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"A Synopsis of Some Oklahoma Acrididae"

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A SYNOPSIS OF SOME OKLAHOMA ACRIDIDAE.

Introduction.

The Orthopteron family "Acrididae" is composed of hundreds of different species. Many of these are of great importance since they often appear in enormous numbers and become seriously injurious to agricultural crops. Others are considered less important owing to the fact that they feed on wild plants. Still there are forms that occur in meadows and similar places but rarely appear in sufficient numbers to do serious damage.

Of all the species of "Acrididae", or grasshoppers, known to be present in Oklahoma, only a few are of importance from the standpoint of injury to agricultural crops. Furthermore, the majority of injurious forms belong to a single genus, "Melanoplus".

In the systematic work of this paper the writer has endeavored to give sufficient keys and descriptions to enable one to identify species of grasshoppers occurring in Oklahoma. One should bear in mind, however, that color is not always a determining factor since it is somewhat variable in some species. A synonymy of many of the species is included in the descriptions.

Illustrations of nearly all the genera have been prepared. In most cases only one species of a genus is illustrated. Where the difference between species of a single genus could be shown in a photograph, a few of such forms are illustrated.

Life History.

Egg.-- Most grasshoppers deposit masses of eggs in the soil during the fall of the year. Some, however, prefer to oviposit in crevices of logs, fence posts and similar objects. The eggs are placed about an inch below the surface of the soil or other material as the case may be. A single egg mass may contain from twenty five to seventy five eggs. They do not hatch until the following spring. Those forms that oviposit in soil generally select barren areas such as borders of fields in which to deposit their eggs.

Nymph.-- The young or nymphs are similar in general appearance

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to the adults with the exception that the tegmina and wings are not fully developed and the head is a little large in proportion to the body. It is not a fact, however, that immature tegmina and wings always designate that the insect is a nymph since many species in the adult stage have these organs much abbreviated. During development from the nymph to the adult, the insect molts or sheds its skin five times.

Adult.-- After the fifth or last molt the insect appears as mature form or adult. Most species mature about the earlier part of July. Oviposition begins about the middle or latter part of August and continues until late in the fall. Soon after the female has deposited her eggs, she dies.

Control.

Artificial Methods.-- One of the most satisfactory methods of destroying grasshoppers is the application of a poisoned bait to the infested field. The formula is as follows;

Bran -----	20 lbs.
Paris green -----	1 lb.
Cheap syrup -----	2 qts.
Oranges or lemons -----	3
Water -----	3½ gal.

The bran and Paris green should be mixed dry. Pour the syrup into the water, squeeze into this the juice of the fruits and add the pulp and rind cut in small bits. Add this mixture to the poisoned bran and stir thoroughly. The fruit makes the bait more attractive. This mixture should be broadcasted in the field before sunup. If applied later it will dry out more rapidly and be less effective since the insects do not take it so readily after it has become dry. The above formula is sufficient for from two to five acres.

Hopperdozer.-- In level fields grasshoppers are often controled to good advantage by means of the hopperdozer which is an arrangement for capturing the insects. A galvanised tank about six or eight inches deep, eight inches wide and about twelve to fifteen feet long is mounted on runners so as to be drawn sidewise across the field. There are no standard measurements regarding the dimensions of the tank. Behind the tank a vertical backstop about three or four feet high and of the same length as the tank should be arranged. Oilcloth is recommended for this since the insects can not cling to it on account of the smooth surface. The tank is partly filled with water over which is poured a layer of kerosene or other oil.

A horse is hitched to each end of the hopperdozer and it is

drawn across the field. The insects while attempting to escape are trapped by the machine and fall into the oil mixture. After they are once covered with oil death is certain.

Natural Factors.-- A large per cent of grasshoppers are destroyed by other insects that prey upon them in all stages of development.

Chief among the egg parasites are the larvae of blister beetles. One average egg mass is sufficient food for the maturation of a single larva. Thus, one of these parasites may be instrumental in destroying, indirectly, from twenty five to seventy five grasshoppers. Various species of tiger beetles, soldier beetles and ground beetles are also active in destroying the eggs. Digger-wasps as well as the common locust mite feed upon the eggs to some extent.

The more important parasites of the nymphs and adults are hair-worms, sarcophagid flies and tachina flies. Aside from insect parasites, various birds as well as domestic fowls capture many of the pests.

Disease.-- During wet seasons many of the insects are destroyed by disease. The common grasshopper fungus (*Empusa grilli*) probably ranks first in the death toll while certain bacterial diseases are also instrumental as destructive agents.

Acrididae.

In the members of this family the antennae are much shorter than the body, filiform, clubbed or ensiform in shape. The head is usually short. Ocelli are always present. Foveolae when present afford characters much used in classification. The pronotum is variable in form and size. As a rule it covers only the thorax while in one sub-family the "Tettiginae" it may extend much beyond the tip of the abdomen. The fore and middle legs are equal or nearly so in size and much smaller than the hind pair; the femora of the latter being distinctly swollen. The apical segment of the tarsi is furnished with a pair of curved claws between which in all sub-families except the "Tettiginae" is a circular pad called the pulvillus or arolium. The ovipositor consists of four short sub-conical organs. The upper pair curve upward at the tips while the tips of the lower pair curve a little downward.

Key to Sub-families of Oklahoma Acrididae.

- A. Size very small (body length 13 m.m. or less). Pronotum as long as or longer than abdomen. Tegmina lobiform. Tarsal claws without pulvilli. Prosternum advanced in the form of a muffler. -----Tettiginae.
- A.A. Size variable (body length 15 m.m. or more). Pronotum never extending over abdomen. Tegmina variable. Tarsal claws furnished with pulvilli.
- B. Prosternum not armed with a distinct spine, though sometimes with a low rounded tubercle.
- C. Front of head oblique. Foveolae either present or wanting, when present, usually distinct. Median carina of pronotum never cristate and never cut by more than one sulcus. - Tryxalinae.
- C.C. Front of head nearly or quite vertical and rounded at vertex. Fastigium generally sloping downward. Foveolae generally obscure. Median carina of pronotum often cristate and cut by one or more sulci. Wings usually brightly colored. ----- Oedipodinae.
- B.B. Prosternum armed with a distinct conical or cylindrical spine. ----- Acridinae.

Sub-family Tettiginae.

The members of this sub-family are commonly known as "grouse locusts". They are the smallest species of Acrididae. The body color is almost a uniform dull brown or blackish. They can be easily recognized from the tapering pronotum which extends back over the abdomen. The tegmina, when present, are lobiform and cover only a small portion of the wings. Wings are usually present and well developed. The body of the male of most species is narrower than that of the female. The sub-anal plate of the male, viewed laterally, is conical or triangular; the supra-anal plate lanceolate or triangular. The valves of ovipositor are serrate; the extremities of valves finely pointed.

Grouse locusts inhabit boggy places near lakes and streams. They feed upon vegetable mold, sprouting grasses, germinating seeds, mosses, lichens and debris found in such places.

Key to Genera of Tettiginae.

- A. Antennae composed of twelve to fourteen joints.
 - B. Vertex advanced beyond the eyes. ---- Tettix.
 - B.B. Vertex not extending beyond eyes. - Paratettix.

Tettix (Charpentier)

The vertex is a little wider than one of the eyes, its front margin projects slightly beyond them. Viewed laterally, it is somewhat sinuate; the front margin angulate, sub-convex or sub-truncate. Antennae composed of twelve to fourteen joints. Pronotum with the front margin truncate or slightly angulate and not produced forward on head to eyes. The upper notch on hind margin of lateral lobes is nearly as deep as the lower. The hind portion of pronotum may extend to or beyond the tip of abdomen. Femora entire or with margins slightly undulate. Posterior tibiae enlarged on apical portion. First joint of posterior tarsi longer than the third.

Tettix arenosus (Burm.)
Tettix arenosa (Burm.)
Tettix arenosus (Bol.)
Tettix ornata (Thom.)

Body rather slender. Color grayish or blackish, sometimes with a square light spot on dorsum. Vertex broad, with the front margin sub-truncate, hind margin rounded. Pronotum flat, front margin truncate, hind portion extended much beyond hind femora. Median carina of pronotum indistinct. The wings are a little longer than pronotum.

Measurements: Length of body, male, 8 m.m., female, 9 m.m.; pronotum, male, 10.5 m.m., female, 13 m.m.; hind femora, male, 5 m.m., female, 5.5 m.m.

Paratettix (Bolivar)

In this genus the vertex is narrow and does not extend beyond the eyes; its front margin truncate. Costa between the antennae more or less prominent, sub-globose. Antennae composed of fourteen joints. Pronotum with its disk flat, truncate in front, moderately prolonged posteriorly; the median carina low. Tegmina oval or elongate. Wings usually well developed. Apical third of hind tibiae gradually enlarged; pulvilli of posterior spiculate.

Paratettix cucullatus (Morse). Plate I, Fig. 1.

Tetrix cucullata (Burm.)
Tettix cucullata (Scudd.)
Tettix cucullatus (Bol.)
Paratettix cucullatus (Morse)

Body rather long, depressed, granulate. Color usually a yellowish gray, sometimes reddish brown or blackish. Vertex, viewed from above, about as broad as the width of eye, not advanced beyond eyes, front margin slightly hollowed. Pronotum truncate in front, advanced upon the head to the eyes. Median carina indistinct on front portion, low on hind portion and extending a little beyond hind femora. Wings slightly surpassing tip of pronotum.

Measurements: Length of body, male, 9 m.m., female, 12 m.m.; pronotum, male, 10.5 m.m., female, 13 m.m.; hind femora, male, 5.5 m.m., female, 7m.m.

Sub-family Tryxalinae.

As a rule the members of this sub-family are small. With the exception of the "Tettiginae", the smallest forms are found in this group. The body is generally slender. In most species the face is decidedly oblique. Vertex is either horizontal or ascending so that the apex is more or less acuminate. Foveolae usually distinct though sometimes wanting. Eyes are usually longer than infraocular portion of genae. Antennae variable, either depressed, acuminate or clavate. The anterior and posterior margins of disk of pronotum are nearly equal in width; the lateral carinae usually distinct; median carina never cristate and cut by only one sulcus. The hind femora are slender. Tegmina and wings are often shorter than the abdomen. Wings are never brightly colored nor with a median dark band as in the "Oedipodinae". The prosternum is not armed with a spine although in one genus, "Mermira", a low rounded tubercle is present.

Key to Genera of Tryxalinae.

- A. Hind margin of disk of pronotum distinctly wider than front margin. Antennae not widened at base.
- B. Disk of pronotum constricted at or a little in front of middle.
 - C. Lateral foveolae of vertex present. Color dull brownish. Tegmina with numerous small fuscous spots. Hind femora swollen, with three dark bars on upper face. ----- Ageneotettix.
- C.C. Lateral foveolae of vertex wanting.

Ageneotettix (McNeill).

Size small. Color dull brown with numerous dark spots. The head is a little swollen. Face oblique. Vertex sloping, nearly as wide as eye. Lateral carinae prominent, meeting in front at a right angle; median carina wanting; lateral foveolae distinct and rectangular. Frontal costa narrow above, widening below, failing to reach the clypeus, not at all sulcate except a slight depression directly below ocellus. Antennae filiform, a little longer than head and pronotum, the basal half dull yellowish, apical half a little darker. Eyes rather large, viewed laterally, nearly straight, hind margin much rounded. Pronotum about as long as head, constricted at middle, constriction of its disk more pronounced. Lateral lobes deeper than long, front and hind margins vertical or nearly so. Median carina only a raised line, cut about the middle by the principal sulcus. Tegmina about as long as abdomen, considerably mottled with small irregular dark spots, tapering and rounded at apex. Wings as long as tegmina, hyaline. Hind femora much swollen, not distinctly banded on outer face, upper face marked with three more or less distinct dark bands, lower face olivaceous. Hind tibiae orange colored, spines tipped with black.

Ageneotettix deorum (Scudd.)

Only one species has been taken in this state. The occiput is a little higher than pronotum. Disk of pronotum is flat or nearly so; hind margin about half again as wide as front margin. Light lines are often present along locations of lateral carinae and then the outer portions of metazonal disk are marked with dark triangular areas. A light bar is often present on side of head extending backward from top of eye. The tegmina, when folded, are often marked with a light line along dorsal surface. Legs pubescent, front and middle pairs quite small. Hind femora swollen. Hind tibiae with nine to eleven spines on outer margin; apical spurs on inner margin very unequal in length.

Measurements: Length of body, male, 16 m.m., female, 22 m.m.; antennae, male, 7 m.m., female, 8 m.m.; pronotum, male, 3 m.m., female, 4 m.m.; tegmina, male, 10.5 m.m., female, 15 m.m.; hind femora, male, 10.5 m.m., female, 13.5 m.m.

- D. Hind tibiae armed with about nineteen to twenty three spines on outer margin. Apical third of antennae slightly swollen. Tip of abdomen of male developed as a short conical process. ----- Syrbus.
- D.D. Hind tibiae armed with eleven to fourteen spines on outer margin. Tip of abdomen of male blunt. ----- Orphulella.
- A.A. Hind margin of disk of pronotum little if any wider than front margin; lateral margins parallel or nearly so.
- B. Antennae broad at base with apex acuminate.
- C. Lateral foveolae of vertex present. Lateral lobes of pronotum with the front half of lower margin sinuate. ----- Opeia.
- C.C. Lateral foveolae of vertex wanting.
- D. Lateral carinae of pronotum present. Antennae scarcely as long as head and pronotum. ----- Tryxalis.
- D.D. Lateral carinae of pronotum wanting. Antennae longer than head and pronotum, basal portion widened, tips acuminate. Prosternum with a low rounded tubercle. ----- Mermira.
- B.B. Antennae filiform, about as long as head and pronotum.
- C. Hind femora banded. Tegmina reaching or surpassing tip of abdomen. ----- Amphitornus.
- C.C. Hind femora not banded. Tegmina rarely reaching tip of abdomen. Color greenish or dull brownish. ----- Dichromorpha.

Syrbula (Stal).

Body slender. Color either greenish or light brown. Head about as long as pronotum. Face greatly oblique. Vertex as long as broad, its disk gently rounded anteriorly; carinae prominent; foveolae wanting. Costa a little more than half as broad as interspace between the eyes, sulcate in the male. Antennae a little longer than (male) or a little shorter than (female) head and pronotum, apical third enlarging and fuscous. Pronotum slightly constricted at middle; disk flat, narrowest portion a little in front of middle; hind margin a little wider than front margin; rugulose on metazona; carinae prominent but low. Lateral lobes about as long as deep, front and hind margins oblique, rugulose on metazona. Tegmina about as long as abdomen, apical portion membranaceous, tips rounded. Wings equal to tegmina in length, a little smokey. Hind femora slender, as long as or slightly surpassing tegmina in length. Hind tibiae very slender. Eyes oblique, upper margin acute-angulate, lower margin rounded.

Syrbula admirabilis (Uhler). Plate I, Fig. 2.
Stenobothrus admirabilis (Uhler)
Syrbula admirabilis (Thom.)
Syrbula leucocerca (Stal)

Male.-- General color light brown. A narrow light yellowish oblique bar on side of head extending back from lower portion of eye. A similar bar is often present extending back from upper portion of eye. Lateral carinae of pronotum often yellow. Lateral lobes with a yellowish spot near center. Tegmina with upper half fuscous, lower half more or less transparent, a row of large dark spots along middle. Hind femora with two fuscous bars on basal half of outer face. Hind tibiae fuscous with a broad pale band at base, armed with eighteen to twenty spines on outer margin.

Female.-- General color greenish. A purple stripe is generally present along middle of occiput and disk of pronotum. On the pronotum this stripe is bordered by black bars that extend to lateral carinae. The lateral lobes are marked with a yellowish spot near the center. Postocular bands indistinct. Tegmina, when folded, greenish on dorsum, sides with the upper half fuscous, lower half greenish, boundary between fuscous and green areas of a saw-toothed appearance. Hind femora greenish

except apical third which is light brown. Apical spurs on inner margin of hind tibiae equal.

Measurements: Length of body, male, 27 m.m., female, 36 m.m.; pronotum, male, 4.5 m.m., female, 6 m.m.; tegmina, male, 20 m.m., female, 29 m.m.; hind femora, male, 19 m.m., female, 27 m.m.

Orphulella (Giglio-Tos.).

Size small. Color either reddish brown or greenish. Body compressed. Head not very prominent. Face very oblique. Vertex blunt; interspace between the eyes hardly as wide as width of eye; lateral carinae prominent; fastigium blunt; lateral foveolae not very distinct and invisible from above. Frontal costa about as wide as front tibia, not distinctly sulcate, the sides slightly diverging below. Antennae slender, about as long as head and pronotum, apical half a little infuscated. Eyes large, globose. Pronotum generally a little longer than head; disk flat; median carina very low, cut near the middle by the principal sulcus; lateral carinae prominent, diverging both before and behind the middle. Lateral lobes about as long as deep, sometimes marked on upper portion with a broad fuscous bar which extends on side of head to eye. Tegmina exceeding abdomen in length, tips rounded, a row of dark spots sometimes present along middle portion. Hind femora of medium size, not banded. Hind tibiae dull brownish; spines tipped with black.

Key to species of *Orphulella*.

- A. Hind tibiae with pale ring at base. Vertex rounded in female. ----- pratorum.
- A.A. Hind tibiae without pale ring at base. Vertex rectangulate in female. ----- speciosus.

Orphulella pratorum (Scudd.).

Size medium. Color dull brownish yellow, darker than "speciosus". The vertex in the female is rounded while in the male it may be rectangulate. Occiput, disk of pronotum and dorsum of tegmina sometimes light. Lateral lobes of pronotum often marked with a piceous band below lateral carinae. This band often crosses over on to disk of metazona. In most forms the spines of hind tibiae are entirely blackish. Hind tibiae without pale ring at base.

Measurements: Length of body, male, 20 m.m., female, 24 m.m.; pronotum, male, 3.5 m.m., female, 4 m.m.; tegmina, male and female, 18 m.m.; hind femora, male, 12 m.m., female, 14 m.m.; antennae, male, 9 m.m., female, 8 m.m.

Orphulella speciosa (Scudd.)
Stenobothrus speciosus (Scudd.)
Orphula speciosa (McNeill)
Orphulella speciosa (Scudd.)
Stenobothrus aequalis (Scudd.)
Orphula aequalis (Morse)
Stenobothrus bilineatus (Scudd.)
Stenobothrus gracilis (Scudd.)

Size small. Vertex more or less rectangulate. Middle joints of antennae about twice as long as broad. Hind tibiae without a pale ring at the base. Spines of hind tibiae are pale at base with tips black. Other characteristics are given in the description of the genus.

Measurements: Length of body, male, 18 m.m., female, 21 m.m.; antennae, male, 6 m.m., female, 5 m.m.; pronotum, male, 3.5 m.m., female, 3 m.m.; tegmina, male, 13 m.m., female, 15 m.m.; hind femora, male, 12 m.m., female, 13 m.m.

Opeia (McNeill).

Size small. In some forms the predominating color is yellowish brown while in others the head, pronotum and tegmina are greenish. The head is about as long as pronotum. Face strongly declivent. Vertex horizontal, not as long as interspace between the eyes; median carina not very distinct; lateral carina rectangulate, the apex blunt; lateral foveolae indistinct, invisible from above. Upper portion of frontal costa as wide as widest portion of antennae, sulcate, the sides diverging below. Antennae broad near base, the joints flattened, apical half acuminate, reddish brown in color, about as long as head and pronotum in the male, a little shorter in the female. Eyes greatly oblique, slightly angulate above, rounded below. Pronotum scarcely, if any, longer than head; the disk flat or nearly so; carinae prominent and parallel, cut a little behind the middle by the principal sulcus. Lateral lobes about as long as deep; front and hind margins oblique; lower margin nearly straight; upper portion may be either fuscous or greenish; lower portion generally pale. Tegmina about as long as abdomen, generally with a median row of fuscous spots, apical half membranaceous. Wings about as long as tegmina, transparent. Hind femora are of medium size; a dusky bar is often present on upper portion of outer face. Hind tibiae with ten to twelve spines on outer margin.

Opeia obscura (Thom.). Plate I, Fig. 3.

The male is about half as large as the female. An indistinct light line is generally present on side of head extending backward from lower portion of eye. Broad fuscous bands are often present above and below the postocular band. The lower edge of lateral lobes of pronotum is marked with a pale band. Ventral surface is of a pale clay-yellow color. Spines of hind tibiae tipped with black.

Measurements: Length of body, male, 15 m.m., female, 23 m.m.; antennae, male, 7 m.m., female, 7.5 m.m.; pronotum, male, 3.5 m.m., female, 4.5 m.m.; tegmina, male, 10 m.m., female, 13 m.m.; hind femora, male, 10 m.m., female, 14.5 m.m.

Tryxalis (Fab.).

Size small. Face very oblique. Vertex horizontal, about as long as broad, front margin strongly rounded; lateral foveolae wanting. Antennae flattened at base, about as long as head and pronotum, tips acuminate. Disk of pronotum flat, front and hind margins truncate; carinae parallel or nearly so; the median cut by one sulcus a little behind the middle. Lateral lobes vertical, a little longer than deep, front and hind margins oblique. Tegmina as long as abdomen in the female, shorter in the male. Hind femora slender.

Tryxalis brevicornis (Linn.). Plate I, Fig. 7.

Gryllus (Acerida) *brevicornis* (Linn.)
Tryxalis brevicornis (Fab.)
Tryxalis brevicornis (Burm.)
Pyrgomorpha brevicornis (Glov.)
Opsomala punctipennis (Serv.)
Opomala punctipennis (Thom.)

Color either greenish or dull rusty brown. In the green forms the lateral carinae of pronotum, antennae and edges of vertex are brownish. The variation in color occurs chiefly in the female. The male is generally brownish with dorsum and fore and middle legs greenish.

Measurements: Length of body, male, 22 m.m., female, 33 m.m.; antennae, male, 7.5 m.m., female, 8 m.m.; pronotum, male, 5 m.m., female, 6 m.m.; tegmina, male 20 m.m., female, 31 m.m.; hind femora, male, 14 m.m., female, 16 m.m.

Mermira.

Size medium in the male, rather large in the female. Body very slender. Color yellowish. Head about as long as pronotum, the dorsum sloping upward. Face greatly oblique. Vertex nearly as long as broad; fastigium more or less acuminate; lateral carinae angulate in the male, rounded in the female; median carina only a faint line; lateral foveolae wanting. Costa about half as wide as interspace between the eyes, sulcate, the lower half a little wider than the upper half. Antennae a little longer than head and pronotum, reddish brown, basal portion broader than the acuminate apical portion. Eyes as long as infraocular portion of genae, very oblique, upper margin bluntly angulate, lower margin well rounded. Pronotum sub-cylindrical, very slightly constricted at middle; median carina low, cut a little behind middle by the principal sulcus. Lateral lobes about as long as deep, front and hind margins oblique, lower margin sinuate. Tegmina equal to abdomen in length, smokey brown with a yellowish bar at base directly below median vein, basal third of dorsal surface sometimes light yellowish, tips rounded. Wings as long as tegmina, transparent, veins fuscous. Hind femora very long and slender, slightly surpassing tip of abdomen; carinae low. Hind tibiae either bright orange or yellowish; spines rather long, tipped with black.

Mermira bivittata (Serv.). Plate I, Fig. 8.

The prevailing color is dull yellowish although in some forms the dorsum, face and lower half of lateral lobes of pronotum may be a very light yellow, almost white. A broad, slightly oblique band is present behind the eyes and is continued across upper half of lateral lobes. The occiput is often marked with a narrow median light line bordered on either side by a narrow dark line. Tegmina often marked with indistinct fuscous spots; the tips rounded. Legs slender. Hind tibiae armed with twenty to twenty two spines on outer margin.

Measurements: Length of body, male, 34 m.m., female, 44 m.m.; antennae, male, 14 m.m., female, 17 m.m.; pronotum, male, 5 m.m., female, 6.5 m.m.; tegmina, male, 25 m.m., female, 32 m.m.; hind femora, male, 22 m.m., female, 27 m.m.

Amphitornus.

Size medium. Predominating color reddish brown. Head no wider than pronotum. Face rather oblique. Vertex about half as long as wide; carinae prominent; foveolae wanting. Costa at ocellus about half as wide as disk of vertex, wider below. In the male the antennae slightly surpass the head and pronotum in length, in the female they are a little less, reddish brown in color. Disk of pronotum not as wide as interspace between the eyes; carinae parallel, not very prominent. Lateral lobes broadly rounded so that part of the upper portion of each really looks as if it belongs to the disk. This rounded portion of lateral lobes is of a fuscous color. A narrow pale band crosses lateral lobes a little below the middle. Bordering this band above is a slight fuscous coloration and then a broad pale area extends between this and the rounded portion of lobes. Below the median light line is a broader fuscous band and then the extreme lower border is light. These bands of lateral lobes continue on head more or less distinct. Tegmina as long as abdomen in female, a little longer in the male, fuscous with a light bar at base. Wings as long as tegmina. Hind femora reaching tip of abdomen in the female, surpassing it in the male, marked with three rather distinct dusky cross-bars. Hind tibiae light blue.

Amphitornus bicolor unicolor (McNeill).

The color markings in the male are not quite so well differentiated as in the female. In the male the lateral carinae of vertex are rectangulate while in the female they are more or less rounded. Tegmina are a little infuscated at tips. Fore and middle legs small. Hind tibiae with thirteen spines on outer margin. Other characteristics are given in description of genus.

Measurements: Length of body, male, 21 m.m., female, 26 m.m.; antennae, male and female, 8 m.m.; pronotum, male, 4 m.m., female, 4.5 m.m.; tegmina, male and female, 17 m.m.; hind femora, male and female, 14 m.m.

Dichromorpha (Morse).

Size small to medium. Color brown or green. Vertex shorter than broad; lateral carinae distinct, meeting in front with the apex blunt; median carina and lateral foveolae absent. Costa much narrower than interspace between the eyes. Antennae about as long as head and pronotum, the joints moderately flattened. Eyes large and prominent, angulate above, broadly rounded below, oblique. Tegmina rarely reaching tip of abdomen. Hind femora rather stout, without dark cross-bars.

Dichromorpha viridis (Scudd.). Plate I, Fig. 5.

Chloealtis viridis (Scudd.)
Chrysochraon viridis (Thom.)
Dichromorpha viridis (Morse)
Chloealtis punctulata (Scudd.)
Chrysochraon punctulata (Thom.)
Opsomala brevipennis (Thom.)
Truxalis angusticornis (Stal)

Both brown and green forms of this species occur. The male is generally brown with the dorsum green, rarely brown, while the female may be entirely brown or green. The green females, however, generally have the legs and abdomen brown. Eyes oblique, dark brown. Front and hind margins of disk of pronotum subtruncate. Tegmina ovate-lanceolate, rarely reaching tip of abdomen generally one-third to one-half (female) or three-fourths (male) as long. Hind femora reaching tip of abdomen in the female, a little longer in the male.

Measurements: Length of body, male, 17.5 m.m., female, 29 m.m.; antennae, male, 8 m.m., female, 10 m.m.; pronotum, male, 4 m.m., female, 5.5 m.m.; tegmina, male, 7 m.m., female, 9 m.m.

Sub-family Oedipodinae.

In the members of this sub-family the prosternum is unarmed. Size varies from medium to large. General body color is dull ash gray or brownish while some forms are greenish. Face is vertical or gently rounded. The fastigium is declivent; the foveolae often indistinct. The antennae are filiform. Eyes generally shorter than infra-ocular portion of genae. Ocelli are placed near the eyes. Disk of pronotum in most forms distinctly wider on metazona than on prozona, either wrinkled, tuberculate or smooth. Median carina either low and cut by one or two sulci or cristate and entire or cut by only one sulcus. In nearly all forms the tegmina and wings are fully developed and the wings are brightly colored. In some forms the hind femora are brightly colored on inner face. The hind tibiae lack an apical spine next to the spurs on outer margin.

Key to Genera of Oedipodinae.

- A. Median carina of pronotum elevated above disk, arcuate.
- B. Principal sulcus of pronotum obsolete.
- C. Disk of vertex more or less pentagonal. with a median transverse semicircular depression. Color brownish or nearly black. Hind femora more or less distinctly banded on outer face.- *Arphia*.

- C.C. Disk of vertex triangular, without a transverse depression. Color green or brownish. Hind femora without distinct bands on outer face. ----- Chortophaga.
- B.B. Principal sulcus of pronotum distinct. Insects of medium or large size.
- C. Wings bluish or black at base with a yellowish band on outer portion. Antennae little if any longer than head and pronotum. - Dissosteira.
- C.C. Wings yellow at base with a dark band on outer portion. Antennae distinctly longer than head and pronotum. ----- Spharagemon.
- A.A. Median carina of pronotum not elevated in the form of a high crest.
- B. Median carina of pronotum low, not cut by a sulcus. Body color dull green. Tegmina about as long as head. Insects of large size. ----- Dictyophorus.
- B.B. Median carina of pronotum low, cut by one sulcus.
- C. Principal sulcus of pronotum at or near the middle. Hind margin of disk wider than front margin.
- D. Color light brown. Disk of pronotum with a light X-shaped bar; hind margin of disk nearly twice as wide as front margin. Tegmina marked with small dark spots. ----- Aulocara.
- D.D. Color greenish. Hind margin of disk of pronotum nearly twice as wide as front margin. Tegmina with four to six large dark spots along discoidal area. ----- Phlibostroma.
- D.D.D. Color blackish in the male, greenish or brownish yellow in the female. Hind margin of disk of pronotum only a little wider than front margin. A short black bar above base of antennae. Tegmina about as long as the abdomen in the male, half as long in the female. ----- Boopedon.

C.C. Principal sulcus of pronotum a little in front of middle.

D. Size small, 21 to 29 m.m. in length. Color rusty brown. Hind tibiae blue with a broad pale ring at base.
----- Encoptolophus.

D.D. Size large, 32 m.m. or more in length. Color yellowish brown. Tegmina usually with large fuscous areas. Disk of pronotum wrinkled or tuberculate. Wings yellow or red at base. ----- Hippiscus.

E.B.B. Median carina of pronotum cut by two sulci.

C. Head swollen, nearly as long as pronotum and distinctly elevated above it, greatly constricted at middle. Body very slender.
----- Trachyrachis.

C.C. Head not swollen, shorter than pronotum, generally no longer than metazona and often shorter.

D. Inner face of hind femora blue with a broad yellow band on apical portion. Antennae blackish. ----- Hadrotettix.

D.D. Inner face of hind femora black with one or two light bands on apical half.
----- Trimerotropis.

Arphia (Stal).

Size rather large. Body compressed. Color varies from dull yellowish brown to dark brown almost black. Head is about as wide as pronotum. Face vertical or gently rounded. Vertex rounded, about as broad as length of eye; median carina present. Costa rather broad. Antennae about as long as head and pronotum, little, if any, longer. Eyes much shorter than infra-ocular portion of genae, front margin nearly straight, hind margin broadly rounded. Pronotum with its disk roof-shaped on prozona, more or less flat on metazona; principal sulcus obsolete; lateral carinae sub-distinct on metazona; front margin of disk distinctly or only slightly advanced upon occiput, hind margin either acute or bluntly angulate. Lateral lobes deeper than long. Tegmina broad, leathery in texture with tips a little membranaceous, exceeding tip of abdomen by one-fourth to one-third their length; intercalary vein nearer the median than the ulnar vein. Wings yellow or red at base with a dark band on outer portion. Hind femora rather stout.

pale yellowish. Disk of pronotum and lateral lobes of metazona dark brown or a little olivaceous. Front margin of lateral lobes pale yellow, behind this margin the color varies from dark brown to black. Wings smokey with a bluish tinge at the base. Hind tibiae with a light yellow band at base, then a black band of equal width, apical half red; knees black; twelve to fourteen spines on outer margin of hind tibiae. Tegmina narrow, rounded at tips. Mesosternum swollen.

Female: Either dull yellowish or greenish in color. Median carina of pronotum fuscous; lateral carinae yellowish with a black band below. A narrow black band below the broad, yellowish, post-ocular band. Eyes about half way between front and back margins of head. A conspicuous black band above base of antennae. Sulci on lateral lobes often blackish. Cross-bars on hind femora not very distinct, often wanting on upper and lower faces; genicular arcs black. Hind tibiae pale reddish-yellow, not distinctly banded. Mesosternum a little swollen.

Measurements: Length of body, male, 31 m.m., female, 42 m.m.; antennae, male, and female, 13 m.m.; pronotum, male, 6 m.m., female, 8 m.m.; tegmina, male, 19 m.m., female, 14 m.m.; hind femora, male, 19 m.m., female, 25 m.m.

Encoptolophus (Scudd.).

Size medium. Body slightly compressed. Vertex triangular, front portion sloping downward, the disk lower than occiput; lateral carinae low; median carina terminating at middle of disk; lateral foveolae distinct, elongate, triangular. Costa narrow, sulcate. Antennae as long as head and pronotum in the female, a little longer in the male, the joints of apical half moderately flattened. Pronotum slightly expanding on posterior half, its disk more or less flat with front margin truncate, hind margin rectangulate with the apex blunt; median carina distinct. Lateral lobes deeper than long, front and hind margins nearly vertical. Tegmina rather broad, slightly surpassing tip of abdomen; the intercalary vein distinctly nearer the ulnar than the median vein. Hind femora reaching tip of abdomen in the female, a little longer in the male.

Encoptolophus sordidus (Burm.). Plate III, Fig. 2.

Oedipoda sordida (Burm.).

Tragocephala sordida (Stal.).

Encoptolophus sordidus (Scudd.).

Locusta nebulosa (Harr.).

Color dull rusty brown. Antennae light brown with the apical third a little darker. Tegmina with two rather distinct dark bars on basal two-thirds separated by lighter areas, apical third

Key to species of Arphia.

- A. Pronotum with front portion of disk acutangulate, extended on occiput even with eyes, hind margin acutangulate, the apex sharp; median carina high and arcuate. ----- xanthoptera.
- A.A. Pronotum with the front portion of disk subtruncate, not extending over occiput to eyes, hind margin blunt at apex; median carina only a little elevated above head, slightly arcuate.
- B. Frontal costa rapidly narrowing above antennae so so that it is subacuminate at union with vertex. ----- sulphurea.
- B.B. Frontal costa only gradually narrowing above antennae so that it is subtruncate at union with vertex. ----- luteola.

Arphia xanthoptera (Germar).
Oedipoda xanthoptera (Germar)
Tomonotus xanthopterus (Thom.)
Tomonotus sulphureus xanthopterus (Thom.)
Arphia xanthoptera (Sauss.)
Arphia xanthoptera carinata (Bl.)

Size medium. Color dark brown almost black. Head not at all prominent. Face greatly rounded. Vertex broad, front portion slightly extended, hind portion rounded; lateral carinae continuous with sides of costa; lateral foveolae the same as in "sulphurea". Costa broad, sulcate, sides parallel below ocellus, convergent above. Antennae slightly longer than pronotum, apical half black. Hind margin of eyes very close to front margin of pronotum. Pronotum minutely tuberculate, the front portion of its disk advanced upon occiput, hind margin acutangulate, the tip quite sharp; median carina a little higher than head, arcuate and sharp. Tegmina much surpassing tip of abdomen, leathery on basal half, apical half membranaceous, smokey, sometimes indistinctly dotted with fuscous. Wings with the basal two-thirds either deep yellow or orange red, outer third with a curved fuscous band, marginal fuscous ray not much longer than width of fuscous band. Hind femora of medium size, outer face dull brown, inner face with broad black bars alternating with narrower yellowish bars, the black bars less distinct on upper face, inner half of lower face black. Hind tibiae black, with a narrow yellowish near base; spines black.

Measurements: Length of body, male, 27 m.m., female

antennae, male and female, 10.5 m.m.; Tegmina, male, 26 m.m., female, 30 m.m.; hind femora, male, 18 m.m., female, 19 m.m.

Arphia sulphurea (Fab.). Plate II, Fig. 1.

Gryllus sulphureus (Fab.)

Locusta sulphurea (Harr.)

Oedipoda sulphurea (Burm.)

Tomonotus sulphureus (Thom.)

Arphia sulphurea (Stal.)

Size medium. Color varying from pale yellowish brown to dark brown or blackish in some males. Vertex broad and rounded except front which is slightly angulate; carinae low but distinct, continuous with sides of costa; lateral foveolae broad, shallow, subrectangular. Costa at and below the ocellus about half as broad as the interspace between the eyes, sulcate, above the ocellus the sides converge rapidly so that they are nearly attingent at union with vertex. Antennae a little shorter than head and pronotum, dull brown. Pronotum densely and minutely tuberculate; front margin of its disk very bluntly angulate, hind margin nearly rectangulate, the apex well rounded; median carina only gently arched, not distinctly elevated above the head. Tegmina broad and leathery, generally much sprinkled with small fuscous spots. Wings with basal two-thirds sulphur-yellow, a dusky curved band on outer third, a dark ray runs from this band almost to base near front margin of wing. Hind femora with the outer face either uniform dark brown with a pale ring near the knee or with alternating bands of black and pale yellow which are more distinct on inner and lower faces. Hind tibiae black or bluish, with a pale ring at base.

Measurements: Length of body, male 22 m.m., female, 32 m.m.; antennae, male and female, 7 m.m.; tegmina, male, 23 m.m., female, 26 m.m.; hind femora, male, 14.5 m.m., female, 18 m.m.

Arphia luteola (Scudd.).

Color yellowish brown or blackish. Face sometimes quite pale and sometimes olivaceous. Head about half as long as pronotum. Genae a little swollen. Costa slightly constricted above and below ocellus, sulcate at and directly below ocellus, sometimes failing to reach the clypeus. Antennae fuscous, bases nearly on a level with lower margin of eyes. Pronotum minutely tuberculate. Front margin of lateral lobes slightly sinuate, hind margin straight and a little oblique, lower margin well rounded posteriorly. Tegmina sprinkled with small dark spots. Wings yellow at base. Hind femora slightly surpassing tip of abdomen, basal half of inner and lower faces black, apical half with two light bands separated by a black band, upper face generally with three rather distinct

dark bands, outer face either yellowish brown or olivaceous and indistinctly banded; upper and lower carinae high and sharp. Hind tibiae with a light band at base bordered by a black band of equal width, then a broader bluish band bordered by a dark band at apex; spines with apical half black; apical spurs on inner margin equal or nearly so.

Measurements: Length of body, male, 27 m.m., female, 37 m.m.; antennae, male, 9 m.m., female, 10 m.m.; pronotum, male, 7 m.m., female, 8 m.m.; tegmina, male, 27 m.m., female, 32 m.m.; hind femora, male, 18 m.m., female, 23 m.m.

Chortophaga (Sauss.).

Size medium. Color either brown or greenish. Body compressed. Face oblique. Vertex a little broader than long, apically truncate, its disk a little sloping; lateral carinae rather distinct; lateral foveolae broadly triangular, shallow. Costa narrow, sulcate below the ocellus. Antennae about as long as head and pronotum, a little flattened, brownish. Pronotum shaped much as in "*Arphia*", about twice as long as head. Tegmina narrow, exceeding the abdomen by about one-fourth their length, marked with irregular areas of brown or green, slightly expanding along apical portion which is membranaceous. Wings equalling tegmina in length, yellow at base with a dark median band. Front and middle legs small. Hind femora of medium size.

Chortophaga viridifasciata (DeG.). Plate II, Fig. 2.

Acridium viridifasciatum (DeG.).

Locusta (*Tragocephala*) *viridifasciata* (Harr.).

Tragocephala viridifasciata (Scudd.).

Chortophaga viridifasciata (Sauss.).

Locusta (*Tragocephala*) *infuscata* (Harr.).

Tragocephala infuscata (Scudd.).

Tragocephala viridifasciata infuscata (Scudd.).

Chortophaga viridifasciata infuscata (Bl.).

Locusta (*Tragocephala*) *radiata* (Harr.).

Tomonotus zimmermanni (Sauss.).

The fastigium of vertex is slightly acuminate. Pronotum and episterna minutely rugulose. As a rule, most of the irregular color markings of tegmina are confined to the lower half. Hind tibiae smokey-blue with pale ring at base; spines pale at base, tipped with black.

With the exception of the "*Tettiginae*", this is the first species to appear in the spring. It passes the winter in the nymphal stage. A nymph was taken by the writer during the month of February. Snow was on the ground at the time.

Measurements: Length of body, male, 20 m.m., female, 30 m.m.; antennae, male, 8 m.m., female, 9 m.m.; pronotum, male, 6 m.m., female, 7.5 m.m.; tegmina, male, 19 m.m., female, 26 m.m.; hind femora, male 12 m.m., female, 17 m.m.

Dissosteira (Scudd.).

Size large. Color dull brownish. Head about as wide as prozona but exceeding it slightly in length. Vertex a little broader than width of eye, its disk a little sloping; median and lateral carinae present but not strongly developed; lateral foveolae small triangular. Costa vertical, sulcate, constricted directly below ocellus and then the sides diverge downward. Antennae filiform, a little longer than head and pronotum, apical half a little infuscated. Eyes prominent, not as long as infra-ocular portion of genae. Disk of pronotum flat on metazona, roof-shaped on prozona; median carina high and sharp, straight on prozona, arcuate on metazona; principal sulcus much in front of middle, deep and oblique. Lateral lobes deeper than long. Tegmina surpassing abdomen by about one-fourth their length, broad; the intercalary vein prominent, elevated. Wings long and broad, black at base, apical portion sulphureous. Front and middle legs rather slender. Hind femora compressed, broad at base, two dark bands on inner face, these are less distinct on upper face, inner face yellowish. Hind tibiae dull yellowish.

Key to species of *Dissosteira*.

- A. Color dull brownish without large distinct dark areas. ----- carolina.
- A.A. Color dull ash brown with numerous large dark areas. ----- longipennis.

Dissosteira carolina (Linn.). Plate II, Fig. 3.
Gryllus (*Locusta*) *carolina* (Linn.).
Locusta carolina (Harr.).
Oedipoda carolina (Burm.).
Dissosteira carolina (Scudd.).

General body color is either a dull reddish brown with numerous small dark spots or rather light with dark spots less distinct. Vertex sub-pentagonal. The costa extends to clypeus. Pronotum enlarging on metazona. Front margin of lateral lobes sinuate, hind margin straight, a little oblique, lower margin with anterior half sloping upward. Tegmina with apical third membranaceous. Upper and lower carinae of hind femora sharp. Legs and sternum pubescent.

Measurements: Length of body, male, 33 m.m., female, 43 m.m.; antennae, male, 11 m.m., female, 14 m.m.; pronotum, male, 7 m.m., female, 10 m.m.; tegmina, male, 36 m.m., female, 44 m.m.; hind femora, male, 15 m.m., female, 20 m.m.

Dissosteira longipennis (Thom.). Plate II, Fig. 4.

Size large. Color brownish yellow with numerous large dark spots. Head more or less olivaceous. Vertex broad, its disk sloping, front portion narrowed; median carina faint; lateral foveolae small, triangular. Costa about half as wide as interspace between the eyes, constricted above and below ocellus, sulcate. Antennae slender, dull brownish, a little longer than head and pronotum, basal joints much swollen. Eyes only a little longer than broad, much shorter than infra-ocular portion of genae. Pronotum similar to that of "carolina" with the exception that the median carina is higher and more arcuate on metazona and the principal sulcus more oblique and deeper. Tegmina exceeding the abdomen by one-third their length, dull yellowish with numerous irregular fuscous spots which are sometimes arranged into more or less distinct bands, apical third a little membranaceous and broader than basal portion. Wings bluish at base for about one-fifth their length, outer third yellow, sprinkled with brown spots at apex, the disk black. Hind femora dull yellowish brown on outer face and outer half of upper face with two indistinct darker bars, inner face with alternating black and yellow bands. Hind tibiae yellow; spines tipped with black.

Measurements: Length of body, male, 40 m.m., female, 43 m.m.; antennae, male, 15 m.m., female, 14 m.m.; tegmina, male, 38 m.m., female, 45 m.m.; pronotum, male, 7.5 m.m., female, 10 m.m.; hind femora, male, 18 m.m., female 23 m.m.

Spharagemon (Scudd.).

Size medium. Body compressed. Color varies from grayish brown to dark brown. Head very little if any broader than pronotum. Vertex rounded, its disk sloping; median carina very low, sometimes wanting; lateral foveolae small, triangular. Costa about half as wide as interspace between the eyes, sulcate. Antennae filiform, as long as or a little longer than head and pronotum, apical portion infuscated. Eyes oblong, much shorter than infra-ocular portion of genae. Pronotum slightly constricted at middle; anterior portion of disk slightly advanced upon occiput; hind margin acutangulate or rectangulate; median carina only moderately elevated or very high and sharp, cut in front of the middle by the principal sulcus; lateral lobes a little deeper than long. Tegmina much surpassing tip of abdomen, much sprinkled with small dark spots which in some forms are arranged into three more or less distinct bars. Wings as long as tegmina, yellowish at base with a dark bar along middle portion, pale or fuscous at tip. Hind femora compressed, basal half very stout; traces of

of three dark bars on upper face, outer face either plain or indistinctly barred, inner and lower face black with two light bars on apical half separated by a black bar of equal width. Legs and ventral surface pubescent.

Key to species of Spharagemon.

- A. Median carina of pronotum very high and sharp.
----- cristatum.
- A.A. Median carina of pronotum only moderately elevated.
 - B. Hind tibiae red with a pale ring at base.-- aequale.
 - B.B. Hind tibiae with apical half red, basal half with a dark and a light band. ----- bolli.

Spharagemon cristatum (Scudd.). Plate II, Fig. 5.

Color a little variable, either yellowish brown or reddish brown, much sprinkled with small fuscous spots sometimes arranged into more or less distinct bands on tegmina. Hind margin of disk of pronotum acutangulate. Median carina of pronotum very high and sharp, arcuate; principal sulcus deep and oblique; lateral carinae rather distinct on metazona. Antennae with basal half dull yellow or reddish, apical half fuscous. Hind tibiae red without a pale ring at base.

Measurements: Length of body, male, 25 m.m., female, 37 m.m.; antennae, male, 14 m.m., female, 15 m.m.; pronotum, male, 8 m.m., female, 9.5 m.m.; tegmina, male, 29 m.m., female, 36 m.m.; hind femora, male, 16 m.m., female, 19 m.m.

Spharagemon aequale (Say).

Color dark brown. Tegmina and outer face of hind femora distinctly banded with dark cross-bars alternating with lighter areas. Median carina of pronotum only slightly elevated, viewed laterally, nearly straight on prozona and slightly arcuate on metazona; principal sulcus only a slight notch. Antennae black, about as long as hind femora. Hind margin of disk of pronotum nearly rectangulate, front margin truncate. Occiput swollen, a little higher than median carina of pronotum. Hind tibiae red with a broad pale yellowish band at base.

Measurements: Length of body, male, 33 m.m.; antennae, 14 m.m.; pronotum, 7 m.m.; tegmina, 30 m.m.; hind femora, 17 m.m.

Spharagemon bolli (Scudd.).
Dissosteira (Spharagemon) bolli (Sauss.).
Dissosteira bolli (Fern.).
Spharagemon balteatum (Scudd.).

General body color a little darker than in "aequale". Cross-bars on femora and tegmina less distinct. Tegmina broad, apical third almost black. Pronotum with the front margin of disk subtruncate, hind margin rectangulate; median carina rather sharp, not very high; principal sulcus only a slight notch. Antennae about as long as hind femora, basal half light brown, apical half with indistinct light bands alternating with dark bands. Hind tibiae fuscous at base, then a light band bordered by a black band of equal width, apical half red.

Measurements: Length of body, male, 30 m.m.; antennae, 17 m.m.; pronotum, 7 m.m.; tegmina, 27 m.m.; hind femora, 17 m.m.

Dictyophorus (Brulle.).

Size large. Color dull olivaceous. Head much shorter and narrower than pronotum. Face quite oblique. Vertex very broad, convex; lateral carinae prominent, rectangulate; foveolae wanting. Costa broad, sulcate at and above ocellus, distinctly narrowed at union with vertex. Antennae filiform, about as long as head and pronotum. Eyes not very prominent. Pronotum greatly enlarging posteriorly, its disk roof-shaped and tuberculate; carinae distinct. Hind margin of lateral lobes greatly oblique. Tegmina developed as broadly rounded pads about as long as head. Wings about as long as tegmina but much narrower. Hind femora not very stout, without dark cross-bars.

Dictyophorus reticulatus (Thunb.). Plate II, Fig. 6.

Occiput granulate. Eyes a little shorter than infra-ocular portion of genae. Costa failing to reach clypeus. Disk of pronotum with the front and hind margins truncate; median carina not cut by a sulcus; lateral carinae cut a little in front of the middle by a sulcus that is quite distinct on lateral lobes. Space between meso- and metasternal lobes nearly or quite four times as broad as long. Upper pair of valves of ovipositor much larger than lower pair.

Measurements: Length of body, female, 55 m.m.; antennae, 18 m.m.; pronotum, 16 m.m.; tegmina, 7 m.m.; hind femora, 28 m.m.

Aulocara.

In general appearance this genus is somewhat similar to "Ageneotettix". Size medium. Color dull ash-brown. Head swollen, nearly as long as pronotum. Face nearly vertical. Vertex sloping, anterior portion sulcate; lateral carinae acutangulate; median carina absent; lateral foveolae large, triangular, visible from above. Costa about half as wide as vertex, very slightly sulcate above ocellus. Antennae filiform, a little longer than head and pronotum, apical half black, basal half pale yellow. Eyes slightly oblong. Pronotum much constricted at middle; median carina very slightly arcuate both on prozona and metazona; cut by the principal sulcus at the middle; lateral carinae rather distinct on metazona. A rather distinct X-shaped mark is present on disk of pronotum. Lateral lobes a little deeper than long. Tegmina as long as abdomen, rounded at tips, sprinkled with numerous small fuscous spots. Wings as long as tegmina, transparent, of a greenish blue tinge. Hind femora very stout, upper face with two fuscous bars which are continued on inner face, remainder of inner face yellowish. Hind tibiae blue with a pale ring at base.

Aulocara ellioti (Thom.). Plate I, Fig. 4.

The occiput is a little swollen, also a little higher than the ascending prozona, occiput and genae olivaceous. Face much infuscated. Pronotum with the disk of metazona flat, quite dark with the exception of the light X-shaped mark. Lateral lobes marked with a short, white oblique line a little below the center. The carinae of outer face of hind femora are marked with a row of dark spots. Lower face of hind femora yellowish with a pale bluish bar near knee. Fore and middle legs small. Spines of hind tibiae tipped with black. Legs and ventral surface pubescent.

Measurements: Length of body, female, 26 m.m.; antennae, 10 m.m.; pronotum, 5 m.m.; tegmina, 19 m.m.; hind femora, 16 m.m.

Phlibostroma (Thom.).

Size small. Body compressed. Head no wider than widest portion of pronotum. Vertex with the disk subtriangular, a little sloping; median carina only a raised line, sometimes absent in the male; lateral foveolae wanting. Costa about half as wide as interspace between the eyes, sides parallel. Antennae filiform, somewhat longer than head and pronotum. Eyes large. Pronotum constricted at middle, front margin of its flat disk a little wider than at middle, hind margin nearly twice as wide as front margin. Lateral lobes about as long as deep. Tegmina with a few

large fuscous spots along middle portion, apical portion reticulate, Surpassing the abdomen in length. Wings transparent, equal to tegmina in length. Hind femora slender, either equalling or a little surpassing tip of abdomen.

Phlibostroma quadrimaculata (Thom.). Plate I, Fig. 6.
Pezotettix olivaceous (Scudd.).

Color greenish. The occiput is a little higher than the pronotum. Eyes more or less vertical. A post-ocular piceous band is generally present. That portion of upper half of lateral lobes of pronotum between the sulci is generally piceous. Anterior half of lower margin of lateral lobes ascending. Front margin of disk of pronotum truncate, hind margin broadly rounded. Front and middle legs small. Hind tibiae light orange; spines pale at base tipped with black.

Measurements: Length of body, male, 16 m.m., female, 24 m.m.; antennae, male, 10 m.m., female, 8 m.m.; pronotum, male, 3 m.m., female, 5 m.m.; tegmina, male, 13 m.m., female, 19 m.m.; hind femora, male, 12 m.m., female, 15 m.m.

Boopedon (Thom.).

Male of medium size, female large. Head a little swollen, nearly as long as pronotum. Face oblique, rounded below. Vertex quite broad, convex; carinae scarcely noticable in the female, a little more prominent in the male; fastigium very broadly rounded; lateral foveolae wanting. Costa a little more than half as broad as interspace between the eyes, not sulcate, failing to reach the clypeus. Antennae filiform, a little longer than head and pronotum in the male, a little less in the female, apical half infuscated. Eyes large, subglobular. Pronotum slightly constricted at middle. In the female the disk of prozona is nearly square, disk of metazona expanding in both sexes. Entire surface of metazona thickly and minutely punctate. Median carina prominent but low. Lateral lobes a little deeper than long, much rounded below. Tegmina as long as abdomen in the male, about half as long in the female, marked with a median row of large black spots indistinct in the male, distinct in the female. Wings smokey. Hind femora much swollen, marked with three broad black bands distinct in the male, indistinct in the female or even wanting.

Boopedon nubilum maculata (Caudell). Plate III, Fig. 1.

Male: General color dark brown almost black. A narrow yellowish band extends from upper margin of eye to pronotum. A short black bar above base of antennae. Sterna, ventral surface of abdomen and basal half of lower face of hind femora often blood-red. Hind margins of abdominal segments generally

Hippiscus saussurei (Scudd.).

Occiput wrinkled. A post-ocular yellowish band present below which is a triangular black area, generally more distinct in the male. A yellowish X-shaped cross-bar sometimes present on the wrinkled or tuberculate disk of pronotum; prozona flaring to receive head, front margin of its disk a little advanced upon occiput; hind portion of pronotum expanding; hind margin of disk acutangulate; median carina prominent, a little depressed between the two intersecting sulci; lateral carinae generally distinct on metazona. Lateral lobes with front margin sinuate, hind margin slightly oblique. Tegmina about a fourth longer than abdomen, marked with large irregular dark spots, apical third membranaceous. Wings red or yellow at base with a dark median band, apical portion transparent with a few fuscous spots at tip. Hind femora with inner and lower faces light blue, a pale band at base, outer face yellowish, sometimes indistinctly banded with fuscous. Hind tibiae either uniform yellow or of a reddish-orange color, armed with eight or nine spines on the outer margin; apical spurs on both inner and outer margins sub-equal.

Measurements: Length of body, male, 38 m.m., female, 56 m.m.; antennae, male, 19 m.m., female, 15 m.m.; pronotum, male, 10 m.m., female, 14 m.m.; tegmina, male, 37 m.m., female, 46 m.m.; hind femora, male, 23 m.m., female, 27 m.m.

Hippiscus rugosus (Scudd.). Plate III, Fig. 3.

Oedipoda rugosa (Scudd.).

Hippiscus corallipes rugosus (Thom.).

Hippiscus variagatus (Scudd.).

Head slightly swollen. Face vertical or nearly so. Vertex broad, convex; median carina crossing its disk, the latter often divided into four sub-equal portions by cross carinae; lateral foveolae small, elongate. Frontal costa narrower than interspace between the eyes, shallowly sulcate below the ocellus, not narrowed above, the sides greatly diverging near clypeus. Antennae slender, about as long as head and pronotum. Pronotum short, greatly expanded posteriorly; disk of metazona with oblong glistening tubercles parallel to the distinct but low median carina. A more or less distinct light X-shaped cross-bar is present on disk of pronotum. Lateral lobes deeper than long, the lower posterior margin broadly rounded, front half of lower margin sloping upward. Tegmina broad, exceeding the abdomen in both sexes, ash brown with large irregular fuscous areas, those on

middle third the larger. Intercalary vein distinctly nearer the median than ulnar vein. Wings pale yellow or orange colored at base. Hind femora rather broad but compressed laterally, the carinae sharp, inner face yellowish with three oblique bluish or fuscous bars, outer face brownish yellow, the oblique fuscous bars less distinct. Hind tibiae yellow with a paler ring at base; apical spurs of inner margin nearly twice as long as those of outer margin.

Measurements: Length of body, male, 33 m.m.; antennae, 14 m.m.; tegmina, 30 m.m.; pronotum, 7.5 m.m.; hind femora 17 m.m.

Hippiscus phoenicopterus (Germar).
Oedipoda phoenicoptera (Germar).
Hippiscus phoenicopterus (Sauss.).
Oedipoda discoidea (Serv.).
Hippiscus discoideus (Stal).

Head slightly swollen. Face a little oblique. Vertex prominent about as broad as width of eye; lateral carinae distinct, rapidly converging on anterior portion but not uniting; median carina low, reaching center of disk; foveolae small, elongate. Costa narrow, deeply sulcate at and below ocellus, distinctly narrowed and punctate above antennae. The latter filiform, as long as head and pronotum in the male, a little shorter in the female. Disk of pronotum nearly flat and tuberculate on metazona, convex and with fewer tubercles on prozona, hind margin rectangulate; median carina low but distinct, cut in front of middle by the principal sulcus; lateral carinae distinct only on metazona. Tegmina in both sexes surpassing tip of abdomen, ash brown, with numerous large dark areas. Wings pinkish red at base with a broad median dark band, tips transparent, in the male the tips are marked with one or two fuscous spots. Hind femora broadly dilated, inner face blue at base; upper and lower carinae elevated and sharp. Hind tibiae yellowish, sometimes tinged with orange, Apical spurs nearly equal in length.

Measurements: Length of body, male, 31 m.m.; antennae, 13 m.m.; pronotum, 7 m.m.; tegmina, 31 m.m.; hind femora, 16.5 m.m.

Key to species of *Trachyrachis*.

A. Mouthparts, sternum and lower face of legs pubescent.
Color ash gray or brownish. ----- *fuscifrons*.

A.A. Mouthparts, lower face of legs and sternum not
pubescent. Color reddish brown. ----- *plattei*.

Trachyrachis fuscifrons (Stal). Plate III, Fig. 4.

General color ash gray or light brown with irregular fuscous and light areas. Face clay yellow. Occiput and disk of pronotum darker. Occiput higher than prozona. Disk of pronotum often marked with a pale X-shaped cross-bar; lateral carinae sometimes distinct on metazona. Lateral lobes with the lower posterior angle distinctly produced. Tegmina with irregular fuscous areas alternating with irregular light areas. Wings equaling tegmina in length, yellow at base with a fuscous median band and fuscous tip. Outer face of hind femora a dull clay yellow, color somewhat variable, inner face blackish with a pale band at tip; dorsal and ventral carinae sharp.

Measurements: Length of body, male, 18 m.m., female, 25 m.m.; antennae, male, and female, 9 m.m.; pronotum, male, 3.5 m.m., female, 5 m.m.; tegmina, male, 13 m.m., female, 16 m.m.; hind femora, male, 19 m.m., female, 22 m.m.

Trachyrachis plattei (Thom.).

Head large. Occiput high and rounded, a little darker than other surface of the head. An oblique piceous bar is sometimes present below base of antennae crossing lower half of eye and continuing a short distance on occiput. This band is sometimes faint below antennae, then it is indistinct or absent on eye and occiput. Lateral lobes of pronotum with a broad, oblique, brownish bar, the lower posterior margin of lobes rounded. Tegmina with the upper half dull yellow, lower half with two rather large fuscous areas alternating with two smaller light areas. Wings sulphureous at base, a median dark band and small fuscous spot at apex. Upper face of hind femora with two more or less distinct dark bars at middle and a dark spot at base, outer face plain, inner face dark with a light band on apical portion. Hind tibiae light blue.

Measurements: Length of body, male, 22 m.m., female, 28 m.m.; antennae, male, 13 m.m., female, 12 m.m.; pronotum, male, 4 m.m., female, 5 m.m.; tegmina, male, 23 m.m., female, 28 m.m.; hind femora, male, 15 m.m., female, 18 m.m.

Hadrotettix (Scudd.).

Size large. Color brownish. Head small, about as long as prozona. Face vertical or nearly so. Vertex broad, narrowing rapidly in front; lateral carinae wanting. Costa about half as broad as interspace between the eyes, strongly sulcate, failing to reach the clypeus. Antennae filiform, as long as hind femora, black, pointed at tips. Eyes prominent, oblong, hardly as long as infra-ocular portion of genae. Pronotum with the hind portion greatly expanded, rugulose, its disk with the front margin subtruncate, hind margin a little less than a right angle, the tip blunt; median carina only a raised line, cut much in front of middle by the principal sulcus. Lateral lobes deeper than long, front margin vertical, hind margin oblique, lower margin with the front half sloping upward. Tegmina surpassing abdomen by about one-fourth their length; intercalary vein nearer the median than ulnar vein. Wings yellow at base with a broad median dark band. Hind femora compressed laterally but much dilated dorso-ventrad.

Hadrotettix trifasciatus (Say). Plate III, Fig. 5.

The prevailing color is brick red although in some forms the face, lower portion of lateral lobes, portions of tegmina between the fuscous bars and outer face of hind femora may be whitish. The prozona is generally lower than head and metazona. The latter is nearly twice as long as prozona. Tegmina rather broad, with three fuscous cross-bars, apical portion membranous and sometimes a little upturned. Hind femora with a rather distinct fuscous bar on outer face a little beyond middle, inner and lower face blue with a yellow band at base; carina on lower face a little higher than that on upper face. Hind tibiae bright orange colored with a pale yellowish band at base, seven to ten spines on outer margin; apical spurs slightly unequal.

Measurements: Length of body, male, 33 m.m., female, 38 m.m.; antennae, male, 19 m.m., female, 17 m.m.; pronotum, male, 8 m.m., female, 9.5 m.m.; tegmina, male, 35 m.m., female, 39 m.m.; hind femora, male, 19 m.m., female, 22 m.m.

Trimerotropis (Stal).

Body of medium size, compressed. General color brownish. Head a little wider than prozona but not as wide as metazona which is somewhat expanded. Vertex a little longer than broad; lateral carinae distinct and continued with sides of costa; median carina only a raised line. Frontal costa vertical and sulcate; foveolae small but distinct, visible from above. Antennae filiform. Eyes prominent, subglobular. Pronotum with its disk a little roof-shaped on prozona, flat and minutely wrinkled or tuberculate on

metazona; median carina very low, cut much in front of middle by the principal sulcus. Lateral lobes deeper than long, front and hind margins nearly vertical, lower margin with the front half ascending, the posterior angle well rounded. Tegmina surpassing abdomen by about one-third their length, either banded or much sprinkled with small dark spots. Hind femora of medium size, reaching or surpassing tip of abdomen. Wings yellowish at base, often with a median dark band, apical portion transparent.

Key to species of *Trimerotropis*.

- A. Inner half of lower face of hind femora black with a yellow band at apex. ----- *viniculata*.
- A.A. Inner half of lower face of hind femora with two dark bands alternating with yellow bands. ----- *citrina*.

Trimerotropis vinculata (Scudd.).

The general color of this species is light or dark brown much sprinkled with small darker spots. These spots are sometimes arranged in the form of cross-bars on the tegmina. Tips of tegmina transparent with a reddish tinge. Pronotum with the disk of prozona unequally divided by the anterior sulcus, that portion in front of the sulcus a little the longer. Inner face of hind femora with two dark bands alternating with two pale yellowish bands, the basal dark band much broader than the other. These bands are less distinct on the upper face. Hind tibiae light yellow.

Measurements: Length of body, male, 23 m.m., female, 29 m.m.; antennae, male and female, 11 m.m.; pronotum, male, 4 m.m.; female, 6 m.m.; tegmina, male, 24 m.m., female, 30 m.m.; hind femora, male, 12 m.m., female, 15 m.m.

Trimerotropis citrina (Scudd.). Plate III, Fig. 6.

Size medium. General color light or dull brownish sprinkled with small fuscous spots which are often arranged in the form of cross-bars on the tegmina. Vertex only a little longer than broad; median carina scarcely noticeable. Pronotum with the metazona but little more than one and a half times as long as prozona. Disk of the latter divided into equal portions by the anterior sulcus; hind margin of disk of pronotum obtuse angled and rounded at tip. Tegmina yellowish brown. Width of median band of wing nearly a third the length of wing. Inner face of hind femora yellow, with two dark bands on middle portion, these continue on inner half of lower face, outer face plain. Hind tibiae pinkish-red, paler at base.

Measurements: Length of body, male, 25 m.m., female, 34 m.m.; antennae, male, and female, 13 m.m.; pronotum, male, 5 m.m., female, 7 m.m.; tegmina, male, 20 m.m., female, 30 m.m.; hind femora, male, 14 m.m., female, 17 m.m.

Sub-family Acridinae.

The members of this group are easily recognised by the conical spine or tubercle on the prosternum between the front pair of legs. Size is quite variable. The head, as a rule, is smaller and less swollen than in the preceding sub-families. The face is vertical or nearly so. The vertex is more or less convex; lateral carinae low and rounded; foveolae often wanting or indistinct. Disk of pronotum is generally smooth; median carina never developed as a high crest; lateral carinae in most forms rounded or obsolete. Tegmina variable, may be developed as small pads about as long as pronotum or may extend to or much beyond tip of abdomen. Wings are usually transparent. Hind femora well developed.

Key to Genera of Acridinae.

- A. Size large. Length of body 37 m.m. or more. Face vertical or nearly so. Lobes of mesosternum longer than broad, the inner margin straight and oblique. Cerci of male more or less rectangular with a median notch at the apex. ----- Schistocerca.
- A.A. Size variable. Lobes of mesosternum transverse, the inner margin usually rounded.
- B. Antennae shorter than head and pronotum.
 - C. Tegmina shorter than pronotum. Body color blackish with numerous bright red spots. --- Dactylotum.
 - C.C. Tegmina nearly or quite as long as abdomen. Body color greenish. Subgenital plate of male with a distinct sub-apical tubercle. --- Hesperotettix.
- B.B. Antennae as long as or longer than head and pronotum. Tegmina developed as small pads or as long as or longer than abdomen. Color variable. Cerci of male slender, spatulate or apically bifurcate.- Melanoplus.

Schistocerca (Stal).

Size large. Body compressed. Vertex rather broad, the front half sloping downward and passing insensibly into the frontal costa; lateral carinae low; median carina wanting; foveolae very small, sometimes obsolete. Face slightly oblique. Eyes oblong and prominent. Antennae about as long as head and pronotum (female) or hind femora (male). Pronotum expanding posteriorly, its disk convex on prozona, flat on metazona, front margin truncate, hind margin broadly rounded or obtuse angled in some males; median carina very low, cut by all three sulci, the principal sulcus at or near the middle of disk. Lobes of mesosternum straight and oblique. Tegmina surpassing abdomen by one-fifth to one-third their length. Wings broad, transparent. Hind femora slender, usually equaling or exceeding tip of abdomen. Hind tibiae without an apical spine on outer margin next to the spurs. Male cerci nearly square with a slight notch on inner margin. Subgenital plate of male upcurved and deeply notched at apex.

Key to species of Schistocerca.

- A. Tegmina with large irregular fuscous spots. -- americana.
- A.A. Tegmina without fuscous spots.
 - B. Prosternal spine curved backward on apical portion. Body color light tan. Disk of metazona with very low pale yellowish tubercles. ----- emarginata.
 - B.B. Prosternal spine straight. Fore and middle femora tumid. Hind margin of abdominal segments marked with a row of black dots. ----- alutacea.

Schistocerca americana (Brun.). Plate IV, Fig. 2.

Gryllus americana (Drury).

Acridium americanum (Scudd.).

Acridium (*Schistocerca*) *americanum* (Stal).

The female is often two inches or more in length, the male is smaller. Vertex hexagonal, the disk concave. Costa about as broad as interspace between the eyes, sulcate at and below the ocellus, the sides more or less parallel and reaching the clypeus. Antennae little if any longer than head and pronotum. Disk of pronotum dark brown with a broad yellowish median stripe continued on occiput and disk of vertex. Lateral lobes with a yellowish bar at middle. Metazona more densely rugulose than prozona. Tegmina with large irregular fuscous spots. Hind femora reddish brown, lighter on lower half of lower face, not banded on upper face. Hind tibiae dark red; spines yellow tipped black.

Measurements: Length of body, male, 38 m.m., female, 52 m.m.; antennae, male, 13 m.m., female, 14 m.m.; pronotum, male, 7.5 m.m., female, 12 m.m.; tegmina, male, 38 m.m., female, 54 m.m.; hind femora, male, 22 m.m., female, 31 m.m.

Schistocerca emarginata (Uhler).

General color light tan, sometimes tinged with greenish. A yellow band extends from vertex nearly to tip of tegmina. This band is lighter on tegmina and a little broader at the base. The metazona is marked with a number of yellow spots. Tegmina without fuscous spots. The hind femora are a little lighter than the body, upper and lower margins of outer face with a row of black spots. The margins of frontal costa and upper portion of clypeus are also marked with black dots. Hind tibiae greenish yellow; spines yellow, tipped with black.

Measurements: Length of body, female, 50 m.m.; antennae, 16 m.m.; pronotum, 11 m.m.; tegmina, 41 m.m.; hind femora, 27 m.m.

Schistocerca alutacea (Harr.).
Acridium alutaceum (Harr.).
Schistocerca alutacea (Brun.).
Acridium emarginatum (Dodge).
Schistocerca emarginata (Brun.).

Color varies from yellowish brown to dark brown almost black. The median yellow stripe is quite distinct. Pronotum nearly uniform in color, without yellow spots as distinct as in "emarginata". Fore and middle legs and hind femora either olivaceous or yellowish brown. The dark forms have two dark bands on upper face of hind femora. Hind tibiae black in the dark forms, red in the lighter forms; spines yellow, tipped with black. Hind margin of abdominal segments with a row of black spots.

Measurements: Length of body, male, 37 m.m., female, 47 m.m.; antennae, male and female, 17.5 m.m.; pronotum, male, 9 m.m.; female, 10 m.m.; tegmina, male, 36 m.m., female, 41 m.m.; hind femora, male, 21 m.m., female, 25 m.m.

Dactylotum .

Male rather small, female of medium size. Color blackish with numerous bright red spots. Head scarcely, if any, wider than pronotum and a little less than half as long. Face oblique. Vertex with its disk rounded, anterior portion very steep, a bright red band between apices of eyes, front half of disk black; lateral foveolae wanting. Frontal costa narrow, with a black line along middle, the margins light yellowish. Antennae filiform, nearly as

long as head and pronotum. Eyes large, oblong, a little oblique. Pronotum subcylindrical, sparsely punctate on prozona, densely punctate on metazona, front margin subtruncate, hind margin rounded; median carina absent on prozona, very low on metazona; lateral carinae absent. Lateral lobes with the front and hind margins sinuate, hind margin straight, greatly oblique. Tegmina developed as small pads reaching to or a little beyond base of hind femora. Fore and middle femora tumid. Hind femora stout, reaching tip of abdomen, outer face decidedly convex.

Dactylotum pictum (Thom.). Plate IV, Fig. 5.

Color black with irregular yellowish bands and bright red spots. That portion of the face bordering frontal costa is black bordered by a yellowish area, then a narrow black bar extends from lower margin of eye to corner of clypeus. A red spot in front of lower and one in front of upper portion of eye. That portion of the face bordering clypeus marked with two red bands which nearly meet at termination of frontal costa. Occiput black. Behind and below the eyes yellowish, an oblique black bar along middle of genae, lower corner of genae red. Front margin of disk of prozona and hind margin of disk of metazona yellowish. Lateral lobes with the lower margin of posterior half and hind margin red. Veins of tegmina yellow, the cells black. Upper face of hind femora with three black cross-bars, interspaces reddish yellow, outer face with two series of black bars alternating with yellowish bars. Hind tibiae blue or olivaceous, with a pale ring at base, armed with six or seven spines on outer margin; apical spurs equal on both inner and outer margin.

Measurements: Length of body, male, 22 m.m., female, 29 m.m.; antennae, male and female, 9 m.m.; pronotum, male, 5.5 m.m., female, 8 m.m.; tegmina, male, and female, 4 m.m.; hind femora, male, 11 m.m., female, 13 m.m.

Hesperotettix (Scudd.).

Size small, the sides nearly parallel. Color pale green. Head small. Face rather oblique. Vertex between the eyes about as wide as second joint of antennae, feebly sulcate in male, less so in female. Frontal costa as wide as interspace between the eyes, sulcate throughout and sides parallel. Antennae about as long as head and pronotum. Eyes about as long as infra-ocular portion of genae, viewed laterally, the front margin is nearly straight while the hind margin is rounded. Pronotum gradually expanding posteriorly, front margin rounded, hind margin sometimes greatly rounded and sometimes bluntly angulate; prozona a

little longer than metazona; median carina only a raised line. Lateral lobes about as long as deep, front and hind margins oblique, lower margin with its anterior half directed upward. Tegmina either a little shorter than or slightly surpassing tip of abdomen, membranaceous, with the dorsal surface purplish or plain, tapering gradually and tips rounded. Wings transparent, as long as tegmina. Fore and middle femora of male swollen. Hind femora either equal to or a little longer than abdomen. Subgenital plate of male with a sub-apical tubercle. Ventral surface of body and legs, especially hind tibiae, pubescent.

Key to species of *Hesperotettix*.

- A. Metazona of pronotum rugulose. ----- speciosus.
- A.A. Metazona not rugulose, punctate.
- B. Transverse sulci of pronotum black. ----- viridis.
- B.B. Transverse sulci of pronotum not marked in black.
Disk of pronotum with a purple stripe along median carina. ----- pratensis.

Hesperotettix speciosus (Scudd.).

Disk of pronotum broadly rounded at its union with the lateral lobes; metazona distinctly rugose, more so than prozona. Lateral lobes without a dark bar. Tegmina about three-fourths as long as abdomen, pale greenish with a purple tinge on dorsum. Other characteristics are given in description of genus.

Measurements: Length of body, male, 24 m.m., female, 30 m.m.; antennae, male and female, 11 m.m.; pronotum, male, 6 m.m., female, 8 m.m.; tegmina, male, 11 m.m., female, 14 m.m.; hind femora, male, 14 m.m., female, 17 m.m.

Hesperotettix viridis (Thom.). Plate IV, Fig. 4.

Median carina of pronotum white with a dark border on either side; the transverse sulci marked in black. Tegmina without purple tinge on dorsum, two indistinct lines sometimes present on tegmina similar to those of "*Melanoplus bivittatus*" (See Plate IV, Fig. 1). Outer face of hind femora with two series of narrow oblique black bars alternating with white bars.

Measurements: Length of body, male, 22 m.m., female, 26 m.m.; antennae, male and female, 9 m.m.; pronotum, male, 5 m.m., female, 6.5 m.m.; tegmina, male, 16 m.m., female, 18 m.m.; hind femora, male, 12 m.m., female, 14 m.m.

Hesperotettix pratensis (Scudd.).

Ommatolampis viridis (Thom.).

In this species the disk of pronotum is broadly rounded at its union with lateral lobes. A narrow light band is sometimes present on prozona along location of lateral carinae. The upper half of lateral lobe of pronotum is marked with an oblique piceous band. The metazona is densely and minutely punctate. A small dark spot is often present below the eye. Tegmina and wings either as long as or slightly surpassing the abdomen.

Measurements: Length of body, male, 22 m.m., female, 26 m.m.; antennae, male, and female, 6.5 m.m.; pronotum, male, 5 m.m., female, 6.5 m.m.; tegmina, male, 15 m.m., female, 24 m.m.; hind femora, male, 13 m.m., female, 16.

Melanoplus (Stal).

Size small, medium or large. Head not distinctly wider than pronotum, nearly as long as prozona. Face either vertical or slightly oblique. Vertex narrow, its disk sloping, generally sulcate especially in the male; lateral carinae low. Frontal costa in most forms narrower than interspace between the eyes. Antennae filiform, as long as or a little longer than head and pronotum. Eyes large, front margin more or less straight, hind margin greatly rounded. Pronotum with the front margin of its disk truncate, hind margin rounded or bluntly angulate; disk flat, the prozona longer than the metazona in many forms; median carina low, sometimes wanting on prozona. Lateral lobes about as deep as long, front margin a little sinuate, hind margin straight and oblique. Tegmina either developed as small pads much shorter than the abdomen, or, fully developed, being nearly or quite as long as abdomen or longer. Wings not brightly colored. Hind femora of medium size; carinae low. Color of hind tibiae variable. Cerci of male variable in shape, either slender, spatulate, or enlarged or bifurcate at tips.

Key to species of *Melanoplus*.

- A. Tegmina developed as small pads much shorter than abdomen. Furcula of male generally feebly developed.
 - B. Cerci of male either equal or tapering beyond the middle, apex gently rounded. Tegmina about as long as pronotum. ----- *scudderi*.
- A.A. Tegmina variable, either a little shorter than, equal to or exceeding abdomen in length. Furcula usually well developed.
 - B. Cerci of male tapering from base toward middle.

- C. Cerci of male, beyond middle, either spatulate or tapering, not broader than apical portion nor bifurcate.
 - D. Cerci, beyond middle, slender, subacuminate at tip. Furcula developed as broad flattened lobes. ----- bowditchi.
 - D.D. Cerci, beyond middle, spatulate.
 - E. Furcula slender, nearly or quite as long as supra-anal plate. ----- impiger.
 - E.E. Furcula much less than half as long as supra-anal plate, rapidly diverging. Extremity of male abdomen without a median notch. ----- packardi.
 - E.E.E. Furcula slender, divergent, one-fourth to one-third the length of supra-anal plate. Extremity of male abdomen with a median notch. ----- atlantis.
- C.C. Cerci of male more or less expanded apically, spatulate, apically angulate or bifurcate.
 - D. Cerci, beyond middle, boot-shaped.
 - E. Size large.
 - F. Occiput, disk of pronotum and tegmina, when folded, with a yellow stripe along outer margin. ----- bivittatus.
 - F.F. Dorsum without yellow stripe along margins. Furcula of male wanting.
 - G. Color yellowish or dull olivaceous. Upper apical portion of male cerci about half as long as entire cercus and three-fourths as wide as basal half of cercus. ----- differentialis.
 - G.G. Color dark brown or blackish. Upper apical portion of male cerci broader than long, rounded at apex, lower apical angle not very prominent. ----- viola.

E.E. Size small. Lower angle of bifurcation of male cerci not very prominent. Piceous post-ocular band continuing lateral lobes of prozona covering nearly the upper half. ----- minor.

D.D. Cerci, beyond middle, bifurcate, upper fork about three times the size of lower fork. ----- keeleri.

Melanoplus scudderi (Uhler). Plate IV, Fig. 7.

Pezzotettix scudderi (Uhler).

Melanoplus scudderi (Scudd.).

Pezotettix unicolor (Thom.).

Size small, brachypterous. Color dark brown. Head about half as long as pronotum, pubescent, very little if any elevated above pronotum. Face oblique. Interspace between the eyes about as wide as frontal costa in female, a little narrower in male. Front half of vertex steeply declivent. Frontal costa shallowly sulcate, biserially punctate on upper portion, failing to reach clypeus. Antennae dark red, about as long as head and pronotum in the female, a little longer in the male, the middle joints about twice as long as broad. Eyes prominent. Pronotum, pubescent, sparsely punctate on prozona, densely punctate on metazona, cylindrical in the male, enlarging posteriorly in the female; the extreme front margin enlarges slightly to receive head. The post-ocular piceous band continues on upper third of lateral lobes of prozona to the principal sulcus. Median carina entire. Disk of pronotum slightly constricted at middle in the male, gradually widening posteriorly in the female, front margin truncate, hind margin rounded. Lateral lobes with the hind margin more oblique than front margin. Tegmina about as long as pronotum, slightly overlapping, rounded at tips, nearly as broad as long. Wings less than half as long as tegmina. Legs pubescent. Fore and middle femora gently tumid in the male. Hind femora stout, dull brownish, sometimes with two feeble dark spots on upper face, lower and inner faces generally lighter, reaching tip of abdomen in the female, surpassing it a little in the male. Hind tibiae coral red, armed with eleven to sixteen spines on outer margin. Cerci feebly falciform, apical portion narrowed, sometimes curved inward and slightly sulcate, apex rounded. Sub-genital plate of male, viewed laterally, conical. Upper pair of valves of ovipositor much larger than lower pair.

Measurements: Length of body, male, 19 m.m., female, 25 m.m.; antennae, male, and female, 9 m.m.; pronotum, male, 5 m.m., female, 6 m.m.; tegmina, male, 4 m.m., female, 5 m.m.; hind femora, male, 13 m.m., female, 13.5 m.m.

Melanoplus bowditchi (Scudd.).

Size medium. Male about as large as female. General color yellowish brown. Vertex narrow, sloping, sulcate on anterior half; lateral carinae slightly diverging anteriorly. Interspace between the eyes a little wider than basal joint of antennae. Face oblique. Costa a little wider than interspace between the eyes, sulcate at and below the ocellus, the sides parallel. Antennae yellowish brown, about as long as head and pronotum in the female, a little longer in the male. Pronotum slightly expanding posteriorly; the disk convex on prozona, flat on the finely punctate metazona; principal sulcus a little behind the middle. Tegmina membranaceous, sometimes marked with indistinct fuscous spots, slender, tapering, either slightly or greatly surpassing the abdomen in length, tips rounded. Fore and middle femora tumid in the male. Hind femora of medium size. Hind tibiae greenish blue, armed with eleven spines on outer margin. Cerci of male very broad at base but rapidly narrowing so that the apical half is slender and incurved. Furcula developed as broad flattened lobes about two-thirds as long as supra-anal plate. Subgenital plate not mesially notched.

Color markings: A post-ocular fuscous band present and continued on lateral lobes to metazona. Occiput with a broad median fuscous band, yellowish between this and the post-ocular bands. Disk of pronotum brownish with yellowish bars along obsolete lateral carinae. Hind femora with two rather distinct fuscous bars on upper face, inner and lower face yellow or pale orange colored, outer face with upper half fuscous, lower half dull yellowish; genicular arc black. Abdomen dull yellowish.

Measurements: Length of body, male and female, 29 m.m.; antennae, male, 12 m.m., female, 9 m.m.; pronotum, male, 7 m.m., female, 6 m.m.; tegmina, male and female, 23 m.m.; hind femora, male and female, 16.5 m.m.

Melanoplus impiger (Scudd.).

Size medium. Male is about as large as female. Color dull brownish. Occiput swollen, a little higher than pronotum. Vertex narrow, shallowly sulcate, front portion very steep. Costa slightly wider than interspace between the eyes, extending to clypeus, sulcate below the ocellus, sides parallel. Antennae about as long as head and pronotum in the female, a little longer in the male, yellowish brown, darker apically. Eyes very large and prominent, longer than infra-ocular portion of genae. A post-ocular piceous band present and continued on upper portion of lateral lobes to metazona. Pronotum with the front margin truncate, hind margin rectangulate with the apex broadly rounded; principal sulcus a little behind the middle; median carina obsolete or very feeble on prozona, distinct but low on the finely punctate metazona. Lateral lobes about as deep as long, front and hind margins

oblique, lower margin sinuate. Tegmina narrow, a little longer than abdomen in both sexes, apical half membranaceous, dark spots arranged in a row along middle portion. Wings as long as tegmina. Fore and middle femora tumid in the male. Hind femora with three rather distinct black bars on upper face; genicular arc black; carinae low. Hind tibiae usually light blue, sometimes red, armed with ten to eleven spines on outer margin. Cerci of male constricted at middle, apical half spatulate, curved inward and sulcate. Furcula acuminate, divergent, a little less than half as long as supra-anal plate. Sub-genital plate of male with a shallow median notch at apex. Measurements: Length of body, male, and female, 25 m.m.; antennae, male, 10 m.m., female, 13 m.m.; tegmina, male, 23 m.m., female, 22 m.m.; pronotum, male, and female, 6 m.m.; hind femora, male, 17 m.m., female, 16 m.m.

Melanoplus packardi (Scudd.). Plate IV, Fig. 6.

Size medium. General color dull brownish yellow. Head slightly elevated above pronotum. Face oblique. Vertex about as broad as frontal costa, front portion steeply declivent and shallowly sulcate; lateral carinae more distinct in male than in female. Pronotum expanding posteriorly, finely punctate on metazona; principal sulcus a little behind the middle. Lateral lobes with the front margin slightly sinuate, hind margin straight and oblique, lower margin with the front half ascending. Tegmina dark, apical half membranaceous, fuscous at tips, extending a little beyond tip of hind femora in both sexes. Fore and middle femora gently tumid in the male. Hind femora of medium size, about as long as abdomen in the female, slightly surpassing it in the male. Hind tibiae greenish blue, armed with eleven to twelve spines on outer margin. Cerci of male broad, constricted at middle, apical portion incurved, broadly rounded and a little concave. Furcula very small, divergent.

Color markings: A post-ocular piceous band present and continued on upper portion of lateral lobes to metazona. Occiput with a broad median black band, brownish yellow between this and the post-ocular band. Face and lateral lobes a uniform brownish yellow. The second and third sulci on upper two-thirds of lateral lobes are marked in black. Disk of pronotum with a broad dark band along the middle bordered on either side by brownish yellow bands about half as wide. Hind femora brownish yellow with two black bars on inner half of upper face also a black spot at base, a black bar on outer face along upper margin, lower face pale yellowish.

Measurements: Length of body, male, 31 m.m., female, 34 m.m.; antennae, male and female, 11 m.m.; pronotum, male, 6.5 m.m., female, 7 m.m.; tegmina, male and female, 24 m.m.; hind femora, male and female, 17 m.m.

Melanoplus atlanis (Riley). Plate IV, Fig. 8.

Caloptenus atlanis (Riley).

Caloptenus atlanis (Thom.).

Melanoplus atlanis (Scudd.).

Size small. General color brownish. Head slightly elevated above pronotum. Face oblique. Vertex with its disk a little broader than long, the front portion sloping and a little broader than interspace between the eyes, generally distinctly sulcate. Frontal costa failing to reach clypeus, slightly constricted between bases of antennae, sulcate at and a little below the ocellus, punctate above, average breadth about equal to interspace between the eyes. Antennae brownish, about as long as head and pronotum in the female, a little longer in the male. Pronotum sparsely pubescent, expanding on metazona; median carina faint or wanting on prozona, distinct but low on metazona. The post-ocular band continued on upper third of lateral lobes to the principal sulcus; metazona minutely and densely punctate. Lateral lobes with front and hind margins gently rounded. Tegmina gently tapering, surpassing tip of hind femora in both sexes, transparent with a median row of fuscous spots becoming scattered on apical third, the tips rounded. Wings hyaline, growing fuscous toward the margins. Legs pubescent. Fore and middle femora of male a little tumid. Hind femora of medium size, about as long as abdomen in the female, a little longer in the male, outer face plain, upper face with three more or less distinct dark bars, lower face generally reddish orange. Hind tibiae red in most forms though sometimes pale green, yellow or dark blue; spines ten to eleven in number on outer margin. Cerci of male about twice as long as broad, the apical portion broadly rounded and slightly bent upward. Furcula developed as short, tapering, divergent lobes. Subgenital plate of male slightly elevated at apex and with a median notch.

Measurements: Length of body, male, 20 m.m., female, 22 m.m.; antennae, male, 10 m.m., female, 9 m.m.; pronotum, male, 4 m.m., female, 5 m.m.; tegmina, male, 19 m.m., female, 21 m.m.; hind femora, male 12 m.m., female, 13 m.m.

Melanoplus bivittatus (Say). Plate IV, Fig. 1.

Gryllus bivittatus (Say).

Caloptenus bivittatus (Uhl.).

Melanoplus bivittatus (Scudd.).

Caloptenus femoratus (Burm.).

Melanoplus femoratus (Scudd.).

Acridium flavovittatum (Harr.).

Size large. Color brownish yellow with disk of pronotum and tegmina fuscous. Head a little swollen, nearly as long as prozona.

Occiput with a broad median fuscous band expanding posteriorly. Face oblique. Vertex longer than broad, gently swollen, interspace between the eyes about three times the width of basal joint of antennae; front half of disk sloping, broadly and shallowly sulcate. Frontal costa about as broad as interspace between the eyes, feebly sulcate at and below the ocellus. Antennae slender, a little longer than head and pronotum. Eyes large. Pronotum slightly expanding posteriorly, its disk fuscous or black with broad yellow bands along outer margin, front margin subtruncate, hind margin broadly rounded; median carina distinct but low, cut a little behind the middle by the principal sulcus. Lateral lobes with a piceous band along upper margin of prozona bordering yellow band of disk; lateral sulci marked in black; front and hind margins oblique. Tegmina fuscous, as long as or a little longer than the abdomen, the yellow bands of pronotal disk continuing on tegmina and meeting in an acute angle. Wings as long as tegmina. Fore and middle femora a little more tumid in the male than in the female. Hind femora swollen, outer face with upper half black, lower half yellow; genicular arc black. Hind tibiae passing more or less gradually from greenish blue at the base to yellowish at the apex; spines black, eleven to twelve in number on outer margin. Cerci of male very stout, broad, the basal half narrowing gently, expanding beyond the middle into two lobes, an upper ovate compressed lobe nearly as long as the basal half, directed upward and backward, and a lower short triangular lobe broader than long, directed downward. Furcula triangular, about one m.m. long. Apex of subgenital plate of male ending in an obtuse tubercle.

Measurements: Length of body, male, 34 m.m., female, 42 m.m.; antennae, male, 17 m.m., female, 14 m.m.; pronotum, male, 8.5 m.m., female, 10 m.m.; tegmina, male, 28 m.m., female, 31 m.m.; hind femora, male, 20 m.m., female, 24 m.m.

Melanoplus differentialis (Uhler). Plate IV, Fig. 3.

Caloptenus differentialis (Uhler).

Acridium differentiale (Thom.).

Melanoplus differentialis (Brun.).

Size large. General body color yellowish or dull olivaceous. Head slightly elevated above pronotum. Face slightly oblique. Vertex broad, shallowly sulcate; lateral carinae parallel or nearly so. Costa about as broad as interspace between the eyes, sulcate below ocellus, punctate above, the sides parallel and failing to reach clypeus. Antennae yellow, more than twice as long (male) or fully half as long again (female) as the pronotum. Eyes large, oblong. Pronotum feebly expanding on metazona, its disk gently rounded on prozona, flat on the punctate metazona; median carina low, sometimes nearly obsolete on prozona, cut a little behind the middle by the principal sulcus. Tegmina exceeding the tips of hind femora in both sexes, a little narrowed apically, membranaceous, with a dull yellowish tinge, tips rounded.

Wings as long as tegmina, transparent, the veins dark. Hind femora of medium size, yellow, outer face with two series of oblique black bars alternating with yellow bars, outer half of lower face with a row of black dots, inner half of upper face with two black bars and a basal black spot, the bars being continued on inner face but rarely cross it; genicular arc black. Hind tibiae yellow with a narrow black ring at base; spines black. Cerci of male boot-shaped, the basal half oblong, apical half expanding and feebly forked, the strongly upcurved upper prong being as long and more than half as wide as the basal half, the lower prong (heel of the boot) being only a rounded, downward projecting lobe. Furcula wanting.

Measurements: Length of body, male, 34 m.m., female, 42 m.m.; antennae, male, 14 m.m., female, 17 m.m.; pronotum, male, 8 m.m., female, 10.5 m.m.; tegmina, male, 28 m.m., female, 35 m.m.; hind femora, male, 18 m.m., female, 23 m.m.

Melanoplus viola (Thom.).

Size medium. General color dark brown. Head slightly elevated above pronotum. Interspace between the eyes a little narrower than frontal costa. Vertex broadening in front, sulcate; lateral carinae continuous with sides of costa; median carina wanting. Costa broad, sparsely punctate, broadly sulcate at and below ocellus, the sides parallel. Antennae, slender, about as long as head and pronotum. Eyes elongate-oval, a little narrower above than below. Pronotum scarcely enlarging posteriorly, front margin of its disk truncate, hind margin broadly rounded; median carina very low, indistinct on hind portion of prozona; entire metazona densely punctate. Lateral lobes about as deep as long, the lower posterior angle broadly rounded. Tegmina a little shorter than abdomen, marked with numerous indistinct fuscous spots, tapering, tips rounded. Hind femora stout, testaceous, with three more or less distinct dark bars on upper and outer faces, inner half of lower face reddish brown. Hind tibiae with a narrow yellow band at base, then a fuscous area, then the apical half red; spines black. Cerci broad, basal two-fifths nearly equal, beyond this, expanding rapidly and considerably to an obliquely transverse, oval lobe. Furcula wanting.

Measurements: Length of body, female, 34 m.m.; antennae, 14 m.m.; pronotum, 8 m.m.; tegmina, 18 m.m.; hind femora, 19 m.m.

Melanoplus minor (Scudd.).
Caloptenus minor (Scudd.).

Size small. General color dull brownish. Head slightly elevated above pronotum. Face oblique. Vertex a little longer than broad, the front portion sloping and shallowly sulcate; interspace between the eyes nearly twice (male) or three times (female) as wide as first joint of antenna. Frontal costa about as broad as interspace between the eyes, faintly narrowed between the antennae,

feebly sulcate at and below the ocellus. Antennae brownish, about as long as head and pronotum in both sexes. Eyes about as long as infra-ocular portion of genae. Pronotum gradually expanding posteriorly, not distinctly constricted, either ash gray or brownish in color; median carina very low, sometimes nearly obsolete on prozona, intersected at or near the middle by the principal sulcus; the disk a little convex with front margin truncate, hind margin broadly rounded. The post-ocular piceous band continues on upper portion of lateral lobes to metazona slightly expanding posteriorly. Lateral lobes with the front and hind margins gently rounded. Tegmina about as long as abdomen, marked with a few indistinct fuscous spots along the middle. Hind femora reaching tip of abdomen in the female, slightly surpassing it in the male, sometimes indistinctly barred with fuscous on the upper and outer faces, orange colored below. Hind tibiae blue; spines black, eleven in number on outer margin. Cerci of male with the basal portion stout, quadrate, the apical portion nearly as long but narrower, bent upward and inward with an inferior angle or process at point of bend; the apex broadly rounded. Furcula slender, acuminate, about as long as the last abdominal segment.

Measurements: Length of body, female, 25 m.m.; antennae, 9 m.m.; pronotum, 5 m.m.; tegmina, 17 m.m.; hind femora, 14 m.m.

Melanoplus keeleri (Thom.).

Size medium. General color blackish brown, the male a little darker than the female. Vertex a little arched, interspace between the eyes a little broader than (male) or nearly twice as broad as (female) the first antennal joint. Frontal costa as broad as the interspace between the eyes, sulcate at and below the ocellus, the sides punctate above. Antennae a little shorter than hind femora, reddish at base, apical portion fuscous. Eyes a little longer than infra-ocular portion of genae. Pronotum scarcely expanding on the obscurely punctate metazona; post-ocular black band continued on upper portion of lateral lobes of prozona; median carina distinct only on extreme front and on metazona; front margin of disk truncate, hind margin obtuse angled. Tegmina reaching or slightly surpassing tips of hind femora, dark brown or blackish. Wings broad, hyaline, veins mostly fuscous. Fore and middle femora a little tumid in the male. Hind femora blackish, with indistinct dull testaceous bands on outer face. Hind tibiae red with a narrow black band at base; spines black, eleven to fourteen in number in the outer series. Cerci small, the basal two-thirds straight, the apical third forked, the upper fork generally twice as broad and half as long again as the lower fork. Furcula only slight, blunt tubercles.

Measurements: Length of body, male, 22 m.m.; antennae, 10.5 m.m.; tegmina, 16.5 m.m.; hind femora, 13 m.m.; female, body, 26 m.m.; antennae, 9.5 m.m.; tegmina, 20.5 m.m.; hind femora, 14 m.m.

- Scudder, S. H. -- "Revision of the Orthopteron Group Melanopli,"
in Proceedings of the U. S. National Museum, 20, pp. 1-421,
1897.
- " " -- "The Orthopteron Genus Schistocerca," in
Proceedings of the American Academy of Arts and Sciences,
34, pp. 441-476, 1899.
- " " -- "The North American Species of Orphulella,"
in Canadian Entomologist, 31, pp. 177-188, 1890.
- " " -- "Catalog of the Described Orthoptera of the
United States and Canada," Proceedings of the Davenport
Academy of Natural Sciences, 8, pp. 1-101, 1900.
- " " -- Index to North American Orthoptera, 1901.
- Stal, Carl. -- *Recensio Orthopterorum; Revue Critique des
Orthopteres decrits par Linne, de Geer et Thunburg*, 1, 1873-75.
- Thomas, Cyrus. -- "Synopsis of the Acrididae of North America,"
Hayden's Report of the U. S. Geological Survey of the
Territories, 5, pp. 1-258, 1873.
- " " -- "The Acrididae of Illinois," Report of the State
Entomologist on the Noxious and Beneficial Insects of the State
of Illinois, 9, pp. 73-140, 1880.
- U. S. Entomological Commission Reports 1, 2, and 3 relating to the
Rocky Mountain Locust and Western Cricket, 1877-83.



Paratettix maculata

Fig. 1



Syrbula admirabilis

Fig. 2



Opala obscura

Fig. 3



Adocara ellioti

Fig. 4



Dichromorpha viridis

Fig. 5



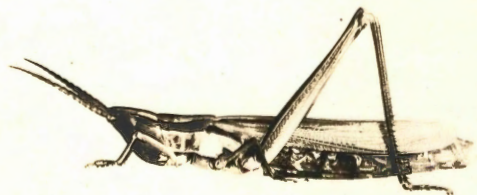
Phlibetronia quadrimaculata

Fig. 6



Truxalis brevicornis (L.) Female, natural size. (After Beutenmüller.)

Fig. 7



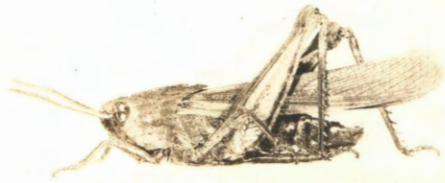
Mermis livittata

Fig. 8



Arphia sulphurea

Fig. 1



Chortophaga viridifasciata

Fig. 2



Fig. 3



Disosteira longipennis

Fig. 4



Spharagemon cristatum

Fig. 5



Dictyophorus reticulatus

Fig. 6



Fig. 1

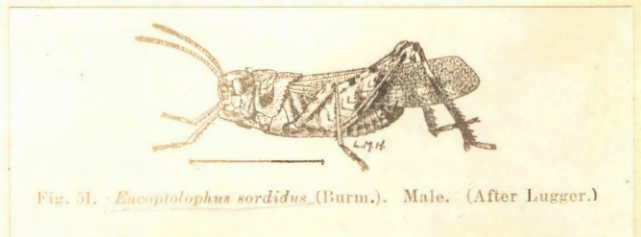


Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



M. brevitarsis

Fig. 1



Shitocarpa americana

Fig. 2



Fig. 3



Hesperotettix viridis

Fig. 4



Dactylotum pictum

Fig. 5



Melanoplus packardii

Fig. 6



Melanoplus scudderii

Fig. 7
PLATE IV



Melanoplus atlanticus

Fig. 8

**This Book May Be Kept
FOURTEEN DAYS**