

**BLISTER BEETLES (COLEOPTERA: MELOIDAE) OF WISCONSIN:
DISTRIBUTION AND ECOLOGY**

By

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Under the supervision of Professor Daniel K. Young

At the University of Wisconsin-Madison

Meloids are commonly referred to as “blister beetles” due to the toxin (cantharidin) they possess which can cause blistering of human skin. Several meloid species have long histories of negatively impacting agriculture resulting from large foraging aggregations and negatively impacting livestock health. Even with these important and interesting aspects, little is known about these beetles in their natural habitats.

There are recent faunistic surveys of selected insect taxa in Wisconsin but a formal investigation of Meloidae is lacking. The blister beetle fauna of several states has been published, but this survey represents the first in the Midwestern United States. This study provides a comprehensive list of all meloid species documented from Wisconsin, as well as taxonomic keys and summaries for each species (species pages) which includes taxonomy, description, and natural history. During this survey, 28 species in seven genera were documented in Wisconsin, with 10 species considered new state records. Initial efforts identified *Gnathium minimum* (Say) with a limited distribution in Wisconsin which represents a peripheral or even disjunct population for the species. For these reasons I chose to further investigate the ecology of *G. minimum*.

A marking study of *G. minimum* at Spring Green Prairie State Natural Area resulted in recapturing 54 of the 104 marked adults from 24 July to 16 August 2008. The maximum daily count was 34 while the maximum daily Jolly-Seber population size estimate was 59 individuals.

Most individuals remained within 12 m of their original capture location, but 601 m was the maximum movement detected.

I also conducted a *G. minimum* population genetics study to compare the genetic variation and magnitude of genetic differentiation of the Wisconsin peripheral population compared to the core population. The percent of polymorphic loci was 52.3 and 52.9, and expected heterozygosity 0.1815 and 0.1883 for the Kansas/Colorado and New Mexico/Texas regions, respectively. Specimens from Wisconsin had a lower percent of polymorphic loci (36.8) and expected heterozygosity (0.1438). F_{ST} values, isolation-by-distance patterns, and GENELAND genetic clusters provide evidence that dispersal among sampling locations is greater in the core population and that local populations in Wisconsin are more isolated.

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Much of this research was dependant on access to previously collected material. For this reason I wish to thank the following people for loaning specimens: Charles Bomar (University of Wisconsin-Stout), Susan Borkin (Milwaukee Public Museum), Mike Bourquin (Retzer Nature Center), Mike Draney (University of Wisconsin-Green Bay), Gene Drecktrah (University of Wisconsin-Oshkosh), Eric Heeg (The Coleopterists Society, Youth Incentive Award Project), Rich Henderson (Wisconsin Department of Natural Resources), Jamee Hubbard (University of Wisconsin-Stevens Point), Steve Krauth (University of Wisconsin-Madison), Phil Pellitteri (University of Wisconsin-Madison), Scott Sauer (Wisconsin Department of Natural Resources), Kurt Schmude (University of Wisconsin-Superior), Paul Skelley (Florida State University), Margaret Thayer (Field Museum of Natural History), and Jay Watson (Wisconsin Department of Natural Resources). I would also like to thank Kansas Department of Wildlife and Parks, The

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While insect identification was the main focus of this research, plant identification was also an important aspect. Jeb Barzen and Andrew Williams provided assistance with identification of several plant species so that I could expand the list of known food plants for blister beetles. The University of Wisconsin-Madison library staff also deserves mention due to the countless articles and books I have requested over the years.

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Chapter 1

A Survey of the Blister Beetles of Wisconsin (Coleoptera: Meloidae)

Abstract

There are recent faunistic surveys of selected insect taxa in Wisconsin but a formal investigation of the Meloidae (blister beetles) is lacking. The blister beetle fauna of several states has been published, but this study represents the first in the Midwestern United States. This study provides a comprehensive list of all meloid species documented from Wisconsin. Also included are taxonomic keys and summaries for each species (species pages) which includes taxonomy, description, and natural history. Specimens were from public and private collections, as well as field sampling which almost solely relied on hand collecting. During this survey, 28 species in seven genera were documented in Wisconsin from 2605 specimens. Of these, 10 species are considered new state records. Initial efforts identified *Gnathium minimum* (Say) as a species with a limited distribution in Wisconsin, but is more widespread in the western and Great Plains states. It appears that the Wisconsin population represents a peripheral population when considering the range of the species. For these reasons I chose to further investigate the ecology of *G. minimum*. This state survey advances our knowledge of meloids in Wisconsin, however there are several species rarely encountered or collected from the state that warrant further attention.

Introduction

Meloids are commonly referred to as “blister beetles” due to the toxin, cantharidin, typically found within their bodies that can cause blistering of human skin (Howell and Ford 1985, Karras *et al.* 1996). Several meloid species also have long histories as negatively impacting agriculture resulting from large aggregations foraging on crops and negatively impacting livestock health (Baerg 1925, Horsfall 1943, Ray *et al.* 1979, 1980, Blodgett *et al.* 1991). Blister beetles have a complex and interesting development. Surprisingly, even with these important and interesting aspects, little is known about these beetles in their natural habitats.

Meloids are medium-sized beetles, ranging in size from 3-70 mm (Pinto and Bologna 2002), with a cylindrical shape and loose build. The thorax is narrower than the abdomen and head, with the head abruptly constricted behind the eyes, forming a cranial “neck.” The abdomen generally extends beyond the leathery elytra, giving the body a softer feel than most other beetles. Most meloids have generalized, chewing mouthparts, however, some taxa additionally have the maxillae modified to form a sucking tube to imbibe nectar. Legs are long and slender with heteromorous tarsi. The pretarsal claws each typically possess a ventral blade, which is sometimes reduced to a tooth.

Meloids exhibit an interesting dichotomy of larval development and hosts/prey. Most genera utilize the provisions and larvae of native ground nesting bees (Apoidea) (Enns 1956, Erickson and Werner 1974a, 1974b, Erickson *et al.* 1976), however, *Epicauta*, *Linsleya*, *Mylabris* (and relatives) and *Psalydolytta* utilize grasshopper eggs (Acridoidea) for larval food (Baerg 1925, Horsfall 1943, Pinto 1991). Selander (1981, 1982) suggested meloid eggs as a third larval food source. Species which provide an appropriate food source for meloid larval

development are referred to as larval host species. Despite these differences in larval feeding, all meloids progress through a complicated hypermetamorphic development.

A generalized life cycle begins with a female ovipositing either in a shallow burrow in the ground, about an inch deep (Horsfall 1943, Selander 1960) or on vegetation (Enns 1956, Erickson *et al.* 1976). The triungulin first larval instar is mobile and searches for an appropriate food. The quantity of larval food explains the extensive size variation among adults (Erickson and Werner 1974a), as adult weight can vary by a factor of 16 (Snead and Alcock 1985) or length by two-to-three fold (Pinto and Mayor 1986).

Once larvae locate food, development is similar for most species. Larvae immediately begin feeding and molt into a non-mobile, scarabaeiform stage. This second instar is the first of four feeding instars, often grouped and referred to as the “first grub” (Selander and Mathieu 1964). After the fifth instar, the larva molts into a diapausing “coarctate” larva that is immobile and heavily sclerotized. The coarctate can serve as an overwintering stage in temperate regions or occurs during the dry season in the tropics and arid regions (Pinto 1991), and can persist for more than a year (Horsfall 1943). It is important to note that overwintering may occur in other stages as well (Horsfall 1943, Middlekauff 1958). After completion of the coarctate, the larva enters a non-feeding, scarabaeiform seventh instar, or “second grub,” resembling the first grub (second to fifth instars). This instar is short in duration and is followed by the pupal stage.

Environmental conditions are important in synchronizing larval stages and may cause development to deviate from this general plan. The fifth instar larva may molt directly to a pupa, allowing an additional generation in a year. It has also been shown that the seventh instar can retrogressively molt to the coarctate to avoid unfavorable conditions (Horsfall 1943).

Adults are phytophagous, feeding on a combination of stems, leaves, and flowers, including petals, pollen, or nectar; food plant specificity and the part(s) of the plant consumed vary among species. Mating generally occurs on the food plant as well. Courtship ranges from the male simply mounting the female without additional precopulatory behavior, to more complex displays including movements and rubbing with antennae and maxillary palpi. Courtship can last for a few seconds to over an hour (Pinto and Mayor 1986). Mating involves the male fully or partially mounting the female, or no mounting at all. Individuals of species with more elaborate courtship displays and mounting tend to exhibit size-assertive mating, whereby they mate with individuals of similar size (Pinto and Mayor 1986). Pairs may be coupled while mating for one to four hours (Pinto 1991). Foraging and mating aggregations often form on the food plants, with individuals mating and dispersing within a few days (Snead and Alcock 1985, Swanson and Kleintjes Neff 2007). Adults of a given species are generally present for one to two months (Pinto 1991).

Meloids earned the common name “blister beetles” because they possess cantharidin, a defensive compound with the capability to cause blistering of the human skin. Although relatively few meloids have been tested, it is believed that nearly all species contain this sesquiterpenoid in the accessory glands of the reproductive system (Sierra *et al.* 1976, Mayer and Johansen 1977, Capinera *et al.* 1985). Possible exceptions include Horiini (Selander 1960, Pinto and Selander 1970) and possibly some *Meloe* (Mayer and Johansen 1977). Only males are able to synthesize cantharidin, primarily stimulated by copulation, during which time the male transfers nearly all his cantharidin to the female (Sierra *et al.* 1976, Capinera *et al.* 1985). These disparities of cantharidin production and transferal result in great variation of cantharidin levels among individuals and sexes (Sierra *et al.* 1976, Capinera *et al.* 1985, Blodgett *et al.* 1991).

Indirect evidence exists that larvae are able to synthesize cantharidin as well (Meyer *et al.* 1968, Haskins *et al.* 1987).

As an allomone, cantharidin is most often released as an autohemorrhage from the femorotibial joint (Pinto 1991) and occasionally from other body parts. It appears that individuals have control over the location of release: Carrell and Eisner (1974) observed beetles releasing cantharidin from body parts in the immediate vicinity of a perturbation. This strategy generally provides an efficient defense against predators such as formicids and carabids. Not only is cantharidin toxic and distasteful to most potential predators (Carrel and Eisner 1974, Mayer and Johansen 1977), but some animals actually avoid the aposematically colored beetles suggesting trial-and-error of eating and becoming sick is not required (Carrel and Eisner 1974). However, some predators are not deterred by the compound (Carrel and Eisner 1974, Carrel 1999) and others are actually attracted to and feed on cantharidin or the beetles that produce it (Young 1984b, Williams and Young 1999, Nardi and Bologna 2000).

Human health issues involving meloids have a long-documented and colorful history, as cantharidin from *Lytta vesicatoria* Linnaeus, or the “green Spanish-fly,” has been erroneously used as an aphrodisiac or cure for impotency (Howell and Ford 1985, Karras *et al.* 1996). However, consumption of cantharidin leads to abdominal pain, fever, shock, hemoconcentration, hemorrhage and ulceration in the urinary bladder, enterocolitis, and myocardial necrosis (Schoeb and Panciera 1978, 1979). Ray *et al.* (1979, 1980) estimated lethal doses at less than 1 mg/kg for humans and there is no reported antidote so only symptoms can be addressed.

General mammalian toxicity has also led to some meloids being considered of agricultural significance, as some species feed on alfalfa and can form large aggregations. Most literature focuses on impacts to horses (Moore 1963, Bahme 1968, Schoeb and Panciera 1978,

1979). Some techniques for harvesting hay kill the beetles, causing the cantharidin-laden dead beetles to remain with the alfalfa, and subsequently incorporated into the hay bale and fed to livestock (Capinera *et al.* 1985, Blodgett *et al.* 1991). Capinera *et al.* (1985) estimated a lethal dose of 1 mg/kg for horses.

Despite these adverse health conditions, researchers have discovered beneficial uses of cantharidin. A low concentration solution is available for wart removal (Coskey 1984). Other studies have investigated uses for the treatment of calcification of the bladder mucosa (Munsen 1966), interstitial cystitis, and skin lesions (Presto 1970). The most common use is by veterinarians as a counterirritant and blistering agent (Kinney *et al.* 1998).

Some meloid species are also considered to negatively impact agriculture because the large feeding and mating aggregations can cause significant damage to crops or ornamental plants. As is generally the case throughout the family, aggregations are localized and very short in duration resulting in most control methods being impractical or ineffective. Often, once the aggregation is discovered, the damage has occurred and the beetles have or will soon leave the area (Horsfall 1943). Some of the plant species with documented damage include cotton, alfalfa, soybeans, peanuts, peas, canola, barley, oats, beets, potatoes, and tomatoes, as well as garden and ornamental plants (Gilbertson and Horsfall 1940, Horsfall 1943, Arnold 1976, Blodgett *et al.* 2002). Despite these potential problems meloids pose to human activities, many species can also be considered beneficial. Parker and Wakeland (1957) found that meloids destroyed an average of 8.8% of grasshopper egg masses each year, with an annual high of 18.5% in one state. Of course, grasshoppers can significantly impact agriculture, themselves. Rees (1973) compiled associations with acridids.

Generally, the taxonomy of this family is fairly well understood. Evidence seems to support recognizing four subfamilies (Selander 1991, Bologna and Pinto 2001); Bologna (1991) previously suggested three subfamilies. The family is represented by 125 genera and 3000 species worldwide and is found everywhere with the exception of Antarctica and New Zealand (Bologna *et al.* 2008). There are presently 410 species represented in the Nearctic fauna (Pinto and Bologna 2002).

Importance of Survey

The recent acceleration of extinctions (Groom 2006) has drawn attention to the importance of conserving the remaining biodiversity. Insects are no exception to this alarming extinction trend and insect diversity is vital to functional ecosystems. Although well over one million species have been described worldwide (May 1988), the worldwide insect fauna is relatively unknown. It has been estimated that five to 30 million species exist (May 1988, Gaston 1991). Mikkelsen and Cracraft (2001) and Gotelli (2004) recently expressed the importance of cataloging biodiversity. Unfortunately, little is known about most of the previously described species. Only by identifying all species, then learning about their natural histories will we be able to attempt to prevent the loss of biodiversity. For threatened species this is critical, as several species have been, in part, declined protection under the Endangered Species Act due to lack of substantial biological knowledge (Pechmann and Wake 2006, USFWS 1993, 2006). Better understanding of the ecology of each species will assist biologists with managing natural areas as well as assisting agriculturalists with pest management and invasive species.

Regional perspectives hold the advantage of producing manageably-sized groups of species to examine questions relating to distribution, habitat, and life history. Wisconsin's fauna

is well documented for many vertebrate groups like birds (Thompson 2004), amphibians (Christoffel *et al.* 2001), and reptiles (Christoffel *et al.* 2000, 2002). However, insects have received only recent consideration (Kriska and Young 2002, Lisberg and Young 2003, Dunford and Young 2004, Kirk and Bomar 2005, Price and Young 2006). Dunn (1996) provided a general overview of insects at the level of the Great Lakes Region.

Regional and local perspectives are also valid for insect studies, because many insect species are tightly associated with specific food plants, habitats, and local weather conditions. These biological parameters require knowledge of the species in greater detail. Wisconsin poses an interesting setting for species distributions as the state is naturally divided into two very different ecotypes. The tension zone, representing a major change in vegetation, separates grasslands to the southwest and forested habitats to the northwest (Curtis 1959, Map 1). Additionally, important biogeographic features unique to the geographic position of Wisconsin include Lake Michigan as an eastern boundary and the Mississippi River as a western boundary.

Generic revisions exist for all Wisconsin meloid taxa, however, some are out of date, taxonomically. Currently, *Nemognatha* and *Zonitis* (Enns 1956) require additional work, while it appears *Lytta* (Selander 1960), *Meloe* (Pinto and Selander 1970), *Epicauta* (Pinto 1991), *Gnathium* (Pinto 2009), and *Tricrania* (Cline and Huether 2011) are reliably described. Questions about species concepts associated with *Nemognatha* and *Zonitis* did not present problems because these two genera have only a few Wisconsin species. A preliminary examination of the University of Wisconsin-Madison Insect Research Collection (WIRC) and current literature, including generic revisions, demonstrated that there are significant gaps in distributional data and habitat associations are virtually lacking.

Objectives

This research provides detailed information regarding Wisconsin meloid diversity, ecology, and natural history. These are, in turn, critically important to wildlife biologists in preserving, managing and restoring natural areas. The design of the project is divided into a statewide survey and ecological study components with the following objectives:

1. Document meloid species in Wisconsin;
2. More accurately describe the geographic distribution, adult food plants, and phenology of each species;
3. Develop a dichotomous key to identify all Wisconsin meloids;
4. Create species pages for all Wisconsin meloids, summarizing data specific to each species.

Methods

The statewide survey is intended to establish baseline data relating to the meloid fauna of Wisconsin. Several states, including Arizona (Werner *et al.* 1966), Colorado (Schmidt 2006), Florida (Selander and Fasulo 2003), Maryland (Staines 1983), and Wyoming (Bomar 1993) have recent reviews of their respective meloid fauna.

Objective 1: Document meloid species in Wisconsin.

To determine the species present in Wisconsin, I consolidated data already published or collected. This included searching for specimens from the state in collections maintained by

museums, universities, wildlife and conservation agencies, and private collectors. Collections of most importance included, but are not limited to, the WIRC, University of Wisconsin-Oshkosh, Milwaukee Public Museum, Wisconsin Department of Natural Resources, and University of Florida-Gainesville. The University of Florida-Gainesville is the repository of the extensive Selander collection of Meloidae. Generic revisions and other published research also include some species records from Wisconsin. Completing this objective also included incorporating specimens collected by myself and other researchers from 2006-2012.

In addition to specimens, other reports of specimen observations were included. These included photos either with an accompanying email or posted on websites, and verified reports to the University of Wisconsin-Madison Insect Diagnostic Lab.

Objective 2: More accurately describe the geographic distribution, food plants, and phenology of each species.

Determining the geographic distribution (see Map 2 for Wisconsin counties) and phenology of each species relied on all data from Objective #1. Food plant assessment was more reliant on field collecting (2006-2012). In following the general protocol for the Young Lab and WIRC, all meloid specimen data were entered into the database, Specify™ to store data fields associated with each specimen. Collected specimens are deposited in the WIRC for permanent storage and future reference. Specimen locations were also recorded with a handheld GPS unit (Garmin™ eTrex®).

Initial documentation of localities for each species indicated geographical gap areas, underrepresented species, and unique species, thus helping to prioritize collecting effort in later field seasons. Most collecting was by hand since there are no published traps or attractants effective in capturing meloids, with the exception of a few species attracted to blacklights (Nabli

et al. 1999). Collecting focused on existing protected areas (reserves) to assist wildlife biologists in creating species inventories.

Objective 3: Develop a dichotomous key to identify all Wisconsin meloids.

I developed generic and species-level taxonomic keys using external anatomical characteristics to identify all meloid species of Wisconsin, including *Macrobasis* females. Females of the subgenus *Macrobasis* are problematic as Pinto (1991) did not include differentiating characteristics, and the major differences among species are found in male antennal modifications. The use of such character sets is important so that species identifications can be made with minimal equipment, and by most interested individuals.

Objective 4: Create species pages for all Wisconsin meloids.

For each genus and species, I created species pages including a general synonymy, capsule description, diagnostic description, natural history, phenology, distribution, and Wisconsin records. Pertinent images and range maps accompany these data.

Capsule descriptions provide specific morphological characteristics to help differentiate the Wisconsin meloid species. Because of the variability in body form within the family, the format of these capsule descriptions is different across species, but is consistent for congeneric species.

Wisconsin records include specimens and other records (e.g. photos) and these are listed separately. The number of specimens or records for each county follows the county name in parenthesis. Detailed collection data for each specimen and record are listed in Appendix 1-3.

Distributional maps include a black dot for the specific locality; the corresponding county is shaded. For specimens accompanied by only a county for locality data, the county is shaded but a dot is not included. Specimen locations were displayed with the GIS program ArcMap™

10.0 (ESRI®). Specimen images were created using an extended depth of field microscope with Auto-Montage 3-D imaging software (Syncroscopy™), and edited in Adobe® Photoshop® 7.0. Scale bars represent 5 mm and apply to the dorsal and lateral photos of the same specimen.

Results

Twenty-eight meloid species are represented by specimens or published records in Wisconsin (Table 2; for all individual specimen data or other reports and published accounts, see Appendix 1-3). I reviewed 2605 meloid specimens collected from Wisconsin. As a group, these species were reported for all months of the year except January and February (Table 3).

It is possible that *Meloe americanus* Leach may yet be found in the state as there is a record near Wisconsin in Waukegan, IL (Pinto and Selander 1970). This species appears to be nocturnal (Pinto and Selander 1970) which would likely result in reduced detection rates, especially for a slow moving and dark species. *Epicauta subglabra* (Fall) is a second species that could potentially inhabit the state due to its distribution including Michigan, North Dakota, and South Dakota (Pinto 1991). Pinto (1991) also suggested that conspecificity with *E. murina* (LeConte) is possible.

Family Meloidae Gyllenhal 1810

Key to the Wisconsin Genera of Adult Meloidae

(Modified in part from Pinto and Bologna 2002)

- | | | |
|----|--|---|
| 1 | Dorsal blade of tarsal claws with a single or double row of teeth along ventral margin (Figure 75) | 2 |
| 1' | Dorsal blade of tarsal claws smooth along ventral margin (Figure 74), or with but a single large tooth | 5 |

- 2 (1) Antennae relative short, submoniliform, antennomeres IV and V only slightly longer than wide (Figure 97); black beetles with brick red elytra *Tricrania*
- 2' Antennae more elongate, antennomeres IV and V at least 1.4X as long as wide; color pattern not as above 3
- 3 (2') Antennae subclavate with apical antennomeres wider than basal antennomeres (Figure 98); head elongate, varying from almost as long as wide to longer than wide; maxillary galeae elongate, forming a distinct sucking tube; body length 6 mm or less *Gnathium*
- 3' Antennae subfiliform, apical antennomeres not wider than basal antennomeres; head mostly not as elongate, if so then maxillary galeae not modified to form a distinct sucking tube; size variable but body length mostly greater than 6 mm 4
- 4 (3') Maxillary galeae short, not produced into a filiform sucking tube; or maxillary galeae produced into a filiform sucking tube, metathoracic tibial spurs similar, spatulate, subequal in width (Figure 78) *Zonitis*
- 4' Maxillary galeae produced into a filiform sucking tube; metathoracic tibial spurs dissimilar *Nemognatha*
- 5 (1') Prothoracic femora each with cinereous patch of pubescence on ventral side (Figure 71-72) *Epicauta*
- 5' Prothoracic femora without patch of pubescence 6
- 6 (5') Elytra shortened; metathoracic wings absent *Meloe*
- 6' Elytra not shortened, covering most of the abdomen; metathoracic wings present ... *Lytta*

Meloinae Gyllenhal 1810

Epicauta Dejean

[Synonymy largely from Pinto and Bologna 2002]

Type species: *Meloe erythrocephalus* Pallas, 1776, by subsequent designation (Werner 1945).

Epicauta Dejean 1834:224.

Causima Dejean 1836:226.

Henous Haldeman 1852:377.

Isopentra Mulsant 1858:106.

Macrobasis LeConte 1858:39 (currently as subgenus).

Apterospasta LeConte 1862:272 (synonym of *Macrobasis*).

Nomaspis LeConte 1866:156.

Pleuropompha LeConte 1866:156.

Gnathospasta Horn 1875:154 (synonym of *Macrobasis*).

Anomlonychus Saylor 1940:46 (replacement name for *Anomalonyx* Depier, not Weise 1903).

Maculicauta Dillon 1952:416.

There are two subgenera (*Epicauta* and *Macrobasis*) within this genus (Pinto 1991).

Epicauta occurs on all continents with the exception of Australia (Pinto 1991, Pinto and Bologna 1999), and is comprised of about 375 species (Pinto and Bologna 1999) making it one of the largest genera of meloids in the world (Pinto 1991). About 75% of *Epicauta* species are of the New World, with the subgenus *Macrobasis* nearly restricted to North America (Pinto 1991).

There are 173 species in North and Central America (Pinto 1991) and about 100 species in South America (Pinto and Bologna 1999). However, there is little overlap between the fauna of the two continents suggesting that tropical habitats of Central America may represent a barrier

(Pinto 1991). *Epicauta* is most diverse in the temperate and semiarid regions of both continents (Pinto 1991, Kerr and Packer 1999).

Larvae of *Epicauta* are predators of grasshopper (Acridoidea) eggs, mainly those in the grasshopper family Acrididae (Rees 1973). Exceptions to Acrididae include *Epicauta gorhami* Marseul which depredates eggs of Pyrogomorphidae (Orthoptera: Pyrogomorphoidea) (Nagatomi and Iwata 1958) and *Epicauta atrata* (Fabricius) which depredates eggs of other *Epicauta* species (Selander 1981, 1982). Oviposition occurs in the soil and triungulins actively search for grasshopper eggs before continuing development (Horsfall 1941, 1942, 1943, Selander 1960). Adults are generally most active during the summer, feeding on leaves, stems, or flowers of a wide range of angiosperms (Pinto 1991).

All *Epicauta* species possess a patch of cinereous pubescence on the ventral side of each prothoracic femur (Figure 71-72). The genera *Denierella* and *Psalydolytta* also possess this patch but are not found in North America and may be eventually placed in *Epicauta* (Pinto 1991). The following key includes the 12 *Epicauta* species confirmed from Wisconsin as well as *E. subglabra*. *Epicauta subglabra* is included because it had been reported east (Michigan) and west (North and South Dakota) of Wisconsin and may be conspecific with *E. murina* (Pinto 1991).

Key to the Wisconsin Species of Adult *Epicauta*

(Modified in part from Pinto 1991)

- 1 Antennomere II longer than III in males, antennomere II at least two-thirds the length of III in females (subgenus *Macrobasis*) 2

- 1' Antennomere II short, no more than half the length of III; segment I, usually shorter than III (subgenus *Epicauta*) 5
- 2 (1) Male with mesothoracic and metathoracic femor bearing a fringe of long setae ventrally; female with antennomere I reaching posterior margin of eye, length of segment II equal to that of III *flavocinerea*
- 2' Male with mesothoracic and metathoracic femor lacking a fringe of long setae ventrally; antennomeres II not equal to that of III in females (either shorter or longer) 3
- 3 (2') Antennomere II in males not bowed in outline, subequal to or distinctly shorter than III and IV combined; antennomere II three-fourths as long as I and 1.33X length of III in females..... *fabricii*
- 3' Antennomere II in males slightly bowed in outline, longer than III and IV combined, often almost as long as III-V; antennomere II nearly as long as I and at least 1.5X length of III in females..... 4
- 4(3') Dorsal vestiture light in color and dense enough to create a slightly grey appearance (Figure 80) *murina*
- 4' Vestiture dark in color, sparse, not influencing the cuticle color (Figure 81) *subglabra*
- 5 (1') Elytra vittate, alternating light and dark longitudinal vittae expressed by colors of integument and overlying vestiture 6
- 5' Elytra not vittate, or if so, then color of vittae expressed by overlying vestiture only, never by integument color as well 7
- 6 (5) Elytra with three, subequally spaced, black vittae, each vitta subequal in width; antennae of males noticeably compressed *occidentalis*

- 6' Elytra with middle and lateral black vittae closer than middle and sutural vitta, or middle and lateral vittae partially to completely fused, in which case there are only two black vittae; antennae of male not noticeably modified *vittata*
- 7 (5') Eyes but slightly emarginate at most, wide, often bulging, gradually and evenly tapered ventrally from widest point; antennal segments relatively short and broad, typically with the following characteristics: width of segment X greater than half its length, length of segment X ≤ 0.7 that of XI, XI abruptly tapered apically; maxillary palpomere IV subparallel-sided most of length to apex, never sexually dimorphic; body length less than 14 mm 8
- 7' Eye distinctly, broadly emarginate, usually narrower and not as markedly bulged, abruptly tapered ventrally from widest point; antennal segments more elongate, narrower, typically with following characteristics: width of segment X less than half its length, length of X > 0.7 length of XI, XI not abruptly tapered apically; palpomere IV usually triangular (subparallel in males of sexually dimorphic species); size variable 9
- 8 (7) Metathoracic tibial spurs dissimilar, outer spur obliquely truncate, expanded apically, apex usually about 2X width of inner spur; cuticle of head varying from entirely orange except for black frons, gula and mouthparts, to entirely black except for an orange frontal macula; vestiture predominantly black to almost entirely cinereous *atrata*
- 8' Metathoracic tibial spurs of subequal width apically, outer spur obliquely truncate or not, but never 2X width of inner spur, apically; dorsal vestiture unicolorous, cinereous, or yellow, never with extensive patches of black setae *sericans*
- 9 (7') Elytral vestiture primarily black, elytral margins cinereous or not 10
- 9' Elytral vestiture primarily cinereous, light brown or yellowish 15

- 10(9) Elytral margins with cinereous pubescence 11
- 10' Elytral vestiture unicolorous, dark brown to black 12
- 11 (10) Metathoracic tibial spurs obliquely truncate apically, outer spur broader than inner spur; maxillary palpi elongate, length of palpomere IV greater than eye width; antennal segments, exclusive of I and II, at least 2.5X longer than wide (part) *funebri*
- 11' Metathoracic tibial spurs only slightly enlarged apically; maxillary palpi not noticeably enlarged, length of palpomere IV less than eye width; antennal segments IV-VI not more than twice as long as wide; males with unique, elongate, curved, exserted setae on antennomeres IV-XI (part) *cinerea*
- 12(10') Metathoracic inner tibial spur not distinctly broadened and obliquely truncate apically, stick-like (*sensu* Pinto 1991); outer spur only slightly broader than inner spur
..... (part) *cinerea*
- 12' Metathoracic outer tibial spur broadened, obliquely truncate apically, usually noticeably broader than inner spur; if spurs of subequal width, then both are obliquely truncate ... 13
- 13(12') Maxillary palpus elongate, most noticeably so in the male, length of palpomere IV greater than eye width in both sexes; antennae elongate, slender, length of antennomere IV at least 2.5X width (part) *funebri*
- 13' Maxillary palpus not elongate, length of palpomere IV \leq eye width in both sexes; antennae shorter, less slender, length of antennomere IV approximately 2X width 14
- 14(13') Vestiture of head, pronotum and elytra cinereous to dark brown (part) *obesa*
- 14' Vestiture of head, pronotum and elytra black *pennsylvanica*
- 15(9') Antennae with elongate, curved, exserted setae on anteroventral surface of antennomeres IV-XI; antennomere I relatively short, bulbous (part) *cinerea*

- 15' Antennae lacking long, conspicuous, exerted setae on anteroventral surface of antennomeres IV-XI; antennomere I variable 16
- 16(15') Maxillary palpus elongate, most noticeably so in male, length of palpomere IV greater than eye width in both sexes; antennae elongate, slender, length of antennomere IV at least 2.5X width; metathoracic tibial spurs moderately broadened and obliquely truncate, apically (part) *funebri*
- 16' Maxillary palpus not elongate; length of palpomere IV never surpassing width of eye; metathoracic tibial spurs and antenna variable 17
- 17(16') Antennomeres IV and V submoniliform, shorter than following antennomeres, their anterior surface not flattened; length of antennomere IV < 0.9X that of VIII; antennomeres IV-X each with a circlet of moderately long, exerted setae, apically *flobcina*
- 17' Antennomeres IV and V more elongate, length of each \geq following antennomeres, their anterior surface flattened or not; antennomeres IV-X each with exerted setae either not forming a circlet or not as obvious as above *obesa*

Epicauta fabricii (LeConte)

(Figs. 1-2, 93-94; Maps 3-4)

[Synonymy largely from Pinto 1991]

Lytta cinerea Fabricius 1798:119; not *Meloe cinereus* Forster 1771; Claypole 1881:32.

Lytta fabricii LeConte 1853:343.

Lytta debilis LeConte 1853:344.

Epicauta fabricii (LeConte); Werner 1945:497; Werner *et al.* 1966:46; Selander 1982a:820; Pinto 1991:74, Williams and Young 1999:97; Selander and Fasulo 2003:4; Blodgett *et al.* 2010:2.

Epicauta murinoides Dillon 1952:409.

Capsule Description

Length: 9-15 mm (Werner 1945). **Integument Color:** Dark brown to black. **Vestiture:** Dense, cinereous pubescence producing a gray appearance. **Head:** Antennomeres I and II highly sexually dimorphic: In males, antennomere II longer than III, antennomere II not bowed in outline and subequal to or shorter than III and IV combined; in females, antennomere II three-fourths as long as I and 1.33X length of III (Werner 1945). **Pronotum:** One-fourth longer than wide, medial suture and basal impressed line distinct. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Mesothoracic and metathoracic femora without a fringe of long setae on venter.

Diagnosis

Antennal structure of males provides the easiest means to separate *E. fabricii* from all other Wisconsin members of subgenus *Macrobasis*. In males, antennomere II is not bowed in outline and subequal in length to III and IV combined. In females, which are most easily confused with *E. murina*, antennomere II is shorter than antennomere I and 1.33X antennomere III (Werner 1945). Males of *E. fabricii* lack the long setal fringe on the mesothoracic and metathoracic femora that are present in *E. flavocinerea*. In females, antennomere II is 1.33X longer than III while in *E. flavocinerea* (Blatchley) antennomere II is subequal in length to III (Werner 1945). Females look very similar to those of *E. flavocinerea* and may not be reliably differentiated as the subgenus *Macrobasis* is in need of revision (Pinto 1991).

Natural History

Adults have been reported feeding on *Amorpha canescens*, *Anemone*, *Astragalus*, *Baptisia australis*, *B. leucantha*, *B. tinctoria*, beans, *Beta vulgaris*, *Caragana arborescens*, cowpeas, *Gleditsia triacanthos*, *Glycine max*, *Gossypium* (probably *G. hirsutum*), *Gymnocladus dioica*, *Ipomoea batatas*, locoweed, *Lupinus perennis*, *Medicago sativa*, *Melilotus alba*, *M. officinalis*, *Pisum sativum*, *Robinia pseudo-acacia*, chrysanthemums, ironweed, *Schrankia nuttallii*, *Solanum lycopersicum*, *Solanum tuberosum*, *Trifolium*, and *Vigna unguiculata* (Harris 1841, Claypole 1881, Chittenden 1898, Blatchley 1910, Robertson 1928, Carruth 1931, Gilbertson and Horsfall 1940, Horsfall 1943, Werner 1945, Werner *et al.* 1966, Capinera *et al.* 1985, Kirk and Balsbaugh 1975, Arnold 1976, Blodgett and Higgins 1988, Evans *et al.* 1989, Evans 1990, Williams and Young 1999, Selander and Fasulo 2003, Blodgett *et al.* 2010).

Wisconsin specimens have been observed feeding on *Lathyrus venosus*, *Lupinus perennis*, and *Robinia pseudoacacia*, as well as collected on *Apocynum*, *Baptisia*, *Medicago sativa*, *Pinus banksiana*, *P. resinosa*, *P. strobus*, and *Trifolium*. Additional specimens were trapped in fields of *Phaseolus vulgaris*, *Trifolium pretense*, and *T. repens*.

Evans (1990) observed an aggregation of *E. fabricii* adults with initial foraging on reproductive tissues of *Baptisia australis*, later changing to leaves and stems. This foraging reduced the plant's reproductive success by 80%. Males were always more abundant than females, but female numbers continuously increased. Mating was infrequently observed (5% of observations). Selander and Fasulo (2003) reported that adults can be found at lights and 21 Wisconsin specimens are labeled as captured with light traps.

Larval prey include eggs of the grasshoppers (Acrididae) *Melanoplus bivittatus* (Say), *M. differentialis* (Thomas), *M. femurrubrum* (Degeer), and *M. sanguinipes* (Fabricius) (Gilbertson and Horsfall 1940, Horsfall 1943, Rees 1973).

Two potential natural enemies have been reported. *Pedilus lugubris* (Say) (Pyrochroidae) was found close to adults of *E. fabricii* in the wild (Williams and Young 1999) and close to caged individuals (Abdullah 1964). *Atrichopogon oedemerarum* Stora (Ceratopogonidae) has also been recorded in association with *E. fabricii* (Wirth 1956).

Phenology

Specimens of *E. fabricii* were recorded in Wisconsin from 13 April to 11 August, although one label indicated a collection date of 3 December. Only one specimen was collected prior to 20 May.

Distribution (Map 3)

Epicauta fabricii is found throughout North America east of the Mississippi River, from Canada to the Gulf of Mexico, and several western states (Pinto 1991). This includes many of the Great Plains states as well as Utah and Arizona.

Wisconsin Records (Map 4)

Werner (1945) recorded *E. fabricii* from Wisconsin and Williams and Young (1999) from Portage County, Wisconsin.

The 280 specimens of *E. fabricii* examined during this study were recorded from the following localities: **Burnett Co. (3); Chippewa Co. (1); Columbia Co. (1); Crawford Co. (7); Dane Co. (31); Door Co. (1); Dunn Co. (3); Eau Claire Co. (17); Green Co. (2); Green Lake Co. (1); Jackson Co. (2); Jefferson Co. (3); Juneau Co. (1); Manitowoc Co. (1); Marquette Co. (1); Milwaukee Co. (2); Monroe Co. (10); Oconto Co. (4); Oneida Co. (15);**

Portage Co. (7); Price Co. (2); Sauk Co. (1); Shawano Co. (1); St. Croix Co. (7); Vernon Co. (7); Walworth Co. (1); Waukesha Co. (2); Waupaca Co. (5); Waushara Co. (12); Wood Co. (125); unknown Wisconsin locality (3).

Epicauta flavocinerea (Blatchley)

(Figs. 3-4, 73; Maps 5-6)

[Synonymy largely from Pinto 1991]

Macrobasis flavocinereus Blatchley 1910:1359.

Epicauta flavocinerea (Blatchley); Werner 1945:500; Pinto 1991:74.

Capsule Description

Length: 9-11 mm (Werner 1945). **Integument Color:** Dark brown to black. **Vestiture:** Dense, cinereous pubescence producing a gray appearance. **Head:** Antennae sexually dimorphic: In males, antennomere I reaching between eye margin and occiput, not flattened; antennomere II longer than III, antennomere II than III and IV combined; in females, antennomere I reaching hind margin of eye. **Pronotum:** One-fourth longer than wide, medial suture and basal impressed line distinct. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Mesothoracic and metathoracic femora each with a fringe of long setae on venter.

Diagnosis

Epicauta flavocinerea can be differentiated from all other Wisconsin *Macrobasis* by the long setal fringes on the mesothoracic and metathoracic femora in males. In females, antennomere II is subequal in length to III, while in females of the other Wisconsin *Macrobasis* species antennomere II is shorter or longer than III. Females look very similar to those of *E.*

fabricii and may not be reliably differentiated as the subgenus *Macrobasis* is in need of revision (Pinto 1991).

Natural History

There is no published information concerning the natural history of *E. flavocinerea*. The three Wisconsin specimens were collected from white sweet clover and wild pea in an open oak woods.

Phenology

Specimens of *E. flavocinerea* were recorded in Wisconsin on 5 July (one specimen) and 10 July (two specimens).

Distribution (Map 5)

Werner (1945) and Pinto (1991) recorded *E. flavocinerea* from the Canadian provinces of Manitoba and Ontario, and the states of Illinois, Indiana, Pennsylvania, and Texas. Werner (1945) found few specimens, concluding that this species is apparently rare everywhere. In this study, specimens were examined from Dane County, representing a **NEW STATE RECORD**.

Wisconsin Records (Map 6)

The three specimens of *E. flavocinerea* examined during this study were recorded from the following locality: **Dane Co. (3)**.

Epicauta murina (LeConte)

(Figs. 5-6, 80, 95-96; Maps 7-8)

[Synonymy largely from Pinto 1991]

Cantharis unicolor Kirby 1837:241; not *Cantharis unicolor* Faldermann 1835.

Lytta murina LeConte 1853:344.

Epicauta murina (LeConte); Werner 1945:499; Kirk and Balsbaugh 1975:80; Arnold 1976:28. Pinto 1991:74.

Capsule Description

Length: 7-11 mm (Werner 1945). **Integument Color:** Black. **Vestiture:** Sparse, cinereous pubescence producing a dark gray color. **Head:** Antennomeres I and II highly sexually dimorphic: In males, antennomere II longer than III, antennomere II bowed in outline and longer than III and IV combined; in females, antennomere II nearly as long as I and one and a half longer than III. **Pronotum:** Sides parallel but converging along apical fourth; medial suture distinct and with few to no setae in immediate area. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Mesothoracic and metathoracic femora without fringes of long setae on venter.

Diagnosis

Antennomeres of males provide an easier means to separate *E. murina* from all other Wisconsin *Macrobasis* compared to female characteristics. In males, antennomere II is bowed in outline and longer in length than III and IV combined. In females, which are most easily confused with female *E. fabricii*, antennomere II is almost as long as I and at least one and a half as III. *Epicauta murina* lacks the long, ventral setal fringe on the mesothoracic and metathoracic femora which *E. flavocinerea* possesses.

Natural History

Adults have been reported feeding on *Beta vulgaris*, *Convolvulus arvensis*, *Lathyrus venosus*, legumes, *Linum usitatissimum*, *Medicago sativa*, *Melilotus officinalis*, *Raphanus sativus*, and *Solanum tuberosum* (Carruth 1931, Werner 1945, Kirk and Balsbaugh 1975, Arnold 1976, Capinera *et al.* 1985, Williams and Young 1999, Blodgett *et al.* 2010).

Wisconsin specimens have been observed feeding on *Lupinus* and *Thalictrum dasycarpum* and also collected from *Lupinus perennis*.

Larvae are reported preying on eggs of *Melanoplus spretus* (Walsh) (Riley 1878).

The only known natural enemy is *Pedilus lugubris*, which was found close to *E. murina* adults (Williams and Young 1999).

Phenology

Specimens of *E. murina* were recorded in Wisconsin from 16 May to 9 August.

Distribution (Map 7)

Epicauta murina is found in the extreme northeast United States as well as the Canadian province of New Brunswick, and the northern states from Michigan west to Montana and south to Colorado (Pinto 1991).

Wisconsin Records (Map 8)

Previously Wisconsin records of *E. murina* include Hazelhurst (Oneida County) and Bayfield (Bayfield County) (Werner 1945) and Dunn County (Williams and Young 1999).

The 178 specimens of *E. murina* examined during this study were recorded from the following localities: **WI (state label only, 1); Bayfield Co. (16); Burnett Co. (9); Dane Co. (3); Door Co. (7); Douglas Co. (7); Dunn Co. (18); Florence Co. (1); Jackson Co. (6); Juneau Co. (3); Marinette Co. (3); Oneida Co. (78); Portage Co. (1); Rusk Co. (1); Sauk Co. (2); Shawano Co. (3); Vilas Co. (7); Waushara Co. (5); Wood Co. (7).**

Epicauta cinerea (Forster)

(Figs. 7-10, 71, 101-103, 108; Maps 9-10)

[Synonymy largely from Pinto 1991]

Meloe cinereus Forster 1771:62.

Meloe cinerea (Forster); Pallas 1798:98.

Meloe clematides Woodhouse 1800:213.

Epicautua fissilabris LeConte 1850:232; Horn 1873:102, 1885:111; Gibson 1912:87; Werner 1945:456.

Lytta cinerea (Forster); LeConte 1853:339.

Lytta fissilabris (LeConte); LeConte 1853:339.

Epicauta cinerea (Forster); Horn 1873:101 (in part), 1875:153; Sherman 1913:246 (in part?); Carruth 1931:52; Werner 1945:456, 1949a:99; Selander and Weddle 1969:32; Gupta 1969:300; 1970:1786; Rees 1973:181 (in part?); Arnold 1976:21; Staines 1983:47; Pinto 1991:177.

Epicauta (Epicauta) cinerea (Forster); MacSwain 1956:48.

Epicauta marginata auctorum, not Fabricius (in part); Werner 1945:456.

Capsule Description

Length: 10-19 mm (Pinto 1991). **Integument Color:** Black. **Vestiture:** Moderately dense to dense with three color forms: 1) *Black form*: dorsal vestiture entirely black, 2) *Cinereous form*: dorsal vestiture entirely gray or rarely light brown, and 3) *Margined form*: similar to the cinereous form but with black setae on head, two areas of the pronotum and most of the elytra (black with gray border). **Head:** Antennae robust, abruptly tapered apically, sexually dimorphic, with antennomere I of males short and bulbous and possessing unique, elongate, curved setae on the anteroventral surface; antennae of females less robust, antennomere I not as bulbous, but as wide as in males, females also with longer setae on the anteroventral surface compared to other surfaces, but shorter than those of the males. **Pronotum:** As long as

wide. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs slightly expanded subapically but not obliquely truncate.

Diagnosis

Males of *E. cinerea* are unique in possessing elongate, curved, exerted setae on antennomeres IV-XI, as well as a swollen antennomere I. Both sexes can also be differentiated on the basis of other antennal characteristics, metathoracic tibial spurs and maxillary palpi. Antennomeres IV-VI are not more than twice as long as wide, the metathoracic tibial spurs are only slightly enlarged apically, and maxillary palpomere IV is shorter than the eye width in *E. cinerea*. Also see “Diagnosis” for *E. obesa*. Black forms of *E. cinerea* may resemble *E. pennsylvanica* (Degeer), but have not been recorded from the state (Pinto 1991 and this study).

Natural History

Both *E. cinerea* and *E. funebris* Horn have cinerous, black and margined color forms and their distributions greatly overlap. For this reason, much of the literature concerning these species (as well as *E. pestifera* and *E. marginata*) could pertain to either species (Pinto 1991).

Adults commonly feed on *Clematis* (Pinto 1991) but have also been recorded feeding on leaves of *Anemone canadensis* (Williams and Young 1999).

Wisconsin specimens have been reported feeding on *Clematis virginiana*, *Ranunculus pennsylvanicus*, *Solanum dulcamara*, and *S. nigrum* but also collected on *Solidago* and sweep-netting in *Sporobolus heterolepis*.

Larval prey include egg masses of *Melanoplus differentialis*, *M. femurrubrum*, *M. sanquinipes*, and *M. spretus* (Horsfall 1943, Rees 1973).

Phenology

Specimens of *E. cinerea* were recorded in Wisconsin from 3 July to 10 September, although only one specimen was collected after 24 August.

Distribution (Map 9)

Epicauta cinerea is widespread in eastern North America from southern Canada south to the Gulf of Mexico, and west to the Great Plains states (Pinto 1991).

Wisconsin Records (Map 10)

In Wisconsin, Pinto (1991) recorded *E. cinerea* from Oregon (Dane County); Williams and Young (1991) reported it from Richland County.

The 78 specimens of *E. cinerea* examined during this study were recorded from the following localities: **Clark Co. (1); Columbia Co. (9); Dane Co. (6); Door Co. (1); Dunn Co. (1); Grant Co. (29); Green Co. (4); Iowa Co. (4); Jackson Co. (1); Kenosha Co. (3); La Crosse Co. (1); Lafayette Co. (2); Marathon Co. (1); Milwaukee Co. (1); Pierce Co. (1); Racine Co. (2); Richland Co. (9); Rock Co. (1); unknown Wisconsin locality (1).**

Epicauta flobcina Pinto

(Figs. 11-12, 99-100; Maps 11-12)

Epicauta flobcina Pinto 1991:182.

Capsule Description

Length: 10-13 mm (Pinto 1991). **Integument Color:** Black, except elytra which vary from brown to black. **Vestiture:** Fine, relatively short and moderately dense; light yellow to light brown dorsally. **Head:** Eye narrow and not noticeably bulged, broadly, moderately shallowly emarginate; antennomeres IV and V subequal and relatively short, submoniliform;

antennomeres VI-X more elongate, subfiliform; antennomeres IV-X each with a circlet of moderately long, exserted setae, apically. **Pronotum:** Varies from slightly shorter to slightly longer than wide. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs subspiniform.

Diagnosis

With respect to Wisconsin *Epicauta* species, the submoniliform antennomeres IV and V of *E. flobcina* are diagnostic.

Natural History

Adults have been found feeding on *Ranunculus* and *Ceanothus* (Pinto 1991). Wisconsin specimens were collected from *Andropogon* and *Sporobolus heterolepis*, generally in dry and/or sandy prairies.

Phenology

Specimens of *E. flobcina* were recorded in Wisconsin from 26 June to 5 August.

Distribution (Map 11)

Epicauta flobcina is distributed in the eastern United States, mainly confined to the Atlantic coastal and Midwestern states (Pinto 1991).

Wisconsin Records (Map 12)

Pinto (1991) reported *E. flobcina* from Poynette (Columbia County) in Wisconsin.

The seven specimens of *E. flobcina* examined during this study were recorded from the following localities: **Burnett Co. (1); Columbia Co. (1); Dane Co. (3); Dunn Co. (1); St. Croix Co. (1).**

Epicauta funebris Horn

(Figs. 13-16, 104; Maps 13-14)

[Synonymy largely from Pinto 1991]

Epicauta funebris Horn 1873:102; Milliken 1921:6; Denier 1935b:23; Horsfall 1943:41 (in part?); Werner 1945:447; Dillon 1952:389; Selander 1981b:777.

Epicauta cinerea (Forster); Riley 1877:551, 561 (in part?); Chittenden 1903:24 (in part?); Milliken 1921:6 (in part?); Rees 1973:181 (in part?).

Epicauta solani Werner 1945:457.

Epicauta pestifera Werner 1949a:100 [replacement name for *E. solani* Werner, 1945, not Denier 1940]; Gupta 1965:455; Selander and Weddle 1969:37; Arnold 1976:20; Adams and Selander 1979:173, 217; Selander 1981b:777, 1982c:427, 1984:3; Staines 1983:48; Lago and Mann 1987:5; McCormick and Carrel 1987:310; Blodgett and Higgins 1988:1461; Williams and Young 1999:97.

Epicauta (Epicauta) funebris Horn; MacSwain 1956:46, Pinto 1991:186.

Epicauta (Epicauta) solani Werner; MacSwain 1956:46.

Epicauta marginata auctorum (in part, see Werner 1945).

Capsule Description

Length: 8-21 mm (Pinto 1991). **Integument Color:** Entirely black. **Vestiture:** Moderately dense and elongate with three color forms: 1) *Black form:* dorsal vestiture entirely dark brown to black, 2) *Cinereous form:* dorsal vestiture is entirely gray or light brown, and 3) *Margined form:* similar to the cinereous form but with black setae on head, two areas of the pronotum and most of each elytron (black with gray border). **Head:** Eyes slightly bulging, distinctly emarginate; antenna elongate and slender with antennomeres III-XI at least 2.5X as

long as wide; maxillary palpi sexually dimorphic: Males with segments enlarged, flattened and elongate, females with maxillary palpi elongate but not to the degree in males, palpomere IV slightly longer than eye width in both sexes. **Pronotum:** As wide as long. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs expanded, obliquely truncate.

Diagnosis

Both sexes of *E. funebris* can be differentiated from *E. cinerea* based on antennal characteristics, metathoracic tibial spurs and maxillary palpi. Antennomeres III-XI are at least twice as long as wide, metathoracic tibial spurs are obliquely truncate apically, and maxillary palpomere IV is elongate and longer than the eye width in *E. funebris*. Black forms of *E. funebris* may resemble *E. pennsylvanica*, but have not been recorded from the state (Pinto 1991 and this study).

Natural History

Adults have been reported feeding on *Amaranthus*, *Beta vulgaris*, *Cynanchum nigrum*, *Glycine max*, *Gutierrezia dracunculoides*, *Medicago sativa*, *Mellilotus alba*, *Physalis heterophylla*, *Solanum carolinense*, *S. elaeagnifolium*, *S. lycopersicum*, *S. melongena*, *S. torreyi*, *S. tuberosum*, *Tribulus terrestris*, and *Solidago* (Arnold 1976, Pinto 1991, Williams and Young 1999).

Wisconsin specimens have been observed feeding on *Clematis virginiana* and *Solanum dulcamara*. They were also collected from *Achillea*, *Helianthus*, *Hypericum perforatum*, *Silphium integrifolium*, and *Solidago rigida* as well as near a field of *Solanum tuberosum*.

Larval prey includes eggs of *Melanoplus bivittatus* and *M. differentialis* (Horsfall 1943).

Phenology

Specimens of *E. funebris* were recorded in Wisconsin from 21 June to 29 August.

Distribution (Map 13)

Epicauta funebris is distributed throughout the eastern United States from just south of the United States-Canada border south to the Gulf of Mexico, and west to the Great Plains states (Pinto 1991).

Wisconsin Records (Map 14)

Previous records from Wisconsin include Shullsburg (Lafayette County) (Pinto 1991) and Columbia County (Williams and Young 1999).

The 112 specimens of *E. funebris* examined during this study were recorded from the following localities: **Adams Co. (4); Columbia Co. (3); Crawford Co. (7); Dane Co. (8); Dunn Co. (2); Grant Co. (54); Green Co. (1); Iowa Co. (4); Jackson Co. (1); Jefferson Co. (1); Juneau Co. (4); Kenosha Co. (7); La Crosse Co. (1); Rock Co. (5); Sauk Co. (2); St. Croix Co. (2); Trempealeau Co. (1); Waukesha Co. (5).**

Epicauta obesa (Chevrolat)

(Figs. 17-18; Maps 15-16)

[Synonymy largely from Pinto 1991]

Lytta obesa Chevrolat 1835:81.

Cantharis obesa (Chevrolat); Dugès 1870:128.

Lytta mus Haag-Rutenberg 1880:55.

Epicauta obesa (Chevrolat); Dugès 1889:66; Champion 1892:424; Werner 1949a:100; Pinto 1982:403; Pinto 1991:196.

Epicauta auricomans Champion 1892:424; Vaurie 1950:28; Pinto 1982:403.

Epicauta ficta Werner 1949a:100; Arnold 1976:21; Hoebeke 1978:14.

Epicauta pseudosolani Dillon 1952:395 (in part).

Capsule Description

Length: 6-15 mm (Pinto 1991). **Integument Color:** Brown to black. **Vestiture:** Moderately dense to dense, gray to dark brown, rarely orange brown or entirely black. **Head:** Eyes narrow, slightly bulging, broadly and shallowly emarginate; antennomeres IV and V subequal to VI and VII, antennomeres IV-XI flattened anteriorly in males. **Pronotum:** As long as wide, vestiture on disk primarily retrose, often whorled at posterolateral corners. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs slightly to distinctly expanded, and obliquely truncate apically.

Diagnosis

Only males of *E. obesa*, *E. flobcina*, and *E. cinerea* can be differentiated easily, using antennal, maxillary palpal, and prothoracic tarsal characteristics. Males of *E. flobcina* have submoniliform antennomeres IV and V which are also shorter than antennomeres VI-XI. Males of *E. cinerea* have elongate, curved, exserted setae on antennomeres IV-XI, as well as a swollen antennomere I. Neither *E. flobcina* nor *E. cinerea* have a pronounced flattening of the anterior antennal surface as does *E. obesa*.

Natural History

Adults have been recorded on *Amaranthus*, *Clematis*, *Lycopersicon*, *Medicago sativa*, *Solanum lycopersicum*, and *Tribulus* (Arnold 1976, Pinto 1991).

Phenology

Specimens of *E. obesa* were recorded in Wisconsin from 13 July to 9 August.

Distribution (Map 15)

Epicauta obesa is distributed from southeast Canada south through the eastern United States and into southern Mexico (Pinto 1991).

Wisconsin Records (Map 16)

The only previous Wisconsin record was from Delavan (Walworth County) (Pinto 1991).

The five specimens of *E. obesa* examined during this study were recorded from the following localities: **Dunn Co. (1); Grant Co. (1); Jackson Co. (1); Oconto Co. (1); Racine Co. (1).**

Epicauta pennsylvanica (Degeer)

(Figs. 19-20, 72, 109; Maps 17-18)

[Synonymy largely from Pinto 1991]

Cantharis pennsylvanica Degeer 1775:15.

Meloe nigra Woodhouse 1800:213.

Lytta pennsylvanica (Degeer); LeConte 1853:339, 1854a:447.

Lytta morio LeConte 1854a:447.

Epicauta pennsylvanica (Degeer); LeConte 1866:157; Riley 1877:561; Champion 1892:418; Wickham 1896:34; Ulke 1902:54; Chittenden 1903:25, 1911:92; Blatchley 1910:1363; Gibson 1912:83; Sherman 1913:246; Rau and Rau 1916:260; Milliken 1921:6; Mutchler and Weiss 1924:10, 18; Cockerell and Harris 1925:31; Gowdey 1926:13; Carruth 1931:52; Staig 1940:135 (in part); Horsfall 1941:144, 1943:13; Vaurie 1950:25; Dillon 1952:388; Selander 1954a:24, 1981b:757, 1982b:756, 1982c:427; 1984:2; Selander and Bouseman 1960:202; Parker and Wakeland 1957:26; Gupta 1965:454; Werner *et al.* 1966:33; Church 1967:754; Mathwig

1968:544; Selander and Weddle 1969:36; Rees 1973:200; Kirk and Balsbugh 1975:79; Arnold 1976:20; Kumar *et al.* 1980:1405; McLain 1982:396; Straines 1983:47; Capinera *et al.* 1985:1054; Goldberg 1987:247; Lago and Mann 1987:5; Blodgett and Higgins 1988:1456; Ray *et al.* 1989:187. Incorrect subsequent spellings.

Epicauta pennsylvanica (Degeer); Horn 1873:102; Werner 1945:447; Pinto 1991:200.

Lytta atrata Claypole 1881:31.

Epicauta potosina Dugès 1889:89.

Epicauta (Epicauta) pennsylvanica (Degeer); MacSwain 1956:47.

Capsule Description

Length: 7-15 mm (Pinto 1991). **Integument Color:** Black. **Vestiture:** Moderately dense, uniformly dark brown. **Head:** Eyes narrow, slightly bulging, moderately deeply, broadly emarginate; antenna subfiliform, gradually tapered apically; average diameter of antennomere I larger in males than females although there is overlap in size (McLain 1982). **Pronotum:** Length and width subequal, sides convergent anteriorly to form a short, broad collar. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs broadened apically, obliquely truncate, outer spur more distinctly so.

Diagnosis

The uniformly black cuticle and setae, and but slightly bulging eyes distinguishes *E. pennsylvanica* from all other Wisconsin *Epicauta*.

Natural History

Adults most commonly feed on flowers of *Solidago* (*S. altissima*, *S. canadensis*, *S. missouriensis*, *S. nemoralis*, *S. petiolaris*, and *S. rigida*), but have also been found feeding on *Achillea lanulosa*, *Amaranthus tamarascinus*, *Ambrosia*, *Artemisia frigida*, *Aster praealtus*,

Baccharis, *Beta vulgaris*, bindweed, *Chenopodium album*, *Chrysothamnus nauseosus*, *Eupatorium serotinum*, *Gossypium* (probably *G. hirsutum*), *Grindelia lanceolata*, *G. squarrosa*, *Gutierrezia dracunculoides*, *G. sarothrae*, *Haplopappus ciliatus*, *Helianthus*, *Medicago sativa*, nightshade, *Salsola kali*, and *Solanum tuberosum* (Werner 1945, Arnold 1976, Kumar *et al.* 1976, Lavigne 1976, Goldberg 1987, Pinto 1991, Selander and Fasulo 2003, Blodgett *et al.* 2010).

Wisconsin specimens have been observed feeding on *Achillea millefolium*, *Daucus carota*, *Eupatorium perfoliatum*, *Helianthus occidentalis*, *Medicago sativa*, *Pycnanthemum tenuifolium*, *P. virginianum*, *Silphium integrifolium*, *S. perfoliatum*, *Solidago canadensis*, *S. gigantea*, *S. missouriensis*, *S. ohioensis*, *S. rigida*, and *S. ulmifolia*. They were also collected from aster, *Euphoria corollata*, *Euthamia graminifolia*, *Medicago sativa*, *Raphanus sativus*, *Silphium integrifolium*, *S. perfoliatum*, *S. trifoliatum*, *Solidago canadensis*, *S. gigantea*, *S. graminifolia*, *S. juncea*, *S. rigida*, *S. speciosa*, *Sporobolus heterolepis*, *Verbena hastata*, and trapped in a field of *Glycine max* and a field of *Trifolium repens*.

Larval prey include egg masses of *Melanoplus differentialis* (Horsfall 1943), *M. femurrubrum*, and *M. spretus* (Rees 1973). *Melanoplus sanguinipes* is probably another larval prey because it was a dominant species in a study area with *E. pensylvanica* (Parker and Wakeland 1957).

Adults are generally found on flowers during the day but will move to plant litter for the night (Mathwig 1968). Males exhibit territorial behavior, as encounters with other males result in a chase, with the larger male often winning and participating in matings (McLain 1982). A marking study of a relatively small spatial scale resulted in detection of individuals 1-2 km from a releasing point (Goldberg 1987).

Natural enemies have been observed to possibly include the four spider species *Argiope aurantia* Lucas, *Araneus bicentenarius* (McCook), *Argiope trifasciata* (Forskål), and *Araneus trifolium* (Hentz), all of the family Araneidae (Bilsing 1920, Adams and Selander 1979). One adult *E. pensylvanica* was found in a web of an *Araneus* (Araneidae) at Barneveld Prairie (Iowa County) on 17 August 2007.

Phenology

Specimens of *E. pensylvanica* were recorded in Wisconsin from 12 March to 19 October. However, only four collection dates are prior to June and nine prior to July.

Distribution (Map 17)

Epicauta pensylvanica is widespread in North America from extreme southern Canada south into northern Mexico, and as far west as Alberta, Idaho, Utah and Arizona (Pinto 1991).

Wisconsin Records (Map 18)

Pinto (1991) previously recorded *E. pensylvanica* from several locations in Wisconsin but specific locations were not provided due to the large number of specimens. As part of a phylogenetic research project, Bologna *et al.* (2008) recorded this species from Madison (Dane County) in Wisconsin.

The 1096 specimens of *E. pensylvanica* examined during this study were recorded from the following localities: **Adams Co. (13); Ashland Co. (3); Barron Co. (13); Brown Co. (5); Buffalo Co. (11); Burnet Co. (6); Calumet Co. (11); Chippewa Co. (6); Clark Co. (8); Columbia Co. (30); Crawford Co. (11); Dane Co. (237); Dodge Co. (15); Door Co. (1); Douglas Co. (6); Dunn Co. (28); Eau Claire Co. (6); Fond du Lac Co. (8); Forest Co. (9); Grant Co. (66); Green Co. (29); Green Lake Co. (21); Iowa Co. (49); Iron Co. (1); Jackson Co. (15); Jefferson Co. (16); Juneau Co. (12); Kenosha Co. (14); La Crosse Co. (16);**

Lafayette Co. (7); Lincoln Co. (1); Marathon Co. (17); Marinette Co. (3); Marquette Co. (13); Menominee Co. (4); Milwaukee Co. (9); Monroe Co. (6); Oconto Co. (2); Oneida Co. (1); Ozaukee Co. (13); Pepin Co. (4); Pierce Co. (2); Polk Co. (2); Portage Co. (3); Price Co. (1); Racine Co. (4); Richland Co. (3); Rock Co. (16); Rusk Co. (16); Sauk Co. (28); Shawano Co. (6); Sheboygan Co. (1); St. Croix Co. (11); Trempealeau Co. (2); Vernon Co. (4); Vilas Co. (2); Walworth Co. (26); Washington Co. (56); Waukesha Co. (25); Waupaca Co. (6); Waushara Co. (70); Winnebago Co. (37); Wood Co. (27); unknown Wisconsin locality (2).

Other confirmed Wisconsin records of *E. pensylvanica* are from the following localities:

Dane Co. (1); Oconto Co. (1); Sheboygan Co. (1).

Epicauta atrata (Fabricius)

(Figs. 21-24, 105, 110-111; Maps 19-20)

[Synonymy largely from Pinto 1991]

Lytta atrata Fabricius 1775:260, 1781:329, 1801:79.

Meloe trichrus Pallas 1798:100.

Lytta coracina Illiger 1804:171 (unnecessary replacement name for *atrata* Fabricius, see Werner, 1945:470).

Cantharis trichrus (Pallas); Fischer 1827:23.

Lytta atrata convolvuli Melsheimer 1846:53 (as a “variety”).

Lytta convolvuli Melsheimer; LeConte 1866:157; Horn 1873:97.

Epicauta trichrus (Pallas); Horn 1875:153; Wickham 1896:34; Blatchley 1910:1361; Chittenden 1911:92; Ulke 1902:54; Sherman 1913:246; Mutchler and Weiss 1924:9, 18; Carruth 1931:51.

Epicauta trichus (Pallas); Gibson 1912:87 (*lapsus calami*).

Epicauta trichura Wellman 1910B:24 (unnecessary replacement name for *trichrus* Pallas; see Werner 1945:470).

Epicauta pensylvanica (Degeer); *sensu* Borchmann 1917:79; Staig 1940:135.

Epicauta atrata (Fabricius); Werner 1945:470; Dillon 1952:387; Pinto 1975:451; Arnold 1976:26; Selander 1981b:757, 1982b:427; Staines 1983:46; Berríos-Ortiz 1985:180; Lago and Mann 1987:5.

Epicauta (Epicauta) atrata (Fabricius); MacSwain 1956:64; Pinto 1991:294.

Capsule Description

Length: 6-13 mm (Pinto 1991). **Integument Color:** Head varies from nearly all orange with black frons, gula and mouthparts, to nearly all black except for orange frontal macula; remainder of body black. **Vestiture:** Entirely black to almost entirely gray; some individuals have been described as having black vestiture bordered by gray margins (not observed in this study). **Head:** Eyes broad and bulging; antennomere XI elongate and abruptly tapered from apical two-thirds to apex. **Pronotum:** As long as wide. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Outer metathoracic tibial spur broadened apically, obliquely truncate and about twice the width of the inner spur.

Diagnosis

Epicauta atrata and *E. sericans* LeConte are the two Wisconsin *Epicauta* species with slightly emarginate and bulging eyes. They can be distinguished by the outer metatibial spur being twice as wide as the inner spur in *E. atrata*, and similar and stick-like (*sensu* Pinto 1991) in *E. sericans*. In addition, the cuticle of the vertex and occiput is generally orange (but can be

black) in *E. atrata* and the vestiture generally black (but can be entirely cinerous). *Epicauta sericans* cuticle is black with cinerous to yellow brown (rarely brown) vestiture.

Natural History

Adults have been reported feeding on *Anthemis*, *Aster*, *Callirhoe alcaeoides*, *Campsis*, *Chrysanthemum*, *Cichorium*, *Cirsium vulgare*, *Coreopsis grandiflora*, *Coreopsis tinctoria*, *Convolvulus arvensis*, *Dahlia*, *Englemannia pinnatifida*, *Geranium*, *Gossypium* (probably *G. hirsutum*), *Helenium*, *Helianthus*, *Hibiscus*, *Ipomoea*, *Lupinus*, *Oenothera speciosa*, *Opuntia*, *Pyrrhopappus geiseri*, *Rosa*, *Rudbeckia hirta*, *Ruellia*, *Schrankia uncinata*, *Silphium*, *Tagetes*, and *Thelesperma filifolium* (Kirk and Balsbaugh 1975, Arnold 1976, Werner 1945, Selander 1981, Pinto 1991).

Wisconsin specimens were collected feeding on *Cirsium arvense*, *Coreopsis palmata*, *Lactuca scariola* (= *L. scariola*), *Silphium integrifolium*, and *Taraxacum*. Single specimens were collected from *Echinacea pallida*, *Helianthus*, *Silphium perfoliatum*, and *Solidago canadensis*. In Wisconsin, the choice of food plants exhibited a certain amount of specificity depending on the exact location. Nearly every time I encountered adults, they were feeding only on *Coreopsis palmata*. However, at Faville Prairie (Jefferson County), adults fed on either *Cirsium arvense* or *Lactuca scariola*, and at a location in Rock County adults fed only on *Taraxacum*. These were the only instances wherein *E. atrata* was observed feeding on these plant species, anywhere. Interestingly, Pinto (1991) found that *Convolvulus* was the most common food plant in Illinois (Pinto 1991).

Selander (1981, 1982) documented the ability of *E. atrata* larvae to utilize eggs of other meloids (*E. pensylvanica*, *E. pestifera*, *E. vittata* (Fabricius), *E. immaculate* (Say), *E.*

occidentalis Werner, and *E. atrata*); they did not develop on grasshopper eggs (*Melanoplus differentialis* and *M. femurrubrum*) in the lab.

Predation was observed by an assassin bug (*Phymata americana americana* Melon, Reduviidae) in Dane County on 22 July 2006.

Phenology

Specimens of *E. atrata* were recorded in Wisconsin from 20 June to 26 August.

Distribution (Map 19)

Epicauta atrata is distributed through the eastern United States from the Atlantic west to the Great Plains states, and from Manitoba south to northern Mexico (Pinto 1991).

Wisconsin Records (Map 20)

As part of a phylogenetic research project, Bologna *et al.* (2008) recorded this species from Faville Prairie (Jefferson County) in Wisconsin.

The 98 specimens and one confirmed report of *E. atrata* examined during this study were recorded from the following localities: **Columbia Co. (1); Crawford Co. (1); Dane Co. (21); Grant Co. (4); Green Co. (10); Jefferson Co. (19); Milwaukee Co. (1); Monroe Co. (3); Richland Co. (2); Rock Co. (25); Sauk Co. (8); Vernon Co. (2); Waushara Co. (1).**

Other confirmed Wisconsin records of *E. atrata* are from the following localities: **Jackson Co. (1); Rock Co. (1).**

Epicauta sericans LeConte

(Figs. 25-26; Maps 21-22)

[Synonymy largely from Pinto 1991]

Epicauta sericans LeConte 1866:158; Horn 1873:98, 1891:43; Blair 1921:281; Milliken 1921:6; Carruth 1931:52 (in part?); Werner 1945:469; Vaurie 1950:29; Dillon 1952:385; Parker and Wakeland 1957:26; Burke 1963:53; Werner *et al.* 1966:44; Church 1967:756; Goeden 1971:42; Rees 1973:205; Arnold 1976:26; Selander 1952:131, 1982c:427; Capinera *et al.* 1985:1054; Pinto 1991:335.

Lytta sartorii Haag-Rutenberg 1880:56.

Epicauta (Epicauta) collosa MacSwain 1956:56 (misidentification of first-instar larva).

Capsule Description

Length: 6-13 mm (Pinto 1991). **Integument Color:** Black. **Vestiture:** Moderately long, varying from moderately dense to dense, possibly concealing the cuticle; gray to yellow-brown, rarely entirely brown; black setae usually restricted to ventral side. **Head:** Head extremely broad, 0.6-0.7X as long as wide (Pinto 1991); eyes large, bulging; antennomere XI abruptly tapered from center to apex. **Pronotum:** Shape variable but generally subquadrate; vestiture usually dense, retrose. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs similar, stick-like (*sensu* Pinto 1991).

Diagnosis

Epicauta sericans and *E. atrata* are the two Wisconsin *Epicauta* species with slightly emarginate, bulging eyes. The metathoracic tibial spurs are of subequal width in *E. sericans*, while in *E. atrata*, the outer metathoracic tibial spur is broadened apically, obliquely truncate and about twice the width of the inner spur. The vestiture of *E. sericans* is never black, as is often the case in *E. atrata*.

Natural History

Adults have been recorded from the plants beans, *Callirhoe alcaeoides*, *Callirhoe involucrata*, *Cirsium*, *Convolvulus arvensis*, *Cylindropuntia imbricata*, *Englemannia pinnatifida*, *Gaillardia puchella*, *Gossypium* (probably *G. hirsutum*), *Helianthus*, *Ipomoea leptophylla*, *Lactuca*, *Lygodesmia juncea*, *Medicago sativa*, *Oenothera caespitosa*, *Opuntia phaeacantha*, *Oenothera laciniata*, *Proboscidea louisianica*, *Schrankia uncinata*, *Solanum elaeagnifolium*, *Solidago*, and *Tribulus terrestris* (Milliken 1921, Dillon 1952, Werner *et al.* 1966, Kirk and Balsbaugh 1975, Arnold 1976, Blodgett and Higgins 1988, Pinto 1991). Pinto (1991) states that he has not been able to confirm feeding on Asteraceae.

Recorded larval prey includes eggs of *Melanoplus differentialis* and *M. bivittatus* (Pinto 1991). *Melanoplus sanguinipes* is a likely larval prey because it was a dominant grasshopper species in a study area with *E. sericans* (Parker and Wakeland 1957).

The robber fly *Ospriocerus abdominalis* (Say) (Asilidae) is a known predator (Pinto 1991).

Phenology

Specimens of *E. sericans* were recorded in Wisconsin on 7 August (three specimens), 11 August (three specimens), and 29 August (one specimen).

Distribution (Map 21)

Epicauta sericans is distributed from Alberta and Saskatchewan Canada, south through the central half of the United States and into southern Mexico (Pinto 1991). Pinto (1991) recorded specimens from Kings Bluff (Winona County) and St. Anthony (Ramsey County) in Minnesota, both near the Wisconsin border. In this study, the specimens from Crawford County represent a **NEW STATE RECORD**.

Wisconsin Records (Map 22)

The seven specimens of *E. sericans* examined during this study were recorded from the following locality: **Crawford Co. (7)**.

Epicauta occidentalis Werner

(Figs. 27-28; Maps 23-24)

[Synonymy largely from Pinto 1991]

Epicauta lemniscata (Fabricius); *sensu* Horn 1873:100; Ortenburger and Hatch 1926:144; Ingram 1927:1; Ingram and Douglas 1932:71; Horsfall 1943:32 (in part); Douglas 1935:686; Werner 1945:463 (in part); Dillon 1952:398 (in part).

Epicauta vittata (Fabricius), *sensu* Bruner 1891:151 (in part?); Cockerell and Harris 1925:31; Tafaelli and Bess 1968:51 (in part?); Pinto 1991:348.

Epicauta occidentalis Werner 1944:69, 1945:465; Dillon 1952:399; Arnold 1976:22; Adams and Selander 1979:246; Blodgett and Higgins 1988:1456; Ray *et al.* 1989:187.

Epicauta (Epicauta) lemniscata (Fabricius); *sensu* MacSwain 1956:60.

Capsule Description

Length: 10-17 mm (Pinto 1991). **Integument Color:** Orange to orange-brown with two, black, longitudinal vittae on the pronotum and three, evenly spaced elytral vittae. **Vestiture:** Orange to orange-brown with two, black, longitudinal, pronotal vittae and three, evenly spaced elytral vittae. **Head:** Antennae elongate, filiform, and in males antennomeres III-XI strongly compressed. **Pronotum:** Elongate, 1.14X as long as wide (Pinto 1991). **Elytra:** Completely or nearly completely covering abdomen; orange to orange-brown with three, evenly spaced vittae.

Legs: Prothoracic tarsomere I and prothoracic tibia subglabrous in males, prothoracic tarsomere I 0.45X the length of the prothoracic tibia (Pinto 1991).

Diagnosis

Epicauta occidentalis and *E. vittata* are the two Wisconsin *Epicauta* species that are striped dorsally; both orange to orange brown with black vittae. The vittae are evenly spaced in *E. occidentalis*, while in *E. vittata* the middle vitta is closer to the outer vitta than it is to the sutural vitta. In *E. vittata*, the middle and outer vitta are often fused together, resulting in two vittae.

Natural History

Adults have been recorded from the plants *Amaranthus retroflexus*, *Amaranthus spinosus*, *Arachis hypogaea*, *Beta vulgaris*, *Brassica oleracea*, *Capsicum*, *Chenopodium album*, *Convolvulus americanus*, *Crotalaria intermedia*, Cyperaceae (“small, fine sedge”), *Glycine max*, *Indigofera*, *Ipomoea batatas*, *Ipomoea hederacea*, *Lycopersicon esculentum*, *Medicago sativa*, *Oryza sativa*, *Passiflora incarnata*, *Salsola kali*, *Schrankia*, *Solanum tuberosum*, and *Zea mays* (Arnold 1976, Adams and Selander 1979, Pinto 1991). Aggregations may include other species, including *E. vittata* (Adams and Selander 1979). Adults feed on *Amaranthus retroflexus*, *Ampelamus albidus*, *Cycloloma atriplicifolium*, *Datura stramonium*, *Petunia*, *Solanum carolinense*, and *Solanum dulcamara* in the lab (Adams and Selander 1979).

This species is known for forming large aggregations, especially on *Medicago sativa*. For example, Zhu and Higgins (1994) found up to 1257 individuals in a 35 m² study plot. Adults are attracted to blacklights (Kirk and Balsbaugh 1975).

A reported predator of this species is the asilid fly *Dizonias tristis* Walker (Ingram 1927).

Phenology

The one specimen of *E. occidentalis* recorded from Wisconsin was collected in July.

Distribution (Map 23)

Epicauta occidentalis is recorded only from the United States, from the southeastern states through the Great Plains (Pinto 1991). Adams and Selander (1979) reported that *E. occidentalis* is expanding its range from the Great Plains east. In this study, the single specimen from Milwaukee County represents a **NEW STATE RECORD**.

Wisconsin Records (Map 24)

The single specimen of *E. occidentalis* examined during this study was recorded from the following locality: **Milwaukee Co. (1)**.

Epicauta vittata (Fabricius)

(Figs. 29-30, 74; Maps 25-26)

[Synonymy largely from Adams and Selander 1979]

Lytta vittata Fabricius 1775:260, 1781:329; 1787:216; 1792:86, 1801:79; Brandt and Ratzeburg 1883:123-124; LeConte 1853:340; Claypole 1880:245, 1885:119; Zimsen 1964:129.

Meloe vittatus (Fabricius); Thunberg 1781-1791:109.

Cantharis sp. *sensu* Chapman 1799:174.

Meloe chapmani Woodhouse 1800:214.

Lytta lemniscata Fabricius 1801:79; LeConte 1853:341; Zimsen 1964:129.

Cantharis lemniscata (Fabricius); Fischer 1827:19.

Epicauta vittata (Fabricius); Horn 1873:100; Saunders 1876:223, fig. 7; Riley 1877:6, 8-13, 15-18, pl. 5, fig. 1-8, 10 (at least in part); Hubbard and Schwarz 1878:663; Forbes 1880:110, 132,

1886:19, 1905:111-112 (at least in part); Hamilton 1895:341, 375; Wickham 1896:34, fig. 3, 1911:35; Forbes and Hart 1900:448 (at least in part); Ulke 1902:32; Balduf 1923:171; Chittenden 1903:22, fig. 12, 1911:91; Anon 1908:573 (in part); Blatchley 1910:1361; Gibson 1912:86, fig. 5; Sherman 1913:246; Flint 1914:477; Webster 1915:377-380, figs. 11-13; Watson 1917:64R; Britton 1918:111, 1920:238; Bilsing 1920:253, 260; Weiss and Dickerson 1921:140; Mutchler and Weiss 1924:10; Davis 1926:298; Robertson 1929:30; Brimley 1938:162; Fenton 1939:74; Staig 1940:139-142, pl. 56; Montgomery and Amos 1941:254; Werner 1945:464; Milliron 1958:8; Gorz, Haskins and Manglitz 1971:1-7.

Epicauta lemniscata (Fabricius); Putnam 1876:173; Schwarz 1878:464; Hamilton 1895:341; Wickham 1895:40; Ulke 1902:32; Chittenden 1903:115, 1903:23 (in part); Hendrickson 1930:98; Carruth 1931:52 (at least in part); Brimley 1938:162; Gilbertson and Horsfall 1940:10-14, figs 4, 5B (at least in part); Montgomery and Amos 1941:254; Horsfall 1943:32-37 (in part); Swingle and Mayer 1944:141; Löding 1945:55 (at least in part); Werner 1945:463 (in part); Frost 1964:140; Kirk 1969:63 (in part); Arnold 1976:22; Blodgett and Higgins 1988:1456.

Epicauta lemnistica [sic] Hamilton 1895:375.

Epicauta (Epicauta) vittata (Fabricius); MacSwain 1956:49, pl. 9; Kirk 1970:61 (in part); Adams and Selander 1979:240; Pinto 1991:352.

Capsule Description

Length: 10-18 mm (Adams and Selander 1979). **Integument Color:** Orange to orange-brown with two, black, longitudinal vittae on the pronotum and two or three elytral vittae. For three elytral vittae, the outer vitta will be closer to the middle vitta than the middle vitta is to the sutural vitta. For two vittae, the outer and middle vittae are fused together which occurs often.

Vestiture: The dorsal vestiture matches underlying integument color. **Head:** Antennae elongate,

filiform, and in males antennomeres III-XI strongly compressed. **Pronotum:** Elongate, 1.14X as long as wide (Pinto 1991). **Elytra:** Completely or nearly completely covering abdomen; orange to orange-brown with two or three vittae as described for the integument color. **Legs:** Prothoracic tarsomere I and prothoracic tibia usually setose, prothoracic tarsomere I less than 0.40X the length of the prothoracic tibia (Pinto 1991).

Diagnosis

Epicauta vittata and *E. occidentalis* are the two Wisconsin *Epicauta* species that are striped dorsally, both orange to orange brown with black vittae. Three vittae are evenly spaced in *E. occidentalis*, while in *E. vittata* the middle vitta is closer to the outer vitta than it is to the sutural vitta. However, *E. vittata* may have two vittae present, resulting from the fusion of the the middle and outer vittae.

Natural History

Adults have been recorded from the plants *Alternanthera philoxeroides*, *Amaranthus retroflexus*, *Asclepias incarnata*, *Asparagus officinalis*, *Beta vulgaris*, beans, *Brassica campestris*, *Brassica oleracea*, *Capsicum*, *Clematis*, *Convulvulus*, *Cucurbita*, *Cuscuta moschata*, *Cycloloma atriplicifolium*, *Cynanchum*, *Datura stramonium*, *Daucus*, *Fagopyrum esculentum*, *Glycine max*, *Gossypium* (probably *G. hirsutum*), *Hibiscus esculentus*, *Ipomoea batats*, *Ipomoea hederacea*, *Lycopersicon esculentum*, *Medicago sativa*, *Melilotus alba*, *Passiflora incarnata*, *Petunia*, *Phaseolus lunatus*, *Phaseolus vulgaris*, *Phytolacca americana*, *Piper*, *Portulaca oleracea*, *Raphanus sativus*, *Rheum rhaponticum*, *Sagittaria*, *Salix*, *Salsola pestifer*, *Solanum lycopersicum*, *S. melongena*, *S. nigrum*, *S. tuberosum*, *Solidago*, *Spergula arvensis*, *Spinacia oleracea*, *Trifolium*, *Vigna sinensis*, and *Zea mays* (Chapman 1799, Werner 1945, Adams and Selander 1979, Pinto 1991, Selander and Fasulo 2003). In the lab, adults were documented to

feed on *Ampelamus albidus*, *Chemopodium*, *Portulaca oleracea*, *Solanum carolinense*, *S. dulcamara*, and *Stellaria* (Adams and Selander 1979). Generally, adults feed on leaves (Adams and Selander 1979) but flowers of *Medicago sativa* (Swenk 1913) and *Asclepias* (Weiss and Dickerson 1921, Robertson 1929) are preferred over leaves. Groz *et al.* (1972) demonstrated that adults of *E. vittata* select individual plants to feed on based on chemical composition.

One Wisconsin specimen was found on *Solanum tuberosum* and another on *Asclepias*.

Aggregations may include other species, including *E. occidentalis* (Adams and Selander 1979). Often individuals of these aggregations eat individual plants, nearly consuming all foliage, but not touching other individual plants of the same species in close proximity (Adams and Selander 1979). Adults are attracted to lights (Selander and Fasulo 2003). Several Wisconsin specimens were collected using black light traps.

Larvae have been reported feeding on eggs of the grasshoppers *Melanoplus differentialis*, *M. femurrubrum*, *M. atlantis* Riley, *M. sanguinipes*, and *Oedipoda sulphurea* (Fabricius) (Acrididae) (Riley 1877, Rees 1973).

Presumed natural enemies include the four spider species *Argiope aurantia*, *Argiope trifasciata*, *Araneus trifollum*, and *Araneus bicentenarius*, all of the family Araneidae (Bilising 1920, Adams and Selander 1979). This species has also been reported from the stomach of northern mockingbirds, *Mimus polyglottos* (Linnaeus), and a gray catbird, *Dumetella carolinensis* (Linnaeus), (Forbes 1880) both members of Mimidae, and as a prey of an asilid fly (Watson 1917).

Phenology

Specimens of *E. vittata* were recorded in Wisconsin from 18 June to 21 September.

Distribution (Map 25)

Epicauta vittata is distributed throughout the eastern United States (east of 100°) with the exception of Maine, Vermont, New Hampshire, North Dakota, and Texas, as well as Ontario and Quebec in Canada (Pinto 1991).

Wisconsin Records (Map 26)

Adams and Selander (1979) reported this species from Dane, Door, Grant, La Crosse, Winnebago, and Wood Counties in Wisconsin.

The 62 specimens of *E. vittata* examined during this study were recorded from the following localities: **Adams Co. (1); Columbia Co. (1); Dane Co. (11); Dodge Co. (2); Door Co. (1); Grant Co. (4); Green Lake Co. (1); Jefferson Co. (2); La Crosse Co. (1); Lafayette Co. (1); Manitowoc Co. (1); Marathon Co. (1); Marquette Co. (2); Milwaukee Co. (2); Outagamie Co. (3); Richland Co. (15); Sauk Co. (1); Vernon Co. (3); Washington Co. (1); Waukesha Co. (1); Waushara Co. (1); Winnebago Co. (4); Wood Co. (2).**

Other confirmed Wisconsin records of *E. vittata* are from the following locality: **Buffalo Co. (1).**

***Lytta* Fabricius**

[Synonymy largely from Pinto and Bologna 1999]

Type species: *Meloe vesicatorius* Linnaeus 1758, by subsequent designation (Wellman, 1910b).

Lytta Fabricius 1775:260.

Cantharis Geoffroy 1762:339 (misapplication of *Cantharis* Linnaeus 1758).

Pomphopoea LeConte 1862:273 (currently as subgenus).

Poreospasta Horn 1868:139 (currently as subgenus).

Adicolytta Selander 1960:137 (currently as subgenus).

Paralytta Selander 1960:49 (currently as subgenus).

There are nine subgenera within *Lytta* but the generic limits are not well established due to the historical additions of many meloine species (Selander 1960, Pinto and Bologna 1999). *Lytta* is Holarctic in distribution, with 109 species, 69 of which are Nearctic (Pinto and Bologna 1999). Pinto and Bologna (1999) hypothesized that a formal revision would lead to the removal of the only South American representative of *Lytta*: *L. neivai* Denier. Most *Lytta* species are temperate, with southern United States and the Central Plateau of Mexico the most speciose regions in North America (Selander 1960).

Larvae are quasi-parasitoids of Apoidea, with oviposition occurring in the soil and triungulins actively searching for bee nests (Selander 1960). Bee hosts are generally of the families Anthophoridae, Megachilidae, Halictidae, and Colletidae (references in Pinto and Bologna 1999). Adults generally have peak activity in middle and late summer except for species in the subgenus *Poreospasta* which are generally active in spring and early summer (Selander 1960). Two of the three Wisconsin *Lytta* species appear to be exceptions as *Lytta aenea* Say is active in the spring and *Lytta nuttalli* Say (in the subgenus *Poreospasta*) is active in the summer.

The *Lytta* species in Wisconsin can be identified by their metallic color and elytra that completely or nearly completely cover the abdomen.

Key to the Wisconsin Species of Adult *Lytta*

(Modified in part from Selander 1960)

- 1 Femora and at least metathoracic tibiae orange; labrum deeply emarginate 2

- 1' Femora and tibiae black or metallic green, blue or purple; labrum not or only shallowly emarginate *nuttalli*
- 2 (1) Prothoracic tibiae of males thickened, stouter than those of mesothoracic tibiae, bowed; female with apex of sixth abdominal sternum deeply grooved medianly *sayi*
- 2' Prothoracic tibiae of males not thickened, no stouter than those of mesothoracic tibiae, not bowed; female with apex of sixth abdominal sternum not or only feebly grooved *aenea*

Lytta sayi LeConte

(Figs. 31-32, 82; Maps 27-28)

[Synonymy largely from Selander 1960]

Lytta aenea Say 1824:288 (in part).

Lytta sayi LeConte 1853:336; Selander 1960:235.

Cantharis pyrivora Fitch 1859:36.

Pomphopoea sayi (LeConte); LeConte 1866:160; Horn 1873:117; Wickham 1896:34; Blatchley 1910:1364; Gibson 1912:4; Britton 1920:238; Mutchler and Weiss 1924:9; Cockerell and Harris 1925:31; Houghton 1947:103; MacSwain 1956:72.

Capsule Description

Length: 13-22 mm (Selander 1960). **Integument Color:** Metallic green or blue.

Vestiture: Moderately long, erect, pale setae on head and ventral surfaces, extremely short and sparse setae on pronotum and elytra. **Head:** Labrum deeply emarginate. **Pronotum:** Sides converging basally and apically from widest point, more so at apically. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Tibiae orange with black base and apex; tarsi black.

Diagnosis

The thickened and bowed prothoracic tibiae in males, deeply grooved abdominal sternum medio-apically in females, and partially orange legs separate *L. sayi* from other Wisconsin *Lytta*. *Lytta sayi* also tends to have a greenish-blue color dorsally.

Natural History

Adults are recorded from a variety of plants: beans, butternut, *Cornus*, elder, *Kolkwitzia*, *Lupinus perennis*, *Pirophorum* (pear), *Prunus* (peach, cherry, plum), *Robinia pseudoacacia*, *Rosa*, *Salix discolor*, *Triticum*, and *Viburnum lentago* (Gibson 1912, Mutchler and Weiss 1924, Houghton 1947, Fitch 1859, Selander 1960, Swanson and Kleintjes Neff 2007). Selander (1960) observed that adult *L. sayi* commonly feed on flowers, but Fitch (1859) reported they will eat young fruit of Rosaceae.

Wisconsin specimens were found feeding on *Baptisia lacteal*, *Gleditsia triacanthos*, and *Lupinus*, but also collected from *Baptisia leucophaea*, *Cornus*, *Gleditsia triacanthos*, *Hemerocallis*, *Lupinus perennis*, *Malus domestica*, *Pinus strobus*, and *Robinia pseudoacacia*.

Adults commonly form large aggregations, potentially eating all flowers of a particular plant species in the immediate area (Houghton 1947, this study). These aggregations persist for only a few days before the adults leave the area. Swanson and Kleintjes Neff (2007) found that an 11-day aggregation, with a maximum count of 951 adults, consumed 100% of *Lupinus perennis* flowers but other plant parts were generally avoided. These observations were in an area known to support populations of the federally endangered Karner blue butterfly, *Lycaena melissa samuelis* Nabokov, whose larvae feed obligately on lupine.

Larvae have been reared from cells of the ground-nesting halictid bee *Agapostemon virescens* (Fabricius) (Eickwort 1981).

Phenology

Specimens of *L. sayi* were recorded in Wisconsin from 22 May to 13 July.

Distribution (Map 27)

Selander (1960) suggested that *L. sayi* is found in three distinct populations: 1) New York state area and southern Quebec, 2) Wisconsin, Illinois, Iowa and Minnesota, and 3) Wyoming.

Wisconsin Records (Map 28)

In Wisconsin, this species was reported from Cedar Lake (Washington County) and Dane County by Selander (1960) and Fall Creek (Eau Claire County) by Swanson and Kleintjes Neff (2007).

The 120 specimens of *L. sayi* examined during this study were recorded from the following localities: **Adams Co. (2); Baron Co. (20); Bayfield Co. (1); Burnett Co. (12); Columbia Co. (3); Crawford Co. (2); Dane Co. (26); Dodge Co. (2); Eau Claire Co. (14); Florence Co. (1); Grant Co. (1); Iowa Co. (1); Marquette Co. (2); Polk Co. (1); Racine Co. (8); Richland Co. (9); Sauk Co. (8); Washburn Co. (4); Waukesha Co. (1); Waupaca Co. (2).**

Other confirmed Wisconsin records of *L. sayi* are from the following localities: **Buffalo Co. (4); Burnett Co. (1); Dane Co. (1); Dunn Co. (1); Jackson Co. (1); Jefferson Co. (1); Juneau Co. (1); Kenosha Co. (1); Milwaukee Co. (1); Pepin Co. (1); Portage Co. (1); Richland Co. (2); Sawyer Co. (1); Trempealeau Co. (2); Waupaca Co. (1).**

Lytta aenea Say

(Figs. 33-34, 83; Maps 29-30)

[Synonymy largely from Selander 1960]

Lytta aenea Say 1824:301; LeConte 1853:337; Selander 1960:229; Arnold 1976:13.

Cantharis nigricornis LeConte 1847:91.

Lytta filiformis LeConte 1853:337.

Lytta tarsalis 1864:71; Borchman 1917:99.

Pomphopoea texana LeConte 1866:161; Horn 1873:117; Tucker 1906:88; Dillon 1952:354.

Pomphopoea aenea (Say); Horn 1873:117; Ulke 1902:32, 1902:54; Blatchley 1910:1364;

Sherman 1913:247; Britton 1920:238; Mutchler and Weiss 1924:9; MacSwain 1956:73.

Capsule Description

Length: 9-16 mm (Selander 1960). **Integument Color:** Metallic brassy green but individuals from the southern United States can be entirely metallic green or blue (Selander 1960). **Vestiture:** Moderately long, erect, pale setae on head, thorax and ventral abdominal surface, short, sparse setae on elytra. **Head:** Labrum deeply emarginate. **Pronotum:** Sides converging basally and apically from widest point, more so apically. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Orange femora and tibiae; femoral apices often black; tarsi orange to almost black.

Diagnosis

Males have prothoracic and mesothoracic tibiae of similar thickness while females have the abdominal sternum feebly grooved, if at all. These characters, in addition to the partially orange legs separate *L. aenea* from other Wisconsin *Lytta*. *Lytta aenea* also tends to have a bronze color dorsally.

Natural History

Adults have been recorded feeding on *Amelanchier*, *Carya*, *Crataegus*, Fagaceae, *Malus*, *Pirophorum* (pear), *Prunus* (peach, plum), and Salicaceae (Ulke 1902, Sherman 1913, Mutchler and Weiss 1924, Selander 1960, Arnold 1976).

Wisconsin specimens have been collected from the flowers of *Malus domestica* and *Prunus americana*.

Larvae have been reported from cells of the colletid bee *Colletes thoracicus* Smith (Batra 1980).

Phenology

Specimens of *L. aenea* were recorded in Wisconsin from 27 March to 13 May, although one specimen has a 24 October collection date.

Distribution (Map 29)

Lytta aenea is distributed in the eastern United States, west to Oklahoma and Texas (Selander 1960). The specimens in this study recorded from 14 Wisconsin counties represent a **NEW STATE RECORD**.

Wisconsin Records (Map 30)

The 40 specimens of *L. aenea* examined during this study were recorded from the following localities: **Adams Co. (1); Crawford Co. (1); Dane Co. (25); Dodge Co. (1); Grant Co. (2); Iowa Co. (2); Jefferson Co. (1); Langlade Co. (1); Richland Co. (1); Rock Co. (1); Sauk Co. (2); St. Croix Co. (1); Vernon Co. (1).**

Other confirmed Wisconsin records of *L. aenea* are from the following locality: **Walworth Co. (1).**

Lytta nuttalli Say

(Figs. 35-36, 84; Maps 31-32)

[Synonymy largely from Selander 1960]

Lytta nuttalli Say 1824:300.*Lytta nuttalli* Say 1824:5; LeConte 1853:334; Horn 1872:390; Cockerell and Harris 1925:30; Carruth 1931:54; Knowlton 1930:53, 1939:5; Fox 1943:206; Peterson 1951:198; MacSwain 1956:87; Selander 1960:205.*Cantharis fulgifer* LeConte 1847:90; LeConte 1878:472.*Lytta fulgifer* (LeConte); LeConte 1853:334.*Cantharis nuttalli* (Say); Horn 1873:106, 1873:717; Saunders 1876:224; Wickham 1896:34; Chittenden 1898:250; Fall 1901:297; Wickham 1901:151; Chittenden 1903:116, 1903:27; Fall and Cockerell 1907:210; Gibson 1912:2.*Lytta nuttalli* var. *fulgifera* (LeConte); Ulke 1875:825.*Cantharis nuttalli* [sic] var. *fulgifera* (LeConte); Putmna 1876:91.(Also, many misspellings of *nuttalli* as *nutalli* or *nuttali*)**Capsule Description**

Length: 7-21 mm (Selander 1960). **Integument Color:** Brassy green head and pronotum, the latter usually edged with purple; usually metallic dark violet elytra with lighter and brassy color near margins; metallic dark green or blue-green ventrally with purple along edges of sternites. **Vestiture:** Black and sparse, except pale, silvery and more dense ventrally. **Head:** Labrum not or only shallowly emarginate. **Pronotum:** Sides converging basally and apically from widest point, more so apically. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Femora and tibiae metallic green, blue or purple.

Diagnosis

The uniformly metallic green, blue or purple legs, without orange color, readily separates *L. nuttalli* from all other Wisconsin *Lytta*.

Natural History

Adults have been reported feeding on *Astragalus bisulcatus*, *A. drummondii*, *A. pectinatus*, *A. tenellus*, *Avena sativa*, beans, *Brassica campestris*, *B. napus*, *Beta vulgaris*, *Caragana arborescens*, *Cnemidophacos pectinatus*, *Delphinium*, *Diholcos bisulcatus*, *Hordeum*, *Iris*, *Lupinus albus*, *L. angustifolius*, *L. argenteus*, *L. luteus*, *L. mutabilis*, *Melilotus alba*, *Oxytropis macounii*, *O. gracilis*, *Thermopsis montanus*, *T. rhombifolia*, *Trifolium hybridum*, *Triticum*, *Vicia americana*, *V. faba*, *V. sativa*, and *V. sparsifolia* (Chittenden 1898, 1903, Gibson 1912, Fox 1943, Goplen 1958, Selander 1960, Church and Gerber 1977, Burgess 1983, Miranpuri and Khachatourians 1994). Foraging on flowers is preferred but adults will feed on leaves as well (Church and Gerber 1977).

Females have been observed ovipositing in an area with remnants of *Megachile* sp. nesting cells (Church and Gerber 1977). The ranges of *L. nuttalli* and *Lytta viridana* LeConte overlap, and Church and Gerber (1977) observed three attempted matings between males of *L. nuttalli* and females of *L. viridana*; Selander (1960) collected what were considered to represent hybrid specimens.

The mirid bug *Hadronema militaris* Uhler was reported attacking adult *L. nuttalli* (Fox 1943, Church and Gerber 1977).

Phenology

The single Wisconsin specimen of *L. nuttalli* was collected on 30 June.

Distribution (Map 31)

Lytta nuttalli is distributed in the western United States and extreme southwest Canada (Selander 1960). Selander (1960) reported this species from St. Anthony Park (St. Paul, Ramsey County) in Minnesota. In this study, the single specimen from Douglas County represents a **NEW STATE RECORD**.

Wisconsin Records (Map 32)

The single specimen of *L. nuttalli* examined during this study was recorded from the following locality: **Douglas Co. (1)**.

***Meloe* Linnaeus**

[Synonymy modified from Pinto and Bologna 2002]

Type species: *Meloe proscarabaeus* Linnaeus 1758, by subsequent designation (Latreille 1810).

Meloe Linnaeus 1758:419.

Proscarabaeus Schrank 1781:225.

Melittophagus Kirby 1818:164.

Triungulinus Dufour 1828:63.

Cnestocera Thomson 1859:124.

There are 16 subgenera within *Meloe* (Bologna and Pinto 1998). *Meloe* is comprised of 153 species, with 22 found in North America (Pinto and Bologna 1999). Their distribution is primarily holarctic but representatives also inhabit sub-Saharan Africa as well as the Oriental Region (Pinto and Bologna 1999). While meloids are generally most diverse in tropical and arid temperate regions, species of *Meloe* tend to inhabit temperate and boreal regions, especially those in the subgenus *Meloe* (Pinto and Selander 1970).

Oviposition occurs in the soil, with triungulins reaching bee host nests by phoresy on adult bees (Pinto and Selander 1970). Species of *Meloe* are known to develop in the nests of Apoidea, particularly the Anthophoridae, Megachilidae, Colletidae, and Andrenidae (Pinto and Bologna 1999). Compared to other meloid genera, adult *Meloe* are less commonly encountered in large aggregations and only a few species known to cause localized agricultural damage (Pinto and Selander 1970). Peak adult activity is generally in spring or fall/winter, with apparent lack of rigidity to allow for some variation (Pinto and Selander 1970). Natural enemies of *Meloe* include ceratopogonid flies and anthicid beetles on adults and phorid flies (*Phora* sp.) parasitizing eggs (Pinto and Selander 1970).

Individuals have shortened elytra and the metathoracic wings are absent, characters shared with other meloids but apparently having been evolved independently (Pinto and Selander 1970). The five Wisconsin species of *Meloe* are the only Wisconsin meloids with these characters. The following key includes the five *Meloe* species confirmed from Wisconsin as well as *Meloe americanus*, a species recorded just south of the state (Pinto and Selander 1970).

Key to the Wisconsin Species of Adult *Meloe*

(Modified in part from Pinto and Selander 1970)

- | | | |
|------|--|-------------------|
| 1 | Head and pronotum finely and sparsely punctate | 2 |
| 1' | Head and pronotum moderate to densely punctate | 3 |
| 2(1) | Antennomere V in males flared apically; pronotum with straight sides that converge posteriorly; anterior margin of eye nearly straight | <i>impressus</i> |
| 2' | Antennomere V in males not flared apically; pronotum with sinuate sides; anterior margin of eye distinctly emarginate | <i>americanus</i> |

- 3 (1') Scutellum conically produced *angusticollis*
- 3' Scutellum not conically produced 4
- 4 (3') Outer spur of each metathoracic tibia straight in lateral view *campanicollis*
- 4' Outer spur of each metathoracic tibia with apical portion produced anteriorly 5
- 5 (4') Antennomere V of males without a flat platform-like distal surface (Figure 90), VI about as long as wide; last abdominal ventrite in females not emarginate *niger*
- 5' Antennomere V of males with a flat platform-like distal surface (Figure 89), VI about 0.25X wider than long; last abdominal ventrite in females emarginate *dianella*

Meloe niger Kirby

(Figs. 37-38, 90; Maps 33-34)

[Synonymy largely from Pinto and Selander 1970]

Meloe nigra Kirby 1837:242; Bethune 1875:157.

Meloe impressus LeConte 1853:328; Wickham 1896b:33.

Meloe impressus var. ? *nigra* Kirby; LeConte 1853:328.

Meloe perplexus LeConte 1853:329.

Meloe opaca LeConte 1861:354.

Meloe niger Kirby; Wickham 1896b:33; Van Dyke 1930:122; Pinto and Selander 1970:135.

Meloe (Proscarabaeus) impressus LeConte; Van Dyke 1928:435.

Meloe (Proscarabaeus) opacus LeConte; Van Dyke 1928:439; Hatch 1965:110.

Meloe montanus Leech 1934:41.

Meloe kirbyi Dillon 1952:371.

Meloe (Meloe) opacus LeConte; MacSwain 1956:100 (in part).

Capsule Description

Length: 8-18 mm (Pinto and Selander 1970). **Integument Color:** Black to moderately metallic blue, sometimes metallic green (Pinto and Selander 1970). **Vestiture:** Extremely short and sparse setae matching integument color. **Head:** Head with length 0.54 to 0.74 that of width (Pinto and Selander 1970); moderately to densely punctate; antennomere V in males without a flat platform-like distal surface. **Pronotum:** Moderately to densely punctate. **Elytra:** Short, not reaching end of abdomen. **Legs:** Each outer metathoracic tibial spur with apical portion produced anteriorly.

Diagnosis

Meloe niger may be readily distinguished from other Wisconsin *Meloe* species except *Meloe dianella* Pinto and Selander based on moderate to dense punctations on the head and pronotum, a scutellum which is not conical, and curved metathoracic tibial spurs. *Meloe niger* can be differentiated from *M. dianella* by antennal characteristics in males, as antennomere V lacks a flat platform-like distal surface and antennomere VI is about as long as it is wide. Females can be differentiated based on the last visible sternite which is not emarginate in *M. niger* but is slightly emarginate in *M. dianella*.

Natural History

Adults have been reported to feed on *Allium cepa*, *A. textile*, *Anemone patens*, *Asparagus officinalis*, *Aster tanacetifolius*, *Atriplex canescens*, *Boutelova gracilis*, *Bromus tectorum*, *Cryptantha fendleri*, *Descurainia pinnata*, *Kochia scoparia*, *Lappula redowskii*, *Lepidium densiflorum*, *Oxytropis sericea*, *Ranunculus*, *Taraxacum officinale*, “?Trifolium pretense”, *Salsola kali tenuifolia*, *Sophora sericea*, and *Yucca glauca* (Pinto and Selander 1970, Kirk and Balsbaugh 1975, Kumar *et al.* 1976, Lavigne 1976).

Larvae have been recorded from a cell of *Colletes fulgidus* Swenk (MacSwain 1956, Pinto and Selander 1970) and the halictid *Nomia melanderi* Cockerell is reported as another larval host (Erickson *et al.* 1976, Mayer and Johansen 1977, 1978, Pinto and Mayer 1986).

Pedilus sp. nov. (cited as *P. monticolus* (Horn) by Leech 1934) has been recorded as a presumed natural enemy of *M. niger*, with its elytra partially eaten (Young 1984a). *Pedilus elegans* (Hentz) has also been recorded on *M. niger* (Harrington 1894).

The larval host association with *N. melanderi* is important because the transfer of alkali bees using cubic foot cores of soil is a method used for enhancing pollination of alfalfa in the Pacific coast states (Johansen and Mayer 1976). This provides an artificial dispersal mechanism for *M. niger*.

Phenology

Specimens of *M. niger* demonstrate both a spring and fall activity period. They were recorded from 2 April to 21 May (seven specimens) and 18 August to 20 October (5 specimens). Pinto and Selander (1970) found that this species is active primarily during spring and early summer over its entire distribution.

Distribution (Map 33)

Meloe niger is distributed from the Atlantic to Pacific coast, with records in central Canada south into Pennsylvania, Wisconsin, Texas, and Arizona (Pinto and Selander 1970).

Wisconsin Records (Map 34)

Pinto and Selander (1970) recorded this species in western Wisconsin and Chequamegon National Forest- Flambeau Ranger District (Price County).

The 12 specimens of *M. niger* examined during this study were recorded from the following localities: **Burnett Co. (1); Dane Co. (2); Eau Claire Co. (1); Marathon Co. (2); Oneida Co. (1); Portage Co. (1); Richland Co. (2); Rusk Co. (1); St. Croix Co. (1).**

Meloe dianella Pinto & Selander

(Figs. 39-40, 77, 89; Maps 35-36)

[Synonymy from Pinto and Selander 1970]

Meloe dianella Pinto and Selander 1970:140; Arnold 1976:8.

Meloe (Proscarabaeus) impressus LeConte; *sensu* Van Dyke 1928:435 (in part).

Capsule Description

Length: 6-11 mm (Pinto and Selander 1970). **Integument Color:** Black to feebly metallic blue (Pinto and Selander 1970). **Vestiture:** Extremely short and sparse setae matching integument color. **Head:** Head length 0.66 to 0.73 that of width (Pinto and Selander 1970); moderately to densely punctate; antennomere V in males with a flat platform-like distal surface. **Pronotum:** Moderately to densely punctate. **Elytra:** Short, not reaching end of abdomen. **Legs:** Each outer metathoracic tibial spur with apical portion produced anteriorly.

Diagnosis

Meloe dianella may be readily distinguished from other Wisconsin *Meloe* species except *Meloe niger* based on the head and pronotum moderately to densely punctate, a scutellum that is not conical, and curved metathoracic tibial spurs. *Meloe dianella* can be differentiated from *M. niger* by antennal characteristics in males, as antennomere V has a flat platform-like distal surface and antennomere VI is about ¼ wider than long. Females can be differentiated based on

the last visible sternite which is slightly emarginate in *M. dianella* but not emarginate in *M. niger*.

Natural History

Adults have been recorded feeding on *Myosurus minimus* and *Ranunculus fascicularis* (Pinto and Selander 1970).

Triungulins have been recorded maintaining stationary positions primarily on inflorescences of *Erigeron philadelphicus* and *Erigeron annuus* but also to a lesser extent on *Cerastium vulgatum*, *Chrysanthemum leucanthemum*, *Medicago lupulina*, *Potentilla simplex*, *Ranunculus septentrionalis*, and *Sanicula gregaria* while awaiting bees (Pinto and Selander 1970).

Larvae were found attached to the halictids *Augochloropsis metallica metallica* (Fabricius), *A. pura pura* (Say), and *Halictus ligatus* Say, apids *Certina calcarata* Robertson and *Certina dupla* Say, the colletid *Hylaeus modestus* Say, and megachilids *Megachile brevis* Say, *Osmia georgica* Cresson, and *Osmia pumila* Cresson (Pinto and Selander 1970).

Phenology

No Wisconsin specimens of *M. dianella* were collected during this study. This species is active primarily in spring (Pinto and Selander 1970).

Distribution (Map 35)

Meloe dianella is distributed from Nova Scotia, south through the Ohio River valley and west to Idaho and British Columbia (Pinto and Selander 1970).

Wisconsin Records (Map 36)

This species was reported from Dane County, Wisconsin by Pinto and Selander (1970), but, as noted above, no additional specimens were collected in Wisconsin during this study.

Meloe angusticollis Say

(Figs. 41-42, 85, 88; Maps 37-38)

[Synonymy largely from Pinto and Selander 1970]

Meloe angusticollis Say 1824:280; Caulfield 1877:75; Wickham 1896b:33; Brimley 1938:162; Pinto and Selander 1970:143.

Meloe rugipennis LeConte 1853:328.

Meloe montanus LeConte 1866a:155.

Meloe (Proscarabaeus) angusticollis Say; Van Dyke 1928:427.

Meloe (Proscarabaeus) montanus LeConte; Van Dyke 1928:432; Hatch 1965:111.

Meloe (Proscarabaeus) carbonaceous Van Dyke 1928:441.

Meloe apacus LeConte *sensu* Linsley and Michener 1943:76 (?).

Capsule Description

Length: 9-19 mm (Pinto and Selander 1970). **Integument Color:** Black with slight metallic blue. **Vestiture:** Extremely short and sparse setae matching integument color. **Head:** Head length 0.62 to 0.80 that of width (Pinto and Selander 1970); moderately to densely punctate. **Pronotum:** Moderately to densely punctate; scutellum conically produced. **Elytra:** Short, not reaching end of abdomen. **Legs:** Each outer metathoracic tibial spur with apical portion produced anteriorly.

Diagnosis

The moderate to dense punctation on the head and pronotum, and the presence of a conically produced scutellum readily distinguishes *M. angusticollis* from the other Wisconsin *Meloe* species.

Natural History

Adults have been recorded feeding on *Arisaema triphyllum*, *Carex pennsylvanica*, *Chaerophyllum procumbens*, *Claytonia virginica*, *Elymus villosus*, *Galium aparine*, *Galium triflorum*, *Ranunculus hispidis*, *Ranunculus septentrionalis*, *Taxaxacum officinale*, and *Ulma rubra* (Pinto and Selander 1970). Pinto and Selander (1970) also found that captive individuals of this species would feed on various grasses.

Triungulins have been recorded maintaining stationary positions on inflorescences of *Dentaria laciniata* and to a lesser extent on the flowers of *Claytonia virginica*, *Erythronium americanum*, *Geranium maculatum*, *Narcissus pseudo-narcissus*, *Ranunculus septentrionalis*, and *Viola eriocarpa* while awaiting bees (Pinto and Selander 1970).

Larvae were found attached to *Agapostemon radiatus* (Say), *Andrena carlini* Cockerell (Andrenidae), *A. cressoni* Robertson, *A. distans* Provancher, *A. sayi* Robertson, *A. violae* Robertson, *Anthophora furcata terminalis* Cresson (Apidae), *Ceratina calcarata*, *Colletes inaequalis* Say, *Evylacus cinctipes* (Provancher) (Halictidae), *E. macoupinensis* (Robertson), and *Nomada* (Apidae) with the suggestion that *Colletes inaequalis* and *Andrena carlini* are larval hosts (Pinto and Selander 1970).

Natural enemies include *Pedilus impressus* (Say) (Say 1827) and *Pedilus terminalis* (Say) (Pinto and Selander 1970) which have been observed on adults of *M. angusticollis*, with the *P. terminalis* observed chewing the elytra along the sutural margin. *Pedilus lugubris* (LeSage and Bousquet 1983) and *Pedilus collaris* (Say) (Butler 1984) have also been observed on adults of *M. angusticollis*.

Phenology

Specimens of *M. angusticollis* were recorded in Wisconsin from 25 April to 28 June. This species is active primarily during spring and early summer (Pinto and Selander 1970).

Distribution (Map 37)

Meloe angusticollis is distributed across the northern half of the United States and southern Canada (Pinto and Selander 1970).

Wisconsin Records (Map 38)

This species has been reported from Cranmoor (Wood County) and Marathon (Marathon County) in Wisconsin (Pinto and Selander 1970).

The 14 specimens of *M. angusticollis* examined during this study were recorded from the following localities: **Burnett Co. (4); Iron Co. (2); Jackson Co. (1); Langlade Co. (1); Oneida Co. (1); Portage Co. (1); Price Co. (1); Vilas Co. (1); Wood Co. (2).**

Meloe impressus Kirby

(Figs. 43-44, 87; Maps 39-40)

[Synonymy largely from Pinto and Selander 1970]

Meloe impressa Kirby 1837:242; Bethune 1875:157.

Meloe angusticollis Say; *sensu* LeConte 1853:328; Saunders 1876:222; Brodie 1877:11; Zimmerman 1877:140; Hill 1883:137; Blatchley 1910:1353; Mutchler and Weiss 1924:11; Leonard 1928:338.

Meloe americanus LeConte 1853:329; *sensu* Caulfield 1877:75; Wickham 1890:90, 1896b:33; Carruth 1931:54; Brimley 1938:162.

Meloe strigulosus Wickham 1902:299.

Meloe (Proscarabaeus) americanus LeConte; *sensu* Van Dyke 1928:421.

Meloe (Proscarabaeus) americanus occidentalis Van Dyke 1928:422; Hatch 1965:111.

Meloe impressus Kirby; Van Dyke 1930:122; Pinto and Selander 1970:161.

Meloe impressus occidentalis Van Dyke; Van Dyke 1930:122.

Meloe (Meloe) impressus Kirby; *sensu* Werner, Enns and Parker 1966:63.

Capsule Description

Length: 6-17 mm (Pinto and Selander 1970). **Integument Color:** Usually brilliant metallic blue, violet or green but can be black. **Vestiture:** Extremely short and sparse setae matching integument color. **Head:** Head length 0.7 to 0.8 that of width (Pinto and Selander 1970); finely and sparsely punctate. **Pronotum:** Finely and sparsely punctate. **Elytra:** Short, not reaching end of abdomen. **Legs:** Each outer metathoracic tibial spur with apical portion produced anteriorly.

Diagnosis

Meloe impressus is the only *Meloe* recorded from Wisconsin with fine and sparse punctation on the head and pronotum. It should be noted that *Meloe americanus* LeConte shares these characteristics and has been recorded from Waukegan, Illinois (Pinto and Selander 1970), located about 14 km south of the Wisconsin border. The anterior eye margin of *M. impressus* is nearly straight, while that of *M. americanus* is emarginate.

Natural History

Adults have been recorded on *Anemone japonica*, *Brassica campestris*, *B. napobrassica*, *Ipatisens aurea*, *Hepatica*, *Ipatisens biflora*, *Ranunculus acris*, *R. septentrionalis*, and *Solanum tuberosum* (Pinto and Selander 1970).

Wisconsin specimens were collected from *Clematis* and *Pinus strobus*.

Triungulins have been recorded in constant movement on flowers of *Claytonia virginica* in search of bees (Pinto and Selander 1970).

Larvae were found attached to *Andrena carlini*, *A. mandibularis* Robertson, *Apis mellifera* Linnaeus (Apidae), and *Colletes inaequalis* (Pinto and Selander 1970).

Phenology

Specimens of *M. impressus* were recorded in Wisconsin from 1 August to 27 October, although one specimen has a 5 May collecting date. This species is active primarily during summer and fall (Pinto and Selander 1970).

Distribution (Map 39)

Meloe impressus is distributed from Alaska and northern Canada south to northern United States, with records extending farther south in the Rocky and Appalachian Mountain areas (Pinto and Selander 1970).

Wisconsin Records (Map 40)

This species has previously been recorded at Trout Lake (Bayfield County), Worden Township (Clark County), Le Roy (Dodge County), Superior (Douglas County), Rib Mountain State Park (Marathon County), 12 miles north of Rhinelander (Oneida County), Enterprise (Oneida County), Oneida Lake (Oneida County), Sayner (Vilas County), and Lake Winnebago (Unknown County) in Wisconsin (Pinto and Selander 1970).

The 76 specimens of *M. impressus* examined during this study were recorded from the following localities: **Bayfield Co. (3); Brown Co. (2); Dane Co. (19); Dodge Co. (2); Douglas Co. (4); Eau Claire Co. (1); Florence Co. (1); Fond du Lac Co. (3); Forest Co. (1); Grant Co. (1); Iron Co. (4); Jefferson Co. (1); La Crosse Co. (1); Manitowoc Co. (1); Marinette Co. (1); Milwaukee Co. (6); Oconto Co. (2); Oneida Co. (1); Ozaukee Co. (3); Polk Co. (3);**

Richland Co. (1); Sauk Co. (7); Sawyer Co. (2); Taylor Co. (1); Vilas Co. (1); Washington Co. (2); Wood Co. (2).

Meloe campanicollis Pinto & Selander

(Figs. 45-46, 76, 86, 112; Maps 41-42)

[Synonymy largely from Pinto and Selander 1970]

Meloe campanicollis Pinto and Selander 1970:128; Arnold 1976:7.

Meloe americanus LeConte; *sensu* Blatchely 1910:1352.

Meloe (Proscarabaeus) perplexus Van Dyke 1928:429.

Meloe perplexus Van Dyke; Brimley 1938:162; Downie 1957:119.

Meloe kirbyi Dillon 1952:371.

Capsule Description

Length: 11-17 mm (Pinto and Selander 1970). **Integument Color:** Black to feebly metallic green, but sometimes metallic blue (Pinto and Selander 1970). **Vestiture:** Extremely short and sparse setae matching integument color. **Head:** Head length 0.6 to 0.7 that of width (Pinto and Selander 1970), moderate to dense punctate. **Pronotum:** Pronotal length 0.9 to 1.0 that of width (Pinto and Selander 1970), moderate to dense punctate. **Elytra:** Short, not reaching end of abdomen. **Legs:** Each outer metathoracic tibial spur straight in lateral view.

Diagnosis

The moderate to dense punctations on the head and pronotum, and straight metathoracic tibial spurs readily distinguish *M. campanicollis* from other Wisconsin *Meloe* species.

Natural History

Adults have been observed on turnips, mustard and oats, wheat, *Allium*, *Avena sativa*, *Brassica campestris*, *B. niger*, *Clematis*, *Medicago sativa*, *Ranunculus*, *Trifolium pretense*, and *Triticum sativum* (Sherman 1913, Brimley 1938, Pinto and Selander 1970).

Wisconsin specimens were found eating grasses or sedges, as well as collected on *Anemone cylindrica*.

I observed ceratopogonid flies on both living and dead *M. campanicollis* adults (Figure 112) and *Notoxus desertus* Casey (Anthicidae) on dead adults.

Phenology

Specimens of *M. campanicollis* were recorded in Wisconsin from 25 August to 23 November, although one specimen has a 13 May collecting date. This species is active primarily during fall and winter (Pinto and Selander 1970).

Distribution (Map 41)

Meloe campanicollis is distributed from New York west to Wisconsin, and south to Georgia and Texas (Pinto and Selander 1970). In this study, specimens from 11 Wisconsin counties were examined. They represent a **NEW STATE RECORD** and northwest extension for the known distribution of this species.

Wisconsin Records (Map 42)

The 73 specimens of *M. campanicollis* examined during this study were recorded from the following localities: **Crawford Co. (1); Dane Co. (52); Eau Claire Co. (1); Kenosha Co. (1); La Crosse Co. (1); Marquette Co. (3); Ozaukee Co. (1); Portage Co. (1); Richland Co. (1); Rock Co. (10); Sauk Co. (1).**

Nemognathinae Castelnau 1840

Gnathium Kirby

[Synonymy largely from Pinto 2009]

Type species: *Gnathium francilloni* Kirby, by monotypy.

Gnathium Kirby 1818: 425; LaPorte 1840: 280; LeConte 1862: 271; Horn 1870: 94; Beauregard 1890: 396; Champion 1892: 381; Wellman 1910a: 222, 1910b: 393; Denier 1935: 150; Vaurie 1950: 13; Dillon 1952: 331; MacSwain 1952: 205, 1956: 123; Enns 1956: 686, 698, 711; Kaszab 1959: 92, 102; 1969: 244; Selander 1964: 1057, 1991: 79; Gupta 1965: 467, 1971: 25, 1978: 138; Hatch 1965: 115; Werner et al; 1966: 66; Arnold 1976: 36; Bologna 1991: 47; Bomar 1993: 30; Pinto and Bologna 1999: 605, 2002: 527; Bologna and Pinto 2001: 72.

Nemognatha sensu Say 1823: 306; LeConte 1858a: 23, 1858b: 77.

Zonitis sensu Casey 1891: 170; Wickham 1905: 171.

The relationship between *Gnathium*, *Nemognatha* and *Zonitis* is unresolved and the three are placed together into Nemognathini in recent research (Pinto 2009). There are 11 species in *Gnathium*, all North American in distribution (Pinto 2009).

Adults are commonly found on flowers of Asteraceae feeding on nectar and pollen (Pinto 2009). Oviposition is on food plants, or even the face of inflorescences (Erickson and Werner 1974b). Larvae are phoretic; the only bee host recorded is the andrenid bee, *Perdita* sp., for *Gnathium nitidum* Horn and *G. minimum* (Say) (Erickson *et al.* 1976, Pinto 2009).

Gnathium species are among the smallest meloids, averaging 4-5 mm and rarely exceeding 7 mm (Pinto 2009). Most are yellow to orange-brown (although this color can be variable) with the maxillary galeae produced into a sucking tube (Pinto 2009). The antennae are relatively short and subclavate (Figure 98). Species of *Gnathium* are the most anatomically

uniform meloids in North America (Pinto 2009), however, there is only one species found in Wisconsin.

Gnathium minimum (Say)

(Figs. 47-48, 98, 113; Maps 43-44)

[Synonymy largely from Pinto 2009]

Nemognatha minima Say 1824:306; LeConte 1858:77.

Gnathium walckeraeri LaPorte 1840:281; Champion 1892:381; MacSwain 1952:223 (as *nomen dubium*).

Nemognatha longicollis LeConte 1958:77; Champion 1892:381; MacSwain 1952:223 (as *nomen dubium*).

Gnathium lonicolle: Denier 1935:150.

Gnathium minimum (Say): Horn 1870:94; Champion 1891:381; Carruth 1931:54; Denier 1935:150; Vaurie 1950:14; MacSwain 1952:212, 1956:124; Dillon 1952:333 (in part); Gupta 1965:465; Hatch 1965:165; Bouseman 1966:59; Werner *et al.* 1966:66; Erickson and Werner 1974:401; Arnold 1976:36; Erickson *et al.* 1976:960; Kumar *et al.* 1976:24; Bomar 1993:30; Garcia-Paris *et al.* 2007:232; Pinto 2009:22.

Capsule Description

Length: 3.8-7.3 mm (Pinto 2009). **Integument Color:** Varies from yellow-brown to a darker orange-brown. **Vestiture:** Pubescence relatively dense on head, pronotum and elytra. **Head:** Elongate, with maxillary galeae modified into a sucking tube; antennae subclavate, with distal antennomeres wider than proximal antennomeres; densely punctate. **Pronotum:** Elongate; widest near mid-length, with narrowing more pronounced anteriorly; densely punctate. **Elytra:**

Completely or nearly completely covering abdomen; with a juxtasutural depression, resulting in a ridge where elytra meet; setation usually denser along the suture; elytral surface densely to moderately densely punctate. **Legs:** Each outer metathoracic tibial spur broadly spatulate, each inner spur also broadened apically but half as wide as outer spur.

Diagnosis

Gnathium minimum may be easily separated from all other Wisconsin Meloidae by its small size (approximately 6 mm) and relatively elongate body form.

Natural History

Adults have been recorded feeding on *Aster parvulus*, *Haplopappus*, *Helianthus annuus*, *H. occidentalis*, *H. petiolaris*, *H. rigidus*, *Rudbeckia hirta*, *Verbesina encelioides*, and possibly *Helianthus niveus* (adult resting on plant) (MacSwain 1952, Bouseman 1966, Werner *et al.* 1966, Erickson and Werner 1974b, Arnold 1976, Erickson *et al.* 1976).

Egg masses, yellow to orange in color, are placed on the faces of inflorescences (Erickson and Werner 1974b) or at the bases of the bracts (Bouseman 1966) of a selected plant. Eggs have been reported from *Aster parvulus* and *Helianthus* sp. (Bouseman 1966, Erickson and Werner 1974b). Erickson and Werner (1974b) found the number of eggs in a mass ranged from 38-87, while Bouseman (1966) found that two egg masses yielded 290 larvae. Eggs eclose about a week after oviposition (Erickson 1973, Erickson and Werner 1974b). Larvae of this species have been taken from the nests of the andrenid bee genus *Perdita* (Erickson *et al.* 1976), specifically the cells of *P. verbesinae* Cockerell (Pinto 2009).

Adult food plants include *Helianthus*, *Rudbeckia*, and *Verbesina endelioides* (Dillon 1952, Pinto 2009). Bouseman (1966) found adults primarily on *Helianthus petiolaris*, but some were

on *Helianthus occidentalis* and *Helianthus rigidus*. During this study, all *G. minimum* adults observed or collected in Wisconsin were on *H. occidentalis*.

Known natural enemies include the asilid fly *Ospricerus latipennis* (Loew) (Dennis and Lavigne 1975), and the assassin bug *Phymata americana americana*, which I observed in Grant Co. on 26 July 2007.

Phenology

Specimens of *G. minimum* were recorded in Wisconsin from late-July to mid-August, 22 July to 16 August.

Distribution (Map 43)

Gnathium minimum is widespread, ranging from southern Canada south to southern Texas, and from the Great Basin states and Baja California, Mexico east to the eastern Great Plains states. Disjunct populations appear to occur in Mexico, Florida, and Great Lakes states (Minnesota, Wisconsin, Illinois). The Illinois localities are three miles south of Savannah and three miles north of Fulton (Bouseman 1966), and the Minnesota locality is Rice (Pinto 2009).

Wisconsin Records (Map 44)

Pinto (2009) recorded *G. minimum* from Fort McCoy (Monroe County) in Wisconsin.

The 156 specimens of *G. minimum* examined during this study were recorded from the following localities: **Grant Co. (33); Iowa Co. (17); Richland Co. (29); Sauk Co. (77).**

***Nemognatha* Illiger**

[Synonymy largely from Enns 1956]

Type species: *Zonitis vittata* Fabricius 1801 (= *Zonitis piazzata* Fabricius 1798), by monotypy (also see Selander, 1991).

Nemognatha Illiger 1807:22; LeConte 1853:345, 1880:212; LeConte and Horn 1883:416; Beaugard 1890: 395; Champion 1892:372; Péringuey 1909:288; Wecknab 1910:396; Borchmann 1917:166; Leng 1920:160; Parker and Boving 1924:32; Van Dyke 1928:402; MacSwain 1951:72; Linsley and MacSwain 1952:205; Dillon 1952:344.

Nematognatha Illiger; Gemminger and Harold 1870:2163 (*lapis calami*).

Zonitis Casey 1891:170; *sensu* Wickham 1905:171; Denier 1935:147; Blackwelder 1939:35, 1945:481; Vaurie 1950:6.

There are four subgenera within *Nemognatha* (Enns 1956, Pinto and Bologna 1999), although Selander (1991) suggested a fifth. Taxonomic difficulties are present regarding this genus, as separation from *Zonitis* is problematic and *Nemognatha* species are difficult to identify (Pinto and Bologna 1999). *Nemognatha* is comprised of 77 species, 49 of which occur in the New World, with a worldwide distribution except Australia and Oceania (Pinto and Bologna 1999).

Females of *Nemognatha* oviposit on plants near or on the inflorescence, mainly in Compositae (Enns 1956). Larval development is in the nests of solitary bees (Pinto and Bologna 1999).

Although *Nemognatha* can be difficult to distinguish from *Zonitis*, the Wisconsin species can be separated based on the dissimilar metathoracic tibial spurs in *Nemognatha*. In addition, *Nemognatha* always possesses modified maxillary galeae produced into a sucking tube, although this is shared with some *Zonitis* species.

Key to the Wisconsin Species of Adult *Nemognatha*

(Modified in part from Enns 1956)

- 1 Metathoracic tibial spurs extremely slender, spiniform; mandibles extremely short giving head in cephalic aspect a subglobose appearance *nemorensis*
- 1' Metathoracic tibial spurs distinctly flattened, usually concave; mandibles large, stout, head in cephalic aspect triangular or elongate-oval *cribraria*

Nemognatha nemorensis Hentz

(Figs. 49-50, 107; Maps 45-46)

[Synonymy largely from Enns 1956]

Nemognatha nemorensis Hentz 1830:258; LeConte 1853:348, 1880:214; Hentz 1884:112; Champion 1892:376; Blatchley 1910:1355; Graenicher 1910:72; Sherman 1913:246; Borchmann 1917:169; Long 1920:160; Mutchler and Weiss 1924:13, 1924:14, 1924:17; Leonard 1928:338; Brimley 1938:162; Enns 1956:780; Arnold 1976:39.

Zonitis nemorensis Hentz; Denier 1935:149; Blackwelder 1939:35.

Nemognatha bimaculata Melsheimer 1847:54.

Capsule Description

Length: 5-9 mm (Enns 1956). **Integument Color:** Head and prothorax vary from yellow to brownish-yellow or rusty red-brown; remainder of body black or very dark.

Vestiture: Black setae arising from most punctures. **Head:** Maxillary galeae modified into a sucking tube. **Pronotum:** Usually with three black spots transversely in a row along basal third, sometimes fused to form a transverse band. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs slender and similar; appendiculate, pectinate claws.

Diagnosis

Nemognatha nemorensis can be readily separated from the *Nemognatha cribaria* LeConte, the only other Wisconsin congener, due to its entirely black color with the exception of orange-brown head and prothorax.

Natural History

Adults have been reported feeding on flowers of *Bidens leucantha*, *Erigeron*, *Eupatorium*, *Helianthus mollis*, *Heterotheca subaxillaris*, *Pterocaulon pycnostachyum*, *Rudbeckia hirta*, and *Solidago* (Enns 1956, Erickson *et al.* 1976, Arnold 1976) and most frequently collected near wooded areas (Enns 1956).

Chalicodoma (Megachilidae) is a reported larval host (Krombein 1967). Pale yellow eggs laid on bracts of *Rudbeckia*, with clusters number about 25 eggs each (Enns 1956).

Phenology

Specimens of *N. nemorensis* were recorded in Wisconsin on 27 June (one specimen) and 28 June (four specimens); Graenicher (1910) documented 3 August as a date of observation.

Distribution (Map 45)

Nemognatha nemorensis is distributed throughout much of the eastern United States, west into the Great Plains (Enns 1956). In this study, specimens from two Wisconsin counties were examined.

Wisconsin Records (Map 46)

Graenicher (1910) recorded this species at the mouth of the Yellow River (Burnett County) in Wisconsin.

The six specimens of *N. nemorensis* examined during this study were recorded from the following localities: **Burnett Co. (5); Waushara Co. (1).**

Nemognatha cribraria fuscata Enns

(Figs. 51-54, 106; Maps 47-48)

[Synonymy largely from Enns 1956]

Nemognatha cribraria LeConte 1853:348; LeConte 1859:56, 1880:214; Snow 1881:70, 1883:43; Graenicher 1910:74; Borchmann 1917:168; Leng 1920:160.

Zonitis cribraria (LeConte); Denier 1935:148; Blackwelder 1939:35.

Nemognatha cribraria fuscata Enns 1956:768.

Capsule Description

Length: 7-10 mm (Enns 1956). **Integument Color:** Head fuscous to black; labium and maxillae (except galeae) pale yellow; prothorax reddish-orange; elytra yellowish-orange to reddish-orange, each often with an apical vitta of varying length; dark brown or black ventrally.

Vestiture: Black setae arising from most punctures. **Head:** Antennomere II one third or less the length of III; antennomere III longer than IV. **Pronotum:** One fifth wider than long (Enns 1956).

Elytra: Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs flattened, each outer spur scarcely wider than the inner spur; appendiculate, pectinate claws.

Diagnosis

Nemognatha c. fuscata can be readily separated from *N. nemorensis*, the only other Wisconsin congener, due to its extensive orange-brown coloration dorsally. The elytra may each have a black vitta that can be nearly the width of the elytra. *Nemognatha c. fuscata* is the only subspecies found in Wisconsin and has an eastern United States distribution while *N. c. cribraria* has a western United States distribution.

Natural History

Adults have been reported feeding on flowers of *Chrysopsis mariana* (Enns 1956, Erickson *et al.* 1976). Wisconsin specimens were collected from *Ratibida pinnata*.

Phenology

Specimens of *N. cribraria* were recorded in Wisconsin from 28 June to 14 September.

Distribution (Map 47)

There are a limited number of published records for *N. c. fuscula*. The known distribution includes the states of New York, Pennsylvania, Maryland, Washington D.C., Virginia, North Carolina, Michigan, Indiana, and Minnesota (Enns 1956). In this study, specimens from five Wisconsin counties were examined, representing a **NEW STATE RECORD**.

Wisconsin Records (Map 48)

The 30 specimens of *N. c. fuscula* examined during this study were recorded from the following localities: **Burnett Co. (18); Jackson Co. (1); Marathon Co. (3); Portage Co. (7); St. Croix Co. (1).**

Tricrania LeConte

[Synonymy largely from Cline and Huether 2011]

Tricrania LeConte 1860:320.

Tricranioides Wellman 1910:219, 392.

There are two species in *Tricrania*, with the distribution restricted to North America (Cline and Huether 2011). Only one species, *Tricrania sanguinipennis*, occurs in Wisconsin. *Tricrania stansburii* (Haldeman) is found in the western United States.

Oviposition occurs on the underside of objects such as stones or wood (Parker and Boving 1924, Cline and Huether 2011). Larvae utilize phorsee to reach the host solitary bees. Adults do not eat; they do remain in the area of the nesting bees they use as larval hosts.

The genus can be easily recognized by its triangular head and black body with brick red elytra, although *T. stansburii* has variable black regions on the elytra (Cline and Huether 2011).

Tricrania sanguinipennis (Say)

(Figs. 55-56, 97, 114; Maps 49-50)

[Synonymy largely from Cline and Huether 2011]

Horia sanguinipennis Say 1824:279.

Tricrania sanguinipennis (Say); LeConte 1860:320; Henshaw 1885:130; Wellman 1910a:219; Blatchley 1910:1354; Borchmann 1917:172; Leng 1920:160; Blackwelder 1939:35; MacSwain 1956:136; Campbell 1991:265; Cline and Huether 2011:8.

Capsule Description

Length: 8.5-15 mm (Cline and Huether 2011). **Integument Color:** Black with brick red elytra that can fade to orange after death. **Vestiture:** Black, short setae, densely covering much of body except for elytra where vestiture is very sparse. **Head:** Broad and triangular.

Pronotum: Subquadrate; widest near anterior angles; wider than long. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs flattened; appendiculate, pectinate claws.

Diagnosis

Tricrania is easily recognizable due to its black body with brick red elytra; *T. sanguinipennis* is the only species of the genus found in Wisconsin.

Natural History

Adults do not feed or consume only a small amount of food, resulting in limited movement in at least females (Parker and Boving 1924). They are found in open areas possessing sandy soils with ground nesting bees and have rarely been observed mating (Frost 1912, Cline and Huether 2011). Mating and oviposition occur shortly after emergence (Parker and Boving 1924). Clusters of white eggs are deposited on the underside of objects such as cow dung, stones, and shells; the eggs have been observed to be fixed into place with a sticky substance (Parker and Boving 1924). Larvae eclose from eggs about three weeks after oviposition (Cline and Huether 2011).

Triungulins show a preference for attachment sites on bees. Parker and Boving (1924) found most triungulins on the posterior and ventral head region of male bees, and the posterior and dorsal head region of female bees suggesting transfer during mating. Larvae have been found in cells of the colletid bee species *Colletes inequalis*, *Colletes rufithorax* Swenk, and *Colletes thoracicus* (Parker and Boving 1924, Batra 1980). Larvae have been recorded on *Megachile* sp. and *Andrena* sp. (Cline and Huether 2011) but Parker and Boving (1924) suggested that andrenids are not likely hosts because their nest construction prevents parasitism.

My observations of adult *T. sanguinipennis* at the University of Wisconsin-Madison Arboretum were in a wooded, sandy habitat. In addition, the microhabitat of a sunny south-facing slope is similar to that described by Cline and Huether (2011).

Adults have also been reported from spider webs (Cline and Huether 2011).

Phenology

Specimens of *T. sanguinipennis* were recorded in Wisconsin from 10 March to 21 April, although pitfall trap samples provide collection dates of 16 May, 22 July and 28 July. Because

the start date of trapping is not provided, it cannot be determine when these individuals were active.

Distribution (Map 49)

Tricrania sanguinipennis is distributed from extreme southeastern Canada and south throughout the eastern United States, with the western limits just into the Great Plains states (Cline and Huether 2011).

Wisconsin Records (Map 50)

Previous Wisconsin records include Madison (Dane County), Necedah National Wildlife Refuge (Juneau County), 5 miles north Neshkoro (Marquette County), Gotham Jack Pine Barrens SNA (Richland County), Kohler Park Dunes SNA (Sheboygan County), Roch A Cri Creek (Waushara County), and Wood County Wildlife Area (Wood County) (Cline and Huether 2011).

The 46 specimens of *T. sanguinipennis* examined during this study were recorded from the following localities: **Dane Co. (13); Juneau Co. (3); Marquette Co. (5); Richland Co. (3); Sheboygan Co. (11); Waushara Co. (4); Wood Co. (7).**

***Zonitis* Fabricius**

[Synonymy largely from Enns 1956 and Pinto and Bologna 1999]

Type species: *Zonitis flava* Fabricius 1775:126.

Zonitis Fabricius 1775:48; Latreille 1804:407; Say 1817:22; Guérin-Méneville 1833-39:593, Mulsant 1857:60; Horn 1875:155; Beauregard 1890:396, 469; Champion 1892:382; Escherich 1897:104; Blatchley 1910:1357; Wellman 1910:220, 1910:393; Borchmann 1917:155; Leng

1920:160; Parker and Böving 1924:33; Van Dyke 1928:403; Denier 1935:147; Blackwelder 1939:35, 1945:481; Vaurie 1950:6; MacSwain 1951:72, 1952:205.

There are three subgenera of *Zonitis*, two of which occur in North America (Enns 1956).

As currently defined, *Zonitis* is cosmopolitan but the generic limits are not well understood (Pinto and Bologna 1999).

Primarily known to parasitize bees in the family Megachilidae, species of *Zonitis* have also been associated with Halictidae, Anthophoridae, Colletidae, and Andrenidae (Pinto and Bologna 1999). These bee nests may be far from the patch of adult food plants (Selander and Bohart 1954)

Zonitis can be difficult to distinguish from *Nemognatha*, but the Wisconsin species can be separated based on the similar, spatulate metathoracic tibial spurs in *Zonitis*. In addition, some *Zonitis* species do not possess maxillary galeae produced into a sucking tube, while all *Nemognatha* species exhibit this trait.

Key to the Wisconsin Species of Adult *Zonitis*

(Modified in part from Enns 1956)

- | | | |
|-------|---|---------------------|
| 1 | Galeae produced into a sucking tube | 2 |
| 1' | Galeae scarcely modified, or produced into a short, broad, lobiform structure | 3 |
| 2(1) | Pronotum finely and densely punctate, sides subparallel | <i>vittigera</i> |
| 2' | Pronotum coarsely, moderately densely punctate, sides rounded | <i>cribricollis</i> |
| 3(1') | Vertex usually brown, densely punctate, pronotum with a median sulcus | <i>sulcicollis</i> |
| 3' | Vertex usually pale, impunctate, pronotum feebly or not sulcate | <i>bilineata</i> |

Zonitis vittigera vittigera (LeConte)

(Figs. 57-60, 75, 92, 115; Maps 51-52)

[Synonymy from Enns 1956]

Nemognatha vittigera LeConte 1853:348; LeConte 1880:215; Blatchley 1910:1355; Graenicher 1910:72; Wickham 1911:35; Berchmann 1917:171; Long 1920:160; Dillon 1952:338.

Zonitis vittigera (LeConte); Casey 1891:171; Denier 1935:150; Blackwelder 1939:35; MacSwain 1951:72, 1951:76.

Zonitis vittigera vittigera (LeConte); Enns 1956:820; Arnold 1976:35.

Capsule Description

Length: 7-12 mm (Enns 1956). **Integument Color:** Color variable but typically reddish-yellow except eyes, antennae, mandibular apices, palpi, galeae, apices of femora, entire tibiae and tarsi, a broad, black, discal vitta on elytra (vittae may vary from being absent to as wide as elytra). **Vestiture:** Short, erect pubescence dorsally. **Head:** Galeae produced into sucking tube; antennomere III one-third longer than II. **Pronotum:** About one sixth wider than long; sides almost parallel. **Elytra:** Completely or nearly completely covering abdomen; densely punctate with most punctures separated by about their own diameter. **Legs:** Outer metathoracic tibial spur somewhat wider and longer than inner spur; appendiculate, pectinate claws.

Diagnosis

Of the Wisconsin species of the genus, *Z. v. vittigera* and *Zonitis cribricollis* (LeConte) have the galeae produced into a sucking tube. The pronotum of *Z. v. vittigera* has subparallel sides when viewed dorsally, while in *Z. cribricollis* the pronotal sides are rounded. *Zonitis v. vittigera* is the only subspecies found in Wisconsin. *Zonitis v. vittigera* has a more northern and

eastern distribution while *Zonitis v. propinqua* has a more southern and western distribution, but ranges overlap in the central United States (Enns 1956).

Natural History

Adults have been reported feeding on *Coreopsis grandiflora*, *Helianthus annuus*, *H. occidentalis*, *Heliopsis*, *Psoralea tenuiflora* var. *floribunda*, *Ratibida columnifera*, *Rudbeckia hirta*, *Silphium speciosum*, *Solidago graminifolia*, and *Vernonia baldwinii interior* (Dillon 1952, Enns 1956, Erickson *et al.* 1976, Arnold 1976).

Wisconsin specimens were found feeding on *Coreopsis palmata*, *Eryngium yuccifolium*, *Helianthus helinathoides*, *Rudbeckia hirta*, *R. pinnata*, *R. serotina*, *R. subtomentosa*, and *R. triloba*.

Eggs are reported to be deposited on phyllaries of *Rudbeckia hirta* (Enns 1956, Erickson *et al.* 1976).

Phenology

Specimens of *Z. v. vittigera* were recorded in Wisconsin from 28 May to 3 August.

Distribution (Map 51)

Zonitis v. vittigera is distributed from Florida and Mississippi, north through the Mississippi River Valley and west into western Kansas and Nebraska (Enns 1956).

Wisconsin Records (Map 52)

In Wisconsin, Graenicher (1910) recorded this species from 20 miles south of Milwaukee (Racine County) and Randall (Burnett County) and Enns (1956) from Kenosha (Kenosha County). Graenicher (1910) also published the occurrence of *Z. vittigera* from the mouth of the Yellow River (Burnett County), but all of the specimens I located from this locality and date are *N. cribraria*.

The 62 specimens of *Z. v. vittigera* examined during this study were recorded from the following localities: **Burnett Co. (1); Columbia Co. (13); Fond du Lac Co. (4); Grant Co. (18); Jefferson Co. (20); Pierce Co. (1); Sauk Co. (2); St. Croix Co. (1); Waukesha Co. (2).**

Zonitis bilineata Say

(Figs. 61-62, 78; Maps 53-54)

[Synonymy largely from Enns 1956]

Zonitis bilineata Say 1817:22; Say 1818:tab. 3, 1818:3; LeConte 1853:349; Horn 1875:155; Snow 1883:43; Casey 1891:170; Pierce 1904:24; Snow 1907:186 loc. cit.; Blatchley 1910:1356; Wickham 1911:35; Sherman 1913:247; Borchmann 1917:157; Leng 1920:238; Mutchler and Weiss 1924:14, 1924:17; Leonard 1928:338; Carruth 1931:54; Böving and Craighead 1931:278; Denier 1935:147; Brimley 1938:162; Blackwelder 1939:35; Schwitzgebel and Wilbur 1942:43; MacSwain 1951:72; Enns 1956:801; Arnold 1976:34.

Zonitis lineata Melsheimer 1847:53.

Zonitis mandibularis Melsheimer 1847:53.

Capsule Description

Length: 6.5-13 mm (Enns 1956). **Integument Color:** Head, prothorax, scutellum, abdomen, and most of legs reddish-brown; elytra pale gray or white, sometimes with a discal black vitta on each elytron, particularly in females (Enns 1956). **Vestiture:** Short, pale, erect seta arising from punctures. **Head:** Maxillary galeae short, not exceeding mandibular length. **Pronotum:** One-sixth wider than long; sides usually evenly rounded. **Elytra:** Completely or nearly completely covering abdomen. **Legs:** Metathoracic tibial spurs equal, broad, and concave; appendiculate, pectinate claws.

Diagnosis

Of the Wisconsin species of *Zonitis*, *Z. bilineata* and *Z. sulcicollis* Blatchley do not have the galeae produced into a sucking tube. In addition, both species have a reddish-brown head and pronotum, and pale gray or white elytra. Each elytron typically exhibits a black vitta (wider in females) (Enns 1956). *Zonitis bilineata* has a pale vertex and the pronotum lacks a sulcus, while in *Z. sulcicollis* the vertex is usually brown and the pronotum is mesally sulcate.

Natural History

Adults have been reported feeding on *Ambrosia*, *Asclepias*, *Cirsium*, *Helianthus annuus*, *Medicago*, *Solidago altissima*, and *Vernonia baldwinni* var. *interior* (Enns 1956, Erickson *et al.* 1976). In addition, several females were collected while resting on the side of unopened *Cirsium* buds (Enns 1956). Eggs were observed as deposited on *Helianthus annuus*, with the oviposition site at the junctures of the veins on the underside of leaves (Enns 1956, Erickson *et al.* 1976). Eggs vary in color from white to reddish-orange, with yellowish orange most common (Enns 1956).

Wisconsin specimens were never recorded eating but were collected on *Asclepias syriaca*, *Helianthus grossesserratus*, *Lespedeza capitata*, *Silphium laciniatum*, *Solidago canadensis*, *S. gigantea*, *S. rigida*, thistle, and *Verbascum thapsus*.

Enns (1956) suggested that bees of *Megachile* as well as *Melissodes* and *Nomia* (both Apidae) commonly visit the same flowers and therefore may be used as larval hosts.

Phenology

Specimens of *Z. bilineata* were recorded in Wisconsin from 6 July to 14 August.

Distribution (Map 53)

Zonitis bilineata is distributed across the United States and extreme southeastern Canada from the Atlantic to Pacific, except for southeastern and Gulf of Mexico coastal states and the Pacific Northwest (Enns 1956). In this study, specimens from 12 Wisconsin counties were examined, representing a **NEW STATE RECORD**.

Wisconsin Records (Map 54)

The 38 specimens of *Z. bilineata* examined during this study were recorded from the following localities: **WI (State label only, 2); Barron Co. (1); Bayfield Co. (3); Dane Co. (4); Grant Co. (1); Green Co. (1); Juneau Co. (2); Richland Co. (1); Rock Co. (1); Vernon Co. (1); Walworth Co. (2); Waushara Co. (1); Wood Co. (17); unknown Wisconsin locality (1).**

Zonitis sulcicollis Blatchley

(Figs. 63-64, XX; Maps 55-56)

[Synonymy largely from Enns 1956]

Zonitis sulcicollis Blatchley 1910:1357; Borchmann 1917:164; Leng 1920:160; Denier 1935:150; Blackwelder 1939:35; MacSwain 1951:72; Enns 1956:805.

Capsule Description

Length: 7.5-10 mm (Enns 1956). **Integument Color:** Reddish-yellow to reddish-orange except elytra, eyes, antennae, mandibular apices, palpi, metathoracic sternum, tibiae, and tarsi dark brown or black; elytral color variable: each pale in color with a broad black vitta that may be as wide as the elytron. **Vestiture:** Short, pale, erect setae arising from punctures. **Head:** Vertex reddish-brown to dark brown or black. **Pronotum:** Mesal pronotal sulcus that generally extends from base to apex, but may be shorter (Enns 1956); pronotum wider than long, usually

widest just anterad the middle; sides evenly rounded or more abruptly rounded apically than basally. **Elytra:** Completely or nearly completely covering abdomen; rugose-punctate to almost smooth. **Legs:** Metathoracic tibial spurs similar, slender and concave; appendiculate, pectinate claws.

Diagnosis

Of the Wisconsin species of *Zonitis*, *Z. sulcicollis* and *Z. bilineata* do not have the galeae produced into a sucking tube. In addition, both species have a reddish-brown head and pronotum, and pale gray or white elytra with varying amounts of dark areas. *Zonitis sulcicollis* exhibits a darker (reddish-brown to black) vertex, more deeply rugose and less distinctly punctate elytra, and a sulcate pronotum. *Zonitis bilineata* has a reddish vertex and the pronotum lacks a sulcus.

Natural History

Adults have been observed to feed on *Cirsium pitcheri* (Enns 1956, Erickson *et al.* 1976).

Phenology

The one specimen of *Z. sulcicollis* was recorded in Wisconsin on 22 July.

Distribution (Map 55)

The distribution of *Zonitis sulcicollis* by Enns (1956) includes only three specific localities in the following states: Indiana, Michigan, and Minnesota. In this study, a specimen from Crawford County was examined, representing a **NEW STATE RECORD**.

Wisconsin Records (Map 56)

The one specimen of *Z. sulcicollis* examined during this study was recorded from the following locality: **Crawford Co. (1)**.

Zonitis cribricollis (LeConte)

(Figs. 65-70, 79, 91; Maps 57-58)

[Synonymy largely from Enns 1956]

Nemognatha cribricollis LeConte 1853:348; LeConte 1880:215; Champion 1892:380; Snow 1907:186; Blatchley 191:1354; Graenicher 1910:74; Wickham 1911-1913:35; Borchmann 1917:168; Leng 1920:160; Dillon 1952:339; Enns 1956:826; Arnold 1976:35.

Zonitis cribricollis (LeConte); Denier 1935:148; Blackwelder 1939:35; MacSwain 1951:72.

Nemognatha porosa LeConte 1853:349, 1880:215; Snow 1883:43; Champion 1892:380; Borchmann 1917:168; Leng 1920:160.

Zonitis porosa (LeConte); Denier 1935:148; Blackwelder 1939:35.

Nemognatha fuscipennis LeConte 1853:349, 1880:21; Champion 1892:380; Borchmann 1917:168; Leng 1920:160.

Zonitis fuscipennis (LeConte); Denier 1935:148; Blackwelder 1939:35.

Capsule Description

Length: 5-11 mm (Enns 1956). **Integument Color:** Color variable but typically yellowish or reddish-yellow except eyes, antennae, palpi, galeae, mandibular apices, metasternum, tibiae and tarsi dark brown to black; head often dark brown; elytral color pale yellow-brown to dark brown, often with disk brown, the sutures and margins narrowly pale.

Vestiture: Fine pubescence on thorax; short, pale setae arising from each puncture on elytra.

Head: Galeae produced into a short sucking tube. **Pronotum:** Sides evenly rounded; about one-fifth wider than long. **Elytra:** Completely or nearly completely covering abdomen; extremely densely and uniformly punctate. **Legs:** Metathoracic tibial spurs large, elongate, concave, equal; appendiculate, pectinate claws.

Diagnosis

Two species of Wisconsin *Zonitis* have the galeae produced into a conspicuous sucking tube: *Z. cribricollis* and *Z. v. vittigera*. The pronotum in *Z. cribricollis* has rounded sides when viewed dorsally, while that of *Z. v. vittigera* has subparallel sides when viewed dorsally.

Natural History

Adults have been collected from flowers of *Achillea lanulosa*, *Coreopsis grandiflora*, *C. tinctoria*, *Helianthus petiolaris*, *Rudbeckia amplexicaulis*, and *R. hirta* (Enns 1956, Arnold 1976, Erickson *et al.* 1976). Eggs have been reported as being deposited on *R. hirta* (Enns 1956, Erickson *et al.* 1976). Wisconsin specimens were collected from the inflorescence of *Rudbeckia*.

Phenology

All three specimens of *Z. cribricollis* examined during the present study belonged to the same series and were recorded in Wisconsin on 30 June.

Distribution (Map 57)

Zonitis cribricollis is distributed from the Gulf of Mexico north to the Great Lakes states (Enns 1956). In this study, specimens were examined from Monroe County. These represent a **NEW STATE RECORD** and new northern range extension, as Enns (1956) considered northern Illinois, Indiana, and Ohio to represent the northern limits of its distribution.

Wisconsin Records (Map 58)

The three specimens of *Z. cribricollis* examined during this study were recorded from the following locality: **Monroe Co. (3)**.

Table 1. Published Meloidae records for Wisconsin, following the phylogeny of Bologna and Pinto (2001).

Species	Citation
<i>Epicauta fabricii</i> (LeConte)	(Williams and Young 1999)
<i>Epicauta murina</i> (LeConte)	(Pinto 1991)
<i>Epicauta cinerea</i> (Forster)	(Pinto 1991)
<i>Epicauta flobcina</i> Pinto	(Pinto 1991)
<i>Epicauta funebris</i> Horn	(Pinto 1991)
<i>Epicauta obesa</i> (Chevrolat)	(Pinto 1991)
<i>Epicauta pensylvanica</i> (Degeer)	(Pinto 1991)
<i>Epicauta atrata</i> (Fabricius)	(Bologna <i>et al.</i> 2008)
<i>Epicauta vittata</i> (Fabricius)	(Adams and Selander 1979)
<i>Lytta sayi</i> LeConte	(Selander 1960)
<i>Meloe niger</i> Kirby	(Pinto and Selander 1970)
<i>Meloe dianella</i> Pinto & Selander	(Pinto and Selander 1970)
<i>Meloe angusticollis</i> Say	(Pinto and Selander 1970)
<i>Meloe impressus</i> Kirby	(Pinto and Selander 1970)
<i>Gnathium minimum</i> (Say)	(Pinto 2009)
<i>Nemognatha nemorensis</i> Hentz	(Graenicher 1910)
<i>Tricrania sanguinipennis</i> Hentz	(Cline and Huether 2011)
<i>Zonitis vittigera vittigera</i> (LeConte)	(Graenicher 1910)

Table 2. Checklist of Wisconsin Meloidae.

Meloinae

Epicautini

Epicauta Dejean

- Epicauta fabricii* (LeConte)
- Epicauta flavocinerea* (Blatchley)
- Epicauta murina* (LeConte)
- Epicauta cinerea* (Forster)
- Epicauta flobcina* Pinto
- Epicauta funebris* Horn
- Epicauta obesa* (Chevrolat)
- Epicauta pensylvanica* (Degeer)
- Epicauta atrata* (Fabricius)
- Epicauta sericans* LeConte
- Epicauta occidentalis* Werner
- Epicauta vittata* (Fabricius)

Lyttni

Lytta Fabricius

- Lytta sayi* LeConte
- Lytta aenea* Say
- Lytta nuttalli* Say

Meloini

Meloe Linnaeus

- Meloe niger* Kirby
- Meloe dianella* Pinto & Selander
- Meloe angusticollis* Say
- Meloe impressus* Kirby
- Meloe campanicollis* Pinto & Selander

Nemognathinae

Nemognathini

Gnathium Kirby

- Gnathium minimum* (Say)

Nemognatha Illiger

- Nemognatha nemorensis* Hentz
- Nemognatha cribraria fuscata* Enns

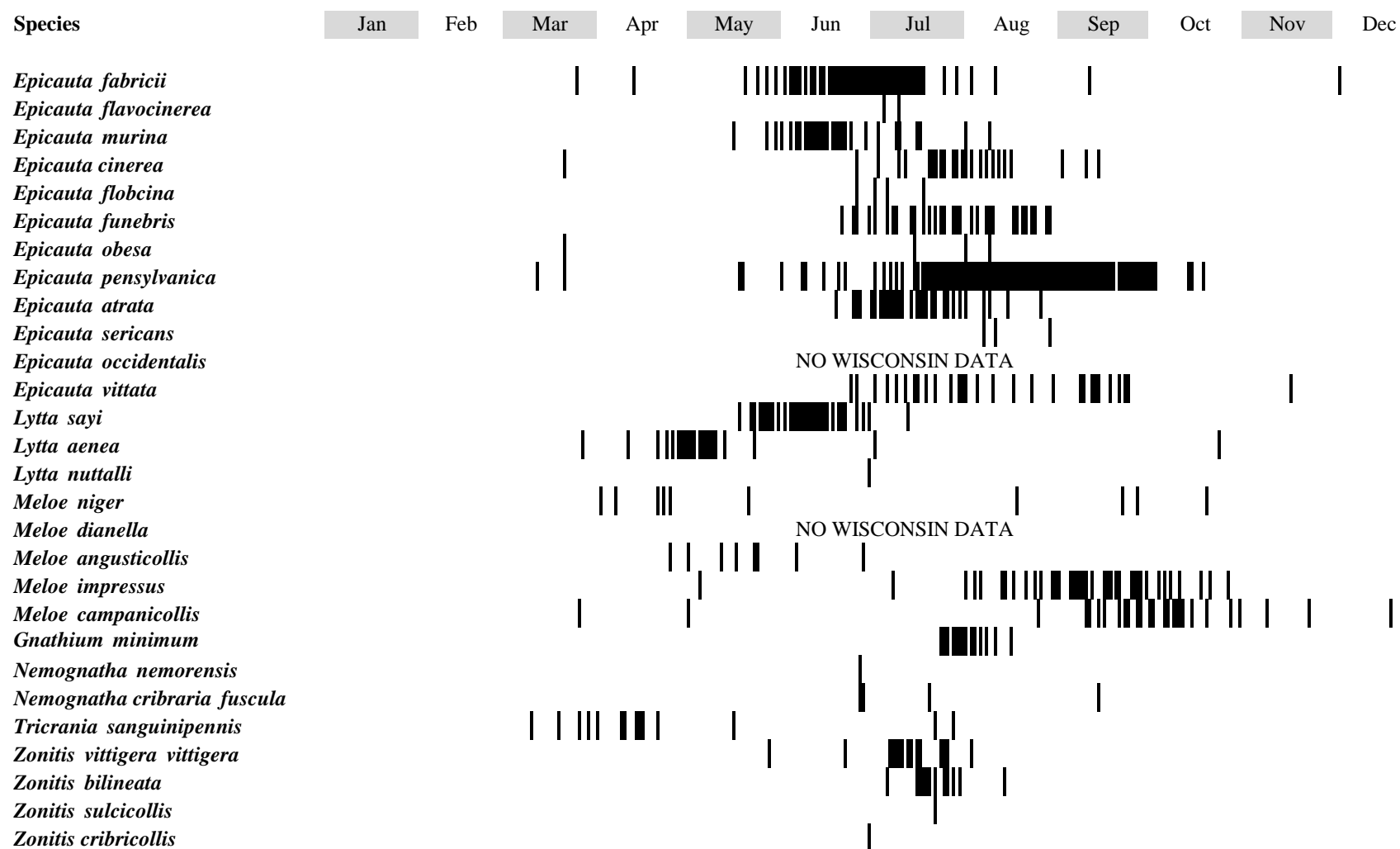
Tricrania LeConte

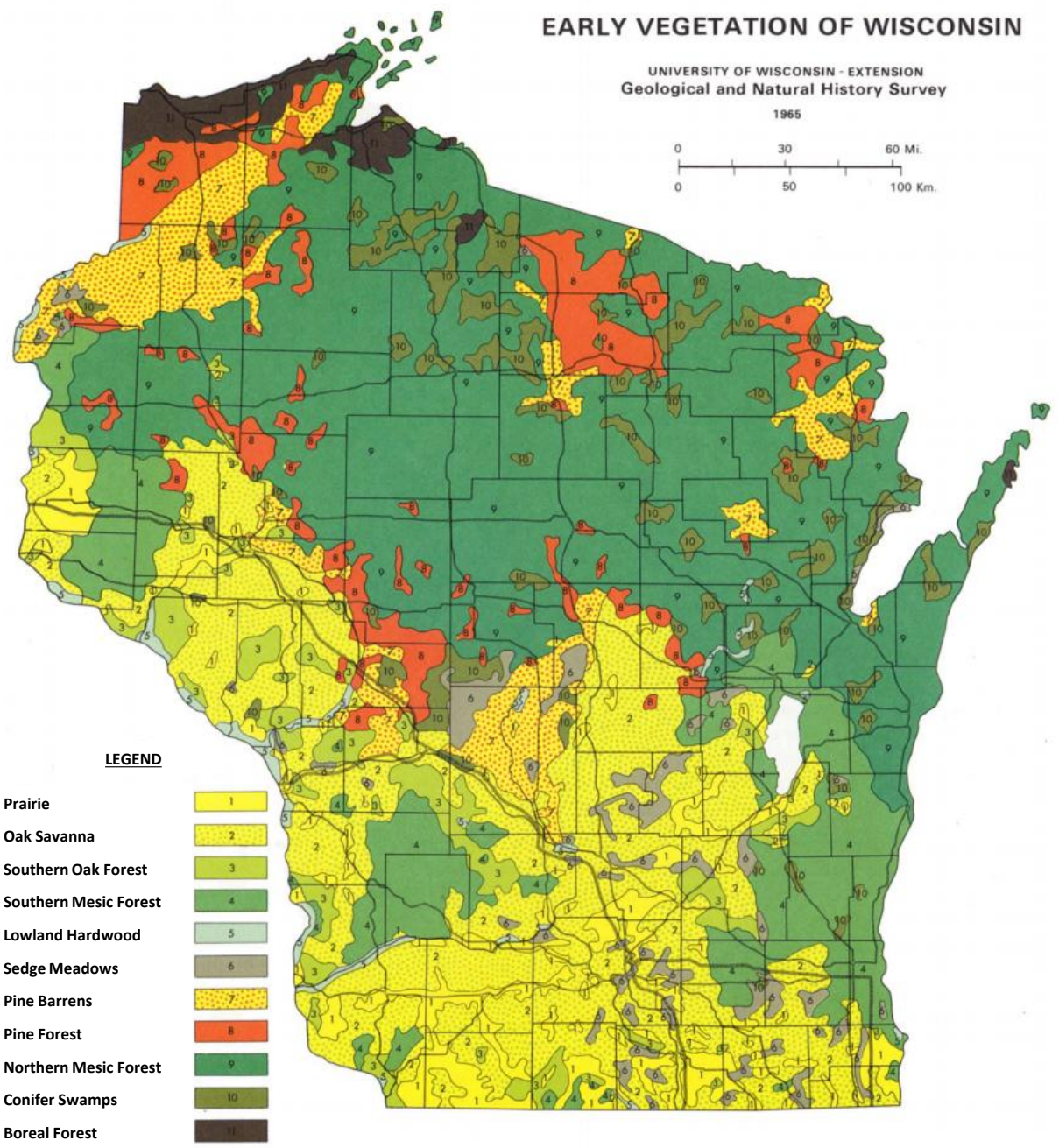
- Tricrania sanguinipennis* Say

Zonitis Fabricius

- Zonitis vittigera vittigera* (LeConte)
- Zonitis bilineata* Say
- Zonitis sulcicollis* Blatchley
- Zonitis cribricollis* (LeConte)

Table 3: Adult meloid phenology in Wisconsin using collection records.

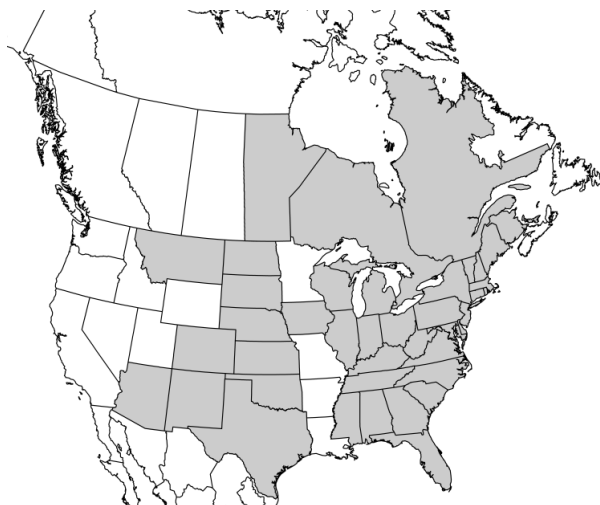




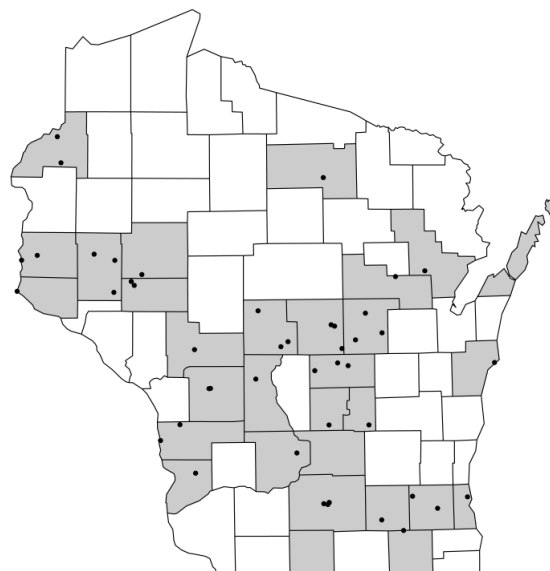
Map 1. Vegetation communities of Wisconsin pre-European settlement based on Curtis (1959) (Wisconsin Geological Survey 2012).



Map 2. Counties of Wisconsin



Map 3. *Epicauta fabricii* (LeConte) distribution (modified from Werner 1945 and Pinto 1991).



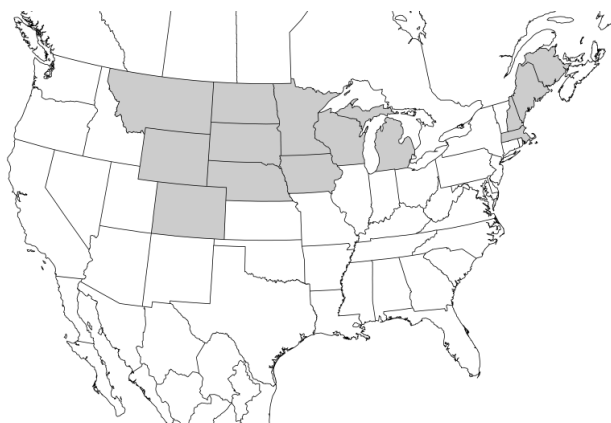
Map 4. *Epicauta fabricii* (LeConte) Wisconsin distribution.



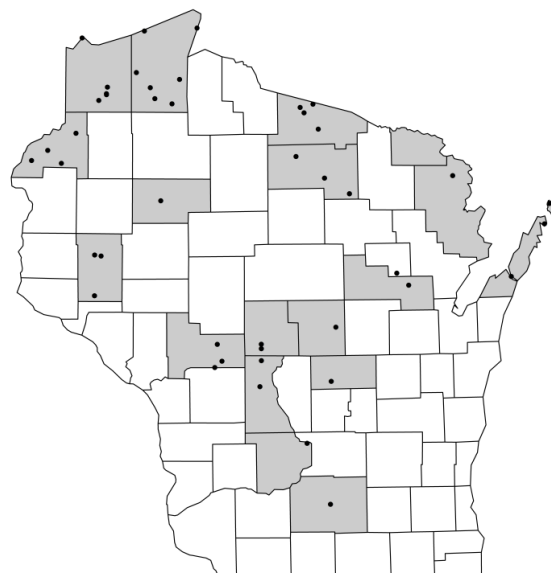
Map 5. *Epicauta flavocinerea* (Blatchley) distribution (modified from Pinto 1991).



Map 6. *Epicauta flavocinerea* (Blatchley) Wisconsin distribution



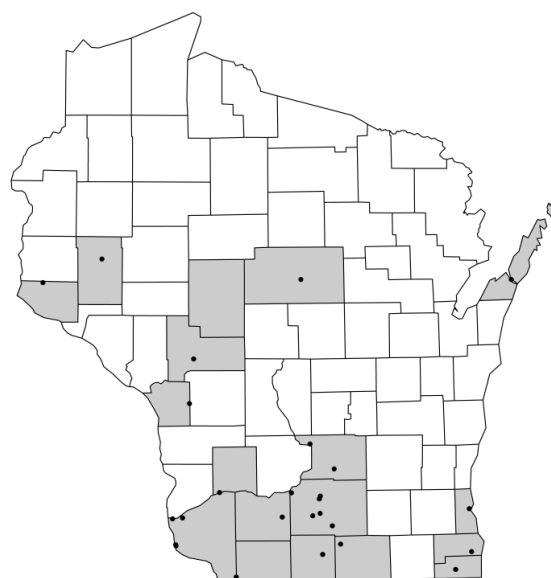
Map 7. *Epicauta murina* (LeConte)
distribution (modified from Werner 1945
and Pinto 1991)



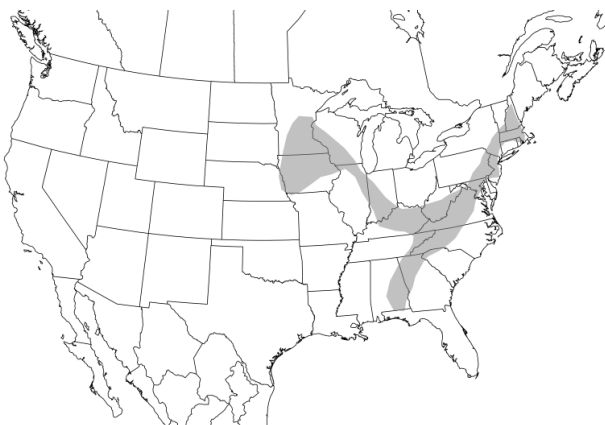
Map 8. *Epicauta murina* (LeConte)
Wisconsin distribution.



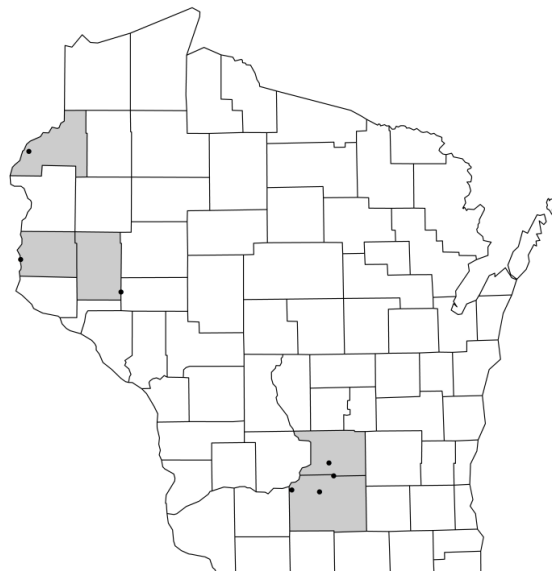
Map 9. *Epicauta cinerea* (Forster)
distribution (modified from Pinto 1991).



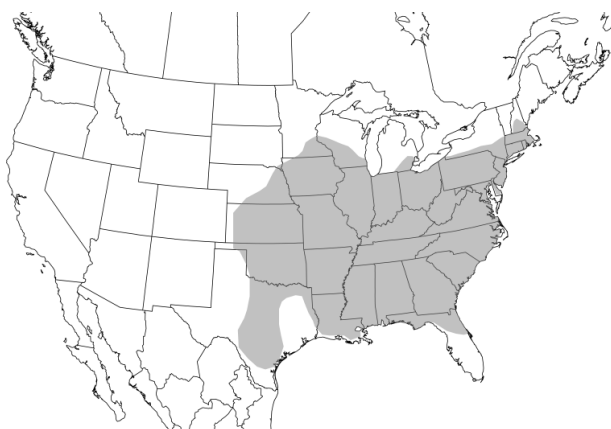
Map 10. *Epicauta cinerea* (Forster)
Wisconsin distribution.



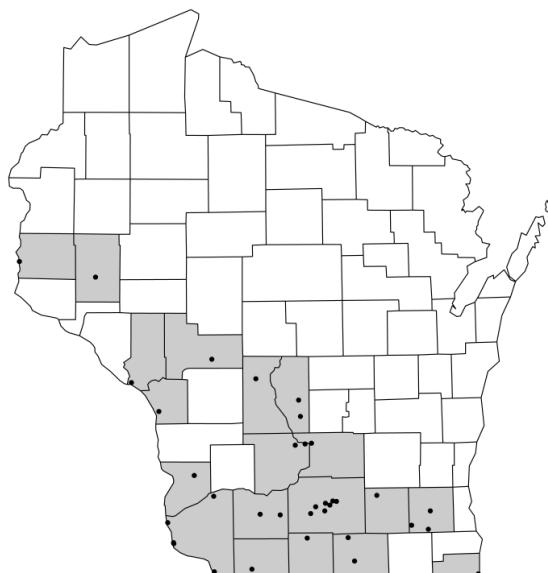
Map 11. *Epicauta flobcina* Pinto distribution (modified from Pinto 1991).



Map 12. *Epicauta flobcina* Pinto Wisconsin distribution.



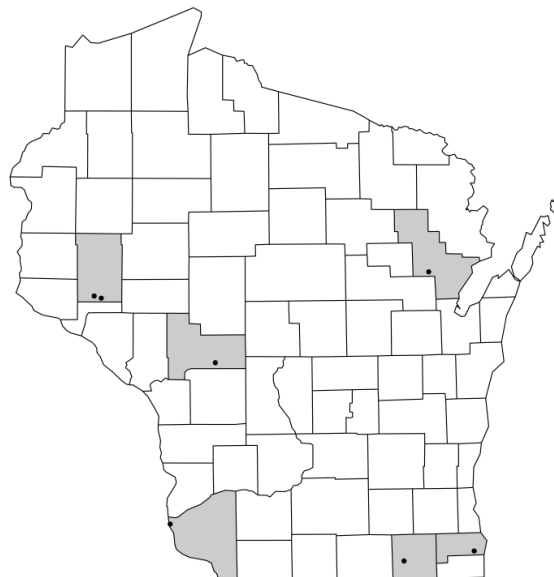
Map 13. *Epicauta funebris* Horn distribution (modified from Pinto 1991).



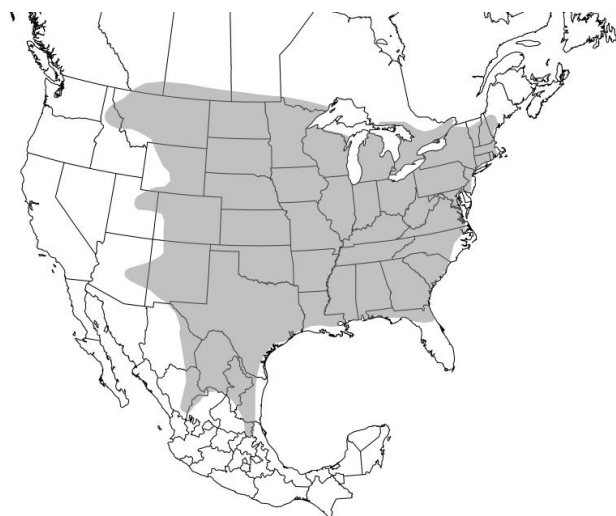
Map 14. *Epicauta funebris* Horn Wisconsin distribution.



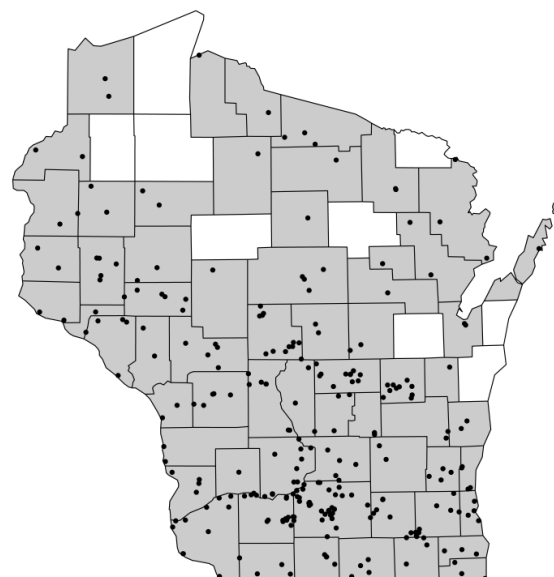
Map 15. *Epicauta obesa* (Chevrolat) distribution (modified from Pinto 1991).



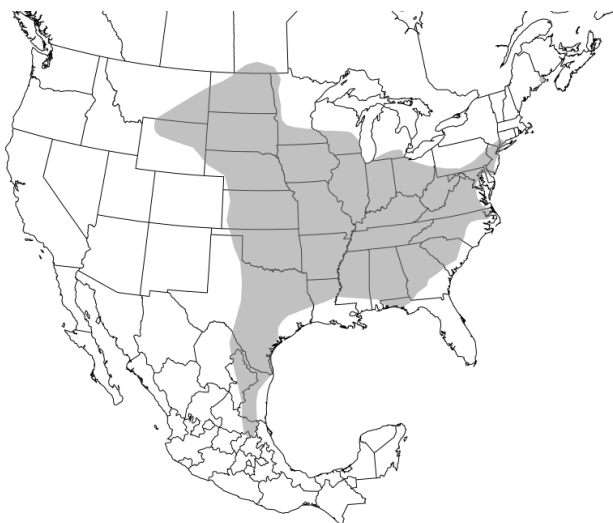
Map 16. *Epicauta obesa* (Chevrolat) Wisconsin distribution.



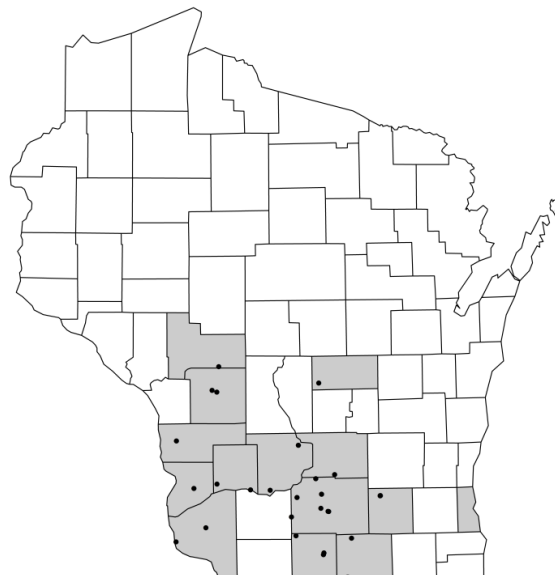
Map 17. *Epicauta pensylvanica* (Degeer) distribution (modified from Pinto 1991).



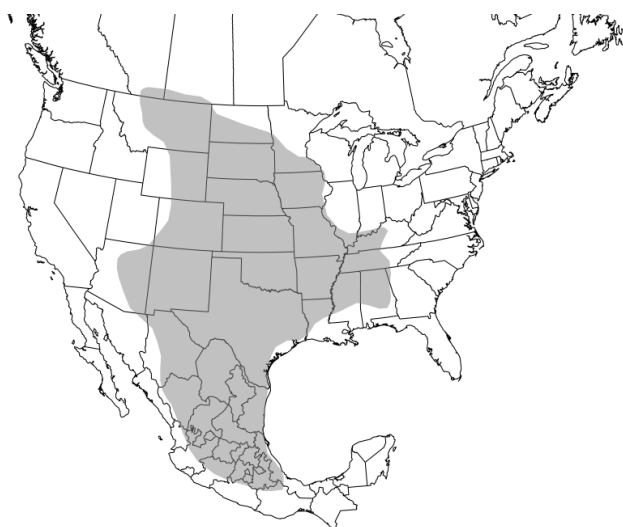
Map 18. *Epicauta pensylvanica* (Degeer) Wisconsin distribution.



Map 19. *Epicauta atrata* (Fabricius) distribution (modified from Pinto 1991).



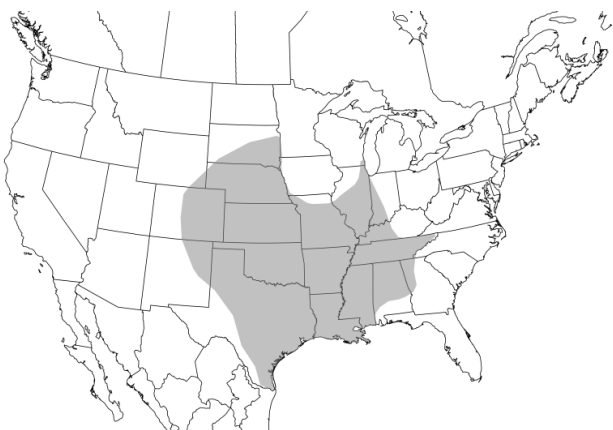
Map 20. *Epicauta atrata* (Fabricius) Wisconsin distribution.



Map 21. *Epicauta sericans* LeConte distribution (modified from Pinto 1991).



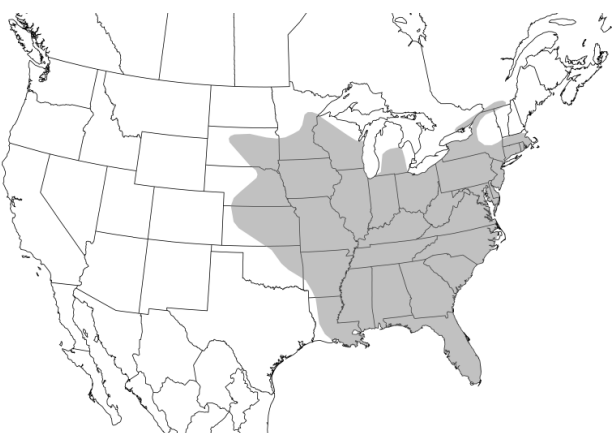
Map 22. *Epicauta sericans* LeConte Wisconsin distribution.



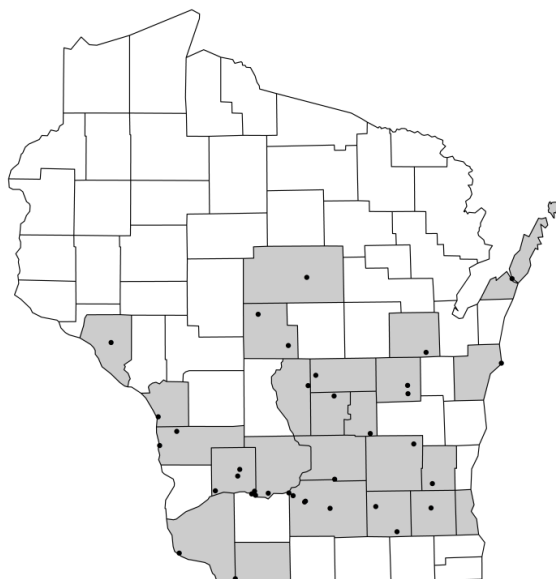
Map 23. *Epicauta occidentalis* Werner distribution (modified from Adams and Selander 1979).



Map 24. *Epicauta occidentalis* Werner Wisconsin distribution.



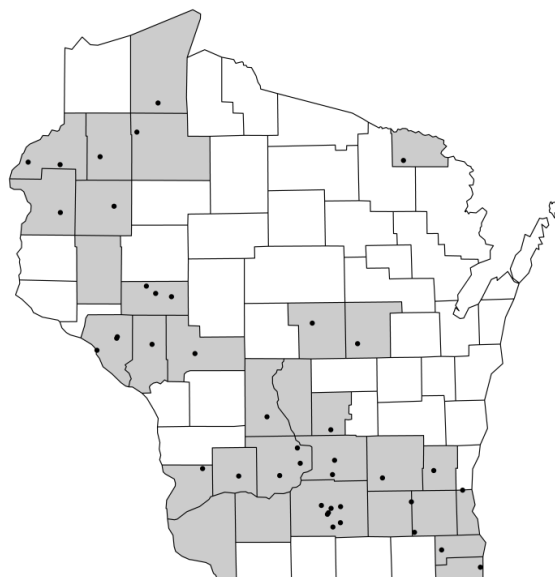
Map 25. *Epicauta vittata* (Fabricius) distribution (modified from Adams and Selander 1979).



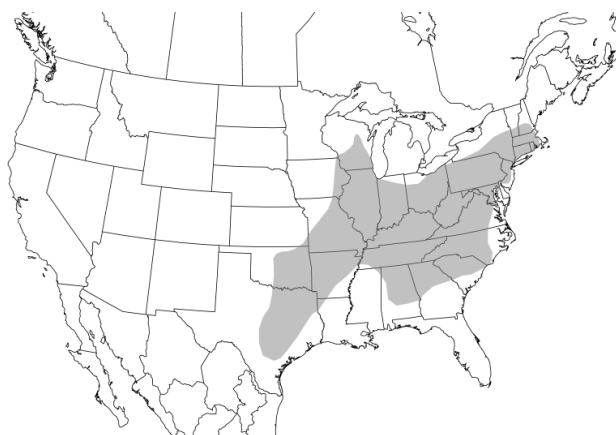
Map 26. *Epicauta vittata* (Fabricius) Wisconsin distribution.



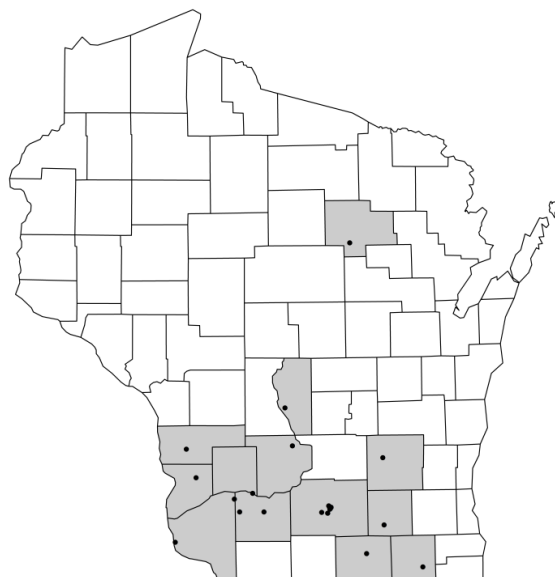
Map 27. *Lytta sayi* LeConte distribution
(modified from Selander 1960).



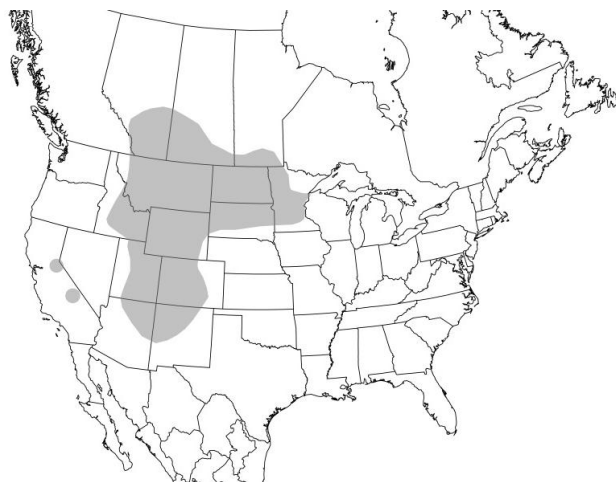
Map 28. *Lytta sayi* LeConte Wisconsin
distribution.



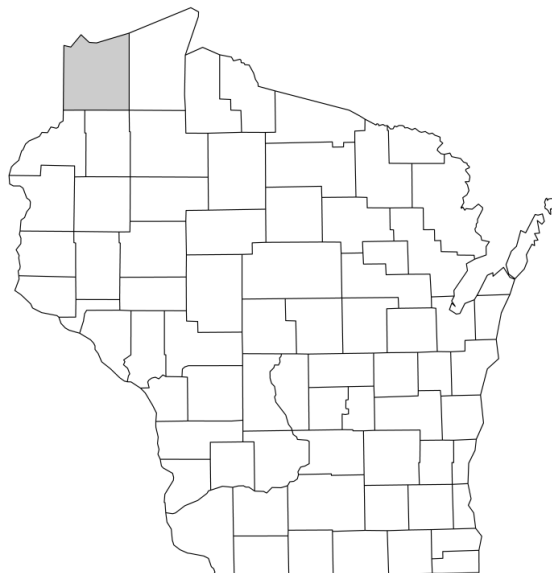
Map 29. *Lytta aenea* Say distribution
(modified from Selander 1960).



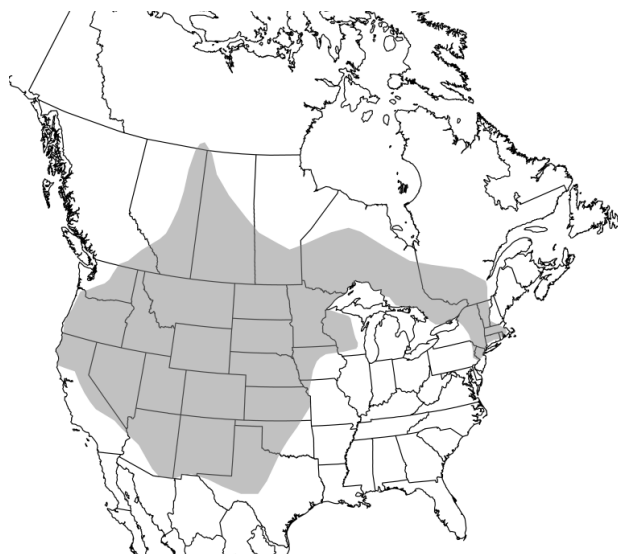
Map 30. *Lytta aenea* Say Wisconsin
distribution.



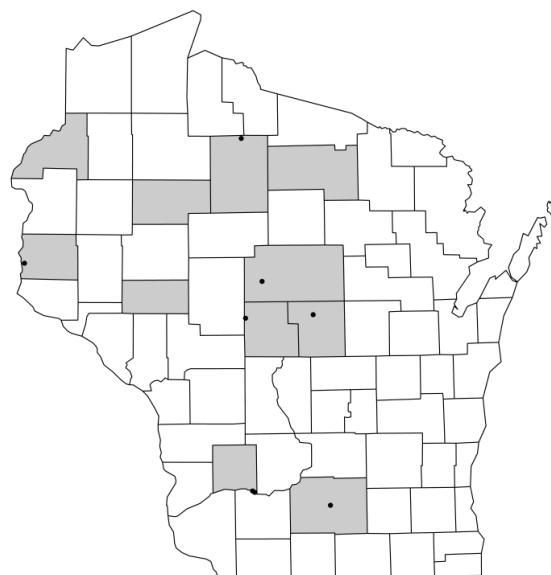
Map 31. *Lytta nuttalli* Say distribution (modified from Selander 1960).



Map 32. *Lytta nuttalli* Say Wisconsin distribution.



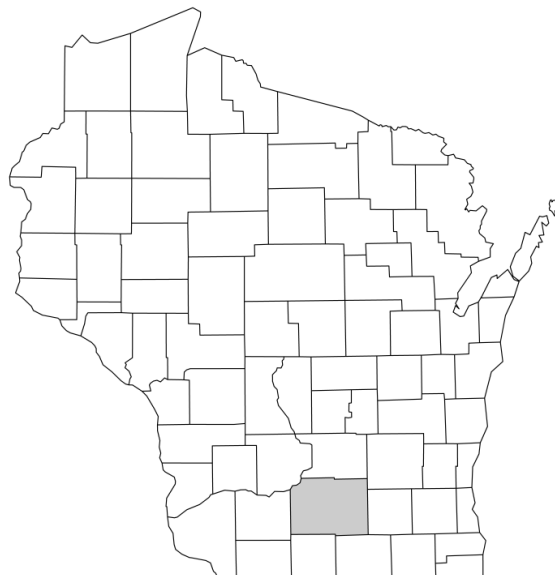
Map 33. *Meloe niger* Kirby distribution (modified from Pinto and Selander 1970).



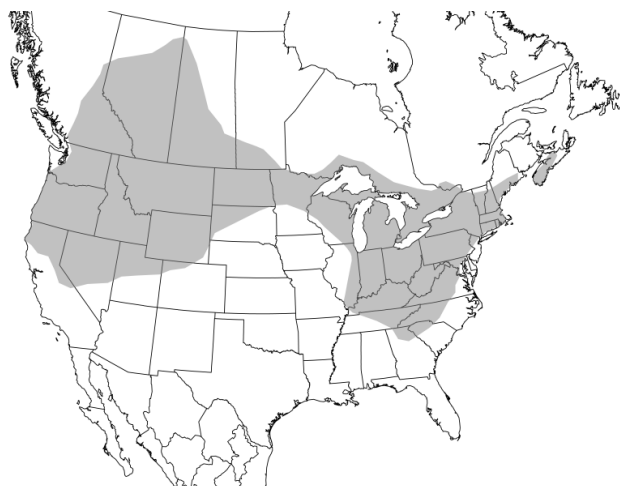
Map 34. *Meloe niger* Kirby Wisconsin distribution.



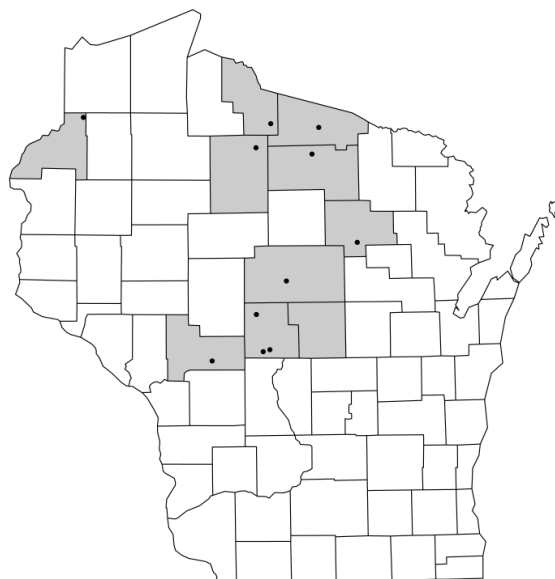
Map 35. *Meloe dianella* Pinto & Selander distribution (modified from Pinto and Selander 1970).



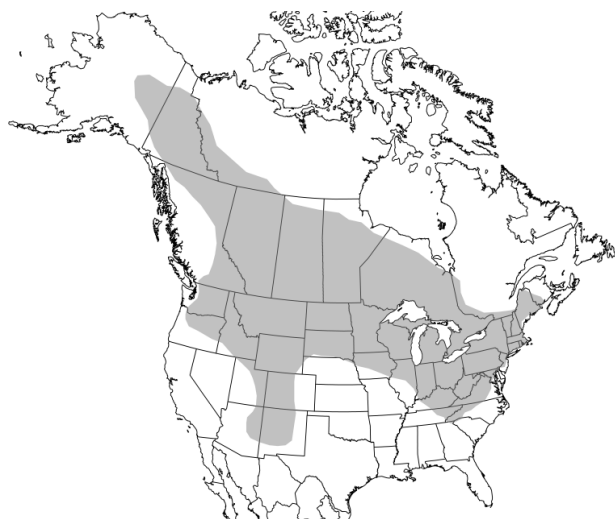
Map 36. *Meloe dianella* Pinto & Selander Wisconsin distribution.



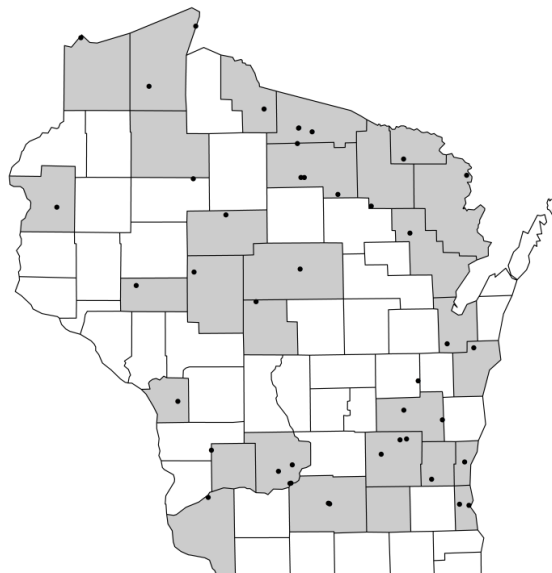
Map 37. *Meloe angusticollis* Say distribution (modified from Pinto and Selander 1970).



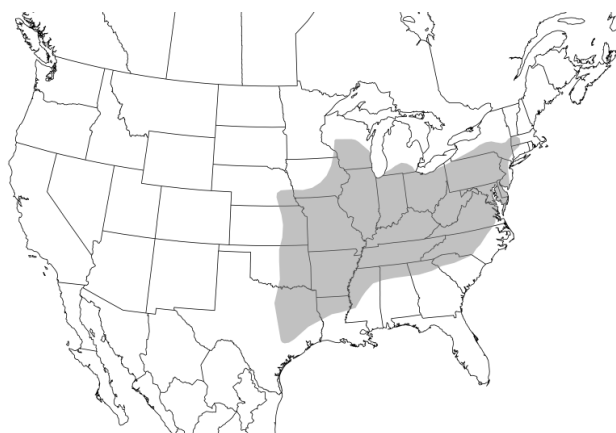
Map 38. *Meloe angusticollis* Say Wisconsin distribution.



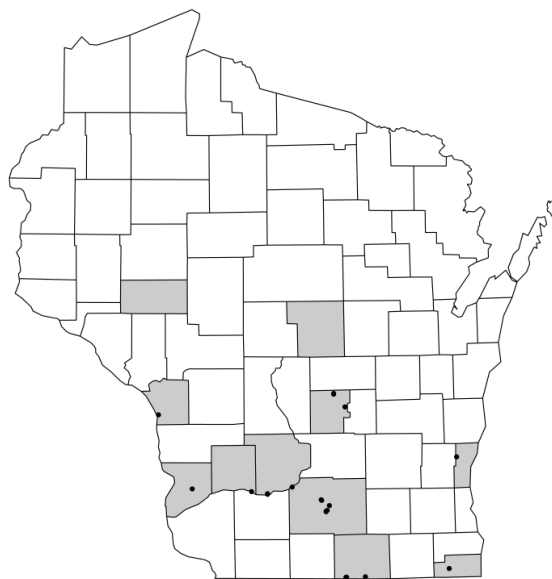
Map 39. *Meloe impressus* Kirby distribution (modified from Pinto and Selander 1970).



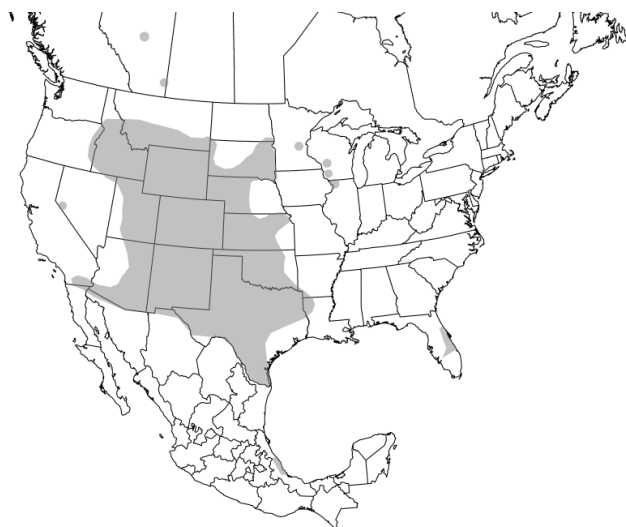
Map 40. *Meloe impressus* Kirby Wisconsin distribution.



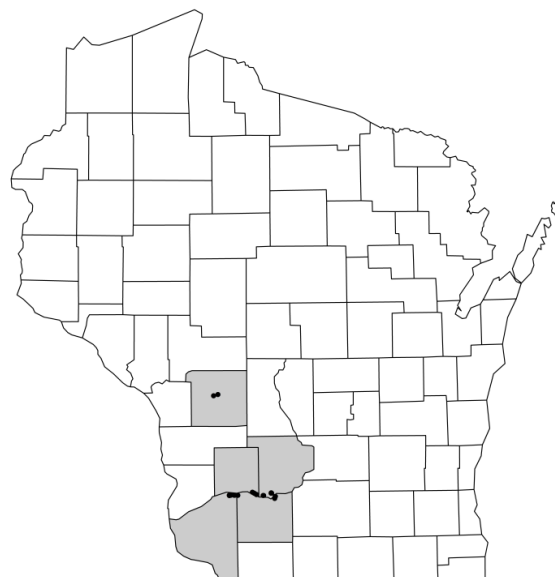
Map 41. *Meloe campanicollis* Pinto & Selander distribution (modified from Pinto and Selander 1970).



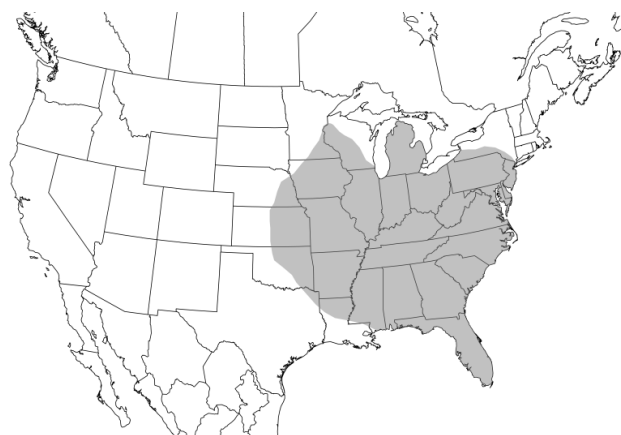
Map 42. *Meloe campanicollis* Pinto & Selander Wisconsin distribution.



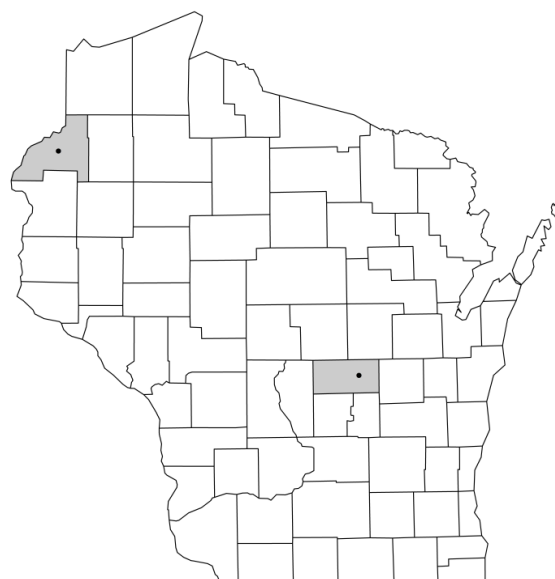
Map 43. *Gnathium minimum* (Say) distribution (modified from Pinto 2009).



Map 44. *Gnathium minimum* (Say) Wisconsin distribution.



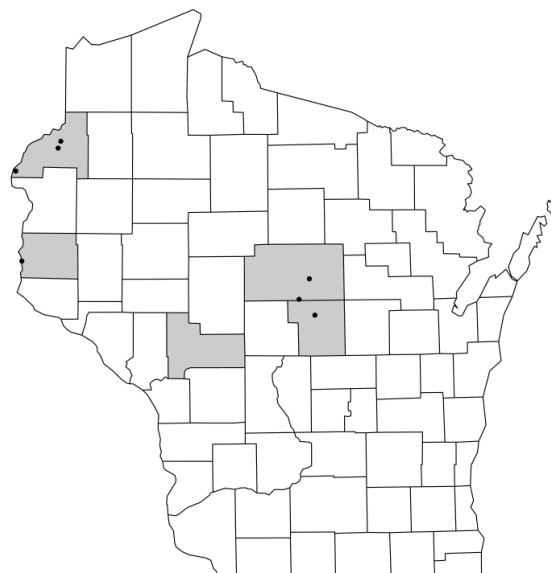
Map 45. *Nemognatha nemorensis* Hentz distribution (modified from Enns 1956).



Map 46. *Nemognatha nemorensis* Hentz Wisconsin distribution.



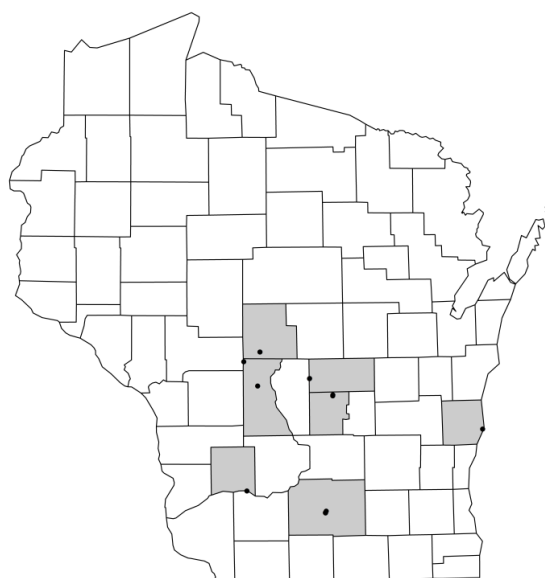
Map 47. *Nemognatha cribraria fuscula*
Enns distribution (modified from Enns
1956).



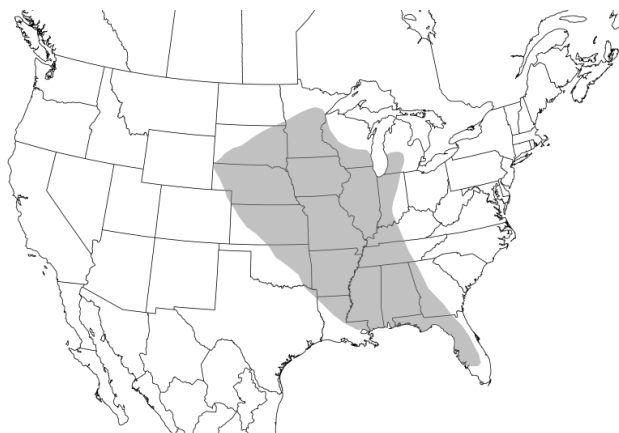
Map 48. *Nemognatha cribraria fuscula*
Enns Wisconsin distribution.



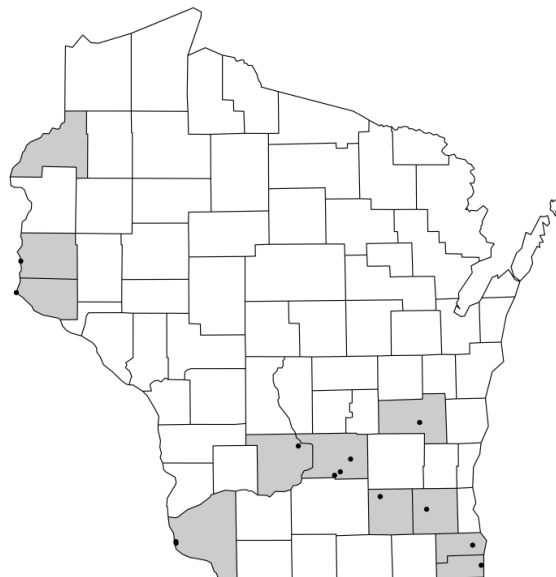
Map 49. *Tricrania sanguinipennis* Say
distribution (modified from Cline and
Huether 2011).



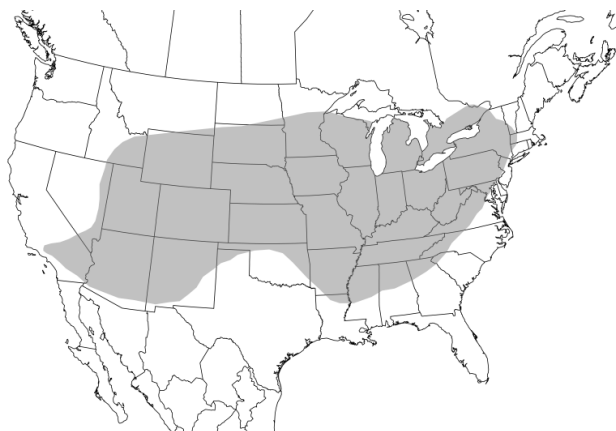
Map 50. *Tricrania sanguinipennis* Say
Wisconsin distribution.



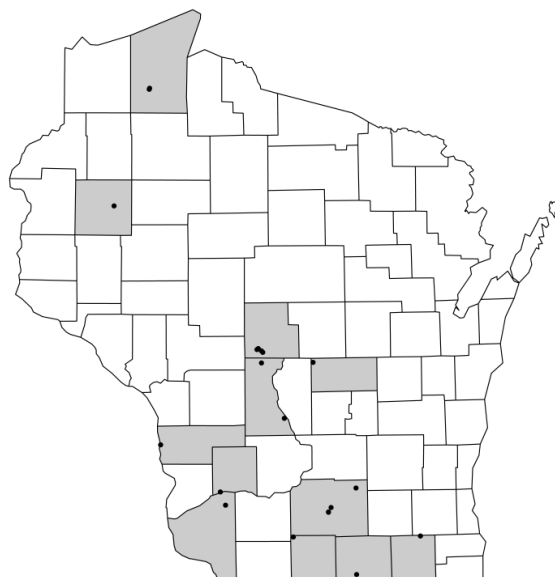
Map 51. *Zonitis vittigera vittigera* (LeConte) distribution (modified from Enns 1956).



Map 52. *Zonitis vittigera vittigera* (LeConte) Wisconsin distribution.



Map 53. *Zonitis bilineata* Say distribution (modified from Enns 1956).



Map 54. *Zonitis bilineata* Say Wisconsin distribution.



Map 55. *Zonitis sulcicollis* Blatchley distribution (modified from Enns 1956).



Map 56. *Zonitis sulcicollis* Blatchley Wisconsin distribution.



Map 57. *Zonitis cribricollis* (LeConte) distribution (modified from Enns 1956).



Map 58. *Zonitis cribricollis* (LeConte) Wisconsin distribution.

Figures 1-6

Figure 1: *Epicauta fabricii* (LeConte), dorsal

Figure 2: *Epicauta fabricii* (LeConte), lateral

Figure 3: *Epicauta flavocinerea* (Blatchley), dorsal

Figure 4: *Epicauta flavocinerea* (Blatchley), lateral

Figure 5: *Epicauta murina* (LeConte), dorsal

Figure 6: *Epicauta murina* (LeConte), lateral



Fig. 1



Fig. 2



Fig. 3

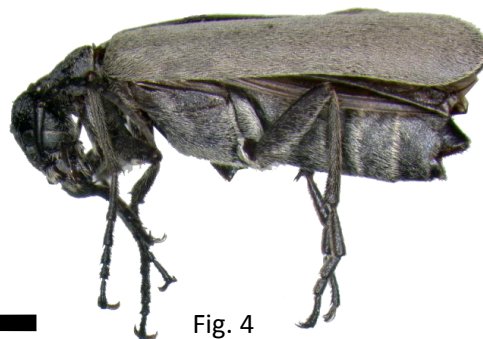


Fig. 4



Fig. 5

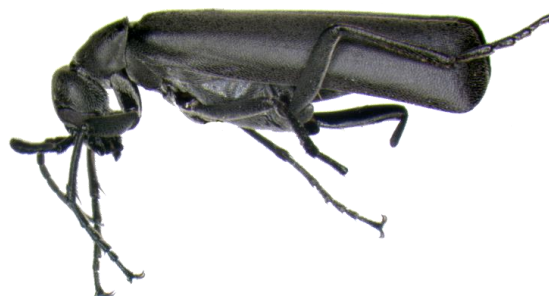


Fig. 6

Figures 7-12

Figure 7: *Epicauta cinerea* (Forster), dorsal, margined form

Figure 8: *Epicauta cinerea* (Forster), lateral, margined form

Figure 9: *Epicauta cinerea* (Forster), dorsal, cinereous form

Figure 10: *Epicauta cinerea* (Forster), lateral, cinereous form

Figure 11: *Epicauta flobcina* Pinto, dorsal

Figure 12: *Epicauta flobcina* Pinto, lateral



Fig. 7

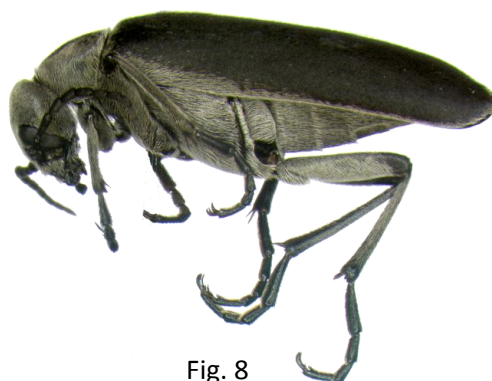


Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12

Figures 13-18

Figure 13: *Epicauta funebris* Horn, dorsal, margined form

Figure 14: *Epicauta funebris* Horn, lateral, margined form

Figure 15: *Epicauta funebris* Horn, dorsal, cinereous form

Figure 16: *Epicauta funebris* Horn, lateral, cinereous form

Figure 17: *Epicauta obesa* (Chevrolat), dorsal

Figure 18: *Epicauta obesa* (Chevrolat), lateral



Fig. 13



Fig. 14



Fig. 15



Fig. 16



Fig. 17

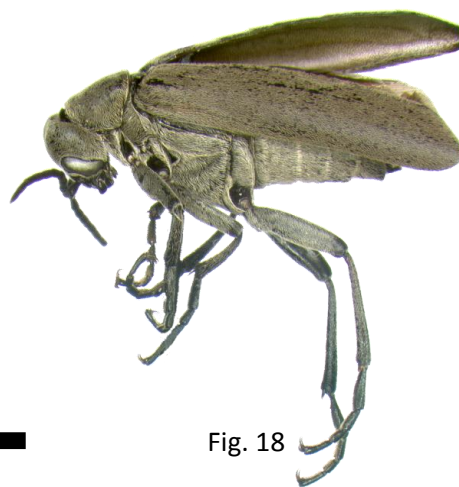


Fig. 18

Figures 19-24

Figure 19: *Epicauta pensylvanica* (Degeer), dorsal

Figure 20: *Epicauta pensylvanica* (Degeer), lateral

Figure 21: *Epicauta atrata* (Fabricius), dorsal, black vestiture

Figure 22: *Epicauta atrata* (Fabricius), lateral, black vestiture

Figure 23: *Epicauta atrata* (Fabricius), dorsal, cinereous vestiture

Figure 24: *Epicauta atrata* (Fabricius), lateral, cinereous vestiture



Fig. 19



Fig. 20



Fig. 21



Fig. 22



Fig. 23



Fig. 24

Figures 25-30

Figure 25: *Epicauta sericans* LeConte, dorsal

Figure 26: *Epicauta sericans* LeConte, lateral

Figure 27: *Epicauta occidentalis* Werner, dorsal

Figure 28: *Epicauta occidentalis* Werner, lateral

Figure 29: *Epicauta vittata* (Fabricius), dorsal

Figure 30: *Epicauta vittata* (Fabricius), lateral



Fig. 25



Fig. 26



Fig. 27



Fig. 28



Fig. 29



Fig. 30

Figures 31-36

Figure 31: *Lytta sayi* LeConte, dorsal

Figure 32: *Lytta sayi* LeConte, lateral

Figure 33: *Lytta aenea* Say, dorsal

Figure 34: *Lytta aenea* Say, lateral

Figure 35: *Lytta nuttalli* Say, dorsal

Figure 36: *Lytta nuttalli* Say, lateral



Fig. 31



Fig. 32



Fig. 33



Fig. 34



Fig. 35



Fig. 36

Figures 37-42

Figure 37: *Meloe niger* Kirby, dorsal

Figure 38: *Meloe niger* Kirby, lateral

Figure 39: *Meloe dianella* Pinto & Selander, dorsal

Figure 40: *Meloe dianella* Pinto & Selander, lateral

Figure 41: *Meloe angusticollis* Say, dorsal

Figure 42: *Meloe angusticollis* Say, lateral



Fig. 37



Fig. 38



Fig. 39



Fig. 40



Fig. 41



Fig. 42

Figures 43-46

Figure 43: *Meloe impressus* Kirby, dorsal

Figure 44: *Meloe impressus* Kirby, lateral

Figure 45: *Meloe campanicollis* Pinto & Selander, dorsal

Figure 46: *Meloe campanicollis* Pinto & Selander, lateral



Fig. 43



Fig. 44



Fig. 45



Fig. 46



Figures 47-52

Figure 47: *Gnathium minimum* Say, dorsal

Figure 48: *Gnathium minimum* Say, lateral

Figure 49: *Nemognatha nemorensis* Hentz, dorsal

Figure 50: *Nemognatha nemorensis* Hentz, lateral

Figure 51: *Nemognatha cribraria fuscula* Enns, dorsal

Figure 52: *Nemognatha cribraria fuscula* Enns, lateral



Fig. 47



Fig. 48



Fig. 49



Fig. 50



Fig. 51



Fig. 52



Figures 53-58

Figure 53: *Nemognatha cribraria fuscata* Enns, dorsal

Figure 54: *Nemognatha cribraria fuscata* Enns, lateral

Figure 55: *Tricrania sanguinipennis* Say, dorsal

Figure 56: *Tricrania sanguinipennis* Say, lateral

Figure 57: *Zonitis vittigera vittigera* (LeConte), dorsal

Figure 58: *Zonitis vittigera vittigera* (LeConte), lateral



Fig. 53



Fig. 54



Fig. 55



Fig. 56



Fig. 57



Fig. 58

Figures 59-64

Figure 59: *Zonitis vittigera vittigera* (LeConte), dorsal

Figure 60: *Zonitis vittigera vittigera* (LeConte), lateral

Figure 61: *Zonitis bilineata* Say, dorsal

Figure 62: *Zonitis bilineata* Say, lateral

Figure 63: *Zonitis sulcicollis* Blatchley, dorsal

Figure 64: *Zonitis sulcicollis* Blatchley, lateral

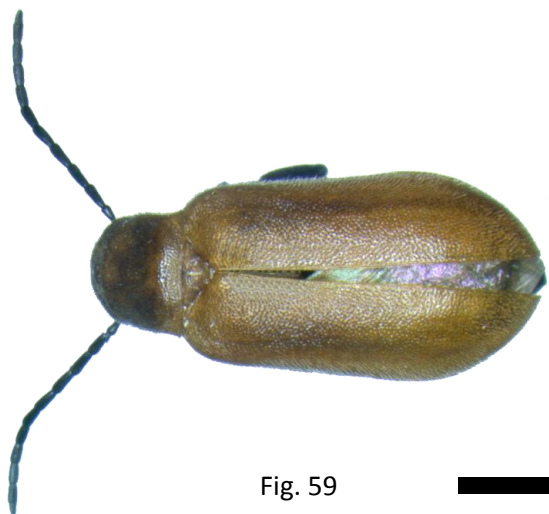


Fig. 59



Fig. 60



Fig. 61



Fig. 62



Fig. 63

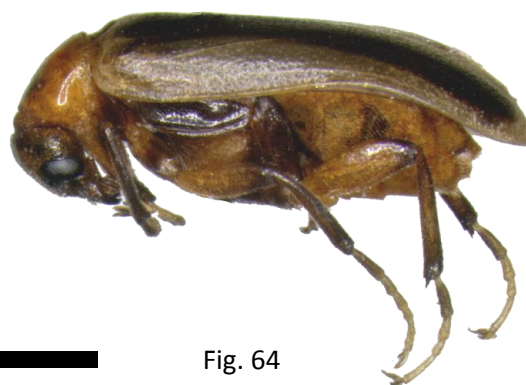


Fig. 64

Figures 65-70

Figure 65: *Zonitis cribricollis* (LeConte), dorsal

Figure 66: *Zonitis cribricollis* (LeConte), lateral

Figure 67: *Zonitis cribricollis* (LeConte), dorsal

Figure 68: *Zonitis cribricollis* (LeConte), lateral

Figure 69: *Zonitis cribricollis* (LeConte), dorsal

Figure 70: *Zonitis cribricollis* (LeConte), lateral



Fig. 65

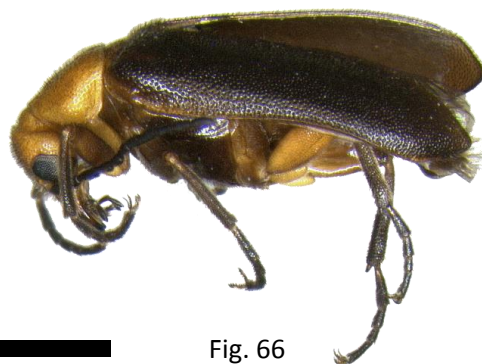


Fig. 66



Fig. 67



Fig. 68



Fig. 69



Fig. 70

Figures 71-73

Figure 71: *Epicauta cinerea* (Forster), patch of setae on femor

Figure 72: *Epicauta pensylvanica* (Degeer), patch of setae on femor

Figure 73: *Epicauta flavocinerea* (Blatchley), elongate setae on metathoracic femora



Fig. 71



Fig. 72



Fig. 73

Figures 74-75

Figure 74: *Epicauta vittata* (Fabricius), dorsal blade on tarsal claw

Figure 75: *Zonitis vittigera vittigera* (LeConte), dorsal blade on tarsal claw



Fig. 74



Fig. 75

Figures 76-79

Figure 76: *Meloe campanicollis* Pinto & Selander, outer metatibial spur

Figure 77: *Meloe dianella* Pinto & Selander, outer metatibial spur

Figure 78: *Zonitis bilineata* Say, metatibial spurs

Figure 79: *Zonitis cribricollis* (LeConte), metatibial spurs

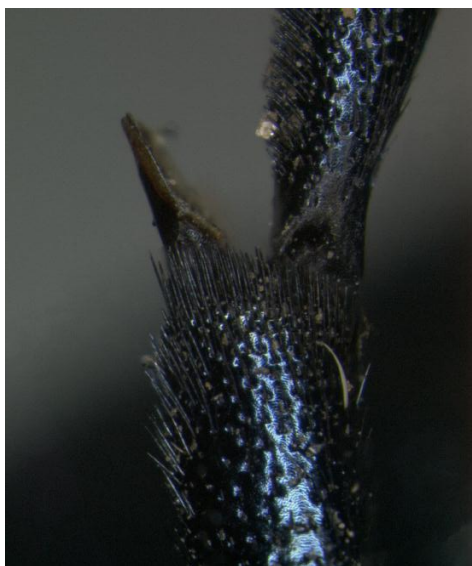


Fig. 76



Fig. 77



Fig. 78



Fig. 79

Figures 80-81

Figure 80: *Epicauta murina* (LeConte), vestiture on elytra

Figure 81: *Epicauta subglabra* (Fall), vestiture on elytra



Fig. 80



Fig. 81

Figures 82-84

Figure 82: *Lytta sayi* LeConte, head

Figure 83: *Lytta aenea* Say, head

Figure 84: *Lytta nuttalli* Say, head



Fig. 82



Fig. 83



Fig. 84

Figures 85-87

Figure 85: *Meloe angusticollis* Say, pronotum

Figure 86: *Meloe campanicollis* Pinto & Selander, pronotum

Figure 87: *Meloe impressus* Kirby, pronotum



Fig. 85



Fig. 86



Fig. 87

Figures 88-90

Figure 88: *Meloe angusticollis* Say, scutellum

Figure 89: *Meloe dianella* Pinto & Selander, antennal platform, male

Figure 90: *Meloe niger* Kirby, antennal platform, male

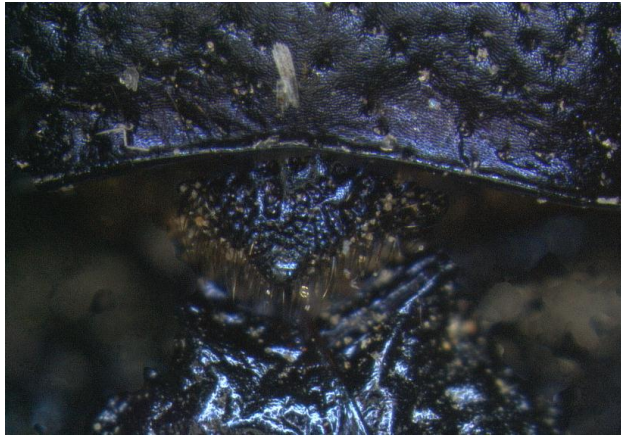


Fig. 88



Fig. 89

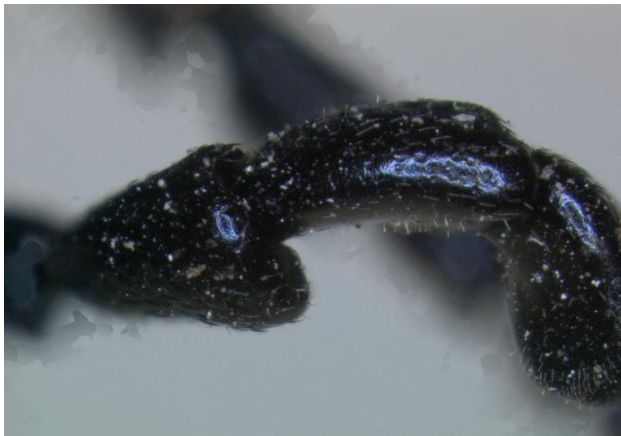


Fig. 90

Figures 91-92

Figure 91: *Zonitis cribricollis* (LeConte), pronotum

Figure 92: *Zonitis vittigera vittigera* (LeConte), pronotum



Fig. 91



Fig. 92

Figures 93-98

- Figure 93: *Epicauta fabricii* (LeConte), antenna, male
Figure 94: *Epicauta fabricii* (LeConte), antenna, female
Figure 95: *Epicauta murina* (LeConte), antenna, male
Figure 96: *Epicauta murina* (LeConte), antenna, female
Figure 97: *Tricrania sanguinipennis* Say, antenna
Figure 98: *Gnathium minimum* (Say), antenna



Fig. 93

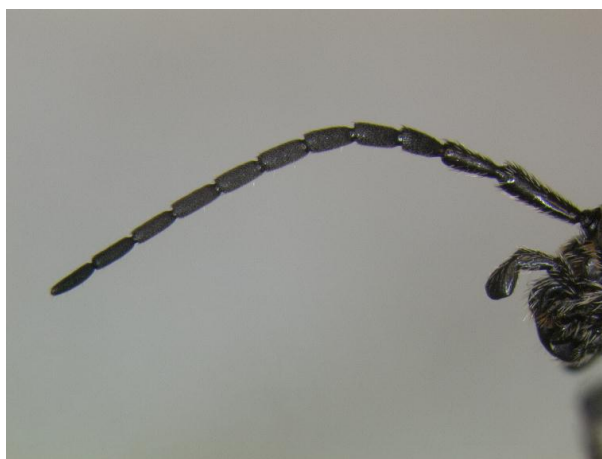


Fig. 94



Fig. 95



Fig. 96



Fig. 97



Fig. 98

Figures 99-103

Figure 99: *Epicauta flobcina* Pinto, antenna

Figure 100: *Epicauta flobcina* Pinto, antenna, cross sectional view

Figure 101: *Epicauta cinerea* (Forster), antenna

Figure 102: *Epicauta cinerea* (Forster), antenna segment I, male

Figure 103: *Epicauta cinerea* (Forster), antenna, male



Fig. 99



Fig. 100



Fig. 101



Fig. 102



Fig. 103

Figures 104-105

Figure 104: *Epicauta funebris* Horn, antenna

Figure 105: *Epicauta atrata* (Fabricius), antenna

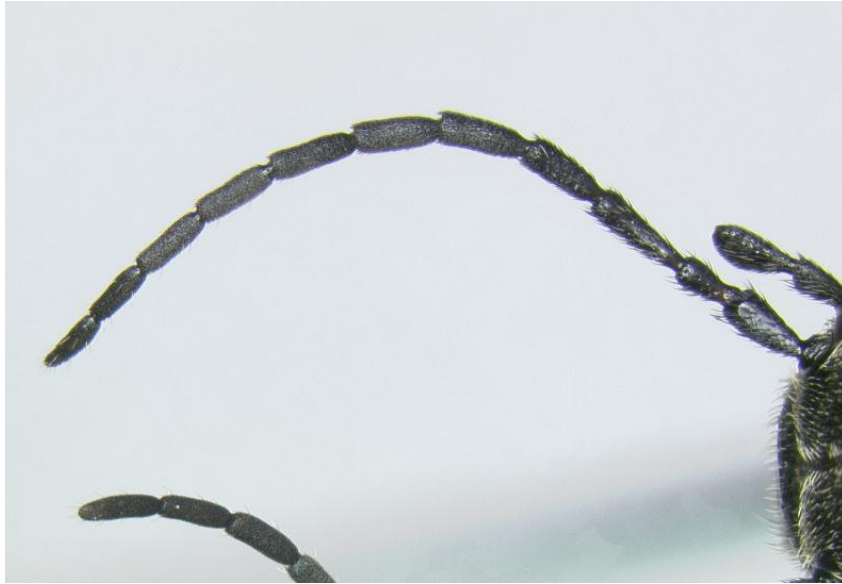


Fig. 104



Fig. 105

Figures 106-107

Figure 106: *Nemognatha cribraria fuscata* Enns, head

Figure 107: *Nemognatha nemorensis* Hentz, head



Fig. 106



Fig. 107

Figures 108-109

Figure 108: *Epicauta cinerea* (Forster) foraging on *Anemone canadensis*.

Figure 109: *Epicauta pensylvanica* (Degeer) mating on goldenrod (*Solidago* sp.).



Fig. 108



Fig. 109

Figures 110-111

Figure 110: *Epicauta atrata* (Fabricius) foraging on *Silphium integrifolium*.

Figure 111: *Epicauta atrata* (Fabricius) be predated by *Phymata americana americana* Melon on *Coreopsis palmata*.



Fig. 110



Fig. 111

Figures 112-113

Figure 112: *Meloe campanicollis* Pinto & Selander attempting to mate (two males on top of larger female) while on sandy path. Ceratopogonids feeding on male beetles.

Figure 113: *Gnathium minimum* (Say) mating and foraging on *Helianthus occidentalis*.



Fig. 112

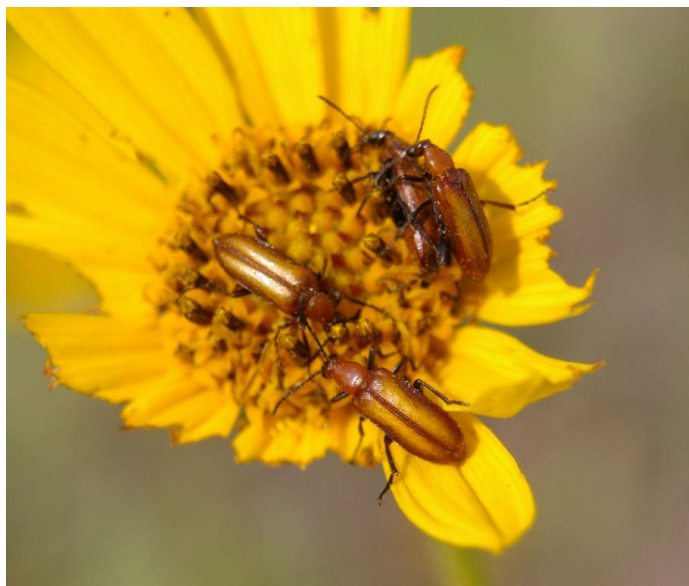


Fig. 113

Figures 114-115

Figure 114: *Tricrania sanguinipennis* Say on sandy path.

Figure 115: *Zonitis vittigera vittigera* (LeConte) on *Rudbeckia hirta*.



Fig. 114



Fig. 115

Appendix:

Wisconsin Specimen Records (Appendix 1)

Other Wisconsin Records (Appendix 2)

Wisconsin Published Records (Appendix 3)

Appendix 1. Specimen records from Wisconsin: *Epicauta fabricii*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Burnett	~3.5 mi SE Siren, SE of Hwy B on Soderberg Rd., 45.759 -92.33018	22-Jun-2004		Craig M. Brabant	on leaves/flowers of Lupinus perennis L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001366
Burnett	~3.5 mi SE Siren, SE of Hwy B on Soderberg Rd., 45.759 -92.33018	22-Jun-2004		Craig M. Brabant	on leaves/flowers of Lupinus perennis L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001367
Burnett	T40N R16W Sect.8	18-Jun-1997		Andrew H. Williams	immobile on top leaf of Lupinus perennis on Hwy 35 ROW, noon gray 65F	WIRC	DAM002000
Chippewa	CTY J @ CTY OO, T28N R9W S26	29-Jun-1998		C. R. Bomar		WDNR	DAM002726
Columbia		9-Jun-2006		Emily E. Mueller	In red clover field, Pan trap	WIRC	DAM000705
Crawford	Gays Mills	9-Jun-1932		J. A. Callenbach, Jr.		WIRC	DAM001970
Crawford	Gays Mills	9-Jun-1932		J. A. Callenbach, Jr.		WIRC	DAM001971
Crawford	Gays Mills	9-Jun-1932		J. A. Callenbach, Jr.		WIRC	DAM001972
Crawford	Gays Mills	9-Jun-1932		J. A. Callenbach, Jr.		WIRC	DAM001973
Crawford	Gays Mills	9-Jun-1932		J. A. Callenbach, Jr.		WIRC	DAM001974
Crawford	Gays Mills	9-Jun-1932		J. A. Callenbach, Jr.		WIRC	DAM001975
Crawford	Gays Mills	9-Jun-1932		J. A. Callenbach, Jr.		WIRC	DAM001976
Dane	Madison	25-Mar-1905		J G Sanders	On clover	WIRC	DAM001961
Dane	Madison	25-Jun-1914		M. Simonds		WIRC	DAM001964
Dane	Madison	27-Jun-1914		S B Fracker		WIRC	DAM001949
Dane	Madison	5-Jul-1914		G A Chandler		WIRC	DAM001965
Dane	Madison	5-Jul-1914		G A Chandler		WIRC	DAM001966
Dane	Madison	6-Jun-1915		A C Burrill	On spreading Dogbane	WIRC	DAM001947
Dane	Madison	6-Jun-1915		A C Burrill	On spreading Dogbane	WIRC	DAM001948
Dane	Madison	24-Jun-1915		G A Chandler		WIRC	DAM001955
Dane	Madison	24-Jun-1915		G A Chandler		WIRC	DAM001956
Dane	Madison	7-Jul-1916		H. K. Harley		WIRC	DAM001957
Dane	Madison	7-Jul-1916		H. K. Harley		WIRC	DAM001958
Dane	Madison	7-Jul-1916		H. K. Harley		WIRC	DAM001959
Dane	Madison	7-Jul-1916		H. K. Harley		WIRC	DAM001960
Dane	Madison	7-Jul-1916		H. K. Harley	alfalfa	WIRC	DAM002092
Dane	Madison	7-Jul-1916		H. K. Harley	alfalfa	WIRC	DAM002093
Dane	Madison	27-May-1924		Student Collection		WIRC	DAM001963
Dane	Madison	15-Jun-1925				WIRC	DAM001953
Dane	Madison	15-Jun-1925				WIRC	DAM001954
Dane	Madison	4-Jun-1930				WIRC	DAM001950
Dane	Madison	May-1936				WIRC	DAM001951
Dane	Madison	May-1941				WIRC	DAM001952
Dane	Madison			J G Sanders		WIRC	DAM001962
Dane	Madison: UW Campus	3-Dec-2006		Andrew B. Hoerig		WIRC	DAM002727
Dane	U.Hill Farm, Madison	28-Jun-1946		J. T. Medler	alfalfa	WIRC	DAM001984
Dane	U.Hill Farm, Madison	28-Jun-1946		J. T. Medler	alfalfa	WIRC	DAM001985
Dane	U.Hill Farm, Madison	28-Jun-1946		J. T. Medler	alfalfa	WIRC	DAM001986
Dane	U.Hill Farm, Madison	28-Jun-1946		J. T. Medler	alfalfa	WIRC	DAM001987
Dane	Wingra Lk	7-Jul-1912		C. E. Brown	On Baptisia	WIRC	DAM001991

Appendix 1. Specimen records from Wisconsin: *Epicauta fabricii*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane		4-Jul-1917		Wm. S. Marshall		WIRC	DAM001967
Dane		11-Aug-1947				WIRC	DAM001968
Dane		18 June 1898				WIRC	DAM001996
Door	Careyville Savanna, T26N R11W	9-Jul-1966		Malmgren		UWOC	DAM000938
Dunn	Sec8	7-Jun-1999		E. Secrist		CRBC	DAM001289
Dunn	Colfax	16-Jul-1920		T.E.B. Pope		MPMC	DAM001012
Dunn	Hwy 170 @F, T30N R13W Sec33-34	11-Jun-1997		C. R. Bomar		CRBC	DAM001285
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000675
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000676
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000677
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000678
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000679
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000680
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000681
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000682
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000683
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000684
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F, Hand collected	WIRC	DAM000685

Appendix 1. Specimen records from Wisconsin: *Epicauta fabricii*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F , Hand collected	WIRC	DAM000686
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F , Hand collected	WIRC	DAM000687
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F , Hand collected	WIRC	DAM000688
Eau Claire	Hwy 12 open roadside, T27N R10W Sec 5	5-Jun-2007		Andrew H. Williams	many, all gray, mating, feeding & resting on Lathyrus venosus leaves, sunny 60F , Hand collected	WIRC	DAM000689
Eau Claire	Little Red School, T26N R10W Sec 2	2-Jul-1997		N. Gaulke		CRBC	DAM000439
Eau Claire		11-Sep-1966		R. N. Spear		UWEC	DAM001266
Green		6-Jul-1949		W. McNeel	coll. from forest floor	WIRC	DAM001977
Green		6-Jul-1949		W. McNeel	coll. from forest floor	WIRC	DAM001978
Green Lake	Hwy A & Hickory Dr	14-Jun-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000808
Jackson	Blk Riv Fls	29-Jul-1914		A C Burrill		WIRC	DAM001992
Jackson	Blk Riv Fls	29-Jul-1914		A C Burrill		WIRC	DAM001993
Jefferson	Ft. Atkinson	3-Jul-1924		E. L. Chambers		WIRC	DAM001988
Jefferson	Ft. Atkinson	3-Jul-1924		E. L. Chambers		WIRC	DAM001989
Jefferson	Ft. Atkinson	3-Jul-1924		E L Chambers		WIRC	DAM002106
Juneau	Necedah NWR, T18N R3E Sec 6 NW	30-May-2006		S. B. Sauer	sweep net, Lupine, Lobelia	WDNR	DAM002724
Manitowoc	Two Rivers	27-Jun-1911		Dr. S. Graenicher		MPMC	DAM000990
Marquette	John Muir Mem. Park	20-Jun-2008		Tim Anderson		TAPC	DAM002728
Milwaukee	Estabrook Park	30-Jun-1931		H. R. Rich		MPMC	DAM001011
Milwaukee		Jul-1902		F. Rauterberg		MPMC	DAM000989
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	DAMC	DAM002499
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	DAMC	DAM002500
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	WIRC	DAM002501
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	DAMC	DAM002502
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	WIRC	DAM002503
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	WIRC	DAM002504
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	WIRC	DAM002505
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	WIRC	DAM002506
Monroe	0686171; 4873193	9-Jun-2008		Emily E. Mueller	On lupine flower, not moving, cloudy 68F	WIRC	DAM002507
Monroe	Ft. McCoy SNA, 43 59'11" -90 41'40"	17-Jun-2007	30-Jun-2007	Jeffrey P Gruber	Barrier-pitfall trap in oak savanna	WIRC	DAM001208
Oconto	Gillett, Hwy 32	19-Jun-2006		Emily E. Mueller	Snap bean field, Pan trap	WIRC	DAM000708
Oconto	Gillett	21-Jun-2006		Emily E. Mueller	snap bean field, suspended pan trap	WIRC	DAM000218
Oconto	Gillett	21-Jun-2006		Emily E. Mueller	snap bean field, suspended pan trap	WIRC	DAM000219

Appendix 1. Specimen records from Wisconsin: *Epicauta fabricii*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Oconto	Gillett	28-Jun-2006		Emily E. Mueller	Weedy area, Suspended pan trap	WIRC	DAM000220
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001932
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001933
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001934
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001935
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001936
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001937
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001938
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001939
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001940
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001941
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001942
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001943
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001944
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001945
Oneida	Rhineland	12-Jun-1923		E. L. Chambers		WIRC	DAM001946
Portage	Amherst Jc	16-Jul-1914		G A Chandler		WIRC	DAM001980
Portage	Amherst Jc	16-Jul-1914		G A Chandler		WIRC	DAM001982
Portage	S.13, T.21N, R.10E	24-May-2010		Tim Anderson		TAPC	DAM002552
Portage	T23N R9E Sect. 12	11-Jun-1997		Andrew H. Williams	10AM fair 75F, 1 of sev. Feeding on flwrs of Lupinus perennis on sandy prairie RR & Hwy ROW. Pedilus lugubris 3813 (det. DKYoung) nearby	WIRC	DAM001997
Portage	T23N R9E Sect. 12	11-Jun-1997		Andrew H. Williams	10AM fair 75F, 1 of sev. Feeding on flwrs of Lupinus perennis on sandy prairie RR & Hwy ROW. Pedilus lugubris 3813 (det. DKYoung) nearby	WIRC	DAM001998
Portage	T23N R9E Sect. 12	11-Jun-1997		Andrew H. Williams	10AM fair 75F, 1 of sev. Feeding on flwrs of Lupinus perennis on sandy prairie RR & Hwy ROW. Pedilus lugubris 3813 (det. DKYoung) nearby	WIRC Williams & Young (1999)	DAM001999
Portage		11-Jun-1997			Feeding on Lupinus perennis flowers, with Pedilus lugubris	Young (1999)	DAM001997- DAM001999
Price	Prescott	13-Jul-1910	19-Jul-1910	Museum Expedition		MPMC	DAM000905
Price	Prescott	13-Jul-1910	19-Jul-1910	Museum Expedition		MPMC	DAM001013
Sauk	Baraboo	20-May-1914		J. G. Sanders		WIRC	DAM001983
Shawano	Keshena	27-Jun-1921		T.E.B. Pope		MPMC	DAM001015
St. Croix	3 Lakes Prairie, T29N R18W Ses5	15-Jul-1997		Joe Wilberg		CRBC	DAM001284
St. Croix	North Hudson	7-Jul-1910	12-Jul-1910	Museum Expedition		MPMC	DAM000898
St. Croix	North Hudson	7-Jul-1910	12-Jul-1910	Museum Expedition		MPMC	DAM000900
St. Croix	North Hudson	7-Jul-1910	12-Jul-1910	Museum Expedition		MPMC	DAM000902
St. Croix	North Hudson	7-Jul-1910	12-Jul-1910	Museum Expedition		MPMC	DAM000903

Appendix 1. Specimen records from Wisconsin: *Epicauta fabricii*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
St. Croix	North Hudson	7-Jul-1910	12-Jul-1910	Museum Expedition		MPMC	DAM000906
St. Croix	North Hudson	7-Jul-1910	12-Jul-1910	Museum Expedition		MPMC	DAM000909
Vernon	Coon Valley	17-Jul-1913		A C Burrill		WIRC	DAM001994
Vernon	Genoa	7-Jul-1911	12-Jul-1911	Museum Expedition		MPMC	DAM000892
Vernon	Genoa	7-Jul-1911	12-Jul-1911	Museum Expedition		MPMC	DAM000894
Vernon	Genoa	7-Jul-1911	12-Jul-1911	Museum Expedition		MPMC	DAM000895
Vernon	Genoa	7-Jul-1911	12-Jul-1911	Museum Expedition		MPMC	DAM000901
Vernon	Genoa	7-Jul-1911	12-Jul-1911	Museum Expedition		MPMC	DAM000908
Vernon	Genoa	7-Jul-1911	12-Jul-1911	Museum Expedition		MPMC	DAM001010
	Kettle Moraine Oak Opening SNA,						
Walworth	42.84111 -88.60444	29-Jul-2005		John J. Dorshorst	oak savanna, HG vapor lamp and black light	JJDC	DAM000698
Waukesha	Niles' Oconomowoc	10-Jul-1913		A C Burrill		WIRC	DAM001990
Waukesha	Waukesha	11-Jul-1972		A. L. Throne		MPMC	DAM002452
Waupaca	Twin Lakes	26-Jun-1945		R. N. Buckstaff	on vegetation	MPMC	DAM002447
Waupaca	Twin Lakes	26-Jun-1945		R. N. Buckstaff	on vegetation	MPMC	DAM002448
Waupaca	Twin Lakes	26-Jun-1945		R. N. Buckstaff	on vegetation	MPMC	DAM002449
Waupaca	Twin Lakes	30-Jun-1945		R. N. Buckstaff	in woods	MPMC	DAM002446
Waupaca	Waupaca	14-Jun-1920		L. G. Gentner		WIRC	DAM001979
Waushara	2 mile W Wild Rose	11-Jun-1981		Kurt Schmude		UWOC	DAM000937
Waushara	8 mi NE Watoma	18-Jul-1978		M Spreeman		UWOC	DAM000939
Waushara	Hancock, UW Res Stat	22-Jun-2006		Emily E. Mueller	Soybean field, Pan trap	WIRC	DAM000704
Waushara	Hancock, UW Res Stat	5-Jun-2007		Emily E. Mueller	In lupine, Pan trap	WIRC	DAM000709
Waushara	Hancock, UW Res Stat	20-Jun-2007		Emily E. Mueller	red clover, pan trap	WIRC	DAM000266
Waushara	Hancock, UW Res Stat	20-Jun-2007		Emily E. Mueller	red clover, pan trap	DAMC	DAM000267
Waushara	Hancock, UW Res Stat	20-Jun-2007		Emily E. Mueller	red clover, pan trap	WIRC	DAM000268
Waushara	Hancock, UW Res Stat	11-Jul-2007		Emily E. Mueller	white clover, pan trap	WIRC	DAM000263
Waushara	Hancock, UW Res Stat	11-Jul-2007		Emily E. Mueller	white clover, pan trap	WIRC	DAM000264
Waushara	Hancock, UW Res Stat	11-Jul-2007		Emily E. Mueller	white clover, pan trap	WIRC	DAM000265
Waushara	Hancock, UW research	2-Jun-2006		Emily E. Mueller	On alfalfa, Hand collected	DAMC	DAM000706
Waushara	Hancock, UW research	2-Jun-2006		Emily E. Mueller	On alfalfa, Hand collected	WIRC	DAM000707
Wood	Griffith St. Nursery	4-Jun-1947		R. D. Shenefelt		WIRC	DAM001842
Wood	Griffith St. Nursery	4-Jun-1947		R. D. Shenefelt		WIRC	DAM001871
Wood	Griffith St. Nursery	4-Jun-1947		R. D. Shenefelt		WIRC	DAM001873
Wood	Griffith St. Nursery	4-Jun-1947		R. D. Shenefelt		WIRC	DAM001910
Wood	Griffith St. Nursery	4-Jun-1947		R. D. Shenefelt		WIRC	DAM001911
Wood	Griffith St. Nursery	4-Jun-1947		R. D. Shenefelt		WIRC	DAM001916
Wood	Griffith St. Nursery	4-Jun-1947		R. D. Shenefelt		WIRC	DAM001918
Wood	Griffith St. Nursery	11-Jun-1947		R. D. Shenefelt	L.T.	WIRC	DAM001854
Wood	Griffith St. Nursery	26-Jun-1947		R. D. Shenefelt		WIRC	DAM001917
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001815
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001831
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001863

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001864
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001867
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001872
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001874
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001881
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001886
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001908
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001919
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001920
Wood	Griffith St. Nursery	27-Jun-1947		R. D. Shenefelt		WIRC	DAM001921
Wood	Griffith St. Nursery	28-Jun-1947		R. D. Shenefelt		WIRC	DAM001835
Wood	Griffith St. Nursery	28-Jun-1947		R. D. Shenefelt		WIRC	DAM001894
Wood	Griffith St. Nursery	28-Jun-1947		R. D. Shenefelt		WIRC	DAM001898
Wood	Griffith St. Nursery	3-Jul-1947		R. D. Shenefelt		WIRC	DAM001914
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001811
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001820
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001839
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001841
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001843
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001844
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001850
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001851
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001852
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001855
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001895
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001896
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001899
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001900
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001906
Wood	Griffith St. Nursery	4-Jul-1947		R. D. Shenefelt		WIRC	DAM001928
Wood	Griffith St. Nursery	10-Jul-1947		R. D. Shenefelt		WIRC	DAM001832
Wood	Griffith St. Nursery	12-Jul-1947		R. D. Shenefelt		WIRC	DAM001822
Wood	Griffith St. Nursery	12-Jul-1947		R. D. Shenefelt		WIRC	DAM001833
Wood	Griffith St. Nursery	12-Jul-1947		R. D. Shenefelt		WIRC	DAM001868
Wood	Griffith St. Nursery	12-Jul-1947		R. D. Shenefelt		WIRC	DAM001869
Wood	Griffith St. Nursery	12-Jul-1947		R. D. Shenefelt		WIRC	DAM001870
Wood	Griffith St. Nursery	12-Jul-1947		R. D. Shenefelt		WIRC	DAM001883
Wood	Griffith St. Nursery	12-Jul-1947		R. D. Shenefelt		WIRC	DAM001893
Wood	Griffith St. Nursery	12-Jul-1947		R. D. Shenefelt		WIRC	DAM001902
Wood	Griffith St. Nursery	16-Jul-1947		R. D. Shenefelt		WIRC	DAM001812
Wood	Griffith St. Nursery	16-Jul-1947		R. D. Shenefelt		WIRC	DAM001826
Wood	Griffith St. Nursery	16-Jul-1947		R. D. Shenefelt		WIRC	DAM001834

Appendix 1. Specimen records from Wisconsin: *Epicauta fabricii*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Wood	Griffith St. Nursery	16-Jul-1947		R. D. Shenefelt		WIRC	DAM001847
Wood	Griffith St. Nursery	16-Jul-1947		R. D. Shenefelt		WIRC	DAM001877
Wood	Griffith St. Nursery	16-Jul-1947		R. D. Shenefelt		WIRC	DAM001903
Wood	Griffith St. Nursery	16-Jul-1947		R. D. Shenefelt		WIRC	DAM001904
Wood	Griffith St. Nursery	16-Jul-1947		R. D. Shenefelt		WIRC	DAM001905
Wood	Griffith St. Nursery	25-Jul-1947		R. D. Shenefelt		WIRC	DAM001897
Wood	Griffith St. Nursery	29-Jul-1947		R. D. Shenefelt		WIRC	DAM001838
Wood	Griffith St. Nursery	29-Jul-1947		R. D. Shenefelt		WIRC	DAM001840
Wood	Griffith St. Nursery	29-Jul-1947		R. D. Shenefelt		WIRC	DAM001853
Wood	Griffith St. Nursery	29-Jul-1947		R. D. Shenefelt		WIRC	DAM001909
Wood	Griffith St. Nursery	3-Aug-1947		R. D. Shenefelt		WIRC	DAM001857
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001816
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001821
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001825
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001858
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001859
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001860
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001861
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001875
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001876
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001889
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001890
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001891
Wood	Griffith St. Nursery	8-Jul-1948		R. D. Shenefelt		WIRC	DAM001892
Wood	Griffith St. Nursery	13-Apr-1949		R. D. Shenefelt	L.T.	WIRC	DAM001907
Wood	Griffith St. Nursery	4-Jun-1949		R. D. Shenefelt		WIRC	DAM001828
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001813
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001814
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001824
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt		WIRC	DAM001829
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001837
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001848
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001849
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt		WIRC	DAM001862
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001865
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001866
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001878
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001879
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001880
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001882
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt		WIRC	DAM001885
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001887

Appendix 1. Specimen records from Wisconsin: *Epicauta fabricii*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001922
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001923
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001924
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001925
Wood	Griffith St. Nursery	11-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001926
Wood	Griffith St. Nursery	17-Jun-1949		R. D. Shenefelt		WIRC	DAM001818
Wood	Griffith St. Nursery	17-Jun-1949		R. D. Shenefelt		WIRC	DAM001819
Wood	Griffith St. Nursery	17-Jun-1949		R. D. Shenefelt		WIRC	DAM001856
Wood	Griffith St. Nursery	17-Jun-1949		R. D. Shenefelt		WIRC	DAM001884
Wood	Griffith St. Nursery	19-Jun-1949		R. D. Shenefelt	L.T.	WIRC	DAM001901
Wood	Griffith St. Nursery	23-Jun-1949		R. D. Shenefelt		WIRC	DAM001927
Wood	Griffith St. Nursery	25-Jun-1949		R. D. Shenefelt		WIRC	DAM001913
Wood	Griffith St. Nursery	29-Jun-1949		R. D. Shenefelt		WIRC	DAM001846
Wood	Griffith St. Nursery	3-Jul-1949		R. D. Shenefelt		WIRC	DAM001836
Wood	Griffith St. Nursery	3-Jul-1949		R. D. Shenefelt		WIRC	DAM001888
Wood	Griffith St. Nursery	8-Jul-1949		R. D. Shenefelt		WIRC	DAM001827
Wood	Griffith St. Nursery	6-Jun-1950		R. D. Shenefelt		WIRC	DAM001830
Wood	Griffith St. Nursery	8-Jul-1951		R. D. Shenefelt		WIRC	DAM001823
Wood	Griffith St. Nursery	2-Jul-1953		R. D. Shenefelt	feeding on black locust	WIRC	DAM001817
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	1-Jul-2007		Eric M. Heeg	Hayfield (mostly alfalfa), sweep net	WIRC	DAM000850
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	8-Jul-2007		Eric M. Heeg	Hayfield (mostly alfalfa), sweep net	WIRC	DAM000847
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	8-Jul-2007		Eric M. Heeg	Hayfield (mostly alfalfa), sweep net	DAMC	DAM000848
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	8-Jul-2007		Eric M. Heeg	Hayfield (mostly alfalfa), sweep net	WIRC	DAM000849
Wood	Nekoosa	21-Jun-1948		W. W. Barrett	from Pinus strobus	WIRC	DAM001929
Wood	Nekoosa	13-Jul-1948		W. W. Barrett	from Pinus resinosa	WIRC	DAM001930
Wood	Nekoosa	14-Jul-1948		W. W. Barrett	from Pinus banksiana	WIRC	DAM001845
Wood	Nekoosa	15-Jun-1949		W. W. Barrett	Pinus strobus	WIRC	DAM001912
Wood	Nekoosa	15-Jun-1949		W. W. Barrett	Pinus strobus	WIRC	DAM001915
Wood	Nekoosa	15-Jun-1949		W. W. Barrett	Pinus strobus	WIRC	DAM001931
	Northport	20-Jun-2008		Emily E. Mueller	Sunny, 70F, D213	WIRC	DAM002492
	Northport	20-Jun-2008		Emily E. Mueller	Sunny, 70F, D213	WIRC	DAM002493
	Northport	20-Jun-2008		Emily E. Mueller	Sunny, 70F, D213	DAMC	DAM002494
						WIRC	DAM002001

Appendix 1. Specimen records from Wisconsin: *Epicauta flavocinerea*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Greene Prairie, UW Arb.	10-Jul-1973		M. Hickey	white sweet clover	WIRC	DAM001255
Dane	Greene Prairie, UW Arb.	10-Jul-1973		M. Hickey	white sweet clover	WIRC	DAM001256
Dane	North of Greene Prairie	5-Jul-1967		D. W. Schwehr	Open oak woods, wild pea	WIRC	DAM001761

Appendix 1. Specimen records from Wisconsin: *Epicauta murina*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Bayfield	4 mi N Cable	4-Jun-1972		Gene Drecktrah		GDPC	DAM000947
Bayfield	4 mi N Cable	4-Jun-1972		Gene Drecktrah		GDPC	DAM000948
Bayfield	Bayfield	19-Jun-1956				WIRC	DAM002084
Bayfield	Lake Namekagon	Jul-1922		Wm. S. Marshall		WIRC	DAM002076
Bayfield	Lake Namekagon	Jul-1922		Wm. S. Marshall		WIRC	DAM002077
Bayfield	Lake Namekagon	Jul-1922		Wm. S. Marshall		WIRC	DAM002078
Bayfield	Lake Namekagon	Jul-1922		Wm. S. Marshall		WIRC	DAM002086
Bayfield	Lupine Field on Co. E, 46.413743 - 91.016279	29-Jun-2011		Kari Gullickson	on Lupinus sp.	KGPC	DAM002845
Bayfield	Lupine Field on Co. E, 46.413743 - 91.016279	29-Jun-2011		Kari Gullickson	on Lupinus sp.	KGPC	DAM002846
Bayfield	Lupine Field on Co. E, 46.413743 - 91.016279	29-Jun-2011		Kari Gullickson	on Lupinus sp.	WIRC	DAM002862
Bayfield	Pigeon L. Field Stat., 4 mi W						
Bayfield	Drummond	20-Jun-1974		Gene Drecktrah		GDPC	DAM000946
Bayfield	Quarry Point, T50N R8W sec 19	22-Jun-1999		Jeffrey P. Gruber	on wet sand on Lk. Superior beach	JPGC	DAM001243
Bayfield	T46N R9S S16	22-Jun-1977	6-Jul-1977		G.M.P-M.T.	WIRC	DAM002082
Bayfield	T46N R9W S16	13-Jun-1977	20-Jun-1977		GMP-MT	WIRC	DAM002083
Bayfield	T46N R9W S16	13-Jun-1977	20-Jun-1977		GMP-MT	WIRC	DAM002103
Bayfield		7-Jun-1970		H. Dymale		UWSC	DAM001258
Burnett	~3.5 mi SE Siren, SE of Hwy B on Soderberg Rd., 45.759 -92.33018	22-Jun-2004		Craig M. Brabant	on leaves/flowers of Lupinus perennis L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001368
Burnett	~3.5 mi SE Siren, SE of Hwy B on Soderberg Rd., 45.759 -92.33018	22-Jun-2004		Craig M. Brabant	on leaves/flowers of Lupinus perennis L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001369
Burnett	Black Brook Road, E of Ice House				off Lupinus perennis, In power line r.o.w.,		
Burnett	Bridge Road, 45.85889 -92.48278	30-May-2006		Craig M. Brabant	2:45pm, overcast, ~72°F, wind: 3-6mph	CMBC	DAM001370
Burnett	Black Brook Road, E of Ice House				off Lupinus perennis, In power line r.o.w.,		
Burnett	Bridge Road, 45.85889 -92.48278	30-May-2006		Craig M. Brabant	2:45pm, overcast, ~72°F, wind: 3-6mph	CMBC	DAM001371
Burnett	Black Brook Road, E of Ice House				off Lupinus perennis, In power line r.o.w.,		
Burnett	Bridge Road, 45.85889 -92.48278	30-May-2006		Craig M. Brabant	2:45pm, overcast, ~72°F, wind: 3-6mph	CMBC	DAM001372
Burnett	Gov. Knowles SF, T39N R19W NESW S.10			Kathryn Kirk	on Lupinus	WIRC	DAM001237
Burnett	near Little Bear Lake, NWECO54: "Bay Drive 4", 45.994026 - 92.170218	15-Jun-2003		Craig M. Brabant	hand-collected off Lupinus perennis in sandy power line right-of-way	CMBC	DAM002840
Burnett	near Little Bear Lake, NWECO54: "Bay Drive 4", 45.994026 - 92.170218	15-Jun-2003		Craig M. Brabant	hand-collected off Lupinus perennis in sandy power line right-of-way	CMBC	DAM002841
Burnett	near Little Bear Lake, NWECO54: "Bay Drive 4", 45.994026 - 92.170218	15-Jun-2003		Craig M. Brabant	hand-collected off Lupinus perennis in sandy power line right-of-way	CMBC	DAM002842
Dane	Madison	6-Jun-1915		G A Chandler		WIRC	DAM002094
Dane	Madison	Jun-1940				WIRC	DAM002095

Appendix 1. Specimen records from Wisconsin: *Epicauta murina*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Madison			J G Sanders		WIRC	DAM002096
Door	Newport State Park	15-Jun-1989		S. Sullivan-Borkin	old field area	MPMC	DAM002445
Door	Sturgn Bay	14-Jun-1921		Chas. L. Fluke		WIRC	DAM001969
Door	Sturgn Bay	14-Jun-1921		Chas. L. Fluke		WIRC	DAM002097
Door	Washington Island	16-Jun-1921		S B Fracker		WIRC	DAM002087
Door	Washington Island	16-Jun-1921		S B Fracker		WIRC	DAM002088
Door	Washington Island	16-Jun-1921		S B Fracker		WIRC	DAM002089
Door		Sep-1966		D. Hjerleid		UWEC	DAM001267
	Douglas Co. PHG, 46 18'09" -91 49'58"	5-Jun-2001	10-Jun-2001	Michele B. Price	Lindgren funnel trap baited with banana & fermenting brown sugar in pine/oak barrens	MBPC	DAM001245
Douglas	Solon Springs	7-Jul-1909	15-Jul-1909	Museum Expedition		MPMC	DAM000896
Douglas	Solon Springs	7-Jul-1909	15-Jul-1909	Museum Expedition		MPMC	DAM000897
Douglas	St. Croix Dam	17-Jul-1909	22-Jul-1909	Museum Expedition		MPMC	DAM000899
Douglas	St. Croix Dam	17-Jul-1909	22-Jul-1909	Museum Expedition		MPMC	DAM000910
	State Hunting Grounds, T44N/R12W/Sec. 14	9-Jun-1999		Alistair Ramsdale	On Lathyrus venosus, feeding and mating, prairie, 1-4PM	WIRC	DAM002114
Douglas	Superior Point	17-Jul-1997		C. R. Bomar		CRBC	DAM001291
Dunn	Hwy 170 @F, T30N R12W Sec31	11-Jun-1997		C. R. Bomar		CRBC	DAM001290
Dunn	Hwy 170 @F, T30N R13W Sec33-34	11-Jun-1997		C. R. Bomar		CRBC	DAM001286
Dunn	Hwy 170 @F, T30N R13W Sec33-34	11-Jun-1997		C. R. Bomar		CRBC	DAM001287
Dunn	Hwy 170 @F, T30N R13W Sec33-34	11-Jun-1997		C. R. Bomar		CRBC	DAM001288
Dunn	Larrabee Prairie, T26N R13-12W Sec 16	10-Jun-1997		C. R. Bomar		CRBC	DAM001292
Dunn	Larrabee Prairie, T26N R13-12W Sec 16	10-Jun-1997		C. R. Bomar		CRBC	DAM001293
Dunn	Larrabee Prairie, T26N R13-12W Sec 16	10-Jun-1997		C. R. Bomar		CRBC	DAM001294
Dunn	Larrabee Prairie, T26N R13-12W Sec 16	10-Jun-1997		C. R. Bomar		CRBC	DAM001295
Dunn	Larrabee Prairie, T26N R13-12W Sec 16	10-Jun-1997		C. R. Bomar		CRBC	DAM001296
Dunn	Larrabee Prairie, T26N R13-12W Sec 16	10-Jun-1997		C. R. Bomar		CRBC	DAM001297
Dunn	Larrabee Prairie, T26N R13-12W Sec 16	10-Jun-1997		C. R. Bomar		CRBC	DAM001298
Dunn	Larrabee Prairie, T26N R13-12W Sec 16	10-Jun-1997		C. R. Bomar		CRBC	DAM001299

Appendix 1. Specimen records from Wisconsin: *Epicauta murina*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dunn	T30N R12W Sect. 31	6-Jun-1997		Andrew H. Williams	5 of 20 seen feeding on youngest leaves of Lathyrus venosus on prairie RR & Hwy ROW. Pedilus lugubris #3789 (det. DKYoung) nearby	WIRC	DAM002115
Dunn	T30N R12W Sect. 31	6-Jun-1997		Andrew H. Williams	5 of 20 seen feeding on youngest leaves of Lathyrus venosus on prairie RR & Hwy ROW. Pedilus lugubris #3789 (det. DKYoung) nearby	WIRC	DAM002116
Dunn	T30N R12W Sect. 31	6-Jun-1997		Andrew H. Williams	5 of 20 seen feeding on youngest leaves of Lathyrus venosus on prairie RR & Hwy ROW. Pedilus lugubris #3789 (det. DKYoung) nearby	WIRC	DAM002117
Dunn	T30N R12W Sect. 31	6-Jun-1997		Andrew H. Williams	5 of 20 seen feeding on youngest leaves of Lathyrus venosus on prairie RR & Hwy ROW. Pedilus lugubris #3789 (det. DKYoung) nearby	WIRC	DAM002118
Dunn	T30N R12W Sect. 31	6-Jun-1997		Andrew H. Williams	5 of 20 seen feeding on youngest leaves of Lathyrus venosus on prairie RR & Hwy ROW. Pedilus lugubris #3789 (det. DKYoung) nearby	WIRC	DAM002119
Dunn		6-Jun-1997			Feeding on Lathyrus venosus foliage, with Pedilus lugubris	Williams & Young (1999)	DAM002115-DAM002119
Florence		3-Jul-1989		H. P. Newton		UWSC	DAM001259
Jackson	Black River SF, Millston Rd, T20N/2W/SE32 R Sec	10-Jun-1997		Kathryn Kirk	sand roadside	WIRC	DAM001236
Jackson	Black River SF, Millston Rd., T20N R2W SE32	10-Jun-1997		Kathryn Kirk	sand roadside	WIRC	DAM002079
Jackson	Black River SF, T20N/2W/SWNE13 R Sec	24-Jun-1997		Kathryn Kirk	sweet fern sweep	WIRC	DAM001239
Jackson	Black River SF, T20N/2W/SWNE13 R Sec	24-Jun-1997		Kathryn Kirk	sweet fern sweep	WIRC	DAM001240
Jackson	Black River SF, T20N/2W/SWNE13 R Sec	24-Jun-1997		Kathryn Kirk	sweet fern sweep	WIRC	DAM001241
Jackson	Staffon Rd. lupines, T22N R2W SENW Sect. 34	10-Jun-1996		Kathryn Kirk	on Lupinus	WIRC	DAM001238
Juneau	Nat'l Guard Range	Jul-1996		C. Bleser	eating lupine	WIRC	DAM002104
Juneau	Nat'l Guard Range	Jul-1996		C. Bleser	eating lupine	WIRC	DAM002105
Juneau	Necedah National Wildlife Refuge	4-Jun-1996		Katy Pope	Flight Intercept trap #136	WIRC	NECSIL0661
Marinette	NE 1/4 18	16-May-1998		Chris Delfosse		UWOC	DAM000936
Marinette	Pembine	1-Aug-1910		J G Sanders		WIRC	DAM002090
Marinette	Pembine	21-Jun-1913		J G Sanders		WIRC	DAM002091

Appendix 1. Specimen records from Wisconsin: *Epicauta murina*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Oneida		9-Jul-1953				FSUC	DAM001300
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002002
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002003
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002004
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002005
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002006
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002007
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002008
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002009
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002010
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002011
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002012
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002013
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002014
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002015
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002016
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002017
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002018
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002019
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002020
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002021
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002022
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002023
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002024
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002025
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002026
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002027
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002028
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002029
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002030
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002031
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002032
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002033
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002034
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002035
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002036
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002037
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002038
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002039
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002040
Onieda	Rhineland	15-Jun-1922		E L Chambers		WIRC	DAM002041
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002042

Appendix 1. Specimen records from Wisconsin: *Epicauta murina*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002043
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002044
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002045
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002046
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002047
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002048
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002049
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002050
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002051
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002052
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002053
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002054
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002055
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002056
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002057
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002058
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002059
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002060
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002061
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002062
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002063
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002064
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002065
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002066
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002067
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002068
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002069
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002070
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002071
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002072
Onieda	Rhineland	15-Jun-1922				WIRC	DAM002073
Onieda	Rhineland	12-Jun-1923				WIRC	DAM002074
Onieda	Rhineland	12-Jun-1923				WIRC	DAM002075
Onieda	T35N R11E S17	2-Jun-1976	8-Jun-1976		Gypsy Moth-M.T.	WIRC	DAM002107
Onieda	T35N R11E S17	6-Jul-1976	13-Jul-1976		Gypsy Moth-M.T.	WIRC	DAM002080
Onieda	T35N R11E S17	6-Jul-1976	13-Jul-1976		Gypsy Moth-M.T.	WIRC	DAM002081
Portage	Amherst Jc	16-Jul-1914		G A Chandler		WIRC	DAM002099
Rusk	T35N R7W B34	9-Aug-1953		R. H. Roberts		WIRC	DAM002085
Sauk	Leopold Reserve	1-Jun-1987		S. G. Miller	on plant	WIRC	DAM002108
Sauk	Leopold Reserve	13-Jun-1988		L. F. Goodman	Burke cabin, mercury vapor light	WIRC	DAM002102
Shawano	Big Eddy Falls	20-Jun-1925		T.E.B. Pope		MPMC	DAM001169
Shawano	Keshena	9-Jun-1921		T.E.B. Pope		MPMC	DAM001014

Appendix 1. Specimen records from Wisconsin: *Epicauta murina*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Shawano	Keshena Plum Lake Hemlock Forest SNA, 46	18-Jun-1925		T.E.B. Pope		MPMC	DAM001168
Vilas	01'06" -89 28'24"	11-Jun-2001		Michele B. Price	on purple lupine flower	MBPC	DAM001244
Vilas	T42N R7E S4	10-Jun-1958		R. D. Shenefelt		WIRC	DAM002100
Vilas	T42N R7E S4	10-Jun-1958		R. D. Shenefelt		WIRC	DAM002101
Vilas	T48N R7E S19	10-Jul-1968			7pm, Accothion plot 7 hrs post treat	WIRC	DAM002566
Vilas	T48N R7E S19	10-Jul-1968			7pm, Accothion plot 7 hrs post treat	WIRC	DAM002567
Vilas	T48N R7E S19	10-Jul-1968			7pm, Accothion plot 7 hrs post treat	WIRC	DAM002568
Vilas	Tenderfoot Lake	Jul-1912		Wm. S. Marshall		WIRC	DAM002098
Waushara	Highway 21 ROW, T18N R9E S12	27-May-1999		Andrew H. Williams	feeding on leaves of <i>Thalictrum dasycarpum</i> , 75F, 11AM sunny	WIRC	DAM002109
Waushara	Highway 21 ROW, T18N R9E S12	27-May-1999		Andrew H. Williams	feeding on leaves of <i>Thalictrum dasycarpum</i> , 75F, 11AM sunny	WIRC	DAM002110
Waushara	Highway 21 ROW, T18N R9E S12	27-May-1999		Andrew H. Williams	feeding on leaves of <i>Thalictrum dasycarpum</i> , 75F, 11AM sunny	WIRC	DAM002111
Waushara	Highway 21 ROW, T18N R9E S12	27-May-1999		Andrew H. Williams	feeding on leaves of <i>Thalictrum dasycarpum</i> , 75F, 11AM sunny	WIRC	DAM002112
Waushara	Highway 21 ROW, T18N R9E S12	27-May-1999		Andrew H. Williams	feeding on leaves of <i>Thalictrum dasycarpum</i> , 75F, 11AM sunny	WIRC	DAM002113
Wood	Hwy X, 44 20' 33.3" -90 07' 49.8"	9-Jun-2007		Eric M Heeg	Taken from <i>Lupinus perennis</i> L. in ditch along road	DAMC	DAM001177
Wood	Hwy X, 44 20' 33.3" -90 07' 49.8"	9-Jun-2007		Eric M Heeg	Taken from <i>Lupinus perennis</i> L. in ditch along road	DAMC	DAM001178
Wood	Hwy X, 44 20' 33.3" -90 07' 49.8"	9-Jun-2007		Eric M Heeg	Taken from <i>Lupinus perennis</i> L. in ditch along road	DAMC	DAM001179
Wood	44 18'26.7" -90 07'49.4" Sandhill Wildlife Area, Parking lot,	9-Jun-2007		Eric M Heeg	Swept from restored prairie in parking lot	WIRC	DAM001173
Wood	44 18'26.7" -90 07'49.4" Sandhill Wildlife Area, Parking lot,	9-Jun-2007		Eric M Heeg	Swept from restored prairie in parking lot	DAMC	DAM001174
Wood	44 18'26.7" -90 07'49.4" Sandhill Wildlife Area, Parking lot,	9-Jun-2007		Eric M Heeg	Swept from restored prairie in parking lot	DAMC	DAM001175
Wood	44 18'26.7" -90 07'49.4" Sandhill Wildlife Area, Parking lot,	9-Jun-2007 prior to Nov-1897		Eric M Heeg Fred. Rauterberg	Swept from restored prairie in parking lot	WIRC MPMC	DAM001176 DAM001170

Appendix 1. Specimen records from Wisconsin: *Epicauta cinerea*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Clark		12-Aug-1949		W. McNeel	forest floor, sweep net	WIRC	DAM000626
Columbia	Hwy 16 open roadside, T13N R7E Sec 25	31-Jul-2006		Andrew H. Williams	solitary beetle feed on leaves of Anemone canadensis 9AM sunny 85 deg. F, Collected by hand	WIRC	DAM000184
Columbia	Hwy 16 open roadside, T13N R7E Sec 25	31-Jul-2006		Andrew H. Williams	solitary beetle feed on leaves of Anemone canadensis 9AM sunny 85 deg. F, Collected by hand	WIRC	DAM000185
Columbia	Hwy 16 open roadside, T13N R7E Sec 25	31-Jul-2006		Andrew H. Williams	solitary beetle feed on leaves of Anemone canadensis 9AM sunny 85 deg. F, Collected by hand	WIRC	DAM000186
Columbia	Hwy 16 open roadside, T13N R7E Sec 25	31-Jul-2006		Andrew H. Williams	solitary beetle feed on leaves of Anemone canadensis 9AM sunny 85 deg. F, Collected by hand	WIRC	DAM000187
Columbia	Hwy 16 open roadside, T13N R7E Sec 25	31-Jul-2006		Andrew H. Williams	solitary beetle feed on leaves of Anemone canadensis 9AM sunny 85 deg. F, Collected by hand	WIRC	DAM000188
Columbia	Hwy 16 open roadside, T13N R7E Sec 25	31-Jul-2006		Andrew H. Williams	solitary beetle feed on leaves of Anemone canadensis 9AM sunny 85 deg. F, Collected by hand	WIRC	DAM000189
Columbia	Hwy 16 open roadside, T13N R7E Sec 26	28-Jul-2006		Andrew H. Williams	2 solitary beetles feed on leaves of Ranunculus pensylvanicus 11AM sunny 85 F, Hand collected	WIRC	DAM000190
Columbia	Hwy 16 open roadside, T13N R7E Sec 26	28-Jul-2006		Andrew H. Williams	2 solitary beetles feed on leaves of Ranunculus pensylvanicus 11AM sunny 85 F, Hand collected	WIRC	DAM000191
Columbia	Reddeman-Young Prairie, T11N R10E Sec 31	10-Aug-1998			Sweep Net (General) Dry-Mesic Prairie	WDNR	DAM002630
Dane	Boltz Prairie, T8N R8E S14 SE	14-Aug-1997		DNR Study		WDNR	DAM002635
Dane	Koch/Ziegler Prairie, T8N R8E Sec 27 NE	24-Jul-2001		Eric D. Mauer		WDNR	DAM002633
Dane	Koch/Ziegler Prairie, T8N R8E Sec 27 NE	24-Jul-2001		Eric D. Mauer		WDNR	DAM002634
Dane	T6N R8E Sec 7 SE1/4 of NW 1/4	14-Sep-1989		R. A. Henderson		WDNR	DAM002658
Dane	Walking Iron Co. Park, T8N R6E Sec 8NW	26-Jun-1991		R. A. Henderson	Taken from: foliage of sand prairie vegetation	WDNR	DAM002636
Dane	Raymond Road Prairie, T6N R8E Sec 2	3-Jul-1996			Sweep Net Native Prairie	WDNR	DAM002631
Door	Twn. St. Bay	16-Aug-1979		Linda Bowen		UWSP	DAM001271
Dunn	Hwy 170 @ wtr trt, T30N R12W S31	10-Jul-1998		C. Bomar	sweep net several feeding and resting on leaves of Anemone canadensis 10AM cloudy 69F, Hand collected	WDNR	DAM002725
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams		WIRC	DAM000597

Appendix 1. Specimen records from Wisconsin: *Epicauta cinerea*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000598
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000599
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000600
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000601
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000602
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000603
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000604
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000605
Grant	Closing Dam Rd, T4N R6W Sec 34	29-Jul-2005		Andrew H. Williams	several feeding and resting on leaves of <i>Anemone canadensis</i> 10AM cloudy 69F, Hand collected	WIRC	DAM000606
Grant	Closing Dam Rd, T4N R6W Sec 34	21-Jul-2006		Andrew H. Williams	about 15 seen on foliage of <i>Anemone canadensis</i> , much frass & feeding damage, Hand collected	WIRC	DAM000194
Grant	Closing Dam Rd, T4N R6W Sec 34	21-Jul-2006		Andrew H. Williams	about 15 seen on foliage of <i>Anemone canadensis</i> , much frass & feeding damage, Hand collected	WIRC	DAM000195
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on <i>Anemone canadensis</i> , <i>clematis virginiana</i> , hand collected	WIRC	DAM000075
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on <i>Anemone canadensis</i> , <i>clematis virginiana</i> , hand collected	DAMC	DAM000076
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on <i>Anemone canadensis</i> , <i>clematis virginiana</i> , hand collected	WIRC	DAM000077

Appendix 1. Specimen records from Wisconsin: *Epicauta cinerea*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on Anemone canadensis, clematis virginiana, hand collected	DAMC	DAM000079
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on Anemone canadensis, clematis virginiana, hand collected	UWGB	DAM000080
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on Anemone canadensis, clematis virginiana, hand collected	WIRC	DAM000081
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on Anemone canadensis, clematis virginiana, hand collected	WIRC	DAM000082
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on Anemone canadensis, clematis virginiana, hand collected	WIRC	DAM000083
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR feeding on Anemone canadensis, clematis virginiana, hand collected	WIRC	DAM000084
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR, feeding & mating on Anemone canadensis, Hand Collected	WIRC	DAM000230
Grant	T6N R5N Sec 17	24-Aug-1977	31-Aug-1977		Gypsy Moth project, Malaise Trap	WIRC	DAM000612
Grant	T6N R6W Sec 17	5-Aug-1975	12-Aug-1975		Gypsy Moth project, Malaise Trap	WIRC	DAM000611
Grant	T6N R6W Sec 17	12-Aug-1975	20-Aug-1975		Gypsy Moth project, Malaise Trap	WIRC	DAM000613
Grant	T6N R6W Sec 17	12-Aug-1975	20-Aug-1975		Gypsy Moth project, Malaise Trap	WIRC	DAM000614
Grant	T6N R6W Sec 17	6-Jul-1977	13-Jul-1997		Gypsy Moth project, Malaise Trap	WIRC	DAM000607
Grant	T6N R6W Sec 17	6-Jul-1977	13-Jul-1997		Gypsy Moth project, Malaise Trap	WIRC	DAM000608
Grant	T6N R6W Sec 17	6-Jul-1977	13-Jul-1997		Gypsy Moth project, Malaise Trap	WIRC	DAM000609
Grant or Iowa		Aug-2006		Daniel A. Marschalek	Escaped from captive group so not certain the specific collected location, Hand collected	DAMC	DAM000711
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.70077 -89.49293	22-Jul-2006		Daniel A. Marschalek	Sandy prairie, grass, Hand Collected	DAMC	DAM000208
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.70077 -89.49293	22-Jul-2006		Daniel A. Marschalek	Sandy prairie, grass, Hand Collected	DAMC	DAM000209
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.70077 -89.49293	22-Jul-2006		Daniel A. Marschalek	Sandy prairie, grass, Hand Collected	WIRC	DAM000210
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	Sandy prairie, on Solidago sp., Hand Collected	WIRC	DAM000211
Iowa	Barneveld Prairie (TNC), 43.00062 -89.92216	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on leaves of Solanum dulcamara, Hand Collected	WIRC	DAM000212
Iowa	Barneveld Prairie (TNC), 43.00062 -89.92216	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on leaves of Solanum dulcamara, Hand Collected	WIRC	DAM000213

Appendix 1. Specimen records from Wisconsin: *Epicauta cinerea*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Iowa	Barneveld Priaire (TNC), 43.00062 - 89.92216	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on leaves of Solanum dulcamara, Hand Collected	WIRC	DAM000214
Iowa	Barneveld Priaire (TNC), 43.00062 - 89.92216	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on leaves of Solanum dulcamara, Hand Collected	DAMC	DAM000215
Jackson	T21N R4W Sec 33	7-Sep-1976	14-Sep-1976		Gypsy Moth project, Malaise Trap	WIRC	DAM000610
Kenosha	Craig Fenter's land, T1N R21E Sec 7	25-Jul-2007		Andrew H. Williams	3 solitary beetles some inches apart feeding on leaves of Solanum nigrum, Hand collected	WIRC	DAM000458
Kenosha	Craig Fenter's land, T1N R21E Sec 7	25-Jul-2007		Andrew H. Williams	3 solitary beetles some inches apart feeding on leaves of Solanum nigrum, Hand collected	WIRC	DAM000459
Kenosha	Craig Fenter's land, T1N R21E Sec 7	25-Jul-2007		Andrew H. Williams	3 solitary beetles some inches apart feeding on leaves of Solanum nigrum, Hand collected	WIRC	DAM000460
La Crosse	La Crosse R. Tr. Pr., T17N R4W Sec35	6-Aug-1995		DNR Study	sweep net in native pr. 75F 12:50pm misting	WDNR	DAM002632
Lafayette	Hardscrabble Prairie, T1N R1E Sec 30	1-Aug-1997			Sweep Net Dry prairie Prairie Dropseed	WDNR	DAM002628
Lafayette	Hardscrabble Prairie, T1N R1E Sec 30	1-Aug-1997			Sweep Net Dry prairie Prairie Dropseed	WDNR	DAM002629
Marathon	Nine Mile Swamp Area, Rib Mountain	25-Jul-1970		James Parkinson		MPMC	DAM002450
Milwaukee	Milwaukee Foster Cemetary Pr.,	10-Sep-1915		GA Chandler		WIRC	DAM000625
Pierce	T27N/R18W/Sec2SE	20-Jul-2003		Misc. DNR	Sweep Net/Burned Pr., Dropseed and others, Dry-Mesic Prairie	WIRC	DAM001249
Racine	Corliss	21-Mar-1905		C. T. Brues		MPMC	DAM001017
Racine		2-Sep-1912		S. Graenicher		MPMC	DAM001016
Richland	T8N R2W Sec 3	22-Jul-1997		Andrew H. Williams	many, feeding on leaves of Anemone canadensis 2 PM p. cloudy 72F, Hand collected	WIRC	DAM000615
Richland	T8N R2W Sec 3	22-Jul-1997		Andrew H. Williams	many, feeding on leaves of Anemone canadensis 2 PM p. cloudy 72F, Hand collected	WIRC	DAM000616
Richland	T8N R2W Sec 3	22-Jul-1997		Andrew H. Williams	many, feeding on leaves of Anemone canadensis 2 PM p. cloudy 72F, Hand collected	WIRC	DAM000617
Richland	T8N R2W Sec 3	22-Jul-1997		Andrew H. Williams	many, feeding on leaves of Anemone canadensis 2 PM p. cloudy 72F, Hand collected	WIRC	DAM000618
Richland	T8N R2W Sec 3	22-Jul-1997		Andrew H. Williams	many, feeding on leaves of Anemone canadensis 2 PM p. cloudy 72F, Hand collected	WIRC	DAM000619

Appendix 1. Specimen records from Wisconsin: *Epicauta cinerea*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Richland	T8N R2W Sec 3	22-Jul-1997		Andrew H. Williams	many, feeding on leaves of <i>Anemone canadensis</i> 2 PM p. cloudy 72F, Hand collected	WIRC	DAM000620
Richland	T8N R2W Sec 3	22-Jul-1997		Andrew H. Williams	many, feeding on leaves of <i>Anemone canadensis</i> 2 PM p. cloudy 72F, Hand collected	WIRC	DAM000621
Richland	T8N R2W Sec 3	22-Jul-1997		Andrew H. Williams	many, feeding on leaves of <i>Anemone canadensis</i> 2 PM p. cloudy 72F, Hand collected	WIRC Williams & Young	DAM000622 DAM000615-
Richland		22-Jul-1997			Feeding on <i>Anemone canadensis</i> foliage	(1999)	DAM000622
Rock	Evansville	12-Jul-1977		James Pea	L.T.	WIRC	DAM000596

Appendix 1. Specimen records from Wisconsin: *Epicauta flobcina*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Burnett	Crex Meadows SWA, 45 50'11" -92 40'44"	3-Jul-2001	18-Jul-2001	Michele B. Price	Flight intercept trap in sandy prairie/barrens	WIRC	DAM002485
Columbia	Arlington Farm Prairie, T10N R10E Sec31	2-Jul-1999			Sweep Net Dry-Mesic Prairie Prairie Dropseed	WDNR	DAM002714
Dane	3 mi N Middleton, Boltz Prairie, 43.16324 -89.50945	18-Jul-2006		Daniel A Marschalek	On Andropogon	DAMC	DAM001227
Dane	Boltz Prairie, T8N R8E Sec 14 SE	6-Jul-1991		R. A. Henderson	Taken from: foliage of prairie veg. dry-mesic, Hand collected	WIRC	DAM000493
Dane	Walking Iron Park, T8N R6E Sec 8 NW	26-Jun-1991		R. A. Henderson	taken from: foliage of sand prairie vegetation, Hand collected	WIRC	DAM000491
Dunn	Rock Falls Raceway, T26N R10W Sec 7	2-Jul-1999		E. Secrist		CRBC	DAM000437
St. Croix	North Hudson	5-Aug-1909	14-Aug-1909	Museum Expedition		MPMC	DAM002733

Appendix 1. Specimen records from Wisconsin: *Epicauta funebris*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Adams	501919 -2337744	23-Jul-2007	30-Jul-2007	Hannah Gaines	BU-16 HC ID#1655	WIRC	DAM001187
Adams	501919 -2337744	23-Jul-2007	30-Jul-2007	Hannah Gaines	BU-16 HC ID#1652	WIRC	DAM002860
Adams	6 mi W Oxford	21-Aug-2006		Ben Werling	Collected	WIRC	DAM000217
Adams	N of Grand Marsh	10-Aug-2007		Ben Werling	In gras near potatoes, sweep net	WIRC	DAM000710
Columbia	T13N R8E Sect. 32	9-Aug-1997		Andrew H. Williams	mating & feeding on leaves of Physalis heterophylla, 4PM hazy 80F	WIRC	DAM001777
Columbia	T13N R8E Sect. 32	9-Aug-1997		Andrew H. Williams	mating & feeding on leaves of Physalis heterophylla, 4PM hazy 80F	WIRC	DAM001780
Columbia		9-Aug-1997			Feeding on Physalis heterophylla foliage	Williams & Young (1999)	DAM001777, DAM001780
Crawford	Gays Mills	18-Jul-1942				WIRC	DAM001765
Crawford	Gays Mills	20-Jul-1942				WIRC	DAM001769
Crawford	Gays Mills	20-Jul-1942				WIRC	DAM001770
Crawford	Gays Mills	22-Jul-1942				WIRC	DAM001766
Crawford	Gays Mills	22-Jul-1942				WIRC	DAM001767
Crawford	Gays Mills	24-Jul-1942				WIRC	DAM001771
Crawford	Gays Mills	25-Jul-1942				WIRC	DAM001768
Dane	Madison, Eagle Heights	18-Jul-2007		Ben Werling	Sweep netting weedy area	DAMC	DAM001186
Dane	Madison, private farm, 43 04'22.51" - 89 23'11.98"	17-Aug-2007		M. Singleton		WIRC	DAM002571
Dane	Madison; Demetral Fields	21-Jun-2012		Heather R. Llanas	In park	DAMC	DAM002823
Dane	Madison; UW Arboretum, 43.039978 -89.430955	5-Aug-2012		Daniel A. Marschalek	Walking on grass/gravel path	WIRC	DAM002909
Dane	Madison; UW-Arboretum, 43.02794 - 89.44221	23-Aug-2006		Daniel A. Marschalek	mesic prairie, resting on Solidago rigida leaf, hand collected	WIRC	DAM000074
Dane	T6N R8E Sec 7 SE1/4 of NW 1/4	9-Aug-1991		R. A. Henderson	Taken from mature oak opening/savanna	WDNR	DAM002626
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	10-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000806
Dane	Wilderness behind Hwy 30, Madison	15-Jul-2007		Sarah J. Foltz	mating pr. on Hypericum perforatum	WIRC	DAM002572
Dunn	Menomonie	9-Jul-2006		C Bomar	On tennis court	DAMC	DAM001228
Dunn	NSP Dushame Creek, T26N R12W Sec 21 & 22	20-Aug-1999		E. Secrist		CRBC	DAM000438
Grant	Closing Dam Rd, T4N R6W Sec 34	24-Jul-2006		Andrew H. Williams	2 solitary beetles feed on leaves of Clematis virginiana 7AM 70F, Hand collected	WIRC	DAM000192
Grant	Closing Dam Rd, T4N R6W Sec 34	24-Jul-2006		Andrew H. Williams	2 solitary beetles feed on leaves of Clematis virginiana 7AM 70F, Hand collected	WIRC	DAM000193

Appendix 1. Specimen records from Wisconsin: *Epicauta funebris*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	Closing Dam Rd, T4N R6W Sec 34	9-Aug-2006		Andrew H. Williams	3 solitary beetles feed on leaves of Physalis heterophylla 10AM, Hand collected	WIRC	DAM000461
Grant	Closing Dam Rd, T4N R6W Sec 34	9-Aug-2006		Andrew H. Williams	3 solitary beetles feed on leaves of Physalis heterophylla 10AM, Hand collected	WIRC	DAM000462
Grant	Closing Dam Rd, T4N R6W Sec 34	9-Aug-2006		Andrew H. Williams	3 solitary beetles feed on leaves of Physalis heterophylla 10AM, Hand collected	WIRC	DAM000463
Grant	Eagle Valley Nat Pres, end of Closing Dam Rd, 42.7868 -91.0699	24-Jul-2006		Daniel A. Marschalek	wooded roadside & RR, feeding on Physalis heterophylla leaves, Hand Collected	WIRC	DAM000216
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001018
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001019
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001020
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001021
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001022
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001023
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001024
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001025
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001026
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001027
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001028
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001029
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001030
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001032
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001033
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001034
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001035
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001036
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001037
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001038
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001039
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001040
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001041
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001043
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001044
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001045
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001045
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001046
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001047
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001049
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001050
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001051
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001052

Appendix 1. Specimen records from Wisconsin: *Epicauta funebris*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001053
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001054
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001055
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001056
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001057
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001058
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001059
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001060
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001061
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001062
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001063
Grant	Rutledge	30-Jul-1911	4-Aug-1911			WIRC	DAM001772
Grant	Rutledge	30-Jul-1911	4-Aug-1911			WIRC	DAM001773
Grant	T8N R2W Sect. 17	14-Jul-1999		Andrew H. Williams	solitary, clambering over Aster ericoides, 11AM fair 76F	WIRC	DAM001774
Grant	Wyalusing	20-Jul-1911	28-Jul-1911	Museum Expedition		MPMC	DAM001042
Green	New Glarus	24-Aug-1997		Jason R. Gerber	Collected by hand from sidewalk old field, feeding on leaves of Solanum dulcamara, hand collected	WIRC	DAM001762
Iowa	Barneveld Prairie (TNC), 43.00062 - 89.92216	3-Aug-2006		Daniel A. Marschalek	old field, feeding on leaves of Solanum dulcamara, hand collected	WIRC	DAM000071
Iowa	Barneveld Prairie (TNC), 43.00062 - 89.92216	3-Aug-2006		Daniel A. Marschalek	dulcamara, hand collected	DAMC	DAM000072
Iowa	Rt. 23, 1 mi N. Gov. Dodge	26-Jun-1991		L. J. Bayer	ex Achillea	WIRC	DAM001764
Iowa	Rt. 23, 1 mi N. Gov. Dodge	26-Jun-1991		L. J. Bayer	ex Achillea	WIRC	DAM001775
Jackson	Black River State Forest, 44 13.920' - 90 38.888'	2-Jul-2008		John J Dorshorst		JJDC	DAM000879
Jefferson	4 mi north of Lake Mills, Prairie Rd: Faville Prairie, 43.1436 -88.87918 Necedah Nat. Wildlife Refuge, N.	8-Aug-2006		Craig M. Brabant	collected during day off flowers in limey hilltop prairie	CMBC	DAM001377
Juneau	Rynearson, 44 4'34" -90 10'13" Necedah Nat. Wildlife Refuge, N.	21-Jun-1996	11-Jul-1996	R. King	F.I. Trap	WIRC	DAM002562
Juneau	Rynearson, 44 4'34" -90 10'13" Necedah Nat. Wildlife Refuge, N.	21-Jun-1996	11-Jul-1996	R. King	F.I. Trap	WIRC	DAM002563
Juneau	Rynearson, 44 4'34" -90 10'13" Necedah Nat. Wildlife Refuge, N.	11-Jul-1996	14-Aug-1996	J. Johnson	F.I. Trap	WIRC	DAM002564
Juneau	Rynearson, 44 4'34" -90 10'13" Chiwaukee Prairie (TNC), 42.50284 - 87.80956	11-Jul-1996	14-Aug-1996	J. Johnson	F.I. Trap dry prairie, feeding on Physalis heterophylla leaves, Hand collected	WIRC	DAM002565
Kenosha	Chiwaukee Prairie (TNC), 42.50284 - 87.80956	21-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Physalis heterophylla leaves, Hand collected	WIRC	DAM000715
Kenosha	Chiwaukee Prairie (TNC), 42.50284 - 87.80956	21-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Physalis heterophylla leaves, Hand collected	DAMC	DAM000716
Kenosha	Chiwaukee Prairie SNA, T1N R23E Sec 31, 32	29-Aug-2006		Andrew H. Williams	5 solitary beetles feed on leaves of Physalis heterophylla 1PM 72F, Hand collected	WIRC	DAM000464

Appendix 1. Specimen records from Wisconsin: *Epicauta funebris*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Kenosha	Chiwaukee Prairie SNA, T1N R23E Sec 31, 32	29-Aug-2006		Andrew H. Williams	5 solitary beetles feed on leaves of <i>Physalis heterophylla</i> 1PM 72F, Hand collected	WIRC	DAM000465
Kenosha	Chiwaukee Prairie SNA, T1N R23E Sec 31, 32	29-Aug-2006		Andrew H. Williams	5 solitary beetles feed on leaves of <i>Physalis heterophylla</i> 1PM 72F, Hand collected	WIRC	DAM000466
Kenosha	Chiwaukee Prairie SNA, T1N R23E Sec 31, 32	29-Aug-2006		Andrew H. Williams	5 solitary beetles feed on leaves of <i>Physalis heterophylla</i> 1PM 72F, Hand collected	WIRC	DAM000467
Kenosha	Chiwaukee Prairie SNA, T1N R23E Sec 31, 32	29-Aug-2006		Andrew H. Williams	5 solitary beetles feed on leaves of <i>Physalis heterophylla</i> 1PM 72F, Hand collected	WIRC	DAM000468
La Crosse	Hixon Forest Nat. Ctr., T16N R7W Sect. 32	30-Jun-2001		Andrew H. Williams	sunny 90F, open grassy area	WIRC	DAM001776
Rock	6 mi S. Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	native plant nursery, fallow field, Collected by hand	WIRC	DAM000183
Rock	Kessler RR Prairie, T2N R11E	10-Aug-1995		DNR Study	coll. on <i>helianthus</i> sp "sunflower"	WDNR	DAM002627
Rock	Norman's sandy prairie, T1N R11E Sect. 31	28-Aug-2001		Daniel K. Young	on sandy ground, 3PPM sunny 80F	WIRC	DAM001778
Rock	Norman's sandy prairie, T1N R11E Sect. 31	28-Aug-2001		Daniel K. Young	on sandy ground, 3PPM sunny 80F	WIRC	DAM001779
Rock	Richard Norman prop., Brandhem Road, 42 30'26" -89 15'04"	28-Aug-2001		Craig M. Brabant	Sand prairie restor., sunny, ~50°F, calm, collected off of sandy soil at edge of prairie	CMBC	DAM001348
Sauk	Aldo Leopold Reserve	30-Jul-1987		Scott G. Miller	found on plant	WIRC	DAM001763
Sauk	ICF, 2 mi N Baraboo	29-Jul-2006		Daniel A. Marschalek	in prairie, on vegetation, hand collected	DAMC	DAM000073
St. Croix	North Hudson	13-Aug-1909	14-Aug-1909	Museum Expedition		MPMC	DAM002734
St. Croix	North Hudson	7-Jul-1910	12-Jul-1910	Museum Expedition		MPMC	DAM002732
Trempealeau	Trempealeau NWR, T18N R9W Sec 2 mi W Waukesha, Retzer Nature Center	25-Jun-2002		Study 053/ED Maurer	sandy prairie restoration, sweep net	WIRC	DAM000492
Waukesha	Mukwonago	18-Aug-2006		Larry Kascht	Hand Collected	WIRC	DAM000229
Waukesha	Scuppernong Pr./SNA, W of Hwy N, T5N R17E Sc16NW4	8-Jul-2003		Kevin Paprocki		WIRC	DAM001752
Waukesha	Scuppernong Pr./SNA, W of Hwy N, T5N R17E Sc16NW4	28-Jul-2002		S B Sauer	Wet prairie, Hand, grouping on <i>Silphium integrifolium</i>	WIRC	DAM001246
Waukesha	Scuppernong Pr./SNA, W of Hwy N, T5N R17E Sc16NW4	28-Jul-2002		S B Sauer	Wet prairie, Hand, grouping on <i>Silphium integrifolium</i>	WIRC	DAM001247
Waukesha	Scuppernong Pr./SNA, W of Hwy N, T5N R17E Sc16NW4	28-Jul-2002		S B Sauer	Wet prairie, Hand, grouping on <i>Silphium integrifolium</i>	WIRC	DAM001248

Appendix 1. Specimen records from Wisconsin: *Epicauta obesa*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dunn	Larrabee Prairie	1-Aug-1996		C. R. Bomar	burned prairie 96, sweep net	CRBC	DAM000436
Grant	Wyalusing	13-Jul-1910	28-Jul-1911	Museum Expedition		MPMC	DAM002735
Jackson	Black River SF , T20N/R2W/SWSE17	15-Jul-1997		Kathryn Kirk	grassy barrens, WDNR-ER flightrap	WIRC	DAM002486
Oconto	Gillet, Hwy 32	9-Aug-2006		Daniel A. Marschalek	weedy field, Pan trap	DAMC	DAM000334
Racine	Corliss	21-Mar-1905		C. T. Brues		MPMC	DAM002731

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Adams	~3 miles south of Adams McKenna Substa. (ATC), 43 54'36" -89 48'16"	30-Jul-2002		Craig M. Brabant	12:30-1:30pm clear, ~86F, winds 4-7mph; off flowers of Solidago sp.	CMBC	DAM002836
Adams	7th Ave	5-Jul-1999		Daniel A. Marschalek	on goldenrod, hand collected	WIRC	DAM000091
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002876
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002877
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002878
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002879
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002880
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002881
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002882
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002883
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002884
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002885
Adams	Hwy W & Archer Ave, 44.184759 - 89.658512	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002886
Ashland	N of Hwy 70; W of Co. GG, 45.99888 -90.85994	24-Jul-2012		Kari Gullickson	On Aster umbellatus	WIRC	DAM002860
Ashland	T48N R4W S27	18-Aug-1998		Andrew H. Williams	among flowers Solidago canadensis, 6PM	WIRC	DAM001544
Ashland	T48N R4W S27	18-Aug-1998		Andrew H. Williams	among flowers Solidago canadensis, 6PM	WIRC	DAM001545
Barron	Barron	19-May-1957				WIRC	DAM001669
Barron	Barron	19-May-1957				WIRC	DAM001670
Barron	Barron	19-May-1957				WIRC	DAM001671
Barron	Barron	19-May-1957				WIRC	DAM001672
Barron	Barron	19-May-1957				WIRC	DAM001673
Barron	Barron	19-May-1957				WIRC	DAM001674
Barron	Barron	19-May-1957				WIRC	DAM001675
Barron	Barron	19-May-1957				WIRC	DAM001676
Barron	Barron	19-May-1957				WIRC	DAM001677
Barron	Barron	19-May-1957				WIRC	DAM001678
Barron	Barron	19-May-1957				WIRC	DAM001679
Barron	Barron	19-May-1957				WIRC	DAM001680

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Barron	T36N R13W Sect. 18	19-Aug-1998		Andrew H. Williams	among flowers of Solidago canadensis, 2Pm cloudy 74F weedy lot surrounded by sumac/box elder/cottonwood woodland & corn field; crawling around on goldenrod flower; 4:41pm	WIRC	DAM001556
Brown	Green Bay, 44 29.571 -87 56.596 Green Bay/Baird Creek, T23N R21E	9-Sep-2006		Kyle E. Johnson	~65-70F sunny breezy	KEJC	DAM002853
Brown	Sec3NE Green Bay/Baird Creek, T23N R21E	26-Jul-1998		Craig M. Brabant	Hand collected during day off of goldenrod	CMBC	DAM001335
Brown	Sec3NE Green Bay/Baird Creek, T23N R21E	26-Jul-1998		Craig M. Brabant	Hand collected during day off of goldenrod	CMBC	DAM001336
Brown	Sec3NE Green Bay/Baird Creek, T23N R21E	26-Jul-1998		Craig M. Brabant	Hand collected during day off of goldenrod	CMBC	DAM001337
Brown	Sec3NE	26-Jul-1998		Craig M. Brabant	Hand collected during day off of goldenrod	CMBC	DAM001338
Buffalo	Fountain City	12-Aug-1910	17-Aug-1910	Museum Expedition		MPMC	DAM001075
Buffalo	Fountain City	12-Aug-1910	17-Aug-1910	Museum Expedition		MPMC	DAM001133
Buffalo	Fountain City	12-Aug-1910	17-Aug-1910	Museum Expedition		MPMC	DAM001136
Buffalo	Fountain City	12-Aug-1910	17-Aug-1910	Museum Expedition		MPMC	DAM001137
Buffalo	Fountain City	12-Aug-1910	17-Aug-1910	Museum Expedition		MPMC	DAM001142
Buffalo	Fountain City	12-Aug-1910	17-Aug-1910	Museum Expedition		MPMC	DAM001143
Buffalo	Mondovi	5-Aug-1920		T.E.B. Pope		MPMC	DAM001073
Buffalo	T20N R8W Sect. 36	16-Aug-1998		Andrew H. Williams	1 of several working flowers Solidago rigida, 3PM sunny 80F	WIRC	DAM001538
Buffalo	T20N R8W Sect. 36 Golden Valley Bluff, T24N R13W Sec	16-Aug-1998		Andrew H. Williams	1 of several working flowers Solidago rigida, 3PM sunny 80F	WIRC	DAM001539
Buffalo	15 Golden Valley Bluff, T24N R13W Sec	30-Aug-1995			Sweep Net 87F Clear Prairie	WDNR	DAM002704
Buffalo	15 "Roling Green Rd-site 2", 45.830242 -	30-Aug-1995			Sweep Net 87F Clear Prairie	WDNR	DAM002713
Burnett	92.11942 "Roling Green Rd-site 2", 45.830242 -	23-Jul-2007		Craig M. Brabant	hand-collected off Solidago sp. in right-of-way; 81F, mostly cloudy	CMBC	DAM002830
Burnett	92.11942 "Roling Green Rd-site 2", 45.830242 -	23-Jul-2007		Craig M. Brabant	hand-collected off Solidago sp. in right-of-way; 81F, mostly cloudy	CMBC	DAM002831
Burnett	92.11942 "Roling Green Rd-site 2", 45.830242 -	23-Jul-2007		Craig M. Brabant	hand-collected off Solidago sp. in right-of-way; 81F, mostly cloudy	CMBC	DAM002832
Burnett	92.11942 "Roling Green Rd-site 2", 45.830242 -	23-Jul-2007		Craig M. Brabant	hand-collected off Solidago sp. in right-of-way; 81F, mostly cloudy	CMBC	DAM002833
Burnett	38.164 Crex Meadows, 45 32.722 -92	30-Jul-2007		Rachel A. Arango	Sand Prairie, on goldenrod	WIRC	DAM002607
Burnett	38.136 Crex Meadows, 45 52.694 -92	30-Jul-2007		Rachel A. Arango	Sand Prairie, on goldenrod	WIRC	DAM002606

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002887
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002888
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002889
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002890
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002891
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002892
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002893
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002894
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002895
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002896
Calumet	Conservation Road, Brillion State Wildlife Area, 44.168222 -88.128527	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002897
Chippewa	1929 80th St.	3-Oct-2000		E. Hoy		UWEC	DAM002819
Chippewa	Lake Wissota St Pk	1-Aug-1996		C. R. Bomar	burned prairie 95	CRBC	DAM000257
Chippewa	Lake Wissota St. Pk.	1-Aug-1996		C. R. Bomar	burned prairie 95, sweep net	CRBC	DAM000249
Chippewa	Lake Wissota St. Pk.	1-Aug-1996		C. R. Bomar	burned prairie 95, sweep net	CRBC	DAM000250
Chippewa	Lake Wissota St. Pk.	2-Sep-1996		C. R. Bomar	burned prairie 95, sweep net	CRBC	DAM000255
Chippewa	Lake Wissota St. Pk.	2-Sep-1996		C. R. Bomar	burned prairie 95, sweep net	CRBC	DAM000256
Clark	5 mi SE Augusta, 44.64074 - 91.01708	16-Aug-2006		Daniel A. Marschalek	mesic prairie roadside feeding on Solidago canadensis flowers, Hand collected	WIRC	DAM000144
Clark	5 mi SE Augusta, 44.64074 - 91.01708	16-Aug-2006		Daniel A. Marschalek	mesic prairie roadside feeding on Solidago canadensis flowers, Hand collected	WIRC	DAM000145

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Clark	5 mi SE Augusta, 44.64074 - 91.01708	16-Aug-2006		Daniel A. Marschalek	mesic prairie roadside feeding on Solidago canadensis flowers, Hand collected	WIRC	DAM000146
Clark	5 mi SE Augusta, 44.64074 - 91.01708	16-Aug-2006		Daniel A. Marschalek	mesic prairie roadside feeding on Solidago canadensis flowers, Hand collected	WIRC	DAM000147
Clark	T29N R3W Sect. 36	18-Aug-1998		Andrew H. Williams	11AM p. cloudy 70F, on flowers of Solidago canadensis	WIRC	DAM001546
Clark	T29N R3W Sect. 36	18-Aug-1998		Andrew H. Williams	11AM p. cloudy 70F, on flowers of Solidago canadensis	WIRC	DAM001547
Clark	T29N R3W Sect. 36	18-Aug-1998		Andrew H. Williams	11AM p. cloudy 70F, on flowers of Solidago graminifolia	WIRC	DAM001548
Clark	T29N R3W Sect. 36	18-Aug-1998		Andrew H. Williams	11AM p. cloudy 70F, on flowers of Solidago graminifolia	WIRC	DAM001549
Columbia	Arlington	4-Sep-1972		P. I. Sunjaya	on alfalfa	WIRC	DAM001466
Columbia	Arlington	4-Sep-1972		P. I. Sunjaya	on alfalfa	WIRC	DAM001467
Columbia	Arlington	4-Sep-1972		P. I. Sunjaya	on alfalfa	WIRC	DAM001468
Columbia	Arlington	4-Sep-1972		P. I. Sunjaya	on alfalfa	WIRC	DAM001732
Columbia	Arlington	12-Sep-1981		S L Roberts		WIRC	DAM001663
Columbia	Arlington	12-Sep-1981		S L Roberts		WIRC	DAM001664
Columbia	Arlington	12-Sep-1981		S L Roberts		WIRC	DAM001665
Columbia	Arlington Farm	4-Sep-1972		R. Tarumingkeng	on raddish	WIRC	DAM002805
Columbia	Arlington AFW	30-Sep-1996		S. A. Steffan		WIRC	DAM001627
Columbia	Arlington farm	4-Sep-1972		R. Tarumingkeng	on raddish	WIRC	DAM001462
Columbia	Arlington farm	4-Sep-1972		R. Tarumingkeng	on raddish	WIRC	DAM001463
Columbia	Arlington, UW Research Stat	6-Aug-2007	9-Aug-2007	Ben Werling	Fallow area, sweep net	WIRC	DAM000712
Columbia	Arlington, UW Research Stat	6-Aug-2007	9-Aug-2007	Ben Werling	Fallow area, sweep net	WIRC	DAM000713
Columbia	Arlington, UW-Madison Res Stat	14-Aug-2007		Emily E. Mueller	In soy field, Pantrap	WIRC	DAM000811
Columbia	ca. 6mi W. & 0.3mi S. Doylestown, Lowville pub. Hunt. & fish.gr.	28-Jul-1980		C. Yanek	along path through stand of crabapple trees w. milkweed & grasses near swampy area	MPMC	DAM002470
Columbia	ca. 6mi W. & 0.3mi S. Doylestown, Lowville pub. Hunt. & fish.gr.	28-Jul-1980		C. Yanek	along path through stand of crabapple trees w. milkweed & grasses near swampy area	MPMC	DAM002471
Columbia	ca. 6mi W. & 0.3mi S. Doylestown, Lowville pub. Hunt. & fish.gr.	28-Jul-1980		C. Yanek	along path through stand of crabapple trees w. milkweed & grasses near swampy area	MPMC	DAM002472
Columbia	ca. 6mi W. & 0.3mi S. Doylestown, Lowville pub. Hunt. & fish.gr.	28-Jul-1980		C. Yanek	along path through stand of crabapple trees w. milkweed & grasses near swampy area	MPMC	DAM002473
Columbia	ca. 6mi W. & 0.3mi S. Doylestown, Lowville pub. Hunt. & fish.gr.	28-Jul-1980		C. Yanek	along path through stand of crabapple trees w. milkweed & grasses near swampy area	MPMC	DAM002474

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Columbia	ca. 6mi W. & 0.3mi S. Doylestown, Lowville pub. Hunt. & fish.gr.	28-Jul-1980		C. Yanek	along path through stand of crabapple trees w. milkweed & grasses near swampy area	MPMC	DAM002475
Columbia	ca. 6mi W. & 0.3mi S. Doylestown, Lowville pub. Hunt. & fish.gr.	28-Jul-1980		C. Yanek	along path through stand of crabapple trees w. milkweed & grasses near swampy area	MPMC	DAM002476
Columbia	ca. 6mi W. & 0.3mi S. Doylestown, Lowville pub. Hunt. & fish.gr.	28-Jul-1980		C. Yanek	along path through stand of crabapple trees w. milkweed & grasses near swampy area	MPMC	DAM002477
Columbia	Portage	22-Sep-1917				WIRC	DAM001617
Columbia	UW Ag. Res. Sta.-Arlington	23-Sep-1997		K. Gross		WIRC	DAM001626
Columbia	Rocky Run Oak Opening, T12N R10E Sec32	5-Sep-1995			Hand Old Field Flowers Canada Goldenrod	WDNR	DAM002671
Columbia	Rocky Run Oak Opening, T12N R10E Sec32	3-Sep-1996			YPT Savanna/Old Field	WDNR	DAM002673
Columbia	Rocky Run Oak Opening, T12N R10E Sec32	3-Sep-1996			YPT Sand Prairie/Savanna to ETOH	WDNR	DAM002685
Columbia	Rocky Run Oak Opening, T12N R10E Sec32	15-Sep-1997			Hand Caught Old Field	WDNR	DAM002648
Columbia	Rocky Run Oak Opening, T12N R10E Sec32	15-Sep-1997			Sweep Net Dry prairie	WDNR	DAM002654
Columbia	Rocky Run Oak Opening, T12N R10E Sec32	15-Sep-1997			Sweep Net Dry prairie	WDNR	DAM002661
Crawford	Gays Mills	9-Jun-1932				WIRC	DAM002784
Crawford	Gays Mills	9-Jun-1932				WIRC	DAM002785
Crawford	Gays Mills	9-Jun-1932				WIRC	DAM002786
Crawford	Gays Mills	9-Jun-1932				WIRC	DAM002787
Crawford	Gays Mills	24-Jul-1942				WIRC	DAM001636
Crawford	Gays Mills	29-Jul-1942				WIRC	DAM001562
Crawford	Bell Center Prairie, T9N R4W Sec 4	1-Sep-1995			Sweep Net 80F Clear A.M. Sand Prairie at Sand Hill Rd.	WDNR	DAM002711
Crawford	Bell Center Prairie, T9N R4W Sec 4 Hogback (Bay Farm), T9N R4W Sec 32	13-Aug-1998			D-Vac Dry prairie Slope above Sand Hill Rd.	WDNR	DAM002652
Crawford	Hogback Prairie, T9N R4W Sec 32	22-Jul-1998			Sweep Net Pasture Prairie	WDNR	DAM002670
Crawford	Hogback Prairie, T9N R4W Sec 32	7-Aug-1996			Sweep Net Dry prairie to ETOH	WDNR	DAM002695
Crawford	Rush Creek, T10N R6W Sec 6	29-Aug-1995			Sweep Net 85F Cloudy 12:00 Bluff Prairie burned unit	WDNR	DAM002677
Dane	3 mi N. Mazomanie	1-Oct-1989		K. Katovich	Taken From Goldenrod Flowers	WIRC	DAM001668
Dane	4mi SW Lake Mills, Zeloski Marsh	17-Aug-2011		Daniel A. Marschalek	On goldenrod (Solidago sp.)	WIRC	DAM000890

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	4mi SW Lake Mills, Zeloski Marsh	17-Aug-2011		Daniel A. Marschalek	On goldenrod (<i>Solidago</i> sp.)	WIRC	DAM000891
Dane	Arboretum	15-Oct-1972		Jide Matanmi		WIRC	DAM001715
Dane	Black Earth Prairie (TNC), 43.14044 - 89.77343	3-Aug-2006		Daniel A. Marschalek	prairie, feeding on flowers of <i>Solidago gigantea</i> , Hand collected	WIRC	DAM000169
Dane	Black Earth Prairie (TNC), 43.14044 - 89.77343	3-Aug-2006		Daniel A. Marschalek	prairie, feeding on flowers of <i>Solidago gigantea</i> , Hand collected	WIRC	DAM000170
Dane	Blue Mounds	15-Jun-1918		S B Fracker		WIRC	DAM001498
Dane	Cambridge	4-Sep-1972		S. Lesch	On <i>Solidago</i>	WIRC	DAM001711
Dane	Curtis Prairie	21-Aug-1997		T. Miller		WIRC	DAM002570
Dane	Curtis Prairie, Trail Inter 12	14-Aug-1967		D. Schwehr	on goldenrod, Hand collected	WIRC	DAM000503
Dane	Curtis Prairie, Trail Inter 12	14-Aug-1967		D. Schwehr	on goldenrod, Hand collected	WIRC	DAM000504
Dane	Deforest	18-Aug-2007		Emily E. Mueller	alfalfa field	WIRC	DAM000272
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001689
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001690
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001691
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001692
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001693
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001694
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001695
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001696
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001697
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001698
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001699
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001700
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001701
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001702
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001703
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001704
Dane	Fitchburg	31-Aug-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001705
Dane	Fitchburg	14-Sep-1972		Shapas	<i>Solidago</i> spp.	WIRC	DAM001688
Dane	Fitchburg	6-Aug-1977		S. Krauth		WIRC	DAM001645
Dane	Fitchburg	6-Aug-1977		S. Krauth		WIRC	DAM001646
Dane	Fitchburg	6-Aug-1977		S. Krauth		WIRC	DAM001647
Dane	Fitchburg	10-Aug-1977		S. Krauth		WIRC	DAM001637
Dane	Hawk Hill site D21, T9N R8E Sect. 4	24-Aug-1996		Andrew H. Williams	1 of several on flowers of <i>Solidago gigantea</i> , 10AM sun 73F	WIRC	DAM001707
Dane	Krueger Rd, Goose Lake, Deerfield	3-Aug-1986		B. Buchli	on goldenrod	WIRC	DAM001603
Dane	Krueger Rd, Goose Lake, Deerfield	29-Jul-1990		B. Buhli	on goldenrod	WIRC	DAM001438

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Krueger Rd, Goose Lake, Deerfield	29-Jul-1990		B. Buhli	on goldenrod	WIRC	DAM001439
Dane	Lower Wis. River State Wildlife Area- Mazomanie, 43 13'25" -89 47'59"	29-Jul-2000		Craig M. Brabant	overcast, ~80°F, 5pm, off of flowers of Solidago sp. along gravel road	CMBC	DAM001349
Dane	Lower Wis. River State Wildlife Area- Mazomanie, 43 13'25" -89 47'59"	29-Jul-2000		Craig M. Brabant	overcast, ~80°F, 5pm, off of flowers of Solidago sp. along gravel road	CMBC	DAM001350
Dane	Lower Wis. River State Wildlife Area- Mazomanie, 43 13'25" -89 47'59" LWRSGA Mazomanie Unit, T9N R6E	29-Jul-2000		Craig M. Brabant	overcast, ~80°F, 5pm, off of flowers of Solidago sp. along gravel road	CMBC	DAM001351
Dane	Sec 28 and 29	17-Aug-2005		Rachel A. Arango	black light	WIRC	DAM000092
Dane	Madison	1-Sep-1910		W. W. Clark	On Aster	WIRC	DAM001591
Dane	Madison	1-Sep-1910		W. W. Clark	On Aster	WIRC	DAM001592
Dane	Madison	21-Sep-1911		S B Fracker		WIRC	DAM001489
Dane	Madison	21-Sep-1911		S B Fracker		WIRC	DAM001494
Dane	Madison	4-Aug-1913		A C Burrill	On goldenrod	WIRC	DAM001587
Dane	Madison	31-Jul-1914		G. A. Chandler		WIRC	DAM001421
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001420
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001424
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001425
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001593
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001594
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001595
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001596
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001597
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001598
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001599
Dane	Madison	6-Aug-1914		G. A. Chandler		WIRC	DAM001600
Dane	Madison	11-Aug-1916		K. Harley		WIRC	DAM001470
Dane	Madison	11-Aug-1916		K. Harley		WIRC	DAM001471
Dane	Madison	11-Aug-1916		K. Harley		WIRC	DAM001472
Dane	Madison	11-Aug-1916		K. Harley		WIRC	DAM001473
Dane	Madison	8-Sep-1916		L. G. Gentner	Copulating on Goldenrod	WIRC	DAM001586
Dane	Madison	22-Aug-1918		L. G. Gentner	Solidago blossoms	WIRC	DAM001568
Dane	Madison	8-Jun-1919		T. T. Brown		WIRC	DAM001465
Dane	Madison	8-Jun-1919		T. T. Brown		WIRC	DAM001482
Dane	Madison	8-Jun-1919		T. T. Brown		WIRC	DAM001483
Dane	Madison	8-Jun-1919		T. T. Brown		WIRC	DAM001484
Dane	Madison	8-Jun-1919		T. T. Brown		WIRC	DAM001485
Dane	Madison	8-Jun-1919		T. T. Brown		WIRC	DAM001486

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Madison	8-Jun-1919		T. T. Brown		WIRC	DAM001487
Dane	Madison	8-Jun-1919		T. T. Brown		WIRC	DAM001488
Dane	Madison	7-Aug-1919		T. T. Brown		WIRC	DAM001480
Dane	Madison	7-Aug-1919		T. T. Brown		WIRC	DAM001481
Dane	Madison	28-Aug-1920		W. Hiestand		WIRC	DAM001490
Dane	Madison	28-Aug-1920		W. Hiestand	Feeding on Goldenrod	WIRC	DAM001497
Dane	Madison	28-Aug-1920		W. Hiestand	Feeding on Goldenrod	WIRC	DAM001499
Dane	Madison	9-Aug-1923		A J Riker		WIRC	DAM001464
Dane	Madison	9-Aug-1923		A J Riker		WIRC	DAM001474
Dane	Madison	9-Aug-1923		A J Riker		WIRC	DAM001475
Dane	Madison	9-Aug-1923		A J Riker		WIRC	DAM001476
Dane	Madison	9-Aug-1923		A J Riker		WIRC	DAM001477
Dane	Madison	9-Aug-1923		A J Riker		WIRC	DAM001478
Dane	Madison	9-Aug-1923		A J Riker		WIRC	DAM001479
Dane	Madison	30-Jul-1934		Chas. L Fluke		WIRC	DAM001588
Dane	Madison	30-Jul-1934		Chas. L Fluke		WIRC	DAM001589
Dane	Madison	30-Jul-1934		Chas. L Fluke		WIRC	DAM001590
Dane	Madison	16-Aug-1956				WIRC	DAM002590
Dane	Madison	16-Aug-1956				WIRC	DAM002591
Dane	Madison	16-Aug-1956				WIRC	DAM002592
Dane	Madison	16-Aug-1956				WIRC	DAM002593
Dane	Madison	16-Aug-1956				WIRC	DAM002594
Dane	Madison	16-Aug-1956				WIRC	DAM002595
Dane	Madison	16-Aug-1956				WIRC	DAM002596
Dane	Madison	26-Aug-1971		J M Thompson		WIRC	DAM001644
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001736
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001737
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001738
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001739
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001740
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001741
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001742
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001743
Dane	Madison	1-Sep-1972		D. R. Engel		WIRC	DAM001744
Dane	Madison	7-Sep-1972		B. Duehn	Mating on alfalfa	WIRC	DAM001414
Dane	Madison	7-Sep-1972		B. Duehn	Feeding on alfalfa	WIRC	DAM001415
Dane	Madison	8-Sep-1972		B. Duehn	Feeding on alfalfa	WIRC	DAM001413
Dane	Madison	9-Sep-1972		P. I. Sunjaya	on goldenrod	WIRC	DAM001718
Dane	Madison	9-Sep-1972		P. I. Sunjaya	on goldenrod	WIRC	DAM002806
Dane	Madison	14-Sep-1972		J. Moon		WIRC	DAM001719
Dane	Madison	14-Sep-1972		J. Moon		WIRC	DAM001720
Dane	Madison	14-Sep-1972		J. Moon		WIRC	DAM001721

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Madison	14-Sep-1972		J. Moon		WIRC	DAM001722
Dane	Madison	14-Sep-1972		J. Moon		WIRC	DAM001723
Dane	Madison	14-Sep-1972		J. Moon		WIRC	DAM001724
Dane	Madison	25-Sep-1972		D. R. Engel		WIRC	DAM001734
Dane	Madison	25-Sep-1972		D. R. Engel		WIRC	DAM001735
Dane	Madison	13-Sep-1978		M. Binkley		WIRC	DAM001638
Dane	Madison	Aug-1981		D Sammatara		WIRC	DAM001667
Dane	Madison	20-Aug-1981		J. Hainze		WIRC	DAM001731
Dane	Madison	9-Sep-1981		J. A. Bentz		WIRC	DAM001558
Dane	Madison	14-Sep-1981		M. Drilias		WIRC	DAM001730
Dane	Madison	20-Jun-1988		S Buchacek		UWOC	DAM000922
Dane	Madison	7-Aug-2002	30-Aug-2002	M. H. Evans	ex. backyard barrier trap	WIRC	DAM001628
Dane	Madison	15-Aug-2009		M. H. Evans	in screened in porch	WIRC	DAM001753
Dane	Madison	Prior to Sep-1941		Wm. E. Sieker		MPMC	DAM001009
Dane	Madison, Arb. Curtis Prairie	4-Aug-1966		J. Zedler		WIRC	DAM000505
Dane	Madison, Arb. Prairie	2-Sep-1962		E. Ables		WIRC	DAM001429
Dane	Madison, Curtis Prairie	19-Jul-1973		M. Hickey		WIRC	DAM001435
Dane	Madison, Curtis Prairie, Trail Inter. - 12	14-Aug-1967		D. W. Schwehr	On goldenrod blossoms	WIRC	DAM001433
Dane	Madison, Curtis Prairie, Trail Inter. - 12A	1-Aug-1967		D. W. Schwehr	On goldenrod	WIRC	DAM001434
Dane	Madison, Elver Pk	5-Sep-1998		Jeffrey P. Gruber	flower of goldenrod	WIRC	DAM001521
Dane	Madison, Hill Farm	13-Aug-1955		T. Koerber		WIRC	DAM002597
Dane	Madison, Hill Farm	13-Aug-1955		T. Koerber		WIRC	DAM002598
Dane	Madison, Hill Farm	13-Aug-1955		T. Koerber		WIRC	DAM002599
Dane	Madison, Hill Farm	13-Aug-1955		T. Koerber		WIRC	DAM002600
Dane	Madison, Hill Farm	13-Aug-1955		T. Koerber		WIRC	DAM002601
Dane	Madison, Hill Farm	13-Aug-1955		T. Koerber		WIRC	DAM002602
Dane	Madison, Hill Farm	13-Aug-1955		T. Koerber		WIRC	DAM002603
Dane	Madison, Rieder Farm	24-Aug-1982				WIRC	DAM002807
Dane	Madison, Rieder Farm	23-Aug-1983		D. Sammataro	Variety 15, Name R273	WIRC	DAM002770
Dane	Madison, SW; Elver Pk	27-Aug-1998		Daniel A. Marschalek	On Solidago sp. flowers, Hand collected	WIRC	DAM000166
Dane	Madison, SW; Elver Pk	27-Aug-1998		Daniel A. Marschalek	On Solidago sp. flowers, Hand collected	WIRC	DAM000167
Dane	Madison, U. Hill Farm	26-Jul-1946		J. T. Medler	alfalfa	WIRC	DAM002788
Dane	Madison, UW-Arboretum, 43.02604 - 89.43582	30-Jul-2006		Daniel A. Marschalek	prairie, feeding on Solidago flowers, hand collected	WIRC	DAM000111
Dane	Madison, UW-Arboretum, 43.02604 - 89.43582	30-Jul-2006		Daniel A. Marschalek	prairie, feeding on Solidago flowers, hand collected	WIRC	DAM000112
Dane	Madison, UW-Arboretum, 43.02604 - 89.43582	30-Jul-2006		Daniel A. Marschalek	prairie, feeding on Solidago flowers, hand collected	WIRC	DAM000113
Dane	Madison; Elver Park	11-Aug-1995		Mari F. Wolter	Goldenrod	WIRC	DAM001706

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Madison; UW Arboretum, 43.038633 -89.430732	5-Aug-2012		Daniel A. Marschalek	On Solidago mesic prairie, feeding on Solidago rigida flowers,	WIRC	DAM002908
Dane	Madison; UW-Arboretum, 43.02794 -89.4422	23-Aug-2006		Daniel A. Marschalek	Hand collected	WIRC	DAM000163
Dane	Madison; UW-Arboretum, 43.02794 -89.4422	23-Aug-2006		Daniel A. Marschalek	Hand collected	WIRC	DAM000164
Dane	Madison; UW-Arboretum, 43.02794 -89.4422	23-Aug-2006		Daniel A. Marschalek	Hand collected	DAMC	DAM000165
Dane	Madison; UW-Arboretum, 43.03869 -89.43028	23-Aug-2006		Daniel A. Marschalek	mesic prairie, mating on Solidago canadensis flowers, Hand collected	WIRC	DAM000151
Dane	Madison; UW-Arboretum, 43.03869 -89.43028	23-Aug-2006		Daniel A. Marschalek	mesic prairie, mating on Solidago canadensis flowers, Hand collected	WIRC	DAM000152
Dane	Madison; UW-Arboretum, 43.03869 -89.43028	23-Aug-2006		Daniel A. Marschalek	mesic prairie, mating on Euthamia graminifolia flowers, Hand collected	DAMC	DAM000153
Dane	Madison; UW-Arboretum, 43.03869 -89.43028	23-Aug-2006		Daniel A. Marschalek	mesic prairie, mating on Euthamia graminifolia flowers, Hand collected	WIRC	DAM000154
Dane	Madison; UW-Arboretum, 43.03869 -89.43028	23-Aug-2006		Daniel A. Marschalek	mesic prairie, mating on Euthamia graminifolia flowers, Hand collected	WIRC	DAM000155
Dane	Madison; UW-Arboretum, 43.03869 -89.43028	23-Aug-2006		Daniel A. Marschalek	mesic prairie, mating on Solidago canadensis flowers, Hand collected	WIRC	DAM000156
Dane	Madison; UW-Arboretum, 43.04034 -89.42879	7-Aug-2006		Daniel A. Marschalek	feeding and mating on Silphium perfoliatum, Hand collected	WIRC	DAM000168
Dane	Madison; UW-Arboretum, 43.04034 -89.42879	7-Aug-2006		Daniel A. Marschalek	feeding and mating on Silphium perfoliatum, Hand collected	WIRC	DAM000196
Dane	Madison; UW-Arboretum, 43.0408 -89.43075	23-Aug-2006		Daniel A. Marschalek	mesic prairie, Hand collected	WIRC	DAM000148
Dane	Mazomanie	Sep-1980s		G. Boyer		WIRC	DAM001661
Dane	Nelson Dewey State Pk, 42.73477 91.018	9-Aug-2007	18-Aug-2007	John J. Dorshorst	lime prairie, Malaise Trap	WIRC	DAM000276
Dane	Nelson Dewey State Pk, 42.73477 91.018	9-Aug-2007	18-Aug-2007	John J. Dorshorst	lime prairie, Malaise Trap	WIRC	DAM000277
Dane	Oregon	12-Sep-1917				WIRC	DAM001610
Dane	Sun Prairie	15-Aug-1983		M. Marosy		WIRC	DAM001659
Dane	Sun Prairie	15-Aug-1983		M. Marosy		WIRC	DAM001660
Dane	Swamp Lover's Preserve, 43 7.401 -89 40.301	20-Aug-2007		Jerry W. Goth	limestone bluff prairie, hilltop open tall grass prairie with few scattered oaks; on Solidago canadensis; 1:00-2:30pm; 1020'	KEJC	DAM002849
Dane	Swamp Lover's Site, 43 7.543 -89 40.383	23-Sep-2007		Ryan T. Larson		WIRC	DAM001733
Dane	Swamp lovers, 43 07'52" -89 39'58"	18-Sep-2009		C. Botero	sweeping on vegetation	WIRC	DAM001754
Dane	T7N R7E Sec 4	27-Sep-1961		Nass		WIRC	DAM001427
Dane	T8N R6E Sec 15	27-Sep-1962		Nass		WIRC	DAM001428

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	T9N R6E Sec 24 Thousand's Rock Pt., T6N R6E S18	17-Sep-1972		B. Duehn	Found on goldenrod	WIRC	DAM001416
Dane	SW Thousand's Rock Pt., T6N R6E S18	26-Aug-1997		DNR Study	Sweep net	WDNR	DAM002675
Dane	SW	26-Aug-1997		DNR Study	Sweep net	WDNR	DAM002678
Dane	Token Creek Park, Madison	21-Sep-1997		K. Kadash	sweeping tall grass	WIRC	DAM001559
Dane	Token Creek Park, Madison	21-Sep-1997		K. Kadash	sweeping tall grass	WIRC	DAM001560
Dane	Univ. Wisc. Arboretum	16-Jul-1946		J R D		WIRC	DAM001579
Dane	Univ. Wisc. Arboretum	9-Aug-1946		J R D		WIRC	DAM001578
Dane	Univ. Wisc. Arboretum	16-Aug-1946		J R D		WIRC	DAM001576
Dane	Univ. Wisc. Arboretum	16-Aug-1946		J R D		WIRC	DAM001577
Dane	Univ. Wisc. Arboretum	19-Aug-1946		J R D		WIRC	DAM001574
Dane	Univ. Wisc. Arboretum	19-Aug-1946		J R D		WIRC	DAM001575
Dane	Univ. Wisc. Arboretum	22-Aug-1946		J R D		WIRC	DAM001580
Dane	Univ. Wisc. Arboretum	2-Sep-1946		J R D		WIRC	DAM001581
Dane	UW Arb. Prairie	2-Sep-1962		G. Kolenosky		WIRC	DAM001431
Dane	UW Arb. Prairie	2-Sep-1962		G. Kolenosky		WIRC	DAM001432
Dane	UW Arb-Curtis Prairie	26-Sep-1997		N. P. Havill		WIRC	DAM001419
Dane	UW Arboretum, Curtis Prairie	29-Sep-1997		Seth J. Dyer	Aspirated from Goldenrod flowers	WIRC	DAM001620
Dane	UW Arb-Picnic Point	17-Sep-1997		N. P. Havill		WIRC	DAM001418
Dane	UW-Arboretum	16-Aug-2006		Daniel A. Marschalek	prairie on Solidago, hand collected	WIRC	DAM000085
Dane	UW-Arboretum	16-Aug-2006		Daniel A. Marschalek	prairie on Solidago, hand collected	WIRC	DAM000086
Dane	UW-Arboretum	16-Aug-2006		Daniel A. Marschalek	prairie on Solidago, hand collected	WIRC	DAM000087
Dane	UW-Arboretum	16-Aug-2006		Daniel A. Marschalek	prairie on Solidago, hand collected	WIRC	DAM000088
Dane	UW-Arboretum	17-Aug-2006		Daniel A. Marschalek	prairie on Solidago, hand collected	WIRC	DAM000089
Dane	UW-Arboretum	17-Aug-2006		Daniel A. Marschalek	prairie on Solidago, hand collected	WIRC	DAM000090
Dane	UWM Arboretum, Madison	23-Sep-1997		Craig M. Brabant	Picked off of low vegetation	CMBC	DAM001334
Dane	UW-madison campus	28-Sep-1993		Y. S. Han		WIRC	DAM001426
Dane	Verona	9-Sep-1991		M. Gehl		WIRC	DAM001430
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	31-Jul-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000828
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	6-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000827
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	10-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000822
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	13-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000798

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	13-Aug-2007		Emily E. Mueller	In soybean field, Pantrap	WIRC	DAM000809
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	13-Aug-2007		Emily E. Mueller	In weed field, Pantrap	DAMC	DAM000820
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	13-Aug-2007		Emily E. Mueller	In weed field, Pantrap	DAMC	DAM000821
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	14-Aug-2007		Emily E. Mueller	In soybean field, Pantrap	WIRC	DAM000797
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	14-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000818
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	21-Aug-2007		Emily E. Mueller	Pantrap	WIRC	DAM000819
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	28-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000792
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	28-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000793
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	28-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000794
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	28-Aug-2007		Emily E. Mueller	In soybean field, Pantrap	WIRC	DAM000795
Dane	W Madison AG Res Stat, Pleasant View Rd & Mineral Point Rd	28-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000796
Dane		19-Aug-1927		A. Granovsky		WIRC	DAM001570
Dane		19-Aug-1927		A. Granovsky		WIRC	DAM001571
Dane		19-Aug-1927		A. Granovsky		WIRC	DAM001572
Dane		21-Aug-1927		A. Granovsky		WIRC	DAM001569
Dane		21-Aug-1927		A. Granovsky		WIRC	DAM001582
Dane		9-Aug-1950				WIRC	DAM001561
Dane		26-Aug-1954		M H Schwertfeger		UWOC	DAM000933
Dane		2-Sep-1954		M H Schwertfeger		UWOC	DAM000934
Dane		3-Aug-1961		Don Carney	on ground	WIRC	DAM001601
Dane		7-Sep-1963		Illigible		WIRC	DAM001604

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane		1-Jun-1967		Dicke		WIRC	DAM001519
Dane		1940's	1967	J. H. Zimmerman		WIRC	DAM001442
Dane		8-Aug-1898				WIRC	DAM001621
Dane	Black Earth Prairie, T8N R6E Sec 27	11-Sep-1996			Dry prairie	WDNR	DAM002680
Dane	Hawkhill (Miller), T9N R8E Sec 5	8-Sep-1995			Hand Dry-Mesic Prairie Flowers Solidago canadensis	WDNR	DAM002646
Dane	Hawkhill (Miller), T9N R8E Sec 5	8-Sep-1995			Hand Dry-Mesic Prairie Flowers Solidago canadensis	WDNR	DAM002664
Dane	Hawkhill (Miller), T9N R8E Sec 5	25-Sep-1997			Sweep Net Dry prairie	WDNR	DAM002691
Dane	Hawkhill Prairie, T9N R8E Sec 5	13-Aug-1986			Sweep Net Hayfield	WDNR	DAM002641
Dane	Hawkhill Prairie, T9N R8E Sec 5	13-Aug-1986			Sweep Net Hayfield	WDNR	DAM002665
Dane	Hawkhill Prairie, T9N R8E Sec 5	17-Sep-1986			Pitfall Trap Native Prairie	WDNR	DAM002647
Dane	Madigan Road Prairie, T9N R9E Sec 20	30-Aug-1995			Hand Native Prairie Flowers Canada Goldenrod	WDNR	DAM002672
Dane	Westport Drumlin, T8N R9E Sec 11	27-Aug-1996			Hand collected Dry-Mesic Prairie to ETOH	WDNR	DAM002710
Dodge	Beaver Dam	12-Mar-1905				WIRC	DAM001619
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001083
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001085
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001086
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001088
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001090
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001091
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001092
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001093
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001094
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001095
Dodge	Beaver Dam	20-Jul-1909		W. E. Snyder		MPMC	DAM001096
Dodge	Beaver Dam	8-Sep-1915		W. E. Snyder		MPMC	DAM001005
Dodge	Fox Lake	29-Sep-1925		W. E. Snyder		MPMC	DAM001006
Dodge	Fox Lake	29-Sep-1925		W. E. Snyder		MPMC	DAM001007
Dodge	Ridges Sanctuary, 45 4.176 -87						
Door	7.130	22-Aug-2005		Kyle E. Johnson	lakeshore meadow; sweep, 581'	KEJC	DAM002854
Douglas	T44N R12W Sect. 14	19-Aug-1998		Andrew H. Williams	1 of several working flowers of Solidago canadensis, 2PM cloudy 74F	WIRC	DAM001540
Douglas	T44N R12W Sect. 14	19-Aug-1998		Andrew H. Williams	1 of several working flowers of Solidago canadensis, 2PM cloudy 74F	WIRC	DAM001541
Douglas	T44N R12W Sect. 14	19-Aug-1998		Andrew H. Williams	1 of several working flowers of Solidago nemoralis 2PM	WIRC	DAM001542
Douglas	T44N R12W Sect. 14	19-Aug-1998		Andrew H. Williams	1 of several working flowers of Solidago nemoralis 2PM	WIRC	DAM001543

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Douglas		22-Jun-1966		W. Olni		UWSC	DAM001264
Douglas		28-Sep-2003		Heidi Siegel		UWSC	DAM001265
Dunn	895th @ BB, T29N R11W S 8/17	26-Aug-1998		C. R. Bomar		WDNR	DAM002722
Dunn	HWY 170 @ 10-10	23-Aug-1996		C. R. Bomar	sweep net	CRBC	DAM000260
Dunn	Hwy 170 @F, T30N R13W Sec 33-34	8-Aug-1997		C. R. Bomar		CRBC	DAM000253
Dunn	Hwy 170 @F, T30N R13W Sec 33-34	8-Aug-1997		C. R. Bomar		CRBC	DAM000254
Dunn	Menomonie	31-Jul-1995		C. Bomar	burned	CRBC	DAM000234
Dunn	Menomonie	31-Jul-1995		C. Bomar	burned	CRBC	DAM000235
Dunn	Menomonie	7-Aug-1995		C. R. Bomar	burned	CRBC	DAM000259
Dunn	Menomonie	8-Aug-1995		C. R. Bomar	burned	CRBC	DAM000262
Dunn	Menomonie	15-Aug-1995		C. Bomar	burned	CRBC	DAM000240
Dunn	Menomonie	15-Aug-1995		C. Bomar	burned	CRBC	DAM000241
Dunn	Menomonie	15-Aug-1995		C. Bomar	burned	CRBC	DAM000242
Dunn	Menomonie	22-Aug-1995		C. Bomar	burned	CRBC	DAM000236
Dunn	Menomonie	22-Aug-1995		C. Bomar	burned	CRBC	DAM000237
Dunn	Menomonie	22-Aug-1995		C. Bomar	burned	CRBC	DAM000238
Dunn	Menomonie	22-Aug-1995		C. Bomar	burned	CRBC	DAM000239
Dunn	Menomonie	25-Aug-1995		C. Bomar	Goldenrod	CRBC	DAM000245
Dunn	Menomonie	25-Aug-1995		C. Bomar	Goldenrod	CRBC	DAM000246
Dunn	Menomonie	25-Aug-1995		C. Bomar	Goldenrod	CRBC	DAM000247
Dunn	Menomonie	25-Aug-1995		C. Bomar	Goldenrod	CRBC	DAM000248
Dunn	Menomonie	1-Sep-1995		C. Bomar	Goldenrod	CRBC	DAM000231
Dunn	Menomonie	1-Sep-1995		C. Bomar	Goldenrod	CRBC	DAM000232
Dunn	Menomonie	1-Sep-1995		C. Bomar	Goldenrod	CRBC	DAM000233
Dunn	Menomonie	10-Sep-1995		C. R. Bomar	goldenrod, unburned	CRBC	DAM000258
Dunn	Menomonie	8-Sep-1997		Robert Goodrich		CRBC	DAM000243
Dunn	Menomonie	8-Sep-1997		Terry Erickson		CRBC	DAM000244
Dunn	Rock Falls Raceway, T26N R10W Sec 7	16-Aug-1999		E. Secrist		CRBC	DAM000261
Dunn	T30N R13W Sect. 34	20-Aug-1998		Andrew H. Williams	noon, 1 of several among flowers of <i>Solidago speciosa</i> , sandy prairie by RR	WIRC	DAM001537
Dunn		29-Jul-1949		W. McNeel	coll. from forest floor	WIRC	DAM001500
Eau Claire	Canoe Landing SNA, T26N R5W Sec 16 SE	5-Aug-2006		S. B. Sauer	sweep net	WDNR	DAM002717
Eau Claire	Canoe Landing SNA, T26N R5W Sec 16 SE	5-Aug-2006		S. B. Sauer	sweep net	WDNR	DAM002721
Eau Claire	Deb Friends Farm	11-Sep-2003		K. Miller		UWEC	DAM002818
Eau Claire	Putman Park Prairie	7-Sep-2004		S. Johnson		UWEC	DAM002820
Eau Claire	T26N R7W Sect. 14	21-Aug-1997		Andrew H. Williams	dead, in group of Phymata among flowers of <i>Solidago speciosa</i> , 4PM fair 72F	WIRC	DAM001553

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Eau Claire	UWEC Prairie	7-Sep-2004		R. Kitzmann		UWEC	DAM002817
Fond du Lac	13 mi. N. West Bend	2-Aug-1979		Jass		MPMC	DAM002461
Fond du Lac	13 mi. N. West Bend	2-Aug-1979		Jass		MPMC	DAM002462
Fond du Lac	13 mi. N. West Bend	2-Aug-1979		Jass		MPMC	DAM002463
Fond du Lac	13 mi. N. West Bend	2-Aug-1979		Jass		MPMC	DAM002464
Fond du Lac	13 mi. N. West Bend	2-Aug-1979		Jass		MPMC	DAM002465
Fond du Lac	13 mi. N. West Bend	2-Aug-1979		Jass		MPMC	DAM002466
Fond Du Lac	Kettle Moraine St. Frst. Near Long Lake, W. side	16-Aug-1972		Gene Drecktrah		GDPC	DAM000964
Fond Du Lac	Kettle Moraine St. Frst. Near Long Lake, W. side	16-Aug-1972		Gene Drecktrah		UWOC	DAM000965
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002792
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002793
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002794
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002795
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002796
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002797
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002798
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002799
Forest	Laona	26-Jul-1949		C. L. Fluke		WIRC	DAM002800
Grant	Bush Clover Prairie, T5N R3W Sect. 17	3-Aug-1992		Andrew H. Williams	off leaf of <i>Heliopsis helianthoides</i> , or adjacent <i>Solidago canadensis</i> , 10AM, 70F, sunny	WIRC	DAM001523
Grant	Bush Clover Prairie, T5N R3W Sect. 17	3-Aug-1992		Andrew H. Williams	off leaf of <i>Heliopsis helianthoides</i> , or adjacent <i>Solidago canadensis</i> 10AM 70F sunny	WIRC	DAM001710
Grant	Bush Clover Prairie, T5N R3W Sect. 17	3-Aug-1992		Andrew H. Williams	off leaf of flowers of <i>Solidago canadensis</i> 11ZM 70F sunny	WIRC	DAM001716
Grant	Bush Clover Prairie, T5N R3W Sect. 17	3-Aug-1992		Andrew H. Williams	off leaf of flowers of <i>Solidago canadensis</i> 11ZM 70F sunny	WIRC	DAM001717
Grant	Dewey Heights Pr., T3N R6W Sec.13	21-Sep-1995		R. A. H.	sweep	WIRC	DAM001625
Grant	Dewey Heights Prairie SNA, Nelson Dewey State Park, 42.73477 -91.018	3-Aug-2004		John J. Dorshorst	flowers in dry lime prairie, sweep net	JJDC	DAM000694
Grant	Dewey Heights Prairie SNA, Nelson Dewey State Park, 42.73477 -91.018	3-Aug-2004		John J. Dorshorst	flowers in dry lime prairie, sweep net	JJDC	DAM000695
Grant	Dewey Heights Prairie SNA, Nelson Dewey State Park, 42.73477 -91.018	3-Aug-2004		John J. Dorshorst	flowers in dry lime prairie, sweep net	JJDC	DAM000696
Grant	Hwy 133 & Blue River Rd, 43.1851 - 90.5073	29-Jul-2007		Daniel A. Marschalek	sandy prairie, on <i>Helianthus occidentalis</i> , Hand collected	WIRC	DAM000512

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001107
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001123
Grant	Rutledge	30-Jul-1911	4-Aug-1911	Museum Expedition		MPMC	DAM001141
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001082
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001084
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001087
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001099
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001101
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001103
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001104
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001105
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001106
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001108
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001109
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001111
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001112
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001113
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001114
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001115
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001116
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001117
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001120
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001121
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001124
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001128
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001129
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001130
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001131
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001134
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001138
Grant	Rutledge	5-Aug-1911	10-Aug-1911	Museum Expedition		MPMC	DAM001140
Grant	Rutledge	11-Aug-1911	15-Aug-1911	Museum Expedition		MPMC	DAM001100
Grant	T6N R5N S17	24-Aug-1977	31-Aug-1977		GM.P-M.T.	WIRC	DAM001653
Grant	T6N R5N S17	24-Aug-1977	31-Aug-1977		GM.P-M.T.	WIRC	DAM001654
Grant	T6N R5N S17	24-Aug-1977	31-Aug-1977		GM.P-M.T.	WIRC	DAM001655
Grant	T6N R6W S17	12-Aug-1975	20-Aug-1975		Gypsy Moth-M.T.	WIRC	DAM001684
Grant	T6N R6W S17	12-Aug-1975	20-Aug-1975		Gypsy Moth-M.T.	WIRC	DAM001685
Grant	T6N R6W S17	20-Aug-1975	26-Aug-1975		Gypsy Moth-M.T.	WIRC	DAM001651
Grant	T6N R6W S17	20-Aug-1975	26-Aug-1975		Gypsy Moth-M.T.	WIRC	DAM001652
Grant	T6N R6W S17	20-Aug-1975	26-Aug-1975		Gypsy Moth-M.T.	WIRC	DAM001682
Grant	T6N R6W S17	9-Sep-1975			Gypsy Moth-M.T.	WIRC	DAM001683
Grant	T6N R6W S17	30-Sep-1975	16-Oct-1975		Gypsy Moth-M.T.	WIRC	DAM001624

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	T6N R6W S17	17-Aug-1977	24-Aug-1977		Gypsy Moth-M.T. sandy RR prairie, 2 of several working flowers of Solidago canadensis, 10 AM, 1st E.p. seen in 1999	WIRC	DAM001681
Grant	T8N R2W Sect. 17	27-Jul-1999		Andrew H. Williams	sandy RR prairie, 2 of several working flowers of Solidago canadensis, 10 AM, 1st E.p. seen in 1999	WIRC	DAM001529
Grant	T8N R2W Sect. 17	27-Jul-1999		Andrew H. Williams	In flower of Silphium perfoliatum 10AM sunny	WIRC	DAM001530
Grant	Thomas Wet Prairie, T7N R1W Sect. 7	8-Aug-1995		Andrew H. Williams	74F working flowers of Eupatorium perfoliatum, PM	WIRC	DAM001708
Grant	Thomas Wet Prairie, T7N R1W Sect. 7	13-Aug-1996		Andrew H. Williams	88F hazy sun working flowers of Pycnanthemum virginianum	WIRC	DAM001522
Grant	Thomas Wet Prairie, T7N R1W Sect. 7	13-Aug-1996		Andrew H. Williams	1PM 88F hazy sun	WIRC	DAM001709
Grant	Woodland, Woodland Lake Sand Prairie SNA, 43.09934 -90.76767	8-Aug-2006		Daniel A. Marschalek	Prairie, mating on Solidago gigantea flowers, hand collected	WIRC	DAM000135
Grant	Woodland, Woodland Lake Sand Prairie SNA, 43.09934 -90.76767	8-Aug-2006		Daniel A. Marschalek	Prairie, mating on Solidago gigantea flowers, hand collected	WIRC	DAM000136
Grant	Wyalusing	20-Jul-1911	28-Jul-1911	Museum Expedition		MPMC	DAM001110
Grant	Wyalusing	20-Jul-1911	28-Jul-1911	Museum Expedition		MPMC	DAM001122
Grant	Wyalusing	20-Jul-1911	28-Jul-1911	Museum Expedition		MPMC	DAM001132
Grant	Wyalusing	20-Jul-1911	28-Jul-1911	Museum Expedition		MPMC	DAM001135
Grant	Dewey Heights Prairie, T3N R6W Sec13	21-Aug-1995			Sweep Net Bluff Prairie	WDNR	DAM002689
Grant	Dewey Heights Prairie, T3N R6W Sec13	21-Aug-1995			Sweep Net Bluff Prairie	WDNR	DAM002698
Grant	Dewey Heights Prairie, T3N R6W Sec13	12-Aug-1998			Sweep Net Bluff Prairie label reads "U:1"	WDNR	DAM002666
Green	3 mi W Albany, Muralt Bluff Prairie SNA	9-Aug-2006		Daniel A. Marschalek	sandy prairie, on Silphium integrifolium, Hand collected	WIRC	DAM000200
Green	3 mi W Albany, Muralt Bluff Prairie SNA	9-Aug-2006		Daniel A. Marschalek	sandy prairie, on Silphium integrifolium, Hand collected	WIRC	DAM000201
Green	3 mi W Albany, Muralt Bluff Prairie SNA	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating on Silphium integrifolium, Hand collected	WIRC	DAM000202
Green	3 mi W Albany, Muralt Bluff Prairie SNA	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating and feeding on Solidago gigantea, Hand collected	WIRC	DAM000203
Green	3 mi W Albany, Muralt Bluff Prairie SNA	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating on Solidago gigantea, Hand collected	WIRC	DAM000204
Green	3 mi W Albany, Muralt Bluff Prairie SNA	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating and feeding on Solidago gigantea, Hand Collected	WIRC	DAM000221
Green	3 mi W Albany, Muralt Bluff Prairie SNA	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating and feeding on Solidago gigantea, Hand Collected	WIRC	DAM000222
Green	3 mi W Albany, Muralt Bluff Prairie SNA	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating on Solidago gigantea, Hand Collected	WIRC	DAM000227

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.69969 -89.49236	22-Jul-2006		Daniel A. Marschalek	sandy prairie, on Silphium trifilium, hand collected	WIRC	DAM000094
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.69992 -89.49261	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating and feeding on Silphium integrifolium, Hand collected	WIRC	DAM000197
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.70251 -89.49321	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating on Solidago, Hand Collected	WIRC	DAM000223
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.70251 -89.49321	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating on Solidago, Hand Collected	WIRC	DAM000224
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.70251 -89.49321	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating on Solidago, Hand Collected	WIRC	DAM000225
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.70251 -89.49321	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating on Solidago, Hand Collected	WIRC	DAM000226
Green	by oaks at edge, T2N R9E Sect. 15 Muralt Bluff Prairie SNA, T36N R8E Sec 36	25-Aug-2000		Andrew H. Williams	1 of few working flowers of Solidago ulmifolia, 3PM sunny 83F	WIRC	DAM001525
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	sandy prairie, on Solidago sp., hand collected	UWGB	DAM000114
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	sandy prairie, on Solidago sp., hand collected	WIRC	DAM000115
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	sandy prairie, on Solidago sp., hand collected	WIRC	DAM000116
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	sandy prairie, on Solidago sp., hand collected	WIRC	DAM000117
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	sandy prairie, on Solidago sp., hand collected	WIRC	DAM000118
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	sandy prairie, on Solidago sp., hand collected	WIRC	DAM000119
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	sandy prairie, on Solidago sp., hand collected	WIRC	DAM000120
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	Sandy prairie, on Solidago sp., hand collected	DAMC	DAM000121
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	Sandy prairie, on Solidago sp., hand collected	DAMC	DAM000122
Green	Muralt Bluff Prairie SNA, T36N R8E Sec 36	8-Aug-2006		N.L. Kriska	Sandy prairie, on Solidago sp., hand collected	DAMC	DAM000123
Green	Vale Prairie, T3N R8E Sect. 23 Brooklyn Wildlife Area, T5N R8E Sec 36	23-Aug-1997		Andrew H. Williams	1 of several working flowers of Solidago missouriensis, 11AM fair	WIRC	DAM001554
Green	Brooklyn Wildlife Area, T5N R8E Sec 36	27-Jul-1998			Hand Old Field Solidago juncea	WDNR	DAM002645
Green	Brooklyn Wildlife Area, T5N R8E Sec 36	27-Jul-1998			Hand Old Field Solidago juncea	WDNR	DAM002650
Green	Brooklyn Wildlife Area, T5N R8E Sec 36	27-Jul-1998			Hand Old Field Solidago juncea	WDNR	DAM002657

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Green Lake	Hwy A & Prairie Drive	24-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000799
Green Lake	Hwy A & Prairie Drive	24-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000800
Green Lake	Hwy A & Prairie Drive	24-Aug-2007		Emily E. Mueller	In weed field, Pantrap	DAMC	DAM000801
Green Lake	Hwy A & Prairie Drive	24-Aug-2007		Emily E. Mueller	In weed field, Pantrap	DAMC	DAM000802
Green Lake	Hwy A & Prairie Drive	24-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000803
Green Lake	Hwy A & Prairie Drive	24-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000804
Green Lake	Hwy A & Prairie Drive	24-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000805
Green Lake	Hwy A & Prairie Drive	24-Aug-2007		Emily E. Mueller	pantrap in weed field	WIRC	DAM002508
Green Lake	Hwy X & Hwy A	2-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000830
Green Lake	Hwy X & Hwy A	2-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000831
Green Lake	Hwy X & Hwy A	7-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000823
Green Lake	Hwy X & Hwy A	7-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000824
Green Lake	Hwy X & Hwy A	7-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000825
Green Lake	Hwy X & Hwy A	7-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000826
Green Lake	Hwy X & Hwy A	16-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000812
Green Lake	Hwy X & Hwy A	16-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000813
Green Lake	Hwy X & Hwy A	16-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000814
Green Lake	Hwy X & Hwy A	16-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000815
Green Lake	Hwy X & Hwy A	16-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000816
Green Lake	Hwy X & Hwy A	16-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000817
Green Lake	Hwy X & Hwy A	30-Aug-2007		Emily E. Mueller	In weed field, Pantrap	WIRC	DAM000810
Iowa	1.0 mi N of Arena	5-Sep-1987		J. E. Fetter		WIRC	DAM001666
Iowa	5 mi S Bluemounds, End of Reilly Rd, 42.95215 -89.86581	20-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Silphium integrifolium flowers, courted by male, Hand collected	WIRC	DAM000149
Iowa	5 mi S Bluemounds, End of Reilly Rd, 42.95215 -89.86581	20-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Silphium integrifolium flowers, courted by male, Hand collected	WIRC	DAM000150
Iowa	5 mi S Bluemounds, End of Reilly Rd, 42.95215 -89.86581	20-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Solidago rigida flowers, Hand collected	WIRC	DAM000157
Iowa	5 mi S Bluemounds, End of Reilly Rd, 42.95215 -89.86581	20-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Solidago rigida flowers, Hand collected	WIRC	DAM000158
Iowa	5 mi S Bluemounds, End of Reilly Rd, 42.95215 -89.86581	20-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Solidago rigida flowers, Hand collected	WIRC	DAM000159
Iowa	5 mi S Bluemounds, End of Reilly Rd, 42.95215 -89.86581	20-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Solidago rigida flowers, Hand collected	WIRC	DAM000160
Iowa	5 mi S Bluemounds, End of Reilly Rd, 42.95215 -89.86581	20-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Solidago rigida flowers, Hand collected	WIRC	DAM000161
Iowa	5 mi S Bluemounds, End of Reilly Rd, 42.95215 -89.86581	20-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Solidago rigida flowers, Hand collected	WIRC	DAM000162
Iowa	Arena	8-Sep-1960		G. J. Knudson		WIRC	DAM002771
Iowa	Arena	14-Oct-1989		K. D. Klepzig		WIRC	DAM002569

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Iowa	Avoca, end Hay Rd, Avoca Prairie SNA, 43.19516 -90.28909	8-Aug-2006		Daniel A. Marschalek	prairie, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000137
Iowa	Avoca, end Hay Rd, Avoca Prairie SNA, 43.19516 -90.28909	8-Aug-2006		Daniel A. Marschalek	prairie, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000138
Iowa	Avoca, end Hay Rd, Avoca Prairie SNA, 43.19516 -90.28909	8-Aug-2006		Daniel A. Marschalek	prairie, feeding on flowers of Solidago gigantea, hand collected	DAMC	DAM000139
Iowa	Avoca, end Hay Rd, Avoca Prairie SNA, 43.19516 -90.28909	8-Aug-2006		Daniel A. Marschalek	prairie, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000140
Iowa	Avoca, end Hay Rd, Avoca Prairie SNA, 43.19516 -90.28909	8-Aug-2006		Daniel A. Marschalek	Prairie, mating on flowers of Solidago gigantea, hand collected	DAMC	DAM000141
Iowa	Barneveld	10-Sep-1979		C. L. Anway		WIRC	DAM001725
Iowa	Barneveld Prairie (TNC)	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, Hand collected	DAMC	DAM000198
Iowa	Barneveld Prairie (TNC)	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, Hand collected	WIRC	DAM000199
Iowa	Barneveld Prairie (TNC), 43.00031 - 89.9218	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flower of Silphium integrifolium, hand collected	WIRC	DAM000134
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000124
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000125
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000126
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000127
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000128
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000129
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000130
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000131
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000132
Iowa	Barneveld Prairie (TNC), 43.00382 - 89.92337	3-Aug-2006		Daniel A. Marschalek	Old field, feeding on flowers of Solidago gigantea, hand collected	WIRC	DAM000133
Iowa	Barneveld Prairie SNA, 43.00417 - 89.92361	27-Jul-2005		John J. Dorshorst	From under rock in prairie/old hay-meadow, Hand collected	JJDC	DAM000697
Iowa	Barneveld Prairie, 43.00417 - 89.92459	17-Aug-2007		Daniel A Marschalek	On Solidago gigantea flowers, in spider web	WIRC	DAM001198
Iowa	Hanson's Farm	22-Sep-1979		L. F. Jiron		WIRC	DAM001658

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Iowa	LWRWSA Avoca Unit, 43 11.120 -90 21.642	8-Sep-2007		Kyle E. Johnson	dry open grassland surrounded by deciduous brush & pine/spruce plantings; 1 of many on flowers of Solidago sp.; 11:25am ~70F sunny/light breeze	KEJC	DAM002850
Iowa	LWRWSA Avoca Unit, 43 11.120 -90 21.642	8-Sep-2007		Kyle E. Johnson	dry open grassland surrounded by deciduous brush & pine/spruce plantings; 1 of many on flowers of Solidago sp.; 11:25am ~70F sunny/light breeze	KEJC	DAM002851
Iowa	LWRWSA Avoca Unit, 43 11.120 -90 21.642	8-Sep-2007		Kyle E. Johnson	dry open grassland surrounded by deciduous brush & pine/spruce plantings; 1 of many on flowers of Solidago sp.; 11:25am ~70F sunny/light breeze	KEJC	DAM002852
Iowa	Muehlechner Prairie, T6N R5E Sec16 SW NE	10-Aug-2006		S. B. Sauer	sweep net	WDNR	DAM002716
Iowa	T6N R5E S1	15-Aug-1977			Gypsy Moth-M.T.	WIRC	DAM001632
Iowa	T6N R5E S1	15-Aug-1977			Gypsy Moth-M.T.	WIRC	DAM001633
Iowa	T6N R5E S1	22-Aug-1977	29-Aug-1977		Gypsy Moth-M.T.	WIRC	DAM001630
Iowa	T6N R5E S1	22-Aug-1977	29-Aug-1977		Gypsy Moth-M.T.	WIRC	DAM001631
Iowa	T6N R5E S1	26-Aug-1977			Gypsy Moth Proj., Solidago	WIRC	DAM001686
Iowa	T6N R5E S1	26-Aug-1977			Gypsy Moth Proj., Solidago	WIRC	DAM001687
Iowa	TNC Thomas Pasture, T6N R5E Sect. 17	24-Jul-1998		Andrew H. Williams	working flowers of Daucus carota, 10AM	WIRC	DAM001555
Iowa		2-Sep-1974		M. Greenfield		WIRC	DAM002801
Iowa		2-Sep-1974		M. Greenfield		WIRC	DAM002802
Iowa	Schuelke Prairie, T6N R5E Sec 18	22-Aug-2000			Sweep Net Dry-Mesic Prairie Prairie Dropseed	WDNR	DAM002693
Iowa	Schuelke Prairie, T6N R5E Sec 18	22-Aug-2000			Sweep Net Dry-Mesic Prairie miscellaneous area Canada Goldenrod	WDNR	DAM002701
Iowa	Schuelke Prairie, T6N R5E Sec 18	22-Aug-2000			Sweep Net Dry-Mesic Prairie miscellaneous area Canada Goldenrod	WDNR	DAM002719
Iron	Mercer			G A Chandler		WIRC	DAM001583
Jackson	Black Riv St For nr. Millston, 44 11'30" -90 38'02"	2-Aug-2006		Daniel K. Young	flowers of Solidago sp.	WIRC	DAM002758
Jackson	Black Riv St For nr. Millston, 44 11'30" -90 38'02"	2-Aug-2006		Daniel K. Young	flowers of Solidago sp.	WIRC	DAM002759
Jackson	Black Riv St For nr. Millston, 44 11'30" -90 38'02"	2-Aug-2006		Daniel K. Young	flowers of Solidago sp.	WIRC	DAM002760
Jackson	Black Riv St For nr. Millston, 44 11'30" -90 38'02"	2-Aug-2006		Daniel K. Young	flowers of Solidago sp.	WIRC	DAM002761
Jackson	Black Riv St For nr. Millston, 44 11'30" -90 38'02"	2-Aug-2006		Daniel K. Young	flowers of Solidago sp.	WIRC	DAM002762
Jackson	Black River SF, T22N R2W SENW 19	23-Jul-1998		Kathryn Kirk	Sand Trail	WIRC	DAM001509

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Jackson	Black River SF, T22N/2W/SESE 29 R Sec	8-Aug-1997		Kathryn Kirk	Flight intercept, cutover land	WIRC	DAM001230
Jackson	Black River SF, T22N/2W/SESE 29 R Sec	8-Aug-1997		Kathryn Kirk	Cutover land	WIRC	DAM001232
Jackson	Black River SF, T22N/2W/SESE 29 R Sec	8-Aug-1997		Kathryn Kirk	Cutover land	WIRC	DAM001233
Jackson	Black River SF, T22N/2W/SESE 29 R Sec	8-Aug-1997		Kathryn Kirk	Cutover land	WIRC	DAM001234
Jackson	Black River SF, T22N/2W/SESE 29 R Sec	14-Aug-1997		Kathryn Kirk	Flight intercept, cutover land	WIRC	DAM001231
Jackson	Hixton Sand Prairie, T22N R5W Sec 16 NE	5-Aug-2006		S. B. Sauer	sweep net sandy RR prairie	WDNR	DAM002720
Jackson		14-Aug-1944		W. McNeel	coll. From Cranberry marsh (goldenrod etc.)	WIRC	DAM001563
Jackson		14-Aug-1944		W. McNeel	coll. From Cranberry marsh (goldenrod etc.)	WIRC	DAM001564
Jackson		14-Aug-1949		W. McNeel	coll. from cranberry marsh (goldenrod etc.)	WIRC	DAM001501
Jefferson	2mi E. Palmyra, nr. R. Carlin Trail, S Kettle Moraine St. F.	25-Aug-1977		Jass & S. Borkin		MPMC	DAM000373
Jefferson	2mi E. Palmyra, nr. R. Carlin Trail, S Kettle Moraine St. F.	25-Aug-1977		Jass & S. Borkin		MPMC	DAM000374
Jefferson	2mi E. Palmyra, nr. R. Carlin Trail, S Kettle Moraine St. F.	25-Aug-1977		Jass & S. Borkin		MPMC	DAM000375
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.1431 -88.88215	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Pycnanthemum tenuifolium, hand collected	WIRC	DAM000098
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.1431 -88.88215	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Pycnanthemum tenuifolium, hand collected	WIRC	DAM000099
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.1431 -88.88215	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Pycnanthemum tenuifolium, hand collected	WIRC	DAM000100
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.1431 -88.88215	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Pycnanthemum tenuifolium, hand collected	DAMC	DAM000101
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.1431 -88.88215	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Pycnanthemum tenuifolium, hand collected	WIRC	DAM000102
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.1431 -88.88215	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Pycnanthemum tenuifolium, hand collected	WIRC	DAM000103
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.1431 -88.88215	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Pycnanthemum tenuifolium, hand collected	WIRC	DAM000104
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14348 -88.88156	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Silphium integrifolium, hand collected	WIRC	DAM000096
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14348 -88.88156	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Silphium integrifolium, hand collected	WIRC	DAM000097
Jefferson	4 mi north of Lake Mills, Prairie Rd: Faville Prairie, 43.1436 -88.87918	8-Aug-2006		Craig M. Brabant	collected during day off flowers in limey hilltop prairie	CMBC	DAM001378

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Jefferson	Hwy S DNR trail, Lake Mills	30-Jul-1988		B. Buchli	on alfalfa	WIRC	DAM001602
Jefferson	Jefferson	5-Sep-1964				WIRC	DAM000502
Jefferson	Lake Mills, Faville Grove Sanctuary	24-Aug-2006		Andrew F. Badje		WIRC	DAM002763
Juneau	Mather	25-Jul-1930				WIRC	DAM001641
Juneau	Necedah Nat. Wild. Ref.	22-Aug-1968		J. Litsinger	Sweep	WIRC	DAM002772
Juneau	Necedah Nat. Wild. Ref.	22-Aug-1968		J. Litsinger	Sweep	WIRC	DAM002773
Juneau	Necedah Nat. Wild. Ref.	22-Aug-1968		J. Litsinger	Sweep	WIRC	DAM002774
Juneau	Necedah Nat. Wild. Ref.	22-Aug-1968		J. Litsinger	Sweep	WIRC	DAM002775
Juneau	Necedah Nat. Wildlife Refuge, N. Ryneerson, 44 4'34" -90 10'13"	14-Aug-1996	25-Sep-1996	R. King	carrion pitfall	WIRC	DAM002560
Juneau	Necedah Nat. Wildlife Refuge, N. Ryneerson, 44 4'34" -90 10'13"	14-Aug-1996	25-Sep-1996	R. King	carrion pitfall	WIRC	DAM002561
Juneau	Necedah Nat'l. W. Ref., T18N R3E Sect. 4	6-Aug-2008		Andrew H. Williams	working flowers of Solidago missouriensis, 1PM fair 70F	WIRC	DAM001440
Juneau	Necedah NWR, T18N R2E Sec 6 NW4	3-Aug-2006		S. B. Sauer	sweep net infls. of blue vervain	WDNR	DAM002718
Juneau	T14N R5E S 10,13,14,24	17-Aug-1998		Andrew H. Williams	1 of several working flowers Solidago missouriensis, 3PM fair 84F	WIRC	DAM001550
Juneau	T14N R5E S 10,13,14,24	17-Aug-1998		Andrew H. Williams	1 of several working flowers Solidago missouriensis, 3PM fair 84F	WIRC	DAM001551
Juneau	T14N R5E Sect. 11	1-Aug-1997		Andrew H. Williams	1 of 4 on flowers of Solidago missouriensis, morning, dry	WIRC	DAM001552
Kenosha	Bong AFB	3-Sep-1967		R. Kuehn		WIRC	DAM001616
Kenosha	Chiwaukee Prairie (TNC), 42.5038 - 87.80979	21-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Silphium integrifolium flower, hand collected	WIRC	DAM000142
Kenosha	Chiwaukee Prairie (TNC), 42.5038 - 87.80979	21-Aug-2006		Daniel A. Marschalek	dry prairie, feeding on Silphium integrifolium flower, hand collected	WIRC	DAM000143
Kenosha		3-Aug-1953		D. H. Habeck		FSUC	DAM001307
Kenosha		3-Aug-1953		D. H. Habeck		FSUC	DAM001308
Kenosha		3-Aug-1953		D. H. Habeck		FSUC	DAM001309
Kenosha		26-Aug-1953		D. H. Habeck		FSUC	DAM001301
Kenosha		26-Aug-1953		D. H. Habeck		FSUC	DAM001302
Kenosha		26-Aug-1953		D. H. Habeck		FSUC	DAM001303
Kenosha		26-Aug-1953		D. H. Habeck		FSUC	DAM001304
Kenosha		26-Aug-1953		D. H. Habeck		FSUC	DAM001305
Kenosha		26-Aug-1953		D. H. Habeck		FSUC	DAM001306
Kenosha	Chiwaukee Prairie, T1N R23E	12-Sep-1995			Sweep Net Mesophytic Prairie E of Marina Rd.	WDNR	DAM002669
Kenosha	Chiwaukee Prairie, T1N R23E	30-Aug-1996			Sweep Net Mesophytic Prairie	WDNR	DAM002712
La Crosse	La Crosse	8-Sep-1962		R. A. Anderson		WIRC	DAM001436
La Crosse	La Crosse	8-Sep-1962		R. A. Anderson		WIRC	DAM001437

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
	La Crosse R. Tr. Pr., T17N R4W Sec.						
La Crosse	36	8-Aug-1995		DNR	Sweeping in native pr. 12:50pm misting	WIRC	DAM001528
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000950
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000951
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000952
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000953
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000954
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000955
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000956
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000957
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000958
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		GDPC	DAM000959
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		WIRC	DAM001634
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		WIRC	DAM001635
La Crosse	West Salem	30-Aug-1970		Gene Drecktrah		WIRC	DAM001649
Lafayette	1 mi NW of Wiota	30-Aug-1997		S. A. Chapman	Collected in sweep sample from grassy area	WIRC	DAM001557
	3 mi SE Platteville, Ipswitch Prairie						
Lafayette	SNA	2-Aug-2007		Daniel A. Marschalek	On Solidago sp, Hand collected	WIRC	DAM000834
Lafayette	Shullsburg	Aug. 14 1949		R. E. Ryckman		MPMC	DAM001097
Lafayette	Shullsburg	Aug. 14 1949		R. E. Ryckman		MPMC	DAM001102
Lafayette	Shullsburg	Sept. 5 1949		R. E. Ryckman		MPMC	DAM001098
Lafayette	So Wayne	28-Aug-1949		E. McDonald		MPMC	DAM000428
Lafayette	So Wayne	28-Aug-1949		E. McDonald		MPMC	DAM000429
	S of Irma; E of Hwy 51, 45.33669 -						
Lincoln	89.66265	10-Aug-2012		Kari Gullickson	Feeding on Solidago canadensis	WIRC	DAM002910
	Eau Claire R. Weston, 45 55'6" -89						
Marathon	33'4"	7-Jul-2005		T. M. Gilbreath	Sweep in flower garden	WIRC	DAM001229
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002898
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002899
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002900
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002901
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002902
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002903
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002904
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002905
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002906
Marathon	Mosinee, 44.786987 -89.63959	8-Aug-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002907
Marathon	Nine Mile Swamp Area	31-Aug-1970		L. A. Ferge		WIRC	DAM001729
Marathon	Nine Mile Swamp Area	3-Aug-1974		James Parkinson		MPMC	DAM000419
Marathon	Nine Mile Swamp Area	3-Aug-1974		James Parkinson		MPMC	DAM000420
Marathon	T29N R8E Sect. 31	1-Oct-1972		L. A. Ferge		WIRC	DAM001726
Marathon	T29N R8E Sect. 31	1-Oct-1972		L. A. Ferge		WIRC	DAM001727
Marathon	T29N R8E Sect. 31	1-Oct-1972		L. A. Ferge		WIRC	DAM001728

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Marinette	616 Roosevelt Road, Niagra; backyard	10-Sep-2004		D. Rock	swamp, Hand collected	UWGB	DAM000440
Marinette	Bloch Oxbow and Pines, 4.1 mi S of Pestigo, 45.00822 -87.69325	9-Aug-2007		Rachel A. Arango	on goldenrod, Hand collected	WIRC	DAM000714
Marinette	High Falls Flowage	22-Jun-1963		T. Galka		WIRC	DAM001443
Marquette	Mecan Riv. Pub. Hung. Grd., 43 57'36" -89 20'17"	24-Sep-2006		Ace Lynn-Miller	on goldenrod	WIRC	DAM001410
Marquette	Mecan Riv. Pub. Hung. Grd., 43 57'36" -89 20'17"	24-Sep-2006		K. Heideman	Found on goldenrod	WIRC	DAM001411
Marquette	Muir Park, T14N R9E Sec 14/23	22-Aug-1997			On goldenrod flowers in prairie reconstruction	WIRC	DAM001618
Marquette	Muir Park, T14N R9E Sec14/23	22-Aug-1997		DNR	On goldenrod flowers in prairie reconstruction	WIRC	DAM002808
Marquette	N 1/4 miles Neshkoro	18-Sep-1982		K Warmbier		UWOC	DAM000919
Marquette	N 1/4 miles Neshkoro	18-Sep-1982		K Warmbier		UWOC	DAM000920
Marquette	T18N R9.5E	26-Aug-2005		Tim Anderson		UWOC	DAM000935
Marquette	Muir Park, T14N R9E Sec 14	22-Aug-1997			Hand/Net Old field/restored prairie North of Lake Goldenrod	WDNR	DAM002676
Marquette	Muir Park, T14N R9E Sec 14	22-Aug-1997			Hand/Net Old field/restored prairie North of Lake Goldenrod	WDNR	DAM002679
Marquette	Muir Park, T14N R9E Sec 14	22-Aug-1997			Hand/Net Old field/restored prairie North of Lake Goldenrod	WDNR	DAM002688
Marquette	Muir Park, T14N R9E Sec 14	22-Aug-1997			Sweep Net Wet-Mesic Prairie North of Lake	WDNR	DAM002697
Marquette	Muir Park, T14N R9E Sec 14	22-Aug-1997			Hand/Net Old field/restored prairie North of Lake Goldenrod	WDNR	DAM002705
Marquette	Muir Park, T14N R9E Sec 14	22-Aug-1997			Sweep Net Wet-Mesic Prairie North of Lake	WDNR	DAM002706
Menominee	Menominee Tribal Enterprises, 44.98528 -88.83306	10-Aug-2005	25-Aug-2005	John J. Dorshorst	baited with verbenon at Neopit saw-mill, Lindgren funnel trap	JJDC	DAM000690
Menominee	Menominee Tribal Enterprises, 44.98528 -88.83306	10-Aug-2005		John J. Dorshorst	taken from yellow flower of Solidago sp. adjacent hardwood forest, Hand collected	JJDC	DAM000691
Menominee	Menominee Tribal Enterprises, 44.98528 -88.83306	10-Aug-2005		John J. Dorshorst	taken from yellow flower of Solidago sp. adjacent hardwood forest, Hand collected	JJDC	DAM000692
Menominee	Menominee Tribal Enterprises, 44.98528 -88.83306	10-Aug-2005		John J. Dorshorst	taken from yellow flower of Solidago sp. adjacent hardwood forest, Hand collected	JJDC	DAM000693
Milwaukee	Cudahy	4-Sep-1960				WIRC	DAM000501
Milwaukee	Cudahy	10-Aug-1975				WIRC	DAM000499
Milwaukee	Milwaukee	Aug-1935		H. Jungmann		FSUC	DAM001325
Milwaukee	Milwaukee	30-Aug-1969		M Dymke		UWOC	DAM000926
Milwaukee	Whitefish Bay	25-Aug-1910		A. C. Burrill		MPMC	DAM001149
Milwaukee	Whitefish Bay	Aug 28th 1910		A. C. Burrill		MPMC	DAM001078

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Milwaukee		21-Mar-1905		Richard A. Muttkowski		MPMC	DAM001147
Milwaukee						WIRC	DAM001495
Milwaukee						WIRC	DAM001496
	Ft McCoy Sand Quar., T17N R3W				on Euphoria corollata in sand prairie/oak		
Monroe	sec2	25-Jul-1999		Jeffrey P. Gruber	savanna	WIRC	DAM001622
Monroe	Ft. McCoy	2-Aug-2007		Daniel A. Marschalek	On Solidago sp flowers, Hand collected	WIRC	DAM000832
Monroe	Ft. McCoy	2-Aug-2007		Daniel A. Marschalek	On Solidago sp flowers, Hand collected	WIRC	DAM000833
Monroe	Tomah	28-Jul-1923		A. Holmquist		WIRC	DAM001493
	La Crosse River Trail, T17N R4W Sec				Sweep Net 70F overcast Dry prairie burned		
Monroe	31	9-Aug-1995			1995	WDNR	DAM002683
	La Crosse River Trail, T17N R4W Sec						
Monroe	31	29-Aug-1995			Sweep Net 80F p/sun 14:00 Native Prairie	WDNR	DAM002692
Oconto	Gillet, Hwy 32	9-Aug-2007		Emily E. Mueller	weedy field, pan trap	WIRC	DAM000273
Oconto	Gillet, Hwy 32	23-Aug-2007		Emily E. Mueller	weedy field, pan trap	WIRC	DAM000275
	Hwy 17 open area, T38N R9E Sect.				1 of several working flowers of Solidago		
Oneida	14	26-Aug-2000		Andrew H. Williams	canadensis 7PM sunny 69F	WIRC	DAM001526
	2.0mi N. County Line Rd., 0.8 mi W.						
Ozaukee	Hy. 57	6-Aug-1978		D. H. Hildebrandt	on goldenrod	MPMC	DAM002467
	2.0mi N. County Line Rd., 0.8 mi W.						
Ozaukee	Hy. 57	6-Aug-1978		D. H. Hildebrandt	on goldenrod	MPMC	DAM002468
	2.0mi N. County Line Rd., 0.8 mi W.						
Ozaukee	Hy. 57	6-Aug-1978		D. H. Hildebrandt	on goldenrod	MPMC	DAM002469
Ozaukee	43.2106 -87.9649	27-Aug-2000		Peter Messer	On goldenrod, suburban backyard, 7pm	UWOC	DAM000925
	ca. 4.5mi W Saukville, UWM Field						
Ozaukee	Station, T11N R21E Sec29/30	11-Sep-1985		S. Sullivan-Borkin		MPMC	DAM002454
Ozaukee	UWM Field Sta.	30-Jul-1985		Daniel K. Young		WIRC	DAM002739
Ozaukee	UWM Field Sta.	30-Jul-1985		Daniel K. Young		WIRC	DAM002740
Ozaukee	UWM Field Sta.	30-Jul-1985		Daniel K. Young		WIRC	DAM002741
Ozaukee	UWM Field Sta.	30-Jul-1985		Daniel K. Young		WIRC	DAM002742
Ozaukee	UWM Field Sta.	30-Jul-1985		Daniel K. Young		WIRC	DAM002743
Ozaukee	UWM Field Sta.	30-Jul-1985		Daniel K. Young		WIRC	DAM002744
Ozaukee	UWM Field Sta.	30-Jul-1985		Daniel K. Young		WIRC	DAM002745
Ozaukee	UWM Field Sta.	30-Jul-1985		Daniel K. Young		WIRC	DAM002746
Pepin	Durand	Aug. 2 1920		T.E.B. Pope		MPMC	DAM001076
Pepin	Durand	Aug. 2 1920		T.E.B. Pope		MPMC	DAM001077
	Five Mile Bluff Prairie, T23N R14W						
Pepin	Sec 15	26-Sep-1995			Sweep Net Bluff Prairie	WDNR	DAM002674
	Five Mile Bluff Prairie, T23N R14W						
Pepin	Sec 15	26-Sep-1995			Sweep Net Bluff Prairie	WDNR	DAM002707
Pierce	Maiden Rock	4-Aug-1910	10-Aug-1910	Museum Expedition		MPMC	DAM001139

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Pierce	Trenton Bluff Pr. SNA, T25N R18W S28	24-Aug-1998		C. R. Bomar		WDNR	DAM002723
Polk	Amery	3-Aug-1923		A. Holmquist		WIRC	DAM001492
Polk	T34N R15W Sec. 36	19-Aug-1998		Andrew H. Williams	among flowers of <i>Solidago canadensis</i> , 6PM p. cloudy 76F	WIRC	DAM001409
Portage	Plover	1-Aug-2005	5-Aug-2005	Ben Werling	grasses/weedy area, sweep net	WIRC	DAM000093
Portage	Stevens Point	31-Jul-2006		Ben Werling	grassy road, sweep net	WIRC	DAM000110
Portage	Sunset Lake, T24N R10W	6-Aug-1999		M. H. Evans	swgp lakeside sedges & brush	WIRC	DAM001755
Price	S of Hwy 70; E of Hwy 13, 45.84968 - 90.18415 1mi. S Rochester on Hwy. W, Honey Creek Wildf. Area, T3N R19E sec10	24-Jul-2012		Kari Gullickson	Feeding on goldenrod	WIRC	DAM002861
Racine	SE	26-Aug-1980		Jass		MPMC	DAM002478
Racine	Corliss	21-Mar-1905		C. T. Brues		MPMC	DAM001145
Racine	Corliss	21-Mar-1905		C. T. Brues		MPMC	DAM001146
Racine		2-Sep-1911		S. Graenicher		MPMC	DAM001118
Richland	[illegible]	21-Aug-1993				WIRC	DAM001629
Richland	1 mi W Lone Rock, Lone Rock Unit LWSR	30-Jul-2008		Daniel A Marschalek	Sandy prairie, on flower of <i>Solidago gigantea</i>	WIRC	DAM001204
Richland	3 mi NW Lone Rock, 43.2073 - 90.26097	29-Jul-2007		Daniel A. Marschalek	sandy prairie, feeding on <i>Helianthus occidentalis</i> , Hand collected	WIRC	DAM000513
Rock	2 mi SE Hanover, Kessler RR Prairie SNA, 42.62726 -89.13139	9-Aug-2006		Daniel A. Marschalek	prairie, feeding on <i>Solidago rigida</i> , Hand collected	WIRC	DAM000171
Rock	2 mi SE Hanover, Kessler RR Prairie SNA, 42.62726 -89.13139	9-Aug-2006		Daniel A. Marschalek	prairie, feeding on <i>Solidago rigida</i> , Hand collected	WIRC	DAM000172
Rock	2 mi SE Hanover, Kessler RR Prairie SNA, 42.62726 -89.13139	9-Aug-2006		Daniel A. Marschalek	prairie, feeding on <i>Solidago rigida</i> , Hand collected	DAMC	DAM000173
Rock	Newark Twsp	14-Aug-1970		James Litsinger	sweep alfalfa	WIRC	DAM001611
Rock	Newark Twsp	14-Aug-1970		James Litsinger	sweep alfalfa	WIRC	DAM001612
Rock	Newark Twsp	21-Aug-1970		James Litsinger	sweep alfalfa	WIRC	DAM001613
Rock	Newark Twsp	21-Aug-1970		James Litsinger	sweep alfalfa	WIRC	DAM001614
Rock	Newark Twsp	21-Aug-1970		James Litsinger	sweep alfalfa	WIRC	DAM001615
Rock	Rock River Prairie, T1N R12E Sec2 SW	29-Aug-1997		DNR	Collected from Goldenrod flowers	WIRC	DAM001510
Rock		6-Sep-1974		M. Greenfield		WIRC	DAM002803
Rock		6-Sep-1974		M. Greenfield		WIRC	DAM002804
Rock	Rock River Prairie, T1N R12E Sec 2	29-Aug-1997			Hand? Mating Pair (2 specs) Prairie Flowers Goldenrod	WDNR	DAM002643
Rock	Rock River Prairie, T1N R12E Sec 2	29-Aug-1997			Hand? Prairie Flowers Goldenrod	WDNR	DAM002649
Rock	Rock River Prairie, T1N R12E Sec 2	29-Aug-1997			Hand? Prairie Flowers Goldenrod	WDNR	DAM002655

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Rock	Rock River Prairie, T1N R12E Sec 2	29-Aug-1997			Hand? Prairie Flowers Goldenrod	WDNR	DAM002667
Rock	Rock River Prairie, T1N R12E Sec 2	29-Aug-1997			Hand? Prairie Flowers Goldenrod	WDNR	DAM002687
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002864
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002865
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002866
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002867
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002868
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002869
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002870
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002871
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002872
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002873
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002874
Rusk	45.56687 -91.45508	26-Jul-2012		Daniel A. Marschalek	On Solidago	DAMC	DAM002875
Rusk	Bruce	1-Aug-1918		Harley		WIRC	DAM001469
Rusk	T35N R17W Sec34	9-Aug-1953				WIRC	DAM002789
Rusk	T35N R17W Sec34	9-Aug-1953				WIRC	DAM002790
Rusk	T35N R17W Sec34	9-Aug-1953				WIRC	DAM002791
Sauk	1 mi NE Spring Green, Sprng Grn Pres. SNA	16-Aug-2008		Daniel A Marschalek	Sandy prairie, on flower of Solidago gigantea	WIRC	DAM001202
Sauk	2 mi W Spring Green, 43.18091 -90.14397	29-Jul-2007		Daniel A. Marschalek	sandy prairie, on Solidago sp., Hand collected	WIRC	DAM000514
Sauk	5 mi N Baraboo, Inter Crane Fndtn, 43.55014 -89.75123	25-Jul-2006		Daniel A. Marschalek	prairie, feeding on Pycnanthemum tenuifolium, hand collected	WIRC	DAM000095
Sauk	Baraboo	23-Sep-1989		B. Anderson		WIRC	DAM001656
Sauk	Baraboo	23-Sep-1989		B. Anderson		WIRC	DAM001657
Sauk	Baxter's Hollow	2-Oct-1993		Peter H. Ault		WIRC	DAM001441
Sauk	Leopold Reserve, E. B. L. Prairie	14-Aug-1988		L. F. Goodman		WIRC	DAM001513
Sauk	Leopold Reserve, E. B. L. Prairie	14-Aug-1988		L. F. Goodman		WIRC	DAM001514
Sauk	Leopold Reserve, E. B. L. Prairie	14-Aug-1988		L. F. Goodman		WIRC	DAM001515
Sauk	Leopold Reserve, E. B. L. Prairie	14-Aug-1988		L. F. Goodman		WIRC	DAM001516
Sauk	Leopold Reserve, E. B. L. Prairie	14-Aug-1988		L. F. Goodman		WIRC	DAM001517
Sauk	Leopold Reserve, E. B. L. Prairie	14-Aug-1988		L. F. Goodman		WIRC	DAM001518
Sauk	Leopold Reserve, Shack Prairie	11-Aug-1987		Lisa Goodman	ex: Solidago sp.	WIRC	DAM001511
Sauk	Leopold Reserve, Shack Prairie	11-Aug-1987		Lisa Goodman	ex: Solidago sp.	WIRC	DAM001512
Sauk	Sauk City	19-Oct-1972		Jide Matanmi		WIRC	DAM001712
Sauk	Sauk City	19-Oct-1972		Jide Matanmi		WIRC	DAM001713
Sauk	Sauk City	19-Oct-1972		Jide Matanmi		WIRC	DAM001714
Sauk	Sauk City	29-Sep-1983		T. Dittl		WIRC	DAM001650
Sauk	Shucklebier	19-Sep-1989				WIRC	DAM001662

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sauk	Spring Grn Pres SNA, 43.19731 - 90.06068	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Solidago flowers, hand collected	WIRC	DAM000105
Sauk	Spring Grn Pres SNA, 43.19731 - 90.06068	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Solidago flowers, hand collected	WIRC	DAM000106
Sauk	Spring Grn Pres SNA, 43.19731 - 90.06068	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Solidago flowers, hand collected	WIRC	DAM000107
Sauk	Spring Grn Pres SNA, 43.19731 - 90.06068	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Solidago flowers, hand collected	DAMC	DAM000108
Sauk	Spring Grn Pres SNA, 43.19731 - 90.06068	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Solidago flowers, hand collected	WIRC	DAM000109
Sauk	Wis. Dells	30-Aug-1968				WIRC	DAM000500
Sauk	Gasser Sand Barrens, T9N R6E Sec 6	3-Aug-1995			Sweep Net Sand Prairie	WDNR	DAM002660
Sauk	Schluckebier Prairie, T10N R6W Sec 33	12-Sep-1997			YPT Sand Prairie	WDNR	DAM002653
Sauk	Spring Green (East), T8N R4E Sec 6	11-Sep-1997			Sweep Net Sand Prairie	WDNR	DAM002709
Shawano		21-Aug-1964		D. H. Habeck		FSUC	DAM001310
Shawano		21-Aug-1964		D. H. Habeck		FSUC	DAM001311
Shawano		21-Aug-1964		D. H. Habeck		FSUC	DAM001312
Shawano		21-Aug-1964		D. H. Habeck		FSUC	DAM001313
Shawano		21-Aug-1964		D. H. Habeck		FSUC	DAM001314
Shawano		21-Aug-1964		D. H. Habeck		FSUC	DAM001315
Sheyboygan	ca. 4.5mi SW Plymouth, T14N R21E Sec 18	23-Aug-1983		S.S. Borkin	gravel road, old field and bottomland along creek	MPMC	DAM000430
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001316
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001317
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001318
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001319
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001320
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001321
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001322
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001323
St. Croix	Baldwin	3-Aug-1965		E. R. Jaycox	goldenrod	FSUC	DAM001324
St. Croix	USFWS-Boucher, T30N R18W Sec 6	11-Aug-1997		Joe Wilberg		CRBC	DAM000251
St. Croix	USFWS-Boucher, T30N R18W Sec 6 Chimney Rock Hunting Area, sedge meadow south of Hwy Y, T23N R9W	11-Aug-1997		Joe Wilberg		CRBC	DAM000252
Trempealeau	SWSW Sect. 11	5-Aug-2003		Kathryn Kirk		WIRC	DAM001623
Trempealeau		28-Jul-1949		W. McNeel	coll. from forest floor	WIRC	DAM001502
Vernon	Genoa	7-Jul-1911	12-Jul-1911	Museum Expedition		MPMC	DAM001125

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Vernon	Genoa	13-Jul-1911	19-Jul-1911	Museum Expedition		MPMC	DAM001126
Vernon	Genoa	13-Jul-1911	19-Jul-1911	Museum Expedition		MPMC	DAM001127
Vernon	Battle Bluff Prairie, T11N R7W Sec 4 Hwy 47 gravelly area, T40N R5E	24-Aug-1995			Sweep Net Bluff Prairie 1 of 2 seen working flowers of Solidago canadensis, 9:30Am sun 63F	WDNR	DAM002684
Vilas	Sect. 5	27-Aug-2000		Andrew H. Williams		WIRC	DAM001524
Vilas	Hwy M, 1/4 mi S Hwy N	7-Aug-2007		Heather R. Llanas		WIRC	DAM002608
Walworth	1.2 mi E East Troy	31-Jul-1976		G. R. Noonan		MPMC	DAM000385
Walworth	1.2 mi E East Troy	5-Sep-1976		A. Young		MPMC	DAM000381
Walworth	1.2 mi E East Troy	5-Sep-1976		A. Young		MPMC	DAM000382
Walworth	1.2 mi E East Troy	5-Sep-1976		A. Young		MPMC	DAM000383
Walworth	1.2 mi E East Troy	5-Sep-1976		A. Young		MPMC	DAM000384
Walworth	Delavan	5-Aug-1912		A C Burrill		WIRC	DAM001584
Walworth	Delavan	5-Aug-1912		A C Burrill		WIRC	DAM001585
Walworth	T4N R16E Sec 5 NW	5-Aug-1997		DNR Study	Taken from: sweep net in prairie dropseed Taken from flowers of Rosinweed in native prairie	WDNR	DAM002681
Walworth	T4N R16E Sec 5 NW	5-Aug-1997		DNR Study	Taken from flowers of Rosinweed in native prairie	WDNR	DAM002690
Walworth	T4N R16E Sec 5 NW	5-Aug-1997		DNR Study	Taken from flowers of Rosinweed in native prairie	WDNR	DAM002700
Walworth	T4N R16E Sec 5 NW	5-Aug-1997		DNR Study	Immobile on flower buds at top of plant	WDNR	DAM002708
Walworth	Young Prairie SNA, T4N R16E Sect 5	5-Aug-2005		Andrew H. Williams	Pyonanthemum virginianum, 10AM fair 77F	WIRC	DAM001605
Walworth	Young Prairie SNA, T4N R16E Sect 5	21-Aug-2005		Andrew H. Williams	1 of 8 seen working flowers of Solidago rigida, 10AM sunny 72F	WIRC	DAM001606
Walworth	Young Prairie SNA, T4N R16E Sect 5	21-Aug-2005		Andrew H. Williams	1 of 8 seen working flowers of Solidago rigida, 10AM sunny 72F	WIRC	DAM001607
Walworth	Lulu Prairie, T4N R17E Sec 2	14-Aug-1995			Sweep Net	WDNR	DAM002656
Walworth	Lulu Prairie, T4N R17E Sec 2	14-Aug-1995			Sweep Net	WDNR	DAM002663
Walworth	Lulu Prairie, T4N R17E Sec 2	22-Aug-1996				WDNR	DAM002642
Walworth	Lulu Prairie, T4N R17E Sec 2	22-Aug-1996				WDNR	DAM002696
Walworth	Lulu Prairie, T4N R17E Sec 2	4-Sep-1997			Sweep Net 65F Sunny Prairie Reconstruction	WDNR	DAM002651
Walworth	Lulu Prairie, T4N R17E Sec 2	6-Sep-1997			Sweep Net Prairie Restoration	WDNR	DAM002702
Walworth	Lulu Prairie, T4N R17E Sec 2	10-Sep-1997			Sweep Net 65F Sunny Prairie Reconstruction	WDNR	DAM002644
Walworth	Lulu Prairie, T4N R17E Sec 2	10-Sep-1997			Sweep Net 65F Sunny Prairie Reconstruction	WDNR	DAM002662
Walworth	Lulu Prairie, T4N R17E Sec 2	10-Sep-1997			Sweep Net 65F Sunny Prairie Reconstruction	WDNR	DAM002668
Walworth	Lulu Prairie, T4N R17E Sec 2	26-Sep-1997			Sweep Net 65F Prairie Restoration	WDNR	DAM002694
Walworth	Lulu Prairie, T4N R17E Sec 2	1-Oct-1997			Sweep Net 65F Prairie Restoration	WDNR	DAM002686

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Walworth	Young Prairie, T4N R16E Sec 5	22-Aug-1996			Hand Collected Mesophytic Prairie to ETOH	WDNR	DAM002703
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000389
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000390
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000391
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000392
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000393
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000394
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000395
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000396
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000397
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000398
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000399
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000400
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000401
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000402
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000403
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000404
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000405
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000406
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000407
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000408

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000409
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000410
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000411
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000412
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000413
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000414
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000415
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000416
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000417
Washington	Jackson Wildlife Area, Maple Road	2-Aug-1985		R.J. Reich		MPMC	DAM000418
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001072
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001074
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001144
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001150
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001151
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001152
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001153
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001154
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001155
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001156
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001157
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001158
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001159
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001160
Washington	Little Cedar Lake	21-Mar-1905		H. L. Ward		MPMC	DAM001161
Washington	Little Cedar Lake	18-Aug-1907		H. L. Ward		MPMC	DAM001188
Washington	near Hartford, T9N R19E Sec 7 NW1/4	1-Aug-1979		K. Lukasavitz		MPMC	DAM000376
Washington	near Hartford, T9N R19E Sec 7 NW1/4	1-Aug-1979		K. Lukasavitz		MPMC	DAM000377
Washington	near Hartford, T9N R19E Sec 7 NW1/4	1-Aug-1979		K. Lukasavitz		MPMC	DAM000378

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Washington	near Hartford, T9N R19E Sec 7 NW1/4	1-Aug-1979		K. Lukasavitz		MPMC	DAM000379
Washington	near Hartford, T9N R19E Sec 7 NW1/4	1-Aug-1979		K. Lukasavitz		MPMC	DAM000380
Washington	T10N R19E Sect. 33	20-Jul-1998		Andrew H. Williams	1 of several among flowers of Solidago canadensis, 2PM sunny 82F	WIRC	DAM001532
Washington	T10N R19E Sect. 33	20-Jul-1998		Andrew H. Williams	1 of several among flowers of Solidago canadensis, 2PM sunny 82F	WIRC	DAM001533
Washington	T10N R19E Sect. 33	20-Jul-1998		Andrew H. Williams	1 of several among flowers of Solidago juncea 2PM sunny 82F	WIRC	DAM001534
Washington	T10N R19E Sect. 33	20-Jul-1998		Andrew H. Williams	1 of several among flowers of Solidago juncea 2PM sunny 82F	WIRC	DAM001535
Washington	T10N R19E Sect. 33	20-Jul-1998		Andrew H. Williams	1 of several among flowers of Solidago juncea 2PM sunny 82F	WIRC	DAM001536
Waukesha	3.5mi SW Eagle	2-Aug-1976		Noonan, Pleyte, Eichers	oak savanna	MPMC	DAM000367
Waukesha	3.5mi SW Eagle	2-Aug-1976		Noonan, Pleyte, Eichers	oak savanna	MPMC	DAM000368
Waukesha	3.5mi SW Eagle	2-Aug-1976		Noonan, Pleyte, Eichers	oak savanna	MPMC	DAM000369
Waukesha	3.5mi SW Eagle	2-Aug-1976		Noonan, Pleyte, Eichers	oak savanna	MPMC	DAM000370
Waukesha	3.5mi SW Eagle	2-Aug-1976		Noonan, Pleyte, Eichers	oak savanna	MPMC	DAM000371
Waukesha	3.5mi SW Eagle Brookfield btwn. Bluemound Rd. & I-94, W of N. 124th St., Underwood Creek Parkway, T7N R20E Sec25	2-Aug-1976		Noonan, Pleyte, Eichers	oak savanna	MPMC	DAM000372
Waukesha	SE1/4 Brookfield btwn. Bluemound Rd. & I-94, W of N. 124th St., Underwood Creek Parkway, T7N R20E Sec25	5-Aug-1982		S. Borkin	shrub-carr, marsh & old field areas along creek	MPMC	DAM002479
Waukesha	SE1/4 Brookfield, btwn. Bluemounds & Schlinger, W. of 124 St., Crawfish River, T7N R14E Sec 20	5-Aug-1982		S. Borkin	shrub-carr, marsh & old field areas along creek	MPMC	DAM002480
Waukesha	Brookfield, east end of Independence Drive	9-Sep-1982		S. Borkin	wet meadow & grassy bank	MPMC	DAM002482
Waukesha	Brookfield, east end of Independence Drive	9-Sep-1982		S. Borkin		MPMC	DAM002455
Waukesha	Brookfield, east end of Independence Drive	9-Sep-1982		S. Borkin		MPMC	DAM002456
Waukesha	Brookfield, east end of Independence Drive	9-Sep-1982		S. Borkin		MPMC	DAM002457

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Waukesha	ca. 1.25mi W Eagle, S hwy. 59 & W hwy. S, T5N R17E Sec20	12-Aug-1982		S. Borkin	along dirt road through pine plantation & oak woods; prairie	MPMC	DAM002458
Waukesha	ca. 1.25mi W Eagle, S hwy. 59 & W hwy. S, T5N R17E Sec20	12-Aug-1982		S. Borkin	along dirt road through pine plantation & oak woods; prairie	MPMC	DAM002459
Waukesha	ca. 1.25mi W Eagle, S hwy. 59 & W hwy. S, T5N R17E Sec20	12-Aug-1982		S. Borkin	along dirt road through pine plantation & oak woods; prairie	MPMC	DAM002460
Waukesha	ca. 1.25mi W. Eagle, S hwy 59 & W hwy S, T5N R17E Sec 20	12-Aug-1982		S. Borkin	along dirt road through pine plantation & oak woods; prairie	MPMC	DAM002453
Waukesha	ca. 3mi SW Eagle; N of Co. Hwy. NN, T5N R17E Sec31 N1/2	12-Aug-1982		S. Borkin	old fields with marshland nearby	MPMC	DAM002481
Waukesha	Hwy 59 roadside prairie, T5N R17E Sect 19	21-Aug-2005		Andrew H. Williams	1 of several working flowers of Solidago ohioensis, 1PM sunny 73F	WIRC	DAM001608
Waukesha	Hwy 59 roadside prairie, T5N R17E Sect 19	21-Aug-2005		Andrew H. Williams	1 of several working flowers of Solidago ohioensis, 1PM sunny 73F	WIRC	DAM001609
Waukesha	Hwy 59 ROW, T5N R17E Sect. 19	19-Aug-1999		Andrew H. Williams	ohioensis, 6PM	WIRC	DAM001531
Waukesha	Meno Falls	15-Jul-1986		M DeVore		UWOC	DAM000921
Waukesha	Pewaukee Lake	1-Sep-1937		K. MacArthur		MPMC	DAM001064
Waukesha	Pewaukee Lake	1-Sep-1937		K. MacArthur		MPMC	DAM001065
Waukesha	T5N R17E Sec 9	24-Aug-1994		DNR Study	Taken from: sweep net in native prairie dry mesic	WDNR	DAM002682
Waukesha	T5N R17E Sec 9	24-Aug-1994		DNR Study	Taken from: sweep net in native prairie dry mesic	WDNR	DAM002699
Waupaca	intersection of Rural Rd. and West Dayton Road, 44 18'54" -89 12'11"	6-Aug-2002		Craig M. Brabant	off Solidago sp. on roadside ("ATC021"	CMBC	DAM002834
Waupaca	intersection of Rural Rd. and West Dayton Road, 44 18'54" -89 12'11"	6-Aug-2002		Craig M. Brabant	off Solidago sp. on roadside ("ATC021"	CMBC	DAM002835
Waupaca	Waupaca	28-Jul-1920		L. G. Gentner	Solidago flowers	WIRC	DAM001565
Waupaca	Waupaca	23-Aug-1920		L. G. Gentner		WIRC	DAM001566
Waupaca	Waupaca	23-Aug-1920		L. G. Gentner		WIRC	DAM001567
Waupaca	Waupaca	23-Aug-1949		W. McNeel	coll. from forest floor	WIRC	DAM001573
Waushara	4 mi. W Plainfield, Field Hamerstrom Property	5-Aug-2002		W. Suter	Sweepings Goldenrod	WIRC	DAM001381
Waushara	4 mi. W Plainfield, Field Hamerstrom Property	5-Aug-2002		W. Suter	Sweepings Goldenrod	WIRC	DAM001382
Waushara	4 mi. W Plainfield, Field Hamerstrom Property	5-Aug-2002		W. Suter	Sweepings Goldenrod	WIRC	DAM001383
Waushara	4 mi. W Plainfield, Field Hamerstrom Property	5-Aug-2002		W. Suter	Sweepings Goldenrod	WIRC	DAM001384
Waushara	4 mi. W Plainfield, Field Hamerstrom Property	5-Aug-2002		W. Suter	Sweepings Goldenrod	WIRC	DAM001385

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Waushara	4 mi. W Plainfield, Field Hamerstrom Property	5-Aug-2002	W. Suter	Sweepings Goldenrod	WIRC	DAM001386
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	21-Aug-2002	W. Suter	Sweeping Goldenrod	WIRC	DAM001456
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	21-Aug-2002	W. Suter	Sweeping Goldenrod	WIRC	DAM001457
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	3-Aug-2003	W. Suter	goldenrod	WIRC	DAM001453
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	15-Sep-2003	W. Suter	Sweep	WIRC	DAM001447
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	15-Sep-2003	W. Suter	Sweep	WIRC	DAM001448
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	15-Sep-2003	W. Suter	Sweep	WIRC	DAM001449
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	15-Sep-2003	W. Suter	Sweep	WIRC	DAM001450
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	15-Sep-2003	W. Suter	Sweep	WIRC	DAM001451
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	16-Sep-2003	J. L. Bengtson	Prairie	WIRC	DAM001445
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	16-Sep-2003	J. L. Bengtson	Prairie	WIRC	DAM001446
Waushara	4 mi. W Plainfield, Field Hamerstrom Property NE	19-Sep-2003	J. L. Bengtson	Sweep	WIRC	DAM001444
Waushara	4 mi. W Plainfield, Field Hamerstrom Property SE	22-Sep-2002	J. Bengtson	Sweep	WIRC	DAM001452
Waushara	4 mi. W Plainfield, Field Hamerstrom Property SE	27-Jul-2003	W. Suter	dirt road	WIRC	DAM001454
Waushara	4 mi. W Plainfield, Field Hamerstrom Property SE	27-Jul-2003	W. Suter	Sweep	WIRC	DAM001455
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002	W. Suter	Sweeping Field NE	WIRC	DAM001387
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002	W. Suter	Sweeping Field NE	WIRC	DAM001388
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002	W. Suter	Sweeping Field NE	WIRC	DAM001389
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002	W. Suter	Sweeping Field NE	WIRC	DAM001390
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002	W. Suter	Sweeping Field NE	WIRC	DAM001391
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002	W. Suter	Sweeping SE bee field	WIRC	DAM001392

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002		W. Suter	Sweeping SE bee field	WIRC	DAM001393
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002		W. Suter	Sweeping SE bee field	WIRC	DAM001394
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002		W. Suter	Sweeping SE bee field	WIRC	DAM001395
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002		W. Suter	Sweeping SE bee field	WIRC	DAM001396
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002		W. Suter	Sweeping Field NE	WIRC	DAM001458
Waushara	4 mi. W Plainfield, Hamerstrom Property	5-Aug-2002		W. Suter	Sweeping Field NE	WIRC	DAM001459
Waushara	4 mi. W Plainfield, Hamerstrom Property	16-Sep-2002		W. Suter	Sweeping Field NE	WIRC	DAM001460
Waushara	4 mi. W Plainfield, Hamerstrom Property	16-Sep-2002		W. Suter	Sweeping Field 3	WIRC	DAM001461
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh S	WIRC	DAM001397
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001398
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001399
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001400
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001401
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001402
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001403
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001404
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001405
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001406
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001407
Waushara	4 mi. W Plainfield, Hamerstrom Property NE	25-Aug-2002		W. Suter	Sweeping Marsh N	WIRC	DAM001408
Waushara	5 mi E Wautoma, Hwy 22	10-Aug-1970		Erickson	On Goldenrod	WIRC	DAM001640
Waushara	8 mi NE Wautoma	29-Jul-1977		M Spreeman		UWOC	DAM000969

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Waushara	8 mi NE Wautoma	29-Jul-1977		M Spreeman		UWOC	DAM000970
Waushara	8 mi NE Wautoma	29-Jul-1977		M Spreeman		UWOC	DAM000971
Waushara	8 mi NE Wautoma	29-Jul-1977		M Spreeman		UWOC	DAM000972
Waushara	8 mi NE Wautoma	29-Jul-1977		M Spreeman		UWOC	DAM000973
Waushara	8 mi NE Wautoma	29-Jul-1977		M Spreeman		UWOC	DAM000974
Waushara	8 mi NE Wautoma	29-Jul-1977		M Spreeman		UWOC	DAM000975
Waushara	8 mi NE Wautoma	29-Jul-1977		M Spreeman		UWOC	DAM000976
Waushara	8 mi NE Wautoma	18-Jul-1978		M Spreeman		UWOC	DAM000911
Waushara	Hancock	4-Sep-1989		Jennifer Feldman		WIRC	DAM001648
Waushara	Hancock, UW Res Stat	31-Aug-2007		Emily E. Mueller	white clover, pan trap	WIRC	DAM000274
Waushara	T19N R12E Sec 17	3-Aug-1976		M Brosseau		UWOC	DAM000924
Waushara	T19N R12E Sec 31	7-Aug-1981		A Techlow III		UWOC	DAM000914
Waushara		9-Aug-1951				WIRC	DAM002776
Waushara		9-Aug-1951				WIRC	DAM002777
Waushara		9-Aug-1951				WIRC	DAM002778
Waushara		9-Aug-1951				WIRC	DAM002779
Waushara		9-Aug-1951				WIRC	DAM002780
Waushara		9-Aug-1951				WIRC	DAM002781
Waushara		9-Aug-1951				WIRC	DAM002782
Waushara		9-Aug-1951				WIRC	DAM002783
Waushara		9-Aug-1951				WIRC	DAM002809
Waushara		18-May-1957		D. Woyok		UWSP	DAM001282
Winnebago	1 miles south Oshkosh	27-Aug-1981		Kurt Schmude		UWOC	DAM000915
Winnebago	1 miles south Oshkosh	27-Aug-1981		Kurt Schmude		UWOC	DAM000916
Winnebago	1 miles south Oshkosh	27-Aug-1981		Kurt Schmude		UWOC	DAM000917
Winnebago	1 miles south Oshkosh	27-Aug-1981		Kurt Schmude		UWOC	DAM000918
Winnebago	2 miles nw Oshkosh	12-Sep-1979		Gene Drecktrah		GDPC	DAM000961
Winnebago	3 miles W Omro	29-Aug-1997		Chris Sample		UWOC	DAM000913
Winnebago	5 miles west Oshkosh	18-May-1996		A Way		UWOC	DAM000912
Winnebago	High Trestle Creek; 2 miles south Oshkosh	20-Aug-1978		T Crunwald		UWOC	DAM000927
Winnebago	High Trestle Creek; 2 miles south Oshkosh	2-Aug-1979				UWOC	DAM000928
Winnebago	High Trestle Creek; 2 miles south Oshkosh	2-Aug-1979				UWOC	DAM000929
Winnebago	High Trestle Creek; 2 miles south Oshkosh	2-Aug-1979				UWOC	DAM000930
Winnebago	High Trestle Creek; 2 miles south Oshkosh	2-Aug-1979		T Crunwald		UWOC	DAM000931
Winnebago	High Trestle Creek; 2 miles south Oshkosh	2-Aug-1979		T Crunwald		UWOC	DAM000932
Winnebago	Oshkosh	21-Aug-1915		Ralph N. Buckstaff		MPMC	DAM001119

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Winnebago	Oshkosh	26-Aug-1928		R.N. Buckstaff	on goldenrod	MPMC	DAM000421
Winnebago	Oshkosh	26-Aug-1928		R.N. Buckstaff	on goldenrod	MPMC	DAM000422
Winnebago	Oshkosh	26-Aug-1928		R.N. Buckstaff	on goldenrod	MPMC	DAM000423
Winnebago	Oshkosh	26-Aug-1928		R.N. Buckstaff	on goldenrod	MPMC	DAM000424
Winnebago	Oshkosh	26-Aug-1928		R.N. Buckstaff	on goldenrod	MPMC	DAM000425
Winnebago	Oshkosh	26-Aug-1928		R.N. Buckstaff	on goldenrod	MPMC	DAM000426
Winnebago	Oshkosh	26-Aug-1928		R.N. Buckstaff	on goldenrod	MPMC	DAM000427
Winnebago	Oshkosh	4-Sep-1930		H. R. Rich		MPMC	DAM001079
Winnebago	Oshkosh	4-Sep-1930		H. R. Rich		MPMC	DAM001080
Winnebago	Oshkosh	4-Sep-1930		H. R. Rich		MPMC	DAM001081
Winnebago	Oshkosh	4-Sep-1930		H. R. Rich		MPMC	DAM001089
Winnebago	Oshkosh	1-Sep-1941		R.N. Buckstaff		MPMC	DAM000431
Winnebago	Oshkosh	1-Sep-1941		R.N. Buckstaff		MPMC	DAM000432
Winnebago	Oshkosh	21-Aug-1948		N. Buckstaff	on goldenrod	MPMC	DAM000386
Winnebago	Oshkosh	21-Aug-1948		N. Buckstaff	on goldenrod	MPMC	DAM000387
Winnebago	Oshkosh	21-Aug-1948		N. Buckstaff	on goldenrod	MPMC	DAM000388
Winnebago	Oshkosh	24-Jul-1991		P. Zemke		UWOC	DAM000923
Winnebago	T18N R14E Sec 36 NW	14-Aug-1990		Gene Drecktrah		GDPC	DAM000963
Winnebago		9-Aug-1953		R.N. Buckstaff	on goldenrod	MPMC	DAM000433
Winnebago		9-Aug-1953		R.N. Buckstaff	on goldenrod	MPMC	DAM000434
Winnebago		9-Aug-1953		R.N. Buckstaff	on goldenrod	MPMC	DAM000435
Winnebago	Koro Prairie, T17N R14E Sec 17	28-Jul-1998			Sweep Net Mesic RR Prairie Big	WDNR	DAM002659
Winnebago	Omro	26-Jul-2001		Adams/Freeman	Bluestem/Forbs	WDNR	DAM002715
Winnebago	BV Prairie Chicken Mgmt, 11 mi SE						
Wood	WI Rapids	21-Aug-1997		Cynthia Hawkinson	Coll. In field with sweep net	WIRC	DAM001520
Wood	Cranmoor	11-Jul-1930				WIRC	DAM001643
Wood	Cranmoor	15-Aug-1930				WIRC	DAM001423
Wood	Cranmoor	15-Aug-1930				WIRC	DAM001639
Wood	Grand Rpds	4-Aug-1929				WIRC	DAM001642
Wood	Griffith St. Nursery	5-Aug-1951		R. D. Shenefelt		WIRC	DAM001503
Wood	Griffith St. Nursery	5-Aug-1951		R. D. Shenefelt		WIRC	DAM001504
Wood	Marshfield, Half Mile Drive, 44.59194 -90.18167	8-Aug-2007		Eric M. Heeg	From Solidago canadensis L. in ditch, Hand collected	WIRC	DAM000851
Wood	Marshfield, Half Mile Drive, 44.59194 -90.18167	8-Aug-2007		Eric M. Heeg	From Solidago canadensis L. in ditch, Hand collected	WIRC	DAM000852
Wood	Marshfield, Half Mile Drive, 44.59194 -90.18167	8-Aug-2007		Eric M. Heeg	From Solidago canadensis L. in ditch, Hand collected	WIRC	DAM000853
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	25-Jul-2006		Eric M. Heeg	Feeding on Solidago sp. in old pasture, Hand collected	WIRC	DAM000854
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	25-Jul-2006		Eric M. Heeg	Feeding on Solidago sp. in old pasture, Hand collected	WIRC	DAM000855

Appendix 1. Specimen records from Wisconsin: *Epicauta pensylvanica*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	25-Jul-2006		Eric M. Heeg	Feeding on Solidago sp. in ditch, Hand collected	WIRC	DAM000856
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	25-Jul-2006		Eric M. Heeg	Feeding on Achillea millefolium L. in driveway to field, Hand collected	WIRC	DAM000857
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	9-Jul-2007		Eric M. Heeg	Taken from Medicago sativa L. growing at driveway near ditch, Hand collected	WIRC	DAM000859
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	15-Jul-2007		Eric M. Heeg	In ditch, sweep net	WIRC	DAM000858
Wood	Marshfld	9-Jul-1923		A. Holmquist		WIRC	DAM001491
Wood	Mill Creek Drive, 44.61194 - 90.13917	20-Jul-2007		Eric M. Heeg	From Solidago canadensis L. in ditch, sweep net	WIRC	DAM000860
Wood	Mill Creek Drive, 44.61194 - 90.13917	20-Jul-2007		Eric M. Heeg	From Solidago canadensis L. in ditch, sweep net	DAMC	DAM000861
Wood	Nekoosa	2-Jul-1948		W. W. Barrett		WIRC	DAM001506
Wood	Nekoosa	19-Aug-1948		W. W. Barrett		WIRC	DAM001505
Wood	Nekoosa by C. Church	27-Aug-1948		W. W. Barrett	coll. from Pn & Pw	WIRC	DAM001508
Wood	open roadside, T21N R3E Sect. 14	14-Aug-1999		Andrew H. Williams	on leaf of Solidago canadensis, 9AM sun 65F	WIRC	DAM001527
Wood	Port Edwards	27-Aug-1948		W. W. Barrett	light trap	WIRC	DAM001507
Wood	Wisconsin Rapids	12-Aug-1928		Gary Nash		MPMC	DAM001164
Wood	Wisconsin Rapids	12-Aug-1928		Gary Nash		MPMC	DAM001165
Wood	Wisconsin Rapids	12-Aug-1928		Gary Nash		MPMC	DAM001166
	0.25 miles N Waukan	6-Sep-1982		Gene Drecktrah		GDPC	DAM000960
	Leona	26-Jul-1949		C. L. Fluke		WIRC	DAM001422

Appendix 1. Specimen records from Wisconsin: *Epicauta atrata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Columbia	Audubon Goose Pnd SNA, 43.31605 - 89.366	14-Jul-2007		Daniel A. Marschalek	prairie, feeding on petals of <i>Coreopsis palmata</i> , Hand collected	WIRC	DAM000345
Crawford	The Hogback Prairie, 43.2175 - 90.87667	7-Aug-2002		Jeffrey P. Gruber	on inflorescence of <i>Solidago canadensis</i> , base of steep dry limy prairie, 1:30pm, Hand collected	JPGC	DAM000357
Dane	1 mi NW Black Earth, Black Earth Rettenmund Prairie SNA, 43.13985 - 89.77331	11-Jul-2007		Daniel A. Marschalek	prairie, feeding on <i>Coreopsis palmata</i> petals, Hand collected	WIRC	DAM000341
Dane	1 mi NW Black Earth, Black Earth Rettenmund Prairie SNA, 43.13985 - 89.77331	11-Jul-2007		Daniel A. Marschalek	prairie, feeding on <i>Coreopsis palmata</i> petals, Hand collected	WIRC	DAM000342
Dane	1 mi NW Black Earth, Black Earth Rettenmund Prairie SNA, 43.13985 - 89.77331	11-Jul-2007		Daniel A. Marschalek	prairie, feeding on <i>Coreopsis palmata</i> petals, Hand collected	WIRC	DAM000343
Dane	3 mi N Middleton, Boltz Prairie, 43.16321 -89.50896	18-Jul-2006		Daniel A. Marschalek	Feeding & mating <i>Coreopsis</i> , hand collected	DAMC	DAM000032
Dane	3 mi N Middleton, Boltz Prairie, 43.16321 -89.50896	22-Jul-2006		Daniel A. Marschalek	prey of assassin bug, on <i>Coreopsis</i> , hand collected	WIRC	DAM000033
Dane	Madison, westside	2-Jul-2007		Emily E. Mueller	soybeans, pan trap	WIRC	DAM000269
Dane	Madison; UW-Arboretum, 43.02657 89.4356	10-Jul-2007		Daniel A. Marschalek	mesic prairie, feeding on <i>Coreopsis palmata</i> petals, area burned in spring 2007, Hand collected	WIRC	DAM000338
Dane	Madison; UW-Arboretum, 43.02657 89.4356	10-Jul-2007		Daniel A. Marschalek	mesic prairie, feeding on <i>Coreopsis palmata</i> petals, area burned in spring 2007, Hand collected	WIRC	DAM000339
Dane	Madison; UW-Arboretum, 43.02657 89.4356	10-Jul-2007		Daniel A. Marschalek	mesic prairie, feeding on <i>Coreopsis palmata</i> petals, area burned in spring 2007, Hand collected	WIRC	DAM000340
Dane	Madison; UW-Arboretum, 43.0276 - 89.4425	30-Jul-2006		Daniel A. Marschalek	Prairie, feeding on <i>Coreopsis palmata</i> flower, hand collected	WIRC	DAM000030
Dane	Madison; UW-Arboretum, 43.0276 - 89.4425	30-Jul-2006		Daniel A. Marschalek	Prairie, feeding on <i>Coreopsis palmata</i> flower, hand collected	WIRC	DAM000031
Dane	Meffert Road; Boltz Prairie, ~1 mi east of Highway 12, 43.1635 - 89.50939	14-Jul-2006		Craig M. Brabant	off flowers of <i>Coreopsis palmata</i> , in hilltop limey prairie, ~2:30pm	CMBC	DAM001373
Dane	Meffert Road; Boltz Prairie, ~1 mi east of Highway 12, 43.1635 - 89.50939	14-Jul-2006		Craig M. Brabant	off flowers of <i>Coreopsis palmata</i> , in hilltop limey prairie, ~2:30pm	CMBC	DAM001374
Dane	Prairie Seed Nursery, T8N R11E Sec 2	19-Jul-2006		Andrew H. Williams	solitary beetle on flower of <i>Silphium perfoliatum</i> , Collected by hand	WIRC	DAM000174
Dane	Thomson Memorial Prairie (TNC), 42 59'15" -89 50'05"	15-Aug-2009		Jeffrey P Gruber	Collected from inflorescence of <i>Helianthus</i> sp., dry prairie, 6:00-7:00PM, 82F, partly cloudy	WIRC	DAM001203

Appendix 1. Specimen records from Wisconsin: *Epicauta atrata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Black Earth Prairie, T8N R6E Sec 27	8-Jul-1994			Native Prairie Flower Rudbeckia hirta	WDNR	DAM002617
Dane	Hawkhill (Miller), T9N R8E Sec 5	16-Jul-1995			Sweep Net Dry prairie (unburned)	WDNR	DAM002611
Dane	Hawkhill (Miller), T9N R8E Sec 5	16-Jul-1995			Sweep Net Dry prairie (unburned)	WDNR	DAM002612
Dane	Hawkhill (Miller), T9N R8E Sec 5	16-Jul-1995			Sweep Net Dry prairie (unburned)	WDNR	DAM002613
Dane	Hawkhill (Miller), T9N R8E Sec 5	21-Jul-1995			Sweep Net Dry prairie burned previous fall	WDNR	DAM002609
Dane	Hawkhill (Miller), T9N R8E Sec 5	21-Jul-1995			Sweep Net Dry prairie (unburned)	WDNR	DAM002610
Grant	Bush Clover Prairie, T5N R3W Sec 17	21-Jul-2000		Andrew H. Williams	working last flower in inflorescence of Echinacea pallida 10AM fair 67F, Hand collected	WIRC	DAM000583
Grant	Eagle Valley Preserve, T4N R6W Sec 22, 27, 34	4-Jul-2000		Andrew H. Williams	4, solitary on nearby flowers of Coreopsis palmata on bluff prairie , Hand collected	WIRC	DAM000578
Grant	Eagle Valley Preserve, T4N R6W Sec 22, 27, 34	4-Jul-2000		Andrew H. Williams	4, solitary on nearby flowers of Coreopsis palmata on bluff prairie , Hand collected	WIRC	DAM000579
Grant	Eagle Valley Preserve, T4N R6W Sec 22, 27, 34	4-Jul-2000		Andrew H. Williams	4, solitary on nearby flowers of Coreopsis palmata on bluff prairie , Hand collected	WIRC	DAM000580
Green	3 mi SW Albany, Oliver Prairie, 42.6872 -89.49836	22-Jul-2006		Daniel A. Marschalek	Feeding on Coreopsis, hand collected	WIRC	DAM000034
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.69992 -89.49261	9-Aug-2006		Daniel A. Marschalek	sandy prairie, caught in flight, Hand collected	DAMC	DAM000205
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.69992 -89.49261	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating and feeding on Silphium integrifolium, Hand collected	WIRC	DAM000206
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.69992 -89.49261	9-Aug-2006		Daniel A. Marschalek	sandy prairie, mating and feeding on Silphium integrifolium, Hand collected	WIRC	DAM000207
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.7009 -89.4931	22-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Silphium integrifolium and Coreopsis palmata flowers, hand collected	WIRC	DAM000035
Green	3 mi W Albany, Muralt Bluff Prairie SNA, 42.7009 -89.4931	22-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Silphium integrifolium and Coreopsis palmata flowers, hand collected	DAMC	DAM000036
Green	Oliver Prairie, 42 41.232 -89 29.911	11-Jul-2009		Kyle E. Johnson	limestone hillside/hilltop dry open prairieremnant; scattered red cedar/cherry/mulberry/sumac on adjacent hillsides; on flowers of Coreopsis palmata	KEJC	DAM002857
Green	Weber Prairie, T4N R6E Sec 9	10-Jul-1995			Sweep Net Mesic Prairie	WDNR	DAM002614
Green	Weber Prairie, T4N R6E Sec 9	10-Jul-1995			Sweep Net Mesic Prairie	WDNR	DAM002615
Green	Weber Prairie, T4N R6E Sec 9	10-Jul-1995			Sweep Net Mesic Prairie	WDNR	DAM002616
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006	10-Jul-2006	Daniel A. Marschalek	Feeding & mating Cirsium arvense, hand collected	WIRC	DAM000007
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006	10-Jul-2006	Daniel A. Marschalek	Feeding & mating Cirsium arvense, hand collected	WIRC	DAM000008
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006	10-Jul-2006	Daniel A. Marschalek	Feeding & mating Cirsium arvense, hand collected	WIRC	DAM000009

Appendix 1. Specimen records from Wisconsin: *Epicauta atrata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006	10-Jul-2006	Daniel A. Marschalek	Feeding & mating <i>Cirsium arvense</i> , hand collected	UWGB	DAM000010
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006	10-Jul-2006	Daniel A. Marschalek	Feeding & mating <i>Cirsium arvense</i> , hand collected	WIRC	DAM000011
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006	10-Jul-2006	Daniel A. Marschalek	Feeding & mating <i>Cirsium arvense</i> , hand collected	WIRC	DAM000012
Jefferson	4 mi N Lake Mills, Faville Prairie	9-Jul-2011		Daniel A. Marschalek		WIRC	DAM002605
Jefferson	43.1431 -88.88215 4 mi N Lake Mills, Faville Prairie,	26-Jul-2006		Daniel A. Marschalek	prairie, feeding on <i>Ratibida pinnata</i> , hand collected	WIRC	DAM000043
Jefferson	43.14348 -88.88156 4 mi N Lake Mills, Faville Prairie,	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on <i>Cirsium arvense</i> , hand collected	WIRC	DAM000044
Jefferson	43.14348 -88.88156 4 mi N Lake Mills, Faville Prairie,	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on <i>Cirsium arvense</i> , hand collected	WIRC	DAM000045
Jefferson	43.14348 -88.88156 4 mi N Lake Mills, Faville Prairie,	8-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on <i>Cirsium arvense</i> , hand collected	WIRC	DAM000003
Jefferson	43.14348 -88.88156 4 mi N Lake Mills, Faville Prairie,	8-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on <i>Cirsium arvense</i> , hand collected	WIRC	DAM000004
Jefferson	43.14348 -88.88156 4 mi N Lake Mills, Faville Prairie,	8-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on <i>Cirsium arvense</i> , hand collected	DAMC	DAM000005
Jefferson	43.14348 -88.88156 4 mi N Lake Mills, Faville Prairie,	8-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on <i>Cirsium arvense</i> , hand collected	WIRC	DAM000006
Jefferson	43.14362 -88.88239 4 mi N Lake Mills, Faville Prairie,	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding & mating on <i>Lactuca scariola</i> , hand collected	WIRC	DAM000046
Jefferson	43.14422 -88.88229	17-Jul-2007		Daniel A. Marschalek	prairie, feeding on <i>Lactuca serriola</i> (prickly lettuce), Hand collected	WIRC	DAM000344
Jefferson	4 mi north of Lake Mills, Prairie Rd: Faville Prairie, 43.1436 -88.87918	6-Jul-2006		Craig M. Brabant	from vacuum smaple of various prairie spp. for 5 min	CMBC	DAM001375
Jefferson	Faville Prairie, 43.14362 -88.88239	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding & mating on <i>Lactuca scariola</i> , hand collected	WIRC	DAM000001
Jefferson	Faville Prairie, 43.14362 -88.88239	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding & mating on <i>Lactuca scariola</i> , hand collected	WIRC	DAM000002
Milwaukee				F. Rauterberg		MPMC	DAM000997
Monroe	0690481; 4871585	20-Jun-2008		Emily E. Mueller	Coreopsis, Sunny, 74F, B1002	WIRC	DAM002495
Monroe	Ft. McCoy	18-Jul-2008		Heather R Llanas	On <i>Coreopsis palmata</i>	WIRC	DAM001199
Monroe	Ft. McCoy	18-Jul-2008		Heather R Llanas	On <i>Coreopsis palmata</i>	DAMC	DAM001200
Richland	Excelsior	26-Aug-1982		B. Giebink		WIRC	DAM000577
Richland	Gotham Jack Pine Barrens, 43 12.222' -90 16.180'	18-Jul-2004		John J Dorshorst		JJDC	DAM000880
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on <i>Taraxacum</i> , hand collected	WIRC	DAM000013
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on <i>Taraxacum</i> , hand collected	WIRC	DAM000014

Appendix 1. Specimen records from Wisconsin: *Epicauta atrata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000015
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	DAMC	DAM000016
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000017
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	DAMC	DAM000018
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000019
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000020
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000021
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000022
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000023
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000024
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	DAMC	DAM000025
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000026
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000027
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000028
Rock	6 mi S Stoughton, Agrecol, 42.81365 -89.19597	6-Jul-2006		Daniel A. Marschalek	Native Plant Nursery, Grown over gravel road, feeding on Taraxacum, hand collected	WIRC	DAM000029
Rock	Prairie Seed Nursery, T4N R11E Sec 9, 10	5-Jul-2006		Andrew H. Williams	several solitary beetles with head deep in dandelion flowers 9AM sunny 73 deg. F, Collected by hand	WIRC	DAM000175
Rock	Prairie Seed Nursery, T4N R11E Sec 9, 10	5-Jul-2006		Andrew H. Williams	several solitary beetles with head deep in dandelion flowers 9AM sunny 73 deg. F, Collected by hand	WIRC	DAM000176
Rock	Prairie Seed Nursery, T4N R11E Sec 9, 10	5-Jul-2006		Andrew H. Williams	several solitary beetles with head deep in dandelion flowers 9AM sunny 73 deg. F, Collected by hand	WIRC	DAM000177
Rock	Prairie Seed Nursery, T4N R11E Sec 9, 10	5-Jul-2006		Andrew H. Williams	several solitary beetles with head deep in dandelion flowers 9AM sunny 73 deg. F, Collected by hand	WIRC	DAM000178

Appendix 1. Specimen records from Wisconsin: *Epicauta atrata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Rock	Prairie Seed Nursery, T4N R11E Sec 9, 10	5-Jul-2006		Andrew H. Williams	several solitary beetles with head deep in dandelion flowers 9AM sunny 73 deg. F, Collected by hand	WIRC	DAM000179
Rock	Prairie Seed Nursery, T4N R11E Sec 9, 10	5-Jul-2006		Andrew H. Williams	several solitary beetles with head deep in dandelion flowers 9AM sunny 73 deg. F, Collected by hand	WIRC	DAM000180
Rock	Prairie Seed Nursery, T4N R11E Sec 9, 10	5-Jul-2006		Andrew H. Williams	several solitary beetles with head deep in dandelion flowers 9AM sunny 73 deg. F, Collected by hand	WIRC	DAM000181
Rock	Prairie Seed Nursery, T4N R11E Sec 9, 10	5-Jul-2006		Andrew H. Williams	several solitary beetles with head deep in dandelion flowers 9AM sunny 73 deg. F, Collected by hand	WIRC	DAM000182
Sauk	5 mi N Baraboo, Inter Crane Fndtn, 43.55018 -89.75116	25-Jul-2006		Daniel A. Marschalek	prairie, feeding on Coreopsis, hand collected	WIRC	DAM000037
Sauk	5 mi N Baraboo, Inter Crane Fndtn, 43.55018 -89.75116	25-Jul-2006		Daniel A. Marschalek	prairie, feeding on Coreopsis, hand collected	WIRC	DAM000038
Sauk	5 mi N Baraboo, Inter Crane Fndtn, 43.55018 -89.75116	25-Jul-2006		Daniel A. Marschalek	prairie, feeding on Coreopsis, hand collected	WIRC	DAM000039
Sauk	5 mi N Baraboo, Inter Crane Fndtn, 43.55018 -89.75116	25-Jul-2006		Daniel A. Marschalek	prairie, feeding on Coreopsis, hand collected	WIRC	DAM000040
Sauk	5 mi N Baraboo, Inter Crane Fndtn, 43.55018 -89.75116	25-Jul-2006		Daniel A. Marschalek	prairie, feeding on Coreopsis, hand collected	WIRC	DAM000041
Sauk	5 mi N Baraboo, Inter Crane Fndtn, 43.5503 -89.75104	25-Jun-2006		Daniel A. Marschalek	prairie, feeding on Coreopsis, hand collected	WIRC	DAM000061
Sauk	5 mi N Baraboo, Inter Crane Fndtn, 43.5503 -89.75104	25-Jul-2006		Daniel A. Marschalek	prairie, feeding on Coreopsis, hand collected	WIRC	DAM000042
Sauk	Sprng Grn Pres. SNA, 43.19939 - 90.05939	1-Aug-2008		Daniel A Marschalek	Sandy prairie	WIRC	DAM001201
Vernon	Town of Newton	28-Jul-1993		P. Whitaker	on flowers of Coreopsis, Hand collected	WIRC	DAM000581
Vernon	Town of Newton	28-Jul-1993		P. Whitaker		WIRC	DAM000582
Waushara	Coloma	27-Jun-2007		Emily E. Mueller	snap beans, pan trap	WIRC	DAM000270

Appendix 1. Specimen records from Wisconsin: *Epicauta sericans*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Crawford	Rush Creek Prairie, T10N R6W Sc6SW4	7-Aug-1996			Sweep net to ETOH Bluff Prairie	WIRC	DAM001808
Crawford	Rush Creek Prairie, T10N R6W Sc6SW4	7-Aug-1996			Sweep net to ETOH Bluff Prairie	WIRC	DAM001809
Crawford	Rush Creek Prairie, T10N R6W Sc6SW4	7-Aug-1996			Sweep net to ETOH Bluff Prairie	WIRC	DAM001810
Crawford	Rush Creek, T10N R6W Sec 6	11-Aug-1995			Sweep Net partly cloudy 85 11:00 Bluff Prairie burned 1995	WDNR	DAM002638
Crawford	Rush Creek, T10N R6W Sec 6	11-Aug-1995			Sweep Net partly cloudy 85 11:00 Bluff Prairie burned 1995	WDNR	DAM002639
Crawford	Rush Creek, T10N R6W Sec 6	11-Aug-1995			Sweep Net partly cloudy 85 11:00 Bluff Prairie burned 1995	WDNR	DAM002640
Crawford	Rush Creek, T10N R6W Sec 6	29-Aug-1995			Sweep Net 80F cloudy 12:00 Bluff Prairie burned 1995	WDNR	DAM002637

Appendix 1. Specimen records from Wisconsin: *Epicauta occidentalis*.

County	Locality Data	Collection (start)	Date Date (end)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Milwaukee		Jul-1902			F. Rauterberg		MPMC	DAM000998

Appendix 1. Specimen records from Wisconsin: *Epicauta vittata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Adams	Coloma	18-Jun-2005	22-Jun-2006	Ben Werling	grassy/weedy area, on new potatoes, hand collected	DAMC	DAM000070
Columbia	Arlington, UW Research Stat LWRSGA Mazomanie Unit, T9N R6E	6-Aug-2007	9-Aug-2007	Ben Werling	Fallow area, sweep net	DAMC	DAM000717
Dane	Sec 28, 29	17-Aug-2005		Rachel A. Arango	black light	DAMC	DAM000069
Dane	Madison	1911		JG Sanders		WIRC	DAM000647
Dane	Madison	1911		JG Sanders		WIRC	DAM000648
Dane	Madison	1911		JG Sanders		WIRC	DAM000649
Dane	Madison			JG Sanders		WIRC	DAM000651
Dane	Mazomanie Swamp Lover's Inc., 43 07'33" -89 40'22"	23-Aug-1989			Black light Trap	WIRC	DAM002577
Dane		21-Aug-2007	28-Aug-2007	Ryan T. Grosvold		WIRC	DAM002574
Dane	Swamp Lover's Preserve, 43 7.929 - 89 39.796	6-Jul-2008		Jerry W. Goth	hilltop oak/walnut/hickory dominated forest; coll. at house lights; 9:45pm-10:30pm ~81F very humid dark skies	KEJC	DAM002859
Dane	Swamp Lover's Preserve, 43 7.929 - 89 39.796	31-Jul-2008		Jerry W. Goth	hilltop oak/walnut/hickory dominated forest; coll. at house lights; 9:15pm-10:45pm ~71F dark skies	KEJC	DAM002858
Dane		13-Sep-1898				WIRC	DAM000654
Dane		1-Aug-1898				WIRC	DAM000653
Dodge	S.29 T.13N R.17E	16-Jul-2011		Tim Anderson		TAPC	DAM002555
Dodge	S.29 T.13N R.17E	16-Jul-2011		Tim Anderson		TAPC	DAM002556
Door	Sturgeon Bay	10-Aug-1948		R.D. Shenefelt		WIRC	DAM000652
Grant	Nelson Dewey State Park, 42.73148 - 91.01665	26-Jul-2004	3-Aug-2004	John J. Dorshorst	near stream, hardwood-conifer forest, and dry lime prairie, black light trap	JJDC	DAM000699
Grant	Nelson Dewey State Park, 42.73148 - 91.01665	26-Jul-2004	3-Aug-2004	John J. Dorshorst	near stream, hardwood-conifer forest, and dry lime prairie, black light trap	JJDC	DAM000700
Grant	Nelson Dewey State Park, 42.73148 - 91.01665	26-Jul-2004	3-Aug-2004	John J. Dorshorst	near stream, hardwood-conifer forest, and dry lime prairie, black light trap	JJDC	DAM000701
Grant	Nelson Dewey State Park, 42.73148 - 91.01665	26-Jul-2004	3-Aug-2004	John J. Dorshorst	near stream, hardwood-conifer forest, and dry lime prairie, black light trap	JJDC	DAM000702
Green Lake	Hwy A & Prairie Drive	30-Aug-2007		Emily E. Mueller	In weed field, Pantrap	DAMC	DAM000807
Jefferson	Lake Mills	Prior to Sep-1941		Kenosha Museum		MPMC	DAM001002
Jefferson	Palmyra; 5 miles West	18-Sep-1999		Lisa Kincaid	sweep net	WIRC	DAM000868
La Crosse	La Crosse	21-Sep-1912		AC Burrill		WIRC	DAM000650
Lafayette	Hardscrabble Prairie SNA, East of Hazel Green 0.7 mi, 42.52823 - 90.42068	1-Sep-2004	9-Sep-2004	John J. Dorshorst	baited with cantharidin in a dry prairie, flight- intercept trap	JJDC	DAM000703
Manitowoc	Point Beach State Forest, Beach S of Molash Creek, T20N R25E Sec29	31-Jul-2008		Kathryn Kirk		WIRC	DAM002769
Marathon	SESN Rothchild: S Military Rd, T28N R7E Sec 25	27-Jul-1998		Krista Lambrecht	Found on milkweed plant, Hand collected	WIRC	DAM000646

Appendix 1. Specimen records from Wisconsin: *Epicauta vittata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Marquette	Mecan Riv. Pub. Hunt. Grd, 43 57°10" -89 20'22"	24-Sep-2006		Lori Rakita	Taken from leaves of tree, hand collected	WIRC	DAM002757
Marquette	Mecan Riv. Pub. Hunt. Grd, 43 57°10" -89 20'22"	23-Sep-2007		Anders S. Huseth	Black light Trap	WIRC	DAM002576
Milwaukee		Jul-1902		F. Rauterberg		MPMC	DAM001003
Milwaukee		Jul-1902		F. Rauterberg		MPMC	DAM001004
Outagamie	Kaukauna	31-Jul-2008		Bill Verbeten	Taken from pig weed plant	WIRC	DAM001781
Outagamie	Kaukauna	31-Jul-2008		William D. Verbeten		WIRC	DAM001782
Outagamie	Kaukauna	31-Jul-2008		Bill Verbeten		WIRC	DAM001783
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002747
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002748
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002749
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002750
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002751
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002752
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002753
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002754
Richland	Knapp Creek PHG, T8N R2W Sec. 7	31-Jul-1997		N. L. Kriska	Coll. Blacklight	WIRC	DAM002755
Richland	Lone Rock	17-Nov-2007		Samantha Bechmann	Ex: beneath rocky area	WIRC	DAM002573
Richland	LWRSWA- Lone Rock, 43 11.63 -90 14.34	24-Jun-1999		Craig M. Brabant	Collected at night with white sheet and UV light	CMBC	DAM001339
Richland	Richland Center	9-Sep-1990		K.L. Schmude	On sidewalk, Hand collected	WIRC	DAM000630
Richland	Richland Center	12-Sep-1990		K. L. Schmude	Weeds by house, Hand collected	WIRC	DAM000632
Richland	Spring Green/near Lone Rock, 43 12°54" -90 12' 26.40"	27-Jul-2011	1-Aug-2011	Natalie Hernandez	pan trap w/green tile, filled w/propylen glycol 1 of 3 together on ground in disturbed low area	DAMC	DAM002484
Richland	T11N R1E Sec 34 Spring Green Pres. SNA, 43.19806 - 90.06139	14-Sep-1996		Andrew H. Williams	2PM p. cloudy, Hand collected	WIRC	DAM000631
Sauk	Genoa	8-Aug-2001	26-Aug-2001	Jeffrey P. Gruber	sandy oak barrens, flight-intercept trap	WIRC	DAM000629
Vernon	Genoa	7-Jul-1911	12-Jul-1911	Museum Expedition		MPMC	DAM001001
Vernon	T14N R6W Sec 13	8-Sep-1973		C. Wright		WIRC	DAM000497
Vernon		2-Jul-1998		Sara Holcomb		WIRC	DAM000663

Appendix 1. Specimen records from Wisconsin: *Epicauta vittata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Washington	ca. 4mi E & 4.5mi S. Hartford, nr. Jct. hwy. 167 & CC Pewaukee; N22 W28774 Oak Ln	31-Jul-1980		C. Yanek		MPMC	DAM002451
Waukesha	53072	15-Jul-2006		James P. Garcia		WIRC	DAM002756
Waushara	UW - H.A.R.S., 44 7' - 89 32'	12-Jul-2007		Anders S. Huseeth		WIRC	DAM002575
Winnebago	2 mi. south of Oshkosh	30-Jul-2011		M. Dempsey		UWOC	DAM002554
Winnebago	Oshkosh	9-Jul-1922		EL Chambers		WIRC	DAM000637
Winnebago	Oshkosh	19-Jul-1923		EL Chambers		WIRC	DAM000658
Winnebago	Oshkosh	30-Jul-2007		Tim Anderson		TAPC	DAM002557
Wood	Griffith St. Nursery	26-Jun-1948		R.D. Shenefelt		WIRC	DAM000657
Wood	Marshfield, Heeg Farm Property, 44.5975 -90.15139	5-Aug-2006		Eric M. Heeg	Hg vapor lamp- from ground in flowerbed near lamp	DAMC	DAM000835

Appendix 1. Specimen records from Wisconsin: *Lytta sayi*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Adams		26-May-1977			On house, Hand collected	WIRC	DAM000543
Adams		26-May-1977			On house, Hand collected	WIRC	DAM000545
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002527
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	DAMC	DAM002528
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002529
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002530
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002531
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002532
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002533
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002534
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002535
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002536
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002537
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	DAMC	DAM002538
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002539
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002540
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002541
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002542
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002543
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002544
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002545
Baron	45 26.383 -91 44.041	12-Jun-2007		Nadine L. Kriska	On flowering dogwood, with female <i>Pedilus lugubris</i> (Say) on abdomen	WIRC	DAM002546

Appendix 1. Specimen records from Wisconsin: *Lytta sayi*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Bayfield	S.4, T.43N,R.7W ~3.5 mi SE Siren, S of Hwy B on	16-Jun-2007		Tim Anderson		TAPC	DAM002550
Burnett	Soderberg Rd, 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L. 9:05-9:30am sunny, ~55°F, Hand collected	WIRC	DAM000542
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001355
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001356
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001357
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001358
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001359
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001360
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001361
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001362
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001363
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001364
Burnett	Soderberg Rd., 45.759 -92.33018 ~3.5 mi SE Siren, SE of Hwy B on	22-Jun-2004		Craig M. Brabant	on leaves/flowers of <i>Lupinus perennis</i> L., 9:05-9:30am, sunny, ~55°F	CMBC	DAM001365
Columbia	Arlington	31-May-2006		Ben Werling	potato field, hand collected	WIRC	DAM000051
Columbia	Rock Run Hunting Grounds, T12N R10E Sec 32	22-May-1999		Jocelyn Hall	Found on <i>Prunus serotina</i> , Hand collected	WIRC	DAM000549
Columbia		8-Jun-1961		Don Carney	Flr. of <i>Petunia</i> , Hand collected	WIRC	DAM000540
Crawford	Soldier's Grove	10-Jun-1999		Daniel K. Young	In flight	WIRC	DAM000864
Crawford	Soldier's Grove	10-Jun-1999		Daniel K. Young	In flight	WIRC	DAM000865
Dane	Dunn			Eleanor White	Sent to Mark 29 May 2001, M. H. Evans	WIRC	DAM001747
Dane	Dunn			Eleanor White	Sent to Mark 29 May 2001, M. H. Evans	WIRC	DAM001748
Dane	Dunn			Eleanor White	Sent to Mark 29 May 2001, M. H. Evans	WIRC	DAM001749
Dane	Dunn			Eleanor White	Sent to Mark 29 May 2001, M. H. Evans	WIRC	DAM001750
Dane	Dunn			Eleanor White	Sent to Mark 29 May 2001, M. H. Evans	WIRC	DAM001751
Dane	Madison	Jun-1925		W. Whitcomb		WIRC	DAM000526
Dane	Madison	Jun-1925		W. Whitcomb		WIRC	DAM000527
Dane	Madison	Jun-1925		W. Whitcomb		WIRC	DAM000528
Dane	Madison	Jun-1925		W. Whitcomb		WIRC	DAM000529
Dane	Madison	2-Jun-1929				WIRC	DAM000524
Dane	Madison	2-Jun-1929				WIRC	DAM000525

Appendix 1. Specimen records from Wisconsin: *Lytta sayi*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Madison	18-Jun-1945				WIRC	DAM000496
Dane	Madison	29-May-1947		Don Allen		WIRC	DAM000535
Dane	Madison	May-1954				WIRC	DAM000536
Dane	Madison	29-May-1974		R.H. Jones		WIRC	DAM000538
Dane	Madison, Curtis Prairie	12-Jun-1967		D. Schwehr		WIRC	DAM000495
	Madison: U.W. Arboretum- south unit; Greene Prairie, 43.02706 - 89.4415				collected off of Baptesia leucophaes, In restored prairie		
Dane		13-Jul-2006		Craig M. Brabant		CMBC	DAM001376
Dane	Oregon	7-Jun-1953		R.D. Shenefelt		WIRC	DAM000532
Dane		31-Dec-1940	31-Dec-1941	J. Zimmerman		WIRC	DAM000494
Dane		4-Jun-1950				WIRC	DAM000537
Dane		6-Jun-1950				WIRC	DAM000530
Dane		23-May-1951				WIRC	DAM000531
Dane		27-May-1955		G. E. Haas	on white pine needles, Hand collected	WIRC	DAM000551
Dane		18-May-1957		Gillette		WIRC	DAM000548
Dane		5-Jun-1957		B. Reed		WIRC	DAM000541
Dane		10-Jun-1957		R. King		WIRC	DAM000544
Dodge	Reeseville	30-Jun-1915		O. Moen		WIRC	DAM000523
Dodge	Reeseville	30-Jun-1915		O. Moen		WIRC	DAM000534
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	DAMC	DAM002512
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	DAMC	DAM002513
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002514
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002515
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002516
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002517
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002518
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002519
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002520
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002521
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002522
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male Pedilus lugubris (Say)	WIRC	DAM002523

Appendix 1. Specimen records from Wisconsin: *Lytta sayi*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Eau Claire	Augusta State WA, 44 44.277 -91 06.294	12-Jun-2007		Rachel A. Arango	On lupine, found with male <i>Pedilus lugubris</i> (Say)	WIRC	DAM002524
Eau Claire	On Co. QQ; E of Hwy 53, 44.8205 - 91.37898	22-May-2012		Kari Gullickson	Feeding on dogwood	KGPC	DAM002844
Florence	Chequamegon-Nicolet Natl For; Morgan Lk CG, 45 46'22" -88 32'39"	16-Jun-1997	17-Jun-1997	Daniel K. Young		WIRC	DAM002558
Grant	T6N R6W Sec 17	29-May-1975	3-Jun-1975		Gypsy Moth project, Malaise Trap	WIRC	DAM000547
Iowa		6-Jun-1933		Chas. L. Fluke		WIRC	DAM000533
Marquette	John Muir Mem. Park	20-Jun-2008		Tim Anderson		TAPC	DAM002551
Marquette		Jul-1999		Dustin Grant	Collected from forest floor, Hand collected	WIRC	DAM000863
Polk	S of Hwy 8; E of Hwy 46, 45.3885 - 92.32333	25-May-2012		Kari Gullickson	Feeding on dogwood	KGPC	DAM002843
Racine	Honey Creek Wldf. Area, ca. 1 mi S Rochester, T3N R19E Sec 41197	6-Jun-1984		J. Jass, S. Borkin, D. Abler		MPMC	DAM000452
Racine	Honey Creek Wldf. Area. ca. 1 mi S Rochester, T3N R19E Sec 41197	6-Jun-1984		J. Jass, S. Borkin, D. Abler		MPMC	DAM000445
Racine	Honey Creek Wldf. Area. ca. 1 mi S Rochester, T3N R19E Sec 41197	6-Jun-1984		J. Jass, S. Borkin, D. Abler		MPMC	DAM000446
Racine	Honey Creek Wldf. Area. ca. 1 mi S Rochester, T3N R19E Sec 41197	6-Jun-1984		J. Jass, S. Borkin, D. Abler		MPMC	DAM000447
Racine	Honey Creek Wldf. Area. ca. 1 mi S Rochester, T3N R19E Sec 41197	6-Jun-1984		J. Jass, S. Borkin, D. Abler		MPMC	DAM000448
Racine	Honey Creek Wldf. Area. ca. 1 mi S Rochester, T3N R19E Sec 41197	6-Jun-1984		J. Jass, S. Borkin, D. Abler		MPMC	DAM000449
Racine	Honey Creek Wldf. Area. ca. 1 mi S Rochester, T3N R19E Sec 41197	6-Jun-1984		J. Jass, S. Borkin, D. Abler		MPMC	DAM000450
Racine	Honey Creek Wldf. Area. ca. 1 mi S Rochester, T3N R19E Sec 41197	6-Jun-1984		J. Jass, S. Borkin, D. Abler		MPMC	DAM000451
Richland	Richland Center	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	WIRC	DAM000052
Richland	Richland Center	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	WIRC	DAM000053
Richland	Richland Center	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	WIRC	DAM000054

Appendix 1. Specimen records from Wisconsin: *Lytta sayi*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Richland	Richland Center	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	WIRC	DAM000055
Richland	Richland Center	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	DAMC	DAM000056
Richland	Richland Center	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	DAMC	DAM000057
Richland	Richland Center	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	DAMC	DAM000058
Richland	Richland Center	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	DAMC	DAM000059
Richland	Richland Center 4 mi N Baraboo, Internl Crane	16-Jun-2006		unknown	100s feeding and mating on honey locust, hand collected	WIRC	DAM000060
Sauk	Fndtn	21-Jun-2006		Daniel A. Marschalek	prairie, on lupine, hand collected	WIRC	DAM000050
Sauk	Devils Lake	6-Jun-1972		L.J. Bayer		WIRC	DAM000546
Sauk	Leland	12-Jun-1983		N. Raudin		WIRC	DAM000550
Sauk	International Crane Foundation, T12N R6E Sec 6	28-Jun-2001			Hand Prairie Restoration Inflorescence Baptisia lactea (White Baptisia)	WDNR	DAM002618
Sauk	International Crane Foundation, T12N R6E Sec 6	28-Jun-2001			Hand Prairie Restoration Inflorescence Baptisia lactea (White Baptisia)	WDNR	DAM002619
Sauk	International Crane Foundation, T12N R6E Sec 6	28-Jun-2001			Hand Prairie Restoration Inflorescence Baptisia lactea (White Baptisia)	WDNR	DAM002620
Sauk	International Crane Foundation, T12N R6E Sec 6	28-Jun-2001			Hand Prairie Restoration Inflorescence Baptisia lactea (White Baptisia)	WDNR	DAM002621
Sauk	International Crane Foundation, T12N R6E Sec 6	28-Jun-2001			Hand Prairie Restoration Inflorescence Baptisia lactea (White Baptisia)	WDNR	DAM002622
Washburn	Spooner	6-Jun-1977		R. B. Stewart	flowerbed	WIRC	DAM001250
Washburn	Spooner	6-Jun-1977		R. B. Stewart	flowerbed	WIRC	DAM001251
Washburn	Spooner	6-Jun-1977		R. B. Stewart	flowerbed	WIRC	DAM001252
Washburn	Spooner	6-Jun-1977		R. B. Stewart	flowerbed	WIRC	DAM001253
Waukesha	Kettle Moraine St. Forest, ~Southern Unit, 42.87252 -88.513994	31-May-2001		Craig M. Brabant	collected off of foliage next to foot path thru mixed deciduous forest, early afternoon	CMBC	DAM002837
Waupaca	T20N R10E Sec NWSE 1	13-Jun-1997		Kathyrn Kirk	In rough grass	WIRC	DAM000866
Waupaca	T20N R10E Sec NWSE 1	13-Jun-1997		Kathyrn Kirk	In rough grass	WIRC	DAM000867

Appendix 1. Specimen records from Wisconsin: *Lytta aenea*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Adams	Quincy Bluff TNC	26-Apr-2010		Nathan R Hoftiezer	Pulled from soil while trying to burrow into the dirt on trail	WIRC	DAM001225
Crawford	Gays Mills	23-May-1932		T.C. Allen		WIRC	DAM000516
Dane	Madison	6-May-1917		M.R. Pickett		WIRC	DAM000517
Dane	Madison	21-Apr-2006		Corie M. Yanger	taken from bristles of broom from porch in afternoon, Hand collected	WIRC	DAM000487
Dane	Madison	26-Apr-2006		Aubrey Meierotto	crawling on plant, Hand collected	WIRC	DAM000486
Dane	Madison	7-May-2007		Lisa Yackel	Found on porch on suburban home, Hand collected	WIRC	DAM000484
Dane	Madison- University of Wisconsin campus, Lakeshore path	3-May-2001		Craig M. Brabant	collected off of gravel bike path, overcast, ~75°F	CMBC	DAM001353
Dane	Madison- University of Wisconsin campus, Lakeshore path	3-May-2001		Craig M. Brabant	collected off of gravel bike path, overcast, ~75°F	CMBC	DAM001354
Dane	Madison, 1337 Mound St.	8-May-2011		Craig M. Brabant	Front Porch	CMBC	DAM002730
Dane	Madison, Bear Mound Park	28-Apr-2009		Lindsay L. Kasten	Walking across Vilas ave to Bear Mound Park	WIRC	DAM002579
Dane	Madison, behind UW Natatorium	5-May-2009		G. R. Beadle	Beside decaying log	WIRC	DAM002580
Dane	Madison, Picnic Point	7-May-2007		Heather Sage	forest floor, Hand collected	WIRC	DAM000483
Dane	Madison, UW Campus	29-Apr-2007		Dustin W. Kincaid	on trail in forest, Hand collected	WIRC	DAM000479
Dane	Madison, UW Campus	29-Apr-2007		John J. Ambeland	Taken from ground, Hand collected	WIRC	DAM000481
Dane	Madison, UW Campus	29-Apr-2009		Christopher J. Sover	Found with sweeping net	WIRC	DAM002581
Dane	Madison; Elver Park	29-Apr-2007		Chad M. Linder	sweep net	WIRC	DAM000478
Dane	Madison; Lakeshore Path	3-May-2003		Suzanne M. Mattke	Found on sidewalk, Hand collected	WIRC	DAM000872
Dane	Madison; UW Campus	9-May-1984		C. Becker	Open field, sweep net	WIRC	DAM000869
Dane	Madison; UW Campus	28-Apr-2001		John J. Dorshorst	Taken from a live tree, Hand collected	WIRC	DAM000871
Dane	Madison; UW Campus	28-Apr-2006		Stephanie Q. Burke	Collected from garage, Hand collected	WIRC	DAM000488
Dane	Madison; UW Campus, Picnic Point	2-May-2006		Robert H. Matson	walking over wood chip trail, Hand collected	WIRC	DAM000485
Dane	Madison; UW-Arboretum, 43.02891 - 89.43759	28-Apr-2006		Daniel A. Marschalek	sandy prairie, bee nests on trail, hand collected	WIRC	DAM000049
Dane	Madison; UW-Arboretum, 43.02916 - 89.43791	2-May-2006		Daniel A. Marschalek	sandy prairie, on side of trail, dug burrow and laid eggs, hand collected	DAMC	DAM000047
Dane	Madison; UW-Arboretum, 43.02918 - 89.43825	2-May-2006		Daniel A. Marschalek	sandy prairie, on trail, hand collected	DAMC	DAM000048
Dane	Madison; Vilas Park	11-Apr-2005		Paul A. Wardrop	Taken while on cement sidewalk, Hand collected	WIRC	DAM000874
Dane	UW Campus	24-Oct-1987		H. Trinidode		WIRC	DAM000515
Dane	UW Campus	2-May-2007		S. Paskewitz	Hand collected	WIRC	DAM000480
Dodge	Beaver Dam	10-May-1895		W. E. Snyder		MPMC	DAM000982

Appendix 1. Specimen records from Wisconsin: *Lytta aenea*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	Eagle Valley, 42 48'38" -91 04'10" LWRSWA Woodman-Millville, T7N	26-Apr-2000		Michele B Price	On American Plum flowers alighted on ground near path on rocky slope,	DAMC	DAM001226
Grant	R4W Sec 29/30	24-Apr-1999		Jeffrey P. Gruber	Hand collected	WIRC	DAM000521
Iowa	Dodgeville, Bethel Horizons	5-May-2002		Megan J. Hyslop	grassy field, sweep net	WIRC	DAM000520
Iowa	Highland	13-May-1984		J. Mielke	Open field, sweep net	WIRC	DAM000870
Jefferson	Fort Atkinson	1-May-2007		Nadine L. Kriska	found crushed in house, Hand collected	WIRC	DAM000335
Langlade	Antigo	2-Jul-2007		Jesse D. Hoffmeister	on dirt pile near garden	WIRC	DAM002578
Richland	LWRSWA Lone Rock Unit, 43.19222 - 90.23917	30-Apr-2000		Matt Kingston	Low vegetation, sweep net southern mesic hardwood forest, flight-intercept	WIRC	DAM000873
Rock	Janesville, 42.70583 89.03	26-Apr-2007	17-May-2007	Rachel A. Arango	trap	WIRC	DAM000271
Sauk	2 mi SW Reedsburg Mirror Lake S.P., 43.56194 - 89.80694	6-May-1979				GDPC	DAM000965
Sauk	North Hudson; E of Hwy 35, 45.00642 -92.73439	7-May-2007		Jeffrey P. Gruber Kari Gullickson & Walter	crawling on sandy path (partly covered with wood chips), Hand collected	DAMC	DAM000781
St. Croix	Sidie Hollow, Viroqua, 43.35806 - 90.94139	5-Apr-2012	25-Apr-2012	Weeks	Malaise trap; mixed hardwood forest; baited with terpentine	WIRC	DAM002863
Vernon		6-May-2007		Pete S. Solverson	apple tree blossoms, Hand collected	WIRC	DAM000482

Appendix 1. Specimen records from Wisconsin: *Lytta nuttalli*.

County	Locality Data	Collection (start)	Date Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Douglas		30-Jun-1971		M. Haglund		UWSC	DAM001257

Appendix 1. Specimen records from Wisconsin: *Meloe niger*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Burnett		Sep-1979		Keith Stoner		UWSC	DAM001262
Dane	Madison	25-Apr-1934		P.O.R.		WIRC	DAM000736
Dane		23-Apr-1932				WIRC	DAM000735
Eau Claire		20-Oct-2000		Bio. 311 Lab		UWEC	DAM002766
Marathon	Marshfield, 44 33'21" -90 18'00"	18-Aug-2007		Lynsey M. Trampush	Found on pile of wood	WIRC	DAM002768
Marathon	Stratford, 44 50'36" -90 6'56"	7-Apr-2007		Sarah E. Brundidge	Taken from gravel driveway	WIRC	DAM002737
Oneida		21-Apr-1960		P. Bloom		WIRC	DAM000737
Portage	Tw'n Hull	21-May-1961		W. Scharf		UWSP	DAM002764
Richland	LWRSGA Lone Rock Unit	22-Sep-2002		Steve A Schreiber		WIRC	DAM002736
Richland	LWRSGA Lone Rock Unit, 43 11'37" - 90 14'21"	27-Sep-2009		Jonathan Mayer	Open sandy blow	WIRC	DAM002812
Rusk		21-May-1966		Lynn Neidel		UWEC	DAM002765
St. Croix	Hudson, 1410 North Ridge Drive	2-Apr-2010		Mark Christenson	Found on bike path	WIRC	DAM002767

Appendix 1. Specimen records from Wisconsin: *Meloe angusticollis*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Burnett	Namekagon Barrens, T42N R14W Sec 12 SE NW	May-1996	Jun-96	J. Evrard	Drift fence	WIRC	DAM000720
Burnett	Namekagon Barrens, T42N R14W Sec 12 SE NW	May-1996	Jun-96	J. Evrard	Drift fence	WIRC	DAM000721
Burnett	Namekagon Barrens, T42N R14W Sec 12 SE NW	May-1996	Jun-96	J. Evrard	Drift fence	WIRC	DAM000722
Burnett	Namekagon W.A., T42N R14W Sec 12 NE SW	May-1997		James Evrard	Prairie habitat	WIRC	DAM000724
Iron	Frog Lake and Pines SNA, 46.072021 -90.003487	23-May-2012		Julia Janicki and Jessica Warwick	Found on forest floor	DAMC	DAM002825
Iron	Frog Lake and Pines SNA, 46.072021 -90.003487	23-May-2012		Julia Janicki and Jessica Warwick	Found on forest floor	DAMC	DAM002826
Jackson	Black River State Forest, 44.23221 -90.6653	6-Jun-2011		Scott R. Larson		WIRC	DAM002491
Langlade	45 08'574" -89 04'198" 2.8mi N Lk Tomahawk on D, T39N	25-Apr-2009		Heather Servi	caught on front steps	WIRC	DAM002588
Oneida	R7E Sec 25 SE1/4	24-May-1981		D. Hildebrandt & M. Plonczynski	in open sandy-gravel area, little vegetation,	MPMC	DAM000453
Portage		12-May-1954		Don Taylor	Hand collected	UWSP	DAM001273
Price	Chequamegon National Forest	1-May-2009		Trish O'Kane	Found in Birch/Aspen swampy area on log	WIRC	DAM002589
Vilas	Star Lake	28-Jun-2002		S. Glaser		UWGB	DAM000442
Wood	Babcock	17-May-1988		R. Kachadoorian		WIRC	DAM000723
Wood	Marshfield, Trinity Lutheran Church, 44.59194 -90.18167	1-May-2007		Eric M. Heeg	Taken from log on side of school, Hand collected	DAMC	DAM000846

Appendix 1. Specimen records from Wisconsin: *Meloe impressus*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Bayfield	Bayfield	10-Sep-1916		D.M. DeLong		WIRC	DAM000767
Bayfield	Bayfield	10-Sep-1916		D.M. DeLong		WIRC	DAM000845
Bayfield	Pigeon Lake Field Station	28-Sep-2011		Bio 110 Student		UWEC	DAM002821
				C.D. Delsman & L.R.			
Brown	Greenleaf	6-Sep-2003		Delsman		UWGB	DAM000441
Brown		26-Sep-1968		R. Katers		WIRC	DAM000778
Dane	Madison	30-Aug-1940		H. R. Dodge		FSUC	DAM001326
Dane	Madison	30-Aug-1940		H. R. Dodge		FSUC	DAM001327
Dane	Madison	30-Aug-1940		H. R. Dodge		FSUC	DAM001328
Dane	Madison	30-Aug-1940		H. R. Dodge		FSUC	DAM001329
Dane	Madison	30-Aug-1940		H. R. Dodge		FSUC	DAM001330
Dane	Madison	30-Aug-1940		H. R. Dodge		FSUC	DAM001331
Dane	Madison	30-Aug-1940		H. R. Dodge		FSUC	DAM001332
Dane	Madison	31-Dec-1940	31-Dec-1967	J. Zimmerman		WIRC	DAM000509
Dane	Madison	5-Sep-1972		Bustillo		WIRC	DAM000842
Dane	Madison	30-Aug-1979		J. Harrington		WIRC	DAM000771
Dane	Madison	18-Sep-1981		Glen Stanosz		WIRC	DAM000755
Dane	T7N R9E Sec 15 S 1/2 UW Campus; Lake Shore, 43 4'40" - 89 24'30"	25-Sep-1967		T. Byles	lakeshore	WIRC	DAM000508
Dane		4-Oct-2009		Nicholas P. Wiersum		WIRC	DAM002810
Dane		Sep-1918		Wm. S. Marshall		WIRC	DAM000840
Dane		Sep-1935		Wm. S. Marshall		WIRC	DAM000841
Dane		31-Dec-1940	31-Dec-1961	J.H. Zimmerman		WIRC	DAM000738
Dane		31-Dec-1940	31-Dec-1947	J.H. Zimmerman		WIRC	DAM000739
Dane		31-Dec-1940	31-Dec-1947	J.H. Zimmerman		WIRC	DAM000740
Dane		21-Oct-1967		J. Jensen		WIRC	DAM000839
Dodge	Beaver Dam	5-May-1910		W. E. Snyder		MPMC	DAM000979
Dodge	Horicon Marsh	27-Sep-2003		Beth Raboin	Taken from pile of mowed grass, Hand collected	WIRC	DAM000878
Douglas	Superior	16-Sep-1914			On Clematis, Hand collected	WIRC	DAM000774
Douglas	Superior	16-Sep-1914			On Clematis, Hand collected	WIRC	DAM000775
Douglas		9-Sep-1969		V. Snarski		UWSC	DAM001261
Douglas		11-Oct-1969		R. A. Kamm		UWSC	DAM001260
Eau Claire	Putnam Drive	10-Sep-2008				UWEC	DAM002822
					roadside through aspen/white spruce/balsam fir/red pine/maple dominated forest; crawling over gravel road; 12:16pm ~75F sunny/light breeze; 1 of 1 observed in area		
Florence	Morgan Creek, 45 45.718 -88 31.504	17-Aug-2009		Kyle E. Johnson		KEJC	DAM002856
Fond du Lac	6 mi SW Greenbush	21-Sep-1974		K Fitzgerald		UWOC	DAM000940
Fond du Lac	6 mi SW Greenbush	21-Sep-1974		K Fitzgerald		UWOC	DAM000941

Appendix 1. Specimen records from Wisconsin: *Meloe impressus*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
					dead, squished into gravel on old RR grade through grassy marsh & aspen/elm/oak woodland; 5:37pm ~65-70F sunny/windy		
Fond du Lac	Eldorado SWA, 43 48.038 -88 34.976	26-Sep-2006		Kyle E. Johnson		KEJC	DAM002855
Forest	near Pickeral Lake	6-Sep-1971		Ron Steffens		UWOC	DAM000943
Grant	Boscobel, 43 7'47" -90 55'39"	27-Oct-2007		Kari A. Hanut	Found crawling across drive way	WIRC	DAM002587
Iron	Mercer	13-Aug-1910		G.A. Chandler		WIRC	DAM000780
Iron	Mercer					WIRC	DAM000761
Iron	Mercer					WIRC	DAM000762
Iron	Mercer			G.A. Chandler		WIRC	DAM000779
Jefferson		18-Oct-1990				WIRC	DAM000498
	Clearwater Farm, 43 53'29" -91 1'44"	20-Sep-2009		Kyle J. Thompson		WIRC	DAM002811
Manitowoc	Maribel	30-Sep-2002		T. J. Valenta	wetland	UWGB	DAM000443
Marinette	Silver Creek Township	24-Aug-1973		William Sloey		UWOC	DAM000942
Milwaukee	Milwaukee	14-Aug-1911		John R. Emmett		MPMC	DAM000978
Milwaukee	Milwaukee	14-Aug-1911		John R. Emmett		MPMC	DAM000981
Milwaukee	Milwaukee	14-Aug-1911		John R. Emmett		MPMC	DAM000988
Milwaukee	Wauwatosa	27-Sep-1911		Chip H. Leach		MPMC	DAM000980
Milwaukee	Wauwatosa	prior to Apr-1890		R. M. Strong		MPMC	DAM000977
Milwaukee		27-Sep-1913		L. D. Peaslee		MPMC	DAM000984
				C. Hector & C.			
Oconto	Mountain	21-Aug-1919		Jorgenson		WIRC	DAM000763
Oconto		8-Jul-1968		D.J. Kall		WIRC	DAM000766
Oneida	Woodruff	8-Sep-1916		D.M.DeLong		WIRC	DAM000844
	UWM Field Sta., T11N R21E Sec 29 & 30	30-Sep-1978		D. Hildebrandt & M. Plonczynski		MPMC	DAM000454
Ozaukee	UWM Field Sta., T11N R21E Sec 29 & 30	30-Sep-1978		D. Hildebrandt & M. Plonczynski		MPMC	DAM000455
	UWM Field Station, T11N R21E Sec 29 & 30	6-Oct-1979		Plonczynski	upland woods	MPMC	DAM000456
Polk	Apple River	Aug-1955		R.D. Shenefelt		WIRC	DAM000764
Polk	DD. Amer	12-Sep-1970		L.J. Bayer	White Pine, Beating	WIRC	DAM000777
Polk		7-Sep-1969		J. Mertins		WIRC	DAM000776
Richland	Viola	8-Oct-2008		Grandma Geary		WIRC	DAM001785
					Feeding on veg. on ground, to of bluff, Hand collected		
Sauk	Ferry Bluff	17-Sep-1972		LJ Bayer		WIRC	DAM000765
Sauk	Ferry Bluff	17-Sep-1972		L.J. Bayer		WIRC	DAM000837
Sauk	Near Leland	27-Oct-1974		Ted Shapas		WIRC	DAM000770
Sauk	Otter Creek	31-Aug-1974		M. Greenfield	Resting on plants, 60F, Hand collected	WIRC	DAM000745
Sauk	Otter Creek	31-Aug-1974		M. Greenfield	Resting on plants, 60F, Hand collected	WIRC	DAM000746
Sauk	Priary Bluff	12-Sep-1972		P.I. Sunjaya		WIRC	DAM000768
Sauk	Priary Bluff	12-Sep-1972		P.I. Sunjaya		WIRC	DAM000769
Sawyer	Fl. S. A. Ridge	4-Aug-1953		W. McNeel	Hemlock log forest floor	WIRC	DAM000838

Appendix 1. Specimen records from Wisconsin: *Meloe impressus*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
	Flambeau River, Cedar Rapids						
Sawyer	Campsite, 45.630208 -90.852637	1-Aug-2009		Nathan Hoftiezer	On trail	DAMC	DAM001185
Taylor	Westboro; 10 mi W	26-Aug-1998		Mary Wahl	Near swamp, in grass	WIRC	DAM000751
Vilas	Trout Lake	6-Aug-1913		J.G. Sanders		WIRC	DAM000843
Washington	Hartford, Hwy CC adn Hwy 167	5-Sep-1979		K. Lukasawitz		MPMC	DAM000457
Washington		1-Sep-2004		J. Jilling	Taken from under a rock, Hand collected	WIRC	DAM000877
Wood	Marshfield	16-Sep-1992		L. Dietel		WIRC	DAM002585
Wood	Marshfield	16-Sep-1992		L. Dietel		WIRC	DAM002586

Appendix 1. Specimen records from Wisconsin: *Meloe campanicollis*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Crawford	The Hogback Prairie, 43.2175 - 90.87667 3 mi N Mazomanie LWRWA- Mazo	20-Oct-2001		Jeffrey P. Gruber	crawling on/near rock, top of steep dry limy prairie, afternoon, partly cloudy, Hand collected	JPGC	DAM000356
Dane	unit, T9N R6E Sec 32	11-Oct-1998		Craig M. Brabant	hand collected off of sandy path	CMBC	DAM001352
Dane	Madison, UW Arboretum	27-Sep-2005		Peter Lisi	Taken from prairie path, Hand collected	WIRC	DAM000876
Dane	Madison, UW Campus	16-Sep-1995		Ross Bagwell	Along sidewalk, Hand collected	WIRC	DAM000728
Dane	Madison, UW-Arboretum	20-Oct-2007		Daniel A Marschalek	Oak savanna, wooded area near, on sandy trail, found crushed with ceratopogonid flies	WIRC	DAM001189
Dane	Madison, UW-Arboretum	28-Oct-2007		Daniel A Marschalek	Oak savanna, wooded area near, on sandy trail	WIRC	DAM001190
Dane	Madison, UW-Arboretum	28-Oct-2007		Daniel A Marschalek	Oak savanna, wooded area near, on sandy trail, found crushed with ceratopogonid flies	DAMC	DAM001191
Dane	Madison, UW-Arboretum	28-Oct-2007		Daniel A Marschalek	Oak savanna, wooded area near, on sandy trail, found crushed with ceratopogonid flies	WIRC	DAM001192
Dane	Madison, UW-Arboretum	28-Sep-2008		Daniel A Marschalek	Oak savanna, wooded area near, on sandy trail	WIRC	DAM001193
Dane	Madison, UW-Arboretum	28-Sep-2008		Daniel A Marschalek	Oak savanna, wooded area near, on sandy trail	WIRC	DAM001194
Dane	Madison, UW-Arboretum	28-Sep-2008		Daniel A Marschalek	Oak savanna, wooded area near, on sandy trail	WIRC	DAM001195
Dane	Madison, UW-Arboretum	28-Sep-2008		Daniel A Marschalek	Oak savanna, wooded area near, on sandy trail	WIRC	DAM001196
Dane	Madison, UW-Arboretum	31-Oct-2008		Daniel A Marschalek	Sandy oak savanna, dead on trail	WIRC	DAM001197
Dane	Madison, UW-Arboretum	21-Sep-2012		Daniel A. Marschalek	Sandy oak savanna, eating grass and in courtship	WIRC	DAM002827
Dane	Madison, UW-Arboretum	21-Sep-2012		Daniel A. Marschalek	Sandy oak savanna, eating grass and in courtship	WIRC	DAM002828
Dane	Madison: UW Arboretum	9-Oct-2003		Amanda M. Knudtson	Found on sandy trail in prairie, Hand collected	WIRC	DAM000875
Dane	Madison; UW Arboretum	2-Oct-2006		Z. Hirschtritt		WIRC	DAM002559
Dane	Madison; UW-Arboretum	6-Oct-2006		Daniel A. Marschalek	sandy oak savanna, on trail, dead, Hand collected	WIRC	DAM000292
Dane	Madison; UW-Arboretum	6-Oct-2006		Daniel A. Marschalek	sandy oak savanna, on trail, dead, Hand collected	WIRC	DAM000293
Dane	Madison; UW-Arboretum	26-Mar-2007		Daniel A. Marschalek	Oak savanna, crushed on sandy trail, wooded area near, 2 anthicids on/in <i>Meloe</i> , Hand collected	WIRC	DAM000785
Dane	Madison; UW-Arboretum	12-Oct-2007		Daniel A. Marschalek	Oak savanna, wooded area near, on sandy trail, Hand collected	WIRC	DAM000791
Dane	Madison; UW-Arboretum	20-Dec-2007		Daniel A. Marschalek	Oak savanna, wooded area near, on sandy trail, Hand collected	WIRC	DAM000786

Appendix 1. Specimen records from Wisconsin: *Meloe campanicollis*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Madison; UW-Arboretum, 43.02824 - 89.4405	28-Sep-2007		Daniel A. Marschalek	Oak savanna, wooded area near, on sandy trail, eating grass/sedge, Hand collected	WIRC	DAM000787
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	WIRC	DAM000282
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	WIRC	DAM000283
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	WIRC	DAM000284
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	DAMC	DAM000285
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	DAMC	DAM000286
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	WIRC	DAM000287
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	WIRC	DAM000288
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	WIRC	DAM000289
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	UWGB	DAM000290
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges; with ~20 other indiv, Hand collected	WIRC	DAM000291
Dane	Madison; UW-Arboretum, 43.0283 - 89.4405	1-Oct-2006		Daniel A. Marschalek	on sandy path eating sedges and grasses, Hand collected	WIRC	DAM000294
Dane	Madison; UW-Arboretum, 43.02832 - 89.4405	28-Sep-2007		Daniel A. Marschalek	Oak savanna, wooded area near, on sandy trail, found dead, Hand collected	DAMC	DAM000790
Dane	Madison; UW-Arboretum, 43.02833 - 89.44062	7-Oct-2007		Daniel A. Marschalek	Oak savanna, wooded area near, on sandy trail, found dead, Hand collected	WIRC	DAM000788
Dane	Madison; UW-Arboretum, 43.02869 - 89.43999	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating sedges, Hand collected	DAMC	DAM000278
Dane	Madison; UW-Arboretum, 43.02892 - 89.44028	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses, Hand collected	DAMC	DAM000280

Appendix 1. Specimen records from Wisconsin: *Meloe campanicollis*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Madison; UW-Arboretum, 43.02931 - 89.43963	7-Oct-2007		Daniel A. Marschalek	Oak savanna, wooded area near, on sandy trail, mite on head, Hand collected	WIRC	DAM000789
Dane	Madison; UW-Arboretum, 43.02991 - 89.44003	24-Sep-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges, Hand collected	DAMC	DAM000281
Dane	Madison; UW-Arboretum, 43.03076 - 89.44077	1-Oct-2006		Daniel A. Marschalek	sandy path in open oak savanna, eating grasses or sedges, Hand collected	WIRC	DAM000279
Dane	Middleton, 43.117756 -89.485971	10-Sep-2011		Sara Levenick	Collecte from: wild prairie	WIRC	DAM002489
Dane	Middleton, 43.117756 -89.485971	11-Sep-2011		Sara Levenick	Collecte from: wild prairie	WIRC	DAM002488
Dane	Middleton, Pheasant Branch Conservancy, 43.1225 -89.49111	23-Nov-2006		Jeffrey P. Gruber	collected after laying eggs in soil, just off grassy dirt path through restored , Hand collected	WIRC	DAM000782
Dane	Middleton, Pheasant Branch Conservancy, 43.1225 -89.49111	23-Nov-2006		Jeffrey P. Gruber	collected after laying eggs in soil, just off grassy dirt path through restored , Hand collected	WIRC	DAM000783
Dane	Middleton, Pheasant Branch Conservancy, 43.1225 -89.49111	23-Nov-2006		Jeffrey P. Gruber	collected dead on soil on grassy dirt path through restored prairie, Hand collected	WIRC	DAM000784
Dane	Public Hunting Grounds	3-Nov-1995		Carrie Caplan		WIRC	DAM000726
Dane	UW Arboretum, 43 -89.4	23-Sep-2007		Tyler (can't read name)		WIRC	DAM002583
Dane	UW-Madison Arboretum	9-Nov-2009		Daniel A. Marschalek	On sandy trail	WIRC	DAM002526
Dane	UW-Madison Arboretum			Daniel A. Marschalek		DAMC	DAM002525
Dane	UW-Madison Arboretum, Grady Tract	31-Oct-2008		Daniel A. Marschalek	On sandy trail in oak savanna, eating grass	WIRC	DAM002496
Dane	UW-Madison Arboretum, Grady Tract	31-Oct-2008		Daniel A. Marschalek	On sandy trail in oak savanna, eating grass	WIRC	DAM002497
Dane	UW-Madison Arboretum, Grady Tract	31-Oct-2008		Daniel A. Marschalek	On sandy trail in oak savanna, eating grass	WIRC	DAM002498
Eau Claire				Dave Tarcon		UWEC	DAM001268
Kenosha	Silver Lake, 42.559081 -88.135195	15-Oct-2011		J. M. Bertolas		WIRC	DAM002490
La Crosse	La Crosse	14-Sep-1962		R. Anderson		WIRC	DAM000507
Marquette	5 mi West Princeton	25-Aug-1996		P. Kiesling		UWOC	DAM001254
Marquette	Mecan Riv St Wldlf Area, 43 57'29" - 89 20'22"	9-Oct-2002		Daniel K. Young		WIRC	DAM002738
Marquette	Mecan Riv. Pub. Hunt. Grd, 43 57'10" -89 20'22"	23-Sep-2007		Ian W. Winter		WIRC	DAM002584
Ozaukee	Riveredge Nature Cent.	10-Oct-1999		Kevin M. Ryan	On grassy pathway	WIRC	DAM001242
Portage	T21N R8E Sec 13	23-Sep-1999		Alemu Mengistu	Found in potato field recently planted with winter wheat	WIRC	DAM000727
Richland	LWRSGA Lone Rock Unit, 43.193307 - 90.239274	2-Oct-2011		Melanie K. Shibley	Collected by hand from stump	WIRC	DAM002487

Appendix 1. Specimen records from Wisconsin: *Meloe campanicollis*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Rock	just south of Brandherm Road along Cty Hwy K, 42 30'28" -89 13'57"	28-Sep-2001		Craig M. Brabant	Sandy prairie remnant, ~53°F, 2:45-4:45pm, overcast, calm wind, on or near leaves of Anemone cylindrica	CMBC	DAM001340
Rock	just south of Brandherm Road along Cty Hwy K, 42 30'28" -89 13'57"	28-Sep-2001		Craig M. Brabant	Sandy prairie remnant, ~53°F, 2:45-4:45pm, overcast, calm wind, on or near leaves of Anemone cylindrica	CMBC	DAM001341
Rock	just south of Brandherm Road along Cty Hwy K, 42 30'28" -89 13'57"	28-Sep-2001		Craig M. Brabant	Sandy prairie remnant, ~53°F, 2:45-4:45pm, overcast, calm wind, on or near leaves of Anemone cylindrica	CMBC	DAM001342
Rock	just south of Brandherm Road along Cty Hwy K, 42 30'28" -89 13'57"	28-Sep-2001		Craig M. Brabant	Sandy prairie remnant, ~53°F, 2:45-4:45pm, overcast, calm wind, on or near leaves of Anemone cylindrica	CMBC	DAM001343
Rock	just south of Brandherm Road along Cty Hwy K, 42 30'28" -89 13'57"	28-Sep-2001		Craig M. Brabant	Sandy prairie remnant, ~53°F, 2:45-4:45pm, overcast, calm wind, on or near leaves of Anemone cylindrica	CMBC	DAM001344
Rock	just south of Brandherm Road along Cty Hwy K, 42 30'28" -89 13'57"	28-Sep-2001		Craig M. Brabant	Sandy prairie remnant, ~53°F, 2:45-4:45pm, overcast, calm wind, on or near leaves of Anemone cylindrica	CMBC	DAM001345
Rock	just south of Brandherm Road along Cty Hwy K, 42 30'28" -89 13'57"	28-Sep-2001		Craig M. Brabant	Sandy prairie remnant, ~53°F, 2:45-4:45pm, overcast, calm wind, on or near leaves of Anemone cylindrica	CMBC	DAM001346
Rock	just south of Brandherm Road along Cty Hwy K, 42 30'28" -89 13'57"	28-Sep-2001		Craig M. Brabant	Sandy prairie remnant, ~53°F, 2:45-4:45pm, overcast, calm wind, on or near leaves of Anemone cylindrica	CMBC	DAM001347
Rock	Normans' Sand Prairie, T1N R11E Sec 31	2-Oct-2005		Andrew H. Williams	dead in sandy track @ prairie edge, 11AM p.cloudy 65F anthicids present on Meloe, Hand collected	WIRC	DAM000674
Rock	Temperate Forest, 42 30'30" -89 1'54"	21-Sep-2008		Amanda C. Maegli	ex: found while being eaten by cat	WIRC	DAM001784
Sauk	Spring Green	1-May-1983		D. Limmex	Under bark, Hand collected	WIRC	DAM000729

Appendix 1. Specimen records from Wisconsin: *Gnathium minimum*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	3 mi W Muscoda, Hwy 133 @ Taylor Rd, 43.1849 -90.49262	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002262
Grant	4 mi W Muscoda, Hwy 133 @ Blue River Rd, 43.18504731 - 90.50880174	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002264
Grant	4 mi W Muscoda, Hwy 133 @ Blue River Rd, 43.185051 -90.508801	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002263
Grant	4 mi W Muscoda, Hwy 133 @ Blue River Rd, 43.185057 -90.508572	29-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002282
Grant	4 mi W Muscoda, Hwy 133 @ Blue River Rd, 43.185076 -90.509302	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002265
Grant	4 mi W Muscoda, Hwy 133 @ Blue River Rd, 43.185078 -90.509375	29-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002284
Grant	4 mi W Muscoda, Hwy 133 @ Blue River Rd, 43.185108 -90.508792	29-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002283
Grant	4 mi W Muscoda, Hwy 133 @ Blue River Rd, 43.18514 -90.507826	29-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002281
Grant	Hwy 133 & Blue River Rd	26-Jul-2007		Daniel A. Marschalek	sandy prairie, prey of reduviid, on <i>Helianthus occidentalis</i> , Hand collected	DAMC	DAM000490
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184513 -90.455274	30-Jul-2008		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002339
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184513 -90.455274	30-Jul-2008		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002340
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184536 -90.451102	30-Jul-2008		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002341
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184554 -90.450581	30-Jul-2008		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002342
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184555 -90.452331	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002267
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184559 -90.449607	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002266
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184563 -90.451104	30-Jul-2008		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002343
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.18458605 -90.45344884	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002273
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184587 -90.453278	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on <i>Helianthus occidentalis</i>	DAMC	DAM002270

Appendix 1. Specimen records from Wisconsin: *Gnathium minimum*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184587 -90.453278	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002271
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184587 -90.45327862	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002272
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.18460012 -90.452324	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002268
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.18462 -90.455295	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002274
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.18462 -90.455295	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002275
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184625 -90.4553	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002276
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.18463818 -90.45530176	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002277
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184641 -90.452776	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002269
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.18464156 -90.45530355	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002278
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184653 -90.455312	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002279
Grant	Muscoda, Hwy 133 @ Minnesota St, 43.184653 -90.455312	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002280
Grant	T8N R1W S. 8 & 9	30-Jul-1997		Andrew H. Williams	1 of several seen all day on flowers of Helianthus occidentalis, dry sandy prairie	WIRC	DAM001786
Grant	T8N R1W S. 8 & 9	30-Jul-1997		Andrew H. Williams	1 of several seen all day on flowers of Helianthus occidentalis, dry sandy prairie	WIRC	DAM001787
Grant	T8N R1W S. 8 & 9	30-Jul-1997		Andrew H. Williams	1 of several seen all day on flowers of Helianthus occidentalis, dry sandy prairie	WIRC	DAM001788
Grant	T8N R1W S. 8 & 9	30-Jul-1997		Andrew H. Williams	1 of several seen all day on flowers of Helianthus occidentalis, dry sandy prairie	WIRC	DAM001789
Iowa	1 mi E Muscoda, Hwy 133/80 @ Azim St, 43.183892 -90.417679	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002257
Iowa	1 mi E Muscoda, Hwy 133/80 @ Azim St, 43.18389821 -90.41766342	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002261
Iowa	1 mi E Muscoda, Hwy 133/80 @ Azim St, 43.18390067 -90.41767418	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002258
Iowa	1 mi E Muscoda, Hwy 133/80 @ Azim St, 43.18390475 -90.41766408	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002260

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Iowa	1 mi E Muscoda, Hwy 133/80 @ Azim St, 43.18390579 -90.4176673	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002259
Iowa	1 mi E Muscoda, Hwy 133/80 @ Azim St, 43.183953 -90.41781	30-Jul-2008		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002337
Iowa	1 mi S Spring Green, Hwy C @ Hwy CC, 43.156597 -90.023684	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002255
Iowa	1 mi S Spring Green, Hwy C @ Hwy CC, 43.15659866 -90.02368483	26-Jul-2007		Daniel A. Marschalek	Sandy roadside prairie, nectaring on Helianthus occidentalis	DAMC	DAM002256
Iowa	Helena, Helena Rd along railroad, 43.173019 -90.015925	8-Aug-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002328
Iowa	Helena, Helena Rd along railroad, 43.173028 -90.016412	8-Aug-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002327
Iowa	Helena, Helena Rd along railroad, 43.173038 -90.017851	1-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002349
Iowa	Helena, Helena Rd along railroad, 43.17304 -90.01785	1-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002350
Iowa	Helena, Helena Rd along railroad, 43.173047 -90.01686	8-Aug-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002326
Iowa	Helena, Helena Rd along railroad, 43.173101 -90.017555	8-Aug-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002324
Iowa	Helena, Helena Rd along railroad, 43.173126 -90.017513	8-Aug-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002325
Iowa	Helena, Helena Rd along railroad, 43.17314 -90.017669	1-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002352
Iowa	Helena, Helena Rd along railroad, 43.173153 -90.017966	1-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002351
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.188547 -90.218482	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002344
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.188553 -90.217353	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002251
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.188553 -90.217353	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002252
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.18856354 -90.2173654	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002253
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.188569 -90.217328	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002254
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.18876958 -90.21786299	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002250

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.188788 -90.217896	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002244
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.18878882 -90.21789518	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002245
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.188789 -90.217895	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002246
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.188789 -90.217895	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002247
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.188789 -90.217896	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002248
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.18879 -90.217898	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002249
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.189638 -90.219509	8-Aug-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002329
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.189638 -90.219509	8-Aug-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002330
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.190151 -90.220346	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002242
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.190151 -90.220347	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002243
Richland	2 mi W Lone Rock, LWSR Lone Rock Unit, 43.19069 -90.222081	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002241
Richland	3 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.199506 -90.242341	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002291
Richland	3 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.199516 -90.242341	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002290
Richland	3 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.19951711 -90.2423439	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002289
Richland	3 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.199534 -90.242388	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002288
Richland	3 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.199627 -90.242612	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002287
Richland	3 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.19971909 -90.24275284	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002286

Appendix 1. Specimen records from Wisconsin: *Gnathium minimum*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Richland	3 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.199725 -	90.242742	29-Jul-2007	Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002285
Richland	4 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.20727841 -	90.26089873	29-Jul-2007	Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002293
Richland	4 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.207345 -	90.260919	29-Jul-2007	Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002292
Richland	4 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.20735709 -	90.26108879	29-Jul-2007	Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002294
Richland	4 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.20737649 -	90.26110243	29-Jul-2007	Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002295
Richland	4 mi W Lone Rock @ Hwy 133, LWSR Lone Rock Unit, 43.207377 -	90.261147	29-Jul-2007	Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002296
Sauk	1 mi NE Spring Green, Spring Grn Pres. SNA	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Heliantus occidentalis flowers, hand collected	DAMC	DAM000062
Sauk	1 mi NE Spring Green, Spring Grn Pres. SNA	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Heliantus occidentalis flowers, hand collected	DAMC	DAM000063
Sauk	1 mi NE Spring Green, Spring Grn Pres. SNA	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Heliantus occidentalis flowers, hand collected	DAMC	DAM000064
Sauk	1 mi NE Spring Green, Spring Grn Pres. SNA	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Heliantus occidentalis flowers, hand collected	DAMC	DAM000065
Sauk	1 mi NE Spring Green, Spring Grn Pres. SNA	31-Jul-2006		Daniel A. Marschalek	sandy prairie, feeding on Heliantus occidentalis flowers, hand collected	DAMC	DAM000066
Sauk	1 mi NE Spring Green, Spring Grn Pres. SNA, 43.19903 -90.05625	4-Aug-2006		Daniel A. Marschalek	sandy prairie, feeding on Helianthus occidentalis flowers, hand collected	DAMC	DAM000067
Sauk	1 mi NE Spring Green, Spring Grn Pres. SNA, 43.19903 -90.05625	4-Aug-2006		Daniel A. Marschalek	sandy prairie, feeding on Helianthus occidentalis flowers, hand collected	DAMC	DAM000068
Sauk	1 mi NE Spring Green, Sprng Grn Pres. SNA	24-Jul-2008		Daniel A Marschalek	Sandy prairie Sandy prairie, on flower of Helianthus occidentalis, part of mark-release-study, Found dead	DAMC	DAM001180
Sauk	1 mi NE Spring Green, Sprng Grn Pres. SNA	3-Aug-2008		Daniel A Marschalek	Sandy prairie, on flower of Helianthus occidentalis	DAMC	DAM001181
Sauk	1 mi NE Spring Green, Sprng Grn Pres. SNA	6-Aug-2008		Daniel A Marschalek	Sandy prairie, on flower of Helianthus occidentalis	DAMC	DAM001182
Sauk	1 mi NE Spring Green, Sprng Grn Pres. SNA	6-Aug-2008		Daniel A Marschalek	Sandy prairie, on flower of Helianthus occidentalis	DAMC	DAM001183

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sauk	1 mi NE Spring Green, Spring Green Pres. SNA	11-Aug-2008		Daniel A Marschalek	Sandy prairie, on flower of Helianthus occidentalis, part of mark-release-study, Found dead	DAMC	DAM001184
Sauk	2 mi N Spring Green, Spring Green Prairie SNA, 43.201026 -90.059921	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002345
Sauk	2 mi N Spring Green, Spring Green Prairie SNA, 43.201026 -90.059921	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002346
Sauk	2 mi N Spring Green, Spring Green Prairie SNA, 43.201026 -90.059921	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002347
Sauk	2 mi N Spring Green, Spring Green Prairie SNA, 43.201026 -90.059921	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002348
Sauk	2 mi W Spring Green, 43.18091 -90.14397	29-Jul-2007		Daniel A. Marschalek	sandy prairie, reduviid prey on Helianthus occidentalis, Hand collected	DAMC	DAM000489
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180827 -90.142356	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002302
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180827 -90.142356	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002303
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180832 -90.14373	6-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002355
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180847 -90.141483	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002297
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180847 -90.141483	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002298
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180852 -90.143805	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002304
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.18085301 -90.14175801	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002301
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180854 -90.141759	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002300

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sauk	1 mi NE Spring Green, Sprng Grn Pres. SNA	11-Aug-2008		Daniel A Marschalek	Sandy prairie, on flower of Helianthus occidentalis, part of mark-release-study, Found dead	DAMC	DAM001184
Sauk	2 mi N Spring Green, Spring Green Prairie SNA, 43.201026 -90.059921	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002345
Sauk	2 mi N Spring Green, Spring Green Prairie SNA, 43.201026 -90.059921	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002346
Sauk	2 mi N Spring Green, Spring Green Prairie SNA, 43.201026 -90.059921	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002347
Sauk	2 mi N Spring Green, Spring Green Prairie SNA, 43.201026 -90.059921	30-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002348
Sauk	2 mi W Spring Green, 43.18091 - 90.14397	29-Jul-2007		Daniel A. Marschalek	sandy prairie, reduviid prey on Helianthus occidentalis, Hand collected	DAMC	DAM000489
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180827 -90.142356	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002302
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180827 -90.142356	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002303
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180832 -90.14373	6-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002355
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180847 -90.141483	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002297
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180847 -90.141483	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002298
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180852 -90.143805	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002304
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.18085301 -90.14175801	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002301

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County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180854 -90.141759	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002300
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180854 -90.141761	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002299
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180874 -90.143729	6-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002353
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180874 -90.143729	6-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002354
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180912 -90.143968	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002305
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180928 -90.144448	6-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002357
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180931 -90.144515	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002306
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180931 -90.145172	28-Jul-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002338
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180944 -90.145377	6-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002359
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.18094733 -90.14484967	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002310
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180948 -90.144849	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002309

Appendix 1. Specimen records from Wisconsin: *Gnathium minimum*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180949 -90.144848	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002307
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180949 -90.144848	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002308
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180952 -90.144862	6-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002358
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180956 -90.145248	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002318
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180956 -90.145285	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002319
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180962 -90.144991	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002314
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180962 -90.14499287	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002315
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180962 -90.14499399	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002316
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180962 -90.145009	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002317
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180963 -90.144995	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002313
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180965 -90.147041	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002322

Appendix 1. Specimen records from Wisconsin: *Gnathium minimum*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.18096587 -90.14704885	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002323
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180971 -90.144966	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002311
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180971 -90.144967	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002312
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180974 -90.143914	6-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002356
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180999 -90.145347	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002320
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.180999 -90.145347	29-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002321
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	16-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002360
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	16-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002361
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	16-Aug-2008		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002362
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	25-Jul-2010		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002420
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	25-Jul-2010		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002421

Appendix 1. Specimen records from Wisconsin: *Gnathium minimum*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	25-Jul-2010		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002422
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	25-Jul-2010		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002423
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	25-Jul-2010		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002424
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	25-Jul-2010		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002425
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	25-Jul-2010		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002426
Sauk	2 mi W Spring Green, Kennedy Rd along railroad, LWSR Bakkens Pond Unit, 43.201027 -90.059921	25-Jul-2010		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002427
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.199084 -90.056298	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002229
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.199084 -90.056298	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002230
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.19912632 -90.05624668	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002232
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.1991269 -90.05624612	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002231
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.19913337 -90.05624837	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002238
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.19913434 -90.056249	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002237

Appendix 1. Specimen records from Wisconsin: *Gnathium minimum*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.199135 - 90.05624935	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002236
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.199135 -90.05625	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002235
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.19913595 - 90.05625098	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002233
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.199136 -90.056251	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002234
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.199173 -90.056194	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002228
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.200794 -90.061095	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002239
Sauk	2 mil N Spring Green, Spring Green Prairie SNA, 43.200794 -90.061095	24-Jul-2007		Daniel A. Marschalek	Sandy prairie, nectaring on Helianthus occidentalis	DAMC	DAM002240
Sauk	Spring Green Pres. SNA, 43 11'53" - 90 3'41"	22-Jul-2001	31-Jul-2001	Jeffrey P. Gruber	flight-intercept trap in sandy oak barrens	WIRC	DAM001790

Appendix 1. Specimen records from Wisconsin: *Nemognatha nemorensis*.

County	Locality Data	Collection (start)	Date Collection (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Burnett	Mouth of Yellow River	29-Jul-1908	3-Aug-1908		on <i>Rudbeckia hirta</i>	Graenicher (1910)	DAM002120- DAM002123
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002120
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002121
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002122
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002123
Waushara	T19N, R12E, S17	27-Jun-1976		M. Brosseau		UWOC	DAM002553

Appendix 1. Specimen records from Wisconsin: *Nemognatha cribraria fuscula*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Burnett	~4.5 mi NNE of Webster, Bushey Rd, E of Hwy C, 45.93056 -92.33833	28-Jun-2005		Craig M. Brabant	from sandy roadside off of Rudbeckia hirta, 1:07p, ~72°F, overcast, wind: 3-6	CMBC	DAM001379
Burnett	~4.5 mi NNE of Webster, Bushey Rd, E of Hwy C, 45.93056 -92.33833	28-Jun-2005		Craig M. Brabant	from sandy roadside off of Rudbeckia hirta, 1:07p, ~72°F, overcast, wind: 3-6	CMBC	DAM001380
Burnett	Randall	28-Jul-1909	7-Aug-1909	Museum Expedition		MPMC	DAM002442
Burnett	Randall	5-Aug-1909	7-Aug-1909	Museum Expedition		MPMC	DAM002443
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002428
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002429
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002430
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002431
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002432
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002433
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002434
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002435
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002436
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002437
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002438
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002439
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002440
Burnett	Yellow River	28-Jul-1909	31-Jul-1909	Museum Expedition		MPMC	DAM002441
Jackson		14-Sep-1949		W McNeel	coll. from along sandy highway	WIRC	DAM001791
Marathon	County Rd. X at gas line r.o.w.; elev: 1199' asl, 44.851578 -89.595046	20-Jul-2007		Craig M. Brabant	hand-collected off flowers in sandy gas pipeline right-of-way; pump station nr. mile marker 17	CMBC	DAM002838
Marathon	County Rd. X at gas line r.o.w.; elev: 1199' asl, 44.851578 -89.595046	20-Jul-2007		Craig M. Brabant	hand-collected off flowers in sandy gas pipeline right-of-way; pump station nr. mile marker 17 nectaring on flowers of Asclepias tuberosa in sandy barrens, 10:30AM sunny 80F	CMBC	DAM002839
Marathon	Hwy34 & RR ROW, T26N R7E S31	27-Jun-2012		Andrew H. Williams		WIRC	DAM002829
Portage	3 mi N of Stevens Point, Willow Springs Drive, 44.56533 -89.59749	28-Jun-2007		Craig M. Brabant	on Ratibida pinnata in gasline ROW, 1:05pm, 68F, overcast, wind 5-7mph, Hand collected	WIRC	DAM000349
Portage	3 mi N of Stevens Point, Willow Springs Drive, 44.56533 -89.59749	28-Jun-2007		Craig M. Brabant	on Ratibida pinnata in gasline ROW, 1:05pm, 68F, overcast, wind 5-7mph, Hand collected	WIRC	DAM000350
Portage	3 mi N of Stevens Point, Willow Springs Drive, 44.56533 -89.59749	28-Jun-2007		Craig M. Brabant	on Ratibida pinnata in gasline ROW, 1:05pm, 68F, overcast, wind 5-7mph, Hand collected	DAMC	DAM000351
Portage	3 mi N of Stevens Point, Willow Springs Drive, 44.56533 -89.59749	28-Jun-2007		Craig M. Brabant	on Ratibida pinnata in gasline ROW, 1:05pm, 68F, overcast, wind 5-7mph, Hand collected	DAMC	DAM000352

Appendix 1. Specimen records from Wisconsin: *Nemognatha cribraria fuscula*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Portage	3 mi N of Stevens Point, Willow Springs Drive, 44.56533 -89.59749	28-Jun-2007		Craig M. Brabant	on Ratibida pinnata in gasline ROW, 1:05pm, 68F, overcast, wind 5-7mph, Hand collected	DAMC	DAM000353
Portage	3 mi N of Stevens Point, Willow Springs Drive, 44.56533 -89.59749	28-Jun-2007		Craig M. Brabant	on Ratibida pinnata in gasline ROW, 1:05pm, 68F, overcast, wind 5-7mph, Hand collected	DAMC	DAM000354
Portage St. Croix	3 mi N of Stevens Point, Willow Springs Drive, 44.56533 -89.59749 North Hudson	28-Jun-2007 7-Jul-1910	12-Jul-1910	Craig M. Brabant Museum Expedition	on Ratibida pinnata in gasline ROW, 1:05pm, 68F, overcast, wind 5-7mph, Hand collected	DAMC MPMC	DAM000355 DAM002444

Appendix 1. Specimen records from Wisconsin: *Tricrania sanguinipennis*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Dane	Madison, UW-Arboretum, 43.02889 - 89.43765	29-Mar-2008		Daniel A Marschalek	Sandy oak savanna, on trail	WIRC	DAM001205
Dane	Madison, UW-Arboretum, 43.02889 - 89.43765	29-Mar-2008		Daniel A Marschalek	Sandy oak savanna, on trail	DAMC	DAM001206
Dane	Madison, UW-Arboretum, 43.02889 - 89.43765	29-Mar-2008		Daniel A Marschalek	Sandy oak savanna, on trail	DAMC	DAM001207
Dane	Madison, UW-Arboretum, 43.028994 -89.437771	10-Mar-2012		Daniel A. Marschalek	Oak savanna with sandy soils, some on trail but most just to the side, very active, 4PM, 62F, 8-10 individuals seen	DAMC	DAM002813
Dane	Madison, UW-Arboretum, 43.028994 -89.437771	10-Mar-2012		Daniel A. Marschalek	Oak savanna with sandy soils, some on trail but most just to the side, very active, 4PM, 62F, 8-10 individuals seen	WIRC	DAM002814
Dane	Madison, UW-Arboretum, 43.028994 -89.437771	10-Mar-2012		Daniel A. Marschalek	Oak savanna with sandy soils, some on trail but most just to the side, very active, 4PM, 62F, 8-10 individuals seen	DAMC	DAM002815
Dane	Madison; Arboretum in longnecker garden	14-Apr-2003		Nadine Horlock		WIRC	DAM000862
Dane	Madison; UW-Arboretum, 43.02866 - 89.43737	26-Mar-2007		Daniel A. Marschalek	oak savanna, wooded area near, on sandy trail with ground nesting bees active, Hand collected	DAMC	DAM000347
Dane	Madison; UW-Arboretum, 43.02883 - 89.43767	26-Mar-2007		Daniel A. Marschalek	oak savanna, wooded area near, crushed on sandy trail with ground nesting bees, Hand collected	WIRC	DAM000346
Dane	Madison; UW-Arboretum, 43.03071 - 89.43905	16-Apr-2007		Daniel A. Marschalek	oak savanna, wooded area near, on sandy trail with ground nesting bees active, Hand collected	WIRC	DAM000348
Juneau	Necedah Wildlife Ref.	9-Apr-1977		P. Kingsley		WIRC	DAM001792
Marquette	5 mi N Neshkoro	19-Mar-1990		Daniel K. Young		WIRC	DAM001793
Marquette	Mecan Riv. Pub. Hung. Grd., 43.952679 -89.339378	10-Apr-2011		Bill Grosdidier		WIRC	DAM001746
Marquette	Mecan Riv. Pub. Hung. Grd., 43.959837 -89.338093	10-Apr-2011		Krysta M. Koralesky	on stem of tall grass	WIRC	DAM001745
Marquette	Mecan Riv. Pub. Hung. Grd., 43.959837 -89.338093	10-Apr-2011		Craig M. Brabant		CMBC	DAM002729
Richland	Gotham Jack Pine Barrens SNA, 43.20972 -90.28194	1-Apr-2003		Jeffrey P. Gruber	crawling on sandy path in open sandy area, blak oak and Jack pine barrens, Hand collected	JPGC	DAM000358
Richland	Gotham Jack Pine Barrens SNA, 43.20972 -90.28194	1-Apr-2003		Jeffrey P. Gruber	crawling on sandy path in open sandy area, blak oak and Jack pine barrens, Hand collected	JPGC	DAM000359
Sheboygan	Kohler Park Dunes SNA, 43 39'53" - 87 43'11"	16-May-2001		Jeffrey P. Gruber	Collected dead on sand, lakeshore dunes	WIRC	DAM002509

Appendix 1. Specimen records from Wisconsin: *Tricrania sanguinipennis*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Sheboygan	Kohler Park Dunes SNA, 43 39'53" - 87 43'11"	16-May-2001		Jeffrey P. Gruber	Collected dead on sand, lakeshore dunes	WIRC	DAM002510
Sheboygan	Kohler Park Dunes SNA, 43 39'53" - 87 43'11"	16-May-2001		Jeffrey P. Gruber	Collected dead on sand, lakeshore dunes	WIRC	DAM002511
Sheboygan	Kohler Park Dunes SNA, 43.66472 - 87.71972	14-Apr-2001		Jeffrey P. Gruber	crawling on sand in Lk Michigan dunes, Hand collected	JPGC	DAM000360
Sheboygan	Kohler Park Dunes SNA, 43.66472 - 87.71972	14-Apr-2001		Jeffrey P. Gruber	crawling on sand in Lk Michigan dunes, Hand collected	JPGC	DAM000361
Sheboygan	Kohler Park Dunes SNA, 43.66472 - 87.71972	14-Apr-2001		Jeffrey P. Gruber	crawling on sand in Lk Michigan dunes, Hand collected	JPGC	DAM000362
Sheboygan	Kohler Park Dunes SNA, 43.66472 - 87.71972	14-Apr-2001		Jeffrey P. Gruber	crawling on sand in Lk Michigan dunes, Hand collected	JPGC	DAM000363
Sheboygan	Kohler Park Dunes SNA, 43.66472 - 87.71972	14-Apr-2001	26-Apr-2001	Jeffrey P. Gruber	near fox den entrance in lakeshore dunes, barrier-pitfall trap	JPGC	DAM000364
Sheboygan	Kohler Park Dunes SNA, 43.66472 - 87.71972	14-Apr-2001	26-Apr-2001	Jeffrey P. Gruber	near fox den entrance in lakeshore dunes, barrier-pitfall trap	JPGC	DAM000365
Sheboygan	Kohler Park Dunes SNA, 43.66472 - 87.71972	14-Apr-2001	26-Apr-2001	Jeffrey P. Gruber	near fox den entrance in lakeshore dunes, barrier-pitfall trap	JPGC	DAM000366
Waushara	Near Roche a Cri Ck	15-Apr-1972		William Reardon		UWOC	DAM000944
Waushara	Taken on 1st Ave, Roche a Cri Creek	15-Apr-1972		Dick Lillie		UWOC	DAM000945
Wood	Sandhill SWA, 44 18' 17.8" -90 7' 37.1"	21-Apr-2008		John J Dorshorst	Taken from sandy open patches of ground and grassy and leafy vegetation surrounding open areas. Sandy openings contained ground nesting bees.	JJDC	DAM000885
Wood	Sandhill SWA, 44 18' 17.8" -90 7' 37.1"	21-Apr-2008		John J Dorshorst	Taken from sandy open patches of ground and grassy and leafy vegetation surrounding open areas. Sandy openings contained ground nesting bees.	JJDC	DAM000886
Wood	Sandhill SWA, 44 18' 17.8" -90 7' 37.1"	21-Apr-2008		John J Dorshorst	Taken from sandy open patches of ground and grassy and leafy vegetation surrounding open areas. Sandy openings contained ground nesting bees.	JJDC	DAM000887
Wood	Sandhill SWA, 44 18' 17.8" -90 7' 37.1"	21-Apr-2008		John J Dorshorst	Taken from sandy open patches of ground and grassy and leafy vegetation surrounding open areas. Sandy openings contained ground nesting bees.	JJDC	DAM000888
Wood	Sandhill SWA, 44 18' 17.8" -90 7' 37.1"	21-Apr-2008		John J Dorshorst	Taken from sandy open patches of ground and grassy and leafy vegetation surrounding open areas. Sandy openings contained ground nesting bees.	JJDC	DAM000889

Appendix 1. Specimen records from Wisconsin: *Tricrania sanguinipennis*.

County	Locality Data	Collection (start)	Date Collection (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Wood	Sandhill Wildlife Area, 44.305 - 90.12639	21-Apr-2007	10-May-2007	Eric M. Heeg	In opening along powerline ROW (?already dead, blown in trap?), barrier-pitfall trap	WIRC	DAM000836
Wood	Wood County Wildlife Area, T20N R2E SENW	28-Jul-1998			pitfall	WIRC	DAM001794

Appendix 1. Specimen records from Wisconsin: *Zonitis v. vittigera*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Columbia	2.4 mi E Rio, 43.442116 -89.19209	9-Jul-2012		Heather R. Llanas	On black-eyed susan	WIRC	DAM002847
Columbia	2.4 mi E Rio, 43.442116 -89.19209	9-Jul-2012		Heather R. Llanas	On black-eyed susan	DAMC	DAM002848
Columbia	Sue Ames Prairie	16-Jul-2004			On black-eyed Susan	WIRC	DAM001235
Columbia	Audubon Goose Pnd SNA, 43.31599 - 89.36546	14-Jul-2007		Daniel A. Marschalek	prairie, nectaring/probing <i>Coreopsis palmata</i> , Hand collected	WIRC	DAM000325
Columbia	Audubon Goose Pnd SNA, 43.31613 - 89.36598	14-Jul-2007		Daniel A. Marschalek	prairie, nectaring on <i>Helianthus helianthoides</i> , Hand collected	WIRC	DAM000324
Columbia	Audubon Goose Pnd SNA, 43.31626 - 89.3665	14-Jul-2007		Daniel A. Marschalek	Prairie, nectaring on <i>Rudbeckia hirta</i> , Hand collected	WIRC	DAM000327
Columbia	Audubon Goose Pnd SNA, 43.31626 - 89.3665	14-Jul-2007		Daniel A. Marschalek	Prairie, nectaring on <i>Rudbeckia hirta</i> , Hand collected	WIRC	DAM000328
Columbia	Audubon Goose Pnd SNA, 43.31626 - 89.3665	14-Jul-2007		Daniel A. Marschalek	Prairie, nectaring on <i>Rudbeckia hirta</i> , Hand collected	WIRC	DAM000329
Columbia	Audubon Goose Pnd SNA, 43.31626 - 89.3665	14-Jul-2007		Daniel A. Marschalek	Prairie, nectaring on <i>Rudbeckia hirta</i> , Hand collected	DAMC	DAM000330
Columbia	Audubon Goose Pnd SNA, 43.31626 - 89.3665	14-Jul-2007		Daniel A. Marschalek	Prairie, nectaring on <i>Rudbeckia hirta</i> , Hand collected	WIRC	DAM000331
Columbia	Audubon Goose Pnd SNA, 43.31626 - 89.3665	14-Jul-2007		Daniel A. Marschalek	Prairie, nectaring on <i>Rudbeckia hirta</i> , Hand collected	WIRC	DAM000332
Columbia	Audubon Goose Pnd SNA, 43.31626 - 89.3665	14-Jul-2007		Daniel A. Marschalek	Prairie, nectaring on <i>Rudbeckia hirta</i> , Hand collected	WIRC	DAM000333
Columbia	Schoenberg Marsh, Audubon Site	22-Jun-2012		Heather R. Llanas	On black-eyed susan	WIRC	DAM002824
Fond du Lac	S of Fond du Lac	28-May-1960				WIRC	DAM001804
Fond du Lac	S of Fond du Lac	28-May-1960				WIRC	DAM001805
Fond du Lac	S of Fond du Lac	28-May-1960				WIRC	DAM001806
Fond du Lac	S of Fond du Lac	28-May-1960				WIRC	DAM001807
Grant	Eagle Valley Nat Pres, 42.73529 - 91.05631	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on <i>Rudbeckia hirta</i> and <i>Ratibida pinnata</i> , Hand collected	DAMC	DAM000317
Grant	Eagle Valley Nat Pres, 42.73529 - 91.05631	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on <i>Rudbeckia hirta</i> and <i>Ratibida pinnata</i> , Hand collected	WIRC	DAM000318
Grant	Eagle Valley Nat Pres, 42.73529 - 91.05631	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on <i>Rudbeckia hirta</i> and <i>Ratibida pinnata</i> , Hand collected	DAMC	DAM000319
Grant	Eagle Valley Nat Pres, 42.73529 - 91.05631	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on <i>Rudbeckia hirta</i> and <i>Ratibida pinnata</i> , Hand collected	WIRC	DAM000320
Grant	Eagle Valley Nat Pres, 42.73529 - 91.05631	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on <i>Rudbeckia hirta</i> and <i>Ratibida pinnata</i> , Hand collected	WIRC	DAM000321
Grant	Eagle Valley Nat Pres, 42.73529 - 91.05631	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on <i>Rudbeckia hirta</i> and <i>Ratibida pinnata</i> , Hand collected	WIRC	DAM000322

Appendix 1. Specimen records from Wisconsin: *Zonitis v. vittigera*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Grant	Eagle Valley Nat Pres, 42.73529 - 91.05631	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on Rudbeckia hirta and Ratibida pinnata, Hand collected	DAMC	DAM000323
Grant	Eagle Valley Nat Pres, 42.79354 - 91.06801	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on Rudbeckia hirta, Rudbeckia triloba, Ratibida pinnata, Daniel A. Marschalek	WIRC	DAM000315
Grant	Eagle Valley Nat Pres, 42.79354 - 91.06801	24-Jul-2006		Daniel A. Marschalek	prairie, feeding on Rudbeckia hirta, Rudbeckia triloba, Ratibida pinnata, Daniel A. Marschalek	WIRC	DAM000316
Grant	Eagle Valley Upland Prairie, T4N R6W Sec 22, 27, 34	11-Jul-2005		Andrew H. Williams	Nectaring on flowers of Pycnanthemum tenuifolium 2PM p. cloudy 85F	WIRC	DAM000469
Grant	G21 Upland Prairie, T4N R6W Sec 22, 27, 34	10-Jul-2006		Andrew H. Williams	2 solitary beetls working flowers of Rudbeckia hirta noon fair 72F, Hand collected	WIRC	DAM000474
Grant	G21 Upland Prairie, T4N R6W Sec 22, 27, 34	10-Jul-2006		Andrew H. Williams	2 solitary beetls working flowers of Rudbeckia hirta noon fair 72F, Hand collected	WIRC	DAM000475
Grant	G21 Upland Prairie, T4N R6W Sec 22, 27, 34	10-Jul-2006		Andrew H. Williams	2 solitary beetles working flowers of Ratibida pinnata noon fair 72F, Hand collected	WIRC	DAM000476
Grant	G21 Upland Prairie, T4N R6W Sec 22, 27, 34	10-Jul-2006		Andrew H. Williams	2 solitary beetles working flowers of Ratibida pinnata noon fair 72F, Hand collected	WIRC	DAM000477
Grant	G21 Upland Prairie, T4N R6W Sec 22, 27, 34	3-Aug-2006		Andrew H. Williams	2 solitary beetls working flowers of Rudbeckia subtomentosa, Hand collected	WIRC	DAM000470
Grant	G21 Upland Prairie, T4N R6W Sec 22, 27, 34	3-Aug-2006		Andrew H. Williams	2 solitary beetls working flowers of Rudbeckia subtomentosa, Hand collected	WIRC	DAM000471
Grant	G21 Upland Prairie, T4N R6W Sec 22, 27, 34	3-Aug-2006		Andrew H. Williams	2 solitary beetls nectaring on flowers of Eryngium yuccifolium 11AM sunny 75, Hand collected	WIRC	DAM000472
Grant	G21 Upland Prairie, T4N R6W Sec 22, 27, 34	3-Aug-2006		Andrew H. Williams	2 solitary beetls nectaring on flowers of Eryngium yuccifolium 11AM sunny 75, Hand collected	WIRC	DAM000473
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006		Daniel A. Marschalek	feeding on Rudbeckia hirta, Hand collected	WIRC	DAM000307
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006		Daniel A. Marschalek	feeding on Rudbeckia hirta, Hand collected	WIRC	DAM000308
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006		Daniel A. Marschalek	feeding on Rudbeckia hirta, Hand collected	WIRC	DAM000309
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006		Daniel A. Marschalek	feeding on Rudbeckia hirta, Hand collected	WIRC	DAM000310
Jefferson	4 mi N Lake Mills, Faville Prairie	8-Jul-2006		Daniel A. Marschalek	feeding on Rudbeckia hirta, Hand collected	WIRC	DAM000311
Jefferson	4 mi N Lake Mills, Faville Prairie	13-Jul-2006		Daniel A. Marschalek	Mating on Rudbeckia hirta, Hand collected	DAMC	DAM000312
Jefferson	4 mi N Lake Mills, Faville Prairie	13-Jul-2006		Daniel A. Marschalek	Mating on Rudbeckia hirta, Hand collected	WIRC	DAM000313
Jefferson	4 mi N Lake Mills, Faville Prairie	9-Jul-2011		Daniel A. Marschalek		WIRC	DAM002604
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14301 -88.88218	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia serotina, Hand collected	WIRC	DAM000297

Appendix 1. Specimen records from Wisconsin: *Zonitis v. vittigera*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14301 -88.88218	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia serotina, Hand collected	WIRC	DAM000298
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14301 -88.88218	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia serotina, Hand collected	WIRC	DAM000299
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14301 -88.88218	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia serotina, Hand collected	WIRC	DAM000300
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14301 -88.88218	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia serotina, Hand collected	UWGB	DAM000301
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14301 -88.88218	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia serotina, Hand collected	DAMC	DAM000302
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14301 -88.88218	7-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia serotina, Hand collected	DAMC	DAM000303
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.1431 -88.88215	26-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia hirta and Ratibida pinnata, Hand collected	WIRC	DAM000314
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14331 -88.88209	8-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding & mating on Rudbeckia serotina, Hand collected	DAMC	DAM000304
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14331 -88.88209	8-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding & mating on Rudbeckia serotina, Hand collected	WIRC	DAM000305
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14331 -88.88209	8-Jul-2006		Daniel A. Marschalek	Forb dominated prairie, feeding & mating on Rudbeckia serotina, Hand collected	DAMC	DAM000306
Jefferson	4 mi N Lake Mills, Faville Prairie, 43.14372 -88.88223	17-Jul-2007		Daniel A. Marschalek	Forb dominated prairie, feeding on Rudbeckia hirta, Hand collected	WIRC	DAM000326
Pierce	Prescott	7-Jul-1910	19-Jul-1910	Museum Expedition		MPMC	DAM002127
Sauk	4 mi N Baraboo, Internl Crane Fdtn, 43.55006 -89.75083	25-Jul-2007		Daniel A. Marschalek	mesic prairie, feeding on Rudbeckia subtomentosa, Hand collected	WIRC	DAM000510
Sauk	4 mi N Baraboo, Internl Crane Fdtn, 43.55006 -89.75083	25-Jul-2007		Daniel A. Marschalek	mesic prairie, feeding on Rudbeckia subtomentosa, Hand collected	WIRC	DAM000511
St. Croix	North Hudson	13-Aug-1909	12-Jul-1910	Museum Expedition		MPMC	DAM002125
Waukesha	Kettle Moraine St For, Lapham Pk Butterfly Grdn, 43.036 -88.38888	7-Jul-2007		Daniel A. Marschalek	prairie opening, feeding on Rudbeckia serotina, Hand collected	WIRC	DAM000295
Waukesha	Kettle Moraine St For, Lapham Pk Butterfly Grdn, 43.036 -88.38888	7-Jul-2007		Daniel A. Marschalek	prairie opening, feeding on Rudbeckia serotina, Hand collected	WIRC	DAM000296

Appendix 1. Specimen records from Wisconsin: *Zonitis bilineata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Barron	Kriska Property, 45.44 -91.73389	16-Jul-2001	21-Jul-2001	James Kriska	Lindgren funnel trap	MBPC	DAM000444
Bayfield	Pigeon L. Field Stat.	22-Jul-1977		Gene Drecktrah		UWOC	DAM000968
Bayfield	Pigeon L. Field Stat.; 4 mi W. Drummond	17-Jul-1979		Gene Drecktrah		UWOC	DAM000967
Bayfield	Pigeon L. Field Stat.; 4 mi W. Drummond	18-Jul-1979		Gene Drecktrah		UWOC	DAM000966
Dane	Deansville State WA, 43.22345 - 89.13049	17-Jul-2007		Daniel A. Marschalek	small prairie near roadside, near top of Solidago sp. without flower, Hand collected	DAMC	DAM000337
Dane	Madison	20-Jul-1920		H K. Harley		WIRC	DAM001801
Dane	Madison, S. edge of Curtis Prairie						
Dane	Wis. Arboretum	25-Jul-1967		D. W. Schwehr		WIRC	DAM001802
Dane	Univ. Wisc. Arboretum	19-Jul-1946		J R D		WIRC	DAM001803
Grant	T7N R1W Sect. 7	18-Jul-1995		Duane Thomas	taken off my head, 3PM sunny 80F	WIRC	DAM001795
Green	Rindy Prairie, T4N R6E Sec 5	30-Jul-1997			Hand Native Prairie Silphium laciniatum	WDNR	DAM002625
Juneau	Finley	6-Jul-1962		G. J. Knudson		WIRC	DAM001798
Juneau	Lemonweir Forest, Prairie Area, 43.77837 -89.89033	28-Jul-2006		Rachel A. Arango	on Solidago gigantea, immobile under leaf, Hand collected	DAMC	DAM000336
Richland	T8N R2W Sect. 2	22-Jul-1997		Andrew H. Williams	snug, head down among young leaves at shood tip of Lespedeza capitata, 6PM cloudy 72F	WIRC	DAM001796
Rock	3 mi NW Beloit, Newark Rd Prairie						
Rock	SNA, 42.54192 -89.14063	26-Jul-2006		Daniel A Marschalek	Mesic prairie, resting on Helianthus grosseserratus	DAMC	DAM001209
Vernon	Genoa	13-Jul-1911	19-Jul-1911	Museum Expedition		MPMC	DAM002124
Walworth	Lulu Prairie, T4N R17E Sec 2	18-Jul-1994			Sweep Net Native Prairie	WDNR	DAM002623
Walworth	Lulu Prairie, T4N R17E Sec 2	18-Jul-1994			Native Prairie Seedhead Solidago rigida	WDNR	DAM002624
Walworth	4 mi. W Plainfield, Hamerstrom Property, Prairie NE 40	26-Jul-2002		J. Zahn	sweep	WIRC	DAM001799
Waushara	Sandhill W.A., T21N R3E SENW 8	16-Jul-1998		Kathryn Kirk	Marsh edge	WIRC	DAM001800
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from Verbascum thapsus L. in meadow/prairie	WIRC	DAM001212
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from Verbascum thapsus L. in meadow/prairie	WIRC	DAM001213
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from Verbascum thapsus L. in meadow/prairie	WIRC	DAM001214
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from Verbascum thapsus L. in meadow/prairie	WIRC	DAM001215
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from Asclepias syriaca L. in meadow/prairie	WIRC	DAM001216
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from Asclepias syriaca L. in meadow/prairie	WIRC	DAM001217
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from Asclepias syriaca L. in meadow/prairie	WIRC	DAM001218

Appendix 1. Specimen records from Wisconsin: *Zonitis bilineata*.

County	Locality Data	Collection Date (start)	Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from <i>Asclepias syriaca</i> L. in meadow/prairie	DAMC	DAM001219
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from <i>Lespedeza capitata</i> Michx. in meadow/prairie	DAMC	DAM001220
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from <i>Lespedeza capitata</i> Michx. in meadow/prairie	DAMC	DAM001221
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from <i>Lespedeza capitata</i> Michx. in meadow/prairie	DAMC	DAM001222
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from <i>Lespedeza capitata</i> Michx. in meadow/prairie	WIRC	DAM001223
Wood	Sandhill Wildlife Area, 44 19' 07" -90 10' 41.6"	20-Jul-2007		Eric M Heeg	Taken from <i>Lespedeza capitata</i> Michx. in meadow/prairie	WIRC	DAM001224
Wood	Sandhill Wildlife Area, 44 19'33.3" -90 09'50.0"	20-Jul-2007		Eric M Heeg	Swept from vegetation along roadside in marsh/wetland	DAMC	DAM001210
Wood	Sandhill Wildlife Area, 44 19'33.3" -90 09'50.0"	20-Jul-2007		Eric M Heeg	Swept from vegetation along roadside in marsh/wetland	DAMC	DAM001211
Wood	T21N R3E Sect 14 Kettle Moraine Pond Park	14-Aug-1999 Jul-1972 prior to Nov-1897 prior to Nov-1897		Andrew H. Williams N. Nack Fred. Rauterberg Fred. Rauterberg	on leaf near top of plant of <i>Solidago canadensis</i> , 9AM sunny 65F On thistle	WIRC WIRC MPMC MPMC	DAM001797 DAM002582 DAM001162 DAM001163

Appendix 1. Specimen records from Wisconsin: *Zonitis sulcicollis*.

County	Locality Data	Collection (start)	Date Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Crawford	Gays Mills	22-Jul-1942				WIRC	DAM001756

Appendix 1. Specimen records from Wisconsin: *Zonitis cribricollis*.

County	Locality Data	Collection (start)	Date Collection Date (end)	Collector	Ecological Data	Specimen Location	Specimen Code
Monroe	Ft. McCoy SNA, 43 59'11" -90 41'40"	30-Jun-2007		Jeffrey P. Gruber	on inflorescence of Rudbeckia sp., sandy prairie/oak savanna, afternoon, mostly sunny, 80-81F	WIRC	DAM002547
Monroe	Ft. McCoy SNA, 43 59'11" -90 41'40"	30-Jun-2007		Jeffrey P. Gruber	on inflorescence of Rudbeckia sp., sandy prairie/oak savanna, afternoon, mostly sunny, 80-81F	DAMC	DAM002548
Monroe	Ft. McCoy SNA, 43 59'11" -90 41'40"	30-Jun-2007		Jeffrey P. Gruber	on inflorescence of Rudbeckia sp., sandy prairie/oak savanna, afternoon, mostly sunny, 80-81F	DAMC	DAM002549

Appendix 2. Non-specimen records from Wisconsin.

Species	County	Locality Data	Collection Date	Collector	Ecological Data	Source	Record Code
<i>Epicauta atrata</i>	Jackson	Black River State Forest	1-Jul-2010	Jeff Gruber	Found on flower at side of dirt/gravel road through oak/pine forest.	Bug Guide: http://bugguide.net/node/view/479198/bgimage	DAMR000004
<i>Epicauta atrata</i>	Rock	Lawrence Prairie, 42.50619 - 89.24415	26-Jun-2012	Kyle Johnson	Feeding on flowers of lead plant	Email with photo. Bug Guide: http://bugguide.net/node/view/92110/bgimage	DAMR000028
<i>Epicauta pennsylvanica</i>	Dane	Cross Plains	6-Sep-2006	Ilona L.	On goldenrod	Bug Guide: http://bugguide.net/node/view/68995/bgimage	DAMR000002
<i>Epicauta pennsylvanica</i>	Oconto	Lakewood	6-Aug-2006	Jim Farrell	On goldenrod	Bug Guide: http://bugguide.net/node/view/160603/bgimage	DAMR000006
<i>Epicauta pennsylvanica</i>	Sheboygan	Town of Plymouth	12-Aug-1992	Janice Stiefel	Adult on Goldenrod (<i>Solidago</i>) in wildflower meadow.	Bug Guide: http://bugguide.net/node/view/550243	DAMR000005
<i>Epicauta vittata</i>	Buffalo	Along Hwy 88 near Praag	22-Jul-2011	Marcie Oconnor	Came to UV lights.	Email with photo.	DAMR000001
<i>Lytta aenea</i>	Walworth	Lake Geneva	27-Mar-2012	Michael Sturgeon		UW-Madison Insect Diagnostic Lab.	DAMR000007
<i>Lytta sayi</i>	Buffalo	Alma	11-Jun-2006	Carl Duely	honeylocust		DAMR000012
<i>Lytta sayi</i>	Buffalo	3.2 mi SSW Gilmanton, 44.425997 -91.69361	6-Jun-2012	Marcie O'Connor	Dozens of individuals in a planted prairie	Email with photo.	DAMR000025
<i>Lytta sayi</i>	Buffalo	3.2 mi SSW Gilmanton, 44.425997 -91.69361	15-Jun-2012	Marcie O'Connor	On wild white indigo, 23 individuals in a photo	Email with photo.	DAMR000026
<i>Lytta sayi</i>	Buffalo	4.1 mi SSW Gilmanton, 44.414107 -91.70086	15-Jun-2012	Marcie O'Connor	3/4 mi down hill from previous aggregations (DAMR000026)	Email with photo. Bug Guide: http://bugguide.net/node/view/214562/bgimage and http://bugguide.net/node/view/214560/bgimage	DAMR000027
<i>Lytta sayi</i>	Burnett	Grantsburg	26-Jun-2008	MN Cedars	Mating and eating on lupine		DAMR000003
<i>Lytta sayi</i>	Dane	Middleton	29-May-2007	Unknown Howeowner		UW-Madison Insect Diagnostic Lab.	DAMR000019
<i>Lytta sayi</i>	Dunn		7-Jun-2007	County Agent		UW-Madison Insect Diagnostic Lab.	DAMR000024
<i>Lytta sayi</i>	Jackson	Black River Falls	28-May-2007	Bill Halfmann	lupine	UW-Madison Insect Diagnostic Lab.	DAMR000018
<i>Lytta sayi</i>	Jefferson	Oconomowoc	18-Jun-2006	Nancy Hazard	day lilly	UW-Madison Insect Diagnostic Lab.	DAMR000017
<i>Lytta sayi</i>	Juneau	Mauston	12-Jun-2006	Carl Krumhardt		UW-Madison Insect Diagnostic Lab.	DAMR000014
<i>Lytta sayi</i>	Kenosha	Kenosha	14-Jun-2006	Randy Powers		UW-Madison Insect Diagnostic Lab.	DAMR000015
<i>Lytta sayi</i>	Milwaukee	Mequon	4-Jun-2007	Bob Gansmer	black locust	UW-Madison Insect Diagnostic Lab.	DAMR000022
<i>Lytta sayi</i>	Pepin	Baldwin	31-May-2007	Bob Cropp		UW-Madison Insect Diagnostic Lab.	DAMR000020
<i>Lytta sayi</i>	Portage	Stevens Point	8-Jun-2006	Nicole		UW-Madison Insect Diagnostic Lab.	DAMR000010
<i>Lytta sayi</i>	Richland	Richland Center	16-Jun-2006	Steve Kolstad		UW-Madison Insect Diagnostic Lab.	DAMR000016
<i>Lytta sayi</i>	Richland	Richland Center	4-Jun-2007	John Aue	apple	UW-Madison Insect Diagnostic Lab.	DAMR000023
<i>Lytta sayi</i>	Sawyer	Hayward	12-Jun-2006	Rebecca Bruner-stroede	Lupin	UW-Madison Insect Diagnostic Lab.	DAMR000013
<i>Lytta sayi</i>	Trempealeau	Whitehall		Pat Malone		UW-Madison Insect Diagnostic Lab.	DAMR000009
<i>Lytta sayi</i>	Trempealeau	Whitehall	6-Jun-2007	Michelle Olcott		UW-Madison Insect Diagnostic Lab.	DAMR000021
<i>Lytta sayi</i>	Waupaca	Waupaca	31-May-2006	Lisa Neuenfeldt	Lupine	UW-Madison Insect Diagnostic Lab.	DAMR000008
<i>Lytta sayi</i>			11-Jun-2006	Jill Wheeler	Lupine	UW-Madison Insect Diagnostic Lab.	DAMR000011

Appendix 3. Published records from Wisconsin.

Species	County	Locality Data	Collection Date	Ecological Data	Source	Record Code
<i>Epicauta atrata</i>	Jefferson	4 mi N L. Mills Faville Prairie	Jul-2006		Bologna et al. (2008)	PUB000036
<i>Epicauta cinerea</i>	Dane	Oregon			Pinto (1991)	PUB000001
<i>Epicauta flobcina</i>	Columbia	Poynette			Pinto (1991)	PUB000002
<i>Epicauta funebris</i>	Lafayette	Shullsburg			Pinto (1991)	PUB000003
<i>Epicauta murina</i>	Bayfield	Bayfield			Werner (1945)	PUB000029
<i>Epicauta murina</i>	Oneida	Hazelhurst			Werner (1945)	PUB000028
<i>Epicauta obesa</i>	Walworth	Delavan			Pinto (1991)	PUB000004
<i>Epicauta pensylvanica</i>	Dane	Madison, U. Wisconsin, Arboretum	23-Aug-2006		Bologna et al. (2008)	PUB000037
<i>Epicauta vittata</i>	Dane				Adams & Selander (1979)	PUB000030
<i>Epicauta vittata</i>	Door				Adams & Selander (1979)	PUB000031
<i>Epicauta vittata</i>	Grant				Adams & Selander (1979)	PUB000032
<i>Epicauta vittata</i>	LaCrosse				Adams & Selander (1979)	PUB000033
<i>Epicauta vittata</i>	Winnebago				Adams & Selander (1979)	PUB000034
<i>Epicauta vittata</i>	Wood				Adams & Selander (1979)	PUB000035
<i>Gnathium minimum</i>	Grant	T8N R1W S8&9 Fort McCoy (1.5 mi E Badger Drop Zone)	Jul-1997	on <i>Coreopsis palmata</i> Nutt.	Pinto (2009)	PUB000027
<i>Gnathium minimum</i>	Monroe		Aug-1997	on 'sunflower'	Pinto (2009)	PUB000024
<i>Gnathium minimum</i>	Monroe	Camp McCoy Fort McCoy (W side of Badger Drop Zone)	Jul-1958	on 'daisies'	Pinto (2009)	PUB000025
<i>Gnathium minimum</i>	Monroe		Jul-1995	on <i>Rudbeckia hirta</i>	Pinto (2009)	PUB000026
<i>Lytta sayi</i>	Dane				Selander (1960)	PUB000022
<i>Lytta sayi</i>	Eau Claire	Fall Creek	6-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (3 individuals present)	SwansonKleintjesNeff (2007)	PUB000040
<i>Lytta sayi</i>	Eau Claire	Fall Creek	7-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 10 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000041
<i>Lytta sayi</i>	Eau Claire	Fall Creek	8-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 210 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000042
<i>Lytta sayi</i>	Eau Claire	Fall Creek	9-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 325 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000043
<i>Lytta sayi</i>	Eau Claire	Fall Creek	10-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 225 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000044
<i>Lytta sayi</i>	Eau Claire	Fall Creek	11-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 125 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000045
<i>Lytta sayi</i>	Eau Claire	Fall Creek	12-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (951 individuals present)	SwansonKleintjesNeff (2007)	PUB000046
<i>Lytta sayi</i>	Eau Claire	Fall Creek	13-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 375 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000047

Appendix 3. Published records from Wisconsin.

Species	County	Locality Data	Collection Date	Ecological Data	Source	Record Code
<i>Lytta sayi</i>	Eau Claire	Fall Creek	14-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 190 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000048
<i>Lytta sayi</i>	Eau Claire	Fall Creek	15-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 20 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000049
<i>Lytta sayi</i>	Eau Claire	Fall Creek	16-Jun-2004	Feeding and mating on <i>Lupinus perennis</i> (about 15 individuals present), Figure 2	SwansonKleintjesNeff (2007)	PUB000050
<i>Lytta sayi</i>	Eau Claire	Fall Creek	2005	Feeding and mating on <i>Lupinus perennis</i>	SwansonKleintjesNeff (2007)	PUB000051
<i>Lytta sayi</i>	Eau Claire	Fall Creek	2006	Feeding and mating on <i>Lupinus perennis</i>	SwansonKleintjesNeff (2007)	PUB000052
<i>Lytta sayi</i>	Washington	Cedar Lake			Selander (1960)	PUB000021
<i>Meloe angusticollis</i>	Marathon	Marathon			Pinto & Selander (1970)	PUB000007
<i>Meloe angusticollis</i>	Wood	Cranmoor			Pinto & Selander (1970)	PUB000006
<i>Meloe dianella</i>	Dane				Pinto & Selander (1970)	PUB000005
<i>Meloe impressus</i>	Bayfield	Trout Lake			Pinto & Selander (1970)	PUB000017
<i>Meloe impressus</i>	Clark	Worden Township			Pinto & Selander (1970)	PUB000018
<i>Meloe impressus</i>	Dodge				Pinto & Selander (1970)	PUB000008
<i>Meloe impressus</i>	Dodge	Le Roy			Pinto & Selander (1970)	PUB000011
<i>Meloe impressus</i>	Douglas	Superior			Pinto & Selander (1970)	PUB000016
<i>Meloe impressus</i>	Marathon	Rib Mountain State Park			Pinto & Selander (1970)	PUB000014
<i>Meloe impressus</i>	Oneida	Enterprise			Pinto & Selander (1970)	PUB000009
<i>Meloe impressus</i>	Oneida	Oneida Lake			Pinto & Selander (1970)	PUB000012
<i>Meloe impressus</i>	Oneida	12mi W Rhinelander			Pinto & Selander (1970)	PUB000013
<i>Meloe impressus</i>	Vilas	Sayner			Pinto & Selander (1970)	PUB000015
<i>Meloe impressus</i>		Lake Winnebago Flambeau Ranger District,			Pinto & Selander (1970)	PUB000010
<i>Meloe niger</i>	Price	Chequamegon National Forest		triungulin	Pinto & Selander (1970)	PUB000019
<i>Meloe niger</i>		western Wisconsin			Pinto & Selander (1970)	PUB000020
<i>Zonitis vittigera</i>	Kenosha	Kenosha			Enns (1956)	PUB000023
<i>Zonitis vittigera</i>	Racine	About 20 mi S Milwaukee	1908	On <i>Rudbeckia hirta</i>	Graenicher (1910)	PUB000039

Collection Codes

CMBC	Craig M. Brabant Personal Collection
CRBC	Charles R. Bomar Personal Collection
DAMC	Daniel A. Marschalek Personal Collection
FSUC	Florida State University Collection
GDPC	Gene Drecktrah Personal Collection
JJDC	John J. Dorshorst Personal Collection
JPGC	Jeffrey P. Gruber Personal Collection
KEJC	Kyle E. Johnson Personal Collection
KGPC	Kari Gullickson Personal Collection
MBPC	Michele B. Price Personal Collection
MPMC	Milwaukee Public Museum Collection
TAPC	Tim Anderson Personal Collection
UWEC	University of Wisconsin-Eau Claire Collection
UWGB	University of Wisconsin-Green Bay Collection
UWOC	University of Wisconsin-Oshkosh Collection
UWSC	University of Wisconsin-Superior Collection
UWSP	University of Wisconsin-Stevens Point Collection
WDNR	Wisconsin Department of Natural Resources Collection
WIRC	University of Wisconsin-Madison Insect Research Collection

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Chapter 2

***Gnathium minimum* (Say) mark-release-recapture study**

Abstract

Mark-release-recapture provides a technique to estimate population sizes, dispersal, survival, and demographic data. I was able to use this technique with the small blister beetle, *Gnathium minimum*, at Spring Green Prairie State Natural Area from 24 July to 16 August 2008. I recaptured 54 of the 104 marked adults, observed a maximum of 34 during a single survey and calculated a maximum daily Jolly-Seber population size estimate of 59 individuals. Most individuals remained within 12 m of their original capture location, suggesting they remained within the same patch of *Helianthus occidentalis* flowers or an adjacent patch. The furthest movement observed was 601 m.

Introduction

Mark-release-recaptures studies (MRR) provide a technique to estimate population sizes without needing to find all individuals (Jolly 1965; Seber 1965; White and Burnham 1999; Arnason and Schwarz 1999). Dispersal, survival, and demographic data can also be collected when individual organisms are marked (Reineke *et al.* 2011; Tikkamaki and Komonen 2011; de Guzman *et al.* 2012). These parameters are important when trying to understand the ecology of a particular species (Matern *et al.* 2008).

As is the case with many insects, little is known about the ecology of the blister beetle *Gnathium minimum* (Say). In Wisconsin, adults appear to feed specifically on the flowers of the sunflower *Helianthus occidentalis* and this plant exhibits a patchy distribution. Specifically, the population size or dispersal ability of *G. minimum* is not well understood. These are two important characteristics related to the conservation of the species considering the restricted range and patchy distribution in Wisconsin.

Methods

I conducted a MRR study at Spring Green State Natural Area (Sauk County, Wisconsin) in 2008 to estimate the population size and investigate movement patterns. During each survey, the reserve was searched for all *H. occidentalis* patches, and then the inflorescences in each patch were inspected for *G. minimum* adults. All captured adults were marked with a felt-tipped marker (Figure 1) as is commonly used for butterflies (Ehrlich and Davidson 1960) and locations of all *G. minimum* sightings were recorded with a handheld GPS unit (GarminTM eTrex®). I analyzed these data with the Jolly-Seber Method (Jolly 1965; Seber 1965; Krebs 1999). Four individuals were excluded from analysis due to the fading of marks which resulted in difficulties determining individual identification.

Uniquely marked individuals provided longevity and movement data for adults. Longevity represents the minimum number of days an individual was known to be alive; however, this likely underestimates the actual longevity because individuals may leave the survey area and surveys were not conducted daily. Two movement parameters were calculated: *dispersal range* is the maximum distance between any two observations for a single individual, and *minimum distance traveled* is the sum of the straight-line distances between all consecutive sightings for an individual. Detectability and distances are constrained by the survey area, with maximum possible straight-line distances of 690 m. This represents the distance between the two *Helianthus occidentalis* patches separated by the greatest distance at Spring Green State Natural Area.

Results

This project started after the adult activity period started, but before peak activity. I encountered 108 (including the four excluded) *Gnathium minimum* adult individuals from 24 July to 16 August 2008. The number of adults generally increased until reaching a maximum count of 34 on 3 August, then decreased fairly rapidly through mid-August (Table 1). Of the 104 clearly marked individuals, 54 (52%) were resighted but 28 (27%) were resighted only once. The maximum number of times an individual was resighted was six (Table 2). The greatest Jolly-Seber Method estimate for a daily population size was 59 adults (95% CI: 41-120) on 3 August.

The distances between most of the consecutive observations were less than 50 m (68 of 81), with a median of 9.6 m (Table 3). The dispersal range and minimum distance traveled had similar patterns, with most individuals moving only short distances (12 m) and only a few individuals traveling over 100 m.

Discussion

While MRR studies have included beetles, this appears to be the first study involving blister beetles (Family Meloidae). As observed in other marking studies, the number of adults recorded on any one particular day represents less than half of the total number of individuals present during the season (Marschalek and Klein 2010; Tikkamaki and Komonen 2011). This is likely due to not encountering every individual during a survey and adults emerging after some have already died. The relative importance of detection rate and survival rate is likely species specific. The detection rate of *G. minimum* is likely high since few individuals eluded detection on a particular day, and were then observed during a later survey. Also, it appears that adults remain on the *H. occidentalis* inflorescence overnight when they are not active. Early morning surveys allow for observations prior to activity, therefore reducing the probability of missing an individual while they are in flight.

The greatest estimated daily population size using Jolly-Seber for *G. minimum* was higher than the maximum count on any one day. However, the estimate has a low level of reliability due to a wide confidence interval. This is often the case with smaller sample sizes (populations) (McKelvey and Pearson 2001). Since I did not start marking individuals at the beginning of the adult activity period, it is my opinion that closer to 150 individuals would have been encountered at Spring Green State Natural Area if the entire 2008 adult activity period was surveyed. The number of marked individuals represents the minimum known annual population size.

Most resightings were a short distance from the previous sighting, suggesting that most adults preferred to remain in a single patch of *H. occidentalis* or only flew to an immediately adjacent patch. The movement event of over 600 m suggests they do have the ability to move

over open habitats with sunflowers. However, because our sampling was restricted to one reserve, I am not able to comment on long-distance dispersal events across the landscape.

Table 1. The number of *G. minimum* adults encountered during every survey date.

Date	Previously Marked	Newly Marked	Not Captured*	Total	Jolly-Seber Estimate
24 July	0	24	0	24	-
26 July	8	17	1	26	34 (27-63)
28 July	14	16	1	31	45 (35-80)
30 July	9	15	2	26	56 (36-127)
1 August	10	16	4	30	59 (41-120)
3 August	18	16	0	34	41 (36-59)
6 August	24	5	1	30	31 (30-37)
9 August	16	2	0	18	20 (18-26)
11 August	13	1	0	14	15 (14-20)
16 August	3	0	0	3	3 (4-6)

*Includes individuals that flew away before capture or were collected for genetic samples.

Table 2. The number of resightings for *G. minimum* adults.

	Number of Resightings					
	0	1	2	3	4	5
Number of Individuals	50	28	15	4	6	1

Table 3. Movement patterns of *G. minimum* adults.

	Median (range)
Distance Between Consecutive Sightings	9.6 (0.6-601.15) m
Dispersal Range	11.4 (0.6-601.2) m
Minimum Distance Traveled	16.0 (0.6-614.4) m

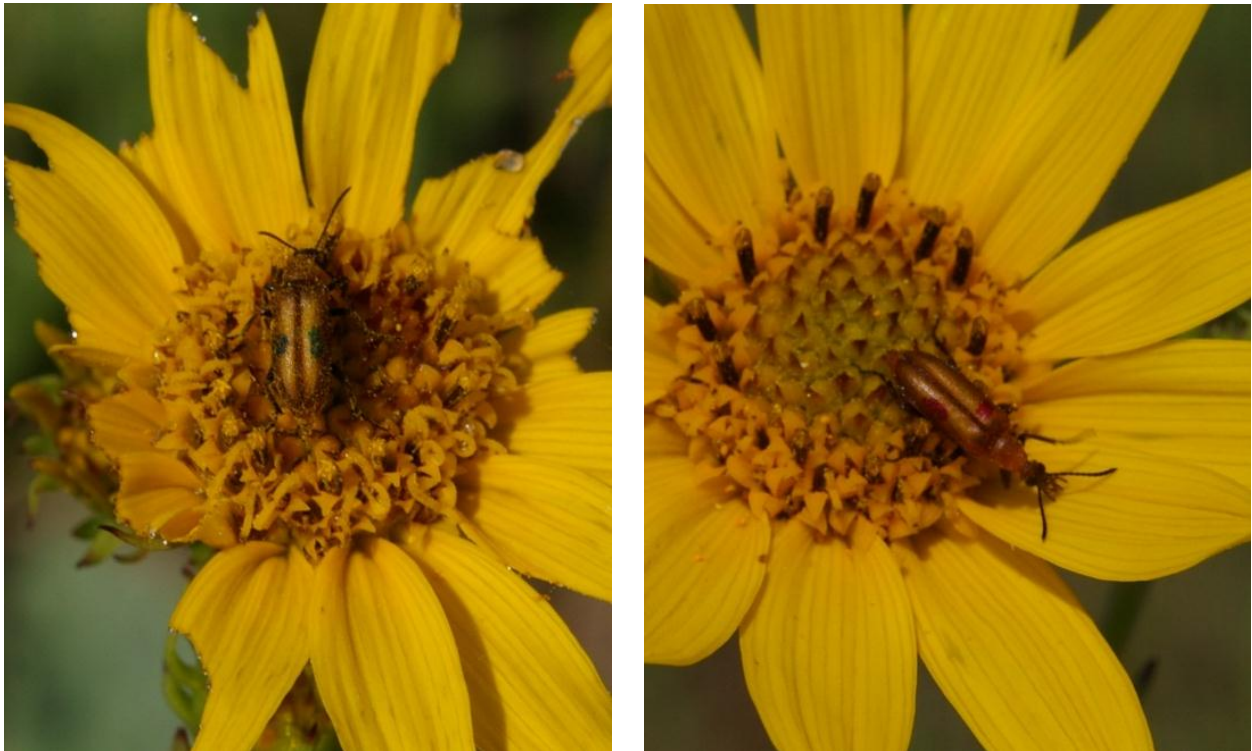


Figure 1. Markings made by a felt-tipped marker shown on an adult *Gnathium minimum*. Left: One black mark in the middle of each elytron. Right: One red mark on upper left elytron and one red mark in the middle of the right elytron.

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Chapter 3

Genetic Population Structure of *Gnathium minimum* (Say):

Core and Peripheral Populations

Abstract

Populations on the periphery of a species' range tend to contain lower genetic variation and increased genetic differentiation compared to populations at the core of a species range. However, this is not always the case. The blister beetle *Gnathium minimum* (Say) exhibits a wide-ranging distribution in the western United States but has peripheral or disjunct populations in Mexico, Florida, and Wisconsin. I used amplified fragment length polymorphism (AFLP) to compare the genetic variation and magnitude of genetic differentiation of the Wisconsin peripheral population compared to the western core populations. The percent of polymorphic loci was 52.3 and 52.9, and expected heterozygosity 0.1815 and 0.1883 for the Kansas/Colorado and New Mexico/Texas regions, respectively. Specimens from Wisconsin had a lower percent of polymorphic loci (36.8) and expected heterozygosity (0.1438). F_{ST} and GENELAND provide evidence for genetic differentiation among and within the areas sampled. Differentiation was greatest among the sampling locations within Wisconsin. Significant isolation-by-distance was also observed in Wisconsin but not within the two populations of the core region. These patterns of genetic differentiation provide evidence that dispersal among sampling locations is greater in the core region and that local populations in Wisconsin are more isolated. While I provide a comprehensive assessment of the genetic characteristics of *G. minimum* in Wisconsin, there are other peripheral populations that could benefit from similar research. Furthermore, additional sampling would provide the opportunity to compare genetic patterns with morphological variation present within the species.

Introduction

Peripheral populations tend to be more isolated, smaller in size, experience greater fluctuations in population size, have lower reproduction rates, and found in marginal habitats (Brown 1984, Lesica and Allendorf 1995, Vucetich and Waite 2003, Sagarin *et al.* 2006). These characteristics suggest that genetic drift is an important factor in genetic population dynamics (Vucetich *et al.* 1997, Vucetich and Waite 2003). With isolation reducing dispersal (gene flow) and the greater influence of genetic drift, peripheral populations are expected to exhibit lower genetic diversity and increased genetic differentiation compared to central or core populations (Lesica and Allendorf 1995, Vucetich and Wait 2003, Eckert *et al.* 2008, Ramakrishnan *et al.* 2010). This is commonly, but not always observed. Eckert *et al.* (2008) reviewed 134 studies involving 115 species and found that periphral populations had lower diversity in 64.2% of the studies and increased differentiation in 70.2%. These patterns have been documented even in species with long-distance dispersal ability (Kyle and Strobeck 2002).

Since increased isolation and decreased genetic diversity increase the risk of extinction (Frankham 1995, Nieminen *et al.* 2001, Holt 2003, Reed and Frankham 2003, Spielman *et al.* 2004), peripheral populations should be a focus of conservation for biological reasons. Peripheral populations are frequently a target of conservation interest, but because widespread species often have a small portion of their range overlap in a particular political jurisdiction (Bunnell *et al.* 2004). Maintaining a higher level of genetic diversity (heterozygosity and allelic diversity) also preserves the evolutionary potential of the species (Allendorf 1986, Frankham 1995). It has been suggested that peripheral populations on the northern range limits are important in the presence of climate change (Etterson and Shaw 2001, Parmesan 2006). These

populations may contain beneficial variation due to local adaptation (Hoffmann and Blows 1994, Lesica and Allendorf 1995).

However, these assumptions concerning characteristics of peripheral populations should be investigated before being considered accurate. It has been found that these characteristics are not always accurate and can interfere with determining the underlying processes responsible for the observed genetic patterns (Eckert *et al.* 2008, Sagarin *et al.* 2006). Local adaptations may allow for a species to deviate from the abundant-centre model (Brussard 1984, Sagarin and Gaines 2002, Vucetich and Waite 2003, Eckert *et al.* 2008) because populations in the core are equally separated or peripheral population sizes are large. This may be related to variation in environmental conditions, variable responses of the species, variation of interspecific interactions, and variation in anthropogenic impacts (Sagarin *et al.* 2006).

With increased isolation due to habitat fragmentation likely resulting in reduced gene flow, understanding how individuals move across the landscape can be critical for conservation. Dispersing individuals are critical for the viability and survival of species, as they can counter detrimental effects associated with high levels of inbreeding (Saccheri *et al.* 1998, Crnokrak and Roff 1999, Williams *et al.* 2003, Frankham 2005, Vandewoestijne *et al.* 2008) and colonize new or post-disturbance habitats (Aviron *et al.* 2007).

Direct observations of long-distance movements are difficult to detect with smaller organisms, even when implementing mark-release-recapture studies. To confound this issue, low recapture rates are common, particularly with insects (Singer and Wedlake 1981, Morton 1982, 1984, Smith and Wall 1998). Genetic techniques can indirectly allow researchers to estimate gene flow, and therefore the magnitude of dispersal. With such methods, differences in

and the distribution of alleles are also used to estimate genetic variation and population differentiation within and among individuals and populations.

Gnathium minimum (Say) is a species that exhibits a disjunct population distribution, primarily inhabiting the Great Plains region including Alberta, Montana, Colorado, New Mexico, Texas, Oklahoma, Kansas, and Nebraska (MacSwain 1952, Pinto 2009). However, there are peripheral populations in Wisconsin, Illinois, Florida, and Mexico (Pinto 2009). Specifically the upper Midwest peripheral population is associated with sandy soils in southwestern Wisconsin and northwestern Illinois (nw IL: Bouseman 1966; WI: present study). Specimen records for *G. minimum* in Wisconsin include Grant, Iowa, Richland, Sauk, and Monroe Counties (Chapter 1).

This species exhibits a relatively specific association with *Helianthus* as adults. Food plants include *H. annuus*, *H. occidentalis*, *H. petiolaris*, and *H. niveus*; it has also been reported from *Verbesina endeloides*, thistle blooms, and once from *Rudbeckia hirta* (Dillon 1952, Werner *et al.* 1966, Kirk and Balsbaugh 1975, Arnold 1976). *Helianthus occidentalis* is found throughout most of Wisconsin, with *H. annuus* and *H. petiolaris* less widespread (Heiser *et al.* 1969, Wiscflora 2007). *Helianthus annuus* and *H. petiolaris* are found throughout most of the contiguous states, *H. occidentalis* in the eastern half of the United States and *H. niveus* restricted to the extreme southwest (Heiser *et al.* 1969).

To compare the genetic characteristics of core and peripheral *G. minimum* populations, I used amplified fragment length polymorphism (AFLP, Vos *et al.* 1995). Analysis quantifies genetic variation and genetic differentiation, thereby providing indications of dispersal ability and gene flow. This is often difficult to detect with other field techniques, particularly with such a small organism as *G. minimum*. Specifically, I addressed the follow objectives:

1. Compare the genetic variation of core and peripheral populations of *G. minimum* to determine if the Wisconsin peripheral population has lower genetic diversity compared to the core populations;
2. Evaluate the magnitude of genetic structure of core and peripheral populations of *G. minimum* to determine if the Wisconsin peripheral population exhibits increased genetic differentiation compared to the core populations;
3. Identify areas of genetic discontinuities (genetic clusters) within *G. minimum*;
4. Evaluate dispersal ability of *G. minimum* and identify dispersal events.

The genetic characteristics of *G. minimum* populations offer insight into the dispersal ability of the species. Integrating these genetic data with the species' natural history and landscape features may suggest factors important for the conservation of the species, and more specifically the peripheral population in Wisconsin. If populations are found to be completely isolated, they should be treated by natural resource managers as separate management units rather than a single population or unit.

Methods

Sample Collection

I obtained 243 *G. minimum* specimens from 23 locations in five states in 2007 and 2008 (Figure 1, Table 1). These locations reflect intensive surveying efforts in Wisconsin and include

all general areas from which this species is known in Wisconsin, with the exception of Fort McCoy (Monroe County). Unfortunately, I was unable to detect *G. minimum* during a collecting trip to Fort McCoy in 2007. Sampling in Kansas was designed to generally resemble the spatial distribution, and therefore sampling pattern, in Wisconsin. Other researchers generously provided specimens from Colorado, New Mexico and Texas to be included in this study. Combined, all samples form three regional groups: 1) Wisconsin, 2) Kansas/Colorado and 3) New Mexico/Texas.

DNA Isolation

Samples were stored in 100% ethanol at 4°C. Following Reineke *et al.* (1998), CTAB was used to isolate and purify DNA (Moller *et al.* 1992). Some modifications were made to the procedure which included removing a metathoracic leg and one elytron (maintained as vouchers by the authors), macerating the specimen in a lysis buffer (0.1M Tris-HCl pH 8.0, 0.01M EDTA, 2% SDS), and the addition of 8.0 mg/ul RNase A. I further modified the procedure to include washing the DNA sample with 100% ethanol at 4°C overnight, then rehydrating with 30 ul 10 mM Tris-HCl (pH 8.0) and heating at 65°C for at least one hour. DNA quality was assessed visually with agarose gel electrophoresis and ethidium bromide staining. Estimates of DNA concentration were obtained by UV (A_{260}/A_{280}) absorbance spectroscopy.

AFLP Markers

Two-hundred ng of purified total genomic DNA was digested to completion with 20U EcoRI (5'-G|AATTC-3') and 5U BfaI (5'-C|TAG-3') overnight followed by a 20 min heat treatment at 65°C. I found that the restriction digestion reaction was only reproducible if run overnight, rather than the widely recommended two hour period. Double-stranded adaptor sequences EcoRI-AD and BfaI -AD (75 pmoles each) with overhangs complementary to the

digested ends were ligated overnight at 16°C with 400U T4 DNA ligase. Ligated samples were diluted 1:4 with sterile 10 mM Tris-HCl (pH 8.0). Pre-selective PCR amplifications were performed in 50 ul volumes (1X GoTaq Flexi Buffer, 1.5 mM MgCl₂, 0.05 mM dNTP, 2% freshly prepared deionized formamide, 1.25U Taq DNA Pol I) containing 10 ul diluted ligation mixture and 15 pmoles each of primers EcoRI+A (5'-GACTGCGTACCAATTCA-3') and BfaI+C (5'-GATGAGTCCTGAGTAGC-3'). Thermocycling consisted of one cycle of 72°C for 2 min, an initial denature at 94°C for 1 min followed by 25 cycles each of 94°C for 50 s, 56°C anneal for 1 min, and 72°C extension for 2 min. Pre-selective amplification products were normally diluted 1:19 in sterile 10 mM Tris-HCl (pH 8.0) but those with lower amplification (determined by an agrose gel) were diluted 1:9. This extra step was included so that the selective PCR would start with similar template concentrations. Selective PCR amplification was performed in 25 ul volumes (1X GoTaq Flexi Buffer, 2 mM MgCl₂, 0.3 mM dNTP, 2% freshly prepared deionized formamide, 0.625U Taq DNA Pol I) containing 5 ul diluted pre-amplification mixture, 5 pmoles HPLC-purified primer EcoRI+AG (5'- GACTGCGTACCAATTCAG-3') labeled with 6-carboxyfluorescein (6-FAM), and 25 pmoles BfaI+CC (5'-GATGAGTCCTGAGTAGCC-3'). Thermocycling consisted of an initial 94°C denature for 1 min followed by 10 cycles of a 1 min annealing touchdown (1°C decrease each cycle) from 65°C to 56°C each with a 72°C extension for 2 min. The selective amplification was completed with 18 cycles of 95°C for 50 s, 56°C for 1 min, and 72°C for 2 min. Selectively amplified PCR products were purified over Sephadex G75 and stored at -80°C. Two ul of purified product was combined with 12.3 ul formamide and 0.7 ul Geneflo 625 (mobility standard, CHIMERx Molecular Biology Products) for electrophoresis on an ABI 3730xl DNA Analyzer. These

parameters generated trace files with the most amplified markers between 20,000 and 30,000 relative fluorescence intensity.

Data Analysis

I used DAX 8.0 (Van Mierlo Software, The Netherlands) to visualize AFLP fingerprints and score individual loci ranging from 50 to 625 base pairs; AFLP-SURV (Vekemans 2002; Vekemans *et al.* 2002) to calculate polymorphism (\hat{p}), expected heterozygosity (H_e), and F_{ST} values; IBDWS (Jensen *et al.* 2005) to test for isolation-by-distance (IBD); and GENELAND (Guillot *et al.* 2005a, 2005b) to identify genetic clusters. F_{ST} values provide a coarse measure of genetic differentiation and are used on a larger geographic scale (sampling location) while GENELAND is used to detect fine-scale genetic differentiation on smaller geographic scales (individuals).

Marker selection required adherence to a resolution criterion to ensure identification and separation of neighboring peaks. Prior to inclusion in the analyses, I screened for proper mobility of the standard. Within DAX I used a threshold value for the trace signal versus noise level of 4.0, with the *slope requires threshold* to assist differentiating neighboring peaks for which the signal did not drop below the threshold. A total of 155 marker loci were included in the analyses.

Observed heterozygosity rates could not be calculated directly because of the dominant characteristic of AFLP data. However, AFLP-SURV estimates heterozygosity by the method of Zhivotovsky (1999) to reduce biases associated with dominant data. To test for statistically significant population differentiation, a 95% confidence interval was constructed around the hypothesis that $F_{ST} = 0$ by permuting individuals across populations (5000 replicates). The 26 Wisconsin samples collected in 2008 were not included with the 2007 specimens for the F_{ST}

calculations, focusing on the intended spatial distribution of genetic variation while avoiding incorporation of a temporal component.

Analysis using GENELAND 3.3.0 (Guillot *et al.* 2005b) followed the general process outlined by Guillot *et al.* (2005a). I first inferred K (number of genetic clusters) prior to estimating other parameters. The GENELAND software was run 10 times allowing K to vary from 1 to 30 with 1 million Markov chain Monte Carlo (MCMC) iterations, burn-in of 200 iterations, correlated allele frequencies, and a spatial coordinate uncertainty of 10 m. This uncertainty level allowed the samples to be assigned to different genetic clusters and compensated for GPS accuracy. I ran the same model 10 times with a fixed K using the number of clusters most frequently estimated with the variable K run. I ran similar analyses for each geographic region separately, initially allowing K to vary from 1 to 20 for 20 runs, then ran the model with a fixed modal K for 20 runs. All samples were included in the genetic cluster assignment. Individuals may exhibit a tendency for membership in more than one cluster, so replicate runs can vary slightly. Consistent clustering patterns provide support for individual membership in each cluster. To measure this support, pairwise comparisons for cluster membership of each individual for each run were performed on the 30 replicates. The average linkage (UPGMA) among individuals was calculated and a dendrogram constructed.

Results

All Wisconsin *G. minimum* were observed on *H. occidentalis* despite the presence of *R. hirta* and other flowers frequently found nearby. In addition, *H. occidentalis* is found in more or less discrete patches, even in larger areas of what appears to be suitable habitat. *Helianthus* species in Kansas are more widespread, often continuously inhabiting roadsides, rather than the discrete patches observed in Wisconsin with *H. occidentalis*.

Initial trials with the Qiagen® DNeasy® Kit could not produce reliable (reproducible) AFLP fingerprints. The restriction digestion was incomplete as high molecular weight DNA was present on an agarose gel following the reaction. I suspect cantharidin is responsible for this result. Regardless of the cause, the modified CTAB technique provided a method that consistently provides pure DNA which is able to be digested to completion and generate reliable AFLP fingerprints.

Standard population genetic analyses yielded similar results between the two populations in the core region. The percent of polymorphic loci estimated to be 52.3 and 52.9, and expected heterozygosity 0.1815 and 0.1883 for the Kansas/Colorado and New Mexico/Texas regions, respectively (Table 1). Specimens from Wisconsin had a lower percentage of polymorphic loci (36.8) and expected heterozygosity (0.1438) than the two core populations. Statistically significant genetic differentiation exists among all three of the sampled regions ranging from $F_{ST} = 0.09$ to 0.14 (Table 2). The two regions separated by the greatest geographic distance, Wisconsin and New Mexico/Texas, resulted in the largest difference.

Within the New Mexico/Texas region, four of the six (67%) pairwise F_{ST} comparisons are significantly different (Table 3). The Portales sampling location was significantly different than the other sampling locations, and Oasis Road and Muleshoe also exhibited significant genetic differentiation. No statistically significant IBD pattern ($Z = 1.2712$, $r = 0.0190$, $P = 0.4652$) was found (Figure 2A).

Within the Kansas/Colorado region, there were interesting patterns of genetic differentiation with 10 of 36 (28%) pairwise F_{ST} comparisons significantly different (Table 4). The Kiowa, CO sampling location was most isolated geographically from the other locations. Individuals from this site were genetically different from other sites with the exception of the site

closest in geographic distance (Cimarron) and the two sites furthest in geographic distance (Meade1 and Meade2). The other significant F_{ST} values involved the Meade1 site. These differences were with the four sampling locations in closest geographic proximity (Meade2, Liberal, Rolla1, Rolla2) as well as Cimarron. A statistically significant IBD pattern ($Z = 2.8495$, $r = 0.2218$, $P = 0.1904$) was not present (Figure 2B).

Within Wisconsin, 25 of 36 (69%) pairwise F_{ST} comparisons were significantly different (Table 5). The grouping of sampling locations that exhibited genetic similarity included the sampling locations Muscoda, MuscodaE and MuscodaW. In contrast to the Kansas/Colorado region, a statistically significant IBD pattern ($Z = 14.4366$, $r = 0.5830$, $P = 0.0082$) was present in Wisconsin (Figure 2C).

A comparison of IBD regressions (Figures 2A-C) showed that the geographic distance required for genetic difference was similar in the three regions. The slope of the regression for Wisconsin was also greater than the other two regions, demonstrating that the genetic difference increased at a greater rate for a similar geographic distance.

Non-spatial Model

Based on genotypic data only, the GENELAND non-spatial model estimated 10 genetic clusters when including all specimens. The Wisconsin specimens were grouped in three clusters, all three more similar to each other than the others with specimens from the core populations (Figure 3). However, there was one exception as a specimen collected in Wisconsin was assigned to a genetic cluster with specimens mostly from Kansas. Specimens from the New Mexico/Texas and Kansas/Colorado regions tended to cluster with specimens from the same region, but there were many exceptions.

For New Mexico/Texas specimens only, GENELAND estimated two clusters (Figure 4). One of the clusters is composed primarily of specimens collected from Portales, NM. However, this group also includes a single individual from each of the Oasis, NM and Boone, NM sampling locations. The second cluster includes the remaining individuals and one of the individuals collected from Portales, NM. All of the Muleshoe, TX specimens clustered together.

For Kansas/Colorado specimens only, GENELAND assigned individuals to four clusters (Figure 5). There is no clear pattern of cluster assignments based on geography, as individuals from each sampling location are nearly evenly distributed within each of the four clusters.

For Wisconsin specimens only, GENELAND estimated seven clusters, with specimens commonly grouping with those from other sampling locations (Figure 6). One cluster was composed of all samples from the Muscoda area with the exception of one individual from Kennedy Road. However, not all of the Muscoda area specimens were included in this cluster.

Spatial Model

For the spatial model involving all specimens which incorporates both genotypic and spatial data, GENELAND estimated six genetic clusters, with each of the three general geographic regions containing two separate genetic clusters (Figure 7). Wisconsin and New Mexico/Texas illustrate a similar pattern in that specimens from the western areas formed their own cluster and those from the eastern area formed a second cluster. The Kansas/Colorado region exhibited a different pattern where specimens from the western and eastern extremes formed a cluster, and those from the middle region formed a second cluster. In all cases, specimens collected from a specific location were always assigned to the same genetic cluster as the other individuals from the same location.

For New Mexico/Texas specimens only, GENELAND estimated two genetic clusters. Individuals from each sampling location were always assigned to the same cluster as other individuals from that same location. Individuals from Portales, NM were always assigned to a different cluster than those of Muleshoe, TX. Individuals from the other two New Mexico locations were always assigned to the same cluster, but there was equal support for clustering with Portales as there was with Muleshoe.

For Kansas/Colorado specimens only, even running GENELAND with $K=2$ (when there was greater support for $K=1$) eight of the 20 (40%) runs assigned all individuals to the same genetic cluster. This indicates that only one cluster exists as suggested by the variable K runs. However, there was evidence of subtle genetic differentiation. As with the full analysis, individuals from Meade1 and Kiowa clustered together in all runs, representing the western-most and eastern-most specimens in this region. Individuals from the other sampling locations tended to cluster together, but again, eight of the 20 runs did cluster with two previously mentioned locations. In whole, this suggests that genetic differentiation is weak (subtle) if present.

For Wisconsin specimens only, GENELAND generally assigned individuals in the immediate geographic location to the same cluster (Figure 8). However, there were two exceptions. Individuals assigned to cluster 5 were relatively widespread, from Lone Rock to Spring Green, with two other clusters interspersed. The second exception was one individual collected near Muscoda which was assigned to the same genetic cluster as individuals from west of Lone Rock, suggesting a dispersal event (cluster 2). This also represented the only example of a genetic cluster with individuals on both sides of the Wisconsin River.

Discussion

The peripheral population of *G. minimum* in Wisconsin exhibits differences from the core populations in the Great Plain states for all genetic parameters assessed. The two populations sampled within the core region exhibited very similar levels of polymorphic loci and heterozygosity despite being separated by about 330 km. Individuals from the peripheral Wisconsin population, which is likely a disjunct population, exhibited about 16% lower levels of polymorphic loci and 4% lower heterozygosity. This pattern is frequently but not always observed in peripheral populations (Eckert *et al.* 2008).

Reasons for the reduced genetic variation in the Wisconsin population are unknown and are often difficult to determine as they can come from a variety of processes. A few founding individuals expanding the range of the species or bottleneck events could both result in lower genetic variation compared to the main population (Tsutsui *et al.* 2000, Lee 2002, Uller and Leimu 2011). There is also evidence that northern populations in the North American temperate region often have lower levels of genetic variation due to post-glacial expansion (Lesica and Allendorf 1995, Hewitt 1999, Hampe and Petit 2005). Without increasing sampling coverage in the northern United States at similar latitudes to Wisconsin, I am unable to determine if the observed difference is due to being an isolated/disjunct population or a pattern caused by the last ice age. Additional sampling in North and South Dakota may provide insight into the cause of lower genetic variation in the Wisconsin population.

F_{ST} values show strong genetic structure among the three geographic regions included in this study. There are similar magnitudes of genetic differentiation when comparing the individuals from Kansas/Colorado with those from either the New Mexico/Texas or Wisconsin regions. It would be expected that reduced gene flow to peripheral populations would result in

greater genetic differentiation compared to core populations assuming other variables are the same. Isolation-by-distance analysis indicates that dispersal (gene flow) is less restricted in the core region of the Great Plains. The genetic differentiation increased about four times as fast over the same geographic distance in Wisconsin compared to Kansas/Colorado. Sample size (four sampling locations) is likely too small in New Mexico/Texas to provide insight for this region but initial indications also suggests less differentiation than observed between sampling locations in Wisconsin.

Identification of genetic clusters differed between non-spatial and spatial models because the spatial model spatially correlated genotypes. However, the two models were consistent in regards to the relative similarity of assigning individuals to genetic clusters. The spatial model did not provide an indication of gene flow between any two of the three regions. However, a genetic cluster in the Kansas/Colorado region contained individuals collected about 300 km apart, indicating gene flow over this distance. The non-spatial model identified several genetic clusters composed of individuals from both the Kansas/Colorado and New Mexico/Texas regions. With the exception of one specimen, all Wisconsin individuals were well separated from those of the core populations.

The region-specific genetic cluster assignments were generally similar between the non-spatial and spatial models. For the New Mexico/Texas region, both models indicated that specimens from Portales, NM and Muleshoe, TX were genetically distinct. However, the other samples in the region would cluster with individuals from either the Portales or Muleshoe locations. This indicates some level of gene flow is present to prevent differentiation of all local populations. Both models indicated gene flow in the Kansas/Colorado region characteristic of a panmictic population. This is based on a single genetic cluster (spatial model) or each cluster

including individuals from many sampling locations (non-spatial model). The Wisconsin region-specific cluster assignment showed more differences between the two models than did the other two regions. The spatial model generally grouped individuals from the same sampling location while the non-spatial model more frequently composed clusters of individuals from multiple sampling locations. However, specimens from the Muscoda area were differentiated regardless of whether or not spatial information was included. This increased genetic differentiation could result from sampling individuals at the extremes of a species' Wisconsin distribution, the Wisconsin River acting as a dispersal barrier or both. Evidence for the river presenting a dispersal barrier is strong in the spatial model, but less so in the non-spatial model because the eastern Wisconsin samples collected north and south of the river cluster together frequently. A significant F_{ST} of 0.05 (-0.01 to 0.001 95% CI) when comparing individuals collected north ($n = 57$) and south ($n = 32$) of the Wisconsin River further supports the river limiting dispersal. Wheeler and Waller (2012) reported similar results, with the spatial model having better resolution of clustering to match a river and large roads which they believed to be dispersal barriers to *Puma concolor* (Linnaeus).

While results of the the non-spatial and spatial models differ, it appears that the spatial model is more conservative in terms of identifying dispersing individuals because it attempts to cluster individuals from the same geographic region. For example I do not believe that the non-spatial model is correctly identifying the one Wisconsin individual as a first generation disperser to Kansas. The distance between the sampling locations and lack of long-distance dispersal in Wisconsin suggests this is not likely. To test the ability of the spatial model to detect a dispersing individual, I assigned a Wisconsin spatial coordinate for a specimen collected in Kansas. In a second test, I assigned a Kansas spatial coordinate for a specimen collected in

Wisconsin. In both cases, the altered individual was assigned to a genetic cluster with individuals from the new geographic area, rather than those it was actually collected nearby. This further supports that the spatial model is conservative in terms of identifying dispersing individuals. However, I caution that the amount of uncertainty assigned to the geographic coordinates appears to have an impact on genetic cluster assignments and warrants further evaluation.

On a continental scale, there does not appear to be a break in habitat from Wisconsin to the Great Plains states based on food plants. Several *Helianthus* species for which *G. minimum* associations are reported (Pinto 2009) are distributed in areas between Wisconsin and Kansas (Heiser *et al.* 1969). At the same time there are no *G. minimum* records in Arkansas, Missouri, Iowa, and only one locality in Minnesota. This illustrates that the distribution of *Helianthus* does not explain the distribution of *G. minimum*. While the distribution of adult food plants is relatively well described (Heiser *et al.* 1969), little is known about requirements of *G. minimum* immature stages and I believe these are likely to be more limiting than adult food plants. The substantial gap in knowledge concerning habitat requirements is directly linked to incomplete information regarding bee hosts.

Habitat in terms of *Helianthus* distribution offers an explanation for the increased dispersal and subsequent gene flow within the core region compared to within the peripheral population. Conducting surveys for *G. minimum*, I found that *H. occidentalis* is patchily distributed in Wisconsin but *Helianthus* species were common in most roadsides and undeveloped or uncultivated areas in Kansas/Colorado. The landscape matrix between sampling locations can influence genetic differentiation by restricting dispersal, not just strictly the geographic distance (Epps *et al.* 2007). The more continuous habitat (*Helianthus* distribution)

presumably equates to increased *G. minimum* occupancy across the landscape in the core populations.

Interpreting patterns of genetic structure and gene flow is also complicated by differing methods of dispersal for *G. minimum* as adults and larvae disperse by different means. Adults have functional wings and are able to move up to at least 600 m in an open habitat with abundance of *Helianthus* (Chapter 2). However, we do not have an understanding of their long-distance dispersal abilities or behavior. Larvae disperse by phoresy on bees, which means that the dispersal ability of *G. minimum* may closely mirror the dispersal ability of their host bee species. For example, an observation about bee dispersal that is consistent with the Wisconsin River acting as a dispersal barrier is that *Colletes* (genus of a known larval host) may not cross water (Ahlback 2010).

F_{ST} provides a coarse measurement of genetic structure, but has limitations as populations must be defined *a priori* and are not very informative for small areas and nonclustered sampling design (Coulon *et al.* 2006). GENELAND provides a solution to these limitations as genetic clusters are defined by a Bayesian clustering method to use individual genotypes as the data source rather than populations. Other Bayesian clustering methods exist (Pritchard *et al.* 2000, Falush *et al.* 2003), but Guillot *et al.* (2005) and Coulon *et al.* (2006) demonstrated that GENELAND can detect weaker population structure than STRUCTURE (Pritchard *et al.* 2000). This is due to GENELAND being able to define spatial genetic units by incorporating spatial data of sampled individuals. Because populations tend to be spatially structured in distinct areas, locations of genetic discontinuities are objectively identified with the assumption that there is spatial dependence among individuals (Guillot *et al.* 2005a). In contrast to independent identically distributed (i.i.d.) mixture models that equally weight all partitions, GENELAND

favors partitions that are spatially organized (Guillot *et al.* 2005a). Another advantage of this program is that migrants can be visually detected while their spatial origin is provided. Guillot *et al.* (2005a) admit that loosely organized clustering may not be recognized, but does not penalize strongly connected groups of small to moderate sizes.

It is clear that the spatial scale of sampling and/or analyses can be influential when interpreting results from GENELAND. By reducing the spatial scale of analyses, additional genetic clusters were identified. However, the relative similarity of individuals, based on cluster assignment, was nearly consistent. It appears that the spatial model would be the conservative model to identify dispersers, as GENELAND would attempt to group individuals collected in the same area into the same cluster. The delineation of clusters varied depending on the spatial extent of analyses.

This study represents a relatively complete assessment of *G. minimum* genetic population structure in Wisconsin, but only provides an initial glimpse into the species. Further genetic work is warranted in this species. First, Wisconsin represents only one of three peripheral populations that appear to be disjunct, with the other two found in Florida and Veracruz, Mexico (Pinto 2009). Based on our results and the conservation concern associated with peripheral populations, it would be important to assess the genetic composition of these populations. Second, a review of *G. minimum* specimens demonstrated that there are high levels of morphological variation, often correlated with geography (Pinto 2009). Investigating the genetic characteristics of these different morphological forms could provide information regarding the level of correlation between morphological and genetic characteristics.

Table 1. Number of sampling locations, number of specimens, polymorphism, and heterozygosity of *Gnathium minimum* for three geographic regions.

Region	Sampling Locations	Number of Specimens	Percent Polymorphic Loci	Expected Heterozygosity (H_e)	Standard Error of H_e
Kansas & Colorado	9	87	52.3	0.1815	0.0142
New Mexico & Texas	4	35	52.9	0.1883	0.0147
Wisconsin	9	121	36.8	0.1438	0.0147

Table 2. Genetic differentiation (F_{ST}) among the three main geographic regions sampled. Pairwise F_{ST} values are bold if significantly different from zero (95% confidence intervals centered around zero in parenthesis).

	WI	KS/CO	NM/TX
WI			
KS/CO	0.0924 (-0.0037 – 0.0037)		
NM/TX	0.1403 (-0.0060 – 0.0076)	0.0902 (-0.0035 – 0.0038)	

Table 3. Genetic differentiation (F_{ST}) for sampling locations in New Mexico and Texas. Pairwise F_{ST} values are below the shaded diagonal and are bold if significantly different from zero (95% confidence intervals centered around zero in parenthesis). Distance (km) between sampling locations are above the shaded diagonal.

	Muleshoe, TX	Boone's Draw, NM	Oasis Road, NM	Portales, NM
Muleshoe, TX		58.8	63.1	61.8
Boone's Draw, NM	0.0164 (-0.0386 – 0.0257)		16.2	8.6
Oasis Road, NM	0.0452 (-0.0379 – 0.0228)	0.0083 (-0.0268 – 0.0182)		7.9
Portales, NM	0.0974 (-0.0300 – 0.0274)	0.0496 (-0.0231 – 0.0204)	0.0717 (-0.0225 – 0.0207)	

Table 4. Genetic differentiation (F_{ST}) for sampling locations in Colorado and Kansas. Pairwise F_{ST} values are below the shaded diagonal and are bold if significantly different from zero (95% confidence intervals centered around zero in parenthesis). Distance (km) between sampling locations are above the shaded diagonal.

	Meade1	Meade2	Liberal	Rolla1	Rolla2	Rolla3	Wilburton	Cimarron	Kiowa
Meade1		6.5	36.8	115.2	115.3	115.8	128.2	127.2	304.2
Meade2	0.0251 (-0.0227 – 0.0166)		32.2	110.7	110.9	111.2	123.8	123.1	302.9
Liberal	0.0420 (-0.0300 – 0.0298)	0.0121 (-0.0217 – 0.0219)		78.5	78.6	79.0	91.5	91.0	275.4
Rolla1	0.0491 (-0.0424 – 0.0421)	0.0287 (-0.0287 – 0.0355)	0.0186 (-0.0314 – 0.0436)		0.9	3.7	13.0	15.4	215.9
Rolla2	0.0256 (-0.0286 – 0.0183)	-0.0099 (-0.0200 – 0.0119)	0.0009 (-0.0286 – 0.0224)	0.0306 (-0.0393 – 0.0316)		2.8	12.9	15.9	216.4
Rolla3	-0.0023 (-0.0368 – 0.0241)	0.0017 (-0.0247 – 0.0223)	-0.0123 (-0.0306 – 0.0361)	0.0200 (-0.0434 – 0.0523)	-0.0171 (-0.0334 – 0.0171)		13.0	17.8	218.3
Wilburton	0.0131 (-0.0211 – 0.0144)	-0.0022 (-0.0142 – 0.0100)	0.0198 (-0.0205 – 0.0201)	0.0280 (-0.0313 – 0.0365)	0.0003 (-0.0190 – 0.0118)	0.0013 (-0.0251 – 0.0211)		10.4	207.6
Cimarron	0.0243 (-0.0293 – 0.0179)	-0.0167 (-0.0204 – 0.0155)	-0.0054 (-0.0265 – 0.0283)	0.0394 (-0.0361 – 0.0449)	-0.0262 (-0.0306 – 0.0167)	-0.0000 (-0.0302 – 0.0272)	0.0096 (-0.0176 – 0.0143)		200.6
Kiowa	0.0290 (-0.0354 – 0.0290)	0.0140 (-0.0288 – 0.0258)	0.0496 (-0.0302 – 0.0383)	0.0579 (-0.0436 – 0.0570)	0.0364 (-0.0361 – 0.0190)	0.0436 (-0.0352 – 0.0334)	0.0285 (-0.0272 – 0.0226)	0.0236 (-0.0369 – 0.0282)	

Table 5. Genetic differentiation (F_{ST}) for sampling locations in Wisconsin. Pairwise F_{ST} values are below the shaded diagonal and are bold if significantly different from zero (95% confidence intervals centered around zero in parenthesis). Distance (km) between sampling locations are above the shaded diagonal.

	Helena Rd	Kennedy Rd	Lone Rock1	Lone Rock2	Lone Rock3	Muscoda	Muscoda E	MuscodaW	Spring Green
Helena Rd		10.4	16.6	18.6	20.3	35.5	32.8	40.1	4.8
Kennedy Rd	0.0239 (-0.0364 – 0.0529)		6.1	8.2	9.9	25.3	22.3	29.8	7.3
Lone Rock1	0.0461 (-0.0400 – 0.0419)	0.0746 (-0.0229 – 0.0196)		2.2	3.8	19.0	16.2	23.6	13.1
Lone Rock2	0.0472 (-0.0396 – 0.0494)	0.0927 (-0.0357 – 0.0474)	0.0405 (-0.0362 – 0.0478)		1.7	17.2	14.4	21.7	14.9
Lone Rock3	0.0269 (-0.0529 – 0.0470)	0.0732 (-0.0373 – 0.0618)	0.0617 (-0.0437 – 0.0532)	0.0229 (-0.0466 – 0.0672)		15.8	13.0	20.3	16.4
Muscoda	0.1191 (-0.0375 – 0.0626)	0.1155 (-0.0211 – 0.0208)	0.1268 (-0.0279 – 0.0305)	0.1626 (-0.0362 – 0.0754)	0.1488 (-0.0391 – 0.0800)		2.9	4.6	32.0
MuscodaE	0.1385 (-0.0501 – 0.0807)	0.1518 (-0.0372 – 0.0641)	0.1473 (-0.0495 – 0.0704)	0.1749 (-0.0551 – 0.1059)	0.1583 (-0.0600 – 0.1583)	0.0246 (-0.0368 – 0.0625)		7.4	29.2
MuscodaW	0.0974 (-0.0439 – 0.0824)	0.0947 (-0.0947 – 0.0376)	0.1075 (-0.0406 – 0.0522)	0.1012 (-0.0440 – 0.0792)	0.1104 (-0.0565 – 0.1108)	0.0376 (-0.0325 – 0.0377)	0.0715 (-0.0610 – 0.0779)		36.6
Spring Green	0.0643 (-0.0435 – 0.0567)	0.0982 (-0.0238 – 0.0208)	0.0784 (-0.0317 – 0.0289)	0.0445 (-0.0401 – 0.0692)	0.1085 (-0.0480 – 0.0803)	0.1717 (-0.0288 – 0.0337)	0.1670 (-0.0544 – 0.0766)	0.0906 (-0.0422 – 0.0574)	



Figure 1. *Gnathium minimum* sampling locations. Black circles and labels represent sampling locations and gray “x”s and labels represent cities. *Upper left*: All sampling locations included in this study gray shaded area represents *G. minimum* distribution. *Upper right*: Sampling locations in Wisconsin (LR = Lone Rock). *Lower left*: Sampling locations in New Mexico and Texas. *Lower right*: Sampling locations in Kansas and Colorado, gray shaded area represents national grasslands (USDA Forest Service).

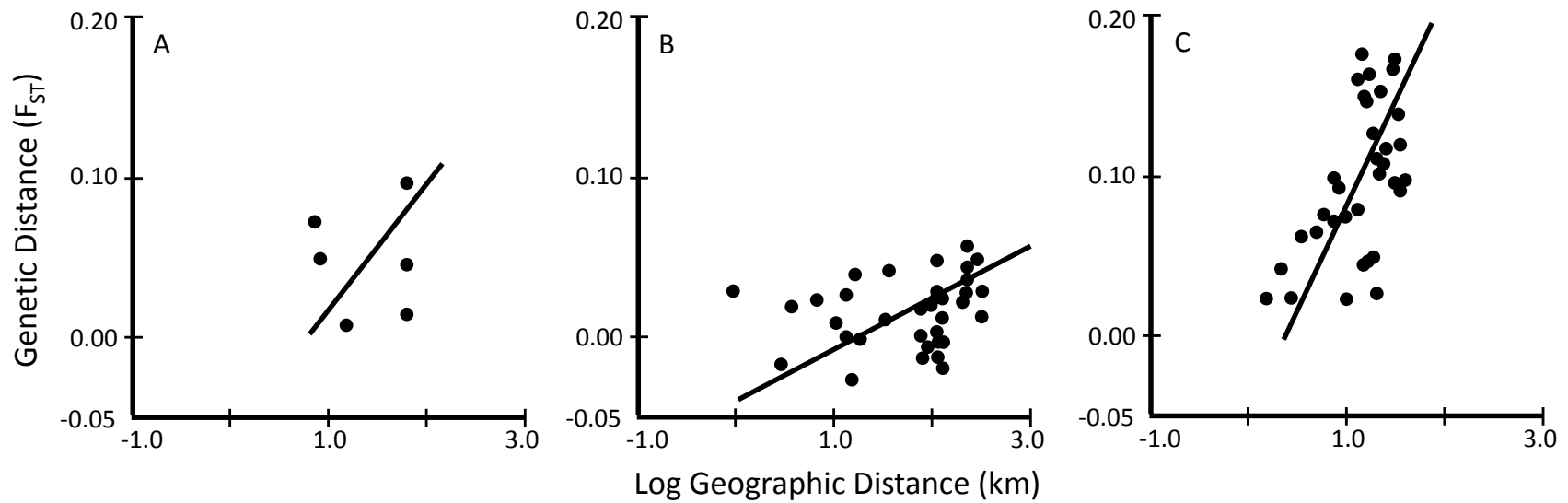


Figure 2A-C. Correlation of genetic differentiation (F_{ST}) and log of geographic distance (km) using a model assuming a two-dimensional stepping stone population structure for each sampling region: A. New Mexico and Texas (slope = 0.0764, 95% CI - 0.0296 – 0.1825); B. Kansas and Colorado (slope = 0.03278, 95% CI 0.0216 – 0.0440); C. Wisconsin (slope = 0.1316, 95% CI 0.0942 – 0.1690).

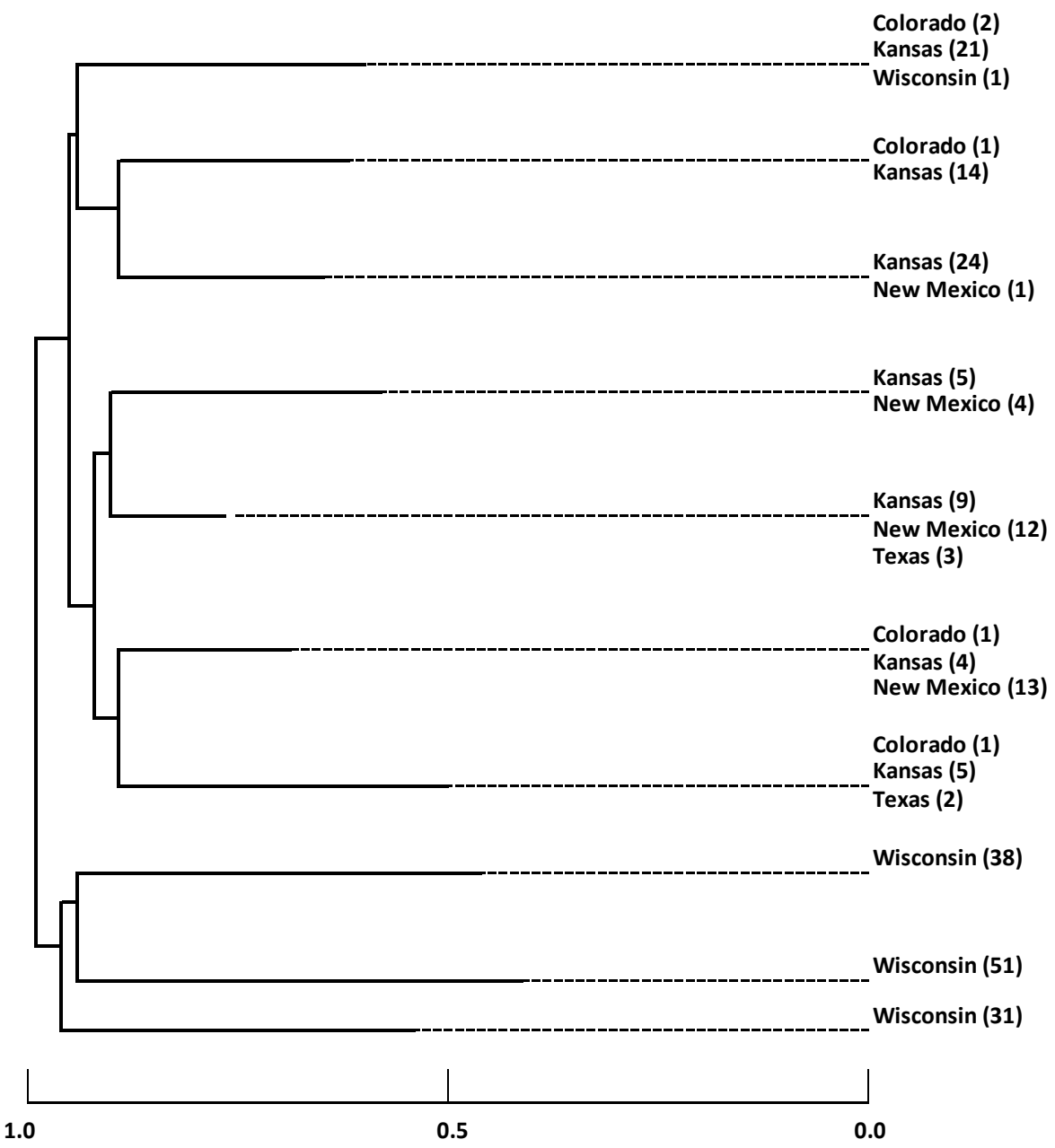


Figure 3. Dendrogram based on individual genetic cluster assignment from the GENELAND non-spatial model for all *G. minimum* specimens. A value of 1.0 indicates that individuals were never assigned to the same cluster, while a value of 0.0 indicates that individuals were always assigned to the same cluster. For simplicity, branching for the ten most differing groups was collapsed and is represented by a dashed line. The number of individuals from each state is shown in parenthesis.

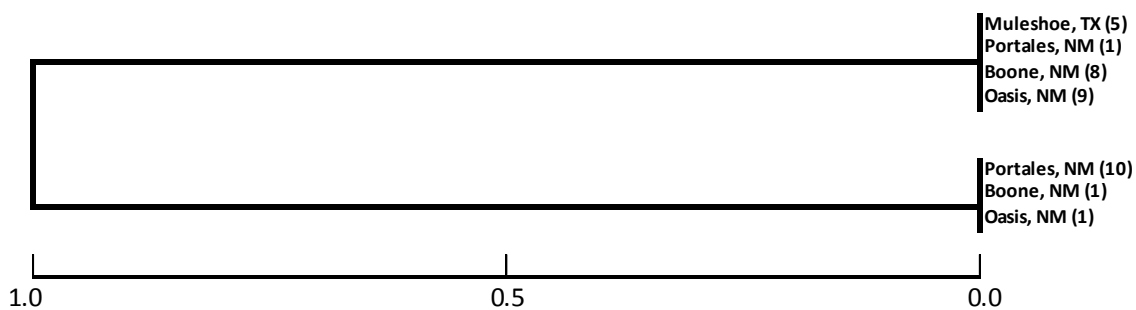


Figure 4. Dendrogram based on individual genetic cluster assignment from the GENELAND non-spatial model for New Mexico/Texas *G. minimum* specimens. A value of 1.0 indicates that individuals were never assigned to the same cluster, while a value of 0.0 indicates that individuals were always assigned to the same cluster. The number of individuals from each sampling location is shown in parenthesis.

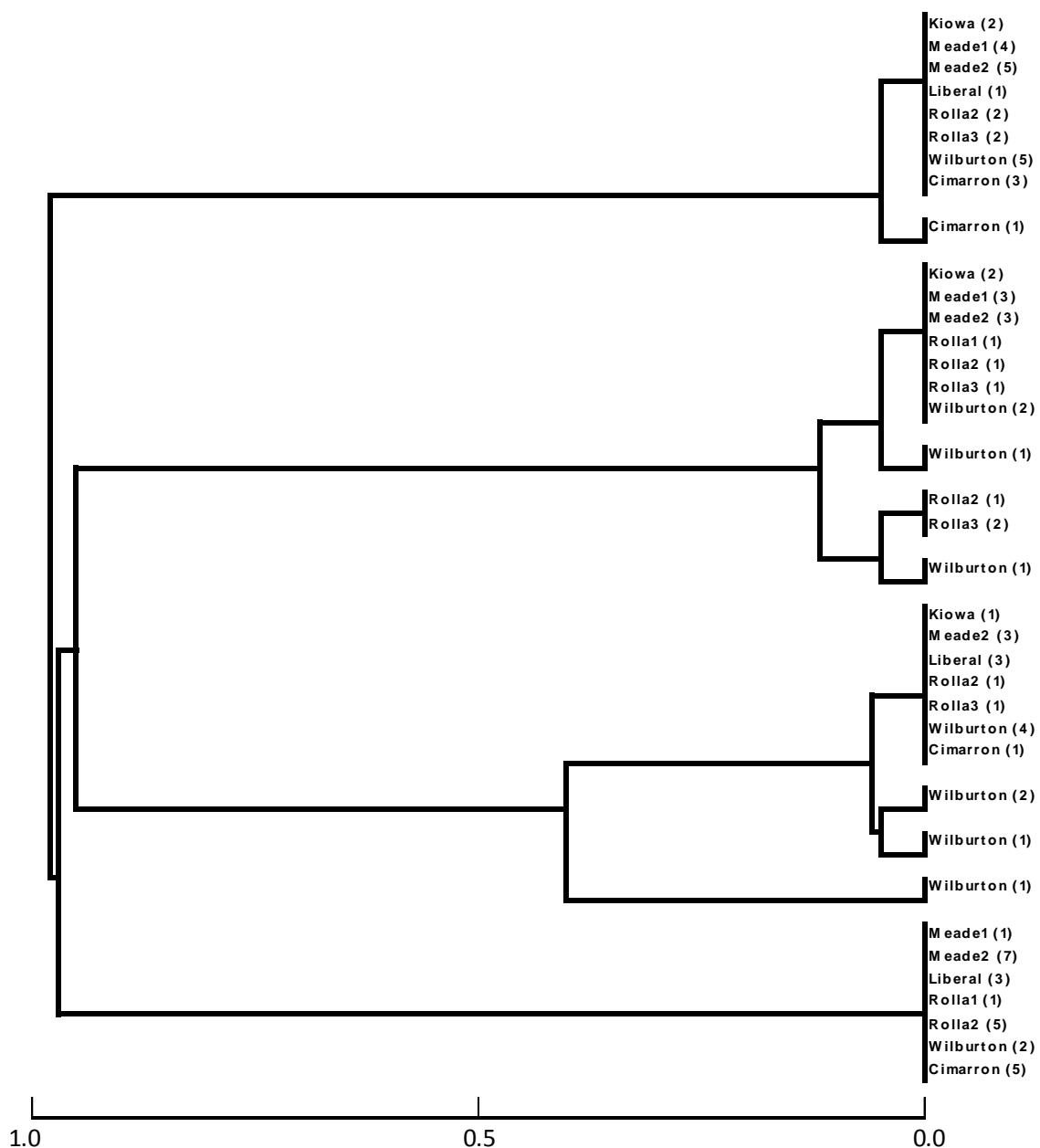


Figure 5. Dendrogram based on individual genetic cluster assignment from the GENELAND non-spatial model for Kansas/Colorado *G. minimum* specimens. A value of 1.0 indicates that individuals were never assigned to the same cluster, while a value of 0.0 indicates that individuals were always assigned to the same cluster. The number of individuals from each sampling location is shown in parenthesis.

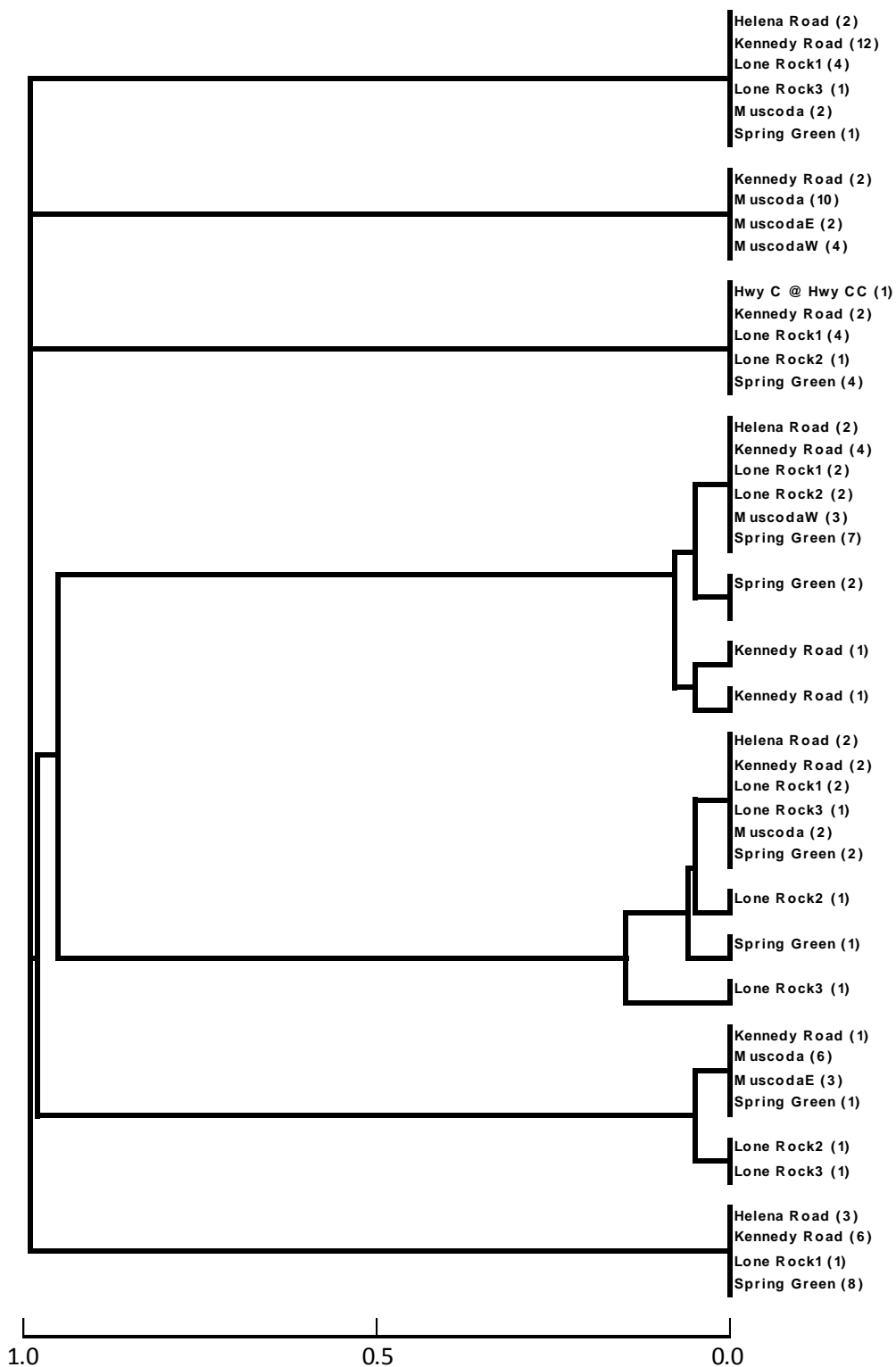


Figure 6. Dendrogram based on individual genetic cluster assignment from the GENELAND non-spatial model for Wisconsin *G. minimum* specimens. A value of 1.0 indicates that individuals were never assigned to the same cluster, while a value of 0.0 indicates that individuals were always assigned to the same cluster. The number of individuals from each sampling location is shown in parenthesis.

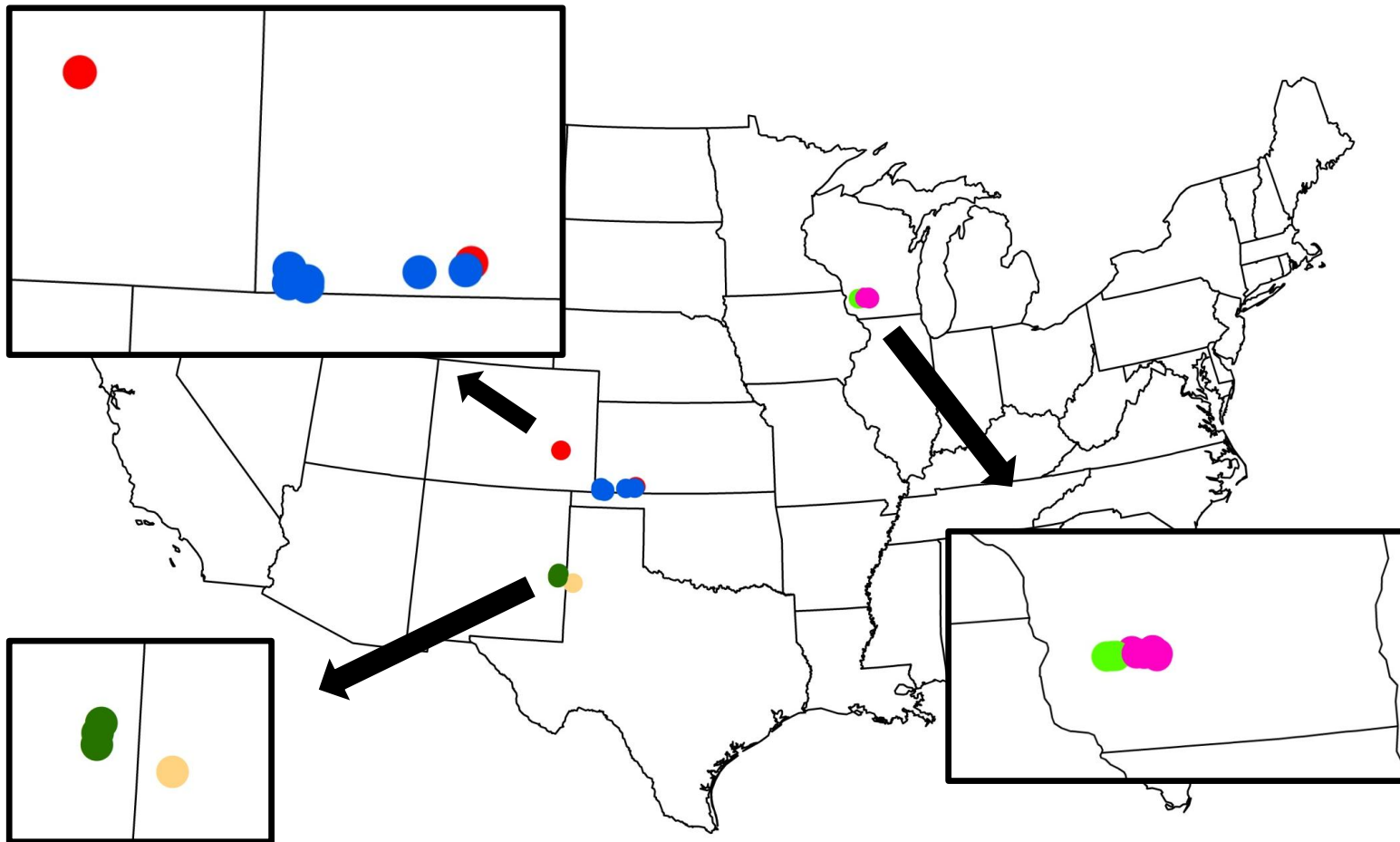


Figure 7. Genetic clusters identified by GENELAND spatial model for *G. minimum* for the three geographical regions.

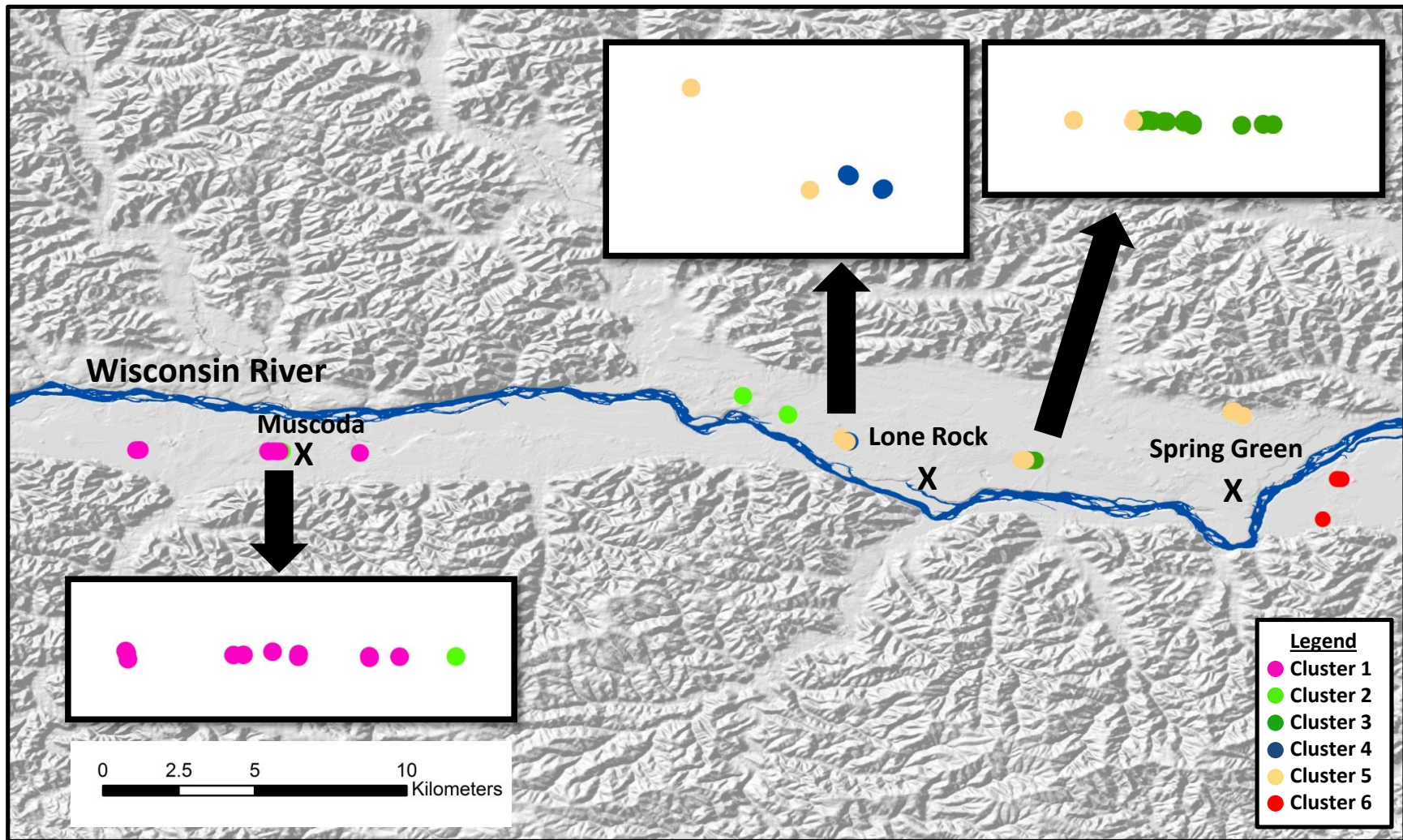


Figure 8. Genetic clusters identified by GENELAND spatial model for *G. minimum* collected in Wisconsin.

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