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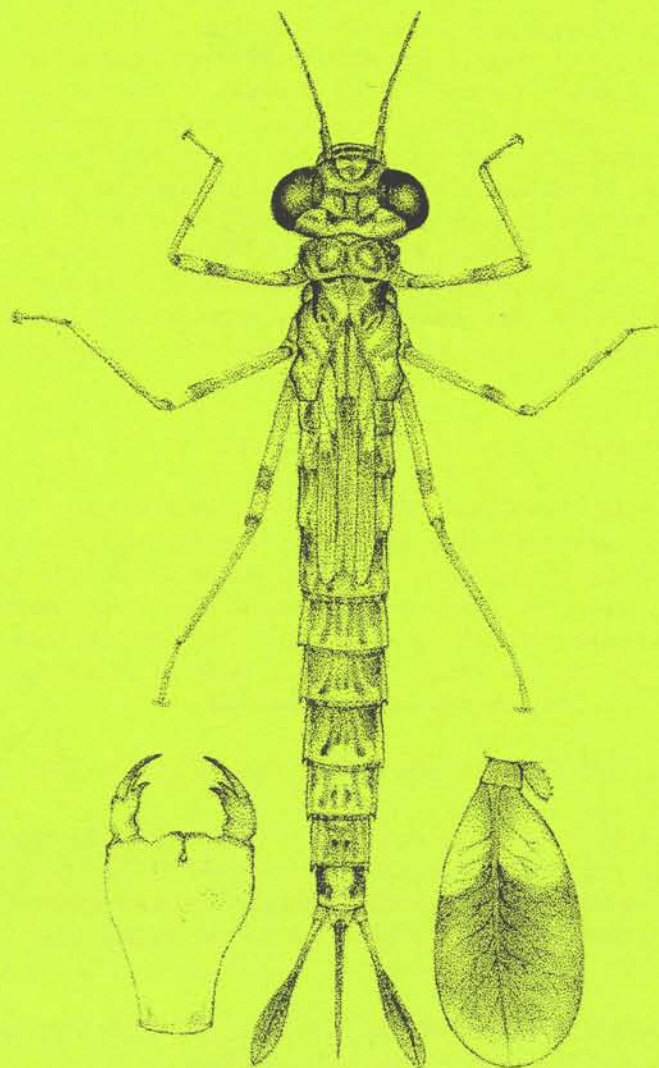
ARGIA

THE NEWS JOURNAL OF THE DRAGONFLY SOCIETY OF THE AMERICAS

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THE DRAGONFLY SOCIETY OF THE AMERICAS

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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 and 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: *Phylolestes ethelae*, larva, drawing from Damselflies of North America, by M.J. Westfall, Jr., and M.L. May. Westfall's discovery of this larva in Haiti in 1960 (Odonatologica 5(1) : 65 - 76) is one of the most important Odonata finds in the New World.

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

IN THIS ISSUE

The Spring and Summer here in the East were cool and wet. My son in Austin, Texas, reports that the summer there was near-record hot and dry. Thanks to the miracle of television, I can now sit in the comfort of my family room and watch my friends' homes being flooded by Hurricane Whoever on the evening news. We used to blame such weather on "all that nuclear testing". What do we blame it on now?

The big news this issue is the publication of the Westfall - May "Damselflies of North America". We will long remember this as a pivotal event in damselfly study.

We have finally fixed the date and place of the DSA meeting for 1997. At New Brunswick we had voted to meet in Gainesville FL on the Memorial Day weekend in late May. Later we found that this conflicted with the annual meeting of the North American Benthic Society's meeting in San Marcos, Texas (See the notice in the last ARGIA). We are still planning to meet in Florida, but on 6 -8 June. Be there!

We also announce the 1997 Southeastern meeting, in the Everglades. To round out the meetings, we have excerpted the 2nd announcement for the 14th Biennial meeting of the S.I.O., which this year is in Maribor, Slovenia. You don't have to be on the net to participate, but, if you are, there is a good web site detailing the plans.

The big "catch" of the year was the discovery of *Palaemnema domina* in Arizona. When I found another species of this tropical genus near Monterrey, Mexico in 1962, I fondly thought that this would be the species that would eventually be found in the U.S. Wrong . . . ! Instead, the discovery is from a southern Mexico species a long ways from home. There are several lessons here: the discovery was made by a person who has only just started collecting odonates. Also, he identified the genus correctly

from the new Damselfly book! Score one for Westfall and May.

Richard Orr gives us a fine account of the Odonata found along the C&O Canal upstream of Washington. I enjoyed this article especially, because this was where I got my start. In the Spring of 1949 I saw my first *Gomphus vastus* near Carderock and I was truly hooked for life. Richard shows that populations of this species and the related *fraternus* fluctuate through the years. We have much to learn about these insects.

Rosser Garrison recounts the results of his trip to Thailand this summer. It amazes all of us that successive trips to the same places (he visited several places Ailsa and I and others have visited previously) and still managed to take species that we never saw. Everyone sees Thailand through different eyes, but everyone enjoys it.

Jerrell Daigle has written of yet another Ecuador visit. After several visits this team still manages to find new things. Half the fun of these visits is the ambiance, from the mosquitoes and heat to the odd foods one finds in rural restaurants.

Paul Brunelle tells us of *Pantala* in Nova Scotia and New Brunswick. The two species of *Pantala* are great wanderers and appear in numbers in some years, perhaps not to be seen again for some time.

Rosser and Jo Garrison checks in with an account of *their* trip to Thailand. You would think that this oft-visited place would cease to amaze, but every visit yields more surprises.

Dave Wagner and Mike Thomas give some good hints about raising adult dragonflies, either reared or taken when very general. Why couldn't have I thought of these ingenious ways to feed dragonflies?

Roy Beckemeyer's experience with *Anax junius* flattened on the highway is not unique. However, we tend to overlook road kills among

dragonflies. If you inspect your automobile radiator while on a long trip, you may be amazed at what you will find. More than one new state record has been made this way.

The section that I am now calling "E-mail Corner" contains bits and pieces of information that is traveling through cyberspace. I vouch for none of it, but I am fascinated by what one finds. I continue to be interested in the subject of dragonfly hearing, although some physiologists tell me to forget it.

The University of Michigan has come alive in a very big way. In this issue Mark O'Brien tells us of the status of the magnificent collection at the Univ. of Michigan Museum of Zoology. Home of Mr. Williamson for several years, it later became the home of Dolly Gloyd. Now the huge Odonata collection is being properly curated and will once again become one of the most important collections in the country.

The second piece news from Michigan tells us of the formation of the Michigan Odonata survey. Spurred by the conspicuous success of his Ohio neighbors, Mark O'Brien and Michael Kielb are beginning their own effort. They have also provided a web site and a mail group for you cyberbugs.

Bill Mauffray continues to provide good things for the community through the efforts of I.O.R.I., which he has been managing recently. This time he has found a source for the

cellophane envelopes so many of used exclusively until fairly recently. The advantage of these envelopes is that they have less of a static electricity problem than the mylar envelopes and are kinder on delicate damselfly specimens.

Did I say damselfly? I have provided a review of the new damselfly book in this issue. Bill Mauffray also has kindly provided a price break on this book good now until the end of the year. If you haven't bought your copy, you should do so now. This is a perfect stocking stuffer, if you have big stockings.

Finally, I have provided a new e-mail list. Please note that many e-mail addresses have changed, especially for university addresses, which seem now to have fewer nodes in their addresses. In some cases the old addresses will work, but you should be prepared to switch to the new names. Please keep sending me changes in address. Most of us now seem to rely on this magnificent way of communicating.

The geese still fly south up here, and the skies were full of them a few weeks ago. As winter comes in, I am putting my bugs to bed and bringing in my brass monkeys. You will be curating your own collection, and perhaps sneaking out to some warmer place, if only for a brief visit. Don't forget to send us a card!

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1997 DSA MEETING: FIRST ANNOUCEMENT

Bill Mauffray

The Annual DSA meeting will be held at Gainesville Florida the first weekend in June (6-8), 1997. Meetings and workshops will be held at the DPI / FSCA facility with collecting trips to Gold Head Branch and the Santa Fe River. *Libellula jesseana* and *Progomphus alachuensis* will be available for taking along with a host of other goodies. The FSCA and IORI collections will be available for us and hopefully the DPI building (including the collections) should be available to us 24 hours

day. There are many restaurants and motels within a 2 mile radius of the DPI and most of the collecting sites are within a hour's drive. More information will be provided in future issues. This Meeting will be hosted by Bill and Carol Mauffray. Bill is soliciting volunteers to host workshops. If interested please contact Bill Mauffray, iori@afn.org

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THE APRIL 1997 SE REGIONAL MEETING IN THE EVERGLADES, FLORIDA

Jerrell James Daigle
daigle_j@dep.state.fl.us

(904)878-8787

The 1997 SE Regional meeting will be held near the Everglades National Park in Florida City, Florida from April 3-6. We will stay at the Rodeway Inn, 815 N. Krome Ave., Florida City, Fl. 33034 and the motel phone number is (305) 248-2741. I have reserved a block of rooms under my name, so call and ask for a room. They are really big with 2 double beds and the group rate is about \$36.00. If necessary, grab yourself a partner and split the costs.

We have three different ecosystems to explore over 3 days. We will dredge for the undescribed endemic *Nehalennia pallidula* larvae in a *Eleocharis* canal, explore man-made lakes to the east, and help inventory the Odonata fauna in the Everglades National Park, looking for exotic species from South America. Our evening meetings will be held around the swimming pool, cabana-style. Several restaurants and other motels exist nearby.

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XIV INTERNATIONAL SYMPOSIUM OF ODONATOLOGY; SLOVENIA, 1997

The XIV International Symposium of Odonatology will be held from 13 - 18 July, 1997, in Maribor, Slovenia.

The registration fee is \$80 for participants and \$27 for accompanying family members. Accommodations will be in a local hotel, costing \$40 for a full board for a double (per person) and \$57 single. Lower cost accommodations will be available; a local hostel will cost about \$17 per person. The local committee is prepared to subsidize participants with limited funds.

Local field trips will include a trip to the nearby Pohorje Mts. (*Somatochlora arctica*, *Aeshna juncea*, *Leucorrhinia dubia*) and some man-made habitats (*Somatochlora meridionalis*, *Cordulegaster heros*). The post-meeting field trip (19-23 July) will combine sight-seeing with visits to other dragonfly habitats.

The following common species, *Aphylla williamsonia*, *Arigomphus pallidus*, *Corphaeschna ingens*, *Libellula needhami*, and *Celithemis eponina* are expected but we will keep an eye open for *Crocothemis servilia*, *Erythemis plebja*, *Micrathyria* species, *Lestes tenuatus*, *Nehalennia pallidula*, *Neoerythromma cultellatum*, and *Coryphaeschna adnexa*.

Permits are forthcoming from the Everglades National Park but I do need to submit a list of those wishing to participate in the Odonata survey in the Park. If you are interested, please let me know.

I can promise that it won't snow! The mosquito population is quite low at this time of the year but bring bug spray, anyway. All in all, it should be a fun meeting! Who knows what new exotic dragonflies and damselflies we will find in this tropical "Sea of Grass" known as the Everglades! See you there!

The updated Home page of the XIV. International Symposium of Odonatology (= Second Announcement Booklets sent recently to all SIO members) is available at: <http://www2.arnes.si/guest/mbsodonad1/16e.html>

From <http://www2.arnes.si/guest/mbsodonad1/form.txt> you can download .txt version of Forms booklet.

The registration deadline is March 1, 1997. All enquiries should be addressed to

Organizing Secretary:
Mr. Mladen Kotarac
Antoliciceva 1
SI-2204 Miklavz na Dravskem polju
SLOVENIA
tel / fax: 386-(0)62-691-855
Mladen.Kotarac@guest.arnes.si

A NEOTROPICAL NOMAD IN THE SONORAN DESERT -- OR -- WHY I DECIDED TO SWITCH FROM TROPICAL TO DESERT LIVING

Rosser W. Garrison

serendipity: n. the faculty of making desirable but unsought-for discoveries by accident. (The American College Dictionary)

This is the story of two collectors, a damselfly, a remarkable nature preserve, and the true nature of serendipity.

Jon Hoekstra is a graduate student at the University of Arizona, Tucson, who is earning a master's in entomology. His primary interest is the ecology of larval aquatic insects. For the past year, he has been studying the larval ecology of the recently described *Argia sabino* Garrison. After learning to recognize members of this complex genus, he went looking for populations of *A. sabino* in the far reaches of Sabino Canyon and beyond. He has successfully recognized a large percentage of the Odonata occurring in southern Arizona.

Our amazing story starts on 11 August 1996. I had received a parcel from Jon. Upon opening it, I saw a single pinned, acetoned male of a hyaline-winged *Palaemnema*.

The strange part was the label accompanying it: ARIZONA: Cochise Co., Hot Springs Canyon, 11 Aug. 1996, J. Hoekstra.. Nooo, I thought, this must be some kind of a joke. Yet the solitary male seemed paler than any other *Palaemnema* I had ever seen. Within the next two days, I belatedly examined my e-mail messages (which these busy days with my two children and work always seem to mount up on my computer). Two messages were from Jon. The first asked if I could identify the specimen he sent me since he did not recognize it. His second told of having seen the new damselfly manual by Westfall and May and, from his recollection, he opined that his specimen was a *Palaemnema*. A *Palaemnema* it definitely was, but I could not place it to any particular species. It keyed in Calvert to *P. clementia* (but Nick Donnelly later told me that every hyaline-winged species that is different will key here).

My next step was to notify Nick because of his extensive knowledge of and interest in this

genus. I also wrote to Jon, suggesting that we take a short weekend trip to the locality to see if we could discover more of these insects. I received a favorable reply. Jon proceeded to obtain official permission to collect at the site, while I arranged to fly out for the weekend of 20-21 September, a scant 40+ days since the original find. Would we be lucky enough to see more *Palaemnemas*? We both hoped so, for Jon told me that he had seen at least two more individuals on 11 August. After I flew to Phoenix, borrowed my parents' car and arrived at Jon's house on Friday night, we discussed his remarkable find at further length. On August 11, it had been drizzling -- certainly not good conditions for collecting adult Odonata!

Muleshoe Ranch Nature Preserve is an isolated, out-of-the-way paradise owned by the Nature Conservancy at the southern end of the Galiuro Mountains. A 15-20 mi dirt road west from Willcox leads to this little-explored locality. As the settlement name implies, there are various hot springs, a perennial water source. We arrived at about 10:30 am on Saturday. Already the cool night air was vanishing, and the scorching sun, we could tell, was about to rule the day. We were both excited, but I did not realize that a 2? mile trek to the capture site was necessary, and I was wearing irrigation boots (not recommended for hiking!).

Along the way to the branch, we were greeted with intermittent patches of water and flowing stream broken by stretches of dry, sandy arroyo. The stench of rotten eggs wafted occasionally through the air, alerting us to the unique nature of this area. Odonata were there aplenty, but we found nothing spectacular along the way. We were also in a hurry to get to "the spot."

Finally, Jon exclaimed, "This is the spot." We could tell that it was fall by the angle of the sun. It was about 2:00 p.m. What greeted us was a large pool shaded by a very tall cottonwood tree. At its base, a tangle of driftwood, roots, stumps, and smaller flotsam had piled up along most of the exposed roots. A search of this matrix revealed no *Palaemnema*. We looked again and

again and were disappointed time and again. Both of us were tired. We sat and ate beef jerky and drank Coke while we discussed our course of action. "What can be do with one specimen? If it is new, do I describe it?" We didn't know what to think, and we were beginning to wonder is its occurrence there was due to storm winds from Mexico. We were resigned, but decided to trek on up the creek. Directly ahead was the spire of Wildcat Peak, and at its base were Arizona's characteristic saguaro cacti. The whole scene was beautiful, but it still did not assuage our disappointment.

At about 2:30, Jon reached the base of a small cottonwood tree beside a small portion of the creek. All of a sudden, he yelled, "I got one! You see, I am not crazy!" I hurried over and, sure enough, he held a freshly-caught male. It had appeared in a small, triangular orifice in the tangle of cottonwood roots and flotsam. "This is where you got it? Where exactly did you see it?" I exclaimed. I couldn't believe it. Well, where there is one, there have to be others. Our pace quickened, and excitement surged. But checking cottonwood after cottonwood revealed no more specimens.

Finally, I came to a very large cottonwood tree shading a magnificent, deep pool. The same kind of tangled root matrix lay there as in other places. I saw nothing there, either, but then I noticed that there was a dark opening about the size of my body. I bent down and stuck the handle of my net inside and moved it. I couldn't see much of anything, because it was dark, but in a way I felt a little like Howard Carter, who stuck the candle for the first time into King Tutankhamen's chamber. I thought I saw something move. I had to take off my hat, backpack, and camera pack to squeeze into the chamber. Dirt and debris fell into my hair and down the back of my shirt. But there in front of me a scant two feet away, was the most beautiful sight of the whole day. There was a single male *Palaemnema* perched on a slight overhanging root. I just couldn't believe it. Slowly I pulled back out, hurriedly opened my camera, mounted the lens, and carefully maneuvered into the chamber again. I snapped off one shot for posterity. I could get no closer, because no maneuvering was possible. No net was possible in there, so I slowly stretched out my hand and picked the damselfly up by its wings. Just as

E.B. Williamson had said, get on your hands and knees and pick them up with your fingers. I backed out and went around the other side, where there was another, smaller entrance into the same chamber. I was rewarded with another male, which, this time, sat partially exposed to the sun. Its placement allowed me to approach much more closely, and I clicked many more photographs, hoping that one would come out. I picked it up in the same way.

As I sat on the roots of the tree, it suddenly dawned on me: Jon had collected these damselflies when it was drizzling. I thought then that these shy creatures ventured into the atmosphere under such conditions. At other times, such as that Saturday, they remain secluded like troglodytes in the more humid and sheltered microhabitats at the bases of these huge cottonwood trees. These are such ephemeral habitats, prone to violent disturbances in some years of heavy rainfall and resulting floods. I have collected Odonata over much of the globe for the past 35 years. My experience in the tropics has led me to look in places where secretive species may occur. But there is no way that I would ever have looked in such a habitat in the Sonoran Desert. Jon's discovery was truly a serendipitous one. Without his alertness and curiosity, this unique riddle of the Sonoran Desert *Palaemnema* would still be hidden from us.

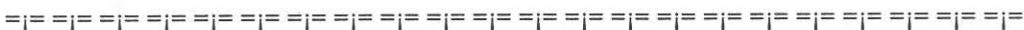
We succeeded in collecting, over the two days, seven males and three females. At the end of the second day, my feet were sore and blistered from approximately 10 miles of walking. Jon had stated that the Odonata were more abundant during previous trips there, and yet we collected eight species of *Argia*. (Sabino Canyon has the honor of yielding 10 different species of *Argia*, but at different times and years.) I had speculated on this trip that we might find a new, undescribed species of *Argia*. Along with the fourth known occurrence of the newly described *Argia pima*, multitudes of *A. oenea* and the less common *A. hinei*, we saw a few specimens of a bright blue, heavily marked *Argia* that was unfamiliar to me. It had a strongly forked humeral stripe, and the top of abdominal segment 7 was black. These occurred occasionally on the root systems in shade. All were found at pools, where they sat on exposed roots. I concluded that the only "unknown" that

it could be was possibly *Argia tarascana*. This species had been collected only once in the United States, at the San Bernardino Ranch east of Douglas, many years ago. It had never been seen again. But sure enough, we had encountered a population of *Argia tarascana* for the second time in the United States. Another plus: specimens of *Apanisagrion lais*. These were found at various places where there were sedges.

When I returned home, e-mail from Nick Donnelly was waiting, and we both decided that this species could be *Palaemnema domina*. When I sent Nick a male, he noticed some minor differences in overall body coloration and a few small structural differences. Despite these differences, Nick and I are inclined to call this taxon *P. domina*. The closest known

populations are in Oaxaca, Morelos and Chiapas, Mexico. Nick states that *P. domina* inhabits arid parts of the tropics, compared with the other members of the genus.

So the United States can now claim a new species, genus, and family to its fauna. We will continue to study the specimens and will report on further knowledge later. I would like to thank the officials at the University of Arizona and The Nature Conservancy for their cooperation in allowing us to discover this mysterious damselfly. I especially thank Jon Hoekstra for his unflagging efforts, his enthusiasm, and his hospitality, all of which shows that you can truly make new and exciting discoveries in your own "back yard," if you look hard enough.



THE ODONATA OF THE CHESAPEAKE AND OHIO CANAL NATIONAL HISTORICAL PARK

Richard Orr, 5215 Durham Road East, Columbia, Maryland 21044

From 1994 through 1996 I was provided the opportunity and the necessary permits from the National Park Service to conduct a survey of the dragonflies and damselflies within the Chesapeake and Ohio Canal National Historical Park. This included the Potomac River, the C&O Canal, and other wetland habitats located within the Potomac River Corridor.

The area surveyed extended from the Washington D.C. line, past Plummers Island and Great Falls, to Edwards Ferry, a distance of just over 20 miles following the course of the Potomac River. All work was conducted on the Maryland side of the river. Species of odonates historically found in Virginia (e.g. *Gomphus ventricosus*) directly across from the Maryland survey location are not covered in this paper.

This 20 mile section of the National Historical Park is one of the heaviest used sections of any National Park in the country. In addition to the strong public pressure to utilize the National Park as a recreational and historical resource, there is also a strong historical precedence for maintaining this park as a biological study area. For that reason, I would like to thank the

National Park Service not only for the support they provided during this study, but for recognizing the importance of the natural heritage aspect of the Potomac River Corridor and the necessity for the continuation of scientific studies.

I normally shun (so called) natural areas which have lots of people. This is especially true when I want to relax and study my insects in peace. But the Potomac River and the C&O canal continue to hold my interest and I often find myself looking forward to exploring its wetlands even though good aquatic habitats can be found closer to my house which have far fewer people. The diversity of the Odonata is only part of the reason. This National Park more than anything else is a "Historical Park" and much of its attraction is tied up with its role in U.S. history.

THE RIVER

The Potomac River has been called the "Nations River". The City of Washington D.C. which was drained from its swamps in 1800, is but a new comer in the river's history. For over 10,000 years the Potomac River has nurtured

humans. Indeed the name itself comes from its early inhabitants the Pawtowmecks (members of the Algonquin Nation) which translates roughly as "the trading place".

The Potomac River has seen both the best and worst of U. S. history. The Legislative, Judicial, and Executive engines that have shaped the country can be viewed from its waters. Its shores were the home of those who forged our independence: the Washingtons, Carters, Lees, Monroes and so on. And when good men failed to resolve the nation's problems, it was the Potomac River drainage that ended up absorbing the blood of tens of thousands of patriots at places like Antietam, Gettysburg, and Bull Run at Manassas. The Potomac River flows as the main artery in the body of Uncle Sam.

The Potomac has not been treated well. When Captain John Smith sailed up the Potomac River in 1608 he found fish "*lying so thicke with their heads above water (that) for want of nets, we attempted to catch them with a frying pan*". For many years the Potomac River reflected America's beauty and untamed abundance. But the river was slowly changed. From the Potomac's source in the Appalachians sulfuric acid from coal mining was freely discharged into the river. All along the Potomac's course to the sea the river received silt, fertilizer, pesticides, and heavy metals from agriculture, industry, and urbanization. The final insult was the dumping of untreated wastes from cities into the waterway (the first treatment plant for Washington D.C. was not built until 1938).

By the 1960s the river was in bad shape. Her historical fisheries of shad, sturgeon, and oysters were gone. Extensive algae blooms covered much of the surface during the summer months and the once pristine river became a health hazard to those who lived along her banks. By 1966 our "nation's river" was identified by President Lyndon Johnson as a "national disgrace".

The clean up is under way. The river is better now than it was a generation ago, but there is still much to be done. The odonates, like the U.S. capital which drinks its water, will be healthier due to the present efforts to clean up the Potomac River.

THE CANAL

Two events took place on July 4, 1828, which would change the way people and commodities moved from the east coast of the United States to the emerging western frontier. On that monumental day President John Quincy Adams turned the first spade full of dirt at Georgetown to start the construction of the Chesapeake and Ohio Canal. Forty miles away in Baltimore (then the third largest city in the nation), Charles Carroll, the only surviving signer of the Declaration of Independence at 91 years of age, simultaneously broke sod for the construction of the Baltimore and Ohio Railroad. The race to open extensive trade to the west was started.

By 1850, at the cost of \$22 million (a tidy sum for the mid 1800s) the C&O canal reached its maximum distance of 184 miles reaching from Washington D.C. to Cumberland, Maryland. The canal paralleled the Potomac River along its entire course. This six foot deep, fifty foot wide cargo waterway consisted of seventy-four locks, seven dams, eleven stone aqueducts, a three thousand foot tunnel and hundreds of culverts and drains. But the competing Baltimore and Ohio Railroad beat the canal to Cumberland by eight years and it was the railroad which fulfilled the dream of connecting trade from the east coast to Ohio. The so called Chesapeake and Ohio Canal never went further than Cumberland, Maryland.

The C&O canal provide trade between Washington D.C. and Maryland's western counties in coal, flour, grain, lumber, and other commodities until the Potomac River flood of 1889 damaged large sections of the canal. The canal was rebuilt and continued to move cargo until 1924 when another flood devastated the canal and its locks. In 1942 the National Park Service bought the canal and began restoration of the canal's lower twenty-two miles. The National Park Service designated the full 185 miles as a National Historical Park on January 8, 1972.

THE FIELD BIOLOGISTS

Because of the proximity to the nation's capital and its associated centers of education and science, the Potomac River (especially near Great Falls) has arguably been studied and

surveyed continuously by biologists for a longer period than any other natural area in the United States. Biological surveys at Plummers Island alone are responsible for over 350 scientific articles and is the type location for at least 175 species of plants and animals. Not bad for a 12 acre river island.

The list of odonatologists which have collected within the Potomac River Corridor is impressive. Prior to World War I, records exist from H. S. Barber, Nathan Banks, J.S. Hine, W.L. McAtee, and the extensive work of Rolla and Bertha Currie (a brother and sister team). During the early forties Carle Cook collected in the area. ARGIA's editor, Nick Donnelly, cut his odonate teeth along the banks of the Potomac in 1949. Nick's interest in the Potomac never waned and his 1961 paper on the Odonata of Washington D.C. still stands as a major reference for this section of the Potomac River. In the past few years Oliver Flint, Mark Scoville, Dave Czaplak, and others have continued with this time honored tradition.

THE ODONATES

We will never know for sure what dragonfly and damselfly species flourished along the Potomac River when Captain John Smith tried to fill his frying pan with fish. It is not unreasonable to assume that major changes have taken place and that today's odonates may represent only a part of the diversity of the Potomac River in the 1600s.

A detailed chronicle of the changes in the odonate species which have occurred over the past 150 years along the Potomac River will have to wait until additional analysis is completed. But some trends are apparent. The most important is that preliminary data indicates that a number of species that have apparently been absent from the study area since the early 1900s have begun to reappear. This recovery is most likely due to the cleanup of the Potomac River and its tributaries. Even more indicative of the renewed health of the Potomac River Corridor is that 60 out of the 66 historically reported odonate species were found during the current survey (approximately 91%).

Twenty-two additional species were identified

during the 1994-1996 survey that were not recorded in earlier records. The single major contributing reason is the increase in lentic wetland restoration projects within the river's corridor. These have created new aquatic environments which attract pond and marsh species which were likely absent or rare when the river was freer and less managed by man. However, a few of the newly found species are riverine and two of these turned out to be new records for Maryland (*Neurocordulia virginiensis* and *N. yamaskanensis*). Other species, such as *Nasiaeschna pentacantha*, appear to be either immigrants or have increased their populations to detectable levels within the survey area only during the later half of this century.

The Potomac River is the largest river in Maryland and therefore provides a unique aquatic environment which is not duplicated elsewhere in the state. Because of this, the Potomac River and her larger tributaries are home to a number of Odonata species not found elsewhere in Maryland. These include *Erpetogomphus designatus*, *Gomphus fraternus*, *G. vastus*, *Ophiogomphus rupinsulensis*, *Stylurus amnicola*, *Macromia taeniolata*, *Neurocordulia obsoleta*, *N. virginiensis*, *N. yamaskanensis*, and *Hetaerina titia*.

A complete list of the species found during the 1994-1996 survey follows. The location where each species was found is listed as 1 = Washington D.C. line to east end of Plummers Island, 2 = Plummers Island, 3 = West of Plummers Island to Sherwin Island, 4 = Widewater to and including Bealls Island (including Great Falls area), and 5 = west tip of Bealls Island to Edwards Ferry. Also recorded along with the species is whether it was found in (B)oth historical records and during the survey, or whether it was found only during the present (S)urvey. Species marked with an asterisk were generally restricted to the Potomac River proper or lotic sections of the C & O canal. All others were usually associated with adjacent lentic wetlands (including non-flowing sections of the C & O Canal) or small forested tributaries entering the Potomac River or found equally in both the Potomac River and either of the later two habitats.

PETALURIDAE: *Tachopteryx thoreyi* (4,B);
CORDULEGASTERIDAE: *Cordulegaster maculata* (4,B), *Cordulegaster obliqua* (5,S);
GOMPHIDAE: *Arigomphus villosipes* (5,S), *Dromogomphus spinosus* (1,2,3,4,5,B,*), *Erpetogomphus designatus* (5,B,*), *Gomphus exilis* (3,4,5,B), *G. fraternus* (5,B,*), *G. lividus* (4,5,S,*), *G. vastus* (2,5,B,*), *Hagenius brevistylus* (2,3,4,5,B), *Ophiogomphus rupinsulensis* (5,B,*), *Stylogomphus albistylus* (5,B), *Stylurus laurae* (5,B,*), *S. plagiatus* (1,B,*), *S. spiniceps* (2,4,5,B,*);
AESHNIDAE: *Aeshna umbrosa* (2,3,B), *Anax junius* (1,2,3,4,5,B), *A. longipes* (3,S), *Basiaeschna janata* (1,3,4,5,B,*), *Boyeria vinosa* (5,B), *Epiaeschna heros* (2,3,4,5,B), *Gomphaeschna furcillata* (3,4,S), *Nasiaeschna pentacantha* (2,3,4,S);
MACROMIIDAE: *Didymops transversa* (3,4,5,S,*), *Macromia illinoiensis illinoiensis* (1,2,4,5,B,*), *M. taeniolata* (4,5,S,*);
CORDULIIDAE: *Epithica cynosura* (1,3,4,5,B), *E. princeps* (1,2,3,4,5,B), *Neurocordulia obsoleta* (2,B,*), *N. virginensis* (5,S,*), *N. yamaskanensis* (2,S,*), *Somatochlora tenebrosa* (3,B);
LIBELLULIDAE: *Celithemis elisa* (5,B), *C. eponina* (5,S), *C. fasciata* (5,B), *C. verna* (5,S), *Erythemis simplicicollis* (1,2,3,4,5,B), *Libellula axilena* (5,S), *L. cyanea* (4,5,B), *L. deplanata* (3,S), *L. incesta* (2,3,4,5,B), *L. luctuosa* (1,2,3,4,5,B), *L. lydia* (1,2,3,4,5,B), *L. pulchella* (3,5,B), *L. semifasciata* (5,S), *L. vibrans* (1,3,5,S), *Pantala hymenaea* (3,4,5,B), *P. flavescens* (3,4,5,S), *Pachydiplax longipennis* (1,2,3,4,5,B), *Perithemis tenera* (1,2,3,4,5,B), *Sympetrum ambiguum* (5,B), *S. rubicundulum* (5,B), *S. vicinum* (2,3,5,B), *Tramea carolina* (5,S), *T. lacerata* (2,3,4,5,B);
CALOPTERYGIDAE: *Calopteryx maculata* (3,4,5,B), *Hetaerina americana* (1,2,3,4,5,B,*);
LESTIDAE: *Archilestes grandis* (2,3,5,B), *Lestes disjunctus australis* (5,S), *L. forcipatus* (5,B), *Lestes rectangularis* (5,B);
COENAGRIONIDAE: *Amphiagrion saucium* (3,B), *Argia apicalis* (1,2,3,4,5,B), *A. moesta* (1,2,3,4,5,B,*), *A. sedula* (2,3,4,5,B,*), *A. tibialis* (2,3,4,5,B,*), *A. translata* (1,2,B,*), *A. fumipennis violacea* (1,2,3,4,B), *Chromagrion conditum* (5,B), *Enallagma basidens* (5,S), *E. civile* (1,2,5,B), *E. divagans* (2,3,B,*), *E. durum* (3,B,*), *E. exsulans* (1,2,3,4,5,B,*), *E.*

geminatum (1,2,3,4,B), *E. signatum* (2,3,4,5,B), *E. traviatum* (5,B), *Ischnura hastata* (5,S), *I. kellicotti* (5,S), *I. posita* (1,2,3,4,5,B), and *I. verticalis* (1,2,3,4,5,B).

The six species known from earlier records, but not found during the current study, are *Cordulegaster erronea*, *Progomphus obscurus*, *Stylurus amnicola*, *Macromia alleghaniensis*, *Hetaerina titia*, and *Lestes inaequalis*. There is little doubt that at least a couple of these species will turn up in additional surveys. This brings the total number of species known from this 20 mile stretch of the Potomac River to eighty-eight.

As with most studies more questions are raised than answered. One of the more interesting questions has to do with *Gomphus fraternus* and *G. vastus*. Based on personal communication with Nick Donnelly, *Gomphus vastus* was common back in 1949. Nick found *Gomphus fraternus* near Seneca a few years later. When he returned to Violet's Lock in 1982 *Gomphus fraternus* was fairly common and *G. vastus* was not found. During the 1994-1996 survey only one *G. fraternus* was recorded. It was photographed in 1995 by Dave Czaplak a couple of miles upstream from Violet's Lock. However, during the same survey well over 100 records of *G. vastus* were taken from the general vicinity of Violet's Lock. The cause of this apparent replacement cycle of *G. vastus* -- *G. fraternus* -- *G. vastus* is not known.

Equally mysterious is the present absence of *Hetaerina titia*. During the 1950s and 1960s this species could be found without too much trouble in riffled areas near Carderock (just down stream from Great Falls) during the fall months. Extensive effort was made during the current survey to find this species. To the best of my knowledge this species has not been taken from the Potomac River since the mid 1980s. I can think of no reason why *H. titia* should disappear or become rare since the riffled habitat is basically unchanged and the water quality has improved since the 1960s. It is obvious that much work remains to be done on the Potomac River odonates.

It brings me comfort (and possibly a little wisdom) in knowing that the renewed health of one of our most treasured and historical national

resources is mirrored by the increasing diversity of its odonates. I will continue to return to the shores of this historic river as long as its waters continue to flow to the beat of dragonfly wings.

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THE RAT PATROL'S EXCELLENT ECUADOR EXPEDVENTURE!

Jerrell J. Daigle

Just one look, that's all it took! One look at Sid Dunkle's golden winged *Polythore concinna* and I quickly signed up for the search for El Dorado's gold in Ecuador last summer!

The Rat Patrol (Bill [Mauffray], Ken [Tennessen], Sid [Dunkle], and I) first joined forces in Miami on July 11. We flew into Quito and stayed at Dr. Giovanni Onore's house that evening. After picking up the rental car and the permits at the university (PUCE), we headed east for the Andes Mountains. At 11,000 feet, it was cold even at noontime and the tundra-like vegetation consisted of bunch grass, lichens, and mosses. In Tena, we stayed at the Hotel Auca or the "Motel of Bats and Tarantulas" as we called it for reasons explained later.

The next day, our first stop was the famous wide lowland Rio Sinde south of Tena. We collected Sid's new red-eyed *Argia*, *A. adamsi*, the infrequently seen *A. infrequentula* (catchy phrase, eh...), *Elasmothermis cannaerioides*, the wary red *Orthemis schmidtii*, and the tiny *Progomphus pygmaeus* (another appropriately named dragon) among others. Upstream, I found a large lily pad pond in the forest that was swarming with *Aeolaagrion axine*, *Lestes* n. sp., the colorful *Telebasis flammeola* with blue, green, red and black stripes, *T. livida*, various *Micrathyrias*, *Nephepeltia leonardina*, and

Coryphaeschna adnexa. I saw a 2-foot long segmented land leech with which I prudently avoided close contact. Also, I inadvertently trampled a farmers hidden rice paddy while trying to catch everything in sight! Rice Crunchies, anyone?

At the nearby shady Rio Chinchipino, we caught 2 new species of *Epipleoneura*, the gangly blue *Heliocharis amazona*, *Heteragrion mitratum*, and a new species of orange and black *Protoneura* but not without some danger! Near the bridge, Sid and I were almost blown to bits by kids tossing dynamite sticks into the stream to stun fish and unwary collectors! I thought we had stumbled unto a noisy military bombing range! Even the damselflies had on ear-muffs! We quickly left and went further upstream where it was a no-bombing zone! That was a wake-up call!

On July 14, we headed north up the Andes on the road to Baeza. Near Cosanga, we collected at several tiny montane forest streams. Typical mountain odonates included *Aeschna brevifrons*, *A. cornigera*, *A. marchali*, *Argia medullaris*, *A. variegata*, *Lestes apollinaris*, *Megapodagrion temporale*?, *Polythore procera*, and *Erythrodiplax ines*, plus *Sympetrum illotum gilvum*. I missed the only two blue-

tipped red *Oxyagrion* n. sp. I saw and despaired that I would ever get any at all!

The next day, we collected on the rocky Loreto road east of Narupa. The elevation here was about 3600' with cool, cloudy weather. At one site, we struck gold in the form of dozens of golden-winged *Polythore concinna*, purple *Mnesarete hauxwelli*, and the black-and-yellow striped *Heteragrion flavidorsum*. Down the road, we got the minuscule *Macrothemis musiva*, *Acanthagrion yungarum*, and I snared a gigantic female bomber, *Aeshna williamsoniana* that was strafing us from time to time!

Did I mention something about bats earlier? That night, we watched the dusk flight of various bats emerging from the roof crevice above our motel room. Giant fruit bats skimmed by our heads as we left for supper. Bill counted 63 bats! The next morning, we found one small stunned bat that accidentally hit the wall on its return. I tossed it on the roof where it scrambled into the crevice to spend the rest of the day recuperating by watching Batman reruns on TV! Besides tarantulas in the dining room at supper time, we had to put up with crowing roosters and cackling hens that kept us awake during the early morning hours! Bill chased one particularly obnoxious rooster and almost caught him! It was a good sound sleep later that night!

The next day was a travel day and we tore out for the Amazon Rain Forest, but not before we ferried over two rivers. One was the Rio Napo, a huge muddy river wider than Rhode Island! It took forever to cross it but soon we were on our way. We still had to register with Maxus Oil Company officials and pick up our security badges.

Finally, we reached the rain forest, stopping to collect at the Rio Savaletto slough to look for the tiny, rare *Calvertagrion* sp. (= *Chysobasis*) seen here last year. Bingo! They were everywhere with equal numbers of the blue or golden phase females! The mature males were green and red with really, old males black and pruinose white.

On the river itself, we caught *Hetaerina caja*, *Heteragrion* nr. *inca*, *Mnesarete* n. sp., and *Neoneura denticulata*. I saw and missed several medium-sized gomphids, including an

ovipositing female at my feet while I was putting away a *Mnesarete* with both hands! Ugh!! At the Yasuni research station that night, we showered and jumped into our bunk beds but not before we collected various caddisflies and colorful moths attached to the communal shower lights.

Tuesday, Bill and Sid explored an ox-bow slough while Ken and I checked several tiny forest trickles. The muddy tributaries were so dense with fallen and overhanging branches that I collected with my fingers. We got *Perissolestes romulus*, *Philogenia minteri*, *Polythore derivata*, *Protoneura woytkowskii*, *Heteragrion*, *Metaleptobasis*, *Phasmoneura ephippiger*, a red *Psaironeura*, and a new species of *Mnesarete*. My best catch was a fine male of the white-tipped brownish *Philogenia redunda* which I missed several times earlier. Ken was signaling, "Time to go", so I made one last peek over the stream and there it was! I swung! I was sure I caught it but it wasn't in my net! My heart sank down to my feet. As it did, I suddenly spotted the stunned *Philogenia* floating by!! In a flash, it was safe and sound in my fanny pack and I greeted Ken with a big thumbs up!

Later, we saw a friendly russet-brown marmoset (chichico) with a black maned hairdo like the Sphinx of Egypt and a long black bushy tail. Does anyone know what species this is? Also, we saw a really big South American coatimundi cross the road. It was as big as a Great Dane and I didn't get out of the car to pet him! Birdlife included guans, the black Caracara, Yellow-bellied Dacnis, Rufous-collared sparrow, many hawks, colorful macaws, and green Amazona parrots. I never seen so many butterflies in one place in my life and Bill collected various spectacular swallowtails and blue Morphos! After dinner that evening, we all tried our hand swinging at various darners darting around the buildings. Everybody got several specimens but they all turned out to be *Gynacantha interioris*!

Morning came too soon! Reluctantly, we left the rain forest with its gigantic balsa and kapok trees towering in our rearview mirror. Eventually, the pain was lessened when we caught *Aeolagrion dorsale*, *Argia infrequentula*, *A. pulla*, the sky-blue *Helveciagrion chirihuanum*, and the flashy red

Rhodopygia cardenalis at several roadside ditches and ponds.

I got thorn-stabbed in the hand by the infamous "Plant from Hell" shrub and had to rest under a tree to wait for the bleeding and dizziness to stop. I watched the others swing away but didn't feel like participating 'til much later in the day. The "Plant from Hell" looks like winged sumac (*Rhus copalina*) but with inch-long thorns at the base of each of the alternatively arranged leaves. Besides slicing and stabbing us, it ripped our nets to shreds. Thank heaven for spare net bags plus handy needle and thread kits. Always be prepared in the jungle!

We spent the night at the Shushufindi Motel and processed our specimens under the African mosquito netting over our beds. At breakfast, we had huevos revueltos, pan tostada con queso and tea or Diet Pepsi. Ken endeared us to the nearby patrons by dropping dragonfly larvae into his cup of boiling water thus fixing them before plopping them in a vial of alcohol. Needless to say, none of the other patrons beckoned the waiter over to say, "I'll have what he's having!"

After a brief morning delay to fix a flat tire, we started back to Tena. Despite drizzling weather, we collected *Polythore concinna*, 3 species of *Heteragrion*, and *Argia variegata* along the way.

The next day, we decided to explore new territory along the road to Puyo. Puuuu....puuuu....Puyo! The rainy weather kept everything under cover and the extensive agriculture in the area didn't help the water quality of the streams. We did get a few *Argia infrequentula*, *A. oculata*, *Mnesarete devillei*, and *Hetaerina sanguinea*. Ken got a fine male of *Orthemis biolleyi*.

Monday, the sun came out and we headed back to the Rio Sinde hoping to swing feverishly at something! We got pretty much the same species as before but I got 2 new species of *Epipleoneura*, *Progomphus pygmaeus*, *Mnesarete devillei*, and the interesting *M. metallica*. This dude has a permanent bent or kink at segments 7-8 which serves as a distinguishing mark for this species! At the pond, we caught the brown and red *Telebasis limoncocha*, the blue *Acanthagrion lancea*,

Oligoclada spps., and deep shade-loving *Orthemis cultriformis*. I saw several red *Coryphaeschnas* but they never got within net range. Sorry, Dennis!

The next day, we decided to explore the small streams entering the Rio Napo as they crossed the Jatun Sacha dirt road. Notable species included the gangling blue *Heliocharis amazona* (Ken got many larvae in tangled streamside tree roots), the lemon-yellow *Perithemis parzefalli*, *Heteragrion*, and *Mnesarete devillei* plus the very small *Erythrodiplax paraguayensis* and *Telebasis flammeola* at a pasture seepage. But the day belonged to the incredible swarms of red dragonflies at a flooded Rio Napo side slough.

A five-minute "pit stop" turned into a 3-hour feeding frenzy when I spotted a green *Coryphaeschna* heading towards the slough. The skies were soon filled with hundreds of red *Orthemis* and carmine *Rhodopygia* plus several green *Coryphaeschna*! We had a big-time blast swinging right and left at bombers all over the place! Woe to the collector venturing into another's swinging net space because he would accidentally get knocked down! Species included *Orthemis discolor*, *O. schmidtii*, *Rhodopygia cardenalis*, the purple and red *R. pruinosa*, *Coryphaeschna adnexa* and *C. luteipennis*. However, when we returned to this spot late in the afternoon, there was no dragonflies at all! They had all disappeared! I wonder why!

Wednesday, we packed up and headed north up the mountains towards Baeza. On our agenda was a stop at the "Famous Marshy Seep" from last year and home to the new species of *Oxyagrion*! We were in luck! The sun was shining in full force and I soon caught several *Argia medullaris*. Then, I got my first ever specimen of the *Oxyagrion* and promptly did a nifty victory dance! All of a sudden, Aeshnids starting flying everywhere, but mostly over the long seepage ditch. We got several patrolling males and ovipositing females of *Aeshna cornigera*, *A. marchali*, and we missed several *A. brevifrons*! A few wandering *Lestes apollinaris*, *Megapodagrion temporale*?, and *Erythrodiplax ines* were also collected. Bill snapped up the only *Cyanallagma laterale* seen on this trip! Later In Baeza, we stayed at the

delightful two-story Hostal San Rafael with its teak floors and walls plus hot showers! Definitely the best place for us to stay in eastern Ecuador!

The next day was to be our last day of exploring and we made the most of it! South of Baeza, we stopped at a beautiful forest stream (elevation 5720') running through a small mountain pasture. BINGO! Flying with *Megapodagrion temporate*?, *Argia medullaris*, *Oxyagrion*, and *Aeshna brevisfrons* was the gigantic and majestic *Mnesarete imperatrix*! Imagine a *Calopteryx maculata* male as big as your hand but with clear wings and purple abdomen!! The smaller females have carmine wings and shiny green abdomens!! Bigger surprises occurred when Ken dip-netted several weird Gomphid, *Polythore*, and *Megapodagrion* larvae! Ken managed to get gomphid larvae at several places in Ecuador but nobody got adults except for *Progomphus pygmaeus*. Sid said authoritatively that gomphid adults live at the tops of trees and only come down to the water when all collectors leave the country!

Later, we hiked down to a horsetail / cattail marsh we had spotted from the road earlier. Despite drizzling rain, we managed to get a good series of *Oxyagrion* and we flushed up many teneral *Cannaphila vibex*. But the real prize was yet another undescribed species of purple *Argia*! Later, Rosser Garrison placed it in the *A. gerhardi* group. Alas, that would be it for the day!

On our way to Quito through the Andes, we experienced a near disaster! A semi-truck had crashed into the side of the cliff, backing up traffic about a mile. Buses were unloading ladies in dresses and high heels to hike back down the mountain. Lucky for us, our tiny Vitara could just barely scrape by! Excellent driving, Sid! Safe and sound in Quito, Ken and I found time to go shopping. I bought a nice rain forest shirt and he suggested monogramming it with the word, Ecuador. This I did and it really looks neat! Thanks, Ken!

Later that night, we had dinner at Giovanni's house. His graduate student, Alicea "jungle boy in Indian language", cooked spaghetti and we drank either "wine in a box" or chicha. Made from chohta palm, chicha tasted gritty and bitter

but it cleaned out your innards. Afterwards, we had a hot herbal drink made from lemon grass which was very good. Giovanni studies gigantic beetles such as *Lucanus*, *Dynastes*, and recently found the larvae of a rare stag beetle. In addition, he conducts research on defoliating insects affecting Ecuador's balsa tree industry. Did you know that the balsa tree can grow 30' in one year!

We also discussed future Odonata expeditions and the need for an updated Ecuador species list. Dennis Paulson and I are compiling the list and if anybody has any records from Ecuador, please drop us a line. Thanks!

The next day at the airport, I was the last person to board our plane and I didn't see the others until later that day in Miami! Evidently, they got bumped and had to take another flight on KLM to Curaçao to get to Miami. I had visions of them being stuck in Ecuador for days! But everything worked out OK and I had a super blast on this trip! I am ready to go back next year! The Rat Patrol will ride again!

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PANTALA IN THE MARITIMES

Paul-Michael Brunelle

Although I understand that *Pantala* spp. are fairly common to the south of the Maritime Provinces, to the north on the Island of Newfoundland and in Quebec to the west, the species of the genus have eluded me until recently. *P. hymenaea* has been known in New Brunswick since Dr. Edmund Walker's visits earlier in the century, and *P. flavescens* had first been taken by Lee Dexter in that province in 1993 near the Fundy Shore.

On August 9th last year I first encountered *P. flavescens* at the Lepreau River upstream above the tidal influence of the Bay of Fundy Shore in New Brunswick. They were present in substantial numbers, wheels and laying in tandem were common, but exuviae were not found. The laying habitat was the distinctly warm, small and shallow isolated pools of this sandy-bottomed river in which the water level is usually very low for most of the summer, although high and rapid in the spring. Securing a specimen proved to be very difficult, they

always stayed just out of net reach and seemed wary of me, and the one I finally took was a solo male patrolling a deeper pool downstream. I had always wondered where *Pantala* bred prior to the advent of borrow-pits and suspect these seasonally-isolated pools may be part of the answer, such features must be very obvious from above due to the bright color of the surrounding sands or dried muds. My suspicions were somewhat supported when I encountered a male patrolling a small isolated stream of the Saint John River. While the pool was cobble bottomed and deep, not particularly warmer than the river, a recent fall of water level of perhaps 25cm had left a bright white residue on the stones of the bank - perhaps misleading the male into thinking it an appropriate site.

On September 16th I returned to the site and sampled extensively for nymphs of the species but none were found. Given the rapidity of development credited to this species I am at a loss to explain this other than the possibility of a diapause over the winter in the egg stage. This seems unlikely given the tumult the river will be in the spring, but the alternative is that the environment of the pools was somehow not suitable for nymphal development and I can think of no reason why it would be - early and late instars of a number of lotic species were found though not in any great quantity.

The species has been taken as adults from July 5th to September 2nd in New Brunswick but has yet to be recorded from Prince Edward Island or Nova Scotia. In the case of the latter province this may be in part due to the lack of sand-bottomed rivers on the Atlantic Shore, but it is almost certainly present in the borrow-pit habitat and awaits discovery.

P. hymenaea was cited as being in Nova Scotia in Walker and Corbet (1978) but this was a misprint, St. Andrews being in New Brunswick (Walker 1933). This dramatic species was one of great interest for me this year, I encountered it in four widely separated places in the region and was greatly taken with its huge arterial-red eyes.

My first encounter was on a logging road in Charlotte County, southwest New Brunswick, near St. Stephen where the last DSA annual meeting was held (45°29'N) and shortly after it on July 17th. Two specimens were hawking over

the dirt road in the late morning, no more than 1.5 - 2.5m up and somewhat lazily. I took one which had a brilliant red mask thinly bordered with orange - a sign of a mature individual and hence probably a migrant from the south. The collection was not difficult and the specimens may have been somewhat sluggish from the previous night, the ease of collection was certainly not repeated in later sitings.

Subsequently I spotted specimens of the species over a gravel parking lot near Halifax, Nova Scotia (44°37'N) on July 28th while giving a talk on the order to a local naturalist's society. It was impossible to abandon my charges and give the species the attention it demanded, a most frustrating experience. The specimens would approach from within or above the forest surrounding the parking lot, cruise over it at heights from 1-4m, sometimes patrolling a long oval for a number of circuits, exit over a cut lawn, adroitly avoid being hit by vehicles on the highway and disappear in or over the woods across the road. This happened a half dozen times on that date and I was unkindly praying for them to mis-judge a car. The eye color and basal wing patches convinced me I was seeing the species but when I returned that evening I again failed to take a specimen, although I had several opportunities - they were fast and agile and seemed to sense my intent and avoid me, although they were seen to pass within netting distance of other people (who also showed some alarm at my approach, net cocked and a determined expression). I finally took a male on July 31st with a desperately lucky over-and-behind-the-head sweep, it too had the red mask indicative of a mature individual.

In early August I traveled to Mount Carleton Provincial Park in northern New Brunswick and observed on August 8th several of the species traveling singly east over a large pond formed by highway construction across a brook (47°30'N). They passed at about 2m at a modest speed, totally ignoring the activity just over the surface of the pond where *Aeshna eremita*, *A. canadensis*, *A. umbrosa*, *Libellula quadrimaculata* and *Somatochlora cingulata* were disputing territory. Their direction of travel was parallel to the highway and would conform to the direction taken if they had traveled north up the Saint John River valley from the Fundy shore and east up its tributaries. Alternately they

comfortable experience. The sleeper cars were air-conditioned! We felt that we had been transported to the Orient Express.

Brother Amnuay took care of our every need, from ordering superb and not too spicy fresh Thai food at every meal to arranging vans and drivers, and hotels or other accommodations every day. Sometimes I wondered how he was able to put up with us day after day. After all, we were like babes in the woods, and probably very few people go to Thailand to travel in such a manner.

Our collecting was punctuated by overcast skies, heat, and lots of perspiration. It was also intense. Almost every day found us getting up very early, driving to a swamp, waterfall, creek, or pond, and spending the day collecting and photographing. Mosquitoes and other biting insects were conspicuously absent, but leeches were always a potential problem. The dragonfly localities that we visited were also good sources for many other orders of insects. The Fuji's enjoyed seeing a collecting the diverse insect life which is usually only dreamed about in books and in pinned collections. James (14) successfully captured everything from beautiful glossy *Papilios* (*P. karna* and *P. paris*) to species of metallic wood-boring beetles.

The country is beautiful and the people are friendly. It is also very cheap to vacation there. We benefited greatly from the services of Brother Amnuay, who took care of us, ordered our food (wow, Thai food is excellent), arranged transportation, and took us to some of the best collecting spots in the country. Did we collect anything new? Yes; I believe we have at least two species previously unrecorded from the country, and we collected some fairly rare species. Some of the dragonflies are real beauties. They flew in the sun flashing their colors with brilliant iridescent wings. Others were more somber creatures found only in the darkest, shadiest parts of the forest where they were difficult for the eye to follow. I tried to photograph many of these because Dr. Matti Hämäläinen and Bro. Amnuay are planning to write a well-illustrated book on the Odonata of Thailand. We succeeded for many species, but it was often difficult. The sweat rolled into my field of view and the camera lenses usually became foggy when taken out of the camera

pack. More than once, Jo and I were soaked by rain as we failed to get to the car in time. We discovered that our ponchos were fine for keeping the rain off the equipment, but they didn't keep us dry underneath in the warmth and humidity.

Following this narrative is a complete list of the Odonata we collected. I will comment on several interesting species.

Our first stop at Pau Pau Waterfall in Chiang Mai Province, a famous locality, yielded a few interesting species. The most famous species from this locality is *Schmidtiphaea schmidi*. Very few specimens are known in collections, but Mr. Somnuk Panpichit, a Thai colleague of Bro. Amnuay who accompanied us throughout our trip, was able to collect one male. This was the first of many episodes which demonstrated Mr. Somnuk's amazing ability with the net. He was able to collect many Odonata that none of the rest of us ever saw. Meanwhile, Jo and I were slipping and sliding up and down the narrow watercourse, waiting, often in vain, for the 30 seconds of sunshine that would bring out the Odonata. In the darkest recesses of the forest, almost invisible *Drepanosticta anascephala* would occasionally make their appearance. They lack the conspicuous blue which is so prominent in our New World genus, *Palaemnema*. I photographed a male by having Jo hold a net about two feet behind the specimen. Even so, it was so dark that I could hardly focus properly on the specimen.

Brother Amnuay had told us that the next locality was the "second-best collecting locality in all of Thailand." We were not disappointed, and the sun made its appearance for the next two days. At Ban Mae Wan Forestry Camp, Brother Amnuay showed us our first specimens of *Orolestes octomaculatus*. I suppose they are so magnificent because of the great amount of dark markings on the wings, which makes them look larger than any *Archilestes* I am used to. It is a damselfly which haunts the bamboo thickets and other brambles where the net cannot reach it. Jo and I were later to collect more specimens by simply grabbing them with our fingers, but we both earned our purple hearts in doing so.

At a stream at Ban Mae Wan, we saw the metallic green wing flashes of our first

specimens of *Neurobasis chinensis* among the great diversity of other species. The magenta, blue, and black wings of *Rhinocypha perforata* glistened from where they sat on exposed rocks in the cold stream. *Euphaea masoni* was common, but only a few *Dysphaea gloriosa* could be netted. The latter is quick, alert, and hard to approach. Two very large dragonflies, *Onychothemis culminicola* and *O. testacea*, appear to homologs to the New World *Elasmothermis*, coursing along the swift stream and perching on overhanging vines. At a pond, the butterfly-like *Rhyothemis plutonia* displayed metallic red and blue of the hind wings.

Our most productive locality, Siriphum Waterfall, yielded 24 species over two days. One of the most exciting captures was by Jo. She had climbed to the rocky base of the fall and had seen a large, swift dragonfly patrolling at about 10-minute intervals. She called me up to beef up the team. After several appearances by the elusive black and yellow dragonfly, Jo finally swung, almost by instinct, as it flew past, and captured a magnificent male *Sieboldius nigricolor*. This specimen is the second or third capture of this species from Thailand. We stumbled upon *Megalestes kurahashii* deep within the forest understory. This endemic species was found in some numbers at this site.

In the afternoon, I hiked up the trail where many *Coeliccia loogali* were found. Because this large damselfly was abundant here, I wanted to get a good photograph of one. As I stopped with my camera, I saw two males hovering and facing each other. Suddenly, they darted toward each other and seemed to grapple with each other. They then separated and faced off again. For the next 3-4 minutes, they repeated the clashes while I photographed them. My efforts yielded two slides, one of the stand-off, the wings frozen in flight, and the other with the two males grappling each other. The somber *Burmargiolestes melanthorax* flew at seepages in complete shade. Near the parking lot, in a grove of banana trees, the brilliant lemon-yellow *Coeliccia chromothorax* flitted among the leaves. A second purple heart was earned under the bananas as I walked into a hornets' nest and was stung. The things we do for the love of Odonata!

Mr. Somnuk again showed his remarkable collecting ability at a large, muddy cattle pond 6 km east of Lampang. In the heat of the sun, Jo and I were struggling to capture one of the large *Ictinogomphus decoratus*. The score thus far was Rosser: 1, Jo: 0, when Mr. Somnuk returned with about a dozen males in hand!

On July 15, Brother Amnuay took us to Wang Chin, where we hoped to find an undescribed species of *Chlorogomphus*. To get there, we all had to hike through about a mile of rice paddies into the mountains. I walked the slight upward grade in the hot sun, wiping the sweat from my brow at every step. Jo decided that next trip the most necessary accessory would be a bandanna to keep her eyes free of the stinging, salty moisture. *Zygonyx iris* was found patrolling over the wooded streams above the paddies. It reminded me in habits of the common *Brechmorhoga mendax* of the American Southwest. I was visibly annoyed every time I tried to take a photo, because I was so tired, hot, and sweaty. Worse yet, the lens continually fogged up when I removed it from the bag. I took several photos of the curious "dragontail" swallowtail, *Lamproptera meges*, which squirts water from the tip of its abdomen while sitting on sand with its proboscis imbibing water. Unfortunately, by this time, the rain clouds appeared, and we started the long trek back to the van. None of us saw a single *Chlorogomphus*.

The second leg of our trip was to Chaiyaphum Province. We stayed at a beautiful mountain cabin at Tung Lui Lai, where a rich assortment of Odonata awaited us. The white-legged *Copera ciliata* was everywhere, and the salmon-legged *Copera vittata* accompanied it in lesser numbers. The white legs of *C. ciliata* are most notable in flight. One surprise was one of the tiniest of Odonata, *Agriocnemis nana*. For an hour, I tried to get close-up photographs of both sexes. I was successful, but it was difficult because the depth of field was so shallow for such a small damselfly. Next to the pond flew the all-black *Pseudothermis jorina*. Their first few abdominal segments are bright yellow, and they cut a striking figure over the muddy water. Later that afternoon, I collected a small, stocky libellulid, *Aethriamanta brevipennis*. Brother Amnuay was very happy to see them, because he had only a few specimens of it from Thailand.

For the next two days, we collected at various lotus ponds at Salaphron Forest. Before leaving for one of these ponds, we were told to be especially careful of leeches. We had seen them at two other sites, and were not particularly concerned. But this place was different. As I stood on the dirt driveway and looked at the ground, I saw hordes of the tiny, wormlike creatures, many of which were headed straight for me. This is the kind of thing that tends to make one self-conscious. We found none in the water, so their appearance on dry land was particularly unnerving. After climbing up an embankment to the paved road, we examined our pant legs and brushed off many of the little critters. Jo urged me to take off my irrigation boots and check inside. I nearly refused, not believing that they could have gotten in there so fast. But, much to my horror, there were several of the leeches looping along on my socks and on the linings of my boots. The final victory was theirs: that evening in the cabin, when I took off my shirt, there was a 2-inch bloodstain from where I had been the host of a sanguinary feast earlier that day. I had noticed a slight itching, but had thought nothing of it. Our colleagues in the forest more prudently stayed to the paved road and suffered no such fate. Was our trek into the brush worth it? Yes! We found there specimens of what appears to be *Cercion calamorum*, which may be a new record for Thailand.

At one of the temporary roadside pools, Mr. Somnuk collected six or seven pairs of a strange new *Ceriagrion*. Brother Amnuay had never seen this before in Thailand. It appears to be the first record of *C. pallidum*, originally described from Laos.

At a small, muddy pond, I saw a large leetid with completely hyaline wings. For the next several minutes, I tried to capture it. I was unaware of anything like it from Thailand. After a while, I caught some specimens, which turned out to be clear-winged forms of *Orolestes octomaculatus*. We found intermediates in wing maculation. Nick Donnelly had also found clear-winged specimens on an earlier trip to Thailand.

The last leg of our trip was toward the Burmese (Myanmar) border in Kanchanaburi

Province. Here, our lucky weather finally gave out in favor of rain. During most of our three-day sojourn, we were constantly dodging the steady to intermittent showers that followed us wherever we went. With typhoons reported both east and west of us, what could we expect. After all, it was the rainy season. In spite of that, we found a few more interesting species. For me, the discovery of *Echo modesta* was a real treat. This large, dark, metallic blue-green calopterygid was found in the darkest recesses of a completely shaded stream, even during the rain. In flight, the hyaline wings would occasionally display the most beautiful opalescent blue, and the brilliant white pruinose face gave me the only clue to their presence. Along with Echo, the emerald green *Vestalis amoena* landed on leaves bordering the stream. This was the second of two members of this genus that we caught in Thailand. The more common *V. gracilis* flew in more sunny habitats.

The penultimate dragonfly of our trip was the deep blue and black *Prodasineura laidlawi*. Unlike the more widely distributed *P. autumnalis*, which we found elsewhere, this species prefers to hover over very small rivulets in the shaded forest.

How to end such a trip? We stopped to visit the famous "Death Bridge" over the River Kwai in Kanchanaburi. The last dragonfly to be had was a single female *Brachythemis contaminata*, which was perched on a bridge near the railroad bridge. Despite the rain, it reminded us that Thailand is a most beautiful country full of grand diversity of Odonata which would be hard to match in other tropical areas.

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ODONATA HUSBANDRY

Dave Wagner and Mike Thomas

We have had good success keeping newly emerged dragonflies alive for 1-2 weeks by feeding them cricket abdomens and thoraces. Teneral adults are best placed on rough vertical surfaces--we often tote a small screen cage in our canoe or car. Brown lunch sacks are said to be good. (BIOQUIP sells small collapsible field cages that fit in any shoulder or back pack...for an arm and a leg. Nick Donnelly makes a portable cage out of plastic mosquito netting.

A 12" x 12" piece is sewn or stapled along one end and side, making a double thickness with an open end. This piece is then folded into a tetrahedron (putting opposite corners of the open end together), folding over the flap on the open end and pinning it shut with safety pins. In the field the cages can be pinned to a shirt, field bag, car seat, etc. They are also good rearing cages-- he has reared more than a few tropical damselflies by placing one of these cages in a shallow dish of water.) Plastic bags a twig for hanging will serve in a pinch but they heat up quickly and provide poor footing.

Mist the adults two to four times a day, enough so that they can drink excess moisture that accumulates on their faces or the sides of the container. Initially, feed the adults by grabbing their wings with one hand and with the other offer a severed cricket abdomen held with a pair of forceps. Very young adults may only drink in the hemolymph and attempt to eat softer internal portions of the cricket, but within a day they should take cuticle, antennae, and wings. They seem to have a special fondness for the drumsticks (legs). Once they begin dining you can often set them about their business and go off to yours.

Last week, while feeding a newly emerged *Stylurus spiniceps* adult with a small (whole) cricket DLW noticed that his pet had lost a leg, severed at the "knee." Closer inspection revealed two more severed legs. Horror. The cricket that was being consumed tail end first had been doling out its own retribution.

Small or juvenile crickets are best--a nymph ca. 8-10 mm in length makes a good meal for a gomphid. Two meals a day will guarantee that you will see the mature coloration within a few days. You can purchase crickets at most pet stores. Alternatively, the abdomens of many other insects, e.g., those that come to light might work just as well. Shy away from females laden with eggs as they may contain adhesives or other substances that could back up the plumbing. *Stylurus* relish deer flies and somehow we don't find it so difficult to facilitate their sacrifice. The warmth and light of a desk lamp seems to stimulate feeding behavior.

William J. Sigmund had success feeding a teneral of *Epiaeschna heros* butter on the end of a wooden stick, although tenerals of *Stylurus amnicola* weren't taken by it. A mixture of ground flies and margarine turned out to be quite satisfactory to six teneral *Gomphus vastus* that we held for a week. Usually a small dab of butter (or the butter-fly mash) placed over the mouthparts will elicit feeding behaviors.

Jon Waage has found that very high humidities are required to maintain *Calopteryx* in captivity. Our loss of a teneral female *Hetaerina americana*--even after it had taken to dining on flies and mayflies that had come in to a blacklight--has us wondering if it wasn't low humidity that did us (and her) in.

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DRAGONFLIES AS ROAD KILL

Roy Beckemeyer

On a recent trip along a stretch of highway in Kansas where there was one lane blocked off for construction work, I noticed that there were dragonflies lying in the closed lane. (I am particularly sensitive after the DSA meeting in New Brunswick and Paul Brunelle's success at such collecting.) As this was early on Labor Day morning and the insects were not yet flying, I expected that most of the prior day's kill had yet to be disturbed by workmen, or blown off the road by the wake of passing cars & trucks, so I collected a half-mile stretch of road.

This is the peak season for *Anax junius*, and all specimens were of that species. The tally: Mile 0.0: 1 stunned & too cold to fly, but alive; mile 0.2: 1 dead; mile 0.25: 1; mile 0.35: 3; mile 0.4: 2; mile 0.5: 1. Total: 9 specimens. All females; 1 alive, 8 dead; 5 intact, 1 headless, 1 with abdomen gone, 1 smashed. This was basically one lane of a 4-lane highway. Even assuming that I had all the kills for the previous day (not likely), that would work out to 72 per mile of road when all 4 lanes are open. There were dragonflies evident along at least 10 miles of that highway, and they were flying later in the day upon my return in large numbers all along the 75 miles of the trip. By the way, the only other insects collected in that half-mile stretch along with the dragonflies were some large

grasshoppers (2) and a beetle (which all remain to be keyed out).

I am uncertain as to the significance of all this, but it is obvious that road kills are likely to be statistically much more significant (to those taxa of Odonata that travel over and across roadways) than netted specimens, when one compares these numbers with those quoted by Dennis Paulson regarding the specimens he has accumulated over his career.

[In the Kenai Peninsula of Alaska I found a great many corpses of *Aeshna eremita* and *interrupta lineata* which had rested too long on the dirt roads and were flattened by pick-up trucks. Ed.]

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E-MAIL CORNER

NEW YORK CONSERVATIONIST ARTICLE

sent by **Hal White**

A colleague of mine at the USDA labs here sent me a copy of an article in the New York State Conservationist for August. "**Those Colorful Needles with Shimmering Wings**" is by James H. Moerschel and refers to a different Nick (Wagnerik). A photo of *Celithemis elisa* is misidentified as *Tramea lacerata*. The photos are good but I would like to see the original which presumably is in color.

AFRICAN BEES INJURE MAN AND KILL DOG

San Antonio Express-News by Jaime Castillo - September 1996; sent by **Jerrell Daigle**

Aggressive Africanized bees were responsible for attacking a San Antonio man and killing a dog Sept. 2, city health officials said.

Entomologists at Texas A&M University confirmed the presence of the more territorial and aggressive bees after studying a sample taken from the scene of an attack nearby, said Sam Sanchez, sanitation services manager with the city's environmental health department.

The case is the first confirmed attack by the so-called "killer bees" in the city so far this summer, Sanchez said. Last year, there were "four or five" confirmed cases, he said. Authorities also are looking into a second attack in which another man was stung more than a dozen times, Sanchez said. Officials at Texas A&M have yet to determine whether Africanized bees were involved in that incident, he added.

In the confirmed case, a man was stung about 20 times as he was swarmed by bees, while repairing a car in front of his home. The bees, which had a hive in a vacant storefront nearby, reportedly attacked him after they had turned on a woman who was trying to save the dog.

Although the aggressive behavior exhibited by the bees is cause for concern, Sanchez believes the attacks were isolated incidents. "These are not swarms of bees flying around the city," he said. "What we're seeing are established colonies which may have been there for years without being noticed." Sanchez said the sudden surge in bee attacks probably is because of the recent heavy rains in the city.

DRAGONFLY HEARING?

sent by **Roy Beckemeyer**

Dear Netters:

I teach an entomology class of about 20 undergraduates at a small liberal arts college in Pennsylvania. A student of mine told me today that while she was taking guitar lessons (one instructor and 7 or 8 students), a large dragonfly flew through the door from outside & proceeded to hover in front of many of the students (except the screaming girls) as they strummed. The dragonfly hovered before the guitar, then the face, back to the guitar, etc... The student said, and I quote, "It looked like a little helicopter." The instructor, seizing upon the moment, began to play a 'bug song'. The dragonfly hovered before him for a while, then departed.

My question: was the dragonfly responding to acoustical signals?

Steve Jenkins

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MICHIGAN ODONATA SURVEY UNDERWAY

Mark O'Brien

Bob Glotzhober's efforts with the Ohio Odonata Survey made me realize that we were really in need of a similar effort for Michigan. I had hatched the idea late in 1995 of a statewide survey to update the old report by Kormondy in 1958. However, my duties at the UMMZ and lack of prodding kept me from really doing anything about it. In late June, Michael Kielb and I decided to quit "talking about it" and start doing something. With Mike's infectious enthusiasm, I knew we could get a survey started. Although the Michigan Odonata Survey (MOS) is just getting underway, we have found several new state records and range extensions without trying too hard. It just goes to show that Kormondy's list was really out of date (and based too much on museum specimens and not enough on collecting efforts). Mike has found a number of birders really interested in helping out, and other collectors have expressed an interest in joining our efforts.

We are soliciting help from others that are interested in the biology and distribution of Odonata in the State of Michigan. Although there are at least 153 species of Odonata listed for the state, we know little about the current distribution of many species. Since the last survey of the Odonata fauna in the state of Michigan was published nearly 40 years ago, the environmental quality of our wetlands has changed, swamps drained, and biotic and abiotic factors have impacted the Odonata fauna both positively and negatively. Also, many parts of the state have been very poorly surveyed for Odonata as well as other groups of insects. Large gaps remain in our knowledge of the fauna in the Upper Peninsula of Michigan, as well as several key areas elsewhere in the Lower Peninsula. We are also concerned that species that have rarely been found in the state are very poorly documented as to whether or not breeding populations exist. Maybe some of these species are merely strays, or perhaps they are residents still existing at the margins of their ranges, in habitats not commonly represented in

Michigan. The MOS will target such species for thorough searches and will cooperate with state agencies to ensure that residual populations are mapped and protected if necessary.

How can you help with the Michigan Odonata Survey? We need people to:

- a) Survey and monitor areas for the appearance of target species of Odonata
- b) Collect adults and larvae in poorly-represented areas of the state
- c) Provide data from personal and institutional collections
- d) Assist in entering distributional and seasonal data into a database
- e) Assist with regular newsletters for the MOS
- f) Act as local naturalists to help educate people about dragonflies
- g) Report sightings of unusual or rare species as well as report habitats that may favor targeted species

An eventual goal is to produce an atlas of Michigan Odonata for use by scientists and avocational odonatologists. In doing so, we will also be able to advise the Michigan Dept. of Natural Resources about the status of candidates for State listing of threatened, endangered or special concern species, as well as in the identification of critical habitats.

This project is not the domain of two people. We are seeking dozens of volunteers state-wide to do what is listed above. Of primary importance is the collection and identification of Odonata from areas all over the state. We encourage the deposition of voucher specimens in the UMMZ's collection – one of the largest and most comprehensive Odonata collections in North America.

The MOS should take 5 years or less, depending upon the number of field volunteers and the quantity and quality of the data generated by the Survey.

For information on how to participate in the Michigan Odonata Survey, please contact:

Mark F. O'Brien or Michael A. Kielb
Museum of Zoology-Insect Division
University of Michigan
Ann Arbor, MI 48109-1079

email: mfobrien@umich.edu (Mark) or
bunting@aol.com (Mike)

also, our web page is:
<http://www.ummz.lsa.umich.edu/insects/MOS.html>

Late addition: There is a MAILGROUP for interested people:

mosinfo@insects.ummz.lsa.umich.edu
To get on this mail group, e-mail O'Brien directly.

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CHANGES ABOUND IN THE UNIV. OF MICHIGAN MUSEUM OF ZOOLOGY ODONATA COLLECTION

Mark F. O'Brien
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Many readers of **ARGIA** probably remember the late Leonora (Dolly) Gloyd, who spent much of the last 20 years of her life at the University of Michigan Museum of Zoology (UMMZ). A disciple of E. B. Williamson, she was always willing to give freely of her time to anyone needing help with an identification, paper review, or other odonatological problem. When I arrived at the UMMZ as the Collection Manager in 1981, I quickly learned that she "ruled" the Odonata collection, lest I get any funny ideas about clear 3x5 envelopes, modern classification, and so on (for those of you who knew Dolly, you'll appreciate that we still keep finding those "booties" in the drawers). For me, finding nearly anything was an exercise in patience and deciphering years of accumulated specimens. Her methods made sense when I understood the history of the collection, and I could find specimens *most* of the time. However, I had a very large collection to deal with, and the Odonata were only part of the picture. Our insect collection has been estimated to contain between 4 and 6 million specimens. So, there was always another group to work with, and I trod lightly in the Odonata range until shortly after Dolly left the Museum. Even though she was not in the best of health late in her stay in Ann Arbor, she was interested in the affairs of the collection.

I knew that the collection really needed a lot of work. For all of the years that Dolly was at the museum, she did not really do any major curation of the collection (but did an excellent job with the Odonata library). She also accumulated many thousands of specimens from the New World through purchases and gifts. In all fairness to her, she had her long-term *Argia* revision, and she was not a paid member of the staff, but an adjunct curator. However, as helpful as she was to others, for me to suggest that the collection needed a lot of work (from me) was to invite a glare and a lecture from her. After Dolly's health deteriorated, she left the Museum behind and went to a rest home, first in Ann Arbor, ultimately moving closer to her children in Texas. It was about that time that I started planning on improving the state of the collection. As some of you know, there were hundreds of old cigar boxes from Kennedy and others that were filled with papered specimens from Asia, the Pacific, and the Neotropics. In addition, there were cigar boxes filled with hundreds of specimens from Williamson expeditions to the southeastern US, as well as boxes from other collectors. The specimens were essentially unusable for research until they were transferred to 3 x 5 envelopes, with full label data added.

A few years ago, we invited Rosser Garrison to come and work with the collection as a Visiting Curator. He spent a few weeks in total at the UMMZ and accomplished a great deal. He'd probably tell you the collection was in need of a lot of work. We had many cabinets filled with specimens still in field envelopes, returned material to be put away, and so on. He cataloged and reorganized, while also working on the type catalog (yes, we will finish it one of these days!). The Odonata library was also in need of better housing. The old boxes were dusty, hard to open, and often had drawers stacked on them. Clearly, the collection needed more space and better space.

In 1993 we started renovation of the ranges in the Reptiles and Amphibians and Insect Divisions. As a result of the renovation and the following NSF Collections Improvement grant (which expires at the end of 1996), we moved the Odonata and Neuropteroid orders to Room 2047, where the alcohol range was formerly

located. The corner room has ample expansion space, we have a nice work area for visitors, and the Odonata reprint library has been transferred to standard shelving and pamphlet file boxes. A future project is to catalog the reprint library, just as we did for the Orthoptera reprints. The addition of new cabinets from Interior Steel and the transfer to standard glass-topped drawers will protect the collection much better than it has been in the past.

One of the missions of the NSF grant was to reduce the backlog of unworked material. In the Odonata, that job consisted of putting many thousands of unincorporated specimens into the clear 3x5 envelope system which is standard elsewhere. We have decided not to transfer all of the specimens in the collection from paper triangles to clear envelopes. Such a transfer would be very costly in time and expenses. However, anything being added, identified, or removed from field triangles gets put onto clear 3x5 envelopes. A representative specimen of each species will also be placed in a clear envelope and placed at the top of the stack of triangles in the unit tray.

Over the past several years, we have been gradually making this transition. Just this past July, one of my employees transferred over 2,500 specimens collected by Luis Peña from Chile and Peru forty years ago, and progress was made on the old Kennedy material. There are still a few places for which I need to find Military APO locations. Several collectors were based in Hawaii and elsewhere during WWII, and the only location on the envelope is an APO number. There are probably some very fine specimens amongst this material.

We have counted about 900 drawers (ca. 80,000 Anisoptera and 105,000 Zygoptera) in the collection, and there are approximately 2200 vials of odonates in the fluid collection. Ethan Bright has been working through our backlog of accumulated aquatic material, and has added hundreds of identified Odonata larvae to our collection. I am hopeful that we will have that information in a database allowing researchers to make better use of the specimens. Michael Kielb has been working to sort the dry Odonata as well as identify the Michigan specimens.

Amid this burst of activity, we founded the **Michigan Odonata Survey** this summer. Mike Kielb and I decided that the time was right, and with the survey work we were doing in the Huron Mountains (Marquette Co., MI) we had a good start on establishing a state-wide survey. I'll provide more information about the Michigan Odonata Survey in a separate article. Meanwhile, you can check out the MOS pages at:

<http://insects.ummz.lsa.umich.edu/MICHODO/MOS.html> and see what we are up to.

As you can imagine, great improvements have taken place in the UMMZ Odonata collection. We still have the following goals to accomplish:

- a) Catalog the entire identified collection to species -level and specimen level for Great Lakes Region locations.
- b) Catalog the Odonata Reprint Library (ca. 6,000 reprints), much as we have done for the Orthoptera collection. In addition, I encourage authors to send their reprints to us.
- c) Inventory and return material loaned to Leonora Gloyd.
- d) complete the transfer of specimens from old triangles into 3 x 5 envelopes.
- e) Curate the Förster collection of pinned specimens.
- f) Transfer (and catalog) the accumulation of exuviae from various collections (Williamson & Kennedy, mostly) into suitable storage units.
- g) Host a meeting of the DSA sometime!

Anyone that has not been to the UMMZ in 5 years or more would appreciate the changes and improvements in the collection and facilities. I hope that anyone interested in using our collection for research will contact me and perhaps visit, if possible.

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BUGS CAUGHT IN LIST OF BUG NAMES

Jerrell Daigle

Two "bugs" or typos were caught in the recent DSA Common Names List! Please make the following changes. *E. crassus* should be *G. crassus* and Hine's Emerald is the correct

common name for *Somatochlora hineana*. Many thanks to Tim Cashatt and Tim Vogt for catching these "bugs"! And yes, it really is *Micrathyria hagenii* with two i's! If any other "bugs" are seen, please let me know. Thanks!

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PUBLICATIONS

REVIEW: DAMSELFLIES OF NORTH AMERICA

Minter J. Westfall, Jr., and Michael L. May
 1996, Scientific Publishers, Gainesville FL, 649 pages, 8 color plates, numerous photographic and line figures.

Reviewed by Nick Donnelly

The long-anticipated appearance of the manual to the damselflies (suborder Zygoptera) of North America has been the most important publishing event in the field of Odonata for several years. The Dragonflies (suborder Anisoptera) of North America had been similarly covered (by the late J.G. Needham and Minter Westfall Jr.) in 1955.

Forty-one years has been a long time to wait for the companion volume, but the final product has been well worth our patience.

At last odonatists in most of the U.S. have a manual which really covers our damselfly fauna. The damselflies of Canada have been covered handsomely in the first of the three-volume set of Edmund Walker (1953), but this set has been of limited use to people in the United States because of Walker's strict policy limiting coverage to Canada alone. This had the unfortunate result of leaving Canadian workers momentarily baffled when two species of *Enallagma* (*basidens* and *triviatum*) appeared unexpectedly in Ontario. Westfall and May, on the other hand, followed the wise principle

established in the earlier dragonfly volume of including the species of northern Mexico, in anticipation that they might be found in the United States. This policy recently enjoyed an unexpectedly early triumph when a collector in Arizona with limited experience with these insects found *Palaemnema*, which was the first North American occurrence of the genus and family. He ran down the genus quickly and correctly!

A very useful feature of this book and its predecessor is its coverage of the Greater Antillean Islands. Except for Cuba, where a nice book not easily obtained in the United States covers these insects, these islands are completely uncovered in the recent literature. Collectors visiting these islands now have both these manuals for Odonata identification.

In the United States literature coverage of the damselflies has been very spotty. Those of us in the Northeast have been relatively lucky, having both Walker's book (1953) and Garman's "Odonata of Connecticut" (1927). In the Midwest, Garman's "Zygoptera of Illinois" (1917) is still quite useful, if one can find a copy. For the Southeast, several of us have used C.F. Byers' "Odonata of Florida" (1930) and, of course, Sid Dunkle's excellent guide (1990). In Texas we have had Clifford Johnson's short but excellent "Damselflies of Texas" (1972). The area that has given people the most difficulty has been the West, which has a large fauna of damselflies, many of which are local species of *Argia* which are otherwise widespread in Mexico. Some of Kennedy's older papers have been of some value, but they are largely difficult to find and contain only a few of the interesting damselfly species of the West.

The book begins with an unusually thorough review of morphology, biology, behavior, and biogeography. There are lessons for all of us in these preliminary pages. For example, I was somewhat surprised to read of Dunkle's observation that tibial spines are, in fact, articulated, and should be called spurs. I am certain that the thorough coverage of this section must be required reading for all workers in the field, regardless of their experience.

The decision to follow the Comstock - Needham venation scheme may strike some workers as

unfortunate, based as it is on a tracheal derivation hypothesis that has been repeatedly rejected by later workers. In this book the terminology of three schemes (C - N, Tillyard & Fraser, Riek & Kukalova-Peck) are compared.

Phylogenetic schemes for the Odonata, which are based mainly on fossil forms, are discussed briefly, but the authors wisely avoid the temptation of delving too deeply into this contentious problem. Many references are provided so that curious readers may delve further on their own.

There is an unusually (for this sort of publication) complete summary of courtship, territoriality, feeding behavior, larval behavior, physiology, vision, flight mechanisms, and other topics, again with ample references to the literature. We waited for a long time to get a taxonomic manual and are now delighted to have a book on the biology of damselflies as well.

I found the biogeographic section especially thoughtful. One of the few conclusions that I would disagree with, however, is that the place with the highest density of species within a group is the probable place of origin of that group. The counter argument is that speciation responds more to changes in the environment of a geologic nature, such as mountain uplift, desertification, and glaciation. The comments on the Caribbean vs. Central American connections and on the possible Gondwana origins of some of the fauna seem quite realistic.

Damselfly habitats are discussed quite thoroughly, with many references to aspects not often considered by workers with these insects, such as chemical and physical requirements of the larvae.

Proceeding into the meat of the book, which is the systematic treatment of the damselfly fauna, I was impressed with the thoroughness of the literature (and collections) searched and with the disposition of many problems that exist in this group.

My only serious criticism with the book, however, is the relegation of subspecies to a lesser category of interest than they deserve in a book of this sort. Subspecies are an attempt to

define, through the only nomenclature structure available to us, variations in organisms that represent fairly recent evolution. The names themselves are an indication to the worker that there are problems which deserve our careful attention. There is no single explanation for these variations, and we could argue that a more elaborate nomenclature might be devised to do more justice to the problems.

The problem of *Lestes disjunctus* is especially troublesome. Walker, who defined the subspecies in 1952, was never satisfied with his own solution, and we should be alerted to his reservations. One possibility is that *disjunctus australis* might be a perfectly good, but somewhat cryptic, species, and it might even turn out to be closer to *forcipatus* than to *disjunctus disjunctus*. I do not suggest that this is the case, but I urge workers to keep the problems of this small complex in their minds as they pursue their studies. I think that the authors probably should have provided more guidance to the uninitiated on this problem.

The status of *Argia fumipennis* and *Enallagma traviatum* subspecies seem to be more "traditional" with plausible geographic separation of subspecies. The first species is divided on color (body and wings) and the second on structure (also color in the extreme end of the range). I feel that the book should have done a bit more in describing the distinctions among these subspecies, if only to flag the on-going interesting problems they represent.

The status of *Enallagma cyathigerum* and *vernale* is especially bothersome, as the authors note. The idea of ecological subspecies seems somehow implausible, and recent work with mitochondrial DNA may well show that the phylogenetic relationships are more complicated than suspected. There is little guidance to the reader on the essence of the problem and few criteria to distinguish these taxa.

In some other species there is variation that may not present a taxonomic problem but might merit further study. The variation of the maculation of *Hetaerina americana* in the United States, especially in the West, is striking, ranging from wings nearly a third red to wings with tiny red basal spots. Oddly, from northern

Mexico to Nicaragua, there is virtually no variation! This might be an interesting topic for future study, but this variation is not described here. Also, the variations in *H. titia*, which were once unwisely used to distinguish the species "*tricolor*", have a strong temporal basis in eastern Texas (early Spring and late Fall insects have paler wings), which is not mentioned here.

The actual descriptions of the species are quite thorough and include many references to behavioral and other non-taxonomic studies which are not traditionally included in manuals. I have a minor criticism of these accounts. The first is that there is no tabulation at the beginning of each account of the figures which pertain to the species, forcing to reader to leaf through the pages to see where the figures might be. The male terminal appendages of most, but not all, species are figured.

The keys are thorough (at least those that I have checked) and admirably accurate, often with characters that had not occurred to me. However, they are not "user friendly". The beginner will not have an easy time, for example, with the key to species of *Argia*. With persistence, and a good microscope, even a beginner in the group can probably place all specimens accurately.

However, the complexity of these traditional dichotomous keys forces the question as to whether there is a better way. Pinhey addressed the problem with his work on African *Pseudagrion* (a similarly large and complex damselfly genus), by providing both a "structural key" and a "simplified key". I suspect that he has been blessed more than once by novice workers for this device. Another approach now used in botanical works is the "random access key". Not all of these are computer based; the device can be used with paper and pencil. The difference is that it allows the user to follow multiple paths to the goal, rather than follow a single path. Also, the authors do not use the character tables which were a feature of the dragonfly book. I find these tables very useful, if only because they include data which is otherwise lost to the user. A key is constructed from such a table, and in its construction, unused information is simply discarded for each species when it is finally

named. The character table retains all this data, some of which may be of considerable value to the user.

My final comment concerns the illustrations. The pale reproduction of the excellent larval illustrations is somewhat bothersome and may well prevent their being xeroxed, but these drawings are masterful and very useful. The stipple drawings of mesostigmal laminae, structures of the prothorax, and other morphological features are especially useful. I wish the artists had been individually identified!

The (often retouched) photographs of the male terminalia were not as successful in this manual as were their counterparts in the dragonfly manual. Many are too dark, and important features are in many cases lost in the darkness. Many of the SEM photos did not reproduce well here. In some critical cases, these photos will not be completely helpful to the user.

There are 32 color photos in the text and two additional on the front and back cover. Almost all genera are shown, and the reproduction of these photos is excellent.

In summary, there are only a few drawbacks in this magnificent work. Experienced workers in the field will learn many things about the insects they think they have already mastered. Beginning Odonata workers will finally be able to identify damselflies, with those in the West especially thankful for having, really for the first time, a reference on this fauna. Even, those of in the North, accustomed as we are to Walker's excellent 1953 book, will probably find that we use this book more. Finally, this book will be essential to non-Odonatists that need a reference to this suborder. Because of its careful and thorough attention to larvae, these users will include aquatic ecologists as well as entomologists.

Do you need a copy of this book? Regardless of where you fit yourself in the above categories, the answer is a ringing, "YES". Sometimes great books are not fully appreciated at the time of publication, when they are easy to purchase. We all know how hard we have searched for copies of Needham and Westfall. At some future time the question will be, "I really need

Westfall and May. Do you know where I can find a copy?"

=====

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BOOK ON MEXICAN BIODIVERSITY

Rosser Garrison

I just received a copy of the following book from Enrique (via George Harp): Llorente Bousquets,

Jorge, Alfonso N. Garcia Aldrete, and Enrique Gonzalez (eds.). 1996. **Biodiversidad, taxonomía y biogeografía de artrópodos de México: hacía una síntesis de su conocimiento.** Universidad Nacional Autonoma de México. xvi + 660pp. This is a truly outstanding book with a great chapter on the status of the Odonata by Enrique and Rodolfo Novelo. I cited this chapter in my last *Argia fissa* group paper. This is one volume you should all want to get, but, unfortunately, I do not know its cost.

NEW ISSUES OF THE BULLETIN OF AMERICAN ODONATOLOGY

AN ANNOTATED LIST OF THE ODONATA OF NEW JERSEY

With an Appendix on Nomenclature in the Genus *Gomphus*

Michael L. May & Frank L. Carle 4(1): 1 - 35

THE ODONATA OF PATUXENT WILDLIFE RESEARCH CENTER AND VICINITY

Richard L. Orr 4(2): 37 - 67

These will be distributed to subscribers to Volume 4 of the Bulletin of American Odonatology.

E-MAIL list as of 12 Oct 1996

Note that many e-mail addresses have changed since the last list, especially ".edu" addresses.

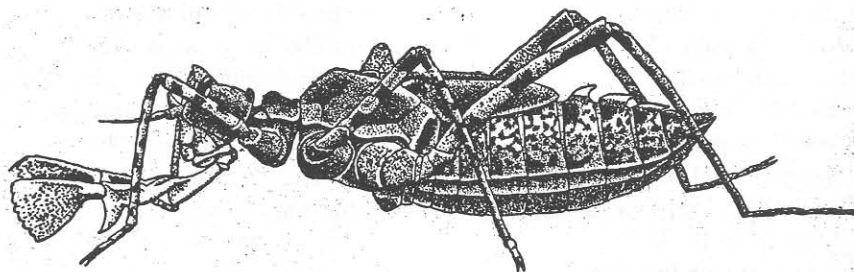
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Macromia magnifica, larva, from Kennedy, C.H. 1915, Dragonflies of Washington and Oregon, Proc. of the United States National Museum 49: 259-345

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