

FIELD  
STATIONS  
BULLETIN



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Vol. 12, No. 2

Milwaukee, Wisconsin

Fall, 1979

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## DRAGONFLIES AT THE UWM CEDAR-SAUK FIELD STATION

When visitors and classes utilize the Field Station facilities during the summer months, they seldom fail to notice dragonflies coursing the old fields or hawking mosquitoes over the little ponds. Their beauty and strong powers of flight have long fascinated observers, but few casual on-lookers are aware of the number of species present at the Field Station and the complexity of their behavior and annual cycles. This report will attempt to familiarize the reader with some aspects of the biology of dragonflies, the species of dragonflies present at the UWM Field Station and the times of the year when each species can be found.

Dragonflies are considered rather primitive insects by entomologists. They appeared very early in geological history and their complex wing venation is also considered a primitive characteristic. Both the aquatic larval form and the winged adult are predacious and are considered beneficial, consuming many mosquitoes and providing food for fish. They are completely harmless to people and don't sting, bite or sew lips shut.

### DRAGONFLY BIOLOGY

Dragonflies hatch from an egg into an immature form called a nymph that lives an aquatic life style. The time spent as a nymph can vary from a few weeks in some species (*Anax*) to as much as four years for other species (*Hagenius*) in Wisconsin (Hilsenhoff, 1975). The feeding apparatus of the nymph is unique among insects. On the under side of the head is an extensible, modified labium armed with hooks, teeth and pincers which is "shot out" to capture their prey (see Needham and Westfall, 1954 p. 28). These armaments on the labium are

Table 1. Dragonflies at the UWM Cedar-Sauk Field Station

<i>Species</i>	MAY	JUN	JUL	AUG	SEP	<i>Status</i>	
<i>Leucorrhinia intacta</i>	■	■	■ +	++		A	
<i>Libellula quadrimaculata</i>	+++	■	+++			C	
<i>Ladonna julia</i>		■	++			A	
<i>Epitheca spinigera</i>		■	+++			C	
<i>Cordulia shurtleffi</i>		■	++			C	
<i>Anax junius</i>		+ +	+	+++	■	A	
<i>Libellula pulchella</i>		■	■	+ +		C	
<i>Dorocordulia libera</i>		■	++ +	+		U	
<i>Libellula vibrans?</i>		+				?	
<i>Libellula luctuosa</i>		+	+	+ +	+	U	
<i>Plathemis lydia</i>			++ + +			U	
<i>Pantala hymenea</i>		+	■			C	
<i>Pantala flavescens</i>		+	■			C	
<i>Sympetrum obtrusum</i>		++	■	■	■ +	A	
<i>Sympetrum internum</i>		+		■	+	U	
<i>Aeschna canadensis</i>		+	+	+		U	
<i>Libellula semifasciata?</i>			++			?	
<i>Sympetrum costiferum</i>			+	+	+	U	
<i>Sympetrum semicinctum</i>			++	■	+++	C	
<i>Sympetrum vicinum</i>				++	■	A	
<i>Sympetrum rubicundulum?</i>			+			U	
<i>Celithemis eponina</i>			+			U	
<i>Aeschna constricta</i>			+	+	■	+++	U
<i>Pachydiplax longipennis</i>				+		U	
<i>Somatochlora sp.</i>				+		U	
<i>Cordulegaster sp.?</i>					+	?	

KEY: A = Abundant C = Common U = Uncommon ? no specimen taken  
 ■ = time of most conspicuous presence + = isolated individuals

used to identify the various species in their immature stages. The nymphs of different species occupy different habitats and have different methods of prey capture. Some crawl over the bottom and stalk prey, others burrow, some climb in aquatic plants, some cling to rocks in rapids and some are capable of active swimming. After spending a certain amount of time (varying with species) as a larvae, they are ready to metamorphose into flying adults.

The nymphs metamorphose in the air by climbing up, out of the water, and shedding their old skins. The place of metamorphosis is also characteristic of each species, various species climbing different distances from the water and emerging on different materials such as rocks, trees, cattails, etc. Some species are highly attuned to emerging all at the same time (synchronous) while others emerge over a long period of time (asynchronous). Corbet (1962) noted that synchronous species are usually present as adults for a very short time and then die, while individuals of asynchronous species frequently live much longer. An example from Table 1 of a synchronous species is *Epithea spinigera*. *Leucorrhinia intacta* is a good example of an asynchronous one. In addition to coordination of emergence, some species have more than one generation per summer (*Anax junius*) while most are univoltine.

Upon emerging, the new adult is soft and rests near the cast-off skin, or exuvia, while the insect hardens. It can only fly weakly at this time, which is termed the teneral stage, and it is very vulnerable to predation and harsh weather. As it gradually hardens, its powers of flight are increased and the animals frequently disperse over the countryside. Some species form huge swarms at this time and are noticed by people who ordinarily ignore them (*Anax junius* swarms in Mequon, Wis. were reported in *The Milwaukee Journal*, Tuesday, August 9, 1977). The insects tend to avoid water at this stage and are generally found over land.

After dispersal, the dragonflies reach sexual maturity and return to aquatic habitats to breed. The dragonflies are an ethologist's delight as their stereotyped behaviors are fascinating to watch and provide another useful taxonomic tool. Many species have males that are territorial on breeding sites with ritualized agonistic behavior and courtship displays to females that rival avian courtship displays. The females tend to stay away from the water except to breed. When the female approaches, the males' aerial acrobatics and flashing colors are a memorable sight. Many behavior patterns of these species have been thoroughly studied, but many others are practically unknown.

The mating itself is unique. The male has a long abdomen of numerous segments. The last (10th) segment terminates in claspers (anal appendages) which grasp the female near the head. Then the rear of the male's abdomen is curled beneath him and a packet of sperm is placed in a special organ on the underside of the male's second abdominal segment. At this time, the female curls the end of her abdomen beneath the male and attaches to his second segment. This posture is called the "wheel position" (Corbet, 1962) and can be readily observed in the field. After copulation, the male frequently flies while still hanging on to the female. This is called the tandem position and is also frequently seen.

The female lays eggs after copulation. The eggs are laid singly, or in gelatinous strings; sometimes they are stabbed into soft mud or even into wood of sunken logs. Each species oviposits in a characteristic manner and frequently an examination of the females' ovipositor will provide clues to that species' preferred oviposition site. Species that merely scatter eggs usually have a poorly developed ovipositor while those that insert them into solid material usually have more complexity.

## SPECIES AT THE UWM CEDAR-SAUK FIELD STATION

The species in Table 1 are presented in the order of their emergence in spring. On the first warm days of late April and early May there are often a few dragonflies in the air. These are *Sympetrum corruptum*, which apparently overwinters as an adult (Walker and Corbet, 1975) and *Anax junius*, which migrates north from Illinois each spring and apparently does not overwinter in Wisconsin at all, either as an adult or as a larva (Walker, 1958).

In discussing some of the species at the Field Station, it will be necessary to use scientific names as most do not have common names. The use of scientific names actually simplifies things because they show relationships and related species are generally similar in appearance.

Libellulidae – a large family of dragonflies that inhabit still waters like lakes, ponds and marshes. These are the most abundant species at the Field Station and include some of the most noticeable species. The genus *Libellula* includes mostly large species with strikingly marked wings. *Ladonna* is the most abundant of the larger dragonflies and can be seen sunning on the bog boardwalk in late spring and early summer. *Leucorrhinia* is a small black dragonfly with a white face found on all the ponds in early spring through July. The two species of *Pantala* are renowned long distance flyers, and one, *Pantala flavescens* is found all over the world. In fall, the large genus *Sympetrum* makes its appearance. These are small red dragonflies and are quite common. One species, *S. semincinctum*, is listed as being rare to scarce (Walker and Corbet, 1975) but is rather common at the Field Station. *S. obtrusum*, with a white face and *S. vicinum*, with yellow legs and a reddish yellow face, are very abundant. One other species previously recorded in fall at the Field Station is *Tramea lacerata*, but it has not been recorded in the last two years.

Aeschnidae – these are very large dragonflies, primarily blue in color. They are difficult to capture because of their fast flight. *Anax junius* is of interest because it arrives from the south early in the spring and then two broods are raised each summer. The last brood lays eggs in fall, but the larvae do not stand up to the cold weather and each spring the species must start over. In spite of this, it is one of the most conspicuous species at the Station. Two species of *Aeschna* have been recorded and others will probably be found.

Corduliidae – four species have been recorded, *Cordulia shurtleffi*,

*Epitheca spinigera*, *Dorocordulia libera* and *Somatochlora* sp. This group is characteristic of northern bogs and one might have expected higher numbers of species and individuals. A comparative study suggested that Cedarburg Bog is populated by primarily "marsh" species of dragonflies.

Gomphidae – of particular interest because of its absence. This family is one of the largest in Wisconsin (about thirty species according to Hilsenhoff, 1975). They are very abundant in most of Wisconsin. The nymphs are bottom burrowers and perhaps pollution or siltation from urbanization and farming has created problems for them in this area.

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