur, 16-II-2009, on grasses, 15♀♀. Manipur, East Imphal, 16-X-2009, on grasses, 5♀♀. Nagaland, Dimapur, 20-X-2009, on grasses, 8♀♀.
Morphometry: (length in mm)
Female: Body 26.5, Tegmina 23.0, Pronotum 6.4, Hind femur 17.6
Distribution: India: Andhra Pradesh, Arunachal Pradesh, Bihar, Assam, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Orissa, Rajsthan, Sikkim, Tamil Nadu, Tripura, Uttrakhand, Goa, Delhi, Chattisgarh, Kerala, Gujrat, Uttar Pradesh and West Bengal. **Elsewhere:** Afghanistan, Africa, Angola, Bangladesh, Benin, Cameroun, Chad, Iran, Gambia, Ghana, Giunea, Kenya, Liberia, Madagaskar, Maldieve Island, Mali, Malawi, Nepal, Niger, Nigeria, Pakistan, Senegal, Sudan, Sri Lanka, Tanzania, Uganda, Zaire and Zambia.

Genus *Caryanda* Stal, 1878

Caryanda Stal, 1878. Bihang Kungl. Svenska Vet. Akad. Handl., 5 (4): 47. Type-species: *Acridium (Oxya) spurium* Stal, 1860.
Dibastica Giglio-Tos, 1907: 9 (Hollis, 1975. Bull. Br. Mus. Nat. Hist. (Ent.): 217). Type-species: *Dibastica modesta,* Giglio-Tos, 1907.
Austenia Ramme, 1929: 331. (Preoccupied by *Austenia* Nevill, 1878: 16). (Hollis 1975. Bull. Br. Mus. Nat. Hist. (Ent.): 217). Type-species: *Austenia Cylindrica* Ramme, 1929.
Austeniella Ramme, 1931: 934. (Replacement name for *Austenia* Ramme, 1929). (Hollis, 1975. Bull. Br. Mus. Nat. Hist. (Ent.): 217).
Diagnosis: Head conical; fastigium of vertex, from above, pentagonal, wider than long, without median longitudinal carinula; frontal ridge sulcate. Eyes normal. Antenna as long as combined lengths of head and pronotum. Prosternal process conical with subacute apex. Dorsum of pronotum weakly flattened, median carina weak, lateral carinae absent, weakly crossed by three transverse sulci; mesosternal interspace slightly longer than wide. Tegmina and hind wings normally reduced to micropterous condition, some species brachypterous and one species is rarely macropterous. Lower genicular lobe of hind femur spined; hind tibia hardly expanded apically, upper margins acute, external apical spine present.

The genus is represented by a single species from this region.

Caryanda paravicina (Willemse, 1925)

(Plate 6; Fig. 6)

Oxya paravicina Willemse, 1925. Tidjschr. Ent., 68: 55.
Caryanda paravicina (Willemse); Hollis, 1975. Bull. Br. Mus. Nat. Hist. (Ent.), 31: 218.
Female genitalia: Supra-anal plate triangular, apex pointed, much longer than wide. Cercus broad basally, narrowing apically, two times as long as wide, apex bluntly rounded. Sub genital plate, lateral margins convex medially and concave posteriorly with straight in the middle. Egg-guide narrowing apically, three times as long as wide, apex pointed. Spermatheca pre-apical diverticulum long and

slender, curved medially. Pre-apical diverticulum long and narrow. Ovipositor, dorsal valve moderately broad, slightly shorter than lateral apodeme, dorsal edge smooth, apex bluntly rounded, ventral valve curved medially, dorsal edge with tooth, apex pointed, dorsal valve slightly shorter than lateral apodeme.

Materaial Examined: Meghalaya, Jowai, Ummolong, 22-X-2008, on grasses, 17♀♀. Manipur, Thoubal, 17-X-2009, on grasses, 7♀♀. Nagaland, Kohima, 21-X-2009, on grasses, 5♀♀.

Morphometry: (length in mm)

Female: Body 13.0, Tegmina 3.6, Pronotum 5.8, Hind femur 12.8

Distribution: India: Meghalaya.

Genus *Cercina* Stal, 1878

Cercina Stal, 1878. Bihang Kungl. Svenska Vet. Akad. Handl., 5 (4): 97. Type-Species: *Cercina obtusa* Stal, 1878.

Diagnosis: Head conical; fastigium from above, short, triangular or pentagonal, wider than long, median longitudinal carina absent; frontal ridge widely sulcate and not quite extending to clypeus; eyes normal; antennae shorter than head and pronotum together; prosternal process subconical, antero-posteriorly flattened with subacute apex; dorsum of pronotum flattened, shallowly crossed by two or three transverse sulci, median carina very weak, lateral carinae absent; mesosternal interspace longer than wide; tegmina and hind wings reduced, scale-like, former not extending beyond 3rd abdominal tergite; lower genicular lobe of hind femur pointed or spined; hind tibia moderately expanded in apical half, with acute upper margins, external apical spine of hind tibia present.

The genus is represented by a single species from this region.

Cercina mussoriensis Prasad & Sinha, 1956

(Plate 7; Fig. 7)

Cercina mussoriensis Prasad & Sinha. 1956. Proc. nation. Acad. Sci. India B, 26 (1): 30.

Female genitalia: Supra-anal plate elongate, angular; slightly less than one and half times longer than wide, apex rounded, cerci broad basally, narrowing apically; almost two times as long as wide, apex bluntly rounded. Sub genital plate wide, apical margin semicircular without setae, egg-guide short, narrow; apex pointed. Ovipositor valves elongate, narrow; dorsal edge of dorsal valve smooth, apical tip bluntly rounded, dorsal valve shorter than lateral apodeme; ventral valve uniformly broad, apical condyle not prominent, apical tip blunt.

Material Examined: Assam, Guwahati, Patorkuchi, 30-X-2008, on grasses, 2♂♂.

Morphometry: (length in mm)

Female: Body length: 16.75, Tegmina: Brachypterous, Pronotum: 1.47, Hind femur: 11.3

Distribution: India: Uttarakhand, Assam.

Genus *Gesonula* Uvarov, 1940

Gesonula Uvarov, 1940. Ann. Mag. nat. Hist., 115: 174. Type-species: *Acridium punctifrons* Stal, 1878.

Gesonia Stal, 1878: 46. (Preoccupied by Gesonia Walker, 1858: 75, in Lepidoptera). Type-species: *Acridium punctifrons* Stal, 1878.

Gesonula Uvarov, 1940a: 174. (Replacement name for *Gesonia* Stal, 1878).

Diagnosis: Body of medium size; antennae filiform, slightly longer than head and pronotum together; head conical; fastigium of vertex parabolic, without mid-longitudinal carinula; frontal ridge sulcate; dorsum of pronotum flattened, shallowly crossed by three transverse sulci, median carina weak, lateral carinae absent; metazona shorter than prozona, posterior margin broadly rounded; prosternal process conical with rounded apex; mesosternal interspace open;

tegmina and wings fully developed, radial area of tegmina with series of regular, parallel transverse stridulatory veinlets; hind femur slender with lower genicular lobe spined; hind tibia expanded in apical half, external apical spine present.

The genus is represented by a single species from this region.

Gesonula punctifrons (Stal, 1861)

(Plate 8; Fig. 8)

Acridium (Oxya) punctifrons Stal, 1861. Kongliga Svenska fregatten Eugenies Resa omkring jorden under befäl af C.A. Virgin åren 1851-1853 (Zoologi), 2 (1): 336.
Heteracris tenuis Walker, F. 1870. Catalogue of the Specimens of Dermaptera Saltatoria in the Collection of the British Museum **4**: 647, 668. Syn. by Bolívar, Ignacio. 1918. Trab. Mus. Cienc. nat., Madrid (Ser. zool.), 34: 14.
Oxya punctifrons (Stal); Stal, 1878. Bihang Kungl. Svenska Vet. Akad. Handl., 5 (4): 47.
Gesonula punctifrons (Stal); Mishchenko, 1952. Fauna of Russia, 4 (2): 144.

Male genitalia: Cerci simple, spine like and incurved, supra-anal plate triangular, oval, the groove of which tubular in shape, large anterior process diverged, tip more or less rounded. Posterior process with a notch like structure, below which bilobed structure present. The upper lobe connected with a membrane. Subgenital plate broad, lateral margin straight, narrowing apically, apex rounded, setose confined to apical margin. Epiphallus, bridge undivided, short, broad, anchorae broad basally, narrowing apically, apex pointed, lophi well developed lobiform. Aedeagus, apical valve short narrow, much shorter than basal valve, apex pointed, basal valve broad uniformly.

Female genitalia: Supra-anal plate elongate, narrow, one and half times as long as wide, apex rounded, cercus broad basally, narrowing apically, two times as long as wide, apex blunt. Sub- genital plate elongate, lateral margins diverging, central margin semi-circular, setae confined, in the middle egg-guide short, elongate narrow, twice as long as wide, apex pointed, Jannone's organ present. Spermatheca apical diverticulum short, broad, apex curved and rounded, pre-apical diverticulum moderately broad, much longer than apical diverticulum. Ovipositor broad, robust, large. Upper one is moderately enlarged, tip end with a large upcurved spine; lower valve which is narrower, less widened, tip of the valve with a large spine which is directed downwards, rest of spines in the both valves uniform.

Material Examined: Assam, Guwahati, Bongra, 28-X-2008, on paddy field, 7♂♂, 12♀♀. Assam, Tezpur, 7-II-2011, on grasses, 5♂♂, 8♀♀. Manipur, East Imphal, 16-X-2009, on grasses, 4♀♀, 3♂♂. Nagaland, Dimapur, 19-X-2009, on grasses, 3♀♀, 2♂♂.

Morphometry: (length in mm)
Male: Body length 18.06, Tegmina 18.58, Pronotum 1.35, Hind femur 10.30
Female:Body length 2.0, Tegmina 18.7, pronotum 4.0, Hind femur 12

Distribution: India: Andman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chattisgarh, Delhi, Goa, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, 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.

Genus *Lemba* Huang, 1983

Lemba Huang, C. 1983. Zool. Res., 4 (2): 149. Type-Species: *Lemba daguanensis* Chunmei, 1983.

Diagnosis: Body of medium size; Head conical; fastigium of vertex short, rounded, separated from vertex by a shallow depression; frontal ridge distinct but subobsolete at clypeo-frontal suture; interocular distance longer than subocular furrow; pronotum rugose, disc with lateral angles rounded into lateral lobes,

posterior margin obtusely angularly excised; prosternal process slightly compressed, conical, apex acute; mesosternal lobes longer than wide, metasternal lobes contiguous (male) or very narrowly separated (female); tegmina covering tympana; hind femur moderately slender and dorsal carina smooth, hind tibia with dorsal margin angularly rounded, with 8 external and 20 internal spines at dorsal margins; apical spine present at both sides.

The genus is represented by one species from this region.

Lemba motinagar Ingrisch et al., 2004

(Plate 9; Fig. 9)

Lemba motinagar Ingrisch et al., 2004. Tijdschr. Voor Entomol., 147: 290.

Male genitalia: Supra-anal plate broad, as long as wide, lateral margins slightly diverging apically, apex rounded. Cercus broad basally and gradually narrowing apically, twice as long as wide, apex conical. Sub genital plate with lateral margin straight, strongly diverging posteriorly, posterior margin extended with a notch medially. Epiphallus, bridge divided, ancorae short and broad, apex blunt, lophi well developed. Aedeagus with apical valve very long and narrow, downcurved, basal valve long and broad, much longer than basal valve, apex blunt.

Female genitalia: Supra-anal plate, lateral margins forming rounded apex, slightly longer than wide. Cercus short and broad, narrowing apically, less than twice as long as wide, apex bluntly rounded. Sub genital plate, lateral margins straight, posterior margin slightly curved, serrated medially forming dents on either side of egg-guide. Apical half of egg-guide broad, abruptly narrowing apically, apex pointed. Spermatheca, long and slender with protuberance. Ovipositor, dorsal valve robust, dorsal edge strongly serrated, apex bluntly rounded, slightly shorter than apodeme, ventral valve elongate narrow, edge curved and serrated, apex or tip bluntly rounded.

Material Examined: Meghalaya, East Khasi Hills, CPRS, 10-X-2009, on grasses, 15♂♂, 20♀♀; Kyrdemkhla, 10-X-2009, on grasses, 10♂♂, 15♀♀.

Morphometry: (length in mm)

Male: Body length 12.0, Pronotum 4.4, Hind femur 8.5

Female: Body length 18.2, pronotum 5.5, Hind femur 13.5

Distribution: India: Meghalaya and Tripura.

Genus *Pseudoxya* Yin & Liu, 1987

Pseudoxya, Yin, X.-C. & Z.-W. Liu, 1987. Acta Zootaxonomica Sin., 12 (1): 66 [71] Mishchenko & Storozhenko. 1990. In Gorochov [Ed.]. News of 210 etazoan 210 c and faunistics of Vietnam insects part 1. Trudy Zool. Inst., Akad. Nauk SSSR, Leningrad, 209: 32. Type-Species: *Oxya diminuta* Walker, 1871.

Diagnosis: Body moderately sized. Head shorter than pronotum. Antennae filiform. Face, in profile, oblique. Vertex convex from above, fastigium rounded. Lateral foveolae absent. Frontal ridge sulcate, with lateral carinae nearly parallel. Eyes oval. Pronotum cylindrical, slightly flattened in the back, posterior margin convex; median carina present, lateral carinae absent. Prosternal process conical with rounded apex. Mesosternal lateral lobes somewhat wider than long. Metasternal lateral lobes meeting in hind part. Elytra and wings developed, extending beyond the middle of hind femur, touching in mid dorsal line when folded and elytra with stridulatory pegs in frontal areas. Upper carina of hind femur smooth, keenly spined in apex; lower genicular lobe spined. Hind tibia expanded in apical half and with external apical spine. Tympanum developed.

The genus is represented by a single species from this region.

Pseudoxya diminuta (Walker, 1871)

(Plate 10; Fig. 10)

Oxya diminuta Walker, 1871. Cat. Derm. Salt. Brit. Mus., 5: 64.

Oxya rufipes Brunner, 1893. Ann. Mus. Civ. Star. Nat. Genova Ser., 2, 13: 153. Syn. by Willemse, Cornelis Jozef Maria. 1955 [1956]. Publ. Natuurhist. Genootsch. Limburg, 8: 146.
Pseudoxya diminuta (Walker); Hollis, 1975. Bull. Br. Mus. Nat. Hist. (Ent.), 31: 217.
Male genitalia: Supra-anal plate broad, slightly broader than long, lateral margins strongly diverging apically, apex rounded. Cercus elongate, narrowing apically, three times as long as wide, apex acutely rounded. Sub genital plate, lateral margin straight, gradually diverging apically, apex rounded. Epihallus, bridge divided medially, lophi developed. Aedeagus, apical valve long and narrow, incurved.
Material Examined: Meghalaya, East Khasi Hills, CPRS, 12-X-2009, on grasses, 20♂♂.
Morphometry: (length in mm)
Male: Body length 12.0, Tegmina 11.9, Pronotum 4.4, Hind femur 8.5
Distribution: India: Andman and Nicobar Islands, Assam and Nagaland. **Elsewhere:** Bhutan, Combodia, China, Laos, Myanmar, Singapore, Sumatra, Thailand, Vietnam and West Malaysia.

ACKNOWLEDGEMENTS

We wish to extend our gratitude to the University Grants Commission, New Delhi for providing financial assistance during the tenure of a major research project (Ref. no. 33-33/2007 (SR)) being carried out on “Studies on taxonomy and diversity of North Eastern States of India”.

LITERATURE CITED

Hollis, D. 1971. A Preliminary Revision Of The Genus *Oxya* Audinet Serville (Orthoptera, Acridoidea). Bull. Br. Mus. Nat. Hist. (Ent.), 26: 267-343.
Hollis, D. 1975. A Review Of The Subfamily Oxynae (Orthoptera, Acridoidea), Bull. Br. Mus. Nat. Hist. (Ent.), 31: 189-234.
Serville. 1831. Revue méthodique des insectes de l'ordre des Orthoptères. Annales des Sciences Naturelles, 22 (86): 28-65, 134-167, 262-292.
Tandon, S. K. 1976. A check list of the Acridoidea (Orthoptera) of India. Part I Acrididae. Rec. Zool. Surv. India, Occ. Pap. No., 3: 1-48.

male female

Figure 1. *Oxya fuscovittata.*

female

Figure 2. *Oxya japonica vitticolis* (female)

male female

Figure 3. *Oxya velox*.

male female

Figure 4. *Oxya chinensis*.

female

Figure 5. *Oxya hyla hyla*.

female

Figure 6. *Caryanda paravicina*.

female

Figure 7. *Cercina mussoriensis*.

male female

Figure 8. *Gesonula punctifrons*.

male female

Figure 9. *Lemba motinagar*.

male

Figure 10. *Pseudoxya diminuta*.

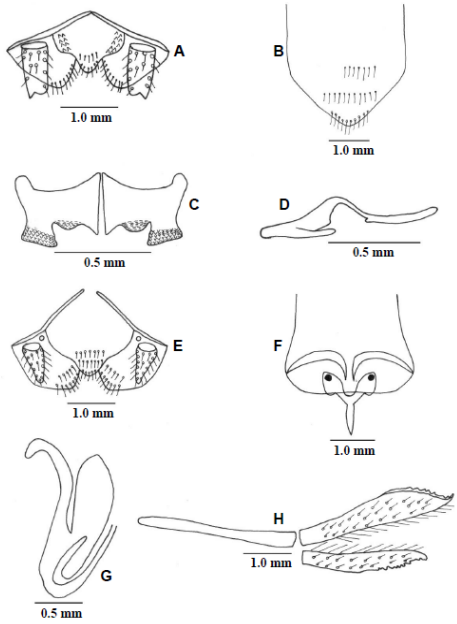

Plate 1. *Oxya fuscovittata* A-D (male); E-H (female) A. Supra anal plate, B. Subgenital plate, C. Epiphallus, D. Aedeagus, E. Supra anal plate, F. Subgenital plate, G. Spermatheca, H. Ovipositor.

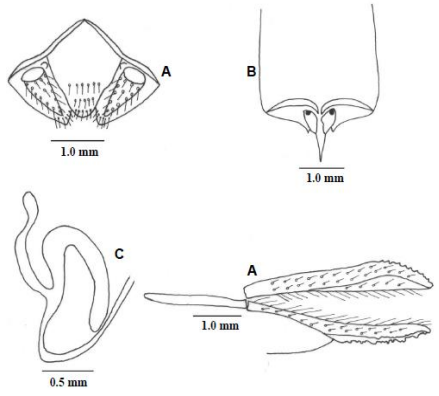

Plate 2. *Oxya japonica vitticolis* (female) A. Supra anal plate, B. Subgenital plate, C. Spermatheca, D. Ovipositor.

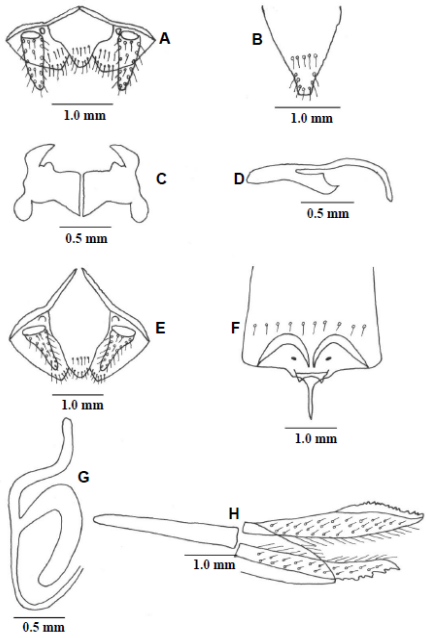

Plate 3. *Oxya velox* A-D (male); E-H (female) A. Supra anal plate, B. Subgenital plate, C. Epiphallus, D. Aedeagus, E. Supra anal plate, F. Subgenital plate, G. Spermatheca, H. Ovipositor.

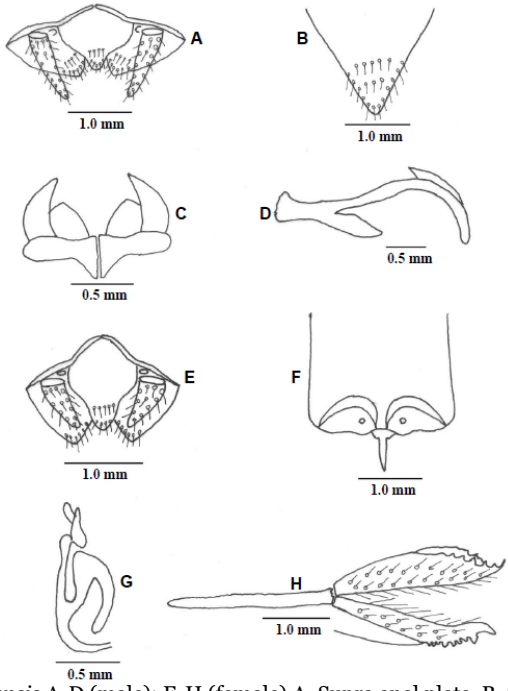

Plate 4. *Oxya chinensis* A-D (male); E-H (female) A. Supra anal plate, B. Subgenital plate, C. Epiphallus, D. Aedeagus, E. Supra anal plate, F. Subgenital plate, G. Spermatheca, H. Ovipositor.

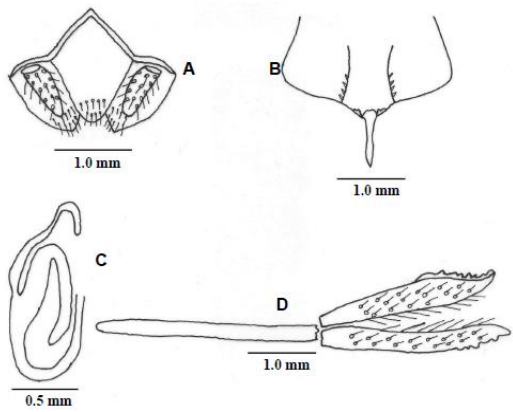

Plate 5. *Oxya hyla hyla* (female) A. Supra anal plate, B. Subgenital plate, C. Spermatheca, D. Ovipositor.

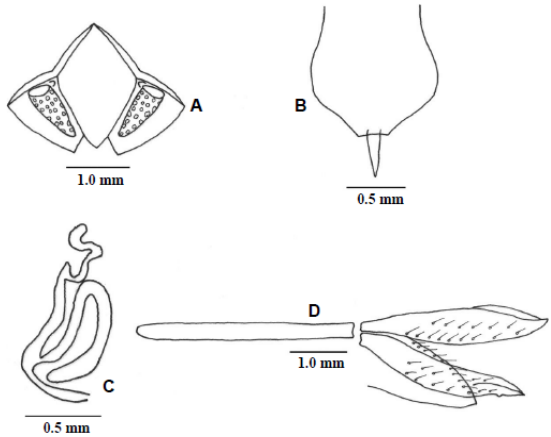

Plate 6. *Caryanda paravicina* (female) A. Supra anal plate, B. Subgenital plate, C. Spermatheca, D. Ovipositor.

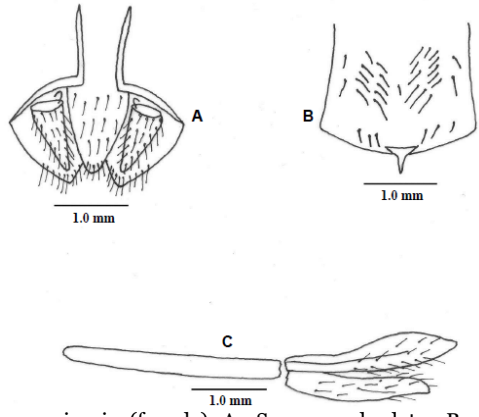

Plate 7. *Cercina mussoriensis* (female) A. Supra anal plate, B. Subgenital plate, C. Ovipositor.

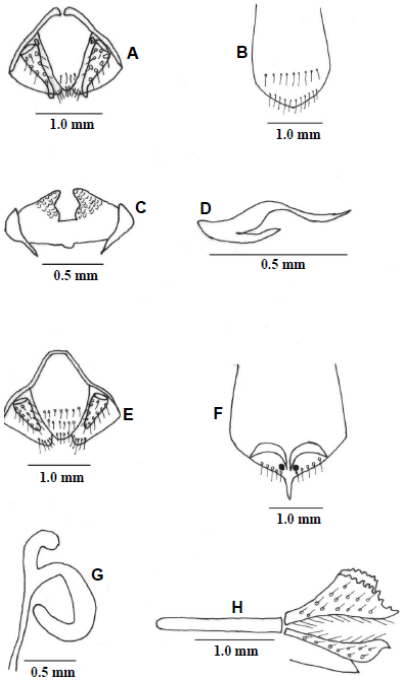

Plate 8. *Gesonula punctifrons* A-D (male); E-H (female) A. Supra anal plate, B. Subgenital plate, C. Epiphallus, D. Aedeagus, E. Supra anal plate, F. Subgenital plate, G. Spermatheca, H. Ovipositor.

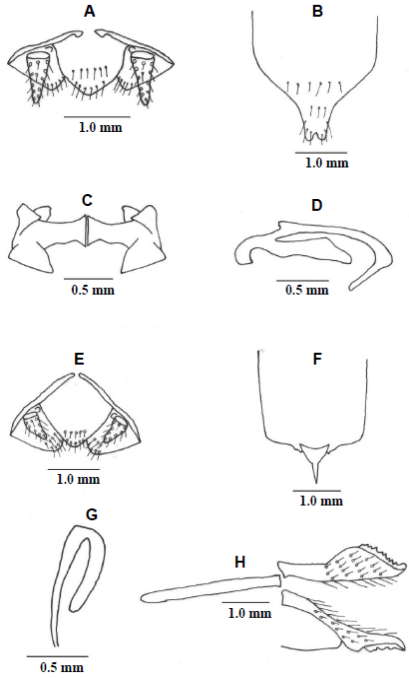

Plate 9. *Lemba motinagar* A-D (male); E-H (female) A. Supra anal plate, B. Subgenital plate, C. Epiphallus, D. Aedeagus, E. Supra anal plate, F. Subgenital plate, G. Spermatheca, H. Ovipositor.

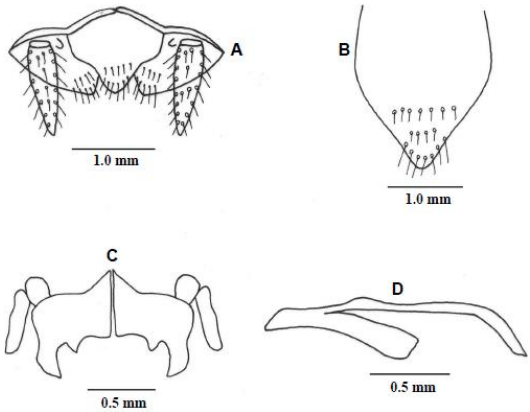

Plate 10. *Pseudoxya diminuta* (male) A. Supra anal plate, B. Subgenital plate, C. Epiphallus, D. Aedeagus.