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DIVISION OF THE  
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THEODORE H. FRISON, *Chief*

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# The Dermaptera and Orthoptera of Illinois

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MORGAN HEBARD



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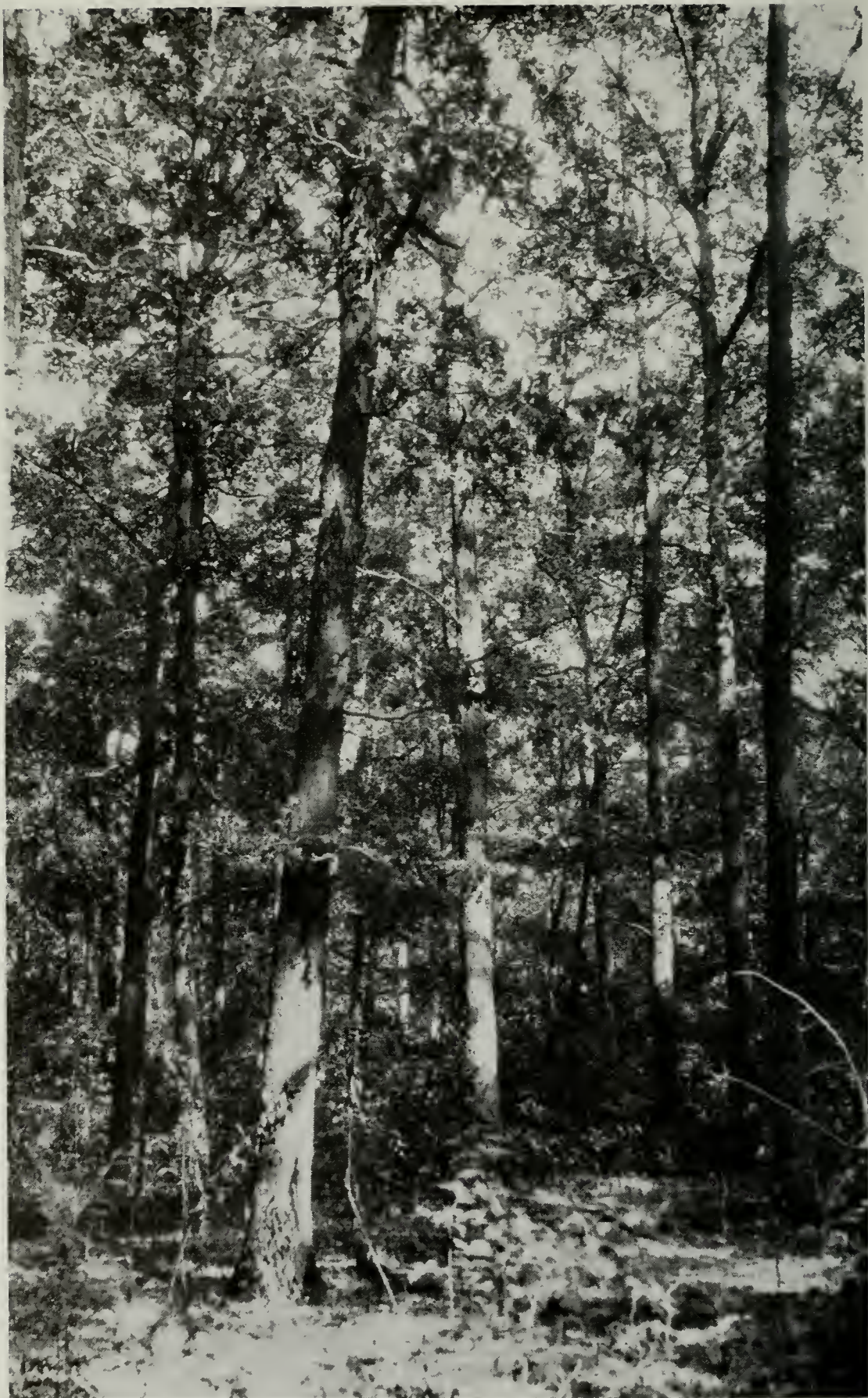
STATE NATURAL HISTORY SURVEY DIVISION  
THEODORE H. FRISON, *Chief*

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The floor of this upland oak-hickory woods south of Olney, Illinois, is a typical habitat of *Melanoplus viridipes viridipes*, *Hapithus agitator* and *Ceuthophilus maculatus*. (Photo by U. S. Forest Service.)



# The Dermaptera and Orthoptera of Illinois

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MORGAN HEBARD<sup>1</sup>

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## BIOLOGY AND HABITS OF THE ORDERS<sup>2</sup>

THE ORTHOPTERA first attract one's attention because of their universal presence and relatively large size. In the warmer parts of the year every woodland and field, roadside and garden harbors numbers of the larger and more conspicuous grasshoppers and crickets which leap or fly from one's path. Some are very drab and sullen creatures, but others flash brilliantly colored wings or crackle stridently through the air. A closer acquaintance however discloses that these bold forms which first catch the eye are no more interesting than a host of their allies, the grouse locusts, walking sticks, katydids and others, who hide away in their surroundings and must be sought with care and patience. It is among these that we find not only the fanciful and bizarre forms, but also the finest assemblage of musicians produced by the insects. The male members of the crickets and katydids keep the late summer and autumn nights fairly alive with song, each with his own particular note or line, the whole mingling to form a really charming chorus.

From the evolutionary standpoint of the insects as a whole, the Orthoptera and Dermaptera are generalized groups lacking many of the specializations in anatomy and development possessed by other orders. They have however followed many lines of development within their own orders, resulting at the present in a startling array of diverse shapes and habits.

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<sup>1</sup>Research Associate, Department of Entomology, Academy of Natural Sciences of Philadelphia.

<sup>2</sup>This section and the one following on ecology were written by H. H. Ross, systematic entomologist, ILLINOIS STATE NATURAL HISTORY SURVEY. The material on the Rhaphidophorinae, p. 220, is the work of T. H. Hubbell of the Department of Biology, University of Florida. W. P. Flint, chief entomologist, ILLINOIS STATE NATURAL HISTORY SURVEY, contributes the section on control measures, p. 266.

## GENERAL RESEMBLANCE OF LIFE CYCLES

In their general features all Orthopteran and Dermapteran life histories are essentially the same, in that the young insects hatching from the eggs are miniature replicas of the adults, differing in their size and the absence of wings and reproductive organs. The wings and certain other sets of characters are developed gradually with successive moults until they are complete and ready for use when the full grown nymphs mature into adults. This gradual type of development is known as *incomplete metamorphosis*. Contrasted with it is *complete metamorphosis*, in which the successive life history stages form at least three distinct and dissimilar types—larva, pupa and adult. This is exemplified by the moths and butterflies, whose first stages are wormlike and known as larvae; these larvae feed until full grown, then change into an inactive resting form called the pupa; from this pupa the adult insect emerges, entirely different in appearance from either the larva or pupa.

The Dermaptera pass the winter in the adult stage, whereas most of the Illinois Orthoptera pass the winter in the egg stage, especially in the northern portion of the state. There are however exceptions to this, most conspicuously in the case of the grouse locusts and the common grasshopper *Chortophaga viridifasciata*, which hibernate as adults and nymphs respectively.

In Illinois cockroaches living in dwellings or other heated structures have a series of generations throughout the year, resulting in several to many annually. The general rule however is that the outdoor members of the two orders usually have only one brood a year.

## ORTHOPTERA FEEDING HABITS VARY WIDELY

The various members of the Orthoptera exhibit a great variety of feeding habits, being either omnivorous, herbivorous or predaceous. The grouse locusts and grasshoppers (Acrididae) and the katydids (Tettigoniidae) are almost entirely herbivorous, feeding on grasses, herbs and to some extent on shrub and tree foliage. Some of the walking stick insects (Phasmidae) feed on the foliage of almost all the deciduous trees, showing some preference for oak and wild cherry; others feed upon prairie plants. Interesting among the herbivorous Tettigoniidae are the members of the genus *Camptonotus*, which make a nest by rolling together the leaves of the bladder nut or other trees. The sand crickets (Gryllotalpinae and Tridactylinae) eat the roots of plants, among which they burrow.

A considerable number of Orthoptera are omnivorous, eating carrion, dung, herbs, etc.; most prominent among these are the ground and field crickets (Gryllinae), the shield bearers (Decticinae), cave and camel crickets (Rhaphidophorinae) and the cockroaches (Blattidae). The tree crickets (Oecanthinae) are more or less omnivorous, feeding upon a variety of soft

foods such as scale insects, aphids, fruits and tender leaves. The mantids are aggressively predaceous, feeding upon many kinds of insects which they capture in their grasping front legs. The myrmecophilous Orthoptera (Myrmecophilinae) are a curious group living in ant nests. They feed on the epidermal secretions of the ants.



Fig. 1.—Prairie composed of *Andropogon scoparius* and prairie herbs near Savanna, Illinois. Habitat of such grasshoppers as *Syrbula admirabilis*, *Hippiscus rugosus* and *Encoptolophus sordidus*. *Arphia sulphurea* usually occurs in shorter grass with a denser sod. *Neoconocephalus ensiger* occurs in similar situations in certain localities. (After Sampson, ILL. NAT. HIST. SURV. BUL., vol. XIII, art. XVI.)

The Dermaptera or earwigs are more or less omnivorous, being herbivorous to some extent, but performing mostly as scavengers.

#### OVIPOSITING METHODS EQUALLY VARIED

The egg laying habits within the Orthoptera exhibit diversifications ranging from a simple type to a highly specialized one. The walking sticks have the simplest method, dropping the eggs indiscriminately on the forest floor. The crickets insert their eggs irregularly into rotten wood, bark or the soil. The snowy tree crickets show considerable care in egg laying—the female makes a small hole in a branch of a tree, deposits the egg in the bottom and covers it first with a mucilaginous secretion and then with chewed-up bark. The meadow katydids and coneheads deposit their eggs in the sheathes of grass stems and similar places.



The katydids lay flat oval eggs, arranged in single rows along the twigs or under the edges of leaves, forming a very pretty arrangement. Mantids cement the eggs in weatherproof masses on upright stems or branches of shrubs and trees, each mass containing 20 to 40 eggs. The grouse locusts also deposit their eggs gregariously, making furrows in the soil and placing 10 to 30 eggs in each. This is an interesting type intermediate between the methods found in the crickets and the grasshoppers. The most highly specialized type of oviposition in the soil is shown by the grasshoppers. They insert the abdomen almost its full length downward into the soil and lay the eggs one by one into the pocket thus formed. The eggs are laid carefully in order, until a neat mass of 30 to 60 is formed. Over them a mucilaginous and waterproof substance is secreted, which binds them together in a bundle. The opening of the egg cavity in the soil is then plugged up by the mother with a mixture of earth and the same mucilaginous secretion, which forms a waterproof cap.

The cockroaches have probably the most specialized egg laying method of the entire order. The eggs are united into a somewhat elongate oblong capsule, or oötheca, which frequently remains attached to the end of the mother's abdomen until nearly time for hatching.

The Dermaptera lay their eggs in a pile at the end of a burrow in the ground. The mother tends the eggs with diligence until they hatch, and soon afterward abandons the young. This maternal care of the eggs is extraordinary for an insect.

#### ECOLOGICAL FACTORS AFFECTING ORTHOPTERA

IN ILLINOIS the distribution of the various species of Orthoptera is apparently determined by soil, cover and climate. In many other groups of phytophagous insects the distribution of the insect species is dependent primarily on the distribution of the food plant. This is not true of the Orthoptera, probably with a few exceptions, such as *Inscudderia taxodii* which is always found upon cypress. Even in this case however the insect may not actually feed upon the cypress foliage. The larger number of Orthoptera are distributed in Illinois according to the general type of vegetation, such as forest, shrubbery, prairie or marsh. Each of these supports species not found in the others. Of the soil types found in the state, pure sand is the only one with a markedly distinct fauna not occurring on other soils. There is of course considerable overlapping between related habitats. The prairie species, for instance, occur mixed with sand species on sand with a moderate cover of grass. A considerable number of the meadow katydids and other Orthoptera occur in both prairie and swampy situations. An interesting example of latitude of requirements is shown

in the case of *Dichromorpha viridis*, which is found in damp woods, prairie and swamp.



Fig. 2.—UPPER.—Sand dunes at Havana, Ill. Habitat of *Melanoplus angustipennis*, *Ageneotettix deorum*, *Spharagemon collare* and *Psinidia fenestralis*. (Photo by Vestal.) LOWER.—Sand blow-out at Havana. The bare sand is the habitat of *Melanoplus flavidus*; the areas of tall sand plants contain *Schistocerca alutacea*. (After Vestal, Bul. Ill. State Lab. Nat. Hist., vol. X, art. I.)

The effect of climate is shown by the northern or southern restriction in the state of a number of Orthoptera. A considerable proportion of the species is found, or is likely to be found, over the entire state. Some other



species however are obviously limited in their northern or southern distribution. The southern forms give the impression of a wave of species fading out at individual boundaries without a segregation into definite faunal zones. Thus *Neotettix femoratus* and *Montezumina modesta* have been taken in the state only rarely, at the extreme southern tip; *Inscudderella taxodii* is limited to the southern floodplain; *Orocharis saltator* extends over this through the Ozark hills; *Melanoplus ponderosus viola* has been taken in the Ozarks and slightly northward; and such forms as *Hapithus agitator*, *Miogryllus verticalis* and *Amblycorypha uhleri* extend farther north, sometimes into the central portion of the state.

There is a similar wave of species entering the state from the north, east and west. They demonstrate the axial position of Illinois in respect to the different climatic faunal zones which radiate from it in all directions.

#### SURPRISING VARIETY OF HABITATS IN STATE

Illinois is usually thought at first glance to be a relatively unproductive collecting ground. Most of the traveled part of the state is flat or only slightly hilly, and under intensive cultivation. The scattered woodlots are usually bare of undergrowth and grazed to their full extent. This impression of the uninteresting nature of the state is erroneous, as a journey through the less populous areas and some of the out of the way places shows.

The state is primarily an alternation of prairie and oak-hickory or mixed forest. The northern two-thirds is mostly prairie, with forest along the north and west borders, and the southern third is almost entirely forest. The most imposing hills lack sufficient elevation to afford the faunal zonation which is occasioned by changes in altitude. The extremely diverse habitats to be found in Illinois are due instead to projections of various faunal regions within its borders, or to the effects of glaciation. Thus the cypress swamps of the south extend up into the southern tip of the state with their accompanying southern fauna, in the central and northern parts are several sand areas as the result of deposits by glacial rivers, and in the northeast corner of the state are many lakes and tamarack bogs which constitute the southernmost extension of the lake country of Wisconsin and northward.

**Prairie.**—The Illinois prairies were originally of the tall grass type, fig. 1, dominated by prairie grasses (*Andropogon furcatus* and *Scoparius*, *Sorghastrum*, *Sporobolus* and others), and by large herbs such as rosinweed (*Silphium terebinthenaceum*). This type of habitat has been reduced more than the forest by cultivation, and throughout the central portion of the state is best represented along the railroad right of ways. This disturbing of the natural sod has doubtless had a detrimental effect upon the general distribution of some of the prairie grasshoppers, but many of them have



taken quite readily to pastures, abandoned grassland, roadsides and the like. The more abundant prairie grasshoppers include *Syrbula admirabilis*, *Hippiscus rugosus*, *Encoptolophus sordidus* and *Arphia sulphurea*. The latter is frequently the dominant grasshopper in dry, well grazed pastures. The conehead *Neoconocephalus ensiger* occurs locally on long grass prairie. The meadow katydids seem to show a preference for moist and weedy situations.

**Sand areas.**—More than any other factor, the pure sand areas of Illinois are responsible for the occurrence within the state of many interesting



Fig. 3.—Portion of cattail swamp. The cattails are the habitat of *Truxalis brevicornis*. The grasses around the habitats contain species of *Conocephalus* and *Orchelimum*, in addition to some of the rarer grasshoppers.

species of grasshoppers. There are several large sand deposits in Illinois. Those along the Mississippi river at Hanover, Savanna and Oquawka, and at Havana, fig. 2, Beach and Dixon, contain considerable bare sand with many blow-outs and dunes. Those at Amboy, Kankakee and especially Winnebago are covered mostly with black oak woods. Those with the greatest amount of free sand display the more interesting fauna.

Bare sand is seemingly the sole habitat of *Trimerotropis maritima interior*, which is practically the only Illinois species so restricted. The commoner grasshoppers of the sparsely covered sand ridges are *Melanoplus angustipennis* and *M. flavidus*, *Ageneotettix deorum*, *Spharagemon collare* and *Psinidia fenestralis*. The ridges with taller and thicker cover usually have an abundant population of *Schistocerca alutacea* in addition to some of the others mentioned, and frequently some of the grassland species, such as *Syrbula admirabilis*.

The Havana sand area along the Illinois river is the most extensive in the state. It has large tracts of bare or sparsely covered sand, intermingled with forested dunes and blow-outs. In addition to the grasshopper fauna

characteristic of all the sand areas of the state, several western species have been found there and nowhere else in Illinois, for instance *Amphitornus coloradus* and *Mermiria neomexicana*.

The Beach area is equally noteworthy. It extends north along the margin of Lake Michigan from Waukegan, continuing beyond the Wisconsin line, and consists of a series of low sand ridges paralleling the lake front and backed by sand prairie. The ridges along the beach are almost bare, whereas those further from the beach have progressively heavier and denser cover. Between the sand ridges are numerous semimarshy swales, and through the prairie run several marsh areas. This multitude of different conditions has an equally varied Orthopteran fauna which includes several northern species taken only at this point in the state.

**Swampy areas.**—From the standpoint of Orthoptera, the significance of most of the swamps, bogs and marshes of Illinois lies in the wet areas of sedges, grass and weeds which form their borders, fig. 3. In these moist situations are found large numbers of meadow katydids, sometimes five or six species in the same location. Only in a few instances have true reed or cattail inhabiting species been taken in the state, notably *Truxalis brevicornis*. Frequently ground crickets, grouse locusts and some short winged Acrididae are found in the same places. The mud flats along ponds, rivers and streams are the favorite habitat of many of the grouse locusts and of the pygmy mole crickets *Tridactylus apicalis* and *T. minutus*.

**Shrubby places.**—The dense growth of rank herbs and shrubs along ditches, fence rows, forest edges, etc., harbors large numbers of Orthoptera. In the shrubbery itself occur the katydid *Amblycorypha oblongifolia*, various species of meadow katydids of the genera *Orchelimum* and *Conocephalus*, and such grasshoppers as *Melanoplus differentialis* and *M. femur-rubrum*. On the ground are found numerous ground crickets and short winged grasshoppers, e.g., *Dichromorpha viridis* and *Melanoplus scudderi*. Frequently large numbers of tree crickets (*Oecanthus spp.*) may be found in such shrubbery and in nearby patches of tall herbs.

**Forest.**—The Illinois forests are entirely deciduous except for very small and isolated tracts of pine, or scattered trees of red cedar and arbor vitae. The river bottom forests are characterized by elm, soft maple, cottonwood and sycamore; the upland forests by hard maple and various species of oak and hickory, with some beech in a few localities in the extreme eastern and southern portions of the state. The upland forests have moderately dense to sparse undergrowth, and are in places interrupted by small glades, fig. 4.

In the northern part of the state the forest floor and undergrowth are the favorite habitats for a considerable number of species, such as the short



winged *Melanoplus viridipes*, *M. fasciatus*, *Chloealtis conspersa* and various ground crickets, including *Atlanticus testaceus* and species of *Nemobius*. In the foliage of the trees and larger shrubs may be found the true katydid, *Pterophylla camellifolia*. In the southern part of the state the forest floor Melanopli are represented chiefly by *Melanoplus walshii* and *M. obovati-pennis*; and the forest tree cricket *Oecanthus latipennis* and brown wood

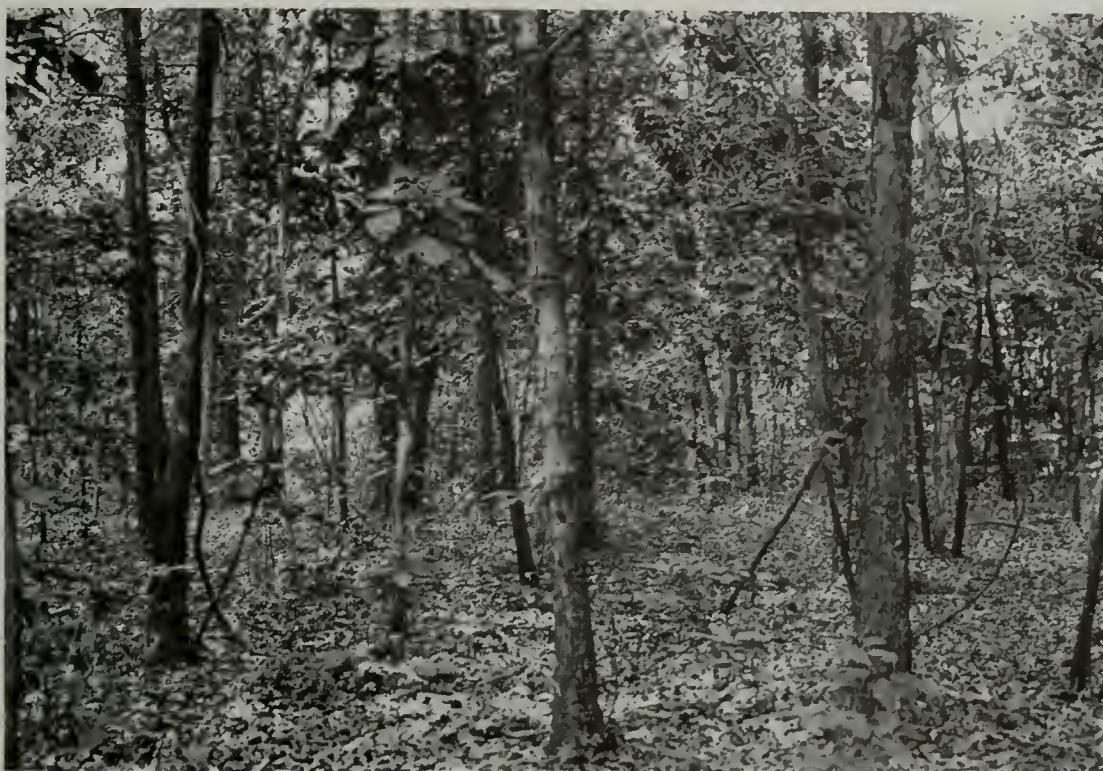


Fig. 4.—Oak-hickory woods at Charleston, Ill. Habitat of *Melanoplus viridipes*, *Melanoplus fasciatus*, *Atlanticus testaceus* and other species. (After Adams, Bul. Ill. State Lab. Nat. Hist., vol. XI, art. II.)

cricket *Hapithus agitator* become abundant, especially in the thick shrubbery in the glades.

The Ozark hills in southern Illinois form a broad band of rolling and semiprecipitous hills extending east and west across the state. They are densely forested with oak and hickory, and profusely cut up by small streams into gullies and valleys. Practically every forest situation is represented in a comparatively small area, from dense floodplain forest to the thinner types of woods, among which treeless vegetation occurs locally on rock ledges and bluffs, fig. 5. Interspersed with the forest are small patches of prairie, pasture and cultivated land. This assemblage of conditions contains a rich Orthopteran fauna, including not only the species found almost generally over the state, but in addition a considerable number of species of decided southern distribution and not found in Illinois north of the Ozarks. A notable example is *Trimerotropis saxatilis*, taken on sandstone



ledges partially covered with lichens; others are *Ischnoptera deropeltiformis*, *Parcoblatta fulvescens*, *Anisomorpha ferruginea*, *Atlanticus americanus* and *Cyrtoxipha columbiana*.

**Cypress bottoms.**—The southern tip of the state harbors a northern extension of the cypress, which together with tupelo gum and buttonbush forms the swamps of the backwaters and river bottoms. At one time these



Fig. 5.—Wooded rock formation near Anvil Rock in the Ozark hills in southern Illinois. The lichen covered rocks are the habitat of *Trimerotropis saxatilis*. (Photo by Turner.)

cypress swamps were very plentiful in Illinois south of the Ozarks, but due to cutting off for lumber and drainage for cultivation only scattered remnants of them remain in the Mississippi, Cache and Wabash river bottomlands. A few Orthoptera have been taken in Illinois only in this southern floodplain region, e.g., *Neotettix bolteri*, *Schistocerca obscura*, *Neoconocephalus triops*, *Montezumina modesta* and others. There is found here also the interesting species *Inscudderia taxodii* which has so far been captured exclusively on cypress.

## SUMMARY OF LITERATURE

THOMAS

THE PUBLISHED DATA on the Orthoptera of Illinois have not been elaborate, but for the times decidedly more satisfactory than for most of the middle western states. In 1876 Cyrus Thomas published "A List of the Orthoptera of Illinois,"<sup>3</sup> including a single species of Dermaptera but

<sup>3</sup>See bibliography, p. 259.

omitting the Tettigoniidae and Gryllidae. Forty-six species were discussed and only in two cases was the same species recorded under two names, but since that time much nomenclatorial change has occurred. In 1880 Thomas published "The Acrididae of Illinois." Thirty-six species were included though the Acrydiinae were omitted, the same errors occurring which appeared in his earlier report.

#### MCNEILL

In 1891 Jerome McNeill's "List of the Orthoptera of Illinois" was published. One hundred and ten species were reported, but in 13 cases the same species was recorded under two names and three species which do not occur in Illinois were included.

#### HART AND VESTAL

In 1907 in a study of the sand areas of Illinois, Charles A. Hart reported the Orthoptera found there, 67 species. In only two cases was the same species recorded under two names, but unfortunately the single species then described is a synonym. A number of important new records for the state were included. Continuing that study, in 1913 Arthur Gibson Vestal listed 34 species in his report called "An Associational Study of Illinois Sand Prairie."

#### BLATCHLEY

Many important records for Illinois are also scattered through the literature, particularly in revisionary studies and W. S. Blatchley's "Orthoptera of Northeastern America" which appeared in 1920.

### COLLECTION AND DISPOSITION OF THE MATERIAL

THE EXTENSIVE COLLECTIONS made by Hart, Theodore H. Frison, H. H. Ross, C. O. Mohr and others of the ILLINOIS STATE NATURAL HISTORY SURVEY, or its predecessors the Illinois State Laboratory of Natural History and Office of State Entomologist, together with the Hancock collection belonging to the author, have afforded the basis for the present study. To these has been added all the Illinois material which has come into our hands or has been examined by us, the most important being the small but exceptionally valuable series belonging to the Field Museum, largely collected by W. J. Gerhard.

We here record more than 10,000 specimens from Illinois, representing 173 species and nine additional races or varieties, two of these being new to science. Ten more species and one race whose range should include part of Illinois will bring the total to 193 species and races for the state. This does not include one adventive earwig and seven adventive cockroaches found in the state. Though the great majority of the species

of Illinois are characteristic of the upper and lower austral zones of the eastern United States, eight boreal species and eight which find their widest distribution and greatest abundance on the great plains occur here.

Collecting in Illinois in the order has been so generally accomplished that we believe very few additional species will be found. It is however obvious that there will be some, and we have discussed briefly those species which have not yet been secured but which we expect to occur. These are *Periplaneta australiasiae* (Fabricius), *Diapheromera velii* Walsh, *Nomotettix cristatus compressus* Morse, *Leptysma marginicollis* (Serville), *Orchelimum bullatum* Rehn and Hebard, *Atlanticus davisii* Rehn and Hebard, *Hadenoeus puteanus* Scudder, *Phrixocnemus truculentus* Scudder, *Ceuthophilus seclusus* Scudder, *C. meridionalis* Scudder and *C. brevipes* Scudder.

#### LOCALITIES

The map, fig. 6, shows the localities in Illinois from which material has been secured. Descriptions in the catalog of species which follows, pp. 150-259, give the localities in numerical order, beginning in the northeast corner of the state and ending at a southwestern limit. The alphabetized list on pp. 138-139 keys each locality.

#### PRESENT HOLDERS OF MATERIAL: SYMBOLS

If not otherwise noted the material listed in this paper belongs to the ILLINOIS STATE NATURAL HISTORY SURVEY. Material in the collections of other institutions or individuals is so designated by the use of the following symbols.

*ANS.*—Academy of Natural Sciences of Philadelphia

*BC.*—Brues Collection

*FM.*—Field Museum

*HC.*—Hebard Collection

*ISC.*—Iowa State College

*MCZ.*—Museum of Comparative Zoology

*MMZ.*—University of Michigan Museum of Zoology

*NM.*—United States National Museum

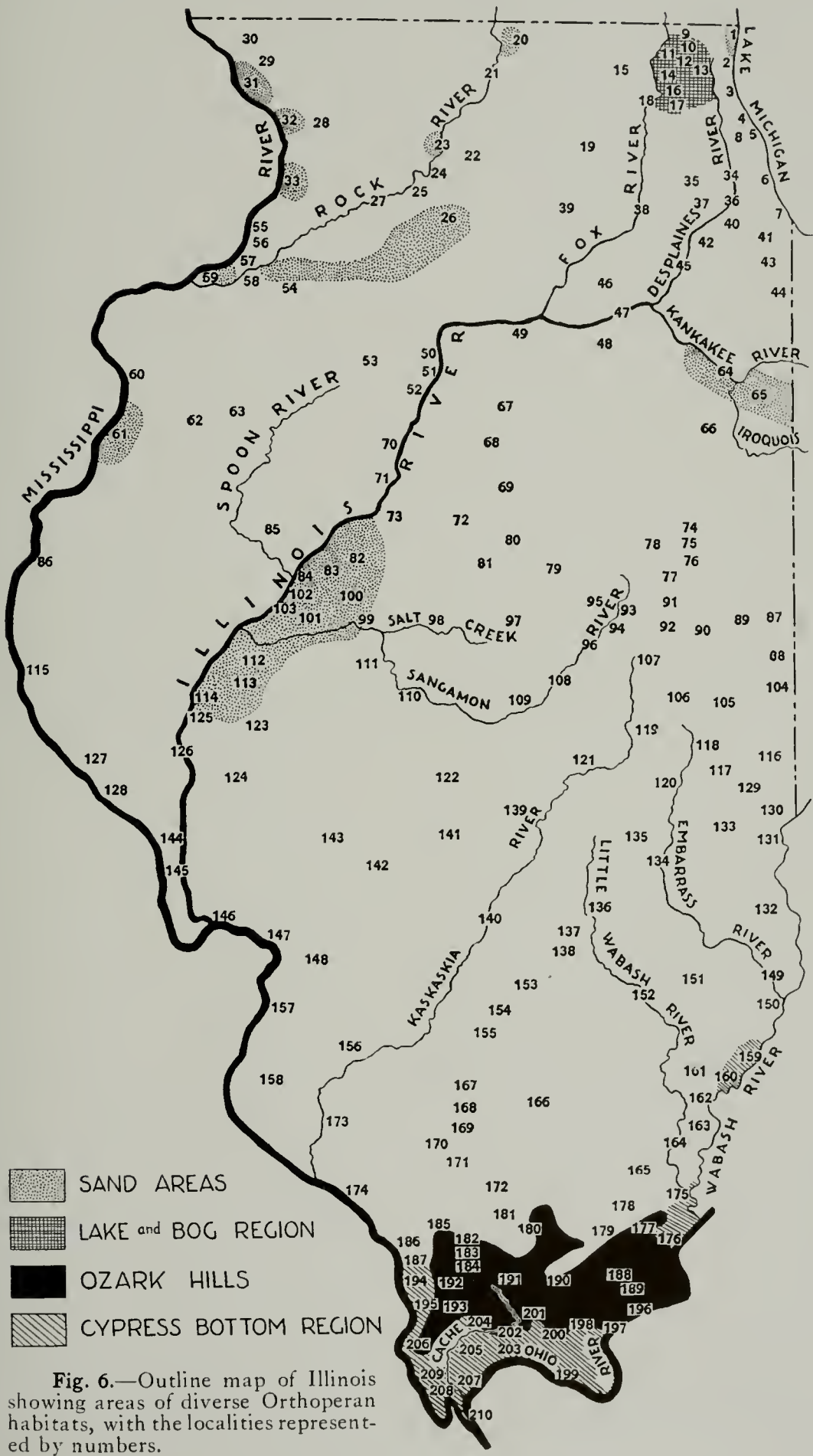
*OSU.*—Ohio State University

*PU.*—Purdue University

*TC.*—Thomas Collection

*UM.*—University of Minnesota





Albion.....	161	Champaign.....	92	Fountain Bluff.....	186
Aldridge.....	194	Champaign county...	92	Fourth Lake.....	10
Algonquin.....	18	Chana.....	22	Fox Lake.....	11
Alma.....	153	Channel Lake.....	9	Fulton.....	33
Alton.....	147	Charleston.....	120	Funks Grove.....	81
Alto Pass.....	192	Chautauqua.....	146	Galena.....	30
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Argo.....	36	Cobden.....	192	Glenview.....	8
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Athens.....	111	Cook county.....	7	Grafton.....	146
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Benson.....	68	Danville.....	87	Hardin.....	145
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Billett.....	150	Deep Lake.....	10	Havana.....	84
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Centralia.....	155	Flossmoor.....	43	Lake Forest.....	3
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Lake Villa.....	10	Olney.....	150	Sullivan.....	121
Lawrenceville.....	149	Oquawka sand area...	61	Summit.....	36
Lemont.....	42	Oregon.....	23	Sun Lake.....	10
Le Roy.....	79	Ottawa.....	49	Sycamore.....	19
Leslie.....	73	Palos Park.....	42	Tamaroa.....	169
Lincoln.....	98	Paris.....	116	Taylorville.....	122
Litchfield.....	142	Parker.....	190	Teheran.....	100
Loda.....	74	Paxton.....	75	Thebes.....	209
Long Lake.....	12	Pekin.....	73	Thomasboro.....	91
Ludlow.....	76	Peoria.....	71	Tolono.....	107
McClure.....	206	Perry county.....	170	Tonti.....	154
McCulloms Lake.....	14	Pike.....	128	Topeka.....	83
Mackinaw Station....	72	Pinckneyville.....	170	Tower Hill.....	139
Mahomet.....	93	Pine Hills.....	187	Tremont.....	73
Makanda.....	184	Pistakee Bay.....	11	Twin Grove.....	80
Manchester.....	124	Port Byron.....	56	Ullin.....	205
Manito.....	82	Prairie View.....	17	Union county.....	193
Mansfield.....	95	Prospect.....	77	Urbana.....	92
Marion.....	180	Prospect Hill.....	188	Vandalia.....	140
Marshall.....	130	Pulaski.....	205	Vermilion county....	89
Martinsville.....	133	Pullman.....	7	Verona.....	48
Mascoutah.....	156	Putnam.....	50	Vienna.....	201
Mason City.....	99	Quincy.....	115	Villa Ridge.....	207
Matanzas Lake.....	102	Quiver Lake.....	84	Volo.....	14
Mayview.....	92	Rantoul.....	77	Volo Lake.....	14
Maywood.....	34	Ravinia.....	4	Wamble Mountain...	188
Meredosia.....	114	Riverdale.....	41	Ware.....	195
Metropolis.....	199	Riverside.....	36	Waterloo.....	158
Milan.....	59	Riverview.....	8	Waterman.....	39
Moline.....	59	Robinson.....	132	Watertown.....	57
Monmouth.....	62	Rockford.....	21	Watson.....	136
Monticello.....	96	Rock Island.....	59	Wauconda.....	16
Mossville.....	70	Rock Island county...	59	Waukegan.....	2
Mt. Carmel.....	159	Rockport.....	127	West Havana.....	84
Mt. Carroll.....	28	Running Lake.....	182	West Union.....	131
Mt. Vernon.....	166	Rutland.....	67	White Heath.....	94
Muncie.....	89	St. Anne.....	65	Whitehill.....	203
Murphysboro.....	185	St. Francisville.....	150	Williams Mountain...	188
Neoga.....	135	St. Joseph.....	90	Willow Springs.....	40
New Columbia.....	200	Saratoga I.....	47	Wilmette.....	5
New Haven.....	175	Saratoga II.....	192	Winnebago county	
Newman.....	105	Savanna.....	32	sand area.....	20
Nokomis.....	141	Seymour.....	94	Winnetka.....	4
Normal.....	80	Shawneetown.....	176	Wolf Lake.....	195
Norris City.....	165	Snyder.....	131	Woodstock.....	15
Oakland.....	118	Sparland.....	52	Woodyard.....	104
Oaklawn.....	40	Spaulding.....	110	Zeigler.....	172
Oakwood.....	89	Starved Rock State		Zion.....	1
Odin.....	154	Park.....	49		
Ogden.....	90				



## USE OF THE KEYS

THE KEYS IN THIS PAPER are intended solely as an aid to the student in determining the species of Orthoptera and Dermaptera found in Illinois. No attempt is made to assist in distinguishing other related species not known from the state. This must be kept in mind especially in a few cases of generic diagnosis where for the sake of clarity an aggregate of artificial characters has been used, as with *Melanoplus* and *Orchelimum* and their nearest relatives. A great many characters have been illustrated to elucidate couplets in the keys, and it is recommended that students consult the following plates I-IV, figs. 7-141, freely when identifying specimens. Only characters of maximum diagnostic value are given. As most species are subject to some individual variation any difficult specimen should not be determined from the key alone, but efforts should be made to locate it more safely by recourse to the latest revision of the group to which it belongs. If that cannot be done the specimen should be submitted to a specialist.

## GLOSSARY

A number of terms in the keys may not be familiar to the general entomology student. Those which appear most commonly in this paper are defined as follows.

**aciculate.**—extremely sharp and needle-like.

**admesal.**—alongside the meson.

**anal field.**—posterior portion of tegmen, or front wing, fig. 32, A, dorsal in repose.

**annulus.**—a circular, transverse band.

**arboreal.**—living in trees.

**arcuate.**—curved like a bow, *i.e.*, in an arc.

**arolium.**—a cushion-like pad on the ventral surface or "sole" of the foot.

**asperate.**—rough with elevated dots.

**auricula.**—earlike lobe or appendage.

**bisinate.**—having two curved incisions or emarginations.

**brachypterous.**—having short wings, fig. 150, p. 151.

**calcar.**—one of the large spurs at apex of the caudal tibia.

**campestran.**—inhabiting open fields.

**carina.**—a keel, fig. 17.

**caudate.**—with taillike extensions or processes.

**cerci.**—the flaplike appendages on each side of the male genitalia, fig. 66, c.

**clavate.**—club shaped, fig. 25.

**clypeus.**—a sclerite above the upper lip.

**cristate.**—having a crest, fig. 17.

**cristation.**—a crest.

**coriaceous.**—thick, tough and leathery.

**deplanate.**—flattened or level.

**discoidal vein.**—the vein from which the median vein arises, situated in the median field.

**disk of pronotum.**—the entire dorsal aspect of pronotum or "saddle," fig. 36.

**divaricate.**—spreading apart.

**ensiform.**—pennant shaped, fig. 26.

**explanate.**—spread out and flattened.

**falcate.**—sickle shaped.

**fastigium.**—the anterior portion of dorsum, or top of head, fig. 22.

**fenestrate.**—with a lattice-like pattern.

**foramen.**—an opening into the body or into an appendage.

**foveolae.**—small pits.

**frontal costa.**—the ridge or raised, flat area extending down the meson, or middle line, of the face, fig. 27, fc.

**furcate.**—forked.

**furcula.**—a paired or forked appendage at the base of the dorsal portion of the male genitalia, fig. 66, fr.

- fusiform.**—spindle shaped.
- genicular areas of femora.**—apical portion of femora forming part of the “knee” joint.
- hirsute.**—hairy.
- humeral sinus.**—the incision frequently present in the dorsoposterior margin of the lateral lobes of the pronotum, fig. 113, h.
- hyaline.**—transparent.
- hygrophilous.**—inhabiting moist or wet places.
- infumate.**—smoky.
- infusate.**—darkened.
- lamellate.**—having a thin, raised plate or leaflike process.
- lamina.**—a thin plate.
- lateral foveolae.**—pits or grooves in the lateral margin of the fastigium, fig. 54, lf.
- macula.**—a marking; a spot.
- marginal field.**—anterior portion of tegmina, fig. 32, M, ventral in repose.
- median carina of head.**—the carina along meson of dorsal portion of head, fig. 21, mc.
- median or discoidal field.**—middle portion of tegmina, fig. 32, D.
- median vein.**—a vein of the median field, fig. 97, mv.
- mediastine vein.**—the subcostal vein behind the costal margin, in the marginal field.
- mesonotum.**—the dorsal region of the mesothorax, situated directly behind the “saddle.”
- mesosternum.**—the ventral plate of the mesothorax, between and in front of the bases of the middle pair of legs.
- metazona.**—the posterior portion of disk of pronotum, fig. 42, mz.
- ocelli.**—the small lenses between the eyes on the front of the head.
- pagina.**—the outer flattened surface of the caudal or hind femora.
- palpi.**—the feeler-like appendages of the mouthparts, fig. 41, pp.
- paraprocts.**—sclerites on the apical region of the abdomen.
- piceous.**—a brownish or reddish shade of black.
- plantula.**—the pad on the ventral surface of the basal segment of the “foot.”
- poculum.**—the ventral sacklike appendage of the male genitalia in the Phasmidae.
- pregenicular.**—before the “knee” area.
- prosternum.**—the ventral plate of the prothorax, between the bases of the anterior pair of legs.
- proximal.**—the part of an appendage nearest the body.
- prozona.**—the anterior portion of disk of pronotum, fig. 42, pz.
- pulvillus.**—the pad between the claws at the end of the foot.
- rugae.**—raised, threadlike portions of the surface, or small wrinkles.
- scalariform.**—ladder-like.
- setose.**—set with fine hair.
- sinuate.**—curved.
- spatulate.**—flattened club shaped, the apex rounded, fig. 79.
- speculum.**—the glassy area at the base of the tegmina of some males.
- style.**—a finger-like process, fig. 95.
- subgenital plate.**—the last apparent ventral segment, or sternite, fig. 66, s.
- submacropterous.**—having wings which are not quite full length.
- subplanate.**—nearly flat.
- subpyriform.**—nearly pear shaped.
- sulcate.**—grooved.
- sulci.**—grooves or channels.
- supracoxal.**—situated above the coxa.
- taenia.**—a broad, longitudinal stripe.
- tectate.**—roof shaped, fig. 17.
- tectation.**—a roof shaped area.
- teneral.**—recently molted specimens not having attained their full color or hardness.
- tergite.**—the dorsal part of a segment.
- tesellate.**—checkered.
- testaceous.**—dull yellowish brown.
- trifasciate.**—having three bands.
- triquetrous.**—with three flat sides.
- ulnar vein.**—a vein of the median field, fig. 97, uv.
- unicarinate.**—having one ridge or carina.
- velutinous.**—velvety.
- vertex.**—top of head.
- vittate.**—striped.

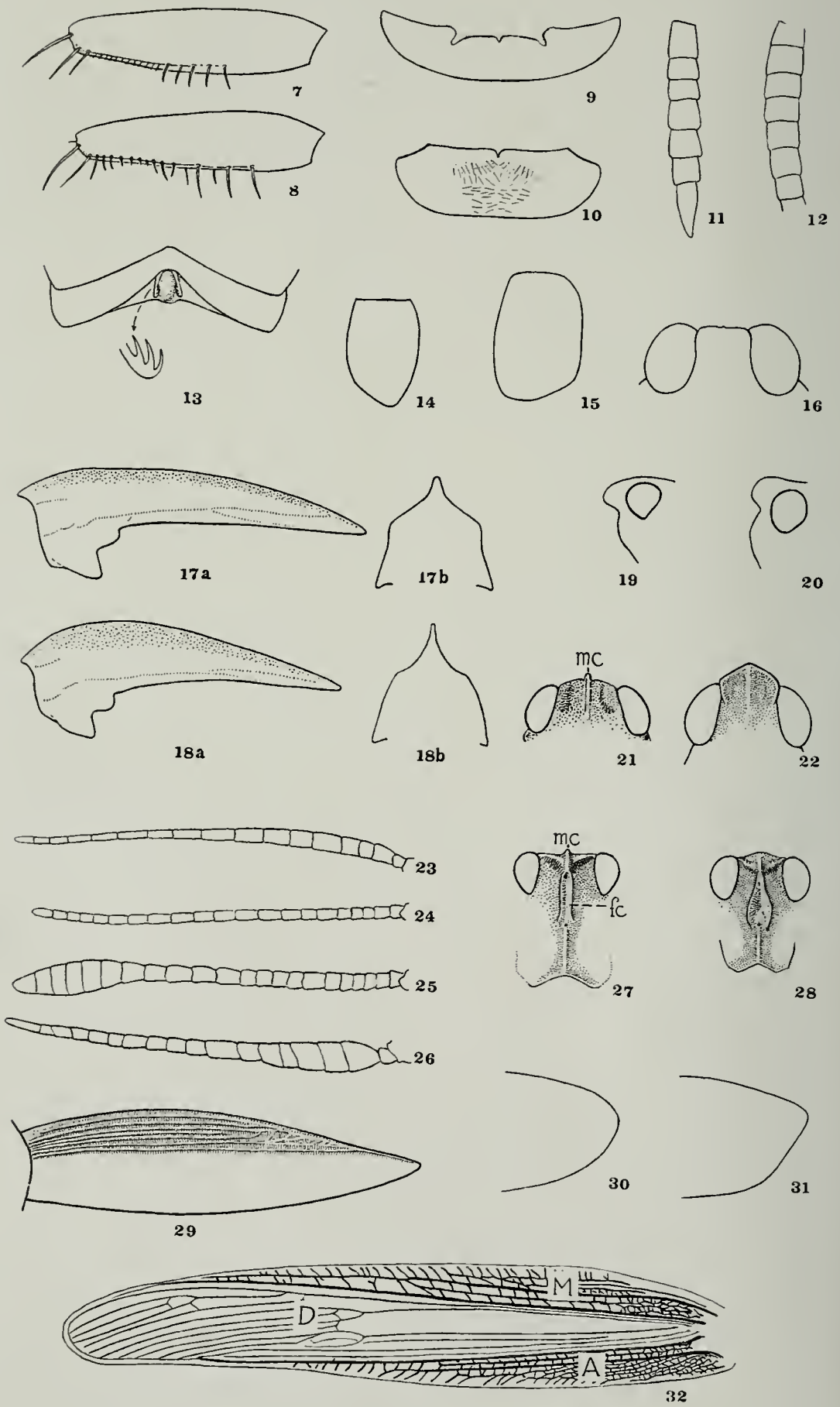


PLATE I



## PLATE I

- Fig. 7.—Anterior femur of *Parcoblatta pennsylvanica* (DeGeer), anterior aspect.  
 Fig. 8.—Anterior femur of *Blattella germanica* (Linnaeus), anterior aspect.  
 Fig. 9.—First abdominal (median) tergite of *Parcoblatta bolliana* (Saussure and Zehntner), male.  
 Fig. 10.—First abdominal tergite of *Parcoblatta virginica* (Brunner), male.  
 Fig. 11.—Portion of cercus of *Parcoblatta uhleriana* (Saussure).  
 Fig. 12.—Portion of cercus of *Parcoblatta fulvescens* (Saussure and Zehntner).  
 Fig. 13.—Sixth abdominal tergite of male *Ischnoptera deropeltiformis* (Brunner).  
 Fig. 14.—Tegmen of female *Parcoblatta lata* (Brunner).  
 Fig. 15.—Tegmen of female *Parcoblatta fulvescens* (Saussure and Zehntner).  
 Fig. 16.—Anterior portion of head of female *Paratettix cucullatus* (Burmeister), dorsal aspect.  
 Fig. 17.—Pronotum of *Nomotettix cristatus cristatus* Scudder; a, lateral aspect, b, anterior aspect.  
 Fig. 18.—Pronotum of *Nomotettix cristatus denticulatus* Morse; a, lateral aspect, b, anterior aspect.  
 Fig. 19.—Fastigium of *Nomotettix parvus* Morse, lateral aspect.  
 Fig. 20.—Fastigium of *Nomotettix cristatus cristatus* Scudder, lateral aspect.  
 Fig. 21.—Fastigium of *Acridium ornatum* (Say), dorsal aspect.  
 Fig. 22.—Fastigium of *Acridium granulatum* Kirby, dorsal aspect.  
 Fig. 23.—Antenna of female *Psinidia fenestralis fenestralis* (Serville).  
 Fig. 24.—Antenna of female *Orphulella pelidna* (Burmeister).  
 Fig. 25.—Antenna of male *Eritettix simplex* (Scudder).  
 Fig. 26.—Antenna of female *Truxalis brevicornis* (Linnaeus).  
 Fig. 27.—Portion of head of *Acridium ornatum* (Say), anterior aspect.  
 Fig. 28.—Portion of head of *Neotettix bolteri* Hancock, anterior aspect.  
 Fig. 29.—Right tegmen of female *Pseudopomala brachyptera* (Scudder).  
 Fig. 30.—Tip of tegmen of *Truxalis brevicornis* (Linnaeus).  
 Fig. 31.—Tip of tegmen of *Mermiria maculipennis macclungi* Rehn.  
 Fig. 32.—Left tegmen of *Melanoplus mexicanus mexicanus* (Saussure).

## ABBREVIATIONS

- A—anal field  
 D—median or discoidal field  
 M—marginal field  
 fc—frontal costa  
 mc—median carina

## PLATE II

- Fig. 33.—Fastigium of *Chloealtis conspersa* Harris, dorsal aspect.  
 Fig. 34.—Fastigium of *Orphulella pelidna* (Burmeister), dorsal aspect.  
 Fig. 35.—Fastigium of *Amphitornus coloradus* (Thomas), dorsal aspect.  
 Fig. 36.—Head and prothorax of *Trachyrhachis kiowa fuscifrons* (Stal), lateral aspect.  
 Fig. 37.—Pronotum of *Dichromorpha viridis* (Scudder), dorsal aspect.  
 Fig. 38.—Pronotum of *Orphulella pelidna* (Burmeister), dorsal aspect.  
 Fig. 39.—Pronotum of *Orphulella speciosa* (Scudder), dorsal aspect.  
 Fig. 40.—Pronotum of *Dissosteira carolina* (Linnaeus), dorsal aspect.  
 Fig. 41.—Head and prothorax of *Trimerotropis saxatilis* McNeill, lateral aspect.

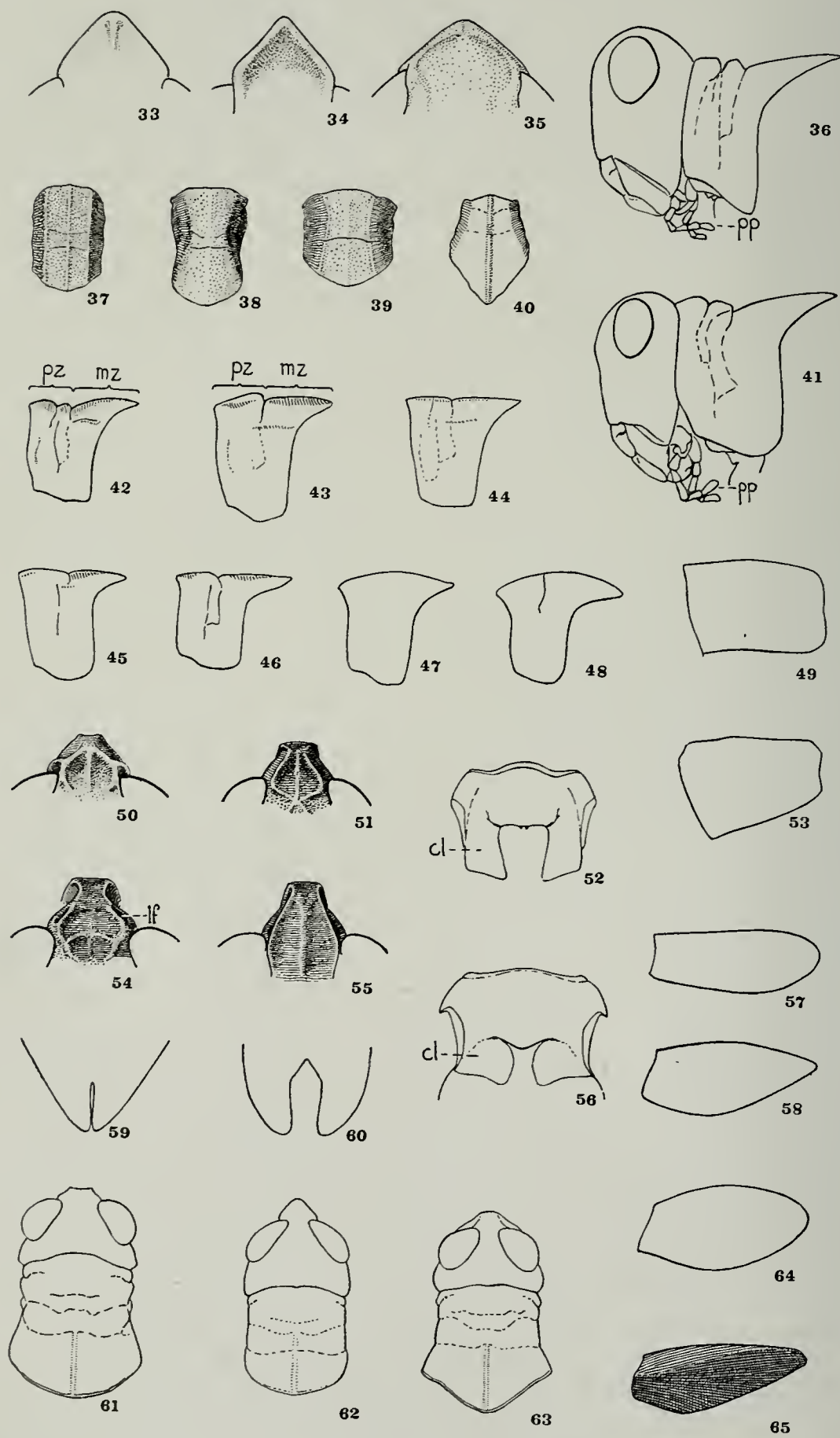


PLATE II

## PLATE II—CONT'D

- Fig. 42.—Pronotum of *Psinidia fenestralis fenestralis* (Serville), lateral aspect.  
 Fig. 43.—Pronotum of *Encoptolophus sordidus sordidus* (Burmeister), lateral aspect.  
 Fig. 44.—Pronotum of *Camnula pellucida* Scudder, lateral aspect.  
 Fig. 45.—Pronotum of *Hippiscus rugosus* (Scudder), lateral aspect.  
 Fig. 46.—Pronotum of *Pardalophora phoenicoptera* (Burmeister), lateral aspect.  
 Fig. 47.—Pronotum of *Arphia sulphurea* (Fabricius), lateral aspect.  
 Fig. 48.—Pronotum of *Arphia zanthoptera* (Burmeister), lateral aspect.  
 Fig. 49.—Cercus of *Schistocerca damnifica damnifica* (Saussure), lateral aspect.  
 Fig. 50.—Fastigium of *Arphia sulphurea* (Fabricius), dorsal aspect.  
 Fig. 51.—Fastigium of *Arphia pseudonietana* (Thomas), dorsal aspect.  
 Fig. 52.—Mesosternum of *Schistocerca damnifica damnifica* (Saussure).  
 Fig. 53.—Cercus of *Schistocerca americana americana* (Drury), lateral aspect.  
 Fig. 54.—Fastigium of *Pardalophora phoenicoptera* (Burmeister), dorsal aspect.  
 Fig. 55.—Fastigium of *Pardalophora apiculata* (Harris), dorsal aspect.  
 Fig. 56.—Mesosternum of *Melanoplus mexicanus mexicanus* (Saussure).  
 Fig. 57.—Tegmen of *Melanoplus gracilis* (Bruner).  
 Fig. 58.—Tegmen of *Melanoplus dawsoni* (Scudder).  
 Fig. 59.—Apex of subgenital plate of *Schistocerca damnifica damnifica* (Saussure).  
 Fig. 60.—Apex of subgenital plate of *Schistocerca alutacea* (Harris).  
 Fig. 61.—Head and pronotum of *Dendrotettix quercus* Packard, dorsal aspect.  
 Fig. 62.—Head and pronotum of *Phoetaliotes nebrascensis* (Thomas), dorsal aspect.  
 Fig. 63.—Head and pronotum of *Melanoplus mexicanus mexicanus* (Saussure), dorsal aspect.  
 Fig. 64.—Tegmen of *Melanoplus scudderi scudderi* (Uhler).  
 Fig. 65.—Tegmen of *Melanoplus ponderosus viola* (Thomas).

## ABBREVIATIONS

- cl—caudolateral (mesosternal) lobes  
 lf—lateral foveolae  
 mz—metazona  
 pp—palpi  
 pz—prozona

## PLATE III

- Fig. 66.—Apex of abdomen of male *Melanoplus mexicanus mexicanus* (Saussure), dorsolateral aspect.  
 Fig. 67.—Cercus of male *Melanoplus scudderi scudderi* (Uhler), lateral aspect.  
 Fig. 68.—Cercus of male *Melanoplus viridipes viridipes* Scudder, lateral aspect.  
 Fig. 69.—Cercus of male *Melanoplus femur-rubrum femur-rubrum* (DeGeer), lateral aspect.  
 Fig. 70.—Cercus of male *Melanoplus borealis junius* (Dodge), lateral aspect.  
 Fig. 71.—Cercus of male *Melanoplus dawsoni* (Scudder), lateral aspect.  
 Fig. 72.—Cercus of male *Melanoplus gracilis* (Bruner), lateral aspect.  
 Fig. 73.—Cercus of male *Melanoplus obovatipennis* Blatchley, lateral aspect.  
 Fig. 74.—Cercus of male *Melanoplus flavidus flavidus* Scudder, lateral aspect.



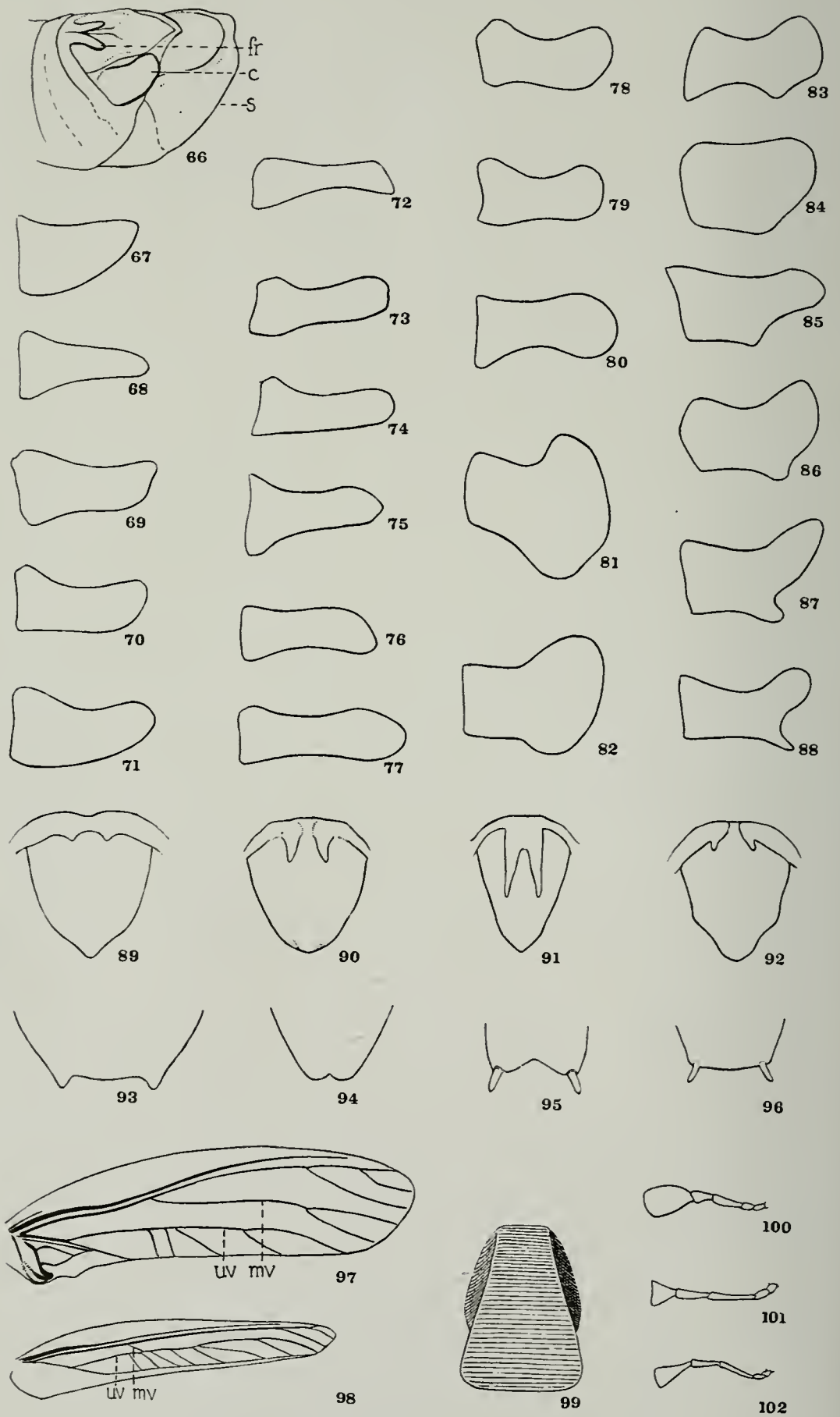


PLATE III

## PLATE III—CONT'D

- Fig. 75.—Cercus of male *Melanoplus impudicus* Scudder, lateral aspect.  
 Fig. 76.—Cercus of male *Melanoplus fasciatus* (F. Walker), lateral aspect.  
 Fig. 77.—Cercus of male *Melanoplus fasciatus* (F. Walker), lateral aspect.  
 Fig. 78.—Cercus of male *Melanoplus morsei* Blatchley, lateral aspect.  
 Fig. 79.—Cercus of male *Melanoplus foedus fluviatilis* Bruner, lateral aspect.  
 Fig. 80.—Cercus of male *Melanoplus angustipennis* (Dodge), lateral aspect.  
 Fig. 81.—Cercus of male *Melanoplus punctulatus punctulatus* (Scudder), lateral aspect.  
 Fig. 82.—Cercus of male *Melanoplus ponderosus viola* (Thomas), lateral aspect.  
 Fig. 83.—Cercus of male *Melanoplus walshii* Scudder, lateral aspect.  
 Fig. 84.—Cercus of male *Melanoplus mexicanus mexicanus* (Saussure), lateral aspect.  
 Fig. 85.—Cercus of male *Melanoplus confusus* Scudder, lateral aspect.  
 Fig. 86.—Cercus of male *Melanoplus bivittatus* (Say), lateral aspect.  
 Fig. 87.—Cercus of male *Melanoplus differentialis* (Thomas), lateral aspect.  
 Fig. 88.—Cercus of male *Melanoplus keeleri luridus* (Dodge), lateral aspect.  
 Fig. 89.—Furcula of male *Melanoplus ponderosus viola* (Thomas).  
 Fig. 90.—Furcula of male *Melanoplus walshii* Scudder.  
 Fig. 91.—Furcula of male *Melanoplus borealis junius* (Dodge).  
 Fig. 92.—Furcula of male *Melanoplus fasciatus* (F. Walker).  
 Fig. 93.—Apex of subgenital plate of male *Melanoplus femur-rubrum femur-rubrum* (DeGeer).  
 Fig. 94.—Apex of subgenital plate of male *Melanoplus mexicanus mexicanus* (Saussure).  
 Fig. 95.—Apex of subgenital plate of male *Orchelimum nigripes* Scudder.  
 Fig. 96.—Apex of subgenital plate of male *Conocephalus fasciatus fasciatus* (DeGeer).  
 Fig. 97.—Tegmen of *Scudderia septentrionalis* (Serville).  
 Fig. 98.—Tegmen of *Inscudderia taxodii* Caudell.  
 Fig. 99.—Pronotum of *Atlanticus testaceus* (Scudder), dorsal aspect.  
 Fig. 100.—Maxillary palpus of *Phyllopalpus pulchellus* Uhler.  
 Fig. 101.—Maxillary palpus of *Cyrtoxipha gundulachi* Saussure.  
 Fig. 102.—Maxillary palpus of *Anaxipha exigua* (Say).

## ABBREVIATIONS

- c—cercus  
 fr—furcula  
 mv—median vein  
 s—subgenital plate  
 uv—ulnar vein

## PLATE IV

- Fig. 103.—Head of *Neoconocephalus triops* (Linnaeus), lateral aspect.  
 Fig. 104.—Head of *Orchelimum vulgare* Harris, lateral aspect.  
 Fig. 105.—Head of *Scudderia furcata furcata* Brunner, anterior aspect.  
 Fig. 106.—Ovipositor of *Conocephalus fasciatus fasciatus* (DeGeer), lateral aspect.  
 Fig. 107.—Ovipositor of *Conocephalus nemoralis* (Scudder), lateral aspect.  
 Fig. 108.—Pronotum of *Orchelimum vulgare* Harris, lateral aspect.

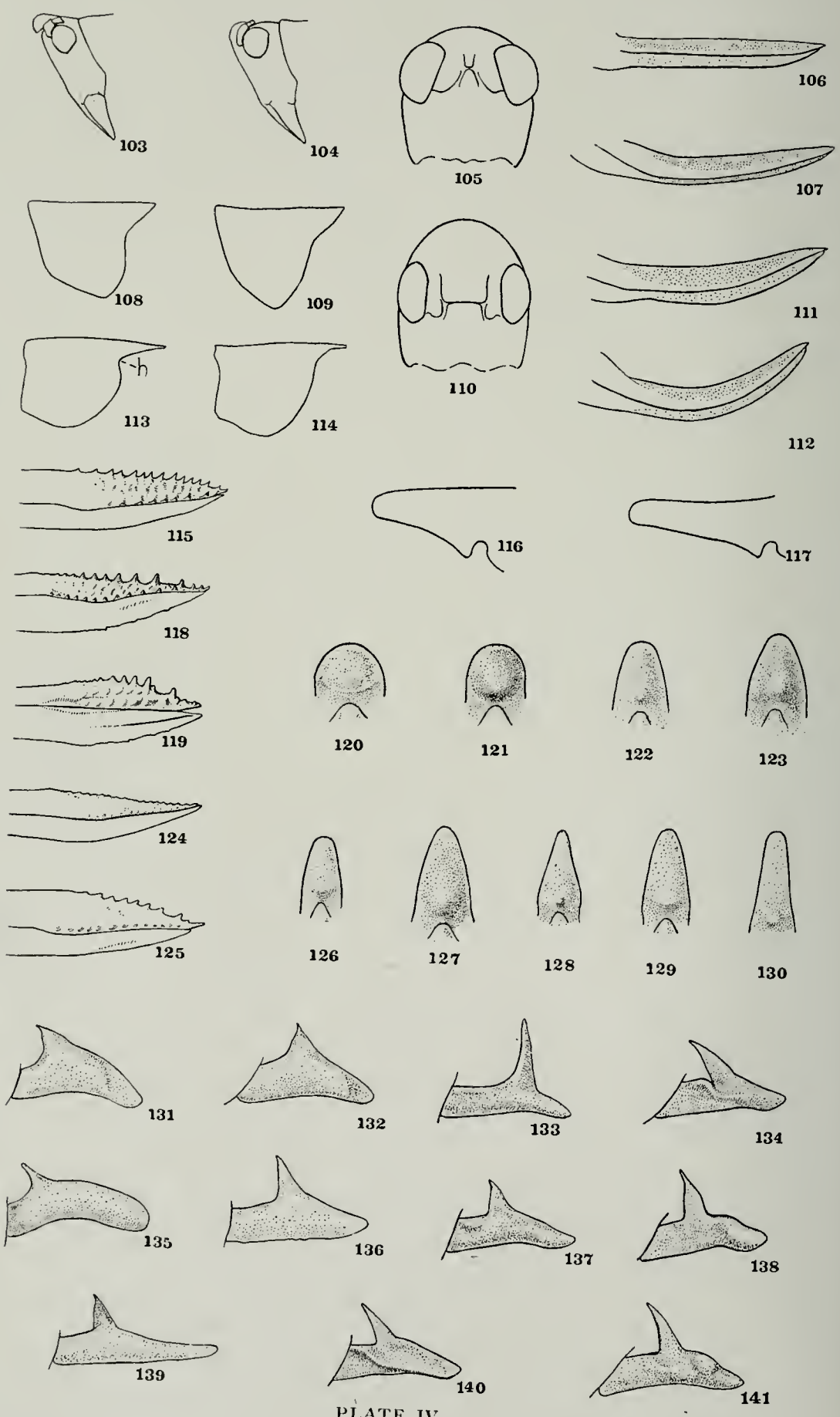


PLATE IV



## PLATE IV—CONT'D

Fig. 109.—Pronotum of *Orchelimum gladiator* (Bruner), lateral aspect.

Fig. 110.—Head of *Amblycorypha oblongifolia* (DeGeer), anterior aspect.

Fig. 111.—Ovipositor of *Orchelimum volantum* McNeill, lateral aspect.

Fig. 112.—Ovipositor of *Orchelimum concinnum concinnum* Scudder, lateral aspect.

Fig. 113.—Pronotum of *Amblycorypha uhleri* Stal, lateral aspect.

Fig. 114.—Pronotum of *Amblycorypha rotundifolia rotundifolia* (Scudder), lateral aspect.

Fig. 115.—Apex of ovipositor of *Nemobius maculatus* Blatchley, lateral aspect.

Fig. 116.—Fastigium of *Neoconocephalus nebrascensis* (Bruner), lateral aspect.

Fig. 117.—Fastigium of *Neoconocephalus exiliscanorus* (Davis), lateral aspect.

Adapted from Rehn and Hebard.

Fig. 118.—Apex of ovipositor of *Nemobius carolinus carolinus* Scudder, lateral aspect.

Fig. 119.—Apex of ovipositor of *Nemobius confusus* Blatchley, lateral aspect.

Fig. 120.—Fastigium of *Neoconocephalus triops* (Linnaeus), ventral aspect.

Fig. 121.—Fastigium of *Neoconocephalus retusus* (Scudder), ventral aspect.

Fig. 122.—Fastigium of *Neoconocephalus robustus robustus* (Scudder), ventral aspect.

Fig. 123.—Fastigium of *Neoconocephalus robustus crepitans* Scudder, ventral aspect.

Fig. 124.—Apex of ovipositor of *Nemobius cubensis palustris* Blatchley, lateral aspect.

Fig. 125.—Apex of ovipositor of *Nemobius fasciatus fasciatus* (DeGeer), lateral aspect.

Fig. 126.—Fastigium of *Neoconocephalus ensiger* (Harris), ventral aspect.

Fig. 127.—Fastigium of *Neoconocephalus palustris* (Blatchley), ventral aspect.

Fig. 128.—Fastigium of *Neoconocephalus lyristes* (Rehn and Hebard), ventral aspect.

Fig. 129.—Fastigium of *Neoconocephalus nebrascensis* (Bruner), ventral aspect.

Fig. 130.—Fastigium of *Neoconocephalus exiliscanorus* (Davis), ventral aspect.

Adapted from Blatchley.

Fig. 131.—Cercus of male *Conocephalus brevipennis* (Scudder), dorsal aspect.

Fig. 132.—Cercus of male *Conocephalus fasciatus fasciatus* (DeGeer), dorsal aspect.

Fig. 133.—Cercus of male *Orchelimum silvaticum* McNeill, dorsal aspect.

Fig. 134.—Cercus of male *Orchelimum nigripes* Scudder, dorsal aspect.

Fig. 135.—Cercus of male *Conocephalus attenuatus* (Scudder), dorsal aspect.

Fig. 136.—Cercus of male *Conocephalus nemoralis* (Scudder), dorsal aspect.

Fig. 137.—Cercus of male *Orchelimum concinnum concinnum* Scudder, dorsal aspect.

Fig. 138.—Cercus of male *Orchelimum vulgare* Harris, dorsal aspect.

Fig. 139.—Cercus of male *Conocephalus strictus* (Scudder), dorsal aspect.

Fig. 140.—Cercus of male *Orchelimum bullatum* Rehn and Hebard, dorsal aspect.

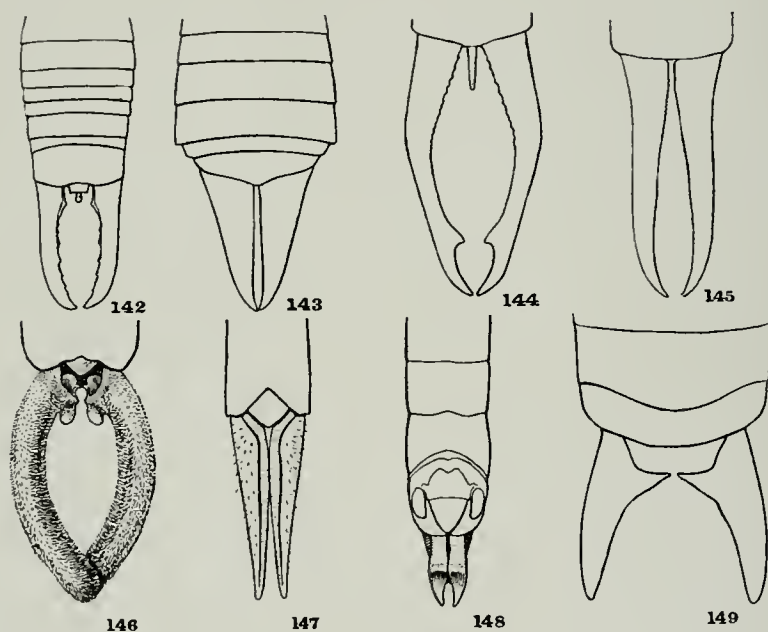
Fig. 141.—Cercus of *Orchelimum gladiator* (Bruner), dorsal aspect.

## ABBREVIATION

h—humeral sinus

## KEY TO THE ORDERS

- Body terminated caudad in a pair of elongate forceps, figs. 142-145. Tegmina present, always very short and without apparent veins, fig. 150, p. 151 ..... **Dermaptera**, p. 151
- Body not terminated caudad in a pair of forceps, figs. 146-149. Tegmina present or absent; when present with distinct veins, fig. 32 ..... **Orthoptera**, p. 151



## PLATE V

## APEX OF ABDOMEN OF DERMAPTERA AND ORTHOPTERA

- Fig. 142.**—*Labia minor* (Linnaeus), male.
- Fig. 143.**—*Labia minor* (Linnaeus), female.
- Fig. 144.**—*Doru aculeatum aculeatum* Scudder, male.
- Fig. 145.**—*Doru aculeatum aculeatum* Scudder, female.
- Fig. 146.**—*Diapheromera blatchleyi blatchleyi* (Caudell), male.
- Fig. 147.**—*Diapheromera blatchleyi blatchleyi* (Caudell), female.
- Fig. 148.**—*Melanoplus mexicanus mexicanus* Sausure, female.
- Fig. 149.**—*Conocephalus strictus* Scudder, male.

## DERMAPTERA

THIS ORDER is represented in the state by two species which are members of separate families, and an additional adventive.

## KEY TO FAMILIES

- Second tarsal segment cylindrical. Very small. Generally buffy brown. Macropterous.  
 Introduced species.....**LABIIDAE**
- Second tarsal segment heart shaped. Small. Generally deep red-brown, tegmina and legs paler. Brachypterous, very rarely macropterous.....**FORFICULIDAE**

**LABIIDAE****Labia** Leach

**L. minor** (Linnaeus).—This is an introduced species, widespread throughout the United States.

**Lake Forest:** 1♂, *HC*. **Algonquin:** May 13, 1894, 1♀, Nason; Oct. 1908, 1♂, Nason. **Havana:** Aug. 16, 1898, 1♂ on houseboat. **Urbana:** 1♀; June 5, 1926, 1♂. **Park.** **Dubois:** 1907, 1♂.

**FORFICULIDAE****Doru** Burr

**D. aculeatum aculeatum** (Scudder).—Thomas (1876) recorded this species as *Forficula aculeata* from northern Illinois. It has not been captured in the state since then. It occurs in sedges and high marsh grasses and has also been found beneath rubbish and leaves in woods.

**D. lineare** (Escholtz).—This species has been captured as an adventive in the state.

The only record is a single female with egg mass found at **Urbana**, April 8, 1933, in a cabbage shipped from Texas.



Fig. 150.—Adult female of *Labia minor* (Linnaeus), an earwig which occurs widely throughout the United States.  $\times 6$ .

## ORTHOPTERA

THIS ORDER is represented in Illinois by 191 species and races. In addition to this number seven species of cockroaches have been found adventive in the state.

## KEY TO FAMILIES

1. Legs nearly equal in size, the caudal femora not distinctly enlarged for leaping, fig. 152, p. 159.....2  
 Caudal legs elongate, their femora enlarged for leaping, fig. 157, p. 188.....4
2. Cephalic legs not highly developed for grasping, fig. 154, p. 161.....3  
 Cephalic legs highly specialized for grasping, fig. 152, p. 159.. **MANTIDAE**, p. 158



## ORTHOPTERA—KEY TO FAMILIES—CONT'D

3. Body strongly depressed, broad, often more or less oval in dorsal aspect, fig. 151, p. 156.....**BLATTIDAE**, p. 152  
Body elongate and slender, fig. 154, p. 161.....**PHASMIDAE**, p. 159
4. Antennae much shorter than body and relatively heavy, fig. 155, p. 169, and cephalic legs never specialized for digging. Auditory organs lateroproximad on abdomen when present. Stridulating organs of male on caudal femora and adjacent portion of tegmina when present. Ovipositor composed of two pairs of short curved pieces with acute tips.....**ACRIDIDAE**, p. 162  
Antennae extremely slender, much longer than body, fig. 158, p. 207, except in *GRYLLOTALPINAE* and *TRIDACTYLINAE* which have cephalic legs specialized for digging. Auditory organs when present proximad on cephalic tibiae. Stridulating organ of male when present in anal fields of tegmina. Ovipositor when exerted forming an elongate blade or tube.....5
5. Tarsi four segmented. Tegmina where present sloping at sides of body with much smaller deplanate dorsal section including only anal fields.....**TETTIGONIIDAE**, p. 200  
Tarsi three segmented, or less in *Tridactylus*. Tegmina where present horizontal in greater part, the narrow lateral portions alone bent downward. Ovipositor when exerted forming a slender tube with apex enlarged, bladelike only in *TRIGONIDIINAE*.....**GRYLLIDAE**, p. 243

**BLATTIDAE**

## KEY TO SUBFAMILIES AND GENERA

1. Ventral margins of femora heavily armed (*PSEUDOMOPINAE*, p. 153)....2  
Ventral margins of femora unarmed (*PANCHLORINAE*)...**Pycnoscelus**, p. 157
2. Ventrocephalic margin of cephalic femora armed proximad with a row of heavy spines, succeeded by a row of much more slender shorter spines, fig. 7....3  
Ventrocephalic margin of cephalic femora armed with a row of heavy spines which gradually decrease in size distad, fig. 8.....4
3. Male with sixth tergite specialized mesad, this flanked by a pair of minute toothed, comblike processes, fig. 13. Structure moderately delicate. Female with pronotum entirely brownish black, with tegmina meeting on meson. General coloration blackish brown, limbs and often tegmina paler, more reddish. Male with fully developed organs of flight, female with subquadrate, overlapping tegmina. Medium small.....**Ischnoptera**, p. 153  
Male without comblike processes flanking specialization of sixth tergite. Female with pronotum varied with light brown or tegmina not meeting on meson.....**Parcoblatta**, p. 153
4. General coloration buffy, pronotum with a pair of dark longitudinal bands. Structure delicate. Small. Organs of flight fully developed. Introduced, domiciliary.....**Blattella**, p. 153  
General coloration dark, pronotum without a pair of darker longitudinal bands. Structure heavily chitinous. Much larger. (*BLATTINAE*, p. 156).....5
5. Organs of flight fully developed, extending beyond top of abdomen. Large. Arolia well developed.....**Periplaneta**, p. 156  
Organs of flight moderately reduced in male, represented by lateral pads in female. Medium large. Arolia subobsolete. Introduced, domiciliary....**Blatta**, p. 157

## PSEUDOMOPINAE

**Blattella** Caudell

**B. germanica** (Linnaeus).—This cosmopolitan species is one of the commonest household and restaurant pests encountered in the state.

**Chicago:** Apr. 28, 1906 and May 7, 1907, 2♀. **Algonquin:** Oct. 8, 1907, 4♂, 7♀, 1 juv. ♀, Nason. **St. Joseph:** July 29, 1919, 1♀. **Urbana:** June 5, 1926, 2♂, 1 juv., Frison; July 11, 1911, 1♀, 1 juv. **Champaign:** Oct. 20, 1891, 2♀ in bakery, Marten. **Bluffs:** Aug. 30, 1905, 1♀. **Harrisburg:** Aug. 13, 1905, 4♂, 1♀, 5 juv.

**Ischnoptera** Burmeister

**I. deropeltiformis** (Brunner).—These are the first records from Illinois, the species being undoubtedly limited to the extreme southern portion of the state.

**Fountain Bluff:** May 15, 1932, 1♀, 1 large juv. ♀, Frison, Ross and Mohr. **Grand Tower:** June 28, 1906, 2♀.

**Parcoblatta** Hebard

Thomas and McNeill recognized only two species which are referable to *Parcoblatta*, *i. e.*, the pale *unicolor* (a synonym of *uhleriana*) and the strikingly colored *pennsylvanica*, both of which were referred to *Ischnoptera*. Their material of "unicolor" cannot be referred with any certainty to any one of the six paler species of *Parcoblatta* now known to occur in Illinois.

## KEY TO SPECIES

1. Tegmina extending beyond apex of abdomen (males).....2  
Tegmina not reaching apex of abdomen (females).....8
2. Dorsal surface of abdomen not specialized, lacking patches of setae, elevations or depressions, fig. 9. Ochraceous buff, head and sometimes pronotum much darker.....**bolliana**, p. 154  
Dorsal surface of abdomen specialized, having patches of setae, elevations or depressions, fig. 10. Small to medium small.....3
3. Median segment (first abdominal tergite) alone specialized.... 4  
Median segment and second abdominal tergite each with twin specialized areas. Medium small.....7
4. Median segment having a single specialized area.....5  
Median segment having twin agglutinated tufts of hairs. Medium small. Generally testaceous.....6
5. Median segment of abdomen with a tuft of agglutinated hairs. Generally testaceous, the pronotum often suffused laterad.....**zebra**, p. 154  
Median segment of abdomen with mesal portion extensively supplied with minute scattered hairs. Generally ochraceous buff.....**virginica**, p. 154
6. Cerci with inner distal angles of sixth to ninth joints acutely though briefly produced, fig. 11.....**uhleriana**, p. 155  
Male cerci simple, fig. 12.....**fulvescens**, p. 155

## PARCOBLATTA—KEY TO SPECIES—CONT'D

7. Specialized area of abdomen represented by slight elevations with a heavy tuft of hairs. Testaceous. . . . . *lata*, p. 155  
Specialized areas of abdomen represented by decided overhanging elevations with ventral surfaces of apices heavily supplied with hairs. Coloration wood brown with pronotum often very dark with pale lateral and cephalic margins. . . . . *pennsylvanica*, p. 156
8. Tegmina not meeting on meson. . . . . 9  
Tegmina meeting or overlapping on meson. . . . . 10
9. Tegmina very small, scarcely projecting beyond mesonotum, and separated by nearly twice their width. . . . . *bolliana*, p. 154  
Tegmina reaching first segment of abdomen, separated by less than their width. . . . . *uhleriana*, p. 155
10. Dorsum of abdomen banded, bases of tergites black with lateral, apical and sometimes mesal portions yellowish. . . . . *zebra*, p. 154  
Dorsum of abdomen more or less unicolorous, composed of shades of brown or blackish brown. . . . . 11
11. Tegmina not more than 3 mm. long. . . . . *virginica*, p. 154  
Tegmina at least 4 mm. long. . . . . 12
12. Pronotum wood brown with well defined yellow marginal band. Tegmina usually extending to or beyond middle of abdomen. . . . . *pennsylvanica*, p. 156  
Pronotum with pale lateral band absent or gradually merging with ground color, poorly defined. Tegmina never reaching middle of abdomen. . . . . 13
13. Posterolateral angle of tegmina somewhat quadrate, fig. 15. . . . . *fulvescens*, p. 155  
Posterolateral angle of tegmina more rounded, fig. 14. . . . . *lata*, p. 155

**P. bolliana** (Saussure and Zehntner).—Occurs only in southern and central Illinois, with Charleston and Clay City as northern known limits.

**Charleston:** June 11, 1931, 2♂, Ross. **Clay City:** June 23, 1909, 2♂ at light. **East St. Louis:** June 26, 1931, 1♂, Frison. **Dubois:** June 22, 1905 and July 2, 1909, 2♂ at light. **Carbondale:** May 27, 1909, 1♀ on persimmon tree; June 28, 1907, 1♂ at light. **Prospect Hill:** June 29, 1905, 1♀. **Parker:** June 7, 1913, 1♂.

**P. zebra** Hebard.—Described in 1917, the type of *zebra* came from Pulaski, the allotype from Havana, Illinois. Other material was then recorded from Knox county, Ind., Rives, Tenn., Lakeview and Hattiesburg, Miss., West Monroe and Mansura, La., and Dallas and Victoria, Tex. The species is evidently common in southern Illinois, Havana being a northern limit point in its distribution.

**Havana:** June 1 to Aug. 14, 1907 to 1911, 10♀, majority Aug. 14 on river shore; June 27 and July 8, 1910, 2♂, **Pike:** May 25 and 26, 1906, 3 juv.♂ in last instar, 5 juv.♀ in preceding instar, 1 juv.♀ in instar preceding that; June 25, 1906, 7♂. **Kampsville:** June 25, 1931, 1♂, Frison. **Mascoutah:** July 17, 1906, 1♀ in woods. **East St. Louis:** July 18, 1906, 2♀, 1 medium juv.♀. **Grand Tower:** June 2, 1913, 6♂ at light; June 28, 1906, 1♀. **Pulaski:** May 29, 1909, 1♀; June 9, 1907, 1♂.

**P. virginica** (Brunner).—This insect was reported from Rock Island by Hebard in 1917.



**Ravinia:** June 30, 1907, 1 ♂, Hood; July 21, 1907, 1 ♀, Zetek. **Aurora:** June 1908, 2 ♂ on hazel. **Danville:** July 7, 1906, 2 ♀ in woods. **Muncie:** June 13 to 16, 1905 and 1907, 8 ♂, 12 ♀. **Homer:** May 26, 1905, 2 ♂. **Urbana:** June 28, 1907, 1 ♂ in woods. **White Heath:** June 18, 1906, 1 ♂ in woods. **Charleston:** June 11, 1931, 1 ♂, Ross. **Pike:** June 25, 1906, 3 ♂. **Mt. Carmel:** July 2, 1906, 7 ♀. **Dubois:** June 21, 1905, 2 ♂, 5 ♀. **Carbondale:** June 26, 1907, 1 ♂. **Grand Tower:** June 2 to 28, 1906 and 1913, 3 ♂, 1 ♀. **Parker:** June 7, 1913, 1 ♂; June 12, 1907, 2 ♀. **Cobden:** June 29, 1905, 1 ♀. **Pulaski:** June 9 and 10, 1907, 1 ♂, 1 ♀, on bluff.

**P. uhleriana** (Saussure).—Recorded from Mossville by Hebard in 1917, the species is distributed over most of Illinois, Savanna being a northern point.

**Savanna:** July 27, 1892, 1 ♀, Hart and Forbes. **Muncie:** June 13, 1905, 1 ♂; July 6, 1907, 2 ♀. **Oakwood:** June 6, 1925, 1 ♂, Frison. **Homer:** July 20, 1907, 1 ♀. **Centralia:** June 15, 1905, 1 ♂. **Carbondale:** May 18, 1910, 1 ♂ on hickory; June 26, 1907, 1 ♀. **Parker:** June 7 to 12, 1907 and 1913, 2 ♂, 1 ♀. **Saratoga II:** July 17, 1877, 1 ♀. **Pulaski:** May 26 to June 10, 1907, 3 ♂.

**P. fulvescens** (Saussure and Zehntner).

1893 *Ischnoptera uhleriana* var. *fulvescens* Saussure and Zehntner, Biol. Cent.-Am., Orth., vol. 1, p. 36. ♂, in part, Georgia.

Type of *fulvescens* here selected. It is probable that the original figures, certainly those of the female, are based on Texan material, all from Dallas and probably representing *zebra*, though specimens of *fulvescens* may be included in the series from there as it is known from that locality. The New Mexican material originally recorded cannot be placed without examination of the specimens. We do not believe however that either *fulvescens* or *zebra* occur in that state but it is likely that *desertae* is actually represented.

We here select a male from Georgia in the Geneva Museum as type of *fulvescens*. A paratype male, labeled simply "Ga.," has been received by us in exchange with that institution. We also received in the same exchange another paratype male from Dallas, Tex., which however represents *zebra*, as did the originally figured female from "Texas," probably also from Dallas. Thus we know that the originally described *fulvescens* was a composite in which males of both *fulvescens* and *zebra* were included.

The species is probably confined to extreme southern Illinois, the following being northern limit records.

**Prospect Hill:** June 29, 1905, 1 ♀. **Cobden:** June 26, 1905, 1 ♀.

**P. lata** (Brunner).—Limited to southern Illinois; Mt. Carmel and Dubois are northern points of distribution.

**Mt. Carmel:** July 2, 1906, 1 ♂, 1 ♀. **Dubois:** June 21, 1905 and July 9, 1909, 3 ♀. **Carbondale:** June 22 and 26, 1907, 2 ♂, 2 ♀. **Cobden:** July 17, 1905, 1 ♂. **Whitehill:** June 29, 1905, 1 ♀. **Pulaski:** June 9, 1907, 1 ♂, 1 ♀, on bluff.

***P. pennsylvanica* (DeGeer).**—This insect is distributed generally and is decidedly the most abundant native cockroach throughout the state.

**Beach:** Aug. 22, 1906, 1♀ on sand ridges. **Chicago:** Feb. 4, 1906, 1♂ in Lincoln Park greenhouse. **Algonquin:** May 1 to July 24, 1905 to 1909, 9♂.

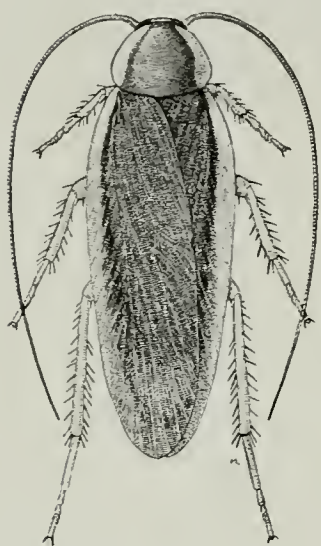


Fig. 151.—An adult male of *Parcoblatta pennsylvanica* (DeGeer), the most abundant native cockroach in Illinois.  $\times 1.7$ .

**Oregon:** June 19, 1917, 1♂, 1♀. **Summit:** July 20, 1907, 1♀, Zetek. **Aurora:** June 1908, 1♂, 1♀, *in coitu* on oak. **Sparland:** June 3, 1933, 1♂, Mohr. **Rock Island:** May 21, 1928, 1♂. **Monmouth:** Apr. 2, 1928, 1 nymph, Frison and Ross. **Peoria:** June 1879, 1 large juv. ♂, TC. **Danvers:** May 27, 1932, 1♀, Frison. **Leslie:** May 1881, 1♂. **Elliott:** July 10, 1906, 3♀. **Topeka:** Aug. 22, 1904, 1♀, Hart and Brown. **Devil's Hole:** June 8, 1905, 1♂. **Havana:** June 9 to Aug. 15, 1905 to 1928, 9♂, 18♀. **Danville:** July 7, 1906, 3♀. **Muncie:** May 10, 1906, 1 large juv. ♂; June 13 to 15, 1905, 8♂, 9♀. **Homer:** May 26 to June 24, 1905 to 1926, 13♂, 4♀. **Urbana:** Jan. 16 to May 21, 1906 and 1926, 7 juv.; June 1 to July 20, 1885 to 1909, 4♂, 8♀. **Champaign:** May 29, 1886, 1♂, Weed. **White Heath:** June 18, 1906, 1♀. **Matanzas Lake:** Aug. 23, 1894, 1♀, Forbes. **Camargo:** June 13, 1900, 1♂, 1♀, Myers. **Pike:** May 26 and June 25, 1906, 2♂, 3♀, 1 large juv. ♀. **Alma:** June 24, 1902, 2♀, Titus. **Centralia:** Aug. 28, 1905, 2♀. **Mascoutah:** July 17, 1906, 2♀. **Mt. Carmel:** July 2, 1906, 2♀. **Dubois:** July 5 and 9, 1909, 2♀ swept from grass. **Shawneetown:** Apr. 23, 1926, 2 large juv. ♂, Frison. **Carbondale:** Apr. 1882, 1♂. **Grand Tower:** June 2, 1913, 1♂ in woods at night; June 28, 1906, 1♀. **Pulaski:** May 26, 1907, 1 large juv. ♀ on bluff.

#### BLATTINAE

#### *Periplaneta* Burmeister

##### KEY TO SPECIES

Solid shining blackish brown. Dorsal surface of male abdomen with median segment specialized mesad. Male supra-anal plate chitinous, specialized ventrad. Introduced, domiciliary.....*fuliginosa*, p. 156

Reddish brown with pronotal disk paler with twin large suffusions of reddish brown. Dorsal surface of male abdomen unspecialized. Male supra-anal plate delicate, lamellate produced, not specialized ventrad. Introduced, domiciliary.....*americana*, p. 157

***P. fuliginosa* (Serville).**—The only record for the state is a series of 13 males and 14 females taken at Chicago, March 1, 1906. This series is probably from a colony established by material accidentally introduced by commerce. This is probably analogous to the colony of *Periplaneta australasiae* which has been reported from Radnor, Pa. Such colonies, although thoroughly established locally, are not liable to spread in these latitudes. However both these species can be introduced and become very

generally distributed in tropical and subtropical regions. The present species was not known to have established itself north of Florida.

**P. americana** (Linnaeus).—This is also not a native species, but unlike the other two discussed it is known to be found quite often this far north. Though probably less abundant in the tropics than *australasiae*, it is usually the most abundant species of the genus in subtropical regions.

**Chicago:** May 20, 1922 and July 16, 1923, 1♂, 1♀, Abbey, in museum; Gueret *FM*. **Normal:** Nov. 1882, 1♂ in ditch. **Champaign:** Jan. 13, 1928, 1♂ in house. **Decatur:** Nov. 3, 1916, 1♂ in house. **Quincy:** Sept. 12, 1904, 3♂, Mosier; Oct. 6, 1903, 1♀, Taylor and Hart.

**P. australasiae** (Fabricius), a third species, is almost certain to be found introduced at Chicago. The coloration is much as in *americana* but much brighter and in sharper contrasts, the male supra-anal process is much as in *fuliginosa* but is unspecialized ventrad. It also is not native, being a domiciliary adventive in this latitude.

### Blatta Linnaeus

**B. orientalis** Linnaeus.—Though not a native this filthy insect is probably generally distributed and well established throughout the towns and cities of Illinois.

**Chicago:** Mar. 1, 1906, 1♂ in greenhouse. **Havana:** July 12, 1894, 1♀. **Urbana:** Apr. 21, 1890, 1♂ at light; May 3 to Sept. 1, 1906 to 1931, 3♂, 4♀, at light and in house. **Champaign:** Sept. 30, 1927, 1♀ with oötheca in house. **Harrisburg:** June 25, 1932, 1♂, Ross, Dozier and Park. **Carbondale:** July 21, 1905, 1 medium large juv.♀. **Grand Tower:** June 28, 1906, 1♀.

### PANCHLORINAE

#### Pycnoscelus Scudder

**P. surinamensis** (Linnaeus).—This is another introduction from tropical and subtropical regions, where the species is common. It can establish itself in greenhouses and similar places and then often appears in large enough numbers to do considerable damage.

**Maywood:** Feb. 9, 1929, 2 juv.♀ from rose bench, Compton; Apr. 21, 1931, 2♀, 12 juv.♀.

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### ADVENTIVE BLATTIDAE

Though the following species have been taken in Illinois they are all tropical forms brought into the state in shipments of fruit. As we do not believe that they ever become even locally established, it is best to consider them adventives and omit them in lists of the species from this region.

### PSEUDOMOPINAE

**Neoblattella detersa** (Walker).—**Urbana:** Aug. 30, 1906, 1♂ in bunch of bananas. Source—probably Jamaica.

**Supella supellectilium** (Serville).—**Urbana:** Jan. 21, 1933, 1♂ in house, Frison. Source—tropical America.



## BLATTINAE

*Eurycotis floridana* (Walker).—Northern Illinois: 1 juv. ♂. Source—southeastern United States.

## NYCTIBORINAE

*Nyctibora noctivaga* Rehn.—Urbana: Dec. 12 and 28, 1925, 2 juv. ♀ in store, E. Decker. Source—Central America.

*Nyctibora* species, near *noctivaga*.—Algonquin: Sept. 17, 1896, 1 ♀ (determined incorrectly as *holosericea* by Hart), 2 juv. ♀. Mt. Carmel: 1 ♂ (determined incorrectly as *Periplaneta americana* by McNeill) from bananas, Schneck. Source—tropical America.

## EPILAMPRINAE

*Epilampra adbomen-nigrum* (DeGeer).—Urbana: Jan. 6, 1920, 1 ♀ from bananas, Folsom. Source—tropical America.

## PANCHLORINAE

*Panchlora cubensis* Saussure.—Prairie View: 1 ♀ in bananas. Algonquin: Apr. 19 to Dec., 1907 to 1915, 6 ♀ (determined incorrectly as *viridis* by Hart) in bananas, Nason. Elliott: May 16, 1906, 1 ♀ in bananas, Kelly. Urbana: Apr. 4, 1924, 1 ♀ in bananas, Van Cleave. Dubois: Nov. 24, 1913, 1 ♀, Hinkley. Source—tropical America.

## MANTIDAE

## MANTINAE

## KEY TO GENERA

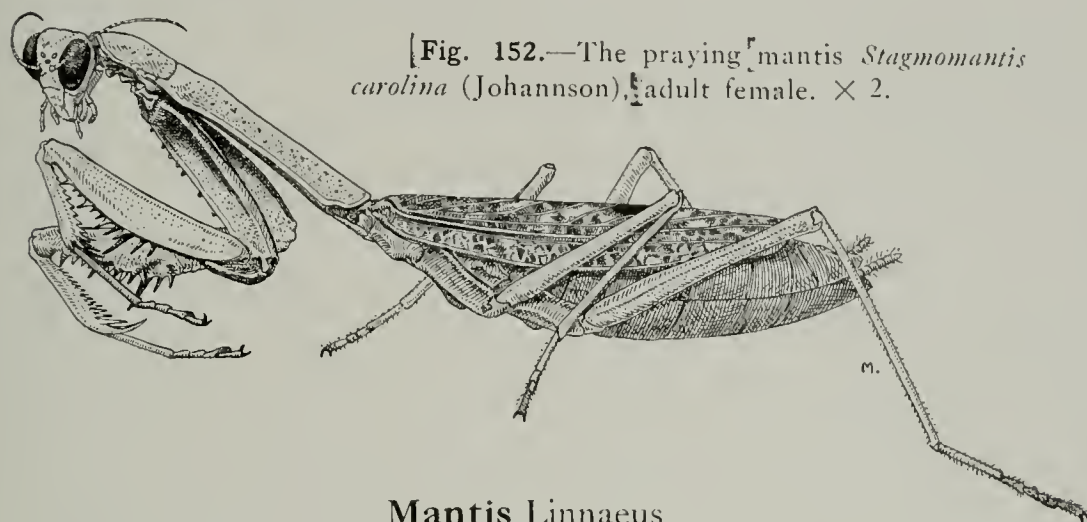
1. Organs of flight fully developed in male with marginal field hyaline, shorter than abdomen in female. Pronotum with supracoxal expansion decided and shaft comparatively slender. Cephalic trochanters immaculate proximointernally, their cephalic margin armed with coarse teeth. Medium size. . . . . *Stagmomantis*, p. 158
- Organs of flight fully developed with marginal field opaque in both sexes. Pronotum with supracoxal expansion moderate and shaft comparatively thick. . . . . 2
2. Cephalic trochanters with a black inner proximal marking, their cephalic margin finely toothed. Medium size. Introduced species. . . . . *Mantis*, p. 159
- Cephalic trochanters immaculate on inner proximal surface, their cephalic margin armed with coarse teeth. Very large. Introduced species. . . . . *Tenodera*, p. 159

**Stagmomantis** Saussure

*S. carolina* (Johannson).—We believe that both Chicago records which follow are accidental introductions and that the northern limits of this species, the only native Illinois mantid, must be given as Quincy, Olney and Centralia, indicating that it is confined to the southern portion of the state.

**Chicago:** Aug. 9, 1921, 1 ♀, brown, in Irving Park, Delchmann, *FM*; Oct. 1919, 1 ♀, brown, on lumber car from the south, Kleinpaste, *FM*. **Quincy:** Aug. 4, 1898, 1 medium juv. ♂. **Vandalia:** Sept. 30, 1929, 1 ♀, green, Frison. **Edwardsville:** Sept. 11, 1929, 1 ♀, green, Frison. **Olney:** Sept. 13, 1904, 1 ♀, dark brown, 1 oötheca, Taylor. **Centralia:** Sept. 23, 1886, 1 ♂, Weed. **Waterloo:** Sept. 11, 1929, 1 ♂, Frison. **Keensburg:** Sept. 5, 1927, 1 ♀, very dark brown. **Browns:** Aug. 21, 1902, 1 ♂, Titus. **Ashley:** Sept. 7, 1905, 1 ♂, Taylor. **Dubois:** Mar. 1894, 1 oötheca; June 22, 1905, 1-small juv.

**Pinckneyville:** Sept. 1887, 1 ♂. **Carbondale:** Oct. 15, 1909, 1 ♀, green, Smith. **Metropolis:** Sept. 3, 1924, 1 ♀, brown, 1 large juv. ♂, Frison; Sept. 28, 1889, 1 ♀, brown, Marten; Sept. 28, 1929, 1 large juv. ♀, Frison. **Pulaski:** Sept. 5 and 10, 1909, 3 ♀, brown, Hart.



### Mantis Linnaeus

**M. religiosa** Linnaeus.—This European species has been intentionally introduced and has become established in northern New York. Whether the record indicates a single introduction or the presence of a colony in northern Illinois remains to be decided.

**Chicago:** Sept. 10, 1909, 1 ♀, brown, Hart.

### Tenodera Burmeister

**T. sinensis** Saussure.—This very large, interesting and beneficial Asiatic insect was introduced in Philadelphia and has flourished and become quite widely distributed from that source. It has evidently been introduced and become established in Illinois also.

**Urbana:** Sept. 25, 1920, 1 ♂, Kienholz; fall of 1920, 1 ♀. **Champaign:** Oct. 1, 1916, 1 ♀ in yard. **Dubois:** Aug. 25, 1909, 1 ♂, Vestal. **Equality:** June 19, 1906, 1 oötheca, Gordon.

## PHASMIDAE

### KEY TO SUBFAMILIES AND GENERA

- Median and caudal femora with a concavity ventrodistad. Body comparatively robust for a walking stick. Brown with a darker mediolongitudinal stripe. Male much smaller and more slender than female. (*ANISOMORPHINAE*).  
 ..... **Anisomorpha**, p. 159
- Median and caudal femora not concave ventrodistad. Body very elongate and slender. (*HETERONEMIINAE*) ..... **Diapheromera**, p. 160

### ANISOMORPHINAE

#### Anisomorpha Gray

**A. ferruginea** (Beauvois).—This is a northern limit record. The

specimen was recorded as *buprestoides* by McNeill in 1891, but corrected by Blatchley in 1920.

Saratoga II: July 17 1877, 3♂, 1♀, 1 juv.♂.

#### HETERONEMIINAE

### Diapheromera Gray

#### KEY TO SPECIES

1. Caudal femora not armed ventrodistad. Male cerci with a slender proximointernal tooth. Female cerci elongate, slightly shorter than the more elongate ultimate tergite. Head much longer than broad. Extremely slender. . . . . *blatchleyi blatchleyi*, p. 160  
Caudal femora armed with a stout spine ventrodistad. . . . . 2
2. Male with middle femora banded with green and brown. Female cerci short, fig. 153c, less than half the length of tenth tergite. Head slightly longer than broad. Very slender. . . . . *femorata*, p. 161  
Male with middle femora unbanded. Female cerci long, as long as tenth tergite. . . . . *velii*, p. 162

**D. blatchleyi blatchleyi** (Caudell).—Much larger series of males of *blatchleyi* now before us from Illinois, as well as two from Missouri (Van Buren, Ozark mountains: July 2, 1930, 1♂, Pence, MMZ) and extreme eastern Oklahoma (Adair county: July 10, 1929, 1♂, Bird, MMZ), show no convergence whatever toward *persimilis*. Indeed the differences, particularly of the ninth sternite and poculum of the male prove that we were incorrect in assigning the present insect to racial status under *persimilis* (Hebard 1931b).

This, it will be further noted, will transfer the eastern race *atlantica* (Davis) from *persimilis* to *blatchleyi*, as it was originally assigned.

Valid related species are actually represented, distinguished by the following characters.

- Both sexes with eighth abdominal tergite distinctly shorter, in male decidedly (to rarely slightly) broader than long. Male with ninth abdominal tergite considerably shorter (length considerably less than  $1\frac{1}{2}$  times least width), conspicuously shorter than seventh and expanding weakly distad. Male with portion of ninth sternite before poculum much more ample, nearly as long as broad, the latter very much shorter with proximal portion only moderately constricted and not stalklike. Male with minute slender tooth at inner base of cerci, normally very acute at apex. Male with median femur much more definitely swollen. . . . . *persimilis*
- Both sexes with eighth abdominal tergite distinctly longer, in male distinctly longer than broad. Male with ninth abdominal tergite considerably longer (length slightly less than twice least width), slightly longer than seventh and expanding very feebly distad. Male with portion of ninth sternite before poculum very narrowly transverse, the latter very elongate with proximal portion decidedly constricted to form a narrow stalk. Male with minute slender tooth at inner base of cerci blunt at apex. Male with median femur very slightly swollen. . . . . *blatchleyi blatchleyi*



We would further note that previous records of *blatchleyi* from Missouri, and probably those from Iowa, are correct and not referable to *persimilis* as we suggested in Hebard 1931b.

This interesting and comparatively recently described walking stick is apparently generally distributed throughout northeastern Illinois, Dubois being a limital point southwestward. We have also a brown female from Williams Bay, Lake Geneva, Wis., taken September 3, 1892, by Hart, and constituting a northern limital record.

**Beach:** Aug. 21, 1906, 1♀, green, in swamp, Hart; Aug. 24 to 29, 1929 and 1932, 4♂. **Waukegan:** Aug. 4, 1930, 4♂, brown, 3♀ and 1 juv.♀, green, Frison, Knight, Ross; Aug. 18 and 20, 1906, 1♂, brown, 1 large juv.♀, green, in swamp, Hart. **Antioch:** Aug. 1, 1930, 1♂, Frison and Knight.

**Sun Lake:** Aug. 9, 1906, 1 large juv.♂ in bog, Hart. **Volo Lake:**

July 16, 1926, 1 large juv.♂, green, in tamarack bog, Frison and Hayes. **Amboy:** Aug. 25, 1933, 1♀, green, Ross and Mohr. **Bloomington:** Sept. 1875, 1♀. **Topeka:** Aug. 22, 1904, 1♀, green, Hart and Brown. **Havana:** July 22, 1912, 1♀, green; Sept. 18, 1895, 1♀, green. **Urbana:** June 30, 1901, 1♀, 2 medium juv.♀, green. **Monticello:** June 28, 1932, 1 juv.♀, green, Frison. **Mantanzas Lake:** July 11, 1910, 1 large juv.♀, green. **Dubois:** June 22, 1905, 1♂, brown, Hart.

**D. femorata** (Say).—This is undoubtedly the commonest walking stick in Illinois, found throughout the state. It was correctly recorded by Thomas in 1876, but as the synonym *sayi* by McNeill in 1891.

**Winnetka:** Aug. 6, 1925, 1♂, Park. **Channel Lake:** Aug. 13, 1906, 1 large juv.♂, Hart. **Algonquin:** July 31, 1905, 1 medium juv.♀, Nason; Aug. 16 to Sept. 13, 1905 and 1906, 4♂, 2♀. **Amboy:** Aug. 25, 1933, 2♂, Ross and Mohr. **Milan:** Aug. 14 to 17, 1885, 1♂. **Danville:** Sept. 28, 1928 and Oct. 24, 1926, 3♂, 2♀. **Muncie:** Sept. 7, 1912, 1♀. **Oakwood:** Sept.

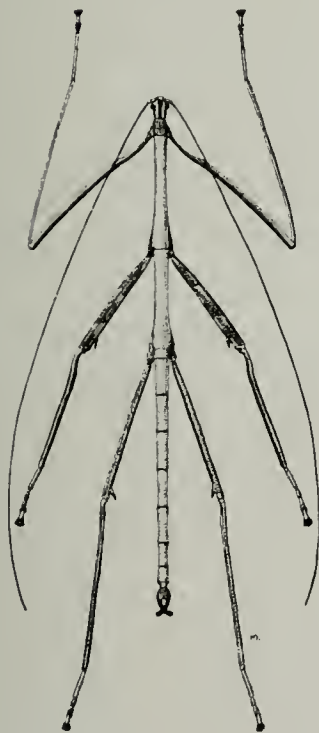


Fig. 154.—A male adult of the commonest walking stick, *Diapheromera femorata* (Say), in Illinois.  $\times .7$ .

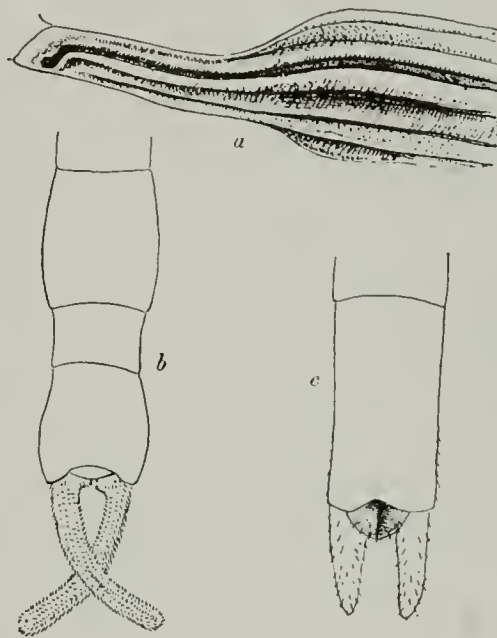


Fig. 153.—Parts of *Diapheromera femorata*. a, middle femora of male; b, terminal abdominal segments and cerci of male; c, terminal abdominal segment and cerci of female.

17, 1928, 2♂, 1♀, Frison. **Homer**: Sept. 24, 1927, 1♂, Frison. **Urbana**: July 27, 1926, 1 medium juv.♀ in woods, Frison; Aug. 1 to Oct. 27, 1885 to 1928, 5♂, 5♀; Sept. 5, 1898, 1 medium juv.♀, Woodworth. **Mahomet**: Aug. 20 to Oct. 2, 1928, 3♂, 1♀. **Quincy**: Oct. 6, 1903, 1♂, Taylor and Hart. **Borton**: Sept. 23, 1932, 1♂, Frison and Ross. **Charleston**: July 16 to 22, 1910, 6♂, 4♀, 2 large juv.♂, 3 large juv.♀, in forest. **Lawrenceville**: Sept. 24, 1932, 5♂, 4♀, Frison and Mohr. **Norris City**: Sept. 9, 1933, 1♀, Ross and Mohr. **Shawneetown**: Oct. 12, 1932, 1♂, Frison and Ross. **Makanda**: Sept. 9, 1908, 1♂, 1♀, Smith. **Herod**: Sept. 27, 1929, 1♂, Frison. **Anna**: Sept. 12, 1883, 1♀. **Elizabethtown**: Oct. 13, 1928, 1♂, Frison. **Metropolis**: Sept. 3, 1924, 1♂, Frison.

**D. velii** Walsh.—Though Walsh in 1864 originally referred a female from Illinois to his *Diapheromera velii*, it is probable that that specimen actually represented *blatchleyi*. The present insect has not subsequently been secured in the state, but may possibly occur in its west-central portion, as the race *velii velii* has been reported from as far east as Central City and Elmira, Iowa, and Memphis, Mo.—localities not distant from the Mississippi river. The two Iowa records, in addition, are less than a hundred miles from Rock Island, where Walsh's doubtful specimen was collected.

## ACRIDIDAE

### KEY TO SUBFAMILIES AND GENERA

1. Pronotum covering all or nearly all of abdomen, fig. 155, p. 169. Pulvilli absent. Cephalic and median tarsi with two segments, caudal tarsi with three segments. Comparatively very small species. (*ACRYDIINAE*, p. 166) . . . 2  
 Pronotum not covering abdomen, fig. 157, p. 188. Pulvilli present. Tarsi all three segmented. Larger species. . . . . 6
2. Antennae with 12-14 segments. Eyes not encroached upon by a convex production of the intervening area dorsad. Tegmina lacking a minute apical dot of buff. . . . . 3  
 Antennae with 22 segments. Eyes encroached upon by a convex production of the intervening area dorsad. Tegmina with a minute apical dot of buff. . . . . *Tettigidea*, p. 171
3. Median carina of pronotum high, cristate, fig. 17; dorsum tectate and longitudinally arched. . . . . *Nomotettix*, p. 166  
 Median carina of pronotum low, fig. 155, p. 169; dorsum not tectate, gently sloping or flat. . . . . 4
4. Fastigium considerably wider than eye, fig. 21. . . . . 5  
 Fastigium narrower, fig. 16; narrower than (male) to slightly wider than (female) eye, not produced, with cephalic margin concave and median carina slightly projecting. . . . . *Paratettix*, p. 170
5. Frontal costa widening slightly ventrad, fig. 27, the interval between its carinae very narrow. Vertex in lateral aspect angulate or rounded angulate. . . . . *Acridium*, p. 168  
 Frontal costa widening suddenly, fig. 28, so that ventrad the interval between its carinae is broad. Vertex in lateral aspect broadly rounded. . . . . *Neotettix*, p. 170

## ACRIDIDAE—KEY TO SUBFAMILIES AND GENERA—CONT'D

6. Prosternum not spined; flat, convex or with an obtuse tubercle.....7  
 Prosternum with a median spine. (*CYRTACANTHACRINAE*, p. 187).....29
7. Disk of pronotum with caudal margin not or but little produced, truncate or convex, figs. 37, 38. Median carina threadlike, only imperceptibly raised above surface of disk. Face usually retreating ventrad and angulate at junction of fastigium. (*ACRIDINAE*, p. 173).....8  
 Disk of pronotum with caudal margin strongly produced, acute or nearly so, fig. 40, usually with a raised crestlike median carina, elevated at least in prozonal portion. Face usually nearly vertical and rounding into vertex. (*OEDIPODINAE*, p. 179).....19
8. Lateral foveolae of vertex not visible from above. Stridulating organs present on male caudal femora and tegmina.....9  
 Lateral foveolae of vertex visible from above.....17
9. Antennae strongly ensiform, fig. 26.....10  
 Antennae cylindrical, fig. 24, or slightly flattened or clavate, fig. 25, never decidedly ensiform.....12
10. Apices of tegmina oblique, fig. 31. Wings of male fenestrate. Caudal femora with genicular areas weakly roundly produced in dorsal portion on each side. Swamp inhabitant.....*Truxalis*, p. 173  
 Apices of tegmina rounded, normal, fig. 30. Wings of male not fenestrate. Caudal femora with genicular areas not produced, normal.....11
11. Tegmina with six or more adjacent, regular, longitudinal veins along basal portion of marginal field, fig. 29. Fastigium with lateral portions overhanging and with a distinct mediolongitudinal carina. Male subgenital plate nearly twice as long as preceding sternite. Organs of flight decidedly (male) or greatly (female) reduced, very rarely submacropterous. Form very slender.....*Pseudopomala*, p. 173  
 Tegmina with few veins in marginal field, fig. 32. Fastigium with lateral portions not overhanging and with mediolongitudinal carina subobsolete or absent. Male subgenital plate not as long as preceding sternite. Organs of flight fully developed. Form slender.....*Mermiria*, p. 174
12. Fastigium with surface largely convex, lacking a conspicuous inframarginal impression, fig. 35. Supplementary carinae present on head or pronotum or both, except in individuals of *Amphitornus* and *Eritettix* in which the pronotal disk is uniform in color. Tegmina and wings fully developed...13  
 Fastigium with surface deplanate or concave or convex with a conspicuous inframarginal impression, fig. 34. Supplementary carinae never developed.....15
13. Inner spurs of caudal tibiae equal.....14  
 Inner spurs of caudal tibiae decidedly unequal. Antennae decidedly clubbed at apices in male, weakly so in female.....*Eritettix*, p. 175
14. Caudal tibiae buff, brown or black, with more numerous (15-24) external spines. Antennae slender, moderately elongate, showing a trace of distal thickening in male. Legs elongate. Male medium sized, graceful; female decidedly larger and heavier.....*Syrbula*, p. 174  
 Caudal tibiae pale blue with fewer (12-15) external spines. Antennae slightly flattened, of medium length. Legs normal. Smaller, form more compact, slender; much less contrast between the sexes.....*Amphitornus*, p. 175



## ACRIDIDAE—KEY TO SUBFAMILIES AND GENERA—CONT'D

15. Fastigium with a conspicuous inframarginal depression, lacking a mediolongitudinal carina. . . . . 16  
 Fastigium deplanate, with a weak mediolongitudinal carina best indicated distad but occasionally absent, due to individual variation. Lateral lobes of pronotum of male shining black. Organs of flight considerably reduced (male) or greatly reduced (normal female), rarely macropterous in female only. . . . . **Chloealtis**, p. 177
16. Lateral lobes of pronotum curving to meet disk, the two forming a rounded arc where they meet. Disk flared out caudally, with mediolongitudinal and lateral carinae weaker, fig. 38. Structure graceful. . . . . **Orphulella**, p. 176  
 Lateral lobes of pronotum deplanate and nearly vertical, forming a sharp angle with the disk. Disk rectangular and deplanate with mediolongitudinal and lateral carinae decided, fig. 37. Structure heavier. . . . . **Dichromorpha**, p. 176
17. Male stridulating rasp on inner surface of caudal femora. Small species, males less than 20 mm., females less than 25 mm. in length. . . . . 18  
 Male stridulating rasp on tegmina. Larger species, males more than 25 mm., females more than 35 mm. in length. Marsh inhabitants. . . . . **Stethophyma**, p. 178
18. Caudal tibiae yellow or buffy. Tegmina with marginal field fenestrate in male. Lateral carinae of pronotal disk arcuate constricted. Form graceful. . . . . **Chorthippus**, p. 177  
 Caudal tibiae pink. Tegmina with marginal field not fenestrate in male. Lateral carinae of pronotal disk very weak, considerably constricted. Form more robust. . . . . **Ageneotettix**, p. 178
19. Wings black with a whitish border. . . . . **Dissosteira**, p. 184  
 Wings not black. . . . . 20
20. Wings with disk nearly or quite transparent. . . . . 21  
 Wings with disk opaque, colored and plainly bordered by a dark band. . . . . 23
21. Pronotum with prozona tectate with lateral carinae absent. Wings usually faintly clouded with dusky cephalad of median portion of peripheral margin. . . . . **Chortophaga**, p. 180  
 Pronotum with prozona relatively flat, the lateral carinae conspicuous. . . . . 22
22. Pronotum with median carina high, prozona nearly as extensive as metazona, fig. 43. Wings very faintly clouded with dusky at tip, the disk very faintly tinged with yellow. . . . . **Encoptolophus**, p. 181  
 Pronotum with median carina low, prozona much smaller than metazona, fig. 44. Wings very faintly clouded with dusky at tip, the disk transparent, colorless. . . . . **Camnula**, p. 181
23. Pronotum with median carina entire, fig. 47, not incised. . . . . **Arphia**, p. 179  
 Pronotum with median carina incised. . . . . 24
24. Median carina of pronotum with a single incision, fig. 45. . . . . 25  
 Median carina of pronotum with two incisions, fig. 42. . . . . 27
25. Incision of median carina of pronotum occurring near middle of pronotum, fig. 45. . . . . **Hippiscus**, p. 181  
 Incision of median carina of pronotum occurring distinctly cephalad of middle of pronotum, fig. 46. . . . . 26

## ACRIDIDAE—KEY TO SUBFAMILIES AND GENERA—CONT'D

26. Pronotum with disk coarsely rugose. Body and tegmina irregularly barred with black and gray.....**Pardalophora**, p. 182  
 Pronotum with disk smooth or very finely punctured. Body and tegmina more or less unicolorous or of an irregularly speckled appearance.....**Spharagamon**, p. 184
27. Antennae simple, fig. 24. Wing disk yellow.....28  
 Antennae subensiform, fig. 23. Wing disk individually pink, through orange to flame scarlet. Prozona not ascending, occiput normal. Frontal costa extremely narrow dorsad. Caudal tibiae with postproximal and apical suffusions of brown, the interval between buff or faintly bluish. Small.....**Psinidia**, p. 185
28. Prozona ascending to the elevated occiput, fig. 36. Wing disk lemon yellow. Frontal costa moderately narrow dorsad. Caudal tibiae buff or light glaucous, without a postproximal annulus. Small....**Trachyrhachis**, p. 184  
 Prozona not ascending, occiput normal, fig. 41. Wing disk light yellow, band moderately broad. Medium size.....**Trimerotropis**, p. 186
29. Antennae ensiform, fig. 26. Fastigium very strongly produced. Face extremely oblique. Tegmina extremely elongate and slender with acute apices. Cephalic and median limbs very short. Form very elongate, subcylindrical. Swamp inhabitant.....**Leptysma**, p. 187  
 Antennae cylindrical, fig. 24. Fastigium little produced. Face nearly vertical. Tegmina not nearly as elongate and slender. Cephalic and median legs normal. Form not as elongate.....30
30. Mesosternum with caudolateral lobes longer than wide, fig. 52. Male subgenital plate deeply notched. Organs of flight fully developed. Females decidedly larger than males.....**Schistocerca**, p. 187  
 Mesosternum with caudolateral lobes as wide as long, fig. 56.....31
31. Vertex broad, fastigium scarcely projecting beyond eye, fig. 61. Form robust. Pronotum with sulci deep; caudal margin of disk very broadly convex, almost truncate. Tegmina represented by pads which are sometimes very briefly acute, but fully developed organs of flight are also occasionally present. Arboreal, oak inhabitant.....**Dendrotettix**, p. 199  
 Vertex narrower, fastigium projecting markedly beyond eye, fig. 63.....32
32. Head of normal size, fig. 63.....33  
 Head disproportionately large, fig. 62. Form graceful. Pronotum with sulci normal, less decided; caudal margin of disk broadly obtuse-angulate, weakly produced. Tegmina represented by acute pads, but fully developed organs of flight occasionally present. Campestran....**Phoetaliotes**, p. 199
33. Pronotum distinctly rugose and hoary with fine white pile.....**Campylacantha**, p. 189  
 Pronotum either not rugose or not hoary.....34
34. General coloration green and pronotum at most with a narrow black band along lateral lobes.....**Hesperotettix**, p. 189  
 Either general color not green or pronotum with entire upper half of lateral lobes black.....35
35. Disk of pronotum twice as long as its average width.....36  
 Disk of pronotum less than twice as long as its average width.....**Melanoplus** in part, p. 190

## ACRIDIDAE—KEY TO SUBFAMILIES AND GENERA—CONCL'D

36. Tegmina much abbreviated, not more than twice as long as wide. . . . . **Melanoplus** in part, p. 190  
 Tegmina at least three times as long as wide. Male cerci with spatulate apices.  
 Male furcula well developed. Caudal tibiae dull pale greenish glaucous.  
 Swamp loving species. . . . . **Paroxya**, p. 200

## ACRYDIINAE

**Nomotettix** Morse

## KEY TO SPECIES

1. Projection of vertex in lateral aspect narrower and longer, fig. 19. Very small.  
 Pronotal carina lower. Fastigium more triangularly produced. . **parvus**, p. 166  
 Projection of vertex in lateral aspect broader and shorter, fig. 20. Small. Pronotal  
 carina higher. Fastigium less produced with sides convex. . . . . 2
2. Pronotal carina high, fig. 17. Surface of pronotum comparatively smooth.  
 Northern race. . . . . **cristatus cristatus**, p. 166<sup>4</sup>  
 Pronotal carina very high, fig. 18. . . . . 3
3. Surface of pronotum comparatively smooth. Pronotal carina highest for the  
 species. More southern race. . . . . **cristatus compressus**, p. 167  
 Surface of pronotum tuberculate. Pronotal carina slightly lower than in alternate  
 category. Southwestern race. . . . . **cristatus denticulatus**, p. 168

**N. parvus** Morse.—The Illinois specimens agree closely with material from northeastern Kansas and south-central eastern Minnesota and are quickly separable from any of the races of *cristatus* by the more projecting vertex which in lateral aspect is narrower, the more coarsely rugose and tuberculate dorsal surface of the pronotum and its low crest which shows scarcely any arcuation except cephalad. The present specimens offer strong evidence that *parvus* is a distinct species. An established synonym is *acuminatus* Hancock.

**Snyder:** Apr. 14, 1930, 2♂, 2♀, 1 juv.♂, Frison and Ross. **Robinson:**  
 Apr. 14, 1930, 3♀, Frison and Ross.

**N. cristatus cristatus** Scudder.

- 1899 *Nomotettix sinuifrons* Hancock, Ent. News, vol. 10, no. 10, p. 278. ♂,♀, St. Anthony Park, Minn.  
 1909 *Nomotettix borealis* Walker, Canadian Ent., vol. 41, no. 6, p. 173, pl. 7, figs. 1 and 1a. ♀, Diamond Lake in Temagami District, Ont.

Rehn and Hebard (1916b) recognized five races of this species, all found in eastern North America, the northernmost of which was considered to be Walker's *borealis*. In 1920 Batchley placed that name in synonymy under *sinuifrons*.

We have examined the type of *borealis*, belonging to Dr. Walker, and that of *sinuifrons*, now in the author's collection. Additional ma-

<sup>4</sup> The races of *Nomotettix cristatus* cannot be distinguished by use of a short key alone.



terial from the more northern portions of the range of *cristatus* shows conclusively that both these names must be synonymized under *cristatus cristatus*. The degree of the production of the vertex is individually variable, even greater contrast than shown by Walker's type as compared with specimens of typical *cristatus cristatus* being found in two cases in material of the same series before us (Wellesley, Mass.; Lake Itaska, Minn.). The emargination of the frontal costa, antennal length and production of cephalic margin and roughness of pronotum are all differences of slight degree and likewise variously combined in other material of the same series before us.

In 1925a we referred to *cristatus cristatus* Rehn's Lakehurst, N. J. record of *sinuifrons* (Smith 1910), and incorrectly recorded as *sinuifrons* three specimens of *Acridium acadicum acadicum* as follows: an immature from St. Anthony Park, Minn., an immature from Brookings, S. D. and a caudate adult from Gull Lake, Muskoka District, Ont. An immature female then recorded from Custer, S. D. fixes the known northwestern limit of *cristatus cristatus*.

Hancock's 1902 records of *compressus* from Indiana were based on a large series of typical *cristatus* from Dune Park, a male probably the same from Clark, and a series intermediate between *cristatus cristatus* and *cristatus compressus* from Vigo county.

This race is probably distributed over most of Illinois. Further collecting is needed to determine its limits definitely and those of *cristatus denticulatus* as well.

**Odin:** May 10, 1910, 32♂, 1 caudate, 22♀, in meadow. **Mt. Carmel:** May 28, 1884, 1♂. **Dubois:** Aug. 25, 1905, 1♂, Hart. **Parker:** May 18, 1908, 1♂, Hart.

**N. cristatus compressus** Morse.—This race is close to typical *cristatus* and individual males are often very difficult to distinguish. The few specimens of this sex before us from southern Illinois listed as the latter may therefore be shown by series from that region to be better considered intergrades or even representatives of the present more southern race. Eight specimens from Vigo county, Ind. in the author's collection are intermediate. To the east the present race apparently occurs further north as we have a typical female from Muncie, Ind. and a typical male from Cleveland, Ohio.

Though we have no material from southern Illinois which we can refer definitely to *cristatus compressus*, we have strong evidence to indicate that intergradation with typical *cristatus* will be found in the northern section of that region and that extreme southern Illinois is probably populated by typical *cristatus compressus*.

**N. cristatus denticulatus** Morse.—Additional material now before us from Oklahoma and the specimens here recorded lead us to believe that this insect had best be recognized as a southwestern geographic race, though poorly defined, and not a synonym of *cristatus arcuatus* showing a decided tendency toward *cristatus compressus*, as we have previously thought. The majority of the races of *cristatus*, though apparently worthy of recognition, are separated on no more distinctive features than the present.

In *cristatus denticulatus* the pronotal surface is decidedly tuberculate, the fastigium much as in *cristatus cristatus*, the pronotal cristation and compression more pronounced than in that race and nearly as decided as in *cristatus compressus*.

The sole Illinois record is **Homer**: Oct. 7, 1906, 3♀, 1 caudate.

This is a limital record, far northeast of the point to which we had expected to find *cristatus denticulatus*. Though recorded from localities to the south and west, the series of *cristatus cristatus* here recorded from Illinois shows no variation whatever toward *cristatus denticulatus* and the presence of the latter at Homer apparently can only be explained by the probability that in Illinois it is limited to local areas of different environment.

### **Acridium** Geoffroy

#### KEY TO SPECIES

1. Fastigium triangularly produced, with median carina not or scarcely projecting, fig. 22. Antennal joints comparatively stout and caudal femora slender.  
.....**granulatum**, p. 168  
Fastigium with sides convex and median carina projecting. Antennal joints comparatively slender and caudal femora stout<sup>5</sup>.....2
2. Fastigium projecting well beyond the eyes, fig. 21, with sides convex. Lateral carinae of cephalic portion of pronotum typically parallel.....3  
Fastigium projecting little beyond eyes, nearly truncate. Lateral carinae of cephalic portion of pronotum typically slightly convergent caudad..  
.....**arenosum angustum**, p. 169
3. Form more robust. Pronotum often showing a trace of tectation. Fastigium often showing very weak indication of triangular production.....  
.....**acadicum acadicum**, p. 169  
Form less robust. Pronotum showing no trace of tectation. Fastigium normally showing less production.....**ornatum**, p. 169

**A. granulatum** Kirby.—The species is found only in northern Illinois, Homer and Bloomington being points on its southern limit of distribution.

Three specimens from Chicago and one from Algonquin are subcaudate, the others are fully caudate.

<sup>5</sup>The three species of *Acridium* which follow are extremely variable and a key is not to be relied upon.

**Beach:** Aug. 21, 1906, 1♀ with pale mediolongitudinal dorsal band and broad dark margins opposite shoulders, in swamp, Hart. **Chicago:** Apr. 28, 1906, 3♂, 1♀, 1 pair with pale mediolongitudinal dorsal band, on beach of Lake Michigan. **Lake Villa:** Aug. 10, 1906, 1♂, 1♀, in swamp, Hart. **Algonquin:** Apr. 14, 1895 to Oct. 9, 1905 and 1908, 4♂, 3♀, 1♀ with striking buff mediolongitudinal dorsal band. **Bloomington:** Nov. 3, 1883, 1♀ with lateral margins of pronotum narrowly pale. **Homer:** May 16, 1906, 2♂, 1 with pale mediolongitudinal dorsal band, Hart. **Urbana:** Mar. 24 to Sept. 9, 1889 to 1905, 7♂, 3♀.

**A. acadicum acadicum** (Scudder).—This is probably a rarer tettigid but of local occurrence over all of Illinois.

**Peoria:** Sept. 9, 1905, 1♀. **Homer:** June 10, 1926, 1♀, Frison. **Urbana:** Sept. 9, 1898, 1♂, Woodworth; Sept. 13 and 14, 1909, 2♀. **Champaign:** May 8, 1886, 1♀, Forbes and Weed. **Mahomet:** Apr. 23, 1925, 1♀, Frison. **Carbondale:** Apr. 23, 1925, 1♂, Chandler. **Elizabethtown:** Aug. 8, 1905, 1♀. **Karnak:** Sept. 2, 1924, 1♀, Frison.



Fig. 155.—Adult male of the pygmy locust *Acridium ornatum* (Say).  $\times 9$ .

**A. ornatum** (Say).—In the vicinity of Chicago the insect usually shows extreme depauperation, but some of the specimens from Muncie, Homer, Urbana, Quincy, Dubois and Pulaski are unusually large and robust with mediolongitudinal carina of pronotum slightly more decided than usual and are consequently difficult to separate from small individuals of *acadicum acadicum*. This common species was correctly recorded by Thomas (1876) and McNeill (1891), but by the latter in addition as the synonym *triangularis*.

The insect is to be found over all Illinois. Seventy-five males, 90 females and nine immature specimens were taken at **Beach, Waukegan, Summit, Chicago, Pullman, Deep Lake, Algonquin, Elizabeth, Fulton, Bradford, Ashkum, Kappa, Loda, Paxton, Ludlow, Rantoul, Normal, Bloomington, Havana, Danville, Hilliary, Georgetown, Muncie, Oakwood, Homer, Ogden, Thomasboro, Urbana, Champaign, Seymour, White Heath, Lincoln, Conover, Tolono, Quincy, Galton, Snyder, Litchfield, Mt. Carmel, Dubois, Carbondale, Grand Tower, Pulaski**, from March 30 to November 3.

**A. arenosum angustum** (Hancock).—In material from central Illinois frequent specimens show a slight tendency toward *arenosum*



*arenosum* and in southern Illinois this is more often seen and more pronounced. All of Illinois is included in the distribution of *arenosum angustum*. This race is weakly defined and in this state subject to marked individual variation.

One hundred and twenty-five males, 109 females and three immature individuals are from Algonquin, Savanna, Galesburg, Havana, Quiver Lake, Bryant, Muncie, Oakwood, Homer, Urbana, Mahomet, White Heath, Woodyard, Paris, Pike, Marshall, Hardin, Lawrenceville, Mt. Carmel, Carmi, Dubois, Carbondale, Grand Tower, Herod, Alto Pass, Cobden, Anna, Jonesboro, Aldridge, Metropolis, Vienna, Karnak, Dongola, Pulaski, Villa Ridge.

### **Neotettix** Hancock

#### KEY TO SPECIES

So variable are the species of the genus *Neotettix* treated here that a key is not to be relied upon.

Pronotum with dorsal surface finely granulose. Caudal femora with ridges not prominent.....**femoratus**

Pronotum with dorsal surface rugosotuberculate. Caudal femora with ridges prominent.....**bolteri**

**N. femoratus** (Scudder).—This is the first record for Illinois and a northern limit point, others being Crawford county in central southern Indiana, and Olden in central southern Missouri, for which the material is in the author's collection.

**Elizabethtown:** May 27 to 31, 1932, 1♂, 3♀, Dozier. **Pulaski:** May 25, 1932, 1♀, Dozier.

**N. bolteri** Hancock.—These specimens are robust and have the pronotum abbreviate. The caudal apex of the pronotum shows much individual variation, as follows: acute in two females, nearly acute but narrowly rounded in nine males and three females, broadly rounded truncate in one male and one female, and broadly bilobate in one female.

**Dubois:** July 3, 1909, 1♂. **Wolf Lake:** May 5, 1932, 1♂, Dozier. **Pulaski:** May 19 to June 10, 1907 and 1908, 9♂, 7♀.

These are northern limit records and Wolf Lake is a westernmost point as well.

### **Paratettix** Bolivar

**P. cucullatus** (Burmeister).—Northern limit points are Algonquin and Savanna, the species occurring over all but the extreme northern margin of the state.

Forty-nine males, 46 females and 54 immature individuals were taken at Algonquin, Chana, Savanna, Moline, Galesburg, Normal, Havana, Quiver Lake, Muncie, Oakwood, Homer, St. Joseph, Urbana, Champaign,

Mahomet, White Heath, Matanzas Lake, Quincy, Pike, Hardin, Grafton, Lawrenceville, Centralia, Mt. Carmel, Carmi, Du Quoin, Shawneetown, Carbondale, Running Lake, Fountain Bluff, Grand Tower, Herod, Elizabethtown, Golconda, Metropolis, Pulaski, Villa Ridge, Thebes. The adults, all of which have the pronotum caudate, were secured between May 7 and October 13.

## Tettigidea Scudder

### KEY TO SPECIES

1. Disk of pronotum with cephalic margin convex: dorsal surface very finely granulate, appearing almost smooth, with few very weak rugae and median carina weak.....2  
 Disk of pronotum with cephalic margin produced either in a large cusp or a sharp angle; dorsal surface longitudinally strongly rugose, the median and lateral carinae well developed.....*acuta*, p. 172
2. More robust. Northern race, if valid.....*lateralis parvipennis*, p. 171  
 More slender. Southern race, if valid.....*lateralis lateralis*, p. 171

**T. *lateralis parvipennis* (Harris).**—The validity of this form has already been noted by us (Hebard 1932) as open to serious question. The intergradation which occurs with typical *lateralis* cannot be plotted in Illinois with any regularity. A series before us from the beach at Lincoln Park, Chicago, averages distinctly more slender than that from Urbana, while the male from Odin and five females from Pulaski are robust. These facts are not as would be expected, typical *lateralis* being supposedly a more slender southern race.

Under *lateralis parvipennis* we have here listed all but material we consider typical of *lateralis lateralis*. The insect was recorded as *lateralis* and abbreviate material as the synonym *polymorpha* by both Thomas (1876) and McNeill (1891).

One hundred and forty-one males and 162 females were taken from March 4 to October 7, and 28 immature specimens are also before us. They were secured at Beach, Chicago, Pullman, Edgewater, Channel Lake, Cedar Lake, Lake Villa, Deep Lake, Wauconda, Algonquin, Savanna, Summit, Bradford, Normal, Bloomington, Funks Grove, Havana, Cuba, Danville, Hilliary, Muncie, Oakwood, Homer, St. Joseph, Urbana, Champaign, Mahomet, Seymour, White Heath, Woodyard, Quincy, St. Francisville, Odin, Mt. Carmel, Dubois, Grand Tower, Herod, Cobden, Aldridge, Metropolis, Vienna, Pulaski. The series is about evenly divided between the caudate and abbreviate phases.

**T. *lateralis lateralis* (Burmeister).**—The typical form of this species is only scantily represented in the collections from Illinois, whereas what is considered as *parvipennis* is abundant.

Chicago: Sept. and Nov. 1909, 2♂, 3♀. Wauconda: July 6, 1932, 1♂.  
 Savanna: Sept. 11, 1932, 1♀, Frison and Mohr. Urbana: June 5, 1885, 1♀.  
 Mahomet: Sept. 12, 1932, 2♀, Park. White Heath: Nov. 25, 1927, 1♀.

**Lawrenceville:** Sept. 24, 1932, 1♀, Frison and Mohr. **East St. Louis:** July 18, 1906, 1♂, 1♀, female caudate. **Herod:** Sept. 4, 1932, 1♀, Ross and Horsfall. **Anna:** June 8 to 28, 1907 to 1913, 3♂, 1♀, all caudate; Sept. 6, 1884, 8 juv. **Golconda:** Aug. 3, 1932, 1♀, Dozier.

**T. acuta** Morse.

- 1895 *Tettigidea acuta* Morse, Jour. N. Y. Ent. Soc., vol. 3, p. 15; vol. 4, pl. II, fig. 7. ♀, New York.  
 1895 *Tettigidea apiculata* Morse, *ibid.*, vol. 3, p. 16; vol. 4, pl. II, figs. 8 and 8a. ♂, ♀, New Orleans, La.  
 1895 *Tettigidea armata* Morse, *ibid.*, vol. 3, p. 107; vol. 4, pl. II, figs. 10 and 10a. ♀, Vigo county, Ind.; Dallas, Tex.  
 1895 *Tettigidea armata depressa* Morse, *ibid.*, vol. 3, p. 107. ♂, Jacksonville, Fla.; ♀, Vigo county, Ind.; St. Johns river and Fort Reed, Fla.; New Orleans, La.  
 1895 *Tettigidea spicata* Morse, *ibid.*, vol. 3, p. 108; vol. 4, pl. II, figs. 9 and 9a. ♂, Georgia; ♀, Florida.  
 1908 *Tettigidea davis* Morse, Psyche, vol. 15, p. 25. ♂, ♀, Perth Amboy and Jamesburg, N. J.; Staten Island, N. Y.

Rehn and Hebard (1916b) placed *armata depressa* and *davis* as synonyms of *armata*. In considering the above names we now find that only a single species is represented. This species, like many others of the Acrydiinae, develops both a caudate and an abbreviate pronotal form. In the present case the abbreviate condition has the median carina of the pronotum more prominent with the dorsum usually showing slight but distinct concavity on each side. Such also appears more rarely in caudate individuals and specimens showing these features were described and have until now been recognized generally as *armata*. In the caudate condition, however, the pronotal disk is usually slightly to decidedly convex, the median carina becoming weaker as such convexity increases. Such individuals we have previously recorded as *spicata*, realizing that *apiculata* was very similar. In 1920 Blatchley, seeing the very decided affinity to *armata*, placed *spicata* as a race and further stated that *apiculata* might represent merely an intergrade and being the oldest name of the three would take specific status for the entity if such were proven.

We have been able to examine the types of all the names given above and a very large series has now been arranged in geographic sequence in our collections. It is surprising to find that *acuta* is the oldest name available for the species in question, based on caudate females with pronotal dorsum convex and showing a very faint mediolongitudinal carina and unusual smoothness. Compared with them the types of *apiculata* and *spicata* are inseparable except for the greater roughness of the dorsum and more spicate cephalic margin of the pronotum. Both these features are shown by our series to be matters of mere individual



variation. Moreover the greater or less convexity and degree of development of the median carina of the pronotum in caudate individuals is just as conclusively proven by the series to have no greater diagnostic weight.

It is true that in the south material from salt marshes is usually caudate with spiculation decided and dorsum convex with weak median carina, but on the Mullica river flats in New Jersey a very large series secured by us includes similar material only, while a series from Sea Isle Junction, N. J. has 11 males and five females abbreviate with pronotum concave laterad of the decided median carina, but four females are caudate and in all other respects as in the Mullica river material. Finally, on the bare soil in swamps from the great lakes to the gulf, the normal is the "*armata*" type, but quite frequently individuals are indistinguishable from the "*apiculata*" condition. Thus even racial recognition can evidently not be given any of the five names here placed in synonymy.

Northern limits are shown by material in the author's collection to be Staten Island, N. Y., Sandusky, Ohio and Dune Park, Ind. Though Urbana, Ill. is a northwestern limital point, the species in the southwest reaches Howe, Okla. and Dallas, Tex., so that it will probably be found locally on bare soil in swamps over all but extreme northern Illinois.

**Urbana:** Nov. 6, 1907, 1♂, caudate. **Dixon Springs:** Oct. 13, 1932, 1♂, caudate, Frison and Ross.

#### ACRIDINAE

##### **Pseudopomala** Morse

**P. brachyptera** (Scudder).—This scarce and handsome species is probably present but very local in the northern portions of the state. These records are limital southward and the first for Illinois.

**Bishop:** Aug. 13, 1907, 1♂, 1♀. **Devil's Hole:** June 29, 1910, 1♂; Aug. 15, 1907, 2♀. **Urbana:** Aug. 13, 1885, 1♀ in bluegrass and timothy. **Champaign:** Aug. 1879, 2♀, *TC*. **Charleston:** Aug. 8, 1910, 1♂ in tall grass.

##### **Truxalis** Fabricius

**T. brevicornis** (Linnaeus).—Havana, Muncie and Champaign are northern limital records. Southward the species occurs probably throughout the marshes and swamps in the state.

**Havana:** Aug. 11 to 23, 1907 and 1910, 8♂, 7♀, 2♀ brown, 3♀ green, 1♀ green with brown dorsum, river shore, swamp. **Muncie:** July 24, 1932, 1♂, Park. **Champaign:** July 30, 1885, 1♂ at light, Hart; July 31, 1886, 1♂, 1♀, female green, Hart; Aug. 25, 1885, 1♀, brown, at light, Hart. **Billett:** Sept. 7, 1933, 7♂, 2♀, 1 pair brown, 1♀ green, Ross and Mohr. **Aldridge:** Aug. 11, 1891, 5♂, 1♀, female brown, Mississippi river bottom, Hart and Shiga.

## Mermiria Stal

### KEY TO SPECIES

1. Pronotum elongate, with distinct lateral carinae. Caudal legs elongate and slender. Form more slender. Lateral foveolae weakly indicated. .... *neomexicana*  
 Pronotum short, lacking lateral carinae. Caudal legs relatively robust. Form less slender. .... 2
2. Male lacking a subcostal pale bar on proximal half of tegmina. Fastigiofacial angle averaging broader. Coloration more frequently greenish. .... *bivittata*  
 Male with a subcostal pale bar on proximal half of tegmina. Fastigiofacial angle averaging narrower. Coloration more frequently buffy. .... *maculipennis macclungi*

**M. neomexicana** (Thomas).—These are easternmost records and Forest City a northernmost as well for this western species. In Illinois it is probably very local, occurring only in sandy areas and on waste land.

**Forest City:** Aug. 20, 1904, 1 ♂ in sand dunes with blackjack oak, Hart and Brown. **Bishop:** Aug. 13, 1907, 5 ♂. **Devil's Hole:** Aug. 13 to Sept. 11, 1904 to 1912, 23 ♂, 19 ♀, 1 large juv. ♀, 13 ♀ brown, 1 ♀ green but tegmina wholly brown, 6 ♀ green.

**M. bivittata** (Serville).—These are northern limits for this scarcer species, which was recorded from Illinois with uncertainty by Thomas in 1880, the present specimens by Hart in 1907.

**Chautauqua:** Aug. 20, 1906, 1 ♂ on bluff. **Tamaroa:** Sept. 22, 1882, 1 ♀, TC.

**M. maculipennis macclungi** Rehn.—These are eastern limits for this western species, Fulton being also northernmost and Meredosia southernmost in this longitude. The insect is probably very local in Illinois, occurring only in sandy areas and on waste land. It was reported from the vicinity of Havana incorrectly as *bivittata* (in part) by Hart in 1907, by Vestal in 1913 and correctly by Rehn in his revision of the genus in 1919.

**Fulton:** July 20, 1927, 4 ♂, 6 ♀, 2 large juv. ♀. **Forest City:** Aug. 20, 1904, 2 ♂, 2 ♀, sand dunes with blackjack oak, Hart and Brown. **Devil's Hole:** Aug. 7 to Sept. 2, 1903 to 1912, 5 ♂, 6 ♀, sand dunes. **Devil's Neck:** Aug. 22, 1904, 1 ♂ on sand prairie, Hart and Brown. **Meredosia:** Aug. 23 to 30, 1905 to 1917, 3 ♂, 2 ♀, in sand pit.

## Syrbula Stal

**S. admirabilis** (Uhler).—The distribution of this graceful species covers practically all Illinois.

**Kenilworth:** July 8, 1899, 2 ♀, green, Hancock. **Chicago:** Aug. 26 to Sept. 7, 1901, 8 ♂, 7 ♀, 5 ♀ green, 8 ♂ and 2 ♀ brown. **Algonquin:** Sept. 23, 1905,

1♀, green, Nason. **Dixon**: 1♀, Ross. **Amboy**: Aug. 25, 1933, 1♀, Ross and Mohr. **Fulton**: July 20, 1927, 1♂, 2♀, females green. **St. Anne**: Aug. 28, 1932, 6♂, 8♀, 6♀ green, 6♂ and 2♀ brown, Ross and Mohr. **Bartonville**: Aug. 29, 1910, 1 medium juv.♀ on bluffs. **Peoria**: Sept. 9, 1905, 1♀, very small, green. **Forest City**: Aug. 20, 1904, 1♀, Hart and Brown. **Devil's Hole**: Aug. 17 to 26, 1903 to 1910, 2♂, 2♀, 2 juv.♀, 1♀ green, 1♀ brown, river shore in sand region. **Homer**: Aug. 29 and Oct. 7, 1906, 3♀, green. **Urbana**: Sept. 20, 1906, 4♀, green. **Teheran**: Aug. 7, 1904, 1 large juv.♀, 1 small juv.♀, Hart and Brown. **Bath**: Aug. 17, 1903, 1♂ in sandy blackjack oak area, Hart. **Meredosia**: Aug. 22, 1917, 2♂ in sand pit. **Quincy**: Oct. 6, 1903, 1♀, green, Taylor and Hart. **Nokomis**: Sept. 7, 1932, 1♂, Ross and Mohr. **Hillsboro**: Sept. 7, 1932, 8♀, Ross and Mohr. **Alton**: Sept. 6, 1932, 1♂, 3♀, females green, Ross and Mohr. **Lawrenceville**: Sept. 24, 1932, 3♀, Frison and Mohr. **Clay City**: Sept. 2, 1909, 1♀, brown. **Alma**: Oct. 12, 1932, 2♀, Frison and Ross. **Dubois**: Aug. 9, 1917, 1♂, 1 small juv.♂. **Shawneetown**: Oct. 12, 1932, 1♀, Frison and Ross. **Grand Tower**: June 25 to July 25, 1905, 1 large juv.♂, 1 medium juv.♀; July 24, 1905, 1♂; Aug. 5, 1905, 2♂. **Alto Pass**: Aug. 27, 1899, 1♂, Hart. **Golconda**: Oct. 13, 1932, 3♀, Frison and Ross. **Dixon Springs**: Sept. 5, 1932, 9♀, Ross and Horsfall. **Metropolis**: Aug. 17, 1891, 1♂; Aug. 19, 1891, 1♂, foot of low bluffs, Hart and Shiga; Sept. 3, 1924, 1♂, Frison.

### **Amphitornus** McNeill

**A. coloradus** (Thomas).—In the present series supplementary pronotal carinae are lacking in two males and one female.

This is a western species, widespread on the plains and it is interesting to find it so far east on the prairies of Illinois, where it is probably very local. The following localities are limital eastward, Forest City being also a northernmost point and the nearby Havana a southernmost point for the species in this longitude. Hart first recorded it from Illinois in 1907 as the homonym *bicolor*.

**Forest City**: Aug. 20, 1904, 2♀ among blackjack oak in sand dunes, Hart and Brown. **Bishop**: Aug. 13, 1907, 5♂, 5♀. **Devil's Neck**: Aug. 22, 1904, 3♀, 1 juv.♀, sand prairie, Hart and Brown. **Havana**: Aug. 7, 1908, 1♀.

### **Eritettix** Bruner

**E. simplex** (Scudder).—The present species probably occurs over all Illinois, but is probably local and confined to areas of comparatively poor soil. It was recorded as the synonym *virgatus* from Havana by Hart in 1907. Two adult females from Havana and the Topeka immature specimen alone have the dorsum of the pronotum wholly pale and uniform in color.

This series is typical of *simplex*; no tendency whatever toward the western *tricarinatus* (Thomas) is shown.

**Forest City**: June 6, 1905, 1♀. **Topeka**: Oct. 30, 1907, 1 medium juv.♀. **Devil's Hole**: Apr. 27 to June 29, 1910 and 1912, 9♂, 10♀, 2 large juv.♀, majority of adults and the 2 juv. taken earliest date.



## Orphulella Giglio-Tos

### KEY TO SPECIES

Pronotum with lateral carinae little incurved, about equally separated cephalad and caudad, particularly the female, fig. 39. Vertex blunt, its central depression extending close to the apex. Prozona longer than metazona. Form usually less graceful and organs of flight less caudate.....**speciosa**

Pronotum with lateral carinae strongly incurved with angulation often indicated, the distance between them considerably greater caudad than cephalad, fig. 38. Vertex rectangular or in male a little acute, its central depression removed from apex one-third (male) to one-fourth (female) the width of the vertex. Prozona and metazona about equal in length. Form usually more graceful and organs of flight more caudate.....**pelidna**

**O. pelidna** (Burmeister).—All of Illinois is included in the distribution of this species, which when found is usually present in considerable numbers.

The females taken in Illinois have the dorsum as follows: eight specimens dark to light brown, seven green but one of these with dorsal portions of tegmina deep purplish vinaceous.

This species and *speciosa* were confused by Thomas (1876) and McNeill (1891) and recorded as *maculipennis*, a synonym of *pelidna*.

**Beach:** Aug. 21 to 26, 1906 and 1932, 13♂, 12♀. **Waukegan:** Aug. 16 to 25, 1906 to 1917, 7♂, 5♀, in swamps and on beach. **Chicago:** Aug. 30 and Sept. 7, 1901, 4♂, 3♀. **Meredosia:** Aug. 22 to 30, 1905 and 1917, 3♀.

**O. speciosa** (Scudder).—This common species is generally distributed in grassland throughout Illinois.

**Beach:** Aug. 24, 1932, 1♀, Ross and Mohr. **Waukegan:** Aug. 16, 1906, 1♀ in swamp. **Kenilworth:** July 18 and Aug. 24, 1899, 5♀. **Winnetka:** Aug. 22, 1897 and Sept. 11, 1899, 8♂, 4♀. **Chicago:** Aug. 15 to Sept. 7, 1901, 3♂, 5♀. **Channel Lake:** Aug. 14, 1906, 1♀ in sand hills. **Deep Lake:** Aug. 2 and 8, 1906, 3♂, 5♀. **Algonquin:** July 20 to Aug. 19, 1905, 6♂, 11♀, 1 large juv.♀. **Downers Grove:** Aug. 13, 1902 and Aug. 19, 1901, 3♂, 4♀. **Starved Rock:** July 14, 1932, 2♂, Dozier and Park. **Colona:** Aug. 16, 1♂, 1♀. **Green River:** Aug. 14, 1♂. **Moline:** Sept. 9, 1905, 4♂, 6♀, in sand hills. **St. Anne:** Aug. 28, 1932, 4♂, 5♀, Ross and Mohr. **Peoria:** Sept. 9, 1905, 1♂. **Elliott:** Aug. 10, 1906, 1♂. **Forest City:** Aug. 20, 1904, 1♂ in sand dunes with blackjack oak, Hart and Brown. **Bishop:** Aug. 13, 1907, 3♀. **Urbana:** July 24, 1891, 1♂ at light, Hart and Shiga. **Taylorville:** Aug. 11, 1902, 2♀, Titus. **Bluffs:** Aug. 19, 1917, 2♂. **Chautauqua:** July 20, 1906, 2♀ on bluff. **Alton:** Sept. 8, 1932, 5♂, Ross and Mohr. **Clay City:** Aug. 21, 1905, 3♂, 1♀. **Odin:** Aug. 28, 1909, 1♀. **Browns:** Aug. 21, 1902, 1♀ in grass in orchard, Titus. **Dubois:** Aug. 24, 1905, 1♀. **Murphysboro:** July 22, 1905, 1♀. **Fountain Bluff:** July 25, 1905, 3♀.

## Dichromorpha Morse

**D. viridis** (Scudder).—This is a common species generally distributed over Illinois.

A single brown female taken at Grand Tower on August 5, 1909, is almost fully macropterous. This is a very rare occurrence in the species; there are four such in the author's collection—one green female from Minersville, Pa., two green females from Jacksonville, Fla. and one brown male from Canton, S.D.

Forty-one males, 41 females and three immature individuals represent the following localities: **Savanna**, **Geneseo**, **Port Byron**, **Bartonville**, **Bloomington**, **Topeka**, **Havana**, **Muncie**, **Homer**, **Urbana**, **Athens**, **Charleston**, **Jacksonville**, **Bluffs**, **Florence**, **Neoga**, **Grafton**, **Alton**, **Lawrenceville**, **Mt. Carmel**, **Chester**, **Shawneetown**, **Carbondale**, **Grand Tower**, **Herod**, **Cobden**, **Aldridge**, **Golconda**, **Metropolis**, **Whitehill**, **Cache**, **Cairo**. The adults were taken between June 28 and October 17. Seventeen males, 25 females and two immatures are brown, the others green.

### **Chloealtis** Harris

**C. conspersa** Harris.—Arenzville and Mt. Carmel are southernmost points, the species becoming probably less and less numerous and more local south to those localities.

**Beach**: Aug. 24 to 26, 1932, 4♂, 1♀, Ross and Mohr. **Antioch**: Aug. 1, 1924, 1♂ in tamarack bog. Frison. **Channel Lake**: Aug. 13, 1906, 1♀ in woods. **Deep Lake**: Aug. 8, 1906, 7♂, 8♀. **Algonquin**: July 21, 1905, 1♂, Nason; July 31, 1905, 1♂, Nason. **Savanna**: Sept. 6, 1905, 1♀. **Moline**: July 21, 1♂, McNeill. **Forest City**: Aug. 20, 1904, 1♂, 2♀, sand dunes with blackjack oak, Hart and Brown. **Havana**: July 1910, 2♂, 3♀. **Muncie**: June 15, 1906, 2 medium large juv.♀; Sept. 18 and 22, 1905 and 1906, 1♂, 2♀. **Homer**: July 20, 1907, 2♂. **Urbana**: July 5, 1889, 1♂; July 6, 1889, 1♂; July 13, and 19, 1889, 3 medium large and large juv.♀ in pond grove. **Champaign**: June 5, 1889, 1 medium juv.♂. **White Heath**: June 18, 1906, 1♀ in woods. **Bath**: Aug. 14, 1903, 1♂ in sand region with weeds and blackjack oak, Hart. **Arenzville**: Aug. 14, 1913, 1♂ on sandy bluff. **Charleston**: Aug. 16, 1910, 1♂, 1♀, in forest. **Mt. Carmel**: July 2, 1906, 1♂.

### **Chorthippus** Fieber

**C. curtipennis** (Harris).—Algonquin and Urbana are southern known limits of this common species of lush grasses, swamps and bogs. It is apparently very abundant in such environments in northeastern Illinois.

**Beach**: July to Aug. 28, 1906, 1926 and 1932, 9♂, 25♀, 1♀ macropterous. **Zion**: July 6, 1932, 8♂, 2♀. **Waukegan**: Aug. 18 and 20, 1906, 2♂, 3♀, in swamps. **Chicago**: July 17 to Oct. 9, 1909, 7♂, 6♀, Allen. **Antioch**: July 5, 1932, 1♂, Frison; Aug. 27, 1932, 1♂, 1♀, Ross and Mohr. **Channel Lake**: Aug. 13 and 14, 1906, 2♂, 4♀, in swamp and woods. **Lake Villa**: Aug. 9 and 10, 1906, 4♂, 9♀, 2 juv. **Sun Lake**: Aug. 3, 1906, 3♂, 1♀, in



Fig. 156.—A short winged grasshopper, *Dichromorpha viridis* (Scudder), ♀. × 2.4.

bog. **Cedar Lake:** Aug. 4 and 7, 1906, 2♂, 2♀, in bog and among tamaracks. **Deep Lake:** Aug. 2 and 8, 1906, 4♂, 3♀, 1 juv. **Algonquin:** July 6 to Sept. 22, 1905 and 1907, 36♂, 28♀, 3 juv. **Urbana:** Sept. 30, 1901, 2♂, 3♀, Titus. **Champaign:** Aug. 31 to Sept. 5, 1885, 2♂.

### Stethophyma Fischer

#### KEY TO SPECIES

Pronotum with lateral carinae parallel. Sternite preceding male subgenital plate with a black mediolongitudinal line. Pronotum with prozona and metazona equal in length. Tegmina lacking a pale stripe . . . . . **platyptera**

Pronotum with lateral carinae divergent caudad. Sternite preceding male subgenital plate immaculate. Pronotum with prozona shorter than metazona. Tegmina with a pale stripe proximad near costal margin . . . . . **lineatum**

**S. platyptera** (Scudder).—The present records define the southern known limits for this swamp loving species in this longitude. Long considered an exceedingly rare insect, it is now becoming evident that it not only has a much wider distribution than was supposed, but that though very local it may sometimes be found in large numbers. It is however safe to say that *platyptera* is not only one of the handsomest, but also one of the least frequently encountered boreal North American grasshoppers. These specimens were recorded by Hart (1907).

**Champaign:** July 31, 1904, 1♀, Hart. **Teheran:** June 22, 1♂, Hart.

**S. lineatum** (Scudder).—This large and handsome insect inhabits a similar environment, is much more frequently encountered and is decidedly more numerous than *platyptera*. Matanzas Lake is the southern limit point.

It was probably this insect which Thomas reported from extreme northern Illinois, with a query, as *gracile* in 1876 and for which McNeill recorded a specimen from Iowa opposite Watertown, Ill. in 1891. Part of the present material was recorded by Hart in 1907.

**Waukegan:** July 6, 1932, 1♂, Frison. **Antioch:** Aug. 17, 1932, 17♂, 3♀, Ross and Mohr. **Sun Lake:** Aug. 3, 1906, 1♀ in bog. **Matanzas Lake:** July 6, 1898, 1♂, Hart.

### Ageneotettix McNeill

**A. deorum** (Scudder).—This very common sand loving species was reported by McNeill incorrectly as *Phlibostroma parva?* (= *quadrinaculatum*) in 1891 and as the synonym *scudderi* in 1897. It was again so reported by Hart in 1907 and correctly by Vestal in 1913.

Very widespread in the west, southeastern limits are Meredosia, Ill. and Vigo county, Ind.

**Beach:** Aug. 21 to 27, 1906 and 1925, 12♂, 15♀. **Zion:** Aug. 25, 1932, 2♂, 10♀, Ross and Mohr. **Waukegan:** Aug. 25, 1917, 1♂. **Oregon:** July 4, 1932, 1♂, Dozier and Mohr. **Fulton:** July 20, 1927, 5♂, 12♀. **Starved Rock:**



July 14, 1932, 15♂, 18♀, Dozier and Park. **Moline**: Aug. 29, 1♀, McNeill; Sept. 9, 1905, 1♂ on sand hill. **St. Anne**: Aug. 28, 1932, 6♂, 11♀, Ross and Mohr. **Forest City**: June 5, 1905, 1 juv. **Manito**: Aug. 31, 1910, 3♂, 3♀. **Bishop**: Aug. 13, 1907, 1♀. **Devil's Hole**: Aug. 12 to Sept. 2, 1903 to 1907, 12♂, 11♀. **Devil's Neck**: July 7, 1905, 1 juv.; Aug. 22, 1904, 1♀ in sand prairie, Hart and Brown. **Havana**: Aug. 25, 1933, 2♂, Ross and Mohr; Oct. 29, 1907, 2♀. **White Heath**: July 22, 1925, 1♂, Frison. **Meredosia**: Aug. 17 to 30, 1905 to 1917, 2♂, 3♀.

## OEDIPODINÆ

**Arphia** Stal

## KEY TO SPECIES

1. Pronotum with median carina very high, arched, strongly cristate, fig. 48. Taenia of broad wing band short. Size larger. Appears adult in summer. Caudal tibiae usually black to the proximal annulus. Wing disk individually varying from yellow through orange to pink. . . . . **xanthoptera**, p. 180  
Pronotum with median carina much lower, very feebly arched, fig. 47. Taenia of wing band elongate. Smaller. . . . . 2
2. Impressed area of fastigium as broad as (male) or broader than (female) long, its sides straight convergent to the acute apex, particularly in male, fig. 50. Vertex joining frontal costa with a definite angulation indicated in the convexity. Appears adult in spring. Wing disk always yellow. Caudal tibiae with mesodistal portion of dark section often briefly glaucous or buffy. . . . . **sulphurea**, p. 179  
Impressed area of fastigium longer than broad, its sides slightly arcuate convergent to its truncate apex, fig. 51. Vertex joining frontal costa in an even convexity. Appears adult in summer. Wing disk rich pink, rarely buff yellow in northeastern portion of its distribution only. Caudal tibiae usually black to proximal annulus. . . . . **pseudonietana**, p. 180

**A. sulphurea** (Fabricius).—In this series the caudal tibiae beyond the broad pale proximal annulus are almost black, sometimes slightly paler and bluish in median portion laterad and ventrad. Only in two females (Oakwood, Parker) is that entire area bluish white. The tegmina are uniform brown in the great majority, five males showing a slightly paler dorsal band but two males having this band very pale and conspicuous.

**Beach**: July 16, 1928, 1♀, Frison and Hayes. **Chicago**: June 6 to 15, 1903 to 1905, 6♂, 3♀. **Cedar Lake**: June 19, 1892, 1♂, Hart and Shiga. **Mt. Carroll**: June 15, 1932, 2♂, 2♀, Frison and Mohr. **Willow Springs**: May 23, 1922, 2♂, Gerhard, *FM*. **Moline**: June 5, 1♂, McNeill. **Rock Island**: June 3, 1930, 1♂, Frison and Ross. **Galesburg**: Apr. 1889, 1♂, *HC*. **Prospect**: June 29, 1906, 1♂. **Forest City**: June 6, 1905, 1♂. **Bishop**: June 23, 1906, 1♂, 2♀. **Havana**: June 23, 1926, 2♂, Frison and Hayes. **Muncie**: June 14 to 30, 1907, 2♂, 4♀; Sept. 22, 1906, 1 juv. ♂ with occiput and disk of pronotum gray with black flecks. **Vermilion county**: May 30, 1926, 1♂, 2♀, Auden. **Oakwood**: May 18 to June 18, 1927, 13♂, 7♀. **Homer**: May 14 to June 21, 1906 and 1926, 4♂, 3♀, 1♀ with occiput and disk of pronotum greenish gray with minute dark flecks. **Urbana**: June 3 to

July 29, 1889 to 1891, 3 ♂, 3 ♀. **White Heath**: June 20, 1906, 1 ♀ in woods. **Odin**: June 25, 1909, 1 ♂. **Dubois**: June 22, 1905, 1 ♂. **Carbondale**: June 7, 1907, 1 ♂, 1 ♀ with occiput and disk of pronotum gray with black flecks. **Grand Tower**: June 27, 1906, 3 ♂. **Parker**: June 12, 1907, 1 ♀. **Cobden**: May 7, 1918, 1 ♂. **Pulaski**: June 10, 1907, 2 ♂, 1 ♀, on bluff.

**A. xanthoptera** (Burmeister).—Recorded as the synonym *carinata* by Thomas (1876), McNeill included that name in his 1891 list.

**Chicago**: Aug. 15 to Sept. 28, 7 ♂, 3 ♀, wing disk yellow in 2 ♀, yellow with a faint orange tinge in 4 ♂, orange in 1 ♂ and 1 ♀, grenadine in 1 ♂, strawberry pink in 1 ♂. **Dixon**: 2 ♂, wing disk yellow in 1, rich orange in 1, Ross. **Starved Rock**: July 14, 1932, 4 ♂, 3 ♀, Dozier and Park. **St. Anne**: Aug. 28, 1932, 1 ♂, 1 ♀, Ross and Mohr. **Forest City**: Aug. 20, 1904, 2 ♀, wing disk orange in 1, grenadine in 1, Hart and Brown. **Devil's Hole**: Aug. 15, 1907, 1 ♀ with wing disk yellow with a faint orange tinge. **Hamilton**: Aug. 30, 1931, 1 ♂ with wing disk orange, Ross and Mohr. **Urbana**: Aug. 30, 1891, 1 ♂ with wing disk grenadine, Hart; Oct. 18, 1889, 1 ♀ with wing disk yellow with a faint orange tinge, Marten. **Champaign**: Aug. 4, 1911, 1 ♀ with wing disk yellow, Frison. **Bluffs**: Aug. 19, 1917, 1 ♂ with wing disk rich orange. **Nokomis**: Sept. 7, 1932, 1 ♂, Ross and Mohr. **Hillsboro**: Sept. 7, 1932, 1 ♂, Ross and Mohr. **Grafton**: Sept. 8, 1932, 3 ♂, Ross and Mohr. **Clay City**: July 22, 1905, 1 ♀ with wing disk yellow tinged with orange; July 28, 1906, 1 juv. ♂. **Albion**: Sept. 24, 1889, 1 ♂ with wing disk yellow, Marten. **Dubois**: Aug. 24, 1905, 1 large juv. ♀. **Running Lake**: Aug. 15, 1883, 1 juv. ♀. **Makanda**: Sept. 25, 1931, 1 ♂ with wing disk yellow, Barrett. **Fountain Bluff**: Aug. 10, 1891, 1 ♂ with wing disk yellow, roadside, Hart and Shiga. **Grand Tower**: July 29, 1905, 1 ♂ with wing disk yellow. **Alto Pass**: Aug. 14, 1891, 1 ♀ with wing disk yellow, Hart and Shiga. **Golconda**: Oct. 13, 1932, 2 ♀, Frison and Ross. **Dixon Springs**: Oct. 13, 1932, 2 ♀, Frison and Ross. **Metropolis**: Aug. 17, 1891, 1 ♂ with wing disk yellow, Hart; Sept. 3, 1924, 1 ♂ with wing disk orange, Frison. **Karnak**: Sept. 2, 1924, 1 ♀ with wing disk yellow, Frison. **Cache**: Oct. 14, 1932, 1 ♂, Frison and Ross.

**A. pseudonietana** (Thomas).—Thomas recorded this insect as *Tomonotus tenebrosus* in 1876 and as *Tomonotus nietanus* in 1880 from extreme northwestern Illinois. McNeill did not have it nor have we seen it from this state, but we believe that Thomas had material as noted above. Southern known definite limits are Amherst Junction, Wis. and Harbert, Mich., only a few miles from the Illinois line. It is however certain that the insect will not be found except locally and probably only along the extreme northern border of the state.

It is interesting to note that the wing disk is invariably pink and usually rich in tone for all western material but that we have specimens from Minnesota and Wisconsin in which that area is light orange. This color phase will therefore probably also be found in material from Illinois.

### **Chortophaga** Saussure

**C. viridifasciata** (DeGeer).—This species is distributed over the entire state.

Seventy-two males and 69 females, taken April 14 to September 6, the great majority in June, and 16 immature individuals were secured at Lake county, Glencoe, Kenilworth, Chicago, Algonquin, Oregon, Sterling, Galena, Savanna, Summit, Palos Park, Moline, Rock Island, Le Roy, Havana, Georgetown, Muncie, Oakwood, Homer, Urbana, Champaign, Mahomet, Seymour, White Heath, Charleston, Taylorville, Alton, Lawrenceville, Tonti, Mt. Carmel, Crossville, Mt. Vernon, Dubois, Shawneetown, Carbondale, Makanda, Murphysboro, Fountain Bluff, Grand Tower, Herod, Williams Mountain, Alto Pass, Cobden, Aldridge, Elizabethtown, Golconda, Dixon Springs, Metropolis, New Columbia, Vienna, Karnak, East Cape Girardeau, Villa Ridge, Cairo. Of this series five males and 36 females are of the green color phase.

### **Encoptolophus** Scudder

**E. sordidus sordidus** (Burmeister).—This species is distributed over practically all the state. In the middle and northern sections it is decidedly more abundant than in the southern portion.

Forty-two males and 41 females taken August 14 to November 26, the majority in September, and two immature specimens were captured at Kenilworth, Winnetka, Chicago, Algonquin, Downers Grove, Starved Rock, Moline, St. Anne, Homer, Urbana, Champaign, Athens, Borton, Charleston, Casey, Hillsboro, Lawrenceville, Alma, Metropolis.

### **Camnula** Stal

**C. pellucida** Scudder.—Evanston, Ill. and Bass Lake in Starke county, Ind. are southern limital points. Scudder incorrectly recorded it from southern Illinois in 1874. The following are the first valid records for the state.

**Kenilworth:** June 21 to July 18, 1899, 9♂, 8♀. **Evanston:** Aug. 16, 1901, 1♂, Hancock.

### **Hippiscus** Saussure

**H. rugosus** (Scudder).—The species was recorded as *corallipes* in 1876 and as *corallipes* var. *rugosus* in 1880 by Thomas and correctly in 1891 by McNeill and in 1913 by Vestal. Scudder (1892), in his revision of *Hippiscus*, reported it from southern Illinois correctly and as the synonyms *variegatus* (in part) and *suturalis*. It was recorded both correctly and as *suturalis* by Hart in 1907.

The northern limits of *rugosus* will probably be found to reach little north of the northern boundary of Illinois. Chana is at present a northern limit in this longitude.

Thirty-seven males and 31 females, taken July 22 to October 13, and six immature individuals were secured at the following localities: **Chicago**, wing disk buff yellow in all; **Chana**, wing disk strawberry pink in 1♂; **St. Anne**, wing disk yellow in 1♀, pink in 1♂ and 3♀; **Havana**, wing disk pale sulfur yellow in 1 pair, light viridine yellow in 1♀, light orange yellow in 1♀, strawberry pink in 1♂; **Muncie**, wing disk sulfur yellow in 1♂, apricot



yellow in 2♂, grenadine in 2♂; **Homer**, wing disk pale viridine yellow in 1♂ and 2♀, strawberry pink in 1♂; **Urbana**, wing disk peach red in 1 pair; **Champaign**, wing disk strawberry pink in 1♀, pale viridine yellow in 1♀, buff yellow in 1♀; **Borton**; **Hillsboro**; **Grafton**, wing disk sulfur yellow in 1♀; **Alton**, wing disk sulfur yellow in 2♂; **Lawrenceville**; **Clay City**, wing disk grenadine in 1♀, sulfur yellow in 1♀; **Alma**; **Dubois**, wing disk sulfur yellow in 1♂; **Carbondale**, wing disk sulfur yellow in 1♂, apricot yellow in 1♂; **Running Lake**; **Murphysboro**, pronotal collar pale, wing disk pale viridine yellow in 1♂; **Grand Tower**, wing disk buff yellow in 1 pair; **Anvil Rock Hills**, wing disk apricot yellow in 1♀; **Herod**; **Alto Pass**; **Golconda**; **Dixon Springs**; **Metropolis**, wing disk buff yellow in 1♂, apricot yellow in 1♀; **Whitehill**; **Cairo**.

### **Pardalophora** Saussure

#### KEY TO SPECIES

1. Fastigium narrowing evenly distad, more produced, fig. 55. Pronotal disk finely granulose. Caudal femora broad with lamellate margins, inner surface buffy with very dark brown markings. Tegmina with a distinctive pattern, in part irregularly maculate. Wing disk pink to deep pink. Caudal tibiae buff.....**apiculata**, p. 182  
Fastigium narrowing less evenly distad, less produced, fig. 54.....2
2. Caudal femora broad with lamellate margins, inner surface very deep bluish with a broad apical annulus of buff or pinkish. Tegmina irregularly maculate. Wing disk normally deep pink, very rarely pale yellow. Caudal tibiae buff. Pronotal disk with scattered granules.....**phoenicoptera**, p. 182  
Caudal femora much narrower, inner surface normally buff, occasionally pink. Tegmina more regularly contrastingly and extensively maculate. Wing disk yellow to pink. Caudal tibiae normally buff, occasionally pink. Pronotal disk more coarsely and conspicuously rugoso-granose.....**haldemanii**, p. 183

**P. apiculata** (Harris).—This species was recorded as *Hippiscus phoenicopterus* by Thomas (1876) and McNeill (1891) and has subsequently been repeatedly recorded as *Hippiscus tuberculatus*.

**Beach**: May 25, 1931, 1♂, 1♀, Benesh. **Algonquin**: May 5 to June 14, 1907 to 1910, 3♂, 14♀, caudal tibiae buff. **Oregon**: May 12, 1915, 1♂, caudal tibiae buff. **Grand Detour**: May 19, 1931, 1♂, caudal tibiae buff, Frison. **Sterling**: May 12, 1915, 2 juv. **Rock Island**: May 8, 1887, 1♀ recorded as *phoenicopterus*, McNeill. **Kappa**: June 6, 1883, 1♀. **Forest City**: June 6, 1905, 1♂. **Havana**: May 30, 1911, 1♀. **Equality**: June 22, 1927, 1♂, caudal tibiae buff tinged with tawny, Frison. **Herod**: June 24, 1932, 1♂, caudal tibiae buff, Ross and Dozier. **Alto Pass**: Apr. 17, 1927, 1♂, 1♀, caudal tibiae deep peach red.

**P. phoenicoptera** (Burmeister).—Uniformity in the coral red wing disk (maximum recession causing only moderate paling to coral pink) and the blue of the dark markings on the inner side of the caudal femora are outstanding features of the species. The caudal tibiae vary from buff to light salmon orange and are usually lightly

suffused with brown distad on the outer side. A color phase in which the head except the mouthparts, pronotum and dorsal and ventral outer margins of the caudal femora are washed with jade green is shown in varying intensity by six males and two females, while in a few females the head, pronotum and outer surface of the caudal femora are almost immaculate, individually varying from deep wood brown to clay color.

This species is local in distribution and abundantly present only in the spring. The present long series of this large and handsome insect would not have been secured had it not been taken in considerable numbers on the several occasions when found.

Fulton and St. Joseph are known northern limits, the species following the Mississippi valley northward in the western portion of the state. It is probably absent from northeastern Illinois.

It was reported as the synonym *discoideus* by Thomas in 1876 and 1880.

Eighty-one males and 39 females taken June 4 to August 13, almost all in June, and 1 half-grown juv.♀ secured July 20 are from **Fulton, Forest City, Bishop, Topeka, Havana, St. Joseph, Arenzville, Meredosia, Carbon-dale, Grand Tower, Anvil Rock Hills, Parker, Alto Pass.**

**P. haldemanii** (Scudder).—The inner and ventral portions of the caudal femora, normally buff, occasionally show dark suffusions but never a trace of blue. In some of the present series these portions are tinged with peach red to varying degrees and in one male from Topeka are uniform scarlet red, a very unusual condition in this species. The caudal tibiae are either clear buff or tinged similarly with peach red or light scarlet red; in the latter case always paling on the inner proximal side. In the series six males and seven females have the wing disk barium yellow, a very pale shade, all the others having it pink, pale geranium pink to rose doré.

Thomas recorded his *Hippiscus neglectus* in his Illinois list of 1880 and Scudder stated in 1892 that the material is labeled "Southern Illinois" and represents the present species. If this is true we believe the locality labeling to be incorrect. We have a female from Rock Island which McNeill in 1891 probably confused with his *H. tuberculatus* (= *P. apiculata*). The species was correctly reported by Hart in 1907 and by Vestal in 1913.

In Illinois this insect is known only from the central and northern portions, confined largely to sand areas. Its easternmost point of distribution is Pine in Lake county, Ind. A series is also before us from Lone Rock, Wis.

Twenty-six males and 24 females taken May 30 to August 28, almost all in June, are from **Chicago, Algonquin, Fulton, St. Anne, Forest City, Bishop, Topeka, Havana, Mason City.**

### Dissosteira Scudder

**D. carolina** (Linnaeus).—This species, the dusty roadside grasshopper, is one of the commonest species in the state.

Thirty-four males and 17 females of this ubiquitous species, taken June 18 to September 9, and 15 immature individuals secured June 5 to July 27, are from **Beach, Zion, Waukegan, Kenilworth, Winnetka, Chicago, Antioch, Wauconda, Algonquin, Chana, Amboy, Savanna, Downers Grove, Lemont, Milan, Kankakee, St. Anne, Peoria, Tremont, Elliott, Forest City, Havana, Hamilton, Muncie, Homer, Urbana, White Heath, Decatur, Pike, Grafton, Alton, Lawrenceville, Centralia, Dubois, Shawneetown, Grand Tower, Herod, Alto Pass, Elizabethtown, Golconda, Dixon Springs, Whitehill, Cache.**

### Spharagemon Scudder

#### KEY TO SPECIES

Caudal tibiae pink, with a broad brown annulus after the proximal buffy annulus.

Pronotum with median carina weak. Tegmina weakly banded.....**bolli**

Caudal tibiae pink, with only a proximal buff annulus. Pronotum with median carina strong. Tegmina with partial banding indicated, often dotted....**collare**

#### **S. bolli** Scudder.

Thirty-eight males and 27 females, taken July 25 to October 20, and two immature examples are from **Beach, Lake Forest, Winnetka, Chicago, Antioch, Barrington, Downers Grove, Muncie, Oakwood, Urbana, Champaign, Charleston, Grafton, Dubois, Fountain Bluff, Herod, Prospect Hill, Alto Pass, Jonesboro, Golconda, Dixon Springs, Metropolis.**

**S. collare** (Scudder).—This species is confined to sand areas or regions of sandy soil.

Stal in 1873 described *Oedipoda belfragii* from Illinois, a name we placed as a synonym of the present species in 1929. Hart in 1907 and Vestal in 1913 recorded *collare* as *wyomingianum*, a name synonymized by Kirby in 1910. Blatchley resurrected this name in 1920 and the author again placed in it synonymy in 1925b.

Seventy-five males and 54 females, taken June 23 to September 22, were captured at **Beach, Zion, Waukegan, Winnetka, Chicago, Fox Lake, Algonquin, Fulton, Starved Rock, Moline, St. Anne, Bishop, Topeka, Havana, Augerville, Arenzville.**

### Trachyrhachis Scudder

#### KEY TO SPECIES

Wing band varying from obsolete, almost obsolete to broken but moderately broad (normally not very broad).....**kiowa thomasi**, p. 184

Wing band very broad and heavy.....**kiowa fuscifrons**, p. 185

**T. kiowa thomasi** (Caudell).—This may be a race intermediate between *kiowa kiowa* of the northern great plains and *kiowa fuscifrons*,



found in the southern and southeastern portions of the species distribution, or it may simply be a transitional condition between those races.

In the present series one female has the pronotal metazona light yellowish olive but whitish cephalad on the disk, another has a white saddle cephalad on the disk of the metazona. All have a yellow wing disk. The wing band is almost obsolete in four females, weak to varying degrees in the majority, broad but mottled in two females, the latter rather representing *kiowa fuscifrons*. To *kiowa thomasi* we also refer two males and six females from Lone Rock, Wis., taken July 28 to August 24. In these the wing disk is yellow, the band practically obsolete in one female, very faint in one female, weak in two males and three females and moderately strong in one female.

**Havana:** Aug. 12 to Sept. 11, 12♂, 18♀. **Alto Pass:** Aug. 13, 1891, 1♂ top of Bald Knob, Hart. **Metropolis:** Aug. 17, 1891, 1♀. Hart and Shiga.

**T. *kiowa fuscifrons* (Stal).**—Dr. J. Carl has kindly examined the type of *Psinidia fuscifrons* var. *texana* Saussure from Dallas, Tex. in the Geneva Museum and states that it is smaller but otherwise similar to the balance of the series from Dallas, Tex. assigned to *fuscifrons*. His sketch shows the wing band to be broad and solid as in that insect and we are satisfied that *texana* must be placed as a synonym.

Under *kiowa thomasi* we note that the majority of the series from Havana, Ill. and Lone Rock, Wis. are typical of that race, but that in each case there are specimens referable to *kiowa fuscifrons*.

We believe that the present race will be found everywhere in southern Illinois, intergrading with *kiowa thomasi* through the other portions of the state.

A series taken June 24 to September 5 is from **Havana, Grafton, Dubois, Carbondale, Murphysboro, Grand Tower, Prospect Hill, Williams Mountain, Elizabethtown, Metropolis, Whitehill.**

### ***Psinidia* Stal**

**P. *fenestralis fenestralis* (Serville).**—The present series has the wing disk varying only slightly, from bittersweet orange to light grenadine pink.

The species is confined to sandy areas and is probably present locally throughout the state though it is as yet not known here south of Meredosia.

Fifty-nine males and 56 females were secured from July 20 to September 2 at **Beach, Waukegan, Chicago, Amboy, Fulton, Moline, Forest City, Bishop, Topeka, Havana, Meredosia.**

<sup>6</sup>Curator, Geneva, Switzerland, Museum of Natural History.

### Trimerotropis Stal

Though typically widely different in appearance, both *citrina* and *maritima interior* are in some places subject to very decided individual variation and are sometimes extremely difficult to distinguish. A key cannot therefore be entirely relied upon.

#### KEY TO SPECIES

1. Dark brown and whitish markings in sharp contrast, the latter often faintly tinged with green. Ventral surface of caudal femora black with a preapical buffy band. Caudal tibiae buffy faintly tinged with green, with a broad buff proximal annulus, suffused beyond this and at apex with brown. Smaller species. Inhabits rocky hills.....*saxatilis*, p. 186  
Never as dark or as contrastingly marked, colors light and dark shades of brown. Caudal tibiae pink or buff. Larger species. Inhabits sandy areas.....2
2. Generally brown finely tessellate with slightly darker areas. Form slightly more graceful. Caudal tibiae pink.....*citrina*, p. 186  
Generally brown with darker areas and whitish suffusions and flecking. Form slightly more robust. Caudal tibiae usually buff, sometimes pink.....  
.....*maritima interior*, p. 187

**T. saxatilis** McNeill.—Five males from Union county, originally described by McNeill (1901) are in the present collections. The lectotype was selected by Frison (1927) as the male taken there on July 23, 1884 by G. H. French; the other four are paratypes taken July 23 and 31, 1880. Additional material was recorded from Arkansas with McNeill's original description.

This insect is very local, inhabiting rocky outcrops in hilly country. In Illinois it is known only from the southern portion of the state.

**Anvil Rock Hills:** Aug. 10, 1905, 5♂, 7♀; Aug. 23, 1900, 1♀, Hart.

**Prospect Hill:** Aug. 13, 1905, 1♂. **Wamble Mountain:** Aug. 12, 1905, 3♂, 2♀.

**T. citrina** Scudder.—Thomas in 1876 recorded *Trimerotropis verrucullata* and McNeill in 1891 reported *Circotettix verrucullatus* from Henry, Ill. and Birds Point, Mo. McNeill in 1901 was incorrect in supposing that Thomas' material represented *saxatilis*. These records we now find to have been based on dried alcoholic material of the present species. Known correct southern limital points for *Circotettix verrucullatus* (Kirby) are the upper peninsula of Michigan and Hinckley, Minn. The species certainly does not reach south of the boreal coniferous forests. Not even in his 1901 revision of the genus did McNeill discover that *citrina* occurred in Illinois but we believe it quite probable that it was this insect which Thomas (1878) may again have reported as *Oedipoda aequalis*.

Though widely distributed over the sandy fields of the southeast, this species is probably largely confined to sandy areas along the rivers

in Illinois, where it is known as far north as Algonquin. It is distributed along the Ohio river east to Vevay, Ind. Some's records (1914) from southeastern Minnesota are however referable to *Trimerotropis maritima interior*.

**Algonquin:** July 24 and 25, 1910, 3 ♂, Nason. **Savanna:** Aug. 1, 1892, 1 ♂, McElfresh. **Henry:** July 15, 1878, 1 ♀, dried alcoholic. **Havana:** Aug. 12, 1903, Aug. 14, 1907 and Aug. 22, 1912, 2 ♂, 1 ♀, in sandy waste and on river shore. **Meredosia:** Aug. 19, 1917 and Aug. 29, 1905, 2 ♂, 1 juv. ♀. **Quincy:** Sept. 6, 1887, 1 ♂ on sand bar. **Grand Tower:** June 24 to Aug. 8, 1891 to 1909, 9 ♂, 9 ♀.

**T. maritima interior** E. M. Walker.—Material before us was reported as *maritima* by Thomas in 1880 from extreme northern Illinois, but McNeill did not have it from the state though giving "Illinois" in the distribution of *maritima* in 1901.

This race has been fully discussed by Hubbell (1929) and to some extent by Some's (1914). It is known only from areas of bare sand along the shores of Lake Michigan in extreme northeastern Illinois but it may be present on the sand shores of lakes and streams in the northern portion of the state as it is known northwestward in southeastern Minnesota and as far as Mullvany Lake, near Willow Bunch in south-central Saskatchewan.

The caudal tibiae of the present series are whitish proximad, thence primrose yellow but usually slightly suffused with brownish distad; they are tinged with ochraceous salmon in a single pair from Waukegan.

**Beach:** Aug. 24, 1906, 1 ♂, 1 ♀, on sand ridges. **Waukegan:** Aug. 16 to 23, 1906 and 1908, 11 ♂, 21 ♀. **Winnetka:** Aug. 22, 1897, 1 ♀, Hancock. **Chicago:** Sept. 1, 1897, 1 ♂ in Windsor Park, Hancock.

#### CYRTACANTHACRINAE

##### Leptysma Stal

**L. marginicollis** (Serville).—This species has been reported from the Wabash river bottoms in Vigo county, Ind., where it was found in sedges and rushes, so that it is certain to be located in similar environments in southern Illinois.

##### Schistocerca Stal

#### KEY TO SPECIES

1. Cerci of male narrowing slightly but distinctly distad, fig. 53. Pronotal disk weakly convex. Large. Brown, with a distinctive and conspicuous pattern of yellowish and whitish stripes and with dark brown spots in discoidal field of tegmina. Male subgenital plate bluntly V-emarginate.....  
.....*americana americana*, p. 188



## SCHISTOCERCA—KEY TO SPECIES—CONT'D

- Cerci of male not narrowing distad, fig. 49. Pronotal disk moderately to decidedly tectate.....2
2. Cleft of male subgenital plate very narrow, fig. 59. Smaller. Form short and stocky. Antennae of male not over one-fifth longer than head and pronotum. Usually almost uniform light brown.....**damnifica damnifica**, p. 188
- Cleft of male subgenital plate not as narrow, fig. 60. Larger. Form more elongate and graceful. Antennae of male more elongate.....3
3. Lateral fields of tegmina usually mottled, when clear never deep purplish brown. Caudal tibiae reddish yellow or pale brown. Lateral projections of apex of male subgenital plate of moderate size. Medium large.....**alutacea**, p. 189
- Lateral fields of tegmina clear deep purplish brown. Caudal tibiae blackish purple. Lateral projections of apex of male subgenital plate very large. Large.....**obscura**, p. 189

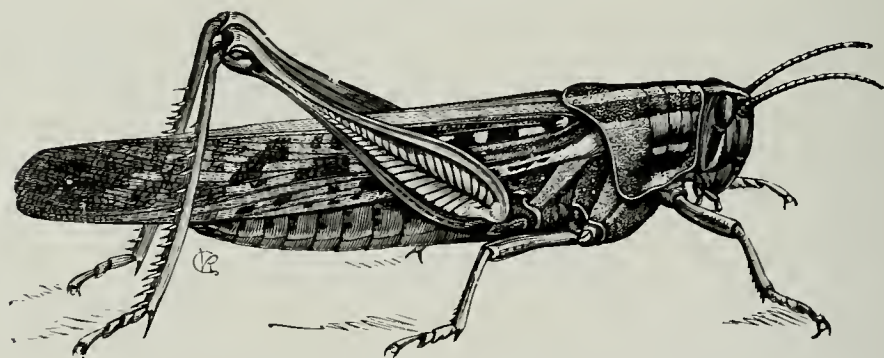


Fig. 157.—The long winged grasshopper *Schistocerca americana americana* (Drury). (After Thomas, 9th Report State Ent. Ill.)  $\times 1$ .

**S. damnifica damnifica** (Saussure).—Clarksville is a northern limit point, the species being confined to southern Illinois.

**Clarksville:** June 14, 1933, 1♂, Frison and Ross. **Albion:** Aug. 22, 1887, 1♀, Weed. **Shawneetown:** Oct. 12, 1932, 1♂, Frison and Ross. **Carterville:** May 11, 1887, 1♀, Ward. **Herod:** Sept. 4, 1932, Ross and Horsfall. **Eichorn:** Apr. 20, 1932, 1♀, Ross and Mohr. **Parker:** Apr. 17, 1914, May 23, 1923 and June 12, 1907, 5♂. **Alto Pass:** Apr. 17, 1927, 1♂, Frison. **Anna:** Apr. 20, 1886, 1♀, Weed. **Golconda:** Oct. 13, 1932, 1♂, 1♀, Frison and Ross.

**S. americana americana** (Drury).—We had believed that this species would not be found north of central Illinois except during its fall migrations, when individuals are known to fly far north of the area of continuous distribution, but a female was secured at Chicago, a northern limit, by G. C. Thompson in Grant Park on May 3, 1922. Two other females were taken there in Windsor Park by J. L. Hancock, September 20 and 27, 1894.

Sixteen males and 15 females, taken May 14 to October 11, are from Chicago, Urbana, Champaign, Decatur, Jewett, Nokomis, Carlinville, Alton, Lawrenceville, St. Francisville, Mt. Carmel, Dubois, Shawneetown,

Makanda, Hicks Branch, Eichorn, Jonesboro, Golconda, Dixon Springs, Metropolis, Villa Ridge, Cache.

**S. alutacea** (Harris).—The present series includes about an equal number of unicolorous and strongly vittate phases, with individuals showing every intergradation between the two.

Sixty-seven males and 49 females, taken July 28 to September 9, are from **Beach, Zion, Waukegan, Chicago, Dixon, Amboy, Fulton, Colona, Moline, St. Anne, Normal, Forest City, Bishop, Topeka, Havana, Bath, Meredosia, Clay City, Williams Mountain, Cobden, Metropolis.**

**S. obscura** (Fabricius).—The following is a northern limit for this handsome species, previously not known from Illinois and probably confined to the extreme southern portion of the state.

Ware: Sept. 21, 1931, 1♀, Mohr.

### **Campylacantha** Scudder

**C. olivacea olivacea** (Scudder).—This species was recorded correctly and as the synonym *acutipennis* by Hart in 1907 and by Vestal in 1913.

Four males and two females of the present series are brown, the others are light green. Havana and Clay City are northeastern known limits for this race.

Seventeen males and 14 females, taken August 12 to October 12, and eight immatures are from **Forest City, Topeka, Havana, Meredosia, Edgewood, Clay City, Ashley, Dubois, Eldorado, Marion, Herrin.**

### **Hesperotettix** Scudder

#### KEY TO SPECIES

Prozona smooth. A median line on pronotum and often dorsal fields of tegmina purplish pink. Pronotal lateral lobes usually with a dark marking. Caudal femora with outer side often maculate and with a subapical pink annulus. Decided color variation occurs. Small. . . . . **viridis pratensis**, p. 189

Prozona with a network of very low, even rugae. A median line on pronotum and along outer dorsal margin of caudal femora purplish pink. Caudal femora otherwise and tegmina immaculate. Larger. . . . . **speciosus**, p. 190

**H. viridis pratensis** Scudder.—This beautiful insect, usually scarce and always very local, occurs everywhere in Illinois. A series before us from Lone Rock, Wis. is from a northern limital point.

The race was recorded as *pratensis* by Hart in 1907 from Waukegan, Havana, Chautauqua and Grafton.

**Beach:** Aug. 22 to 28, 1906 to 1932, 20♂, 15♀. **Zion:** Aug. 25, 1932, 3♂, 3♀, Ross and Mohr. **Waukegan:** Aug. 18 to 25, 1906 and 1917, 3♂, 2♀. **St. Anne:** Aug. 28, 1932, 1♀, Ross and Mohr. **Havana:** Aug. 18, 1903, 4♂, 8♀, Hart. **Chautauqua:** July 20, 1906, 1♂. **Dubois:** June 22, 1905, 2♂, 2♀; Aug. 9, 1917, 1♂, 1♀. **Baldwin:** Sept. 1, 1908, 1♀.

**H. speciosus** (Scudder).—This species was first recorded from Illinois by Hart in 1907.

The following are eastern limits of distribution for this western species and the only ones known for it east of the Mississippi. It will however probably be found locally in similar sand areas west and south of these.

**Devil's Hole:** Aug. 7 to Sept. 2, 1905 to 1912, 1♂, 7♀. **Devil's Neck:** Aug. 17 and 22, 1904 to 1912, 2♂, 4♀. **Edgewood:** Aug. 21, 1886, 1♀, Garman.

## Melanoplus Stal

### KEY TO SPECIES

1. Organs of flight showing marked reduction, similar to fig. 156.....2  
Organs of flight not reduced (see exceptions under 2 in *scudderi scudderi*,  
*dawsoni*, *borealis junius* and *fasciatus*).....11<sup>7</sup>
2. Tegmina represented by pads, fig. 64.....3  
Tegmina in repose with a distinct angle between dorsal and discoidal areas,  
fig. 65; sometimes fully developed in *fasciatus* and *borealis junius*.....8
3. Tegmina represented by slender elongate pads, fig. 57, not reaching beyond  
first abdominal segment. Caudal femora green with apices dark. Caudal  
tibiae green with immediate bases dark.....*gracilis*, p. 192  
Tegmina represented by ovate or lanceolate pads, figs. 58, 64, reaching to at  
least second abdominal segment.....4
4. Caudal tibiae green. Sylvan species.....5  
Caudal tibiae pink.....7
5. Caudal femora greenish, heavily marked with blackish brown. Male furcula  
minute.....*viridipes viridipes*, p. 192  
Caudal femora brown, the dorsal surface alone weakly marked with darker  
brown. Male furcula heavier.....6
6. Male cerci with apices truncate, fig. 73. Male furcula of moderate size, slender,  
tapering regularly. Male subgenital plate short, truncate.....  
.....*obovatipennis*, p. 193  
Male cerci with elongate, spatulate, rounded apices, fig. 78. Male furcula  
longer, heavy proximad, slender distad. Male subgenital plate more  
elongate, convex.....*morsei*, p. 193
7. Tegmina represented by ovate pads, fig. 64, organs of flight very rarely fully  
developed. Male furcula very small. Male cerci longer, broader, less bent,  
fig. 67. Larger. General coloration usually light brown, abdomen not  
ringed, ventral surface buff. Prefers open weedy areas.....  
.....*scudderi scudderi*, p. 194  
Tegmina represented by lanceolate pads, fig. 58, organs of flight rarely fully  
developed. Male furcula large. Male cerci smaller, more bent, fig. 71. Smaller.  
General coloration usually darker brown, abdomen usually appearing ringed,  
ventral surface yellow buff. Sylvan.....*dawsoni*, p. 196

<sup>7</sup>No satisfactory key for separating females of all the species of this section of *Melanoplus* can yet be supplied.



## MELANOPLUS—KEY TO SPECIES—CONT'D

8. Male cerci with apex not markedly spatulate, figs. 70, 77, broad and gradually narrowing but stil. broad distad with apex dorsad. Caudal femora without conspicuous outer markings.....9  
     Male cerci with apex extremely broad and spatulate, figs. 82, 83. Caudal femora dark with three conspicuous pale areas on outer surface. Larger. Form more robust. Spatulate apex of male cerci short.....10
9. Male furcula large, fig. 91. Male subgenital plate margined with black. Caudal tibiae pale glaucous, buffy or pink.....*borealis junius*, p. 197  
     Male furcula minute, fig. 92.....*fasciatus*, p. 197
10. Male furcula stout, fig. 90. Male cerci large, with apex bent inward, fig. 83. Medium large for genus. Caudal tibiae pink, suffused proximad beyond a broad pale subproximal annulus.....*walshii*, p. 194  
     Male furcula subobsolete, fig. 89. Male cerci very large, with apex not bent inward, fig. 82. Large for genus. Caudal tibiae orange buff or pink, suffused proximad beyond a broad pale subproximal annulus.....  
     .....*ponderosus viola*, p. 194
11. Male cerci with a lateral projection, or forked, figs. 85-88.....12  
     Male cerci simple or with merely expanded apices, figs. 67, 84.....15
12. Male cerci with a projecting angulation of the ventral margin, figs. 85, 87....13  
     Male cerci forked, the ventral arm slender and finger-like, fig. 88. Caudal tibiae rich pink. Male furcula minute.....*keeleri luridus*, p. 198
13. Dorsum of pronotum and tegmina without lateral stripes, uniformly greenish or yellowish olive hues.....14  
     Dorsum of pronotum and tegmina with a longitudinal light stripe along the dorsolateral angle.....*bivittatus*, p. 195
14. Caudal tibiae yellowish buff, always except in California. Male furcula subobsolete. Male cerci with a rounded projection mesad on ventral margin, fig. 87. Very large. Appears adult in summer.....*differentialis*, p. 195  
     Caudal tibiae pink or glaucous. Male furcula heavy, its arms parallel. Male cerci with an obtuse angulation about middle of ventral margin, fig. 85. Medium small. Appears adult in spring.....*confusus*, p. 196
15. Male cerci with apices conspicuously expanded, figs. 79, 81.....16  
     Male cerci with apices not or only little expanded, figs. 67, 77. Male furcula large.....18
16. Male cerci with apices only moderately expanded, fig. 79.....17  
     Male cerci with apices greatly expanded, fig. 81. Male furcula minute. Caudal tibiae pink or very hirsute. Medium size. Gray and mottled like bark, not striped. Caudal femora deep pink on outer and ventral surfaces. Arboreal.  
     .....*punctulatus punctulatus*, p. 196
17. Male subgenital plate with apex undivided, fig. 93. Apices of male cerci short, definitely spatulate, fig. 79, with dorsal and ventral margins rounded and distal margin truncate. Antennae very elongate for genus. Caudal femora with transverse bands only. Caudal tibiae glaucous, buffy or pink. Male furcula small, strongly divergent. River valley inhabitant.*foedus fluviatilis*, p. 198  
     Male subgenital plate with twin rounded apices, due to a mesodistal impression, fig. 94. Male cerci with shaft moderately broad and apical expansion

## MELANOPLUS—KEY TO SPECIES—CONCL'D

- normally slightly greater ventrad than dorsad. Male furcula well developed. Small. Form comparatively graceful. Caudal tibiae glaucous or pink.  
.....**angustipennis**, p. 198
18. Male cerci elongate and very slenderly cylindrical, figs. 74, 75.....19  
Male cerci broad, flattened, tapering to the broadly rounded apices, figs. 69, 84. Medium small to small.....20
19. Apices of male cerci rounded, fig. 74, with merest trace of thickening. Medium size. Form graceful. Caudal tibiae rich glaucous..**flavidus flavidus**, p. 199  
Apices of male cerci acute, fig. 75, elongate and lamellate. Antennae normal. Caudal femora with two dark bands oblique on external pagina. Caudal tibiae rich pink. Male furcula small, its arms parallel. Sandy pine woods inhabitant.....**impudicus**, p. 196
20. Male subgenital plate not produced dorsocaudad, with undivided apex, fig. 93. Male cerci elongate and slender, fig. 69. Caudal tibiae pink, very rarely buff or glaucous.....**femur-rubrum femur-rubrum**, p. 197<sup>8</sup>  
Male subgenital plate moderately produced dorsocaudad, with twin apices, due to a mesodistal impression, fig. 94. Male cerci considerably shorter and wide, fig. 84. Caudal tibiae in majority from Illinois pink, occasionally buff, frequently glaucous.....**mexicanus mexicanus**, p. 197

**M. gracilis** (Bruner).—Though undoubtedly this species occurs over all of Illinois, Kenilworth is as yet a northern known limit point of distribution.

Thomas described the synonym *Pezotettix minutipennis* from Normal in 1876.

Thirty-three males and 31 females, taken June 21 to October 31, and one immature specimen are from **Kenilworth, Bloomington, West Havana, Hilliary, Muncie, Homer, Urbana, Mahomet, Charleston, West Union, Chatauqua, Mt. Carmel, Dubois, Shawneetown, Dixon Springs, Karnak.**

**M. viridipes viridipes** Scudder.—This race was recorded as *Pezotettix viridulus* (in error for the unpublished name *Pezotettix viridicrus* of Walsh) by McNeill in 1891 from Normal and Bloomington. In 1897 *viridipes* was described, Illinois material being from Rock Island, Moline and Ogle county, and in 1912 Rehn and Hebard selected the type, a male from Moline.

In 1920 Hebard described the eastern race *viridipes eurycerus* and found the area of intergradation between these races to extend through Wisconsin, southern Michigan and western Indiana.

The race probably is found over all of Illinois, though in the extreme northern and the extreme eastern portions of the state atypical colonies may occur. The present series is typical, only occasional males having the cerci as long as but slightly heavier than the normal.

<sup>8</sup>Females are distinguishable from those of *mexicanus*, both very common campestran species, only by having in *femur-rubrum* the tegmina averaging slightly broader and less maculate, the prosternal spine stouter and the distal curvature of the dorsal ovipositor valves broader.

Eighty males and 58 females, taken May 27 to October 26 but the large majority in June, and two immatures are from Zion, Lake Forest, Glenview, Rockford, Oregon, Mt. Carroll, Savanna, Riverside, Riverdale, Palos Park, Moline, Kankakee, Bloomington, Normal, Muncie, Oakwood, Homer, St. Joseph, Urbana, White Heath, Monticello, Kampsville, Dubois, Grand Tower, Pulaski.

**M. obovatipennis** Blatchley.—Scudder figured in 1897 the apex of the male abdomen of the type of Stal's *Pezotettix rusticus*, described in 1878 from Texas, probably from the vicinity of Dallas, but material from Dallas was at that time referred to *obovatipennis*. Comparison of large series now before us from Ohio and Tennessee to Iowa, Missouri and northeastern Texas shows that except for features of size and coloration such material is inseparable. Texan specimens do have however the divided median production of the penis with its parts separated and somewhat enlarged. As a result, until thoroughly revised we believe that *obovatipennis* should be recognized, though the name will quite probably prove to have no more than racial status and is possibly a synonym of *rusticus*.

This insect is known north to Ohio; the localities Lafayette, Ind., Savanna, Peoria and Hilliary, Ill. and Hamburg, Iowa are represented by specimens before us. A southern limit is Clarksville, Tenn., but southwestward the *rusticus* problem prevents other limits being given at the present time.

Forty-eight males and 50 females and eight immature individuals of this handsome insect, found in or near forests, were taken August 8 to October 11 from Savanna, Central, Benson, Bartonville, Peoria, Hilliary, Charleston, Grafton, Clay City, Dubois, Zeigler, Shawneetown, Grand Tower, Prospect Hill, Herod, Golconda, Dixon Springs, Metropolis, Cache, Thebes. A large series is from Hilliary on October 11.

**M. morsei** Blatchley.—A pair was recorded from Running Lake by McNeill in 1891 as *Pezotettix manca*, which material he referred to *Melanoplus obovatipennis* in 1899. Though the male genitalia are very different, females of *morsei* are difficult to distinguish from those of *M. obovatipennis*. The former are best separated by being normally slightly more graceful, the pronotum showing a slightly greater tendency toward constriction cephalad, the tegminal pads usually separated by a narrower interval, the caudal femora showing very feeble marking and the dorsal ovipositor valves appreciably narrower in proximal portion with margin there normally smoother, and distad curving more gently into the slightly longer and more weakly recurved apical portion. Furthermore, *morsei* appears in greatest adult abundance in the spring and early summer, while *obovatipennis* so appears in the summer and early fall.



Though Morse's *tepidus* is very closely related to *morsei*, they are much more widely separated from *obovatipennis* than Morse (1907) supposed, a fact noted by Blatchley in 1920.

This distinctive and apparently rarer sylvan species, also known from Hocking county, Ohio and from near Bedford and Wyandotte in southern Indiana, is apparently confined to extreme southern Illinois, Carbondale being a northern limit. Its distribution southward and westward is extensive, Hattiesburg, Miss. being a southwestern limit. Morse's pair from there is typical but very large.

**Carbondale:** June 26, 1907, 1♂, 1♀. **Running Lake:** July 15, 1883, 1♂. **Hicks Branch:** June 24, 1932, 1♀, Ross, Dozier and Park. **Alto Pass:** Aug. 13, 1891, 1♂, 1♀, Hart and Shiga. **Thebes:** July 31, 1905, 1♂.

**M. scudderi scudderi** (Uhler).—Part of the originally described series came from Rock Island. The race has also been reported from Illinois as the synonym *Pezotettix unicolor* Thomas.

Sixty-four males and 66 females, taken August 11 to October 31, are from **Beach, Waukegan, Kenilworth, Colona, Milan, Benson, Bartonville, Bloomington, Forest City, Topeka, Havana, West Havana, Hilliary, Muncie, Homer, Urbana, White Heath, Arenzville, Charleston, Neoga, Grafton, Clay City, Norris City, Dubois, Shawneetown, Herod, Alto Pass, Elizabethtown, Golconda, Dixon Springs, Metropolis, Cache.**

**M. walshii** Scudder.—The species has been reported from Illinois by McNeill (1891) as Bruner's *Pezotettix occidentalis* (not *Caloptenus occidentalis* Thomas) and by Scudder (1897) under Scudder's new name *blatchleyi*, now included in the synonymy of *walshii*.

In extreme southern Illinois the insect averages very large.

This handsome forest and bog loving insect is represented by 37 males and 41 females, taken June 21 to October 13, the majority late in the season, from **Lake Forest, Antioch, Sun Lake, Deep Lake, Long Lake, Algonquin, Savanna, Downers Grove, Moline, Bartonville, Havana, Charleston, Grafton, Alton, Dubois, Shawneetown, Herod, Golconda, Dixon Springs, Metropolis, Vienna, Karnak, Pulaski, Cache, Thebes.**

**M. ponderosus viola** (Thomas).—This race, described from central and southern Illinois as *Pezotettix viola* by Thomas in 1876, was so recorded from Running Lake by McNeill in 1891. In 1920 Blatchley considered it to be merely a short winged form of *ponderosus*, but later that year we assigned it as a race of that species (Hebard 1920, p. 370, footnote 18).

In the present series the caudal tibiae are usually orange buff, rarely pink, becoming suffused proximad and there with a broad subproximal pale annulus.

We believe that the insect occurs in Illinois only in the southern part. Thomas' record from central Illinois is apparently based upon a

male before us from the Thomas collection labeled "Peoria, IX, 24, 1877." This labeling we believe is incorrect. This specimen, apparently taken a year after the species was described, and a female labeled 819P, are all that remain in the collection of the original describer at the ILLINOIS STATE NATURAL HISTORY SURVEY, nor is any of Thomas' material at the National Museum where many of his types are preserved.

Known northern limits are Tyrone, Ky., Grafton and Mt. Carmel, Ill. and St. Louis and Willard, Mo., judging from large series before us. Though Tyrone, Ky. is an eastern limit and the race probably occupies a moderately wide area to the south, there are no other records from that section of its distribution. From Memphis, Tenn. south through Mississippi and southeastern Louisiana the species is supplanted by the closely related *tunicae* Hebard. Morse's record of *viola* in 1907 from Hattiesburg, Miss. was based on material of *tunicae*.

Westward it is known as far as Willard, Mo. and Cane Hill, Ark. but probably most of the latter state, eastern Oklahoma and all but southeastern Louisiana are in the area of intergradation with *ponderosus ponderosus*, which race occurs in the western portions of Texas and Oklahoma. Bruner's record of *viola* from southeastern Nebraska is almost certainly based on material which was either incorrectly determined or labeled. This race is not even known from southeastern Kansas, though it may occur there.

This insect lives in undergrowth growing on low ground in forests and is very local. Diligent search however can often disclose colonies of fair size.

Ten males and five females, taken August 13 to October 13, and one immature female are from **Grafton, Mt. Carmel, Dubois, Running Lake, Makanda, Fountain Bluff, Grand Tower, Prospect Hill, Goreville, Alto Pass, Aldridge, Golconda.**

**M. differentialis** (Thomas).—This large common species is probably abundant, particularly in waste weedy areas, throughout Illinois.

Forty-two males and 24 females, taken August 19 to October 1, and seven immature examples are from **Kenilworth, Winnetka, Chicago, Pistakee Bay, Algonquin, Amboy, Savanna, Riverside, Downers Grove, Putnam, St. Anne, Rutland, Peoria, Havana, Hamilton, Urbana, Champaign, Spaulding, Charleston, Nokomis, Hillsboro, Grafton, Alton, Lawrenceville, Billett, Odin, Shawneetown, Grand Tower, Herod, Golconda, Dixon Springs, Cache.**

**M. bivittatus** (Say).—The great majority of this series have the caudal tibiae rich pink, but a very few have these parts buffy or buffy and bluish black, *viz.*, one from Elliott in a series of 17, one from Champaign, one from Charleston and two from Dubois.

This common species is probably even more generally distributed throughout Illinois than the preceding.

Seventy-four males and 40 females, taken June 18 to August 26, are from **Beach**, **Zion**, **Lake Forest**, **Kenilworth**, **Winnetka**, **Chicago**, **Antioch**, **Sun Lake**, **Volo Lake**, **Algonquin**, **Riverside**, **Downers Grove**, **Moline**, **St. Anne**, **Elliott**, **Havana**, **Homer**, **Urbana**, **Champaign**, **Seymour**, **White Heath**, **Teheran**, **Charleston**, **Mt. Carmel**, **Dubois**, **Carbondale**, **Grand Tower**, **Prospect Hill**, **Golconda**, **Dixon Springs**.

**M. punctulatus punctulatus** (Scudder).—McNeill recorded this insect from Galesburg and Urbana in 1891, and Scudder reported it from Rock Island in 1897.

The present specimens agree in size with Virginia material before us, being considerably larger than those from Massachusetts and northern New York.

As Urbana is the southernmost known locality in Illinois, we can not tell whether intergradation with *punctulatus arboreus* occurs in the southern portion of the state.

This insect is very local but often moderately numerous in restricted areas and there is found on the trunks of trees. It remains so motionless and blends so completely with its immediate surroundings that it is rarely secured unless special and intensive search is made for it.

**Antioch**: Aug. 6, 1930, 2♀ on *Larix*, Frison and Knight. **Barrington**: Aug. 15, 1897, 1 large juv.♀. **Oakwood**: Sept. 18, 1927, 1♂, 1♀, *in coitu*, Frison. **Urbana**: Oct. 4, 1885, 1♀; Oct. 14, 1906, 1♂.

**M. dawsoni** (Scudder).—Lake Forest is a southern limit for this species, not previously known from Illinois. Its range extends from Maine to British Columbia, but its distribution is probably highly discontinuous east of the Mississippi.

**Beach**: Aug. 21 to 28, 1906 to 1932, 28♂, 30♀. **Zion**: Aug. 25, 1932, 3♀, Ross and Mohr. **Lake Forest**: Sept. 26, 1902, 1♂, 3♀, Hancock.

**M. impudicus** Scudder.—A northern limit is Forest City. In that vicinity the species is probably confined to sandy areas, but Hart reported it common on the high rocky slopes of the Ozark Ridge in southern Illinois.

**Forest City**: Aug. 20, 1904, 1♀, Hart and Brown. **Bath**: Aug. 17, 1903, 2♂, 1♀, Hart. **Herod**: Sept. 4, 1932, 1♀, Ross and Horsfall. **Prospect Hill**: June 29, 1905, July 25, 1898 and Aug. 13, 1905, 8♂, 2♀. **Williams Mountain**: Aug. 11, 1905, 1♀, Hart. **Alto Pass**: June 27, 1905, 1♀, Hart. **Dixon Springs**: Oct. 13, 1932, 1♀, Frison and Ross. **Cache**: Oct. 14, 1932, 3♀, Frison and Ross.

**M. confusus** Scudder.—This species has been recorded from Illinois under the preoccupied name *minor* of Scudder by that author in 1897 and from Devil's Neck near Topeka by Hart in 1907.



The caudal tibiae are dull glaucous in all but eight females of the present series, in which they are pink.

This species appears in grassy spots in the spring and should be found locally throughout Illinois, though the following are the only localities as yet known for the state.

Fifteen males and 16 females, taken June 4 to August 2, all but three in June, are from **Beach, Waukegan, Fox Lake, Devil's Neck** and **Watson** on high prairie.

**M. femur-rubrum femur-rubrum** (DeGeer).—A series of 334 specimens of this species, ubiquitous in the east, is from all parts of Illinois. Some from Karnak are unusually large. This red legged locust is the commonest and most abundant grasshopper in the state.

**M. fasciatus** (F. Walker).—Dubois is a southern limital point for this boreal, sylvan insect. In the southern portion of Illinois it is probably present only on or near the Ozark Ridge. Hart reported it as being found in blackjack oak areas in Illinois and it is probably very local in this state.

**Forest City:** Aug. 20, 1904, 3♂, 8♀, Hart and Brown. **Havana:** July 11, 1912, 1♂ at White Oak Run; Aug. 14, 1907, 1♀ at river shore. **Muncie:** June 30 and July 6, 1907, 30♂, 28♀. **Bluff Springs:** June 10, 1932, 1♀, Ross and Mohr. **Dubois:** June 21, 1905, 1♂, Hart.

**M. borealis junius** (Dodge).—This race was reported as *extremus*, a synonym of *borealis borealis*, from Chicago by Scudder in 1897. It is the southernmost race of a species whose typical race occupies a very wide area of distribution far to the north. It probably occurs only in restricted bog areas in northern Illinois, Manito being a southern limit.

**Chicago:** July 11, 1903, 2♂, 2♀, Hancock. **Volo:** July 8, 1932, 1♂, Ross, Dozier and Mohr. **Manito:** June 10, 1914, 1♂.

**M. mexicanus mexicanus** (Saussure).—One hundred eighteen males and 110 females of this very common race, which for long was recorded as the synonym *atlanis*, are before us from all parts of Illinois. It is apparently usually not as common as *femur-rubrum* in the east, though as a rule very much more abundant than that insect in the west.

In the present series 54 specimens have the caudal tibiae light glaucous, in several they are buffy or partly pale pink and partly pale glaucous, and in the rest they are pink. This is a very much higher percentage having glaucous caudal tibiae than is found on the Atlantic coast.

In 1878 Thomas stated that strays of *spretis* (Thomas) = *spretus* (Walsh), now known to be the migratory phase of *mexicanus*, might have been taken in Illinois. It is possible but not probable that indi-

viduals of that phase reached this far east and without any material from Illinois being known that name should be omitted from a list for the state.

**M. keeleri luridus** (Dodge).—McNeill (1891) and Scudder (1897) reported this race from Illinois as the synonym *collinus*.

Probably local, this race should be found often fairly abundant in semisylvan environments, in sand areas, on hills and sides of ravines and on natural prairies throughout Illinois.

Fourteen males and 20 females, taken June 26 to September 6, and four immature individuals are from **Beach, Waukegan, Winnetka, Moline, St. Anne, Forest City, Bishop, Bath, Arenzville, Chautauqua, Makanda.**

**M. foedus fluviatilis** Bruner.—A pair of paratypes of *macneilli* Hart from the sand hills at Moline are in the author's collection. These show that Blatchley (1920) was correct in assigning that name to the present synonymy.

Moline is the only locality known for Illinois, but the race undoubtedly occurs on the river bottomlands in the western portions of the state, as we have seen it from 13 localities in Iowa and also from St. Anthony Park, Minn.

The affinity to *angustipennis* is not as close as Hart supposed, the present insect being distinguished not only by the much shorter and more divergent male furcula and the usually lighter and grayer dorsum in both sexes, but also by the male subgenital plate which terminates in a bluntly rounded apex, whereas in *angustipennis* that plate is broad at its extremity, showing more or less conspicuously two rounded projections.

Very rarely has *angustipennis* the outer ventral surfaces of the caudal tibiae as rich sanguineous as is often the case in the present insect and as is shown by the Illinois material. This coloration is however absent in some series or individuals of *foedus fluviatilis*. It can therefore not be used as a constant feature of difference.

This is the river valley and more eastern race of the very widespread and plastic western species *foedus*.

**M. angustipennis** (Dodge).—In the Illinois material studied the caudal tibiae are rich pink in 29 males and 20 females, rich glaucous in the others, this latter being the normal condition. Each series is subject to decided individual variation, but the large series from Beach and Waukegan average small and very dark, those from Havana and Fulton very large and pale. A series taken at Topeka in October averages as large but considerably darker and all the markings are dull. Toward the end of the season surviving individuals of many species of grasshoppers are tattered, very dark and dull colored.

In the present material the outer ventral section of the caudal femora is yellowish buff, sometimes more or less strongly tinged with orange, but in four males from Arenzville that area is sanguineous.

This species occurs only in the open on sandy soil in Illinois, but is often very common locally. *Meredosia* is a southeastern limit for *angustipennis*, a species very widespread in the west, but further north it is known as far east as Kewanna in northwestern Indiana.

Eighty-eight males and 79 females, taken June 23 to October 30, and one immature are from **Beach, Zion, Waukegan, Chicago, Oregon, Fulton, Moline, St. Anne, Forest City, Bishop, Topeka, Havana, Bath, Arenzville, Meredosia.**

**M. flavidus flavidus** Scudder.—McNeill's *cenchri*, described from Moline in 1891, is an established synonym.

*Meredosia* is a southeastern limit, this race being known as far east as Pine, Ind. Its distribution is discontinuous in Illinois, but it should be found in sand areas throughout the northern portion of the state.

Twenty-nine males and 24 females, taken August 10 to September 9, are from **Beach, Moline** (sand hills), **St. Anne, Bishop, Topeka** (sand prairie), **Havana, Devil's Hole, Bath, Meredosia.**

### **Dendrotettix** Riley

**D. quercus** Packard.—The accompanying records were given in 1920 by Blatchley and are probably easternmost limits for the species as naturally distributed. Bruner recorded the species from Illinois in 1893a. Though thoroughly established in New Jersey and adjacent New York, we believe that *quercus*, like *Melanoplus differentialis*, was accidentally introduced by man on the Atlantic coast.

These specimens, like others from St. Louis and Willard, Mo., are shorter and stockier with coloration more gray and dorsocaudal bars of femora more conspicuous than Texan material in which the legs show conspicuously red browns and light yellows. Series from southeastern Kansas and the east are almost intermediate but resemble the Texan series more closely. These differences may well be due to local environment.

Though known to appear locally sometimes in enormous numbers, this species is arboreal and usually very difficult to locate except during such outbreaks.

**Crete:** July 30, 1905, 1 ♂. **Dubois:** June 21, 1905, 1 ♀.

### **Phoetaliotes** Scudder

**P. nebrascensis** (Thomas).—This species was recorded as the synonym *Pezotettix autumnalis* from Illinois by McNeill in 1891.



Bloomington and Bath are southeastern limits, but the species reaches extreme northwestern Indiana along the shore of Lake Michigan.

It is apparently local but often abundant when found in sand areas in northern Illinois.

Forty-four males and 28 females, taken August 4 to September 28, and six immatures are from **Beach, Waukegan, Volo Lake, Cordova, St. Anne, Bloomington, Forest City, Bishop, Bath**. One male and three females are macropterous, the others brachypterous.

### **Paroxya** Scudder

#### KEY TO SPECIES

Organs of flight fully developed. Form less elongate. Smaller. Male antennae shorter than caudal femur. Male cerci at apex evenly rounded dorsad and ventrad.

.....**atlantica atlantica**

Organs of flight decidedly reduced. Form more elongate. Larger. Male antennae longer than caudal femur. Male cerci with apex showing a decided rounded projection ventrocaudad.....**hoosieri**

**P. atlantica atlantica** (Scudder).—This species is known in Illinois and Indiana only from the swamps near the shores and usually in the sand areas bordering Lake Michigan. It would appear very probable that it reached this far northwestward from the east, and not from the south by way of the Mississippi.

Thirty-nine males and 22 females, taken August 3 to September 26, and one immature individual are from **Beach, Waukegan, Lake Forest, Chicago, Channel Lake, Cedar Lake, Sun Lake, Long Lake**.

**P. hoosieri** Blatchley.—The following is a western limit record and the first for Illinois. The species may however have a fairly extensive distribution in the swamps along the eastern border of the state. It is probably a distinct species and not a race of *clavuliger*, as was indicated by Blatchley in 1920. Morse's record (1907) from Buras, La. is based on material of *hoosieri*.

**St. Francisville:** Sept. 8, 1933, 1♀, Ross and Mohr.

### **TETTIGONIIDAE**

#### KEY TO SUBFAMILIES AND GENERA

1. Organs of flight present. Cephalic tibiae with auditory foramina. Ovipositor normal in having dorsal and ventral valves in that position throughout. .2
- Organs of flight absent. Cephalic tibiae lacking auditory foramina. Ovipositor very elongate, very slender vertically and horizontally, with dorsal valves including the ventral valves throughout.....12
2. Prosternum unarmed. Cephalic tibiae with auditory foramina without a lateral slit. General coloration green. Ovipositor elongate and deep but transversely very greatly compressed, lamellate (*PHANEROPTERINAE*, p. 203).....3

## TETTIGONIIDAE—KEY TO SUBFAMILIES AND GENERA—CONT'D

- Prosternum armed with a pair of spines usually elongate except in species of *Atlanticus*, and erect except in *Conocephalus saltans*. Cephalic tibiae with auditory foramina having a long lateral slit.....7
3. Fastigium little if at all wider than proximal antennal segment, horizontal or but little deflexed, fig. 105. Tegmina long and narrow in comparison with alternate category, very little broader mesad than distad, except in *Scuddereria pistillata* which has the tegmina decidedly broad but narrowing little distad. Male subgenital plate without socketed styles, except in *Montezumina modesta* which sometimes has traces of sockets at the bases of the styliform appendages.....4
- Fastigium very wide, fig. 110, curving downward to facial fastigium. Tegmina very broad, distinctly broader mesad than distad. Male subgenital plate with socketed styles.....6
4. Proximal branch of median vein, which springs from the discoidal vein mesad, not joining the ulnar vein, fig. 97. Tegmina broader than in alternate category. General coloration immaculate green.....5
- Proximal branch of median vein joining the ulnar vein for a short distance, fig. 98. Tegmina very narrow for this subfamily. General coloration green, strikingly marked with brown and black. Male ultimate tergite not produced. Male cerci short, incurved, with apex enlarged. Male subgenital plate elongate, expanding at apex. Ovipositor shorter and showing angulation of the dorsal margin in its stronger curvature dorsad. Peculiar to cypress swamps.....**Inscuddereria**, p. 205
5. Cephalic and median femora with ventral margins unarmed. Eyes subglobose. Margins of pronotal disk less sharply defined. Larger. Male subgenital plate lacking definite styliform processes.....**Scuddereria**, p. 203
- Cephalic and median femora with ventrocephalic margins strongly dentate and moderately lamellate. Eyes oblong-oval, much deeper than wide. Margins of pronotal disk sharply defined. Small. Male ultimate tergite with a large produced area curving downward and no longer than wide. Male cerci long and gently curved, bent suddenly inward but not enlarged at apex. Male subgenital plate briefly produced, with very small styliform processes and traces of sockets sometimes indicated. Ovipositor curved dorsad with angulation scarcely indicated. Prefers bush foliage in forests.....**Montezumina**, p. 205
6. Cephalic and median tibiae flat or sulcate dorsad, with margins raised. Tegmina oblong-elliptical or ovate. Caudal femora elongate. Ovipositor large and elongate, curving dorsad, with margins convex-convergent to the acute apex.....**Amblycorypha**, p. 206
- Cephalic and median tibiae convex dorsad. Tegmina ovate-lanceolate. Caudal femora short. Ovipositor extremely small, with distal extremity of ventral valves showing truncation. Arboreal species.....**Microcentrum**, p. 207
7. Pronotum as broad as long. Pronotal disk crossed by two transverse sulci. Form extremely robust. Large. Tegmina short and very broad, with dorsal surface decidedly convex and male stridulating area very highly developed with heavy veins. Green, with stridulating field of male brown. Very small vertex acute, produced. Strictly arboreal. (**PSEUDOPHYLLINAE**).....**Pterophylla**, p. 208

## TETTIGONIIDAE—KEY TO SUBFAMILIES AND GENERA—CONT'D

- Pronotum longer than broad. . . . . 8
8. Vertex produced, figs. 103, 116, with weakly to strongly rounded apex and bearing a ventroproximal tooth. Form very elongate. Large. Cephalic and median femora with ventral margins sometimes spined. Ovipositor very elongate and very slender. Species individually green, light brown or dark brown. Organs of flight fully developed, the tegmina very narrow and elongate. (*COPIPHORINAE*) . . . . . **Neoconocephalus**, p. 208
- Vertex much less produced, fig. 104, its apex flattened, vertical and in same plane with facial fastigium, its sides concave. Medium small to small. Form medium. Cephalic and median femora unarmed ventrad. Ovipositor of various types, never very broad. Organs of flight fully developed to greatly reduced. . . . . 9
9. Pronotum with dorsolateral margins rounded, less produced caudad. Caudal tarsi without plantula. Form less robust. Ovipositor straight to weakly curved dorsad, moderately to extremely elongate, narrow to medium wide vertically and extremely narrow horizontally. (*CONOCEPHALINAE*, p. 211) . . . . . 10
- Pronotum with dorsolateral margins angulate, produced caudad over base of abdomen, fig. 99, entirely concealing the rudimentary female tegmina. A free plantula present, attached ventrad at base of caudal metatarsus. Form robust. Coloration brown. Vertex of same general type as in Conocephalinae, but heavier. Tegmina of male greatly reduced but distal section not covered by pronotum. Ovipositor almost straight, very elongate, narrow vertically and extremely narrow horizontally, with acute apex ventrad of a median point. Sylvan, terrestrial. (*DECTICINAE*). **Atlanticus**, p. 218
10. Tegmina abbreviated, not reaching apex of hind femora. . . . .
- . . . . . **Conocephalus** in part, p. 215
- Tegmina not abbreviated, reaching beyond apex of hind femora. . . . . 11
11. Male with subgenital plate almost truncate, fig. 96. Female with ovipositor of uniform thickness, not upcurved and slender, figs. 106, 107. . . . .
- . . . . . **Conocephalus** in part, p. 215
- Male with subgenital plate distinctly emarginate, fig. 95. Female with ovipositor not of uniform thickness or upcurved, figs. 111, 112. . . . .
- . . . . . **Orchelimum**, p. 211
12. Tarsi broadened, the first three segments greatly broadened and produced to accomodate enormous pulvilli. Eyes elongate-ovate, vertical. Ovipositor curved dorsad, wholly unarmed. Form robust. Small. Legs short. Fastigium broad and not at all produced. General coloration buffy; abdomen often suffused with dark brown dorsocaudad, particularly in females. Vine and bush inhabitant. (*GRYLLACRINAE*) . . . . . **Camptonotus**, p. 220
- Tarsi compressed, the segments not lobate. Eyes subrotund. Ovipositor straight or feebly curved dorsad, armed. (*RHAPHIDOPHORINAE* according to Hubbell, p. 220) . . . . . 13
13. Fastigium deeply sulcate, forming two distinctly raised areas. Tarsal claws with basal sensory setae. Male subgenital plate with styles. Ventral valves of ovipositor not strongly toothed. . . . . 14



## TETTIGONIIDAE—KEY TO SUBFAMILIES AND GENERA—CONCL'D

- Fastigium not or scarcely sulcate, subconical to subplanate. Tarsal claws lacking basal sensory setae. Male subgenital plate lacking styles. Ventral valves of ovipositor conspicuously toothed. . . . . 16
14. Halves of fastigium low, rounded. Genicular lobes of cephalic and middle femur unarmed. Dorsal carinae of caudal tibia with some movable spurs. Caudal metatarsus unarmed distodorsad. . . . . **Hadenoeus**, p. 222
- Halves of fastigium acute-conical. Genicular lobes of middle femur and caudal lobe of cephalic femur with movable spurs. Dorsal carinae of caudal tibia with fixed denticulations only, except at apex. Caudal metatarsus terminating in a distodorsal spine. . . . . 15
15. Dorsal carinae of caudal tibia armed with distinctly separated, subequal denticulations. Small median spur present between paired distoventral spurs of cephalic tibia. Ventral keel of cephalic metatarsus not setose. Unicolorous. . . . . **Diestrammena**, p. 220
- Dorsal carinae of caudal tibia armed with crowded denticulations arranged in groups within which spine size increases distad, this series interrupted at about distal fourth of tibia by a pair of larger, opposite spines. No median spur between distoventral spurs of cephalic tibia. Ventral keel of cephalic metatarsus with row of stout setae extending nearly to apex. Variegated. . . . . **Tachycines**, p. 221
16. All tarsi four segmented. Elevated margins of antennal fossae with bases touching or nearly so. Genicular spur present on caudal face of middle femur. . . . . 17
- Cephalic tarsus three segmented, others four segmented, proximal two segments of caudal tarsus showing incipient fusion. Elevated margins of antennal fossae with bases separated mesad by space at least equal to middle breadth of antenna. Middle femur without genicular spur. Very robust. Caudal legs of male highly modified; tibia shorter than femur in both sexes; each dorsal carina with five spurs (seven in certain allied genera). Ovipositor short, stout; dorsal valves abruptly truncate at apex. . . . . **Phrixocnemis**, p. 242
17. Dorsal surface of cephalic tibia unarmed except at apex. Coloration not solidly reddish brown to black. . . . . **Ceuthophilus**, p. 222
- Dorsal surface of cephalic tibia with a spur slightly distad of middle of cephalic margin. Reddish brown to black. Robust. Heavily sclerotized. Legs short. All tibiae heavily armed. . . . . **Udeopsylla**, p. 242

*PHANEROPTERINAE***Scudderia** Stal

## KEY TO SPECIES

1. Male ultimate tergite not produced in an elongate median process. Male cerci long and gently curved, with apex not enlarged. Elongate male subgenital plate not compressed distad. Ovipositor longer and more evenly and broadly curved dorsad. Medium size. Tegmina moderately broad for genus. Arboreal. . . . . **septentrionalis**, p. 204
- Male ultimate tergite produced in an elongate median process. Male cerci shorter and very strongly incurved distad, with apex enlarged. Elongate male

## SCUDDERIA—KEY TO SPECIES—CONT'D

- subgenital plate compressed distad. Ovipositor shorter and showing angulation of the dorsal margin in its stronger curvature dorsad.....2
2. Male with production of ultimate tergite furcate at apex, with no median projection.....3
- Male with production of ultimate tergite having a slight median projection at apex and with strongly compressed lateral flanges. Size and tegmina as in *curvicauda curvicauda*, females scarcely distinguishable from that species but ovipositor sometimes slightly narrower distad. Prefers swamps and marshes.....**texensis**, p. 205
3. Male with lobes of furcate apex of ultimate tergite bearing ventrad small longitudinal flanges.....4
- Male with lobes of furcate apex of ultimate tergite lacking flanges. Small. Tegmina moderately elongate for genus. Generally distributed. . **furcata furcata**, p. 205
4. Tegmina very broad and short for genus, not more than four times as long as wide. Medium size. Male with lobes of furcate apex of ultimate tergite distinctly tapering when seen from above. Prefers bushes in open....
- .....**pistillata**, p. 204
- Tegmina narrower and longer, at least nearly five times as long as wide. Larger. Male with lobes of furcate apex of ultimate tergite subequal in width when seen from above. Partial to oaks and usually in undergrowth.....
- .....**curvicauda curvicauda**, p. 204

**S. septentrionalis** (Serville).—Champaign and Urbana constitute the southern limit of distribution for this comparatively very scarce species. It was previously unknown from Illinois, though it had been reported from Lone Rock, Wis., just over the northern boundary.

**Algonquin:** July 27 to Aug. 16, 1907 and 1910, 3 ♂. **Cook county:** 1 ♂, Chope, *FM*. **Urbana:** July 19, 1890, 1 ♂ at light in woods, Hart and Shiga; Aug. 15, 1882, 1 ♂ at light, Hart. **Champaign:** July 12, 1887, 1 ♂ at light, Hart.

**S. pistillata** Brunner.—This boreal species is probably largely confined to bogs in northern Indiana and Illinois.

Scudder's record (1898) from southern Illinois is certainly in error. The same is true of Saussure and Pictet's record (1897) from Georgia unless the material came from the very restricted boreal area in the mountains of the northeastern section. The southernmost definite Appalachian record is Monterey, Va.

**Antioch:** Aug. 14, 1906, 1 ♀ in tamarack bog. **Cedar Lake:** Aug. 7, 1906, 1 ♂ in bog. **Wauconda:** Aug. 23, 1932, 1 ♀, Ross and Mohr. **Normal:** June 25, 1880, 1 ♀. **Sun Lake:** Aug. 3, 1906, 1 ♂, 3 ♀, in bog.

**S. curvicauda curvicauda** (DeGeer).—Though more common in the southern portion of the state, this insect undoubtedly occurs over all of Illinois. A specimen showing a northern limit in this longitude is from Lone Rock, just across the line in Wisconsin.

The species has been very frequently confused with the much com-

moner *texensis*. We believe that *curvicauda* is decidedly partial to oak shoots and oak trees.

**Amboy:** Aug. 25, 1933, 1 ♂, Ross and Mohr. **Devil's Hole:** Aug. 18, 1904, 1 ♀, Hart and Brown. **Nokomis:** Sept. 7, 1932, 1 ♀, Ross and Mohr. **Clay City:** Aug. 21, 1905, 4 ♀. **Dubois:** July 27, 1905, 1 ♂; Aug. 24, 1905, 1 ♂. **Harrisburg:** June 30, 1905, 1 juv. ♂. **Carbondale:** July 16, 1909, 1 ♂. **Fountain Bluff:** July 25, 1905, 1 ♂. **Williams Mountain:** Aug. 11, 1905, 1 ♀. **Dixon Springs:** Sept. 5, 1932, 1 ♀, Ross and Horsfall.

**S. texensis** Saussure and Pictet.—This was probably the insect recorded as *curvicauda* from Moline by McNeill in 1891. It was reported correctly from Havana by Hart in 1907 and Vestal in 1913.

It is common throughout the state and is probably, as is elsewhere the case, particularly abundant in wet meadows and marshy spots.

Twenty-five males, 23 females, taken July 18 to October 12, and three immatures are from **Beach, Waukegan, Evanston, Antioch, Lake Villa, Sun Lake, Long Lake, Wauconda, Algonquin, Savanna, Fulton, Summit, Oak Lawn, Starved Rock, St. Anne, Normal, Forest City, Havana, Mayview, Urbana, Champaign, Charleston, Shawneetown, Carbondale.**

**S. furcata furcata** Brunner.—This common race was recorded as *fuscata* by McNeill in 1891.

Sixty-one males and 48 females, taken August 10 to October 15, are from **Beach, Waukegan, Kenilworth, Evanston, Cedar Lake, Wauconda, Algonquin, Amboy, Summit, Putnam, St. Anne, Benson, Normal, Bloomington, Forest City, Havana, Danville, Muncie, Homer, Urbana, Champaign, Mahomet, Monticello, Quincy, Borton, Manchester, Hillsboro, Lawrenceville, Olney, Centralia, Dubois, Shawneetown, Carbondale, Herod, Golconda, Dixon Springs, Metropolis, Karnak, Ullin, Cache, Thebes.**

### **Inscudderia** Caudell

**I. taxodii** Caudell.—This delicate and distinctive katydid was described by Caudell in 1921 and figured in color by the author in 1925b. The present records extend the known distribution of the species considerably northward, as it was previously not known north of Greenville, Miss.

**Karnak:** July 26, 1930, 1 ♀, 2 juv. ♂, 3 very small juv., on *Taxodium distichum*, Knight and Ross. **Cairo:** July 27, 1930, 1 ♂, 2 small juv., on *Taxodium distichum*, Knight and Ross.

### **Montezumina** Hebard

**M. modesta** (Brunner).—In 1878 Brunner proposed the genus *Symmetropleura*, including three species, each probably representing a distinct genus, of which the South American *laevicauda* was selected as genotype by Kirby in 1906. Brunner in the same study described *Turpilia oblongoculata* and using that species as genotype we erected the genus *Montezumina* (Hebard, 1925c), there explaining its affinity



to *Anaulacomera* rather than to *Turpilia* and *Diplophyllus*, as had been supposed. We have long realized that *Symmetropleura* was a composite genus, but not until the present was it realized that *modesta* was a species not only referable to *Montezumina* but exceedingly closely related to the Mexican *oblongoculata*. Indeed *modesta* is practically inseparable in the male sex but the female has an ovipositor which is much larger, less bent and distally broader, nearer the type developed in *Montezumina sinaloae* Hebard, but more definitely rounding to its apex.

In 1920 Blatchley recorded a female belonging to the Field Museum as *Symmetropleura modesta* from Boskydell near Carbondale. Previously the species had been recorded only as far west as Mississippi. On the Atlantic coast it has been found as far north as Raleigh, N. C. It is probable that the species is limited in its distribution within the state to the extreme southern part.

Cairo: July 27, 1930, 1♀, Knight and Ross.

### Amblycorypha Stal

#### KEY TO SPECIES

1. Lateral lobes of pronotum with humeral sinus decided, fig. 113, rounded and forming approximately a right angle. Caudal margin of disk of pronotum convex. Tegmina proportionately narrower. Form less robust. . . . . 2  
     Lateral lobes of pronotum with humeral sinus weak, fig. 114, rounded obtuse-angulate. Caudal margin of disk of pronotum more broadly convex. Tegmina proportionately broader. Form slightly more robust. Medium size. Caudal femora normal for genus. Male subgenital plate with distal margin V-emarginate. . . . . **rotundifolia rotundifolia**, p. 207
2. Male subgenital plate with distal margin V-emarginate. Ovipositor not deeper distad than at base. Large. Caudal femora proportionately less elongate. . . . . **oblongifolia**, p. 206  
     Male subgenital plate with distal margin truncate or very feebly obtuse-angulate emarginate. Small for genus. Ovipositor deeper distad than at base. Caudal femora elongate for genus. . . . . **uhleri**, p. 206

**A. oblongifolia** (DeGeer).—Generally distributed over Illinois, this species has been repeatedly recorded from the state correctly.

Twenty males and 15 females, taken July 28 to September 9, are from Beach, Winnetka, Kenilworth, Wilmette (a purplish pink female, *FM*), Evanston, Chicago, Antioch, Moline, Kankakee, Danville, Urbana, Norris City, Grand Tower, Pulaski, Thebes.

**A. uhleri** Stal.—Recorded from Meredosia by Hart in 1907, the species is now known to occur over southern Illinois as far north as this locality, which also constitutes a western limit point. We have recently noted that the species does not occur in Minnesota, the following Illinois localities being in the latitude of northernmost advance of *uhleri*.

Eleven males, six females and one immature male, taken July 27 to

September 2, are from Meredosia, Grafton, Clay City, Centralia, Dubois, Herod, Prospect Hill, Williams Mountain, Elizabethtown, Metropolis.

**A. rotundifolia rotundifolia** (Scudder).—Though Winnetka, Amboy and Moline (Rehn and Hebard 1914) are known northern limits, all of Illinois is probably included in the distribution of this race.

Fifteen males and 16 females, taken June 21 to October 6, are from Winnetka, Amboy, Riverside, Willow Springs, Palos Park, Moline, Havana, Hilliary, Muncie, St. Joseph, Urbana, Champaign, Seymour, Charleston, Odin, Dubois, Murphysboro, Fountain Bluff, Prospect Hill, Dixon Springs.

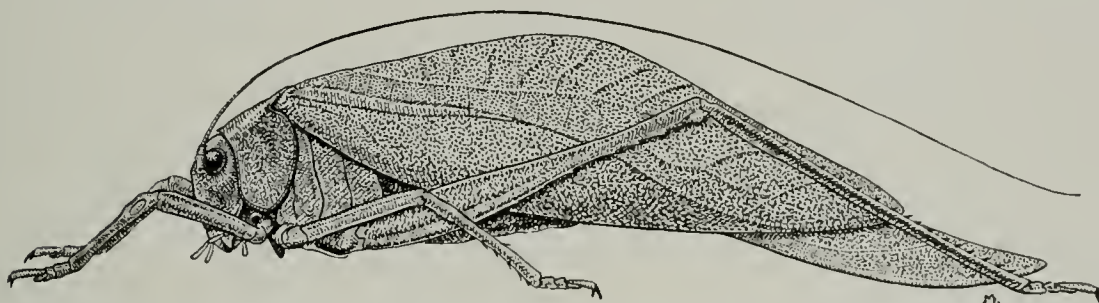


Fig. 158.—Adult male of the bush katydid *Microcentrum rhombifolium* (Saussure).  $\times 1.6$ .

### **Microcentrum** Scudder

#### KEY TO SPECIES

- Pronotum with cephalic margin showing a distinct though weak angulate production mesad. Very large. Fastigium weakly sulcate. Stridulating area of male tegmina immaculate. Male cerci gently incurved, apex not thickened, armed with a minute tooth beside the immediate tip. Male styles smaller and shorter, separated by a broad concave interval. Ovipositor with apex of ventral valves transverse truncate. . . . . **rhombifolium**, p. 207
- Pronotum with cephalic margin evenly concave. Large. Fastigium distinctly sulcate. Stridulating area of male tegmina with a large brown suffusion. Male cerci bisinuate, apex moderately enlarged, a minute but stout tooth directed sharply inward and inset so that the immediate apex appears bilobate. Male styles large and elongate, separated by a very small but decided emargination. Ovipositor with apex of ventral valves obliquely truncate. . . . **retinerve**, p. 208

**M. rhombifolium** (Saussure).—Though in this latitude a northern known limit is Twin Grove, the species undoubtedly occurs throughout the state, as it is known from as far north as Lansing, Mich. and Winona, Minn. We believe however that *rhombifolium* is very scarce throughout northern Illinois. McNeill in 1891 noted that he had never heard or seen the species at Moline, referring to it as *laurifolium*, an error then in general practice.

Thirteen males, 20 females, taken August 10 to October 20, and one immature are from Normal, Twin Grove, Urbana, Champaign, Mahomet, Charleston, Metropolis, Olive Branch.

**M. retinerve** (Burmeister).—The present record is a northwestern limit, the species being known in Indiana only as far north as Vigo county. Other western limits are shown by other specimens before us to be Polk county on the central portion of the western boundary of Arkansas, and Bowie county in extreme northeastern Texas. We believe Bruner's records (1893b) from Nebraska and Kansas are incorrect, no material from those states being in his collection nor has any been subsequently secured there. The records from New Mexico, Arizona and Central America are, we now know, based on material of allied but distinct species.

Jonesboro: Aug. 28, 1889, 1 ♂, Hart.

#### PSEUDOPHYLLINAE

#### **Pterophylla** Kirby

**P. camellifolia** (Fabricius).—Occurring over all of Illinois, this species was recorded as the synonym *Cyrtophyllus concavus* by McNeill in 1901.

Thirteen males and 20 females, taken July 23 to October 27, and one immature are from **Winnetka, Kenilworth, Evanston, Downers Grove, Waterman, Willow Springs, Palos Park, Lake Senachwine at Putnam, Oakwood, Urbana, Kansas, Charleston, Dubois, Alto Pass, Golconda.**

#### COPIPHORINAE

#### **Neoconocephalus** Karney

##### KEY TO SPECIES

1. Fastigium with length approximating width, fig. 121, its ventral surface dark or with a dark band.....2  
Fastigium decidedly longer than wide, fig. 123.....3
2. Fastigium large and usually slightly wider than long, fig. 120. Ovipositor approximately length of caudal femur. Form robust for genus. Large....  
.....**triops**, p. 209  
Fastigium small and usually slightly longer than wide, fig. 121. Ovipositor very much longer than caudal femur. Form more slender. Medium to small for genus.....**retusus**, p. 209
3. Fastigium moderately produced for genus, distinctly longer than proximal width, figs. 122, 127.....4  
Fastigium strongly produced, much longer than basal width, figs. 126, 128....6
4. Fastigium narrowing to the more acute apex, fig. 127, with ventral surface immaculate. Male small and slender, female larger and robust with abdomen decidedly enlarged. Pronotum elongate, expanding evenly caudad. Ovipositor wider than usual for genus, normally slightly shorter than caudal femur. Swamp inhabitant.....**palustris**, p. 209  
Fastigium with apex broader, fig. 123. Male large, female larger. Pronotum not elongate, not expanding evenly caudad. Ovipositor of normal width, slightly shorter (normal) to slightly longer than caudal femur. Ventral



## NEOCONOCEPHALUS—KEY TO SPECIES—CONT'D

- surface normally immaculate, rarely with a very small distal suffusion.  
Form robust for genus.....5
5. Fastigium shorter, not narrowing as decidedly and with apex somewhat broader, fig. 122. Large to (normally) very large.....**robustus robustus**, p. 210  
Fastigium longer, narrowing decidedly and with apex sharply rounded, fig. 123. Large.....**robustus crepitans**, p. 209
6. Fastigium with ventral surface narrowly but continuously margined laterad and distad with black; slender and elongate, fig. 126. Ovipositor much longer than caudal femur.....**ensiger**, p. 210  
Fastigium with ventral surface black to or including basal tooth; heavy or very elongate, figs. 129, 130.....7
7. Fastigium not as long, with basal tooth less prominent, fig. 116. Ovipositor much longer than caudal femur. Medium size.....8  
Fastigium exceedingly long, with basal tooth very prominent, fig. 117. Ovipositor very much longer than caudal femur. Medium to very large....  
.....**exiliscanorus**, p. 211
8. Fastigium pointed, its sides straight or concave, fig. 128.....**lyristes**, p. 211  
Fastigium broadly rounded, not pointed, its sides more or less convex, fig. 129.....**nebrascensis**, p. 210

**N. triops** (Linnaeus).—This is a northern limit and the first record of *triops* from the state. The species is probably confined to southern Illinois.

**Cairo:** May 23, 1927, 1♂, brown, attracted to light.

**N. retusus** (Scudder).—Not previously known from Illinois, this species includes the southern portions of this state and Indiana in its distribution. Urbana is a northern limit point.

**Urbana:** Aug. 29, 1909, 1♀, green. **Lawrenceville:** Sept. 7, 1933, 2♂, 1♀, 1♂ brown, pair green, Ross and Mohr. **Clay City:** Sept. 2, 1909, 1♂, brown. **Dixon Springs:** Sept. 5, 1932, 1♀, green, Ross and Horsfall. **Dongola:** Aug. 23, 1916, 1♀, green. **Ullin:** Sept. 20, 1932, 1♀, green, Frison and Mohr. **Olive Branch:** Oct. 29, 1909, 1♀, Gerhard, *FM*.

**N. palustris** (Blatchley).—Lawrenceville and Carbondale are northern and western limits respectively for *palustris*, a species living in swamps and consequently much less frequently encountered than the ubiquitous forms of the genus. It is probably confined to the southern portions of Indiana and Illinois.

**Lawrenceville:** Sept. 7, 1933, 1♀, green, Ross and Mohr. **Carbondale:** Aug. 4, 1909, 1♀, green, at light.

**N. robustus crepitans** Scudder.—The Cairo female alone is strictly typical of this poorly defined race, being larger with vertex blunter than the others, which show individual variation in these features. In none of the present series is there a small dark marking on the ventral surface of the vertex.

At present Urbana is a northern limital point in this longitude. The race may occur over the entire state, but it is probably very scarce in the northern portions.

**Urbana:** 1♂, green. **Jacksonville:** Aug. 7, 1903, 1♂, green, Crane. **Clay City:** Aug. 22, 1905, 1♂, green; Sept. 2, 1909, 1♂, green. **Dubois:** July 27, 1905, 1♀, brown. **Cairo:** Aug. 1, 1905, 1♂, green.

**N. robustus robustus** (Scudder).—The present individuals are somewhat atypical, the vertex averaging appreciably less produced than in series from the Atlantic coast. In all other respects however close agreement is found and individuals showing nearest convergence can certainly not be separated even racially. It is evident that this is the insect which Blatchley (1920) recorded from the shores of Lake Michigan in La Porte county, Ind. It is becoming increasingly apparent that this insect may be the response to a sand environment in this species and not the typical race elsewhere represented by a separable geographic race (*robustus crepitans*). We do not yet feel justified, however, in indicating synonymy.

The present insect probably occurs in sandy areas throughout Illinois.

**Forest City:** Aug. 20, 1904, 1♀, green, Hart and Brown. **Topeka:** Aug. 7, 1908, 2♂, 1 green, 1 brown, Ewing. **Devil's Hole:** Aug. 12 to Sept. 11, 1904 to 1910, 5♂, 2♀, 1♂ brown, others green. **Quiver Lake:** Aug. 11, 1884, 1♂, brown, on shore, Hart. **Anna:** Aug. 5, 1883, 1♂, brown.

**N. ensiger** (Harris).—The last three localities are limital points in the distribution southward of this species.

Sixteen males, 22 females, taken July 23 to September 1, and four immatures are from **Beach, Chicago, Algonquin, Ottawa, Urbana, Champaign, Seymour**. The great majority are green, a very few specimens being light brown.

**N. nebrascensis** (Bruner).—In this series the ventral surface of the vertex is black with the exception of the basal portion including the tooth which is of the ground coloration (brown or green). Only in the Muncie male is the ventral surface of the vertex almost solidly black, showing very weak paling only at the base of the tooth.

We have recently expressed the opinion that Lugger's record (1897) of this species from Minnesota was an error, though *nebrascensis* may indeed occur in the southern portion of that state. All of Illinois is probably within its range, though Moline is as yet a northernmost and Charleston a southernmost known point in this longitude. Blatchley recorded much of the present material in 1920. With it he included a female of *lyristes* from Normal.

**Moline:** Aug. 25, 1♂, green, McNeill; Sept. 12, 1♂, paratype, green, McNeill, HC. **Normal:** Aug. 16, 1879, 1♀. **Muncie:** July 28, 1909, 1♂,

green, vertex slightly longer than normal. **Homer:** Sept. 2, 1905, 1♀, green, vertex slightly longer than in allotype from Omaha, Neb., *HC*. **Urbana:** July 15 to Aug. 13, 1885 and 1887, 1♂, 2♀, pair brown, 1♀ green. **Charleston:** Aug. 20, 1910, 1♀, brown, vertex slightly longer than normal.

**N. lyristes** (Rehn and Hebard).—Close affinity to *nebrascensis* is shown by this insect, but we can find no justification in placing it as a race of that species, as was done by Blatchley in 1920.

Ohio and Illinois series show that two distinct species exist in this region and *lyristes* is seen to extend its distribution far west of the Atlantic coast, to which we have believed that it was limited. It is probable that the present species reaches its northwestern limits of distribution along the shores of Lake Michigan in northeastern Illinois.

**Beach:** Aug. 21 and 24, 1906, 1♂, 2♀, very small, pale brown, in swamps and on sand ridges. **Chicago:** Sept. 17, 1905, 2♂, green, south of Jackson Park on *Iris versicolor*, Hancock, *HC*. **Savanna:** Sept. 6, 1905, 1♀, recorded as *nebrascensis* by Blatchley in 1920. **Palos Park:** Sept. 5, 1909, 1♀, brown, Smith.

**N. exiliscanorus** (Davis).—This large and handsome species has been very rarely encountered except on the Atlantic coast from Long Island to Virginia. The following is a northwestern limit record, a northern limit point being New Harmony, Ind., a specimen from there constituting the basis for Blatchley's synonym *bruneri*. A western limit point is Dallas, Tex.

**Tower Hill:** Aug. 1933, a considerable colony located by Hunter, *HC*.

#### CONOCEPHALINAE

#### Orchelimum Serville

##### KEY TO SPECIES

1. Male cerci of moderate length, with portion beyond tooth little if any longer than portion before it, fig. 141.....2  
Male cerci more elongate, with portion beyond tooth distinctly longer than portion before it, fig. 140. More slender species.....5
2. Male cerci with tooth much longer than distal portion of shaft; distal portion simple, conical, fig. 133. Lateral lobes of pronotum with humeral sinus broad and shallow. Caudal femora with outer ventral angle always spined....  
.....*silvaticum*, p. 213  
Male cerci with tooth not longer than distal portion of shaft; distal portion bearing a node or carina, fig. 138. Caudal femora with ventral margins unarmed (occasionally with one or two spines).....3
3. Tibiae not darkened. Male cerci with a large dorsal node (but no carina) mesodistad, fig. 138. Ovipositor shorter, never distinctly over half as long as caudal femur. Form more robust. Moderately macropterous and (rarer) strongly macropterous phases developed.....4  
All tibiae black or partially suffused. Male cerci dorsad with a distinct, obtuse,



## ORCHELIMUM—KEY TO SPECIES—CONT'D

- sinuate carina, but lacking a node, fig. 134, with tooth strongly apressed against proximal portion of carina. Ovipositor longer, distinctly over half as long as caudal femur. Lateral lobes of pronotum with little indication of humeral sinus and remainder of caudal margin distinctly sinuate. Caudal femora with ventral margins armed. Form moderately graceful. Occurs only in proximity of water.....**nigripes**, p. 214
4. Lateral lobes of pronotum with humeral sinus distinct, fig. 108. Male cerci with apical portion of shaft longer than tooth and its apex blunt, fig. 138. Ovipositor curved evenly dorsad and only slightly broader mesad than elsewhere.....**vulgare**, p. 212
- Lateral lobes of pronotum with humeral sinus broad and shallow, fig. 109. Male cerci with apical portion of shaft equal in length to tooth and its apex sharper. Ovipositor with dorsal margin straight beyond base, strikingly broader mesad than elsewhere.....**gladiator**, p. 213
5. Male cerci with a distinct, obtuse sinuate carina, fig. 140. Tibiae not black. Lateral lobes of pronotum with humeral sinus appreciable, and remainder of caudal margin weakly convex. Caudal femora with ventral margins unarmed, occasionally with one or two spines. Form medium for genus. Marsh inhabitant.....**bullatum**, p. 214
- Male cerci without a distinct dorsal carina.....6
6. Antennae not annulate. Lateral lobes of pronotum deeper. Caudal femora with ventral margins rarely armed. Male with speculum of stridulating field of tegmina only weakly longitudinal. Male cerci with tooth nearly median in position (in vertical sense); apex of cerci not decidedly acuminate. Ovipositor with depth not conspicuously greatest mesad.....7
- Antennae very finely annulate. Lateral lobes of pronotum not as deep. Caudal femora with ventral margins spined. Male with speculum of stridulating field of tegmina decidedly longitudinal. Male cerci with tooth dorsal (in vertical sense); apex of cerci decidedly acuminate. Ovipositor with depth conspicuously greatest mesad. Marsh inhabitant.....**volantum**, p. 215
7. Ovipositor never more than slightly over half as long as caudal femur, slender and showing stronger curvature dorsad. Face sometimes with a very striking vertical dark marking. Eastern race....**concinnum concinnum** p. 214
- Ovipositor considerably to very decidedly over half as long as caudal femur, heavier and showing weaker curvature dorsad. Western race.....**concinnum delicatum**, p. 214

**O. vulgare** Harris.—This very common and generally distributed, weed loving species has been recorded from Illinois correctly, but individuals at hand with organs of flight showing extreme caudation have been recorded improperly as *glaberrimum* and *longipenne*. Fourteen males and 13 females of the present series show that condition and a number of other specimens are intermediate between it and the normal.

Ninety-one males and 61 females, taken July 24 to October 14, are from Beach, Winnetka, Kenilworth, Lake Villa, Sun Lake, Volo, Wauconda, Algonquin, Amboy, Downers Grove, Watertown, Moline, St. Anne, Forest City, Bishop, Devil's Hole, Muncie, St. Joseph, Urbana, Champaign,

Mansfield, Arcola, Charleston, Nokomis, Lawrenceville, Billett, Alma, Odin, Norris City, Ashley, Dubois, Tamaroa, Shawneetown, Marion, Makanda, Herod, Alto Pass, Golconda, Dixon Springs, Vienna, Cache.

*O. gladiator* (Bruner).—This boreal species is confined to central and northern Illinois, Champaign being a southern limit of distribution.

Sixteen males and 12 females are from **Beach** (in swamp), **Waukegan**, **Chicago**, **Antioch**, **Cedar Lake** (in bog), **Sun Lake** (in bog), **Wauconda**, **Algonquin**, **Champaign**.

*O. silvaticum* McNeill.

1891 *Orchelimum silvaticum* McNeill, Psyche, vol. 6, p. 26. ♂, ♀, Rock Island, Ill.

1915 *Orchelimum calcaratum* Rehn and Hebard, Trans. Am. Ent. Soc., vol. 41, p. 46, figs. 1, 2, 43, 44 and 73. ♂, ♀, type locality San Antonio, Tex.

Rehn and Hebard (1915a) placed *silvaticum*, the type of which has been lost, as a synonym of *agile*. Study of series subsequently obtained shows *agile* to be a species which is distributed westward only along the gulf coast north to Chattanooga, Tenn., Montgomery and Selma, Ala., and a narrow strip in Mississippi, Louisiana and Texas, to Harris county in the southeastern portion of the latter state. The present species, on the other hand, is found to occur south to San Antonio, Victoria and Doucette, Tex., and Beauregard county in southwestern Louisiana. Other eastern limits are Clarksville, Tenn. and Ohio (material before us), while northern limits are the latter, Marshall county, Ind. (by inference—recorded as *agile* by Blatchley in 1920), Amboy and Rock Island, Ill., Iowa, (a male in the author's collection) and Capa, S. D.

From study of the Illinois material now available it is evident that *silvaticum* is a valid species, with *calcaratum* of Rehn and Hebard a synonym. Blatchley in 1920 recorded this insect as *calcaratum* from Olney, Ill. and Clarksville, Tenn.

Though McNeill's description is exceedingly unsatisfactory, he states that in *silvaticum* the males have the wings not surpassing the tegmina and the females with ovipositor more than half as long as the caudal femur. In our series both sexes have the tegmina very slightly exceeded by the wings, the ovipositor in Texan series very slightly less than, but in Illinois specimens very slightly more than, half the length of the caudal femur.

In *agile* normally the wings well surpass the tegmina in both sexes, while the ovipositor is considerably less than half as long as the caudal femur. These two species agree, and differ from *vulgare* in having the ventral margins of the caudal femora armed; *silvaticum* resembles *vulgare* much the more closely but has the fastigium narrower.

**Amboy**: Aug. 25, 1933, 1 ♂, Ross and Mohr. **Devil's Hole**: Aug. 7, 1908, 1 ♀; Aug. 12, 1907, 1 ♂, HC. **Charleston**: Aug. 16 and 17, 1910, 2 ♂ in forest. **Tower Hill**: Aug. 1933, 1 ♂ on oak sprout in upland pasture, Hunter,

*HC. Grafton*: Aug. 26, 1905, 1♂; Sept. 8, 1932, 1♀, Ross and Mohr. *Olney*: 1♂, 1♀, Ridgway. *Fountain Bluff*: July 25, 1905, 1♂. *Dixon Springs*: Sept. 5, 1932, 1♂, Ross and Horsfall.

*O. bullatum* Rehn and Hebard.—As this species has been recorded from an upland cattail marsh near Lafayette in northwestern central Indiana by Rehn as a variety of *nigripes* (Fox 1915) and as *bullatum* by Blatchley in 1920, it is certain to be found in similar environment in southern Illinois. The Indiana record is a northeastern limital one for the species. Specimens from Fox's series are in the author's collection.

The species is otherwise known only from southern Louisiana and eastern Texas, but undoubtedly occurs widely through the Mississippi valley south of central Illinois.

*O. nigripes* Scudder.—A species of the water's edge, this insect is apparently very common in southern Illinois, becoming less numerous northward. In this longitude Algonquin, Ill. and Lone Rock, Wis. are northern limital points.

Fifty-three males, 34 females, taken July 27 to October 25, and four immatures are from Algonquin, Amboy, Savanna, Putnam, Watertown, Havana, Danville, Muncie, Oakwood, Urbana, Monticello, Decatur, Grafton, Alton, New Haven, Shawneetown, Ware, Golconda, Metropolis, Karnak, Cairo.

*O. concinnum concinnum* Scudder.—We placed Blatchley's *campestre* as a synonym in 1915 and are convinced that that is the correct assignment. Blatchley placed *campestre* as a trinomial in 1920, though discussing it there as a "form" preferring upland pastures and dryer prairies.

In this series 32 specimens have a heavy vertical red-brown stripe on the face, these in almost all cases having been taken in company with individuals with immaculate faces. This color phase is largely confined to the swamps and bogs of northern Illinois and Indiana, a single female being from Clay City to the south. This is a physiological condition like the brown and green color phases of certain species. A large immature of *concinnum* from Ventnor, N. J. was kept alive by us. Its face was immaculate but after its last moult when hardening into an adult a heavy red-brown vertical stripe gradually appeared on its face.

Forty-six males and 50 females, taken August 3 to September 26, are from Beach, Waukegan (swamps), Lake Forest, Winnetka, Chicago (76th street meadows), Channel Lake (swamp), Lake Villa (swamp), Cedar Lake (bog), Sun Lake (bog), Deep Lake, Grays Lake, Volo (tamarack bog), Algonquin, Amboy, Savanna, Glen Ellyn, Havana, Urbana, Quincy, Billett, Clay City, Marion, Anna.

*O. concinnum delicatum* Bruner.—Under *concinnum delicatum* only females are here recorded, except in one series where the sexes are



definitely associated. We are still unable to separate males of this western race from those of *concinnum concinnum*.

Though typical *concinnum* occurs over the east and the present insect over the great plains, the two conditions, indistinguishable in the male sex and only separable in females by the form and length of the ovipositor, do not appear to have an area of intergradation of the kind usually found between geographic races. Instead, from Indiana to eastern Nebraska and Kansas, typical *concinnum* is strongly dominant but occasionally females representing *concinnum delicatum* are found. Possibly they come from plainslike areas. In South Dakota and western Minnesota, however, *concinnum delicatum* alone has been found.

**Beach:** Aug. 24 to 26, 1932, 9♂, 7♀, length of ovipositor 9.1 mm. to 10.8 mm., Ross and Mohr. **Algonquin:** July 25, 1905, 3♀, length of ovipositor 10.6 mm. to 10.8 mm., Nason. **Havana:** July 26, 1910, 1♀, length of ovipositor 12.7 mm. **Urbana:** July 30, 1891 and Sept. 1, 1889, 2♀, length of ovipositor 10.8 mm. and 11 mm., 1 at sugar bait in orchard. **Champaign:** Sept. 10, 1891, 1♀, length of ovipositor 10.9 mm., Marten.

**O. volantum** McNeill.—We have pointed out (Hebard 1931) that a Kansas specimen of *concinnum delicatum* had been in error recorded as this species. Thus *volantum* is known to occur only from southern Ontario (Sarnia) and northern Ohio, west to extreme eastern Nebraska. In Indiana and Illinois it is known from near the northern border (type locality Cleveland in Henry county, Ill.) to south of a median line across these states.

The fact that *volantum*, like its southeastern relative *bradleyi* Rehn and Hebard, lives only on plants which grow out of the water, is an important reason why the limits of distribution are still poorly understood. It is usually possible to secure specimens only from a boat or by wading in waist-deep water.

**Cedar Lake:** Aug. 11, 1887, 1♀, Hart and Garman. **Cary:** Aug. 7, 1905, 2♀, Gerhard. **Peoria:** 1♀, HC.

### **Conocephalus** Thunberg

#### KEY TO SPECIES

1. Caudal tibiae armed at distal extremity with three pairs of spurs.....2  
Caudal tibiae armed at distal extremity with one pair of spurs. Prosternum unarmed. Male cerci very slender, with an elongate median tooth. Green or brown. Normally brachypterous, occasionally macropterous. Ovipositor distinctly shorter to distinctly longer than caudal femur....**saltans**, p. 218
2. Male cerci armed with a heavy mesal tooth, fig. 131.....3  
Male cerci armed with a more delicate tooth, fig. 135, mesal portion of surface swollen and elongate ovate. Brachypterous, rarely macropterous.....6
3. Male cerci with distal portion depressed and with apex broad and rounded, fig. 131. Ovipositor nearly straight and of medium length for genus. General coloration green.....4

## CONOCEPHALUS—KEY TO SPECIES—CONT'D

- Male cerci with distal portion not at all depressed and with apex acuminate, fig. 136. Normally brachypterous, very rarely macropterous.....5
4. Male cerci with distal portion weakly depressed, the depression general and not more decided on the inner side, fig. 132. Ovipositor averaging slightly narrower (in vertical sense) and shorter. Always macropterous but degree highly variable.....**fasciatus fasciatus**, p. 216
- Male cerci with distal portion more decidedly produced and very decidedly depressed, particularly on the inner side, fig. 131. Ovipositor averaging heavier and longer. Normally brachypterous, rarely macropterous..  
.....**brevipennis**, p. 216
5. Male cerci with distal portion short, bluntly conical, fig. 136. Ovipositor much shorter than caudal femur. Vertex broad, very weakly ascending. General coloration brown, rarely greenish on sides. Sylvan, terrestrial.....  
.....**nemoralis**, p. 216
- Male cerci with distal portion very elongate, with apex strongly acuminate, fig. 139. Ovipositor very much longer than caudal femur. Vertex very broad, not ascending. General coloration green, sometimes pale brown. Prefers grasses growing on poorer soil.....**strictus**, p. 217
6. Coloration solid, distinctive and vivid; abdomen wholly or in large part black, tegmina and caudal legs rich green. Male cerci shorter. Form slightly more robust. Ovipositor much shorter, considerably longer than to shorter than caudal femur.....**nigropleurum**, p. 217
- Brown or brownish buff, head and pronotum trifasciate. Male cerci longer. Form slightly more slender. Ovipositor exceedingly elongate, very much longer than caudal femur. Inhabits marsh vegetation. Exceedingly rapid in movements.....**attenuatus**, p. 217

**C. fasciatus fasciatus** (DeGeer).—A series of 205 specimens of this common species is before us from all parts of Illinois. Some of these show extreme macropterism.

**C. brevipennis** (Scudder).—Scudder's *ensifer*, described from Lawn Ridge, Ill. in 1862, was placed as a synonym by Rehn and Hebard in 1915.

The present material is variable in size but averages small, two males from Chicago being the smallest we have seen.

Though occurring over the entire state, this species is never as generally distributed as the preceding. It appears to be most abundant in the northern portion of Illinois.

Thirty-seven males and 55 females, of which a single female from Dubois is macropterous, taken July 25 to September 27, are from **Zion, Beach, Waukegan, Winnetka, Kenilworth, Chicago, Bowmanville, Antioch, Channel Lake, Lake Villa, Sun Lake, Long Lake, Wauconda, Algonquin, Port Byron, Bloomington, Havana, Urbana, Champaign, Dubois, Shawneetown, Jonesboro, Karnak, Olive Branch.**

**C. nemoralis** (Scudder).—This insect inhabits the undergrowth on the borders of and in openings in the woods, or open woodlands.

It occurs over all of Illinois, material from Lone Rock in southern Wisconsin indicating a known limit of distribution northward.

Twenty-eight males and 31 females, taken August 17 to October 15, are from Willow Springs, Starved Rock, Rock Island, Muncie, Urbana, Monticello, Charleston, Farina, Hillsboro, Hardin, Grafton, Lawrenceville, Clay City, Dubois, Carbondale, Herod, Golconda, Karnak, Olive Branch, Cache. A single female is macropterous, this being a rare condition in *nemoralis*.

At Hardin a female was found ovipositing in an apple.

**C. strictus** (Scudder).—This species prefers grasses growing on poor soil. Material from as far north as Lone Rock in southern Wisconsin is before us, indicating that *strictus* is present throughout Illinois.

Seventy-six males, 89 females, of which a pair is macropterous and 1♀ nearly macropterous, taken August 5 to October 13, and 11 immature individuals, are from Chicago, Antioch, Lake Villa, Deep Lake,

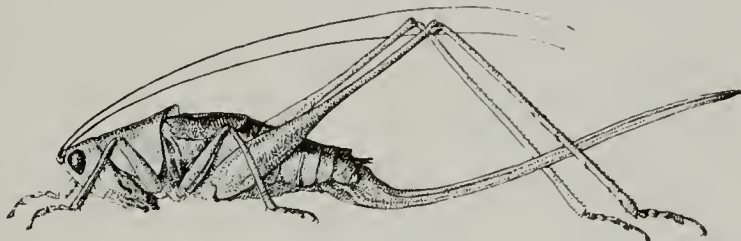


Fig. 159.—An adult female of the meadow katydid *Conocephalus strictus* (Scudder).  $\times 2$ .

Long Lake, Algonquin, Amboy, Riverside, Downers Grove, Milan, Moline, Rock Island, St. Anne, Forest City, Devil's Hole, Quiver Lake, Muncie, Urbana, Champaign, Monticello, Borton, Charleston, Hillsboro, Alton, Clay City, Norris City, Shawneetown, Marion, Herod, Elizabethtown, Ullin.

**C. nigropleurum** (Bruner).—Rehn and Hebard (1915b) recorded this handsome hygrophilous species from Watertown, Ill. It is certainly much more abundant in the northern portions of Illinois and Indiana than to the south. Southern known limits are Urbana, White Heath and Alton, but as it is known in southeastern Indiana from Gibson county, it will probably be found in favorable situations throughout Illinois.

Twenty-one males, 18 females, taken August 1 to September 10, and 11 immature individuals are from Beach (in swamp), Winnetka, Kenilworth, Bowmanville, Antioch (in tamarack bog), Cedar Lake (in tamarack swamp), Deep Lake, Lake Villa (in swamp), Wauconda, Algonquin, Argo, Havana, Urbana, White Heath (in woods), Alton.

**C. attenuatus** (Scudder).—This species was described from material from "Illinois," originally referred to *Xiphidion* in 1869. Rehn and Hebard (1915b) recorded it from Watertown, Ill.

Not only does brachypterism and macropterism give certain individuals a different general appearance, but in Illinois a color phase with legs rich green is frequently developed, very much in contrast



with normal individuals in which the legs, like the other portions of the insect, are various shades of brown.

The species probably does not occur in extreme southern Illinois, but though Putnam is at present a southern known limit point, *attenuatus* will probably be found further south than that, as it is known in Indiana south to Knox county. It is an inhabitant of swamp vegetation. Individuals are much more rapid in their movements and alert than are those of our more frequently encountered species of the genus.

**Antioch:** Aug. 27, 1932, 2♂, Ross and Mohr. **Lake Villa:** Aug. 9 and 10, 1906, 6♂, 6♀, 6 juv., swamp. **Grays Lake:** Aug. 27, 1932, 20♂, 18♀, Ross and Mohr. **Wauconda:** Aug. 23, 1932, 2♂, 1♀, all teneral, 1 juv.♀, Ross and Mohr. **Algonquin:** Aug. 10 to Sept. 5, 1905 and 1910, 6♂, 3♀, 2 juv. **Putnam:** Sept. 26, 1933, 7♂, 1♀, Ross and Mohr. A few of these specimens are macropterous, the others brachypterous.

**C. saltans** (Scudder).—The present series has the tegmina very decidedly reduced, except one male which is semimacropterous.

This insect, preferring grasses growing on dry poor soil, is found throughout Illinois. Northern limits from material before us are West Spring Green and Lone Rock in southern Wisconsin.

**Zion:** Aug. 25, 1932, 1♂, 3♀, Ross and Mohr. **Beach:** Aug. 21 to 26, 1906 and 1932, 25♂, 21♀, sand ridges and swamps. **Waukegan:** Aug. 18, 1906, 1♂, 1♀. **St. Anne:** Aug. 28, 1932, 1♂, 1♀, Ross and Mohr. **Devil's Hole:** Sept. 11, 1910, 1♂.

#### DECTICINAE

### **Atlanticus** Scudder

#### KEY TO SPECIES

1. Male tegmina projecting caudad of pronotal disk a distance considerably exceeding half the length of pronotum. Pronotum of male proportionately large. Subgenital plate of female with lateral apices exceedingly broadly and evenly rounded. Prosternal spines very short. Male cerci relatively short, robust. Subgenital plate of male with distal emargination shallowly rounded, angulate. . . . . **testaceus**, p. 219
- Male tegmina projecting caudad of pronotal disk much less than half the length of pronotum. Pronotum of male shorter and narrower. Subgenital plate of female with lateral apices much less broadly rounded and showing angulation. Subgenital plate of male with distal emargination normally decidedly angulate-emarginate. . . . . 2
2. Prosternal spines very short. Caudal femora less elongate. Pronotal disk averaging broader at the nearly or definitely truncate caudal margin. Ultimate tergite of male with projections on each side very weak, bluntly obtuse-angulate. Male cerci relatively short and robust. Smaller. . . **davisi**, p. 219
- Prosternal spines elongate. Caudal femora very elongate for genus. On the average the pronotal disk narrower at the very broadly convex caudal

## ATLANTICUS—KEY TO SPECIES—CONT'D

margin. Ultimate tergite of male with projections on each side more decided with apices acute. Male cerci relatively elongate. Larger.....

.....*americanus hesperus*, p. 219

**A. testaceus** (Scudder).—This species, found throughout woodlands in Illinois, was generally recognized as *pachymerus* until 1916. It was recorded from Rock Island, Ill. as *Thyreonotus pachymerus* by McNeill in 1891 and from Moline and Peoria correctly by Rehn and Hebard in 1916.

We have studied 14♂, 20♀ and 1 juv.♀, taken June 10 to September 10, and 17 immature individuals, all from **Winnetka, Deep Lake, Savanna, Downers Grove, Willow Springs, Beverly Hills, Palos Park, Joliet, Putnam, Moline, Muncie, Homer, Grafton, Dubois, Prospect Hill, Parker.**

**A. davisii** Rehn and Hebard.—It is almost certain that this species will be found in southern Illinois, as it is known from southern Indiana and Keokuk in extreme southeastern Iowa.

**A. americanus hesperus** Hebard.—Described from "Tennessee," the type female of *americanus* (Saussure) in the Geneva Museum has been examined for us by Dr. Carl, whose sketch of the subgenital plate shows its median emargination to be very deep and decidedly narrow. Material from the Appalachian mountains in North Carolina, eastern Tennessee and Georgia represents the eastern race, whereas all material before us from points in Tennessee to the west represents the western race. We believe therefore that the type came from the Appalachians in extreme eastern Tennessee. Large series before us show that the species divides into an eastern and a western race and this feature is characteristic of the eastern race, of which *Decticus derogatus* Scudder is a synonym. The eastern race is found from New Hampshire (probably southern) and Dedham, Mass., south throughout the Appalachians, at lower elevations known as far south as Plummers Island, Md. (material in the author's collection) and Greensboro, N. C.

The western race (Hebard 1934) is found from the gulf coast north to southern Ohio, Indiana and Illinois and west to the Mississippi.

Alto Pass is a northwestern limital point for this race, previously not known from Illinois, where it is apparently limited to the southern portion of the state.

**Alto Pass:** Aug. 16, 1909, 1♀. **Thebes:** July 31, 1905, 1♂.

Length of body: ♂, 25 mm. (abdomen retracted); ♀, 27.5 mm. Length of pronotum: ♂, 10.7 mm.; ♀, 11.8 mm. Caudal width of pronotal disk: ♂, 7 mm.; ♀, 7 mm. Projection of male tegmina: 3.3 mm. Length of caudal femur: ♂, 27.7 mm.; ♀, 30.4 mm. Length of ovipositor: 26.3 mm.

## GRYLLACRINAE

**Camptonotus** Uhler

**C. carolinensis** (Gerstaecker).—This species has received considerable attention because of its unique habit of rolling leaves into a nest, in which it hides.

**Bluffs:** Aug. 19, 1917, 1 juv.♀. **Carbondale:** Sept. 23 to 26, 1909, 2♂, 2♀, Gerhard, *FM*. **Boskydell:** Sept. 26, 1909, 2♂, Gerhard, *FM*. **Alto Pass:** Aug. 13, 1891, 1♀, Hart and Shiga. **Metropolis:** Sept. 23, 1924, 1♀, Frison.

RHAPHIDOPHORINAE<sup>9</sup>**Diestrammena** Brunner**D. apicalis** Brunner.

- 1888 *Diestrammena apicalis* Brunner, Abh. zool.-bot. Ges. Wien., vol. 38, pp. 298-299. ♀, Japan.
- 1904 *Diestrammena unicolor* Morse, Psyche, vol. 11, p. 80. Chicago, Ill., in greenhouse. (Not of Brunner 1888).
- 1907 *Diestrammena unicolor* Caudell, Can. Ent., vol. 39, p. 290. Citation of last.
- 1908 *Diestrammena apicalis* Matsumura & Shiraki, Journ. Coll. Agr. Sapporo, vol. 3, no. 1, p. 77. Japanese records, description and measurements.
- 1916 *Diestrammena apicalis* Chopard, Bull. Soc. Ent. France, 1916, p. 156. Characterization in key, partly erroneous.
- 1920 *Diestrammena unicolor* Blatchley, Orth. Northeast. Am., p. 612. Citation of Morse's 1904 record.
- 1921 *Diestrammena apicalis* Chopard, Bull. Soc. Ent. France, 1921, p. 210. *Unicolor* and *apicalis* differentiated as result of type examination.
- 1925 *Tachycines asynamorus* Hebard, Proc. Acad. Nat. Sci. Phil., vol. 77, p. 146. In part, Morse's 1904 record erroneously assigned to this species, following suggestion made by Chopard in 1914.
- 1928 *Diestrammena apicalis* Karny, Stett. Ent. Zeit., vol. 89, p. 307. Hiogo, Japan. Notes on leg armature and proportions.
- 1930 *Diestrammena apicalis* Karny, Ann. Naturh. Mus. Wien., vol. 44, p. 173. Notes on ♀ holotype in Vienna Museum and on coloration.

The various records of *Diestrammena unicolor* Brunner from European greenhouses by Wünn, Chopard and others have been demonstrated to have been based upon *Tachycines asynamorus* Adelung, and it has been assumed in recent years that the specimen from Chicago recorded as *unicolor* in 1904 by Morse was also that species. Inveighing against the failure of American students to acquaint themselves with the literature in which the identity of the insect had been pointed out, Karny in 1930, pp. 173-174, makes the statement that members of the genus *Diestrammena* are so far as known confined to the eastern Asiatic region, and that it is highly unlikely that any species

<sup>9</sup>A comprehensive treatment of the North American species has been recently completed by T. H. Hubbell, and is expected to appear at an early date.



of that genus should occur in America; he refers all North American records of *D. "marmorata"* and *D. unicolor* without exception to *Tachycines asynamorus*. It was surprising therefore to find in the collections submitted for study by the ILLINOIS STATE NATURAL HISTORY SURVEY specimens from Chicago greenhouses which show that *apicalis* was established there for a period of not less than four years. Morse's identification of the species proves to have been as accurate as the state of the literature in 1904 would permit.

*Diestrammena apicalis* differs from *D. unicolor* and from all of the other species of the genus, except *D. minuta* Chopard of Tonkin, in the character of the distal armature of the cephalic tibiae. In *apicalis* and *minuta* the apex of the tibia is unarmed dorsad (except for a single small distodorsal spine sometimes present in *minuta*), and there is no median spinule between the paired distoventral spurs. This feature distinguishes these two species at once, not only from all of the remaining species of *Diestrammena*, but also from *Tachycines asynamorus*, the only other member of this old world tribe known to be adventive to North America; in all of these a small median spine or spinule is present between the two larger distoventral spurs, and a distodorsal spine is present on one or both sides. From *Diestrammena minuta* the present species is distinguished by its greater size, and in the female by the form of the subgenital plate—in *apicalis* this is triangular and straight sided while in *minuta* it is more broadly triangular, with convex sides and acute apex. The relatively uniform coloration of *Diestrammena apicalis*, together with the differences in the armature of the cephalic tibiae, serves to differentiate all instars of this species from those of the strikingly maculate *Tachycines asynamorus*.

The following specimens in the collection of the ILLINOIS STATE NATURAL HISTORY SURVEY, and the original material recorded by Morse, are believed to constitute the only records of the occurrence of the species outside of Japan.

**Chicago:** Apr. 24, 1906, 2 ♂, 1 ♀, 2 juv. ♂, 4 juv. ♀ (the immature individuals all more than half grown); taken with *Tachycines asynamorus* which was apparently the more abundant; Dec. 28, 1907, 3 small juv. ♂ taken with adults and immature specimens of *Tachycines asynamorus* in Lincoln Park greenhouse, Zetek.

### **Tachycines Adelung**

#### **T. asynamorus Adelung.**

- 1902 *Tachycines asynamorus* Adelung, Ann. Mus. Zool. Petersbourg, vol. 7, pp. 59-62, text figs. a, b, c. ♂, ♀, St. Petersburg, Russia, in palm house, introduced on plants.
- 1920 *Diestrammena japonica* Blatchley, Orth. Northeast. Am., p. 611, fig. 205.

- 1925 *Tachycines asynamorus* Hebard, Proc. Acad. Nat. Sci. Phil., vol. 77, p. 146. Synonymy, distribution in North America.
- 1930 *Tachycines asynamorus* Karny, Ann. Naturh. Mus. Wien., vol. 44, pp. 174-176. Full discussion of synonymy, specific characters, distribution.

This widely distributed and aggressive adventive species, apparently of Chinese and Manchurian origin, has been recorded from greenhouses in a large number of European and North American localities. In addition to its many other distinctive characters, the presence of a third smaller spine midway between the two distoventral spurs of the cephalic tibiae is a feature which does not occur in any other native or adventive North American raphidophorid. Long referred to as *Diestrammena marmorata* by authors (not *Locusta marmorata* DeHaan 1843), and often recorded in Europe as *D. unicolor* (not of Brunner 1888), its true identity has only gradually become recognized in this country. The name *japanica*, proposed by Blatchley in 1920 to replace DeHaan's preoccupied *marmorata*, does not apply to the insect for which Blatchley used it but to the true *marmorata* DeHaan, which is a Japanese species not known to be adventive.

**Chicago:** Apr. 24, 1906, 4♂, 18♀, 11 juv.♂, 7 juv.♀; Oct. 4, 1911, 1♂, 2♀, NM; Dec. 28, 1907, 1♂, 4♀, 1 juv.♀, in Lincoln Park greenhouse, Zetek. **Urbana:** summer of 1906, 1♂ in greenhouse; Oct. 20, 1904, 1♂, 1♀, in university greenhouse; June 17, 1933, 2♂, Chouinard, in basement. **Decatur:** Oct. 1932, 1♀ in basement.

### **Hadenoecus** Scudder

**H. puteanus** Scudder.—There is a slight possibility that this species may reach southern Illinois, as it has been found to have a wide geographic range and to occur in a variety of environmental conditions. Its known limits extend from the Okefenokee swamp in southeastern Georgia north to central Pennsylvania and west to central Kentucky, Monticello in south-central Mississippi and the Cumberland plateau in Tennessee. Unrecorded series are in the collection of the Museum of Zoology of the University of Michigan from Allardt in Fentress county, Grassy Cove in Cumberland county, and Middle creek on the south slopes of Signal Mountain in Hamilton county, Tenn. Chopard (1931) has recently presented evidence to show that the genus *Hadenoecus* Scudder should be referred to the tribe Dolichopodini rather than to the Ceuthophilini.

### **Ceuthophilus** Scudder

Excellent taxonomic characters present in the male genitalia in this genus render identification of specimens of this sex relatively easy and certain; females possess no such distinctive characters and are often difficult to determine. Many of the species exhibit striking peculiarities of

form and coloration which are diagnostic, but others are so variable in these respects or so similar to one another that size, form and pattern are unreliable criteria. It is a matter of some difficulty to construct a brief key which will invariably distinguish even the species of a restricted area, and that which follows is intended for use only with Illinois material—additional species present in adjacent regions are not included.

The most important taxonomic characters of the male are found in the terminal abdominal tergites, the subgenital plate, the supra-anal plate (composed of a basal portion, the epiproct, and a smaller deflexed distal portion, the suranale), and particularly in the pseudosternite. The last is a sclerotized arch lying below the anus and paraprocts, and concealed by the upper margin of the subgenital plate. The inner rim of this arch, particularly its dorsal edge, is variously modified to form flanges, paired lobes or median processes, which are highly diagnostic of the species and often unique in form. The apex of the arch is a submembranous flap deflexed cephalad of the specializations of the dorsal rim; this portion is the cephalic lobe, usually simple but often characteristically modified. To observe the pseudosternite the subgenital plate must usually be pulled out far enough to expose the interior of the genital cavity; this should always be done in mounting fresh specimens, and in dried material can be accomplished by softening the tip of the abdomen with warm water or a drop of household ammonia, or by relaxing the entire specimen in the usual manner.

#### KEY TO SPECIES

1. Ventral keel of caudal metatarsus with a row of short stout setae extending at least halfway to apex. *Male*—dorsum of pseudosternite with a median, vertically compressed, caudally directed process; sides of subgenital plate convergent to narrowly rounded, briefly notched apex. *Female*—ovipositor not more than 5 mm. long; teeth and apices of dorsal valves elongate, aciculate. . . . . **elegans**, new species, p. 237  
 Ventral keel of caudal metatarsus not setose. Remaining features not as in alternative; ovipositor more than 5.5 mm. long except in *divergens*. . . . . 2
2. Caudal margin of ninth abdominal tergite of male strikingly upturned, recurvate. Dorsum of pseudosternite an erect, acute spinose process. Female subgenital plate tridentate at apex, the points acute. . . . . **seclusus**, p. 227  
 Caudal margin of ninth abdominal tergite of male not strikingly upturned. Pseudosternite either without median process or such process not spinose. Female subgenital plate with entire margin. . . . . 3
3. Males (abdomen without apical ovipositor). . . . . 4  
 Females (abdomen with apical ovipositor, fig. 160). . . . . 11
4. Dorsum of pseudosternite forming an erect median process with spatulate, subtruncate apex. Caudal margin of ninth abdominal tergite broadly angulate-emarginate. Caudal tibia usually distinctly sinuate proximad. . . . . **maculatus**, p. 226  
 Inner rim of pseudosternite arch thickened, flanged or biauriculate; dorsum not forming a median process. Caudal margin of ninth abdominal tergite



## CEUTHOPHILUS—KEY TO SPECIES—CONT'D

- not broadly emarginate except sometimes in *latens*. Caudal tibiae rarely distinctly sinuate proximad.....5
5. Cephalic lobe of pseudosternite bilobed. Inner rim of arch continuously laminate-flanged, or with paired auriculae bearing spinose, caudally directed processes.....6
- Cephalic lobe of pseudosternite with entire margin. Inner rim of arch thickened or auriculate, the auriculae if present not spinose.....8
6. Caudal tibial spurs conspicuously blackened at base. Pseudosternite with a pair of small dorsolateral auriculae giving rise to caudally directed spinose processes.....*latens*, p. 228
- Caudal tibial spurs not blackened at base, at most slightly infumate. Inner rim of pseudosternite continuously flanged with a thin recurvate lamina..7
7. Dorsal margin of pseudosternite flange evenly convex. Cephalic femur/pronotum ratio 1.5-2.1, average in this region 1.75. Coloration normally transversely banded.....*gracilipes*, p. 229
- Dorsal margin of pseudosternite flange roundly angulate mesad, deflexed at this point. Cephalic femur/pronotum ratio 1.2-1.6, average 1.4. Dorsum with a broad orange mediolongitudinal stripe.....*meridionalis*, p. 228
8. Ventrocephalic carina of caudal femur with 18-40, commonly 20-25 small subequal denticulations. Pseudosternite with conspicuous auriculae. Ventral margin of lateral lobe of pronotum brown bordered, this sometimes dilute.....9
- Ventrocephalic carina of caudal femur with two to 15, commonly eight to 10 denticulations and spines; those in middle of series the largest, length often equaling depth of caudal tibia. Inner rim of pseudosternite thickened or weakly auriculate. Ventral portion of lateral lobe of pronotum pale..10
9. Auriculae of pseudosternite laminate, curved, separated by a space as broad as one of them. Lobes of subgenital plate distinctly digitate at apex. Caudal tibia darkened above and on sides between spur bases; areas at base of spurs pale, concolorous with spurs.....*brevipes*, p. 229
- Auriculae of pseudosternite thickened, triquetrous with impressed dorsal surface, separated by a space not more than half as broad as one of them. Lobes of subgenital plate bluntly conical on either side of median sulcus. Caudal tibia uniform pale brownish.....*williamsoni*, new species, p. 230
10. Dorsal surface dull. Yellow- or red-brown, indistinctly maculate with darker brown, without median pale stripe. Caudal femur in this region 12-16 mm. long. Caudal tibia normally with two subdistal ventral spurs.....*uhleri*, p. 236
- Dorsal surface polished, at least on thorax. Reddish brown, more or less darkened on either side of narrow pale median stripe. Caudal femur in this region 8-12 mm. long. Caudal tibia commonly with a single subdistal ventral spur.....*divergens*, p. 237
11. Ventrocephalic carina of caudal femur with 18-40, commonly 20-25 denticulations. Ventrolateral margins of pronotum broadly bordered with brownish, this sometimes dilute but continuous across ventrocephalic angle.....12
- Ventrocephalic carina of caudal femur with none to 15, commonly less than 12 denticulations. Ventral portions of lateral lobes of pronotum pale, or if a dark marginal band is present it is interrupted by the distinctly pale ventrocephalic angle.....13

## CEUTHOPHILUS—KEY TO SPECIES—CONCL'D

12. Dorsal surface distinctly polished. Coloration dark. Ovipositor in this region 6.6-7.5 mm. long. Caudal tibia darkened between spur bases.....  
.....**brevipes**, p. 229  
Dorsal surface weakly polished. Coloration largely pale, distinctly transversely banded. Ovipositor 8.2-11.4 mm. long. Caudal tibia nearly uniform pale brown.....**williamsoni**, new species, p. 230
13. Caudal femur less than 12 mm. and ovipositor less than 6 mm. long. Ovipositor/pronotum ratio .8-1.4, average 1.2. Dorsocephalic angle of middle coxa acutely produced. Dorsum of thorax polished and with narrow pale median stripe. Caudal tibial spurs dorsally bicarinate, external face multisetose.....**divergens**, p. 237  
Caudal femur at least 12 mm. and ovipositor at least 6 mm. long. Ovipositor/pronotum ratio 1.5-2.3. Dorsocephalic angle of middle coxa obtuse to slightly acute, scarcely produced. With or without pale median stripe. Caudal tibial spurs commonly unicarinate dorsad and/or external face sparsely setose; if bicarinate and multisetose dorsal surface of body dull. 14
14. Thorax and base of abdomen with a broad reddish to orange-yellow median stripe, continuous and with well defined margins, contrastingly bordered by deeply infuscated dorsolateral areas. Caudal femur suffused with brownish distad, with numerous indistinct pale rounded maculae in this portion.....15  
Dorsum without such a stripe, or if indicated it is a mere hairline or more or less interrupted and the dorsolateral dark areas but little contrasted and much broken by paler markings. Caudal femur with prominent scalari-form pattern; if distally suffused, without numerous rounded pale maculae.....16
15. Caudal tibial spurs distinctly blackened at base. Infuscated portions of dorsum intensely black, nearly solid. Ovipositor teeth appearing crowded toward apex, proximal interval not wider than rest.....**latens**, p. 228  
Caudal tibial spurs pale, or at most slightly infumate at base. Infuscated portions of dorsum brownish black, in places dilute, and enclosing numbers of small pale rounded maculae. Ovipositor teeth not appearing crowded, proximal interval almost always distinctly wider than rest.....  
.....**meridionalis**, p. 228
16. Dorsal surface dull to very weakly polished. Red- or yellowish brown indistinctly mottled with darker brown. Caudal tibial spurs dorsally bicarinate. Pronotum in lateral aspect strongly narrowed ventrad....**uhleri**, p. 236  
Dorsal surface polished, with contrasted pattern, distinctly banded or maculate or both. Caudal tibial spurs normally unicarinate, but outer carina sometimes weakly indicated. Pronotum in lateral aspect subquadrate, weakly narrowed ventrad.....17
17. Caudal femur 12-15 mm. and ovipositor 6.8-9.5 mm. long. Cephalic femur/pronotum ratio 1.1-1.4, average in this region 1.2. Caudal tibia normally with a single subdistal ventral spur. Dorsum much maculate, often with interrupted pale median stripe or row of large maculae...**maculatus**, p. 226  
Caudal femur 17-23 mm. and ovipositor 11-15 mm. long. Cephalic femur/pronotum ratio 1.4-1.9, average in this region 1.6. Caudal tibia normally with two subdistal ventral spurs. Dorsum transversely banded, more or less maculate; pale median stripe seldom indicated in this region.....**gracilipes**, p. 229

**C. maculatus** (Harris).

- 1841 *Rhaphidophora maculata* Harris, Rept. Insects Mass., p. 126. Massachusetts.
- 1920 *Ceuthophilus maculatus* Blatchley, Orth. Northeast. Am., pp. 622-624, fig. 207; pl. VI, fig. b; pl. VII, figs. d, j. Statement of range in part incorrect; *latebricola* Scudder correctly and *bicolor* Scudder incorrectly synonymized.
- 1920 *Ceuthophilus maculatus* Morse, Orth. New Eng., pp. 379-380, fig. 60; pl. 14, figs. 24, 25.
- 1922 *Ceuthophilus maculatus* E. M. Walker, Ann. Ent. Soc. Am., vol. 15, p. 26; pl. III, fig. 27. ♂ genitalia described and figured.
- 1925 *Ceuthophilus maculatus* Hebard, Proc. Acad. Nat. Sci. Phil., vol. 77, pp. 140-141. Range correctly stated, except Kentucky, Missouri and Kansas (based on doubtful or erroneous records in literature); *seclusus* Scudder incorrectly synonymized.

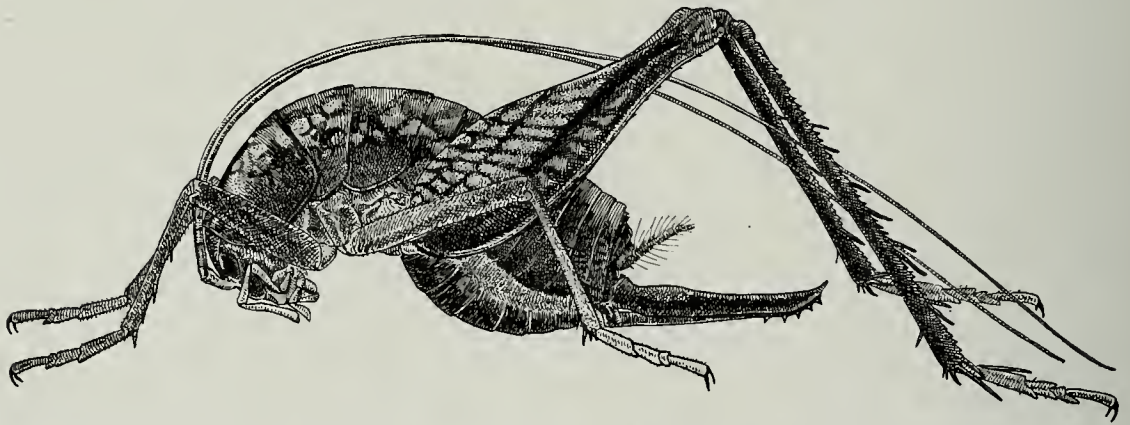


Fig. 160.—Adult female of the camel cricket *Ceuthophilus maculatus* (Harris).  $\times 2$ .

The range of this species is extensive, with limits which may be given as follows: Nova Scotia and New Brunswick westward north of Lake Superior to Lake Winnipeg, Man., thence south through Devil's Lake, N. D., Springfield, S. D. and West Point, Neb.; the species is not known from Kansas nor certainly from Missouri, but extends south along the Mississippi to West Helena, Ark.; east of the Mississippi its southern limits are reached in southern Illinois, Indiana and central Ohio, while farther east it is apparently common throughout New England and New York, but is represented in the collections examined from only four localities south of Long Island—Rockville and Chestnut Hill, Pa., "Maryland" and the District of Columbia. These records are based partly upon a specimen from the Kabina-Kagami river, Algoma District, Ont., in the Canadian National Collection; unrecorded series from Arkansas in the Museum of Zoology, University of Michigan; a female labeled "Maryland," collected by Uhler, one of the paratypes of *C. terrestris* Scudder in the Museum of Comparative Zoology; and three specimens from Washington, D. C., part of the type series of *C. latebricola* Scudder in the Museum of Comparative Zoology and the Hebard collection. The Pennsylvania records are based on a single female of doubtful identity from each locality, in the Hebard collection.



As an illustration of the extent of the confusion existing in the literature of the genus *Ceuthophilus*, and the consequent uncertainty attendant upon the use of published locality records, it may be noted that examination of the original material (or in a few cases, strong circumstantial evidence) shows that *Ceuthophilus maculatus* has at various times been recorded under the names *maculatus* and the synonymous *latebricola*, and as *blatchleyi*, *gracilipes*, *brevipes*, *lapidicola*, *seclusus*, *tenebrarum* and *terrestris*. *Machamala armata* Walker is probably a synonym, and *Ceuthophilus scriptus* Walker, described from an unknown locality, is possibly another. On the other hand, among the specimens which had been recorded as *C. maculatus* or *C. latebricola* were found the following species: *brevipes*, *tenebrarum*, *pallidipes*, *lapidicola*, *divergens*, *nigricans* and *nodulosus*, while the Colorado records of the species were probably based upon *uniformis*.

*Ceuthophilus maculatus* was correctly recorded from Moline by McNeill in 1891 and Scudder in 1894. Illinois records of *C. tenebrarum* (Scudder 1894), (Kirby 1906) and (Blatchley 1920), are based on a paratypic immature male from southern Illinois and on a paratypic male and female, both immature, the latter selected as allotype by Blatchley (1920) from Port Byron, Ill. Examination of these specimens, now in the Museum of Comparative Zoology and the Hebard collection, shows that they are referable either to *maculatus* or to the very closely allied *tenebrarum*; since *maculatus* is common over the whole of Illinois while *tenebrarum* appears to be restricted to a small area in southern Ohio and adjacent north-central Kentucky, it appears best to assign these specimens to the present species. According to notes received from Caudell the Port Byron specimens are a part of the series recorded by McNeill in 1891 as *Ceuthophilus latens*.

**Chicago:** 3 ♂, 1 ♀, Brues, *BC*; 4 ♂, 3 ♀, *MCZ*. **Glenview:** Sept. 22, 1918, 1 ♀, Liljeblad, *MMZ*. **Fox Lake:** Aug. 2, 1922, 1 ♂, 1 ♀, Frison. **Algonquin:** Sept. 15, 1905, 1 ♂, 1 ♀, Nason. **Sycamore:** Aug. 14, 1 ♂, Dawson, *OSU*. **Summit:** 1 ♂, Zetek. **Moline:** June 6, 1 ♂, McNeill, *MCZ*. **Newman:** May 30, 1921, 2 ♀, Vinkler. **Mascoutah:** July 17, 1906, 2 ♂, 2 ♀. **Dubois:** June 21, 1905, 1 ♂, 4 ♀; July 2, 1909, 1 ♀; Aug. 9, 1929, 6 ♂, 11 ♀, Hubbell, *MMZ*.

### **C. seclusus** Scudder.

- 1894 *Ceuthophilus seclusus* Scudder, Proc. Am. Acad. Arts and Sci., vol. 30, p. 45. ♂, ♀, Dallas and Crawford counties, Iowa; West Point, Neb., in error.
- 1920 *Ceuthophilus seclusus* Blatchley, Orth. Northeast. Am., p. 629, pl. VI, figs. m, o; pl. VII, figs. g, p.
- 1931 *Ceuthophilus seclusus* Hubbell in Hebard, Proc. Acad. Nat. Sci. Phil., vol. 83, p. 205. Synonymy, characters of ♀, statement of range.

This species undoubtedly occurs in Illinois, though it has not yet been taken in the state. It is one of the most abundant species of the

Ozark plateaus and is widely distributed in the prairie regions, where it occurs in open woodland and in stream-margin forests. Vigo county, Ind. is the easternmost record.

**C. latens** Scudder.

- 1862 *Ceuthophilus latens* Scudder, Bost. Journ. Nat. Hist., vol. 7, p. 437. ♀, Illinois.  
 1920 *Ceuthophilus latens* Blatchley, Orth. Northeast. Am., p. 630, pl. VI, figs. g, l; pl. VII, figs. f, q. In part, records from Texas and eastern Nebraska probably, and that from Cheboygan county, Mich. certainly, erroneous.

This well known and easily recognizable species ranges from southern New England south on the coastal plain and piedmont to Maryland and Virginia; westward its northern limits are found in central New York, extreme southern Ontario, southern Michigan and southeastern Minnesota; this last is based on two males from Hennepin county, Minn., July 17, 1927, in the Hebard collection and that of the University of Minnesota. Limital records on the west are Cedar Rapids and Iowa City in Iowa, excluding Bruner's questionable record from eastern Nebraska, cited by Blatchley (1920). The species occurs throughout Illinois, Indiana and Ohio, and probably most of Pennsylvania and Kentucky; it reaches its known southern limits at Clarksville and on the Cumberland plateau in northern Tennessee, these last records being based on unrecorded series in the University of Michigan Museum of Zoology.

*Ceuthophilus latens* was described from Illinois by Scudder in 1862, and it has since been recorded from the state by McNeill (1891), Scudder (1894) and Blatchley (1920).

**Chicago:** Aug., 2 ♂, MMZ. **Savanna:** July 21 to Aug. 1, 1892, 1 ♂, 1 ♀.  
**Willow Springs:** July 14 to Aug. 24, 1910 to 1914, 3 ♂, 3 ♀, FM. **Palos Park:** July 24, 1904, 1 ♂, Wolcott; Sept. 3 to 11, 1910 and 1911, 2 ♂, 2 ♀, FM.  
**Danville:** July 7, 1906, 3 ♂, 1 ♀. **Muncie:** June 13, 1905, 1 ♂. **Urbana:** June 10, 1891, 1 juv. ♂, 2 juv. ♀, Martin; July 6, 1901, 1 ♀, NM; July 22, 1926, 2 ♂, 6 ♀, Frison; Sept. 18, 1933, 1 ♂, Ross. **Mahomet:** Aug. 26, 1898, 1 ♂, Woodworth. **White Heath:** May 14, 1909, 1 juv. ♂. **Martinsville:** Aug. 8, 1929, 4 ♀, Hubbell, MMZ. **Parker:** June 12, 1907, 1 ♀.

**C. meridionalis** Scudder.

- 1894 *Ceuthophilus meridionalis* Scudder, Proc. Am. Acad. Arts and Sci., vol. 30, p. 66. ♂, "Chihuahua, Mexico," in error.

This species is the northern representative of *Ceuthophilus gracilipes* (Haldeman), from which it differs in its lesser size, greater robustness, characteristic armature of the caudal femora (fewer, heavier and less regular spines than in *gracilipes*), shorter and stouter legs, and in details of the concealed male genitalia. In coloration the two show average differences of considerable amount, *meridionalis* having typically a broad, plainly contrasted mediolongitudinal stripe of orange-yellow, and being otherwise much more intensively pigmented than typical

*gracilipes*. Locally *gracilipes* may approach *meridionalis* rather closely in coloration, but not, so far as observed, in the regions where the two might occur together.

*Ceuthophilus meridionalis* is a common species in the southern peninsula of Michigan, in southern Ontario and in northern and central Ohio and Indiana, replacing *gracilipes* in those regions. It should occur in northeastern Illinois, and probably does so. The statements about the habitat of *Ceuthophilus* species on page 236 of Shelford (1913) and the photograph (fig. 216) almost certainly apply to this species.

### **C. gracilipes** (Haldeman).

- 1850 *Phalangopsis gracilipes* Haldeman, Proc. Am. Ass. Adv. Sci., vol. 2, p. 346. ♂, central Pennsylvania.
- 1920 *Ceuthophilus gracilipes* Blatchley, Orth. Northeast. Am., p. 630, fig. 209; pl. VI, fig. f; pl. VII, figs. a, b, r. In part, records from Michigan, central Ontario, Manitoba, Minnesota, Colorado and Chihuahua, Mex. erroneous, partly based on *meridionalis*.

This is the largest species of the genus, except *C. stygius* (Scudder). Its range, as determined by studies in progress, extends from Massachusetts and central New York, central Ohio and Indiana and southern Illinois, south to Liberty and Jackson counties in Florida, central Alabama and Vicksburg, Miss. It probably occurs throughout the piedmont, but only reaches the coastal plain from Virginia north to Long Island, and in the gulf states. The western limits are still in doubt; it occurs at West Helena, Ark., and immature specimens from Cliff Dweller's cave near Noel, Mo. are doubtfully referred to *gracilipes* by Hebard; a female in the Hebard collection is labeled Fairbury, Neb., but this record requires verification. Unrecorded series from Florida, Alabama and Arkansas are in the Museum of Zoology, University of Michigan.

*Ceuthophilus gracilipes* probably occurs only in the southernmost part of Illinois. It has been recorded from "Illinois" or from "southern Illinois" by Scudder (1862), Brunner (1888), McNeill (1891) and Scudder (1894); in the last "northern Illinois" is also given, doubtless in error.

**Illinois:** 1♀, Webster, HC. **Southern Illinois:** 1♂, Uhler, MCZ. **Herod:** Oct. 12, 1933, 2 juv. ♂, 1 juv. ♀, Frison and Ross. **Cypress Creek:** July 19, 1877, 1♂.

### **C. brevipes** Scudder.

- 1862 *Ceuthophilus brevipes* Scudder, Bost. Journ. Nat. Hist., vol. 7, p. 434. ♂, ♀ (juv.), Grand Manan Island, N. B.
- 1894 *Ceuthophilus terrestris* Scudder, Proc. Am. Acad. Arts and Sci., vol. 30, pp. 46-47. In part, Moosehead Lake, Norway, Bethel and Gorham, Me.; Anticosti Island; Cambridge, Lowell and Nahant, Mass.



- 1905 *Ceuthophilus terrestris* Walker, Can. Ent., vol. 37, pp. 113-119, pl. V, fig. 4. Synonymy and comparison with other species.
- 1918 *Ceuthophilus terrestris* Piers, Trans. Nova Scotia Inst. Sci., vol. 14, pp. 327-328, pl. IV, fig. 25.
- 1920 *Ceuthophilus terrestris* Blatchley, Orth. Northeast. Am., p. 636, pl. VI, fig. h. In part, Newfoundland, Nova Scotia, New England, Michigan, Catskill mountains and Ithaca, N. Y.
- 1920 *Ceuthophilus terrestris* Morse, Orth. New Eng., pp. 375, 380, pl. 14, figs. 26, 27.
- 1929 *Ceuthophilus brevipes* Hubbell, Fla. Ent., vol. 13, p. 20. Types immature; *terrestris* Scudder (1894) a synonym. Male selected as single type by Rehn and Hebard in 1912, not found in Museum of Comparative Zoology in 1928.

Although no Illinois specimens of this easily recognizable species have been seen, it undoubtedly occurs at least in the northeastern parts of the state, as it is found throughout eastern Wisconsin and is known from numerous localities in Indiana. Unrecorded material from Dane and Oneida counties, Wis. is in the collections of W. S. Marshall, Morgan Hebard and the Field Museum of Natural History, and unrecorded series from various localities in Indiana are in the University of Michigan Museum of Zoology, the southernmost locality being Clifty state park on the Ohio river. The southernmost record in this part of the range is Horse cave, Ky. Shelford's (1913) record of *Ceuthophilus* species from the margin of tamarack forest in the Chicago region is very likely referable to *C. brevipes*, as that is one of the most characteristic habitats of the species in southern Michigan.

**C. williamsoni** Hubbell. NEW SPECIES.<sup>10</sup>—This species is closely allied to *C. brevipes* Scudder, from which it has probably been derived. It differs from that species in its larger average size, less polished surface, paler and more conspicuously banded coloration, and particularly in proportions and in details of the male genitalia. The legs average more slender and elongate than in *brevipes* from Michigan, Ohio and Indiana, in this respect resembling more closely the proportions of the Maryland and Virginia phase of that species. The most marked differences between the two are found in the pseudosternite of the male, that of *williamsoni* being uniquely specialized and sufficing in itself for recognition of the species. The female of *williamsoni* is less easily distinguished from that of *brevipes*, but the principal difference is a longer, more slender ovipositor.

In the following descriptions the figures in parentheses show range of variation as observed in the paratype series; spur and spine counts for holotype and allotype give the number for the right leg first. Color names refer to Ridgway (1912).

<sup>10</sup> Named in remembrance of Edward Bruce Williamson, in admiration of his attainments as a naturalist and in sorrow for his loss.

## HOLOTYPE—MALE

GENERAL.—Onondaga cave, Crawford county, Mo.: Sept. 15, 1930, Hubbell, *MMZ*. Length of body 16 mm. Dorsum weakly polished, with satiny sheen, minutely and sparsely setose, especially on abdomen.

HEAD.—Fastigium a low rounded eminence with bluntly conical apex, in lateral aspect less prominent than expanded mesal margins of antennal fossae. Length of eye 1.2 mm., ratio length/breadth 1.3 (to 1.5). Interocular space 1.4 (to 1.2) times as long as eye. Antenna 4.1 (to 4.9) times as long as caudal femur. Distal segment of maxillary palpus 1.9 (1.8-2.1) times as long as interocular space.

THORAX.—Surface smooth, foveolae shallowly impressed. Pronotum broad, in lateral aspect subquadrate, longer than apparent height; sides weakly convergent ventrad, ventrocephalic angle more broadly rounded than ventrocaudal, ventral margin evenly convex. Caudal margin of mesonotum slightly convex dorsad, of metanotum truncate.

LEGS.—Minutely setose. Cephalic femur 1.73 (1.55-1.8) times length of pronotum; ventrocephalic carina with 1, 1 (1-3) subdistal spurs .6 (.3-.7) times as long as breadth of femur at point of insertion. Cephalic metatarsus as long as proximal breadth of clypeus. Middle femur with 0, 2 (0-4) spurs on ventrocephalic carina; caudal face with short genicular spur and 2, 3 (0-4) small to minute spurs on ventral carina. Dorsal spurs of middle tibia shorter than depth of tibia. Caudal femur slender, proximal portion moderately enlarged, sides tapering gradually to distal fifth, thence subparallel; length 4.1 (3.9-4.3) times greatest breadth, 3.31 (3.15-3.52) times length of pronotum, 1.92 (1.85-2.06) times that of cephalic femur; ventrocephalic carina nearly straight, narrowly and uniformly explanate, armed with 25, 24 (21-40) small subequal denticulations irregularly spaced, the largest slightly larger than those of caudal tibia; ventrocaudal carina with 32, 36 (20-45) denticulations; caudal genicular lobe minutely denticulate (in half the specimens of each sex); surface denticles on upper half of subdistal two-fifths of femur about 45 (0-55, mode 15); dark parts of scalariform pattern closely and minutely setose. Caudal tibia straight, just appreciably sinuate proximad, slender; 1.21 (1.12-1.23) times length of caudal femur; dorsal spurs slender, of moderate length, apex gently curved, acuminate, outer face sparsely setose, dorsal surface bicarinate; subdistal spur of cephalic carina 1.9 (1.7-2.) times as long as depth of tibia; intervals between spurs averaging more than twice spur length; spine

formula of cephalic carina 11/8/7/6/7, 7/7/7/5/5; calcars short, the dorsocephalic .7 (.5-.75) times and dorsocaudal .8 (.7-.85) times dorsal length of caudal metatarsus; subdistal ventral spurs 2, 2 (1, 2; 1, 1). Caudal tarsus slender, .41 (to .44) times length of caudal tibia; dorsal length of metatarsus 3.2 mm., 2.7 (2.4-2.9) times length of eye; second segment 1.3 mm., 2.2 (2.-2.3) times as long as broad; fourth segment 1.7 mm., 1.75 (1.7-2.) times length of eye; claws .43 (.4-.45) times as long as fourth segment.

TERMINAL ABDOMINAL STRUCTURES.—Seventh and eighth tergites weakly tectate dorsad. Caudal margin of seventh tergite truncate, of eighth broadly arcuate. Mesal portion of caudal margin of ninth tergite subquadrately produced; apex truncate-emarginate, projecting beyond eighth a distance slightly less than exposed breadth of the latter; dorsolateral portions of ninth tergite largely hidden by eighth. Epiproct weakly sclerotized, broad, depressed mesad, joined without obvious demarcation to broadly triangular suranale, the two together pentagonal in outline. Paraprocts largely membranous, unspecialized. Cerci slender, unusually elongate, 1.27 (1.18-1.3) times length of pronotum. Pseudosternite distinctive; dorsolateral auriculae in caudal aspect triangular with bluntly pointed admesal apices, subvertical mesal faces, and gradually declivent, nearly straight outer margins; each lobe strongly triquetrous with concavoplanate caudal and mesal faces and narrowly triangular, transverse, deeply excavate dorsal surface; auriculae separated by a deep narrow trough with overhanging walls, its floor concave and projecting beyond caudal faces of lobes so as to overhang concavity of pseudosternite arch; cephalic lobe paraboloid, narrower and more elongate than that of *brevipes*. Subgenital plate small, shallow; in caudal aspect suboval; distal portion with a pair of swollen arcuate-divaricate ridges more heavily sclerotized than rest of plate, widening distad and terminating as distolateral angles of plate, together outlining a rounded V shaped distomesal area with depressed submembranous floor, divided by median sulcus, the latter evanescent proximad of junction of ridges; distal margin subtruncate; margins adjacent to median sulcus weakly produced as bluntly triangular but scarcely digitate projections; proximolateral plates separated by distinct sulcus, their narrowly rounded apices separated by membranous areas from proximal portion of free margin. Penial setae differing strongly from those of *brevipes*, which are strongly curved, broad bladed falcate structures with distinctly fluted shafts; in *williamsoni* the most specialized are short shafted, the shafts with lateral



flanges but rarely fluted, the distal blade abruptly bent, commonly at about right angles to the shaft, narrowly pointed; a large proportion of the rest of the penial setae stout and flask shaped at the base, abruptly tapering distad into elongate, straight or sinuate flagelliform apices.

ALLOTYPE—FEMALE

GENERAL.—Onondaga cave, Crawford county, Mo.: Sept. 15, 1930, Hubbell, *MMZ*. Length of body exclusive of ovipositor 17.3 mm.

LEGS.—Cephalic femur 1.53 (1.47-1.64) times as long as pronotum; ventrocephalic carina with 2, 1 (1-3) spurs. Middle femur with 2, 2 (1-4) spurs on ventrocephalic carina; caudal

CEUTHOPHILUS WILLIAMSONI—MEASUREMENTS IN MILLIMETERS

	Length of pro- notum	Length of cephalic femur	Length of caudal femur	Breadth of caudal femur	Length of caudal tibia	Length of ovi- positor
MALE						
Onondaga cave, Mo.*.....	4.8	8.3	15.9	3.9	19.3	....
Onondaga cave, Mo.....	4.6	7.3	14.4	3.7	16.9	....
Onondaga cave, Mo.....	4.7	8.	16.5	4.	19.3	....
Short Bend cave, Mo.....	3.8	6.4	12.6	3.1	14.5	....
Short Bend cave, Mo.....	4.2	7.5	13.9	3.5	16.7	....
Lesterville cave, Mo.....	3.8	6.7	12.9	3.1	15.7	....
Dubois, Ill.....	4.4	7.9	15.5	3.5	18.4	....
FEMALE						
Onondaga cave, Mo.**...	4.7	7.2	14.8	3.8	17.5	9.9
Onondaga cave, Mo.....	4.4	6.7	13.4	3.6	15.3	9.1
Onondaga cave, Mo.....	5.4	8.4	16.5	4.3	19.3	11.1
Short Bend cave, Mo.....	4.5	7.3	14.	3.6	16.3	9.4
Short Bend cave, Mo.....	5.	8.	16.1	4.	19.	10.1
Lesterville cave, Mo.....	3.9	6.2	12.7	3.2	14.9	8.2
Little Rock, Iowa.....	5.6	....	....	....	....	10.4

\*Holotype. \*\*Allotype. Antennae of both are 65 mm. long.

face with genicular spur and 3, 3 (0-5) spurs on ventral carina. Caudal femur/pronotum ratio 3.15 (2.93-3.26); caudal femur/cephalic femur ratio 2.06 (to 1.92); caudal femur length/breadth ratio 3.9 (3.54-4.15). Caudal femur with 22, 23 (20-39) small denticulations on ventrocephalic carina; ventrocaudal carina with 21, 23 (15-44) similar denticulations; dorsal surface with 9, 5 (0-21) denticles. Caudal tibia straight, 1.18 (1.1-1.22) times as long as femur; spine formula of cephalic carina 9/11/6/7/4, 10/8/7/6/4. Caudal tarsus as in male except that the second segment is 2.5 times as long as broad.

TERMINAL ABDOMINAL STRUCTURES.—Cerci slender, elongate, 1.17 (1.1-1.21) times as long as pronotum. Subgenital plate

simple. Ovipositor 2.1 (1.79-2.16) times as long as pronotum; almost straight, slender and gradually tapering from base; apices of dorsal valves slightly upturned, acuminate but not prolonged; ventral valves armed in distal .22 (.18-.25) with five acute, narrowly triangular teeth (including decurved distal hook), the interval between the proximal pair distinctly greater than remaining intervals.

#### GENERAL NOTES ON THE SPECIES

COLORATION.—Dorsum generally ochraceous buff to cinnamon brown, transversely fasciate with darker brown; caudal portions of abdomen often suffused with brownish. Antennae buckthorn brown to clay color, darker at base. Head warm buff to cinnamon buff ventrad; vertex antimony yellow to clay color, with four slender ramose lines breaking up into a network of fine brownish lines. Eyes dark. Disk of pronotum largely cinnamon buff to clay color, more or less variegated with brownish; bordered cephalad and caudad with broad bands of bister, ventral margins bordered with dilute warm sepia to dilute bister; cephalic marginal bands sending back on each side of the meson a stripe of bister which nearly attains apices of triangular admesal expansions of caudal marginal band, the mesal margins of these stripes often dilute, sometimes intensive and nearly obliterating median pale hairline. Meso- and metanotum bordered caudad and ventrad with broad marginal band of bister, mummy brown or blackish sepia about half as wide as exposed breadth of tergites, often dilute along ventral margin; rest of surface, including a few small maculae enclosed in marginal bands, cinnamon buff to clay color. Caudal margins of abdominal tergites broadly bordered by blackish bister to blackish sepia, the dark areas more or less broken by many small pale maculae, or nearly solid; even the ventral margins of the tergites dilute brownish. Cerci cinnamon buff to sayal brown. Venter, proximal and internal surfaces of cephalic and middle femora, distal portions of all tibiae and all tarsi light ochraceous buff to cinnamon buff; genicular portions of cephalic and middle legs lightly suffused with brownish. Caudal femur cinnamon buff to clay color proximad, scalariform pattern distinct in this portion. Dresden brown to sayal brown, distad becoming lost in a general suffusion of that shade. Genicular lobes and base of caudal tibia slightly darkened; caudal tibia nearly unicolorous light ochraceous buff, cinnamon buff or clay color; spurs and spur bases not notably lighter, as is normal in *brevipes*.

VARIATION.—The species appears to be relatively constant

in its more important characters. Spine formula of cephalic carina of caudal femur, as determined from 62 adult legs and 76 legs of last three nymphal instars: range 7-15/5-11/4-10/3-8/1-7, mode 11/7/7/6/5. In 39 adults and 43 late instar nymphs the subdistal ventral spurs of the caudal tibiae vary as follows: 1, 1, 22%; 1, 2, 43%; 2, 2, 34%; 2, 3, 1%. In *Ceuthophilus* the middle tibiae normally possess 2 spurs upon each dorsal carina; nine of the 39 adult specimens of *williamsoni* deviate from this condition by the loss or addition of a single spur upon one or several of these margins. This is an unusually high degree of variability in this feature, a characteristic of the species which is also found in *brevipes*. No tendency toward increase in number of ovipositor teeth such as is found in *brevipes* is indicated in the series studied.

LIFE HISTORY.—The species apparently matures over an extended period, for although an adult male was taken at Dubois, June 3, the series obtained at Krapf cave, Mo. by Williamson on August 18 contained no adults, and the species was apparently just reaching maturity at Onondaga cave on September 6, 7. At the latter locality adults had become numerous by September 15. The Krapf cave material was studied in detail; it apparently represents six preadult instars, the largest specimens being in the penultimate stadium. Nymphs of *williamsoni* may be distinguished from those of most of the other species occurring within its range by the slender legs and multidenticulate carinae of the caudal femur; in general appearance they resemble those of *gracilipes*, but seldom show any trace of the pale pregenicular annulus usually present on the caudal femur in the latter species.

HABITAT.—The greater part of the series here recorded was obtained in and about the mouths of limestone caves in the Ozark uplands. At Onondaga cave the species occurred in rock piles and about stone walls on the openly wooded slopes above the cave mouth; it was common in the entrance chamber of the cave where the nymphs were for the most part on the floor and walls, the adults on the ceiling; and attendants stated that occasional specimens had been seen several hundred yards within the cave. Williamson found it abundant in the entrance of Krapf cave and specimens were collected in other Missouri caves by Creaser and Clanton. Two small nymphs dubiously referred to *williamsoni* were obtained by Garman in a cave on the Ohio river in southern Illinois. The situations in which the Iowa specimens and the male from Dubois, Ill. were taken are not known.

*C. williamsoni* is not an obligatory cavernicole, but is probably



a rock loving species inhabiting open forests and taking refuge in caves and similar shelters wherever they are available, as does *brevipes* in Indiana and Kentucky. In Onondaga, Short Bend and Krapf caves it appeared to be the only species present, but in Lesterville cave it was outnumbered by *C. gracilipes*. A trip made to Dubois, Ill. in hope of obtaining additional material resulted in the capture of *maculatus*, *uhleri* and great numbers of *divergens* in molasses traps set in oak-hickory upland woods, but *williamsoni* was not encountered.

**DISTRIBUTION.**—The Ozark plateau appears to be the center of distribution of this species, from which region it extends northward in the prairie-plains to Little Rock and McGregor, Iowa, and crosses the Mississippi into southernmost Illinois. Its range borders that of *brevipes* on the west, but the two species are not known to come into contact.

One hundred sixty-six specimens were examined, 17 ♂, 25 ♀ (holotype, allotype and paratypes) and 124 immatures, as follows:

**ILLINOIS.**—**Dubois:** June 3, 1919, 1 ♂. **Cave** on Ohio river: July 27, 1883, 2 juv. ♂, approximately third instar, Garman, determined with doubt.

**IOWA.**—**Little Rock,** Lyon county: 1 ♀, determined by Scudder in 1896 as *seclusus*, *ISC*. **McGregor,** Clayton county: July 13, 1904, 1 juv. ♂ in last instar, Wolcott.

**MISSOURI.**—**Cave** 1.5 miles northeast of Lesterville, on west bank of east fork of Black river, Reynolds county: Oct. 17, 1933, 1 ♂, 1 ♀, on roof of pocket at side of large room 100 ft. from entrance, Clanton, *MMZ*. **Cave** 2.5 miles southeast of Windyville, Dallas county: Aug. 20, 1930, 1 large juv. ♂, Creaser, *MMZ*. **Krapf cave,** near Waynesville, Pulaski county: Aug. 18, 1929, 52 juv. in all instars, Williamson, *MMZ*. **Onondaga cave,** 5 miles south of Leasburg, Crawford county: Sept. 6-15, 1930, 12 ♂, 19 ♀, 16 large juv. ♂, 15 large juv. ♀, 34 small juv. ♂♀, Hubbell, *MMZ*. **Rocheport,** Boone county: July 4, 1 juv. ♂, 2 juv. ♀ in fourth or fifth instar, Wolcott, *ANS*. **Short Bend cave,** bank of Meramec river, 1 mile northeast of Short Bend, Dent county: Oct. 14, 1933, 3 ♂, 4 ♀, Clanton, *MMZ*.

### **C. uhleri** Scudder.

- 1862 *Ceuthophilus uhleri* Scudder, Bost. Journ. Nat. Hist., vol. 7, p. 435. ♂, ♀, Maryland.  
 1920 *Ceuthophilus uhleri* Blatchley, Orth. Northeast. Am., p. 627, fig. 208; pl. VI, fig. c; pl. VII, fig. o.  
 1931 *Ceuthophilus uhleri* Hubbell in Hebard, Proc. Acad. Nat. Sci. Phil., vol. 83, p. 206. Synonymy, statement of range.

Although not previously recorded from Illinois, *Ceuthophilus uhleri* is apparently one of the commoner species in the forests of the southern two-thirds of the state. The species is evidently limited west-

ward by the treeless plains, but pushes far out into the prairie region along the stream-margin forests of Iowa and Kansas.

**R. I. C. (Rock Island county):** 1 juv. ♂, 1 juv. ♀, McNeill, *MCZ*. **Martinsville:** Aug. 8, 1929, 62 juv., Hubbell, *MMZ*. **Dubois:** Aug. 9, 1929, 106 juv., Hubbell, *MMZ*.

***C. divergens* Scudder.**

- 1862 *Ceuthophilus divergens* Scudder, Bost. Journ. Nat. Hist., vol. 7, p. 436. ♂, ♀, Nebraska.
- 1920 *Ceuthophilus caecus* Blatchley, Orth. Northeast. Am., p. 637; pl. VI, fig. i; pl. VII, figs. h, s. In part.
- 1931 *Ceuthophilus divergens* Hubbell in Hebard, Proc. Acad. Nat. Sci. Phil., vol. 83, pp. 205-206. Synonymy, statement of range.

Judging by the number of times it has been collected this species appears to be the commonest member of the genus in Illinois. There are no published records of its occurrence in this state, but there is reason to believe that the references to *Ceuthophilus* species by Hart (1907), Vestal (1913) and Adams (1915) are more than likely to have been based upon specimens of *divergens*.

**Savanna:** July 22, 1892, 1 ♂, Hart and Forbes. **Palos Park:** June 20, 1933, 1 ♂, 1 ♀, Ross and Mohr. **R. I. C. (Rock Island county):** June 15, 1 juv. ♂, McNeill, *MCZ*. **Havana:** May 2, 1912, 1 ♂ in flood drift in Spoon river; Aug. 14, 1907, 2 ♂ on river shore. **Muncie:** June 14, 1907, 2 ♀. **Homer:** June 21, 1907, 1 juv. ♂ in park. **Urbana:** June 9, 1889, 1 juv. ♂; Aug. 12, 1885, 1 ♀. **Mahomet:** June 30, 1912, 1 ♀ on shore of Sangamon river. **Martinsville:** Aug. 8, 1929, 24 ♂, 44 ♀, Hubbell, *MMZ*. **Grafton:** Aug. 26, 1905, 1 ♂. **Dubois:** June 21, 1905, 3 ♂, 4 ♀, 1 juv. ♀; Aug. 9, 1929, 234 ♂, 285 ♀, Hubbell, *MMZ*. **Chester:** July 30, 1905, 1 ♂, 1 ♀. **Parker:** June 12, 1907, 1 juv. ♀.

***C. elegans* Hubbell. NEW SPECIES.**—This is a small compact species with a robust fusiform body, yellowish brown and usually with exposed margins of tergites infuscated to form a strongly contrasted dorsal pattern, and short stout legs.

It is practically indistinguishable from dark colored eastern material of the great plains species *C. fusiformis* Scudder, except by means of the uniquely specialized pseudosternite of the male. No character has been found to separate females of the two species. *C. elegans* cannot be confused with any other species east of the Mississippi except *occultus*; but the latter is smaller and paler, its known range lies east of Illinois, and the male has a strikingly bicristate pseudosternite arch instead of a median process. *C. silvestris* Bruner, occurring from Minnesota to Kansas and Arkansas, is very similar to *elegans*, but like *occultus* has a bicristate pseudosternite and is normally paler.

**HOLOTYPE—MALE**

**GENERAL.**—Madison, Dane county, Wis.: May 1915, Mar-

shall, *MMZ*. Length of body 10.3 mm. Dorsum polished, subglabrous.

HEAD.—Fastigium with broadly conical apex, in lateral aspect slightly more prominent than expanded mesal margins of antennal fossae; dorsal surface depressed, strongly declivent. Eyes small, not prominent, broadly subpyriform, length .8 mm., ratio length/breadth 1.1 (to 1.25). Interocular space 1.56 (to 1.4) times as long as eye. Antennae short, approximately 3.1 times as long as the short caudal femur. Distal segment of maxillary palpus 1.4 (to 1.1) times as long as interocular space.

THORAX.—Surface smooth, foveolae scarcely impressed. Pronotum broad, in lateral aspect three-fourths as high as length of dorsum; sides moderately convergent ventrad, ventrocephalic angle more broadly rounded than ventrocaudal, ventral margin evenly convex. Caudal margin of mesonotum slightly convex dorsad, of metanotum truncate.

LEGS.—Minutely setose. Cephalic femur 1.09 (to 1.19) times length of pronotum; slightly stouter than middle femur; ventrocephalic carina with 1, 1 (1-3) subdistal spurs .25 (.1-.3) times as long as breadth of femur at point of insertion. Cephalic metatarsus .5 (to .7) times as long as proximal breadth of clypeus. Middle femur with 2, 3 (2-5) spurs on ventrocephalic carina; caudal face with a very short genicular spur and 2, 3 (1-5) small spurs on ventral carina. Dorsal spurs of middle tibia about a third as long as depth of tibia. Caudal femur short, stout, grylloid; base moderately enlarged and sides tapering to base of genicular lobes with scarcely an indication of the usual pregenicular constriction; length 2.76 (2.5-3.1) times greatest breadth, 2.24 (to 2.52) times length of pronotum, 2.04 (2.-2.17) times that of cephalic femur; ventrocephalic carina narrowly and uniformly explanate, armed with 34, 31 (18-48) small subequal denticulations; ventrocaudal carina with 33, 33 (18-54) similar denticulations; caudal genicular lobe minutely denticulate (cephalic lobes less conspicuously so in about two-thirds of the specimens); dorsal surface with 5, 8 (0-12) small denticles. Caudal tibia straight; 1.05 (1.-1.12) times as long as caudal femur; dorsal spurs rather short, moderately slender, gently curved, apex minutely hooked, outer face sparsely setose, dorsal surface bicarinate (outer carina sometimes faint or abbreviate); length of subdistal spur of cephalic carina 1.4 (to 1.8) times depth of tibia; spine formula of cephalic carina 8/5/5/6/5, 7/4/5/5/5; calcars short, the dorsocephalic .93 (.8-1.) times and dorsocaudal 1. (.94-1.15) times dorsal length



of caudal metatarsus; subdistal ventral spurs 1, 1 (rarely 0, 1; 0, 0). Caudal tarsus short, stout; .43 (.39-.45) times length of caudal tibia; dorsal length of metatarsus 1.75 (1.67-1.83) times as long as eye; second segment 1.6 (1.5-1.8) times as long as its depth; claws .43 (to .5) times as long as fourth segment; ventral carina of metatarsus with a row of short stout setae extending at least halfway to apex.

TERMINAL ABDOMINAL STRUCTURES.—Caudal margins of first six abdominal tergites truncate, of seventh weakly rounded-angulate dorsad. Dorsal portion of eighth strongly produced, projecting portion overhanging genital cavity and concealing dorsal portion of ninth tergite; sides of projection arcuate-convergent to apical truncation about three-fifths as broad as interocular space, margin of truncation thickened and membranous, shallowly emarginate in dried material. Caudal margin of eighth tergite oblique in lateral aspect, broadly concave, extending in an almost regular curve to the lateral angles of apical truncation (roundly angulate in *occultus* and *silvestris*). Ninth tergite shaped like eighth but smaller; dorsal truncation membranous at edge, underlying same portion of eighth. Truncations of eighth and ninth tergites strongly convex upward in caudal aspect. Epiproct largely membranous, its distal portion in dried material usually compressed between dorsal edges of paraprocts, with sides slightly elevated, straight and convergent to the narrowly rounded, acute-angulate apex; in dried material surface usually impressed or sulcate. Suranale broadly triangular, abruptly deflexed. Pseudosternite a flattened arch, in caudal aspect subtriangular; concavity of arch small, occupied with membrane; broad ventrolateral arms with sides nearly straight and convergent dorsad, continuing without interruption as margins of short paraboloid cephalic lobe; dorsum of arch uniquely specialized, furnished with a caudally directed, vertically compressed median process laminate at apex, appearing acuminate in dorsal aspect and distally rounded in lateral aspect, its surfaces and margins minutely asperate. Subgenital plate small, weakly sclerotized; in caudal aspect subtriangular and more or less tectate; broadest proximad, sides thence nearly straight and convergent to narrowly rounded admesal apices which are separated by a narrow mesal cleft or emargination extending but a short distance into the plate; in lateral aspect subtriangular with narrowly rounded apex, straight dorsal margin and angulately convex ventral outline; proximolateral plates triangular, set off by distinct sulci. Penial setae reduced in number, small; the most specialized short, about twice as broad in caudal as in

lateral aspect because of flaring lateral expansions with broadly arcuate margins, their sides convergent toward apex, which is a short, acute, vertically laminate point bent abruptly at more or less than a right angle to shaft; between this extreme and the simple, short, curved, acuminate lateral setae all intergradations occur.

ALLOTYPE—FEMALE

GENERAL.—Madison, Dane county, Wis.: May 1915, Marshall, *MMZ*. Length of body exclusive of ovipositor 10.4 mm. Similar in size and proportions to male, and indistinguishable from female of *fusiformis* by any well defined characters.

CEUTHOPHILUS ELEGANS—MEASUREMENTS IN MILLIMETERS

	Length of pro- notum	Length of cephalic femur	Length of caudal femur	Breadth of caudal femur	Length of caudal tibia	Length of ovi- positor
MALE						
Ames, Iowa.....	3.1	3.4	7.1	2.5	7.9	...
Ames, Iowa.....	3.6	4.3	9.	3.2	9.8	...
Madison, Wis.*...	4.2	4.6	9.4	3.4	9.9	...
Madison, Wis.....	4.4	4.9	10.5	3.8	10.6	...
Mayview, Ill.....	3.1	3.7	7.8	2.6	8.1	...
Southern Ill.....	3.7	4.3	8.6	3.4	9.6	...
Lafayette, Ind.....	2.8	3.1	6.3	2.1	7.	...
Lafayette, Ind.....	3.8	4.5	9.4	3.3	10.3	...
FEMALE						
Ames, Iowa.....	2.8	3.1	6.1	1.9	7.	3.8
Ames, Iowa.....	3.3	3.6	7.	2.4	7.5	4.3
Ames, Iowa.....	3.8	4.4	9.1	3.	9.9	4.8
Madison, Wis.**...	4.	4.3	8.8	3.1	9.2	4.8
Madison, Wis.....	3.5	3.9	8.1	2.6	8.8	4.4
Urbana, Ill.....	3.6	3.9	8.3	2.8	8.9	4.4
Muncie, Ill.....	3.7	3.9	8.2	2.9	9.	4.4
Normal, Ill.....	4.1	4.6	9.3	3.4	10.4	4.7
Southern Ill.....	3.7	4.2	8.5	3.1	9.5	3.9
*Holotype.      **Allotype.						

LEGS.—Cephalic femur/pronotum ratio 1.07 (1.03-1.16); caudal femur/pronotum ratio 2.2 (2.1-2.31); caudal femur/cephalic femur ratio 2.04 (1.83-2.24); caudal femur length/breadth ratio 2.84 (2.74-3.21); caudal tibia/caudal femur ratio 1.04 (to 1.15). Caudal tarsus .39 (to .46) times as long as caudal tibia; metatarsus 1.63 times as long as eye; second segment 1.7 times as long as broad; fourth segment 1.5 times as long as eye; claws .5 times as long as fourth segment. Armature of legs as in male, except middle tibia with less dorsal spurs on all carinae, and caudal legs as follows: *femur*—ventrocephalic carina with 24, 31 (19-45) minute denticulations, ventrocaudal carina with 24, 21

(19-41) similar denticulations, no (to 25) surface denticulations on upper half; *tibia*—spine formula of cephalic carina 7/5/4/5/4, 8/7/4/5/5, dorsocephalic calcar 1.07 times and dorsocaudal calcar 1.23 times dorsal length of metatarsus.

TERMINAL ABDOMINAL STRUCTURES.—Cerci slender, .7 times as long as pronotum. Subgenital plate simple. Ovipositor very short, 1.2 (1.05-1.36) times as long as pronotum; stout proximad, tapering rapidly to middle, thence slender and subequal; entire organ slightly upcurved; apices of dorsal valves distinctly upturned and drawn out into elongate, slenderly aciculate points; ventral valves armed in distal .23 (.21-.26) with five elongate, very slender and strongly aciculate, curved teeth (including distal hook), the subapical tooth as long as distal breadth of dorsal valves, intervals between teeth increasing slightly proximad.

#### GENERAL NOTES ON THE SPECIES

COLORATION.—Dorsum generally yellowish brown, the tergites black bordered and pronotum with a pair of short dark bars projecting backward from cephalic marginal band. Dark portions of the pattern often broad and conspicuous, in maximum intensity spreading over most of dorsum of abdomen, and longitudinal pronotal bars often fused into a quadrate cephalomesal blotch. The average coloration of *elegans* is like that of the darkest eastern material of *fusiformis*, and while the recessive extreme of the latter is wholly pale, unmarked specimens of *elegans* have not been seen and probably rarely if ever occur.

VARIATION.—Aside from differences in size and coloration and in leg armature already treated the species appears to be quite constant. The breadth and exact form of apex of the median process of the pseudosternite vary slightly without affecting the general aspect of the structure. The subdistal ventral spurs of the caudal tibiae are 1, 1 in all except two females, in which the condition is 0, 1 and 0, 0. The ventral valves of the ovipositor of a single female from Ames, Iowa bear six instead of the usual five teeth.

LIFE HISTORY AND HABITAT.—From the available data it appears that adults and nymphs of *C. elegans* occur in every month of the year, adults being most numerous in the fall. The species seems to inhabit both grassland and open forest, the latter being indicated by a label on a specimen from Lafayette, Ind., "taken under logs," and by other evidence. The species is also of common occurrence in cultivated fields. The overlapping of generations noted is probably correlated with its largely sub-



terranean mode of life and consequent ability to pass the winter in various stages—a characteristic shared by the other members of the group to which *elegans* belongs. The most accurate information regarding the species is that furnished by Leroy Hunter, who writes from Tower Hill, Ill.

"I have known this insect for at least 10 years, some being dug up in my garden every year. The garden is located on sandy upland soil at the edge of open woods. The insects are frequently encountered in deserted mole runways, but they also dig holes for themselves, and can even bore into hard clods. They winter in both nymph and adult stages, and are often found in colonies; sometimes as many as 10 nymphs of various sizes and one or two adults are found together. The nymphs in life are bluish gray."

**DISTRIBUTION.**—The range of *C. elegans* appears to lie entirely within the zone between the deciduous forest region and the plains—the prairie belt. The species is replaced in the great plains by *fusiformis*, from which it has probably been derived. In the prairie region west of the Mississippi its range overlaps that of the more distantly related *silvestris*, and to the east it is replaced by *occultus*, a species related to *silvestris* more closely than to *elegans*. No other species of the group to which it belongs has as yet been found in Illinois.

Forty-five specimens were examined, 19♂, 25♀ (holotype, allotype and paratypes) and 1 juv. ♀, as follows:

**ILLINOIS.**—**Normal:** Apr. 18, 1881, 1♀. **Urbana:** Mar. 27, 1889, 1♀ in cornfield, Marten; Apr. 9, 1887, 1♂ in pasture, Weed; 1♀. **Mayview:** Oct. 25, 1907, 1♂. **Tower Hill:** Feb. 15, 1934, 1♀ in garden, Hunter, MMZ (additional material in Hunter and Hebard collections). **Southern Ill.:** 1♂, Uhler, MCZ; —? 1♀, Barnes, MCZ.

**INDIANA.**—**Lafayette,** Tippecanoe county: May 26, 1926, 1♂; Oct. 10-25, 1930, 2♂; Oct. (Dec.?) 8, 1931, 1♂ under logs; PU, MMZ.

**IOWA.**—**Ames,** Story county: Oct. 22-27, 1891, 8♂, 13♀, 1 juv.♀, ISC, MCZ, MMZ. **Iowa:** 1♂, 2♀, ISC; —? probably Ames, 1♂, ISC.

**WISCONSIN.**—**Madison,** Dane county: Apr. 4, 1912, 1♀, Marshall; Oct. 10, 1912, 2♀, Marshall; May 1915, 1♂, 2♀, Marshall; Aug. 27, 1915, 1♂, Marshall. All in MMZ and Marshall collections.

### **Phrixocnemis** Scudder

**P. truculentus** Scudder.—There is the possibility of this species occurring in Illinois, as the type of *P. inhabilis* Rehn, placed by Hebard as a synonym of *truculentus* in 1929, came from St. Louis, Mo.

### **Udeopsylla** Scudder

**U. robusta** (Haldeman).

1850 *Phalangopsis (Daihinia) robustus* Haldeman, Proc. Am. Ass. Adv. Sci., vol. 2, p. 346. ♀, North America.

1925 *Udeopsylla robusta* Hebard, Proc. Acad. Nat. Sci. Phil., vol. 77, p. 145. Synonymy, distribution.

This large, robust and heavily sclerotized insect reaches its eastern limits of distribution in eastern Illinois, extending thence west to the Rocky mountains in Colorado, Wyoming and Montana, and following the prairie and plains regions south to northern Texas and New Mexico and north to southern Manitoba; it has also been reported from southern Idaho and Utah. Established synonyms are *Marsa arcuata* Walker, *Udeopsylla compacta* Bruner, *U. nigra* Scudder, *Daihinia gigantea* Bruner, *Ceuthophilus politus* Scudder, *C. devius* Scudder, *C. niger* Scudder and *C. ater* Scudder.

The principal Illinois records are as follows: the synonymous *Ceuthophilus niger* was described by Scudder in 1862 from Rock Island, and has been listed as occurring in Illinois by Brunner (1888), McNeill (1891) and others; as *Udeopsylla nigra* it was recorded from Perry county, Rock Island and southern Illinois by Scudder in 1894; and as *U. robusta* it was reported from Bloomington by Thomas in 1878, and from the vicinity of Havana by Hart in 1907; a number of other records from "Illinois" or "eastern Illinois" all seem to be based on these cited above.

**Savanna:** July 21 and 22, 1892, 1 ♂, 1 ♀, at light and at sugar. **Normal:** June 14, 1882, 1 ♂. **Bloomington:** July 26, 1895, 1 ♀. **Topeka:** Oct. 28 to 31, 1907, 8 small and 1 medium juv. ♂, 4 small juv. ♀. **Havana:** May 17, 1894, 1 large juv. ♂; Aug. 11, 1907, 1 ♀. **Devil's Hole:** June 8, 1905, 1 ♀; June 27, 1907, 1 juv. ♀. **Muncie:** Apr. 30, 1905, 1 juv. ♂, Hart; June 15, 1905, 1 ♂, 2 ♀. **Urbana:** Jan. 9, 1900, 1 ♂, Woodworth; May 14, 1885, 1 juv. ♀ in woods; June 6 to 11, 1906, 9 ♂, 1 juv. ♂, 3 ♀; June 8, 1933, 1 ♀, Mohr; June 17, 1885, 1 ♂, 1 ♀, under stones; June 20, 1907, 1 ♂ at light; June 25, 1909, 1 ♂; July 31, 1906, 1 ♂ in insectary basement; Oct. 24, 1932, 1 ♂, Mohr. **Champaign:** July 19, 1912, 1 ♂, Frison. **Champaign county:** Aug. 4, 1894, 1 ♂ under ear of green sweet corn in cellar, Johnson. **Quincy:** June 18, 1923, 1 ♀, Clench, MMZ. **Kampsville:** June 25, 1931, 1 ♂, Frison, Betten and Ross.

## GRYLLIDAE

### KEY TO SUBFAMILIES AND GENERA

1. Tarsi compressed. . . . . 2  
Tarsi with second joint depressed, heart shaped. . . . . 11
2. Cephalic tibiae normal, not specialized for digging. Male tegmina distad provided with a speculum. . . . . 3  
Cephalic tibiae highly specialized for digging, fig. 164, p. 257. Male tegmina lacking a speculum. Ovipositor not exerted. Form cylindrical. . . . . 10
3. Surface without scales. Caudal tibiae armed with spines, except *Neoxabea bipunctata*. . . . . 4  
Surface clothed with scales. Caudal tibiae without spines but with dorsal margins closely serrulate. Head horizontal, with a large interantennal

## GRYLLIDAE—KEY TO SUBFAMILIES AND GENERA—CONT'D

- protuberance. Eyes oblique. Ocelli absent. Male pronotum greatly produced caudad with tegmina briefly projecting; female pronotum very short, organs of flight absent. Caudal femora short. Cephalic tibiae with evident auditory foramina on cephalic face only. Ovipositor simple with apex enlarged but unarmed. Form stout. Minute. Red-brown and very dark brown. Terrestrial. (*MOGOPLISTINAE*)....**Cycloptilum**, p. 256
4. Head short, vertical or nearly so, fig. 161, p. 249. Caudal femora stout. Caudal tibiae armed with large spines but lacking teeth between them. Color brown or black.....5
- Head elongate, horizontal, fig. 163, p. 254. Caudal femora very slender. Caudal tibiae with dorsal margins armed with elongate delicate spines with minute teeth between them, or unarmed. Eyes ovate, oblique. Ocelli absent. Organs of flight fully developed. Cephalic tibiae moderately enlarged at the evident auditory foramina. Form elongate. Comparatively small. Structure very delicate. (*OECANTHINAE*, p. 251).....9
5. Organs of flight present. Eyes not reduced. Ocelli present. Caudal femora moderately enlarged. Cephalic tibiae with evident auditory foramina. Form moderately elongate. Small to large.....6
- Organs of flight absent. Eyes greatly reduced. Ocelli absent. Caudal femora enormously enlarged. Cephalic tibiae lacking auditory foramina. Form subspherical. Minute. Ovipositor tubular with apices of valves diverging and specialized. Brown. Inhabits the nests of ants. (*MYRMECOPHILINAE*).....**Myrmecophila**, p. 257
6. Caudal metatarsus flat above with a row of very small teeth on each side. Caudal tibiae armed dorsad with fixed spines which are shorter and glabrous. No large bristles present on body or legs. Medium to large. (*GRYLLINAE*, p. 246).....7
- Caudal metatarsus rounded above, unarmed but hirsute. Caudal tibiae armed with movable spines which are elongate and velutinous. Large bristles present on body and legs. Small. (*NEMOBIINAE*)....**Nemobius**, p. 247
7. Caudal tibiae with inner dorsal spur shorter than inner mesal spur. Ovipositor fully exerted. Fastigium twice as wide as proximal antennal joint or wider.....8
- Caudal tibiae with inner dorsal spur longer than inner mesal spur. Ovipositor vestigial, projecting briefly beyond apex of subgenital plate. Fastigium less than twice as wide as proximal antennal joints. Large in comparison. Reddish brown or reddish buff. Tegmina definitely transparent.....
- .....**Anurogryllus**, p. 247
8. Caudal tibiae with usually more numerous (five to eight) spines on each dorsal margin. Male tegmina with three to six transverse veins. Larger..
- .....**Gryllus**, p. 246
- Caudal tibiae with usually fewer (four to six) spines on each dorsal margin. Male tegmina with normally two, occasionally one to three, transverse veins. Females brachypterous. Black to dark brown, in all but the darkest individuals occiput marked proximad with pale longitudinal lines. Medium size.....
- .....**Miogryllus**, p. 246
9. Caudal tibiae with dorsal margins armed with elongate delicate spines having minute teeth between them; apex with three pairs of spurs. Proximal



## GRYLLIDAE—KEY TO SUBFAMILIES AND GENERA—CONT'D

- antennal segment without a rounded projection distad on ventral surface. Pronotum showing little specialization. Wings little if any longer than tegmina. General coloration whitish or very pale green. In dried specimens the general coloration is usually buffy. In life *niveus* is whitish with scarcely any green, the other species being a very delicate pale green. .... **Oecanthus**, p. 251
- Caudal tibiae with dorsal margins unarmed; apex with two pairs of spurs. Proximal antennal segment with a prominent rounded projection distad ventral surface. Pronotum impressed mesad, elevated broadly along caudal margin, this area bounded cephalad and caudad by carinae and with series of short ridges crossing it. Wings very much longer than tegmina, the latter very narrow in the male. General coloration buffy, weakly to strikingly marked with brown. Prefers vines and thick undergrowth foliage in woods. .... **Neoxabea**, p. 254
10. Tarsi three segmented. Antennae with very many segments. Two large ocelli present. Body hirsute. Large. Subterranean; nocturnal. Generally dull brown. (*GRYLLOTALPINAE*) .... **Gryllotalpa**, p. 257
- Cephalic and median tarsi two segmented, caudal tarsi consisting of a single segment or absent. Exceedingly small. Antennae with fewer (11) segments. Body smooth. Live along the margins of bodies of water. (*TRIDACTYLINAE*) .... **Tridactylus**, p. 258
11. Caudal tibiae armed with elongate delicate spines but lacking teeth between them and without inner ventrodistal spur. Ovipositor compressed and distinctly upcurved with dorsal and ventral margins serrate at apex. Form moderately robust. Small. (*TRIGONIDIINAE*, p. 255) .... 12
- Caudal tibiae armed with large spines with minute teeth between them, and with the usual three pairs of distal spurs. Ovipositor cylindrical, apex with ventral surface alone armed with blunt projections. Medium size. (*ENEOPTERINAE*, p. 255) .... 14
12. Pale and not brilliantly colored. Palpi with last segment cone shaped, not greatly expanded, figs. 101, 102. Interantennal space equal to or slightly wider than the broader first antennal segment. Pronotum in dorsal aspect decidedly wider than long. .... 13
- Coloration brilliant; black, bright red-brown, white and sometimes Indian red. Palpi with last segment greatly expanded, fig. 100, with sides convex divergent, apex truncate and dorsal surface concave. Interantennal space over twice as wide as the narrower first antennal segment. Pronotum in dorsal aspect as long as wide. Prefers vegetation near ground in damp situations. .... **Phyllopalpus**, p. 255
13. Palpi with last segment elongate, expanding very gradually, fig. 102. Interocular area ascending strongly to the rounded occiput. Eyes vertical. Straw colored with facial markings and external surface of caudal femora with a suffused longitudinal brown line. Prefers vegetation near ground in damp situations. .... **Anaxipha**, p. 255
- Palpi with last segment short, expanding very strongly, fig. 101. Interocular area horizontal and in same place as occiput. Eyes horizontal. Very pale green in life, dried specimens usually buffy. Inhabits deciduous forest foliage. .... **Cyrtoxipha**, p. 255
14. Cephalic tibiae with an evident foramen on cephalic face only. Form robust, short. Head and pronotum with dorsal surface slightly more convex.

## GRYLLIDAE—KEY TO SUBFAMILIES AND GENERA—CONCL'D

- Tegmina normally not surpassing apex of abdomen; of female more coriaceous, of male with fewer branches of mediastine vein. Wings not projecting. Ovipositor slightly shorter than caudal femur. Usually dark brown. Prefers vegetation in damp situations.....**Hapithus**, p. 255
- Cephalic tibiae with evident foramina on both faces. Form more elongate. Head and pronotum with dorsal surface less convex, subdeplanate. Tegmina surpassing apex of abdomen; of female more delicate, of male with numerous branches of mediastine vein. Wings projecting briefly beyond tegmina. Ovipositor longer than caudal femora. Light brown, sometimes marked with darker brown. Prefers vines and trees; probably entirely nocturnal.....**Orocharis**, p. 256

## GRYLLINAE

**Gryllus** Linnaeus

## KEY TO SPECIES

- Dark brown or black. Head not barred.....**assimilis**
- Straw colored. Head with a dark bar between the eyes and another between the antennal sockets. Introduced, domiciliary.....**domesticus**

**G. assimilis** Fabricius.—This ubiquitous cricket is represented by a series of 318 specimens from all parts of Illinois showing all graduations from phase *neglectus* to phase *luctuosus* and varying from very small to large for the species. Strong tendency toward phase *scudderianus* is shown however in a series from West Havana, and one female is typical of that phase, which is, we believe, a response to a sandy environment.

The smallest examples are from Beach, Oakwood, Muncie and Homer; the largest from Carbondale, Anna and Pulaski. Immediate environment more than geographic distribution has however been found by us to influence the size development in this very plastic insect.

McNeill in 1891 recorded this species from Illinois as the synonyms *luctuosus*, *vernalis*, *pennsylvanicus* and *abbreviatus*.

**G. domesticus** Linnaeus.—McNeill reported this insect from Moline and Urbana in 1891. The present material shows that it had reached inland as far as Illinois as early as 1877. Its distribution in the United States has since that date become much more extensive and more general in the east. It is the common European house cricket.

**Chicago:** Oct. 12, 1920, 1♀, Gueret, *FM*. **Antioch:** July 8, 1932, 1 large juv.♂, Frison. **Joliet:** Aug. 7 and 12, 1925, 5♀, 3 large juv.♂, 2 large juv.♀, 1 very small juv. **Peoria:** Dec. 1, 1932, 1♂, 2♀, in city dump. **Mackinaw Station:** Apr. 22, 1880, 1♀. **Normal:** Oct. 16, 1877, 1♂ in house. **Urbana:** Dec. 14 and 18, 1928, 1♂, 1♀, in house.

**Miogryllus** Saussure

**M. verticalis** (Serville).—This insect is limited to the southern half of Illinois, Muncie and Urbana being northernmost records. In

the northern portions of its distribution it evidently appears adult early in the season and in Illinois may well be called a species of the late spring. Almost all of the adults here recorded were secured in June.

Considerable size variation is shown in the material, the series averaging small for the species. The majority of the males are dark.

Twenty-seven males and 42 females, taken June 9 to July 19, and six immatures are from **Muncie, Homer, Urbana, Cerro Gordo, East St. Louis, Dubois, Shawneetown, Carbondale, Grand Tower, Prospect Hill, Alto Pass, Anna, Elizabethtown, Whitehill, Pulaski.**

### **Anurogryllus** Saussure

**A. muticus** (DeGeer).—This record is based upon only one brachypterous male labeled "Illinois."

This specimen, evidently collected many years ago, is much the smallest we have ever seen of this interesting species, widespread in the southeastern United States and through the American tropics. It is nocturnal, exceedingly rapid in its movements, and its song is loudest of the crickets found in the United States.

The present individual probably came from extreme southern Illinois and furnishes a northwestern limit record. It measures: length of body 12 mm., length of pronotum 2.7 mm., length of tegmen 8.7 mm., length of caudal femur 8.8 mm.

### *NEMOBIINAE*

### **Nemobius** Serville

#### KEY TO SPECIES

1. Caudal tibiae with the very small pair of ventral apical spurs unequal in length.  
Ovipositor longer, the apex armed with very fine teeth.....2  
Caudal tibiae with the very small pair of ventral apical spurs equal in length.  
Ovipositor short for genus, its teeth very heavy, figs. 118, 119.....8
2. Ovipositor nearly rigidly straight, as long as or longer than the caudal femur..3  
Ovipositor very gently curved dorsad, about two-thirds as long as caudal femur.....7
3. Ovipositor with dorsal margin of apex armed with not very sharp teeth, fig. 125.  
Size medium to large for genus.....4<sup>11</sup>  
Ovipositor with dorsal margin of apex armed with very sharp teeth, fig. 115,  
which can however be worn down by use.....5
4. Occiput with pale longitudinal markings. Dorsal field of male tegmina slightly narrower, not strikingly margined with paler. General coloration brown, often very dark. Tegmina normally showing less distal truncation. Field inhabitant.....**fasciatus fasciatus**, p. 248  
Occiput immaculate. Dorsal field of male tegmina slightly broader, often margined laterad with a fine but conspicuous whitish line. General coloration

<sup>11</sup>The races of *fasciatus* here treated are subject to so much individual variation that they cannot be safely separated by a key.



## NEMOBIUS—KEY TO SPECIES—CONT'D

- brown, usually with a clear reddish tint like lacquer. Tegmina showing definite distal reduction. Forest inhabitant. . . . . **fasciatus tinnulus**, p. 249
5. Ovipositor as long as caudal femur, with rather heavy apex. Form robust. Medium size. Dark brown maculate with piceous, a pale yellowish suffusion about eyes except ventrad, no other striking markings on head. Tegmina showing definite distal truncation. Forest inhabitant. . . . **maculatus**, p. 249  
Ovipositor usually much longer than caudal femur. Form more slender. Medium to small. Peculiar to sand areas. . . . . 6
6. Light dark brown with suffusions of grayish, face black or blackish brown and occiput with striking longitudinal markings. . . . . **griseus griseus**, p. 249  
Much darker, generally black, markings usually obsolete. . . . .  
 . . . . . **griseus funeralis**, p. 250
7. Clay color, mottled and flecked with dark brown; face very dark, occiput usually with a transverse dark area. Ovipositor with teeth normal. Medium to medium large. . . . . **bruneri**, p. 250  
Blackish brown, sometimes somewhat paler, females of the latter phase with dorsal surface of abdomen with paler spots. Ovipositor with teeth exceedingly fine and closely set, fig. 124. Small to very small. . . . .  
 . . . . . **cubensis palustris**, p. 250
8. Palpi yellowish with apex of last segment darkened. Rather pale shining brown, usually with a reddish tinge; dorsal surface of female abdomen with paler spots. Ovipositor with teeth very heavy for genus, fig. 118. Medium size. Prefers woodland borders. . . . . **carolinus carolinus**, p. 251  
Palpi white, immaculate. Shining blackish brown, dorsal surface of female abdomen immaculate. Ovipositor with even heavier teeth, fig. 119. Small. Prefers deep damp woods. . . . . **confusus**, p. 251

**N. fasciatus fasciatus** (DeGeer).—Five hundred and six specimens of this very common cricket are before us from all parts of Illinois.

In the north the series average very dark with pale markings usually present and sharply defined though often much reduced. Apparently only in sandy areas is a condition frequently encountered which is characterized by its more robust form and decided pallidity. This local adaptation grades into the typical so generally that it should not be recognized by name. It is the extreme of the condition shown by *canus*, described by Scudder from Dallas, Tex., a name placed by us in synonymy under *fasciatus socius* in 1913. Seventy-three such specimens are before us, the very pallid of these numbering 29, from Savanna, Moline, Meredosia, Quincy, Clay City, Dubois, Anvil Rock Hills, Williams Mountain.

We do not agree with Fulton (1931) who believes that *fasciatus socius* represents an ecological rather than a geographic race. It differs from typical *fasciatus* mainly in having the ovipositor as long as to slightly shorter than the caudal femur, but we do admit that it may not be sufficiently distinguished to warrant nominal recognition. If recogniz-

able it certainly constitutes a southern geographic race. In the present series a very few females in the large series from Urbana have the ovipositor almost as short as the caudal femur. In 11 females from Cairo however this is the rule, a few having it no longer than the caudal femur, as in one specimen in a series from St. Louis recorded by us in 1913.

If *fasciatus socius* is recognizable we would therefore say that typical *fasciatus* shows convergence toward it in southern Illinois and that in the extreme southern portion of the state occasional individuals of *fasciatus socius* appear in series which are predominantly intermediate.

**N. fasciatus tinnulus** Fulton.—Discontinuous in its distribution and found only in woodland undergrowth, *fasciatus tinnulus* is known from all but the northern portion of Illinois, as far north as Amboy, Hilliary and Muncie.

The coloration of less than half of the specimens listed is normal, the others being considerably darker and consequently less easily distinguishable from typical *fasciatus*. In a large series from Urbana five are so referred, the others assigned to *fasciatus fasciatus* though with some uncertainty.

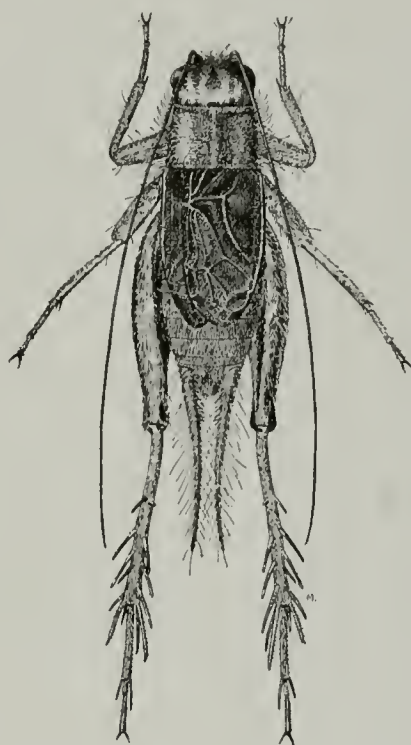
A series of 140 individuals is referred to this sylvan race, the females showing an average longer ovipositor than those from the east as noted by Fulton (1931) for his material from Ames, Iowa.

They are from **Amboy**, **Hilliary** (in woods), **Muncie** (in woods), **Homer**, **Urbana**, **White Heath**, **Charleston** (in woods), **Tower Hill**, **Alton**.

**N. maculatus** Blatchley.—Deep Lake is a northern limit and the material from there is very small. This sylvan species probably occurs in the undergrowth of forests throughout Illinois.

**Deep Lake:** Aug. 8, 1906, 11♂, 14♀. **La Grange:** Sept. 11, 1907, 1♀. **Hilliary:** Oct. 6, 1906, 1♂, 10♀, in woods. **Muncie:** Sept. 22 to Oct. 13, 1906 and 1907, 10♂, 17♀, in woods. **Homer:** Aug. 29 and Sept. 2, 1905 and 1906, 4♂, 5♀, 3 large juv. **St. Joseph:** Sept. 27, 1904, 4♀, Hart and Chapman. **Urbana:** Oct. 14, 1906, 1♀; Oct. 21, 1907, 1♀. **Tower Hill:** 1931, 1♂, Hunter. **Grafton:** Sept. 8, 1932, 1♂, Ross and Mohr.

**N. griseus griseus** Walker.—These localities on the shore of Lake Michigan and Lone Rock, Wis. (a female before us), constitute known



**Fig. 116.**—Adult male of a small field cricket, *Nemobius fasciatus fasciatus* (DeGeer).  $\times 3.4$ .

southern limits, so that this race may be looked for locally in sand areas in northern Illinois.

**Zion:** Aug. 23, 1932, 1 ♂, Ross and Mohr. **Beach:** Aug. 22 and 24, 1906, 14 ♂, 19 ♀, 4 juv., among sand ridges. **Waukegan:** Aug. 18, 1906, 2 large juv. ♀ in swamp area.

**N. griseus funeralis** Hart.—This record constitutes a northwestern limit and intergradation with *griseus griseus* should be looked for in central Illinois. The present race, though very rarely secured, from the few published records is seen to have a very extensive distribution. It was described from College Station, Tex., and has since been reported from Winslow, Ark. and Macon, Ga. It has been found locally abundant by B. B. Fulton at Raleigh, N. C., and a large series from there has very kindly been secured for us.

**Golconda:** Oct. 13, 1932, 1 ♂, Frison and Ross.

**N. bruneri** Hebard.—Hilliary and Muncie are northern limits and the former an eastern limit as well for this species. Material from Springfield, S. D. in the author's collection shows a northwestern limit to be that locality.

The individuals from Pike and Herod, Ill. and a large immature male from Wickliffe, Ky. are unusually large for the species, but the largest specimens of the Muncie series, which shows considerable variation, are of an equal size.

**Hilliary:** Oct. 6, 1906, 8 ♂, 7 ♀, in woods. **Muncie:** Sept. 22 to Oct. 18, 1906 and 1907, 9 ♂, 12 ♀, in woods. **Homer:** Oct. 7, 1906, 1 ♂, 1 ♀. **Pike:** May 26, 1906, 1 large juv. ♂. **Grand Tower:** June 1, 1906, 1 ♂; June 27, 1913, 1 ♂ at light. **Herod:** Aug. 9, 1905, 1 ♂, macropterous; Sept. 7, 1933, 2 ♂, 1 ♀, Ross and Mohr.

**N. cubensis palustris** Blatchley.—Careful analysis of very large series now available gives convincing evidence that *palustris* cannot be considered more than an ecological race of *cubensis*.

It is true that in the northeastern United States the present subspecies alone occurs, but we have very similar specimens from the mangrove swamps near Miami, Fla. Typical *cubensis* is distinguished, as we noted in 1913, mainly by its greater size and paler color.

Beach and Long Lake are northern limits. Though as yet known only from extreme northeastern Illinois, the insect should be found locally in swamps throughout the state. A northwestern limit is Springfield, S. D. as shown by specimens in the author's collection.

Most of the following specimens are very small and very dark, but a few are distinctly larger than the others and several are distinctly paler.

**Beach:** Aug. 21, 1906, 1 ♂ in swamp. **Waukegan:** Aug. 20, 1906,



1♀ in swamp. **Chicago:** Sept. 23, 1904, 1♀ in 79th street meadow, Hancock.

**Long Lake:** Aug. 11, 1906, 10♂, 9♀, 2 juv., in tamarack bog.

**N. carolinus carolinus** Scudder.—One hundred and forty-seven specimens, of which 20 are macropterous, are from all portions of Illinois. Decided individual variation in size and depth of coloration is shown by the series.

**N. confusus** Blatchley.—Muncie and Tower Hill constitute northern limits and Tower Hill is also a western limit for this secretive species which lives in the ground litter in dark woodlands.

This species is rare in collections and upon our request for aid, Mr. L. Hunter has very kindly secured for us this fine series. He writes:

During July the nymphs are rather numerous in the damp half filled washes of the esker upon which I live. Upon maturing, the females seem to be more numerous. Toward the end of September few are to be found in these ditches. They have scattered to the tops of the wooded slopes and there the males, which have become more numerous, may be heard calling—a rather unusual “Cha-w-e-e-d, Cha-w-e-e-d, Cha-w-e-e-d,” the “Cha” dim and unaccented, but the “w-e-e-d” trilled and louder.

**Muncie:** Oct. 18, 1907, 1♀. **Tower Hill:** 1931, 3♂, Hunter; Aug. 21, 1932, 4♂, 10♀, Hunter; late Sept. 1932, 17♂, 6♀, Hunter. **Metropolis:** Sept. 4, 1932, 1♂, Ross and Horsfall.

#### OEACANTHINAE

### Oecanthus Serville

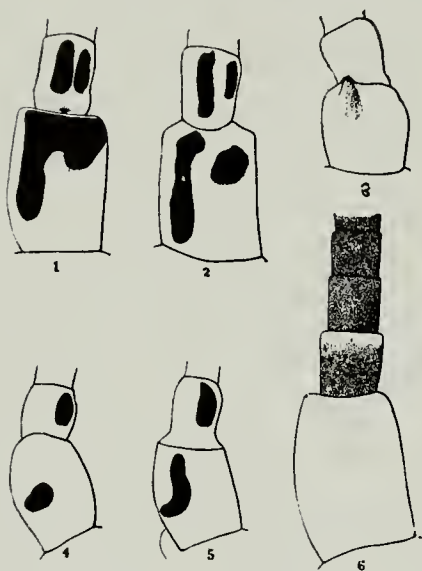
#### KEY TO SPECIES

1. Antennae with black marks on the two proximal segments, these markings obsolete only in specimens of *nigricornis quadripunctatus* showing extreme recession. Front of head and bases of antennae never pinkish. Dorsal surface of male tegmina less than half as broad as long. . . . . 2
- Antennae lacking black marks on proximal joints, which with adjacent portions of the head are usually suffused with pinkish, fig. 162, 6, p. 252. Dorsal surface of male tegmina more than half as broad as long. Coloration in life whitish faintly tinted with green. Prefers low oaks. . *latipennis*, p. 254
2. First two antennal segments each with a single small black mark, fig. 162, 4 and 5. Occiput often weakly suffused with orange-brown. . . . . 3
- First two antennal segments each with two black marks, sometimes coalesced into irregular patches, fig. 162, 1 and 2. . . . . 5
3. First antennal segment with a longitudinal black mark. Male tegmina narrower. . . . . 4
- First and second antennal segments each with a black dot or mark, fig. 162, 4. Male tegmina broader. Bush, vine and tree inhabitant. . . *niveus*, p. 253
4. First antennal segment with a longitudinal black mark, second with a black dot. Size averaging appreciably larger. More definitely arboreal. . . . .
- . . . . . *exclamationis*, p. 252

## OECANTHUS—KEY TO SPECIES—CONT'D

First antennal segment with a J shaped black mark, second with a black dot, fig. 162, 5. Size averaging appreciably smaller. Bush, vine and tree inhabitant.....**angustipennis**, p. 253

5. Marks on first antennal segment normally not as heavy, separated by an interval at least as wide as the widest of them, varying individually through mere lines to obsolete, in rare cases of maximum recession. Form less robust. General coloration pale, never with striking markings. Prefers pithy stemmed herbs.....**nigricornis quadripunctatus**, p. 253



**Fig. 162.**—Basal segments of antennae of *Oecanthus* and *Neoxabea* spp. 1, *Oecanthus nigricornis*. 2, *Oecanthus nigricornis*. 3, *Neoxabea bipunctata*. 4, *Oecanthus niveus*. 5, *Oecanthus angustipennis*. 6, *Oecanthus latipennis*. (After Hart, Entomological News, vol. III, p. 33.)

Marks on first antennal segment heavier, often confluent, varying individually to separated by an interval in extreme cases as wide as the widest mark, fig. 162, 1, 2...6

6. Form less robust. General coloration pale, never with striking markings. Prefers pithy stemmed herbs.....

.....**nigricornis argentinus**, p. 253

Form averaging slightly more robust. General coloration pale, in intensive material with proximal antennal joint suffused, other portions of antennae, head, ventral surface of abdomen, legs (except caudal femora) and three longitudinal bands on pronotum black, the latter sometimes fused. Prefers large coarse herbaceous plants.....

.....**nigricornis nigricornis**, p. 253<sup>12</sup>

**O. exclamationis** Davis.—This insect occurs over southern and middle Illinois as far north as St. Joseph, Decatur and Grafton, the westernmost points for it being central Missouri—Willard (material before us) and Hollister.

Though it is the scarcest species of the genus in the United States, we are satisfied that its rarity in collections is partially due to the fact that it is more strictly arboreal than the others. In the fall individuals creep down the trunks of trees, and in such environment we secured a moderate series on September 13, 1903, at Chestnut Hill, Pa.

**St. Joseph:** July 29, 1919, 1♂. **Urbana:** Aug. 10 and 11, 1932, 2♂, 1♀, on *Quercus macrocarpa*, Knight; Sept. 9, 1898 and Oct. 15, 1907, 2♀ in woods. **Decatur:** Oct. 11, 1907, 1♀. **Grafton:** Aug. 26, 1905, 1♀. **Clay City:** Aug. 22, 1905, 1♂. **Dubois:** Aug. 23, 1905, 1♀. **Aldridge:** Aug. 12, 1891, 1♀, Hart and Shiga.

<sup>12</sup>We are not yet satisfied that we can separate correctly individuals of this race showing extreme recession in coloration from those of *nigricornis quadripunctatus*, though intensive material is so very different in appearance.

**O. angustipennis** Fitch.—McNeill recorded *angustipennis* from Moline in 1891.

Though the species averages smaller, individuals are occasionally quite as large as the normal for *exclamationis* Davis.

The range of this common tree cricket undoubtedly covers all of Illinois, Algonquin being a northern limit in this latitude.

One hundred and eight specimens, taken August 14 to October 16, are from Algonquin, Havana, Danville, Muncie, Urbana, Decatur, Shawneetown, Carbondale, Boskydell, Golconda, Dixon Springs, Karnak, Cache.

**O. niveus** (DeGeer).—This is a common species which includes all of Illinois in its range. In this latitude Fond du Lac, Wis. (male in author's collection) is a northern limit.

Twenty-six specimens taken August 2 to October 16 are from Zion, Lake Forest, Cedar Lake, Woodstock, Algonquin, Riverside, Willow Springs, Normal, Havana, Urbana, Monticello, St. Francisville, Centralia.

**O. nigricornis quadripunctatus** Beutenmüller.—Recording this species from Illinois as *fasciatus* (based on a misidentification by Fitch), McNeill in 1891 did not distinguish between the races.

This insect is found throughout Illinois, but in the southern portion is far less abundant than the western race *nigricornis argentinus*.

Seventeen specimens typical of this insect were taken June 28 to September 14 at Chicago, Sun Lake, Wauconda, Algonquin, Moline, St. Anne, Havana, Urbana, Arenzville, Charleston, Grafton, Alton, Clay City, Shawneetown, Harrisburg, Carbondale, Williams Mountain, Alto Pass, Anna, Metropolis, Pulaski, Cache.

**O. nigricornis argentinus** Saussure.—Urbana and Bishop constitute northern, and St. Francisville and Mt. Carmel the eastern limits of this western race, which occurs throughout the southern and central portions of Illinois.

One hundred and one specimens, taken June 27 to September 20, are from Bishop (four class 8<sup>13</sup>), Topeka (one class 8), Havana (four class 8), Urbana (one class 7), Quincy (six class 8), Casey, Hillsboro, Alton, Lawrenceville, St. Francisville (two class 8), Centralia (one each class 5, 6), Mt. Carmel (one class 7, seven class 8), Albion (two class 8), Grayville, Dubois (one class 6, four class 7, 17 class 8), Shawneetown, Harrisburg (11 class 8), Carbondale (two class 7, 15 class 8), Murphysboro (three class 8), Grand Tower (two class 7, 10 class 8), Hicks Branch, Eichorn, Cobden (three class 8), Alto Pass (four class 8), Elizabethtown, Golconda, Vienna, Karnak, Ullin, Pulaski (one class 8), Cache, Cairo (one class 7).

**O. nigricornis nigricornis** F. Walker.—We have had great difficulty distinguishing pallid recessive eastern material of *nigricornis nigricornis* from *nigricornis quadripunctatus*. Both these races occur

<sup>13</sup>These classes represent the artificial classification of color variation in this species used by Fulton (1926).



throughout Illinois and though the above material is satisfactorily separable, there remain 45 specimens which appear to be intermediate to different degrees. These are from Topeka, Havana, St. Joseph, White Heath, Quincy, Centerville, Grand Tower, Metropolis, Thebes.

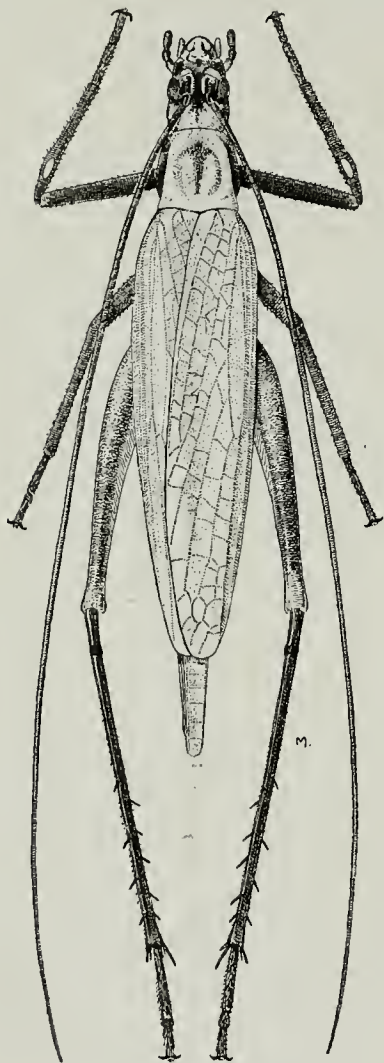


Fig. 163.—Adult female of a tree cricket, *Oceanthus nigricornis nigricornis* F. Walker.  $\times 4$ .

over all but extreme northern Illinois. Glen Ellyn is the known northern limit.

**Glen Ellyn:** Sept. 7, 1903, 1♀, Gerhard, *FM*. **LaGrange:** Sept. 11, 1907, 1♂ with coloration strongly recessive. **Riverside:** Sept. 1, 1893, 1♀ strongly intensive, Hancock. **Willow Springs:** Aug. 21, 1910, 1♀, Gerhard, *FM*. **Joliet:** Aug. 31, 1930, 2♀ intensive, Knight and Ross. **Hilliary:** July 29 and Aug. 7, 1909, 2♂ strongly recessive, 1♀ recessive. **Urbana:** July 22, 1893, 1♂ strongly recessive; July 31, 1900, 1♀ moderately intensive. **Manchester:** Aug. 23, 1892, 1♀ intensive, McElfresh. **Mascoutah:** 1890, 1♀ recessive. **Grayville:** June 25, 1932, 1 large juv.♂, Ross, Dozier and Park.

Eighty-one specimens, taken July 12 to September 29, are from **Zion, Beach** (one with dark markings moderately heavy, others very weak), **Ravinia** (five weak), **Riverview**, **Channel Lake** (one very weak), **Wauconda** (three moderately heavy), **Algonquin**, **Rockford** (one very weak), **Fulton**, **Urbana** (one very heavy, two weak, two very weak), **Seymour** (two heavy), **Borton**, **Charleston** (two heavy), **Alton**, **Lawrenceville**, **Centralia** (one very weak), **Norris City**, **Shawneetown** (13 heavy), **Carbondale** (one moderately heavy), **Grand Tower** (eight very weak), **Elizabethtown**, **Golconda** (one weak), **Dixon Springs**, **Cypress** (one weak).

**O. latipennis** Riley.—This oak loving species is probably numerous in southern Illinois. Northern limits of distribution are Hilliary and Quincy.

McNeill reported this species from Carmi in 1891.

Thirty-four specimens, taken July 31 to October 13, are from **Hilliary**, **Quincy**, **Borton**, **Grafton**, **Lawrenceville**, **Odin**, **Carmi**, **Boskydell**, **Grand Tower**, **Herod**, **Jonesboro**, **Golconda**, **Metropolis**, **Karnak**, **Dongola**, **Olive Branch**.

### **Neoxabea** Kirby

**N. bipunctata** (DeGeer).—McNeill reported this species from Rock Island in 1891, referring it to *Oecanthus*.

This scarce species, preferring vine tangles in and along forests, probably occurs

## TRIGONIDIINAE

**Anaxipha** Saussure

**A. exigua** (Say).—This species was recorded from Colona as *A. pulicaria* by McNeill in 1891.

Muncie, Urbana and Colona are known northern limits. The species should be found only locally abundant in southern Illinois. It probably occurs to the north though in greatly reduced numbers as it has been found on the Mississippi river as far north as extreme southeastern Minnesota.

Eighteen males, seven females, taken July 22 to September 30, and five immatures are from **Havana, Muncie, Urbana, Quincy, Tower Hill, Lawrenceville, St. Francisville, East St. Louis, Carbondale, Vienna, Karnak, Olive Branch.**

**Cyrtoxipha** Saussure

**C. columbiana** Caudell.—This is an exceedingly interesting record, extending far northward the known distribution of this arboreal, very delicate light green cricket, in the Mississippi valley. Other western limits are Polk county, Ark. (female in author's collection) and Dallas, Tex.

The insect is probably very scarce in extreme southern Illinois, where it should be sought for by beating the foliage in deciduous forests.

**Carbondale:** Sept. 26, 1909, 1♀, Gerhard, *FM*.

**Phyllopalpus** Uhler

**P. pulchellus** Uhler.—McNeill recorded this insect as a *Phylloscirtus* from Pine Hill in 1891.

Confined to southern and central Illinois, this beautiful and richly colored little cricket is probably moderately abundant locally in weeds growing in wet spots.

Marion county, Ind. and Monticello, Ill. are northern limital points; known western limits are the latter, Grand Tower and Olive Branch.

**Monticello:** Aug. 17, 1883, 1♂, Seymour. **St. Francisville:** Sept. 8, 1933, 1♂, 1♀, Ross and Mohr. **Carbondale:** Sept. 26, 1909, 4♂, 1♀, Gerhard, *FM*. **Grand Tower:** Aug. 10, 1891, 1♀, Hart and Shiga. **Herod:** Aug. 9, 1905, 1♀. **Metropolis:** Sept. 3, 1924, 1♀, Frison, **Karnak:** Sept. 2, 1924, 1♀, Frison. **Pulaski:** June 2, 1910, 1 very small juv. **Olive Branch:** Sept. 29 to Oct. 3, 1909, 6♂, 5♀, Gerhard, *FM*.

## ENEOPTERINAE

**Hapithus** Uhler

**H. agitator agitator** Uhler.—Due to incorrect generic association

a female from Illinois was described as *Orocharis uhleri* by McNeill in 1891.

This series averages from large to small with apparently little geographic significance, as both extremes are shown by Dubois females while the entire series from Karnak is very small. One female from the former locality is unusually large with exceptionally well developed tegmina; length of body 13.8 mm., length of tegmen 12 mm., length of caudal femur 11.7 mm., length of ovipositor 12.8 mm.

This rather common though secretive bush loving cricket occurs only in southern and central Illinois. Muncie is the northern limit.

Eighteen males, 43 females, taken August 16 to October 1, and 18 immatures are from **Muncie, Borton, Charleston, Manchester, Tower Hill, Hillsboro, Grafton, Lawrenceville, Clay City, Odin, Centralia, Norris City, Dubois, Equality, Carbondale, Boskydell, Grand Tower, Herod, Cobden, Ware, Elizabethtown, Metropolis, Vienna, Cypress, Karnak, McClure, Thebes.**

### **Orocharis Uhler**

**O. saltator** Uhler.—This retiring cricket, found in vines and on trees, is as yet known only from extreme southern Illinois, Shawneetown being a northern limit point. It should however be found throughout southern Illinois as it is known as far north as central Indiana. We have recently noted (1932) that Lugger's figure in his Minnesota report (1897) was certainly drawn from material which did not come from Minnesota.

A synonym, indicated by Blatchley in 1903 but not mentioned by him in 1920, is his *Apithes mcneilli*.

**Shawneetown:** Oct. 12, 1932, 1♂, 2♀, Frison and Ross. **Herod:** Aug. 8, 1898, 1 juv.♂, Hart. **Alto Pass:** Aug. 15, 1909, 1♂. **Union county:** Sept. 10 to 16, 1908, 2♂, 1♀, on apple and forest trees, Smith. **Karnak:** Sept. 8, 1924, 1♂, 1 juv.♀, Frison.

### *MOGOPLISTINAE*

#### **Cycloptilum Scudder**

**C. squamosum** Scudder.—This species was correctly recorded from Metropolis by Blatchley in 1920, but the southeastern insect which was generally referred to *squamosum* is a distinct species, described by us as *C. bidens* in 1931.

**Tower Hill:** 1931, 4♂, 3♀, Hunter, HC. **Metropolis:** Aug. 18, 1891, 2♂, 1♀, in woods at foot of bluff.

These are northeastern limits for *squamosum*. To the south it is probably found over a very large area, as it is known as far southeast as Cedar Keys, Fla.



## MYRMECOPHILINAE

**Myrmecophila** Latrielle

**M. pergandei** Bruner.—Though Murphysboro is a northern limit, this inhabitant of ant nests probably occurs throughout southern Illinois, as it is known from Indiana as far north as Mitchell.

**Shawneetown:** Apr. 23, 1926, 2♂, 1♀, 1♂ rather small, pair small, Frison and Auden. **Murphysboro:** May 16, 1910, 2♂, small, 1♀, very small.

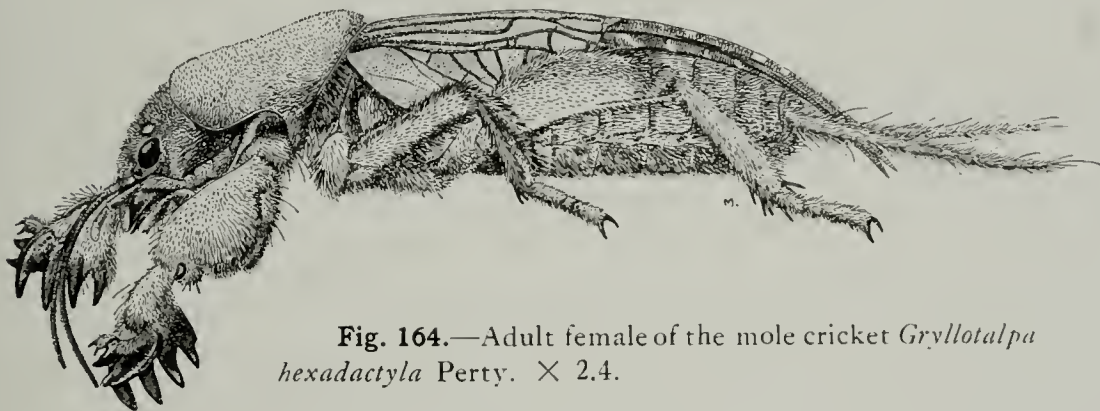
**Olive Branch:** Sept. 29, 1909, 1♀, 6 juv., Gerhard, *FM*.

## GRYLLOTALPINAE

**Gryllotalpa** Latrielle

## KEY TO SPECIES

- Caudal tibiae with four internal and four external spines. Cephalic trochanter with process short, nearly semicircular, armed with spinose hairs. Large. . . . .**hexadactyla**, p. 257
- Caudal tibiae with three internal and four external spines. Cephalic trochanter with process knifelike, curved, acute. Very large. . . . .**major**, p. 258



**Fig. 164.**—Adult female of the mole cricket *Gryllotalpa hexadactyla* Perty.  $\times 2.4$ .

**G. hexadactyla** Perty.—McNeill recorded this species in 1891 from Rock Island and Moline as the synonyms *columbia* and *borealis*.

All of the present series are macropterous except six, three having moderately and three strongly reduced tegmina and wings. Scarcity of males in northern series has been previously observed by us and suggests parthenogenesis. The northernmost males before us are one in four specimens from Kansas and one in 11 from Nebraska.

This species certainly occurs over all of Illinois, though it is apparently decidedly more numerous in the central portion of the state than elsewhere. It is not frequently seen as it is not only nocturnal but lives most of the time in its underground burrows.

A northern limital point is shown by a macropterous female from Osceola, Wis. in the author's collection.

Thirty-one females, taken July 18 to September 20, and one immature are from **Fourth Lake, Fox Lake, McCollums Lake, Algonquin, Verona,**

Rock Island, Pekin, Fithian, Urbana, Champaign, White Heath, Clinton, Hume, Kansas, Oakland, Sullivan, Rockport, Carlinville, Albion.

**G. major** Saussure.—Described in 1874 from "Illinois," no material from this state has been seen by us. The type was however probably correctly labeled, as *major* is known from Carthage, Mo., and a southeastern published limit is Louisville, Miss. Westward the species is not known beyond the eastern limits of the great plains.

#### TRIDACTYLINAE

### Tridactylus Olivier

#### KEY TO SPECIES

- Caudal metatarsi present. Larger. Pronotum with a weak transverse sulcus. Shining brown, little or not maculate.....**apicalis**
- Caudal metatarsi absent. Smaller. Pronotum not sulcate. Blackish brown, usually strikingly maculate with buffy.....**minutus**

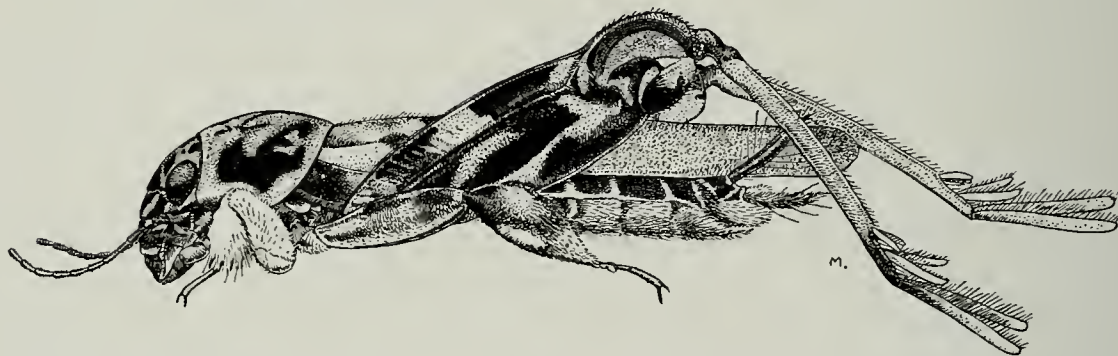


Fig. 165.—Adult male of the pygmy mole cricket *Tridactylus minutus* Scudder.  $\times 15$ .

**T. apicalis** Say.—Thomas' *illinoisensis* is an established synonym, described from Illinois in 1863. The species has been reported from southern Illinois and as the established synonym *terminalis* from Urbana and Quincy by McNeill in 1891.

Decided individual size variation occurs in both sexes, females being best distinguished by the slight concavity mesad of the distal margin of the penultimate sternite.

This insect occurs about lakes and watercourses throughout the state. On the Mississippi it is known as far north as southeastern Minnesota.

Seventeen males, 43 females, taken May 8 to September 11, and eight immatures are from **Beach, Chicago, Savanna, Peoria, Havana, Urbana, Matanzas Lake, Quincy** (on sand bar), **Kampsville, Herod, Elizabethtown, Olive Branch.**

**T. minutus** Scudder.—This species was reported from Champaign by McNeill in 1891.

About half the adults of this series are macropterous, the others brachypterous.

We have recently found the characters which were used to separate *Ellipes* insufficient to distinguish it from *Tridactylus*. Unlike *apicalis*, the females in *minutus* average slightly larger than the males, and in them the penultimate sternite has its sides convergent to the rounded apex, leaving the cleft ultimate tergite partially exposed.

This minute insect occurs throughout Illinois like the preceding species, but is much more abundant and more generally distributed in similar environments. It also is known on the Mississippi north to southeastern Minnesota.

Fifty males, 53 females, taken April 17 to September 10, and 16 immatures are from Waukegan, Willow Springs, Flossmoor, Bradford, Danvers, Havana, Muncie, Oakwood, Urbana, Champaign, White Heath, Quincy, Robinson, Mt. Carmel, Browns, Norris City, Dubois, Shawneetown, Carbondale, Makanda, Grand Tower, Herod, Hicks Branch, Eichorn, Parker, Anna, Jonesboro, Elizabethtown, Golconda, Metropolis, Dongola, Pulaski, Villa Ridge, Olive Branch, Thebes.

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## APPENDIX

## GRASSHOPPER CONTROL

GRASSHOPPERS are among the most general plant feeders of the many kinds of insects occurring in Illinois. Their food includes practically all the garden crops and flowering plants, nearly all the ornamentals, the foliage and bark of many trees, especially while the trees are young, and all the wild as well as cultivated grasses. Grasshoppers have caused damage in the state from the time the first settlers made their clearings and planted their first crops. There is every year some damage from these insects to field crops, gardens and particularly ornamentals, but up to the present Illinois has not suffered to nearly the same extent as states west of the Mississippi river. Serious grasshopper losses occur at irregular periods in local areas with no definite time of reoccurrence of injury as is the case with some insects.

Of the many species of grasshoppers that occur in Illinois only three are of much importance economically. These are (1) the red legged grasshopper, *Melanoplus femur-rubrum*, a medium sized brownish red grasshopper about an inch long, (2) the lesser migratory grasshopper, *Melanoplus mexicanus*, which is about the same size as the red legged grasshopper, and (3) the differential grasshopper, *Melanoplus differentialis*, which is 1½ inches or more in length when full grown.

## Natural Control

Grasshopper populations are affected to a marked degree by weather and usually become most abundant after a period of dry years. There are a number of insect, bird and animal enemies of grasshoppers which play an important part in holding down their numbers. Some of the most important of these are certain flies (Bombyliidae) and blister beetles (Meloidae) whose larvae feed upon the grasshopper egg masses. A heavy toll is made on grasshopper populations by fungus diseases, mites, tachinid flies, many species of birds, snakes and small mammals.

## Applied Control

There are three standard methods of grasshopper control which may be used in years when the insects are abundant. In order of importance, these are the use of poisoned bait, trapping and cultivation.

POISON BAITS.—In the western areas poison bait is now depended upon almost entirely for grasshopper control. Grasshoppers are attracted to certain odors and it has been found comparatively easy to poison very large numbers of them. Hundreds of tons of poisoned bait have been used in the western states during the past few years, in

many cases the bait being made up literally by the trainload and distributed over the heavily infested areas.

*Preparation.*—About the most satisfactory bait and the one which is now generally recommended contains sodium fluosilicate, white arsenic or Paris green as the poisoning agent, and is made up as follows:

- Coarse wheat bran free from shorts.....100 pounds
- Sodium fluosilicate, white arsenic or Paris green..... 5 pounds
- Molasses, preferably black strap..... 2 gallons
- Water, sufficient to make a stiff mash, usually 10 to 12 gallons.



Fig. 166.—Corn and sweet clover destroyed by grasshoppers. (After Drake and Decker, Iowa Extension Service Bulletin 182)

The bran and poison are thoroughly mixed together while dry. The water and molasses are then mixed and added to the grain. This can be done on a concrete or other floor, using scoop shovels in the same manner as mixing cement. Very thorough mixing is necessary and the bran must be shoveled over until all the lumps have been worked out. Where considerable amounts of bait are needed a cement mixer can be conveniently used for mixing the bait. There are a number of commercial companies that make this bait. It is usually sold with bran, poison and sweetening mixed. The water is added to it just before the bait is used.

Small amounts of the bait can be made, using the following formula.

- Bran.....5 pounds
- Molasses.....  $\frac{3}{4}$  pint
- Water.....2 quarts
- Paris green or sodium fluosilicate.....  $3\frac{1}{2}$  ounces

Thoroughly mix the bran and poison while dry. Then mix the molasses with the water and slowly add to the bran, stirring constantly.

It is important to get an even distribution of the poison and molasses in the bait.

*Application.*—The bait should be applied early in the morning at the rate of 20–25 pounds of wet mash for each acre of ground, distributed as evenly and thinly as possible over the entire surface. It is far more effective when put out in this way than when distributed in windrows, lumps or small piles. Where the bait is used around home gardens or ornamental plantings, small truck patches or small fields, it can be readily applied by hand, carrying the bait in a basket or bucket.

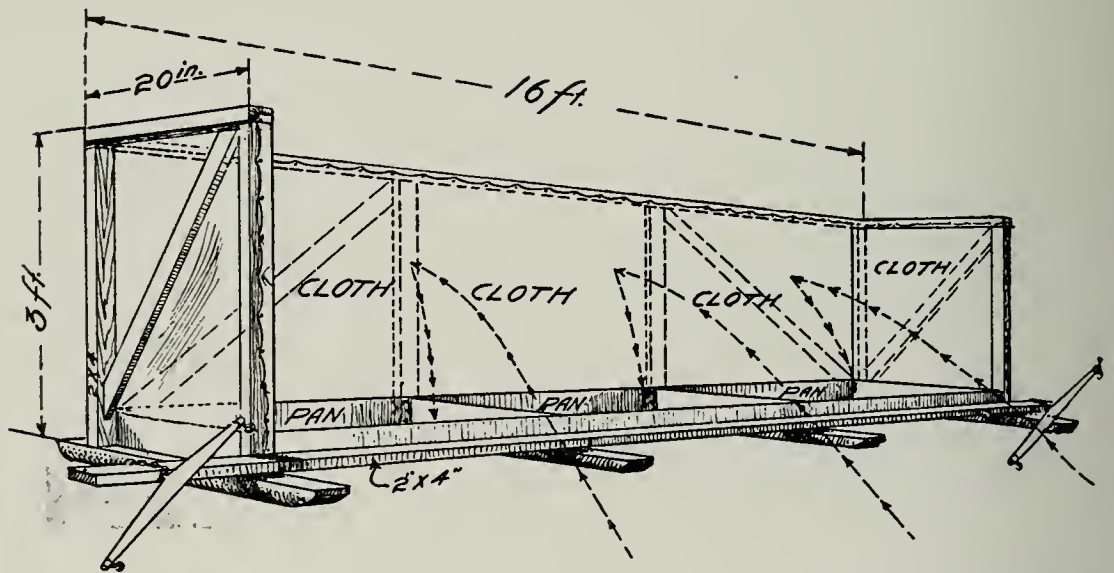


Fig. 167.—Hopperdozer with cloth back showing construction. (After Walton, Farmers' Bull. 747, U. S. Dept. Agr.)

For larger areas it can be sown by hand from the rear of wagons or may be distributed by an end-gate oat seeder, regulating the seeder to put out the right amount of poison. In the wholesale poisoning work carried on in the west, airplanes have been used for distributing the bait over large waste areas. The poison works rather slowly and dead grasshoppers will not be found before the second or third day after the bait has been applied. As the pests become sick from the poison they tend to crawl away and hide and one has to look rather carefully in order to find them.

*Kill.*—It has been repeatedly demonstrated that a thorough application of the above poison over an infested area will kill 60–80 per cent of all grasshoppers there.

*TRAPPING.*—Results of the last few years' work with hopperdozers and hoppercatchers have shown that poisoning is usually far cheaper and more effective than trapping. A hopperdozer, fig. 167, however can be readily made by following these specifications:



The hopperdozer is made with a shallow trough or pan 20 inches wide, with 6-inch sides, set on the 2x4 runners directly in front of the shield. This pan should have partitions across it every 3 or 4 feet. To operate the hopperdozer, partly fill the pan with water, pour a little kerosene on top and drag across the infested fields. The hoppers striking the shield fall into the pan where they are quickly killed by the oil. Once having become wet with the kerosene they will die in a few minutes even though they hop out of the pan.

The hopperdozer is somewhat easier and less expensive to build than the catcher, and is about as effective. A catch of 60 bushels of grasshoppers on 20 acres of clover was recently made with one of these machines.<sup>14</sup>

CULTIVATION.—Control of grasshoppers by cultivation is designed to destroy the eggs in fall and winter. It consists of fall plowing or disking areas in which the grasshoppers have laid their eggs, thus exposing them to birds and the weather. Cultivation to a depth of 4 inches is usually sufficient for this purpose.

### COCKROACH CONTROL

COCKROACHES are one of the most annoying pests encountered in dwellings, restaurants and like places. Their food consists of many things, including bindings of books or magazines and practically all foodstuffs, especially of a starchy nature. They leave a slight but disagreeable odor wherever they frequent. In warm, dark places, such as around enclosed stoves in restaurants and bakeries, these insects sometimes multiply in enormous numbers and from this haven overrun the whole establishment.

The most effective control for these pests is dusting with sodium fluoride (not sodium chloride, which is common salt). This dust should be sprinkled liberally in dark corners, behind stoves, cabinets, etc., and in cracks in the wall. Persistent treatment of this kind, if thoroughly applied, will clean up an infestation.

Cockroaches spread from one house to another, so that it is entirely possible to have recurring infestations of these insects, which will necessitate almost continuous control measures.

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<sup>14</sup>Grasshopper control in relation to cereal and forage crops, W. R. Walton, U. S. D. A. Farmers' Bull. 747, October, 1916.

## INDEX TO SUBFAMILIES, GENERA AND SPECIES

Page numbers in this index are for occurrence of the names in the catalog of species, pp. 150–259, only. Numbers in light face type refer to mere mention of the name or its location without discussion; numbers in bold face show location of discussions or keys in the case of families and genera, and discussions or collection records for species. Placement of names in keys is not indexed.

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## SUPPLEMENT

## DERMAPTERA

## LABIIDAE

**Vostox** Burr

**V. brunneipennis** (Serveille).—Blatchley (1920) recorded this earwig from southern Illinois on the basis of specimens collected by Mr. Gerhard of the Field Museum. The specimens taken September 29 are from under the bark of a large dead tree and a few from the ground directly beneath, to which no doubt they had fallen when the bark was pulled off.

**Olive Branch:** Sept. 29, 1909, 3♂, 9♀, 1 juv.; Sept. 30, 1♂, Gerhard, *FM*.







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**1. ILLINOIS NATURAL HISTORY SURVEY BULLETIN. Volume XX.**

**Article I.—Initial Studies of American Elm Diseases in Illinois.** By Hubert A. Harris. October 1932. 70 pp., 35 figs. Partial contents: Character of the present elm malady, Laboratory methods, General results of cultural tests, Specific diseases, Other infections, Inoculation trials, Preliminary control experiments.

**Article II.—A Survey of the Fishery of the Kaskaskia River.** By Wilbur M. Luce. August 1933. 52 pp., 12 figs. Partial contents: Hydrography, Methods and equipment, Value of the fishery, Kinds and numbers of mussels, Kinds of fishes caught with various tackle, Factors affecting abundance, Rate of growth, Large fishes, Small fishes.

**2. ILLINOIS NATURAL HISTORY SURVEY CIRCULAR.**

**24.—Care of Trees.** By L. E. Sawyer. February 1932. 7 p., 5 figs. Formerly Illinois Natural History Survey Forestry Circular Number Five. Contents: Watering, Fertilization, Trimming, Surgery.

**25.—How to Collect and Preserve Insects.** By H. H. Ross. February 1934. 27 pp., 11 figs. Partial contents: Where to collect, What to use, How to handle unmounted specimens, How to mount and preserve the collection, How to label the specimens, Housing the collection permanently.

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Address orders and correspondence to the Chief,  
**ILLINOIS STATE NATURAL HISTORY SURVEY**  
Natural History Bldg., Urbana, Ill.