

ISSN 1061-8503

ARGIA

THE NEWS JOURNAL OF THE DRAGONFLY SOCIETY OF THE AMERICAS

VOLUME 14

20 March 2002

NUMBER 1



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

EXECUTIVE COUNCIL 2001-2003

President	D. Paulson	Seattle WA
President Elect	R. Beckemeyer	Wichita KS
Immediate past President	M. May	Cranbury NJ
Vice President, Canada	R. Cannings	Victoria, BC
Vice President, Latin America	R. Novelo G.	Jalapa, Veracruz
Secretary	S. Dunkle	Plano TX
Treasurer	J. Daigle	Tallahassee FL
Editor	T. Donnelly	Binghamton NY
Regular member	J. Abbott	Austin TX
Regular member	S. Valley	Albany OR
Regular member	P. Brunelle	Halifax NS

JOURNALS PUBLISHED BY THE SOCIETY

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

T. Donnelly (address 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 \$25.

Dues should be mailed to Jerrell Daigle, 2067 Little River Road, TALLAHASSEE FL 32311

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

Cover: *Cora terminalis*, Bolivia. This is the sort of bug that has Daigle, Tennessen, and friends returning to South America. Photo by Steve Valley

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

In This Issue.

Mother Nature is teasing us, as she always does at this time of the year. One day the temperature is in the 60's and flocks of Canada and Snow geese pour overhead. The next day the snow returns and summer seems impossibly far away. But we know it will come, and we are already preparing for all those wonderful field trips, in a world populated by whirring wings and glinting bodies - a world that seems very far away right now.

There are more field gatherings than ever before. The season starts with the Arkansas meeting in the middle of May, and the Dragonfly Days in south Texas that same weekend, and proceed to the Annual meeting in June, followed swiftly by the Michigan meeting in early July and the Tug Hill NY meeting in mid July. We will have a busy schedule. The annual meeting in West Virginia will feature the unusual combination of a very attractive venue in a poorly known state. Be there!

In late May there will be another Paul Brunelle seminar in Maine. These have been very popular in the past.

Fred Sibley reports on eastern strays of *Sympetrum corruptum*. This is one of our more interesting stray odonates, with numerous reports in the east. I know of no breeding populations east of Michigan, but strays are numerous. Most are found near the ocean, suggesting that they wander east and only stop when they see the surf.

Fred also reports on finding two teneral male *Leptobasis* damselflies in the Yale collection. Of unknown origin, he suggests that they may have come into the US as larvae on imported aquatic plants. I am reminded of Christiansen's 1946 report in *Psyche* of *Andinagrion peterseni* at Beltsville, Maryland. Christiansen decided that this insect was introduced on tropical plants also, and the locality near the huge Department of Agriculture complex seems consistent with this. Long ago Hagen, in his famous 1861 work, described *Oxyagrion rufulum* (a close relative of *peterseni*) from Northern California. It boggles the mind that aquatic plants might have been imported to San Francisco at the time the town was filled with raucous forty-niner gold miners, and we have always regarded this as a mis-labeled specimen (There were other mis-labelings in Hagen's work.) More recently Bob Honig found *Protoneura cara* in an aquatic garden in Houston and concluded that this, too, was a stray. Here the distance is only a

few hundreds of miles, but his conclusion seems sound. The point is well made. The little buggers are invading our shores. Is anything safe these days?

John Abbott and Robert Larsen report two new species for Nevada. That superbly dry state is finally getting a fairly respectable list of Odonata. Jim Johnson reports on an old specimen of *Gomphus lynnae* from eastern Oregon - right smack where he found it decades later. There are indeed good things hidden in insect collections, where they often gather dust (we hope not) for years after being collected. Remember Kelly Miller finding the *Tanypteryx hageni* from south of Bozeman, Montana in the Montana State University collection? The problem is that this one might not have been correctly labeled. If you have a few hours on a rainy day, why not go over some university's collection? You might be surprised. I did so recently at Cornell and managed to remove an old record of *Enallagma doubledayi* from a New York county. Sometimes negative knowledge is good too.

Jerrell Daigle once again provides us with a mouth-watering account of the latest Bolivia trip. These glorious accounts make you want to get on the next plane. I broke new editorial ground with this story. Generally I do a "global find-and-replace" to change his exclamation points with periods. But that just doesn't sound like our Jerrell. This time I just left them all in!

Fred Sibley gives us another account of his dragonfly observations in the British Virgin Islands. He has taken a less interesting part of the dragonfly world and made it very interesting. (How many species do you anticipate finding on semi-arid oceanic islands anyway?) He not only finds dragonflies, but finds the species mix different from year to year. His last article finally nudged me to put down on paper my own observations that are nearly a half century old from St. Thomas and St. John, the American part of the archipelago. Neither Fred nor I are holding out any great promise, but if you should happen to visit, then take a net anyway. Who knows what will be in residence when you do?

Fred and Dennis Paulson also add some range extensions for the Caribbean part of the world - *Micrathyria debilis* in Jamaica and *Telebasis demerarum* in Trinidad.

Bob Behrstock contributes an unusual article – a compilation of late occurrence records for Texas odonates. Most people simply let the end of the season drift past, but Bob is interested in how long these species last. Oddly enough, I received the article from Bob shortly after returning from a Christmas trip to Austin – where I observed several of these late occurrences first hand. The one that has always interested me is *Hetaerina titia* (flying around Austin the day after Christmas), which Bob does not include. Both early in the season (April and May) and late (November and December) Texas specimens have wings with only red color at the bases. But in the mid season their wings are largely black. No one has ever documented whether the same individual changes wing color, or whether the populations change. So many problems, so little time!

Sid Dunkle contributes a fascinating observation about a European falcon catching dragonflies. I have added my own observation of a Guatemalan falcon also catching dragonflies – but in an entirely different way. Just how many ways are there of catching dragonflies?

Bill Mauffray summarizes the recent activity in Georgia and provides with a URL for their attractive website.

I am happy that at least someone is using the address list that I sent out in the last issue. It was misprinted, as four readers let me know. The printer has supplied replacements, which I include with this issue.

Few Odonata people outside of the Northwestern crowd knew William Ricker, of Nanaimo BC, who died last fall. He was a towering presence in fisheries biology and a friend of dragonflies also. I have taken a few notes from his obituary which was written by Rob Canning.

Being an editor definitely has its moments. Sometimes people send you news items with no explanation or context. One included the following text: “The sight of Ed Vosberg pitching with a large dragonfly on his cap in those critical eighth-inning moments was absolutely hilarious. If you missed it, don’t worry. You’ll see it time and time again on blooper videos for years to come . . .” This has something to do with the Phillies baseball team. Anyone out there got a clue?

2002 SE MEETING IN FLORIDA 29-31 March

Jerrell J. Daigle, jdaigle@nettally.com, tel. 850-878-8787

It may be too late for you to plan on the Eglin Air Force Base meeting, but if you are around, perhaps

you could drop in. The meeting motel is the Friendly Inn at Niceville (904/678-4164).

DRAGONFLY DAYS; WESLACO TEXAS 17-18 MAY 2002

The third Dragonfly Days will be held in the Rio Grande Valley on 17-18 May this year at the Valley Nature Center. The event has been very popular in the past. The featured speaker is Jackie Sones.

The URL for this event is
<http://www.valleynaturecenter.org/dragonflydays.html>.

MIDSOUTH ODONATA MEETING, 16-19 MAY 2002

George L. Harp, Dept. of Biol. Sciences, P.O. Box 599 Arkansas State University, State University, AR 72467 Ph.: 870 972-3082, FAX: 870 972-2638, glharp@mail.astate.edu

A complete announcement was in the previous issue of **ARGIA**.

Glenwood, AR, will be our location for the meeting.

Accommodations:

RIVERWOOD INN (870 356-4567) Single (\$47), double (\$55) (nice)
Ouachita Mtn. Inn (870 356-3737) Single (\$47), double (\$47) (nice)
Lux Motel (870 356-3151) Single (\$36) double (\$42) (remodeled; okay; has a great breakfast restaurant)

If you are interested in this meeting, please contact George Harp.

DSA MEETING IN WEST VIRGINIA, 20 – 23 JUNE 2002

The West Virginia meeting is fast approaching. The meeting itself is 20 – 23 June, 2002, at Lewisburg WV. Post meeting field trips to Elkins on 23- 28 June and the Ohio River at Point Pleasant on 26-28 June will provide an exciting introduction to the Odonates of this beautiful but understudied state. The main meeting will be close to the Greenbrier Rivers and tributaries, and also to Cranberry Glades, one of West Virginia’s famous high-altitude sites. At Elkins there are additional high-altitude sites such as Dolly Sods. The Point Pleasant trip will visit Greenbottom Swamp, a large wetland in the floodplain of the Ohio River.

Perhaps some of the *Neurocordulia molesta* that occur just across the river in Ohio will be found on the West Virginia side!

The web site for the meeting is http://www.dnr.state.wv.us/wvwildlife/nongame/2002_dragonfly_society_meeting.htm

Jennifer Wykle, who is organizing the meeting, can be reached at jwykle@mail.dnr.state.wv.us

2002 GREAT LAKES ODONATA MEETING - 1 - 4 JULY 2002

Mark O'Brien

A complete announcement was in the previous issue of **ARGIA**.

Meeting place: Roscommon MI.

For more information or to be put on the mailing list for a registration form, contact Mark O'Brien via email at: mfobrien@umich.edu or call 734-647-2199. You can also send mail to Mark at: Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079.

Additional updates on the meeting will be available on the web at:

<http://insects.ummz.lsa.umich.edu/GLOM2002/>

NORTHEASTERN DSA MEETING IN TUG HILL PLATEAU, NEW YORK, 12 - 14 JULY 2002

An announcement was in the previous issue of **ARGIA**.

Meeting place; Watertown NY.

The group will meet Thursday evening 11 July in Watertown. The meeting motel will be the Watertown Econolodge (1-315-782-5500 or 1-800-553-2666). The rates are \$45 single, \$55 double with queen-size bed, and \$60 with two double beds.

Contact Nick Donnelly, tdonnel@binghamton.edu; 607-722-4939 for further details

2002 ODONATE SEMINARS AT THE HUMBOLDT INSTITUTE ON THE COAST OF MAINE

"Larval and Adult Dragonflies and Damselflies: Systematics and Biomonitoring", by Paul Brunelle, May 26 - June 1.

This seminar will give an introduction to the order Odonata, its basic lifestages, morphology, behavior, and temporal and geographical distribution in the region. Current regulations, references, and sampling techniques will be reviewed. Larvae and adults will be sampled for taxonomic study and rearing. Reference specimens of larvae and adults will be available for comparative study. Determination to species using morphology and appearance will be the emphasis of lab work, with consideration given to preservation and record-keeping methods. Paul-Michael Brunelle has been studying Odonata of the Atlantic Provinces of Canada and northern New England for the last ten years and recently published with respect to their distribution in that area. He has been retained by the Maine Department of Inland Fisheries and Wildlife to plan the Maine Damselfly and Dragonfly Survey (MDDS), a 5-year survey which began in 1999. He has been retained by Parks Canada to study the order in the Cape Breton Highlands and has received a grant from the Themadel Foundation to study the behavior of *Neurocordulia michaeli*, recently discovered in New Brunswick as well as grants from the Nova Scotia Museum and the New Brunswick Museum. He is the founder of the Atlantic Dragonfly Inventory Program (ADIP).

For information contact Brunelle at as849@chebucto.ns.ca

CONNECTICUT RECORDS OF *SYMPETRUM CORRUPTUM* AND SOUTH AMERICAN COENAGRIONIDS

Fred C. Sibley, 2325 Co. Rd. 6, Alpine, NY 14805

Two Connecticut *Sympetrum corruptum* specimens and two *Leptobasis* (?) specimens were discovered in the process of sorting the Yale Odonate collection and are reported on here.

Sympetrum corruptum is a rare late summer and fall vagrant to the New England States (Blair Nikula, *Argia* 1998 10:(3)20) with only one (1906) record from Connecticut (Wagner and Thomas, 1999, The odonate fauna of Connecticut, *Bull. Am. Odonatology* vol 5 (4)). Yale specimen ENT.145456 (male) was collected by Philip Brylski, October 22, 1979 in Litchfield County, 1 mile south of Killingworth at Kroopa Pond. Yale specimen ENT. 145458 (M) was collected by Jeff Spendelow and Fred Sibley, July 12, 1980 in New Haven County on Faulkner's Island.

Faulkner's Island is about 4 miles off the Connecticut coast south of Madison. There is a lot of brushy vegetation but no fresh water on the island. This island has been a good place to sample

from 1997 to present are difficult to interpret because there are no earlier studies. This note adds three species to the BVI.

My five visits to the BVI have all been in October, 1997-2001, so reference to these years in the text means October.

Species and site notes

Lestes forficula - New species for BVI. First collected in September 1990 by David Smith at The Slob on Anegada Island (specimen in IORI collection). It was found to be quite common in a stock pond on Ridge Road, Tortola in 2000 and 2001 but was not found in either year on Anegada despite serious searching.

Brachymesia furcata - First seen at Botanical Garden, Tortola in 1999, absent in 2000 but a few present in 2001.

Brachymesia herbida - At Botanical Garden, Tortola since 1999 and in 2001 also collected on Guana Island and at stock pond on Ridge Road, Tortola in 2001 (single individuals). In addition a large population was present in the ditch ponds around the Beef Island Airport.

Erythemis simplicicollis - CORRECTION - 2000 ARGIA article should read ***Erythemis vesiculosa***.

Erythrodiplax berenice - New species for BVI. Collected in September 1990 on Anegada by David Smith (IORI collection). Refound there in 2000 and 2001 as well as on Tortola and Beef Island. The most abundant odonate in the islands with incredible densities around the salt pond and mangroves on Anegada Island and lesser numbers in similar habitat on Tortola and Beef Island.

Erythrodiplax umbrata - A common species on Tortola, Guana and Beef Islands but very rare on Anegada. One individual seen there in 2000.

Micrathyria dissocians - New species for BVI. Common in stock pond on Ridge Road in 2000 and 2001.

Anegada island is the only flat coral island in the country. It has a large central salt pond and three freshwater slob. Two are mostly filled with trees and the third, The Slob, has been bulldozed out to leave a pond in the middle of bare coral. In 2000 all three had ***Orthemis ferruginea***, ***Ischnura ramburii*** and ***Tamea abdominalis*** with the more open pond having larger numbers. Only two ***Pantala flavescens*** and one ***Erythrodiplax umbrata*** were found in a day and a half on the island. 2001 was much drier and all three ponds had shrunk in size

and depth. ***Erythrodiplax umbrata*** was not present and ***Ischnura ramburii*** was scarce.

Tortola: Three ponds were checked on Ridge Road in 2000. Two had the standard species while the last, about 60x30 feet, also contained ***Lestes forficula***, ***Micrathyria dissocians***, ***Perithemis domitia***, and in 2001 ***Brachymesia herbida***. This third pond differs in having dense aquatic growth including water hyacinth.

Rate of immigration

Most if not all the odonates on Guana Island are from other islands. The major freshwater pool is unsuitable for larval growth. The other pools hold only a few larvae, frequently dry up, and the only emerging larvae we have seen was killed by one of the abundant anolis lizards. The island is thus a good site to study immigration. ***Erythrodiplax umbrata***, ***Orthemis ferruginea*** and ***Tamea abdominalis*** are all common on Beef and Tortola Islands, only a mile or so from Guana.

In 2000 and 2001 we tried to estimate populations and immigration rates of these three species on Guana Island. Using a modified mist net held horizontally over the pond it was possible to capture most of the individuals in a relatively short time.

In 2000 we captured dragonflies on only a few days, marked individuals and either returned them to pond or removed them to another island. A few marked ***Orthemis*** and ***Tamea*** were still present 10 days later but most (20 plus marked) were not found again. Marked ***Erythrodiplax*** individuals (12) taken to Beef Island did not return. Maximum populations were about the same on the first and last days of trapping: ***Erythrodiplax*** 12; ***Orthemis*** 20; ***Tamea*** 2.

In 2001 we tried to capture every individual present each day and remove them to another island. The maximum numbers were vastly different from 2000 (***Erythrodiplax*** 3; ***Orthemis*** 3; and ***Tamea*** 3). In 5 days we caught 10 ***Tamea***, 7 ***Orthemis*** and 7 ***Erythrodiplax*** with numbers declining so there was only 1 ***Tamea*** found the last day, an immigration rate of about 1 individual per species per day. After a 4 day break numbers had recovered to first day levels. After another 4 day break, due to bad weather, we made a visual estimate (floating debris in a pond 300 times as large as the original 5x2 foot pool precluded using mist net) of at least 10 ***Tamea***, 10 ***Orthemis*** and 5 ***Erythrodiplax***.

In both years, when we removed the adult male ***Erythrodiplax*** they were replaced by subadult males. In 2000 removal of ***Orthemis***, almost all "purple", resulted in a replacement population of

mainly "red" individuals. Populations in both years were approximately 2-3 times the number of occupied territories (except see *Tramea* under establishment of new species).

Conclusions: Individuals of all three species wander randomly from other islands searching for new habitat and land on Guana. These are primarily subadult individuals who move on if habitat is not available, or stay and mature if habitat is available. A larger pond size, as in 2000 and the last day of our stay in 2001, attracts and hold more individuals. Immigration rates also must be dependent on size of source populations. Drier conditions in September of 2001 presumably produced a lower immigration rate than in 2000.

Establishment of New Species

In 1997 huge numbers of *Tramea calverti* invaded Guana Island and Anegada Island. This species has not been recorded since.

In 1997 huge numbers of *Pantala hymenaea* invaded Guana Island but not Anegada. This species has not been seen since.

The failure of these two species to establish populations is difficult to explain. Certainly Tortola and Anegada presented suitable breeding pools although Guana did not.

In 1997 huge numbers of *Tramea abdominalis* invaded Guana Island but not Anegada. It was not seen on Guana Island in 1998 but has been increasingly common since. On Tortola, not checked until 1999, it has also increased in abundance and on Anegada was common in 2000 and 2001. This species was probably already established on Tortola, but its absence from Anegada in 1997 and subsequent abundance in 2000 and 2001 leaves the question open. It was definitely absent from Guana in 1998 but has increased its population each year since. Is this due to new populations on Tortola and Beef Island or an explosion of those populations following a series of wet years?

Brachymesia herbida was first recorded from Tortola in 1999 and since it was at a permanent water source of long standing was assumed to have always been present there. The appearance of the species in 2001 on Guana Island and at a pond on Tortola where it was absent in 2000 plus the establishment of a large population on Beef Island again presents the choice of explosion with series of wet years or recent invasion.

The absence of *Lestes forficula* on Anegada although present in 1990 would suggest that there is

regular extinction and reestablishment of populations in the BVI.

Acknowledgements

Thanks to the Jarecki family, the Falconwood Foundation and James Lazell of The Conservation Agency for making this study possible. Thanks also to my wife and several bird banders who helped in mist netting dragonflies.

Fred C. Sibley Home phone 607-594-4179 or 594-3584 2325 County Road 6, Alpine, NY 14805 fcsibley@empacc.net

=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=

ODONATA OF ST. THOMAS AND ST. JOHN, VIRGIN ISLANDS

Nick Donnelly

I had not envisioned writing an account of the relatively meager Odonata fauna of the northern US Virgin Islands, but Fred Sibley's excellent articles on the nearby British islands have made me realize that there is interest in this area. I spent about six months on these islands in 1956 and 1957 while carrying out a geological mapping project. The islands are thorn scrub and semi-arid in most part, with only small remnants of original forest. They have very few attractive fresh-water habitats, mainly streams ("guts") with low flow and stockponds, which generally had unvegetated shorelines. On most days I went into the field without a net. This can be a big mistake, as I found several times.

St. Thomas is one of the original localities listed by Hagen (1861) for two of his newly described species: *Agrion* (= *Enallagma*) *coecum* and *Diplax* (= *Erythemis*) *credula*. There are some problems with both of these, and they are discussed below.

I also list some Odonata found in the vicinity of Cruz Bay, St. John, by Whitehouse (1939). These were from small streams whose names had disappeared by the time of my visit 18 years later. I include also some species reported by Klots (1932) from both the US and British Virgin Islands.

In my several return visits (up to 2000). I have seen the few aquatic habitats degraded further with sprawling development, as the rich have purchased and fenced off tracts containing access to the few "guts" that have fresh water most of the year. Stockponds have largely disappeared, as the economy has become almost entirely tourist development in the subsequent decades. Turpentine Run, between Donoe and Mt. Zion in the east central part of St Thomas, is a low-gradient

but highly impacted stream that might warrant an inspection by visiting Odonatists. Dorothea Gut, in northwestern St. Thomas, is a tiny, steep rocky stream with pools of water and small waterfalls dropping about a thousand feet to the sea.

St. John has fared much better, but there were fewer aquatic habitats on that island. The most interesting locality that I found is a spring in bedrock at L'Esperance, not far from the Centerline Road. Some typical stockpond Odonata were also found at Bethany, in Guinea Gut.

Species:

Lestes forficula. A common stockpond species

Protonaura viridescens. I found a mated pair on 28 August 1956 along Turpentine Run, which was fairly open and heavily impacted by agriculture. I went home for a net and returned about an hour later to catch the pair, which had been ovipositing in moss on rocks in the stream. I found it in numbers in the spring at L'Esperance in St. John in June of 1961. These specimens were included in the type series of this species, which Westfall had determined by this time was not conspecific with *capillaris*.

Whitehouse (1939) reported this (as *capillaris*) from "Envy Gut", near Cruz Bay, St. John.

Enallagma civile. An uncommon species on stockponds.

Enallagma coecum. Widely distributed in streams in scrub forest, although never abundant.

The localities (Hagen, 1861) of this widespread and variable species were given by Hagen as St. Thomas and Cuba. The St. Thomas specimen in the MCZ has evidently been designated as lectotype, but this designation has not been published. The species is also reported by Whitehouse (1939) from St. John.

Ischnura ramburi credula. Not common but widespread on small ponds. Reported by Whitehouse (1939) from St. John.

Telebasis dominicanum. Common on Turpentine Run.

Anax junius. Reported from St. Thomas and St. John by Klots (1932), but not seen by me.

Brachymesia herbida. On a few ponds; not common.

Dythemis rufinervis. Turpentine Run; L'Esperance. Widespread but not abundant anywhere. Also reported by Klots (1932) and Whitehouse (1939) from St. John.

Erythemis credula. The type series included two specimens, from St. Thomas, and Minas Gerais, Brazil (Hagen, 1861). The Brazil specimen is a

complete male; the St. Thomas specimen is a female lacking the abdomen. *Credula* is South American and is unknown from the Antilles (except for reports of larvae from Antigua and Barbados (Calvert, 1928), both of which were queried by the author and seem to me to be erroneous.) Its valid occurrence on St. Thomas is doubtful.

Erythemis vesiculosa. Common on Turpentine Run. Also reported by Klots (1932) from St. Thomas and St. John, and by Whitehouse (1939) from St. John.

Erythrodiplax berenice naeva. Locally common in saline pools on the mainland behind mangroves.

Also reported by Klots (1932) from St. Thomas.

Erythrodiplax jusiniana. Reported by Klots (1932) from St. Thomas. This was not found by me, but it is common on Puerto Rico and could well have occurred on St. Thomas.

Erythrodiplax umbrata. Fairly common on stockponds.

Also reported by Klots (1932) from St. Thomas and St. John and by Whitehouse (1939) from St. John.

Macrothemis celeno. On Lovenlund Creek, St. Thomas, and L'Esperance. Not common.

Also reported by Klots (1932) from St. Thomas and St. John and by Whitehouse (1939) from St. John.

Orthemis "ferruginea". Fairly common in Turpentine run and at scattered stockponds. The quotations on the name indicate that this is not in my estimation true *ferruginea* but a widespread Antillean species which is still unnamed. Most of the specimens seen and taken were of the purple phase, but I have seen the bright red phase near the airport on St. Thomas. Fred Sibley has collected numerous specimens of both color phases in the British Virgin Islands.

Also reported by Klots (1932) from St. Thomas, St. John, Tortola, and Virgin Gorda, and by Whitehouse (1939) from St. John.

Pantala flavescens. Scarce.

Also reported by Klots from St. Thomas and by Whitehouse (1939) from St. John.

Pantala hymenaea. Reported by Whitehouse (1939) from St. John.

Perithemis domitia. In shaded pools along Turpentine Run, and also at L'Esperance.

Reported by Whitehouse (1939) from St. John.

Tramea abdominalis. Widespread; generally on roads or hilltops.

Also reported by Klots (1932) from St. Thomas and by Whitehouse (1939) from St. John.

Tramea onusta. I saw a lone individual flying in a swarm of *abdominalis* on a hill top on my first day in the field in St. Thomas. Having no net, I hit it with a machete and confirmed the identification, but discarded the mangled specimen. I never saw another.

Also reported by Klots (1932) from St. Thomas and St. John.

Macrothemis, *Micrathyria*, *Neoerythromma*, *Neoneura*, and *Phyllogomphoides* have attracted many collectors, albeit usually during the more productive, warmer, mid-year months. Most recently, Eubanks et al. (2001) summarized the odonate fauna of the Lower Valley. Still, collecting effort remains uneven for both geographic and temporal coverage in the Lower Valley and the remainder of Texas; thus, the current understanding of both early and late flight dates may be overly conservative.

Based upon recent fieldwork, I summarize late Texas flight dates for 29 species, about one seventh of the 210 odonates recorded in the state (pers. comm. John Abbott). Twenty of these represent new late flight dates for the entire U.S. These data are presented with the hope that they will be of value to other workers tracking the long-term effects of temperature change on spatial and temporal distribution of aquatic invertebrates.

METHODS: Most records pertain to specimens that were selectively netted, placed in labeled envelopes, dehydrated in acetone, and air-dried (Dunkle 1989). The few photographic records were obtained with a tripod-mounted 35mm camera, 100 ISO film, 200mm macro lens and strobe. Slides were labeled with field note data taken during the photographic process. Records derived from slides are for easily recognized species only. Sight records of *Anax walsinghami* and *Tramea insularis* involved multiple individuals observed intermittently over 0.5 hours or more, and were made with the aid of close-focusing binoculars. Both were at or near previous collection sites. Specimens were identified by the author and confirmed by John C. Abbott (University of Texas, Austin), in whose care original or duplicate slides and all but three of the voucher specimens were placed. The remaining specimens (*Lestes disjunctus australis*) were sent to Mark McPeck, Dartmouth College, for DNA extraction.

RESULTS: Twenty-nine new late Texas flight records are compared to previously published late dates for Texas and, if available, for the U.S. (Table 1). Several intermediate later dates are presented to establish trends. The records pertain to 14 zygoptera and 15 anisoptera. The twenty boldfaced dates are late records for the entire U.S. The large number of December fliers, contributing the bulk of the list, is noteworthy. Although a tropical origin has not been established for *Enallagma*, the six remaining zygopteran genera are tropical. Nine of the 14 species are coenagrionids, by far the largest zygopteran family in the U.S. and the world. Abbott (2001) lists five other December-flying coenagrionids (a sixth is extrapolated from its Mexican range), four of which I encountered during December 2001. Three families comprise the 15

Anisoptera listed: Aeshnidae and Gomphidae, each with one species of Middle American origin, and Libellulidae with 13 species in nine genera. Of the latter, only *Sympetrum* has its center of abundance in the northern latitudes; the remaining genera are tropical. Eight of the Libellulids were not recognized by Abbott (2001) as late fliers, doubling the number now known to fly in Texas during December.

DISCUSSION: Any consideration of late flying odonates is fraught with uncertainty: Is a January flying *Erythrodiplax minuscula* in Florida very late or very early? Is one flying in Texas during December enjoying a prolonged flight season because of favorable winter temperatures, or did it emerge late because of an especially cold or dry summer (Corbet 1999)? Still, the exercise is worth pursuing, as trends among observations peripheral to the norm can only be recognized when numbers of apparently isolated reports are assembled into a body of records. Multiple to numerous individuals are indicated for most species (Table 1), signifying definite flight season extensions, as opposed to single anomalous individuals.

Abbott (2001) lists 15 species--7% of the state fauna--flying in Texas during December. Combining the records from Table 1 yields a total of 34 species on the wing in December--16% of the state fauna. Because freezing temperatures often reach south Texas during late December and January (as they did in late December 2001), Abbott's figure of 16 January fliers will probably be minimally influenced by future collecting efforts.

The presence of three late-flying lestids may be noteworthy, although not wholly unexpected, as: (1) most Florida species are known to fly late in the year (Dunkle 1990), and (2) most lestids exhibit one generation per year overwintering as eggs (Corbet 1999), so late Texas breeders should be present in temporary pools filled by fall rains. In Houston (Harris County), *Lestes disjunctus australis* was flying 19 Dec, the same date on which I photographed it two years earlier. Abbott (2001) (in possession of mid-summer specimens) echoes the suggestion of others that southern populations of *disjunctus* may exhibit both spring and late fall emergences. In southern Texas, both *L. alacer* and *L. forcifcula* were common and flying more than two months later than published late Texas dates. Many reproductive pairs of each were noted.

The large proportion of coenagrionids and libellulids conforms to Corbet's life cycle data, if (1) odonate cycles in the subtropical Rio Grande Valley reflect those of organisms further south, and (2) multiple generations account for the Lower Valley's late fliers. Highest numbers of generations

per year are exhibited by tropical coenagrionids and libellulids that are capable of breeding and developing continuously ("facultatively multivoltine") within habitats that are always available for occupancy by larva (Corbet 1999). The various ponds, oxbow lakes, irrigation canals, and the Rio Grande itself all provide aquatic habitats that are available on a year-round basis.

What factors might account for so many occurrences that are weeks to months later than previously published dates? It is tempting to cite global warming as the cause of extended flight periods. Indeed, during the current 25-year warming trend documented by NOAA's National Climatic Data Center (2001), invertebrates such as odonates are being exposed to a global temperature increase of approximately 2.0°C/century. For the seven years prior to 2001, this translated to an average December temperature in the Lower Rio Grande Valley (Brownsville, Cameron County) of 21.88° C (71.2° F). Alternatively, the Climatic Data Center also documented moderate to severe drought conditions in the Lower Valley during much of 2000 and 2001, and the presence of large numbers of *Lestes*, and *Micrathyria* may reflect delayed emergence from temporary pools receiving water late in the year.

Paulson (2001) offered persuasive evidence for global warming-induced changes (e.g., northward-extended ranges and prolonged flight dates) for south Florida's winter odonates. His brief January 2000 survey yielded 42 species of odonates flying in a region that produced only 9 January species during the early 1960s. Of those 42 species, six exhibited later flight dates than had been documented in the interim; two had established new U.S. populations, and two represented first and second records of tropical species for the U.S. Similarly, I documented northward expansion of several Neotropical odonates in east Texas (Behrstock 2000), apparently the result of a series of warmer winters with higher average and minimum temperatures. Such warmer winters may prolong feeding of larvae and enhance survival of their prey base, as well as increase the period during which adults can both feed and breed, culminating in increased survival at the northern periphery of a species' range.

An alternative explanation for the rash of late dates uncovered by this brief study is simply under-representation of southern Texas counties leading to collecting bias. The four southernmost counties of Texas (Cameron, Hidalgo, Starr, and Willacy) comprise only a bit less than 2% of the state. However, as indicated above, they are rich in tropical odonates that attract collectors, although rarely during winter. Currently, Abbott's odonate database at the University of Texas contains 5114

Texas records gleaned from collections across the country. Only 188 (3.7%) of these are from the Lower Rio Grande Valley, and (due partly to incomplete data entry) only a few of these are known to be winter captures (pers. comm. John Abbott). Thus, it is reasonable to say that winter odonates of the Lower Rio Grande Valley are under-represented in Texas collections.

I conclude that in all likelihood, a portion of these late records represents changes induced by warming trends. However, the importance of temperature increases in modifying the winter odonate fauna of Texas is masked by the paucity of late season collections in the Lower Rio Grande Valley and elsewhere throughout the state. The data presented here should establish a better baseline for future reference.

ACKNOWLEDGMENTS: Thanks to the staff of the Sabal Palm Grove Audubon Sanctuary, Brownsville, Texas for permitting me to collect two specimens. John C. Abbott (Univ. of Texas, Austin), Sidney W. Dunkle (Collin County Community College, Plano, Texas), and Dennis R. Paulson (Univ. of Puget Sound, Tacoma) reviewed this note and provided many helpful suggestions. Thanks also to Ted Eubanks (Fermata, Inc., Austin, Texas) for giving me the opportunity to observe odonates in West Texas.

References:

- Abbott, J.C. 2001. Distribution of Dragonflies and Damselflies (Odonata) in Texas. *Transactions of the American Entomological Society*. 127(2): 199-228.
- Behrstock, R.A. 2000. New records of Neotropical Odonates on the Upper Texas Coast with comments on recent temperature increases. *Argia* 12(1): 8-11.
- Biggs, K. 2000. California Dragonflies & Damselflies. <http://www.sonic.net/dragonfly/>
- Corbet, P.S. 1999. *Dragonflies: Behavior and Ecology of Odonata*. Ithaca: Cornell University Press.
- Dunkle, S.W. 1989. *Dragonflies of the Florida Peninsula, Bermuda and the Bahamas*. Gainesville: Scientific Publishers.
- Dunkle, S.W. 1990. *Damselflies of Florida, Bermuda and the Bahamas*. Gainesville: Scientific Publishers.

Table 1. New supporting data for latest Odonata flight dates in Texas and the U.S. Late U.S. dates are boldfaced. Abbreviations in Species column: (S) = specimen record, (P) = photo record, (V) = sight record.

SPECIES	LATEST PUBLISHED TEXAS AND U.S. FLIGHT DATES	LATE DATE	TEXAS COUNTY	NO. SEEN	HABITAT
<i>Zygoptera</i>					
<i>Hetaerina americana</i> (S)	1 Dec (Abbott 2001)	28 Dec 2001	Starr	25+	Cane bed at Rio Grande edge
<i>Lestes alacer</i> (S)	17 Oct (TX) (Westfall and May 1996)	21 Dec 2001	Kenedy	c. 20	Grassy pool edge
<i>L. disjunctus australis</i> (S)	27 Nov (Abbott 2001); 15 Jan (FL) (Dunkle 1990)	19 Dec 1999	Harris	3-4	Grassy pool edge
Same (S)		19 Dec 2001	Harris	3-4	Grassy pool edge
<i>L. forficula</i> (S)	14 Oct (Abbott 2001)	26 Dec 2001	Hidalgo	c. 6	Grassy pool edge
Same (S)		29 Dec 2001	Cameron	80+	Lake edge, woodland understory
<i>Neoneura amelia</i> (P)	23 Sep (Abbott 2001)	13 Oct 2001	Hidalgo	c. 16	Floating detritus at Rio Grande edge
<i>Argia apicalis</i> (S)	2 Oct (Abbott 2001); 25 Oct (AR) (Westfall and May 1996)	22 & 26 Dec 2001	Hidalgo	1 and 1	Bare ground at Rio Grande edge
<i>A. immunda</i> (S)	6 Nov (Abbott 2001)	28 Dec 2001	Starr	3-4	Shaded drainage ditch near Rio Grande
<i>A. moesta</i> (S)	November (Abbott 2001); 15 Nov (FL) (Westfall and May 1996)	28 Dec 2001	Starr	40+	Open and weedy Rio Grande edge
<i>A. rhoadsi</i> (P)	No late U.S. dates published	5 Oct 2001	Kinney	50+	Shrubs, ditch, creek & stream edge
<i>A. scdhila</i> (S)	20 Oct (Abbott 2001); All year (FL) (Westfall and May 1996)	26 Dec 2001	Hidalgo	25+	Open and weedy Rio Grande edge
Same (S)		29 Dec 2001	Cameron	35+	Open and weedy Rio Grande edge
<i>A. translata</i> (S)	27 Oct (Abbott 2001); 7 Nov (AR) (Westfall and May 1996)	22 & 26 Dec 2001	Hidalgo	10+	Grassy-edged steep-sided canal
<i>Enallagma novohispantiae</i> (S)	14 Oct (Abbott 2001)	22 Dec 2001	Hidalgo	2 & 2	Stick perches at Rio Grande edge
Same (S)		22 Dec 2001	Hidalgo	15+	Sheltered shrubs near Rio Grande edge
<i>Neorhynchosma cullittatum</i> (P)	23 Sep (Abbott 2001); 24 Dec (FL) (Dunkle 1990)	22 Dec 2001	Starr	2	Open and weedy Rio Grande edge
Same (S)		22 Jan 2000	Hidalgo	20+	Grassy-edged steep-sided canal
<i>Telebasis sabva</i> (P)	6 Nov (Abbott 2001)	22 Dec 2001	Hidalgo	3	Sticks, grasses at Rio Grande edge
Same (S)		13 Oct 2001	Hidalgo	1	Sheltered shrubs near Rio Grande edge
		22 Dec 2001	Hidalgo	20+	Artificial pond and woodland edge
		7 Nov 2001	Hidalgo	3	Artificial pond and woodland edge
		22 Dec 2001	Hidalgo	3	Artificial pond and woodland edge
<i>Anisoptera</i>					
<i>Anax walsinghami</i> (V)	28 Sep (Abbott 2001)	4 Oct 2001	Presidio	2 males	Territorial along shaded desert stream
<i>Erpetogomphus compositus</i> (S)	25 Sep (Abbott 2001)	2 Oct 2001	Presidio	2	Shrubby Rio Grande edge
<i>Cannaphila insularis</i> (P)	4 Sep (Abbott 2001)	8 Sep 2001	Kinney	c. 8	Weedy drainage ditch
<i>Dythemis fugax</i> (S)	25 Oct (Abbott 2001); 2 Dec (TX) (Needham et al. 2000)	26 Dec 2001	Hidalgo	1	Weedy Rio Grande edge
<i>D. maya</i> (P)	28 Aug (Abbott 2001)	3 Oct 2001	Presidio	2	Small, spring fed shaded desert stream
<i>D. nigrescens</i> (S)	23 Sep (Abbott 2001)	26 Dec 2001	Hidalgo	3	Weedy bench above Rio Grande
<i>Erythrodiplex minuscula</i> (S)	23 Sep (Abbott 2001); 12 Jan (FL) (Paulson 2001)	19 Dec 2001	Harris	4	Low grasses and trail at pond edge
<i>Macrolethemis inacula</i> (P)	18 Sep (Abbott 2001)	21 Sep 2001	Hidalgo	1	Woodland edge at irrigation channel
<i>Mitathyria nuarcella</i> (S)	28 Oct (Abbott 2001); 12 Jan (FL) (Paulson 2001)	26 Dec 2001	Hidalgo	1	Weedy Rio Grande edge
<i>Micrathyria aequalis</i> (S)	13 Sep (Abbott 2001); 6 Jan (FL) (Paulson 2001)	26 Dec 2001	Hidalgo	2	Grassy water treatment pond edge
<i>M. hagenii</i> (S)	4 Nov (Abbott 2001); Mid-Nov (TX) (Dunkle 1989)	23 Dec 2001	Hidalgo	6-8	Grassy pool edge
<i>Perithemis domitia</i> (S/P)	30 Sep (Abbott 2001)	13 Oct 2001	Hidalgo	4	Shrubs & grasses at pond edge
<i>Sympetrum ambiguaum</i> (P)	31 Oct (Abbott 2001); 2 Dec (FL) (Needham et al. 2000)	1 Dec 1999	Harris	1	Sunny trail at pond edge
<i>Tramea insularis</i> (V)	23 May (Abbott 2001); All year (Dunkle 1989)	7 Sep 2001	Kinney	2 males	Territorial at large, spring fed pool
<i>Tramea omata</i> (S)	November (Abbott 2001); 9 Jan (FL) (Paulson 2001)	21 Dec 2001	Kenedy	2	Hunting over grassy pool edge
Same (S)		22 Dec 2001	Hidalgo	2	Hunting over residential lawn

Dunkle, S.W. 2000. Dragonflies through binoculars: A field guide to Dragonflies of North America. Oxford: Oxford University Press.

Eubanks, T.L., R.A. Behrstock and J.C. Abbott. 2001. Odonata (Dragonflies and Damselflies) of the Lower Rio Grande Valley. http://www.fermatainc.com/nat_odonates.html

Mauffray, W. 1999. The Dragonflies and Damselflies (Odonata) of Louisiana. <http://www.afn.org/~iori/lalist.html>

Mauffray, Bill. 2000. The Dragonflies and Damselflies (Odonata) of Georgia. <http://www.afn.org/~iori/galist.htm>

Needham, J.G., M.J. Westfall, Jr. and M.L. May. 2000. Dragonflies of North America. Gainesville: Scientific Publishers.

National Climatic Data Center. 2001. Climate of 2001 - Annual review. preliminary report. <http://lwf.ncdc.noaa.gov/oa/climate/research/2001/preann2001/preann2001.html>

Paulson, D.R. 2001. Recent Odonata records from southern Florida - effects of global warming? International Journal of Odonatology 4(1): 57-69

Westfall, M.J. and M.L. May. 1996. Damselflies of North America. Gainesville: Scientific Publishers.

HOBBY FALCONS AND DRAGONFLIES

Sid Dunkle, Plano, Texas

A chapter in the book "Curious Naturalists", by ethologist Niko Tinbergen (1958), discusses the habits of the European Hobby (*Falco subbuteo*) in The Netherlands. I had read that Hobbies routinely prey dominantly on dragonflies, but this is the first time I have come across any details. (The second most common type of prey caught by the Hobbies were swifts!) Their flat glide back to the nest over 2.5 km was at a speed of at least 150 kph (90 mph); their hunting stoop must be much faster. That dragonflies could give such a predator any trouble is a tribute to the aeronautical prowess of the dragonflies. Tinbergen relates: "... we often saw prolonged, determined swoops over distances of 100 to 200 yards, ending in a quick, zigzagging dash. In such cases we could often see that they were catching dragonflies. After seizing them they usually broke off the wings and ate the rest." This was done high in the air and on the wing. Some pairs of nesting Hobbies specialized on insects such as dragonflies, others on birds. They could see dragonflies up to 200 m away, twice as far as the unaided human eye. One pair brought 70 dragonflies to the nest in 4 hours.

BAT FALCONS AND DRAGONFLIES

Nick Donnelly

Sid Dunkle's interesting note on European falcons catching dragonflies prompts me to include a note on the New World tropical bat falcon (*Falco ruficularis petoensis*). Between 1962 and 1983 I visited the spectacular ruins at Tikal on seven trips. Between 1962 and 1969 visitors would fly to a dirt airstrip in a DC-3; more recently visitors fly to Flores and drive to the ruins. The airstrip was close to the lodge, and in the evening it was a short stroll from the lodge to look for night-flier dragonflies (*Gynacantha nervosa*, *Triacanthagyna caribbea*, *T. septima*), which swarm on the edge of the airstrip for only about fifteen minutes as the sun sets.

Bat falcons are resident in the forest and commonly perch on the tops of the Mayan temples during the day. At sundown they often fly over to the airstrip to hunt for dragonflies. On several occasions I watched them from a distance of only about twenty meters as they caught large dragonflies directly in front of me. The method was interesting. They would swoop down from the rear and pass beneath the dragonfly. Doing a barrel roll, they pulled the dragonfly down to them as they passed underneath. I have seen the same technique used by a Cooper's hawk in Wyoming catching horned larks in open country. I presume that catching the prey from below prevents it from escaping by dropping.

In Misiones, Argentina, I have seen plumbeous kites (*Ictinia plumbea*) hunting large dragonflies (*Coryphaeschna perrensi*) at dusk, but I never witnessed the actual capture. Now I am curious: what are the actual capture techniques of falcons and kites?

GEORGIA UPDATE

Bill Mauffray

International Odonata Research Institute
Gainesville, Fl.; iori@afn.org

The Georgia Dragonfly Survey GDS, as coined by Alan Harvey, has emerged and will be officially launched at the Georgia Entomological Society meeting being held in Statesboro this spring. Although we have no new state records to mention for the 2001 season, over a hundred new county records have been added, mainly through the continuing efforts of Giff Beaton, a well known birder who got the "dragonfly bug" and has brought his photographic and field expertise into the picture.

Giff Beaton has enjoyed the outdoors for over 25 years, and is especially interested in the identification and photography of Odonates and birds. He has been working with me on the Georgia Odonata mapping project for about four years, and has been scouring the state for additional county records during that time. He is an airline pilot and lives in Marietta GA.

Alan Harvey is Assistant Professor of Biology at Georgia Southern University. Although most of his research involves hermit crabs, he has always been interested in dragonflies. Alan and his students are studying the systematics of *Erythemis* and developing a "passive marking" technique for dragonflies.

The GDS web site will be a consolidation of Alan Harvey's web based illustrated key, his maps, data from my list currently on the web, Giff Beaton's images, as well as, links to images of others such as Forrest Mitchell's excellent Digital Dragonflies site. The GDS Site is maintained by Alan Harvey and is hosted by the Biology Department at Georgia Southern University. The site will be continuously updated and expanded, you can see the latest version at <http://www.bio.gasou.edu/bio-home/Harvey/ga.dragons.html>

It will be the goal of the GDS, that a comprehensive state list be published in BAO and co-authored by the three of us sometimes within the next 3 years. If any one has Georgia data please e-mail me @ iori@afn.org. or you can go to the GDS web site and fill in the online form provided by Alan Harvey.

=====
=====

ATTACHMENT DEVICES OF INSECT CUTICLE, Stanislav Gorb, Kluwer Academic Publishers, 2001, Dordrecht, The Netherlands.

Reviewed by **Roy Beckemeyer**

DSA member Stas Gorb, of the Ukraine, has been conducting research in some esoteric areas focused on the microstructure of insect cuticle. A number of his studies have used Odonata as model organisms. ARGIA readers may remember my short review (Beckemeyer, 1997) of his study in PETALURA (Gorb, 1993) on the head-arresting system that stabilizes damselfly and dragonfly heads when the insects are perched or otherwise not in free flight. This book deals with a larger subject of which the head-arrester system is an example: the macro- and micro-structures found on insect cuticle (setae, spines, sensillae, bristles, hooks, pores, wax layers, etc.) and generally involved in attachment of insects to substrates or to other insects. Filled with marvelous scanning electron microscope pictures, the book is an overview of the

state of the art in a vibrant field of research. Specific information on Odonata includes a detailed review of the head-arresting system, information on cuticular attachment during copulation, and the presence of structures on ovipositors that function to help move eggs out through the ovipositor. SEM microphotographs of Odonata include ovipositors of *Calopteryx splendens*, attachment of the male anal appendages to female prothoraces in *Platycnemis latipes* and *Lestes barbarus*, inner surfaces of the ovipositor valvulae of *Sympecma annulata*, the head-arrester post-cervicle sclerite and the microtrichia field on the back of the head of *Sympetrum sanguineum*, and details of these structures for *Perissolestes romulus* and *Aeshna mixta*. In the non-Odonata groups, such wonders as wing-locking devices, and the functioning of tarsi (e.g., how flies walk) are covered. Insect cuticle is a remarkable organic material; this book gives some insight into just how remarkable it is.

References:

Beckemeyer, Roy, 1997, Functional morphology of tandem flight in Odonata, Argia, 9:13-17

Gorb, S., 1993, The skeleton-muscle organization of the head-fixation system in odonates and its evolutionary implications: a comparative study, Petalura: Ann. J. SGSP, 1:3-20

=====
=====

FIXED AND FLAPPING WING AERODYNAMICS FOR MICRO AIR VEHICLE APPLICATIONS, T.J. Mueller (Ed.), 2001, Vol. 195, Progress in Astronautics and Aeronautics, American Institute of Aeronautics and Astronautics, Reston, Virginia.

Reviewed by **Roy Beckemeyer**

The study of insect flight has gone on in various universities throughout the world for many years, usually by researchers who have had to struggle to find funding. Then, in the mid 90's, after the success of the high-tech weaponry in the Gulf War, the Defense Research Projects Agency (DARPA), Naval Research Lab, and other government weapons research organizations started thinking about how useful very small unmanned surveillance vehicles (bird and insect-sized) might be. Voilà, the MAV (Micro-Air-Vehicle) era was born, and funds started to flow. Now super computers solving the Navier-Stokes equations for three-dimensional flow fields around flapping wings, computer models of insect wing vein and membrane structures, and tests of wings and airfoil sections at very low Reynolds Numbers (RN) are being funded by the government. Lots of insight is being gained into how insects fly (one of the MAV's is called "Robofly"), and exciting things are

going on in the field. It is even becoming hard to keep up with it all. This book contains a set of papers dealing primarily with low-speed and small scale (low RN) aerodynamics. One paper in particular is directly applicable to Odonata: Akira Azuma, Masato Okamoto and Kunio Yasuda's paper (Chapter 17 of the book, pp. 341-391), "Aerodynamic characteristics of wings at low Reynolds Number". It recounts their pioneering work on dragonfly and damselfly aerodynamics that was originally published in the Journal of Experimental Biology. Anyone who has worked or been interested in the flight mechanics of Odonata would find that chapter and portions of the rest of this book of interest.

=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=

THE NATURE OF NEBRASKA: ECOLOGY AND BIODIVERSITY, Paul A. Johnsgard, 2001, University of Nebraska Press, Lincoln.

Reviewed by **Roy Beckemeyer**

Paul Johnsgard is well known to birders and ornithologists. He is a prolific author, having produced forty books, mostly ornithological, over a forty year professional career. He has also published on more general natural history topics, particularly on the Great Plains. This book is an excellent summary of "natural" Nebraska and its ecological communities. It contains checklists of fauna and flora, these including for the invertebrate groups, Tiger Beetles, Carrion Beetles, common Scarabs, Grasshoppers, mantids and walking sticks, butterflies, selected moth families, freshwater mussels, and dragonflies and damselflies. The latter list is based largely on the one that I generated and posted on my web site for the 1998 DSA meeting in Valentine, but includes a couple of new county (photographic) records provided to Paul by John Sullivan (*Arigomphus submedianus* from Douglas County and *Gomphus militaris* from Lancaster County) as well as a reference that I had missed, an MS thesis from 1934 (Keech, C.F., The Odonata of Nebraska, Univ. Nebraska Lincoln). In addition to the checklists, the book contains references to identification aids such as Sid Dunkle's "Dragonflies through binoculars" and my and Don Huggins' "Checklist of Kansas Dragonflies". Hopefully Paul's book will inspire folks in the Cornhusker state to become more interested in dragonflies.

=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=

DRAGONFLIES AND DAMSELFLIES OF NORTHEAST OHIO. By Larry Rosche, Cleveland Museum of Natural History, 94 pp., spiral bound, \$18.95. The Cleveland Museum of Natural History, 1 Wade Oval Drive, University Circle, Cleveland, Ohio 44106-1767. The author

suggests that for purchase you contact Renee Boronka at rboronka@cmnh.org

Reviewed by **Nick Donnelly**

This surpassingly gloomy late winter day suddenly became very sunny when the afternoon mail brought a copy of Larry Rosche's "Dragonflies and Damselflies of Northeast Ohio". I had one of those "wow" moments when I leafed through it. Its spiral binding and sturdy construction will guarantee its presence is numerous pocket and field bags during the upcoming field season.

It is not only thorough, but beautifully illustrated. The illustrations (acrylics?) are both elegant and accurate, and are some of the most useful and attractive I have ever seen. The accompanying text gives field identification marks and a brief description of habits and habitat. The book also reminds me that we have a lot of survey work to do just a few miles away in western New York!

If you live anywhere east of the Mississippi you will find this book indispensable.

=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=

MISCELLANEA

FSIO REPORT

Bill Mauffray
International Odonata Research Institute
Gainesville, Fl.; iori@afn.org

North American memberships in the Foundation SIO have been increasing steadily over the last year. The IORI handles the membership fee which includes subscriptions and distribution for Odonatologica and Notulae for all of North America including Mexico and Canada.

One thing that has helped is the Student special supplement offered by the IORI so that students pay only \$64.00. This is offered only by the IORI as a small grant to help students of Odonatology and is available for students world wide. The condition for student rates is that the applicant submit a brief explanation of their studies and agree to provide the IORI with any reprints or copies of any publications they are ever involved in. For more information you can visit the web site <http://www.afn.org/~iori/siointro.html>

=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=

IORI UPDATE

Bill Mauffray
International Odonata Research Institute
Gainesville, Fl.; iori@afn.org

IORI book and envelope sales remained brisk through 2001. Profits were used to build almost an entire row of cabinets for collection expansion at the FSCA/IORI adding over 800 drawers of storage space. A technician was hired to expand the collection and to re-label all the drawers

We have completely sold out of Sid Dunkle's Florida guides and the publisher has no more either. It is hoped that Sid will update the Florida guides and publish 2nd editions. We have no pending books to announce at this time. The IORI will handle the sale on any publications under the condition that we can take advanced orders beginning at least 6 months in advance and that we are given bulk rate pricing. We usually will not handle a new book after it is already published, unless it is an exclusive relationship.

=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|

FSCA TO DOUBLE ODONATA SECTION

Bill Mauffray

International Odonata Research Institute
Gainesville, Fl.; iori@afn.org

The Florida state collection of Arthropods (FSCA) has scored a NSF grant covering much needed expansion of the collection. A portion of the grant will be used to build an entire double row of Odonata cabinets expanding the existing 1216 drawers to a projected 2432. Also shelves and work space will be built along the back wall adjacent to the existing Odonata cabinets so that the entire Odonata reference library and archives can be housed there making it easier for researchers to do their work without having to go to 3 different places as it exists now. The 4 year grant extends into early 2004 at which time all projects should be completed.

=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|

WDA'S 3RD INTERNATIONAL SYMPOSIUM OF ODONATOLOGY, MURRAY DARLING FRESHWATER RESEARCH CENTRE, COOPERATIVE RESEARCH CENTRE FOR FRESHWATER ECOLOGY, BEECHWORTH, AUSTRALIA, JANUARY 7-13, 2003.

An official invitation to host the 3rd WDA Symposium in Australia in 2003 was made by John Hawking during the 2nd (Swedish) Symposium being held in July 2001. The Symposia Committee feels it important to give advance notice of this exciting event so that members, and anyone else with an interest in Odonata, may make their plans for early 2003 with the following dates in mind.

Location: The symposium is to be held at the historic town of Beechworth, in north-east Victoria, between the two major Australian capital cities,

Sydney and Melbourne. Beechworth is a beautiful little town, nestled in the foothills of the Australian Alps. It was a major commercial centre for the Ovens Goldfields during the gold rush of the 1850's. It is now classified as a "Notable" heritage town with over 30 buildings on the National Trust's register, with many of the buildings dating back to the 1860's. Over 40 species of damselflies and dragonflies can be found in the area, with *Ischnura heterosticta*, *Griseargiolestes intermedius*, *Eusynthemis brevistyla*, *Austrogomphus guerini*, *Hemigomphus gouldii*, *Spinaeshna tripunctata*, and *Orthetrum caledonicum* being common in nearby Spring and Reid Creek, while at Lake Sambell *Ischnura aurora*, *Xanthagrion erythronerum*, *Austroagrion watsoni*, *Austrolestes leda*, *Hemianax papuensis*, *Hemicordulia tau* and *Diplacodes bipunctata* can be found in plentiful numbers.

Venue: The symposium venue will be the historic May Day Hills Campus of La Trobe University which occupies a 106 hectares site of the old Mayday Hills hospital. The University has created a unique special educational environment amongst the heritage gardens and historical buildings. The campus accommodation ranges from International Hotel rooms, to Conference Hotel rooms, to shared cottages and backpack accommodation.

Mid Symposium Field Trip: The field trip will follow the Kiewa River from its source in the beautiful Snow Gum ridges of the Bogong High Plains down to the lush farming valley where it joins the mighty River Murray. We will travel 100 km, over an altitudinal decline of 1400m, and encounter some 25 species of dragonflies which occupy discrete zones along the river. We will visit the alpine village of Falls Creek, pass through the Hydro-electricity town of Mount Beauty and on down to the sleepy country village of Tangambalanga.

Post Symposium Field Trip: The field trip will combine dragonfly collecting with visits to cultural and heritage areas. We will visit the site of the world's most primitive odonate, *Hemiphlebia mirabilis*, which will be flying, and sites of other Gondwanan dragonflies, like *Austropetalia tonyana* and *Telephlebia brevicauda*. We will also visit National Parks with their spectacular scenery, brightly coloured wildflowers, and unique Australian fauna.

Links to Further information:
http://powell.colgate.edu/wda/Australia/Home_page.htm

=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|=|

BACK ISSUES OF ARGIA AND THE BULLETIN OF AMERICAN ODONATOLOGY

The editor is able to provide back issues of **ARGIA**. Please contact T. Donnelly, 2091 Partridge Lane, Binghamton NY 13903. The present price schedule takes into account the different costs of duplication of each number of **ARGIA**. In the event that an issue becomes exhausted, then xerox copies will be sent. Prices are \$2.00 per issue; these do not include postage; see below.

Back Issues of the **BULLETIN OF AMERICA ODONATOLOGY** can be furnished at the prices given below. Prices do not include postage; see below.

1(1) The Odonata of New York, Thomas W. Donnelly p. 1-28	\$3.00
1(2) Distribution of Dragonflies and Damselflies in Florida, Sidney W. Dunkle p. 29-50	\$2.50
1(3) Morphological and ecological differences among species of <i>Ladona</i> , Michael L. May p. 51-56	\$1.50
Comportamiento reproductivo y policromatismo en <i>Ichnura denticollis</i> Burmeister, Alejandro Córdoba Aguilar [with English summary] p. 57-64	
1(4) A checklist of the Odonata of the Dominican Republic by Province, Jerrell James Daigle p. 65-69	\$1.50
Odonata de la Sierra de Huauchinango, Puebla, Mexico [with English summary], José A. Gómez Anaya and Rodolfo Novelo Gutiérrez p. 71-73	
2(1) La Nayade de <i>Archilestes latialatus</i> Donnelly, 1981 [with English summary], R. Novelo-Gutiérrez p. 1-7	\$1.50
Descripción e Historia Natural de las Larvas de Odonatos de Costa Rica. III <i>Gynacantha tibiata</i> (Karsch 1891) [with English summary], Alonso Ramirez p. 9-14	
2(2) Description of the Nymph of <i>Epiptera (Tetragoneuria) spinosa</i> (Hagen, K. J. Tennessen p. 15-19	\$1.50
The Larva and Adult Male of <i>Somatochlora georgiana</i> Walker, Jerrell J. Daigle p. 21-26	
2(3) <i>Macromia illinoiensis</i> and <i>georgina</i> : a Study of heir Variation and Apparent Subspecific Relationship, T.W. Donnelly, K.J. Tennessen p. 27-61	\$3.00
2(4) The Subgenus <i>Tetragoneuria (Anisoptera: Corduliidae: Epiptera)</i> in New Jersey, Michael L. May p. 63-74	\$1.50
3(1) The Odonata of Ohio - a Preliminary Report, Robert C. Glotzhofer p. 1-30	\$3.00
3(2) Four Decades of Stability and Change in the Odonata Population at Ten Acre Pond in Central Pennsylvania, Clark N. Shiffer & Harold B. White p. 31-40	\$1.50
Descripción e Historia Natural de las Larvas de Odonatos de Costa Rica. IV. <i>Mecistogaster ornata</i> (Rambur, 1842) [with English summary], Alonso Ramirez p. 43-47	
3(3) The Distribution of Odonata in Alabama, Kenneth J. Tennessen, James D. Harper, R. Stephen Krotzer, p. 49-74	\$3.00
3(4) Distribution Records of the Odonata of Montana, Kelly B. Miller and Daniel L. Gustafson, p. 75 - 88	\$1.50
4(1) An Annotated List of the Odonata of New Jersey, With an Appendix on Nomenclature in the Genus <i>Gomphus</i> , Michael L. May & Frank L. Carle p. 1 - 35	\$3.00
4(2) The Odonata of Patuxent Wildlife Research Center and Vicinity, Richard L. Orr p. 37 - 67	\$3.00
4(3) The Status of <i>Lestes apollinaris</i> Navás and <i>L. henschawi</i> Calvert, Thomas W. Donnelly p. 69-74	\$1.50
4(4) The Dragonflies of Washington, Dennis R. Paulson p. 75-90	\$1.50
5(1) The Dragonflies and Damselflies (Odonata) of Louisiana, Bill Mauffray p. 1-26	\$3.00
5(2) The Odonata of the Cayman Islands: a Review, R.R. Askew, R. Prosser, and P.S. Corbet p. 27-32	\$1.50
Taxonomic and Population Studies of British Columbia <i>Aeshna</i> species, G. Peters p. 33-42	
5(3) Adapting the Townes Malaise Trap for Collecting Live Odonata, Robert C. Glotzhofer & Dan Riggs, p. 43-48	\$1.50
<i>Archilestes grandis</i> (Great Spreadwing) in Central New Jersey, with Notes on Water Quality, David P. Moskowitz and David M. Bell, p. 49-54	
Variation in Head Spines in Female <i>Ophiogomphus</i> , with a Possible Example of Reproductive Character Displacement (Anisoptera: Gomphidae), Dennis R. Paulson, p. 55-58	
5(4) The Odonata fauna of Connecticut, David L. Wagner and Michael C. Thomas, p. 59-85	\$3.00
6(1) The Distribution of the odonata of Hawaii, Jerrell J. Daigle, p. 1-5	*
Additions to the Description of <i>Gomphomacromia nodisticta</i> Ris 1928 (Odonata: Corduliidae), N. von Ellenrieder, p. 7-11	
6(2) The Odonata of Iowa, Robert W. Cruden and O.J. Gode, Jr., p. 13-48	*

* subscription

Mailing and Handling Costs:

	SURFACE		AIR MAIL	
	1st number	each additional	1st number	each additional
United States	\$1.25	\$1.00	---	---
Canada, Mexico	\$1.25	\$1.00	\$1.50	\$1.25
Western Hemisphere	\$1.50	\$1.25	\$2.00	\$1.50
Europe, Asia, etc	\$1.50	\$1.25	\$3.00	\$2.50

ARGIA

Binghamton, New York

Vol. 14, No. 1, 20 March 2002

In This Issue		1
DRAGONFLY DAYS, 17-18 MAY 2002		2
MIDSOUTH ODONATA MEETING, 16-19 MAY 2002		2
DSA MEETING IN WEST VIRGINIA, 20 -23 JUNE 2002		2
2002 GREAT LAKES ODONATA MEETING , 1 - 4 JULY 2002		3
NORTHEASTERN DSA MEETING IN TUG HILL PLATEAU, NEW YORK, 12 - 14 JULY 2002		3
2002 ODONATE SEMINARS AT THE HUMBOLDT INSTITUTE ON THE COAST OF MAINE		3
CONNECTICUT RECORDS OF <i>SYMPETRUM CORRUPTUM</i> AND SOUTH AMERICAN COENAGRIONIDS	Fred Sibley	3
TWO NEW DAMSELFLIES FOR NEVADA	John Abbott and Robert Larsen	4
A NEAT DISCOVERY	Jim Johnson	4
A FISTFUL OF BOLIVIANOS!	Jerrell Daigle	5
MISCELLANEOUS NOTES ON BRITISH VIRGIN ISLAND DRAGONFLIES	Fred Sibley	5
ODONATA OF ST THOMAS AND ST JOHN, VIRGIN ISLANDS	Nick Donnelly	7
<i>MICRATHYRIA DEBILIS</i> FROM JAMAICA	Fred Sibley	9
<i>TELEBASIS DEMERARUM</i> IN TRINIDAD	Dennis Paulson	9
NEW LATE FLIGHT DATES FOR TEXAS ODONATA INCLUDING 20 LATE RECORDS FOR THE UNITED STATES	Robert A. Behrstock	9
HOBBY FALCONS AND DRAGONFLIES	Sid Dunkle	13
BAT FALCONS AND DRAGONFLIES	Nick Donnelly	13
GEORGIA UPDATE	Bill Mauffray	13
BOOK REVIEW: ATTACHMENT DEVICES OF INSECT CUTICLE, by Stanislav Gorb	Roy Beckemeyer	14
BOOK REVIEW: FIXED AND FLAPPING WING AERODYNAMICS FOR MICRO AIR VEHICLE APPLICATIONS, ed. T.J. Mueller	Roy Beckemeyer	14
BOOK REVIEW: THE NATURE OF NEBRASKA: ECOLOGY AND BIODIVERSITY, by Paul A. Johnsgard	Roy Beckemeyer	15
BOOK REVIEW: DRAGONFLIES AND DAMSELFLIES OF NORTHEAST OHIO. by Larry Rosche	Nick Donnelly	15
MISCELLANEA		15
WILLIAM RICKER 1908-2001		16
TRAMEA		17