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THE DRAGONFLY SOCIETY OF THE AMERICAS

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JOURNALS PUBLISHED BY THE SOCIETY

ARGIA, the quarterly news journal of the **DSA**, is devoted to non-technical papers and news items relating to nearly every aspect of the study of Odonata and the people who are interested in them. The editor especially welcomes reports of studies in progress, news of forthcoming meetings, commentaries on species, habitat conservation, noteworthy occurrences, personal news items, accounts of meetings and collecting trips, and reviews of technical and non-technical publications. Articles for publication in **ARGIA** should preferably be submitted as hard copy and (if over 500 words) also on floppy disk (3.5" or 5.25"). The editor prefers MS DOS based files, preferably written in WORD, WORD for WINDOWS, WordPerfect, or WordStar. Macintosh WORD disks can be handled. All files should be submitted **unformatted and without paragraph indents**. Each submission should be accompanied by a text (=ASCII) file. Other languages should be submitted only as text (=ASCII) files. Line drawings are acceptable as illustrations.

T. Donnelly (address below) is the interim editor of **ARGIA**.

BULLETIN OF AMERICAN ODONATOLOGY is devoted to studies of Odonata of the New World. This journal considers a wide range of topics for publication, including faunal synopses, behavioral studies, ecological studies, etc. The **BAO** publishes taxonomic studies but will not consider the publication of new names at any taxonomic level. Enquiries and submission of manuscripts should be made to **BAO** editor T. Donnelly, 2091 Partridge Lane, Binghamton NY 13903. Final submissions (after review) should be made on floppy disk, as above, with illustrations in final form and preferably adjusted to final size.

MEMBERSHIP IN THE DRAGONFLY SOCIETY OF THE AMERICAS

Membership in the **DSA** is open to any person in any country. Dues for individuals in the US, Canada, or Latin America are \$15 for regular membership and \$20 for contributing membership, payable annually on or before 1 March of membership year. Dues for members in the Old World are \$20. **ARGIA** is mailed Air Mail outside of the US and Mexico, and First Class in those countries.

The **BULLETIN OF AMERICAN ODONATOLOGY** is available by a separate subscription at \$15 for members and \$18.75 for non-members and institutions.

Cover: Computer-aided drawing of *Ophiogomphus edmundo* (handrawn pencil sketch based on color photograph, inked and scanned into Adobe Photoshop; detail added with Photoshop tools, and basic colors added by sampling colors from scanned color slide--Ken Tennessen).

ARGIA - The News Journal of the D.S.A.

IN THIS ISSUE

How did you spend the off season? This year I visited museums, mainly to see type specimens of dragonflies. First I visited the Museum of Comparative Zoology in Cambridge, where I found the very interesting story of formicophagy (I just made that up) recounted later in this issue. Then I went on to Florida for what I hope will become an annual visit to Bill Mauffray and the FSCA collection. Jerrell Daigle came down from Tallahassee and we had a fine time. In March Ailsa and I went to Germany and England. In Germany I visited the Ris collection in Frankfurt, where I met Wolfgang Schneider, and the Humboldt collection in Berlin, where I met Günther Peters and Werner Piper. I also stayed with Gerhard Jurzitza, whose attic collection is a museum in itself. Jurzitza's book, "Welche Libelle ist das?" is a superb field guide to German Odonata, illustrated with wonderful color photographs. Odonatology is alive and very vigorous in Germany! In England we visited London where I spent several days in the British Museum, visiting with Steve Brooks and acquiring his newly published gem, "Field Guide to the Dragonflies and Damselflies of Great Britain and Ireland". This is probably the finest field guide to Odonata ever produced, lavishly illustrated and with a highly articulate and thorough introductory section. Wouldn't it be nice to have such a guide for the US? This guide, however, treats only the 38 species of the British Isles; a proportionate guide for the US and Canada would weigh 8 ½ pounds and cost about \$380! Both of these books remind me of how much we need a good field guide in the US - one that really tells how you how to identify both adults and larvae, and also discusses habits and life history.

The calendar tells us that the time for mending our nets and sniffing the spring air is at hand. I haven't seen my first odonate yet this year, but only because I have been stuck indoors assembling ARGIA. I am certain *Anax* has arrived on our ponds - a migrant from the south of course. Both Richard Orr and Mike May have contributed articles on migration in this issue. This is one of those subjects that a large,

vigorous, and connected group of amateurs can really contribute to.

We have several trips coming. The Georgia meeting is only a few weeks away, so get ready! In early May there may be the first ADIP meeting (if you're not already planning to attend, this notice will be too late). In June the northeastern group meets in southern Maine, and a week later there will be a week-long seminar on dragonflies and damselflies also in Maine. In July we all go to Nebraska, where Roy Beckemeyer has planned a very fine meeting in a place that will be new for almost everybody. In August the main ADIP meeting will be in New Brunswick. Whew!

This issue reports some very interesting records, mainly from older material. The most interesting is Dennis Paulson's find of *Orthemis discolor* in Fayette Co. TX. Only a week previous to his announcement I had sent an e-mail to a member in Texas suggesting that *discolor* was due to be found in the state. And then it was! On the heels of this announcement was the news by Sid Dunkle of having also found a specimen taken in Gonzalez Co.

We also report interesting finds of *Somatochlora williamsoni* from Connecticut, *Neoneura amelia* from Texas, *Nehallenia irene* from Alaska, *Tramea lacerata* from British Columbia, and *Erythrodiplax minuscula* (again) and *Tramea abdominalis* from New York.

Richard Orr's account of Sideling Hill came just as I was seeing this for the first time myself (but too early for the dragonfly part). It is truly a geological treasure, and the bugs sound just as good.

Paul Catling speculates that *Enallagma civile* might be extending its range to the north in New York. Roy Beckemeyer gives a thorough account of the only *Somatochlora* found on the Great Plains, *S. ensigera*. Visitors to Valentine should be able to find this very nice species.

I have assembled several volunteers to write their thoughts about a problem that is vexing many of

us: the status of the widespread *Enallagma cyathigerum* and the more local *E. vernale*. Several of us now feel that they should be considered species. If so, there may be extensive intergradation to a degree hitherto unknown in the dragonfly world, but familiar to ornithologists. Jean-Guy Pilon told me recently that there are many similar occurrences of intermediate forms in Québec also. He also reminded me that Fr. Adrien Robert, in his wonderful guide to Québec Odonata, had pointed out the same thing.

We present the usual notices and short notes. The most eagerly awaited of these is the news that orders are now being taken for the reprinted (not copied) edition of Walker's famous three-

volume set on the Odonata of Canada and Alaska. At least some workers are going to be able to have a thorough guide.

We finish this issue with a report on the status of the dot-map project. We have accomplished a great deal and can now see where we are going. There is a large amount of work ahead, but the gestures of cooperation have been overwhelming.

I quickly found a home for my copy of Needham & Westfall. If I had had two dozen copies, I could have distributed them all. The next time you visit a used book store, keep your eyes open!

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CALENDAR OF UPCOMING MEETINGS AND TRIPS		
Group and Place	Date	Contact
ADIP; New Brunswick	9-10 May	Paul Brunelle
southeastern DSA; northern Georgia	15-17 May	Ken Tennessen
northeastern DSA; southern Maine	19-21 Jun	Paul Brunelle
Dragonflies of the NE seminar, Steuben ME	28 June - 4 July	Paul Brunelle
DSA annual; Valentine NB	17-24 July	Roy Beckemeyer
ADIP; New Brunswick	7-9 Aug.	Paul Brunelle

ADIP MEETINGS - MAY AND AUGUST

Paul Brunelle (as849@chebucto.ns.ca)

People are starting to ask me when we're going to have the ADIP meetings in the coming summer, so I thought I'd propose some dates and see what everyone thinks.

Big news this year was Jim Edsall's collection of *Somatochlora brevicincta* in a bog just north of Moncton, New Brunswick, so we will concentrate on that (lovely) bog this year.

We could have our first meeting the weekend of May 9th and 10th at the Moncton area or nearby. We could sample for larvae at the bog and spend some time with slide shows and informal seminars. There is always the chance that we will add *Williamsonia lintneri* to the Canadian list, although I expect *W. fletcheri* will not be out yet. This might best be a meeting for locals, but everyone would be welcome.

The main meeting could be on the weekend of August 7th, 8th and 9th, again at Moncton or nearby, and we would principally be after the

little green-eyed devils on the bog. *Aeshna subarctica* and *sitchensis*, and *Somatochlora incurvata* will also likely be there, and it is not inconceivable that we will encounter *Leucorrhinia patricia*, which was taken at Kouchibouguac National Park not a long way away. Stuart Tingley and Jim Edsall know this area well. There may be the option of going on to the Cape Breton Highlands, where a number of northern species can be seen, including *S. brevicincta* and *S. septentrionalis*.

I would appreciate any feedback on the proposed dates and sites, and any of you who might be attending the NABS meeting on PEI June 2nd to 5th should contact one of us locals for advice of where to sample to and from.

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GEORGIA MEETING: SE MEETING IN CHATSWORTH

Ken Tennessen and Steve Krotzer

The 1998 Southeastern meeting of DSA will be held in north Georgia, May 15 through 17. We

and the only requirement will be to let Brunelle know where and when you encountered those species.

Accommodation is available in Fryeburg at the Oxford House Inn (800-261-7206). If you intend to attend please book directly and let Brunelle know that you have done so (both to see if we can get a better rate and to allow booking of the dining room for meetings). Overflow would be in the Admiral Peary House (800-237-8080).

We will meet at the Oxford House on Friday the 19th at 7:00pm and an itinerary will be proposed for the following two days.

If you have any questions please contact Paul-Michael Brunelle, 2460 John Street, Unit 1 Halifax, Nova Scotia, Canada B3K 4K, 902-423-1845, as849@chebucto.ns.ca

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1998 DRAGONFLY SOCIETY OF THE AMERICAS ANNUAL COLLECTING MEETING IN VALENTINE, NEBRASKA

Roy Beckemeyer

Make your reservations NOW for the meeting. The motels are already filling up on the weekends of the meeting with groups of canoers. We will operate out of the Super-8 Motel, but the town is small, and it will not be terribly inconvenient to locate at another motel in Valentine. You will likely not be able to make reservations at the Super-8 now for the entire period of the meeting. I know of folks staying at the Raine and the Trade Winds in addition to the Super-8. The motels in Valentine are:

Super 8 Motel AAA (402) 376-1250; 1-800-800-8000

Motel Raine AAA (402) 376-2030; 1-800-999-3066

Trade Winds AAA (402) 376-1600; 1-800-341-8000

Valentine Motel (402) 376-2450; 1-800-376-2450 ext. 10

Dunes Motel (402) 376-3131

Ballard Motel (402) 376-2922

Fountain Inn 7 (402) 376-2300

Comfort Inn (402) 376-3300; 1-800-478-3307

Our Own Home (402) 376-1662; 1-800-376-1662

Cook out:

Many of us will cook our dinner in the magnificent Valentine City Park. Watch otters play along the creek while you cook and drink beer.

Preliminary schedule of events:

Thursday, July 16

Early arrivals gather at the Super-8 parking lot for area familiarization and collecting.

Friday, July 17: Continued collecting and meeting up with old and new friends. Check in and get area info and maps. Dinner arrangements TBA. DSA Meeting 7:00pm - 11:00pm, Cherry County Office Building Meeting Room. Dennis Paulson has indicated that he will have slides of African odonates to share with us during one of the evening meetings (either Friday or Saturday).

Saturday, July 18

Formal collecting trips: **Smith Falls State Park**, **Fort Niobrara National Wildlife Refuge**, **Niobrara River** and streams that feed into it, **Merrit Reservoir area**, including Boardman Creek, Nature Conservancy Niobrara Valley Preserve, **Valentine Fish Hatchery**. (Collecting permits will be arranged for ahead of time)
Duck Lake, Valentine NWR

Some areas such as Boardman Creek will not accommodate large numbers of collectors at one time and will have to be visited by smaller groups. We also have permission to visit The Nature Conservancy Jumbo Valley Fen site. (It is further away and will take the better part of a day to visit from Valentine, but if there is enough interest, we will arrange a special trip. Please contact Roy Beckemeyer if you think you would like to visit this neat site, as I will have to let the Nature Conservancy folks know ahead of time when we are coming and how many will be in the group).

DSA Annual Meeting: Saturday, 7:00pm - 11:00pm, Cherry Co. Office Bldg. Mtg.Room.

Sunday, July 19: Continued collecting trips.

Monday, July 20: DSA Group Canoe trip down the Niobrara. (Approximately \$15.00 per person canoe rental.) Get those gomphids by having them land on the "gunnels" of your canoe!. Let us know if you wish to participate so that we can arrange for the canoes and transportation.) Informal meeting to plan the Tuesday "Odonate Larval Stomp" - The Nebraska Game and Parks Department personnel from the Valentine Fish Hatchery will be emptying a fish rearing pond, either on the Hatchery or on the Fort Niobrara NWR, and we will be collecting the larvae in a probably unique approach to larval sampling that may never have been done before.

Tuesday, July 2: The DSA "larval sampling team" will conduct the sampling of the pond, collecting larvae for subsequent sorting and use in the Workshop on the Nature Conservancy grounds (Niobrara Valley Preserve). The team members will be staying at the preserve for three nights (Tuesday through Thursday). There are two cabins, each holding five bunks and therefore ten people. There is a kitchen available and separate men's and women's bath facilities. Since there is only room for 20 folks, you need to sign up early. (We have 15 tentatively signed up at present.)

Wednesday, July 22 & Thursday, July 23: Using the larval material collected at the pond on Tuesday and specimens that we will obtain from the Nature Conservancy property (Niobrara River and its feeder streams), we will all participate in an Odonate Larva Workshop, to be led by Ken Tennessen. We will also be assembling a display box of spread Odonata specimens to leave as an educational aid for the Conservancy.

Friday, July 24: End of post-meeting activities.

THINGS TO DO NOW:

Decide on your itinerary and make motel reservations with the Super-8 or the motel of your choice. Do so very soon, as many canoeists are making their reservations for next summer now, and the motels are filling up quickly.

Look up the Valentine web site (At: <http://www.valentine-ne.com/main/>) to see what other activities are going on and what other things there are to see and do in the area. For

example, there is a Casino on the Rosebud Sioux Reservation just 30 miles or so north of Valentine for those inclined to do some gambling. The Black Hills are not too much further to the west, and this might be a good time to add them to your plans.

Once you have made your plans, let Roy Beckemeyer or Steve Hummel know of your intentions so that we can stay on top of the arrangements. Thus far, attendees from whom we have heard include the Roger Long family from Idaho, Marian Brickner and Joe Smentowski from St. Louis, the Donnellys from New York, the Flints from Washington, DC, O.J. Goode and Steve Hummell from Iowa, Nayeem Hoq from Maryland, Steve Valley from Oregon, Dennis Paulson from Washington, Bob Percelles and Jerrell Daigle from Florida, Clark Schiffer from Pennsylvania, Ken Tennessen and the Krotzers from Alabama, and John Weber from Minnesota. This is a nice representation of geographical areas.

Let one of us know of your wishes regarding the canoe trip: number of canoeists, and whether you want to rent one or bring your own. Again, let us know soon so we can get the canoes reserved.

Let one of us know if you wish to give a talk or paper and what you will need in the way of audio-visual equipment.

Let us know if you wish to participate in the post-meeting activities with the Game and Park Department and with the Nature Conservancy. Remember that if you wish to stay on the Conservancy Preserve in the cabins, you need to get your request in early, as there is only room for 20 people overnight (we could accommodate more during the day).

If you would like to help with the display case and/or the collection and preparation of specimens for the case, let us know that as well.

Roy Beckemeyer, 957 Perry, Wichita, KS
67203-3141, (316) 264-0049,
royb@southwind.net

Steve Hummel, P O Box 121, Lake View, IA
51450, mshummel@netins.net (Michael S.
Hummel)

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RIDES NEEDED TO VALENTINE

Marian Brickner of St. Louis will tentatively be flying from St. Louis to North Platte, Nebraska for the July Meeting of the DSA and would like to make contact with someone who might either be flying in that way or be passing through North Platte on their way so that she could share a ride to Valentine. Her email address is: marian@anet-stl.com Please either contact her directly or contact Roy Beckemeyer at royb@southwind.net (or write Roy Beckemeyer, 957 Perry, Wichita, KS 67203-3141, or call me at 316-264-0049). Anyone else wishing to share rides or car pool can also contact me, and if there is anyone in your area travelling to the meeting, I will try to put you in touch with them.

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DSA MEETINGS - A REQUEST FOR INPUT

Jerrell Daigle (daigle_j@dep.state.fl.us)

With Springtime on the way, it is time to think about future meeting sites! The DSA Meeting Committee would like to hear all offers to host future DSA National and regional meetings. The 1999 National DSA meeting will be held in the Northeast, coordinated by Nick Donnelly. Also, The 2000 National DSA meeting will be held in the Northwest and the 2001 meeting will be in the Southwest. Please contact Dennis Paulson, Steve Valley, Rosser Garrison or me if you want to host the meeting somewhere in these two regions!

Likewise, I need requests to host the 1999 DSA Southeast Regional meeting or any other future SE Regional meeting. Please contact me for more information. Prospective hosts should present a short show at this year's May meeting in Georgia. Attendees will vote and select the winner as per custom! If you have any questions, please drop me a line.

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SEMINAR ANNOUNCEMENT

Dragonflies and Damselflies of the Northeast, A seminar at the Humboldt Field Research

Institute on the Maine coast. June 28 - July 4, 1998.

The seminar will give an introduction to the order Odonata, its basic life stages, morphology, behavior, and temporal and geographical distribution in the region. Current regulations, references, and sampling techniques will be reviewed. The principal emphasis will be field work on adults in a range of habitats. In addition, larvae will be sampled for taxonomic study and rearing. Reference specimens of larvae and adults will also be available for study. Determination to species using morphology and appearance will be the emphasis of lab work, with consideration of preservation and detailed record-keeping methods. NC.

Paul-Michael Brunelle has been studying Odonata of the Atlantic Provinces of Canada for the last ten years and recently published their distribution in that area (Northeastern Naturalist 4:2). He has been retained by the Maine Department of Inland Fisheries and Wildlife to plan a 5-year survey of the order, to begin in 1998. He has been retained by Parks Canada to study the order in the Cape Breton Highlands and has received grants from the New Brunswick Museum and the Madel Foundation, the latter to study the behavior of a new species of the genus *Neurocordulia* discovered in New Brunswick. He is the founder of the Atlantic Dragonfly Inventory Program (ADIP), an informal organization intended to encourage responsible study of the order in the Northeast.

The seminar involve intensive practical field experiences, follow-up lab work, lectures, and discussions. The seminar is offered at the Humboldt Field Research Institute (formerly known as Eagle Hill Field Research Station), which is located on the coast of Maine on the summit of the peninsula just east of the Schoodic Pt. section of Acadia National Park and just west of Petit Manan National Wildlife Refuge.

A DETAILED BROCHURE IS AVAILABLE

contact: Humboldt Field Research Institute, PO Box 9, Steuben, ME 04680-0009, 207-546-2821, FAX 3042, E-mail humboldt@nemaine.com <http://maine.maine.edu/~eaghill>

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a red frons. Also they have a red face with orange labrum, and red eyes (latter according to notes).

Sid went on to say in a later e-mail, "The underside of the thorax is unmarked rusty orange, there is no discernible thoracic pattern (specimen is well acetoned), and the long wing veins are rusty orange. Perhaps the wing veins are paler in juvenile discolor?"

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AN EARLY RECORD OF *NEONEURA AMELIA* (AMELIA'S THREADTAIL) FROM TEXAS

Dennis Paulson

Recently Blair Nikula (ARGIA 9[4]: 11-12, 1998) reported *Neoneura amelia* for the first time from the United States, from specimens collected 25 April-13 May 1997 on the Rio Grande near McAllen, Hidalgo County, Texas.

Two decades earlier, I found a population of *Neoneura* on 20 August 1977 at a slough in Bentsen Rio Grande Valley State Park, Hidalgo County, Texas. I recorded them at the time as *N. aaroni*, the only species known at that time from the state. The slough was about 100 m wide by 1.6 km long, with steep tree-lined banks, a mud bottom, and no aquatic vegetation. On a hot, sunny afternoon, several females and a pair were seen among tangled branches too far from shore to collect, but I found a male that had just emerged and preserved it in alcohol, thinking the record was of some interest.

Recently I sent all my Texas field notes to John Abbott, and he asked me to examine my Hidalgo County specimen in the light of the recent records of *N. amelia*. Indeed, the specimen is *amelia*, indicating populations of this species have been established in Texas for some time. Its known distribution includes a very short stretch of the Rio Grande in Hidalgo County, and its known flight season in Texas is 25 April to 20 August.

N. aaroni has been found only in south-central Texas south to Nueces County (C. Johnson, Bull. Florida State Mus. 16: 55-128, 1972), about 200 km north of the Rio Grande. The region in between appears to be virtually without streams

and effectively separates populations of the two species, which have similar coloration and rather similar appendages and, I think, are closely related. [I have taken *aaroni* in Nuevo Leon, Mexico. Ed]

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NEW COMMON NAMES FOR U.S. ODONATA

Common Names Committee (D. Paulson, Chairman)

The Common Names Committee of the DSA has chosen the name "**Orange-bellied Skimmer**" for *Orthemis discolor*. A male in the hand should be distinguishable by the yellow-orange underside of the thorax, immatures and females by their lack of thoracic markings (conspicuous light and dark markings in *O. ferruginea*).

The committee has also selected "**Amelia Threadtail**" for *Neoneura amelia*.

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SOMATOCHLORA WILLIAMSONI IN CONNECTICUT

Mike Thomas (e-mail)

This past summer, on August 2 at approx. 5:00 PM, Dave Wagner and I were searching for Odonates in a large calcareous shrub swamp located in the northwest corner of the State (Litchfield Co., CT). While working our way along the edge of the shrub swamp, bordered by deciduous woods, we came upon a small rivulet entering the swamp. The banks of the rivulet were very muddy and were partially enclosed by a canopy of vegetation, which blocked out much of the sunlight. No more than several inches above the muddy bank, in deep shade, a *Somatochlora* was observed ovipositing in the muddy bank. While hovering, she was observed tapping her vulvar lamina into the wet mud approx. 4- 6 times in succession. With a lucky swing of the net, the female was captured and was quickly identified as *S. tenebrosa*. Several minutes later, a second female was observed ovipositing in the same location and manner. Unfortunately, the swing of the net came up empty this time.

Several months later, we noticed there were several characteristics that were inconsistent with other vouchers of *S. tenebrosa*. This female was noticeably larger and had an entirely black labrum instead of partially orange. The vulvar lamina was slightly more slender, with a pointed apex. To our surprise, we had collected the first *S. williamsoni* reported from the State in over 75 years. The only other CT record for this boreal species is a female collected by L. B. Woodruff in Litchfield Co. sometime prior to 1927 (initially identified as *S. tenebrosa* and later identified by Garman as *S. williamsoni* (Garman, 1927)).

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NEHALLENIA IRENE IN ALASKA

e-mail from Jochen M. Mueller
(Jochen.Mueller@student.uni-ulm.de)

I'm a student of biology and chemistry at the university in Ulm/Germany. I am very interested in dragonflies and damselflies and stayed last summer for eight weeks at the Tanana river in Alaska. I was well prepared for the Alaskan dragonflies with an identification key from Mr. Paulson (Museum for National History, Tacoma/WA) from the (inter-)net. I also had a key for the dragonflies of British Columbia and Yukon (Canada) from Armstrong et al.. I hoped to find some interesting dragonflies in the area between Fairbanks and Tok along the Richardson Highway. The most exciting record was *Nehalennia irene*! I found at least two male specimens at a small pond between Midway Lodge and Delta-junction and the Tanana and the Richardson Highway. I preserved one specimen. Mr. Paulson wrote me back that it is the first record of *Nehalennia irene* for Alaska. Unfortunately I had no chance to get back to this place a second time to look for signs if *N. irene* is reproducing in this pond. But probably it's still an interesting record and it might be interesting for North American odonatologists to hear about it. [It sure is. Ed.]

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NEW RECORD OF TRAMEA LACERATA (HAGEN), THE BLACK - MANTLED GLIDER, IN WESTERN CANADA

Gordon Hutchings

Tramea lacerata appeared on southern Vancouver Island in the summer of 1996. A number were seen and several specimens were captured in the Victoria area. On 13 July at 12:50 PST Hannah Nadel observed one flying in her suburban garden in Saanich. The day was sunny and warm (32 C) with a light breeze. Hannah watched it through 10X binoculars as it glided 10 - 15 m above her; she noted the distinctive saddlebag markings at the base of the hind wings.

Armed with this exciting information I was keeping an "extra eye out" for anything odonatologically unusual in the vicinity.

On 25th July while hunting dragonflies about 7 km. away, I was pleasantly surprised to see three *Tramea* flying about in a suburban area near a local wetland called Rithet's Bog. They were flying at about 3-7 m above me, just out of reach of my net. I decided not to risk an attempt at catching them and instead headed off to visit the nearby marsh. After about 40 minutes, I returned to my car; one *Tramea* still flew above it. I watched the rising and falling flight patterns and tried to decide if perhaps there might be a pattern to this, like surf waves crashing on the shoreline. I decided to give it a go and make a swing with the net, trying to bag this rare beauty.

With a nearby police officer poised to catch speeding motorists as my witness to my antics, I finally lunged into the air and swung at the insect from behind. I recall it being a well executed, upper back-swing followed by an audible "thwack" as it hit the end of the bag. Ah, the sound of success as the four strong wings rustled in the mesh! I had my proof to deposit to the Royal British Columbia Museum and, as a boost to my ego, I could show off to my friend Rob Cannings the entomology curator there. Rob, however, would put me in my place.

After further investigation, Rob came up with some other records, not only from earlier in 1996, but also from 1995. Tom Clarke of Victoria had seen or collected *T. lacerata* on 6 July and 25 August at Swan Lake and on 13-14 July from Lochside Drive (4000 block). Tom also had collected a male from Swan Lake the previous year.

And I thought I could claim the first collection of *T. lacerata* in Western Canada, when all this time Tom had kept his find to himself.

T. lacerata has a transcontinental range in North America that stretches from eastern Washington State east to southern Ontario and New Hampshire and south to Northern Mexico. It also occurs in Hawaii. As I had previously seen this insect only in Oregon, I was surprised to find it in the Victoria area. An increase in sightings also occurred in western Washington in 1996.

As yet there is no good explanation for the increase of sightings of *T. lacerata* in coastal Washington and British Columbia. Because of its proximity to the species' breeding grounds in eastern Washington, the Okanagan Valley of the British Columbia Interior was thought to be the most likely spot for the first *Tramea* records in the province. In the future, keep your eyes peeled and scan the zone 5-15 m above the ground for this newcomer to southern British Columbia.

For a more detailed account of the *Tramea* records noted here, and ones from Washington, see Rob Cannings' article in *Notulae Odonatologicae* 4(9):148-149.

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NEW DRAGONFLY RECORDS FOR NEW YORK

communicated by **Paul Lederer**

(Excerpted from *The Journal of the New York Entomological Society*, 1930, 38:215)
"Mr. Wm. T. Davis showed a box of dragonflies and stated that with the aid of the recently published "Handbook of the Dragon Flies [sic] of North America" several additions to the New York State List of Odonata had been detected in his collection. He said that he had in preparation a more complete list of additions, but gave the following as important:

"Erythrodiplax minuscula Rambur. A southern species first detected in Staten Island by Mr. Joseph F. Burke during the summer of 1929. Several individuals were captured.

"Pantala hymenaea Say. Collected at Totenville, Staten Island, July 12, 1925.

"Tramea abdominalis Rambur. A southern species, the male of which was collected in the Clove Valley many years ago on the 21st of July."

This Clove Valley is not to be confused with the place of the same name in Dutchess County.

[*Pantala hymenaea* occurs sporadically in the state, with many seen during the very hot summer of 1988. *Erythrodiplax minuscula* was recently recorded for New York by George Bick, who found a specimen from Whiteface Mtn. In the FSCA collection (*ARGIA* 9(3): 24). *Tramea abdominalis* has also been recorded from Cape Cod; it is indeed a notable addition to the state list. Ed.]

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ANOTHER MIGRATION REPORT, FOR THOSE OF YOU WHO CAME IN LATE

Mike May, Rutgers University

The North American Dragonfly Migration Project was conceived in 1992 as a way of studying the widespread, sometimes spectacular, but little known phenomenon of odonate migration (although it didn't get the fancy name until a year or two later when Ken Soltesz started sending out official-sounding fliers to his birding colleagues). Like the better known migration of birds and of monarch butterflies, long-distance migration of some dragonflies occurs annually throughout much of North America. Sometimes it takes the form of spectacular mass flights that can involve hundreds of thousands, even millions of individuals. On the other hand, migrants sometimes occur at much lower numbers, with scattered individuals moving along parallel courses but without any aggregation. Mass flights are much easier to document, but independent movement of individual dragonflies may well be equally important.

Because migration occurs over such a broad area, and because mass flights are largely unpredictable, no one person, or even any small group, can keep up with what's happening across the continent. For that reason, I have, for the past several years, been trying to enlist the help not only of DSA members and other odonatologists, but professional and amateur entomologists of whatever ilk, birders, and anyone else interested

in dragonflies or migration or natural history in general. The response has been gratifying, and quite a few people, birders as well as dragonfly freaks, seem to have gotten pretty seriously interested in migration watching. Certainly I couldn't have gotten far without that input, and I'd especially like to acknowledge Ken Soltesz and Bob Barber, who have been enthusiastic collaborators from the beginning and have a lot to do with the current (re)incarnation of the effort.

Some of what we've learned so far has been summarized in a forthcoming journal paper (Russell, R. W., M. L. May, K. L. Soltesz, and J. W. Fitzpatrick, 1998. Massive swarm migrations of dragonflies (Odonata) in eastern North America. *American Midland Naturalist*. In Press). In a nutshell, we reviewed previous reports of dragonfly migrations and reported detailed observations of our own on three large flights, at Crescent Beach, FL (MLM), Cape May, NJ (RWR), and Chicago IL (JWF), ranging in magnitude from about 200,000 to 1,000,000 individuals. Several distinct patterns emerged: 1) all reported flights occurred between late July and mid-October, with a peak in September; 2) most large flights occur along topographic "leading lines" such as seacoasts and lakeshores; 3) massive swarms commonly follow the passage of cold fronts (but flights may also occur ahead of cold fronts, as though the dragonflies, once they started, continued flying beyond the frontal system; in a few cases, simultaneous or near-simultaneous movements have been documented at widely separated geographic areas, apparently all in response to the same front); 4) *Anax junius* was the dominant species in most of these late summer/early autumn flights, but numerous other species have been reported to migrate more or less regularly; these rather predictably included species of *Tramea* and *Pantala*, but also several *Libellula* spp., some *Sympetrum*, and maybe even *Pachydiplax longipennis*, among others. We don't know in most of these cases, however, whether all individuals migrate or whether migration is a regular part of the annual cycle

The striking parallels between dragonfly and bird migrations in seasonal timing, geographical distribution, and associated meteorological phenomena lead us to think that similar factors may underlie these migrations, both in terms of fundamental causes and immediate behavioral responses to topography and winds. On the other

hand, dragonflies almost certainly differ from birds (and monarch butterflies) in at least one very important respect. Whereas bird migrations are true return movements in which an individual migrant completes one or more round-trips between breeding and non-breeding areas during its lifetime, dragonfly migrations are intergenerational movements in which an individual migrant carries out a migration in only one direction, with its offspring completing the trip at a later time. The common green darner is the only species of migratory dragonfly whose life history has received much attention. In the most detailed study to date, Robert Trottier showed that populations of green darners in southern Canada include subpopulations of both residents and migrants. The resident subpopulation overwinters as half-grown larvae, requiring about 11 months of development from oviposition in late July/early August of one calendar year until emergence in late June/early July of the following year. In contrast, the migratory subpopulation requires only about three months of development, from oviposition in June by migrant adults from the south until emergence in September of the same year. Apparently, the resident population is not simply composed of slowly growing individuals that fail to develop rapidly enough to emerge before the onset of winter, but instead represents a truly distinct life-history strategy.

Until very recently, direct evidence of northbound migration has been very skimpy, although there have been quite a few reports of the early appearance of mature *A. junius* in the northern U.S. and southern Canada, well before local emergence seemed possible. Apparently mass migrations never occur in the spring, at least on the east coast. Ongoing observations, however, particularly by Soltesz, Barber and Carpenter and by Richard Orr, have shown that regular influxes of apparent migrants accompany southwest air flows behind warm fronts from late March (in warm years; first *Anax* seen behind a very strong warm front on March 27 in MD and March 29 in NJ this spring) through June. This aspect of migration remains very poorly studied, though.

In fact, for all we have learned, we still have more questions than answers. For instance, perhaps the most glaring unanswered question is, Where do migrant dragonflies go? The observations at Crescent Beach suggest that some

may reach peninsula Florida, and Dennis Paulson's records of seasonal occurrence of green darners in southern Florida is consistent with the idea that migrants arrive there in autumn and at least some of their descendents leave after emergence in spring. *Anax junius* and *Pantala flavescens* have been seen flying steadily westward along the Gulf Coasts of Florida and Louisiana, sometimes in large numbers. Also, vast concentrations of *Anax*, along with other, mostly migratory, dragonflies, sometimes feed along the beaches of Florida from August to early October. *Tramea lacerata* and *Anax junius* have even been observed flying southward across the Gulf of Mexico. Nonetheless, we have no way to be certain that these dragonflies originated much further north than where they were sighted.

At present we don't know of a practical way of marking large numbers of dragonflies individually, analogous to banding of birds, although Richard Orr has been marking as many as he can with red paint (so watch out for red *Anax*). The problem isn't that large dragonflies couldn't carry some kind of permanent mark or even a gummed paper tag but rather that it seems too hard to catch enough to have a reasonable chance of getting any returns. If anyone has an idea for efficient marking of large numbers (e.g., without actually catching each individual), we'd love to know about it. In any case, we hope that if we receive enough data supporting the idea that movements are widespread or, best of all, documenting the sequential appearance of large flights at a series of locations from north to south, we can put our inference of long-distance movements on more solid footing.

Other mysteries: Why do some cold fronts in the fall produce massive migrations while most seem to stimulate no dragonfly movements at all? One idea is that solitary migrants may reverse their course and fly back northward in response to warm air flow. Thus a cold front that follows quickly on the heels of a warm front may be more likely to concentrate dragonflies in swarms. In order to document relatively complex patterns like that, we need a lot more information about large movements at many localities, and the weather conditions preceding them. Are there reasons in addition to individual responses of solitary migrants to weather and topography that cause dragonflies to gather into apparently cohesive mass swarms?

What determines dragonflies' responses to topographic features, especially large bodies of water? We have observations from Cape May, NJ, and the St. Joseph Peninsula, FL (from Gary Sprandel) of apparent fall migrants reversing their normal southward or westward course and moving northward, following coastlines, apparently reluctant to venture over water. On the other hand, we've also seen them flying steadily out across the Delaware Bay. We suspect that, as with birds, this behavior is affected by wind strength and direction, but we don't know this. Also, do the reoriented, northbound migrants eventually cross open water and continue southward, or do these situations represent dead-ends hit by wind-drifted migrants?

This is only a sampling of what can be learned through a coordinated effort to collect information. So here's our pitch. We still need your help. In the past I've solicited information by mail and through periodic pleadings in **ARGIA**. That has worked pretty well, but it's hard for correspondents to keep observations coming on a regular basis and hard for me to keep up my own observations, much less prod, receive, process, and acknowledge data from others. Now, though, we are going electronic. Bob Barber has added a migration page to his web site (<http://www.hsrl.rutgers.edu/BOB/migrant/mig.html>) This has a form, returnable by email, on which you can record observations. Hopefully this will be easy to use and will get everyone out to watch for migrants and then tell us about them (Yes, now - don't forget those spring returnees). At least take a look and let me or Bob know what you think. We'd be glad to have suggestions for improvement.

Thanks in advance for your help. We look forward to hearing from you.

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RESTING DRAGONFLY EATING CRAWLING ANTS!

**From a discussion and e-mail communications
with Peter McIntyre, Harvard University**

While in the MCZ recently, I learned from Harvard undergraduate Peter McIntyre (pbgmccintyre@fas.harvard.edu) of a noteworthy

instance of a dragonfly eating ants. On the University of Michigan's E.S. George Reserve in Pinckney, Michigan, Peter observed a small dragonfly sitting on sand and pebbles adjacent to a trail used by very small ants (unidentified; 2-3 mm in size). The dragonfly positioned itself very near the path and dipped down to catch passing ants. Due to the small size of the ants and the sensitivity of the dragonfly to his intrusion, Peter was unable to actually see individual ants being consumed, but he noted that sand grains seemed to fly from the ant trail every time the dragonfly moved its body (the legs remained set). From this he concluded that the dragonfly, while resting on the ground, was indeed capturing or attempting to capture ants. Some dragonflies have been observed eating flying ants, and dragonflies have been taken with ant heads clamped to their legs (defensive mechanism following capture in flying state?), but this is the first instance with which I am familiar of dragonflies catching and eating ants while sitting on the ground. Unfortunately the dragonfly was not taken for identification. Peter remembers it as a small powder gray dragonfly, which would appear to make it a libellulid (*Ladona julia?* *Leucorhina frigida?*).

For those interested, researchers at the University of Michigan have found that larvae of many dragonfly species found on the George Reserve are efficient predators on the numerous tadpoles which inhabit temporary pools with them. One of the evolutionary responses observed in many tadpoles is a significant alteration of the tail morphology, color, and musculature in response to chemical cues produced by dragonfly larvae consuming tadpoles. Similar results have been obtained for species living in the southwest and Europe. The magnitude and costliness of this response for tadpoles underscores the longtime importance of larval dragonflies (especially Aeshnids) as predators in aquatic systems.

further reference: Beatty, George H. III, 1951, Bull. Brooklyn Ent. Soc. 46(2): 29-38, "Odonate bionomics: I - Notes on the food of dragonflies. I. Odonata vs. ants and bees."

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A BIT OF 1997 MIGRATORY ANAX JUNIUS DATA FROM MARYLAND

Richard Orr

At Patuxent Wildlife Research Center (PWRC), Maryland, the first spring 1997 wave of *Anax junius* arrived on April 16 when twelve adult males were seen skirting around the edges of ponds. The following couple of days were windy, rainy, and cool. But by April 19 it was sunny again with a high near 70 degrees. Approximately 100 mature adults were scattered along the swamps, marshes, and eight established ponds (approximately 200 acres total) in my survey area. Frequent male to male interaction occurred. Copulation and ovipositing (in tandem) was also seen. The majority of the individuals seemed to stay around the water edges and no swarming tendencies were observed.

These observations are consistent with what I have seen at PWRC since 1991 (See "The Odonata of Patuxent Wildlife Research Center and Vicinity" BAO 4:2 37-67). What made this field day different was that I was actually able to capture, mark, and release all the individual *Anax junius* that I saw at Patuxent Marsh, a small 2.5 acre pond. Although the total capture was only 5 individuals (four males and one female), this was extraordinary (at least for me) since the capture of even a single migrating *Anax junius* is an extremely rare event.

In the BAO paper mentioned above (page 60) I made the assumption that when new warm fronts moved through PWRC southern migrants were deposited and that the previous set of migrants at PWRC caught the front to move further north. In this way the adults moved in steps in their northern migration taking advantage of calmer weather (between fronts) to oviposit before once again catching a front to move north. I made this assumption based on the observation that at times north moving fronts would fail to deposit new migrants at PWRC but all of the previous migrants were gone essentially removing *Anax junius* adults from PWRC for a short period of time (again see the BAO paper for details).

Since all *Anax junius* look alike, this step wise progression of adults northward was an assumption. I could not tell for sure which individuals were from a new wave of migrants and which may have just stuck around. The obvious solution was to mark individuals and watch to see if they stayed or moved on after a weather front moved through. Although 5

Sideling Hill Creek may not be as well known as the mountain ridge in which it parallels but it is not without fame. The 66,000 acre Sideling Hill Creek watershed is considered one of the most pristine ecological systems in the central Appalachia. The origin of Sideling Hill Creek is in a mountainous section of south-central Pennsylvania. When it enters Maryland it is still running clean and unobstructed and eventually flows into the mighty Potomac. Threatened and endangered species abound, including the world's healthiest population of the federally-listed delicate white flower called *Harperella* and the highest biodiversity of freshwater mussels in Maryland and Pennsylvania. Sideling Hill Creek has recently been targeted as one of the top four rivers for conserving biodiversity in the Chesapeake Bay watershed by The Nature Conservancy. This is a good choice since no dam impedes Sideling Hill Creek providing a Valley and Ridge riparian habitat which pulses with the seasons; a characteristics long lost for most other rivers in the mid-Atlantic region.

Under the auspices of the Maryland Department of Natural Resources and The Nature Conservancy, I conducted a two year (1996-1997) study of the dragonflies and damselflies of Sideling Hill Creek. Forty-three species were found during the study in which two species *Gomphus quadricolor* and *Gomphus viridifrons* were new for Maryland.

During wet years (like 1996) Sideling Hill Creek maintains the characteristics of a medium-sized river. Riverine species such as *Ophiogomphus rupinsulensis* and *Macromia illinoensis* seem to have little problem maintaining healthy populations. However, during dry years (like 1997) the scouring river-like spring flow is quickly reduced to stream-size by the end of spring and eventually to a collection of pools connected by a weakly flowing creek by the end of summer. This drastic change in flow from one season to the next provides a multitude of micro aquatic habitats at Sideling Hill Creek that supports both lotic and lentic odonate species.

The following species were recorded from Sideling Hill Creek. GOMPHIDAE: *Dromogomphus spinosus*, *Gomphus exilis*, *G. lividus*, *G. quadricolor*, *G. viridifrons*, *Hagenius brevistylus*, *Ophiogomphus rupinsulensis*, *Stylogomphus albistylus*;

AESHNIDAE: *Aeshna umbrosa*, *Anax junius*, *Basiaeschna janata*, *Boyeria grafiana*, *B. vinosa*, *Epiaeschna heros*, *Gomphaeschna furcillata* (probably a stray), *Nasiaeschna pentacantha*; CORDULEGASTRIDAE: *Cordulegaster maculata*; MACROMIDAE: *Didymops transversa*, *Macromia illinoensis*; CORDULIIDAE: *Epithea cynosura*, *E. princeps* (probably a stray), *Helocordulia uhleri*, *Somatochlora linearis*, *S. tenebrosa*; LIBELLULIDAE: *Celithemis elisa*, *Erythemis simplicicollis*, *Libellula luctuosa*, *L. deplanata*, *L. tydia*, *L. pulchella*, *Pachydiplax longipennis*, *Pantala hymenea* (probably a passing migrant and not a resident), *Sympetrum rubicundulum*, *S. vicinum*; CALOPTERYGIDAE: *Calopteryx maculata*, *Hetaerina americana*; LESTIDAE: *Lestes rectangularis*; COENAGRIONIDAE: *Argia fumipennis violacea*, *A. moesta*, *A. translata*, *Enallagma exsulans*, *Ischnura posita* and *I. verticalis*.

Sideling Hill Creek was both exhilarating and frustrating to work. Few roads allow access along its meandering 25 miles in Maryland. Alternating rapids and deep pools were often edged with steep shale rock canyon walls that made walking difficult and at times dangerous. Field days were long and hard but the rewards were equally great. The diversity of wildlife from freshwater mussels, to birds, to butterflies was as impressive as I have ever seen in Maryland. The characteristics of the stream changed constantly around every bend of the river. I was never bored.

The biological makeup of current day Sideling Hill Creek is without question very different from the scale trees, seed ferns, horsetails, and early odonate-like insects that dominated the swamps 300 million years ago when the sediment layers of the syncline were still horizontal. At the end of a long field day at Sideling Hill Creek I would occasionally stop to view the syncline before returning home. The syncline often acted as a catalyst allowing me to drift through time. For a few minutes, with eyes closed, I would visualize 300 million years into the future when this magnificent mountain ridge had long since eroded to the sea. In this far distant world of unnamed plants and animals I would cheerfully watch the evolutionary descendants of today's odonates spread their colorful wings and dance upon the landscape.

**A BRIEF HISTORY OF THE PLAINS
EMERALD - *SOMATOCHLORA ENSIGERA***

Roy Beckemeyer

One of the odonates you may get to see in the Great Plains at this summer's meeting in Valentine is *Somatochlora ensigera*, one of those little-known, elusive green-eyed enigmas, the *SOMATOCHLORA*'s, that we odonatists love so well. Edmund Walker summarized *Somatochlora* obsession nicely in his 1925 monograph:

"The student of northern Odonata...cannot fail to be attracted by the genus *Somatochlora*. Although one of the larger genera of the Anisoptera, and by far the largest of the Corduliinae, few of the species are easily obtained in settled districts; most of them are local even where the genus is well represented, and they are seldom abundant even in the immediate vicinity of their breeding places. They are shy denizens of the wilderness..."

Part of the attraction of *Somatochloras* thus seems to be that they epitomize wilderness, wildness, exclusiveness, elusiveness. Part of the attraction also has to be the fact that they are lovely insects. To me they are the Ferraris of the Odonata, sleek and elegant. *S. ensigera* is one of the prettiest examples of the genus, with conspicuous yellow marks on the sides of the thorax and abdomen. I dearly love Williamson's (1907) description of its colors, which can be so easily made into a poem by a little rearrangement:

"Eyes Nile green.
Yellow markings
chrome yellow,
tending to gamboge."

Somatochlora ensigera was described originally by Rene Martin (1907), from a female specimen taken in Montana. The exact type location is unknown, and the species has not been recorded again from Montana (Miller & Gustafson, 1996). Before the appearance in print of Martin's description, Williamson (1907) submitted for publication the description of a new species, which he called *Somatochlora charadraea*. His description was based on a male, collected by E.J. Osler in Bear Creek Canyon, Jefferson

County, Colorado, at 8000 feet altitude. Walker eventually synonymized *charadraea* with *ensigera* in 1925. Until that time, however, the two lived separate lives in scientific circles. For example, Muttkowski (1910) listed both species in his catalog of North American Odonata.

In any event, both *ensigera* and *ensigera* in the guise of *charadraea* were for some time considered likely to be insects of mountain torrents, having been collected in mountainous states. Williamson (1907) quoted Osler's account of the capture of the type specimen of *charadraea*: "At the place I took it there were 2, but on account of the wariness and the almost inaccessible character of its haunts (on willows overhanging the swift and breakneck dashing Bear Creek), I was unable to secure the other specimen."

Williamson was certainly surprised (1912) to come across *charadraea* next in northeastern Indiana, in early July in Wells County, on a tributary of the Little River, "...Flat Creek...its name...indicative of its character...is anything but...a mountain torrent." Between 1911 and 1921, he took a number of males and one female from Davis and Flat Creeks in Wells County (Williamson, 1912, 1917, 1922). His first collection was taken as the *charadraea* hovered over riffles in an area where Flat Creek passed through a small woodlot.

For some reason, Elsie Broughton, in Needham and Heywood (1929), continued the idea that *S. ensigera* was an insect of the mountains, by listing only Colorado and Montana as states of occurrence and including Williamson's quoted description of the Bear Creek habitat. Even though she referenced Walker's 1925 treatise and correctly synonymized *charadraea* with *ensigera*, she ignored Walker's notes on Williamson's Indiana records as well as the former's note of a record of the species from Iowa (Delaware County) that was in the Royal Ontario Museum collection.

Another Colorado occurrence was recorded in 1940, when Hess listed *ensigera* from the Pikes Peak area, El Paso County, Colorado.

By the time Needham and Westfall published *The Dragonflies of North America* in 1955, *ensigera* had been recorded in Manitoba and

Saskatchewan in Canada. On the US side of the border, they listed Colorado, Indiana, Iowa, and Montana, and added Oklahoma on the basis of Bird's 1932 listing. They missed its having been recorded in northwestern Ohio, noted by H. Price in 1950. They now characterized the habitat, largely on the basis of Williamson's Indiana observations, by saying: "Frequents small woodland streams."

Price found his *ensigera* in Ohio in very different circumstances than previously collected specimens. Bob Glotzhober (1997) emailed to me data from the records of the Ohio Odonata Survey's database. Dates of collection for Ohio vary from June 20 to August 16. Price's notes include comments like: "ditch between fields", "open ditch between fields of oats and corn", and "ditch between fields; ovipositing, no brush/trees in ditch". In a 1958 summary, Price stated: "It seems to prefer ditches, with or without trees in them." The nature of *ensigera* habitat is becoming much broader, indicating the species to be fairly adaptable.

Walker and Corbet (1973) listed *ensigera*'s range as "...Ohio, Ind. and Iowa, s.w. to Okla., Colo. and Mont., n. to s. Sask., Man. and Ont." In Bick's 1957 work on Oklahoma Odonata, however, he had identified Bird's "*ensigera*" as *linearis*, thus the Oklahoma record should have been deleted. The Canadian records were listed in Walker and Corbet as: Simcoe County, Ontario (1959), Onah, Manitoba, and Maple Creek, Saskatchewan. All these records, except for the concentration of three counties in northwestern Ohio, were scattered and occasional in nature, separated by many years and many miles. Walker and Corbet failed to specifically list Minnesota and North Dakota, both states where *ensigera* had been recently found. They also still listed the habitat as "Small streams in the woods."

A hotbed of *ensigera* activity, North Dakota was to prove to be the place for the species. In 1968 Milan Alby produced his thesis at North Dakota State University, and recorded *ensigera* for Adams, Grand Forks, Lamoure, Sheridan, and Stark counties. He commented in his thesis: "This species is frequently encountered along the Turtle River near Arvilla. The largest series was taken from Cottonwood Creek (Lamoure County). Both of these streams are sand bottom and have overhanging grass along the sides."

His specimens were taken in June, July and August.

In 1971, Hamrum, Anderson and Boole listed *ensigera* for 3 northern counties in Minnesota: Cook, Lake of the Woods, and Polk, for July-August. They did not record any ecological or habitat data. These records with those from North Dakota identified a swath of *ensigera* territory across the northern Great Plains.

George and Juanda Bick and Lothar Hornuff in 1977 published their summary of the Odonata of the Dakotas, finally listing Alby's records in the open scientific literature and adding Logan County to the list: "Rather from a mountain torrent or forest stream, this collection was from a heavily cultivated, open prairie area where *S. ensigera* cruised along a narrow, shallow, mud-bottom creek which, because of drought, was actually a series of potholes." Another indication of the tenacity of this *Somatochlora* species.

The next record of *Somatochlora ensigera* was again from North Dakota, this time from Pembina County, where Don Huggins (1983) collected 3 larvae in May of 1978, and reared 1 male and 1 female from 2 of them. He described the collection locale: "Carl Creek, where the collection was made, is a small intermittent stream having a maximum width of 2.0 m and depth of 1.0 m. The water was very turbid (the result of recent heavy rains) and apparently higher than normal summer levels. Canopy cover varied considerably because of cultivation practices and ranged from zero to 100 percent within the collection area. All nymphs were taken from debris deposited along a gravel shelf bordering a shallow pool area below a short riffle of gravel and rubble. The stream current in this area was reduced but noticeable."

In late July of 1986, Jerrell Daigle (1987) visited North Dakota to search for the wild and wily *Somatochlora ensigera* and succeeded in finding them in another county, Walsh, on the Forest River. He also found them in Grand Forks County, where "...males were very common along the Turtle River...They flew continuously from dawn to dusk...Eggs were deposited directly on exposed damp mud underneath overhanging grasses."

Mary Alics Evans summarized the Colorado Odonata fauna in 1988. The 1907 and 1940

records of *ensigera* were still the only occurrences that had been documented for the state.

In 1993, Carl Cook collected *ensigera* in Ohio, adding Defiance County to the list (Glotzhofer, 1995), thus indicating that the species is still to be found in northwestern Ohio.

Another state was added when Molnar and Levigne published their survey on the Odonata of Wyoming. They listed records of collections of *Somatochlora ensigera* from eastern Wyoming from 1976 and 1977, from the South Fork of Crazy Woman Creek in Johnson County, a small, clear stream with grass along the edge (4500 ft elevation), and from Salt Creek in Weston County, a clear, rock-bottom creek (4400 ft elevation).

I collected *ensigera* for the first time in Nebraska from Boardman Creek, in Cherry County, in August of last year (Beckemeyer, 1997). This creek is sand-bottomed, clear, and cover varied from open to completely covered. The *ensigera* (all males) seemed to be patrolling the more open areas and hanging in the overhanging grasses, though when disturbed, they would take off down the creek. As I was collecting there only in the afternoon, I may have missed female activity, as Jerrell indicated that they were more often seen late in the day.

Finally, Nick Donnelly also collected *ensigera* from Boardman Creek on our trip last summer, then took the insect in Custer County, South Dakota, for the first South Dakota state record of the species (Donnelly, 1998). Nick also reported that he had previously taken specimens from southern Manitoba (near Windygates).

It is obvious that there are other potential localities in which this species might be found. Reviewing the range of habitat types in which *Somatochlora ensigera* has been found, it appears that the insect is tenacious and is perhaps at least partially adapting to the changing nature of the streams in the Midwest. Hopefully it will continue to be found here. I think it is fitting to close with Williamson's (1922) reflections on the enormous impact that man was having on the forests and prairies of the Midwest (this 76 years ago):

"Eighty-five years ago, in 1837, Calvin C. Dean, aged six years, came to Wells County, Indiana, with his parents. Here they found only a few white people in a few small cleared areas in the practically continuous forest, two small prairies, the largest about seventy or eighty acres, being the only natural openings in the woodland, which covered the land to the water's edge along the Wabash River...Calvin Dean has lived to see the day when the original forest has gone from Wells County as certainly and completely as has the Indian. He has seen the ruination of the Wabash and the complete destruction of many of its tributaries...the old water level is forever lowered, and the primitive conditions are gone never to return...And, as Calvin Dean has told me of the deer that used to come in the heat of the day to the cool recesses of the Vanemon Swamp...so I would tell a little of the *Somatochlores* which still survive, but which are going, - which may be gone before another year has passed."

Williamson would be pleased, I think, to know that his *charadraea*, our *ensigera*, is still to be found as the millennium approaches.

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ENALLAGMA CYATHIGERUM AND VERNALE: SPECIES, SUBSPECIES, HYBRIDS, ALL OF THE ABOVE, OR NONE OF THE ABOVE? YOU BE THE JUDGE

Nick Donnelly

Some problems never seem to be resolved. Just when you think you have found an acceptable solution, new observations tend to cloud the picture. Such seems to be the case of the enigmatic *Enallagma* species pair: *cyathigerum* and *vernale*. Having observed that in the northeastern United States "*cyathigerum*" specimens were morphologically highly variable, tending towards *vernale*, I proposed 1989 that because of evident interbreeding they should be treated as subspecies. The problem with this was that the two taxa are very different in habits and habitats. Westfall and May (1996) accepted this conclusion "with some reservations". However, they decided to simply synonymize the two, which seemed a very poor decision. Their decision has encouraged me to look further, and to invite comments on the problems from several workers. These comments appear in following articles.

Enallagma cyathigerum (the Northern Bluet), one of the most widespread damselflies in the world, is also one of the most variable. West of the Rocky Mountains it seems to occur in nearly all types of fresh water: grassy ponds, streams, slow rivers, bog ponds, and lakes. In the

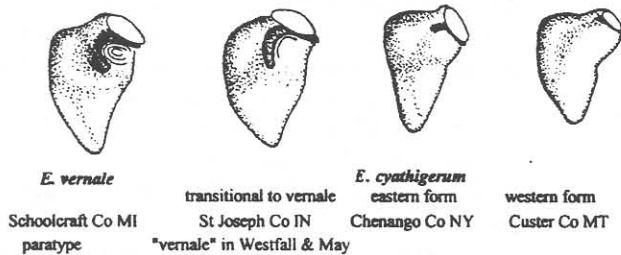
northeastern US and Canada I have found it predominantly in ponds within sphagnum bogs, or in grassy small lakes. These are habitats that McPeck (1989, etc.) referred to as "fishless", a conclusion with which I would concur - but only in the northeast.

Gloyd (1943) described *Enallagma vernale* from Michigan, comparing it with *boreale*, *cyathigerum*, and *hageni*, but not noting a particular closeness to any one of these. Gloyd said that *vernale* (in Michigan) seems to inhabit

"... woodland pools, ponds, or small lakes. On the Seney Refuge the species was found at small lakes which were being used for fish culture."

In upstate New York I first found *vernale* in the Tioughnioga River in Cortland County, a river that was literally choked with fish. If ever there was no place for a damselfly larva to hide, this was it - but clusters of lily pads had numerous perching *vernale*.

McPeck (unpublished) finds that DNA samples taken from northeastern *cyathigerum*, *boreale*, and *vernale* were different, and that arguably the *vernale* was closer to *boreale* than to *cyathigerum*.



Right cerci of four *Enallagma*. Orientation is apex upwards, outside to left. *Vernale* has the glabrous subapical process bent strongly forwards and terminates in a swollen tip. It also has a conspicuous hemispherical pit just mesad of this process. Typical (western) *cyathigerum* has the subapical glabrous process small and extending laterally into a continuous swollen rim around cercus, whereas *vernale* has a bulbous rim. Eastern "*cyathigerum*" are a mixture of these morphologies.

The distinction between *vernale* and *cyathigerum* was discussed further by Jurzitza (1975), who showed by SEM photographs that *cyathigerum* was the most closely related species, and there was a difference in the

structure of the cercus of the male. Garrison (1984) amplified and reinforced this distinction.

The problem that I confronted (Donnelly, 1989) was that in upstate New York specimens of *cyathigerum* are highly variable, and several populations contained a fraction of males with a morphological tendency towards the *vernale* type of structure. Noting that the Great Lakes is the center of distribution for *vernale*, this "*vernale* tendency" in *cyathigerum* seems to diminish in populations of *cyathigerum* increasingly far from the lakes.

An apparently large habitat difference, with a morphological difference (most of the time anyway) in the east suggests two specific entities. The large fraction of *cyathigerum* males that seem to look something like *vernale* males within the area of geographic overlap suggests gene flow. The real question is, "What is going on here?" The next question is, how do we investigate this? There seem to be larval differences, but could these represent adaptations to very different environments?

What are our choices? I am inclined to think my suggestion that these be considered subspecies should not be followed. I am now wondering if *cyathigerum* and *vernale* shouldn't be considered species along with the recognition of abundant intergradation (hybridization by any other name). Specific recognition of *vernale* might have the practical effect of leaving many specimens in our collections either mislabeled or incompletely labeled. This is the sort of problem that makes our zealous attention to the Code of Zoological Nomenclature look just a bit foolish. In our zeal to find the right level of nomenclatorial distinction, we may be missing a more important point. There seems to be a deeper issue here, and I think Mother Nature is having a quiet laugh at our expense.

I would argue that we are observing in the damselfly world something like the Bullock's - Baltimore Oriole problem, with extensive intergradation at the boundary of their ranges. Mike Kielb recently suggested a better analogy might be the blue-winged and golden-winged Warblers, which are more sympatric and which intergrade to a truly bewildering extent.

These common damselflies are simply crying for more attention - especially to the extent of their morphological variations and especially to their habits and habitats. I urge people in the northeast to pay particular attention to them.

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COMMENTS ON *ENALLAGMA* *CYATHIGERUM* AND *VERNALE*

Mark McPeck

I would agree with the assessment of *E. vernale* as a distinct species from *E. cyathigerum*. I base this on both ecological and morphological work that I have completed over the last four years.

First the molecular stuff: Jonathan M. Brown, Mike May and I are revising a paper that we will soon submit for consideration of publication in which we present a phylogenetic hypothesis for 33 of the 38 North American *Enallagma* species (Brown, J. M., M. A. McPeck, and M. L. May, in

prep). This phylogenetic hypothesis is based on 815 base pairs of sequence of two mitochondrial genes and 51 morphological characters. In that phylogeny, *cyathigerum* and *vernale* come out as sister taxa, with *boreale* being quite closely related. However, this phylogeny also shows that there are at most only 6 nucleotide substitution differences between the following species (out of 815 total): *boreale*, *cyathigerum*, *recurvatum*, *hageni*, *ebrium*, *davisi*, *laterale*, *clausum*, and *minusculum*. All of these species form a largely unresolved clade and are obviously the result of a very recent and very rapid radiation event: i.e., all are descended from one common ancestor that existed very recently. *E. vernale* and *cyathigerum* do appear however to be sister taxa within this clade. So I do think we now have further data to place *cyathigerum* and *vernale* as most closely related to one another.

I have also been interested since arriving in New England in the relationship between *E. vernale* and *E. cyathigerum*. I never ran across populations of *E. vernale* in Michigan, and so I cannot comment on their habitat distributions in that part of the range. However, I have located and have been studying a number of populations in New Hampshire and Vermont. In this part of the range, *E. vernale* is found as larvae in ponds, lakes and streams with non-centrarchid fishes. All of the populations I know of in this area are found as larvae in waters where perch, pickerel and minnows abound, but no sunfishes. These lakes and streams also generally support populations of *E. vesperum*, *E. hageni*, *E. ebrium*, and *E. geminatum*. Lakes with sunfishes generally have all these *Enallagma* except *vernale*. I also know that this is not the case in other parts of *E. vernale*'s range, since I distinctly remember seeing *Lepomis* species swimming around the weed bed in the Preble population in the Tioughnioga River [TWD's *vernale* site].

E. boreale, *E. aspersum*, and *E. cyathigerum* are, as I found in Michigan, Florida, North Carolina, and Ohio, found as larvae around here only in waters that have abundant populations of large dragonflies like *Anax* and *Aeshna* and Tramea species as the top littoral predators. For most water bodies this also means fishless waters. However, I regularly find isolated ponds in the mountains that only have trout in them, and that have only *E. boreale* and *E. cyathigerum* as

the *Enallagma*, and *Anax* and *Aeshna* as the littoral predators. Trout in particular seem to be quite lousy predators on benthic and littoral invertebrates: from an *Enallagma's* perspective these ponds are "fishless". This is why I now prefer the terminology, fish and dragonfly lakes instead of fish and fishless lakes to describe the habitat segregation of *Enallagma* species (and most all other invertebrate taxa for that matter).

My working hypothesis for the *boreale* / *cyathigerum* / *vernale* relationships are as follows: (1) Sometime very recently (probably <<350,000 year ago if the molecular clock is right), a lineage of an *Enallagma* species in the fish lake habitat was established in a dragonfly lake. This founder population quickly adapted to living with dragonfly predators instead of fish predators (McPeck 1995, McPeck et al. 1996, McPeck 1997). This was the progenitor species of *boreale*, *cyathigerum* and *vernale*. (2) A subsequent speciation event occurred to give rise to *boreale* and *cyathigerum* somewhere in the northeastern part of North America (this is from considering the biogeography of species along with our phylogeny). (3) Then another speciation event associated with a habitat shift from dragonfly lakes back into fish lakes occurred in the *cyathigerum* lineage to form *E. vernale*.

Obviously, this scenario is all conjecture based on the limited data we have so far, but I am currently testing these conjectures. I also have unpublished data that is also consistent with this hypothesis. Three years ago, I had an Honor's student, Jennifer Mitchell, do a project comparing the larval morphology and behavior of *E. boreale* with *E. vernale*. These studies repeated the studies I have published previously on species comparisons among larger groups of species (i.e., McPeck 1990, McPeck 1995). Jennifer found that *boreale* and *vernale* are indistinguishable in the size and shape of the caudal lamellae, abdomen and labium. However, they are very different in behavior. I have previously shown that *Enallagma* species coexisting with dragonflies are more active than species coexisting with fish. Also, species coexisting with fish respond to the presence of both fish and dragonflies by reducing activity, but dragonfly-lake species only respond to the presence of dragonflies. Jennifer's results show that *vernale* has the typical behavioral repertoire

of a fish-lake species. The only way to reconcile the morphological similarity and behavioral dissimilarity is for *vernale* to be the derived taxon from *cyathigerum*. Moving back into the fish environment does not require any change in morphology, but does require a big change in behavior.

WILL THE REAL ENALLAGMA VERNALE PLEASE STAND OUT?

Ken Tennessen

In 1968, Minter Westfall asked a young graduate student to look at specimens of *Enallagma cyathigerum* and *E. vernale* to see if he could discern the published distinctions between the two and to decide whether two species existed. At that time Minter needed to decide himself whether these two taxa were separate or synonymous for his book on the damselflies of North America, plus I think he just wanted to see what a young amateur would make of the situation. A few years later I realized it was more his way of introducing a student to the frustrations of taxonomy and that all is not black and white in such endeavors.

After a few days of study, my report to Minter was noncommittal as I could make it, and I felt inadequate. We talked about the supposed differences, and he then confessed that he was still unsure, but it appeared he was leaning toward sinking *vernale*. A while later we learned that L. K. Gloyd said she had another undescribed species that was intermediate between *cyathigerum* and *vernale*. Needless to say, that put the kibosh on *vernale* for those of us already doubtful about any distinctness.

In paying only modest attention to this pair since my days with Minter, it appears that most North American odonatologists have considered *cyathigerum* as a widespread, highly variable species, and *vernale* as an interesting variant not even worthy of subspecific rank. Living in Alabama, I really did not have to think about them much, but whenever either name popped up, I had an unsettled feeling about them. The only specimen of *vernale* I possessed was a Massachusetts male sent me by Hal White (determined as *vernale* by Gloyd), in which I could see the distinguishing characters. Then there was Walker's treatment of the female and larva of *vernale*, in which he gave significant

distinctions from *cyathigerum*, plus the early, short flight season of *vernale*.

A couple years ago I began to study the odonate fauna of the Great Lakes via an invitation from Pat Hudson with the Great Lakes Science Center. Pat had collected a number of larvae and adults of *Enallagma*, and although *carunculatum* and *hageni* were the most common among the collections, a few *cyathigerum* and *vernale* were collected, adults of both species being found along the shore of Lake Huron, and *vernale* also at a small woodland pool. Larvae of *vernale* have been taken in L. Huron proper. For the sake of Pat's reports, I have included *vernale* as a species, even though I have no additional convincing evidence of its distinctness from *cyathigerum*. I don't know if the larvae occur in different habitats in Michigan, or if adults interbreed, or even if there are intermediate males. All I have are some questions.

1) Is *vernale* ever found where there are no *boreale*?

2) Do adults and larvae of *cyathigerum* and *vernale* occur together in Michigan (in the same microhabitat), and if so, what do they look like?

3) Has anyone ever seen a female intermediate between *cyathigerum* and *vernale*?

4) What was the intermediate thing that Mrs. Gloyd thought was a third species?

5) Are intermediates really hybrids?

It might be worthwhile for someone to start projects such as trying to attempt to induce "interspecific" matings in enclosures, or perhaps try cross-fertilizing the two by dissecting out gonads live sperm and eggs, mixing them, and rearing the progeny. Other approaches might be to take eggs from both "species" and rear larvae under different microhabitat conditions, or to observe mating attempts in the field to see if there are behavioral isolating mechanisms. If we just keep talking about it, we are going to go on forever, wondering.

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COMMENTS ON *ENALLAGMA* PROBLEMS

Mike May

I'm glad we (W&M) managed to stimulate some discussion of the issue. I'm not sure I personally have too much to add to the debate at present, though. I'd just make the following comments:

1) The group of apparently very closely related species we're dealing with here includes 8 or 10 "entities", mostly Eurasian, and the nominotypical *cyathigerum* is, of course, the European form (I don't have any particular reason to believe that this is different from North American *cyathigerum*, but it's a possibility to keep in mind). It may be possible to work out the relationship of *vernale* to North American *cyathigerum* without reference to those taxa, but we certainly can't hope to figure out in general what's going on in this corner of *Enallagma* without looking at them, and, who knows, they might illuminate the *vernale* problem.

2) At the very least, we need to look at morphology, habitat, and, if possible, molecular characteristics, over a wide geographic range. I think I'd have been inclined to go with *vernale* as a species in the book, although certainly with reservations, if I hadn't found that female with *vernale*-like mesostigmal plates from Montana. That doesn't say that *vernale* can't occur in Montana or that genetically distinct *cyathigerum* can't have plates of that form, but it does say we really don't know what's going on at this point. At the moment, Mark's data seem to be the best we have, and I agree that they certainly point to species status, but the geographic variation problem looms large.

3) Taking off from the preceding point, and echoing Ken's remarks, we cannot necessarily assume that specimens that appear morphologically intermediate are hybrids. Although that is an obvious possibility, I think it will take more information on geographic and habitat distribution, larval characteristics (maybe including behavior) and/or molecular and genetical characters to put that inference on firm ground.

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paragraph was by me, and none of Jill's communication appeared in that issue.

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ERRATUM: NEW JERSEY LIST

Mike May

In the Appendix of the New Jersey list in BAO, where we tabulated differences between *Gomphurus* and *Stenogomphurus* (p. 34), the character states of the larval labium were reversed. They should be, for *Gomphurus* - Ligula without well developed median tooth; for *Stenogomphurus* - Ligula with well developed median tooth.

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VIDEO ON DRAGONFLIES

announcement

Common Dragonflies of the Northeast presents stunning footage of our region's common species. This unique video covers the identification, behavior, and habitats of adult dragonflies. Over 40 species are presented, including males and females. Orders: 1-800-343-5540. Each video is \$24.95. S & H is \$5.00 for the first unit and \$2.00 for each additional unit. Credit cards accepted or mail check to Natural History Services, 22-D Hollywood Ave., Ho-Ho-Kus, NJ 07423. Details: <http://www.concord.org/~dick/>

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SOME NOTEWORTHY DRAGONFLY GRAPHICS

Hal White

I'm not accustomed to seeing color photos of dragonflies in high circulation publications so when I had two such encounters within 24 hours I took note. The May 30th 1997 issue of SCIENCE [276:1341] displays the green darter [sic] (Aeshnidae) from an Internet digital gallery of Texas dragonflies <www.our-town.com/dragonfly/Welcome.html> developed by Forrest Mitchell. The Chronicle of Higher Education for June 6th 1997 [43(39):A6] illustrates several pinned Odonates from the

insect collection of the late Rev. Charles V. Reichard, a professor at Providence College who willed his 30,000 specimens to the Smithsonian. While the collection features primarily exotic Hemiptera, the illustrated species appear to be local Odonata, not "true bugs" as the news item implies. In the photograph are two nymphs, *Hagenius brevistylus* and an Aeshnid. The adults featured are probably *Epiaeschna heros*, both sexes of *Calopteryx maculata*, and another Aeshnid. I guess we should be happy for the exposure and be tolerant of the mistakes. After all, darters are aquatic.

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SOMATOCHLORA LARVAL INFORMATION SOUGHT

Bill Smith (SmithW@mail01.dnr.state.wi.us)

I have now reared larvae of *Somatochlora incurvata* to adults and also have *S. incurvata* larvae determined by mitochondrial DNA. From what I can discern from the literature the larvae of this species are going to be difficult to separate from *S. forcipata*. I would like to borrow larvae or exuviae of *S. forcipata* in order to better provide a means of distinguishing these species in the forthcoming description.

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SUBMISSIONS TO ARGIA

Keep those submissions coming in! I can use floppy disks for almost all languages. I very much prefer MSDOS; I have to take the disk to the university to translate Macintosh. I use Microsoft WORD but can translate WordPerfect and several other languages. If in doubt, save your file in Rich Text Format (available in most languages).

If you send your file by e-mail, it is far better to paste it onto the message. Attachments can cause problems.

In order to make things easier for your editor, I would appreciate your noting the following points:

- 1. Do not format your text. By this I mean, no leading spaces for paragraphs and no tabs at the beginning of paragraphs. Do not use "bullets", and use numbered lists sparingly (these take up

much space and are generally modified or discarded). And of course, no page numbers or headers! (You wouldn't believe what I get sometimes.)

2. I put odonate scientific names in bold face and italics. If you do this, you will save time for me. However, this is not necessary. I generally miss only a few each issue.

3. I can handle some illustrations.

4. Tables are a special problem. Better contact me before sending me a table.

5. Many of you have a lazy finger on the space bar, placing arbitrarily two spaces between some words within a sentence, or placing a space or two at the beginning of a paragraph. I try to remove all extra spaces. Please don't type with a jiggly finger on the space bar.

6. If in doubt (writing addresses, telephone numbers, etc.) simply follow the style I use in this issue.

7. In fact, the overall rule is to follow the style established for **ARGIA**.

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STATUS OF THE NORTH AMERICAN ODONATA DOT- MAP PROJECT: A CALL FOR ASSISTANCE

Nick Donnelly

I have sent this communication by e-mail to a large number of members of the DSA. Several have responded, and I appreciate their response. This version is slightly modified to reflect some of the information that came as a result of my e-mail.

The dot-map project was conceived to produce a county-level dot map for North American Odonata. There are more than 3000 counties in the "lower 48"; I haven't counted the Canadian counties and other political subdivisions. Dot maps are well known; Two states covered in the Bulletin of American odonatology (Ohio, Washington) feature dot-maps at the state level. My reaction to these maps is that they illustrate the principle that the larger the area, the more useful the dot-map. If the dot-map is big enough in range (small enough scale) to show the entire range of the species, then we find it of immense use, especially when compared to similar maps of closely related species.

When I conceived this project, I envisioned county-level dot maps for North American species. Below is a summary of where we stand. I was surprised to find out that we could make a pretty good map today, if we had too.

U.S. SUMMARY, divided into three categories

Category 3: no recent state summary currently available to me.

CALIFORNIA, no state summary available; Kennedy papers

GEORGIA, no state summary available

IOWA, older state papers; old Elrod, Weber lists

MINNESOTA, no state summary available

MISSOURI, no state summary available

NEBRASKA, only Preuss state list

TENNESSEE, Trogdon dissertation

WEST VIRGINIA, no state summary available; Harwood papers

NORTH CAROLINA, Brimley's old list

IDAHO, Logan dissertation

VERMONT, no state summary available; old Howe and Calvert data

RHODE ISLAND, no state summary available

CONNECTICUT, Wagner / Thomas data, Garman's old paper

Category 2: state lists available in one form or another, including **IN PROGRESS**.

These have not yet been reduced to computer files by TWD. Data for some states are somewhat out of date.

KENTUCKY, Resener list

MAINE, Brunelle in progress, Borrer's papers

NEW HAMPSHIRE, H. White; Brunelle in progress

SOUTH CAROLINA, T. White et al

OREGON, Valley on web

NEVADA, Simpkin in progress

VIRGINIA, Roble in progress; Anisoptera From Carle

MARYLAND, Orr on web

UTAH, Brown, Musser, Provonsa papers

MICHIGAN, O'Brien data; Kormondy list

WYOMING, Molnar & Lavigne

ARKANSAS, Harp

COLORADO, Evans

NEW MEXICO, Evans

OKLAHOMA, Bick, Abbott data

MISSISSIPPI, Bick

NORTH DAKOTA, Beckemeyer in progress

SOUTH DAKOTA, Beckemeyer in progress

TEXAS, Abbott in Progress

Category 1: Data in computer files by TWD;
some states need update

INDIANA, Williamson, Montgomery, etc
DELAWARE, White data
WISCONSIN, Smith data
PENNSYLVANIA, Shiffer data, mainly from
Beatty et al
MASSACHUSETTS, Leahy, Nikula preliminary
ARIZONA, Garrison data
ILLINOIS, Cashatt data
KANSAS, Beckemeyer data
ALABAMA, BAO Tennessen, et al
WASHINGTON, BAO Paulson
MONTANA, BAO Miller
NEW JERSEY, BAO May and Carle
LOUISIANA, BAO Mauffray
OHIO, BAO Glotzhober
FLORIDA, BAO Dunkle
NEW YORK, BAO Donnelly

CANADA and ALASKA SUMMARY

Note: I have little personal knowledge here. In
general I rely on all those Walker papers plus a
few summaries which are more recent.

ALASKA, Very poor coverage; Gloyd, Currie,
Ahrens papers, Paulson on web
YUKON, Cannings, Walker
NW TERRITORY, Walker
BRITISH COLUMBIA, Cannings
ALBERTA, new database Walker data - old
SASKATCHEWAN, Walker data - old
MANITOBA, Walker data - old
ONTARIO, new database, Walker data -
QUEBEC, Pilon data, Hutchinson data
LABRADOR, Brunelle published; few
geographic subdivisions
NEWFOUNDLAND, Brunelle published; few
subdivisions
NEW BRUNSWICK, Brunelle published
P.E.I., Brunelle published;
NOVA SCOTIA, Brunelle published

THE PROCEDURE

(1) Data. I am assembling data as EXCEL
spreadsheet files. People have generously given
me data, but in every conceivable format. I have
received paper lists by species, paper lists by
county, computer files of all sorts, either spread
sheets or word-processed programs. I have

reduced it all to one of two forms; Spreadsheet
with specific counties as columns, and
spreadsheets, with counties arranged
alphabetically, but not in specific columns. I can
easily go from the first to the second, but vice
versa is more difficult. Ultimately, I can work
easily from both styles, but if I provide data to
others, it is liable to be in one form or the other.
I now put new data in the second form. I am, of
course, more than willing to share data. So far
no one has provided me with data they do not
want to be made available to others. I would
probably find it most easy to e-mail EXCEL
attached files, but I am a bit inexperienced e-mail
transmission, and I may need help on this.

I have had to make some taxonomic decisions.
Examples include some older *Lestes*
“*forcipatus*” and “*disjunctus*”, or *Sympetrum*
“*rubicundulum*” data where it appeared that the
taxa were not named according to current
understanding. This is potentially the difficult
part, but it has gone more easily than I had
anticipated.

(2) Presentation. For the US and southernmost
Canada I would plan to use Mercator projections.
These give north-south and east-west state
boundaries as straight horizontal and vertical
lines, which most of us are familiar with. For
species that extend far to the north, I would
probably use a Lambert, Albers, or Polyconic
projection. Canadian data are generally
presented with these projections, but only rarely
is the projection identified on a Canadian map. It
is no concern to me to select one of these; the
computation is essentially the same for all
projections. I seek advice from Canadian
workers here.

For most maps I would simply present a map
showing dots for county records. The
distribution of the dots would be the information.
For some subspecies (*Lestes disjunctus*, *Aeshna*
interrupta, *Argia fumipennis*, etc.) I might use
different types of dots for determined subspecies
and a small dot where the subspecies has not
been determined.

(3) Processing technique. Currently I process
data with three programs. The spread-sheet is for
the basic data. I output this to a text file and
process it in a BASIC program to find the X and
Y coordinates for the chosen projection. I then
use a plotting program to plot the continental

shoreline, rivers, lakes, and state boundaries. I have no files currently for Canadian provincial boundaries, and I will have to obtain this.

BIBLIOGRAPHY OF NORTH AMERICAN LITERATURE

George Bick has generously and vigorously begun a bibliography of U.S. and Canada Odonata references. Rosser Garrison sent me his database with many additional references, and I have added many more on my own. The present total is about 1400 references. These do not include book reviews, obituaries, biographies, laboratory studies on anatomy or physiology, theoretical behavior studies, or wing venation papers. I can provide information from this bibliography or even the entire bibliography (when I can devise a way of transmitting it!). Probably the completed bibliography will be placed first on the web, and then published separately. It is our goal to cross-reference the bibliography by state.

THE FUTURE, AND WHAT I WOULD LIKE FROM PARTICIPANTS

If I were to produce this map today, some states would stand out as glaring white patches, or perhaps with a tantalizing few dots. I think this would be an embarrassment for the project, and so I am making this pitch for information to fill in the gaps.

Well into the project I realized that we are fairly close to a dot-map for the northeastern quarter of North America. Ontario to the Maritimes, south to DE- MD- OH - IN - IL. I would like to push ahead with this sub- project. The US west of the Rockies is also in pretty good shape, with a big hole (California). It could conceivably be done next. The southeastern US is not bad, but the holes here are more bothersome (Georgia, Tennessee, West Virginia). The US mid-continent is the most poorly covered in the literature, but there is a surprising amount of current activity there. In Canada the Maritimes are in the bag, and Quebec is also well covered, but with an unknown problem of data conversion. British Columbia is well covered. The far north is more spotty (as well it might be expected to be), but only Alaska strikes me as probably too sparse to include. The Prairie provinces have mainly old coverage.

Clearly the most pressing need is for summarized data. I have been pleased that so many people have been willing to share data with me, but I need more (It's a big continent!). The most time-consuming task for me has been the translation of place names to counties and political subdivisions. I did New Hampshire as an experiment, both because it is fairly small and there was a good summary paper that did not use counties extensively (White and Morse). It went fairly well, using various spreadsheet techniques and a gazetteer.

Sadly, I have found that much data that I thought existed really doesn't. I refer to collectors' journals or notebook data, which are lacking for some large collections. Some of these data can be reconstituted by going through Museum collections, but this is a staggering task that may not get done. It is too late to suggest this here, but you should all be keeping notebook summaries of your activities and observations.

I have been heartened by the positive response of so many people. There is enough data in hand to show that the project is viable, but this only means that the real push starts now.

So - Can you supply data, either summarized or not, for this project? Especially, can you supply information for one of the high-priority areas (CA, GA, IA, MN ,MO, TN, WV, NC)?

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DRAGONFLY LOVE

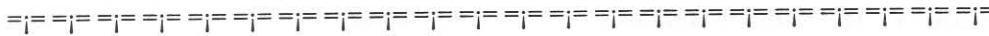
poem by Philip Corbet, submitted by William Plomer

Plated with light I float a thousand-eyed,
On rustling wings of veiny talc I fly,
To kiss in flight the image of my pride
That skims the deep reflection of the sky,
Where finny shoals in shadowy grace repose:
Insects that perish with a tiny cry
Provide the speed with which my body goes
In scaly splendour quadruplaning by.

Giddy with hope I seize my love at noon;

On tremulous wave of fiery air we run,
Long locked in love, across the red lagoon,
Blazing delirious while we whirl as one-

Diamond melting underneath the moon,
Planets in union going round the sun.



TRAMEA

Roy Beckemeyer filling in for Jackie Sones who is basking in the subtropical sun in Mexico this month.

Searching for esoteric Odonata publications has never been easier than it has become recently with the help of the web. One can now search for out of print scientific publications here in North America and around the world. I have made purchases from Australia, England, the Netherlands, as well as the US and Canada over the past year, picking up such gems as: "Revision der Gattung *Microstigma Rambur*" by Erich Schmidt, "The external morphology of the dragonfly *Onychogomphus ardens* Needham", by H.-F. Chao, "The dragonflies of New Guinea and neighbouring islands", Parts I, II, III, by M.A. Lieftinck, "A handbook of the dragonflies of Australia", and "A reclassification of the order Odonata", both by F.C. Fraser, and "Insects of Australia and New Zealand", by R.J. Tillyard. Usually all it takes is to go into a web browser such as Alta Vista, enter search terms: "book dealers" or "used books", then go browsing into the sites that show up. Once at a promising web site, search by such keywords, as "odonata", "dragonflies", etc, as well as by author's name. While I still do not trust the security of electronic mail enough to transmit charge card information, all the dealers typically have either phone numbers, fax numbers, or snail mail addresses by which they can be contacted, and most take charge cards thus eliminating the need to buy international money orders. Happy hunting.

One of the first odonate identification aids on the web was Dennis Paulson's Field Key to Washington Odonata

<http://www.ups.edu/biology/museum/WAODkey.html>

at his University of Puget Sound web site. (Remember that lower and upper cases are important in web site addresses.) This was followed shortly by his Field Key to Alaska Odonata

<http://www.ups.edu/biology/museum/AKdragonkey.html>

Recent additions include some well-illustrated efforts by Rob Cannings and associates at the Royal British Columbia Museum. Their Diagrammatic Key to the Aeshnidae of British Columbia can be found at http://rbcml.rbcm.gov.bc.ca/nh_papers/aeshna_key/dragonfl.html. Note that it is rbcm"one", not rbcm"ell", and dragonf"one", not dragonf"ell". Speaking of aeshnids, it is worth noting that Stuart Tingley has photos of the thorax patterns of *Aeshna* species side-by-side on his web site at

<http://www.geocities.com/~stubird/odes/thorax.html>

Finally, Ethan Bright and Mark O'Brien have a dynamite site at the University of Michigan with illustrated keys to the Odonate Larvae of Michigan. Hook up at

<http://insects.umm.lsa.umich.edu/MICHODO/test/Home.htm>

There is lots of geographic information on the web. Those planning to attend the annual meeting in Nebraska might find the site "Atlas of the Great Plains", by the EPA and The Nature Conservancy, to be of interest. It contains maps showing land cover, precipitation, water basins, potential natural vegetation, population density, percent of counties in cropland, irrigated farm acres, herbicide use, and so on. Gives a quick insight into the Great Plains as a habitat and as it has been impacted by man. Go to: <http://www.greatplains.org/resource/atlas/index.htm>

A completely different kind of experience can be had at the Online Map Creation site, where you input latitude and longitude boundaries and type of projection desired, and have a map generated. You can down-load the result, or just play around. Interesting and informative for novice mapmakers or those who just like maps. Find it at:

<http://www.aquarius.geomar.de/omc/>>

Humor on the web is creeping onto dragonfly sites. Click on Dennis Paulson's "MATING BEHAVIOR" link at

<http://www.ups.edu/biology/museum/UPSdragonflies.html>

Then access Gunter Beckly's page on Photos of Fossil Dragonflies, and click on the link to: "Gunter Bechly, Holocene of Germany".

<http://members.aol.com/odonatadat/phylogeny/photos.htm>

Jackie mentioned last month that George Bick's Distribution Summary of North American Anisoptera had been placed on the IORI web site by Bill Mauffray. You will also find a link on Bill's page to an Oklahoma Checklist that I put together based on George's 47 years of records for Oklahoma. I have linked the species names to county distribution maps that show Kansas and Oklahoma distribution (only for Zygoptera so far, Anisoptera coming as I get to them). Access either list from <http://www.afn.org/~iori/oinlist.html>

Photographs: Some of the more exotic odonates from around the world may be found pictured in life at Dennis Paulson's photo gallery at

<http://www.ups.edu/biology/museum/ODphotos.html>

Included are examples from such exotic Odonata families Polythoridae (Mexico), Chlorocyphidae (Phillipines, Zimbabwe, Malaysia), Megapodagrionidae (Peru, Costa Rica, Ecuador) and Pseudostigmatidae (Costa Rica). There are also some great examples of odonates of familiar families from exotic locales. Particularly noteworthy are gomphids and libellulids from Zimbabwe (there seem to be few published photos of African dragonflies). These pictures will help when you read through the exciting accounts of trips to far-away places and references to strange odonates in the pages of ARGIA.

Remember that the 1998 DSA Annual Meeting information is posted on the web at:

<http://www.afn.org/~iori/oinevent.html#DSA1998>.

Finally, a note on the internet and scientific publishing. Many refereed journals are now publishing abstracts on the web. One that I know of that publishes the entire contents of the journal is the Florida Entomologist. This is a pioneering effort, and is likely breaking ground for many more publications to come. Check it out at

<http://www.fcla.ufl.edu/FlaEnt/fehmpg.htm>

You will need an Adobe Acrobat reader to interpret the PDF formatted files, but the reader can be downloaded for free. It would be interesting to get feedback from the scientific community on your impressions and opinions of electronic vs paper publication. (A thought that crosses my mind is that some pretty hard (read impossible) to find journals have been used over the years to publish descriptions of new species. I wonder if a hundred years from now old electronic publications would be any easier to find.)

[Here's some late additions from e-mail. First Gary Dunn says: I just finished uploading the "official Green Darner for Michigan State Insect" website. It's full of information on the green darner and has up to date information on the status of the state insect campaign. Hope you can check it out. Please help spread the word among your colleagues and students. The site is located at

<http://members.aol.com/YESnetwk/index.html>

Bob Barber has added a page to his web site about dragonfly migration, with a form to be filled out to submit information to Mike May via email.

<http://www.hsrl.rutgers.edu/BOB/migrant/mig.html>]

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ARGIA

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IN THIS ISSUE

ADIP MEETINGS - MAY AND AUGUST	Paul Brunelle	1
GEORGIA MEETING: SE MEETING IN CHATSWORTH	Ken Tennessen & Steve Krotzer	2
1998 DSA NORTHEASTERN GROUP MEETING IN SOUTHERN MAINE	Paul Brunelle	3
1998 DRAGONFLY SOCIETY OF THE AMERICAS ANNUAL COLLECTING MEETING IN VALENTINE, NEBRASKA	Roy Beckemeyer	4
DSA MEETINGS - A REQUEST FOR INPUT	Jerrell Daigle	6
SEMINAR ANNOUNCEMENT		6
<i>ORTHEMIS DISCOLOR</i> (ORANGE-BELLIED SKIMMER), A NEW SPECIES FOR THE U. S.	Dennis Paulson	7
ANOTHER <i>ORTHEMIS DISCOLOR</i> RECORD FROM TEXAS	Sid Dunkle	7
AN EARLY RECORD OF <i>NEONEURA AMELIA</i> (AMELIA'S THREADTAIL) FROM TEXAS	Dennis Paulson	8
NEW COMMON NAMES FOR U.S. ODONATA	Common Names Committee	8
<i>SOMATOCHLORA WILLIAMSONI</i> IN CONNECTICUT	Mike Thomas	8
<i>NEHALLENIA IRENE</i> IN ALASKA	Jochen M. Mueller	9
NEW RECORD OF <i>TRAMEA LACERATA</i> (HAGEN), THE BLACK - MANTLED GLIDER, IN WESTERN CANADA	Gordon Hutchings	9
NEW DRAGONFLY RECORDS FOR NEW YORK	Paul Lederer	10
ANOTHER MIGRATION REPORT, FOR THOSE OF YOU WHO CAME IN LATE	Mike May	10
RESTING DRAGONFLY EATING CRAWLING ANTS!	Peter McIntyre	12
A BIT OF 1997 MIGRATORY <i>ANAX JUNIUS</i> DATA FROM MARYLAND	Richard Orr	13
THE ODONATA OF SIDELING HILL CREEK	Richard Orr	14
EVIDENCE FOR A RECENT NORTHWARD SPREAD OF <i>ENALLAGMA CIVILE</i> IN NEW YORK STATE	Paul M. Catling	16
A BRIEF HISTORY OF THE PLAINS EMERALD - <i>SOMATOCHLORA ENSIGERA</i>	Roy Beckemeyer	17
<i>ENALLAGMA CYATHIGERUM</i> AND <i>VERNALE</i> : SPECIES, SUBSPECIES, HYBRIDS, ALL OF THE ABOVE, OR NONE OF THE ABOVE? YOU BE THE JUDGE	Nick Donnelly	20
COMMENTS ON <i>ENALLAGMA CYATHIGERUM</i> AND <i>VERNALE</i>	Mark McPeck	22
WILL THE REAL <i>ENALLAGMA VERNALE</i> PLEASE STAND OUT?	Ken Tennessen	23
COMMENTS ON <i>ENALLAGMA</i> PROBLEMS	Mike May	24
BLUE EYE COLOR AND ACETONE	Dennis Paulson	25
DRAGONFLY MAGAZINE	Hal White	25
THE ODONATA OF CANADA & ALASKA BY WALKER & CORBET (3-VOLUME SET) announcement		25
CORRECTION	Mike May	25
ERRATUM: NEW JERSEY LIST	Mike May	26
VIDEO ON DRAGONFLIES announcement		26
SOME NOTEWORTHY DRAGONFLY GRAPHICS	Hal White	26
<i>SOMATOCHLORA</i> LARVAL INFORMATION SOUGHT	Bill Smith	26
SUBMISSIONS TO ARGIA		26
STATUS OF THE NORTH AMERICAN ODONATA DOT- MAP PROJECT: A CALL FOR ASSISTANCE	Nick Donnelly	27
DRAGONFLY LOVE	poem by Philip Corbet	29
TRAMEA	Roy Beckemeyer	30