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Prairie Apioninae (Coleoptera: Brentidae) of Wisconsin: Collections and distributions

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Abstract: Two recent invertebrate collections from Wisconsin prairies have yielded large numbers of Apioninae. These collections and published literature demonstrate that certain members are important components of the prairie biotic community. This paper examines the collections, associated food plants, and prevalence of prairie Apioninae in Wisconsin.

Introduction

The Prairie Invertebrate Biodiversity Inventory (the Inventory) is a multi-state, multi-partner project conducted from 1994 to 2000 under the leadership of the Wisconsin Department of Natural Resources (WDNR) with primary funding provided by the USFWS Partnerships for Wildlife Program. Research focused on identifying the invertebrate fauna utilizing native grasslands, especially those dependent on prairie remnants and landscapes. Some Inventory participants focused on particular taxa, while other inventory efforts were more generalized.

The Inventory was born out of an interest in the status and distribution of prairie remnant-dependent invertebrates, and concerns regarding the effects of fire management upon them. As a first step in developing the Inventory, specimens from a previous prairie invertebrate survey conducted by Antje Liskén, a graduate student at the University of Wisconsin-Madison, were processed and entered into a SAS database. Liskén conducted her research on eight prairie sites in southern Wisconsin in 1986 and 1987. Her study focus was on Araneae, but she kept all other invertebrate specimens collected during the course of her study.

Methods

Liskén used three quantitative sampling methods: sweeping, pit fall traps, and vacuuming. Each collection method was replicated at each site for a total of 526 samples. Liskén did not target particular plant species for collection. All her non-spider specimens were stored along with the collection

labels in sealed vials of 70% ethyl alcohol. Most Apioninae were processed to point mounts by the author in 2000. Seven of the eight Liskén study sites were re-visited as part of the Inventory.

Over a six-year period, WDNR staff employed a wide variety of methods on more than 180 prairie sites in Wisconsin. These included sweeping, water pan traps, and hand collection. Some sampling focused on specific plants; but much of the collecting was generalized. Specimens of Apioninae were, for the most part, taken incidentally while collecting other specimens. In some instances, however, Apioninae were the focus of collection, or came from collections on targeted plant species.

Sites were both private and public and varied in management histories. Habitats included dry bluff prairies on limestone substrates, sand prairies, wet prairies, and fens. Sites were selected for sampling as representatives of native grasslands. As a general rule, collections were segregated into individual events - i.e., each site, subsite (either a management unit or distinct area), collection date, collection method, and targeted plant species (if any) were separated from other collections into a distinct sample, or "collection event." This methodology can result in several different events being recorded for the same site visit. Collection events received field labels with pertinent information at the time of collection and were subsequently mounted and labeled by series. It is difficult to quantify the exact number of discrete collections, but it is at least several hundred.

All specimens were pinned and labeled according to the field label, then sorted to taxa. Steven Krauth, University of Wisconsin-Madison Insect Research Collection (UW-IRC) performed prelimi-

nary separation, with final identification provided by David G. Kissinger of Loma Linda, California. After identification, each specimen was given a unique ordinal number and entered into a SAS database.

Additional specimens in this report came from the personal collection of R. A. Henderson, project coordinator for the Inventory. Many of these specimens came from seed collection, and provide excellent species/plant information. The author also examined Apioninae from the UW-IRC. This latter group contains relatively few specimens and species, and for the most part did not represent collections with habitat information. While this last group was tabulated, its numbers are treated apart from those pertaining to Liskén, Henderson, and WDNR collections and are tabulated separately in Table 1.

Results

The combined collections yielded a total of 690 Apioninae representing eight genera and 18 species. These specimens were collected from 97 discrete sites. The number of specimens for each species, the number of sites from which it was collected, the site type, counties of occurrence, and recorded plant associates are summarized in Table 2. Site type is based on Curtis (1959), and plant names follow Gleason and Cronquist (1991).

WDNR collections account for 66% of total specimens, Liskén 21%, and 9% are from Henderson. The remaining 4% are from miscellaneous collections associated with the WDNR.

Sixty-four percent of the records, 446 specimens, had no plant association. This includes all of the Liskén specimens. Thirty-two percent, 136 specimens, reflect direct plant associations. All but 17 of these specimens were from legumes. The remaining records reflect collections in grasses targeted for other insect species, and may be only incidental collections.

Sweep netting accounted for 516 (75%) specimens, either on a targeted plant or in a general site sweep. Hand collection or beating vegetation of a targeted plant species garnered 177 (17%) specimens. The remaining 8% were collected using miscellaneous other methods or no recorded method.

For Liskén's 526 samples, 211 came from sweeping, 60 from vacuum samples, and 255 from pitfall traps. Only the sweep net samples yielded Apioninae.

Geographic distributions of species are detailed in the Table 2.

Liskén Study

As a blind, quantitative survey, the Liskén Study data provide a snapshot of the Apioninae as a part of the prairie invertebrate community.

Liskén's collections included Apioninae in 28 of the 526 total samples. These collections represent 146 specimens from only four species. *Trichapion modicum* (Kissinger) was the most commonly collected species, representing 49% of total specimens, and was present in 18 samples (64% of those containing Apioninae). *Trichapion minor* (Smith) was the second most commonly collected species, with 42% of the total specimens in 12 samples (43% of those containing Apioninae). *Kissingeria amarum* (Kissinger) was found in six samples (16%), and yielded 11 specimens (7.5% of total). A single specimen of *Kissingeria capitone* (Kissinger) was collected.

All Liskén sites yielded species of the subfamily. However, 113 of the 146 specimens came from a single site. Forty-two of these 113 were from a single sample, with an additional 29 from another. In seven of nine samples from this particular site, *T. modicum* and *T. minor* co-occurred. For the remainder of samples containing Apioninae, species occurrences were, for the most part, solitary.

Discussion

Apioninae are commonly associated with legumes in prairie habitat. Kissinger (1968) and Downie and Arnett (1996) list a number of legumes commonly found in remnant prairie as associates for the species collected in this study. Unless otherwise noted, the host plant citations that follow refer to these two texts, and specimens come from WDNR collection material. Associates and habitat are best discussed on a species-by-species basis where data are available.

***Coelocephalapion decoloratum* (Smith).** Collected from only one roadside savanna site in Dane County by Henderson from the seed heads of *Desmodium canadense* (L.). Listed as a *Lespedeza* and *Desmodium* feeder.

***Fallapion bischoffi* (Fall).** Five specimens collected from three wet-mesic prairies.

***Fallapion impeditum* (Fall).** A single specimen from a sandy inland site. There is no associate information.

Table 1. Wisconsin Apioninae in University of Wisconsin-Madison Insect Research Collection

Genus	County	notes
<i>Coelocephalopion decoloratum</i> (Smith)	Dane, 1898	
<i>Coelocephalopion emaciipes</i> (Fall)	Dane (Stewart Park, Mt. Horeb 1983; Madison)	
<i>Fallapion bischoffi</i> (Fall)	Juneau (Necedah, 1978), Kenosha (Carol Beach, 1981)	
<i>Fallapion impunctistriatum</i> (Smith)	Dane (Picnic Point, 1994)	
<i>Fallapion melanarum</i> (Gerstaecker)	Jackson (Black River Falls, 1930), Dane (Nevin Marsh, 1974; Madison), Langlade (Antigo, 1910)	
<i>Fallapion pennsylvanica</i> (Boheman)	Dane (Stewart Park, Mt. Horeb, 1983), Oconto (1995), Dane (Madison, 1919; Dunn's Marsh, 1977)	
<i>Kissingeria capitone</i> (Kissinger)	Dane (Arboretum Grady Tract, 1999), Barron (1957), Monroe (Ft. McCoy, 1997), Kenosha (Carol Beach, 1981)	Reared from <i>Dalea purpurea</i>
<i>Leconteapion huron</i> (Fall)	Oconto (1995)	"tallgrass"
<i>Neapion idiaestes</i> (Kissinger)	Fond du Lac (1975, 1977)	Gypsy Moth Malaise Trap
<i>Nearctalox attenuatum</i> (Smith)	Wood (Babcock, 1977)	
<i>Nearctalox fulvotibiabe</i> (Wagner)	Wood (Babcock, 1977)	
<i>Perapion punctinatum</i> (Smith)	Dane (1900, 1975)	
<i>Podapion gallicola</i> Riley	Vilas (1961)	<i>Pinus banksiana</i>
<i>Rhopalopion longirostre</i> (Olivier)	Dane (numerous dates)	numerous collections, many in hollyhocks
<i>Sayapion segnipes</i> (Say)	Dane (1983), Iowa (Blue River, 1977)	<i>Tephrosia virginia</i>
<i>Trichapion centrale</i> (Fall)	Jackson (1976), Winnebago (Oshkosh, 1917)	Gypsy Moth Malaise Trap
<i>Trichapion minor</i> (Smith)	Dane (1899), Adams (1949)	
<i>Trichapion modicum</i> (Kissinger)	Grant (Eagle Valley, 2001), Jackson (1997)	from moth rearing material from Leadplant, Bog birch sweep
<i>Trichapion nigrum</i> (Herbst)	Richland (Buena Vista, 1983), Rock (1976), Waupaca (1920), Barron (1957)	
<i>Trichapion perforicollae</i> (Fall)	Grant (Blue River, 1977), Adams (1949), Sawyer (1982)	grass sweep, "prairie species in oak opening"
<i>Trichapion reconditum</i> (Gyllenhal)	Sawyer (Stone Lake, 1982), Kenosha (Benedict Prairie, 1998), Waukesha (Eagle), Grant (Wyalusing, 1975), Dane, Milwaukee	
<i>Trichapion rostrum</i> (Say)	Grant (1994), Dane (Arboretum Grady Tract, 1977; 1955), Columbia (1977), Monroe (Two sites at Ft. McCoy, 1997), Richland (Lone Rock, 1978), Waupaca (1920)	Commonly collected, mostly on <i>Baptisia</i> spp.
<i>Trichapion tenuirostrum</i> (Smith)	Kenosha (Carol Beach, 1999)	

***Kissingeria amaurum* (Kissinger).** All specimens were taken from dry/dry-mesic Prairies. Henderson collected nine specimens from the collected seed of *Dalea* (*Petalostemum*) *candida* Michx. ex Willd. Additional associates include *Amorpha canescens* Pursch and *Desmodium* sp.

***Kissingeria capitone* (Kissinger).** Collected from the full breadth of prairie habitat types, from dry to wet-mesic. Most collections occurred on drier sites. Listed as a *Dalea* (*Petalostemum*) *purpurea* Vent. feeder, from which four specimens were collected. The UW-IRC contains a 1955 series of 12 specimens reared from *D. purpurea* by G.E. Haas.

Data are very limited, but the collection of *K. amaurum* and *K. capitone* from different species of *Dalea* may reflect a species-specific plant association, although Bright (1993) indicates that *Dalea candida* is also a host of *K. capitone*.

***Leconteapion huron* (Fall).** Only four specimens of this species were collected, two each from two wet prairie/sedge meadow environments.

***Sayapion segnipes* (Say).** Collected from four sandy sites, all specifically from *Tephrosia virginiana* (L.) Pers. (goats rue), it's listed host. The UW-IRC contains a 1983 series collected from *Tephrosia* by E.E. Woehler. The author also collected a series from the retired Savanna Army Depot in Jo Davies County, Illinois, also from *Tephrosia*.

***Trichapion minor* (Smith).** Collected largely from dry/dry-mesic sites in association with *A. canescens*, it occurs at the most sites (34) for any species collected in the subfamily. One specimen was collected in May from *Lupinus perennis* L. (wild lupine) growing in association with *Amorpha*. The one collection from a wet-mesic site is a restoration in the University of Wisconsin-Madison Arboretum.

***Trichapion modicum* (Kissinger).** Same habitat and plant associations as *T. minor*. Rearing moths from over-wintered *A. canescens* material, Andrew Williams reared out eight specimens of *T. minor*, and these are deposited in the UW-IRC.

T. modicum and *T. minor* are often collected sympatrically. *Trichapion minor* appears more widespread throughout Wisconsin, while *T. modicum* appears to be more abundant locally. The number of Inventory specimens is approximately equal for the two species, but *T. minor* occurred at

roughly 50% more sites than *T. modicum*. The two species were sympatric at 16 sites, over two-thirds the number of recorded sites for *T. modicum*. Conversely, sympatric sites represent less than half the sites recorded for *T. minor*.

Lisken's specimens of *T. modicum* and *T. minor* were strongly sympatric and largely from just one site, Arlington Farm Prairie. One can infer that *A. canescens* was in the sweep area for these samples. Compared to the other Lisken sites, the absolute cover of *A. canescens* at Arlington Farm Prairie was six times greater than the average for the other sites where it was recorded (Lisken, 1988). However, as previously noted, the two *Trichapion* species were disproportionately concentrated in just two samples. In this case, it is apparent that collection of the two species is a simple matter of having the host plant in the sample. The absence of these species from other Lisken collections, or their low numbers when present, obliquely demonstrates their fidelity to their host and their general pattern of sympatry.

***Trichapion perforicolle* (Fall).** Collected mostly from very sandy sites, with one specimen associated with *T. virginiana*. Listed as associated with *Tephrosia spicata* (Walter) T. & G. and *A. canescens*.

***Trichapion porcatum* (Boheman).** Listed as being found on *Robinia pseudoacacia* L. (black locust). The one specimen collected for this study was taken from *Sporobolus heterolepis* (A. Gray) (prairie dropseed) on a very small prairie remnant heavily encroached upon by black locust. This species is best viewed as a non-prairie associate.

***Trichapion reconditum* (Gyllenhal).** Collected largely from mesic sites and in clear association with a number of different plants. Although most associated plant species were legumes, *T. reconditum* was collected from sweep samples in cordgrass (*Spartina pectinata* Link) at five different sites. A large series was also collected from the leaves of prairie dock (*Silphium terebinthinaceum* Jacq.). This particular association was very clear, as no other plants were targeted.

***Trichapion rostrum* (Say).** Large (3.0-3.6 mm) for the subfamily, this species is familiar to prairie seed collectors, who commonly find it in the seed-pods of *Baptisia* spp. So specific is this animal to *Baptisia* that it was seldom collected during the

Table 2. Summary of Apioninae in the Wisconsin DNR collection, including Liskien, Henderson, and miscellaneous collections.

Species Name	Number of Specimens	Number of Sites	Site Type	Plant Associates from Collection Data	Counties of Occurrence (no. of sites)
" <i>Apion</i> " <i>contusum</i> (Smith)	4	4	DDM	<i>Sporobolus heterolepis</i>	Dane (3), Grant
" <i>Apion</i> " sp. nr. <i>parallelum</i>	1	1			Dane
<i>Apion</i> spp.	3	3			Dane, Green, Kenosha
<i>Coeloccephalopion decoloratum</i> (Smith)	16	1	M	<i>Desmodium canadense</i> (s)	Dane
<i>Fallapion bischoffi</i> (Fall)	5	3	WM, W		Green Lake, Iowa, Kenosha
<i>Fallapion impeditum</i> (Fall)	1	1	DDM		Sauk
<i>Fallapion</i> spp.	2	2		Grasses	Grant, Winnebago
<i>Kissingeria amaurum</i> (Kissinger)	50	13	DDM, M	<i>Sporobolus heterolepis</i> , <i>Dalea candida</i> (s), <i>Desmodium</i> sp (s), <i>Amorpha canescens</i>	Columbia (3), Crawford, Dane (5), Green, Iowa, Jefferson, Kenosha, Pierce
<i>Kissingeria capitone</i> (Kissinger)	96	22	DDM, M, WM, W	<i>Sporobolus heterolepis</i> , <i>Dalea purpurea</i>	Buffalo, Columbia, Dane (3), Grant, Green (2), Iowa (3), Jefferson, Kenosha, Pierce, Sauk, Trempealeau, Walworth (3), Waukesha (2), Winnebago
<i>Kissingeria</i> sp.	1	1			Walworth
<i>Leconteapion huron</i> (Fall)	4	2	W		Marquette (2)
<i>Neartadox</i> att nr. <i>parallelum</i> **	2	1	W	Willow twigs & galls	Grant
<i>Savapion seguiques</i> (Say)	15	4	DDM	<i>Tephrosia virginiana</i> (s)	Dane (3), Sauk
<i>Trichapion minor</i> (Smith)	150	34	DDM, M, WM	Grasses, <i>Amorpha canescens</i> , <i>Lupinus perennis</i>	Columbia (3), Crawford (3), Dane (12), Grant (7), Green (3), Iowa (3), La Crosse, Marquette (2), Walworth
<i>Trichapion modicum</i> (Kissinger)	144	23	DDM, M, WM	<i>Sporobolus heterolepis</i> , <i>Amorpha canescens</i>	Columbia (2), Crawford, Dane (15), Grant, Green (2), Iowa, Jefferson, Marquette
<i>Trichapion perforicalle</i> (Fall)	11	5	DDM, M	<i>Koeleria cristata</i> , <i>Tephrosia virginiana</i>	Dunn, Grant, LaCrosse, Marquette, Sauk
<i>Trichapion porcatum</i> (Boheman)	1	1	DDM	<i>Sporobolus heterolepis</i> *	Fond du Lac
<i>Trichapion reconditum</i> (Gyllenhal)	86	18	M, WM	<i>Andropogon gerardii</i> , <i>Spartina pectinata</i> , <i>Desmodium canadense</i> , <i>D. illinoense</i> (s), <i>Dalea purpurea</i> , <i>Silphium terebinthinaceum</i> , <i>Apocynum</i> sp., <i>Prunus</i> sp., <i>Zizia aurea</i> , <i>Rosa</i> sp.	Columbia, Dane (6), Grant, Green, Jefferson, Kenosha (2), Rock, Walworth (2), Winnebago (3)
<i>Trichapion rostrum</i> (Say)	62	9	DDM	<i>Baptisia bracteata</i> (s), <i>B. lactea</i> (s), <i>Sporobolus heterolepis</i>	Crawford, Dane (2), Dunn, Grant, Iowa, Rock (2), Sauk
<i>Trichapion</i> sp. prob <i>leporinum</i>	1	1			Kenosha
<i>Trichapion tenuirostrum</i> (Smith)	36	16	DDM, M, WM	Grasses	Buffalo, Columbia, Dane (4), Grant, Kenosha, LaCrosse (2), Lafayette, Rock, Sauk, Walworth, Waukesha, Winnebago

Prairie Types: DDM=Dry-Dry-Mesic, M=Mesic, WM=Wet-Mesic, W=Wet, (s)=taken from seed

* see text

** A. H. Williams collection

Inventory, as *Baptisia* pods often ripened past the period of heaviest sampling. Collected from four sites, the species was always associated with either *Baptisia lactea* (Raf.) (white indigo) or *B. bracteata* Muhl. ex Elliot (cream indigo). UW-IRC specimens are mostly associated with *Baptisia*.

Trichapion tenuirostrum (Smith). Not collected in association with any specific plant, and available plant associations are with native grasses that are likely not hosts. Kissinger (1968) refers to *Dalea* spp. as hosts.

Conclusions

The Inventory and related collections yielded large number of Apioninae in remnant prairies, and greatly increased the number of specimens recorded for Wisconsin. The majority of these specimens had no recorded plant associations, and were not the result of a specific effort to collect this taxon. This group can be considered pervasive in the prairie biome.

Where plant associations were recorded, they support the literature concerning hosts, and offer the possibility of species specificity for *K. capitone* and *K. amarum*. No other study has shown either the sympatry of *T. minor* and *T. modicum* on *Amorpha canescens*, nor reported the relative abundances of the two species. These data show the value of gathering detailed ecological information when collecting invertebrates. Future sampling of prairie invertebrates should make an effort to target known hosts of Apioninae in order to further refine host associations and enlarge distributions.

Acknowledgments

The author would like to acknowledge Inventory Coordinator Rich Henderson and fellow workers

Eric Maurer, Richard Bautz, Becky Brown, Kate LeMieux, and Jon Simonson. Additional thanks to Steve Krauth and Dan Young with the UW-IRC and David Kissinger. Final thanks go to the many property owners who allowed access to their properties, and therefore the wealth of data collected during the life of the Inventory. Funding for the Prairie Invertebrate Inventory Project was provided in part by a United States Fish and Wildlife Service Partnerships for Wildlife match grant to the WDNR.

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