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

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

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Front cover: *Tramea carolina*, a pair in copula, photo by Brian Pfeiffer

more than one participant. When will this digital fad ever end?!

On Thursday, July 24th, we worked our way towards the Boundary Waters Canoe Area Wilderness (BWCAW) through Cook County with stops at 4-Mile Creek and Toohey Lake and a few near misses with logging trucks on gravel roads. We canoed into the BWCAW at Baker Lake. Odonates were not flying in great numbers anywhere, but we did manage to snag a number of new Cook County records including: *Lestes dryas* in two locations, *Lestes forcipatus*, *Coenagrion resolutum*, and *Sympetrum occidentale*.

Bill Morgenstern and Barb Natterer, both recently recuperating from major joint surgery (Team Hobble), spent much of their time during the GLOM road-hunting for new sites and new finds, which was quite worrisome as they always had our food in their vehicle. They always seemed to get found just in time.

We enjoyed a supper cookout (without cookout tools!) at one of the National Forest campsites on Baker Lake. Renee Boronka's iced tea mix was strong enough to strip paint, but no one complained at all. A good time was had by all and the bugs were, fortunately, not up to their usual northern Minnesota standards.

On Friday we surveyed some of the habitats at Wolf Ridge, concentrating on the lakes in the morning and the streams in the afternoon. Raven Lake produced a new Lake County record in *Enallagma exsulsans*. Bob DuBois was particularly excited by the relatively large numbers of *Boyeria grafiana* found at both of the streams. Other species of interest included *Somatochlora williamsoni* and *Ophiogomphus carolus*.

Saturday was very sticky, hazy and hot and with very little breeze. Kurt worked everyone pretty hard with a short hike through peat lands and a black spruce forest into a little unnamed bog-pool surrounded by floating bog, with thousands of predacious pitcher plants and sundews (sundews found by Caryle Spence's sharp eyes). We had to be careful about gathering in groups about the water's edge so as to avoid sinking underwater. This location yielded two new county records in *Lestes eurinus* and *Lestes unguiculatus*. Despite prior warnings to the rest of the group about getting lost in the black spruce forest, Kurt had some momentary difficulty in leading the group back to

the vehicles. It must've been the heat... You are very tolerant, Ailsa.

A small beaver pond on an unnamed creek adjacent to the Heffelfinger Road revealed a new county record in *Lestes forcipatus*. There were also several teneral *Sympetrum danae* flying here.

While eating lunch at Katherine Lake (finally some shade!), *Enallagma boreale*, a new county record, was found flying in the bog border of the lake. Bob DuBois is convinced that that site needs to be closely watched next spring for *Williamsoni fletcheri*, the holy grail of dragonflies in Minnesota.

Because of the heat and humidity, we sped a fairly hasty retreat to the Avalon Falls on the Beaver River so that Marjorie Hughes could swim in the falls and so we could all rest. Very little was flying at Avalon, or perhaps we were too weary to care. We then returned to Wolf Ridge about mid afternoon.

Species list for GLOM 2003:

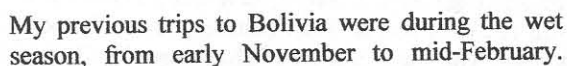
Aeshna canadensis, *Aeshna eremita*, *Aeshna tuberculifera*, *Aeshna umbrosa*, *Boyeria grafiana*, *Cordulegaster maculata*, *Didymops transversa*, *Hagenius brevistylus*, *Gomphus adelphus*, *Gomphus exilis*, *Ophiogomphus carolus*, *Ophiogomphus colubrinus*, *Ophiogomphus rupinsulensis*, *Tetragoneuria cynosura*, *Tetragoneuria spinigera*, *Dromogomphus spinosus*, *Cordulia shurtleffi*, *Dorocordulia libera*, *Somatochlora minor*, *Somatochlora williamsoni*, *Ladona julia*, *Plathemis lydia*, *Libellula quadrimaculata*, *Leucorrhinia frigida*, *Leucorrhinia glacialis*, *Leucorrhinia hudsonica*, *Leucorrhinia proxima*, *Sympetrum costiferum*, *Sympetrum danae*, *Sympetrum internum*, *Sympetrum obtrusum*, *Sympetrum occidentale* (CR for Cook County), *Calopteryx aequibilis*, *Calopteryx maculata*, *Lestes disjunctus*, *Lestes dryas* (CR for Cook County), *Lestes eurinus* (CR for Lake County), *Lestes forcipatus* (CR for Lake and Cook Counties), *Lestes unguiculatus* (CR for Lake County), *Chromagrion conditum*, *Coenagrion resolutum* (CR for Cook County - only 2nd record for MN), *Enallagma boreale* (CR for Lake County), *Enallagma ebrium*, *Enallagma exsulsans* (CR for Lake County), *Enallagma hageni*, *Ischnura verticalis*, *Nehalennia irene*

Although I was initially surprised to not come up with more Anisopteran county records, the fact that nearly half of all of the Zygopterans collected were

2003 GLOM Participants: Carl Buettemeier (Hugo MN), Renee Boronka (Cleveland OH), Rod Kuehn (Ramsey, MN), Colin and Marjorie Hughes (Winnipeg, Manitoba), Nick and Ailsa Donnelly (Binghamton NY), Bob Dubois (Superior WI), Caryle Spence (Northville MI), Barb Natterer (Lodi OH), Bill Morgenstern (Fort Frances, Ontario), Kurt Mead (Finland MN)

BOLIVIA V: A DRY SEASON ENDEAVOR

It was on Hwy. 9, between Yotau and Guarayos where we saw the signs. Highway signs are a rare sight anywhere in Bolivia, but these were exceptional. They were caution signs, warning that some kind of long-legged, loping animal crosses the highway in this area, but we never did see the exact animal depicted. We finally decided the animal must be the elusive “Dobolope” (see figure).



Accompanying me on the trip were Jerrell J. Daigle (Tallahassee, Florida), Jim Johnson (Vancouver, Washington), Bill Mauffray (Gainesville, Florida), Fred Lencioni (Sao Paulo, Brazil), and a new student from the Noel Kempff Mercado Museum in Santa Cruz, Patricia Caballero. The following account of our labors is incomplete, as we have not yet determined everything we collected.

Armando Vaca, who runs the Hotel Iguasú in Ascension de Guarayos (hereafter shortened to Guarayos) where we spent the majority of our nights, told us about several nearby lakes, streams and forests. One of the best spots we visited was the Cachuela de Yotau, a rocky falls on the Rio San Pablo (this is the same river as the Rio San Julian in Ñ. de Chavez Prov.). The river is a complex of strong rapids and large slow pools with aquatic plants. We saw lots of *Acanthagrion*,

Enallagma, *Helveciagrion*, *Homeoura*, *Ischnura*, *Neoneura*, *Coryphaeschna*, *Erythemis*, *Perithemis* and *Uracis*. Two very familiar, widespread species, *Miathyria marcella* and *Pantala flavescens*, floated in the air overhead. We crossed the river on a narrow, tippy metal footbridge to the forest on the other side. Here we found several species of *Aeolagrion*, a small red *Telebasis* that appears to be the recently described *T. bickorum* Daigle, young *Telebasis gigantea* perching horizontally on low *Heliconia* leaves, and we also saw a few beautiful pseudostigmatids gleaning for spiders.

Another productive locality was a lake with marginal wetlands 10 km S of the town of Guarayos. The beautiful red *Coryphaeschna perrensi* was numerous, and libellulids were everywhere, *Erythrodiplax* and *Micrathyria* species abounding. I thought *Erythrodiplax paraguayensis* was the smallest species in the genus until I saw *E. maculosa*. Jerrell and I saw a strange *Orthemis* with a dark green thorax and reddish abdomen, but it would not let a person with an aerial net get anywhere close (however, one flew right under my nose while I was dipping for larvae). Some of the damselflies here were *Acanthagrion*, *Helveciagrion*, and *Telebasis*. I was pleased to rear males of *Micrathyria eximia* and *Helveciagrion chirihuanum*.

Although Guarayos is a beautiful, friendly town, we had trouble finding a good restaurant. The meat at the first place we tried would have made long-lasting soles for our shoes. After a second night of frustration, Fred and I decided to make our own dinner at the hotel. In the market place in Guarayos, we bought fresh tomatoes, garlic, green peppers and onions to make spaghetti sauce. Along with the pasta we prepared small steaks from fresh beef we got at a butcher shop in Yotau. However, the cookware was limited and the cooking was slow on Armando's small gas stove. It was late, about 10:00 pm by the time we finished preparing the meal, but the team said it was worth the wait. After this, we found a better restaurant just off the central plaza. Problem was, all they served was fried chicken with rice and French fries, but it was very tasty so we kept going back. By the end of our trip, we all agreed we wouldn't be eating chicken for at least a month. Jerrell found that the vendors on the plaza make pretty good popcorn; he even tried one of their "hamburguesas". He sends the following anecdote, entitled "A Day at the Laundromat!"

"One of the most communal activities in small Bolivia towns is laundry day at the local stream or

river. It is a good place for the ladies to catch up on gossip and girl talk, just like the old neighborly fence post chats in the Deep South. It is a festive occasion with lots to talk to about. But one hot afternoon in Guarayos, they had more to talk about, especially about the invasion of net-swinging gringos jostling for space at the waterhole. While washing their laundry, bemused senoras and senoritas watched Bill, Patricia, and I catch several species of seepage odonates. While only *Orthemis discolor* flew over the soapsuds, we were able to catch furtive *Argia lilacina*, basking *Progomphus intricatus*, inky-black *Erythrodiplax juliana*, and colorful *Oxyagrion chapadense*, both upstream and downstream of the main laundry spots. These species were not at the wetlands or ponds that we visited elsewhere, so we were particularly glad to see these seepage stream species. So, if you are ever driving down the dusty roads in eastern Bolivia and you see the native ladies doing their laundry, try to stop and check out the activities. You never know whom you would meet or what would fly by!"

Thanks Jerrell!!!!!! There, I have always wanted to use more exclamation marks in an article than Jerrell does. My story continues--

The road from Guarayos to Urubichá was hilly and dusty, thoroughly dried by the warm winds, and we saw lots of smoke where ranchers were burning the dry scrub. Before reaching Urubichá, the road enters a huge wetland chock-full of tall *Cyperus*, but we saw little open water here. This stretch is called "The 12 bridges." Construction on all but one of the concrete bridges has been started, and it appears that they will be impressive structures. Curiously however, the road was not finished; it seemed to us that this would be a good time for road building. Instead the road coiled around the closely spaced bridges, and huge potholes almost tipped our vehicle over; I doubt this stretch is passable in the wet season. I was beginning to think choosing this area of central Bolivia to survey was a mistake. Ah, but north of Urubichá was the Rio Blanco, and it was definitely worth the toilsome drive. Along the river and its associated wetlands we found an interesting Odonate community, including a number of species new to our Bolivia list. Jerrell discovered *Erythemis carmelita* at a deep slough, Bill *Telebasis dunklei* at a different slough, Fred and I several species of *Epipleoneura* plus *Acanthagrion chararum* along the river, and Jim a strange little *Acanthagrion* and a *Protoneura* with red eyes and brilliant shining orange thoracic dorsum. The single female of *Diastatops* I collected

Sorry Nicaraguan farmers, but I appreciated the extra weeks without rain.

We had chickened out on going to Bartola because of the problems of chartering a boat for the river trip. The fall back position was Domatila [a private reserve located in dry tropical forest south of Managua]. We were thrilled to find a welcoming party - Maria Jose, the all purpose manager, owner, cheerleader and organizer for Domatila. After a short ride from the airport we turned onto the 10 kilometer dirt road to Domatila and Lake Nicaragua. It is more like 100 miles from the modern world. For a week we were cared for by Maria, her husband Silvio, seven staff members plus two very friendly small dogs and a cat. One vehicle, other than the resident jeep, went by in the week. There are no electric lights and no hot water - Coleman and kerosene lanterns fill in for light and the tropical temperature makes anything but a late night shower perfect. The three meals a day are wonderfully prepared and varied enough to have you anticipating what will be served. Juice and cold water were always available in abundance so there was no excuse to get dehydrated. The temperatures were tropical but delightfully pleasant when you were sitting in the open thatch-roofed dining portion of the building looking out toward the lake. On our arrival we were greeted by a veritable swarm of dragonflies over the dry arid scrub land. All common widespread things, *Pantala flavescens*, *Erythemis ferruginea*, *Erythemis vesiculosa*, *Erythrodiplax funerea*, *Brachymesia herbida*, *Tramea calverti*, *T. onusta*, and *Erythemis plebeja*, but I still get a thrill out of seeing large masses of odonates. I was a little disappointed that one had to travel 2 kilometers to get to the lake, but Silvio pointed out that in exceptionally rainy years it would only be a few hundred yards to the lake and at the height of dry season a 3 kilometer trek. We both found this place wonderfully relaxing. It was tempting to forget dragonflies and just rest but the first few days there was an impressive morning and evening flight of dragonflies that stretched the day from 5:30AM to after 6PM. We never did figure out everything that was in the flight but caught *Gymnacantha mexicana* and *nervosa*, *Triacanthagyna caribbea* and *septima*, the dusk flying libellulid *Tholymis citrina* plus a number of early and late flying *Pantala flavescens* and *Tramea calverti*. Some of our success was due to Eric van den Burghe, professor at American University in Managua, whose good eyes and quick reflexes increased our harvest of dusk flying creatures. He also was a

wealth of information on Nicaragua and potential collecting sites.

The lake was visited one day in the jeep and another in the ox cart - take the latter; it has a better ride. The odonates included *Enallagma novaehispaniae*, *Telebasis digiticollis* and *griffinii*, *Phyllocycla breviphylla*, *Progomphus clendoni*, *Brachymesia herbida*, *Erythemis plebeja*, *Micrathyria aequalis*, *M. didyma*, *Tauriphila australis* as well as a number of *Anax* and *Aeshna* that we never did catch. If you would like to see an area where ox carts and kerosene lanterns are a way of life and not just tourist curios come to Domatila. Also see real weather-beaten, hard-used authentic cowboys.

The buildings are located on a slight rise with a 500 foot forested hill behind that proved good for a few hilltoppers [*Argia tezpi* and *Phyllocycla breviphylla* among others]. Two permanent, spring fed, forest streams, Rio Dorado and Rio Pital, are a short distance east and west respectively.

The lake was good for many species not found in the streams but the streams were where the action was. An unpredictable and fickle population of odonates, but when the sunlight and temperature were right there were always new surprises. On one day I found a collection of 40 plus pairs of the very striking *Neoneura amelia* [red head and thorax with black abdomen] laying eggs in a tiny collection of floating debris. One group of 5-6 pairs were in a tight circle with the heads of the males almost touching. In the shade only the red of the male's head and thorax show up, and these little red dots seem to be floating in the air.

Argia pulla, *translata*, *Hetaerina caja* and *titia* were the dominant species but the striking red-eyed *Argia oenea* was common and the hard to find species included. *Hetaerina occisa*, *Palaemnema nathalia*, *Neoneura esthera*, *Protoneura amatoria*, *P. cara*, *Acanthagrion trilobatum*, *Aphylla obscura* and in the riparian woodland the big helicopter damselfly *Mecistogaster ornata*.

If you have a weakness for butterflies, you will store the dragonfly gear and spend your time on these creatures. There are an amazing variety and abundance of them. There is also probably the highest density of howler monkeys you'll find anywhere. There is no escaping the din when you are in the field, but they also show up next to the hotel every day.

several good close-up views of others which all turned out to be *Aeshna eremita*. As mentioned, this was all taking place in a real down-pour but was also fairly dark with the thick, black clouds covering the sun low on the horizon. This down-pour which must have been like large water-filled balloons to a dragonfly's wing, didn't slow down their hectic flight but did cause some to do these somersaults in mid-air. I could easily make out their complete flips and the reason they perform this - to rid themselves of the water they had accumulated, flinging it off in all directions. It was cool to see this at such close proximity and as a backdrop, the sound of thunder and the flash of lightening.

Besides the ovipositing along the shore, many females inspected not only my paddle and boat, but also landed on my jacket to sense around for a suitable location to punch in their eggs. I even had one give "a go" at my bare hand!

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WHERE DO DRAGONFLIES GO WHEN THEY DIE?

Gord Hutchings <sea-trek@islandnet.com>

I don't normally think of dragonflies, let alone invertebrates, of choosing a place or time to expire, something associated with elephants or perhaps our own species, but this summer I observed several dragonflies that seemed to be exhibiting this behaviour.

While in central Saskatchewan I took advantage of idle days to get out and obtain more observations on dragonflies and one day while my daughter and I were visiting a small pond, intense with dragonfly activity, we observed several adults plunging onto the surface only to be trapped by the surface tension, usually ending stuck upside down. At this first sight which was August 24, we recorded 6 *Aeshna* spp. performing this and I managed to collect every one of them. The interesting findings of this small collection resulted in all 6 being not only females, but having varying degrees of tattered outer wing margins which I am sure many of us have seen. One would assume that these individuals have seen their share of aerial battles or mating attempts, and draw the conclusion that this is a rather "mature" specimen. The species that were included in this were 1 each of *Aeshna constricta*, *A. juncea*, *A. canadensis*, *A. subarctica* and 2 *A. eremita*. When we looked on the surface, there were dozens of dragonflies littering the surface in varying states of decay that had broken the surface

tension and hung right-side up. I identified several more to be of the already mentioned species, but there were also many *Leucorrhinia* spp. and *Libellula quadrimaculata*. This pond was approximately 1-3 metres across and a length of about 10 metres with an edge of sedge and rushes, and with emergent *Potamogeton* and *Nuphar*.

Jump ahead two days later while at a large lake, there was five of us on a family afternoon swim enjoying one of the final swims of the summer. Around us we had very many *Aeshna eremita* hawking above the beach and the water and once again, this splashing onto the surface of the lake and getting stuck upside down on the surface tension. My nearly 4-year old nephew waded out on three different occasions and picked up these large bugs for his collection. Continuing on, we all had several goes at collecting many more of this same species at this same spot on our beach. This time, there were three males included in our collection and in total, we collected about 16 specimens, once again some with rather tattered wing margins.

Now, I'm sure many of us have seen this behaviour and have noted how these dragonflies almost seem Osprey-like in how they can extract themselves from the surface, somersault in the air (see article "Observations Of An Ovipositing Dragonfly Frenzy In The Rain"), and carry on. I've seen mating or battling pairs perform this stunt with both leaving the water eventually either singly or attached as a copulating pair. However, these observations I made in late August of aged individuals appeared almost as if they intended to remain here to die. At this latter site on the large lake, I observed two individuals about 15 metres off shore, plunge in and remain fluttering upside down on the surface for up to 15 minutes, enough time for me to finish my hot dogs and beer! Their fluttering frequency diminished to the point where they eventually cooled down and become almost totally motionless. I revived these sad looking females who never did take flight again and instead became more permanent specimens for my collection instead of replenishing the lake of nutrients. Has anyone seen this before and drawn the same conclusion?

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ANOTHER DOT ON THE MAP - AESHNA TUBERCULIFERA FROM NORTH-CENTRAL SASKATCHEWAN

Gord Hutchings <sea-trek@islandnet.com>

Last year I wrote an article on the dragonflies I recorded from northern Saskatchewan's Athabasca Sand Dunes Provincial Wilderness Park, which is at a northern latitude of 59°08' ("A List of the Odonata of Athabasca Sand Dunes Provincial Wilderness Park, Saskatchewan", *Argia* 14:4). The biggest discovery of that survey was the discovery of *Aeshna tuberculifera*, which was a fair range extension from its previous records of central British Columbia and southwest Ontario. This past August 24, 2003, I once again picked up *A. tuberculifera*, this time a little further south in north-central Saskatchewan.

I collected two males patrolling over a small pineforested pond from Canwood, Saskatchewan situated at 53°14' N, and 106°23' W, 68 south of the previous site. At this site there were also flying *Aeshna juncea*, *A. subarctica*, *A. eremita*, *A. constricta*, *A. canadensis*, *Leucorrhinia hudsonica*, *Libellula quadrimaculata*, *Sympetrum danae*, *S. internum* and *Lestes unguiculatus*. This pond was previously mentioned in the article I wrote about the choices of places where dragonflies go to die ("Where Do Dragonflies Go When They Die?"). On every visit I make to this province, I seem to add new range extensions. It is an important area to report distributions.

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LESTES DISJUNCTUS, FORCIPATUS, AND AUSTRALIS: A CONFUSING COMPLEX OF NORTH AMERICAN DAMSELFLIES

Nick Donnelly

Few North American damselflies have given so much difficulty as the *Lestes disjunctus* complex. Frequent collections of these insects in southern

New York have convinced me that the subspecies *australis* Walker 1952 should be elevated to species status. Extensive correspondence and discussion with fellow odonatists has convinced me that the most difficult diagnosis in the complex is the separation of males of *forcipatus* and *australis*. I present here what I hope will be a clarification of the diagnoses of these three difficult species.

Lestes forcipatus was one of the earliest species in the genus to be described (Rambur, 1842). Because of the very primitive knowledge of the genus at the time, Rambur provided no characters of the sort that are now considered diagnostic, and he provided no figures. The types have not been located for examination. The original male was not even certainly from North America. The original female was North American but has no descriptive attributes that one would associate with *forcipatus* as presently understood. It is possible that Rambur was not describing the species we now take to be *forcipatus*. Selys (1862) described *Lestes disjunctus* (as *disjuncta*; we now use the masculine gender to agree with the genus) and redescribed *forcipatus*. His diagnosis of *disjunctus* seems to be accurate as presently recognized. He noted that for the cerci the spacing of the two teeth is less than for *forcipatus*. He noted that the paraproct of *disjunctus* is spatulate but not curved (as would be the case for *australis*). He described the paraproct as "slightly thinned in the middle, the tip a little widened and spatulate." For Selys, the female of *forcipatus* is said to have "average vulvar laminae", whereas we now consider the ovipositor long. In fact, the longer ovipositor of *forcipatus* remains the most useful diagnostic character for the species. Calvert (1893) and Williamson (1900) describe and figure "*forcipatus*", but their figures seem more likely to be of *australis*. The earliest paper that

presents a distinction between *forcipatus* and *disjunctus* similar to the current understanding is that of Garman (1917). Although Garman provided figures showing a longer anterior lamina of *forcipatus*, he failed to point out this distinction in either the figure captions or text! Having evidently discovered an important morphological distinction, his failure to note in the text this distinction remains a fascinating mystery.

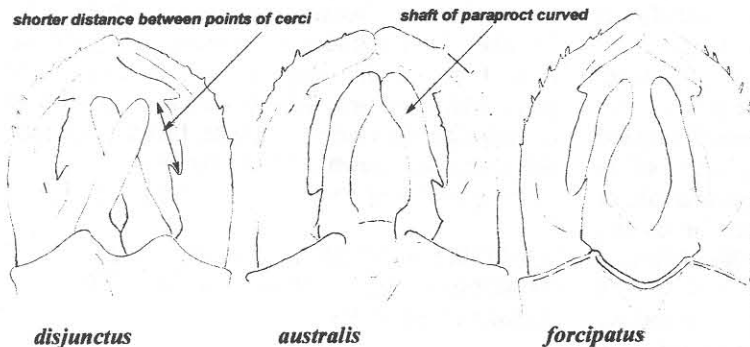


Fig. 1 Dorsal views of male terminal appendages, showing cerci

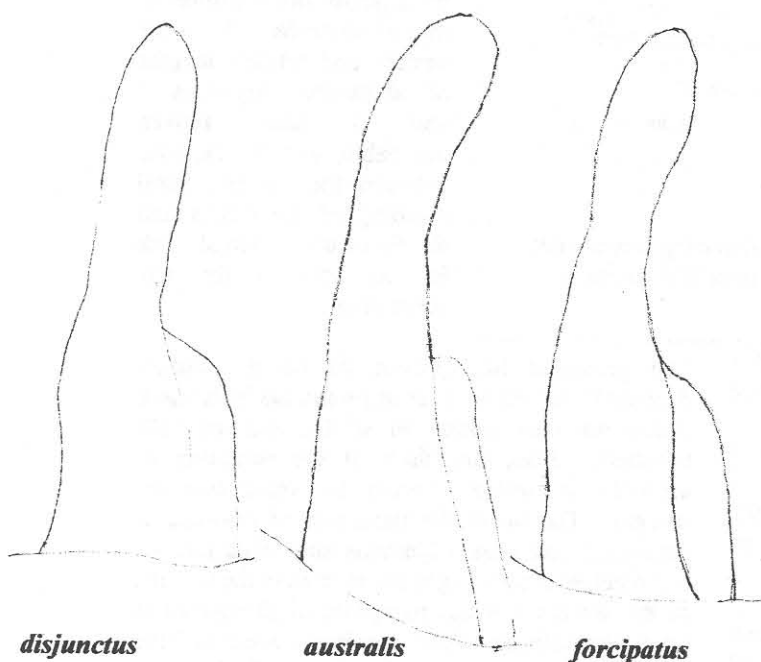


Fig. 2 Ventral views of paraprocts

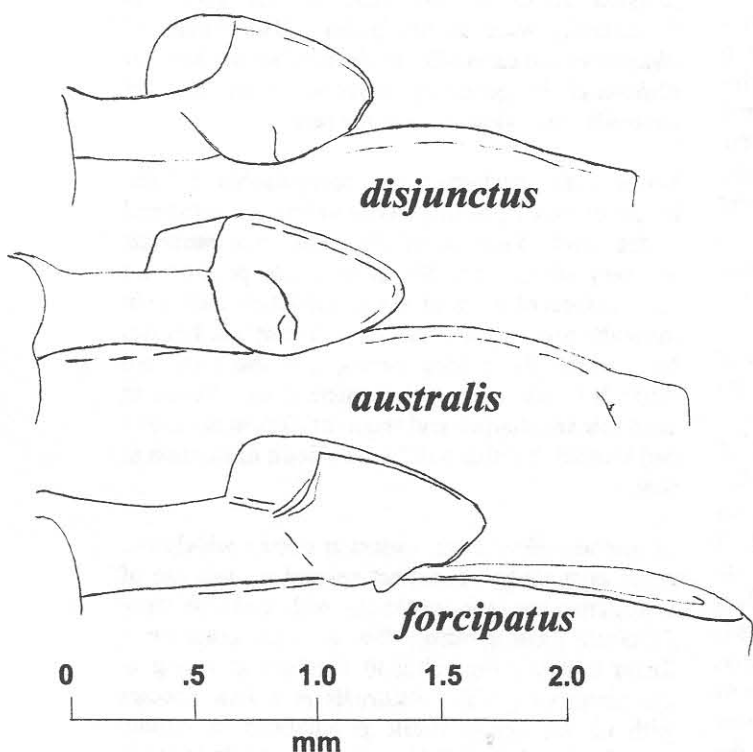


Fig. 3 Lateral- ventral views of anterior laminae

Montgomery (1941) noted widespread confusion between *disjunctus* and *forcipatus* and diagnosed the two (with the assistance of Dolly Gloyd). He cited four differences: (1) distance between teeth of the cercus; (2) width of apical notch of abdominal segment 10; (3) width of base of penis vesicle, and (4) shape of penis.

Walker (1952) reviewed Montgomery's findings and rejected the shape of the penis, but retained the remaining three distinctions. He added distinctions in the relative lengths of abdominal segments 2 and 3, and the length of the anterior lamina, possibly inspired by Garman's mysterious figures. Walker expanded upon Montgomery's discussion, and described *australis* as a subspecies of *disjunctus*. Walker considered numerous specimens to be intermediate between *disjunctus* and *australis*, and named *australis* as a subspecies. As noted below, I re-examined several of these intermediates and concluded that virtually all could be assigned to one or the other taxon. Walker noted a distinction in size (*australis* is larger, *disjunctus* smaller) sharpness of the distal spine of the cercus (blunt in *australis*, sharp in *disjunctus*), and continuity of the dark stripes on the side of the thorax (isolated dark spot on mesinfraepisternum of *australis*). Walker noted that *australis* flies earlier in the season than *disjunctus*. Living at the northern edge of the range of *australis*, Walker had little experience with *australis* over most of its range.

Westfall and May (1996) based their separation of *disjunctus* and *forcipatus* on the relative lengths of abdominal segments 2 and 3; on the distance between the tip of the basal tooth of the cercus and a small ventral swelling just basad of this tooth; the shape of the penis vesicle, and the relative size of the teeth on the cerci.

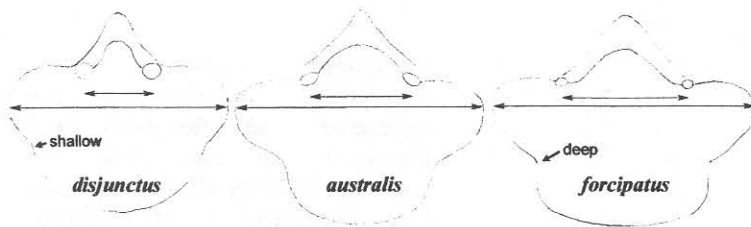


Fig. 4 Apical view of tenth segment; terminal appendages removed; arrows show widths of notch and entire segment; note differences in sharpness of lateral indent.

Westfall and May mention *australis* in their text but do not attempt a formal diagnosis. Catling (2002) expanded somewhat on Westfall and May's criteria for the distinction of *disjunctus* and *forcipatus*, adding, and emphasizing, the length of the anterior laminae of segment 2 of the male. Catling also does not attempt a diagnosis of *australis*.

In my study of several thousand specimens, I found a few *australis* as far north as Douglas Co., WI, and Lake Simcoe, Ontario. In the east *disjunctus* is widespread in New England and local south of New York, with scattered records as far south as Highland Co., VA. In the west, *disjunctus* seems to penetrate south in the mountains to California and New Mexico. *Australis* occurs west to New Mexico, and is widespread in the southeast, and north to Iowa and Nebraska. There is an eight-degree overlap in latitude between *australis* and *disjunctus*, and I base my conclusion on the specific distinction between the two taxa on the broad overlap in their ranges, the very different seasons of their emergence and flight, and lack of any sort of geographical gradation in any character of either species.

A distinction between *disjunctus* and *forcipatus* makes little sense unless *australis* can also be diagnosed. Unfortunately, for some characters, *australis* is intermediate between *disjunctus* or *forcipatus*. Of the criteria mentioned for the distinction of *disjunctus* and *forcipatus*, I have found that the length of the anterior lamina is reliable, but I prefer to state it as a fraction of the total length of the abdomen (including terminal appendages) rather than an absolute value. *Australis* falls in with *disjunctus* for this character, but *forcipatus* is distinct from the two. The cerci of *australis* and *forcipatus* are not reliably separated from each other, but *disjunctus* is separable on the basis of the shorter distance between the teeth, and the larger, sharper distal tooth. A small number of

disjunctus have a blunted distal tooth quite similar to that of *australis*. The penis vesicle and relative lengths of abdominal segments 2 and 3 have proven unreliable, and the distance between the ventral, basal swelling of the cercus and the tip of the proximal tooth is too variable for any separation.

The paraproct has proven to be a valuable diagnostic character. That of *forcipatus* is thinnest, *disjunctus* intermediate in width, and *australis* broadest. Also, the shaft of the paraproct of *australis* is curved whereas the other two are straight. The tip of the paraproct of *australis* is commonly spatulate, *disjunctus* somewhat less so, and *forcipatus* only slightly constricted in the middle. In the eastern US the paraproct of *forcipatus* is often very thin, and most specimens seem to have the distal portion bent sharply. Whether this occurred post mortem is not clear.

The notch at the distal rim of abdominal segment 10 (measuring the width at the centers of the tiny rounded knobs at the base of the hood) is distinctively wide in *forcipatus*. The widths of *disjunctus* and *australis* are similar, but the hood of *disjunctus* is generally narrower than that of *australis* when viewed from the rear.

Females of *forcipatus* are recognizable by the length of the ovipositor, whose valves reach the end of the cerci. Females of *disjunctus* and *australis* are very similar, but Sid Dunkle has pointed out that the teeth of the ventral rim valves are coarser in *australis* than *disjunctus*. This distinction has not been tested for a long series, and the teeth are difficult to see, even with a microscope. Those of *australis* are sharper and those of *disjunctus* lower and blunted, but this will be a difficult distinction at best.

In southern New York, *australis* occurs widely but never commonly. I suspect several records are of strays (two are co-occurrences with probable stray *Libellula semifasciata*), but on one occasion I found *australis* emerging in numbers at a bog in Chenango Co., NY. *Australis* is a June species with no apparently stable populations in upstate New York. At localities where *australis* is fairly common (such as Ten Acre Pond, Centre Co., PA), the species appears in early June but may persist as

Table for the separation of *forcipatus*, *disjunctus*, and *australis*. Important distinctions are capitalized.

	<i>disjunctus</i>	<i>australis</i>	<i>forcipatus</i>
Male; cerci (fig. 1)	DISTANCE BETWEEN TEETH OF CERCI RELATIVELY SHORT; DISTAL TOOTH SHARP	Similar; distance between teeth of cerci relatively long ; distal tooth blunt	
Male; paraproct (fig. 2)	Shaft straight, slightly narrowed in middle	SHAFT CURVED IN VENTRAL VIEW, DISTINCTLY NARROWED IN MIDDLE	Shaft straight, generally narrower than <i>disjunctus</i> , sometimes narrowed in middle
Male; anterior lamina of segment 2 (fig. 3)	similar: 0.55 +/- .03 % of abdomen length (N= 29) (<i>disjunctus</i>) 0.52 +/- .025 % of abdomen length (N= 17) (<i>australis</i>)		0.65 +/- .04 PERCENT OF ABDOMEN LENGTH (N=21)
Male; apical notch on segment 10 (fig. 4)	0.37 +/- .03 the width of the segment, HOOD NARROWER	0.35 +/- .03 the width of the segment; HOOD BROADER	0.46 +/- .04 THE WIDTH OF THE SEGMENT; HOOD BROAD, LOW
Female; ovipositor	similar: Valves not reaching tips of cerci teeth blunted (<i>disjunctus</i>) teeth sharp (<i>australis</i>)		VALVES REACHING TIPS OF CERCI
Male; abdomen length	28.6 +/- 1.6 mm; N=29	31.8 +/- 1.0 mm; N=17	30.7 +/- 1.7 mm; N=21

It might be asked whether the three species hybridize. Blair Nikula has sent me mis-paired specimens (*disjunctus* and *forcipatus*) from eastern Massachusetts. Male hybrids would be difficult to recognize, but females should be fairly distinctive. I have seen no females that might be hybrids with *forcipatus*, and I conclude that *forcipatus* hybrids with either of the other two are rare at best.

I examined 41 specimens of *australis* and *disjunctus* that had been examined by Walker in his 1952 study. Of these 41, Walker had some sort of query for nine determinations. Of these nine, one from Noble Co. IN which he called intermediate ("*disjunctus* transitional to *australis*"), I call *australis*, but with a query. A specimen from Mackinac Co. MI he called a "possible hybrid"; I believe it to be a somewhat aberrant *forcipatus*. The remainder I assigned to *disjunctus* or *australis*. Nevertheless, a question will remain as to the tendency for *disjunctus* and *australis* to intergrade. Although the evidence seems to indicate that this is a rare event, further study is needed.

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TWO NEW DRAGONFLIES FOR VERMONT

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Ah, the delights of autumn in Vermont: forests erupting into a canvas of red, orange, and gold; crisp apples; cool breezes; and a new *Aeshna* species for the state.

On an ideal fall day, I netted Vermont's first *Aeshna subarctica* (Subarctic Darner) at an unnamed spruce bog in Essex County, in the region we Vermonters call the Northeast Kingdom. In one sense, the record is little more than a missing puzzle piece in the circumboreal distribution of this handsome insect. But for Vermont, the discovery – along with the state's first *Libellula cyanea* (Spangled Skimmer) in July – illustrates the fast pace of ode breakthroughs in the state.

The two new state records bring Vermont's odonata list to 91 Anisoptera species and 42 Zygoptera species (give or take a few, depending on your taxonomic view of the world). It also shows, however, that Vermont remains beckoning country for new ode discoveries. Accordingly, state odonatists (all dozen or so of us) may host a regional DSA meeting in Vermont next June (more on that later).

With *A. subarctica* recorded in Quebec to our north and Massachusetts to our south, Vermont was overdue. On September 10, in my usual *Aeshna* acquisition mode, I had parked myself at the edge of the bog pond, where I would pick off countless patrolling *A. canadensis* (Canada Darner) and *A. interrupta* (Variable Darner). Only when I drifted over to a section of the bog with flooded sphagnum did I encounter several males of *A. subarctica* (right where Paul-Michael Brunelle, Nick Donnelly, and Blair Nikula advised me to look). They seemed to hover and hang more than the other *Aeshna* species at the bog that day, about a meter or so above the mat, almost *Epithea*-like, so lazily that I identified by sight the new state record before he landed in my net.

My *L. cyanea* discovery was a bit more accidental. It came at the end of a butterfly count at North Springfield Lake in Windsor County on July 6. As soon as I set eyes on those bi-colored pterostigmas, the butterflyers (but not the butterflies) were a bit startled to hear me shout "*Libellula cyanea*!" as the ode dashed away. With relocation help from local

birder and butterflyer Wally Elton, I was able to net the male for another long-overdue state record.

Odonatists may be able to net some state records of their own next spring. We're contemplating hosting a regional DSA meeting in the north-central portion of the state from June 24-27. It'll be prime time for Gomphids. We haven't yet agreed to take on the conference, but if I hear now from folks who might attend that might boost our efforts.

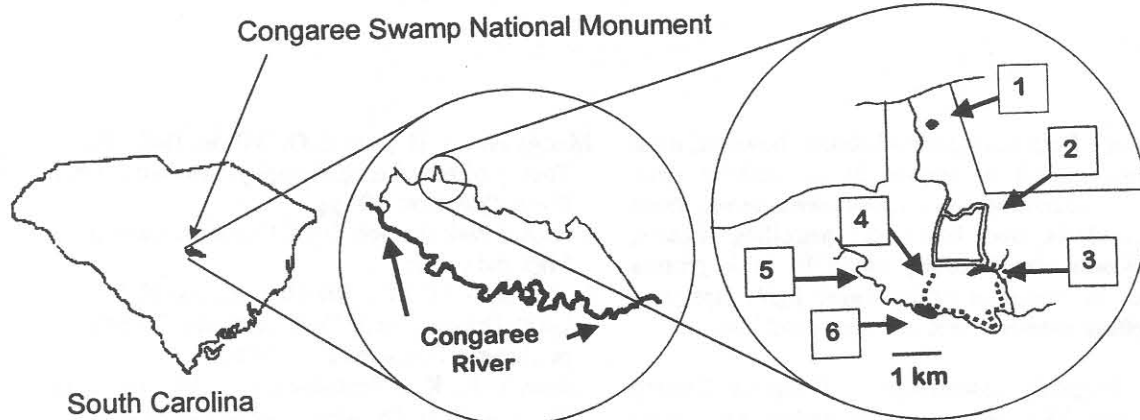
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A SURVEY OF ODONATES OF CONGAREE SWAMP NATIONAL MONUMENT, RICHLAND CO., SOUTH CAROLINA

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INTRODUCTION: The dragonfly communities of South Carolina are poorly described relative to other southeastern states like Florida and North Carolina. This sampling bias may be responsible for the disjunct distributions seen in several southeastern species. For instance, *Progomphus bellei* Knopf & Tennessen is recorded from Florida and North Carolina but has not been recorded from intervening states (Needham et al. 2000). I decided to sample the odonates of Congaree Swamp National Monument (CSNM), located 25km southeast of Columbia, SC, in Richland County. The monument is bounded to the south by the flat and meandering Congaree River, that has an elevational change of only 3m over a 20km distance. The broad floodplain of the Congaree River creates the Congaree Swamp, the largest intact expanse of old-growth floodplain forest in the eastern United States (National Parks Service 1998). CSNM is home to some of the largest trees in the eastern U. S., with record loblolly pines in excess of 45m tall and over 300 years old. It also contains a variety of dragonfly habitats including ponds, oxbow lakes, permanent and temporal creeks, meadows, and forests.

METHODS: Adult odonates were collected by net once every two weeks from March through September 2002, along an 8km trail at Congaree Swamp National Monument, Richland Co., SC (Figure 1). I purposefully sampled different habitat types, including: 1) a small pond surrounded by open field, 2) temporary creeks and sloughs, 4) permanent creeks, 5) permanent large oxbow lakes, 6) meadows, and 7) closed forest. Voucher specimens are stored at either CSNM or the Furman University Insect Collection. Sampling focused on



Location of Congaree Swamp National Monument. 1= small pond and meadow; 2= boardwalk; 3= Weston Lake, 4= Weston Loop Trail; 5= Cedar Creek; 6= Wise Lake and meadow

anisopterans, but some zygopterans were collected, as well. Also, I collected larvae from five sites on 23 February, 2003.

RESULTS AND DISCUSSION: A total of 41 species were collected (List, below), including 16 new records for Richland County, SC (White et al. 1980, 1983; T. Donnelly, personal communication). Most species formed several habitat specific assemblages. The small pond was isolated from other water bodies and was surrounded by an open meadow. This was used by 15 species, and was the only site where the following 12 species were found: *Celithemis elisa*, *Celithemis fasciata*, *Celithemis ornata*, *Celithemis verna*, *Erythrodiplax minuscula*, *Libellula auripennis*, *Orthemis ferruginea*, *Pachydiplax longipennis*, *Pantala flavescens*, and *Perithemis tenera*. The Comet Darner, *Anax longipes* Hagen, was often seen at the pond, as well. Typically, single individuals would make rapid a rapid patrol the length of the pond and then return to the trees bordering the surrounding meadow. However, I

was not able to catch a voucher specimen, and so this species was not included in the official species list.

The large lakes were populated by a distinct assemblage of species, as well. *Anax junius*, *Basiaeschna junata*, *Epiaeschna heros*, and *Nasiaeschna pentacantha* patrolled over open water, while *Tetragonuria semiaquea*, *Tetragonuria spinosa*, and *Libellula incesta* patrolled the shore. *Libellula incesta* would move into the lakes from adjoining creeks, and *Ladona deplanata* and *Plathemis lydia* were also captured at lakes.

The *Tetragonuria* species, *Plathemis lydia*, and *E. heros* also made forays from Wise Lake into the nearby meadow. This meadow was also the only

site where *Gomphus exilis*, *Gomphus lividus*, *Gomphus hybridus*, and *Erpetogomphus designatus* were collected. The dragonflies that visited this woodland meadow were different from the species found in the larger, more open meadow surrounding the small pond.

Cedar Creek also formed a distinct habitat populated by a particular assemblage of dragonflies. *Hagenius brevistylus* and *Didymops transversa* patrolled the creek, with *D. transversa* perching vertically in surrounding vegetation while *H. brevistylus* often perched on rocks or snags in the stream channel. *Boyeria vinosa* was also isolated to Cedar Creek. *Epiaeschna heros* also patrolled Cedar Creek on occasion, flying down from high perches in the trees lining the stream corridor. The zygopterans collected were also most common in the creek. *Calopteryx maculata* and *C. dimidiata* perched on vegetation overhanging the creek, while *Argia moesta* was common on emergent snags.

The woodland habitats varied from cypress-tupelo swamp to pine-oak upland. The majority of the sampling area, however, was in cypress-tupelo swamp and the riparian forests along Cedar Creek. *Dromogomphus spinosus* was very common on the path or vegetation in closed forest. *Libellula vibrans* and *Libellula incesta* were very common at sloughs and temporary streams within the forest. *Erythemis simplicicollis* and *Plathemis lydia* were common in canopy gaps were thick clumps of grasses dominated.

The site fidelity among most of these species is rather remarkable considering the extreme proximity of these habitats. For instance, the distance from Wise Lake to the meadow is only 60m, and Cedar Creek runs between them. As such, there is ample opportunity to easily move

COMMON NAME FOR *ENALLAGMA VERNALE*

Nick Donnelly

The Committee on Common Names has selected "Vernal Bluet" for *Enallagma vernale*.

The species has always been poorly understood since its original description by Gloyd (1943), partly because Grace Eager's normally brilliant illustrations were uncharacteristically murky. Walker's (1953) drawing is simply incorrect. The illustration in Westfall and May (1996) is very sharp but it is not *vernale*! No wonder that there has been widespread confusion about the species. A major problem is its near co-occurrence in the northeastern US and adjacent Canada with *cyathigerum*, with which it apparently interbreeds abundantly (The Westfall and May SEM is of such an intergrade). Because of these intergrades, Donnelly (1989) considered it to be a subspecies of *Enallagma cyathigerum*. However, further consideration (Donnelly, 1998; McPeck, 1998; May, 1998; Tennessen, 1998; Donnelly, 2001) suggests that these are two biologically distinct species, but are genetically very close (as emphasized by McPeck). *Vernale* inhabits lakes and small rivers where fish are numerous. *Cyathigerum* in this same range is confined to essentially fishless bogs, unlike *cyathigerum* from Minnesota westward, which inhabit a wide range of aquatic habitats, including many with conspicuous fish.

The common name does not imply "official" acceptance of its status as a species, but it should draw attention to the fascinating problem it presents.

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THE DRAGONFLY LADY

from *The Providence Sunday Journal*, 27 July 2003

"I get to do this for my job. How cool is that?" Ginger Brown, for years one of the most enthusiastic spokespersons for the world of dragonflies, appears again in a long and lavishly illustrated (mainly live dragonflies held in her fingers) in the Sunday supplement of the Providence, Rhode Island, newspaper.

Ginger is the dynamic force behind one of the most successful Odonata surveys in the country, which has now tabulated 134 species in this smallest of the states. It is easy to see why she has been so successful in enlisting volunteers for the project. "They eat a gazillion mosquitoes in their lifetime." She notes that come "in all colors of the rainbow", and that some are "drop dead gorgeous". If you go to Rhode Island (and her enthusiasm makes it difficult not to), don't forget to bring your net. She will sign you up instantly.

ANOTHER TRIBUTE TO MINTER

I started studying dragonflies just after James Needham died, and I feel I've now seen the passing of another era. We've lost Minter Westfall, but we had him for a long time as a wonderful influence on studies of dragonflies in the Americas and the people who conducted these studies. He "fathered" so many of the dragonfly researchers who make up the current crop in the USA that we indeed have a "Westfall generation" who continue to contribute to our knowledge of this fascinating order.

Minter's influence on me was tremendous. When I began studying dragonflies in southern Florida in

observations, which will guide the user to becoming a good observer and not just an identifier.

Softcover \$18.95; order from Kurt Mead, 6388 Lax Lake Rd., Finland, MN 5560, and add \$3.00 for shipping.

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Review: **A FIELD GUIDE TO THE DRAGONFLIES AND DAMSELFLIES OF MASSACHUSETTS**, by Blair Nikula, Jennifer L. Loose, and Matthew R. Burne, Massachusetts Division of Fisheries & Wildlife, Natural Heritage & Endangered Species Program. 197p., numerous color photos.

Reviewed by Nick Donnelly

Fresh on the heels of his recent success (*The Stokes "Beginners Guide to Dragonflies"*), Blair has now produced a very attractive and useful guide to the Odonata of Massachusetts, this time in collaboration with Jennifer Loose and Matthew Burne. Beginning with a discussion of odonate life history, and including diagrams explaining morphological terms, the introduction is full of helpful tips to aid identification, discussions of habitats, and conservation issues (which are especially important in such a highly populated state). There is a highly useful initial key to families with several attractive illustrations of dragonfly heads. Beginners will have little difficulty in quickly determining the families of netted specimens.

The accounts of each of the 165 species described includes color photos of males, and, in many cases, additionally females. A generous description, range of the species, habitat, and habits are included. Larval sketches are included for each family, but the immature stages are only slightly discussed.

In addition to the color photos, drawings have been included to illustrate *Lestes* terminal appendages, *Enallagma* abdomen tips in color, *Ischnura* abdomen tips, *Argia* abdomen tips, *Aeshna* thoracic stripes in color, *Gomphus* terminal appendages, and *Somatochlora* terminal appendages. These drawings are very well done and may be the single most useful part of the guide.

The color photos themselves are somewhat disappointing. Many of them are also reproduced in the Stokes guide, but the vivid color of the latter

simply has not been achieved in the Massachusetts guide. This may be simply a matter of paper selection, but the overall impression is somewhat disappointing to those who know Blair's photos. In some cases (*Neurocordulia obsoleta* bothered me the most) the photos have been cropped to show some but not all of the wings. Cropping saves space but produces less attractive images.

Blair alludes to one ongoing problem: The Mantled Baskettail (*Tetragoneuria semiaquea*) is apparently widespread in eastern Massachusetts, but has unmarked wings. The stouter and shorter abdomen of *semiaquea* will not be apparent in the field and will require netting for close inspection to distinguish it from the very similar *cynosura*.

Readers will discover that the state Natural Heritage & Endangered Species Program of Massachusetts has listed no fewer than 32 species, certainly the highest for any state. The terms "endangered", "threatened", and "special concern" are not defined, however, and the reader may wonder why so many species have been listed.

The only difficult part of the guide is the index, in which scientific and common names are merged. Two indices would have taken no more space and been more user-friendly.

This is an excellent guide and will be the most important guide to all of New England and many additional northeastern states. The guide is meant for slightly large pockets, and has a sturdy spiral binding, enabling it to lie flat. New England has become one of the most active centers for odonate study in North America. The large and enthusiastic group of odonatists there will be well served by this lovely guide.

Order from Massachusetts Division of Fisheries & Wildlife, Natural Species & Endangered Species Program, Route 135, Westborough MA 01581. \$20 postpaid. (508 - 792 - 7270 ext. 200)

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BULLETIN OF AMERICA ODONATOLOGY: Vol. 7 No. 3

AT-RISK ODONATA OF CONTERMINOUS
UNITED STATES, George H. Bick 7(3):41 - 56;

DESCRIPTION OF THE LAST LARVAL
INSTAR OF ISCHNURA FLUVIATILIS
SELYS (COENAGRIONIDAE), Natalia von
Ellenrieder and Javier Muzón, 7(3): 57-60

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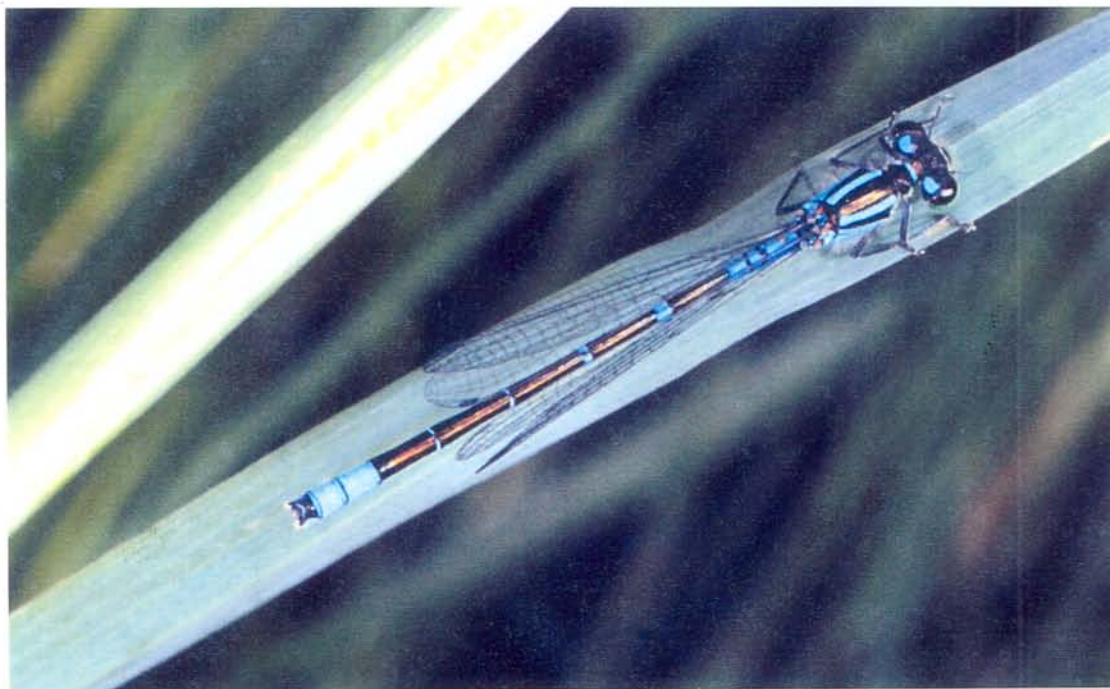
BACK COVER

Erpetogomphus eutania, Gonzalez TX, photo by Greg Lasley

Coenagrion angulatum, Moose Mountain, SK, photo by Nick Donnelly



Erpetogomphus eutania, photo by Greg Lasley



Walker said of me, "... one of the most abundant Zygoptera on the Canadian prairies." Yet, few odonatists have seen me. Who am I? see inside cover.