

Naiades et exuvies des libellules du Québec : clé de détermination des genres

By Raymond Hutchinson et Benoit Ménard. 2016. Entomofaune du Québec (EQ) Inc. 71 pages, 116 anatomical drawings, and 15 plates of illustrations (79 colour photos), 25.00 CAD, Cloth with spiral-binding and thick, semi-gloss paper for intensive use in the lab. Available from <http://entomofaune.qc.ca>.

This guide is most importantly a key to the determination of the genera (groups of similar species) of nymphs (naiads, larvae) of the dragonflies and damselflies of Québec. As Michel Savard very correctly points out in the Foreword, an accurate name derived from a key is an essential starting point from which a huge amount of information on a species becomes available. This book was partly prepared to assist in the provincial survey aimed at developing an ongoing dragonfly atlas project in Québec. It will be of value in all of eastern Canada and the adjacent United States where genera are similar.

The authors are in an excellent position to provide information on dragonfly larvae. Both have written many scientific and popular articles about dragonflies. Raymond Hutchinson has served for decades as the science teacher at the children's camp at Port-au-Saumon. Benoit Ménard is relentless in his hobby pursuit of dragonflies and uses his artistic talents to great advantage. All artwork in the book is his. Both authors have reared many hundreds of dragonfly larvae to adults in order to make a connection between features of larval skins and adults of many different species. They have popularized dragonflies with the public through popular articles, TV programs, radio and newspaper interviews, presentations, and workshops. In science and field biology they successfully promoted the study of dragonfly larvae which has led to new ecological understanding and discoveries of new species in Québec. Author credibility varies among books, but this is as good as it gets.

On the back cover this book is advertised as a guide "for the Francophone naturalist". An informative book is one that anyone can benefit from regardless of language or how much effort has to be used to learn from it. This is simply an informative book that is in French because it is focussed on Québec. I recommend it to the Anglophone naturalist as well because it is helpful for a region that is three times the size of Québec to the south, east, and west. The essential part of the book, the key, is not difficult for anyone to understand. For example, it is easy to imagine that "première partie de l'antenne" means the "first part of the antenna". There are illustrations with arrows to help.

The book is valuable for many reasons. There is the issue of convenience. If you want to identify dragonfly larvae you will have to deal with the larger keys to genera in Needham *et al.* (2014) and Westfall and May (2006). This is because keys to larger geographic areas are longer and more complicated because of the increased number of taxa (many of which do not occur anywhere near the area of interest).

Then there is the question of why you might want to identify dragonfly larvae to genera at all. Well, dragonflies are useful bioindicators but at a particular time when you survey adults, not all dragonflies in the area will be flying because flight times for different species vary. Some will only be present as larvae while others will have already emerged for a secretive life in the forest canopy leaving only the empty exuviae (skins from larval transformation) as indicators of their presence. Only by surveying the larvae and the exuviae as well as the adults is a complete survey possible. This idea is emphasized by the authors and some evidence is available to support it (e.g., Catling 2003).

The introductory section is full of interesting information. Behaviour and ecology are well summarized. Some dragonflies are so secretive as adults that there is no other way to find them than to search for the nymphs and exuviae. Without understanding the larvae, you know only 10% of the dragonfly's life. This section also indicates how to distinguish dragonfly and damselfly larvae from other aquatic insects and from each other. It also describes how to catch the larvae (also called naiads or nymphs) using the preferred flat strainer net, which has revolutionized the collecting of aquatic insects (and was popularized by the authors). The first part of the book also contains a very helpful and informative overview of aquatic environments occupied by the different genera. There is information available for grouping Québec dragonflies under habitats (e.g., Hutchinson and Ménard 2007a; Catling 2009; Hutchinson 2011) which may be outlined in an update.

The key is outstanding, based on the most easily used characters and with illustrations to assist in most of the decisions. Having identified a species to genus, it is necessary to return to the basic North American manuals which are referenced in the text (Westfall and May 2006; Needham *et al.* 2014), but by this time some of the most difficult work has been easily accomplished. If these latter North American manuals are not available, there are some other options for species identification. For example, Québec (and northeastern North America) has many species in common with Michigan, so the online keys updated to 2017 in Bright and O'Brien (2017) will be helpful. See also Bright (2017) for *Ophiogomphus* nymphs. These keys sometimes employ different (and perhaps better) characters than the older keys in the larger manuals (and they are shorter).

Following the key are 12 plates of outstanding illustrations. The value of these in identification is substantial, whether careful line drawings or photographs of excellent quality. These pages contain 95 pictures and of course there are numerous illustrations elsewhere.

It is a very well illustrated book. The plates are followed by a useful glossary, list of major references, and a helpful index.

A companion update or a second edition for this book seems to be a good idea for three reasons:

(1) Although some groups (genera) are difficult and require more work, there are distinctive species in some of these genera that are easily identified. For example, the discovery of Maine Snaketail (*Ophiogomphus mainensis*) in Ontario was based on larvae which have the most distinctive antennae in the genus (Catling and Brownell 1999). Also, the discovery of l'épithèque de Brunelle (*Neurocordulia michaeli*) in Quebec was based on exuviae with a key to the latter in the Charest and Savard (2014) report.

(2) The members of some genera are easily identified and keys with illustrations have been produced for all that occur in eastern Canada. This is true for *Stylurus* (e.g., Catling 2000; Bright and O'Brien 2017).

(3) Along the same lines there is information on the ecology and characteristics of larvae, some especially referring to Quebec (and eastern Canada) that could have been mentioned here (perhaps in the list of genera and associated habitats). See, for example, Catling (2004) and Hutchinson and Ménard (2007b).

Making reference to this information, or better still, including it, would be helpful to the dragonfly survey effort. It seems unfortunate not to make some useful information available only because it cannot be complete for some groups.

This work will further promote the study of dragonfly larvae, something that the authors have been doing for a long time. It is excellent and valuable, and yet another important contribution from two outstanding Canadian field biologists.

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