

Pictorial Handbook on
Indian Short-horned Grasshopper Pests
(Acridoidea : Orthoptera)

S.K. MANDAL
A. DEY
A.K. HAZRA



ZOOLOGICAL SURVEY OF INDIA

Pictorial Handbook on
Indian Short-horned Grasshopper Pests
(Acridoidea : Orthoptera)

S.K. MANDAL

A. DEY

A.K. HAZRA

Zoological Survey of India, M-Block, New Alipore, Kolkata 700 073

Edited by the Director, Zoological Survey of India, Kolkata



Zoological Survey of India
Kolkata

CITATION

Mandal, S.K.; Dey, A. and Hazra, A.K. 2007. *Pictorial Handbook on Indian Short-horned Grasshopper Pests* (Acridoidea : Orthoptera) : 1-57. (Published by the Director, Zool. Surv. India, Kolkata)

Published : March, 2007

ISBN 978-81-8171-140-8

© Govt. of India, 2006

ALL RIGHTS RESERVED

- No part of this publication may be reproduced stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the publisher.
- This book is sold subject to the condition that it shall not, by way of trade, be lent, resold, hired out or otherwise disposed of without the publisher's consent, in an form of binding or cover other than that in which, it is published.
- The correct price of this publication is the price printed on this page. Any revised price indicated by a rubber stamp or by a sticker or by any other means is incorrect and should be unacceptable.

PRICE

Indian Rs. 500.00

Foreign : \$ 35; £ 30

Published at the Publication Division by the Director Zoological Survey of India, 234/4, AJC Bose Road, 2nd MSO Building, 13th floor, Nizam Palace, Kolkata 700020 and printed at M/s Image, New Delhi 110 002.

CONTENTS

INTRODUCTION	1
LIST OF AGRICULTURALLY IMPORTANT SPECIES OF ACRIDOIDEA (ORTHOPTERA)	7
SYSTEMATIC ACCOUNT	9
Key to families of ACRIDOIDEA	9
Family PYRGOMORPHIDAE	
Key to the genera of Family PYRGOMORPHIDAE	9
Key to the species of Genus <i>Chrotognus</i> Serville, 1893	9
1. <i>Chrotognus (Chrotognus) trachypterus trachypterus</i> (Blanchard)	10
2. <i>Chrotognus (Chrotognus) oxypterus</i> (Blanchard).....	11
Genus <i>Atractomorpha</i> Saussure, 1862	
3. <i>Atractomorpha crenulata</i> (Fabricius).....	12
Genus <i>Colemania</i> Bolivar, 1910	
4. <i>Colemania sphenarioides</i> Bolivar	13
Genus <i>Neorthacris</i> Kevan and Singh, 1964	
5. <i>Neorthacris acuticeps acuticeps</i> (Bolivar)	15
Genus <i>Poeciloceris</i> (Fabricius) 1775	
6. <i>Poeciloceris pictus</i> (Fabricius).....	16
Family ACRIDIADAE	
Key to the subfamilies of Family ACRIDIADAE	17
Subfamily HEMIACRIDINAE	
Key to genera of Subfamily HEMIACRIDINAE	22
Genus <i>Gesonula</i> Uvarov, 1940	
7. <i>Gesonula punctifrons</i> (Stål).....	22
Genus <i>Spathosternum</i> Krauss, 1877	
8. <i>Spathosternum prasiniferum prasiniferum</i> (Walker)	23

Genus <i>Hieroglyphus</i> Kraus, 1877	
Key to the species of Genus <i>Hieroglyphus</i> Kraus, 1877	24
9. <i>Hieroglyphus banian</i> (Fabricius)	25
10. <i>Hieroglyphus nigrorepletus</i> Bolivar	26
11. <i>Hieroglyphus orizivorous</i> Carl	27
Subfamily OXYINAE	
Genus <i>Oxya</i> Serville, 1831	
Key to species (Male) of Genus <i>Oxya</i> Serville, 1831	27
Key to species (Female) of Genus <i>Oxya</i> Serville, 1831	28
12. <i>Oxya hyla hyla</i> Serville	28
13. <i>Oxya fuscovittata</i> (Marschall)	29
14. <i>Oxya nitidula</i> (Walker)	30
Subfamily TROPIDOPOLINAE	
Genus <i>Tristria</i> Stål, 1873	
15. <i>Tristria pulvinata</i> (Uvarov)	31
Subfamily EYPREPOCHEMIDINAE	
16. <i>Eyprepocnemis alacris alacris</i> (Serville)	32
17. <i>Eyprepocnemis rosea</i> Uvarov	33
Genus <i>Choreodocus</i> Bolivar, 1914	
18. <i>Choreodocus robutus</i> (Serville)	34
Genus <i>Tylotropidius</i> Stål, 1873	
19. <i>Tylotropidius varicorinis</i> (Walker)	35
Genus <i>Eupreponotus</i> Uvarov, 1921	
20. <i>Eupreponotus inflatus</i> Uvarov	36
Subfamily GOMPHOCERINAE	
Genus <i>Dnopherula</i> Karsch, 1896	
Subgenus (<i>Alacobothrus</i>) <i>luteipes</i> (Walker)	
21. <i>Dnopherula</i> (<i>Alacobothrus</i>) <i>luteipes</i> (Walker)	37
Key to the Genus of Subfamily CATANTOPINAE	38
Genus <i>Catantops</i> Schaum, 1853	
22. <i>Catantops pinguis innotabilis</i> (Walker)	38

Genus <i>Xenocatantops</i> Dirsh & Uvarov, 1953	
Key to Species of Genus <i>Xenocatantops</i> Dirsh & Uvarov, 1953	39
23. <i>Xenocatantops karnyi</i> (Kirby)	39
24. <i>Xenocatantops humilis humilis</i> (Servile)	40
Key to the Genus of Subfamily CYRTACANTHACRIDINAE	40
Genus <i>Cyrtacanthacris</i> Walker, 1870	
25. <i>Cyrtacanthacris tatarica</i> (Linnaeus)	41
Genus <i>Chondracris</i> Uvarov, 1923	
26. <i>Chondracris rosea</i> (de Geer)	42
Genus <i>Patanga</i> Uvarov, 1923	
27. <i>Patanga succincta</i> (Johansson)	44
Genus <i>Anacridium</i> Uvarov	
28. <i>Anacridium flavescence</i> (Fabricius)	45
Genus <i>Scistocerca</i> Stål, 1873	
27. <i>Scistocerca gregaria</i> (Froskal)	46
Subfamily ACRIDINAE	
Key to genera of Subfamily ACRIDINAE	47
Genus <i>Acrida</i> Linnaeus, 1758	
30. <i>Acrida exaltata</i> (Walker)	47
Genus <i>Phlaeoba</i> Stål, 1860	
Key to Species of Genus <i>Phlaeoba</i> Stål, 1860	48
31. <i>Phlaeoba infumata</i> Brunner	49
32. <i>Phlaeoba antennata</i> Brunner	50
Subfamily OEDIPODINAE	
Key to the genera of Subfamily OEDIPODINAE	51
Genus <i>Aiolopus</i> Fieber, 1853	
33. <i>Aiolopus thalassinus tamulus</i> (Fabricius)	51
Genus <i>Oedaleus</i> Fieber, 1853	
34. <i>Oedaleus abruptus</i> (Thunberg)	52
Genus <i>Dittopternis</i> Saussure, 1884	
35. <i>Dittopternis venusta</i> (Walker)	53
Genus <i>Trilophidia</i> Stål, 1873	
36. <i>Trilophidia annulata</i> (Thunberg)	54

Genus <i>Locusta</i> Linnaeus, 1758	
37. <i>Locusta migratoria migratorioides</i> (Reiche & Fairmaire)	55
Genus <i>Gastrimargus</i> Saussure, 1884	
38. <i>Gastrimargus africanus orientalis</i> Sjostedt	56
SUMMARY	57
ACKNOWLEDGEMENTS	57
REFERENCES	57

INTRODUCTION

Locusts are the well known of all grasshopper pests. Many species have already been recorded as occasional pests, but the damage is usually local and confined to native crops, so that it does not attract much attention. Acridoidea is commonly known as shorthorned grasshoppers, locusts, bush hoppers, surface grasshoppers etc. They are highly economically important, as some of the species do considerable damage to the crops and vegetable plants or forest. Colemann and Kannan (1911), Pruthi and Nigam (1939), Rao (1970), Roonwal (1976), Tandon (1990) and Mandal *et al.* (1999) have recorded some species of Acridoidea as a pest of crops and vegetables, besides this work no serious efforts have been made to study on this group. However, typical grasshoppers in the following aspects, mandibulated mouth parts, apterous, brachypterus or fully winged, a pair of wider, membranous hind wings. The male external genitalia enlarged ninth abdominal sternum or sub genital plate. Hind legs are modified for jumping, Female external genitalia have four short, stout egg laying valves at the end of abdomen. The young (called nymph or hoppers) are wing less.



Fig. 1. Diagram of a typical Grasshopper

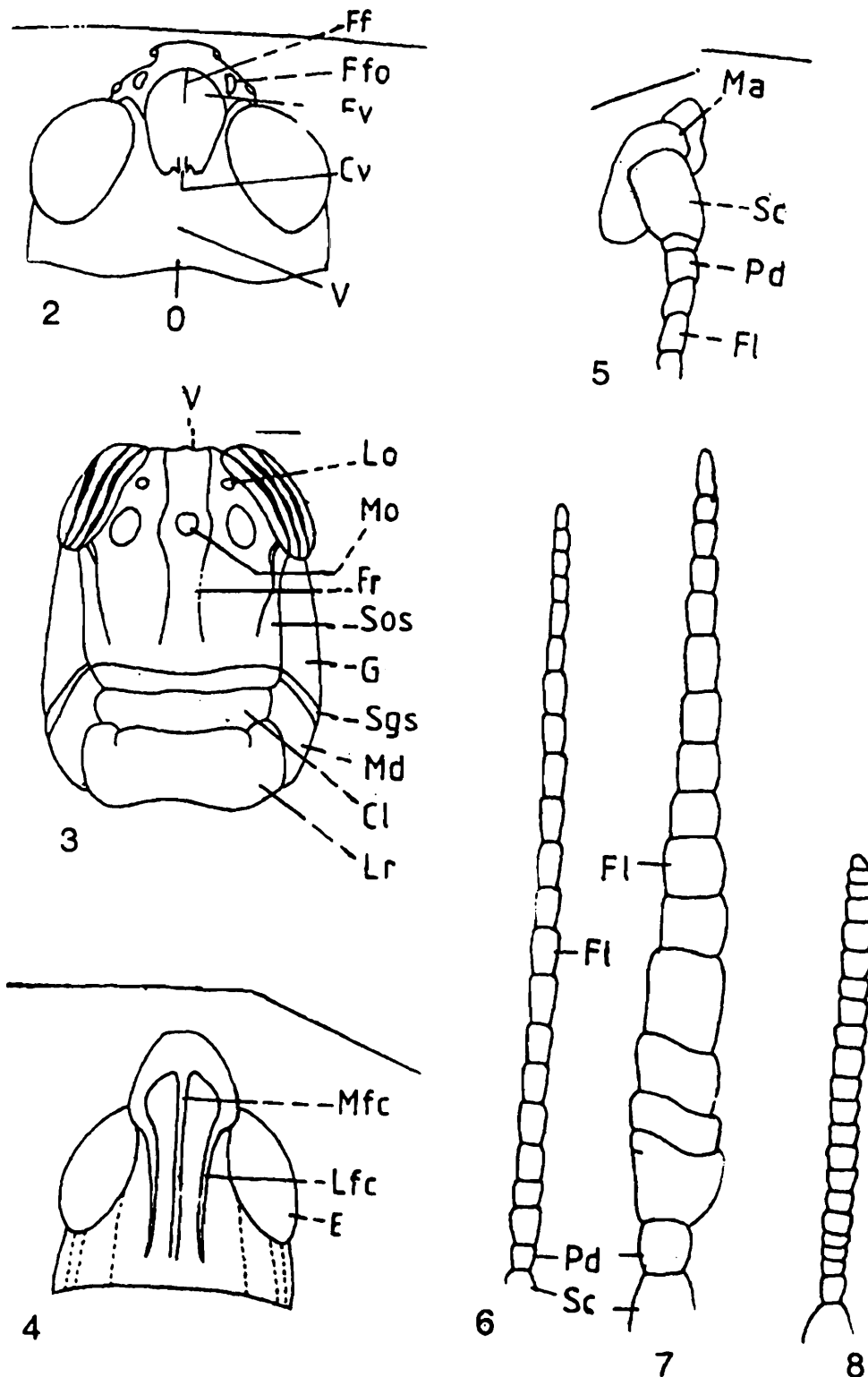


Fig. 2-8

Fig. 2. Dorsal portion of head. 3. Head (front view). 4. Same as Fig. 2. showing median carina. 5. Base of antenna. 6. Type of antenna (Filiform). 7. Type of antenna (Thick filiform or rod like). 8. Type of antenna (Ensiform). Cl. Clypeus; Cv. carinula of vertex; E. eye; Ft. Fastigial furrow; Ffo. fastigial foveolae; Fl. flagellum; Fr. frontal ridge; Fv. fastigium of vertex; G. gena; Lfc. lateral carinulae of fastigium of vertex; Lo. lateral ocellus (simple eye); Lr. Labrum; Ma. membranous area; Md. mandible; Mfc. median carinula off astigium of vertex; Mo. median ocellus; O. occiput; Pd. pedicel; Sc. scape; Sgs. sub genal sclerite; Sos. sub ocular; V. vertex.

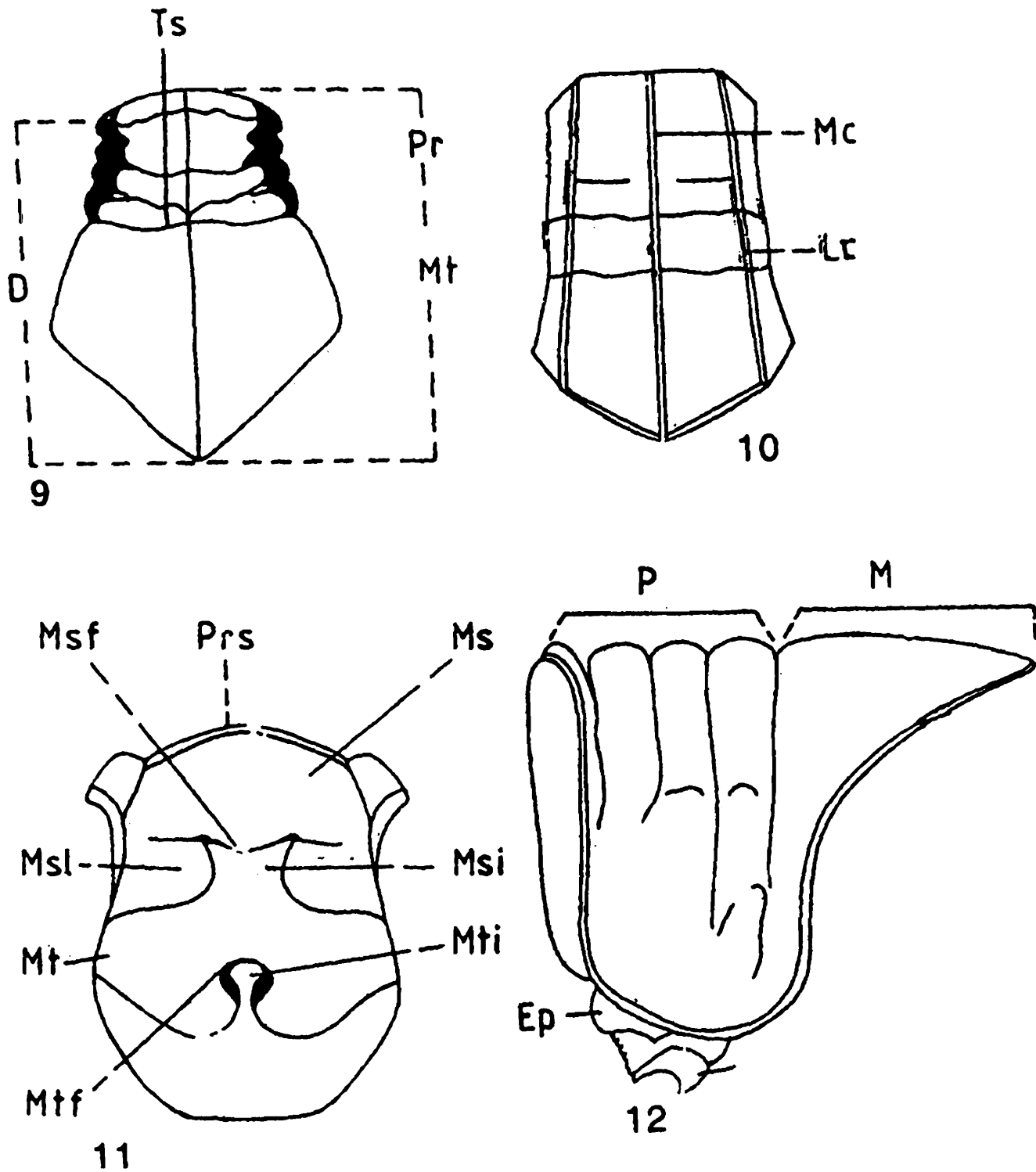


Fig. 9-12

Fig. 9. Dorsal view of pronotum. 10. Dorsal view of pronotum. 11. Ventral view of thorax. 12. Lateral view of pronotum. D. dorsum; Lc. lateral carina of pronotum; Mc. median carina; Ms. mesosternum; Msf. mesosternal furcal suture; Msi. mesosternal interspace; Msl. mesosternal lobe; Mt. metazona; Mtf. metasternal furcal suture; Pr. prozona of pronotum; Mti. Metasternal interspace; Mt. Metasternum; Ep. Episternum; P. pronotum; Ts. Transverse sulci.

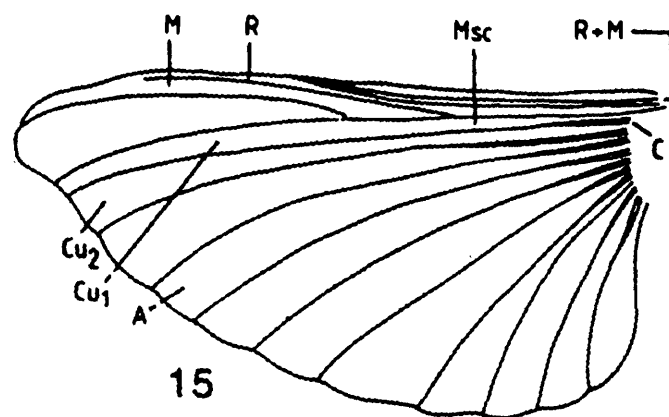
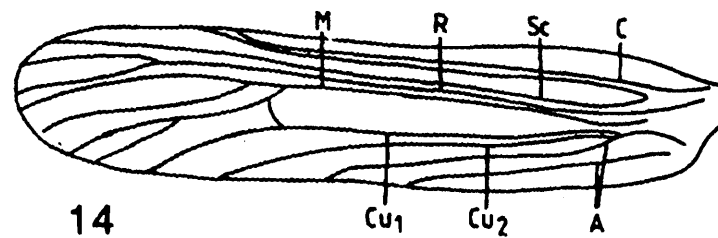
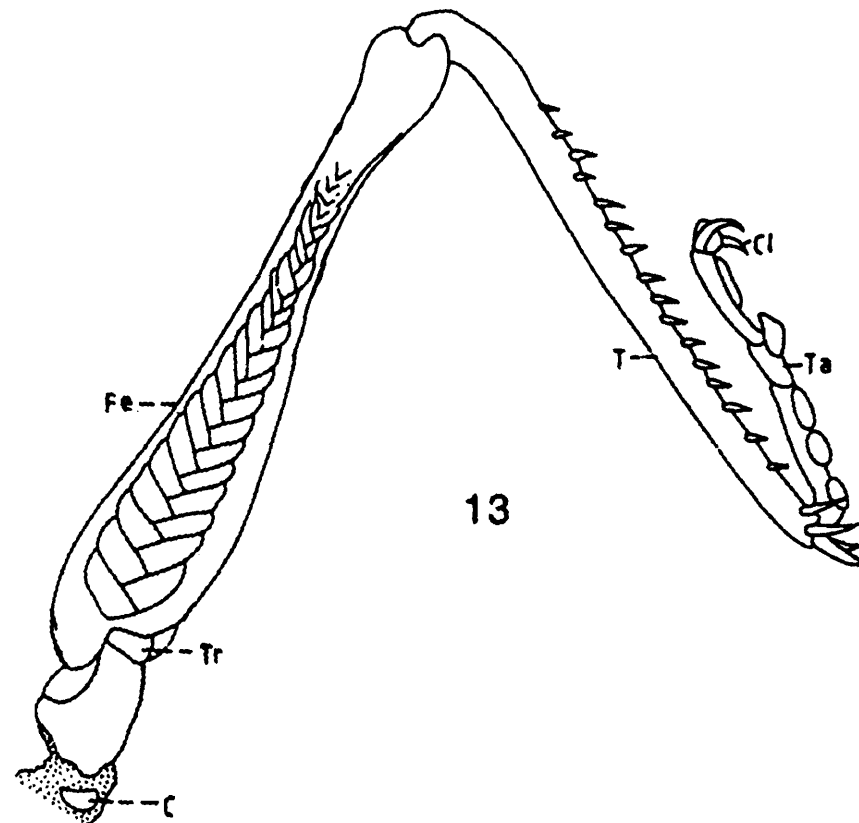


Fig. 13-15

Fig. 13. Hind leg. C. coxa; Cl. claw; Fe. femur; T. tibia; Ta. tarsus; Tr. trochanter. 14. Fore wings showing venation. 15. Hind wings showing venation. A. annal; C. costa; Cu. cubitus; M. median; R. radius; Msc. median sub costa; R+M. radius + median; Sc. sub costa.

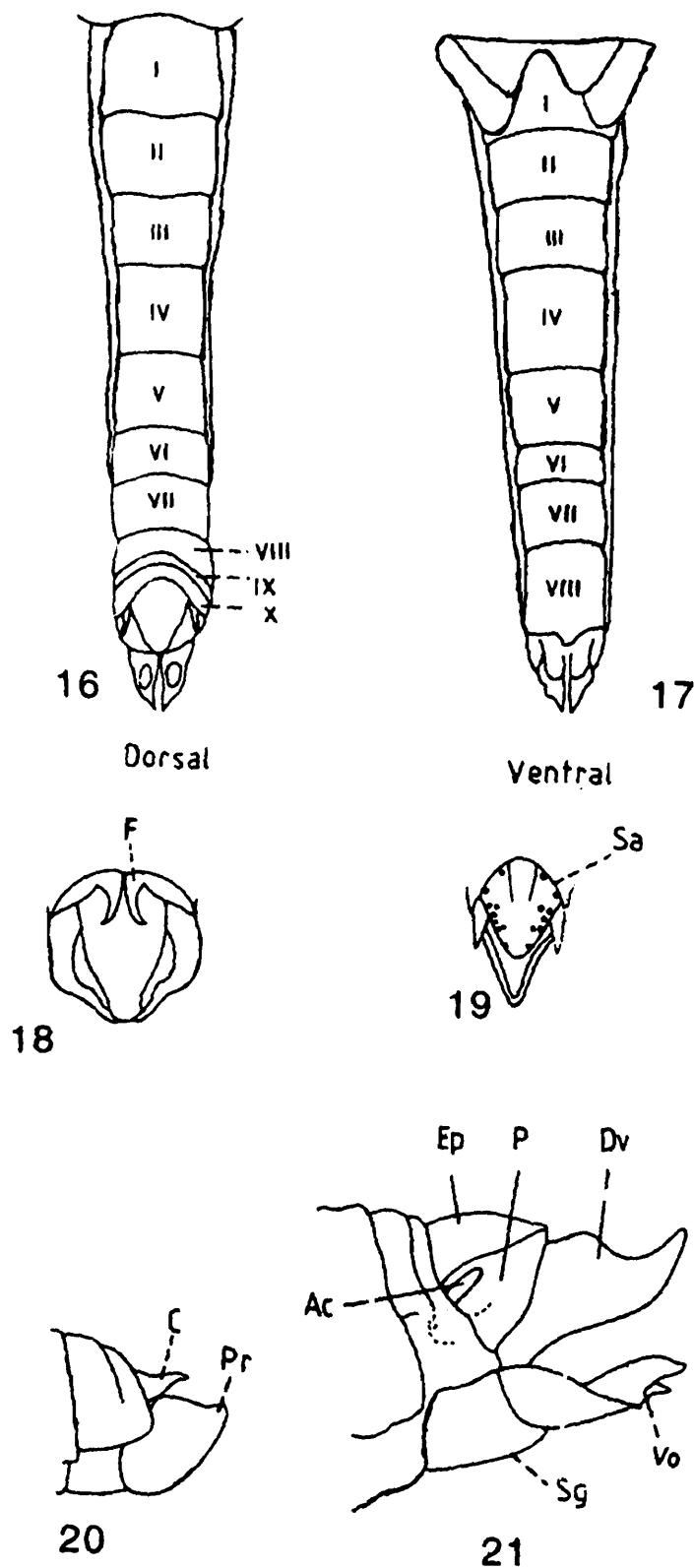


Fig. 16-21

Fig. 16. Dorsal view of Abdomen (female). 17. Ventral view of Abdomen (female) Fig. 18. Tip of the abdomen (male). 19. tip of the abdomen (male). 20. Tip of the abdomen. Lateral view of hind end of male. 21. Tip of the abdomen. Lateral view of Hind end of female. F. furcula; Sa. Supraanal plate; C. cerci; Pr. paraproct; Ep. epiproct; P. paraproct; Sg. subgenital plate; v. ventral valve; v. ventral valve; Ac. anal cerci; Dv. dorsal valve.

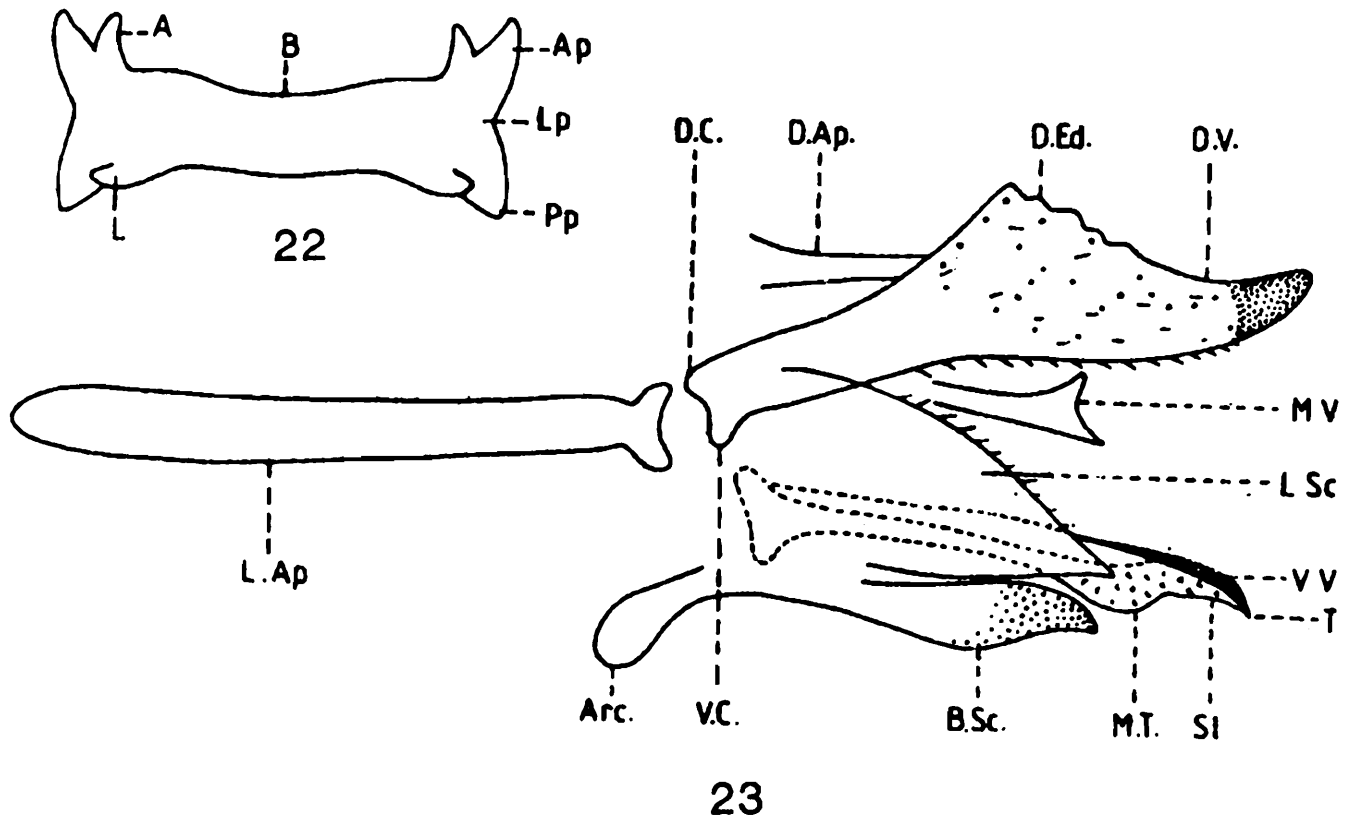


Fig. 22-23

Fig. 22. Structure of Ovipositor (Lateral view). 23. Structure of Epiphallus (Dorsal) Ovipositor : Arc. arcus; B. Sc. basal sclerite; D.AP. dorsal apodeme; Dc. dorsal condyle; D. Ed. dorsal edge; DV. dorsal edge; DV. dorsal valve; L.AP. Lateral apodeme; L.Sc. lateral sclerite; M.T. mesial tooth; MV> mesial valve; SI. slope; T. tip; V.C. ventral condyle; V.V. ventral valve. Epiphallus : A. ancora; Ap. apical valve of penis; B. bridge of lophus; L. lophus; Lp. lateral process; Pp. posterior process of epiphallus.

**LIST OF AGRICULTURALLY IMPORTANT SPECIES OF ACRIDOIDEA
(ORTHOPTERA)**

Order ORTHOPTERA
Super Family ACRIDOIDEA
Family PYROGOMORPHIDAE

1. *Chrotogonus (Chr.) tr. trachypterus* (Blanchard)
2. *Chrotogonus (Chr) oxy. oxypterus* (Blanchard)
3. *Atractomorpha crenulata* (Fabricius)
4. *Colemania sphenarioides* Bolivar
5. *Neorthacris acuticeps* (Bolivar)
6. *Poekilocerus pictus* (Fabricius)

Family ACRIDIDAE
Subfamily HEMIACRIDINAE

7. *Gesonula punctifrons* (Stål)
8. *Spathosternum pr. prasiniferum* (Walker)
9. *Hieroglyphus banian* (Fabricius)
10. *Hieroglyphus nigrorepletus* Bolivar
11. *Hieroglyphus oryzivorous* Carl

Subfamily OXYINAE

12. *Oxya hyla hyla* Serville
13. *Oxya fuscovittata* (Marschall)
14. *Oxya nitidula* (Walker)

Subfamily TROPIDOPOLINAE

15. *Tristria pulvinata* (Uvarov)

Subfamily EYPREPOCNEMIDINAE

16. *Eyprepocnemis al. alacris* (Serville)
17. *Eyprepocnemis rosea* Uvarov
18. *Choroedocus robustus* (Serville)
19. *Tyloptropidius varicornis* (Walker)
20. *Eupreponotus inflatus* Uvarov

Subfamily CATANTOPINAE

21. *Catantops pinguis innotabilis* (Walker)
22. *Xenocatantops karnyi* Kirby
23. *Xenocatantops humilis humilis* (Serville)

Subfamily CYRATACANTHACRIDINAE

24. *Cyrtacanthacris tatarica* (Linnaeus)
25. *Condracris rosea* (de Geer)
26. *Pantanga succincta* (Johansson)
27. *Anacridium flavescence* (Fabricius)
28. *Scistocerea gregaria* (Froskal)

Subfamily ACRIDINAE

29. *Acrida exltata* (Walker)
30. *Phlaeoba infumata* Brunner
31. *Phlaeoba antennata* Brunner

Subfamily GOMPHOCERINAE

32. *Dnopherula (Aulacobothrus) luteipes* (Walker)

Subfamily OEDIPODINAE

33. *Aiolopus thalassinus tamulus* (Fabricius)
34. *Oedaleus abruptus* (Thunberg)
35. *Ditopternis venusto* (Walker)
36. *Trilophidia annulata* (Thunberg)
37. *Locusta migratoris migratorioides* (Reitche & Fairmaire)
38. *Gastrimargus africanus africanus* (Saussure)

SYSTEMATIC ACCOUNT

Key to families of ACRIDOIDEA

1. Foveolae of the vertex contiguous, superior and forming the extremity of the fastigium; stridulatory mechanism absent PYRGOMORPHIDAE
- Foveolae lateral or inferior, never forming the tip of the fastigium, stridulatory mechanism present ACRIDIDAE

Family PYRGOMORPHIDAE

Key to the genera of Family PYRGOMORPHIDAE

1. Anterior margin of prosternum strongly reflexed and dilated; body short and stout; pronotum heavily rugosed and much widened behind; posterior femora not stout...
..... *Chrotognus* Serville
- Anterior margin of prosternum neither reflexed nor dilated; body slender; pronotum not rugosed and not much widened behind; posterior femora not stout 2
2. Antennae remote for the eyes, placed in front of ocelli; wings present
..... *Atractomorpha* Fabricius
- Antennae placed near the eyes and placed below the ocelli; wings absent 3
3. Outer apical spine of posterior tibiae absent or difficult to detect, body not robust⁴
- Outer apical spine of posterior tibiae very distinct, body robust
..... *Poekilocerus* Serville
4. Body with “humped” dorsally; tegmen extending to the end of abdomen
..... *Colemania* Bolivar
- Body with “Humped” absent; tegmen completely absent
..... *Neorthacris* Kevan and Singh

Key to the species of Genus *Chrotognus* Serville, 1893

1. Hind wings hyaline or occasionally tinged yellowish brown but never infumated
..... *trachypterus* (Blanchard)
- Hind wings always infumated *oxypterus* (Blanchard)

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

Fig. 24, (Male); 25 (Female)

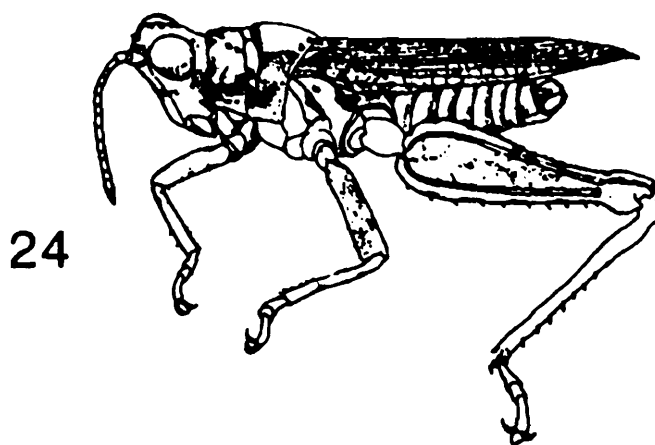
Digonosis : Medium size, body dorsoventrally flattened; hind wings hyaline or occasionally with faintly tinged yellowish brown but never infumated or infuscated, apparently always at least two third as long as tegmina.

Habitat : It is widely distributed in low grass and herbs, associated with a good deal of bare ground. Adults and nymphs are found throughout the year, suggesting three generations per year. It is a minor pest of cotton, sorghum, maize, wheat, ground nut, tobacco and paddy nurses.

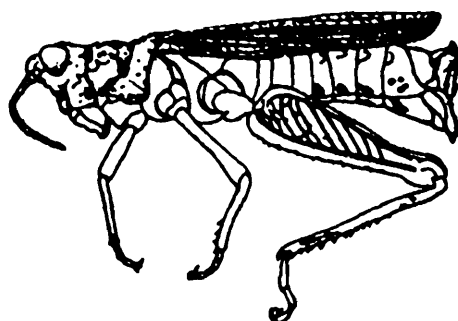
Distribution : India : Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Uttar Pradesh Uttaranchal and West Bengal.

Elsewhere : Bangla Desh and Nepal.

Remarks : This species can easily be identified in having hind wings hyaline or occasionally with faintly tinged yellowish brown.



24



25

Fig. 24. Showing general morphology of *Chrotogonus trachypterus trachypterus* (Male).

Fig. 25. Showing general morphology of *Chrotogonus trachypterus trachypterus* (Female).

2. *Chrotogonus (Chrotogonus) oxypterus* (Blanchard)

Fig. 26 (Male); 27 (Female)

Diagnosis : Size small; head large and broad; fully alate to micropterous form; hind wings infumated at basal part and extended nearly two-thirds as long as tegmina.

Habitat : It is a pest of various crops and vegetables and prefer the places where the amount of water is less in soil. Others habitat are same as previous species.

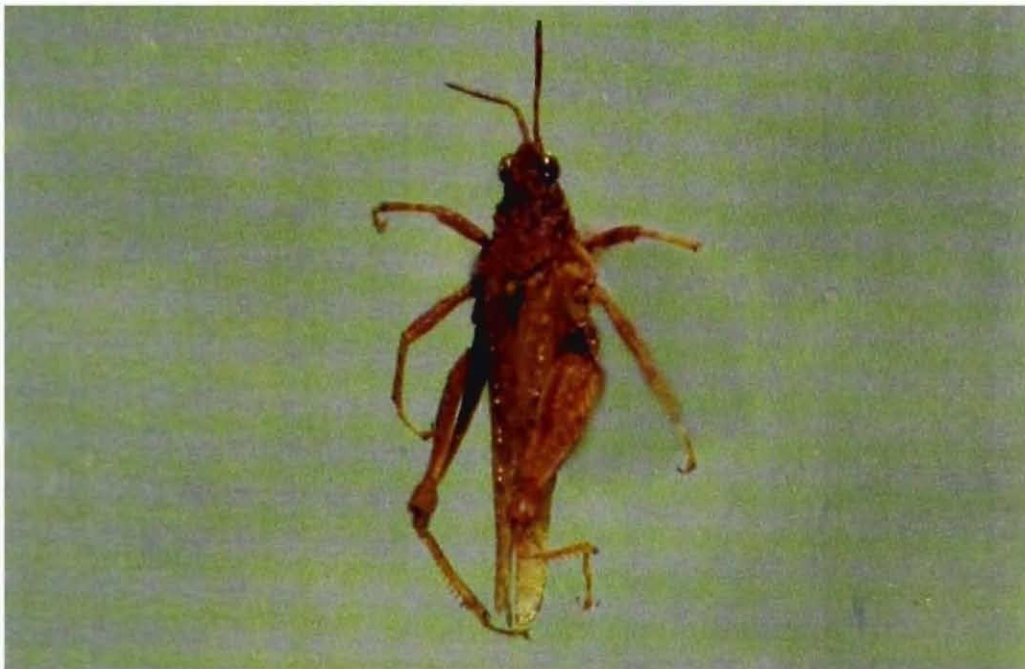


Fig. 26. *Chrotogonus (Chr.) oxy. oxypterus* (Blanchard) – Male



Fig. 27. *Chrotogonus (Chrotogonus) oxypterus* (Blanchard) – Female

Distribution : India : Andhra Pradesh, Bihar, Goa, Karnataka, Kerala, South-East of Maharashtra, South of Madhya Pradesh, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Sri Lanka.

Remarks : Hind wings always infumated to dark fuscous never clear hyaline.

Genus *Atractomorpha* Saussure, 1862

3. *Atractomorpha crenulata* (Fabricius)

Fig. 28 (Male); 29 (Female)

Diagnosis : Body medium and slender; fastigium of vertex short; eyes convex and prominent; lateral pronotal lobes with distinct membranous area, specially in females; hind femora not clearly convex; tegmina pointed, extending one-fourth of their length beyond the hind femora; hind wings normally tyrian pink to light mallow purple at base.

Habitat : Trend of population suggests that there are three generations per year, the first generation of hoppers hatching after the early rains, in the month of April, may and becoming adult July-August. It causes the damage to seedling of growing crops like, paddy, maize, milch, millet, oat, cow pea, tobacco, the second the third generation adult may congregate on wheat, millet, and oat.

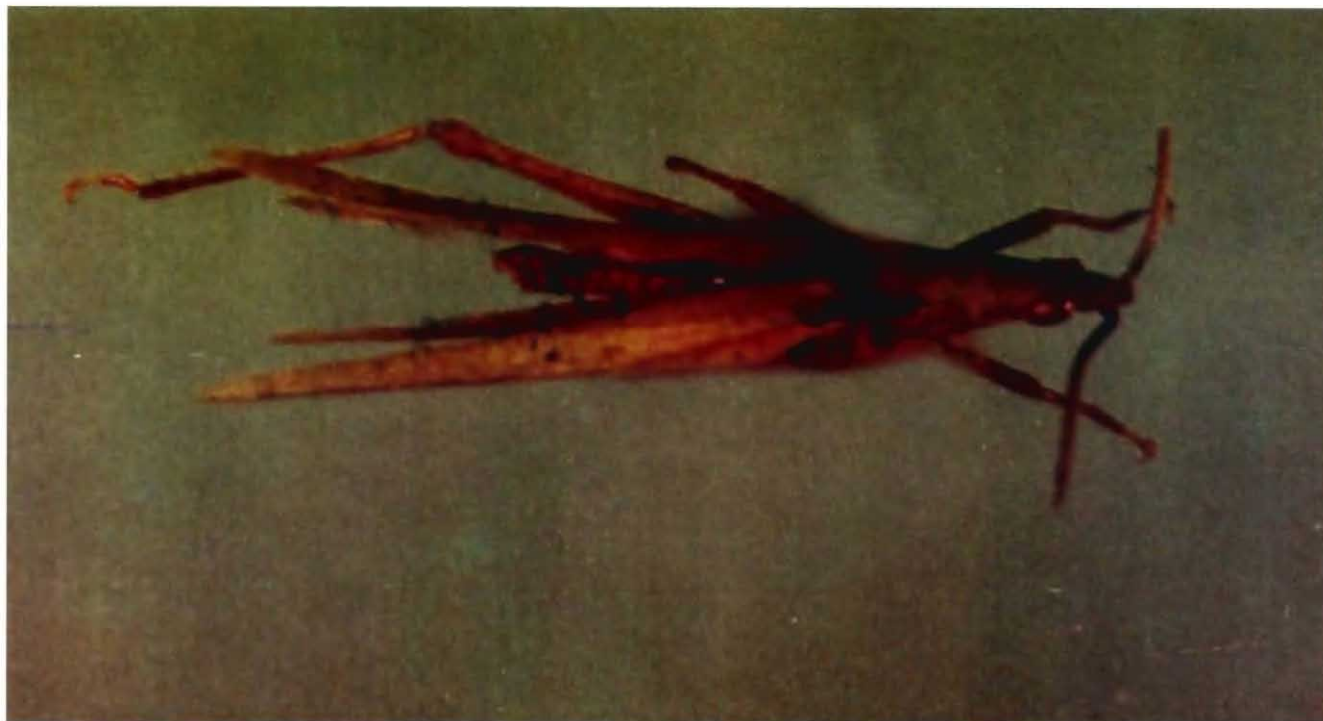


Fig. 28. *Atractomorpha crenulata* (Fabricius) – Male



Fig. 29. *Atractomorpha crenulata* (Fabricius) – Male

Distribution : India : Throughout.

Elsewhere : Bangla Desh; Malayasia; Myanmar; Pakistan; Sri Lanka, N.W. Sumatra; Thailand and S. Vietnam.

Remarks : Lateral pronotal lobe always with a membranous area on posterior margin and more prominent in female.

Genus *Colemania* Bolivar, 1910

4. *Colemania sphenarioides* Bolivar

Fig. 30 (Male); Fig. 30a (Female)

Diagnosis : Medium large size; bluish green in colour with pink and yellow stripe; always having wing pads, tegmina extending to the end of the 1st adomen; prosternum acutaly tuberculated; supraanal plate forming a long traingle, longer than cerci.

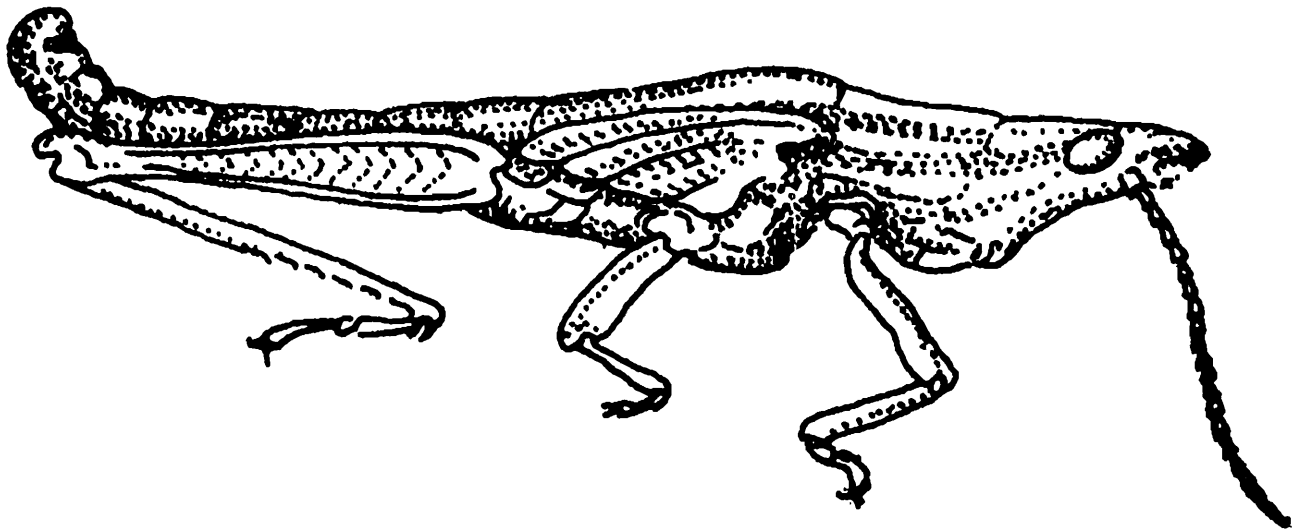


Fig. 30. a *Colemania sphenarioides* Bolivar (Male)

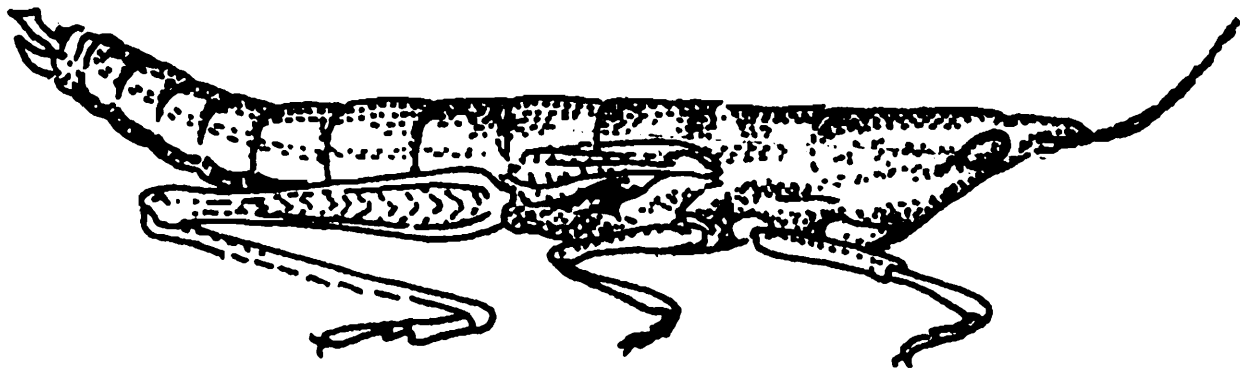


Fig. 30. *Colemania sphenarioides* Bolivar (Female)

Habitat : This species is popularly known as Deccan grasshopper. It is a serious pest of Jawar, Bazra, Sugarcane and millets. It is also found on flower and pods of pulses, cotton and on perennial grasses. There is a single generation in one year. It hatches during July-August.

Distribution : India : Andhra Pradesh, Maharashtra, Karnataka and Tamil Nadu.

Remarks : We think that the distribution of the species is restricted to South India only.

Genus *Neorthacris* Kevan and Singh, 1964

5. *Neorthacris acuticeps acuticeps* (Bolivar)

Fig. 31 (Male)

Diagnosis : Size medium; body slender and with a distinct broad, black band both above & below by much narrow yellow stripes, head conical not longer than wide; antennae filiform, shorter than the body; male cerci abruptly tapered apically.



Fig. 31. *Neorthacris acuticeps* (Bolivar) – Male

Habitat : This subspecies probably biannual insect. It causes minor damage the tea plantation.

Distribution : India : Andhra Pradesh, Tamil Nadu.

Elsewhere : Sri Lanka.

Remarks : It is restricted in South India.

Genus *Poeciloceris* (Fabricius) 17756. *Poeciloceris pictus* (Fabricius)

Fig. 32 (Female)

Diagnosis : Body large in size with finely rugose integument; head and pronotum with faint medium carina and lateral carinae absent; antennae blue black with yellow beyond the basal third of their length.



Fig. 32. *Poeciloceris pictus* (Fabricius) – Female

Habitat : Commonly known as Ak grasshopper and generally feed on Ak plants (*Calotropis gigantea*), but also reported to feed on various crops, vegetables and fruit plants and occasionally causes considerable damage by feeding on young plants. It may have a single generation per year. The nymphs and adults are found in groups.

Distribution : India : Andhra Pradesh, Chattrishgarh, Delhi, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Pakistan.

Remarks : Beautiful colour insect.

Family ACRIDIADAE

Key to the subfamilies of Family ACRIDIADAE

- 1. Prospetnal process or tubercle usually absent; 2
- Prosternal process or tubercle present 5
- 2. Sound producing mechanism represented by articulated or non articulated stridulatory serration or pegs on inner side of hind femur 3
- Sound producing mechanism not represented by such serration or pegs on inner side of hind femur 4
- 3. Sound producing mechanism represented by unarticulated serration on inner side of hind femur TRUXALINAE (Fig. 33)

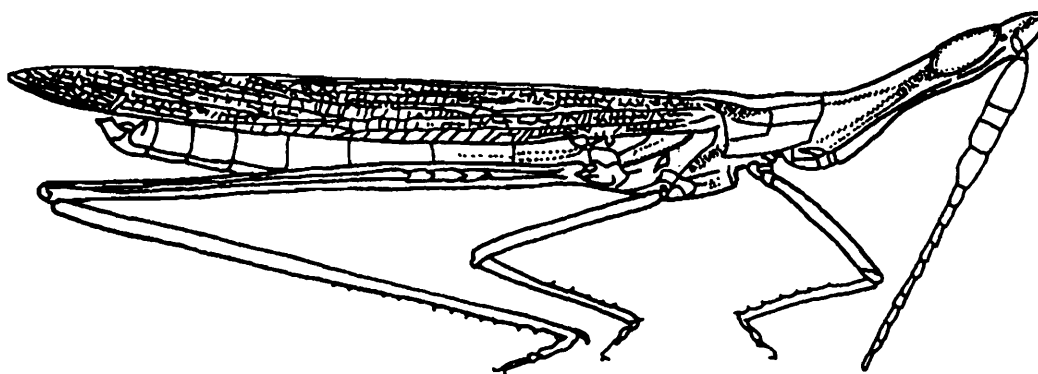


Fig. 33. Subfamily : TRUXALINAE

- Sound producing mechanism represented by row of articulated stridulatory pegs on inner side of hind femur GOMPHOCERINAE (Fig. 34a, b, c : Male; 35 a, b : Female)

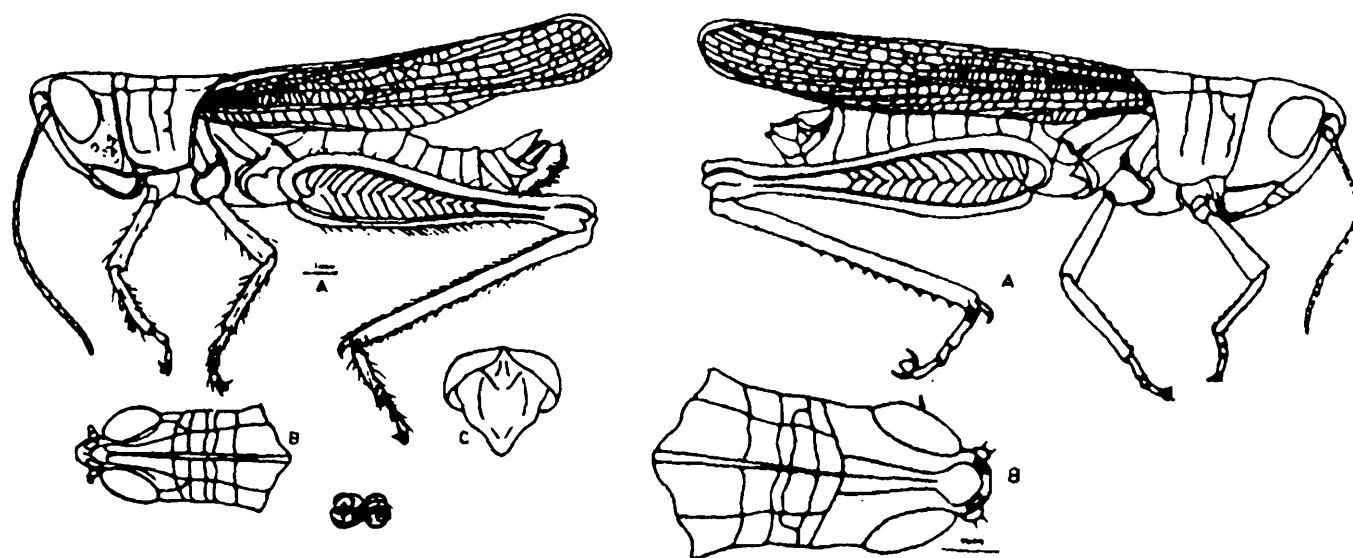


Fig. 34. Subfamily: GOMPHOCERINAE (Male) Fig. 35. Subfamily: GOMPHOCERINAE (Female)

4. Head with acute in profile, and it acute angle of frons; tegmina without inter calary vein (if present, weak, irregular and serrated vein in male)
ACRIDINAE (Fig. 36, a, b, c : Male; 37 : Female)

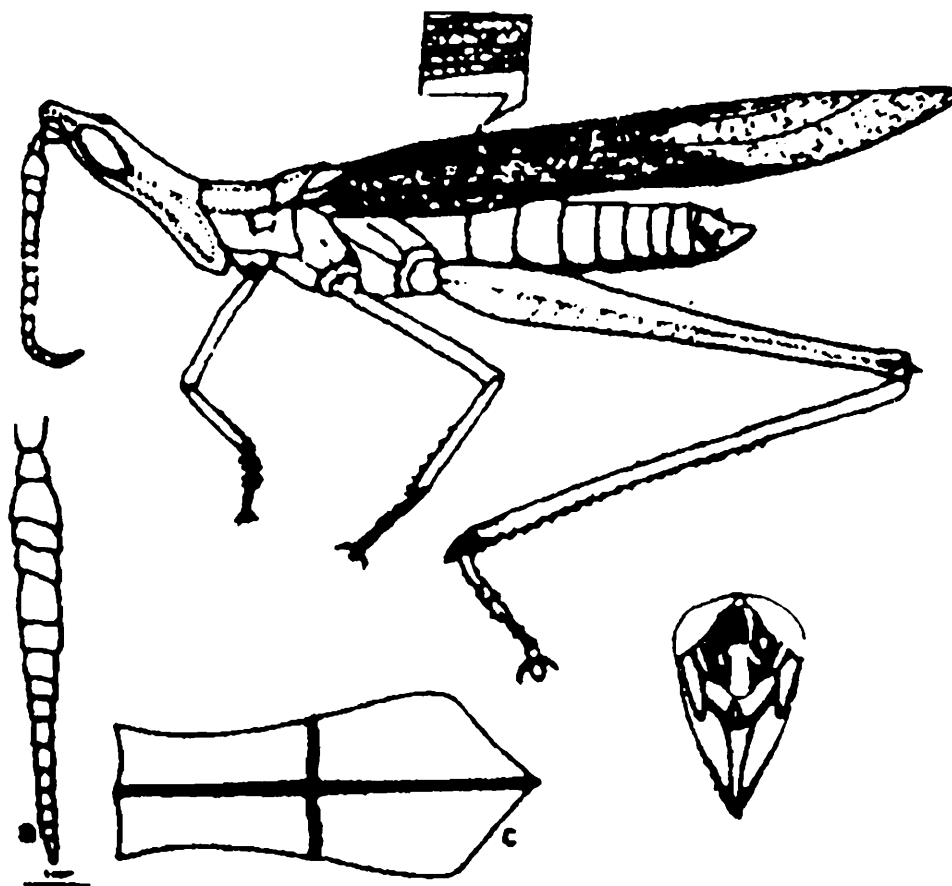


Fig. 36 a-c. Subfamily : ACRIDINAE (Male)

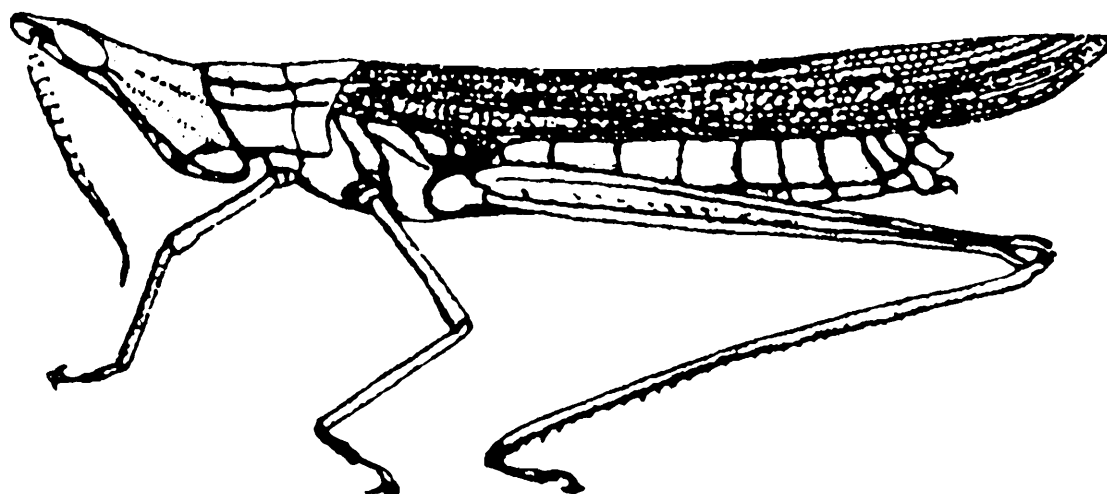


Fig. 37. Subfamily : ACRIDINAE (Female)

- Head rounded in profile, face almost vertile, rarely oblique and tegmina always with an intercalary vein in median area (Mostly well developed)
.....OEDIPODINAE (38 : Female)

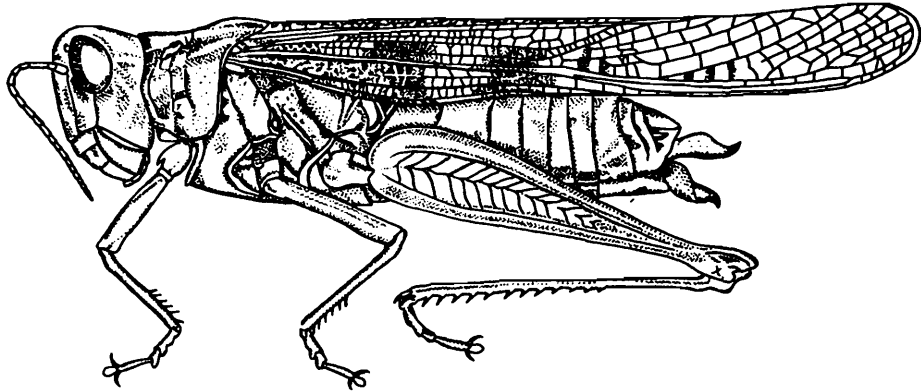


Fig. 38. Subfamily : OEDIPODINAE (Female)

- 5. Radial area of tegmina with a series of regular, parallel striduaory veinlets.....
.....HEMIACRIDINAE (Fig. 39 : Female; 40 : Male)

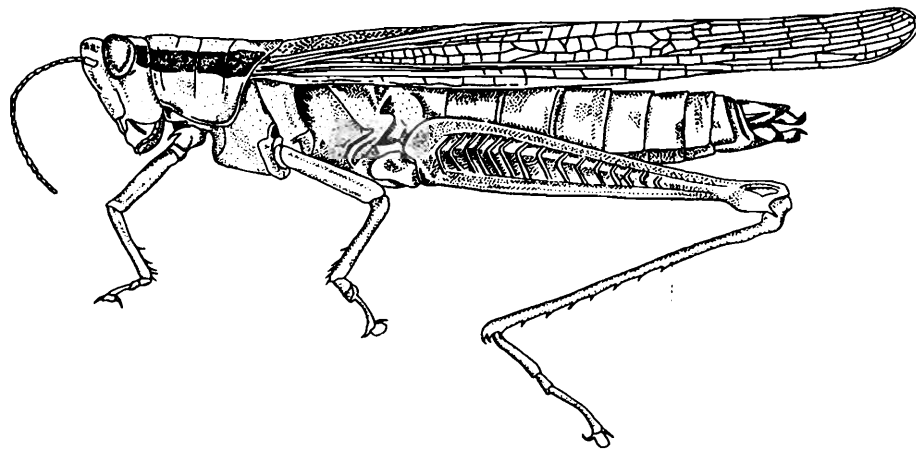


Fig. 39. Subfamily : HEMIACRIDINAE (Female)

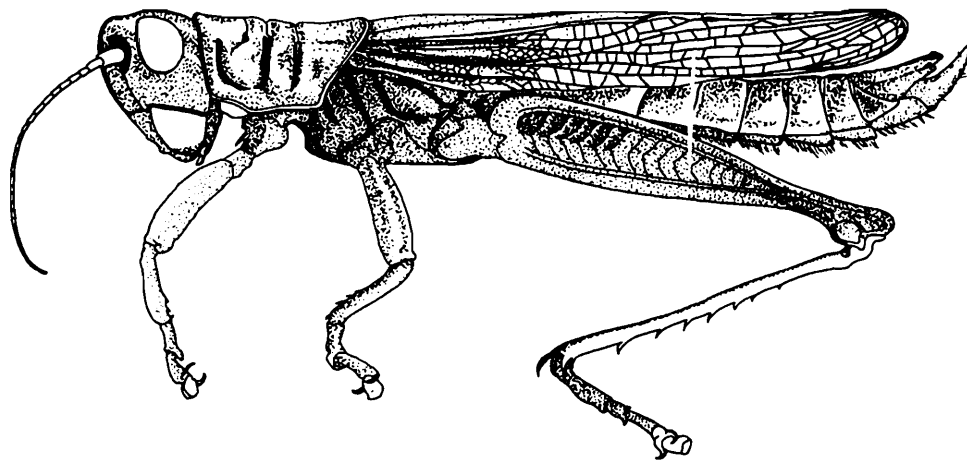


Fig. 40 : *Hieroglyphus orizivorus* Carl (Male)

- Radial area of tegmina veinlets absent, if apterous, then tympanum (at least rudimentary) present..... 6
- 6. Lower external lobe of hind knee with spine like apex .. OXYINAE (Fig. 41 : Male)
- Lower external lobe of hind knee with apex founded, angular or sub-acute but not spine like 7

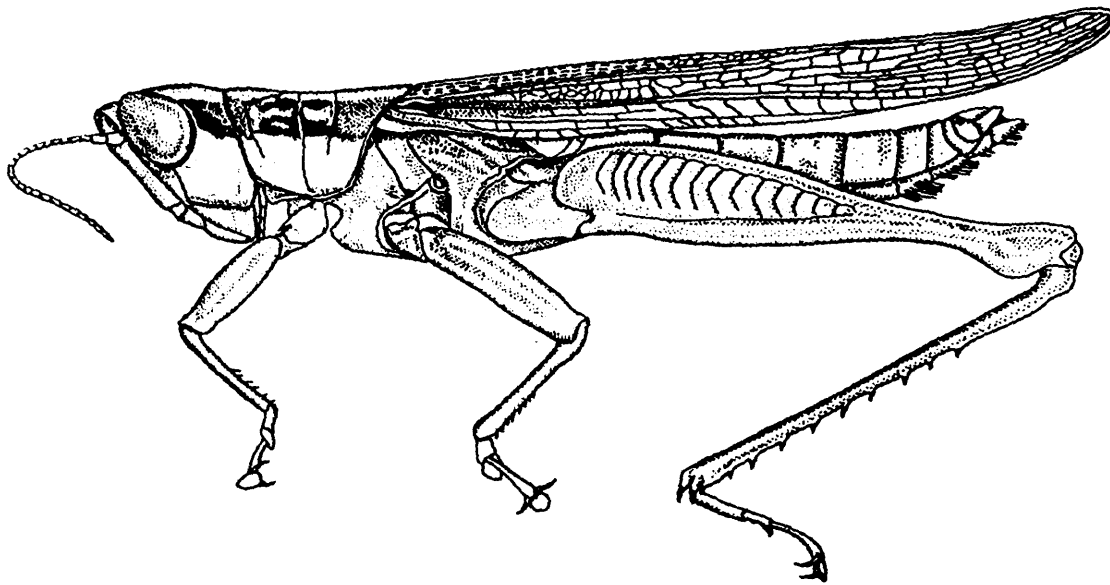


Fig. 41. Subfamily : OXYINAE (Male)

- 7. Mesosternal interspace closed..... TROPIDOPOLINAE (Fig. 42 : Female)
- Mesosternal interspace open..... 8

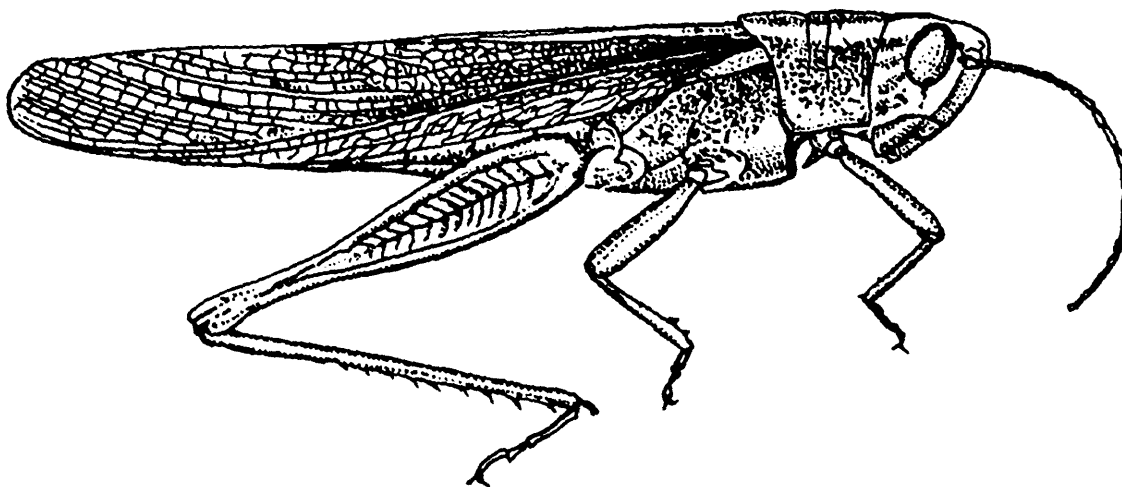


Fig. 42. Subfamily : TROPIDOPOLINAE (Female)

8. Mesosternal lobes rounded or obtuse-angular or acute-angular, but not triangular 9
 – Mesosternal lobes rectangularCYRTACANTHACRIDINAE (Fig. 43 : Male)

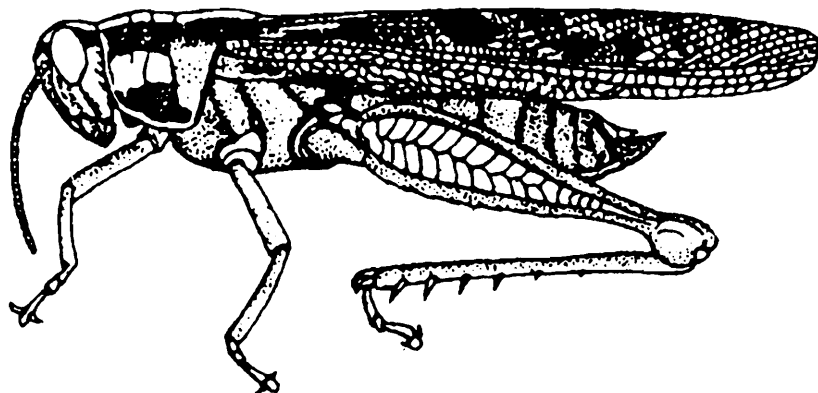


Fig. 43. Subfamily : CYRTACANTHACRIDINAE

9. Dorsum of pronotum flat or tectiform, with median and lateral carinae linear (lateral carinae sum times obliterated); male circus with strongly compressed, lobiform or subacute downEYPREPOCNEMIDINAE (Fig. 44 : Female)

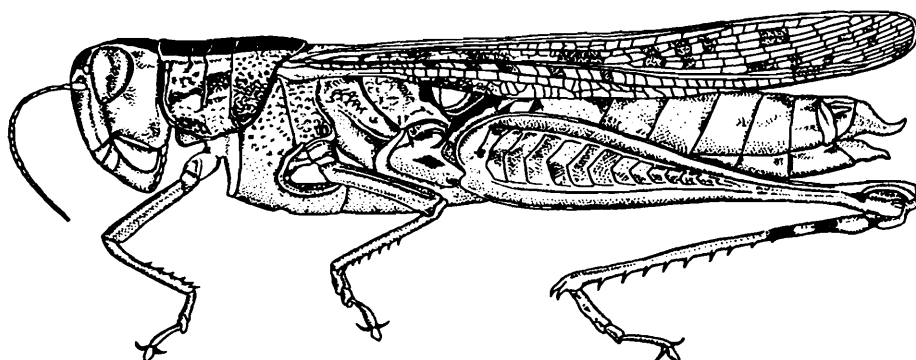


Fig. 44. Subfamily : EYPREPOCNEMIDINAE (Female)

- Dorsum of pronotum of variable shape; lateral carinae, if present, not linear; male circus variable, but not with strongly compressed, lobiform or subacute
 CATANTOPINAE (Fig. 45 : Male; 46 : Female)

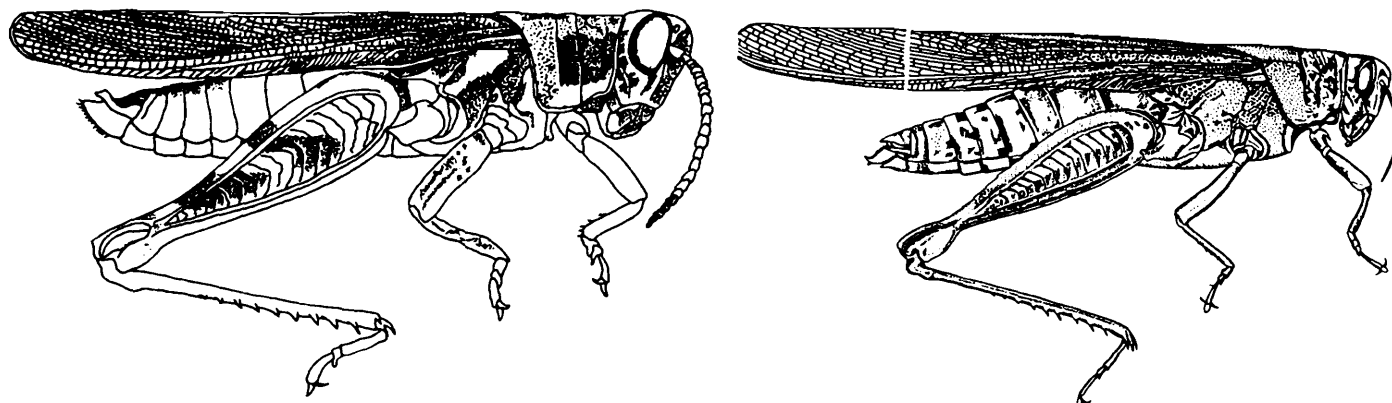


Fig. 45. Subfamily : CATANTOPINAE (Male) Fig. 46. Subfamily : CATANTOPINAE (Female)

Subfamily HEMIACRIDINAE

Key to genera of Subfamily HEMIACRIDINAE

1. Male supra anal plate narrower than long, with sides excurved towards apex; male curcus with apex bifurcate; size large.....*Hieroglyphus* Krauss
- Male supra anal not as above; male curcus not bifurcate at apex; size small to medium 2
2. Prosternal process conical; fastigium of vertex elongate, projecting in front of eyes; pronotum not distinctly tricarinate *Gesonula* Uvarov
- Prosternal tubercle or process spathulate; fastigium of vertex not much produced before the eyes, parabolic or obtusely angular; pronotum distinctly tricarinate
..... *Spathosternum* Krauss

Genus *Gesonula* Uvarov, 1940

7. *Gesonula punctifrons* (Stål)

Figs. 48 (Male); 49 (Female)

Diagnosis : Size medium; eyes large; antennae longer than head and pronotum together; pronotum long, narrow and rugose; prosternal tubercle conical; supra-anal plate spoon shaped, wide basally, with wide longitudinal median groove; in female ovipositor valves with small blunt teeth along the dorsal-outer margin.



Fig. 48. *Gesonula punctifrons* (Stål) – Male



Fig. 49. *Gesonula punctifrons* (Stål) – Female

Habitat : Both adults and nymphs were amongst water hyacinth, but also occurred in low number at the edge of the paddy field. This species also attacked the *Colocasia* sp. Besides this there is a possibility of its occurrence in other areas as this species is known to occur in mixed habitat of grass and low vegetation. The trend of population suggest it has two generation in one year.

Distribution : India : Andaman and Nicobar Isl., Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Kerala, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. Bangladesh; Borneo; China; Japan; Java; Malacca; Myanmar; Philippines; Sri Lanka; Taiwan; Thailand and Tonking.

Remarks : Apical part of the hind tibiae modified for swimming.

Genus *Spathosternum* Krauss, 1877

8. *Spathosternum prasiniferum prasiniferum* (Walker)

Fig. 50 (Male); 51 (Female)

Diagnosis : Size small; broad blackish or dark green stripe runs behind the lower part of the eyes and below the lateral carinae of the pronotum; spathulated prosternum tubercle.

Habitat : This species is associated with grass. Adults and nymphs occurs almost throughout the year. There are three generation in a year and cause damage to swelling of growing crops like paddy, maize and vegetables like brinjal, milch, tometo, etc. It may attack on leaves and grains of wheat, millet, oat in winter.



Fig. 50. *Spathosternum pr. prasiniferum* (Walker) – Male

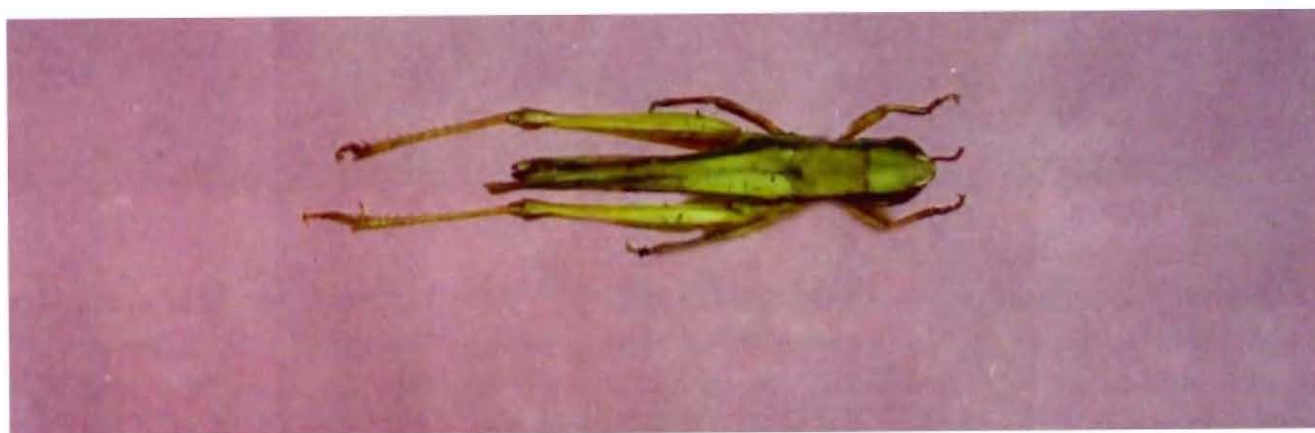


Fig. 51. *Spathosternum pr. prasiniferum* (Walker) – Female

Distribution : India : Arunachal Pradesh, Andhra Pradesh, Assam, Delhi, Goa, Karnataka, Kerala, Maharastra, Manipur, Meghalaya, Mizoram, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : Bangladesh; Indo-China; Myanmar; Pakistan; Sri Lanka; Thailand.

Remarks : This species can easily be identified by spathulated prosternal tubercle.

Genus *Hieroglyphus* Kraus, 1877

Key to the species of Genus *Hieroglyphus* Kraus, 1877

1. Male circus with apex simple oblique on upper margin 2
- Male circus with apex bifurcate, relatively slender *banian* Fabricius
2. 1st and 3rd sulci on sides of pronotum not joined by black band, or if joined, then also with irregular stripes connecting all sulci on dorsum *nigrorepletus* Bolivar
- 1st and 3rd sulci on sides of pronotum joined by black band, without irregular stripes connecting all sulci on dorsum *oryzivorus* Carl

9. *Hieroglyphus banian* (Fabricius)**Fig. 52 (Male); 53 (Female)**

Diagnosis : Large size; male with bifurcate cercus, relatively slender, with upper branch of fork recurved anteriorly to wards head and lower branch elongate and acute; lower valves of ovipositor long and slender with external lateral projection well defined and acute.

Habitat : *H. banian* is a major pest of paddy and it is commonly known as rice grasshopper. It is also a major pest of maize, oat, sugercane and fodder grass like para grass. The hopper hatching at the end of July and August and becoming adult Sept.-October. The population reaches its peak at the end of October when the paddy is fully matured. Single generation per year.



Fig. 52. *Hieroglyphus banian* (Fabricius) – Male

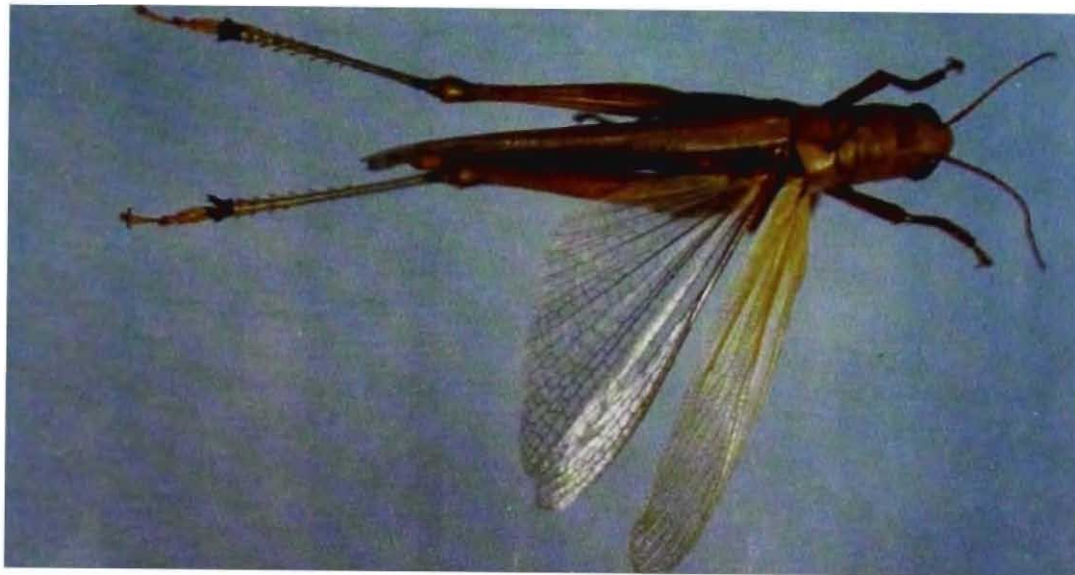


Fig. 53. *Hieroglyphus banian* (Fabricius) – Female

Distribution : India : Andhra Pradesh, Himachal Pradesh, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Bangladesh; Bhutan; Mayanamar; Vietnam; Thailand and China.

10. *Hieroglyphus nigrorepletus* Bolivar**Fig. 54 (Male); 55 (Female)**

Diagnosis : Size large; brachypterous; colour buff with yellowish buff patches; fastigium of vertex one and a half times as broad as long; frontal ridge parallel sided; female subgenital plate with very acute medium lobe.



Fig. 54. *Hieroglyphus nigrorepletus* Bolivar – Male

Habitat : Same as previous species.

Distribution : India : Andhra Pradesh, Assam, Bihar, Karnataka, Orissa, Punjab, Uttar Pradesh, Uttaranchal; West Bengal.

Elsewhere : West to southern Baluchistan; Pakistan.

Remarks : This species can easily be separated from other species by character on pronotum and shape of male cerci.



Fig. 55. *Hieroglyphus nigrorepletus* Bolivar – Female

11. *Hieroglyphus orizivorous* Carl

Fig. 40 (Male) and 55a

Diagnosis : Female larger than male; frontal ridge diverted downwards and with moderately shallow sulcus; circus simple, up-curved and incurved; body colour pale green or buff with yellowish brown patches.

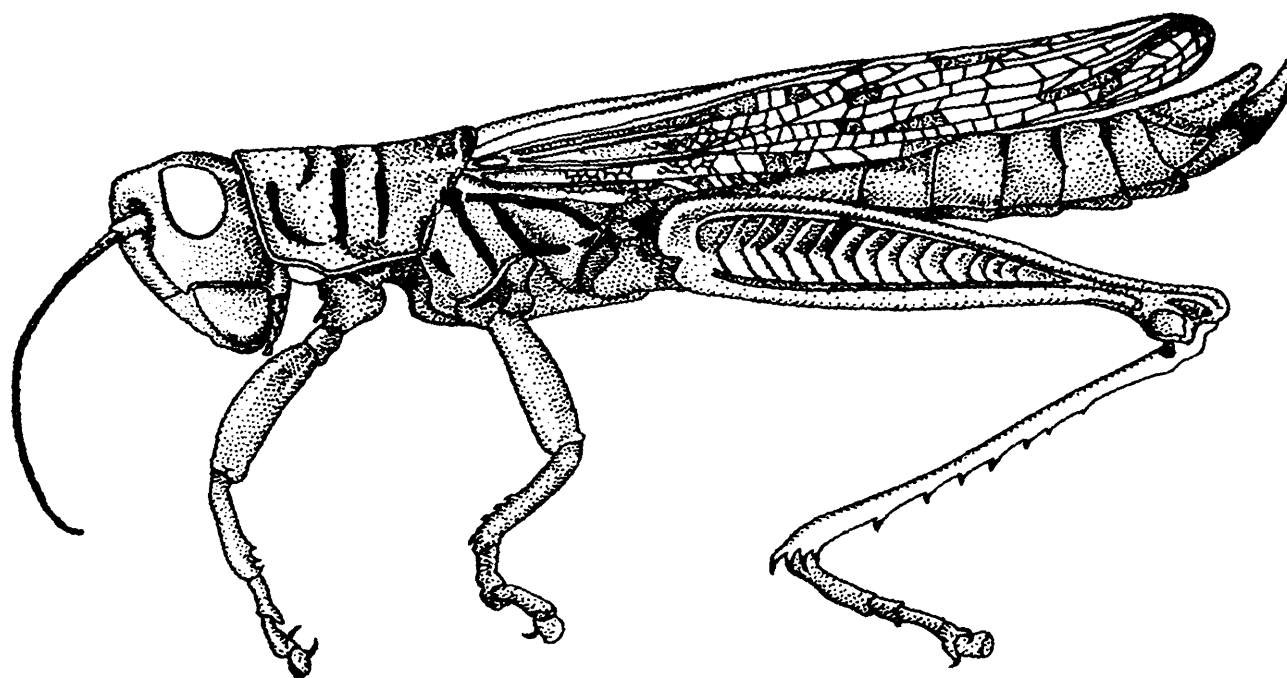


Fig. 55a. *Hieroglyphus orizivorous* Carl (Male)

Habitat : Same as previous species.

Distribution : India : Andhra Pradesh, Gujrat, Maharashtra, Orissa, Rajasthan, West Bengal.

Elsewhere : Pakistan.

Remarks : This species can easily be identified with the shape of male epiphallus.

Subfamily OXYINAE

Genus *Oxya* Serville, 1831

Key to species (Male) of Genus *Oxya* Serville, 1831

- 1 Supra-anal plate with a tubercle on each side of a median apical process 2

- Supra anal plate without lateral tubercle *nitidula* (Walker)
- 2. Cercus laterally compressed, hardly narrowing towards apex, weakly bifurcate at apex *fuscovittata* (Marschall)
- Cercus conical, narrowing towards apex and obtuse or truncate apically *hyla hyla* Serville

Key to species (Female) of Genus *Oxya* Serville, 1831

1. Anterior margin of tegmen with a dense row of short bristles extending from coStål bulge to apex; ovipositor valves with long teeth, the apical one curved 2
- Anterior margin of tegmen weakly or not at all spined; valves of ovipositor with short teeth *nitidula* (Walker)
2. Ventral surface of subgenital plate almost completely flat or weakly concave, appearing widen posteriorly *fuscovittata* (Marschall)
- Ventral surface or subgenital plate flat or concave only in median posterior half, not widened posteriorly *hyla hyla* Serville

12. *Oxya hyla hyla* Serville

Fig. 56 (Male)

Diagnosis : Size medium; body finely rugulose, shiny; in male supra anal plate trapezoidal, with triangular apical projection; in both sides of supra anal plate a small tubercle present; cercus with subacute apex; in female subgenital plate with two longitudinal ridges extending forwards from posterior margin, this ridges often toothed.

Habitat : It is a major pest throughout the year. The maximum population in the month of Sept-October in marshy places. This is probably two to three generation per year and can cause damage to seedling of growing crops like paddy, maize, milch etc. It is also attacked cowpea, wheat, oat and millet etc. and in the vegetable like ladies finger, cabbage, leaf of cauliflower in the winter season and different pulses plants.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Andaman and Nicobar Isld., Assam, Chattishgarh, Himachal Pradesh, Meghalaya, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttaranchal and West Bengal.



Fig. 56. *Oxya hyla hyla* Serville –Male

Elsewhere : Afghanistan; Bangladesh, Iran; Madagascar; Maldivé Islds; Nepal, Pakistan.

Remarks : This species is variable in general appearance.

13. *Oxya fuscovittata* (Marschall)

Fig. 57 (Female)

Diagnosis : Size medium; integument finely pitted and shiney; lateral tubercle of supra anal plate more prominent than *O. hyla hyla*; male circus strongly compressed, apex strongly truncate or almost bifid; in female subgenital plate, broadly flattened in ventral surface; posterior margin emarginated medially, straight, or with two very small medial spines.

Habitat : Associated with previous species.



Fig. 57. *Oxya fuscovittata* (Marschall) – Female

Distribution : India : Widely distributed.

Elsewhere : Afghanistan; Bangladesh; Pakistan.

Remarks : This species is associated with paddy and grasses adjoining cultivated fields.

14. *Oxya nitidula* (Walker)

Fig. 58 (Male)

Diagnosis : Antennae with 24-26 segments; pronotum narrowing forwards posterior margin of metazona rounded; in male supra anal plate roundly triangular; curcus conical with acutely truncate apex; in female ventral surface of subgenital plate with a sub-apical tooth on each side of a median apical spine.

Habitat : Same as previous species.

Distribution : India : Andhra Pradesh, Chattisgarh, Goa, Karnataka, Kerala, Madhya Pradesh, Rajasthan, Tamil Nadu, Tripura, and West Bengal.

Elsewhere : Sri Lanka.

Remarks : Recorded earlier from South India.



Fig. 58. *Oxya nitidula* (Walker) – Male

Subfamily TROPIDOPOLINAE

Genus *Tristria* Stål, 1873

15. *Tristria pulvinata* (Uvarov)

Fig. 59 (Male); 60 (Female)

Diagnosis : Medium in size; fastigium of vertex parabolic; prosternal tubercle curved backwards, strongly widened and concave apically; curcus at apical third incurved, downcurved and laterally flattened; in male subgenital plate almost linear, compressed, knife like, in female it is on the posterior margin on either side of mid line.



Fig. 59. *Tristria pulvinata* (Uvarov) – Male



Fig. 60. *Tristria pulvinata* (Uvarov) – Female

Habitat : Adult obtain from March to November; nymphs are found throughout the year. This species may attack to oat, wheat, fodder like grasses. The highest population in the month of May among dry long grasses and is minimum in December.

Distribution : India (Widely distributed).

Elsewhere : Sri Lanka.

Remarks : This species is easily recognized by its ventral view of subgenital plate which is almost linear.

Subfamily EYPREPOCHEMIDINAE

16. *Eyprepocnemis alacris alacris* (Serville)

Fig. 61 (Female)

Diagnosis : Size medium; concavity of fastigium of vertex distinct, with a low apical carinula; hind tibiae bluish grey with two whitish ring at base, reddish tarsus; male circus gradually narrowing towards apex incurved and down curved, with acute apex.



Fig. 61. *Eyprepocnemis al. alacris* (Serville) – Female

Habitat : Nymphs and adults occurs amongst long coarse grass with bushes. This species considerably damage to paddy, maize, cucumber, oat, cow peae and fodder like grasses. Both adults and nymphs are found in the month of April, May to November. The trend of population suggests bi-annual generation.

Distribution : India : Andhra Pradesh, Chattisgarh, Bihar, Delhi, Goa, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Sikkim, Tamil Nadu, Uttaranchal, Uttar Pradesh and West Bengal.

Remarks : This species can easily recognized in having with bluish grey hind tibiae, with two whitish ring at the base of hind tibiae and reddish tarsi.

17. *Eyprepocnemis rosea* Uvarov

Fig. 62 (Female)

Diagnosis : Medium in size; shortened tegmina; wings with red tinge basally and red colour posterior tibiae.

Habitat : Same as previous species.

Distribution : India : Himachal Pradesh, Uttar Pradesh, Uttaranchal.

Remarks : This species in limited is distribution.



Fig. 62. *Eyprepocnemis rosea* – Female

Genus *Choreodocus* Bolivar, 1914

18. *Choreodocus robustus* (Serville)

Fig. 63 (Male); 64 (Female)

Diagnosis : Large in size; median carina of pronotum cut by all the three sulci; prosternal tubercle gradually tapering apically, weakly incurved and pubescent; supra anal plate tongue shaped, apex broadly rounded; subgenital plate gradually tapering, apex truncate; circus wide, thick, strongly compressed, incurved and downcurved.



Fig. 63. *Choreodocus robustus* (Serville) – Male



Fig. 64. *Choreodocus robustus* (Serville) – Female

Habitat : This species prefers mixed vegetation zone and moves to paddy fields once it starts growing towards maturity. The nymphs appears toward the end of May and adults start appearing in the first week of August. Single Annual generation.

Distribution : India : Arunachal Pradesh, Andhra Pradesh, Assam.

Elsewhere : Bangladesh.

Remarks : *C. robustus* can easily be identified in having large size; prosternal turbercle gradually tapering apically; supraanal plate tounge shaped.

Genus *Tylotropidius* Stål, 1873

19. *Tylotropidius varicornis* (Walker)

Fig. 65 (Male)

Diagnosis : Moderately large in size; general coloration of body brown or light brown, blackish brown from below; antennae with a light color pre-apical ring; margins of frontal ridge, below the median ocelli, with streaks of blackish brown.



Fig. 65. *Tylotropidius varicornis* (Walker) – Male

Habitat : There is one generation in a year. It is a minor pest of maize, oat, and paddy. Maximum population observed in the month of October.

Distribution : India : Andhra Pradesh, Goa, Himachal Pradesh, Maharashtra Meghalaya, Orissa, Rajasthan, Tamil Nadu and West Bengal.

Remarks : This species is easily recognized by its, hind femur, thickened at the base, very slender towards the tip.

Genus *Eupreponotus* Uvarov, 1921

20. *Eupreponotus inflatus* Uvarov

Fig. 66 (Male)

Diagnosis : Size moderately large; deep velvety coloration of the head and pronotum; pronotum not punctured; lateral lobe slightly higher than long; tegmina extending beyond posterior knees; male curcus short, more or less entirely coriaceous; apex of abdomen inflated; supra-anal plate of female tongue shaped, with medially a longitudinal groove.



Fig. 66. *Eupreponotus inflatus* Uvarov – Male

Habitat : This species is limited in distribution. Nymphs and adults occur amongst long coarse grass with bushes. This species migrate to paddy fields once its starts maturity. Nymphs start appearing from April and adults starts appearing in August. Single annual generation.

Distribution : India : Uttar Pradesh, Uttaranchal, West Bengal.

Remarks : This species is easily recognized by its deep velvety coloration of the head and pronotum.

Subfamily GOMPHOCERINAE

Genus *Dnopherula* Karsch, 1896

Subgenus (*Alacobothrus*) *luteipes* (Walker)

21. *Dnopherula* (*Alacobothrus*) *luteipes* (Walker)

Fig. 28 (Male).; 29 (Female)

Diagnosis : Size small; fastigium of vertex almost trapezoidal, with truncate apex; fastigial foveolae not visible from above; hind femora with three black bands on the dorsal surface and with a black one at distal end; pronotum with nearly parallel lateral carinae which are weakly concave in the middle.

Habitat : This species is a minor pest of paddy around the mixed vegetation. It is generally biannual generation, nymphs and adults are found from March to 1st week of December.

Remarks : Fastigial foveolae not visible from above.

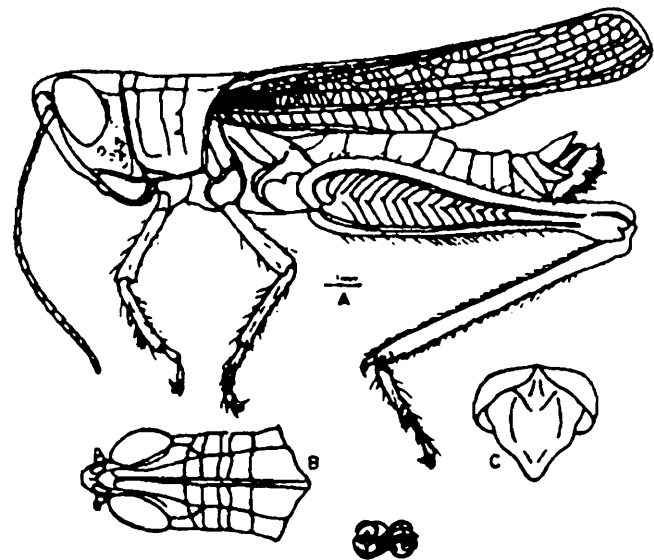


Fig. 34. Subfamily: GOMPHOCERINAE (Male)

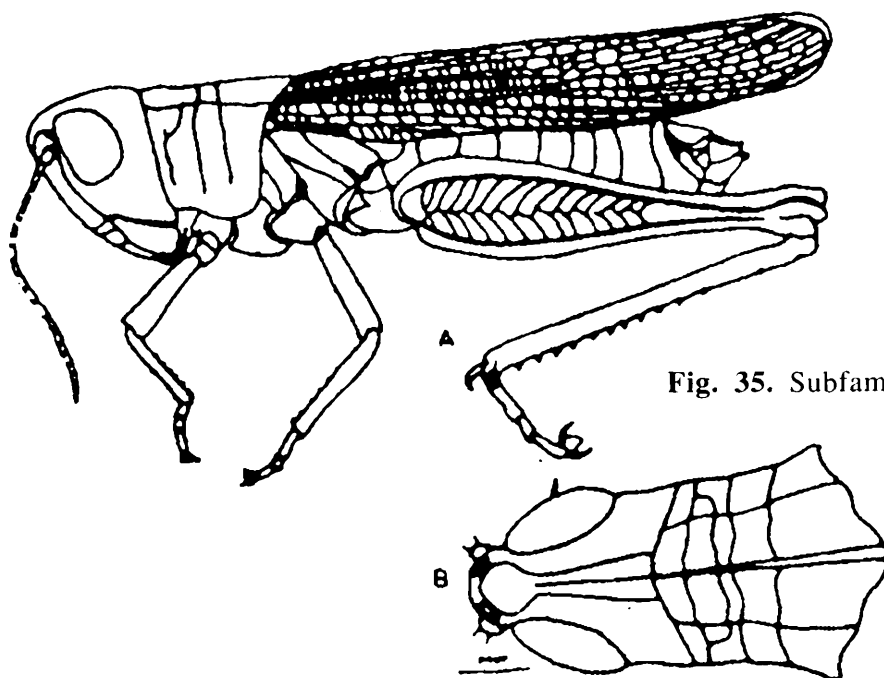


Fig. 35. Subfamily: GOMPHOCERINAE (Female)

Key to the Genus of Subfamily CATANTOPINAE

- 1 Pronotum sub-cylindrical, a little narrowing forwards, prosbernal tubercle thick, cylindrical or slightly rounded at apex.....*Catantops* Schaum
- Pronotum constricted; prosternal tubercle conical at apex
.....*Xenocatantops* Dirsh and Uvarov

Genus *Catantops* Schaum, 1853

22. *Catantops pinguis innotabilis* (Walker)

Fig. 46 (Female)

Diagnosis : Size medium; lateral lobe of pronotum without coloured pattern; external disc of hind femur without the black median spot below the upper carinula; male curcus upcurved, with more broad apex projecting upper apical angle.

Habitat : It is minor damage to millet, cotton, maize, rice tea, teak etc. This species probably bi-annual generation per year. Maximum population observed in the month of October. Both adults and nymphs are found from March to 1st week of December.

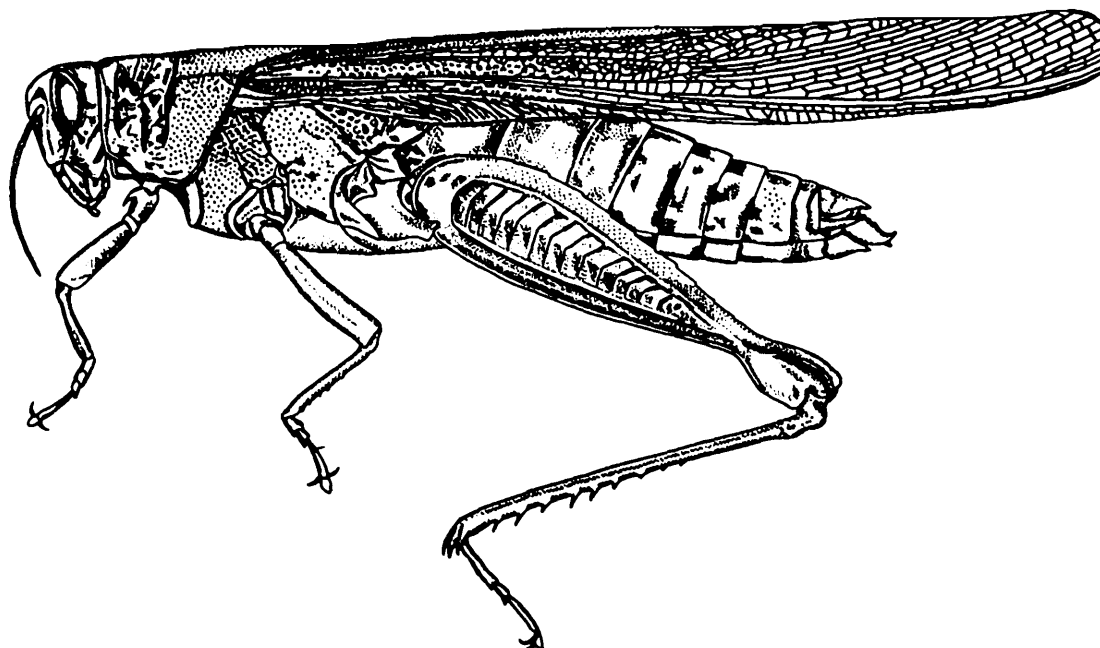


Fig. 46. Subfamily : CATANTOPINAE (Female)

Distribution : India : Widely distributed.

Elsewhere : Afghanistan; Bangladesh; Borneo; China; Hong Kong; Indo-China; Kambodia; Koria; Malaysia; Maldiv Islands; Myanmar; Nepal; New Guinea; Pakistan; Philippines; Sri Lanka; Sumatra; Thailand; Tiber; Yunnan.

Remarks : This species is charecterised by male cucus up curved, with broad apex and projecting more upper apical angle.

Genus *Xenocatantops* Dirsh & Uvarov, 1953

Key to Species of Genus *Xenocatantops* Dirsh & Uvarov, 1953

- 1. Male cercus showing no clear apical bifurcation, but apically bilaterally compressed and slightly curved*humilis humilis* (Surville)
- Male cercus clearly bifurcate apically*karnyi* (Kirby)

23. *Xenocatantops karnyi* (Kirby)

Fig. 45 (Male)

Diagnosis : Size medium; on the lateral lobe of pronotum a black spot, approximating to square form in the middle; apical bifurcation of cercus bluntly pointed and subequal.

Habitat : Same as previous species.

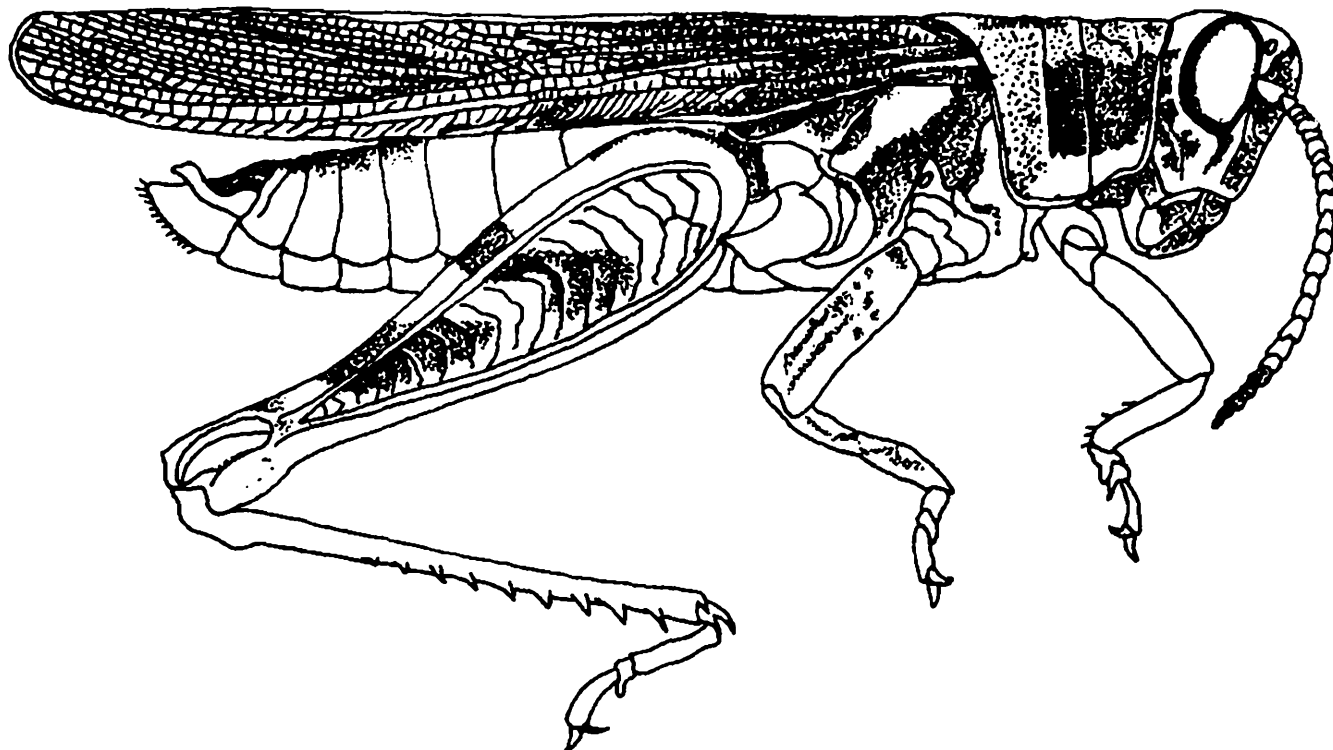


Fig. 45. Subfamily : CATANTOPINAE (male)

Distribution : India : Andhra Pradesh, Delhi, Himachal Pradesh, Chhattisgarh, Tamil Nadu, Tripura, Uttar Pradesh.

Remarks : This species is a minor pest.

24. *Xenocatantops humilis humilis* (Servile)

Diagnosis : Medium size; antennae longer than head and pronotum together; pronotal and thoracic markings much lighter with proportionately broader light oblique band on episternum III; Ratio of length to depth of hind femur never less than 3.45; male circus with rounded apex.

Habitat : This species is generally inhabitant of forest, a heavy infestation of this species have been found on hill slopes adjoining to the cultivated fields such as mature paddy, maize, oat cow pea. Adults are almost found in every month and nymphs are also found in groups under the leaves.

Distribution : India : Andaman and Island, Aruncachal Pradesh, Assam, Bihar, Himachal Pradesh, Kerala, Madhya Pradesh, Maharastra, Manipur, Meghalaya, Mizoram, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : Bangladesh; Bornea; Indo-China; Lombok; Malaya; Myanmar; New Guinea; Philippines; Sri Lanka; Sumatra; Thailand; S. Tibet; Vietnam and Yunam.

Remarks : This species is also found in moist forest parts near streams and rivers.

Key to the Genus of Subfamily CYRTACANTHACRIDINAE

- 1 Prosternal tubercle straight, vertical or slightly inclined backwards in the direction of mesosternum, conical or compressed at apex..... 2
 - Prosternal tubercle strongly curved backwards, touching almost mesosternum. inflated in middle, with acutely or subacute apex 3
2. Pronotum in both sexes with a low median carina, almost obliterated in anterior part; sub-genital plate triangular incision at apex *Schistocerca* Stål
 - Pronotum in both sexes with high median carina, comb-shaped elevated in anterior part; sub-genital plate in male trilobate, with 2 rounded incisions at apex *Anacridium* Uvarov
3. Tegmina with straight venation in apical part, transverse vein forming almost right angle with principal veins; prosternal process almost cylindrical with rounded apex *Patanga* Uvarov
 - Tegmina without straight venation; prosternal process not as above 4

4. Pronotum with integument strongly rugose; male cercus incurved at base about half as wide as its length ***Chondracris*** Uvarov
- Pronotum a little constricted; integument fairly rugose or dotted; male cercus with subacute apex ***Cyrtacanthacris*** Walker

Genus *Cyrtacanthacris* Walker, 1870

25. *Cyrtacanthacris tatarica* (Linnaeus)

Fig. 67 (Male); Fig. 68 (Female)

Diagnosis : Size large; pronotum on both sides above with a broad velvety blackish brown band; tegmina with thick and dense reticulation and transverse oblique fasciae or irregular spots; wings hyaline or sometimes yellowish at base; hind tibiae bluish or brown with yellow or brown spines, tips black.

Habitat : This grasshopper occurs both in plain as well as in the hilly regions. There is one generation in a year. It is a minor pest of paddy, sorghum and cow pea. Nymphs are collected from middle of July to end of August. The adults are very active and can travel long distances.



Fig. 67. *Cyrtacanthacris tatarica* (Linnaeus) – Male

Distribution : India : Andhra Pradesh, Assam, Bihar, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Maharashtra, Manipur, Orissa, Rajasthan, Tamil Nadu, Uttaranchal, Uttar Pradesh, West Bengal.



Fig. 68. *Cyrtacanthacris tatarica* (Linnaeus) – Female

Elsewhere : Africa (except North Africa) and Sahara; Hainan, Madagascar; Phillipines; Seychelles; Sri Lanka; Sumatra and Thailand.

Remarks : Multivorous species.

Genus *Chondracris* Uvarov, 1923

26. *Chondracris rosea* (de Geer)

Fig. 69 (Male); 70 (Female)

Diagnosis : Size large; body robust, coarsely punctured; median carina of pronotum moderately raised in prozona; straight in metazona, metazona feebly tectiform; wing hyaline, with the base rose colour; hind tibiae and tarsi red.

Habitat : This species occurs mostly in thick forest regions. It is associated with dense under growth mixed vegetation specially near the streams on the hill region and occasionally migrate to dense crops vegetation like maize, cow pea, at the edge of rice field. The adults are collected during July to middle of December. Single generation per year.

Distribution : India : Arunachal pradesh, Assam, Bihar, Madhya Pradesh, Manipur, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Bangladesh; China; Hainan Islands; Indonesia; Japan; Korea; Manchuria; Philippines; Taiwan; Thailand and Veitnam.

Remarks : Green to pale green colour and tectiform pronotum.



Fig. 69. *Condracris rosea* (de Geer)– Male



Fig. 70. *Condracris rosea* (de Geer) – Female

Genus *Patanga* Uvarov, 192327. *Patanga succincta* (Johansson)

Figs. 71 (Male); 72 (Female)

Diagnosis : Size large; pronotum stouter, shorter, hind margin obtuse to rectangulate; tegmina with a straight venation in apical part, transverse veins forming almost right angle with principal veins, wing base rosy violet or colourless, male subgenital plate long, curved upwards, conical and apex pointed.

Habitat : *Patanga succincta* is popularly known as Bombay locust and widely distributed in India. In the past this species was a major pest of many crops in swarming phase. Adults and nymphs feed on a very great variety of plants such as oat, sorghum, paddy, cow pea, maize etc. Their is one generation in a year during the rains. The adults are very active and can travel long distances.

Distribution : India : Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Himachal Pradesh, Jammu and Kashmir, Kerala, Laccadive Islands, Maharashtra, Meghalaya, Orissa, Rajasthan, Tamil Nadu, Uttaranchal, Uttar Pradesh, Tripura and West Bengal.



Fig. 71. *Patanga succincta* (Johansson) – Male



Fig. 72. *Patanga succincta* (Johansson) – Female

Elsewhere : South Arabian desert; China; Japan; South East Asia; Sri Lanka, Taiwan.

Remarks : This species can easily be recognized in having tegmina with a straight venation in apical part.

Genus *Anacridium* Uvarov

28. *Anacridium flavescence* (Fabricius)

Fig. 73 (Male); 74 (Female)

Diagnosis : Size large; pronotum with elevated median carina; black antennae, large eyes; scattered dark spots on tegmina specially on wings, small scattered tubercles on prozona and trilobate subgenital plate are very distinctive.

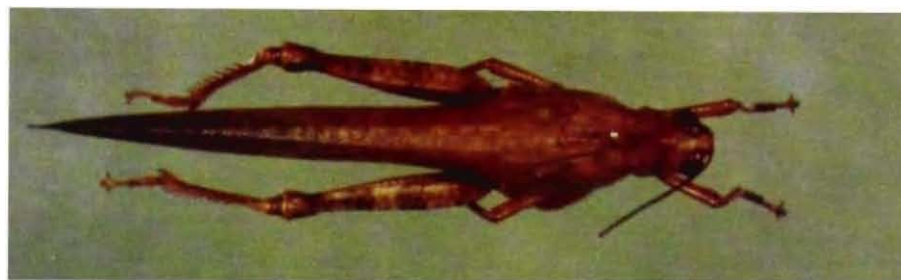


Fig. 73. *Anacridium flavescence* (Fabricius) – Male



Fig. 74. *Anacridium flavescence* (Fabricius) – Female

Habitat : This species prefers forest habitat rather than grass and plains. It survives rainy season as an adult, laying eggs after the rains. The nymphs develop early rainy season. It is a minor pest of crops and vegetables. They may cause damage ripening gram by the side of the forest. Single generation per year. Occasionally they take shelter in thorny bushes of human height and were sluggish. They could be caught by hand.

Distribution : India : Andhra Pradesh, Bihar, Orissa, Tamil Nadu and West Bengal.

Elsewhere : Sri Lanka.

Remarks : It can be easily be recognized by its yellow wing base with black fascia.

Genus *Scistocerca* Stål, 187327. *Scistocerca gregaria* (Froskal)

Fig. 75 (Male); 76 (Female)

Diagnosis : Large in size; pronotum constricted, with obtuse median carina, some times indistinct in prozona, metazona a little longer than prozona with rounded posterior margin; prosternal process widened in middle narrowed at apex, which is obtuse, and moderately inclined backwards; tegmina with transparent membrane and sparse reticulation; hind femur short.



Fig. 75. *Scistocerca gregaria* (Froskal) – Male



Fig. 76. *Scistocerca gregaria* (Froskal) – Female

Habitat : It is commonly known as desert locust. Both adults and nymphs are found in solitary and gregarious phase. They can migrated long distances. In India during July-August is the breeding season in natural condition. It is not only a serious pest of crops and vegetables. They are caused all types of vegetation.

Distribution : India : Delhi, Gujarat, Jammu, Maharastra, Punjab, Rajasthan and Uttar Pradesh.

Elsewhere : Africa; S. Europe; S.W. Asia.

Remarks : Pronotum in both sexes with a high median carina. This species in some peak years swarms have been known to reach all parts of India except the extreme south.

Subfamily ACRIDINAE

Key to genera of Subfamily ACRIDINAE

- 1. Head conically ascending, fastigium of vertex broad and laminate; lateral carinae of pronotum divergent posteriorly *Acrida* Linnaeus
- Head not ascending; fastigium not so broad and laminate; lateral carinae of pronotum straight *Phlaeoba* Brunner

Genus *Acrida* Linnaeus, 1758

30. *Acrida exaltata* (Walker)

Fig. 77 (Male); 78 (Female)

Diagnosis : Head conically ascending, basal part narrow, fastigium of vertex broad, transverse sulcus of pronotum place about the middle of disc.

Habitat : This species is associated with grass. Nymphs and adults occur almost throughout the year. There are probably three generation per year and cause damage to crops like paddy, maize, oat, sorghum, wheat and vegetable likes brinjal, milch, tomato etc. Some times attack on wheat, millet, cowpea. Maximum population observed in the month of September and minimum in February.

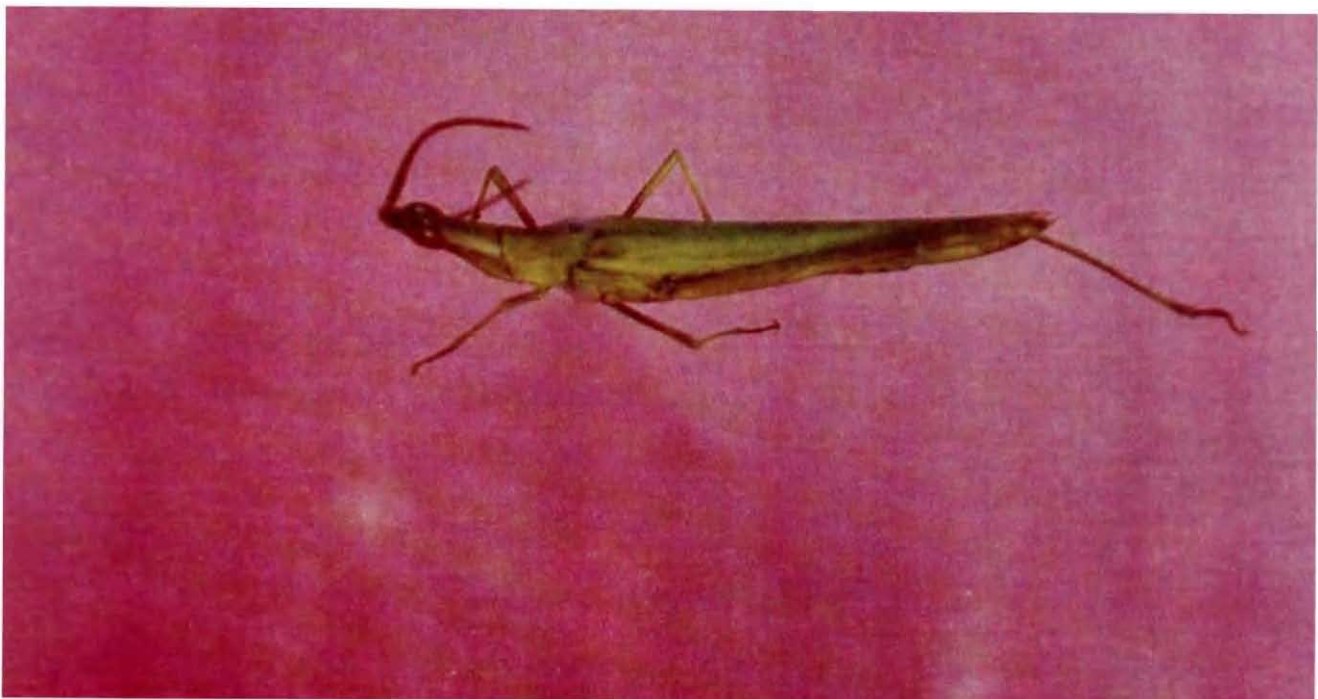


Fig. 77. *Acrida exaltata* (Walker) – Male

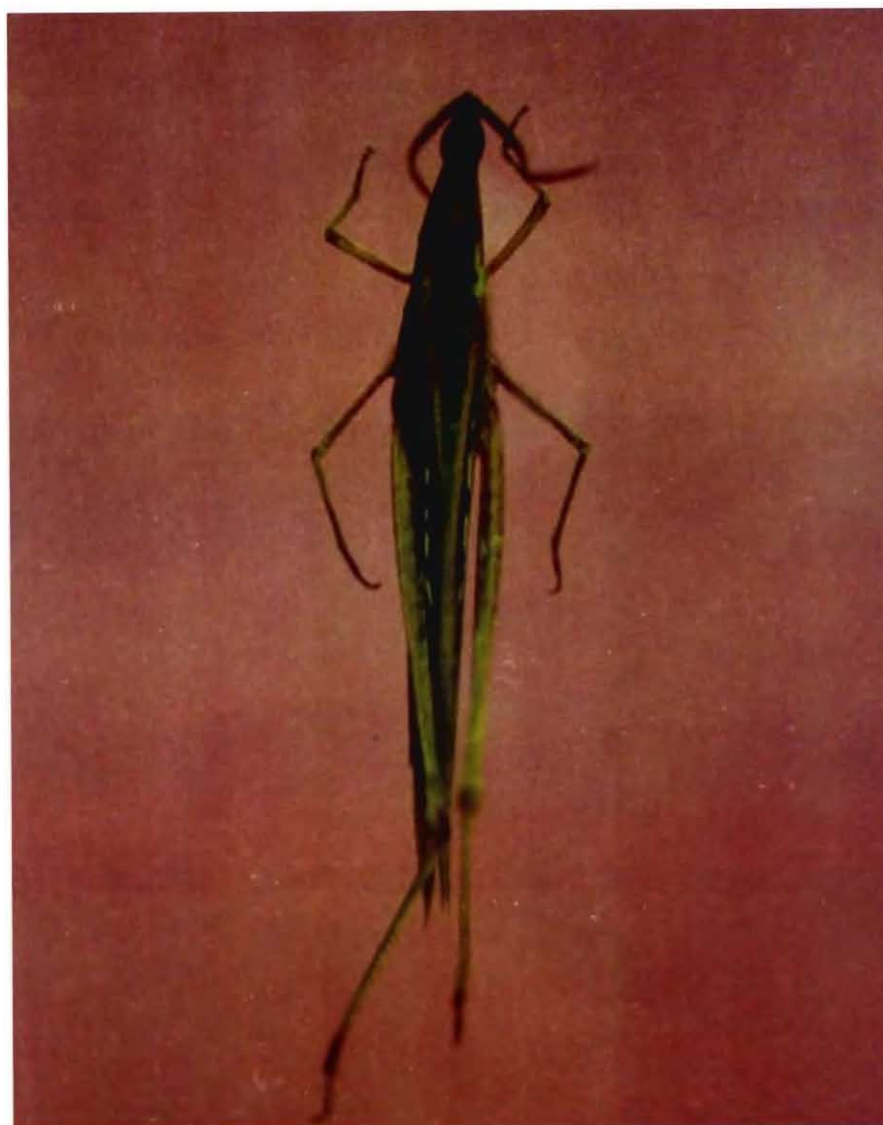


Fig. 78. *Acrida exaltata* (Walker) – Female

Distribution : India (Widely distributed).

Elsewhere : Afghanistan; Eden; Arabia; Bangladesh; S.E. Iran; Nepal; Pakistan; Sri Lanka; S.E. Tibet and Yemen.

Remarks : This species widely distributed in India.

Genus *Phlaeoba* Stål, 1860

Key to Species of Genus *Phlaeoba* Stål, 1860

1. Antenna unicolorous *infumata* Brunner
- Antennae ringed or tipped with obscure yellow *antennater* Brunner

31. *Phlaeoba infumata* Brunner

Fig. 79 (Male); 80 (Female)

Diagnosis : Size medium; 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; wings fusco hyaline, infumated towards apex; in male subgenital plate acute at apex.

Fig. 79. *Phlaeoba infumata* Brunner – Male

Habitat : It is a common species of India and is known to occur in plains and hill region. It is a minor pest of paddy, sorghum, maize, millets. Both adults and nymphs are generally found throughout the year in moist area. Maximum population observed in the month of November. Probably it is three generation per year.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Himachal Pradesh, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Bangladesh; Myanmar; S. China.

Fig. 80. *Phlaeoba infumata* Brunner – Female

32. *Phlaeoba antennata* Brunner

Fig. 81 (Male); 82 (Female)

Diagnosis : Medium in size; olive-brown colour with a broad band running from the vertex to the end of tegmina, at least in male; antennae ensiform, black, tipped with yellow; pronotum smooth, all the three carinae will marked; wings bluish black at base, infuscated towards the tip; posterior tibiae dirty blue.



Fig. 81. *Phlaeoba antennata* Brunner – Male

Fig. 82. *Phlaeoba antennata* Brunner – Female

Habitat : This species generally occurs in or around thick forest. Occasionally migrate to the paddy field. Highest population observed in the month of October. It is two generation per year.

Distribution : India : Arunachal Pradesh, Assam, Kerala, Orissa, Rajasthan, West Bengal.

Elsewhere : Bangladesh; Borneo; Myanmar; China; Hainan; Malaysia; Tonking; Sumatra.

Subfamily OEDIPODINAE

Key to the genera of Subfamily OEDIPODINAE

1. Median carina of pronotum entire or slightly intersected by the transverse groove. (Foveolae trapezoidal) *Aiolopus* Feiber
 - Median carina of pronotum very distinctly interrupted by transverse groove 2
2. Thorax rather short 3
 - Thorax long 4
3. Wings without well marked fascia *Dittopternis* Saussure
 - Wings with well marked fascia *Oedaleus* Feiber
4. Pronotum with well marked crest, angulated behind; median crina of pronotum distinctly interrupted in prozona by 2 transverse grooves *Trilophidia* Stål
 - Pronotum without crest, tectiform or shaddle shaped; median carina of pronotum not interrupted in prozona *Locusta*

Genus *Aiolopus* Fieber, 185333. *Aiolopus thalassinus tamulus* (Fabricius)

Fig. 83 (Male); Fig. 84 (Female)

Diagnosis : Size medium; fastigium with front angle more acute; foveolae trapezoid, about long as wide; frontal ridge gradually narrowing and angular towards fastigial end, coarsely punctured; posterior tibiae usually with red colouration in apical fourth and broadly separated from black band by a wide bluish grey band.

Habitat : Nymphs and adults occur throughout the year. It is found in grass and attacked on cultivated fields like paddy maize oat, wheat, sorghum, cow pea, lentil and vegetable like brinjal, milch, ladies finger. There are three generation per year. The first generation after the early rains at the end of March.

Fig. 83. *Aiolopus thalassinus tamulus* (Fabricius)– Male





Fig. 84. *Aiolopus thalassinus tamulus* (Fabricius) – Female

Distribution : India : Andaman and Nicobar Islands, Andhra Pradesh, Bihar, Dehi, Himachal Pradesh, Karnataka, Madhya Pradesh, Rajasthan, Tamil Nadu and West Bengal.

Elsewhere : Australia; Bangladesh; Borneo; Celebes; China; Hainan; Hong Kong; Japan; Java; Lombok; Malaya; New Guinea; Papua; Phillipines; Singapore; Sri Lanka; Sumatra; Taiwan.

Remarks : *A. th. tamulus* is a fairly well distributed species in India.

Genus *Oedaleus* Fieber, 1853

34. *Oedaleus abruptus* (Thunberg)

Fig. 85 (Male)

Diagnosis : Size small; fastigium of head almost flat; pronotum short, with incomplete white cruciform marks, strongly carinated and entire, posterior margin pointed; wings with a broad transverse band curving inwards to anal angle; hind tibiae red, with a yellow ring at the base.

Habitat : Both adults and nymphs are geophilous, it was generally associated with bare ground, frequently with cultivation and both are found throughout the year. Adults may attack seedling of sorghum, maize, millets and paddy nurses. Maximum population observed in the month of August.



Fig. 85. *Oedaleus abruptus* (Thunberg) – Male

Distribution : India : Andhra Pradesh, Bihar, Goa, Himachal Pradesh, Meghalaya, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Afghanistan; Bangladesh; China; Indo-China; Myanmar; Pakistan, Sri Lanka and Thailand.

Remarks : Pronotum with distinct markings situated on slightly raised ridges.

Genus *Dittopternis* Saussure, 1884

35. *Dittopternis venusta* (Walker)

Fig. 86 (Female)

Diagnosis : Small size; vertex with diverging rows of pale granules running backwards between the eyes; pronotum, strongly carinated, cut by principal sulcus before the middle, obtusely angulated behind; tegmina with basal half brown; hind tibiae blue at base, followed by a light yellow band, then blue.

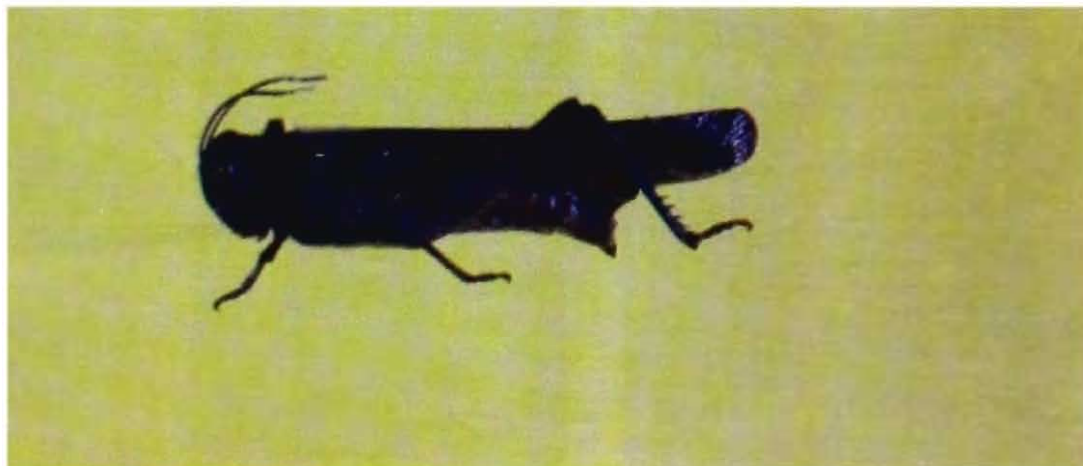


Fig. 86. *Dittopternis venusta* (Thunberg) – Female

Habitat : This species is associated with bare ground on small grass. It is generally biannual generation. Nymphs are found from March to November. It is a minor pest of paddy nurses and cow pea.

Distribution : India : Andhra Pradesh, Chattishgarh, Karnatka, Madhya Pradesh, Meghalaya, Orissa, Tamil Nadu, West Bengal.

Elsewhere : Sri Lanka.

Remarks : It is easily recognize by its rugose pronotum and principal circus cut before the middle.

Genus *Trilophidia* Stål, 1873

36. *Trilophidia annulata* (Thunberg)

Fig. 87 (Male); 88 (Female)

Diagnosis : Small size; brown or dark brown or grey with black markings, pubescent beneath; pronotum rugose with a high medium carina, forming two teeth in front and with lateral carinae; wings yellow at base and black beyond; hind tibiae brown with a pale band towards the base and with a faint narrow pale band beyond the middle.

Habitat : This species was mainly found on bare ground by the side of pond or kachcha road along with green grasses. This species may attack on paddy nurses, cow pea. Adults and numphs are found throughout the year. It is tri annual in generation. The highest population was in the month of August and minimum in February.

Distribution : India : Widely distributed.

Elsewhere : Bangladesh; Borneo; Japan; Java; Korea; Malaysia; Mongolia; Myanmar; Pakistan; Philippines; Saraswak; Singapore; Sri Lanka; Sumatra; Taiwan; Thailand.

Remarks : It occurs in almost all type of vegetation.



Fig. 87. *Trilophidia annulata* (Thunberg) – Male



Fig. 88. *Trilophidia annulata* (Thunberg) – Female

Genus *Locusta* Linnaeus, 1758

37. *Locusta migratoria migratorioides* (Reiche & Fairmaire)

Fig. 89 (Female)

Diagnosis : Large in size; colour green or brown; head some times slightly inflated, pronotum tectiform or saddle shaped; lateral lobes of pronotum higher than its length; metazoana rounded or angular posteriorly.

Habitat : Locust swarms are bigger and travel greater distance, so it is known as migratory locust. Nymphs hatch out during July-August. They are not only serious pest of crops and vegetables, they are cause all types of vegetation. They are found in two phases solitary and gregarious.

Distribution : India : Orissa. It occurs in the whole in Ethiopian region and whole of eastern hemisphere except arctic and nothern region.

Remarks : Lateral lobe of pronotum higher than its length.



Fig. 89. *Locusta migratoria migratorioides* (Reitche & Fairmaire) – Female

Genus *Gastrimargus* Saussure, 1884

38. *Gastrimargus africanus orientalis* Sjöstedt

Fig. 90 (Female)

Diagnosis : Size large; pronotum tectiform with high sharp median carina; metazoan of pronotum with X-marking; tegmen with basal pale transverse bands sometimes reduced or absent; wings with complete fascia, basal area usually bright yellow, apex variable infumate.



Fig. 90. *Gastrimargus africanus orientalis* Sjöstedt – Female

Habitat : It is widely distributed on long grasses and herbs. It survives throughout the dry period. It is a minor pest of wheat, oat, cow pea. It has two annual generation. It is generally found in scattered form.

Distribution : India : Andhra Pradesh, Bihar, Chhattisgarh, Delhi, Goa, Himachal Pradesh Madhya Pradesh, Maharastra, Sikkim, Uttar Pradesh and West Bengal.

Elsewhere : Nepal; Saudi Arabia; Sri Lanka; Thailand; Tibet and Yemen; A.R. Africa.

Remarks : Wings with complete fascia, basal is bright yellow and variable infumate.

SUMMARY

The present study deals with the pest of crops, vegetables and pasture of some economically important short horned grasshoppers. In all 38 species belonging to 29 genera have been described. A Key to the identification of families and species of Acridoidea has been provided.

ACKNOWLEDGEMENTS

We are grateful to the Director, Zoological Survey of India, for providing necessary laboratory facilities to carry out this study. Thanks are due to Dr. R.A. Khan, Joint Director, for going through the manuscript and giving suggestions. Our thanks are also due to Photography section.

REFERENCES

- Coleman, L.C. 1911. A new Indian grasshopper (*Colemania sphenarioides* Bolivar), *Bull. J. Bombay nat. Hist. Soc.*, **20** : 879-82
- Coleman, L.C. and Kannan, K.K. 1911. The rice grasshopper (*Hieroglyphus banian fabricius*), *Bull. Dep. Agric. Mysore*, (Ent.) No. **1** : 1-52.
- Mandal, S.K., Hazra, A.K. and Tandon, S.K. 1990. Studies on Taxonomy, Biology and Ecology of Grasshoppers Infesting Field Crops and Vegetables with notes on Nymphal Taxonomy of some species in West Bengal, *Rec. zool., Surv. India, Occasional Paper No.*, **173** : 1-178.
- Pruthi, H.S. and Nigam. 1939. The bionomics, life history and control of the A.K. grasshopper, *Poeciloceris pictus* Fab., a new pest of cultivated crops in *North Indian J. Agric. Sci.* **9**(4) : 629-641
- Roonwal, M.L. 1976. Ecology and Biology of the grasshopper *Hieroglyphus nigrorepletus* Bolivar (Orthoptera : Acrididae) 2. Distribution, economic important, life history, colour forms and problems of control. *Z. angew. Zool., Berlin*, **63** : 307-322.
- Rao, Y.R. 1970. The problem of the Bombay Locust, *Pantanga succincta* (1), India. *Proc. Int. Study Conf. Current and Future Problems of Acridology, London Session : Population Studies II*.
- Tandon, S.K. 1980. Distribution Pattern of Grasshopper of India. The distribution of genus *Hieroglyphus* krauss (Orthoptera : Acridoidea : Acrididae) in the Indian region. *Hexapoda Vol. II*.