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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 Windows 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, or as e-mail attachment, 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 institutions or contributing membership, payable annually on or before 1 March of membership year. Dues for members in the Old World are \$25.

Dues should be mailed to Jerrell Daigle, 2067 Little River Lane, TALLAHASSEE FL 32311

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

Front cover: Belgian postage stamp showing M. E. de Selys – Longchamps (scan supplied by Matti Hämäläinen)

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

In This Issue

Here in Binghamton we are in the depths of winter. It is difficult to think of dragonflies when your thoughts are centered on frozen water pipes and bone-chilling temperatures. Our friend Bill Mauffray, ever considerate of our misery, sent several of us the following e-mail: "Yesterday (New Year's) I was walking with my wife under beautiful 70+ degree weather alongside a subdivision retention pond here in Gainesville. Flying were *Anax junius* (several, plus a cop pair), *Orthemis ferruginea*, *Ischnura hastata*, *Enallagma* sp.(either *doubledayi* or *civile*), and several *Lestes d. australis*." Thanks, Bill, we needed that.

The one constructive thing we can do during winter is to plan for next year's field meetings. We start with two winter conferences in Athol MA, and the Eglin AFB annual early season meeting (Niceville FL) in sunny and warm Florida. Getting into the season proper, we have the Weslaco TX Dragonfly Days in May, two DSA regional meetings (Mammoth Cave KY and Hartford VT) plus the Great Lakes meeting (Cleveland OH) in June, the DSA national meeting in Decorah IA in July, and the Bitter Lakes Dragonfly Festival in August in Roswell NM. This is the largest number of meetings we have ever had announced this early. Plan now to attend!

Roy Beckemeyer gives us the first of several articles on dragonfly flight. Drawing from his experience in the world of aeronautics, he scales his knowledge down from Boeing behemoths to tiny insects and show us that the same fundamental rules apply. In this issue there is also a note on a CIA-inspired "insectothopter", based on dragonflies, designed to be used as a small spy vehicle. This device failed, not because the builders were unaware of the principles that Roy explains, but for inadequate flight control mechanism, which we hope Roy will cover in a later article.

I reprint an interesting article by Matti Hämäläinen that first appeared in MALANGPO, the Thai dragonfly newsletter. This tells us about the founder of dragonfly study, Selys, and gives us an excuse to feature a fine illustration of a postage stamp on our cover. It also tells us of the early study of the Caloptera – a group of damselfly families that have always attracted collectors and are of special interest to Matti.

I have added an article on the puzzling genus *Erythemis*. I show why I currently suggest that the eastern and western forms, *simplicicollis* and *collocata* be considered as subspecies of a single species.

Ken Tennessen gives us an account of *Enallagma exsulans* gleaning water striders from the surface of a stream. For a group of insects so dedicated to aerial capture of its prey, accounts of other feeding habits are always thought provoking. Remember (from an old ARGIA) the perched dragonfly chomping on passing ants? Noble Proctor points out that the color of freshly emerged *Nannothemis* is bright green, rather than the yellowish, waxy color we are most familiar with, and he suggests why this is so. Herb Wilson notices that *Erythrodiplax berenice* nearly always perches facing into the wind – just like many birds.

We present several summaries of regional study. Ginger Brown tells us that her vigorous Rhode Island project continues to make good discoveries. Allen Barlow fills us in on two years' discoveries in New Jersey, and also speculates on the large number of late flight dates he has encountered, along with a similar note from Dave Moskowitz. Curiously, the conditions accompanying these late dates seem different than those we experienced in New York a few years ago. More work will have to be done on the subject of longevity.

We have brief updates for Iowa by Ann Johnson (we can all see this stuff later this year at the annual meeting), and for Georgia and Louisiana by Bill Mauffray. Omar Bocanegra adds *Tetragoneuria spinosa* to the Texas list. Fred SaintOurs describes increasingly abundant *Somatochlora linearis* in Massachusetts, and a brief note tells us that this species is newly discovered in Ontario. Dave McShaffrey describes swarming dragonflies of several sorts in Florida.

We are saddened by the recent passing of George Beatty and regret that this remarkably able dragonfly enthusiast dropped out of the dragonfly world in the 70's.

One of the most important bibliographic notices that we have provided is the announcement that the Smithsonian Institution has now provided on the web facsimile scans of the entire monumental turn-of-the-century work entitled *Biologia Centrali Americana*. The Calvert volume on Odonata (entitled *Neuroptera*) is one of our most important, and unobtainable, dragonfly works of all time.

Most of us will meet at the Tisa's Friendly Inn (850/678-4164) in Niceville Thursday afternoon (April 8) to check in and get ready for dinner. Early Friday morning, we should meet at the motel and get ready to go to Jackson Guard to meet Theresa Thom.

We plan to eat out each evening and hold the SE regional business meeting either Friday or Saturday. We have some DSA issues to discuss over ice cream and desert, including any proposal presentations for hosting next year's meeting.

For information contact Jerrell Daigle
<jdaigle@nettally.com>

NEW ENGLAND ODONATE CONFERENCE

This conference is co-sponsored by the Massachusetts Natural Heritage & Endangered Species Program, the Athol Bird and Nature Club, and Ode News

Date: Saturday, 17 April (all day)

Location: Miller's River Environmental Center, Athol, MA

Speakers from throughout New England will explore topics focusing on the distribution, conservation, and ecology of the regions dragonflies and damselflies. Further details will be posted on the Northeastern Odonate and International Odonata list serves. Contact Jennifer Loose (<jennifer.loose@state.ma.us>; 508-792-7270, ext. 313) or Blair Nikula (<odenews@odenews.net>; 508-432-6348) for further info.

DRAGONFLY DAYS, WESLACO TX, 14-16 MAY 2004

Dragonfly Days at will be held again in 2004 at the Valley Nature Center in Weslaco, Texas. From beginners to experts, there is something for everyone at Dragonfly Days; learn to tell a skimmer from a glider, discover the world of naiads in our bog pond, and roam the Rio Grande Valley's wetlands with experienced guides including Dr. Forrest Mitchell, Bob Behrstock, Dr. John Abbott, Dr. Terry Fuller, and Kathy Biggs. Prices range from \$5 for lectures to \$10 for field trips. For more information call (956) 969-2475, or on the web at <www.valleynaturecenter.org>

DSA's 2004 SOUTHEAST REGIONAL MEETING- UPDATED INFORMATION

Carl Cook

The meeting will be held at Mammoth Cave National Park, Kentucky, 10-13 June 2004. MCNP is nearest to Cave City, and approximately 75 miles south of Louisville, KY. It is best reached via Interstate 65 exiting onto highway #70 west at Cave City (Exit 53). There is an adequate choice of restaurants and nationally known motels at this exit, a hotel and several campgrounds within the park, and several economy class motels in the town of Cave City itself. Additional particulars will appear in next ARGIA.

Suggested arrival time is afternoon or evening on 10 June, an orientation session will be held that evening (place to be announced in next update), 11-13 June will consist of day time field activities at sites both inside MCNP and several locations nearby, evenings may be devoted to social/business activities. Some of the more interesting sites to visit in the park will be lower Green River at three different ferry crossings- Houchen's, Mammoth Cave, and Dennison's, plus the Park Service will provide power boats and guides to reach several island sites in the river. An easy to reach site, sure to be equally enjoyed for it's rich variety of both odonates and amphibians, is Sloans Crossing Pond alongside Highway 70. Outside MCNP one location we will want to visit is my all time favorite Kentucky river, with several easy to reach sites in Green and Metcalfe Counties- Little Barren River- over more than sixty years collecting this beautiful little stream the number of different gomphids taken is approaching two-dozen species.

I have received several inquires about holding a post meeting trip (or trips) and will welcome suggestions and input about doing this. One possibility is the Central Interior Plateau of Tennessee, Fentress, and Cumberland Countries (two-three hours driving time from MCNP) and/or higher elevation areas in eastern Kentucky (five hours driving time). These trips can be organized if there is enough interest.

Contact: Carl Cook, 469 Crailhope Rd., Center, KY 42215; <bugman@scrtc.com>; 270-565-3795 for further information, or with your suggestions.

GREAT LAKES ODONATA MEETING, JUNE 22-26, 2004

Renee Boronka <rboronka@cmnh.org>

This meeting will be hosted by the Natural Areas Division of The Cleveland Museum of Natural History.

Throughout the week, we will visit Museum Preserves, as well as other significant natural areas in northeast Ohio. The Museum's Natural Areas Program has protected over 3,600 acres of land in northern Ohio. The Museum is unique in that it owns a system of nature preserves, representing the broad spectrum of biodiversity found within northern Ohio. Natural communities found in our preserve system include hardwood forest, Lake Erie island, fossil dune ridge, marsh, swamp and glacial wetland. They serve as an outstanding resource for learning about the remarkable biodiversity of northern Ohio.

Tentative Schedule

Tuesday, June 22, 2004: Arrive in time for dinner (6pm)

Wednesday, June 23, 2004: Field Trip (TBA)

Thursday, June 24, 2004 ; Field Trip (TBA)

Friday, June 25, 2004: Carpool to the Cleveland Museum of Natural History. The Museum is located in University Circle. The Natural History Museum's Biological Collections will be open for Behind the Scene tours, as well as for research purposes. OR you can tour the Museum on your own. Within walking distance from the Natural History Museum are the newly renovated Cleveland Botanical Garden and the famous Cleveland Museum of Art.

Saturday, June 26, 2004: Field Trip (TBA)

Lodging: Being organized. We hope to have several lodging options posted very soon.

Meals: We will meet each morning at 8 a.m. for breakfast at a designated location. From there we will depart for our field day.

Box lunches will be available to those who register for them.

For dinner, there are many reasonably-priced, good restaurants in the area.

Transportation: Will be determined based on attendance.

Registration: Cost is \$35, which includes box lunches on all field days.

To make your reservation, fill out registration form on website. Or please contact Renee Boronka (800-317-9155 ext. 3505) <rboronka@cmnh.org>.

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VERMONT NORTHEAST DSA MEETING

Bryan Pfeiffer <bryan@vermontbirdtours.com>

It should be great for Gomphids, magnificent for Macromids, and lovely for Libellulids when odonatists from across the Northeast converge on Vermont in June for a northeast regional gathering of the Dragonfly Society of the Americas and a BioBlitz.

The DSA meeting will run from Thursday to Sunday, June 24-27. Odonatists will convene in Hartford, Vermont, for explorations in the Upper Connecticut River Valley (Windsor County) -- not far from White River Junction, Vermont, and Hanover, New Hampshire.

Awaiting the adventurous person with a net is a smorgasbord of habitats, including: emergent marshes, small and large ponds, well-oxygenated rivers (including the dramatic Quechee Gorge), a reservoir, and various sunny woodland openings. (We're working on getting permission to visit a fen and bog in the area.) The setting includes the Connecticut River, the White River, and the Ottauquechee River. New state records are likely. For details on the DSA gathering consult <www.vinsweb.org/BioBlitz/DSA-NE.html>.

The meeting coincides with a BioBlitz organized by the Vermont Institute of Natural Science. The BioBlitz is expected to draw biologists from across the region to a 24-hour race against time to identify every living thing at a site along the Ottauquechee River in Hartford. DSA members will be encouraged to join the BioBlitz. Part social event, part science, and a lot of fun, BioBlitzes are being organized across the country. Entomologists specializing in other taxa will be in abundance for the event. The formal BioBlitz survey period runs from 3 p.m. on June 25 (Friday) to 3 p.m. on June 26 (Saturday). DSA members can join the huge

grand tally supper following the BioBlitz on Saturday.

The central gathering spot for all DSA members and BioBlitzers will include an indoor location with stereoscopes for any needed identification work. The BioBlitz site is an extensive river and wetlands complex, a flood-control project of the US Army Corps of Engineers on the Ottawaquechee River. The Corps is an eager participant in the BioBlitz and will issue a blanket collecting permit.

Here's a tentative agenda:

Thursday, June 24: DSA members convene in Hartford, either at reserved campsites at Quechee State Park or at local motels. (Directions and motel information is on the web site.)

Friday, June 25: Collecting trips to various locations at and near the BioBlitz site.
Pizza supper. Possible evening Speaker.

Saturday, June 26: Continued collecting at BioBlitz site or short trips to other sites and (pending approval) a bog and rich fen.
Evening Event: BioBlitz grand tally supper

Sunday, June 27: Optional field trips.

For more information contact Bryan Pfeiffer at
<bryan@vermontbirdtours.com>

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DSA 2004 NATIONAL MEETING IN IOWA

Steve Hummel and Roy Beckemeyer

Pre-meeting trip: July 5 to 8 - Waterloo - Cedar Falls area
Meeting: July 8 to 12 - Decorah
Post-meeting: July 12 to 15 - TBA

The DSA 2004 annual meeting will be in Decorah, Iowa. Hosting the meeting will be Steve and Marcia Hummel of Lake View, Iowa, and Roy Beckemeyer of Wichita, Kansas.

Decorah is located on the Upper Iowa River in Winneshiek County in the northeast corner of the state. The meeting will be centered at Luther College. Geothermal air-conditioned housing will be available at Baker Village on the campus (see <<http://reslife.luther.edu/photos/blaphotos.html>> for photos). Each unit is 4 or 6 bedrooms with bathroom, kitchen, and living room area. Cost of housing will be \$35.00 per person per night with

breakfast at the Centennial Union (the price includes a blanket and pillow, a linen packet, and breakfast tickets). Another possibility for housing would be the Super 8 motel located on the south edge of Decorah. Information on hotels and motels in Decorah may be found on the web at: <<http://hotel-guides.us/iowa/decorah-ia-hotels.html>>. Pulpit Rock Campground is run by the city and is located along the Upper Iowa River a short distance from the Luther College campus.

The closest major airport is at Minneapolis, about 3 hours drive north of Decorah. Smaller airports that have good connections would include Cedar Rapids, IA, about 2 hours drive south, or Des Moines, IA, about 3.5 hours southwest.

The format for this years meeting will be different from past meetings. After considerable discussion among the DSA Executive Council members, we will be using a three-day format (with one day set aside for meetings, including presentation of papers and slide shows, leaving evenings free for informal get-togethers and processing specimens. Anyone having spare specimens of specialties from their part of the world may wish to bring them for exchanges.). We will arrive in Decorah on July 8th (check in at Luther begins at 2 pm). Field trips will take place on Friday and Sunday, Saturday will be set aside for programs and the business meeting. Departure will be on Monday, July 12, when those who wish to attend will move to the post-trip location. At present, a location for the post-trip has not been determined, but could be to north-central Iowa's great lakes region, or into Minnesota or Wisconsin.

Also new for this year will be a pre-meeting trip beginning on July 5th based in the Waterloo - Cedar Falls area. The soon to be named *Ophiogomphus* sp. (Sand Snaketail) has been found in the Black Hawk, Benton, and Buchanan county area and the main purpose of the pre-meeting trip will be to survey the area for this species.

For additional information on the Decorah area, check out the meeting website at <<http://www.windsofkansas.com/dsa2004.html>>. If you have any questions, please contact us by email (<mshummel@netins.net> or <royb@southwind.net>), or mail or phone (Steve and Marcia Hummel, P O Box 121, Lake View, IA 51450, Phone: 712-657-2180; Roy Beckemeyer, 957 Perry Ave., Wichita, KS 67203-3141, Phone: 316-264-0049).

This simple ratio, the wing loading, can be figured for any odonate by weighing the live insect, and by measuring its wing area, then dividing the weight by the area. (Area measurement has become a lot easier in these days of computers and scanners. By scanning a set of wings at high resolution and then using an image processing software program like NIH Image (available for free from the National Institutes of Health web site), the total wing area can be very accurately figured.)

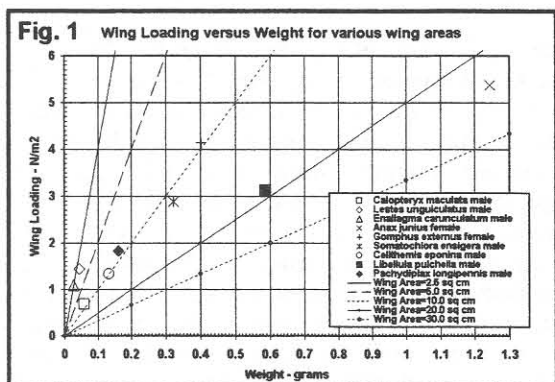


Figure 1 will allow you to figure the wing loading if you know an insect's weight in grams and wing area in square centimeters. I have also plotted the wing loadings for a number of odonates based on data I have measured.

Several papers have been published that record wing loading values for different odonates (see references) also. Rüppell and Hilfert (1993) have summarized some values for different taxa:

Epiophlebia superstes (Anisozygoptera): 4.6 N/m²
 Zygoptera (excluding Calopterygidae): 1.2 to 2.2 N/m² (I should note that I have measured values as low as 0.37 for Coenagrionidae)
 Zygoptera (Calopterygidae): 1.1 to 1.6 N/m²
 Anisoptera: 1.0 to 5.8 N/m²

What do these values tell us about how these insects might fly? A trip to a wind tunnel with an assortment of wings would eventually lead us to find that the lift generated by any given wing is **directly proportional to the density of the air**, and the **projected area of the wing**. It is also **proportional to the square of the velocity of the wing with respect to the air**. We could thus say that:

L (the lift) is proportional to ρ (the density of the air) times S (the wing area) times V^2 (the square of the velocity)

This can also be written down as an equation:

$$L = C \text{ (a constant of proportionality) times } \rho \text{ times } S \text{ times } V^2 = C \rho S V^2$$

A measure of the kinetic energy possessed by a moving mass of air is a quantity called the "dynamic pressure", usually written as: $q = \frac{1}{2} \rho V^2$, so the equation for lift is usually written:

$L = \frac{1}{2} \rho V^2 C_L S$ where now we have used C_L to denote the constant of proportionality. This constant is called the "lift coefficient", and one of the goals of our testing would have been to determine a value for that constant. (The value of the lift coefficient is determined by the geometry of the wing and the angle it makes with the moving air – we will investigate this in more detail at a later date.)

Let's suppose that our dragonfly is gliding along at 3 m/s, and is at sea level, where the density is 1.2256 kg/m³. Then we can figure out what lift coefficient is needed for each wing to generate its share of the lift supporting our Green Darner.

Remember that we calculated the wing loading was as 5 N/m². This is just lift divided by wing area, or L/S. We could write our equation as:

$$C_L = [L/S] / [\frac{1}{2} \rho V^2] =$$

$$[5] / [(\frac{1}{2})(1.2256)(3)^2] = 5/5.515 = 0.91$$

We will see in a future column that values of around 1 (one) for lift coefficients are perfectly achievable for wings of various shapes and sizes.

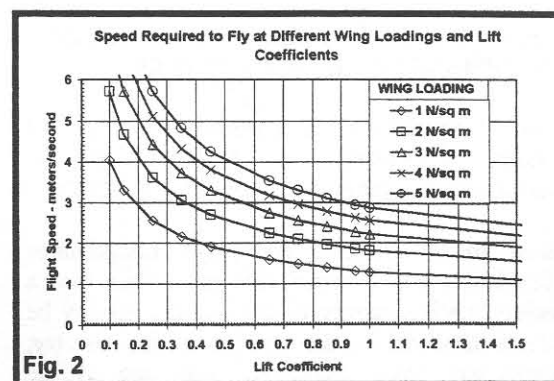


Figure 2 shows the speed of the air moving past the wings that would be necessary to generate lift to support insects of various wing loadings for values of lift coefficients from 0 to 1.5. At a C_L of 1.0, we

see that an insect with a wing loading of 1 could glide at speeds as low as around 1.3 m/sec, while an insect with a wing loading of 4 could only glide as slow as around 2.6 m/sec. The wing loading thus gives us a very rough indication of whether an insect is a high or low speed flyer.

Key facts:

- Wing Loading is just the weight of the insect divided by the total area of its wings.
- The wing loading indicates the average differential pressure that the air must exert on the wings to support the insect in flight.
- Lower wing loadings mean the insect can fly at lower speeds.

Next time: More about the pressure distribution on wings and how it is generated.

REFERENCES

Rüppell, G. & D. Hilfert, 1993, The flight of the relict dragonfly *Epiophlebia superstes* (Selys) in comparison with that of the modern Odonata (Anisozygoptera: Epiophlebiidae), *Odonatologica*, 22(3):295-309.

Grabow, K. & G. Rüppell, 1995, Wing loading in relation to size and flight characteristics of European Odonata, *Odonatologica*, 24(2):175-186.

Wakeling, J.M., 1997, Odonatan wing and body morphologies, *Odonatologica*, 26(1):35-52.

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THE 150 YEAR ANNIVERSARY OF SELYS' SYNOPSIS DES CALOPTÉRYGINES

Matti Hämäläinen, Department of Applied Biology, University of Helsinki, Finland (reproduced with permission from MALANGPO)

Baron Michel-Edmond de Selys Longchamps (1813-1900) was a remarkable man. Born into a wealthy, ancient family of the Belgian nobility he became involved in the politics of his country, independent since 1831. He was one of the founders of the liberal party in 1846, became senator in 1855, and rose to become the President of the Senate in 1880-1884. However, it was not his achievements as a politician for which he immortalized in a stamp issued in Belgium on

September 29, 1986. This honour was bestowed for his achievements as a scientist.

De Selys Longchamps, sometimes called the "Father of Odonatology", has been widely regarded as the world's greatest authority on the taxonomy of dragonflies. In his synopses and monographs and in numerous other publications he provided a firm basis for the taxonomy of the world fauna of Odonata. He named over 950 new species-group taxa in Odonata, many more than any other worker.

The reprint issue of his first synopsis - "Synopsis des Caloptérygines" - is dated "29 juillet 1853". The Annexe 20 of the Bulletin de l'Académie, where it was included, appeared in 1854. However, since the reprints were sold and circulated separately already in 1853, this is the valid publication year of the synopsis. Now, exactly 150 years after its first appearance, a few lines on this publication and its contents may be interesting. The synopsis (73 pp.) was actually a shortened version of a much more detailed "Monographie des Caloptérygines" (291 pp. and 14 plates) authored by de Selys Longchamps and H.A. Hagen, published in Mémoires de la Société Royale des Sciences de Liège (vol. 9) in 1854.

Selys was listed as sole author of the Synopsis, although the contributions of Dr. Hermann August Hagen (1820-1893) were duly acknowledged in the introduction. In it Hagen described 27 new species, whereas Selys described 39 species. In addition 6 subspecific (race) names were introduced, 4 by Selys and 2 by Hagen. Total full species included numbered exactly 100, only 34 of them having been described by earlier authors. The Monograph also included the same 100 spp., but a few more subspecific names were introduced. Of the 100 full species, 87 are presently considered valid.

The species were placed in 12 genera and 25 subgenera. Selys' subgenera correspond perfectly with the genera in present use and in fact Selys' binomial names were combined from the subgeneric and the species name. Of the generic names most were new, only 6 (*Calopteryx*, *Epallage*, *Euphaea*, *Rhinocypha*, *Micromerus* and *Libellago*) having been introduced earlier.

CLASSIFICATION: In Selys' system Odonata was placed as a suborder of the Orthoptera; it was divided into the "tribes" Anisoptera and Zygoptera. Zygoptera contained only one family Agrionidae, divided to two subfamilies "Agrionines" and "Caloptérygines". In the Synopsis the subfamily

Caloptérygines was divided to 7 legions (see the figure below).

LÉGIONS.	GENRES.	SOUS-GENRES.
I. CALOPTERYX.	CALOPTERYX.	1. SYLPHIS, Hagen. 2. CALOPTERYX, De Selys. 3. MATRONA, De Selys.
	NEVROBASIS.	4. NEVROBASIS, De Selys.
	ECHO.	5. ECHO, De Selys. 6. MNAIS, De Selys. 7. SAPHO, De Selys.
	PHAON	8. CLEIS, De Selys. 9. PHAON, De Selys.
	VESTALIS. . .	10. VESTALIS, De Selys.
	II. HETAERINA. .	11. LAIS, Hagen.
		12. HETAERINA, Hagen.
III. EUPHAEA. . .	EUPHAEA. . . .	13. ANISOPLEURA, De Selys. 14. EPALLAGE, Charp. 15. EUPHAEA, De Selys. 16. DYSPLAIA, De Selys.
		17. HELIOCHARIS, De Selys.
		18. DICTERIAS, De Selys.
IV. DICTERIAS. .	LIBELLAGO. . .	19. LIBELLAGO, De Selys. 20. RHINOCYPSA, Ramb. 21. MICROMERUS, Ramb.
		22. AMPHITERYX, De Selys.
V. LIBELLAGO. .	AMPHITERYX.	23. CHALOPTERYX, De Selys.
		24. THORE, Hagen.
VI. AMPHITERYX.	THORE	25. CORA, De Selys.

Fig. 1 The classification from the Selys 1853 Synopsis

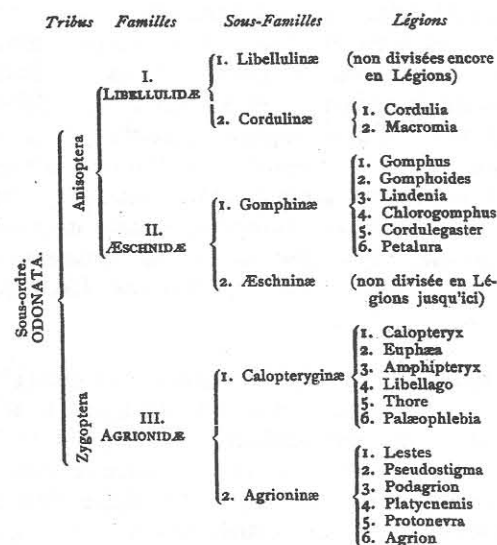
These legions correspond to families in our present classification. Recently, the validity of Selys as the author of the family names derived from his legions has prompted lively discussion (see the articles in International Journal of Odonatology 2(2), 1999). We do not need to discuss this further here, although I am in favour of the view presented by John Trueman.

Already in "additions and corrections" in the last two pages of the Synopsis, Selys presented a corrected classification of Caloptérygines, where Légion *Hetaerina* was combined with Légion *Calopteryx* and Légion *Dictierias* with Légion *Euphaea*. This classification with 5 legions was then used in the Monographie and in the additions of the Synopsis, issued in 1859-1879. In 1889 Selys established one more legion in the Caloptérygines, Légion *Palaeophlebia*, for the famous Japanese species presently known as *Epiophlebia superstes* (Selys, 1889).

"Légion *Dictierias*" was reinstated to family status by Tillyard & Fraser in 1939. They named the family Heliocharitidae, but now it is usually called Dictieriidae. Hetaerinidae and Calopterygidae

were placed as separate families in the phylogenetic systems by Fraser (1954, Trans. R. ent. Soc. London (B)23: 89-94, pl. 1) and Pfau (1991, Adv. Odonatol. 5: 109-141). On the other hand in Bechly's (1996, Petalura, Special-Volume 2) classification, where no fewer than 20 new families and 63 higher taxa above the family-group level were established, Hetaerininae was still ranked as a subfamily of Calopterygidae. A ground breaking molecular genetic paper by Dumont & al., still in press in Systematic Biology, will hopefully provide a better answer to the taxonomic status of Selys' former Légion *Hetaerina*.

However, it seems that Selys' original idea of 7 legions, as presented in the Synopsis of Caloptérygines, was a much better solution than his later systems with 5 (Monographie des Caloptérygines, 1854) and 6 legions.



Liège.

EDM. DE SELYS LONGCHAMPS.

Fig. 2 Classification from Selys 1896

Although Selys' categories were somewhat unusual and in the nomenclature of higher categories he used French instead of Latin, his system was fully consistent and he never changed his position. Below is a scan from the last page of one of his last papers "Le Progrès dans la connaissance des Odonates", published in 1896 in "Compte-Rendu des Séances du 3me Congrès international de Zoologie. Leyde, 15-21 Septembre 1895" (pp. 441-460). This seldom referred to paper is a detailed historic and bibliographic review of the research on taxonomy and diversity of odonates. It can be considered as a valedictory address from the

receding master to the new generation of odonatologists.

REGIONAL COVERAGE: As might be expected in 1853 the Caloptera [a recently introduced name for the families Calopterygidae, Euphaeidae, Chlorocyphidae, and Polythoridae] faunas of Europe and the adjacent areas of the Near East and North Africa were already quite well known; 6 species were listed. From the New World there was also quite good coverage; of 47 spp. listed 37 are presently considered valid species corresponding to nearly one third of the presently known species. From Africa, south of Sahara, only 8 species were known (less than 1/7th of the presently known fauna). The 37 species listed from South, South-East, East Asia and Papua represent ca 1/7th of the presently known species. From Australia 1 sp. was known.

Of the 37 Asian species the greatest number came from India. From South-East Asia, 6 species were listed from Java, 2 from Sumatra, 2 from (Peninsular) Malaysia and 3 from Cochin China (Vietnam). Of the Caloptera damselflies presently known to occur in Thailand, the following 7 species (the present names given here) were included in the Synopsis: *Neurobasis chinensis*, *Vestalis amoena*, *V. gracilis*, *Dysphaea dimidiata*, *Aristocypha fenestrella*, *Heliocypha perforata* and *Libellago lineata*.

INCREASE OF THE KNOWN DIVERSITY SINCE 1853: Four additions to the Synopsis des Caloptérygines were published in 1859, 1869, 1873 and 1879, where many new species were described. Also many other papers authored by Selys, Hagen, McLachlan and Brauer brought new species to light in the latter part of the 19th century. Kirby's (1890) "A synonymic catalogue of Neuroptera Odonata or dragonflies" already listed 233 Caloptera species, although 51 of these are now considered synonyms. However, less than 40 years after the publication of the Synopsis the number of species had already doubled.

At present the number of the known Caloptera species (including the still undescribed ones in different collections) is already over 450, and new species are still being discovered in their haunts in the tropics, especially from the Oriental region. During the last 10 years the rich fauna of southern China has been more intensively studied, and at the same time the opening of Vietnam and Laos for foreign visitors has also revealed many new Caloptera species. Burma, Cambodia, Borneo and

Sulawesi are also promising areas for new discoveries. Undoubtedly tens of new species still await discovery worldwide. Moreover, new species are also discovered when old museum material is identified or re-identified for revisions. The fact that altogether ca 700 species-group names have already been established for the extant world Calopterygoidea indicates that the taxonomic work on them poses more difficulties than work on most other odonate groups. Among others, groups such as the genus *Mnais*, *Calopteryx splendens* - complex and *Rhinocypha tincta* - superspecies are notoriously difficult. Especially in the Chlorocyphidae and Calopterygidae many subspecies have been named, the status of which is still insufficiently known. I would not be surprised if the list of Caloptera species would eventually pass the limit of 500 species, unless an unexpected reason to lump many oriental taxa arises.

As conspicuous insects Caloptera damselflies were discovered and described proportionately much earlier than many other, more elusive odonate groups. An excellent basis for comparison is to look at the development of knowledge of Gomphidae diversity, as illustrated by Selys' second synopsis "Synopsis des Gomphines" (published in 1854). In this also exactly 100 spp., (of Gomphidae in the present sense), were listed. In Kirby (1890) the corresponding figure is 228 spp., also very close to that for the Caloptera. However, presently already ca 950 species of Gomphidae are known and there seems to be no end to the new discoveries being made. In their interesting article "Pattern of discovery of the species of New World Odonata" in Argia 8(4): 6-9, 1996, Nick Donnelly and Roy Beckemeyer calculated the median year for descriptions of new New World odonates. For calopterygids (including hetaeriniids) it was 1869, for polythorids 1881 and for gomphids 1942.

WALKER'S CATALOGUE: Another publication published exactly 150 years ago in November or December 1853 was "List of the specimens of neuropterous insects in the collection of the British Museum. Part 4. - Odonata", one of the series of 68 similar volumes in the small, 12mo size on various insect orders compiled by Francis Walker (1809-1874) between the years 1844-1873. Despite the implications of the titles of these catalogues, they were not simply catalogue lists, but often contained descriptions of all known species in the group in question. Although the title of this part was "Odonata", the catalogue covered only "Sub-fam. Calopteryginae" and it remained the only odonate volume in this series. Much of it is a direct

Figure 2 shows the length – width ratios for 107 specimens from Missouri collection (mainly from Linden Trail) 31 from Kansas, including a few from Nebraska (from Roy Beckemeyer), and 22 from Colorado (mainly from the Evans collection). The graph shows that the ratio changes from west to east. I cannot find a morphological break between an eastern and western species.

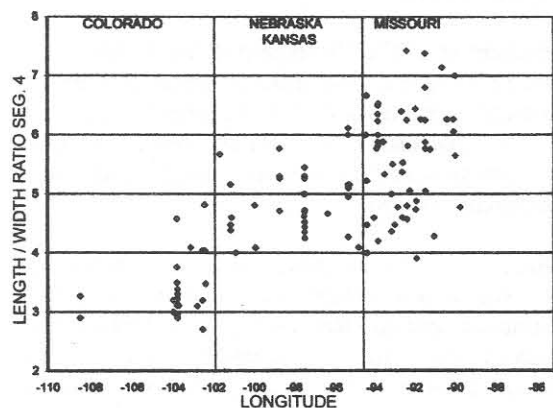


Figure 2. Diagram showing length – width ratio of the 4th segment venter for 107 specimens from Missouri, Kansas, Nebraska, and Colorado, vs. longitude, showing the change of this ratio with east-west position.

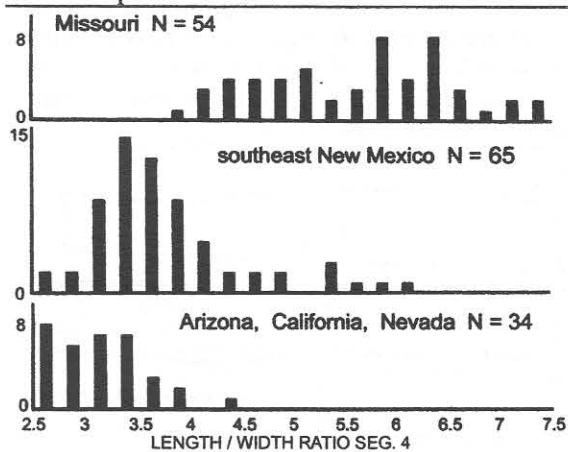


Figure 3. Histograms of the length – width ratio for three populations: Missouri (upper), SE New Mexico (middle), and California, Arizona and Nevada (lower).

The third figure shows histograms of three populations of *Erythemis simplicicollis* and *collocata*. The upper histogram is of 54 Missouri specimens (all of which would be called *simplicicollis*), and the lower histogram is of 34 specimens from Arizona, California, and Nevada (all of which are clearly *collocata*). The central histogram is of 65 specimens from southeastern

New Mexico. These are mainly but not entirely the Larsen specimens, and they come from Chaves (the majority), Eddy, DeBaca, Guadalupe, Lea, and Lincoln Counties. The peak of this histogram is offset from the more western *collocata*, and the histogram overlaps broadly with the *simplicicollis* histogram of Missouri specimens.

On the basis of these measurements I conclude that *simplicicollis* and *collocata* are putatively subspecies, which is to say, that genes are flowing freely between western and eastern populations. Are there alternative interpretations? The species could be distinct, with no free flow of genes, and with more specimens a break into two populations might become clear. Alternatively, the two species could be distinct, but could intergrade broadly (indeed, almost universally) in a broad zone. If this is the case (which is a very uncommon case demonstrated in only a few Odonata and relatively few other organisms), then there would have to be some basis for showing the species are really distinct. I have posited this for northeastern *Enallagma cyathigerum* and *vernale*, and for mid-western *Tetragoneuria cynosura* and *costalis*, but in these cases there was some additional evidence (different habits, distinct habitats, coexistence of both individuals of both species in some occurrences of the two.)

Of course, additional data, or data of another sort, might show that a subspecific interpretation is not supportable. But the data at hand do not support the conclusion that these are distinct species, and I present this as a invitation for further investigations. On the basis of the data before me, I interpret these as subspecies of a single species. The nominate species is *simplicicollis*, which is the older name (by Say in 1839), whereas *collocata* was named by Hagen in 1861.

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many towns would not be productive in filling gaps. Armed with an Excel spreadsheet showing our 133 species versus Rhode Island's 39 townships, we were able to see where the gaps were and work individually with volunteers to target their efforts. As a result, we added 226 township records and 17 county records to our database in 2003. In addition, two species never before reported in Rhode Island were discovered this year: Arrow Clubtails (*Stylurus spiniceps*) and Umber Shadowdragons (*Neurocordulia obsoleta*). These new state records were almost completely unexpected and certainly unplanned for such a mature project. We now know of 135 odonate species cruising the waters of Rhode Island, and expect that there are as many as 6 or 8 others yet to be discovered.

The copious precipitation that characterized 2003 may have contributed to the unprecedented numbers of certain species encountered this year, some of which were reported in greater numbers than ever before during the Atlas. These include Wandering and Spot-winged Gliders (*Pantala flavescens* and *P. hymenaea*), Lance-tipped Darner (*Aeshna constricta*), and Band-winged Meadowhawk (*Sympetrum semicinctum*). The two gliders, which were virtually absent from records in 2002, were observed or collected in a total of 27 new townships in 2003.

In terms of widespread and abundant species, we have completed Rhode Island distributions for 10 species (3 damselflies and 7 dragonflies). For nine of these species, we have adult specimen vouchers from all 39 townships. The tenth species, the Seaside Dragonlet (*Erythrodiplax berenice*), has now been vouchered from all townships in which habitat is present. We are within range (10 or fewer townships remaining) of completing distributions of an additional 15 species (6 damselflies and 9 dragonflies), 10 of which are needed from 5 or fewer townships. Vouchers for two species of this latter group are needed from just one township, though adults have been observed there.

In 2003, in addition to targeting species and township gaps, we focused on a few understudied watersheds in the state and this work produced significant results, including the state's first Umber Shadowdragons and Arrow Clubtails and three other dragonfly species previously known from only on watershed. Prior to 2003, Arrowhead Spiketails (*Cordulegaster obliqua*) were known from just one location in the southern part of the state. Work in the Blackstone River watershed in

northern Rhode Island revealed a large population of this dragonfly, separated by roughly 36 miles from the original South Kingstown site. Similarly, we had records for Zebra Clubtails (*Stylurus scudderi*) and Maine Snaketails (*Ophiogomphus mainensis*) only from the Pawcatuck Watershed prior to 2003. Both of these river species were discovered in the Blackstone Watershed this year, disjunct from the Pawcatuck system in the southern part of the state. Also of interest is the remarkable odonate species richness discovered in what was once the most degraded watershed in the state. Although many of the more sensitive odonates discovered in the Blackstone system were found in tributaries upstream of sewage treatment plants and mills, even the main stem of the river (what was once the heart of the industrial revolution) supports fine populations of Spine-crowned Clubtails (*Gomphus abbreviatus*) and Arrow Clubtails (*Stylurus spiniceps*). These we find primarily in the rapid rocky reaches below dams. In addition, as the state's largest river, the Blackstone is host to numerous populations of American Rubyspot (*Hetaerina americana*), Blue-fronted Dancer (*Argia apicalis*), and Dusky Dancer (*Argia translata*), again primarily in the vicinity of dams. The two dancers have not been reported outside of Providence County.

Surveys for other locally or globally rare, range restricted, and TNC Conservation Targets continued in 2003. Three new populations of Ringed Boghaunters (*Williamsonia lintneri*) were discovered this year, bringing the state total to 27 populations. The 2003 additions are close in proximity to other known populations. All appear to be small in size (based on exuvia collections) and are most likely sub-populations within larger meta-populations. Coppery Emeralds (*Somatochlora georgiana*) were collected or observed in 2 additional locations this year. Ovipositing females were observed in one location and a high-flying foraging male was observed in another. We now have adult vouchers for this species from 5 townships, representing 8 different breeding sites. The population in one southern Rhode Island location is particularly large and apparently stable, with swarms of 40 or more animals observed on several days this year and in previous years.

Blackwater Bluets (*Enallagma weewa*) again appeared in good numbers in the usual sites, although no new breeding locations were discovered in 2003. Surveys for three New England endemic damselflies produced excellent results this year. Rhode Island now has a total of 64

COUNTY RECORDS: Little known piedmont and highlands localities were visited resulting in 94 county records. A number of these records were erroneously omitted from previous reports.

Calopteryx aequabilis [River Jewelwing] (S2)
HUNTERDON: Readington Twp., Numerous individuals were observed along the Rockaway Creek @ Island Road (7/9/02 AEB, JBA, IJ). Courtship displays and oviposition were observed as well.

Calopteryx maculata [Ebony Jewelwing] (S5)
UNION: Union Twp. Collected at the Watchung Reservation, town of Hillside (8/27/96 AK)

Archilestes grandis [Great Spreadwing] (S3)
PASSAIC: West Milford Twp. Two individuals were encountered at a small pond along Clinton Road between parking areas P4 and P5, Newark Watershed (9/14/02 AEB)

Lestes forcipatus [Sweetflag Spreadwing] (S2S3)
GLOUCESTER: West Deptford Twp. Riverwinds nature trail, Riverwinds Road off Rt. 44 (10/13/03 CK)

Lestes rectangularis [Slender Spreadwing] (S5)
HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir outflow and associated wetlands along Mulhockaway Creek (6/28/02 AEB). SALEM: Pittsgrove Twp. Maurice River @ West Garden Road (CR 674) (8/27/03 JB, SC)

Lestes vigilax [Swamp Spreadwing] (S4S5)
HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir outflow and associated wetlands along Mulhockaway Creek (6/28/02 AEB).

Argia apicalis [Blue-fronted Dancer] (S5) ESSEX: Livingston Twp. Passaic River @ South Orange Ave (7/10/99 AB) HUDSON: Kearny Twp. NJ Meadowlands adjacent to NJ Transit Boonton Line, near Sawmill Creek WMA (7/1/97 AEB) MIDDLESEX: Plainsboro Twp. Plainsboro Audubon Preserve (6/28/02 AK) PASSAIC: West Milford Twp. Long Pond Ironworks S.P. (7/6/02 JB) SALEM: Pittsgrove Twp. Union Lake WMA, Maurice River @ end of Eppinger Rd (9/11/03 JB, SC) UNION: Westfield Twp. Robinsons Branch of the Rahway River (7/18/95 AK)

Argia fumipennis violacea [Variable Dancer] (S5)
UNION: Mountainside Twp. Watchung Reservation (8/27/96 AK)

Argia moesta [Powdered Dancer] (S4S5) UNION: Mountainside Twp. Watchung Reservation (8/27/96 AK)

Argia tibialis [Blue-tipped Dancer] (S3S4)
SALEM: Pittsgrove Twp. Maurice River @ West Garden Road (CR 674) (8/27/03 JB, SC) SUSSEX: Vernon Twp. Waywayanda Creek @ Canal Road (6/26/02 AEB)

Argia sedula [Blue-ringed Damsel] (S?)
BURLINGTON: Springfield Twp. Assuncunk Creek @ County Road 628 - Jacksonville Road (7/25/02 AEB, JBA, IJ). It should be noted that this stream was in a highly degraded state due to nearby agricultural activities. All other species encountered here were of the ubiquitous class. This is the second record of this species in New Jersey. It's status remains unknown.

Chromagrion conditum [Aurora Damsel] (S5)
HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir outflow and associated wetlands along Mulhockaway Creek (6/28/02 AEB).

Enallagma civile [Familiar Bluet] (S5) ESSEX: Livingston Twp. This species was found to be extremely abundant along the Passaic River @ South Orange Avenue (7/10/99 AEB)

Enallagma cyathigerum [Northern Bluet] (S2)
PASSAIC: West Milford Twp. Newark Watershed. Temporary pond on Clinton Road south of Utertown between parking areas P4 and P5 (6/4/01 AEB) Given the intermittent nature of this habitat it is more likely that this species breeds nearby under more stable conditions.

Enallagma divagans [Turquoise Bluet] (S4S5)
MERCER: Washington Twp. Miry Run @ Pond Road near jct. Rt. 526. (6/23/03 AEB, JBA, IJ)

Enallagma durum [Big Bluet] (S2S3) HUDSON: Kearny Twp. Tidal wetlands adjacent to NJ Transit RR tracks, near Sawmill Creek WMA (9/98 AEB). This large, conspicuous species was quite numerous at the site visited.

Enallagma hageni [Hagen's Bluet] (S2S3)
PASSAIC: West Milford Twp. Newark Watershed, Clinton Road @ parking area P3 (6/20/02 JB)

WARREN: Hardwick Twp. Rattlesnake Swamp adjacent to the Appalachian Trail, Millbrook Road (7/30/03 AB)

Enallagma signatum [Orange Bluet] (S5)
HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir outflow and associated wetlands along Mulhockaway Creek (6/28/02 AEB). SALEM: Pittsgrove Twp. Willow Grove Lake on Willow Grove Road (5/31/96 AEB)

Enallagma versperum [Vesper Bluet] (S4)
MONMOUTH: Upper Freehold Twp. Assunpink WMA, Assunpink Lake, fishing access off the Clarksburg-Robbinsville Road. (6/19/03 AEB).

Enallagma weewa [Blackwater Bluet] (S3S4)
SALEM: Pittsgrove Twp. Maurice River @ West Garden Road (CR 674) (8/27/03 JB, SC)

Ischnura hastata [Citrine Forktail] (S4) BERGEN: North Arlington (8/29/96 AK) SALEM: Pittsgrove Twp. Maurice River @ West Garden Road (CR 674) (8/27/03 JB, SC)

Ischnura kellicotti [Lilypad Forktail] (S4S5)
WARREN: Independence Twp. Jenny Jump State Forest. Lakes off Shades of Death Road, west of Shiloh. (7/30/03 AEB)

Ischnura posita [Fragile Forktail] (S5)
HUNTERDON: Tewksbury Twp. The Lamington River @ Rt 523 bridge south of Vlietown (7/17/01 AEB, JBA, IJ).

Ischnura verticalis [Eastern Forktail] (S5)
SALEM: Pittsgrove Twp. Union Lake WMA, Maurice River @ end of Eppinger Rd (9/11/03 JB, SC)

Nehalennia gracilis [Sphagnum Sprite] (S4S5)
WARREN: Hardwick Twp. Rattlesnake Swamp adjacent to the Appalachian Trail, Millbrook Road (6/12/02 JB)

Tachopteryx thoreyi [Grey Petaltail] (S1)
SUSSEX: Sandyston Twp. Stokes State Forest. Steam Mill Camping Area along Crigger Road near crossing of the Big Flat Brook. This is perhaps the states rarest species of Odonata. I was quite unhappy when this individual struck my car on 6/13/02. The location of the breeding seepage is not known based on this record. This species does not normally wander more than a mile or so from its breeding habitat. A concerted effort will be made to locate the breeding site and ascertain the population

size. It has been encountered sporadically throughout the Highlands and Ridge & Valley provinces. New Jersey's largest confirmed breeding colony was destroyed by residential development in Bergen County.

Aeshna constricta [Lance-tipped Darner] (S2S3)
WARREN: Hardwick Twp. Cattail swamp on Lincoln Laurel Road off Rt. 94 (8/21/02 AEB). Due to severe drought this marsh was largely devoid of standing water when I visited. Three individuals of this species were observed patrolling the marsh (one male collected, the others released).

Aeshna mutata [Spatterdock Darner] (S1S2)
ESSEX: Hilltop Reservation (6/2/02 K.D.) A photograph was submitted with this report and was considered adequate to the identification of this conspicuous species.

Aeshna tuberculifera [Black-tipped Darner] (S1S2) CAMDEN: Cherry Hill Twp. Fields adjacent to the Cooper River (10/5/03 CK) CUMBERLAND/SALEM: Maurice River (10/14/03 CK) GLOUCESTER: West Deptford Twp. Riverwinds nature trail, pond # 14, Riverwinds Road off Rt. 44 (10/13/03 CK) This is the first time this species has been recorded on New Jersey's Coastal Plain. PASSAIC: Bloomingdale Twp. The Pequannock River @ town of Bloomingdale (9/12/03 JB, SC)

Aeshna umbrosa [Shadow Darner] (S5) HUDSON: Kearny Twp. NJ Meadowlands adjacent to NJ Transit Boonton Line, near Sawmill Creek WMA (8/8/99 AEB) HUNTERDON: Readington Twp: Prescott Brook @ Payne Road (10/1/02 AEB) GLOUCESTER: Logan Twp. Floodgate Road off Rt. 44 (10/24/03 CK)

Anax junius [Common Green Darner] (S5)
HUDSON: Kearny Twp. NJ Meadowlands adjacent to NJ Transit Boonton Line, near Sawmill Creek WMA (7/1/97 AEB)

Basiaeschna janata [Springtime Darner] (S5)
HUNTERDON: Readington Twp. South Branch Raritan River @ Stanton Station Road. (6/5/2001 AEB, JBA, IJ)

Epiaeschna heros [Swamp Darner] (S5)
HUDSON: Kearny Twp. NJ Meadowlands adjacent to NJ Transit Boonton Line, near Sawmill Creek WMA (7/1/97 AB) HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir near boat launch area (6/28/02 AEB) MERCER:

Washington Twp. Miry Run @ Pond Road near jct. Rt. 526. (6/23/03 AEB, JBA, IJ)

Arigomphus villosipes [Unicorn Clubtail] (S4) HUDSON: Kearny Twp. NJ Meadowlands adjacent to NJ Transit Boonton Line, near Sawmill Creek WMA (7/1/97 AEB) HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir near boat launch area (6/28/02 AEB) OCEAN: Lacey Twp. Greenwood Forest WMA. Wetlands by Webbs Mill Brook, Rt. 539 (6/26/03 AEB) This is first time this species has been encountered in the NJ Pine Barrens. UNION: Cranford Twp. Lenape Park (6/22/96 AK)

Gomphus exilis [Lancet Clubtail] (S5) HUNTERDON: Readington Twp. South Branch Raritan River @ Stanton Station Road. (6/5/2001 AEB, JBA, IJ). Adults and exuviae were found to be abundant.

Gomphus spicatus [Dusky Clubtail] (S2S3) SUSSEX: Walpack Twp. Delaware River Nat'l Recreation Area. A teneral male was collected near a pond at the end of Thunder Mountain Road (5/4/03 TH)

Hagenius brevistylus [Dragonhunter] (S3S4) HUNTERDON: Tewksbury Twp. The Lamington River @ Rt 523 bridge south of Vlietown (7/17/01 AEB, JBA, IJ). 12 exuviae were collected from the Rt 523 bridge, 1 adult was observed at close range.

Stylurus spiniceps [Arrow Clubtail] (S2) MERCER: Hopewell Twp. Delaware River @ Washington Crossing S.P. off Rt. 546 (8/28/02 JB).

Cordulegaster erronea [Tiger Spiketail] (S2) HUNTERDON: Lebanon Twp. Vorhees State Park off Route 31. Several males and one female were observed along Willouby Brook and an adjacent seepage tributary (AEB 6/28/02). This species was subsequently reported from the nearby Rocky Run from larval collections (7/2/02 DR). These occurrences lie at the southern extent of the highlands province. This species has not yet been recorded on the piedmont or coastal plain of New Jersey. PASSAIC: West Milford Twp. Newark Watershed. Intermittent first order tributary of Mossman's Brook north of Clinton Reservoir (8/15/03 AEB). One male was netted and released patrolling what I considered to be inappropriate habitat for this species. It is likely that the breeding colony is nearby and this male was a vagrant.

Cordulegaster obliqua [Arrowhead Spiketail] (S2) PASSAIC: West Milford Twp. Newark Watershed. First order tributary of Mossman's Brook between P4 and P5, Clinton Road. (6/20/02 JB)

Didymops transversa [Stream Cruiser] (S5) HUNTERDON: Readington Twp. South Branch Raritan River @ Stanton Station Road. (6/5/2001 AEB, JBA, IJ)

Cordulia shurtleffi [American Emerald] (S2) PASSAIC: West Milford, Newark Watershed, parking area P3, Clinton Road. (6/5/02 JB) WARREN: Hardwick Twp. Rattlesnake Swamp adjacent to the Appalachian Trail, Millbrook Road (6/12/02 JB)

Dorocordulia libera [Racket-tailed Emerald] (S2S3) WARREN: Hardwick Twp. Rattlesnake Swamp adjacent to the Appalachian Trail, Millbrook Road (6/11/02 JB)

Epitheca princeps [Prince Baskettail] (S5) BURLINGTON: Springfield Twp. Assuncunk Creek @ CR 628 (Jacksonville Rd) (7/25/02 AB) HUNTERDON: Tewksbury Twp. Lamington River @ Rt. 523 bridge, south of Vlietown. ((7/17/02 AB)

Neurocordulia obsoleta [Umber Shadowdragon] (S1) GLOUCESTER: Elk Twp. Larvae was collected at Raccoon Creek @ Eillis Mill Road (7/5/00 JBA).

Somatochlora linearis [Mocha Emerald] (S2) MIDDLESEX: Plainsboro Twp. Plainsboro Preserve off Scotts Corner Road, patrolling small stream. (6/28/02 AK)

Somatochlora walshii [Brush-tipped Emerald] (S1S2) PASSAIC: West Milford Twp. Newark Watershed. Kanouse Road, Newfoundland off Rt. 23. (7/25/03 SC)

Somatochlora williamsoni [Williamson's Emerald] (S1S2) PASSAIC: Ringwood Boro, Ramapo State Forest off Skyline Drive. One male was netted from a feeding swarm of various Corduliids (7/31/02 AEB). The surrounding habitat was unsuitable for this species. It is presumed therefore that this was a stray.

Celithemis elisa [Callico Pennant] (S5) HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir near boat launch area (6/28/02 AB) HUDSON: Kearny Twp. NJ

Meadowlands adjacent to NJ Transit Boonton Line, near Sawmill Creek WMA (7/1/97 AB) MERCER: Hopewell Twp. The Stony Brook @ Mine Road (8/7/02 AB).

Celithemis eponina [Halloween Pennant] (S5) HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir outflow and associated wetlands along Mulhockaway Creek (6/28/02 AEB).

Celithemis fasciata [Banded Pennant] (S4) PASSAIC: West Milford Twp. Newark Watershed, wetlands along Clinton Road south of Uttertown (7/10/02 JB)

Erythemis simplicicollis [Eastern Pondhawk] (S5) HUDSON: Kearny Twp. NJ Meadowlands adjacent to NJ Transit Boonton Line, near Sawmill Creek WMA (7/1/97 AB)

Leucorrhinia frigida [Frosted Whiteface] (S2) PASSAIC: West Milford Twp. Newark Watershed, wetlands along Clinton Road south of Uttertown (7/10/02 JB) WARREN: Hardwick Twp. Rattlesnake Swamp adjacent to the Appalachian Trail, Millbrook Road (5/31/03 AB)

Leucorrhinia hudsonica [Hudsonian Whiteface] (S1) PASSAIC: West Milford Twp. Waywayanda SP (7/6/02 JB)

Libellula cyanea [Spangled Skimmer] (S5) HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir outflow and associated wetlands along Mulhockaway Creek (6/28/02 AEB). Two individuals of this conspicuous species were observed along the reservoirs shoreline.

Libellula incesta [Slaty Skimmer] (S5) HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir outflow and associated wetlands along Mulhockaway Creek (6/28/02 AEB).

Libellula luctuosa [Widow Skimmer] (S5) UNION: Cranford Twp. Pond within Lenape Park (6/22/96 AK)

Libellula semifasciata [Painted Skimmer] (S5) HUNTERDON: Readington Twp. South Branch Raritan River @ Stanton Station Road. (6/5/2001 AEB, JBA, IJ). This species was abundant in the flood plain ponds adjacent to the river.

Libellula vibrans [Great Blue Skimmer] (S4S5) MERCER: Washington Twp. Miry Run @ Pond Road near jct. Rt. 526. (6/23/03 AEB, JBA, IJ)

Pachydiplax longipennis [Blue Dasher] (S5) HUNTERDON: Tewksbury Twp. The Lamington River @ Rt 523 bridge south of Vlietown (7/17/01 AEB, JBA, IJ).

Pantala flavescens [Wandering Glider] (S4) HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir. A large feeding swarm was observed at the inflow of Spruce run by the boat launch area. (6/28/02 AEB). MERCER: Washington Twp. Fields adjacent to Miry Run @ Pond Road. One female was collected from a feeding swarm of *Tramea lacerata* (7/13/02 AEB, JBA, IJ).

Perithemis tenera [Eastern Amberwing] (S5) HUNTERDON: Union Twp. Clinton WMA, Spruce Run Reservoir outflow and associated wetlands along Mulhockaway Creek (6/28/02 AEB).

Plathemis lydia [Common Whitetail] (S5) HUNTERDON: Readington Twp. South Branch Raritan River @ Stanton Station Road. (6/5/2001 AEB, JBA, IJ). This species was abundant in the flood plain ponds and open fields adjacent to the river.

Sympetrum ambiguum [Blue-faced Meadowhawk] (S2) GLOUCESTER: West Deptford Twp. Riverwinds nature trail, Riverwinds Road off Rt. 44 (8/13/03 CK)

Tramea lacerata [Black Saddlebags] (S4S5B, SZN) MERCER: Washington Twp. A feeding swarm was observed in the fields adjacent to Miry Run @ Pond Road. One male was collected (7/13/02 AEB, JBA, IJ) UNION: Cranford Twp. Pond within Lenape Park (6/22/96 AK)

CORRECTIONS TO PREVIOUS LITERATURE RECORDS:

Ophiogomphus aspersus [Brook Snaketail] (S1S2) A record from Point Mountain Road was reported by May & Carle 1996. This was attributed to Morris County. This site straddles the border between HUNTERDON and WARREN Counties. This species should therefore be added to the Hunterdon County list.

Ophiogomphus mainensis [Maine Snaketail] (S2)
Reported from Warren County by May & Carle 1996. The record is specifically cited as follows "exuviae, Delaware River at confluence of Flat Brook...". This locality, which is due south of Flatbrookville is situated within Walpack Twp., Sussex County. This species should therefore be removed from the Warren County list.

Gomphus descriptus [Harpoon Clubtail] (S1)
Reported from Warren County by May & Carle 1996. The record is specifically cited as follows "exuviae, Delaware River at confluence of Flat Brook...". This locality, which is due south of Flatbrookville is situated within Walpack Twp., Sussex County. This species should therefore be removed from the Warren County list.

Gomphus viridifrons [Green-faced Clubtail] (S1)
Reported from Warren County by May & Carle 1996. The record is specifically cited as follows "exuviae, Delaware River at confluence of Flat Brook...". This locality, which is due south of Flatbrookville is situated within Walpack Twp., Sussex County. This species should therefore be removed from the Warren County list.

ACKNOWLEDGEMENTS:

I would like to thank Jeanette Bowers-Altman and Kris Shantz of the NJ Division of Fish Game & Wildlife for funding assistance during the past two years. I would also like to thank all the individuals who have shared their records with NJOS and allowed its publication. Kieth Dedrick, Tom Halliwell, Chip Krilowicz, and Andrew Krivenko have all contributed valuable data during the past two years. My colleagues Jeanette Bowers-Altman and Ian Jones have shared many interesting days surveying Odonates and freshwater mussels. Fellow NJOS members Jim Bangma and Sheryl Chacon have taken the trouble of visiting many far away localities and found treasure on each occasion.

COLLECTORS: JBA - Jeanette Bowers-Altman, JB - Jim Bangma, AEB - Allen Barlow, AK - Andrew Krivenko, SC - Sheryl Chacon, KD - Keith Dedrick, TH - Tom Halliwell, IJ - Ian Jones, CK - Chip Krilowicz

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ADVERSE WEATHER AND ITS IMPACT ON ODONATA FLIGHTS SEASONS NEW RECORD LATE DATES FROM NEW JERSEY

Allen Barlow, 10 Belle Court, Budd Lake, New Jersey 07828 <abarlow@njodes.com>

Throughout much of the region 2003 was typified by persistent periods of rain. This inconvenienced those interested in searching for Odonata. Based on this years data, the weather was a greater inconvenience to the Odes themselves. A comparison of 2003 records to those gathered since Philip Calvert's day have resulted in a long list of record late flight season extensions. This contrasts greatly with 2000 and 2001 for instance when many species emerged early and consequently ended their adult cycle early. It is of course possible that with more people in the field than in the past, we are simply gathering more data. The following list should not be interpreted as a suggested trend but is offered as a point of interest.

In general, we found many early season species had emerged as normal and perished during prolonged periods of poor weather. Species normally abundant during June emerged later and persisted into July. Many mid to late season species (eg *Aeshna umbrosa*) emerged very late this year as evidenced by tenerals still being found the second week of September.

The previous late date is followed by the current late date

<i>Hetaerina americana</i>	9/24	11/1
<i>Lestes congener</i>	10/27	11/21
<i>Lestes dryas</i>	7/6	7/23
<i>Lestes forcipatus</i>	10/2	11/1
<i>Argia apicalis</i>	9/24	9/24
<i>Enallagma civile</i>	10/29	11/1
<i>Enallagma durum</i>	10/3	11/2
<i>Enallagma signatum</i>	9/26	10/12
<i>Enallagma weewa</i>	9/7	9/11
<i>Ischnura hastata</i>	10/28	11/1
<i>Ischnura kellicotti</i>	9/22	10/2
<i>Ischnura ramburii</i>	10/23	11/2
<i>Aeshna clepsydra</i>	9/30	10/30
<i>Aeshna tuberculifera</i>	10/13	11/1
<i>Aeshna umbrosa</i>	11/7	11/10
<i>Anax longipes</i>	9/1	9/11
<i>Boyeria grafiana</i>	10/5	11/1
<i>Boyeria vinosa</i>	10/6	11/1
<i>Hagenius brevistylus</i>	9/13	9/30

<i>Progomphus obscurus</i>	8/13	9/5
<i>Stylogomphus albistylus</i>	8/13	9/9
<i>Cordulegaster diastatops</i>	6/14	7/8
<i>Cordulegaster erronea</i>	8/30	9/5
<i>Somatochlora tenebrosa</i>	9/21	9/24
<i>Erythemis simplicicollis</i>	10/8	10/30
<i>Ladona deplanata</i>	7/12	7/26
<i>Libellula incesta</i>	10/12	10/16
<i>Pachydiplax longipennis</i>	10/20	10/26
<i>Pantala flavescens</i>	10/9	10/31
<i>Plathemis lydia</i>	10/17	11/1
<i>Sympetrum semicinctum</i>	9/13	10/4

I would like to thank Jim Bangma, Sheryl Chacon, Chip Krilowicz, and Dave Moskowitz for sharing their records with me throughout the year.

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A NEW LATE FLIGHT DATE FOR *LESTES* CONGENER IN NORTH AMERICA

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On 21 November 2003 a female spotted spreadwing damselfly (*Lestes congener* Hagen) was collected in Mine Hill Township, Morris County, New Jersey. This record appears to be the latest reported flight date for the species in New Jersey and in North America. Throughout the transcontinental range of the species, *L. congener* typically has the latest flight season of any zygopteran often extending late into the fall (Walker 1953, Westfall and May 1996). In New Jersey, reported late flight dates include September 15 (Barber 1994), October 27 (May and Carle 1996, NJOS 2003) and November 1 (pers. comm. A. Barlow 2003). Late flight dates from other northeastern states include October 23 in New York (Mulberry Wing 2003; an unconfirmed record from November without a specific date also exists from this source), October 24 in Connecticut (University of Connecticut) and November 12 in Maine (MDDS 2003). Other notable late dates for the species include November 10 in British Columbia, Canada (Whitehouse 1941) and November 15 in Washington State (Paulson 2003).

The damselfly was collected in an early successional field approximately 30 meters from a large (approx. 1 hectare) manmade detention basin that is well-vegetated with wetland plants interspersed with shallow open pools of water. The damselfly was in excellent condition and the detention basin receives stormwater runoff from a

large townhouse development. Weather conditions at the time of capture were sunny and warm with an above-normal temperature of approximately 22°C. The specimen will be deposited in the Rutgers University Insect Collection as a voucher.

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Acknowledgements

I appreciate the assistance of Allen Barlow of the New Jersey Odonata Survey for sharing his vast knowledge about the distribution of *L. congener* in New Jersey and EcolSciences, Inc. for the opportunity to escape into the field on a regular basis.

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IOWA 2003 RECORDS

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Gomphus militaris (Sulfur-tipped Clubtail) was found in two new locations this past summer, extending the known range in Iowa 75 miles north and 120 miles west of where it had been previously recorded. *Aeshna multicolor* (Blue-eyed Darner) was confirmed in two northeastern counties and may indicate that the range is not primarily limited to the western part of the state. *Lestes inaequalis* (Elegant Spreadwing), considered extremely rare by Cruden & Gode, was recorded in an additional northeastern county. The mystery of the summer was a number of unusual *Epithecas* in southern Iowa.

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GEORGIA 2003 SUMMARY

Bill Mauffray, Managing Director, International Odonata Research Institute, Gainesville FL
<iori@afn.org>

For the second year in a row over 200 new county records have been added to the Georgia Dragonfly survey list. Most of the records come from the continuing efforts of Giff Beaton who seems to spend every free second in the field when he is not flying, which is what he does for a living. Additional contributions are from the results of the S.E regional DSA meeting held in Northwest Georgia in May. Two state records: *Lestes eurinus* Say and *Arigomphus villosipes* (Selys). Other contributions came from Marion Dobbs, another birder who converted to dragonflies, Michele Veit, Stephen Krotzer, Jeff Biller, James Flynn and a few others.

The web site has been updated to include links to images, about 95% of which are Giff Beaton's. Common names were added to the list also.

It is my goal to publish the Georgia list in BAO in 2005. If anyone has any records to contribute please

email me at <iori@afn.org>. I am also looking for records from within a 100 miles of Georgia which either are not in the Georgia list, or are not represented by verifiable records.

The list can be viewed at
<<http://www.afn.org/~iori/galist.htm>>

LOUISIANA 2003 SUMMARY

Bill Mauffray, Managing Director, International Odonata, Research Institute, Gainesville FL
<iori@afn.org>

Like the Georgia Site, The Louisiana site has been updated to include links to images, provided by Gayle and Jeanell Strickland of Baton Rouge Louisiana. These images include close ups of important characters used for their determination. New Parish records are from the Stricklands. Common names will be added soon.

Any additions would be greatly appreciated.

This list can be view at
<<http://www.afn.org/~iori/lalist.html>>

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FIRST RECORD OF *TETRAGONEURIA SPINOSA* FOR TEXAS

Omar R. Bocanegra, U.S. Fish and Wildlife Service, 711 Stadium Drive, Suite 252, Arlington, Texas 76011

Three male *Tetragoneuria spinosa* were collected at Ratcliff Lake National Recreation Area within the Davy Crockett National Forest in Houston County, Texas, on March 13, 2003. This is the first record of this species from Texas (Needham et al. 2000), which brings the known odonate fauna for the state to 213 species (John Abbott pers. comm.). The Recreation Area is centered around Ratcliff Lake, an approximately 45-acre impoundment of Lee Creek within the Neches River Basin. The only Anisoptera observed during this visit were *Tetragoneuria sp.*, which were common along the edges of the lake and associated wetlands. Two female *Tetragoneuria sp.* were observed ovipositing in the open water along the edge of the lake. Although they were somewhat common, they were extremely elusive. An hour and a half of collecting attempts resulted in the capture of only three specimens, all of which were *T. spinosa*. The

only other odonate species observed at the site during this collection period was *Ischnura posita*. The date of this record marks the earliest recorded date (reported from Florida) for this species according to Needham et al. (2000). Nick Donnelly (pers. comm.) visited the area in April 2003, but did not collect *T. spinosa*. A voucher specimen was verified by John Abbott.

Reference

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NOTES ON *SOMATOCHLORA LINEARIS* IN SOUTHEASTERN MASSACHUSETTS

Fred SaintOurs

From migrating masses of *Anax junius* to clouds of corduliids, 2003 was a good year for dragonfly hunting in New England. Unlike the rest of the country, much of which experienced drought, Massachusetts had an exceptionally wet year, though after two summers of drought conditions here one might expect some observable decline in local Odonata populations. Not so, apparently, as some species were seen in much greater numbers this year than in the past several years. Even after a late start due to cool weather, many species seemed to recover quite readily from the two-year dry spell. Some species such as the Stream Bluet *Enallagma exulans* seemed to benefit from the deluge, appearing in great numbers at a few places where they were not especially numerous in previous years.

One species that seemed especially abundant this year was the state-listed Mocha Emerald *Somatochlora linearis*. Since Hal White's initial discovery in Norfolk County in 1968, there have been but a small handful of observations in the state of this large and easily identifiable emerald. In July 2001 I excitedly netted two females in my back yard in northern Plymouth Co., less than 15 miles from Hal's original site of discovery, as they were spiraling upward from a low perch just after a brief summer shower. In 2002, while exploring a powerline road near the original site in Norfolk Co. on July 29, two females and a male were observed patrolling over stands of cattails (*Typha latifolia*) just before dusk.

In 2003 the number of encounters with *S. linearis* increased dramatically. It seemed that wherever I

looked in southern Norfolk and northern Plymouth Counties, I was rewarded with at least one sighting. In total, fourteen individuals of this species were caught and released at nine different locations, including one new county record. The Bristol County record came at a propitious time, as the Transit Authority considers re-construction of an abandoned railway that bisects a wildlife management area for use as a commuter line. This area, like most wetland-dominated landscapes, is laced with small streams, many of which cease to flow in the late summer months. The Mocha Emerald's larval habitat - small, sometimes intermittent, muck-bottomed or boggy streams often choked with Sphagnum and smartweed (*Polygonum*) - appears to be common throughout the region, but receives little, if any, recognition from the conservation community. Coupled with this is the difficulty in finding the larvae, making benthic sampling ineffective as a method of survey for this species. Although other Odonata larvae have been collected from intermittent streams in this region, including *Boyeria vinosa*, *Stylogomphus albistylus*, and *Cordulegaster obliqua*, more than 300 samples from nearly 100 intermittent and perennial streams have failed to produce a single corduliid larva (though one exuviae was found streamside near a teneral male *S. linearis*).

Searches for *S. linearis* adults were concentrated on small streams that cross open areas, particularly utility easements. One especially productive site was a rock outcropping that formed a high point along a powerline easement, near a large reservoir fed by several small forest streams. Here I was able to observe daily afternoon *Aeshna* / *Somatochlora* swarms* in August, and after four consecutive visits finally netted one *S. linearis* female as it passed overhead. At other locations I was rewarded by the emerald's attraction to forest/meadow ecotones, where vegetation forms transitional borders consisting of small tree species like Staghorn Sumac (*Rhus typhina*) and tall, herbaceous "wildflowers" like goldenrod (*Solidago*) and asters. Late-summer "swarmers" such as *S. tenebrosa*, *Aeshna verticalis* and *A. umbrosa*, among others, may be taking advantage of reduced wind velocity and abundant prey possibly aggregated there as a result of wind or temperature patterns in the meadow. Daily late-afternoon gatherings of dragonflies* were seen along the eastern edge of one large meadow, probably catching the last warming rays of sun and a few mosquitoes before retiring to their evening perches. After spending a few hours observing these swarms

CIA USED DRAGONFLY, CATFISH AS SPY GADGET MODELS

from the web. Original article by **Tabassum Zakaria** (from Reuters, article appeared 28 Oct 2003)

LANGLEY, Va. (Reuters) - The CIA once built a mechanical dragonfly to carry a listening device but found small gusts of wind knocked it off course so it was never used in a spy operation.

The agency also tested a 24-inch-long rubber robot catfish named "Charlie" capable of swimming inconspicuously among other fish and whose mission remains secret.

Charlie and the dragonfly were among spy gadgets displayed at CIA headquarters in an exhibit to mark the 40th anniversary of the Directorate of Science and Technology. It is not open to the public.

"Charlie's mission is still classified, we can't talk about it," Toni Hiley, curator of the CIA museum, told Reuters on a tour of the exhibit. "All we can say is he's our work on aquatic robotic technologies."

After seeing the life-like "insectothopter," Hiley jokes that she cannot look at a dragonfly in the same way anymore.

In the 1970s the CIA had developed a miniature listening device that needed a delivery system, so the agency's scientists looked at building a bumblebee to carry it. They found, however, that the bumblebee was erratic in flight, so the idea was scrapped.

An amateur entomologist on the project then suggested a dragonfly and a prototype was built that became the first flight of an insect-sized machine, Hiley said.

A laser beam steered the dragonfly and a watchmaker on the project crafted a miniature oscillating engine so that the wings beat, and the fuel bladder carried liquid propellant.

Despite such ingenuity, the project team lost control over the dragonfly in even a gentle wind. "You watch them in nature, they'll catch a breeze and ride with it. We, of course, needed it to fly to a target. So they were never deployed operationally, but this is a one-of-a-kind piece," Hiley said.

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YOU SHOULD HAVE SEEN THE ONE THAT GOT AWAY!

Joanne Solem

On a hot summer day, my husband, Bob, fellow enthusiast June Tveekrem, and I spent an afternoon visiting reservoir sites for odonates. At Pigtail boat landing on Triadelphia Reservoir in central Maryland, we were getting our gear assembled and checking out nearby odes when two young men with fishing rods came over and inquired what we were catching. Bob explained our quest; then we started down the path while they stayed in the parking lot to fish. We had not gone more than 100 yards when we heard yelling: "I've got one." "Do you want to see it?" "It's a big one!" After debating briefly how they could have actually caught a dragonfly when they didn't have a net, we started back, moving swiftly with Bob in the lead. When June and I arrived, Bob was kneeling on the ground extracting something from under his net. It was a female *Nasiaeschna pentacantha*!

How had it been captured? As one fisherman dangled his lure over the water, the dragonfly zoomed up and grabbed the artificial 3 inch yellow minnow. (Talk about her eyes being bigger than her stomach!) The young man flipped the lure back on shore with the dragonfly still clinging to it. When Bob came up, the odonate and the lure were still on the ground so he clapped a net over both. It was the first female of the species we had had in hand so June took numerous photos, and the proud young man asked us to take his picture with the dragonfly and the lure. Eventually, we set the odonate on a shrub; later, when we returned, she was gone. Not only was this one of our most intriguing odonate experiences, but August 19 was also a new late date for the species for this part of the state.

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SHOW US YOUR TATTOOS!

Nick Donnelly

Just when you think you have experienced everything...

During a recent visit to our vet, Ailsa was surprised when the vet asked if I could supply a dragonfly pattern for her mother, who "had always wanted to get a dragonfly tattoo." Not having faced this question before, I had to do a bit of thinking.

ARGIA

Binghamton, New York

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IN THIS ISSUE		1
EXUVIA2000		2
EGLIN AFB MEETING 9-11 APRIL		2
NEW ENGLAND ODONATE CONFERENCE		3
DRAGONFLY DAYS, WESLACO TX, 14-16 MAY 2004		3
DSA's 2004 SOUTHEAST REGIONAL MEETING- INFORMATION	Carl Cook	3
GREAT LAKES ODONATA MEETING, JUNE 22-26, 2004	Renee Boronka	4
VERMONT NORTHEAST DSA MEETING	Bryan Pfeiffer	4
DSA 2004 NATIONAL MEETING IN IOWA	Steve Hummel and Roy Beckemeyer	5
ROSWELL NM MEETING		6
AEROBATIC ANISOPTERA & ZOOMING ZYGOPTERA: ODONATA FLIGHT FROM A TO Z	Roy Beckemeyer	6
THE 150 YEAR ANNIVERSARY OF SELYS' SYNOPSIS DES CALOPTÉRYGINES	Matti Hämäläinen	8
ERYTHEMIS SIMPLICICOLLIS AND COLLOCATA – SUBSPECIES?	Nick Donnelly	11
ENALLAGMA EXSULANS GLEANING AT THE WATER SURFACE	Ken Tennessen	13
COLOR OF EMERGENT ELFIN SKIMMERS NANNOTHEMIS BELLA	Noble S. Proctor	13
PERCHING ORIENTATION OF SEASIDE DRAGONLETS (ERYTHRODIPLAX BERENICE) IN A MAINE SALT MARSH	Herb Wilson	14
RHODE ISLAND ODONATA ATLAS SEASON SUMMARY, 2003	Ginger Brown	14
THIRD REPORT OF THE NEW JERSEY ODONATA SURVEY	Allen E. Barlow	16
ADVERSE WEATHER AND ITS IMPACT ON ODONATA FLIGHT SEASONS. NEW RECORD LATE DATES FROM NEW JERSEY	Allen Barlow	21
A NEW LATE FLIGHT DATE FOR LESTES CONGENER IN NORTH AMERICA	David P. Moskowitz	22
IOWA 2003 RECORDS	Ann Johnson	23
GEORGIA 2003 SUMMARY	Bill Mauffray	23
LOUISIANA 2003 SUMMARY	Bill Mauffray	23
FIRST RECORD OF TETRAGONEURIA SPINOSA FOR TEXAS	Omar R. Bocanegra	23
NOTES ON SOMATOCHLORA LINEARIS IN SOUTHEASTERN MASSACHUSETTS	Fred SaintOurs	24
DRAGONFLY HITS THE NEWS	Colin Jones	25
SWARMING DRAGONFLIES IN FLORIDA	Dave McShaffrey	25
GEORGE BEATTY PASSES AWAY	Hal White and Nick Donnelly	26
THE BIOLOGIA CENTRALI AMERICANA ON THE WEB!		26
CIA USED DRAGONFLY, CATFISH AS SPY GADGET MODELS		27
YOU SHOULD HAVE SEEN THE ONE THAT GOT AWAY!	Joanne Solem	27
SHOW US YOUR TATTOOS!	Nick Donnelly	27
DOT-MAPS ARE NOW BEING PUBLISHED	Nick Donnelly	28
BOOK NOTICES. A GUIDE TO THE DRAGONFLIES OF SOUTH AFRICA, by Warwick and Michelle Tarboton; EAST AFRICAN DRAGONFLIES, by Peter and Kate Miller; A GUIDE TO THE DRAGONFLIES OF BORNEO, by A.G. Orr		28
ORDERING SOME ODONATA BOOKS OF INTEREST		29

BACK ISSUES OF ARGIA AND THE BULLETIN OF AMERICAN ODONATOLOGY

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Orthemis discolor - a tropical dragonfly now resident in south Texas (John Abbott)



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