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ARGIA

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*Williamsonia
lintneri*

Photo by
Steve Roble

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THE DRAGONFLY SOCIETY OF THE AMERICAS

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

Front and back covers: *Williamsonia lintneri* (front cover, photo by Steve Roble) and *fletcheri* (back, larva by Bill Smith and adult by M.W. Nelson) May is *Williamsonia* month!

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

In This Issue

This winter has been so tough that even most of my southern friends seem to have suffered. I write this on the first day of April, with the snow falling very hard -- yet again. Right now Eglin AFB looks pretty good. I hope to see many of you there next week.

One thing that spring means is that we are about to start looking for dragonflies again. The cover photo of *Williamsonia lintneri* reminds us that this elusive insect has already finished its brief, early season by the time that most of us in the northeast start looking at all! I would like to make a special plea to those in the northeast to set aside some time at the beginning of May to look for *lintneri*. Recent discoveries in Wisconsin and Michigan tell us that there must be additional localities, like, in New York. Hey, that's where I live . . .

Spring means making firm plans for our meetings. Our Northeastern and Southeastern meetings unfortunately are scheduled for the same weekend. The organizers really had no choice, so you will have to pick one. The Eagle Hill seminar has always been a great place to learn the basics, and the coast of Maine is hard to beat. The annual meeting will be in California this year. This looks like the most ambitious meeting ever, and I am greatly looking forward to it. The GLOM meeting this year will be on a ridge overlooking Lake Superior, and will feature some of the really fine northern habitat that few of us get to visit. Both Canadians and Americans will have quite a drive to get here, but it will be worth it!

Jane Walker has contributed a fine piece whose subtext is that Missouri is a great place to look for dragonflies. After Linden Trial's discovery of Hine's Emerald there a few years ago, the fens in this state have been surveyed to a fare-thee-well. Jane's article is on *Tachopteryx thoreyi* and *Somatochlora tenebrosa*, which they have found flying with *hineana* in several places. Oh well, there goes that theory [that the two *Somatochlores* didn't co-occur].

Probably many of you have driven through Terrell County, Texas, without knowing it. It is west of the Hill Country, on the road to El Paso, where the landscape becomes truly bleak and parched. Maybe you should have stopped and looked around. Omar Bocanegra presents an impressive list of odonates.

Bob DuBois tells us what many of us sort of realized -- but never documented properly. Published keys to larvae are often deceptive, suggesting that you can distinguish species when you really can't. Bob uses *Leucorrhinia* as an example of this problem, which we should all pay attention to.

Paul Catling tells us of observations of swallow-tailed kites eating dragonflies. Several species of kites seem to like these insects. Perhaps someone should document the diet of the entire group.

Dave Czaplak added *Phyllocycla* to our fauna, showing that a good photo, even of a female, can be very useful. In this case the choice between two species will turn out to be a non-choice if the two species are synonymized.

Peter Allen gives us an account of a trip to Cuba, showing that the odonates there are varied and rewarding. We will have a BOA issue devoted to Cuba shortly. Book your tour!

Jorge Montero M. tells us of one of the most beautiful damselflies in the American tropics. *Thaumatoneura* is one of those waterfall dwellers that few Odonatists have been fortunate enough to see, let alone net.

We have some brief notes. John Abbott sent me for inspection a *Gomphus graslinellus* from eastern New York. Is this insect a hitchhiker on trucks? Paul Catling found that exuviae from beneath bridges commonly are badly infested with dermestids. I don't think anyone noticed this previously.

Jake Harding, already well known to the northeastern crowd, is featured in a fine sequence in a Canadian TV program. Too bad you missed it! I will try to remember to bring the video to the California meeting.

We include a notice for a video of New Mexico dragonflies. Not only is it very useful for identification of more than 40 species, it also has some lovely footage of dragonflies eating their prey (including a pondhawk eating a pondhawk). This is one of the nicest videos I have seen, and it will be very useful to people in the mid-continent.

Joe Smentowski and Jane Walker report on one of those "why-did-it-take-so-long-to-think-of-this" items. The "portabug" is a truly wonderful field accessory. I have used brown paper bags, and little

cages made from mosquito netting. Others use zip-lock baggies. But the Portabug beats them all. And, having put a teneral specimen of some rare *Gomphus* in it, you are unlikely (as I once did) to put in on the seat of your truck and then hop in, reducing your precious specimen to the thickness of a credit card.

In **TRAMEA** we feature a website which illustrates many northeastern species and will help to identify them.

Cover Photos for ARGIA- I recently e-mailed the community soliciting cover photos for **ARGIA**. The response was overwhelming, and this month's cover uses one of them. I am keeping the others in reserve for future use. Please keep sending me pictures, but pictures that I cannot use directly (i.e., for which I will need permission to use) are not as useful. I am greatly cheered by the photographic prowess of members and their willingness to share their excellent images.

CALENDAR: 2003 DSA and other meetings			
meeting	date	place	contact
Southeast DSA	22-26 May	La Fayette GA	J Daigle <jdaigle@nettally.com>
Northeast DSA	23-25 May	Marietta OH	D McShaffrey <mcshaffd@marietta.edu>
Eagle Hill Seminar	25-31 May	Steuben ME	P Brunelle <as849@chebucto.ns.ca>
National DSA	20-22 June	Williams CA	K Biggs <bigsnest@sonic.net>
Great Lakes Meeting	23-27 July	"Wolf Ridge" MN	K Mead <mndfly@cpinternet.com >

2003 DSA SOUTHEASTERN MEETING

Jerrell Daigle (jdaigle@nettally.com)

The 2003 DSA Southeastern meeting will be held in La Fayette, Georgia from May 22-26. La Fayette is in the extreme northwestern corner of Georgia. It will be hosted by Giff Beaton and the Georgia Dragonfly Survey. We will be staying at the Key West Inn, although there are 5 other local hotels. We will meet Thursday evening, May 22, to get settled in. We hope to survey the mostly unknown odonate fauna in the area. If we are lucky, we might be able to find *Gomphus consanguis*. If you have any questions, please let me know. Thanks!

to the Historic Lafayette Hotel located right at the confluence. Camping is available at private campgrounds and sites maintained by the Forest Service. When not collecting, Marietta is home to a number of antique stores (including one that specializes in tools) and museums. Across the river, Fenton Art Glass is located in Willamstown, WV. There are numerous restaurants, including one on a paddlewheel showboat moored in the Muskingum River. A website will be set up with meeting info, watch www.marietta.edu/~odonata or contact Dave McShaffrey for details.

2003 ODONATE SEMINAR AT THE HUMBOLDT INSTITUTE ON THE COAST OF MAINE MAY 25 - 31

Paul Brunelle <as849@chebucto.ns.ca>

2003 NORTHEAST REGIONAL MEETING, MARIETTA, OHIO, LATE MAY 2003

Dave McShaffrey (mcshaffd@marietta.edu)

The 2003 Northeast Regional meeting will be held in Marietta, Ohio, from May 23rd to the 25th. Marietta is at the confluence of the Ohio and Muskingum Rivers and is directly across from West Virginia. Collecting locales include sites on the Muskingum River (home to large beds of endangered mussels) and the Little Muskingum River.

DAMSELFLIES AND DRAGONFLIES: SYSTEMATICS AND BIOMONITORING

This seminar is offered both for specialists involved in aquatic insect biomonitoring programs and for amateur naturalists who assist in these programs. The seminar will provide a broad overview of the study of the order Odonata: its basic lifestages, morphology, behaviour, emergence, and temporal and geographical distribution in the northeastern region. Current regulations, references, and sampling techniques will be reviewed. Field and lab work will focus on adults as well as on larvae and their exuviae. Larvae will be sampled for taxonomic study and rearing. Adults will be sampled as encountered. Reference specimens of

Meeting and lab space will be available at Marietta College. There are many lodging possibilities ranging from typical chain motels near Interstate 77

larvae and adults will be available for study. Difficult specimens are welcome.

Note! A 15% discount applies to all agency/company participants in this region-wide seminar (30% if 2 or more).

Paul-Michael Brunelle has been studying the Odonata of the Atlantic Provinces of Canada and northern New England for the last twelve years and has recently published regarding their distribution in the region. He was retained by the Maine Department of Inland Fisheries and Wildlife to plan a 5-year survey of the order Odonata (Maine Damselfly and Dragonfly Survey), which began in 1999, and to conduct survey for rare odonates in the state. He has also been retained by Parks Canada, and The Nature Conservancy, and has received a grant from Themadel Foundation to study the behaviour of *Neurocordulia michaeli*, which he discovered in New Brunswick. He is a Research Associate of the Nova Scotia and New Brunswick Museums, and founder of the Atlantic Dragonfly Inventory Program (ADIP).

For more information, please contact:
Humboldt Institute, PO Box 9, Steuben, ME 04680-0009.
207-546-2821. Fax 207-546-3042.
E-mail - office@eaglehill.us.
Online registration and information - <http://www.eaglehill.us>

DSA MEETING IN CALIFORNIA, 20-22 June 2003.

Kathy Biggs <bigsnest@sonic.net>

The DSA 2003 meeting will be held June 20-22 in Williams, CA. Williams lies in the heart of California's northern Central Valley, and offers convenient access to our main field trip locations in the coast ranges and northern foothills of the Sierra Nevada. Descriptions of the planned field trips and accommodations can be found at Kathy Biggs' official website: <http://www.sonic.net/~bigsnest/DSA2003/>. Please register by signing the guest book.

The post-meeting field trip to the Owens Valley on June 22-24, with stops in the Sierra Nevada along the way, will provide great opportunity to photograph and collect western mountain and Great Basin odonates while surrounded by some of the

most spectacular scenery in North America. Hope to see you there!

Those without email/Internet access are encouraged to let the CA DSAers know you are coming by writing to: DSA CA'03, C/O Kathy Biggs, 308 Bloomfield Rd., Sebastopol, CA 95472

Phone contact: (Kathy) 707-823-2911 (note time change and don't call before it is 8 am PCT please!)

The group will gather informally on Thursday, June 19 at Granzella's (undoubtedly in the parking lot between the hotel and restaurant if past experiences hold true!) and field trips will begin on Friday morning, again leaving from the parking lot. Field trips will be all day Friday and Saturday (see below). Meetings/ presentations will be held Friday and Saturday evenings. On Sunday June 22, those who can will be leaving for the post-meeting trip Odonata Activities:

Trip 1. Opportunities to collect and observe Pacific Odonata abound at Pope Creek and Bear Creek in the rugged coastal mountains of California! Both Bear & Pope Creeks can easily be included in a day trip. Bear Creek is west of Williams on Highway 20 (~20 min. drive) - leaders Kathy & Dave Biggs:

Bear Creek: Located only 25 miles north of Pope Creek and just 20 miles due east of Williams on Highway 20. Bear Creek shares much of its Odonate fauna with Pope Creek, but also boasts a population of *Anax walsinghamsi*, the largest dragonfly in North America. This list includes all 37 species seen there by DSA members Kathy & Dave Biggs, Tim Manolis and Andy Rehn in recent years: *Hetaerina americana* American Rubyspot, *Archilestes* sp. Stream Spreadwing sp., *Argia agroides* California Dancer, *A. emma* Emma's Dancer, *A. lugens* Sooty Dancer, *A. vivida* Vivid Dancer, *Enallagma carunculatum* Tule Bluet, *E. boreale* Boreal Bluet, *E. civile* Familiar Bluet, *E. cyathigerum* Northern Bluet, *Ischnura cervula* Pacific Forktail, *I. perparva* Western Forktail, *Telebasis salva* Desert Firetail, *Erpetogomphus compositus* White-belted Ringtail, *Gomphus kurilis* Pacific Clubtail, *Progomphus borealis* Gray Sanddragon, *Stylurus olivaceus* Olivaceous Clubtail, *Aeshna/Rhinoeschna* sp. Mosaic Darner sp., *Anax junius* Common Green Darner, *A. walsinghamsi* Giant Darner, *Cordulegaster dorsalis* Pacific Spiketail, *Macromia magnifica* Western River Cruiser, *Brechmorhoga mendax* Pale-faced Clubskimmer, *Erythemis collocata* Western Pondhawk, *Libellula forensis* Eight-

spotted Skimmer, *L. luctuosa* Widow Skimmer, *L. lydia* Common Whitetail, *L. pulchella* Twelve-spotted Skimmer, *L. saturata* Flame Skimmer, *Pachydiplax longipennis* Blue Dasher, *Pantala flavescens* Wandering Glider, *P. hymenaeae* Spot-winged Glider, *Paltothermis lineatipes* Red Rock Skimmer, *Sympetrum corruptum* Variegated Meadowhawk, *S. madidum* Red-veined Meadowhawk, *S. pallipes* Striped Meadowhawk, *Tramea lacerata* Black Saddlebags.

Pope Creek/ Cold Canyon is in the Lake Berryessa State Recreation Area - leader Andy Rehn:

Pope Creek: Located 1 hour and 30 minutes west of Davis in the Lake Berryessa State Recreation Area, Pope Creek is one of the best collecting localities in the coastal ranges of northern California. Many Pacific coast species are common here, including *Gomphus kurilis* Pacific Clubtail, *Ophiogomphus bison* Bison Clubtail, *Octogomphus specularis* Grappletail, *Argia agrioides* California Dancer and the CA endemic *Zoniagrion exclamationis* Exclamation Damselfly. There is also a population of *Tanypteryx hageni* Black Petaltail nearby, but it is small and difficult to access due to the high level of Lake Berryessa. We can probably arrange to transport (i.e. ferry) a few of the most adventurous collectors to the site, but it's small size will require visitor's to keep tromping to an absolute minimum (not to worry, we can get petalurids elsewhere - see Chico area trip).

Trip 2. Retrace C.H. Kennedy's Steps!

Chico area: Cherry Hill/Upper Bidwell Park

These areas are north east of Williams and support a diverse western odonate fauna - leader Tim Manolis:

The Chico field trip "follows in the footsteps of Kennedy" in that this field trip will spend a good deal of the time in Bidwell Park, where Kennedy collected when preparing his seminal paper on California Odonata. Upper Bidwell Park is in the foothills bordering Chico, Butte County, California, and contains a beautiful stream, Big Chico Creek, with inviting pools and riffles, flowing through basalt gorges and pine-oak and sycamore woodland. The park also contains a small lake and numerous seep springs, so the odonate habitat is quite varied.

Many Pacific coast species are common in Bidwell Park along the creek, and isolated seeps and springs in Big Chico Canyon and nearby Butte Creek Canyon harbor isolated populations of *Libellula*

croceipennis, and *L. comanche* (Neon and Comanche Skimmers). And, if that isn't enough, although Kennedy did not also collect in the mountains of Butte County at Cherry Hill, that is where the *Tanypteryx* (Petaltails) and *L. nodisticta* Hoary Skimmers are and we will go there too.

The species list from our scouting trip in 2002 to Upper Bidwell Park is as follows: *Erpetogomphus compositus* White-belted Ringtail, *Gomphus kurilis* Grappletail, *Ophiogomphus bison* Bison Snaketail, *Progomphus borealis* Gray Sanddragon, *Macromia magnifica* Western River Cruiser, *Brechmorhoga mendax* Pale-faced Clubskimmer, *Erythemis collocata* Western Pondhawk, *Libellula luctuosa* Widow Skimmer, *L. pulchella* Twelve-spotted Skimmer, *L. saturata* Flame Skimmer, *Pachydiplax longipennis* Blue Dasher (western form), *Paltothermis lineatipes* Red-rock Skimmer, *Plathemis lydia* Common Whitetail, *Pantala hymenaeae* Spot-winged Glider, *Sympetrum corruptum* Variegated Meadowhawk, *Tramea lacerata* Black Saddlebags, *Hetaerina americana* American Rubyspot (with NO stigma), *Argia agrioides* California Dancer, *A. emma* Emma's Dancer, *A. lugens* Sooty Dancer, *A. vivida* Vivid Dancer, *Enallagma civile* Familiar Bluet, *Ischnura denticollis* Black-fronted Forktail, *I. perparva* Western Forktail. And this is by no means a complete list of the species that might be found there.

The second part of the Chico trip is a drive up into the Butte County high country, visiting the meadows, springs and streams in the mixed conifer forests of the southern Cascade Range. Cherry Hill is a mid- elevation mountain seepage nestled in the highest corner of Butte Co., about an hour's drive northeast of Bidwell Park. It can easily be included in a day trip, and is a good place to encounter *Tanypteryx hageni* Black Petaltail, and *L. nodisticta* Hoary Skimmers. *Somatochlora semicircularis* Mountain Emerald, and other western mountain species can be found higher up at Humbug Summit. Lassen Volcanic National Park is only 30 miles north of Cherry Hill and would offer an exciting side trip for families and geology buffs.

Species of interest seen on last year's scouting trip were to Cherry Hill: *Tanypteryx hageni* Black Petaltail, *Rhinoeschna multicolor* Blue-eyed Darner, *Leucorrhinia hudsonica* Hudsonian Whiteface, *Libellula nodisticta* Hoary Skimmer, *L. quadrimaculata* Four-spotted Skimmer, *Amphiagrion abbreviatum* Western Red Damselfly, *Enallagma cyathigerum* Northern Bluet.

Field trips to some of the region's most beautiful (and Odonatically interesting) waters will be visited, including a day trip paddling in the Boundary Waters Canoe Area Wilderness (BWCAW) and, weather permitting, a remote swimming hole below a waterfall.

The Odonata of the Arrowhead Region are under-surveyed and new finds abound. National experts have listed the Damselfly populations of Minnesota as particularly in need of survey work.

Preliminary schedule is as follows:

July 23 Wed.

Arrive after supper to check in and look around. During an evening social gathering, we will finalize our plans for the week and get to know each other.

July 24 Thurs.

After breakfast in the Dining Hall, we will visit the two lakes at Wolf Ridge; one deep and rocky and the other shallow and bog-bordered. There are canoes at both lakes for our use (including a 36 foot Montreal canoe). After lunch in the Dining Hall, we will survey the two streams at Wolf Ridge; the famed, rocky Baptism River and the marshy, beaver-dammed Sawmill Creek.

July 25 Fri.

After breakfast we will load up Wolf Ridge canoes, bag lunches and a campfire supper and car pool to the Baker Lake entrance of the BWCAW. A wide variety of habitats is available within walking or canoeing distance of the landing including Peterson Lake which was one of the sites where *Somatochlora cingulata* was first discovered in Minnesota in 1999. We will return after dark.

July 26 Sat.

After breakfast we will pick up bag lunches and will carpool to several remote habitats, including a newly-discovered *Aeshna subarctica* habitat; a small, fishless bog pool surrounded by black spruce, floating mats of sphagnum, thousands of pitcher plants and bog cranberries. We will return before supper.

July 27 Sun.

Check out and departure after breakfast. It is possible that there will be a short field trip with Bob DuBois near Superior, Wisconsin for those who are headed east or south and are not in a hurry to get home.

Potential family schedule:

Families are encouraged to use Wolf Ridge as a base from which to explore the many natural and historical sites of the North Shore. They are, of course, welcome to join us in the field as well, especially on Friday as we travel to the BWCAW and will be gone all day.

As a special consideration for families who join us at Wolf Ridge, we will offer a day of classes at Wolf Ridge while we are out in the field. This will occur on Saturday and class topics can be decided by those who wish to participate. Potential classes include such topics as Voyageur or Ojibwa Culture, Animal Signs, Beaver Ecology, Bird Studies and many more and they will be led by professional naturalists on staff. We'll decide what classes you want to take when we get together on Wednesday evening.

In addition, Wolf Ridge has two indoor rock climbing walls and two adventure ropes courses that will be available for our group's use in the evenings.

Cost:

\$205 per person, which includes all meals, four nights of housing, linens, classes and equipment at Wolf Ridge.

Housing is dormitory-style with bunk beds. To keep costs down you will be sharing rooms with other GLOM participants. You may request more private accommodations, but your costs will increase. Wolf Ridge will try to accommodate families accordingly. Call for information.

Your fees can be reduced if you wish to camp nearby. Call for more information.

Transportation to and from the airport in Duluth (1 1/2 hours away) may be available for a reasonable fee. Call for more information.

To learn more about Wolf Ridge Environmental Learning Center go to www.wolf-ridge.org For more information and call Kurt Mead at 218.353.7378

For registration call Wolf Ridge at 800.523.2733 or 218.353.7414

Or register online at www.wolf-ridge.org

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**TACHOPTERYX THOREYI (HAGEN),
SOMATOCHLORA TENEBROSA (SAY) AND S.**

HINEANA WILLIAMSON - OBSERVATIONS FROM MISSOURI

Jane Walker and Joe Smentowski: Washington University Tyson Research Center, P.O. Box 258, Eureka, MO 63025, e-mail: walker@biology.wustl.edu

Intense searches for the federally endangered Hine's Emerald Dragonfly (*Somatochlora hineana*) in the Missouri Ozarks has yielded some interesting observations on *Tachopteryx thoreyi* (Gray Petaltail) and *Somatochlora tenebrosa* (Clamp-tipped Emerald). These two species of odonates are being encountered on fens and both are utilizing fens for reproduction.

Fens are natural communities of organic muck or marly soils that are continually saturated with calcareous groundwater at the surface or just below (Orzell, 1983). Water movement can vary from an imperceptible seepage to sheet flow over the surface. The plant community is characterized by distinct calciphilic vegetation. Fens in Missouri are located primarily in the Ozark Highlands, often at the base of a toeslope where an impervious valley floor meets a pervious valley wall (Orzell, 1983). Many of these fens are small and isolated, but some are as large as nine to ten acres. Most of these fens are surrounded by oak-hickory or oak-pine forests.

The following information was gathered from the author's field notes, members of the Missouri Hine's Emerald Survey Team, and solicited contributors from outside the state of Missouri.

TACHOPTERYX THOREYI- Dunkle (1981, 1989) indicated that *T. thoreyi* uses forested hillside seeps and the females oviposit in the wet leaves or mud. Males await females in sunny areas around these seepage areas or patrol the forest, examining the sunny side of tree trunks looking for females (Dunkle, 1981). Further explanation from Dunkle (pers. comm.) stated that the forest seeps where he studied *T. thoreyi* were in closed canopy forest and shady. The authors have also observed *T. thoreyi* in forested seepage areas: one flying along a heavily forested spring branch (St. Francois County); one on a tree trunk above a seepage area feeding a second order stream (St. Francois County); and one flying from tree trunk to tree trunk in a spring/seep fed hollow (Carter County). A female was observed by the first author and Tim Vogt, ovipositing in wet leaves in the bank above a small, forested spring branch just outside a fen in Ripley County.

However, recent information collected in the field, shows that *T. thoreyi* also will use open seepage areas or fens for ovipositing. In Missouri we now consider *T. thoreyi* as a common Ozark fen associate along with *Argia bipunctulata* and *Libellula flavida*. Williamson (1932) collected the earliest records of *T. thoreyi* in Missouri. He describes one collection site "Tachopteryx Bog" in Carter County as: "...largely covered with low sedges interspersed in which are grasses, taller herbs, a few bushes and briars, and two or three small trees, the whole surrounded by deciduous forest, mostly oaks, with some conifers high on the hills. The soil is black, filled with small stones. The water is warm, in tiny trickles, occasionally pockets with perhaps only a few spoonfuls of water, and rarely, little pools 2-3 feet wide. In full sun *Argia bipunctulata* flew in great numbers with occasional *Argia vivida* [these are *A. plana*. Ed.].... Down from the adjacent forest frequently came *Tachopteryx thoreyi*, paying brief visits to their birth place, to alight on small tree trunks or to oviposit in the thimbles of water deep among the sedges and grasses." The "bog" he refers to describes more closely an Ozark fen. Attempts to re-locate this "bog" have proved unsuccessful (John Belshe, pers. comm.).

Through ecological studies of *T. thoreyi* in Missouri it became apparent that *T. thoreyi* was more likely to be encountered on fens (Ferro and Belshe, 1999). Ferro and Belshe (1999) report occurrences of *T. thoreyi* on six of the six fens in their study. John Belshe (pers. comm.) indicated that the few times he has seen *T. thoreyi* ovipositing, it has been in seepage areas adjacent to but not in forested areas. Further studies by Ferro (2001) found substantial occurrences of larvae in other fens including a Hine's Emerald Dragonfly (*S. hineana*) site in Ripley County, which was verified in June 2002. Brett Landwer (pers. comm.) counted six adult *T. thoreyi* on this same site in June 2002. According to Ferro (2001) "Larvae were never collected more than 1-2 meters from the edge of the fen." Mike Ferro (pers. comm.) has also observed *T. thoreyi* in copulo several times at one of his fen study sites. He reported observing a female *T. thoreyi* oviposit in a fen for 25 minutes "...probing under and around rocks and leaves."

Evidence of fen utilization by *T. thoreyi* also comes from reports and personal communications by other members of the Missouri Hine's Emerald Dragonfly Recovery Team. By surveying Missouri's fens for Hine's Emerald Dragonfly, team members have

frequently encountered and observed *T. thoreyi* on the fens they were watching. Some of their accounts follow.

Linden Trial (pers. comm.) collected *T. thoreyi* on 23 of 55 fens she sampled from 1998-2001. She observed females laying eggs in six locations. Each time the female was laying eggs out in the open in areas where sedges and/or cattails predominated. These fens were surrounded by forest with seepage at the forest edge.

Tim Vogt (2001) reports occurrences of *T. thoreyi* on ten of the twenty fens he surveyed for *S. hineana* in the summer of 2001. In the summer of 2002 he found a *T. thoreyi* larva in an open, marly area of a fen (Ripley County) with sheet flow and little vegetation. The larva wriggled out of the mud at the toe of his boot. The next day the first author watched a female *T. thoreyi* oviposit under a willow in the same fen approximately three meters from where the larva was found and six meters from the forest edge.

The authors have collected and/or encountered *T. thoreyi* on all twelve fens in four counties they surveyed for Hine's Emerald dragonfly in the summers of 2001 and 2002. We typically saw four to six *T. thoreyi* fly throughout the fens, especially on fens less than one acre. They would frequently perch on snags or small trees in the fens. Sometimes males would chase each other. In larger fens, *T. thoreyi* flew closer to the fen-forest margins. On one Hine's Emerald site in Ripley County the first author observed a male *T. thoreyi* fly into the fen, grab a female in mid-air, and fly "in wheel" into some small trees jutting out into the fen. We observed another *T. thoreyi* eating another dragonfly on the same fen, but could not identify the species of prey.

The following information comes from outside of Missouri through direct contacts and with the aid of Tim Cashatt and the Odonate I - list serve. Tim listed the following query for us: "During their search to find new sites for *Somatochlora hineana*, Joe and Jane have made some other interesting observations and are interested in writing an article in *ARGIA* concerning the utilization of fens by *Tachopteryx thoreyi* and *Somatochlora tenebrosa*. Does anyone have anecdotal evidence of *Tachopteryx thoreyi* and/or *Somatochlora tenebrosa* being observed on fens, and/or either ovipositing on fens? We will take into account any broad definition of fen to include bogs, seepages or shallow marshes in the open."

From Ohio Bob Glotzhofer replies that he has seen *T. thoreyi* at Cedar Bog Nature Preserve that he states is really a fen despite its name. While he has not seen *T. thoreyi* ovipositing, he has seen an emergence of larvae at this site. He also has seen *T. thoreyi* in abundance in an "...old beaver pond meadow seep somewhat downstream of the narrow streams and seeps where I find *Cordulegaster erronea*." (Bob Glotzhofer, pers. comm. via Tim Cashatt).

In answer to our letter of inquiry, Clark Shiffer wrote from Pennsylvania that he has seen *T. thoreyi* ovipositing at Beaver Dam - 2 miles northwest of Whipple Dam, Huntingdon Co., PA which he described as "...an open Spirea-grass-sedge meadow surrounded by forest." Oviposition occurred in the shadier areas of the meadow "...among moss or other vegetation." Other observations of *T. thoreyi* were in small forest clearings around seepages. Bear Meadows south of College Station, PA is another large open site where *T. thoreyi* has been observed along with *S. tenebrosa* (Clark Shiffer, pers. comm.).

Further observations come from Tom Swinford in Indiana. He has observed *T. thoreyi* on four different fens in four counties, and on one, "reproductive behavior was observed often." *S. tenebrosa* reproductive behavior was also seen on this fen. He further describes this fen as a "high quality till plain prairie fen." Swinford further states that the fen is open and has been under burn management for ten years (Tom Swinford, pers. comm.).

Finally, *T. thoreyi* is known from two fens in southwestern most Berrien County, Michigan (Jim Bess and Bill Smith, pers. comm. via Tim Vogt).

SOMATOCHLORA TENEBROSA— Like *T. thoreyi*, *S. tenebrosa* is usually considered a forest dwelling odonate. Walker (1925) described *S. tenebrosa* as "... another inhabitant of small forest streams and seems to be partial to very shady places." In collections of *S. tenebrosa* from Missouri, Williamson (1932) gives the following descriptions of habitat from which he collected his specimens: Site 42 in Carter County: "...is a nice stream in woods 6-15 feet wide..." Site 43 in Carter County: "...there is a stretch for about half a mile of a small creek, 1-6 feet wide, with some fine pools, all well shaded, ending at its upper end in springs emerging from a rock pile." Of the *S. tenebrosa* he collected at Site 43 Williamson

(1932) says "*Tenebrosa* hovered generally over pools in shade." In more recent literature, *S. tenebrosa* is still described as an odonate of shady forest streams (Dunkle, 2002).

Survey team member Brett Landwer has observed *S. tenebrosa* breeding behavior on three Hine's Emerald fen sites, one in Iron county and two in Reynolds County. He vouchered ovipositing female *S. tenebrosa* on two of these fens. One female was ovipositing directly in a crayfish burrow. On the third fen he observed females searching for oviposition sites and saw one male on territory over a large seep in the fen (Brett Landwer, pers. comm.).

The following responses come via our inquiry through Tim Cashatt and the Odonata-I list serve. Tom Shultz has observed *S. tenebrosa*, both ovipositing and patrolling males, in a sphagnum bog/fen in Pike County in southern Ohio (Tom Shultz, 2000). He describes this wetland as an area where seepage water filled in the bottom of a sandstone mining operation. Water flows in and out of the area giving it a fen-like nature. He also reports this as the habitat for the first reported *L. flavida* in Ohio. Also from Ohio, Bob Glotzhofer reports seeing *S. tenebrosa* "ovipositing in shallow water" at Cedar Bog Nature Preserve (pers. comm., via Tim Cashatt).

Bob Barber in New Jersey once saw a female *S. tenebrosa* ovipositing "...in small water-filled depressions among taller grasses..." in an area of old Cranberry bogs. These bogs have become marsh-like with grasses, Leather-leaf (*Chamaedaphne calyculata*), and Red Maple (*Acer rubrum*) (Bob Barber, pers. comm.).

SOMATOCHLORA HINEANA- The search for Hine's Emerald (*Somatochlora hineana*) has been complicated by its close resemblance to *tenebrosa*. Linden Trial caught the state record *Somatochlora hineana*, a male, as it flew by on a fen in Reynolds County, MO at the end of June 1999. Slightly later she caught a female *S. tenebrosa* in a nearby feeding flight.

While members of the Missouri Hine's Emerald Recovery Team have seen *S. tenebrosa* patrolling over shady streams, recent observations of the last two summers have *S. tenebrosa* feeding, patrolling, and ovipositing in fens. These behaviors may be problematic for surveyors looking for new Hine's Emerald sites. Both *S. hineana* and *S. tenebrosa* look very similar in the field and in the future may

necessitate netting every *Somatochlora* sp. in order to rule out *S. hineana*. Although *S. hineana* peak flight time is earlier than *S. tenebrosa*, enough of an overlap exists to make survey work more difficult. We captured a young, feeding female *S. tenebrosa* with fairly distinct yellow thoracic stripes 20 minutes before netting a feeding male *S. hineana* in an adjacent field on 25 June 2002.

The first author and St. Francois State Park naturalist Ron Mullikin watched a female *S. tenebrosa* fly among the sedges looking for oviposition sites in a privately owned fen in St. Francois County July 2001. The authors and fen landowner Jack Painter watched a female oviposit in the same fen, July 2002. One week later in a nearby satellite fen, we watched four female *S. tenebrosa* enter the fen, flying low among the sedges looking for oviposition sites. Three of the females started ovipositing in small puddles of water amid the sedges, very similar to places *S. hineana* females might choose (Cashatt and Vogt, 1994).

We returned to the same above fen in October with Ron Mullikin and Tim Vogt. Our goal was to try to recover any *S. tenebrosa* larvae from crayfish burrows of *Cambarus diogenes* (Devil's crayfish). *S. hineana* larvae use crayfish burrows to overwinter in Illinois and Wisconsin (Soluk, et al. 1999). We wanted to know if any overlap of burrow usage occurred in the two species *S. hineana* and *S. tenebrosa*. Of the 5-6 burrows we pumped we recovered one immature crayfish (*Cambarus diogenes*) and no odonate larvae. After many surveys of Missouri fens using the crayfish burrow pumping device, Vogt did recover one male final instar larva from a fen which appears to be *S. tenebrosa*. No other *Somatochlora* larvae were collected from this site. He is presently rearing this larva for confirmation purposes (Tim Vogt, pers. comm.).

A female *S. tenebrosa* was observed ovipositing at Centerville Slough, Reynolds County, MO at the same time *S. hineana* males were patrolling on territory (pers. comm. Brett Landwer & Tim Vogt). Brett also observed a feeding swarm of *S. tenebrosa* at Grasshopper Hollow fens, Reynolds County, MO while nearby male *S. hineana* were patrolling on territory on the prairie fen at this fen complex. While an overlap of flight time occurs between these two species, Brett feels that *S. hineana* peaks early and *S. tenebrosa* later. (Brett Landwer was hired by the MO Dept of

Conservation to observe HED behavior on the known HED sites.)

Nick Donnelly has identified Bergen Swamp, a calcareous fen in New York, as a possible site for *S. hineana*. However, he states that *S. tenebrosa* is so abundant there that "How one could find a *hineana* amidst literally hundreds of *tenebrosa* is a tough question..." (Nick Donnelly, pers. comm.).

Clark Shiffer writes that he has observed *S. tenebrosa* females ovipositing in an open wet meadow called Beaver Dam (2 miles northwest of Whipple Dam near Greenlee Run, Huntingdon, Co., PA). While he has seen *T. thoreyi* ovipositing in the shadier parts of the meadow, he has seen *S. tenebrosa* "males maintaining territories and females ovipositing in open sunny areas" (Clark Shiffer, pers. comm.). Shiffer also reports that various collectors have taken *S. tenebrosa* and observed oviposition by females in shaded and open areas at Bear Meadows, a boreal bog (acid fen) in central Pennsylvania. *S. tenebrosa* habitat preferences at Bear Meadows are discussed briefly by White et al. (1968).

Tom Swinford has observed *S. tenebrosa* on five different fens in four counties in Indiana. On three of these fens he has seen reproductive behavior. He describes two of these fens as graminoid and the third fen is the same fen where he observed *T. thoreyi* reproductive behavior (Tom Swinford, pers. comm.).

In conclusion, gathered anecdotal evidence indicates that both *T. thoreyi* and *S. tenebrosa* are using open, fen-like wetlands for breeding, in addition to better known forested seeps and streams. To what degree these two species are using this additional habitat compared to the forest habitat is unknown. Intense surveys of fens for Hine's Emerald dragonfly in Missouri may have biased our observations towards fen habitats. The presence of *T. thoreyi* along with *A. bipunctulata* and *L. flavida* has proven to be a good indicator of high quality fen habitat in Missouri, and also overlaps with known Hine's Emerald sites. Observations of *S. tenebrosa* on fens in Missouri are more recent. However, out-of-state evidence seems to indicate that utilization of fen, or fen-like habitat by *S. tenebrosa* is apparently more widespread. More information needs to be collected to determine the degree of habitat preference of *T. thoreyi* for forested seeps vs. fens and *S. tenebrosa* for forested streams vs. fens.

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A PRELIMINARY LIST OF THE ODONATA OF TERRELL COUNTY, TEXAS

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The distribution of Odonata within the south central United States (Arkansas, Louisiana, Oklahoma, New Mexico, and Texas) has recently been studied through the verification and compilation of known records by biotic province and county/parish (Abbott, 2001; Abbott and Stewart, 1998). From these efforts, it is apparent that there is a significant lack of geographical data on the odonate fauna within this region. For example, Texas currently holds 212 species records (about 48% of the species occurring in North America excluding Mexico), but available records on a county by county basis indicate disjunct distributions of many species (Abbott, 2001). Within the Trans-Pecos ecological region of the state, over 100 species have been reported representing 50% of the fauna known in the state, however, only one species is reported from Terrell County within this region (Abbott, 2001).

The xeric conditions, lack of public land, and sparsely populated nature of Terrell County are most likely the reasons the insect fauna from this county has not been well documented. Forming the southeastern corner of the Trans-Pecos region in

Texas, Terrell County is approximately 2,391 square miles (1,530,240 acres) in size and underlain by marine limestone cut by streams and rivers (SCS, 1974). The county has an estimated population of 1,232 people (TDED, 1997) and contains only two cities, Sanderson and Dryden. The land use in Terrell County is dominated by ranching operations. Within this arid region, the Pecos and Rio Grande Rivers and the spring fed waters of Independence Creek provide perennial sources of water and a variety of habitats for dragonflies and damselflies. However, the original species account from the county, as well as the additional records reported in this article, are from the portion of Independence Creek that occurs within the Nature Conservancy's Independence Creek Preserve located in the northeastern portion of the county.

The approximately 20,000-acre Independence Creek Preserve encompasses about eight miles of Independence Creek in Terrell County, Texas. It contains the portion of the creek at State Highway 349 downstream to the confluence with the Pecos River. The creek is shallow and braided throughout the preserve with multiple riffle/run/pool complexes. It is a cool, clear water stream fed by T5 Springs (Caroline Springs), Vanderbeek Springs, Chandler Springs, and other minor unnamed springs occurring on the preserve (Brune, 1981).

Since the report of a single species of dragonfly by Abbott (2001), three surveys of the Independence Creek area have been conducted that have documented 45 species for Terrell County. The following list references these surveys and includes Abbott's initial report. Each reference is numbered (1-4) and the appropriate number is placed after each species on the species list that follows.

1) The first odonate account reported from Terrell County was *Libellula comanche* (Abbott, 2001). The specimen was collected by C. Riley Nelson at Independence Creek upstream of the Pecos River on May 21, 1996, and is currently in the collection of the Monte L. Bean Museum of Life Sciences at Brigham Young University (Nelson, personal communication).

2) The senior author performed a brief survey of Independence Creek Preserve in May 2001, as well as two additional preserves within the Trans-Pecos region managed by the Nature Conservancy (Bocanegra, 2001). This survey produced 26

species and added 25 species to the list of Odonata known from Terrell County.

3) A brief odonate survey was conducted by John Abbott on June 11-14, 2002, at the ponds of T5 Springs, just upstream of Independence Creek (Abbott, personal communication). Twenty species were collected, including six species new to Terrell County.

4) In August 2002, we conducted a two day survey of Independence Creek Preserve, which included the creek and the small impoundments at T5 Springs (Bocanegra and Lewis, 2003). A total of 38 species were collected or observed, 13 of which are new records for Terrell County.

Species List:

Calopterygidae: *Hetaerina americana*: 2, 3, 4
Coenagrionidae: *Argia fumipennis violacea*: 2, 3, 4; *A. immunda*: 2, 3, 4; *A. leonora*: 2, 4; *A. moesta*: 2, 3; *A. nahuana*: 3; *A. sedula*: 2, 3, 4; *A. translata*: 2, 4; *Enallagma basidens*: 2, 3, 4; *E. civile*: 4; *E. novaehispaniae*: 4; *Ischnura hastata*: 4; *I. ramburii*: 2, 4; *Telebasis salva*: 2, 4.
Protoneuridae: *Protoneura cara*: 3, 4.
Aeshnidae: *Anax junius*: 4.
Gomphidae: *Dromogomphus spoliatus*: 3; *Erpetogomphus designatus*: 2, 3, 4; *Gomphus militaris*: 2, 3; *Phyllogomphoides albrighti*: 4; *P. stigmatus*: 2, 3, 4.
Corduliidae: *Epicordulia princeps*: 4.
Macromiidae: *Macromia annulata*: 3.
Libellulidae: *Brachymesia furcata*: 4; *B. gravida*: 4; *Brechmorhoga mendax*: 2, 4; *Celithemis eponina*: 4; *Dythemis fugax*: 2, 3, 4; *D. nigrescens*: 2, 4; *D. velox*: 2, 3, 4; *Erythemis simplicicollis*: 2, 3, 4; *Erythrodiplax basifusca*: 2; *Libellula commanche*: 1, 2, 3, 4; *L. croceipennis*: 4; *L. luctuosa*: 2, 3, 4; *Macrodiplax balteata*: 2, 3, 4; *Orthemis ferruginea*: 2, 4; *Pachydiplax longipennis*: 2; *Pantala flavescens*: 3, 4; *P. hymenaea*: 4; *Plathemis lydia*: 2; *Pseudoleon superbus*: 4; *Tramea insularis*: 4; *T. lacerata*: 2, 4; *T. onusta*: 3, 4.

The dragonflies and damselflies currently known from Terrell County represent only a portion of the odonate fauna in the general area. This is evident from the disparity between species lists from adjacent counties. For example, in adjacent Brewster County to the southwest, 56 species are reported, 28 of which are not on the list for Terrell. To the east Val Verde County has 67 species and Pecos County to the northwest has 20 species, of

which 27 and 7 have not been documented from Terrell County, respectively. Combined, these three counties have 49 species records absent from the current Terrell County list.

Conversely, the current species list for Terrell County has three species, *Celithemis eponina*, *Epicordulia princeps*, and *Macrodiplax balteata*, not on the species list for these three other counties. Of these, *C. eponina* and *E. princeps* were previously unknown to the Trans-Pecos region. Independence Creek is located at the western edge of the known distribution of *E. princeps* in the United States (Dunkle, 2000), unfortunately, a voucher specimen was not obtained.

Independence Creek provides a variety of undisturbed, perennial odonate habitat in the dry desert climate of west Texas. It is likely to be the most attractive habitat for migratory and transient dragonflies and damselflies within the southeastern Trans-Pecos region. Future surveys at Independence Creek Preserve will likely contribute to the knowledge of Terrell County odonate fauna and better define the spatial distribution of odonates within the Trans-Pecos region.

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UNRELIABILITY OF TAXONOMIC KEYS TO LARVAL *LEUCORRHINIA*

Robert B. DuBois

In this note I provide evidence that the couplets in currently used taxonomic keys to separate larvae of *Leucorrhinia intacta* and *L. proxima* are not reliable, at least for specimens from northern Wisconsin. Evidence of a problem first surfaced following a 1996 field survey of the Bois Brule River State Forest, Douglas County, WI. Aquatic insect larvae were collected from a range of habitats throughout the forest and were identified by competent taxonomists. Results reported substantial numbers of four of the five species of *Leucorrhinia* known to occur in the region, but no larvae of *L. proxima* were identified. This result was puzzling because my extensive collections of adult dragonflies throughout the watershed indicated that *L. proxima* was one of the two most common species of *Leucorrhinia* at many of the sites sampled by this larval survey.

Suspecting a problem with the keys used, I conducted a "blind" test with a competent aquatic macroinvertebrate taxonomist from the University of Wisconsin – Superior. In my reference collection I possessed several known exuviae of each of the five *Leucorrhinia* species in question; these exuviae were collected in association with positively identified teneral during emergence.

Without letting the taxonomist know their identity, I asked him to identify these exuviae using the larval keys of Needham, Westfall, and May (2000) and Walker and Corbet (1975). The couplets in these keys use dorsal hook and lateral spine characters that were developed earlier by Walker (1916) to separate these species. Similar couplets are used by Kenner (2001) and by Bright in his web-based key (<http://insects.ummz.lsa.umich.edu/MICHODO/test/Leucorr.htm>). The results of this blind test were that all exuviae of *L. intacta*, *L. frigida*, *L. hudsonica*, and *L. glacialis* were correctly identified, but two exuviae of *L. proxima* were misidentified as *L. intacta*.

During spring of 2002 I attempted to collect more known exuviae of *L. proxima* and *L. intacta* from which characters might be found to reliably separate these species. I was successful only in increasing the numbers of known exuviae in my possession to four for *L. proxima* (one male and three females) and five for *L. intacta* (two males and three females). I have recently examined these nine exuviae and have determined that none of the dorsal hook or lateral spine characters used in current keys will correctly separate these specimens. Based on this small sample size, the lengths of the dorsal hooks on abdominal segments 7 and 8 vary sufficiently within each species to compromise their use in separating the species. The lateral spines on segment 9 extend beyond the tips of the cerci for all specimens of both species and these spines are no more convergent in *L. proxima* than in *L. intacta*. Thus, determinations favoring *L. intacta* are likely for both species. I also examined other characters including total length, patterns of marking on the venter of the abdomen, pattern of cuticular granules on the abdominal terga, relative lengths of all dorsal hooks, relative thickness of the lateral spines on segments 8 and 9, length of the epiproct relative to the tips of the paraprocts, shape of the head and eyes, number of palpal setae, number and length of premental setae, and the number of spiniform setae between the crenulations on the distal margin of the palpus (Walker suggested *L. proxima* usually has two, *L. intacta* usually one.) None of these characters correctly separated the specimens. These species are extremely similar yet most of the characters I examined varied as much within each species as they did between them.

Caution is therefore warranted for those intending to separate the larvae or exuviae of these species based on current keys. I intend to increase my

sample sizes of known exuviae of both species this spring and will subsequently reexamine a larger sample. I would welcome collaboration with anyone who has interest or relevant larval or exuvial material to share.

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HOW IMPORTANT ARE DRAGONFLIES TO SWALLOW-TAILED KITES?

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In a clearing near the Cypress Trail in Highlands Hammock State Park, South Florida, on 20 April 2001, I observed 9 Swallow-tailed Kites (*Elanoides forficatus*) wheeling in large circles, up to 200 m in diameter, and occasionally maneuvering in such a way as to catch something. The birds were associated together and flew over hammocks, cypress swamp and meadows from 50 to 100 m above ground. They were never closer than 15 m to the tops of trees. Over approximately 30 minutes they moved approximately one kilometer. Every so often there were rapid changes in direction and a few wing beats and/or tail movements suggesting an attempt to capture a flying insect. In one such rapid maneuver, a kite was seen to catch a large dragonfly in a claw, possibly *Epiaschna heros*, but in most cases it was not possible to understand the maneuvers due to the distances and rapidity of action. With the aid of 7 x 35 binoculars I observed 3 of the kites transfer a large dragonfly from the claws to the mouth while in flight. Two others were seen holding dragonflies in their claws. These observations were made around sunset between 7:00 PM and 7:30 PM.

The kites appeared to be so well suited to catching dragonflies that these insects seemed likely to be an important component of their diet. I expected the literature to contain an abundance of references to the phenomenon that I had observed, but that is not what I found.

Bent (1937) lists dragonflies among the food of the Swallow-tailed Kite and also quotes Audubon (1840) who indicated that these birds soar high and perform elegant maneuvers in pursuit of "the large insects called Musquito Hawks". After describing aerial pursuit of dragonflies Audubon noted that "their principal food, however, is large grasshoppers, grass-caterpillars, small snakes, lizards and frogs". After Audubon's early reference to dragonfly prey, dragonflies were less profiled among the prey items of Swallow-tailed Kites, in both the literature relating to the food of birds and that concerning the ecological importance of dragonflies. Kennedy (1950), in a classic review of the importance of dragonflies as food of birds, indicated that there were no records of stomachs of Swallow-tailed Kites containing dragonflies. The lack of records of Swallow-tailed Kites eating dragonflies may have been a result of there being fewer stomachs available because Swallow-tailed Kites: (1) were less often shot since they were less often considered as a menace to ducks; and (2) they had already declined throughout much of eastern North America by the time stomach sampling was extensive. Corbet (1999), in his standard reference to the biology of dragonflies, drew attention to a number of species of birds that consume dragonflies, but Swallow-tailed Kite was not mentioned.

Recently published accounts of the prey of Swallow-tailed Kites in the ornithological literature present a picture of an opportunistic insect feeder consuming large numbers of insects as well as a great variety of other prey and even fruit (Lee and Clark 1993, Lemke 1979, Meyer and Collopy 1995, Meyer 1995, Stevenson and Anderson 1994, Snyder 1974, Stiles and Skutch 1989). The lack of mention of dragonflies is notable.

Despite the lack of documentation in the literature, it was not difficult to find others who had seen Swallow-tailed Kites feeding on dragonflies. In southern Florida at the Fairchild Tropical Garden in south Miami in June 1998, a Swallow-tailed Kite was seen soaring above "a flock of relatively small dragonflies, possibly Metallic Pennants (*Idiataphe cubensis*)" which were flying 15-20 m above the

treetops. "The kite would periodically dip downward into the insects, then return to its station above them, and most times pick at its feet. The foot-picking was presumably to eat the dragonfly it had caught" (J.S. Rose, pers. comm.). Nearby in the northern part of Everglades National Park on 20 April two Swallow-tailed Kites were seen to capture dragonflies in the air and one of them began eating the captured dragonfly in the air. Five other field biologists responded with a statement that they had seen Swallow-tailed Kites feeding on dragonflies.

There are now many web sites featuring observations of birds and sometimes useful information on aspects such as foraging behavior is included. Eliminating those sites that were simply repeating the published literature, there were six references to eating dragonflies, two references to eating grasshoppers, one reference each to eating insects (in general), wasps, frogs, and lizards. A closer look at some of the web sites reveals the following observations: On the St. John's River near its junction with the Wekiva River in July, 12 Swallow-tailed Kites were soaring and feeding on dragonflies over a marshy area. They were seen to catch the dragonflies with their talons and "bowed their heads to transfer each dragonfly from talon to beak" (Green 1999). In July 1999, Swallow-tailed Kites were observed frequently feeding on dragonflies at Zellwood, Orange County, Florida (Florida Ornithological Society 2000). In a summary of the ornithological significance for Lake Apopka in Orange County, Florida, the comments opposite Swallow-tailed Kite read "birds present all summer, feeding on dragonflies" (Pranty 2000). A Swallow-tailed Kite was "seen hawking dragonflies on the wing just above the treeline" at Huntley Meadows in Fairfax Co., Virginia, on 18 June 1999 (<http://www.clwillis.com/LesPage/Birdline/data/990623.txt>).

I also gathered more information on Swallow-tailed Kites eating dragonflies through posting a request for information on five birdwatcher discussion groups in Florida. The respondents reported observations of prey as follows: 5 reported birds, 3 reported dragonflies, 5 reported reptiles, and 1 reported small insects.

Based on all of the preceding observations it appears that the literature and particularly the more recent literature has failed to give dragonflies the profile that they deserve in the diet of Swallow-tailed Kites.

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This is a report of a short visit to a small area. The abundance of species as well as numbers indicates what a fertile island this is for odonates. It will repay further study - a pleasure in a delightful country with delightful, friendly people.

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A NOTE OF *THAUMATONEURA INOPINATA* McLACHLAN 1897 IN RIO CHITARIA COSTA RICA WITH A LIST OF COSTA RICAN MEGAPODAGRIONIDAE

Jorge R. Montero Moreno, P.O. Box 1913-1000, San Jose, Costa Rica

The family Megapodagrionidae in Costa Rica includes three genera and twelve species. One of the most remarkable genera is *Thaumatoneura* with one species, *Thaumatoneura inopinata* McLachlan 1897. These large damselflies, with an abdomen length of 55 mm., are easily recognized by the broad black bands across each wing in the males, although some males lack this. The females have clear wings except for a black spot in the apical area. *T. inopinta* is peculiarly restricted to waterfalls or their vicinity, and are to be found in part of the Atlantic Slope of Costa Rica. They also occur in Panama. Larvae, which are found among roots in small pools of water, were studied by Calvert and Calvert in 1917.

In the past years I have had the opportunity to take three males of this unusual species in two different trips to Rio Chiaria, near Turrialba. On the first trip, in February of 1998, two males were taken, one at noon near the bridge where the river falls, and one on the upper stream into the forest at 4.30 p.m. On the second trip a male was taken near the bridge at approximately 9 a.m. It is remarkable that the first trip was made in the dry season and the second in October 1999 in the fully wet season. However it is important to remember that the Atlantic slope of Costa Rica does not have strong fluctuations in rains as compared to the Pacific slope.

I include here a check list of Costa Rica Megapodagrionidae, based mainly in bibliography, with the hope of contributing to a better understanding of the group and stimulating their study.

I devote this paper to my mother Cecilia Moreno for her encouragement of my studies in insects

during the time I was ill; thanks to her I did not lose hope.

A LIST OF FAMILY MEGAPODAGRIONIDAE IN COSTA RICA

- Heteragrion albifrons* Ris, 1918
- H. atrolineatum* Donnelly, 1992
- H. erythrogastrum* Selys, 1884
- H. majus* Selys, 1886
- H. mitratum* Williamson, 1919
- Philogenia carrillica* Calvert, 1907
- P. championi* Calvert 1901
- P. expansa* Calvert, 1924
- P. peacocki* Brooks, 1989
- P. terraba* Calvert, 1907
- Thaumatoneura inopinata* McLachlan, 1897

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DRAGONFLIES AS HITCHHIKERS? A PUZZLING RECORD OF *GOMPHUS GRASLINELLUS* FROM EASTERN NEW YORK

Nick Donnelly

John Abbott recently e-mailed me about a *Gomphus* collected by a friend (on 14 August 1996) in Newburgh, New York, which is on the banks of the Hudson River. His verbal description did not fit any northeastern species, and attached scans only raised my curiosity. He sent me the specimen, which proved to be *Gomphus grasinellus*, which is one of the most wide-ranging species in the genus, but which has not been taken east of Ohio.

The exact locality is about 4 miles from the Hudson River. It is not close to any *Gomphus*-sized stream, and is slightly more than a mile from a small lake.

ON THE ROAD AGAIN - JAKE HARDING ON CANADIAN TELEVISION

Nick Donnelly

An e-mail from Bob Harding informed me that his son Jake was about to appear on Canadian television on 22 January 2003. We quickly asked a cousin in Toronto to tape it for us, and, a fortnight later, the tape appeared in our mailbox.

Jake appeared on a CBC program entitled "On The Road", which consists of ten to fifteen minute segments featuring a variety of activities, mainly in less populated parts of Canada, in this case Prince Edward Island. The focus of this segment was Jake, who is well known to us in the Northeast as one of the more skilled young Odonatists, teaching a fascinated group of what appeared to be pre-teens about the pleasures of dragonfly study. Sequences of Jake's marvelous wrist action were interspersed with pictures of youths sitting quietly while *Leucorrhinia* and *Ladona* sat on their faces and shirts.

The program was very successful and brought our field some welcome publicity. There were views of father Bob, and a brief sequence showing Nova Scotia's evil Dr. B and his black Odemobile.

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Video Notice: "THE COMMON DRAGONFLIES OF NEW MEXICO", by DUSTIN HUNTINGTON

This video, created by Dustin Huntington, shows 41 species of dragonflies in close-up and with remarkable detail. Forty one species (listed below) were photographed using digital video and long telephoto lenses. All sequences are in the natural habitat and unposed. Details of dragonfly behavior that are almost impossible to see in the field, such as how they chew their food or land on a perch, can be seen clearly. In close-up, dragonflies show great "personality" that is rarely possible to see even with binoculars. The species are shown from multiple angles and both male and female are usually included. In many cases, similar species are shown side-by-side for comparison. This is particularly helpful when learning identification.

The video is almost an hour, with over a minute of detailed video of each species. New Mexico has a wide and diverse variety of dragonflies. Due to its location at the end of the Rocky Mountains and between of the grasslands of Texas and the deserts

of Arizona, many dragonfly species reach the limit of their range in the NM. The eastern part of the state along the Pecos River between Roswell and Carlsbad has the largest number of dragonfly species, per area, of anywhere in the US. This diversity is well represented in the video.

In addition to showing identification details, the video shows interesting behavior such as the odd moth-like flight of a Filigree Skimmer, an Eastern Amberwing mimicking a wasp or the cannibalistic habits of a pondhawk. The video also shows the New Mexico form of some species such as the intermediate Eastern/Western Pondhawk or the local Blue Dasher that has an all pruinose, almost unstriped, thorax.

Whether you are just starting on dragonflies or already an expert, this is a video you will enjoy - and it will make you want to take a trip to New Mexico. The video will be available in either VHS tape or DVD. The DVD provides much sharper and higher quality images and is indexed to allow rapidly jumping to a particular group of species. They can be ordered from a Web site, www.imunu.com (currently under construction) or directly from Dustin Huntington, 93 Campo, Tijeras, NM 87059 dhuntington@exsys.com.

The price is \$29.95 for VHS tape or \$39.95 for DVD, plus \$3 for shipping and handling in the US. Species on the tape: Common Green Darner, Blue-eyed Darner, Sulphur-tipped Clubtail, Plains Clubtail Common Sanddragon, Pale Snaketail, Eastern Ringtail, Yellow-legged Ringtail, White-belted Ringtail, Four-Striped Leaf-tail, Bronzed River Cruiser, Widow Skimmer, Common Whitetail, Desert Whitetail, Twelve-spotted Skimmer, Four-spotted Skimmer, Comanche Skimmer, Flame Skimmer, Neon Skimmer, Bleached Skimmer, Roseate Skimmer, Filigree Skimmer, Variegated Meadowhawk, Striped Meadowhawk, Yellow-legged Meadowhawk, Band-winged (Western) Meadowhawk, Seaside Dragonlet, Eastern Amberwing, Blue Dasher, Eastern Pondhawk, Western Pondhawk, Wandering Glider, Spot-winged Glider, Black Saddlebags, Red Saddlebags, Marl Pennant, Four-spotted Pennant, Halloween Pennant, Checkered Setwing, Swift Setwing, Black Setwing.

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**A PORTABLE, POCKET-SIZED, FIELD
ODONATE CAGE, OR AFTER YOU CATCH
THEM, THEN WHAT!**

Joe Smentowski and Jane Walker

The vast majority of the time we are like most people when we are dragonfly hunting. We remove the dragonfly from the net, gently fold the wings, and place it in an envelope. However, there are times when you wonder, "Do I really want this one?" Maybe it is rare, too common, a bit battered, the wrong sex, or you feel unsure whether to keep it or not. In the field we carry a Pop Up Port a Bug, a collapsible, live insect cage made by Insect Lore U.S.A. Collapsed it looks like a disk 4-1/2" in diameter and 1" thick. It comes in a nylon pouch with a draw-string and a clip to hang it from your belt. When removed from the pouch, it springs open like a 10" diameter fish net that twists on itself to make a 3" disk. The opened cage is made of mosquito netting and is pyramidal in shape. The dimensions are 10" X 10" at the base, and 10" high. One of the four sides of the pyramid unzips and acts like a door. The top of the cage has a nylon loop for carrying or hanging in the shade until a better specimen is collected. The cage is also useful for those teneral specimens we would like to keep, but need a few more days to harden off and color up. We have successfully used it this way with *Dromogomphus spinosus*, *Gomphus ozarkensis*, and *Stylurus spiniceps*. The only improvement we have made is to make a darker window in the white mosquito mesh with a magic marker. This allows you to better see the dragonfly in the cage. The Pop Up Port a Bug can be purchased from Insect Lore U.S.A., P.O. Box 1535, Shafter, CA 93263 or on their website: www.insectlore.com. We have purchased it locally at a children's educational toy store, and we have heard that some museum shops may carry them.

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TRAMEA

Gloria Mundi Press has a website which illustrates 35 species of northeastern odonates. The site may be helpful for the identification of these species. The URL is http://www.gloriamundipress.com/exhibits_dragonflies.htm

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**BULLETIN OF AMERICAN
ODONATOLOGY**

V. 7, no 1 (distributed with the present ARGIA)

**THE ODONATA OF THE HURON
MOUNTAINS, MARQUETTE CO.,
MICHIGAN**

**Mark F. O'Brien, Ethan Bright and Michael A.
Kielb**

ABSTRACT

The Odonata fauna of the Huron Mountains of Marquette Co., Michigan was surveyed during 1996 - 2002. Our survey, combined with specimens from earlier collectors has resulted in a total of 79 species known from the area, which is nearly half of Michigan's known Odonata species. In addition, 9 species are new records for Marquette County.

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Notice: An appendix summarizing specimens examined was omitted from the last number of the **BAO**. This appendix is being distributed with the present BAO mailing as a separate sheet. I regret the inconvenience.

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Ebony Boghaunter (*Williamsonia fletcheri*), male

Photo by M.W. Nelson

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Williamsonia fletcheri

Photo by
Bill Smith