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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 above) 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: It IS a bit late for Valentine's Day, but since when have we ever been on time? Elyse O'Grady of Rutgers submitted this whimsical sketch.

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

IN THIS ISSUE

Signs of Spring are everywhere; the first geese flew over a few weeks ago, our snowdrops are blooming, and we are now in a distinctly cheery mood as we can count the weeks until the bugs start flying and our local outings require sunblock rather than warm woolies.

The first order of business is to remind the readers of the several upcoming trips. The Everglades trip will occur shortly after you receive this issue, so if you haven't made your plans, it may well be too late. It is not too late, however, to plan for the Gainesville and Vermont trips. And if you are still contemplating the Slovenia SIO meeting, then you should note that plans can still be made. And for those of you in the vicinity, the newly formed Michigan Odonata Survey is having a May meeting in Ann Arbor.

Ailsa and I couldn't wait for Spring, and took off for a brief trip to Argentina. Evidently the Rat Pack couldn't wait either and went at the same time to Ecuador, combining a bug trip with a first-hand look at a *Golpe de Estado*.

Getting serious, Roy Beckemeyer has contributed an article on flight of dragonflies. It is not that far removed from the Boeing airliners he deals with every day - I guess it is mainly a matter of scale. Roy wonders how these bugs can fly when they in tandem flight. So haven't we all.

I have added an article on the early days of Odonata study in the New World. What started loosely as a response to several enquiries about the people involved in the field has grown to a minor research project. I have been receiving tidbits about more contemporary people which will appear in later numbers, and I urge readers with old photos or anecdotes to bring them to my attention.

Paul Catling has sent in an intriguing observation about quasi-migratory movements of a common *Sympetrum* species. As our membership grows, we seem to experience many more observations about behavioral aspects of Odonata study, especially those involving flight.

At this time, Mike May reminds that Spring brings with it migrations of dragonflies when low pressure areas bring the right direction of warm winds. Keep your eyes open in the next few months and contact Mike with your observations.

A photo showing a Least Grebe eating a female Green Darner was sent to me recently. I regret that I cannot print the lovely colored version.

Bob Cruden has contributed some notes on Iowa collecting, and Ginger Carpenter reminds us that even the smallest state has interesting Odonata. The best thing about Rhode Island collecting is that it takes such a short time to reach any site. Bill Mauffray has found a new, and apparently large, population of *Cordulegaster sayi* in Florida.

Nancy Van der Poorten has organized a major republishing undertaking - the reprinting of the three magnificent Walker volumes on Canadian Odonata. The price seems quite reasonable, and if you live in the northern half of the US, you should definitely consider acquiring these volumes. The original press run was only 200 copies, and it is no surprise that so few people own their own copies.

Bob Muller has contributed some thoughts on good nets for catching dragonflies. One of the amusing aspects of our field meetings is seeing how many varieties of this simple device have been devised. Bob has some good ideas to pass along.

Roy Beckemeyer contributes a poem to this issue. With the many poems that have appeared, we will have to consider another publishing venture.

I finish this issue with a new column, which I am calling "TRAMEA" for reasons which are explained below. This will be the single column to deal with the large number of submissions that I am receiving regarding the INTERNET, which is truly revolutionizing the way we look at our world.

by May 1, 1997, Otherwise you would be on your own.

Camping is available at nearby O'Leno State Park (904) 454-1853 (45 minutes from **IORI**) and also at Gold Head Branch State Park (352) 473-4701 (1:15 from **IORI**).

There is an Airport at Gainesville with Delta and US Air providing service; however much better rates are usually available from either Jacksonville (1:30 from **IORI**), or Orlando (2:15 from **IORI**) Rental cars are available at all three airports. they can be picked up at one and dropped of at another with no penalty any where in the state of Florida.

By the time you read this the Web site [see WEB address below] for the meeting should be set up. It will include useful tourist information about for the meeting should be set up.

I am soliciting volunteers to host workshops and also post meeting collecting trips into Georgia, The Florida panhandle and/or possible into North Carolina for *Ophiogomphus*, etc. If interested please contact Bill Mauffray: (352) 375-5903; iori@afn.org

NEW!!!

I will have an **IORI** store set up at the meeting. Envelopes, books, and possible some crafts will be available. Bring your checkbook. There will be specials and the shipping charge will be waived on all purchases. If any of you have anything to donate for sale to help the **IORI**, please let me know. (i.e. books, crafts, nets, etc)

IORI STORE: (prices effective Apr 1-May 31, 1997) Bill Mauffray. iori@afn.org
All profits go to **IORI**.

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IORI is a not-for profit organization that will provide to anyone who request it, information about the insect order Odonata (dragonflies and damselflies). Archives, collections, and library located within the Florida State Collection of Arthropods at Gainesville FL,

MICHIGAN ODONATA SURVEY MAY MEETING

contact Mark O'Brien

e-mail: mfobrien@umich.edu
tel. 313-747-2199

We have scheduled a meeting for MOS participants for Sunday afternoon, May 18, at the UM's Matthaei Botanical Gardens on Dixboro Road. The (very) tentative schedule is:

- Update on MOS plans/progress.
- Identification of larvae & exuviae.
- Demonstration of Web-based key.
- (MOS Collector's handbook will be available) Collecting in Fleming Creek.

The scheduled time is 1-5 pm

I'll have more information soon.

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VERMONT MEETING (20-22 June)

Contact: Paul Novak

e-mail: pnovak@tnc.org
telephone: 518-765-4524

The target area will be the Poultney River in southwestern Vermont. Attempts to find lodging in a local college have so far not worked out. Probably a local hotel or hotel will serve as the meeting place. Please contact Paul if you are interested in attending.

=====

SIO MEETING IN MARIBOR, SLOVENIA (12-23 July)

contact: Mladen Kotarac

e-mail: Kotarac@guest.arnes.si
mailing address: Antoliciceva 1
SI-2204 Miklavz na Dravskem polju
SLOVENIA
tel/FAX: 386-(0)62-691-855

Kotarac is still accepting applications to attend the 14th International Symposium of Odonatology. The field trips look pretty good, and this interesting area is not commonly visited by tourists.

Please notify Kotarac NO LATER THAN 15 May if you would like attend.

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MINUTES OF DSA BUSINESS MEETINGS, 29-30 JUNE 1996

Sid Dunkle

Since it is almost time for the 1997 DSA meeting, it is past time to distribute these minutes of the 1996 meeting! I regret the late publication of this information, but have several excuses. I was traveling all last summer, then plunged immediately into teaching, and my meeting notes were lost under piles of papers. Fortunately, Paul-Michael Brunelle summarized the collecting and slide show happenings at the 1996 meeting in the August 1996 **ARGIA**. The following notes basically add those things not mentioned by Paul in his article.

This was the first DSA meeting held outside the United States, our first foreign meeting! I hope and trust it will not be our last, as we were cordially welcomed by our genial host, Paul-Michael Brunelle and his colleagues, including Robert Harding who cooked us hot dogs provided by Maple Leaf Canada. The business meetings took place from 8:40-10 AM 29 June, and 9-10:30 AM 30 June 1996, in St. Stephen, New Brunswick.

Jerrell Daigle, Treasurer, noted that we are in good financial shape, with a balance of \$8000 US as of this meeting. Our main expenses have been publication and mailing costs for **ARGIA** and the **BULLETIN OF AMERICAN ODONATOLOGY (BAO)**. It was noted that the **BAO** is now listed in the Zoological Record. Possible publication of new species in the **BAO** was discussed, but no conclusion was reached on this issue. Mike May and others pointed out that there are inexpensive outlets for publication of the description of new species, such as *Insecta Mundi*, the journal of the Center for Systematic Entomology in Gainesville, Florida.

There were 25 name changes to the list of English names voted on by DSA members. Mike May was to check on getting our names also approved by the Entomological Society of America. Paul Brunelle was to distribute these names to Canadian

colleagues. A Common Names Committee was established, now consisting of Tim Cashatt, Jerrell Daigle, Nick Donnelly, Sid Dunkle, Bob Glotzhober, Dennis Paulson, Ken Tennessen, and Steve Valley.

President Ken Tennessen selected a Meeting Site Committee to find sites for future DSA meetings, namely Tim Cashatt, Jerrell Daigle, Rosser Garrison, Nick Donnelly, and Dennis Paulson. The 1997 meeting will be in Gainesville, Florida, and will honor Dr. Minter Westfall. The 1998 meeting is tentatively established for Valentine on the Niobrara River in Nebraska.

It was also noted that the 1999 Societas Internationalis Odonatologica (SIO) Symposium will be in Hamilton, New York, hosted by Vicky McMillan and Janet Rith-Najarian. Mike May gave us an update on the activities of SIO.

The DSA Collecting Guidelines were approved unanimously by its oversight committee, and are to be finalized by Richard Orr.

A letter was read from our good friend and the founder of the DSA, Carl Cook, who was unable to attend the meeting.

The possibility of establishing Local Chapters of the DSA was discussed. In particular the Ohio Odonata Survey wants to be a satellite chapter of the DSA. Several members favored such satellite chapters, others suggested that such groups could be regional, representing more than one state or province. The use of the DSA name would help the Ohio Group to obtain funds. At present there are 30 people participating in the Ohio Odonata Survey, and they send out 100 newsletters. Dues for local chapters should be as low as possible. A committee to look into starting local chapters was established, consisting of Mary Jane Krotzer and

Jan Trybula, with Ollie Flint and Paul Brunelle advising.

Jerrell Daigle provided buttons containing an illustration of a dragonfly, in what has become a nice tradition.

It was noted that the **IORI** (International Odonata Research Institute, managed by Bill Mauffray in Gainesville, Florida) is now selling books and Odonata envelopes. Insect Fair (Los Angeles, California) T-shirts are available from Rosser Garrison for \$16 U.S.

It was also noted that the U.S. Endangered Species Act was reauthorized on 26 Feb 1996, but that only Class 1 species are considered, including 6 *Megalagrion* from Hawaii.

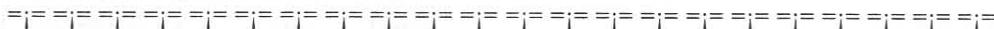
Ken Tennessen requested help such as new distributional records for the manual of North American Anisoptera that he is writing. Nick Donnelly also requested distributional data for the Dot-Map Project, especially for the northeastern quarter of North America; much more data are needed, especially from Ontario.

Tim Cashatt needs *Somatochlora* specimens for mitochondrial DNA analysis; acetone treated specimens are OK.

Mike May and John Michalski announced that they are working on illustrated keys for the Odonata of northeastern North America.

Ken Tennessen suggested, and it was generally agreed, that workshops in Odonata identification should be offered at all future DSA annual meetings.

Advance public relations should also be done for all future DSA meetings to encourage participation by the local people.



DON'T CRY FOR ME, ARGENTINA - OR - A MONTH IN THE HOT SUN WHILE YOU FROZE

Nick Donnelly

It's that time of year again. The winter is less snowy than usual, but fully as annoying, what with cold, bleak days, and - no dragonflies at all.

What is a fellow to do? Why, take his wife to Argentina, which is sweltering in January.

Ailsa and I had informally arranged last year with Javier Muzón to take a trip to northwestern Argentina - sort of an "Odonata no man's land" - which might be interesting to explore. We planned to use an ancient Ford station wagon (No one knows the car's age, but it probably was not new in 1970.) belonging to Javier's Instituto de Limnología.

Four of us (including Javier's assistant Natalia Ellenrieder) set out at dawn. This first day was long (think of Denver to Oklahoma City with no interstates) and flat. Javier kept assuring us that we would see mountains when we arrived, but it was long after dark when we finally rolled into Santiago del Estero, still in the plains.

This first day gave us a chance to be properly introduced to Argentina. The dreary pampas held little interest, and we passed the long, boring drive by sipping hot *maté* ("MA - tey"). One striking difference between a field trip in Argentina and almost everywhere else is that one person constantly fills a *maté* (hollowed-out gourd) with fresh shredded *yerba* (a type of tea, but related to *Ilex*, and is pronounced ("ZHER - ba")), and pouring in some hot water from a thermos. The Argentines pronounce "ll" and "y" as "zh", which meant that I had to translate what I heard into the sort of Spanish I am more used to. It really fooled us for a while.

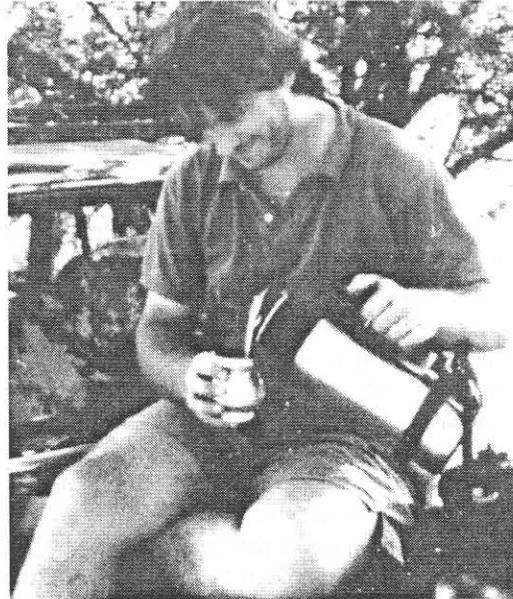
The *maté* is sucked through a metal straw called a "*bombilla*" (pronounced "bom- BEE - zha"). The *maté* is passed around to everyone in the car, with the *maté*-person adding hot water after every sip. This goes on essentially all day. Hot drinks on hot days really do make good sense, especially when the drink is *maté*. It almost (but not quite!) cut my craving for a cold beer. Natalia was our *maté*-person, and she also introduced us to an interesting variant: Fanta *maté*. In this version one adds not hot water, but cold lime or lemon-flavored Fanta. It's surprisingly tasty.

When we reached Santiago del Estero we met our first adventure: the discovery that the hotel room was indeed air conditioned, but the clerk at the desk had his itchy finger on the switch. Evidently he felt that the last month's electricity bill had been too high, and - well - who will know if the unit is switched off at, say, midnight? We did, of course, and in the next few days we learned that one always has to negotiate the

availability of air conditioning in air conditioned hotel rooms.

NORTHWEST: THE HOT, DRY PART

Did I mention that Argentina is very flat? The first day we saw not so much as the lowest of hills. The pampas are totally agricultural in the eastern side, giving way to thorn forest in the west. The only bugs we saw were the ubiquitous *Miathyria marcella* (how could have I been so thrilled when I caught my first one in Texas years ago?) and oodles of little *Aeshnas*. While we northerners associate *Aeshna* with ponds and marshes, in Argentina several species live in unpromising dry country. Stop to fill your car with gas in some hot, dusty place and there will be several *Aeshna* patrolling around the pumps.



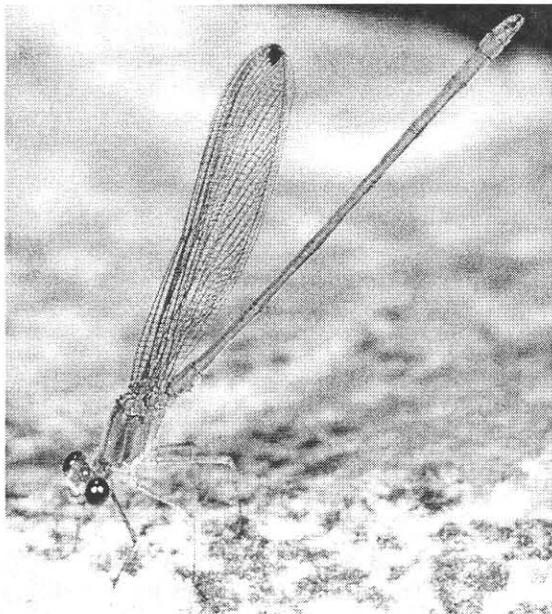
Javier preparing his *maté* while sitting on the hood of the ancient Ford. (How ancient is it? It can hold Javier without caving in!)

The next day was our first real bug day. Our first location, in the hot, still mainly flat country around Tucumán, was a seepage area below a major dam, which were full of odonates. My first *Phyllocycla medusa*, *Micrathyria hesperis*, and *Orthemis nodiplaga* were here, as well as what we thought at the time was Argentina's first record of *Enallagma*. I tried to match Javier's enthusiasm at the *novaehispaniae* - it seemed just like old times to me. The major surprise of this site were two co-occurring *Acanthagrion peruvianum* and *lancea*. These are so nearly

identical that only hours of work when I got back home enabled me to distinguish them. I doubt that I could have done it in the field. How do they sort themselves out?

The next day we finally climbed into the hills, which our Argentine hosts told us were not the Andes. Not yet. They apparently reserve this term for the snow-covered highest ranges only. I guess we never reached the proper Andes. It was raining, as it often does in these forested foothills, which are called "Yungas". That's pronounced "ZHUNgas".

We had intended to explore this narrow zone of Amazonian-type forest in the northern part of the country, but the first days were slow indeed. In the rain we found only *Mnesarete grisea* in the first stream and abundant *Ischnura ultima* at a tiny pond along the road. That was it for the second day. The *Mnesarete* was sort of interesting, if you like clear-winged *Hetaerinas* with a totally pruinose gray body.



The totally gray *Mnesarete grisea* is appropriate for a black-and-white picture.

After spending the night in a tiny, dusty, sleepy village which our guidebook assured us was rife with interesting customs, we spent the next few days exploring the first really dry, high country of the trip. This country - mainly around the wine-producing town of Cafayate (remember: "Ca - fa - ZHA - te") was great for birds but a

little slow for bugs. There were several *Aeshnas* and a few libellulids, but new things were not coming very fast. We saw wondrous animals: several foxes and the tiniest armadillo (covered with short bristly hair) that I have ever seen. Also a huge lizard (Would you believe nearly a meter?) which scuttled across the road. The scenery was magnificent, especially the Quebrada de Cafayete, whose magnificent red cliffs and narrow box canyons looked as though they had sprung from the pages of ARIZONA HIGHWAYS. We added *Argia juyuya*, a dry-country pale species, and I found a pruinose gray *Dasythemis mincki* (Everything in this dry country seems to be gray.). The local *Tamea* is *cophysa* and is - are you ready? - pruinose gray. The bugs were still coming slowly. One stream seemed exactly like Sabino Canyon, right down to the tourists. But there were only a very few odonates, and I was getting a bit anxious.

After two dry days we rolled into the lovely city of Salta. Natalia's parents lived here and her husband Pablo (a hemipterist) had come north to join us for the remainder of our trip. We spent several days going out to inspect local streams and ponds, with more success. The streams were more forested but not really humid. They were loaded with *Argia joergenseni* (the huge red-eyed dancer of the southern cordillera) and *Mnesarete grisea*. On one stream we found many *Allopdagrion* sitting on leaves with outspread wings and pretty pale purple patches on the thorax. Things were now improving.

On a local reservoir, its outflow stream, and a nearby pond, we added several things totally new to me. My first *Oxyagrion rubidum* was a treat - a bright red *Enallagma*-sized damselfly with a blue spot on the end of the abdomen. The big treat was a northern record of *Andinagrion peterseni*, which is a truly amazing damselfly. Its front half is red and the rear half is sky blue - one of the most striking color combinations that I have seen. On a pond there were abundant *Micrathyria unguolata*, a strange pruinose gray bug with the sides of the thorax bright green. *Homeoura chelifera* were also abundant and resembled nothing so much as a slightly oversize *Enallagma basidens*.

Finally we set off for our first real "adventure": four nights camping in Calilegua National Park. Javier had arranged tents and sleeping bags for

all. It was easy to reach the park boundary, but we were required to ford a torrential, rocky river. We waited an hour for the high water to go down and crossed successfully, worrying what it might be like when the anticipated rains arrived later in the day. We expected to have our camping site to ourselves, but a troop of boy scouts was already in residence, forcing us to set up our tents off in a corner of the site.

That night, to the loud songs of the boy scouts, we enjoyed our first experience with Argentine camp cooking. I have to digress at this point and reveal that Argentine camp cooking is a "guy thing" based on the national dish (thick steak) grilled in the national way, on a parilla ("Par - EE - zha"). The dinner follows the preparation of the day's bug catch, of course, and we lingered until about 9 P.M. putting up our specimens by the light of a lantern and trying unsuccessfully to evade the absolute worst black flies and mosquitoes of my entire life. After the catch has been stowed in the acetone the fire was started. Now in the good old U.S. we put some sticks on the fire, get it going, and start cooking. Not in Argentina. As I said, cooking is a guy thing, and Pablo and Javier cosseted the fire for about two hours before they pronounced it ready for the first steak. It seems that you use one type of wood to get flames, and then you put another type of wood on. The aim is to reduce this second wood to coals (no flame!) before the steak goes on the parEEzha. Because the steak is about six inches above the coals and has to be cooked until it is well done, you don't taste dinner until midnight, listening all the while to boy scout songs. Because breakfast and lunch were more or less skipped over, us gringos were FAMISHED! But it was good. . .

Meanwhile the boy scouts were in full song. Did I mention that Argentines are evening people, and kids never seem to go to bed before midnight? The only thing that slowed them down finally was torrential rain at two in the morning. This also dampened us a bit, because we found that our tents were in a slight depression. Happily, they floated.

The next day brought a crisis for the boy scouts. They were due to leave, and the river was now definitely too high to ford. We might have to spend another night listening to boy-scout songs! After several hours, however, the locals devised a plan: send over a big tractor with a scoop and

ferry the boy scouts - a few at a time - in the scoop. None were apparently lost and it was pronounced a success. Ah - a quiet campsite!

A few years ago I told you about the Mexican non-term for time, "diez minutos", which, as used by Enrique González, means "about two hours." It was in Calilegua that we learned the invaluable Argentine measure of distance (or non-measure): "dos cientos metros", which means, "Stop before you get to Paraguay." We discovered that when you asked directions to any place at all, the answer undoubtedly contained this valuable bit of information. It became a joke for our little party, and towards the end of the trip a car stopped to ask directions of me. I smiled at the lady, told her which way to drive, and added the helpful hint, "dos cientos metros". Behind me I heard my wife hiss, "You're awful.."

Calilegua is a good, though small, sample of "ZHUNgas", and we hoped to find good things. At a small pond we found some of my old friends - *Coryphaeschna adnexa*, *Tramea abdominalis*, *Micrathyria ocellata* and *didyma*, and *Lestes forficula*. We also found a new one for me - *Lestes pictus*. Things were getting better all the time.

I have to digress again and mention that Javier is especially interested in aeshnids. In the first days of the trip the bug that we looked for was the fabled "*Marmaraeschna*", which was his bug-*de-jour*. We finally found it in this park - the huge *Aeshna viginipunctata*, which has a marbled rather than striped thorax. We took a few flying at a stream at high elevation on a day, while elegant swallow-tailed kites swooped so close to us that I noticed that they are not really black but blue-gray.

The *Aeshnas* actually got a lot better. At the Arroyo Tres Cruces (Mark this name well!) we found *Aeshna rufipes* (females only - sob!), a large female *Aeshna* related to *punctata*, and an elegant yellow-faced large aeshnid that I can't even place to genus! This last one is most like the rare *Limnetron*, and we suspect that it is an undescribed species and, maybe, genus. These bugs all flew in the shadows, with the males poking into bushes looking for females and females flying past at top speed in the gloom. I am not certain how we managed to catch any of them. With these great aeshnids, the pretty

Progomphus phyllochromus sitting on rocks were merely a diversion during rare moments of sun.

Did I mention the spiders? I should digress at this point to mention that my quite intrepid wife harbors one animal phobia: spiders. She faces down huge snakes and fierce animals with superb poise, but even small spiders gross her out. Being a Scotswoman, however, she would not think of squashing one. Well, Calilegua was full of HUGE spiders. There were several types of tarantula, of which the largest was called poZHEEto ("little chicken", or pollito). The name comes either from their size or food preference. Well, we saw several, and at quite close range. A slightly smaller variety was, we were informed, highly dangerous, because it would jump, and its bite could do you in. This variety we found on our tent, and, later in Iguazú, patrolling the walls of our dining room. Argentinians seem quite unanimous that this is one bad dude.

One day we went out of the park looking for lowland streams and ponds. At the first stream along the highway we found abundant *Macrothemis imitans*, which is quite different from its supposed sibling subspecies from Venezuela to Texas. This was the first place where we found *Hetaerina* in numbers. They were all *rosea*, which is closely related to *caja* and looks just like it. I found a *Phyllocycla basidenta* sitting on a rock and a *Progomphus* that we can't yet identify. The real surprise was a dark *Argia*, which looked to me just like *translata*, a species I have caught a few miles from my home in New York. Imagine my surprise when it actually turned out to be *translata*, which now ranges from northern U.S. to Argentina.

We stopped briefly at a tiny, scruffy roadside pond to look for *Lestes*, which is Javier's other passion. We found none, but in a few moments we had added *Erythrodiplax media* and *Micrathyria longifasciata* to our list.

It was now time to say good bye to northwest Argentina. We stopped one last time at a mountain (still not the Andes) lake and to find *Sympetrum illotum* (and practically nothing else), and then bid good bye to this wonderful area. The next morning Ailsa and I were on a

plane bound for Buenas Aires, and on to the tropical forest at Iguazú National Park. Later that day we found ourselves in a rented car driving through heat and humidity towards a small biological research station which was to be our home for the next five days.

NORTHEAST: THE HOT, WET PART

Iguazú Falls is one of the world's great waterfalls. It is especially spectacular at the height of the rainy season when prodigious amounts of water spill over a long lip, forming about a dozen major waterfalls. The walks around the falls are a definite must for any tourist. Flying everywhere were large, red *Coryphaeschna perrensi*.

We collected in several places in the park. The most rewarding spot was a series of tiny ponds on the site of the abandoned gravel airfield. At one pond that I would have not hesitated to drive across in my pickup there were six species of *Erythrodiplax* (*connata fusca*, *umbrata paraguayensis*, *latimaculata*, and - new for me - *ines* and *melanorubra*), as well as *Micrathyria hypodidyma* and *Tramea binotata* and *rustica*. Two of these (*ines* and *rustica*) - were records for the country. There was a large red *Anax* here. It is *concolor*, which I think is the same species as our familiar *longipes*. My specimen has a spotted red abdomen, which combines the characters of these two taxa and bolsters my belief.

Elsewhere in the park we found *Argia mollis*, *A. reclusa*, and *A. hasemani*, *Epileoneura venezuelensis*, *Neoneura ethela*, *Peristicta misionera*, the huge blue *Heliogaris amazona*, *Hetaerina rosea* and *longipes* (formerly *carnifex*), *Elasmothermis constricta*, *Brechmorhoga praedatrix*, *Nephepeltia phryne*, *Acanthagrion ascendens* and *gracile*, *Telebasis limoncocha* and *carmesina*, *Tigriagrion aurantinigrum*, and *Heteragrion aurantiacum*. Several of these seem to be new for the country: *A. reclusa* and *hasemani*, *E. venezuelensis*, *N. ethela*, *T. limoncocha*, and *B. praedatrix*.

Along a forest path we found many *Triacanthagyna trifida* males looking for females in the low trees about three meters above the path, along with a lone *Gynacantha adela*, which is one of the smaller, more delicate species

in this large genus. Walking everywhere on the forest paths were huge solitary ants - probably one of the ponerine species whose sting can immobilize you for hours. My favorite bugs of the forest were the butterflies, which are more profuse and beautiful in Iguazú than anywhere I have been in the tropics. Not only are there huge *Morphos* (both blue and white varieties) everywhere, but also clouds of swallowtails, sulfurs, riordinids, and many others - each more beautiful than the last.

My favorite odonate at Iguazú was the lovely "*Helicóptero*": *Mecistogaster amalia*. Although you wouldn't think a bug six inches long would be too easy to miss flying in the forest, in fact it is sometimes difficult to spot. So ghostly and slow is its movement that the only way that I spotted it was by noticing that a horizontal line was moving in a mysterious way. Normally one associates horizontal lines with bits of sunlight catching strands of spider silk, but this one was moving deliberately. Following it, I found it perched and nabbed it. Never once did I see its wings moving!

Birds and animals were a wonderful part of the park experience. There were tropical wood warblers, tanagers, trogons (one lived quite tamely close to our cabin), and several woodpeckers, including a huge, brilliant yellow flicker. We saw families of guans in the forest, and every dead tree seemed to have a plumbeous kite perched on the top, especially at dusk. These kites were hunting insects, and the most likely candidates may have been the evening flying aeshnids. Has anyone checked out the diet of these birds?

On the animal front we saw a peccary and an absolutely cute "cuis", which seems to be the wild equivalent of a guinea pig. Well, close enough. A relative of the huge lizard of the northwest lives here. So tame did they seem, that I was certain that I could catch one. However, I didn't try - those toe nails could probably draw lots of blood. Our most memorable animal was a large green agouti which scuttled across the road just as we were parking. Yes, I said "green". I have seen teen-age girls with hair less green. Must be the algae in their shampoo!

THE STREAM FROM HELL WITH HEAVENLY DRAGONFLIES

Sometimes an experience really sets you back and forces you to reconsider all your previous notions. The Arroyo Mbocay did that to us. Javier had advised us to go to this stream; four years previously he had found it to be clean and full of odonates. Of course we went to the outskirts of the town of Puerto Iguazú to find it. In the four years since Javier's visit the stream had undergone a few changes, to put it mildly. The poor section of the town had expanded almost to the stream, and the dirt road to the stream had been "improved" for municipal garbage trucks going to the official dump. The stream had become the unofficial dump, however. Kids swam in it, women did their laundry, and everywhere the odor of filth and feces hung over the remnants of the forest. We should have left immediately, but I decided to take a look.

Finding a few good dragonflies (my first *Elasmothermis constricta* was spotted immediately), I poked around a bit. Now, we commonly assume that streams get fouled by neglect - by people too lazy to carry their trash somewhere else, or to pick up bags of garbage that fall from the passing trucks. However, it had taken a considerable effort to trash this stream. Carcasses of television sets and air conditioners are heavy; some had been carried a long way from the road. It must have taken at least two people (maybe more) to have carried the severed top of an old car about fifty meters upstream, creating a small dam and providing a habitat for *Aphylla producta*, which prefers slower water. Small plants growing in this quiet water had *Allopodagrion contortum* perching on their leaves - along with *Acanthagrion gracile* and *ascendens*, *Peristicta misionera*, *Telebasis limoncocha* and its look-alike, *Oxyagrion chapadense*. On the once-clean dark basalt boulders in the bed of this stream the local women had left a white film of laundry soap - all the better to spot *Progomphus basistictus*, which also liked to perch on carcasses of automobile tires protruding from the water. In a swale trampled by legions of cows one could flounder around in the deep, thin mud and find the occasional bright red *Oxyagrion temporale*. Old rusted drums that had once held some super-toxic agricultural chemical now provided the backdrop for the glorious territorial dance of *Heteragrion*

rest of the day was rather uneventful as we sampled lowland streams in agricultural areas. Although some of these streams have lots of Progomphus larvae, we did not see any adults which is usually the case with tropical gomphids.

We did not collect much the next morning, although we did get some wary *Hetaerina aurora* at one stream. After navigating through numerous mud slides on the exciting drive back to Quito, we did some shopping for supplies and souvenirs. Bill treated us to dinner at one of Giovanni's favorite fancy restaurants! For the next part of our game plan, we decided to go northwest to Lita and collect along the recently opened gravel/dirt road to San Lorenzo. We didn't realize how close to Colombia we would be until later.

The following day, we hit the high road! After stopping for gas in Otavalo, we decided to collect at the huge crater lake, Lago San Pablo. The elevation was about 9,000 feet and I didn't think we would get much but Bill proved me wrong! Almost immediately, he collected a rusty red damselfly with a pale, blue-tipped abdomen. It looks like a big *Amphiagrion* from the USA (except for the blue-tipped abdomen). Everybody got a good series of *Oxyallagma dissidens* which flew over the quaking sphagnum fields. We also got some *Aeshna marchali* among the tall reeds and tule grass.

Continuing on, we hit some dry desert country at Salinas. We collected some *Aeshna elsia*, *Brechmorhoga postlobata*, *Erythrodiplax* spp., *Orthemis discolor*, one *Ischnura fluviatilis*, and believe it or not, *Ischnura ramburii*!! That afternoon, we reached Lita and checked into the only primitive two-bit hotel in town. We walked down the road and collected *Acanthagrion trilobatum*, a new blue *Argia*, and that purple *Argia* again.

The next day, we drove about 37 kilometers WNW of Lita (almost to Urbina) and collected along the streams and ponds there. This is a really good area and we found lots of goodies! Among the notables were *Acanthagrion trilobatum*, *Argia indicatrix*, *A. nr. cupraurea*, that purple *A. nr. oculata*, a black and whitish-blue *Argia adamsi*? with golden wings, a blue and black *Argia nr. talamanca* that flew only in the rain, *Ischnura indivisa*, *Hetaerina fuscoguttata*, the blood red *Heteragrion erythrogastrum*, the giant *Telebasis garleppi*,

Erythrodiplax castanea, and *Uracis fastigiata*. Ken found *Protoneura macintyre* and an undescribed *Psaironeura* (similar to *remissa* but with an all-red face). He also got several interesting larvae in this small tributary, including *Perigomphus*, a small polythorid, and a weird libellulid with a flat, protruding, rounded frontal shelf.

We also stopped at a place near Finca Consuegros but the drizzling weather kept things from flying, so we returned the next morning under slightly sunnier conditions. We collected *Acanthagrion trilobatum*, *Argia indicatrix*, *A. nr. oculata*, *Hetaerina fuscoguttata*, *Megapodagrion* sp., *Coryphaeschna luteipennis*, *Erythrodiplax andagoya*, *E. fusca*, *Micrathyria catenata*, and *Uracis fastigiata*. Ken and Bill got some more of the red-faced *Psaironeura* along a tiny stream bordered with pink flowers!

The next day, we walked down to the Lita railroad tracks. After crossing the flimsy wooden bridge and slipping through several dark muddy train tunnels (Elicio said there were vampire bats in these), we found some interesting hillside seepage tributaries. We collected *Acanthagrion trilobatum*, *Argia indicatrix*, *A. nr. oculata*, the new blue *Argia*, an all-blue *Argia* sp., *Hetaerina fuscoguttata*, *Miocora peraltica*, *Psaironeura* sp., *Cannaphila vibex*?, *Dythemis multipunctata*, *Elasmothemis cannaciodes*, several bold *Libellula herculea*, and *Orthemis discolor* among others. Bill had a blast catching those giant wary *L. herculea* and he did quite well! This whole area is pretty promising! Collecting under sunny weather at another time may really be even more rewarding since Ken got one *Gynacantha membranalis* and one *Epigomphus* sp. just before it started raining.

The next two days were uneventful collecting wise, but not travel wise and politically! I will let Bill takeover from here. Take it, Bill!

WILL THE REAL PRESIDENT PLEASE STEP FORWARD??!

The most unsettling part of this trip was a potential revolution resulting from a citizen uprising against the president. The entire country went on a 2-day strike to protest the democratically elected president. They promised to freeze the entire country by blocking all roads unless the president "stepped down" voluntarily. He did not, thus the strike took place.

We stayed in the village of Lita during the first day of the strike and had no problems. The next day, we began heading back to Quito to prepare for our flight back to the US. Once we got close to civilization near Salinas, we were "blocked" from going all the way to the Pan-American Highway, the main road back to Quito. However, with the help of an English-speaking farmer and Elicio, we were directed to Chachimbiro via back roads; Chachimbiro is a hot springs spa/resort at about 8000 ft, where we stayed overnight for supper.

Between several rousing slam-dunk ping pong games that evening, we learned that Congress had impeached the president! The vice president, the head of congress, and the defense minister were all claiming the presidency! There were massive demonstrations in Quito, but only a few people were hurt. We later learned that there were 2 deaths from being hit on the head with tear gas canisters!

Our biggest worry was not being able to get back to Quito to make our flight home. The next day (Friday), we proceeded to Quito. We had agreed to give the Chachimbiro naturalist a ride to Otavalo. Lucky for us we did, because he helped us get through the ensuing events.

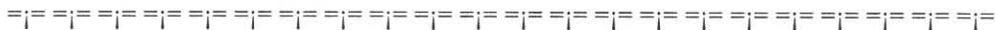
As we proceeded south on the Pan-American Highway, we went through several abandoned road blocks. Then we came upon one which was still

manned by Indians who apparently did not get the message that the strike was over. Young villagers threw a bucket of water on our vehicle. Later, we heard that some vehicles were stoned the day before. However, they let us through but a few kilometers up ahead, we were turned back by police who told us the "road was broken???"

We backtracked north through the previous road block and with the naturalist's help, we maneuvered around the troubled areas via tiny, rocky mountain roads. Once in Otavalo, things got better. We said adios to our new friend and proceeded south into Quito.

We spent a relaxing evening sampling homegrown fruits, honey, and other delicacies with our host/collaborator, Dr. Giovanni Onore and Elicio. After pre-packing our luggage, we hit the bunkbeds for a restless night's sleep. Fortunately, our morning drive to the airport and flight out of Quito were smooth and eventless!

Later that day, we heard that the vice president and the head of Congress had agreed on a truce, and things returned to normal. We praise the military and local police who "kept their cool" and did not initialize martial law. This was a big plus for Ecuador! A neighboring country might have become a military dictatorship under these same conditions! We look forward to another trip to the great country of Ecuador!



FUNCTIONAL MORPHOLOGY OF TANDEM FLIGHT IN ODONATA

Roy Beckemeyer

Introduction

The tandem flight of Odonata in copulation and oviposition has some interesting implications which have been little studied. Most published work on the mechanics of flight relates to the kinematics of wing beat patterns, the physiology and mechanics of muscular workings, and the interaction of the unsteady motion of the wings with the air and the resulting aerodynamic forces. Not much has been done regarding flight control (though Alexander, 1986, did look at the flight of dragonflies from the perspective of the differential motions of the wings that caused the turns).

Force Balance in Tandem Flight

One aspect of interest is how male dragonflies compensate for the backward shift in center of gravity when flying in copula and when the female is not using her wings. To begin, let's look at a single dragonfly in level, unaccelerated flight (Figure 1a) to get a feel for the situation. For this case, the forces acting on the dragonfly must be balanced; if they were not, the insect would be accelerating in some direction. For example, if lift was greater than the weight, it would be climbing. If thrust were greater than drag, it would be speeding up. I have shown the weight acting at the insect's center of gravity, the lift and thrust at the thorax between the wing attach

points since that is where they act on the body. The drag is shown there as well for simplicity. Note that the aerodynamic forces depicted are the average values over a wingbeat.

Now consider a male and female in tandem, again in level unaccelerated flight (Figure 1b). Basically, the weight to be lifted has doubled, as has the lift generated by the male, so there is no vertical acceleration and flight is level. But the center of gravity of the pair has moved back fairly significantly compared to where it would be for the male alone. Since the lift force and weight no longer line up, the net effect is a pair of forces that tend to rotate the male into a tail-down position. Since he is still flying level, there must be a force that is counteracting the cg shift. I have shown this as a nose-down moment or twisting force applied to the thorax by the wings. The drag and thrust are left out for now to make things less complicated. What could effect this twisting moment that counteracts the offset weight?

Referring back to Figure 1a for the single hovering dragonfly, we can envision the lift force shown balancing the weight of its body as being generated as it flaps its wings roughly the same amplitude above and below the thorax. For a male hovering with a female in tandem, more lift might be generated during the portion of the wing beat when the wings are above the thorax. In Figure 1c, I show the average lift force applied to the wings rather than to the thorax. Now the lift and weight are in line. This force pair is mechanically identical with the two forces and the moment shown in Figure 1b. Production of this kind of lift force requires that the insect alter its wing beat pattern. One way in which this could be done is for that portion of the wing stroke above the thorax to be greater than the portion below the wing, as shown in by the extreme wing positions drawn in Figure 1b. Another way might be to alter the phasing and thus the interaction of the wings to increase the lift generated when the wings are above the thorax.

Another factor is that the thrust and drag forces for the pair in tandem are also not in alignment. Because of the female position, the total drag force on the pair will be lower than the thrust force generated by the male's wings and applied to the thorax. As shown in Figure 1d, this force pair would tend to rotate the insects into a nose

down direction, thus counteracting a portion of the weight-lift misalignment. Careful investigation of tandem flights compared with non-tandem flights might help to explain the exact mechanics of the balancing mechanisms actually being used in tandem flight.

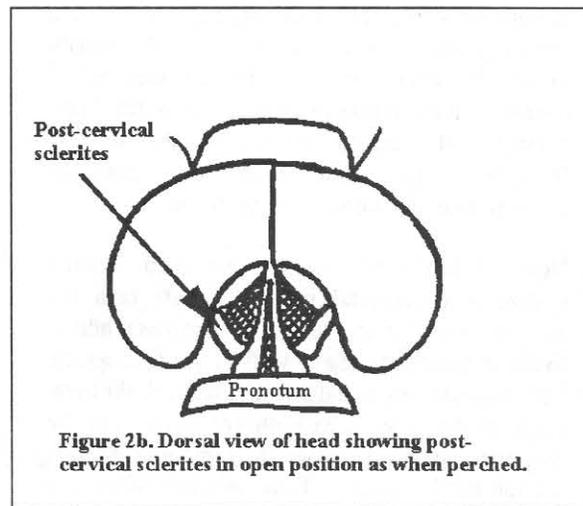
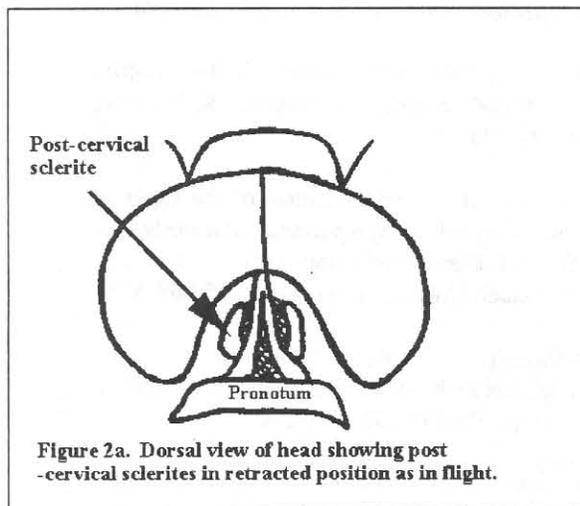
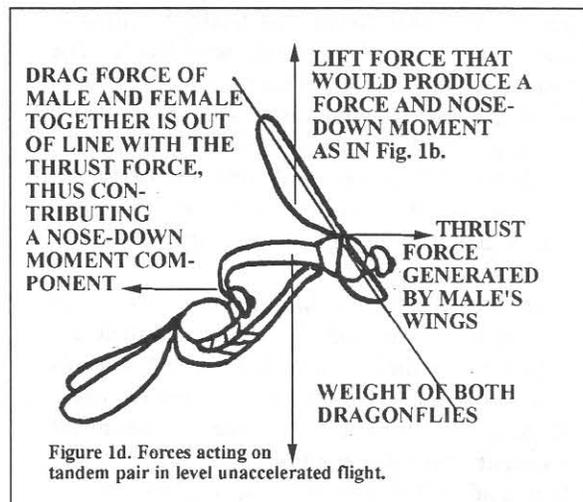
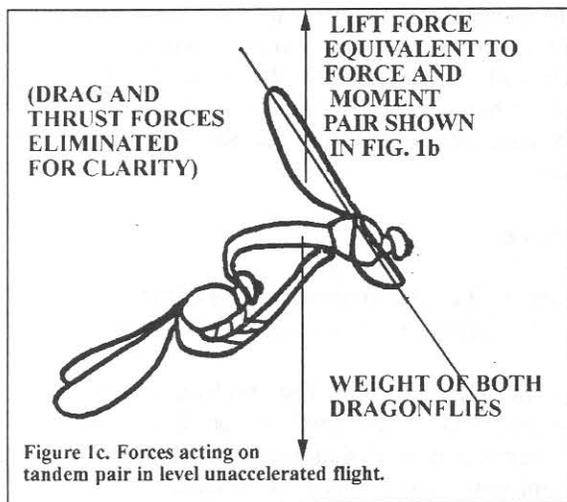
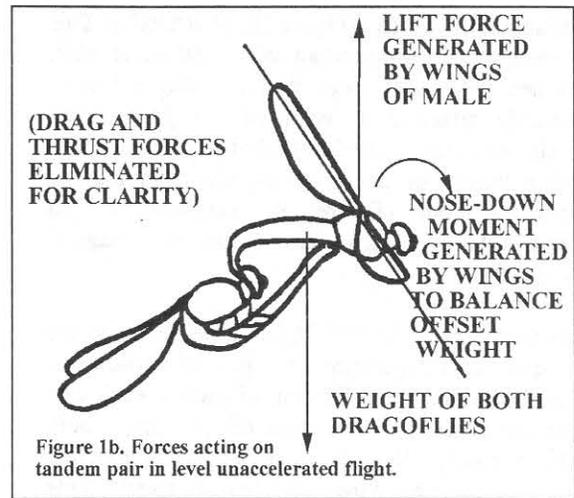
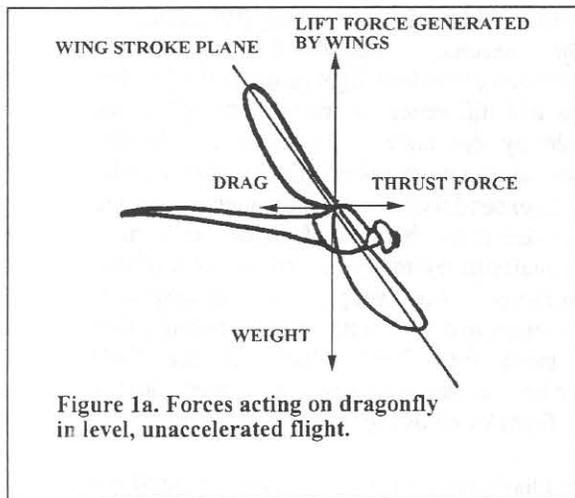
Male Control of Female in Tandem Flight: Force vs Finesse

Another even more interesting question is raised by some remarkable work of Stanislaw Gorb of the Ukraine (1993). His comprehensive research into the functional morphology of the head-fixation system of Odonata leads to some interesting implications relating to tandem flight.

Work in the sensory systems that control flight in visually-oriented insects has been published on locusts, *Drosophila*, and houseflies, among other taxa (Taylor, 1981; Gotz, 1968; Srinivasan, 1977), but little has been done in the Odonata (I have seen a reference to but have not read Hisada, et al, 1965).

Gorb advances the case originally made by Mittelstaedt (1950) that contact between cervical structure and microtrichia on the rear of the head capsule provide the sensory input on the spatial orientation of the thorax to the head, and thus a control input to the flight muscles to allow the insect to steer in the desired direction relative to where the eyes are oriented. The fact that in flight the head is connected by a very small contact area (Figure 2a, after Gorb) means that the thorax can pivot easily around the head (or vice-versa) so that there is the ability for very finely tuned responsiveness in terms of differential motion.

Gorb's studies have revealed that there are postcervical sclerites which, because of cuticular elasticity, spring out from the base of the cervix like legs of a tripod to make contact with the posterior surface of the head capsule in Odonata at rest. In essence, the non-flying odonate has its head supported not by the "pinpoint" tip of the cervix alone, but by a very stable three-point



triangular structure (Figure 2b, after Gorb). This would make for a mechanically rigid attachment. When the insect takes flight, a single levator muscle attached to each of the postcervical sclerites contracts and actively holds the sclerites in a medial position, freeing the head into its pivoting mode (Figure 2a). This head-fixation and release system is unique to imaginal Odonata.

In Gorb's paper in PETALURA, he discusses the sequence of copulation of a pair of Anisoptera, describing the head fixation of each at each step of the process. They start off perched (both heads fixed). Next the male flies to the perched female (male head free, female head fixed). This is followed by copulation while perched (male and female heads fixed), and finally by flight in copula (male head free, female head fixed). The head fixation system obviously affords a more solid mechanical connection and likely helps make the rigors of the coupling process more easily tolerated by the female with less likelihood of damage that might occur if the only connection were through the tip of the cervix.

Gorb does not discuss the situation in which the two fly in tandem and the female and male are both flapping their wings. It turns out that this may be the most interesting case! Here the heads of both insects would be free. One might speculate that now, because of the male having firm hold of the female's head capsule, he can more easily control her flight. He controls the orientation of the flight directional sensor - the head capsule - and in essence forces the female to fly in formation not only by mechanical contact, but by indirect manipulation of the flight control and steering system of the female! Interesting to contemplate the potential consequences of such an arrangement.

Now, as Gorb also shows, the head fixation system is widespread in all Odonata taxa (he studied over 100 species of 26 families), and is found in the Zygoptera as well as the Anisoptera. Let's consider the situation of tandem flight here, again in the case when both are flying. In the Zygoptera, the male clasps the female prothorax, not the head capsule. Thus, in damselflies, the male's control over the female is strictly mechanical, and does not involve manipulation of the head to thorax orientation (the head can move relative to the direction of flight).

There should be some interesting differences that might become evident through careful observation of tandem flight of the two suborders given this difference in "controllability" of the female by the male. Do Zygoptera females escape tandem more easily? Do Zygoptera males have to expend more energy in tandem relative to Anisoptera males because of greater freedom of the females to try to fly in some other direction or to escape? Are Zygoptera females subject to more stress in the tandem situation because they can move their head relative to the flight direction, but cannot compensate as they could in solo flight by adjusting wing beat patterns?

I don't have any answers as yet, but the questions are certainly interesting ones to think about. I highly recommend Gorb's paper to you, and would enjoy hearing from anyone willing to debate and/or elaborate on the ideas I have presented here. There is so much to be learned about these wonderfully complex and intriguing insects!

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early species were either large dragonflies or very showy species.

Dragonfly Study in the Early 19th Century

In the first part of the 19th century the study of the Odonata of the New World was entirely in the hands of Europeans. The British entomologist Dru Drury (1725 - 1893) described in his "**Illustrations of Natural History . . .**" (1773) several New World species, including the North American *Libellula pulchella*, *Anax junius*, *Celithemis eponina*, *Libellula lydia*, and *Erythrodiplax berenice*, and the tropical species *Perithemis domitia*, *Mecistogaster lucretia*, and *Hetaerina titia*, not, of course, placing them in these genera.

J.C. Fabricius (1745 - 1808), a Danish entomologist, wrote his "**Systema Entomologiae . . .**" in 1775 and followed this with several other works, describing the North American species *Libellula cyanea*, *L. vibrans*, and *Hetaerina americana*, and the tropical species *Erythemis vesiculosa* and *Orthemis ferruginea*, as well as the Globe Trotter, *Pantala flavescens*. Fabricius also coined the name "**Odonata**" for the order. This name has troubled many people, because it comes from the Greek word for tooth, and it is not so easy to understand why he named these insects for such a dreary part of their anatomy. The explanation is that he had a thing for mouth parts and devised a system for classifying all insects based on how they eat. The name seems, however, a poor choice for these glorious fliers.

Johann Sulzer added the European (also North American) *Sympetrum danae* in 1776. The French naturalist Ambroise Marie François Joseph Palisot de Beauvais described the Jewelwing, *Calopteryx maculata* in 1805, and the Englishman John Obidiah Westwood added *Libellula axilena* in 1837.

In addition there were minor contributions of tropical species by some otherwise major figures of European entomology. One of these was Carl de Geer, an eminent Swede and a student of Linnaeus, who described *Erythrodiplax unimaculata*. Another was William Kirby, otherwise known as the "Father of British Entomology" (not to be confused with William Forest Kirby, of whom more later) and who described *Hetaerina brightwelli*. I also include

here Joseph A. M. Perty, who wrote the engagingly titled "**Delectus animalium articulorum, quae in itinere per Brasiliam annis 1817 - 1820 jussu et auspiciis Maximiliani Josephi Bavariae regis augustissimi peracto, collegerunt J.B. de Spix et Dr. C.F.Ph. de Martuis; digessit, descripsit et pingenda curavit Dr. M. Perty. Monachii, Author**". I translate this as "A Selection of articulated animals, which in 1817 to 1820 Dr. J.B. de Spix and Dr. C.F.Ph. de Martuis collected in a Brazilian expedition conceived and supervised by the most august king of Bavaria, Maximilian Joseph; published, described, and illustrated under the supervision of Dr. M. Perty, etc." In this work Perty described *Telebasis filiola* (the first New World coenagrionid), *Nephepeltia phryne*, and *Perithemis lais*.

By 1837 there were 36 named New World species of Odonates. Twelve of these were North American and four more reach North America but are predominantly tropical. The remainder were tropical. There were few damselflies, only some very beautiful calopterygines and some of the huge, showy pseudostigmatids ("helicopteros" of the Spanish-speaking countries). No species of lested damselfly nor gomphid dragonfly had yet been described from the entire New World!

John Abbott (1751 - 1840) came from his native England as a young man and settled eventually in Burke Co., Georgia. Abbott published no studies of insects, but some of his specimens of odonates were later given names by later workers. Inspired by Mark Catesby's "**Natural History of Carolina**", (1730's), he produced thousands of fine drawings, mainly of butterflies, moths, and beetles. His place in my account stems from one of the sentences in his "Notes on My Life":

"My peculiar liking for insects was long before I was acquainted with any method of catching them I remember knocking down a Libella and pinning it, when I was told it wou'd sting as bad as a Rattle Snake bite."

Abbott collected the first specimens of several of our species: *Calopteryx angustipennis*, *Enallagma signatum*, *Argia bipunctulata*, *Somatochlora filosa*, and *Anax longipes*.

THE SECOND PHASE - SAY TO SELYS

Thomas Say (1787 - 1834) was the first North American Odonatist. This opening sentence is strictly incorrect, or at least highly deceptive. Yet when I stand on the banks of a local pond and see that most of the species within my field of view (including the especially common *Erythemis simplicicollis*, *Ischnura verticalis*, *Lestes rectangularis*, *Perithemis tenera*, and *Tetragoneuria cynosura*.) are species he described, I find it difficult to realize that Odonata formed only a very minor part of Say's interests. The 26 species that he added to the North American list include several coenagrionids, several lestids, our first *Cordulegaster (obliqua)*, our first *Gomphus (fraternus)*, and several cordulines.

At the time of his death in 1834 he had published three volumes of his "American Entomology. . ." (1824, 1825, 1828), but at this time hadn't yet published his first odonate name. We are fortunate that a diligent successor published his Odonata work posthumously! So broad were his interests that workers in diverse groups all fondly think of him as the "Father of. ..". In fact his most famous work was **American Conchology!**

Thomas Say has accurately been called the "Linneaus of the New World". A grand nephew of the naturalist William Bartram, Say sprang from the sturdy Philadelphia roots which have furnished so many of the early naturalists of the United States. He was one of the founders of the Philadelphia Academy in 1812.

The most interesting aspect of his career was his decision in 1825 to join the wealthy socialist Robert Owen and the Philadelphia geologist and financier William Maclure in their founding of one of America's most famous utopian colonies, at New Harmony, Indiana. Say became a leader in the new colony, and, when most of the others abandoned the colony a few years later, Say lingered on as the supervisor until his death in 1834.

Lest he be identified too closely with Philadelphia and Indiana, it should be noted that he participated on a long expedition to Florida (then Spanish), and later, to the Rocky Mountains. In his short life he described about 1500 insects and was the first North American widely recognized in Europe.

Carl H. C. Burmeister (1807 - 1892) was a German prodigy mainly known for his work on beetles, his monumental **Handbuch der Entomologie** (1839) provided 37 species of New World odonates to our growing list. Almost all are tropical, but *Pachydiplax longipennis*, *Libellula luctuosa* and *semifasciata*, are his additions. Late in his life he moved to Buenos Aires, where he died.

Jules P. Rambur (1801 - 1870) published his "Histoire naturelle des insectes. Névroptères" in 1842. Again virtually all of his 50 New World species are tropical, but *Lestes forcipatus*, *Nasiaeschna pentacantha*, *Coryphaeschna ingens*, *Arigomphus pallidus*, *Gomphus dilatatus* and *minutus*, *Progomphus obscurus*, *Stylurus notatus*, *Macromia taeniolata*, *Sympetrum ambiguum*, *Ladona deplanata*, *Celithemis ornata*, *Erythrodiplax minuscula*, are all North American species, dominantly from the southern U.S.

With Rambur, I end the first period of American odonatology. Though dominated by Europeans, the first home-grown entomologist (Say) has made his mark. In the next part, I will begin with the Belgian "Father of the Study of Dragonflies", Baron Selys Longchamps.

By the time of Selys' first contribution in 1850 the New World list had grown to 159 species. The list was still dominated by tropical over North American species, but the southeastern U.S. was well represented.

to be continued.

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UNIDIRECTIONAL FLIGHT OF *SYMPETRUM VICINUM* IN TANDEM

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ABSTRACT

On 1, 6 and 13 October, 1996, tandem pairs of *Sympetrum vicinum* were observed flying southwest along a narrow route approximately 20 m wide west of Metcalfe, Ontario. It is estimated that between 400 and 1000 pairs moved along

this overland route on each of the three days when observations were recorded and that between 1500 and 10,000 moved along the route during the first part of October. The explanation is unclear but could involve a combination of factors including return to breeding site.

On 1, 6 and 13 October, 1996, tandem pairs of *Sympetrum vicinum* were observed flying southwest along a narrow route approximately 20 m wide west of Metcalfe, Ontario. Sixty pairs passed an observation point on this route from 12 - 12:30 PM on 1 Oct, 33 pairs from 1-1:20 PM on 6 Oct. and 60 passed from 2:19-2:34 on 13 Oct. On each of these days the weather during the observation period was mostly sunny. The wind was 5-20 km/hour mostly from the SW, but also from the south and west. The temperature ranged from 15-17 C. The pairs flew 2-10 m above ground and all tandem pairs in flight were flying the same way. Many individuals were also present in the area but were not moving in any particular direction and were not in sustained flight, alighting frequently on trees, buildings etc. The length of the route was not determined, but it was at least 200 m long, and passed over scrubby abandoned farmland, a major highway, a paved road, through a garden and either over or around a house.

Based on the observations noted above and other observations at odd times, we estimate that between 400 and 1000 pairs moved along this route on each of the three days when observations were recorded and that between 1500 and 10,000 moved along the route during the first part of October. If movement was continuous 30-50 km might be covered in this manner in one day, which would be ample for an insect with some frost resistance (eg. Hutchinson et al. 1977) and a long flight period to disperse several hundred km southward over a period of a month.

Although there are many published reports of movements of *Sympetrum* in Europe (eg. Dannreuther 1941, Lack & Lack 1951, Longfield 1948, see also references in Corbet 1962 and Williams 1958), there are few published observations in North America. However, large concentrations of *S. vicinum* have been reported at traditional late summer and autumn concentration points in southern Ontario, and some of these concentrations have included tandem pairs (eg. Corbet and Eda 1969).

The kind of movement reported here involving an inland path, and a continuous series of unidirectional transients in tandem has not been reported previously. Some of the "migrations" reported in Europe have included reference to a high frequency of pairs (eg. Longfield 1948). Movements of *Sympetrum* involving sexually active and mature individuals differ in this respect from the true migrations of other dragonflies which frequently involve sexually immature individuals. Corbet (1962) made a distinction between movements initiated in search of food or breeding sites and true migration aimed at dispersal. Since the movement of *S. vicinum* described above included exclusively tandem pairs, breeding appears to be a likely objective. The problem however is that breeding sites could be encountered in all directions. Thus a return to a particular breeding site is implied. Nevertheless a landscape with later frosts is first encountered by moving southwest. On the other hand less energy may be spent in gliding in tandem against the wind than flying in any other direction, but this does not necessarily explain a long narrow flight path and the lack of observation of tandem pairs moving in other directions. The dragonflies might avoid more severe frosts through being active on higher ground where colder air would not accumulate through inversion. Some of the classic explanations of insect movement, including overcrowding, may also be a part of the explanation, and a combination of factors may be involved. More observations are required before an adequate explanation can be provided, and we would appreciate receiving similar observations.

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SPRING MIGRATION

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It's not too early to begin watching for northward migration of *Anax junius* and other migrants in the eastern U.S. Good evidence is beginning to accumulate that dragonfly movements often accompany southerly airflow any time from mid-March until early June. Movements of some species might continue throughout the summer in association with tropical air masses. Typically, after warm fronts numbers of apparently mature dragonflies will appear suddenly at sites where none had been seen previously, will remain relatively abundant for a few days, then will disappear, probably even if warm weather persists. I believe, although I can't document it very well as yet, that these adults may sometimes occur at bodies of water where they do not breed successfully, (e.g., because of the abundance of fish), and therefore are unlikely to be common later in the season. Timing probably depends in part on how warm the season is. One question of interest is whether this is primarily dependent on seasonal weather in the area of origin (wherever that is) or at the destination. As in past years, I would really appreciate hearing of your observations, with species involved, behavior, and weather conditions documented as thoroughly as possible. Thanks to all.

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NOTES ON IOWA ODONATA

Robert Cruden

We have collected four species that are not listed in either Needham & Westfall (1955) or Montgomery (Proc. North Central Branch - ESA 22: 121-129, 1967):

Gomphus militaris Hagen : Mills Co. (SW Iowa)
Ophiogomphus aspersus Morse; Buahanan Co. (NE Iowa)
Aeshna tuberculifera Walker, Allamakee Co. (NE Iowa)
Argia emma Kennedy, Crawford Co. (W Iowa)

Some specimens reported by L.S. Wells (Proc. Iowa Acad. Sci. 24: 327-333, 1917) were misidentified. *Gomphus "pallidus"* Rambur (male from Fairport and female from Muscatine) is *Arigomphus submedianus* (Williamson). *Gomphus "furcifer"* Hagen (female from Ames) is *Arigomphus cornutus* Tough. These specimens are in the Iowa State Univ. collection.

Several species that we collected during the past two years have probably extended their distributional ranges westward over the past 50 years and now occur in the state's most western counties. These include *Arigomphus submedianus* (Williamson), *Epitheca princeps* Hagen, *Celithemis eponina* (Drury), *Enallagma aspersum* (Hagen), and *E. traviatum* (Selys). Likewise, two western / southwestern species, *Argia plana* Calvert and *E. anna* Williamson, are now found in counties adjacent to the Mississippi River.

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NEW RECORDS FROM RHODE ISLAND

Ginger Carpenter

Despite a cool, wet spring and summer, our inventory in Rhode Island continued with many fine collecting days on swollen rivers and in soggy wetlands. We found nine species new to the state, including one never taken in New England before 1996. Many of the new records were not unexpected, but exciting nonetheless.

The Blackstone is the largest, and really the only, river in Rhode Island. Though impounded and heavily polluted, it proved a delightful new ode spot. A fine population of *Gomphus abbreviatus* was found in June on a stretch of shallow, but rapidly flowing water just below a

dam. *Dromogomphus spinosus*, *Argia apicalis*, and *A. translata* (also new to the state) also flew here, all in what seemed to be large populations. I have only worked this river one season; the 1996 results excite me about continuing my work there.

Perhaps the most interesting find of 1996 was *Gomphaeschna antilope*. I found a single male in the southern part of Rhode Island along a dirt road where it crosses a cold, riffly woodland stream and runs by a small shrub bog, and where *G. furcillata* is often seen. This is, to my knowledge, the first New England record for the species. Folks in nearby Connecticut and Massachusetts should look for it. Also in this neighborhood I netted several female *Somatochlora linearis* (another state record) cruising the road with *S. tenebrosa*. Finally, after a few return trips, I took a male *linearis*. Subsequently I found this species in another part of the state. This area was *Somatochlora* heaven for several weeks during the summer, and I plan many more collecting trips here for next year.

The final three new state records were *Ischnura hastata*, *Aeshna clepsydra*, and *Libellula vibrans*, all of which occur in neighboring states and were expected here.

1995 was also a productive inventory year in Rhode Island, during which we added 6 new species to our list, including a first New England record for *Libellula axillena*, previously reported in ARGIA and subsequently discovered on Cape Cod by Blair Nikula and Jeremiah Trimble in 1996. We hope to continue to fill the gaps in Rhode Island in the future, and, as recent work has shown, we believe that this tiny state has a very diverse and interesting odonate fauna.

WALKER VOLUMES TO BE REPRINTED

Nancy van der Poorten, Secretary, TEA

The Toronto Entomologists' Association announces that it is preparing to REPRINT the 3-volume set The Odonata of Canada & Alaska by Walker & Corbet and is interested in gauging the interest of potential buyers before reprinting. This is NOT a photocopy but a true reprinting - the interior pages are the same quality as the

original book, on acid-free paper; the cover is a deluxe-quality hard cover but is not the same as the original. The cost will be in the range of \$220 Can. (\$165 U.S.) for the 3-volume set. If you have an interest in purchasing these books, please reply to T.E.A. c/o Alan Hanks, 34 Seaton Drive, Aurora, Ontario L4G 2K1, (905) 727-6993; or e-mail to nmg.vanderpoorten@sympatico.ca

LEAST GREBE EATS GREEN DARNERS!

Photo by Seymour Levin
c/o Peterson, PO Box 825
Old Lyme CT 06371

This photo (original in color) shows a Least Grebe with a freshly caught female *Anax Junius* (Green Darner). It was taken on the McAllen Ranch, McAllen TX. Are these small birds serious predators on ovipositing *Anax*? Your observations are sought!



© Sey Levin

CHOOSING A NET

Bob Muller

Try something new to improve your capture-to-miss ratio.

I realize I'm new to the field of collecting Odes and it is difficult for many people to accept change but I assure you that when it comes to the choice of nets, bigger is NOT better. From all I've read over this past year, many long-time collectors seem to prefer modified, large diameter, heavy-weight fish landing nets. Also, in looking at pictures I see they use a standard commercial net bag with a heavy sailcloth top.

Well, I'm sure thousands of bugs have been netted with these outdated obsolete nets, but would like to say there is a better way to improve your netting success and take those rarities that eluded you in the past.

For some background: I'm certainly not new to the use of nets, which I have been swinging since the mid thirties. I've tried every possible combination described in the various collecting publications, and find none that allows me to take odonates in the various situations I encounter on daily trips afield - like standing in a clear cut at the wood's edge trying to take a high flying specimen, or deep in a swamp where one more step and I'd be sunk in muck up to you know where, and always the fast flying stuff was quicker than my swing. I knew there had to be a better way to eliminate the problems, and to come home with more than I'd seen fly by.

Don't get upset but throw your old favorite net away, or hang it on the wall with memories of the past - it's time for a change. The ultimate net for collecting in any situation is produced by BIOQUIP, with a few modifications. I must say I am in no way connected with or have stock in BIOQUIP, but suggest you put together the following if you want to improve the odds

The net will allow you to take high-flyers, or those that seem to pass back and forth just out of reach, not to mention those Great River species that dip to the water for a quick drink and zip up to a branch way out of reach of your net.

Purchase their Collapsible 15-inch net #7115cp, throw away the bag that comes with it, or save it for slow-flying butterflies. Make your own bag using a very fine mesh nylon material; DO NOT USE A HEAVY MATERIAL FOR THE TOP. The light weight bag has less resistance and permits a much faster swing. Next, order their net ring #7352, which is a stronger steel ring; replace the spring steel ring which comes with the net, it is too flimsy and can't be used for collecting odonates. Now order net handle extensions #7312AB. My basic net as carried consists of three extensions (6 feet), plus I carry up to five added extensions depending on where I am collecting, to increase my net to 16 feet as needed. I will admit it takes practice to use the net beyond 10 feet, but once accomplished, those high flyers end up in the bag.

Put the old net away and try this combination - the old net will end up collecting dust.

[ed. Additions and notes.

The address of BIOQUIP is 17803 KaSalle Ave., Gardena CA 90248-3602. Their telephone is 310-324-0620.

Bob puts his finger on an important and overlooked problem: the stiffness of the net rim. BIOQUIP nets come with rims of two gauges: a light weight gauge designed for their folding net, and a heavier gauge for the standard net. If you ever did any surveying, the double twist that you fold the net with is precisely what you used to do to coil up those 100 foot steel tapes. For my nets I purchase an extra thin rim (for the folding net). I then tape the two rims together with electrician's plastic tape. The hole in the handle is too small for a double rim so I enlarge it to a square cross section with a triangular file. I also discard the 1/4" x 20 cap screw that holds the rims in place and tap the hole for a 3/8" x 24 cap screw, which is much more solid.

This gives my nets a good stiff rim. The folding net can no longer be twisted into a third size, so I cram it into a bag. The standard net now has a thin and a regular rim and is also much stiffer. When you lunge for one of those *Macromias*, you don't want your net to flop around.]

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NEW *CORDULEGASTER SAYI* POPULATION DISCOVERED, POSSIBLY THE LARGEST.

Bill Mauffray

On March 7 John Milio and I visited Jennings State Forest, southwest of Jacksonville, FL with hopes of finding a *Cordulegaster sayi* population. Since John had been there before checking on the deer population, he recalled that there were some sand hills with turkey oaks at the site. After careful study of the topo maps, we decided that there was a good probability of some seeps being there.

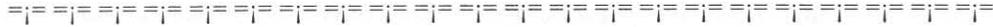
We agreed to meet in Middleburg, a few miles to the south of the state forest. At about 10:30am, John and I began walking up Mill Branch, a tributary to yellow Water Creek, looking for

with this marvelous Gift.

than I have time for today.

Your incomparable mastery of the barely-
tangible air
will take more divining

Perhaps more divining
than is mine to possess.



TRAMEA

FEATURING THE WEB FOR ARGIA READERS

Because of the popularity of the **WEB** (otherwise known as INTERNET), I have decided to begin a regular feature on **WEB** sites of interest for odonatists. Many people have submitted little pieces featuring their own or other web sites of interest, but I have decided in the future to combine these submission in a regular column.

Why The Name "TRAMEA"?

I am naming this column **TRAMEA**. Why? The name *Tramea* comes from the Latin for "Web", and *Trameas* are among my favorite dragonflies. The dense venation of *Tramea* is a good metaphor for our new electronic communication system.

Why am I placing this feature in a single column rather than two columns? I have given up trying to write the long URL's (**WEB** addresses) in the narrower columns and believe that the format must be widened. The also allows me to write the addresses in a larger (and, I hope, clearer font).

The **WEB** and Dragonfly Study

As though of you who use the **WEB** already know, the dissemination of information, and images, using this medium is virtually exploding. **WEB** users also know that navigating on the NET is most commonly by means of "Links", which enables the browser to access sites far beyond the original site.

Japanese Odonata workers seem to have carried the concept of Dragonflies on the Web further than anyone else. At least two of their **WEB** sites are fully instructional and lavishly illustrated. One of their concepts, which is only a short distance along towards realization, is the illustration of all Japanese species.

It would seem now that perhaps the moment has come to assemble a comparable product in the United States. As a result of literally dozens of competent photographers filming the North American species and storing their slides away we now have the potential for an important collection of North American images. Perhaps some enterprising person should now attempt to assemble a **WEB** slide site for North American species. This would not constitute a complete guide, of course, but think of what it would do for the beginner! When surfing recently I was personally astounded at how many sites feature good color images.

IORI -- Probably the first Site to look for is the **IORI** site originated and maintained by Bill Mauffray. It is very useful, containing, among other things, news about guides and other publications, and many links to other sites. He also maintains up-to-date information about **DSA** activities, including upcoming field trips.

<http://www.afn.org/~IORI>

This will get you into the **IORI** Site. From there one can link directly to **DSA** information, including our upcoming field trips, the most up-to-date e-mail address list that I have seen, and many links to other sites.

Cape Cod Net -- Blair Nikula and Jackie Somes' site is my first choice, partly because of the exhaustive of links to other sites. This would alone make this the premier site, but there are also extensive notes on what is going on in their part of the country.

<http://www.capecod.net/~bnikula/odenews.htm>

Roy Beckemeyer's Site -- Roy's site is excellent and shows a very imaginative means of displaying distributional data by counties. He has thorough information on Kansas and Oklahoma collecting, including maps and identification tips, and he also has links to many other sites. Roy writes further, "Since I recently purchased Minter Westfall's ODONATOLOGICA collection (Volumes 1-24), and have just finished entering all 25 years of that journal's articles into my bibliography, it might prove to be of use to other odonatologists. . . The files are accessible from the referenced home page by links. They are grouped into major taxa: Odonata; Anisoptera; Zygoptera, Anisozygoptera; Aeshnidae; Calopterygidae; Coenagrionidae; Cordulegastridae; Corduliidae (Macromiinae, Corduliinae); Gomphidae; Lestidae; Libellulidae, and by: Odonatologists and Odonatology; and Odonata Faunistics Studies. . . If you have time, browse through the files - it might prove useful in gathering references on a particular subject you are researching, and hopefully will save you the effort of paging through your back issues of ODONATOLOGICA."

<http://www2.southwind.net/~royb/odonata.html>

Steve Valley's Oregon Site -- Turning to the Northwest, we have a fine Site in Oregon. There a few first-class images as well as information about that part of the country. Steve also has an excellent county-map scheme for showing the distribution of Oregon odonates.

<http://www.orst.edu/~keenr>

Dennis Paulson's Tacoma Site -- Still in the Northwest there is a fine Site established by Dennis Paulson. This has numerous lists of odonates, including one to South American species.

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

Bob Barber's New Jersey Site -- This site is a gem, full of information. A special feature is a guide to northeastern gomphids, as well as information on *Ophiogomphus* larvae.

http://www.hsrl.rutgers.edu/http__bobs_home.html

I suggest you link through The **Cape Cod** or **Roy's Site**. I tried to access this site directly and seemed to do something wrong every time. It could be those two underlines in the address.

The University of Michigan Sites -- Actually there is more than one Site here, and the linkage between them is not complete. One site covers the Michigan Odonata Survey and has links to the other, which is a collection of color images, many of which are of tropical species that never made it to Ann Arbor.

<http://insects.ummz.lsa.umich.edu/MICHODO.MOS.HTML> (Mich. Od. Survey)

<http://insects.ummz.lsa.umich.edu/Images/Odonata/Odo-picts.html> (images)

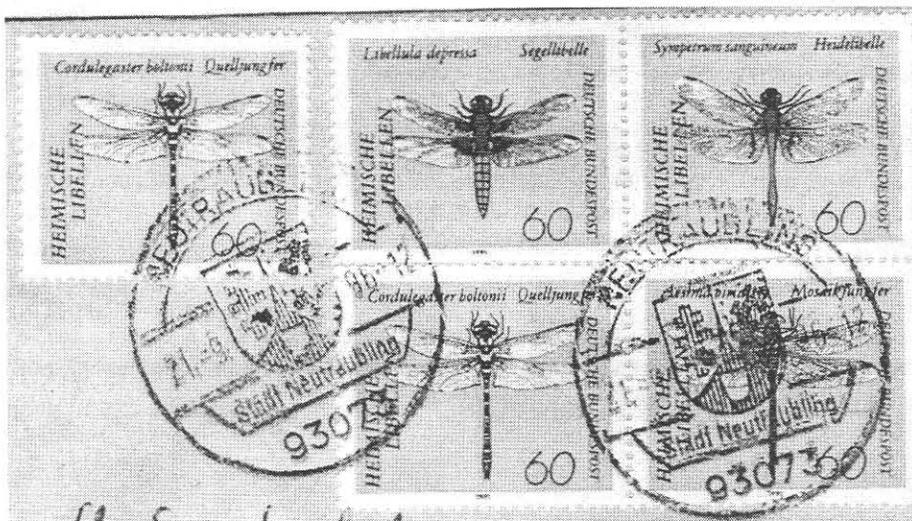
The Hawaii Site -- Naturally this site is full of images of *Megalagrion*. The specimens are live but probably stunned, judging from the drooping abdomens. But the images are really lovely.

<http://www.bishop.hawaii.org/bishop/ento/Megalagrion/htm/pages/Mega01.html>

(That one is long and complicated ; I hope I got it right . You can always link through another Site)

Virginia **Carpenter** (Esmond RI)
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