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THE ODONATA OF MECOSTA CO. MICHIGAN, WITH RECENT ADDITIONS

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(NOTE: a slightly less-comprehensive version of this list appeared in Michigan Birds and Natural History: Ross, S. 1998. The dragonflies and damselflies of Mecosta Co.: Literature search and recent additions. Michigan Birds and Natural History. 5(4):161-166. [1999].)

While looking for a means to provide a list of insects for a natural history book on Mecosta Co., it became apparent that the available material was difficult to interpret, incomplete, and beyond a reasonable time scale, difficult to obtain. By sheer serendipity, I was introduced to the Michigan Odonata Survey (MOS) by an acquaintance. With the help of Mark O'Brien and Ethan Bright (Univ. of Michigan Museum of Zoology, [UMMZ]), I was able to compile a list of dragonflies and damselflies for Mecosta Co. Sources included a literature search of past records (Byers 1927 and Kormondy 1958), examination of the UMMZ collection, and collection of over 200 specimens between 14 May and 6 December 1998 which O'Brien and Bright helped identify.



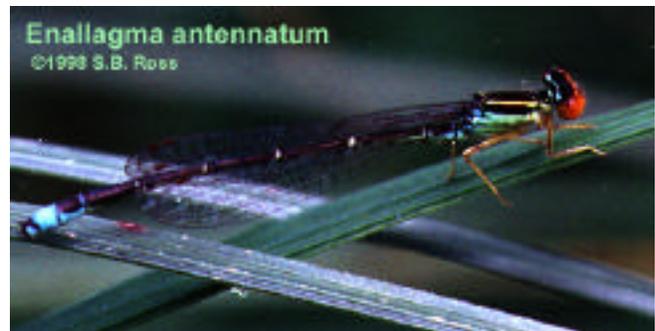
Ashgun Lake, Mecosta Co.

Prior to the collection of voucher specimens in 1998, the most recent specimen had been collected in 1965. The largest number of specimens collected was from the mid-1940s to 1957 by R. R. Dreisbach and others. Most of Dreisbach's large

collection is in the UMMZ. By all estimates of activity, 1998 was an extraordinary year statewide for dragonflies (O'Brien, pers. comm.). The strong El Nino of winter 1997-98 provided a warmer than normal season that probably increased survival of larvae in the lakes. Spring arrived early and warm, summer remained warm to hot, clear, and very dry, while the warm autumn temperatures lingered into November. Dragonflies were observed, at times, in the thousands along dry upland two-tracks, lake and pond edges, and out on the emergent vegetation in the marshes.

Michigan Odonata Survey material from the MOS database was used for several species not mentioned by Byers or Kormondy. Database material was for both adults and exuviae-larval specimens. References to the R. R. Dreisbach (RRD) collection are also noted in Kormondy.

The resulting annotated list below comprises 71 species of damselflies (Zygoptera) and dragonflies (Anisoptera). Thirty-eight represent new county records collected by the author; 26 are re-collections of species listed in the literature, and seven are listed only in the literature (shown in parentheses below).



Damselflies: Suborder Zygoptera

Broadwing Damsels: Family Calopterygidae

Ebony Jewelwing, *Calopteryx maculata* Beauvois. Common along shaded streams. Byers (1927) listed a larvae collected 1926 as *Agrion maculatum*.

Spreadwings: Family Lestidae

Spotted Spreadwing, *Lestes congener* Hagen. County Record. Uncommon but increased in September. Uplands and near ponds.

Common Spreadwing, *Lestes disjunctus* Selys. Common over lakes near upright emergent vegetation like rushes. Also collected in 1953, by RRD (UMMZ).

(Emerald Spreadwing), *Lestes dryas* Kirby. No recent record. Listed in Kormondy (1958); also ten specimens in UMMZ from 1950s from four collectors.

Amber-winged Spreadwing, *Lestes eurinus* Say. County Record. One collected 23 May 1998 in dry upland second growth aspen.

Sweet-flag Spreadwing, *Lestes forcipatus* Rambur. Male collected 18 September 1998. Also two specimens from 1952 and 1957 by RRD (UMMZ).

Elegant Spreadwing, *Lestes inaequalis* Walsh. County Record. One adult collected on 21 June 1998 and exuviae (cast larval skin) collected 27 June 1998.

Slender Spreadwing, *Lestes rectangularis* Say. One male collected 19 August 1998. Three specimens from 1948-52 by RRD (UMMZ).

Lyre-tipped Spreadwing, *Lestes unguiculatus* Hagen. One female collected 18 August 1998. Four specimens from 1950-58 by RRD (UMMZ).

Swamp Spreadwing, *Lestes vigilax* Hagen in Selys. County Record. Common in upright emergent vegetation along lakes and ponds.

Pond Damselfly: Family Coenagrionidae

(Eastern Red Damselfly), *Amphiagrion saucium* Burmeister. No recent record. Listed in Kormondy (1958) as collected in the county by Dreisbach but does not appear in the UMMZ list of his collection. Also collected by Muttkowski early in the century.

Variable Dancer, *Argia fumipennis violacea* (Hagen). Common in open areas near shore, usually on sandy or gravelly areas like boat launches. Also collected by Dreisbach in 1942.

Aurora Damselfly, *Chromagrion conditum* Selys. One adult collected on 22 May 1998, and a larva collected on 2 December 1998 at Little John Flooding Dam. Also from 1939 by RRD (UMMZ).

(Taiga Bluet), *Coenagrion resolutum* Selys. No recent record. One specimen in the UMMZ from 1940 collected by Brown and Ball.

Rainbow Bluet, *Enallagma antennatum* Say. One collected on 27 June 1998 at Brockway Lake. Several others seen. Three specimens from 1950 by RRD (UMMZ).

Boreal Bluet, *Enallagma boreale* Selys. County Record. So far, only one record from a bog in section 34 of Grant Township on 8 June 1998. May be more common.

Tule Bluet, *Enallagma carunculatum* Morse. County Record. One collected on 14 August 1998.

Northern Bluet, *Enallagma cyathigerum* Charpentier. County Record. Common along pond and lake edge vegetation. Larvae collected on 29 November 1998 at Lower Evans Lake and 2 December at Haymarsh Lake. Almost identical to the Boreal Bluet.

Marsh Bluet, *Enallagma ebrium* Hagen. One collected on 5 July 1998 and two specimens in the from 1939 and 1940 by RRD (UMMZ).

Skimming (Shining) Bluet, *Enallagma geminatum* Kellicott. One pair collected on 26 August 1998. Also one specimen from 1949 by RRD (UMMZ).

Hagen's Bluet, *Enallagma hageni* (Walsh). County Record. Larval record from Ashegun Lake, 3 Dec. 1998.

Orange Bluet, *Enallagma signatum* Hagen. County Record. Abundant on lily pads in lakes away from shore in mid-June to late July.

Slender Bluet, *Enallagma traviatum* Selys. County Record. Common to abundant early to late July, nearly identical to Familiar Bluet.

Vesper Bluet, *Enallagma vesperum* Calvert. Uncommon in mid-June to abundant in August over lily pads in lakes. Flies mainly at dusk. One specimen from 1949 by RRD (UMMZ).

Lilypad Forktail, *Ischnura kellicotti* Williamson. County Record. Uncommon on lily pads away from shore. Record represents large leap in knowledge of range in state. Previously known only from southern tier of counties.

Fragile Forktail, *Ischnura posita* Hagen. County Record. One collected on 16 August 1998 at Brockway Lake.

Eastern Forktail, *Ischnura verticalis* Say. Our most abundant damselfly. Found on all lake and pond edges in tall shoreline vegetation and near lakeshore emergent vegetation. Four specimens in the UMMZ (RRD), two from July 1940 and two from August 1950.

Sphagnum Sprite, *Nehalennia gracilis* Morse. County Record. Replaces the very similar Sedge Sprite in bogs.

Sedge Sprite, *Nehalennia irene* Hagen. Very common along edges of lakes and ponds in upright vegetation. Very similar to male Eastern Forktail. Six specimens from 1939-57 by RRD (UMMZ).

Dragonflies: Suborder Anisoptera

Spiketail: Family, Cordulegasteridae

Twin-Spotted Spiketail, *Cordulegaster maculata* Selys. Fairly common along woodland streams. One larva collected by Metzelaar in 1926. Listed in Byers 1925, 26 larval specimens.

DARNERS: FAMILY, AESHNIDAE

Canada Darner, *Aeshna canadensis* Walker. County Record. Common over lakes, ponds and uplands August to early October.

(Shadow Darner), *Aeshna umbrosa* Walker. Larval specimen collected on Dec. 3, 1998 in Ashegun Lake. Also known from a larval specimen collected by Fortney and Moody in 1924.

Common Green Darner, *Anax junius* Drury. Common over lakes, ponds and uplands June to August. Collected by Byers in 1925. Our largest dragonfly.

Springtime Darner, *Basiaeschna janata* Say. An exuviae (cast larval skin) was collected on 14 May 1998 as well as adults on 14 and 19 May. Larvae collected Nov. and Dec. 1998. Also known from an exuviae collected by Brown and Ball in 1940.

Harlequin Darner *Gomphaeschna furcillata* Say. County Record. One specimen taken near a beaver pond in section 27 of Grant Township on 14 May 1998. Though a southern species, this is the furthest south this species has been collected in Michigan.

Cyrano Darner, *Nasiaeschna pentacantha* (Rambur). County Record. One female photographed (photographic record only) ovipositing on a log at the Pickerel Lake Dam on 12 June 1998. One larva collected at Tubbs Lake (6 Dec. 1998).

Clubtails: Family Gomphidae

Lilypad Clubtail, *Arigomphus furcifer* Hagen. County Record. One specimen taken on 21 June 1998 at Pickerel Lake Dam. Larval specimen collected Dec. 2, 1998. Emerges on lily pads.

Unicorn Clubtail, *Arigomphus villosipes* Selys. County Record. Common around ponds and slow moving, muddy-bottomed streams.

Lancet Clubtail, *Gomphus exilis* Selys. County Record. Found on lakes and ponds, often lands on lily pads away from shore.

(Ashy Clubtail), *Gomphus lividus* Selys. One specimen in the UMMZ from 1925 collected by Metzelaar.

Dusky Clubtail, *Gomphus spicatus* Hagen in Selys. May to early July. One specimen collected at Ashegun Lake. Also a specimen in UMMZ Dreisbach collection from 1950.

Rusty Snaketail, *Ophiogomphus rupinsulensis* Walsh. County Record. The only specimen is from an exuvia (cast larval skin) collected 19 May 1998 at Pickerel Lake Dam; no adults found.



Elusive Clubtail, *Stylurus notatus* Rhambur. County Record. One dead specimen collected from the Muskegon River in section 36 of Big Rapids Twp. on 1 August 1998. A species common to large river systems.

Emeralds: Family Corduliidae

American Emerald, *Cordulia shurtleffi* Scudder. County Record. Mid-May to late June. One female collected Pickerel Lake Dam 19 May 1998.

Racket-tailed Emerald, *Dorocordulia libera* Selys. County Record. Common along edges between fields and woods in mid-June to mid-July.

Common Baskettail, *Epiheca cynosura* Say. Briefly abundant mid-May to early June along pond and lake edges and uplands, and along sandy two-track roads where they can be in the thousands. Specimens from 1940 by Brown and Ball in the UMMZ collection.

Prince Baskettail, *Epiheca princeps* Hagen. County Record. Uncommon around rivers, lakes, and ponds. One caught on 24 June 1998 at Hannah Lake.

Spiny Baskettail, *Epiheca spinigera* Selys. Three exuviae (shed larval skin) collected on 14 May and one specimen on 19 May 1998. Also in UMMZ collection from 1940 by Brown and Ball.

Williamson's Emerald, *Somatochlora williamsoni* Walker. County Record. Larva collected at Ashegun Lake, Dec. 3, 1998. This species is widespread in Michigan.

Skimmers: Family Libellulidae

(Calico Pennant), *Celithemis elisa* Hagen. The only specimen is in the UMMZ, from 1950 (RRD).

Halloween Pennant, *Celithemis eponina* Drury. County Record. Uncommon to briefly common at lake edges and uplands in June through mid-August.

(Banded Pennant), *Celithemis fasciata* Kirby. Known from a larval specimen in the UMMZ collected by Brown and Ball in July 1940. Noted as questionable specimen by Ethan Bright's work with these specimens.

Eastern Pond Hawk, *Erythemis simplicicollis* Say. Common along lake edges and uplands in summer. UMMZ specimen collected by P.J. Martinat on Jehnsen Lake in 1965.

Frosted Whiteface, *Leucorrhinia frigida* Hagen. County Record. Common on lakes and ponds in summer; gone by August.

Hudsonian Whiteface, *Leucorrhinia hudsonica* Selys. County Record. Uncommon. Three collected from 22 May to 3 June 1998.

Dot-tailed Whiteface, *Leucorrhinia intacta* Hagen. County Record. Two collected on 19 May and 22 May 1998 at Pickerel Lake Dam. Common to June to mid-August along edges of lakes and ponds as well as uplands.

Red-waisted Whiteface, *Leucorrhinia proxima* Calvert. One teneral specimen collected 14 May and one adult on 22 May 1998. Also from 1953 by RRD (UMMZ).

Slaty Skimmer, *Libellula incesta* Hagen. County Record. Uncommon in mid-summer along edges of weedy lakes and ponds.

Chalk-fronted Corporal, *Libellula julia* Uhler. County Record. Common at edges of lakes and ponds and upland sites, particularly sandy two-tracks.

Widow Skimmer, *Libellula luctuosa* Burmeister. Common in uplands and lake edges. Also from 1948 by RRD (UMMZ).

Common Whitetail, *Libellula lydia* Drury. Common on lake edges, ponds, and uplands (where it is often abundant) in May-August. Also listed in Byers (1927).

Twelve-spotted Skimmer, *Libellula pulchella* Drury. County Record. Fairly common mid-June to August over fields, lakes and ponds.

Four-spotted Skimmer, *Libellula quadrimaculata* Linnaeus. County Record. Uncommon in May and June around lakes and ponds.

Elfin Skimmer, *Nannothemis bella* Uhler. County Record. Our smallest dragonfly. Known only from one seep in Grant Twp. where it is locally common in May to late June.

Blue Dasher, *Pachydiplax longipennis* Burmeister. County Record. Common during summer on lakes and ponds, occasionally upland.

Eastern Amberwing, *Perithemis tenera* Say. County Record. Uncommon at edges of emergent vegetation near boat launches of several lakes from mid-June to mid-August.

Saffron-winged Meadowhawk, *Sympetrum costiferum* Hagen. County Record. Found along roadsides and field edges. Our latest-flying dragonfly, found until early November.

Cherry-faced Meadowhawk, *Sympetrum internum* Montgomery. Common in summer to autumn. Specimens listed in Kormondy (1958) as being in the Dreisbach collection but not on list provided by the UMMZ.

White-faced Meadowhawk, *Sympetrum obtrusum* Hagen. Common from mid-June to September around lakes, ponds, and uplands. Noted in Kormondy (1958) with no other reference. Two specimens from July 1957 collected by Moore and Etheridge.

Ruby Meadowhawk, *Sympetrum rubicundulum* Say. A teneral male taken on 11 June 1998. Found into October. Also a specimen from 1947 by RRD (UMMZ).

Yellow-legged Meadowhawk, *Sympetrum vicinum* Hagen. County Record. A male and female pair taken on 27 August 1998

Damselflies and dragonflies with ranges around or near Mecosta Co. for that there is no known specimen or sighting include *Calopteryx aequabilis*, *Enallagma civile*, *E. exsulans*, *Aeshna interrupta*, *Boyeria vinosa*, and *Macromia illinoiensis*. (O'Brien 1997).

ACKNOWLEDGMENTS

A special thanks to Mark O'Brien of the Michigan Odonata Survey for his help, encouragement, and willingness to answer endless questions during my summer's collecting. He identified all adult specimens from about 200 specimens sent the UMMZ. Ethan Bright identified some 90 larval and exuviae specimens. All specimens collected have been deposited in the UMMZ collection, and bear MOS catalog numbers. The MOS can be contacted at its web site at <http://insects.ummz.lsa.umich.edu/>

A very useful booklet (64 pages), *Color Guide to Common Dragonflies of Wisconsin* was published in 1998 and is very useful for Michigan. This covers dragonflies only, no damself. The booklet can be ordered from Karl Legler, 429 Franklin Street, Sauk City, WI 53583 for \$19.95 including postage and handling.

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NANNOTHEMIS BELLA LARVAL HABITAT

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I've always been frustrated in finding larvae here in Michigan for *Nannothemis bella*, our smallest dragonfly. Last year, Mark O'Brien and I located a site off Embury Road in NW Washtenaw Co., where we caught an adult, rather early in the year (mid-May), near a pond that had a sphagnum/Carex mat in the middle. I vowed to see check that out the following year and see if those little buggers might be there...

On Sunday April 4, ignoring that I have two papers and two exams due in a couple of weeks, I went back to the site to see if I could rustle up some larvae. This seepage pond is in an interlobate region of moraine, with a bottom of thick organic matter. The pH was 6.8, conductivity 50 uS cm⁻¹, and low alkalinity (23 mg/l CaCO₃). I then carefully waded out to the mat, which was composed of *Carex* sp. and *Sphagnum* sp., with leatherleaf (and red-osier) around the edges. This mat is mostly *Carex*, but there were clumps of sphagnum with small water-filled depressions. The water had a pH of 5.1, conductivity of 30 μS cm⁻¹, and an alkalinity of only about 1-2 mg/l CaCO₃. These "holes" are indeed tiny, and one such depression about 25 cm wide, 1 m long and 30 cm deep. I used a USGS 2mm sieve to carefully sample from this tiny holes. At first I could see anything, but finally I made out what appeared like libellulid-like eyes. Boy, are they small! Although they have wingpads extending out to Ab5-6, they were only about 10 mm in total length. Plus, they don't move at all, which makes finding them

among the sphagnum difficult. Also, the larvae have lots of particulate matter attached to their many long hairs, and they look rather cryptic. They like to burrow a little into the sphagnum after a while, disappearing into the maze of moss. However, once you get familiar with what they look like, there appears to be a lot of them in these tiny holes. Sampling in the larger pools surrounded by *Carex*, however, did not yield any larvae, but lots of aeshnids and leucorrhinids. *Nannothemis* was the only odonate in the sphagnum-surrounded pools, even though the distance between the two different pools was only about 10 m. I thought it was a nice bit of habitat partitioning.

I don't know if this is exciting for any of you, but after several years of wanting to find where these creatures are, I'm just tickled pink that I finally found them. If anyone else has collect larvae of these here in the midwestern USA and in Canada, I'd like to compare notes.

Changes to the 1999 Michigan Odonata List

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In January, I sent a copy of our Michigan Odonata data to Nick Donnelly for use in his North American Dot-Map Project. After exchanging several e-mails about the Michigan list, Nick's opinions and questions have prompted me to consider some changes to the Michigan list. In addition, some changes in nomenclature may be resulting from some work done on the genus *Libellula* by Kambhampati and Charlton (1999). Towards that end, *Ladona julia* will once again be used instead of *L. julia*, and *Plathemis lydia* instead of *L. lydia*. If all this seems a bit confusing, remember that the science of systematics is all about relationships. Early authors felt that *Ladona* and *Plathemis* were distinct from *Libellula*, so they placed species in those genera. Later authors felt that they should all be lumped under the genus *Libellula*, even though the larval characters are sufficiently different to warrant different generic placement. Now, with DNA analysis, we have gone full circle, back to the old nomenclature. Sometimes (more often than not), those old guys had it right.

Lestes disjunctus disjunctus and *L. disjunctus australis* - We had formerly lumped these together under *disjunctus*. However, the males seem to separate out, though the females give me a lot of trouble. Nick feels that they should be distinct entries, so I'll make that change, in our list. Fortunately, most recent identifications I have made are already entered in the database as either of the two subspecies. Older entries will have to be checked in the collection. Walker's key distinguishes the two subspecies, though Westfall and May does not.

Enallagma cyathigerum and *E. vernale* Gloyd are two other closely intertwined entities. Depending on who you ask, *E. cyathigerum vernale* is either a subspecies of *E. cyathigerum* or is a distinct species, or is just a variant of the nominate species. Based on Donnelly's work, it looks like we'll list both species in our database, meaning I'll have to go back and check older specimens (hey, it'll be easy - that is why we have unique numbers for all specimens in our database).

Enallagma traviatum westfalli Donnelly is another subspecies

that is very likely going to be added to the list in place of the nominate subspecies. According to recent literature (Donnelly 1973, Catling 1999) *E.t. westfalli* occurs W of the Appalachians and *E. traviatum* occurs E of the Appalachians. I am in the process of checking our specimens to see which subspecies they belong to.

Amphiagrion saucium (Burmeister) has what appears to be an intermediate between it and *A. abbreviatum* (Selys), a western US species. Leonora Gloyd had attempted to describe this intermediate as *A. mesonum*, but she never finished the job. We still have much of the material that she accumulated for the study, so perhaps we'll get that finished one of the days. Meanwhile, I'll just lump those records together.

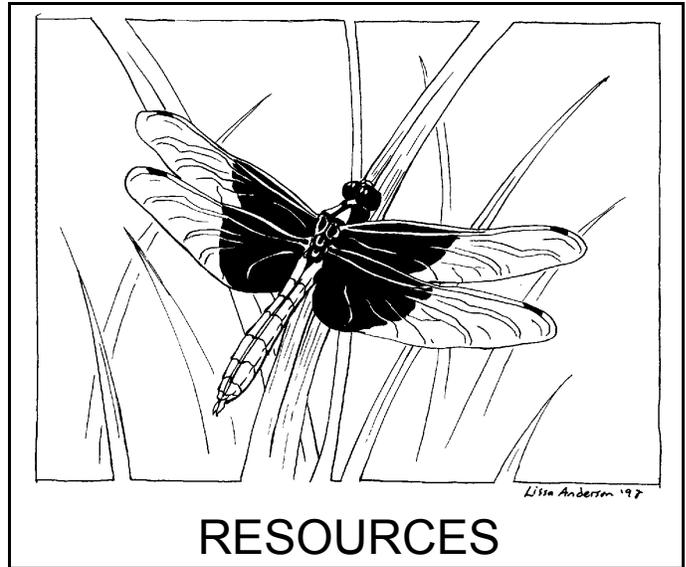
Celithemis monomelaena Williamson is synonymized with *M. fasciata* Kirby. Williamson's species is just a northern variant of *C. fasciata*, and Garrison's 1998 list also has *monomelaena* as a synonym of *fasciata*. Another species in Michigan with reduced spots on the wings is *Epitheca princeps* (Hagen)-- as one moves towards the northern part of the state, *E. princeps* nearly loses much of its wing maculation.

Cordulegaster bilineata Carle and *C. diastatops* (Selys) - These two species present a problem as they seem to be nearly indistinguishable. Hopefully, Eric Pilgrim's work on them will resolve this issue. For now, we'll keep them separate.

There are now at least 158 taxa that have been listed for Michigan. Over the past few years, we have removed a few species, but we have added more. I am sure that next year's list will have at least a couple of changes, as we explore the state's fauna in ever-expanding collecting efforts. As I update our database, the number of species for various counties keeps growing. In the next issue, I hope to list the numbers of species for each county, and provide the Michigan County checklist in the spreadsheet format.

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Color Guide To Common Dragonflies of Wisconsin

This full color illustrated guide to the Wisconsin dragonflies is a book that all MOS participants should purchase. The photos are excellent, and the book covers much of the fauna that occurs in Michigan. If you have not yet obtained a copy, here is the pertinent information:

Color guide to Common Dragonflies of Wisconsin - \$18.95 (make check out to Karl Legler). Send order to: Karl Legler, 429 Franklin Street, Sauk City, WI 53583. email: karlndot@bankpds.com

A Great Lakes Wetland Flora

This book should be carried on field trips. It is a comprehensive, illustrated guide (with keys) to the wetland plants of the Great Lakes region. At 569 pp, it is not a pocket-sized book, but it will be worth carrying in a backpack or in a handy spot in your vehicle. The author, Steve Chadde, has produced a very useful guide that is specific to our region, and includes a lot of useful ecological information in this work. How about a key to the wetland types? Well, this book has it, and an introduction to wetland habitats.

The book has complete coverage of the aquatic and wetland plants of the upper midwest, with descriptions and keys to major wetland types of the Great lakes region. Over 900 plant species in 114 families are described and illustrated. The illustrated glossary is a much-appreciated inclusion, as not everyone will be familiar with all the botanical terms.

Chadde, Steve W. 1998. *A Great Lakes Wetland Flora*. Pocketflora Press, Calumet, MI 569 pp. \$44.95. May be obtained via mail from PocketFlora Press, RR1 Box 206A, Calumet MI 49913; email: pocketflora@yahoo.com; phone: (906) 296-0506.

Maine Odonata Survey Poster Available

The Maine Damselfly and Dragonfly Survey (MDDS) has just issued a beautiful full-color poster illustrating rare and endangered odonates in Maine. Paul-Michael Brunelle has rendered very life-like images of these species and is to be commended for producing not only a work of art but a useful reference as well. The front of the approximately 8.5 x 24" poster has a series of dorsal views of the rare and endangered Maine species set against a sky background. The reverse side has color patterns of the various species in detail, as well as short synopses of their distribution and ecology. For example, the male appendages of many *Somatochlora* are illustrated, as well as aeshnid thoracic patterns. This poster was included free of charge (folded) in the latest issue of *Argia* (another good reason to join the Dragonfly Society of the Americas) and additional (unfolded) copies may be purchased from the MDDS for \$13 (checks made out to "Non-game and Wildlife fund." The address is:

MDDS, Endangered species group, Maine Inland Fisheries and Wildlife, 650 State Street, Bangor, ME 04401

More Walker Books!

The Toronto Entomologists' Association announces that it is NOW taking PREPAID ORDERS for reproductions of the following out-of-print books:

1. The North American Dragonflies of the Genus *Somatochlora* by E.M. Walker (1925) (In Canada-\$55 Can. (includes gst and S&H via surface post); In USA \$43 US (includes S&H via surface post; add \$3 US for airmail).
2. The North American Dragonflies of the Genus *Aeshna* by E.M. Walker (1912) (with colour plates) (In Canada-\$65 Can. (includes gst and S&H via surface post); In USA \$50 US (includes S&H via surface post; add \$3 US for airmail).
3. Copies are still available for the 3-volume set "The Odonata of Canada & Alaska by Walker & Corbet"; cost for 3-vol set: In Canada- \$196 Can. (includes gst and S&H via surface post); In USA \$145 US (includes S&H via surface post; add \$5 US for airmail).

Please inquire for international rates. These are NOT photocopies but are high quality scans by University of Toronto Press - the interior pages are on acid-free paper; the cover is a deluxe-quality hardcover but is not the same as the original. Orders must be PREPAID (personal cheques accepted for US or Canadian orders; money or postal orders only for others; sorry we can't take credit card orders but can invoice you). Please send your order (please be sure to specify which book(s) and to give your address!) to T.E.A. c/o Alan Hanks, 34 Seaton Drive, Aurora, Ontario Canada L4G 2K1, (905) 727-6993; or e-mail inquiries to nmg.vanderpoorten@sympatico.ca

Odonata List Server

For the past few months, many of us have been enjoying the often useful odonata e-mail group that Dennis Paulson has set up. Topics have ranged from pronunciation of latin names to migration, larval habitats, collection procedures, etc. The responses have often been extremely informative, and this e-mail list has really gotten people with similar interests exchanging information. If you are not receiving messages from dragonflies@listbot.com, then contact Dennis Paulson

(dpaulson@ups.edu) and ask to be put on the recipient list. You'll get instructions for posting to the group.

MOS Collecting Supplies Available

If you are going to be collecting for the MOS, be sure to ask for collecting supplies, as I do not expect collectors to be spending their own money for supplies. We have several sizes of glassine envelopes for preserving adults, and will also provide vials for exuviae and larvae. I'll gladly furnish ethanol for preserving larvae, but I can't furnish acetone via mail. It's something that can easily be purchased locally at a hardware store. Ethanol is harder to obtain, although Isopropyl alcohol is satisfactory. Methanol (denatured or wood alcohol) is not recommended for preservation.

We have several aerial nets that can be used by MOS participants in the field; and if you need an aerial net, please let me know. We can purchase more if necessary. Aquatic nets are expensive, and if you need to borrow one, we can provide it if you pick it up and return it.

We will also provide field notebooks (Rite in Rain type) if you want to record your field observations/collecting activities for the MOS. If you are looking for inexpensive field notebooks, Borders' has blank books for about \$4 that are ideal for field work, as they fit nicely into a jacket pocket.

Whirl-Pack bags are ideal for aquatic sampling, as they take up little space until used. They are excellent for taking along on a trip when space is at a premium. We can furnish the 4 oz. size if you would like to use them.

Several people have asked about the clear plastic envelopes. We don't generally give these out for collectors because I would rather that we received specimens in glassine envelopes. The plastic envelopes are for final specimen storage, not for storing the day's catch. Many times I have received specimens that were moldy or rotten inside the plastic envelopes because the collector did not dry the specimen enough. Keeping them in glassine envelopes allows them to dry thoroughly, and since we print up the 3x5 data cards, you are not saving us any time. However, if you wish to use the clear storage envelopes to maintain a reference collection, then I'll be happy to send some out.

Other Collecting/Storage Ideas

I have found the small tins that contain Altoids and Velamints to be very useful for storing exuviae in the field as well as teneral adults. The boxes have enough room for them to hold the wings outstretched while they protect the teneral dragonfly from being crushed. Another useful item for the field is a metal or plastic band-aid box. The larger sizes are big enough to hold a number of specimens in glassine envelopes in a field vest or jacket pocket. This keeps the specimens from being damaged. A variation on the band-aid box idea is the small yellow plastic Nestle's Quick powdered mix box. The smaller size is ideal for holding even the largest glassine envelopes, yet it fits in my field vest pocket.

Safety In the Field

This might seem obvious to many, but remember to bring along a first-aid kit in your travels. A small thing to carry, but when you need to use it, you'll be glad you brought it along. Also essential are bug spray (whatever works for you) and sun screen. A wide-brimmed hat is so much more functional than a

baseball-style cap. Not only is your neck protected from the sun, but so is much of your face. A scarf or bandana around the neck can not only serve to keep the sun off, but the bugs, too. If you wet it with cold water, it also helps cool you off on a hot day. I carry a small bag in the back of my van with a light nylon windbreaker, spare pair of socks, underwear, t-shirt and shorts. If you fall in that mudhole you were skirting, a dry set of clothes is really appreciated. Another useful item is a pair of the relatively new Family Radio Service radios that you see advertised for about \$100/pair. They fit in a shirt pocket, have up to a 2-mile range, and they enable you to communicate with your collecting partner(s) without being in sight of each other - a very useful way to keep in contact as you get away from the trails. They are also not subject to interference like that found with CB radios.

Make Your Own Kick-net

A kick-net is a useful item for collecting in rivers and streams. It is nothing more than a 3 ft. wide piece of screen attached to two broom-handles. You stand upstream of it while you hold it upright tight against the bottom of the stream. By dislodging the substrate (hence the name "kick" net), any aquatic organisms are pushed against the netting by the force of the stream. You carefully pick up the net by tilting up the bottom and pull off or pour the contents into a pan. This is a great way to collect gomphid larvae, since many are partially covered by the substrate. The easiest way to construct the kick net is to use a piece of fiberglass or plastic screening and sew the ends into sleeves that just fit over 1" diam PVC pipe. You can also use 3 - 4 ft. lengths of broom sticks or 3/4" dowels. The dimensions of the net can be about 2 to 3 feet high, by 3 feet wide. You can also use good-quality mosquito netting, but it's not as durable as the fiberglass screening. This makes a great project for youth groups, since a kick-net is much cheaper to make and use than a long-handled aquatic net. You can roll it up and take it just about anywhere. Bio-Quip Products sells a folding "Collapsible Pocket Seine" which works pretty well, yet folds into a very compact bundle.

LISTED SPECIES NEWS

A Refuge for Hine's Emerald

I found a very interesting post on the Odonata list-bot run by Dennis Paulson. It definitely points out an area of research that I had never thought of. Certainly, animal burrows serve as refugia for terrestrial animals, but it never occurred to me that crayfish burrows could act as refuges for dragonfly larvae, and possibly other aquatic animals as well. I wonder if the populations in the UP of Michigan share the habit explained below.

Here are the two posts from the dragonflies@list-bot.com:

L.M. Pintor and D. A. Soluk of the Illinois Natural History Survey have an abstract in the latest issue of the Bulletin of the North American Benthological Society (for a paper they will give at the NABS meeting in Duluth in May) titled "Living with the enemy? Crayfish burrows as refuge for an endangered dragonfly" (The crayfish was *Cambarus diogenes*). They report finding *Somatochlora hineana* larvae in 14 of 15 crayfish burrows investigated, with densities of 1 to 22 larvae per burrow and with 3 of 4 year classes represented. This was when the streamlets inhabited by the dragonfly were dry. They

mention that this behavior would possibly offer refuge from both summer drying and winter freezing. Sounds like we should get in the habit of checking out crayfish burrows. I wonder what other strange habitats we need to look for dragonflies in?

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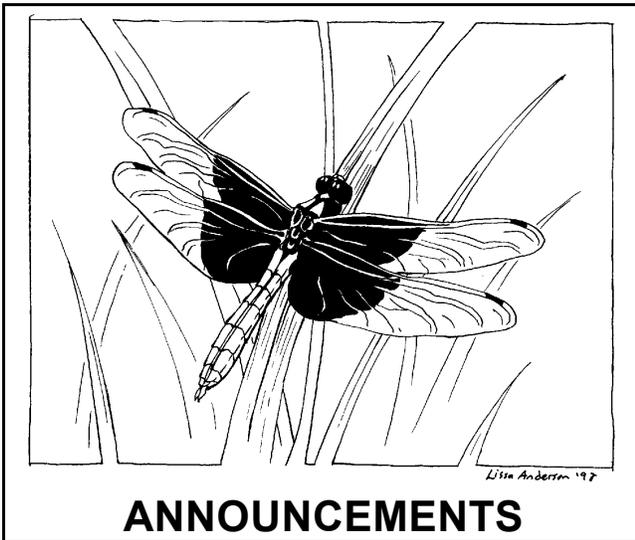
Well it's great to see other people thinking of crayfish burrows as refuges for more than crayfish! I've actually been working on this idea quite extensively for the past two years. Its part of my master's thesis work, under Dr. Daniel Soluk, where I've been looking at the effect of drought on the endangered Hine's Emerald Dragonfly, *Somatochlora hineana*. Not only have we extensively investigated their use of burrows in their larval habitat, but are also looking at the interaction with the resident crayfish, *Cambarus diogenes*, as well as the behaviors exhibited by *S. hineana* larvae entering & using the burrow. We currently have a manuscript in the works that will hopefully be out soon. In the meantime, I'll be presenting a talk at the North American Benthological Society Meeting on Wed. May 26, 1999 in Duluth, Minnesota entitled "Living with the enemy?: Crayfish burrows as refuge for an endangered dragonfly", which is co-authored with Daniel A. Soluk (not S.A. Daniel, as incorrectly listed in the NABS bulletin & web page!). We will also be co-authoring a talk on the ecology of *Somatochlora hineana*, including their use of crayfish burrows, at the 1999 Congress of Odonatology & First Symposium of the Worldwide Dragonfly Association at Colgate University the week of July 11-16, 1999. It'd be great to hear other anecdotes that are out there of refuges larvae may use to survive drought!

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Tachopteryx thoreyi Status

Last year, I figured that the status of *T. thoreyi* would be changed from **Threatened to Special Concern**, based upon recommendations made by the panel on which I served. It took longer than I expected, but now the change has been made, as well as many other proposed additions, etc. The recent changes made to the list of state-listed species is on the web at http://www.dnr.state.mi.us/Wildlife/Heritage/Thr_End/list_changes.htm

Therefore, I encourage MOS members to look for this seldom-encountered species in the SLP lower tier of counties wherever seeps and springs near woodlands are found. Look for the Grayback on tree trunks, fenceposts, and other grayish vertical surfaces. They are apparently rather "tame" and have been known to land on gray sweatshirts! The target times are from late May to mid-June.



ANNOUNCEMENTS

Odonata Field Trips in the Benzie/Charlevoix/Grand Traverse Co. Area

Carl Freeman will be leading a series of walks focusing on Odonata, but given his wide-ranging interests, he'll likely point out any interesting avifauna as well. Dragonfly field trips; Wed. June 23rd, 10:00 AM Upper Herring Lake Preserve, Benzie Co, 6 miles S of Frankfort on M22.

Friday July 16th, 10:00 AM St. Clair Lake/Six Mile lake Natural Area, Charlevoix Co, go S from Ellsworth on Six Mile Lake Rd to sign for Natural Area on left.

These trips are sponsored by the Grand Traverse Regional Land Conservancy. For more info call the GTRLC at (616) 929-7911 or Carl Freeman at (616) 352-4739.

Dragonfly Walk at the Arb

Mark O'Brien will be leading a Dragonfly Walk at Nichols Arboretum in Ann Arbor, on Saturday, June 12, from 10 AM to 2 PM. MOS members are encouraged to attend. We'll be meeting at the Huron River where the trails from the Arb converge. Depending on what is flying, be prepared to get wet as we sample the larvae and the adults that are there. General dragonfly biology and study techniques will also be discussed.

Michigan Entomological Society Annual Meeting

Friday, June 4, 1999
Ralph A. MacMullen Conference Center
104 Conservation Drive, Roscommon, MI 48653

This year's meeting will be held at the spacious, comfortable and ideally-located Ralph A. MacMullen (RAM) Center on the North shore of Higgins Lake. The RAM Center is 11 miles South of Grayling off US-27. A new feature at this year's

meeting will be the addition of a Thursday evening open house from 7-10 pm at the RAM center. Since lodging is available on site, we are hoping that many attendees will want to arrive the evening before the meeting. This will be a great opportunity to chat with fellow members and to explore the area. You do not have to be a member of the Michigan Entomological Society to attend the meeting. MOS members are encouraged to attend what should be a very informative and fun gathering!

Thursday June 3:

3:00 - 9:00 PM Lodging Registration - Administration Bldg.
4:00 - 5:15 Meeting Registration - Conservation/Education Bldg.
5:30 - 6:15 Dinner - Administration Bldg.
7:00 - 10:00 Reception, Conservation/Education Bldg.

Friday, June 4

7:15 - 8:00 Breakfast
8:00 - 9:00 Registration/Meeting - Conservation/Education Bldg.
9:00 - 9:15 Welcome - Ron Priest
9:15 - 10:15 Great Lakes Regional Ecosystems - Dennis Albert
10:15 - 10:45 MI Natural Features Inventory: Goals and Challenges - Judith Soule
10:45 - 11:00 BREAK
11:00 - 11:45 Great Lakes Area Trichoptera - Brian Armitage
11:45 - 12:45 LUNCH
12:45 - 1:15 Poster/Display Session
1:15 - 1:45 Insect Conservation: MI Nature Conservancy - Chris Clampitt
1:45 - 2:30 Lepidopteran Ecoregions of Ohio - Eric Metzler
2:30 - 2:45 BREAK
2:45 - 3:15 MI DNR Wildlife Div.: Goals and Challenges - Ray Rustem
3:15 - 3:30 Michigan Lepidoptera Survey - Robert Kriegel
3:30 - 3:45 Michigan Odonata Survey - Mark O'Brien
3:45 - 4:00 Butterflies of Michigan: A new book - Mogens Nielsen
4:00 - 4:15 BREAK
4:15 - 5:00 Business Meeting
5:00 - 5:30 Open
5:30 - 6:15 Dinner
7:30 - ? Night Insect Surveys

Saturday, June 5

7:15 - 8:00 Breakfast
9:00 - ? Daytime Insect Surveying, Nature Photography, Hiking, Warbler Viewing, etc.

For more information about the meeting, contact Ron Priest: fax: 517-353-4354; phone: 517-355-1803



Michigan Odonata Survey
CHECKLIST OF MICHIGAN ODONATA
April 1999

ZYGOPTERA

Calopterygidae

Calopteryx aequabilis Say
Calopteryx maculata (Beauvois)
Hetaerina americana (Fabr.)
Hetaerina titia (Drury)

Lestidae

Lestes congener Hagen
Lestes disjunctus disjunctus Selys
Lestes disjunctus australis Walker
Lestes dryas Kirby
Lestes eurinus Say
Lestes forcipatus Rambur
Lestes inaequalis Walsh
Lestes rectangularis Say
Lestes unguiculatus Hagen
Lestes vigilax Hagen

Coenagrionidae

Amphiagrion saucium (Burmeister)
Argia apicalis (Say)
Argia moesta (Hagen)
Argia sedula (Hagen)
Argia tibialis (Rambur)
Argia fumipennis violacea (Hagen)
Chromagrion conditum (Hagen)
Coenagrion interrogatum (Hagen)
Coenagrion resolutum (Hagen)
Enallagma anna Williamson
Enallagma antennatum (Say)
Enallagma aspersum (Hagen)
Enallagma boreale Selys
Enallagma basidens Calvert
Enallagma carunculatum Morse
Enallagma civile (Hagen)
Enallagma cyathigerum (Charp.)
Enallagma cyathigerum vernale
 Gloyd
Enallagma divagans Selys
Enallagma ebrium (Hagen)
Enallagma exsulans (Hagen)
Enallagma geminatum Kellicott
Enallagma hageni (Walsh)
Enallagma signatum (Hagen)
Enallagma traviatum (Selys)
Enallagma traviatum westfalli
 Donnelly?
Enallagma vesperum Calvert
Ischnura kellicotti Williamson
Ischnura posita (Hagen)
Ischnura verticalis (Say)
Nehalennia gracilis Morse
Nehalennia irene (Hagen)

ANISOPTERA

Petaluridae

Tachopteryx thoreyi (Hagen)

Cordulegastridae

Cordulegaster bilineata Carle
Cordulegaster diastatops (Selys)

Cordulegaster erronea Hagen
Cordulegaster maculata Selys
Cordulegaster obliqua (Say)

Aeshnidae

Aeshna canadensis Walker
Aeshna clepsydra Say
Aeshna constricta Say
Aeshna eremita Scudder
Aeshna interrupta Walker
Aeshna juncea Linn.
Aeshna mutata Hagen
Aeshna sitchensis Hagen
Aeshna subarctica Walker
Aeshna tuberculifera Walker
Aeshna umbrosa Walker
Aeshna verticalis Hagen
Anax junius (Drury)
Anax longipes Hagen
Basiaeschna janata (Say)
Boyeria grafiana Williamson
Boyeria vinosa (Say)
Epiaeschna heros (Fabr.)
Gomphaeschna furcillata (Hagen)
Nasiaeschna pentacantha (Rambur)

Gomphidae

Arigomphus cornutus (Tough)
Arigomphus furcifer (Hagen)
Arigomphus villosipes (Selys)
Dromogomphus spinosus Selys
Gomphus exilis Selys
Gomphus fraternus (Say)
Gomphus graslinellus Walsh
Gomphus lineatifrons Calvert
Gomphus lividus Selys
Gomphus quadricolor Walsh
Gomphus spicatus Hagen
Gomphus submedianus Williamson
Gomphus vastus Walsh
Gomphus ventricosus Walsh
Gomphus viridifrons Hine
Hagenius brevistylus Selys
Hylogomphus adelphus (Selys)
Ophiogomphus anomalus Harvey
Ophiogomphus aspersus Morse
Ophiogomphus carolus Needham
Ophiogomphus colubrinus Selys
Ophiogomphus howei Bromley
Ophiogomphus rupinsulensis
 (Walsh)
Progomphus obscurus (Rambur)
Stylogomphus albistylus (Hagen)
Stylurus amnicola Walsh
Stylurus laurae Williamson
Stylurus notatus Rambur
Stylurus plagiatus Selys
Stylurus scudderi Selys
Stylurus spiniceps (Walsh)

Macromiidae

Didymops transversa (Say)

Macromia illinoiensis Walsh
Macromia taeniolata Rambur

Corduliidae

Cordulia shurtleffi Scudder
Dorocordulia libera (Selys)
Epithea canis MacLachlan
Epithea cynosura (Say)
Epithea spinigera (Hagen)
Epithea spinigera Selys
Neurocordulia yamaskanensis (Prov.)
Somatochlora cingulata (Selys)
Somatochlora elongata (Scudder)
Somatochlora forcipata (Scudder)
Somatochlora franklini (Selys)
Somatochlora hineana Williamson
Somatochlora incurvata Walker
Somatochlora kennedyi Walker
Somatochlora linearis (Hagen)
Somatochlora minor Calvert
Somatochlora walshi (Scudder)
Somatochlora williamsoni Walker
Williamsonia fletcheri Williamson

Libellulidae

Celithemis elisa (Hagen)
Celithemis eponina (Drury)
Celithemis fasciata Kirby
Erythemis simplicicollis (Say)
Ladona julia Uhler
Leucorrhinia frigida (Hagen)
Leucorrhinia glacialis Hagen
Leucorrhinia hudsonica (Selys)
Leucorrhinia intacta (Hagen)
Leucorrhinia proxima Calvert
Libellula cyanea Fabr.
Libellula incesta Hagen
Libellula luctuosa Burmeister
Libellula pulchella Drury
Libellula quadrimaculata Linn.
Libellula semifasciata Burm.
Nannothemis bella (Uhler)
Pachydiplax longipennis (Burm.)
Pantala flavescens (Fabr.)
Pantala hymenaea (Say)
Perithemis tenera (Say)
Plathemis lydia Drury
Sympetrum ambiguum (Rambur)
Sympetrum corruptum (Hagen)
Sympetrum costiferum (Hagen)
Sympetrum danae (Sulzer)
Sympetrum internum Montgomery
Sympetrum obtrusum (Hagen)
Sympetrum occidentale Bartenev
Sympetrum rubicundulum (Say)
Sympetrum semicinctum (Say)
Sympetrum vicinum (Hagen)
Tramea carolina (Linn.)
Tramea lacerata Hagen

Williamsonia (plant). Quite the same Wikipedia. Just better.Â Williamsonia was originally described as *Zamia gigas* by William Crawford Williamson.[4] William Carruthers proposed the name *Williamsonia* in an 1870 paper of his, with the type species being *W. gigas*. [2].
Biology. *Williamsonia* life restoration at MUSE - Science Museum in Trento. *Williamsonia* possessed a sturdy stem and had multiple fern-like leaves. The plant did not live in groups. The stamens of *Williamsonia* curved inward and upward. [3].