



WILLIAMSONIA



VOL. 2 No. 2

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A publication of the Michigan Odonata Survey

1998 Schedule of Michigan Odonata Survey Events

MOS Field Trips Subject to Change

Field Trips are scheduled to expose MOS participants to sampling techniques for aquatic and aerial stages of Odonata. Protocols for data recording and sampling can be demonstrated, and participants can share observations. Field trips are also a way for us to explore interesting habitats and to search for new records and validate old ones. It's a good chance to meet others with similar interests, and renew acquaintances.

Note: If it is raining the day listed, the field trip is off. There are no alternate days scheduled.

June 21 - Summer Solstice - 9 am - dusk Suggested Area: **Berrien Co., Warren Woods**; Cass Co., St. Joseph Co., Three Rivers SGA, all going back towards AA. Meet at Warren Woods Parking Area at 9 am. *Directions to WW:* From I-94 take exit 12 (Sawyer Rd)- go W 0.5 mi to Three Oaks Rd. Turn L (S) onto Three Oaks and go ca. 4 mi to Elm Valley Rd. Turn R (W) and drive less than 1 mi to S entrance of Warren Woods. Park in circular parking area. We'll take the trail to the Galien River and sample the stream there, as well as look for seep habitats. We'll have maps available for the rest of the days events at Warren Woods and by request via mail. Also, if you need a ride or can offer a ride, contact Mark and we can try and match the two up!

5 July - Washtenaw Co. - Hudson Mills MetroPark; noon - 4 pm. Hudson Mills MetroPark vehicle entrance fee required. It'll probably be a busy day for the July 4th weekend. Prepare to spend some time sampling the River. We'll be doing a show and tell for park visitors at the same time. Look for a MOS sign to guide you to the parking/meeting area (likely the lot closest to the Huron River).

9 August- Lapeer Co. Ortonville S.R.A. - Big Fish Lake and nearby marshes & streams. Meet at Big Boy in Fenton off US 23 at 9:30 am., and we will collect in Lapeer Co. until we poop out. We'll coordinate & car pool from the Big Boy parking lot.

13 Sept. Washtenaw Co., Chelsea S.G.A. and Waterloo S.R.A. 10 am - meet at parking lot for Chelsea SGA.

18 Oct. - MOS Fall Business Meeting/workshop - place TBA. (Any offers to host the meeting?)

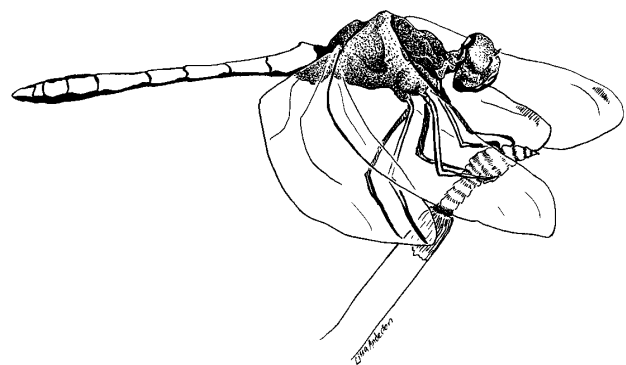
WHAT TO BRING ON A MOS FIELD TRIP:

- Collecting equipment and supplies
- Lunch and something to drink
- a towel and extra pair of shorts & socks in case you fall in (Well, it happens to almost everyone at least once)
- insect repellent, hat or scarf, sunscreen
- binoculars (you birders already know that)
- rubber knee boots, waders or hip boots, depending on how deep you want to go without getting wet.
- A sense of humor!

It is a good idea to own either a DeLorme Michigan Atlas or a MUCC Michigan County Map. Both are available at local bookstores and are extremely useful.

The MOS has aquatic and aerial nets that can be shared on a field trip, so don't worry if you don't have a net.

If you have questions, give Mark O'Brien a call at 734-647-2199 (day) or 971-6033 (home); or e-mail at mfobrien@umich.edu



Sympetrum sp. illustration by Lissa Anderson

OTHER MOS NEWS

GIFTS

We thank Ellie Shappirio for her generous monetary gift to the MOS this year, which has allowed us to purchase equipment for field trips. We bought three new aquatic nets and three aerial nets, some other supplies, as well as a GPS unit for better precision for mapping purposes. This kind of support is greatly appreciated, and was quite unexpected.

We continue to receive donations from our supporters to defray the costs of Williamsonia, and the sale of the MOS Handbook has been quite successful as well. Thanks to all of you that have contributed!

MOS SPRING MEETING

The MOS Spring Meeting was held on April 18 at the UM Museum of Zoology in Ann Arbor. Only 10 people attended, which was disappointing, but several people not there said the date conflicted with spring breaks and the like. The highlights of the meeting were presentations by Nick Donnelley and Sam Riffell. Nick described the problems in speciation with *Enallagma cyathigerum* and *E. vernale* and also highlighted similar work with *Sympetrum*. There has been debate whether or not *Enallagma vernale* Gloyd is a subspecies of *E. cyathigerum* Charp., a valid species, or a hybrid. Based on ecological, behavioral and morphological data it appears that *E. vernale* should be treated as a valid species that hybridizes in certain areas with *E. cyathigerum*. It's certainly a complex problem that deserves more attention. A more detailed discussion is in the latest issue of *Argia* (Vol. 10 No. 1, April 1998).

Sam Riffell gave a talk and poster about his work last summer with patterns of roadkill mortality in dragonflies in Chippewa Co. Apparently, short-winged males are less likely to be hit than long-winged males (of the same species) because the short-winged males are successfully defending territories and the males with longer wings are killed by passing cars when searching for new territories. In another result, females of small populations are more likely to have a greater percentage of mortality than females of more common species. This obviously has implications for species such as Hine's emerald.

Mark O'Brien gave a short talk on the work at the Huron Mountain Club in Marquette Co., and the group then discussed various ideas for MOS activities. The MOS ID card was agreed upon, and at 5:00 pm the meeting was adjourned.

PROGRESS IN THE DATABASE

The MOS database is now somewhere over 15,000 records, and about 99.5% of the UMMZ dry material has been catalogued. The larval collection has close to 2,000 records, of which about half are from Michigan. We are gradually adding records from MSU's collection (larvae and adults), and I expect that we'll also start adding records from

other institutions this year. Target collections are Northern Michigan University, UM Biological Station, and Western Michigan Univ. The main database has been migrated to FileMaker Pro 3, and at some point, we can start putting the database up on the WWW.

U.S. FOREST SERVICE GRANT

Thanks to the efforts of Dr. Robert A. Haack of the E. Lansing USDA Forest Service office, Mark O'Brien will be receiving a \$6000 grant titled "Geographic Distribution of Dragonflies in Michigan." Of course, this grant is really going to boost the field work this summer, as money will be available for temporary employment for field work (and lab work) as well as for travel expenses and supplies. The best thing about this grant is that it allows us to do exactly what we have been doing with some financial backing that will allow some work in more remote areas of the state. At this point, the details are still being worked out, but once the funds are available, MOS field work will be supported. This probably will not be a one-time grant, with likely continuation for at least another year with new funding each year.

The Forest Service is interested in riparian aspects of its lands. Streams and lakes provide wildlife habitat as well as recreational opportunities on U.S. Forest Service lands. The health of the watersheds is related to the quality of the forested lands, and any sampling that we do on National Forest lands will undoubtedly aid the USFS in this area.

One of the best aspects of this grant is that it validates the Michigan Odonata Survey's activities and goals. Such support from a federal agency may provide an avenue in pursuing grants from Michigan agencies and other non-governmental organizations.

MOS MEMBERSHIP DATABASE

The MOS member database has finally been revamped in FileMaker Pro 3, and enables us to easily output labels and ID badges. The database contains not only the names of people that are actually MOS volunteers, but also those that are just interested in receiving Williamsonia. At present, there are about 75 names on the list, with about 40 listed as MOS volunteers. Anyone with an e-mail address is also added to the MOSinfo e-mail list, which has proven to be a quick way to disseminate information.

ID BADGES AND WINDOW SIGNS

The MOS recently purchased a small laminating machine that has allowed us to make MOS ID badges for people working in the field. The badges contain a photo of the person named on the badge with contact information for the MOS (example below). The badges clip on to your clothing, and are waterproof. If you would like to have an id badge, you'll need to either furnish a recent photo of yourself to be scanned into the computer, or come and have

your photo taken with a digital camera. If you are attending an MOS field trip, then that would be a good opportunity to have your photo taken. The purpose of the photo ID is to lend workers in the field some credibility and an easy way for people with questions to know what you are doing in the river.



In addition, Beverly Shepard has designed and produced an attractive and informative sign to put on your car's dash that informs passersby that the occupant is doing Odonata survey work. It's especially useful if we are looking for someone's car during a field trip. The signs will be available by request.

WILLIAMSONIA ON THE WEB?

Although it could have been done starting with issue #1, *Williamsonia* has never been put up on our web site. If people are interested in having it there, then it can be added to the web site without too much trouble. Email mfobrien@umich.edu if you think it's a good or bad idea. The format would likely be as an Adobe Acrobat file (.pdf) so the viewable product would look like the printed version.



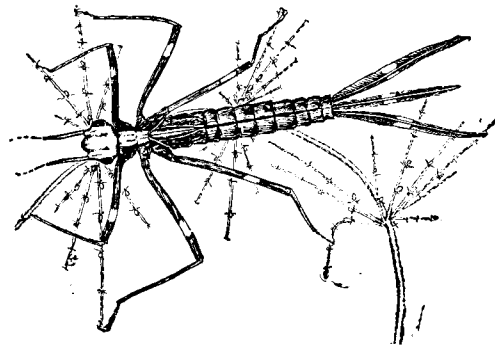
EXUVIAE COLLECTION

Thanks to the volunteer efforts of Ellie Shappirio, Alexis Kielb, and some temporary employees, nearly all of the formerly decrepit and ignored exuviae that had been stored away in a metal box for over 40 years have been put into the collection. This collection was a real eye-opener, as the dingy cigar boxes with boxes and vials within were opened and the contents removed and placed in vials and labeled. It turned out to be a real treasure hunt, as we discovered specimens collected and/or identified by E.M. Walker, J.G. Needham, E.B. Williamson, C.H. Kennedy, Mike Wright, P.P. Calvert, and others. About 50% of the specimens were from Kennedy's collection, and included all of the exuviae (and some dried larvae) from his studies on the Bass Islands of Lake Erie, and his work in Washington,

Nevada, and California from 1914-1922. All of the material was included in his publications, so sometimes cryptic notation was decipherable into dates and places. The Williamson material, though not as extensive, consists primarily of specimens collected in Indiana, the Southeast, and Michigan, along with a smattering of neotropical specimens from his excursions into South America.

It is interesting to note that the early collectors were undoubtedly aware that collecting exuviae was a way of documenting a presence, but they never seemed to give them as much importance as adults. Of course in the early years of this century, larval keys were inadequate for many genera, and unless the adult was reared, the exuviae were "less precise." Many times we encountered tobacco tins full of exuviae that just had very rudimentary data, sometimes none at all. Vanemon Swamp in Wells Co. Indiana was frequented by Williamson, and we have a lot of exuviae from that locality (does it still exist?).

We are still in the process of transcribing full locality data and replacing the temporary labels in the vials and jars. Some material has been databased, and the formerly ignored metal box has now given up its secrets. This material is very important, since much of it was the basis of several published studies, and is now available for study by other researchers.

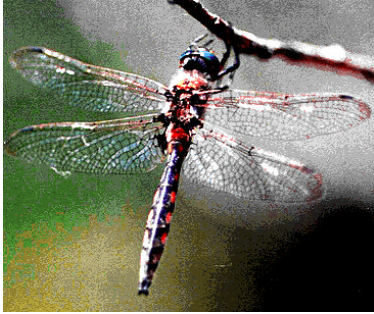


Nymph of *Calopteryx maculata*

WALKER VOLUMES ARE BEING REPRINTED!

THE ODONATA OF CANADA & ALASKA BY WALKER & CORBET (3-VOLUME SET): The Toronto Entomologists' Association (T.E.A.) announces that it is NOW TAKING PREPAID ORDERS for a one-time reprinting of these volumes. These are NOT photocopies but a true reprinting - the interior pages are the same quality as the original book, on acid-free paper; the cover is a deluxe-quality hardcover. The cost for all 3 volumes is: In Canada \$196 Can. (includes gst and shipping via surface post); In USA \$145 US (includes shipping via surface post). Please inquire for international or airmail rates. Orders must be PREPAID (personal cheques are accepted for US or Canadian orders; money or postal orders only for others) and received by June 10, 1998. Unfortunately, single volumes are not available. Please send your order 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>. Nancy and Michael van der Poorten, 164 Morse St. Toronto Ontario Canada M4M 2P8



Epitheca (canis?). Photo by Carl Freeman

Virtual Collecting...

Mark O'Brien

E-mail messages really do help us out! The beauty of the internet is that distance no longer matters, and we can share observations with others nearly immediately. For me, this spring has been very exciting with so many new early records coming via e-mail as well as by my own efforts. These announcements also serve to alert others to what is emerging, and other MOS folks can start searching in his/her local area. Remember, you can send e-mail to everyone on the MOS mailgroup at: mosinfo@insects.umz.lsa.umich.edu. Here are some excerpts from some recent email exchanges:

(From Carl Freeman 05/22) (email: heather@benzie.com)

Hi, Taking advantage of nice days and a delivery to a gift shop, I looked for Odonatas yesterday afternoon in Leelanau Co., all in SBDNL. At Shell lake I found the biggest "event" I have ever seen with dragonflies. It reminded me of a big Hex[agenia] hatch on a trout stream. I found many *C. elisa* in a field by the access site and then went out in my canoe along the edges of the emergent vegetation (some kind of reed) and found thousands of exuvae and many emerging. I looked at several spots in one end of the lake and there were bugs everywhere. There were also thousands of damselfly emerging, sometimes 5 or 6 on the same reed. I collected exuvae but really do not have a clue what species. There were *I. verticalis* and probably an *Enallagma* sp. in the field. Also in the field was a new Leucorrhinia for me, probably glacialis (red on the thorax and first few abdominal segments).

Would something like *Ophiogomphus rupinsulensis* be emerging now? [YES!!] I briefly saw with my binocs a big dragon with bright green thorax & pale abdomen recently emerged take its first flight only to be eaten by a tree swallow! Or would *A. junis* be emerging now. They are the

only ones I know of with green thoraxes. It was along edge of the Crystal river.

If there is anyone who would like a free place to stay and go look for dragons I would be more than willing to put them up. I would very much like to be in the field with someone who knows what they are doing. Are you & Mike doing field work every week and if so would it be possible for me to tag along?

I have a net, acetone, a few of the bags you gave me, and will start collecting ones that are new co. records, but I believe that you want sexually mature individuals and many of the ones I am finding and photographing are tenerals maturing in fields.

(From Jody Clark 05/22) (email: etc@traverse.com)

Mark, yesterday on west side Pearl Lake, state land, sandy road, sunshine patches paved with variety of dragons. They were so thick it seemed they were touching wings. I'm still not good enough at ID to be able to quote everything, and by that time I had a non-bio companion with me at the wheel of her auto (I walk out, she picks me up...more later perhaps) so not enough control, but there was a beautiful variety.

Am I correct in feeling they were there due 1) cold front moved through after record heat weeks, 2) moderate breeze. Damselfly were lining the shore, but I did not notice them interior. However the damselfly were all very healthy size, as big a average dragon. As the dragons use our old road as a 'stream' 1/4 mi or more from water, I am curious if anyone has a theory of why? Mostly it is congregation w/out mating.

(From Steve Ross 05/19) (email: rosssb@tucker-usa.com)

Mark:

I got out last thursday and today to collect dflies in Mecosta County. Found a wonderful site in the Haymarsh SGA where there are thousands of them. So far I think I have about 15 species, several of which I think are new to the county records. ...

From: Samuel Keith Riffell <riffells@pilot.msu.edu>

Mark,

I can do you one day better on *Nannothemis* -- May 23 in Chippewa county. I first collected it at this same site (which I visit weekly) on July 5 last year!!!! Are we really 6-7 weeks ahead??

Also, FYI from my study area in the Eastern UP: *L. quadrimaculata*, *L. julia*, *A. junius* (of course), *E. spingera*, *B. janata* are all very numerous at the wetlands and are breeding. I have also seen *M. illinoensis* (19 May), *G. spicatus*, *G. cornutus*, *Leucorrhinia*, *D. libera*, and a newly emerged *A. canadensis* (18 May).

What a crazy year.

Can someone help this guy out? I have not collected these species, and we have minimal information on adult records. (Mark)

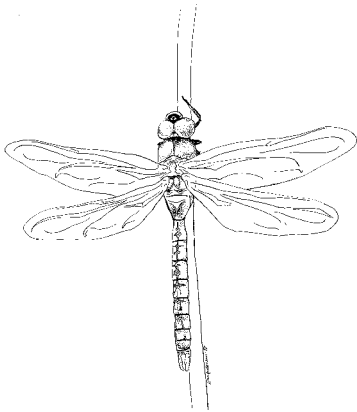
I'm a grad student at Wright State University in Dayton, OH. My thesis work involves resolving the dispute over the taxonomic designation of *Cordulegaster diastatops* and *Cordulegaster bilineata*. I plan to use RAPDs for testing for genetic differences. I also plan to look at the ecological behavior of both species if possible. I notice from your distribution maps that both species occur in areas of southern Michigan. I'd be interested in visiting these areas for observation and possible collection of a few individuals. Any information you can give about specific locations would be greatly appreciated. Also I could use any information on permitting or receiving permission to visit any of these areas. If you have any information, please e-mail me at my school address: s009emp@paladin.wright.edu.

Thank you,
Erik Pilgrim

NEW KANSAS DAMSELFLIES BOOKLET

Roy Beckemeyer and Don Huggins have done it again with a full-color guide to the damselflies of Kansas. The March 1998 Kansas School Naturalist, titled "Checklist of Kansas Damselflies" is Vol. 44 No. 1, and is free from: Kansas School Naturalist, Box 4050, Emporia State University, 1200 Commercial Street, Emporia, KS 66801-5087. I suggest that you send a dollar or two to help defray the cost of the publication.

This checklist contains many nice photos that will assist you in identifying some of the fauna from Michigan.



EARLY SPRING SIGHTINGS

Mark F. O'Brien

Well, El Niño has kept people busy this spring. If you recall, last year's spring issue contained a list of early records for Michigan (April and May). Of course, last year's

spring was cool and late. This year is a different story, and with phenology about 2 to 2.5 weeks ahead of schedule, some early records have resulted.

Sam Riffell has been working in Chippewa Co., and has provided some early records, and since he's out at his site on a regular basis, he's got a good feeling as to how early adults are emerging, especially as compared to last year. Carl Freeman has been providing sightings from Benzie Co., which is really great, because he is far enough North that the area is about a week behind Ann Arbor; however, he's in the influence of Lake Michigan, too, which probably influences conditions as well. I have also been collecting adults since May 5, and reports of *Anax junius* (northward migrants) have been coming in since the end of March. Mike Kielb relayed a report of *A. junius* off Lake Erie marshes around March 29; sightings were in Ann Arbor around April 5. The recent issue of *Argia* (Vol. 10 No. 1, April 1998) contains several articles on *A. junius* migratory patterns that should be of interest.

The early records bring up an interesting point. Adult emergence records need to be placed in context of the area and climatic conditions for them to have greater meaning. For instance, May 9 is the earliest record for *Cordulegaster maculata* in Michigan. Adrienne O'Brien caught the female along Embury Rd. in Washtenaw Co., not far from a small stream, and the specimen had emerged only hours before. Therefore, we know the emergence date with great certainty. However, in a "normal" year, I suspect that individuals would emerge about 2 weeks later. So, with a range of dates from May 5 to ???, one might get the impression that adults emerge quite early in Michigan. This is where graphing the number of records for the dates would also be a good idea. If we have 3 records for May, 40 records from the first week of June, 60 for the second, 50 from the third week, and 10 for mid-July, then we get an rough idea of when the adult flight period is taking place. Or, do we? Is it just a reflection of when collectors are out in the field? Obviously, the more data the better.

Based upon my exchanges with MOS participants, it looks like we will be getting a tremendous amount of data this year, and with the early sightings, our field season will be the longest ever (supposing we don't get a hard freeze in August!). Mass emergences of species has been reported by several people, and I don't recall ever seeing this phenomenon in odonates. You folks in the field keep your eyes open and keep on with the collections and observations! Your contributions are most welcome additions to our growing body of information.

Summary of Early Records for 1998 to May 20

Species	Date	County	Record by
<i>Anax junius</i>	04/05	Washtenaw Co.	MAK
	04/17	Livingston Co.	MFO
	04/25	Washtenaw Co.	MFO
	04/30	Benzie Co.	CAF
	05/08	Ingham Co.	SR
	05/14	Marquette Co.	EB
<i>Amphiagrion saucium</i>	05/03	Benzie Co.	CAF
<i>Cordulia shurtleffi</i>	05/05	Washtenaw Co.	MFO
<i>Epithea canis</i>	05/05	Washtenaw Co. (1st Co. Record!)	MFO
<i>Libellula julia</i>	05/05	Washtenaw Co.	MFO
	05/08	Ingham Co.	SR
<i>Ischnura verticalis</i>	05/05	Washtenaw Co.	MFO
	05/08	Ingham Co.	SR
<i>Ischnura posita</i>	05/17	Washtenaw Co.	MFO
<i>Chromagrion conditum</i>	05/05	Washtenaw Co.	MFO
<i>Enallagma boreale</i>	05/05	Washtenaw Co.	MFO
<i>Leucorrhinia hudsonica</i>	05/05	Washtenaw Co.	MFO
	05/06	Benzie Co.	CAF
<i>Leucorrhinia intacta</i>	05/12	Benzie Co.	CAF
<i>Libellula quadrimaculata</i>	05/08	Benzie Co.	CAF
	05/09	Washtenaw Co.	MFO
<i>Libellula pulchella</i>	05/08	Ingham Co.	SR
<i>Basiaeschna janata</i>	05/09	Washtenaw Co.	MFO
<i>Cordulegaster maculata</i>	05/09	Washtenaw Co.(1st Co. Record!)	MFO
<i>Epithea cynosura</i>	05/09	Washtenaw Co.	MFO
<i>Libellula lydia</i>	05/12	Benzie Co.	CAF
	05/15	Washtenaw Co.	MFO
<i>Aeshna mutata</i>	05/15	Washtenaw Co.	MFO
<i>Calopteryx maculata</i>	05/14	Benzie Co.	CAF
	05/20	Lenawee Co.	MFO
<i>Hetaerina americana</i>	05/20	Lenawee Co.	MFO
<i>Calopteryx aequabilis</i>	05/20	Lenawee Co.	MFO
<i>Libellula cyanea</i>	05/20	Lenawee Co.	MFO
<i>Erythemis simplicicollis</i>	05/20	Lenawee Co.	MFO
<i>Ophiogomphus rupinsulensis</i>	05/20	Lenawee Co.	MFO
<i>Argia fumipennis violacea</i>	05/20	Lenawee Co.	MFO

MFO = Mark F. O'Brien; CAF = Carl A. Freeman; MAK = Michael A. Kielb; SR= Sam Riffell; EB = Ethan Bright

SAMPLING PROTOCOL FOR ODONATES IN AQUATIC HABITATS

Ethan Bright

Larval odonates are aquatic, and can be found in just about every type of aquatic habitat. Below is a brief summary of the methods and materials used to find larval Odonata.

Materials Used for Larval Collection

Being well-supplied and organized for aquatic sampling requires some planning and certainly more materials than when collecting for adults. Below is a list of required and recommended items. Consult your MOS Handbook or ask MOS members for sources to purchase these materials.

1. Net, sieves and pans. Several types are recommended. D-nets are the best, all-purpose net for both lotic and lentic habitats. They can be used in kick-seining for flowing waters, and are excellent for reaching difficult areas, such as underneath overhanging vegetation, undercut banks, from

piers, and from the edge of water. A high-quality net with approximately 0.5-mm mesh works best. Kick-seines are very good in flowing waters, and can be inexpensively constructed with door screening nailed to several planks of wood. They are difficult to use in lentic waters, as one must move around in order to capture dislodged organisms, and are even more difficult to use in areas thick with vegetation or other obstructions. Small dip nets are also useful, especially for small habitats such as tiny pools, seeps and springs. White sorting pans are very useful for sorting organism – the white background makes it easy to find organism moving among the inevitable debris. Finally, USGS round steel sieves (0.25 – 1.00 mm mesh diameters) and mesh from kick-seines are useful for sorting through material from nets and seines. Odonates generally will begin to move about when water drains through the mesh, and can thus be easily identified and picked.

2. Alcohol. Preferred is ethyl or grain alcohol (ETOH), but this is difficult to legally obtain without permit. However, isopropanol can also be used, but this tends to dehydrate specimens and make them stiff and brittle. When merely preserving all sampled material, it is best to use 95% alcohol, as water from collected debris will add considerable water to the container. Too much water will allow fungi to develop upon specimens. Also, larval Odonata are predacious, and sometimes take several minutes to die in alcohol and thus can damage other specimens (particularly if you are collecting aquatic organisms other than Odonata). It may be a good idea to avoid putting too many specimens in one container. At least separate Zygoptera from Anisoptera, and the former has fragile caudal gills which are easily broken off and lost from the specimen, and which are very important diagnostic features. When returning to the lab to sort, place the specimen in 70% ETOH (or other alcohol) and add a few drops of glycerin, which will help prevent desiccation. Contact MOS for obtaining ETOH for collection purposes ONLY. BioQuip also sells ETOH that is doctored with an poisonous and odorless additive (this is required by law). Shipping a liquid is also costly.

3. Vials, jars or whirl packs. 4 dram vials, 1 or 2 ounce jars are ideal. Plastic vials can also be used, and are less likely to break. Good quality lids (e.g., polyseal) are recommended. Do not forget to mark containers to identify collection location, date and collector. Whirl packs are an excellent idea when one is taking many samples, as these are disposable, light-weight and generally do not leak. One can easily write locational data on them. Finally, I also use 0.25 dram (“quarter-dram”) shell vials for coenagrionids. Three of these can be placed in one 4 dram vial, and are very useful to protect these delicate creatures and their fragile gills from being damaged from movement. These can be stoppered with cotton, which can be inexpensively purchased from cosmetic sections of stores (the thick ones for facial makeup are the best).

4. Clothing and gloves. Although the weather may be warm, the water may be a lot colder than you think. If you accidentally become wet, there is a chance of hypothermia,

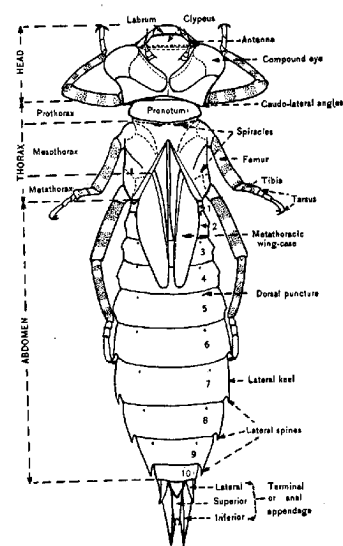
particularly if the weather suddenly changes. Bring a towel and spare set of dry clothing. And how to prevent getting wet? A good set of chest or hip waders are indispensable, and rubber waterproof aquatic sampling gloves (Bemar) are also recommended. These are particularly a good idea if one has doubts about water quality. And because water – particularly lakes – reflect light, don’t forget sunscreen during the summer.

5. Forceps. Finer tipped forceps are preferred, particularly for more fragile (e.g., Zygoptera) specimens.

6. Notebook, preferable water-resistant (e.g., rite-in-the-rain), and **pencils** (more resistant to rain than ink, and also durable in alcohol). Pigma Micron ink pens (01 recommended) also work well, but allow about a minute to dry before immersing in fluid. Also, don’t forget **labeling paper** for making labels!

Procedure for Collecting Larval Odonata

Below is an outline on how to collect for larvae. Effective and useful collecting is not merely finding the organism and preserving it in a vial of alcohol for posterity. Rather, you are a naturalist and scientist, not a hunter - observe the environment in which the specimen was taken. This way, you can make a really *useful* contribution to our knowledge and, at the same time, truly appreciate the function and beauty of the organism in study.



Sampling Methodology

1. Site information. Note the type and name of habitat you are sampling – spring, seep, brook, stream or river; a pool, pond, fen, bog and lake. Provide location data including state, county, and some locality reference, such as a road or distance from a town. Other useful information is either latitude-longitude and/or township-range-section. This can be obtained from a USGS topographical map, road atlases and the newer GPS units. Note the date and name of collector. If you have the ability, note important features

such as the type of aquatic and nearby terrestrial vegetation, the condition (human impact) of a habitat, flow conditions (low or baseflow, or high flow), etc. Refer to the MOS Handbook for more information.

2. Sampling Notation. Differentiate between samples from a particular locality. For example, if you sampled from an undercut bank, a riffle, a run, and a backwater area with aquatic vegetation, a bog pool, among cattails or algae, or wave-portion of a lake, you can really improve our knowledge by noting where particular odonates were collected by separating individual samples, instead of pooling them all in one container. Make separate references to these different habitats in your field notebook.

3. Sampling Method. Below is a general methodology for sampling for odonate larvae. Small pools, springs and seeps are best sampled with a small dip-net, with contents being placed in a pan or screen and gently sorted. These can be fragile ecosystems, so do not recklessly tread in the water, or sample too many times in one particular area. Streams and rivers are best sampled with a D-net or kick-seine. Place the net downstream about 1 foot from your feet, and then with your feet disturb the substrate. Organisms are then dislodged and collected by the net or screen. If using a D-net, empty the container into a pan or screen and pick the organism. The D-net can also be used to in a similar fashion to sample from underneath undercut banks, and also swept through aquatic vegetation growing in slow-moving or still-ports of the stream or river. Samples from sandy or silty areas from both lakes and streams are best sampled with the D-net, with contents emptied onto a screen or sieve. Also, do not forget to sample among *and* underneath woody or leafy debris accumulations, for these habitats often harbor a great number of odonate and other aquatic insect larvae. If you need any further information.

4. Preservative. Place the specimen in a vial containing alcohol. Do not place too many different kinds of organisms (or odonates themselves) in a container. It takes some time for these organisms to expire, and they may trash about or attempt to feed upon one another. Thus, a specimen may be damaged, making future identification more difficult. If a lot of debris is placed in the container with the organism, it is probably best to use 95% alcohol to compensate for dilution. Replace with 70% alcohol back in the lab.

5. Identification. Larvae of Michigan Odonata can be identified to species using an on-line www key at the following address: <http://insects.ummz.lsa.umich.edu/michodo/test/home.htm>. For other identification resources, contact Mark O'Brien or Ethan Bright. Identical specimens should be placed in individual vials with a label noting the identity (Family, Genus and Species) and Locality (State, County, Habitat and Locality, Date, Collector and Field Notebook Reference Number). This information should then be made available to the MOS so that we can include this information in our computer database.

Brief Survey of Aquatic Habitats

There are many kinds of aquatic systems, but these can be classified as either *lentic* (standing-water) or *lotic* (running-water).

Lentic systems range from temporary pools to large, deep lakes, and tend ecologically to be more self-contained, with recycling occurring within the basin. Types of lentic systems are governed by climate, geology and basin shape. These range from temporary pools that can arise from depressions filling from rain or an elevated water table, to ponds in which aquatic vegetation is found throughout the lake, to bogs in which are covered by a mat of floating sphagnum, and lakes which there are large sections of open water and great differences in water chemistry and temperature. Lentic habitats are divided into zones: *pleuston* (surface film); *limnetic zone* (open water to the depth of photosynthetically-effective light penetration; *profundal zone* (area below the limnetic zone (usually below 10 m) where light penetration is inadequate for plant growth; *and littoral zone* (shallow region with light penetration to the bottom, or benthos, and characterized by macrophytic (rooted aquatic plants and macroalgae) growth. For reasons of productivity and food availability, predator avoidance and emergence needs, almost all larvae of lentic Odonata are found in the littoral zone. Zygoptera and Aeshnidae, which are clingers, and some Libellulidae, will be found among the aquatic vegetation; Gomphidae, Corduliidae, Macromiidae and most Libellulidae are sprawlers or burrowers among the substrates. Some Coenagrionidae, Lestidae and Libellulidae are adapted to develop in small, temporary pools. These are all best sampled with the D-frame or dip net, depending on the size of area being sampled.

Lotic habitats are a direct result of landscape geomorphology, and result simply from water precipitated upon the land being drained by gravity to lower elevations. Sources of water for lotic systems include direct input from precipitation, surface and subsurface drainage, and groundwater. Water eventually collects into channels to form seeps and springs, creeks and streams, and ultimately rivers. A myriad of factors work to form river channels and the ecosystems they influence. Rivers respond to changes in discharge and sediment load, and these factors control a rivers' response in adjusting channel form – and habitats. Seeps and springs points at which groundwater reaches the surfaces, and can be a mere trickle of water that appears as wet ground, or a forceful stream of water from the ground or hillside source. Several odonate larvae are found in these habitats (e.g., *Tachopteryx*, *Cordulegaster*). Brooks, stream and rivers usually provide more diverse habitats for larval Odonata. The riffle-pool sequence forms as part of a regularly-spaced alteration between areas of erosion and deposition within the stream channel. Riffles are areas of particulate deposition (during bankfull discharge), and during low flow, because water must rise over riffles, mean water velocity is higher. Clingers such as *Argia*, *Boyeria*, *Basiaeschna* may be found here, but generally few odonate larvae are found here (though many other aquatic insect taxa). However, riffle areas with larger stones and rocks often

have silt and sand accumulated about them, and these should be sampled thoroughly. *Ophiogomphus*, *Cordulegaster*, and other sprawlers and clingers are found here. Pools and runs are characterized by finer substrates, greater depth and lower velocity. During high flow, these are areas of erosion. Areas of finer substrates, including sand bars after river bends, attract burrowing and sprawling Gomphidae, and other sprawlers such as *Cordulegaster*, *Hagenius*, Macromiidae and many Libellulidae. Flow and channel characteristics are also the forces creating other important stream habitats, such as depositional areas of low flow and floodplains that often support aquatic vegetation, log jams (where water power is insufficient to transport it out of the channel), and variously shaped stream banks and undercuts. These stream and river habitats perhaps provide for the greatest number and diversity of odonate larvae.

Final Word

After some initial hesitation, you'll find aquatic sampling is a lot of fun. However, it is by nature a procedure of disturbance. We need to keep disruption to these habitats to a minimum. Whenever safe, try to enter a sampling point from land, rather than moving continually within aquatic habitats. This should be always done in seeps, springs and small pools. This may not be possible in larger streams and rivers, particularly if the current is strong, and in larger lakes. In this case, move about slowly, trying to disturb the substrate as little as possible. Finally, it is not necessary to take *everything*: in fact, you can learn a lot by releasing the organism back into the water and watching what it does. Examine how larvae propel themselves through the water, and how gomphids, macromiids, and cordulegastrids attempt to conceal themselves within the substrate, or how aeshnids and zygopterans cling to substrate surfaces. Also, if you have a large enough contain, think about perhaps keeping these alive in an aquarium or shallow pan for a few days. Although perhaps not as beautiful as the adult stage, aquatic larvae have a different set of colors and hues that look quite stunning underneath the microscope. Collect other aquatic organisms as food, and then examine how odonate larvae feed – you'll find it as exciting, if not more, than that of the adults. Unless you have access to an air pump, release them back to where they were collected within a few days.

If you have any questions or need any particular resource so make your studies possible, feel free to contact Ethan Bright or Mark O'Brien. We can also recommend various texts and journals that will considerably help in appreciating larval odonate biology and ecology, and the aquatic habitats in which they live.

Northern Michigan - 1998 1st Sightings

Carl Freeman

SBDNL = Sleeping Bear Dunes National Lakeshore
LSA = The pond in front of our house, Blaine TWP, Benzie Co.

UHLP = Upper Herring Lake Preserve of Gd. Traverse Reg. Land Conserv., Benzie Co
PP = Pond along Peterson Rd., SBDNL, Nearest town is Honor, Benzie Co
SL=Shell Lake, SBDNL, Leelanau Co.
OC= Otter Creek, SBDNL, Leelanau Co.

1. *Anax junis*, Ad. male; 4/30/98, PP
2. *Libellula lydia*, teneral, 5/3/98, LSA
3. *Amphiagrion saucium*, teneral, 5/3/98, LSA
4. *Leucorrhinia hudsonica*, teneral, 5/6/98, PP
5. *Libellula julia*, teneral, 5/6/98, PP
6. *L. quadrimaculata*, 5/8/98, OC, SBDNL
7. *Gomphus* sp., 5/12/98, UHLP
8. *Ischnura verticalis* 5/15/98, LSA
9. *Amphiagrion saucium*, 5/3/98, LSA
10. *Celithemis elisa*, 5/21/98, SL
11. *Leucorrhinia intacta* 5/7/98, LSA
12. *Didymops transversa*, 5/18/98 Blaine TWP, Benzie Co
13. *Epiptera* sp.
14. *Cordulegaster* sp.
15. *Calopteryx maculata*, 5/14/98, OC, SBDNL
16. *Basiaeschna janata* 5/14/98, OC, SBDNL
17. (Probable, *Ophiogomphus rupinusulensis*, 5/21/98 Crystal River, Glen Arbor)
18. (probable *Leucorrhinia glacialis*, 5/21/98 SL, SBDNL)
19. (Probable *Enallagma* sp., "Bluets" in several places.)



Calopteryx maculata