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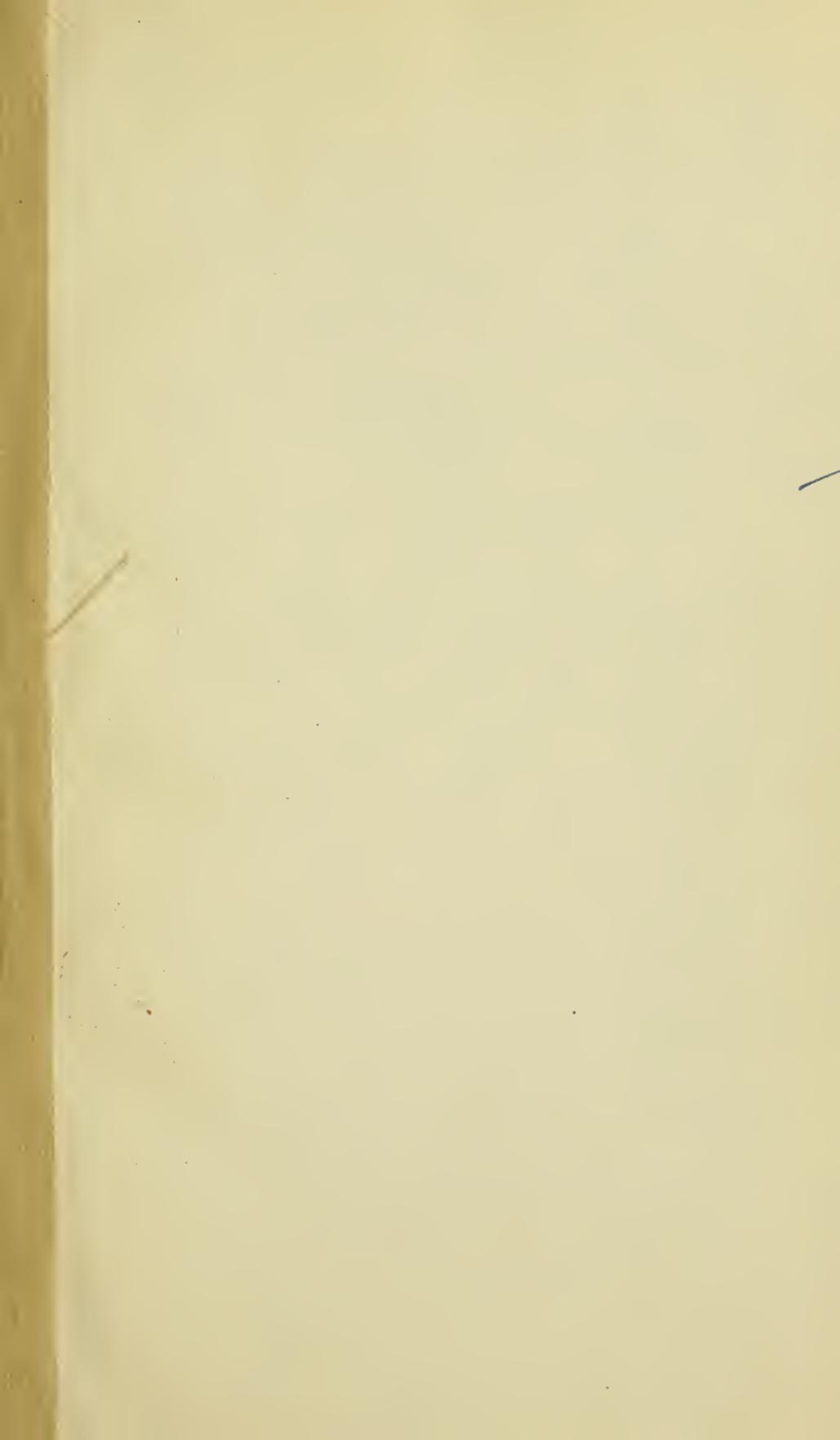
THE
ORTHOPTERA
OF
NEW ENGLAND.

Designed for the use of the Students in the Massachusetts Agricultural College and the Farmers of the State.

C. H. FERNALD, A. M., PH.D.

1888.

BOSTON :
WRIGHT & POTTER PRINTING COMPANY,
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THE
ORTHOPTERA OF NEW ENGLAND.

INTRODUCTION.

The insects belonging to the order Orthoptera are almost without exception injurious to our cultivated crops, our forest and shade trees, or become a nuisance in our houses, and therefore demand the careful attention of the student of agriculture and the practical farmer.

It has been our aim to present the subject in as simple a manner as possible, and as free from difficult terms as is consistent with scientific accuracy, so that any intelligent farmer may be able to determine any orthopterous insects he may find destroying his crops, and learn what means have been suggested for their destruction or for holding them in check. To give completeness to the work, all the New England species are here described, the greater part of them having already been found within the limits of the State of Massachusetts.

In the preparation of this work I have made free use of the writings of others, especially the works of Stål, Saussure and Scudder. In fact, any work on the North American Orthoptera must be based more or less on the writings of Mr. Scudder, our highest authority on this order, whether recent or fossil, and to this gentleman I am indebted more than I can well express for personal assistance in this work. All errors and erroneous conclusions must be laid to my charge, and not to any advice from him. I am also under obligations to Profs. A. S. Packard and C. V. Riley for illustrations, as well as to Mrs. Tenney for illustrations from Tenney's Natural History.

CHARACTERS OF THE ORDER.

If we omit the Earwigs (*Forficulidæ*), as has been urged by Dr. Packard and some others, the Orthoptera form quite a compact and natural order, which may be briefly defined as follows. The fore wings are somewhat thickened (not as much as in the beetles), and are not used in flight, but as wing covers. The hind wings are thin and membranous, and are the true organs of flight.

They are folded up lengthwise like a fan and concealed beneath the wing covers when at rest. A few of the species have the wings or wing covers, one or both, much shortened or entirely wanting. The mouth has jaws which move laterally against each other, and they are used for biting or chewing.

The Orthoptera have an incomplete transformation from the egg to the adult state; that is, they have no period of inactivity, but closely resemble the adult from the time they leave the egg, except in size and the absence of wings and wing covers.

This order is represented in New England by the following families:—

GRYLLIDÆ,	which include the Crickets.
LOCUSTIDÆ,	which include the Katydid.
ACRIDIDÆ,	which include the Grasshoppers.
PHASMIDÆ,	which include the Walking-sticks.
BLATTIDÆ,	which include the Cockroaches.

EXTERNAL ANATOMY.

To enable one to determine the species of the Orthoptera, it is necessary to gain some acquaintance with the external parts and their names. For this purpose we have introduced a brief description of the anatomy of a grasshopper, with illustrations, which will serve for the whole order.

An insect may be divided into three parts: *head*, *thorax* and *abdomen*. The thorax may be subdivided into *prothorax*, *mesothorax* and *metathorax*. See Fig. 1. The head bears a pair of jointed *antennæ*, two large compound *eyes*, three *ocelli* or simple eyes (sometimes wanting) and the mouth parts. Fig. 1. The mouth parts consist of an upper lip or *labrum*, a broad flap which closes over the mouth in front, a pair of jaws or *mandibles*, one on each side, which move laterally, and by means of which they chew their food. Behind the mandibles are a pair of smaller jaws, called the *maxillæ*, which also move laterally, and to these are attached a pair of small jointed appendages, called the *maxillary palpi*. The maxillæ are accessory jaws, used to hold and arrange the food while it is being ground by the mandibles. Behind the maxillæ is the lower lip or *labium*, which forms the lower side of the mouth, and attached to this are a pair of jointed appendages, called the *labial palpi*. See Fig. 2, where the mouth parts are shown separated from each other.

The prothorax has the fore legs attached to its under side, and the part between the base of these legs is the *prosternum*, which is sometimes a smooth piece extending from one leg to the other, and

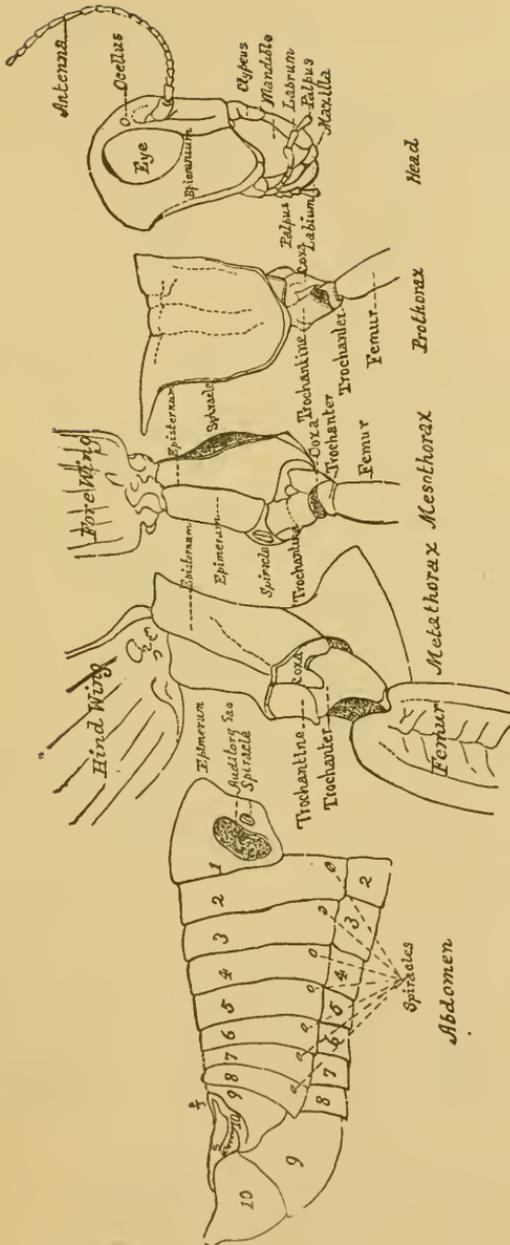


FIG. 1.

sometimes it has a prominent spine arising from the middle. In some families more than one spine arises from the prothorax. The top and sides of the prothorax are covered by one continuous saddle-shaped piece, called the *pronotum*. The ridge along the

These wings fold lengthwise like a fan, and are concealed beneath the fore wings when the insect is at rest.

The abdomen consists of a series of rings, or segments, more or less movable on each other, and has the external organs of reproduction at the end. On each side of the first segment is a large auditory sac, and near it a *spiracle*, and there is a row of similar spiracles along each side of the abdomen, as shown in Fig. 1. These spiracles are holes which allow the air to pass into the respiratory system within the body. A cross section of the abdomen is shown in Fig. 2, A.

The legs are attached to the body by three pieces, called *trochanter*, *trochantin* and *coxa*. Each leg consists of three parts: the *femur*, the *tibia* and the *tarsus*, but the tarsus has several joints, the last one ending with a pair of diverging *claws*. There is sometimes a small cushion, or pad, between these claws, called the *pulvillus*. See Fig. 2.

In the female, Fig. 2, B, the abdomen tapers somewhat towards the end, to which are appended the two pairs of stout, somewhat curved spines, called *valves*, which form the ovipositor. Fig. 2, B, *r, r'*. The anus is situated above the larger and upper pair, the external opening of the oviduct being between the lower pair of spines, and bounded beneath by a triangular, acute flap, which serves as an egg guide. Fig. 2, B, *e-g*, and Fig. 3. At the time of egg-laying, the abdomen may be lengthened to nearly twice its usual proportions. The ovipositor varies considerably from the above description, in some families.

The end of the male abdomen is usually blunt and more or less turned up, the space above being more or less covered with the supra-anal plate, Fig. 1, *s*, upon which rest the marginal *apophyses*, Figs. 1 and 2, *f*, which arise from the middle of the hinder edge of the last dorsal segment. On each side of the supra-anal plate is a more or less flattened and pointed appendage; these are the anal *cerci*. Figs. 1 and 2. In some families they are developed into long, tapering, jointed appendages.

INTERNAL ANATOMY.

The internal anatomy of a grasshopper (*Melanoplus femur-rubrum*) is shown in part in Fig. 3, where the œsophagus arises from the mouth *m*, and curves backward into the crop, which is very large, and occupies a central position in the thorax. It is in the crop that the "molasses," thrown out by the insect when captured, is produced, and which consists of partially digested food. The stomach is much smaller in diameter than the crop, and lies

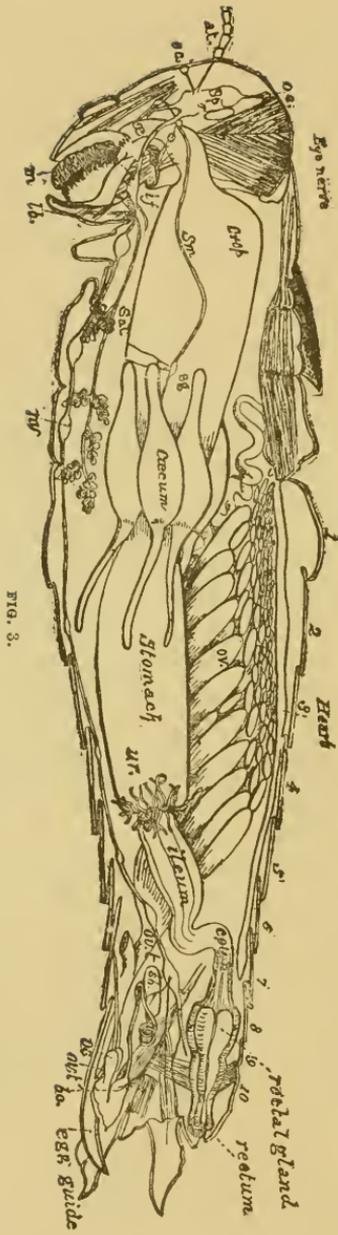


FIG. 3.

below the middle line in the forward half of the abdomen. From the forward end of the stomach arise six large appendages, called *gastric caeca*; and from the hinder end, where the stomach connects with the *ileum*, arise a large number of fine tubes, much convoluted, and wound around the intestine. These are called the urinary

tubes, Fig. 3, *wr.*, and are supposed to correspond to the kidneys of higher animals. The ileum is much smaller than the stomach, and has numerous longitudinal ridges on its surface. The next division of the digestive system is the *colon*, which is smaller than the ileum, has a smooth surface, is somewhat twisted, and ends in the much enlarged rectum, which ends in the anus, at the extremity of the abdomen. The rectum has six large rectal glands on the outside, the nature of which is unknown. The salivary glands are shown in Fig. 3, *sal.*, extending from beneath the gastric cœca forward to the mouth, where they empty their secretions.

The ovaries, Fig. 3, *ov.*, form a large mass before the eggs are laid, and crowd the intestine somewhat out of place. The heart, Figs. 3 and 4, consists of a long tube lying along the abdomen just beneath the upper side, and has six enlarged places along its course, probably where valves are situated within. The blood flows through this tubular heart toward the head, and flows back again among the viscera, bathing the surface of all the organs of the body.

All insects breathe by means of a complicated system of air tubes distributed throughout the body, the air entering through the spiracles or breathing holes which are arranged in a row along each side of the body. From these spiracles air tubes pass in, a short distance, connecting with tubes on each side which extend through the abdomen into the thorax. Fig. 4, S.

Branches extend from these tubes to a similar pair near the back, Fig. 4, D, and another pair along the under side, Fig. 4, V. The tubes send out numerous branches which divide and subdivide, the ultimate ends of which are closed. The blood, as it flows from the head, bathes these tubes (called *tracheæ*), and is purified, as in the human lungs. In addition to the above system of air tubes, those species which take long flights have a series of air sacs connected with the air tubes. See Fig. 4, 1-7, and I, II, III.

The nervous system consists of a series of nerve centers (ganglia), which are double, though quite fully fused together. These are connected by two cords, which are united in some parts of the body, but distinct in others.

The first ganglion, Figs. 3, *sp.*, and 5, is situated near the central part of the head, and sends nerves to the ocelli, antennæ and eyes; and the nervous cord which connects this ganglion with the second separates, allowing the œsophagus to pass through the opening. The second ganglion sends nerves to the mouth parts, the third to the fore legs, the fourth to the middle legs and fore

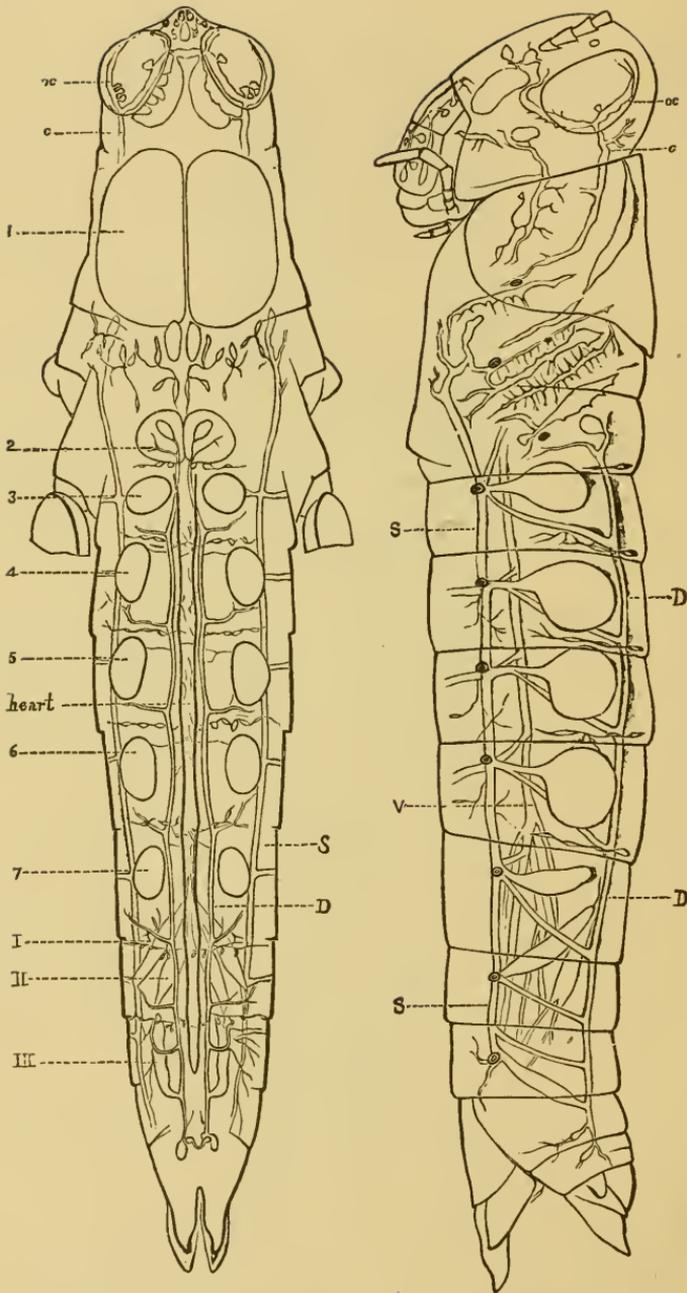


FIG. 4.

wings, the fifth to the hind legs and hind wings, and the remaining ganglia send nerves to the various parts of the abdomen.

The sense of sight is undoubtedly well developed in those

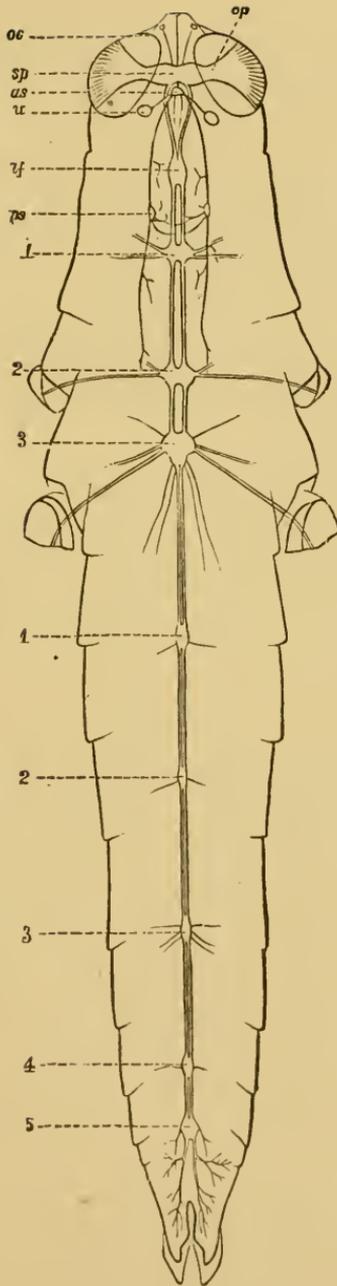


FIG. 5.

Orthoptera which have eyes. The sense of feeling probably exists over the surface of the body to a slight degree, but to a very great degree in the palpi and antennæ.

The sense of hearing is possessed by nearly if not all the Orthoptera. The ears or auditory sacs in grasshoppers are situated on the sides of the first segment of the abdomen. Fig. 1.

SYNOPSIS OF THE FAMILIES.

The New England Orthoptera may be separated into families by means of the following table, in which each figure on the right leads to the same one on the left:—

- | | | |
|----|--|--|
| 1. | { Hind legs longest; hind femora thickened; (jumpers) 4. | |
| | { Legs of nearly equal length; hind femora not thickened (runners), 2. | |
| 2. | { Abdomen with a forceps-like appendage at the end, FORFICULIDÆ. | |
| | { Abdomen without a forceps at the end 3. | |
| 3. | { Body oval and flattened BLATTIDÆ. | |
| | { Body long and slender PHASMIDÆ. | |
| 4. | { Antennæ shorter than the body ACRIDIDÆ. | |
| | { Antennæ longer than the body 5. | |
| 5. | { Wing covers flat above, but bent abruptly down at the sides, GRYLLIDÆ. | |
| | { Wing covers sloping down on the sides LOCUSTIDÆ. | |

FAMILY GRYLLIDÆ.

Crickets.

Body somewhat cylindrical. Head large and free. Antennæ long, slender, tapering and many jointed. Eyes elliptical, and ocelli present. Labrum nearly circular, and maxillary palpi with the last joint enlarged at the end (except in *Nemobius*). Wing covers in the male with a stridulating organ. Wings folded lengthwise, their pointed ends sometimes extending beyond the wing covers. Wings and wing covers often shortened, or wholly wanting. Organs of hearing, when present, situated on the fore tibiæ. Tarsi three-jointed, without pads between the claws. They stridulate or make their chirping noise by rubbing the wing covers together.

The Genera of the Gryllidæ may be separated by the following table:—

- | | | |
|----|--|--|
| 1. | { Fore tibiæ broad 2. | |
| | { Fore tibiæ slender 3. | |
| 2. | { Length more than one-third of an inch <i>Gryllotalpa</i> . | |
| | { Length less than one-third of an inch <i>Tridactylus</i> . | |
| 3. | { Hind thighs slender <i>Æcanthus</i> . | |
| | { Hind thighs stout 4. | |
| 4. | { Last joint of maxillary palpi nearly the same length as the one preceding <i>Gryllus</i> . | |
| | { Last joint of maxillary palpi twice as long as the one preceding <i>Nemobius</i> . | |

GENUS TRIDACTYLUS. Olivier (1789).

Body somewhat depressed, the surface punctured and glassy. Head and pronotum convex and slightly depressed. Antennæ inserted beneath the eyes, and in a very lateral position. Eyes oval, very distant from each other, and slightly projecting. Ocelli placed in a line between the eyes, the two lateral ones against the eyes, and the third (sometimes obsolete) between them. Second joint of labial palpi and third joint of maxillary palpi not dilated.

Elytra horny and opaque, not reaching to the end of the abdomen. Wings much longer, and folded lengthwise like a fan. In the colder latitudes the wings are sometimes imperfect. Anterior tibiæ dilated, and armed at the end with four slightly curved spurs; the inside of the tibiæ with a groove in which the tarsus may be lodged. Middle tibiæ with their edges ciliated, and their four apical spurs very short. Fore and middle tarsi with the first joint much shorter than the third, and the second joint very short. End of hind tibiæ with four spurs finely hooked at the end. Hind edges of these tibiæ often dentate. There are four pairs of movable paddle-shaped organs near the outer end. Upper cerci (anal appendages) composed of two joints, the lower ones entire and blunt.

TRIDACTYLUS TERMINALIS. Scudder.

Length, from one-third to one-fourth of an inch.

Head and thorax pitchy black, sometimes with reddish-brown spots. Hind femora with two broad transverse white bands, and a white spot near the end. The wings reach to the end of the abdomen. — *Cambridge, Mass., Harris Collection.*

GENUS GRYLLOTALPA. Latreille (1807).

Mole-Crickets.

Posterior margin of the sternum of the eighth abdominal segment, in the males, entire. Fore tibiæ broad and flattened, with four spurs at the end, the upper two movable, the lower two immovable. Hind femora shorter than the prothorax. First joint of hind tarsi unarmed or obscurely spined at the tip. The fore legs, being very stout and strong, are admirably adapted for digging. Wing covers seldom reach beyond the middle of the abdomen. Anal cerci longer than pronotum.

GRYLLOTALPA BOREALIS. Burmeister.

The Common Mole-Cricket. (Fig. 6.)

Fig. 6.
Grylotalpa
borealis.

Length, one inch and one-fourth.

Color, dark cinnamon brown, and covered with very fine short hairs. Wing covers less than half the length of the abdomen, the wings, when folded, extending only about an eighth of an inch beyond them.

“Sides of ponds, burrowing in moist earth.”
This species occurs very generally east of the Rocky Mountains.

GRYLLOTALPA COLUMBIA. Scudder.

This species does not differ in any respect from *G. borealis*, as stated by Mr. Scudder, save in the larger size, and comparatively greater breadth of the wing covers, which cover rather more than half of the abdomen, and in the much greater length of the wings, which extend considerably beyond the extremity of the abdomen.

This species has been taken in Massachusetts, Maryland and Washington, D. C.

The mole-cricket has often done great damage in Europe, where they burrow under the turf in moist gardens and meadows, and feed on the tender roots of many kinds of plants. They are also said to feed on other insects and worms, so that they are undoubtedly omnivorous in their habits.

Genus GRYLLOUS. Linneus (1758).

Crickets.

Stout-bodied insects. Head large and globose; eyes large and rounded; three ocelli present, the middle one between the antennæ, and elongated transversely. Antennæ as long or longer than the body, and gradually tapering towards the end. Last joint of maxillary palpi but little, if any, longer than the one before it. Pronotum of the same width as the head.

Feet stout, and slightly lengthened. Femora compressed; hind femora much enlarged, even to the end. Fore tibiæ with a large oval drum on the outside, and a smaller, round drum on the opposite side (auditory sacs). Hind tibiæ with a double row of from four to seven spines. Tarsi slender and elongated; a

groove along the middle of the upper side of hind tarsi, with a row of short spines along each side of it. Anal cerci tapering, jointed, nearly as long as the abdomen, and present in both sexes. Ovipositor often longer than the abdomen.

Wing covers usually well developed, flattened above and strongly bent down at the sides. In the females they are generally reticulated in the dorsal field by more or less regular, lozenge-shaped spaces. Wing covers of the males provided with a well-developed stridulating organ, with two to six quite transverse undulated or arched veins. "Mirror" rounded behind, and divided by a broken or arcuate vein. The wings vary much in length, and are sometimes wanting.

The New England species may be separated as follows:—

1. { Ovipositor as long as the body *abbreviatus*.
 { Ovipositor as long as the femur and half the tibia *luctuosus*.

GRYLLUS ABBREVIATUS. Serville.

Black; elytra fusco-testaceous; veins testaceous; wings wanting; ovipositor as long as the body.

GRYLLUS LUCTUOSUS. Serville.

The Common Black Cricket.

Black or brownish; elytra fusco-testaceous or black; wings extending to the end of the abdomen, or wanting. Ovipositor as long as the femur and half of the tibia.

Saussure considers *G. pennsylvanicus*, Burm., a wingless variety of this species; and he also considers *niger*, Har., and *neglectus*, Scudd, varieties of the same species.

The species are so variable that it is exceedingly difficult to separate them; and it is necessary to have a long series for examination.

Packard states that crickets lay in the fall three hundred eggs glued together in a common mass. In July the larvæ appear, and by the last of August the grass is alive with them. They are quite omnivorous in their habits, feeding on grass, garden vegetables and fruit, to which they do much injury.

Genus NEMOBIUS. Serville (1839).

The insects which belong to this genus are rather small, their bodies and legs covered more or less with hairs. Head orbicular, and scarcely wider than the pronotum; front of head obliquely flattened. Ocelli present, but the one in the middle of the face is

often obliterated. Last joint of maxillary palpi twice as long as the one before it, and enlarged at the outer end, which is obliquely truncate.

Pronotum square, somewhat narrowed in front, the forward and hinder edges parallel.

Elytra with but few veins; wings present or absent in variations of the same species.

Feet nearly as stout as in *Gryllus*. Anterior tibiæ with a small oval drum (auditory sac) on the outside, near the upper end. Hind femora short and stout. Hind tibiæ somewhat compressed, and armed with spines, and elongated, movable, pubescent spurs. Three or four pairs of spines inserted near the middle line of the tibiæ. All the tarsi elongated, but the hind tarsi without a longitudinal groove above, and the first joint with two spurs at the end, the inner one twice as long as the outer, and reaching nearly to the claws. Anal cerci of medium length, and very hairy.

NEMOBIUS FASCIATUS. De Geer.

The Striped Cricket.

Brown, with the head fuscous, and with four dull, yellowish-brown lines on the vertex. Palpi reddish brown, lighter at the end. A dull, yellowish-brown, longitudinal stripe, more or less distinct, on each side of pronotum. Elytra pale brown, a little shorter than the abdomen, with the humeral bands pale, and the lateral ones fuscous.

Legs dark brownish yellow; hind femora as long as the tibiæ and two-thirds of the tarsi. Hind tibiæ with four pairs of spines before the terminal spines.

Ovipositor as long as the femur; valves crenulated on the upper side near the end.

Saussure makes three varieties under this species, as follows:—

- | | | |
|----|--|----------------------|
| a. | Elytra but little shorter than the abdomen, wings long and caudate | <i>N. fasciatus.</i> |
| b. | Wings wanting; elytra covering about half of the abdomen | <i>N. vittatus.</i> |
| c. | Smaller than the last, otherwise the same | <i>N. exiguus.</i> |

Very common in the fall, in company with the larger species.

Genus ŒCANTHUS. Serville (1831).

Body very slender, smooth or slightly pubescent, and, when alive, of a whitish or greenish-white color.

Head elongated and directed forward; the vertex horizontally flattened; eyes ovoid, slightly projecting; ocelli wanting.

Palpi filiform, slightly elongated, the last joint not dilated.

Antennæ very long and tapering. Pronotum elongated, very narrow, contracted in front, with the hinder border nearly straight.

Wing covers large, reaching beyond the end of the abdomen. Wings often prolonged. Legs slender, and moderately long. Tibiæ all longer than the femora, those of the first two pairs without spurs at the end; the first pair somewhat dilated above the middle, where they are provided with a little "drum" or auditory sac on each side. Hind femora slightly swollen; tibiæ more or less spiny; tarsi with a pair of unequal spurs at the end of the first joint.

Abdomen comparatively slim, armed at the end with a pair of tapering, jointed, and hairy cerci, which are of about the same length as the abdomen.

CECANTHUS NIVEUS. Serville.

Tree Cricket. (Fig. 7, male; Fig. 8, female.)

Length, about three-fourths of an inch to the ends of the closed wings. Color, pale whitish green, often changing to a lighter or darker brown, frequently with brownish stripes on the head. Two short black lines, one beyond the other, on the under side of the base of the antennæ.

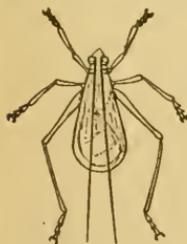


Fig. 7.
Cecanthus niveus.
Male.

These insects arrive at maturity in the autumn, when the singing or shrilling of the males may be heard. After pairing, the female forces her ovipositor into the tender canes or branches of the raspberry, grape, plum, peach and other trees, depositing her eggs in a series, as shown in

Fig. 9. The canes are weakened in this way, and break down easily. The eggs hatch in the early part of the next summer, and the young feed at first on plant lice, and later in the season on the ripe fruits.

The infested canes may be cut off and burned late in the fall or early in the spring; and the mature insects may be killed in the fall by jarring the bushes on which they collect, causing them to fall to the ground, where they may be crushed under the feet.



Fig. 8.
Cecanthus niveus.
Female, side view.

FAMILY LOCUSTIDÆ.

Katydid.

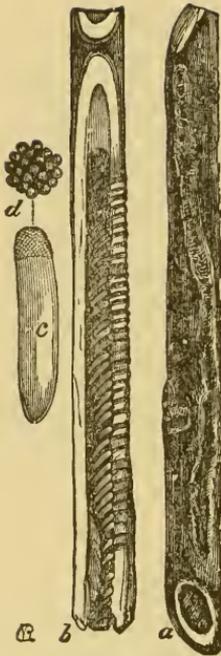


Fig. 9.

Eggs of *Ceanthus*.

- a. Irregular row of punctures.
- b. The same laid open.
- c. An egg enlarged.
- d. The end of the same.

Head placed perpendicularly; antennæ longer than the body, slim, tapering and many jointed. Eyes hemispherical, elliptical or ovoid; ocelli nearly always wanting; labrum circular.

Wings and wing covers generally well developed, though sometimes shortened or wholly wanting. The chirping or stridulating organs consist of a transparent membrane, in a more or less rounded, thick ring, situated in the anal field of the wing covers of the male. The stridulation is made by rubbing the bases of the wing covers together. Near the upper end of the fore tibiae there is an oval cavity covered with a membrane (auditory sac). Tarsi four-jointed, without pulvilli or pads between the claws.

The New England Genera may be separated by means of the following table:—

1.	{	Wingless, or with rudimentary wings and wing covers	2.
	{	Winged	3.
2.	{	Wingless; pronotum not covering the whole top of the thorax	<i>Ceuthophilus</i> .
	{	Pronotum covering the whole top of the thorax	<i>Thyreonotus</i> .
3.	{	Wing covers expanded in the middle	4.
	{	Wing covers not expanded in the middle	6.
4.	{	Wing covers much broader in the middle, concave	<i>Cyrtophyllus</i> .
	{	Wing covers somewhat broadened in the middle, not concave	5.
5.	{	Ovipositor very small	<i>Microcentrum</i> .
	{	Ovipositor of medium size	<i>Amblycorypha</i> .
6.	{	Vertex of the head with a conical projection forward	<i>Conocephalus</i> .
	{	Vertex of the head without a conical projection	7.
7.	{	Ovipositor straight, or nearly so; insect small	<i>Xiphidium</i> .
	{	Ovipositor curved; insect large	<i>Scudderia</i> .

GENUS CEUTHOPHILUS. Scudder (1862).

“Head rather large, oval; antennæ long, slender, cylindrical; first joint as broad as long, larger and stouter than the rest, which are about equal in thickness, gradually tapering to the extremity; second, quite short; third, longest; the remainder unequal. Eyes sub-pyriform, sub-globose, crowded against the first swollen joint

of antennæ. Maxillary palpi long and slender; first two joints equal; third fully equal in length to first and second together; fourth, three-fourths as long as the third; fifth, nearly as long as third and fourth together, somewhat curved, swollen towards extremity, split on the under side almost its entire length. Sides of the thoracic nota broad, mostly concealing the epimera; wings wanting; legs rather long; coxæ carinated externally, the third pair but slightly, the first pair having the carina elevated into a sharp, the second into a dull, point at the middle; first two pairs of femora mostly wanting spines; hind femora thick and heavy, turned inward at the base, channelled beneath. Ovipositor generally rather long, nearly straight, but a little concave above, rounded off somewhat abruptly at the extremity to the sharp upturned point."

CEUTHOPHILUS MACULATUS. Harris.

The Spotted, Wingless Grasshopper.

Length, when mature, nearly three-fourths of an inch; entirely without wings and wing covers. Pale yellowish brown, somewhat darker above, and covered with light-colored spots. Hind femora marked on the outside with short, parallel, oblique lines. Hind tibiæ in the mature male curved at the base.

Everywhere common under stones, old logs, etc.

CEUTHOPHILUS BREVIPES. Scudder.

"A species very closely allied to the preceding, but of a smaller size, and differing from it in its markings and proportions. It is of a pale, dull, brown color, very profusely spotted with dirty white spots, not so large or so frequently confluent as in *C. maculatus*, except near the extremity of the hind femora, where they nearly form an annulation. The mottling of the pronotum is somewhat different than in *C. maculatus*; the hind legs are proportionably shorter, as is also the ovipositor, the spines of whose inner valves are duller.

"Length scarcely more than half an inch; average length of hind femora, .44 inch; average length of ovipositor, .25 inch."
—*Scudder.*

GENUS CYRTOPHYLLUS. Burmeister (1838).

Antennæ very long and slim, eyes small, globular and prominent, vertex with a small spine projecting forward between the antennæ. Pronotum truncate in front, rounded behind, with two transverse grooves. Prosternum with two spines; fore coxæ with one spine on the outside. Middle tibiæ spinose on the outer and inner sides. Wing covers much wider in the middle, concave, obtuse and rounded at the end.

CYRTOPHYLLUS CONCAVUS. Harris.

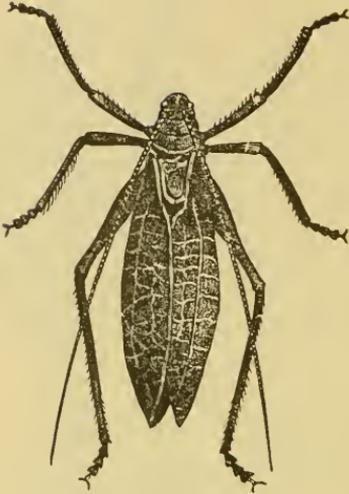
Broad-winged Katydid. (Fig. 10.)

Fig 10.
Cyrtophyllus concavus.

Length about one inch and a half to the end of closed wing covers ; body, one inch. Color of body, pale green, wings and wing covers somewhat darker green. The wing covers curve around the body so that their edges touch above and beneath, enclosing the body. Wing covers with a prominent vein running through the middle, and on each side of this the veins form a network, so that the wing cover strongly resembles a leaf.

Their eggs are of a dark slate-color, about one-eighth of an inch in length, and one third as wide.

They are laid in two rows along a twig, the eggs overlapping each other a little. They hatch the next spring, and the young feed on the tender leaves of almost any plant.

These insects have never been reported as injurious, but, where abundant, their noise may become an intolerable nuisance. I cannot imagine what ingenious person first discovered that their song resembled the words "katy did," instead of some other words ; for many persons besides myself fail, upon hearing them for the first time, to recognize them by their sound.

GENUS AMBLYCORYPIA. Stål (1873).

Vertex smooth, without spines or projections of any kind, but with a slight groove along the middle, between the antennæ ; eyes elliptical ; pronotum rounded behind, narrower in front. Prosteronum without spines. Fore coxæ with a spine on the outside. Wing covers as long or but little longer than the hind femora. Hind tibiæ with a row of spines on each edge behind, and a row, more remote, on the opposite side. Wings longer than the wing covers.

The species may be separated as follows :—

- { Wing covers extending beyond the end of the hind femora. *oblongifolia.*
- { Wing covers reaching only to the end of the hind femora . *rotundifolia.*

AMBLYCORYPHA OBLONGIFOLIA. De Geer.

Oblong Leaf-winged Katydid.

Length, one inch and three-fourths to the end of the wing covers, the wings extending one-fourth of an inch beyond.

Wings and wing covers, grass green; body, dull clay yellow, tinged with green in places.

AMBLYCORYPHA ROTUNDIFOLIA. Scudder.

Round-winged Katydid.

Length, one inch and one-fourth to the end of the wing covers, the wings extending about one-eighth of an inch beyond. Color, grass green, sometimes tinged more or less with clay yellow.

GENUS MICROCENTRUM. Scudder (1862).

“Head oval. broader and stouter than in *Amblycorypha*; tubercle of the vertex somewhat prominent, scarcely broader than first joint of antennæ, slightly furrowed; eyes broadly oval, very prominent; first joint of antennæ as broad as long; second, one-third as large, but also stout; remainder long and slender, cylindrical. Prothorax flat or very slightly concave, posterior quite convex; the sides nearly parallel, the length but little surpassing the breadth; lateral carinæ quite sharp; lobes of the side straight in front, well rounded and curving forward behind, rounded beneath, deeper than broad; wing covers with the triangular superior surface extending backward farther than in *Amblycorypha*, and the wing covers themselves not regularly rounded as there, but with the inner border straighter till near the tip, the outer border sloped off towards the tip, and the tip itself more pointed; legs slender, much shorter than in *Amblycorypha*, especially the hind legs; ovipositor very short, strongly curved, and bluntly pointed.

“This genus differs from *Amblycorypha*, to which it is most nearly allied, especially by the cut of the wing covers and the shortness of the hind legs and ovipositor.” — *Scudder*.

MICROCENTRUM LAURIFOLIUM. Linneus.

Length of wing covers, one inch and three-fourths; of hind femora, nine-tenths of an inch. Wings and wing covers, grass green; body, yellowish green, lighter beneath. Front of prothorax with a very small central tooth.

Scudder described this species under the name of *Microcentrum affiliatum*, but Stål pronounces it identical with the Linnean

species, after a comparison with the type. Is it distinct from *M. retinervis*, Burm.?

Genus SCUDDERIA. Stål (1873).

Top of the head, between the antennæ, compressed into a short, blunt spine, which curves upward sharply. Eyes nearly hemispherical. Pronotum slightly narrowed in front, rounded behind, deeply notched on the side behind, the sides of the notch forming a right angle. Fore coxæ with a sharp spine on the outside. Ovipositor large, curving upward. Supra-anal plate of the male sending out a stout spine, which curves down, and is widened and notched at the end. Sub-anal plate sends out a much longer spine, notched at the end, and curving upward.

SCUDDERIA CURVICAUDA. De Geer.

Narrow-winged Katydid.

Length of body, about one inch; from the face to the end of the wing covers, an inch and a half; the wings extending about one-fourth of an inch farther. Body and wings, grass green; face and under side of the body, sometimes lighter, and sometimes tinged with dull yellow. It feeds principally on oak leaves.

The male does not make as loud a "shrill" as the broad-winged katydid, and the sound he makes at night and in cloudy weather is different from the one he makes in the sunshine.

Genus CONOCEPHALUS. Thunberg (1815).

Face, very oblique; vertex, prolonged forwards into a cone. Eyes, elliptical; pronotum, truncate in front, rounded behind, narrowed in front, obtusely notched on the side behind. Prosternum, with two long, slim spines. Fore coxæ with a spine on the outside.

CONOCEPHALUS ENSIGER. Harris.

Cone-headed Katydid.

Length of body, one inch; to the end of the wing covers, two inches and one-fourth; length of ovipositor, one inch. Color, pale green, lighter in the face and beneath. A small tooth is situated on the under side of the conical part of the head, between the antennæ; and a U-shaped black mark on the under side of the cone near the end.

CONOCEPHALUS ROBUSTUS. Scudder.

“ Either pea-green or dirty brown ; tubercle of the vertex tipped with black, not extending, or but very faintly and narrowly, down the sides ; lateral carinæ of prothorax, pale yellowish ; wing covers dotted with irregularly distributed black dots, most conspicuous in the brownish individuals. In form, as in coloration, this species is much like *C. ensiger*. The shape of the conical projection of the vertex is the same, or a little stouter ; it is a larger species, much broader and stouter than it, the wings broader, and, when compared with the hind femora, a little longer than they are in *C. ensiger* ; the spines upon the under side of the hind femora are larger than there, being noticed easily with the unassisted eye ; the ovipositor of the female is much shorter than in *C. ensiger* ; and, finally, the insect is much broader across the mesothorax, with a heavier sonorous apparatus in the male ; wing covers fully as long as the wings, in the male ; slightly longer than the wings, in the female. The only difference between this species and *C. ensiger* in coloration is the usual lacking of the spots on the wing covers in the latter, and in the same the presence of a broad black band on either side of the tubercle of the vertex, which exists in the former but seldom, and then it is very narrow.

“ Male, length of wings, 1.7 inch ; breadth in middle, .32 inch ; of hind femora, .9 inch. Female, length of wing covers, 1.9 inch ; extent of wing covers beyond wings, .1 inch ; breadth of wing covers in middle, .22 inch ; length of hind femora, 1 inch ; of ovipositor, 1 inch.” — *Scudder*.

Genus XIPHIUM. Serville (1831).

Face, rounded, somewhat oblique ; a blunt projection between the antennæ, somewhat excavated on the sides, for the reception of the protuberance on the inner side of the first joint of the antennæ. Eyes, hemispherical ; pronotum truncate in front, rounded behind, lateral edges rounded, slightly excavated on the side, behind. Prosternum, with two spines ; front coxæ, with a spine on the outside. Anterior tibiæ armed beneath with a row of six spines on each side.

This genus includes those small and medium-sized green grasshoppers, with long, tapering antennæ, which are so common during the summer in grass fields.

The species may be separated by the following table : —

- | | | | |
|----|---|--|--------------------|
| 1. | { | Wing covers abruptly narrowed in the middle | 3. |
| | { | Wing covers not narrowed in the middle | 2. |
| 2. | { | Wings a little longer than the wing covers | <i>fasciatum.</i> |
| | { | Wings a little shorter than the wing covers | <i>brevipenne.</i> |
| 3. | { | Brown stripe on the pronotum, bordered with black, <i>glaberrimum.</i> | |
| | { | Brown stripe not bordered with black | 4. |
| 4. | { | Wing covers as long as the wings | <i>vulgare.</i> |
| | { | Wing covers a little shorter than the wings | <i>concinnum.</i> |

XIPHIDIUM FASCIATUM. De Geer.

The Slender Meadow Grasshopper.

Length of body, about half an inch; to the end of wing covers, about four-fifths of an inch. Wings a little longer than the wing covers. Upper side of abdomen, brown. A brown stripe extends from the projection between the antennæ, back across the middle of the pronotum, being widest behind. Legs, sprinkled with brown. Ovipositor, as long as the abdomen.

XIPHIDIUM BREVIPENNE. Scudder.

“Size of *X. fasciatum*, with which it agrees in coloration throughout, except that the wings are a little darker. The dorsal band is a little broader, and the ovipositor is reddish brown throughout, while in *X. fasciatum* it is green at the base; wings, .08 inch shorter than the wing covers; both shorter than the body; ovipositor nearly equalling the hind femora in length. In these respects it differs very much from *X. fasciatum*.”

“Length of body, .5 inch; of wing covers, .33 inch; of hind femora, .43 inch; of ovipositor, .4 inch.”

XIPHIDIUM VULGARE. Harris.

The Common Meadow Grasshopper.

Length of body, three-fourths of an inch; to the end of the wing covers, about one inch. Wing covers abruptly narrowed in the middle; green, faintly tinged with brown. The males have two black dashes, one behind the other, on each wing, on the outside of the transparent spot. Body green, or greenish brown, with a dorsal brown stripe extending from the tubercle of the vertex across the prothorax, being widest behind. Ovipositor gradually curved, and pointed at the end; about three-tenths of an inch in length.

XIPHIDIUM CONCINNUM. Scudder.

“Male, brownish green; a dark reddish-brown dorsal streak upon the head and prothorax, becoming faint towards the hind border of the prothorax, and narrowing anteriorly to the width of the tubercle of the vertex, passing over this down the front to the labrum, expanding broadly in the middle of the face; legs brownish green, tarsi dark brown, spines of tibiæ tipped with black; abdominal appendages reddish brown; wing covers pellucid, veins grass green, except the heavy transverse vein of the sonorous apparatus, which is brown; wings pale brownish green, extending a little beyond wing covers; female having the same markings as the male, except that all the nervures of the wing covers are brown, and the wings are more dusky and are shorter than the wing covers; ovipositor reddish brown, a little curved, and very pointed; a much slenderer and more graceful form than *X vulgare*.

“Length of body, .7 inch; of wing covers, .84 inch; of wings beyond wing covers, .08 inch; of hind femora, .6 inch; of ovipositor, .32 inch.”

XIPHIDIUM GLABERRIMUM. Burmeister.

“The dorsal band here is bordered with black, as is also the outer edge of the sonorous apparatus of the male; antennæ very long; ovipositor slightly expanded in the middle.” — *Scudder*.

Genus THYREONOTUS. Serville.

Face rounded, slightly oblique. Eyes small and nearly globose. Vertex with a blunt projection between the antennæ, somewhat excavated on the sides, and grooved above. Basal joint of the antennæ flattened. Pronotum truncate in front, more or less rounded behind, and extending back over the first joint of the abdomen, concealing the rudimentary wings and wing covers; flattened above and bent sharply down on the sides, forming an abrupt, curved edge on each side of the back. Prosternum with two short spines; fore coxa with a long sharp spine on the outside.

The fore and middle tibiæ have two rows of six spines each on the inside, and a row of three or four equidistant spines along the outside. Hind femora and tibiæ very long, and of equal length. Ovipositor as long as the body, and straight.

THYREONOTUS DORSALIS. Burmeister.

Length of body, nearly one inch ; of ovipositor, one inch. Color, yellowish brown, more or less mottled, darker above.

THYREONOTUS PACHYMERUS. Burmeister.

“ Among other distinctions between these two species, it may be seen that this species has the pronotum well rounded behind, while the hind margin of the other is nearly square ; and the ovipositor is longer in *T. dorsalis* than in *T. pachymerus*, as are also the hind legs.” — *Scudder*.

FAMILY ACRIDIDÆ.

Grasshoppers.

Anterior and middle legs equal, or nearly equal, in length, much shorter than the posterior pair ; posterior legs elongate, fitted for leaping ; the femora enlarged near the base. The tarsi three-jointed ; the first joint, which is usually the longest of the three, and much longer than the second, has the under side marked by two cross-impressions, which give it the appearance, when seen on this side, of being composed of three pieces ; the terminal or third joint is furnished with two strong claws. Wing covers and wings, when in repose, rest partly horizontal on the back of the abdomen, and partly deflexed against the sides. The antennæ are shorter than the body, seldom exceeding half its length, and composed of from six to twenty-four joints ; they are either filiform, flattened, or ensiform, rarely clavate. Most of the species possess wings, but in a few these organs are wanting.

This family contains a much larger number of species than either of the other families of the Orthoptera, and includes those which have proved the most destructive to our cultivated crops. The entire life-history of but few of our species has been carefully studied ; yet, in a general way, they are so nearly alike that the history of one will answer for that of all.

When the female is ready to deposit her eggs, she digs a hole in the ground, with the valves of her ovipositor, as deep as the length of her abdomen will permit, and at this time she is able to lengthen the abdomen to nearly twice its ordinary length. She then deposits her eggs in this hole, one at a time, placing them in regular order, so as to form an elongated oval mass. During the process a glairy fluid is deposited about the mass, which hardens and binds them together somewhat in the form of a bean. The hole is then filled

with dirt mixed with this fluid, which forms a mass nearly impervious to water, after it hardens. See Fig. 11. The number of eggs deposited by the different species varies considerably, some laying only twenty-five or thirty in one mass, but depositing several masses, while others, as the red-winged grasshopper (*Hippiscus tuberculatus*), deposit all, to the number of 125 or 130, in one mass.

The different species vary also in the selection of

places for depositing their eggs; some species may frequently be seen, in the fall, digging holes and laying their eggs in the hard gravel of a well-travelled road.

The young grasshoppers are very large eaters; and, in the process of growth, they molt or shed their skins from three to five times. At the second or third molt, rudimentary wing covers appear, and the insect is called a pupa; but previous to this time it is called a larva. At the last molt the wings and wing covers appear fully developed, and then the insect is called an imago, — perfect or mature insect. See Fig. 12.

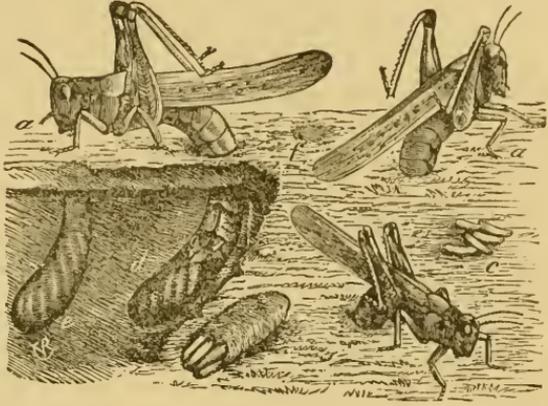


FIG. 11.

Grasshoppers laying eggs.

a, a, a, female in different positions.*b*, egg pod.*c*, separate eggs.*d, e*, earth removed to expose the pods.

FIG. 12.

Grasshopper molting its skin. *a* to *e*, showing the successive stages.

A pupa may be distinguished from a short-winged imago, by having the wing covers twisted around so that the faces and margins are the reverse of what they are in the perfect insect.

Warm, dry weather is favorable to the increase of grasshoppers, and it is in excessively dry seasons that they are most injurious. Dampness is undoubtedly the most efficient natural agent for keeping them in check. Although they may hatch in great numbers, yet, if a rainy season follow soon after, they will to a large extent be destroyed. Extreme changes during the winter appear to destroy the vitality of the eggs.

Grasshoppers are preyed upon in their various stages by quite a number of different species of insects, and especially by a reddish-colored mite, which adheres to them in large numbers, and, by sucking their blood, weakens and finally destroys them. Very many of our native birds feed on them, and domestic fowls are great aids in their destruction. It is doubtful if any artificial remedies can be used profitably, except when a great invasion is threatened, as sometimes occurs; and then it may prove safe and profitable to sprinkle the crops, ahead of the invading hosts, with Paris green or other poisonous insecticides.

The sub-families represented in New England may be separated by the following table:—

- | | | | |
|----|---|---|-------------------|
| 1. | { | Pronotum extending back to the tip of the abdomen | <i>Tettiginæ.</i> |
| | { | Pronotum not extending back to the tip of the abdomen | 2. |
| 2. | { | Prosternum with a prominent spine | <i>Acridinæ.</i> |
| | { | Prosternum not spined, or with only an oblique tubercle | 3. |
| 3. | { | Face very oblique | <i>Truxalinæ.</i> |
| | { | Face not oblique, or but slightly so | <i>Ædipodinæ.</i> |

Synopsis of the Acridinæ.

- | | | | |
|----|---|--|--------------------|
| 1. | { | Wings abortive or wanting | <i>Pezotettix.</i> |
| | { | Wings well developed | 2. |
| 2. | { | Median carina of the pronotum somewhat prominent | <i>Acridium.</i> |
| | { | Median carina of the pronotum not prominent | 3. |
| 3. | { | Hind femora not reaching the end of the wing covers | <i>Melanoplus.</i> |
| | { | Hind femora reaching or surpassing the end of the wing covers, | <i>Paroxya.</i> |

Genus PEZOTETTIX. Burmeister (1840).

Body medium size; female narrow posteriorly. Head large; face perpendicular, or nearly so; vertex between the eyes narrow, in front of these, short, somewhat deflexed, concave, no foveolæ; frontal costa, lateral carinæ, and cheek carinæ, distinct; frontal costa generally convex above the ocellus; eyes sub-ovate or sub-globose; antennæ cylindrical, reaching the tip of the pronotum;

joints somewhat distinct. Pronotum sub-cylindrical; disk sub-convex; median carina generally obliterated on the anterior lobes, more or less distinct on the posterior lobe, sub-truncate in front, truncate or rounded behind, sometimes obtusely angled, but in the latter instances the posterior lateral margin ascends from the lateral angle to the apex without any entering angle at the humerus; the three transverse impressions distinct, cutting the median carina; the intermediate one sub-bisinate; posterior lobe punctured. Prosternal spine rather short, obtuse; pectus broad as the head. Elytra and wings wanting or abbreviated. Four anterior legs short; in the male the middle femora much swollen; posterior femora moderately dilated at the base. Extremity of the male abdomen somewhat swollen and turned up; cerci generally slender.

The species may be separated by the following table:—

- | | | |
|----|---|-------------------|
| 1. | { Without wings or wing covers | <i>glacialis.</i> |
| | { Wing covers present | 2. |
| 2. | { Wing covers more than half the length of the abdomen, | <i>borealis.</i> |
| | { Wing covers not more than half the length of the abdomen, | <i>manca.</i> |

PEZOTETTIX GLACIALIS. Scudder.

The Wingless Mountain Grasshopper.

Head not large; vertex furrowed; frontal costa with a deep furrow and depression at the ocellus; eyes not prominent, not elongate, docked anteriorly, and very slightly above. Pronotum a little widest posteriorly; anterior and posterior margins truncate; lateral carinae almost obliterated, obtusely rounded; median very slight. Prosternal spine rather short and blunt, compressed laterally. With neither wings nor elytra. Color, female: vertex, disk of the pronotum, and abdomen, olivaceous green; a broad black band behind the eye, crossing the sides of the pronotum to the tip, extending upon the abdomen in the form of transverse streaks; pronotum below this, greenish yellow, with a medial black spot. Vertex and pectus, greenish yellow; prosternum, dusky. Front and sides of the head yellowish green, with a greenish stripe down the middle of the frontal ridge. Furrow and interior carina of the under side of the hind femora, coral red; remainder yellowish green, with two broad bands of dark green across the outside; apex, black; tibiae, green.

Male differs as follows: mesonotum and metanotum, bright green; whole dorsal surface black, with a dorsal row of yellowish green spots, and a triangular spot of the same color between the middle and posterior coxae; a lateral row of greenish-yellow spots on the first eight abdominal segments.

Length, about three-fourths of an inch.

Mr. Scudder states that this species frequents the branches of the small birch trees among the White Mountains of New Hampshire. It has also been taken on Speckled Mountain in Maine, and on Graylock in Massachusetts.

PEZOTETTIX MANCA. Smith.

Top of the head, disk of pronotum, and elytra, brown. Sides of the pronotum smooth and shining in front of the last transverse impression; behind it thickly punctate; a broad black band extending from the eyes over the upper half of the pronotum, and continued upon the other thoracic segments and along the side of the abdomen, inclosing on the thorax an oblique whitish spot, which extends from the base of the elytra to the posterior coxæ. Hind femora brown, yellow below, banded with black above; tibiæ, bright red.

Length, about three-fourths of an inch; length of elytra, from one-sixth to one-seventh of an inch; posterior femora, about four-tenths of an inch.

PEZOTETTIX BOREALIS. Scudder.

Dark brown, darkest above; a broad black band behind the eye, extending over the upper portion of the sides of pronotum to the hind border; front, dark yellowish brown; mouth parts, dirty yellowish; legs, yellowish brown; hind femora streaked with black, with the tip black; hind tibiæ reddish, with a faint, paler annulation near the base, the spines tipped with black; wing-covers, dirty, yellowish brown, spotted irregularly with darker brown; wings colorless, a little dusky on costal border.

Length of body, about two-thirds of an inch; of wing covers, nearly half an inch; of hind femora, nearly half an inch.

This northern species has been taken on Speckled Mountain in Maine, and on the White Mountains, New Hampshire. It is thought by some to be identical with *P. frigida* of Northern Europe.

Genus ACRIDIUM. Burmeister (1838).

Prosternum armed with a prominent, blunt spine; median carina of the pronotum somewhat prominent; wings and wing covers well developed, as long or longer than the abdomen; abdomen of the male not swollen at the tip; eyes, elongate, oval.

The species may be separated as follows:—

{	Wing covers longer than the abdomen	<i>alutaceum.</i>
{	Wing covers about as long as the abdomen	<i>rubiginosum.</i>

ACRIDIDIUM ALUTACEUM. Harris.

Leather-colored Grasshopper.

Dirty brownish yellow, a paler yellow stripe on the top of the head and thorax; a slightly elevated, longitudinal line on the top of the thorax; wing covers semi-transparent, with irregular brownish spots; wings transparent, uncolored, netted with dirty yellow; abdomen, with transverse rows of minute blackish dots; hind femora, whitish within and without, the white portion bounded by a row of minute distinct black dots, and crossed, herring-bone fashion, by numerous brown lines; hind tibiae reddish, with yellowish-white spines, which are tipped with black.

Length to the end of abdomen, one and three-fourths inches.

ACRIDIDIUM RUBIGINOSUM. Harris.

Light rust red, somewhat uniform. Wing covers opaque, rather paler on the overlapping position, without spots, or sprinkled over with dim, small, dusky spots. Wings transparent, slightly reddish towards the tip; veins blackish; posterior femora reddish; the flat disk whitish, with a row of black dots above and below; apex with a lunate black spot on the side. Spines of the tibiae whitish, tipped with black.

Length of female about one inch and a half,—male much smaller.

Genus MELANOPLUS. Stål (1873).

Eyes nearly equal in the sexes, never broader than the length of the cheek; no distinct lateral carinae; mesosternum and metasternum together longer than wide; upper margin of the hind femora smooth; first joint of hind tarsi of the same length as the last joint, and a little stouter; pulvilli between the claws, large; last joint of the abdomen of the male much swollen.

The species may be separated as follows:—

- | | | | |
|----|---|---|----------------------|
| 1. | { | Wing covers shorter than the abdomen, or of the same length | 2. |
| | { | Wing covers much longer than the abdomen | 5. |
| 2. | { | Median carina distinct on the front lobe of the pronotum | 3. |
| | { | Median carina indistinct or wanting on front lobe of the pronotum, 4. | |
| 3. | { | With a yellow stripe along the sides | <i>femoratus.</i> |
| | { | With no yellow stripe along the sides | <i>punctulatus.</i> |
| 4. | { | Wing covers as long as the abdomen | <i>collinus.</i> |
| | { | Wing covers much shorter than the abdomen | <i>rectus.</i> |
| 5. | { | Anal cerci pointed at the tip | <i>femur-rubrum.</i> |
| | { | Anal cerci broadly rounded at the tip | <i>atlantis.</i> |

MELANOPLUS FEMORATUS. Burmeister.

The Yellow-striped Grasshopper. (Fig. 13.)

Dull or olive green, with a yellowish line on each side, extending from the front of the head to the tips of the wing covers; hind

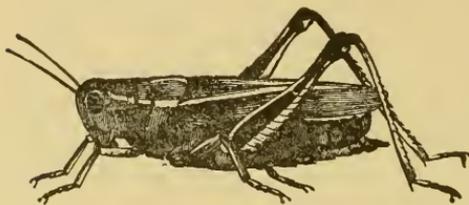


Fig. 13.
Melanoplus femoratus.

tibiae and tarsi blood red, the spines tipped with black; wings transparent, faintly tinged with pale green, and netted with greenish-brown lines. Abdomen of the male very obtuse, curving upward at

the end; anal cerci expanded at the base; female with the upper valves of the ovipositor tapering, finely pointed.

Length to tip of the abdomen, from one to one and one-fourth inches.

MELANOPLUS PUNCTULATUS. Uhler.

“Antennæ dark colored; eyes prominent; no lateral stripe. Wing covers spotted irregularly with dusky blotches; posterior lobe of pronotum rather coarsely punctate; hind tibiae parti-colored. Male with the basal half of the anal cerci equal. Female with the upper valves of the ovipositor scarcely tapering, finely pointed.”—*Scudder*.

Length, one inch. This species is very rare, but has been taken in Maine and Massachusetts.

MELANOPLUS COLLINUS. Scudder.

“Transverse furrows of anterior lobe of pronotum, distinct; upper half of divergent lobes but little darker than the lower half; wing covers as long as the abdomen. Male with the anal cerci forked at the tip. Female, stout.”—*Scudder*.

MELANOPLUS RECTUS. Scudder.

“Transverse furrows of anterior lobe of pronotum indistinct; upper half of divergent lobes strikingly darker than the pale lower half; wing covers much shorter than the abdomen. Male with the anal cerci equal or nearly equal throughout; long, slender, and nearly straight. Female rather slender.”—*Scudder*.

This species is quite rare. It has been taken in Massachusetts, in the valleys of the White Mountains, New Hampshire, and at Norway, Maine.

MELANOPLUS FEMUR-RUBRUM. De Geer.

The Red-legged Grasshopper.

Dull olive-green, with a black spot extending from the eyes along the side of the pronotum; an oblique yellow line on each side of the body, beneath the wings; a row of dusky brown spots along the middle of the wing covers; hind tibiæ and tarsi red, with black spines. Marginal apophyses of the last dorsal segment in the male, stout and parallel, reaching half-way over the supra-anal plate. Anal cerci tapering, pointed at the tip, and not half as broad on the apical as on the basal half. Apex of the last abdominal segment entire. Median carina of the pronotum of the female generally distinct on the anterior lobe; prosternal spine nearly cylindrical, scarcely tapering, except at the extreme tip, which is generally bluntly rounded.

Length, about one inch.

The eggs are deposited in the ground in the fall, and hatch the following May or June; but the insects do not reach maturity until July or August.

This is one of the most common grasshoppers in New England, and at times becomes so abundant as to destroy not only garden and field crops, but even attack shrubs and small trees. Prof. S. I. Smith states that he has seen small hackmatack trees, in Maine, almost covered with them, and entirely stripped of their leaves. When they are so abundant, they rise in the air and are carried long distances by the wind, when it is blowing strongly.

MELANOPLUS ATLANTIS. Riley.

Length, about one inch.

This species strongly resembles *M. femur-rubrum*, but may be distinguished by the following characters given by Mr. Scudder:—

Male, with the marginal apophyses of the last dorsal segment slender, divergent, reaching scarcely one-third way over the supra-anal plate; anal cerci broad, equal, broadly rounded at tip, scarcely twice as long as broad; apex of last abdominal segment notched. *Female*, with the median carina of the pronotum generally indistinct or wholly wanting on the anterior lobe; prosternal spine tapering, generally bluntly pointed at tip.

This is a common species throughout New England.

GENUS PAROXYA. Scudder (1876).

Body straight, sub-cylindrical. Head moderately large; eyes large, prominent, separated from each other above by fully (male)

or very much more than (female) the width of the basal joint of antennæ; antennæ long, equal, of similar length in both sexes. Pronotum simple, smooth (the posterior lobe punctulate); the median carina slight, equal; the anterior scarcely longer than the posterior lobe, the hind border of latter obtusely and bluntly angled; lower border of deflected lobes very obtusely angled in the middle; tubercle of prosternum prominent, sub-cylindrical, bluntly pointed, at the base laterally compressed, at least in the male. Wings and wing covers about reaching the tip of the abdomen, slender. Hind femora reaching (male) or surpassing (female) the tip of the wing covers, moderately stout, but tapering very regularly, unarmed above. Edges of inferior valve of ovipositor smooth; anal cerci of male having the general structure of those of *Melanoplus*.

PAROXYA ATLANTICA. Scudder.

Dull, olivaceous, excepting the top of the head, thorax and wing covers, which vary from light to dark brown. Head olivaceous, yellow on face and sides, in the female more or less infuscated; above the antennæ brownish, fuscous, more or less tinged with chestnut color; behind the eye a broad, straight, horizontal black band, edged more or less distinctly, above and below, with yellowish; antennæ not half so long as the body, in the male; pale yellow at base, at least in male; beyond, testaceous, deepening into fuscous toward the tip. Upper surface of pronotum of the color of the top of the head, the upper half of the deflected lobes with a very broad black band, in continuation of that on the head, anteriorly edged more or less distinctly, both above and below, with yellowish, and fading out before, or abruptly terminating at, the posterior lobe. Wing covers nearly uniform brownish fuscous, with a faint line of small fleckings down the middle, in the female. Legs of the color of the body, the middle and hind femora generally more or less infuscated on their outer face; hind tibiæ glaucous, with black or blackish spines.

Length, one inch.

Synopsis of the Truxalina.

- | | | |
|----|--|----------------------|
| 1. | { Prosternum obtusely tuberculated | 2. |
| | { Prosternum not tuberculated | 3. |
| 2. | { Antennæ somewhat enlarged towards the base | <i>Opomala.</i> |
| | { Antennæ not enlarged towards the base | <i>Stetheophyma.</i> |
| 3. | { Posterior margin of the pronotum truncate | <i>Chloëaltis.</i> |
| | { Posterior margin of the pronotum rounded or angular | <i>Stenobothrus.</i> |

GENUS *OPOMALA*. Serville (1831).

Head pyramidal; face very oblique. Antennæ reaching the apex of the pronotum, more or less enlarged near the base; the joints prismatic. Eyes somewhat prominent, oblique, placed near the front and close to the antennæ. Pronotum usually tricarinate, sometimes sub-cylindrical, and the carinæ sub-obliterated; sides straight, parallel or nearly so, truncate in front, truncate or obtusely rounded behind; transverse impressions generally indistinct. Wing covers straight, lanceolate, sometimes reaching to the tip of the abdomen, sometimes abbreviated. Prosternum with a short, blunt protuberance. Anterior and middle legs short; posterior generally long and slender.

OPOMALA BRACHYPTERA. Scudder.

Brown, dotted faintly above with black. A faint, dark stripe extending from the lower border of each eye along the side of the pronotum. Hind femora with a row of black dots on the upper edge; terminal lobe dark. Spines tipped with black. The female is more uniformly brown than the male, with numerous minute dusky dots; wings and wing covers shorter than the male.

Length, a little more than an inch.

GENUS *CILOËALTIS*. Harris (1841).

Eyes rather short, somewhat acuminate at the apex, placed near the vertex, oblique, and rather distant from each other. Back of the pronotum and head in one plane, horizontal. Head produced in front between the antennæ, in the form of a short, blunt pyramid. Antennæ short, filiform, sub-depressed, and joints sub-distinct. Face oblique and straight. Pronotum short, compressed at the sides, which are flat, straight and parallel, or very nearly so; tricarinate, the three carinæ distinct but not elevated; transverse incisions slight; truncate in front, and truncate or sub-truncate behind. Wing covers abbreviated, shorter than the abdomen, except in *Ch. punctulata*, when they are about equal to it in length; ovate-lanceolate. Prosternum unarmed, but slightly swollen.

The species may be separated as follows:—

- | | | |
|----|---|---------------------|
| 1. | { Female, green, or pale brown; male, green above | <i>viridis</i> . |
| | { Brown, without any green | 2. |
| 2. | { Wing covers about as long as the abdomen | <i>punctulata</i> . |
| | { Wing covers shorter than the abdomen | <i>conspersa</i> . |

CHLOËALTIS VIRIDIS. Scudder.

Wing covers shorter than the body, a little longer than the wings. Top of head and prothorax, green; sides of head and prothorax, dirty brown, with a horizontal black band behind the eye, extending over the prothorax; front of head, yellowish brown; fore and hind legs, reddish brown; mesothoracic legs, green; spines of tibiæ tipped with black; wing covers above, green; upon the sides, brown; body beneath, yellowish. The female varies from olivaceous green to dark brown, with a dark band behind the eye, as in the male; upon the top of the head a dark band extends from either side of the vertex, curving inwards and then outwards to midway between the median and lateral carinæ; hind tibiæ, reddish brown.

Length, about three-fourths of an inch.

CHLOËALTIS PUNCTULATA. Scudder.

Wings and wing covers extending to tip of abdomen. Vertex edged with reddish brown; a narrow, reddish-brown band extends along the lateral carinæ of pronotum to the eye, edged below with black; it extends also slightly upon the base of the wing covers; abdomen, sternum, fore legs and mouth parts (except the black mandibles), reddish brown; hind tibiæ, yellowish brown, the spines tipped with black; all the tarsi darker; wing covers green, with scattered, small, brownish spots.

Length of body, about one inch.

CHLOËALTIS CONSPERSA. Harris.

The Sprinkled Grasshopper.

Light reddish brown, sprinkled with black spots; a black line running behind each eye, on the head, and extending on each side of the thorax on the elevated lateral line; wing covers oblong-oval, pale yellowish brown, with many small, darker brown spots; wings about one-seventh of an inch long, transparent, with dusky lines at the tip; hind tibiæ pale red, the spines at the end, black.

Length, nearly nine-tenths of an inch.

GENUS STENOBOTIRUS. Fischer (1853).

Body medium size or small, elongate. Face more or less sloped, obliquely backward and under toward the breast; vertex in front of the eyes, somewhat prominent, horizontal; eyes sub-rotund or sub-angulate. The antennæ generally exceed the head and pronotum in length, and are sub-compressed or sub-cylindrical.

Pronotum with a more or less flattened disk, the sides somewhat compressed, the front margin truncate, the hind margin obtuse angled or obtusely rounded; the three carinae usually distinct, but not elevated: the median straight, entire; the lateral straight or curved inward at or in advance of the middle. Wings and wing covers sometimes abbreviated, sometimes as long or longer than the abdomen, generally narrow. Prosternum unarmed, narrow.

The species may be separated as follows:—

{ Wing covers unspotted	<i>curtipennis.</i>
{ Wing covers spotted	<i>maculipennis.</i>

STENOBOTHRUS CURTIPENNIS. Harris.

The Short-winged Grasshopper.

Olive gray above, variegated with dark gray and black; legs and body beneath, yellow; a broad black line extending from behind each eye on the sides of the thorax; wing covers, in the male, as long as the abdomen; in the female, covering two-thirds of the abdomen; wings rather shorter than the wing covers, transparent, faintly tinged with yellow; spines on hind tibiae tipped with black. Length, about seven-eighths of an inch.

STENOBOTHRUS MACULIPENNIS. Scudder.

The Spotted-winged Grasshopper. (Fig. 14.)

Head and top of pronotum, green (in some individuals, brown); a broad, reddish-brown band extending from the eyes to the hinder side of the pronotum, limited above by the lateral carinae, which are white. Sides of the pronotum below the band, brownish or dull yellowish. Wing covers extending beyond the end of the abdomen, green; with a row of square, black spots along the middle, and a few irregularly scattered, smaller black spots. Length, three-fourths of an inch.

This is a very variable species, and contains several well-marked varieties.

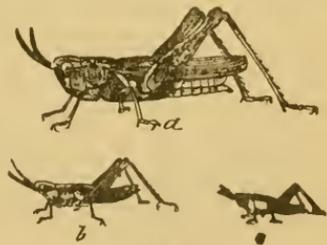


Fig. 14.
Stenobothrus maculipennis.
a. Mature insect.
b. Pupa.
c. Larva.

GENUS STETHEOPHYMA. Fischer (1854).

Head large; face somewhat oblique; eyes sub-depressed; antennae filiform, of medium length. Pronotum flattened above,

tricarinate; the median carina somewhat acute, and the lateral rather obtuse, sub-parallel, or slightly divergent posteriorly; the three transverse furrows undulate, the posterior only cutting the median carina; the sides marked more or less with impressed lines. Prosternum with an obtuse tubercle. Wings and wing covers perfect in both sexes, or slightly abbreviated in the female.

STETHEOPHYMA LINEATA. Scudder.

Dark brown. A narrow, curved, dark line extends from the upper border of the eyes to the lateral carinae of the pronotum, and is the upper limit of a broad, brownish-yellow band extending from the eye to the lateral carinae, whence it continues backward along the carinae; below this, upon the upper border of the side, extends another broad black band from the eye to the hind edge of the pronotum; median carina, black. Costal edge of wing covers dark, with a yellow streak beneath extending from the base to the costal border at about two-thirds the distance to the apex; beneath this is a band, narrow and black at the base, broadening till it occupies the whole width of the wing covers, becoming brown toward the tip, while the inner border is yellowish brown. Wings dusky, the internal half with a yellowish tinge. Legs dark brown; hind femora black on the outer and inner surfaces, reddish brown above, coral red below, with a white spot near the apex; tip black. Hind tibiae yellow, with black spines; the base and tips black, and a dusky annulation below the knee. Length, from one inch to one and one-fourth.

Mr. Scudder has described two other species, — *gracilis* and *platyptera*; but they are thought to be varieties of *lineata*.

Synopsis of the Ædipodinae.

1.	{ Median carina of the pronotum with a single notch	2.
	{ Median carina of the pronotum with two notches	7.
2.	{ Mesosternal lobes of the female twice as distant as the meta-	
	sternal lobes	3.
	{ Mesosternal lobes of the female not more distant than the	
	metasternal lobes	5.
3.	{ Wings brightly colored	<i>Arphia.</i>
	{ Wings transparent, faintly colored	4.
4.	{ Pronotum wrinkled	<i>Encoptolophus.</i>
	{ Head and pronotum smooth or granulated	<i>Chortophaga.</i>
5.	{ Median carina of the pronotum even throughout	<i>Camula.</i>
	{ Median carina of the pronotum irregular	6.
6.	{ Median carina of pronotum nearly obsolete on hind lobe,	<i>Hippiscus.</i>
	{ Median carina of pronotum high and arched on hind lobe,	<i>Dissosteira.</i>

- | | | | |
|----|---|--|---------------------|
| 7. | { | The two inner longitudinal veins of the wing covers run separately to the inner border | 8. |
| | | The two inner longitudinal veins of the wing covers unite before reaching the inner border | <i>Psinidia.</i> |
| 8. | { | Veins of the hind part of the hind wings thickened | <i>Circotettix.</i> |
| | | Veins of the hind part of the hind wings not thickened, <i>Trimerotropis.</i> | |

Genus ARPHIA. Stål (1873).

Body compressed; pronotum granulated; median carina either notched or entire. Wing covers of one color, but sprinkled with minute black dots; wings margined externally with black.

The species may be separated as follows: —

- | | | |
|---|--|---------------------|
| { | Pronotum right angled behind | <i>sulphurea.</i> |
| | Pronotum acute angled behind | <i>xanthoptera.</i> |

ARPHIA SULPHUREA. Fabricius.

Dusky brown, varying from an ashen to a dark hue. Wing covers paler than the head and thorax, more or less distinctly spotted with brown. Wings deep yellow at the base and on the basal half of the front margin, bounded externally by a dusky brown band beyond the middle, which curves and is prolonged on the hind margin, but does not reach the anal angle; a sub-marginal ray of the dark, extending two-thirds the distance to the base, separates the yellow of the margin from that of the disk; apex translucent, dusky. Posterior femora black inside, with two white bands; posterior tibiæ dusky, with a pale ring near the base; middle sometimes bluish. Length, a little over an inch.

ARPHIA XANTHOPTERA. Burmeister.

Thorax generally, though not always, darker than in the former species; sometimes with two yellow dots on the middle of the sides of the pronotum, one above the other, and the front and hind margins dotted with olive; but these markings are not uniform. The dark ray of the wings near the front margin, not more than half as long as in the former species, extending but one-third the distance to the base; this is remarkably uniform. Posterior femora generally with two oblique dull yellowish bands on the exterior face, and also a paler and more distinct ring near the apex.

Length, from one to one and one-fourth inches.

Genus CHORROPHAGA. Saussure (1884).

Body compressed, somewhat slim, punctate or fine wrinkled, green, sub-glabrous, slightly pubescent. Legs remote, with seat-

tered hairs on their surface. Antennæ rather short, and slightly flattened. Pronotum acute angled behind. Wing covers narrow; costal half, green; the sutural half, brownish.

CHORTOPHAGA VIRIDIFASCIATA. De Geer.

The Goat-Headed Grasshopper. (Fig. 15.)



Fig. 15.

Chortophaga viridifasciata.

a. Larva.

b. Mature insect.

This exceedingly variable insect has received numerous names, but all the different shades of variation may be reduced to two forms, which are

known by the names *virginiana*, Fabricius, the green form; and *infusata*, Harris, the brown form.

The form *VIRGINIANA* is described as follows:—

Green; wing covers with a broad green stripe on the outer margin, extending from the base beyond the middle, and including two small dusky spots on the edge, the remainder dusky, but semi-transparent at the end; wings transparent, very pale greenish yellow next to the body, with a large dusky cloud near the middle of the hind margin, and a black line on the front margin; antennæ fore and middle legs reddish; hind femora green, with two black spots in the furrow beneath. Length, about one inch.

FORM *INFUSATA*. Harris.

Dusky brown; wing covers faintly spotted with brown; wings transparent, pale greenish yellow next to the body, with a large dusky cloud near the middle of the hind margin, and a black line on the front margin; hind femora pale, with two large black spots on the inside; hind tibiæ brown, with darker spines, and a broad whitish ring below the knees.

Genus *EXCORTOLOPHUS*. Scudder (1875).

Head but little swollen above, front vertical above, roundly sloping below, a little constricted above the antennæ; eyes separated by about their own width, moderately large, somewhat elliptical; antennæ rather short and flattened; top of the pronotum nearly flat, the median carina abrupt, but not greatly elevated, cut into halves by a distinct though slight notch; lateral carinæ dis-

tinet but broken, very slightly curved; hind margin of pronotum forming a right angle; wing covers reaching but little beyond the end of the abdomen.

ENCOPTOLOPHUS SORDIDUS. Burmeister.

The Clouded Grasshopper. (Fig. 16.)

Dusky brown; wing covers pale, clouded, and spotted with brown; wings transparent, dusky at tip, with a dark brown line on the front margin; hind tibiae brown, with darker spines, and a broad whitish ring below the knees. Length, about one inch.

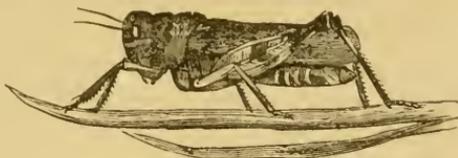


Fig. 16.
Encoptolophus sordidus.

GENUS CAMNULA. Stål (1873).

Head compressed: antennae medium, a little stouter in the male; hind femora with an acute margin slightly crested; eyes small, rather prominent, rounded kidney-shaped. Pronotum nearly level above with median and lateral carinae.

CAMNULA PELLUCIDA. Scudder.

Ash brown; face reddish brown; antennae yellowish at base, dark brown toward tip; a triangular black spot behind the eye, the apex touching it; a quadrate transverse black spot on the anterior upper portion of the sides of the pronotum; pronotum above sometimes with a dark band down the middle; wing covers with the basal half dark brown, with small yellowish spots and transverse streaks, especially on front border; apical half clear, with dark brown rounded spots prevalent along the



Fig. 17.
Camnula pellucida.

middle, decreasing in size toward the tip; when closed, the upper surface is dark brown, with a rather broad yellowish line along each angle on the upper surface; wings pellucid, with black nervules; legs dark brown, the hind femora yellowish or reddish brown, with two or three rather broad, diagonal, dark brown streaks, dark

brown at the apex; hind tibiæ yellowish brown, reddish toward the tip, with a very narrow, generally faint, annulation of dark brown at the base; spines tipped with black. Length of body, three-fourths of an inch.

Genus *HIPPISCUS*. Saussure (1861).

Large, or medium-sized, glabrous. Top of the head with a small central ridge. Pronotum with a granular surface, truncate in front, acute angled behind, compressed centrally on the sides, and above on each side of median carina; this last with one notch; lateral carinæ prominent only in the middle. Wing covers extending considerably beyond the end of the abdomen.

The species may be separated as follows:—

- | | | |
|---|---|-----------------------|
| { | Base of the wings, pale yellowish | <i>rugosus</i> . |
| { | Base of the wings, red | <i>tuberculatus</i> . |

HIPPISCUS RUGOSUS. Scudder.

Head and thorax, dark brown; two yellowish bands run from behind the eye backwards and inwards, nearly or quite meeting one another a little in advance of the middle of the pronotum, where they diverge and strike the hinder edge of the pronotum at the outer angles; there are two yellowish spots, one below the other, on the sides of the pronotum; wing covers marked with large dark blotches, generally occupying the larger portion of the wing; the tip of the wing cover pellucid, nearly free from spots; wings with the basal color, pale yellowish, and the apical portion dusky. Length of body, from one inch to one and one-fourth.

HIPPISCUS TUBERCULATUS. Palisot de Beauvois.

The Red-winged Grasshopper.

Antennæ of female rather short and stout; pronotum granulated, scarcely spotted, plain above; median carina of uniform height throughout. Wing covers spotted with brown; base of wings red, costa and outer margin fuscous.

This species has been generally called *phœnicopterus*; but Saussure has shown that they are distinct species.

Genus *DISSOSTEIRA*. Scudder (1876).

Head prominent, vertex elevated and tumid; antennæ of the male not thickened before, nor tapering at the tip; posterior lobe of the pronotum somewhat enlarged, median carina much elevated,

deeply notched near the middle, the posterior lobe much arched. Insects of large size.

Saussure unites the genus *Spharagemon*, Scudder, established in 1875, with *Dissosteira*, and adopts the latter name because of the gender of the former!

The species may be separated as follows:—

- | | | | |
|----|---|--|--------------------|
| 1. | { | Base of the wings black | <i>carolina</i> . |
| | { | Base of the wings light yellow | 2. |
| 2. | { | Apex of the wings with dusky spots at the tip | <i>marmorata</i> . |
| | { | Apex of the wings without dusky spots at the tip | 3. |
| 3. | { | Body pale, sparingly punctured | <i>bollii</i> . |
| | { | Body deeply punctured, and irrorate with black | <i>æqualis</i> . |

DISSOSTEIRA CAROLINA. Linneus.

Pale yellowish brown, with small dusky spots; wings black, with a broad yellow hind margin, which is covered with dusky spots at the tip. Length, from one to one and one-half inches.

DISSOSTEIRA ÆQUALIS. Say.

Ashy gray, mottled with dusky brown and white; wing covers semi-transparent at tip, with numerous dusky spots, so run together as to form three transverse bands; basal half of wings light yellow, transparent, with dusky veins and a few spots at the tip, and an intermediate broad black band, which reaches the inner angle of wing, curving and growing narrower on the hind margin; hind tibiæ coral red, spines tipped with black, and a wide white annulation below the knees. Length, one and one-fourth inches.

DISSOSTEIRA BOLLII. Scudder.

Brownish fuscous, the face with a grayish cinereous (in the male) or yellowish cinereous (in the female) tinge, distinctly punctate, the pits dusky or blackish; antennæ brownish yellow on the basal half, infuscated beyond, the whole more or less annulate with dusky yellow and blackish in the male. Wing covers flecked throughout with minute blackish spots. Wings light greenish yellow at the base, with a broad median arcuate band, blackish in color, sending out a broad short shoot toward the base next the upper border. Beyond, the wing is at first hyaline, with broad blackish, fuliginous veins, while the extreme tip is black, as the median band. Hind femora dull brownish; the basal two-fifths of the hind tibiæ blackish, with a broad whitish annulus beyond, coral red. Crest of pronotum very high, that of the posterior lobe

independently arched, much more elevated in front than behind. Length of body, about one and one-fourth inches.

Mr. Scudder has described a species under the name of *D. balteatum*; but Saussure considers it only a variety of the above species.

DISSOSTEIRA MARMORATA. Harris.

The Marbled Grasshopper.

Ash-colored, variegated with pale yellow and black; thorax suddenly narrowed before the middle, the slightly raised longitudinal line on the top cut through in the middle by a transverse fissure; wing covers marbled with large whitish and black spots, and semi-transparent at the end; wings light yellow on the half next the body, transparent near the end, with two black spots on the tip, and a broad intermediate black band, which, narrowed and curving inwards on the hind margin, nearly reaches the inner angle; hind femora pale yellow, black at the extremity, and nearly surrounded by two broad black bands; hind tibiæ coral red, with a black ring below the knee, and followed by a white ring, black at the lower extremity also, with tips of the spines black. In some individuals, an additional black ring below the white one on the tibiæ. Length, from three-fourths to one inch.

GENUS PSINIDIA Stål (1873).

Antennæ of the male elongated, somewhat stout and flattened; pronotum with a granulated or tuberculated surface, rounded in front, acute angled behind; median carina with two notches, lateral carinæ distinct on the posterior lobe.

PSINIDIA FENISTRALIS. Serville.

The Long-horned Grasshopper.

Ash-colored, variegated with gray and dark brown; antennæ nearly as long as the body, and with flattened joints; thorax very much compressed laterally before the middle; wing covers and wings long and narrow; the former variegated with dusky spots, and semi-transparent at the tip; wings next to the body vermilion red, yellow, sometimes pale, sometimes deep and almost orange-colored, at other times uncolored and semi-transparent; with a broad black band across the middle, which is narrowed and prolonged on the hinder margin, and extends quite to the inner angle; beyond the band, the wings are transparent, with the tips black or covered with blackish spots; hind tibiæ whitish, with a

black ring at each end, a broad one of the same color just above the middle, and the spines tipped with black. Length, three-fourths of an inch. The wings of this species are very variable in color at the base.

GENUS TRIMEROTROPIS. Stål (1873).

Body slightly wrinkled, and covered with fine hairs; pronotum slightly angled in front and acutely angled behind, and slightly wrinkled; median carina broken by two wide notches; wing covers long and narrow.

TRIMEROTROPIS MARITIMA. Harris.

Ash gray; face variegated with white; wing covers sprinkled with minute brownish spots, and semi-transparent at tip; wings transparent, faintly tinged with yellow next the body, uncolored at tip, with a series of irregular blackish spots forming a curved band across the middle; hind tibiae and feet pale yellow, with the extreme points of the spines black. Length, from three-fourths to one and one-fourth inches.

GENUS CIRCOTETIX. Scudder (1876).

Body pubescent and punctured. Eyes somewhat prominent, separated above by a space about equal to their width; antennae but little longer than the head and prothorax combined; pronotum with the front lobe slightly narrower than the head; median carina on the anterior portion of the front lobe, obsolete on the posterior portion, and inconspicuous on the hind lobe; front margin scarcely angulated, hind margin rectangular; lateral carinae distinct on posterior lobe, but not prominent; surface slightly wrinkled. Wings and wing covers much longer than the body.

CIRCOTETIX VERBUCULATUS. Kirby.

Ash-colored, mottled with black and gray; wing covers semi-transparent beyond the middle, with numerous blackish spots which run together at the base, and form a band across the middle; wings broad, light yellow on the basal half, the remainder dusky but transparent, with black net-work, and deep black at tip, and an intermediate, irregular band, formed by a contiguous series of black spots, reaching only to the hind margin, but not continued toward the inner angle; hind tibiae pale yellow, with a black ring below the knees, a broader one at the extremity, and a blackish spot behind the upper part of the tibia. Length, nearly one inch.

Synopsis of the Tettiginæ.

- | | | | |
|----|---|--|---------------------|
| 1. | { | Pronotum arched roundly | <i>Batrachidea.</i> |
| | { | Pronotum nearly or quite horizontal | 2. |
| 2. | { | Antennæ with thirteen or fourteen joints | <i>Tettix.</i> |
| | { | Antennæ with twenty-two joints | <i>Tettigidea.</i> |

Genus TETTIX. Fischer (1853).

Head generally small; eyes globular, somewhat prominent; antennæ composed of thirteen or fourteen joints, filiform; pronotum extending back over the abdomen to or beyond its extremity; the lower anterior angle of the sides angulated and bent inward; the lateral carinæ somewhat prominent, convergent near the front border. Wing covers short, in the form of oval scales. Wings well developed, usually as long or longer than the abdomen, and slightly curving upward at the end. Pronotum without any spine or tubercle. Species small.

The species may be separated as follows:—

- | | | | |
|----|---|---|----------------------|
| 1. | { | Length about half an inch | 2. |
| | { | Length about one-fifth of an inch | <i>triangularis.</i> |
| 2. | { | Length to tip of wings, .55 to .60 of an inch | <i>granulatus.</i> |
| | { | Length to tip of wings half an inch or less | 3. |
| 3. | { | Pronotum advanced to the eyes | <i>cucullatus.</i> |
| | { | Pronotum not advanced to the eyes | <i>ornatus.</i> |

TETTIX GRANULATUS. Kirby.

Cinereous, obscurely clouded with black, the whole body granulated with very minute, elevated, whitish points. Pronotum longer than the abdomen, tricarinate. Tibiæ reddish, obscurely banded with white. Body black, sprinkled with numberless very minute elevated points or granules. Pronotum cinereous, clouded obscurely with black; the middle carina straight, and the lateral ones curved at the base. The rudiments of wing covers cinereous, ridged, with excavated punctures; nerves of the wings black, those of the costal area white. The fore anterior tibiæ reddish, obscurely annulated with white. Length, nearly half an inch.



Fig. 18.
Tettix
granulatus.

TETTIX ORNATUS. Say.

Smaller than *T. granulatus*; vertex but little in advance of the eyes, and front border nearly straight, instead of angulated. Pronotum shorter than in the preceding; wings smaller. Both this and the preceding species have almost every conceivable variation

of ornamentation ; but, as has been remarked, color and ornamentation have but little value in separating the species of *Tettix*.

TETRIX CUCULLATUS. Scudder.

Vertex at the front border smaller than across the middle of the prominent eyes. Testaceous-fuscous, granulose. Pronotum dilated in front, advanced upon the head to the eyes. Length, nearly half an inch.

It differs from *T. granulatus*, which it most resembles, in having the vertex very narrow, slightly less than the diameter of the much-inflated eyes, the front cut off square, and slightly hollowed, not projecting outward so far as the eyes. The pronotum is broader and more compact over the thorax, more suddenly sloped off behind, and extending backward nearly twice the length of the abdomen, the wings overreaching slightly. The punctures on the wing covers not so deep.

TETRIX TRIANGULARIS. Scudder.

Allied to *T. ornatus*, and agreeing with it in ornamentation, in the character of the vertex and prominence of the eyes, but differing in the length of the pronotum and wings. As in both of the preceding species, the pronotum and wings are of equal length, but in this species the pronotum is scarcely longer than the body, and is not produced backward into such a slender point, the sides being straighter. Length, three times the breadth ; length of pronotum, .17 of an inch.

Genus TETTIGIDEA. Scudder (1862).

More robust and clumsy than *Tettix*, head larger, more swollen upon the top, and less sloping down the front ; antennæ consisting of twenty-two joints, which are cylindrical and not flattened. The lower anterior angle of the sides of the pronotum, which is angulated and bent inwards in *Tettix*, is here rounded and straighter ; the lateral carinæ are not so prominent as there, or so strongly bent inwards in advance of the broader portion ; the front border is thrust forward at an angle partially concealing the head. Wing covers considerably longer and narrower than in *Tettix*. This genus further differs from *Tettix*, in having a small circular space, without facets, set off from the upper, inner border of the eye.

The species may be separated as follows :—

- | | | |
|---|--|--------------------|
| { | Pronotum extending beyond the end of the abdomen . . . | <i>lateralis.</i> |
| | Pronotum not extending beyond the end of the abdomen . . . | <i>polymorpha.</i> |

TETTIGIDEA LATERALIS. Say.

Pale brownish-testaceous, with a lateral, broad fuscous line. Pronotum shorter than the wings. Antennæ reddish brown, blackish at tip. Pronotum flattened, with small longitudinal lines or wrinkles, and a more obvious, continuous, elevated central line extending the whole length. Wings brown on the anterior margin toward the tip, and extending at least one-twentieth of an inch beyond the pronotum; sides with a dilated blackish-brown line or vitta, beginning at the eye, and including the abdomen above, and each side. Legs brown, more or less annulated with pale; under side of abdomen pale yellowish or testaceous. Length, to tips of wings, nearly half an inch.

TETTIGIDEA POLYMORPHA. Burmeister.

Dark brown; sides blackish; pronotum clay-colored or pale brown, and about as long as the body. Wing covers with a small white spot at the tips; wings much shorter than the pronotum. Male with the face and edges of the lateral margins of the pronotum yellow. This species is much shorter and thicker than *T. lateralis*.

Length, two-fifths of an inch.

Genus BATRACHIDEA. Serville (1839).

Head larger than in *Tettix*; eyes more distant; front less sloping; antennæ with twelve joints; median carina very high and arched; lateral carinæ indicated only in front.

The species may be separated as follows: —

{	Pronotum reaching to the end of the abdomen	<i>cristata</i> .
{	Pronotum not reaching to the end of the abdomen	<i>carinata</i> .

BATRACHIDEA CRISTATA. Harris.

Vertex projecting beyond the eyes, front border well rounded, a little angulated, the median carina sharp, prominent, sloping downwards posteriorly, the front deeply notched immediately in front of the eyes; eyes rather prominent, scarcely more than half as broad as the vertex; the pronotum with sides neither swollen nor hollowed, of the length of the body; the median carina high, regularly arched; the lateral border with two shallow grooves, one anterior, the other posterior, overlapping one another in the middle; the whole pronotum is minutely scabrous, and there is generally a dark quadrate or triangular spot on either side, above the terminal half of the wing covers; wings reaching the tip of the pronotum. Length of pronotum, one-third of an inch.

BATRACHIDEA CARINATA. Seudder.

The head much as in *B. cristata*, with the eyes slightly larger and more prominent; the median carina of the pronotum sharp, regularly arched, the pronotum extending backward quite a distance behind the tip of the abdomen, a little upturned towards the tip, with slightly longer wings; the lateral grooves are narrower and less distinct than in *B. cristata*, and the upper surface is more coarsely scabrous than in that species; markings the same as in *B. cristata*. Length of body, one-third of an inch; of pronotum, .43 of an inch.

FAMILY PHASMIDÆ.

The Walking-sticks.

But a single member of this family is known to occur in New England, and it has been placed in the genus *Diapheromera*.

Genus DIAPHEROMERA. Gray (1835).

Body long, slender and cylindrical. Head oval and slightly inclined. Antennæ long, slender, and composed of numerous joints, and are inserted in front of the eyes. Palpi short, cylindrical. Legs simple, the anterior pair similar to the others. Tarsi five-jointed. Elytra very short, or wanting.

DIAPHEROMERA FEMORATA. Say.

The Common Walking-stick. (Fig. 19.)

Length of body, from two and one-half to three inches. Color, green or greenish brown, but varying much, becoming quite brown towards the end of the season.

Head of the male with three brown stripes, the female with only two, one on each side, extending backward from the base of the antennæ.

Fore and middle femora armed with a short acute spine on the under side, near the outer end. Elytra entirely wanting.

This insect feeds on the foliage of oak, hickory, locust, and has been known to attack the peach and rose bushes.

The eggs, which are black, and oval in outline, are dropped loosely on the ground in the fall, and do not hatch till the succeeding year, and sometimes not till the second year. They change but little except in size and color during their early life, and molt but twice.



Fig. 19.

Diapheromera femorata.

FAMILY BLATTIDÆ.

Cockroaches.

Body usually depressed and oval. Pronotum shield-like. Legs adapted for running only. Wing covers usually leathery, opaque, overlapping (if well developed) when at rest. Head bent down, face sloping backwards. Eyes large; ocelli rudimentary, usually two. Antennæ long and slender.

Synopsis of the Genera.

- | | | | |
|----|---|---|---------------------|
| 1. | { | Sub-anal styles wanting in the males; last joint of the abdomen of the female not divided beneath | <i>Blatta.</i> |
| | | Sub-anal styles present in the males; last joint of the abdomen of the female divided | 2. |
| 2. | { | Supra-anal plate fissured | <i>Periplaneta.</i> |
| | | Supra-anal plate not fissured | <i>Platamodes.</i> |

Genus *BLATTA*. Linneus (1758).

The insects placed in this genus have a pad (pulvillus) between the claws of the feet; the seventh sternum of the abdomen entire in both sexes; and the sub-anal styles rudimentary in the males.

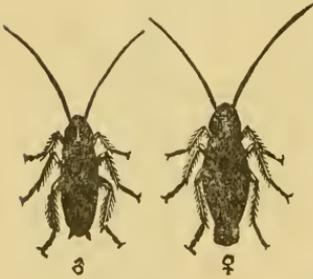
BLATTA GERMANICA. Fabricius.*Water Bug. Croton Bug. (Fig. 20.)*

Fig. 20.
Blatta germanica. Male and female.

Length, about half an inch. Color, dull yellowish, with a yellowish-brown head and yellowish antennæ. Pronotum with a reddish-brown longitudinal band on each side. Wing covers and wings somewhat longer than the abdomen.

The eggs, thirty-six in number, are laid in two rows in a capsule which the female carries around attached to the end of her abdomen; and, when the young hatch, she assists them in escaping from the capsule. The young molt or shed their skins six times before they reach maturity, which takes from four to five months. They do not avoid the light as much as the other species of this family, but still are nocturnal to a certain degree.

This species is common in houses in and about all the large cities in New England, where it is called the "croton bug." It feeds on almost everything, but prefers wheat bread to all other articles of diet. It sometimes injures libraries by gnawing the

bindings of books bound in cloth. The use of Ryethrum powder on the shelves is the best remedy. It has been recommended to mix a teaspoonful of powdered arsenic with a tablespoonful of mashed potato, and scatter about their lurking-places; but, when poison is used, the greatest caution is necessary to prevent accidents.

Borax is also said to be useful in destroying the croton bug.

BLATTA? FLAVOCINCTA. Scudder.

“Prothoracic shield rather dark brown, slightly paler along the median line, bordered throughout with a pale yellowish band, forming only a very narrow edge posteriorly; broader in front, and quite broad at the sides, covering all the deflexed border; the edge at the sides and front is slightly raised; wing covers scarcely reaching the tip of the abdomen, reddish brown, with the anterior half of the outer margin paler, with a yellowish tinge; wings not half the length of the wing covers; abdomen above very dark brown; below, dark brown, the terminal segment being darkest; legs yellowish brown, with spines as in *B? lithophila*; head reddish brown: sides below antennae yellowish; eyes black; antennae dark brown, paler toward tip; third joint rather larger than the two succeeding joints, and equal in size to the second. Length of body, fifty-six hundredths of an inch.”

Mr. Scudder placed this species and *germanica* under the genus ECTOBIA, and it may not be properly placed here. He also described a species under ECTOBIA as *lithophila* (a manuscript name of Harris); but he informs me that it is very likely to be the larva of *Platamodes pennsylvanica*.

Genus PERIPLANETA. Burmeister (1838).

Last abdominal sternum of the female divided; sub-anal styles of the male well developed. Antennae slim and tapering, longer than the body. Legs long and very spiny.

{	Wing covers and wings extending beyond the end of the abdomen in both sexes	<i>americana</i> .
	Wing covers and wings not reaching to the end of the abdomen in the males, rudimentary in the females.	<i>orientalis</i> .

PERIPLANETA AMERICANA. Fabricius.

Length, one inch and one-fourth. Color, reddish brown, with paler indistinct bands on the pronotum. Wings and wing covers well developed in both sexes, and extending beyond the end of the abdomen. Legs much lighter in color than the body.

PERIPLANETA ORIENTALIS. Linneus.

Length, about four-fifths of an inch. Color, dark brown. Pronotum not banded: legs of a lighter color than the body. Wings and wing covers of the male well developed, reaching nearly to the end of the abdomen. Wings wanting in the female, and wing covers very small, not more than one-fifth of an inch long.



Fig. 21.
Periplaneta orientalis.

The female lays sixteen eggs in two rows in a large horny capsule, which she carries with her for seven or eight days, when she drops it in a warm and sheltered place. When the young hatch, they discharge a fluid which softens the cement along the edge of the capsule, and enables them to escape without assistance. The young larvæ are white at first, differing from the adult only in size, color and the absence of wings. They run about with great activity, feeding upon any starchy food they can find.

This species is nocturnal in its habits, and flees at the first appearance of light. It is a great pest, for it devours almost anything that comes in its way, as flour, bread, meat, cheese, woolen clothes, and even old leather. Various methods have been suggested for their destruction, but one of the best is to use a small wooden box, having a circular hole at the top, with a glass rim, out of which they cannot escape. It should be baited at night, and the contents thrown into hot water in the morning.

GENUS PLATAMODES. Scudder (1862).

“ A genus more closely allied to *Periplaneta* than to any other, but readily distinguishable from it by its much narrower and more elongated body, — the sides being sub-parallel to one another throughout their whole extent, while in *Periplaneta* the abdomen is much swollen. The wings and wing covers extend beyond the abdomen, the latter being well rounded at the tip. The supra-anal plate is regularly rounded, but lacks altogether the fissuration seen in *Periplaneta*; but at the same time it is not squarely docked, as in *Stylopyga*. The anal cerci are somewhat shorter and not so flattened as in *Periplaneta*, while the anal styles are very short, and turned abruptly downwards. In *Periplaneta* the sub-genital plate does not extend so far backward as the supra-anal. In *Platamodes* it extends backward farther. A further distinction between the

two genera may be seen at the inner borders of the eyes, which in *Platamodes* are nearly parallel, while in *Periplaneta* they approach one another anteriorly. I have only seen males."

PLATAMODES UNICOLOR. Seudder.

"Wings and wing covers, uniform pale, shining reddish brown; head and prothoracic shield nearly the same, but slightly darker, particularly in the middle of the latter; abdomen a little darker above, especially on the borders; cerci dark brown; legs, especially the tibiae, darker than the body; eyes black; antennae and palpi brown; antennae reaching backward to tip of wing covers. Length of body, .25 inch; length to tip of wings, .35."

FAMILY FORFICULIDÆ. Stephens (1829).

Earwigs. (Fig. 22.)

Dr. Packard has followed Leach and some others in separating the earwigs from the Orthoptera, and has established the Order Dermaptera for their reception.

We have but a single species in New England, common also in Europe, and placed in the genus LABIA.



Fig. 22.
Earwig. Forficula.

Genus LABIA. Leach (1817).

Body small and convex; head moderately large; antennae composed of from ten to fifteen joints. Pronotum somewhat smaller than the head; wing covers always present, though the wings are sometimes wanting. Abdomen somewhat widened in the middle, the last segment much larger than the others, and armed with a pair of forceps separated at the base in the males, but not separated in the females. Legs comparatively short; the first joint of the tarsi as long as the other two, and the second is the shortest.

LABIA MINOR. Linneus.

The Little Earwig.

Length of body, including forceps, one-fourth of an inch. Head and sides of abdomen nearly black. Mouth parts, antennae, thorax, wing covers, exposed portion of the wings, and the middle of the upper side of the abdomen, yellowish brown; the last segment of the abdomen and the forceps reddish brown. Legs and

last two joints of antennæ honey yellow. Entire surface of the body covered with fine, short hairs.

This species remains concealed during the day, but flies about at night, and is sometimes attracted into houses by the light. It was taken in this way at Amherst, Mass., at 8 P. M., Aug. 25, 1887. It is probably not abundant enough to do any considerable damage, but in Europe they are at times very injurious to flowers and fruits; and they are caught in traps, consisting of hollow tubes closed at one end, which are set up in the gardens, and in which they conceal themselves. The hollow stems of the sunflowers are used for this purpose, as the earwigs are fond of the remains of the sweet pith.

Curtis states that the female earwig lays her cluster of little oval, opaque, yellowish eggs under a fallen leaf or other sheltered place, then nestles upon them as a hen does on her eggs, and then probably protects and feeds her young.

The term earwigs, which has been applied to these insects in Europe, and very generally in this country, has sometimes been incorrectly given to one of the Myriopods.

DEFINITION OF TERMS.

- Antenna.* Two jointed, thread-like appendages on the front of the head.
- Carina* (plural *Carinæ*). A keel or ridge.
- Cerci.* The small appendages issuing from the sides of the last abdominal segment.
- Cinereous.* An ash-gray color.
- Clavate.* Having a thickened, club-like extremity.
- Costa.* It is usually applied to the median carina of the face; but is also applied to the front margin of the wings and elytra.
- Dentate.* Furnished with a tooth.
- Disk.* The middle surface.
- Dorsum.* The upper surface or back of the thorax, abdomen, etc.
- Dorsal.* Pertaining to the upper surface.
- Elongate.* Signifies that the part is longer than it is wide.
- Elytra.* The wing covers. The anterior or upper wings.
- Femora.* The thighs.
- Filiform.* Slender, or thread-like.
- Forcola.* A cavity or cellular depression.
- Fulvous.* Tawny, or light yellowish brown.
- Fuscous.* Dark brown, or sooty color.
- Ganglion* (plural *Ganglia*). A nervous mass or enlargement.
- Glabrous.* Smooth or polished.
- Hyaline.* Transparent, with a greenish tinge.
- Lateral lobes* of the pronotum. The deflexed portions that cover the sides of the thorax.
- Medial* or *Median.* Occupying the middle.
- Mesonotum.* The upper or dorsal surface of the mesothorax.
- Mesosternum.* The under surface of the mesothorax.
- Mesothorax.* The middle part of the thorax, to which the wing covers and middle pair of legs are attached.
- Metanotum.* The upper or dorsal surface of the metathorax.
- Metasternum.* The under surface of the metathorax.
- Metathorax.* The posterior part of the thorax, to which the wings and hind pair of legs are attached.
- Nerves.* The larger ribs or veins of the wings and wing covers, extending from the base toward the apex.
- Nervules.* The smaller connecting veins of the wings and wing covers.
- Ocelli* (singular *Ocellus*). The three simple or little eyes.
- Pectus.* The breast or under surface of the thorax.
- Pronotum.* The shield which covers the front part of the thorax.

Prosternum. The under surface of the prothorax.

Prothorax. The anterior division of the thorax, to which the head is joined.

Pulvilli (singular *Pulvillus*). The little pads between the claws.

Punctate or *Punctured.* Containing numerous small, point-like depressions or punctures.

Reticulated. Furnished with veining or markings like net-work.

Scabrous. Covered with small, slight elevations.

Spurs. The strong spines at the apex of the tibiæ.

Sulcus. A linear groove or channel.

Suture. A seam or impressed line; generally used in reference to the junction of two pieces or plates.

Tarsus (plural *Tarsi*). The jointed foot.

Tibia (plural *Tibiæ*). The part of the leg between the thigh and the foot.

Tricarinate. Having three keels or *carinæ*.

Tuberculate. Covered with tubercles.

Unarmed. Without a spine; unspined.

Vertex. The front portion of the upper surface of the head, between and in front of the eyes.

A LIST OF THE NEW ENGLAND ORTHOPTERA,
 With the Principal Synonyms.

GRYLLIDÆ.

<i>Tridactylus terminalis</i> , Uhler, Mss. (Scudder.)	<i>Gryllus luctuosus</i> , Serv.
<i>Gryllotalpa borealis</i> , Burmeister.	Gr. pennsylvanicus, Burm.
Gr. brevipennis, Serville.	Gr. neglectus, Scudd.
<i>Gryllotalpa columbia</i> , Scudder.	Gr. niger, Harris.
G. longipennis, Scudd.	<i>Nemobius fasciatus</i> , De Geer.
<i>Gryllus abbreviatus</i> , Serv.	N. vittatus, Harr.
Gr. angustus, Scudd.	<i>Æcanthus niveus</i> , Serv.
	Æ. fasciatus, Fitch.

LOCUSTIDÆ.

<i>Ceuthophilus maculatus</i> , Harr.	<i>Conocephalus ensiger</i> , Harr.
Phal. lapidicola, Burm.	<i>Conocephalus robustus</i> , Scudd.
<i>Ceuthophilus brevipes</i> , Scudd.	<i>Xiphidium fasciatum</i> , De Geer.
<i>Cyrtophyllus concavus</i> , Harr.	Orch. gracile, Harr.
Platy. perspicillatum, Serv.	<i>Xiphidium brevipenne</i> , Scudd.
<i>Amblycorypha oblongifolia</i> , De Geer.	<i>Xiphidium vulgare</i> , Harr.
<i>Amblycorypha rotundifolia</i> , Scudd.	<i>Xiphidium concinnum</i> , Scudd.
<i>Microcentrum laurifolium</i> , Linneus.	<i>Xiphidium glaberrimum</i> , Burm.
Micro. affiliatum, Scudd.	<i>Thyreonotus dorsalis</i> , Burm.
<i>Scudderia curvicauda</i> , De Geer.	<i>Thyreonotus pachymerus</i> , Burm.
Gryl. myrtifolius, Drury.	
Phan. angustifolia, Harr.	

ACRIDIDÆ.

<i>Pezotettix glacialis</i> , Scudd.	<i>Melanoplus punctulatus</i> , Scudd.
<i>Pezotettix manca</i> , Smith.	<i>Melanoplus collinus</i> , Scudd.
<i>Pezotettix borealis</i> , Scudd.	<i>Melanoplus reclus</i> , Scudd.
<i>Acridium alutaceum</i> , Harr.	<i>Melanoplus femur-rubrum</i> , De Geer.
<i>Acridium rubiginosum</i> , Harr.	<i>Melanoplus atlantis</i> , Riley.
<i>Melanoplus femoratus</i> , Burm.	M. atlantis, Scudd.
C. bivittatus, Uhl.	<i>Paroxya atlantica</i> , Scudd.
L. leucostoma, Kirby.	<i>Opomala brachyptera</i> , Scudd.
A. flavivittatum, Harr.	

- Chloëaltis viridis*, Scudd.
Chloëaltis punctulata, Scudd.
Chloëaltis conspersa, Harr.
Stenobothrus curtipennis, Harr.
 Sten. longipennis, Scudd.
Stenobothrus maculipennis, Scudd.
 Sten. æqualis, Scudd.
 Sten. bilineatus, Scudd.
Stetheophyma lineata, Scudd.
Arphia sulphurea, Fab.
Arphia xanthoptera, Burm.
Chortophaga viridifasciata, De Geer.
 T. infuscata, Harr.
 T. radiata, Harr.
Encoptolophus sordidus, Burm.
 Æ. nebulosa, Harr.
Cannula pellucida, Scudd.
 Æ. atrax, Scudd.
Hippiscus rugosus, Scudd.
Hippiscus tuberculatus, Pal. de Beau.
 Æd. obliterata, Burm.
 Æd. phænicoptera, Thos.
- Dissosteira carolina*, Linn.
Dissosteira æqualis, Say.
Dissosteira bollii, Scudd.
Dissosteira marmorata, Harr.
Psinidia fenestralis, Serv.
 Æ. eucerata, Harr.
Trimerotropis maritima, Harr.
Circotettix verruculatus, Kirby.
 Loc. latipennis, Harr.
Tettix granulatus, Kirby.
 T. ornata, Harr.
Tettix ornatus, Say.
 T. arenosa, Burm.
 T. dorsalis, Harr.
 T. quadrimaculata, Harr.
 T. bilineata, Harr.
 T. sordida, Harr.
Tettix cucullatus, Scudd.
Tettix triangularis, Scudd.
Tettigidea lateralis, Say.
Tettigidea polymorpha, Burm.
 T. parvipennis, Harr.
Batrachidea cristata, Harr.
Batrachidea carinata, Scudd.

PHASMIDÆ.

Diapheromera femorata, Say.

BLATTIDÆ.

- Blatta germanica*, Fab.
Blatta ? flavocincta, Scudd.
Periplaneta americana, Fab.
- Periplaneta orientalis*, Linn.
Platamodes unicolor, Scudd.

FORFICULIDÆ.

- Labia minor*, Linn.
 L. minuta, Scudd.

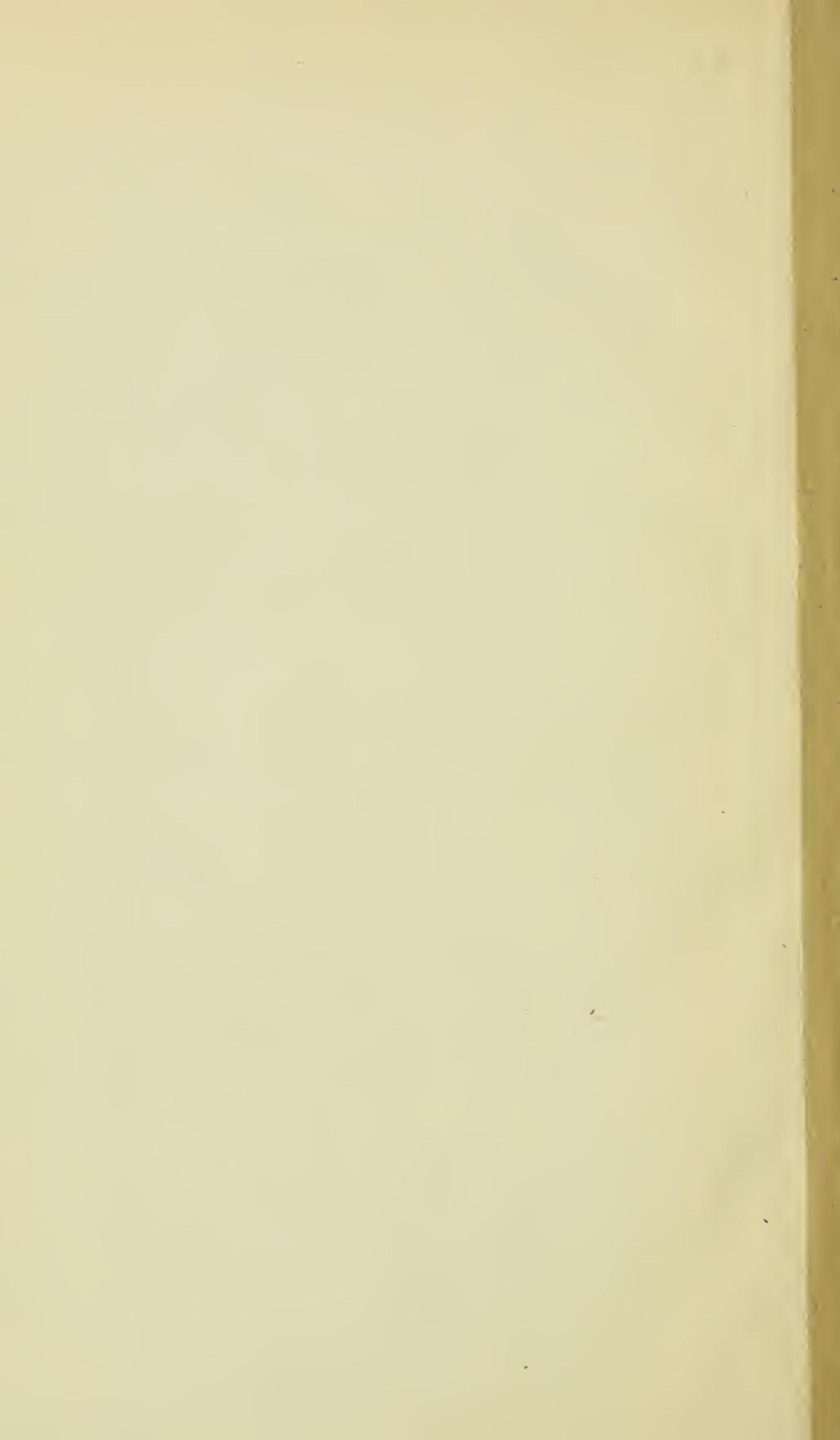
INDEX OF FAMILIES AND GENERA.

	Page		Page
Acerididæ.	26	Labia,	53
Aceridium.	30	Locustidæ,	18
Amblycoryphæ,	20	Melanoplus,	31
Arphia,	39	Microcentrum,	21
Batrachidea,	48	Nemobius,	15
Blatta,	50	Œcanthus,	16
Blattidæ,	50	Opomala,	35
Cannula,	41	Paroxya,	33
Ceuthophilus,	18	Periplaneta,	51
Chloëaltis,	35	Pezotettix,	28
Chortophaga,	39	Phasnidæ,	49
Circotettix,	45	Platamodes,	52
Conocephalus,	22	Psinidia,	44
Cyrtophyllus,	19	Scudderia,	22
Diapheromera,	49	Stenobothrus,	36
Dissosteira,	42	Stethæophyma,	37
Encoptolophus,	40	Tettigidea,	47
Förficulidæ,	53	Tettix,	46
Gryllidæ,	12	Thyreonotus,	25
Gryllotalpa,	13	Tridactylus,	13
Gryllus,	14	Trimerotropis,	45
Hippiscus,	42	Xiphidium,	23

INDEX OF SPECIES.

	Page		Page
abbreviatus,	15	fasciatum,	24
æqualis,	43, 58	fasciatus,	16, 57
affiliatum,	57	femorata,	49
alutaceum,	31	femoratus,	32
americana,	51	femur-rubrum,	33
angustifolia,	57	fenistralis,	44
angustus,	57	flavivittatum,	57
arenosa,	58	flavocincta,	51
atlanis,	33	germanica,	50
atlantica,	34	glaberrimum,	25
atlantis,	57	glacialis,	29
atrax,	58	gracile,	57
bilineata,	58	granulatus,	46
bilineatus,	58	infuscata,	40, 58
bivittatus,	57	lapidicola,	57
bollii,	43	lateralis,	48
borealis,	14, 30	latipennis,	58
brachyptera,	35	laurifolium,	21
brevipenne,	24	leucostoma,	57
brevipennis,	57	lineata,	38
brevipes,	19	longipennis,	57, 58
carinata,	49	luctuosus,	15
carolina,	43	maculatus,	19
collinus,	32	maculipennis,	37
columbia,	14	manca,	30
concavus,	20	maritima,	45
concinnum,	25	marmorata,	44
couspersa,	36	minor,	53
cristata,	48	minuta,	58
cucullatus,	47	myrtifolius,	57
curtipennis,	37	nebulosa,	58
curvicanda,	22	neglectus,	57
dorsalis,	26, 58	niger,	57
dorsatus,	57	niveus,	17
ensiger,	22	obliterata,	58
eucerata,	58	oblongifolia,	21

	Page		Page
orientalis,	52	rotundifolia,	21
ornata,	58	rubiginosum,	31
ornatus,	46	rugosus,	42
pachymerus,	26	sordida,	58
parvipennis,	58	sordidus,	41
pellucida,	41	sulphurea,	39
pennsylvanicus,	57	terminalis,	13
perspicillatum,	57	triangularis,	47
phœnicoptera,	58	tuberculatus,	42
polymorpha,	48	unicolor,	53
punctulata,	36	verruculatus,	45
punctulatus,	32	viridifasciata,	40
quadrinaculata,	58	viridis,	36
radiata,	58	vittatus,	57
rectus,	32	vulgare,	24
robustus,	23	xanthoptera,	39



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