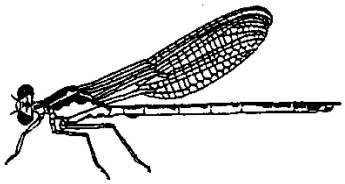
Ode News



An Occasional Newsletter about Dragonflies and Damselflies in Southern New England

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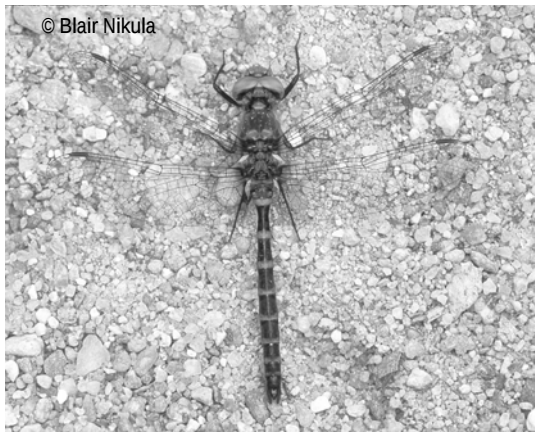
This issue of *Ode News* was put on the back-burner for a while, as the editors worked feverishly to complete a beginner's guide to dragonflies and damselflies. The manuscript is now at the publisher (Little, Brown, & Co.) with publication scheduled for later this year. It will be a soft cover guide of 144 pages with over 150 color photographs illustrating more than 100 of the most common and widespread species in North America.

The world of odonate publications expanded dramatically during the last half of 2000, with the appearance of two long-awaited books: Sid Dunkle's *Dragonflies through Binoculars* and the extensively revised manual *Dragonflies of North America* by Needham, Westfall, and May. Reviews of both appear later in this issue. Odonatists can now have at their fingertips exhaustive manuals to both dragonflies and damselflies, a field guide to dragonflies, and a monumental work on the behavior and natural history of odonates – quite a leap forward from the relative dearth of publications just five years ago!



Ringed Boghaunter (*Williamsonia lintneri*) — male
Canton, MA

This issue of *Ode News* focuses on the 2000 field season, a mediocre season at best. Water levels were very low and the weather poor during much of the prime time (June & July). These factors may have been responsible for what seemed to be very low populations of many odonates, even such normally abundant and widespread species as Eastern Forktails (*Ischnura verticalis*) and Common Green Darners (*Anax junius*). The most exciting find came from Connecticut where observers discovered the first regional records for Great Spreadwing (*Archilestes grandis)*; see Mike Thomas' account on page 4.

Also in the pages that follow are articles by Jeremiah Trimble on his study of dragonfly congregations on the summit of Mt. Watatic and by Dick Hildreth on a surprising southbound movement of meadowhawks last fall.

2000 MASSACHUSETTS HIGHLIGHTS

The 2000 field season in Massachusetts (and elsewhere in southern New England) was generally rather slow, with few notable finds. Many species went unreported altogether.

A dry, nearly snow-less winter and early spring resulted in a continuation of the drought conditions of 1999 and very low water levels prevailed as we headed into the 2000 ode season. The early spring was very dry and warm (March rainfall was about 5½" below average, while Boston temperatures averaged almost 5ºF above normal), which apparently induced the early emergence of a number of species in late April and May, and undoubtedly prompted the unprecedented late March arrival of what was probably a Common Green Darner in Duxbury (erroneously reported as April 1st in the last issue of *Ode News)*.

Very wet weather arrived in June, with rainfall in Boston (6.6") nearly double the norm. The weather dried out a bit in early July, but another long stretch of wet and cool weather prevailed from mid-July into early August. Dry weather returned in mid-August and continued into the fall. Although the wet weather early in the summer replenished wetlands somewhat, water levels remained low throughout the season. Whether due to depressed water levels and/or the

heavy rains in June (the prime emergence period for much of the local odonate fauna), many species seemed to be in very low numbers in 2000. Whatever its impact on odonates, the wet weather, much of which occurred on the weekends, certainly had a negative impact on the activity of odonatists.

Observers: Fred Goodwin, Rick Heil, Gail Howe, Jim MacDougall, Blair Nikula, Fred SaintOurs, Jackie Sones, Jeremiah Trimble, Michael Veit. Letters in brackets following the species name indicate Massachusetts state-listing designations: [**E**] = Endangered; [**T**] = Threatened; [**SC**] = Special Concern.

Lateral Bluet (*Enallagma laterale*) [**SC**]: In addition to reports from coastal sites, notable inland records of this species came from Moosehorn Pond Bog in Hubbardston on 3 June where about 15 individuals were found (MV *et al*.), and Tom's Swamp, Petersham on the same date where a dozen or so were seen (BN *et al*.).

Citrine Forktail (*Ischnura hastata*): Normally scarce and local, this tiny yellow damselfly seemed unusually widespread this season. As many as 25+ were present in late August at a large, well-studied vernal pool in Eastham (JS *et al*.) where the species has only rarely been found in the past. One at Gooseberry Neck, Westport on 23 September (GH) was interesting, though this species is surprisingly regular on islands well offshore. This species was also numerous in Connecticut this year (see page 4). Did the low water levels favor this species? The usually abundant Eastern Forktail (*I. verticalis*) was very scarce in many areas this year. Did Citrine Forktails benefit from the paucity of their larger congeners?

Citrine Forktail (*Ischnura hastata*) — male
Eastham, MA

Mottled Darner (*Aeshna clepsydra*): One at Gay Head on Martha's Vineyard on 15 October (JT *et al*.) was a first for Dukes County.

Lake Darner (*Aeshna eremita*): The only record for this large darner came, once again, from Mt. Watatic in Ashburnham where a single individual was netted on 13 July (MV *et al*.). Of the several state records for this species, all but one are from the summit of this mountain. Although there are several potentially suitable lakes nearby, breeding by this species in the state remains unconfirmed.

Spatterdock Darner (*Aeshna mutata*) [**E**]: This blue-eyed dazzler was found again at a number of sites in northern Middlesex County (MV) and in Hampshire County (FM). One rather late individual was netted on 8 July at Littleville Lake in Chester (MV *et al*.).

Subarctic Darner (*Aeshna subarctica*): The only record for this late-flying, northern darner came from a new site, a lovely bog in southern Ashburnham, where a single male was netted on 9 September (BN). This discovery was particularly encouraging, as the only other site known for the species in the state, a tiny fen at the base of Mt. Watatic, has been flooded by beaver activity and may no longer provide suitable habitat for this sphagnum inhabiting dragonfly. There have been no records at this site since 1997.

Black-tipped Darner (*Aeshna tuberculifera*): One on Martha's Vineyard in mid-September (JS) was another first for poorly surveyed Dukes County.

Comet Darner (*Anax longipes*) [**SC**]: We are aware of only a handful of sightings for this conspicuous species in the state in 2000, all on Cape Cod.

Cyrano Darner (*Nasiaeschna pentacantha*): The only report of this southern darner came from Boston Brook/Pritchard's Pond in Middleton where three were found on 4 June (RH).

Unicorn Clubtail (*Arigomphus villosipes*): Two males at Bray Lake on Mt. Tom, Holyoke on 8 July (MV, BN) provided a first Hampden County record.

Spine-crowned Clubtail (*Gomphus abbreviatus*): A male captured on the Miller's River in South

Spine-crowned Clubtail (*Gomphus abbreviatus*) — male
Burnham, ME

Royalston on 17 June (MV), was the first for Worcester County and one of only a handful of records from the state.

Harpoon Clubtail (*Gomphus descriptus*) [**E**]: A single male at Littleville Lake, Chester on 17 June (BN) was the only one reported this year.

Cobra Clubtail (*Gomphus vastus*) [**SC**]: At least 70 freshly emerged individuals were counted along a stretch of the Connecticut River in Sunderland on the morning of 18 June (JT *et al*.). Heavy rains arrived later that morning, soaking the observers and leaving them pondering the fate of these still weak, incompletely developed tenerals.

Skillet Clubtail (*Gomphus ventricosus*) [**SC**]: A single male near the Connecticut River in Longmeadow on 17 June (BN) was the only report of this scarce species.

Southern Pygmy Clubtail (*Lanthus vernalis*): Two of these tiny gomphids were in Norwell on 25 May and several on 3 June (FS) at a site where they've been found regularly in recent years.

Riffle Snaketail (*Ophiogomphus carolus*) [**T**]: The only reports we received for this bright green clubtail were from the Middle Branch of the Westfield River in Chester where a single male was netted on 17 June (BN) and in Middlefield where at least two males were present on 8 July (MV, BN).

Arrow Clubtail (*Stylurus spiniceps*) [**T**]: An emerging male was found on the banks of the Nashua River in Harvard on 15 July (JT *et al*.), a new site and first modern Middlesex County record.

Arrowhead Spiketail (*Cordulegaster obliqua*): A male caught by an eleven year-old(!) in Ipswich on 3 June (*fide* FG) was the only one reported in the state this year.

Ski-tailed Emerald (*Somatochlora elongata*) [**SC**]: The only record for this species this year came from Mt. Watatic in Ashburnham on 13 July (MV *et al*.).

Forcipate Emerald (*Somatochlora forcipata*): A young male was captured on 16 June at a new site in Ashburnham (MV). There are now five records (from four sites) for this northern dragonfly in the state, the first in 1973, and the remainder all in the past four years.

Mocha Emerald (*Somatochlora linearis*) [**SC**]: A teneral female caught on 5 July in West Newbury (RH) was the only one reported.

Ebony Boghaunter (*Williamsonia fletcheri*) [**E**]: This small, dark dragonfly was found at three sites in Massachusetts this year. About 10 tenerals, both males and females, were found at a bog in Ashburnham on 14 May (MV), a new site for the species in the state. A single male was found at Moosehorn Pond in Hubbardston on 27 May (MV), where the species was known from just one previous record in 1991. Several individuals were present again at Tom's Swamp in Petersham on 3 June (BN, JT *et al*.).

Ebony Boghaunter (*Williamsonia fletcheri*) — male
Petersham, MA

Hudsonian Whiteface (*Leucorrhinia hudsonica*): Two in Ipswich on 30 April (JM) represented a long overdue first for Essex County.

Elfin Skimmer (*Nannothemis bella*): This tiny bog denizen was present again in numbers at the Lake Wampanoag bog in Ashburnham (MV, BN *et al*.).

Spot-winged Glider (*Pantala hymenaea*): Two at Belle Isle marsh in East Boston on 15 July (RH) provided an overdue first record for poorly surveyed and heavily urbanized Suffolk County.

Very few evening swarms of dragonflies were noted in 2000. One of the few occurred on 7 August at the Mill Pond Conservation Area in West Newbury where roughly 300 individuals included three Canada Darners (*Aeshna canadensis*), 12 Lance-tipped Darners (*A. constricta*), three Black-tipped Darners (*A. tuberculifera*), four Green-striped Darners (*A. verticalis*), 125+ unidentified mosaic darners (*Aeshna* spp.), 125+ Common Green Darners (*Anax junius*), four Clamp-tipped Emeralds (*Somatochlora tenebrosa*), eight unidentified striped emeralds (*Somatochlora* spp.), three Spot-winged Gliders (*Pantala hymenaea*), and two Black Saddlebags (*Tramea lacerata*).

Migrants: Inveterate hawkwatcher Tom Carrolan provided a couple of dragonfly migration reports from Massachusetts this year. On 10 June he counted 453 northbound individuals over seven hours at Pilgrim Heights in Truro. Although he was unsure of the species, that same day a few miles south in Wellfleet, Jackie Sones noted numbers of Spot-winged Gliders (*Pantala hymenaea*) moving north. On 13 September, while hawkwatching at Salisbury Beach (just south of the New Hampshire border), Tom witnessed a substantial movement of southbound dragonflies (again, species unknown, but this time most likely Common Green Darners). Based upon a series of one minute sample counts, he estimated about 900/hour passing during the late morning, increasing to 1500+/hour from 2:00 – 4:00 p.m.

Brian Cassie and others from the Massachusetts Butterfly Club made systematic counts of migrant butterflies along the coast of Westport this fall, primarily at Gooseberry Neck. In the process they recorded numbers of migrant dragonflies. The only date upon which a significant movement was seen was 22 September when Brian counted 1438 Common Green Darners (*Anax junius*), 205 Black Saddlebags (*Tramea lacerata*), 1 Carolina Saddlebags (*T. carolina*), and 13 Wandering Gliders (*Pantala flavescens*).

2000 CONNECTICUT HIGHLIGHTS

Mike Thomas

For many individuals, the highlight this season was the opportunity to observe several very cooperative adult **Ringed Boghaunters** (*Williamsonia lintneri*) during the University of Connecticut Dragonfly and Damselfly Workshop field trip held this past May (for details see Argia 12[3]:8). With adrenalin flying high, participants left the workshop anxious to test their new skills in the field. Unfortunately, good intentions were hampered by above average rainfall, with some parts of the state receiving over 8" of rain during the month of June.

With rivers and streams near or above capacity, adult gomphids at times seemed scarcer than Ringed Boghaunters, with emergence delayed by at least a week compared to past seasons. On 27 May, several **Brook Snaketail** (*Ophiogomphus aspersus*) larvae were collected from sandy pockets behind boulders in Sandy Brook (Litchfield County), although not one adult was observed patrolling over the stream in the weeks to follow. On 11 June, one eclosing **Cobra Clubtail** (*Gomphus vastus*) was found on a tree trunk along the Connecticut River in the vicinity of Kings Island (Hartford County). Most emergence sites (*e.g*., mossy river banks, tree trunks) were completely submerged, and along with the swift current, made searching for exuviae a very difficult and unproductive activity. Robert Muller observed several territorial **Spine-crowned Clubtails** (*Gomphus abbreviatus*) on the Mill River in Hamden (New Haven County) on 9 & 10 June. Along the Hollenbeck River (Litchfield County), Dave Wagner and Mike Thomas located three adult **Harpoon Clubtails** (*Gomphus descriptus*) perching on the ground in a corn field on 24 June. For whatever reasons, perhaps due to last year's drought conditions or this year's heavy rains, there seemed to be a lack of adult gomphid activity on many of our streams and rivers.

Both **Stygian** and **Umber Shadowdragons** (*Neurocordulia yamaskanensis* & *N. obsoleta*) seemed unaffected by the heavy rains, and were again seen along the Connecticut River in Cromwell (Middlesex County) during late June and early July.

Several species appear to be expanding their range in Connecticut, perhaps due to global warming. Prior to this year, all of our records for the **Citrine Forktail** (*Ischnura hastata*) were from coastal localities. This

year, not only was this species especially abundant along the coast, it was reported well inland for the first time. One of the more bizarre records was a single male captured in a malaise trap set in a sandy grassland located in northern New Haven County. **Spatterdock Darners** (*Aeshna mutata*) also had a banner year, with several new sites documented from Norfolk and Canaan (Litchfield County), representing our first records from the northwest corner of the state. Of note was a swarm of up to five individuals feeding on insects along the edge of a corn field on 24 June (MCT & DLW).

Surprises come when you least expect them, and this year was no exception. Of the 21 odonate species recorded during a Biodiversity Day held in Madison on 9 September, the most exciting discovery was a male **Great Spreadwing** (*Archilestes grandis*) collected by Clay Taylor. This finding not only represents a new state record, it is the first time this species has been documented from southern New England. In the last issue of *Ode News* (Volume VII, Number 1), Blair Nikula included this species in a list of potential invaders to be sought in our area. Two other sites have since been discovered. On 22 September, Andy Brand captured a second male from a field in Hamden (New Haven County) and on 30 September, Chris Maier and Mike Thomas observed up to six males and females at Lake Gaillard (New Haven County), a large manmade impoundment with little, if any, emergent vegetation. Both males and females were observed hanging from vegetation in typical lestid fashion along wooded glades several hundred yards from the impoundment.

Giant Spreadwing (*Archilestes grandis*) — male
Colima, Mexico

On the Northeastern Odonate listserv, Bill Yule provides an account of an impressive migration of **Common Green Darners** (*Anax junius*), numbering in the thousands, along the dunes of Hammonasset State Park on 15 October. The same day, Noble Proctor and Margaret Ardwin observed this flight on the coast just to the west. At Jacob's Beach in Guilford during the late morning, they estimated green darners passing at the rate of over 10,000/hour (based upon a series of one-minute counts). At Ox Pasture in Madison, from noon to 1:00 pm, their sample counts resulted in estimates of up to an astounding 120,000/hour! They also noted hundreds of Yellow-legged Meadowhawks moving (see article by Dick Hildreth on page 6).

RHODE ISLAND UPDATE

The former Ginger Carpenter — now Ginger Brown following November nuptials (Congratulations, Ginger!) — took a moment from her hectic schedule to provide some highlights from the Rhode Island Odonate Atlas' 2000 field season. The atlas completed its third year, receiving over 2000 records for the year, and turned up one new species, bringing the state total to 130 species.

Several new records were found for **Attenuated Bluet** (*Enallagma daeckii*), **New England Bluet** (*E. laterale*), **Scarlet Bluet** (*E. pictum*), and **Pine Barrens Bluet** (*E. recurvatum*). Especially interesting was the discovery of the latter two species on a stretch of quiet backwater on the Pawtuxet River. These species are typically associated exclusively with coastal plain ponds, though Ginger reports that this stretch of the river botanically is very similar to such ponds. Most exciting among the damselfly reports was the discovery in mid-July of a second population of **Blackwater Bluet** (*E. weewa*) in Charlestown along a small, sluggish, tannin-rich stream. Additionally, a specimen collected at a lake in South Kingston in 1999, and initially identified as a Stream Bluet (*E. exsulans*), proved upon reexamination also to be a Blackwater Bluet. Thus, this southern damsel is now known from three sites in Rhode Island, two small streams and a lake. There are no other New England records.

Comet Darners (*Anax longipes*) were found at two or three new sites, and there were three records of **Spatterdock Darner** (*Aeshna mutata*). Clubtails

were scarce (as elsewhere in southern New England), but two records of **Lilypad Clubtail** (*Arigomphus furcifer*) represented the first during the atlas period. Two occurrences of **American Emerald** (*Cordulia shurtleffii*) were the first for the Ocean State. Single **Beaverpond Baskettails** (*Epitheca canis*) and **Spiny Baskettails** (*E. spinigera*) represented just the second record for each from the state. Another **Coppery Emerald** (*Somatochlora georgiana*) was found, the only one of this rare southern emerald found in New England in 2000.

Once again, extensive field work was conducted on the imperiled **Ringed Boghaunter** (*Williamsonia lintneri*) in Rhode Island. At one site, Ginger and her co-workers recovered 586 exuviae, by far the most ever recorded for this inconspicuous species. However, there was considerable mortality at this site, most likely weather-related. Emergence, first noted on 10 April, occurred on some cold (low-mid 40s ºF), wet days and some tenerals apparently expired right on the spot. Of far greater concern, this site, home to the largest known population of Ringed Boghaunter, has been severely impacted by a sand and gravel mining operation which has destroyed much of the upland habitat adjacent to the wetland.

CORRIGENDA

In the last issue of *Ode News* (Vol. VII, #1) we reported an extremely early dragonfly, probably a migrant Common Green Darner, at Duxbury Beach on the first of April. The date was actually 31 March 2000 – making it the first March odonate ever recorded in the state (and, as far as we know, New England)!

Also in the last issue, we identified the dragonfly in the photo below as a Yellow-sided Skimmer (*Libellula flavida*). It is, in fact, a Bar-winged Skimmer (*Libellula axilena*), identifiable by the dark bar on the outer leading edge of the forewing and the small, gray patch at the base of the hindwing. Thanks to Sid Dunkle for calling our attention to this error. Now that Sid's guide is out, we no longer have any excuses for such misidentifications!

POSSIBLE MASS MOVEMENT OF MEADOWHAWKS IN MASSACHUSETTS

Richard Hildreth

On 13 October 2000, I hiked along a power line in Milford, Massachusetts, from Route 85 southeast to Route 16 and back. This transverse (about 2.6 miles round trip) passes over an area of mostly dry, upland, rocky country, underlain by the Milford Granite. The granite is crisscrossed-crossed by many faults. Fractured rock along several of the major faults was removed by glacial action leaving linear valleys. In these valleys are some small wetlands; red maple swamps in the forested country beside the power line, shrub swamps along the power line right-of-way.

My major purpose for the trek was to look for migrating butterflies. By this date, almost all of the flowers were "gone by" and there was little butterfly activity. I saw only two migrating butterflies, both Mourning Cloaks flying rapidly southwest.

I was also looking to see what odonates might by flying on that date. Right away I saw a few meadowhawks (*Sympetrum* sp.) flying and perching in warm sunny spots. I saw one Common Green Darner (*Anax junius*) in apparent migratory flight toward the southwest. I also saw five mosaic darners patrolling in the area; I netted two of these and they turned out to be Shadow Darners (*Aeshna umbrosa*).

I noticed a pair of meadowhawks in the towing mode (male clasping the female) flying rapidly across the power line. Soon I saw more pairs in tandem, all flying southwesterly. They were flying rapidly about 6–15 feet above the ground. When they reached the forest at the edge of the power line right-of-way, they flew up and over the trees and continued on toward the southwest. Along the power line, close to Route 16, is a small quarry hole with a pond. I stopped to look at this pond and saw several tandem pairs of meadowhawks flying around the pond. I expected to see the females depositing eggs on the water or along the damp shore. Instead, I saw tandem pairs flying in from the northeast, dropping down into the quarry pond, flying around a bit "checking it out," then departing off to the southwest. During my trek, I saw 24 pairs flying toward the southwest and none in any other direction. They were all flying high and fast and I was unable to catch any.

Yellow-legged Meadowhawk (*Sympetrum vicinum*) — male
Provincetown, MA

On 14 October, I visited the same power line, but on the other side of Route 16. During this very short visit I saw four tandem pairs flying southwest. This time I managed to net one of the pairs and they proved to be Yellow-legged Meadowhawks (*Sympetrum vicinum*). I had studied those seen the previous day through 10X binoculars and they also seemed to be this species (females have a distinctive trumpet-shaped ovipositor which can sometimes be seen with binoculars).

On 15 October, I visited Plum Island (Essex County) on a Forbush Bird Club trip. I noticed nine tandem pairs of meadowhawks flying southwestward. They were all flying rapidly in a direct, "determined" fashion. I watched several of them fly out over the salt marsh on the west side of Plum Island.

***Editor's Note**: Dick Hildreth's observations coincide with similar reports received over the Internet from the Connecticut coast and from New Jersey, involving even larger numbers of meadowhawks. On 15 October at Hammonasset Beach State Park on the Connecticut coast, Bob Yule saw hundreds of meadowhawks (species uncertain) moving, many of them in tandem. The same day, just to the west, Noble Proctor and Margaret Ardwin, saw hundreds of Yellow-legged Meadowhawks, mostly pairs in tandem, moving along the coast in Madison and Guilford. Also on the 15th, about 20 miles to the west, Bob Muller estimated thousands (based upon a series of one-minute counts) passing through his yard in Milford, CT between the hours of 2:00 – 5:00 p.m. North American meadowhawks, other than the western Variegated Meadowhawk* (Sympetrum corruptum)*, generally have not been considered migratory. The movement of so many pairs in tandem is also curious and puzzling. However, southwesterly movements of tandem pairs in the fall has been observed before in southern Ontario. Large numbers were recorded there in 1996, with lesser numbers in 1998 (see* Argia*, 9[1]:19-21 & 10[4]:19-22). Time will tell whether this is a regular phenomenon (perhaps in response to drought conditions?).*

2001 DSA MEETING IN TEXAS

The 2001 annual meeting of the Dragonfly Society of the Americas will be held in the Texas Hill Country, July 12-15th. Based in the town of Junction, about 120 miles west of Austin, the meeting is being organized by John Abbott of the University of Texas. Junction is located at the confluence of the North and South forks of the Llano River and is within a short drive of several rich natural areas, such as South Llano River State Park, Garner State Park, Lost Maples State Natural Area, and the Nueces, Frio, and San Saba rivers. There will be a post-meeting trip to the Dolan Falls Nature Conservancy property in Val Verde County, at the intersection of three biomes.

Texas specialties such as Chalky Spreadwing (*Lestes sigma*), Coral-fronted Threadtail (*Neoneura aaroni*), Orange-striped Threadtail (*Protoneura cara*), Comanche Dancer (*Argia barretti*), Coppery Dancer (*Argia cuprea*), Neotropical Bluet (*Enallagma novaehispaniae*), Broad-striped Forceptail (*Aphylla angustifolia*), Five-striped Leaftail (*Phyllogomphoides albrighti*), Four-striped Leaftail (*P. stigmatus*), Bronzed River Cruiser (*Macromia annulata*), Red-tailed Pennant (*Brachymesia furcata*), Black Setwing (*Dythemis nigrescens*), Ivory-striped Sylph (*Macrothemis imitans*), and Jade-striped Sylph (*M. inequiunguis*) are likely.

A web site with full details is available at: www.esb.utexas.edu/jcabbott/odonata/2001DSA/index.html
See you there!

DRAGONS AT THE SUMMIT

Jeremiah Trimble

During the summer of 1999, I had an opportunity to research dragonfly behavior for my senior's honor's thesis at Connecticut College. Studying dragonflies has become an intense hobby of mine and over the last few years I have visited many places throughout New England and North America looking at dragonflies. One of the most fascinating sites I have visited is Mt. Watatic in Ashburnham, Massachusetts. During visits to Mt. Watatic, hundreds of dragonflies, mostly mosaic darners (*Aeshna* spp.), and smaller numbers of striped emeralds (*Somatochlora* spp.) can be seen cruising around the rocky summit. I found it intriguing that such high numbers of darners were concentrated in such a small area, while relatively few were seen in nearby areas. I designed a study to look at this phenomenon, hoping to solve the mystery of why dragonflies were congregating on the mountaintop.

Two possible hypotheses were devised for the congregations of dragonflies on Mt. Watatic. The first hypothesis suggested that the dragonflies were "hilltopping." Certain orders of insects (such as the Diptera and Lepidoptera) have been shown to converge on hilltops in order to increase mating success. In other words, mature individuals of a species move to the highest points in the landscape. By doing this they become more concentrated as they occupy a smaller area, and it becomes more likely that a male and a female of that species will find each other. This is probably most important in species with low population densities. In a hilltopping situation one would expect nearly all of the mature individuals to congregate at the highest point, otherwise the mechanism would not be as effective. The second hypothesis suggested that these dragonflies were converging on Mt. Watatic in order to feed. Many dragonflies, especially darners and emeralds, feed in open habitats such as meadows. Thus, the summit of Mt. Watatic might represent an excellent feeding habitat for them.

In order to test these hypotheses, four study plots were established at intervals along an abandoned ski slope that stretches from the summit of Mt. Watatic to its base. Dragonfly abundance and meteorological data (temperature, light intensity, wind speed, and humidity) were recorded at each plot throughout the summer to determine (1) whether elevation affected dragonfly abundance and (2) whether various weather conditions affected dragonfly abundance. I also spent time recording time budgets for individual dragonflies: watching an individual dragonfly for one minute and recording the amount of time it spent at various activities such as feeding, mating, and resting. I spent many days on Mt. Watatic catching as many dragonflies as I could and recorded the number and sex of each species. I found five species of mosaic darners, with Variable Darner (*Aeshna interrupta*) by far the most numerous, and four species of striped emerald. The sex ratio on the mountaintop was very close to 50:50. Finally, I studied relative prey densities in the various plots. This was done by setting out insect traps, which consisted of aluminum pie pans with a sticky substance spread on them (makeshift fly paper), in the four plots for eight hours each day. I brought them in at the end of the day and counted the number of insects captured and recorded the order to which each belonged.

Some interesting findings came out of the meteorological data. There was a significant positive correlation between dragonfly abundance and both temperature and light intensity. The hotter and brighter the day became, the more dragonflies were seen in the plots. This reached a threshold, however, at about 30ºC (86ºF). At such high temperatures and light intensities, perhaps the dragonflies were unable to thermoregulate and retreated to shaded areas. There was no correlation between dragonfly abundance and humidity or wind speed.

The data I collected supported the feeding hypothesis rather than the hilltopping hypothesis. Although numbers of dragonflies increased significantly as elevation increased, they were found at all of the study plots. My time budget study showed that the darners were spending nearly 100% of their time feeding and no time mating. The 50:50 sex ratio also did not support the hilltopping hypothesis. In a hilltopping situation one would expect there to be many more males than females congregating on the hilltop, with females appearing only briefly to mate and then move on. Also of note was that no mating behavior was observed during the study (although in past years, mated pairs of darners have occasionally been seen on the mountaintop). The findings from the prey density study supported the feeding hypothesis. The number of prey items increased with elevation and the number of dragonflies was

positively correlated with relative prey density (though these correlations were not statistically significant). That is, the more prey there was, the more dragonflies were present. Small dipterans made up the majority of insects captured in the traps and they appear to make up a large part of dragonfly diets (though I was unable to determine what the dragonflies on Mt. Watatic were feeding upon).

Although dragonflies on Mt. Watatic exhibited a significant tendency to concentrate at the summit, the results of this study suggest they were doing so not to find mates, but rather to take advantage of a food supply that increased with elevation. So, despite exhibiting a hilltopping-like behavior, it was not consistent with hilltopping as it previously has been defined (*i.e.*, to increase mating success). Hilltopping may still play an indirect role in the Mt. Watatic situation, as it is possible that these dragonflies are taking advantage of the hilltopping behavior of other insects in order to increase their foraging efficiency.

Why are these dragonflies apparently not hilltopping to increase mating efficiency? Previous observations and studies have shown that dragonflies in most cases return to their aquatic habitat to mate. In general, males set up a territory or patrol the habitat in search of a potential mate. Carrying out these behaviors at the aquatic habitats is beneficial as in most cases this is also where the eggs will be laid and the larvae develop. It might not make as much sense for dragonflies to mate on the hilltop, as the travel time back to the wetland could introduce increased mortality of females. Congregating at the breeding site to find a mate, breed and lay eggs seems to be a very efficient life cycle for dragonflies. Why, then, don't butterflies meet at patches of the caterpillar host plants to find mates and carry out the rest of the life cycle? Well, many species of butterflies may do just that. However, in some cases, as in those species known to be "hilltoppers," the larval food plants may be so spread out that mate finding is very inefficient. Thus, a mechanism might develop to increase mating efficiency (*i.e.*, hilltopping). In such cases, the benefits of congregating presumably outweigh the risks of traveling to the hilltop and back to the breeding site.

Of course, there is still a lot to be learned about this phenomenon. It is unknown how widespread this behavior is in New England, or elsewhere. It would be interesting to learn about other occurrences.

MASSACHUSETTS STATE-LISTED ODONATES

With the recent addition of Rapids Clubtail (*Gomphus quadricolor*), there are now 27 species of odonates listed by the Natural Heritage & Endangered Species Program as either Endangered (10 species), Threatened (4 species), or Special Concern (13 species) in Massachusetts. This represents about 16% of the 165± species known from the state.

Of the 49 species of damselflies, only four (8%) are listed (all bluets). Twelve (almost half) of the listed species are clubtails (Gomphidae), while another eight species are emeralds (Corduliidae). These totals represent 44% and 35% of the clubtails and emeralds, respectively, known from the state. In sharp contrast, none of the skimmers (Libellulidae), the most diverse family in the state (41 species), is state-listed.

Damselflies (Zygoptera)

Family Coenagrionidae (Pond Damsels):

Tule Bluet (*Enallagma carunculatum*)	SC
Attenuated Bluet (*Enallagma daeckii*)	SC
New England Bluet (*Enallagma laterale*)	SC
Pine Barrens Bluet (*Enallagma recurvatum*)	T

Dragonflies (Anisoptera)

Family Aeshnidae (Darners):

Spatterdock Darner (*Aeshna mutata*)	E
Comet Darner (*Anax longipes*)	SC
Ocellated Darner (*Boyeria grafiana*)	SC

Family Gomphidae (Clubtails):

Spine-Crowned Clubtail (*Gomphus abbreviatus*)	E
Beaverpond Clubtail (*Gomphus borealis*)	SC
Harpoon Clubtail (*Gomphus descriptus*)	E
Midland Clubtail (*Gomphus fraternus*)	E
Rapids Clubtail (*Gomphus quadricolor*)	T
Cobra Clubtail (*Gomphus vastus*)	SC
Skillet Clubtail (*Gomphus ventricosus*)	SC
Brook Snaketail (*Ophiogomphus aspersus*)	SC
Riffle Snaketail (*Ophiogomphus carolus*)	T
Riverine Clubtail (*Stylurus amnicola*)	E
Zebra Clubtail (*Stylurus scudderi*)	E
Arrow Clubtail (*Stylurus spiniceps*)	T

Family Corduliidae (Emeralds):

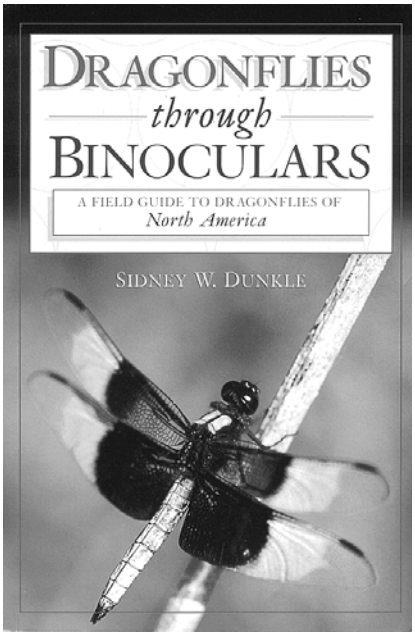
Umber Shadowdragon (*Neurocordulia obsoleta*)	SC
Lake Emerald (*Somatochlora cingulata*)	SC
Ski-tailed Emerald (*Somatochlora elongata*)	SC
Coppery Emerald (*Somatochlora georgiana*)	E
Kennedy's Emerald (*Somatochlora kennedyi*)	E
Mocha Emerald (*Somatochlora linearis*)	SC
Ebony Boghaunter (*Williamsonia fletcheri*)	E
Ringed Boghaunter (*Williamsonia lintneri*)	E

DRAGONFLIES THROUGH BINOCULARS

Sidney Dunkle. 2000. Oxford University Press. 266 pp. 47 color plates. Paperback. $29.95.

The long wait for Sid Dunkle's *Dragonflies through Binoculars* is over!

Similar in format to the popular *Butterflies through Binoculars* series, this guide covers 307 species of dragonflies (but no damselflies) known from North America. There are 26 pages of introduction, with sections covering such topics as biology; habitats; identification; finding dragonflies; conservation; photography; and binoculars. The Species Accounts occupy 218 pages, including 47 plates of photographs. Each account is divided into sections headed: Identification, Similar Species, Habitat, Season, and Comments. The book concludes with a brief bibliography and an index of both common and scientific names.



The first thing most users will turn to, and the most important part of any field guide, are the illustrations. Unfortunately, the plates in *Dragonflies through Binoculars* are perhaps its weakest point. The 47 plates contain 483 photographs, an average of over 10 per page. Although the photographs (the majority taken by the author) are mostly of good quality, they are reproduced in such a small size (averaging about 1¾" x 2¼") that salient field marks are often difficult to discern. It's interesting that photos of generally the same size work fine in this guide's sister publication, *Butterflies through Binoculars*. However, the differing proportions of dragonflies, with their much more elongate bodies, and the fact that critical features are often on the body rather than the wings, means that larger photos — and in some cases, both top and side views — are necessary to show all of the significant features. For many species there is only one photo which means that the variability in appearance due to age or sex is not shown. If this publication achieves the success it deserves, perhaps the publisher can be convinced to expand the plates in future editions. Nonetheless, this is the best, most-complete collection of North American dragonfly photos available, which alone makes it a worthwhile addition to any odonatist's bookshelf.

Facing each plate are brief, concise species descriptions, as well as range maps. The maps are small but give a good sense of the range of each species and, given that they are the first odonate maps to appear in print, are another very valuable feature of the guide. The maps are also color coded to indicate, in a very general sense, each species' flight season (*i.e.*, spring, summer, fall, or year-round).

The species accounts, drawing upon the author's extensive experience and discerning eye, contain a wealth of useful information. The Comments sections supplement the Identification sections with useful behavioral information. Although the guide is geared to identification through binoculars (*i.e*., not in the hand), the author occasionally includes features that are visible only in the hand (and in some cases, only under a microscope). Yet, there is no discussion of catching dragonflies for closer inspection. This incongruity apparently results from the author's desire to be thorough conflicting with the series editor's aversion to collecting, or even catching and releasing odonates. The inescapable fact is that many species of dragonflies simply are not identifiable except in the hand, and, unlike butterflies, generally can be handled without harm. Avoiding the issue of occasional in-the-hand examination does the reader — especially the beginner — a disservice.

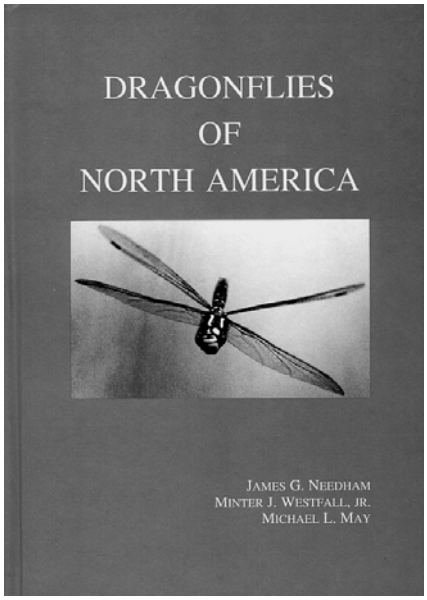
So, was it worth the wait? Absolutely! Could it have been better? Certainly (and had the author not had restrictions placed upon his efforts, undoubtedly would have been). But whatever its shortcomings, *Dragonflies through Binoculars* is a monumental achievement and a significant addition to the rapidly growing body of literature on North American odonates. Everyone interested in these creatures should own a copy or two (one for the bookshelf, one for the car). I look forward to giving it a good workout in 2001. Hats off to Sid Dunkle! *Blair Nikula*

(Rumor has it that Sid has begun work on a damselfly guide – another round of anticipation begins!)

DRAGONFLIES OF NORTH AMERICA

James G. Needham, Minter J. Westfall, Jr., & Michael L. May. 2000. Scientific Publishers. 939 pp. 24 color plates. Hardcover. $110.

In 1955, James Needham and Minter Westfall co-authored *Dragonflies of North America*, the first comprehensive manual to the identification of North American Anisoptera. For 45 years this stood as the one and only identification reference. It was an intimidating tome to the beginner, and for at least a few (this writer included) dissuaded further pursuit of the subject!



Some years ago, Mike May undertook a complete revision of this landmark publication – a massive undertaking, but one accomplished with great success. The revised manual covers 350 species recorded from northern Mexico through Canada. Extensive keys are included for the families as well as genera, and for many species the male anal appendages and various other body parts significant for identification are illustrated, either with black-and-white photos or line drawings.

The 46-page introduction includes thorough descriptions of the anatomy of both adult and larval dragonflies, as well as sections titled Field Studies, Preservation and Curation Techniques, and Suggestions for Users of This Manual, and concludes with a 5-page checklist of the species included. A nice, and welcome addition from the first edition is 24 full-color plates: 14 plates of illustrations by Lawrence Zettler and 10 plates of photos. The illustrations are of lateral views only, but are nicely done and include four plates of Aeshnidae (36 species), seven of Gomphidae (~90 species), one of Cordulegastridae (8 species), and two plates of Corduliinae (25 species). Color copies of these would be a useful addition to any odonatist's field pack. In some cases, the colors of the illustrations seem a bit gaudy (*e.g.*, the lateral thoracic stripes on the *Nasiaeschna pentacantha* are much too bright and green). I find the facing-page keys to the illustrations to be quite confusing in many cases, as the species name often does not line up with the appropriate illustration. The 73 photos on 10 plates illustrate the major genera and a few life history stages, and are generally well reproduced.

The species accounts occupy 748 pages and include extensive, "stem to stern," descriptions of each species. These accounts are not intended to aid in field identification, rather being geared to in-the-hand or under-the-microscope examinations. Natural history information, aside from an occasional, very brief comment in the introductory sentence, is lacking. (There is one notable taxonomic change from the previous edition and most other publications to date: the cruisers and emeralds are treated as belonging to the subfamilies Macromiinae and Corduliinae, respectively, within the Libellulidae, rather than separate families, Marcomiidae and Corduliidae.) The book concludes with a 13-page checklist to the species by region, a 14-page glossary, a 27 page bibliography (nearly 600 citations), and indexes to both the scientific and common names.

Although still intimidating, the extensive visual enhancements make this manual more "user friendly" than its predecessor. Mike May has done the odonatological community a great service. This publication belongs on the bookshelf of every serious odonatist.

Blair Nikula

NEW ONTARIO PUBLICATION

A new publication on the odonates of Ontario is now available: *Damselflies and Dragonflies (Odonata) of Ontario: Resource Guide and Annotated List* by P. M. Catling and V. R. Brownell. The book is 198 pages, with complete species accounts, dot maps, and identification keys. It is also liberally illustrated with drawings of anatomical details useful for identification. The book can be ordered directly from the authors (2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario, K0A 2P0; email: brownell@achilles.net). The price is $28.00 plus $6.00 shipping, Canadian funds.

ANOTHER ONTARIO PUBLICATION

The folks in Ontario have been busy! *Ontario Odonata, Volume 1*, edited by Paul M. Catling, Colin Jones, and Paul Pratt, was recently published by the Toronto Entomologists Association. Contained within its 153 pages are a variety of interesting articles covering such subjects as the conservation status of odonates in Ontario, the status of particular species in the province, surveys from specific regions, dragonfly migration along the Lake Ontario shoreline, a garter snake preying upon a dragonfly, and a key to the nymphs of hanging clubtails (*Stylurus*). The bulk of the publication, nearly 90 pages, is devoted to records from the 1999 field season, presented in a tabular format — over 3,600 records total! The editors describe this as the "first annual," suggesting that additional volumes will appear regularly. They have established a high standard to maintain!

Ontario Odonata is available for $20.00 (U.S. funds). To order, send a check to: Toronto Entomologists Association, c/o Alan Hanks, 34 Seaton Drive, Aurora, Ontario, L4G 2K1.

Ode News

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