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ARANEAE AND OPILIONES FROM *TYPHA* SPP. AND *PHRAGMITES AUSTRALIS* STANDS OF GREEN BAY, LAKE MICHIGAN, AND AN EXOTIC SPIDER SPECIES NEWLY REPORTED FROM THE U.S. GREAT LAKES REGIONMichael L. Draney¹ and Jeanette M. Jaskula^{1,2}**ABSTRACT**

Invertebrates were sampled using pan traps in three paired sets of *Typha* spp. (cattail) and *Phragmites australis* (giant reed grass) habitats in Lake Michigan's Green Bay in June and September 2002. The collection included 34 harvestmen belonging to one species (found at all three sites), and 180 spiders belonging to 25 species in eight families. The two habitats yielded similar numbers of spider taxa, and 16 species were restricted to one of the two habitats. Between 10 and 15 species were found at each site, and only five spider species were collected at all three sites.

Four species appear to be new records for the state of Wisconsin, including the linyphiid spiders *Hypomma marxii* (Keyserling) and *Sitalcus ruralis* Bishop & Crosby, and the salticid *Synageles noxiosus* (Hentz). Of particular interest is the first report from the U.S. Great Lakes region of the clubionid spider *Clubiona pallidula* (Clerck), a species introduced from Eurasia.

Giant reed grass, *Phragmites australis* (Poaceae), is native to North America, but an introduced Eurasian genotype has been rapidly and aggressively expanding, in many cases by displacing other native wetland vegetation types (Saltonstall 2002). Little is known about the effects of Eurasian *P. australis* in the Great Lakes Region, where it is now rapidly displacing *Typha* (cattail) habitat. We collected invertebrates using pan, or water traps as part of a study to compare invertebrate biodiversity between stands of cattail (*Typha* spp.) and giant reed grass (*P. australis*) in the Great Lakes region (Jaskula 2003). The purpose of the present paper is to report on the species of spiders collected during this research. Most importantly, we report here several species new to Wisconsin, including an exotic species that has not yet been reported from the Great Lakes region of the United States. Although this collection does not represent the complete spider fauna of these habitats (more intensive sampling and addition of ground-level sampling would undoubtedly reveal many more species), it represents the first reports of spiders from these habitats in the western Great Lakes region, and includes species that are abundant and conspicuous on vegetation in these habitats. Because the study was not designed to sample the spider community, we make no quantitative attempt to compare the spider assemblages from these two habitats, although the results do suggest some differences between the assemblages.

MATERIALS AND METHODS

Three wetlands each with paired monotypic stands of *P. australis* and *Typha latifolia* were located in Brown County, Wisconsin along the southwestern shore of Green Bay, Lake Michigan using criteria discussed in Jaskula

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(2003). These sites were Ken Euers Nature Area (N44.56011°, W88.03703°), Duck Creek (N44.56541°, W88.04524°), and Peter's Marsh (N44.58851°, W88.01626°). The *P. australis* at each site was determined morphologically and by recent growth history to be of the non-native, aggressively invasive haplotype (Blossey 2003; G. Fewless, UW-Green Bay Herbarium Curator, pers. comm.). At each stand, all plants from ten 0.5 × 0.5 m quadrats in June and from ten 0.25 × 0.25 m quadrats in September were harvested, counted, and weighed (unpublished data). All samples contained at least 90% (by stem count) of either *P. australis* or *T. latifolia*. Secondary plant species included *Impatiens capensis* (Balsaminaceae), *Urtica dioica* (Urticaceae), *Lythrum salicaria* (Lythraceae), *Calystegia sepium* (Convolvulaceae), and *Cirsium* sp. (Asteraceae). Each species was found in all stands, except for *Cirsium* sp., which was only found in *T. latifolia* stands.

Terrestrial invertebrates were obtained from pan traps, yellow bowls 20 cm in diameter and 8 cm deep, positioned 1 m above the marsh surface with wire tomato stands (Fig. 1; see also Dithlago et al. 1992). The traps were filled with water and a few drops of detergent (to facilitate invertebrate capture) and deployed for two 5-day periods (17-22 June and 9-14 September 2002). Pan traps were inspected on the second day of deployment, emptied of all invertebrates, refilled with water then inspected and emptied again on day 5. The collected invertebrates were retained by pouring through a sieve and stored in 70% ethanol before identification and counting.



Figure 1. Yellow plastic pan trap suspended on wire tomato stand, within a *Phragmites australis* plot. The plastic bowl or pan is 20 cm diameter.

Ten pan traps were deployed in stands of each plant species for a total of 120 samples (10 replicates \times 2 plant community plots \times 3 sites \times 2 seasons). Pan traps were randomly located in a 50 m \times 50 m plot in *Typha* spp. stands using a numbered grid. As *P. australis* grows in long, fence-like rows greater than 50 m long and less than 20 m wide, pan traps were positioned along a transect that ran through the middle of each stand. Each trap was positioned no closer than 5 m from each other or the edge of the stand.

In addition to pan traps, arthropods were collected from the quadrat-based plant samples detailed above. These yielded few arachnid specimens, so data from this method (detailed in Jaskula 2003) is not here presented. However, one species, *Haplodrassus hiemalis* (Gnaphosidae) was collected exclusively by this method: A single female specimen was captured wandering on the sorting table so it cannot be determined which habitat it came from.

All animals were identified to species level by the senior author or workers listed in the acknowledgements, and vouchers are deposited in the Field Museum of Natural History, Chicago. Further information on methods and sites can be found in Jaskula (2003).

RESULTS AND DISCUSSION

A total of 180 adult and immature spider specimens (Order Araneae) were collected, comprising 1.5% of the 12,049 invertebrate specimens in the entire data set of Jaskula (2003). Eighty-eight specimens (49% of collected spiders) were adults. Spiders (Order Araneae) were the 6th most abundant order in the assemblage, after Diptera, Hymenoptera, Coleoptera, Collembola, and Acari.

The 88 adult spiders (and all immature specimens, when possible) were identified to species, and represent 8 families and 25 species (Table 1). The *Typha* spp. samples yielded more of the adult specimens (50, or 57%) than the *P. australis* samples (38, or 43%), and 64% of the specimens were collected in June. The *Typha* spp. samples yielded slightly more families and species (19 species in 7 families) than *P. australis* samples (15 species in 6 families), a difference of doubtful significance. Ten species were restricted to *Typha* spp. habitats and six species were restricted to *P. australis* habitats (Table 1). Interestingly, all six species of Salticidae (jumping spiders) were restricted to *Typha* spp. habitats, although all are elsewhere known from other habitat types.

The three sites (Ken Euers Nature Area, Duck Creek, and Peter's Marsh) each yielded 10 to 15 species (Table 1). Only five spider species were collected at all three sites: *Clubiona maritima* L. Koch, *Clubiona pallidula* (Clerck), *Larinioides cornutus* (Clerck), *Pachygnatha dorothea* McCook, and *Tmeticus ornatus* (Emerton). More extensive sampling will probably reveal that many of the collected species are present in most coastal wetlands of Green Bay.

A total of 34 individual harvestmen (Arachnida: Opiliones) were also collected and the adults were identified to species. All individuals were *Leiobunum* sp., and all identifiable individuals (adults) belonged to one species, *Leiobunum flavum* Banks (family Gagrellidae). This species appears to be common in both habitats, with 15 adults collected in *Typha* spp. habitats and 4 in *P. australis* habitats, and was found at all three sites (Table 1).

Four spider species appear to be new Wisconsin state records. First, the linyphiid *Hypomma marxii* (Keyserling) is only known from Massachusetts, Michigan, New York, North Dakota, Washington, British Columbia, Saskatchewan, Manitoba, Ontario, Quebec, and Newfoundland. The current record is among the southernmost known (Buckle et al. 2001). Two specimens of *H. marxii* were trapped in *Typha* spp. habitats and one in *P. australis* habitat. Second, a single female linyphiid believed to be *Sitalcus ruralis* Bishop & Crosby

Table 1. Macroarachnids (Opiliones and Araneae) collected in *Typha* and *Phragmites* stands in Brown County, Wisconsin. This list includes only specimens that could be identified to species or assigned a definite morphospecies. Immatures are included only when an adult is not present at a stand/sampling period (simply to indicate possible presence, marked as *). "Sites" column lists presence at each of the three locations; locations are pooled for stand and month figures. Site abbreviations: DC = Duck Creek; KE = Ken Euers Nature Area; PM = Peter's Marsh.

Taxon	<i>Typha</i>		<i>Phragmites</i>		Sites		
	June	Sept	June	Sept	KE	DC	PM
Order Opiliones (Harvestmen)							
Gagrellidae							
<i>Leiobunum flavum</i> Banks	9	1	5	0	6	3	6
Order Araneae (Spiders)							
Araneidae							
<i>Larinia borealis</i> Banks	0	*	1	0	0	0	1
<i>Larinioides cornutus</i> (Clerck)	5	0	2	0	1	1	4
<i>Neoscona arabesca</i> (Walckenaer)	*	1	0	0	1	0	0
Clubionidae							
<i>Clubiona maritima</i> L. Koch	4	6	4	7	7	12	2
<i>Clubiona pallidula</i> (Clerck)	0	0	10	1	1	3	7
Gnaphosidae							
<i>Haplodrassus hiemalis</i> (Emerton) †	0	0	0	0	?	?	?
Linyphiidae							
<i>Ceraticelus limnologicus</i> Crosby & Bishop	0	0	0	1	1	0	0
<i>Erigone autumnalis</i> Emerton	0	0	0	1	0	1	0
<i>Hypomma marxii</i> (Keyerling)	2	0	1	0	1	2	0
<i>Hypselistes florens</i> (O. P.-Cambridge)	6	*	0	*	6	0	0
<i>Islandiana flaveola</i> (Banks)	1	0	0	0	1	0	0
<i>Sitalcus ruralis</i> Bishop & Crosby	1	0	0	0	1	0	0
<i>Tmeticus ornatus</i> (Emerton)	0	5	0	1	2	3	1
unknown sp. "C"	0	0	1	0	0	1	0
Philodromidae							
<i>Philodromus cespitum</i> (Walckenaer)	0	0	1	0	0	0	1
<i>Tibellus maritimus</i> (Menge)	4	0	1	0	2	2	0
Pisauridae							
<i>Pisaurina mira</i> (Walckenaer)	0	*	0	0	0	0	0
Salticidae							
<i>Eris militaris</i> (Hentz)	1	0	0	0	1	0	0
<i>Marpissa grata</i> (Gertsch)	1	0	0	0	0	1	0
<i>Synageles noxiosus</i> (Hentz)	0	1	0	0	0	1	0
<i>Pelegrina proterva</i> (Walckenaer)	1	0	0	0	1	0	0
<i>Sitticus floricola palustris</i> (G & E Peckham)	0	2	0	0	0	2	0
<i>Zygoballus nervosus</i> (G & E Peckham)	0	2	0	0	2	0	0
Tetragnathidae							
<i>Pachygnatha dorothea</i> McCook	1	2	3	2	2	2	4
<i>Tetragnatha caudata</i> Emerton	4	0	*	0	0	2	1
<i>Tetragnatha elongata</i> Walckenaer	1	0	0	0	0	0	1
Theridiidae							
<i>Thymoites unimaculatus</i> (Emerton)	0	0	1	0	0	0	1

† *H. hiemalis* habitat presence not certain, see text.

was trapped in *Typha* spp. habitat in June. This determination is not a certainty, as the species is not well known, females are difficult to identify, and no specimens of *S. ruralis* were available to us for comparison, but this would be a new Wisconsin state record and a western range extension, as it is known only from New York (Buckle et al. 2001). Third, our record confirms the presence in Wisconsin of *Synageles noxiosus* (Hentz), a small jumping spider that ranges from northern California to the lower peninsula of Michigan and southern Ontario and south to southern Mexico. The species has been reported from Wisconsin previously (Levi & Field 1954), but confusion between this and other *Synageles* species makes records pre-dating Cutler's (1987) revision questionable without re-examination.

Of particular interest is our collection of 12 specimens of the sac spider *C. pallidula* in *P. australis* at all three sites. An exotic species from Eurasia, it is believed to be a recent arrival in North America with the earliest record from 1949 (Roddy 1966; Dondale and Redner 1982). *C. pallidula* has been previously reported from coastal British Columbia and Washington as well as southern Ontario (Dondale and Redner 1982). This represents the first United States record for the Great Lakes region. Interestingly, *C. pallidula* were the most abundantly collected adult spiders in our samples (Table 1). Additional directed searches in *P. australis* and *Typha* spp. habitats, as well as other wetland communities, will help to further clarify the distribution and abundance of this relatively new species in North America as well as determine its effects on the marsh ecosystems it has invaded.

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