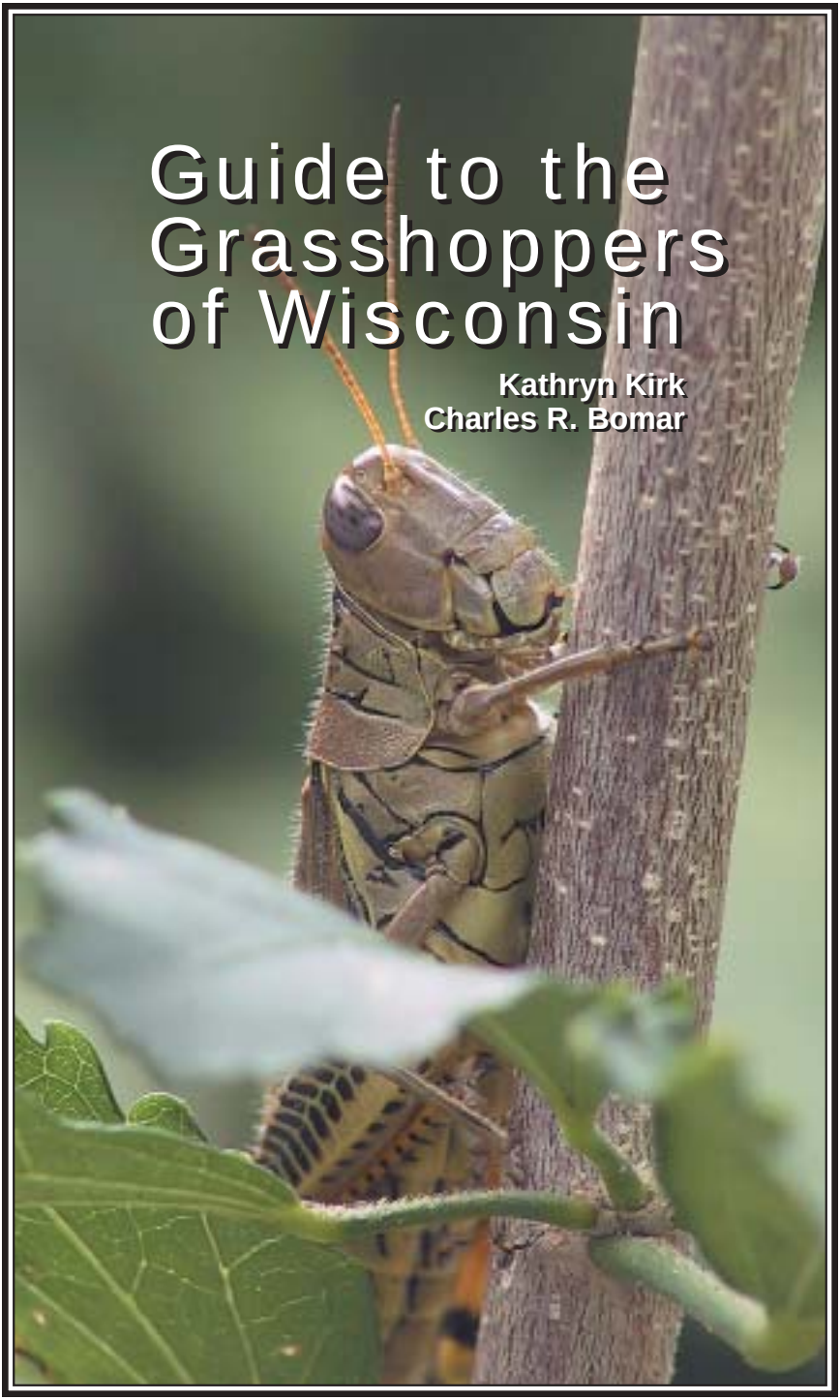
Guide to the Grasshoppers of Wisconsin

Kathryn Kirk
Charles R. Bomar



Front cover: *Melanoplus differentialis differentialis*.
Photo by Franziska Lang.
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Back cover: *Arphia pseudonietana*.
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KATHRYN KIRK

GRASSHOPPERS

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Kathryn Kirk and Charles R. Bomar

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Designed by: Michelle E. Voss

Published by:
Bureau of Integrated Science Services
Wisconsin Department of Natural Resources
P.O. Box 7921 Madison, WI 53707

2005

KATHRYN KIRK

GRASSHOPPERS

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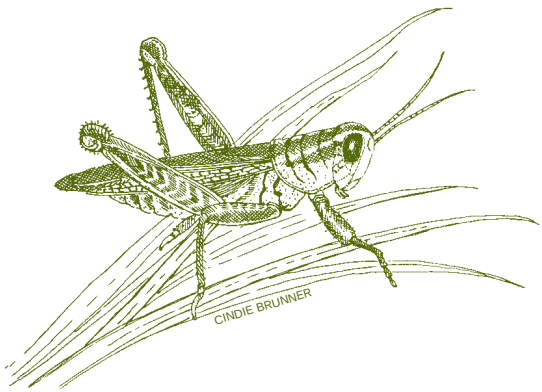
An Explanation of the Grasshopper

The Grasshopper, the Grasshopper,
I will explain to you:
He is the Brownies' racehorse,
The fairies' Kangaroo.

—Vachel Lindsay



GRASSHOPPER INTRODUCTION

KATHRYN KIRK

Purpose of This Guide

A comprehensive survey of grasshoppers (Orthoptera: Acrididae) of Wisconsin has been long overdue. To date, only four taxonomic or ecological papers have been published on acridids from Wisconsin. Valek and Coppel (1972a,b) studied *Dendrotettix quercus* in central Wisconsin. More recently, Bomar (2001) and Bomar and Secrist (2002) explored the acridid communities in western Wisconsin prairies. In 1996, Harvey Ballard, Jr. developed an unpublished list of 55 Wisconsin Orthoptera based on specimens at the Insect Research Collection in the Entomology Department at the University of Wisconsin-Madison.

This guide provides the first comprehensive treatment of Wisconsin acridids and includes keys for identification of species, maps of known species distributions, descriptions of habitats occupied, and comments on taxonomy, life history, and ecology of the individual species. We also assess the conservation status of each species by listing its state rank (see Appendix C for the definition of status rankings).

ERIC EPSTEIN

History of Grasshopper Surveys in Wisconsin

Collection of grasshoppers in Wisconsin can be described in terms of four time periods (Figure 1). The Exploratory Period encompasses the years 1881 to 1929. One of the first major contributions to the data was the study of J.D. Hood of the University of Illinois in Champaign-Urbana. At the same time that Hart and Gleason (1907) were exploring the sand areas of Illinois, Hood was conducting a similar study of the sand dunes and sand barrens along the Wisconsin River terrace at Lone Rock in Richland County, Wisconsin. Although no publication of this study has been found, various collections hold 26 different grasshopper species Hood collected in 1906 at Lone Rock including *Melanoplus flavidus*, *M. scudderi,* and *M. islandicus*. The Milwaukee Public Museum (MPM) sent an expedition to the western counties in 1910-1912 for zoological specimens, contributing 230 acridid specimens to the MPM collections.

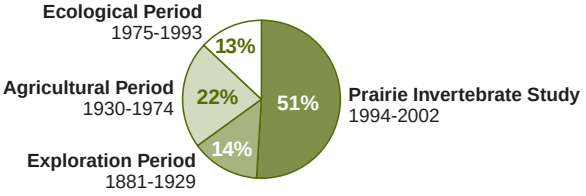


Figure 1. *Collection period of specimens examined.*

From 1930 to 1974, the Agricultural Period, interest in pest species prompted scattered collecting primarily in the 1930s and 1940s. W. McNeal collected *Dendrotettix* in oak forests in 1949. Incidental collecting produced data from the northern counties by individuals on summer vacation or participating in scout camps. During the latter years, student collections became popular with university biology classes in Wisconsin.

Student collections continued into the Ecological Period when teaching of biological diversity and ecological principles became standard biology curriculum. In addition, research studies from this period were particularly fruitful for our purposes. Wisconsin Department of Natural Resources (Wisconsin DNR) foresters studied gypsy moth parasitoids (1974 to 1977) in forests of the state. Orthoptera collected in malaise traps were stored in alcohol at the University of Wisconsin Insect Research Collection (IRC) and remained unexamined for over 20 years. In those vials we found 25 species including *Paratylotropidia brunneri* and *Chloealtis abdominalis.* A study of arachnids in Wisconsin prairies was conducted in 1986-1987. Stored in alcohol vials were 268 grasshopper specimens of 15 species, including *Orphulella pelidna*. Half of the total specimens that contributed to this report, however, were collected from 1994 to 2002. The Prairie Invertebrate Study, a multi-state effort begun in 1994 and administered through the Wisconsin DNR's Bureau of Integrated Science Services gave biologists the resources to inventory invertebrates on

prairies and savannas. In addition, Wisconsin DNR field biologists accelerated efforts to collect data on terrestrial invertebrates on state forest properties as a part of the biological inventories conducted by the DNR's Bureau of Endangered Resources.

Wisconsin Geography and Natural Communities

Wisconsin lies at a juncture of the Eastern Deciduous Forest Ecoregion and the Prairie Peninsula, an eastward extension of the Great Plains Ecoregion. A band of overlap known as the Tension Zone spans Wisconsin from northwest to southeast, divides the state into the Mixed Conifer-Northern Hardwoods Province and the Prairie-Southern Forest Province, and provides a valuable reference for understanding Wisconsin biogeography. South of the band, there are fewer rainy days, higher summer temperatures and evaporation, and less average annual snowfall. Since the 1870s, botanists have observed that the range limits of many species fall within this band. Eventually, Curtis (1959) defined this zone based on the range limits of 182 plant species that enter the state from the North or from the South and West (Figure 2).

Figure 2. *The vegetative tension zone (after Curtis 1959).*

South and west of the Tension Zone the state is a mixture of farmland and deciduous woodland with remnants of prairie, oak opening, oak barrens on droughty soils, and oak woodland. Northern Wisconsin communities are dominated by conifers; largely forests of pine with maple and oak, beech on the east side of the state, hemlock and balsam fir plus tamarack and white cedar swamps, open bogs, northern sedge meadows and marshes, and abundant soft-water lakes. The Wisconsin, Black, St. Croix and Chippewa rivers and their tributaries drain two-thirds of the state into the Mississippi River on the western edge. The Fox River system including the Wolf River and numerous minor waterways drain the eastern portion into Lake Michigan. With Lake Superior to the north, Wisconsin waters contribute riverine forest, bluff lands, clay banks, and open beach and dune communities to the natural diversity of the state.

Figure 3. *Geographic provinces in Wisconsin (after Martin 1965).*

Wisconsin may be described, based on geology and glacial history, in terms of five regions or provinces (Figure 3). The northernmost province is the Lake Superior Lowland, an ancient rift valley at the western edge of Lake Superior bounded by dramatic red clay bluffs. The shoreline includes 22 islands with sandstone bluffs and sand or gravel beaches. The lowlands support open bogs, black spruce swamps, muskeg, and interdunal wetlands (NHI 2002). In this province, boreal forest extends into Wisconsin adding white spruce, balsam fir, and white cedar forests to the mix of red and white pine, hemlock, birch, and sugar maple of the northern mesic forest, the dominant community type of the Northern Highland province. This area is part of a vast upland "shield" of Precambrian bedrock sloping southward from Labrador and Hudson Bay and characterized in Wisconsin by flat plains and hills of glacial drift. Significant sand deposits in the western part of the province support jack pine forest and pine barrens ("the Northwest Sands"), with smaller amounts of similar habitat in the eastern and the north central portions of the province (Figure 4).

The Central Plain is a crescent of Cambrian sandstone below the northern forests and is widest in the middle of the state ("the Central Sands"), where pine and oak barrens are interspersed with marshlands over a glacial lakebed. Escarpments, rocky hills, buttes, and mesas dot the landscape where erosion resistant rock caps the sandstone. This is a transition zone between forest and grassland regions. Here, jack pine, bur, black, and Hill's oak begin to have a greater presence.

The topography of the Eastern Ridges and Lowlands is a study in glacial history. The retreating ice left drifts of sand, gravel, and fragments of older rock carried from the North over dolomitic limestone bedrock. Drumlin and eskar mounds strafe the landscape and morainal hills mark the stuttering progress of the glaciers' retreat. Much of the moraine area is now farmland, but oak woodland and degraded oak savannas are present, and remnant dry prairie may be found on south and west-facing hillsides.

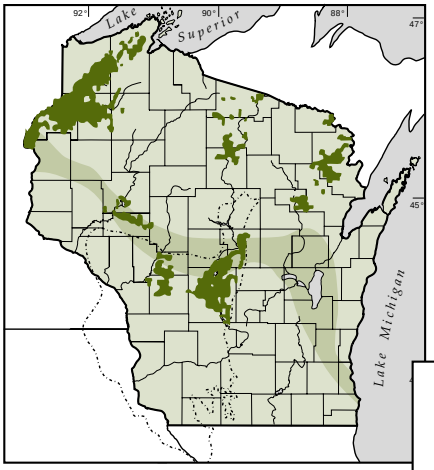
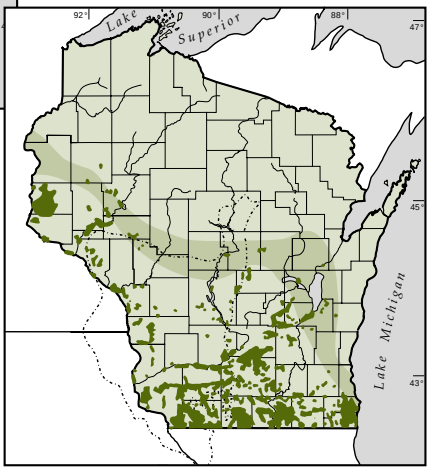


Figure 4. *Original pine barrens habitat in Wisconsin (from Cochrane and Iltis 2000).*

Figure 5. *Original tallgrass prairie habitat in Wisconsin (from Cochrane and Iltis 2000).*



Some areas are dotted with "kettles", formed from melted ice blocks that hold wet prairies, fens, sedge meadows, or conifer swamps. The bedrock is exposed in the Door County peninsula as the rocky cliffs of the Niagara Escarpment above the Lake Michigan shore. Dune and beach communities border the lake, and ridges and swales formed from old Lake Michigan shorelines support conifer swamps, marshes, and sedge meadows with disjunct boreal forest, white cedar, and northern mesic forest on the high ground.

On the western side of the state is the Western Uplands province, the major portion of which is the Driftless Area. This area is exceptional for having been totally surrounded by glaciers but never scraped by the ice or covered in glacial drift. The area abounds in rocky crags, columns, standing rocks, towers, sinkholes, and caves. Residual soils from the sandstone bluffs above the Mississippi River were transported by the wind into pockets of dunes in the river valleys (Martin 1965). Loess deposition contributed to the silt loam soils along the western counties, where many of the original tallgrass prairies were present in openings within the oak forests (Figure 5).

The Driftless Area lacks standing water but is braided by rivers and streams often running in deep valleys called coulees. Today, prairies are most often found on west and south-facing hillsides where conditions mimic the dry, exposed habitats of the West. Many of Wisconsin's grasslands are in the process of being recovered from decades of fire prevention and the spread of red cedar and other persistent woody vegetation.

Grasshopper Habitats

Grasshoppers are generally associated with grasslands, but also occur in barrens, marshes, bogs, interdunal wetlands, and forests, and along cobble and sand beaches. This section includes photographs of some representative grasshopper habitats in Wisconsin.

KATHRYN KIRK

RESTORED PRAIRIE
Sauk County

KATHRYN KIRK

OAK OPENING
UW Arboretum
Dane County

KATHRYN KIRK

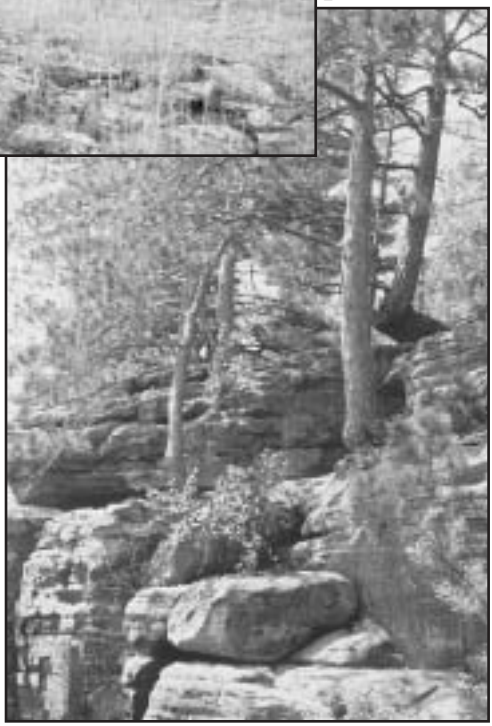
HILL PRAIRIE
Crawford County

OAK SAVANNA
Iowa County

MIKE MOSSMAN

BASALT GLADE
Interstate State Park
Polk County

ERIC EPSTEIN

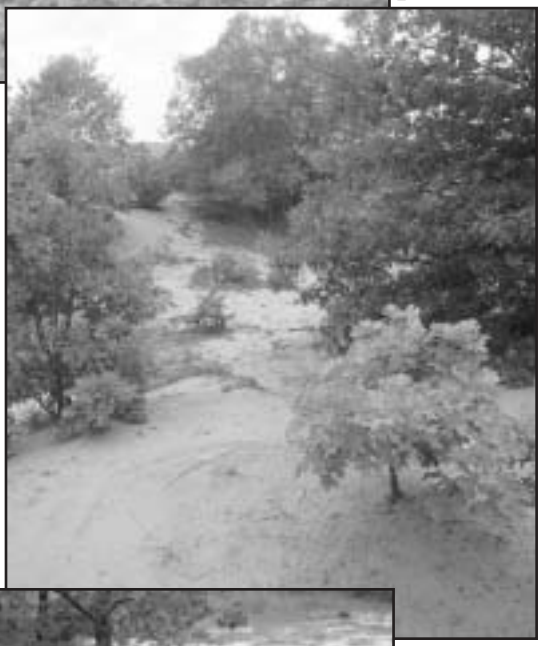


SANDSTONE CLIFF
Lone Rock
Richland County

ERIC EPSTEIN

ERIC EPSTEIN

PINE BARRENS
Stockton Island
Ashland County



THOMAS MEYER

SAND BARRENS
Blue River
State Natural Area
Grant County

SAND BLOWOUT
Millston
Jackson County

ERIC EPSTEIN

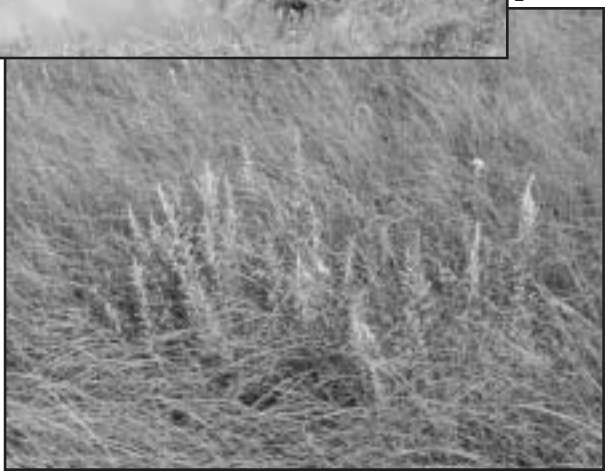
MARSH
Oconto County

KATHRYN KIRK

KATHRYN KIRK

OPEN BOG
Chippewa County Forest
Chippewa County

WIREGRASS SEDGE MEADOW
Black River State Forest
Jackson County



ERIC EPSTEIN

DNR PHOTO ARCHIVES

SANDBAR Wisconsin River *Columbia County*

LAKE MICHIGAN DUNE
Whitefish Dunes State Park
Door County

ERIC EPSTEIN

INTERDUNAL WETLAND
Stockton Island
Ashland County

ERIC EPSTEIN

KATHRYN KIRK

COBBLE BEACH Lake Michigan

ERIC EPSTEIN

DRY-MESIC FOREST
Chambers Island
Door County

KATHRYN KIRK

OLD FIELD
Door County

Grasshopper Biology and Life History

Short horned grasshoppers (Orthoptera: Acrididae) represent a very diverse array of species found occupying numerous habitats around the world. Over 600 species exist in the United States and Canada (Arnett 2000). Grasshoppers are generally associated with grasslands, but also occur in wetlands, marshes, and forests. Grasshoppers are univoltine, having one generation per year. Grasshoppers have an incomplete metamorphosis in which three life stages occur: egg, nymph, and adult. The length of each of these stages varies greatly, depending upon time of year and stage of emergence. From the egg emerges a small first instar nymph. This nymph then passes through multiple instars, with the final instar being the adult stage. Most grasshoppers have 4-6 instars. Morphological features that vary with instar include length of wings, number of antennal segments, and presence of reproductive genitalia in the adults (Capinera and Sechrist 1982).

Adult grasshoppers are found from June to October with most species present in late summer. Males use sound, color, and behavior to attract females. Stridulation, drawing the hind leg across a ridged area of the wing to create sound, is used by some species in tall grasses. Wing-crackling (crepitation), hind leg signaling, and flashes of colorful hind wings are used by banded-winged grasshoppers in open areas. The Melanoplines, with many similar species, use neither of these devices. Rather, the male jumps a female he chances to encounter and begins a species-specific behavior of hind leg shaking. Melanoplines show little diversity of gross morphology but the genitalia of both sexes are specific for each species.

After copulation the female forms an egg pod by combining a frothy excretion, local soil, and the eggs. The female deposits this pod by burying it in the soil (see photograph, page 102), plant roots, or rotten logs, or laying it directly on the surface of the soil. The eggs go through an obligatory diapause before hatching in the spring. Pods vary in egg number depending on the species; from 3-5 eggs per pod in *Ageneotettix deorum* to nearly 200 eggs per pod in *Melanoplus differentialis differentialis* (Pfadt 1994). Females will deposit multiple egg pods during the adult stage. Most species overwinter as eggs. Six species found in Wisconsin (*Eritettix simplex, Arphia conspersa, A. sulphurea, Chortophaga viridifasciata, Pardalophora apiculata* and *P. haldemani*), however, are exceptions. These species overwinter as late instars and complete development in the spring. Adults are present typically until mid-June.

Grasshoppers represent an economically important insect in many parts of the United States given their destructive nature in agricultural and rangeland settings. Many western states often report grasshopper densities in excess of 15 grasshoppers per square meter. These population outbreaks often require use of a chemical or biological agent to control the population. While large outbreaks have not been recorded recently in Wisconsin, there were numerous reports of crop damage by grasshoppers in the mid-1930s. Actual documented records of such events, however, are scarce. Fortunately, such levels of damage no longer occur in Wisconsin.

DICK DUBIELZIG

The Wisconsin Grasshopper Fauna

The inspiration for this project began with the U.S. Fish and Wildlife Service's Partnership for Wildlife survey of prairie invertebrates. We began collecting specimens in 1996 on state-owned forest, park, and wildlife properties and on managed prairie remnants on hillsides, bluff tops, and railroad rights-of-way. The majority of specimens collected during the study were taken from grasslands: hill prairie (goat prairie), pine/oak barrens, sand prairie, open oak woodland, and jack pine forest, with attention given to roadsides, sandblows, and gravel pits. Wetland sites were poorly represented in our efforts, as were beach and sand dune communities, boreal forest, northern mesic forest, and southern lowland forest.

From 1999 to 2002, 18 entomological collections were surveyed. The majority of grasshopper specimens were found at the University of Wisconsin Insect Research Collection and the Milwaukee Public Museum. Teaching and student collections at the University of Wisconsin campuses of Eau Claire, Green Bay, La Crosse, Oshkosh, Platteville, River Falls, Stevens Point, Stout, Superior, and Whitewater, University of Minnesota-Duluth, Winona State University, and the UW Arboretum in Madison were surveyed for acridid specimens. We examined specimens from the Leopold Foundation in Sauk County and Lawrence University in Appleton. Wisconsin specimens also were discovered in the collections of the Field Museum of Natural History, Illinois Natural History Survey, University of Minnesota, University of Michigan, and the Academy of Natural Sciences of Philadelphia.

In addition, we examined specimens collected during the period of the study by other prairie invertebrate researchers, Wisconsin DNR wildlife managers, and conservation biologists at the Wisconsin DNR Bureau of Endangered Resources. Specimens were identified using keys in Otte (1981, 1984) and Vickery and Kevan (1985), with help from Scudder (1897), Brooks' (1958) drawings of the *Melanoplus* spp. genitalia, and Hubbell's (1960) and Song's (2004) treatments of *Schistocerca* spp.

We have identified 70 species of Acrididae from Wisconsin, none of which are endemic to the state. We also believe one additional species (not included in the list below) is adventive. *Romalea microptera* (not a true short horned grasshopper, Orthoptera: Romaleidae*)* was collected June 23, 1973, on the bluffs above the Mississippi River in the southwestern corner of the state and one was also collected in a garden in Madison on July 20, 1965. The first specimen was likely a migrant from Mississippi River barge traffic; the second specimen is less understood, but perhaps represents an escaped specimen from a biology class.

Ten other species were collected at only one site and may now be extirpated from the state. These are *Pardalophora phoenicoptera, Hippiscus ocelote, Metaleptea brevicornis, Schistocerca alutacea, S. americana, S. damnifica, Paratylotropidia brunneri, Encoptolophus costalis, Hesperotettix speciosus,* and *Melanoplus rusticus obovatipennis.* Only one species on this list, *H. speciosus,* has been collected recently in Wisconsin; the others have not been collected in at least 25 years. Further survey work needs to be done to clarify the status of these species in Wisconsin.

It is possible that another sixteen species may be found in the state, based on collections in neighboring states in habitat similar to that found in Wisconsin. Nine of these species (*Melanoplus packardii, M. occidentalis, Hypochlora alba, Campylacantha olivacea, Amphitornus coloradus, Mermiria picta, Boopedon auriventris, Metator pardalinus, and Xanthippus corallipes*) are known from the grasslands to the West. Two species are preferential to wetlands or wet grassland, and include *Stethophyma celata* from Minnesota and Illinois and *Paroxya hoosieri* from Michigan and Indiana. Five species are associated with northern woodlands of Michigan and Minnesota and include *Melanoplus eurycercus, M. gracilis, M. huroni, Appalachia arcana* (endemic to Michigan), and *Booneacris variegata*. To confirm these species in Wisconsin, formal surveys will need to be conducted in appropriate habitats. The woodland and wetland habitats, for example, have not been surveyed in any manner for grasshoppers. To account for their potential presence in Wisconsin, we incorporated most of these species into the taxonomic keys included in this guide.

GIFF BEATON

GRASSHOPPER

IDENTIFICATION KEYS

GIFF BEATON

ERIC EPSTEIN

Grasshopper Anatomy

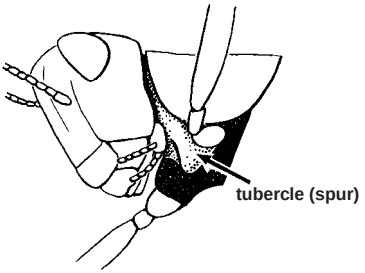


Figure 6. *Prosternal tubercle of spurthroat grasshopper (adapted from Capinera and Sechrist 1982).*

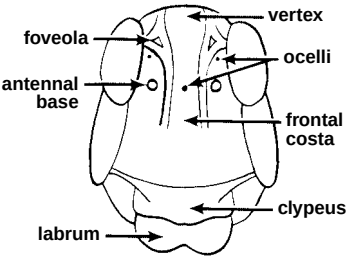


Figure 7. *Frontal view of adult grasshopper head (adapted from Capinera and Sechrist 1982).*

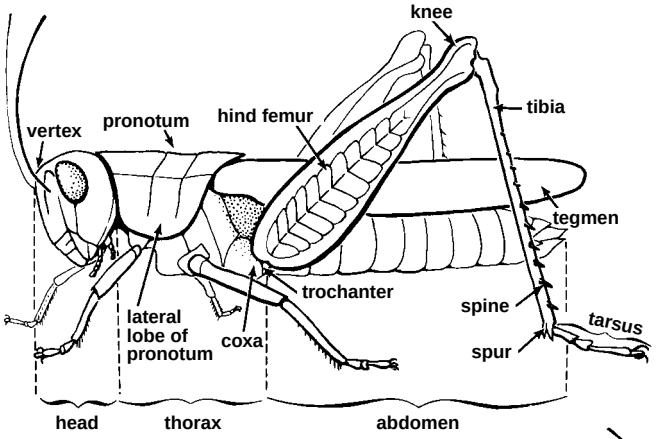


Figure 8. *Lateral view of adult grasshopper (adapted from Capinera and Sechrist 1982).*

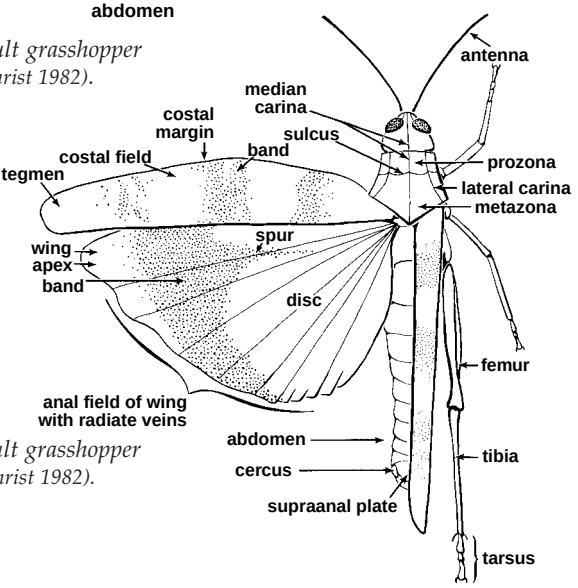


Figure 9. *Dorsal view of adult grasshopper (adapted from Capinera and Sechrist 1982).*

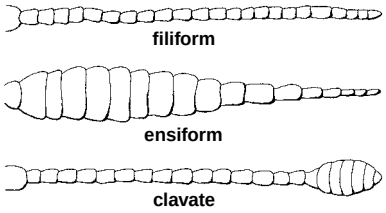


Figure 10. *Grasshopper antennae (adapted from Pfadt 1994).*

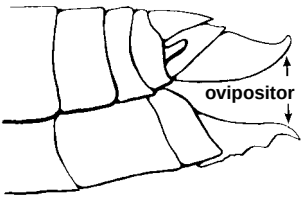


Figure 11. *Female reproductive anatomy (adapted from Capinera and Sechrist 1982).*

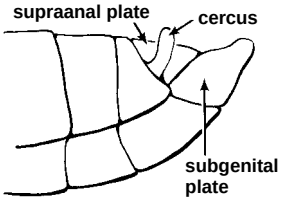


Figure 12. *Male reproductive anatomy, lateral view (adapted from Capinera and Sechrist 1982).*

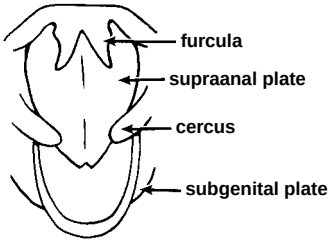


Figure 13. *Male reproductive anatomy, dorsal view (adapted from Capinera and Sechrist 1982).*

Identification Keys

In this section of the guide, we present keys for the identification of Wisconsin grasshoppers. These keys apply only to adult grasshoppers. For help in species identification of immature acridids refer to Pfadt (1994). We have included a few species in the keys that have not yet been found in Wisconsin, but may occur here. The names of these species are presented in parentheses. Body length is measured from the front of the head to the end of the abdomen.

Key to the Subfamilies

1a. With a distinct knob at the base of the neck (prosternal tubercle) (see Figure 6) . . . **Cyrtacanthacridinae and Melanoplinae,** KEY B

1b. Lacking a prosternal tubercle **2**

2a. Vertex angular, face strongly slanted to vertical, hind wings transparent, antennae filiform, ensiform, or clavate (see Figure 10) . . . . . **Acridinae and Gomphocerinae,** KEY A

2b. Vertex rounded, face usually vertical, hind wings often banded and strongly colored, antennae typically filiform or clavate (see Figure 10) . . . **Oedipodinae,** KEY C

KEY A. The Slantfaced Grasshoppers (Acridinae and Gomphocerinae)


GIFF BEATON

1a. FOVEOLAE AREA VISIBLE FROM ABOVE **2**
1b. FOVEOLAE AREA NOT VISIBLE FROM ABOVE **8**

2a. Clavate antennae (less obvious on females) (see Figure 10), white vertical stripe in front of eye . . . . . *Aeropedellus clavatus*
2b. Filiform antennae (see Figure 10) **3**

3a. HIND FEMORA DISTINCTLY MARKED **4**
3b. HIND FEMORA UNMARKED, wet habitats **5**

4a. Tegmina extending nearly to end of abdomen, femora with dark triangles on dorsal surface, pale antennae, hind tibial spurs unequal in length . . . . . *Ageneotettix deorum*
4b. Tegmina short, hind tibial spurs equal in length . . . . . *(Boopedon auriventris)*

5a. Prozona longer than metazona, vertex carina indistinct, narrowly rectangular foveolae, body length less than 20mm . . . . . *Chorthippus curtipennis*
5b. Prozona not longer than metazona, vertex carina distinct, foveolae triangular, body length at least 23mm **6**

6a. Prozona distinctly shorter than metazona, pronotal lateral carinae divergent posteriorly and cut by more than one sulcus, hind tibial spines black **7**
6b. Prozona subequal to metazona, carinae only vaguely divergent and cut by one sulcus, hind tibial spines yellow with black tips, upper third of lateral lobes of pronotum dark . . . . *(Stethophyma celata)*

7a. Tegmina with a white streak along the side, lateral carinae cut by three sulci . . . . . *Stethophyma lineata*
7b. Tegmina lacking white streak, lateral carinae cut by two sulci . . . . . *Stethophyma gracile*

8a. Three dorsal carinae on head and pronotum (pronotal ridges may be obscure on some males), adults present in May . . . . . *Eritettix simplex*
8b. Only one dorsal carina on head and pronotum **9**

9a. ANTENNAE ENSIFORM (see Figure 10) **10**
9b. ANTENNAE FILIFORM (see Figure 10) **14**

10a. Tips of tegmina cut obliquely (see photograph, page 43), extending well beyond hind femora, rare wetland species . . . . . *Metaleptea brevicornis*
10b. Tips not cut obliquely, tegmina short or long **11**

11a. VERTEX CARINA DISTINCT, lateral pronotal carinae cut by one sulcus, postocular bands indistinct or lacking **12**

11b. VERTEX CARINA INDISTINCT, lateral pronotal carinae cut by at least two sulci, distinct postocular bands **13**

12a. Abdomen extending beyond hind femora, tegmina shorter than both, tall grasses in prairie habitat . . *Pseudopomala brachyptera*

12b. Hind femora longer than abdomen, possibly host specific on blue grama grass (*Bouteloua gracilis*), western prairie species *Opeia obscura*

13a. Lateral carinae cut by three sulci, female tegmina with a light streak, apex of male subgenital plate a blunt cone, vertex broadly rounded, tall grasses of prairie habitat . . . . . *Mermiria bivittata*

13b. Lateral carinae cut by two sulci, tegmina lacking a light streak, male subgenital plate strongly tapering, vertex long and narrowly rounded, dry prairie and sandy habitats . . . . . *(Mermiria picta)*

14a. VERTEX LACKING A MEDIAN CARINA, males with enlarged fore and middle femora **15**

14b. VERTEX WITH DISTINCT MEDIAN CARINA, males without enlarged femora **17**

15a. Lateral pronotal carinae parallel, tegmina usually extending only to mid-abdomen, body typically very green . . . *Dichromorpha viridis*

15b. Lateral carinae constricted, tegmina extending beyond abdomen **16**

16a. Lateral pronotal carinae cut by one sulcus, impression on vertex narrow and near margin, tegmina usually shorter than hind femora . . . . . *Orphulella speciosa*

16b. Lateral carinae cut by two or more sulci, impression on vertex forming a quarter moon distinctly behind margin, tegmina equal to or longer than hind femora . . *Orphulella pelidna*

17a. Large species, male body length 22-27 mm, females 35-40 mm, tegmina with a line of large spots . . . . . *Syrbula admirabilis*

17b. Small species, males shorter than 20 mm, females shorter than 28 mm, tegmina lacking a line of spots **18**

18a. HIND TIBIA RED OR ORANGE, tegmina not longer than abdomen **19**

18b. HIND TIBIA BLUE, tegmina longer than abdomen . . . . . *(Amphitornus coloradus)*

19a. Male lateral pronotum entirely black, female tegmina with rounded tips typically covering about half of abdomen, hind femur with a central white spot, female inner hind femur black basally, macropterous females found occasionally . . . . . *Chloealtis conspersa*

19b. Male lateral pronotum black along upper edge only, female tegmina extending only to about one-third length

of abdomen with pointed tips, posterior pronotal margin rou
female hind femora not as above . . . . . *Chloealtis ab*

VALERIE WRIGHT

KEY B. The Spurthroated Grasshoppers (Cyrtacanthacridinae and Melanoplinae)

For species identification, lab or field examination of *Melanoplus* spp. males are preferred over females, given the greater dissimilarity of external genital structures between males of different species.

1a. WINGS ABSENT **2**

1b. WINGS PRESENT **3**

2a. Anterior edge of pronotum rounded and with a shallow notch, male antennae same length as hind femora, male cerci black and only slightly narrowed at the middle . . . . *Booneacris glacialis canadensis*

2b. Anterior edge of pronotum truncate, male antennae longer than length of hind femora, male cerci brown and strongly narrowed at the middle . . . *(Booneacris variegata)*

3a. Green body with pink colorations and usually a salmon-colored ring above hind knee, tegmina typically do not reach end of abdomen . . . **4**

3b. Not as above **5**

4a. Surface of prozona smooth, pronotum with a yellow central stripe and only slightly tectiform, tegmina may extend beyond abdomen . . . . *Hesperotettix viridis pratensis*

4b. Surface of prozona rough, pronotum distinctly tectiform with medium carina purplish, tegmina shorter than abdomen . . . . . *Hesperotettix speciosus*

5a. SHORT-WINGED, tegmina do not reach end of abdomen (some long-winged females during oviposition appear to have wings shorter than abdomen because abdomen is extended) **6**

5b. LONG-WINGED, tegmina reach end of abdomen or beyond **22**

6a. Bright green legs, pronotum twice as long as dorsal pronotal width with parallel sides, tegmina linear and two-thirds abdominal length, hind femora unbanded . . . . *(Paroxya hooseri)*

6b. Legs, if green, not so bright, pronotum shorter, tegmina, if linear, much shorter, hind femora banded or unbanded **7**

7a. SHORT TEGMINA, UP TO 1-½ TIMES PRONOTAL LENGTH **8**

7b. LONGER, STRONGLY OVERLAPPING TEGMINA 1½ TIMES PRONOTAL LENGTH TO NEAR APEX OF ABDOMEN . . . **20**

8a. Head large, nearly 1½ times length of pronotum, anterior edge of pronotum flared for the large head, edges of tegmina rolled inward . . . . *Phoetaliotes nebrascensis*

8b. Head not large, edges of tegmina not rolled inward **9**

9a. Body and tegmina unicolorous green, associated with wormwoods

(*Artemisia* sp.) or perennial ragweed (*Ambrosia psilostachya*) **10**

9b. Body brown, yellow or dark green, abdomen brown or yellow **11**

10a. Pale sage-colored body, abdomen pinkish, tegmina apices narrowed to blunt points . . . . . *(Hypochlora alba)*

10b. Grass-green body conspicuously covered with short pale hairs . . . . . *(Campylacantha olivacea)*

11a. HIND TIBIAE GREEN OR BLUE, male genitalia as in Appendix B, Table A **12**

11b. HIND TIBIAE RED/ PINK, male genitalia as in Appendix B, Table B . . **15**

12a. Tegmina narrowly oblong and well separated, hind femora unbanded . . . . . *(Melanoplus gracilis)*

12b. Tegmina round or oval, hind femora banded or not **13**

13a. Hind femora red on lower edge, head large, male cerci twisted, yellow basal ring on hind tibiae, oak forest species . . . . . *Dendrotettix quercus*

13b. Hind femora may be yellow-orange but not red on lower edge, male cerci straight, hind tibiae basal ring creamy but not yellow . . . **14**

14a. Black and white basal rings on hind tibiae, hind femora strongly banded, though less so on female, female body length usually less than 24 mm . . . . . *Melanoplus viridipes*

14b. Black basal ring lacking on hind tibiae, femoral bands indistinct, female at least 24 mm in length, adults appear after August . . . . *Melanoplus rusticus obovatipennis*

15a. Tegmina broadly rounded, dorsal abdomen with wide light stripe . . . *Melanoplus islandicus*

15b. Tegminal apices narrowed to blunt points, abdominal stripe thin or lacking **16**

16a. TEGMINA WITH DORSAL AND LATERAL SURFACES SHARPLY DEFINED, usually with dorsal areas lighter **17**

16b. TEGMINA WITHOUT WELL DEFINED DORSAL AREAS **19**

17a. Dorsum of pronotum distinctly carinate laterally and marked with pale stripes that extend from behind eyes to tips of tegmina, males lack furculae, female ovipositor valve apices notched . . . . . *Paratylotropidia brunneri*

17b. Dorsum of pronotum rounded onto lateral lobes and lacking pale stripes, males with furculae, female ovipositor valves unnotched . . **18**

18a. Dorsal areas of tegmina light brown with a few speckles, hind femora pale or reddish-yellow below, female body length 23-29 mm with a distinct 90 degree notch on 8th abdominal sternum (Figure 20) . . . . . *Melanoplus walshii*

18b. Tegmina dark brown with a row of dark quadrate spots, head and pronotum speckled, hind femora deep red below, female body length at least 28 mm with an obtuse notch

on 8th abdominal sternum (Figure 19) . . . . . *(Melanoplus huroni)*

(Key B continued on next page)

KEY B. **(Continued)**

19a. Prozona longer than broad, anterior edge of pronotum truncate to faintly notched, abdomen not distinctly banded . . . . . *Melanoplus scudderi scudderi*

19b. Prozona broader than long or quadrate, abdominal segments banded with anterior portion black and posterior portion yellow . . . . . *Melanoplus dawsoni*

20a. Large species with convergent light stripes on tegmina, femora with dark longitudinal stripe on upper half of the outer face, male cercus with a protrusion (Appendix B, Table E) . . . . . *Melanoplus bivittatus*

20b. Smaller species (females shorter than 25 mm) lacking stripes on tegmina, hind femora banded, male cercus lacking a protrusion (Appendix B, Table C) **21**

21a. Distinct bands on outer faces of femora, tibias paler near base, prosternal tubercle short and stout, in northern habitats under conifers in association with heaths-blueberries or huckleberries . . . . . *Melanoplus fasciatus*

21b. Unbanded outer femora, prosternal tubercle moderately long, in lush grasses or wetland habitats . . *Melanoplus borealis borealis*

22a. MESOSTERNUM LATERAL LOBES LONGER THAN WIDE with straight inner margins (Figure14), large-bodied grasshoppers . . . . . Cyrtacanthacridinae, Bird Locusts, **23**

22b. LATERAL LOBES AS WIDE AS LONG with curved inner margins (Figure15) **26**

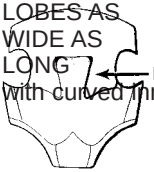


Figure 14. Cyrtacanthacridinae mesosternum (adapted from Capinera and Sechrist 1982).

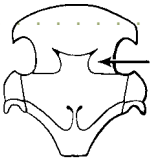


Figure 15. Melanoplinae mesosternum (adapted from Capinera and Sechrist 1982).

23a. Tegmina marked with very large dark brown spots extend well beyond abdomen, large species (males to 52 mm, females to 68 mm) . . *Schistocerca americana*

23b. Tegmina slightly beyond abdomen marked with little or no mottling, body smaller **24**

24a. Rusty-brown body with narrow brown mid-dorsal stripe on head,

pronotum tectate, small *Schistocerca* (males 25-29 mm, females 37-46 mm) . . *Schistocerca damnifica*

24b. Body usually light brown with or without a pale mid-dorsal stripe, body larger **25**

25a. With or without pale mid-dorsal stripe, male fore and middle femora inflated, throughout the state particularly in dry habitats . . . . . *Schistocerca lineata*

25b. Always with a pale mid-dorsal stripe on head, pronotum and usually to wingtips, males without inflated fore and middle femora, moist habitats, wetlands, or thickets of mesic forest in southeastern Wisconsin . . *Schistocerca alutacea*

Note: **The following portion of the key covering the long-winged *Melanoplus* spp. includes the uncommon macropterous forms of the typically short-winged species *M. dawsoni, M. borealis borealis,* and *M. fasciatus.***

26a. MALES (see Appendix B, Tables D, E and F) **27**

26b. FEMALES (see Appendix B, Table G) **43**

27a. LONG FURCULAE covering more than one-third length of supra-anal plate (see Appendix B, Table D) **28**

27b. SHORT FURCULAE from one-third length of supra-anal plate to mere nubs (see Appendix B, Tables E and F) **33**

28a. Notched subgenital plate (feebly emarginate in *Melanoplus dawsoni*) **29**

28b. Subgenital plate unnotched **31**

29a. MESOSTERNUM WITH BLUNT TUBERCLE OR SWELLING (less conspicuous on females), cerci slightly narrowed at the middle and about twice as long as wide **30**

29b. NO TUBERCLE ON MESOSTERNUM, cerci narrowed at the middle and more than twice as long as wide with apex spatulate, abdomen bright yellow with black bands on anterior portions of segments (see Appendix B, Table B) . . . *Melanoplus dawsoni*

30a. Hind femora entirely yellowish below, furculae heavy and pointed downward, found mostly in forested or shrubby areas . . . . . *Melanoplus bruneri*

30b. Hind femora with red/pink on outer and lower flanges, furculae pointed outward, most commonly found in open areas . . . . . *Melanoplus sanguinipes sanguinipes*

31a. Tibiae blue with white spines tipped in black, furculae truncate . . . . . *Melanoplus flavidus*

31b. Tibiae red to yellowish, furculae not truncate **32**

32a. Subgenital plate expanded, cerci apices truncate . . . . . *Melanoplus femurrubrum*

32b. Subgenital plate not expanded, cerci apices rounded (see Appendix B, Table C) . . . . . *Melanoplus borealis borealis*

33a. CERCUS WITH A VENTRAL PROTRUSION (see Appendix B, Table E) **34**

33b. CERCUS WITHOUT A PROTRUSION (see Appendix B, Table F) . . **38**

(Key B continued on next page)

KEY B. **(Continued)**

34a. Cercus ventral protrusion is a distinct thumb . . . . . *Melanoplus keeleri luridus*

34b. Cercus ventral protrusion is only a knob or corner **35**

35a. Small to medium species, about 18-19 mm, with bent cerci . . . . . *Melanoplus confusus*

35b. Large species with large, longer than 19 mm, roughly boot-shaped cerci **36**

36a. Distinct round fuscous spots on tegmina, cercus “boot sole” flat . . . . . *Melanoplus punctulatus griseus*

36b. No spots on tegmina, “boot sole” arched **37**

37a. Hind femora marked with a herringbone pattern . . *Melanoplus differentialis differentialis*

37b. Hind femora with dark longitudinal stripe on upper portion of its outer face . . . . . *Melanoplus bivittatus*

38a. APEX OF CERCUS UNSYMMETRICAL, extending further ventrally . . **39**

38b. CERCUS hourglass shaped, widening to a SYMMETRICAL APEX . . **40**

39a. Hind femora yellow below and inside with lower flange obsolete basally, dorsal portion of tegmina with spots, present after mid-August in dry grassy areas, never in forests . . . . *Melanoplus gladstoni*

39b. Hind femora red to orange below with lower flange complete, found June to September in northern habitats under conifers in association with heaths (see Appendix B, Table C) . . . *Melanoplus fasciatus*

40a. Furculae nearly one-third length of supra-anal plate, apex of subgenital plate subtruncate with a wide saddle-like notch . . . . . *Melanoplus angustipennis*

40b. Furculae much shorter, subgenital plate broadly rounded **41**

41a. Hind femora banded only on dorsal and inner surface, hind tibiae may be red or blue without dark basal ring, forewings immaculate or with a few faint spots near base **42**

41b. Hind femora with distinct broad black bands, tibiae dark red possibly with darker basal ring, median areas of tegmina with row of subquadrate dull yellow spots, coloration dark fuscous brown above, dull yellow-reddish below, found in sandy areas in northern pine forests and pine barrens . . . . *Melanoplus stonei*

42a. The species in this couplet can clearly be separated only by examination of internal genitalia. LIGHT COLORATION, yellowish brown to reddish, usually with two pale stripes on pronotum and dark stripe on top of head extending to posterior pronotum, hind tibiae usually blue, male usually longer than 24 mm, female usually longer than 26 mm, found in sandy, gravelly grasslands . . . . MIGHT BE *(Melanoplus packardii packardii)*

42b. DARK COLORATION, greenish brown to greenish gray, may or may not have pale stripes, hind tibiae may be blue, red, or pink, male usually shorter than 24 mm, female usually shorter than 26 mm, found in sandy habitat along lakes and waterways . . . . . *Melanoplus foedus fluviatilis*

43a. MESOSTERNUM WITH SWELLING OR BLUNT TUBERCLE **44**

43b. MESOSTERNUM FLAT **45**

44a. Dorsal angle of dorsal ovipositor valve slightly more than 90 degrees (Figure 16), hind femora with red or pink on outer and lower flanges, long tegmina . . . . . *Melanoplus sanguinipes sanguinipes*

44b. Dorsal ovipositor valve broadly curved (Figure17), hind femora yellowish below, tegmina extend to hind knees . . . . . *Melanoplus bruneri*

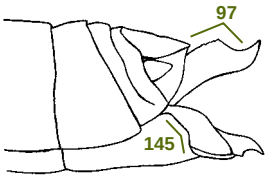
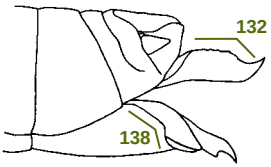


Figure 16. *Melanoplus sanguinipes,* female genitalia (adapted from Vickery and Kevan 1985).

Figure 17. *Melanoplus bruneri,* female genitalia (adapted from Vickery and Kevan 1985).



45a. Significant acute notch on 8th abdominal sternum resulting in an extended lobe (Figure 18) **46**

45b. Notch angle 90 degrees or more **47**

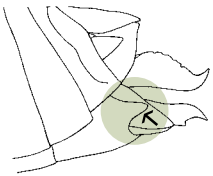


Figure 18. Abdominal sternum with extended lobe (adapted from Vickery and Kevan 1985).

46a. Large body over 30 mm, yellow hind femora with herringbone pattern, cercus narrowed to a point . . *Melanoplus differentialis differentialis*

46b. Smaller species, dark hind femora banded and lacking herringbone pattern, cercus blunt, ventral ovipositor valve untoothed or barely toothed, prominent eyes, coniferous or possibly oak habitat . . . . . *Melanoplus punctulatus griseus*

(Key B continued on next page)

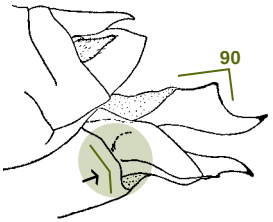
47a. Dorsal angle of dorsal ovipositor valve NEAR 90 DEGREES (Figure 19) **48**

47b. Angle of dorsal ovipositor valve WELL OVER 90 DEGREES (Appendix B, Table G) **51**

48a. Notch on 8th abdominal sternum 100 degrees or more (Figure 19) . . . **49**

48b. Notch on 8th abdominal segment with angle about 90 degrees (Figure 20) **41**

Figure 19. Abdominal sternum with obtuse notch (adapted from Vickery and Kevan 1985).



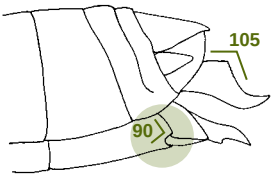


Figure 20. Abdominal sternum with right angled notch (adapted from Vickery and Kevan 1985).

49a. Body length less than 25 mm, tibiae blue or not **50**

49b. Body length at least 25 mm, tibiae blue or purple . . . . . *Melanoplus flavidus*

50a. Cercus stubby and convex on both sides (Figure 21), prosternal tubercle large and thick, a shiny black patch behind eye uninterrupted by pale markings and extending onto prozona . . . . . *Melanoplus confusus*

50b. Cercus elongate (Figure 22), prosternal tubercle narrow, black marking behind eye interrupted by pale markings . . . . . *Melanoplus angustipennis*

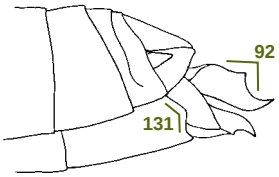


Figure 21. *Melanoplus confusus,* female genitalia (adapted from Vickery and Kevan 1985).

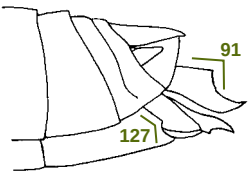


Figure 22. *Melanoplus angustipennis,* female genitalia (adapted from Vickery and Kevan 1985).

51a. Abdomen bright yellow with black bands on anterior of segments . . . . . *Melanoplus dawsoni*

51b. Not as above **52**

Note: **The following species are best separated by identification of associated males. Appendix B, Table G provides an additional aid to separate females of these species.**

52a. Hind femora without bands **53**

52b. Hind femora with conspicuous bands **54**

53a. Hind femora with a dark longitudinal stripe on upper portion, lower surface of femora yellow, tegmina usually extend beyond hind knees . . . *Melanoplus femurrubrum*

53b. Hind femora marked with dark patches on dorsal and inner surface only and lower surface light orange to red, tegmina usually do not extend to hind knees . . . . *Melanoplus borealis borealis*

54a. Hind femora distinctly banded with black markings merging into a line pointed toward the base and lower surface yellow-orange . . . . . *Melanoplus keeleri luridus*

54b. Hind femora red-orange below or, if yellow below, with marks only on upper and inner surfaces **39**

BART DREES

KEY C. The Bandwinged Grasshoppers (Oedipodinae)


GIFF BEATON

1a. MEDIAN PRONOTAL CARINA CUT BY ONE SULCUS **2**

1b. MEDIAN PRONOTAL CARINA CUT BY TWO OR MORE SULCI . . **19**

2a. BASE OF HIND WINGS CLEAR, SMOKEY, OR WITH A YELLOW TINT **3**

2b. BASE OF HIND WINGS STRONGLY COLORED (yellow/orange/red) OR BLACK **6**

3a. Front portion of lateral pronotal lobes glossy black, tegmina with dark spots and converging light stripes, hind wings clear . . . . . *Camnula pellucida*

3b. Lateral lobes of pronotum not so marked, tegmina clear, speckled, or banded **4**

4a. Adults present in spring to early summer, tegmina and hind femora lacking bands, females usually green and males brown in Wisconsin . . . . *Chortophaga viridifasciata*

4b. Adults in late summer to fall, tegmina and hind femora with 2-3 dark cross bands **5**

5a. Hind tibiae brown-black, vertex wider than long, metazona with black dashes perpendicular to posterior edge, abdomen wood brown . . *Encoptolophus sordidus*

5b. Hind tibiae blue-gray, vertex longer than wide, metazona with black marks but not dashes, abdomen yellow. . *Encoptolophus costalis*

6a. Disc of hind wings black with pale margins . . *Dissosteira carolina*

6b. Disc of hind wings yellow, orange, or red and bordered by a black band **7**

7a. HIND TIBIAE RED, ORANGE, OR YELLOW **8**

7b. HIND TIBIAE LACKING RED, ORANGE, OR YELLOW **15**

8a. Hind tibiae with black bands in basal third **9**

8b. Hind tibiae without black bands **10**

9a. Median pronotal carina as high as top of head in profile, body brown, tegmina with wide bands, wide black bands on hind tibiae, dry deciduous woods and wood margins . . . . . *Spharagemon bolli*

9b. Median pronotal carina low, body and tegmina heavily mottled, black bands on hind tibiae narrow, sandy soil, pine woods, pine/oak barrens . . . . *Spharagemon marmorata marmorata*

10a. MOTTLED BODY, tegmina speckled with tiny spots, black band across center third of hind wing, pronotum smooth **11**

10b. UNMOTTLED head, thorax, and hind femora, tegmina with large blotches, black hind wing band marginal, pronotum tuberculate . . . **12**

11a. Median pronotal carina as high as top of head in profile and deeply cut, posterior margin of pronotum forming a distinctly acute angle, on sand dunes, beaches, sand blows . . . . *Spharagemon collare*

11b. Median pronotal carina low and shallowly cut, posterior pronotal angle obtuse or near 90 degrees some females of . . . . . *Spharagemon marmorata marmorata*

12a. Adults from spring to early July, METAZONA LONGER THAN PROZONA **13**

12b. Adults from late July to fall, PROZONA AND METAZONA SUBEQUAL . . . *Hippiscus ocelote*

13a. Inner faces of hind femora yellow-orange with black bands **14**

13b. Inner faces of hind femora yellow-orange with no black bands . . . . . *Pardalophora haldemani*

14a. Inner faces of hind femora yellow-orange, tegmina evenly dark between Cu1 and Cu2 veins (see Figure 23), hind wings red, adults from May through June in dry, open, sparsely vegetated habitat . . . . . *Pardalophora apiculata*

14b. Inner faces of hind femora blue, tegmina spotted between Cu1 and Cu2 veins, dorsal areas of tegmina may have pale converging lines, hind wings orange to red, adults present after June in sedges and tall grasses of ravines, slopes, woods openings, a southern species . . . *Pardalophora phoenicoptera*

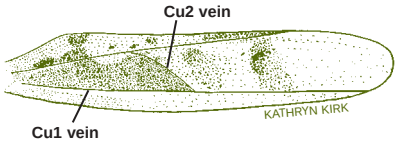


Figure 23. Cubitus wing veins of *Pardalophora apiculata.*

15a. ADULTS FROM SPRING TO MID-SUMMER **16**

15b. ADULTS FROM MID-SUMMER TO FALL **18**

16a. Fastigium as broad as long, foveolae square, hind tibiae light brown to black with black band . . . . . *Arphia sulphurea*

16b. Fastigium longer than broad, foveolae not square, inner face of hind tibiae may be bluish and may or may not be banded . . **17**

17a. Foveolae triangular, male body length less than 25 mm., hind tibiae unbanded and yellowish with perhaps a bluish cast, hind wings red to yellow . . . . . *Arphia conspersa*

17b. Foveolae rectangular and longer than tall, male body length greater than 28 mm, hind tibiae usually greenish-blue with a black band, hind wings yellow . . . . . *Arphia simplex*

(Key C continued on next page)

18a. Spur of black band on hind wing extending toward the base of the wing only into first half of the colored disc (see Figure 9), hind wings yellow, median pronotal carina as high as top of head in profile . . . . . *Arphia xanthoptera*

18b. Spur of black band on hind wing extending into the upper half of the colored disc, hind wings pink to red or yellow, median pronotal carina low . . . . . *Arphia pseudonietana*

19a. ANTENNAE ENSIFORM (see Figure 10), tibiae greenish, open sand habitat . . . . . *Psinidia fenestralis*

19b. ANTENNAE FILIFORM (see Figure 10), tibiae may be pale blue but not greenish **20**

20a. Hind tibiae red, adults from May to early July **21**

20b. Hind tibiae not red, adults from July to September **22**

21a. Inner faces of hind femora red, median pronotal carina may be indistinct on prozona, dry prairies, gravelly to rocky soils . . . . . *(Xanthippus corallipes)*

21b. Inner faces of hind femora usually yellow-orange, median pronotal carina distinct on prozona . . *Paradalophora haldemani*

22a. HIND TIBIAE BLUE TO BLUE-GRAY **23**

22b. HIND TIBIAE BROWN TO DULL YELLOW **24**

23a. MALE CERCI POINTED, distinct white spot on lateral pronotal lobe, hind wings clear or pale yellow, bare rocky or gravelly ground, quarries, roadsides . . . *Trachyrhachys kiowa*

23b. MALE CERCI SPOON-SHAPED, lateral pronotal lobe unspotted, hind wings yellow or orange, western short-grass prairie species . . . . . *(Metator pardalinus)*

24a. Body and tegmina sooty dark gray to blackish, on rocky habitat of riverways, lakeshores, lichen-encrusted rock, gravel pits . . . . . *Trimerotropis verruculata verruculata*

24b. Body and tegmina usually pale, yellow, gray-brown, burnt orange or reddish with white markings, in sandy habitat **25**

25a. Inner faces of hind femora pale basally, southern and western Wisconsin on sandy shores of lakes and rivers . . . . . *Trimerotropis maritima*

25b. Inner faces of hind femora with black in the basal area, northern Great Lakes dunes . . . . . *Trimerotropis huroniana*

GRASSHOPPER

COLOR PLATES

MIKE REESE

ERIC EPSTEIN

On the Grasshopper and Cricket

THE POETRY of earth is never dead:
When all the birds are faint with the hot sun,
And hide in cooling trees, a voice will run
From hedge to hedge about the new-mown mead;
That is the Grasshopper's—he takes the lead
In summer luxury,—he has never done
With his delights; for when tired out with fun
He rests at ease beneath some pleasant weed.
The poetry of earth is ceasing never:
On a lone winter evening, when the frost
Has wrought a silence, from the stove there shrills
The Cricket's song, in warmth increasing ever,
And seems to one in drowsiness half lost,
The Grasshopper's among some grassy hills.

December 30, 1816.

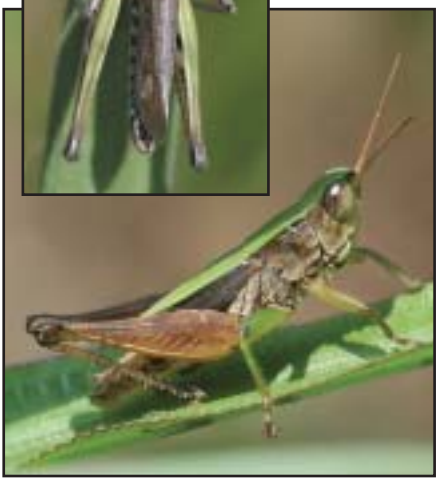
—John Keats (1795–1821)

GIFF BEATON

Metaleptea brevicornis

DAN JOHNSON

Aeropedellus clavatus



GIFF BEATON

Dichromorpha viridis

VALERIE WRIGHT

Mermiria bivittata

KATHRYN KIRK

Syrbula admirabilis

DAN JOHNSON

Pseudopomala brachyptera

KATHRYN KIRK

Ageneotettix deorum

Chorthippus curtipennis

DAN JOHNSON

Eritettix simplex

STEVE WHITE

DAN JOHNSON

Chloealtis abdominalis

Orphulella pelidna

GIFF BEATON

Spurthroated Grasshoppers
(Cyrtacanthacridinae and Melanoplinae)

GIFF BEATON

Schistocerca americana

VALERIE WRIGHT

Schistocerca lineata

KATHRYN KIRK

Melanoplus angustipennis

Melanoplus bivittatus

JANICE STEIFEL

Melanoplus differentialis differentialis

BART DREES

JANICE STEIFEL

Melanoplus femurrubrum

Melanoplus sanguinipes sanguinipes

DAN JOHNSON

DAN JOHNSON

Melanoplus borealis borealis

DAN JOHNSON

Melanoplus dawsoni

KATHRYN KIRK

Booneacris glacialis canadensis

BART DREES

Dendrotettix quercus

STEVE WHITE

Hesperotettix viridis pratensis

Spurthroated Grasshoppers *continued*
(Cyrtacanthacridinae and Melanoplinae)

Phoetaliotes nebrascensis

HERBERT D. POWNALL

KATHRYN KIRK

Paratylotropidia brunneri

Grasshopper Nymphs

THOMAS MEYER

JANICE STEIFEL

JANICE STEIFEL

DAN JOHNSON

Arphia pseudonietana

DAN JOHNSON

Camnula pellucida

GIFF BEATON

Chortophaga viridifasciata

MIKE REESE

Dissosteira carolina

Pardalophora phoenicoptera

GIFF BEATON

JOHN A. HAARSTAD

Spharagemon collare

MIKE REESE

Spharagemon marmorata marmorata

Trimerotropis huroniana

BRIAN SCHOLTENS

GRASSHOPPER

SPECIES ACCOUNTS

BART DREES

Acridinae

Gomphocerinae

Cyrtacanthacridinae

Melanoplinae

Oedipodinae

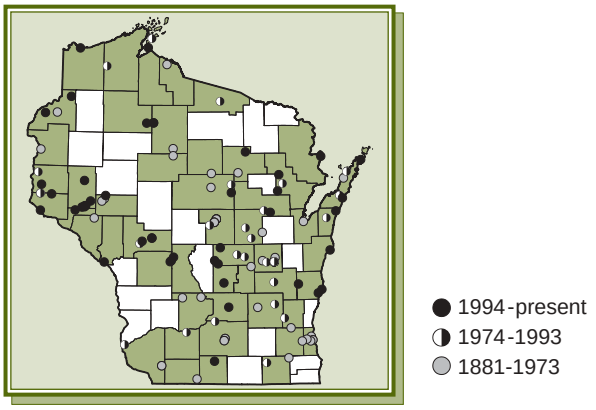
KATHRYN KIRK

How to Read the Accounts

No standard currently exists for common names of the Acrididae. We took the common names used here from Blatchley (1920), Cantrall (1968), Pfadt (1994), and Capinera and Sechrist (1982). To encourage friendly relations between humans and insects, we took the liberty of changing all labels of "locust" to "grasshopper," thus removing the badge of plague and pestilence from these valuable members of Wisconsin's ecological community. The only exception to this practice is *Trimerotropis huroniana*, which the U.S. Fish and Wildlife Service includes on the endangered species list as the Lake Huron locust. Scientific names follow Naskrecki and Otte (1999). We do not intend the species descriptions to be diagnostic; refer to the keys for species identification. State rank listings come from the Wisconsin DNR's Natural Heritage Inventory Program and global ranks come from NatureServe (2001). Both ranks were current as of March 7, 2003. Refer to Appendix C for rank definitions. Unless otherwise indicated, NatureServe ranks the grasshoppers as G5. Unfortunately, global distribution data remain very incomplete. Habitat information specific to Wisconsin collections is indicated as such; otherwise the habitat information has been taken from the listed references to facilitate the identification of potential habitat in Wisconsin.

Key to the Distribution Maps

Black dots indicate that the most recent collection from this site occurred after 1993, that is, during the years of the Prairie Invertebrate Study. Half-black dots mean that the most recent collection was after 1974 but before 1994. Grey dots indicate historical records when the most recent collection occurred between 1881 and 1973. We have no site-specific data for shaded counties without dots. Appendix A includes an index map with Wisconsin counties labeled.



GRASSHOPPER SPECIES ACCOUNTS

GIFF BEATON

ACRIDINAE

Gomphocerinae

Cyrtacanthacridinae

Melanoplinae

Oedipodinae

KATHRYN KIRK

ACRIDINAE

Metaleptea brevicornis (Johannson)

Shorthorned Grasshopper

Description: Medium-sized, long-winged grasshopper. Males with a green dorsal stripe and dark brown forewings. Females variable in color, often light brown to green. Forewings come to an angled tip.

Range: Eastern U.S. south to Argentina.

Wisconsin distribution: Fond du Lac County.

State rank: SH/S1.

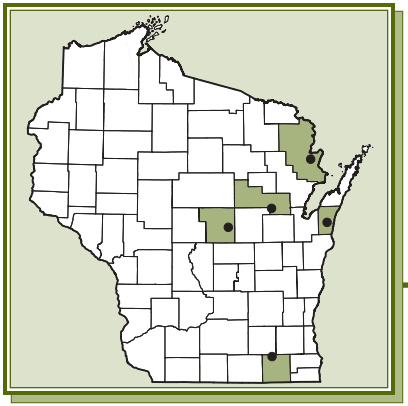
Habitat: Tall grasses, sedges along the margins of lakes and ponds. The Wisconsin specimen has no habitat information associated with it.

Discussion: Only one specimen labeled “Fond du Lac, Wisconsin” has been collected. The city of Fond du Lac and Fond du Lac County are located at the south end of a large lake, Lake Winnebago.

Specimens examined: 1 male at ACNAT. There is no collection date for this specimen.

References: Cantrall (1968), Otte (1981), Donato and Cigliano (2000).

see Color Plate, p. 33



Stethophyma gracile
(Scudder)

Graceful Sedge Grasshopper

Description: Yellow to pale green slender grasshopper, slightly smaller than *S. lineata*. Lateral carinae of pronotum cut by one or two sulci. Lower surface of hind femora red. Hind tibiae pale with black spines.

Range: Primarily Northern U.S. and Canada, extending south in the mountain states to Colorado.

Wisconsin distribution: Northeastern Wisconsin, from Kewaunee, Marinette, and Shawano counties and Portage and Walworth counties.

State rank: S?.

Habitat: Sedge meadow, marsh, and swamp, Walworth County fen.

Discussion: We collected all five specimens in July- August 2000 and 2002.

Specimens examined: 5 males from 5 sites.

References: Hebard (1932), Otte (1981), Vickery and Kevan (1985).

Stethophyma lineata
(Scudder)

Striped Sedge Grasshopper

Description: Yellow to pale green slender grasshopper. Lateral carinae of pronotum cut by three sulci. Side of forewing above the hind femur always with a white horizontal streak. Lower surface of hind femora red. Hind tibiae pale with black spines.

Range: New England west to Alaska and south to Indiana, Illinois, and Iowa.

Wisconsin distribution: Found in two northern counties and the southwestern corner of Wisconsin.

State rank: S3?.

Habitat: Wet prairie in Grant County, marsh and peaty swale within the Lake Superior beach and dune system, and northern sedge meadow in northern Wisconsin.

Discussion: No specimens of *Stethophyma* sp. were found in the collections. The grasshoppers are strong fliers and difficult to catch as they quickly cross an area of wetland and drop into the vegetation. Both *S. gracile* and *S. lineata* were collected at the Marinette County site, a large open sedge meadow area, part of a sizable wetland complex. These species might be quite local in distribution. Wetland habitats were poorly collected during this study. These adults were collected late July to mid-August.

Specimens examined: 5 males, 1 female from 4 sites.

References: Hebard (1932), Otte (1981), Vickery and Kevan (1985).

GRASSHOPPER

SPECIES ACCOUNTS

GIFF BEATON

Acridinae

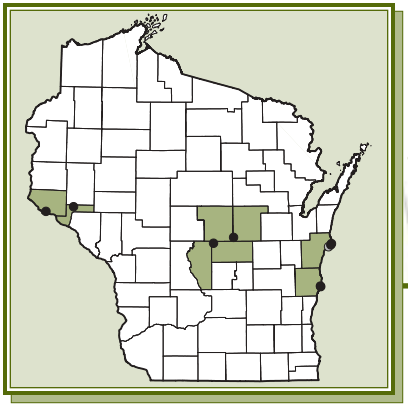
GOMPHOCERINAE

Cyrtacanthacridinae

Melanoplinae

Oedipodinae

KATHRYN KIRK



GOMPHOCERINAE

Aeropedellus clavatus
(Thomas)

Clubhorned Grasshopper

Description: Medium-sized grasshopper. Females gray, males gray with green markings on head, pronotum, and hind femora. Head obviously slanted with clubbed antennae and a white stripe extending down from the eye. Forewings shorter than abdomen.

Range: Canadian prairies and central Great Plains from Idaho to Minnesota, predominant along the front range of the Rocky Mountains.

Wisconsin distribution: Found in sandy areas south of the Tension Zone.

State rank: S2.

Habitat: Dry open grasslands in association with sandy soil, and Lake Michigan dunes.

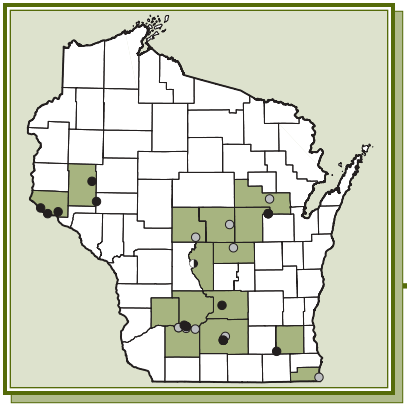
Discussion: Adults collected mostly in June and July. At one site in Pepin County, specimens were readily collected in yellow pan traps. No stridulation has been recorded from Wisconsin *A. clavatus*.

Specimens examined: 11 males, 14 females from 10 sites. Most (17 of 25) recorded from the most recent collection period.

References: Hebard (1932), Cantrall (1968), Otte (1981), Vickery and Kevan (1985), Pfadt (1994), NHI (2001).

see Color Plate, p. 33

JOHN A. HAARSTAD



Ageneotettix deorum
(Scudder)

Whitewhiskered Grasshopper

Description: Small to medium-sized, reddish-brown grasshopper. Antennae light colored or white. Head not dramatically slanted. Forewings extend to end of abdomen. Hind femora with black dorsal markings. Hind tibiae red.

Range: California east to Michigan.

Wisconsin distribution: Collected from counties at or south of the Tension Zone.

State rank: S3?.

Habitat: Disturbed sand plains with patches of bare ground, Wisconsin River sand terraces, sandblows, sand prairies, and a few sites in oak openings.

Historical Note: A 1912 specimen labeled “Kenosha dune region” is from a narrow sand dune area of the southern Lake Michigan shoreline created by glacial Lake Chicago. This area is now highly disturbed and existence of the species at the site is unlikely.

Discussion: Adults are collected from July to October. Over half of the specimens are from the most recent collection period.

Specimens examined: More than 90 specimens from 30 sites.

References: Hebard (1932), Otte (1981), Vickery and Kevan (1985), Pfadt (1994).

see Color Plate, p. 34

Chloealtis abdominalis
(Thomas)

Rocky Mountain
Sprinkled Grasshopper

Description: Small, light brown grasshopper. Forewings to end of abdomen with rounded tips in males, much shorter and pointed in females. Lateral lobes of male pronotum dark in upper one-third. Hind femora unmarked. Hind tibiae reddish-orange, paler at base.

Range: Extreme northern U.S. from Maine to Washington, and south to New Mexico in the Rocky Mountains.

Wisconsin distribution: From three counties: two in the Central Plain and Bayfield County in the Northern Highland.

State rank: S1/S2.

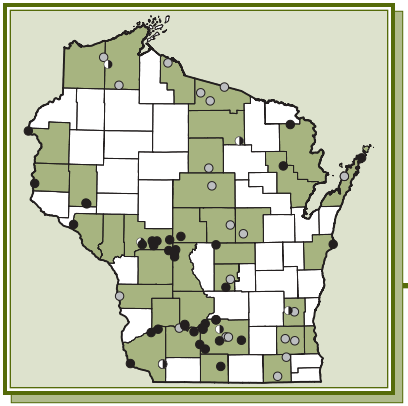
Habitat: Three of 4 Wisconsin sites are in jack pine barrens in the sand areas of the Northwest and Central Plains.

Discussion: Adults are collected in August.

Specimens examined: 9 specimens from 4 sites.

References: Hebard (1932), Otte (1981), Vickery and Kevan (1985).

see Color Plate, p. 34



Chloealtis conspersa
(Harris)

Sprinkled Grasshopper

Description: Small, light brown grasshopper. Forewings to end of abdomen with rounded tips in males, much shorter and pointed in females. Lateral lobes of male pronotum entirely black. Hind femora with a central white spot on outside. Hind tibiae reddish-orange, black at base.

Range: Similar to *C. abdominalis*, but extending further south. Southern range extends from South Carolina west to Colorado.

Wisconsin distribution: Widespread across the state.

State rank: S5.

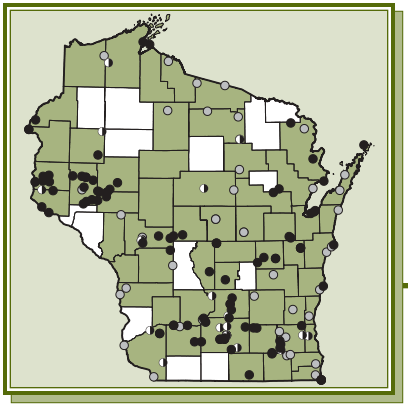
Habitat: Thickets and edges of dry open woods.

Historical notes: There is 1 specimen from the ACNAT collected in 1900-labeled “Wis”.

Discussion: Adults are collected from late June to October, most commonly in July and August.

Specimens examined: Over 100 specimens from 74 sites.

References: Hebard (1932), Cantrall (1968), Otte (1981), Vickery and Kevan (1985).



Chorthippus curtipennis
(Harris)

Marsh Meadow Grasshopper

Description: Small, light brown grasshopper with forewings to end of abdomen in males, shorter in females. Head strongly slanted. Body dark on the sides and pale yellow below. Hind tibiae yellow to straw colored.

Range: Widespread across most of North America, but absent from the southeastern U.S.

Wisconsin distribution: Widespread, most likely occurring in every county of the state.

State rank: S5.

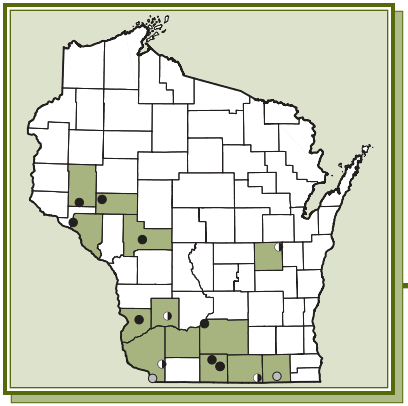
Habitat: Highly variable, but common in low wet prairies. Bomar (2001) reported this as a common species in newly constructed prairies.

Discussion: Adults are collected in late June to October. This species is very mobile, commonly found in urban areas on warm dry windy days in late August through September.

Specimens examined: Specimens recorded from 189 sites.

References: Hebard (1932), Cantrall (1968), Otte (1981), Vickery and Kevan (1985), Pfadt (1994).

see Color Plate, p. 34



Dichromorpha viridis
(Scudder)

Shortwinged Green Grasshopper

Description: Medium-sized grasshopper. Body color green and/or brown. Females may be unicolorous but the male dorsum is usually lighter than the sides. Head strongly slanted. Forewings usually shorter than abdomen.

Range: Eastern half of U.S., extending into central Mexico.

Wisconsin distribution: In counties at or below the Tension Zone.

State rank: S2/S4.

Habitat: Preferential to grasses at the edges of woodlands, most commonly found in association with heavy soils.

Historical note: One specimen stored at the INHS is labeled “Geneva Lake, Williams Bay, Oct 11, 1881”. This is the oldest Wisconsin grasshopper collection record that we found.

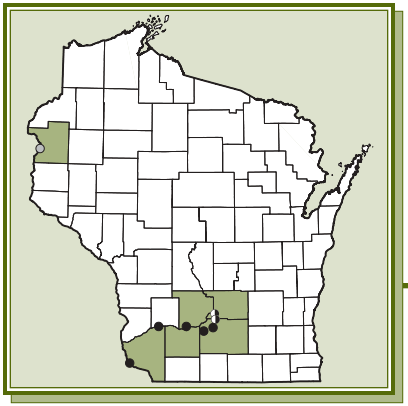
Discussion: Adults were collected from July to October. No macropterous specimens were found.

Specimens examined: 16 males, 9 females from 19 sites.

References: Hebard (1932), Cantrall (1968), Otte (1981), Vickery and Kevan (1985).

GIFF BEATON

see Color Plate, p. 33



Eritettix simplex
(Scudder)

Velvetstriped Grasshopper

Description: Slender, medium-sized grasshopper with wings extending to end of abdomen, head with obvious slant. Body tan with brown markings in females, brown and green in males. Pronotum with three distinct longitudinal carinae (ridges).

Range: Two main regions: eastern slopes of the Appalachians eastward through Tennessee, and Central Great Plains from southern Canada to central Mexico. Current distribution maps suggest that these are not disjunct populations.

Wisconsin distribution: Most recent collections are from remnant dry prairie in Dane and Grant counties in southern Wisconsin.

State rank: S2/S3.

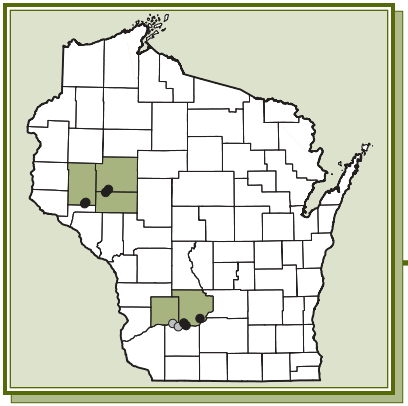
Habitat: Short to mixed grass stands, associated with remnant prairies. Somes (1914) infers a relationship with “low Wild sage, *Artemesia*”, but this was not observed in our collections.

Discussion: Nymphs overwinter and adults are generally collected from May to early July.

Specimens examined: 30 specimens from 13 sites.

References: Somes (1914), Hebard (1932,1934), Otte (1981), Vickery and Kevan (1985).

see Color Plate, p. 34



Mermiria bivittata

(Serville)

Twostriped Slantfaced Grasshopper

Description: Large, slender grasshopper with head dramatically slanted. With ensiform antennae. Forewings to end of abdomen, or nearly so. Dark brown band runs from behind the eye across the pronotum. Often referred to as a “toothpick” grasshopper.

Range: Widespread from the Carolinas to southern California. Its most prominent range is Central Great Plains, from southern Canada to central Mexico

Wisconsin distribution: Most recent collections from Dunn, Chippewa, Eau Claire and Sauk counties south of the Tension Zone. These specimens greatly expand the reported range of this species in the Midwest.

State rank: S2.

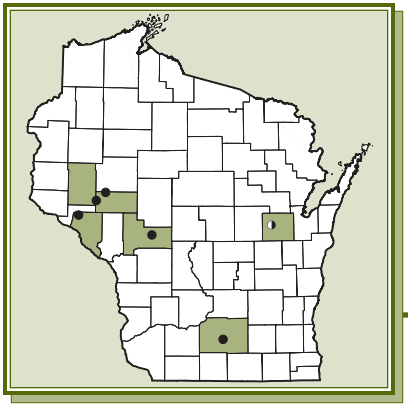
Habitat: Associated with oak barrens, which in Wisconsin are dominated by black oak (*Quercus velutina*), and Hill’s oak (*Q. ellipsoidalis*), and remnant prairies. Northern specimens were found hanging from the branches of Hill’s oak.

Discussion: Adults are collected from July to September.

Specimens examined: 20 specimens from 11 sites.

References: Hebard (1932, 1934), Otte (1981), Vickery and Kevan (1985), Pfadt (1994).

see Color Plate, p. 33



Opeia obscura (Thomas)

Obscure Grasshopper

Description: Small to medium-sized tan grasshopper, possibly with green markings on pronotum and forewings. Head strongly slanted. Forewings to near end of abdomen. Dark line present on top third of hind femora.

Range: Minnesota to California; most records are from the Great Plains from southern Canada to central Mexico

Wisconsin distribution: South of the Tension Zone on light soils. Wisconsin collections greatly expand the reported range of this species. The specimen from dry prairie in Outagamie County may be the easternmost station for *O. obscura*.

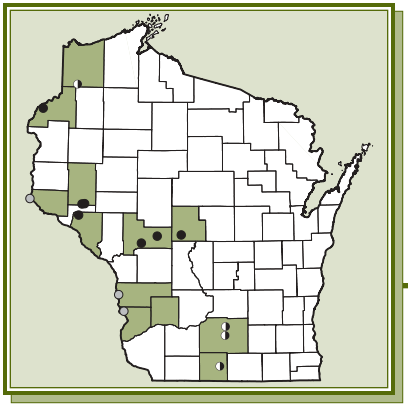
State rank: S2/S3.

Habitat: Dry prairie remnants, namely those sites that have full sun and the presence of bare ground and short grasses. Two collection sites are southwest-facing hills. *O. obscura* is associated with blue grama grass (*Bouteloula gracilis*) in the Great Plains.

Discussion: Most of the adults were collected in July from western Wisconsin. The Dane County specimen was collected from the UW Arboretum oak forest edge on August 21, 1997.

Specimens examined: 6 specimens from 6 sites.

References: Otte (1981), Vickery and Kevan (1985), Pfadt (1994).



Orphulella pelidna
(Burmeister)

Spottedwinged Grasshopper

Description: Small to medium-sized grasshopper. Body color green or brown. Head with an obvious slant. Lateral pronotal carinae cut by two or three sulci. Forewings extend beyond hind femora.

Range: Atlantic Coastal Plain to southern California, with scattered sites in western river valleys and the northern Midwest.

Wisconsin distribution: Western half of state.

State rank: S2/S3.

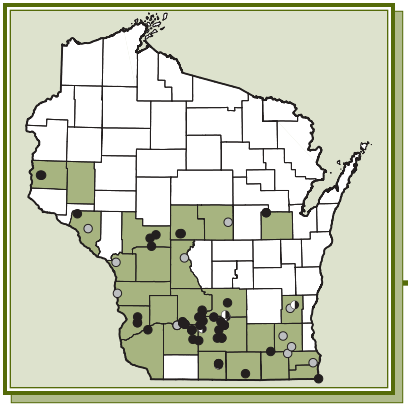
Habitat: Seven of 14 sites in Wisconsin are sandy upland associated with ephemeral pools, freshwater marsh, or river terrace. The others are dry prairie and pasture.

Discussion: Adults are collected throughout July and August. The Wood County specimen was collected July 1, 1998.

Specimens examined: 12 males, 2 females from 14 sites.

References: Froeschner (1954), Cantrall (1968), Otte (1981), Vickery and Kevan (1985).

see Color Plate, p. 34



Orphulella speciosa
(Scudder)

Pasture Grasshopper

Description: Small grasshopper. Body color variable, but often males green and females brown. Head with an obvious slant. Lateral pronotal carinae cut by one sulcus. Forewings extend to knees of hind femora.

Range: Central Plains from Mexico to southern Canada, east to Maine north of the Appalachians.

Wisconsin distribution: Widespread below the Tension Zone.

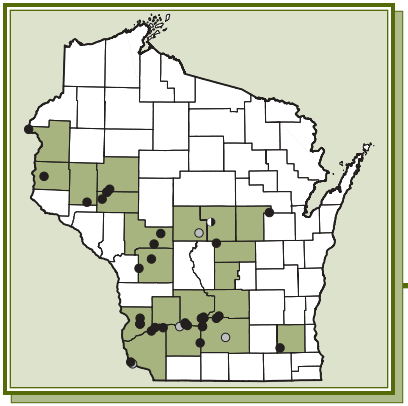
State rank: S5.

Habitat: Dry to dry-mesic prairies, pine/oak barrens, but highly variable.

Discussion: Adults are collected from July to September, most from late July to mid-August. The Washington County specimen was collected June 18, 1983.

Specimens examined: Over 100 specimens from 73 sites.

References: Froeschner (1954), Cantrall (1968), Otte (1981), Vickery and Kevan (1985).



Pseudopomala brachyptera (Scudder)

Bunchgrass Grasshopper

Description: "The Toothpick". Long, narrow, tan/brown grasshopper with strongly slanted head and strongly ensiform antennae. Wings of males do not reach ends of hind femora, shorter in females.

Range: Primarily southwestern Canada and northern U.S. south to Utah, Oklahoma, and New Jersey.

Wisconsin distribution: South of the Tension Zone.

State rank: S5.

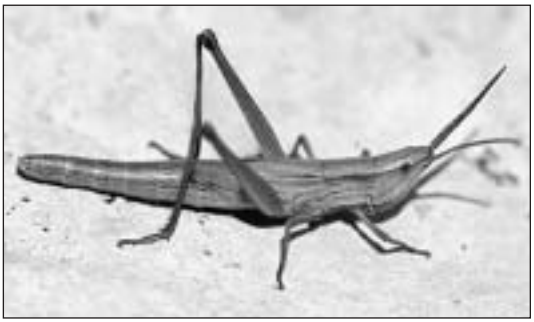
Habitat: Highly variable, from remnant bluff prairies, sand prairies, and pine barrens to weedy roadside and forest edges.

Discussion: Adults collected from mid-June to early September. Most (39 of 46) are from the latest collection period and are never abundant where found. We have not observed this species in moist habitats in Wisconsin as has been reported elsewhere (Cantrall 1968, Vickery and Kevan 1985).

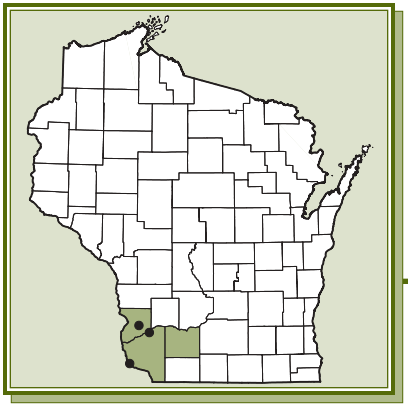
Specimens examined: 40 males, 6 females from 35 sites.

References: Froeschner (1954), Cantrall (1968), Otte (1981), Vickery and Kevan (1985).

see Color Plate, p. 34



DAN JOHNSON



Syrbula admirabilis
(Uhler)

Handsome Grasshopper

Description: Large, long-winged grasshopper with strongly slanted head. Variable in color from brown to green, but with a line of spots along the forewings. Male has a white marking behind eye and along lower edge of pronotum. Antennae slightly clavate. Hind femora with pale bands near knees.

Range: Mexico across southeastern U.S. and north to Iowa, Wisconsin, Michigan, Pennsylvania, and New Jersey.

Wisconsin distribution: Southwest corner of the state in Crawford, Grant, and Iowa counties.

State rank: S2?.

Habitat: Three of the four sites collected 1998-1999 are dry prairie on high bluffs in the Driftless Area. No habitat information is available for the Iowa County site, though the area has similar topography.

Discussion: The Hogback Prairie in Crawford County, Wisconsin and Gratiot County, Michigan (Cantrall 1968) are the only known sites for this species above the 43rd Parallel. The species may be limited to high "islands" of suitable habitat at the northern border of the range. Adults were collected in Wisconsin from August 12 to September 7.

Specimens examined: 3 males, 1 female from 4 sites.

References: Hebard (1934), Cantrall (1968), Otte (1981).

see Color Plate, p. 33

KATHRYN KIRK

GRASSHOPPER

SPECIES ACCOUNTS

GIFF BEATON

Acridinae

Gomphocerinae

CYRTACANTHACRIDINAE

Melanoplinae

Oedipodinae

KATHRYN KIRK

CYRTACANTHACRIDINAE

Schistocerca alutacea
(Harris)

Leathercolored Bird Grasshopper

Description: Large long-winged grasshopper, yellowish-brown, always with a pale dorsal stripe. Hind tibiae yellow or brown with black-tipped yellow spines.

Range: Gulf and Atlantic Coast Plain states north to eastern Oklahoma and southern New England. Scattered records from coastal areas of Wisconsin, Michigan, Pennsylvania, and New York.

Wisconsin distribution: One specimen from MPM labeled “Milwaukee County, 1906”.

State rank: SH?.

Habitat: Marshes, swamps, moist thickets, and forest edges. Hubbell (1960) notes that the Great Lakes records are nearly all from sandy regions in proximity to moist habitats, which all but eliminates site elements as an aid in separating this species from *S. lineata* for collections along Lake Michigan.

Discussion: The taxonomy for this species remains disorganized, with six subspecies being recognized by Dirsh (1974). We have relied on the work of Hubbell (1960) and Song (2004) for identification and nomenclature. Hubbell (1960) accepts the nearby Lake County, Illinois records from southern Lake Michigan but reassigns Iowa, Minnesota, and all other Illinois records of *S. alutacea* to *S. lineata*. Dirsh (1974), on the other hand, recognizes three subspecies from Wisconsin, including *S. alutacea alutacea*, *S. a. lineata*, and *S. a. rubignosa*. Song (2004) has revived these as three valid species and does not recognize *S. alutacea* from Illinois. Bomar (2001) identifies his specimens from Western Wisconsin as *S. alutacea*, but upon further inspection now considers these to be *S. lineata*.

Specimens examined: 35 males, 26 females.

References: Hebard (1934), Hubbell (1960), Dirsh (1974), Song (2004).

Schistocerca americana
(Drury)

American Grasshopper

Description: Large, yellow-brown grasshopper, forewings with distinct large brown spots extend well beyond abdomen. Head and body with a pale median stripe. Hind tibiae red.

Range: Breeding from southern U.S. to South America; migrants to Massachusetts, southern Ontario, Michigan, and central Minnesota.

Wisconsin distribution: Dane and Milwaukee counties.

State rank: SH?.

Habitat: Specimen labels did not specify, but Blatchley (1920) found *S. americana* in wet meadows, marshes, and other damp locales in northern Indiana and the habitat may be similar in Wisconsin.

Discussion: The taxonomy for this species remains disorganized, with 11 subspecies being recognized in the most recent monograph by Dirsh (1974). Wisconsin specimens date from the early 1900s and are probably migrants.

Specimens examined: 2 males, 3 females.

References: Blatchley (1920), Vickery and Kevan (1985).

see Color Plate, p. 35

Schistocerca damnifica
(Saussure)

Mischievous Bird Grasshopper

Description: Large long-winged grasshopper, yet smallest of the Wisconsin *Schistocerca*. Body short and stocky, reddish brown with a brown line on head and pronotum. Body yellow below. Pronotum narrower than that of other *Schistocerca* and distinctly tectate.

Range: Breeds from Florida to Texas in southeastern U.S., north to Ohio. Migrates to Massachusetts, southern Ontario, Michigan, and Minnesota.

Wisconsin distribution: Two specimens from Milwaukee County collected in 1905 by W. Wheeler.

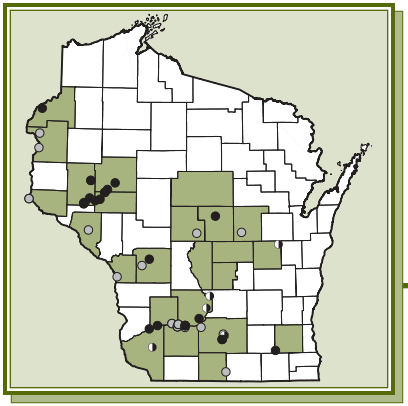
State rank: SH?.

Habitat: Recorded on sandy soils in dry open pine and oak woods.

Discussion: Only two specimens, found in the Milwaukee Public Museum, most likely representing isolated migrants from the eastern U.S.

Specimens examined: 2 males.

References: Hubbell (1960), Dirsh (1974).



Schistocerca lineata
Scudder

Spotted Bird Grasshopper

Description: Large, yellowish-brown grasshopper, may have a pale dorsal stripe. Hind tibiae may have some black coloration. Fore and middle femora of males distinctly inflated.

Range: Mexico, Colorado, South Dakota, central Midwest, scattered stations of the eastern Appalachians, and North Carolina along the Atlantic Coastal Plain to southern New England.

Wisconsin distribution: Along the Tension Zone and south in Wisconsin.

State rank: S5.

Habitat: Sand barrens, sandblows, river terraces on sand, dry prairie, and a few sites in dry forest openings.

Discussion: We re-examined superficial markings and relative body measurements as dictated by Hubbell (1960) on a majority of the 35 male and 26 female specimens identified as *S. alutacea*, leading us to believe that most, if not all, belong to *S. lineata*. A few specimens labeled "*S. alutacea rubiginosa*" were also assigned to *S. lineata*. Adults were collected July 2 through October 14.

Specimens examined: 79 males, 49 females.

References: Hubbell (1960), Vickery and Kevan (1984), Song (2004).

see Color Plate, p. 35

GRASSHOPPER

SPECIES ACCOUNTS

DAN JOHNSON

Acridinae

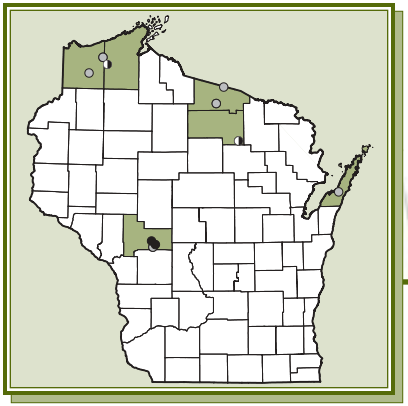
Gomphocerinae

Cyrtacanthacridinae

MELANOPLINAE

Oedipodinae

KATHRYN KIRK



MELANOPLINAE

Booneacris glacialis canadensis (E.M. Walker)

Northern Wingless Grasshopper

Description: Wingless, green, medium-sized grasshopper. Hind femora banded and coral red below and inside. Tibiae blue-green.

Range: Ontario and Minnesota east to New Brunswick. The subspecies is found in Ontario, Minnesota, Wisconsin, Michigan, and western Quebec.

Wisconsin distribution: Northern counties and Jackson County in the Central Sands.

State rank: S1/S2.

Habitat: Most sites are within jack pine barrens habitat or pine forest. Known from sphagnum bogs elsewhere, but little collecting has been conducted in these habitats in Wisconsin.

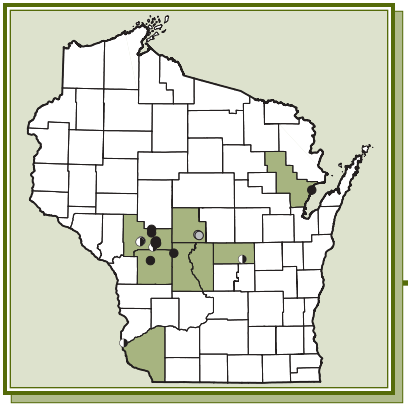
Discussion: The species was collected only twice during the period of this study and only in the central part of the state. Cantrall (1968) reported it as common in the Upper Peninsula of Michigan and abundant on wild blackberry in northern Wisconsin.

Specimens examined: 32 males, 37 females from 10 sites.

References: Cantrall (1968), Vickery and Kevan (1985).

see Color Plate, p. 37

KATHRYN KIRK



Dendrotettix quercus

Packard

Post Oak Grasshopper

Description: Short-winged, medium-sized, brown grasshopper, with a large head. Femora red below. Tibiae green, with yellow basal rings.

Range: Nebraska and Texas east to Tennessee and southern Ontario.

Wisconsin distribution: Central Plains and Grant County in the Southwest.

State rank: S3/S4.

Habitat: Dry to dry-mesic oak forests. Recorded on bur oak (*Quercus macrocarpa*), northern red oak (*Q. rubra*), and hazel (*Corylus americana*) in Wisconsin (Valek and Coppel 1972a).

Historical note: No collections were made prior to 1947.

Discussion: *D. quercus* population explosions have been implicated in defoliation of young oaks. Macropterous individuals were collected in the Central Plains in August of 1967 and 1977. This is an arboreal species that often may be overlooked in the forest.

Specimens examined: 47 males, 27 females from 22+ sites.

References: Valek and Coppel (1972a, 1972b), Vickery and Kevan (1985).

see Color Plate, p. 37

BART DREES

Hesperotettix viridis pratensis Scudder

Purplestriped Grasshopper

Description: Medium-sized green grasshopper, with orange bands on femora and blue-green tibiae. Narrow forewings do not reach end of abdomen.

Range: From central Mexico to British Columbia and western Ontario across the U.S., possibly with the exception of the most northeastern states. The subspecies *H. v. pratensis* covers the northern portion of the range south to Oklahoma.

Wisconsin distribution: Western Uplands.

State rank: S2?.

Habitat: Dry prairie and sand barrens associated with major rivers.

Discussion: Nine of the 13 collections were prior to 1920. The three recent collections were from sand terraces along the Mississippi and Wisconsin Rivers, and a bluff prairie along the Mississippi River. Cantrall (1968) reported the species from Michigan, including along the Wisconsin border with the Upper Peninsula, so we expect to find individuals farther east and north of the recorded counties. Adults are collected July 5-August 28.

Specimens examined: 23 males, 14 females from 9 sites.

References: Hart and Gleason (1907), Cantrall (1968), Vickery and Kevan (1985).

see Color Plate, p. 37

Hesperotettix speciosus
(Scudder)

Western Grassgreen Grasshopper

Description: Medium-sized, robust-bodied, green grasshopper with a central pink stripe on pronotum. Forewings do not reach end of abdomen. Dorsal surface of femora red. Tibiae green.

Range: New Mexico and Texas to Montana and east to Illinois, Iowa, and Minnesota.

Wisconsin distribution: One specimen collected July 31, 2000, from Sauk County.

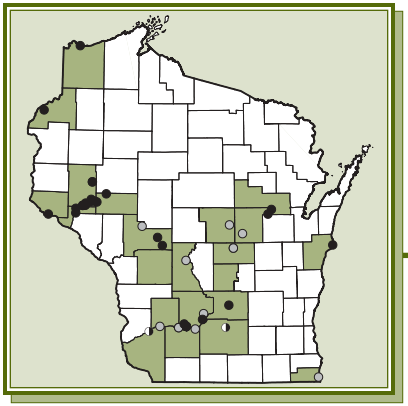
State rank: S1/S2.

Habitat: The site is at the edge of oak woods on a south-facing bluff above extensive sand prairie on the terrace of the Wisconsin River.

Discussion: There are few sites reported for this species in the Upper Midwest. Somes (1914) reported *H. speciosus* along the Mississippi River in Minnesota and northern Iowa. Hart and Gleason (1907) found it along the Illinois River.

Specimens examined: 1.

References: Hart and Gleason (1907), Somes (1914), Blatchley (1920), Hebard (1934), Vickery and Kevan (1985).



Melanoplus angustipennis (Dodge)

Narrow-winged Sand Grasshopper

Description: Long-winged, medium-sized grasshopper of gray and yellow color, with narrow forewings and red or blue tibiae.

Range: Alberta and Ontario south to New Mexico, Texas, and the fall-line Sandhills of the Carolinas.

Wisconsin distribution: Represented in all the large areas of sand deposits in the Northern Highlands and the Central Plains. Also found on sand terraces of the Mississippi, Wisconsin, and Chippewa rivers and Lake Michigan dunes.

State rank: S4?.

Habitat: Sand prairie, dunes, and pine/oak barrens.

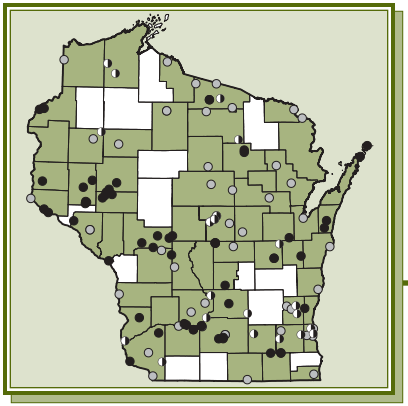
Historical note: A 1912 specimen labeled “Kenosha dune region” is from a narrow sand dune area of the southern Lake Michigan shoreline created by glacial Lake Chicago. This area is now highly disturbed and existence of the species at the site is unlikely.

Discussion: Probably secure in large areas of sandy habitat in the state.

Specimens examined: 64 males, 22 females from 42 sites.

References: Blatchley (1920), Hebard (1934), Vickery and Kevan (1985).

see Color Plate, p. 35



Melanoplus bivittatus
(Say)

Twostriped Grasshopper

Description: Large grasshopper with two converging pale lines on dorsal surface of head, pronotum, and forewings. Forewings extend to apex of abdomen or may be slightly shorter.

Range: Widely distributed across North America.

Wisconsin distribution: Statewide.

State rank: S5.

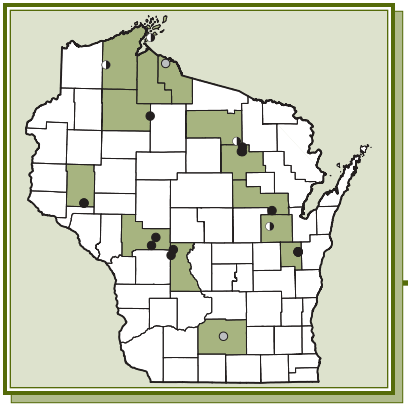
Habitat: Herbaceous vegetation in forest, grassland, roadside, and old field.

Discussion: This is a common and abundant species that occasionally may become an agricultural pest. Adults usually are present July through September, with an early collection date of June 10 in Dunn County.

Specimens examined: 151 collection records, 54 of these after 1993.

References: Blatchley (1920), Vickery and Kevan (1985), Pfadt (1994).

see Color Plate, p. 36



Melanoplus borealis borealis (Fieber)

Northern Grasshopper

Description: Small to medium-sized dark grasshopper, with forewings extending from ¾ the length to near apex of abdomen. Femora red/orange below. Tibiae reddish to yellowish.

Range: Across Canada south to Minnesota, Wisconsin, Iowa, Pennsylvania, and Ohio.

Wisconsin distribution: Scattered records south to the Central Plains.

State rank: S3?.

Habitat: Marsh, bog, and grassy sandy areas in coniferous forest.

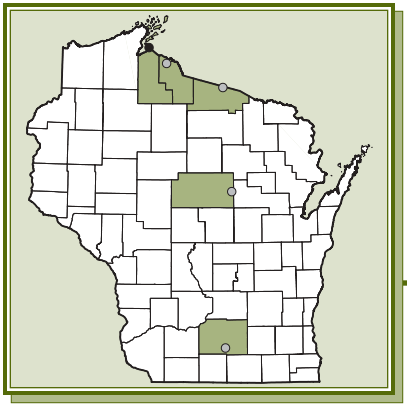
Historical Note: Hebard (1934) identified a specimen from Dane County in 1912, now at ACNAT. The species may have ranged further south in the state when wetland habitats were less fragmented than they are today.

Discussion: Wisconsin collections are from June 10 to August 15.

Specimens examined: 25 males, 19 females from 17 sites.

References: Somes (1914), Blatchley (1920), Hebard (1934), Vickery and Kevan (1985).

see Color Plate, p. 37



Melanoplus bruneri
Scudder

Bruner's Grasshopper

Description: Long-winged, medium-sized, brown grasshopper, with hump on the sternum similar to *M. sanguinipes*. Tibiae red or usually pink.

Range: Alaska to New Brunswick, south in mountain meadows into northern Arizona and New Mexico, eastward to Iowa, northern Minnesota, Wisconsin, and Michigan.

Wisconsin distribution: Ashland County in the Lake Superior Lowland is the only recent collection (1996).

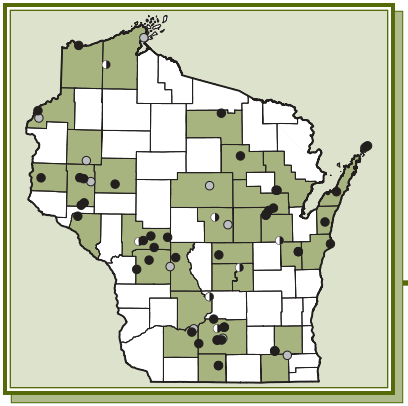
State rank: S1/S2.

Habitat: Known from shrubby areas of the Upper Peninsula and Isle Royale in Michigan. The Ashland County site is an undisturbed coastal barrier sand spit in Lake Superior with low shrubs and pines on a system of beaches and dunes.

Discussion: Vilas, Iron, and Marathon counties were collected before 1920. Hebard identified a specimen in ACNAT taken in 1914 from Dane County in the southern part of the state. The species may have been more widespread in the early 1900s. Froeschner (1954) reported its presence in western Iowa, and Pfadt (1994) reported an outbreak occurred in north central Minnesota in 1921.

Specimens examined: 4.

References: Blatchley (1920), Hebard (1934), Froeschner (1954), Vickery and Kevan (1985), Pfadt (1994).



Melanoplus confusus
Scudder

Little Pasture Grasshopper

Description: Long-winged, medium-sized, grayish grasshopper, with shiny black patch behind eye and a particularly thick prosternal tubercle. Tibiae color variable.

Range: British Columbia to Maine, south to Virginia, Kentucky, and Texas.

Wisconsin distribution: Widely distributed across the state.

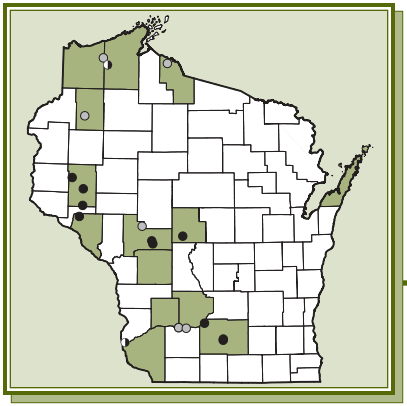
State rank: S5.

Habitat: Found in a wide range of habitats, including remnant prairie, pine and oak barrens, dry forest, sand beach, disturbed areas, and old fields.

Discussion: Both red and blue-legged individuals are present in Wisconsin. An early summer species, adults were found May 23 in Jackson County.

Specimens examined: 65.

References: Somes (1914), Blatchley (1920), Froeschner (1954), Vickery and Kevan (1985), Pfadt (1994).



Melanoplus dawsoni
(Scudder)

Dawson's Grasshopper

Description: Small, robust-bodied, short-winged brown grasshopper that is bright yellow below. Abdomen ringed with black and yellow. Hind tibiae red.

Range: Great Basin in the West to the Great Plains, northern Midwest, and east to New England.

Wisconsin distribution: Western half of the state.

State rank: S2/S4.

Habitat: Open areas such as pine barrens and brushy prairie. Bomar (2001) observed this species to be a common inhabitant of reconstructed prairies in Wisconsin.

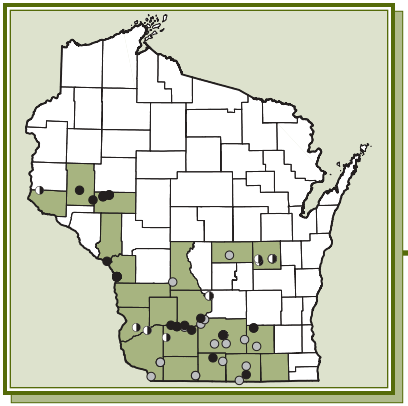
Historical note: Cantrall (1968) lists the species from several sites in the Upper Peninsula of Michigan; however, the only collection from the eastern portion of Wisconsin is one male collected Aug.15, 1920, in Door County.

Discussion: Hebard (1934) reported a very high percentage of long-winged individuals from northwestern Minnesota. Two of the 44 specimens we examined are macropterous, both from northwestern Wisconsin, collected in 1939 and 1966.

Specimens examined: 32 males, 18 females from 20 sites.

References: Blatchley (1920), Hebard (1934), Vickery and Kevan (1985), Pfadt (1994), Bomar (2001).

see Color Plate, p. 37



Melanoplus differentialis differentialis (Thomas)

Differential Grasshopper

Description: Long-winged, large-sized grasshopper, typically yellow-brown in color, with distinctive herringbone pattern on hind femora.

Range: Northern U.S. border to Mexico, east to the Blue Ridge Mountains and the New Jersey coast.

Wisconsin distribution: Common south of the Tension Zone.

State rank: S5.

Habitat: Originally restricted to tall vegetation in meadows, swales, and river bottoms, but now widely distributed in weedy, moist habitats, roadsides, and edges of agricultural fields.

Discussion: Adults are collected from June to October Most Wisconsin collections are from within towns and cities and the species has a history as an agricultural pest.

Specimens examined: 99.

References: Blatchley (1920), Hebard (1934), Vickery and Kevan (1985), Pfadt (1994).

see Color Plate, p. 36

Melanoplus fasciatus
(F. Walker)

Huckleberry Grasshopper

Description: Small to medium-sized dark grasshopper, with forewings extending from 2/3 the length to near apex of abdomen. Femora red/orange below and inside and tibiae dull red. Outer surface of femora conspicuously banded.

Range: Alaska to Newfoundland, south to New Jersey, northern Indiana, and Colorado.

Wisconsin distribution: Northern counties and the Central Sands.

State rank: S2?.

Habitat: Hart and Gleason (1907) report this species on blackjack oak (*Q. marilandica*) brush in Illinois. Wisconsin habitats are sandy woods and pine/oak barrens with jack pine, blueberry, sweet fern, and lupine.

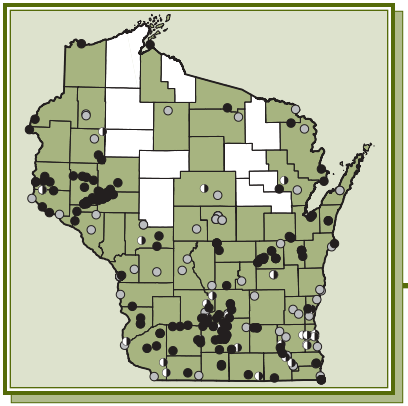
Historical Note: The specimen from Ashland County was collected on the Apostle Islands in Lake Superior by the MPM Expedition of 1907. This is the only Wisconsin specimen we have seen from the islands.

Discussion: *M. fasciatus* is a sedentary species on shrubs. Recent records are only from Jackson and Wood counties in the Central Plains. Adults are collected June 20 through August 24.

Specimens examined: 9 males, 8 females from 13 sites.

References: Hart and Gleason (1907), Somes (1914), Blatchley (1920), Hebard (1934), Vickery and Kevan (1985).

DAN JOHNSON



Melanoplus femurrubrum
(DeGeer)

Redlegged Grasshopper

Description: Long-winged, medium-sized grasshopper of gray and yellow color, typically with red tibiae. Femora have a dark longitudinal stripe in the upper portion. Males distinguished by the bulbous abdominal apex.

Range: North America, except the far North and high mountains. It is especially abundant in southern Wisconsin and Minnesota, and northern Illinois and Iowa, where large populations may develop in response to hot, dry weather (Pfadt 1994).

Wisconsin distribution: Widespread throughout the state.

State rank: S5.

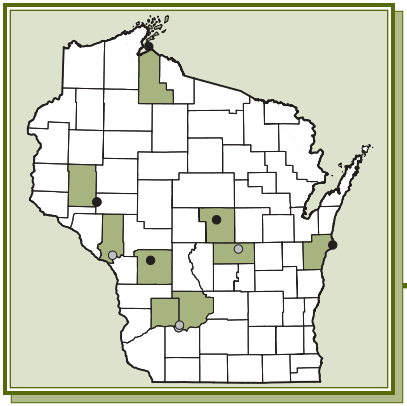
Habitat: Grasslands, roadsides, woods edge, backyards, old fields, wetlands, reconstructed prairies. *M. femurrubrum* is a colonizer of disturbed habitat and may become an occasional pest of crops and gardens.

Discussion: *M. femurrubrum* is very common and abundant, although there is only one current record from the Northern Highlands region.

Specimens examined: 318.

References: Blatchley (1920), Vickery and Kevan (1985), Pfadt (1994).

see Color Plate, p. 36



Melanoplus flavidus
Scudder

Bluelegged Grasshopper

Description: Long-winged, medium to large-sized yellowish grasshopper, with blue tibiae.

Range: Alberta to northwest Indiana, south to Colorado and Kansas.

Wisconsin distribution: Scattered counties on high quality sand habitat.

State rank: S2/S3.

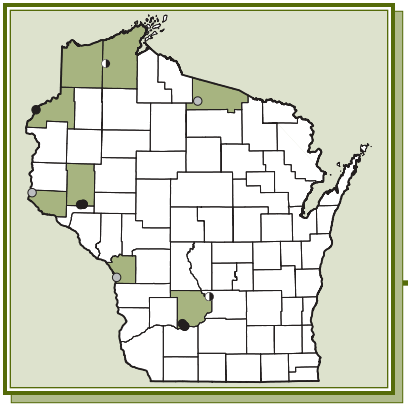
Global Ranking: G4.

Habitat: *M. flavidus* is a xerophytic species: "..as one approaches and enters the wind-excavated hollows of the apex (of the dunes), *M. flavidus* becomes most abundant" (Hart and Gleason 1907). Wisconsin individuals have been found in sandblows, dunes, open sand prairies, and the Ashland County barrier sand spit described under *M. bruneri.*

Discussion: Much of the Wisconsin land that used to support active dunes and sandblows is overgrown with trees or covered by buildings or pine plantations. Those areas that remain are often heavily disturbed by recreational vehicles. Michigan also ranks *M. flavidus* as a Special Concern species (NatureServe April 2001).

Specimens examined: 11 males, 6 females from 10 sites.

References: Hart and Gleason (1907), Blatchley (1920), Vickery and Kevan (1985), NHI (2001), Natureserve (2001).



Melanoplus foedus fluviatilis Bruner

Sandbar Grasshopper

Description: Long-winged, medium-sized dark grasshopper of greenish brown or gray, with a brown central band on the head and pronotum. Tibiae blue or purple.

Range: Montana, Wyoming, and New Mexico to Iowa, Illinois, and Wisconsin.

Wisconsin distribution: Western half of the state.

State rank: S2/S3.

Habitat: Sand prairie, sandblows, grassy openings in pines and oak savanna.

Discussion: *Melanoplus foedus* has been known almost exclusively from west of the Mississippi River, where this subspecies is found in river bottom habitats. In Illinois, it was collected along the Mississippi River at the edge of a sandblow (Hart and Gleason 1907). All but two Wisconsin records are along major rivers: the Mississippi, Wisconsin, Chippewa, and St. Croix. Adults are found from July through mid-September. Two males and a female from Vilas County labeled *M. packardii* are included here until such time as the identification can be clarified.

Specimens examined: 17 males, 18 females from 11 sites.

References: Hart and Gleason (1907), Blatchley (1920), Vickery and Kevan (1985).

Melanoplus gladstoni
(Scudder)

Gladston's Grasshopper

Description: Long-winged, medium-sized, dark brown grasshopper, with femora flattened near the base and distinctly banded. Forewings with a line of spots. Tibiae red.

Range: Alberta south to Mexico, east to Iowa and western Wisconsin.

Wisconsin distribution: Dunn and Chippewa counties.

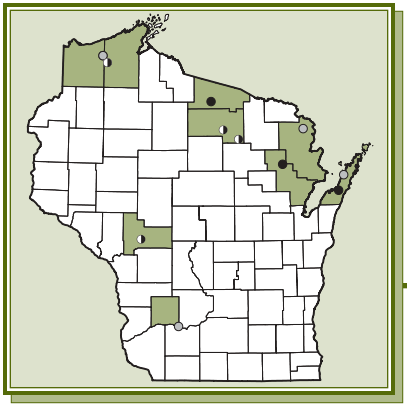
State rank: S2?.

Habitat: Dry grassland, "cobble flats" along the Chippewa River.

Discussion: The two adults were collected in August. These specimens represent an eastward extension of the known range of this species. The flattened hind femur is not easily recognizable in the Wisconsin specimens.

Specimens examined: 1 male, 1 female from 2 sites.

References: Vickery and Kevan (1985), Pfadt (1994), Bomar (2001).



Melanoplus islandicus
Blatchley

Forest Grasshopper

Description: Small short-winged brown and yellow-green grasshopper, with broad pale stripe the length of dorsal abdomen. Tibiae red.

Range: Manitoba, Quebec south to Virginia and Iowa.

Wisconsin distribution: Only one recent collection, Vilas County, though there are several earlier records from the central Northern Highland Region.

State rank: S2/S4.

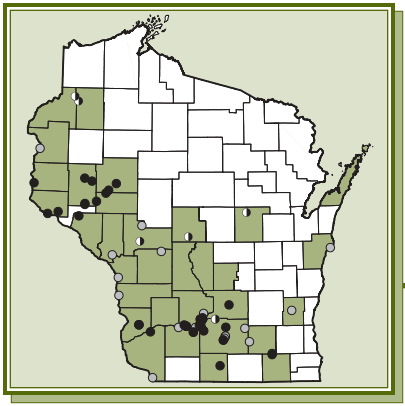
Habitat: Northern-mesic and dry-mesic forest of the interior, grassy opening in jack pine forest of the Lake Superior Coastal Plain.

Historical note: There is one southern Wisconsin record from Lone Rock in 1907.

Discussion: *M. islandicus* is a northern forest species. Vickery and Kevan (1985) state that the colonies are usually small and scattered. Cantrall (1968) calls it “relict, local, and rare” in the Lower Peninsula of Michigan.

Specimens examined: 10 males, 10 females from 10 sites.

References: Blatchley (1920), Cantrall (1968), Vickery and Kevan (1985).



Melanoplus keeleri luridus (Dodge)

Keeler's Grasshopper

Description: Long-winged, medium-sized grasshopper, with red tibiae and a dark stripe on the femora narrowing toward the base.

Range: Alberta to Nevada and Texas, east across the U.S.

Wisconsin distribution: South, central, and western Wisconsin.

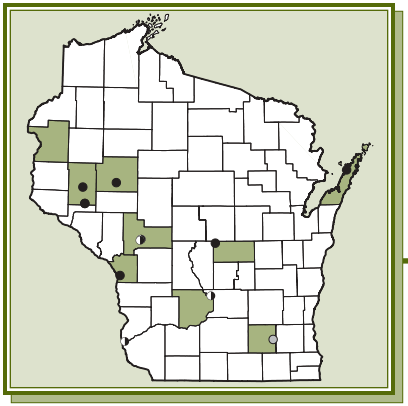
State rank: S5.

Habitat: Sand barrens, dry prairie, pine barrens, and oak openings.

Discussion: Half of the collection records (35 of 71) are from the most recent collection period.

Specimens examined: 71 males, 32 females from 58 sites.

References: Blatchley (1920), Vickery and Kevan (1985), Pfadt (1994).



Melanoplus punctulatus griseus (Thomas)

Pinetree (Grizzly) Spurthroat Grasshopper

Description: Long-winged, medium-bodied, dark, speckled grasshopper, with large protruding eyes and dull red tibiae.

Range: North Dakota and Ontario to Pennsylvania, south to Arizona and Texas.

Wisconsin distribution: Western Central Plain and Western Uplands, including one site along the forested Niagara Escarpment above Lake Michigan.

State rank: S3?.

Global rank: G4.

Habitat: Arboreal species of pine forest, swamp conifers (tamaracks), and perhaps oaks in the Southwest. Specimens are occasionally collected at the prairie-forest border, most likely in association with thickets and bramble. The only southeastern Wisconsin record is from an area that was probably good conifer swamp along the Kettle Moraine in 1917. *M. punctulatus griseus* occurs on tamarack in southern Michigan (Cantrall 1968).

Discussion: *M. punctulatus griseus* has been recorded in Polk County "ovipositing in pine stump". Adults are collected late July to mid-October. Because of the mottled coloration, individuals may be overlooked against the gray lichen on tree trunks.

Specimens examined: 13 males, 27 females from 14 sites.

References: Cantrall (1968), Vickery and Kevan (1985).

Melanoplus rusticus obovatipennis Blatchley

Obovatewinged Grasshopper

Description: Small, dark grasshopper, with short, ovate forewings. Femora faintly banded and tibiae dark olive green with a pale basal ring.

Range: Texas and Oklahoma, east to Tennessee, north to Illinois, Wisconsin, Indiana, and Ohio.

Wisconsin distribution: Grant County in the Driftless Area.

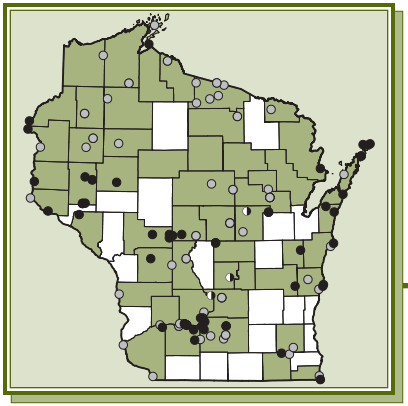
State rank: SH?.

Habitat: Reported from dry forests with oaks and wooded hillsides in other states (Hart and Gleason 1907, Blatchley 1920), though Blatchley suggests it may be found in marsh vegetation late in a dry autumn. Grant County has dry bluff prairies, oak forest, and many valleys and ridges, but the habitat information for these specimens is unknown.

Discussion: *M. rusticus obovatipennis* is a late maturing southern species. Wisconsin specimens collection dates include September 9 and October 6, 1962. Wisconsin is the northern border of the range.

Specimens examined: 1 male, 1 female.

References: Scudder (1899), Blatchley (1920), Hebard (1934).



Melanoplus sanguinipes sanguinipes (Fabricius)

Migratory Grasshopper

Description: Long-winged, medium-bodied grasshopper of gray-brown color, with spots along forewings and a hump on the mesosternum. Distinct notch in subgenital plate. Femora red below. Tibiae red or blue.

Range: Alaska to New Brunswick, south to northern Florida and Mexico

Wisconsin distribution: Throughout the state.

State rank: S5.

Habitat: Sand barrens, pine barrens, Great Lakes dunes, dry prairie, dry-mesic prairie, sand blowouts, oak forest, pine forest, and sand river terraces.

Discussion: Records for the North Central Forest and Northern Highland regions are from 1930 to early 1950s.

Specimens examined: 149.

References: Blatchley (1920), Hebard (1934), Vickery and Kevan (1985).

see Color Plate, p. 36

HERBERT D. POWNALL

Melanoplus scudderi scudderi (Uhler)

Scudder's Shortwinged Grasshopper

Description: Small, dull brown grasshopper, with short, ovate forewings. Femora unbanded and tibiae red.

Range: New England to northern Florida, west to Texas, Nebraska, Minnesota, and Ontario. Reported as local and uncommon in the northern Midwest.

Wisconsin distribution: One recent record, from a high quality Lake Michigan dune community.

State rank: S?.

Habitat: Manitowoc County sand dunes, scattered oaks, and spreading juniper; Grant County bluff brush prairie within oak forest.

Discussion: Adults were collected in August and September, but the species also was collected July 12, 1976, in Grant County and July 26, 2000, along the Lake Michigan shore. These dates are earlier than any reported in the literature.

Specimens examined: 11 males, 2 females from 4 sites.

References: Gleason and Hart (1907), Somes (1914), Blatchley (1920), Hebard (1934), Vickery and Kevan (1985).

Melanoplus stonei Rehn

Stone's Grasshopper

Description: Long-winged, medium-bodied, dark brown grasshopper, with dark red tibiae.

Range: New Brunswick and Ontario to Michigan, Wisconsin, Minnesota, and Manitoba.

Wisconsin distribution: Jackson and Manitowoc counties.

State rank: S1/S2.

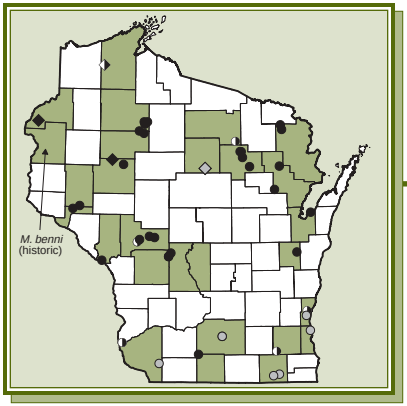
Global rank: G4/G5.

Habitat: Pine/oak barrens and northern dry-mesic forest in the Central Plain sands and Lake Michigan high quality dune habitat with scattered oaks, spreading juniper, and bearberry.

Discussion: Collected July 15, July 26, and August 26. Ontario ranks the species as Special Concern (NatureServe 2001).

Specimens examined: 7 males from 2 sites.

References: Blatchley (1920), Vickery and Kevan (1985), NatureServe (2001).



Melanoplus viridipes Scudder

Greenlegged Grasshopper

Melanoplus benni Otte

A Grasshopper

Description: Small gray-brown grasshopper, with short elliptical forewings. Femora distinctly banded. Tibiae green, ringed with black and cream basally.

Range: Indiana, Illinois, Iowa north to Minnesota and Wisconsin.

Wisconsin distribution: Found in most regions of the state.

State rank: S5.

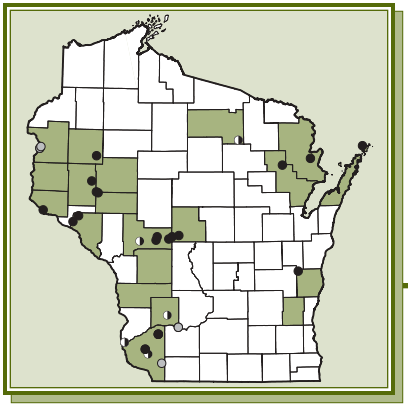
Global rank: (for species *M. viridipes*): G4.

Habitat: Common in northern mesic forest openings, dry-mesic forest openings, and pine/oak barrens.

Discussion: Otte (2002) has recently redefined this group to include two more species in Wisconsin. Specimens from the northern counties of Bayfield, Burnett, Polk, and Lincoln appear to be individuals of *M. benni* (depicted with diamonds in the map above). Another specimen from Polk County appears to be *M. eurycercus*, formerly a subspecies that ranges across the northeastern U.S. Cantrall (1970) considered Lake Michigan to be the western boundary of *M. eurycercus*, a glacial relict in Michigan. The Driftless Area may have played a role in speciation as a refugium where some populations of *M. viridipes* remained isolated within a colder environment than did those populations waiting out the glaciers' retreat in the Appalachians or the southwestern states. Otte (2002) describes the distribution of *M. viridipes* as Indiana, Illinois, Iowa, and Minnesota. *M. benni* has been identified from southern Indiana to northern Michigan and Wisconsin. All of the species in the *viridipes* group, he admits, are so similar that it is very difficult to distinguish between them. Adults are found in June and July in Wisconsin with extreme dates of May 23 and August 16.

Specimens examined: 91 males, 124 females.

References: Blatchley (1920), Hebard (1934), Cantrall (1968), Cantrall (1970), Vickery and Kevan (1985), Otte (2002).



Melanoplus walshii
Scudder

Walsh's Grasshopper

Description: Short-winged, medium-sized, dark gray-brown arboreal grasshopper, with dorsal area of forewings light brown and femora distinctly banded with a narrow extension toward its base. Hind tibiae red.

Range: Virginia, North Carolina, and Georgia north to Michigan, Wisconsin, Minnesota, and South Dakota.

Wisconsin distribution: Mostly collected in the western half of the state, also in the Northeast.

State rank: S5.

Global rank: G4/G5.

Habitat: Openings in northern dry to dry-mesic forest, pine and oak barrens, and prairie remnants.

Discussion: Brachypterous species known to oviposit in wood (Somes1914).

Specimens examined: 40 males, 30 females from 43 sites.

References: Somes (1914), Blatchley (1920), Vickery and Kevan (1985).

Paratylotropidia brunneri Scudder

A Grasshopper

Description: Short-winged, medium-sized, stout, brown and yellow grasshopper, with two distinct yellow stripes from fastigium of head to forewing tips. Pronotum has prominent lateral carinae. Hind tibiae typically deep red.

Range: Iowa, west central Illinois, possibly southeastern South Dakota ("Dakota"), Missouri, Arkansas, Texas, Oklahoma, and Kansas, disjunct to central Wisconsin.

Wisconsin distribution: Jackson County on the border of the Central Plain and the Western Upland.

State rank: S1?.

Global rank: G4/G5.

Habitat: Collected in a forested area along the Black River where the river cuts between the sandstone uplands of the Driftless Area to the west and the flat sand plain to the east. Lowland forest is interspersed with white pine-red maple stands along the high ground. *M. punctulatus griseus* and *M. viridipes* were taken from the same site.

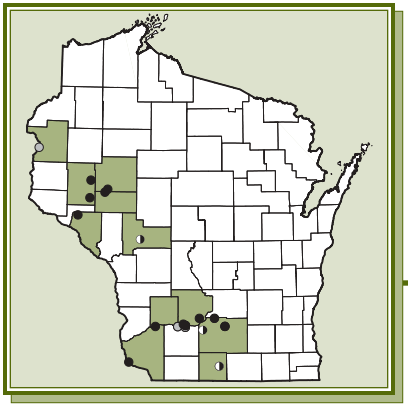
Discussion: Rehn and Rehn (1943) state, "It is quite possible the northern boundary of the distribution of brunneri will be found to coincide approximately with the border of the Wisconsin glaciation." The Wisconsin site is about 12 miles in from the boundary of the Driftless Area.

Specimens examined: 2 females, 1 male caught by malaise trap July 6, 1976. These specimens are, on average, smaller than the Iowa specimens at the ACNAT.

References: Scudder (1897), Rehn and Rehn (1943), Helfer (1953).

see Color Plate, p. 38

KATHRYN KIRK



Phoetaliotes nebrascensis (Thomas)

Largeheaded Grasshopper

Description: Short-winged, medium-sized, light gray grasshopper, with very large head relative to size of body. Short forewings pointed and inrolled. Tibiae blue.

Range: British Columbia to Michigan and south to Texas and Arizona.

Wisconsin distribution: Western Upland portion of the Wisconsin range of tallgrass prairie.

State rank: S2/S4.

Habitat: With few exceptions, collected on dry hill prairies and sand prairie on river terraces.

Discussion: Feeds on grasses, preferring lush, tall grassy areas (Pfadt 1994). In Wisconsin, tallgrass prairie remnants are few and prairie habitat is mostly confined to rocky and sandy substrates. The species is found also in marshes and swales in Michigan, Iowa, and Minnesota (Cantrall 1968, Somes 1914). Little collecting has been done in these habitats in Wisconsin.

During this study *P. nebrascensis* was collected at 13 dry prairie sites.

Specimens examined: 70 males, 7 females from 18 sites.

References: Vickery and Kevan (1985), Pfadt (1994), NHI (2001).

see Color Plate, p. 38

GRASSHOPPER SPECIES ACCOUNTS

KATHRYN KIRK

Acridinae

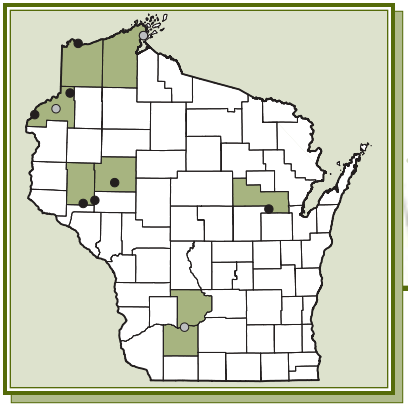
Gomphocerinae

Cyrtacanthacridinae

Melanoplinae

OEDIPODINAE

ERIC EPSTEIN



OEDIPODINAE

Arphia conspersa Scudder

Speckled Rangeland Grasshopper

Description: Forewings dark, hind wings vary in color from red to yellow. Abdomen yellow to brown. Light yellow or straw-colored line often appears at the dorsal juncture of the forewings. Hind tibiae yellow, often with a blue or greenish tint.

Range: Most of western North America, Minnesota to California. Vickery and Kevan (1985) report one record from the Upper Peninsula of Michigan.

Wisconsin distribution: North of the Tension Zone plus Sauk and Iowa counties along the Wisconsin River.

State rank: S2.

Habitat: Generally associated with sandy gravel soils in dry prairie settings, such as open sand of northwestern pine barrens and Lake Superior sand spits.

Discussion: This species overwinters as a nymph, most likely buried in dead grass. Wisconsin specimens were all collected in May and June.

Specimens examined: 9 males, 4 females from 11 sites.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985).

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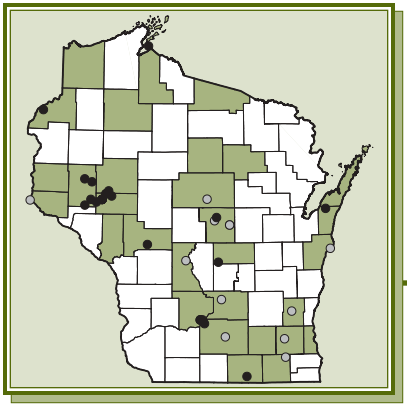


Arphia pseudonietana
(Thomas)

Redwinged Grasshopper

Description: Dark, large-sized grasshopper. Forewings dark brown with numerous dark speckles. Red hind wings typical across most of the range, but yellow-winged forms common across Wisconsin. Abdomen dark brown. Hind tibiae brown to black, with yellow basal ring. Inner face of hind femora black. Some individuals have a grayish-white pronotal disc.

Range: Most of western North America, east to Michigan, Ontario, and northern Ohio.

Wisconsin distribution: Widely distributed across Wisconsin.

State rank: S5.

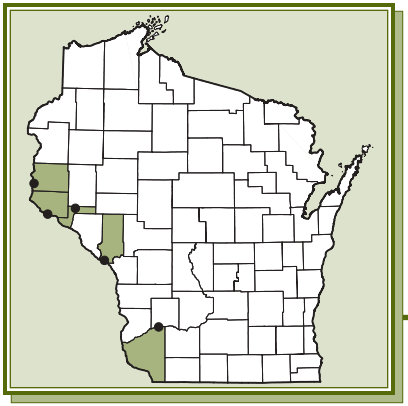
Habitat: Similar habitat to *A. conspersa*, sandy gravel soils in dry prairie.

Discussion: The hind wings of this species are red in most populations across the range, but mixed populations occur in the upper peninsula of Michigan (Cantrall 1968). The majority of the Wisconsin specimens (114 of 132) have yellow hind wings, with one known mixed population (both red and yellow -winged individuals) from Eau Claire County. The remaining specimens are from scattered populations across the northern counties and primarily have pink hind wings, but also include red-winged and one orange-winged specimen. Adults are collected from mid-July to early October.

Specimens examined: 84 males, 55 females from 42 sites.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985).

see Color Plate, p. 39



Arphia simplex Scudder
A Grasshopper

Description: Large, gray-black grasshopper. Hind wings yellow, with a complete black margin. Inner surface of hind tibiae may be bluish. Tibiae with two white bands.

Range: South Central Great Plains north to western Iowa, disjunct to southeast Missouri and southern Ohio.

Wisconsin distribution: Collected from five counties bordering the Mississippi River in western Wisconsin.

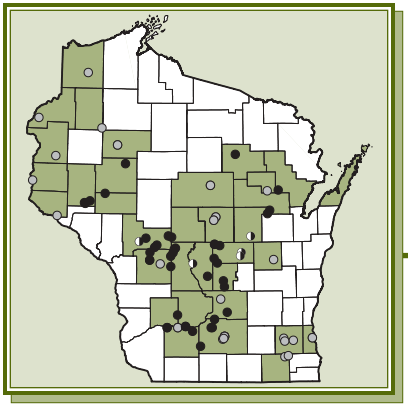
State rank: S1/S2.

Habitat: Associated with remnant prairies, grassy woodlands, and timber margins. The Grant County specimen is from sand barrens.

Discussion: Hind wings are yellow in all Wisconsin specimens. Wisconsin specimens were collected May 29, June 11, June 22, and July 14. These records dramatically extend the eastern edge of the range from the previous eastern boundary of western Iowa.

Specimens examined: 8 specimens from 5 sites.

References: Otte (1984).



Arphia sulphurea

(Fabricius)

Spring Yellow-winged Grasshopper

Description: Smaller than other *Arphia* spp. Black to blackish-gray body, with yellow hind wings. Median carina of pronotum weakly cut by sulcus and commonly has a moderate arch readily observable from the side.

Range: Eastern half of North America, from New England to eastern Nebraska.

Wisconsin distribution: Abundant across much of Wisconsin, but most recently collected only from interior counties of the state.

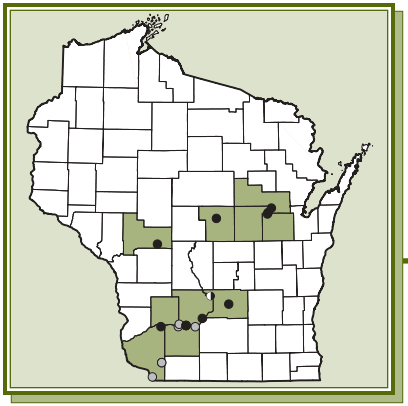
State rank: S5.

Habitat: Open woodlands with grassy understory, fields, prairies and roadsides.

Discussion: Nymphs overwinter, adults are collected from April to July, with most specimens collected in June.

Specimens examined: 56 males, 75 females from 93 sites.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985).



Arphia xanthoptera
(Burmeister)

Autumn Yellow-winged Grasshopper

Description: Large, black to blackish-gray grasshopper. Median carina of pronotum prominent. Hind wings yellow. Hind tibiae black with white basal ring.

Range: Eastern half of U.S., from New England to Nebraska and Texas.

Wisconsin distribution: Tension Zone south.

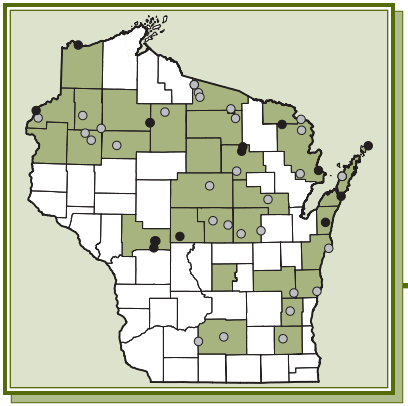
State rank: S3?.

Habitat: Sandy soils in dry open oak woodland, oak openings, jack pine/oak barrens, dry prairie, and upland fields.

Discussion: The range of *A. xanthoptera* appears to correlate with the range of black oak (*Quercus velutina*) within the state (Cochrane and Iltis 2000), as well as nationally (U.S.G.S. 2002). We suggest that this species may be dependent on oak savanna. Adults are collected from July to October in Wisconsin. Most specimens have been collected recently.

Specimens examined: 37 males, 8 females from 18 sites.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985).



Camnula pellucida
(Scudder)
Clearwinged Grasshopper

Description: Yellow to brown grasshopper, with mottled forewings. Hind wings clear, with no banding.

Range: Common in the northern states from Maine to Minnesota, and the western one-third of the U.S.

Wisconsin distribution: Widely collected across the northern half of the state.

State rank: S5.

Habitat: Sandy openings across the north, commonly collected in wet sandy ditches and Lake Superior sand dunes.

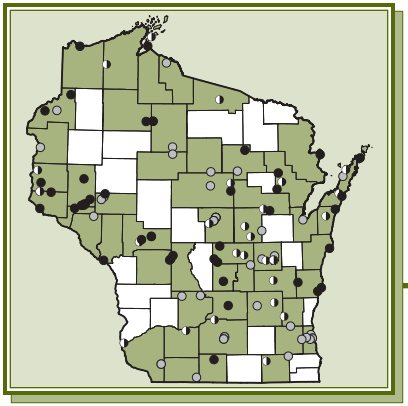
Discussion: The species has been found much less frequently in southern Michigan and Minnesota than in the northern portions of those states (Cantrall 1968, Somes 1914), but the last specimen from southern Wisconsin was taken in Marquette County in 1934. Hebard (1934) reported this species along Lake Michigan in 1901. Adults are generally collected from late June through September, but two records from Lincoln County are dated May 28, 1934, and June 2, 1948.

Specimens examined: 112 males, 94 females.

References: Hebard (1932, 1934), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), Pfadt (1994).

see Color Plate, p. 39

HERBERT D. POWNALL



Chortophaga viridifasciata (DeGeer)

Greenstriped Grasshopper

Description: Medium to large grasshopper. Body color variable, brown to bright green, occasionally with purple highlights. Commonly, males are brown and females are green. Hind wings pale yellow with a faint black band. Male fastigium narrows strongly and a horizontal band marks the eye.

Range: Widespread and common across the eastern two-thirds of the U.S., ranging westward to the Rocky Mountains.

Wisconsin distribution: Common across the entire state.

State rank: S5.

Habitat: Grassy swales, stream banks, and roadside ditches.

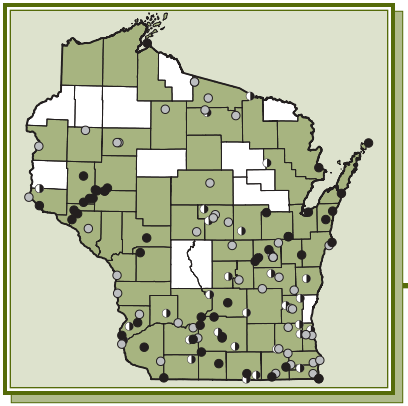
Discussion: This species overwinters as a late instar nymph, adults collected from May to July.

Specimens examined: 149 males, 202 females.

References: Hebard 1932, Cantrall 1968, Otte 1984, Vickery and Kevan 1985, Pfadt 1994.

see Color Plate, p. 39

GIFF BEATON



Dissosteira carolina
(Linnaeus)

Carolina Grasshopper

Description: Large grasshopper. Wisconsin specimens range from a solid brown or reddish-clay color to straw-colored with distinct banding on forewings. Hind wings black with yellow margins.

Range: Throughout the U.S. and southern Canada.

Wisconsin distribution: Common and widespread across the entire state.

State rank: S5.

Habitat: Found in roadsides and disturbed areas, wherever bare ground and open areas are present.

Discussion: *D. carolina* has been collected from late June through October in Wisconsin, most specimens captured in August and September. Because it is found in diverse habitats, there is great variation in forewing coloration.

Specimens examined: 163.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), Pfadt (1994).

see Color Plate, p. 39

DAN JOHNSON

Encoptolophus costalis
(Scudder)

Western Dusky Grasshopper

Description: Gray, medium-sized grasshopper with three distinct black bands on forewing. Pronotum with pale X-shaped marking on the disc. Hind wing clear to smoky with a weak, incomplete black band. Hind tibiae blue.

Range: Central Great Plains from Manitoba to central Mexico.

Wisconsin distribution: One specimen at the Milwaukee Public Museum from Milwaukee County in 1906.

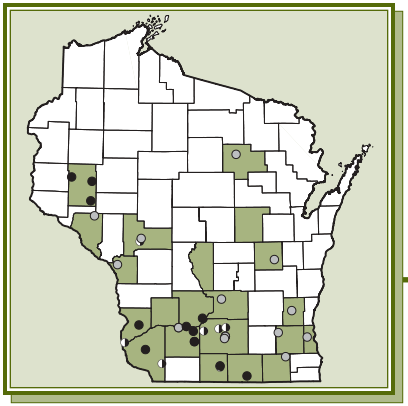
State rank: SH?/S1.

Habitat: Prairies, open grassland, and open woodland elsewhere, but no habitat information is available on the Wisconsin specimen.

Discussion: The 1906 collection of this species expands the known range, but since it has not been collected in almost 100 years, it has probably been extirpated from Wisconsin. This species was recognized based on the following characteristics: abdomen yellow below, tibiae blue-gray, fastigium longer than wide, dorsal field of forewings with converging pale stripes.

Specimens examined: 1 female.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), Richman et al. (1993), Pfadt (1994).



Encoptolophus sordidus (Burmeister)

Dusky Grasshopper

Description: Gray medium-sized grasshopper with three distinct black bands on forewing. Pronotum with short black dashes on posterior edges and pale X-shaped marking on the disc. Hind wing clear to smoky with weak and incomplete black band. Hind tibiae dark brown.

Range: New England to the central Great Plains.

Wisconsin distribution: South of the Tension Zone and Langlade County in northern Wisconsin.

State rank: S5.

Habitat: *E. sordidus* prefers weedy sites in the western U.S., but is found on disturbed prairie remnants and woodlands in Wisconsin.

Discussion: Generally collected in late August and September, never found in abundance. It has been considered a pest species in the western states. Only one specimen has been collected in northern Wisconsin, though the range through neighboring states suggests it should be found in the North.

Specimens examined: 48 males, 25 females from 37 sites.

References: Somes (1914), Otte (1984), Vickery and Kevan (1985), Richman et al. (1993).

Hippiscus ocelote

(Saussure)

Wrinkled Grasshopper

Description: Large, robust-bodied grasshopper, with mottled forewings. Hind wings yellow to pale orange. Inner surface of hind femora yellow with distinct black bands. Hind tibiae yellow.

Range: Widespread over the eastern two-thirds of the U.S., to the front range of the Rocky Mountains but apparently limited in northern range to the 42nd Parallel east of the Great Plains.

Wisconsin distribution: One specimen from the southwest corner of the state (Cassville, Grant County).

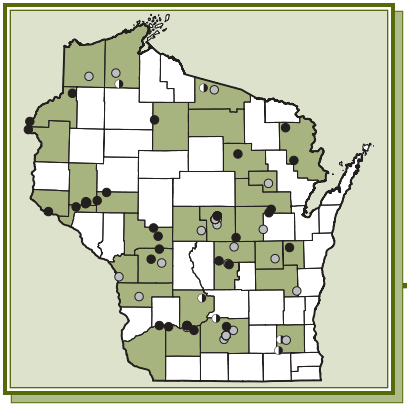
State rank: SH.

Habitat: Dry fields and prairie, alfalfa and timothy hayfields.

Discussion: The only Wisconsin specimen was collected September 30, 1956.

Specimens examined: 1 female at UW-Platteville Biology Department.

References: Capinera and Sechrist (1982), Otte (1984), Richman et al. (1993).



Pardalophora apiculata
(Harris)

Coralwinged Grasshopper

Description: Large, robust bodied grasshopper. Forewing area between veins Cu1 and Cu2 entirely dark. Hind wings pale to rosy red. Inner surface of hind femora pale yellow with black bands. Hind tibiae yellow.

Range: Widespread across north central U.S. into Canada, commonly associated with prairie-forest borders.

Wisconsin distribution: Widespread across the state.

State rank: S5.

Habitat: Generally found in association with sand or sandy outwash soils, uplands and old fields.

Discussion: Adults are collected from late April to early July. The species overwinters as a nymph. Many of the specimens have the proximal bands of the inner femur fused.

Specimens examined: 110 collection records.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), Richman et. al (1993).

Pardalophora haldemani (Scudder)

Haldeman's Grasshopper

Description: Large, robust-bodied grasshopper, with mottled forewings. Hind wings yellow to red. Inner surface of hind femora orange to rosy red with no banding. Hind tibiae yellow.

Range: Central Great Plains, southern Michigan west to the front range of the Rocky Mountains.

Wisconsin distribution: Sands of the Central Plains.

State rank: SH/S1.

Habitat: Open areas of sparse vegetation on sandy soils.

Discussion: The species overwinters as a nymph, adults are collected from May to July, though the specimen from Lone Rock, Richland County, was collected on August 10, 1906. The three most recent collections of this species are from 1981, 1973, and 1959. Possibly the species is being replaced by *P. apiculata* in Wisconsin as appears to be the case in areas of Michigan (Otte 1984).

Specimens examined: 11 males, 13 females from 12 sites.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), Richman et al. (1993).

Pardalophora phoenicoptera
(Burmeister)
Orangewinged Grasshopper

Description: Large, robust-bodied grasshopper, with mottled forewings. Hind wings deep orange to rosy red. Inner surface of hind femora blue basally, with two or three black bands. Hind tibiae yellow to orange.

Range: Southeastern U.S., from Florida north to Ohio, Indiana, and northern Illinois, west to Texas and Oklahoma.

Wisconsin distribution: Wood County in the sands of the Central Plains.

State rank: SH.

Habitat: Woods, openings, brushy hillsides and meadows in southern states. The Wood County specimen was collected at "Griffith St. Nursery."

Discussion: Hart and Gleason (1907) reported the species as common on grassy dunes and oak barrens along the Illinois River, and Hebard (1934) reported the species collected at Fulton, Illinois on the Mississippi River about 50 miles south of the Wisconsin border. The 50-year old Wisconsin specimen has the distinctive blue coloration on the inside of the hind femora.

Specimens examined: 1 immature.

References: Hart and Gleason (1907), Hebard (1934), Otte (1984).

see Color Plate, p. 40

GIFF BEATON

Psinidia fenestralis
(Serville)

Longhorned Grasshopper

Description: Slender-bodied, dark gray to dark brown grasshopper. Hind wings rosy red, with clear band in the black outer margin of the male. Ensiform antennae.

Range: Eastern third of U.S. to eastern Minnesota.

Wisconsin distribution: Commonly collected along river bottoms in those counties with large rivers and sandy banks.

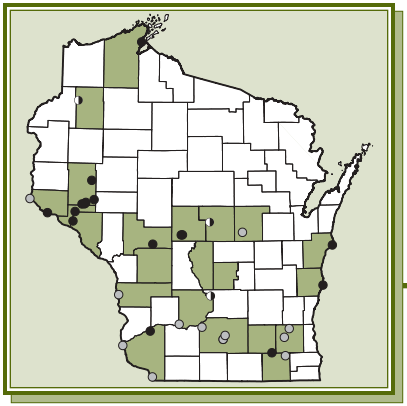
State rank: S2/S4.

Habitat: Sand, sand blowouts, and sandy river bottoms along the lower Chippewa and Wisconsin rivers.

Discussion: Most adults are collected from late June through September. Previous authors have discussed the ease by which this species is captured in the field, but our experience has been to the contrary. Adults, when disturbed along the Chippewa River, take flight, often traveling great distances with some individuals landing on the opposite bank. This species is commonly found in association with *Trimerotropis maritima* along the Lower Chippewa and Wisconsin rivers.

Specimens examined: 19 males, 9 females from 19 sites.

References: Hebard (1932), Froeshner (1954), Cantrall (1968), Otte (1984), Vickery and Kevan (1985).



Spharagemon bolli
Scudder

Boll's Grasshopper

Description: Medium-sized, wood brown to dark brown grasshopper. Forewings may have two or three faint black bands. Hind wings yellow, with black band across the central area. Inner surface of hind femora with four black bands and the proximal two bands fused. Hind tibiae red, with ivory and black basal rings.

Range: Eastern two-thirds of the U.S., from New England to the front range of the Rocky Mountains.

Wisconsin distribution: Primarily south of the Tension Zone in Wisconsin. One specimen from Bayfield County coincides with previous records from the Michigan-Wisconsin border.

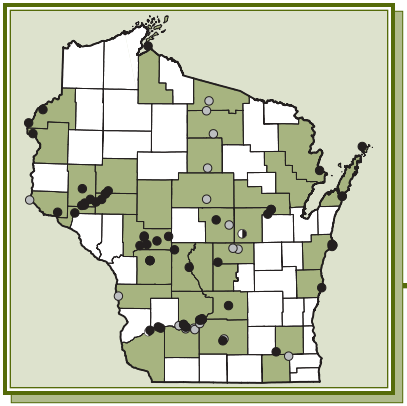
State rank: S3/S4.

Habitat: Open, sunny, dry prairie-woodland margins, including oak woodlands, oak savanna, barrens, dunes on Lake Michigan, sandblows, and sand flats along major rivers.

Discussion: *S. bolli* inhabits Lake Michigan dunes behind the beach, whereas *S. collare* is found on the open beach and dunes. Adults are collected from June to October, with most Wisconsin specimens collected in July.

Specimens examined: 37 males, 12 females from 35 sites.

References: Hebard (1932), Froeschner (1954), Cantrall (1968), Otte (1984), Vickery and Kevan (1985).



Spharagemon collare
(Scudder)

Mottled Sand Grasshopper

Description: Medium-sized, gray to light brown, mottled grasshopper, with medium carina of pronotum prominent and deeply cut. Forewing banding, when present, appears as clustered speckles. Hind wings yellow, with the black band across the central area. Hind tibiae red to orange.

Range: Northern U.S., from New England to western Montana, southern extensions along the front range of the Rocky Mountains into New Mexico.

Wisconsin distribution: Collected widely across the state.

State rank: S5.

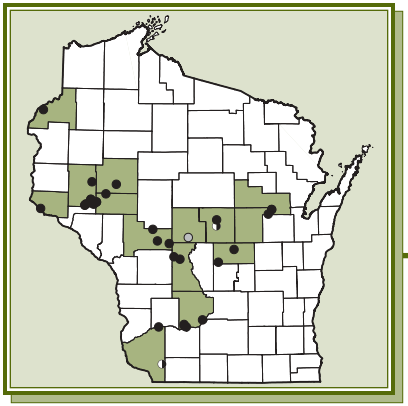
Habitat: Preferential to open sandy soil and sparse vegetation, barrens, dunes, sandy river terraces, and roadsides with open sand.

Discussion: *S. collare* is common on Lake Michigan beaches. Adults are collected from late June through September. We examined one specimen from the UW-Madison Arboretum labeled May 5, 1967, but consider it to be improperly labeled. This is perhaps the best flier of the three *Spharagemon* spp. occurring in Wisconsin and appears to colonize restored prairies.

Specimens examined: 113 males, 54 females from 62 sites.

References: Hebard (1932), Froeschner (1954), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), Bomar (2001).

see Color Plate, p. 40



Spharagemon marmorata marmorata
(Harris)

Northern Marbled Grasshopper

Description: Medium-sized grasshopper. Color quite variable, gray to brown, and usually highly speckled. Medium carinae of pronotum low. Hind wings yellow, with black band across central area, and clear to smoky tip outside black band. Hind tibiae red banded, with black and usually white basal rings.

Range: Northern states, New England to eastern Minnesota.

Wisconsin distribution: Southwestern Wisconsin to the northern edge of the Tension Zone.

State rank: S4.

Habitat: Jack pine barrens of the Central Plains, in open sandy areas on edges of trails, prairie borders within dry forest, sandblows, and river terraces.

Discussion: This beautiful mottled grasshopper is a very poor flier and a low, sluggish jumper. Most specimens are collected in July and August. The earliest Wisconsin collection date is July 1, 1998, in Juneau County. Only four specimens were collected prior to the most recent sampling period. Ontario (NatureServe 2001) and Wisconsin (NHI 2001) rank this as a species of Special Concern, though we found it to be well represented in sandy habitat in the central part of the state.

Specimens examined: 35 males, 7 females from 36 sites.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), NHI (2001), NatureServe (2001).

see Color Plate, p. 40

MIKE REESE

Trachyrhachys kiowa
(Thomas)

Kiowa Grasshopper

Description: Slender, medium-sized tan grasshopper, with black splotches. Pronotum cut by two sulci. Forewings generally lighter near pronotum with two or three dark spots on side of forewings. Hind wings generally pale yellow basally in Wisconsin, but variable across the range. Tibiae light blue to blue-gray.

Range: Widespread across the U.S., from Virginia west to California, with its greatest predominance in the western Great Plains and Rocky Mountain states.

Wisconsin distribution: A few sites in the Central Plains and Western Uplands.

State rank: S2.

Habitat: This may be a barrens species in Wisconsin. It was not found at dry prairie sites.

Discussion: *T. kiowa* has only been collected at three sites during the recent period; two in jack pine barrens of the Central Plains and one in sand prairie near the Wolf River. Adults are collected July 13 through September 24. A great amount of variation exists in this species across its range; three or four subspecies may exist or even more than one species (Otte 1984). Wisconsin specimens fall into the category of *T. k. fuscifrons* or *T. k. thomasi*, having pale yellow hind wings with black outer bands of variable intensity.

Specimens examined: 13 males, 14 females from 12 sites.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), Pfadt (1994), NHI (2001).

GEORGINE PRICE

Trimerotropis huroniana

E.M. Walker

Lake Huron Locust

Description: Medium to large-sized highly speckled grasshopper. Pronotum cut by two sulci. Gray to yellow or pale brown coloration with dark or weak banding on forewings. Hind wings clear to light yellow, with black band in the central area. Inner surface of hind femora with a broad dark basal band. Hind tibiae yellow.

Range: Northern dunes of Lake Michigan, Lake Huron, and Lake Superior.

Wisconsin distribution: Door County.

State rank: S1, END.

Global rank: G2/G3.

Habitat: Undisturbed high quality dunes on the northern shores of Lake Michigan. The grasshoppers are encountered behind the open beach, where dune grass (*Ammophila breviligulata*) has become established, though Hubbell (1929) observed that the females might be found on the beach just above the high water mark.

Discussion: Adults collected on July 28, 1999, and August 17,1988. In heavily used areas of beach, the species is replaced by *Spharagemon collare*. The U.S. Fish and Wildlife Service lists this species, under the name of “Lake Huron Locust”, as endangered. *T. huroniana* occurs only in Michigan, Wisconsin, and Ontario (NatureServe 2001).

Specimens examined: 5 males, 4 females from 2 sites.

References: Hubbell (1929), Cantrall (1968), Otte (1984), Vickery and Kevan (1985), NatureServe (2001).

see Color Plate, p. 40

Trimerotropis maritima
(Harris)

Seaside Grasshopper

Description: Medium to large-sized, highly speckled grasshopper. Pronotum cut by two sulci. Gray to yellow or pale brown coloration with bands on long forewings that may be very pale. Hind wings clear to light yellow, with the black band in the central area. Inner surface of the hind femora with narrow and short dark basal band. Hind tibiae yellow.

Range: Widespread in eastern and central U.S., with specimens from as far west as Arizona, most prominent along the Atlantic Coast.

Wisconsin distribution: Found commonly along the sandy shores of the lower Chippewa and Wisconsin rivers, and on beaches along southern Lake Michigan.

State rank: S2/S4.

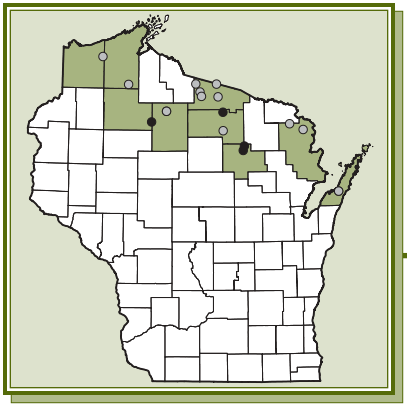
Habitat: Sand beaches, river terraces, and sand barrens. The Lake Michigan habitat is similar to that of *T. huroniana*, but the two species have never been recorded together.

Discussion: Adults have been collected from July 13 to September 20. This species is a great flier, and often difficult to catch. Along the lower Chippewa River, we often observed adults resting on open sands. These individuals were very sensitive to movement and readily took flight, often for very long distances. Some individuals were never observed landing.

Specimens examined: 27 males, 21 females from 17 sites.

References: Hubbell (1929), Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985).

GIFF BEATON



Trimerotropis verruculata verruculata (Kirby)

Crackling Grasshopper

Description: Dark-bodied, strongly speckled grasshopper. Pronotum cut by two sulci. Hind wings pale yellow, with black band in central area and smoky band in distal third. Hind tibiae brown to black, with pale basal rings.

Range: Northern states of eastern and Midwestern U.S. into the border provinces, including the northernmost portions of Manitoba and Saskatchewan.

Wisconsin distribution: The Northern Highlands.

State rank: S3?.

Habitat: Northern mesic to dry mesic forest.

Discussion: There have been few recent collections of this species. Thirteen of 17 sites were collected prior to 1952. Most of the Wisconsin specimens were collected in August.

Specimens examined: 16 males, 12 females from 17 sites.

References: Hebard (1932), Cantrall (1968), Otte (1984), Vickery and Kevan (1985).

" ...Immediately before settling
the grasshopper makes a quick turn,
reversing the course of flight and landing
so as to the face the direction from which it came.
This last second curl allows the grasshopper
to determine if its foe is in pursuit.
So it is with my passage through life.
Stimulated by hope, fear, joy, or sorrow I take flight.
When it seems I have gone far enough, I turn and stop,
resting for a moment to see if that
which provoked this leg of my journey is still there."

from Twisted Thoughts and Crooked Roads
"Prairie Soul: Finding grace in the earth beneath my feet"

Jeffrey A. Lockwood 2004

GRASSHOPPER

LITERATURE CITED
GLOSSARY

KATHRYN KIRK

KATHRYN KIRK

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GLOSSARY

Abdomen - the posterior of the three main body divisions of an insect (see Figures 8, 9).

Anal - pertaining to the last abdominal segment (which bears the anus); the posterior basal part (for example, of the wing, see Figure 9).

Antennae - (sing. antenna) a pair of segmented sensory appendages located on the head above the mouth parts (see Figures 9, 10).

Anterior - front; in front of.

Apex - (pl. apices) the end of a structure farthest from its base or point of attachment; "tip" of a structure.

Apical - at the end, tip, or outermost part.

Basal - at the base; near the point of attachment (of an appendage).

Carina - (pl. carinae) an elevated ridge or keel, not always high or acute (see Figure 9).

Cercus - (pl. cerci) an appendage (generally paired) near the end of the abdomen, often segmented but sometimes not. Often important in insect classification, especially the Melanoplinae (see Figures 12 and 13 and Appendix B).

Clavate - thickening gradually toward the tip of the antennae, clubbed (see Figure 10).

Clypeus - area on head below the frons that the labrum attaches to (see Figure 7).

Costal field - tegminal region adjacent to the anterior margin or costa (see Figure 9).

Costal margin - the anterior margin of a wing (see Figure 9).

Costal vein - a longitudinal wing vein, usually forming the anterior margin of the wing (see Figure 9).

Coxa - (pl. coxae) the basal segment of the leg (see Figure 8).

Crenulate - having the margin cut into rounded scallops.

Cubitus (Cu) - prominent longitudinal vein of the forewing (see Figure 23).

Disc - somewhat flat circular part or area; central upper portion or central portion, usually of the wing (see Figure 9).

Distal - toward the end farthest from the point of attachment on the body; near or toward the free end or apex of any appendage .

Dorsal - of or belonging to the upper surface.

Dorsum - the back.

Ensiform - sword shaped, with a wide base and tapering toward the tip (see Figure 10).

Fastigium - a depressed area at the front of the vertex of the head.

Femur - (pl. femora) thigh; usually the stoutest segment of the insect leg (see Figures 8, 9) connected to the body by a coxa and trochanter and bearing a tibia at the distal end.

Filiform - threadlike, of uniform diameter (see Figure 10).

Flange - a projected edge of the femur.

Foveola - (pl. foveolae) small depressions or pits located below the vertex (see Figure 7).

Frons - the upper anterior portion of the head, below the vertex and above the clypeus, including the area between the antennal bases.

Frontal costa - broad prominent vertical ridge on front of head between the compound eyes and running down toward the clypeal margin, often bearing a median ocellus (see Figure 7).

Furcula - (pl. furculae) one of a pair of structures at the base of the supra-anal plate of some grasshoppers, often distinctive in size and shape and therefore useful in classification of closely related species (see Figure 13 and Appendix B).

Integument - the outer covering or cuticle of the insect body.

Knee - the point of junction of the femur and the tibia (see Figure 8).

Labrum - upper lip, abutted to the clypeus (see Figure 7).

Lateral carina - ridges on pronotum along lateral margins of the dorsum (see Figure 9).

Lateral lobes - side portions of pronotum, which cover sides of the prothorax.

Marginal field - the anterior area of a wing or tegmen.

Median - in or at the middle; of or pertaining to the middle.

Median carina - any keel or ridge set along the middle on a part of an insect, of the head or pronotum (see Figure 9).

Mesosternum - bottom or ventral portion of the mesothorax (see Figures 14, 15).

Metasternum - bottom or ventral portion of metathorax.

Metazona - portion of the pronotum behind the principal sulcus (see Figure 9).

Ocellus - (pl. ocelli) a simple eye (see Figure 7).

Ovipositor - sharply pointed female organ to facilitate egg deposit into soil or wood (see Figure 11).

Ovipositor valve - dorsal or ventral portion of the ovipositor (see Figure 11).

Posterior - hind or rear.

Postocular - extending behind the eye.

Pronotum - shield-like cover of the prothorax (see Figure 8).

Prosternum - bottom portion of the prothorax, the forebreast.

Proximal - nearer to the body, or to the base of an appendage.

Prozona - portion of the pronotum in front of the principal sulcus (see Figure 9).

Punctate - with impressed dots or punctures.

Radiate veins - the longitudinal veins spreading fan-like in the anal field of the hind wings (see Figure 9).

Right Angle - an angle of 90º; an angle made by the meeting of two straight lines perpendicular to each other.

Spatulate - spoon-shaped; broad with a depression apically, and narrowed basally.

Spine - a thorn-like outgrowth of the integument, usually associated with the leg segments on grasshoppers (see Figure 8).

Spur - Of a leg segment: a movable "spine," usually larger than most spines and located at the apex of the segment (see Figure 8). Of a wing: a dark area running toward the base from the outer band, near front of wing (see Figure 9). Of the thorax: the prosternal tubercle of spurthroated grasshoppers (see Figure 6).

Spurious vein - certain folds or thickenings in the wing surface that resemble veins so nearly as to be readily mistaken for them.

Sternum - the ventral (bottom) portion of the body; segments of the ventral abdomen.

Subapical - near the apex.

Subgenital plate - a plate covering the male genital opening from beneath, often scoop-shaped (see Figures 12, 13 and Appendix B).

Sulcus - (pl. sulci) a groove or furrow.

Supra-anal plate - a more or less triangular-shaped plate over the anus (see Figures 12, 13).

Tarsus - (pl. tarsi) the foot; the jointed appendage attached at the apex of the tibia, bearing the claws (see Figure 8, 9).

Tectiform - tent like structure, sloping from the ridge of the pronotum.

Tegmen - (pl. tegmina) the thickened or leathery front wing of a grasshopper (see Figure 9).

Thorax - the body region behind the head, which bears the legs and wings, formed of the pro-, meso-, and meta- regions between head and abdomen (see Figure 8).

Tibia - (pl. tibiae) the fourth leg segment, between the femur and tarsus (see Figures 8, 9).

Transverse - broader than long; running across.

Trochanter - the second segment of the leg, between the coxa and femur (see Figure 8).

Truncate- cut squarely across; shortened.

Tubercle - a small knob-like or rounded protuberance (see Figure 6).

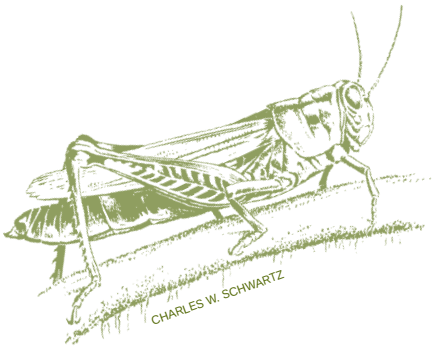
Venation - the complete system of veins of a wing.

Ventral - pertaining to the undersurface.

Vertex - the top of the head, including the upper region between the eyes (see Figure 7).

Wing disc - the central area of a wing, usually in reference to the hind wing (see Figure 9).

Wing pads - the undeveloped wings of nymphs.



GRASSHOPPER

APPENDIX A.
County Lists of Species

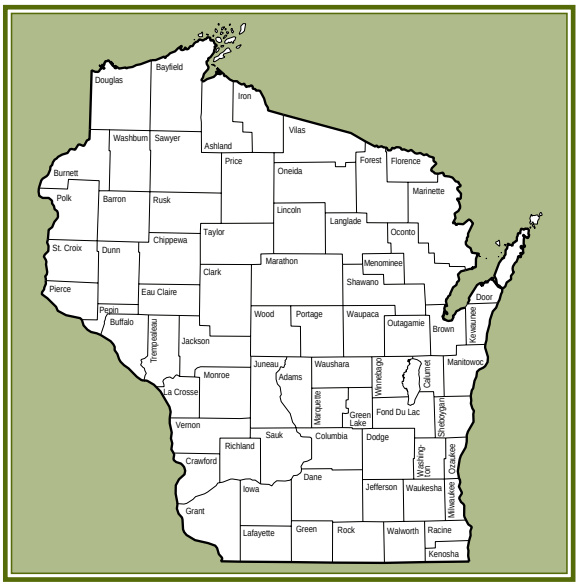
APPENDIX B.
Tables of Melanopline Genitalia

APPENDIX C.
Status Rankings

KATHRYN KIRK

KATHRYN KIRK

APPENDIX A. County Lists of Species



Wisconsin counties.

Adams

Aeropedellus clavatus
Ageneotettix deorum
Arphia sulphurea
Chorthippus curtipennis
Dendrotettix quercus
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus viridipes
Schistocerca lineata
Spharagemon bolli
Spharagemon collare

Ashland

Arphia pseudonietana
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus borealis
Melanoplus bruneri
Melanoplus fasciatus
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus sanguinipes
Spharagemon collare

Barron

Camnula pellucida
Chorthippus curtipennis
Dissosteira carolina
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus sanguinipes
Melanoplus walshii

Bayfield

Arphia conspersa
Booneacris glacialis canadensis
Chloealtis abdominalis
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus borealis

Melanoplus confusus
Melanoplus dawsoni
Melanoplus fasciatus
Melanoplus foedus
Melanoplus islandicus
Melanoplus sanguinipes
Melanoplus viridipes
Pardalophora apiculata
Spharagemon bolli
Stethophyma lineata
Trimerotropis verruculata

Brown

Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus femurrubrum

Buffalo

Chloealtis conspersa
Chortophaga viridifasciata
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus confusus
Melanoplus dawsoni
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus walshii
Opeia obscura
Orphulella pelidna
Orphulella speciosa
Phoetaliotes nebrascensis
Schistocerca alutacea
Spharagemon bolli

Burnett

Arphia conspersa
Arphia pseudonietana
Arphia sulphurea
Camnula pellucida
Chorthippus curtipennis
Chortophaga viridifasciata
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus foedus
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus viridipes
Orphulella pelidna
Pardalophora apiculata
Schistocerca lineata
Spharagemon collare
Spharagemon marmorata

Calumet

Chorthippus curtipennis
Dissosteira carolina
Melanoplus bivittatus
Melanoplus borealis
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus sanguinipes
Melanoplus viridipes
Pardalophora apiculata

Chippewa

Arphia conspersa
Arphia pseudonietana
Arphia sulphurea
Chorthippus curtipennis
Dissosteira carolina
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus gladstoni
Melanoplus keeleri
Melanoplus punctulatus griseus
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Mermiria bivittata
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Schistocerca lineata
Spharagemon collare
Spharagemon marmorata

Clark

Chorthippus curtipennis
Dissosteira carolina
Spharagemon collare

Columbia

Ageneotettix deorum
Arphia pseudonietana
Arphia sulphurea
Arphia xanthoptera
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Encoptolophus sordidus
Eritettix simplex
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Orphulella speciosa
Pseudopomala brachyptera
Spharagemon collare

Crawford

Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Hesperotettix viridis pratensis
Melanoplus bivittatus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri
Orphulella pelidna
Orphulella speciosa
Pseudopomala brachyptera
Syrbula admirabilis

Dane

Ageneotettix deorum
Arphia pseudonietana
Arphia sulphurea
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Eritettix simplex
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus borealis
Melanoplus bruneri
Melanoplus confusus
Melanoplus dawsoni
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus viridipes
Opeia obscura
Orphulella pelidna
Orphulella speciosa
Pardalophora apiculata
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Romalea microptera
Schistocerca americana
Schistocerca lineata
Spharagemon bolli
Spharagemon collare
Trachyrhachys kiowa
Trimerotropis maritima

Dodge

Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus femurrubrum

Door

Arphia pseudonietana
Arphia sulphurea
Booneacris glacialis canadensis
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus confusus
Melanoplus dawsoni

Melanoplus femurrubrum
Melanoplus islandicus
Melanoplus keeleri
Melanoplus punctulatus griseus
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Spharagemon collare
Trimerotropis huroniana
Trimerotropis verruculata

Douglas

Arphia conspersa
Arphia pseudonietana
Arphia sulphurea
Booneacris glacialis canadensis
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus dawsoni
Melanoplus fasciatus
Melanoplus femurrubrum
Melanoplus foedus
Melanoplus islandicus
Melanoplus sanguinipes
Orphulella pelidna
Pardalophora apiculata
Trimerotropis verruculata

Dunn

Ageneotettix deorum
Arphia conspersa
Arphia pseudonietana
Arphia sulphurea
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus borealis
Melanoplus confusus
Melanoplus dawsoni
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus foedus
Melanoplus gladstoni
Melanoplus keeleri
Melanoplus punctulatus griseus
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Mermiria bivittata
Opeia obscura
Orphulella pelidna
Orphulella speciosa
Pardalophora apiculata
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Psinidia fenestralis
Schistocerca lineata
Spharagemon bolli
Spharagemon collare
Spharagemon marmorata
Trimerotropis maritima

Eau Claire

Arphia pseudonietana
Arphia sulphurea
Chorthippus curtipennis
Chortophaga viridifasciata
Dichromorpha viridis
Dissosteira carolina
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus walshii
Mermiria bivittata
Opeia obscura
Pardalophora apiculata
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Schistocerca lineata
Spharagemon collare
Spharagemon marmorata

Florence

Camnula pellucida
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus sanguinipes

Fond du Lac

Camnula pellucida
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus femurrubrum
Melanoplus sanguinipes
Metaleptea brevicornis
Pardalophora apiculata

Forest

Dissosteira carolina

Grant

Arphia simplex
Arphia xanthoptera
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dendrotettix quercus
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Eritettix simplex
Hesperotettix viridis pratensis
Hippiscus ocelote
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus dawsoni
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus punctulatus griseus
Melanoplus rusticus obovatipennis
Melanoplus sanguinipes
Melanoplus scudderi
Melanoplus viridipes
Melanoplus walshii
Orphulella speciosa
Pardalophora apiculata
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Psinidia fenestralis
Romalea microptera
Schistocerca alutacea
Spharagemon bolli
Spharagemon collare
Spharagemon marmorata
Stethophyma lineata
Syrbula admirabilis
Trachyrhachys kiowa
Trimerotropis maritima

Green

Arphia xanthoptera
Chloealtis conspersa
Chortophaga viridifasciata
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Melanoplus confusus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus viridipes
Orphulella pelidna
Orphulella speciosa
Phoetaliotes nebrascensis
Schistocerca lineata

Green Lake

Chortophaga viridifasciata
Dissosteira carolina
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus sanguinipes

Iowa

Ageneotettix deorum
Arphia conspersa
Arphia sulphurea
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dichromorpha viridis
Dissosteira carolina

Encoptolophus sordidus
Eritettix simplex
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Orphulella speciosa
Pardalophora apiculata
Pseudopomala brachyptera
Schistocerca lineata
Spharagemon collare
Syrbula admirabilis
Trachyrhachys kiowa

Iron

Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Melanoplus bivittatus
Melanoplus borealis
Melanoplus bruneri
Melanoplus dawsoni
Melanoplus sanguinipes

Jackson

Arphia pseudonietana
Arphia sulphurea
Arphia xanthoptera
Booneacris glacialis canadensis
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dendrotettix quercus
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus borealis
Melanoplus confusus
Melanoplus dawsoni
Melanoplus fasciatus
Melanoplus femurrubrum
Melanoplus islandicus
Melanoplus keeleri
Melanoplus punctulatus griseus
Melanoplus sanguinipes
Melanoplus stonei
Melanoplus viridipes
Melanoplus walshii
Opeia obscura
Orphulella pelidna
Orphulella speciosa
Paratylotropidia brunneri
Pardalophora apiculata
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Psinidia fenestralis
Spharagemon bolli
Spharagemon collare
Spharagemon marmorata
Trachyrhachys kiowa

Jefferson

Arphia pseudonietana
Chorthippus curtipennis
Dissosteira carolina
Melanoplus bivittatus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus punctulatus griseus
Orphulella speciosa
Spharagemon bolli

Juneau

Arphia pseudonietana
Arphia sulphurea
Chloealtis abdominalis
Chloealtis conspersa
Chortophaga viridifasciata
Dendrotettix quercus
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus borealis
Melanoplus confusus
Melanoplus differentialis
Melanoplus femurrubrum

Juneau *(continued)*

Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus viridipes
Orphulella speciosa
Spharagemon collare
Spharagemon marmorata

Kenosha

Ageneotettix deorum
Chorthippus curtipennis
Dissosteira carolina
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus sanguinipes
Orphulella speciosa

Kewaunee

Arphia pseudonietana
Camnula pellucida
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus sanguinipes
Stethophyma gracile

La Crosse

Chorthippus curtipennis
Dissosteira carolina
Encoptolophus sordidus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus foedus
Melanoplus keeleri
Melanoplus punctulatus griseus
Orphulella speciosa
Pardalophora apiculata
Schistocerca lineata

Lafayette

Chortophaga viridifasciata
Dissosteira carolina
Melanoplus differentialis
Melanoplus femurrubrum

Langlade

Arphia pseudonietana
Arphia sulphurea
Camnula pellucida
Chorthippus curtipennis
Chortophaga viridifasciata
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus borealis
Melanoplus confusus
Melanoplus fasciatus
Melanoplus sanguinipes
Melanoplus viridipes
Pardalophora apiculata
Trimerotropis verruculata

Lincoln

Arphia pseudonietana
Camnula pellucida
Chloealtis conspersa
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus sanguinipes
Melanoplus viridipes
Spharagemon collare

Manitowoc

Aeropedellus clavatus
Arphia pseudonietana
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus angustipennis
Melanoplus bivittatus

Melanoplus confusus
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus scudderi
Melanoplus stonei
Spharagemon bolli
Spharagemon collare

Marathon

Arphia pseudonietana
Arphia sulphurea
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus bruneri
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus sanguinipes
Pardalophora haldemanii
Schistocerca lineata
Spharagemon collare

Marinette

Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus islandicus
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Pardalophora apiculata
Spharagemon collare
Stethophyma gracile
Stethophyma lineata
Trimerotropis verruculata

Marquette

Arphia sulphurea
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus fasciatus
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Pardalophora apiculata
Pseudopomala brachyptera
Schistocerca lineata
Spharagemon bolli
Spharagemon collare

Menominee

Arphia sulphurea
Melanoplus bivittatus
Melanoplus sanguinipes

Milwaukee

Arphia pseudonietana
Arphia sulphurea
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Encoptolophus costalis
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus viridipes
Schistocerca alutacea
Schistocerca americana
Schistocerca damnifica
Trimerotropis maritima

Monroe

Arphia sulphurea
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dendrotettix quercus
Dissosteira carolina
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus dawsoni
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Orphulella speciosa
Pardalophora apiculata
Pardalophora haldemanii
Pseudopomala brachyptera
Schistocerca alutacea
Schistocerca lineata
Spharagemon bolli
Spharagemon collare

Oconto

Arphia sulphurea
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dendrotettix quercus
Dissosteira carolina
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus islandicus
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Spharagemon collare

Oneida

Booneacris glacialis canadensis
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Dissosteira carolina
Melanoplus bivittatus
Melanoplus borealis
Melanoplus confusus
Melanoplus fasciatus
Melanoplus femurrubrum
Melanoplus islandicus
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Pardalophora apiculata
Spharagemon collare
Trimerotropis verruculata

Outagamie

Ageneotettix deorum
Arphia sulphurea
Chorthippus curtipennis
Dissosteira carolina
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus borealis
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus sanguinipes
Opeia obscura
Orphulella speciosa
Pardalophora apiculata
Trachyrhachys kiowa

Ozaukee

Chorthippus curtipennis
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus viridipes

Pepin

Aeropedellus clavatus
Arphia simplex
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus angustipennis
Melanoplus femurrubrum
Melanoplus viridipes
Pardalophora apiculata
Psinidia fenestralis
Spharagemon bolli
Spharagemon collare

Pierce

Aeropedellus clavatus
Ageneotettix deorum
Arphia pseudonietana
Arphia simplex
Arphia sulphurea
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Hesperotettix viridis pratensis
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus foedus
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus walshii
Orphulella pelidna
Pardalophora apiculata
Schistocerca alutacea
Spharagemon bolli
Spharagemon collare
Spharagemon marmorata
Trimerotropis maritima

Polk

Arphia sulphurea
Camnula pellucida
Chloealtis abdominalis
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Eritettix simplex
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus punctulatus griseus
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Pardalophora apiculata
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Schistocerca alutacea
Schistocerca lineata
Spharagemon collare

Portage

Aeropedellus clavatus
Ageneotettix deorum
Arphia pseudonietana
Arphia sulphurea
Arphia xanthoptera
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Hesperotettix viridis pratensis
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus sanguinipes
Orphulella speciosa
Pardalophora apiculata
Pardalophora haldemanii
Pseudopomala brachyptera
Psinidia fenestralis
Schistocerca lineata
Spharagemon bolli
Spharagemon collare
Spharagemon marmorata
Stethophyma gracile
Trachyrhachys kiowa

Price

Camnula pellucida
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus femurrubrum
Pardalophora apiculata
Trimerotropis verruculata

Racine

Chorthippus curtipennis
Dissosteira carolina
Melanoplus femurrubrum
Orphulella speciosa
Trimerotropis maritima

Richland

Ageneotettix deorum
Arphia sulphurea
Arphia xanthoptera
Chloealtis conspersa
Chorthippus curtipennis
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Hesperotettix viridis pratensis
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus dawsoni
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus islandicus
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus scudderi
Melanoplus walshii
Mermiria bivittata
Orphulella pelidna
Orphulella speciosa
Pardalophora haldemanii
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Psinidia fenestralis
Schistocerca alutacea
Schistocerca lineata
Trachyrhachys kiowa
Trimerotropis maritima

Rock

Arphia pseudonietana
Chorthippus curtipennis
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus differentialis
Melanoplus femurrubrum
Orphulella speciosa

Rusk

Arphia sulphurea
Camnula pellucida
Dissosteira carolina
Dissosteira carolina
Melanoplus bivittatus
Melanoplus sanguinipes
Melanoplus viridipes

Sauk

Ageneotettix deorum
Arphia conspersa
Arphia pseudonietana
Arphia sulphurea
Arphia xanthoptera
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Encoptolophus sordidus
Eritettix simplex
Hesperotettix speciosus
Hesperotettix viridis pratensis
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus dawsoni
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus foedus
Melanoplus keeleri
Melanoplus punctulatus griseus
Melanoplus sanguinipes
Mermiria bivittata
Orphulella speciosa
Pardalophora apiculata
Phoetaliotes nebrascensis
Pseudopomala brachyptera
Psinidia fenestralis
Schistocerca lineata
Spharagemon bolli
Spharagemon collare
Spharagemon marmorata
Trachyrhachys kiowa

Sawyer

Arphia pseudonietana
Camnula pellucida
Chortophaga viridifasciata
Melanoplus bivittatus
Melanoplus borealis
Melanoplus sanguinipes
Melanoplus viridipes
Trimerotropis verruculata

Shawano

Ageneotettix deorum
Arphia conspersa
Arphia sulphurea
Arphia xanthoptera
Camnula pellucida
Chortophaga viridifasciata
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus borealis
Melanoplus confusus
Melanoplus fasciatus
Melanoplus sanguinipes
Pardalophora apiculata
Psinidia fenestralis
Spharagemon collare
Spharagemon marmorata
Stethophyma gracile

Sheboygan

Aeropedellus clavatus
Camnula pellucida
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus sanguinipes
Melanoplus walshii
Spharagemon bolli
Spharagemon collare
Trimerotropis maritima

St. Croix

Arphia pseudonietana
Arphia simplex
Arphia sulphurea
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus walshii
Orphulella speciosa
Pseudopomala brachyptera

Taylor

Chorthippus curtipennis
Chortophaga viridifasciata
Melanoplus sanguinipes

Trempealeau

Arphia pseudonietana
Arphia simplex
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Hesperotettix viridis pratensis
Melanoplus bivittatus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus keeleri
Melanoplus viridipes

Vernon

Chloealtis conspersa
Chorthippus curtipennis
Dissosteira carolina
Hesperotettix viridis pratensis
Melanoplus bivittatus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri

Vernon *(continued)*

Melanoplus sanguinipes
Melanoplus walshii
Orphulella pelidna
Orphulella speciosa
Pardalophora apiculata
Spharagemon bolli
Spharagemon collare

Vilas

Arphia pseudonietana
Booneacris glacialis canadensis
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Melanoplus bivittatus
Melanoplus bruneri
Melanoplus islandicus
Melanoplus sanguinipes
Pardalophora apiculata
Spharagemon collare
Trimerotropis verruculata

Walworth

Arphia pseudonietana
Arphia sulphurea
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus confusus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus viridipes
Orphulella speciosa
Spharagemon bolli
Spharagemon collare
Stethophyma gracile

Washburn

Arphia sulphurea
Camnula pellucida
Camnula pellucida
Melanoplus dawsoni
Melanoplus femurrubrum
Melanoplus sanguinipes

Washington

Arphia pseudonietana
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus walshii
Orphulella speciosa
Spharagemon bolli

Waukesha

Ageneotettix deorum
Arphia pseudonietana
Arphia sulphurea
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus sanguinipes
Melanoplus viridipes
Orphulella speciosa
Pardalophora apiculata
Pseudopomala brachyptera
Schistocerca lineata
Spharagemon bolli
Spharagemon collare

Waupaca

Aeropedellus clavatus
Ageneotettix deorum
Arphia sulphurea
Arphia xanthoptera
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Chortophaga viridifasciata
Dissosteira carolina
Encoptolophus sordidus
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Pardalophora apiculata
Pseudopomala brachyptera
Schistocerca lineata
Spharagemon bolli
Spharagemon collare
Spharagemon marmorata
Trachyrhachys kiowa

Waushara

Aeropedellus clavatus
Ageneotettix deorum
Arphia pseudonietana
Arphia sulphurea
Chortophaga viridifasciata
Dendrotettix quercus
Dissosteira carolina
Melanoplus angustipennis
Melanoplus bivittatus
Melanoplus confusus
Melanoplus differentialis
Melanoplus femurrubrum
Melanoplus flavidus
Melanoplus sanguinipes
Pardalophora apiculata
Pardalophora haldemanii
Schistocerca alutacea
Schistocerca lineata
Spharagemon collare
Spharagemon marmorata

Winnebago

Arphia sulphurea
Arphia xanthoptera
Chorthippus curtipennis
Chortophaga viridifasciata
Dichromorpha viridis
Dissosteira carolina
Encoptolophus sordidus
Melanoplus bivittatus
Melanoplus confusus
Melanoplus differentialis
Melanoplus femurrubrum
Orphulella speciosa
Pardalophora apiculata
Pardalophora haldemanii
Schistocerca alutacea

Wood

Ageneotettix deorum
Arphia sulphurea
Camnula pellucida
Chloealtis conspersa
Chorthippus curtipennis
Dendrotettix quercus
Dissosteira carolina
Melanoplus bivittatus
Melanoplus dawsoni
Melanoplus fasciatus
Melanoplus femurrubrum
Melanoplus keeleri
Melanoplus sanguinipes
Melanoplus viridipes
Melanoplus walshii
Orphulella pelidna
Orphulella speciosa
Pardalophora apiculata
Pardalophora phoenicoptera
Pseudopomala brachyptera
Schistocerca lineata
Spharagemon bolli
Spharagemon marmorata
Trachyrhachys kiowa

APPENDIX B. Tables of Melanopline Genitalia

Table A. Short wings and no furculae

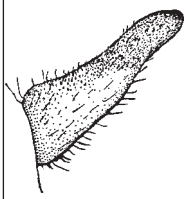
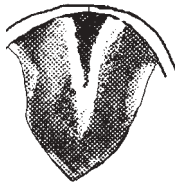
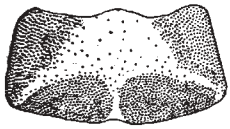
Species	Cercus	Furcula	Subgenital Plate
Paratylotropidia brunneri			

Table A. Short wings and green legs

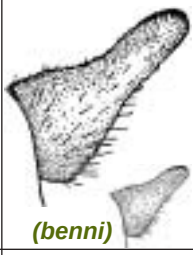
Species	Cercus	Furcula	Subgenital Plate
M. viridipes	 *(benni)*		
M. gracilis			
M. rusticus obovatipennis			

Table B. Short wings and pink or red legs

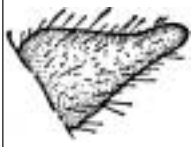
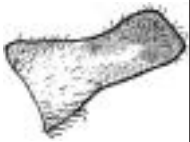
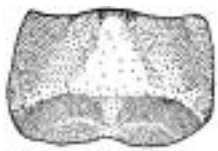
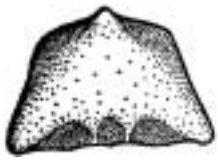
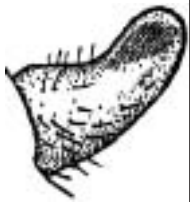
Species	Cercus	Furcula	Subgenital Plate
M. islandicus			
M. walshii			
M. huroni			
M. scudderi scudderi			
M. dawsoni			

Table C. Wings 1 1/2 pronotal length to near apex of abdomen

Species	Cercus	Furcula	Subgenital Plate
M. fasciatus			
M. borealis borealis			

Table D. Long wings and long furculae (see also Tables B and C, *M. dawsoni* and *M. borealis*)

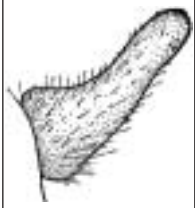
Species	Cercus	Furcula	Subgenital Plate
M. bruneri			
M. sanguinipes sanguinipes			
M. flavidus			
M. femurrubrum			

Table E. Long wings and cercus with a protrusion

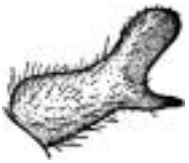
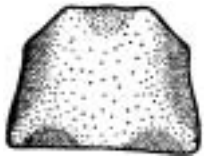
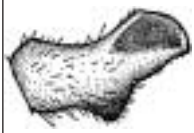
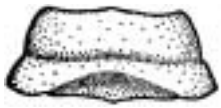
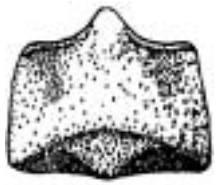
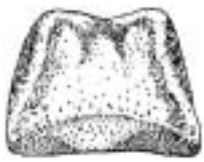
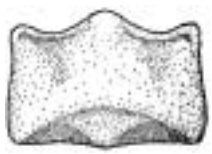
Species	Cercus	Furcula	Subgenital Plate
M. keeleri luridus			
M. confusus			
M. punctulatus griseus			
M. differentialis differentialis			
M. bivittatus			

Table F. Long wings and cercus with no protrusion
(see also Table C, *M. fasciatus*)

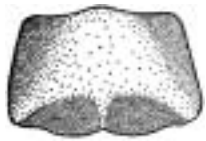
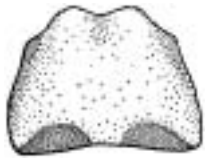
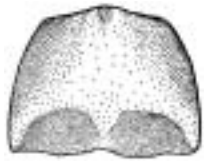
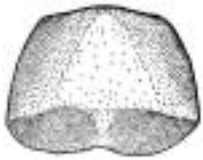
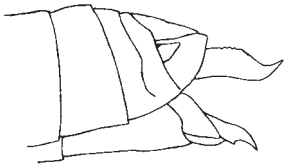
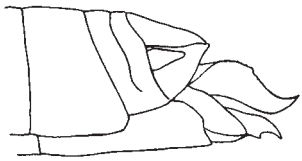
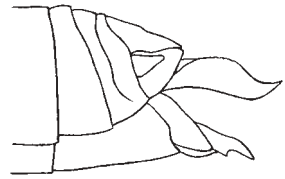
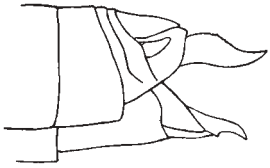
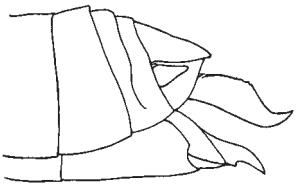
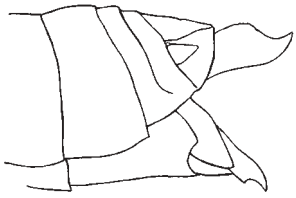
Species	Cercus	Furcula	Subgenital Plate
M. gladstoni			
M. angustipennis			
M. packardii			
M. foedus fluviatilis			
M. stonei			

Table G. Female Genitalia

Species	
M. dawsoni	
M. femurrubrum	
M. borealis borealis	
M. keeleri luridus	
M. fasciatus	
M. gladstoni	

APPENDIX C. Species Status Rankings

he Wisconsin DNR's Natural Heritage Inventory (NHI) program is part of an international network of programs that focus on rare plants and animals, natural communities, and other rare elements of nature. The defining and unifying characteristic of this network is the use of a standard methodology for collecting, processing, and managing data on the occurrences of natural biological diversity. A key feature of the NHI methodology is a system for assessing rarity of the various elements at the global (G) and state (S) level. These status ranks have proven useful in directing action toward the elements most in need of conservation. The methodology was developed by The Nature Conservancy and is currently coordinated by NatureServe, an international non-profit organization. The Wisconsin NHI Working List records "elements" tracked by the Wisconsin DNR. The list is revised as species' populations change (increase or decrease) and as knowledge about their status and distribution in Wisconsin increases. Definitions of legal protection categories and state and global status ranks used in the species accounts are provided below.

Protection Category

END = **Endangered**
Any species whose continued existence as a viable component of this state's wild animals or wild plants is determined by the Department to be in jeopardy on the basis of scientific evidence.

THR = **Threatened**
Any species which appears likely, within the foreseeable future, on the basis of scientific evidence to become endangered.

SC = **Special Concern**
Those species about which some problem of abundance or distribution is suspected but not yet proven. The main purpose of this category is to focus attention on certain species before they become threatened or endangered.

State Ranks

S1 = Critically imperiled in Wisconsin because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.

S2 = Imperiled in Wisconsin because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.

S3 = Rare or uncommon in Wisconsin (21 to 100 occurrences).

S4 = Apparently secure in Wisconsin, with many occurrences.

S5 = Demonstrably secure in Wisconsin and essentially ineradicable under present conditions.

SA = Accidental (occurring only once or a few times) or casual (occurring more regularly although not every year); a few of these species (typically long-distance migrants such as some birds and butterflies) may have even bred on one or more of the occasions when they were recorded.

(continued on next page)

SE = An exotic established in the state; may be native elsewhere in North America.

SH = Of historical occurrence in Wisconsin, perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an element would become SH without such a 20-year delay if the only known occurrence were destroyed or if it had been extensively and unsuccessfully looked for.

SN = Regularly occurring, usually migratory and typically non-breeding species for which no significant or effective habitat conservation measures can be taken in Wisconsin. This category includes migratory birds and bats that pass through twice a year or, may remain in the winter (or, in a few cases, the summer) along with certain Lepidoptera which regularly migrate to Wisconsin where they reproduce, but then completely die out every year with no return migration. Species in this category are so widely and unreliably distributed during migration or in winter that no small set of sites could be set aside with the hope of significantly furthering their conservation.

SZ = Not of significant conservation concern in Wisconsin, invariably because there are no definable occurrences in the state, although the taxon is native and appears regularly in the state. An SZ rank will generally be used for long-distance migrants whose occurrence during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped, and protected. Typically, the SZ rank applies to a non-breeding population.

SR = Reported from Wisconsin, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. Some of these are very recent discoveries for which the NHI program has not yet received first-hand information; others are old, obscure reports that are hard to dismiss because the habitat is now destroyed.

SRF = Reported falsely (in error) from Wisconsin but this error is persisting in the literature.

SU = Possibly in peril in the state, but status is uncertain. More information is needed.

SX = Apparently extirpated from the state.

Global Ranks

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region) or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.

G4 = Apparently globally secure, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its

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Acknowledgments

The U.S. Fish and Wildlife Service (through the Partners in Wildlife program), Wisconsin Department of Natural Resources (Bureaus of Integrated Science Services and Endangered Resources), University of Wisconsin-Stout, and Stout Foundation provided funding for this research. We thank our Wisconsin DNR colleagues Rich Henderson for continued encouragement, Scott Sauer for assistance with mapping, and Bill Smith and Kate Barrett. Harvey Ballard (Ohio State University), Spencer Schell (University of Wyoming), and Tim McNary (United States Department of Agriculture, Western Region) reviewed the manuscript. We appreciate the willingness of all collection managers to open their cabinets to us especially Daniel Otte and Jason Weintraub at the Philadelphia Academy of Sciences, Margaret Thayer at the Field Museum of Natural History in Chicago, and Colin Favret at the Illinois Natural History Survey in Champaign.

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PUB-SS-1008 2005