SOMATOCHLORA
of SOUTHERN ONTARIO

Written and Illustrated by
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SOMATOCHLORA OF SOUTHERN ONTARIO

A new age of odonatology has arrived. Once, the only way to become familiar with dragons and damsels other than in the field was through the consultation of technical books and papers. These impressive volumes and efforts grandfathered what has become contemporary "odeing"; their meticulous coverage of each species, making particular note of the unique and species-distinguishing anatomical parts, is the foundation for what the interested public now knows about this group of insects. Indeed, to begin the process of familiarization, naturalists typically must describe species based on such exact characteristics to reliably separate species. In time, especially using these distinguishing characteristics as a foundation, more subtle differences among different species become apparent. Birds were once collected and classified based on such quantifiable characteristics. However, centuries later and using that knowledge as a basis to further study, a skilled bird watcher will tell you that a species is knowable by the subtlest of hints offered from the most fleeting of views; something about shape, posture, some pattern of movement—a well-informed intuition. This guide aims to instil the same sort of intuitive power in the dragonfly enthusiast for recognizing subtlety. It is my hope to equip the 'oder' of any level of experience with a system that extends beyond an exacting anatomy-based identification methodology and into the realm of building an intuitive sense for identification. I hope for this work to enable such an at-a-glance identification method for the most elusive group of Ontario's dragons: our Somatochlora, the Emeralds.

The Somatochlora are difficult to depict in an illustrative format. This is in part because they are simply difficult to come to know. Unlike the general pattern with insects, these species can appear to be very rare and hard to find, even at known breeding places. The fact that the Somatochlora all look similar (extremely similar in some cases) also makes identification more a challenge. Indeed, the majority of Ontario's species follow the same template: bodies with metallic greens, blacks, bronzes and browns, with yellow spots or stripes on the thorax.

Successfully locating emeralds and predicting where to find each species is made much easier if close attention is paid to water. Perhaps more than any other group of dragonflies in our region, the Emeralds have diversified and specialized into niches that are well-categorized by water chemistry, temperature and movement. As an example, in Ontario the Hine's Emerald is only known from, specifically, shallow-water alkaline fens where the larvae develop in the underground and water-filled burrows of the crayfish species Fallicambarus fodiens. Incurvate Emeralds frequent acidic bogs where the underlying water movement is such that very small and very shallow breeding pools form on the top of the mat of Sphagnum moss. This appears to be why habitat descriptions for some emeralds vary so much in the literature. Ski-tipped Emeralds are reported to breed in ponds, rivers, bogs, lakes, and every other wetland habitat in between. In reality, this species is common nowhere, and only appears at some representatives of each of these types of wetlands. This is due to the suitability of the water itself within each individual wetland—its temperature, acidity, flow, input from springs, etc. Reading the water can be a challenge for our mostly terrestrial eyes, but it is worth the effort. So, when watching for dragons, also pay close attention to the water at scales from the minute to the entire landscape.
This guide is for use throughout Ontario and anywhere else these species are found, but it covers only a complete suite of species for southern Ontario. This area is loosely defined from the southern limits of Ontario in Essex County, northward into the sub-boreal and boreal realms. The Muskeg Emerald (Somatochlora septentrionalis), Whitehouse's Emerald (Somatochlora whitehousei), Quebec Emerald (Somatochlora brevicincta), and Hudsonian Emerald (Somatochlora hudsonicus) all inhabit Ontario's far north or west and are not included here. These northern species do not seem to begin to appear until true boreal muskeg dominates the landscape; a point well into the north (at about 48°N). The Plains Emerald (Somatochlora ensigera) is found in the Rainy River district.
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The following is the process by which this guide recommends assessing your emerald in order to identify it. It is from this framework that the "similar species" are derived and described in the species accounts.

1. Assess the age of the individual

When a dragonfly has freshly emerged from its larval stage, it appears different than it will as a mature adult. Within the first few hours of emergence, the dragonfly will appear ghostly pale and will be extremely soft and shiny. As a young adult (the first week or so of life) the dragonfly will appear sharply marked, its colours and pattern being most pronounced and crisp at this time. Some species will lose the vibrancy of their pattern with age while others will not. All of this can change the appearance of a dragonfly and it can be important to first establish an individual's age before trying to identify it.

-Fresh emeralds possess gray and purple eyes and sport much brighter and pronounced patterns than older individuals. They may also appear shiny (almost "wet" looking).

-Aged emeralds normally possess green eyes and may have had their patterns fade. However, no pattern disappears entirely with age.
2. Identify sex

Many dragonflies are very sexually dimorphic. The emeralds are no exception. As a result, it can be important to determine the sex of your dragonfly before attempting to make an ID.

-Males possess unique and intricate reproductive structures at the tip of their abdomen called claspers and are more slim than females.

-Females possess "terminal appendages" at the tips of their abdomens which can look like the claspers of males. However, these are not nearly as unique or intricate as the true claspers of males. They appear paddle-like, often break off, and are perhaps used by females as a way of looking more like real males to avoid harassment. Female emeralds show a genital plate on the underside of the abdomen tip used for egg-laying. Lastly, they are also built more robustly than males and, in particular, have a bulbous base to the abdomen.
3. Categorize the thorax

Some emerald species have markings on the thorax while others do not. These markings are usually yellow, can be single or multiple, and can be simply spots or both spots and stripes. Ask yourself what your impression of your emerald’s thorax is; are there markings? how many are there? would you say they are spots, or stripes?
4. Categorize the abdomen

This is an important characteristic to make note of. Whether an emerald has abdominal markings or not can help focus your identification. Some species possess rings while others have spots. The size, shape, and number of spots, as well as which abdominal segments they fall upon, are all useful things to make note of. When considering abdominal segments, appreciate that there are ten of them. Number 10 (S10) is at the very tip (where the claspers project out), and number one (S1) is nearer to the middle of the body (where the abdomen meets the thorax) and can be hard to see. It is always best to start counting from S10.

*very close examination of what this guide considers “unmarked abdomen” species may produce tiny or extremely faint and low-contrast spots; be aware that having a “spotted abdomen” requires the marks to be significant enough (and confusing individuals can always be cross-referenced with other characteristics)

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5. Make your identification

6. Reproductive structures (claspers in males, genital plates in females) can be examined to resolve any uncertainties that are unresolved by body characteristics.
SPECIES ACCOUNTS
Ski-tipped Emerald  
*Somatochlora elongata*

52-62mm. A large emerald and one of the more commonly encountered. This species seems to have an affinity for beaver ponds and the rivulets that flow into and drain them, but is present in a wide variety of habitats.

♂  (fresh)

abdomen dark and unmarked

claspers not hairy and with two teeth

thorax marked with clear, well-defined yellow anterior stripe and posterior spot

**Compare to:** Williamson’s has hairy claspers with a single tooth in profile, less well-defined thoracic marks, and spots on the abdomen. Ocellated is smaller, with the thorax marked with distinct spots.

♀

genital plate triangular and very wide

thorax like male

**Compare to:** Williamson’s has markings on the abdomen and a thinner genital plate. Ocellated is smaller, has a spotted thorax, and a less fat genital plate. Clamp-tipped has a thinner genital plate, as does Hine’s, which carries it at an angle (not perpendicular).

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Williamson’s Emerald
Somatochlora williamsoni

53-60mm. This species is characterized by its spotted abdomen and mustard-coloured thoracic markings, along with the distinct reproductive appendages of both sexes. More than any other Somatochlora species, its appearance changes drastically over time, with colour becoming less distinct with age.

**Compare to:** Brush-tipped is patterned similarly but is smaller and has concentration of hairs at tip of claspers, not midway along. Mocha has no thoracic pattern and different claspers. Incurvate and Forcipate have very different claspers. Ski-tipped has an unmarked abdomen.

**Compare to:** Mocha has a more slight appearance, an unmarked thorax, and is very local in our range. Clamp-tipped has a similar genital plate but an unmarked abdomen. Incurvate and Forcipate have very different genital plates. Ski-tipped has unmarked abdomen and a fatter genital plate.

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Clamp-tipped Emerald
_Somatochlora tenebrosa_

48-64mm. An associate of small, shaded boulder streams in woodland with coursing rapids, pools, and riffles. Above all else, the fantastic claspers of this species set it apart from others.

*♂ claspers “clamp” shaped

*abdomen unmarked and often hairy at posterior

*thorax with two distinct yellow markings; a stripe and spot

*claspers “clamp” shaped

_Compare to:_ Hine’s has very similar patterning and similar claspers, but the upper arch of the clasper bends around and makes a hook in lateral profile.

*♀ unmarked abdomen

*thorax like male

*genital plate long and held perpendicular from abdomen

_Compare to:_ Williamson’s has markings on the abdomen and a sharper genital plate. Hine’s is almost identical, but is much more local, the genital plate is held at a 45° angle to abdomen, and often has brown spot on S4. Ocellated is smaller and has a distinctly spotted thorax. Ski-tipped is very similar, but has a fatter genital plate.

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Hine’s Emerald
Somatochlora hineana

58-63mm. This species is known in Ontario only from the Minesing Wetlands west of Barrie, where it breeds in shallow alkaline fens and forages in adjacent uplands.

♂

- abdomen unmarked and often hairy at posterior
- claspers “clamp” shaped with downward hook
- thorax with two distinct yellow markings; a stripe and spot

Compare to: Clamp-tipped has very similar patterning and similar claspers, but the upper arch of the clasper does not bend around and make a hook in lateral profile. These unique claspers should separate this species from other similar looking forms.

♀

- unmarked abdomen
- abdomen usually with indistinct brown spot on S4
- thorax like male
- genital plate long, shovel-shaped, and held at about 45° from abdomen

Compare to: Care should be taken when discerning from Clamp-tipped, which has a more triangular (rather than shovel-shaped) genital plate which it holds perpendicular to the abdomen. Be aware, though, of the effect handling can have on the positioning of genital plates (and of the extremely local distribution of this species in Ontario). Skittipped possesses a much fatter genital plate.

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**Brush-tipped Emerald**

*Somatochlora walshii*

41-52mm. A small emerald that is one of the more commonly-encountered species. It associates with gently-flowing streams through open bogs and meadows. In flight, the short, stocky abdomen and hairy claspers on males can be visible in proper viewing conditions.

- **hairy claspers**
- **abdomen usually with three crescent-like markings**
- **claspers upturned at tips, densely haired, with concentration at tip**
- **thorax marked with anterior stripe and posterior spot**

**Compare to:** Williamson’s is similarly marked, but is larger, has abdomen marked with true spots rather than crescents, and has the concentration of hairs on its claspers midway, not at the tip. **Forcipate** has different claspers, is slighter, and has spots, not crescents on the abdomen.

- **abdomen like male**
- **thorax like male**
- **scoop-shaped genital plate**

**Compare to:** Forcipate has a very similar genital plate, but abdomen is marked with more spots (including one on S4 that this species almost always lacks) that appear as large polka-dots (not dots/crescents) and is very rare. **Incurvate** is larger and possesses more abdominal spots of larger size.

*all emerald claspers will show scant amounts of hair when viewed at very close range under a lens, but it is never as obvious at a macro-level and as thick as in this species*

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Ocellated Emerald
*Somatochlora minor*

42-50mm. In our area this species breeds and associates with sluggish, clear streams through meadows. It appears very small on the wing, and is built in a robust fashion. It may be difficult to discern from baskettail species on the wing.

♂ claspers slightly upturned at tip and with two ventral teeth; one large, the other very fine

**Compare to:** Ski-tipped has similar claspers, but is larger and with a different shape to thoracic markings. Brush-tipped and Williamson's have markings on the abdomen.

♀ (fresh)

abdomen dark and unmarked

genital plate broad, triangular, and held perpendicular to abdomen

**Compare to:** Ski-tipped is larger, has a fatter genital plate and different thoracic markings. Clamp-tipped is also larger and with a different thoracic pattern. Brush-tipped is similar size, but has different thoracic pattern, small markings on the abdomen, and a different genital plate.

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Delicate Emerald
Somatochlora franklini

44-54mm. A dragonfly of very large, open, northern sedge bogs. Males are easily recognized by their slim profile; the females, though, are not built so slight. Both sexes have a prominent, well-defined dark blotch at the base of the hind wing.

Compare to: Kennedy’s shares the single indistinct yellow thoracic spot and has similar claspers, but lacks the “thread-waisted” appearance and dark basal spot on the hind wing. The thorax is also more green in this species, rather than copper/bronze.

Compare to: Kennedy’s lacks distinct dark brown spot on wing and has decidedly bronzier, rather than greenish, thorax. It also does not have the same strong tie for very large open bogs. No other female emerald mixes the single yellow spot on the thorax with an unmarked abdomen and scoop-shaped genital plate.

*dark colouration can be found at the base of the hind wings of other emeralds, but is never as extensive or well-defined into a splotch as in this species

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Kennedy’s Emerald
*Somatochlora kennedyi*

47-55mm. This species associates with bogs with sedge. Its distribution in Ontario is mostly on the Canadian Shield, and it appears to be essentially absent from further south.

**Male**
- abdomen dark and unmarked
- claspers not upturned at tip and with arch on underside near base

**Female**
- abdomen otherwise unmarked
- genital plate short and scoop shaped
- basal segments of abdomen with blocky orange-brown markings
- thorax like male

**Compare to:** Delicate is similar, though it is slighter, has a brown spot at the base of the hind wing, and its claspers do not possess the basal arch on the underside as in this species. Its thorax is also more green, rather than copper/bronze. Incurvate has similar claspers, but has indistinct markings on the thorax that includes a faint stripe, not a spot. Its abdomen also possesses spots.

**Compare to:** Only other emerald with dark abdomen and single thoracic spot is Delicate, which has a basal spot on the hind wing, a greener (rather than bronzy) thorax and no blocky markings on the basal abdomen segments. Incurvate possesses different thoracic markings, spots on the abdomen, and a longer genital plate.
**Incurvate Emerald**  
*Somatochlora incurvata*

50-59mm. This species is found in large northern peat bogs. These usually have an abundance of sedge, scatterings of spruce and tamarack, as well as very small shallow pools in the peat where these dragonflies breed. As with Williamson’s, the contrast of their pattern changes with age. They are typically very rare.

Compare to: Forcipate is smaller, with more distinct thoracic markings and better-defined abdominal spots. Kennedy’s has similar claspers, but an unmarked abdomen and only a single yellowish spot on thorax. An aged Williamson’s could look similar, but has very different claspers.

Compare to: Williamson’s appears very similar, but has a very different genital plate. Forcipate is also very similar but is smaller, has a shorter genital plate, and more distinctive markings on the thorax. **Brush-tipped** is smaller and with fewer abdominal spots of different shape. Kennedy’s has a shorter genital plate, an unmarked abdomen, and only a single yellowish spot on thorax.

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Forcipate Emerald
*Somatochloria forcipata*

43-52mm. A small, very rare emerald that associates with spring-fed streams and rivulets in meadows, bogs, and fens. Its distribution in Ontario is erratic. In addition to the reproductive structures, it is recognizable by its small size and spotted abdomen.

**♂**
- abdomen with small but well-defined spots, especially distinct on S6 and S7
- clasper downturned making prominent arch

**♀**
- (fresh) abdomen with very large yellow polka dots from S3 to S7
- genital plate scoop-shaped

**Compare to:** *Incurvate* is larger, has marks on thorax less contrasting, and larger abdominal spots. *Williamson’s* possesses similar patterning, but is larger and has very different claspers. *Brush-tipped* is similar, but has very different claspers.

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Mocha Emerald
*Somatochlorella linearis*

58-68mm. This species breeds in streams and flowing seepages in woodlands. They have a relatively small thorax and long abdomen. It is a southern species and is very rare in Ontario. The intensity of the abdominal spotting fades with age.

**♂ clasper downturned at tip, widest approximately midway along**

**♀**

**S2 with single prominent spot**

**abdomen with dull yellow markings**

**thorax green or bronzy with no markings**

**Compare to:** The unmarked thorax, spotted abdomen, and unique claspers make this species very distinctive. A very mature and faded *Williamson's* may appear to have an unmarked thorax and would show a spotted abdomen, but the claspers are very different.

**♂**

**S2 with single prominent spot**

**abdomen with dull yellow markings**

**thorax bronzy with no markings**

**Compare to:** Ski-tipped, Ocellated, Clamp-tipped, and *Williamson's* have similar perpendicular genital plates. Of those, *Williamson's* is the only with a spotted abdomen, but its marked thorax will discern it from this species. Remember that this species is very range restricted within southern Ontario.

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Lake Emerald
Somatochlora cingulata

54-68mm. A large emerald of the boreal zone, entering southern Ontario only at the upper latitudes and in the Algonquin highlands. Breeds in both acidic bog lakes and cold, deep oligotrophic lakes. Male flies with a slightly arched abdomen. Rings can be difficult to see while in motion.

**Compare to:** Only **Ringed** is similar, though it is smaller, the thorax is decidedly greener with an obvious pale marking, and the claspers possess teeth on the underside.

**Compare to:** **Ringed** is smaller, with a greener thorax that has a single pale marking, though fresh individuals of this species will also show a pale thoracic marking. The genital plate of **Ringed** appears heart-shaped and is about half the length of S9 viewed ventrally.

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Ringed Emerald
Somatochlora albicincta

45-52mm. A small emerald that associates with lakes and rivers in the true boreal forest. Unlike the Lake Emerald which seems to have populations in northern-like habitats in areas of southern Ontario, this species seems to be limited to boreal habitats proper.

♂

abdomen with well-defined cream-coloured rings

claspers with an upturned tip; underside with teeth

Compare to: Only Lake is similar, though it is larger, the thorax decidedly bronzier without an obvious pale marking, and the claspers do not possess teeth on the underside.

♀

(fresh)

ringed abdomen shows brown spots when fresh

in ventral profile, genital plate appears heart-shaped and is about half the length of S9

Compare to: Lake is larger, with a bronzier thorax that only shows a pale marking when fresh. The genital plate of Lake appears only slightly lobed, not heart-shaped, and is about one-third the length of S9 viewed ventrally, not one half.

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CONCLUDING REMARKS

The Plains Emerald (*Somatochloras ensigera*) is known in southern Ontario from a single record near Stroud in 1959 (it does occur in Ontario’s northwest district of Rainy River, however). This species has similar markings to Ski-tipped, Clamp-tipped, and Hine’s (yellow stripe/spot on thorax). The female’s overall body colour is quite brown, and this extends well onto the abdomen. They associate with riffling streams in open areas. This species should be searched for in southern Ontario in areas where there are other midwestern prairie remnant habitats.

♂

claspers have very unique shape; similar to Mocha, but the two are patterned very differently (this species also lacks widening at midpoint of clasper)

♀

terminal appendages very short

anterior edge of genital plate noticeably concave

*some clasper and genital plate illustrations have been redrawn from Walker and Corbet (The Odonata of Canada and Alaska, Vol. 3. Toronto: University of Toronto Press. 1975).*

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Peter Mills has worked as an interpretive naturalist for eight seasons in Ontario’s Algonquin Provincial Park. He has found 108 species of odonate within the Park’s boundaries, including ten of the *Somatochloras* species included here. His favourites are the Lake Emeralds of Found Lake.

This guide was created over 14 months of intensive exploring, collecting, and illustrating. Many specimens came from within or near Algonquin Provincial Park and Alberta’s Jasper National Park.

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