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Front cover: Blue-eyed Darners (*Rhionaeschna multicolor*) all in a row, Owens Valley near Bishop, California, 27 July 2016. Photo by Ron Oriti.

2017 DSA Annual Meeting in Staunton, Virginia

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Welcome DSA members to the first annual meeting to be held in Virginia! We have held two recent regional meetings, but this is our first time hosting the full event. Our focus will be on sampling and adding to the knowledge of Virginia's extensive odonate fauna. Virginia has one of the highest species totals (195) of any state, including 139 dragonflies and 56 damselflies.

The dates for the main meeting will be 9–11 June 2017. We are planning on pre-meeting field trips in areas southeast of Richmond for 7–8 June. The post-meeting will likely continue in Staunton, probably heading farther west into some high-elevation private lands.

The pleasant small city of Staunton will be our headquarters. It is located at the junction of I-64 and I-81 in the Shenandoah Valley, about a two hour drive west of Richmond. Another major airport is Washington-Dulles, which is about a 2.5 hour drive. Staunton will give us convenient access to the extensive mountainous areas to its west, as well as the interesting sinkhole ponds that lie to the east near the base of the Blue Ridge Mountains. Mary Baldwin College will be the site of our annual meeting and banquet.

Our motel headquarters in Staunton will be the Sleep Inn, 222 Jefferson Highway, Staunton, Virginia, 24401, which is right on I-81. Call the hotel directly at 540-887-6500, option 2 by 15 May 2017, and refer to the Dragonfly Society to reserve the rate of $99 Friday–Saturday, and $89 weekdays. We are also looking into having dorm rooms at Mary Baldwin College available.

Our pre-meeting hotel is still to be determined, but will be about a 30 minute drive south of the Richmond airport. This will give us the best access to our pre-meeting sites, which will include Harrison Lake National Fish Hatchery <https://www.fws.gov/harrisonlake/>, the Virginia Commonwealth University Rice Rivers Center <www.ricerivers.vcu.edu> in Charles City County, and Chub Sandhill Natural Area Preserve <http://www.dcr.virginia.gov/natural-heritage/natural-area-preserves/chub> in Sussex County. The fish hatchery ponds have a nice diversity of odonates, and Herring Creek is a site for *Enallagma weewa* (Blackwater Bluet). The adjacent Rice Rivers Center gives us access to the tidal lower James River, where we should find *Enallagma durum* (Big Bluet). Chub Sandhill Natural Area Preserve and the Nottoway River in Sussex County have a different set of species including *Libellula flavida* (Yellow-sided Skimmer), *Enallagma dubium* (Burgundy Bluet), and *Telebasis byersi* (Duckweed Firetail).

On Thursday we will head west to Staunton, with numerous stops along the way. Pocahontas State Park has a species list of around 70, including *Dythemis velox* (Swift Setwing), *Ischnura kellicotti* (Lilypad Forktail), and *Enallagma daeckii* (Attenuated Bluet). We also have a chance for *Tachopteryx thoreyi* (Gray Petaltail), though they can be unpredictable. Other stops will include several boat landings on the James River for *Gomphus vastus* (Cobra Clubtail) and other large river species.

Our main meeting field trips will be divided into two general areas, and participants can alternate sites on Friday or Sunday. The area east of Staunton at the foot of the Blue Ridge Mountains contains the sinkhole pond complex known as Big Levels, which includes Maple Flats. This area was studied and the odonate fauna described by Steve Roble in 1999. This paper with the species list can be accessed on the meeting web site, found

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Calendar of Events

For additional information, see <http://www.odonatacentral.org/index.php/PageAction.get/name/DSAOtherMeetings>.

Event	Date	Location	Contact
SE DSA Meeting	mid-late May 2017	Conyers, Georgia	Jerrell J. Daigle <jdaigle@nettally.com>
DSA Annual Meeting	9–11 June 2017	Staunton, Virginia	Paul Bedell <pbedell@verizon.net>
Ohio Odo-Con	23–25 June 2017	Ashtabula Co., Ohio	Jim Lemon <jlem@woh.rr.com>
Eagle Hill Odonate Seminar	2–8 July 2017	Steuben, Maine	see <http://tinyurl.com/gvwhupg>
NE DSA Meeting	13–16 July, 2017	New Hampshire, Vermont	Bryan Pfeiffer <bryan@bryanpfeiffer.com>

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at <http://tinyurl.com/j6mm2xx>. West of Staunton there are a considerable number of river and small pond sites to visit in the George Washington National Forest plus a variety of other public and private lands. Species we will look for include *Gomphus descriptus* (Harpoon Clubtail) and *Calopteryx angustipennis* (Appalachian Jewelwing). This area includes Highland County, a sparsely settled and high-elevation county. Be aware that cell phone reception west of Staunton may be poor to non-existent.

Our post-meeting field trips will remain in the Staunton area, and will possibly only include one additional day on Monday 12 June. We will go farther afield to areas near the West Virginia border, including some private lands. There is a known location for *Calopteryx amata* (Superb Jewelwing) which we will visit. This is beautiful country and we know you will enjoy it. Hope to see you there!

Announcing Ohio's Odo-Con17!

Mark your calendars for 23–25 June 2017 at the Grand River Conservation Campus of The Nature Conservancy in Ashtabula County, Ohio. This event will be the combined 2017 Ohio Odonata Conference, kickoff for the new statewide Ohio Odonata Survey, and Ohio Odonata Society Annual Meeting. It will feature lots of talks, training, and field trips. This part of the state is filled with interesting rivers and wetlands and unique species. More information will follow in late winter 2017. Contact Jim Lemon <jlem@woh.rr.com> or Bob Glotzhober <rcglotzhober@wowway.com>.

The 2016 Annual DSA Meeting in Utah

Alan Myrup <alanmy@comcast.net>

The 2016 Annual Meeting of the Dragonfly Society of the Americas kicked off on 13 July at Zion National Park in Utah, where over 40 DSA members and a few park visitors participated in a bioblitz in conjunction with the 100th anniversary of the National Park Service. Over 14 sites were surveyed for odonates, many for the first time. Voucher specimens for 27 species were obtained, including many records from newly-sampled areas. Four new Zion National Park species records were obtained, as well as records for six species that had not been recorded in the park for many years.

One of the highlights came from Seth Bybee and his students, Samantha Smith and Rebecca Clement, who ventured into two of the more difficult locations, Hop Valley and the Right Fork of North Creek. Hiking the eight-mile round trip into beautiful Hop Valley with its colorful high sandstone walls, they were rewarded with a fascinating fauna of odonates including: *Anax junius* (Common Green Darner), *Rhionaeschna multicolor* (Blue-eyed Darner), *Libellula nodisticta* (Hoary Skimmer), *L. pulchella* (Twelve-spotted Skimmer), *L. saturata* (Flame Skimmer), *Paltothemis lineatipes* (Red Rock Skimmer; sight only), *Pantala flavescens* (Wandering Glider), *P. hymenaea* (Spot-winged Glider), *Argia lugens* (Sooty Dancer), *A. vivida* (Vivid Dancer), and *Ischnura perparva* (Western Forktail), a new Zion National Park record. On 14 July, this same group worked their way down a 400 foot basalt cliff into the Right Fork of North Creek, where they found *Anax walsinghami* (Giant Darner), *Progomphus borealis* (Gray Sanddragon), *Brechmorhoga mendax* (Pale-faced Clubskimmer), *Libellula saturata*, *Paltothemis lineatipes*, *Hetaerina vulnerata* (Canyon Rubyspot), *Argia lugens*, and *Enallagma annexum* (Northern Bluet).

Virgin River, Zion Canyon. Photo by Alan Myrup.

Flame Skimmer (*Libellula saturata*) male, Salem Ponds. Photo by Paul Dacko.

Riley Nelson took a small group including Emily Sandall to a small pond along the Lava Point Road, one of the higher elevations (7950 ft) of the park, in hopes of finding new Zion records. Although they only found two species at this ephemeral pond, *Lestes dryas* (Emerald Spreadwing) and *Enallagma annexum*, both were new Zion National Park records. Riley and his group also took on the responsibility of carrying out part of a nation-wide sampling project to study mercury levels in dragonfly nymphs throughout our national parks. Special protocols were used to collect nymphs in order to prevent contamination. These were stored on ice to preserve them during shipping.

One group visited Taylor Creek in the Kolob Canyon area at the northern end of Zion National Park. They reported some fascinating species including *Oplonaeschna armata* (Riffle Darner), *Cordulegaster diadema* (Apache Spiketail), *Archilestes grandis* (Great Spreadwing), *Argia lugens* (Sooty Dancer), and *A. vivida* (Vivid Dancer). Another specimen of *Cordulegaster diadema* was also taken in the Emerald Pools area of Zion Canyon.

Desert Forktail (*Ischnura barberi*), Saltair, Utah. Photo by Marion Dobbs.

In Zion Canyon, the Virgin River was sampled at many locations, as were several small creeks including Birch, Oak, Pine, Weeping Rock, and Zion Lodge Creeks. Species found along the Virgin River include: *Aeshna persephone* (Persephone's Darner), *Anax junius*, *Erpetogomphus compositus* (White-belted Ringtail), *Libellula saturata*, *Brechmorhoga mendax*, *Hetaerina vulnerata*, *Argia lugens*, *A. nahuana* (Aztec Dancer), *A. sedula* (Blue-ringed Dancer; Zion NP record), *A. vivida*, *Enallagma praevarum* (Arroyo Bluet), and *Ischnura denticollis* (Black-fronted Forktail). The small creeks yielded *Libellula saturata*, *Paltothemis lineatipes*, *Hetaerina vulnerata*, *Archilestes grandis*, *Argia lugens*, *A. vivida*, and *Enallagma annexum*.

Voucher specimens were returned to A. Myrup at the Zion Park Lodge for documentation and curation. These specimens, which belong to the National Park Service, are stored in the Brigham Young University Collection (BYUC) in Provo, Utah along with the Zion NP 2011 Odonata survey, where they are available for study by researchers.

Zigzag Darner (*Aeshna sitchensis*), Lily Lake, Utah. Photo by Jim Johnson.

During the bioblitz, A. Myrup and his wife Linda operated a dragonfly learning center for park visitors throughout the day. Both children and adults had fun coloring dragonfly pictures and making dragonfly finger puppets (both taken from the Kathy Biggs and Tim Manolis coloring book on dragonflies), observing specimens under the microscope, and classifying specimens using a picture key made by Alan Myrup for Zion National Park. Posters made by Alan Myrup's high school students were displayed at the lodge, covering topics such as dragonfly life cycles, differences between dragonflies and damselflies, dragonfly habitats, and threats to wetland habitats and dragonflies. In the evening, A. Myrup gave a presentation at the Zion Park Lodge on the Odonata of Zion National Park for interested park visitors.

Many thanks to Fred Armstrong from Zion National Park and his staff for making this scientific bioblitz possible and for helping to organize the educational opportunities for park visitors. Also, a big thanks to all the DSA members who gave their time and energy to help with the bioblitz.

Many of the same species as well as others were collected and/or photographed by DSA members from areas such as Lytle Ranch, a nature preserve owned by Brigham Young University on a fieldtrip led by Shawn Clark, the Virgin

Lily Lakes, Uinta Mountains, Utah. Photo by Doug Mills.

River and LaVerkin Creek at Confluence Park, the Santa Clara River, and other locations in the area. One interesting find was the many new records for *Orthemis ferruginea* (Roseate Skimmer); previously, only three records existed for this species in Utah.

Heading north to Provo, a few DSA members stopped at Beaver Creek to collect *Ophiogomphus morrisoni* (Great Basin Snaketail), while others stopped at Meadow Hot Springs and found *Libellula composita* (Bleached Skimmer) and *Plathemis subornata* (Desert Whitetail).

On Friday and Sunday, four field trips were offered including the Uinta Mountains (trip leaders Alan Myrup and Heath Ogden), Timpie Springs (trip leaders Richard Baumann and Jerrell Daigle), Desert Lake (trip leader Robert Johnson), and Jordanelle Wetlands and Heber Mountain (trip leaders Seth Bybee & Milly Sharkey).

The Uinta Mountain field trip included a visit to Lily Lake near Crystal Lake Trailhead and a pond along Whitney Road. DSA members found *Aeshna eremita* (Lake Darner), *A. juncea* (Sedge Darner), *A. sitchensis* (Zigzag Darner), *Cordulia shurtleffii* (American Emerald), *Somatochlora semicircularis* (Mountain Emerald), *Leucorrhinia hudsonica* (Hudsonian Whiteface), *L. proxima* (Red-waisted Whiteface), and others. Ken Tennessen identified *Ladona julia* (Chalk-fronted Corporal) at Lily Lake; only one other had previously been recorded from Utah but the location was unknown. An early trip to Lily Lake next year is on the calendar to search for more.

White-belted Ringtail (*Erpetogomphus compositus*), Lytle Ranch, Utah. Photo by Buck Snelson.

The Jordanelle Wetlands field trip yielded *Aeshna palmata* (Paddle-tailed Darner), *Somatochlora semicircularis* (Mountain Emerald), *Leucorrhinia borealis* (Boreal Whiteface), *Ischnura cervula* (Pacific Forktail), *Coenagrion resolutum* (Taiga Bluet), and others. The Timpie Springs field trip provided an insight into the interesting species of Odonata from the Great Basin Desert such as *Rhionaeschna multicolor* (Blue-eyed Darner), *Gomphus externus* (Plains Clubtail), *Erythemis collocata* (Western Pondhawk), *Libellula composita*, *L. forensis* (Eight-spotted Skimmer), *Hetaerina americana* (American Rubyspot), *Lestes congener* (Spotted Spreadwing), *Argia alberta* (Paiute Dancer), *Enallagma anna* (River Bluet), *E. clausum* (Alkali Bluet), and especially *Ischnura barberi* (Desert Forktail).

DSA members found that Desert Lake in the middle of the Colorado Plateau and the San Rafael River was a good spot for *Anax junius*, *Rhionaeschna multicolor*, *Ophiogomphus severus* (Pale Snaketail), *Erythemis collocata*, *Libellula composita* (Bleached Skimmer), *L. forensis* (Eight-spotted Skimmer), *Sympetrum costiferum* (Saffron-winged Meadowhawk), *S. semicinctum* (Band-winged Meadowhawk), *Hetaerina americana*, *Argia emma* (Emma's Dancer), *Enallagma clausum*, *Ischnura cervula*, and others.

The main meeting, held at the Monte L. Bean Museum on the campus of Brigham Young University, provided an excellent slate of presentations on Odonata (see Abstracts in Argia Vol. 28, Iss. 3) and dinner in the museum beneath the big elephant.

The post-meeting field trip led by Seth Bybee to Fish Springs National Wildlife Refuge and Baker Hot Springs provided an opportunity to see *Anax walsinghami* (Giant Darner) and *Libellula comanche* (Comanche Skimmer) as well as *Rhionaeschna multicolor*, *Libellula saturata*, and *Argia alberta*.

Over 80 people attended the meeting and its various field trips, and a total of 75 species of Odonata were reported from the many locations visited (Table 1). Thanks to all who helped in its planning (Alan Myrup, Shawn Clark, Richard Baumann, Seth Bybee, and Heath Ogden), Michael Moore for the website, Steve Valley for the group photo, Chris Hill and Jerrell Daigle for help and advice, Brigham Young University for hosting the main meeting at the Monte L. Bean Life Science Museum and the use of Lytle Ranch, and the trip leaders previously mentioned.

Table 1. DSA Utah 2016 Meeting Species List. Please send additions or corrections to <alanmy@comcast.net>.

Aeshnidae (Darners)	
Aeshna eremita (Lake Darner)	Uinta Mtns. (Lily Lake)
A. interrupta (Variable Darner)	Uinta Mtns. (Whitney Rd. pond), Jordanelle Wetlands
A. juncea (Sedge Darner)	Uinta Mtns. (Lily Lake)
A. palmata (Paddle-tailed Darner)	Jordanelle Wetlands, Sandy Pond
A. persephone (Persephone Darner)	Zion NP (Virgin River)
A. sitchensis (Zigzag Darner)	Uinta Mountains (Lily Lake)
Anax junius (Common Green Darner)	Zion NP (Hop Cr.)
A. walsinghami (Giant Darner)	Zion NP, Fish Spr.
Oplonaeschna armata (Riffle Darner)	Zion NP (Taylor Cr.)
Rhionaeschna multicolor (Blue-eyed Darner)	Lytle Ranch, Zion NP, Timpie Spr., etc.
Gomphidae (Clubtails)	
Erpetogomphus compositus (White-belted Ringtail)	Lytle Ranch, Zion NP, Horseshoe Spr.
Gomphus externus (Plains Clubtail)	Jordan River Inlet Park
Ophiogomphus morrisoni (Great Basin Snaketail)	Beaver River
O. severus (Pale Snaketail)	Sevier River, Clear Cr., Huntington Cr.
Progomphus borealis (Gray Sanddragon)	Lytle Ranch, Zion NP, North Cr.
Cordulegastridae (Spiketails)	
Cordulegaster diadema (Apache Snaketail)	Zion NP (Emerald Pools, Taylor Cr.)
C. dorsalis (Pacific Spiketail)	Zion NP (Hop Cr.), Leeds Cr.
Corduliidae (Emeralds)	
Cordulia shurtleffii (American Emerald)	Uinta Mtns. (Lily Lake, Whitney Rd. pond)
Somatochlora hudsonica (Hudsonian Emerald)	Chepeta Lake
S. semicircularis (Ringed Emerald)	Uinta Mtns. (Lily Lake, Whitney Rd.), Heber Mtn.
Libellulidae (Skimmers)	
Brechmorhoga mendax (Pale-faced Clubskimmer)	Zion NP, Lytle Ranch
Erythemis collocata (Western Pondhawk)	Timpie Spr., Horseshoe Spr., Hobble Cr. WMA, Sandy Pond
Leucorrhinia borealis (Boreal Whiteface)	Heber Mtn.
L. hudsonica (Hudsonian Whiteface)	Uinta Mtns. (Lily Lake, Whitney Rd. pond, Heber Mtn.)
L. intacta (Dot-tailed Whiteface)	pond below Piute Reservoir
L. proxima (Belted Whiteface)	Uinta Mtns. (Whitney Rd. pond)
Libellula comanche (Comanche Skimmer)	Baker Hot Spr.
L. composita (Bleached Skimmer)	Timpie Spr., Horseshoe Spr., Desert Lake
L. forensis (Eight-spotted Skimmer)	Timpie Spr., Horseshoe Spr., Hobble Cr. WMA, Sandy Pond
L. nodisticta (Hoary Skimmer)	Zion NP (Hop Cr.), Baker Hot Spr.
L. pulchella (Twelve-spotted Skimmer)	Zion NP, Hobble Cr. WMA
L. quadrimaculata (Four-spotted Skimmer)	Uinta Mtns. (Lily Lake, Whitney Rd. pond)
L. saturata (Flame Skimmer)	Zion NP (North Cr.), Lytle Ranch, Meadow Hot Spr.
Orthemis ferruginea (Roseate Skimmer)	Lytle Ranch, Confluence Park (LaVerkin)
Pachydiplax longipennis (Blue Dasher)	Salem Ponds, Sandy Pond
Paltothemis lineatipes (Red Rock Skimmer)	Zion NP
Pantala flavescens (Wandering Glider)	Zion NP
P. hymenaea (Spot-winged Glider)	Zion NP
Plathemis subornata (Desert Whitetail)	Timpie Spr., Horseshoe Spr., Meadow Hot Spr.
Sympetrum corruptum (Variegated Meadowhawk)	Saltair, Sandy Pond
S. costiferum (Saffron-winged Meadowhawk)	Timpie Spr.
S. danae (Black Meadowhak)	Jordanelle Wetlands
S. internum (Cherry-faced Meadowhawk)	Uinta Mtns. (Whitney Rd. pond)
S. madidum (Red-veined Meadowhawk)	Uinta Mtns. (Whitney Rd. pond)
S. pallipes (Striped Meadowhawk)	Jordanelle Wetlands
S. semicinctum (Band-winged Meaowhawk)	Timpie Spr., Meadow Hot Spr., Desert Lake, Jordan River access

Table 1. DSA Utah 2016 Meeting Species List, continued.

Libellulidae (Skimmers), cont,	
*Tramea lacerata (*Black Saddlebags)	Timpie Spr.
T. onusta (Red Saddlebags)	Timpie Spr.
Calopterygidae (Broad-winged Damsleflies)	
Hetaerina americana (American Rubyspot)	Huntington Cr., Horseshoe Spr.
H. vulnerata (Canyon Rubyspot)	Zion NP, Leeds Canyon
Lestidae (Spreadwings*)*	
Archilestes grandis (Great Spreadwing)	Zion NP
Lestes dryas (Emerald Spreadwing)	Zion NP, Heber Mtn.
L. congener (Spotted Spreadwing)	Horseshoe Spr.
L. disjunctus (Northern Spreadwing)	Uint Mtns. (Whitney Rd. pond).
Coenagrionidae (Pond Damsels)	
Amphiagrion abbreviatum (Western Red Damsel)	Jordanelle Wetlands
Argia alberta (Paiute Dancer)	Timpie Spr., Horseshoe Spr., Saltair
A. emma (Emma's Dancer)	Jordan River Inlet Park, 1700 S. SLC
A. lugens (Sooty Dancer)	Zion NP
A. nahuana (Aztec Dancer)	Zion NP
A. moesta (Powdered Dancer)	Zion NP
A. sedula (Blue-ringed Dancer)	Zion NP
A. vivida (Vivid Dancer)	Zion NP, Timpie Spr.
Coenagrion resolutum (Taiga Bluet)	Crystal Lake TH (Uinta Mts.), Heber Mtn.
Enallagma anna (River Bluet)	Timpie Spr.
E. annexum (Northern Bluet)	Zion NP
E. boreale (Boreal Bluet)	Zion NP
E. carunculatum (Tule Bluet)	Timpie Spr., Saltair, Sandy Pond
E. civile (Familiar Bluet)	Saltair, Desert Lake
E. clausum (Alkali Bluet)	Desert Lake, Timpie Spr.
E. praevarum (Arroyo Bluet)	Zion NP
Ischnura barberi (Desert Forktail)	Saltair (Great Salt Lake Marina), Timpie Spr.
I. cervula (Pacific Forktail)	Timpie Spr., Jordanelle Wetlands, Sandy Pond, Jordan River Inlet Park
I. denticollis (Black-fronted Forktail)	Zion NP, Jordanelle Wetlands
I. perparva (Western Forktail)	Zion NP, Clear Cr.

The 15th Annual Dragonfly Festival at Bitter Lake National Wildlife Refuge in Roswell, New Mexico

Jerry K. Hatfield <l.hatiejk7@yahoo.com>

The annual Dragonfly Festival that takes place at Bitter Lake National Wildlife Refuge near Roswell drew scores of guests, as usual. There was much excitement early in the morning on Saturday 10 September as tourists arrived for what has been the most popular venue and the the main attraction of the festival: the dragonflies! But, along with the excitement, there was a somber mood especially among the staff and volunteers due to the absence of one of our fondest dragonfly enthusiasts and friend to all: the late Bill Walton Flynt, II. His absence is a missing element that will not be overshadowed any time soon!

Tour leaders this years included long-time experts James Laswell and Bill Lindemann, as well as dragonfly larva specialist Karen Gaines and dragonfly enthusiast Jerry Hatfield. One other long-time tour leader and local expert on the dragonflies of Roswell and the Bitter Lake National Wildlife Refuge, Robert Larsen, was unable to bring his vast knowledge and insight to the event, due to health issues. Bob's absence this year resulted in a great knowledge-based deficit as well as the lack of his warm personal presence that I've always found most endearing.

The first tour of the morning was partly impacted by a cool front that brought with it some early passing showers, but the day later brought an abundance of sun and dragonflies. The remainder of the day as well as the next was mostly sunny but increasing winds made netting specimens for observation quite challenging. Dragonflies seen included *Anax junius* (Common Green Darner), *Dythemis fugax* (Checkered Setwing), *Erpetogomphus designatus* (Eastern Ringtail), *Gomphus militaris* (Sulphur-tipped Clubtail), *Erythemis collocata* (Western Pondhawk), *Erythrodiplax berenice* (Seaside Dragonlet), *Libellula comanche* (Comanche Skimmer), *L. composita* (Bleached Skimmer), *L. luctuosa* (Widow Skimmer), *L. pulchella* (Twelve-spotted Skimmer), *L. saturata* (Flame Skimmer), *Macrodiplax balteata* (Marl Pennant), *Pachydiplax longipennis* (Blue Dasher), *Pantala flavescens* (Wandering Glider), *P. hymenaea* (Spot-winged Glider), *Plathemis subornata* (Desert Whitetail), *Rhionaeschna multicolor* (Blue-eyed Darner), *Sympetrum corruptum* (Variegated Meadowhawk), and *Tramea lacerata* (Black Saddlebags). Standouts among the many damselflies seen included *Enallagma civile* (Familiar Bluet), *Hetaerina americana* (American Rubyspot), and *Ischnura barberi* (Desert Forktail). One additional possible sighting of *Micrathyria hageni* (Thornbush Dasher) was mentioned by James Laswell, but he was unable to net or photograph a voucher specimen.

Amidst the usual preoccupation with sticking rigidly to the allotted time schedule so as to allow for a smooth transition from one tour to the next I—as a tour leader—sometimes forget to just relax and enjoy myself and, on the last day of the festival, I learned a most valuable lesson….from a child, no less! Our first tour of the day involved a single family unit comprised of mom, teenage son, and pre-teen daughter. In addition to the son with blue hair was the daughter dressed for fun in a colorful wardrobe that included a thin skirt and denim jean pants underneath. At first I thought it a bit odd that she would dress in this manner, but before the two-hour tour was over, I discovered the reason for her chosen attire. In addition to seeing the dragonflies we netted close in the hand, she also frequently made time to sit for a spell in the dirt and doodle with her fingers. So engrossed was she in being one with the ground, I distinctly noticed she was usually quite reluctant to return to the van when it was time for us to move on. This bright and playful young lady taught this tour leader something essential that no amount of adult interaction could: How to immerse oneself regularly in the quintessential activity of PLAY for human thriving!!! The lesson learned will make this festival one that I will long remember and cherish.

Libellula composita (Bleached Skimmer) male, Bitter Lake NWR, Roswell, New Mexico, 11 September 2016. Photo by Jerry K. Hatfield.

Don't Forget to Pay Your DSA Dues for 2017—Online Payment is Now Live!

As 2016 fades into the sunset, it's time to think about renewing your DSA dues to continue your membership for 2017. Annual dues are only $15, and include a digital subscription to Argia, the news journal of the DSA, and to the Bulletin pf American Odonatology (BAO), the DSA's peer-reveiewed research journal. Your dues help sustain these publications and the work of the DSA, including the fantastic resource OdonataCentral and the new Dragonfly ID mobile app. A sustaining membership of just $20 (or more!) provides even more support for our organization. And, if you find annual renewals hard to remember, you can pay dues for multiple years at once.

New this year, by popular request, you can now pay your dues online with a credit card if you wish. Find membership information on the OdonataCentral web site at <http://odonatacentral.org/index.php/PageAction.get/name/DSA_Membership>. Please note that you will need to have an OC account to access the credit card payment. If you prefer to pay via check, you can still download the membership form and mail it along with your dues to DSA accountant Cynthia McKee (mailing address on membership form).

Thank you for supporting the DSA!

New State Record Dragonflies for Mississippi and Alabama

R. Stephen Krotzer <rsktotze@gmail.com> **and Mary Jane Krotzer**, 2238 Haysop Church Road, Centreville, Alabama, 35042

On 22 July 2016, RSK received an e-mail from Jeanell Strickland (who some of you may remember from several SEDSA meetings she attended with her late husband Gayle). She sent a photograph of a dragonfly that a colleague of hers, Diane Lafferty, had sent from Hattiesburg, Mississippi. Diane had encountered numerous individuals around the Hattiesburg sewage treatment lagoons, and she was wondering if they could possibly be *Brachymesia furcata* (Red-tailed Pennant), which was not known to occur in the state. Well, it sure looked like one to me, so I arranged to meet Diane at the site on 8 July. As it turned out, they were indeed *B. furcata*, and there were thousands (well, at least hundreds) of them at the ponds! They were by far the most common odonate flying that day. I was able to get two males and a female for voucher specimens, and get serviceable photographs of both sexes. To my knowledge, this represents the first record of the species from Mississippi (OC #456042).

This species appears to be expanding its range to the north in recent years. Several workers (Marion Dobbs, Giff Beaton, and others) have reported the species from the northern parts of Georgia, and in 2015 Karen Chiasson submitted to OdonataCentral a photograph of a male *B. furcata*, taken 6 August from a pond at Fairhope Falls, Baldwin County, Alabama (OC #43079). This record represented the first known occurrence of the species in Alabama. On 17 September 2016 we documented a second Alabama county for *B. furcata* when MJK photographed a female at Washington County Public Lake, Washington County, Alabama (OC #456043); one additional individual was seen at this locality. Additional searching for the species in its preferred habitat (mineralized or otherwise enriched ponds with relatively sparse shoreline vegetation) might reveal its presence throughout much of the coastal southeastern U.S.

Female *Brachymesia furcata* (Red-tailed Pennant), Washington County, Alabama, 17 September 2016. Photo by M.J. Krotzer.

Female *Tramea calverti* (Striped Saddlebags), Baldwin County, Alabama, 6 September 2016. Photo by R.S. Krotzer.

On the afternoon of 6 September 2016 RSK visited the Fort Morgan historical site along the Gulf Coast in Baldwin County, Alabama. Among the hundreds of *Tramea lacerata* (Black Saddlebags) and occasional *T. onusta* (Red Saddlebags) perched high along the walkways and dunes, I noticed an individual that didn't appear to fit either of these species. On closer inspection I was very excited to discover that it was *T. calverti* (Striped Saddlebags), a species I'd never seen before. After making a quick trip back to the CR-V to get the "real" camera, I was able to relocate the specimen, a female, and get some photographs for documentation. Later the same day I searched several areas just outside the entrance gate and was able to collect a female voucher specimen and get some better photos (OC #456127). This represents the first record of *T. calverti* from Alabama.

Argia sedula (Blue-ringed Dancer), New to Wisconsin

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On 28 June 2014, while visiting Wisconsin from out of state, Steve grabbed his camera and walked along the Bark River near the intersection of U.S. Route 18 and State Route 67 (Fig. 1; hereafter the church site) in Dousman, Waukesha County. He took a photograph of a male damselfly, which he posted on BugGuide <http://bugguide.net>, where William Edwards identified it as *Argia sedula* (Blue-ringed Dancer; male Fig. 2, female Fig. 3), a species with a southern and eastern distribution in the United States. Noting that this species was not listed on the Wisconsin Odonata Survey (WOS) website as occurring in Wisconsin, Steve sent the image to Bob on 5 June 2016, who confirmed the record as the first for *A. sedula* in Wisconsin.

Figure 2. *Argia sedula* (Blue-ringed Dancer) male at the Bark River. Photo by Dan Jackson.

Known Range of *Argia sedula* in Wisconsin

To determine if a population of *A. sedula* was persisting in the Bark River, and if so, its extent, we visited the church site and areas upstream and downstream on a number of trips from 8 June through 8 September 2016. Four F-0 nymphs of *A. sedula* were collected at the church site on 8 June, which confirmed that the site was being used successfully for breeding. On 30 June, at least six adult and immature males were seen at the church site and two were collected. On 5 July, males and pairs in wheel, in tandem, and ovipositing were noted from an area slightly downstream of the church site, upstream to the Genesee Lake Road Bridge, a river length of about 5 km. A number of visits in late July and early August at road crossings at increasing distances from the church site ultimately revealed a robust population of *A. sedula* that occupied a roughly 30-km middle reach of river from the Turner Road Bridge in Slabtown, Jefferson County (N 42.9672, W 88.6379), upstream to Cushing Memorial Park in Delafield, Waukesha County (N 43.0611, W 88.4143). *Argia sedula* was not found in the smaller, narrower upper section of river above the 400-ha Nagawicka Lake and only a single male was found in the wider, deeper, brown-stained lower river below the Rome Mill Pond. We also surveyed for *A. sedula* in areas of the Oconomowoc, Mukwonago, Scuppernong, and Whitewater rivers (Waukesha and Jefferson counties), but did not find *A. sedula* at those rivers. All retained specimens of *A. sedula* are housed in the Odonata Collection of the Wisconsin Department of Natural Resources in Superior.

Figure 1. Bark River at the church site, Waukesha, Wisconsin. Photo by Joanne Kline.

Behavioral and Ecological Notes

No reproductive behavior was noted on 29 and 30 June at the church site, but on 5 July at the same site, single and paired adults were seen on streamside herbaceous vegetation about 0.5 m above the water. Several pairs were ovipositing in close proximity to one another on a patch of sago pondweed (*Stuckenia pectinata*). Another pair was attempting to oviposit into softstem bulrush (*Schoenoplectus tabernaemontani*). At the Genesee Lake Road Bridge area at about noon on 27 July, hundreds of *A. sedula* were seen flying over the river, most facing upstream, hovering briefly and darting about in what might have been a dense feeding swarm. Many others were on and amongst the shoreline vegetation, usually within 1 m of the stream's edge, including dozens of tandem pairs. Several pairs were ovipositing in close proximity into the dead, floating stems of softstem bulrush (Fig. 4) in slow water near shore, but close to faster water. On 31 July at the same site, similar activity was noted at 1:30 pm, but by 3:30 pm

many had moved away from the river and were seen along the road up to about 20 m from water, and at 5:30 pm none were seen at the river, although some could have been missed there. No adult *A. sedula* were seen on visits to the occupied middle reach on 19 August and 8 September. *Argia sedula* was one of the numerically dominant species of damselfly in late July and early August from the church site to the Genesee Lake Road Bridge. Other damselfly species often seen near *A. sedula* included American Rubyspot (*Hetaerina americana*), Ebony Jewelwing (*Calopteryx maculata*), River Jewelwing (*C. aequabilis*), Stream Bluet (*Enallagma exsulans*), Skimming Bluet (*E. geminatum*), Eastern Forktail (*Ischnura verticalis*), Powdered Dancer (*Argia moesta*), and Variable Dancer (*A. fumipennis violacea*).

Habitat Notes

The Bark River is a 109-km tributary of the Rock River in southeastern Wisconsin. It originates in southern Washington County and flows generally southwestward, eventually feeding the Rock River at Fort Atkinson in Jefferson County. The middle reach of the Bark River where the population of *A. sedula* is centered is relatively shallow and well-vegetated with clear, gently flowing water over a sand, gravel and cobble substrate. Areas of river near the church site and the Genesee Lake Road Bridge have >50% cover of aquatic macrophytes dominated by sago pondweed and Richardson's pondweed (*Potamogeton richardsonii*), and also have dense, herbaceous shoreline vegetation.

The preferred habitat of *A. sedula* has often been described as small to large streams with gentle flow and with heavily vegetated banks (Walker, 1953; Westfall and May, 2006; Paulson, 2009). The middle section of the Bark River clearly fits within that general description. This river reach included three flowage lakes that ranged in surface area from 97 to 181 ha, which evidently were not impediments to the dispersal of the species throughout the reach. There is also an approximately 7-km stretch of river within the occupied reach that from aerial photographs appears to have been channelized. None of the flowages were sampled for *A. sedula*, nor was any part of the channelized section. *Argia sedula* was not found in smaller, narrower upper sections of river and was not common in the wider, deeper, brown-stained lower section of river, where substrate materials appeared to include more fine silt than the heavily occupied middle reach. Despite having areas of habitat that appeared to be similar to the middle reach of the Bark River, no *A. sedula* were found at the Oconomowoc, Mukwonago, Scuppernong, and Whitewater rivers, but their apparent absence at those rivers does not necessarily mean that habitat conditions were unsuitable.

Figure 3. *Argia sedula* (Blue-ringed Dancer) female at the Bark River. Photo by Dan Jackson.

Conclusion and Recommendations

In 2016, a robust population of *A. sedula* occupied a substantial reach of the middle section of the Bark River in Jefferson and Waukesha counties, where it was the only known population of this species in Wisconsin. Because many areas of southern Wisconsin have never been thoroughly surveyed for damselflies it is impossible to know if *A. sedula* is a recent addition to the fauna of the state or if native populations have simply been unnoticed. In either case, it is reasonable to surmise that the Bark River population was founded from individuals that originated from the south, because this population is near the northern limit of the species' known range. If so, the dispersal route of *A. sedula* might have been along the Rock River, which has a number of tributaries in Wisconsin in addition to the Bark River, all of which could have populations.

Argia sedula will not be ranked in Wisconsin until more data are collected to establish its range and conservation status with greater confidence. The species is evidently not well-established in the northern part of its range in the Upper Midwest, as it is state-ranked as imperiled (S2) in Illinois and in the Province of Ontario, and is ranked as vulnerable (S3) in Indiana. In Michigan it is not yet ranked (SNR). We recommend that additional surveys for *A. sedula* be made in other river reaches in the southeastern counties of Wisconsin, especially those that are similar in size and physical aspects to the middle reach of the Bark River and those that are tributary to the Rock River.

Acknowledgments

We thank T. Nanz for supplying biological insights about the Bark River at the church site, and John Dixon and Kurt Huebner for visiting the Genesee Lake Road site during the first week of August and for posting photographs of *Argia sedula* online <https://facebook/groups/

wisconsindragonflysociety.org>. Funding for RD was provided by the Bureau of Natural Heritage Conservation of the Wisconsin Department of Natural Resources.

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Figure 4. *Argia sedula* ovipositing pairs at the Bark River. Photo by Dan Jackson.

The Passing of Jane Chandler Walker (3 November 1951–16 October 2016)—the Loss of Yet Another Leading Missouri Odonatologist

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On 16 October 2016 I received the tragic news from Joe Smentowski that Jane Walker had passed away after a valiant battle with ALS. Jane's contribution to our knowledge of the status and distribution of many of Missouri's odonates was so significant that it will be extremely difficult to fill the void left by her passing. Certainly, those of us left with the task of continuing and completing various odonate projects she worked on will do so by dedicating and championing her efforts, because she would expect nothing less of us than to carry on.

Jane during HED mark/recapture study at Kay Branch Fen, 18 June 2013. Photo by Joe Smetowski.

It has been attributed to the infamous Will Rogers that he never met a man that he did not like. I knew Jane for about 15 years and can say with extreme confidence that I never met a person who did not like and admire Jane Walker. Jane was kind, considerate, caring, compassionate, dedicated, and extremely intelligent. Jane was involved with surveys and conservation efforts for the federally listed Hine's Emerald Dragonfly (HED; *Somatochlora hineana*) from the beginning of its discovery in Missouri by Linden Trial in 1999 and identification of the specimen by odonate expert Tim Vogt. Without the dedication and commitment to HED efforts by Jane and her companion Joe Smentowski, our knowledge of the status and distribution of this species in Missouri would still be in its infant stages. Jane was a member of the Missouri HED Recovery Team and was always at the forefront of discussions of the species' life history requirements, recommendations for additional survey efforts, and conservation efforts needed to contribute to the long-term conservation of this species.

Jane's interest in and knowledge of odonates extended well beyond her intense interest in HED. Throughout her career, she collected over 2,600 specimens of odonates including new records for various localities and counties. Other than her and Joe's four new locality records of HED in Missouri (yet they surveyed numerous other sites that yielded negative results), there were probably not any discoveries more exciting to Jane than her discovery of the first documented record of *Gomphus fraternus* (Midland Clubtail) for Missouri (Walker, 2005), and Jane and Joe's rediscovery of *Nehalennia gracilis* (Sphagnum Sprite) in the state at two different localities (Walker et al., 2009). One of the projects that Jane was intensely interested in was working with other Missouri odonatologists on publishing an expanded version of the Atlas of Missouri Odonata completed in 2002 (Trial and Belshe, 2002) and revised in 2005 (Trial, 2005). Several of us met with Jane

where she enthusiastically provided her recommendations on the format, problem areas, and species' coverage. Although she unfortunately did not live long enough to see the completion of this project, she will be a co-author and we will dedicate the checklist to her memory.

Jane's interest in the natural world started at an early age as she grew up in a family committed to nature study. Her father Dr. Willard ("Buzz") Walker was an avid fly-fisherman, birder, outdoorsman, and worked on lichens at the Missouri Botanical Garden after he retired. Her mother Patsy loved wildflowers and was a volunteer for Dr. George Yatskievych's Flora of Missouri Project at the Missouri Botanical Garden for many years. Jane attended Albion University in Michigan, the University of Missouri-St. Louis, and Meramec Community College in St. Louis. These combined efforts resulted in a B.S. degree in Biology as well as a Teacher Certification. Jane excelled as an instructor whether as a substitute teacher in the public schools or as the instructor in the K-12 Science Program at the Tyson Research Center. She loved teaching children and provided instruction on everything from earth sciences to bird banding. While at Tyson, she also became a curator of the agency's natural history collections and developed the center's herbarium.

Jane was an excellent naturalist who not only excelled in identifying odonates but also many plants, including troublesome grasses, sedges, rushes, and numerous forbs that occur in fens inhabited by HED. She was an accomplished birder and would often call or e-mail me about different species that visited her feeders and yard in St. Louis. Jane enjoyed butterflies and was always on the lookout for *Calephelis muticum* (Swamp Metalmark) and *Euphydras phaeton ozarkae* (Ozark Baltimore Checkerspot), both of which occurred infrequently in HED fens. Her love of butterflies, however, was interrupted one day when she was buzzed by an *Anax longipes* (Comet Darner) and excitedly asked Joe, "What was that red dragonfly? It was amazing!" From then on Jane was hooked as an odonatologist and began a passionate study of dragonflies and damselflies. She was also immediately interested in HED soon after its discovery in Missouri and was a main figure in mark/recapture studies at Kay Branch Fen in 2013 (Figs. 1 and 2) and at Johnson Shut-Ins State Park's Onoclea Fen in 2014 (Fig. 3).

Due to Jane's leadership, interest, and commitment to learning about Hine's Emerald and her passion for the species' conservation in Missouri, she was worthy of her multiple nicknames. Phil Koenig stated that she would always be known as the "Dragonfly Lady," and Alan Templeton noted that she was the heart and soul of the Missouri HED Recovery Team. There is yet another term that I have not heard but certainly would be appropriate but only in a positive sense: matriarch, as one definition given is a motherly woman who is the leader of a group. Jane enjoyed leading discussions on various odonates, especially HED. She was very structured, persistent, and insistent that field trips, meetings and planning efforts be well-organized. She was a quick study and became familiar with all pertinent literature related to the recovery and conservation of HED in Missouri. Even as her physical condition worsened, she would frequently send out reminders on various actions that needed to be undertaken or ask about any recent discoveries of HED or *Nehalennia gracilis*. When Jane met with Joe, Richard Day, and me this past August to outline a revision to the Atlas of Missouri Odonata, she had sound recommendations on the direction the book should take. We had an enjoyable discussion of various issues, and while we were not always in agreement, suggestions were frequently punctuated with bouts of laughter and friendly chiding. Jane had a great sense of humor and her friendly smile was always welcomed by friends, family, and everyone she met.

Figure 3. Jane and Joe during HED mark/recapture study at Kay Branch Fen, 18 June 2013. Photo by Richard Day of Daybreak Imagery.

Jane was generally on the forefront of meetings, surveys, or special projects involving HED (e.g., mark/recapture studies, collecting material for genetic analyses, and identification workshops). She was an active member of the Dragonfly Society of the Americas (DSA) where she was able to attend a few meetings out of state (e.g. annual meeting in Decorah, Iowa in 2004) as well as being a main organizer when Missouri hosted the DSA meeting in 2009. In addition to the notes mentioned above, Jane had several articles published in the DSA journal Argia. Jane also co-authored with Joe 12 reports on HED as well as two on Sphagnum Sprite.

I would fall short on any attempt in my tribute to Jane without mentioning her partner of 20 years, Joe Smentowski. They were an inseparable pair and you cannot dis-

cuss one without discussing the other. Their relationship started when Jane showed up in Joe's front door with a microscope, needing help with identification of microorganisms she had collected. The friendship blossomed from there and Jane and Joe spent many hours canoeing on many streams and rivers throughout the state collecting odonates. Jane was particularly fond of bald cypress (*Taxodium distichum*) and preferred canoe trips were where this species and odonates occurred. This interest resulted in Jane and Joe taking enjoyable trips to the Okefenokee Swamp in Georgia, the Cache River in Illinois, the Big Thicket in SE Texas, the Felsenthal National Wildlife Refuge in Arkansas, and Honey Island Swamp in St. Tammany Parish, Louisiana.

They often spent many hours planning their next odonate foray, and this only intensified once they began conducting surveys for HED in 2002. They worked great as a team but served different roles. Joe eloquently described their respective responsibilities by stating "At a fen, Joe was the timekeeper and the muck-booted secretary writing Jane's plant and odonate observations while he created a map of the entire fen. Once the survey was completed Joe would improve his hand drawn maps while Jane typed the report." For those of us who worked with both of them over the years, this is a fair assessment on Joe's part but his contributions were never any less important.

I know of or personally experienced many enjoyable trips with Jane and Joe over the years. Most notable in my mind are Joe's miraculous net toss from a canoe up into the trees and to catch a specimen of the extremely rare *Stylurus spiniceps* (Arrow Clubtail) in Missouri during an odonate trip with Jane; Joe's sticking in the mud waist deep at Botkins Fen while looking for HED; and this author's personal head encounter with the canoe rack on Jane and Joe's car. As I was recovering from my stunned condition on the ground associated with the latter incident, Jane looked down at me, smiled, and with a chuckle said, "We always knew you were hard-headed!" Despite the headache, I had to laugh!

Jane and members of the Missouri Hine's Emerald Dragonfly Recovery Team at Johnson Shut-Ins State Park's Onoclea Fen, 20 June 2014. Photo by Richard Day of Daybreak Imagery.

Jane was loved and appreciated by her family members and many friends. Below are personal comments in alphabetical order that I received from individuals who had the strength to express their thoughts either in a personal e-mail or as condolences on the funeral home website.

Tim Cashatt: Jane was an inspiration to me and I think others who conducted field work with her on Hine's Emerald Dragonfly in Missouri. Her enthusiasm and persistence were contagious, resulting in many successful field studies. She was very professional and a pleasure to have on our field crew. We will certainly miss her.

Richard Day: From my first meeting with the Hine's Emerald group in Missouri 11 years ago, Jane's enthusiasm and knowledge were obvious to me. We worked together closely on the mark/recapture studies we did and they wouldn't have been so complete without Jane. She will definitely be missed.

Nick Donnelly: Ailsa and I have many delightful memories of trips with Jane and Joe, especially to the Bourbeuse River, where they showed Ailsa and me our first *Macromia pacifica* (Gilded River Cruiser). A few years later they hosted the DSA meeting at the same, very lovely, part of Missouri. When I began to assemble data for what became the dot-map project in the early 90s, Missouri was one of the most poorly known states for its odonate fauna. Thanks to the efforts of Jane and Joe, along with the late Linden Trial and the rest of the Missouri crew, it soon became one of the better-known states for its odonate fauna. More to the point, Jane and the rest of the Missouri crew put a human face on the arduous task of assembling fairly dry data. And Missouri was the place where the project passed from being satisfying to actual fun. I will always remember Jane especially for these lovely experiences.

George Harp: Jane was a nice lady. I always enjoyed visiting with her.

Phil Koenig: Jane and Joe would sometimes invite me to join them

when they were visiting a likely Hine's Emerald Dragonfly habitat because Metalmark butterflies can be found in the same place. On one occasion, the temperature was around 100 degrees. After not finding much of interest, Joe and I decided to go to the car for some air conditioning. While we were in the car, Jane called Joe and told him that she spotted a Swamp Metalmark and wanted to know if she should catch it. We would not have a record from that fen if she had not been so persistent, dedicated, and heat-tolerant. She will always be remembered as "The Dragonfly Lady".

Paul McKenzie: Jane was one of the most delightful persons I ever had the pleasure of working with. She was a breath of fresh air and an inspiration to everyone she met.

Joe Smentowski: Jane's life was the natural world! From microscopic pond life to giant Redwoods, from native wildflowers to succulents and cacti, from knowing the calls of birds and frogs, and from the pursuit of native bees, damselflies, and dragonflies, she knew them all. The front of my canoe will be forever empty!

Alan Templeton: One of the joys of doing research in conservation biology as a professional scientist is that I frequently interact with people who are not professional scientists but who are dedicated and passionate about conserving and protecting the life on our planet. In my over 40 years of working in conservation, only a handful of these non-professionals were so knowledgeable and with such a high-level of expertise that I would consider them to be citizen-scientists. Jane was foremost among this select group. My first real encounter with Jane was when she came to my office to recruit me to the Hine's Emerald Dragonfly Recovery Team. I was already over-committed on other research projects, so I was pre-disposed to decline her offer. But I was overwhelmed by Jane's passion, dedication, knowledge, and vision of how the project should proceed, so I agreed to join the team. Once on the team, I soon realized that my initial impressions about Jane were all true. In many ways, she was the heart and soul of our team, and I willingly followed the lead of this outstanding citizen-scientist.

Ken Tennessen: I have a lot of thoughts about Jane, but as you stated, it is hard to say what I want to say. I can let you know now some of the foremost thoughts I'm having initially after just hearing this news. She was an inspiration because she studied all phases of dragonfly life, including adults and nymphs, and also their biology including behavior and distribution. She did a tremendous amount of faunistic work in her home state of Missouri, greatly increasing the knowledge base for that state. I believe that dedicating most of one's time to working within a state is the most important approach when trying to expand a database. I know that she was a keen and careful observer. A few years ago she helped me with the problem of distinguishing *Somatochlora hineana* from *S. tenebrosa* (Clamp-tipped Emerald) by rearing the latter species from eggs and sending me the specimens. I guess the last thing I would want to say about her is that I absolutely loved her smile. And she was kind to everyone. She was a dear friend and colleague.

Kathy Thiele: Not only was she a scholar and enthusiast for all things in nature, she was a kind and welcoming human being. She always had a smile for me and we always enjoyed catching up with each other at MONPS (Missouri Native Plant Society) and Entomology meetings.

Tim Vogt: Jane was much more than a very good odonatologist in Missouri. She was a good botanist and an excellent birder. Sometimes while with Jane in the field I would ask, "Jane, what's that bird calling?" She, without exception, always knew. She will be missed, especially on the Missouri Hine's Emerald Recovery Team. She will also be sorely missed as a dear friend.

John Walker: Jane was my sister and someone I looked up to when it came to gardening and bird watching. Jane had a keen memory for bird songs and usually spoke Latin when walking around the garden. Jane was always helpful to others as demonstrated by her large following in the garden center at the Home Depot store in Ellisville. In addition to dragonflies, Jane loved butterflies, especially Monarchs. Jane was disappointed when the Monarchs failed to lay eggs on her five kinds of milkweed in the garden. However, she successfully raised over ten Black Swallowtails. The week after Jane passed away the yard was suddenly filled with birdsongs and birds I normally do not see: chickadees, White-breasted nuthatch, Carolina Wren, House Fnches and a pair of Barred Owls hooting at night. Jane will be sorely missed by the family but always remembered when a bird calls or a butterfly lands on a flower. (Note from the author—I suggest that the bird songs John heard were from the local resident species who were echoing in song a serenade of thanks for her kindness to them over the years!)

George Yatskiveych: Jane was a delightful person, a meticulous student of nature, a wonderful communicator, and an inspiration to all of the many persons with whom she interacted.

Jane was loved and appreciated by everyone who knew her. Jane's hard work, dedication, compassion, and commitment to odonates was recognized when she received,

along with Joe, the U.S. Fish and Wildlife Service's Conservation Champion and Appreciation Award on 6 October 2014, for their work on HED. Jane's contributions as an outstanding naturalist were also acknowledged on 13 May 2015, when she received a lifetime achievement award from the Webster Grove Nature Study Society.

We can all take solace knowing that Jane made a difference and provided significant contributions to our knowledge of the natural world. She will be missed by many but never forgotten.

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Dragonflies and the Ill-fated Arctic Explorer Sir John Franklin (1786–1847)

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One of the most intriguing maritime archaeological discoveries this year was the discovery on 3 September of the sunken wreck of HMS Terror at Terror Bay on King William Island in the Canadian Arctic, almost exactly 170 years after it had been become icebound about 60 miles to the north. It was the second ship of Sir John Franklin's disastrous polar voyage in 1845–1848. The wreck of the other lost ship HMS Erebus, Franklin's flagship, was found further south in Queen Maud Gulf off Adelaide Peninsula two years earlier on 7 September 2014. These discoveries have reinvigorated the great interest which this voyage and Franklin himself have always attracted.

Franklin's name is also immortalized in the dragonfly species name *Somatochlora franklin*i (Delicate Emerald) bestowed by Edmond de Selys Longchamps. As usual in his descriptions, Selys did not provide any etymology, so the identity of the eponymee has remained uncertain to many odonatologists. Although Cannings and Stuart (1977) wrote "*franklini*—probably named after Sir John Franklin (1786–1847), arctic explorer", the etymology of *S. franklini* in Paulson and Dunkle (2012) still reads: "presumably a person's name, source unknown". While preparing my Odonata eponym catalogue (Hämäläinen, 2015) I made a preliminary search of the old literature on this species and became convinced that the species was named after John Franklin. But only in last September when the latest "Franklin boom" started did I delve deeper into the various literature available on Franklin's expeditions to determine when and by whom the holotype of the species was collected at "Fort Resolution" at Great Slave Lake in the Northwest Territories of Canada. The literature also revealed some other Odonata records made during Franklin's expeditions and the later expeditions in search of him.

The dragonfly *Somatochlora franklini* (Selys, 1878)

The species epithet *franklini* appeared first in Hagen's "Synopsis of the Neuroptera of North America" (Hagen 1861, p. 138). A total of 15 species in the genus *Cordulia* Leach were listed. Among them were two species names, *C. franklini* and *C. richardsoni*, but since no descriptions were included, these names were *nomina nuda* and not available for zoological nomenclature.

In his "Synopsis des Cordulines", Selys Longchamps (1871, p. 298; reprint p. 64) listed these two names (again without any descriptions) under the species "*Epitheca septentrionalis* Hag." [Present *Somatochlora septentrionalis* (Hagen, 1861), Muskeg Emerald]. Hagen (1875, p. 59) came to a different conclusion and he listed *Epitheca franklini* as a distinct species, but placed '*Cordulia richardsoni*' (*nomen nudum*) as

Figure 1. Labels attached to the holotype of *Somatochlora franklini* (Delicate Emerald).

a synonym of *Epitheca septentrionalis*. The name *franklini* became formally available when Selys Longchamps (1878, p. 195, reprint p. 17) named the species as *Epitheca franklini* based on a single female specimen from Fort Resolution.

In each of Hagen's and Selys' papers the collection locality of the holotype female specimen of *franklini* is given somewhat differently: "Hudson Bay" (Hagen 1861), "Fort Resolution, Hudson's Bay Territory" (Hagen 1875), "District de la Baie d'Hudson" (Selys Longchamps 1871) and "Fort Résolution, territoire de la baie d'Hudson" (Selys Longchamps 1878). Both Hagen and Selys refer to the area of the Hudson Bay Company, not Hudson Bay. The circular locality label attached to the holotype (Fig. 1) reads "Hudson's Bay". The holotype specimen was originally in "Musée britannique" [BMNH] in London, but it was given to Selys. At present it is in poor condition (Fig. 2) in Coll. Selys at RBIN in Brussels. A watercolour painting of the holotype is available in Selys' dragonfly watercolour collection (Fig. 3). The painting was made in 1890s, so the abdomen tip was lost after Selys studied the specimen. It should be noted that in the painting the species epithet was misspelled as "*francklini*", as well as in Selys Longchamps (1874, p. 20; reprint p. 9), an easily made error for a French speaker.

Literature search for the collecting data

The name *franklini* combined with the manuscript name "*richardsoni*"and Selys' (Selys Longchamps, 1871) statement that the '*richardsoni*' specimen from Fort Simpson was received from Dr Richardson was the first clue that these names refer to Sir John Franklin and Sir John

Figure 2. Holotype of *Somatochlora franklini*, dorsal and lateral views.

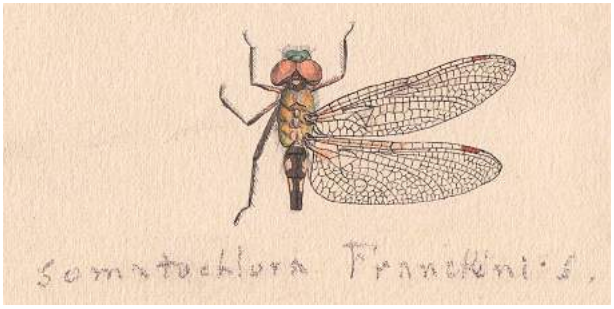


Figure 3. Extract of an unpublished watercolor painting by Guillaume Séverin of the holotype of *Somatochlora franklini*. (Figure and text are placed further apart in the original).

Richardson. Richardson participated in both of the first overland expeditions sent to the Canadian Arctic by the British Admiralty. John Franklin led these expeditions in 1819–1822 and 1825–1827 (see below). Moreover, in 1848–1849 Richardson and John Rae led the first overland search for the lost Franklin expedition.

In order to find more information on the collection of these dragonfly specimens, old literature dealing with these expeditions was consulted. Fortunately, the published reports of the last two of these expeditions included data on the insect specimens collected, including dragonflies. So, my task turned out not to be too difficult.

Richardson (1851, Vol. 2, p. 360) lists four Odonata species collected during his 1848–1849 expedition with John Rae (Fig. 4). *Libellula* –sp. from "Fort Simpson on Mackenzie" refers to a specimen of *Somatochlora septentrionalis*, which Selys had originally identified as a new species "*Cordulia richardsoni*". According to data given in Richardson (1851), Richardson stopped at Fort Simpson from 5 PM of 22 July 1848 to 5 PM of 24 July 1848 on the way towards the north along the Mackenzie River. On the return trip in 1849 he stayed at Fort Simpson from mid-June to 25 June. Both periods match the flight season of *S. septentrionalis* in northern Canada, from mid-June to late August. So the specimen could have been collected either in 1848 or 1849. I am not sure if the specimens of the three other species were studied later to confirm their identity. They might be *Aeshna septentrionalis* Burmeister, 1839 (Azure Darner), *Sympetrum danae* (Sulzer, 1776; Black Meaowhawk) and *Enallagma annexum* (Hagen, 1861; Northern Bluet).

Results of the insects collected by Richardson during Franklin's second overland expedition in 1825–1827 were published by William Kirby in the fourth volume of Richardson's famous "Fauna boreali-americana" in 1837 (Kirby 1837, p. 252). The only odonate listed is *Agrion puella*, of which two specimens had been collected at the latitude of 65°, obviously in Mackenzie River area or in the southern part of the Great Bear Lake. Obviously this misidentified

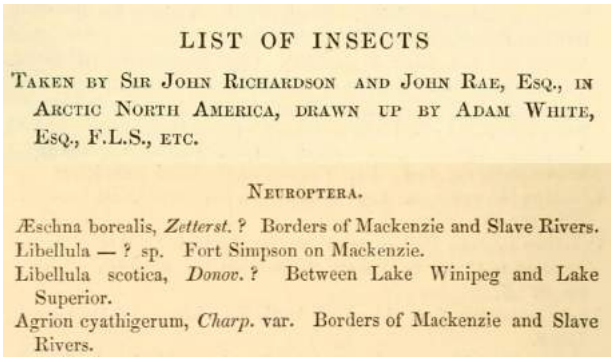
species has never been re-identified, but according to Rob Cannings (pers. comm.) it must be *Coenagrion resolutum* (Hagen, 1876; Taiga Bluet), which is an extremely common species in the region in question and the only one which fits the given description.

Anyway, these published results suggest that the holotype of *S. franklini* was collected during the first expedition in 1819–1822. According to the summarized itinerary of the expedition (Houston, 1994, p. xii-xiii) all participants were at Fort Resolution on 25–27 July 1820. This is the only date when any of the expedition members was at this site during the potential flight season of a *Somatochlora*. Therefore, it is quite safe to assume that the holotype of *S. franklini* was collected during these three days and that it was collected by John Richardson, who acted as the surgeon and naturalist of the expedition. This specimen is surely among the first, if not the very first, scientifically collected and preserved odonate specimen from Canada. I am not sure if specimens of any other dragonfly species were collected during this expedition. Since this single specimen links Franklin to the science of odonatology, a brief summary of his 1819–1822 and 1845–1848 expeditions may be of interest here.

Franklin's 1819–1822 expedition

The 1819–1822 expedition, led by John Franklin (Fig. 5), at that time a lieutenant, suffered from poor advance planning and took place when the rival North West Company and Hudson's Bay Company were virtually in open warfare. This caused great difficulties in getting help and supplies to the expedition. Moreover none of the four officers participating (Franklin, Richardson, George Back and Robert Hood) had any previous experience in overland travel in the Arctic. The shortage of food and supplies was already acute when, on 21 July 1821, the expedition of 20 men, including four British officers and a British seaman, started their main job surveying the coastline eastwards of the mouth of Coppermine River in two native canoes. After reaching Turnagain Point on Kent Peninsula, Franklin decided to return to their winter quarters at Fort Enterprise at Winter Lake, a trip of 250 miles. The two month long overland return started at the mouth of Hood River on 26 August. The food supplies were exhausted already by 4 September and the expedition party was rebelling. The winter with snowfall had started exceptionally early and the journey quickly turned to a terrible ordeal. Frequently the men had only lichen to eat; they also had to eat their old shoes to get something in their stomachs. Hunger, cold, and exhaustion weakened them and the journey proceeded at only a few miles a day. Eventually nine of the 20 men died en route, among them Lieutenant Robert Hood, who was murdered by one of the party. It is also possible that this same Iroquois man had a little earlier killed at least one of his fellow travellers. Anyway it is sure that he had cannibalised a body and served human flesh to three British members of the party, telling that it was wolf meat. The situation became so serious that Richardson executed him, since he and his compatriot, the seaman John Hepburn, were to be the next victims; both Franklin and Back had separated from them earlier. When all the remaining men finally reached the winter lodge at Fort Enterprise they found it empty without any food stores. Only piles of animal skins, which had earlier been used as blankets, and carcasses were available to eat. Two of the men died in the lodge, bringing the death toll to 11. Most of the remainder, including Franklin and Richardson, were already very weak from starvation when a group of natives arrived with food on 9 November and saved the men from inevitable death.

These terrible events give us one of the most harrowing stories in all travel literature. They have always had a macabre fascination and have been related in numerous publications. The grim happenings during this expedition earned Franklin the grisly cognomen "The man who ate his boots". For the original accounts by the expedition members, see the voluminous book by Franklin (1823) and the later books based on private journals of John Richardson, George Back and Robert Hood (Houston, 1974; 1984; 1994). It is amazing that these men were able to keep daily records even when struggling for their lives in terrible conditions in a hostile environment. Although the main target of this expedition, the survey of the entire coastline between the mouth of Coppermine River in west to the Repulse Bay in the Melville Peninsula in the east, failed, the expedition gathered much valuable information on the geography and nature of the region. It should be noted that before Franklin and his men, only three Europeans had ever reached the Arctic coastline via the American continent. It is admirable that in spite of all their sufferings and narrow escape from death during their arduous



LIST OF INSECTS

TAKEN BY SIR JOHN RICHARDSON AND JOHN RAE, ESQ., IN ARCTIC NORTH AMERICA, DRAWN UP BY ADAM WHITE, ESQ., F.L.S., ETC.

NEUROPTERA.

Æschna borealis, *Zetterst.* ? Borders of Mackenzie and Slave Rivers.
Libellula — ? sp. Fort Simpson on Mackenzie.
Libellula scotica, *Donov.* ? Between Lake Winipeg and Lake Superior.
Agrion cyathigerum, *Charp.* var. Borders of Mackenzie and Slave Rivers.

Figure 4. Extracts from Richardson (1851, Vol. 2, p. 357 and 360) listing the four Odonata species collected during Richardson's 1848–1849 expedition with John Rae.

trek of some 5,550 miles in the northern, largely previously unexplored, parts of North America, Franklin, Richardson and Back were ready to start a new overland expedition to the same regions in 1825–1827. This expedition was much better planned and was a success. Nearly 1,900 miles of previously unmapped Arctic coast were surveyed. An extensive narrative of this expedition was presented by Franklin and Richardson (1828).

Franklin's lost expedition

On 19 May 1845 the British Admiralty sent off a voyage aiming to chart the remaining unexplored sections of the Northwest Passage in the Canadian Arctic and to gather magnetic data. An expedition of two ships, HMS Erebus and HMS Terror, was led by Franklin, by then a veteran and 59 years old. The expedition ended in disaster. The last sighting of the ships and their crew by other Europeans was made in July 1845 when the ships were encountered in Baffin Bay, waiting for good weather in order to enter Lancaster Sound. What happened afterwards to the ships and to the 129 men on board has been pieced together by the explorers of the rescue expeditions and later by numerous scientists over the last 170 years.

It was established that the crew spent the winter 1845–1846 off small Beechey Island, which is situated near the southwestern coast of Devon Island. Three men died and were buried on Beechey Island. According to a note, dated 25 April 1848 and found in a cairn on King William Island, the ships became trapped in ice off the western side of King William Island on 12 September 1846 and remained icebound throughout the summer of 1847. Thus, the crew had to overwinter twice in the same spot. At the time the note was written, nine officers and 15 men had already died, including Franklin, who perished on 11 June 1847.

On 26 April 1848 the remaining men started to walk south to the Back River. Based on new evidence, obviously some of the men returned to the ships later once they were freed from the ice and navigated southwards. None of them survived; later several skeletons and various equipment left by the expedition members were found scattered on King William Island and the adjacent Adelaide Peninsula. Local Inuits had made observations of the white men on their desperate walk. In spite of numerous rescue expeditions in 1849–1869 and later in 1878–1880, no sign of the two lost ships was found until they were found in 2014 and 2016 in a search mission launched by former Canadian prime minister Stephen Harper in 2008.

Numerous books have been written on this ill-fated expedition and on the expeditions mounted for the search for Franklin and the other crew. Basic biographic data on

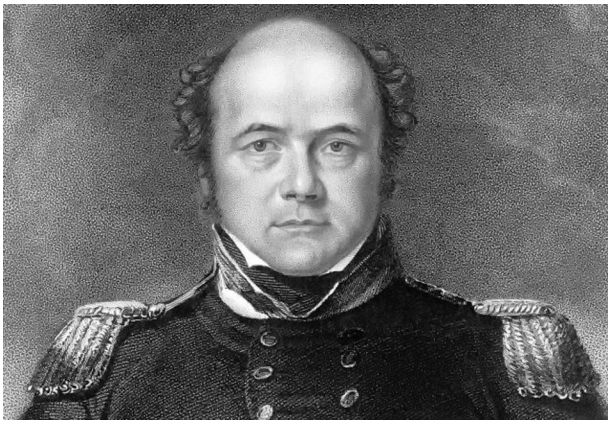


Figure 5. John Franklin (1786–1847).

Figure 6. John Richardson (1787–1865).

Franklin is provided in the online article of the Dictionary of Canadian biography at <http://www.biographi.ca/en/bio/franklin_john_7E.html>. The search for Franklin's lost expedition is summarized in Wikipedia (<https://en.wikipedia.org/wiki/Franklin%27s_lost_expedition>.

Sir John Richardson—a celebrated zoologist

John Richardson (1787–1865) (Fig. 6) was an esteemed Scottish surgeon, arctic explorer, and zoologist. He became a surgeon of the Royal Navy in 1807 and served the navy for 48 years. Richardson was the foremost ichthyologist of his time, and being highly respected was elected to the Royal Society of London in 1825 and knighted in 1846. Numerous vertebrate and plant species have been named after him, as well as many Canadian geographic features. Richardson's full publications have been catalogued by Curvey and Johnson (1969) and Huntley et al. (1972). Biographic data for Richardson is provided in the Dictionary of Canadian Biography, and can be found online at <http://www.biographi.ca/en/bio/richardson_john_9E.html>.

By virtue of the epithet *franklini,* John Franklin is an interesting addition to the long list of great people among odonate eponymees. He was directly linked to the discovery of 'his species', although dragonflies played only a very minor part in the results of these famous expeditions. Unfortunately, the odonate name dedicated to John Richardson, who actually collected all the few odonate specimens, did not materialize.

Acknowledgements

Albert Orr improved the English expression of the manuscript. Rob Cannings, Rosser Garrison, and Jan van Tol commented on parts of the manuscript and provided information. Karin Verspui and Marcel Wasscher let me to use their scan of the painting of *Somatochlora franklini* in Selys' portfolio. Jérôme Constant took the photos of the holotype of *S. franklini* and its labels. Sami Karjalainen helped with the illustrations. I am grateful to all of them.

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Call for Papers for BAO

Bulletin of American Odonatology needs your submissions for timely reporting of research on Odonata of the New World, including . faunal synopses, behavioral analyses, and ecological studies. See the last page of this issue of Argia for BAO publishing guidelines or contact Steve Hummel, BAO Editor, at <editor@dragonflysocietyamericas.org>.

New Lubbock County, Texas Record for *Paltothemis lineatipes* (Red Rock Skimmer)

Jerry K. Hatfield <l.hatfiejk7@yahoo.com>

It has now been more than a decade since I first spied what I believed then was a specimen of the dragonfly *Paltothemis lineatipes* (Red Rock Skimmer) on the Caprock proper of Lubbock County., Texas Nevertheless, without any way to confirm my evidence at the time, I had no proof that such an animal was known to make an occasional appearance on the Texas South Plains.

That was the case until 1 November 2016, when I made another observation of *P. lineatipes* in the early afternoon in Ransom Canyon (just a few miles east of Lubbock and technically off the Caprock) as I was heading on foot up the paved driveway from the parking lot towards the chapel. My eye caught the glint of Flame Skimmer (*Libellula saturata*) wings as one sailed 10 feet over my head and back in the direction of the canyon's main road that curved back south away from the waterway and drained further east in a lower drainage pond below. In the curve of the paved road, the waterway of the upper canyon intersects and flows across the road (usually in streamlet trickles) and continues down a small man-made impoundment to the other pond at a lower elevation below. It was precisely

at this juncture on the paved roadway and also on an upraised brick walkway that I came into contact with a single male *P. lineatipes*. Having had previous encounters on several occasions with *P. lineatipes* in McKittrick Canyon of the Texas Guadalupe Mountains as well as Sitting Bull Falls of New Mexico and in the mountainous region north at Jemez Springs, I knew both their identifying features as well as something of their behavior—especially where and how they perch. I also knew that they can be quite wary and therefore, difficult to approach. This male exhibited all the classic markings and signs I have come to observe of *P. lineatipes,* being wary as well as perching on the white pavement of the roadway over which the water trickled on its way down to the lower drainage pond. And, at least once, this single male perched vertically on the impound-

ment facing side of the man-made constructed brick walkway that traversed the streamlet on its way down the embankment. As I made no sudden moves when attempting to get quality photos of this surprising first-time visitor to Ransom Canyon, he became a bit more tolerant of my close approaches. However, eventually becoming more wary of my attempts to get unlimited photos, he flew off in the direction of the wood-ringed upper pond never to be seen by me again. But not before I managed to get several excellent photographs to document his visit with certainty.

An Instance of Intergeneric Copulation Between *Archilestes* and *Lestes*

Jim Johnson <gomphusjim@gmail.com>

During a visit to a couple of small ponds in the Brush Prairie area of Clark County, Washington, an instance of copulation between a male *Archilestes californicus* (California Spreadwing) and a female *Lestes congener* (Spotted Spreadwing) was observed and photographed. The date was 19 September 2015—a time of year when *Lestes congener* is common at a variety of wetlands in the Northwest, and the *Archilestes* is somewhat less so, with its preference for wetlands with overhanging willows or alders.

The two small ponds, located on the grounds of the Center for Agriculture, Science, and Environmental Education, are well vegetated with emergent sedges, tules, and cattails, and surrounded by willows and alders on their shores. As I started to wander through the open space toward the first pond, I noticed many *Lestes congener* and a scattering of the larger *Archilestes californicus* perched on sun-exposed blackberry brambles, shrubs, and small trees. Since these were a short distance away from either pond, most were simply perching or making short sallies at flying prey, but some pairs in tandem or copulating were also noted.

Suddenly my eyes fell upon a copulating pair comprised of a male *Archilestes californicus* and a female *Lestes congener*. It was pretty stunning—not only because intergeneric copulations are pretty rare (this is my first), but also because of the size difference between the individuals involved. Obviously they made it work, but I imagine both experienced some degree of structural strain.

The caudal appendages of male *Archilestes californicus* and *Lestes congener* are somewhat similar, which may be partly why the female in this case engaged in copulation. Their paraprocts are considerably shorter than their cerci which makes them more similar to each other in this respect than the latter is to congeneric species in this region. I have observed mismatched pairs of *Lestes* in tandem involving female *L. congener* (e.g. with a male *L. disjunctus* [Northern Spreadwing]), but it seems likely that the very different paraprocts of the males in these cases is enough to dissuade the females from going into copulation.

I obtained several photos of the copulating *Archilestes*/*Lestes* pair, but they disappeared during one of the brief moments that I checked the results on my camera. I presume they headed to the nearest pond, but whether they parted ways or proceeded to oviposit in tandem is unknown. I imagine the male would have headed toward a woody branch of an overhanging tree, while the female expected to oviposit in emergent vegetation, perhaps resulting in irreconcilable differences.

Panama Pantanos: Part 2!

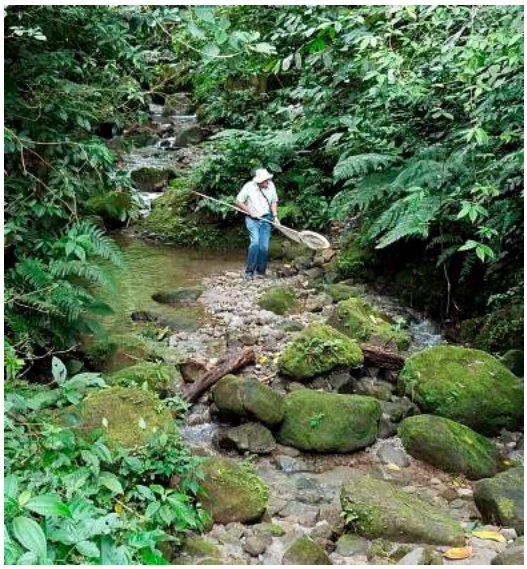
Jerrell J. Daigle <jdaigle@netally.com>

Bill Mauffray and I had such a good time in our last trip to Panama (Argia 28:3) that we went back again in September 2016. Chris Rasmussen, an avid birder and ode guy from Brandon, Florida, came with us. This time, we flew the Panama airline COPA, and we were pleasantly surprised when they served us a hot lunch, either roast beef or lasagna. They do fly to regional airports in Panama if one does not want to do any long driving from Panama City.

The three amigos: Chris Rasmussen (L), Jerrell Daigle (C), and Bill Mauffray (R). Photo by Chris Rasmussen.

Our first stop was back to the Hotel Valle Verde in El Valle. We spent time going back to the local waterfalls. This time, we were rewarded with finding a new odonate, *Heteragrion atroterminatum*, at two waterfalls. Bill and I found a swampy mountain pool with lots of *Argia oculata* while Chris went looking for birds and critters like the blue-headed parrot, keel-billed toucan, and the three-toed sloth. Back on the hotel grounds, we found lots of activity at dawn and dusk, including *Brechmorhoga nubecula*, *Gynacantha nervosa* (Twilight Darner), and *Macrothemis* spp. (Sylphs).

Keel-billed toucan and three-toed sloth. Photos by Chris Rasmussen.



Waterfall sites for *Heteragrion atroterminatum* in El Valle. Photos by Chris Rasmussen.

On our way down to the Hotel Vista Lago Ecolodge near Santiago, we stopped at that cactus scrub forest park past Rincon Largo and collected a good series of *Orthemis sulphurata*, one of my favorite dragonflies. The lake here was almost filled up and many *Orthemis* were seen flying around in the open. This time, I did not tear my net on the cactus thorns! Back at the Ecolodge, we were surprised to see that the lake was almost filled to the top of the berms. The staff said the rainy season started in full force about 2-3 weeks before we got there. We saw the usual suspects at the lake and the nearby forest streams like last time.

We spent more time up in the mountains north of Santa Fe. We drove the main road down the slope, hoping to reach the Caribbean side of Panama, but we were stopped

as they were still building the road.

So we turned around and collected on the waterfalls and rocky streams near Santa Fe. Here the odonate diversity was really good! We found colorful species like the red-eyed *Argia cupraurea* and a new red-eyed *Argia* species with a black abdomen. We found other *Argia* species like *A. adamsi*, *A. oculata*, *A. talamanca*, and *A. ulmeca*. We found three species of *Heteragrion*, including *H. atroterminatum*, *H. atrolineatum*, and *H. erythrogastrum*. At one waterfall site, we got a couple of *Erpetogomphus constrictor*! There is just a lot of odonate and bird diversity around Santa Fe!

Heteragrion atroterminatum. Photo by Chris Rasmussen

While we have a good feel for the odonate fauna in the area during the rainy season, we would like to see more cloud forest habitat, but in the dry season. We are hoping to go back in either March or April to see what is flying then, maybe around the area of David and Volcan. Who knows what we will find? Hasta la vista!

Argia talamanca. Photo by Chris Rasmussen.

New *Argia species* (top)*; Erpetogomphus constrictor* (bottom). Photos by Chris Rasmussen.

Would You Like to See Any New Features in Argia?

Argia is of, by, and for the DSA membership, so at the close of each year I like to ask our readers if they have ideas for new features for the journal. I can't promise that all suggestions will be instituted, but I am always striving to make Argia even better than it is today. Please send ideas and/or feedback to me at <editor@dragonflysociety-americas.org>. Thanks!

Celeste A. Searles Mazzacano

Argia agrioides (California Dancer) New for Idaho

Jim Johnson <gomphusjim@gmail.com>

During my return trip from the DSA annual meeting in Utah, I decided to spend the night at Bruneau Dunes State Park in Owyhee County, Idaho. That gave me the afternoon of 18 July 2016 and the following morning to check out the odonate activity around the surprisingly substantial lake nestled between the tallest freestanding sand dunes in North America.

The temperature that first afternoon felt to be in the triple digits (if it wasn't in actuality), and the odonates felt it too, since I found them mostly perching in the shade of willows and tamarisk around the lake shore. I found a lot of odonates, but nothing surprising, and after a couple of hours in the hot sun I was ready to find a site at one of the park's campgrounds.

The following morning (19 July), I returned to the lake while the temperature was still comfortable. Not surprisingly, I found more odonates in the open sunny areas, including quite a few coenagrionids warming up on sandy areas. One of these was a male *Argia* of the *agrioides/nahuana* (California/Aztec Dancer) type with its bright blue coloration, small size, forked humeral stripe, and limited abdominal black markings (compared with *A.vivida*, Vivid Dancer—the common blue species in the region).

Argia agrioides (California Dancer), Bruneau Dunes State Park, Idaho, 19 July 2016. Photo by Jim Johnson.

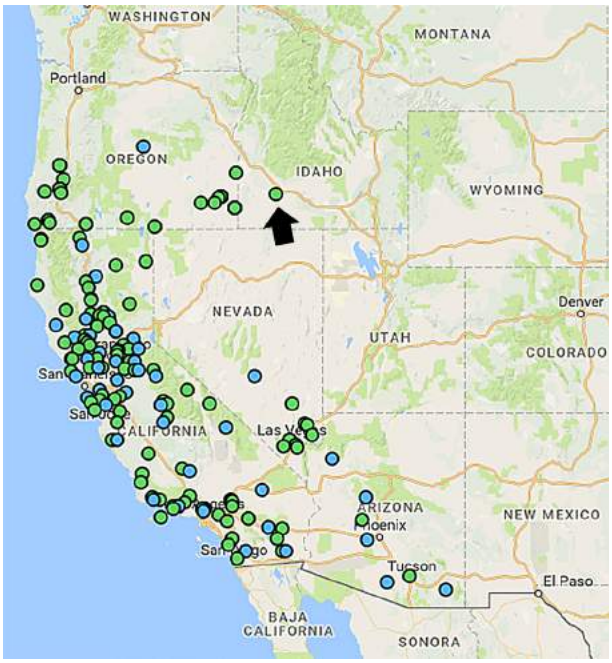
This *Argia* cooperated nicely, perching on grass stems that were lying flat on the sand, so I took several photos. With a quick check of the images on my camera's display screen, I was able to determine with confidence that it was an *A. agrioides* (California Dancer) based on the length of the tori relative to the space between them. Confident that I obtained identifiable photographs, I moved on to see what else I could find.

It was some time later that I realized I had found a new species for Idaho when I looked up the species on OdonataCentral. The fact that *A. agrioides* is in Idaho isn't surprising at all since the species is known to be in far

The tell-tale tori of *Argia agrioides* (California Dancer), Bruneau Dunes State Park, Idaho, 19 July 2016. Photo by Jim Johnson.

southeastern Oregon on the Owyhee River at Three Forks and on Succor Creek—both within 10 miles of the Idaho border. Bruneau Dunes is on the order of about 75 miles east of those sites, extending the species' roughly semicircular range in a way that makes it appear as though it's avoiding much of Nevada like the plague (see map).

No doubt there are lots of other discoveries to be made in Idaho—a state which tends to receive even less odonatological attention than most of the surrounding states.



Current distribution of *Argia agrioides* (California Dancer) in the U.S. The arrow indicates the new Idaho record. Data from OdonataCentral.org.

Two Species New For the State of Sonora, Mexico

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In March 2016, the new book "A Field Guide to the Damselflies and Dragonflies of Arizona and Sonora" was released. Among its many attributes, it whetted the appetites of Arizona naturalists for the appealing and mind-boggling biota south of the U.S. border, some of which occasionally drizzles northward across that border into Arizona. For various reasons, expeditions into Sonora had been scaled down in recent years. Greater Good, under the guidance of Tucson's Tom Vandevender, had sponsored bio-blitzes into some of the Sky Islands of eastern Sonora but aside from those trips, scientific study in Sonora of Odonata had been meager since about 2010.

Several Arizona odonatists both new and seasoned had expressed interest in a trip to the south to put the new book to use. In early October 2016, Aeromar Airlines initiated new service from Tucson to Hermosillo, Sonora; Los Mochis, Sinaloa; and ultimately Guadalajara, Jalisco. As a business incentive, early rates were lowered. This seemed especially appealing since the long automobile ride to southern Sonora could be avoided by flying to Hermosillo, saving 5–6 hours of driving, or to Los Mochis, saving 8–10 hours. The combination of interested naturalists and the low prices under $300 round trip to Los Mochis resulted in a 4–5 day trip to extreme southern Sonora in October.

Dwarf Gliders (*Miathyria simplex*). Upper: female, Mocúzari spillway stream, Alamos, Sonora; lower: male, pond five miles south of Navojoa, Sonora.

Carribean Dasher (*Micrathyria dissocians*), at a pond five miles south of Navojoa, Sonora.

The group consisted of four southern Arizonans: Fred Heath and Rich Bailowitz of Tucson, Mike Bearce of Green Valley, and Doug Danforth of Bisbee. We stopped at various spots during the three full field days: a canal several kilometers south of the city of Navojoa, the Río Mayo at and to the southwest of the highway bridge on Navojoa's north edge, and the Río Mayo at the town of Tesia, all on 7 October; the Río Cuchujaqui, Mentidero Wash, and several ponds, all southeast of Álamos on 8 October; and the Mocúzari spillway and a border-with-Sinaloa pond on 9 October.

One of the ponds, a cattle tank approximately 10 km south of Álamos, proved to be the trip's most interesting stop. This pond was about 80 x 20 m and was largely covered in duckweed. It had a muddy, slippery bottom, with sparsely-vegetated shrubs along its margin, and with many downed and inundated *Sesbania* plants at its center. Among the more the more common species here—Carmine Skimmer (*Orthemis discolor*), Thornbush Dasher (*Micrathyria hagenii*), Chalky Spreadwing (*Lestes sigma*), etc.—were two things of great note. There were four or five very small red dragonflies flying rapidly about which proved to be Dwarf Gliders (*Miathyria simplex*), and several individuals of a second *Micrathyria*, this one with yellow-green eyes, which turned out to be Caribbean Dasher (*M. dissocians*). Dwarf Gliders were also found a day later in what may be more typical habitat, in a wide shallow pond with floating mats of *Ludwigia* near the town of Mocúzari. Here, at least one female was observed ovipositing. Also at this site were a number of Garnet Gliders (*Tauriphila australis*).

Both *M. simplex* and *M. dissocians* were new to the state of Sonora. And in an event that is certainly not coincidental, both of these species were only recently (2009) documented from coastal Nayarit, near the town of San Blas, at what had been the northern and western limits of their respective ranges. This new site in Sonora is almost

exactly 700 km northwest of those previous range limits, completely sidestepping the state of Sinaloa. *M. dissocians* appears to be widely expanding its range northward, as it has also appeared sparsely in the lower Rio Grande Valley in extreme southern Texas. Perhaps *M. simplex* will be found to occur with it there as well.

First Arizona and Northernmost Record of the Three-striped Dasher, *Micrathyria didyma*

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The Three-striped Dasher, *Micrathyria didyma*, is a subtropical and tropical species that, in the United States, occurs regularly only in southernmost Florida and south Texas (Paulson, 2009; 2011; OdonataCentral), and had until now not been documented west of the latter state. Toward the end of a day-long odonate survey that we conducted on 6 November 2016 in Pinal County, Arizona, one of us spotted a small male dasher perched at eye level in the shade, in a cattail bed at the Nature Conservancy Preserve Ponds in Dudleyville (320 55' N; 1100 44' W; 615 meters [2018 feet] a.s.l.; Figures 1-3). Our initial impression was that we were looking at a Thornbush Dasher, *Micrathyria hagenii*, a subtropical species found in the fall and at the same location in 2014 and again in 2015. Upon further examination, however, it turned out we had in fact discovered a Three-striped Dasher. The microhabitat where this individual was found—a shaded area close to still water—is typical of the species (Paulson, 2011; Bailowitz et al., 2015). This observation provides the first record of *M. didyma* in Arizona and documents its northernmost occurrence to date.

Arizona regularly hosts subtropical vagrant odonates. For example, species recorded in the past five years but not known to reside or breed in the state, as defined by copulating pairs or ovipositing females, include Blue-faced Darner (*Coryphaeschna adnexa*), Straight-tipped Ringtail

Figure 1. Nature Conservancy Preserve pond in Dudleyville, Pinal County, Arizona. Photo by Pierre Deviche.

Figure 2. Male Three-striped Dasher, *Micrathyria didyma*, at the Nature Conservancy Preserve Ponds, Dudleyville, Pinal County, Arizona. Photo by Pierre Deviche.

(*Erpetogomphus elaps*), Great Pondhawk (*Erythemis vesiculosa*), Pin-tailed Pondhawk (*E. plebeja*), Black-winged Dragonlet (*Erythrodiplax funerea*), Antillean Saddlebags (*Tramea insularis*), Sooty Saddlebags (*T. binotata*), Harkness' Dancer (*Argia harknessi*), and Neotropical Bluet (*Enallagma novaehispaniae*) (OdonataCentral; Bailowitz et al., 2015; <http://azdragonfly.net>). The geographic origin of individuals belonging to these species and found in Arizona is unknown. Most observations have been in late summer and fall, i.e., during the summer monsoon or within one to two months of its end. Thus, movement of the above species from breeding habitats into Arizona may be related to the monsoon-associated influx of moisture from subtropical regions taking place at that time of the year. The origin of the Dudleyville ponds *Micrathyria hagenii* and *M. didyma* is likewise conjectural. The closest known populations of these species are found in southern Sonora, Mexico, i.e., approximately 650 kilometers (400 miles) south of Dudleyville (Bailowitz et al., 2015). *Micrathyria* reaching Arizona may, therefore, have dispersed from this Mexican region.

The Dudleyville ponds have proved attractive to vagrant odonates, with species including Antillean Saddlebags (2011), Great and Pin-tailed Pondhawks (2014 and 2015, respectively), and Thornbush Dasher being recorded there. These shallow, relatively isolated artificial ponds cover an approximately 12,600 sq. meters (3.1 acres) area and serve as protected habitat for several rare native fish species.

Single-day odonate surveys during the summer and fall regularly yield 25–30 species.

Two factors may contribute to the species richness of this location. First, the ponds are located within 200 meters (0.12 miles) of the Lower San Pedro River, one of the few semi-perennial rivers flowing from Mexico into Arizona and with the potential of serving as corridor for species moving from that country into the southwest US. Second, the ponds are surrounded by large overhanging cottonwoods (*Populus fremontii*) and other tree species, and by a thick bed of cattail (*Typha* sp.), thereby offering diverse open as well as shaded stratified microhabitats. Given their location and characteristics, the Dudleyville ponds seem to be ideally suited to attract uncommon species and so it would come as no surprise if additional subtropical vagrants were discovered there in the future.

Acknowledgements

We thank Richard Bailowitz, Doug Danforth, and Dennis Paulson for comments on an early version of the manuscript.

Figure 3. Male Three-striped Dasher, *Micrathyria didyma* (same specimen as in Fig. 2). Photo by Pierre Deviche.

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Libellula pulchella (Twelve-spotted Skimmer): Range Expansion in Western Canada

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Libellula pulchella Drury (Twelve-spotted Skimmer) is a common and widespread dragonfly in much of the United States, but in Canada it is restricted to parts of the extreme south and is uncommon in much of its Canadian range (Abbott, 2006–2016; Catling et al., 2005). In eastern North America, the species is somewhat migratory; it has been recorded in migrating groups on the Atlantic coast in midsummer and autumn and, in the Southeast, is usually reported only in autumn (Paulson, 2011; pers. comm.). In the past few years and, especially in 2016 in British Columbia and Alberta, *L. pulchella* has appeared many times outside its former documented range, provoking questions about the reasons for these movements.

In British Columbia, *L. pulchella* has been considered a species at risk ever since Odonata were first ranked for conservation status in the 1990s. In 2015 it was ranked S3 (Vulnerable; BC Conservation Data Centre, 2016) largely because it is restricted to warm southern valleys where most of the eutrophic ponds it prefers have been destroyed as agriculture and urbanization have expanded. Whitehouse (1941) called it and close relative *Libellula forensis* Hagen (Eight-spotted Skimmer) "abundant" in the large marshes at Penticton; these habitats no longer exist. Records are concentrated in the Okanagan Valley but there are two old ones from the 1930s from Salmon Arm and Enderby in the eastern Thompson River drainage (Buckell, 1938; Cannings 2014a).

Until recently, records in the Kootenay and Columbia valleys were far less frequent. In addition to an historical northern outlier in the Columbia River watershed from

Revelstoke (Buckell, 1938), Cannings et al. (2000) list only seven; however, since that study was published, the number of reports has increased significantly. There was a flurry of sightings around Cranbrook in July and August of 2005, for example, at St. Eugene Mission Golf Course (N 49.58514°, W 115.76016°) on 31 July 2005 (D. Nicholson, pers. comm.). On 21 August 2006, a survey of four lakes in the Haha Creek drainage southeast of Cranbrook produced records of multiple individuals: 2–3 seen at Edith Lake (N 49.43629°, W 115.51757°) and 4–6 seen, one photographed, at Lund Lake (N 49.43044°, W 115.44993°) (DeGroot, 2007). On 26 July 2007, a male was photographed at Wasa Lake (N 49.78710°, W 115.74251°) (T. Gripich, pers. comm.). *Libellula pulchella* is now common in many localities southward; for example, several were seen at the Tobacco Plains Indian Reserve (N 49.00677°, W 115.07296°; N 49.02009°, W 115.07557°) near the US border on 12 July 2016 (D. Nicholson, pers. comm.). Clearly, populations in the southern Rocky Mountain Trench have increased dramatically in the past decade.

The northern margin of the range of *L. pulchella* has also expanded, with many individuals recently recorded in the Kamloops region, west of previous localities. Although the linear increase in the range is modest (about 75 km), this colonization of a new region full of excellent habitat is significant. These new occurrences in the Kamloops region were first noted in 2014 (Table 1), but the date of the species' first arrival is unknown. A male photographed on 29 June 2014 on Pine Springs Road (N 50.77184°, W 120.34342°) was in an urban garden adjacent to an artificial pond containing *Cyprinus carpio* (koi) (W. Pycock, pers. comm.) In both 2014 and 2015, D. Giles photographed at least three adults at Heffley Mill Pond A (N 50.83634°, W 120.28538°), a wetland in an old gravel pit that supports extensive stands of *Typha latifolia* (cattail) and *Scirpus* sp. (bulrush) (Fig.1).

Most records in 2016 were from built ponds, including an ornamental garden feature at N 50.62418°, W 120.32932° on 28 June 2016 (G. Dreger, pers. comm.). Several were built for irrigation and some as water features on "The Dunes at Kamloops" golf course (Dunes Ponds A-E, see Table 1 for details). *Libellula pulchella* was first reported at the golf course in 2015 but could have occurred earlier (G. Gore, pers. comm.). There, emergent aquatic vegetation varies from sparse to abundant; *Oncorhynchus mykiss* (rainbow trout) live in some of these golf course ponds and are potential predators of both skimmer larvae and adults.

All of the anthropogenic water features were created since about 2000, although McArthur Slough and Heffley Mill Pond B are naturally occurring. All sites but the Dreger Pond lie at the lowest elevations in the North and South Thompson river valleys and are relatively close to each other, allowing easy colonization by this strong-flying skimmer. The Dreger Pond is located over 300 metres higher in a transitional upland landscape adjacent to open grasslands. Further surveys of ponds along the South Thompson River drainage may indicate a logical colonization route from the Salmon Arm area to the east. *Libellula pulchella* has been recorded at two sites (Pine Springs Road and Heffley Mill Pond A) over three years and at Dunes Pond B for two years, suggesting that these sites, at least, have established viable populations.

Libellula pulchella is rare in southern Alberta (Cannings, 2014b), where it was ranked S1S2 (Critically Imperiled to Imperiled) in 2015 (Alberta Conservation Information Management System, 2016) based on the following occurrences. It was first recorded in Alberta on 10 and 14 July 1984, when Hilton (1985) saw four in the Cypress Hills (estimated N 49.5852°, W 110.2982°). Christine Rice and Jonathan Hornung relocated the species in the Cypress Hills (N 49.6790°, W 110.1844°) during the summer of 2000 (C. Rice and J. Hornung, pers. comm.). On 24 July 2011 John Acorn recorded another at Strathcona Island Park (N 50.0354°, W 110.6477°) in Medicine Hat (J. Acorn, unpub. data). One was seen on the Onefour Ranch, east of the Lost River (estimated N 49.032°, W 110.433°), on 16 July 2014 (G. Hilchie and M. Buck, pers. comm.) and a lone male was photographed at Middle Springs Wildlife Corridor, Banff National Park (N 51.16331°, W 115.58156°) on 3 August 2013 (D. Lepitzki, pers. comm.). Banff, lying in a valley in the Rocky Mountains at about 1500 metres, surrounded by subalpine slopes, is an unusual locality for this dragonfly. *Libellula pulchella* normally frequents warm, low-elevation sites and, although the one photographed was visiting a warm spring in the valley bottom, it was clearly a wanderer far from suitable habitat.

In 2016, four new localities were discovered in Alberta. Along the Red Deer River at Dry Island Buffalo Jump

Heffley Mill Pond A, Kamloops, British Columbia. Photo by Rick Howie.

Provincial Park, N 51.9351°, W 112.9634° (near Trochu, about 100 km southeast of Red Deer), on 3 July 2016, I. MacDougall saw a single male. T. Schowalter photographed a male at a dugout about 4 km ESE of Michichi (N 51.5750°, W 112.5128°) on 25 July 2016 and at a dugout about 11 km south-southwest of Empress (N 50.8507°, W 110.1059°) on 28 July 2016, G. Hilchie saw another. J. Acorn photographed a male at Fincastle Wetland, about 6.4 km north of Purple Springs (N 49.8724°, W 111.9014°), on 29 July 2016.

In Saskatchewan, *L. pulchella* was first recorded by R. Hooper (specimens at Royal Saskatchewan Museum) at Wadena (estimated N 51.949°, W 103.807°) on 1 July 1984 and Maryfield (estimated N 49.835°, W 101.526°) on 5 July 1984. The next several records are from farther north: Canwood Provincial Forest near Prince Albert (estimated N 53.3547°, W 106.5858°) on 1 August 2000 (G. Hutchings, pers. comm.); grid road #983 at Peepaw Creek (N 52.43303°, W 102.2239°), seven males and one female, 11 July 2002 and Peepaw Lake boat launch (N 52.4264°, W 102.2159°), three males, on the same day; Somme, 16.6 km southeast (N 52.500°, W 102.857°), one female, 19 July 2003 (J. Kozial, pers. comm. to D. Halstead).

The species was observed twice in 2010: Estevan (N 49.11389°, W 102.97111°), 3 July and Saskatoon (N 52.16918°, W 106. 41142°), male photo, 18 July (both L. Duczek). There are two more records in 2011: Bradwell (N 51.92376°, W 106.20634°), photo of a male on 17 June (C. Salisbury) and Val Marie (N 49.19736°, W 107.65712°), 8 August (L. Duczek) (Abbott, 2006–2016). In 2016, C. Salisbury photographed a male at Saskatoon (N 52.10238°, W 106.63726°) on 24 June 2016 (Abbott, 2006–2016) and a breeding population was found on 10 July 2016 southeast of Yellow Creek (N 52.70377°, W 105.15725°) (D. Parker, pers. comm.). The Saskatchewan records show little pattern of range expansion from south to north.

Libellula pulchella is described as common in southern Manitoba as far north as 51°N (Hughes and Duncan, 2003). Deanna Dodgson (pers. comm.) indicates that she has not observed any northerly increase in reports in recent years. The most northerly she recorded in 2016 was at N 50.55942°, W 96.05644°, 6 July 2016, near St. Georges, northeast of Winnipeg.

The geographical range of any organism is dynamic and changeable; any distribution map is merely a snapshot in time. It is not surprising that strong-flying insects can appear outside what we consider their normal place in the landscape. Anyone who has watched *L. pulchella* in the field knows that it is a powerful flier and observations of migration on the east coast confirm that it is capable of long-distance flight.

The recent profusion of records of *L. pulchella* at the northern margins of its range in the western Canadian provinces suggests that populations are expanding in these areas. The apparent change in range may be the result of increased observation, although recent interest in odonates in Alberta probably peaked in about 1998–2001. It is also relevant that observers in many areas of northern Montana have recently reported *L. pulchella* for the first time: e.g., Sheridan County, 11 July 2013; Chouteau County, 30 July 2016 (Abbott, 2006–2016).

Historically, *L. pulchella* has been common in southern Ontario, but rare northward in the Precambrian Shield (Catling and Brownell, 2000). Colin Jones (pers. comm.) notes that, in his experience, it now seems to be more common in Algonquin Provincial Park than it was in the 1990s; however, this is an increase in abundance rather than a range expansion. Nevertheless, in British Columbia and Alberta, the increase in occurrences will probably result in reduced conservation ranks when these are next reviewed.

In the dry interior of British Columbia, natural wetlands in at least the middle and lower elevation grasslands have decreased in size and number as drought conditions increase and snowpacks are reduced (Coelho, 2015). Many ephemeral ponds have vanished; those that remain close to human population centers are likely doomed when people see them only as dry depressions of little value. New artificial ponds in backyards, parks, and golf courses may ameliorate these conditions in and around urban areas. Dugouts for watering livestock have been created in the drying grasslands to replace the declining, biologically more diverse, natural wetlands but these dugouts often lack emergent vegetation or any vegetation at all. Nevertheless, the increase in such human-created ponds has apparently stimulated the expansion of *L. pulchella*, at least in the Kamloops region.

Acorn (2004) also suggested that artificial wetlands were increasing in much of southern Alberta. He noted that a number of damselflies, such as *Enallagma carunculatum* (Tule Bluet) and *E. clausum* (Alkali Bluet), have appeared in Alberta in the past few decades because more aquatic habitat is now available: "The amount of water on the prairies…has changed dramatically. Irrigation, cattle watering dugouts, waterfowl management areas, power plants and recreational areas have all provided habitat… that simply was not present until relatively recently." Many of the wetlands where *L. pulchella* has appeared in

Alberta are also of recent origin.

However, this may not tell the whole story. Wetlands on the prairies can be considered ecological islands set in a matrix of grasslands unsuitable for odonates. Dispersal of odonates is generally portrayed as a matter of flying over the matrix, from one wetland island to the next. Nevertheless, the characteristics of the intervening grasslands, termed "matrix effects" (Ricketts, 2001), may also be important. In contrast to the situation in British Columbia, the years since 2008 have been remarkably moist east of the Rocky Mountains, creating not only a proliferation of shallow water bodies, but also a noticeably more lush grassland vegetation that remains green longer into the summer. Perhaps dispersal through moist grasslands is easier for adult *L. pulchella* than dispersal through (or over) the arid, brown grasslands of the recent past, perhaps for physiological reasons (e.g., risk of dehydration) or perhaps because more food is available during dispersal when the prairies are more lush. Thus, climate change is likely a factor contributing to the range expansion of this species (but not definitively supported; see Catling, 2016), alongside the creation of new wetlands, but the mechanism by which climate change favours *L. pulchella* may be more complicated than simple average warming. in the future.

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Table 1. Observations of Libellula pulchella (Twelve-spotted Skimmer) at Kamloops, British Columbia.

Site	Latitude (°)	Longitude (°)	Elevation (masl ± 3 m)	Date	# Individuals	Observer	Photo
Pine Springs Rd.	50.7718	120.3434	352	29 Jun 2014	1	Ward Pycock	Y
Heffley Mill Pond A	50.8363	120.2854	347	summer 2014	3+	Doug Giles	Y
Heffley Mill Pond A	50.8363	120.2854	347	summer 2015	3+	Doug Giles	Y
Dunes Pond B	50.7832	120.3304	346	22 Jun 2015	1	Gordon Gore	Y
Pine Springs Rd.	50.7718	120.3434	352	summer 2016	1	Ward Pycock	N
Dreger Pond	50.6241	120.3293	775	28 Jun 2016	1	Glenn Dreger	Y
MacArthur Slough	50.6969	120.3865	341	18 Jul 2016	1	John Casey	Y
Heffley Mill Pond A	50.8363	120.2854	347	7 Aug 2016	5	Rick Howie	N
Heffley Mill Pond B	50.8437	120.2770	346	7 Aug 2016	1	Rick Howie	N
Dunes Pond A	50.7816	120.3335	353	15 Aug 2016	1	Rick Howie	N
Dunes Pond B	50.7832	120.3303	346	15 Aug 2016	1	Rick Howie	N
Dunes Pond C	50.7833	120.3262	345	15 Aug 2016	1	Rick Howie	N
Dunes Pond D	50.7858	120.3268	346	15 Aug 2016	3	Rick Howie	Y
Dunes Pond E	50.7876	120.3267	346	15 Aug 2016	2	Rick Howie	Y

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Thank You to Everyone Who Submitted Material to Argia in 2016!

It was another fascinating, fun, fact-filled year for Argia. This publication wouldn't be possible without the many DSA members who not only are living, working, or playing among odonates, but who also take the extra time needed to write up an essay or article or share a photo.

Everyone has something to contribute as we pursue our different levels of obsession with Odonata. If you have never contributed before but enjoy reading Argia, I urge you to take a look at your field notes and consider adding your own bit of knowledge to an issue of Argia in 2017.

Celeste A. Searles Mazzacano, Editor in Chief

Unprecedented Number of Neotropical Bluets, *Enallagma novaehispaniae* Calvert, in Arizona

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A large number of Neotropical Bluets, *Enallagma novaehispaniae*, were discovered in November 2016 at a central Arizona site. This number of individuals is unprecedented for the state, where the species was discovered only recently and is a rare vagrant known from a handful of scattered locations.

The Neotropical Bluet has a vast distribution that extends from Texas to Argentina (Paulson, 2009). In Texas, it is common to abundant in its preferred habitat—slow streams and rivers lined with vegetation (Abbott, 2011; Paulson, 2009). In the state of Sonora, Mexico, the bluet has been recorded within 130 kilometers (80 miles) of the U.S. border (Bailowitz et al., 2015). It had, however, never been found in Arizona until November 2010, when two males were discovered along a small stream flowing from an agricultural run-off pond in Maricopa Co. (Bailowitz, 2010; <http://azdragonfly.org/locations/painted-rock-dam-pond>). This site is located 225 kilometers (140 miles) northwest of the closest known Mexican locations of the species. Following this find it was not until 2015 that another *E. novaehispaniae* was encountered in the state—also a male, but this time in June and close to the Mexican border (Sonoita Creek State Natural Area, Santa Cruz Co.; P. Deviche, pers. obs.). The situation changed in fall 2016 with the discovery on 15 September of a male bluet in California Gulch (Santa Cruz Co.; D. Danforth: SoWestOdes Yahoo group) and in November, of two males each at two Pinal Co. locations (Queen Valley and Gila River at Kelvin Bridge; P. Deviche and J. Jones, pers. obs.). All these records are thus of males and of one or two individuals at a time.

The Arizona status of *E. novaehispaniae* took a dramatic and unexpected turn during a visit to the Phoenix, Maricopa Co., Tres Rios Wetlands (<https://www.phoenix.gov/waterservices/tresrios/wetlandsinfo>; 330 230 N; 1120 180 W; 284 meters a.s.l.) on 13 November 2016. This recently constructed (2010) wetland encompasses approximately 195 hectares (480 acres) and comprises interconnected ponds that receive highly treated effluent from a local wastewater treatment plant. Water eventually reaches the nearby Gila River through a small, 60 meter (200 foot) long stream that is lined with floating vegetation (*Ludwigia* sp.; Fig. 1). On 13 November 2016, an estimated 40 Neotropical Bluets, almost all males but also one pair in tandem, were observed along the stream (Figs. 2 and 3). The actual number of bluets present that day probably was considerably larger than 40. Indeed, only the stream was surveyed but an extensive mat of *Ludwigia* sp. also borders the river itself and therefore offers apparently appropriate habitat for the bluet. Mixed with *E. novaehispaniae* were Kiowa and Blue-ringed Dancers, *Argia immunda* and *A. sedula*, but no other *Enallagma* species was detected. No *E. novaehispaniae* was found elsewhere in the wetlands, including along vegetated ponds. Of note, local odonatists regularly visit the Tres Rios Wetlands but had never observed Neotropical Bluets at this location before November 2016. Thus, it cannot be excluded that small numbers of individuals were previously present, but it can be concluded that the fall 2016 record constitutes an unprecedented event.

What accounts for the above observations? One hypothesis is that the November 2016 Arizona records of *E. novaehispaniae* are related to weather events earlier that fall. On 7 September 2016, powerful Hurricane Newton made landfall along the coast of Sonora, and then became a tropical cyclone that rapidly moved in a northeastward direction and crossed southeast Arizona later the same day. This weather system was associated with high winds and a spectacular incursion of seabirds into the state (<http://www.azfo.org/gallery/1main/photos_recent.html>). It can be speculated that Hurricane Newton also transported Mexican odonates northeastward and these insects were then deposited at sites such as the Tres Rios Wetlands, where they found suitable breeding conditions. Accordingly, the November central Arizona population of Neotropical Bluets may represent the offspring of individ-

Figure 1. *Ludwigia* sp.-lined stream at the Tres Rios Wetlands, Maricopa Co., Arizona, November 2016.

uals transported from Mexico to this region in early September. Supporting this hypothesis, compelling evidence indicates that wind can carry odonates, including some small Zygoptera (e.g., *Ischnura*), over several hundred kilometers; Corbet, 1999). As well, such small Zygopteran species can complete their larval development in as little as 30–60 days (Corbet, 1999, p. 630). The larval development duration of *E. novaehispaniae* is not known, but if not exceeding two months, it would also be compatible with the hypothesis that the November 2016 central Arizona individuals developed and emerged locally. Irrespective of the origin of these individuals, it will be important to determine whether the Tres Rios Wetlands population of Neotropical Bluets is ephemeral. The observation of a pair in tandem suggests the possibility of local breeding and of the species establishing a persistent local population. Time will tell….

Acknowledgements

I thank Douglas Danforth for discussions related to the Arizona status of the Neotropical Bluet and Dennis Paulson for comments on an early version of the manuscript.

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Figure 2. Male Neotropical Bluet, *Enallagma novaehispaniae*, at the Tres Rios Wetlands, Maricopa Co., Arizona, 13 November 2016.

Figure 3. Pair of Neotropical Bluets, *Enallagma novaehispaniae*, in tandem at the Tres Rios Wetlands, Maricopa Co., Arizona, 13 November 2016.

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Bringing the George H. and Alice F. Beatty Odonata Collection Into the Digital Age

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A collection of over 60,000 odonate specimens can tell many stories. It can show the successful preservation of dragonflies and damselflies, as well as the differences in prey and habitat associations between taxa. The field notes can share observations and collecting details with those who may have never seen a particular species in the field. A collection of this size can also demonstrate the importance of natural history museums and their contents, enabling biodiversity research decades later. Of particular interest is the mobility of collections in the digital age, as evidenced through the U.S. Natonal Science Foundation's investment in Advancing Digitization of Biodiversity Collections (ADBC) grants, liberating natural history data on which novel research can be conducted. Over the past two years, I have worked with the collection of George H. and Alice F. Beatty at the Frost Entomological Museum at Penn State University in order to digitize the specimens, catalog them, and find ways to use their data, through an NSF Thematic Collections Network (TCN) grant for digitization.

The Beatty Collection, whose specimens were collected throughout the northeastern United States and Mexico from the 1930s to 1970s, contains papered specimens, pinned adults, exuviae, and a substantial number of odonates housed in ethanol. Some localities were revisited year after year, and these were documented through maps and collecting event numbers, in an attempt to simplify the labeling process in the field. While two collectors returning to the same places over and over again could be considered the epitome of sampling bias, it can also provide a comprehensive look at how quickly or slowly odonate distributions may be changing in a variety of Nearctic locations. Their contributions to surveying the Odonata fauna of Pennsylvania and the factors influencing their distribution throughout the state have inspired me to look deeper into the shifts in presence and abundance of taxa within our collection (Beatty and Beatty, 1969).

Throughout their expeditions, the Beattys filled notebooks with maps, drawings, and notes that provide further insight into the conditions that enabled collecting, a skill not often honed in modern field experiences. Furthermore, they collected new taxa on their journeys, even though they did not describe most of them, instead assigning working names and documenting unique morphological characters to possibly publish in the future. While most of these have since been described by others, there could still be new species to be discovered in the collection, especially upon closely examining the specimens, sketches, and lists of unique characters. In a time of increased accessibility and opportunity for the public to document encounters with odonates through photos and web interfaces, recording the specimen data in this manner in decades of field notes and notebooks is simultaneously comprehensive and, at times, difficult to interpret when locality numbers alone are provided with specimens and need to be reconciled.

Beyond collecting the specimens, the Beattys developed a storage standard currently used in Odonata collections around the world. Specimens are placed on paper notecards, slipped into cellophane envelopes, and stored upright in boxes (Beatty and Beatty, 1963). This protects the specimens from the breakage that occurs from pinning as well as reducing the large amount of space that dragonflies and damselflies can occupy in drawers, greatly impacting the storage infrastructure for this order within entomological collections. Having each specimen in its own envelope also makes it easy to photograph specimens individually and digitize them without too much handling. The utility of this storage standard is something that many of us take for granted, but it has enabled specimens to become more accessible and transportable, from the level of the personal to the institutional collection.

The imaging process has been relatively straightforward, enabling upgrading of the storage of individual specimens as each is imaged. The wax paper triangles, cellophane envelopes, and storage boxes have held specimens for over 50 years, and some of these items have deteriorated, necessitating upgrades to safeguard the specimens. We examine each specimen and photograph it, adding a unique identifier with a data matrix code in order to scan and access the data in the future (Deans and Sandall, 2015). We are upgrading the nomenclature associated with the dragonflies and damselflies as we go, cataloging them and organizing them in the research collection at the Frost Entomological Museum. The specimen photographs are uploaded to TaxonWorks, a database for the images and their data, using optical character recognition (OCR) software as well as manual entry for data transcription (TaxonWorks, 2016). Optimizing the transcription process has proven to be difficult, as the imaging step takes much less time than actually reading and documenting the data, similar to the amount of time it takes to collect a single specimen versus the time it takes to prepare it for a collection.

In addition to imaging the individual odonate specimens, it has been necessary to subsequently digitize the field notes that provide context for their collection, particularly as some specimens have only a locality code associated with them. The field notes alone can rectify the determination and collecting event. These field notes vary from detailed, handwritten presence and absence data to typed lists corresponding to simple maps drawn to show localities. Fortunately, the Preservation, Conservation, and Digitization Department of the Penn State University Libraries has helped us with this process, and the over three decades of Beatty field notes have been digitized and hosted online by the Penn State Special Collections Library, with the goal of associating them with their specimens and transcribing the data of numerous collecting events (Penn State Libraries, 2016).

These field notes provide a wide range of details about places that may no longer be accessible for odonate collection, also enabling comprehensive georeferencing and providing further information about the time, collecting method, and environmental conditions. We have not fully investigated the possibilities for research projects in these handwritten notes, but we hope to identify ways to better understand our collection, its biases, and new ways to examine field notes data.

Current research on the collection includes ecological niche modeling, in which the collecting events are used to generate distribution maps and then layered with data sets of factors that could be affecting the ranges of a vari-

ety of taxa. Using OdonataCentral records in addition to the specimen records for the Beatty collection has enabled a more comprehensive picture of odonate distribution (Abbott, 2016). Emerging results indicate that examined Coenagrionidae taxa are experiencing range expansions over time, as well as moving northward (Sandall, 2016). With the addition of more variable layers, identifying the factors affecting the niches will direct future sampling efforts as well as highlight areas where conservation should be considered.

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Update on the Oklahoma Odonata Project: Zygoptera and Mixed-species Pairs

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Since our last update on the Oklahoma Odonata Project (Patten and Smith-Patten, 2014) we have added enough records to our database—well over 10,000—that another update is warranted. Our summary herein of these thousands of records is by no means exhaustive, especially in terms of new county records, which number in the hundreds. Instead, we highlight the more interesting and important records. Even with this pruning down, there remained a sufficient number to split the update up by suborder. This first part will primarily cover the damselflies (Zygoptera), and an upcoming installment will discuss dragonfly (Anisoptera) records.

Of note in the past two years were the severe floods that much of Oklahoma endured during the spring of 2015. Flooding replenished most of the state's desiccated lakes, but it did not bode well for creeks and lotic odonates. Many creeks were scoured, and it took some time for the flood waters to subside and for odonate creek populations to recover. The flooding was particularly distressing because we had funding to conduct early season surveys for some species of conservation concern in the state, but we were not able to survey. We nonetheless managed to add one new species, Thornbush Dasher (*Micrathyria hagenii*), to the state list (Smith-Patten and Hoagland, 2015). Despite surpassing 90 days in the field we did not add a species to the state list in 2016, nor did anyone else, although we did document, with a specimen of a male, the first record of the nominate subspecies of the Swift River Cruiser (*Macromia illinoiensis*).

Oklahoma Odonata Project database

Since 2009 we have compiled records for our database from a variety of sources, including from literature, photographs, reported sightings, field notes, and specimens. Even with all of our past efforts, we continue to unearth new records from these sources. For instance, almost at random we met a birdwatcher and professional photographer who for years has taken photographs of dragonflies but had not always identified the species in his photos. He did not think much could come of his photos outside of aesthetics until Brenda chatted with him about how much data could actually be mined from those photos.

So far we have been able to document at least one county record and additional support for the nominate subspecies of the Swift River Cruiser in Oklahoma (details will be provided in the second installment). Another professional photographer, one who primarily photographed butterflies and moths (Lepidoptera) previously, has begun to pay much more attention to Odonata (and tiger beetles, too!) and as such has submitted many good records. Perhaps more surprising is that we still find museum specimens now and then. Just a couple of weeks ago, Brenda bumped into an obscure government report that indicated the Cornell Insect Collection in Ithaca, New York, had some Oklahoma specimens. To our delight we discovered that a handful of specimens that we have been looking to find for years now were in their collection. These included specimens of Ozark Emerald (*Somatochlora ozarkensis*) and some thought-to-be-lost paratypes of the Double-ringed Pennant (*Celithemis verna*).

Our database now exceeds 48,000 records, accounting for hundreds of thousands of individual odonates (we are approaching 190,000 individuals just from our surveys). As part of our efforts we keep track of the documentation level of each species in each of the 77 counties in the state. The number of county records supported solely by reports in the literature (2.2%, or 111 of 4,941 records summed across all counties) or by sight records (2.3%, or 116 of 4,941 records) declined, meaning we have upped to >95% the percentage of county records supported by specimen or photographic evidence. In our previous update (Patten and Smith-Patten, 2014) we listed the dozen species on the state list for which there was no specimen support. A mere nine remain on that list, because we have since secured specimens for three of those species: Banner Clubtail (*Gomphus apomyius*), Twin-spottted Spiketail (*Cordulegaster maculata*), and Allegheny River Cruiser (*Macromia alleghaniensis*). There remain two species—the Chalky Spreadwing (*Lestes sigma*) and Cinnamon Shadowdragon (*Neurocordulia virginensis*)—reported in the literature as specimen records but for which we have been unable to locate the specimens (each has been recorded but once in Oklahoma). By the end of the 2016 season, and at long last, at least 50 odonate species had been recorded in each of the state's 77 counties (Fig. 1).

Abbreviations Used

We used a number of abbreviations herein. They included using M in place of male and F for female. We also truncated these locality names: County (Co.), National Wildlife Refuge (NWR), The Nature Conservancy (TNC), and Wildlife Management Area (WMA). Museums and other data sources cited include the Colorado State University, Gillette Museum (CSU), the Essig Museum of Entomology Collection (EMEC), the International Odonata Research Institute (IORI), John C. Abbott Col-

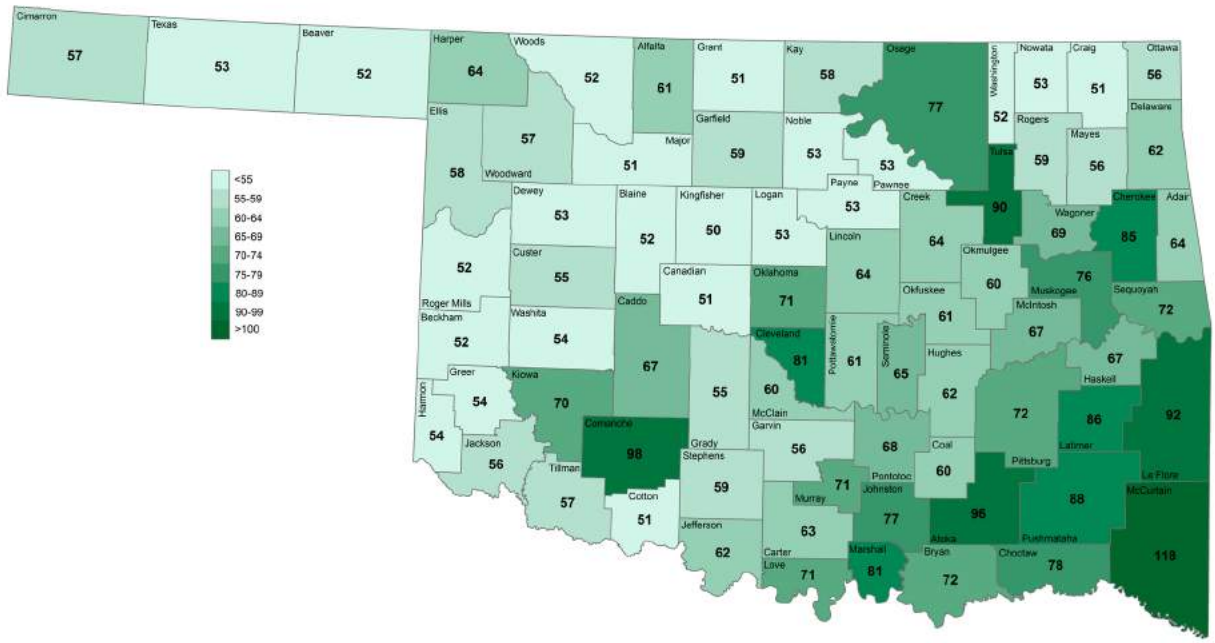

Figure 1. Map of Oklahoma depicting species totals for each county, and color coded by diversity. Shades of green vary with species richness, from palest (50–54 species) to darkest (>100 species). Note that richness is highest in southeastern Oklahoma, except for the biogeographical anomaly of Comanche Co. in the southwest.

lection (JCAC), Odonata Central (OC), the Sam Noble Oklahoma Museum of Natural History (OMNH), the K. C. Emerson Entomology Museum, Oklahoma State University (OSU), the Rosser W. Garrison Collection (RWG), the Smith-Patten/Patten Collection (SP), the University of Michigan, Museum of Zoology (UMMZ), and the National Museum of Natural History/Smithsonian Institution (USNM). Collectors/observers cited multiple times are the two authors, Brenda Smith-Patten (BS-P) and Michael A. Patten (MAP), and A. Earl Pritchard (AEP), Bill Carrell (BC), George H. Bick (GHB), James W. Arterburn (JWA), Ken Williams (KW), and Lothar E. Hornuff (LEH). If a specific collector is not named, then the record is from BS-P, MAP, or both. Months are abbreviated to three letter codes.

Zygoptera Records

Calopterygidae

Smoky Rubyspot (*Hetaerina titia*) was reported from 16 counties between 1907 and 1975. The last year marked the beginning of a 27-year hiatus for sightings of the species in the state; it was not reported again until 15 Sep 2002 (1F; Oxley Nature Center, Tulsa Co.; BC, OC334186). Since then the species has been added to 13 counties, seven of those in just the past two field seasons, and it has twice been found in sizeable numbers (15M [1 as SP1732], 3F; Caddo Creek 3 km E of Blue, Bryan Co.; 24 Jul 2015; 18M, 1F [1 pair as SP2003, OC448362], Muddy Boggy Creek 5 km ESE of Lehigh, Coal Co.). With the addition of *H. titia* (1M, 1F [SP2011]; Cooper Creek 9 km ENE of Broken Bow; 3 Jul 2016), McCurtain County now has a remarkable 118 species recorded in it!

On the surface the *H. titia* records appear to signal a healthy population with a wide distribution, but a closer look gives us pause. There are 11 counties from which the species was reported historically but not since, despite intensive surveys (Fig. 2). Smoky Rubyspot has not been seen in five of those counties since 1950–1970: Murray (since 1970), Beckham (1968), Marshall (1963), Pittsburg (1954), Muskogee (1950), and it has not been seen in five counties (Cleveland, Grady, Kiowa, McClain, and Stephens) since 1932 and in one (Le Flore) since 1907. This is not to say that the species will not be found again in those counties, as it was in Bryan and Johnston Counties, where it was "rediscovered" in 2015 after having not been seen since 1967, but at this point we are not optimistic. Given the apparent range contraction in the state we maintain the idea that this species is one of conservation concern for Oklahoma (Patten and Smith-Patten, 2013a).

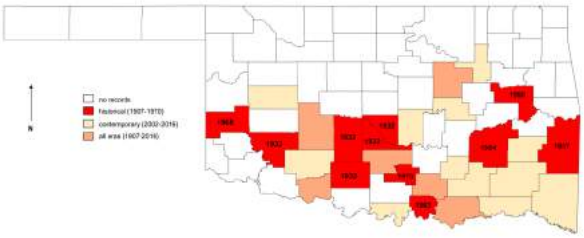

Figure 2. Distribution of Smoky Rubyspot (*Hetaerina titia*) in Oklahoma. Note the 11 counties in which the species was reported historically but not seen since (the date indicates last year seen).

Lestidae

In 2015 the Great Spreadwing (*Archilestes grandis*) was found in Major County, somewhat outside the species' known range in the state (1M [SP1752], OC435074; Major Co. WMA; 15 Aug). It was also new for Blaine County (1F [SP1796], 1M; American Horse Lake; 19 Sep; MAP) and for Adair County, where it was first seen on 2 Jul (1M [SP1686]; Beaver Mountain in Cookson WMA; BS-P) and then again on 4 Nov (1F, OC438523; Caney Creek 6 km NW of Stillwell; Cliff Ivy). Although 2016 was not quite as good a year for the species, MAP did secure a county record for Garvin (3M [1 as SP22011], 2F with 1 pair; Rush Creek 8 km S of Maysville; 11 Sep).

Amber-winged Spreadwing (*Lestes eurinus*) was first discovered in Oklahoma on 10 Jun 2013 when we captured a female (SP688, OC400672; Patten and Smith-Patten, 2013b) at a small, clear pond in Pushmataha WMA, Pushmataha Co. Given the species' geographic range, we thought this female was a vagrant, but in 2014 the species appeared again in Oklahoma, this time in Cherokee Co. well north of the first record. On 13 Jun JWA found 5M at three different ponds at TNC's J. T. Nickel Preserve (OC423037). Subsequent records for the preserve were 2F on 5 Jul (BC, OC424308), and one individual on 11 Jul (JWA, KW, OC424690). In 2015 BC found 2M at the Nickel Preserve on 7 Jun (OC431433), and the species was located at Cookson WMA, on 2 Jul (3M [1 as SP1688], BS-P) and 12 Jul (5M, MAP), at a small pond on Beaver Mountain, Adair County. The species was not seen in 2016.

Coenagrionidae

The Atlantic Bluet (*Enallagma doubledayi*), first found in the state in 2012 (Patten and Smith-Patten, 2012), has been seen annually since but seemingly remains confined to two counties: Atoka and Pushmataha. In 2015, 2M were spotted at Pushmataha WMA on 7 Jun (one as a mixed

pair; see below), and it was seen again on 3 Oct at McGee Creek WMA, Atoka Co. (4M [1 as SP1805]). The species was only found once in 2016, when 15M were present at the same spot in Atoka Co. on 17 Sep (1M found dead was retained as SP2203). We still expect this species to turn up in the highland conifer belt of McCurtain and Le Flore Counties, at the least.

We continue to monitor a tiny population of the Attenuated Bluet (*E. daeckii*) at Crooked Branch Lake, Le Flore Co. We first found the species there in Jun 2013, when we stumbled upon 2M (1 as SP669, OC400667) on 8 Jun, had 2M, 1F, including one pair, on 9 Jun, and had 2M on 15 Jun. The species could not be found in 2014, but we found 2M at this lake on 6 Jun 2015 (1M as SP1630). The species apparently was absent again in 2016. There are only three previous records of *E. daeckii* for Oklahoma. The first was in Jun 1934, when AEP discovered the species in the state (Antlers, Pushmataha Co.; EMEC 331092–331094). The second record was not until 13 Jun 1957, when GHB found 1M and 2F (IORI) at 1.5 mi N of Antlers (likely the same locale as AEP's). It was not seen again for another 35 years, when Sidney W. Dunkle found 2M at Bokhoma Camp, McCurtain Co., 6 Jun 1992 (IORI). Despite our surveys across the region of the earlier records, Crooked Branch Lake remains the only locality in the state with a known population of *E. daeckii*.

An equally enigmatic species in Oklahoma is the Burgundy Bluet (*E. dubium*). Pritchard (1935) mentioned *E. dubium* in passing as a species he encountered at the same pond at Antlers, near the Kiamichi River, at which he secured the allotype and many paratypes of the Double-ringed Pennant (*Celethemis verna*) and the same spot from where his *E. daeckii* specimens (see above) came, but unlike with those species we have yet to find his vouchers of *E. dubium*. The next record of the species came from Dunkle, on the day before his *E. daeckii* record, this time at Kulli Lake, McCurtain Co. (2M, IORI). We found no *E. dubium*, or suitable habitat for it, when we surveyed that lake on 8 Jun 2013, but later that day, at a park in the city of Broken Bow, McCurtain Co., we discovered 25M and 2F, including 2 pair (1M as SP656; a M was photographed on 10 Jun by Berlin Heck and David Arbour, OC400474). The following year a single M was seen at Broken Bow (14 Jun 2014, MAP), but the species has not been seen anywhere in the state since.

Bluets on the other side of the state proved interesting, too. Even though we (and BC, Joe Grzybowski, and Bryan Reynolds) have managed at least 20 visits to the far western portion of the Oklahoma panhandle between 2013 and 2016, we have yet to find an Alkali Bluet (*E. clausum*), a species we expect to be discovered in Oklahoma.

Figure 3. Male Rainbow Bluet (*Enallagma antennatum*) on the Cimarron River, 4 km NNE of Kenton, Cimarron Co., 3 June 2015. Photo by Brenda D. Smith-Patten.

On 2–4 Jun 2015, desperate to find a spot in the state that was not flooded, we headed to the panhandle. On 3 Jun we found the Cimarron River flowing again, and along the river we found 12M and 1F (with 1 pair as SP1606) of the Rainbow Bluet (*E. antennatum*; Fig. 3). This bluet had not been seen in the state since 1975 until we found a teneral M on North Carrizo Creek, Cimarron Co., on 26 May 2013 (SP587), and an adult M at Shultz WMA, Texas Co., on the following day (SP594). The 3 Jun 2015 record marks only the 8th time the species had been recorded in Oklahoma. On that same day, we discovered 4M Arroyo Bluets (*E. praevarum*) in Cimarron Co.: 2M each on the Cimarron River 4 km NNE of Kenton and on North Carrizo Creek 10 km N of Kenton. We collected a male at each location (SP1604 and SP1608, respectively). This was only the 7th time the species had been recorded in the state, the last being on 11 Oct 2002, when a vagrant M was collected at Ft. Sill, Comanche Co.; CSU specimen, OC381754). It had not been seen in the panhandle since 1978. Later in the year BC found a male (OC438265) at "Watson's Crossing" of the Cimarron River 13 km E of Kenton, Cimarron Co. Despite multiple visits to the panhandle in 2016, no *E. antennatum* or *E. praevarum* were reported.

Three western forktails (*Ischnura* sp.) of interest in Oklahoma are the Mexican Forktail (*I. demorsa*), Plains Forktail (*I. damula*), and Western Forktail (*I. perparva*). The first two had not been seen in the state for 39 and 40 years, respectively, until we rediscovered them. *I. demorsa* was fairly regularly reported between 1956, when GHB and Juanda Bick first found the species in Oklahoma (in Harper and Woodward Counties; Bick and Bick 1957; 4 Jun, 6M and 13F at IORI), and 1973, when LEH last reported it (1M [IORI]; 2.1 mi W of Kenton, Cimarron Co.; 11 Aug). We next found the species on Kiowa Creek 5 km N of Slapout, Beaver Co., on 29 Jul 2012 (1M [SP361], 1F, both as OC378186). We since have found a few annually from 2014–2016. Between 1956 and 1973 the species was recorded in six counties (Beaver, Beckham, Cimarron, Ellis, Harper, and Woodward), but it has not been seen in

Ellis and Woodward since 1970 or in Harper since 1956, despite multiple surveys in those counties, including at the specific localities where the species had been recorded. Still, from 2012–2016 we added the species to Greer and Jackson Counties in southwestern Oklahoma.

The Plains Forktail has a similar history in Oklahoma, although it appears not to have been as common, or at least it was not found as readily, as *I. demorsa*, that species having been encountered on eleven occasions compared to a mere six for *I. damula*. T. H. Hubbell first reported I. damula on 8 Jul 1926 from 3 mi N of Kenton, Cimarron Co. (1M, 1F [UMMZ]). It was next reported by AEP on 7 Jul 1933 at or near Kenton (2M, 1F, USNM374680–374682). GHB and LEH reported it again in 1968 and 1970, and it was last seen by LEH on 11 Aug 1973 (1M, 2.1 mi W of Kenton, IORI). On 26 May 2013 we bumped into 13M and 9F at three localities in Cimarron Co. (SP612–613, 623–628, with two specimens now RWG). It was seen again in 2013 at two localities along the Cimarron River, Cimarron Co., on 5 Jul, but it was not detected again until 2015. On 3 Jun 2015 we found it in Cimarron Co. on South Carrizo Creek at Black Mesa State Park (1F [SP1601]) and along North Carrizo Creek 10 km N of Kenton (1M [SP1610]). Also on that day we found a first for Texas County: 2M on the Beaver River 12 km N of Goodwell (1M as SP1613). Of note is that GHB and LEH had this species much farther east in Woodward Co., where we have been unable to locate it, even at the location where their specimens (IORI) were collected.

Western Forktail (*I. perparva*) has a spottier history in Oklahoma, having been recorded only three times, the first being at the Lake Elmer Thomas Recreational Area, Comanche Co., 20 Sep 2003 (2M [1 at CSU], 1F, OC381755; Zuellig, et al. 2006). The second and third records are from Cimarron Co., where we would have expected the species to appear first (1M [SP584, OC401508], Carrizozo Creek 2 km W of Kenton, 26 May 2013; 1M [SP1607], Cimarron River 4 km NNE of Kenton, 3 Jun 2015).

Western Red Damsel (*Amphiagrion abbreviatum*) had an impressive 2016 in Oklahoma. Although it was only encountered twice, it was encountered in remarkable numbers (18M, 7F, including 1 pair, Doby Springs, Harper Co., 21 May; 100M, 50F, including 10 pair [1 as SP1911; also OC445176], Lake Lloyd Vincent, Ellis Co., 28 May; both records MAP). Smaller numbers were found three times in 2015 at Doby Springs: 4M [2 as SP1573-1574] on 17 May (BS-P); 6M (1 as SP1582), 2F (1 as SP1583; also OC430903) on 18 May (BS-P), and 1M on 2 Jun (BS-P, MAP). Between 1931 and 1975 this species had been recorded in five counties (Alfalfa, Cleveland, Comanche, Major, and Woodward), but it was not seen again until 2012, when Jason R. Heinen found 1M and 1F at Drummond Flats WMA, Garfield Co., on 9 Apr (OC374349). The species was encountered six other times that year: 2 additional times at Drummond Flats WMA, on 10 Apr and 21 Apr, as well as in Alfalfa, Ellis, and Harper Co. on 12 May, and again on 2 Jun in Beaver Co. In 2013 a lone female was collected at Shultz WMA, Texas Co., on 27 May (SP593), but no individuals were seen in 2014. Between 2012 and 2016 *A. abbreviatum* was reported for six counties, five of which were new for the species (Beaver, Ellis, Garfield, Harper, and Texas). Four of the counties where it had been recorded in 1931–1977 had no reports: it was last seen in Cleveland Co. and Comanche Co. in 1932, Major Co. in 1937, and Woodward Co. in 1956.

Sphagnum Sprite (*Nehalennia gracilis*) has been seen only twice since it was first found in the state in 2014 (Smith-Patten and Tucker 2014). That year it was seen multiple times between 3 Jun and 20 Jul. In 2015 it was seen on 12 Jun (4M, 1F) and in 2016 on 19 Jun (1M, 2F). It has only been found at one location, TNC's Boehler Seeps and Sandhills Preserve, Atoka Co., which is currently the westernmost outpost for the species.

Sooty Dancer (*Argia lugens*) has been found in Oklahoma only in western Cimarron County. It was not seen in the state in 2016, but there were two reports in 2015, when MAP collected a male on North Carrizo Creek 7 km N of Kenton (SP1743, OC434752) on 8 Aug and BC saw 6M on the Cimarron River 3 km NE of Kenton (OC436524) on

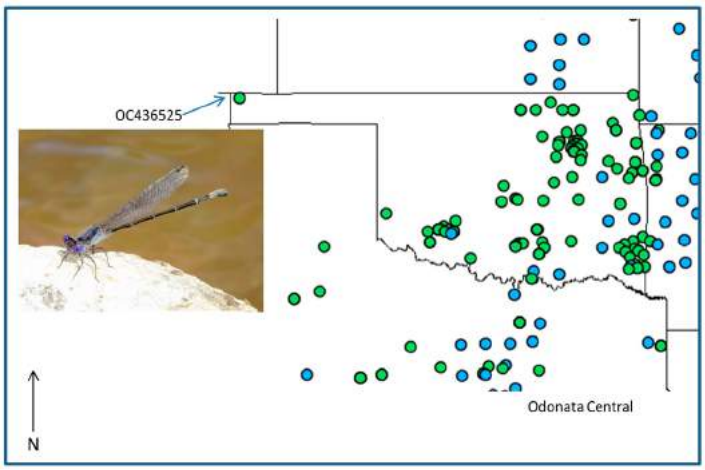

Figure 4. Distribution of the Dusky Dancer (*Argia translata*) in Oklahoma. Photo of male is from 7 September 2015 on the Cimarron River north of Black Mesa State Park, Cimarron Co. (OC436525, used with permission from Bill Carrell).

7 Sep, which extended the seasonal late date for the species in Oklahoma by four days. The previous late date was set by BC when he re-discovered the species in the state after a 30-year hiatus (OC410018). Prior to that record, A. lugens had been seen three times: AEP collected 2M (EMEC) on 29 Jun 1933 and 5M and 2F the following day (EMEC, USNM); GHB and LEH had a lone male (IORI) 37 years later (2.4 mi NE of Kenton, 5 Aug 1970); and 13 years later H. C. Reed and John Nelson collected 3M and 1F (OSU; Black Mesa State Park, 8 Jun 1983).

Bill Carrell apparently has an affinity for *Argia* records. He not only has a proven track record with Sooty Dancers, he also has extended the ranges of other dancers. On the same 7 Sep 2015 trip to the panhandle he found a stunning record of the Dusky Dancer (*A. translata*) on the Cimarron River north of Black Mesa State Park, Cimarron Co. (OC436525). This record is very much out of the species' range as we know it in Oklahoma, where it is unknown from northwestern Oklahoma, although it has been discovered recently in southwestern Oklahoma, including additions to Tillman and Greer Counties (Fig. 4). Not to be outdone in the eastern part of the state, BC found 1M Paiute Dancer (*A. alberta*) at the Nickel Preserve, Cherokee Co., on 12 Jul 2016 (OC449154), that was, although not astonishingly out of its "normal" Oklahoma range, quite a range extension to the east.

We continue to monitor the Seepage Dancer (*A. bipunctulata*), a species of conservation concern in Oklahoma because of habitat loss (Patten and Smith-Patten, 2013a). Its stronghold remains TNC's Boehler Seeps and Sandhills Preserve, Atoka Co. Although it was first found in the state in 1931, it was not discovered at Boehler Seeps until 3 Jun 2014, when 8M and 1F (1 pair) were spotted (OC422873, 1M as SP1246; BS-P and Jona Tucker). It was seen multiple times at Boehler Seeps in 2014 and again in 2015 and 2016, with numbers—typically in the dozens—indicating a healthy population. The sole other location the species was seen in 2016 was in the Ouachita National Forest, 18 km E of Talihina, at a pond nicknamed "Newt Pond", where a lone male was collected on 3 Jul (SP2010, MAP).

And finally for *Argia*, Leonora's Dancer (*A. leonorae*) still eludes us. There are two records of this species for Oklahoma. What was thought to be the first record of the species occurred on 28 Jul 2011, when Tom Kompier found a male 3.5 km SE of Snyder, Kiowa Co. (OC333094), but subsequently we discovered a fluid specimen labeled *A. sedula*, Blue-ringed Dancer, in the OMNH collection that proved to be a male *A. leonorae* captured in the Wichita Mountains, Comanche Co., likely at Sulphur Spring (OMNH3064). That spring was recently mutilated

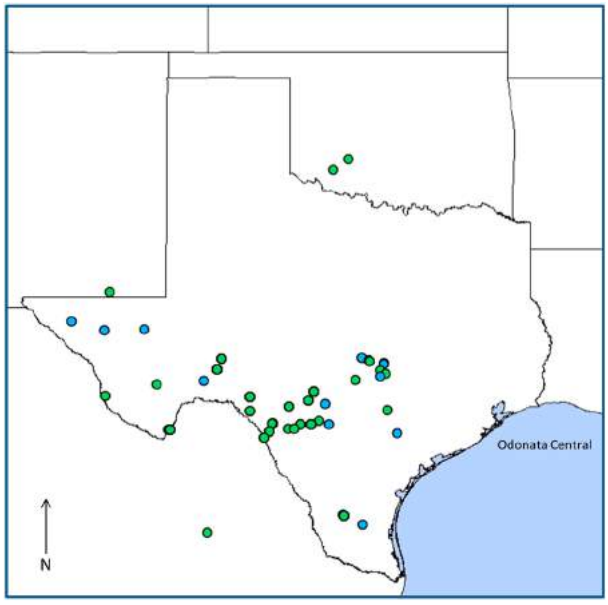

Figure 5. Distribution of Leonora's Dancer (*Argia leonorae*). The two Oklahoma records are the farthest north localities known for the species.

by road work and the fortified fence erected for a large game hunting ranch of which the spring is now a part. We have spent considerable time in southwestern Oklahoma searching specifically for this species, and we have re-examined historical specimens in the hopes of finding another Leonora's Dancer misidentified as perhaps an Aztec Dancer (*A. nahuana*) or Paiute Dancer (*A. alberta*), but so far we have had no luck. It remains to be seen if this species is a part of the Oklahoma fauna or if it merely wanders north on occasion (Fig. 5).

Mixed species pairs

As a final note for this installment, we provide some records of mixed-species pairs. In 2014, BS-P photographed a male Spangled Skimmer (*Libellula cyanea*) and female Slaty Skimmer (*L. incesta*) at Sportsman Lake, Seminole Co., on 29 Jun 2014. Both species were county records (OC423872 and OC423904). But 2015 was arguably the year of mixed pairs. In early June we captured a pair consisting of a male Atlantic Bluet (*Enallagma doubledayi*) and a female Azure Bluet (*E. aspersum*) at a small pond at Pushmataha WMA, Pushmataha Co., (SP1644, 7 June; also present were 50M and 15F, including 14 pairs, of *E. aspersum* and one other M *E. doubledayi*). In Jul 2015, MAP sighted two mixed pairs, the first a male Carolina Saddlebags (*Tramea carolina*) and a female Black Saddlebags (*T. lacerata*) at McGee Creek State Park, Atoka Co., on 11 Jul, and the second was an utterly bizarre male-male coupling of a Slaty Skimmer with an Orange Shadowdragon (*Neurocordulia xanthosoma*) at Lake Mur-

ray State Park, Love Co., on 24 Jul. No mixed pairings were reported in 2016.

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Splash-Dunk/Spin-Dry Analysis for 2011–2016

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As part of our dragonfly-watching routine over the past several years, my wife Betsy and I have studied the splash-dunk/spin-dry suite of behaviors (Walker, 2014a). We enjoyed doing so again this year. The purpose of this paper is to update the results of our observations that now cover a total of 602 splash-dunk events and 13 spin-dry videos. As a reminder, splash-dunks are events where a dragonfly slams into the water at full speed to bathe (Walker, 2011), and a spin-dry is the subsequent 1,000 rpm spinning motion in mid-flight to shed the water (Walker, 2014b) (Figure 1). The dragonfly in Figure 1 is a Paddle-tailed Darner (*Aeshna palmata*), which is the species most commonly seen doing this behavior.

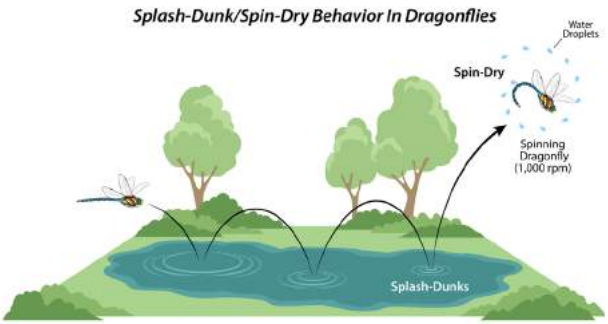

Figure 1 A typical splash-dunk/spin-dry event. Drawing by Sabine Deviche <devichedesigns.com>.

The 2016 season was memorable in a few different ways. First, we noticed much less dragonfly activity than normal at our usual dragonfly locations in Anacortes, Washington. For example, no American Emeralds (*Cordulia shurtleffii*) were seen at Cranberry Lake this year, though we usually see at least a few. In addition, there were fewer Four-spotted Skimmers (*Libellula quadrimaculata*) and Eight-spotted Simmers (*L. forensis*) than in previous years.

On a more positive note, the other interesting occurrence this season was a particularly impressive spin-dry performed by an Eight-spotted Skimmer (Figure 2). This occurred in mid-summer, when we were observing dragonflies in eastern Washington at the Quincy Lakes complex of lakes and beaver ponds near Quincy. At one point we were looking down from a hillside at a small beaver pond. The water was dark, and we immediately saw a brilliant Eight-spotted Skimmer take flight from the shoreline. It flew out over the water, did a series of three splash-dunks, gained a bit of altitude, and then did a spectacular head-over-heels spin-dry with its flashy black-and-white wings spinning rapidly. It was quite a sight to behold, especially when compared to the much more common, but less showy, spin-dry of a darner with its clear wings.

The Number of Splash-Dunks per Event

Whenever we see a dragonfly initiate a splash-dunk event, we count the number of splash-dunks it performs before it does a spin-dry. This is often just a single splash-dunk, but in many cases the event extends to a series of several splash-dunks in a row. The maximum number of splash-dunks we've seen in any one event is eight (Walker, 2013).

The results of our observations for the six dragonfly seasons from 2011 to 2016 are shown in Figure 3. In a normal year we see an average of 115 events, but this year, with its low activity level, we saw only 25 events. Still, as mentioned above, the total number of events represented iss 602. Notice the almost exponential falloff as the number of splash-dunks increases, with a noticeable "shoulder" at 3 splash-dunks. This feature has persisted for several years (Walker, 2014a), indicating an unexpected preference for events with this number of splash-dunks.

The average number of splash-dunks per event is 2.31. This result is unchanged over the last three years—a significant finding, considering that the statistics are derived from hundreds of observations.

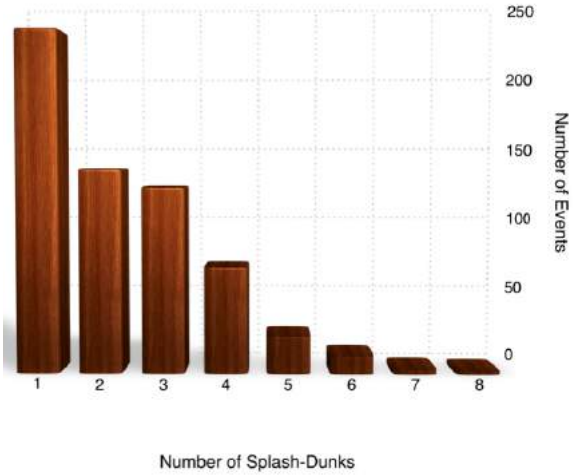

Figure 3. Cumulative splash-dunk data for 602 splash-dunk events observed during 2011–2016.

Temporal Distribution of Splash-Dunking

Another important aspect of splash-dunk behavior is the time of year in which it occurs. We record the date of all the splash-dunks we see (Figure 4). Notice the large peak in September, when more than half of all events are observed. Part of the reason for the September peak is that this is also the peak month for the flight season of the Paddle-tailed Darner (Figure 5). Notice the similarity between the chances of seeing a Paddle-tailed Darner and the chances of seeing a splash-dunk. The main discrepancy is that fewer splash-dunks are seen in July and August than one might expect on the basis of the flight season.

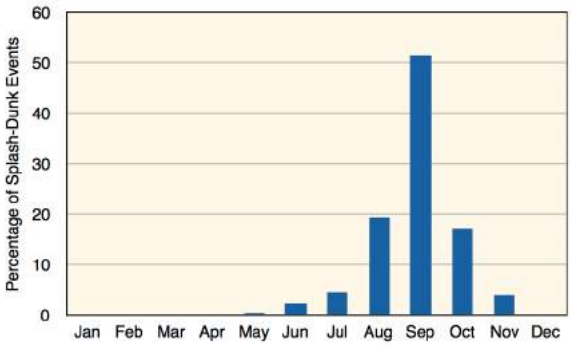

Figure 4. Temporal distribution of 602 splash-dunk events from 2011-2016.

The flight season of the Shadow Darner (*Aeshna umbrosa*) is shown in Figure 6. Again, the flight-season and splash-dunk distributions are similar, but notice that more splash-dunks would be expected in October and November if the Shadow Darner were the primary splash-dunker. It seems that the actual splash-dunk distribution is roughly an average of what one might expect from these two darners.

The Blue-eyed Darner (*Rhionaeschna multicolor*) is also seen to splash-dunk on occasion, and a comparison of flight season with splash-dunks is of interest (Figure 7). Notice the very different temporal distribution for this species compared with the distribution of splash-dunks.

Figure 2 A male Eight-spotted Skimmer (*Libellula forensis*) showing off its flashy wings.

Another reason for a lot of splash-dunking in the fall may be that this is also the season when spider webs carrying young spiders are frequently drifting through the air. It is not uncommon to see darners speeding by in September with a spider web trailing from their abdomen. This is quite possibly the reason for many of the splash-dunks we see.

Splash-Dunk Species

As mentioned above, most of the splash-dunks we observe are performed by Paddle-tailed Darners. We also see Shadow Darners doing splash-dunks, though they seem to hit the water with less force than do the Paddle-tailed Darners. These two species are shown side by side in Figure 8.

We occasionally see splash-dunks performed by the following darners as well: California Darner (*Rhionaeschna californica*), Blue-eyed Darner (*R. multicolor*), and Common Green Darner (*Anax junius*).

Species in other families of dragonflies have also been observed to splash-dunk—like the Eight-spotted Skimmer mentioned above—though usually just in isolated incidents. These species are as follows: Four-spotted Skimmer (*Libellula quadrimaculata*), Eight-spotted Skimmer (*L. forensis*), Western Pondhawk (*Erythemis collocata*), Autumn Meadowhawk (*Sympetrum vicinum*), and Blue Dasher (*Pachydiplax longipennis*).

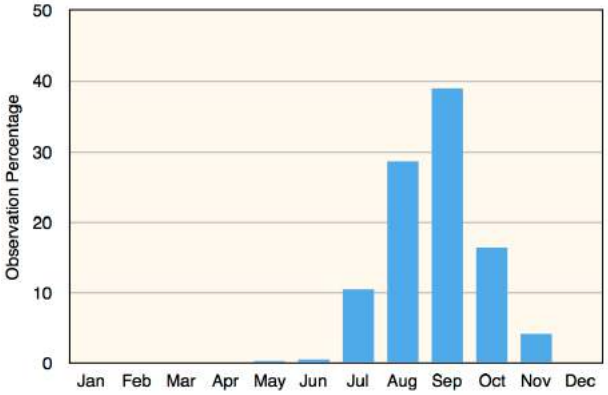

Figure 5. Paddle-tailed Darner (*Aeshna palmata*) flight season.

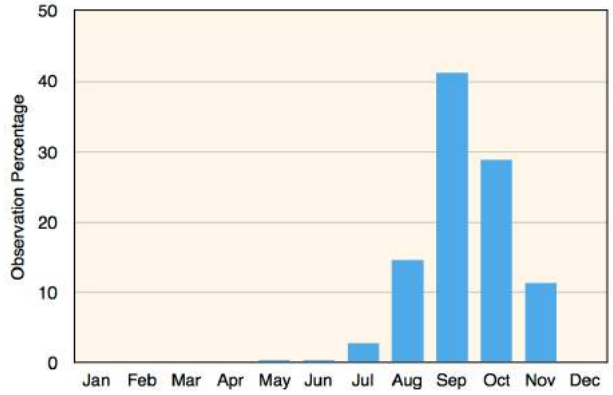

Figure 6. Shadow Darner (*A. umbrosa*) flight season.

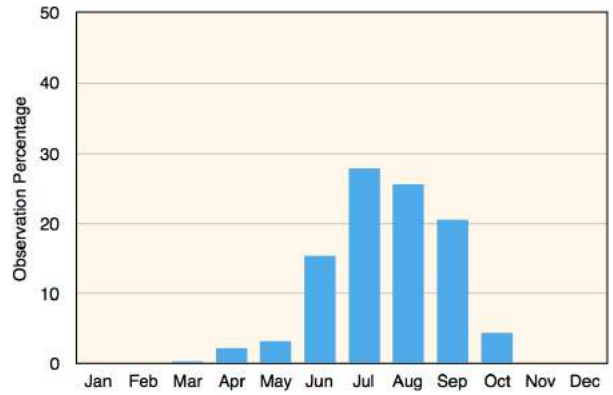

Figure 7. Blue-eyed Darner (*Rhionaeschna multicolor*) flight season.

The Autumn Meadowhawk is notable on this list for being the only species we have observed so far to do a spin-dry while attached in tandem. Their tandem spin-dry was very slow, and lasted for only a couple of rotations.

Spin-Dry Statistics—The Fastest Rotating Animal

A fitting end to a series of splash-dunks is an invigorating spin-dry to shed the water. Data is harder to obtain for a spin-dry than for a series of splash-dunks because the spins happen so quickly. When I get a good slow-motion video of a spin-dry, however, I can then analyze it in detail. This season I added a 13th slow-motion spin-dry video to my collection, giving just that much more specific information on the behavior.

This 13th darner is shown performing one of six splash-dunks it did during the event (Figure 9). It then gained some altitude (perhaps 3–5 feet) and did a spin-dry. This video was detailed enough that I could count the number of frames (filmed at 240 frames per second) corresponding to each individual rotation. As a result, we know that the spin-dry consisted of seven revolutions, lasted 0.458 seconds, and had a maximum spin rate of 1,200 rpm.

Figure 10 collects the results from 13 slow-motion videos of the spin-dry behavior. It shows the spin rate for each event, along with a red line indicating the average value. As can be seen, 1,000 rpm is a good round-figure to characterize spin-drying in dragonflies—the fastest known


Figure 8. A comparison between Shadow Darners (*Aeshna umbrosa*; two at left) and Paddle-tailed Darner (at right; *A. palmata*). These "free range" dragonflies were "whispered" onto my fingers.

rotational motion of any animal.

To be specific, the data from these 13 videos gives the following numerical results:

* Number of rotations per spin-dry = 5.85 ± 1.18

* Time spent spinning = 0.443 ± 0.062 sec.

* Maximum spin rate = 1,060 ± 207 rpm

Finally, the centripetal acceleration associated with a spin-dry is quite large—certainly more than enough to shed water. The angular speed is ω = 1,200 rpm = 111 rad/s, and the corresponding centripetal acceleration is $r\omega^2$, where r is the radius of the spinning object in meters and ω is the angular speed in rad/s (Walker, 2016). It's hard to estimate r, but a reasonable value for a 70-mm darner is somewhere between r = 0.01–0.03 m, giving an acceleration of 120–370 m/s^2. Thus, the spin-dry produces an acceleration ranging from about 10g to 40g, where g = 9.81 m/s^2 is the acceleration due to gravity. This is quite an impressive "g force" for any organism to endure—and they don't even get dizzy.

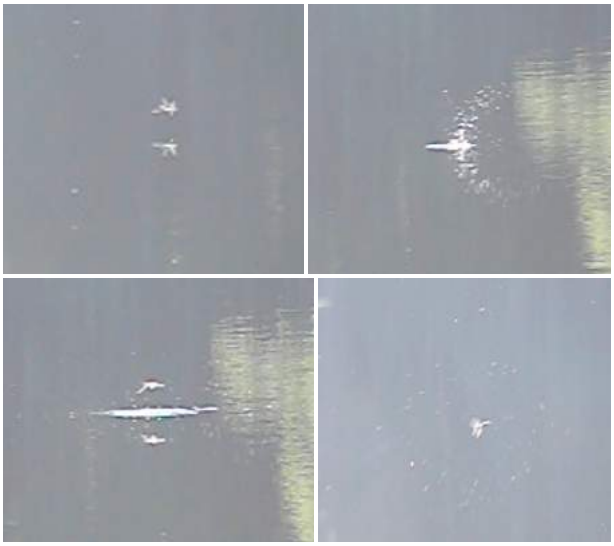

Figure 9. A darner approaches Cranberry Lake (upper left), plows into it (upper right), sending up a plume of droplets as it stops, then emerges to do it again (lower left). A spin-dry at a 1,200 rpm (lower right) sheds a fine halo of water droplets.

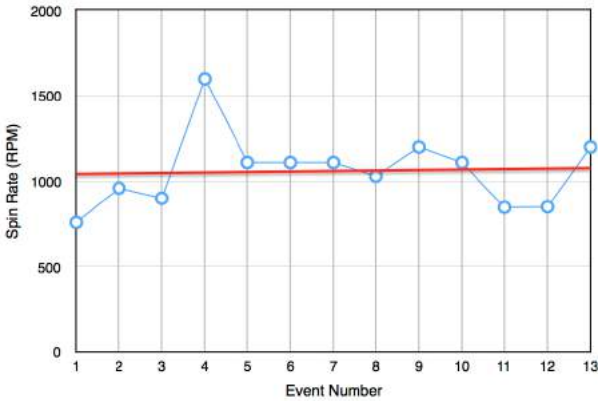

Figure 10. Spin rate for 13 different darners doing a spin-dry. Red line indicates an average value just more than 1,000 rpm.

Future observations may yield videos of other types of dragonflies doing a spin-dry. When this occurs, the comparison with the spin-dry of darners will be of great interest.

Acknowledgements

I would like to thank Betsy Walker for help collecting the data presented here.

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Call for Abstracts: 2017 Northeast Natural History Conference

I'm seeking to build a critical mass of Odonata presentations at the Northeast Natural History Conference in Cromwell, Connecticut, 21–23 April 2017. As a conference session organizer, I'm welcoming abstracts on odonatology or closely related orders. Once I receive four worthy submissions, we'll put on a formal "session" at the conference. Find details about the gathering at <https://www.eaglehill.us/NENHC_2017/NENHC2017.shtml>. Please e-mail abstract ideas to me at <bryan.pfeiffer@uvm.edu>. Thanks!

Bryan Pfeiffer

Odonata in the News

Odonata in the News is compiled by the Editor. Please feel free to send alerts about any noteworthy odonate-related items such as news stories, popular articles, and scientific publications to me at <editor@dragonflysocietyamericas.org>. A sampling of recent newsworthy Odonata includes:

Bybee S., A. Córdoba-Aguilar, M.C. Duryea, R. Futahashi, B. Hansson, M.O. Lorenzo-Carballa, R. Schilder, R. Stoks, A. Suvorov, E.I. Svensson, J. Swaegers, Y. Takahashi, P.C. Watts, and M. Wellenreuther 2016. Odonata (dragonflies and damselflies) as a bridge between ecology and evolutionary genomics. Frontiers in Zoology 13: 46. Odonata (dragonflies and damselflies) present an unparalleled insect model to integrate evolutionary genomics with ecology for the study of insect evolution. Key features of Odonata include their ancient phylogenetic position, extensive phenotypic and ecological diversity, several unique evolutionary innovations, ease of study in the wild and usefulness as bioindicators for freshwater ecosystems worldwide. In this review, we synthesize studies on the evolution, ecology and physiology of odonates, highlighting those areas where the integration of ecology with genomics would yield significant insights into the evolutionary processes that would not be gained easily by working on other animal groups. We argue that the unique features of this group combined with their complex life cycle, flight behaviour, diversity in ecological niches and their sensitivity to anthropogenic change make odonates a promising and fruitful taxon for genomics focused research. Future areas of research that deserve increased attention are also briefly outlined.

Kietzka G.J., J.S. Pryke, and M.J. Samways. 2016. Aerial adult dragonflies are highly sensitive to in-water conditions across an ancient landscape. Diversity and Distributions doi:10.1111/ddi.12493. Adult dragonflies are renowned for being good bioindicators of anthropogenic change, but their response to the heterogeneity of undisturbed river systems has received little investigation. The Cape Floristic Region (CFR) has had a long lineage of natural selection which has honed life stages to the fine grain of the river systems. This leads to the intriguing question: How sensitive are the aerial adults to the in-water conditions? Rivers of the CFR, in the Western Cape Province, South Africa, are naturally heterogeneous and complex ecosystems running across a geologically ancient landscape. The CFR is a significant centre of local endemism for many taxa, including dragonflies. We investigated dragonfly assemblages and 20 environmental variables along untransformed reaches of three CFR rivers. We found that each river has its own particular 'signature' dragonfly assemblage. We also found that certain in-water parameters were the most important factors driving adult dragonfly assemblages, and not variables associated with substrate or riparian vegetation under these historic, natural conditions. This responsiveness to a heterogeneous range of in-water variables was similar from one river to the next, and also was independent of species turnover among the different dragonfly assemblages. From a conservation perspective, the natural variation in certain water parameters, particularly in-water conditions, is essential for supporting the full suite of adult dragonfly species. Challenging but important for conservation planning is that each river has its own biotic merit. Addressing this challenge also means maintenance and restoration of historic, heterogeneous, in-water conditions in addition to the removal of alien invasive trees which are already known to be highly detrimental to this largely irreplaceable dragonfly fauna. Prioritizing which rivers to conserve can be achieved through using indices involving dragonflies.

da Silva Monteiro Jr., C., M.C. Esposito, and L. Juen. 2016. Are the adult odonate species found in a protected area different from those present in the surrounding zone? A case study from eastern Amazonia. Journal of Insect Conservation 20(4): 643–652. We studied 30 streams in eastern Amazonia, 17 of which were located within a protected area (PA) and the other 13 in the surrounding zone, with the objective of evaluating the diversity of adult Odonata and differences between the physical habitat variables of the two environments. We hypothesized that a greater diversity of odonate species would be found in the PA due to a greater complexity of habitats. This hypothesis was rejected, however, due to the greater odonate diversity found in the surrounding zone in comparison with the PA. Differences were also found in the species composition of the two environments. Our results indicate that there are differences between the environmental variables in the areas, and the few alterations observed in the surrounding zone may have contributed to the formation of new conditions and habitats appropriate for species that may have been rare. The PA, despite having reduced species richness and abundance in comparison with the surrounding zone, was nevertheless characterized by a more heterogeneous species composition. A quarter of the species were common to both environments, while 34% were exclusive to the surrounding zone. In this case, it appears that the combination of the protected area and the surrounding zone, which has a low level of disturbance, conserves a wider range of specialist species than either area on its own. The great challenge in the future is finding a way to identify the disturbance levels that would be acceptable, and to prevent over-exploitation of resources in such areas.

Tichanek, F. and R. Tropek. 2016. The endangered damselfly *Coenagrion ornatum* in post-mining streams: population size, habitat requirements and restoration. Journal of Insect Conservation 20: 701. The damselfly *Coenagrion ornatum* represents a threatened species of lowland headwater streams. Although the species is threatened in Western and Central Europe, it is known at a system of post-mining drainage ditches in the Radovesicka spoil heap (northwestern Bohemia, Czech Republic). This study aimed to estimate its population size in this post-mining stream system, and to explore habitat preferences of both its larvae and adults with respect to various environmental factors. The adults were captured-recaptured along 5.2 km of the ditches in June 2012; larvae were sampled in 64 study sites (i.e., 27-meter-long sections of the same ditches) in April 2012. The adult population size was estimated via log-linear models with the robust design on 4544 individuals (1560 ± 391 females and 2983 ± 298 males). Larvae were present in a third of the sections. GLMs revealed that both larvae and adults required emergent vegetation with a high proportion of Eleocharis spp. plants. The adults preferred the slow-flowing and shallow streams with 2-meter-high banksides covered by intermediately tall vegetation (~40 cm), whereas the larval abundance was supported by a high in-stream vegetation heterogeneity and a patchy cover of rocks on the streambeds. These results indicate that the post-mining streams could represent a valuable secondary habitat for the complete life cycle of this relatively large population of the endangered headwater specialist. Therefore, we recommend consideration of the conservation potential of such ditches during post-mining sites restoration and their subsequent management.

Johnson, J.T. 2016. *Leptobasis linda sp. nov.* from Ecuador (Odonata: Coenagrionidae). Zootaxa 4171(2): 373–381. *Leptobasis linda* is described from the Pacific lowlands of Ecuador. The coloration of mature individuals is superficially similar to the widespread *L. vacillans*, but structural and color characteristics differentiate *L. linda* from all congeneric species. The male caudal appendages and the female posterior margin of the prothorax are unique among *Leptobasis*.

Bried, J.T., , A.M. Siepielski, D. Dvorett, S.K. Jog, M.A. Patten, X. Feng, and C.A. Davis. 2016. Species residency status affects model selection and hypothesis testing in freshwater community ecology. Freshwater Biology 61(9): 1568–1579. Species occurrences have multiple ecological states that may strongly influence community analysis and inference. This may be especially true in freshwater systems where many animals have complex life cycles with adult dispersal and juvenile resident stages. The effects of ecological state variation on standard empirical approaches are largely unknown. Here, we analysed the effects of natal resident versus non-natal immigrant species occurrence on community-level environmental gradient modelling and spatial–environmental hypothesis testing using adult dragonflies and damselflies as model taxa. Resident and total (resident + immigrant) occurrences of these taxa responded to different sets of environmental variables and resident occurrences reduced model selection uncertainty in 75% of test cases. Effects of environmental gradients, spatial gradients or both were observed in residents but not immigrants, and supported predictions of dispersal limitation and niche-based species sorting often implicated for structuring freshwater communities. These results indicate that resident-only analysis of the dispersal stage should improve multi-model inference and detection of spatial–environmental effects in freshwater community ecology. The species resident–immigrant dichotomy neglects population dynamics and individual variation yet apparently marks an ecologically significant boundary that scales up to influence community-level occurrence patterns.

Sisson, M.S., C.A. Santamaria, A.J. Smith-Herron, T.J. Cook and J.L. Cook. 2016. Geographical color pattern of *Argia apicalis* (Odonata: Coenagrionidae) in the absence of molecular variation. Florida Entomologist 99(3): 355–362. The blue-fronted dancer, *Argia apicalis* Say (Odonata: Coenagrionidae), is an ecologically vagile species inhabiting both pond and stream environments of the eastern United States. Variation in color pattern in *A. apicalis* occurs between a southeastern United States morph and a south Florida morph. Southeastern populations often are described as "typical" with a predominantly bright blue pterothorax and narrow black humeral stripe, whereas the southern Florida populations are "atypical," with a bright blue pterothorax and larger, wider black humeral stripes. Variability in color pattern has caused some researchers to question the true identity of the Florida morph. This study used color pattern and mitochondrial cytochrome-b sequences to test the species identity of the two *A. apicali*s geographical color morphs. Mitochondrial cytochrome-b gene sequences showed that there is a single haplotype, showing no divergence between individuals, populations, or regions. This study is the first to test if color pattern variation is correlated with molecular characters within this species.

Khelifa, R., ,M.K. Mellal, A. Zouaimia, H. Amari, R. Zebsa, S. Bensouilah, A. Laouar, and M. Houhamdi. 2016. On the restoration of the last relict population of a dragonfly *Urothemis edwardsii* Selys (Libellulidae: Odonata) in the Mediterranean. Journal of Insect Conservation 20(5): 797–805. The restoration of endangered relict populations is challenging in conservation biol-

ogy because they require specific environmental conditions within an inhospitable regional climate. *Urothemis edwardsii* Selys is the most endangered dragonfly in the Mediterranean with only one known relict small population (Lac Bleu) left in Northeast Algeria. With the absence of successful (re-)colonization over the last two decades, the restoration of the species became a top priority. To improve the status of the species in northeast Algeria, we carried out a reintroduction and translocation scheme during 2011–2015 and assessed the changes in distribution and population size. Our restoration plan led to the emergence of three populations of which one was restored (Lac Noir), one resulted from successful translocation (Lac Tonga Northeast), and one established after successful colonization (Lac Tonga Southwest). In three localities (Lac Noir, Lac Tonga Northeast, and Lac Tonga Southwest), signs of population growth were observed, whereas no significant trend in the source population (Lac Bleu) was detected. A new population (El Graeate) was also recorded in 2015, but its origin is uncertain. Capture-mark-recapture on adults conducted in 2015 in two sites (Lac Bleu and Lac Noir) showed low recapture rates and no sign of dispersal between the two sites. Dispersal capacity of the species and conservation implications of adult distribution are discussed. This study highlights the importance of using biological indicators in selecting host habitats for the restoration of critically threatened populations.

Lorenzo-Carballa, M.O., C. Hassall, A.C. Encalada, I. Sanmartín-Villar, Y. Torres-Cambas, and A. Cordero-Rivera. 2016. Parthenogenesis did not consistently evolve in insular populations of *Ischnura hastata* (Odonata, Coenagrionidae). Ecological Entomology DOI: 10.1111/een.12360. The evolutionary advantages that have driven the evolution of sex are still very much debated, and a number of benefits of parthenogenesis over sexual reproduction have been proposed. In particular, parthenogenetic individuals are thought to exhibit higher probabilities of establishment following arrival in new, isolated habitats such as islands. One notable example of parthenogenesis occurring in islands is the damselfly *Ischnura hastata*, an American species that has colonised the Azores archipelago, where the populations consist only of females. This is the only known example of parthenogenesis within the insect order Odonata. Here, two island populations of *I. hastata* were studied, one in the Galapagos and one in Cuba, to test whether island colonisation is consistently associated with parthenogenesis in this species. Field capture–mark–recapture studies and laboratory rearing of field-collected eggs were undertaken in both areas. 4. Sex ratios in the field were found to be heavily female-biased among mature individuals; however, fertility rates of field-collected eggs were high, and the sex ratios in the laboratory did not differ from 1:1. Data from laboratory rearing showed that shorter larval development times and shorter adult life spans in males result in protandry, which might explain the skewed sex ratios in the field. These findings are consistent with sex differences in key demographic parameters which could predispose *I. hastata* to parthenogenesis. However, the Azores population of *I. hastata* remains the only documented case of asexual reproduction in this insect group.

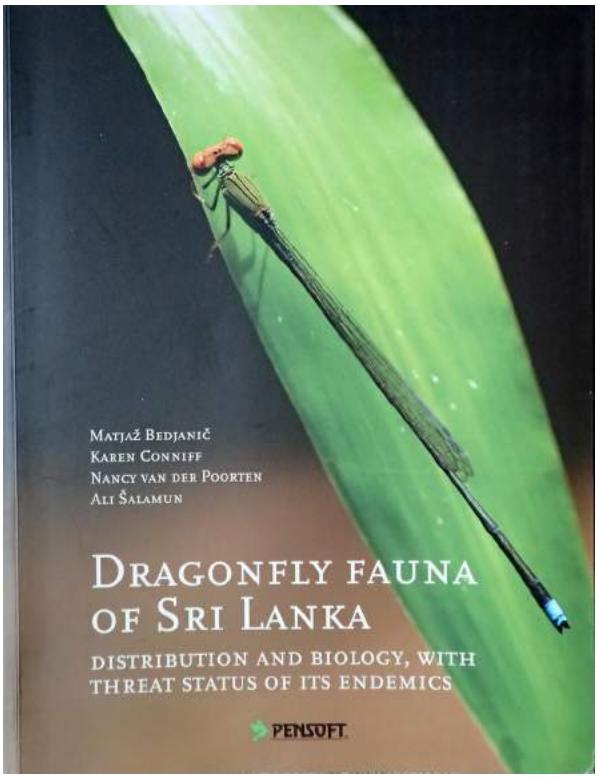
García-García, P.L., G. Vázquez, R. Novelo-Gutiérrez, and M.E. Favila. 2017. Effects of land use on larval Odonata assemblages in cloud forest streams in central Veracruz, Mexico. Hydrobiologia. 785: 19. doi:10.1007/s10750-016-2900-x. This study analyzes the effect of stream water quality and its relationship with habitat characteristics on larval Odonata assemblages in streams found in tropical montane cloud forests, pastures, and coffee plantations in the upper La Antigua River watershed. The main factors that influenced larval Odonata assemblages in forest streams were low temperatures and high oxygen levels in water, coupled with a high diversity of the substrate and riparian vegetation; in pasture streams and coffee plantation streams, sedimentation strongly affected the composition of larval Odonata assemblages. In all the streams, species richness (${}^0D$) was higher during the dry season. The highest Shannon α diversity (${}^1D$) values were found in forest streams during the rainy season; however, in pasture and coffee plantation streams, ${}^1D$ values were higher during the dry season. The low species turnover in forest streams suggests that these streams provide highly stable conditions for Odonata assemblages; however, in pasture and coffee plantation streams, the higher turnover was related to the more variable water and habitat conditions. Thus, the persistence of Odonata assemblages in the upper La Antigua River watershed is closely related to the conservation status of the tropical montane cloud forests.

Robert C. Glotzhober was interviewed as part of a story for public broadcasting on PRX by Renee Wilde, out of Yellow Springs, Ohio. He met her on the banks of Big Darby Creek, and they talked about dragonflies and migration and dragonflies and clean water. Her recording can be heard at <http://www.prx.org/pieces/186775-dragonfly-swarms>.

Book Review: Dragonfly Fauna of Sri Lanka: Distribution and Biology, with Threat Status of its Endemics, by Matjaž Bedjanič, Karen Conniff, Nancy van der Poorten and Ali Šalamun

Dennis Paulson <dennispaulson@comcast.net>

Dragonfly Fauna of Sri Lanka, Distribution and Biology, with Threat Status of its Endemics. Pensoft, Sofia, Bulgaria, 2014, 320 pp. Available for 90 Euros + postage or Open Access download at <http://books.pensoft.net/book/12977/dragonfly-fauna-of-sri-lanka-distribution-and-biology-with-threat-status-of-its-endemics>.



Having written two dragonfly guides and seen most of the rest that are available in the world, I can call this book one of the best regional Odonata books I have ever seen. It is a very useful combination faunal list and identification guide, and I think any question one might ask about Sri Lankan Odonata has been answered here. It is so much more than a guide to the species, truly the results of an intensive and extensive consideration of the fauna of this island. Recommendations by the authors for further research and conservation are very important and usually lacking from such works.

The accounts for each species are far lengthier than one can find in most books of this sort. Occurrence records are divided into historical periods graphically and on the range maps, of importance in this age of climate change and often declining populations. By showing relief on the maps, a much better idea of the ecological situation in the island and how that influences the restricted distribution of many species is shown. The altitudinal and seasonal graphs are also a great asset. Commendably, all literature records are listed for each species, a feature of checklists rather than popular guides but one that will be very helpful for anyone studying the fauna. It is as if the four authors have a great collection of such books among them and were able to choose the best ideas from all of them.

By publishing the book at a large size, the beautiful photos are large enough even though they take up a relatively small part of the page. Specimens were photographed in the small number of cases in which no photos from nature were available. Many habitat photos are presented as well. In the index of photo credits, the authors couldn't resist adding still more photos of many species. The only thing missing is drawings of appendages and other structures that might be helpful for identification, but the thorough text descriptions provide a wealth of information that facilitates identification very well.

But it gets even better. This terrific book is available as a free download! If you want to own the paperback version, you can order it from Pensoft.

2017 Northeast DSA Regional Gathering: 13–16 July in Vermont and New Hampshire

Bryan Pfeiffer <bryan@bryanpfeiffer.com>

Northern *Somatochlora* (Striped Emeralds) and other boreal species are among our objectives for the 2017 regional meeting of the Northeast chapter of the Dragonfly Society of the Americas in July. Although we have no lodging or field sites selected just yet, our base will be somewhere in northern Vermont or New Hampshire—not too far from bogs or high-elevation sites.

Target species include *Somatochlora albicincta* (Ringed Emerald), *S. cingulata* (Lake Emerald), *S. kennedyi* (Kennedy's Emerald), *S. incurvata* (Incurvate Emerald), and *S. minor* (Ocellated Emerald), among others.

Reaching some of these species may require a bit of mountain climbing. But our lowland sites will offer opportunities for the *Somatochlora*, as well as such crowd-pleasers as *Calopteryx amata* (Superb Jewelwing) and *Stylurus scudderi* (Zebra Clubtail).

By sometime in January, I'll have more information about the meeting posted to <http://bryanpfeiffer.com/nedsa/>. Until then, save the date: 13–16 July 2017.

Ringed Emerald (*Somatochlora albicincta*), 3 July 2007, Vermont. Photo by Bryan Pfeiffer.

All-new Dragonfly ID 2.1 Mobile App

From BirdsEye Apps:

FREE in the App Store: Enhanced "Field Guide" format with SmartSearch

This release of Dragonfly ID is a true field guide. Not only will you see what's nearby just like in the old version, the app experience has been re-designed to focus on identification. In addition to a list of species and an updated "Smart Search" feature, each species account provides a detailed description of the species highlighting ID, habitat, and abundance.

Sightings are now displayed in a "Range Map" view and the entire list of species is available in the Table of Contents. You have a choice to display all dragonfly and damselfly species in North America, to show only those species in your area, or to show species found in several regional hotspots throughout the U.S.

Key Update Features

A complete re-design that is, we think, cleaner, more intuitive and easier to use, including zoomable photos and photos of every species in the continental U.S. and Canada (we're still missing text for many species.... if you'd like to help, please let us know.), and convenient regional lists

Plus...you can now submit sightings from the app. BUT, there are a few big limitations to be aware of—most importantly, sightings cannot be edited after submission (we're working on it).

Also, sightings submitted through the Dragonfly ID are stored on our BirdsEye Nature Apps servers and are not regular OdonataCentral reports, and are not vetted by experts. Sightings will be visible to the public via the app but not initially via the OdonataCentral website. In the future (~1 year?) sightings will integrate with the OC website. For now, think of this as a way to keep track of

your personal sightings. We will be adding improvements over the next few months to enhance this initial release.

Please don't submit "junk" or "test" sightings (i.e., data that you know or suspect to be erroneous)! If you want to test this functionality, please use actual sightings to do so. If you notice any erroneous sightings let us know, and we will remove them.

Again, this is a first release of the new design and two features of the old version are still missing: OdonataCentral life list sync and "Needs" lists based on your OC life list- Those are on our "to do" list.

We hope you like the new format, and would love to hear what you think. So, download the app soon and let us know. For more information, visit us at <http://www.birdseyebirding.com/apps/dragonfly-id-app/>or download it from the App Store at <https://itunes.apple.com/us/app/dragonfly-damselfly-field/id1011910922?mt=8&at=11ldCs>.

Photo Submissions for Argia

Would you like to contribute a photo as a possible front or back cover "glamour shot" for Argia? We use high-quality images in TIFF or JPEG format with a resolution of at least 300 ppi at 6.5 inches in width. **Please check your image resolution before sending!** Photos of an interesting behavior or specimen may be suitable for Parting Shots if they have a resolution of 300 ppi at column width (3.2 inches).

Please send your photos as e-mail attachments to <editor@dragonflysocietyamericas.org> (up to 15 Mb), via a file transfer service, or in GoogleDrive, **NOT in the body of an e-mail or document!** Photos may be used in later issues, but will never be used for purposes other than Argia, and the copyright is retained by the photographer. Please include date, location (state and county at minimum), and photographer's name for each photogaph.

How I Fell Into the Clutches of the Odonata

This feature presents essays from DSA members describing how, when, where, and why they first became interested in Odonata. It also doubles as a fun way for members to find out a little more about each other. If you would like to contribute, write a short essay describing your first forays into the world of Odonata and how it has affected your life since, including your most interesting ode-hunting tale, and send it to the Editor at <editor@dragonflysocietyamericas.org>. Pictures to illustrate the tale are encouraged. Whether you are discovering odonates this year or have pursued them for decades, I know there are plenty of interesting, entertaining, and inspiring stories out there to be told!

Dragonfly Discoveries, by John Michalski <huonia@aol.com>

I was always a science and nature kid. When I was about five years old, my classmate and neighbor Rodney taught me how to catch and pin butterflies, a skill he had learned from his father, who was an inventor for Bell Labs. Together, we scoured the neighborhood and the nearby woods for years. The prize catch of our young lives was a freshly-emerged Luna moth that appeared on the screen door of Rodney's porch—I would be nearly out of high school before I matched it. Between us we owned the How and Why Wonder Book of Insects, the Herbert S. Zim guide to Butterflies and Moths, and every other introduction to bug collecting that was available to us. But by the age of ten, when most of the other kids, including Rodney, had drifted off into the Cub Scouts, Little League, and Peewee Football, I was left to wander the local woods pretty much on my own.

I had not realized how unusual it was for a sixth-grader to browse the 590 section of the public library, working my way through Edwin Way Teale's Life of the Ant, Gene Stratton Porter's Moths of the Limberlost, and Holland's Moth Book, until I reached University at Rutgers Cook College in New Brunswick, New Jersey. It was nearly the end of my freshman year as a Biology major, when I discovered a listing in the course catalogue for "General Entomology."

"What!?", I must have thought, "You mean, they teach classes in this?" Somehow I had spent my youth reading and re-reading my way through dozens of scientific works on the study of insects, without ever quite making the connection that somebody had had to write the stuff. I had always recognized that my favorite authors were "Doctor" this and "Professor" of that, but it had never occurred to me that there were places in the world where I might actually meet such people—or better yet, perhaps join their ranks one day.

As a child it had always been my fantasy to live life as an explorer of jungles and a discoverer of new discoveries. (New discoveries, I always felt, were the way to go—old

discoveries never seemed to excite anyone.) My family was of city stock—my parents born and raised in Queens and Brooklyn, but moved into the burgeoning suburbs of rural New Jersey shortly after I was born. So I had the benefit of unspoiled woodlands a short walk from my house, and the American Museum of Natural History, the Bronx Zoo, and the Coney Island Aquarium less than an hour away by car. And my parents took me to all three at least once a year.

The difficulty for me was that I didn't know how a career of exploring jungles and discovering new discoveries was founded. It seemed, at the time, that you had to be a "professor" at the AMNH or the Smithsonian, or a writer for National Geographic to get such work, and I didn't have a clue how those people got there.

But the class in General Entomology was a start. And as soon as I walked into the classroom at John B. Smith Hall, it was evident that Rutgers had an entire department devoted to the study of insects! Who knew? As soon as class let out I was shown to the head office, where I could set the wheels in motion to declare myself a "minor" in Bug Science (at RU they called it an "option"; doesn't have the same ring to it, but in this life you sometimes take what you get.)

First day in my new department I was introduced to Dr. Rad Roberts (sadly now deceased, far too young, from cancer) who was to be my faculty advisor. "How did you come to the science of Entomology?" was his first question. To my surprise—the first of many replays of this very discussion—he was delighted to find in me a devoted Nature Boy who had been collecting insects of every size, shape, and description since my childhood. I was soon to discover that almost none of my fellow Ento students came from a similar background. Most were in it for the chance to pursue other research projects using insects as convenient "lab animals". For the ensuing three years I was regularly consulted by graduate students several years my senior, bug in hand, asking me "What kind of beetle is this?" and "Is this a chironomid?" I was frankly shocked that so few advanced students of Entomology had any background at all in going afield and collecting their own specimens. I was in it for the sheer love of insects, and they were in it only peripherally. I greeted this revelation in stunned silence—and, I have to admit, a little bummed-out.

"What sorts of insects do you collect?" Dr. Roberts wanted to know. "All sorts," I began, "Butterflies, of course, but also beetles, dragonflies…" "We have a dragonfly specialist in our department," Dr. Roberts replied. "Dr. May has an office directly below mine on the first floor. You should go and introduce yourself."

Mike May was probably in his earliest 40s at that point and had just, along with his wife Leslie, had his son Jamie, who would one day go on to become, among other things, my first godchild. (In those days people did not yet realize that I should in no way be trusted with the moral upbringing of our nation's youth. Now that I've been a school teacher for about 20 years it is apparent that people have still not caught on.)

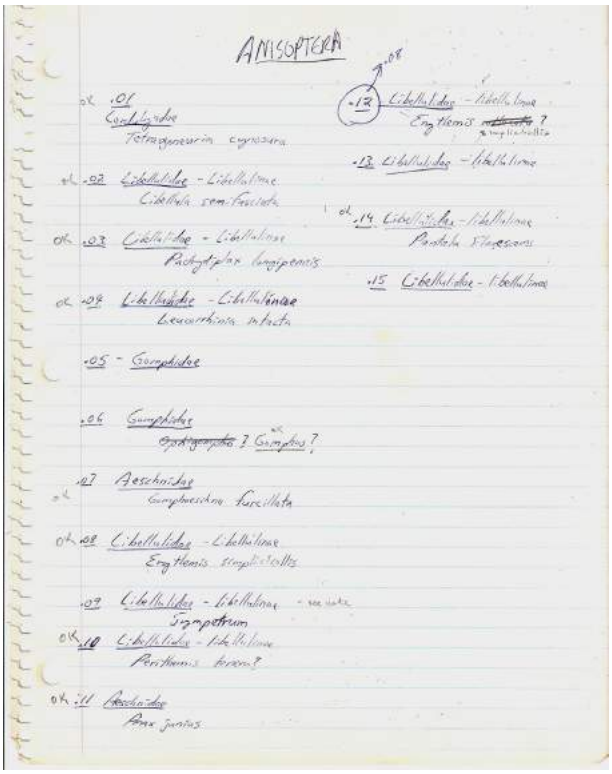
Mike's deep southern drawl and resplendent beard were a great novelty among the first-year students whom he was required to lecture in one or two chapters of biology each year, and several of my new friends and I became familiar with both as the year progressed, but my first encounter with the man was this very moment when Dr. Roberts encouraged me to drop in following our chat.

Mike's office was a tight space, probably about 10 feet on a side, with glass-fronted cabinets over enameled metal work desks, his own desk suspended in the center of this rather filled-up cubbyhole. Long, skinny brown cardboard boxes the size of a loaf of Wonderbread stood in rows here and there—the classic "long boxes" used to house dragonfly specimens. There was a whiff of mothballs in the air too. Mike's desk was stacked with photocopies and scribbled-on legal pads. The Professor was, as I recall, eating a peanut-butter sandwich (or perhaps tuna fish) when I knocked on his door. I explained why I was there and he encouraged me to drop by after classes with my one box of pinned dragonflies, and he would show me how to identify them.

The book—the only book—was Needham & Westfall's Dragonflies of North America. I still remember, about a year later, having finally decided to purchase my own copy, the novelty of entering a good, small-town bookseller—remember those?—and finding the title in one of their enormous, bound indexes of publications, and paying what was for me the colossal sum of $54.00 for the volume. Of course I still have my copy, worn-out and well-loved, in a prominent position on my odes bookshelf.

Mike taught me the rudiments of odonate classification and identification—depending to a great extent on constant referral to the labelled wing diagrams near the front of the book—and I pinned a series of identification numbers to my specimens so that I could write my IDs on a sheet of notebook paper for Mike's approval or redirection. (There were fifteen specimens of dragonflies, and I no longer recall if I had collected any damselflies at the time.) More than 30 years later, I was surprised and delighted to discover that I still have that sheet of paper in my possession (see photo).

By the time I had struggled through N&W enough times to identify those 15 bugs, I was hooked on dragonflies for keeps. That spring was the beginning of my quest to sniff out odonates from every seepage, stream, and pond in northern New Jersey (which has quite a lot of them). My best friend at the time, Al Barlow, joined me in this pursuit, and for much of the next ten years we traversed New Jersey for dragonflies and damselflies anywhere we could find them, and eventually found quite a number of new records for the State. (Al eventually went on to a self-made career with the Nature Conservancy and the New Jersey Department of Environmental Protection, where he co-authored the spiral-bound identification guide to the odes of New Jersey and became a self-taught expert in rare and endangered freshwater mussels, among his many other accomplishments.)



Round about the same time—probably in 1983—I had purchased, from a commercial dealer in dead insects, a package described to me as "an assortment of ten unidentified dragonflies from New Guinea and Malaysia." Most, it turned out, were common species found in developed lowland areas throughout the Pacific region, but at the time they were all as new to me as if they had come from Mars. Mike was no expert on Asian odes, but he had the experience and resources to locate papers by such founding fathers as M.A. Lieftinck (New Guinea and the Dutch East Indies), James Needham (the "China Manual") and others of whom I'd never heard until then. It was very difficult in 1983 for a North American to obtain copies of Lieftinck's numerous papers on the region, so I made do with whatever we could get, and in the end it took me several years before I had names for all 10 of the specimens in that first box. But the experience was invaluable—I had learned how the thing was done, and along the way I became fascinated with the dragonflies of New Guinea.

This fascination eventually led me to gather together everything that had been published on the fauna, and in the process I became interested in the culture and history of the island, which in turn led me to go solo across the country in the summers of 1994 and again in 2004. A handful of new species came out of that, which gave me the great pleasure of putting my own names to things previously unrecognized by science. In 2012 my efforts to compile and reorganize the literature on New Guinean odes were fulfilled in the "big book" that I self-published, and my satisfaction was complete.

There was also, throughout the 1980s and 90s, my meeting and subsequent friendship with Nick & Ailsa Donnelly, and a lengthy and lovingly-recalled interlude involving the Caribbean island of Trinidad, and a beautiful and dynamic young woman from that place, but those are stories for another occasion. (*JM has written two guides to tropical Odonata, and writes travel nonfiction under the pseudonym Chuck McAllister.*)

Of Odes and Citizen Science, by Ann M. Graf <annmgraf@gmail.com>

My parents instilled in us a love for nature, and my father specifically a love of photography and all the details to be seen in various parts of the natural world. This included a fascination with what some might overlook on a Sunday stroll in the park or nature center, including bugs. I have followed his photographic lead and began toting a camera pretty much everywhere since I was in my late teens. Now at 51, I always have at least my phone with me to capture any interesting image.

This appreciation for the natural world, and the fact that both of my parents and I have master's degrees in library science, leads me to read a lot and often non-fiction works of natural history. About 20 years ago I read a book that changed my life: Read Richard Conniff's Spineless Wonders: Strange Tales from the Invertebrate World (1996). This volume includes the chapter "Lions of the Pond" wherein he introduces the reader not only to the odes themselves, but to those who chase them, devoting hours and hours to their study and enjoyment, adding as many species as possible to their life lists. I clearly remember thinking, when Conniff described these dragonfliers gath-

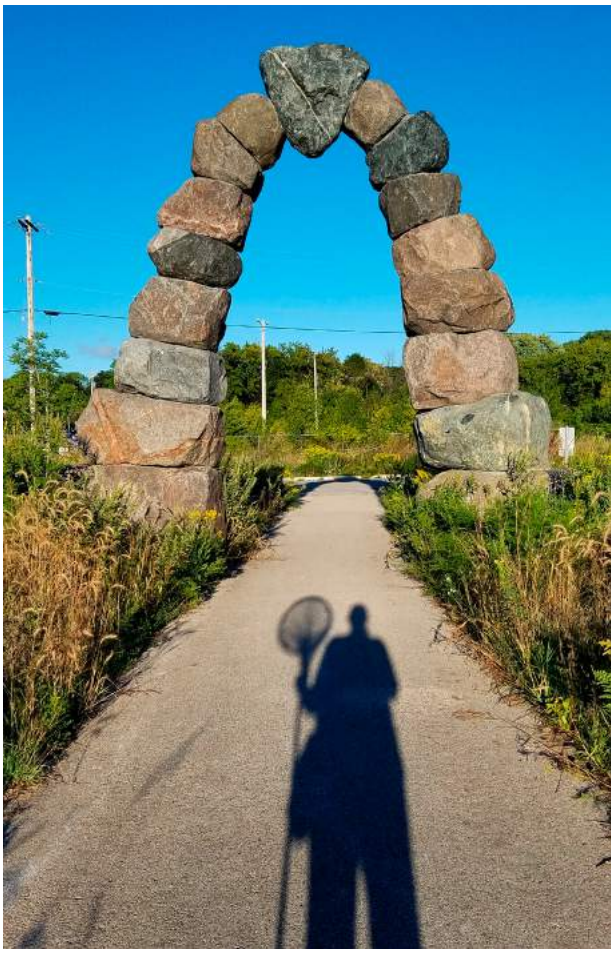
ered at an outing by a pond in southeastern Arizona, that there is no way these people actually were able to identify what species some of them were—in flight, zipping by over the water!

I began to be "aware" of dragonflies. There was the dragonfly with the distinctly marked wings that we found and photographed on the sidewalk outside Dad's back door one cool, early autumn day about 15 years ago. A little research revealed it was *Tramea onusta* (Red Saddlebags). Later, once I really began to fall into the clutches of the Odonata, this was the first (and only) species I knew by Latin name. Then there was that time up north when out canoeing and a number of dragonflies came to rest on the gunwales, bow, and stern while we drifted in Kangaroo Lake in Door County, Wisconsin.

Another nudge toward the Odonata came after running into researchers at The Ridges Nature Sanctuary in Baileys Harbor years ago and finding out about the extremely rare and endangered Hine's Emerald (*Somatochlora hineana*). I learned then that The Ridges hosts the largest known population for the species, right here in Wisconsin, in Door County where our family had been vacationing every year since the 1970s.

Seeds like this were planted in my life and then seemed to accumulate once I discovered the Urban Ecology Center (UEC), a Milwaukee organization devoted to environmental outreach and education, preservation, and appreciation for the natural world around us in the middle of our urban environment. We began to be regular visitors to the UEC in the early 1990s, taking our expanding family there often when the kids were young to expose them to the wonders of nature close to home. One of my four children in particular became interested in the UEC when he began to attend college at the University of Wisconsin-Milwaukee, and he became a regular volunteer there, eventually changing his major to Environmental Science. I had gone back to school myself and began a Ph.D. program in Information Studies in 2012 when, following my son's lead, I began to explore volunteer opportunities at the UEC located close to the UWM campus (there are now three branches as the UEC has expanded to various areas of the city).

Using my visits to the UEC as a break from the rigors of my Ph.D. studies, I soon learned about the Citizen Science program and their invertebrate monitoring group. I attended a workshop specifically to train volunteers in the survey of odonate species in the spring of 2015, and this is when those clutches of the odonata really clamped down tightly.



The shadow of a citizen scientist—Ann Graf at UEC.

Last season, in 2015, I became a regular and enthusiastic participant in the ode surveys at the three branches of the UEC, conducting roughly 3–4 surveys a month when my schedule permitted. I was a complete newbie (except that I knew *Tramea onusta* if I was ever to see one again) but under the knowledgeable and encouraging "wing" (pun intended) of UEC Citizen Science Coordinator Jennifer (Jenn) Callaghan I began to be able to identify several species in hand, and—amazing to me—in flight! The season wrapped up and I experienced my first withdrawal symptoms, already looking forward to my season two.

This year I bought my own net, added to my collection of ID tools, including books, binoculars, hand lens, and sturdy boots to wear into wet habitat. I attended every single UEC survey that I could. Jenn suggested, based on my obviously developing obsession, that we attend the Wisconsin Dragonfly Society (WDS) Annual Meeting near Black River Falls in June. I jumped at the chance, packing supplies, boots, sunscreen, and bug spray and heading off into some of the most beautiful dragonfly habitat I had yet to see. It was during this trip that I finally met what my older son affectionately calls my personal Nerd

Herd. These wonderful people were passionate, knowledgeable, and patient with me as I tried to soak up as much information as I could during these two short days. We had perfect weather and I saw species I had never heard of, improved my netting and ID skills, learned so much, and became even more dedicated to the pursuit of odes. I received encouragement from so many on this trip, including WDS founder and current Dragonfly Society of the Americas president-elect Bob duBois.

I owe the largest debt of gratitude for what I've learned to Jenn at the UEC. As citizen science coordinator, she is tireless in her efforts not only to collect environmental data, but to teach others how to share in the process, why it is important, and how the use of collected data is proof of the positive effect that the three branches of the UEC is having on Milwaukee area ecosystems. She has been willing not only to drag a newbie across the state to the WDS annual meeting, but also to run to other parts of the state on the weekend in the hope of finding some not-yet-reported county records. She was also willing, a week later, to run back down to said habitat with me to try to find that Blue-tipped Dancer (*Argia tibialis*) we had in hand (a county record) but forgot to photograph to add to the Wisconsin Odonata Survey database. Unfortunately, we did not see this dancer again that day, but did document (and photograph this time) several *Hetaerina americana* (American Rubyspot) that were new finds for the survey. We were also together on surveys where several new species were found for the three branches of the UEC, including one particularly exciting day in August of this year where we had three new species in hand: *Aeshna umbrosa* (Shadow Darner), *A. verticalis* (Green-striped Darner), and *Ischnura posita* (Fragile Forktail). This particular day also happened to be when a videographer was along on the survey to interview odonate volunteers and record the citizen science experience for UEC promotional materials. I was walking on a cloud for a week after that survey!

Shadow Darner (*Aeshna umbrosa*). Photo by Ann Graf.

One thing that has changed for me now is that I go out to local habitats on my own, net in hand, and see what I can see. I'm getting better at using the hand lens to more definitively identify what I net, especially with some of the trickier damselfly species. I read Argia and participate in discussion on the WDS Facebook page. I have submitted finds, albeit only a couple so far, to the state database. I enjoyed running around in my spare time this fall in Milwaukee with our mild weather to see how late in the season I can still find odes. I have also developed the ability to notice small things flying past out of the corner of my eye where most people do not. I almost wandered into traffic in early November downtown when, after coming out of a Milwaukee Symphony Orchestra concert on a Friday afternoon, I spotted a meadowhawk flying past a tour bus in front of the concert hall. The friend I was with of course saw nothing, but I could identify at least the genus and could guess at the likely species (*Sympetrum vicinum*, Autumn Meadowhawk), based on the fact that it was meadowhawk season and knowing what is common in our area.

I woke this morning to our first snow on the ground and the realization that although friends still spotted some meadowhawks yesterday, the season is likely really over now. I'm mourning the passing of another dragonfly year, dreaming of possible mid-winter trips I could take to warmer climes for a hunt, and anticipating what next year will bring. I've come a long way in my odonate-ID skills, but based on how long odes been around, I have as Conniff (1996) says, "roughly 299 million years of catch-up work ahead". Bring it!

Getting Serious About Dragonflies, by Bob Glotzhober <rcglotzhober@wowway.com>

Like most of us, even as a small kid I was playing in and around puddles and ponds. While I never got into insect collecting as a kid, I always enjoyed watching dragonflies darting around. As I got a little older and interested in nature photography, there was the occasional serendipitous opportunity to capture a dew-covered dragonfly on film. These were always fun, and I still have some of those slides that were taken 40-plus years ago. But things never got "serious".

In 1980 I came to work in the natural history department of the Ohio Historical Society in Columbus (now named Ohio History Connection). I was mostly involved with educational programming for the public, but also got to work with the natural history collections and several natu-

ral areas we managed. About nine months after starting at OHS, I attended a conference for "science education centers" at the Cranbrook Institute of Science in Bloomfield Hills, Michigan. One of the speakers at the conference (I wish I could remember who) expressed that anyone working in a public science museum should become at the very least a local or regional expert in some area within the center's emphasis. I translated that to at least being a serious student—not an "expert". Perhaps some of you know the definition of an expert: the mathematical symbol for the unknown of course is "x" and a "spert" is just a drip under pressure. But I took seriously the idea of becoming a serious student—but of what subject? Certainly not birds! With my arthritic neck and so many great birders out there already, accomplishing anything noteworthy with birds would be a huge challenge for me. So what else?

As I looked around the OHS collections, I noted that we had a pretty good collection of dragonflies and damselflies. Some of these went back to 1899; others were collected by Don Borror, who was still active at the nearby Ohio State University's Borror Lab of Bioacoustics. But for at least 20 years, no one was seriously working on Ohio Odonata. Gee—sunshine, warm weather, beautiful ponds and rivers—sounds like fun!

After getting out and doing a little collecting, my next challenge was to identify the specimens. The museum had a copy of Needham and Westfall's Dragonflies of North America (1954) as well as the three volume set of the Odonata of Canada and Alaska. Now, I had only one course in entomology in college along with numerous other zoology classes, so the terminology in the keys was another challenge. I plugged away and got most of them identified (many correctly, I'm glad to say), but still had trouble with several others. Somewhat hesitantly, I found a phone number for Don Borror at OSU, and called to see if he might help. Perhaps, I asked, I could bring some specimens by his office if he could find time to help with their ID. What an amazing and warm response I got! Borror offered to come to my lab and help me—almost the next day as I recall! Where I had struggled for hours, he made his identifications without even looking at a book. Was I excited—these critters could be identified, and I could learn to do it. Borror even offered several helpful pointers on how to interpret the keys.

Appalachian Jewelwing (*Calopteryx angustipennis*), Jett Bridge area, Clear Creek, Morgan County, Tennessee, 6 June 2016. Photo by R.C. Glotzhober.

Glowing in success and Borror's friendliness, I decided to take one more bold step with my quest. Being in charge of planning public workshops, I asked him if he might lead a workshop/field experience for about 20 people at our Wahkeena Nature Center 45 minutes southeast of town. He agreed instantly. We picked out a date and planned an agenda of indoor instruction and outdoor fieldwork at the preserve's "Lake Odonata". I was blown away during his pre-workshop visit to the site with me, as he could ID most of the species flying by at 10 or 20 yards, while I still struggled with dead specimens under a stereoscope! (Of course, many of our readers today can do the same, and after 36 years I'm OK at it too.) The day of his workshop was wonderful and everyone enjoyed learning about these fascinating critters.

That experience got me a small start. I soon got permission to work on a species survey of a nearby state nature preserve. I also got some further help from Bob Restifo, at that time with the Ohio Department of Health's vector-borne disease unit. Bob had worked on Odonata for his master's degree at OSU and continued occasional collecting. (Bob is now a great friend and treasurer of our Ohio Odonata Society.) Things were starting to click. The hook was baited and I was swimming around scanning it carefully, but not quite ready to swallow it deeply.

In another few years I had reason to travel to Racine, Wisconsin. A favorite aunt on my mother's side, and one of my godparents, was celebrating her 90th birthday. One of my sisters, my Dad, and I all determined to drive to Racine to join in her celebration. After that fantastic party with lots of seldom-seen relatives, we drove to the neighborhood where my mother was born. No one thought to ask any of the relatives for verification, but we believe she was born at home—not uncommon in 1918. The house she lived and grew up in was on Racine's Michigan Boulevard, and across the street was a steep, sandy hill running down to Lake Michigan. We had all heard tales of the whole family running down that hill to play in the sand and swim in the often quite cold Lake Michigan. On this early September day, as we were looking at the home, there in the bushes in the front yard was a wheel-pair of mosaic darners. I had not brought a camera along and had no net, and still could not make identification just from seeing it, even up close. Just the same, it was pretty neat seeing that right in my mother's former front yard!

After looking more at the house (all from the front sidewalk), we climbed down the hill to the lake shore. Here was an even more stunning surprise. Hundreds of mosaic darners were flying along the edges of the beach and beach-grass dunes! We must have hit a migratory swarm while at a feeding stop! Living at that home for at least 18 years while growing up, my Mom must have experienced similar sights at least during some years. Had I had inherited my growing interest in Odonata at least in part "genetically", following my mother's experiences on the shores of Lake Michigan?

I cannot say which of these experiences or many others during the 1980s really got me hooked on dragonflies. But in the late 1980s I gave a slide talk about dragonflies to a group at the annual "Eco-Weekend" retreat sponsored by the Columbus Audubon Society. Afterwards, Dan Rice of the Ohio Division of Natural Areas suggested that I follow his pattern of the Ohio Breeding Bird Survey and start a state-wide survey of dragonflies. I recognized that there was nowhere near the number of folks interested in dragonflies as there were birders, but after a few months of consideration, I set out to recruit other workers and in 1991 launched out nine-year survey that resulted in the publication in 2002 of "The Dragonflies and Damselflies of Ohio". The hook had really been set by that time—I was and am still addicted to Odonata! (*R.G. is the Curator Emeritus of Natural History, Ohio History Connection.*)

52.8%, by Buck Snelson <fsnelson@bellsouth.net>

As of this writing, 7 November 2016, I have 246 species of odonates on my life list from North America. According to the most recent checklist by Dennis Paulson and Sid Dunkle (2016), the total number of species known from North America north of Mexico is 466, so I'm more than half way there at 52.8%.

One of the nice things about there being a modest number of dragonfly species in North America compared to, say, birds (914) or butterflies (829), is that the task of growing your species list seems more tractable. One can accumulate a more inclusive life list in a shorter span of time. That's nice for me because I was a late starter. I got my first digital camera in February 2012, and took my first photo of a dragonfly on 9 May of that year. It took me a while to run down the identification—a male Eastern Pondhawk (*Erythemis simplicicollis*), arguably the most abundant dragonfly species in Florida. My notes show that I had photographed 40 species by the end of 2012, all from near home in Gainesville, Florida. I was hooked!

I have had some great adventures and a few minor misadventures along the way to 246. My most memorable trip

Red Saddlebags (*Tramea onusta*). Photo by Buck Snelson.

was to my first DSA meeting in Saskatchewan in 2013. I had never been that far north, seen those kinds of habitats, or seen such an abundance of odes. I have one "grab shot" of the afternoon skyline in Prince Albert National Park where I can count 86 dragonflies on the wing in a feeding swarm of mostly Lake and Variable Darners (*Aeshna eremita* and *A. interrupta*). Of course, all of the species there were new for me. In addition, I met for the first time many folks who I only knew as book authors or through correspondence.

The trip I would just as soon forget was to the Everglades in October 2015. I was warned that the mosquitoes would be bad. Since I live near a large wet prairie in the shade of live oak trees, I thought I knew a thing or two about mosquitoes. I went prepared for the worst, with every possible level of protection. But the mosquitoes were much worse than I could have ever imagined. A planned three-day trip turned into a one-day trip. I beat a hasty retreat back to Miami, leaving a trail of blood behind. The worst part was I didn't see either of the target species I was looking for—Mangrove Darner (*Coryphaeschna viriditas*) and Pale-green Darner (*Triacanthagyna septima*). The trip was salvaged by two good days in "civilization" around Miami, especially at Fairchild Tropical Botanic Garden, a great place to see and photograph skimmers.

I have some distinct advantages living in Florida. First, there are lots of dragonfly species: 169 species statewide and 113 recorded from my home county alone. Second, we have a long flight season. A few species are active even in mid-winter in the northern part of the state where I live and winter activity in the southern part of the state is even stronger. Finally, each region of the state offers a unique set of habitats and associated species, from the tropical darners, skimmers, and damselflies in the extreme south to the endemic clubtails in the panhandle. I have been around most of Florida in the past four years, largely following in the footsteps of Sid Dunkle, Dennis Paulson, and Jerrell Daigle, but my Florida life list is still far from complete.

Since getting started in 20I2, I have attended all of the national DSA meetings and two of the southeast regional meetings. In all, I have visited eight states and one Canadian province on dragonfly safaris lasting from a few days to a week or so. Every trip has been memorable, not only for the new species and habitats experienced but also for having kept company with some great folks. Some highlights include:

- Chris Hill putting on a Shadowdragon netting demonstration in South Carolina, producing both Smoky (*Neurocordulia molesta*) and Umber Shadpwdragon (*N. obsoleta*) in successive evenings.

- Finding Four-striped and Five-striped Leaftails (*Phyllogomphoides stigmatus* and *P. albrighti*) with Greg Lasley in patches of Prickly Pear cactus in Texas, the most unlikely-looking odonate habitat I could imagine.

- Photographing both the smallest and largest clubtail species in the eastern U.S. (Eastern Least Clubtail [*Stylogomphus albistylus*] and Dragonhunter [*Hagenius brevistylus*], respectively) in same day in Tennessee with Doc Schoch.

- With Dennis Paulson, finding the Ebony Boghaunter (*Williamsonia fletcheri*) and the tiny Elfin Skimmer (*Nannothemis bella*) in wheel in Wisconsin.

- Exploring the beautiful Gila River in New Mexico with the Southwest Odonate Blitz group and finding 14 lifers in three days.

- Getting 20 lifers in five days in Utah in habitats ranging from a desert spring oasis to a montane pond at 10,000 ft elevation, Desert Whitetail (*Plathemis subornata*) one day and Mountain Emerald (*Somatochlora semicircularis*) the next.

- Stumbling upon (literally, as in struggling to stay close to vertical and out of the water) a pair of Filigree Skimmers (*Pseudoleon superbus*) along the San Pedro River in Arizona, coming away with a poor photo but a vivid memory.

Given my late entry into odonate studies, I have benefitted greatly from the help and encouragement of others in getting up to speed. I have relied on friends and colleagues for help with identifications, advice on when and where to look for selected species, photographic tips, guide service and transportation, and for companionship in the field. Special thanks to the following: Giff Beaton, Bob Behrstock, Jerrell Daigle, Bob DuBois, Marion Dobbs, Terry Hibbitts, Chris Hill, Eric Isley, Jim Johnson, Steve Krotzer, Greg Lasley, Patrick Leary, Bill Mauffray, Alan Myrup, Dennis Paulson, Chris Rasmussen, Doc Shoch, and Ken Tennessen. Finally I must thank my wife, Margaret Flagg, who not only has been tolerant of my odd hobby, she has been a constant source of encouragement. Now that I am teaching her to swing a net, I expect the pace of discovery to quicken.

(Upper) Desert Whitetail (*Plathemis subornata*); (Lower) Black Saddlebags (*Tramea lacerata*). Photos by Buck Snelson.

Dragonfly Names in the Upper Midwest

Lucia Wilkes Smith <luciaws@usiwireless.com>

Many years ago I was a student in the University of Minnesota's M.A. program in American Studies. At one point I submitted an 11-page paper focused on "dragonflies", with 13 additional pages of maps and charts, plus a bibliography, for a graduate-level course in American English taught by a renowned linguist, Professor Harold B. Allen. Really!

I hardly know anything about the biology of dragonflies. But, during that summer session in 1969, I learned a lot from The Linguistic Atlas of the United States about research in migration patterns of people who immigrated to the U.S. and then moved around the country. The migration patterns of human families and communities could be traced from the Eastern U.S. into the Upper Midwest (Minnesota, Iowa, North Dakota, South Dakota, and Nebraska) by listening and observing the particular words they used to denote specific commonly-known things.

Some students in the linguistics class chose to research migration patterns by following colloquial linguistic substitutions for objects such as window shades or pancakes. I chose to trace the common, or unique, words used by various Americans to designate the dragonfly. Variations from the term "dragonfly" often were affected by the ethnic heritage of the speaker. Sometimes the educational level of the speaker altered the term used, and the more highly-educated individual might use the generally-accepted term, dragonfly. In contemporary times, of course, these variations probably have been lost to "standard English" that is so accessible through public education, radio and television. But, this list shows the many colorful terms people used to talk about a dragonfly in earlier days:

Darning Needle; Devil's Darning Needle; Devil's Needle; Devil's Fly; Sewing Needle; Sewer; Spindle; Mosquito Hawk; Mosquito Catcher; Snake Feeder, Snake Doctor; Snake Eater; Snake Fly; Snake Charmer; and Doctor Fly.

Minor variants included: Snake Servant; Snake Guarder; Snake Heeder; Snake Waiter; Airplane; Beetle; Hummingbird; and Spanish Needle.

I enjoyed doing the research about language variations, and I have been watching dragonflies ever since.

Parting Shots

Parting Shots pays tribute to the endless diversity and interest of odonate behaviors and to the many skilled photographers among us, with an additional nod to the many unexpected (and sometimes downright silly) ways in which odonates can creep into daily life. If you have photos that showcase an odd, bizarre, unusual, unexpected, or amusing aspect of odonate life (or of life with odonates), please e-mail them to the Editor at <editor@dragonflysocietyamericas.org>, along with a short note describing the photo, location, and event.

Damsels in Distress, by Mark Shields <shieldsm@embarqmail>

Although dragonflies and damselflies are well known for their carnivorous habits, sometimes the tables are turned and they become the prey, but not always to other animals! While surveying odonates at a pond in Stones Creek Game Land, Onslow County, North Carolina, on 14 May 2016, I discovered this pair of Atlantic Bluets (*Enallagma doubledayi*) caught in a Spoonlleaf Sundew (*Drosera intermedia*) growing at the water's edge. As the damsels tried to escape the sticky grip of this carnivorous plant, their struggles only resulted in them becoming even more entangled. Eventually, the hapless duo succumbed. Lunch is served!

Atlantic Bluets (*Enallagma doubledayi*) trapped in carnivorous sundew plants, Onslow County, North Carolina. Photo by Mark Shields.

A Pallid Widow, by Jim Stuart <jnstuart61@gmail.com>

The following photo shows a very pruinose male Widow Skimmer (*Libellula luctuosa*) from the Clark County Wetlands Park in Clark County, Nevada, taken 17 July 2010. I believe Dennis Paulson mentions in his book that males in southern Nevada/lower Colorado River are very pruinose, maybe as an adaptation for the extreme high temperatures. Not sure what the red eyes mean...

Widow Skimmer (*Libellula luctuosa*), Clark County Wetlands Park, Nevada, 17 July 2010. Photo by Jim Stuart.

Classroom Assistant, by Celeste Searles Mazzacano <cmazzacano@gmail.com>

On the afternoon of 5 August 2016, I was giving a presentation on odonates at one of my local survey sites in Westmoreland Park in Portland, Oregon. The field session was part of an ongoing seminar series sponsored by the Urban Ecosytems Research Consortium of Portland/Vancouver (UERC). Dragonflies and damselflies being a somewhat novel topic, it was well-attended by staff members of various regional natual resource organizations, one of whom (Bonnie Shoffner, Metro Restoration Volunteer Coordinator) is also a volunteer in a new odonate citizen science program that I'm coordinating with the Johnson Creek Watershed Council. We were standing on a boardwalk overlook that juts out into a well-vegetated wetland that is always buzzing with odonates. As I expounded on the superb hunting abilities of odonates, I explained that they could eat small prey on the wing, but would land and perch to consume larger prey items. As I spoke, as if on perfect cue, this female Western Pondhawk (*Erythemis collocata*) landed on Bonnie's arm, the better to consume a substantial snack of female Tule Bluet (*Enallagma carunculatum*). The meal took longer than my exposition did, but Bonnie gamely held her arm out until the pondhawk finished, cleaned up a bit, and flew away.

Western Pondhawk female (*Erythemis collocata*) devouring a female Tule Bluet (*Enallagma carunculatum*), Westmoreland Park, Multnomah County, Portland, Oregon, 5 August 2016. Photo by Celeste Searles Mazzacano.

Oviposition Substrate Surrogate, by Josh Lincoln <jklincoln@gmail.com>

While walking along the Vermont shore of the Connecticut River in Hartland, Vermont on 5 August 2016 with Wally Jenkins and Mike Blust, Wally spotted a tandem pair of *Argia moesta* (Powdered Dancer) ovipositing repeatedly on or in an insect that was floating in the water.

When they flew off, I fished the insect out of the water and found it to be a still-living *Ischnura verticalis* (Eastern Forktail). I transferred it to Mike asking him if he would like to see *Argia moesta* eggs, whereupon, evidently having dried enough by then, it promptly flew away.

Argia moesta (Powdered Dancer) pair ovipositing onto a hapless Eastern Forktail (*Ischnura verticalis*), 5 August 2016, Hartland, Vermont Photo by Josh Lincoln.

ARGIA and BAO Submission Guidelines

All materials must be submitted digitally via e-mail or an internet file sharing service (i.e., Dropbox, GoogleDrive, TransferBigFiles, or similar service). If digital submissions are not possible, contact the Editor before sending anything. Material for ARGIA and BAO should be sent to the Editors at <editor@dragonflysocietyamericas.org>. Authors should expect to receive an e-mail confirming receipt of submissions within five business days.

Articles

All articles and notes should be submitted in Word, Pages, or Rich Text Format (RTF), without embedded figures, tables, or captions. All photos and figures must be submitted as separate files (see Figures below). Only minimal formatting of each article to facilitate review is needed: single column with paragraph returns and bold/italic type where necessary. Include captions for all figures and tables in a separate Word, Pages, or Rich Text Format document. Articles may be edited if needed for clarity, grammar, and/or space.

Begin the article with title, author name(s), and contact information (including e-mail for primary author) with a line between each. The article or note should follow this information. Paragraphs should be separated by a line and the first line should not be indented. The first time each species is mentioned in the article, always give both the scientific name as well as the official common name (where one has been assigned) in parentheses. Subsequent mention of the same species may be done using scientific or common name only, as the author prefers.

Figures

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

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

Charts, graphs, diagrams, and other vector graphics (e.g. computer-drawn maps) can be submitted as raster graphics (PNG or TIFF) with a minimum of 600 ppi at the intended print size. You may be asked to provide the raw data for charts and graphs if submitted graphics are deemed unsatisfactory. When charts and graphs are generated in Excel or Numbers, please submit the file with each chart or graph on a separate sheet and each sheet named appropriately (e.g. "Fig. 1", "Fig. 2", etc.)

Tables

Tables may be submitted as Word or Pages documents or as spreadsheets in Excel or Numbers. If Excel or Numbers is used, place each table on a separate worksheet and name each worksheet appropriately (e.g. "Table 1", "Table 2", etc.).

The Dragonfly Society Of The Americas

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Journals Published By The Society

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

Bulletin Of American Odonatology is devoted to studies of Odonata of the New World. This journal considers a wide range of topics for publication, including faunal synopses, behavioral studies, ecological studies, etc. The BAO publishes taxonomic studies but will not consider the publication of new names at any taxonomic level. Membership in DSA includes a digital subscription to BAO.

Membership in the Dragonfly Society of the Americas

Membership in the DSA is open to any person in any country and includes a digital subscription to Argia and BAO. Dues for individuals in the US, Canada, or Latin America are $15 US for regular memberships (including non-North Americans), institutions, or contributing memberships; $5 US or more can be added for sustaining memberships. Dues are payable annually on or before 1 March of membership year. Membership dues can be paid online via credit card; see <http://odonatacentral.org/index.php/PageAction.get/Name/DSA_Membership>. Membership forms can also be downloaded and mailed with a check to The Dragonfly Society of the Americas, Inc., Attn: Cynthia McKee, Accountant, 605 9th Avenue, Ottawa, Illinois 61350-4119. For more information on joining DSA, visit <www.dragonflysocietyamericas.org/join>.

Mission of the Dragonfly Society of the Americas

The Dragonfly Society of the Americas advances the discovery, conservation and knowledge of Odonata through observation, collection, research, publication, and education.

Back cover: **(upper)** *Libellula composita* (Bleached Skimmer) male, Tooele County, Utah, July 2016. Photo by Jim Burns. **(lower)** Sarracenia Spiketail (*Cordulegaster sarracenia*) male, Pitcher Plant Bog, Kisatchie National Forest west of Alexandria, Louisiana, April 2016. Photo by David Oakley.