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The Dragonfly Society Of The Americas

Business address: c/o John Abbott, Section of Integrative Biology, C0930, University of Texas, Austin TX, USA 78712

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Journals Published By The Society

ARGIA, the quarterly news journal of the DSA, is devoted to non-technical papers and news items relating to nearly every aspect of the study of Odonata and the people who are interested in them. The editor especially welcomes reports of studies in progress, news of forthcoming meetings, commentaries on species, habitat conservation, noteworthy occurrences, personal news items, accounts of meetings and collecting trips, and reviews of technical and non-technical publications. Membership in DSA includes a subscription to **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.

Membership in the Dragonfly Society of the Americas

Membership in the DSA is open to any person in any country and includes a subscription to **ARGIA**. Dues for individuals in the US, Canada, or Latin America are \$20 US for regular membership and \$25 US for institutions or contributing membership, payable annually on or before 1 March of membership year. Dues for members in the Old World are \$30 US. The **Bulletin Of American Odonatology** is available by a separate subscription at \$20 US for North Americans and \$25 US for non-North Americans and institutions. Membership dues and BAO subscription fees should be mailed to Jerrell Daigle, 2067 Little River Lane, Tallahassee, FL, USA 32311

ARGIA and BAO Submission Guidelines

Digital submissions of all materials (via e-mail or CD) are much preferred to hardcopy. All articles and notes should be submitted in Word or Rich Text Format, without any figures or tables embedded. Only minimal formatting to facilitate review is needed. Photographs should be submitted as TIFF (preferred) or JPEG files with a minimum of 300 ppi at the intended print size. Charts, graphs, diagrams, and other vector graphics are best submitted in Illustrator format or EPS. If this is not possible, submit as PNG or TIFF at a minimum of 600 ppi at the intended print size. Charts and graphs may also be submitted in Excel documents. Tables may be submitted as Word or Excel documents. For more information see the entire guidelines at the end of this issue or visit <www.odonatacentral.com/dsa1/submission_guidelines.htm>. **ARGIA** submissions should be sent to John Abbott, Section of Integrative Biology, C0930, University of Texas, Austin TX, USA 78712, <jcabbott@mail.utexas.edu>; BAO submissions should be sent to Ken Tennessen, P.O. Box 585, Wautoma, WI, USA 54982, <ktennessen@centurytel.net>.

Front cover: *Palaemnema domina* (Desert Shadowdamsel) at Bonita Creek, near the Gila River in Graham Co., Arizona, 1 Aug 2007. Photo by Jim Johnson.

In This Issue

We start off this issue with the good news that Duncan Cuyler, who fell and broke his hip a couple of months ago, has had successful hip replacement surgery. He is up and walking around with the aid of walker. We wish Duncan a very rapid recovery and hope to see him at the 2008 annual meeting in Oregon. Speaking of annual meetings, Bryan Pfeiffer recounts the success of the 2007 meeting in Springerville. As is evident by the images on both covers of this issue, this meeting resulted in lots of beautiful photography of southwestern species. Giff Beaton also tells about the fun had by participants at the Southeastern Regional Meeting held in Bainbridge, Georgia this year.

There are several notes pertaining to DSA business in this issue. Steve Valley provides the annual meeting minutes and Dennis Paulson provides some important decisions made by the DSA Checklist Committee. I provide some updates on the 2008 DSA membership dues and some recent changes to the Executive Council. I'm also happy to announce the new version of OdonataCentral (<http://www.odonatacentral.org>) is now up and running. I appreciate everyone's patience as it took longer than expected to get the new site up, but it is finally live.

David Chelmick tells about his explorations in Florida, comparing them to his "desert" fauna in England. François Meurgey recounts his 2007 trip to Guadeloupe including a hair raising 100 m drop down into the crater of La Cit-erne. Meurgey also provides a convincing story as to the true type locality for *Argia concinna*.

Tony Gallucci provides numerous observations of *Macrothemis inequiunguis* (Jade-striped Sylph) in Texas. I have always considered this species rare in Texas, but several seemingly viable populations have been discovered this year. Several subtropical species including *M. inequiunguis*, *Orthemis discolor* (Carmine Skimmer) and *Rhionaeschna psilus* (Turquoise-tipped Darner) seem to be expanding their range.

Robert Larsen discusses observations of *Lestes alacer* (Plateau Spreadwing) that he has made in southeastern New Mexico.

William Nichols and Jenna McAdoo provide a brief account of the summer activity they found at Oswegatchie River in New York. Not only did they generate a nice list of species for the river, but they had fun educating many camp-goers along the way. Wade Worthen and Christopher Jones are surveying the odonates at preserves located in Greenville County, South Carolina.

Mike May provides part two of his discussion on Odonata phylogeny. This time he lists the different phylogenies that have been put forth and provides a critique of each detailing the differences. Though there are still disagreements and many groups to sort out, it does appear we are getting closer and closer to a consensus about the higher relationships of odonates.

There are a number of new records reported in this issue. Robert Harding reports the first finding of *Lanthus parvulus* (Southern Pygmy Clubtail) in Canada. Doug Danforth and Rich Bailowitz discovered *Macrothemis pseudimitans* (White-tailed Sylph) in Arizona, a first record for the US. Rich also tells us of his discovery of *Tholymis citrina* (Evening Skimmer) in Arizona. Arizona is quickly becoming the odonate Mecca of the western US.

Edwin and Lisa Keppner, along with Jerrell Daigle document the expansion of *Nehalennia pallidula* (Everglades Sprite) into Bay County, Florida. Bob Behrstock, Marion Dobbs, Sid Dunkle, and Mike Overton provide 24 new state records for northeastern Mexico.

John Avise reports *Rhionaeschna psilus* (Turquoise-tipped Darner) for the first time in California, right on the heels of Dennis Paulson's record from Baja California Sur, Mexico in the last issue of ARGIA. This species may be one to keep an eye out for in the southern part of the US. This year I

Calendar of Upcoming Events

For additional information, see <<http://www.odonatacentral.com/dsa1/meetings.htm>>.

Event	Date	Location	Contact
DSA SE Regional Meeting	8–11 May	Cheraw, South Carolina	Jerrell Daigle < jdaigle@netally.com >
Dragonfly Days	15–18 May	Weslaco, Texas	Jennifer Owen < jennifer.owen@tpwd.state.tx.us > 

found it in west Texas and the field station where I work right here in Austin, and as this issue goes to print, I got a report from Jerry Hatfield of its discovery in the Texas Panhandle. It seems to be steadily moving north.

Finally, Natalia von Ellenrieder and Rosser Garrison's new book, *Dragonflies of the Yungas* is reviewed and I briefly

note two other newly published books. I've also included the abstracts of two recent research articles, one on the taxonomy of *Sympetrum* and the other on the functionality of dragonfly flight. I believe both will be of interest to the ARGIA readership. 

2007 Annual DSA Meeting in Eastern Arizona

Bryan Pfeiffer <bryan@wingsenvironmental.com>

The San Francisco River carves a pleasant, narrow notch in the Colorado Plateau at the Arizona–New Mexico border. It was here, beneath a glade of juniper and pinyon pine, that a small group of odonatists, first to arrive for the DSA annual meeting, found themselves lacking dragonflies.

But it didn't really matter. Feet were wet and spirits high. Lively conversation and lofty anticipation for the meeting had replaced the sunshine. Then Paul Bedell, from Richmond, Virginia, who had wandered off upstream somewhere, appeared with a grin and a bug. It was a male *Ophiogomphus arizonicus* (Arizona Snaketail), dazzling with blue eyes, lime thorax and yellow-marked abdomen. This was arguably the meeting's signature dragonfly. So Paul's catch marked an unofficial kickoff to what went on to become an enjoyable and productive 2007 DSA annual gathering in eastern Arizona.

Fear not Arizona in August. Our base in Springerville (6,974 feet above sea level) was a perch on the Colorado Plateau, those elevated layers of mostly sedimentary rock

that managed to remain horizontal, without much faulting and folding, over the past 600 million years. (One of its remunerations is the Grand Canyon.) Beckoning us were mountain streams and major rivers (we weren't far from the headwaters of the Little Colorado River), a few sluggish fen-like flowages, and scattered ponds, some with barren rocky shorelines and others with emergent plants and plenty of odes.

Warning to readers: This is approximately the point in a DSA meeting account where the writer, noting rainfall or lack thereof, makes the obligatory reference to the "Donnelly Effect"—the hypothesis that Nick Donnelly's attendance at any DSA gathering brings on such copious rainfall that attendees consider packing an ark along with their acetone. As it turned out, Nick and Ailsa did not attend this meeting. Yet it poured every single day, even during the post-trip. Note, however, that Jerrell J. Daigle did indeed attend. (A competing theory is known as the "Daigle Effect.")



Photo by Bryan Pfeiffer.



Photo by Bryan Pfeiffer.

This was, after all, Arizona's monsoon season. We were haunted daily by roving bands of thunderstorms. Nevertheless, during the main event and post-trip (near Safford, Arizona), from 27 July to 2 August, we encountered a total of 77 odonate species, 12 of which were *Argia*.

Some of the big news included a first state record—*Cordulegaster dorsalis* (Pacific Spiketail), which landed in the net of more than one participant, first on 29 July. It was later determined, when trying to assign credit for the catch, that Cary Kerst landed Arizona's first *C. dorsalis* only minutes before Mary Jane Krotzer and Jim Johnson got theirs and about an hour before Dan Bogar got his at another site. This was an impressive insect, to be sure. But, of course, there were many others.

Anax walsinghami (Giant Darner) caused more than a few hearts to pound faster. Those of us deprived of *Erpetogomphus* (Ringtails) at home could enjoy up to three members of this impressive genus. And during the post trip the elegant and somewhat odd *Palaemnema domina* (Desert Shadowdamsel) offered many northerners a new odonate family—the Platystictidae. And, of course, all those *Argia*! It was an orgy of *Argia* (an Orgia).

More on the odes later. First, a milestone and some praise. This gathering of 35 attendees marked yet another peaceful transfer of power at the DSA. During the business meeting on 28 July our president, Steve Krotzer, handed over DSA's leadership to John Abbott, who also serves as ARGIA editor and OdonataCentral webmaster. Steve was a diligent, astute and effective DSA leader. Our gratitude extends not only to Steve but to Mary Jane Krotzer as well for her active and enduring support for the DSA. And for this particular annual meeting participants owe many thanks to chief organizer (and rainmaker) Jerrell J. Daigle.

But also of critical importance to this gathering were Rich Bailowitz and Doug Danforth, who were a fountainhead of Arizona wisdom and natural history.

A roster of engaging speakers justified our day indoors. Mike May (filling in for Jessica Ware) presented some of her work exploring wing venation as a determiner for perchers versus flyers in odonate species. Mike also presented findings on radio-tagging of migrating *Anax junius* (Common Green Darner) and *Cordulegaster erronea* (Tiger Spiketail) as well as some thoughts on the taxonomy of *Epithea* (Baskettails). The intrepid Jerrell displayed some nice images of *Orthemis schmidtii* and *O. macrostigma* along with some Guadeloupe photos. Pam Hunt presented on her haul of odonate exuviae, resulting in various significant discoveries, from major rivers in New Hampshire. Dennis Paulson offered insights into Zygoptera foraging behavior (based in part on how closed wings are held either above or in line with the abdomen when the damselfly is perched) and shock-and-awe photos from his most recent expedition to southern Africa. Afterwards, we browsed the back tables for Kathy and Dave Biggs' dragonfly books and coloring books plus other literature, books, reprints, and even dragonfly pottery by April Baisan and Mike McGarry.

For this meeting, we often found ourselves on National Forest land and in no need of collecting permits. On the occasions we visited a Native American reservation, permits were readily available on the spot for a nominal fee.

DSA members who have never attended an annual or regional meeting are missing out on opportunity, inspiration, education and unadulterated enjoyment. We are an amicable group, with a healthy mix of collectors, photographers, academics, historical figures, and casual observ-

ers. (A smattering of images from Arizona are at <www.wingsphotography.com/dsa-az.html>.)

Now onward to Oregon. The 2008 annual meeting, to be hosted by Steve Valley and Jim Johnson, is tentatively set for the first weekend of August in Bend, Oregon (near the central Cascades), where *Gomphus lynnae* (Columbia Clubtail) flies on the John Day River, and a post-meeting trip farther south may present, among others, *Aeshna walkeri* (Walker's Darner) and *Ophiogomphus morrisoni* (Great Basin Snaketail). Watch this space for details.

Below is a (more-or-less) complete list of species encountered during the main meeting around Springerville (Apache County) and the post-trip in Safford (Graham County). This list does not include other species—such as *Archilestes californicus* and *Argia extranea*, encountered by individuals on post-post-trip excursions, including forays into Sycamore Canyon and California Gulch along the Mexican border.

Hetaerina americana, American Rubyspot
Hetaerina vulnerata, Canyon Rubyspot
Archilestes grandis, Great Spreadwing
Lestes alacer, Plateau Spreadwing
Lestes disjunctus, Northern Spreadwing
Palaemnema domina, Desert Shadowdamsel
Amphiagrion abbreviatum, Western Red Damsel
Apanisagrion lais, Black-and-white Damsel
Argia alberta, Paiute Dancer
Argia hinei, Lavender Dancer
Argia immunda, Kiowa Dancer
Argia lugens, Sooty Dancer
Argia moesta, Powdered Dancer
Argia nahuana, Aztec Dancer
Argia oenea, Fiery-eyed Dancer
Argia pallens, Amethyst Dancer
Argia plana, Springwater Dancer
Argia sedula, Blue-ringed Dancer
Argia tonto, Tonto Dancer
Argia translata, Dusky Dancer
Enallagma annexum, Northern Bluet
Enallagma basidens, Double-striped Bluet
Enallagma boreale, Boreal Bluet
Enallagma carunculatum, Tule Bluet
Enallagma civile, Familiar Bluet
Enallagma praevarum, Arroyo Bluet
Hesperagrion heterodoxum, Painted Damsel
Ischnura cervula, Pacific Forktail
Ischnura damula, Plains Forktail
Ischnura demorsa, Mexican Forktail
Telebasis salva, Desert Firetail
Aeshna interrupta, Variable Darner
Aeshna palmata, Paddle-tailed Darner

Anax junius, Common Green Darner
Anax walsinghami, Giant Darner
Oplonaeschna armata, Riffle Darner
Rhionaeschna dugesi, Arroyo Darner
Rhionaeschna multicolor, Blue-eyed Darner
Erpetogomphus compositus, White-belted Ringtail
Erpetogomphus heterodon, Dashed Ringtail
Erpetogomphus lampropeltis, Serpent Ringtail
Ophiogomphus arizonicus, Arizona Snaketail
Progomphus borealis, Gray Sanddragon
Cordulegaster diadema, Apache Spiketail
Cordulegaster dorsalis, Pacific Spiketail
Macromia magnifica, Western River Cruiser
Brachymesia furcata, Red-tailed Pennant
Brachymesia gravida, Four-spotted Pennant
Brechmorhoga mendax, Pale-faced Clubskimmer
Dythemis fugax, Checkered Setwing
Dythemis nigrescens, Black Setwing
Dythemis velox, Swift Setwing
Erythemis collocata, Western Pondhawk
Erythrodiplax basifusca, Plateau Dragonlet
Libellula comanche, Comanche Skimmer
Libellula croceipennis, Neon Skimmer
Libellula forensis, Eight-spotted Skimmer
Libellula luctuosa, Widow Skimmer
Libellula nodisticta, Hoary Skimmer
Libellula quadrimaculata, Four-spotted Skimmer
Libellula saturata, Flame Skimmer
Plathemis lydia, Common Whitetail
Plathemis subornata, Desert Whitetail
Macrodiplax balteata, Marl Pennant
Orthemis ferruginea, Roseate Skimmer
Pachydiplax longipennis, Blue Dasher
Paltorthemis lineatipes, Red Rock Skimmer
Pantala flavescens, Wandering Glider
Pantala hymenaea, Spot-winged Glider
Perithemis tenera, Eastern Amberwing
Pseudoleon superbus, Filigree Skimmer
Sympetrum corruptum, Variegated Meadowhawk
Sympetrum danae, Black Meadowhawk
Sympetrum occidentale, Western Meadowhawk
Sympetrum pallipes, Striped Meadowhawk
Tramea lacerata, Black Saddlebags
Tramea onusta, Red Saddlebags



Minutes of the 2007 Annual Meeting of the Dragonfly Society of the Americas

Steve Valley, DSA Secretary <svalley2@comcast.net>

The annual meeting of the Dragonfly Society of the Americas was held on Saturday, 28 July, 2007, at the Round Valley School District Boardroom in Springerville, Arizona, with President Steve Krotzer presiding.

Reading of the 2006 Annual Meeting Minutes was waived and the minutes were approved as published in ARGIA Vol. 18 No. 4.

Introductions and the welcoming statement were made by Steve Krotzer.

Attending members introduced themselves. There were 35 participants at the 2007 DSA meeting:

Steve Valley and Cary Kerst from Oregon
Jim Johnson and Dennis Paulson from Washington
Sid Dunkle, Doug Danforth, Rich Bailowitz, Barry Blust
(Safford only), Bob Behrstock, Mike McGarry, and
April Baisan from Arizona
Steve and Marcia Hummel from Iowa
Ken Tennessen from Wisconsin
George and Phoebe Harp from Arkansas
David Halstead from Saskatchewan, Canada
Yvette Liautaud, and Kathy Kozacky from Illinois
Paul Bedell from Virginia
Jerrell J. Daigle from Florida
Steve and Mary Jane Krotzer from Alabama
Mike Blust and Brian Pfeiffer from Vermont
Nancy Rideout and Pam Hunt from New Hampshire
David Allan Fitch from Massachusetts
Dan Bogar from Pennsylvania
Roy Beckemeyer from Kansas
Kathy and Dave Biggs from California
Ed Lam from New York
Mike May and Jeremy Huff from New Jersey.

Steve Krotzer announced that Bill Mauffray was elected President-Elect and Natalia von Ellenrieder was elected as a Regular Member.

Treasurer's Report: We began the 2007 year with a balance forward of \$11,288.94. Our current balance is \$17,450.64. Our projected year-end balance should be about \$12,000. At this time, we have 388 DSA members. In 2008, we will file a 990 Tax Exempt Form online. Our 8734 Non-Profit Organization status report has apparently been upheld by the IRS. A final year-end report will be presented in ARGIA later.

Steve Valley and Jim Johnson proposed that the 2008 annual meeting be held in western Oregon. The proposal was voted on and carried.

There was a discussion of future annual meetings, and the 2008 NE and SE regional meetings.

Jerrell J. Daigle gave a brief report for the International Odonata Research Institute.

There was a brief discussion of editorship of ARGIA and Bulletin of American Odonatology (BAO). John Abbott has assumed the position of Editor in Chief and editorship of ARGIA and Ken Tennessen has assumed editorship of BAO. Jim Johnson will continue to assist as associate editor and doing the layouts.

Dennis Paulson reported on the formation of the new Checklist Committee.

Jim Johnson gave a brief OdonataCentral update.

Bryan Pfeffer took the group photo during the break.

Nick and Ailsa Donnelly and Duncan Cuyler were voted honorary lifetime members for their service to DSA and the Odonata community.

Mary Jane Krotzer presided over the presentations, and the meeting was adjourned afterwards.

Jerrell J. Daigle passed out the meeting buttons.



2007 Southeastern Regional DSA Meeting Summary

Giff Beaton <giffbeaton@mindspring.com>

Participants at the Southeastern Regional DSA meeting in Bainbridge, Georgia, had been promised hot weather and by golly that's what they got! With afternoon temperatures in the mid to high 90s, the activity sometimes waned even if the camaraderie and witty banter did not. As long as you consider discussing eye color to separate subspecies of spiketails witty...

Though the meeting did not officially begin until Thursday evening, several participants showed up Wednesday night or early Thursday, so a few of us set off to do some last minute scouting in this semi-remote and poorly surveyed part of the state on Thursday. We mostly succeeded in eliminating one whole side of Lake Seminole as utterly depauperate in terms of odonate numbers or even habitat. Fortunately, the other (south) side had a few tantalizing streams, so we planned on working there on Friday. After most people arrived Thursday afternoon, the first event was the requisite Mexican dinner. After a nice meal and a couple of cervezas (for non-drivers), the entire group headed out to a small stream and several nearby dirt roads to look for *Somatochlora* before dark, but without success. We did find a few species, including a pair of *Stylurus laurae* (Laura's Clubtail) in wheel, but utterly missed catching them. This sort of became a theme. However, with the help of Gayle Strickland's big light, we did learn how to catch *Boyeria* (Fawn Darners) at night...

After a continental breakfast at the hotel, which not surprisingly was not as complete as advertised, we headed out in two groups to survey two very nice sandy streams

in Decatur County, just a couple miles from the Florida state line. While the hoped-for *Somatochlora*s and *Stylurus* did not materialize this cloudy morning, we did find a few darners and clubtails (including *Gomphus dilatatus* [Blackwater Clubtail]). All of the streams in the area are very low due to a drought of historical proportions, but this did have the one nice benefit of few biting insects. One small streamlet produced the always-popular *Cordulegaster obliqua* (Arrowhead Spiketail). We met for lunch and to share our meager finds, and then both groups combined to go to a stream one group had found at the end of the morning. We had a nice afternoon there, with some surprising finds like *Aphylla williamsoni* (Two-striped Forceptail) and a male *Nasiaeschna pentacantha* (Cyrano Darner) that refused to cooperate with photographers. It was willing to pose nicely but with his abdomen bent into a huge "S." Late in the afternoon a female *Stylurus laurae* flew slowly downstream and perched right in front of a couple of us and was just as badly missed as the pair the previous night. A Scarlet Snake found near the stream proved to be a willing subject for the photographers present. On the recommendation of one member of the group who will not be named, we went next door to our hotel for one of the poorest meals imaginable but had a nice evening afterward with tall tales and story swapping by the pool, which was nice after a very hot day.

Saturday morning we all headed out to a wonderful TNC preserve up in Early County, next to the Chattahoochee River and Alabama state line, home of some recently found southern *Ophiogomphus* of so far unknown species. The

morning was cloudy again, but we worked the two small streams here hard and all the nearby open areas for several hours. We ended up with about 30 species of odonates, and the big hits were *Dromogomphus armatus* (Southeastern Spinylegs) and more *Cordulegaster obliqua*. While this population is thought to be the more southern subspecies *C. o. fasciata*, it was interesting to note that individuals from the same stream had different eye color, ranging from green to blue-green. More importantly, we actually found a couple of *Somatochlora*s, including the farthest south population of *S. tenebrosa* (Clamp-tipped Emerald) for Georgia (a few have been found just south of here in Florida). We left this great spot for lunch at a local southern buffet restaurant, where the out of towners got to try "hoe cakes" for the



Photo by Giff Beaton.

first time and vast quantities of liquids were consumed to try to combat the heat and humidity. Next was Kolo-moki Mounds State Park, also in Early County, where we worked a couple of lakes for the remainder of the afternoon. Photographers and collectors worked this area pretty well, but we didn't find anything of note. One of the non-odonate highlights was good numbers of the impressive robber fly *Mallophora orcina*. We all made it back to Bainbridge and after both losing and finding Jerrell and Duncan, we enjoyed another good Mexican dinner.

Many of the 12 participants were heading out Sunday, so the group started to split up under really dark skies and intermittent rain. A small group drove over to Seminole

County (back to the Chattahoochee and Alabama border) to check out a new property with friendly owners. Friendly is an understatement, as we had a great lunch laid out and a guided tour driving Mules. We only found more of the same species we had already found, but had a great time, and then everyone either headed back to their homes (Georgia, Florida, Alabama, Louisiana, North Carolina, and Massachusetts) or off to work on other regional spots (New York and Washington participants). Everyone seemed to have a good time, which is what counts, and we are already looking forward to next year's SE Meeting in South Carolina! We ended up with 58 species for the meeting—not bad for mid-summer in the deep south.



Changes to DSA Membership and Executive Council

John C. Abbott, President of DSA, Austin, Texas <jcabbott@mail.utexas.edu>

Rob Cannings has served as the Canadian Vice President for DSA since the founding of the society in 1989. He has asked to step down after serving the society for nearly 20 years. Rob has done a fantastic job as Vice President, but felt like it was time to have someone else take over this post. As dictated within the DSA bylaws, I am temporarily appointing Colin Jones (Lakefield, Ontario) to fill this post. The position will come up for election during our next official voting period in 2009. We welcome Colin to the DSA Executive Council.

The DSA Executive Council has made some changes to the membership dues structure. Starting with 2008, the default membership will include the digital version

of ARGIA available through <www.OdonataCentral.org>. This will come at the reduced rate of \$15. You can, however, still elect to receive ARGIA in hardcopy. In this digital age, the Executive Council, felt it was time to offer the membership this option. The Bulletin of American Odonatology (BAO) will remain a printed journal, but will also be available digitally through OdonataCentral to current subscribers.

The 2008 Membership Dues and Fee structure can be viewed at <http://www.odonatacentral.org/index.php/PageAction.get/name/DSA_Membership>. It's not too early to renew your membership.



DSA Annual Meetings Update

Jerrell J. Daigle <jdaigle@nettally.com>

There have been some changes in the DSA Annual Meeting Coordinators assemblage. First of all, I want to thank Tim Cashatt, Nick Donnelly, Rosser Garrison, and Steve Valley for all of their hard work over the years! Recently, Nick and Rosser have decided to pass the baton to others. Bryan Pfeffer and John Abbott will be the new NE and SW regional coordinators, respectively.

If you would like to host an annual DSA meeting in the future, please contact me or one of the regional coordinators and let us know of your proposal. Next year's meeting will be in Oregon, and there is a solid proposal for Missouri in 2009. If you have any questions, please let me know. Thanks!



2008 DSA SE Regional Meeting

Jerrell J. Daigle <jdaigle@nettally.com>

The 2008 DSA SE Regional Meeting will be held in Cheraw, South Carolina from 8–11 May. I have reserved a block of ten rooms at the Inn Cheraw. Call 1-800-535-8709 and ask for Roger and mention my name or DSA group to reserve. For more information, please contact me or call me at 850-878-8787.



Recent Decisions of the DSA Checklist Committee*

Dennis Paulson, 1724 NE 98 St., Seattle, WA <dennispaulson@comcast.net>

The DSA Checklist Committee* met during the 2007 meeting in Springerville, Arizona, and at that meeting and during subsequent e-mail exchanges, made decisions that affect species-level taxonomy and common names of a few species.

Enallagma cardenium, Purple Bluet. ***E. coecum***, Antillean Bluet. Although Dunkle (1990) and Westfall & May (1996) listed *Enallagma cardenium* as a synonym (or subspecies) of *E. coecum*, Daigle & McPeck (2007) argued for their separation based on differences in the cytochrome oxidase gene, color pattern, and morphology of the male cerci. Thus we recognize *cardenium* as a species restricted to Cuba and Florida, barely entering Alabama and Georgia. It is therefore necessary to establish common names for both species. The name Purple Bluet is to be used for *E. cardenium*. *E. coecum*, now restricted to the West Indies other than Cuba, is to be called Antillean Bluet.

Enallagma eiseni, Baja Bluet. This species was first recorded from the US by Kappes & Kappes (2006) in southern Arizona. No common name was applied. Bledsoe (2007) then reported it from California, with the common name Baja Bluet, suggested unofficially by Paulson. The committee subsequently decided to assign that name to the species as a more concise and alliterative form of the alternative Baja California Bluet, stemming from the common convention of calling Baja California “Baja.”

Macrothemis pseudimitans, White-tailed Sylph. Recently added to the US list by Rich Bailowitz and Doug Danforth, the species was called Wide-tipped Sylph in Needham, Westfall, & May (2000), but the convention for coining common names has been that “tipped” really refers to the tip of the abdomen, and “tailed” refers to the abdomen itself, and it is the club on segments 7–9 that is wide in this species. But two other North American *Macrothemis*, *M. imitans* (Ivory-striped Sylph) and *M. inequiunguis* (Jade-striped Sylph), both have well-developed abdominal clubs and are thus also “wide-tailed.” Uniquely, mature males of *M. pseudimitans* usually (but not always) develop extensive white pruinosity on the club as well as on the unwidened segment 6, and the name White-tailed refers to this characteristic.

Sympetrum semicinctum, Band-winged Meadowhawk. Western populations have been considered a separate species, *S. occidentale* (Western Meadowhawk), since Walker

(1951) distinguished them from the eastern *S. semicinctum*. Although no published work presented evidence for combining the two species, some North American workers have questioned the separation, and Dunkle (2000), Donnelly (2004), and Abbott (2005) did not recognize *occidentale* as distinct. Finally, Pilgrim & von Dohlen (2007) presented evidence that populations of *semicinctum* and *occidentale* were identical at two genetic loci and that the morphological characters that had been used to distinguish the two species overlapped. They further stated that the subspecies that had been recognized for western populations were not worthy of formal recognition because of much overlap in characters. It should be added, however, that populations that have been considered *semicinctum*, *occidentale*, *californicum*, and *fasciatum* do in fact possess distinctive characteristics and point to an interesting example of geographic variation in a widespread and common species. This information should not be lost by the suppression of the names.

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The New OdonataCentral is Now Live

John C. Abbott, The University of Texas at Austin, Austin, Texas <jcabbott@mail.utexas.edu>

At long last the new OdonataCentral is now up and running. It can be reached by any of the following URLs : <www.odonatacentral.org>, <www.odonatacentral.net>, <www.odonatacentral.com>.

Please note that if you linked to the old site using <http://odonatacentral.bfl.utexas.edu> the link will most likely be broken. We are working on redirections from this domain, but they may not be possible.

The site has been completely overhauled and now uses PHP with Oracle as its database backbone. This provides for a much more efficient navigation and delivery of information.

Some of the major improvements and additions to look for include, but are not limited to:

- (1) A visual redesign
- (2) MyOC. This feature allows users to login and use customized interfaces. Much like MyAmazon or MyeBay, the site remembers you and keeps track of favorite locations and will allow you to easily track your record submissions, or if you are a Record Administrator, manage the records in your area. We plan to implement much more with this, including a set of preferences that will allow you to choose scientific, common or both names to be used throughout the site.
- (3) The site is now worldwide. The interfaces will allow for the addition of records from anywhere. Features such as checklists, field guides, and the map distribution viewer are no longer limited in scope (just in the underlying records!).
- (4) MyRecords interface is now much improved in terms of tracking and submitting. Submitted Records are automatically plotted and seen by all, but tagged as “Pending” until they are vetted. Users can change their records at

any time as long as it is still pending. A batch submission process has also been developed.

(5) Odonata Distribution Viewer—this has been completely overhauled. We are still using GoogleMaps and GoogleEarth as our engine, but a completely new application (like none I have seen) has been developed. You can search by taxa or geographic area. It is world-wide in scope. You can select to view Google Maps or Satellite and choose to overlay (transparently or opaquely) US county boundaries on the map. We are still facing speed issues with this, but to overcome much of that, we have implemented a “clustering” mechanism. Basically, at broad zoom levels where there is a lot of data, data is clustered instead of showing individual points. You wouldn’t be able to discern the points anyway, so this helps speed things up. We are still looking at additional ways to improve speed with this resource. Records are indicated as clusters or points and pending or accepted. You can filter by the latter to increase data integrity. We are also now plotting data at their actual localities. Dot Map data (indicated as blue dots on the map) is plotted at county centers, but all other data is plotted at the actual lat/long of collection. This will allow users to generate checklists and seasonality histograms for specific areas. You can also link to a specific species/geographic distribution and include them on your own web pages.

(6) Because OC has gone world-wide, we are now hosting a world catalog. This is derived from several sources, but primarily from the Schorr et al. list. I have integrated Rosser Garrison’s New World list into this however, and have always defaulted to his list when there are discrepancies. As a result, you can now view/search either the World or New World catalogs.

(7) I’ve added a “Resources” tab that will eventually contain all sorts of useful information. For now, there are subtabs that include the Taxonomic Catalogs, OC Membership Directory, Taxonomic Notes, bibliography and Odonata links.

(8) There is now a tab for “Publications.” You can search and view the DSA publications ARGIA and Bulletin of American Odonatology. If you are a current DSA member, all of these publications will be available to you. If you are not a member, then you will not be able to view the latest three years of ARGIA or three volumes of BAO.

(9) I have also added a tab for “Societies.” Presently, this has information on DSA and the Odonata Survey of Texas.

Please change links on your web pages to reflect the new URL, <<http://www.odonatacentral.org>>.

We have worked hard to make the site compatible across platforms and browsers. Note the following however: Although the site looks gorgeous in Safari, it appears that the Safari browser has an actual bug when dealing with file uploads and there may not be a solution. This has been reported by others as well, basically it just hangs sometimes when trying to upload files (which would apply to the record submission process on OdonataCentral).

I welcome comments and feedback about the new improved site. Please remember OdonataCentral is a community-based server and project. Its success depends on users like you. Thanks for looking at the new OdonataCentral! 

From a Desert Across the Pond

David Chelmick <dgc@davidchelmick.com>

I first visited Florida in the 1990s doing the “Disney” trip for my kids. I vowed to return after witnessing clouds of *Celithemis eponina* (Halloween Pennant) along the nature trail at the Royal Palm visitor centre in the Everglades. A common weed I hear you scoff. Well, I live in Bristol, England. It’s a dragonfly desert with fewer than 40 species. We have no pattern-winged darters and this sight was, to me, a dragonfly spectacular. I was hooked on Florida, and since 2000 I have been coming back, often twice a year.

Trips on your own can be dull. My wife likes deserts and mountains. Not much for her in Florida, so I thank Bryan Pickess, Pete Mitchell, Anthony Winchester, and John Luck who have all put up with me on trips. They are all birders and now enthusiasts for Florida dragonflies.

Early trips were to south Florida and the Everglades, partly for the dragonflies, but also the milk shakes. Near the entrance to the national park there is a shop that makes them so thick you need a knife and fork! Early in the year the lakes and pools are crowded with emerging *Macrodiplax balteata* (Marl Pennant), *Brachymesia gravida* (Four-spotted Pennant), and the ever present *C. eponina*. Exotic beasts such as *Idiataphe cubensis* (Metallic Pennant) appear occasionally. It is libellulid heaven with occasional *Arigomphus pallidus* (Gray-green Clubtail) for added interest. In September 2005 we went to the Keys. They were shut! Hurricanes Katrina and Rita saw to that, so we returned to the Everglades which were almost devoid of people. When we got out of the car we found out why. The mosquitoes may be small but they are vicious and in unbelievable numbers. We escaped north.

For many years, I have been studying *Macromia* (river cruisers) in Europe. In the month of June I have to get

on a plane, fly to Spain or Southern France, sit on a river bank, and wait for a break in the cold and pouring rain. One year in three, I may succeed in finding *Macromia splendens* (Splendid Cruiser), our only European species. Contrast this with Florida. Hickey Creek is a mitigation area near Fort Myers. It was the last day of a spring trip and a long way from the airport but worth the effort. From the moment we arrived a *Macromia illinoensis georgina* (Georgia River Cruiser) was cruising along the river; and then it settled! Twenty years studying *M. splendens* in Europe and I had never seen one settle, at least not in viewing distance. This was unbelievable—but it just got better! A black gomphid the size of a Buick flew past. In England we have one gomphid, *Gomphus vulgatissimus* (Common Clubtail), a small clubtail found very locally on a few rivers like the one quite close to where I live in Sussex, but this had not prepared me for *Hagenius brevistylus* (Dragonhunter). Huge, black and menacing, it became the dragonfly of the trip that year!

Of course, we have experienced failure. I tried three years running to see *Tachopteryx thoreyi* (Gray Petaltail) at a park near Gainesville. The first year it was shut. The second year the rain was so heavy you couldn’t get out of the car, and the third was the coldest spring in Florida for 50 years. To rub salt in the wound, my friend Graham Vick (another Brit) had visited this same park some years before and saw the beast flying in numbers around the car park.

It is impossible to be interested in Florida dragonflies without coming across Jerrell Daigle. We met, at last, on my recent trip with Anthony, and I happened to mention my interest in corduliids. We have two in England, *Somatochlora metallica* (Brilliant Emerald) and *Cordulia aenea* (Downy Emerald) and, in years past, *Oxygastra*

curtisii (Orange-spotted Emerald). “Meet me at Whittle Road at 8:30 AM,” said Jerrell. We met and started driving along a rather unpromisingly dry forest road. “There’s one,” said Jerrell from the backseat, promptly leaping from the car to catch something. In his net was *Somatochlora filosa* (Fine-lined Emerald)! Admittedly I was driving but had seen nothing. We drove on. “There’s another species,” and again out jumped Jerrell. This time, *Somatochlora calverti* (Calvert’s Emerald) was in his net. By now I was

at least getting my eye in. I had seen just two *Tramea carolina* (Carolina Saddlebags) and an *Anax junius* (Common Green Darner)!

Jerrell tells me that six species of *Somatochlora* are regularly found along this road which is the same number that occurs in the whole of Europe. So now you know why I keep coming back. From my dragonfly desert that is England, Florida is my oasis! 

2007 Collecting Trip in Guadeloupe—Where Have All the Seasons Gone?

François Meurgey, Natural History Museum of Nantes, France <francois.meurgey@mairie-nantes.fr>

This 2007 collecting trip was organized and financed by both the Parc National de Guadeloupe and the Nantes Museum of Natural History to carry out a study on the distribution and ecology of the recently described *Protoneura romanae*. Jerrell J. Daigle joined us for the second time for additional work on his recently described *Macrothemis meurgeyi*, and the distribution of *Brechmorhoga archboldi*.

Our first unpleasant surprise was the widespread drought. Normally, June is the beginning of the wet season and we had expected rain showers every day. Not at all! The average daily temperature exceeded 32°C and reached 40°C some days, instead of 25–26°C in a normal year! We learned that no rain fell for three months . . . too bad!

But let us start, beginning Sunday 3 June 2007. At the airport, Jerrell met Patrick Jean, photographer of the Nantes Museum of Natural History for the first time. Gaëlle and myself were very happy to meet him a second time for this three week collecting trip. Later that day, we rested at Les Gîtes du Bois d’Inde and met Annick and Claude Delacruz, our hosts. We also spent time in the supermarket to buy acetone, supplies, food, and lots of rum!

In spite of the inclement weather, we were able to fulfill the first of our objectives by finding larvae of *Protoneura romanae* at Sofaïa, north of Basse-Terre. This site is the type locality for this species. We found a small population and collected about ten larvae here.

We decided to do some prospecting around the ponds and mangrove swamps on the north of Basse-Terre, to verify the hypothesis that *Tramea binotata* (Sooty Saddlebags) is a wet season species, and to find new localities for *Protoneura romanae*. No success with *P. romanae*, but Jerrell found a new location for *Lestes tenuatus* (Blue-striped Spreadwing) and *Micrathyria didyma* (Three-striped Dasher). Other species seen in the hot mangrove swamps were *Telebasis corallina*, *Micrathyria aequalis* (Spot-tailed

Dasher), and *Tramea abdominalis* (Vermilion Saddlebags). Unfortunately, the ponds were almost completely dry and no other odonate species were seen.

We found a cooler place at the Grand Etang, south of Basse-Terre. We went to this beautiful mountain lake twice. We found several males and females of *T. binotata* and we missed one mating pair. About six or seven *Anax concolor* (Blue-spotted Comet Darner) were flying along the shoreline, some males were searching for females and one female was seen egg laying. This irritating species is decidedly very hard to catch, even if Jerrell is in the water with his full-length net and waders! Other species seen here were *Lestes tenuatus* (Blue-striped Spreadwing), *Anax junius* (Common Green Darner), *Ischnura ramburii* (Rambur’s Forktail), *Brachymesia furcata* (Red-tailed Pennant), *Dythemis sterilis* (Brown Setwing), *T. binotata*, *Protoneura romanae*, and *Argia concinna*.

One day was devoted to *M. meurgeyi* and *B. archboldi*. Jerrell led us to “La Chapelle des Larmes”, near Pointe-Noire (Basse-Terre). This site was previously surveyed by Jerrell, and Fred and Peggy Sibley in 2006. We found here some adults of the two species, plus several larvae of *B. archboldi*. We observed the behaviour of a female *B. archboldi* egg-laying directly in the water by tapping the surface several times.

Even if Guadeloupe is a relatively small island and highly urbanized, it is sometimes difficult to find a pond or lake in the deep rain forest. One can spend all day climbing a mountain without finding anything. This happened while trying to reach the unsurveyed “Gros Fougas” lake. This old crater is filled with open water alternating with bogs. After several hours of climbing and hacking a way with a machete, we realized that we were in another valley and passed by the lake. Too tired to continue . . . maybe next time, we thought! Later that day, we went to l’Etang de l’As de Pique, a 748 meter high volcanic lake, below the

active volcano la Soufrière, where we found several *M. meurgeyi* flying along a small tributary plus lots of *D. sterialis*.

We returned successfully to Anse-Bertrand later, where a single female of *Anax ephippiger* (Vagrant Emperor) was caught in 2006. One male was seen flying above a cattle field near a small pond, exactly at the same place as in 2006, but we were unable to find a population or larvae/exuviae. Nevertheless, it seems that this species could now be resident in Guadeloupe. But where? Jurg de Marmels provided information in the last issue of ARGIA (2007, 19: 16) supporting the possibility that *A. ephippiger* could have arrived like the African locusts to the Caribbean. One dry cattle pond was surveyed here and it provided some specimens of *Lestes forficula* (Rainpool Spreadwing), *Erythemis vesiculosa* (Great Pondhawk), *Pantala flavescens* (Wandering Glider), *Erythrodiplax umbrata* (Band-winged Dragonlet), *Orthemis macrostigma* and *M. aequalis*. Jerrell caught the only male *Brachymesia herbida* (Tawny Pennant) that day in a cattle field near the sea.

The next day, we decided to prospect a previously unsurveyed crater lake, named "La Citerne". This 80 m wide lake is surrounded by meadows, situated at 1000 m at the top of an old volcano and is almost always under constant fog and rain. Once at the top of the mountain, we still had to drop 100 m down in the crater to reach the water. No one can imagine a more dangerous 100 m to go down! It was crazy! We felt as if we were in an antlion funnel struggling for traction. The unstable soil here is covered by bromeliads and palm trees such that you cannot see what you are walking on. We often fell in holes between rocks, or under roots of tall trees. Once we arrived at the bottom, we took a rest before collecting. We found a couple of *Argia concinna*, no larvae or exuviae, very few aquatic insects and the rare and elusive *Eleutherodactylus pinchoni* (Pinchon's Pipping Frog).

Once we arrived back to Les Gîtes du Bois d'Inde, we told Claude Delacruz about this journey. "Are you crazy?" he said! "There is nothing more dangerous than that crater lake if you do not have a climbing rope!" Okay, okay, no matter! We had a frightening and exciting field course, and we now know that this crater lake is not favorable for dragonflies. This fact suggested a discussion between Jerrell and myself about the geological youth of Guadeloupe and the evidence that numerous favorable habitats are not yet colonized by dragonflies. In this same type of cold, mountainous habitat in some Greater Antillean Islands, species have colonized successfully, like *Phyllostes ethelae* in Hispaniola, for example. It could be interesting to be in Guadeloupe in one or two million years.....

The next day was devoted to new localities along the south coast of Basse-Terre. Unfortunately, all the streams were completely dry and once more, we were obligated to reach the rainforest and its relative freshness. We stayed at the picnic area of the Rivière Corrosol at "La Pépinière", where Jerrell, Fred, and Peggy Sibley went in 2006. This station is one of the most interesting for *B. archboldi* and *M. meurgeyi* to date. We found also a small population of *P. romanae* and some adults and larvae of *Enallagma coecum* (Purple Bluet). This was also the occasion to see some good birds like *Margarops fuscus* (Scaly-breasted Thrasher), the Guadeloupean endemic *Ciclbherminia lherminieri* (Forest Thrush), several hummingbirds, and the rare *Chaetura martinica* (Lesser Antillean Swift) of which we do not know its breeding habitat in Guadeloupe.

After a day of rest, we tried to prospect along a forest trail on the windward coast of Basse-Terre. Bad luck! Heavy rainfalls stopped us. We then decided to reach the leeward coast to find clement weather. The other side of the island was contrastingly completely dry. Nevertheless, we followed a forest trail above Deshaies on the Morne Mazeau, where we found *A. concinna*, *B. archboldi*, *M. meurgeyi*, *O. macrostigma*, and *T. abdominalis* flying along the forest edges.

At the Maison de la Mangrove area, we found *P. romanae*, *I. hastata*, *I. ramburii*, *O. macrostigma*, *Triacanthagyna* sp., *Ixobrychus exilis* (Least Bittern), and several *Crotophaga ani* (Smooth-Billed Ani). At the picturesque Ravine Quiok, we found *B. archboldi*, *Rhionaeschna psilus* (Turquoise-tipped Darner), *M. meurgeyi*, *P. romanae*, and *A. concinna*. On the other side of the highway, Jerrell found two beautiful sites, both famous picnic areas that had large populations of *B. archboldi* and *M. meurgeyi* adults along the river.

One day, I had a meeting with Hervé Magnin, head of the Biodiversity Cellule at the Parc National de Guadeloupe to talk about the entomology strategic plan for the French West Indies, the partnership with Cuban Protected Areas Committee, and other subjects. During this time, Jerrell returned to Habitation Deravin to find lots of *O. macrostigma* mated pairs. Patrick and Gaëlle tried to find new sites for *P. romanae*. They saw two males of *R. psilus* at Les Bains Jaunes, a series of sulphurous pools devoted to public bathing. Gaëlle successfully swung her net a few centimeters above the head of a bather. I was afraid to learn that Gaëlle not only caught the dragonfly, but also the scalp of that guy!

One very hot day, we took a 30-minute hydroplane-boat ride to Terre de Bas, the less urbanized of the two islands forming the Saintes archipelago, 10 km south of Guade-

loupe. The island was surprisingly dry. Of the four ponds present on this island, only one still had some water. This forested pond is now totally invaded by water-lettuce, but we found one male *Telebasis corallina*, several *B. furcata*, two male *Coryphaeschna adnexa* (Blue-faced Darner) and two male *Tramea abdominalis*. We decided to collect larvae and found numerous *Telebasis corallina*. This species, although included in the keys of Westfall and May (2006), was never formerly described or illustrated. A complete description will be published soon.

The other days were devoted to the research of new localities for *P. romanae*, *B. archboldi* and *M. meurgeyi*. The distribution range of these endemics is now better known. We frequently visited several spots along “la route de la Traversée” on Basse-Terre, like “Rivière Corrosol” or “La Pépinière” to find them. The endemic *P. romanae* is not a common species and it is local to small, calm sections of the Basse-Terre mountain streams, generally in small populations consisting of less than 30 individuals. On Grande-Terre, the few populations inhabiting the flooded bloodwood forest of the west coast can be considered vulnerable because of the loss and fragmentation of this type of habitat. An ambitious project is planned by the Antilles-Guyane University to protect and to reintroduce bloodwood in several parts of the coast of Grande-Terre in the coming years.

Some days were too hot, so we had to cool off. We went swimming on a calm and unfrequented rocky beach close to where we stayed. These hours spent under the water were enchanting with many fishes, nudibranchs, corals, and even some alarming stonefish! We also went shopping at the open markets to buy spices and souvenirs to bring back to France and Florida.

In spite of particularly uncomfortable and very hot weather, this 2007 collecting trip was very successful! The study on *P. romanae* is proceeding nicely and the description of the larva will be published soon. This trip also marks a turn in the study of the French West Indian Odonata. After almost eight years collecting and studying dragonflies and damselflies from Guadeloupe to Martinique, it is time to finalize the data. As a result, the publication of a book on the Dragonflies of the French West Indies is planned for early 2009.

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The *Argia concinna* Rambur Type Locality Mystery: Can it be Solved?

François Meurgey, Natural History Museum of Nantes, France <francois.meurgey@mairie-nantes.fr>

Argia concinna Rambur is a common Lesser Antillean damselfly endemic to the central islands of Dominica and Guadeloupe (Meurgey, 2006). Ever since its first description by Rambur under the name *Agrion concinnum*, the type locality has remained a mystery. In his 1842 “Revue des Odonates . . .” Rambur mentions “du Cap” as the type locality. This information seemed erroneous to Selys (1876) who stated that this genus was not present in Africa. Later, Mrs. Gloyd (1941) stated that after a complete study of all the specimens available, this species was only present in the Lesser Antilles. Donnelly (1970) tried to give a solution to this problem by proposing Cape Estate (northern part of St. Lucia) as the probable type locality for *A. concinna*. Donnelly was influenced by the locality given by Rambur. Cape Estate is an English name and Rambur, while labelling the specimen, probably did not use the correct name.

Meanwhile, studies carried out in the French West Indies showed that *Argia concinna* is absent from Martinique. Only two data records are known to date for this island;

one larva collected in 1981 (Starmühlner & Therezien, 1982), and one exuvia in 2005 (Meurgey, 2005). These two records refer, in fact, to *Protoneura ailsa* Donnelly. So far, *A. concinna* occurs only in Dominica and Guadeloupe. The type locality should be on one of these islands.

I recently asked Jérôme Constant (IRSNB) to send me several photos of the holotype male and scans of the labels which he kindly did. I was surprised to discover that the locality on the label is not “du Cap” or “Le Cap”, but simply “Cap.” Working in a museum gives one good experience on the manner of reading old labels and how to decrypt their obscure significance. The wording “Cap.” probably refers to an abbreviated locality and should refer to a longer name. I didn’t find any locality names beginning with “Cap.” in Dominica or St. Lucia. I therefore assume that the type locality should be on Guadeloupe, maybe near Capesterre, on Basse-Terre.

The detective work will continue, so no doubt the mystery will be solved soon.

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Observations on the Behavior of *Macrothemis inequiunguis* (Jade-striped Sylph)

Tony Gallucci, Gulf Coast Laboratory for Wildlife Research and Milk River Film, P.O. Box 6, Camp Verde, Texas 78010-5006, <<http://milkriver.blogspot.com>>, <hurricanetg@hotmail.com>

Since April 2006, faunal and floral surveys have been conducted on the Big Springs Ranch, nine miles north of Leakey in Real County, Texas, USA. The site holds several major springs, including series at the fractured juncture of the Glen Rose and Edwards Aquifers known as “Big Springs” that is the major contributor to the headwaters of the Frio River, a clear-water, limestone-based Texas Hill Country stream. The surveys thus far have identified 51 species of odonates on the approximately 7500-acre property, including six new county records, and one species new to the Edwards Plateau.

On 20 August 2006, a survey team first gained access to the Big Springs area itself, and while there Mike Overton netted what would prove to be a first county record for *Macrothemis inequiunguis* (Jade-striped Sylph; photographed; specimen deposited at the University of Texas at Austin). This individual was a teneral female caught on a ridge overlooking the second series of outflows (“second falls”) from the main springs and a ca. 5 m pour-off emanating from the first main series of outflows (“first falls”). Each of these falls is a complex of smaller flows from cracks, fissures and caves spanning about 40 m, with the falls themselves ranging from 10 to 18 m above the initial streambed.

Macrothemis inequiunguis is one of the rarer resident United States odonates, known only from a handful of locations. Real County is only the fourth known county of occurrence for Texas and the US, all on the Edwards Plateau or just off the western terminus (Abbott, 2001, 2005, 2006,

2007a, 2007b). The presence of the insect at this personally accessible location in Real County has allowed for further investigation into its status, for occasional photographic and filming opportunities, and enabled field observations of this apparently little known creature.

Earlier references on members of the genus *Macrothemis* appear to be largely taxonomic in nature (i.e., Calvert, 1898; Donnelly, 1984; May, 1998), and even anecdotal behavioral accounts seem limited to guidebooks (Abbott, 2005), though even there, information on *M. inequiunguis* is limited.

On the next survey, 24 September 2006, Overton netted another individual, this one a striking, fresh male, which was photographed in hand, but escaped when attempts were made to pose it for natural photos. This one was caught foraging over the dry terraces of travertine pools at the first falls (after a several year drought this falls had not been “wet” for some time, but the adjacent second falls have persisted). The day was cool, dank and misty when this individual was caught.

Not long after, a barely post-teneral female was flushed from the stream bank above the major pour-off below the first falls. This was the first individual that allowed some behavioral observation, since it proved difficult to catch. On first flush it flew to the dorsal surface of a drooping False-Nettle (*Boehmeria cylindrica*) leaf and hung there in near vertical position. Attempts to net this individual were fruitless as it routinely allowed approach to within

about 3 m and then flushed, flying no more than about 6 m before again landing on another drooping leaf, usually of *Boehmeria*, until it finally made its way out of reach up the falls slope.

A second teneral female was flushed from the streambank a few hundred meters downstream at a point where the stream splits, a portion is mostly shaded by overhanging vegetation, and it is narrowed into a meter-wide section of fast-water and riffles. This individual flew up to the ventral surface of a leaf, inside the canopy of leaves of an Evergreen Sumac (*Rhus virens*) overhanging the stream from the limestone bluff on the opposite side. This individual was easily netted, and was photographed in hand and collected.

Ken Cave later netted a male *Macrothemis imitans leucozona* (Ivory-striped Sylph) near the junction of the Big Springs stream and the Frio River while it was perched horizontally on the whitish limestone slabs forming the river's bank. While this was being examined another landed near us, perched the same way, and it too was netted. Both were photographed and collected, establishing another county record for this genus. At the date of this publication no further sightings of *M. imitans leucozona* at Big Springs Ranch have been recorded.

The survey of 2 October 2007 resulted in the unsuccessful pursuit of a single flying female at the then still dry first falls. The pursuit resulted in similar observations of evasive activity. Each time this individual flushed it would fly to a location slightly upslope and no more than about 6 m away, usually perching nearly vertically on a leaf of *Boehmeria*. Twice this individual resorted to static hovering flight about 5–6 m away until advances were made towards it.

On 29 October 2007 three *M. inequiunguis* were seen. The first was a foraging male at the second falls. This particular outflow is largely covered in Watercress, *Rorippa nasturtium-aquaticum*, an invasive, and the travertine pooling there is covered over such that the falls simply cascade down the slope. This male was foraging in a crescent as though this slope were terraced, making runs of about 8–10 m, then reversing track. After three to six runs it would move a short distance up the slope before resuming the crescent transverse foraging runs. Once it reached the spring outlets where run lengths were shortened to about 3 m, it would fly out of sight into vegetation, but would soon reappear near the base of the falls working crescent runs again, incrementally moving upslope.

Two more were encountered while checking for pond skimmers at a canyon location just down from and nearly opposite the second falls. This is an interesting location

in that it is a spring fed pour-off, with perennial flow, but the road crosses the pour-off well above the streambed, perhaps 8–10 m high. The road itself is a concrete and rock structure that effectively dams the spring stream and creates a slackwater pond of significant depth. The odonate fauna here is quite different from the stream fauna below.

While filming a male *Brachymesia furcata* (Red-tailed Pennant) perched on *Boehmeria* on the shore it was usurped by a wheeled pair of odonates that, on close examination, proved to be *M. inequiunguis*. Sans digital still camera at the time, I was able to capture 40 seconds of hand-held digital footage of them perched on the leaf (Gallucci, 2007). While I was trying to back off to get a tripod for the camera they flushed, flying over the road and down the pour-off and I lost sight of them. This location was the fourth spot at which they had been seen on the Ranch, which remains the case after Spring 2007 surveys.

While in copula they perched at about a 45 degree angle on the somewhat drooping leaf. It was a breezy day, and the effects of that can be seen in the footage in the movement of the leaf, their wings, and the camera (Gallucci, 2007), though it seemed to not cause any particular grief to the insects. I believe this to be the first documentation of copulation in *M. inequiunguis*.

No further fall surveys were conducted in 2006—29 October remains the latest sighting at this location. Abbott, (2006, 2007b) records the known late date for this species as 14 November.

On the survey of 22 April 2007, two teneral dragonflies, considered at the time to possibly be sylphs, stayed out of reach and were not closely examined either through binoculars or in hand. This would represent a substantial shift in the early date from the currently known 31 May (Abbott, 2006, 2007b), if indeed they were *M. inequiunguis*. *Macrothemis imitans leucozona* has an even narrower window of known occurrence—between 2 June and 24 October (Abbott, 2005, 2007b).

Surveys on 28 and 29 April 2007 were focused on birds and plants, but cursory attempts to find sylphs on these dates found none. On 6 May 2007 attention was focused on invertebrates, odonates in particular, though at this date odonates in general were still somewhat scarce. In addition, heavily overcast skies hindered each of these last surveys, and no sylphs were found on any of these last three dates.

Then on 2 June 2007, the plan was specifically to survey odonates and to try to locate sylphs and observe behavior.

A flying female, somewhat worn, was located foraging in a glade next to the first falls, was observed for a few minutes, and then was netted and photographed. This female foraged repeatedly along a transect about 5 m long. It was my impression that the travel in one direction was decidedly slower and more “focused” than the “return” trip. In addition the insect had a curious undulating flight on the slower passes, reminiscent somewhat of a woodpecker’s characteristic flight pattern. The depth of the arc between peaks was ca. 12–15 cm, and the arc tangent about 1.5 m.

Another brief look was had of a female hovering above a shaded pool at one of the cave outlets of the springs in a temporally shaded spot. This female was observed for ca. ten seconds as it hovered about 50 cm above the water pooling below the outflow. I watched it deeply dip the tail end of its abdomen twice, but at the time got the impression that it was related to flight balancing while hovering. The bug left after a few seconds of observation and was not relocated.

On 23 June 2007 with only a few hours on site, the plan was to again locate and observe sylph behavior. I almost immediately located a female patrolling a 5 m long, gravel-bottomed streambed pool emanating from a spring outlet below one of the smaller caves just above the first falls complex. It foraged the length of this pool. At one point I apparently got too close and it moved up to the big terraced first falls (see photo), and as I pursued it disappeared into the vegetation. I returned to the original pool hoping it would return, and waited about thirty minutes. Then I noticed movement in the tiny shaded gathering pool below the outflow itself and moved into better viewing position and saw the female hovering there. For nearly five minutes I watched it hover there doing the same dipping motion with its tail end as I had witnessed the week before, only this time it occurred to me that the motion was reminiscent of the ovipositing motion of other odonates that dip their abdomens into ponds and quiet streams to deposit their eggs. I also became aware that as the abdomen dipped the entire body also dropped about one or two centimeters towards the water. The interesting aspect of this is that it was done from a height of about 30–40 cm above the water, and in deep shade. I tried to determine if eggs were actually dropping into the water from that height, but the combination of shade, and the splash and spray from the spring made it impossible to see any contact with the water’s surface, or to obtain any footage.

On that same date I also located four males. These were found at the four different locations where *M. inequiunguis* had been observed in the preceding months—the first falls (since April 2007, following two weeks of substantial rainfall, flowing for the first time in several years, and in fact

raging after several particularly strong rains; these falls composed of the outflow from several fractures cascading down terraced travertine pools), the second falls (slightly below the first set of fractures, this falls too cascades down a hill, but at a steeper decline and without the braking of travertine-rimmed pools; Gallucci, 2007), the pond pour-off (water pouring shallowly from the dammed road pond, down a rock spout, a few meters downstream and opposite the second falls), and the riffle section a few hundred meters downstream, where part of the flow of the spring stream is diverted into a narrow, fast, overhang-shaded section (Gallucci, 2007).

Each of these males was patrolling/foraging in transects mirroring the terrain—at the first falls, following the travertine pools, at the second falls, following the crescent-shaped bulge of the hillside, at the pond pour-off following the stream up and down the slope, and at the riffle section, likewise following the flow of the stream in the narrow channel. None of these males were seen to engage females.

Interactions with *Brechmorhoga mendax* (Pale-faced Clubskimmer) and *Libellula saturata* (Flame Skimmer), the only other odonates working the falls on this date, were common, with the sylphs always retreating to shaded vegetation when pursued. No encounters were noted at the pour-off. One interaction with *Brechmorhoga* was noted at the narrow riffles, in which case the sylph also retreated upslope.

Thanks to John Abbott for reviewing this note, and for the original identification, and to Mike Overton, Greg Lasley, Cheryl Johnson, Ken Cave, Tom Collins, Mitch Heindel, Jason Penney, Bob Thomas, Susan Sander, Dean and Susi Mitchell, and all the other field workers on the Big Springs Ranch Surveys for help working these sylphs.

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Notes on the Plateau Spreadwing (*Lestes alacer*) in Eastern New Mexico

Robert R. Larsen, Roswell, New Mexico, <robllrsn@yahoo.com>

Here are some notes and observations made between 1998 and 2007 on the damselfly *Lestes alacer* (Plateau Spreadwing) from sites in eastern New Mexico. Westfall and May (2006) note that *Lestes alacer* is primarily a Mexican species, and poorly known biologically.

The flight season for the Plateau Spreadwing in New Mexico is from 27 January to 10 October, but the population is most abundant in July and August in southern and eastern New Mexico. Perhaps the most interesting behavior in this species is the use of nocturnal communal roosting sites away from water.

Habitat types and sites in southern and eastern New Mexico are somewhat varied, but most are located in the northern Chihuahuan Desert and the transition zone between the Chihuahuan Desert and the short grass prairies of the Great Plains Biome. Aquatic plants utilized by the Plateau Spreadwing in their habitat areas are the spikerush and sedges; *Scirpus acutus* (Tule Bulrush), *Scirpus paludosus* (Prairie Bulrush), Spikerush *Eleocharis macrostachya* and *Eleocharis parishii*, along with *Typha* (Cattails) and *Distichlis* (Salt Grass).

In Guadalupe County the spreadwing has been found on the outflow vegetated wetlands from a limestone sink hole, Perch Lake. In De Baca County the spreadwing has been found along the vegetated edges of the Pecos River oxbows on the Bosque Redondo; at spring fed pools along Yesso and Conejo Creek drainages. In Chaves County it has been taken from sheet flow out of Sago Springs, along the vegetated edges of the Hondo oxbows and from seep springs along the Spring River and also from the Saltgrass shallows along the Salt Creek in the Salt Creek Wilderness. In Lea County it has been taken from vegetated seep springs feeding Lane Salt Lake. In Roosevelt County it

has been taken from a small damp seep feeding the modified playa lake at Oasis State Park. In Curry County the species was taken from the vegetated northeastern edge of the playa lake in Green Acres Park. In Eddy County it is known from Rattlesnake Springs outflow. The Plateau Spreadwing is the most common *Lestes* found on the Llano Estacado (Staked Plains) and appears to be tolerant of saline aquatic habitats.

The larval habitat is interesting and generally found in spikerush and bulrush (sedge) beds about the playa lakes and oxbows. But, very teneral specimens found about nearly dry seep springs in July and August on the Llano Estacado may indicate that the larvae can reach the adult stage with little standing water and survive in the damp vegetated areas around desert seep springs. The larvae have been observed emerging on the sheet flow wetlands from springs and sinks with more permanent water flow. Predators in the larval habitat are Mosquito Fish, Plains Killifish, and Pecos Pupfish noted at several sites in Chaves and De Baca Counties.

Oviposition is in tandem and endophytic with the female generally inserting eggs into spikerush and sedges in their habitat. A tandem pair was seen ovipositing into the outer branches of Honey Mesquite which overhang the cut bank of the Hondo oxbow on the Bitter Lake National Wildlife Refuge farm. The most common plant utilized for oviposition is the larger spikerush, *E. macrostachya*, found in the shallows.

The adult has been observed feeding on Diptera and gleaning the small butterfly Western Pygmy Blue from Sea Lavender about Sago Springs. A female was observed along the Pecos River gleaning small brown ants from the stems of rabbitbrush. The Arid Lands Ribbon Snake and

Plains Leopard Frogs have been noted at several habitat areas of the Plateau Spreadwing, and are known to feed on adult damselflies.

In the summer of 2004 the Plateau Spreadwings were observed gathering at dusk on particularly hot days at a communal roosting site away from water half a mile south of their habitat on the Spring River. The spreadwings would also gather at the same communal site during periods of bad weather (heavy rain, hailstorms, and the two tornados that passed close by). The communal roosting site is much like that described for *Hetaerina americana* (American Rubyspot) by Kellicott, except that the Plateau Spreadwings are found away from water, and made up of mature pruinoses males and females that gather in large numbers at dusk and remain at the site through the night to about 0800 hrs.

The structure of the roosting site is made up of several canopies—the highest of which are cottonwoods and shorter Texas Hackberry below. Below this are the higher *Kochia americana* (Kochia) and smaller *Solanum elaeagnifolium* (Nightshade) on which the Plateau Spreadwings roosted through the night in vertical position just below the sturdy leaves of the nightshade and in the Kochia. In all, about 600 to 700 individuals would roost on the east facing side of the canopy away from the prevailing wind. At dusk, when disturbed, the spreadwings would move to

the upper canopy in the Hackberry trees, then to the Cottonwoods. The nearest water source to this site is the seep springs behind the old Trophy Meat Packing Plant on the Spring River half a mile away. Specimens were taken from the roosting site at dusk, during the night, and in the early mornings over a several month period. All were mature pruinoses males and females. The last taken from the roosting site was 10 October 2004.

Distribution in New Mexico counties (Evans, 1995; Abbott, 2005): Bernalillo, Chaves, Curry, Dona Ana, De Baca, Eddy, Grant, Guadalupe, Hidalgo, Lea, Lincoln, Luna, Otero, Roosevelt, San Miguel, Sierra, and Socorro.

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Phylogeny of Odonata: Part 2, Relationships Among Odonata

Mike May, Rutgers University, New Brunswick, New Jersey <may@aesop.rutgers.edu>

Why go through all that theory in Part 1 (May, 2007) before getting to actual relationships among Odonata? Partly to give me cover—I told you it's all only hypothetical! Even more than that though, is to make a bit more understandable the state of uncertainty that currently surrounds odonate phylogeny. For decades, opinions about odonate relationships have been marked by controversy. Figure 1 summarizes the principal competing hypotheses since Fraser's (1957), all of which are based only on morphological evidence. Four of the seven proposals (Fig. 1 A–D) regard Zygoptera as paraphyletic, three consider Zygoptera to be monophyletic (Fig. 1 E–G). Although all find Anisoptera to be monophyletic and *Epiophlebia* to be the sister group (closest relative) to Anisoptera, proposed relationships among families or superfamilies in both suborders include nearly every possible arrangement.

Each of these studies can be criticized in one way or another. Fraser (1957) explicitly based his phylogeny of shared ancestral characters, i.e., plesiomorphies, so his basic premise is

illogical, although it was a common one until almost a decade later, when Hennig's (1966) Phylogenetic Systematics was revised and published in English. Nevertheless, his 40+ years of studying odonates evidently led him to some conclusions that now seem likely to be correct (see below). The placement of Zygoptera basal to Anisoptera and of Calopterygoidea as highly derived Zygoptera departed from the earlier view of Selys (1854) and Needham (1903) of Calopterygidae at the base of a monophyletic Zygoptera. Fraser's narrative is ambiguous in places and appears not always to agree with the phylogenetic tree that accompanied it. Nevertheless, this has certainly been the most influential hypothesis, since it was followed in large part by Davies & Tobin (1983, 1985), Bridges (1993) and Steinmann (1997) in their catalogs. Hennig (1981), although he was aware of Fraser's approach, did little more than rearrange Fraser's scheme, relocating a few families based on his assessment of apomorphies; he also made an argument to justify a monophyletic Zygoptera, although he did not incorporate this idea into the tree.

The phylogenies of Pfau (1991, 2005) and Trueman (1996) are derived independently from Fraser's, although Trueman's conclusions are similar to Fraser's. He performed a cladistic analysis (i.e., recognizing that apomorphies alone indicate phylogenetic relationships) based on wing venation of 47 genera of fossil and extant Odonata to produce

the tree shown in simplified form in Fig. 1 C (among other things, fossil taxa are excluded from my figure). His results differ from most others in suggesting an extremely early branching of *Hemiphlebia* and a polyphyletic Lestoidea, and in grouping Chlorogomphidae with Aeshnoidea. Despite a long tradition of strong reliance on venation as

perhaps the principal indicator of phylogeny (e.g., Munz, 1919; Fraser, 1957), and with due recognition of the fact that most fossil specimens provide little other information, more recent work makes clear that venation alone cannot provide an adequate picture of odonate relationships. Venation is functional, subject to selection pressures, and hence to convergent similarity, a situation that may be particularly hard to recognize in cases of severe reduction or loss (Carle, 1982). Dijkstra & Vick (2006) and Fleck et al. (2007) have uncovered a particularly clear instance in demonstrating that Tetrathemistinae (Libellulidae) are polyphyletic. Furthermore, although lack of detailed knowledge of wing function makes it hard to prove, it is to be expected that changes in venational characters may often be mutually interdependent. Thus Trueman's analysis may suffer from use of correlated and/or convergently similar characters.

Pfau (1991, 2005) also relied almost entirely on a single correlated system of characters, the secondary male genitalia, in inferring a phylogeny of Anisoptera. It is buttressed by a genuinely remarkable study of the morphology and functioning of that system across a wide range of odonates, and his most recent analysis is a detailed examination of mechanisms of sperm expulsion across families. His most heterodox conclusion is that Cordulegastridae are part of a clade, the Petaluroidea, with Petaluridae and Gomphidae, rather than close relatives of the Libelluloidea, as, e.g., numerous larval characters suggest.

Bechly (1996), using ground plans and "intuitive" cladistics, combined a monophyletic Zygoptera (Calopterygoidea ((Megapodagrionidae + Coenagrionoidea) (Hemiphlebiidae + Lestoidea)), with a polyphyletic Anisozygoptera and monophyletic Anisoptera with Petaluridae basal and Gomphidae sister to Libelluloidea. Finally, in the same frenetic year, Lohman (1996) proposed

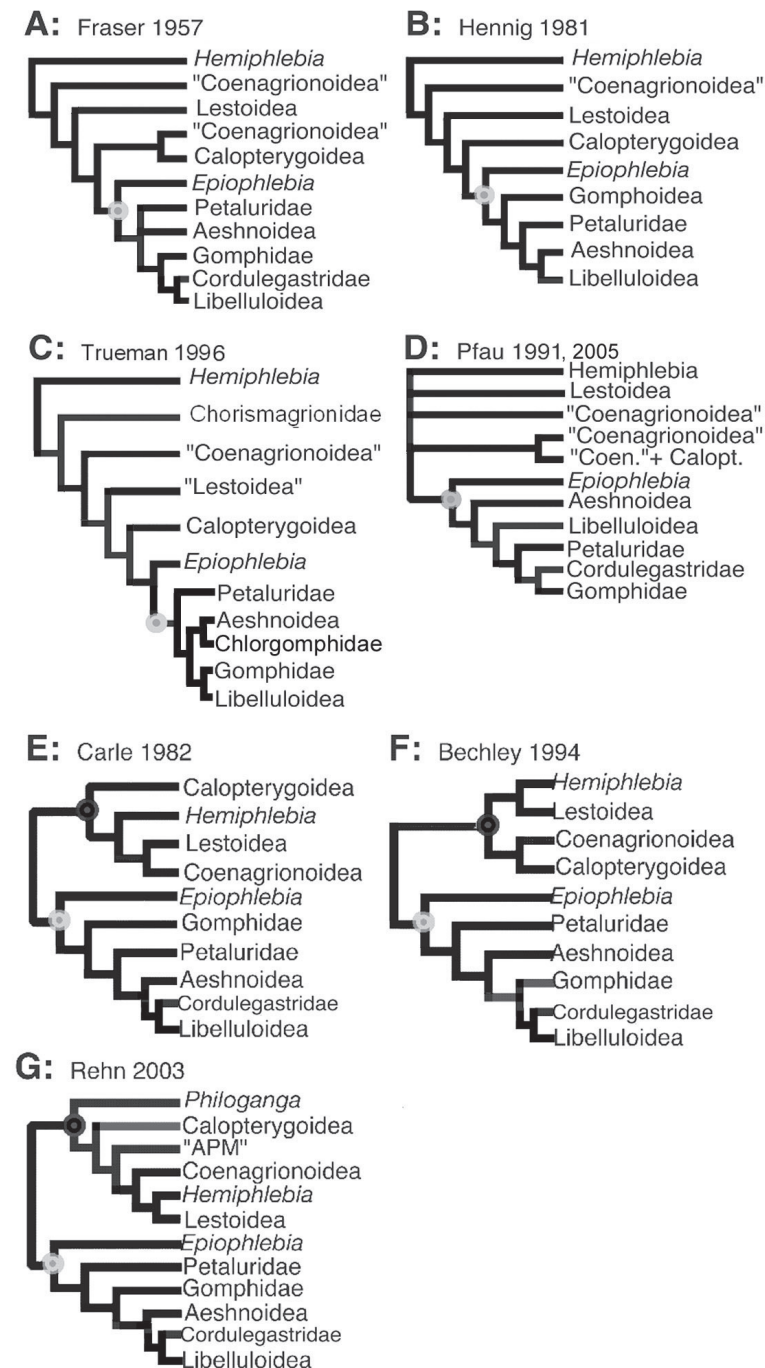
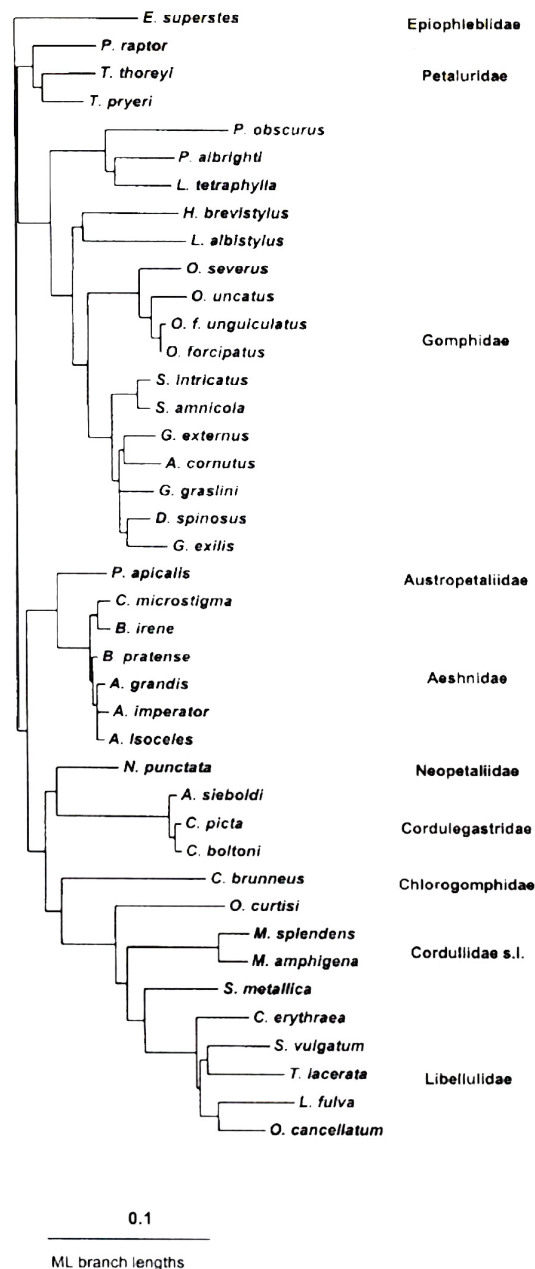


Figure 1. Seven morphology-based hypotheses of Odonata phylogeny, authors indicated on figure. In G, "APM" stands for "Amphipterygidae, Pseudolestidae, Megapodagrionidae".

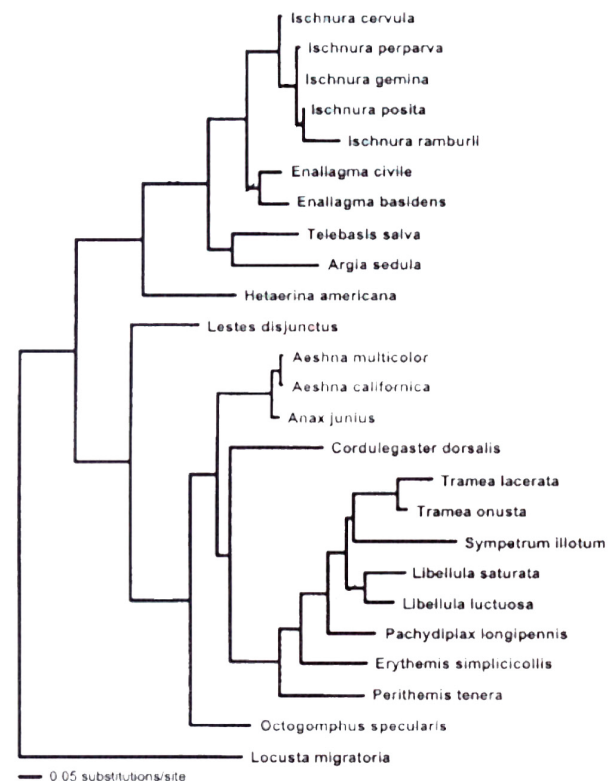
a phylogeny for Anisoptera much like Bechly's but with Aeshnidae basal, in accord with Pfau's arguments. Carle & Kjer (2002) also based in part on the work of Pfau proposed yet another arrangement of Anisoptera, (((Austropetalidae + Aeshnidae) Gomphidae) Petaluridae) Libelluloidea). The most recent computer-implemented morphological

study (Rehn, 2003), utilized diverse characters and again found a monophyletic Zygoptera and Anisoptera. Rehn's results placed *Philoganga* or *Philoganga* + *Dipblebia* as basal Zygoptera, with Amphipterygidae and Megapodagrionidae forming a paraphyletic assemblage basal to a monophyletic Lestoidea (with *Hemipblebia* at its base) plus a monophy-

A: Misoff et al. 2001



B: Saux et al. 2003



C: Hasegawa & Kasuya 2006

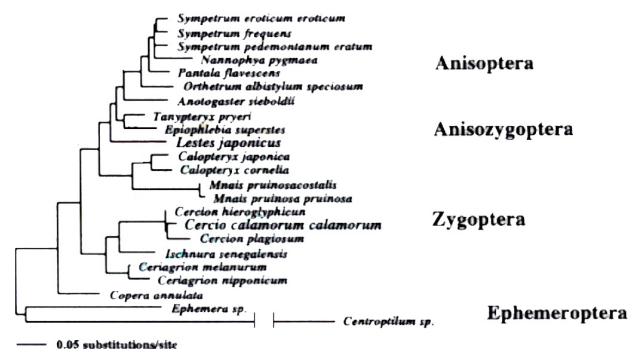


Figure 2. Three DNA sequence-based hypotheses of Odonata phylogeny, authors indicated on Figure. Data in A from small and large subunits (12S, 16S) of mitochondrial rDNA, in B from small subunit mitochondrial rDNA (12S), and in C from large subunit (28S) nuclear rDNA (Hasegawa & Kasuya also presented a tree based on 16S mitochondrial rDNA, not shown here).

letic Coenagrionoidea. Rehn's Anisoptera form a pectinate array with Petaluridae basal to Gomphidae.

Molecular phylogenies have been published for Anisoptera by Misof et al. (2001) and for all of Odonata by Saux et al. (2003) and Hasegawa & Kasuya (2006); these are summarized in Fig. 2. Misof et al. (2001) recovered a very traditional family arrangement, with Petaluridae and Gomphidae separating first, followed by Aeshnoidea and Libelluloidea. As these authors point out, however, the support for relationships among families is extremely weak (notice the almost non-existent branches at the base of the family and superfamily clades). The genes they sequenced, the small and large mitochondrial rDNA subunits, apparently have changed rapidly enough that little information is preserved about events during the time period when anisopteran families were differentiating.

Both Saux et al. (2003) and Hasegawa & Kasuya (2006) hypothesize that Zygoptera are paraphyletic, with Lestidae at the base of Anisoptera. Otherwise their conclusions about Zygoptera are discordant. Anisoptera are hard to compare, since Saux et al. omitted Petaluridae and Hasegawa & Kasuya omitted both Aeshnidae and Gomphidae. Both found Cordulegastridae immediately basal to Libelluloidea, as did Misof et al. (2001), contra Pfau (2005). The principal problem with both the former analyses is that taxon sampling is very sparse, and Saux et al. (2003) used an outgroup, *Locusta* (Orthoptera), that could be a misleading choice.

So, now on to the punch line. For the last several years, with my colleagues, Karl Kjer and Frank Carle (who deserve most of the credit for the sequence-based phylogeny that I will discuss below), I've been studying relationships among

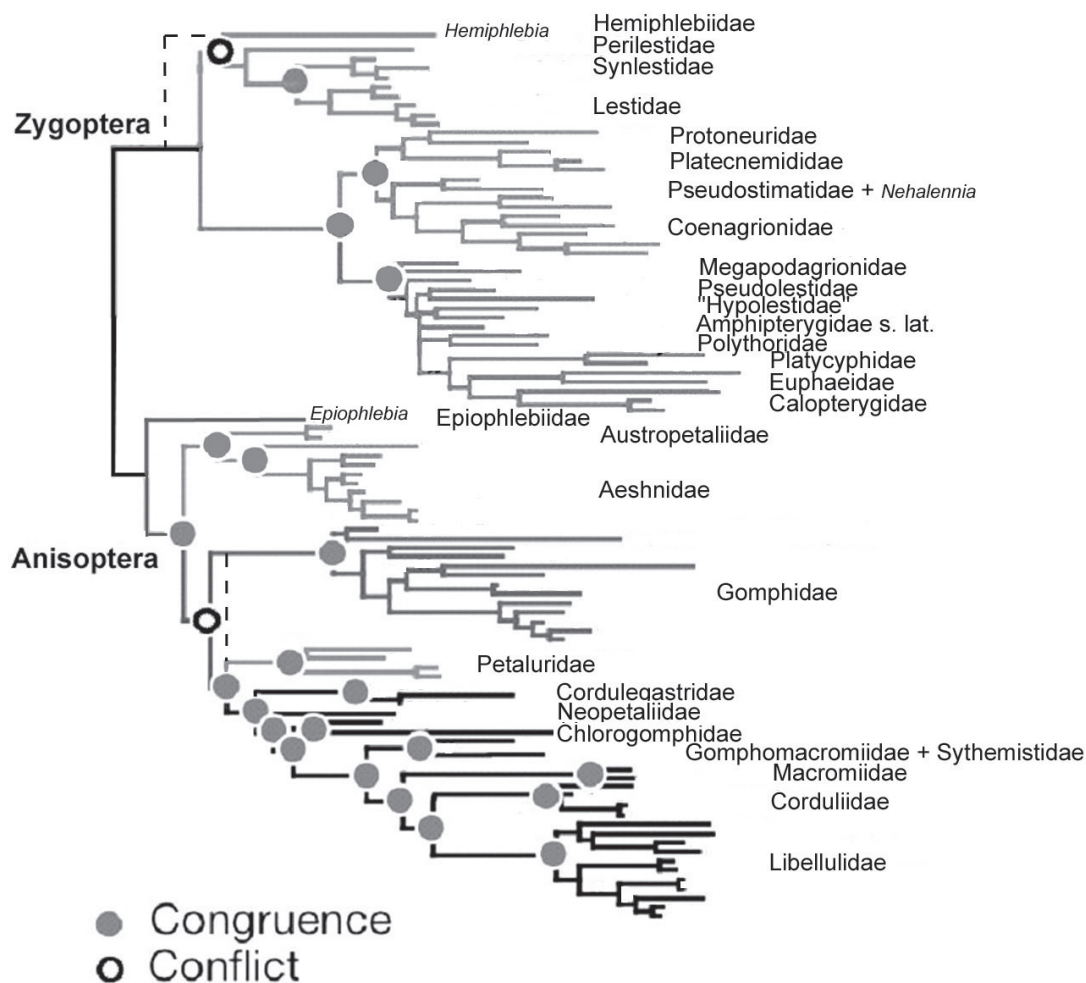


Figure 3: Preliminary DNA sequence-based hypothesis based on unpublished work of Kjer, Carle, and May. Data include large subunit (28S) nuclear rDNA, small and large subunit (12S, 16S) mitochondrial rDNA (largely from Misof et al 2001), and the nuclear protein-coding gene, EF1 α . Filled indicate branch point that are congruent among separate data sets while open circles indicate those in which analyses of individual data sets are in conflict.

Odonata. Ultimately we will include morphological data and information from additional genes not included here, but the following information is based largely on mitochondrial and nuclear ribosomal DNA. And despite my remarks about punch lines, by no means does this analysis solve all our problems, so let the odonatologist beware. First, they obviously omit many interesting taxa, and they resolve the order to families, at best; Jessica Ware (Ware et al., 2007 in press) has made a great deal of progress toward a more detailed understanding of Libellulidae, but I won't deal specifically with her results. Each terminal "twig," by the way, represents a species, but I've left out the names both to make the tree less cluttered and because, honestly, I don't want to put all the details in ARGIA before they appear in a refereed publication. Second, the tree shown here is a couple of years out of date. Even as I type, Karl and Frank are (I hope) slaving over a large number of new sequences, including new taxa and additional genes, that will undoubtedly change the current picture somewhat, and we will ultimately include a large set of morphological data.

Our current hypothesis is summarized in Fig. 3. It represents combined data from nuclear rDNA, mitochondrial rDNA, and the nuclear protein coding gene, EF1 α , although not all taxa are represented by data from all genes. The major branch points that are recovered in all data partitions (i.e., the separate analyses of each independent data set, in this case each independently inherited gene) are shown by solid circles, those that are not recovered in some partitions but are in the whole data set, are indicated by open circles. Only two incongruent branchings are found: in some trees, *Hemiphysalis* is the sister taxon to all other Zygoptera (as shown by the dashed line) rather than to Lestoidea, and in some the Petaluridae form a clade with Gomphidae rather than with Libelluloidea. Also notice that the tree is in the form of a phylogram. That is, the branch lengths are approximately proportional to the number of genetic changes thought to have occurred between successive bifurcations, or between the last bifurcation and a terminal taxon. In other words, if the analysis shows a particular branch to be very short, it means that the amount of evolutionary change from the beginning to the end point is small. This, in a sense, suggests that evidence supporting that branch is scanty, although even a short branch may be reliable if it is found with sufficient consistency. Incidentally, unusually long branches can also both indicate and cause problems in analysis.

In any event, to make a long story short, our results indicate that both Anisoptera and Zygoptera are monophyletic. As in other schemes, *Epiophlebia* is the closest living relative of Anisoptera, and the generally-recognized anisopteran families are all recovered as monophyletic,

with Aeshnoidea (Austropetaliidae + Aeshnidae) basal. Note, by the way, that the separation of Austropetaliidae and Neopetaliidae (Carle & Louton, 1994) is strongly supported. Gomphids branch next and are distinguished by a large number of synapomorphies. Petalurids (with the caveat noted above, that some evidence suggests a relation to Gomphidae) seem most likely to be the sister group to the Libelluloidea, as broadly defined to include Cordulegastridae.

The latter family, Neopetaliidae, and Chlorogomphidae form a paraphyletic assemblage and therefore clearly seem to deserve recognition as separate families despite phenotypic similarities. Gomphomacromiidae (here represented only by *Gomphomacromia*, but similarly placed even if many more taxa are included; Ware et al., 2007) and Synthemistidae together form the basal clade of a well marked group of families forming the more traditional Libelluloidea. The generic composition of gomphomacromiids and synthemistids, and whether they deserve separate family status, is an ongoing study—stay tuned. Finally, to my personal surprise, Macromiidae, Corduliidae (restricted to the Corduliinae of Fraser, 1957, Bridges, 1993, and others) and Libellulidae form very distinct clades that, we now believe, each deserve family status. In particular, Macromiidae + Corduliidae is paraphyletic.

With a few exceptions then, relationships among Anisoptera are reasonably clear and well supported by concordant data. The Zygoptera is another story. First, the much debated position of *Hemiphysalis* still is not clear, although our best estimate implies that it is a very basal leptoidea. At least we can be pretty certain it isn't an aberrant coenagrionoid. The suborder is clearly divided into three major clades, with Lestoidea the sister to Coenagrionoidea + Calopterygoidea. The leptoidea seem to fall into more or less traditional families, although our taxon sampling here (and in other Zygoptera groups) needs expansion.

Coenagrionoidea and Calopterygoidea are closer to one another than either is to Lestoidea. In the former, several of the expected families are recovered, although *Nehalennia* groups with *Pseudostigma*, not other Coenagrionidae—on its surface about as unlikely a pairing as one could imagine. Furthermore, it now appears questionable whether either Coenagrionidae or Protoneuridae are monophyletic. We're still working, too, on the placement of Platycnemididae and Isostictidae, neither of which are included in this tree and both of which have been unstable in recent unpublished analyses. So, a lot of work remains here.

A lot of work also remains to be done on the Calopterygoidea. Perhaps surprisingly, although much as predicted by Fraser (1957), Megapodagrionidae and Pseudolestidae

are pretty clearly the basal families of this clade. These two are not easy to define or discriminate by either molecular or morphological criteria and may be a paraphyletic assemblage. They are also relatively poorly distinguished by our data from Amphipterygidae and Polythoridae (another real surprise). The terminal families are those of traditional calopterygoids with numerous antenodal crossveins. This branch is perhaps the most problematic in the entire tree. One conclusion that is clear though, is that Calopterygidae and their closest relatives are not plesiotypic Zygoptera. Megapodagrionids, in a loose sense, are probably basal calopterygoids, but the identity and relationships of the families, especially at the base and middle of the clade, are very far from certain. I can only raise the inevitable cry of the ignorant—more data are needed.

Perhaps many readers at this point feel much as they might after spending a hot afternoon slipping on algae-covered stones in a rushing creek after uncatchable gomphids. Despite our best efforts, a lot of uncertainty remains, and it's sometimes frustrating to wade through all the contradictory information and opinion and still not have clear answers. Nonetheless, I think we're gradually closing in on a fairly close approximation of "odo-evo". In five or ten years, call my home health aide and I'll give you an update.

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Odonata Survey of Blue Wall Nature Preserve and Bunched Arrowhead Heritage Trust Preserve, Greenville County, South Carolina

Wade B. Worthen and Christopher M. Jones, Department of Biology, Furman University, Greenville, SC 29613.
<worthen@furman.edu>

We surveyed odonates at two natural areas in Greenville County, South Carolina, from March 2005 through August 2007. Bunched Arrowhead Heritage Trust Preserve is owned by the state of South Carolina and is overseen by the S.C. Department of Natural Resources. It is located approximately 15 km N of Greenville in Travelers Rest, its 72 ha contain mostly old fields and successional forest dominated by Virginia pine (*Pinus virginiana*) and sweetgum (*Liquidambar styraciflua*). The site also contains a rare seepage habitat that is home to one of the rarest plants in the world, bunched arrowhead (*Sagittaria fasciculata*). Bunched arrowhead is only known from Greenville County, South Carolina, and Henderson Co., North Carolina (USFWS, 1991). There is also a small stream, and a 0.10 ha impoundment (34° 59′ 32″ N, 82° 24′ 27″ W) that was the primary site for odonate collections.

We also sampled two impoundments at the Blue Wall Nature Preserve in northern Greenville Co., South Carolina, approximately 6.5 km W of Landrum, SC, and 1 km from the border of North Carolina. The 222 ha preserve is owned by The Nature Conservancy. The ponds were both ca 1 ha, and were ca 500 m apart. They were designated as “Upper Blue Wall” (UB; 35° 10′ 54″ N, 82°

15′ 55″ W) and “Lower Blue Wall” (LB; 35° 10′ 54″ N, 82° 15′ 35″ W).

Species were recorded as “observed” [O], “photographed” [P], or “collected” [C]. The “observed” status was only used for unambiguous species such as *Anax longipes* (Comet Darner), and was never used as evidence for a new county record. Collected specimens are cataloged and preserved in the Furman University Zoological Collection. (Collections were permitted under S.C. State Parks permit number N-12-02 and N-01-04). The list includes six new county records confirmed by photograph or collected specimen.

Bunched Arrowhead Heritage Trust Preserve

Total of 42 species (* = new county record, Abbott, 2007).

Amphiagrion saucium (Eastern Red Damsel) [C]
Anax junius (Common Green Darner) [C]
Anax longipes (Comet Darner) [O]
Argia fumipennis (Variable Dancer) [O]
Basiaeschna janata (Springtime Darner) [P]

Boyeria vinosa (Fawn Darner) [C]
Calopteryx maculata (Ebony Jewelwing) [C]
Celithemis elisa (Calico Pennant) [C]
*Celithemis eponina** (Halloween Pennant) [C]
Celithemis fasciata (Banded Pennant) [P]
*Celithemis verna** (Double-ringed Pennant) [C]
Chromagrion conditum (Aurora Damsel) [C]
Cordulegaster bilineata (Brown Spiketail) [C]
Enallagma aspersum (Azure Bluet) [C]
*Enallagma geminatum** (Skimming Bluet) [C]
Enallagma traviatum (Slender Bluet) [C]
Erpetogomphus designatus (Eastern Ringtail) [C]
Epithecina [Tetragoneuria] *cynosura* (Common Baskettail) [C]
Erythemis simplicicollis (Eastern Pondhawk) [C]
Erythrodiplax minuscula (Little Blue Dragonlet) [C]
Gomphus exilis (Lancet Clubtail) [C]
Ischnura hastata (Citrine Forktail) [C]
Ischnura posita (Fragile Forktail) [C]
*Ischnura ramburii** (Rambur's Forktail) [C]
Ladona deplanata (Blue Corporal) [C]
Lestes disjunctus australis (Southern Spreadwing) [C]
Lestes vigilax (Swamp Spreadwing) [C]
Libellula auripennis (Golden-winged Skimmer) [C]
*Libellula axilena** (Bar-winged Skimmer) [C]
Libellula cyanea (Spangled Skimmer) [C]
Libellula flavida (Yellow-sided Skimmer) [C]
Libellula incesa (Slaty Skimmer) [C]
Libellula luctuosa (Widow Skimmer) [C]
Libellula pulchella (Twelve-spotted Skimmer) [C]
Libellula semifasciata (Painted Skimmer) [C]
Libellula vibrans (Great Blue Skimmer) [O]
Pachydiplax longipennis (Blue Dasher) [C]
Pantala hymenaea (Spot-winged Glider) [C]
Perithemis tenera (Eastern Amberwing) [C]
Platthemis lydia (Common Whitetail) [C]
Tramea carolina (Carolina Saddlebags) [C]
Tramea lacerata (Black Saddlebags) [C].

Blue Wall Nature Preserve

Total of 38 species (* = new county record, Abbott, 2007).

Anax junius (Common Green Darner) [P]
Anax longipes (Comet Darner) [O]
Argia fumipennis (Variable Dancer) [C]
Basiaeschna janata (Springtime Darner) [C]
Calopteryx maculata (Ebony Jewelwing) [C]
Celithemis elisa (Calico Pennant) [P]
Celithemis fasciata (Banded Pennant) [C]
Cordulegaster erronea (Tiger Spiketail) [C]
Didymops transversa (Stream Cruiser) [C]
Dromogomphus spinosus (Black-shouldered Spinyleg)

[O]
Dythemis velox (Swift Setwing) [O]
Enallagma divagans (Turquoise Bluet) [C]
Epiaeschna heros (Swamp Darner) [C]
*Enallagma vesperum** (Vesper Bluet) [C]
Epithecina [Tetragoneuria] *cynosura* (Common Baskettail) [C]
Epithecina [Epicordulia] *princeps* (Prince Baskettail) [O]
Erythemis simplicicollis (Eastern Pondhawk) [P]
Erythrodiplax minuscula (Little Blue Dragonlet) [O]
Gomphus exilis (Lancet Clubtail) [C]
Gomphus lividus (Ashy Clubtail) [C]
Hagenius brevistylus (Dragonhunter) [P]
Ischnura posita (Fragile Forktail) [C]
Ladona deplanata (Blue Corporal) [O]
Lestes vigilax (Swamp Spreadwing) [C]
Libellula auripennis (Golden-winged Skimmer) [O]
Libellula cyanea (Spangled Skimmer) [C]
Libellula flavida (Yellow-sided Skimmer) [C]
Libellula incesa (Slaty Skimmer) [C]
Libellula luctuosa (Widow Skimmer) [C]
Libellula pulchella (Twelve-spotted Skimmer) [P]
Libellula semifasciata (Painted Skimmer) [C]
Pachydiplax longipennis (Blue Dasher) [C]
Perithemis tenera (Eastern Amberwing) [O]
Platthemis lydia (Common Whitetail) [C]
Progomphus obscurus (Common Sanddragon) [P]
Tachopteryx thoreyi (Gray Petaltail) [C]
Tramea carolina (Carolina Saddlebags) [O]
Tramea lacerata (Black Saddlebags) [O].

Web site with photos can be viewed at <<http://facweb.furman.edu/~wworthen/dfies/dfies.htm>>.

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Summer of Fun: Odonates on the Oswegatchie River in New York

William J. Nichols, Jr. and Jenna R. McAdoo, (WJN) Northern Illinois University, Dept of Biological Sciences
DeKalb, IL 60115 <wnichols@niu.edu>; (JRM) SUNY Oswego Department of Biological Sciences, P.O. Box 461,
Middleburgh, NY 12122

The summer of 2007 has been one of the best times of my ode career. I spent it with friends and family, the best women in the world, thousands of odonates; and I caught the largest catfish I have ever landed on the beautiful Oswegatchie River and Upper and Lower lakes, St. Lawrence County, New York. These bodies of water connect through a small outlet that is normally dammed by beavers, unless local residents remove it, so I decided I would study both bodies of water at the same time. The stretch of river is several miles long and has waterfalls at each end and approximately 15 summer camps that people privately own. I stayed at one of these camps, called the McAdoo Camp, during my surveying. The water was deep amber; and the shore was filled with pickerel weed, stones (dumped by farmers in the past), and water logged limbs of trees that was perfect habitat to provide for a great diversity of flies and an amazing diversity was seen.

I collected 39 different species (see list below), not to mention the ones I was unable to capture. Notable finds were a Rapids Clubtail (*Gomphus quadricolor*), Hagen's Bluet (*Enallagma hageni*), and an Arrow Clubtail (*Stylurus spiniceps*), which is a new county record. Even though I identified the *S. spiniceps*, what excited me was that it was given to me by a young girl that was spending the weekend at her camp and found out I was studying odes. This happened numerous times with different odes and was the most exciting part of my study in the region because not only did they help, but I had the opportunity to educate people on the Oswegatchie as to why odonates are so important to them.

Species List

CALOPTERYGIDAE

Calopteryx aequabilis (River Jewelwing), *Calopteryx maculata* (Ebony Jewelwing)

LESTIDAE

Lestes dryas (Emerald Spreadwing), *Lestes forcipatus* (Sweetflag Spreadwing), *Lestes rectangularis* (Slender Spreadwing), *Lestes congener* (Spotted Spreadwing)

COENAGRIONIDAE

Argia moesta (Powdered Dancer), *Coenagrion resolutum*

(Taiga Bluet), *Enallagma civile* (Familiar Bluet), *Enallagma ebrium* (Marsh Bluet), *Enallagma exsulans* (Stream Bluet), *Enallagma hageni* (Hagen's Bluet), *Enallagma signatum* (Orange Bluet), *Enallagma vesperum* (Vesper Bluet), *Ischnura posita* (Fragile Forktail), *Ischnura verticalis* (Eastern Forktail), *Nehalennia irene* (Sedge Sprite)

AESHNIDAE

Aeshna canadensis (Canada Darner), *Aeshna verticalis* (Green-striped Darner), *Anax junius* (Common Green Darner), *Basiaeschna janata* (Springtime Darner)

GOMPHIDAE

Dromogomphus spinosus (Black-shouldered Spinyleg), *Gomphus* (*Gomphus*) *exilis* (Lancet Clubtail), *Gomphus* (*Gomphus*) *quadricolor* (Rapids Clubtail), *Gomphus* (*Hylogomphus*) *adelphus* (Moustached Clubtail), *Stylurus spiniceps* (Arrow Clubtail)

CORDULIIDAE

Cordulia shurtleffii (American Emerald), *Dorocordulia libera* (Racket-tailed Emerald), *Epithea* (*Tetragoneuria*) *cynosura* (Common Baskettail), *Epithea* (*Tetragoneuria*) *spinigera* (Spiny Baskettail)

LIBELLULIDAE

Erythemis simplicicollis (Eastern Pondhawk), *Ladona julia* (Chalk-fronted Corporal), *Leucorrhinia hudsonica* (Hudsonian Whiteface), *Leucorrhinia intacta* (Dot-tailed Whiteface), *Libellula luctuosa* (Widow Skimmer), *Libellula quadrimaculata* (Four-spotted Skimmer), *Pachydiplax longipennis* (Blue Dasher), *Sympetrum obtrusum* (White-faced Meadowhawk), *Sympetrum vicinum* (Autumn Meadowhawk) 

Lanthus vernalis (Southern Pygmy Clubtail) Finally Found in Canada

Robert W. Harding, <rwarding@eastlink.ca>

Until this summer, *Lanthus vernalis* (Southern Pygmy Clubtail) had not been recorded from anywhere in Canada. It is one of those species that has certainly been anticipated, given its known distribution in Maine less than 50 km (30 miles) from the New Brunswick border, but has until now evaded detection east of the border. I can recall a meeting of the Atlantic Dragonfly Inventory Program (ADIP) in New Brunswick, where we were eager to find it, and while we found *L. parvulus* (Northern Pygmy Clubtail), we came up short on *L. vernalis*.

On a sunny 7 July 2007 two males were taken in northeastern Kings County, New Brunswick, about 195 km (120 miles) east of the nearest locale, and 160 km (100 miles) east of the US border. We were driving back home to Prince Edward Island from New Brunswick, the kids were asleep and my wife Karen, recognizing that my focus was more on the beautiful streams we were passing than the road, suggested that I stop and stretch my legs.

I stopped at the next water I saw—a small stream that frankly didn't look all that promising for odes from the road. It was 1–2 m wide, with plenty of riffles and protruding rocks, and small trout were jumping. The usual suspects were there: *Calopteryx aequabilis* (River Jewelwing), *C. amata* (Superb Jewelwing), *C. maculata* (Ebony Jewelwing), *Ischnura verticalis* (Eastern Forktail), and *Cordulegaster maculata* (Twin-spotted Spiketail)—but also *Amphiagrion saucium* (Eastern Red Damsel), a real treat for me as this was my first encounter with them, and they are uncommon in New Brunswick.

The *L. vernalis* were perched on the top of bushes leaning over the water, about 1 m above the surface. I was actually working my way back to the highway when I noticed one male raise up briefly to follow a passing *Calopteryx* (*aequabilis* I think) and quickly return to its perch. I doubt I would have noticed it at all, but I was lucky to be right there when it moved. The second male was about 3 m upstream from the first, and at nearly the same type of perch.

I thought they were likely *L. parvulus*, but didn't examine them more closely until later that night at home. I packaged one and sent it to Paul Brunelle, who confirmed it as *L. vernalis*. This was a pretty exciting find—I only wish I had time to return and examine the site more closely. Hopefully more *L. vernalis* specimens will be found to add to its known range.

One of the specimens taken will be deposited to the New Brunswick Museum, the other to the Canadian National Collection of Insects, Ottawa.

Comments from Paul Brunelle

Bob Harding and his family are unquestionably the greatest volunteer contributors to ADIP, dating from when he cozened me into starting the organization in the mid-1990s. They have contributed ~4,000 records to the ADIP databases (1/3 of our records in total), from all of the Maritime Provinces. Their data is documented to exemplary standards (that would be due to Bob; the boys tend to be better at acquisition than documentation), and include many records of significance, including provincial firsts. Their excellently curated voucher specimens are largely deposited at the New Brunswick Museum.

The Hardings are of five principal groups—James Harding, Bob's father, who has contributed many records of note from Queens County, Nova Scotia; Bob himself, who has taken specimens and careful observations all over the region; the 'J' series Harding sons (Jacob and Jordan) with many records to their credit; the 'C' series Hardings sons (Clayton and Caleb) who are just finding their wings, so to speak; and finally, but by no means least, Karen Harding, who has the patience of a saint.

Lanthus vernalis is a species of limited global distribution—largely confined to the Appalachians from northern Georgia north to Maine, west to the southern shores of the eastern Great Lakes, and is an inhabitant of primary streams. Prior to Bob's discovery, its most northern locale was at Hales Creek, Aroostook County, Maine, where it had been discovered in 1997 by Blair Nikula and the famous Somatochlora Swat Team out of Massachusetts. Emergence has been confirmed in that brook, and it conforms in most respects to the character of the brook of Bob's discovery.

The species will likely be considered of conservation interest in Canada, although it is reckoned secure both globally and in the United States, and it is listed as of conservation concern in Maine (S1S2).



Evening Skimmer (*Tholymis citrina* Hagen) in Arizona

Rich Bailowitz <raberg2@earthlink.net>

A number of collecting trips were made to the eastern edges of Arizona during the late spring of 2007. One function of these forays was to take advantage of the only region in the state not suffering from the intense, prolonged drought.

On 12 June, Doug Danforth, Sandy Upson, Sid Dunkle, and I investigated the Gila River primarily upstream from the town of Duncan in Greenlee County. Several stops were made and a total of about 30 species of odonates was found along the easternmost four miles of river (and an old fish pond) west of the New Mexico border.

Along one stretch, water is pulled from the drainage, used agriculturally, and returned to the floodplain. In this reach of returned water, the flow is along a bench above the river for several hundred yards and cottonwood and willow saplings have formed a young flooded woodland. Willow Flycatchers were singing in this area.

In the late morning, while walking in calf-deep water through this 10–15 foot high flooded forest, I flushed a nondescript dragonfly. It flew 15 to 20 feet ahead of me and dipped up inside a willow, hanging from a low branch in the shade. It appeared to be about the size, and had the mid-day behavior, of *Brechmorhoga mendax* but when it was netted, it proved to be a species unknown to me. Both Doug Danforth and Sid Dunkle confirmed its identification as *Tholymis citrina*. This is a first for the state

of Arizona and easily the westernmost North American record to date.

Normally, this is a species of coastal flooded forests, from southern Mexico south to Brazil (Abbott, 2005) and is perhaps no more than a stray to the southern borders of the United States in Florida and Texas. However, its routinely crepuscular habits, flying mostly before dawn (Forster, 2001), are odd for a libellulid and may disguise the possibility that it is more widespread in the southern U.S. than we think.

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Note on the Occurrence of *Nehalennia pallidula* Calvert (Everglades Sprite) in Bay County, Florida.

Edwin and Lisa Keppner, and Jerrell J. Daigle, Tallahassee, Florida <jdaigle@nettally.com>

According to the sources one examines, *Nehalennia pallidula* Calvert (Everglades Sprite) has been reported from 9–12 counties in Florida, and all of the counties on record are in the peninsula of Florida. On 30 April 2007 and 17 May 2007, Ed collected a number of specimens of a species of *Nehalennia* from a location in Bay County. He keyed the specimens to *Nehalennia pallidula*, but was convinced that the identification was in error because *N. pallidula* did not occur anywhere near Bay County. The specimens were brought to Jerrell J. Daigle for help in identifying the specimens. He tentatively identified them as *N. sp.* or *Ischnura sp.* The site was visited by us on 21 August 2007, and a number of specimens were observed

and collected. Jerrell confirmed the identification as *N. pallidula*.

The specimens agree with the description provided by Dunkle (1990) and Westfall and May (1996) in that the male has a tall, erect lobe at the posterior of the prothorax and the dorsal terminal abdominal appendages are longer than ventral appendages. The cerci are about ½ the length of abdominal segment 10. Abdominal segments 8 and 9 are black dorsally and segment 10 has a black spot on the basal dorsal surface. The female has a more square and sloping central projection at the posterior of the prothorax and a small ventral spine on abdominal segment 8.

Abdominal segments 8 and 9 are black dorsally with segment 10 black basally.

The number of specimens observed and netted (35–40) at the site and the size of the site indicates that this is a permanent population of this species. The April collection yielded mostly juveniles and the August collection yielded all adults. *N. pallidula* is present at the site at least from late April to the end of August based on the collection dates.

The site is located on a peninsula of land between Cedar Creek and Econfina Creek along the shore of Deer Point Reservoir in Bay County, Florida. Specimens were collected and observed along both shores of the peninsula (85° 34.75' W and 30° 19.81' N for the west site and 85° 31.50' W and 30° 31.50' N for the east site) on property owned by the Northwest Florida Water Management District. Both sites where adults were found are upland strips of habitat along the lake. The distance along the sides of the peninsula that is occupied by the species is not known.

The adults occupied a strip of forested area along the west and east shoreline of the peninsula at the time of collection. The western site is dominated by large slash pines (*Pinus elliotii*), with scattered water oak (*Quercus nigra*), sweetgum (*Liquidambar styraciflua*), and an occasional southern magnolia (*Magnolia grandiflora*) in the closed canopy. The understory and shrub layer consists of sparse wax myrtle (*Myrica cerifera*), wild olive (*Osmanthus americanus*), titi (*Cyrilla racemiflora*), and muscadine (*Vitis rotundifolia*). Ground cover consisted of patches of slender woodoats (*Chasmanthium laxum*) scattered among the bare areas

that were covered with pine needles and oak leaves. The eastern site is similar except the slope to the shoreline was greater, and the ground cover is almost completely pine needles and oak leaves.

The shoreline of the peninsula has a broad area of emergent wetland vegetation dominated by sawgrass (*Cladium jamaicense*), with giant cutgrass (*Zizaniopsis miliacea*), sedges, and floating aquatic vegetation such as lemon bacopa (*Bacopa caroliniana*) and American white water lily (*Nymphaea odorata*). Deer Point Reservoir was formed in the early 1960s by the construction of a dam at the mouth of Econfina Creek at its entrance to North Bay, an arm of the St. Andrew Bay estuary. Econfina Creek is a primarily spring-fed creek that provides high quality water to the Reservoir.

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Macrothemis pseudimitans (White-tailed Sylph), New Species for the U.S.

Doug Danforth <danforthdg@aol.com> and Rich Bailowitz <raberger2@q.com>

On 14 September 2007 we were checking Black Draw, a small stream on the San Bernardino National Wildlife Refuge fifteen miles east of Douglas, Arizona. A small Libellulid was seen cruising the stream. Its flight was low over the water in beats of eight to ten feet and the white spot on the expanded tail could be seen as well as the light turquoise striping on the thorax and the blue eyes. At one point, it perched high in a mesquite tree, only giving us a view of its underside. We knew it had to be a *Macrothemis* or the tiny *Brechmorhoga praecox*. Upon its capture it was quickly identified as *Macrothemis pseudimitans* as we are familiar with that species from neighboring Sonora.

The northern most records for *M. pseudimitans* are from Tepoca, Sonora. This is approximately two hundred miles due south of the San Bernardino NWR location.

The form encountered was the spotted tail form which has a large triangular white spot on segment seven. This form seems to be less commonly encountered in Sonora than the form with totally pruinose segments seven and eight. This is the character from which this species gets its common name.



Additional Records of Odonata from Tamaulipas, San Luis Potosí, Hidalgo, and Querétaro States, Mexico

Robert A. Behrstock, Marion Dobbs, Sidney Dunkle, and Mike Overton, (BB) 10359 S. Thicket Pl., Hereford, AZ 85615 <rbehrstock@cox.net>; (MD) 9 Bridlewood Lane, Rome, GA 30165 <ecurlew@mac.com>; (SD) 8030 E Lakeside Pkwy., Tucson, AZ 85730, <sidneydunkle@msn.com>; (MO) PO Box 1196, Weslaco, TX 78599 <mdover-ton@rgv.rr.com>

Resumen

Con base en visitas durante Octubre y Noviembre 2006 y Abril 2007, se presentan aquí 24 registros de Odonata (11 Zygoptera y 13 Anisoptera) que no estaban reportados por los estados de Tamaulipas, San Luis Potosí, Hidalgo, o Querétaro, México.

Introduction

During October and November 2006, and April and July 2007, we observed Odonata in northeastern Mexico while traveling with friends or leading birding or butterfly tours (Table 1). New state records are provided for Tamaulipas (8), San Luis Potosí (2), Hidalgo (1), and Querétaro (13). Records are based upon specimens (14), photographs (6), and sightings (4). Most records fill gaps within a species' known distribution; noteworthy findings are discussed. Complete species lists for each site may be obtained from the respective authors. Less familiar common names were suggested by Paulson and May (in litt., 2 Nov 2006). Voucher specimens are deposited with Dennis R. Paulson, and the Colección Nacional de Insectos (CNIN), UNAM, Mexico.

Species List

Hetaerina cruentata (Rambur, 1842)

Site J: One male collected from twigs along stream. Specimen, RAB.

Site K: One male perched on stems at streamside. Specimen, RAB.

Acanthagrion quadratum Selys, 1876: Mexican Wedgetail

Site J: Males were numerous, perched on grassy vegetation along stream and pool edges. Specimen, RAB.

Apanisagrion lais (Brauer in Selys, 1876): Black-and-white Damsel

Site K: Two females (one teneral) taken from low, herbaceous growth along stream and pools. Two additional females and two males were observed. Specimens, RAB.

Argia anceps Garrison, 1996: Cerulean Dancer

Site K: One male on stream margin. Specimen, RAB.

Argia cuprea (Hagen, 1861): Coppery Dancer

Site C: Tandem pairs with females ovipositing in streamside vegetation establish the presence of *cuprea* in Tamaulipas. Although the similar *A. oenea* is common in Tamaulipas, they were not observed alongside *cuprea*. This is the northeastern-most record of *cuprea* for Mexico. Photos, MD.

Argia immunda (Hagen, 1861): Kiowa Dancer

Site J: Many males and a few females, as well as ovipositing pairs were present on terrestrial and emergent aquatic vegetation at stream edge. Sight record, RAB.

Argia plana Calvert, 1902: Springwater Dancer

Site C: At Los Troncones *plana* exhibits the bright blue body coloration typical of populations in Monterrey, Nuevo León, and in the Texas Hill Country. As was the case in Monterrey (Photos, RAB), these males exhibited either simple or forked humeral stripes. An individual with a forked humeral stripe possessed a prominent lateral streak on segment 3 (Dobbs photo). On another individual with a simple humeral stripe, the streak was greatly reduced or absent (Dobbs photo). The presence of *plana* near sea level is noteworthy. Photos, MD.

Argia rhoadsi Calvert, 1902: Golden-winged Dancer

Site J: Two males were collected from stream edge vegetation where common. Specimens, RAB.

Argia ulmeca Calvert, 1902: Olmec Dancer

Site K: A male and a copulating pair collected from low growth along stream. Specimens, RAB.

Ischnura posita (Hagen, 1861): Fragile Forktail

Site G: At least 12 males and females were observed in grasses near water's edge or on emergent vegetation. Dennis Paulson notes these males have a patch of blue on top of abdominal segment 9 and are thus intermediate between typical *I. p. posita* of the US (without blue or, rarely, with a small spot) and *I. p. atezca*, described from Hidalgo (much blue present on 9, usually some on 8) (Novelo-Gutiérrez & Peña-Olmedo, 1989). As Hidalgo isn't far from S Tamaulipas, such an occurrence is not surprising. Note that this population now bridges the gap between those previously known for *I. p. posita* and *I. p. atezca*. This record augments those from San

Luis Potosí, Hidalgo, and Quintana Roo. Specimens, RAB.

Neoneura amelia Calvert, 1903: Amelia's Threadtail

Site F: Steep slope with dry forest. One male observed on emergent grass stems in concrete-lined roadside drainage box, approx. 2 × 1.5 m and less than 0.3 m deep. Sight record, RAB.

Site H: Several pairs ovipositing plus a few males patrolling over water. Oviposition tandem, on bits of leaves on open pond surface. Also one male clinging to fine branch tip approx. 2 m above edge of

Table 1. Sites visited by the authors

Site	Date/Time	Location	Obs.
A	15 Oct 2006	La Poza Madre recreation area, Tamaulipas. Narrow trail through tall scrub and light woodland of semi-deciduous forest. NW of Ciudad Mante. N 22° 47' 13", W 99° 14' 05" Elev. 185 m.	RAB
A-2	17 Apr 2007 15:45–17:30 hrs.	Same general location as above but elevation approximately 30 m lower. Tamaulipas. Cypress-lined river, low water, dry season flow with much exposed substrate and boulders. River shallow, slow, and clear.	RAB
B	16 Oct 2006	Río Sabinas, El Azteca village W of Mexico Hwy 85, Tamaulipas. N 23° 06' 43" W 99° 08' 35" Cypress-lined river.	RAB
C	10 Nov 2006 Afternoon visit	Centro Recreativo Los Troncones, W side of Ciudad Victoria, Tamaulipas. N 23° 47' 30" W 99° 11' 05", c. 296 m elevation.	MD
D	14 Nov 2006 11:00–14:00 hrs.	Headwaters of Río Frio at Bocatoma II, Tamaulipas. N 22° 59' 10" W 99° 08' 54" Elev. Approx. 85 m. Small fish ponds adjacent to shallow, clear river through evergreen and semi-deciduous forest.	RAB
E	11 Nov 2006 Afternoon visit	Cañon del Novillo, SW side of Cd. Victoria, Tamaulipas. Approximately N 23° 42' 08", W 99° 12' 58" Elev. approximately 1,500'	MD
F	16 Apr 2007, 16:50–17:50 hrs.	Roadside between Tula and Ocampo, Tamaulipas. Tamps. State Hwy 66 at approx. Km 24.5. N 22° 55' 49", W 99° 30' 58" Elev. 904 m.	RAB
G	17 Apr 2007 12:10–13:25 hrs.	Sunny, large pond at village of La Servilleta, Tamaulipas. S of Ocampo Rd. N 22° 51' 39", W 99° 07' 26" Elev. 80 m.	RAB, MO
H	17 Apr 2007, 13:30–15:00 hrs.	Stream crossing en route to La Poza Madre recreation area, Tamaulipas. Shallow, wide and narrow sections, also small muddy pools and one large, deep pool just upstream. This site is a flowing low water crossing during rainy season (i.e., Oct) but little water this date. N 22° 49' 10", W 99° 14' 02" Elev. 176 m.	RAB, MO
I	20 Apr 2007, 10:20–10:50 hrs.	Río Moctezuma, Hidalgo, approx 21 km SW of Tamazunchale, San Luis Potosí (S.L.P.). River fast and turbid with limited access and little emergent vegetation. N 21° 10' 50", W 98° 59' 52" Elev. 238 m.	RAB, MO
J	20 Apr 2007, 11:00–12:00 hrs.	Pisaflores, just N of Río Moctezuma, Querétaro. Approx 22 km SW of Tamazunchale, S.L.P. Shallow, sunny stream in village, part of which served as a roadbed. Muddy bottom with a few shallow side pools. N 21° 11' 24", W 98° 59' 54" Elev. 233 m.	RAB, MO
K	20 Apr 2007, 14:00–15:20 hrs.	Just NW of Agua Zarca, Queretaro. Approx. 33 km WSW of Tamazunchale, S.L.P. and approx 7 km S of Mexico Hwy 120. Small seep on steep hillside (probably a wet season waterfall) forming short stream with muddy pools before feeding into a concrete ornamental/recreational pool and then disappearing under road. N 21° 13' 52", W 99° 06' 45" Elev. 1,344 m.	RAB, MO
L	12 July 2007, late morning	San Luis Potosí, 22 km N of Mexico Hwy 70 on paved road to El Naranjo. Slough-like vegetated pond at forest/field edge in flat land.	SD

- pond. Specimens, RAB.
- Site A-2: Perhaps five present near banks in slower, cypress-shaded portions of river, where sympatric with *Protoneura cara*. Specimen, RAB.
- Dromogomphus spoliatus* (Hagen in Selys, 1858): Flag-tailed Spinyleg
- Site A: In Mexico, *D. spoliatus* is known only from Nuevo León (Paulson & González Soriano 2007). This distinctive clubtail occurs in much of Texas, including the Lower Rio Grande Valley just across the Rio Grande (Río Bravo del Norte) from Tamaulipas. This individual was photographed on a narrow, sunny trail cut through tall scrub and light woodland where it flew alongside *Phyllogomphoides albrighti* (Needham, 1950) (Five-striped Leaf-tail) and *P. suasus* (Selys, 1859) (Common Leaf-tail). The closest river was perhaps 100 m distant. Photos, RAB.
- Brechmorhoga praecox* (Hagen, 1861): Thread-waisted Clubskimmer
- Site I: Two males and one female collected from river edge. The date is somewhat earlier than 1 May presented for Mexico (Veracruz) in Needham et al. (2000). Specimens, RAB, MO.
- Dythemis nigrescens* Calvert, 1899: Black Setwing
- Site J: One or two males patrolling stream margins and perching on brush. Specimen, MO.
- Dythemis sterilis* Hagen, 1861: Brown Setwing
- Site J: One male defending a territory along the edge of a small stream and adjacent pool. Sight record, RAB.
- Erythemis haematogastra* (Burmeister, 1839): Red Pondhawk
- Site L: One male perched periodically on barbed wire fence at the edge of wooded slough. This species has been recorded to the east in Tamaulipas. Photo, SD.
- Erythemis plebeja* (Burmeister, 1839): Pin-tailed Pondhawk
- Site J: One or two males perching near water's surface on bent stems of aquatic vegetation. Sight record, RAB.
- Erythemis simplicicollis* (Say, 1839) Eastern Pondhawk
- Site J: One not quite mature male with some green on thorax was perched on mud at the edge of a small, open pool. Sight record, RAB.
- Orthemis discolor* (Burmeister, 1839): Carmine Skimmer
- Site J: One male patrolling stream. Specimen, MO.
- Orthemis levis* Calvert, 1906
- Site L: One male perched on tall stem in middle of wooded slough. This appears to be the first Mexican record from a state with no coastal lowlands. Photo, SD.
- Paltorthemis lineatipes* Karsch, 1890: Red Rock Skimmer
- Site E: One of several males was photographed as it patrolled a rocky streambed. Although known from throughout the Mexican highlands (Paulson & González Soriano 1994), *lineatipes* appears to have been overlooked in Tamaulipas. This represents the northeastern-most record for Mexico. Photo, MD.
- Perithemis domitia* (Drury, 1773): Slough Amberwing
- Site D: Perhaps 10 territorial males and several females were observed at the margins of small fish ponds a few meters higher than the banks of the Río Frio. Individuals perched along or very close to the shore on short stems projecting from the water, less frequently on the weathered branches of a partly submerged stump. Specimen, RAB.
- Site H: Both *P. domitia* and *P. tenera* were common, the former in more shaded portions of pools or stream edge. Specimen, RAB.
- Tamea abdominalis* (Rambur, 1842): Vermilion Saddlebags
- Site J: One male patrolling the stream. Specimen, MO.
- Tamea insularis* Hagen, 1861: Antillean Saddlebags
- Site B: A dead male was removed from the web of a Green Lynx Spider (Oxyopidae: *Peucetia* sp.). The web was at the top of a shrub (c. 1 m tall) growing among cobbles not far from the river's main channel. In Mexico, *insularis* has been recorded in Campeche, Veracruz, and recently in Sonora (Paulson & González Soriano, 1994; pers. comm. Doug Danforth). Elsewhere, it is known from the Greater and Lesser Antilles, S Florida, and at least five sites in Texas (Abbott, 2006; Donnelly, 2004; Paulson, 2005). Its presence in NE Mexico is not unexpected. Iden-

tification of the headless individual was based upon body color, the distribution of pigmentation on the terminal abdominal segments and hind wings, the unmarked thorax, relatively short hind wings, and very long cerci—the latter two collected and compared directly with those of *T. abdominalis*. Photo and partial specimen in alcohol, RAB

Acknowledgements

The authors wish to express their appreciation to Dennis Paulson and Jerrell Daigle for comments on the identification of certain species. Behrstock and Overton thank Lic. Saúl Martínez Hernández and Maria Luisa Cordoba Martínez of Turismante (Ciudad Mante, Tamaulipas), for providing logistical support and transportation during several recent trips to northeastern Mexico, including those organized by the Chambers of Commerce of Mission and Harlingen, Texas. Thanks also to Lee Zieger of Brownsville, Texas who made arrangements and provided transportation for trips taken by Behrstock and Overton and, more recently, by Dobbs.

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Turquoise-tipped Darner (*Rhionaeschna psilus*) in California

John C. Avise, Professor of Ecology and Evolutionary Biology, University of California, Irvine, CA, 92697 <javise@uci.edu>

On 16 September 2007, at 8:35 AM, I observed what proved to be a mature male *Rhionaeschna psilus* (Turquoise-tipped Darner) in Huntington Beach in Orange County, coastal California. The site was in Huntington Central Park, on the east side of Goldenwest Street, adjacent to Talbert Lake (which at the time was almost completely dry). Specifically, the darner was observed along the north edge of the “wet area,” along the tongue or arm of Lake Talbert that extends to the east, toward Gothard Street. For most of the five minutes of observation, the animal was flying quickly and erratically in the area, over *Myoporum* shrubs, but it landed once, long enough for four photographs to be taken. One of these photographs, from which the identification was confirmed, was submitted to OdonataCentral (<http://www.odonatacentral.org>). This is the first documented record of *Rhionaeschna psilus* in California. This tropical species is resident north to southeastern Arizona and south Texas but was only recently documented in southern Baja California (Paulson & Mlodinow, 2007).

Whether the Huntington Beach animal was a natural vagrant, an inadvertent and ephemeral human-mediated introduction, or perhaps a member of a local resident population, is not known. I thank Joan Avise, Peter Bryant, and Hartmut Wisch for forwarding my photographs to Dennis Paulson and Kathy Biggs for confirmation of the species identification and Dennis Paulson for information about the species.

Literature Cited

Paulson, D. and S. Mlodinow. 2007. New records of Odonata from Baja California Sur, Mexico, and a checklist of the Odonata fauna of that state. ARGIA 19(2): 26–27. 

Book Review: Dragonflies of the Yungas (Odonata)/Libélulas de las Yungas (Odonata), by Natalia von Ellenrieder and Rosser W. Garrison. Paperback, 116 pp. Pensoft <www.pensoft.net>, 2007.

Reviewed by **Dennis Paulson** <dennispaulson@comcast.net>

Ecotourism travel to exotic tropical locations has never been greater, and there is a crying need for field guides so these travelers can identify the animal and plant species they encounter. Furthermore, if we want to conserve the tropical biota, we have to know something about it, including what it looks like! That need has been filled for many groups in many parts of the world but not for odonates, until just recently when dragonfly books that are actually field guides have appeared dealing with dragonflies of Peninsula Malaysia and Singapore, Borneo, Australia, Namibia, and South Africa, among others.

The neotropical region, with arguably the highest diversity of Odonata, has been a black hole for odonate field identification until even more recently, although books by Steffen Förster on Central America and Fred Lencioni on Brazilian damselflies have provided great material for in-hand identification. Carlos Esquivel's book on Middle America gives a good overview to this fauna, and finally this little Yungas book by two authorities on neotropical odonates gives us a guide that can be used in the field to identify all species of a fauna. That fauna is restricted geographically, but many of the 102 species of 45 genera

that occur in the Argentine Yungas are widespread, and most of those species are illustrated by excellent photos (a few are too dark as printed), the first published for most of them. Genera with four species or more include *Lestes*, *Argia*, *Telebasis*, *Rhionaeschna*, *Progomphus*, *Erythrodiplax*, *Macrothemis*, *Micrathyria* (9!), and *Tramea*.

A great thing about the book is that it is bilingual, in English and Spanish, so all Americans are included in its readership. It begins with a good introduction to the Yungas and to odonate biology. In lieu of keys, drawings are provided to aid in identification of similar species, and from the wealth of information presented, anyone should have no trouble identifying any odonate encountered in this rich environment. Habitat preferences are given, and a bit of natural history info is included for each species. By what it doesn't include, the book also gives us an unstated challenge: It is long past time to acquire and archive photos in life of at least all the genera of that rich neotropical fauna. Where are the photos of *Tigriagrion*, *Andaeschna*, and *Gomphomacromia*? Get out there, photographers, and let's begin to prepare for the next generation of field guides! 

Recent Articles of Interest

Pilgrim, E.M. and C.D. Von Dohlen 2007. Molecular and morphological study of species-level questions within the dragonfly genus *Sympetrum* (Odonata: Libellulidae). Annals of the Entomological Society of America 100(5): 688–702.

ABSTRACT: This study combines morphological and molecular data to address several questions of species validity within the dragonfly genus *Sympetrum*. We compared morphological characters (genitalia and other putatively diagnostic characters) and DNA sequences from mitochondrial cytochrome oxidase I (COI) and nuclear internal transcribed spacer (ITS) regions between these disputed taxa and their close relatives. Specimens of *Sympetrum nigrescens* Lucas shared COI haplotypes with *Sympetrum striolatum* (Charpentier), and no morphological characters consistently diagnosed *S. nigrescens*, which therefore becomes a junior synonym of *S. striolatum*. Similarly, *Sympetrum occidentale* Bartenev shared identi-

cal COI and ITS sequences with *Sympetrum semicinctum* (Say), and the supposed diagnostic morphological characters overlapped with the intraspecific variation within *S. semicinctum*. *Sympetrum occidentale* becomes a junior synonym of *S. semicinctum*. In a third case, the genetic distance between *Sympetrum signiferum* Cannings & Garrison and *Sympetrum vicinum* (Hagen) was lower than that found between most undisputed species. However, the morphological characters that distinguish *S. signiferum* from *S. vicinum* were distinct and consistent, and they supported the retention of *S. signiferum* as a valid species. In the fourth case, neither morphological nor genetic data were able to distinguish *Sympetrum janeae* Carle consistently from *Sympetrum internum* Montgomery, or *Sympetrum rubicundulum* (Say); in addition, genetic distances between individuals of *S. internum* and *S. rubicundulum* were small or nonexistent. Further studies are necessary to test the species status of *S. janeae* and its close relatives.

Z.J. Wang and D. Russell. 2007. Effect of Forewing and Hindwing Interactions on Aerodynamic Forces and Power in Hovering Dragonfly Flight. *Physical Review Letters* 99(148101): 1–4.

ABSTRACT: Dragonflies are four-winged insects that have the ability to control aerodynamic performance by modulating the phase lag (ϕ) between forewings and hindwings. We film the wing motion of a tethered dragonfly and com-

pute the aerodynamic force and power as a function of the phase. We find that the out-of-phase motion as seen in steady hovering uses nearly minimal power to generate the required force to balance the weight, and the in-phase motion seen in takeoffs provides an additional force to accelerate. We explain the main hydrodynamic interaction that causes this phase dependence. 

New and Recent Books Briefly Noted

Common Dragonflies and Damselflies of Ohio by D. McShaffrey and B. Glotzhober, 2007, published by the Ohio Division of Wildlife.

This very well organized guide was recently debuted at the Ohio Dragonfly Conference held this summer. It is a small (71 pp) color field guide to the 164 species of Odonata known from Ohio. In addition to the species accounts, it includes sections on how to use this booklet, dragonfly and damselfly families, life cycles, habitats, and places to find dragonflies. The species accounts include photographs, a discussion on identification, measurements, habitat, flight period and a map showing its distribution in Ohio. The booklet is laid out very well. It is obvious that some real thought went into the appearance and design of this guide. The best news of all is that this little gem is *free*! As part of an education initiative, the Ohio Division of Wildlife is giving these away. A copy may be obtained from them at: ODNR, Ohio Division of Wildlife, 2045 Morse Road, Bldg. G, Columbus, Ohio 43229-6693, 1-800-750-0750.

Congrats to Dave and Bob for putting together such a marvelous little guide and best of all working with the Ohio Division of Wildlife to make it freely available!

Damselflies of North America, Color Supplement by M.L. May and S.W. Dunkle, 2007, Scientific Publishers, 156 pages. ISBN0-945417-98-5.

This long awaited supplement to the revised edition of Westfall and May's *Damselflies of North America* is now available. The Supplement is the same length and width as its accompanying text and so they make a nice pair on the book shelf. Because the Supplement is only 156 pages, it is of a size that could easily be taken into the field. It includes photographs of nearly all of the 168 species known from North America. This is the first book to do this and it fills a much needed gap in the published photographs of Odonata in North America. The photographs are arranged well, with the males on the left side and females on the right. They are also reproduced very large at over 5.5 inches in width. In many cases, several forms of each species are shown. The end of the book contains a useful table of the regional species distributions as well as an index to common and scientific names. There are a few species and a few females of species for which "no photo available" is listed, but I know at least in some cases there are photos out there (females of *Argia leonorae*, *Enallagma basidens*, and *Leptobasis melinogaster* for example). I was also a bit disappointed with the quality of reproduction in many cases, but I know just how hard it can be to match colors and see consistency across printed copies. Despite these minor issues, this is certainly a book that everyone in North America should have on their shelf. I suspect they will go quickly, so I encourage you to purchase your copy soon! They can be obtained from Bill Mauffray through the International Odonata Research Institute, <<http://www.iodonata.net/>>. 

ARGIA and BAO Submission Guidelines

Digital submissions of all materials (via e-mail or CD) are vastly preferred to hard-copy. If digital submissions are not possible, contact the Editor before sending anything. Material for ARGIA must be sent directly to the John C. Abbott, Section of Integrative Biology, C0930, University of Texas, Austin TX, USA 78712, <jcabbott@mail.utexas.edu>; material for BAO must be sent to Ken Tennessen, P.O. Box 585, Wautoma, WI, USA 54982, <ktennessen@centurytel.net>.

Articles

All articles and notes are preferably submitted in Word or Rich Text Format, without any figures or tables, or their captions, embedded. Only minimal formatting to facilitate review is needed—single column with paragraph returns and bold/italic type where necessary. Include captions for all figures and tables in a separate document.

Begin the article with title, author name(s), and contact information (especially e-mail) with a line between each. The article or note should follow this information. Paragraphs should be separated by a line and the first line should not be indented. Where possible always refer to the scientific name of a species followed by its official common name in parentheses.

Figures

Submit figures individually as separate files, named so that each can be easily identified and matched with its caption. Requirements vary depending on the type of graphic.

Photographs and other complex (continuous tone) raster graphics should be submitted as TIFF (preferred) or JPEG files with a minimum of 300 ppi at the intended print size. If unsure about the final print size, keep in mind that oversized graphics can be scaled down without loss of quality, but they cannot be scaled up without loss of quality. The printable area of a page of ARGIA or BAO is 6.5 × 9.0 inches, so no graphics will exceed these dimensions. Do not add any graphic features such as text, arrows, circles, etc. to photographs. If these are necessary, include a note to the Editor with the figure's caption, describing what is needed. The editorial staff will crop, scale, sample, and enhance photographs as deemed necessary and will add graphics requested by the author.

Charts, graphs, diagrams, and other vector graphics (e.g. computer-drawn maps) are best submitted in Illustrator format or EPS. If this is not possible, then submit as raster graphics (PNG or TIFF) with a minimum of 600 ppi at the intended print size. You may be asked to provide the raw data for charts and graphs if submitted graphics are deemed to be unsatisfactory. When charts and graphs are generated in Excel, please submit the Excel document with each chart or graph on a separate sheet and each sheet named appropriately (e.g. "Fig. 1", "Fig. 2", etc.)

Tables

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Back cover: (upper) *Erpetogomphus lampropeltis* (Serpent Ringtail) at Bonita Creek, near the Gila River in Graham Co., Arizona, 1 Aug 2007. Photo by Bryan Pfeiffer/Wings Photography. (middle) *Hesperagrion heterodoxum* (Painted Damsel) NE of Young, Arizona, 26 Jul 2007. Photo by Michael Blust. (lower) *Ophiogomphus arizonicus* (Arizona Snaketail) on the North Fork of the White River, east of McNary, Arizona, 29 Jul 2007. Photo by Bryan Pfeiffer/Wings Photography.

