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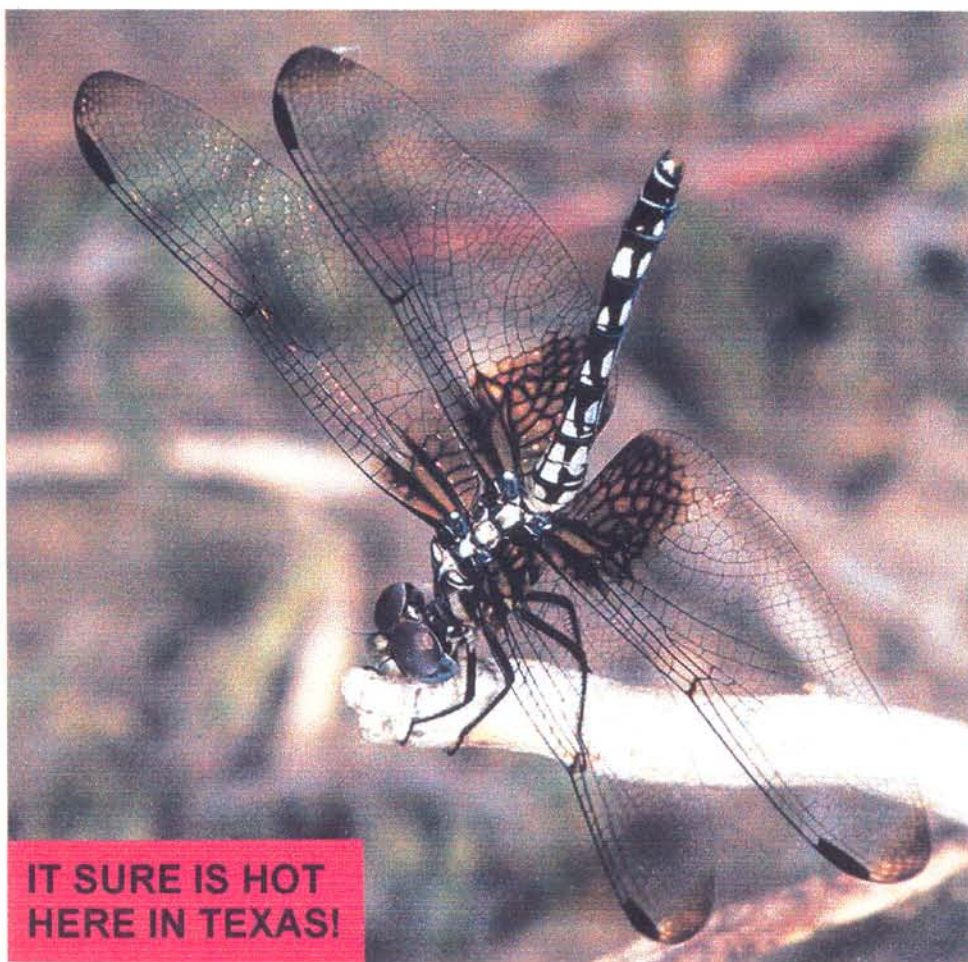
ARGIA

THE NEWS JOURNAL OF THE DRAGONFLY SOCIETY OF THE AMERICAS

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NUMBER 2



IT SURE IS HOT
HERE IN TEXAS!

PUBLISHED BY THE DRAGONFLY SOCIETY OF THE AMERICAS

THE DRAGONFLY SOCIETY OF THE AMERICAS

Business address: c/o T. Donnelly, 2091 Partridge Lane, Binghamton NY 13903

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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 MS DOS based files, preferably written in **WORD**, **WORD** for **WINDOWS**, **WordPerfect**, or **WordStar**. Macintosh **WORD** disks can be handled. All files should be submitted **unformatted and without paragraph indents**. Each submission should be accompanied by a text (=ASCII) file. Other languages should be submitted only as text (=ASCII) files. Line drawings are acceptable as illustrations.

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

BULLETIN OF AMERICAN ODONATOLOGY is devoted to studies of Odonata of the New World. This journal considers a wide range of topics for publication, including faunal synopses, behavioral studies, ecological studies, etc. The **BAO** publishes taxonomic studies but will not consider the publication of new names at any taxonomic level. Enquiries and submission of manuscripts should be made to **BAO** editor T. Donnelly, 2091 Partridge Lane, Binghamton NY 13903. Final submissions (after review) should be made on floppy disk, as above, with illustrations in final form and preferably adjusted to final size.

MEMBERSHIP IN THE DRAGONFLY SOCIETY OF THE AMERICAS

Membership in the **DSA** is open to any person in any country. Dues for individuals in the US, Canada, or Latin America are \$15 for regular membership and \$20 for institutions or contributing membership, payable annually on or before 1 March of membership year. Dues for members in the Old World are \$20.

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

Cover: *Dythemis fugax*, female, west Texas. The obelisk position shows that this a hot day!
Photo by Nick Donnelly

IN THIS ISSUE

Spring is here and reports of first sightings of dragonflies have been appearing on the internet. As usual, *Anax junius* is the overwhelming choice for first bug of the year. Ginger Brown found a female ovipositing in Rhode Island on 20 April. We presume the ice had melted. Around Binghamton, cold, wet weather in late May kept me indoors. Finally, two days ago (1 June), Ailsa shouted that there was a *Tetragoneuria* in the side garden. I went out, netted it, admired a very new female *cynosura*, and released it to fly away. Now I am looking for my second!

This promises to be a busy summer, with many fine meetings planned. Don't forget to be at the Hill Country annual meeting. And you can leave your woollies at home. The cover illustration for this issue is a *Dythemis fugax* greeting us in the Hill Country. She shows us in how to assume the obelisk position for maximum relief from the heat.

Speaking of the annual meeting, Ron Lyons sent in a copy of a very interesting article in New Mexico Magazine on Robert Larsen and his collecting at the Bitter Lake National Wildlife Refuge. Those planning to attend this meeting and the post-meeting field trip to this place should find and read this nice article.

Paul Bedell writes with the good news that the salt-loving damselfly, *Ichnura barberi*, is alive and well at a saline pond in eastern Nebraska. Perhaps someone will demonstrate some day that this species needs the salinity. Or is this simply the case of an otherwise not very competitive insect that can tolerate salinity that other species cannot?

Bob Harding sends us yet another provincial record for Prince Edward Island (*Enallagma aspersum*). Adrian Trapero Quintana and Carlos Naranjo

López report still more records for that determined Oriental invader: the bright red libelluline *Crocothemis servilia*.

I continue my series of biographic sketches this issue with a brief account of Donald Borrer. The reader may sense my feeling of personal indebtedness to this fine gentleman.

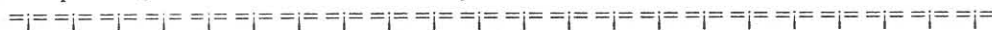
I have used the opportunity of a sparsely contributed issue to write a summary account of the problems I have been wrestling with in regard to the dot-map project. I should have realized in the beginning that this would be no mere assembly of data. By the way, new data keep pouring in, and I am grateful. The maps will be published soon, I promise!

Ken Tennesen provides an account of an interesting observation – a teneral tropical aeshnid that has black markings that disappear on maturation. Are there other cases of this?

I have provided a brief account of the re-discovery of a tropical odonate that has puzzled people for more than a century. Fred Sibley managed to find a few *Orthemis sulphurata* in a fairly dry part of western Ecuador.

We congratulate Bill Mauffray on his recent wedding. We note (but withhold our congratulations) that Jerrell Daigle has changed his e-mail address.

Finally, we close with a long **TRAMEA**, featuring two large and very attractive web sites. The Costa Rican site is full of scans of tropical odonates, and visitors to Central America will find it very useful for identification. The Iowa site is one of the most ambitious state sites yet and is full of range maps and other data.



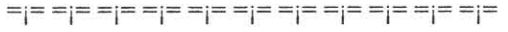
Calendar of Upcoming Meetings, 2001		
Place	Date	Contact
DSA Northeastern Meeting, Southern New Jersey	9-10 June	Allen Barlow <Tramea@optonline.net> 973-426-0074
DSA Annual Meeting, Hill Country, Texas	12-15 July	John Abbott <jcabbott@mail.utexas.edu> 512-471-5467
Great Lakes Odonata Meeting, Western Ontario	3-6 July	Colin Jones <naturalist@algonquinpark.on.ca>
DSA Southeastern Meeting, Phase One, North Central Tennessee	20-22 August	Carl Cook <bugman@scrtc.com> 502-565-3795

DSA Southeastern meeting, Phase Two, East Tennessee	23-26 August	Jerrell J. Daigle <jdaigle@nettally.com> 850-921-9479
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**TRIBUTE TO NEW MEXICO
DRAGONFLIES**

Ron Lyons sent along a Xerox of an article from "NEW MEXICO MAGAZINE" (March 2001), with an article entitled "Magical Dragonflies". It features the Bitter Lake National Wildlife Refuge and Bob Larsen, who has found so many interesting records there. The DSA members who go to the Texas meeting in July will have an opportunity of seeing this place themselves in the post-meeting field trip led by John Abbott. I can't wait.



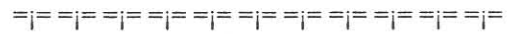
**SOME RECENT ODONATE RECORDS FOR
NEBRASKA**

Paul Bedell, 10120 Silverleaf Terr., Richmond, VA 23236, pbedell@vcu.org

Roy Beckemeyer's article about the occurrence and habitat of *Ischnura barberi* (ARGIA Vol. 11 #1 p.22) prompted me to look for the species in the saline wetlands of Lancaster County, Nebraska. Roy had stated that there was but a single 1937 specimen record for Nebraska from this area, and wondered if they might still be extant there. I am happy to report that even though there has been extensive loss of the salt-marsh habitat to the growing Lincoln community, *I. barberi* (Desert Forktail) is still there! On 11 Aug. 2000, I took a single male specimen and saw another individual at a saline wetland near the southeast corner of the intersection of I-80 and N. 27th St. in Lancaster County, NE. I returned to the area on Aug. 13th with Loren & Babs Padelford, and Don & Janis Paseka. We observed at least a dozen individuals scattered throughout the surrounding dry low-stature native grassland. A few males were observed at some standing water in a small man-made depression, otherwise they were located away from water, similar to *I. hastata* which also occurs there in low numbers, but is most often found away from the water in the surrounding grassland. The Pasekas (pers. comm.) observed more *I. barberi* at another wetland (Little Salt Fork Marsh) about seven miles from this site. Fortunately, both of these wetlands have been preserved. *I. barberi* likely occurs in other saline marshes in the immediate area, but there is no other similar habitat in southeast Nebraska. The nearest population may be in the salt

marshes of south-central Kansas. Travel-weary drivers on I-80 can easily take a break and visit this wetland by taking Exit 406 south. Go about a half mile and look for the business access road paralleling N. 27th St. on the east side. Park here and walk in. It's also good for migrant shorebirds.

On 4 June 1999, I took a small male aeshnid in Sowbelly Canyon, Sioux County, Nebraska. I recently got around to identifying it as *Aeshna californica* based on the small size, concave cerci, and shape of the thoracic stripes. This is a new species for the state. *A. californica* (California Darner) also occurs in the Black Hills of South Dakota and there is a specimen at the NMNH from Devils Tower, WY. These areas are within 100 miles, so this record is not too surprising.



**ENALLAGMA ASPERSUM IN PRINCE
EDWARD ISLAND**

Robert W. Harding

Prince Edward Island is Canada's smallest province, located on the Atlantic Ocean in the Gulf of Saint Lawrence. Collecting in PEI's protected natural areas is permitted - even encouraged - provided the data is shared for public benefit. We have collected in several of these natural areas, having been involved in the Atlantic Dragonfly Inventory Program (ADIP) since it was launched by Paul Brunelle in 1993.

On September 2, 2000 my son Jake and I stopped for a quick dragonfly survey of one of these natural areas: it was our first trip to a small kettlehole-type pond in the southeastern part of the Island, locally referred to as 'Isaac's Lake'.

It was a pretty spot that day - the clear blue sky was reflected in an apparently deep pond surrounded by a floating mat of sphagnum, upon which grew sundews and pitcher plants. It was immediately obvious to us that the odeing would be good that day. The place was alive with dragonflies - feeding, sparring, mating, ovipositing.

It soon became painfully obvious to us that the place was alive with biting bugs too. The flying bloodsuckers attacked as though somehow the

arrival of fresh meat had been announced to them. We beat a hasty retreat, but were soon back in action after a generous slathering of DEET. The mosquitoes kept their distance, but the deer flies still bounced off our hats, waiting for the dope to wear off.

We gingerly negotiated our way along the floating shoreline, collecting as we went, and several times our swings (and the tabanids) nearly sent us into the water. We persevered, and soon realized that we had netted something different - *Enallagma aspersum*, a first record for the species for Prince Edward Island!

Enallagma aspersum has been recorded in the neighbouring provinces of New Brunswick and Nova Scotia, and this new record brings the total number of odonate species recorded in PEI to 65. According to the ADIP database, this record also represents a northeastern expansion of the known range of *Enallagma aspersum*.

It is interesting to note that while there were a great many *Enallagma aspersum* on Isaac's Lake that day, very few females were seen. And the few females that were netted were part of tandem pairs, captured as they were embarking on an apparent ovipositing expedition. Obviously, the males were patrolling for females, and were doing a much better job than we were. But then again, they didn't have to worry about treacherous footing or kamikaze bloodsuckers ... and let's face it - they were very highly motivated.

We recorded a total of sixteen different species of Odonata in our one-hour survey of Isaac's Lake that day. *Enallagma aspersum* and *civile*, tandem pairs of *Lestes disjunctus*, and *Nehalonia gracilis* and *irene* were both at the site. *Aeshna canadensis* was ovipositing, as was *eremita*, *i. interrupta*, *subarctica*, and we collected one male each of *tuberculifera* and *u. umbrosa*. We found one very worn *Libellula julia*, along with an old, slow *Leucorrhinia proxima*. We netted several wheels of *Sympetrum obtrusum*, and a few individuals of *costiferum* and *vicinum* rounded out the list.

Given the positive results from this short collecting trip last year, we will surely be tantalizing the tabanids at Isaac's Lake again this summer.

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NEW LOCALITY REPORTS FOR *CROCOTHEMIS SERVILIA* (DRURY, 1773) (ODONATA: LIBELLULIDAE) IN CUBA

Adrian Trapero Quintana (1); Carlos Naranjo
López (2)

(1) Centro Oriental de Ecosistemas y Biodiversidad (BIOECO); (2) Universidad de Oriente, Departamento de Biología.

Translated by Nick Donnelly

In 1996 Dr. Oliver Flint reported for the first time the occurrence of *Crocothemis servilia* in Cuba, in San Antonia de los Baños, La Habana Province (western sector) (Flint, 1996). In 1997 this species was collected in Sancti Spiritus (central sector) by José Ramos (Ramos, 2000).

The present authors collected two males of this species on 9 April, 1996, in the Río San Juan, at La Redonda (6 km from Santiago de Cuba). A female was taken in the same river near the botanical garden of Santiago de Cuba on 10 July of the same year. On 13 December, 1998, a male was collected at the Minerva reservoir, 20 km east of the city of Santa Clara, Villa Clara Province, by one of the authors.

Later, in the Río Gascón, on 12 February 1999, on the crossing of the road to the dump of Santiago de Cuba, a young male was collected. On the outskirts of the city two adult males were collected in the Río Los Guaos, near the bridge for the Carretera de Mar Verde, and in the vicinity of the quarries of the old road of Cobre on 11 and 25 November, 2000, respectively. Also, a male of this species was collected in the Río Cobre, at the locality of Malgarejo, northeast of the city of Santiago de Cuba on 1 March 2001. Only the wings of this last specimen were preserved.

With this note the published range of this species has been increased in Cuban territory. The collected specimens are in the collection of Adrian Trapero Quintana.

Acknowledgements:

We would like to thank Sr. José Ramos for sending us his data on the wings and genitalia of both sexes, which aided us in the determination of this species.

References:

- Flint, O. 1996, The Odonata of Cuba, with a report on recent collection and a checklist of the Cuban species. *Cocuyo*, 5: 17-20.
Ramos, J. 2000, Geographic distribution of *Crocothemis servilia* (Drury) (Odonata: Libellulidae) in Cuba. *ARGIA*, 12(3): 28-29.

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HISTORY OF ODONATA STUDY IN AMERICA:

DONALD J. BORROR (1909 – 1988)

Nick Donnelly

Donald Borrer was the most important Odonata student that Clarence Kennedy had in his long career at Ohio State University. An Ohioan from birth to death, Borrer contributed immeasurably to the study of Odonata of Ohio as well as providing monographic treatments of two difficult Neotropical libelluline genera. Borrer was born in Ohio in 1909, the son of a Methodist minister. While still in his teens his family moved to Columbus when his father was named minister of a church there. He never left this city, except for World War II duty, in which he served as a medical entomologist (along with a virtual who's-who of American entomologists) in the southwest Pacific.

He received his Masters degree (at Ohio State) in 1930 with a dissertation on the genus *Oligoclada*, which still is the premier study on this small but challenging genus of South American libellulines. In 1935 he received his doctorate for a superb study of the genus *Erythrodiplax*, which is the largest and most difficult of the New World libelluline genera. In this study, which has held up admirably in the subsequent three quarters of a century, he found that many cryptic species could only be distinguished by their internal secondary genitalia. Although he contributed a few subsequent papers on this genus, his entomological work was largely completed with this study. His "Key to the New World genera of Libellulidae" (1945) stands in my estimation as the clearest and best-presented diagnostic key I have ever used in this order. He published several regional faunal papers on Ohio and Maine, but his Odonata bibliography is surprisingly brief for such an influential man.

One of his last entomological publications was his hugely successful introductory text, "An Introduction to the Study of Insects" (with D. DeLong, and in later editions with C. Triplehorn). He was also the senior author (with R.E. White) of the very attractive Peterson guide, "A Field Guide to the Insects".

He should be remembered for something else. At Montgomery's famous 1963 symposium at Lafayette, Indiana, Borrer gave a talk on common names. He devised the first North American list of common names based on the same scheme that Selys himself had used more than a century earlier: translation of the scientific names directly into the vernacular. Interestingly he did not use common



Donald J. Borrer

names with his students, who seemed not to be put off by scientific names.

He was also one of the longest serving instructors (insects and birds) at the legendary Audubon Nature Camp on the coast of Maine (19 summers between 1938 and 1962) and was very popular with the students. Doubtless I was not the only one during his tenure who developed an absorbing and life-long interest in insects through his cheerful and patient instruction. He told me something, however, that stuck with me. "I'm getting out of insects now," he said (This was in 1948). "I have started to record bird songs, and this will keep me busy in the future." And it did. Picking up after the long-forgotten P.P. Kellogg of Cornell, Borrer recorded a huge number of bird songs. These were marketed as long-playing records for many years, and he is still remembered today largely as the father of recorded bird songs. In spite of the overwhelming success of these recordings, it always seemed to me very sad that such an enthusiastic odonatist was planning to abandon these insects.

On field trips in Maine he would lead his insect class out in the wee hours of the morning ("Dawn is the best time for insects." I almost immediately rejected this advice.) I still recall him cheering me on while I was trying to net my first *Aeshna canadensis*. He urged me to wade out farther and farther in an excessively muddy pond in a cow pasture, while the students looked on and

presumably wondered how difficult it would be to retrieve my body. (I caught the bug.) Very late that summer, I decided that I was hooked on Odonata and sought his advice on literature (His advice was, "Buy Garman's 'Odonata of Connecticut' [for \$2]; it will serve you well in Washington."). Later I knew him mainly through correspondence. Responding to a query on *Leucorrhinia*, he sent me drawings of the appendages of all the species – a very generous act on his part. The Montgomery symposium in 1963 was Borror's last visit to an Odonata gathering. I will always cherish memories of him as a kind, generous, and enthusiastic teacher.

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TAXONOMIC PROBLEMS WITH NORTH AMERICAN ODONATA SPECIES – A LAST APPEAL FOR INFORMATION

Nick Donnelly

Finalizing the data for the dot-map project has led me into unexpected and unintended directions. It is only when you assemble reports from many Odonatists that you realize how incomplete is our understanding of many North American Odonata species.

The recent highly successful damselfly (Westfall and May, 1996), and Dragonfly (Needham, Westfall, and May, 2000) manuals have alluded to many of these problems, but they have provided only limited discussion and little direction as to how we might most profitably proceed towards, if not a solution, at least a clearer understanding of taxonomic relationships.

I have discussed these problems in earlier ARGIA numbers, and in numerous "chat" discussions on the net. The response to these presentations has been very generous and very helpful. I have received and examined, for example, many thousand *Lestes* specimens representing major collections. I have also benefited from ideas that colleagues have furnished.

None of my ideas are novel, but many seem to have been only infrequently discussed. I believe that all are worthy of discussion, because all represent necessarily imperfect and tentative conclusions based on our present understanding.

I have prepared some graphic presentations (JPEG files) for many of these problems. I have distributed several via e-mail attachments. Some are fairly large (1200 K) and may not be able to be received or opened by everybody. But I stand ready to distribute these widely.

I intend to discuss these problems at the Texas meeting, and I hope these words will stimulate a lively discussion.

Lestes disjunctus complex

This seems to be the study that most people are aware of. The problem is simple: there are three taxa. One (*disjunctus*) is easily distinguishable for males, and another (*forcipatus*) for females (itself an unusual situation for Odonata). The third (*australis*) seems intermediate in most characters, but is extreme in at least one (the paraproct). It is not a simple intergrade between *forcipatus* and *disjunctus*.

The problem starts with Rambur, who described *forcipatus* in 1842. I have not seen his type specimen, nor do I even know if it exists. It would not assist in the present problem and might only complicate the nomenclatorial aspect. Rambur was not even certain his type came from North America, although his female was certainly North American. This raises the question, why did he associate these as the same species? Rambur's description is almost certainly that of what we now know to be *australis*. Hagen (1861, "Synopsis of Neuroptera of North America"), Selys (1862, "Synopsis des Agrionines. Seconde Légion: *Lestes*"), Calvert (1893, "Catalogue of the Odonata in the vicinity of Philadelphia"), Williamson (1900, "Dragonflies of Indiana"); and Howe (1917, "Manual of the Odonata of New England, Part II") provided descriptions of *forcipatus*, but all seem to be *australis* also, or at least are not definitive for *forcipatus*. Calvert's and Williamson's figures are fairly definitive for *australis*.

The study that seemed to define the taxa as we now know them was that of Garman (1917, "Zygoptera of Illinois"). He was the first to characterize the female of *forcipatus* by the length of the ovipositor. His description seems to lump male *australis* and *forcipatus*, but he provided (but failed to discuss nor even note in the text!) poor figures of the hamules and the basal abdominal segments that suggested that he understood *forcipatus*, as we now view it. This is the first study that seems to convey the modern concept of this species. In his later "Odonata of Connecticut" (1927) he neither figures nor really effectively discriminates the taxa.

Montgomery (Records of Indiana Dragonflies. X, 1941) discusses the problem (along with Dolly Gloyd). They find two criteria for the separation of *forcipatus* and *disjunctus* that seem to work, and two that, in my opinion, are less useful. The breadth of the apical hood of the 10th abdominal segment, and the relative placement of the basal

tooth of the cerci seems to be of real value. But they did not recognize three taxa – only two.

Walker's landmark study ("The *Lestes disjunctus* and *forcipatus* Complex", 1952) introduces the third taxon - - *australis*, but only as a subspecies. Walker picked up on Garman's 1917 figured but undiscussed criterion of the length of the hamule and the second abdominal segment. Walker's superb figures have served us well in sorting out the three taxa, but I have found a number of specimens in almost all the collections that I have examined that have confused the three. His conclusion that *australis* was a subspecies was undoubtedly colored by his observation that, "There are sometimes, if not always, intergrades with [*disjunctus*]"'. I have examined many of the specimens that he labeled "intergrade" and respectfully disagree with his conclusion. The two taxa overlap in range broadly (*Disjunctus* occurs south to Virginia and *australis* north to Ontario, New York, and Connecticut). Their flight times are quite different, and in several localities they co-occur.

I intend to treat these as species, but I note variation in the morphology of all three species. How much of this can be attributed to simple variation and how much to possible intergradation is difficult to tell. Both *australis* and *disjunctus* have considerable ranges quite apart from the other two species, but they vary considerably within these outlying ranges. Thus, possible hybridization where two species overlap will be difficult to establish.

Remaining problems will be to determine the northern limit of *australis* in the mid-west, the southern limit of *disjunctus* in the east, and the western and southern limits of *forcipatus*.

Amphiagrion saucium and *abbreviatum*

It has long been recognized that the eastern (*saucium*) and western (*abbreviatum*) taxons differ in both appearance and habits. *Saucium* is slender, relatively pale, and occurs mainly at seeps. *Abbreviatum* is stouter, darker, and occurs at a wide variety of aquatic habitats. These two taxa seem to have all the characteristics of distinct species.

The present problem stems from numerous and widely scattered occurrences in the mid section of the country (approximately, but not limited to, the Great Plains) of forms which are intermediate in color pattern. Among the never-completed studies which Dolly Gloyd undertook, the naming of a third, mid-continent, species was one of the better known. I hesitate to repeat Dolly's manuscript name here, because it is my sad experience that

stating of the name, even with abundant caveats, does not prevent some readers from assuming that this name is both authentic and useful.

It seems that there might well be two species-level taxa here: a far-western, and a Great Plains and eastern forms. The habitat difference is not well reported for the Great Plains form, but may well correspond to *saucium*.

I will treat these as a single species but with strong warnings and reservations. This is not a satisfactory solution but will call attention to the problem. Unfortunately, some western workers have not tried to sort out the problem, but simply named their specimens "*abbreviatum*" because of tradition rather than examination.

Enallagma vernale and *cyathigerum*

I have discussed this problem in the pages of *ARGIA* (1998, 10(1): 20-22). Recapping, *vernale* is a northeastern species (Wisconsin to Nova Scotia; not found south of New York). In this range "*cyathigerum*" is always more or less distinguishable from western (Minnesota and western; also subarctic Canada, Alaska, and western Europe) specimens in possessing a variable amount of "*vernale* morphology" of the cerci. Specimens from West Virginia have been troublesome; they all seem to be *cyathigerum* with much *vernale* morphology, but I have seen no true *vernale* from this area.

In the northeast, *vernale* inhabits small rivers and lakes, commonly with abundant fish. *Cyathigerum* in this area is confined to fishless bog ponds, but occasionally irrupts in a fishy lake (where it does not persist). In the main part of its range, *cyathigerum* occurs in a wide variety of aquatic habitats, including along with fish.

My conclusion is that habitat differences alone are enough to indicate that *vernale* is a distinct species, but that extensive intergradation occurs. The possible causative mechanism is man's extensive modification of the landscape. The ultimate outcome is that the two species in the Northeast might mongrelize and lose their identities.

Aeshna interrupta subspecies

It is not easy to understand why these subspecies have so long been ignored. They were all originally described as discrete species by Walker (1910, "Key to North American Species of *Aeshna*"). [It is difficult with our hindsight to see how the specific identity of *interrupta* could have been overlooked for so long, but that is another matter.] Walker quickly relegated them to

subspecies status (1912, "North American Dragonflies of the Genus Aeshna").

Lineata and *interrupta* have all the attributes of good geographic races: the latter is a plains race and the former is an eastern woodlands race. Where they approach, intergrades are found extensively. *Interna* is a distinct form that inhabits the Great Basin. It is easily separable on the basis of cerci morphology, and in other parts of the world it would possibly be treated as a distinct species. Walker (1958, "The Odonata of Canada and Alaska, Vol. 2") states, however, that it intergrades with *lineata* in British Columbia. This seems to be the sole bar to its consideration as a species.

Unfortunately, many people working in areas of potential overlap do not distinguish or record the races, and it is possible that a close examination of all collected material might produce an unexpected result (that the races may overlap after all, and the that two taxa might be distinct species).

Nevadensis is a more unusual case. In his well-known later work (1958) Walker "dropped *nevadensis* from the Canadian list." Actually, it was never on the Canadian list. It was described from specimens from Reno, Nevada. Walker stated that it "seems to be indistinguishable from *lineata* of the prairies". Yet he described and figured differences in this paper as well as earlier ones. One objection to retaining *nevadensis* as a subspecies is that it is admittedly similar to *lineata* (I find the morphological difference minor but fairly constant). Its recognition seems to remove one problem that occurs with the retention of *lineata*: if it were the same as *lineata*, then subspecies would have two disjunct populations. With the recognition of the minor morphological differences, then *lineata* becomes the Great Plains - to - Alaska subspecies, and *nevadensis* a geographically disjunct montane subspecies.

Examination of numerous specimens from the Pacific Northwest might shed further light on this intriguing problem. A further wrinkle is the occurrence of a few specimens of apparently typical *interrupta* in the Northwest (I have taken them myself on Vancouver Island).

I am treating these tentatively as subspecies with the hope that people in the Northwest will take a good look at the problem.

Cordulegaster bilineata vs *diastatops*

The distinction of these two species has been very troublesome. Until only a few decades ago, *diastatops* was known dominantly from the Appalachians and eastward. Southern forms

(starting approximately in New Jersey and Maryland) are paler with narrower thoracic stripes, and with a smaller, slighter epiproct., Carle called these *bilineata*. The view arose that these were northern and southern species, respectively. However, Ohio and Michigan specimens later began to be studied, and these were largely but not entirely ascribed to *bilineata*. (Curiously, some of the specimens called *bilineata* from Michigan occur almost as far north as "true" *diastatops* in the northeast. So much for northern and southern species.)

The problem is specimens from intermediate areas of the East, and also from much of Ohio and Michigan, seem to be intermediate in character between the two "species". I haven't heard from anyone a convincing argument as to why these should be treated as distinct species.

Epitheca costalis, *petechialis*, and *cynosura*

The problem of distinguishing these three species has vexed workers for many years. Most of the past attention to the subgenus *Tetragoneuria* was focused on specimens from the east: New England to Florida, with only limited attention to western specimens. In the east the distinction between *costalis* and *cynosura* is shown clearly by Tennessen (1977, "Rediscovery of *Epitheca costalis*"). No specimens of *costalis* west of the Mississippi River were included in that study.

The examination of western material (east TX, OK, KS, MO, AR, LA) has revealed hidden complexities. In the first place, *costalis* seems to grade into *petechialis*, a southwestern species that was originally known for its wing maculation. But specimens of *petechialis* from central Texas are quite variable in maculation, and this diagnostic character is of little apparent value. *Petechialis* and *costalis* have different morphologies (*petechialis* has shorter cerci and a less constricted abdomen), but these two seems to grade together. At the moment it seems more straightforward to regard them as geographic races, but further work might show that they are distinct species with broad intergradation (This does seem possible but unlikely at this point.).

The further problem involves *cynosura*. Specimens under this name from Iowa to Louisiana are not like the thick-waisted form from the east, but seem to have a variably developed constriction in the basal abdominal segments. Similarly, many of these specimens depart from the cercal distinction shown by Tennessen. It is uncomfortable but perhaps inescapable that many of the mid continent specimens are intergrades between *cynosura* and *costalis* (*sensu lato*). Further study, especially of

larval habitats, might shed light on this problem. For the moment I am considering *cynosura* and *costalis* valid species, but am forced to label many specimens "apparent intergrade").

Erythemis collocata and *simplicicollis*

Hagen (1861, "Synopsis of Neuroptera of North America") named but did not make explicit the distinction between these two. [This section of Hagen's paper is confusing. He described *Erythemis* to include (present nomenclature) *Erythemis mithroides*, *Brachymesia furcata*, and *Idiataphe longipes*, but placed *simplicicollis* and *collocata* into *Mesothemis*, apparently based on narrowness or broadness of the abdomen!] The distinction between *collocata* and *simplicicollis* has seemed to be secure for many decades, in spite of Calvert's decision (1907, "Biologia Centrali Americana") to consider them questionably subspecies.

The traditional distinction between the species has been based both on stature (*simplicicollis* is long and narrow, *collocata* is short and stout), and on the extent of black vs yellow-green coloration of much of the body. The coloration distinction has shown too many exceptions and is not currently used. Gloyd (1958, "Dragonfly fauna of the Big Bend Region"), restudied these two and diagnosed them according to a metric based on the ventral surface of the 4th segment of the abdomen (actually the tergum folded beneath the abdomen). Needham, Westfall, and May (2000) employed her criterion to distinguish them in their manual.

I found that there was a problem with these species when I was assembling Colorado data for the dot-map project. Evans had reported *simplicicollis* from Larimer County, and Orr had reported *collocata* from the same place. Was one of them mistaken? Or did they both occur in the county? I asked Boris Kondratieff to look at the specimens in the collection at Fort Collins and tell me which species occurred in Larimer County. Instead he sent me all the material of these species from Colorado and New Mexico (thank you, Boris!). When I measured them, I found that the distinction between the two seemed to be unclear. Later, I received a huge collection from Missouri (thank you, Linden Trial), much material from Kansas (ditto Roy Beckemeyer), and a vast amount of material from Chavez County, New Mexico, courtesy of Robert Larsen. Measurements of all of this material, plus much material from Texas (from Dennis Paulson and John Abbott) and Arizona (several people) have helped clarify the problem.

It now appears that there is an east-west cline from Missouri to Arizona. All specimens from Missouri

are clearly *simplicicollis*, and most from Kansas would be similarly identified. But the Kansas specimens are already somewhat "*collocata* like"; that is, they have broader, shorter abdomens than their Missouri brethren. In Colorado and New Mexico there is no clear break between populations of the two, and, in fact, they grade together. I wish I had more Arizona material, but the specimens already studied show a clinal distinction between the two. It now seems unrealistic to retain these as distinct species.

Orthemis ferruginea, *discolor*, and a third species

I discussed these in an article in *ARGIA* (1995, 7(4): 9-12). The distinction between *discolor* and *ferruginea* was first clearly enunciated by DeMarmels (1988, "Odonata del Estado Tachira"). It was a distinction that had been right in front of our noses for years, but no one seemed to pick up on it. Typically (but not always) the two species differ in color of the frons (purple in *ferruginea* and red in *discolor*). At the time of my article, the northernmost record of *discolor* was from Hidalgo, Mexico. In 1998 (paper at the NABS conference) I reported additional records from northernmost Mexico. Subsequently there have been a very few records of *discolor* from Texas and possibly New Mexico. There seems little doubt that there will be more records in the future.

Several matters complicate the simple distinction between the two species. Unlike most odonates, the females are more distinct than the males (see *Lestes forcipatus* for a similar example!), and juvenile males are more distinct than mature males. The problem with mature males is that they develop, on the thoracic dorsum and sides, a deep red-purple color that obscures the diagnostic juvenile color pattern, leaving minor remnants of the pattern still visible on the lower part of the sides. The thoracic venter is very distinctive, but I have never seen a photograph of a live specimen that shows the venter. It is almost impossible to observe through binoculars. [These bugs should carry a warning label: "If you can see my venter, you're too close!"]

The current preference among many Odonatists for identifying through binoculars rather than netting has not helped to determine the range of *discolor*. Many observers have observed a red instead of a purple frons, and black instead of orange wing veins, and used these as diagnostic characters. But the wing vein color is variable throughout the range of *ferruginea*, and other color characters also do not seem to be constant.

In southern Texas a few springs ago I found *ferruginea* flying with *Brachymesia furcata* at the

McAllen sewage ponds. They were exactly the same color! I thought I was seeing *discolor* and I netted two specimens. They were differently colored *ferruginea*. The next year I found these two species at the same place (slightly later in the season), but with very different living colors. If these are real color morphs, and not an abnormal occurrence, then this is the first example in this species.

We do not yet have clues as to whether *discolor* and *ferruginea* actually co-exist on a fine scale or prefer different habitats. Years ago Minter Westfall found them at the same locality in Guatemala, and further labeled his specimens with the sublocality. When I found that he had taken the two species, I also found that they did not seem to be flying exactly together. A clue! But we must find some more clues. The species "co-exist", according to generalized locality labels, from Texas to Costa Rica, but we still don't know if they intimately co-exist.

The entire matter would rest there if it were not for the existence of a third taxon. This is an Antillean form differing in the remnant of the thoracic color pattern seen on the bottom of the thoracic sides, and on the thoracic venter. Fresh or well-preserved specimens show these differences clearly. Older museum specimens, especially those which were not acetoned in the first place, show a degraded thoracic pattern which makes their identification difficult. The Antillean form occurs also in the Florida Keys and locally around Miami, never far from the coast, as well as the Bahamas. I still have no good observations about this species and *ferruginea* flying together (or not), but there are a few specimens of the two bearing the same locality label. I visited Florida last year to sort this out, but my brief visit coincided with a strong cold front, and I found neither species.

In Puerto Rico and the Dominican Republic two color morphs (my interpretation) have been regularly observed. These red and purple morphs (recall the two "morphs" of *ferruginea* at McAllen TX) were flying together in Puerto Rico, under circumstances that led me to conclude that they represented maturation stages. Other libellulids have color morphs (*Orchithemis pulcherrima* is an example), but color morphs are at least very unusual in the family. In the Florida Keys I found only the red morph, but in the remainder of the Antilles (all the way to Trinidad) I have seen the purple morph more commonly.

There is a lot that still needs to be sorted out in this complex. Habitat (and habit) differences need to be sought and described. Previous studies on behavior have not recognized the possibility of multiple

species. I have seen older museum specimens from coastal Texas to Honduras that might be the Antillean species. But their preservation has always been too poor to make a reliable call. I am intrigued by the possibility that the Antillean species might be found from time to time in Texas.

We need to know why there are color morphs in the first place. It is possible that there are even more species than the three, and we are a long way from understanding these species.

Sympetrum internum vs *janeae* (and *rubicundulum* for that matter)

The distinction among species of *Sympetrum* has always presented a challenge for Odonatists who want to identify species through binoculars. The face color (although differing from place to place) can be fairly reliable. Even Odonatists who net specimens have a difficult time. The difference in the hamules might not be very clear in some variant specimens. And the clear existence of at least one hybrid (*internum* X *obtrusum*), and the possible existence of two others (*rubicundulum* X *obtrusum* and *rubicundulum* X *internum*) has further complicated this problem.

Carle (1982) recognized that some *Sympetrum* from Virginia were neither *rubicundulum* nor *obtrusum*. He named these *janeae* in his dissertation. Subsequently he considered *internum* and the description of *janeae* (1993, "*Sympetrum janeae*, spec., nov.") was based on the distinction between the western *internum* and the eastern *janeae*.

I do not find the distinction given by Carle very convincing. Coastal color is variable in many Anisoptera, and the hamular differences east to west seem quite minor. Also, I find apparent intermediates, especially in the portions of their ranges closest to the other form. The variation of hamular morphology within the eastern population of hamular morphology seems larger than the east-west difference. The face color of the eastern and western forms are said to be different: pale brown in the east and "cherry red" in the west. There are examples of pink-faced specimens throughout the eastern range of what I call *internum*. [Incidentally, what sort of cherries did Williamson have in mind? This color is a very unimpressive pink. The real cherry red in the genus is the face color of *vicinum*. But I digress.]

Janeae and *internum* have somewhat disjunct ranges, with many fewer records of either from northern Illinois to eastern Ohio. It is possible that this disjunction has strengthened their differences.

I think that a good study might show that these are useful subspecies.

I am currently, with no hesitation but a feeling of incompleteness, treating *janeae* as a synonym of *internum*.

I find that the difference between eastern and western *rubicundulum* even more striking. In the mid-west and plains, *rubicundulum* is a very common species. In the east it is more local, but is persistently found between Cape Cod and eastern Virginia. In some parts of the east it seems to be local. In New York, for example, it is found commonly around the Great Lakes, but is scarce elsewhere. These eastern *rubicundulum* are very different from the western forms. The western forms have orange wing veins and a large orange patch on the wings. The eastern forms have totally clear wings. The east - west difference in *rubicundulum* seems as great or greater than in *internum* - *janeae*.

Sympetrum semicinctorum and *occidentale*

Several people have recently questioned the validity of *Sympetrum occidentale*. Walker (1951, "*Sympetrum semicinctorum* (Say) and its Nearest Allies") decided that Bartenev's *Sympetrum semicinctorum occidentale* (the presently accepted name is placed in the neuter) should be considered a species, distinct from *semicinctorum*. The distinction between *occidentale sensu lato* and *semicinctorum* is based on size, and on the dark color of the thoracic venter of *occidentale*. The difference is also parallel to that of *Aeshna i. interrupta* and *A. i. lineata*: one is an eastern woodland species (*semicinctorum*) and the other a western plains species. But in western Ontario, intergrades between *occidentale* and *semicinctorum* are found (just as in *Aeshna interrupta* from this area.) In fact, four specimens from this area that I have examined, (including one from Isle Royale) are all intergrades.

Pending further study, I am considering these to be the same species. I recognize four subspecies; *semicinctorum*, *occidentale*, *californicum*, and *fasciatum*. Intergrades among all these have been reported. I am not overwhelmed with these differences and have no further plans to study them.

On a parallel note, eastern *Sympetrum costiferum* are red with dark markings on the thoracic venter. Western specimens are also red but otherwise very pale on the thoracic venter. The comparison is almost the reverse of that seen in *semicinctorum* s.l. This variation would also make a nice study.

Sympetrum signiferum and *vicinum*

These two species seem to be very different. But they are morphologically extremely close. They are allopatric, approaching each other in New Mexico. One specimen from New Mexico has more wing color (basal smudge) than any *vicinum* I have seen, but much less than typical *signiferum*. There seem to be two possibilities; some New Mexico "*vicinum*" records may refer to pale *signiferum*. Or these two taxa may be subspecies. I have seen too little material to be confident of any interpretation but call the community's attention to the problem.

Further comments

It should be apparent to everyone that the data base on which our understanding of North American Odonata taxonomy is based is highly inadequate, especially compared to that for birds and butterflies. Thus, our understanding of taxonomic relationships is necessarily also inadequate. It should be a goal of the Odonata community to constantly improve our knowledge through habit and habitat observation, and through the assembling and close study of further samples of these, and probably several other species.

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COLOR PATTERN IN IMMATURE *CORYPHAESCHNA ADNEXA*

Ken Tennesen

Coryphaeschna adnexa is the smallest member of the genus *Coryphaeschna*, but it is one of the most widespread, occurring in peninsular Florida, Cuba, Mexico, throughout Central America, and in South America south to Brazil (Needham, Westfall, and May, 2000). Mature males are easily recognized by the combination of their size (64-69 mm), china blue face (green in females), and green thorax lacking dark humeral and lateral stripes (although the sutures themselves are dark). The penis is radically different from all the other species in the genus in bearing a pair of long scythe-shaped lobes (Paulson 1994). *Coryphaeschna guyanensis* Machet (1991), which was based on a single, immature male from Guyana, was synonymized with *adnexa* by Machet (1994). Thanks to Jean Legrand of the Museum National d'Histoire Naturelle in Paris, I recently examined Machet's specimen while preparing the description of a new species of *Coryphaeschna* from Ecuador (Tennesen, in press). In all respects, including penis morphology, the specimen agrees with *C. adnexa*, but it has dark stripes above the mesopleural and metapleural sutures (1.3-1.6 mm wide; I speculate that this specimen was captured the day after it emerged, as the eyes, thorax and

abdomen are partly shrunken in). Unable to find any literature reference to thoracic coloration in immature *C. adnexa*, questions still remain concerning the dark stripes on Machel's specimen. Was this an isolated incident? Is there an unusual population in Guyana? Or is this coloration widespread in immature *C. adnexa*, the stripes disappearing with maturity?

On my most recent trip to Bolivia, I was fortunate to rear a larva of *Coryphaeschna adnexa* to the adult stage. The teneral adult (a female) had dark stripes above the mesopleural and metapleural sutures, similar to the stripes on Machel's specimen. By providing live Diptera as prey (see ARGIA 1994, vol. 6(1/2), p. 19-20 for tips on feeding reared adult dragonflies), I was able to keep her alive for four days. On the third day of postemergence, I noticed that the mesopleural and metapleural stripes were fainter than on the previous day, especially the metapleural stripe. The eyes were light greenish gray and the thorax was darker green than the day before. On the fourth day, the mesopleural stripe was still visible but the metapleural stripe was gone; the green coloration of the thorax was as deep green as in mature individuals and the eyes were green. I would like to hear from anyone who has reared this species or collected very teneral individuals and noted their thoracic coloration. The presence of dark thoracic stripes which disappear in a few days in immature *C. adnexa* removes any doubt that *C. guyanensis* is a synonym of *C. adnexa*.

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REDISCOVERY OF ORTHEMIS SULPHURATA

Nick Donnelly

Because of my interest in the *ferruginea* group of *Orthemis*, I have long wanted to find out the status of Hagen's enigmatic species *sulphurata*. The description of the species is a single (albeit a ponderously long) sentence buried in a section discussing *Orthemis discolor* (1868, "Odonaten Cubas").

[Incidentally, this larger section is one of the first to discuss the problem of the *ferruginea* complex in the tropical New World. Hagen's discussion of color variation is very thorough and thought provoking.]

There are some specimens of male *Orthemis* labeled "*sulphurata*" in the MCZ (Hagen's Museum). But they were taken by Campos long after Hagen wrote his paper, and I am fairly certain he had died before they arrived in the museum. Males, unfortunately, are often not clearly diagnostic in this group. These male specimens do not correspond to Hagen's description of the female.

The type locality of *sulphurata* is not an area which will be attractive to odonatists. Guayaquil, Ecuador is not noted for its tropical ambience, and few Odonatists would want to go there to look for a dragonfly. Fortunately, Fred Sibley told me he was going there for other reasons. I asked him to be on the lookout for this bug. He was successful, taking a few males and females.

Hagen's *sulphurata* was a female (which are at least more diagnostic than males in this group). He notes the following characters: Wing tips marked with chestnut brown (Flügelspitzen bis zum pterostigma kastanienbraun); legs sulfur yellow (binden breiter und schwefelgelb); labrum yellow, with a dark central area (Unterlippe schwefelgelb, in der Mitte mit breiter schwarzer Binde). Fred's females had these characters, but only the fore and middle femora were bright yellow. Fred collected both males and females, which fortunately allow us to characterize the male. At the moment, the main distinction between *sulphurata* and the remaining species of this complex is in the thoracic venter. *Sulphurata* has broad dark longitudinal stripes, diverging rearward, on a slightly paler gray ground. It is closest to the Antillean undescribed species.

The male has darker legs and labrum, but there is still a noticeably darker center of the labrum with small bits of yellow flanking on the distal margin. It also has the small but very distinct patch of chestnut brown at the tips of the wings. I was rather hoping that two mysterious specimens I collected in northwestern Argentina (Tucumán and

The 13 family albums, containing male and female images for nearly all species, allow for the rapid visual comparison of the members of each family. In most cases someone wholly unfamiliar with odonates, or anything entomological, can use the albums to obtain approximate and often correct identifications. There are no keys and, as yet, no text on biology and habitats. The site is simply an easy-to-use pictorial atlas that will make the taxonomy of these insects more accessible to a broad range of users. Enjoy.



Iowa Odonata Web Site

Ann Johnson, Norwalk, IA hologrambirds@att.net

Thanks to the work of Bob Cruden and Bud Gode, recently published in the Bulletin of American Odonatology, we now have a web site featuring Iowa odes. Dragonflies are obviously becoming more popularized and the format is geared more towards the hobbyist, but if anyone is interested in range maps, etc. for our crossroads of the nation, take a look at <http://odonates.home.att.net>. We're all anxious for the season to really begin so we can improve on our photo collection. Thanks to Jim Bangma for the use of many of his photos and to Blair Nikula for linking permission. Please report all grievous errors to the author!

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