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## THE ODONATA OF ISLE ROYALE, MICHIGAN

Josh Van Buskirk<sup>1,2</sup>

## ABSTRACT

This paper presents a list of the Odonata recorded from Isle Royale National Park, located in northwestern Lake Superior. Collections from Isle Royale include 38 species of Anisoptera and 12 species of Zygoptera. The list is typical of the boreal regions of North America, and includes nine new records for Isle Royale and one new record for the state of Michigan.

Isle Royale National Park is a wilderness island in northwestern Lake Superior. The flora and large fauna of Isle Royale have been well studied, beginning with a 1905 ecological survey of the island sponsored by the Michigan State Biological Survey (Adams 1909). Checklists of the vascular plants and vertebrates of Isle Royale have recently appeared (Johnsson and Shelton 1982, Slavick and Janke 1987), but there have been no published lists of the invertebrate fauna. Here I present a list of the Odonata known to occur at Isle Royale.

Isle Royale (48°10'N, 88°30'W, elevational range 183–425 m, Keweenaw County, Michigan, USA) is located in Lake Superior, 24 km south of the nearest Canadian mainland and 70 km north of the Michigan Upper Peninsula. The island (72 km long by 14 km wide, 540 km<sup>2</sup>) is almost entirely forested with boreal vegetation. Forests in the cool, moist regions near the Lake Superior shore are composed of primarily white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), and white birch (*Betula papyrifera*), while those at higher elevations in the interior of the island contain yellow birch (*Betula alleghaniensis*) and sugar maple (*Acer saccharum*) (Krefting et al. 1970, Edwards 1978).

Isle Royale is formed by tilted bedrock strata covered with a relatively thin soil (Wolff and Huber 1973, Huber 1975). Much of the island is underlain by interbedded volcanic and sedimentary rocks, tilted toward the southeast due to subsidence within the basin that now forms Lake Superior. Stream erosion and glacial scouring have removed much of the softer sedimentary rock, resulting in a distinctive parallel ridge-and-valley topography. The thin azonal soil mantle has been formed during about 10,000 years since the most recent glacial retreat, and the flora and fauna have colonized the island from the mainland by crossing Lake Superior.

Surrounded by the world's largest freshwater lake, Isle Royale enjoys more moderate temperature fluctuations and higher precipitation than surrounding mainland areas (Peterson 1977). Minimum winter temperatures rarely drop below -34°C, and maximum summer temperatures rarely climb above 30°C,

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although such extremes are common in northern Minnesota. Precipitation on Isle Royale averages 70–80 cm per year, about 25% higher than northcentral Minnesota.

Aquatic habitats on Isle Royale are abundant. The island's ridge-and-valley topography creates numerous parallel streams, interrupted at regular intervals by beaver ponds and elongate lakes with weedy shores. Many of the smaller lakes and ponds have *Sphagnum* spp. bog mats extending up to 30 m out from the shore. Vernal temporary ponds are found in wooded depressions at higher elevations. On bedrock shores of exposed headlands and islands along Lake Superior are found small, clear rock pools.

### SOURCES AND COVERAGE

Isle Royale odonate records were gathered from several published sources, museum collections, and my own observations and collections. The first published observations of Odonata on Isle Royale were made from 5 July to 17 August, 1905, by H.A. Gleason, participating in an expedition sponsored by the Michigan State Biological Survey. Determinations were made by E.B. Williamson and reported in Adams (1909).

Private collecting trips to Isle Royale have been made by Dr. R.R. Dreisbach (August 1936, published in Kormondy 1958), G. Steyskal (July 1938, unpublished), P.J. Martinat (September 1970, unpublished), and R.C. Glotzhober (August 1984, Glotzhober 1985). I have examined collections of the University of Michigan (hereafter UMMZ) for records of odonates taken on Isle Royale. My own observations extend from 1983 to 1991, and are focused on the northeastern end of the island. During most years I arrived at Isle Royale between 10 May and 5 June, and remained until early August. During four summers (1988–1991) I made repeated samples of larval odonates using a dip net in 22 ponds, bogs, and streams in northeastern Isle Royale.

### RESULTS AND DISCUSSION

The following list of the Odonata recorded for Isle Royale includes the earliest and latest adult records where possible, whether the material is adult or larval if known, and for uncommon species the locality of capture. Specimens representing new records that were collected by me have been verified by Dr. Sidney W. Dunkle, and are deposited in the UMMZ.

There are records for 12 Zygoptera and 38 Anisoptera from Isle Royale. The list includes eight new species for the island: *Aeshna clepsydra*, *Aeshna juncea*, *Leucorrhinia glacialis*, *Libellula pulchella*, *Pantala flavescens*, *Sympetrum costiferum*, *Sympetrum danae*, and *Sympetrum semicinctum*. One species (*Aeshna juncea*) represents a new record for Michigan. *Aeshna juncea* is an abundant dragonfly in the High Arctic; at Isle Royale the larvae are common in small splash pools along exposed shores of Lake Superior (Van Buskirk 1990). Isle Royale is one of the southernmost localities of *Aeshna juncea* in North America (Needham and Westfall 1954, Walker 1958).

In the following list, the collectors and sources of records are abbreviated as follows:

- A = Expedition of the State Biological Survey of Michigan, 5 July to 17 August 1905. Specimens collected by H.A. Gleason, determined by E.B. Williamson, and deposited at UMMZ (Adams 1909).
- D = Collections of R.R. Dreisbach of Midland, Michigan, 3–7 August 1936, deposited at UMMZ.

- G = Collection of R. C. Glotzhofer of Columbus, Ohio, 6-11 August 1984, deposited in the Natural History Museum of Isle Royale National Park.  
 J = Collections of J. Van Buskirk, 1983-1991, deposited at UMMZ.  
 M = Collection of Peter J. Martinat, 7-11 September 1970, deposited at UMMZ.  
 S = Collections of Michigan State University, exact dates and localities unknown (Kormondy 1958).  
 St = Collection of G. Steyskal, 10-18 July 1938, deposited at UMMZ.

### Suborder Zygoptera

#### CALOPTERYGIDAE

*Calopteryx aequabilis* Say. (A,S)

#### LESTIDAE

*Lestes congener* Hagen. (S)

*Lestes disjunctus* Selys. (D,G,J,S; adults and larvae) Common and widespread. 20 July-7 August.

*Lestes dryas* Kirby. (D; adult) 3-7 August 1936.

*Lestes forcipatus* Rambur. (D; adult) 3-7 August 1936.

*Lestes unguiculatus* Hagen. (D,S; adult) 3-7 August 1936.

#### COENAGRIONIDAE

*Coenagrion interrogatum* (Selys). (S,St; adult) 12 July 1938.

*Enallagma boreale* Selys. (G,S,St; adult) 10 July-6 August.

*Enallagma carunculatum* Morse. (S)

*Enallagma exsulans* (Hagen). (A; adult) 20 August 1905.

*Enallagma hageni* (Walsh). (D,G,J,S; adults and larvae) Common and widespread. 23 July-7 August.

*Nehalienia irene* (Hagen). (D,G,J,S; adult) Common and widespread. 23 July-9 August.

### Suborder Anisoptera

#### GOMPHIDAE

*Dromogomphus spinosus* Selys. (D,G; adult) 3-7 August.

*Gomphus exilis* Selys. (S)

*Gomphus spicatus* Hagen. (J,St; adults and larvae) Common and widespread. 29 May-23 July.

*Hagenius brevistylus* Selys. (G,S; adult) 6 August 1984 at Lake Richie.

*Ophiogomphus colubrinus* Selys (A,S; adult) 7 August 1905 at Siskiwit Lake.

#### AESHNIDAE

*Aeshna canadensis* Walker. (D,G,J,S; adults and larvae) Common and widespread. 6 July-9 August.

*Aeshna clepsydra* Say. (M; adult) 7 September 1970 at Chickenbone Lake.

*Aeshna eremita* Scudder. (D,G,J,M,S; adults and larvae) 30 July-11 September.

*Aeshna interrupta* Walker. (D,G,J,M,S; adults and larvae) Common and widespread. 16 June-11 September.

*Aeshna juncea* (Linnaeus). (J; adults and larvae) 25 June-19 August, small pools on the outer islands. New state record.

*Aeshna sitchensis* Hagen. (A,M; adult) 21 August-11 September.

- Aeshna subarctica* Walker. (A; adult) 8-16 August 1905.  
*Aeshna umbrosa* Walker. (D,G,J,M,S; adults and larvae) Common and widespread. 25 June-9 September.  
*Anax junius* (Drury). (A,J; adult) 23 May-19 August.  
*Boyeria grafitana* Williamson. (S; adult)

## CORDULEGASTRIDAE

- Cordulegaster maculata* Selys. (S)

## CORDULIIDAE

- Cordulia shurtleffi* Scudder. (A,J,S; adults and larvae) Common and widespread. 25 May-30 July.  
*Dorocordulia libera* (Selys). (S)  
*Somatochlora franklini* (Selys). (D; adult) 3-7 August 1936.  
*Somatochlora kennedyi* Walker. (S)  
*Somatochlora minor* Calvert. (A,D,S,St; adult) 17 July-7 August.  
*Somatochlora williamsoni* Walker. (D,S; adult) 3-7 August 1936.  
*Tetragoneuria spinigera* Selys. (A,J,S,St; adults and larvae) 23 June-21 July.

## LIBELLULIDAE

- Leucorrhinia frigida* Hagen. (J,S; adult) 11-14 July.  
*Leucorrhinia glacialis* Hagen. (J; adults and larvae) Common in bogs. 27 June-26 July.  
*Leucorrhinia hudsonica* (Selys). (A,J; adults and larvae) 25 May-8 August.  
*Leucorrhinia proxima* Calvert. (A,D,J,S; adults and larvae) Common and widespread. 18 July-7 August.  
*Libellula julia* Uhler. (J,S; adults and larvae) Common and widespread. 31 May-23 July.  
*Libellula lydia* Drury. (J,S; adults and larvae) Common and widespread. 26 June-9 August.  
*Libellula pulchella* Drury. (J; adult) 5 August 1988 at Hidden Lake.  
*Libellula quadrimaculata* Linn. (A,D,J,S; adults and larvae) Common and widespread. 27 May-7 August.  
*Pantala flavescens* (Fabricius). (J; adult) 13 July-18 August.  
*Sympetrum costiferum* (Hagen). (M; adult) 8 September 1970 at Mount Franklin.  
*Sympetrum danae* (Sulzer). (J; adults and larvae) 15 July-5 August.  
*Sympetrum internum* Montgomery. (G,M,S; adult) 11 August-8 September.  
*Sympetrum obtrusum* (Hagen). (A,D,J,S; adults and larvae) Common and widespread. 14 July-13 August.  
*Sympetrum occidentale* Bartenev. (G; adult) 7 August 1984 at Lake LeSage.  
*Sympetrum semicinctorum* (Say). (J; teneral) 14 July 1989 at Moose Lake.

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