



THE BOGHAUNTER

Occasional News About the Dragonflies and Damselflies of Vermont

Number 9

On the web at www.wingsenvironmental.com/boghaunter

Spring 2007

Courting Corduliidae

On securing *Somatochlora* and navigating *Neurocordulia*

Editor's Note: *The Boghaunter* has asked various odonatologists to share their wisdom about locating certain noteworthy dragonfly genera. The series begins with Paul-Michael Brunelle's sage (and duly witty) advice on *Somatochlora* and *Neurocordulia*. Even if you hold no particular interest in these genera, Brunelle's dispatch is a tutorial in persistence and attention to detail, which are indispensable field skills. *The Boghaunter* intends to continue this series with reports on various other choice genera, particularly members of the Gomphidae.

By Paul M. Brunelle

The Boghaunter has asked me to give you some tips on finding the Striped Emeralds (*Somatochlora*) and the Shadowdragons (*Neurocordulia*). Both of these genera are challenges to encounter – the Striped Emeralds because most of the species inhabit peatlands that become progressively rarer as you move south, and which are not frequently surveyed, and the Shadowdragons because they fly in the evening when we rarely look for them.

Consequently, many of the species of these two genera are considered rare – though they may actually be common in places. *Neurocordulia michaeli* (Broad-tailed Shadowdragon), for example, is the most common dragonfly species on Canoose Stream, its type locale, but you would never know that unless you collect exuviae (the larvae are painfully difficult to find) or collect adults well after sunset.

Specimens of these genera in public collections are few and far between, and we should definitely be trying to increase the holdings available to taxonomists. Note that I consider none of these species vulnerable to collection that follows the Dragonfly Society of the

(Continued on page 2)



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Somatochlora williamsoni (Williamson's Emerald)

Change Comes to The Boghaunter

By Bryan Pfeiffer

Time, expense and technology have caught up to *The Boghaunter*. We regret to report the demise of our print edition.

To be sure, nothing can replace words and images on paper. But it has become hard enough for me to find the time and finances to produce two issues of this newsletter each year. (Our last was the Spring 2006 edition.) The lure of electronic publishing is too compelling. So, for this and future issues, I'll post Adobe Acrobat Reader

(PDF) files to the web site and alert subscribers by email.

One benefit is that we're now in full color. Acrobat allows you to easily print files front-to-back for taking *The Boghaunter* to your favorite reading locale. This benefit is particularly noticeable in this issue. Paul Brunelle's habitat images, which, regrettably, were cropped and reduced in order to fit, are more vivid and recognizable in this color PDF version compared to black-and white on paper.

Also, because *The Boghaunter* is more, as the credo above attests, "occasional" than I

might like, I've elected to cease categorizing issues with Volume and Number. This is our ninth edition of the newsletter; so I'll start the new system here with issue "Number 9."

Finally, many thanks to those of you who donated money to the production of *The Boghaunter*. It offered me inspiration and a much-needed (but hardly entire) portion of the production and postage costs.

The dregs of tropical storm Barry are still in Vermont; so I can get back to the 120 or so skins I collected from the White River on June 3.

Now Flying in Vermont

By Bryan Pfeiffer

We had hoped that *Williamsonia lintneri* (Ringed Boghaunter) would be the first flying oode of the season this year. No such luck (despite much searching that began May 8). However, Kevin Hemeon found his first *Williamsonia fletcheri* on May 10 in Pownal. On May 30, Bryan Pfeiffer had *Lestes eurinus* (Amber-winged Spreadwing) emerging at a bog in Fairlee. On May 31 Mike Blust had quite a haul of skins (representing at least five species) from the Poultney River in West Haven. Here's a partial list of what was on the wing as of June 3 (or before):

Calopteryx amata (Superb Jewelwing)
Calopteryx maculata (Ebony Jewelwing)
Amphiagrion saucium (E. Red Damsel)
Argia moesta (Powdered Dancer)
Chromagrion conditum (Aurora Damsel)
Coenagrion resolutum (Taiga Bluet)
Enallagma boreale (Boreal Bluet)
Enallagma annexum (Northern Bluet)
Enallagma antennatum (Rainbow Bluet)
Ischnura verticalis (Eastern Forktail)
Ischnura posita (Fragile Forktail)
Nehalennia irene (Sedge Sprite)
Anax junius (Common Green Darner)
Basiaeschna janata (Springtime Darner)
Gomphus abbreviatus (Spine-crwnd Clubtail)
Gomphus borealis (Beaverpond Clubtail)
Gomphus descriptus (Harpoon Clubtail)
Gomphus lividus (Ashy Clubtail)
Gomphus spicatus (Dusky Clubtail)

Gomphus quadricolor (Rapids Clubtail)
Lanthus vernalis (Southern Pygmy Clubtail)
Ophiogomphus carolus (Riffle Snaketail)
Ophiogomphus rupinsulensis (Rusty Snktail)
Cordulegaster sp. (Spiketail species)
Didymops transversa (Stream Cruiser)
Dorocordulia libera (Racket-tailed Emerald)
Epitheca canis (Beaverpond Baskettail)
Epitheca cynosura (Common Baskettail)
Epitheca spinigera (Spiny Baskettail)
Neurocordulia yamaskanensis
Ladona julia (Chalk-fronted Corporal)
Libellula lydia (Common Whitetail)
Libellula luctuosa (Widow Skimmer)
L. quadrimaculata (Four-spotted Skimmer)
Leucorrhinia intacta (Dot-tailed Whiteface)
Leucorrhinia frigida (Frosted Whiteface)
L. hudsonica (Hudsonian Whiteface)
L. glacialis (Crimson-ringed Whiteface)

THE BOGHAUNTER is an occasional newsletter about the dragonflies and damselflies of Vermont. It is available for no charge, although contributions to help offset our production time are welcome.

CONTRIBUTIONS to THE BOGHAUNTER can take two forms: financial and editorial. The newsletter appears one or two times per year. Your articles, photos, and ideas are welcome as well. The next issue should appear in December.

THE BOGHAUNTER is on the web in color at: www.wingsenvironmental.com/boghaunter.

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THE BOGHAUNTER expresses gratitude to Paul-Michael Brunelle and the Maine Department of Inland Fisheries and Wildlife for inspiration and use of the *Williamsonia fletcheri* image on the front-page banner

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Back Cover Image: *Williamsonia lintneri* (Ringed Boghaunter), a female photographed by Bryan Pfeiffer in Massachusetts on 13May2007.

Corduliidae Continued

(Continued from page 1)

Americas policy (<http://odonatacentral.bfl.utexas.edu/dsa1/collectingpolicy.htm>). Most are myriad in the north, or after dark, and bloody difficult to find here. Some are hard to find anywhere. And many (most in my opinion) are hard or impossible to accurately identify to species on the wing. I have no hesitation in giving exact locales (if I have them, and Google Earth coordinate references) on where to find even the rarest species. Manual collection does not present even the remotest risk to populations of Odonata in Acadia (in other groups of flora and fauna I acknowledge that it does). In the Maritime Provinces there are no legally protected species, and in Maine while there are several, they are not in these two genera.

One unfortunate aspect of conservation politics is that many species rarely encountered are relegated to the status "undetermined" or comparable terms. Essentially this means that we do not know enough about them to make a considered judgment as to their rarity (and often their habitat preferences), and by extrapolation the degree to which they are endangered by human activity, if any. While this is perfectly appropriate as far as it goes, the subsequent treatment of species ranked undetermined is a serious problem. In many, if not most, jurisdictions, species ranked as undetermined seem to be basically forgotten; rather than attracting interest and support for study, they are not considered at all. Only incidental encounters, or private survey, develop sufficient data on these species to bring them back to official attention; hence my interest in seeing further data.

Of particular interest would be specimens of teneral and their associated exuviae. There may well be undescribed species lurking out there, considering how few contacts we have had

with some of the species, and larva (exuviae) specimens with determination guaranteed by the teneral are valuable in general. Exuviae are also very valuable, particularly if you document where you found them by photographs or detailed descriptions of the habitat. I have provided some location photographs, as these give you a search image for specific habitat types.

Rearing is an excellent way of determining what you've found. I'm sure there is an intrepid bog fanatic out there who doesn't mind shifting a ton or two of peat and Sphagnum in search of rare larvae (note that the larva of *S. incurvata* is undescribed). Collecting in May and early June will give the best prospects for emergence-ready specimens, which should emerge shortly after being raised to room temperature.

If you find any of the following species (or any odonate) in the Atlantic Provinces, please let us at the Atlantic Dragonfly Inventory Program know; if in Maine, I can take the information for the Maine Damselfly and Dragonfly Survey. (In Vermont, send data to bryan@wingsenvironmental.com.) Bear in mind that there are no useless records of Odonata for even our most common species (*Ischnura verticalis* natch). We have only one record per sixty square kilometers (about 23 square miles) after more than 100 years of study.

Finding the Striped Emeralds (*Somatochlora*) in the Northeast

The genus *Somatochlora* includes some of the most desirable of the northeastern species, mostly because it contains a group of subarctic species which are rarely found below 45°N latitude (where I suspect most of you readers are): albicincta,

(Continued on page 3)

(Continued from page 2)

brevicineta, cingulata, forcipata, franklini, incurvata, kennedyi, and septentrionalis. There is, however a group of southern species which affect us frostbacks similarly: calverti, filosa, Georgiana and linearis. I won't have anything to say about the latter group because I haven't seen any of them in flight.

Many of the northern Emeralds are associated with peatlands (bogs and fens), some are found at slow running waters (albicineta, cingulata, elongata, minor, williamsoni). Although searching for larvae or exuviae of the running waters species is a good idea, and can give you a hint where they will be flying later on, these life stages of the peatland species are excruciatingly hard to find; seeing the adults is generally much more likely. The following general advice is based on my experiences with the genus in Acadia (Maine and the Maritime Provinces).

Look for woods road aligned about east to west. You can see the little devils a mile off in the early evening (also on bogs). Intersections of woods roads are excellent places, as both the sun-loving and shade-loving species end up there at one point or the other.

During windy days you can find many species of dragonflies in the "wind shadows" formed by stands of trees, and particularly along the sheltered side of bogs. The flying species from all around are concentrated in these calm areas, so a really windy day can be very productive if you find the right spot.

Exuviae of the stream and lake species are usually found near the shore, but exuviae of the bog and fen species are more of a challenge. I have had the most success looking for them along animal paths in the bog, but you have to look carefully; they are usually covered in peat and quite inconspicuous.

***Somatochlora albicineta* (Burmeister 1839) Ringed Emerald (Photo 1)**

Identifying: Moderate size, robust, abdomen ringed in white. Distinctive in the hand. Resembles brevicincta and walshii on the wing in appearance and behaviour.

Range: Northern, trans-continental, rare in Acadia.

Flight Period: First week of July to mid-August.

Foraging: Has not been encountered in feeding swarms away from water or patrolling roads.

Aquatic Habitat: Slow-running waters; bog streams, still waters, beaver ponds, backwaters of otherwise rapid streams and rivers, and coves of lakes. Search image for the habitat is sparse emergent plants in slow water.

Flight Style: Males fly slowly during the day at about knee level along the edge of the water feature, with frequent hovers. Females fly much more quickly and oviposit in the margins.

Netting Advice: Put your net on the shore and sweep up to them when they reach the right place. Experience indicates that pitching rocks at them when you've missed a swing is an ineffective technique.

Where To Find It If You're Desperate (WTFIYD): See comments under cingulata as well. Drive along highways 108 or 180, which cross mid to northern New Brunswick, stopping at the ponds and still waters along the way. Do not take the lumber trucks casually anywhere in northern Maine or New Brunswick, park well off the road.

***Somatochlora brevicincta* Robert 1954 Quebec Emerald (Photo 2)**

Identifying: Moderate size, robust, abdomen with partial white rings. Distinctive in the hand. Resembles albicineta and walshii on the wing in appearance and behaviour.

Range: Northern, trans-continental, rare in Acadia (rare everywhere, even in Quebec).

Flight Period: Last week of June (thanks to Stuart Tingley for discovering this) to mid-August (but there are two records of males in September).

Foraging: Has not been encountered in feeding swarms away from water, or patrolling roads (but one teneral female was taken circling in a sunlit patch of road not far from a bog).

Aquatic Habitat: Fen areas within and bordering bogs, not at the secondary (open, firm-edged) ponds of those bogs. Search image for the habitat is bright green Sphagnum-filling pools (do NOT wade light-heartedly in these places). I have found that territorial male *Libellula*

quadrimaculata (Four-spotted Skimmer) in a bog or fen are indicators for brevicincta.

Flight Style: Males fly slowly during the day at about knee level above the surface, with frequent protracted hovers. Females spend as little time as possible at the ponds, ovipositing frantically then "booking," to use the scientific term. Very annoying to the collector and presumably to males of the species, which of course is why she does it.

Netting Advice: Slush (carefully) over to where you suspect the insect will be when you get there, keep your net low, try not to weep or rant when you miss, unless you're alone.

WTFIYD: Along Highway 108 in mid New Brunswick there is one bog (only one) about the size of a football field ("Stuart's Bog"). The species is there some years (it may be irruptive). Wade across the bog at the east end to the side away from the road until you find, or fall into, what appears to be a green Sphagnum stream. Wait for it....

***Somatochlora cingulata* Selys 1871 Lake Emerald (Photo 3)**

Identifying: Large size, robust, abdomen ringed in white. Distinctive in the hand. Resembles *Didymops transversa* (Stream Cruiser) and *Epitheca princeps* (Prince Baskettail) in appearance on the wing, and in behaviour when feeding away from water.

Range: Northern, trans-continental, fairly common in the Maritime Provinces, sometimes abundant, uncommon in Maine.

Flight Period: Last week of June to late August.

Foraging: Commonly encountered feeding away from water but usually solo or in small numbers, often patrols roads. Flight is much like a Darner's when foraging.

Aquatic Habitat: Lakes, the secondary ponds of bogs, and rivers. At water, it will generally be seen wherever it is most difficult to get to. The larvae are usually found at active lakeshores, where wave-wash and currents keep silt from forming on the bottom.

Flight Style: Males fly close to the water surface at prodigious speeds well away from shore. They tend to approach the shore

(Continued on page 4)

(Continued from page 3)

most closely (but usually not closely enough) at points. These guys do not hover.

Netting Advice: Wading is the only practical solution where the bottom is firm enough to support you (not in bog ponds). Frustratingly, the insect then begins to consider you part of the shore and moves out further. Canoes or boats are not a good idea unless you want to end up swimming. But swimming perhaps? With the net gripped in your teeth, commando style? Persist. This may be one of the species in which a “fly” is useful; something resembling a female dipping her tail might well bring the male into reach (let me know how it goes). My greatest success in capturing this species was in a moderately fast current river about calf-deep along which the males were rocketing in a straight, uninterrupted path a few metres out from the shore.

WTFIYD: The river I mention above is in Mt. Carleton Provincial Park in northern New Brunswick, just south of Highway 180. A bridge on North Shore Road crosses the river, and the pool downstream around the corner is happy hunting ground for a number of *Somatochlora* (one-stop shopping for *albicincta*, *cingulata*, *elongata*, *minor*, *williamsoni*). The park people are unusually friendly and helpful, but it would be a good idea to let them know that you're going to be netting when you arrive.

***Somatochlora elongata* (Scudder 1866)** **Ski-tipped Emerald**

Identifying: Large size, slim, thorax with strong white bars. Distinctive in the hand. Resembles *williamsoni* on the wing in appearance and behaviour.

Range: Southern, west to the Great Lakes region, south along the Appalachians, common for its genus in Acadia.

Flight Period: Mid June to mid September.

Foraging: Commonly encountered feeding away from water, sometimes in abundance, often patrols roads. Flight is much like a Darner's when foraging.

Aquatic habitat: All slow waters.

Flight Style: Males fly about knee height along the shore, with frequent hovers. Females oviposit in protected areas by driving their eggs into a bank then washing their abdomen tips in the water; however, they also lay directly onto the water surface. I once saw a female laying in the small pool within a hollow standing stump. She was less than a metre from the males intently searching the shore; I could almost hear her chuckling.

Netting Advice: As with *albicincta*.

WTFIYD: See *cingulata*, but almost any still or slow-moving water.

***Somatochlora forcipata* (Scudder 1861)** **Forcipate Emerald**

Identifying: Moderate size, slim, thorax with strong white markings. Distinctive in the hand. Resembles *franklini* on the wing in appearance and behaviour.

Range: Northern, trans-continental, south along the Appalachians, uncommon in Acadia.

Flight Period: Late May to mid September.

Foraging: Commonly encountered patrolling roads early in the season. Flight is straight and fast along the length of the road above waist height, but usually not too high up.

Aquatic Habitat: I have seen it ovipositing into moist Sphagnum on an old skidder trail, and males are found protecting territories in Sphagnum areas surrounding bogs. Walker (1975) reports it from tiny streams.

Flight Style: Males fly straight and fast along roads, apparently somewhat slower at streams.

Netting Advice: When encountering them flying along roads, consider yourself “at bat.” I have found that in this situation, trying to figure out which way the next dragonfly is going to come is counter-productive; they always come from the direction you're not looking. Best to pick a direction and ignore those who pass you from behind.

WTFIYD: In northern Maine and New Brunswick, during June, they appear to be flying on every lumber road. I first realized how common they were in this context when I realized that several of the dragonflies I found stuck on the net racked on the top of my Jeep were *forcipata*. I also drive with a net in front of the radiator during most years, but that does not extend more than a meter above the road, and I have not taken *forcipata* in it.

***Somatochlora franklini* (Selys 1861)** **Delicate Emerald (Photo 4)**

Identifying: Moderate size, males are very slim, hindwings with a small dark patch beside the membranule (a suede-like membrane at the basal angle of the hindwing – often dark in whole or part – can confuse). Distinctive in the hand. Resembles *forcipata* and *incurvata* on the wing in appearance and behaviour.

Range: Northern, trans-continental, not much further south than northern New England, uncommon in Acadia.

Flight Period: Late May to early August. At its bog habitats the species seems to be chased away later in its flight by the larger *incurvata*, which has similar habits.

Foraging: Commonly encountered foraging on roads, usually at an infuriating height. Does not often fly rapidly along the roads as does *forcipata*.

Aquatic Habitat: I have seen it ovipositing in small areas of open water between the woody stems of bog shrubs, but not in the open ponds. A good tactic with this species (and some bog Darners) is to stand still and listen for the sound of wings clashing in the brush stems. Most interestingly, this species' females (in common with *incurvata*) appear to lay by preference in footprints in moss lawns of bogs. I have seen it laying in a moose print, and likely the depression of that print would have filled in shortly afterward leaving the larvae to develop in the saturated moss. See the comment under *incurvata* as well. It is interesting to speculate as to whether the extinction of the Caribou in the east affected these species, by reducing the footprints in bogs. Males patrol over moss-choked pools or moss lawns. In patterned bogs, the males will tend to patrol the length of the elongated depressions.

Flight Style: Males fly straight and at moderate speed, females are somewhat fluttery in flight when searching for laying areas.

Netting Advice: The species is not particularly wary, so it is best to note the direction in which the male is traveling and slog over to an interception point (excellent cardiac exercise), keeping your net low and about flat to the bog surface, and sweeping upwards when it comes within reach. Of course, just before the conditions are perfect it will spot another male thirty meters away and charge off to challenge it. At this point, do not delete your expletives, but also do not pursue immediately. Annoying though it is to have it fly away, it is much more

(Continued on page 5)

(Continued from page 4)

aggravating to toil along after it, only to have it return to its original patrol area, now behind you. Be patient, there are advantages to standing still even in the austere habitats of a bog. Once, in northern Maine, when waiting for a franklini, I was treated to the sight of a very large bear rising up from behind the trees a stone's throw away from me in the direction I had been traveling. As the trees on this bog were only a metre or so high, it looked like a scene from a science fiction movie (Bearzilla). All participants, including, alas, the franklini, left the scene unscathed.

WTFIIYD: In May and June, look for them on the moss lawns of large bogs, or flying over heaths.

***Somatochlora incurvata* (Walker 1918) Incurvate Emerald (Photo 5)**

Identifying: Large size, slim. A bit difficult to discriminate in the hand. Resembles forcipata and franklini on the wing in appearance and behaviour.

Range: Northern, west to the Great Lakes region, south along the Appalachians to Ohio; common in Acadia; in fact one of the most common dragonflies in August in its habitat.

Flight Period: Late June to mid October, a very long flight period. At its bog habitats the species chases away the smaller franklini, which has similar habits.

Foraging: Commonly encountered foraging on roads, flying fast like forcipata, but usually lower (about waist height). A common species for road kill in Acadia.

Aquatic Habitat: As with franklini, particularly regarding laying in footsteps in the moss lawns. On one occasion I was surveying a bog near a good-sized pond choked with bright green Sphagnum and with no open water. I had seen absolutely nothing for over half an hour until I saw an *Aeshna subarctica* (Subarctic Darner) on (as usual) the other side of the pond, so I walked gingerly through the pond to bag it, but before I got there it booked (again, as usual). By the time I had turned around, there were two incurvata females laying in my open footsteps.

Flight Style and Netting Advice: Very similar to franklini.

WTFIIYD: Very similar to franklini, but flies a little later.

***Somatochlora kennedyi* Walker 1918 Kennedy's Emerald**

Identifying: Large size, slim. Distinctive in the hand. Resembles forcipata and franklini on the wing in appearance and behaviour.

Range: Northern, trans-continental, not much further south than New York, uncommon in Acadia.

Flight Period: Mid May to late August, a very early emergence for the genus.

Foraging: Often encountered foraging on roads, flying fast about waist height.

Aquatic Habitat: I have seen it ovipositing in small areas of open water between the woody stems of bog shrubs as with franklini. Walker (1975) gives bogs and swamps as the likely habitat, but notes that it has been taken laying in ponds. I have

encountered the males behaving territorially in pocket bogs with little standing water.

Flight Style and Netting Advice: Much like franklini.

WTFIIYD: Very similar to franklini, but flies a little earlier.

***Somatochlora minor* Calvert 1898 Ocellated Emerald (Photo 6)**

Identifying: Small size, fairly robust, thorax with strong white markings. Distinctive in the hand. Resembles walshii on the wing in appearance, and elongata and williamsoni in behaviour.

Range: Northern, trans-continental, not much further south than Massachusetts, common in Acadia.

Flight Period: Early June to late August.

Foraging: Rarely encountered patrolling roads.

Aquatic Habitat: Slow streams and stillwaters, much like the habitats described for albicincta and elongata. They are abundant in the little streams that drain Everlasting Barrens Bog (see septentrionalis below).

Flight Style: Males fly judiciously along the stream bank, with frequent hovers, much like elongata and williamsoni.

Netting Advice: As with elongata.

WTFIIYD: Should be found at most slow running waters in the region.



Clamp-tipped Emerald

***Somatochlora septentrionalis* (Hagen 1861) Muskeg Emerald (Photo 7)**

Identifying: Moderate size, fairly robust, wings with a relatively large triangular dark spot along the membranule. A bit difficult in the hand, and depending how north you are, you should keep whitehousei in mind. Resembles kennedyi on the wing in appearance, and Cordulia shurtleffii (American Emerald) in behaviour.

Range: Very northern, trans-continental, it does not get below northern New Brunswick and Cape Breton Island, where it is rare and confined to highlands bogs. One of the few species in North America not known from the contiguous US (is found in Alaska). I have scrutinized bogs in northern Maine with no luck for this species, though it is found in similar habitats at the same latitude and elevation in New Brunswick.

Flight Period: Mid June to mid August.

Foraging: Has not, in this region, been found away from water.

Aquatic Habitat: My first encounter with this species was in late August in a sloped bog in the Cape Breton Highlands. I had been in the Highlands earlier in the month, looking for septentrionalis and other northern species, but had no luck for this species, which I knew from a specimen in the Nova Scotia Museum that had been taken somewhere up there. Not that I didn't see Emeralds. I spent a full day chasing them from pond to pond, always a tad short, always on the wrong side of the pond. For you sailors out there, they seemed to have the lee gage on me, in the heavy winds typical over these bogs they just sailed away when spooked. By late August the male Emeralds were no longer evident at the small ponds where they were earlier in the month and I had given up on seeing the species.

(Continued on page 6)

(Continued from page 5)

There is a large pond (or small lake) on this particular bog in which I had not seen the annoying Emeralds (probably because the larger Darners and cingulata shooed them away). Late in August there were no dragonflies at this pond and I netted a female septentrionalis laying at speed while flying along its quaking margin. The following year I was in the Highlands in July, and found the males and females abundant in the smaller ponds along with *Aeshna sitchensis* (Zigzag Darner). Here the females tended to tap their eggs into the water in one small area (less than 50 cm in diameter), behaviour quite at odds with that during my first encounter. In a bog found by Stuart Tingley in northern New Brunswick, males were territorial at the down-wind ends of secondary ponds (there were none of the small shallow pools) where the debris had built up around the shore in a pinkish matt under shallow water (I collected larvae in these places the following year).

Cordulia shurtleffii was territorial along the firmer-edged shores of the pond. When a patrolling septentrionalis met a patrolling shurtleffii they clashed pro forma, their hearts just didn't seem to be in it.

Flight Style: In the sloped bogs of the Cape Breton Highlands, males fly at a moderate speed into the wind along the length of one small pond and on to the next. They are quite stately in their progress, rarely pausing, rarely speeding up. This makes not getting near them all the more aggravating. In northern New Brunswick they establish territories at the soft shorelines of secondary ponds, patrolling back and forth over their domain, in a manner typical of shurtleffii.

Netting Advice: Don't chase them, stand and hold your ground at the end of a pond with the wind at your back. Pick an area with the least complicated pond structure. Don't complain about the wind, in this part of the world you would be drained dry by blackflies without it.

WTFIYD: Anyone wanting to find this species in Acadia should contact me for detailed directions. Both the bogs I mention above are reachable with a normal car (leave the Ferrari at home). If you have access to Google Earth, you can see the northern New Brunswick bog (Renous Bog) at 46°54'4.97"N, -66°37'10.63"W but the imagery is not very good for that area. The Cape Breton Highlands bog (Everlasting Barrens Bog) is at 46°40'10.91"N, -60°38'50.37"W and the imagery is excellent for this area, you can nearly see the bugs. The large pond is at the north end of the bog (note how quaking bog is consuming it), the secondary ponds south of it and a little west, and the flark ponds at which septentrionalis is found are over at the east side of the complex. The little streams draining the bogs are generally patrolled by minor and *Cordulegaster diastatops* (Delta-spotted Spiketail). This bog is outside Cape Breton Highlands National Park (the smaller bog adjacent to the northwest is partially in the park) and no permission is needed to sample there.

***Somatochlora tenebrosa* (Say 1839) Clamp-tipped Emerald (Photo 8)**

This is a species that I have very little experience with, its greatest abundance being south of Acadia.

Identifying: Large size, slim, the male terminalia is an easy call, female ovipositor not so much, little colour on the side of the thorax. Distinctive in the hand. Resembles *elongata* and *incurvata* on the wing in size, appearance and behaviour.

Range: Southern and eastern, fairly common in Maine, rare in the Maritime Provinces.

Flight Period: Late June to early September.

Foraging: Occasionally encountered patrolling roads. Flight is fairly straight and fast along the length of the road above waist height, sometimes high up. I have seen it feeding at the intersection of dirt roads often enough to suspect that's a good place to look for it. The species is reputed to love shade, and my first encounter with it was of a male flying along a heavily shaded ditch, but all of my other encounters have been in full sunlight. Blair Nikula mentioned to me once that the species flies in powerline cuttings, and with that search image I have found it a few times since.

Aquatic Habitat: Edmund Walker characterized this as an "inhabitant of small forest streams with intermittent rapids and pools" and he was undoubtedly right, but I have never encountered it at these habitats in Acadia, and I've been to a few. The one larval collection we have was from a slow stream through a bog/fen in

Maine. Students of the Humboldt (Eagle Hill) larval odonate seminar industriously dipped this stream for a morning and came up with some pretty neat stuff, most of which I stated authoritatively was *Cordulia shurtleffi* because of the dark lateral thoracic marks. Pride goeth before the fall. This particular seminar was attended by a small, stalwart band of naturalists who just loved to catch me in an error. In this case many of the shurtleffii proved to have dorsal hooks and to key to *tenebrosa* (some others were actually shurtleffi). Bronco Quick collected more the following year and they emerged as *tenebrosa*, confirming the determination, so the habitat in this case is also confirmed as being within floating Sphagnum moss in the slow-flowing stream. And note that shurtleffi and *Dorocordulia sp.* are not the only Emeralds with lateral stripes on the thorax (although *tenebrosa*'s are not as long).

Flight Style: I haven't seen these at water, but suspect that they would fly similarly to *elongata*, minor, *williamsoni* and *C. shurtleffii*. Let me know if you find out.

Netting Advice: As with the other species that patrol roads, but keep an eye out for lurkers in the shadows. I once saw dragonfly in the deep shadows below a spruce tree but only by the glint of two green eyes, and I did not succeed in netting it.

WTFIYD: Blair's advice seems the soundest: powerline cuttings.

***Somatochlora walshii* (Scudder 1866) Brush-tipped Emerald (Photo 9)**

Identifying: Small size, fairly robust, males have hairy terminalia. Distinctive in the hand. Resembles *albicincta* and *brevicincta* on the wing in appearance and behaviour (but not habitat).

Range: Not particularly northern, trans-continental with a big gap in the prairies, south to Pennsylvania, common in Acadia.

Flight Period: Early June to mid September, one record in mid-October.

Foraging: Commonly encountered patrolling roads, where they fly very fast along the length of the road just above the surface,

(Continued on page 7)

(Continued from page 6)

weaving from side to side. Females haunt sun-lit forest clearings and roads.

Aquatic Habitat: I have several times seen it ovipositing into the muck of the animal paths in fens and bogs, Sphagnum-choked ponds in bogs, and Sphagnum-choked brooks, scarcely more than trickles. It probably lays in the backwaters of lakes and running waters.

Flight Style: Males patrol over aquatic features at about knee height, very similar to the flight of albicincta and brevicincta.

Netting Advice: When the males are flying along roads, much the same advice as for forcipata, however, walshii is particularly difficult because it flies so low down and weaves from side to side like a drunken sailor. I've had a lot of luck collecting them on dirt roads with the net attached to the front of my Jeep.

WTFIHYD: Common, so it should be fairly easy to find, but in my experience you get the best results at grassy fens and marshes.

***Somatochlora williamsoni* Walker 1907 Williamson's Emerald**

Identifying: Moderate size, slim, thorax without strong white markings (except teneral have these markings and could easily be mistaken for elongata). Distinctive in the hand. Resembles elongata on the wing in appearance and behaviour.

Range: Somewhat northern, reaches west into the Prairie Provinces, south to West Virginia, common in Maine, less common in the Maritimes.

Flight Period: Mid June to mid September.

Foraging, Flight Style, Netting Advice: Similar to elongata in all respects.

Finding the Shadowdragons (*Neurocordulia*) in the Northeast

Since I first encountered exuviae of *Neurocordulia* in 1993, I have spent about 100 nights searching for adults in Acadia, and I suppose I have become quite proficient at it. Nevertheless, I have taken adults on only 35 occasions, a rather low success ratio considering I was carefully selecting the habitats for evening survey – so netting one is still a thrill.

I would encourage you to survey all sorts of aquatic habitats in the late evening, as much more occurs there when it is dusk than we know. Nick Donnelly suggested to me years ago that there was late-day Gomphid activity, and subsequently Tony Thomas in New Brunswick discovered that *Stylurus scudderii* (Zebra Clubtail) is largely crepuscular in flight.

I think one reason why few of us go out at this time is that there is a prolonged period of relative inactivity at water from late afternoon until early evening. I call this the “calm before the swarm,” and during this period there are few things to see (although I have noticed that stream and river Corduliid females take advantage of the male's absence to get a little uninterrupted laying done). So this is a good time to have dinner and dry your



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***Somatochlora walshii* (Brush-tipped Emerald)**

socks. About 8:00pm EST, it is worthwhile to return to the water and start keeping your eyes open.

Flight of *Neurocordulia* in Acadia is heralded by the appearance of a particularly nasty mosquito species with striped legs (bring the bug spray), and also by a fairly sudden cooling of the air (have a sweater). Whether you're shivering or scratching, flight should begin within 15 minutes. Light overcast does not seem to discourage them.

I suggest that you find a stream or river with a bridge over it both because of simplicity of access and the fact that this will be public land, and because running waters are usually bridged at narrow sections, which means rapids, which is usually where michaeli and yamaskanensis are to be found. Also, the bridge lets you get up in the air where the initial flight occurs, rather than drooling on the bank. However, standing around on a bridge in the dark looking into the sky should not be done without caution – think road hockey and watch out for cars.

***Neurocordulia michaeli* Brunelle 2000 Broadtailed Shadowdragon (Photos 10 to 14)**

Identifying: Small size for northern species of the genus, females very plump when gravid, both genders wide of abdomen compared to congeners. Distinctive in the hand. In overall form this species resembles an Epitheca (Baskettail) more than a Shadowdragon.

Range: Northeastern and north central, fairly common in Maine (many exuviae records), rare in the Maritime Provinces (confined to western New Brunswick). It has been taken quite high in latitude in Ontario, and appears to be the most northern of its genus.

Flight Period: Early June to mid-August.

Foraging: Has never, to my knowledge, been taken other than in the evening at its larval habitat, although teneral have sometimes been seen feeding over water earlier in the day. I believe they hang up in the shaded understory of the forest until the evenings. One evening at Canoose Stream, Nick Donnelly had directed my attention to a Turkey Vulture flying hundreds of metres up, and as I focussed my binoculars I saw myriad

(Continued on page 8)

(Continued from page 7)

dragonflies apparently feeding up where the sun was still shining. They flew like Emeralds, and in form could have been *N. michaeli* and/or *Epitheca*; so the lives of these species may be more complex than we know. How we will find out the truth of this I have no idea. Perhaps a helicopter-towed net?

Aquatic Habitat: *N. michaeli* is a species of medium to large rivers with coarse substrate (angular football-sized rocks) and a rapids, riffles, pool structure.

Flight Style: The species is usually abundant when Mayflies are emerging, and those people with sharp eyes can usually see the swarm following the swarms of Mayflies. Flight begins late in the evening, at perhaps 21:00EST, well after the sun has gone down, and about when you can't see details in the marginal trees and brush, although the sky is still fairly light. Initially, both genders seem to be up high, then the females go down to the water surface to oviposit. When flying up high they travel only moderately quickly in straight lines for a couple of metres then make an abrupt turn followed by another straight travel. This is fairly distinctive behavior and, combined with the comparatively small size and thick abdomen, makes it possible to recognize, at least tentatively, the species in flight. When down at the water surface, the females fly very rapidly and very close to the water surface. They fly at least until the sky is fully dark, however this is a period of only three-quarters of an hour or so. Shortly after the emergence date, teneral can sometimes be found lazily feeding on Mayflies much earlier in the day.

Netting Advice: Initially, take a position on a bridge cross the stream or river and try (emphasis on try) to net males and females as they rocket around. You need to see them against the sky, so stay low to the road (locals will question your sanity, but that is a small price to pay). Photo 12 shows Michael Brunelle demonstrating good form. If there is a light breeze, stay on the side of the bridge that the breeze is blowing toward. Later, when there seems to be less activity over the bridge, the best technique is to wade into the water at the foot of a pool with the current flowing down behind you, but facing upstream. Females will oviposit at high speed up the rapids, and often circle at the foot of the pool and head back down during this circle you have a reasonable chance to net them, swinging parallel to the water surface and almost touching it. Good luck.

Larvae are difficult to find, but hand-checking rocks in the stream or river has yielded a few. In late May or early June (in Acadia) the emergence-sized larvae can be found in settle points along the shore; little coves or backwaters beside current in which waterlogged sticks have built up on the bottom. Photo 13 shows a shallow back-water of the Eel River, beside which a much higher density of emerging *michaeli* were found than on the banks exposed to direct current. The foam is indicative of the countercurrent eddy here, and the substrate is gravel rather than rocks.

WTFIYD: I have only encountered *michaeli* in abundance on three rivers, Canoose Stream and Eel River in New Brunswick, and the Northwest Saint John River in northwest Maine. During June and early July the species is present in great numbers at these sites. See photos for further details. Exuviae collection suggests that it is fairly common in Maine and western New Brunswick.

***Neurocordulia obsoleta* (Say 1839) Umber Shadowdragon**

Identifying: Intermediate in size between *michaeli* and *yamaskanensis*, and slim. Distinctive in the hand. Resembles *yamaskanensis* and *Somatochlora* on the wing in size, appearance and behaviour.

Range: Southern and eastern, fairly common in Maine, not reported from the Maritime Provinces.

Flight Period: Late May to early September.

Foraging: Not to my knowledge taken except at its aquatic habitat and in the evening.

Aquatic Habitat: Lakes with rocky substrate. I mention above that it has been taken at a river, and exuviae have been taken at small fast streams, but these seem to be the exception to the rule. My only encounter with adults was at Mud Pond, near Old Town, Maine. The lake, in spite of its name, has coarse angular substrate where I found *obsoleta*, but is elsewhere bog-margined. The water is turbid. Bronco Quick did an extensive exuviae survey at this lake, yielding many records of the species, *Helocordulia uhleri* (Uhler's Sundragon) and (interestingly) *Gomphus abbreviatus* (Spine-crowned Clubtail).

Flight Style: At Mud Pond the adults fly at extraordinary speed just above the surface of the water, the females laying at full speed. I believe that this is the fastest dragonfly that I have ever seen. They go from shoreline prominence to prominence (much like *S. cingulata*), and I had the most luck swinging around a large emergent boulder, which they would circle at speed (this large boulder is at the coordinates I have given below).

WTFIYD: Mud Pond is located at 44°56'50.56"N, -68°46'42.75"W. This is a municipal park with good access to the water.

***Neurocordulia yamaskanensis* (Provancher 1875) Stygian Shadowdragon (Photo 15)**

Identifying: Large size, slim. Distinctive in the hand. Resembles *Somatochlora* on the wing in size, appearance and behaviour.

Range: Southern and eastern, uncommon in Maine and the Maritime Provinces.

Flight Period: Early June to late July.

Foraging: Not to my knowledge taken in Acadia except at its aquatic habitat and in the evening, although Nick Donnelly tells me he has encountered it flying in sun at mid-day.

Aquatic Habitat: Much like *michaeli*, and its rarity in Acadia is strange; there should be abundant habitat and few direct competitors.

Flight Style: At the East Branch Union River, males patrol the edges of the fast water segment running under the bridge. They are found at water level much more often than is *michaeli*, and they seem associated with the shore much more than that species. Females were (contrary to *michaeli*) much harder to catch ovipositing at speed up the center of the run and out onto the stillwater.

Netting Advice: I had the most success by finding a slightly concave section of shoreline and sweeping it with a net whenever I heard wings moving.

WTFIYD: East Branch Union River, Highway 179, Hancock County, Maine.

Paul-Michael Brunelle has been studying the Odonata of the Atlantic provinces of Canada and northern New England for 20 years. He planned and helped coordinate the Maine Damselfly and Dragonfly Survey, was retained by Parks Canada to study Odonata in Cape Breton Highlands, taught Odonata seminars at Eagle Hill (Humboldt Field Research Institute, Steuben, Maine) and discovered Neurocordulia michaeli (Broadtailed Shadowdragon) in New Brunswick. He also founded the Atlantic Dragonfly Inventory Program. He lives in Nova Scotia.

Details For Habitat Photographs On The Following Pages

Photo 1: North Branch Clearwater Brook, upstream of Highway 108, Victoria County, New Brunswick. On August 17 2004, *S. albicincta* males were territorial in backwaters of this otherwise fast-flowing brook. Notice the green grassy emergents at the shore in the cove – the males were patrolling along those stands.

Photo 2: Chamberlain Fen, Piscataquis County, Maine. On July 5 2001, *S. brevicincta* males were territorial over the bright green areas, which were very wet, and a female was taken ovipositing in the mucky pond in the background. Google Earth 46°12'4.35"N, 69° 9'9.67"W will put the cursor at where the photo was taken looking southwest.

Photo 3: Frying Pan Lake, Rockwood Park, Saint John County, New Brunswick. On July 31 2006, *S. cingulata* males were flying over the surface of the lake, usually not approaching shore. Note the rocky bottom and few emergent waterplants. 45°18'17.41"N, 66° 3'23.34"W.

Photo 4: Drysdales Bog Fen, Halifax County, Nova Scotia. Typical of the footsteps you make when you slog across a soft area of a fen – and which franklini and incurvata females seem to prefer ovipositing in. Note the small pools in each footstep – the moss will have bounced back to its original surface in a matter of days. Some people have expressed concern that trampling in a bog or fen might be bad for the habitat, but I take the view that these habitats used to house many Caribou, made extinct by humans, and the subsequent lack of their footsteps may have had a negative influence on some bog species. Our footsteps are probably not greatly significant one way or the other with respect to dragonflies. 44°36'11.29"N, 63° 41'26.32"W.

Photo 5: Drysdales Bog Fen as in Photo 4. This is a typical area for *S. incurvata* (and *Aeshna sitchensis*) to fly – low down over the fen surface. Female incurvata oviposit in the small open areas. In the background you can see the ATV tracks which seem to be the principal threat to such habitats (though the tracks would have to be much more extensive than shown to have an impact). Bogs and fens are categorized as wetlands, and driving ATVs across them has been made illegal in some subnationals.

Photo 6: A small tributary of Trafton Brook, Victoria County, New Brunswick. On July 18 2004 males of *S. minor* were patrolling this little stream. The species is found on larger streams as well, with firmer substrate.

Photo 7: Fen ponds in “Radio Tower Bog,” Cape Breton Highlands National Park, Inverness County, Nova Scotia. On July 16 1998, *S. septentrionalis* males were territorial at these ponds, and females were ovipositing among the sparse emergent plants in their center.

Photo 8: Stream through Hooper Heath, Hancock County, Maine. Larvae of *S. tenebrosa* were collected from the floating Sphagnum and bottom of this slow stream, although adults have not been encountered there.

Photo 9: Mushamush Fen, Lunenburg County, Nova Scotia. This photo was taken earlier in the year than *S. walshii* flies, the paths are almost invisible beneath the grasses later on. Females

lay in these paths in August and September, when the grass is bright green, and males patrol the paths, the wetter areas of the fen, and to a lesser extent along the lake shore.

Photo 10: Canoose Stream, Highway 745, Charlotte County, New Brunswick. The type locale for the species. Our first (known) contact with *N. michaeli* was exuviae taken in 1993 from the retaining wall just visible at the right hand shore. This photo is taken much earlier than michaeli flies – during the flight there will be little or no foliage details visible, but the sky will be only slightly darker. 45°22'26.00"N, 67°21'31.37"W.

Photo 11: Eel River, Harten Road crossing, York County, New Brunswick. This is a very rich habitat for *N. michaeli*, with vast numbers emerging in early June, and easy access.

Photo 12: Michael stalking Neurocordulia on the bridge at Eel River. In spite of the fine form he displays, neither of us succeeded in catching any, although he could see clouds of them feeding on Mayflies not far away (I was having trouble seeing the tip of my nose). Shortly after, however, he informed me that they were flying down near the water under the bridge and we moved down and into the river, where he caught his namesake for the first time. Heck of a night.

Photo 13: When I first visited the Eel River at this location, on June 6 2003, I saw no trace of *N. michaeli* – the following day they were emerging in numbers. I had taken a michaeli skin on the grass beside fast current on one side of the river, while Kate Bredin was searching for exuviae on the other side. She called out that she had found an emerging dragonfly, and by the time I crossed over had found several more. Along this 2-3 metre stretch of back-current there were more michaeli emerging than we encountered in total elsewhere – convincing evidence that they drift down on emergence day (or before) and crawl out where the current deposits them. Foam in this type of habitat is indicative of a slow-current area.

Photo 14: Northwest Saint John River, American Realty Tote Road, near Daaquam on the Québec border, Aroostook County, Maine. There is a huge flight of *N. michaeli* at this river, and presumably on the Daaquam river which is just visible downstream. As the latter river flows into Maine only a few kilometers west of this point, it is likely that michaeli will be found in that province. 46°36'6.98"N, 69° 58'56.94"W.

Photo 15: East Branch Union River, Highway 179, Hancock County, Maine. This is one of the few locations in Acadia in which yamaskanensis adults have been encountered in abundance. The males patrol at speed along the shores of the fast run below the rapids visible in the picture, the females oviposit at high speed up the center of the run and off over the stillwater. Phillip deMaynadier caught one obsoleta among the yamaskanensis about mid-way along the run; I suspect it was moving from one stillwater to the next, rather than being territorial at the fast waters. 44°44'55.38"N, 68°19'17.83"W.

Somatochlora and Neurocordulia Habitat Photographs

Photo 1 – *Somatochlora albicineta*



Photo 4 – *Somatochlora franklini*



Photo 2 – *Somatochlora brevicincta*



Photo 5 – *Somatochlora incurvata*



Photo 3 – *Somatochlora cingulata*



Photo 6 – *Somatochlora minor*



Photo 7 – *Somatochlora septentrionalis*



Photo 8 – *Somatochlora tenebrosa*



Photo 9 – *Somatochlora walshii*



Photo 11 – *Neurocordulia michaeli*



Photo 10 – *Neurocordulia michaeli*



Photo 12 – Michael Brunelle



Photo 14 – *Neurocordulia michaeli*



Photo 13 – *Neurocordulia michaeli*



Photo 15 – *Neurocordulia yamaskanensis*



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