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Front cover: *Coenagrion interrogatum* (Subarctic Bluet) mating wheel, near Mile 50 of the Steese Highway, northeast of Fairbanks, Alaska. Photo by John Hudson.

2014 DSA Southeast Regional Meeting

Jerrell J. Daigle <jdiagle@nettally.com> and Bill Mauffray <iodonata@gmail.com>

The 2014 southeast regional DSA meeting was held in Gainesville, Florida on 3–6 April, with the post-trip held in Bristol, Florida. The hosts were Esther and Bill Mauffray and they put on a terrific show! About 30 people from as far away as New York and Colorado attended for a really good time. Almost everyone who had registered on the OdonataCentral website showed up. On the first day of the meeting, a number of people visited the International Odonata Research Institute (IORI) at DPI/Florida State Collection of Arthropods (DPI/FSCA) and worked on odonate specimens in the collection for their projects, while some went collecting locally.



Say's Spiketail (*Cordulegaster sayi*). Photo by David Leatherman.



Marion Dobbs in serious pursuit of photographic subjects. Photo by Paul Bedell.

That night at DPI, Esther and Bill treated everyone to a delicious catered barbecue dinner! After chowing down on chicken, brisket, and pulled pork (ouch!), we held an informal meeting to discuss the events of the day. One thing that was discussed was the site for next year's southeast regional DSA meeting and a few possibilities were mentioned. Selection is ongoing and the final site will be announced later. Ken Tennesen also talked a little about the details of the

upcoming annual DSA meeting in Ladysmith, Wisconsin in June.

The next day, about 25 of us caravanned to Gold Head State Park northeast of Gainesville. All of the target species of odonates for the meeting were seen here, but in low numbers. A few folks saw the headline species, *Cordulegaster sayi* (Say's Spiketail), and Dave Leatherman managed to take a photo of one. Other highlight species were *Gomphus cavillaris* (Sandhill Clubtail) and *Epithecica sepia* (Sepia Baskettail). Our thanks to Christine Housel (Department of Environmental Protection) for the collecting permits and Richard Owen (Gold Head State Park) for his help in the field.

Later that night, we all went to Esther and Bill's house to finish up leftover barbeque and continue our lively discussions. We also began compiling a species list of what we all saw at Gold Head State Park to help complete the permit report. The official report submitted to Gold Head contained 18 species of dragonflies and 16 species of damselflies

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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
2014 DSA Annual Meeting	13–15 June 2014	Ladysmith, Wisconsin	Ken Tennesen <ktennesen@centurytel.net>
2014 NE DSA Meeting	26–29 June 2014	Binghamton, New York	Bryan Pfeiffer <bryan@bryanpfeiffer.com>
CalOdes Bioblitz	27–30 June 2014	Warner Mtns., California	Kathy Biggs <biggsnest@sonic.net>



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for a total of 34 species! We also continued to discuss sites for next year's SE regional meeting, and it looks like eastern Tennessee in the summer is the leading non-binding choice. Stay tuned for more on this later in the year.

The post-trip was held in Bristol, Florida along the banks of the Apalachicola River. Byron Cherry, Ken Larsen, Chris Rasmussen, and I found several interesting species in the area. We did photograph one female *Cordulegaster sayi* feeding at the Garden of Eden property just north of Bristol. Another highlight species of post-trip was *Gomphaeschna antilope* (Taper-tailed Darner). Other rare creatures seen were the Red-cockaded Woodpecker and the Harvester butterfly.

All in all, it was a great meeting and we hope to see you all again next year!

Species List from Gold Head Sate Park

Zygoptera:

Calopteryx maculata (Ebony Jewelwing)
C. dimidiata (Sparkling Jewelwing)
Hetaerina titia (Smoky Rubyspot)
Lestes vidua (Carolina Spreadwing)
L. vigilax (Swamp Spreadwing)
Argia bipunctulata (Seepage Dancer)
A. fumipennis atra (Variable Dancer, black form)
A. tibialis (Blue-tipped Dancer)
Enallagma concisum (Cherry Bluet)
E. doubledayi (Atlantic Bluet)
E. signatum (Orange Bluet)
Ischnura hastata (Citrine Forktail)
I. kellicotti (Lilypad Forktail)
I. posita (Fragile Forktail)
I. ramburii (Rambur's Forktail)
Nehalennia integricollis (Southern Sprite)



Boris Kondratieff peers at his catch. Photo by Paul Bedell.

Anisoptera:

Anax junius (Common Green Darner)
A. longipes (Comet Darner)
Coryphaeschna ingens (Regal Darner)
Arigomphus pallidus (Gray-green Clubtail)
Gomphus cavillaris (Sandhill Clubtail)
Progomphus alachuensis (Tawny Sanddragon)
Cordulegaster sayi (Say's Spiketail)
Epithea sepia (Sepia Baskettail)
Didymops floridensis (Florida Cruiser)
Celithemis ornata (Ornate Pennant)
Erythemis simplicicollis (Eastern Pondhawk)
Erythrodiplax minuscula (Little Blue Dragonlet)
Ladona deplanata (Blue Corporal)
Libellula auripennis (Golden-winged Skimmer)
L. semifasciata (Painted Skimmer)
L. vibrans (Great Blue Skimmer)
Pachydiplax longipennis (Blue Dasher)
Tramea carolina (Carolina Saddlebags)



Carolina Saddlebags (*Tramea carolina*) pair in wheel. Photo by David Leatherman.

A Photographic Tour of the Florida State Collection of Arthropods (FSCA) Odonata Collection

Chris Hill <chill@coastal.edu>

One of the highlights for participants in this year's south-east regional DSA meeting was the opportunity to take a tour of the incredible odonate collection at the Florida State Collection of Arthropods (FSCA). The Dragonfly Society of the Americas, which was founded 25 years ago to promote the study of dragonflies, has always supported collecting as a major focus. In fact, one reason for holding this year's southeastern regional meeting near Gainesville, Florida was to let participants access the huge and important FSCA collection.

I went to see it while I was at the meeting. I had a couple of small goals related to checking out some unusual South Carolina records, but I mostly just went for a quick tour. It would be a great place to sit and study regional variation in the shape of baskettail (*Epithec*a) appendages if I had several days to do it (and I'm not joking, I would really be interested in that!) but I've never chased living odes in Florida and it was going to be sunny, so I knew I would only be there for a little while. However, I present here a photographic record of my voyage through the collection that I hope will give you a small idea of the scope and importance of the FSCA collection, and of the great work done by Bill Mauffray in its curation.

The first photo shows me standing between two banks of drawers. The collection has six banks of drawers like this, all filled with specimens of odonates from around the world. The second photo gives you a closer view of some of the drawers. Inside each plastic envelope is a specimen and a data card with all the details of when, where, and by whom it was collected. The drawer in Figure 3 gives you an idea of the amazing things in the collection. For example, the left half of this drawer has maybe 100 specimens of Alabama



Figure 1. Banks of specimen drawers in the FSCA collection.



Figures 2 & 3. Specimen cards in the FSCA collection.

Shadowdragon (*Neurocordulia alabamensis*), a species that (based firmly on my own experience) DOES NOT EVEN EXIST! :-)

I then pulled out this next drawer (Figure 4), which contained Calvert's Emerald (*Somatochlora calverti*), one of the species I had wanted to check on. There is one and only one record of this Floridian species for South Carolina, published in the 1980s. The person who collected and published this record took her collection with her when she left the state. I managed to track her down recently, only to find out that all of her collection had unfortunately been lost



Figure 4. Calvert's Emeralds (*Somatochlora calverti*).

in a move. But what's that? The divider at the back right says "South Carolina"! And there they are (Figure 5)—two individuals, from the same pond, on the same date in 1977,



Figure 5. South Carolina specimens of *Somatochlora calverti* (Calvert's Emerald).



Figure 6. The cerci tell the tale of this South Carolina *Somatochlora calverti* (Calvert's Emerald).

and never found in the state since! I put the cerci under a microscope and snapped a photo for confirmation—yep, looks like *Somatochlora calverti* (Figure 6).

I also looked for any trace of some old coastal plain records of Eastern Forktails (*Ischnura verticalis*), which nobody can find on the coast now, but there were no South Carolina specimens at all of that species.

Finally, we end this photographic journey with a picture of Bill Mauffray, who curates the FSCA odonate collection, a tremendous amount of work (and all volunteer), and who hosted the 2014 southeast regional DSA meeting. Thanks, Bill!



Bill Mauffray, curator of the FSCA Odonata collection

Request for Future DSA Annual Meeting Proposals

If you or someone you know would like to host a DSA annual meeting in the northeast (2015), northwest (2018), or central USA (2019), please let me know. If you have any questions at all about what is involved in planning a meeting or what the desired location aspects are, please contact me at <jdaigle@nettally.com>. Thank you very much!

Jerrell J. Daigle

Call for Papers for BAO

Bulletin of American Odonatology needs your manuscript submissions. Help us keep BAO the vehicle for timely reporting of research on Odonata of the New World. If you have questions about BAO guidelines, please see the last page of this issue of ARGIA or contact Steve Hummel, BAO Editor, at <mshummel@iowatelecom.net>.

An Ode to Collecting: Following the Path of an Early 20th Century Dragonfly Collector

Joan E. Ball-Damerow <jball@berkeley.edu>

Cold, rushing water splashes over boulders and logs and around my legs as I try to find footing on the slippery rocks of Steven's Creek. In the upper reaches of this coastal mountain stream near Cupertino, California, a shield of alders and bay trees protects against the hot July sun, lowering the temperature by about ten degrees. Rays of light shine through openings in the canopy and enliven the otherwise dimly lit setting. Moving downstream through the fast-flowing water, I use the six-foot handle of my insect net as a walking stick and am grateful for the extra support. Then suddenly and from a distance, I see a Pacific Spiketail (*Cordulegaster dorsalis*) flying about a foot above the water, heading straight toward me.

"This dragonfly adds a note of mystery to the scene", wrote Clarence Hamilton Kennedy, who surveyed dragonfly communities throughout California in 1914, "for the individuals with their strange ophidian coloration glide noiselessly up stream or down." I swing the net and miss, feeling a twinge of disappointment, while the mysterious black and yellow dragonfly carries on aloof, "moving straight ahead as though drawn irresistibly onward." Kennedy once lamented that the collector had only a single chance at a spiketail. If so, I just missed mine. Whatever else has changed since 1914, the behavior of this species remains the same, which is unsurprising given that dragonflies have inhabited the Earth for over 300 million years.

Kennedy was the first to carry out a comprehensive census of dragonflies in the western United States. While working on a graduate degree in entomology from Stanford in 1914–1915, he travelled by railroad as far north as Chico, California; as far east as Carlin, Nevada; and as far south as Los Angeles, California. He compiled lists of species at specific sites along with notes on environmental conditions. During that time, many naturalists were documenting biodiversity throughout the country, finding and describing new species, but detailed historical information for insect communities is rare. Kennedy's work is a valuable source of information on freshwater habitats and insect communities at a time when widespread urban development was beginning, and more than 50 years before there was any thought of global warming. Aquatic insects also serve as biological indicators of freshwater ecosystem health. Shifts in the diversity and community composition of dragonflies in California and Nevada over the past century could indicate that similar changes are occurring in other aquatic insect groups and freshwater ecosystems as a whole.

I revisited Kennedy's sites from 2011–2013 to determine how dragonfly communities have responded to large-scale intensive land use and climate warming. Along the way, I also found myself comparing our personal, cultural, and environmental experiences at each location. Accounts from six of the 45 sites that I have re-surveyed illustrate some of our shared experiences collecting and observing dragonflies within settings that are worlds apart. Both the Chico River, running through Bidwell Park in Chico, California, and the relatively undeveloped Humboldt River in Nevada, invoke a feeling of unity with the past, while the Truckee River, Lake Tahoe, and Donner Lake in the Sierra Nevada Mountains remind me of how different our lives and environments have become. Steven's Creek starts out relatively undeveloped in its headwaters but becomes a highly urbanized stream before it empties into the San Francisco Bay. Patches of habitat pop up as the stream meanders through city parks. To follow Kennedy's footsteps nearly a hundred years later is to examine the world with a renewed awareness of surroundings and the passage of time.

At its headwaters in the northern Central Valley, the Chico River runs through the center of Bidwell Park, where the habitat is largely protected. Here I encountered all the same species that Kennedy observed, and more. We both witnessed the Western River Cruiser (*Macromia magnifica*) flying above the water as if on a bomb run. Similar to the Spiketail in both appearance and behavior, this species flies straight up and down the river, only at much faster speeds. We both captured the Gray Sanddragon (*Progomphus borealis*), whose larvae live in sand-bottomed areas of streams. They burrow through the sediments, just below the surface, so that their backs are covered, and thus avoid being carried



The Chico River at Bidwell Park.

away by the flowing water and shifting sands. The Pale-faced Clubskimmer (*Brechmorhoga mendax*), which Kennedy described as the most graceful dragonfly he had ever seen, is also still flying in healthy numbers. He admired a female cutting figure eights through a swarm of small flies. This dragonfly is black with clear wings, a long thin abdomen, and a large white dot on its bulbous, clubbed end. My heart skipped a beat when I saw one elegant individual flying toward me. Just as Kennedy described, this clubtail was indifferent to several passes of the net made before I succeeded in capturing it.

Our experiences converged again along the Humboldt River in Nevada, where not much seems to have changed over the past century—except for piles of old cars embedded in the riverbanks, fittingly in Carlin. The river itself remains a muddy alkali stream with many tight meanders and loops. In Golconda, the Humboldt is so muddy that when I attempted to cross it I found myself waist-deep in muck. As detailed in his notes, this is where Kennedy first saw the Brimstone Clubtail (*Stylurus intricatus*), unfortunately flying away from him, and waited with great suspense to see if it would land or continue to fly out of reach. On hands and knees, he approached the rare clubtail, and “was greatly relieved...to see that he, still unmindful of his danger, was busily engaged scratching his head with his foot.” Such accounts from the field are perfectly clear, involving no head-scratching on my part, after prowling the same sites and engaging in the same task as Kennedy. I have felt the same relief while successfully stalking a hard-to-catch dragonfly, and the satisfaction that comes from then capturing the gray-eyed and elusive Brimstone Clubtail.

Outside of protected habitat and relatively undeveloped regions like the Nevada desert, my experience differed significantly from Kennedy’s. The most obvious change since 1914 is the sheer number of people that live in or visit any given locale. The population of California, for instance, has

increased from 2.7 million to 37.9 million people over the past 100 years. As a result, the traveler’s experience is now burdened by crowds and traffic, particularly in popular vacation spots such as Truckee and the Lake Tahoe area. Additionally, freshwater habitat has become more similar over the state with the expansion of urban areas, agriculture, and dams. Some aquatic species benefit from the multiplicative introductions of lake-type habitat, retention ponds, canals, and ditches in California, while many others do not.

Over the Fourth of July weekend, I found throngs of people floating down the Truckee River, some in yellow inner tubes with drink coolers attached, others in big blue rafts seating four to eight each. One party of around 40 people, all holding onto one another, made a long chain of floating donuts. After marveling at the spectacle, I bought a raft in Tahoe city and joined them. I started at the outlet of Lake Tahoe and floated down the river en masse with about 1,000 vacationers, although instead of drinking beer and sunbathing I was catching dragonflies—like the Four-spotted Skimmer (*Libellula quadrimaculata*), Paddle-tailed Darner (*Aeshna palmata*), and Western Red Damsel (*Amphiagrion abbreviatum*). Kennedy would have been shocked to find such a scene. Those 1,000 people would have represented half of Truckee’s population in 1914, all floating down the river at once during a four-hour period. Today, close to 17,000 people live in the town, and many more visit during the summer. While the total number of dragonfly species was essentially the same as in 1914, the percentage of generalist species (those able to inhabit a variety of pond, lake, and stream habitats) increased from 41% of species along the Truckee River in 1914 to 63% in 2012, while specialist species declined from 59% to 37%.

Another way in which life has changed since Kennedy’s time is transportation, and it, too, has impacted dragonflies. The Truckee River flows from Lake Tahoe, which has been a popular holiday destination since the early 1900s. I trav-



The Humboldt River at Carlin (left) and Golconda (right).

eled there in my car from Berkeley along two to four lane roads, at an average speed of 70 miles per hour. The entire journey took about four hours. In 1914, limited transportation through the mountains made it much more difficult for travelers who, like Kennedy, took the railroad to Truckee and then made their way to the lake. The road connecting southern Lake Tahoe to the western shore of the lake—what is now Highway 89—was just completed in 1913, after months of dynamiting granite out of the mountain slopes. Originally, this rough one-lane road only supported light traffic, such as open-air Model-Ts and Oldsmobiles with a top cruising speed of 30 miles per hour. Kennedy explored the lake itself aboard a steamer, as did most vacationers at the time.

Such conveniences have come with a cost. Although today Lake Tahoe is world-renowned for its clarity, it was even more majestically clear during Kennedy's time. Dust from the very roads that make traveling to Tahoe easier, allowing more people to live and travel here, are implicated as a major factor in degrading the clarity of the lake. Aboard the steamer, Kennedy observed fish 20 feet below the surface and noticed distinct scratches on the paint on the keel, so that looking over the boat deck gave him the feeling of "floating on air". He must have been delighted when a single Great Basin Snaketail (*Ophiogomphus morrisoni*) flew aboard the steamer in Emerald Bay, considering that the nutrient-poor lake generally supports little aquatic vegetation or insect life. This multi-colored species is about 50 mm long with a big blue eyes, yellow face, olive-green thorax, and yellow triangles atop each of its 10 abdominal segments. White adorns the sides of the abdomen tip where it flares out into a club shape. I did not see the Great Basin Snaketail at Lake Tahoe, or any of Kennedy's sites for that matter.

Many other stream and lake-breeding species are less abundant and more narrowly distributed today than they were in 1914. Several of them, including the Great Basin Snaketail, belong to the clubtail family (Gomphidae), named for their club-shaped abdomen. About 40 miles northeast of Emerald Bay, Kennedy hit the jackpot with this species, catching over 100 specimens of the Great Basin Snaketail on the fine-gravel beaches of Donner Lake. He then caught 80 specimens of the Pacific Clubtail (*Gomphus kurilis*), also a common clubtail species in his time, while I caught only one specimen—the only one I saw after two days of collecting. The shoreline habitat has been eliminated or drastically changed by a road and docks along the northern length of the lake and vacation homes right on the water on the south. As a result, the two clubtail species that once thrived in this habitat are no longer present or they are more rare.

Back at Stevens Creek County Park, after missing the first

Pacific Spiketail in the upper reaches of the stream, I soon saw another one. This individual, like the first, made its way up the stream without regard to my presence and, to my great excitement, I nabbed it. Then, I saw another, and another, and realized that this beautiful snake-like dragonfly was abundant here in the headwaters during this time in the season. I had sampled here twice before, earlier in the summer, and this was the first time I saw this species. With the Pacific Spiketail, I had caught all the same species that Kennedy observed here in 1914.



At last, a Pacific Spiketail (*Cordulegaster dorsalis*)!

Eventually, Stevens Creek settles down onto a flatter terrain and winds its way through Cupertino and Mountain View before emptying into the San Francisco Bay. In the heart of Silicon Valley, this area of the stream has become highly urbanized in recent years. The surrounding neighborhood is covered in concrete and buildings. In general, as large regions become urbanized or converted to agriculture, the diversity of aquatic habitats declines. Dragonflies track habitat homogenization and their communities also become more similar across individual sites. Habitat generalists thrive and expand, because they can survive as long as there is water and some aquatic vegetation, while habitat specialists decline in abundance or in the extent of their distribution with the loss of their particular type of bog or stream habitat.


As I visit the creek in a Cupertino park, bright orange Flame Skimmers (*Libellula saturata*) chase one another playfully, and cherry-red Cardinal Meadowhawks (*Sympetrum illotum*) perch upon Tule reeds. This small patch of habitat is alive with dragonflies. Sure, they are not the same species that Kennedy encountered—all are fairly tolerant to habitat change and pollution—but they are still wonderfully charismatic. They are a highly-visible sign that life is possible in urban streams, as long as vegetation grows on the banks and in the water channel, and there are areas of open canopy that let the sun shine in over the water. The health of ecosystems in many urban areas is admittedly limited, and they will never be the same as in the past. But a good starting point is converting concrete-covered water drainage systems back into stream habitat for these vibrant insect predators. It helps that humans can relate to the big eyes and personalities of dragonflies, and can enjoy their activity on a pleasant stroll through the park. All the while, the charming red, blue, orange, white, spotted, green, and purple individuals dart through the sky and from reed to reed, eating mosquitoes.

Acknowledgements

Most of Kennedy's specimens and his field notes are currently located in the Museum of Zoology at the University of Michigan in Ann Arbor, Michigan; special thanks to Mark O'Brien for his assistance with this material. Kennedy's species lists and notes are formally detailed in his *Notes on the Life History and Ecology of the Dragonflies of Central California and Nevada* (Kennedy, 1917). Some specimens are also held in the California Academy of Sciences, the United States National Museum, the Essig Museum of Entomol-

ogy, and the Florida State Collection of Arthropods. For recent surveys, I captured a very limited number of voucher specimens (usually 1–3) of each species encountered, which will be deposited in the Essig Museum of Entomology.

References

- Kennedy, C.H. (1917). Notes on the life history and ecology of the dragonflies (Odonata) of Central California and Nevada. *Proceedings of the United States National Museum*. 52: 483–635. 

Epiaeschna heros (Swamp Darner) in Michigan—A Mystery No Longer

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For many years, I doubted that the large and occasionally seen Swamp Darner, *Epiaeschna heros* (Fabricius), was a permanent resident of Michigan. In 2004, I indicated that finding larvae or exuviae of *E. heros* would be definitive proof of overwintering and thus, a resident population (O'Brien, 2004a). Later in the year, I wondered if in fact all the specimens we were seeing were migrants (2004b). At the time, I lacked positive evidence of emerging adults or overwintering larvae as all we had were adult records, some of which were indicative of early spring migrants.

In Michigan, *E. heros* is known primarily from the southeast corner of the state (Figure 1). Kormondy (1958) listed seven counties for *E. heros*, with Shiawassee Co. represented by Kellicott's 1894 note, and Cheboygan Co. represented by Evans' (1915) paper on the dragonflies of the Douglas Lake region. Evans witnessed several *E. heros* in the vicinity of Douglas Lake, and stated that "Adults of this large species were common throughout the summer in various habitats." Furthermore, one adult was collected at late twilight as it was flying swiftly near Reese's Bog. Unfortunately, the specimens collected by Evans have not been found, but *E. heros* is a large and unmistakable species, so Evans' account should be valid. The Kellicott specimens are presumed lost, but *E. heros* is very likely to be found in Shiawassee Co.

From reviewing 17 adult collection records, *E. heros* has a flight season that runs from early May to early August in Michigan, with most dates clustered in late June to early July. Individuals were removed from mist nets set up for migrating bird studies in Wayne Co., Michigan on 8 May 2007, 10 May 2003, and 25 May 2007. (J. Craves, pers. comm.). It's probable that the early dates (before June) correspond with an influx of migrating adults from the south, such as we see with Common Green Darner (*Anax junius* Drury). However, the dates in mid-June through August

could be migrants or local populations. Without larvae, exuviae, or teneral adults to prove that an overwintering population existed, I assumed that the individuals were visitors and not local residents.

Adult observations

On 6 August 1996, I collected a male *E. heros* flying near the edge of a pond ringed with *Typha* at the E.S. George Reserve in Livingston Co., Michigan. On 21 June 1998, I observed and collected a female *E. heros* in Berrien Co., Michigan at Warren Woods Natural Area. The female was observed searching for oviposition sites on rotting wood in the slough areas of the Galien River. Similarly, females were observed ovipositing in rotten wood at a wetland near Canton, Wayne Co. on 16 and 21 June 2007 by Julie Craves and Darrin O'Brien (J. Craves, pers. comm.).

The adults have a distinctive profile in flight, as the abdomen arches down; this trait combined with their large size makes it easy to spot them in flight. I have seen *E. heros* in flight at scattered locations in Washtenaw Co. meadows in early August. However, I had never collected any exuviae or nymphs.

It was not until 2012 that data from Julie Craves and Darrin O'Brien and the ecological samples from the E.S. George Reserve in Livingston County provided solid evidence for an overwintering population of the Swamp Darner in southern Michigan. An exuvia of a Swamp Darner was found at the edge of a wooded wetland on 10 June 2012 by Julie Craves and Darrin O'Brien in Lodi Township in Washtenaw Co. On 26 June 2013, they captured a female at the same site, and they found a male exuvia on the stalk of *Typha latifolia* there on 29 June 2013 <<http://urbanodes.blogspot.com/2013/09/epiaeschna-breeding->

hotspot.html>. The vernal pool is often reduced to a barely muddy to moist depression during mid-summer. Boose (2014) demonstrated that Swamp Darner nymphs are able to withstand drought in vernal pools in northwest Ohio in moist leaf litter. It is apparent that the Swamp Darners at the Lodi township wetland are doing likewise.

Long-term aquatic ecology projects have been conducted by Earl Werner at the E.S. George Reserve (ESGR) in Livingston County, Michigan over a span of 15 years. Several lentic sampling methods were used to survey the ponds. Dipnet and pipe samples were taken by Earl Werner and his students at several permanent and ephemeral ponds at the ESGR from 1996–2010. In addition, McCauley (2006, 2008) studied odonates at natural and artificial ponds at the ESGR. Those samples recently became accessioned into the University of Michigan's Museum of Zoology collections in 2012, and I was able to access the samples after they were cataloged. Repeated sampling at designated sites provided many thousands of Odonata specimens (along with all other aquatic organisms). Sixteen samples, from 12 May to 21 July (1996–2010), contained late to final instar larvae of *E. heros*. The specimens indisputably confirm that *E. heros* is overwintering in the larval stage, and hence, there is a resident population in southeast Michigan.

As far as more northern areas of Michigan, there is only one record of the Swamp Darner from the Upper Peninsula, which was collected on 22 June 2008 by Ryne Rutherford in Schoolcraft Co., Hiawatha National Forest, Scott's Marsh (MOS0033109). That female was flying at the edge of a marsh, and presumably looking for oviposition sites. The early date (for the Upper Peninsula) is indicative of a migrant individual. I doubt that there is a resident population in the Upper Peninsula. It is interesting that no further records of *E. heros* from the Douglas Lake region have appeared since the Evans (1915) documentation. I searched the collections at the University of Michigan Biological Station at Douglas Lake and did not find any vouchers from Evans, nor more recent specimens of *E. heros*.

Acknowledgements

First of all, Julie Craves and Darrin O'Brien have made many great contributions to the study of Odonata in Michigan, and for them to find *E. heros* in a wetland on their new property is a sign that they made the right decision to purchase it. I thank them profusely for their collaboration. The data set from the ESGR has been of great help, as have the voucher specimens collected from the ponds by a number of students over the years. I thank Earl Werner for his foresight to save and catalog all of the ecological vouchers. The adult collection data is from the Michigan Odonata Survey database.

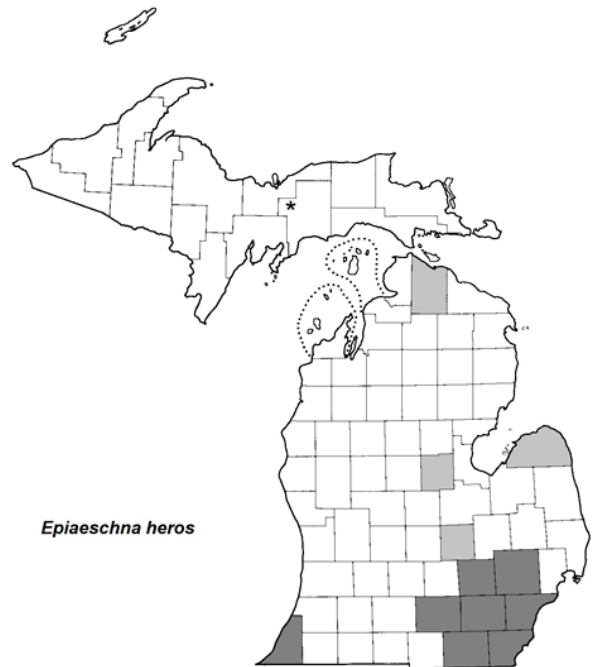


Figure 1. *Epiaeschna heros* distribution in Michigan. Light gray: records before 1996 that are either based only on literature or have not been collected since. Dark gray: re-collected since 1996. The asterisk in the Upper Peninsula indicates a vagrant specimen.

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Plains Clubtail (*Gomphus externus*)—First Louisiana Record

Ronnie Maum, Haughton, Louisiana <rmwoodworks@aol.com>

On 18 April 2014, I went to the Red River National Wildlife Refuge (NWR) Headquarters Unit, south of Bossier City, Louisiana in search of nature subjects to photograph. On the previous two weekends, I had been observing and photographing damselflies, including Orange Bluet (*Enallagma signatum*), Southern Spreadwing (*Lestes australis*), and Citrine Forktail (*Ischnura hastata*); and dragonflies such as Common Green Darner (*Anax junius*) and Eastern Pondhawk (*Erythemis simplicicollis*).

One of my favorite trails for photographing Odonata species at Red River NWR Headquarters Unit is the Yellow Trail, which runs adjacent to, but often a hundred yards or more from, the actual navigable channel of the Red River. The trail is partially grass-covered and has numerous bare spots of river sand.

On 26 March 2011, I photographed and later submitted to OdonataCentral in 2012 a potential Plains Clubtail (*Gomphus externus*) record along the Yellow Trail (OC#367186). The image, vetted by Greg Lasley, lacked sufficient detail to make a definite species determination and thus remained unconfirmed.

In 2012 and 2013, I searched specifically for Plains Clubtail along the Yellow trail, but did not find a single specimen. This may have been due to insufficient search time.

On 18 April 2014, I photographed one specimen on the Yellow Trail within about 50 yards of the previous unconfirmed record. I submitted this latest image (Figure 1) to Odonata Central (OC#421890), where it was vetted and confirmed by Martin Reid.



Figure 1. Plains Clubtail (*Gomphus externus*) from Red River NWR Headquarters Unit Yellow Trail. Photo by Ronnie Maum.



Figures 2 and 3. Dorsal and lateral views of the same specimen of Plains Clubtail (*Gomphus externus*) photographed 19 April 2014 at Red River NWR Headquarters Unit Yellow Trail in Louisiana. Photo by Ronnie Maum.


On the next two consecutive days, I photographed several other specimens along the Yellow Trail. Figures 2 and 3 are of the same very photogenic individual.

Plains Clubtail had yet to be reported in Louisiana, but its presence was not unexpected, as Texas, Oklahoma, and Arkansas have numerous records. A Plains Clubtail record is now established in at least one location within Louisiana and other locations may also be discovered.

Acknowledgements

Thanks to Greg Lasley for his encouragement to obtain better photographic images and to Martin Reid for his identification confirmation.

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Life at 1,000 RPM

James S. Walker, Anacortes, Washington <jswphys@aol.com>

Dragonflies exhibit a wide variety of behaviors that are both fascinating to observe and fun to share with others. When I show splash-dunking and spin-drying to others, there are always a number of good questions that follow—particularly about the spin-dry part of the process (Walker, 2011). In this article, I provide details of the spin-dry to clarify this intriguing behavior.

The Basics of Splash-Dunk/Spin-Dry Behavior

One of my favorite dragonfly behaviors to discuss in presentations, and to show people in the field, is the splash-dunk and spin-dry. The basic outline of the splash-dunk behavior is illustrated in Figure 1. It begins with a series of vigorous plunges into the water, each resulting in a sizeable splash. A given splash-dunk event can consist of one to as many as eight splash-dunks in succession. The purpose of the splash-dunk seems to be to clean the dragonfly, as has been documented previously article (Walker, 2013).

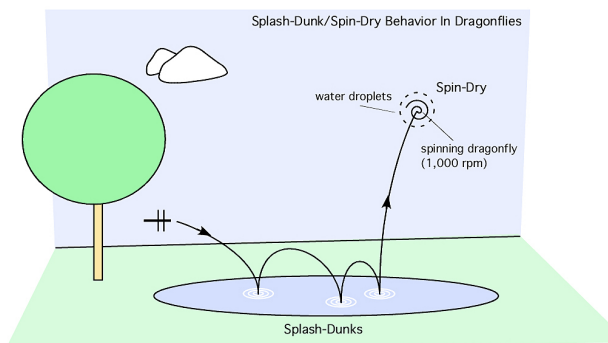


Figure 1. Schematic of the splash-dunk/spin-dry behavior observed in many dragonfly species.

Following the splash-dunks, the dragonfly gains altitude, and then performs a dramatic spin-dry at 1,000 rpm. This sheds the water it picked up during the splash-dunks. The water sprays off in all directions, generating “ooh”s and “aah”s from the crowd. Sometimes you can see droplets of water hitting the surface of the lake or pond. On other occasions, you can see and feel droplets falling all around you on the shore. If you look up quickly, you may be able to see the dragonfly that just did a spin-dry over your head.

As interesting and fascinating as the spin-dry part of the behavior is, it's often hard for people to visualize. In what follows, I discuss the axis of rotation of the spin-dry, the rate of spinning and how it is determined, and the centripetal acceleration that results.

Axis of Rotation

Nothing causes more confusion than the axis of rotation of the spin-dry. Perhaps the best way to clarify the situation is to start with the three mutually-perpendicular axes of rotation of a rigid body like a dragonfly, or an airplane. This is presented in Figure 2, which shows a Paddle-tailed Darner (*Aeshna palmata*) in level flight. Any rotation of the dragonfly can be represented as a combination of rotations about the roll axis, the yaw axis, and the pitch axis. Note that the roll axis goes along the length of the body, and the pitch axis goes along the wings, from tip to tip.

As a dragonfly prepares for a spin-dry, it heads directly upward, with its head pointing to the sky and its tail pointing to the ground. It now initiates the spin-dry by powering itself forward into a rapid rotation about the pitch axis (i.e., the axis along the wings). As it does so, it curls up into the shape of a partial hoop and rotates with an angular speed ω , as illustrated in Figure 3. In human terms, we

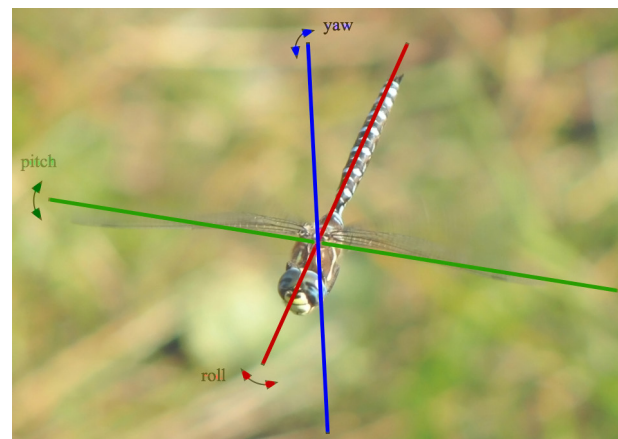


Figure 2. The three axes of rotation for a dragonfly.

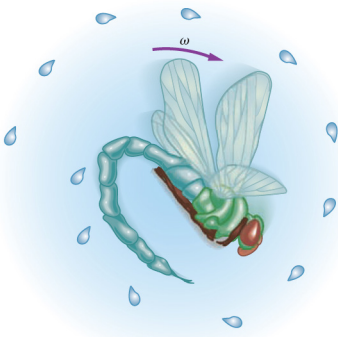


Figure 3. Dragonfly executing a spin-dry. It spins primarily about the pitch axis of the body and is curled into a partial hoop.

heads for a tree or a bush to perch, other times it decides to spin-dry one or two more times for good measure.

Rotation Rate of the Spin-Dry

The dragonflies I observe doing a spin-dry most often are the Paddle-tailed Darners (*A. palmata*). They spin at a rate of roughly 1,000 rpm. When I quote that figure to people, they sometimes assume I'm just throwing out a large number to indicate the dragonflies are rotating rapidly. In fact, the rotation rate is quantitatively accurate, and comes from direct measurement.

When I film a spin-dry, it is with a slow-motion video camera shooting at the rate of 240 frames per second. As a result, if it takes the dragonfly N frames of video to complete one rotation, the rotation rate in rpm is given by the following relationship:

$$\text{Rotation rate (in rpm)} = 14,400/N$$

A typical spin-dry takes about 14 frames for a revolution, with a resulting spin rate in the neighborhood of 1,000 rpm.

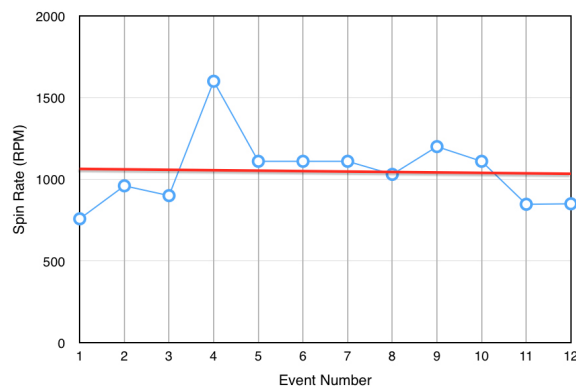


Figure 4. Spin rate as measured in different spin-dry videos. The red lines shows average value.

would say that it is tumbling “head over heels”. At this point, droplets of water come streaming off the dragonfly’s body.

The dragonfly spins for roughly eight complete revolutions, which takes about 0.5 s. It then pulls out of the spin, and resumes normal flight. Sometimes it

A plot of rotation rate for 12 different spin-dry videos is presented in Figure 4. These videos were chosen because they had the best resolution of the spin-dry, giving an accurate count of the number of frames per revolution. As shown by the red line, the rotation rate of 1,000 rpm is a good average value.

Another point that frequently causes confusion is the distinction between a rate and an amount. When I say a dragonfly does a spin-dry at 1,000 rpm, some think I mean the dragonfly spins 1,000 times, or that it spins for a minute. In fact, as mentioned above, a spin-dry lasts for only about half a second, during which time the dragonfly completes about eight revolutions, so it’s the rate that is large, not the total time or total number of revolutions. It’s like the situation with a car, where if you drive at 60 mph it doesn’t necessarily mean that you’re going 60 miles or that you’re driving for an hour.

Centripetal Acceleration of the Spin-Dry

As one might imagine, a spin-dry at 1,000 rpm is a fairly extreme and violent maneuver—certainly one a human would not want to experience. One way to quantify this is to note that a rotation rate of 1,000 rpm is equivalent to an angular speed of $\omega = 105$ radians/s (Walker, 2010). The centripetal acceleration associated with a spin rate ω is $a_{cp} = r\omega^2$, where r is the radius of the spinning object. In the case of a darner, the radius is roughly $r = 0.012$ m, which results in a centripetal acceleration of 130 m/s^2 .

To put this into context, we note that 130 m/s^2 is about 13 times the acceleration due to gravity on the surface of the Earth ($g = 9.81 \text{ m/s}^2$). This is certainly a large enough acceleration to send the water flying in all directions. In addition, it’s an acceleration that would immediately render a human unconscious, and could even prove fatal if sustained. Even so, it seems to have no effect on the dragonflies—they don’t even get dizzy!

Conclusions


Dragonfly spin-dry behavior is so novel that many have a hard time visualizing it, or properly understanding what it actually means. Dragonflies spin about an axis going through their wings at 1,000 rpm for half a second. This leads to eight revolutions with a centripetal acceleration of $13g$, and an impressive spray of water. The final result—a spin-dried dragonfly!

Acknowledgements

I would like to thank Betsy Walker for helpful discussions, and for help with the observations. I would also like to

thank Carl Tomoff for insightful questions that helped sharpen this presentation.

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Advice Column

If you have any words of wisdom about the many aspects of life with odonates that you would like to pass on to your fellow enthusiasts, please don't hesitate to share! Send submissions for the Advice Column to the Editor at <celeste@xerces.org> and do your part to help make the world of odonates a better place.

First Record of Black Setwing (*Dythemis nigrescens*) for Oklahoma

Brenda D. Smith-Patten, Oklahoma Biological Survey, University of Oklahoma <argia@ou.edu>

While conducting a routine survey on 9 May 2014 at the city lake in Altus, Jackson County, Oklahoma (34.65855, -99.32257°), I discovered a male Black Setwing (*Dythemis nigrescens*). Although the species was new for Oklahoma I was not at all surprised to see it, namely because Michael A. Patten, my colleague and husband, had predicted its presence in the state. Michael had reasoned some time ago that the species had a small population in the southwestern corner of the state or at the least would be found there as a vagrant. Indeed, to his credit he even predicted that we would find the species at Altus' city lake. I concurred with his predictions but knew that finding the species would be difficult given the ever-increasing intensity of aridity in that part of the state. Southwestern Oklahoma is currently in a severe drought; in this calendar year for example, the southwest is at 52% below normal precipitation (OKWRB 2014, <<http://www.okwrb.ok.gov/supply/drought/bulletin.php>>). Currently the two major reservoirs nearest to Altus city lake, Tom Steed Lake and Lake Lugert-Altus, are 4 m (14 ft) and 9 m (30 ft) below normal storage, respectively, which is <50% of capacity (OKWRB, 2014).



Black Setwing (*Dythemis nigrescens*), Altus, Jackson County, Oklahoma, 9 May 2014. Photo by Brenda Smith-Patten.

Prognostications for Jackson County aside, one could have predicted the Black Setwing to occur in southeastern Oklahoma in light of the fact that nearest confirmed record of the species to Oklahoma is of a male photographed by Jessica Womack on 13 October 2007 in Fannin County, Texas (33.63269°, -95.91984°; OC #375274), which is adjacent to Bryan County in southeastern Oklahoma. As with the southwestern corner of Oklahoma, the southeast has experienced periods of drought in recent years, but it is currently classified as being in an “incipient drought” as opposed to the “severe drought” of the southwest (OKWRB, 2014). In any case, at the moment it is impossible to discern if the lone male Black Setwing from Altus is a vagrant or part of a hypothesized small, albeit possibly intermittent, population along the southern fringe of Oklahoma.

The story behind the first state record of Black Setwing for Oklahoma is a fine example of the adage “what a difference a day makes”. I arrived at the city lake in Altus in the early afternoon on 9 May. After surveying some smaller ditches near the lake, I climbed down the steep slope of what is known as the “Altus Canal”, a broad flood-control channel whose size seems extreme for so dry a region. Shortly after reaching the bottom, where there is a small (spring-fed?) pool, I noticed the setwing. I was able to take several photographs (Figure 1; OC #422099), but he persistently remained just out of the reach of my net. After a couple of futile swings at him, the setwing ascended, was caught up by the high winds so common to western Oklahoma, and was never seen again. I tried for another hour and a half to re-find the setwing and even returned to the spot later that day, but to no avail. I stayed in Altus overnight so I could re-survey the area the following morning, but again I had no luck despite spending roughly three-and-a-half hours surveying, during which I noticed a notable turnover in species and numbers.

On 9 May I had the following species: Familiar Bluet (*Enallagma civile*; 5♂, w/2 immatures), Kiowa Dancer (*Argia immunda*; 1♂), Aztec Dancer (*Argia nahuana*; 25♂, 5♀, w/5 pairs), Powdered Dancer (*Argia moesta*; 1♂), Black-fronted Forktail (*Ischnura denticollis*; 20♂, 10♀, with pairs), Common Green Darner (*Anax junius*; 2♂), Black Setwing (*Dythemis nigrescens*; 1♂), Band-winged Dragonlet (*Erythrodiplax umbrata*; 1♂), Roseate Skimmer (*Orthemis ferruginea*; 6♂, 2♀), Common Whitetail (*Plathemis lydia*; 6♂, 1♀), Variegated Meadowhawk (*Sympetrum corruptum*; 2♂, 1♀), Wandering Glider (*Pantala flavescens*; 4♂), Black Saddlebags (*Tramea lacerata*; 1♂, 1♀), and Red Saddlebags (*T. onusta*; 1♂, 1♀). On 10 May I had: Familiar Bluet (*Enallagma civile*; 20♂, 3♀, w/2 pairs), Citrine Forktail (*Ischnura hastata*; 2♂, 2♀), Rambur's Forktail (*I. ramburii*; 1♂), Black-fronted Forktail (6♂, 4♀), Aztec Dancer (2♂), Kiowa Dancer (1♂), Common Green Darner (2♂, 1♀, w/1 pair), Variegated Meadowhawk (8♂, 2♀, w/2 pairs), Roseate Skimmer (6♂, 2♀), Wandering Glider (7, 6♂, 1♀), Red Saddlebags (1♂), and Black Saddlebags (4, unsexed).

Beyond the missing Black Setwing and the Band-winged Dragonlet (a new county record), what struck me most about how different the two days were was the prevalence of Aztec Dancer on the first day but their near-absence the next, and that Black-fronted Forktails were quite com-

mon on 9 May, yet there were many fewer on 10 May. Citrine and Rambur's Forktails, though low in numbers, were found on the 10th but not on the 9th. On the first day I had many teneral zygopterans, which I did not take the time to try to identify, but I found it interesting that I had so few Familiar Bluets that day with many more the following.

The anisopterans also showed some changes, i.e. the higher number of Variegated Meadowhawks on the second day (three on May 9 vs. 10 on May 10). The most obvious example of changeover for anisopterans was the Common Whitetail, which was fairly common on the first day but absent the next. Granted, these observations are anecdotal, but I feel they illustrate how different weather conditions (9 May: 73–82°F, breezy, partly cloudy; 10 May: 60–75°F, windy, clear) and emergence cycles can affect one's surveys of Odonata. Not that the middle of the United States can be compared directly, but this is akin to my experience in the tropics with birds, where consecutive visits to a survey plot can produce species lists that almost do not resemble one another, despite being a mere 24 hours later. I learned that Oklahoma, though not necessarily as drastic as the tropics, can also experience rapid turnover. There does seem to be something to the old saw of "what a difference a day makes".



Sylph (*Macrothemis*) Photo Mis-identified in Western Odonata Field Guide

Dennis Paulson, Seattle, Washington <dennispaulson@comcast.net>

When I was collecting photos for Dragonflies and Damselflies of the West (Princeton University Press, 2009), I tried to understand variation in tropical genera with sometimes limited resources. At the time, I was confused about the differences between White-tailed Sylph (*Macrothemis pseudimitans*) and Ivory-striped Sylph (*M. imitans*). Thus I didn't realize that I had included a photo of a male White-tailed (332.1, page 494) as a male Ivory-striped. However, the inset photo is a bona fide Ivory-striped.

While trying to establish the identity of a *Macrothemis* he photographed in Texas, Martin Reid and I discussed differences between the two species, and he was able to determine that the photo in my book was in error. I thank him for pointing it out.

Other errors in this book and its eastern counterpart are listed at Odonata Central <<http://www.odonatacentral.org/docs/PaulsonWestErrata.pdf>>. Fortunately, there are no other misidentified photos!



Photos Needed for ARGIA

If you would like to contribute a photo for possible use as a front or back cover "glamor shot" for ARGIA, please contact the Editor at <celeste@xerces.org>. Submitted photos may be saved for later issues. We need high-quality images that are pixel-dense enough to have a resolution of 300 ppi at about 6.5 inches in width. Please check that your images will have high enough resolution at this size before sending them. Images in TIFF format are best, but JPEGs work too if they are high quality and compression artifacts are limited. Please send photos as attachments (up to 15 MB) or via a file transfer service or GoogleDrive as opposed to being embedded in the body of an e-mail.

Odonata in the News

Odonata in the News is compiled by the Editor. Please feel free to send alerts about any noteworthy items including news stories, popular articles, and scientific publications to the Editor at <celeste@xerces.org>.

A sampling of the most recent newsworthy odonata includes:

Dragonflies lack “smell center” but can still smell <<http://news.sciencemag.org/biology/2014/03/dragonflies-lack-smell-center-can-still-smell>>: Odonates lack the olfactory system common to most terrestrial mammals and insects, and were long thought to lack any sense of smell. However, researchers in Italy have found tiny bulbs in pits in odonate antennae that resemble olfactory sensilla. These sensilla reacted when exposed to odors by sending nerve impulses. In addition, damselflies that were placed in a tunnel downwind of a cluster of fruit flies that were hidden behind thin cotton congregated on the screen near where the flies were clustered.

O'Brien, M.F. 2014. Great Lakes Odonata Bibliography. Michigan Odonata Survey, Technical Note No. 4 <http://insects.ummz.lsa.umich.edu/MICHODO/mospubs/MOS_TN4.pdf>: A complete bibliography of the literature dealing with the odonates of the states and provinces that drain into the Great Lakes.

Ball-Damerow, J.E., L.K. M'Gonigle, and V.H. Resh. 2014. Changes in occurrence, richness, and biological traits of dragonflies and damselflies (Odonata) in California and Nevada over the past century. Biodiversity and Conservation DOI 10.1007/s10531-014-0707-5: A re-survey of 45 sites originally sampled in 1914–1915 to assess changes wrought by climate change and increased human population pressure. While species richness did not change significantly, the odonate assemblages had become much more similar across all sites. In addition, habitat specialists and species that undergo diapause were seen less often in areas that were warmer and/or highly populated.

Dijkstra, K.D.B., V.J. Kalkman, R.A. Dow, F.R. Stokvis, and J. Van Tol. 2013. Redefining the damselfly families: a comprehensive molecular phylogeny of Zygoptera (Odonata). Systematic Entomology 39: 68–96: Assessment of mitochondrial and nuclear DNA of 59% of the 310 recognized genera of Zygoptera. While most traditional existing families were recognized as monophyletic, a re-organization of the superfamily Coenagrionoidea into three families as well as additional subfamily designations is proposed.

Dumont, H.J. 2013. Phylogeny of the genus *Ischnura*, with emphasis on the Old World taxa (Zygoptera: Coenagrionidae). Odonatologica 42: 301–308: COI (cytochrome oxidase I) and ITS (nuclear internal transcribed spacer) DNA was used to examine phylogenetic relationships within *Ischnura*. The genus resolves into two main clades. Some formerly enigmatic species were resolved, while others require additional study.

Allen, K.A. and D.J. Thompson. 2014. Population size and survival estimates for the rare damselflies, *Coenagrion mercuriale* and *Ischnura pumilio*. Insect Conservation and Diversity 7: 241–251: A mark-recapture-release project done to estimate population size and survival estimates for two rare species in the United Kingdom whose populations have been declining in recent years. Their estimated population sizes were much greater than previously thought, which suggests that populations of threatened odonates can flourish where good habitat is maintained. Higher numbers of females were estimated when wider search techniques were used, which has implications for survey design in studies done to estimate populations of rare species for conservation purposes.

Zeuss, D., R. Brandl, M. Brändle, C. Rahbek, and S. Brunzel. 2014. Global warming favours light-coloured insects. Nature Communications DOI 10.1038/ncomms4874, 10 pp.: An analysis of 366 butterfly species and 107 dragonfly species in Europe found that current distributions reflect a dominance of light-colored insects in the warmer southern areas of Europe with darker insects dominating in the north. They also found that from 1988 to 2006, there was a general shift towards lighter-colored assemblages across Europe, and this change was positively correlated with changes in annual mean temperatures. Shifts towards darker assemblages were seen in cooler regions in the western margins of Europe, the Alps and the Balkans.

Smith-Patten, B.A. and Patten, M.A. 2014. A Checklist of Oklahoma Odonata (Dragonflies and Damselflies). Oklahoma Biological Survey <<http://www.biosurvey.ou.edu/patten/Patten%20Research%20Oklahoma%20Odonata%203.html>>: An updated checklist of all species in the state is provided. This site also has links to records by county as well as information on the conservation status of Oklahoma odes.



How I Fell Into the Clutches of the Odonata

This feature presents essays from DSA members that describe how, when, where, and why they first became interested in Odonata. It's also 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 <celeste@xerces.org>. Whether you just discovered odonates this spring or have pursued them for decades, I know there are interesting, entertaining, and inspiring stories to tell. In this installment, Jim Stuart discovers that developing a passion for Odonata is an event that comes better late than never.

Getting Hooked on Odonates in Three Easy Steps

James N. Stuart <jnstuart61@yahoo.com>


I think most naturalists who live in an arid state like mine (New Mexico) develop a real affection for the limited aquatic habitats we have, but my fascination with freshwater environments goes back to when I was a kid in New York. Chasing frogs and garter snakes led me into herpetology as an all-consuming hobby and occasional vocation. I pursued degrees in vertebrate zoology and eventually a career in wildlife biology, where I expanded my interests to include mammalogy and ornithology. And yet, I'm embarrassed to admit, in 40-some years of poking around wetlands and streams across the U.S. in pursuit of specimens, I never once paused to look at a dragonfly. Not once. But that all changed several years ago, thanks to the confluence of three events that got me hooked on odonates.

After years of procrastinating, I finally made the leap to digital camera technology. I also bought a decent telephoto lens and quickly tried to make up for lost time in pursuing my renewed interest in nature photography. But since chasing birds and mammals with a camera can often be frustrating, I started to point my lens at other creatures during my photo outings so I wouldn't come up empty. In 2008, while stalking an uncooperative Marsh Wren in Nevada, I paused to photograph a neat little dragonfly that posed on a cattail as if he wanted me to shoot him. It was a common Blue Dasher (*Pachydiplax longipennis*), but I didn't even know that much at the time. However, from that point on I started including these "bugs" as photo subjects whenever I was out near water and discovered a

diversity of life that had been invisible to me. That was my first nibble at the odonate hook.

It wasn't long before I contacted Robert Larsen of Roswell, New Mexico, our state expert for odonates. I'd never met Robert and didn't know if he'd be at all interested in looking at my photos and answering questions, but it turned out he was a perfect gentleman and an amazing source of information. He recommended a couple of very good odonate field guides by John Abbott and Dennis Paulson, which I purchased, and sent me his annotated state list of odonates. He graciously gave me a personal tour of the diverse odonate habitats around Roswell, and he enthusiastically pointed out which of my various photos represented new county records for New Mexico. To a former scientific specimen collector like me, the chance to come up with new range records in an under-surveyed state was the real bait.

Robert recommended I submit my photo-records to OdonataCentral, a website I'd never heard of, so I checked it out. What an amazing resource for someone just getting into identifying and photographing odonates! John Abbott's creation is a virtual museum collection on the web and unlike anything I'd ever seen for other taxonomic groups. This would be a great way to blend my new hobbies of digital photography and odonate field identification with a long-standing interest in species distributions. At that point I took the bait and was hooked!

I've heard that some odonatists are "burned-out" birders looking for new challenges, and I can relate to that (although I'm only a second-rate birder!). We all occasionally need new interests to keep things fresh and mentors like Bob Larsen to cultivate those interests. Despite my zoology background, I'm fairly ignorant about insects. I was a dedicated vertebrate collector for many years but have never made an insect collection, so I doubt I'll ever fully understand the subtle characteristics used to sort out odonate taxa. These are the skills you learn only from many a specimen in hand and countless hours working in a collection (been there, done that, albeit with other animals). But that's a deficiency in my knowledge I can live with, at least for now; the fun of chasing odonates with a camera is enough. And, with the perspective of a new hobbyist, I've developed an even deeper appreciation for the streams and wetlands of my state than I had before. 

New Book Announcement: Atlas of Dragonflies in Britain and Ireland

Atlas of Dragonflies in Britain and Ireland, edited by Steve Cham, Brian Nelson, Adrian Parr, Steve Prentice, Dave Smallshire and Pam Taylor. Field Studies Council, Code SP6, hardcover, 400 pp., price: £32.00 /\$54/€39.

From the Field Studies Council web site at <<http://www.field-studies-council.org/publications/pubs/atlas-of-dragonflies-in-britain-and-ireland.aspx>>:

Produced in partnership with the British Dragonfly Society and DragonflyIreland, this full colour hardback book (approx. 400 pages) represents five years work by volunteers and partner organisations to map the distribution of damselflies and dragonflies throughout Britain and Ireland.


As well as summarising the distribution of over 1 million dragonfly records, the Atlas includes:

- Species accounts, including maps, for all 56 resident

and immigrant species recorded in Britain and Ireland

- Four pages devoted to each resident species
- Sections on habitats, conservation, distribution changes and phenology
- High quality colour photographs of all species and their habitats



Additional information about the new atlas is also available in a brief review at <<http://phys.org/news/2014-05-atlas-reveals-trends-british-dragonfly.html>>. 

Cumulative Index of ARGIA and Bulletin of American Odonatology Titles

Have you ever found yourself trying to remember in what year the first Texas record of *Somatochlora tenebrosa* (Clamp-tipped Emerald) occurred, who attended the Great Lakes Odonata Meeting in 2002, or what the scoop is on reproduction in *Arigomphus villosipes* (Unicorn Clubtail)? If so, just visit Jim Johnson's web site Bogfoot and check out the cumulative index he has compiled for ARGIA and BAO issues. You can find it at <http://odonata.bogfoot.net/docs/Argia-BAO_Cumulative_Index.pdf>.

Odonates Are All Over Facebook!

Those of you who enjoy staying connecting via social media will be happy to know that the number of odonate-specific Facebook Group pages is burgeoning. In addition to the DSA Facebook page, you can connect with fellow ode enthusiasts via FB groups with broad regional coverage, such as Western Odonata, Northeast Odonata, Southeastern Odes, and the Migratory Dragonfly Partnership, as well as more regionally-focused groups such as the Minnesota Dragonfly Society, Odonata Ohio, and the Wisconsin Dragonfly Society. Another FB group simply called Dragonflies has world-wide coverage and provides the opportunity to see species from Africa, Europe, and Thailand.

To find these groups, just type the name into the search bar at the top of your Facebook page. The discussions are lively, friendly, and highly educational! If I have missed any Facebook sites you would like to see included in further announcements, please let me know at <celeste@xerces.org>.

Parting Shots

Parting Shots pays tribute to the endless diversity and interest of odonate behaviors and the 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 some odd, bizarre, unusual, unexpected, or amusing aspect of odonate life (or of life with odonates), please send them to the Editor at <celeste@xerces.org>, along with a short note describing the photo and event.

Bromeliad-breeding Beauty

Dennis Paulson, Seattle, Washington <dennispaulson@comcast.net>

The “helicopter damselflies” of the family Pseudostigmatidae have always been thought of as an unusual and unique group of the American tropics. They are huge, with very long abdomens, and they breed in phytotelmata (elevated containers that collect rain water) rather than in the usual wetlands of most odonates. As the South American fauna became better known, we learned that quite a few pond damsels (Coenagrionidae) also breed in such places. Many phytotelmata breeders use tree cavities, while others use bromeliads.

The pseudostigmatids seemed less and less unique as more pond damsels with similar habits were discovered, and in fact, recent molecular studies show that the helicopter damsels actually belong in the pond damsel family, and they are special more for their size than for anything about their evolutionary position. One of the better-known groups of coenagrionid phytotelmata breeders is the genus *Leptagrion*, which is almost entirely restricted to Brazil. Quite possibly all of the 17 species breed in bromeliads, and several of them have been better studied than most South American damselflies.

Here is one of those species, *Leptagrion capixabae*, from the Serra dos Orgaos mountains of southern Brazil. It



Mature male *Leptagrion capixabae*, Serra dos Orgaos National Park, Brazil, 23 October 2013. Photo by Netta Smith. On territory on breeding habitat, the huge bromeliad *Vriesia imperialis*.

breeds in the giant terrestrial bromeliad *Vriesia imperialis*, whose flower stems are almost two meters in height.

When I visited these mountains on 23 October 2013, I found three different males apparently each defending a single *Vriesia* with water in its leaf axils in a big clearing. I also found a few *L. macrurum* a bit higher up on the mountain, as well as a female *Leptagrion* just emerging from one of those axils. I was very impressed by this genus.



Emerging female *Leptagrion*, Serra dos Orgaos National Park, Brazil, 23 October 2013. Photo by Netta Smith.



Bromeliad, Serra dos Orgaos National Park, Brazil, 23 October 2013. Photo by Dennis Paulson.


Clash of the Titans

Sally Jue <dsjue@embarqmail.com> captured the moment as this Gray-green Clubtail (*Arigomphus pallidus*) prepared to dine on the almost equal-sized Taper-tailed Darner (*Gomphaeschna antilope*) on 6 May 2014, in the Apalachicola National Forest, Florida.



Spider Outranks Corporal

Peter Allen <allenbds1@btinternet.com> caught this shot of a spider taking down a Chalk-fronted Corporal (*Ladona julia*) on 16 July 2004 at Little John Jr. Lake in Vilas County, Wisconsin.

The dragonfly was already well-secured by silk (and from the long strands just visible trailing off the wingtips likely had smacked into the web) but the spider appears to be taking no chances and may be injecting venom as it bites between the abdominal segments. 



Back Issues of Odonatologica Must Go!!!

Due to the need for space here at the Florida State Collection of Arthropods, all of the extra copies of Odonatologica must be removed. I am now having a FINAL clearance sale on them. Here is what's available:

- * Individual copies prior to 2009, mostly new, a few used but in good condition (minimum order of 4), \$10 each;
- * Year sets 1979, 1980, 1983, 1987, 1988, 1992, 1993, 1994, 1995, 1996, \$25 per set;
- * Year sets 1997, 2009, \$20.00 per set;
- * Year sets 2011–2013, \$50.00 per set.

Please send me your request list at <iodonata@gmail.com> before sending any money. All orders must be pre-paid by check or PayPal (add 3%).

What is not sold by 15 August 2014 will be put into recycling.

Bill Mauffray, IORI

ARGIA and BAO Submission Guidelines

Digital submissions of all materials (via e-mail or CD) are vastly preferred to hardcopy. If digital submissions are not possible, contact the Editor before sending anything. Material for ARGIA should be sent to Celeste Mazzacano, The Xerces Society for Invertebrate Conservation, 628 NE Broadway, Suite 200, Portland, Oregon, USA 97232, <celeste@xerces.org>. Material for BAO must be sent to Steve Hummel, Lake View, Iowa, USA 51450, <mshummel@iowatelecom.net>.

Articles

All articles and notes should be submitted in Word or Rich Text Format, without any figures or tables or their captions, embedded. Please submit all photos and figures as separate files along (see Figures below). Only minimal formatting 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 or Text document.

Begin the article with title, author name(s), and contact information (especially e-mail) 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. Where possible always give both the scientific name of a species as well as its official common name in parentheses.

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 (preferred) or JPEG files with a minimum of 300 ppi at the intended print size. If unsure about the final print size, keep in mind that over-sized 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 editorial staff 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) are best submitted in Illustrator format or EPS. If this is not possible, then submit 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 to be unsatisfactory. When charts and graphs are generated in Excel, please submit the Excel document 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 documents or Excel spreadsheets. If Excel is used, place each table on a separate sheet and name each sheet appropriately (e.g. "Table 1", "Table 2", etc.)

The Dragonfly Society Of The Americas

Business address: Celeste Mazzacano, The Xerces Society for Invertebrate Conservation, 628 NE Broadway, Suite 200, Portland, Oregon, USA 97232

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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 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**. Dues for individuals in the US, Canada, or Latin America are \$15 us for regular memberships (including non-North Americans), institutions, or contributing memberships, payable annually on or before 1 March of membership year. The **Bulletin Of American Odonatology** is available by a separate subscription at \$20 us for North Americans and \$25 us for non-North Americans and institutions. Membership dues and BAO subscription fees should be mailed to Jerrell Daigle, 2067 Little River Lane, Tallahassee, Florida, USA 32311. More information on joining DSA and subscribing to BAO may be found at <www.dragonflysocietyamericas.org/join>.

Back cover: (upper) Male Citrine Forktail (*Ischnura hastata*), Amboy Marsh, Lee Co., Illinois. Photo by Dick Todd.
(lower) *Perithemis lais* (Fine-banded Amberwing) Rio Cuiaba near Porto Jofre, Brazil, 7 October 2013.
Photo by Dennis Paulson.

