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A Key to the Acrididae (Orthoptera) of Northeastern Texas with Ecological Notes[1]

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1a. Pronotum elongated, covering all or most of the abdomen (fig. 2). No pulvilli (pad between claws at end of foot). Fore and middle legs with two-segmented tarsi, tarsi of hind legs three-segmented. Hind wings (membranous) clear and well developed, but front wings (tegmina) very small. Size small, length of body (not including antennae) not more than 18 mm. Acrydiinae (Pygmy or Grouse Grasshoppers)

1b. Pronotum short, covering little or none of the abdomen (figs. 25, 26). Pulvilli present. All tarsi three-segmented. Front wings (tegmina) and hind wings (membranous wings) may be absent, short, or well developed, but tegmina always well developed if hind wings are well developed.[2] Size variable 2

2a. Prosternal spine projecting downward between the fore legs (in *Leptysma,* the spine is short and bluntly rounded, but it is easily recognized by the very slanting face, the almost cylindrical body and the flattened antennae; in *Brachystola* the spine is blunt and short, but is easily recognized by its large and robust form, the distance between the front of head and the

[1]This includes the northeastern Texas species known to occur in the East Texas timbers, the blackland prairie, the east cross timbers, the grand prairies and at least a small portion of the west cross timbers (approximately as far west as Palo Pinto or Mineral Wells, Texas).

The writer is indebted to Professor F. B. Isely of Trinity University, Waxahachie, Texas, for lending numerous specimens for study, for many helpful suggestions, and for supplying most of the ecological notes. Dr. C. E. Mickel of the University of Minnesota has kindly lent the writer seventeen species for study. Mr. Ashley B. Gurney has kindly checked the determinations of two species and has cited literature which has aided in the preparation of this paper.

[2]The beginning student may have difficulty in distinguishing between the older immature stages (the nymphs, which are not included in this key) and the adult short-winged species. The nymphs are more robust, with the head, pronotum, and legs larger in proportion to the rest of the body. See plate I, fig. 27.

apex of the abdomen not under 40 mm. (except in distorted specimens) and wings reduced to nearly round spotted pads which are widely separated). *Merimiria,* a member of the Acridinae (3b), has a blunt prosternal tubercle which is not more than half as long as wide, but otherwise has the typical characters of that subfamily .....
Cyrtacanthacrinae (Spine-breasted or Spur-throated Grasshoppers)

2b. No prosternal spine between the fore legs.....3

3a. Median carina of pronotum distinctly raised at least as high as its width (except in *Platylactista, Hadrotettix,* and some species of *Trimerotropis* and *Paragemon,* all of which agree with the remaining characters). Hind wings distinctly banded (except in *Encoptolophus* and *Chortophaga,* which agree with the remaining characters). Face not exceedingly slanting, being more rounded and without a prominently projecting vertex (figs. 24, 25, 26, 28, 29). Caudal border of pronotum extending backward at an acute angle or usually not more than 110 degrees. *Acrolophitus,* a member of the Acridinae, might seem to belong to 3a because of its striking metazona which extends backward at an acute angle on which the median carina is highly arched and because of the brightly colored hind wings, but its face is very slanting and its vertex strongly produced anteriorly .....
Oedipodinae (Band-winged Grasshoppers)

3b. Median carina of pronotum not so distinctly raised, seldom if ever higher than wide; hind wings not banded or colored and caudal border of pronotum usually produced posteriorly at an angle of more than 110 degrees (except in *Acrolophitus,* see 3a). Face more slanting, and vertex usually strongly produced anteriorly (figs. 8, 17) .....
Acridinae (=Tryxalinae) (Slant-faced Grasshoppers)

Subfamily *ACRYDIINAE,* Key to Genera

1a. Antennae with approximately 22 segments. Small convex projections of dorsum of head extending over dorsal surface of compound eyes (fig. 1). ..... *Tettigidea*

1b. Antennae with 12-14 segments. Dorsum of head without small convex projections of dorsum of head extending over dorsal surface of compound eyes 2

2a. Vertex triangularly produced forward beyond the front of the compound eyes, the distance between the eyes more than one-half greater than the width of one compound eye when viewed from above. Anterior border of pronotum angularly produced over the head. Median carina of pronotum high and longitudinally arched (fig. 2) ..... *Nomotettix*

2b. Vertex scarcely if at all produced beyond the front of the eyes, the distance between the eyes scarcely if at all greater than the width of one compound eye when viewed from above. Anterior border of pronotum scarcely if at all angularly produced over the head. Median carina of pronotum low and only feebly longitudinally arched (except in nymphs) ..... *Paratettix*

Genus *Nomotettix* Morse

One species, *Nomotettix cristatus denticulatus* Morse. A southwestern geographic race which prefers areas of poor soil and scant vegetation.

Genus *Paratettix* Bolivar

One species, *Paratettix cucullatus cucullatus* (Burmeister). Common along banks of lakes and streams throughout the year.

Genus *Tettigidea* Scudder

1a. Pronotal disc projecting over the head forming a sharp acute angle (fig. 1), the median carina usually projecting beyond the flat pronotal disc. Anterior portion of disc greatly wrinkled ..... *armata*

1b. Pronotal disc projecting over the head to form an obtuse angle, the median carina usually not projecting much if any beyond the flat pronotal disc. Anterior portion of disc not greatly wrinkled ..... *lateralis lateralis*

Tettigidea armata Morse

Inhabits the bare banks of lakes and streams and can probably be taken locally throughout the year. Synonym *acuta*.

Tettigidea lateralis lateralis (Say)

A common species found throughout the year most abundantly along sandy shores but may also be taken in open woods and uplands.

Subfamily *ACRIDINAE*, Key to Genera

1a. Median carina on metazona highly arched, as high or nearly as high as the length of the compound eye. General color green ..... *Acrolophitus*

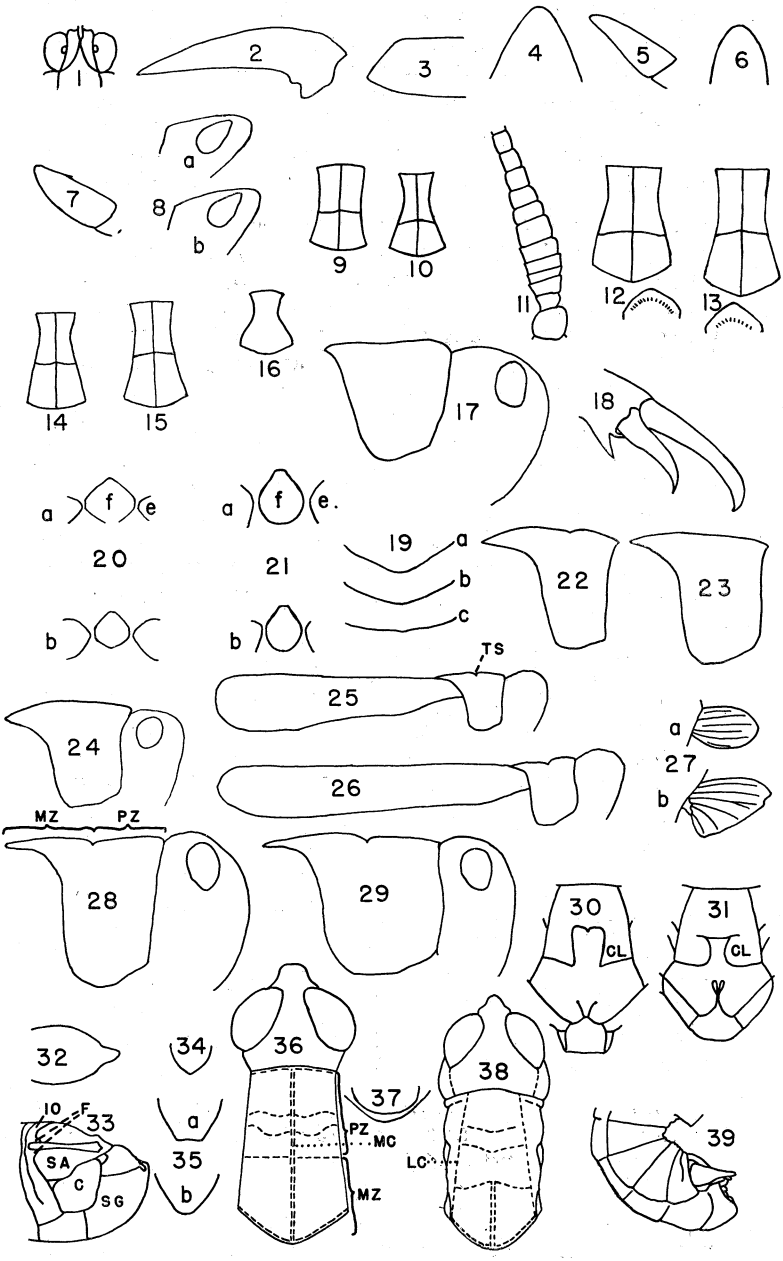
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PLATE I

1b. Median carina on metazona low, never approaching as high as in 1a. Color variable 2

2a. Apex of tegmina oblique-angled, the ventral margin being longer than the dorsal margin (fig. 3). Lateral sides of tegmina and pronotum of male usually black or dark brown, the dorsum green; female generally green or greenish brown ..... *Tryxalis*

2b. Apex of tegmina rounded or at least not pointed as in 2a. Color and markings variable 3

3a. Antennae at least as strongly flattened at the base as in fig. 11. (*Syrbula fuscovittata* females may have the basal segments this flattened, but belongs in 3b. This species recognized by the lateral carinae of pronotum incurved as in fig. 10, along with sixteen or more spines on the outer edge of hind tibia, not including the two apical spurs) 4

3b. Antennae not as strongly flattened at the base as in fig. 11 6

4a. Very small and short winged, tegmina not more than 3.5 times as long as the greatest width..... *Mesochloa*

LEGEND FOR PLATE I

1. Dorsal view of head and anterior border of pronotum of *Tettigidea armata*, female.
2. Lateral view of pronotum of *Nomotettix cristatus denticulatus*, female.
3. Apex of tegmen of *Tryxalis brevicornis*, male.
4. Impressed area of fastigium of *Mermiria picta*, male.
5. Lateral view of subgenital plate of *Mermiria picta*, male. (Drawn by Horace Love).
6. Impressed area of fastigium of *Mermiria neomexicana*, male.
7. Lateral view of subgenital plate of *Mermiria neomexicana*, male. (Drawn by Horace Love).
8. Lateral view of head of (a) *Mermiria bivittata*, male; (b) *Mermiria maculipennis maculipennis*, male.
9. Pronotal disc (dorsum) of *Syrbula admirabilis*, female.
10. Pronotal disc of *Syrbula fuscovittata*, female.
11. Basal segments of antenna of *Opeia obscura*, female.
12. Pronotal disc and central depression of fastigium of *Orphulella speciosa*, female.
13. Pronotal disc and central depression of fastigium of *Orphulella pelidna pelidna*, female.
14. Pronotal disc of *Orphulella speciosa*, male.
15. Pronotal disc of *Orphulella pelidna pelidna*, male.
16. Pronotal disc of *Ageneotettix deorum deorum*, female.
17. Lateral view of head and pronotum of *Boopedon maculatum*, female.
18. Inner view of the two large inner apical spurs of hind tibia of *Boopedon maculatum*, female.
19. Posterior border of pronotal disc of: (a) *Boopedon maculatum*, male; (b) *Boopedon nubilum*, male; (c) *Boopedon auriventris*, male.
20. Impressed area of fastigium of *Arphia sulphurea*: (a) female; (b) male. e, compound eye; f, fastigium.

4b. Size small to large and wings fully developed, tegmina more than 3.5 times as long as the greatest width.....5

5a. Size large, distance from front of head to apex of tegmina more than 25 mm. .....*Mermiria*

5b. Size small, distance from front of head to apex of tegmina less than 25 mm. .....*Opeia*

6a. Caudal tibia with 16-24 spines on outer edge (not including the two apical enlarged spurs) .....*Syrbula*

6b. Caudal tibia with less than 16 spines (not including the two apical enlarged spurs) 7

7a. Lateral carinae of pronotum strongly incurved in the middle in proportion to the length of the pronotum, always as much as in fig. 16. Head more swollen.....13

7b. Lateral carinae of pronotum absent, not incurved, or not so much incurved in the middle in proportion to the length of the pronotum, never more than in figs. 14, 15. Head less swollen (except in *Boopedon*).....8

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21. Impressed area of fastigium of *Arphia conspersa*: (a) female; (b) male. e, compound eye; f, fastigium.
22. Lateral view of pronotum of *Arphia conspersa*, female.
23. Lateral view of pronotum of *Arphia simplex*, female.
24. Lateral view of head and pronotum of *Chortophaga viridifasciata*, female.
25. Lateral view of head, pronotum and tegmen of *Encoptolophus sordidus costalis*, male. TS, transverse sulcus of median carina.
26. Lateral view of head, pronotum and tegmen of *Encoptolophus subgracilis texensis*, male.
27. Outline of external wing of (a) *Melanoplus flabellatus*, adult male; (b) *Pardalophora saussurei*, last nymphal stage of female. Only a few of the veins shown to indicate their direction.
28. Lateral view of head and pronotum of *Hippiscus rugosus*, female. PZ, prozona; MZ, metazona.
29. Lateral view of head and pronotum of *Pardalophora phoenicoptera*, female.
30. Ventral view of sternum of *Schistocerca obscura*, male. CL, caudo-lateral lobes of mesosternum.
31. Ventral view of sternum of *Melanoplus ponderosus ponderosus*, male. CL, caudo-lateral lobes of mesosternum.
32. Tegmen of short-winged *Hypochlora alba*, female.
33. Apex of abdomen of male *Melanoplus discolor*. C, cersus; F, furcula; SA, supra-anal pale; SG, subgenital plate; 10, tenth abdominal segment.
34. Outline of apex of subgenital plate (dorsal view) of *Melanoplus flabellatus*, male.
35. Outline of apex of subgenital plate (dorsal view) of (a) *Melanoplus angustipennis imipiger*, male; (b) *Melanoplus bispinosis*, male.
36. Dorsal view of head and pronotal disc of *Paroxya atlantica atlantica*, female. MC, median carina of pronotum; MZ, metazona; PZ, prozona. (Drawn by Horace Love).
37. Outline of apex of subgenital plate of *Paroxya atlantica atlantica*, male.
38. Dorsal view of head and pronotum of *Phoetaliotes nebrascensis*, male. LC, latera carina. (Drawn by Horace Love).
39. Lateral view of apex of abdomen of *Paratylotropidia brunneri*, male. Redrawn from Scudder's illustration of the type from "Dakota" (specimen partly damaged).

8a. Two large apical spurs on inner margin of hind tibia unequal in length (fig. 18), one being at least one-fourth longer than the other 9

8b. Two large apical spurs on inner margin of hind tibia equal or nearly equal in length, one never being one-fourth longer than the other 10

9a. Lateral carinae and accessory carinae of pronotum (the latter between the median carina and lateral carinae) all parallel. Apical segments of antennae flattened ..... *Eritettix*

9b. Lateral carinae of pronotum absent, or if present they may be either parallel or slightly incurved in the middle, no accessory carinae present. Apical segments of antennae not flattened. Often short winged. Females large and robust (fig. 17), males smaller and more slender ..... *Boopedon*

10a. Tegmina not covering more than three-fourths of the abdomen. General color green or brown, without stripes ..... *Dichromorpha*

10b. Tegmina covering more than three-fourths of abdomen (except in females with abdomen greatly extended because of egg-laying). General color variable, with or without stripes 11

11a. Dorsum of head and pronotum darker than the sides, often with a median longitudinal broad light stripe. Dorsal margin of hind femur usually with three or four dark spots ..... *Amphitornis*

11b. Dorsum of head and pronotum as light as, or lighter than the sides, never with a median longitudinal light stripe. Dorsal margin of hind femur without three or four dark spots 12

12a. Lateral carinae little or not at all raised, sides of pronotal disc parallel ..... *Amblytropidia*

12b. Lateral carinae more distinct with edges definitely raised at least in part, and incurved in the middle (figs. 12, 13, 14, 15) ..... *Orphulella*

13a. Hind tibia deep shiny blue ..... *Aulocara*

13b. Hind tibia mostly or entirely red, pink, or some shade of brown 14

14a. Hind tibia mostly or entirely brownish. Form long and slender, tegmina usually more than 5.5 times as long as its greatest width ..... *Psoloessa*

14b. Hind tibia mostly or entirely red or pink. Form short and robust, tegmina usually less than 5.5 times as long as the greatest width 15

15a. Tegmina with distinct black bars, triangles, or spots (usually one mm. or more in diameter) and usually four in number.....*Phlibostroma*

15b. Tegmina without distinct black bars, triangles, or spots, or if present, usually less than one mm. in diameter and not four in number.....*Ageneotettix*

Genus *Tryxalis* Fabricius

One species, *Tryxalis brevicornis* (Linnaeus). Adults July-November. A semi-marsh inhabitant of the East Texas timbers.

Genus *Mermiria* Stal

1a. Lateral carinae present on pronotum.....2

1b. Lateral carinae not present on pronotum.....3

2a. Sides of fastigium (anterior portion of top of head) converging anteriorly in straight or only slightly curved lines, the tip narrowly rounded, almost pointed (fig 4). Subgenital plate of male greatly produced (fig. 5) .....*picta*

2b. Sides of fastigium converging in a well-rounded curve, the tip bluntly rounded (fig.6). Subgenital plate of male less produced than in 2a (fig. 7).....*neomexicana*

3a. Tegmina of male without a pale bar on proximal half. Fastigio-facial angle (lateral view) more broadly rounded in both sexes (fig. 8a). Color usually more greenish .....*bivittata*

3b. Tegmina of male with a pale bar on the proximal half. Fastigio-facial angle (lateral view) less broadly rounded in both sexes (fig. 8b). Color usually more buffy. *maculipennis maculipennis*

Mermiria picta (Walker)

Adults more abundant in August and September. Habitat tall grass and margins of open woods of East Texas timbers.

Mermiria neomexicana (Thomas)

Adults July-October, most abundant August-September. Habitat upland coarse grass area.

Mermiria bivittata (Serville)

Adults late June-October, with peak in July. Prairie habitat, occasionally tall grass of lower areas.

Mermiria maculipennis maculipennis Bruner

Data generally as in *M. bivittata,* but more common.

Genus *Mesochloa* Scudder

One species, *Mesochloa abortiva* Bruner. Adults October-May, overwintering as nymphs and adults. Optimum habitat areas of low vegetation.

Genus *Acrolophitus* Thomas

One species, *Acrolophitus variegatus* (Thomas) Adults May-August. Prairie habitat, generally associated with *Evax* or "Indian Tobacco."

Genus *Syrbula* Stal

1a. Lateral carinae of pronotum strongly incurved in the middle (fig. 10) ..... *fuscovittata*

1b. Lateral carinae of pronotum weakly incurved in the middle (fig. 9) ..... *admirabilis*

Syrbula fuscovittata (Thomas)

Distribution extremely local. Professor Isely has found only one colony, this being at Camp Wisdom, Dallas County. This camp is predominantly cedar brake with limestone outcroppings.

Syrbula admirabilis (Uhler)

Adults July-November, with peak in late August. Distribution general and very abundant.

Genus *Opeia* McNeill

One species, *Opeia obscura* (Thomas). Adults midsummer and fall among short mesquite grasses.

Genus *Amphitornus* McNeill

One species, *Amphitornus coloradus coloradus* (Thomas). Adults appear from midsummer to early fall. A great plains species, but can adapt itself to a variety of habitats.

Genus *Amblytropidia* Stal

One species, *Amblytropidia occidentalis* (Saussure). Adults October-May. Optimum habitat sandy woods.

Genus *Eritettix* Bruner

One species, *Eritettix simplex simplex* (Scudder). Adults March-May, overwintering as a nymph. Prairie grass habitat.

Genus *Phlibostroma* Scudder

One species, *Phlibostroma quadrimaculatum* (Thomas). Adults June-September. Optimum habitat areas of short vegetation and grass.

Genus *Orphulella* Giglio-Tos

1a. Pronotum shorter and lateral carinae less constricted than in 1b, and transverse sulcus cutting the median carina distinctly behind the middle. Vertex more blunt with central depression more rounded and closer to apex (figs. 12, 14) ..... *speciosa*

1b. Pronotum longer and lateral carinae usually more constricted, the transverse sulcus cutting the median carina almost in the middle. Vertex more rectangular,

the central depression more pointed and removed from the apex one third (in male) and one-fourth (in female) the width of the vertex (figs. 13, 15) ..... *pelidna pelidna*

Orphulella pelidna pelidna (Burmeister)
Adults June-November. Habitat open woods and sandy areas.

Orphulella speciosa (Scudder)
Adults June-December. Abundant in pastures of short vegetation, less common in open woods.

Genus *Dichromorpha* Morse
One species, *Dichromorpha viridis* (Scudder). Adults August-November. Optimum habitat along streams and moist areas in woods.

Genus *Ageneotettix* McNeill
One species, *Ageneotettix deorum deorum* (Scudder). Adults June-November. Habitat upland prairie, often bordering woods.

Genus *Psoloessa* Scudder
One species, *Psoloessa texana texana* (Scudder). Adults March-June, overwintering as a nymph. Habitat woods and sandy areas bordering woods.

Genus *Boopedon* Thomas

1a. No distinct, coarse lateral carinae on prozona. No transverse bars on outer face of hind femur. No distinct spots distributed on tegmina of female (although sometimes black bars). Posterior border of dorsum of pronotum as in fig. 19b ..... *nubilum*

1b. More or less distinct although often coarse lateral carinae on prozona and sometimes the metazona. Transverse bars may or may not be present on outer face of hind femur. Distinct spots may or may not be present on tegmina of female. Posterior border of dorsum of pronotum as in either fig. 19a or fig. 19c....2

2a. Seldom if ever three bars on the outer face of the hind femur. Black spots never distributed over tegmina of females. Posterior border of dorsum of pronotum more truncate (fig. 19c) ..... *auriventris*

2b. Usually three bars on outer face of hind femur. Black spots or bars distributed over tegmina of females. Posterior border of dorsum of pronotum more angular fig. 19a) ..... *maculatum*

Boopedon nubilum (Say)
Adults June-August. In area studied probably limited to the west cross timbers.

Boopedon maculatum Caudell
Adults June-August. Habitat upland weedy pastures. Most common of this genus.

Boopedon auriventris McNeill
A summer species inhabiting upland prairie.

Genus *Aulocara* Scudder
One species, *Aulocara elliotti* (Thomas). A late spring to mid-summer species. Optimum habitat short grass.

Subfamily *OEDIPODINAE*, Key to Genera

1a. Hind wing clear or faintly yellow at the base, with a cloudy distal area, never a well defined black band, the entire wing being very transparent (figs. 24, 25, 26) 2

1b. Hind wing basally brightly colored with at least a part of the black band well defined (except in *Dissosteira*, which is basally black with a narrow yellow or white border), the entire colored area less transparent and often opaque 3

2a. Dorsum of pronotum flat or nearly so, often with various markings and designs. Median carina low, not as high as half the width of the compound eye. Lateral carinae more or less distinct. (figs. 25, 26) ..... *Encoptolophus*

2b. Dorsum of pronotum very sloping to the sides, never with markings or designs. Median carina as high or higher than the width of the compound eye. No lateral carinae (fig. 24) ..... *Chortophaga*

3a. Basal portion of hind wing black with a narrow white or yellow apical border ..... *Dissosteira*

3b. Basal portion of hind wing one of various colors (never black) and with a black apical band 4

4a. Median carina of pronotum distinctly raised and with or without a very shallow transverse sulcus (figs. 22, 23) ..... *Arphia*

4b. Median carina of pronotum, if raised, cut by one or two distinct transverse sulci (as in figs. 28, 29), or if median carina is low and thread-like, then the transverse sulci may not cut deeply 5

5a. Median carina of pronotum cut by one distinct transverse sulcus (in *Spharagemon* the deep transverse sulcus may be very narrow and a second very shallow sulcus may be present, but it is not more than one-fifth as deep as the main sulcus) 6

5b. Median carina of pronotum cut by two distinct transverse sulci of nearly equal depth (except in *Hadrotet-*

tix, in which the anterior sulcus is very shallow, this genus being recognized by the large robust form, the antennae more than 15 mm. in length and the three dark distinct transverse bars on the tegmina) 10

6a. Small and slender, distance from front of head to apex of tegmina not more than 26 mm. in male and 31 mm. in female. Median carina of pronotum low and thread-like and often missing on the metazona.... *Platylactista*

6b. Larger, distance from front of head to apex of tegmina more than 26 mm. in male and 31 mm. in female. Median carina may or may not be low and thread-like.. 7

7a. Either hind tibia with distal two-thirds red and basally with a bluish-black and white ring, or median carina of pronotum raised at some place at least as high as two-thirds the width of the compound eye, or without distinct tubercles or ridges on the pronotum visible to the naked eye. No distinct bars or spots distributed over tegmina (although three transverse bars may be present in *equale*). Size medium and more slender..... *Spharagemon*

7b. Hind tibia never as described in 7a, median carina never as highly raised as described in 7a, always with distinct large tubercles or ridges easily visible to the naked eye. Distinct dark bars or spots distributed over tegmina. Size large and robust..... 8

8a. Transverse sulcus cutting the median carina of the pronotum at or near the middle (fig. 28). Frontal costa (raised medio-longitudinal flat portion on face) margins but little incurved above antennae.... *Hippiscus*

8b. Transverse sulcus cutting the median carina of the pronotum distinctly posterior to the middle (fig. 29). Frontal costa margins much constricted above the antennae 9

9a. Hind tibia salmon-red..... *Xanthippus*

9b. Hind tibia yellow or tan..... *Pardalophora*

10a. Median carina of metazona never low and thread-like, always distinctly raised 11

10b. Median carina of metazona low and thread-like or absent 13

11a. Hind wings basally pink, orange, or red. Frontal costa (raised medio-longitudinal portion of face) margins constricted between the antennae. Basal segments of antennae slightly flattened. Size small..... *Psinidia*

11b. Hind wings basally yellow. Frontal costa margins not strongly constricted between the antennae. Basal seg-

ments of antennae not flattened. Size medium to large 12

12a. Dorsal flange of hind femur subsiding evenly. No cristation of median carina of pronotal mesozona..... *Rehnita*

12b. Dorsal flange of hind femur subsiding abruptly. Cristation of median carina of pronotal pro-and mesozona usually about equal ..... *Trachyrhachis*

13a. Antennae unusually long, being at least 15 mm. in length. Tegmina always with three distinct dark transverse bands and distance between front of head and apex of tegmina usually more than 34 mm..... *Hadrotettix*

13b. Antennae less than 15 mm. Tegmina may be with or without three transverse black bands, but if the former (*T. pistrinaria*) then distance between front of head and apex of tegmina less than 34 mm..... *Trimerotropis*

Genus *Arphia* Stal

1a. Median carina of pronotum raised into a high crest, at least as high on the metazona as the width of the compound eye ..... *xanthoptera*

1b. Median carina not raised as high as in 1a 2

2a. Impressed area of fastigium (front part of dorsum of head) as broad as (in male) and broader (in female) than long (fig. 20) ..... *sulphurea*

2b. Impressed area of fastigium longer than broad (as in fig. 21) 3

3a. Lateral lobes of pronotum proportionately narrower and posterior border of pronotum (when viewed from side) more curved (fig. 22). More robust and smaller, length of tegmina usually less than 25 mm., of hind femur usually less than 14.5 mm. in male; length of tegmina usually less than 30.5 mm., of hind femur usually less than 18 mm. in female. Early spring species ..... *conspersa*

3b. Lateral lobes of pronotum proportionately wider and posterior border of pronotum (when viewed from side) less curved (fig. 23). Less robust and larger, length of tegmina usually more than 25 mm., of hind femur usually more than 14.5 mm. in male; length of tegmina usually more than 30.5 mm., of hind femur usually more than 18 mm. in female. Late spring, summer, and fall species ..... *simplex*

Arphia conspersa Scudder

Often occurs in the literature as *frigida*. Passes the

winter in late nymphal stages, reaching adulthood in late March or early April and has generally disappeared by the end of June. Optimum habitat along border of upland woods.

Arphia xanthoptera (Burmeister)
Adults July-December. Habitat sandy soil of open woods.

Arphia sulphurea (Fabricius)
An early spring species which passes the winter as a nymph. Most commonly found in dry upland pastures near woods.

Arphia simplex Scudder
Adults April-December, being most abundant in May and June, nymphs September-May. Habitat general, but most abundant along timber margins.

Genus *Chortophaga* Saussure
One species, *Chortophaga viridifasciata* (DeGeer). Juveniles found throughout the year, adults February-December, reaching the peak in March and April. Habitat general, most abundant in grass along timber margins.

Genus *Encoptolophus* Scudder

1a. Tegmina longer in proportion to pronotum (fig. 26). No definite designs or markings on dorsum of pronotum ..... *subgracilis texensis*

1b. Tegmina shorter in proportion to pronotum (fig. 25). Definite patterns may or may not be present on dorsum of pronotum ..... *sordidus costalis*

Encoptolophus subgracilis texensis Bruner
Adults June-December, with some overwintering adults to be found in early spring, most commonly in plowed black land.

Encoptolophus sordidus costalis (Scudder)
Nymphs and adults found throughout the year, the adult peak being in October and November. Optimum habitat open areas of black soil covered with partially-grazed grass, although they may even occur on the lawns within the well built-up residential districts of cities.

Genus *Hippiscus* Saussure
One species, *Hippiscus rugosus* (Scudder). Adults late June-December. Grassland habitat.

Genus *Pardalophora* Saussure

1a. Metazonal disc covered with scattered round granules and tubercles, very few if any united to form ridges.... *phoenicoptera*

1b. Metazonal disc covered with many ridges and fused tubercles, often one or more pairs of ridges running parallel to the hind border of the metazona..... *saussurei*

Pardalophora phoenicoptera (Burmeister)
Adults April-August, the nymphs probably appearing again in September. Habitat open woods, sandy soil.

Pardalophora saussurei (Scudder)
Seasonal appearance and habitat similar to *P. phoenicoptera,* but more common.

Genus *Xanthippus* Saussure
One species, *Xanthippus corallipes pantherinus* (Scudder). Adults April-August, the nymphs appearing in November and overwintering in that stage. Common on upland limestone prairie.

Genus *Dissosteira* Scudder
One species, *Dissosteira carolina* (Linnaeus). Seldom abundant, adults May-November. Optimum habitat alluvial soils with short vegetation and bare areas.

Genus *Spharagemon* Scudder

1a. Distal two-thirds of hind tibia red, basally with a bluish-black and a white ring..... *bolli*
1b. Hind tibia not marked as in 1a..... 2
2a. Median carina of pronotum highly crested, arched in some place at least as high as two-thirds the width of the compound eye ..... *collare*
2b. Median carina lower than in 2a ..... *equale*

Spharagemon collare (Scudder)
Adults appear in May, common from May through October, and disappear in December. Generally confined to sandy fields.

Spharagemon equale (Say)
Adults May-December. Habitat rather general, but most commonly found in short vegetation.

Spharagemon bolli Scudder
Adults June-September. Inhabits open woods.

Genus *Platylactista* Hebard
One species, *Platylactista aztecus* (Saussure). Adults occur at least in early and late spring and in late fall on bare areas and places of scant vegetation.

Genus *Trachyrhachis* Scudder
One species, *Trachyrhachis kiowa fuscifrons* (Stal). Adults found throughout the year but most abundantly from June to September. General habitat black soil with scant vegetation and sometimes sandy areas.

Genus *Rehnita* Hebard

One species, *Rehnita capito* (Stal). Adults appear at least as early as June, on bare and rocky areas of scant vegetation. In the area included in this paper it is probably confined to the western half.

Genus *Psinidia* Stal

One species, *Psinidia fenestralis fenestralis* Stal. Apparently not common, adults June-November. Sandy soil habitat.

Genus *Trimerotropis* Stal

1a. Hind tibia pale yellow or consisting of one or more of the following colors — green, tan, yellow, brown, or black. Prozona highly arched.....2

1b. Hind tibia red or pink. Prozona not highly arched.....3

2a. Hind tibia pale yellow without annular rings. Coloration light and dark grey. Larger..... *pallidipennis pallidipennis*

2b. Hind tibia buff, often tinged with green and many dark markings and usually with a sub-apical light band. Coloration very contrasting, often approaching black and white. Smaller ..... *saxatilis*

3a. Whitish (limestone color) or reddish (red soil color) with three distinct black transverse bands on the tegmina. Size small ..... *pistrinaria*

3b. Greyish-brown and much darker, tegmina without three distinct transverse bands. Size medium.... *citrina*

Trimerotropis citrina Scudder

Adults May-December. Habitat sandy fields and banks of streams.

Trimerotropis pistrinaria Saussure

Adults June-December. Habitat white or red subsoil of eroded hillsides and limestone outcroppings of rough upland pastures.

Trimerotropis pallidipennis pallidipennis (Burmeister)

In area included in this paper probably confined to western and southwestern portions in areas of scant vegetation.

Trimerotropis saxatilis McNeill

Inhabitant of rocky hillsides.

Genus *Hadrotettix* Scudder

One species, *Hadrotettix trifasciatus* (Say). Adults June-November, the adult peak being late June and July. Habitat limestone and sandy loam areas.

Subfamily *CYRTACANTHACRINAE*,
Key to Genera

1a. Wings not visible, tympanum absent.....*Paraidemona*
1b. Wings visible, tympanum present.....2
2a. Head abnormally wide and long in proportion to rest of body. Lateral edges of dorsum of pronotum nearly parallel. Pronotum flared out to meet the head. Wings nearly always much shorter than the abdomen and pointed at the apex (fig. 38).....*Phoetaliotes*
2b. Head normal in size, not proportionately as large as in 2a. Lateral edges of dorsum of pronotum may or may not be parallel. Pronotum may or may not be flared out to meet the head. Wings variable.....3
3a. Hind femur with either a pink stripe on outer dorsal margin or a subapical pink ring. General color green (although other bright colors may be present), with a medio-longitudinal stripe on the pronotum.....*Hesperotettix*
3b. Hind femur with neither a pink stripe on outer dorsal margin nor a pink subapical band. Coloration variable.....4
4a. Wings not extending over more than two-thirds of the abdomen[3] (some long-winged females, belonging in 4b, may have the abdomen greatly extended during egg-laying season).....5
4b. Wings extending over more than two-thirds of the abdomen.....11
5a. Size large and robust, either distance from front of head to apex of abdomen 40 mm. or more or widest distance between lateral lobes of pronotum at least 11 mm., or both.....6
5b. Size medium or small, neither distance from front of head to apex of abdomen as much as 40 mm. nor widest distance between lateral lobes of pronotum as much as 11 mm.....7
6a. Hind wings red with a black border. Lateral carinae of pronotum absent or very indistinct, never raised throughout entire length of pronotum.....*Romalea*
6b. Hind wings mere colorless pads. Lateral carinae of pronotum distinct and raised throughout entire length.....*Brachystola*

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[3]Occassionally to rarely some normally short-winged species may develop long wings, and vice versa. King, R. L. and H. W. Beams (*J. Morph. 63* (2): 289-296) report (in collections made in southeastern Iowa) that sixteen out of ninety-four females of *Paratylotropidia brunneri* were long winged although all of the forty-six males were short-winged.

7a. Tegmina widely separated (not meeting over dorsum of abdomen) and rounded. Brightly colored with contrasting bands and spots of green, black, yellow, orange, and red, or most of these colors....*Dactylotum*

7b. Tegmina usually touching or crossing over dorsum of abdomen, being either rounded or pointed at the apex. Coloration never consisting of as many colors as in 7a 8

8a. General color greenish-gray, white, or light greenish-brown. No distinct markings (although there may be indistinct dark areas behind compound eyes, on sides of pronotum, or a median band on dorsum of head)....9

8b. General color variable, but seldom green. Distinct markings on several areas other than those listed in 8a 10

9a. Pronotum covered with hundreds of hairs (not necessarily visible to the naked eye). Apex of subgenital plate of male rounded with only a median small blunt tubercle. Apex of tegmina rounded or pointed but point less sharp than in fig. 32. Size medium .... *Campylacantha*

9b. Pronotum with few or no hairs. Apex of subgenital plate of male definitely produced posteriorly at an acute angle. Apex of tegmina sharply pointed (fig. 32). Size small ....*Hypochlora*

10a. Space between compound eyes unusually wide, being twice as wide as the frontal costa. See Plate III and fig. 39 of Plate I....*Paratylotropidia*

10b. Space between compound eyes not as wide as in 10a.... *Melanoplus*

11a. Caudolateral lobes of mesosternum longer than wide (fig. 30) ....*Schistocerca*

11b. Caudolateral lobes of mesosternum not longer than wide (fig. 31) 12

12a. Antennae greatly flattened. Tegmina long, slender and pointed. Face very slanting, the vertex extending as far in front of the compound eyes as half the width of the compound eye ....*Leptysma*

12b. Antennae not flattened, thread-like. Tegmina less slender, face much less slanting, and vertex not as produced as in 12a 13

13a. General color greenish-grey, white, or light greenish-brown. No distinct markings. This long-winged form rare ....*Hypochlora*

13b. General color variable, but with always some distinct contrasting markings 14

14a. Dorsum of pronotum proportionately long for its width (fig. 36). Apex of male subgenital plate broadly truncate (fig. 37). Male cercus always narrowed in the middle. Vertex of head moderately produced (fig. 36). ..... *Paroxya*

14b. Dorsum of pronotum usually not proportionately as long for its width (compare with fig. 36). Apex of male subgenital plate not as broadly truncate as in fig. 37. Male cercus may or may not be narrowed in the middle. Vertex may or may not be as produced as in fig. 36 ..... *Melanoplus*

Genus *Brachystola* Scudder

One species, *Brachystola magna* (Girard). Adults from late spring to early fall. In area studied, probably does not occur any farther eastward than Dallas County and becomes more abundant westward.

Genus *Romalea* Serville

One species, *Romalea microptera* (Beauvois). In area studied limited to eastern half. Optimum habitat open woods in underbrush and tall weeds.

Genus *Leptysma* Stal

One species, *Leptysma marginicollis* Serville. Adults July-April. Habitat confined to borders of streams, ponds, and lakes, where it clings to the stems of rushes and sedges.

Genus *Schistocerca* Stal

1a. Body marked with bars and stripes of contrasting colors, entire tegmina except the basal portion with black contrasting spots ..... *americana americana*

1b. Body without contrasting bars and stripes, except the medio-longitudinal stripe, and the apical half of tegmina may possess black contrasting spots 2

2a. Median longitudinal tan stripe on tegmina less defined and contrasting, being broad basally and gradually narrowing apically. General color uniform brown. Size small for genus ..... *damnifica damnifica*

2b. Median longitudinal yellow stripe well defined and more contrasting, being of equal width throughout. General color dark greenish-brown to tan. Size larger. 3

3a. Hind tibia blackish-purple. Tegmina greenish-purplish-brown, usually not at all spotted or barred, but if so, very slightly ..... *obscura*

3b. Hind tibia reddish-yellow to tan. Tegmina generally tan, without spots or sometimes as much as the apical half spotted 4

4a. In area included in this paper roughly distributed over western half (species difficult to separate in key) ..... *lineata*

4b. In area included in this paper roughly distributed over eastern half ..... *alutacea*

Schistocerca americana americana (Drury)

Adults may be taken the year around but most commonly in late fall. A strong flyer and can be taken in a variety of habitats but most commonly in areas of high vegetation.

Schistocerca damnifica damnifica (Saussure). Adults November-April. Habitat woods.

Schistocerca lineata Scudder

Adults June-October. Habitat tall grass and open sandy woods.

Schistocerca alutacea (Harris)

Data generally as that of *S. lineata.*

Schistocerca obscura (*Fabricius*)

Adults late summer and fall. Optimum tall grasses and shrubs along marshes and streams.

Genus *Hypochlora Brunner*

One species, *Hypochlora alba* (*Dodge*). Adults July-September. Occurs locally on or near *Artemisia.*

Genus *Paraidemona* Brunner

One species, *Paraidemona punctata* (Stal). Adults June-September. Habitat upland limestone fields and old pastures.

Genus *Campylacantha* Scudder

One species, *Campylacantha olivacea olivacea* Scudder. Adults August-December. Generally distributed in woody wastelands.

Genus *Hesperotettix* Scudder

1a. Pronotum with fine wrinkles. A pink median longitudinal stripe on pronotum and outer dorsal margin of hind femur. No definite pink ring around hind femur near the apex. Wings almost always shorter than the abdomen ..... *speciosus*

1b. Pronotum without fine wrinkles. Median longitudinal stripe on pronotum seldom pink and outer dorsal margin of hind femur seldom of a different color from rest of femur. A definite pink band around hind femur near the apex. Wings almost always as long or longer than abdomen 2

2a. White or yellow medio-longitudinal stripe on pronotum broad and transverse sulci of pronotum usually marked

with black. Tegmina light green with two longitudinal white stripes ..... *viridis viridis*

2b. Medio-longitudinal line on pronotum narrower and transverse sulci usually not marked with black. Tegmina often brownish-purplish-red and without two longitudinal white stripes (although there may be traces of them) ..... *viridis pratensis*

Hesperotettix viridis viridis (Thomas)

Adults May-November. Common in upland prairies and waste fields.

Hesperotettix viridis pratensis Scudder

Seasonal appearance much like *H. viridis viridis*, but less abundant and much more locally distributed because of the restricted diet.

Hesperotettix speciosus (Scudder)

Data much like that of *H. viridis viridis*, but more favoring weedy pastures.

Genus *Paratylotropidia* Brunner

One species, *Paratylotropidia brunneri* Scudder. Brunner named the genus in 1893 from Dallas, Texas specimens without giving a species name. Scudder, in 1897, described the species from a male from "Dakota" and a female from Dallas, Texas. The writer has no records of this species from this locality since that time. Distribution extremely local.

Genus *Melanoplus* Stal, Key to males

(See Plate II, and fig. 33 of Plate I).

1a. Tegmina covering at least four-fifths of the abdomen (occasionally old long-winged specimens may have a portion of the apex broken off, producing a ragged instead of a rounded or pointed appearance) 2

1b. Tegmina not covering more than four-fifths of the abdomen 14

2a. Cercus forked, or with a definite knob-like projection in addition to the main portion 3

2b. Cercus neither forked nor with a knob-like projection 6

3a. Cercus definitely forked, the ventral projection being at least twice as long as its average width ..... *keeleri keeleri*

3b. Cercus with a knob-like projection, but not twice as long as the average breadth 4

4a. Size smaller, distance from front of head to apex of

tegmina less than 25 mm. and furcula extending over supra-anal plate at least as far as the width of the tenth abdominal segment at the place where it is attached ..... *confusus*

4b. Size larger, distance from front of head to apex of tegmina more than 25 mm., the furcula not at all or only slightly projecting over the supra-anal plate, never as much as in 4a. 5

5a. Dorsum of pronotum or tegmina or both with two distinct light parallel longitudinal stripes ..... *bivittatus*

5b. Dorsum of pronotum and tegmina without stripes ..... *differentialis*

6a. Cercus scapula-shaped ..... *ponderosus ponderosus*

6b. Cercus not shaped as in 6a 7

7a. Cercus with apex expanded, narrowed in the middle .. 8

7b. Cercus with apex not expanded, nor narrower in middle than at some place distally 12

8a. Two faint, light, longitudinal, parallel lines on pronotum due to a dark broad median longitudinal stripe .... *packardii*

8b. No light parallel stripes on pronotum 9

9a. Furcula relatively short, projecting scarcely if any farther over the supra-anal plate than the width of the tenth abdominal segment at the place where it is attached 10

9b. Furcula relatively long, projecting over the supra-anal plate at least twice as far as the width of the tenth abdominal segment at the place where it is attached .. 11

10a. Size larger, more robust. Caudal tibia buff or yellow. General color yellow or buff. Bar behind eye rarely solid, usually decidedly broken and often almost missing ..... *foedus iselyi*

10b. Size smaller, less robust. Caudal tibia not buff or yellow (usually bluish-grey or rarely pink). General color more buff. Bar behind eye more nearly solid .... *foedus fluviatilis*

11a. Subgenital plate distinctly narrower than long, not notched at the apex (fig. 35b) ..... *bispinosus*

11b. Subgenital plate broadly rounded at the apex, as broad as long, and often slightly notched at the apex (fig. 35a) ..... *angustipennis impiger*

12a. Cercus elongated, with sides of apical two-thirds nearly parallel. Furcula long and broad ..... *flavidus*

12b. Cercus shorter, with sides of apical two-thirds not so nearly approaching parallelism. Furcula much shorter and narrower 13

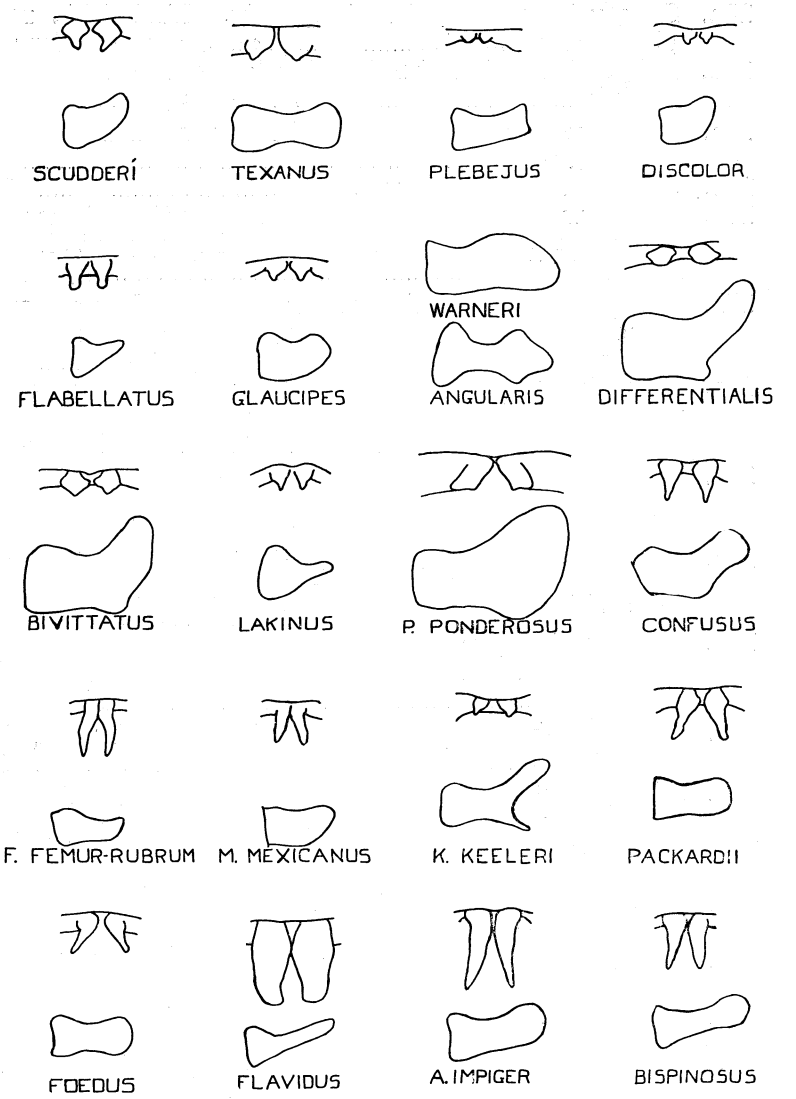

Plate II. Male cercus and furcula of the species of *Melanoplus* with the exception that no furcula is shown for *M. warneri* Little, and *M. angularis* Little, the cercus of these two species being redrawn from the illustrations published in the original description.

13a. Subgenital plate notched apically. Hind tibia red, pink, or blue ..... *mexicanus mexicanus*

13b. Subgenital plate not notched apically. Hind tibia red or pink ..... *femur-rubrum femur-rubrum*

14a. Cercus with apex expanded, being narrower in some proximal place 15

14b. Cercus narrowing apically 18

15a. Cercus with the greatest width nearly three times as great as the narrowest width, with two opposite knob-like projections ..... *angularis*

15b. Cercus with the greatest width not more than one and three-fourths times as great as the narrowest width, without two subapical knob-like projections 16

16a. Cercus with lateral margins gradually converging toward the apex, with the apex but little expanded and not broadly rounded ..... *plebejus*

16b. Cercus with lateral margins more strongly incurved in the middle or basal portion, with the apex more expanded and broadly rounded 17

17a. Cercus with the narrowest width at approximately the basal one-fourth, the dorsal margin more strongly incurved than the ventral margin ..... *warneri*

17b. Cercus with the narrowest width at approximately the middle, the dorsal and ventral margins incurving about equally ..... *texanus*

18a. Apex of subgenital plate terminating at a sharp angle or point when viewed from above (fig. 33) 19

18b. Apex of subgenital plate bluntly rounded or flattened when viewed from above (fig. 34) 21

19a. Basal portion of cercus greatly enlarged and apex much narrowed ..... *lakinus*

19b. Basal portion of cercus not greatly enlarged and apex not greatly narrowed 20

20a. Cercus broader and shorter, not more than twice as long as the middle breadth (fig. 33) ..... *discolor*

20b. Cercus narrower and longer, more than twice as long as the middle breadth ..... *scudderi*

21a. Cercus broader and shorter, not more than twice as long as the middle breadth, apex broadly flattened ..... *glaucipes*

21b. Cercus longer and narrower, longer than twice its middle breadth, apex more broadly rounded ..... *flabellatus*

Melanoplus scudderi texensis Hart

Adults August-December. Distribution rather general,

but most common along dry grassy roadsides. Furcula longer and cercus narrower than in *M. scudderi latus.*

Melanoplus scudderi latus Morse
Data generally like that of *M. scudderi texensis.*

Melanoplus plebejus (Stal)
Adults August-December. Distribution local but rather general.

Melanoplus discolor (Scudder)
Adults June-December. Distribution local on grassy fields.

Melanoplus flabellatus Scudder
Adults June-October. Distribution general on limestone pastures.

Melanoplus glaucipes (Scudder)
Adults June-September. Open woods habitat.

Melanoplus texanus (Scudder)
Adults May-August. Abundant on limestone prairies.

Melanoplus angularis Little
Adults spring and early summer. Habitat East Texas pine woods.

Melanoplus warneri Little
Adults spring and early summer. Habitat open post oak woods of East Texas timbers.

Melanoplus differentialis (Thomas)
Adults June-November. Optimum habitat low weedy pastures and cultivated fields.

Melanoplus bivittatus (Say)
Data generally as in *M. differentialis,* but found only occasionally.

Melanoplus ponderosus ponderosus (Scudder)
Adults June-December. Optimus habitat weedy pastures.

Melanoplus confusus Scudder
Common in late April and May and disappearing by the end of July. Habitat black land prairie and open woods in the cross timbers.

Melanoplus femur-rubrum femur-rubrum (DeGeer)
Rare in this region, but generally distributed in other regions where they appear abundantly.

Melanoplus lakinus (Scudder)
In area included in this paper, probably confined to the extreme western border.

Melanoplus mexicanus mexicanus (Saussure)
Adults April-December. Habitat general.

Melanoplus keeleri keeleri (Thomas)
Adults August-December. Habitat open woods and weedy pastures.

Melanoplus packardii Scudder
Uncommon mid-summer species. Habitat prairie and cultivated fields.

Melanoplus foedus iselyi Hebard
A mid-summer southeastern race inhabiting lowlands along streams.

Melanoplus foedus fluviatilis Bruner
A northeastern race with data generally as that of *M. foedus iselyi*.

Melanoplus flavidus Scudder
Uncommon summer species. Habitat low sandy areas.

Melanoplus angustipennis impiger Scudder
Adults May-December. Common on sandy waste lands and old pastures.

Melanoplus bispinosus Scudder
Adults June-November. Distribution general, the optimum being sandy lowlands.

Genus *Phoetaliotes* Scudder
One species, *Phoetaliotes nebrascensis* (Thomas). Rare in northeastern Texas. In other regions where it occurs more abundantly the distribution is general with the optimum being tall grasses.

Genus *Paroxya* Scudder
One species, *Paroxya atlantica atlantica* Scudder. In area studied, probably confined to eastern half along marshes and lakes.

Genus *Dactylotum* Carpentier
One species, *Dactylotum pictum* (Thomas). Adults June-October, with peak in June. Habitat upland weedy pastures.

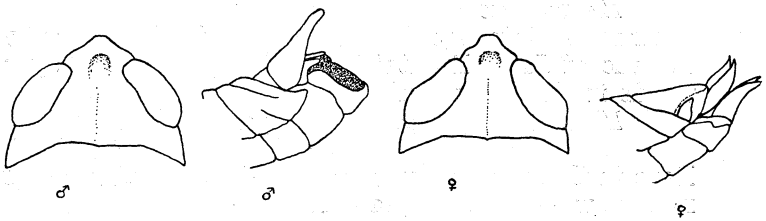

Plate III. Head and apex of abdomen of both sexes of *Paratylotropidia brunneri*, drawn by Robert A. Burton from Iowa specimens in the Iowa Insect Survey Collection of Iowa Wesleyan College.