The Great Lakes Entomologist

Volume 29
Number 1 - Spring 1996 *Number 1 - Spring 1996*

Article 1

April 1996

Occurrence of Libellulid Dragonflies (Odonata: Libellulidae) in Southeastern Michigan and Adjacent Essex County, Ontario

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OCCURRENCE OF LIBELLULID DRAGONFLIES (ODONATA: LIBELLULIDAE) IN SOUTHEASTERN MICHIGAN AND ADJACENT ESSEX COUNTY, ONTARIO

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ABSTRACT

During 1994–1995 extensive field work was conducted in southeastern Michigan in an attempt to assess the species population and composition of libellulid dragonflies. Additional field work was conducted on dragonflies from southwestern Ontario migrating into southeastern Michigan. Comparisons were made with the species listed for this area 37 years earlier in Kormondy (1958) anticipating changes due to wetland reductions and the effects of pesticides. With one exception, all species listed in Kormondy were observed. Additionally, one species, unknown from this area as of 1958, was encountered.

Most dragonfly study in Michigan and adjacent Ontario, Canada was conducted prior to the 1960s, with numerous references to Michigan and Essex County, Ontario in the classic Odonata texts (Needham and Westfall 1955, Walker 1958, Walker and Corbet 1975). These publications precede the vast wetland destruction and the deleterious effects of pesticides that have occurred since the 1950s. Historically, over 70% of southern Michigan's presettlement wetlands have vanished (MIRIS 1995, Comer [in prep]), although losses in Monroe County may approach 89% (P. J. Comer pers. comm.). If healthy, unpolluted wetlands are vital to a healthy Odonata population, I ask, how does the present species composition of libellulid dragonflies compare to that prior to the environmental degredation of the 1950s–1970s in southeastern Michigan? In addition, the fall population of Odonata in southeastern Michigan dramatically increases as migrants follow the state's Great Lakes shores southbound and as individuals cross the Detroit River into Michigan from southwestern Ontario. This study represents the current status of the family Libellulidae in southeastern Michigan and migration in southwestern Ontario as it pertains to species entering the study area in Michigan.

Twenty-five species of Libellulidae have been recorded from southeastern Michigan (Kormondy 1958) and southwestern Ontario (Walker 1958, Walker and Corbet 1975), with two additional species recorded only in Essex, Ontario (Walker and Corbet 1975). During the field seasons (May through October) of 1994 and 1995 twenty-four of the species listed for southeastern Michigan were recorded in Washtenaw, Jackson, Monroe, Wayne counties, Michigan, and Essex County, Ontario (Figure 1). Records include sightings, specimens collected, and specimens caught and released at numerous locations in the above-mentioned counties (Appendix 1).

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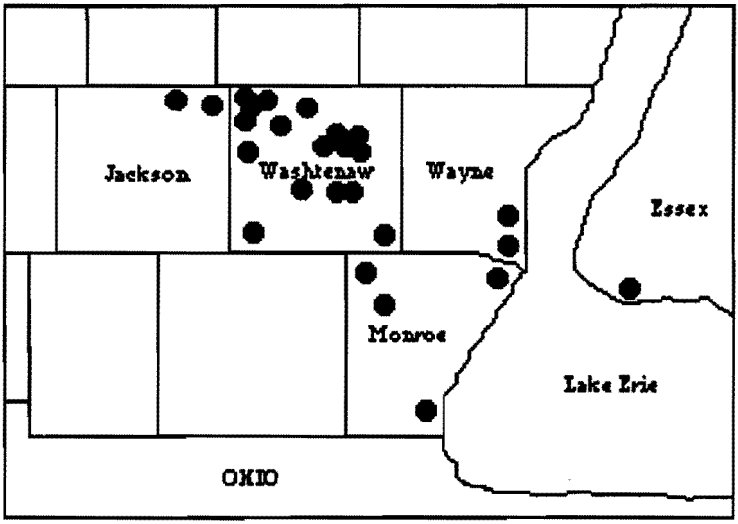

Figure 1. Distribution of sites within the study area

METHODS

Sites were selected in areas of known dragonfly occurrence (Figure 1), without effort to secure an equal number of sites in each county. For all sites a one-way, non-redundant route was followed and all dragonflies encountered were identified and tallied in an attempt to determine relative abundance. One exception was Holiday Beach Conservation Area, Essex, Ontario, where an initial route was covered, then migrants were tallied as they proceeded west in migration. Individuals were captured for identification when necessary and voucher specimens were collected at most sites.

The great difficulty in identifying many of the members of the genus *Sympetrum* necessitated catching and collecting numerous individuals. Several species are easily identified "on wing", while others are fairly easily identified "in hand" but others, possibly hybrids or atypical specimens, were virtually unidentifiable, resulting in 188 unidentified *Sympetrum spp.* (compared to 710 identified to species, leaving 21% unidentified). Brief visual identification criteria were developed in order to quickly determine if collecting was necessary (Appendix 2).

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DOI: 10.22543/0090-0222.1893

SPECIES ACCOUNTS

For each species there is a number in brackets following the name; this represents the total number of individuals recorded during the study. Specimens were secured for all species, except *Sympetrum corruptum* (Hagen) and *Tramea carolina* (Linn.).

***Celithemis elisa* (Hagen)** – [14] Common between 17 June and 2 Sept. in Washtenaw, Jackson, Monroe, Wayne, and Essex.

***Celithemis eponina* (Drury)** – [9] Uncommon 9 June to 13 Sept. in Washtenaw.

***Celithemis monomelaena* Williamson** [9] Uncommon 26 May to 30 July in Washtenaw.

***Erythemis simplicicollis* (Say)** – [141] Very common summer and early fall resident in all counties. Recorded in all counties 9 June to 18 Sept., with a maximum of 43 on 28 August at Holiday Beach Conservation Area (HBCA) where there is an apparent, and previously unrecorded, migration similar to that recorded in New York (Walter 1996).

***Leucorrhinia intacta* (Hagen)** – [9] Locally common 15 May - 17 June in Washtenaw.

***Libellula cyanea* Fabr.** – [3] Locally uncommon 8 - 24 June in Lyndon Twp, Washtenaw.

***Libellula incesta* Hagen** – [15] Generally uncommon, although locally common in Lyndon Twp., Washtenaw, 6 - 25 August, with one other record on 2 Sept. from Brown Park, Washtenaw.

***Libellula julia* (Uhler)** – [4] Uncommon 22 May - 13 August in Washtenaw.

***Libellula luctuosa* Burmeister** – [13] Common in Washtenaw, Wayne, and Monroe 9 June - 25 August.

***Libellula pulchella* Drury** – [58] This large, common, easily identified dragonfly was recorded in all counties 9 June - 18 September.

***Libellula quadrimaculata* Linn.** – [5] Uncommon 21-25 May in northwestern Washtenaw.

***Libellula semifasciata* Burmeister** – [5] Uncommon 13-20 August in Washtenaw, Monroe, and Wayne.

***Nannothemis bella* (Uhler)** [0] Listed in Kormondy, but not recorded during this study, although habitat exists in western Washtenaw and eastern Jackson counties.

***Pachydiplax longipennis* (Burmeister)** – [48] Common in all counties 17 June - 30 September.

***Pantala flavescens* (Fabr.)** – [40] Common in Washtenaw and Monroe 13 August - 18 September, with a maximum of 18 on 31 August at Furstenburg Park, Washtenaw.

***Pantala hymenaea* (Say)** – [1] Although it is not listed in Kormondy, a specimen from southeastern Michigan (11 August 1968 Ann Arbor, Washtenaw) was examined at the University of Michigan Museum of Zoology (UMMZ). This species commonly occurs in Essex (Walker and Corbet 1975, Corbet and Eda 1969). One was recorded at Campau Rd., Pt. Mouillee State Game Area (SGA), Wayne, on 18 September 1995, and a specimen was examined that was taken within the study area (Monroe) by Tom Heatly on 30 July 1995.

***Perithemis tenera* (Say)** – [14] Generally uncommon, although locally common, in Washtenaw 19 July - 11 August.

***Plathemis lydia* (Drury)** – [75] Another common, large, and easily-identified species found in all counties 20 May - 4 September.

***Sympetrum ambiguum* (Rambur)** – [3] Uncommon in this area with

records on 25 August in Jackson, and 11 and 17 September at Four Mile Lake, Washtenaw.

***Sympetrum corruptum* (Hagen)** – [1] One observed at Erie Gun Club, Monroe on 27 August 1995.

***Sympetrum obtrusum* (Hagen)** – [25] Uncommon in Washtenaw and Jackson 17 August - 22 September.

***Sympetrum rubicundulum* (Say)** – [103] One of the most abundant dragonflies in the study area. Recorded in all counties 19 July - 29 Sept., with a maximum of 31 on 4 September at M-14 Ann Arbor Public School Property, Washtenaw.

***Sympetrum semicinctum* (Say)** – [4] This uncommon dragonfly is the easiest of the genus to identify and was found in small numbers at three sites in Washtenaw during 6 - 26 August, with one additional occurrence on the very late date of 3 September in Monroe.

***Sympetrum vicinum* (Hagen)** – [574] The most abundant dragonfly in the study area, overlapping in habitat and season with *S. rubicundulum*, although peaking later in the season. Recorded in all counties 6 August - 23 October with maxima of 79 on 1 Sept. in Washtenaw and 73 on 21 Sept. in Jackson. Twelve pairs in tandem observed on 30 Sept. 1995 at a small pond at Erie Metropark, Wayne, with five pairs observed ovipositing.

Sympetrum species – [188]

***Tramea carolina* (Linn.)** – [4] There were few records of this beautiful species 27 Aug. - 5 Sept. at Matthaei Botanical Gardens (MBG), Washtenaw, Erie Gun Club, Monroe, and HBCA, Essex. In addition to those individuals identified as *T. carolina*, several believed to be *T. onusta* were observed. Needham and Westfall (1955) include Ontario, Illinois, Indiana, and Ohio in the range of *T. onusta*, but not Michigan. Walker and Corbet (1975) cite a single occurrence at Pt. Pelee, Essex, Ontario. Dunkle (1989) gives southern Ontario as the northern limit of this species, stating that "It is generally scarce in the eastern U.S., but is common in the southwestern U.S. . . . " Additionally, Kormondy (1958) does not list this species for Michigan. Unfortunately, efforts to secure a specimen failed.

***Tramea lacerata* Hagen** – [314] A common, and locally abundant (as a migrant), late summer, early fall species recorded from Washtenaw, Wayne, Monroe, and Essex 23 July - 30 Sept. This species gathers in large migratory swarms, as has been documented in other parts of eastern North America (Borror 1953), and occurs in large numbers in southern Ontario (Corbet and Eda 1969), moving across the mouth of the Detroit River into Wayne and Monroe County, where it is also quite abundant. Over 100 were recorded actively migrating on 4 Sept. at HBCA, Essex. New latest date of occurrence: 30 September 1995 Erie Metropark, Wayne

DISCUSSION

Twenty-four of the 25 species listed in Kormondy as occurring in southeastern Michigan were recorded during 1994 and 1995. Additionally, *Pantala hymenaea* was observed in Wayne County; a specimen collected in Monroe and a specimen at UMMZ, from Washtenaw County, were examined. Many of the species from southeastern Michigan were also recorded at the Holiday Beach Conservation Area in Essex County, Ontario, Canada, where the main purpose of study was to document the fall migration of a variety of dragonfly species, including non-libellulids. Additionally, numbers recorded at each site allowed an approximation of species abundance in relative terms.

It appears that the occurrence of libellulid dragonflies has changed very

https://scholar.valpo.edu/tgle/vol29/iss1/1
DOI: 10.22543/0090-0222.1893

little in southeastern Michigan over the 37 years since Kormondy's 1958 *Catalogue of the Odonata of Michigan*. What is impossible to assess is the change in the numbers or population structure since that time. It is difficult to believe that the reduction in wetlands in the counties of southeastern Michigan could have failed to have an adverse affect on these numbers. However, this cannot be determined. The results of this study show the species composition and relative population of each species in the study area as of 1994–95, establishing a regional baseline for future study.

There also appears to be an active large-scale migration among a number of dragonfly species southward along the Great Lakes shores in the fall. The movement in southern Ontario appears two-phased. One presumed strategy is island-hopping from Pt. Pelee to Pelee Island, on to Kelley's or the Sister Islands (Ohio). Others follow the Essex coast westward and cross the mouth of the Detroit River into Michigan. There appears to be no difference in the species composition of these two pathways. This migration is dominated by a non-libellulid, *Anax junius* (Drury), as has been documented elsewhere (Borror 1953, Corbet and Eda 1969). Secondarily, a number of libellulid species form a large component of this fall migration. The five species in *Pantala* and *Tramea* dominate the libellulid portion. Also, there may be a movement of *Erythemis simplicicollis*, although this has been documented elsewhere (Walter 1996) it requires further study in Ontario and southeastern Michigan. Unlike sites in Japan (Miyakawa 1994), Europe (Gatter 1975), and Siberia (Belyshev and Belyshev 1976) I have yet to find evidence of *Sympetrum* migration.

An interesting result of the study was the discovery of the great number of dragonflies in the genus *Sympetrum* which could not be identified to a given species. Historically, there has been a great deal of difficulty in dealing with the complex of *Sympetrum internum* Montgomery, *S. obtrusum*, and *S. rubicundulum* (Williamson 1933, Montgomery 1943, Kormondy 1958). While Kormondy (1958) shows that the nearest Michigan specimens of *S. internum* are from Ingham County, to the north of the study area, there are specimens from Indiana (Williamson 1917) and Ohio (Borror 1937, Price 1950), much farther to the south. Yet, I have not found *S. internum* in southeastern Michigan. Throughout their ranges these three species appear to form disjunct areas of sympatry as has been observed in other species of *Sympetrum* (Michaels and Dhondt 1987). Additionally, there is great variation in wing veination and hamule size and shape, suggesting either that hybridization may be occurring (Barber 1994), or that a new species may be involved (Carle 1993). Obviously, much work is needed in this area regarding the species composition in the genus *Sympetrum*.

ACKNOWLEDGMENTS

I thank Susan Kielb, Roger Wykes, Mark O'Brien, and an anonymous reviewer for their helpful comments on earlier drafts of this paper. Tom Heatley provided access to his collection of Odonata. Mark O'Brien provided access to, and assistance with, the Odonata collection and library at the Insect Division, University of Michigan Museum of Zoology. Roger Wykes and Susan Kielb provided field assistance and companionship.

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Appendix 1. Locations of specimens collected and sight records of Libellulidae in southeastern Michigan and Essex County, Ontario.

Jackson Co.

Waterloo Twp.: Waterloo Recreation Area

Monroe Co.

Berlin Twp.: Point Mouillee State Game Area; **Dundee Twp.**: Erie Gun Club; **Milan Twp.**: **Summerfield Twp.**: Petersburg State Game Area,

Washtenaw Co.

Ann Arbor: Barton Park, Brown Park, Furstenburg Park, Geddes/Gallup Park, M-14 Public School Property, Pioneer High School Prairie, Scarlett-Mitchell Woods, Matthaei Botanical Gardens. **Augusta Twp.**: Bielec property. **Dexter Twp.**: Half Moon Lake, Hankerd Rd., Stinchfield Woods. **Lima Twp.:** Four Mile Lake/Chelsea State Game Area. **Lyndon Twp.**: Boyce Rd., Cassidy Lake Rd., Embury Rd., Park Lyndon North, South Lake. **Manchester Twp.**: Bialecki property. **Saline Twp.**: Maple Rd., Saline Nature Park. **Sharon Twp.**:Rank Rd. **Sylvan Twp.:** Eddy Geological Center

Wayne Co.

Erie Metropark. Point Mouillee State Game Area , Campau Rd..

Essex Co.

Holiday Beach Conservation Area

Appendix 2. Identification criteria of dragonflies of the genus *Sympetrum* occurring in Michigan and Ontario.

Scientific name	Common name	Hind Wing	Abdomen Length	Total Length	Face	Tibia
Sympetrum ambiguum	Blue-faced Meadowfly	26-28	23-25	36-38	bluish-white	yellow
Sympetrum corruptum[1]	Variegated Meadowfly	29-30	29-30	39-42	red	dark
Sympetrum costiferum	Saffron-winged Meadowfly	25-28	21-26	31-37	pale	pale
Sympetrum dana[2]	Black Meadowfly	20-27	18-24	21-23	black	black
Sympetrum internum	Cherry-faced Meadowfly	23-27	23-27	23-36	red	black
Sympetrum obtrusum	White-faced Meadowfly	20-29	22-26	31-39	white	black
Sympetrum rubicundulum	Ruby Meadowfly	24-30	21-23	33-34	yellow	black
Sympetrum semicinctum[3]	Band-winged Meadowfly	18-23	16-20	24-31	yellow	black
Sympetrum vicinum	Yellow-legged Meadowfly	21-23	21-22	31-35	red	yellow

[1]Distinctive abdominal color pattern mottled with reds and browns.
[2]Distinctive abdominal color pattern of black and yellow.
[3]Hind wings banded with translucent orange.

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DOI: 10.22543/0090-0222.1893

Appendix 3. Visual key for quick tentative identification of dragonflies in the genus *Sympetrum*. (The final separation of many specimens in groups 5&6 still requires inspection of the genitalia.)

1a. Adbomen mottled in red and olive/brown. ..... *corruptum*
1b. Abdomen predominantely yellow, olive, orange, or reddish. 2

2a. Abdomen color yellow and black ..... *danae*
2b. Abdomen reddish, orange, or olive and black. 3

3a. Wings banded with transparent orange for half the length, basally . . *semicinctum*
3b. Wings unmarked. 4

4a. Tibia pale or yellow 5
4b. Tibia dark or black 6

5a. Face red ..... *vicinum*
5b. Face bluish-white or white ..... *ambiguum*
5c. Face pale ..... *costiferum*

6a. Face red ..... *internum*
6b. Face white ..... *obtrusum*
6c. Face yellow ..... *rubicundulum*

Appendix 4. Counties in which each species was recorded.

Species	Jackson	Washtenaw	Wayne	Monroe	Essex
Celithemis elisa	•	•	•		•
Celithemis eponina		•			
Celithemis monomelaena		•			
Erythemis simplicicollis	•	•	•	•	•
Leucorrhina intacta		•			
Libellula cyanea		•			
Libellula incesta		•			
Libellula julia		•			
Libellula luctuosa	•	•	•	•	•
Libellula pulchella	•	•	•	•	•
Libellula quadrimaculata		•			
Libellula semifasciata		•	•	•	
Pachydiplax longipennis	•	•	•	•	•
Pantala flavescens		•	•		
Pantala hymenaea			•		
Perithemis tenera		•			
Plathemis lydia	•	•	•	•	•
Sympetrum ambiguum		•			
Sympetrum corruptum				•	
Sympetrum obtrusum	•	•			
Sympetrum rubicundulum	•	•		•	•
Sympetrum semicinctum		•		•	
Sympetrum vicinum	•	•	•	•	•
Tramea carolina		•			•
Tramea lacerata		•	•	•	•