Monotomidae (Coleoptera) of the Maritime Provinces of Canada

Christopher G. Majka and Yves Bousquet

ABSTRACT

The Monotomidae of the Maritime Provinces of Canada are surveyed. Nine species are found in the region in the genera *Rhizophagus* and *Monotoma*. Four species are adventive from the Palaearctic region; the other five are native to the Nearctic region. Five species have been recorded in New Brunswick, eight in Nova Scotia, and two in Prince Edward Island. Seven new provincial records are reported. The distribution of species in North America, and of adventive species, elsewhere in the world, is briefly summarized, as well as the bionomics of each species.

INTRODUCTION

The Monotomidae (the “root-eating beetles”) are a small family of Coleoptera, with 55 species recorded from North America (Bousquet 2002). The Canadian fauna consists of 24 species (Bousquet 1991). In Atlantic Canada monotomids include representatives of two genera; *Rhizophagus* Herbst, including six species that are generally found under bark in association with scolytine larvae and subcortical fungi on which they feed; and *Monotoma* Herbst, including four species that feed on fungi and are variously found in decomposing micro-habitats such as compost heaps and haystacks. Some species (i.e., *Monotomoma longicollis*) are found in association with dried stored products, while others (i.e., *Monotoma producta*) are found under beach wrack (Bousquet 1990, 2002; Bousquet and Laplante 1999).

The Canadian fauna of both these genera have been reviewed by Bousquet (1990) and Bousquet and Laplante (1999). Nonetheless, recent collections, and an examination of voucher specimens in collections in the Maritime Provinces of Canada (New Brunswick, Nova Scotia, Prince Edward Island) have revealed many additional specimens, that have almost doubled the number of provincial records in the region, and added to our knowledge of their bionomics. The present contribution presents these new discoveries and surveys the status of the family in the region.
METHODS AND CONVENTIONS

Specimens of Monotomidae from the Maritime Provinces in a variety of collections were examined and identified. These collections yielded 145 specimens, 104 from Nova Scotia, 38 from New Brunswick, and two from Prince Edward Island. Abbreviations (following Evenhuis 2009) of collections consulted and referred to in this study include:

- CBU Cape Breton University, Sydney, Nova Scotia, Canada
- CGMC Christopher G. Majka Collection, Halifax, Nova Scotia, Canada
- CNC Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Ontario, Canada
- DHWC David H. Webster Collection, Kentville, Nova Scotia, Canada
- JCC Joyce Cook Collection (now at the New Brunswick Museum, Saint John, New Brunswick, Canada)
- MMUE Manchester Museum, The University, Manchester, United Kingdom
- NSMC Nova Scotia Museum, Halifax, Nova Scotia, Canada
- NSNR Nova Scotia Department of Natural Resources, Shubenacadie, Nova Scotia, Canada

In the species treatments, the number of specimens and the collection abbreviation are enclosed in parentheses. Abbreviations employed are: FIT = flight intercept trap.

RESULTS

Ten Monotomidae species are found in the Maritime Provinces in the genera Rhizophagus and Monotoma. Five are adventive Palearctic species; the other five are native to the Nearctic region. Six species have been recorded in New Brunswick, eight in Nova Scotia, and two in Prince Edward Island (Table 1). Seven new provincial records are reported.

**Rhizophagus Herbst, 1793**

Keys to the identification of North American Rhizophagus species are available in Bousquet (1990).

*Rhizophagus brunneus brunneus* Horn, 1879 (Fig. 1)

**Fig. 1.** Dorsal habitus photograph of Rhizophagus brunneus brunneus. Photo Credit: Christopher Majka, Nova Scotia Museum, Halifax, NS.


*Rhizophagus brunneus brunneus* is newly recorded from Nova Scotia. Previously the species was recorded from New Brunswick by Bousquet (1990). *Rhizophagus brunneus brunneus* is widely distributed throughout most of mainland Nova Scotia (Fig. 2). This Nearctic species has been recorded from the Maritime Provinces west to Alberta and south to Alabama in the eastern United States (Bousquet 1990). Specimens have been collected from under the bark of *Pinus strobus* L. *Pinus palustris* Mill., and *Picea glauca* (Moench) (Pinaceae).
Table 1. Monotomid fauna of Atlantic Canada.

<table>
<thead>
<tr>
<th>Species</th>
<th>Regional Distribution</th>
<th>Confidence</th>
<th>Localities</th>
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<tr>
<td><strong>Rhizophaginae</strong></td>
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<tr>
<td><em>Rhizophagus minutus rotundicollis</em> Bousquet</td>
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<td>1 1</td>
<td>MA, ME, NF, NS, NY, ON, QC, RI</td>
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<tr>
<td><em>Rhizophagus remotus</em> LeConte</td>
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<td>CT, MA, ME, NH, NS, NY, ON, QC, VT</td>
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**Monotominae**

<table>
<thead>
<tr>
<th>Species</th>
<th>Regional Distribution</th>
<th>Confidence</th>
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<tr>
<td><em>Monotoma producta</em> LeConte</td>
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<td>CT, MA, ME, NB, NH, NS, NY, PE, RI</td>
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</table>

**Note:** † = adventive Palearctic species; NB = New Brunswick; NS = Nova Scotia; PE = Prince Edward Island; NL = Newfoundland and Labrador. Information from Newfoundland and Labrador is included as a basis of comparison for the Maritime Provinces fauna. For purpose of this treatment, northeastern North America is taken to consist of the following jurisdictions: CT = Connecticut; LB = Labrador; MA = Massachusetts; ME = Maine; NF = insular Newfoundland; NH = New Hampshire; NY = New York; ON = Ontario; QC = Quebec; RI = Rhode Island; PM = St. Pierre et Miquelon; and, VT = Vermont.

**Fig. 2.** Distribution of *Rhizophagus* species in the Maritime Provinces of Canada.

**Fig. 3.** Dorsal habitus of *Rhizophagus dimidiatus*. Photo Credit: Christopher Majka, Nova Scotia Museum, Halifax, NS.


*Rhizophagus dimidiatus* Mannerheim, 1843 (Fig. 3)

*Rhizophagus dimidiatus* is newly recorded from New Brunswick. Previously the species was recorded from both Nova Scotia and insular Newfoundland by Bousquet (1990). In Nova Scotia, it is the most abundant and widely distributed monotomid, found both on the mainland and on Cape Breton Island (Fig. 2). The absence of records
from New Brunswick likely reflects a lack of collecting effort for monomotids in that province. In North America *Rhizophagus dimidiatus* exhibits a disjunct distribution; in the east, it is found from insular Newfoundland and Ontario south to North Carolina and Tennessee; in the west, it occurs from Alaska south to southern Arizona and New Mexico (Bousquet 1990). Bousquet (1990) suggested that this species might represent a complex of related species. In the east, Bousquet (1990) reported it from under the bark of a variety of deciduous and coniferous trees; records from Nova Scotia include specimens collected on *Picea rubens* Sarg., *Picea mariana* (Mill.) BSP., *Pinus strobus* (Pinaceae), and *Betula papyrifera* Marshall (Betulaceae) in both coniferous and deciduous forests aged from 45 to > 120 years. Chandler (1991) collected them in mixed coniferous-deciduous forest stands in New Hampshire.

*Rhizophagus minutus rotundicollis* Bousquet, 1990

**NOVA SCOTIA: Inverness Co.:** Lone Shieling, July 1, 1983, R. Vockeroth, malaise trap (1, CNC).

*Rhizophagus minutus rotundicollis* is newly recorded in Nova Scotia (Fig. 2). Previously the species was reported from insular Newfoundland (Bousquet 1990). In eastern North America it is distributed from Newfoundland and Ontario south to Maine and New Hampshire recorded from *Abies balsamea* L. Mill. (Pinaceae) and *Picea glauca*. (Bousquet 1990).

*Rhizophagus parallelocollis* Gyllenhal, 1827

**Fig. 4.** Dorsal habitus of *Rhizophagus parallelocollis* (Length = 3.0 mm). Photo Credit: Christopher Majka, Nova Scotia Museum, Halifax, NS.

*Rhizophagus parallelocollis* has previously been recorded from both Nova Scotia and insular Newfoundland (Bousquet 1990). The only record of this adventive Palaearctic species in the Maritime Provinces is from 1957 in Waverley, Nova Scotia. The bionomics of this species are unusual; in Europe it is known as the “graveyard beetle” since it is frequently found in graves, swarming on corpses in coffins where it is associated with dipterous larvae on which they may feed. The species is also found in fungi, soil, mammal nests, on mould, plant refuse, old bones, and at sap (Bousquet 1990). *Rhizophagus parallelocollis* is widely distributed throughout Europe, from northern Russia and Scandinavia south to the Mediterranean including Great Britain and Ireland and the Black Sea coast (Jelínek 2007).

*Rhizophagus remotus* LeConte, 1866 (Fig. 5)

**Fig. 5.** Dorsal habitus of *Rhizophagus remotus*. Photo Credit: Christopher Majka, Nova Scotia Museum, Halifax, NS.

*Rhizophagus remotus* has previously been recorded from Cape Breton Island in Nova Scotia (Bousquet 1990). Additional records from the mainland of Nova Scotia are given above (Fig. 2). This species also has a disjunct distribution in North America, occurring from Nova Scotia south to New Jersey and west to eastern Manitoba and Minnesota; in the west it is found from Alaska south to Arizona and New Mexico, reported commonly on *Pinus* spp., *Populus tremuloides* Michx, *Populus grandidentata* Michx., and *Populus trichocarpa* Torr. and Gray (Salicaceae) (Bousquet 1990). Chandler (1991) collected them in mixed coniferous-deciduous forest stands in New Hampshire.
Fig. 6. Distribution of Monotoma species in the Maritime Provinces of Canada.

Monotoma Herbst, 1793

Keys to the identification of North American Monotoma specimens are available in Bousquet and Laplante (1999).

Monotoma bicolor Villa & Villa, 1835 (Fig. 7)

NOVA SCOTIA: Colchester Co.: Bible Hill, July 4, 2007, C.W. D’Orsay, pasture, sweeping (1, CBU); Kings Co.: Kentville, August 10, 2005, D.H. Webster, compost heap, moldy corncobs (1, DHWC).

Monotoma bicolor has previously recorded from New Brunswick by Bousquet and Laplante (1999). There is only one record of this adventive Palaearctic species from the region (Fig. 6). The species is widely distributed in Europe from Northern Russia and Scandinavia south to the Mediterranean including Great Britain, Ireland, and the Mediterranean islands. It is also found across North Africa, in Turkey and the Middle East, across Siberia to the Russian Far East, south to China and Tajikistan and in Australia (Jelinek 2007). Monotoma bicolor is primarily found in decaying vegetable matter such as grass piles and barnyard litter (Bousquet and Laplante 1999).

Monotoma longicollis (Gyllenhal, 1827) (Fig. 8)

Monotoma longicollis is newly recorded from Nova Scotia (Fig. 5). This adventive Palaearctic species has previously recorded from New Brunswick and insular Newfoundland (Bousquet and Laplante 1999). The species is widely distributed throughout North America where it has been found in grass piles and stored wheat (Bousquet and Laplante 1999). Monotoma longicollis is widely distributed in Europe from Northern Russia and Scandinavia south to the Mediterranean including Great Britain, Ireland, Sardinia, Madeira, and the Canary Islands. It is also found in the Russian Far East south to Turkmenistan, China, and Japan, and in sub-Saharan Africa and Australia (Jelinek 2007).

Monotoma picipes Herbst, 1793 (Fig. 9)

PRINCE EDWARD ISLAND: Queens Co.: Harrington, September 2, 2005, M.E.M. Smith, weeds & barley, sweep (1, CGMC).

Monotoma picipes is newly recorded from Prince Edward Island. This adventive Palaearctic species has previously been recorded from New Brunswick, Nova Scotia, and insular Newfoundland (Bousquet and Laplante 1999). It is

Fig. 7. Dorsal habitus of Monotoma bicolor (Length: 1.9-2.5 mm). Photo credit: Christopher Majka, Nova Scotia Museum, Halifax, NS.

Fig. 8. Dorsal habitus of Monotoma longicollis. Photo credit: Tim Moyer, Medford, New Jersey.
widely distributed in the region with the exception of Cape Breton Island (Fig. 6) and it has been recorded throughout most of North America where it is typically found in decaying vegetable matter, under the bark of pine logs, in moss, seaweed, and occasionally in association with ants (Bousquet and Laplante 1999). Monotoma picipes has been found throughout Europe except for Albania, Belgium, Bosnia-Herzegovina, Bulgaria, and Macedonia where it has not been recorded. It is also found across North Africa and across Siberia to the Russian Far East, and south to China, Korea, Japan, and throughout central Asia (Jelinek 2007).

**Monotoma producta** LeConte, 1855 (Fig. 10)

Monotoma producta is newly recorded from Nova Scotia and Prince Edward Island. This Nearctic species has previously been recorded from New Brunswick by Bousquet and Laplante (1999). Additional New Brunswick records are given above. There are scattered records from coastal locations throughout the Maritime Provinces except for Cape Breton Island (Fig. 6). Monotoma producta is found along the Atlantic coast from Nova Scotia south to Florida (Bousquet and Laplante 1999). In the Maritime Provinces, the species has been found under flotsam and wrack on ocean beaches, similar to habitats where it has been found in the United States (Bousquet and Laplante 1999). Chandler (1983) found larvae feeding on the spores of “fungi imperfecti.”

**DISCUSSION**

Although the data presented herein are preliminary, an examination of the species distributions in the Maritime Provinces reveals several patterns. Of the adventive species, Monotoma picipes, and to lesser degree Monotoma longicollis, are generally distributed in the region, whereas only single records of Monotoma bicolor and Rhizophagus parallelocollis are known (Figs. 2, 6). Early dates of detection of these species are provided in Table 2 for all the jurisdictions in Atlantic Canada and North America as a whole.

Among the native species, Rhizophagus dimidiatus and Rhizophagus brunneus brunneus are abundant and generally distributed, at least within Nova Scotia (Fig 2). The lack of records of the latter species from Cape Breton Island, and both from Prince Edward Island, warrants further investigation. Monotoma producta also appears to be generally distributed in the region, within its preferred coastal habitats (Fig. 1). There are scattered records of Rhizophagus remotus from northern Cape Breton and on the mainland of Nova Scotia, and there is but a single record of R. minutus rotundicollis from northern Cape Breton (Fig. 2). Both these species also warrant further investigation to determine the extent of their distribution in the region.

Most Rhizophagus species inhabit subcortical environments and prey on bark beetles and/or feed on fungal mycelia or spores that grow in such environments and may therefore be considered saproxylic. The exception is Rhizophagus parallelocollis, which in Europe is primarily...
associated with carrion, apparently feeding on larval Diptera.  

*Monotoma* species, in contrast, are primarily found in decomposing situations, particularly decaying vegetation. *Monotoma longicollis* is occasionally found in association with stored products, and the native *M. producta* appears to be a specialist inhabitant of beach drift environments. Bousquet and Laplante (1999) noted that adults are mold feeders in such habitats.

Other species of monotomids may also potentially occur in the Maritime Provinces. *Pycnotomia cavicollis* (Horn), *Bactridium striolatum* (Reitter), *Monotoma americana* Aubé, and *Monotoma testacea* Motschulsky have all been recorded in the neighbouring province of Québec (Bousquet 1991; Bousquet and Laplante 1999). These species exhibit similar modes of life as those known in the region and should therefore be sought, particularly in western portions of New Brunswick.

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**REFERENCES**


