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# Part 3: Cucujoidea

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# Synopsis of adventive species of Coleoptera (Insecta) recorded from Canada. Part 3: Cucujoidea

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# Contents

## Introduction

This is the fourth volume in a series in which we treat the Canadian adventive species of the insect order Coleoptera (Klimaszewski et al. 2010, 2012, 2013). The first one provided a quick overview of all recorded species of adventive Coleoptera in eastern Canada, and the two subsequent volumes reviewed in detail the adventive species of the families Carabidae and Staphylinidae, respectively, in Canada. This volume focuses on the diverse superfamily Cucujoidea which contains 19 families and 548 species in Canada (Bousquet et al. 2013). The most species-rich families are the Cryptophagidae, Nitidulidae, Coccinellidae and Latridiidae.

Adventive species in the Cucujoidea span a wide variety of trophic roles including fungivory (e.g., Cryptophagidae, Latridiidae, Erotylidae), necrophagy (e.g., some Nitidulidae), herbivory (e.g., Kateretidae), pollen-feeding (e.g., Nitidulidae – Meligethinae), seed-feeding (e.g., Laemophloeidae), and predation (e.g., Coccinellidae) (Downey and Arnett 1996). Many adventive members of this superfamily are associated with stored food products and rotting materials (e.g., fruit, compost, grass, hay) and are frequently synanthropic (Campbell et al. 1989). However, some species are also found in a wide range of natural habitats, especially forests, where they are associated with dead wood (saproxylic) and litter (epigaeic) (Majka et al. 2009).

Many species of adventive Cucujoidea, especially in the families Cryptophagidae, Silvanidae, and Laemophloeidae, are associated with stored food products (e.g., grains, dried fruit) and, therefore, can be nuisance pests in households and cause economic damage in granaries and other dried good storage and processing facilities (Campbell et al. 1989). Many of these have been transported around the world in association with grains and other dried foods.

Several species of predaceous Coccinellidae were intentionally introduced into Canada as biocontrol agents targeting soft-bodied insects such as aphids, adelgids and scales, and became established; some remain localized in distribution and others have spread across all or most of the country. Two species, *Coccinella septempunctata* Linnaeus and *Harmonia axyridis* (Pallas), are having ecological impacts by displacing native species of coccinellids in many parts of the country (Acorn 2007).

The Cucujoidea contain some families that are well-studied taxonomically (e.g., Coccinellidae) and some that are poorly known in North America. Three families that have relatively large numbers of adventive species in Canada – Cryptophagidae (21

spp.), Latridiidae (20 spp.), and Nitidulidae (13 spp.) – have been poorly studied, both in terms of taxonomy and distribution. Much effort is needed to develop a comprehensive understanding of the diversity of these families in Canada (and North America) and to establish a stable taxonomic foundation. Our goal is to provide a comprehensive and consolidated knowledge of the 89 species of adventive Cucujoidea known from Canada (Humble 1994, Bousquet et al. 2013), including diagnostic features, colour habitus photos for all species, native range, Canadian distribution, new Canadian provincial and territorial records, general distribution in the USA, early Canadian and North American records, and habitat information. The present information on species of this group is scattered across the literature and is difficult to access by non-specialists. We hope that this contribution will provide an easy access to the latest information on this group of adventive species in Canada and the USA, and will aid in their identification.

## Materials and methods

**Structure and convention.** This review is based largely on the published literature and on information associated with identified specimens in mainly Canadian collections. The arrangement of the species and classification follows that used by Bousquet et al. (2013).

We use the term "adventive species" to refer to those that arrived in Canada from other countries, either through natural dispersal or through inadvertent or deliberate human action (Wheeler and Hoebeke 2009). We do not include coverage of native Canadian species that have been translocated to novel jurisdictions and habitats within the country.

**Images**. We provide 91 colour habitus images of all adventive rove beetle species reported from Canada. Thirty additional black and white drawings of genital structures are provided to aid with species identification of the difficult family Latridiidae.

The external images of adults were taken using an image processing system (Nikon SMZ 1500 stereoscopic microscope; Nikon Digit-like Camera DXM 1200F or Nikon D5200 digital photo camera), Adobe Photoshop and Helicon Focus software.

**Distribution.** Each species is cited with its currently known distribution in Canada and the USA. Data for distribution maps (Canada only) were extracted from specimens in collections, as well as from literature records. Geographic coordinates were standardized using the NAD83 datum, and maps projected onto a Lambert Conic Conformal using ESRI ArcMap version 10 for Windows. The following abbreviations are used in the text for Canadian provinces and territories:

**AB** – Alberta, **BC** – British Columbia, **LB** – Labrador, **MB** – Manitoba, **NB** – New Brunswick, **NF** – Newfoundland (island), **NS** – Nova Scotia, **NT** – Northwest Territories, **NU** – Nunavut, **ON** – Ontario, **PE** – Prince Edward Island, **QC** – Quebec, **SK** – Saskatchewan, **YT** – Yukon Territory.

USA state abbreviations follow those of the US Postal Service.

**Collection codens.** The following collections contained specimens of adventive Cucujoidea from Canada, and specimen data were used to delimit distribution:

**ACU** Acadia University, Wolfville, Nova Scotia, Canada

**ACNL** Agriculture and Agri-food Canada, St. John's, Newfoundland and Labrador, Canada
**ACNS** Agriculture and Agri-food Canada, Kentville, Nova Scotia, Canada
**ACPE** Agriculture and Agri-food Canada, Charlottetown, Prince Edward Island, Canada
**AFC** Atlantic Forestry Centre (Canadian Forest Service), Fredericton, New Brunswick, Canada
**CFCB** Canadian Forest Service, Corner Brook, Newfoundland and Labrador, Canada
**CBU** Cape Breton University, Sydney, Nova Scotia, Canada
**CIQ** Collection d'Insectes de Québec, Québec, Québec, Canada
**CIUL** Collection d'Insectes de l'Université Laval, Québec, Québec, Canada
**CMN** Canadian Museum of Nature, Ottawa, Ontario, Canada
**CMNH** Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA
**CNCI** Canadian National Collection of Insects, Ottawa, Ontario, Canada
**DAL** Dalhousie University Collection, Halifax, New Brunswick, Canada
**DEBU** University of Guelph, Guelph, Ontario, Canada
**DHWC** David H. Webster Collection, Kentville, Nova Scotia, Canada
**DJLC** David J. Larson Collection, Maple Creek, Saskatchewan, Canada
**EMPC** Edward M. Pike Collection, Calgary, Alberta, Canada
**JAC** John Acorn Collection and Database, Edmonton, Alberta, Canada
**JCC** Joyce Cook Collection, North Augusta, Ontario, Canada
**JOC** Jeffrey Ogden Collection, Truro, Nova Scotia, Canada
**LEMQ** Lyman Entomological Museum, Ste. Anne-de-Bellevue, Quebec, Canada
**LFC** Laurentian Forestry Centre (Canadian Forest Service), Quebec, Canada
**MUN** Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada (on loan to David Langor, Edmonton)
**MZH** Museum of Zoology, University of Helsinki, Helsinki, Finland
**NBM** New Brunswick Museum, Saint John, New Brunswick, Canada
**NOFC** Northern Forestry Centre (Canadian Forest Service), Edmonton, Alberta, Canada
**NSAC** Nova Scotia Agricultural College, Bible Hill, Nova Scotia, Canada
**NSMC** Nova Scotia Museum, Halifax, Nova Scotia, Canada
**NSNR** Nova Scotia Department of Natural Resources, Shubenacadie, Nova Scotia, Canada
**PFC** Pacific Forestry Centre (Canadian Forest Service) Victoria, British Columbia, Canada
**ROM** Royal Ontario Museum, Toronto, Ontario, Canada
**RSM** Royal Saskatchewan Museum, Regina, Saskatchewan, Canada
**RWC** Reginald Webster Collection, Charters Settlement, New Brunswick, Canada
**STFX** St. Francis Xavier University, Antigonish, Nova Scotia, Canada

**UASM** University of Alberta Strickland Museum, Edmonton, Alberta, Canada
**UBC** University of British Columbia, George J. Spencer Entomological Museum, Vancouver, British Columbia, Canada
**UMAN** University of Manitoba, Winnipeg, Manitoba, Canada
**UNB** University of New Brunswick, Fredericton, New Brunswick, Canada
**UPEI** University of Prince Edward Island, Charlottetown, Prince Edward Island, Canada
**USNM** National Museum of Natural History, Washington, DC, USA

**Faunal composition of adventive Cucujoidea (number of species in brackets)**

89 recorded species in 48 genera and 12 families (two additional species are herein removed from the Canadian list):

**EROTYLIDAE [1]**: *Cryptophilus* (1); **MONOTOMIDAE [7]**: *Rhizophagus* (1), *Monotoma* (6); **CRYPTOPHAGIDAE [21]**: *Cryptophagus* (10), *Henoticus* (1), *Pteryngium* (1), *Telmatophilus* (1), *Atomaria* (7), *Ephistemus* (1); **SILVANIDAE [6]**: *Ahasverus* (1), *Nausibius* (1), *Oryzaephilus* (2), *Silvanoprus* (1), *Silvanus* (1); **LAEMOPHLOEIDAE [3]**: *Cryptolestes* (3); **KATERETIDAE [2]**: *Brachypterolus* (1); *Brachypterus* (1); **NITIDULIDAE [13]**: *Carpophilus* (4), *Brassicogethes* (1), *Genisthogethes* (1), *Meligethes* (1); *Aethina* (1), *Nitidula* (2), *Omosita* (2), *Soronia* (1); **CERYLONIDAE [1]**: *Murmidius* (1); **ENDOMYCHIDAE [2]**: *Symbiotes* (1), *Mycetaea* (1); **COCCINELLIDAE [11]**: *Rhyzobius* (1), *Adalia* (1), *Aphidecta* (1), *Coccinella* (2), *Harmonia* (1), *Hippodamia* (1), *Propylaea* (1), *Scymnus* (3); **CORYLOPHIDAE [2]**: *Orthoperus* (1), *Sericoderus* (1); **LATRIDIIDAE [20]**: *Adistemia* (1), *Cartodere* (3), *Dienerella* (5), *Enicmus* (1), *Latridius* (2), *Stephostethus* (1), *Thes* (1), *Corticaria* (5), *Cortinicara* (1).

## Discussion

Although the 19 families contained in the superfamily Cucujoidea in Canada represent only ~7.5% of beetle species in Canada (Bousquet et al. 2013), these species corporately represent a wide range of trophic roles (e.g., herbivory, necrophagy, mycophagy, predatory, pollen-feeding) and habitats. Bousquet et al. (2013) recorded 90 adventive species in Canada but did not include the establishment of *Aphidecta obliterata* (Linnaeus) in BC (Humble 1994). We removed two species, *Acanthogethes fuscus* (Olivier) (Nitidulidae), and *Stephostethus productus* Rosenhauer (Latridiidae) from the species list for Canada because of lack of evidence of an established population and misidentification. This leaves 89 purported adventive species in Canada, representing 16.1% of the total Canadian Cucujoidea fauna. In comparison, 9.4% of the Staphylinidae are adventive in Canada (Klimaszewski et al. 2013) and 5.7% of the Carabidae (Klimaszewski et al. 2012). Several small families have no known adventive species in Canada (e.g., Cucujidae, Phalacridae), and others have a high percentage of adventive species, e.g., Silvanidae (37.5% of Canadian species are adventive), Latridiidae (35.6%), and Cryptophagidae (31.3%) (Table 1).

The aforementioned three families with the highest percent of adventive species among the Cucujoidea are similar in that they contain many non-native species that are associated with grains and other dried food products (at least 27 species). Altogether, in the Cucujoidea there are no less than 37 adventive species that are associated with dried stored food products. Such stored product species, many of which are pests, have been transported around the world for centuries due to human commerce (Campbell et al. 1989). Of the 37 adventive Cucujoidea species in Canada associated with stored food products, 28 have also been inadvertently introduced to other regions of the world in addition to the Nearctic, and many now have cosmopolitan distributions. There are also many other adventive beetle species associated with stored food products in Canada in other beetle families, e.g., Tenebrionidae and Dermestidae, and many of those also have cosmopolitan distributions.

The adventive Cucujoidea in Canada consists mostly of species that were inadvertently introduced onto our shores, but there are also seven species of predaceous Coccinellidae that were intentionally introduced for the purposes of biocontrol of economically important aphids and adelgids in forestry and agriculture (McLeod et al. 1962, Acorn 2007). There have also been attempted introductions of other lady-

bird beetle species, e.g., *Scymnus pumilio* (Weise), that were unsuccessful (McLeod et al. 1962). The impact of these biocontrol agents on the target species is difficult to assess, but there seems to be little evidence of significant and lasting success in reducing the populations of target species and their damage below an economic threshold. The unfortunate outcome of the introduction of generalist predators is that there are sometimes non-target impacts on native fauna. Two of these introduced coccinellid species, *C. septempunctata* and *H. axyridis*, have been demonstrated to displace native ladybird beetles (Acorn 2007), therefore highlighting the ecological impacts of adventive species. The ecological impacts of other adventive Cucujoidea are unexplored.

The diversity of adventive Cucujoidea in Canada varies greatly by geographic jurisdictions (Table 1). The Atlantic Provinces have the highest number of species (66), followed by Quebec (65), Ontario (64), and British Columbia (55), a diversity pattern also evident for Staphylinidae and Carabidae (Klimaszewski et al. 2012, 2013). This general pattern reflects that ports in these regions and provinces have had a long history of trade, particularly with Europe and Asia. As Atlantic Canada has a relatively low diversity of native beetles and a high number of adventive species, the percent of fauna represented by non-native Cucujoidea species is highest there, especially in Newfoundland, Prince Edward Island and Nova Scotia (Table 1). This same pattern is evident for Staphylinidae and Carabidae (Klimaszewski et al. 2012, 2013). The northern territories and prairie provinces are the least invaded regions of the country.

It is difficult to determine when each adventive species arrived in Canada and became established, especially before the 1920s when insect survey and collection efforts in Canada were minimal. The date of first detection of a species in Canada only roughly approximates the true time of entry and establishment. However, the collections made by entomologists in the 19th century help to categorize some adventive species as old versus recent introductions. As well, palaeoentomological evidence generated through excavation of an old latrine site at Ferryland in southeastern NF, which dates back to the early 17th century (Bain and Prévost 2010), provides evidence that some species were introduced very early (before 1620) in the human colonization of Canada, e.g. *Oryzaephilus surinamensis* (Silvanidae), *Latridius minutus* (Latridiidae), and *Mycetaea subterranea* (Endomychidae), all of which are associated with stored food products. Two carrion-associated species, *Nitidula rufipes* (Nitidulidae) and *Omosita discoidea* (Nitidulidae), were established in northern Canada by 1819-1825 when they were collected by a naturalist during Sir John Franklin's first expedition in northern Canada (Kirby 1937). The collection locality, listed as 65° N, when overlaid on top of Franklin's route, corresponds to a locality in the Northwest Territories between 110°W to 114°W. Seven species were first collected in Canada from 1850-1874, 17 from 1875-1899, 17 from 1900-1924, 20 from 1925-1949, six from 1951-1974, seven from 1975-1999 and four thus far in the 21st century. The rate of first discovery of species peaked in the second quarter of the 20th century and has declined since then.

The site of first detection of an adventive species in Canada is presumed to be in the vicinity of the site of introduction and establishment. Almost half of the adventive Cucujoidea that were inadvertently introduced into Canada were detected in close proximity to the St. Lawrence River (28 spp.), near the shores of Lake Ontario (12 spp.), and in southern Ontario, near Lake Erie (4 spp.). Along the St. Lawrence River, the highest concentrations of first records were in Quebec City and vicinity (10 spp.), Montreal and vicinity (8 spp.), and Ottawa and vicinity (7 spp.). Five species were first detected in southeastern Newfoundland, near early settlements at St. John's and Ferryland. As well, six species associated with stored grains were first detected in Winnipeg, an important crossroads for the movement of grain from the prairies. Interestingly, no species were first detected in the Lower Mainland of British Columbia and only two species were first detected in the Victoria area, unlike for Staphylinidae and Carabidae where many species were introduced through southwestern British Columbia.

As with Staphylinidae, Carabidae, and adventive insects on woody plants (Langor et al. 2008, Klimaszewski et al. 2012, 2013), most adventive Cucujoidea originated in the Palaearctic and arrived in North America most likely through trade with European nations. *Nausibius clavicornis* (Silvanidae) has a Neotropical origin, *Aethina tumida* (Nitidulidae) originates in sub-Saharan Africa, and *Cartodere bifasciata* (Latridiidae) is Australian, although it is believed to have entered Canada via Europe. It is nearly impossible to ascertain which species were directly introduced into Canada from ports of origin and which were first established in the United States and then spread, by natural or human-assisted dispersal, to Canada. Of the 83 species inadvertently introduced into Canada, about 36 (43%) were first collected in the USA. Many of these may have arrived in Canada indirectly through spread from the south. In comparison, 67% of adventive carabids and 44% of adventive staphylinids were first collected in the USA and may have spread to Canada from there (Klimaszewski et al. 2012, 2013). Undoubtedly, some adventive species first arriving in Canada have subsequently spread to the USA. This underscores the continued need for a Canada-USA-Mexico collaboration for reducing adventive species introductions in North America and for combating spread and implementing management solutions for impactful species.

Finally, it is clear that there are taxonomic impediments to fully understanding the true extent of colonization of Canada by non-native beetle species. While the state of knowledge for well-known and conspicuous families such as Coccinellidae is excellent, some families containing large numbers of physically small species are inadequately studied taxonomically and distribution is poorly known. The state of knowledge of the diversity of Latridiidae and Cryptophagidae in Canada is especially poor, for both native and purportedly adventive species. There are many undescribed species, and modern keys to species are largely non-existent. Some species currently listed as adventive in Canada may in fact be Holarctic. Similarly, there may be yet-unidentified adventive species in our fauna. These two families need intensive taxonomic attention in Canada and the USA.

**Table 1.** Summary of the native and adventive Cucujoidea beetle fauna of Canada by province and territory.

| Family | Percent of fauna adventive [no. adventive spp./total no. species] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Total** | **YT** | **NT** | **NU** | **BC** | **AB** | **SK** | **MB** | **ON** | **QC** | **NB** | **NS** | **PE** | **LB** | **NF** |
| Byturidae | 0% [0/1] | 0% [0/1] | 0% [0/1] | - | 0% [0/1] | 0% [0/1] | 0% [0/1] | 0% [0/1] | 0% [0/1] | 0% [0/1] | 0% [0/1] | 0% [0/1] | 0% [0/1] | - | 0% [0/1] |
| Sphindidae | 0% [0/6] | - | - | - | 0% [0/2] | 0% [0/2] | - | 0% [0/4] | 0% [0/5] | 0% [0/5] | 0% [0/4] | 0% [0/3] | - | - | - |
| Biphyllidae | 0% [0/1] | - | - | - | - | - | - | - | 0% [0/1] | 0% [0/1] | 0% [0/1] | | - | - | - |
| Erotylidae | 3.6% [1/28] | - | - | - | 0% [0/5] | 0% [0/6] | 0% [0/5] | 0% [0/9] | 5.0% [1/20] | 5.3% [1/19] | 0% [0/10] | 0% [0/7] | 0% [0/2] | - | - |
| Monotomidae | 25.9% [7/27] | 0% [0/1] | - | - | 28.6% [4/14] | 37.5% [3/8] | 62.5% [5/8] | 25.0% [1/4] | 38.9% [7/18] | 38.5% [5/13] | 33.3% [3/9] | 37.5% [3/8] | 50.0% [1/2] | - | 60.0% [3/5] |
| Cryptophagidae | 31.3% 21/67 | 0% [0/2] | 0% [0/4] | 100% [1/1] | 23.4% [11/47] | 35.0% [7/20] | 37.5% [9/24] | 37.5% [6/16] | 50.0% [12/24] | 37.5% [12/32] | 57.1% [12/21] | 42.3% [11/26] | 42.9% [3/7] | 25.0% [2/8] | 26.7% [4/15] |
| Silvanidae | 37.5% 6/16 | - | 50.0% [1/2] | - | 57.1% [4/7] | 50.0% [3/6] | 60.0% [3/5] | 50.0% [4/8] | 38.5% [5/13] | 42.9% [6/14] | 57.1% [4/7] | 62.5% [5/8] | 100% [2/2] | - | 66.7% [2/3] |
| Cucujidae | 0% [0/8] | 0% [0/1] | 0% [0/1] | - | 0% [0/6] | 0% [0/2] | 0% [0/2] | 0% [0/3] | 0% [0/3] | 0% [0/3] | 0% [0/2] | 0% [0/1] | - | 0% [0/1] | 0% [0/1] |
| Passandridae | 0% [0/1] | - | - | - | - | - | - | - | 0% [0/1] | 0% [0/1] | - | - | - | - | - |
| Phalacridae | 0% [0/8] | - | - | - | 0% [0/3] | - | 0% [0/5] | 0% [0/3] | 0% [0/4] | 0% [0/3] | 0% [0/4] | 0% [0/3] | 0% [0/2] | 0% [0/1] | 0% [0/2] |
| Laemophloeidae | 23.1% [3/13] | - | - | - | 75.0% [3/4] | 100% [2/2] | 50.0% [3/6] | 42.9% [3/7] | 33.3% [3/9] | 27.3% [3/11] | 16.7% [1/6] | 37.5% [3/8] | 50.0% [1/2] | - | 50% [1/2] |
| Kateretidae | 25.0% [2/8] | 0% [0/1] | 50.0% [1/2] | - | 20.0% [1/5] | 50.0% [2/4] | 50.0% [2/4] | 66.7% [2/3] | 33.3% [2/6] | 33.3% [2/6] | 40.0% [2/5] | 66.7% [2/3] | 100% [1/1] | - | 50.0% [2/4] |
| Nitidulidae | 14.1% [14/99] | 7.7% [1/13] | 25.0% [2/8] | 0% [0/1] | 14.8% [9/61] | 9.3% [4/43] | 18.9% [7/37] | 15.2% [7/46] | 9.6% [8/63] | 13.6% [9/66] | 14.6% [7/48] | 17.9% [7/39] | 23.1% [3/13] | 50.0% [1/2] | 40.0% [4/10] |
| Botherideridae | 0% [0/4] | - | - | - | 0% [0/2] | - | - | - | 0% [0/2] | - | - | - | - | - | - |
| Cerylonidae | 12.5% [1/8] | - | 0% [0/1] | - | 0% [0/3] | 0% [0/2] | 0% [0/2] | 0% [0/1] | 16.7% [1/6] | 0% [0/4] | 0% [0/3] | 0% [0/3] | 0% [0/1] | - | 0% [0/2] |
| Endomychidae | 12.5% [2/16] | - | 0% [0/1] | - | 14.3% [1/7] | 0% [0/2] | 0% [0/2] | 0% [0/5] | 18.2% [2/11] | 11.1% [1/9] | 0% [0/6] | 16.7% [1/6] | 50.0% [1/2] | - | 50.0% [1/2] |
| Coccinellidae | 6.8% [11/162] | 3.3% [1/30] | 5.8% [2/35] | 0% [0/2] | 9.5% [9/95] | 4.8% [4/83] | 5.0% [4/80] | 6.1% [4/66] | 8.3% [7/84] | 9.8% [8/82] | 14.3% [6/42] | 16.3% [7/43] | 28.6% [6/21] | 27.2% [3/11] | 29.4% [5/17] |
| Corylophidae | 12.5% [2/16] | 0% [0/1] | 0% [0/2] | - | 28.6% [2/7] | 0% [0/4] | 0% [0/5] | 25.0% [1/4] | 10.0% [1/10] | 10.0% [1/10] | 0% [0/4] | 12.5% [1/8] | 0% [0/1] | - | - |
| Latridiidae | 35.6% [21/59] | 16.7% [1/6] | 0% [0/6] | - | 31.4% [11/35] | 50.0% [7/14] | 43.5% [10/23] | 57.1% [12/21] | 55.6% [15/27] | 50.0% [17/34] | 50.0% [13/26] | 56.7% [17/30] | 56.3% [9/16] | 75.0% [3/4] | 57.1% [8/14] |
| CUCUJOIDEA | 16.4% [90/548] | 5.4% [3/56] | 9.5% [6/63] | 25.0% [1/4] | 18.1% [55/304] | 16.1% [32/199] | 20.6% [43/209] | 19.9% [40/201] | 20.8% [64/308] | 20.7% [65/314] | 24.1% [48/199] | 28.9% [57/197] | 37.0% [27/73] | 33.3% [9/27] | 38.5% [30/78] |

## List of recorded adventive species in Canada

Family EROTYLIDAE Latreille
- Subfamily Cryptophilinae Casey
  - *Cryptophilus integer* (Heer)

Family MONOTOMIDAE Laporte
- Subfamily Rhizophaginae Redtenbacher
  - *Rhizophagus parallelocollis* Gyllenhal
- Subfamily Monotominae Laporte
  - *Monotoma bicolor* A. Villa & G.B. Villa
  - *Monotoma longicollis* (Gyllenhal)
  - *Monotoma picipes* Herbst
  - *Monotoma spinicollis* Aubé
  - *Monotoma quadrifoveolata* Aubé
  - *Monotoma testacea* Motschulsky

Family CRYPTOPHAGIDAE Kirby
- Subfamily Cryptophaginae Kirby
  - *Cryptophagus cellaris* (Scopoli)
  - *Cryptophagus distinguendus* Sturm
  - *Cryptophagus fallax* Balfour–Browne
  - *Cryptophagus laticollis* Lucas
  - *Cryptophagus obsoletus* Reitter
  - *Cryptophagus pilosus* Gyllenhal
  - *Cryptophagus saginatus* Sturm
  - *Cryptophagus scanicus* (Linnaeus)
  - *Cryptophagus scutellatus* Newman
  - *Cryptophagus subfumatus* Kraatz
  - *Henoticus serratus* (Gyllenhal)
  - *Pteryngium crenatum* (Gyllenhal)
  - *Telmatophilus typhae* (Fallén)
- Subfamily Atomariinae LeConte
  - *Atomaria apicalis* Erichson

*Atomaria fuscata* Schönherr
*Atomaria lederi* Johnson
*Atomaria lewisi* Reitter
*Atomaria pusilla* (Paykull)
*Atomaria testacea* Stephens
*Atomaria atrata* Reitter
*Ephistemus globulus* (Paykull)

Family SILVANIDAE Kirby
Subfamily Silvaninae Kirby
*Ahasverus advena* (Waltl)
*Nausibius clavicornis* (Kugelann)
*Oryzaephilus mercator* (Fauvel)
*Oryzaephilus surinamensis* (Linnaeus)
*Silvanoprus angusticollis* (Reitter)
*Silvanus bidentatus* (Fabricius)

Family LAEMOPHLOEIDAE Ganglbauer
*Cryptolestes ferrugineus* (Stephens)
*Cryptolestes pusillus* (Schönherr)
*Cryptolestes turcicus* (Grouvelle)

Family KATERETIDAE Kirby
*Brachypterolus pulicarius* (Linnaeus)
*Brachypterus urticae* (Fabricius)

Family NITIDULIDAE Latreille
Subfamily Carpophilinae Erichson
*Carpophilus hemipterus* (Linnaeus)
*Carpophilus dimidiatus* (Fabricius)
*Carpophilus mutilatus* Erichson
*Carpophilus marginellus* Motschulsky
Subfamily Meligethinae C.G. Thomson
*Acanthogethes fuscus* (Olivier)
*Brassicogethes viridescens* (Fabricius)
*Genisthogethes carinulatus* (Förster)
*Meligethes atratus* (Olivier)
Subfamily Nitidulinae Latreille
*Aethina tumida* Murray
*Nitidula carnaria* (Schaller)
*Nitidula rufipes* (Linnaeus)

*Omosita colon* (Linnaeus)
*Omosita discoidea* (Fabricius)
*Soronia grisea* (Linnaeus)

Family CERYLONIDAE Billberg
Subfamily Murmidiinae Jacquelin du Val
*Murmidius ovalis* (Beck)

Family ENDOMYCHIDAE Leach
Subfamily Anamorphinae Strohecker
*Symbiotes gibberosus* (Lucas)
Subfamily Mycetinae Jacquelin du Val
*Mycetaea subterranea* (Fabricius)

Family COCCINELLIDAE Latreille
Subfamily Coccinellinae Latreille
*Rhyzobius lophanthae* (Blaisdell)
*Adalia bipunctata* (Linnaeus)
*Aphidecta obliterata* (Linnaeus)
*Coccinella septempunctata* Linnaeus
*Coccinella undecimpunctata undecimpunctata* Linnaeus
*Harmonia axyridis* (Pallas)
*Hippodamia variegata* (Goeze)
*Propylaea quatuordecimpunctata* (Linnaeus)
Subfamily Symninae Mulsant
*Scymnus impexus* Mulsant
*Scymnus suturalis* Thunberg
*Stethorus punctillum* Weise

Family CORYLOPHIDAE LeConte
Subfamily Corylophinae LeConte
*Orthoperus atomus* (Gyllenhal)
*Sericoderus lateralis* (Gyllenhal)

Family LATRIDIIDAE Erichson
Subfamily Latridiinae Erichson
*Adistemia watsoni* (Wollaston)
*Cartodere bifasciata* (Reitter)
*Cartodere constricta* (Gyllenhal)
*Cartodere nodifer* (Westwood)
*Dienerella argus* (Reitter)

*Dienerella costulata* (Reitter)
*Dienerella filiformis* (Gyllenhal)
*Dienerella filum* (Aubé)
*Dienerella ruficollis* (Marsham)
*Enicmus histrio* Joy & Tomlin
*Latridius hirtus* Gyllenhal
*Latridius minutus* (Linnaeus)
*Stephostethus lardarius* (DeGeer)
*Stephostethus productus* Rosenhauer
*Thes bergrothi* (Reitter)

Subfamily Corticariinae Curtis
*Corticaria elongata* (Gyllenhal)
*Corticaria impressa* (Olivier)
*Corticaria pubescens* (Gyllenhal)
*Corticaria saginata* Mannerheim
*Corticaria serrata* (Paykull)
*Cortinicara gibbosa* (Herbst)

## Taxonomic review

**Family EROTYLIDAE** Latreille, 1802 [the pleasing fungus beetles; including Languriinae, Crotch 1873, the lizard beetles]

**Diagnosis.** Body length 2.0–10 mm, body shape narrowly elongate and parallel-sided, moderately flattened or slightly convex, usually glabrous and glossy, colour variable, dark or light brown, blue, red or green, some with dark or light spots; head and pronotum nearly equal in width; head elongate and retracted into thorax, usually with stridulatory file; eyes well developed and coarsely faceted; antennal club with three antennomeres, antennal insertions concealed in dorsal view; mandible without a deep cavity; pronotum with lateral margins simple, sometimes slightly crenulate, base of the disc sometimes with two small depressions; elytra often elongate and with well-defined epipleura and punctation random or seriate; abdomen with five freely articulate ventrites, basal ventrite equal in length to remaining ventrites; procoxae globose, their cavities open or closed; mesocoxal cavities closed laterally; tarsal formula 5-5-5.

**Subfamily CRYPTOPHILINAE** Casey

**1. *Cryptophilus integer*** (Heer)
(Fig. 1, Map 1)

**Diagnosis.** Body length 1.8-2.0 mm, narrowly oval, reddish-brown with dark brown legs; head with prominent eyes; antennae with elongate club, segments subquadrate to slightly transverse; pronotum strongly transverse, evenly arcuate laterally and slightly explanate, punctation large; elytra narrowly oval, with distinct striae except for scutellar region, intervals flat, with dense and decumbent pubescence.

**Native range.** Palaearctic; adventive in New Zealand (Downie and Arnett 1996, Klimaszewski et al. 2010).

**Distribution in Canada.** ON, QC (Bousquet et al. 2013).

**Distribution in USA.** AL, CA, FL, IN, LA, MS, PA, SC, TX (Downie and Arnett 1996).

**First Canadian records.** Chatham, ON in 1928; Hemmingford, QC in 1933 (LFC). Klimaszewski et al. (2010) reported a 1913 record from an unspecified Canadian locality.

**First North American records.** See above.

**Habitat data.** In Europe, this species is associated with decaying plant material (e.g., compost piles) where it is fungivorous (Ruta et al. 2011).

**Family MONOTOMIDAE Laporte, 1840** [the root-eating beetles]

**Diagnosis.** Body length 1.5–4.5 mm, slender, elongate, parallel-sided, sub-cylindrical to flattened, pubescence short and sparse or body glabrous, colour dull; head prognathous, usually constricted posteriorly, antennae with 10 antennomeres, and 1-2-articled club, labrum indistinct; pronotum subquadrate to elongate, with smooth or denticulate lateral margins; elytra truncate exposing tip of abdomen; abdomen with five visible sternites; procoxae usually globular and usually with hidden trochanters (exception *Rhizophagus*), their cavities closed behind; mesocoxae narrowly to widely separated, their cavities open laterally; tarsal formula usually 5-5-5 in females and 5-5-4 in males, although in a few species 5-5-5 or 4-4-4 in both sexes.

**Subfamily RHIZOPHAGINAE** Redtenbacher

**2. *Rhizophagus parallelocollis*** Gyllenhal
(Fig. 2, Map 2)

**Diagnosis.** Body subparallel, dark-reddish brown, glossy, length 3.0–4.3 mm; head with antennal groove on each side lateroventrally, tempora long; antenna appearing 10-segmented, club rounded apically and appearing one-segmented; antennomere III as long as antennomeres IV, V and VI combined; pronotum elongate with markedly impressed microsculpture, anterior angles of pronotum reflexed and somewhat protruded anteriorly; base of elytron without extra punctures at level of second interval; fore-coxal cavities transverse; metacoxal bead thickened and usually somewhat interrupted at level of trochanter; last abdominal ventrite without depression.

**Native range.** Palaearctic (Bousquet 1990b, Jelinek 2007b).

**Distribution in Canada.** BC, NF, NS, ON, QC (Bousquet 1990b, Majka and Bousquet 2010, Bousquet et al. 2013).

**Distribution in USA.** DC, IN, KY, MA, ME, NJ, NY, PA, RI, WA (Bousquet 1990b, Majka and Bousquet 2010).

**First Canadian records.** Toronto, ON in 1897; Montreal, QC in 1904; Creston, BC in 1938; and Waverley, NS in 1947 (Bousquet 1990b).

**First North American records.** New Bedford, MA in 1895 (Bousquet 1990b).

**Habitat data.** This species is recorded from subcortical environments in *Abies balsamea* L. Mill., and *Picea glauca* (Moench) Voss (Bousquet 1990b, Majka and Bousquet 2010). In Europe, it is known as the "graveyard beetle" because it is frequently found in graves, swarming on corpses in coffins where it is associated with dipteran larvae on which it may feed. The species is also found in fungi, soil, mammal nests, mould, plant refuse, old bones, and at sap (Bousquet 1990b, Majka and Bousquet 2010).

**Subfamily MONOTOMINAE** Laporte

**3. *Monotoma bicolor*** A. Villa & G.B. Villa
(Fig. 3, Map 3)

**Diagnosis.** Body narrowly oval, dark brown with reddish tinge, not glossy, length 1.9–2.5 mm, head and pronotum reddish-brown to piceous, distinctly darker than elytra, body dorsally covered with moderately dense setae; dorsum of head and pronotum with coarse, subcontiguous punctures; head without antennal grooves and without longitudinal impressions on frons, temples relatively long, 0.5–0.8 times length of longitudinal diameter of eye; antennomere III as long as antennomere II, antennal club 2-segmented; disc of pronotum with two shallow foveae in posterior half, sides more or less parallel to slightly rounded posteriorly, anterior angles roundly protruding; elytra with rows of paired punctures; fore-coxal cavities rounded; first abdominal ventrite longer than remaining ventrites, without coxal lines.

**Native range.** Palaearctic; adventive in Middle East, Australia, and New Zealand (Bousquet and Laplante 2000, Jelinek 2007b).

**Distribution in Canada.** BC, NB, ON, QC, SK (Bousquet and Laplante 2000, Majka and Bousquet 2010, Bousquet et al. 2013).

**Distribution in USA.** AR, AZ, CA, DC, IA, IL, IN, KS, KY, MA, ME, MI, NC, NH, NY, OH, OK, OR, PA, TN, VT, WI (Majka and Bousquet 2010).

**First Canadian records.** Montreal, QC in 1919; Salmon Arm and Vancouver, BC in 1932; Vineland Station, ON in 1937; and Drinkwater, SK in 1953 (Bousquet and Laplante 2000).

**First North American records.** New York, NY before 1855 (LeConte 1855, as *M. parallelum* LeConte).

**Habitat data.** This species is primarily found in decaying vegetable matter such as grass piles and barnyard litter (Peacock 1977, Bousquet and Laplante 2000).

**4. *Monotoma longicollis*** (Gyllenhal)
(Fig. 4, Map 4)

**Diagnosis.** Body length 1.4–1.9 mm, body dorsally covered with moderately dense setae; head without antennal grooves and without longitudinal impressions on frons, temples relatively short, 0.3–0.4 times length of longitudinal diameter of eye, head dorsally and pronotum with shallow punctures, irregularly spaced, not contiguous; antennal club 2-segmented; pronotum elongate, distinctly wider anteriorly, anterior angles protruding, the extremity rounded or blunt; elytra with rows of paired punctures; fore-coxal cavities rounded; first abdominal ventrite longer than remaining ventrites, without coxal lines.

**Native range.** Palaearctic; adventive in sub-Saharan Africa and Australia (Jelinek 2007b).

**Distribution in Canada.** AB, BC, NB, NF, NS, ON, QC, SK (Bousquet and Laplante 2000, Majka and Bousquet 2010, Bousquet et al. 2013). This constitutes the first report of this species from BC: 10 km south of Radium, 1987 (CNCI); Gabriola, 1988 (CNCI).

**Distribution in USA.** AL, AZ, CT, DC, FL, IL, IN, MA, ME, MN, MO, NC, NH, NV, NY, OK, VT, WI (Bousquet and Laplante 2000, Majka and Bousquet 2010).

**First Canadian records.** Montebello, QC in 1937 (Bousquet and Laplante 2000).

**First North American records.** DC before 1879 (Horn 1879).

**Habitat data.** This species was found in grass piles and stored wheat (Bousquet and Laplante 2000).

**5. *Monotoma picipes*** Herbst
(Fig. 5, Map 5)

**Diagnosis.** Body length 1.9–2.5 mm, body dorsally covered with moderately dense setae; head without antennal grooves, with pair of deep longitudinal impressions on frons, temples relatively short, 0.3–0.4 times length of longitudinal diameter of eye; antennal club 2-segmented; dorsal part of head and pronotum with coarse, subcontiguous punctures; pronotum wider near posterior angles, anterior angles protruding and posterior ones slightly angulate; elytra with rows of paired punctures; fore-coxal cavities rounded; first abdominal ventrite longer than remaining ventrites, without coxal lines.

**Native range.** Palaearctic (Jelinek 2007b); now cosmopolitan (Nikitsky 1986).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, ON, PE, QC, SK (Bousquet and Laplante 2000, Majka and Bousquet 2010, Bousquet et al. 2013).

**Distribution in USA.** AZ, CA, CO, CT, DC, FL, IL, IN, KY, LA, MA, ME, MI, MN, MO, NH, NM, NV, NY, OK, PA, TN, TX, VA, VT, WA, WI (Bousquet and Laplante 2000, Majka and Bousquet 2010).

**First Canadian records.** Winnipeg, MB in 1911; Montreal, QC in 1915 (CIUL); Prince Edward County, ON in 1917; French Lake, NB in 1928; and Royal Oak, BC in 1953 (UBC) (Bousquet and Laplante 2000).

**First North American records.** Boston, MA between 1675-1740 (Bain and King 2011).

**Habitat data.** In North America, this species was found in decaying vegetable matter, under bark of pine logs, in moss, seaweed, and occasionally occurs in association with ants (Bousquet and Laplante 2000).

**6. *Monotoma spinicollis*** Aubé
(Fig. 6, Map 6)

**Diagnosis.** Body length 2.0–2.6 mm, body dorsally covered with moderately dense and strong setae; head without antennal grooves and without longitudinal impressions on frons, temples moderately long, 0.5–0.6 times length of longitudinal diameter of eye; antennal club 2-segmented; dorsal part of head and pronotum with coarse, subcontiguous punctures; pronotum widest just behind middle, without impressions on disc, sides markedly rounded, anterior angles acutely protruding; elytra with rows

of paired punctures; fore-coxal cavities rounded; first abdominal ventrite longer than remaining ventrites, without coxal lines and without median depression in the male.

**Native range.** Palaearctic (Jelinek 2007b).

**Distribution in Canada.** ON, SK (Bousquet and Laplante 2000, Bousquet et al. 2013).

**Distribution in USA.** MA, OR (Hatch 1962, Bousquet and Laplante 2000).

**First Canadian records.** Mer Bleue, ON in 1980 (Bousquet and Laplante 2000).

**First North American records.** McMinnville, OR in 1941 (Hatch 1962).

**Habitat data.** This species is recorded from decaying vegetable matter (Peacock 1977).

### 7. *Monotoma quadrifoveolata* Aubé
(Fig. 7, Map 6)

**Diagnosis.** Body length 1.9–2.3 mm, body dorsally uniformly yellowish to reddish, covered with moderately dense setae; head without antennal grooves and without longitudinal impressions on frons, temples long, 1.2–1.5 times length of longitudinal diameter of eye, dorsal part of head and pronotum with coarse, subcontiguous punctures; antennal club 2-segmented; pronotum subquadrate to slightly elongate, disc with four deep impressions confluent into two longitudinal furrows, anterior angles of pronotum not protruding; elytra with rows of paired punctures; fore-coxal cavities rounded; first abdominal ventrite longer than remaining ventrites, without coxal lines, with slight, oval median depression in the male.

**Native range.** Palaearctic; now cosmopolitan (Nikitsky 1986, Jelinek 2007b).

**Distribution in Canada.** ON (Bousquet and Laplante 2000).

**Distribution in USA.** DC, IL, MN, NM, NY, PA (Bousquet and Laplante 2000).

**First Canadian records.** Tilbury, ON in 1967 (Bousquet and Laplante 2000). This is the only known collection locality for this species in Canada.

**First North American records.** DC before 1879 (Horn 1879).

**Habitat data.** This species is found in decaying vegetable matter (Peacock 1977).

**8. *Monotoma testacea*** Motschulsky
(Fig. 8, Map 7)

**Diagnosis.** Body length 1.8–2.2 mm, body more or less uniformly reddish-brown dorsally or elytra slightly paler than fore-body, dorsally covered with moderately dense and short yellowish setae, dorsal part of head and pronotum with coarse, subcontiguous punctures; head without antennal grooves and without longitudinal impressions on frons, temples moderately long, 0.6–0.8 times length of longitudinal diameter of eye; antennal club 2-segmented; pronotum with two very shallow, sometimes indistinct, impressions on anterior half of disc, anterior angles of pronotum slightly protruding, the extremity rounded; elytra with rows of paired punctures; fore-coxal cavities rounded; first abdominal ventrite longer than remaining ventrites, without coxal lines, with slight, oval median depression in the male.

**Native range.** Palaearctic; adventive in New Zealand (Bousquet and Laplante 2000, Jelinek 2007b).

**Distribution in Canada.** AB, ON, QC, SK (Bousquet et al. 2013).

**Distribution in USA.** AZ, CA, ID, IL, KS, MA, MD, NH, NY, OK, OR, TX (Bousquet and Laplante 2000).

**First Canadian records.** Montreal, QC in 1919; Drinkwater and Thrasher, SK in 1953; and New Dayton, AB in 1954 (Bousquet and Laplante 2000).

**First North American records.** CA before 1916 (Casey 1916).

**Habitat data.** Peacock (1977) recorded this species from decaying vegetable matter and granaries. In Canada, some specimens were collected in mill feeds and oat bins (Bousquet and Laplante 2000).

**Family CRYPTOPHAGIDAE** Kirby [the silken fungus beetles]

**Diagnosis.** Body length 0.8-5.2 mm, elongate and parallel sided and moderately flattened [Cryptophaginae] to ovoid and somewhat convex [Atomariinae], yellowish or reddish-brown to brown or black, pubescence variable, long or short, decumbent to erect, often with silky hairs; head with short neck which is retracted into thorax, mandible with well-developed molar but lacking mycangium or cavity; antennae 11-segmented with 3-segmented club (rarely with 1-2 segments), inserted into a small or

large exposed cavity; pronotum subquadrate to rounded with well-developed lateral carina, lateral margins with or without teeth, processes or angularities; elytra completely covering abdomen, punctation random or in poorly defined rows; abdomen with five freely articulated sternites, basal sternite longer than remaining sterna in genera treated here; procoxae rounded and separate with their cavities open or closed; mesocoxal cavities closed laterally by metasternum; tarsal formula 5-5-5 in females, in males 5-5-4 (Cryptophaginae) or 5-5-5 (Atomariinae).

**Subfamily CRYPTOPHAGINAE** Kirby

**9. *Cryptophagus cellaris*** (Scopoli)
(Fig. 9, Map 8)

**Diagnosis.** Body length 2.0-3.0 mm, elongate and parallel sided, yellowish-brown, fore-body dark brown; antennal club elongate, 3-segmented, antennomeres as long as wide; pronotum transverse, pronotal anterior callosities small, moderately thickened, prominent laterally, right angled posteriorly, lateral tooth at middle of side with side converging from tooth to base in a straight line, punctation moderately deep with punctures separated by 0.5-1.0 times the diameter of a puncture (Woodroffe and Coombs 1961, page 200, Fig. 26a); elytral pubescence with longer hairs obliquely raised and arranged in rows; aedeagus a single robust tube with base widened and flattened, apex narrowly forked, parameres somewhat globular at base, elongate and narrowly rounded near apex (Woodroffe and Coombs 1961, page 200, Figs. 26b, c).

This species differs from its other congeners by having large, but not prominent, hemispherical eyes, and two types of elytral pubescence that consist of small, decumbent setae and longer ones slightly raised and arranged in vertical rows.

**Native range.** Palaearctic origin; now cosmopolitan (Johnson et al. 2007).

**Distribution in Canada.** AB, BC, MB, ON, QC, SK (Downie and Arnett 1996, Bousquet et al. 2013). Although this species has previously been reported from an unspecified location in MB (Woodroffe and Coombs 1961), we could not locate a specimen from that province. We report this species for the first time from QC: Cap Rouge, 1861-1878 (CIUL); Lachine, 1929 (LFC), Lévis, 1880-1889 (CIUL), Montreal, 1915 (LFC), and Saguenay, 1879 (CIUL).

**Distribution in USA.** AZ, CA, CO, DC, FL, IA, IL, KS, MI, MN, MO, MT, NC, NJ, NV, NY, OR, PA, TN, UT, WA, WI, WY (Woodroffe and Coombs 1961, Downie and Arnett 1996).

**First Canadian records.** Cap Rouge, QC from 1861-1878 (CIUL); Saguenay, QC in 1879 (CIUL); Hastings County, ON in 1895 (CNCI); and Creston, BC in 1949 (UBC).

**First North American records.** Buffalo, NY, Detroit MI, and San Diego CA before 1889 (Fauvel 1889).

**Habitat data.** This species is recorded from Canadian cargo ships carrying wheat, flour, soybean meal, and beans (Aitken 1975, Bousquet 1990a). It is also found in products such as such as wheat, oats, barley, rice, bran, flour, bread, linseed fruit and dried fruit (Campbell et al. 1989).

**10. *Cryptophagus distinguendus*** Sturm
(Fig. 10, Map 9)

**Diagnosis.** Body length 1.6-2.2 mm, narrowly oval, uniformly brown or head and pronotum dark brown, elytra reddish-brown with darker spot near scutellum and alongside lateral margins in basal half of lateral margin; legs and antennae reddish-brown; eyes large and prominent; antennal club elongate, 3-segmented, two basal segments transverse; pronotum slightly transverse, anterior callosities very small, weakly thickened and not prominent laterally with posterior rim thickened into moderate tooth, lateral tooth at or behind middle of side, sides concave anterior to lateral tooth and convex behind lateral tooth (Woodroffe and Coombs 1961, page 191, Fig. 8a); punctures larger and deeper than those on elytra; elytral pubescence long and decumbent; aedeagus consists of a single robust tube with base widened and flattened, outer apical angles rounded with inner angle constricted into a tooth that faces medially, parameres short and broad, transversely truncate (Woodroffe and Coombs 1961, page 191, Figs. 8b, c).

The parameres of the male genitalia are distinctive for this species.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** BC (Casey 1924 [as *C. keeni*], Bousquet et al. 2013).

**Distribution in USA.** CA, NY, PA, WA (Woodroffe and Coombs 1961).

**First Canadian records.** Metlakatla, BC before 1924 (Casey 1924).

**First North American records.** As above.

**Habitat data.** This species is found in grain elevators, granaries, mills and bakeries, nests (birds, mammals and ants), haystacks, vegetable refuse, dried fruit, fungi, and stored food products (Hinton 1945, Campbell et al. 1989).

**Comments.** This species appears to have been introduced on separate occasions on the east and west coasts of North America.

**11. *Cryptophagus fallax*** Balfour–Browne
(Fig. 11, Map 10)

**Diagnosis.** Body length 2.2-3.3 mm, broadly oval and somewhat flattened, head and pronotum reddish-brown, elytra yellowish to reddish-brown, legs and antennae yellowish to reddish-brown; eyes large and slightly protruding; antennal club compact, 3-segmented, two basal segments transverse; pronotum slightly flattened, subquadrate, much narrower than elytra at base, anterior callosities large, prominent laterally, face upturned and expanded posteriorly, surface with a central shallow depression, lateral tooth near or slightly behind middle, sides nearly parallel or slightly angled at lateral tooth, punctures moderately coarse and dense (Woodroffe and Coombs 1961, page 193, Fig. 12a); elytra convex, with fine punctation and decumbent pubescence; aedeagus consists of a single robust tube with base widened and flattened, outer apical angles slightly concave laterally, parameres triangular, narrowly rounded at apex (Woodroffe and Coombs 1961, page 193, Figs. 12b, c).

The male genitalia are somewhat typical of the genus as a whole except that the endophallic orifice is located beneath the apodeme instead of within the aedeagus proper, the latter condition being typical of all the other species.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** NB, NS, PE (Bousquet et al 2013).

**Distribution in USA.** ME (Woodroffe and Coombs 1961, Downie and Arnett 1996, Majka and Langor 2010).

**First Canadian records.** Sable Island, NS in 1967 (Howden 1970).

**First North American records.** Mt. Desert Isle, ME before 1961 (Woodroffe and Coombs 1961).

**Habitat data.** Adult specimens collected in Canada were found in buildings on stored food products, except for two specimens collected on Sable Island in the nest

of an Ipswich Sparrow, *Passerculus sandwichensis princeps* (Gmelin) (Howden 1970, Majka and Langor 2010).

**12. *Cryptophagus laticollis*** Lucas
(Fig. 12, Map 10)

**Diagnosis.** Body length 1.8-2.0 mm, broadly oval, uniformly reddish-brown, upper body with sparse, large and coarse punctation, pubescence long and suberect; eyes small and conical; antennal club 3-segmented, two basal segments transverse; pronotum transverse, anterior callosities large, not prominent laterally and weakly thickened, blunt and broadly rounded apically, facing upwards, lateral tooth near or slightly behind middle, sides evenly rounded, punctation deep and dense, almost contiguous (Woodroffe and Coombs 1961, page 201, Fig. 28a); elytra convex, punctation fine, small, and shallowly impressed; aedeagus consists of a single robust tube with base sinuate, widest about middle, outer apical angles triangular and broadly rounded, parameres elongate triangular, broadly rounded at apex (Woodroffe and Coombs 1961, page 201, Figs. 28b, c).

**Native range.** Palaearctic; adventive in sub-Saharan Africa, the Orient, and Australia (Johnson et al. 2007).

**Distribution in Canada.** AB, BC, NS, SK (Majka and Langor 2010, Bousquet et al. 2013). Although previously reported from AB by Woodroffe and Coombs (1961), we could not locate a specimen from that province.

**Distribution in USA.** CA, OR, WA (Woodroffe and Coombs 1961).

**First Canadian records.** Royal Oaks, BC in 1953 (UBC); Fort Qu'Appelle, SK in 1966 (RSM); and Carleton, NS in 1993 (Majka and Langor 2010).

**First North American records.** North America (unspecified locality) before 1900 (Casey 1900).

**Habitat data.** It is found on stored produce and in vegetable refuse (Woodroffe and Coombs 1961).

**Comments.** Most records in North America are from the west. The record from NS likely represents a separate introduction event.

**13. *Cryptophagus obsoletus*** Reitter
(Fig. 13, Map 11)

**Diagnosis.** Body length 2.2-2.8 mm, subparallel, uniformly reddish-brown to blackish, elytra paler at shoulders and at apex in some reddish-brown specimens, legs dark brown, dorsum of body often blackish; pronotum transverse and almost as wide as elytra at base, anterior callosities moderate to small, not prominent laterally, strongly projecting anteriorly with posterior tooth, lateral tooth in posterior half, sides almost straight and parallel, punctation deep and dense, almost contiguous (Woodroffe and Coombs 1961, page 191, Fig. 7a); elytral punctation distinctly finer, shallower and sparser than pronotum; aedeagus consists of a single robust tube with base sinuate, widest at apical two-thirds, apical apodemes parallel, elongate, with oblique row of short setae, parameres elongate conical, broadly rounded at apex (Woodroffe and Coombs 1961, page 191, Figs. 7b, c).

This species differs from its congeners by: having single elytral pubescence, the anterior angles of the pronotum are protruding anteriorly, and the lateral margins of the pronotum are only slightly convergent anteriorly.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** ON, MB, SK. We report this species for the first time from MB and SK (numerous localities in each province; CNCI, UMAN, RSM).

**Distribution in USA.** IA, IL, NY, SD (Woodroffe and Coombs 1961, Downie and Arnett 1996).

**First Canadian records.** Hamilton, ON in 1931 (CNCI); Sperling, MB in 1954 (UMAN); and Corinne and Radville, SK in 1954 (CNCI).

**First North American records.** See above.

**Habitat data.** This species is a pest of stored food products, and it has also been found in produce and in an oak tree hole (Woodroffe and Coombs 1961, Downie and Arnett 1996).

**14. *Cryptophagus pilosus*** Gyllenhal
(Fig. 14, Map 12)

**Diagnosis.** Body length 2.0-3.2 mm, narrowly subparallel, uniformly dark brown, pronotum sometimes darker than elytra; pronotum transverse, as wide at middle as elytra at base, anterior callosities moderate to small, moderately prominent laterally and not projecting anteriorly, toothed posteriorly, lateral tooth near middle, sides

evenly angled to almost straight; punctation fine, separated by 0.5-1.0 times puncture diameter (Woodroffe and Coombs 1961, page 192, Fig. 9a); elytral punctation distinctly finer, shallower and sparser than pronotum; aedeagus consists of a single robust tube, base slightly sinuate, widest in apical two-thirds, apical apodemes elongate and slightly globose to broadly rounded apically, parameres triangular to somewhat conical, narrowly rounded at apex (Woodroffe and Coombs 1961, page 192, Figs. 9b, c).

This species is very variable, particularly in elytral pubescence, which may consist of only single short setae or double setae (one short and one long). Specimens with double elytral setae have anterior angles of pronotum pointed posteriorly and the lateral tooth is located near the middle of the side of the pronotum. Those with single pubescence resemble *C. obsoletus* from which they differ by having the lateral margins of the pronotum more convergent towards the base and by usually uniform reddish-brown elytral integument (Bousquet 1990a).

**Native range.** Palaearctic; adventive in sub-Saharan Africa and Australia (Johnson et al. 2007).

**Distribution in Canada.** BC, MB, NB, ON, QC, SK (Bousquet et al. 2013). Although previously reported from MB (Woodroffe and Coombs 1961), we could not locate a specimen from that province.

**Distribution in USA.** CA, CT, CO, DC, IA, ID, IL, IN, MI, MN, NJ, NY, OR, PA, VT, WA, WI (Woodroffe and Coombs 1961, Downie and Arnett 1996).

**First Canadian records.** Sudbury, ON in 1892 (CNCI); Montreal, QC in 1916 (LFC); Vernon and Wellington, BC in 1946 (UBC); and Punnichy, SK in 1963 (RSM).

**First North American record.** See above.

**Habitat data.** This species is found on stored vegetables, grain, bulbs, and vegetable refuse (Woodroffe and Coombs 1961, Downie and Arnett 1996).

### 15. *Cryptophagus saginatus* Sturm
(Fig. 15, Map 13)

**Diagnosis.** Body length 2.0-2.8 mm, narrowly oval, uniformly reddish-brown, forebody strongly punctate; pronotum slightly transverse, evenly rounded, anterior callosities moderate in size, not prominent anteriorly or laterally, weakly thickened without posterior tooth, lateral tooth is located at the middle of the side of the pronotum, sides evenly rounded, punctation deep and moderately dense (Woodroffe and Coombs 1961,

page 198, Fig. 20a); elytral punctation distinctly shallower, smaller and sparser than pronotum; aedeagus consists of a single robust tube, base moderately sinuate, widest in apical two-thirds, apical apodemes elongate and slightly globose to broadly rounded apically, preputial sac acuminate apically, parameres elongate triangular to conical, narrowly rounded at apex (Woodroffe and Coombs 1961, page 198, Figs. 20b, c).

*Cryptophagus saginatus* may be distinguished from its congeners by the shape of the frontal pronotal angles, and single elytral pubescence. It may be sometimes confused with *C. scutellatus* and *C. subfumatus*. It differs from *C. scutellatus* by its body length exceeding 1.9 mm, and in having denser pronotal punctation separated by one-half to three-quarters of their diameter. It differs from *C. subfumatus* in having the anterior angles of the pronotum not prominently extended anteriorly, and the lateral tooth is located at the middle of the side of the pronotum.

**Native range.** Palaearctic; adventive in Australia and the Neotropical Region (Johnson et al. 2007).

**Distribution in Canada.** AB, BC, NB, ON, QC, SK (Bousquet et al. 2013). We report this species for the first time from AB (five localities; CNCI), NB (Odell Park, Fredericton; Currie Mountain, Douglas; C.F.B. Gagetown; RWC) and QC (Roberval; LFC).

**Distribution in USA.** AK, CA, CT, CO, IA, ID, IL, MA, MN, NH, NY, OH, OR, PA, WA (Woodroffe and Coombs 1961, Downie and Arnett 1996).

**First Canadian records.** Trenton, ON in 1896 (CNCI); Roberval, QC in 1939 (LFC); St. John's, NL in 1949 (ACNL); Exshaw, AB in 1959 (CNCI); and Radium, BC in 1985 (CNC).

**First North American records.** SC (unspecified locality) before 1889 (Fauvel 1889).

**Habitat data.** In Great Britain, this is one of the commonest species indoors and is also abundant in the wild (Coombs and Woodroffe 1955). This species is found on stored grain produce and vegetable refuse (Woodroffe and Coombs 1961, Downie and Arnett 1996), and has been recorded on Canadian cargo ships carrying soybeans and meal (Aitken 1975).

**16. *Cryptophagus scanicus*** (Linnaeus)
(Fig. 16, Map 14)

**Diagnosis.** Body length 2.2-2.8 mm, narrowly oval, black with reddish humeral patches or reddish-brown mottled with dark brown patches; pronotum strongly transverse and broadest apically, anterior callosities large, almost one-quarter length of side, prominent

laterally but not anteriorly, strongly thickened, somewhat rounded posteriorly, lateral tooth near middle, sides concave anteriorly of lateral tooth and almost straight basally, punctation deep and dense, almost contiguous (Woodroffe and Coombs 1961, page 206, Fig. 44a); elytral punctation shallower and sparser than on pronotum; aedeagus consists of a single robust tube, base moderately sinuate, widest in apical two-thirds, apical apodemes slightly globose basally and narrowly rounded apically, parameres broadly triangular converging strongly in apical three-quarters to form a narrowly rounded, somewhat elongate apex (Woodroffe and Coombs 1961, page 206, Figs. 44b, c).

This species differs from other congeners in having single elytral pubescence, anterior angles of pronotum not drawn out posteriorly, and dorsal part of the body is bicolorous with head and pronotum reddish and elytra darker, often blackish, with the exception of the humeral region. Uniformly reddish specimens are known from Europe, but in North America only bicolorous specimens have been found (Bousquet 1990a).

**Native range.** Palaearctic; may be adventive to sub-Saharan Africa (Johnson et al. 2007).

**Distribution in Canada.** NF (Woodroffe and Coombs 1961, Bousquet et al. 2013).

**Distribution in USA.** No known records.

**First Canadian records.** St. John's, NF in 1949 (Woodroffe and Combs 1961; ACNL).

**First North American records.** As above.

**Habitat data.** It Europe, this species is found in various habitats including stored produce (Woodroffe and Combs 1961).

### 17. *Cryptophagus scutellatus* Newman
(Fig. 17, Map 14)

**Diagnosis.** Body length 1.5-1.9 mm, narrowly subparallel, reddish-brown with forebody darker; pronotum slightly tranverse, almost quadrate, anterior callosities small, slightly prominent laterally and anteriorly, weakly thickened and angled posteriorly, lateral tooth in apical half, sides deeply concave anterior of lateral tooth and slightly rounded to base, punctation small, somewhat shallow and sparse (Woodroffe and Coombs 1961, page 194, Fig. 13a); elytral punctation similar to pronotum but somewhat more sparse; aedeagus consists of a single robust tube, base moderately sinuate, widest in apical two-thirds, apical apodemes globose basally and obliquely truncate apically, parameres broadly triangular to oval, broadly rounded at apex (Woodroffe and Coombs 1961, page 194, Figs. 13b, c).

This species is readily distinguishable from its congeners in having single elytral pubescence, small body size, and sparse pronotal punctation with punctures separated by at least their diameter. The shape of the pronotum is also distinctive.

**Native range.** Palaearctic (Woodroffe and Coombs 1961).

**Distribution in Canada.** ON, QC (Woodroffe and Coombs 1961, Bousquet et al. 2013). This species is newly recorded from QC: Saint-Jacques-de-Leeds, 1993 (LFC).

**Distribution in USA.** CT, PA, WA (Woodroffe and Coombs 1961, Downie and Arnett 1996).

**First Canadian records.** Britannia, ON in 1928 (CNCI).

**First North American records.** WA before 1961 (Hatch 1962).

**Habitat data.** This species is a pest of stored grain and produce (Woodroffe and Coombs 1961, Downie and Arnett 1996).

**Comments.** Given the disjunct distribution of this species in North America, it appears that there may have been separate introduction events on the east and west coasts.

**18. *Cryptophagus subfumatus*** Kraatz
(Fig. 18, Map 15)

**Diagnosis.** Body length 2.0-3.0 mm, broadly elongate, almost uniformly reddish-brown, pubescence single and yellow; pronotum distinctly transverse, anterior callosities very large, almost one-third length of side, prominent laterally and projecting strongly anteriorly, strongly thickened and angulate posteriorly, lateral tooth at middle, pronotum sides evenly rounded, punctation moderately deep and moderately dense (Woodroffe and Coombs 1961, page 202, Fig. 30a); elytral punctation distinctly finer, shallower and sparser than that on pronotum; aedeagus consists of a single robust tube, base moderately sinuate, widest in apical two-thirds, apical apodemes globose basally and broadly rounded apically, parameres somewhat quadrate with apical medial corner slightly extended and narrowly rounded (Woodroffe and Coombs 1961, page 202, Figs. 30b, c).

This species differs from its congeners in having a single elytral pubescence and in the shape of the pronotum.

**Native range.** Palaearctic; adventive in neotropics (Johnson et al. 2007).

**Distribution in Canada.** AB, BC, NB, ON, QC, SK (Downie and Arnett 1996, Bousquet et al. 2013). This species is newly recorded from NB (Acadia Research Forest, Cranberry Lake PNA, Dionne Brook PNA; RWC). Hatch (1962) recorded this species from northwestern BC but we could not locate a specimen or specific locality record.

**Distribution in USA.** AL, AR, AZ, FL, ID, IL, ME, MI, NH, NY, OH, WA (Woodroffe and Coombs 1961, Downie and Arnett 1996).

**First Canadian records.** Hastings County, ON in 1897 (CNCI); Montreal, QC in 1915 (LFC); and Lethbridge, AB in 1924 (CNCI).

**First North American records.** As above; earliest records from USA unknown.

**Habitat data.** Woodroffe and Coombs (1961) noted that *C. subfumatus* is usually found on dried fruit in Europe and on grain in North America. It is also found in buildings on grain and dried fruit in North America (Downie and Arnett 1996).

**19. *Henoticus serratus*** (Gyllenhal)
(Figs. 19, 104a, b, Map 16)

**Diagnosis.** Body length 1.7-2.3 mm, narrowly subparallel, reddish-brown to blackish, sparsely covered with yellow setae, legs usually paler; eyes large and protuberant; pronotum transverse and convex, sides evenly arcuate with 8-10 fine teeth that become obsolete towards the obtuse hind angles, base with a deep, smooth, transverse impression, punctation deep, relatively small, circular to oval, moderately dense, separated by 1.0-1.5 times diameter of a puncture; elytra slightly wider than pronotum and obtusely rounded apically, converging slightly anteriorly, punctures foveate, shallow, tending to be closer together than pronotal punctures; aedeagus consists of a single dorso-ventrally flattened tube, base moderately sinuate, widest in apical one-third, apical apodemes widest basally, narrowing apically into a narrow point, bifurcate at apex, parameres narrowly conical, gradually narrowing, broadly round at apex (Figs. 104a, b).

This species is readily distinguished from its congeners by the distinct shape of the pronotum.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** AB, BC, LB, MB, NB, NF, NS, ON, QC, SK. This species is newly recorded from AB (several localities; CNCI) and LB (Charlottetown; MUN).

**Distribution in USA.** Widely distributed.

**First Canadian records.** Sudbury, ON in 1890 (CNCI); Montreal, QC in 1899 (UMAN); Wellington, BC in 1946 (MUN); and South Branch and Woody Point, NF in 1949 (MUN).

**First North American records.** AK, CA, MA, NH, PA before 1894 (Hamilton 1894).

**Habitat data.** Adults in Atlantic Canada were collected in wild habitats such as red spruce (*Picea rubens* Sarg.) and red oak (*Quercus rubra* L.) forests (Majka and Langor 2010, Webster et al. 2012). Blatchley (1910) reported it from dry fungi. Bousquet (1990a) noted that adults of *Henoticus* are usually found in leaf litter, fungi, under bark of dead or dying trees, and on leaves of trees and shrubs.

**Comments.** It is uncertain whether this species is palaearctic and adventive or holarctic (Bousquet et al. 2013).

**20. *Pteryngium crenatum*** (Gyllenhal)
(Figs. 20, 105a, b, Map 17)

**Diagnosis.** Body length 1.7-2.1 mm, narrowly subparallel, fore-body reddish-brown and elytra yellowish-brown with some brownish patches or entirely rufo-testaceous, surface glossy, pubescence obscure and decumbent; head distinctly punctate, punctures deep, round and moderately dense; eyes small and flat; pronotum transverse, sides evenly and finely serrated, base with two small fovea not connected by basal transverse impression, punctation of disk moderately deep, somewhat foveate, moderately dense; elytra punctation similar to pronotum, slightly more foveate and strigulose between punctures; aedeagus consists of a single robust tube, base moderately sinuate in basal one-third, more or less equal in width basally and apically, lateral apical apodemes broadly round and blunt, median apical apodeme sharply pointed, a fourth ventral, flattened, pointed apodeme present, parameres elongate oval, narrowly rounded at apex with several accessory setae at apex and laterally (Figs. 105a, b).

This species is readily distinguished from congeners by its small body size, body shape and coloration, subquadrate segments of the antennal club, large eyes and evenly arcuate lateral margins of the pronotum.

**Native range.** Western palaearctic (Johnson et al. 2007).

**Distribution in Canada.** AB, BC, QC, NB, NS. This species is newly reported from AB (Cypress Hills; CNCI).

**Distribution in USA.** IN, NH, OR, WA (Downie and Arnett 1996, Chandler 2001).

**First Canadian records.** Quebec, QC in 1934 (CNCI); Garibaldi Park, BC in 1953 (CNCI); Cypress Hills, AB in 1964 (CNCI); and Lunenburg, NS in 1997 (NSM).

**First North American records.** North America (unspecified locality) before 1900 (Casey 1900).

**Habitat data.** In NS, all specimens were collected in coniferous forests, and most of them were found on bracket fungi (Polyporaceae) (Majka and Langor 2010). In NB, adults were captured using Lindgren funnel traps deployed in old-growth forests of various types (Webster et al. 2012).

**Comments.** The disjunct distribution of this species in North America suggests probable separate introduction events on the east and west coasts.

**21. *Telmatophilus typhae*** (Fallén)
(Fig. 21, Map 18)

**Diagnosis.** Body length 1.6-1.8 mm, narrowly subparallel, uniformly black with reddish-brown legs, body finely and densely punctate, pubescence decumbent and yellow-to-gray; eyes prominent; antennal club 3-segmented, basal segment subquadrate and second one transverse; pronotum transverse, lateral margins evenly arcuate, slightly more strongly converging basally, and minutely serrated laterally; elytra long and subparallel, basal punctures small and deep, anterior edges slightly raised, separated by about one times their diameter, becoming shallower, smaller and more diffuse towards apex; aedeagus conists of a single robust tube, cylindrical, subapical flanges triangular and wide, apex triangular and drawn out to a sharp point, lacking accessory structures (Hoebeke and Wheeler 2000, page 399, Fig. 3).

This species differs from the North American *Telmatophilus americanus* LeConte by its smaller body size, unmodified metatibia in males, a shallow depression at the apex of the fifth abdominal sternite, and a relatively simple aedeagus.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** NB, NS, ON, PE (Bousquet et al. 2013).

**Distribution in USA.** Not known from the USA.

**First Canadian records.** Weston, ON in 1978 (DEBU) and Conrad Island, NS in 1986 (NSM).

**First North American records.** As above.

**Habitat data.** In North America, it is found on the male flowers of cattails, *Typha latifolia* L. and *T. angustifolia* L. (Typhaceae) (Majka et al. 2010).

**Subfamily ATOMARIINAE** LeConte

The taxonomy of North American species of *Atomaria* is very poorly known and it is difficult to identify material with certainty. Records of *Atomaria* from Canada should therefore be treated with caution until there is a revision of the genus. All of the species treated here have uncertain origins; they may be palaearctic or holarctic.

**22. *Atomaria (Anchicera) apicalis*** Erichson
(Fig. 22, Map 19)

**Diagnosis.** Body length 1.3-1.6 mm, narrowly oval, strongly convex, coloration variable, reddish-brown with elytra slightly gradually paler apically or piceous to castaneous or rarely black, punctation of elytra similar to that of pronotum or finer and shallower but always less dense; antennomere I swollen, almost cylindrical, not noticeably widened apically, equal in length to antennomere II, antennomeres VI-XI distinctly transverse; pronotal margins arcuate and strongly converging apically, base almost straight, slightly sinuate; elytra oval, sides in basal half diverging in almost straight lines, suddenly and strongly converging in apical half; aedeagus consists of a single robust tube, oblong-oval, widest in basal half and converging apically, apical margin drawn out out into a broad truncate tooth, parameres fused into a broadly rounded, flattened flange with lateral edges upturned and folded medially, base formed by a moderately robust, highly divergent forked spicule (Majka et al. 2010, page 44, Fig. 12.1).

This species is highly variable in colour and form; however, it can be distinguished from other *Atomaria* spp. by the shape and form of the pronotum, and the form of the basal antennomeres.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** MB, NB, NF, NS, QC (Bousquet et al. 2013).

**Distribution in USA.** CT, IA, IN, MA, MS, NH, NY (Majka et al. 2010 and references therein).

**First Canadian records.** Aweme, MB in 1912 (CNCI) and Bridgewater, NS in 1965 (Majka et al. 2010).

**First North American records.** North America (unspecified locality) before 1889 (Fauvel 1889); and IN (unspecified locality) before 1910 (Blatchley 1910).

**Habitat data.** This is a grassland species that has been recorded around farms, gardens, parks, and in refuse, cut vegetation, grass compost, dung, flood debris, carrion, and rotting fungi (Johnson 1993).

### 23. *Atomaria (Anchicera) fuscata* Schönherr
(Fig. 23, Map 20)

**Diagnosis.** Body length 1.4-1.7 mm, broadly oval, dark red-brown castaneous, pronotum and head sometimes darker than elytra, legs reddish or reddish-testaceous; antennomere I enlarged, longer and wider than the cylindrical antennomere II, antennomere III longer and narrower than antennomere II, antennomere X about three times wider than antennomere IX, making the club appear abrupt and distinct; pronotum widest at middle, lateral margin broadening from base to about half the length of side and then rapidly converging apically, forming angular edges in middle of lateral margins, base of disc with transverse impression, pronotal punctures moderately fine and dense apically becoming progressively coarser and denser basally; elytral punctures fine and sparse, punctures separated by more than two times puncture diameter; aedeagus consists of a single robust tube, cylindrical, base and apex broadly rounded, apex heavily sclerotized and minutely punctured, parameres fused into a broadly rounded, flattened flange, apex heavily sclerotized and minutely punctured, apical edge with many short setae, base formed by a very robust, highly divergent forked spicule (Majka et al. 2010, page 44, Fig. 12.3).

This species can be distinguished from other *Atomaria* species by the more-or-less uniform red-brown colour, the form of the antennal segments, and the form of the pronotum.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** AB, LB, MB, NB, NF NS, NU, ON, PE, QC, SK (Bousquet et al. 2013). This species is reported for the first time from AB (Eureka River, Touchwood Lake; NOFC) and NU (Turquetil Lake; DEBU).

**Distribution in USA.** DC, ID, IN, MA, MD, MI, NH, NY, OR, PA, RI, VA, WA, WI (Majka et al. 2010 and references therein).

**First Canadian records.** Ottawa, ON before 1900 (Casey 1900, as *A saginata*); Yorkton, SK in 1947 (RSM); Piccadilly and St. Barbe, NF in 1949 (MZH); and Chester, NS in 1960 (NSM; Majka et al. 2010).

**First North American records.** As above.

**Habitat data.** In Atlantic Canada, it was collected in mixed and coniferous forests, pastures, blueberry and potato fields, hedgerows, in coastal dunes, on beaches under drift, by freshwater ponds, and in compost (Majka et al. 2010). In Alberta, it was collected in natural forest in window traps attached to dead *Populus* (NOFC). Hatch (1962) reported this species as very common on herbage and in grass clippings, compost, leaf litter, and humus. Johnson (1993) reported it from grasslands, wetlands, and woodlands in litter, moss, flood debris, cut vegetation and compost.

**24. *Atomaria (Anchicera) lederi*** Johnson
(Fig. 24, Map 21)

**Diagnosis.** Body length 1.2-1.4 mm, narrowly oval and robust, reddish-testaceous, fore-body sometimes darker, head, pronotum and elytra moderately coarsely and densely punctate; antennomere I enlarged, cylindrical, antennomere II similar to antennomere I in size and form, antennomeres III and V similar to each other in size and shape, slightly shorter and narrower than antennomere II; antennomeres IX and X somewhat elongate-quadrate, the club appearing more gradually enlarged; pronotum widest at middle, evenly arcuate laterally, slightly more converging to apex than to base; aedeagus consists of a single robust tube, base slightly sinuate, gradually divergent towards apex, apical margin transverse, parameres fused into a shallowly bilobed, flattened flange, base a broadly triangular shield, basal margin broadly rounded (Majka et al. 2010, page 44, Fig. 12.4).

This species is distinguished from congeners by a more robust body form, a unique form of the basal antennomeres, a more gradual antennal club, and very distinctive male genitalia.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** NS (Bousquet et al. 2013).

**Distribution in USA.** No known records.

**First Canadian records.** Bridgewater, NS in 1965 (NSM; Majka et al. 2010).

**First North American records.** As above.

**Habitat data.** The species is reported in Nova Scotia mainly from mixed red spruce and eastern hemlock, *Tsuga canadensis* (L.) Carr., forests of various ages, and occasionally in boggy areas on *Spiraea alba* Duroi and balsam fir, *Abies balsamea* (L.) (Majka et al. 2010).

**25. *Atomaria (Anchicera) lewisi*** Reitter
(Fig. 25, Map 22)

**Diagnosis.** Body length 1.5-2.0 mm, narrowly oval, entirely brownish-yellow or reddish-brown, head, pronotum and elytra densely punctate, punctures moderately large, setae long, prominent and erect - giving a "bristling" appearance - particularly on elytra; antennomere I curved, long and enlarged at apex, 1.5-2.0 times the width at base, antennomere II about two-thirds as long as antennomere I, antennomere III subequal in length to antennomere II but narrower, antennomeres IV-VIII robust, subquadrate, almost as wide as long, antennomeres IX and X distinctly transverse; pronotum widest at middle, evenly arcuate laterally and apically, basal margin with strong bead; aedeagus consists of a single robust tube, lateral margin slightly sinuate, narrowest at middle and widest at base, apical margin obliquely transverse with moderately large median subquadrate, blunt tooth, parameres fused into a flattened flange, apex broadly rounded with lateral edges upraised and turned inwards, base formed by a robust, highly divergent forked spicule with angulate spines on each side of the basal apodeme where the forks diverge (Majka et al. 2010, page 44, Fig. 12.5).

This species can be readily distinguished from congeners by the form of the antennomeres and by the distinct aedeagus.

**Native range.** Palaearctic; now cosmopolitan (Johnson et al. 2007).

**Distribution in Canada.** NB, NS, ON, QC (Bousquet et al. 2013).

**Distribution in USA.** CT, MA (Majka et al. 2010 and references therein).

**First Canadian records.** Ottawa, ON before 1900 (Casey 1900, under synonymic *A. curtula*); Ridgeway, ON before 1900 (DEBU); Berthierville, QC in 1932 (LFC); and St. Andrew's, NB in 1978 (DEBU).

**First North American records.** CT (unspecified locality) before1920 (Leng 1920 [as *A. curtula*], Majka et al. 2010).

**Habitat data.** In NS, it has been found in coniferous and mixed forests, in boggy areas, on *Crataegus* sp. (Rosaceae), and in compost (Majka et al. 2010). Johnson (1993) considers it as a grassland species in Europe where it has been recorded around farms, gardens and parks, and also in other habitats such as heaps of refuse, cut vegetation, hay, grass and compost.

**26. *Atomaria (Anchicera) pusilla*** (Paykull)
(Fig. 26, Map 23)

**Diagnosis.** Body length 1.0-1.2 mm, narrowly oval and rounded posteriorly, reddish-yellow or reddish-brown throughout but legs sometimes more yellow; head finely and sparsely punctate; antennomere I sub-cylindrical, about two times as long as wide, not expanded at apex, antennomere II similar in form to antennomere I but slightly shorter and narrower, antennomere III similar in form to antennomere II but slightly shorter and narrower, antennomere VIII spherical, smaller than antennomere VII and much smaller than antennomere IX; antennomeres IX and X distinctly transverse, club appearing abrupt and distinct; pronotum widest at middle, strongly converging apically and slightly converging basally; aedeagus consists of a single robust tube, cylindrical; base wider than apex, converging slightly at middle, basal and apical margins broadly rounded, apex heavily sclerotized and minutely punctured, parameres fused into a broadly rounded, flattened flange, apex heavily sclerotized and minutely punctured, base goblet-shaped with basal margin broadly round to truncate (Majka et al. 2010, page 44, Fig. 12.6).

This is the smallest species of *Atomaria* in the Nearctic region.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** BC, NB, NS ON, QC, SK (Bousquet et al. 2013). This species is reported for the first time from ON (several localities; DEBU and CNCI) and SK (Morse; RSM).

**Distribution in USA.** AK, CT, ID, IN, NY, OH, OR, WA (Majka et al. 2010 and references therein).

**First Canadian records.** Vineland, ON in 1930 (DEBU); Quebec, QC in 1938 (LFC); Creston, BC in 1952 (UBC); and Acadiaville, NS in 1929 (ACNS).

**First North American records.** IN (five counties) before 1910 (Blatchley 1910).

**Habitat data.** In NB, it was found in coniferous forest on a decaying gill fungus (Majka et al. 2010). Johnson (1993) regarded it as a grassland species in Europe, found around farms and gardens, collected from heaps of refuse, cut vegetation, hay, grass and compost. Blatchley (1910) reported it from a border of sphagnum marsh and in other damp vegetable debris.

### 27. *Atomaria (Anchicera) testacea* Stephens
(Fig. 27, Map 24)

**Diagnosis.** Body length 1.3-1.6 mm, narrowly oval, elytra slightly pointed apically, head and pronotum piceous, elytra piceous basally and reddish-brown posteriorly, legs and antennae dark testaceous; head finely and moderately sparsely punctate; antennomere I enlarged, slightly curved and widened at apex, antennomere II somewhat triangular, half as long as antennomere I, rounded and expanded at apex, antennomere III similar in form to antennomere II but slightly narrower, antennomere VII slightly wider apically than antennomeres VI and VIII, antennomeres IX-XI transverse; pronotum widest at middle, strongly converging apically and slightly converging basally, base of disc with narrow transverse impression; elytra widest in basal half, slightly sinuate laterally and converging posteriorly; aedeagus consists of a single robust tube, oblong-oval, widest in basal half and converging apically, apical margin drawn out into a broad point, parameres fused into a broadly rounded, flattened flange with lateral edges upturned and folded medially, base formed by a moderately robust, highly divergent forked spicule (Majka et al. 2010, page 44, Fig. 12.7).

The aedeagus of *A. testacea* is similar in form to that of *A. apicalis*, the difference being that for *A. testacea* the apical margin is much more narrowly rounded and comes to a distinct point, whereas for *A. apicalis* it is more broadly rounded and not pointed.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** NB, NS, QC (Bousquet et al. 2013).

**Distribution in USA.** CA (Leng 1920, under synonym *A. ruficornis* Marsham).

**First Canadian records.** Montreal, QC in 1937 (LFC) and St. Andrews, NB in 1978 (DEBU).

**First North American records.** Southern CA before 1920 (Leng 1920, under synonym *A. ruficornis* Marsham).

**Habitat data.** This species was recorded in Atlantic Canada from red spruce forests, boggy areas, marshes, pastures, fields, meadows, open areas, on beaches under wrack, in a ravine, and in compost (Majka et al. 2010). Johnson (1993) reported it as a grassland species in Europe as it is found around farms, gardens and parks, but it has also been collected from heaps of refuse, especially cut vegetation, grass, hay, haystack bottoms, compost, and dung.

**28.** ***Atomaria (Atomaria) atrata*** Reitter
(Fig. 28, Map 25)

**Diagnosis.** Body length 1.6-1.8 mm, narrowly oval, piceous, elytra sometimes paler near humeral angles, legs sometimes lighter, rarely contrasting, head and pronotum coarsely, deeply punctured, punctures separated by 1.0-1.5 times puncture diameter, elytra similarly punctured at base, becoming finer and sparser towards apex, pubescence moderately long, coarse and decumbent; antennomere I enlarged, curved and widened at apex, antennomere II somewhat cylindrical, half as long as antennomere I, rounded and somewhat expanded at apex, antennomere III similar in form to antennomere II but slightly narrower, antennomere VII slightly wider apically than antennomeres VI and VIII, antennomeres IX-VII almost quadrate; pronotum widest at middle, evenly arcuate on sides and converging from middle more strongly apically than basally, appearing somewhat quadrate; aedeagus consists of a single robust tube, sub-cylindrical, widest near base and converging apically, apical margin widely bilobed; parameres fused into an angulate, broadly pointed, flattened flange with many accessory setae along apical edge, base formed by a robust, highly divergent forked spicule, basal apodeme broadly widened.

**Native range.** Palaearctic (Johnson et al. 2007).

**Distribution in Canada.** BC? (Bousquet et al. 2013). Although reported from BC, we have not been able to find a specimen or a specific locality record. This species was previously identified from AB but we were unable to re-examine this material as it is on loan. We will therefore not add this as a new jurisdictional record.

**Distribution in USA.** Unknown.

**First Canadian records.** Unknown.

**First North American records.** Unknown.

**Habitat data.** Unknown in North America.

**Comments.** As specimens or locality records could not be found, we are doubtful that this species is present in Canada. Its presence in the USA is also doubtful.

**29. *Ephistemus globulus*** (Paykull)
(Figs. 29, 106a, b, Map 26)

**Diagnosis.** Body length 1.0-1.3 mm, oval, strongly convex and glossy, without punctures or pubescence; black or piceous black, legs reddish or yellow, posterior part of elytra sometimes reddish-brown; pronotum transverse, sides evenly curved, basal margin oblique laterally and pointed medially; elytra oval and rounded at apex; metasternum very long, almost as long as entire abdomen; aedeagus consists of a single robust tube, widest at base and slightly tapering towards the broadly rounded, pointed apex, two elongate and highly sclerotized apodemes present, base with a slender basal apophysis that is approximately one-half the length of the apical tube, parameres fused at apex into a robust, quadrate shield (Figs. 106a, b).

In habitus this species resembles the family Leiodidae, except that in *Ephistemus* the antennae are elongate and the head is partially visible from above.

**Native range.** Palaearctic; adventive in Australia (Johnson et al. 2007).

**Distribution in Canada.** BC, ON (Bousquet et al. 2013).

**Distribution in USA.** ID, IN, NY, OR, WA (Downie and Arnett 1996).

**First Canadian records.** Vineland, ON in 1930 (DEBU) and Cowichan and Royal Oak, BC in 1953 (UBC).

**First North American records.** As above.

**Habitat data.** In BC, it was found commonly in grass clippings (Hatch 1962).

**Comments.** The disjunct distribution of this species in North America suggests two separate introduction events, one in the east and one in the west.

**Family SILVANIDAE** Kirby [the silvanid flat bark beetles]

**Diagnosis.** Body length 2.0-15 mm, usually strongly dorso-ventrally flattened, elongate-oval or parallel-sided, brown to blackish, sometimes with a pattern, pubescence usually conspicuous; head large, constricted behind eyes, labrum small, broadly rounded; antenna with 11 antennomeres, filiform, with elongate scape and an inconspicuous club, or moderately elongate, with a short scape and distinct club; pronotum transverse to elongate, usually constricted basally and often with lateral spines or teeth; elytra usually completely covering abdomen, with broad epipleural fold, with longitudinal punctate striae; abdomen with five visible sternites, sutures entire; procoxae round, narrowly to broadly separated, their cavities open or closed posteriorly; mesocoxae round, broadly to narrowly separated and with cavities open laterally; metacoxae transverse; tarsal formula 5-5-5.

**Subfamily SILVANINAE** Kirby

**30.** ***Ahasverus advena*** (Waltl)
(Fig. 30, Map 27)

**Diagnosis.** Body length 1.8-2.2 mm, body narrowly ovate, markedly convex dorsally; head with short temple, base of mandible with dorsal setose pit (mycangium); antenna with club, antennomere X about as wide as XI, antennomere XI acuminate apically; lateral edges of pronotum simple, not clearly dentate or undulate, anterior angle of pronotum lobed; fore-coxal cavities closed posteriorly; tarsomere III lobed; intercoxal process of first abdominal ventrite rounded anteriorly; femoral line on first abdominal ventrite open.

**Native range.** Likely palaearctic in origin but now cosmopolitan (Halstead et al. 2007).

**Distribution in Canada.** AB, BC, MB, NS, ON, PE, QC, SK (Bousquet et al. 2013).

**Distribution in USA.** MA, ME, NH (Majka 2008) but likely throughout the USA.

**First Canadian records.** Quebec City, QC in ~1860 (Bain 1999); Vineland, ON in 1930 (DEBU); Edmonton, AB in 1942 (CNCI); and Creston, BC in 1949 (UBC).

**First North American records.** North America (unspecified locality) before 1854 (LeConte 1854).

**Habitat data.** This species feeds on surface moulds such as *Penicillium glaucoma* and *Aspergillus* sp., and it has been found on mouldy copra, lima beans, pigeon peas, stored grain, fruit, nuts, corn, dried pears, cereals, damp flour, rice, figs, apples, coffee beans, mouldy grass, cured ham, heated wheat, triticale, stored oats, and decaying soybeans (Campbell et al. 1989, Thomas 1993).

**Comments.** Campbell et al. (1989) give a detailed summary of its biology.

**31. *Nausibius clavicornis*** (Kugelann)
(Fig. 31, Map 28)

**Diagnosis.** Body length 3.2-4.5 mm, narrow and subparallel, dark brown to blackish, legs reddish to reddish-black, pubescence dense and decumbent; fore-body densely punctate; head ventrally without antennal cavities, base of mandible with dorsal setose pit (mycangium); antennae lacking pronounced club; pronotum subquadrate, with a distinctly less densely punctate area medially and with a crescent-shape depression basally, lateral edges undulate; fore-coxal cavities closed posteriorly; tarsal formula 5-5-5 in both sexes, tarsomere I longer than tarsomere II, tarsomere III not lobed.

**Native range.** Originally neotropical; now cosmopolitan (Thomas 1993).

**Distribution in Canada.** NB, NS, ON, QC (Bousquet et al. 2013).

**Distribution in USA.** CA, FL, MA, MD, NC, NY, PA, SC, TX (Downie and Arnett 1996, Bain 1998).

**First Canadian records.** Cap Rouge, QC from 1861-1878 (CIUL); Ridgeway, ON before 1900 (DEBU); and Saint John, NB in 1902 (NBM).

**First North American records.** Boston, MA in ~1670 (Bain 1998).

**Habitat data.** This species is found in subcortical habitats and old bees' nests, and is also associated with stored food products such as rice, dried apples, ginger, cassia, and raw yellow-crystal sugar (Thomas 1993).

**Comments.** In the collections examined, only two records of this species were found in recent history, both in NS in 1968 and 2008. It seems that this species is rarely collected in Canada.

**32. *Oryzaephilus mercator*** (Fauvel)
(Fig. 32, Map 29)

**Diagnosis.** Body length 2.4-3.4 mm, narrowly elongate, reddish-brown; head with temples short, length of temple less than one-third longitudinal diameter of eye, base of mandible with dorsal setose pit (mycangium); antenna with club; pronotum elongate, lateral edges with six moderately to strongly acute, large teeth; fore-coxal cavities closed posteriorly; males have spine-like projection on posterior margin of hind trochanter and the upper margin of hind femur, females luck such projections, tarsal formula 5-5-5 in both sexes.

**Native range.** Palaearctic; now cosmopolitan (Halstead et al. 2007).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, NT, ON, PE, QC, SK (Loschiavo and Smith 1970, Bousquet et al. 2013).

**Distribution in USA.** Widely distributed.

**First Canadian records.** Edmonton, AB in 1925; Vernon, BC in 1931; Winnipeg, MB in 1936; Quebec, QC in 1937 (LFC); Toronto, ON in 1939; Saint John, NB in 1946 (CNCI); and Stoughton, SK in 1944 (Loschiavo and Smith 1970).

**First North American records.** Boston, MA in ~1670 (Bain 1998) and 1675-1740 (Bain and King 2011).

**Habitat data.** The species occurs in heated food-storage premises across Canada (Bousquet 1990a). It is considered a common household pest in Canada (Majka 2008). Adults and larvae feed on cereal products, particularly those with high oil content such as oatmeal, bran, shelled sunflower seeds, rolled oats, and brown rice (Loschiavo and Smith 1970, Loschiavo 1976, Campbell et al. 1989).

**Comments.** Campbell et al. (1989) give a detailed summary of its biology.

**33. *Oryzaephilus surinamensis*** (Linnaeus)
(Fig. 33, Map 30)

**Diagnosis.** Body length 1.9-3.0 mm, narrowly elongate, dark reddish-brown; head with temple length at least half longitudinal diameter of eye, base of mandible with

dorsal setose pit (mycangium); antenna with club; pronotum elongate, lateral edges with six moderately-to-strongly acute, large teeth; fore-coxal cavities closed posteriorly; males have spine-like projection on posterior margin of hind trochanter and the upper margin of hind femur, females lack such projections, tarsal formula 5-5-5 in both sexes.

**Native range.** Palaearctic; now cosmopolitan (Halstead et al. 2007).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, ON, QC, SK (Bousquet et al. 2013).

**Distribution in USA.** Widespread.

**First Canadian records.** Ferryland, NF in ~1620 (Prévost and Bain 2007); Cap Rouge, QC from 1861-1878 (CIUL); Saint John, NB in 1902 (NBM); Picton, ON in 1909 (CNCI); Aweme, MB in 1920 (UMAN); and Victoria, BC in 1923 (CNCI).

**First North American records.** As above.

**Habitat data.** In Canada, this species is a serious pest of stored grain, and occurs mainly in granaries, grain elevators, and flour mills (Bousquet 1990a). It has been recorded from dried fruit, copra, nuts, and carob (Thomas 1993). Adults and larvae attack damaged grain and processed cereals. Its presence in household products is incidental (Loschiavo and Sabourin 1982).

**Comments.** Campbell et al. (1989) give a detailed summary of its biology.

**34. *Silvanoprus angusticollis*** (Reitter)
(Fig. 34, Map 30)

**Diagnosis.** Body length 2.5-3.1 mm, narrowly elongate, brown to reddish-brown with paler legs; head with temples virtually absent, mandible with dorsal setose pit (mycangium), eyes large and coarsely faceted; antenna with distinct club; pronotum elongate, lateral edge sinuate before anterior angle, anterior angle large and acute; fore-coxal cavities closed posteriorly; femoral line on first abdominal ventrite closed; tarsomere III lobed beneath.

**Native range.** Eastern palaearctic and oriental (Halstead et al. 2007).

**Distribution in Canada.** QC (Bousquet et al. 2013).

**Distribution in USA.** MD?, WV (Downie and Arnett 1996).

**First Canadian records.** Varennes, QC in 1991 (C. Chantal, personal communication).

**First North American records.** As above.

**Habitat data.** In Asia, this species was found in stored food products (Downie and Arnett 1996).

**35. *Silvanus bidentatus*** (Fabricius)
(Fig. 35, Map 31)

**Diagnosis.** Body length 2.5-3.5 mm, narrowly elongate, dark reddish-brown; head with temple about as long as two eye facets, mandible with dorsal setose pit (mycangium); antenna with club; pronotum narrowly elongate, narrowest at base, sides arcuate and converging basally, disc with deep lateral longitudinal foveae, well-defined from base to apex, anterior angle large and acute; fore-coxal cavities closed posteriorly; femoral line on first abdominal ventrite closed; tarsomere III not lobed.

**Native range.** Palaearctic; now almost cosmopolitan (Halstead et al. 2007).

**Distribution in Canada.** BC, MB, NB, NS, ON, QC (Bousquet et al. 2013). This species is reported for the first time from MB (Twp. 3, Rge. 17, east of first meridian; CNCI).

**Distribution in USA.** CA, ME, NH, NY, RI, TX (Downie and Arnett 1996, Majka 2008). Probably widespread in the United States.

**First Canadian records.** Cap Rouge, QC from 1861-1878 (CIUL); Trenton, ON in 1889 (CNCI); Fredericton, NB in 1928 (CNCI); Creston and Mission City, BC in 1932 (UBC).

**First North American records.** "Middle and southern states" before 1854 (LeConte 1854).

**Habitat data.** Species of *Silvanus* are found under the bark of logs and in dead trees where they are at least partially fungivorous (Thomas 1993). In NS, this species has been found most frequently under the bark of logs and dead trees in an old deciduous forest, in red spruce forests of different ages, in old-growth hemlock forest, in mixed eastern hemlock/balsam fir/black spruce forest, and under the bark of *Picea rubens* and *Pinus strobus* (Majka 2008). It is found most frequently in coniferous forests (Majka 2008).

**Family LAEMOPHLOEIDAE** Ganglbauer [the lined flat bark beetles]

**Diagnosis.** Body length 1.0-5.0 mm, usually strongly flattened (rarely sub-cylindrical), ovate to elongate, brown to black but sometimes bicoloured or maculate, pubescence usually inconspicuous; head mostly large, broadest across eyes, disc usually bordered by carinate or grooved sublateral lines; antenna with 11 (rarely 10) antennomeres, mostly filiform (rarely moniliform), with modified scape in males, and a poor-to-well defined club; pronotum quadrate to elongate, usually constricted basally and with disc bordered by carinate or grooved sublateral lines; elytra often with cells and humeral carina, epipleural fold moderate to broad; abdomen with five visible sternites, sutures entire; procoxae obliquely transverse, their cavities open or closed posteriorly; mesocoxae globular, broadly separated and with cavities mostly open laterally; metacoxae transverse, cavities moderately to broadly separated; tarsal formula 5-5-4 or 5-5-5 (males), 5-5-5 (females).

**36. *Cryptolestes ferrugineus*** (Stephens)
(Fig. 36, Map 32)

**Diagnosis.** Body length 1.8-2.2 mm, compressed dorso-ventrally, colour yellowish, reddish-brown or rufo-testaceous; head with lateral carina on each side of frons that is not extended transversly near the posterior margin of head; labrum rounded anteriorly, male with mandibles expanded laterally near base; antennae elongate, without distinct club; pronotum broadened apically, with sublateral carinated lines, disc without depressions; elytra with second interval enclosing four rows of setae; intercoxal process of first abdominal ventrite broadly rounded anteriorly.

**Native range.** Palaearctic; likely adventive in sub-Saharan Africa (Wegrzynowicz 2007).

**Distribution in Canada.** AB, BC, MB, NF, NS, ON, PE, QC, SK (Bousquet et al. 2013).

**Distribution in USA.** AK, CA, FL, LA (Klimaszewski et al. 2010); probably distributed throughout the United States.

**First Canadian records.** Winnipeg, MB in 1924 (CNCI); Fort William and Goderich, ON in 1932 (CNCI); Pontiac, QC in 1932 (LFC); Carmichael, SK in 1941 (UMAN); Vancouver, BC in 1957 (UBC); St. John's, NF in 1965 (CNCI).

**First North American records.** North America (unspecified locality) before 1863 (LeConte 1863).

**Habitat data.** This species is the most serious pest of stored grain, particularly of wheat, in Canada (Watters 1955, Sinha 1961, Bousquet 1990a). It became a major pest of stored grain in western Canada during 1939-1944 (Rilett 1949). It is found in granaries, grain elevators, and mills, where adults and larvae feed on the germ of the grain kernel. In tropical and subtropical regions, it infests oilseeds and cocoa beans (Howe and Lefkovitch 1957).

**Comments.** Campbell et al. (1989) give a detailed summary of its biology.

**37. *Cryptolestes pusillus*** (Schönherr)
(Fig. 37, Map 33)

**Diagnosis.** Body length 1.5-1.9 mm, compressed dorso-ventrally, reddish-brown; head with lateral carina on each side of frons extended transversly near the posterior margin of head, labrum rounded anteriorly, male with mandibles expanded laterally; antennae elongate, without distinct club; pronotum subquadrate in shape, with sublateral carinated lines, disc without depressions; elytra with second interval enclosing four rows of setae; intercoxal process of first abdominal ventrite broadly rounded anteriorly.

**Native range.** Likely palaearctic origin; now cosmopolitan (Wegrzynowicz 2007).

**Distribution in Canada.** BC, MB, NB, NS, ON, QC, SK (Bousquet et al. 2013).

**Distribution in USA.** ME (Majka 2008); probably throughout the United States.

**First Canadian records.** Winnipeg, MB in 1924 (CNCI); Vancouver, BC in 1930 (UBC); and Mary's Point, NB in 1988 (Majka 2008).

**First North American records.** CA before 1854 (LeConte 1854, as *Laemophloeus puberulus*).

**Habitat data.** This species is recorded from many countries, particularly those in wet-tropical and warm-temperate regions of the world. In Canada, the species can survive winter conditions only in a heated environment and, therefore, it is found mainly in grain elevators and flour mills feeding on damaged grain, preferably wheat (Bousquet 1990a).

**Comments.** This species was often confused in the past with *C. turcicus*. It is considered a minor pest. Campbell et al. (1989) give a detailed summary of its biology.

**38. *Cryptolestes turcicus*** (Grouvelle)
(Fig. 38, Map 34)

**Diagnosis.** Body length 1.9-2.2 mm, compressed dorso-ventrally, colour rufo-testaceous, finely punctate and pubescent; head with lateral carina on each side of frons extended transversly near the posterior margin of head, labrum rounded anteriorly; antennae elongate, without distinct club; pronotum approximately subquadrate with basal constriction, with sublateral carinated lines, lateral edges even, disc without depressions; elytra with second interval enclosing three rows of setae; intercoxal process of first abdominal ventrite broadly rounded anteriorly.

**Native range.** Palaearctic; now cosmopolitan (Wegrzynowicz 2007).

**Distribution in Canada.** AB, BC, MB, NS, ON, QC, SK (Bousquet et al. 2013). Although previously recorded from AB, we were unable to locate a specimen or specific locality record.

**Distribution in USA.** NH (Majka 2008); probably throughout the United States.

**First Canadian records.** Danville, QC in 1911 (CNCI); Vancouver, BC in 1930 (UBC); Keewatin, ON in 1938 (UMAN); Homewood and Oakbank, MB in 1961 (UMAN); and Dartmouth, NS in 1986 (NSM).

**First North American records.** MI before 1884 (Casey 1884, as *Laemophloeus truncatus* Casey).

**Habitat data.** This species is a notorious pest in flour and feed mills in temperate regions. It is found in grain elevators and warehouses in Canada (Smith 1962, 1965). Aitken (1975) recorded the species in Canadian cargo ships carrying wheat. Chang and Loschiavo (1971) showed that the development of this species is favoured by the presence of fungi in its diet.

**Comments.** Campbell et al. (1989) give a detailed summary of its biology.

**Family KATERETIDAE** Kirby [the kateretid beetles]

**Diagnosis.** Body length 1.5-12.0 mm, elongate oval, depressed, pale to piceous; head prognathous and much narrower than pronotum, eyes large and with large facets; antennae with 11 antennomeres, last three forming a feeble club; pronotum slightly narrower than elytra; elytra truncate posteriorly exposing pygidium and at least one

abdominal tergite, epipleura narrow, scutellum large and usually triangular; procoxal cavities open behind; tarsal formula 5-5-5 or 4-4-4.

**39. *Brachypterolus pulicarius*** (Linnaeus)
(Fig. 39, Map 35)

**Diagnosis.** Body length 1.8-2.5 mm, oval and convex, body dark brown to black, legs from light brown to piceous, integument moderately glossy and densely punctate, pubescence dense and long, brown or grey; pronotum strongly transverse with sides strongly converging apically; elytra short, exposing at least three posterior tergites, scutellum large.

**Native range.** Palaearctic (Jelinek 2007a).

**Distribution in Canada.** AB, MB, NB, NF, NS, ON, PE, QC, SK (Bousquet et al. 2013).

**Distribution in USA.** South to PA and west to IA; also in CO, ID, MT, NY, OR, SD, UT, WA, WI, WY (Majka and Cline 2006a, Klimaszewski et al. 2010).

**First Canadian records.** Onah, MB in 1920 (CNCI); Fredericton, NB in 1921 (CNCI); Prince Edward Co., ON in 1922 (CNCI); QC (three localities) in 1927 (CNCI); Red Deer, AB in 1946 (CNCI); Mortlach, SK in 1951 (CNCI); and NF (three localities) in 1965 (CNCI).

**First North American records.** Keene Valley, NY in 1918 (Parsons 1943).

**Habitat data.** This species is found on various flowers and is associated with *Linaria* (Scrophulariaceae) and *Fragaria* (Rosaceae) species (Parson 1943, Downie and Arnett 1996). In the Maritime Provinces, it is found on herbaceous vegetation in different open habitats (Majka and Cline 2006a).

**40. *Brachypterus urticae*** (Fabricius)
(Fig. 40, Map 36)

**Diagnosis.** Body length 1.5-2.0 mm, form convex, body piceous black or brownish with brassy tinge, legs reddish-brown to dark brown; integument glossy, sparsely pubescent and moderately punctate; pronotum about twice as wide as long, broadest at middle and strongly converging apically, sides arcuate and sinuate before base or almost parallel, punctures slightly finer than those of elytra; elytra exposing 1-2 apical tergites.

**Native range.** Palaearctic (Jelinek 2007a).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, NT, ON, QC, SK (Bousquet et al. 2013). Although previously reported from NF, we could not locate a specimen or published locality record.

**Distribution in USA.** This species is recorded along the Atlantic seaboard south to the Great Smoky Mountains National Park in NC and TN, and west to MO, IA, and WI; also in CO, WA, CA, and AK (Majka and Cline 2006a).

**First Canadian records.** Cap Rouge, QC from 1861-1878 (CIUL); NT (unspecified locality) in 1879 (CNCI); Prince Edward Co., ON in 1899 (CNCI); Chilliwack River, BC in 1901 (CNCI); Aweme, MB in 1903 (UMAN); Beaver Lake, AB in 1907 (CNCI); Saskatoon, SK in 1907 (CNCI); and Amherst, NS in 1994 (NSNR).

**First North American records.** Atlantic states (unspecified localities) before 1843 (Erichson 1843) and before 1879 (Horn 1879).

**Habitat data.** This species is associated with nettle, *Urtica dioica* L. (Urticaceae) (Hamilton 1894).

**Comments.** The widespread distribution of this species by the late 19th and early 20th centuries suggests that it had been in Canada for a long time previous to that.

**Family NITIDULIDAE** Latreille [the sap beetles]

**Diagnosis.** Body length 1.5-12.0 mm, narrowly-to-broadly oval, or narrowly subparallel, flattened, usually glabrous but sometimes with short and sparse pubescence or bristles, glossy to matte, pale to black with red or yellow markings; head prognathous with surface smooth, punctate or rugose, usually abruptly constricted behind eyes; antennae with an abrupt and spherical club, usually comprised of three antennomeres; pronotum with lateral borders explanate and arcuate; elytra usually short, truncate and exposing some apical tergites or entirely covering abdomen; procoxae transverse with exposed troachantins, procoxal cavities transverse and open or closed; mesosternum short, sometimes carinate, mesocoxal cavites closed; metasternum large and broad, with cavities closed; tarsal formula 4-4-4 or 5-5-5, tarsomeres dilated, with pads or setae beneath, tarsomere IV minute and V elongate.

**Subfamily CARPOPHILINAE** Erichson

**41. *Carpophilus hemipterus*** (Linnaeus)
(Fig. 41, Map 37)

**Diagnosis.** Body length 2.4-4.0 mm, brownish-black to brown with paler legs and two paler, usually yellowish, humeral and triangular apical spots, head and thorax sparsely punctate and elytra densely so; pronotum one-third wider than long; elytra with posterior margin shallowly V-shaped, two apical tergites exposed; males with sixth abdominal sternite exposed and the apical margin of preceeding one deeply emarginated, females have the sixth abdominal sternite concealed and the apical margin of preceeding one truncate.

**Native range.** Likely palaearctic origin; now cosmopolitan (Jelinek and Audisio 2007).

**Distribution in Canada.** AB, BC, MB, NB, ON, QC, SK (Bousquet et al. 2013). This species is recorded for the first time from SK (near Maple Creek; David J. Larson, personal communication).

**Distribution in USA.** AK, CA, CO, FL, ID, IL, IN, KS, MA, NC, NY, OH, OR, TX, WA (Parsons 1943, Downie and Arnett 1996, Majka et al. 2008).

**First Canadian records.** Lévis, QC from 1880-1889 (CIUL); London, ON likely before 1900 (DEBU); Winnipeg, MB in 1921 (CNCI); Kelowna, BC in 1939 (CNCI); and Calgary, AB in 1958 (CNCI).

**First North American records.** Boston, MA before 1670 (Bain 1998).

**Habitat data.** This species may be found on a wide variety of fruits. Adults and larvae feed on the flesh of fruit, particularly when contaminated by fungi, including yeast. The species has also been found in all kinds of dried fruit and sometimes in cereals, oilseeds, and other derivatives (Bousquet 1990a).

**42. *Carpophilus dimidiatus*** (Fabricius)
(Fig. 42, Map 38)

**Diagnosis.** Body length 2.0-3.5 mm, subparallel, piceous to testaceous with elytra usually testaceous or slightly paler than pronotum, integument moderately glossy; pronotum

about 1.5 times as wide as long, sides slightly curved in apical one-third, straight to base; elytra exposing 1-2 tergites, elytral punctures sparse, much finer that those of pronotum.

**Native range.** Likely palaearctic origin; now cosmopolitan (Jelinek and Audisio 2007).

**Distribution in Canada.** BC, MB, NB ON, QC, SK (Bousquet et al. 2013). Although previously recorded from BC, we were unable to locate a specimen or published locality record.

**Distribution in USA.** Most of the continental USA (Parsons 1943).

**First Canadian records.** Lévis, QC from 1880-1889 (CIUL); Toronto, ON in 1940 (DEBU); and Saint John, NB in 1940 (UMAN).

**First North American records.** As above.

**Habitat data.** Adults may be found on overripe fruit (Westcott et al. 2006, Klimaszewski et al. 2010).

**Comments.** This species is abundant in temperate and tropical regions of the world (Parsons 1943, Downie and Arnett 1996).

**43. *Carpophilus mutilatus*** Erichson
(Fig. 43, Map 39)

**Diagnosis.** Body length 2.3-3.3 mm, narrowly subparallel, dark brown to pale ferruginous-brown, elytra usually paler but with suture and sides darker, integument moderately glossy, pubescence golden except for black at apical sides of elytra; pronotum moderately transverse, apical margin truncate, base bisinuate with obtuse angles, surface alutaceous except for punctated variable median strip; elytra broadest in apical one-third, usually exposing two apical tergites, posterior margin of each elytron oblique forming broadly V-shaped angle medially.

**Native range.** Origin uncertain; now cosmopolitan (Jelinek and Audisio 2007).

**Distribution in Canada.** BC (Bousquet et al. 2013). Although recorded from southeastern BC by Hatch (1962), we could not locate a specimen or specific locality record.

**Distribution in USA.** Broadly distributed across the USA (Downie and Arnett 1996).

**First Canadian records.** Southeastern BC before 1962 (Hatch 1962).

**First North American records.** Unknown.

**Habitat data.** This species is a pest of stored food products (Downie and Arnett 1996).

**Comments.** Until specimens from Canada can be located and authoritatively identified, this record should be considered tentative.

**44. *Carpophilus marginellus*** Motschulsky
(Fig. 44, Map 40)

**Diagnosis.** Body length 2.7-3.0 mm, broadly subparallel, piceous brown, sometimes with a reddish tinge, venter paler, integument glossy; head moderately punctate; pronotum about 1.5 times as wide as long, sides subparallel basally and arcuately narrowed in front, hind angles well defined, disc coarsely and sparsely punctate with median basal impunctate line; elytra usually exposing two apical tergites, posterior margins angular and broadly V-shaped, at base slightly more finely punctate than pronotum.

**Native range.** Palaearctic origin; now cosmopolitan (Jelinek and Audisio 2007).

**Distribution in Canada.** MB, NB, NS, ON, PE, QC, SK (Bousquet et al. 2013).

**Distribution in USA.** CA, FL, GA, NH, NJ, NV, VT (Downie and Arnett 1996, Chandler 2001, Majka and Cline 2006a).

**First Canadian records.** Prince Edward Co., ON in 1944 (CNCI); Winkler, MB in 1964 (CNCI); and L'Islet, QC in 1980 (CIQ).

**First North American records.** Mobile, AL before 1910 (Fall 1910).

**Habitat data.** This species is associated with dried stored food products (Majka and Cline 2006a). In Canada, specimens from PE were found in food storerooms of hotels, and in NS, specimens were found in a food processing facility (Majka and Cline 2006a). In Great Britain and Scandinavia, it moved and adapted from dried products to outdoor environments such as compost heaps (Hammond 1974, Ødegaard and Tømmeråls 2000) In Australia, it has colonized peach and nectarine orchards (James et al. 2000).

**Subfamily MELIGETHINAE** C.G. Thomson

**45. *Acanthogethes fuscus*** (Olivier)
(Fig. 45)

**Diagnosis.** Body length 2.0-2.4 mm, short and broadly oval, dark brown with paler legs and posterior elytra, basal and scuteller part of elytra dark brown, integument densely and finely punctate and with short and dense pubescence; pronotum with sides arcuate, strongly converging apically from middle of disc; elytra short, about one-seventh longer than wide, rounded apically, abdomen not exposed.

**Native range.** Palaearctic (Bousquet et al. 2013). Jelinek and Audisio (2007) do not record this species from the nearctic.

**Distribution in Canada.** NF (Bousquet et al. 2013).

**Distribution in USA.** No known records.

**First Canadian records.** South coast of NF before 1879 (as *Meligethes pinguis* 1879).

**First North American records.** As above.

**Habitat data.** In Europe, larvae are associated with the flowers of Cistaceae (Audisio 1993).

**Comments.** This species was described on the basis of one specimen from the south coast of NF (Horn 1879) which now resides in the J.L. LeConte collection at the Museum of Comparative Zoology, Harvard University. Parsons (1943) stated that the specimen falls within the range of variation of *A. fuscus*. No additional specimens have been collected in Canada since, so the establishment of this species is uncertain. As larvae of this species are associated with flowers of Cistaceae (Audisio 1993), future searches for this species in NF should focus on sampling golden heather, *Hudsonia ericoides* L., which is the only member of this plant family on the island. This plant does occur in coastal habitats but is rare in NF. It seems unlikely *A. fuscus* would have success in finding patches of this host after introduction. Audisio (2002) reasoned that this specimen likely was mislabelled by the collector, L. Reiche. We therefore remove this species from the faunal list for NF and for Canada.

**46. *Brassicogethes viridescens*** (Fabricius)
(Fig. 46, Map 41)

**Diagnosis.** Body length 2.0-2.4 mm, narrowly oval, subparallel medially, streamlined, integument blackish with metallic greenish tint, legs and antennal bases reddish-

brown, body densely and finely punctate, pubescence short and dense; pronotum as wide as elytra at base, margins subparallel basally and slightly converging apically from middle of disc; elytra about twice as long as wide, rounded at apex.

**Native range.** Palaearctic (Jelinek and Audisio 2007).

**Distribution in Canada.** NB, NS, PE, QC (Bousquet et al. 2013).

**Distribution in USA.** ME (Hoebeke and Wheeler 1996b).

**First Canadian records.** Halifax, NS in 1945 (NSM); Sainte-Catherine (Portneuf), QC in 1951 (LEMQ); and Charlottetown, PE in 1974 (CNCI).

**First North American records.** As above.

**Habitat data.** This species feeds on pollen of cruciferous plants. In Canada, it was collected from the flowers of wild radish, *Raphanus raphanistrum* L. (Brassicaceae).

**Comments.** The biology and habits of this species are provided by Hoebeke and Wheeler (1996b).

**47. *Genisthogethes carinulatus*** (Förster)
(Fig. 47, Map 42)

**Diagnosis.** Body length 2.7-3.0 mm, broadly oval, integument blackish, legs and sometimes antennal bases reddish-brown, body densely and finely punctate, pubescence short and dense; pronotum almost as wide as elytra at base, margins arcuate and strongly converging apically from middle of disc; elytra slightly less than twice as long as wide, truncated at apex and exposing part of pygidium.

**Native range.** Palaearctic (Jelinek and Audisio 2007).

**Distribution in Canada.** BC (Bousquet et al. 2013).

**Distribution in USA.** No known records.

**First Canadian records.** Merritt, BC in 2012 (CNCI).

**First North American records.** As above.

**Habitat data.** Unknown.

**48. *Meligethes atratus*** (Olivier)
(Fig. 48, Map 42)

**Diagnosis.** Body length 3.0-3.4 mm, moderately narrowly oval, integument dark brown to blackish with legs and sometimes antennal bases reddish-brown, body densely and finely punctate, pubescence short and dense; pronotum at least as wide as elytra at base, margins arcuate and strongly converging apically from base of disc; elytra slightly longer than wide, rounded at apex and converging apically in basal third.

**Native Range.** Palaearctic; adventive in Africa (Jelinek and Audisio 2007).

**Distribution in Canada.** BC (Bousquet et al. 2013).

**Distribution in USA.** No known records.

**First Canadian records.** Metlakatla, BC in 1915 (Hatch 1962).

**First North American records.** As above.

**Habitat data.** In Europe, this species is associated with the flowers of Rosaceae (Audisio 1993).

**Comments.** No specimens have been collected in Canada for a century. Specimens from Metlakatla should be re-examined to confirm identity.

**Subfamily NITIDULINAE** Latreille

**49. *Aethina tumida*** Murray
(Fig. 49, Map 43)

**Diagnosis.** Body length 4.8-5.3 mm, broadly oval, integument glossy, dark brown to blackish with lateral margins of pronotum and legs usually reddish-brown, body densely and finely punctate, pubescence minute and dense; pronotum wider than elytra at base, margins strongly converging apically from base of disc; elytra transverse, truncated at apex, small portion of pygidium may be exposed.

**Native range.** Sub-Saharan Africa; adventive in Australia (Jelinek and Audisio 2007).

**Distribution in Canada.** MB?, ON, QC (Bousquet et al. 2013, OMAFRA 2013). This species was recorded from southern MB in 2002 and 2006 and deemed as not es-

tablished (OMAFRA 2013); however, it is uncertain whether specimens collected from MB in 2012 come from established populations. The species was also recorded from southern AB in 2006 but was eradicated through control measures (OMAFRA 2013).

**Distribution in USA.** It is widely distributed in the USA and is especially successful in warmer coastal states (OMAFRA 2013).

**First Canadian records.** Near MacGregor, MB in 2002 (CNCI) and Godmanchester, QC in 2008 (CNCI).

**First North American records.** FL (unspecified locality) in 1998 (OMAFRA 2013).

**Habitat data.** This small hive beetle is a pest of European honey bee colonies. Larvae feed on honey bee brood, pollen, honey and the wax comb. Larval defecation in the honey comb causes the honey to ferment and spoil (OMAFRA 2013).

**Comments.** This species is invasive and should be closely monitored in southern and coastal Canada. The biology of the species is well known (OMAFRA 2013).

**50. *Nitidula carnaria*** (Schaller)
(Fig. 50, Map 44)

**Diagnosis.** Body length 1.6-3.0 mm, narrowly elongate, dark brown to piceous, with two large posterior and two smaller anterior pale spots on elytra, sometimes spots are obsolete in densely pubescent specimens; pronotum transverse, width to length ratio about 1.8:1.0, lateral margins arcuate, narrowly reflexed, apex of disc slightly narrower than base, hind angles obtuse, surface densely covered with small and minute punctures; elytra exposing at least two abdominal tergites, surface finely and densely punctate.

**Native range.** Palaearctic (Jelinek and Audisio 2007).

**Distribution in Canada.** BC, NS, ON, QC, SK (Bousquet et al. 2013). This species is reported for the first time from SK (two locations in the southwest; David J. Larson, personal communication).

**Distribution in USA.** CA, IN, MA, MI, NJ, NY, OR, PA, WA, WI (Parsons 1943, Downie and Arnett 1996).

**First Canadian records.** Prince Edward County, ON in 1922 (CNCI); Quamichan, BC in 1926 (CNCI); Sydney, NS in 1965 (CNCI); and Pointe-du-Lac, QC in 1968 (LEMQ).

**First North American records.** NY in 1894 (Parsons 1943).

**Habitat data.** In NS, this species was found in association with a decomposing pig, *Sus scrofa* L. (Majka and Cline 2006a).

**51. *Nitidula rufipes*** (Linnaeus)
(Fig. 51, Map 45)

**Diagnosis.** Body length 2.0-4.0 mm, broad, subparallel, flattened, piceous to black, legs paler, integument moderately densely pubescent, punctures medium to minute; pronotum slightly less than twice as wide as long, sides moderately arcuate, strongly converging apically from middle of disc, margins moderately flattened; elytra usually covering entire abdomen, punctures finer and sparser than those of pronotum.

**Native range.** Palaearctic (Jelinek and Audisio 2007).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, NT, ON, QC, SK, YT (Bousquet et al. 2013).

**Distribution in USA.** AK, CO, ID, IN, KS, ME, MI, MT, NH, NY, OR, PA, VA, WA, WI (Parsons 1943, Downie and Arnett 1996, Majka and Cline 2006a, Klimaszewski et al. 2010, Bousquet et al. 2013).

**First Canadian records.** NT 65˚N (likely between 110˚ and 114˚W) in Canada between 1819 and 1825 (Kirby 1837); Cap Rouge, QC in 1861-1878 (CIQ); Sudbury, ON in 1889 (CNCI); Aweme, MB in 1908 (UMAN); Edmonton, AB in 1917 (CNCI); Fredericton, NB in 1928 (CNCI); Vancouver, BC in 1930 (CNCI); Saskatoon, SK in 1940 (CNCI); St. John's, NF in 1949 (CNCI); Yellowknife, NT in 1949 (CNCI); and 14 km east of Dawson City, YT in 1962 (CNCI).

**First North American records.** As above.

**Habitat data.** This species is associated with carrion and bones (Downie and Arnett 1996). In NS, it was found in association with a dead pig (Majka and Cline 2006a).

**52. *Omosita colon*** (Linnaeus)
(Fig. 52, Map 46)

**Diagnosis.** Body length 2.2-3.5 mm, oval, sparsely pubescent, brown to piceous with paler clypeus, legs, antennae, and margins of pronotum, venter dark rufous; pronotum

nearly twice as wide as long, sides curved and converging apically, more densely and coarsely punctate than elytra; elytra coarsely punctate, lateral margins arcuate, apex slightly truncate, small part of apical tergite exposed, with small basal spots, and large apical yellowish or rufous spots enclosing small dark spots.

**Native range.** Palaearctic; adventive in Australia and Mexico (Parsons 1943, Jelinek and Audisio 2007).

**Distribution in Canada.** AB, BC, LB, MB, NB, NL, NS, ON, PE, QC, SK, (Majka and Cline 2006a, Bousquet et al. 2013). This species is reported for the first time from LB (Happy Valley; MUN).

**Distribution in USA.** Widely distributed (Parsons 1943, Downie and Arnett 1996).

**First Canadian records.** Cap Rouge, QC from 1861-1878 (CIUL); Saint John, NB in 1899 (NBM); London and Ridgeway, ON before 1900 (DEBU); Aweme, MB in 1904 (UMAN); Wilmot, NS in 1913 (LEMQ); Salmon Arm, BC in 1934 (UBC); and Goulds, NF in 1953 (ACNL).

**First North American records.** Boston, MA from 1600-1740 (Bain 1998, Bain and King 2011).

**Habitat data.** This species is found on dry carrion, bones, hides, fungi, and decaying material (Downie and Arnett 1996). It usually feeds on carrion and only occasionally has been reported as occurring in dwellings and empty granaries (Bousquet 1990a).

**53. *Omosita discoidea*** (Fabricius)
(Fig. 53, Map 47)

**Diagnosis.** Body length 2.0-3.2 mm, oblong ovate, sparsely pubescent, testaceous except for piceous head, antennal club, and posterior third to fourth of elytra which has several small pale spots; pronotum strongly transverse, strongly concave anteriorly and arcuate laterally, with sides more converging apically than basally from middle of disc, densely and coarsely punctate; elytra long, truncate at apex and usually exposing one abdominal tergite.

**Native range.** Palaearctic; adventive in the neotropical region (Jelinek and Audisio 2007).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, NT, ON, QC, SK (Bousquet et al. 2013). This is the first record from NT (Riley 1837).

**Distribution in USA.** Widely distributed (Parsons 1943, Downie and Arnett 1996, Majka and Cline 2006a).

**First Canadian records.** NT 65˚N (likely between 110˚ and 114˚W) in Canada between 1819 and 1825 (Kirby 1837); Saguenay, QC in 1880 (CIUL); Edmonton, AB in 1914 (CNCI); Winnipeg, MB in 1915 (UMAN); Peachland, BC in 1919 (UMAN); Rainy River District, ON in 1925 (CNCI); Bulyea, SK in 1944 (RSM); and near Badger, NL in 1972 (CFCB).

**First North American records.** As above Pacific coast of North America before 1879 (Horn 1879); MA in 1899; NJ and NY in 1930 (Parsons 1943).

**Habitat data.** This species feeds on dried carrion, bones, hides, fungi, and decaying vegetation (Downie and Arnett 1996). It has been found occasionally in dwellings and empty granaries (Bousquet 1990a). In NS, it was reported on decaying pigs and bones of white-tailed deer, *Odocoileus virginianus* (Zimmerman) (Majka and Cline 2006a).

**Comments.** According to Parsons (1943), this species was probably introduced into New Jersey and Maryland directly from Europe.

**54. *Soronia grisea*** (Linnaeus)
(Fig. 54, Map 48)

**Diagnosis.** Body length 4.7-5.2 mm, oblong ovate, sparsely pubescent, testaceous except for legs, piceous and densely spotted dorsum of pronotum and central part of elytra; pronotum strongly transverse, strongly concave anteriorly and arcuate laterally, with sides strongly converging apically from base of disc, densely and coarsely punctate; elytra long, rounded at apex and covering entire abdomen.

**Native range.** Palaearctic (Jelinek and Audisio 2007).

**Distribution in Canada.** NF, NS (Bousquet et al. 2013).

**Distribution in USA.** No known records.

**First Canadian records.** Corner Brook and Pasadena, NF in 1989 (McNamara 1992b) and Sydney, NS in 2000 (NSNR).

**First North American record.** As above.

**Habitat data.** In NS, one specimen was associated with Japanese walnut (*Juglans ailanthifolia* Carr.), a tree which was first introduced into North America in 1870, and now is widely spread (Majka and Cline 2006a). In Latvia, adults were collected feeding on yeasty sap of birch, *Betula pendula* Roth (Salmane 2007).

**Family CERYLONIDAE** Bilberg

**Diagnosis.** Body length 1.0-3.0 mm, broadly oval or elongate-robust, sometimes flattened, red to brown, dorsal surface hairless and glossy; head visible from above, antennal insertions usually exposed, antennal club 1- or 2-segmented, and abrupt; pronotum lacking lateral margin; elytra nearly always striate; tarsal formula 4-4-4.

**Subfamily MURMIDIINAE** Jacquelin du Val

**55. *Murmidius ovalis*** (Beck)
(Fig. 55, Map 48)

**Diagnosis.** Body length 1.2-1.4 mm, oval, convex, brownish to reddish-brown, glossy; pronotum broad and narrow, lateral margins converging apically; elytra with distinct punctation in regular rows.

This species is distinctive by its habitus, and the presence of antennal cavities on anterolateral margins of the pronotum.

**Native range.** Likely palaearctic; now cosmopolitan (Downie and Arnett 1996).

**Distribution in Canada.** ON (Bousquet et al. 2013).

**Distribution in USA.** AK, CA, DC, FL, IL, KS, LA, MO, NY (Downie and Arnett 1996).

**First Canadian records.** Fort William, ON in 1939 (CNCI).

**First North American records.** Unknown.

**Habitat data.** The species was reported occasionally in stored food products in North America where it does not damage the products directly because the adults and larvae feed on moulds and yeasts. In Canada, most specimens have been collected from feed mills (Bousquet 1990a). Downie and Arnett (1996) reported it from granaries and warehouses and also from cut grass and leaves.

**Family ENDOMYCHIDAE** Leach [the handsome fungus beetles]

**Diagnosis.** Body length 4.0-8.0 mm, oval to elongate-oval or round, pubescence fine or reduced, black with reddish or pale markings, glossy; head slightly deflexed and proganthous; antenna usually with 11 antennomeres, club consisting of 1-2 antennomeres; pronotum usually much broader than head with anterior angles prolonged and partly enclosing head, borders margined; elytra entire and apically rounded, punctate, epipleuron well developed; abdomen with 5-6 ventrites; procoxal cavities open behind; mesosternum short, its cavities open or closed; metasternum with subcostal fovae in many species; tarsal formula 4-4-4 or 3-3-3.

**Subfamily ANAMORPHINAE** Strohecker

**56. *Symbiotes gibberosus*** (Lucas)
(Fig. 56, Map 48)

**Diagnosis.** Body length 1.8-2.2 mm, oblong oval and subconvex, glossy, pubescence sparse and moderately long and erect, uniformly reddish-brown or brownish-yellow; antenna with 3-segmented prominent club; pronotum about twice as broad as long, sides evenly curved to apical third and then strongly converging apically, surface finely punctate, humeral angles with round depressions; elytra with sides arcuate and converging posteriorly from basal third, apex rounded, surface with rows of fine punctures.

**Native range.** Palaearctic (Rücker et al. 2007).

**Distribution in Canada.** ON (Bousquet et al. 2013).

**Distribution in USA.** CA, FL, NY, OH (Downie and Arnett 1996).

**First Canadian records.** Near St. Williams, ON in 2007 (DEBU).

**First North American records.** Unknown but before 1996 (Downie and Arnett 1996).

**Habitat data.** In ON, specimens (DEBU) were collected in a forest near vernal pools.

**Subfamily MYCETINAE** Jacquelin du Val

**57. *Mycetaea subterranea*** (Fabricius)
(Fig. 57, Map 49)

**Diagnosis.** Body length 1.5-1.8 mm, ovate and convex, glossy, rufo-testacous or reddish-brown integument with sparse, short and erect pubescence; pronotum broadest at middle, with complete sublateral carina on each side of disc; elytra strongly narrowed apically and slightly pointed at apex, with unequal pubescence and setae near vertical. Sexes are externally similar.

**Native range.** Palaearctic (Rücker et al. 2007); adventive in a few tropical countries and New Zealand (Bousquet 1990).

**Distribution in Canada.** BC, NF, NS, ON, PE, QC (Bousquet et al. 2013).

**Distribution in USA.** CA, CT, DC, MA, MD, MI, NY, OR, PA (Downie and Arnett 1996).

**First Canadian records.** Ferryland, NF from 1621-1696 (Bain and Prévost 2010); Quebec City, QC 1675-1699 (Bain and King 2011); Grimsby, ON before 1900 (DEBU); and Agassiz, BC in 1931 (CNCI).

**First North American records.** See above.

**Habitat data.** This species is occasionally associated with stored food products in granaries, mills, warehouses, and cellars (Bousquet 1990a). It has not had a direct effect on the products because it feeds on fungi. In the wild, it was also found in old tree trunks, caves, and beehives (Bousquet 1990a). Downie and Arnett (1996) reported it from old tree trunks, cellars, caves, granaries, and warehouses, where it probably feeds on mould.

**Family COCCINELLIDAE** Latreille [the ladybird beetles or ladybugs]

**Diagnosis.** Body length 0.8-11.0 mm, usually compact, broadly oval to nearly spherical, strongly convex dorsally and nearly flat ventrally; often brightly coloured and spotted: yellow, orange, and red with black markings or black with yellow to reddish markings; usually strongly glossy; head partly or completely concealed by pronotum and deeply inserted into prothorax; antennae short with 8-11 antennomeres, club with 3-6 antennomeres; pronotum broader than head, transversely oval to quadrate, with deep or shallow anterior emargination; elytra entire, glossy, finely to moderately punctate, non-

striate, epipleural fold entire or obsolete; abdomen with 5-7 ventrites (visible sternites); procoxal cavities usually closed behind; mesosternum short, trapezoidal to subquadrate; metasternum long and broad; tarsal formula 4-4-4 (third tarsomere minute), or 3-3-3.

**Subfamily COCCINELLINAE** Latreille

**58. *Rhyzobius lophanthae*** (Blaisdell)
(Fig. 58, Map 49)

**Diagnosis.** Body length 1.7-2.8 mm, elongate oval and convex, moderately densely pubescent, pubescence is of mixed types, on elytra forming wavy lines near suture, head yellowish-brown, pronotum reddish-brown, elytra dark reddish-brown to dark brown, sometimes elytra with faint metallic green tint, legs brown and tarsi paler; head partly concealed under pronotum; antenna with 3-segmented club; pronotum strongly transverse with anterior margin concave and lateral margins strongly converging in apical region.

**Native range.** Eastern palaearctic; adventive in Europe, Africa, Australia and the neotropics (Kovář 2007).

**Distribution in Canada.** BC (Bousquet et al. 2013).

**Distribution in USA.** AZ, CA, DE, MD, NM, TX (Downie and Arnett 1996).

**First Canadian records.** Victoria, BC in 1988 (CNCI).

**First North American records.** CA in 1898 (Quayle 1941).

**Habitat data.** This species is a predator of scale insects.

**Comments.** This species was intentionally introduced into CA in 1898 to control scales on citrus trees, and subsequently spread to other citrus-growing areas of the USA (Quayle 1941).

**59. *Adalia bipunctata*** (Linnaeus)
(Fig. 59, Map 50)

**Diagnosis.** Body length 3.5-5.5 mm, oval and slightly convex, colour extremely variable, typically pronotum with median black spot and orange-red elytra with single black discal spot on each elytron, number of spots varies from none to many, sometimes

elytra black with varying reddish to orange yellow spots; prosternum with distinct lateral ridges and median area depressed; legs with apex of middle and hind tibiae each with two spurs, tarsal claw with tooth at middle.

**Native range.** Palaearctic; adventive in Africa, Australia and the neotropical (Kovář 2007).

**Distribution in Canada.** AB, BC, LB, MB, NB, NF, NS, NT, ON, PE, QC, SK, YT (Bousquet et al. 2013).

**Distribution in USA.** Widely distributed (Downie and Arnett 1996).

**First Canadian records.** Saguenay, QC in 1874 (CIUL); Toronto, ON in 1885 (ROM); Saint John, NB in 1900 (CNCI); Gull Lake, AB in 1901 (UASM); Weyburn, SK in 1901 (UASM); Trail, BC in 1909 (UASM); Granville Ferry, NS in 1909 (NSAC); Aweme, MB in 1912 (NOFC); Mount Herbert, PE in 1922; Cameron Bay, NT in 1937 (CNCI); Howley, NF in 1942 (DEBU); and Dawson City, YT in 1949 (CNCI).

**First North American records.** Unknown.

**Habitat data.** This species is a predator of small soft-bodied insects.

**Comments.** Given its wide distribution in Canada even a century ago, this species was likely accidentally introduced into Canada well before the 1870s.

**60. *Aphidecta obliterata*** (Linnaeus)
(Fig. 60, Map 54)

**Diagnosis.** Body length 3.5-5.0 mm, form elongate-oval and moderately convex, colour variable, elytra yellowish-orange with suffused darkened areas, pronotum usually lighter with M-shaped median black patch; apex of clypeus broadly and feebly emarginated, anterolateral angle produced forward; pronotum and elytra with lateral margins explanate; prosternum with intercoxal process feebly convex, slightly ridged laterally, lacking carina; mesosternum with apical margin truncate; legs with apex of middle and hind tibiae lacking spurs, tarsal claw with large, subquadrate basal tooth; postcoxal line on first abdominal sternite complete; male genitalia symmetrical (Gordon 1985, page 841, Figs. 679 c-f); female genitalia with infundibulum (Gordon 1985, page 842, Fig. 680c).

**Native range.** Palaearctic (Kovář 2007).

**Distribution in Canada.** BC (Humble 1994).

**Distribution in USA.** NC (Amman 1966).

**First Canadian records.** This species was released in Victoria, BC between 1960 and 1969 (Schooley et al. 1984) and was first recovered there in 1987 (Humble 1994).

**First North American records.** This species first established at Mt. Mitchell, NC following releases in 1960 and 1963 (Amman 1966).

**Habitat data.** This species is a predator of small, soft-bodied insects such as aphids and scales. In BC, it was found associated with balsam woolly adelgid on balsam fir, hemlock woolly adelgid, *Adelges tsugae* Annand, on western hemlock and green spruce aphid, *Elatobium abietinus* (Walker), on Sitka spruce (Humble 1994).

**Comments.** This species was not recovered at the Victoria, BC release sites during the 1960-1969 release period (Schooley et al. 1984) nor during surveys at the release sites in 1971, 1974 and 1978 (Humble 1994). This underscores that long term monitoring may be required to assess establishment of introductions of biocontrol agents.

**61. *Coccinella septempunctata*** Linnaeus
(Fig. 61, Map 51)

**Diagnosis.** Body length 6.0-7.8 mm, oval and convex, head black with two well separated pale spots, anterior margin of pronotum black at middle and with two larger pale spots near anterior shoulder, elytra reddish-brown with common black scutellar spot and with three additional spots, one lateral before middle, one at middle of disc, and one lateral and subapical, number of spots may be somewhat variable, integument glossy; antennal club 3-segmented, two basal segments small, subquadrate to slightly elongate, last segment elongate and swollen; pronotum strongly transverse as wide as about two-thirds of maximum width of elytra; elytra four times longer than pronotum.

**Native range.** Palaearctic; adventive in Africa and the Orient (Kovář 2007).

**Distribution in Canada.** AB, BC, LB, MB, NB, NF, NS, NT, ON, PE, QC, SK (Bousquet et al. 2013). This species is newly recorded from LB (Hopedale and Labrador City; ACNL, CFCB).

**Distribution in USA.** Widely distributed (Downie and Arnett 1996).

**First Canadian records.** The earliest provincial records are: Sainte-Anne-de-Bellevue, QC in 1965 (LEMQ); Kinbrook Island Provincial Park, AB in 1970 (John Acorn, personal

communication); Fredericton, NB in 1972 (NSM); Ness Lake. BC in 1990 (Humble 1991; PFC); Lac du Bonnet, MB in 1989 (UMAN); Marystown, NF in 1981 (ACNL); Labrador City, LB in 1981 (ACNL); Glenhilme, NS in 1982 (NSAC); Daring Lake, NT in 2010 (James Miskelly, personal communication); Pukaskwa National Park, ON in 1975 (DEBU); Charlottetown, PE in 1978 (ACPE); Gainsborough, SK in 1989 (RSM).

**First North American records.** See above. In the USA, the first established population was discovered in Bergen Co., NJ in 1973 (Angelet and Jacques 1975).

**Habitat data.** The seven-spotted ladybug is a predator of small, soft-bodied insects. It inhabits many different habitats, but is uncommon in forests.

**Comments.** This species was intentionally introduced as a biocontrol agent into North America numerous times from 1956 to 1971 (Gordon 1985), but did not establish. The population that eventually established in NJ was the result of an accidental introduction (Gordon 1985). It is an active flier and disperses well. It easily displaces native ladybug species, a cause for conservation concern (Acorn 2007).

**62. *Coccinella undecimpunctata undecimpunctata*** Linnaeus
(Fig. 62, Map 52)

**Diagnosis.** Body length 4.0-5.0 mm, elongate and moderately convex, head black with two well-separated pale spots, pronotum and legs usually black, pronotum with two larger pale spots near anterior shoulders, elytra yellowish-red and spotted, often with six distinctive black spots on each elytron, number of spots may be variable, integument semi-glossy; antennal club 3-segmented, two basal segments small, subquadrate to slightly elongate, last segment elongate and swollen; pronotum moderately transverse as wide as two-thirds of maximum width of elytra; elytra about 3.5 times longer than pronotum.

**Native range.** Palaearctic; adventive in Australia (Kovář 2007).

**Distribution in Canada.** BC, LB, NB, NS, NF, ON, PE, QC (Bousquet et al. 2013). This species is newly reported from LB (near Wabush and Lanse-au-Loup; MUN).

**Distribution in USA.** It is distributed along the American eastern seaboard from ME to NJ and is also in IN, OH and the Pacific Northwest (OR, WA) (Watson 1979, Wheeler and Hoebeke 1981, Downie and Arnett 1996, Majka and McCorquodale 2006, 2010).

**First Canadian records.** Brackley Beach and Dalvay House, PE in 1940 (CNCI); Kamouraska, QC in 1940 (CIQ); Halifax, NS in 1945 (NSM); NF (three localities in the

west) in 1949 (MUN); Ramsayville, ON in 1955 (LEMQ); Moncton, NB in 1976 (UNB); South Pender Island, BC in 1979 (UBC); and near Wabush, LB in 1981 (MUN).

**First North American records.** Boston, MA in 1911 (Schaeffer 1912).

**Habitat data.** The eleven-spotted lady bird is a predator of soft-bodied insects. It is found mainly in open habitats.

**Comments.** This species was unintentionally introduced into North America. The disjunct distribution of this species in North America suggests two separate introduction events, one in the east and one in the Pacific Northwest.

**63. *Harmonia axyridis*** (Pallas)
(Fig. 63, Map 53)

**Diagnosis.** Body length 5.6-5.8 mm, broadly oval and convex, reddish-yellow with blackish spots, pronotum reddish-yellow with irregularly shaped blackish spot in central part of disc, elytra reddish-yellow, usually with nine blackish spots on each elytron, size and number of spots is variable, legs reddish-yellow to brown.

**Native range.** Eastern palaearctic; adventive in Europe and the Orient (Kovář 2007).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, ON, PE, QC, SK (Bousquet et al. 2013). This species is newly recorded from AB (Medicine Hat; John Acorn, personal communication).

**Distribution in USA.** Most of the eastern USA, south to LA and MS; CA, MT, OR and WA (Foley et al. 2009, Majka and McCorquodale 2010).

**First Canadian records.** Kentville, NS in 1983 (ACNS); Gabriola, BC in 1994 (CNCI); Ontario (many locations) in 1994; Montreal, QC in 1994 (CMNC); Fredericton, NB in 1995 (CNCI); Harrington, PE in 1998 (ACPE); Kelligrews, NF in 2000 (Hicks et al. 2010); Carman, MB in 2001 (UMAN); and near Maple Creek, SK in 2011 (David J. Larson, personal communication).

**First North American records.** Following intentional introductions in 1978-1981, it became established in LA in 1988 and in MS in 1990 (Gordon 1985, Gordon and Vandenburg 1991, Hoebeke and Wheeler 1996a, Majka and McCorquodale 2010).

**Habitat data.** This species is a predator of aphids (Hicks et al. 2010).

**Comments.** This species has dispersed rapidly in North America and populations can be very high. Its dispersal has likely been aided by humans as the species is commonly used in greenhouses to control aphids. There are some concerns that the high abundances of this species may have negative impacts on native species of coccinellids. The species is also sometimes a nuisance as it can damage fruit and form large overwintering aggregations in bee hives and in homes (Foley et al. 2009).

**64. *Hippodamia variegata*** (Goeze)
(Fig. 64, Map 54)

**Diagnosis.** Body length 4.4-5.0 mm, elongate-oval and moderately convex, male with head yellow and vertex black, female with head yellow and vertex and large frontal spot black, pronotum of male with anterior border of black area deeply emarginate medially and contrasting with yellow margins, pronotum of female black with anterior and lateral borders and small lateral spot on each side yellow, elytra of both sexes orange with 5-8 black spots on each elytron, with scutellar, posthumeral, and two postscutellar spots often absent.

**Native range.** Palaearctic; adventive in Africa and the Orient (Kovář 2007).

**Distribution in Canada.** BC, NB, NF NS, ON, PE, QC (Bousquet et al. 2013). This species is newly recorded from BC (Penticton; CBU) and NF (Carbonear; UNB).

**Distribution in USA.** CT, MA, ME, NH, NJ, NY, PA, RI, VT (Klimaszewski et al. 2010, Majka and McCorquodale 2010).

**First Canadian records.** In and near Montreal, QC in 1984 (Gordon 1987); Moncton, NB in 1987 (UNB); LeBreton Flats, ON in 1989 (CNCI); Harrington, PE in 1991 (ACPE); Carbonear, NF in 1992 (UNB); Kingsburg, NS in 1984 (NSNR); and Penticton, BC in 2009 (CBU).

**First North American records.** Introduced to AZ, CA, FL, GA and NC from 1957-1958 (Gordon and Vandenburg 1991).

**Habitat data.** This species is a predator of soft-bodied insects. In NS, it was found in coastal habitats (Majka and McCorquodale 2010). In QC, adults were found in abandoned fields (Gordon 1987).

**Comments.** It was introduced into North America to control aphids of agricultural crops, including Russian wheat aphid, *Diuraphis noxia* (Mordivilko) (Gordon and Vandenberg 1991). It appears that the population in BC may be the result of a separate introduction.

**65.** ***Propylaea quatuordecimpunctata*** (Linnaeus)
(Fig. 65, Map 55)

**Diagnosis.** Body length 3.5-5.2 mm, oval and convex, head of male yellow with black vertex, head of female with black spot on clypeus, pronotum in both sexes with large medial and irregular-shaped black area, elytra variable, usually yellowish-orange with fourteen irregular and angular spots which fuse in different combinations, rarely elytra black with some pale spots.

**Native range.** Palaearctic (Kovář 2007).

**Distribution in Canada.** NB, NS, ON, PE, QC (Bousquet et al. 2013).

**Distribution in USA.** MA, ME, NH, NY RI, VT (Majka and McCorquodale 2010).

**First Canadian records.** Sainte-Foy, QC in 1968 (CIUL); Debert, NS in 1989 (NSNR); Sherwood, PE in 1989 (ACPE); LeBreton Flats, ON in 1990 (CNCI); and Fredericton, NB in 1992 (ACNB).

**First North American records.** As above; Grand Isle Co., VT in 1984 (Dysart 1988).

**Habitat data.** This species is a predator of soft-bodied insects. It was intentionally introduced into North America to control the Russian wheat aphid (Hoebeke and Wheeler 1996a).

**Comments.** This species was first introduced into the Great Plains states in 1968, followed by introductions in the eastern USA in 1989-1990. However, the first established population was discovered in Sainte-Foy, QC in 1968, likely as a result of an accidental introduction via trans-Atlantic shipping (Majka and McCorquodale 2010). It is likely that the current populations of this species in southeastern Canada and the eastern USA originated from this accidental introduction.

**Subfamily SCYMNINAE** Mulsant

**66.** ***Scymnus impexus*** Mulsant
(Fig. 66, Map 56)

**Diagnosis.** Body length 2.3-2.5 mm, elongate-oval and moderately convex, uniformly reddish-brown, pubescence short, yellowish, moderately dense and forming wavy pattern on posterior part of elytra; head with large eyes; pronotum trans-

verse, at base about two-thirds of maximum width of elytra, margins strongly converging apically.

**Native range.** Palaearctic (Kovář 2007).

**Distribution in Canada.** BC (Bousquet et al. 2013).

**Distribution in USA.** CT, MI, NY, PA (Klimaszewski et al. 2010). It was introduced into NC but did not establish. Introductions into OR in 1960 and 1962 (Gordon 1985) did not likely persist as there have been no recent collections.

**First Canadian records.** This species was intentionally introduced into NB, NS, and NF from 1951-1955 and 1962-1966 but did not persist beyond 5 years (Clarke and Brown 1961, Gordon 1976, 1985, CIBC 1971, Majka and McCorquodale 2006, 2010). It was also intentionally released at three locations in the lower mainland of BC from 1960-1968, was recovered following winter at two locations (Mount Seymour and Seymour Valley), and is considered established. At Seymour Valley site, the species was repeatedly collected up to 10 years post release when annual sampling was discontinued (Harris and Dawson 1979).

**First North American records.** As above.

**Habitat data.** This species is predatory on soft-bodied insects (aphids, adelgids, scales, etc.). It was intentionally introduced into NB (1962-1964, 1966), NF (1959-1961, 1966), NS (1963-1964, 1966) and BC (1960, 1963, 1965-1966, 1968) for control of the balsam woolly adelgid, *Adelges piceae* (Ratzeburg) (Harris and Dawson 1979, Schooley et al. 1984, Majka and McCorquodale 2006).

**Comments.** This species is not currently considered to be established in the wild in Atlantic Canada (Majka and McCorquodale 2006). As well, no recent specimens have been collected in BC despite targeted work on balsam woolly adelgid there (L. Humble, personal communication). The most recent specimen collected in North America is from BC in 1978 (Harris and Dawson 1979).

**67. *Scymnus suturalis*** Thunberg
(Fig. 67, Map 56)

**Diagnosis.** Body length 1.6-1.9 mm, elongate-oval and moderately convex, moderately densly pubescent and punctate, pubescence yellowish and on elytra directed obliquely posteriorly from suture, head blackish, pronotum blackish with reddish an-

terior angles, elytra reddish-brown with black basal and sutural section of disc, legs reddish-brown; pronotum much narrower than elytra, at base less than two-thirds of maximum width of elytra; elytra oval and rounded at apex.

**Native range.** Palaearctic (Kovář 2007).

**Distribution in Canada.** NS, QC (McNamara 1992a, Majka and McCorquodale 2010, Bousquet et al. 2013).

**Distribution in USA.** CT, MA, ME, MI, NY, PA, RI, VA (Klimaszewski et al. 2010, Majka and McCorquodale 2010).

**First Canadian records.** Oka, QC in 1983 (McNamara 1992a); Halifax, NS 1993 (Hoebeke and Wheeler 1996a, Majka and McCorquodale 2010).

**First North American records.** Saginaw Co., MI in 1961 (Gordon 1985).

**Habitat data.** This species preys on aphids and adelgids found on conifers (Majka and McCorquodale 2010). In NS, it was found on Scots pine (*Pinus silvestris* L.), and jack pine (*Pinus banksiana* Lamb.) (Majka and McCorquodale 2010).

**Comments.** It was presumably inadvertently introduced into NS with conifer nursery stock (Majka and McCorquodale 2010). Also, it is believed to have been inadvertently introduced into other areas in eastern North America, including QC (Majka and McCorquodale 2010). Gordon (1985) reports an introduction from Germany to MI in 1961 that apparently established.

**68. *Stethorus punctillum*** Weise
(Fig. 68, Map 57)

**Diagnosis.** Body length 1.4-1.6 mm, elongate-oval, black with antennae, mouthparts and legs usally brownish-yellow or reddish-brown, basal three-quarters of femorae brown, body with pubescence short, semierect and yellowish-white; antennae short and clubbed.

**Native range.** Palaearctic (Kovář 2007).

**Distribution in Canada.** AB, BC, MB, ON, QC, SK (Bousquet et al. 2013). This species is recorded for the first time from AB (Taber; John Acorn, personal communication) and SK (three locations in the southeast; David Larson, personal communica-

tion). Although previously recorded from MB (Bousquet et al. 2013), we were not able to locate a specimen or a published locality record.

**Distribution in USA.** MA, MI, NH, NY, OH, PA, VT, WI (Downie and Arnett 1996).

**First Canadian records.** Leamington, ON in 1931 (CNCI); Lulu Island, BC in 1950 (CNCI); Saint-Nicolas (Lévis), QC in 1993 (CIQ); and Taber, AB in 2001 (John Acorn, personal communication).

**First North American records.** As above; Framingham, MA before 1950 (Brown 1950).

**Habitat data.** This species is a predator of soft-bodied insects (aphids, adelgids, scales, etc.).

**Family CORYLOPHIDAE** LeConte [the minute hooded beetles]

**Diagnosis.** Body length 0.6-2.3 mm, form usually oval and depressed, nearly hemispherical or slightly elongate, colour usually testaceous to piceous, some with paler pronotum or spots on elytra; head small, quadrate to elongate, and usually completely concealed by expanded pronotum forming a hood anteriorly; antennae with 9-11 antennomeres, and with 3-segmented club; pronotum with the anterior margin emarginated or entire and usually completely covering the head; elytra mostly truncate apically, exposing the apex of abdomen; abdomen with six ventrites, basal ventrite very long and bearing subparallel femoral lines; procoxae from short and globose to elongate, their cavities closed internally; mesocoxae variable in shape, round to elongate, their cavities closed internally; metacoxae widely separated; legs with tarsal formula 4-4-4, tarsi with first and second articles large, third very small and fourth narrow and elongate.

**Subfamily CORYLOPHINAE** LeConte

**69. *Orthoperus atomus*** (Gyllenhal)
(Fig. 69, Map 59)

**Diagnosis.** Body length 0.6-0.8 mm, oval and convex, strongly glossy with minute, barely visible and sparse punctation, body uniformly yellowish-red to reddish-brown with slightly darker, asymmetrical antennal clubs; pronotum sinuate at base and arcuate laterally without strong delimitation between anterior and lateral margins; elytra entirely covering abdomen and rounded apically.

**Native Range.** Palaearctic (Bowestead 2007).

**Distribution in Canada.** BC (Bousquet et al. 2013).

**Distribution in USA.** OR, WA (Hatch 1957).

**First Canadian records.** Steelhead, BC in 1935 (UBC).

**First North American records.** See above; OR and WA (unspecified localities) before 1957 (Hatch 1957).

**Habitat data.** In Poland, it was sifted from mouldy hay, found in fungi on an ash tree, sifted from willow leaf litter, found under the bark of *Populus*, and collected from a wildlife feeder (Ruta et al. 2010).

**70. *Sericoderus lateralis*** (Gyllenhal)
(Fig. 70, Map 58)

**Diagnosis.** Body length 0.9-1.2 mm, oblong-oval and convex, slightly glossy, more so on pronotum, yellowish to reddish-brown, anterior margin of pronotum usually with nebulous dark spot, moderately densly pubescent and punctate, pubescence yellowish-brown; antennae clubbed, club slightly asymmetrical; pronotum at base as wide as elytra, margins strongly converging apically, base sinuate; elytra with apex truncate and exposing pygidium.

**Native range.** Probably palaearctic origin; now cosmopolitan (Bowestead 2007).

**Distribution in Canada.** BC, MB, NS, ON, QC (Bousquet et al. 2013). Although previously recorded from MB, we were unable to locate a specimen or published locality record.

**Distribution in USA.** FL, IN, MA, ME, MI, NY, OR, WA (Downie and Arnett 1996, Klimaszewski et al. 2010).

**First Canadian records.** Grimsby, ON before 1900 (DEBU); Peachland, BC in 1919 (UBC); Montreal, QC in 1969 (CNCI); and Pictou, NS in 2002 (NSNR).

**First North American records.** Near Corvallis, OR in 1949 (Walters and Roth 1950).

**Habitat data.** In NS, it was found feeding on mouldy corncobs in a compost heap (Majka and Cline 2006b). In Oregon, it was collected (identified as *Arthrolips decolor* (LeConte)) in the nest of a woodrat (Walters and Roth 1950). In Europe, it occurs,

often in very large numbers, on mouldy plant remains in warm places, especially in compost and grass cuttings (Bowestead 2007).

**Family LATRIDIIDAE** Erichson [the minute brown scavenger beetles]

**Diagnosis.** Body length 1.0-3.0 mm, elongate to elongate-oval, flattened to slightly convex, ranging in colour from uniformly pale testaceous, to piceus, rarely bicolored, surface glabrous and rugosely sculptured and/or carinate [Latridiinae] to pubescent and reasonably smooth [Corticariinae]; head prognathous, oval to trapezoidal, not concealed from above, occasionally with carinae or foveae; clypeus separated from frons by distinct suture and on a lower plane [Latridiinae] to clypeus separated from frons by an indistinct suture on the same plane [Corticariinae]; eyes usually protuberant and coarsely faceted; antennal bases widely separated, antennae with 10-11 antennomeres with a club bearing 2-3 sensillae; pronotum wider than head and variously shaped, from trapezoidal or highly constricted medially to hemispherical or completely oval, punctation fine to coarse, often with carinae; prosternum convex, occasionally foveate; prosternal process complete to lacking, keel-like in some genera; procoxal cavities circular, narrowly separated to contiguous, usually closed behind; elytral base wider than base of pronotum, oval, usually covering entire abdomen, apex usually rounded, punctate in regular striae or irregularly punctate, often with interstriae raised or carinate; hind wings variously developed, from completely absent to fully developed; abdomen with with 5-6 visible sternites, occasionally with a fovea present between metacoxae or in middle of first ventrite; many species exhibit sexual dimorphism with males having either enlarged profemur, development of a median tibial tooth, or tarsal formula usually 2-3-3, females exhibit simple femora and tibia with 3-3-3 tarsal formula; male genitalia variable, usually composed of a large, simple, and curved tube.

**Subfamily LATRIDIINAE** Erichson

**71.** ***Adistemia watsoni*** (Wollaston)
(Figs. 71, 92a, b, Map 59)

**Diagnosis.** Body length 1.0-1.7 mm, elongate and narrow, slightly dorso-ventrally flattened, colour variable, from uniformly pale testaceous to rufo-testaceous; head elongate with small trapezoidal clypeus and large bilobed labrum; eyes small, composed of 6-8 irregularly placed coarse facets; pronotum narrowly elongate, trapezoidal, widest near apex, slightly wider than maximum head width, strongly convergent basally; elytra elongate oval with 8 striae, intervals 3 and 7 carinate, coarsely and distinctly punctate; front coxae contiguous; mesosternum, metasternum and abdominal

sternites coarsely and distinctly punctate; metasternum fused to first abdominal sternite, abdomen appearing 4-segmented; aedeagus a simple curved tube, apex flattened and broadly rounded, base with two long, slender, more or less parallel basal apophyses which are longer than the apical tube (Figs. 92a, b).

**Native range.** Palaearctic; adventive in Africa, New Zealand, and the neotropics (Chile, Honduras, Mexico, Venezuela) (Watt 1969, Downie and Arnett 1996, Johnson 2007).

**Distribution in Canada.** ON, QC (Bousquet et al. 2013).

**Distribution in USA.** DC (Downie and Arnett 1996).

**First Canadian records.** Ottawa, ON in 1974 (LFC) and Lac des Étangs and Sainte-Foy, QC in 1999 (LFC).

**First North American records.** As above.

**Habitat data.** It is found in stored food products where it feeds on spores and hyphae of moulds (Hoebeke and Wheeler 1983).

**72. *Cartodere bifasciata*** (Reitter)
(Fig. 72, Map 59)

**Diagnosis.** Body length 2.0-2.1 mm, reddish-brown with blackish spots on pronotum and elytra; antennal club 3-segmented with segments narrowly elongate; pronotum with constriction in basal third; elytra broadly oval with angular shoulders and without distinct gibbosities or depressions, alternate intervals feebly convex but not carinate; aedeagus similar to *C. constricta* except the apex is slightly more sinuate and overall generally wider and more stout (based on internet photo found at http://www.galerie-insecte.org/galerie/ref-117144.htm; accessed 12 September 2014).

The unique coloration and form of the elytra distinguish this species.

**Native range.** Australia; adventive in Europe, Morocco and Turkey (Johnson 2007, Majka et al. 2009).

**Distribution in Canada.** NS, PE (Majka et al. 2009). Although previously recorded from PE, we were unable to locate a specimen or published record.

**Distribution in USA.** No known records.

**First Canadian records.** Halifax, NS in 1989 (Majka et al. 2009; NSMC).

**First North American records.** As above.

**Habitat data.** In Europe, it is found in habitats ranging from forested to grassy terrain, with slight preference for open habitats and fire-damaged woodland (Majka et al. 2009). It is found in decaying organic material such as litter, mouldy bark, wood, hay, and straw debris (Reemer 2003, Majka et al. 2009).

**Comments.** This species was introduced into Europe (Germany) in tobacco imported from Australia (Majka 2009 and references therein). It is likely that the introduction into Canada came from Europe rather than from Australia.

**73. *Cartodere constricta*** (Gyllenhal)
(Figs. 73, 93a, b, Map 60)

**Diagnosis.** Body length 1.5-1.6 mm, uniformly reddish-brown, often with darker fore-body; antenna with 2-segmented club; pronotum strongly constricted in basal fourth; elytra broadly oval without gibbosities or impressions; aedeagus consists of a single tube, acutely reflexed to approximately 60°, apex broadly rounded and flattened, basal spicule simple (Figs. 93a, b).

The combination of a 2-segmented antennal club and a unique pronotal shape are diagnostic for this species.

**Native range.** Palaearctic; now cosmopolitan (Majka et al. 2009).

**Distribution in Canada**. AB, BC, LB, MB, NB, NF, NS, ON, PE, QC, SK, YT (Bousquet et al. 2013). This species is newly reported from LB (Muskrat Falls and Middle Brook; MUN) and YT (Dawson City; DEBU).

**Distribution in USA.** AZ, CA, FL, ID, IL, IN, MA, MI, MN, NC, NH, OR, RI, SC, VA, WA, WY (Majka et al. 2009).

**First Canadian records.** Winnipeg, MB in 1916 (CNCI); Montreal, QC in 1929 (CNCI); Vancouver, BC in 1933 (UBC); Belleville and Mer Bleue, ON in 1936 (CNCI); Halifax, NS in 1951 (CNCI); Rouleau, SK in 1953 (CNCI); Lacombe, AB in 1953 (NOFC); and Dawson City, YT in 1988 (DEBU) (Majka et al. 2009).

**First North American records.** IL (unspecified locality) before 1855 (LeConte 1855).

**Habitat data.** This species is frequently associated with stored food products, including grain (Bousquet 1990a). It is also found in houses, feed mills, grain elevators, and occurs in vegetative detritus such as herbaceous vegetation, straw, and grass (Hatch 1961). It was recorded in Canadian cargo ships carrying wheat (Aitken 1975). The species is also frequently found in native habitats such as forests (Majka et al. 2009).

**74. *Cartodere nodifer*** (Westwood)
(Figs. 74, 94a, b, Map 61)

**Diagnosis.** Body length 1.5-1.7 mm, dark brown with reddish fore-body and reddish patches on elytra; antennal club 3-segmented; pronotum strongly constricted behind the middle; elytra broadly oval, surface distinctly wavy, intervals 3, 5 and 7 strongly carinate, the third interval with transverse, shallow depressions and a longitudinal swelling on the apical third; aedeagus consists of a single tube, acutely reflexed to approximately 80°, apex cuspidate and narrowly rounded, basal spicule bifurcate both basally and apically (Figs. 94a, b).

The elytral character is unique among species of this genus. This species is atypical compared to other *Cartodere* in that there is external sexual dimorphism; males differ from females in having a large accessory tooth along the inside edge of the metatibia near the apex, whereas females have simple metatibia.

**Native range.** Likely of palaearctic origin; now cosmopolitan (Johnson 2007).

**Distribution in Canada.** BC, MB, NB, NS, ON, PE, QC (Bousquet et al. 2013).

**Distribution in USA.** CA, NC, NH, OR, RI, VA, WA (Majka et al. 2009).

**First Canadian records.** Winnipeg, MB in 1919 (CNCI); Vancouver, BC in 1926 (UBC); and Kentville, NS in 1952 (Majka et al. 2009).

**First North American records.** CA, OR, VA, WA before 1894 (Hamilton 1894, Fall 1899).

**Habitat data.** This species is frequently associated with stored food products such as grains, but it also occurs under bark, and in mouldy wood, leaf compost, vegetable refuse, moss, stacks of wood, haystacks, mouldy corn cobs and corn husks, cellars, nests of Hymnoptera and wood rats (Hinton 1945, Hatch 1962, Bousquet 1990a, Webster et al. 2012). It feeds on filamentous fungi (Lawrence and Newton 1980). It was also recorded in Canadian cargo ships carrying wheat (Aitken 1975). In Atlantic Canada, this species was collected in forests using flight intercept traps (Majka et al. 2009, Webster et al. 2012).

**Comments.** The population on the west coast of North America may represent an independent introduction event.

**75. *Dienerella argus*** (Reitter)
(Figs. 75, 95a, b, Map 62)

**Diagnosis.** Body length 2.3-2.6 mm, narrowly oval and reddish-brown; antennal club 3-segmented; eyes moderately large and occupy hind angles of head so that the temples appear absent; head broad and produced in front of eyes; pronotum broadest in apical third, lateral margin slightly serrated, two distinct fovea present near posterior angles of disc; aedeagus consists of a single reflexed tube which is somewhat dorso-ventrally flattened, apex narrowly pointed and slightly flattened, base with two long, slender, convergent basal apophyses which are subequal in length to the apical tube (Figs. 95a, b).

**Native range.** Palaearctic (Johnson 2007).

**Distribution in Canada.** MB, NB, NS, ON, PE, QC (Bousquet et al. 2013). This species is reported for the first time from MB (Wanless and Pilot Mound; CNCI, UMAN).

**Distribution in USA.** CA, MI, MT, OR (Fall 1899, Majka et al. 2009).

**First Canadian records.** Ottawa, ON in 1932 (CNCI); Wanless, MB in 1960 (CNCI); Halifax, NS in 1970 (NSMC); Bunbury, PE in 1970 (CNCI); Vanier, QC in 1980 (CNCI).

**First North American records.** Pomona, CA; Detroit, MI; Bonner, MT; and Le Grande, OR before 1899 (Fall 1899).

**Habitat data.** This species is found in association with stored grain, in ground cereals, on strips of drying yucca pith, in drug stores and in wheat fields (Fall 1899, Hinton 1945, Bousquet 1990a).

**76. *Dienerella costulata*** (Reitter)
(Figs. 76, 96a, b, Map 63)

**Diagnosis.** Body length 2.1-2.3 mm, oval, light rusty-brown; antennal club 3-segmented, segments elongate; eyes very small near base of head but distant from posterior angles of head, consisting of 4-6 facets; elytra intervals 3, 5 and 7 slightly carinate, stria 8 punctate on apical half; aedeagus consists of a single reflexed tube, apex nar-

rowly pointed and slightly flattened, base with two long, slender and parallel sub-basal apophyses which are subequal in length to the apical tube (Figs. 96a, b).

**Native range.** Western palaearctic (Johnson 2007).

**Distribution in Canada.** MB, NS, ON, PE, QC, SK (Bousquet et al. 2013).

**Distribution in USA.** MA, MI, PA (Majka et al. 2009).

**First Canadian records.** Winnipeg, MB in 1916 (CNCI); Toronto, ON in 1929 (CNCI); Montreal, QC in 1938 (CNCI); and Charlottetown, PE in 1986 (ACPE).

**First North American records.** Lowell, MA; Detroit, MI; and PA (unspecified locality) before 1899 (Fall 1899).

**Habitat data.** It was collected in granaries, cellars, and drug stores, and is associated with various dried food products (Fall 1899, Hinton 1945).

**Comments.** The genitalia of the three male specimens of putative *D. costulata* from North America that were examined had a basally forked ventral spicule, which has not been observed in specimens from the Palaearctic region. Thus, these specimens may be a different species. A thorough study of this genus is required to ascertain whether *D. costulata* is present in North America.

77. ***Dienerella filiformis*** (Gyllenhal)
(Figs. 77, 97a, b, Map 64)

**Diagnosis.** Body length 2.3-2.5 mm, narrowly oval, uniformly rusty-brown; antennal club 3-segmented, basal articles transverse; eyes small and coarsely faceted; pronotum broadest in apical third, basal two-thirds of margin straight and entire; elytra with intervals 3, 5 and 7 flat, seven punctate striae present in apical half of each elytron, striae 5 and 6 converge near middle and then separate again basally; aedeagus consisting of a single reflexed tube, apex narrowly pointed and highly flattened and somewhat longer than in other species, base with two long, slender and parallel basal apophyses which are subequal to or slightly longer than the length of the apical tube (Figs. 97a, b).

The unique shape of the pronotum and the elytra with flattened elytral intervals and coalescing striae 5 and 6 diagnose this species.

**Native range.** Palaearctic (Johnson 2007).

**Distribution in Canada.** MB, NS, ON, QC, SK, (Bousquet et al. 2013). This species is recorded for the first time from ON (Vineland; DEBU). This species was removed from the faunal lists of NB and PE by Majka et al. (2009) as earlier records were based on misidentified specimens.

**Distribution in USA.** MO, PA (LeConte 1855, Majka et al. 2009).

**First Canadian records.** Vineland, ON in 1939 (DEBU); Dominion City and Winkler, MB in 1964 (UMAN); Quebec, QC in 1972 (UMAN); and New Ross, NS in 1989 (NSMC).

**First North American records.** Unspecified locality in MO and Philadelphia, PA before before 1855 (LeConte 1855).

**Habitat data.** It is commonly found in granaries, grain elevators, old flour barrels, wine cellars, and homes (Hinton 1945, Bousquet 1990a). In NS, it was reported from stored grain on a farm (Majka et al. 2009). This species feeds on filamentous fungi including slime moulds (Reticulariceae) (Hinton 1945).

**78. *Dienerella filum*** (Aubé)
(Figs. 78, 98a, b, Map 65)

**Diagnosis.** Body length 2.5-2.7 mm, narrowly oval, uniformly dark rusty-brown; antennal club 2-segmented, with basal article transverse and last elongate; eyes large and coarsely faceted; head with median longitudinal impression; pronotum broadest in apical fourth, slightly constricted in basal third, with broad median oval depression in anterior half of the disc; aedeagus consists of a single reflexed tube which is somewhat dorso-ventrally flattened, apex twisted dorso-ventrally, very narrowly pointed and flattened, base with two slender, slightly convergent, basal apophyses which are approximately one-third the length of the apical tube (Figs. 98a, b).

The combination of the 2-segmented antennal club, large eyes, and unique head and pronotal shape distinguish this species.

**Native range.** Palaearctic; adventive in Greenland, Australia and the neotropics (Böcher 1988, Johnson 2007).

**Distribution in Canada.** AB, BC, MB, NF, NS, ON, QC, SK (Bousquet et al. 2013). This species is newly recorded from AB (three localities; NOFC). Although previously reported from SK, we could not locate any specimens or published locality records.

**Distribution in USA.** AR, CA, CO, MI, NY, WA (Majka et al. 2009).

**First Canadian records.** Ottawa, ON before 1899 (Fall 1899); Winnipeg, MB in 1919 (CNCI); Vancouver, BC in 1951 (UBC); North of Maycroft, AB in 1962 (NOFC); Halifax, NS in 1966 (NSMC); and Vanier, QC in 1980 (CIQ).

**First North American records.** CO and NY before 1899 (Fall 1899).

**Habitat data.** This species is found in association with stored grains and in mouldy plant and animal material (Böcher 1988). It feeds on hyphae and spores of filamentous fungi (Ustilaginaceae, Tilletiaceae, Ascomycetes, Physaraceae, Lycoperdaceae), and spores of slime moulds (Hinton 1945, Lawrence and Newton 1980). It has recently been reported as a potential pest of air-conditioning and refrigeration systems (Carlton 1988).

**79. *Dienerella ruficollis*** (Marsham)
(Figs. 79, 99a, b, Map 66)

**Diagnosis.** Body length 2.1-2.2 mm, oval, dark rusty-brown with paler fore-body; antennal club 3-segmented, with segments elongate; eyes small with about 20 coarse facets; head evenly broad in front of eyes; pronotum broadest in apical third, strongly constricted in basal third, sides of pronotum are often covered with a waxy exudate; elytra with six deeply punctured striae, intervals 4 and 5 slightly carinate, margins slightly serrate especially in basal half; aedeagus consisting of a single robust tube, apex strongly recurved and dorso-ventrally twisted, narrowly rounded and slightly flattened, base with two slender, convergent basal apophyses which are about half the length of the apical tube (Figs. 99a, b).

**Native range.** Palaearctic; adventive in North and South America and New Zealand (Archibald and Chalmers 1983, Bousquet 1990a, Johnson 2007).

**Distribution in Canada.** BC, NB, NF, NS, ON, PE, QC (Majka et al. 2009, Webster et al. 2012, Bousquet et al. 2013). This is the first record of this species from PE (Bunbury, UMAN).

**Distribution in USA.** IN, MA, NY, OR (Majka et al. 2009).

**First Canadian records.** Grimsby, ON before 1900 (DEBU); Salmon Arm and Victoria, BC in 1932 (CNCI); Grafton, NS in 1951 (NSAC); Montreal, QC in 1955 (CNCI); Bunbury, PE in 1971 (UMAN); and Portugal Cove, NF in 1980 (MUN).

**First North American records.** Central and southern USA (unspecified localities) before 1889 (Fauvel 1889).

**Habitat data.** This species is found in granaries, grain elevators, flour mills, houses, museums, haystacks, and barns in association with stored grains, dried dung, bird nests, refuse, fungi, and mouldy paper (Hinton 1945). In NB, a large series was collected in a bulk milk tank (Webster et al. 2012).

**Comments.** The genitalia of the two male specimens of putative *D. ruficollis* from North America that were examined had a basally fine, forked ventral spicule, which has not been observed in specimens from the Palaearctic region. Thus, these specimens may be a different species. A thorough study of this genus is required to ascertain whether *D. ruficollis* is present in North America.

The disjunct distribution of this species in North America suggests two separate introduction events, one in the east and one in the Pacific Northwest.

**80. *Enicmus histrio*** Joy & Tomlin
(Fig. 80, Map 67)

**Diagnosis.** Body length 1.4-1.7 mm, usually uniformly reddish-brown; antennal club 3-segmented, basal two segments subquadrate to slightly transverse; pronotum with lateral margins parallel or weakly convex, not broader at middle than at apex or base; elytra broadly oval with eight striae with deep and large punctures, intervals slightly carinate, stria 6 not reaching elytral base, separated by slightly elevated impunctate area; aedeagus consists of a single, slightly dorso-ventrally flattened tube, apex narrowly rounded and pointed, tip slightly reflexed, base strongly tapered into a single, slender apophysis which is slightly shorter than apical tube and forked apically (from internet photo (Abb. 32) at http://www.coleo-net.de/coleo/texte/enicmus.htm, accessed 17 September 2014).

The shape of the pronotum distinguishes this species.

**Native range.** Palaearctic; adventive in neotropical and Australian regions (Johnson 2007, Rücker 2007).

**Distribution in Canada.** NB, NS (Bousquet et al. 2013).

**Distribution in USA.** No known records.

**First Canadian records.** Sydney, NS in 1996 (CBU).

**First North American record**. As above.

**Habitat data.** It is found in damp or mouldy straw, hay, and cut grass, and also associated with other vegetable refuse and on stored wheat (Hinton 1945). In NS, specimens were collected in the nest of a barred owl, *Strix varia* Barton.

**Comments.** This species is known in North America only from two localities and three specimens so it seems to be relatively rare.

**81. *Latridius hirtus*** Gyllenhal
(Figs. 81, 100a, b, Map 67)

**Diagnosis.** Body length 1.6-1.8 mm, dark brown to black, with mouthparts, antennae, tibiae, tarsi and elytral margins slightly paler, reddish; antennal club 3-segmented, segments slightly elongate and somewhat rounded; pronotum widest apically, and converging gradually towards base, anterior angles produced and rounded, and with three large impressions merging basally; elytra broadly oval, with long suberect to erect setae, elytral strial punctures small and shallowly impressed; last male abdominal tergite slightly sinuate; aedeagus consisting of a single robust tube, apex strongly pointed, slightly twisted, and slightly flattened, base strongly tapered into a single, slender apophysis which is slightly shorter than apical tube, with a slender largely forked, ventral spicule (Figs. 100a, b) and NB (15 km west of Tracy; RWC).

**Native range.** Palaearctic (Johnson 2007).

**Distribution in Canada.** AB, BC, MB, NB, ON, QC (Bousquet et al. 2013). This species is recorded for the first time from AB (39 km west of Red Earth Creek; NOFC).

**Distribution in USA.** No known records.

**First Canadian records.** Creston, BC in 1948 (UBC); Black Sturgeon Lake, ON in 1956 (CNCI); Gatineau Park, QC in 1966 (CNCI); and Thompson, MB in 1988 (NOFC).

**First North American records.** As above.

**Habitat data.** In MB, specimens were reared from recently dead jack pine killed by jack pine budworm, *Choristoneura pinus* Freeman. In AB, specimens were collected in flight intercept traps attached to a dead *Populus tremuloides* Michx. In BC, specimens were found on lumber and collected from *Populus trichocarpa* (UBC).

**82. *Latridius minutus*** (Linnaeus)
(Fig. 82, Map 68)

**Diagnosis.** Body length 1.2-2.4 mm, brown, with antennae, mouthparts, legs, and the margins of the pronotum and elytra paler, reddish; antennal club 3-segmented, two basal segments subquadrate to transverse, apical segment laterally pointed; pronotum broadest apically with lateral margins converging posteriorly, front angles rounded and slightly produced, basal part of disc with two lateral fovea joined by a transverse impression; elytra broadly oval, intervals slightly carinate and sinuate posteriorly, two rows of punctures present on both sides between interval 7 and the lateral margin of elytra; metasternum with two pits posterior of mesocoxae, moderately pubescent, with medium length setae (Rücker 2006, page 22, Fig. 8); last male abdominal tergite broadly excavate (Rücker 2006, page 21, Fig. 5); aedeagus consisting of a single robust tube, apex strongly pointed, slightly twisted, and slightly flattened, base gradually tapered into an elongate, bifurcate fork (Rücker 2006, page 21, Fig. 2).

The Palaearctic *Latridius minutus*, *L. porcatus* (Herbst) (= *L. anthracinus* Mannerheim) and *L. pseudominutus* (Strand) can be identified by a combination of the aedeagus and the last abdominal tergite (see Rücker 2006).

**Native range.** Palaearctic (Johnson 2007).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, ON, PE, QC, SK (Bousquet et al. 2013). This species is newly recorded from ON (numerous localities; CNCI, DEBU).

**Distribution in USA.** AK, CA, CO, DC, ID, IL, LA, MA, MD, ME, MI, MN, NH, NJ, NY, OR, PA, TX, WA, WI, WY (Majka et al. 2009).

**First Canadian records.** Ferryland, NF from 1620-1696 (Bain and Prévost 2010); Quebec City, QC 1675-1699, 1700-1725 (Bain et al. 2009, Bain and King 2011); Hastings, ON in 1897 (CNCI); Merritt, BC in 1924 (UBC); Winnipeg, BC in 1916 (CNCI); and Saskatoon, SK in 1938 (UMAN).

**First North American records.** As above.

**Habitat data.** This species is the most common latridiid associated with stored food products including grains, and it is especially frequent in putrid, mouldy vegetables and decaying hay and grass (Bousquet 1990a, Rücker 2004). It has been recorded on Canadian cargo ships carrying wheat, flour, and linseed meal (Aitken 1975). It is found in buildings, nests of Hymenoptera and birds, manure heaps, decomposing fungi, wood stacks, and on various mouldy objects, where it feeds on filamentous fungi (Hinton 1945, Lawrence and Newton 1980). In Atlantic Canada, the species has been reported from native habitats such as red

spruce and balsam fir forests (Majka et al. 2009), and was found under the bark of a dead sugar maple (Webster et al. 2012). In BC, it was reared from dead wood of subalpine fir, Engelmann spruce, lodgepole pine, ponderosa pine, and western white pine (Hatch 1962).

**Comments.** Prévost and Bain (2007) found remains of *L. minutus* in a latrine excavated in Ferryland, NF, originating from 1620-1696 which is the earliest record for this species in North America. This species was distributed throughout Canada at least a century ago.

**83. *Stephostethus lardarius*** (DeGeer)
(Figs. 83, 101a, b, Map 69)

**Diagnosis.** Body length 2.3-2.8 mm, usually uniformly reddish-brown; antennae with an inconspicuous 3-segmented club, segments slightly narrowly elongate with apical segment transversely enlarged; head width at eye level about equal to width of pronotum at middle; pronotum with sides weakly concave near middle, width at the constriction nearly equal to or greater than length of pronotum; elytra broadly oval, slightly produced apically, shoulders slightly angular, strial punctures large, intervals slightly elevated; last abdominal male tergite and sternite fused into a large bulbous structure containing the genitalia; aedeagus consisting of a single tube, apex strongly flattened, tip elongate and broadly rounded, gradually expanding basally in lateral view (Figs. 101a, b).

Males of *Stephostethus* species differ from females in that they have an apical tooth or spine present at apex of protibia (often meso- and metatibia as well), or if tibial teeth are absent then the first pro-tarsomere (often the first meso- and meta-tarsomere as well) is expanded. Females do not have any modification of the tibia and tarsomeres.

**Native range.** Palaearctic (Johnson 2007).

**Distribution in Canada.** NF (Bousquet et al. 2013).

**Distribution in USA.** Not known from USA.

**First Canadian records.** St. John's, NF in 1949 (CNCI, MUN).

**First North American records.** As above.

**Habitat data.** This species was recorded from houses, beds, vegetable refuse, and moss (Hinton 1945).

**Comments.** This species seems to be confined to St. John's. It is still persisting there as it was found on three occasions in 1997 (AASJ).

**84. *Stephostethus productus*** Rosenhauer
(Fig. 84)

**Diagnosis.** Body length 1.7-1.8 mm, dark reddish-brown, antennae, mouthparts and legs paler yellowish-red; antennae short, about as long as length of head and pronotum combined, with inconspicuous 3-segmented club, basal antennomere elongate, apical antennomeres slightly transverse; head width at eyes broader than width of pronotum at middle; pronotum with strong middle constriction, anterior angles strongly produced horizontally; elytra oval, sixth interval carinate in basal two-thirds and extending onto humeral angle, striae with medium sized punctures that are shallowly impressed, medium-length pubescence sparsely distributed and suberect to erect.

No male specimens were available to examine the genitalia.

**Native range.** Southwestern palaearctic (Johnson 2007).

**Distribution in Canada.** Although this species was initially reported from NB by Webster et al. (2012), that was an error.

**Distribution in USA.** NY? (Downie and Arnett 1996).

**First Canadian records.** Not present in Canada.

**First North American records.** North America (unspecified locality) before 1889 (Fauvel 1889).

**Habitat data.** Unknown.

**Comments.** There have been only one reported collection of this species in North America. The record of *S. productus* from NY is questionable and cannot be confirmed, and the record from NB represents misidentification of *L. hirtus*. *Stephostethus productus* is therefore removed from the NB and Canadian species list.

**85. *Thes bergrothi*** (Reitter)
(Figs. 85, 102a, b, Map 69)

**Diagnosis.** Body length 1.7-1.8 mm, reddish-brown; antennal club 3-segmented, segments slightly elongate; pronotum slightly broadening apically, subquadrate, front angles slightly produced anteriad and pointed apically, basal part of disc impressed; elytra broadly oval, with no distinct pubescence, costae between rows of punctures elevated, four rows of punctures present on both sides between the seventh interval and the

lateral margin of elytra; aedeagus consists of a simple, single tube which is strongly dorso-ventrally flattened, apex varies from weakly-to-strongly aciculate and elongate with a smaller flattened and often-twisted, lightly sclerotized plate, basal spicule present (sometimes fused to base of aedeagus) with both apex and base bifurcate (Figs. 102a, b).

A second species, *Thes laeviventris* (Fall 1899), is recognized in North America (Walkley 1952). This rare species was originally described in the genus *Enicmus*, from a single specimen collected from Astoria, Oregon. It differs from *T. bergrothi* in that it is entirely rufo-testaceous, has an overall smaller body size (<1.5 mm), elytral intervals 3 and 5 are not strongly elevated and only interval 7 is elevated and carinate along its entire length.

**Native range.** Palaearctic; adventive in Greenland and Africa (Böcher 1988, Johnson 2007, Rücker 2007).

**Distribution in Canada.** BC, MB, NB, NS, QC, SK (Bousquet et al. 2013). This species is recorded for the first time from QC (four localities; CIQ).

**Distribution in USA.** Unknown.

**First Canadian records.** Montreal, QC in 1915 (CIQ); Winnipeg, MB in 1916 (CNCI); Saskatoon, SK in 1926 (CNCI); Vancouver, BC in 1948 (Hatch 1962); and Sable Island, NS in 1967 (CNCI).

**First North American records.** See above.

**Habitat data.** This species is commonly associated with stored food products, damp or mouldy houses, cellars, warehouses, kitchens, granaries, where it is found on flour, mouldy wallpapers, dried plants, leather, mouldy wine vats, cheese, and dried cocoa (Hinton 1945, Böcher 1988, Bousquet 1990a). In NS, it was found in straw (Majka et al. 2009).

## Subfamily CORTICARIINAE

### 86. *Corticaria elongata* (Gyllenhal)
(Fig. 86, Map 70)

**Diagnosis.** Body length 1.3-1.8 mm, dark brown to uniformly reddish-brown or reddish-yellow; head with large eyes that encompass most of the lateral side of the head, temples very tiny and angulate; antennal club 3-segmented, antennomere II strongly transverse; pronotum subquadrate to rectangular, margins serrate, posterior angles with small spines; elytra with margins parallel for most of length, intervals with single row of

fine punctures, pubescence inconspicuous; aedeagus consisting of a single tube, overall form spatulate, strongly dorso-ventrally flattened, apex broadly rounded, with forked ventral accessory spicule fused behind apical third (Majka et al. 2009, page 359, Fig. 43).

Males of *Corticaria* species differ from females by having a small apical tooth or spine present at the apex of the pro-tibia (often meso- and meta-tibia as well), or if tibial teeth are absent then the first pro-tarsomere (often the first meso- and meta-tarsomere as well) is expanded and heart shaped. Females do not have any modification of the tibia and tarsomeres.

**Native range.** Western palaearctic; now cosmopolitan (Johnson 2007).

**Distribution in Canada.** LB, NB, NF, NS, ON, QC, SK (Bousquet et al. 2013). This species is recorded for the first time from LB (Muskrat Falls; MUN), ON (five localities; DEBU) and QC (numerous localities; CIUL, CIQ).

**Distribution in USA.** CA, FL, IA, ID, IN, MA, MI, NH, NJ, NY, OR, PA, WA (Majka et al. 2009).

**First Canadian records.** Saguenay, QC in 1879 (CIUL); Ridgeway, ON before 1900 (DEBU); Marion Bridge, NS in 1966 (AASJ); and Mount Pearl, NF in 1980 (AASJ).

**First North American records.** See above; MA, MI and PA (unspecified localities) before 1889 (Fauvel 1889).

**Habitat data.** It is frequently found in stored food products in warehouses, grain elevators, and food mills (Hatch 1961, Bousquet 1990a), and in decomposing hay and grass, moss, vegetable detritus, dry fungus, birds' nests and on trees and branches (Hinton 1945, Hicks 1959, Rücker 2007). In NB, it was found in skim milk powder (Webster et al. 2012).

**87. *Corticaria impressa*** (Olivier)
(Fig. 87, Map 71)

**Diagnosis.** Body length 2.2-2.5 mm, dark brown to blackish, with mouthparts, antennomeres I-IX, legs and tarsi paler, reddish-brown to yellowish-brown; antennal club 3-segmented, segments elongate, first antennal segment distinctly longer than wide; head strongly narrowed in front of eyes, eyes small, temples small but distinct; pronotum slightly elongate, arcuate laterally with margins crenulate, broadest at middle of disc and narrowest at base; elytra oval with sides broadly arcuate, shoulders rounded, intervals more finely punctate than striae, pubescence conspicuous and recumbent;

aedeagus consisting of a single tube, overall form narrow and pointed, dorso-ventrally flattened, apex pointed and narrowly rounded and slightly elongate, with forked ventral accessory spicule fused behind apical third to half, internal sac with conspicuous diamond shaped teeth (Majka et al. 2009, page 359, Fig. 45).

**Native range.** Palaearctic (Johnson 2007).

**Distribution in Canada**. BC, NB, NS, ON, QC (Bousquet et al. 2013). This species is recorded for the first time from ON (Elora and Fathom Five National Park; DEBU) and QC (Lévis; CIUL).

**Distribution in USA.** No known records.

**First Canadian records.** Lévis, QC from 1880-1889 (CIUL); Creston, BC in 1951 (Majka et al. 2009); South Harbour Beach, NS in 1983 (CNCI); and Kent Island, NB in 1990 (Majka et al. 2009).

**First North American records.** As above.

**Habitat data.** In Europe, this species was found in swamps and moist forests (Peez 1967). In NS, adults were collected in a raised bog with pitfall traps, on the edge of a marsh, in a young white pine forest and on coastal beaches (Majka et al. 2009).

**Comments.** The record in BC likely represents an independent introduction event.

**88. *Corticaria pubescens*** (Gyllenhal)
(Fig. 88, Map 72)

**Diagnosis.** Body length 2.3-3.0 mm, dark brown to dark reddish-brown, with antennomeres I-VIII, tibia and tarsomeres often paler, reddish-brown; antennal club 3-segmented, segments distinctly elongate; head with eyes moderate in size; temples moderate in size, angulate; pronotum slightly elongate, broadest at middle of disc, sides broadly arcuate and serrated; elytra narrowly oval, shoulders rounded, pubescence conspicuous, setae of intervals longer and stouter than those of striae, erect to suberect; mesocoxae separated by one-third to one-quarter of their diameter; aedeagus consists of a single tube, overall form narrow and pointed, dorso-ventrally flattened, apex pointed and narrowly rounded and elongate, apical third strongly reflexed ventrally, with forked ventral accessory spicule fused behind apical third to half, internal sac with conspicuous triangular shaped teeth in basal half (Majka et al. 2009, page 360, Fig. 46).

**Native range.** Palaearctic; adventive in sub-Saharan Africa and Australia (Johnson 2007).

**Distribution in Canada.** AB, BC, MB, NS, ON, QC, SK (Bousquet et al. 2013). This species is recorded for the first time in AB (Waterton Lakes National Park; CNCI), MB (Aweme and Riding Mountain National Park; UMAN, CNC) and QC (Roberval and Duchesnay; CIQ).

**Distribution in USA.** IA, ID, IL, MA, MI, NY, PA, WA (LeConte 1855, Majka et al. 2009).

**First Canadian records.** Sudbury, ON in 1889 (CNCI); Aweme, MB in 1919 (UMAN); Creston, BC in 1931 (UBC); Roberval, QC in 1937 (CIQ); and Waterton Lakes National Park, AB in 1980 (CNCI).

**First North American records.** Cambridge, MA before 1855 (LeConte 1855); MA and MI (unspecified localities) before 1889 (Fauvel 1889).

**Habitat data.** This species is frequently associated with stored food products such as grains. It also occurs in haystacks, flood debris, decaying seaweed, moss, hay, straw, vegetable detritus, old birds' nests, houses, and on tree bark (Hinton 1945, Bousquet 1990a).

**89. *Corticaria saginata*** Mannerheim
(Fig. 89, Map 73)

**Diagnosis.** Body length 1.5-1.8 mm, dark brown to entirely blackish, with antennae, legs and tarsi often reddish-brown; head shape triangular, eyes moderate in size and slightly protruding, temples small and angulate; antennal club 3-segmented with basal two segments transverse; pronotum transverse, broadest at middle, arcuate laterally and strongly converging near base of disc giving a heart shaped appearence, lateral margins coarsely serrate with large teeth and basal angles; elytra elongate-oval, lateral margins arcuate and gradually converging posteriorly into a round apex, punctures small and shallowly impressed, pubescence conspicuous and recumbent; aedeagus consisting of a single tube, overall form robust, narrow and blunt, apex blunt broadly rounded to slightly angulate, slightly elongate, apex strongly curved ventrally, with forked ventral accessory spicule fused behind apical third to half (Majka et al. 2009, page 360, Fig. 48).

The distinctive oval shape of the elytra, coarsely serrate lateral margins of the pronotum, and triangular head distinguish this species from congeners.

**Native range.** Palaearctic (Johnson 2007).

**Distribution in Canada.** NB, NS, QC (Bousquet et al. 2013). This species is reported for the first time from QC (Quebec City; CIQ).

**Distribution in USA.** No known records.

**First Canadian records.** Annapolis Royal, NS in 1924 (CNCI); Taxis, NB in 1967 (CNC); and Quebec City, QC in 1983 (CIQ).

**First North American records.** As above.

**Habitat data.** This species is found in decomposing hay, sometimes on heaths under heather, *Calluna vulgaris* (L.) Hull (Ericaceae), and broom, *Cytisus scoparius* (L.) Link. (Fabacaeae) (Peez 1967). In NB, it was found on bracket fungi (Majka et al. 2009).

**90. *Corticaria serrata*** (Paykull)
(Fig. 90, Map 74)

**Diagnosis.** Body length 1.7-2.3 mm, dark reddish-brown to dark brown, often antennae, head, pronotum, legs and tarsi paler than elytra, reddish brown; head with large rounded eyes, temples very tiny to obsolete and rounded; antennal club 3-segmented, basal two segments subquadrate to slightly transverse; pronotum slightly transverse, broadest at middle, arcuate laterally and slightly more converging basally than apically, lateral margins coarsely serrate (10-12 large teeth), anterior half of disc with punctures wider than facets of eyes and seldom separated by as much as one diameter; elytra elongate, narrowly oval, sides at middle slightly arcuate, nearly straight, apex rounded, punctures on intervals near base of disc almost as coarse as strial punctures, punctures on median portion of disc at least half the size of strial punctures; aedeagus consists of a single tube, overall form robust, broad, apex broadly rounded and strongly curved ventrally, with forked ventral accessory spicule fused behind apical third to half (Majka et al. 2009, page 360, Fig. 49).

The coarsely serrate pronotum and large rounded eyes distinguish this species from congeners.

**Native range.** Palaearctic; now cosmopolitan (Johnson 2007).

**Distribution in Canada.** AB, BC, MB, NB, NF, NS, ON, PE, QC, SK (Bousquet et al. 2013). This species is reported for the first time from AB (numerous localities; NOFC, UASM), MB (Winnipeg; UMAN), ON (four localities; DEBU) and NB (near Tracy). Although previously recorded from BC, we were unable to locate a specimen or a published locality record.

**Distribution in USA.** AZ, CA, FL, ID, IL, IN, MA, MI, NC, NE, NH, OR, RI, SC, VA, WA, WY (Majka et al. 2009).

**First Canadian records.** Saguenay, QC in 1879 (CIUL); Winnipeg, MB in 1911 (UMAN); St. John's, NF in 1975 (ACNL); Windsor, ON in 1976 (DEBU); and Lunenburg, NS in 1977 (NSMC).

**First North American records.** NE before1825 (Say 1825); CA, MI, NB and Buffalo, NY before 1889 (Fauvel 1889).

**Habitat data.** This species is associated with stored food products, including grains, and is also found on mouldy plant debris (Böcher 1988, Bousquet 1990a). In BC, it has been reared from the dead wood of subalpine fir, Engelman spruce, lodgepole pine and ponderosa pine (Hatch 1962). In PE, it was found feeding on mould in a house. In Maine, it was found in association with fungi (Procter 1946).

**91. *Cortinicara gibbosa*** (Herbst)
(Figs. 91, 103a, b, Map 75)

**Diagnosis.** Body length 1.1-1.7 mm, reddish-brown to dark brown, often antennomeres II-VII, legs and tarsi paler, yellowish-red; antennal club 3-segmented, segments narrowly elongate; head with large round eyes, temples obsolete; pronotum narrowest at apex and broadest at middle of disc, rounded apically and laterally, basally with slight constriction; elytra broadly oval and rounded at apex, pubescence long, fine and recumbent; first visible abdominal sternum with coxal lines; second meta-tarsomere shorter than first; aedeagus consists of a single tube, overall form robust, broad, apex broadly rounded, slightly elongate at tip and strongly curved ventrally, with forked, keeled, ventral accessory spicule fused behind apical third to half (Figs. 103a, b).

Males of *C. gibbosa* differ from females in the presence of a large tooth on the inside of the protibia near the apex; females have simple protibia.

**Native range.** Palaearctic; adventive in sub-Saharan Africa and the Orient (Johnson 2007).

**Distribution in Canada.** AB, BC, LB, MB, NB, NF, NS, ON, PE, QC, SK (Bousquet et al. 2013). This species is newly recorded from LB (Charlottetown; MUN).

**Distribution in USA.** CA, ID, IN, MA, ME, MI, NH, NY, OR, PA, RI, WA, WV (Majka et al. 2009).

**First Canadian records.** Brandon, MB in 1903 (CNCI); Lavaltrie, QC in 1922 (CIUL); Port Grey, BC in 1926 (UBC); Penobscquis, NB 1926 (CNCI); Annapolis Royal, NS in 1928 (CNCI); Elkwater, AB in 1956 (CNCI); Arkell, ON in 1957 (DEBU); and Gander, NF in 1974 (ACNL).

**First North American records.** CA, NH, MA, MI, OR, WA, WV before 1899 (Fall 1899).

**Habitat data.** In Atlantic Canada, it is the most abundant latriidid species recorded from marshlands, pastures, coastal fields and barrens, seashores, sand dunes, heaths, pine barrens, meadows, sphagnum bogs, stream edges, shores of ponds, wet swales, grasslands, and in coastal mixed and coniferous forests (Majka et al. 2009). Fifty-nine percent of individuals reported by Majka et al. (2009) were found in open and damp habitats. In BC, it was collected from fungus, a bog, and flowers of hawthorn.

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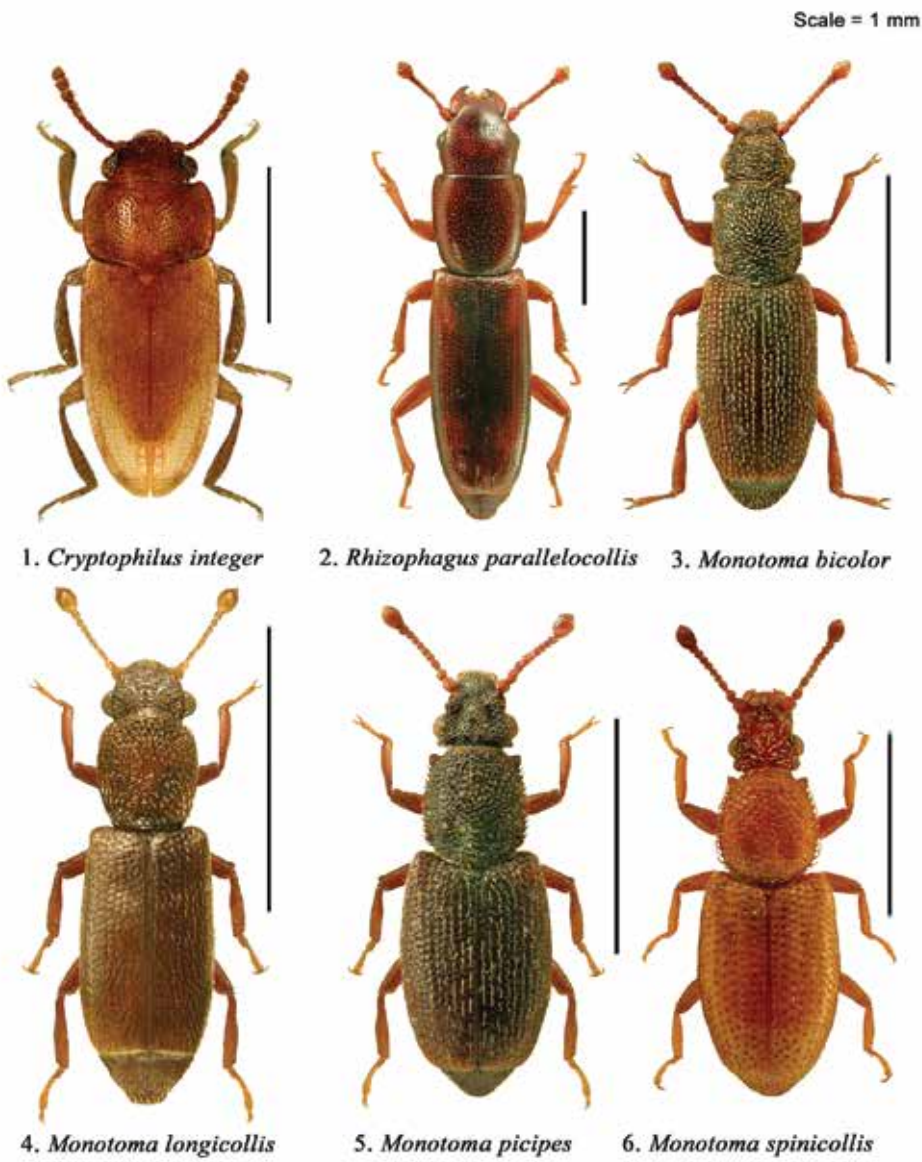
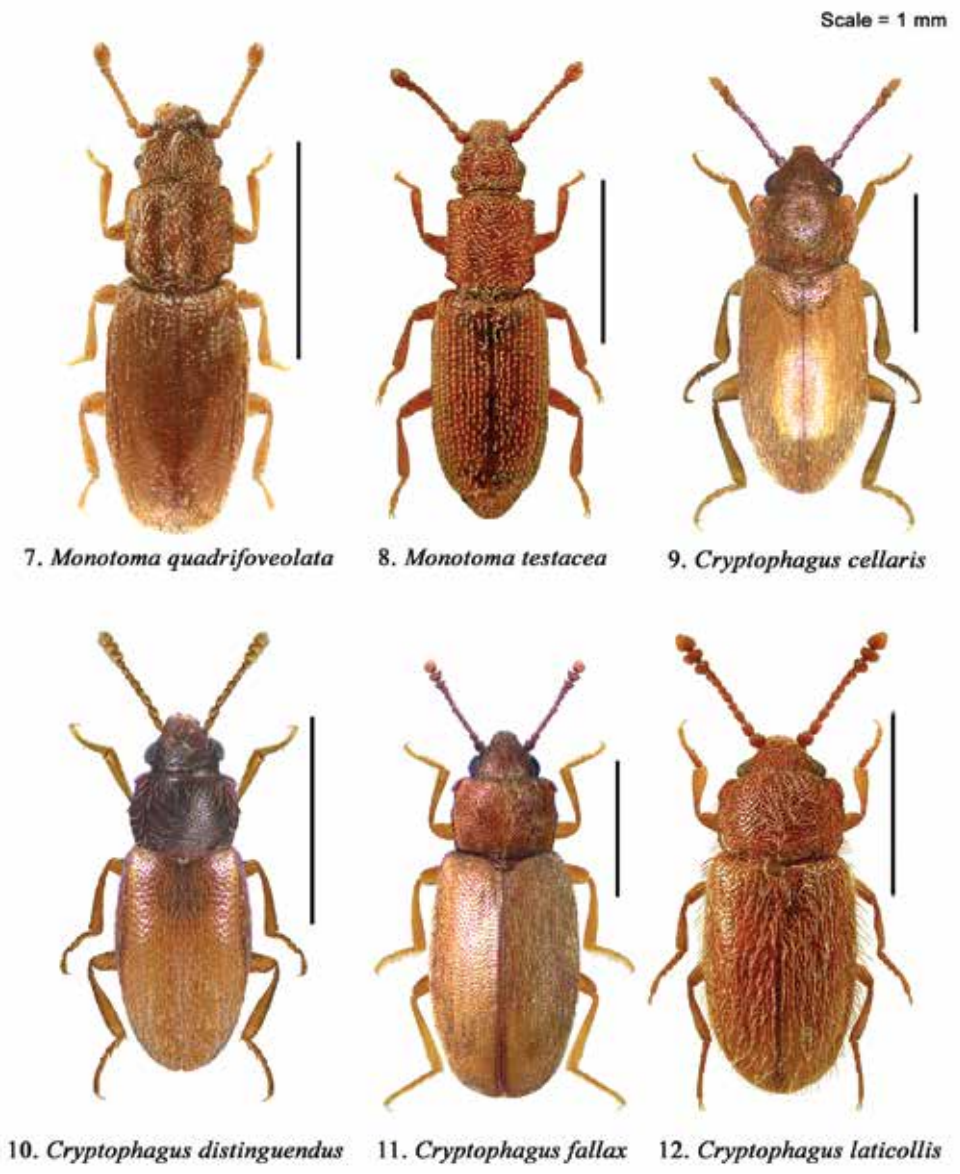
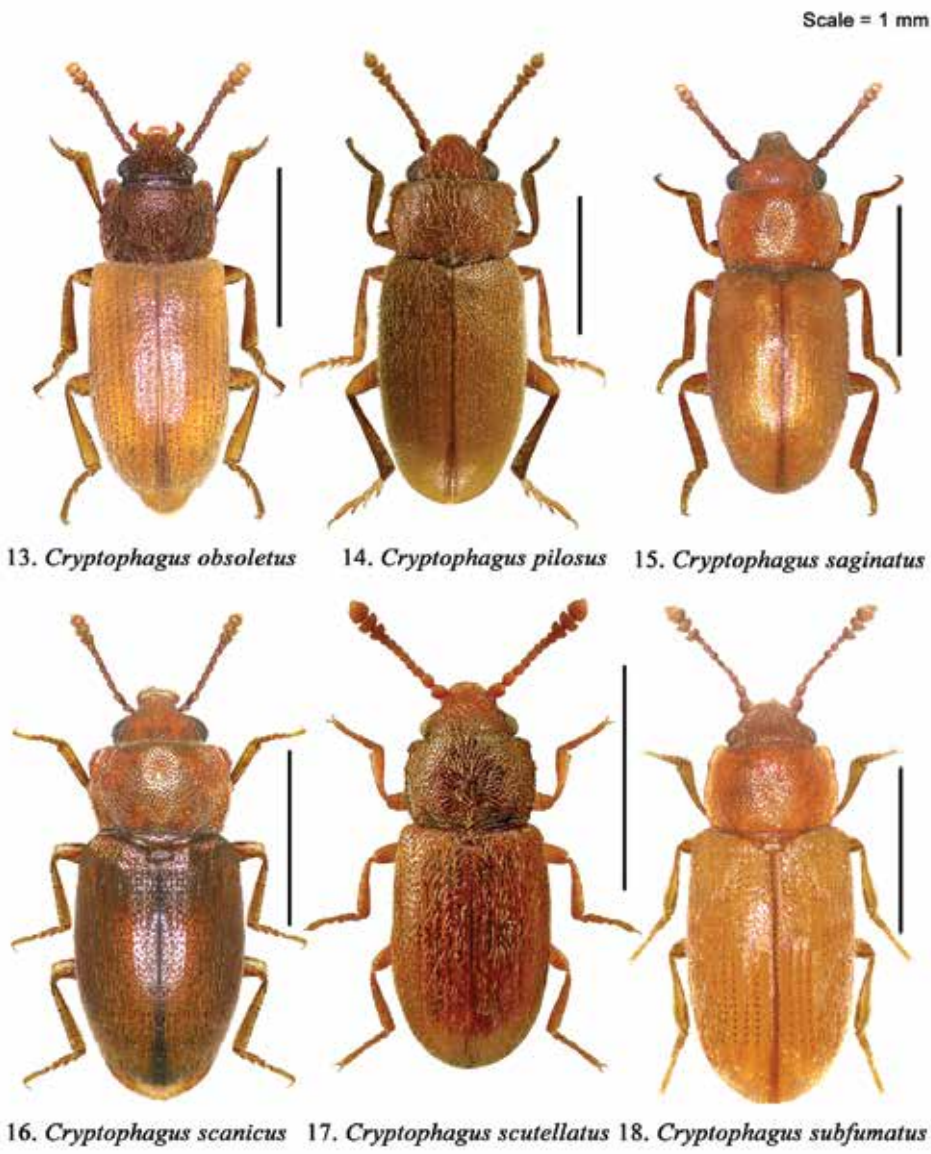
# Plates



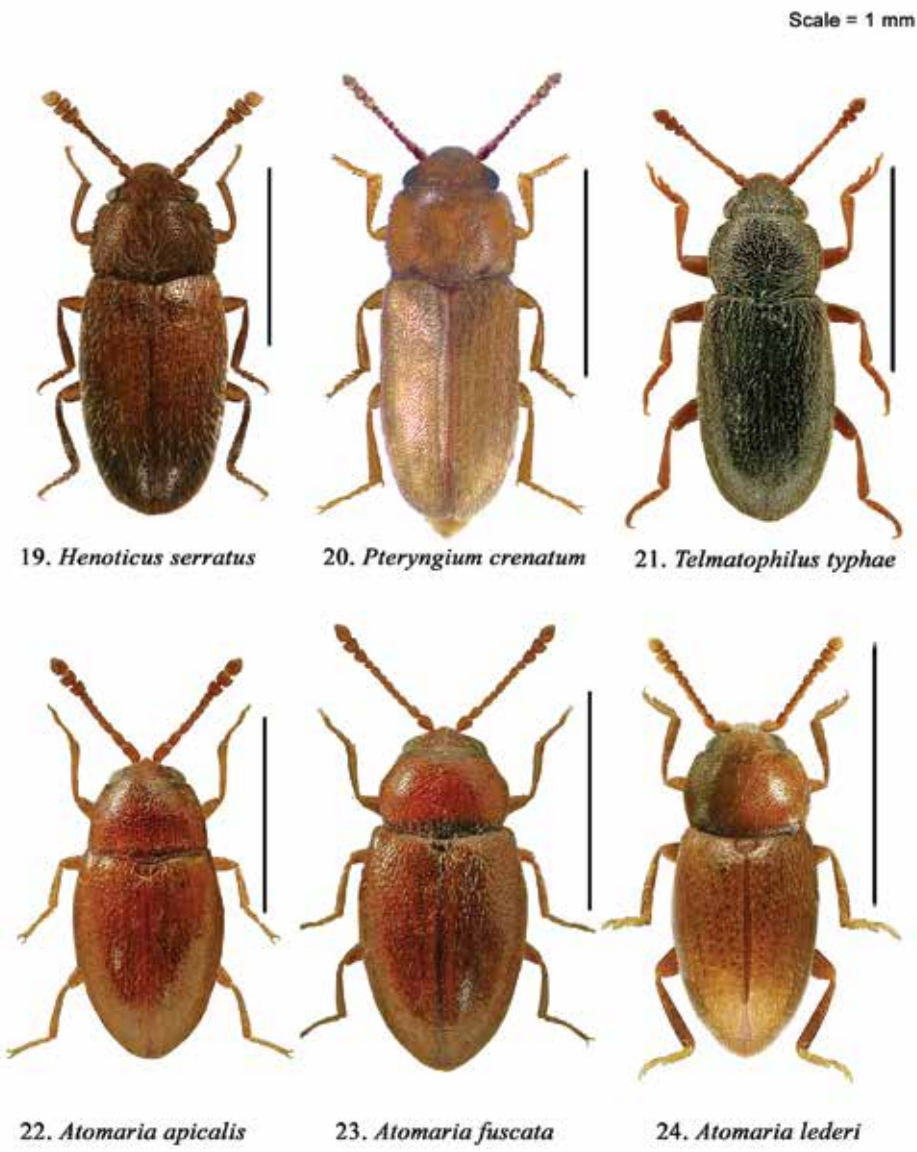

**Figures 1-6.** Body images in dorsal view: 1, *Cryptophilus integer* (Heer); 2. *Rhizophagus parallelocollis* Gyllenhal; 3, *Monotoma bicolor* A. Villa & G.B. Villa; 4, *Monotoma longicollis* (Gyllenhal); 5, *Monotoma picipes* Herbst; 6, *Monotoma spinicollis* Aubé. Scale bar = 1 mm.



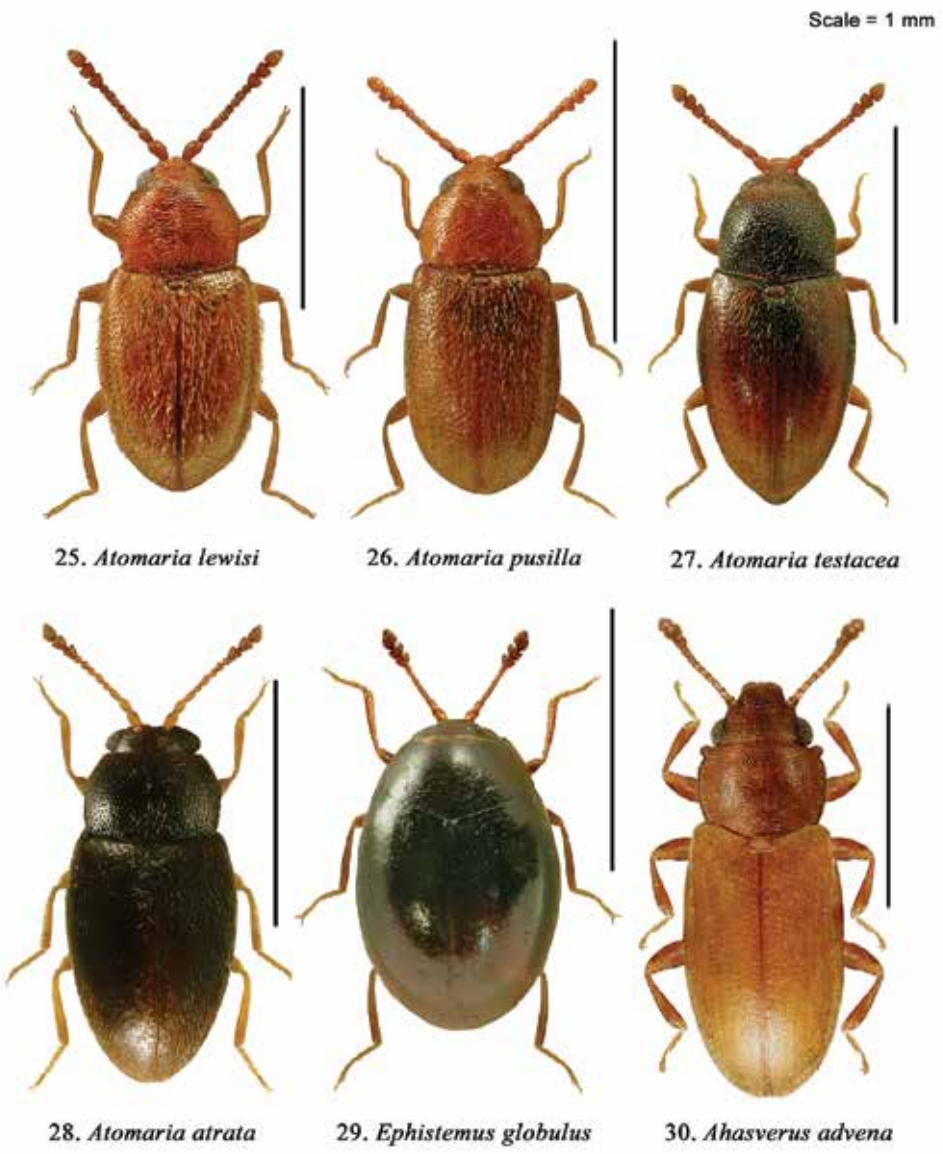

**Figures 7-12.** Body images in dorsal view: 7, *Monotoma quadrifoveolata* Aubé; 8, *Monotoma testacea* Motschulsky; 9, *Cryptophagus cellaris* (Scopoli); 10, *Cryptophagus distinguendus* Sturm; 11, *Cryptophagus fallax* Balfour–Browne; 12, *Cryptophagus laticollis* Lucas. Scale bar = 1 mm.



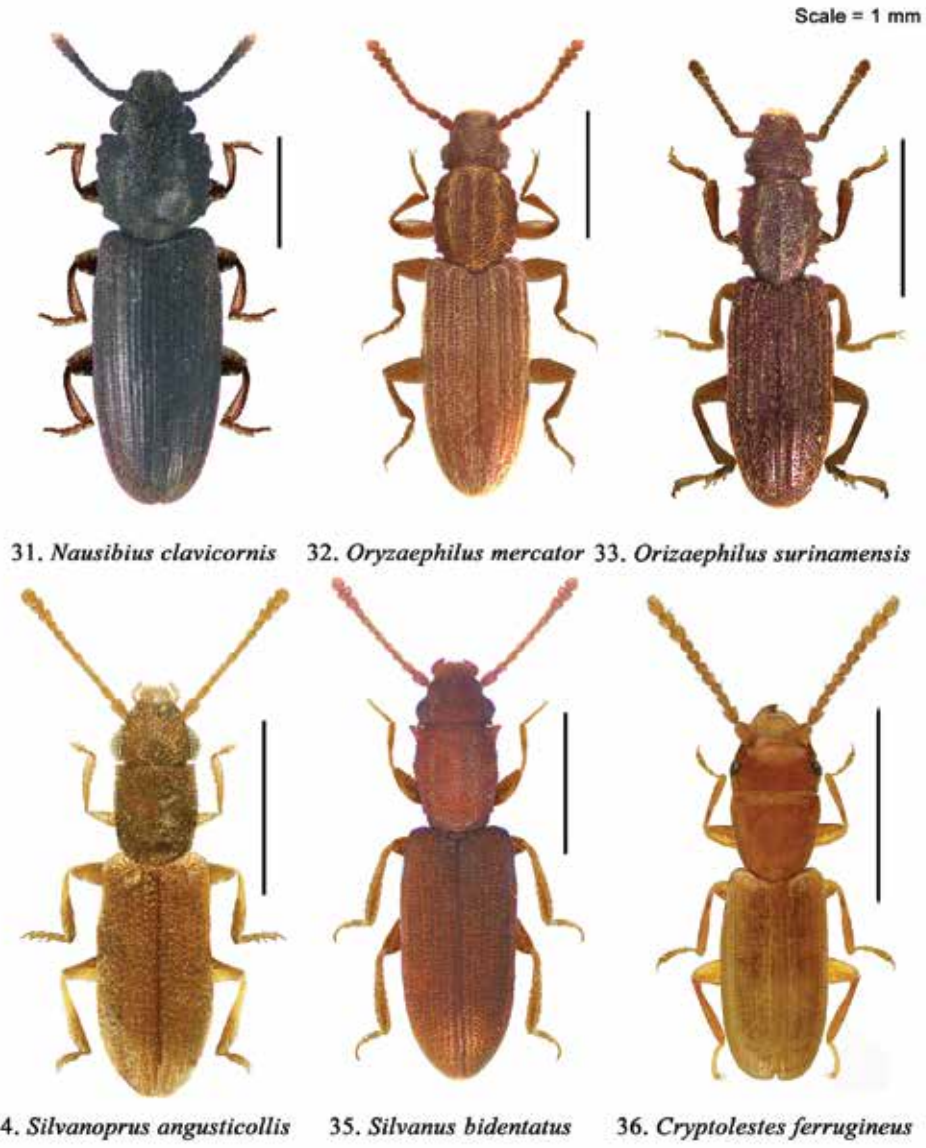

**Figures 13-18.** Body images in dorsal view: 13, *Cryptophagus obsoletus* Reitter; 14, *Cryptophagus pilosus* Gyllenhal; 15, *Cryptophagus saginatus* Sturm; 16, *Cryptophagus scanicus* (Linnaeus); 17, *Cryptophagus scutellatus* Newman; 18. *Cryptophagus subfumatus* Kraatz. Scale bar = 1 mm.



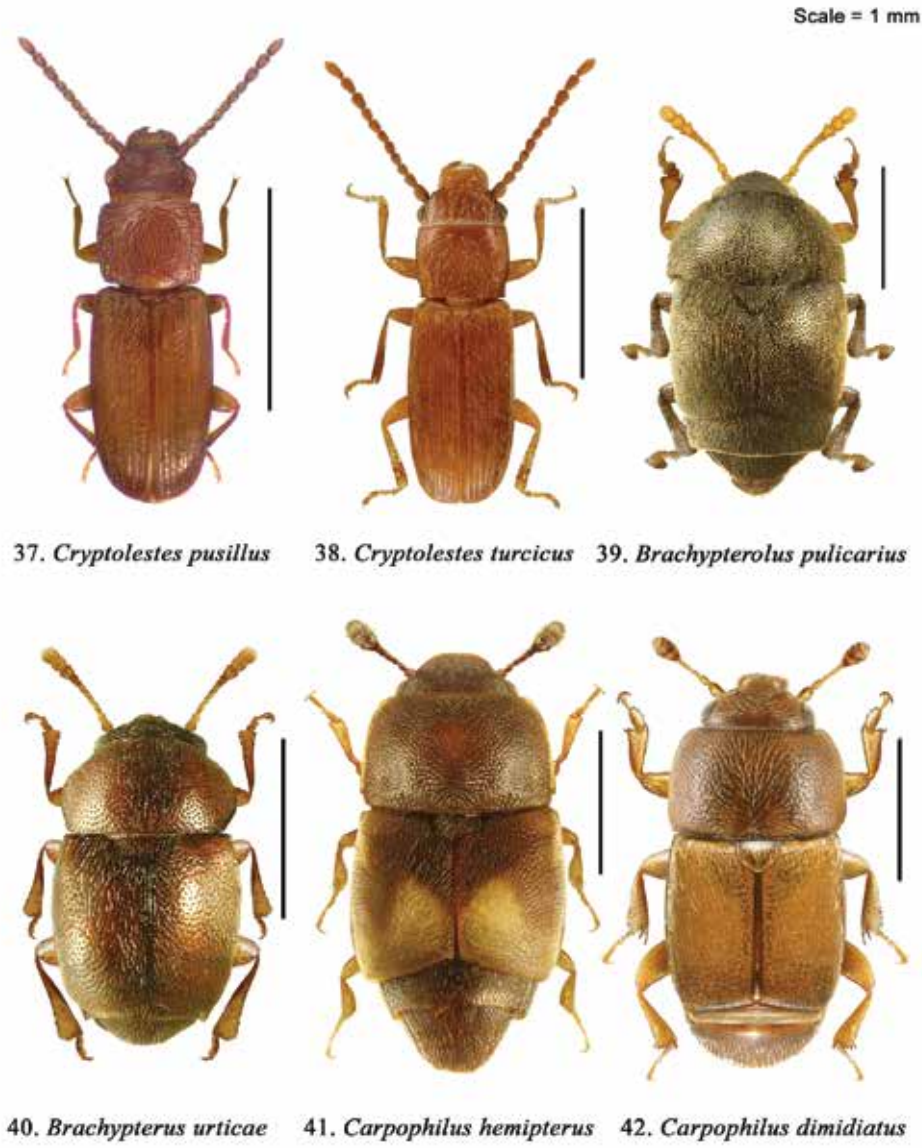

**Figures 19-24.** Body images in dorsal view: 19, *Henoticus serratus* (Gyllenhal); 20. *Pteryngium crenatum* (Gyllenhal); 21, *Telmatophilus typhae* (Fallén); 22, *Atomaria apicalis* Erichson; 23, *Atomaria fuscata* Schönherr; 24, *Atomaria lederi* Johnson. Scale bar = 1 mm.



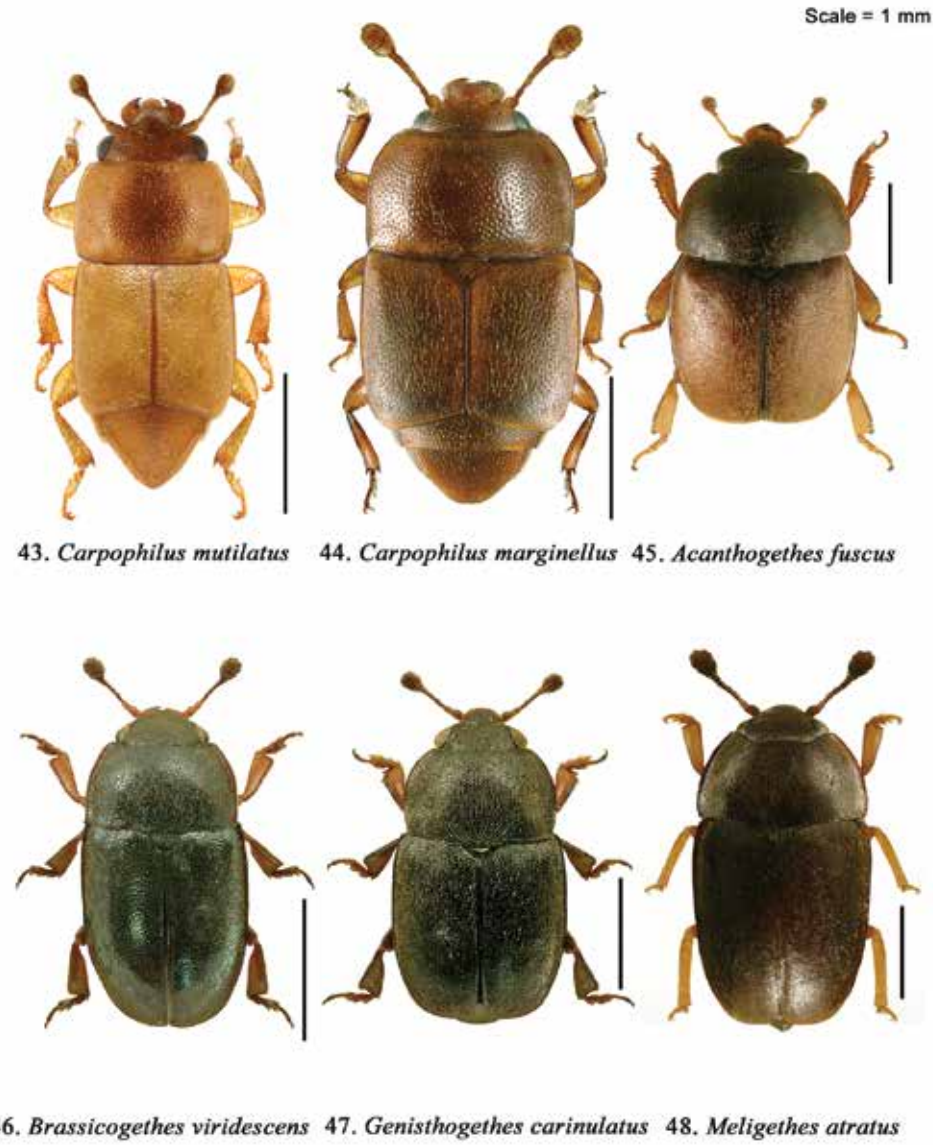

**Figures 25-30.** Body images in dorsal view: 25, *Atomaria lewisi* Reitter; 26, *Atomaria pusilla* (Paykull); 27. *Atomaria testacea* Stephens; 28. *Atomaria atrata* Reitter; 29. *Ephistemus globulus* (Paykull); 30, *Ahasverus advena* (Waltl). Scale bar = 1 mm.



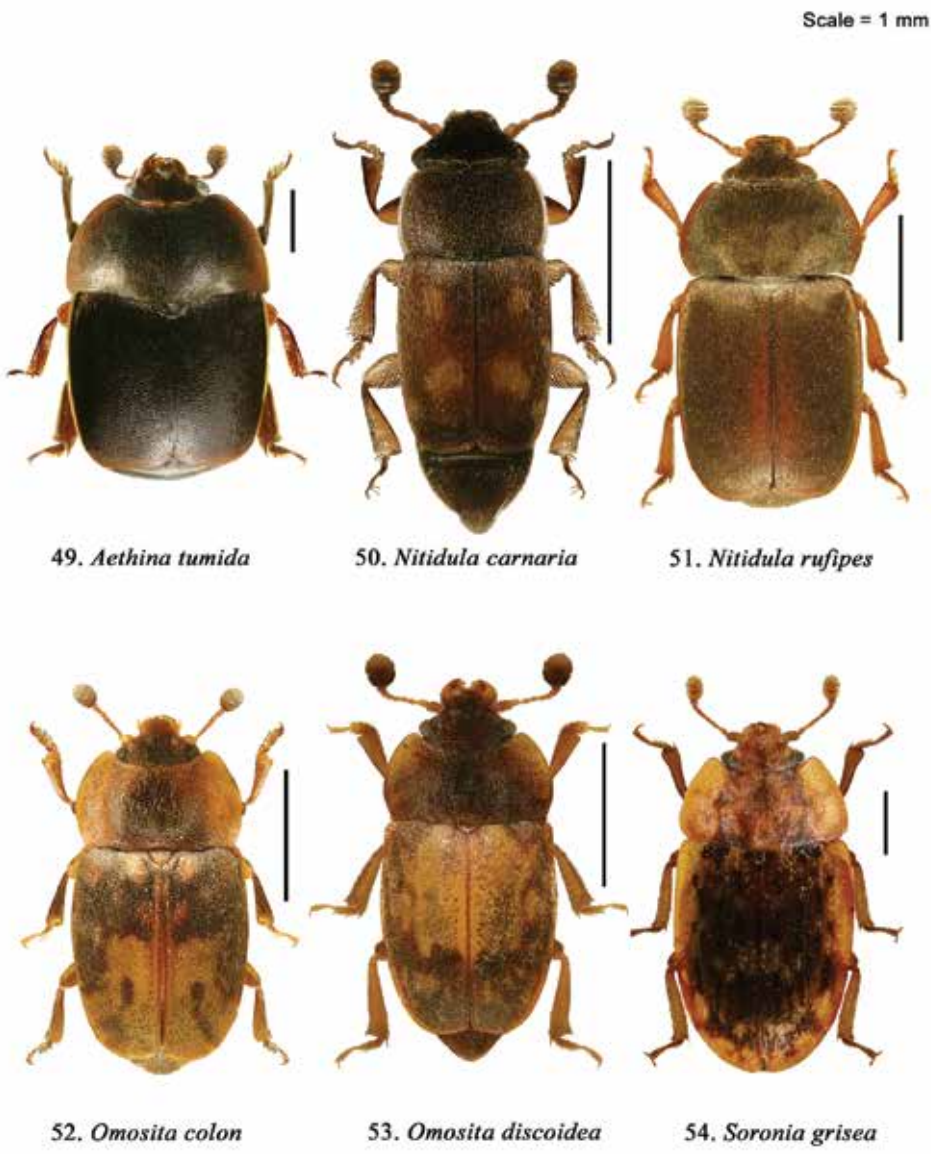

**Figures 31-36.** Body images in dorsal view: 31, *Nausibius clavicornis* (Kugelann); 32, *Oryzaephilus mercator* (Fauvel); 33, *Oryzaephilus surinamensis* (Linnaeus); 34, *Silvanoprus angusticollis* (Reitter); 35, *Silvanus bidentatus* (Fabricius); 36, *Cryptolestes ferrugineus* (Stephens). Scale bar = 1 mm.



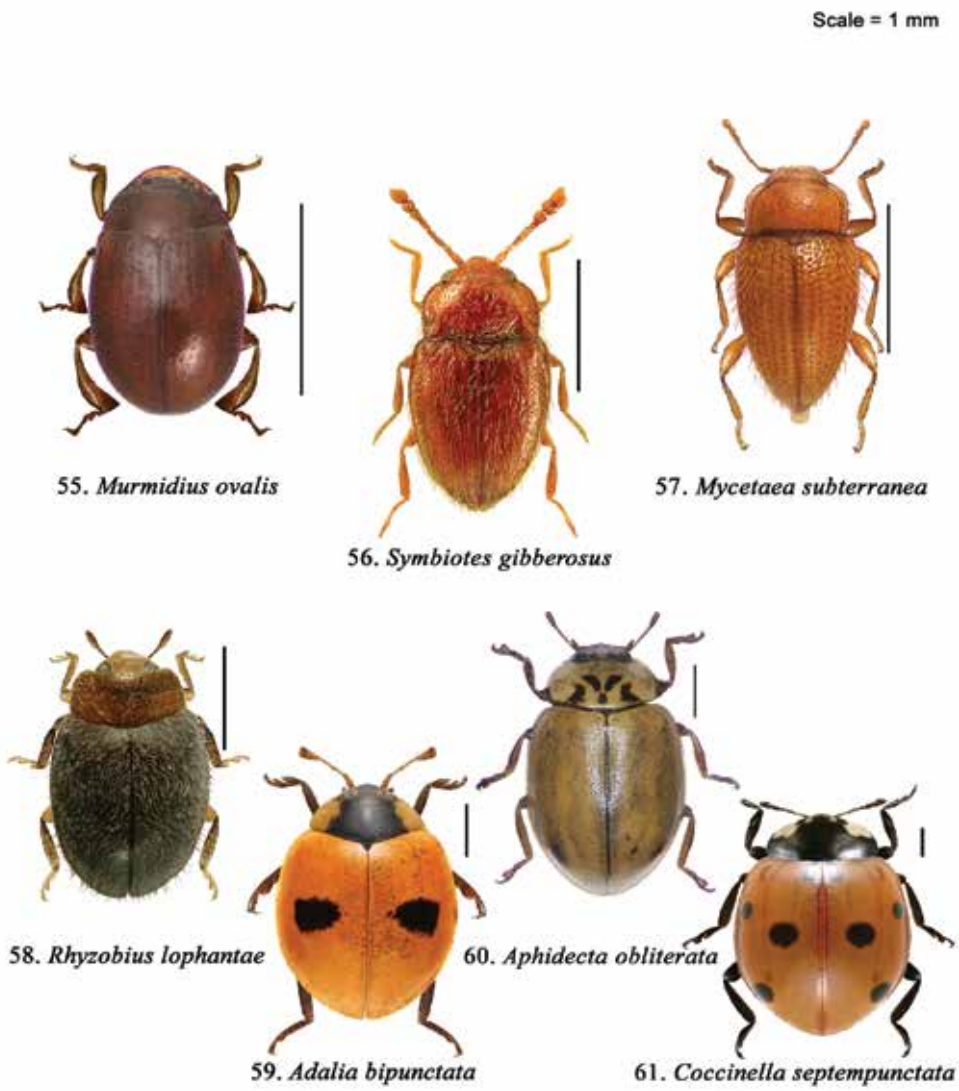

**Figures 37-42.** Body images in dorsal view: 37, *Cryptolestes pusillus* (Schönherr); 38, *Cryptolestes turcicus* (Grouvelle); 39, *Brachypterolus pulicarius* (Linnaeus); 40, *Brachypterus urticae* (Fabricius); 41, *Carpophilus hemipterus* (Linnaeus); 42, *Carpophilus dimidiatus* (Fabricius). Scale bar = 1 mm.



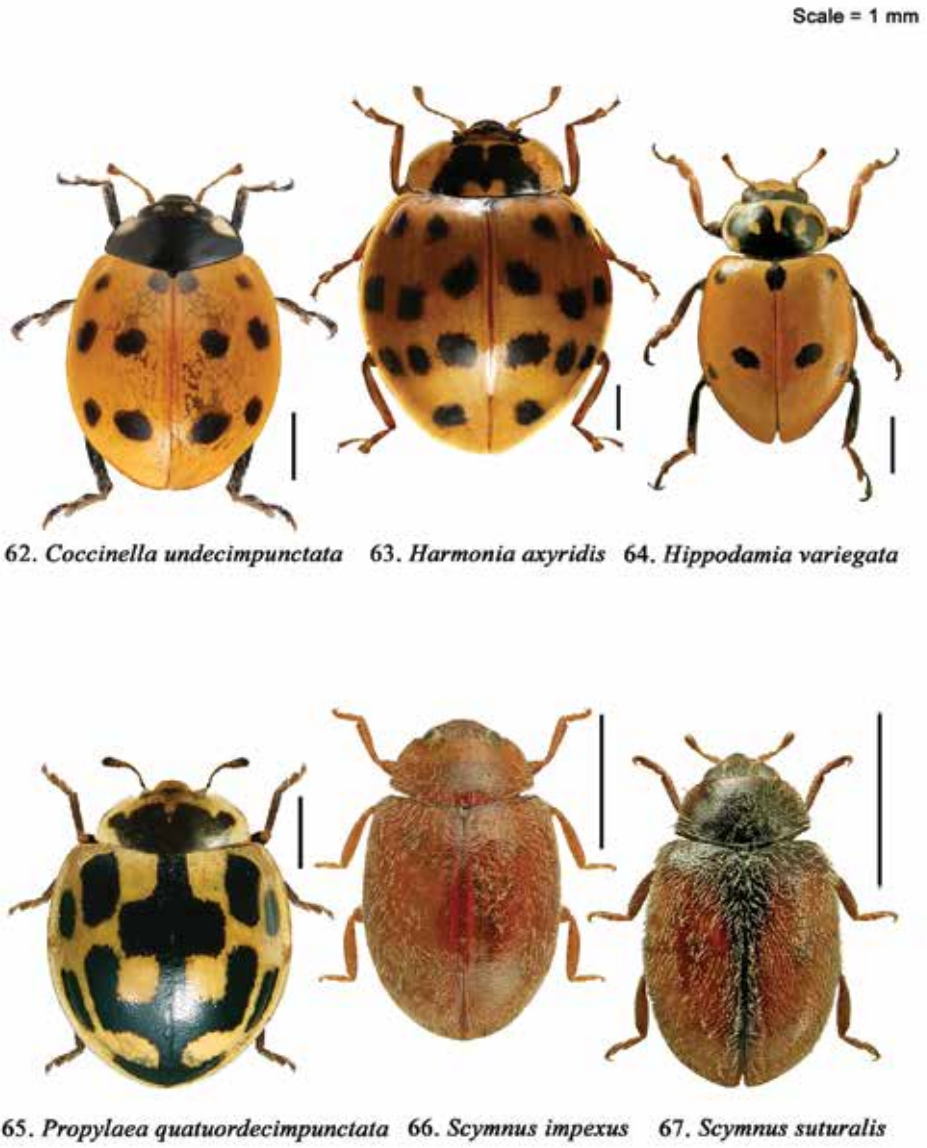

**Figures 43-48.** Body images in dorsal view: 43, *Carpophilus mutilatus* Erichson; 44, *Carpophilus marginellus* Motschulsky; 45, *Acanthogethes fuscus* (Olivier); 46, *Brassicogethes viridescens* (Fabricius); 47, *Genisthogethes carinulatus* (Förster); 48, *Meligethes atratus* (Olivier). Scale bar = 1 mm.



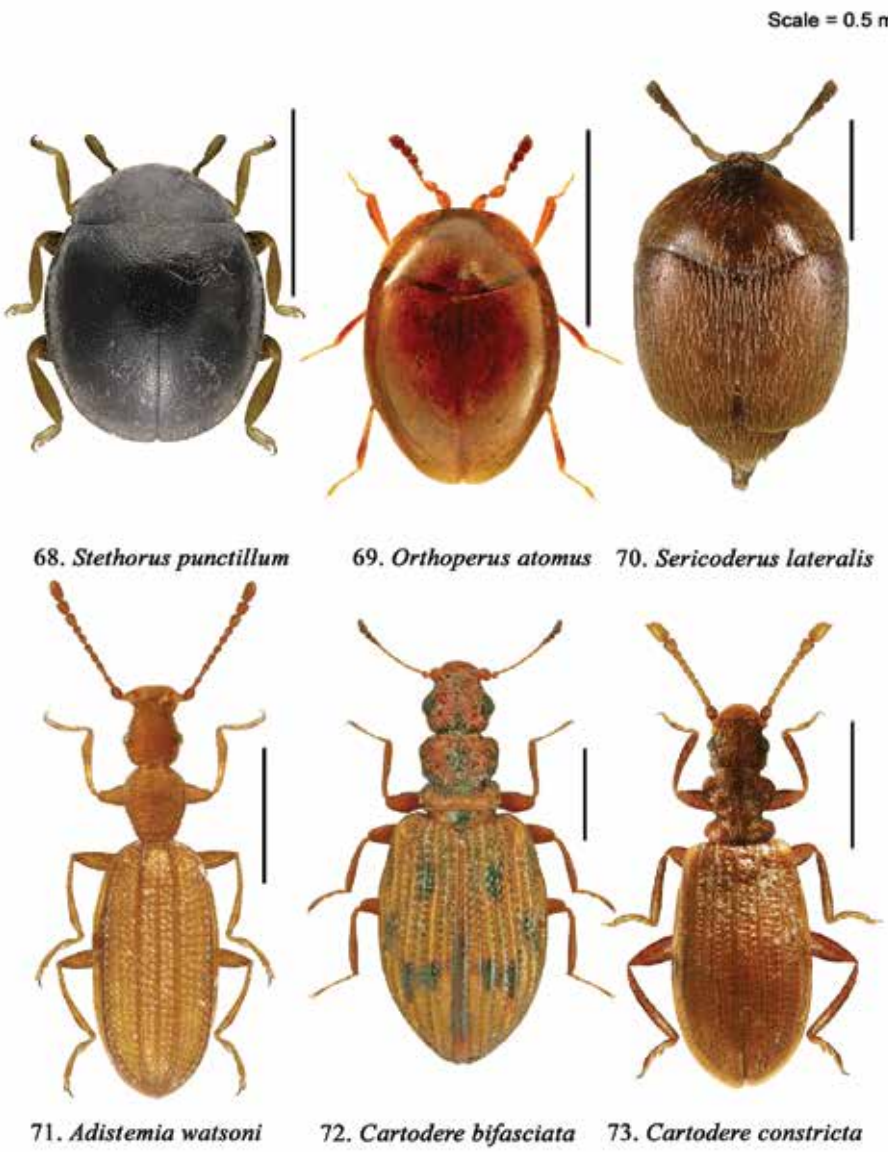

**Figures 49-54.** Body images in dorsal view: 49, *Aethina tumida* Murray; 50, *Nitidula carnaria* (Schaller); 51, *Nitidula rufipes* (Linnaeus); 52, *Omosita colon* (Linnaeus); 53, *Omosita discoidea* (Fabricius); 54, *Soronia grisea* (Linnaeus). Scale bar = 1 mm.



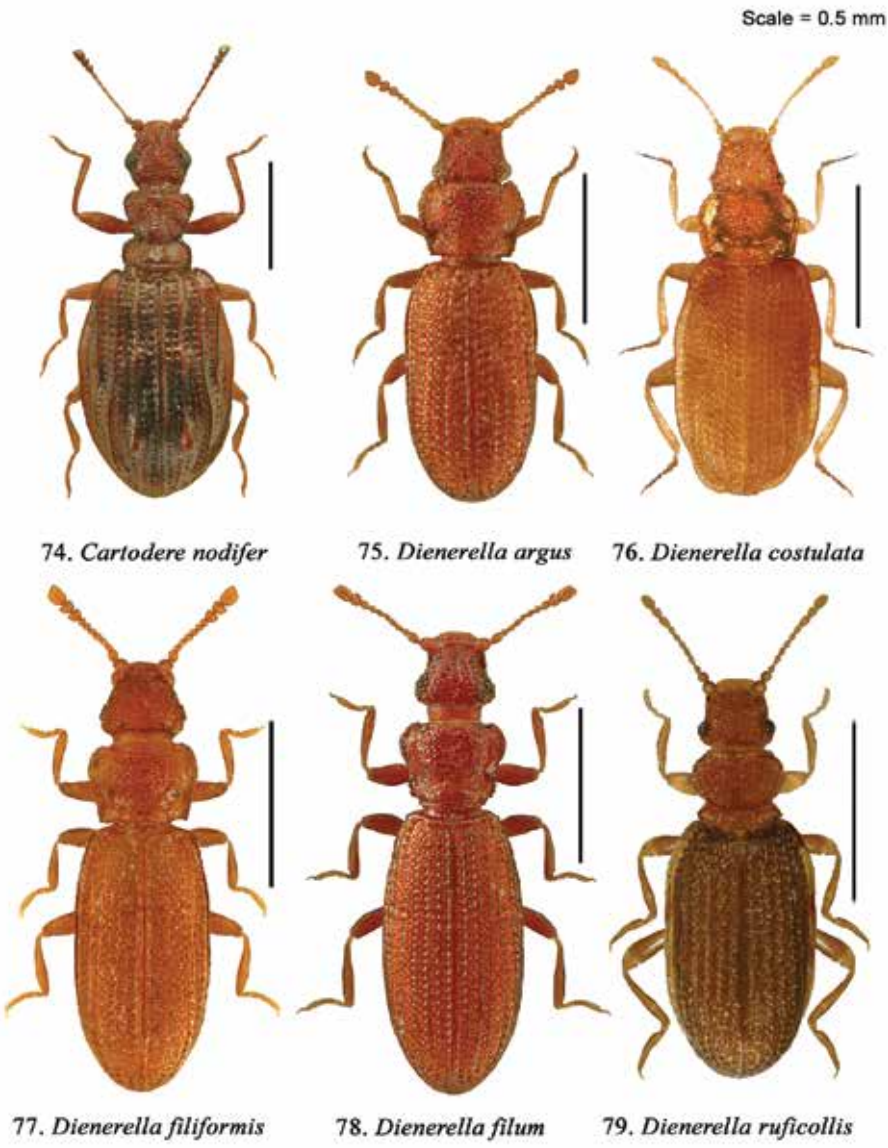

**Figures 55-61.** Body images in dorsal view: 55, *Murmidius ovalis* (Beck); 56, *Symbiotes gibberosus* (Lucas); 57, *Mycetaea subterranea* (Fabricius); 58, *Rhyzobius lophanthae* (Blaisdell); 59, *Adalia bipunctata* (Linnaeus); 60, *Aphidecta obliterata* (Linnaeus); 61, *Coccinella septempunctata* Linnaeus. Scale bar = 1 mm.



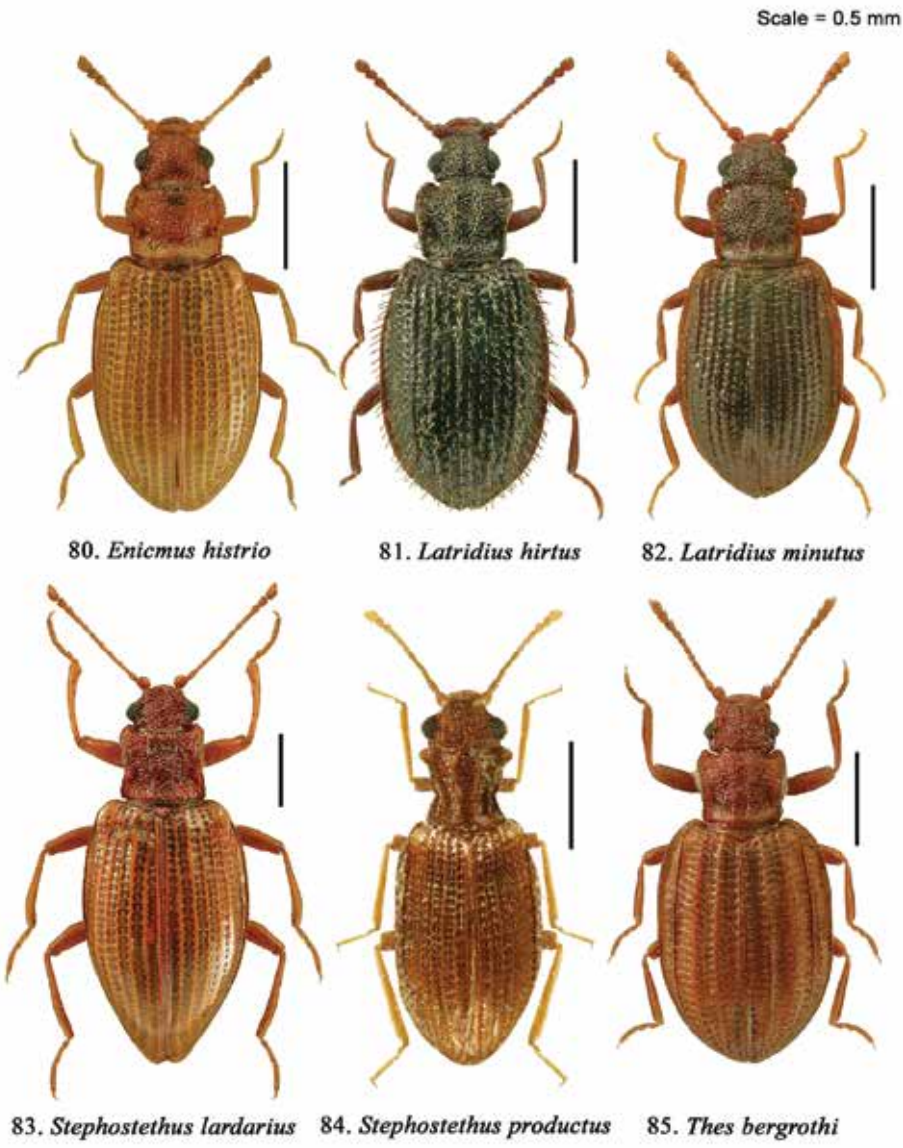

**Figures 62-67.** Body images in dorsal view: 62, *Coccinella undecimpunctata undecimpunctata* Linnaeus; 63, *Harmonia axyridis* (Pallas); 64, *Hippodamia variegata* (Goeze); 65, *Propylaea quatuordecimpunctata* (Linnaeus); 66, *Scymnus impexus* Mulsant; 67, *Scymnus suturalis* Thunberg. Scale bar = 1 mm.



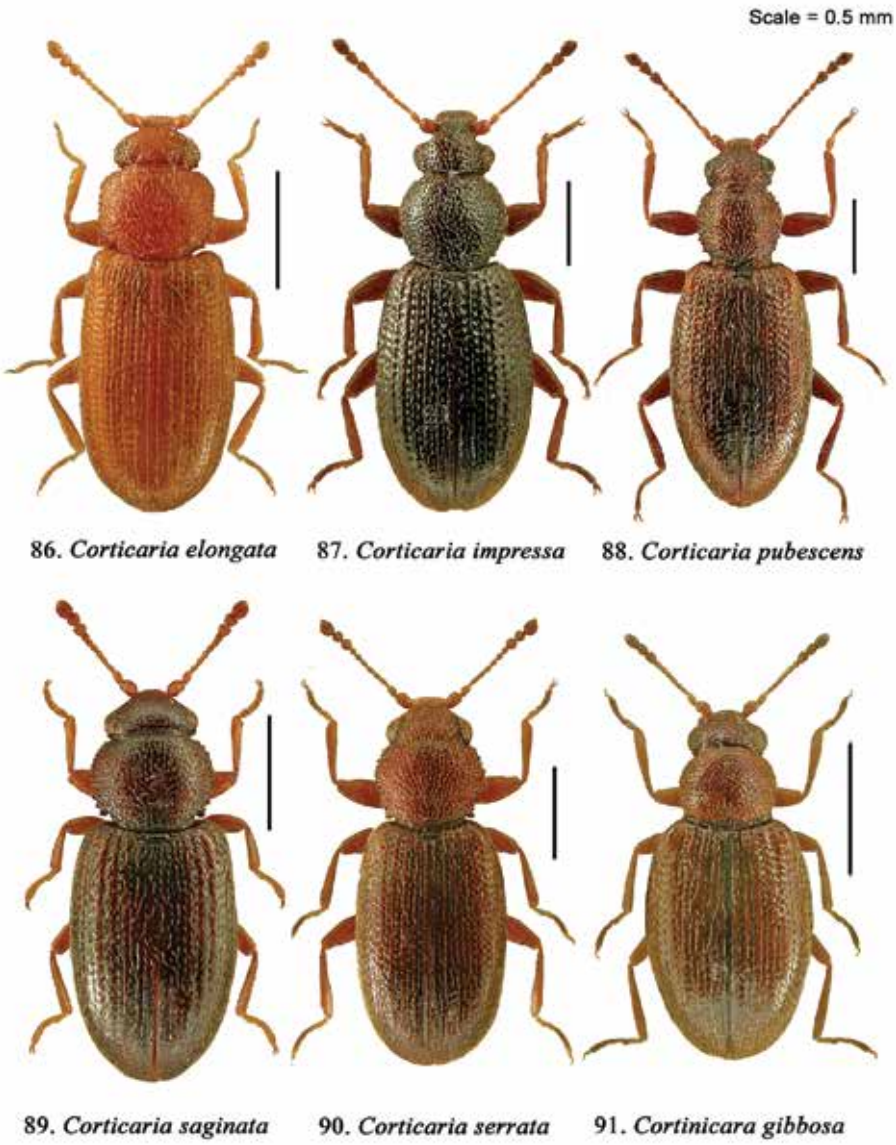

**Figures 68-73.** Body images in dorsal view: 68, *Stethorus punctillum* Weise; 69, *Orthoperus atomus* (Gyllenhal); 70, *Sericoderus lateralis* (Gyllenhal); 71, *Adistemia watsoni* (Wollaston); 72, *Cartodere bifasciata* (Reitter); 73, *Cartodere constricta* (Gyllenhal). Scale bar = 1 mm.



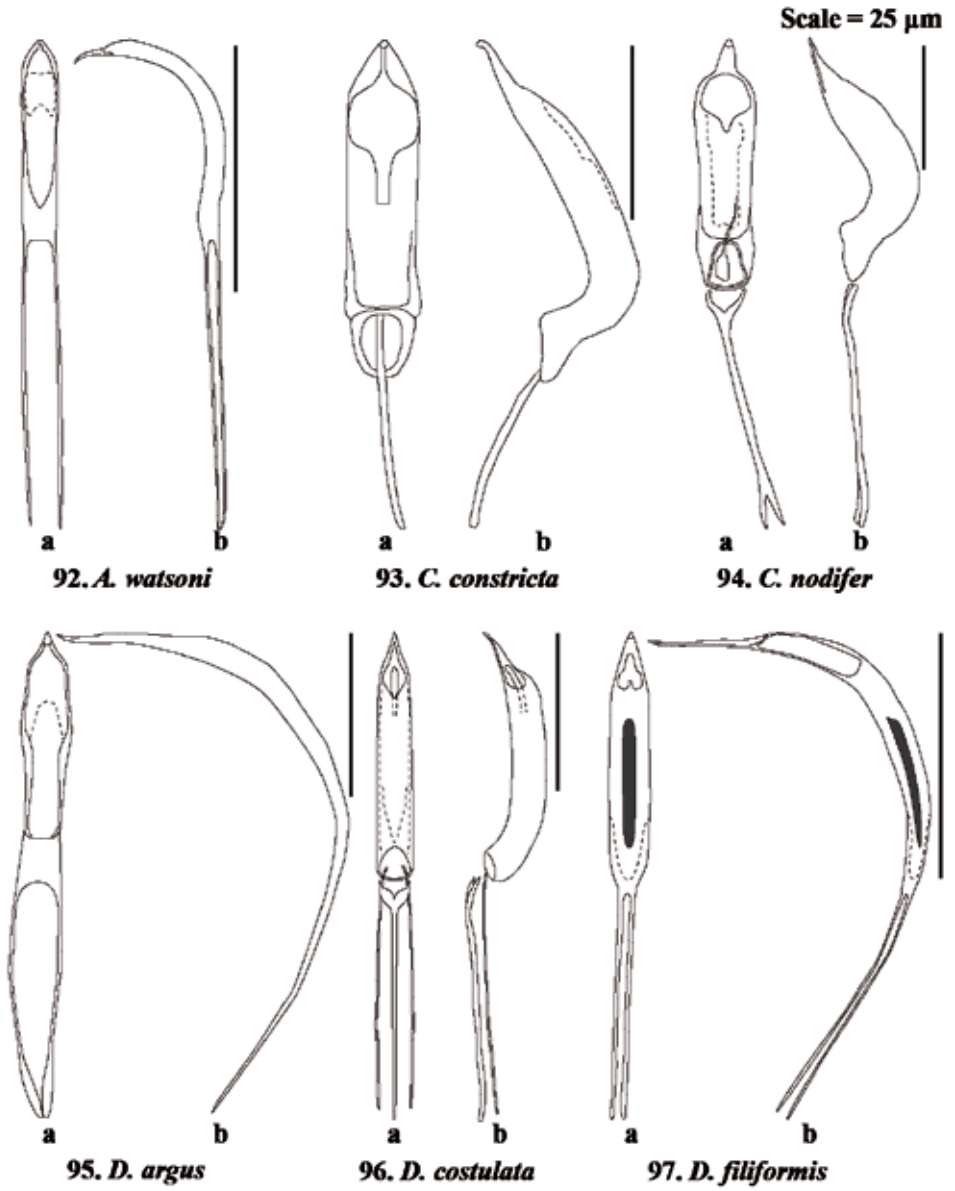

**Figures 74-79.** Body images in dorsal view: 74, *Cartodere nodifer* (Westwood); 75, *Dienerella arga* (Reitter); 76, *Dienerella costulata* (Reitter); 77, *Dienerella filiformis* (Gyllenhal); 78, *Dienerella filum* (Aubé); 79, *Dienerella ruficollis* (Marsham, 1802). Scale bar = 1 mm.



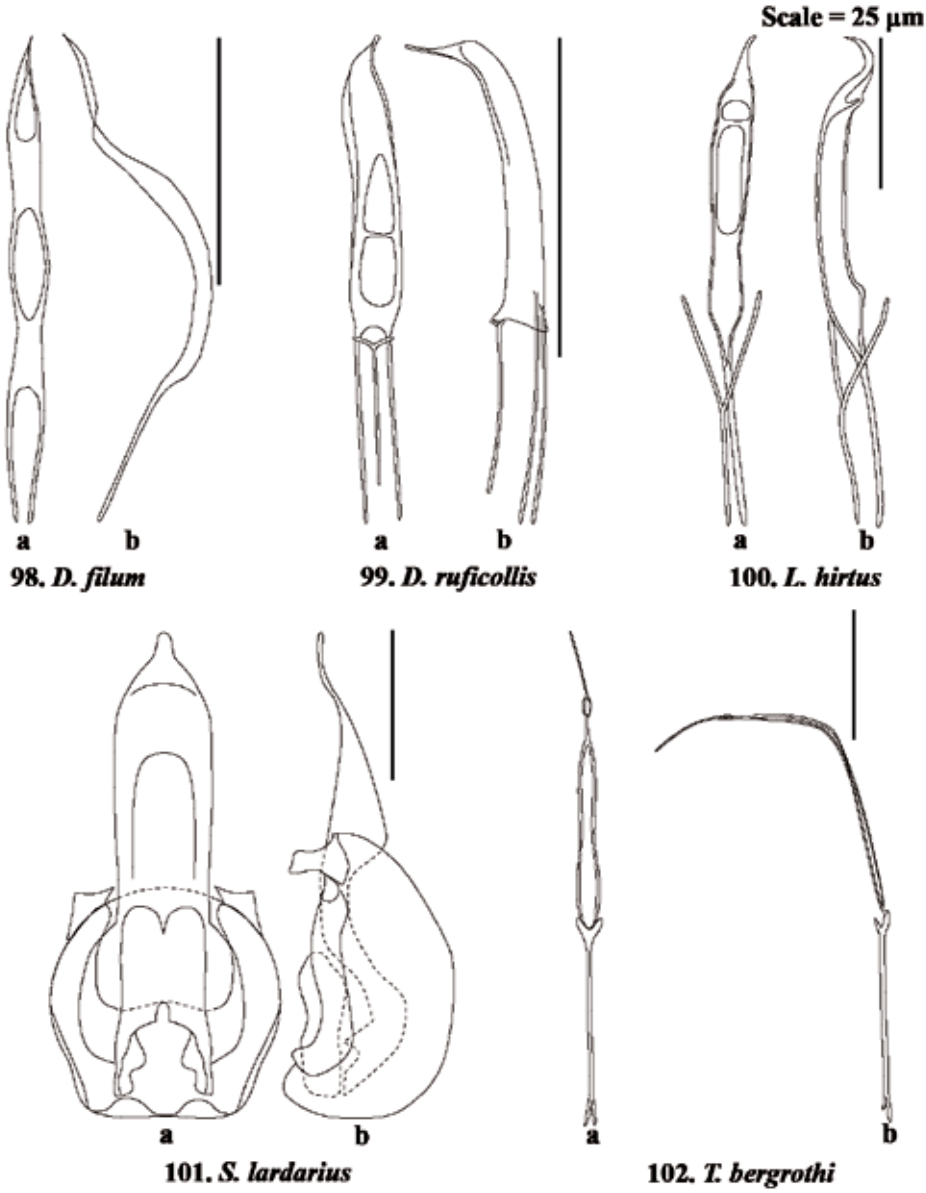

**Figures 80-85.** Body images in dorsal view: 80, *Enicmus histrio* Joy & Tomlin; 81, *Latridius hirtus* Gyllenhal; 82, *Latridius minutus* (Linnaeus); 83, *Stephostethus lardarius* (DeGeer); 84, *Stephostethus productus* Rosenhauer; 85, *Thes bergrothi* (Reitter). Scale bar = 1 mm.



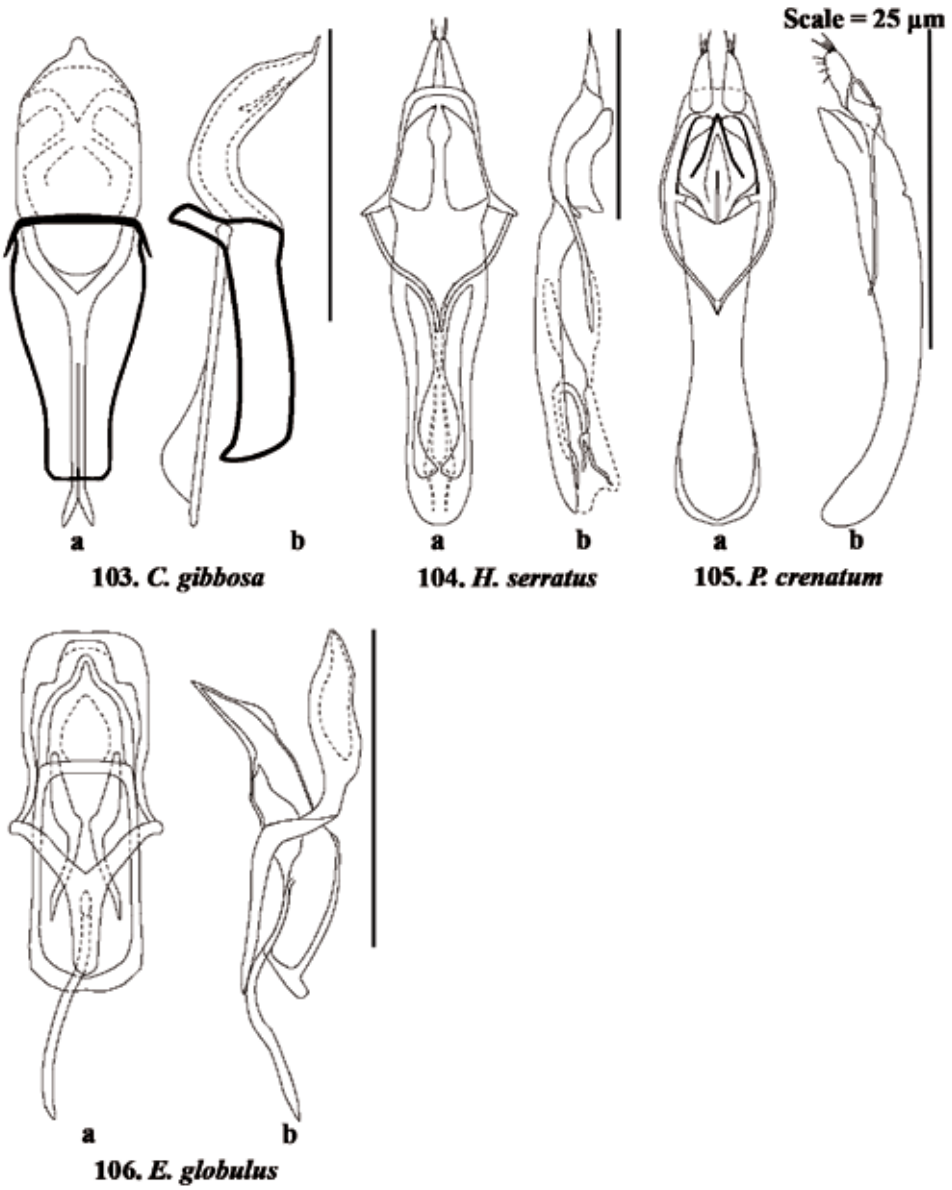

**Figures 86-91.** Body images in dorsal view: 86, *Corticaria elongata* (Gyllenhal); 87, *Corticaria impressa* (Oliver); 88, *Corticaria pubescens* (Gyllenhal); 89, *Corticaria saginata* Mannerheim; 90, *Corticaria serrata* (Paykull); 91, *Cortinicara gibbosa* (Herbst). Scale bar = 1 mm.




**Figures 92-97.** Aedeagus in ventral (a) and lateral (b) views: 92, *Adistemia watsoni* (Wollaston), Lac des Etangs, Quebec; 93, *Cartodere consricta* (Gyllenhal), Fort McMurray, Alberta; 94, *Cartodere nodifer* (Westwood), Summerland, British Columbia; 95, *Dienerella argus* (Reitter), Ottawa, Ontario, Pilot Mound, Manitoba; 96, *Dienerella costulata* (Reitter), Winnipeg, Manitoba, College Park, Maryland; 97, *Dienerella filiformis* (Gyllenhal), Oak Lake, Manitoba.

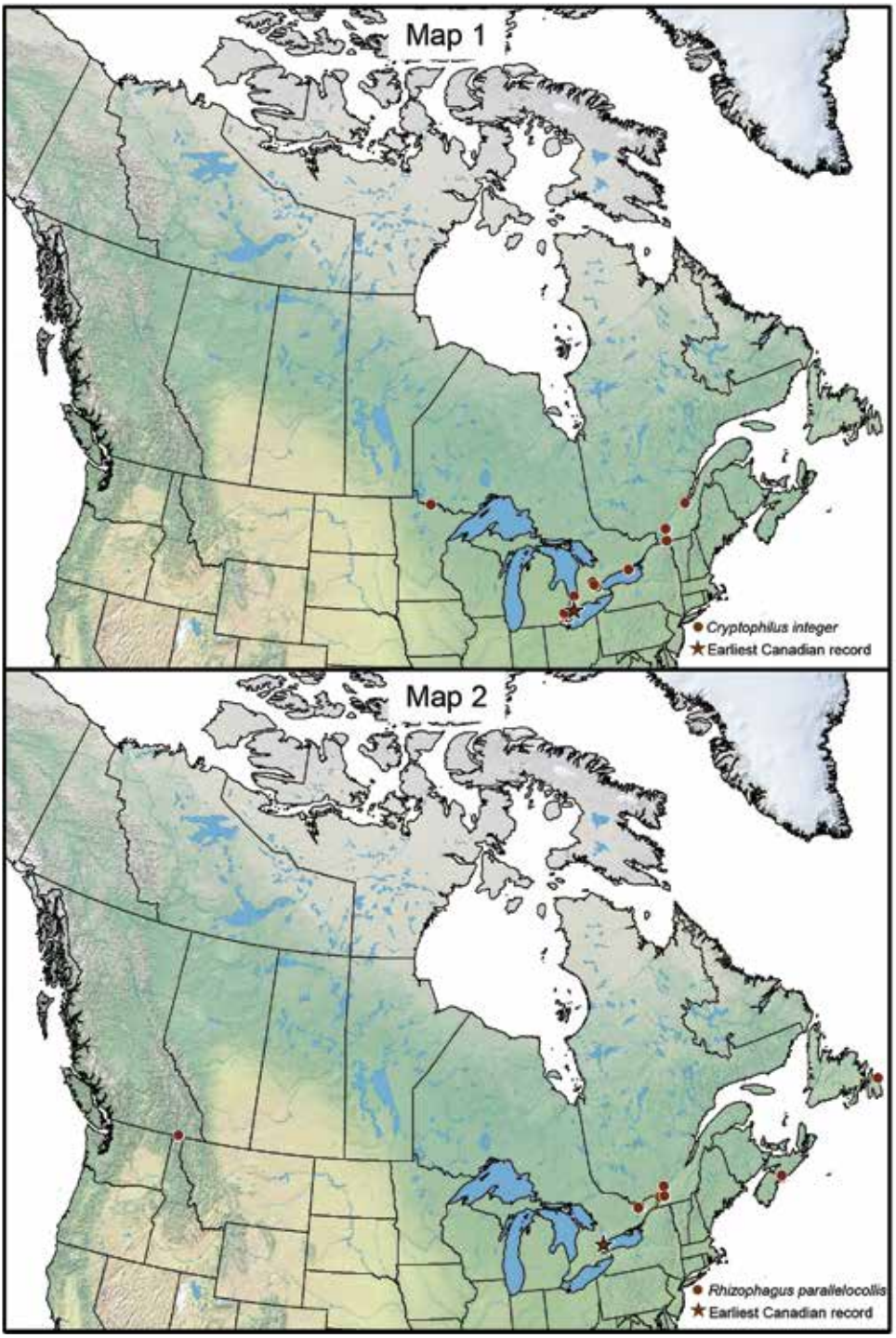


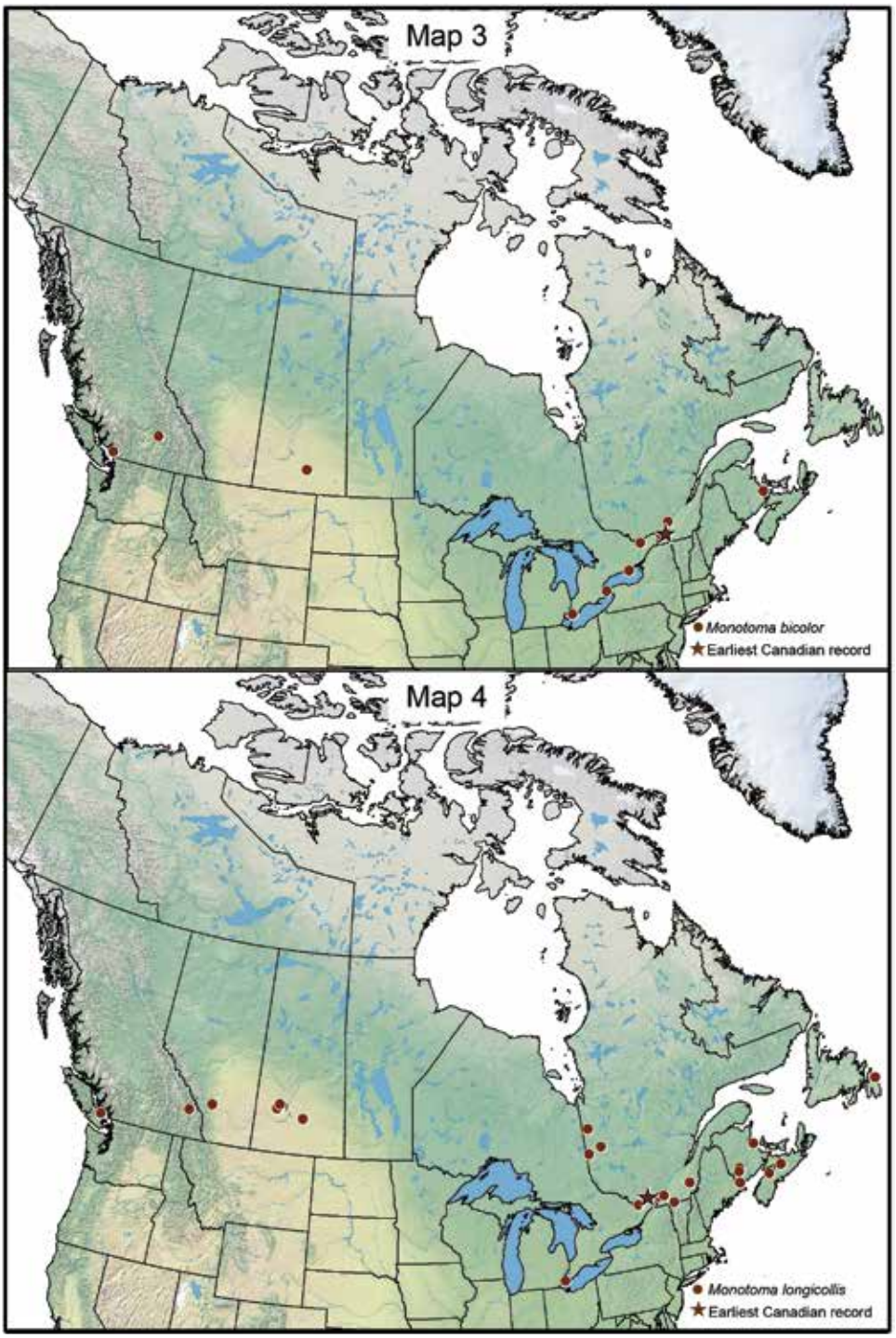

**Figures 98-102.** Aedeagus in ventral (a) and lateral (b) views: 98, *Dienerella filum* (Aube), Quebec City, Quebec; 99, *Dienerella ruficollis* (Marsham), Salmon Arm, British Columbia, Sable Island, Nova Scotia; 100, *Latridius hirtus* Gyllenhal, Red Earth Creek, Alberta; 101, *Stephostethus lardarius* (De Geer), Montreal, Quebec; 102, *Thes bergrothi* (Reitter), Sable Island, Nova Scotia, Winnipeg, Manitoba.

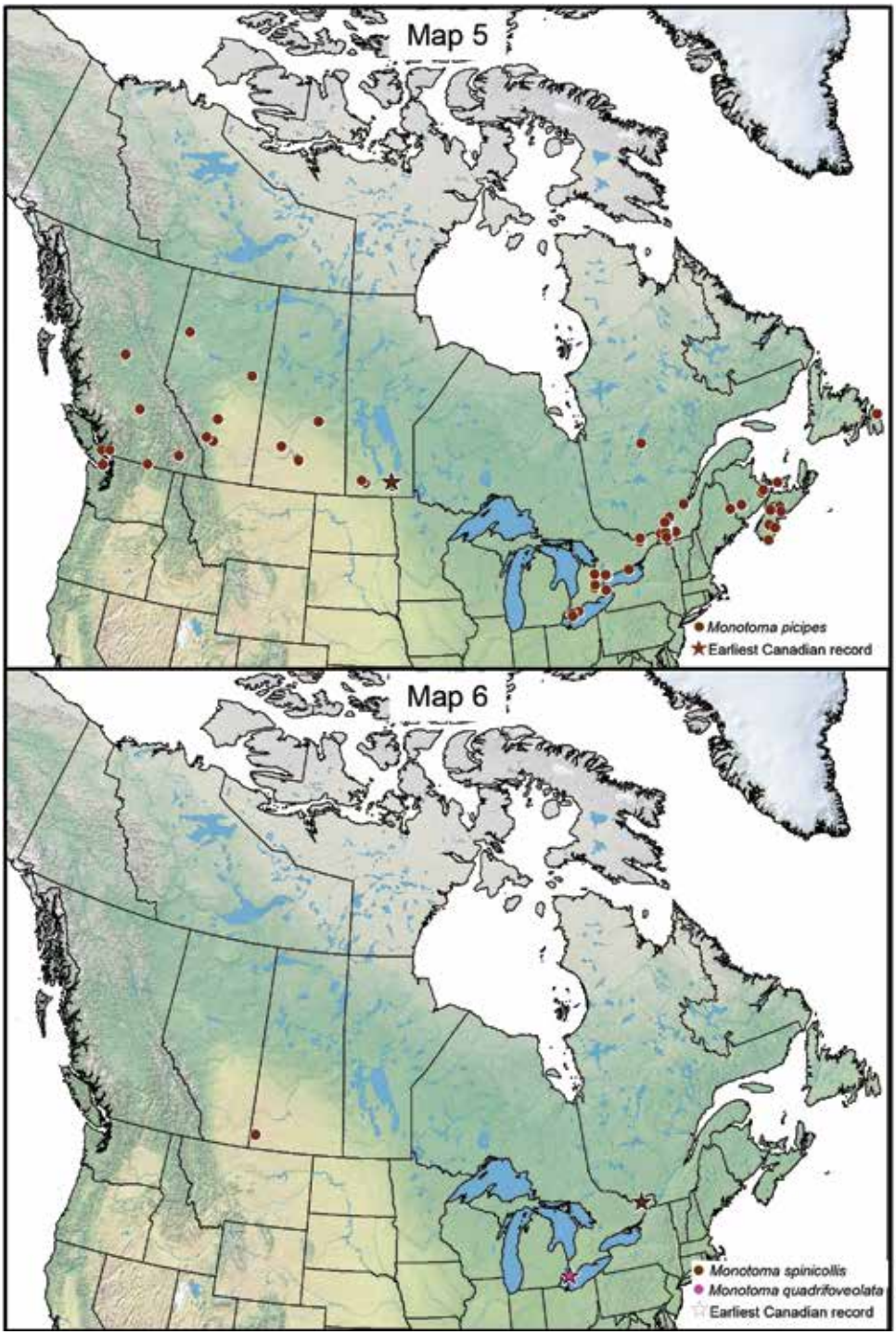


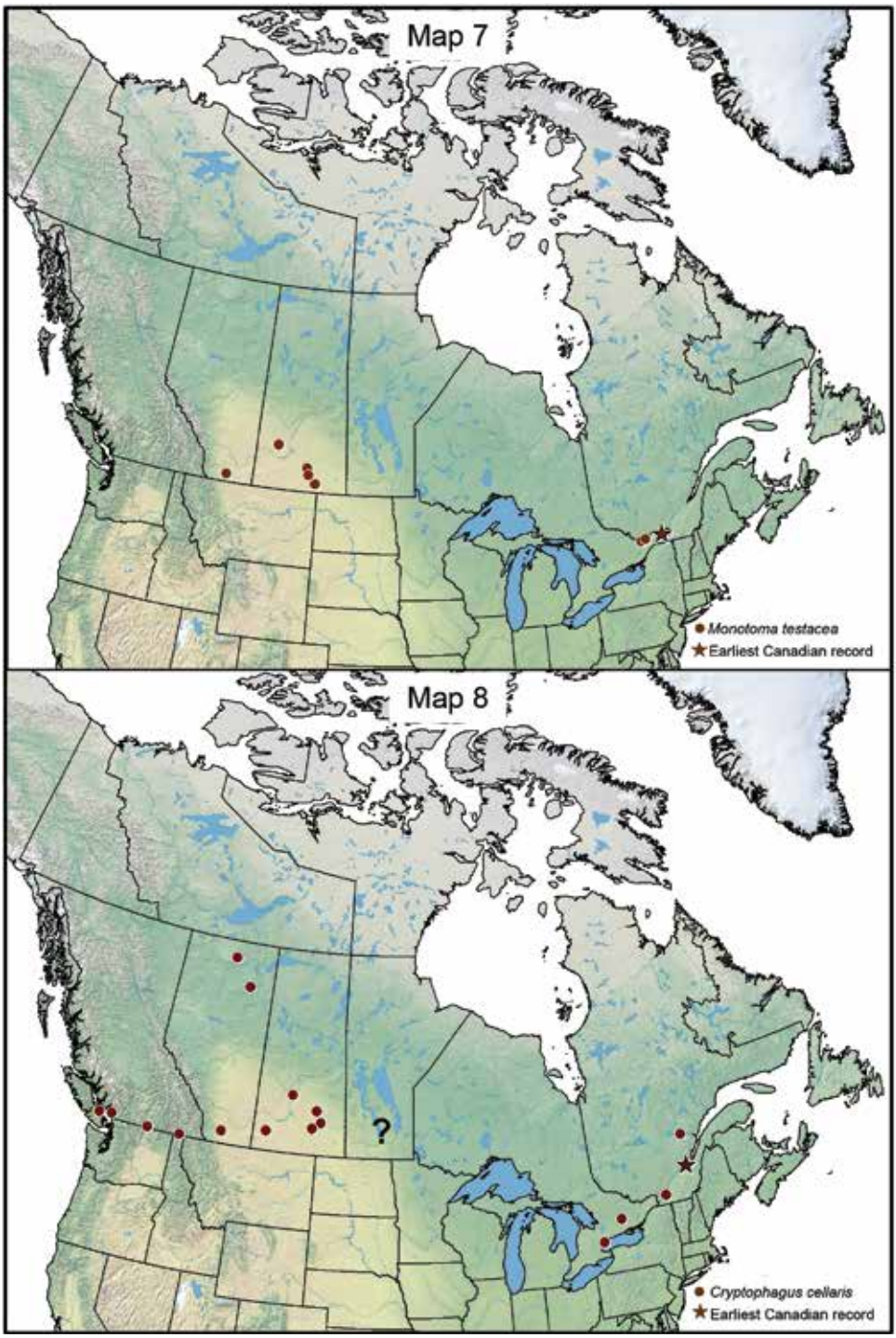

**Figures 103-106.** Aedeagus in ventral (a) and lateral (b) views: 103, *Cortinicara gibbosa* (Herbst), Gros Morne National Park and Carbonear, Newfoundland; 104, *Henoticus serratus* (Gyllenhal), Mount Lyall, Quebec, Point Wolfe River Trail, New Brunswick; 105, *Pteryngium crenatum* (Gyllenhal), Vancouver and Lorna, British Columbia; 106, *Ephistemus globulus* (Paykull), Royal Oak, British Columbia.

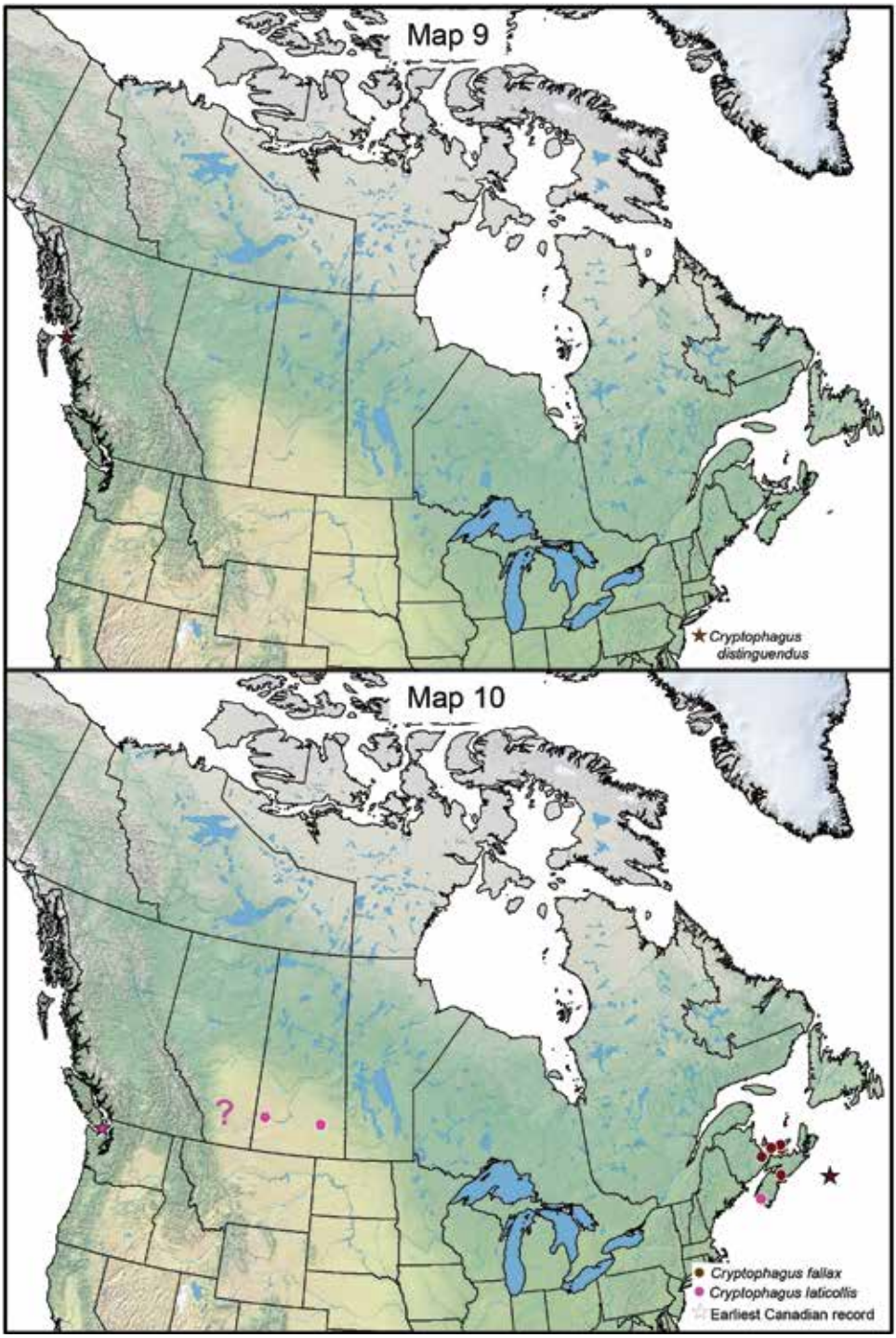
# Maps

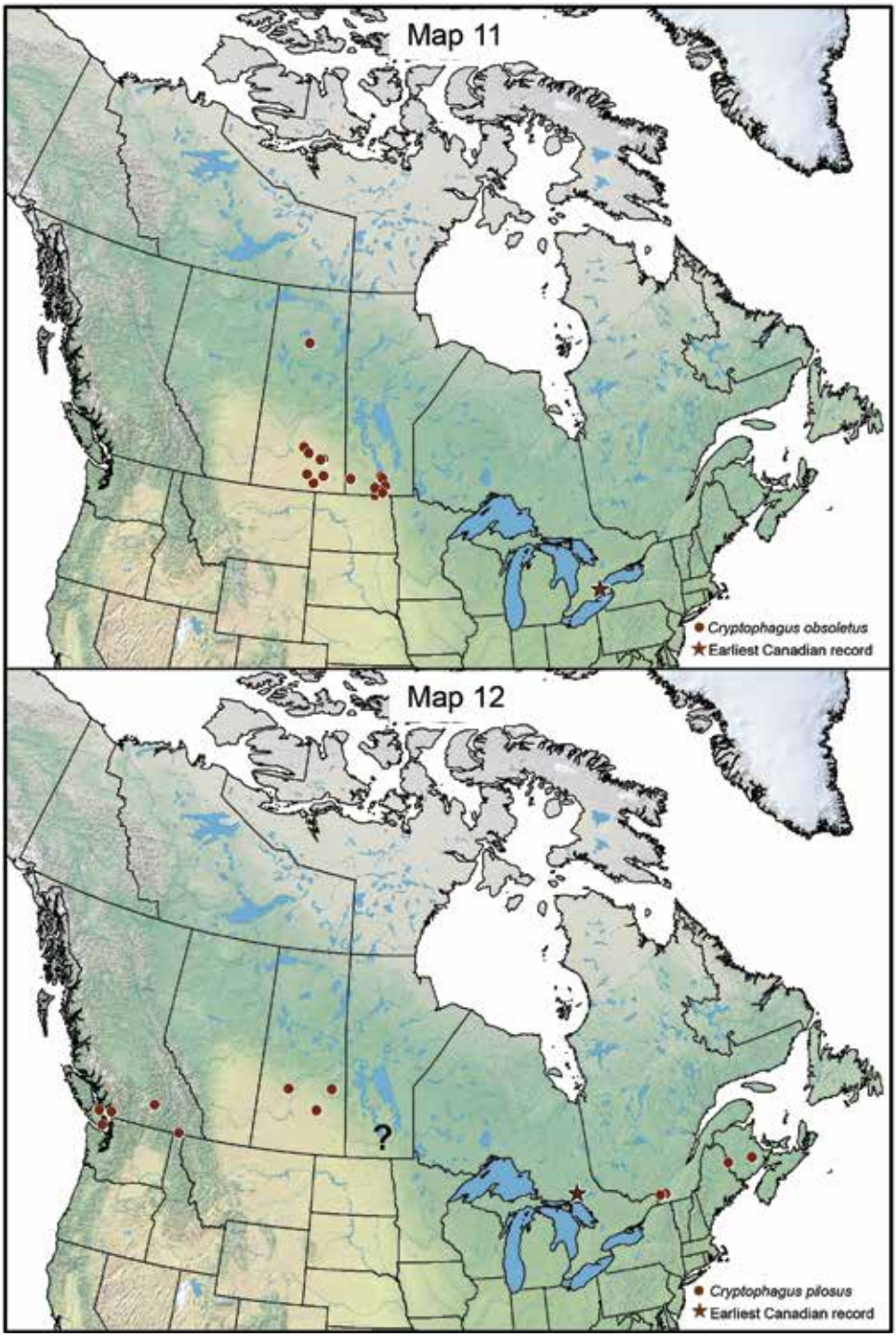

Map 1
Cryptophilus integer
Earliest Canadian record
Map 2
Rhizophagus parallelocollis
Earliest Canadian record

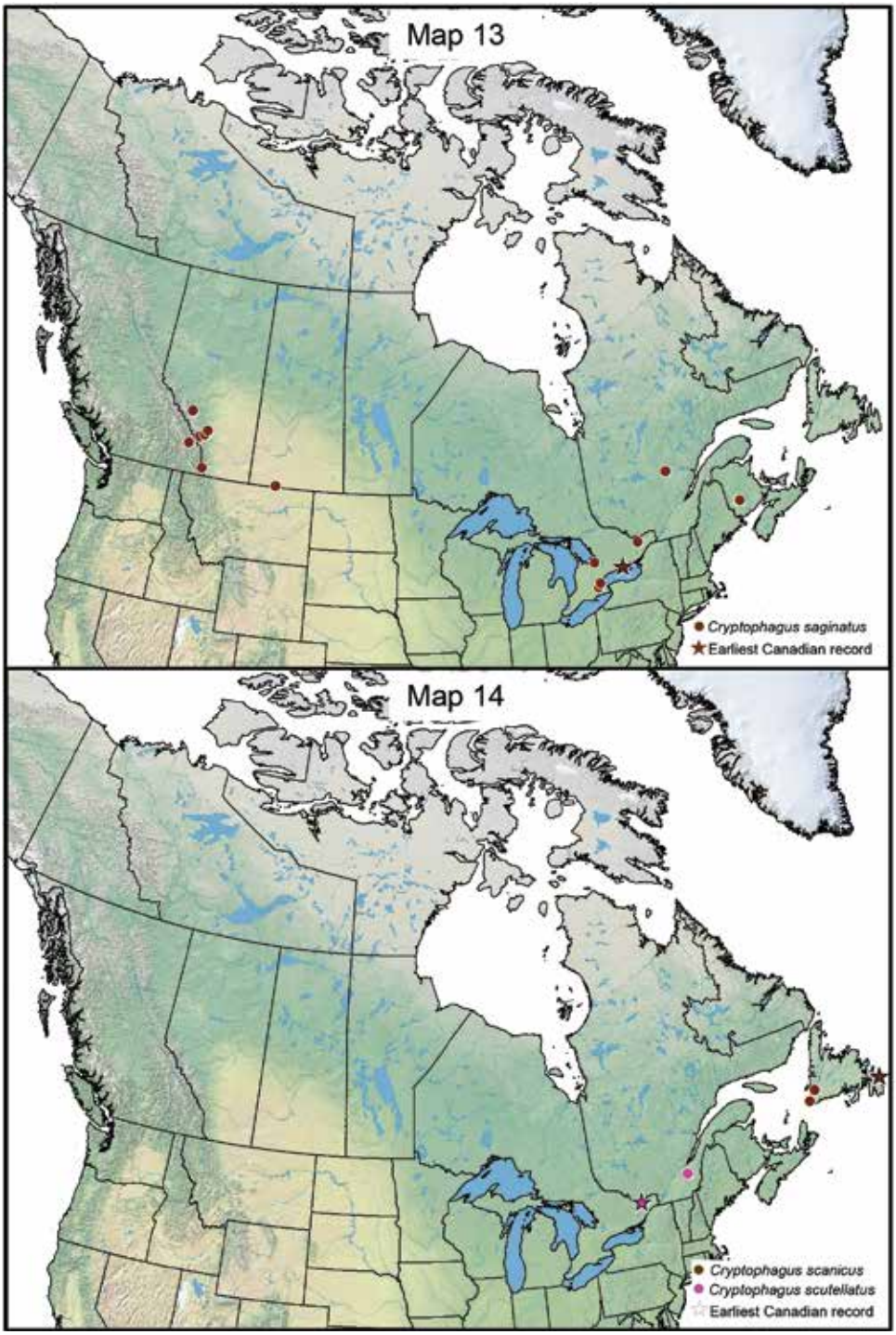

Map 3
Monotoma bicolor
Earliest Canadian record
Map 4
Monotoma longicollis
Earliest Canadian record

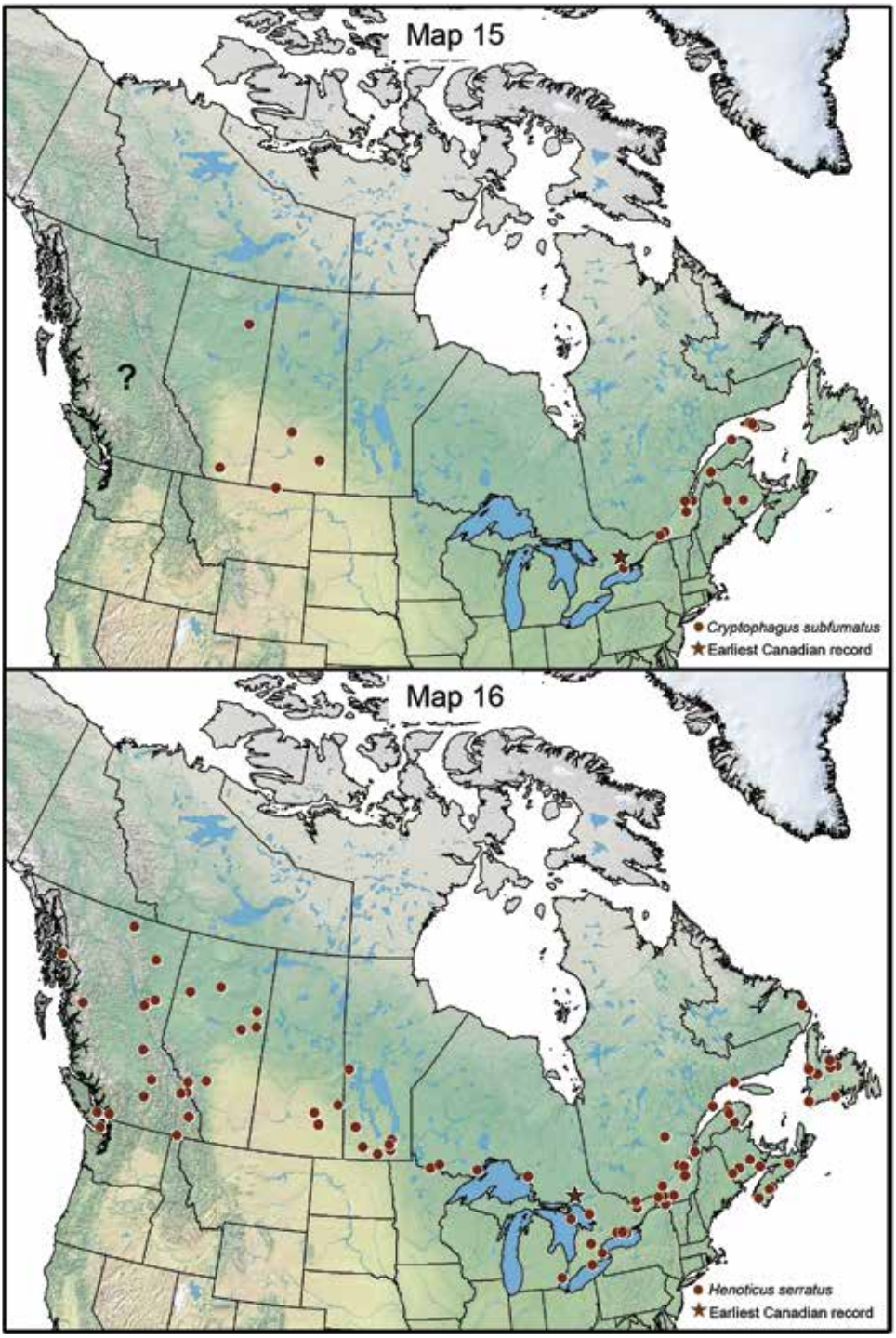

Map 5
Monotoma picipes
Earliest Canadian record
Map 6
Monotoma spinicollis
Monotoma quadrifoveolata
Earliest Canadian record

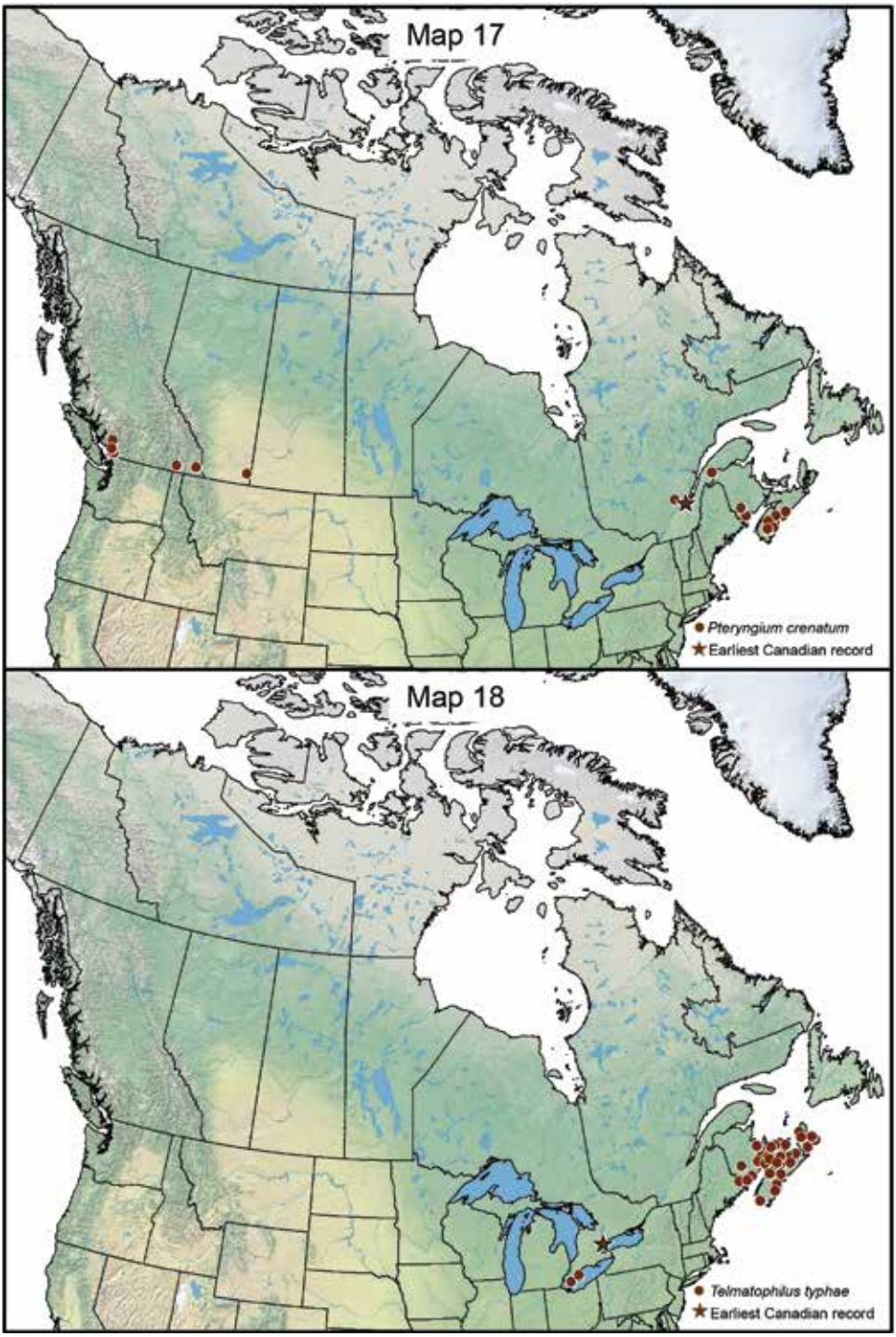

Map 7
Monotoma testacea
Earliest Canadian record
Map 8
?
Cryptophagus cellaris
Earliest Canadian record

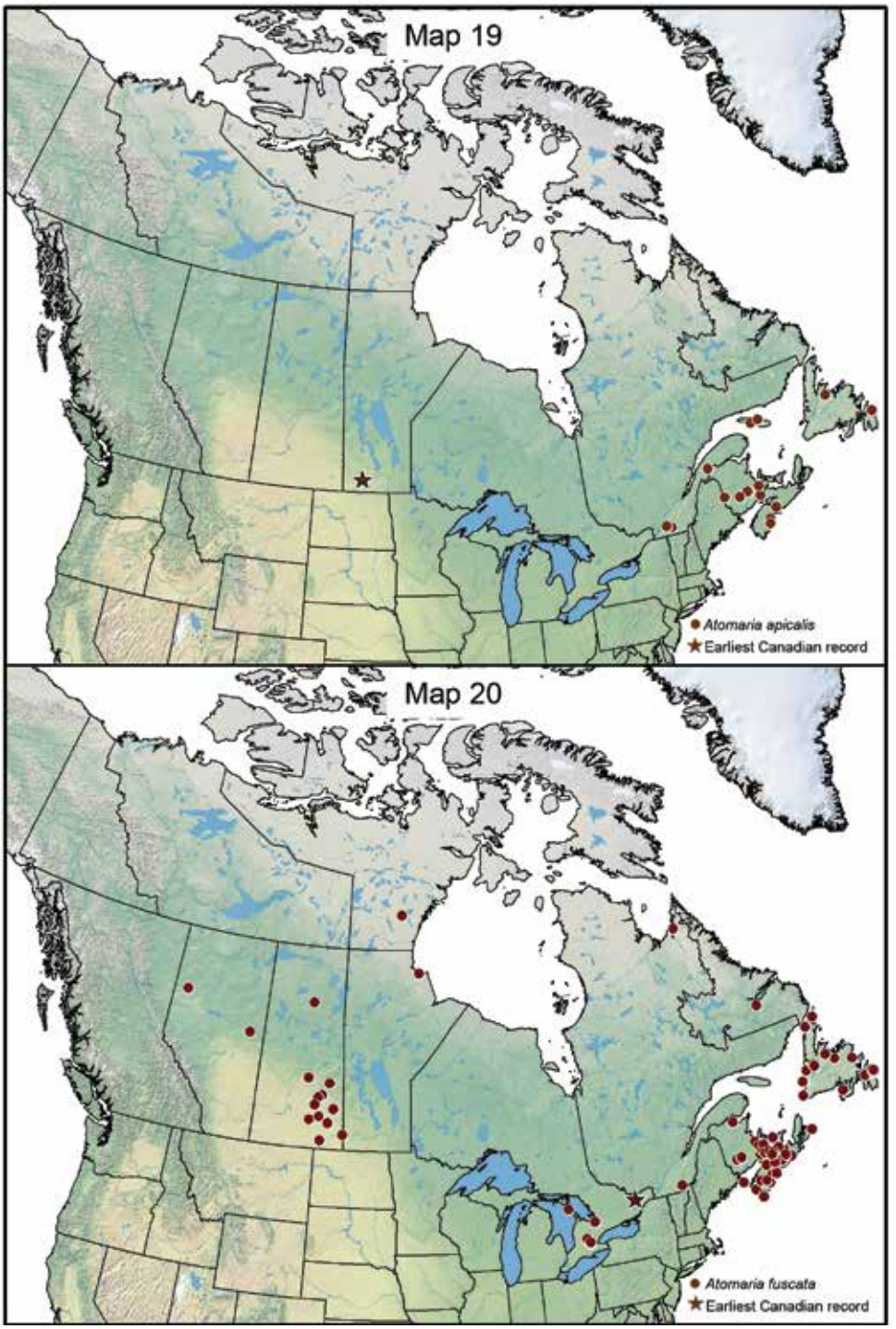

Map 9
Cryptophagus distinguendus
Map 10
?
Cryptophagus fallax
Cryptophagus laticollis
Earliest Canadian record

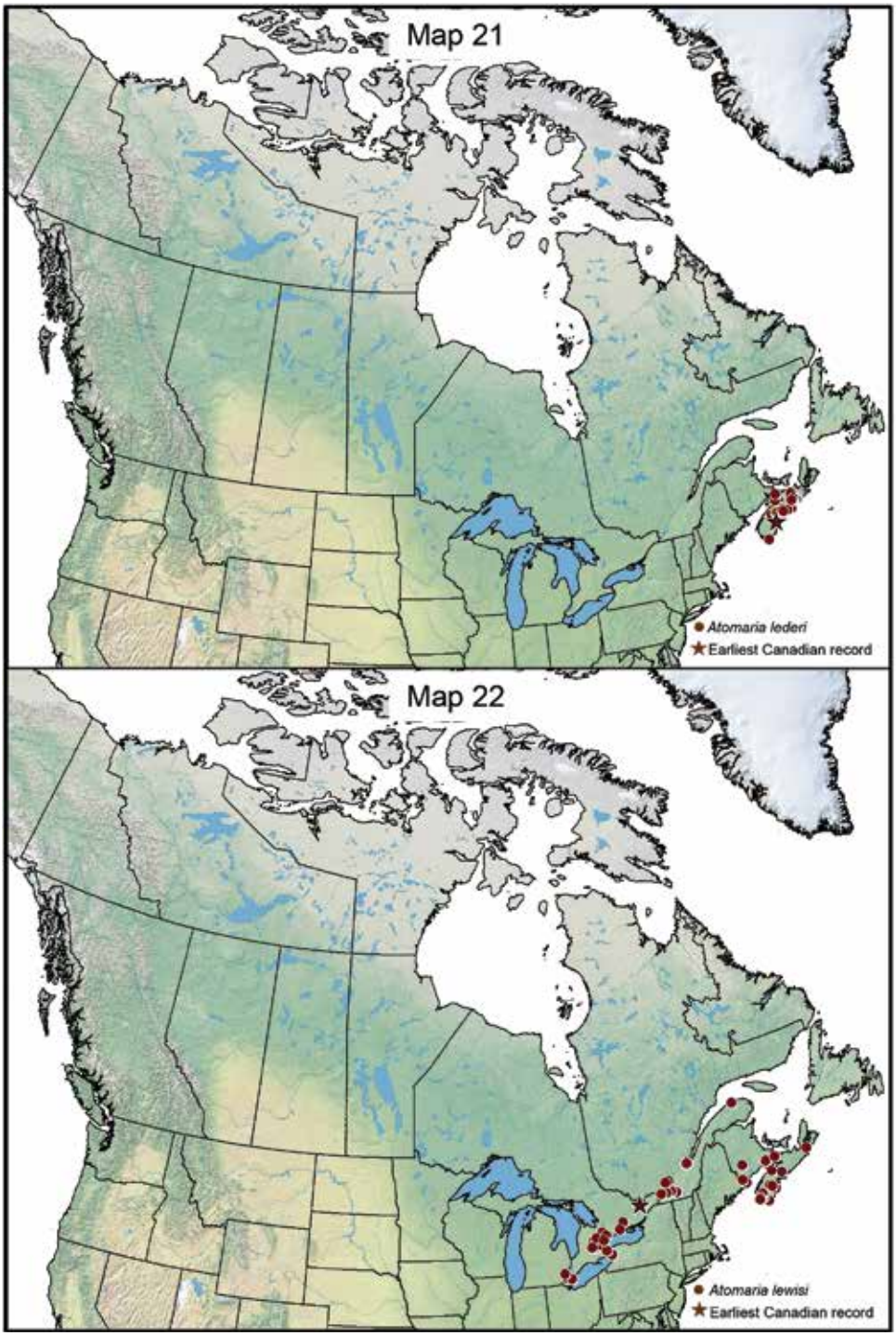

Map 11
Cryptophagus obsoletus
Earliest Canadian record
Map 12
?
Cryptophagus pilosus
Earliest Canadian record

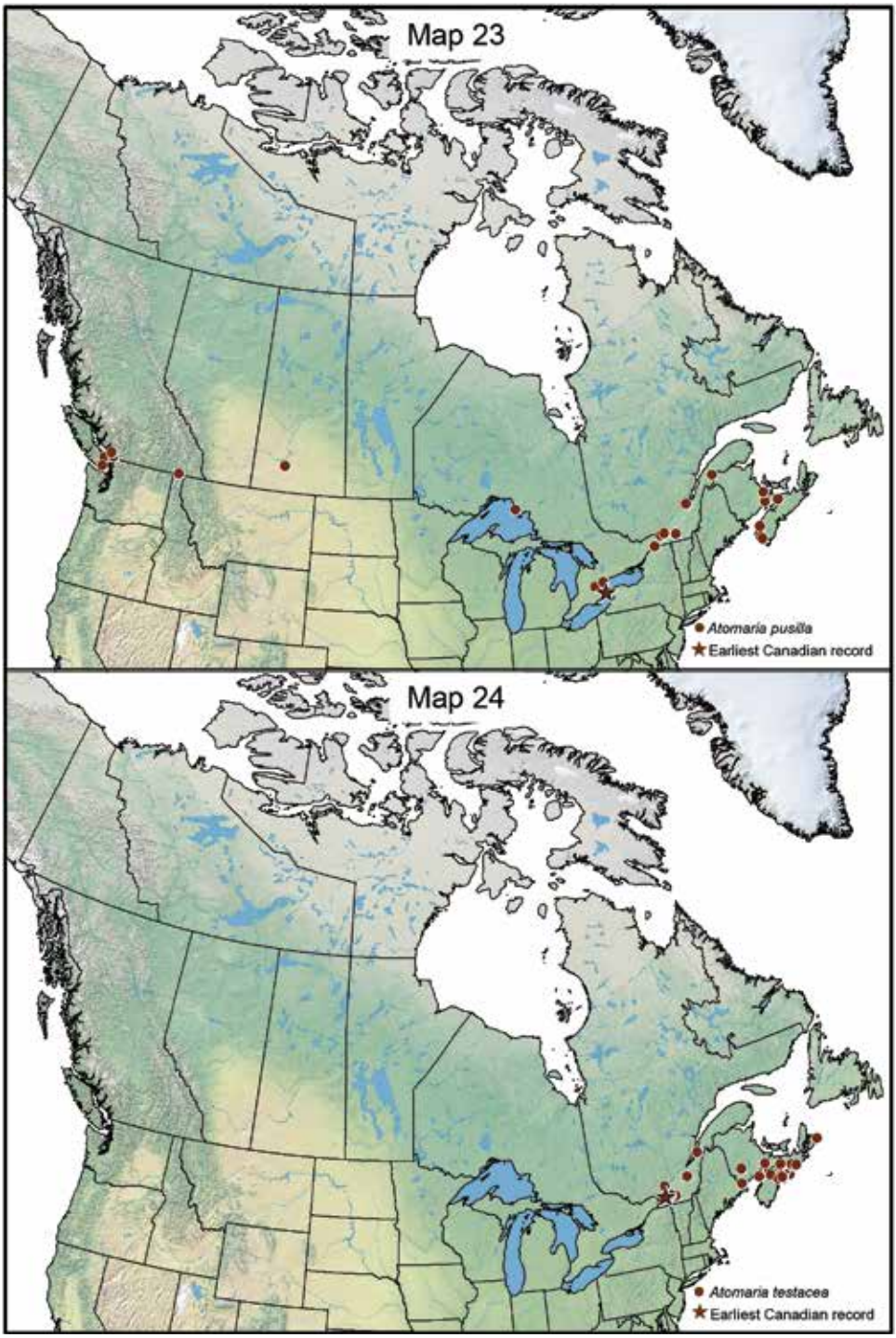

Map 13
Cryptophagus saginatus
Earliest Canadian record
Map 14
Cryptophagus scanicus
Cryptophagus scutellatus
Earliest Canadian record

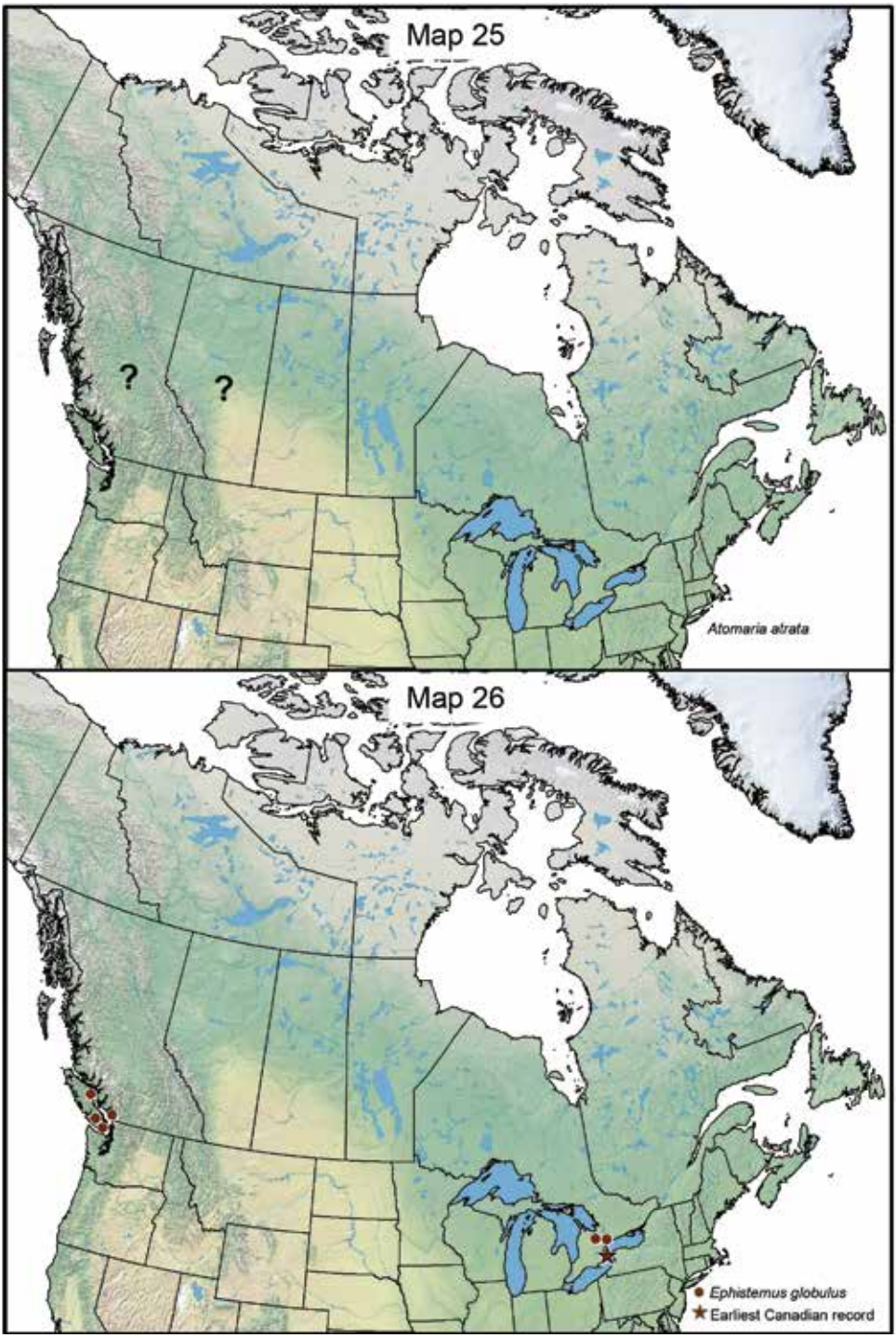

Map 15
?
Cryptophagus subfumatus
Earliest Canadian record
Map 16
Henoticus serratus
Earliest Canadian record

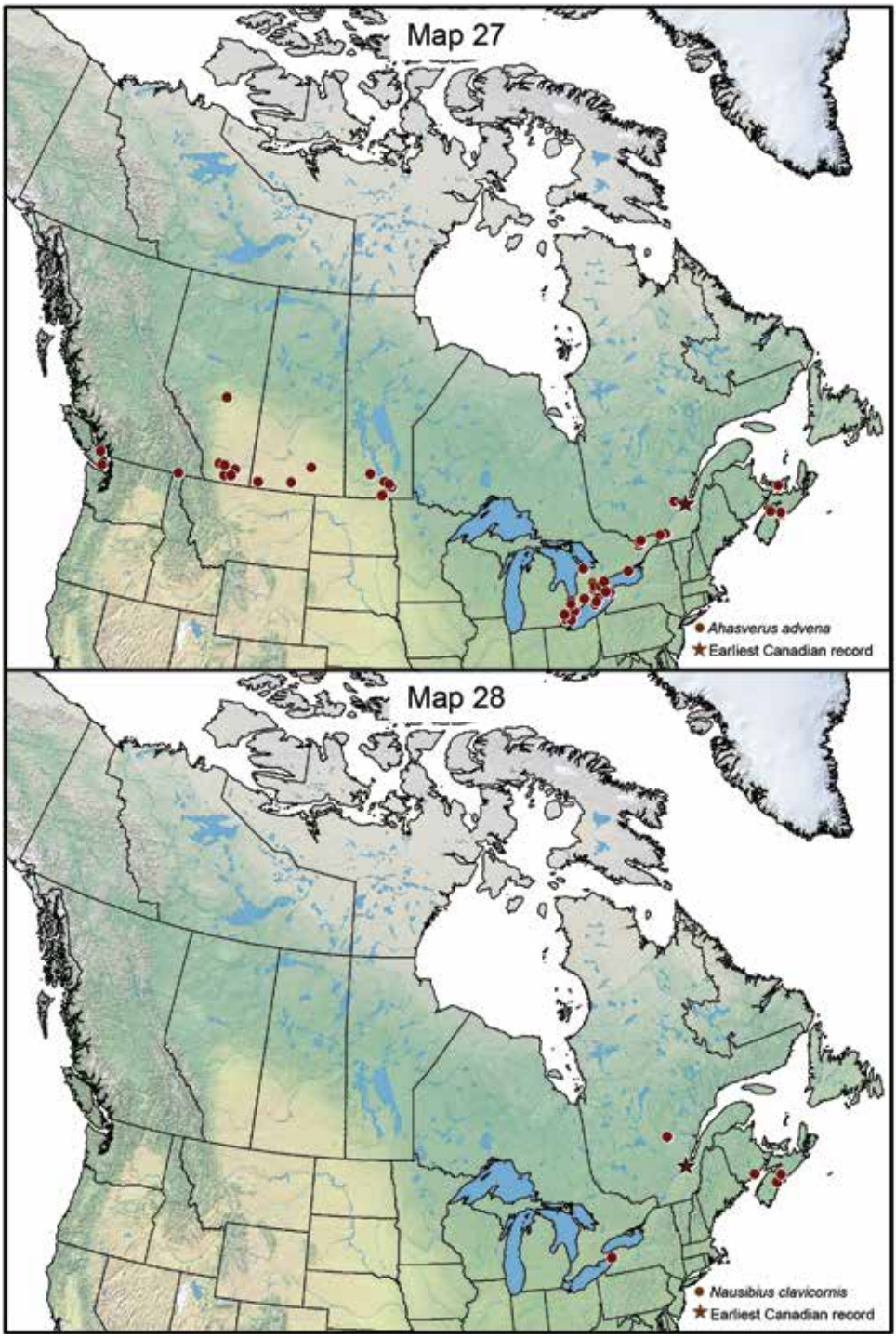

Map 17
Pteryngium crenatum
Earliest Canadian record
Map 18
Telmatophilus typhae
Earliest Canadian record

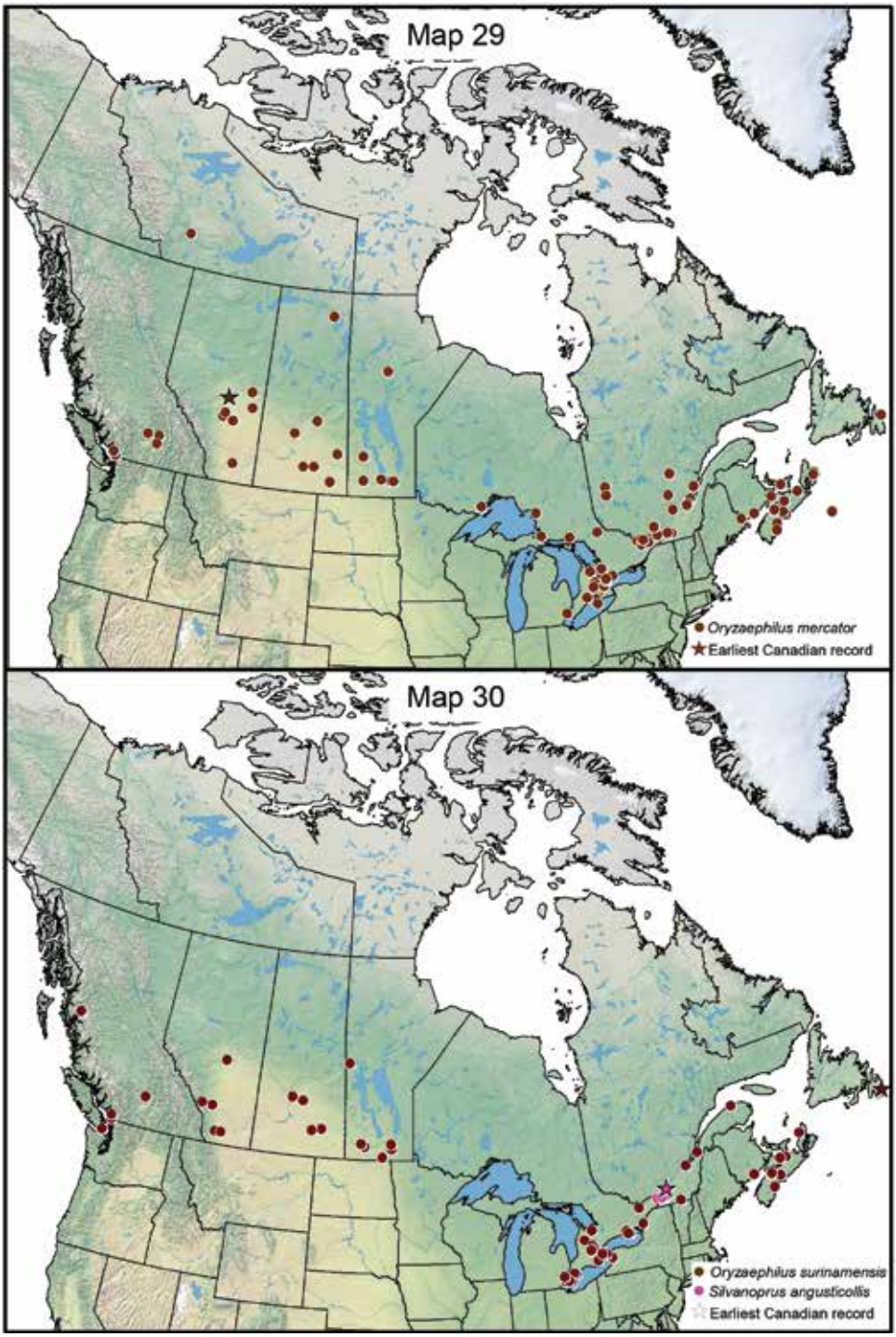

Map 19
Atomaria apicalis
Earliest Canadian record
Map 20
Atomaria fuscata
Earliest Canadian record

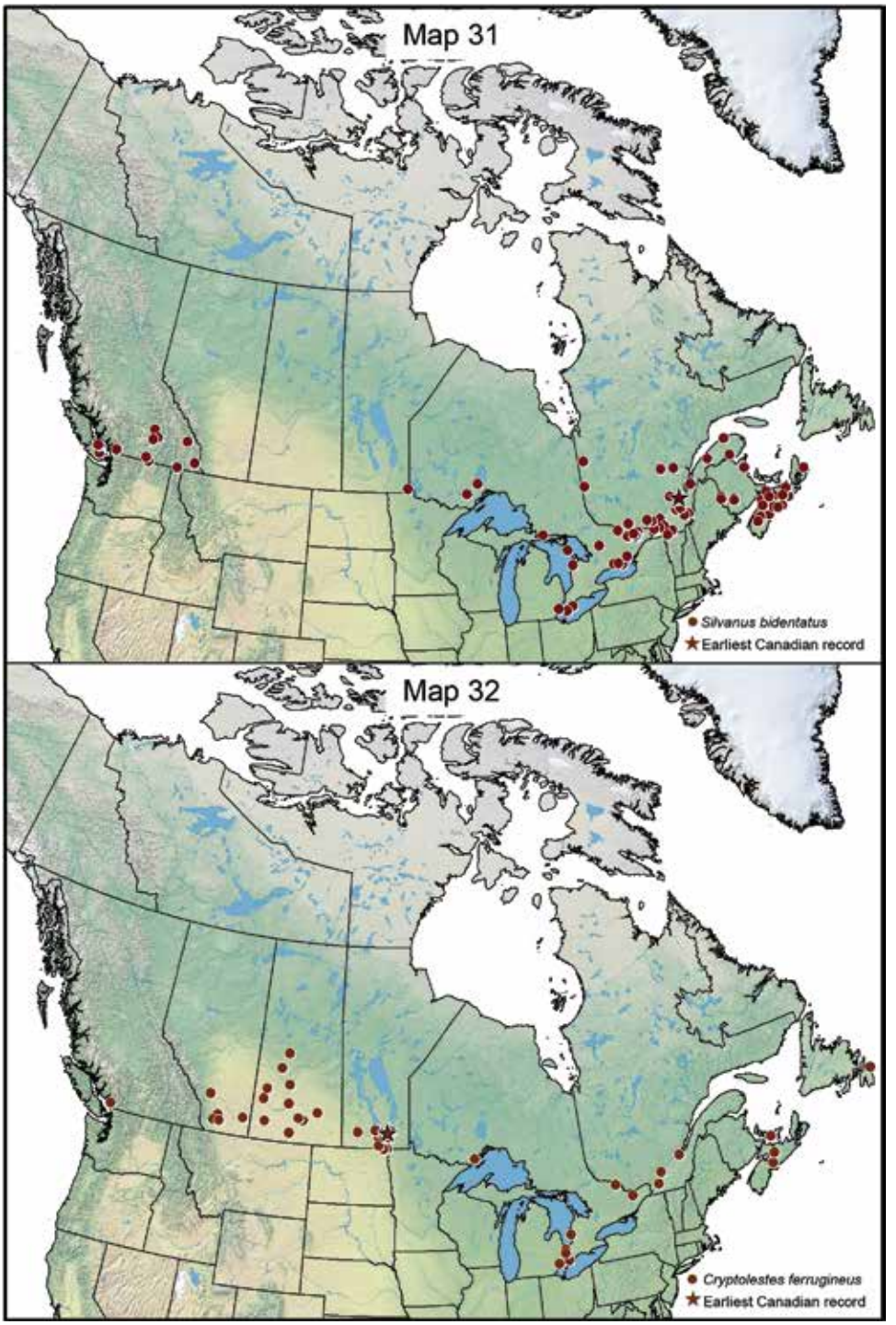

Map 21
Atomaria lederi
Earliest Canadian record
Map 22
Atomaria lewisi
Earliest Canadian record

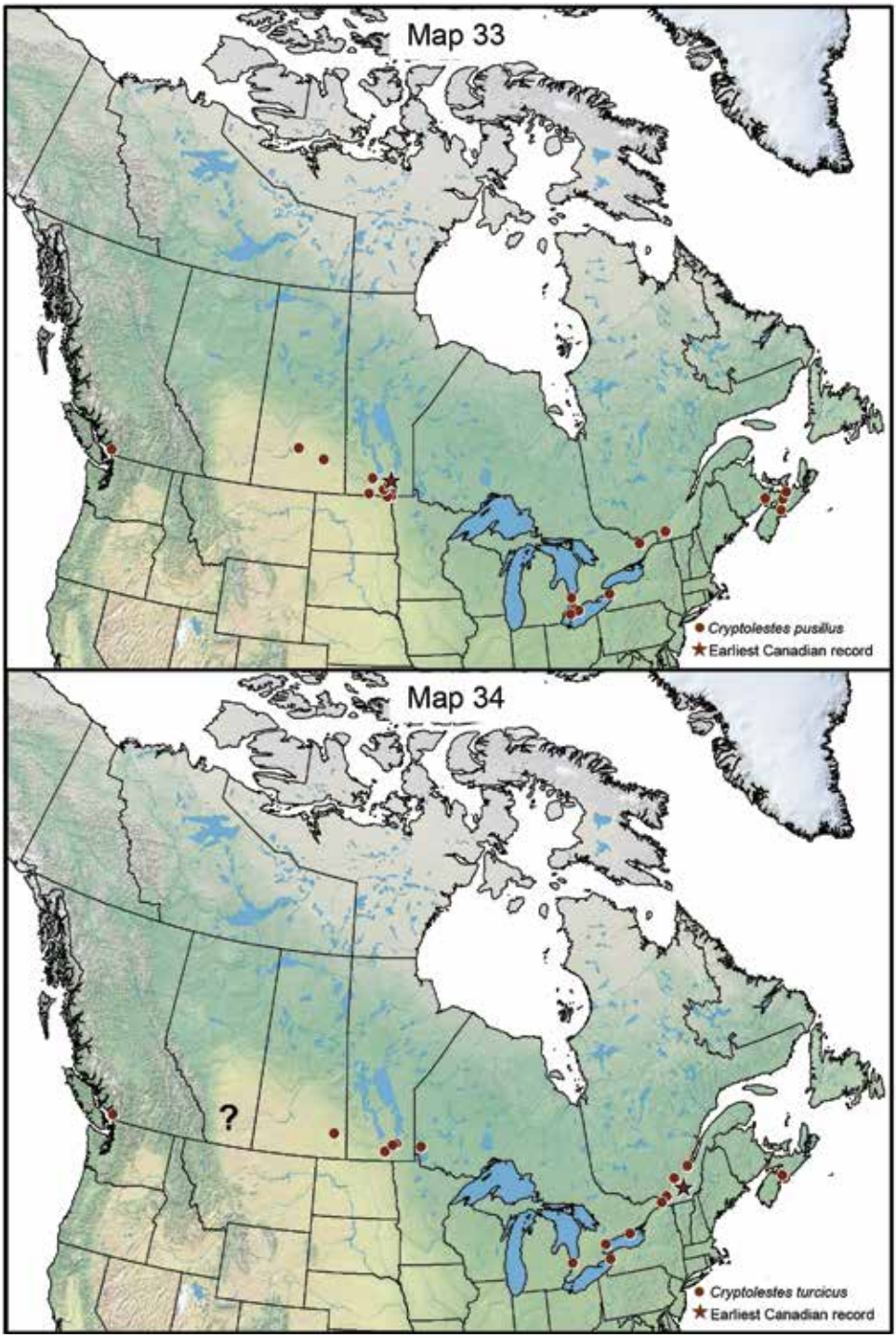

Map 23
Atomaria pusilla
Earliest Canadian record
Map 24
Atomaria testacea
Earliest Canadian record

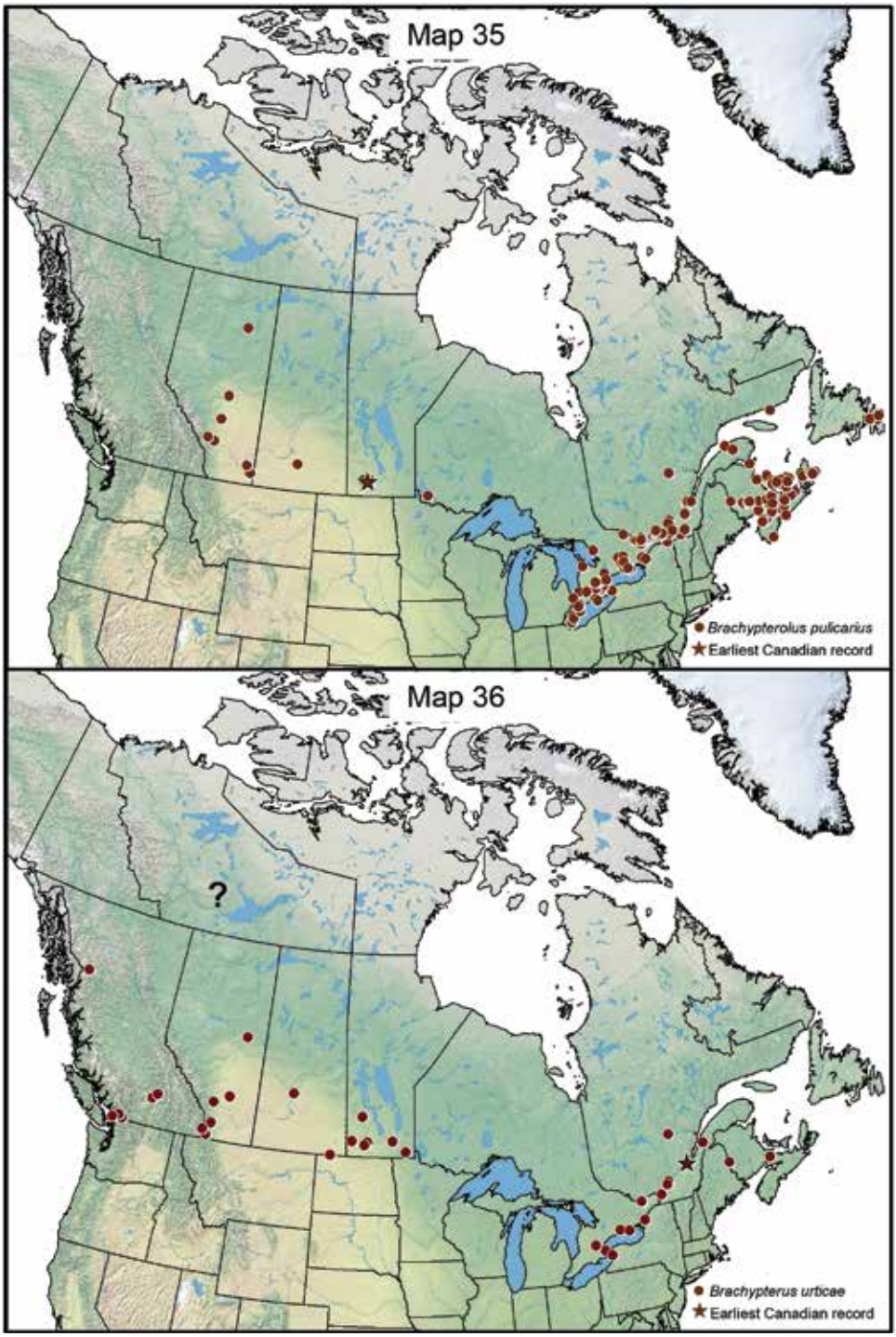

Map 25
?
?
Atomaria atrata
Map 26
Ephistemus globulus
Earliest Canadian record

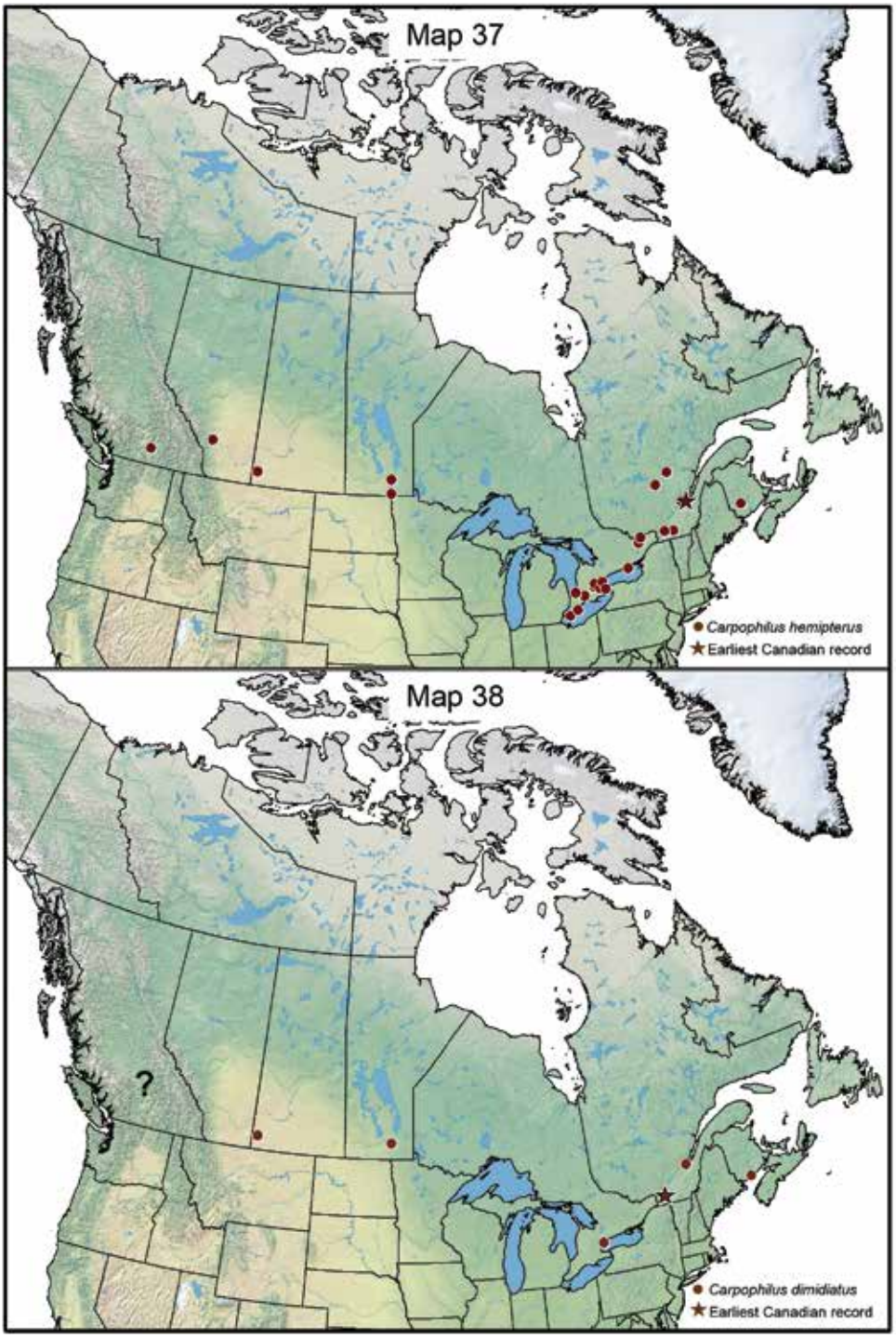

Map 27
Ahasverus advena
Earliest Canadian record
Map 28
Nausibius clavicornis
Earliest Canadian record

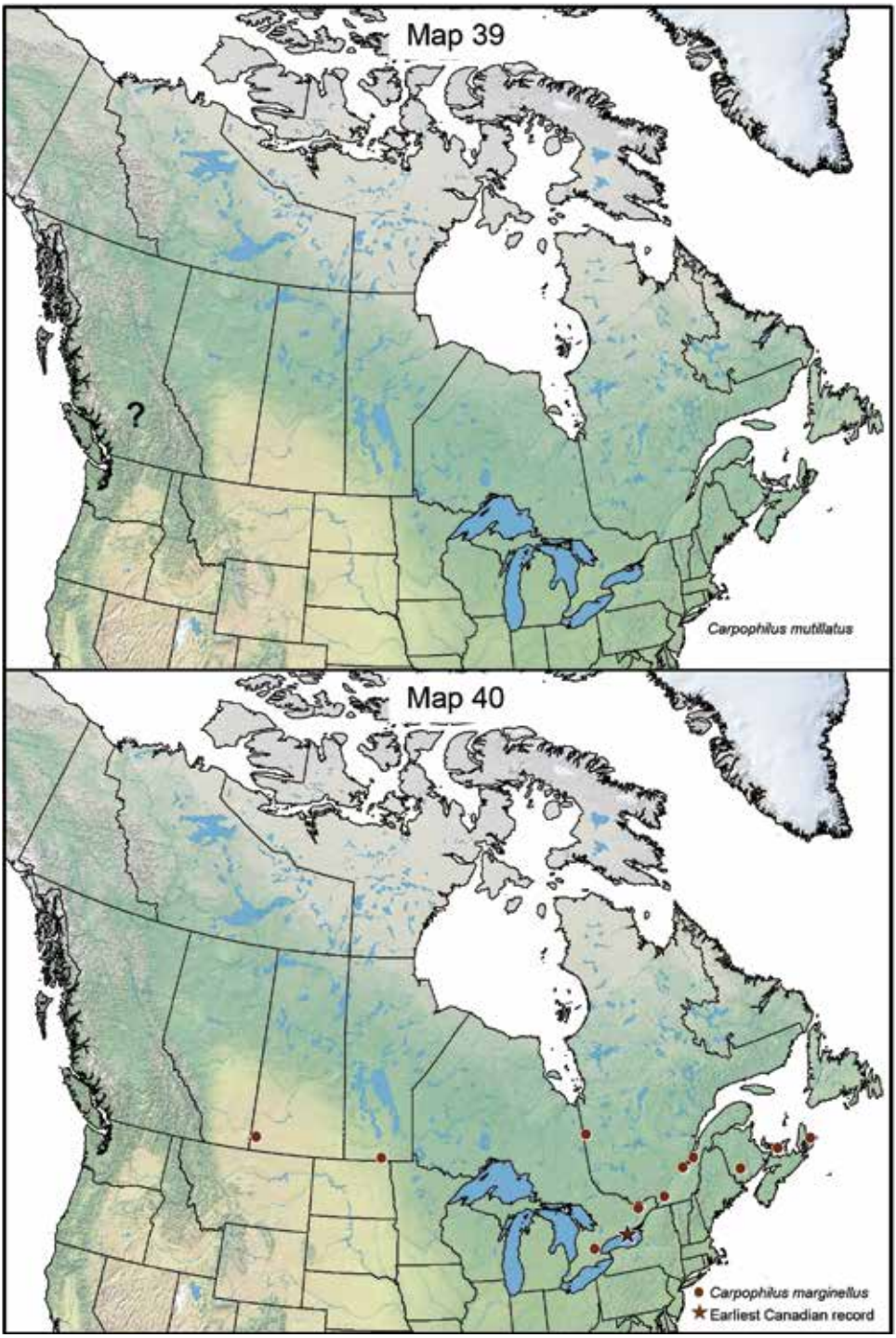

Map 29
Oryzaephilus mercator
Earliest Canadian record
Map 30
Oryzaephilus surinamensis
Silvanoprus angusticollis
Earliest Canadian record

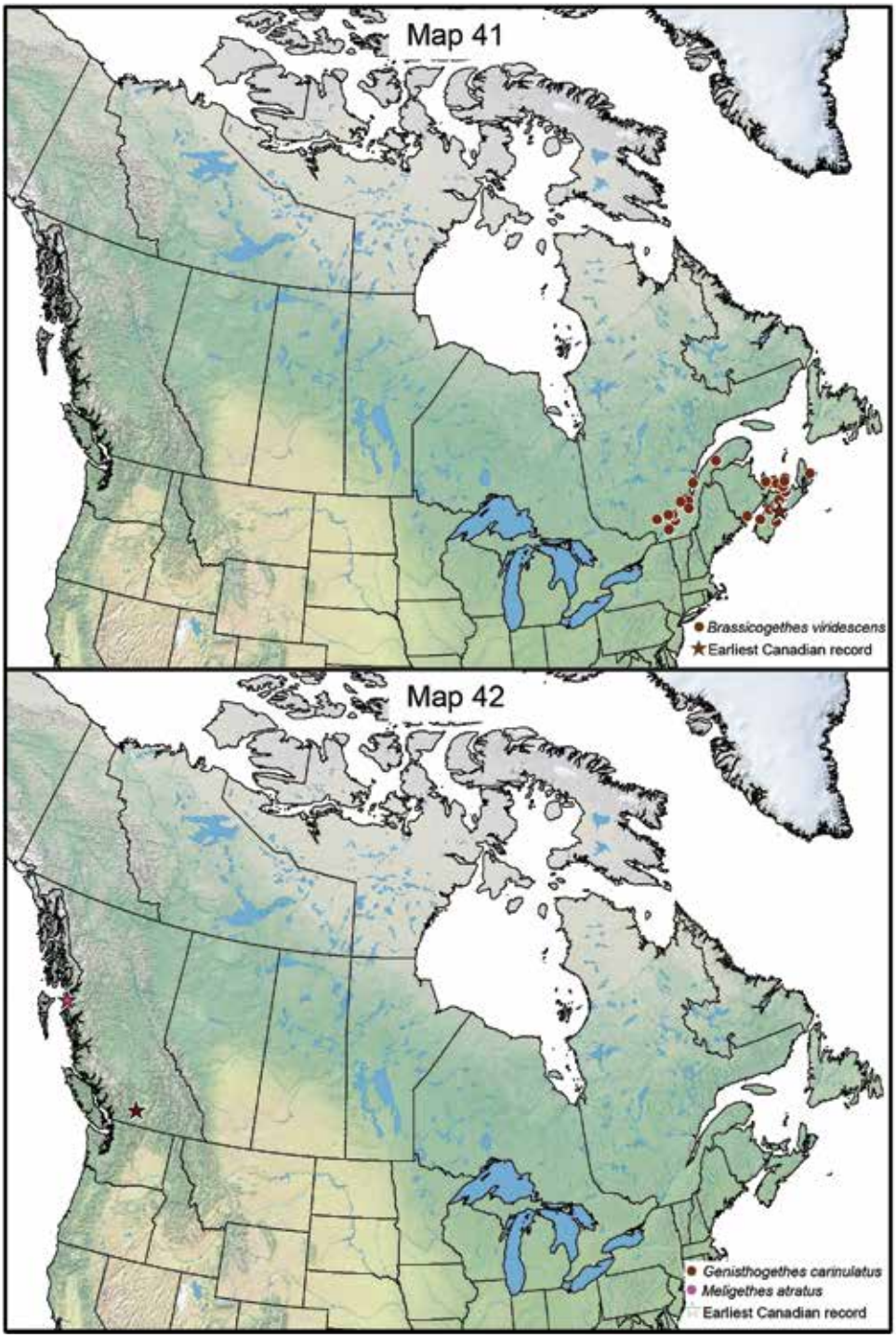

Map 31
Silvanus bidentatus
Earliest Canadian record
Map 32
Cryptolestes ferrugineus
Earliest Canadian record

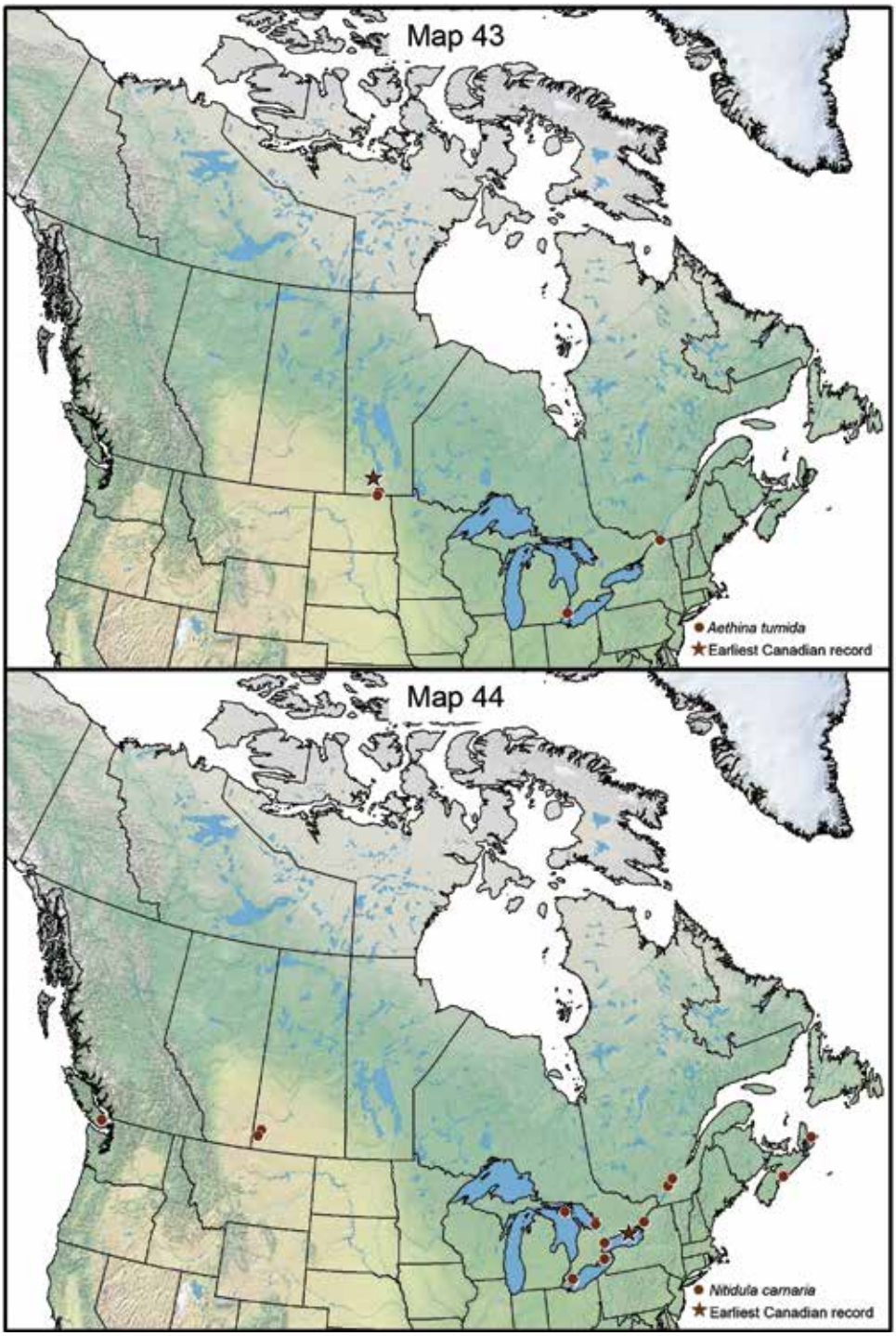

Map 33
Cryptolestes pusillus
Earliest Canadian record
Map 34
?
Cryptolestes turcicus
Earliest Canadian record

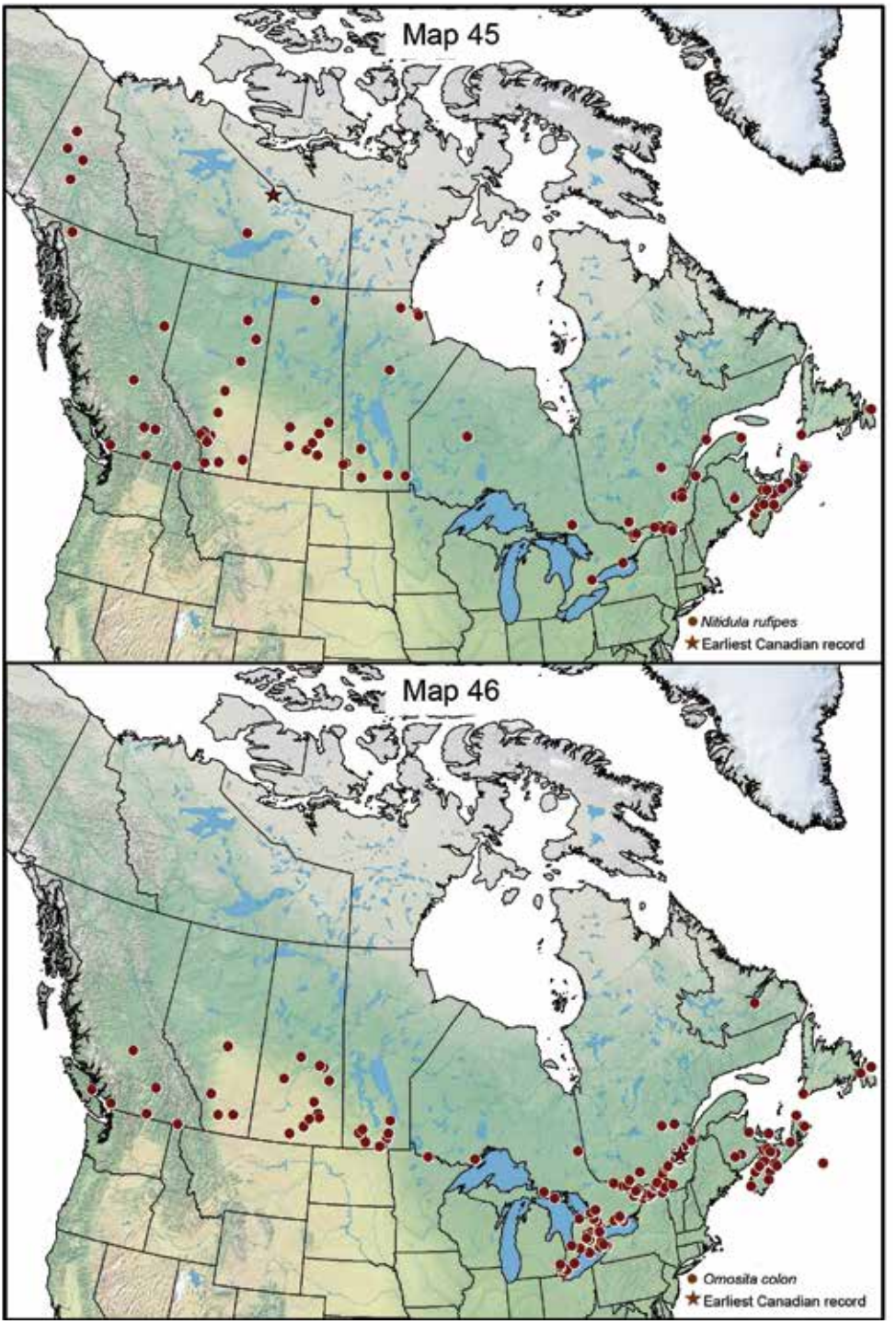

Map 35
Brachypterolus pulicarius
Earliest Canadian record
Map 36
?
Brachypterus urticae
Earliest Canadian record

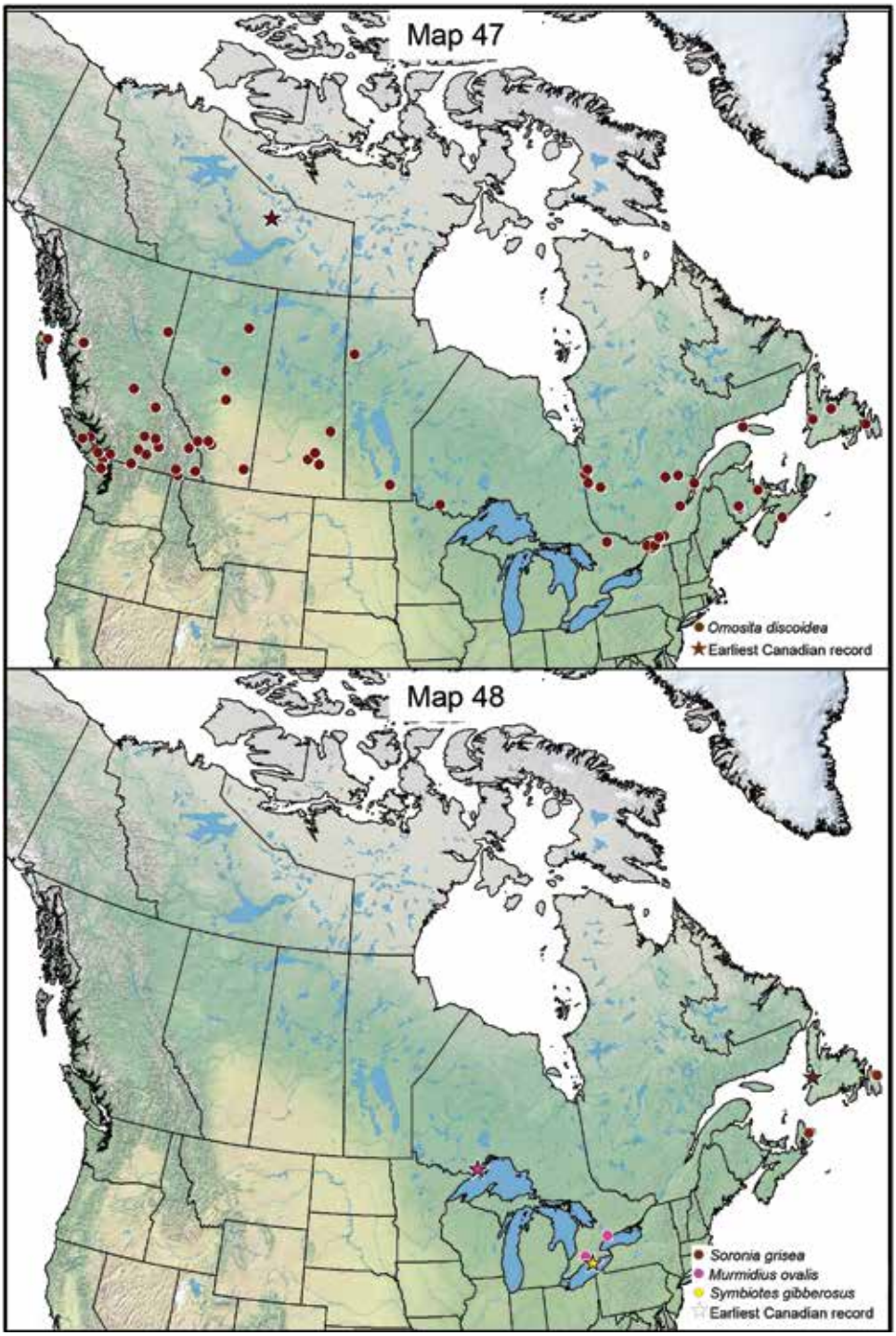

Map 37
Carpophilus hemipterus
Earliest Canadian record
Map 38
?
Carpophilus dimidiatus
Earliest Canadian record

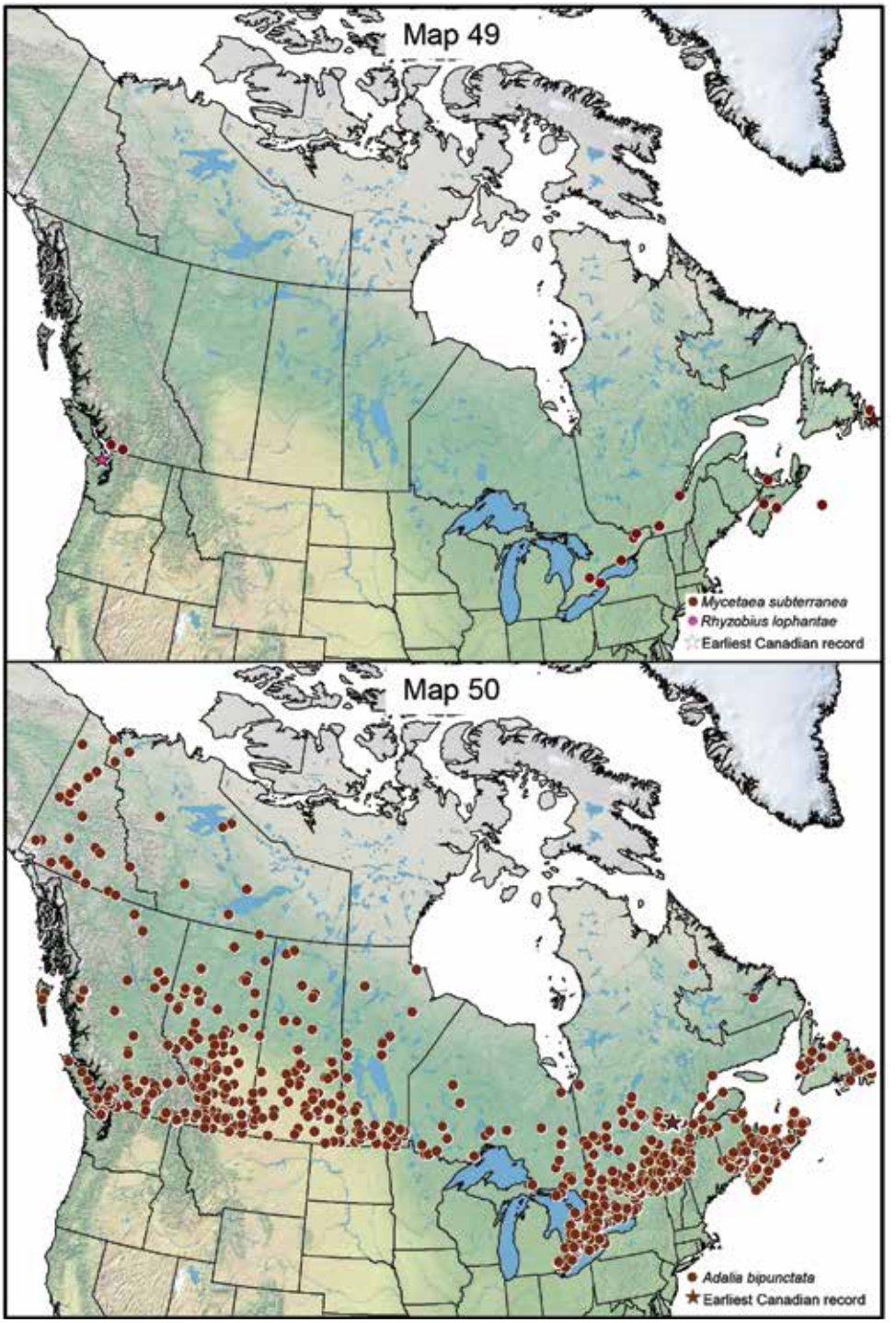

Map 39
?
Carpophilus mutilatus
Map 40
Carpophilus marginellus
Earliest Canadian record

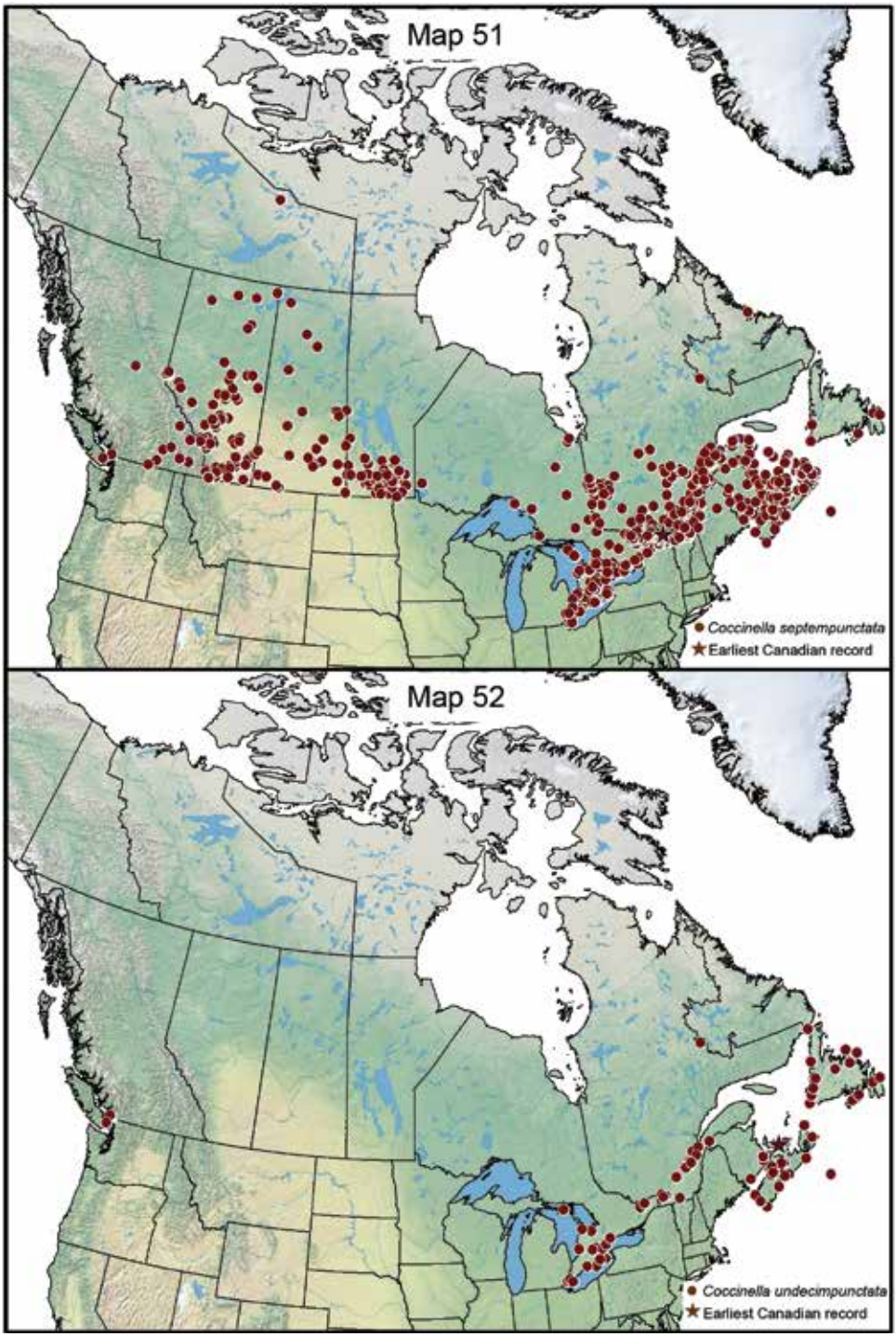

Map 41
Brassicogethes viridescens
Earliest Canadian record
Map 42
Genisthogethes carinulatus
Meligethes atratus
Earliest Canadian record

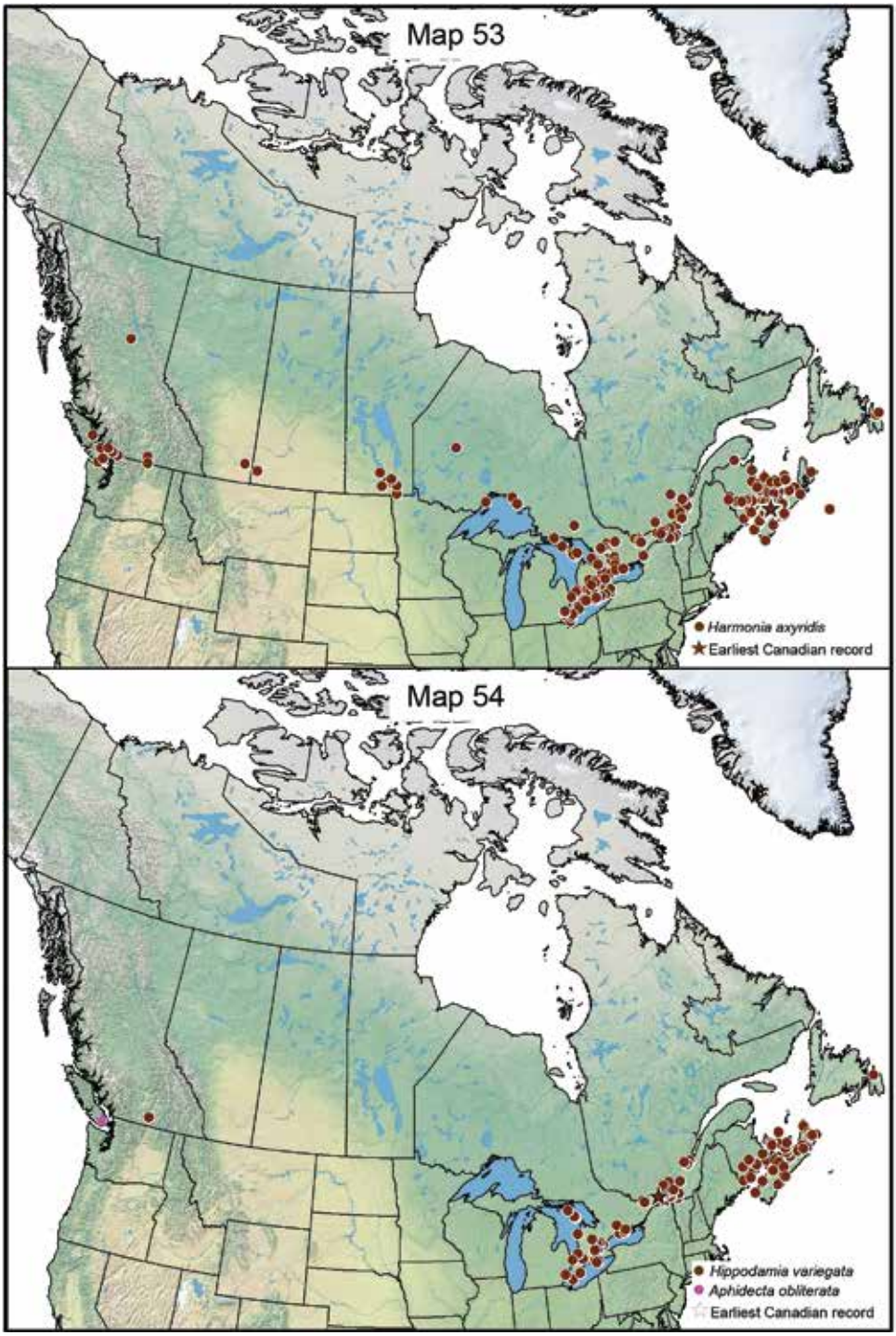

Map 43
Aethina tumida
Earliest Canadian record
Map 44
Nitidula carnaria
Earliest Canadian record

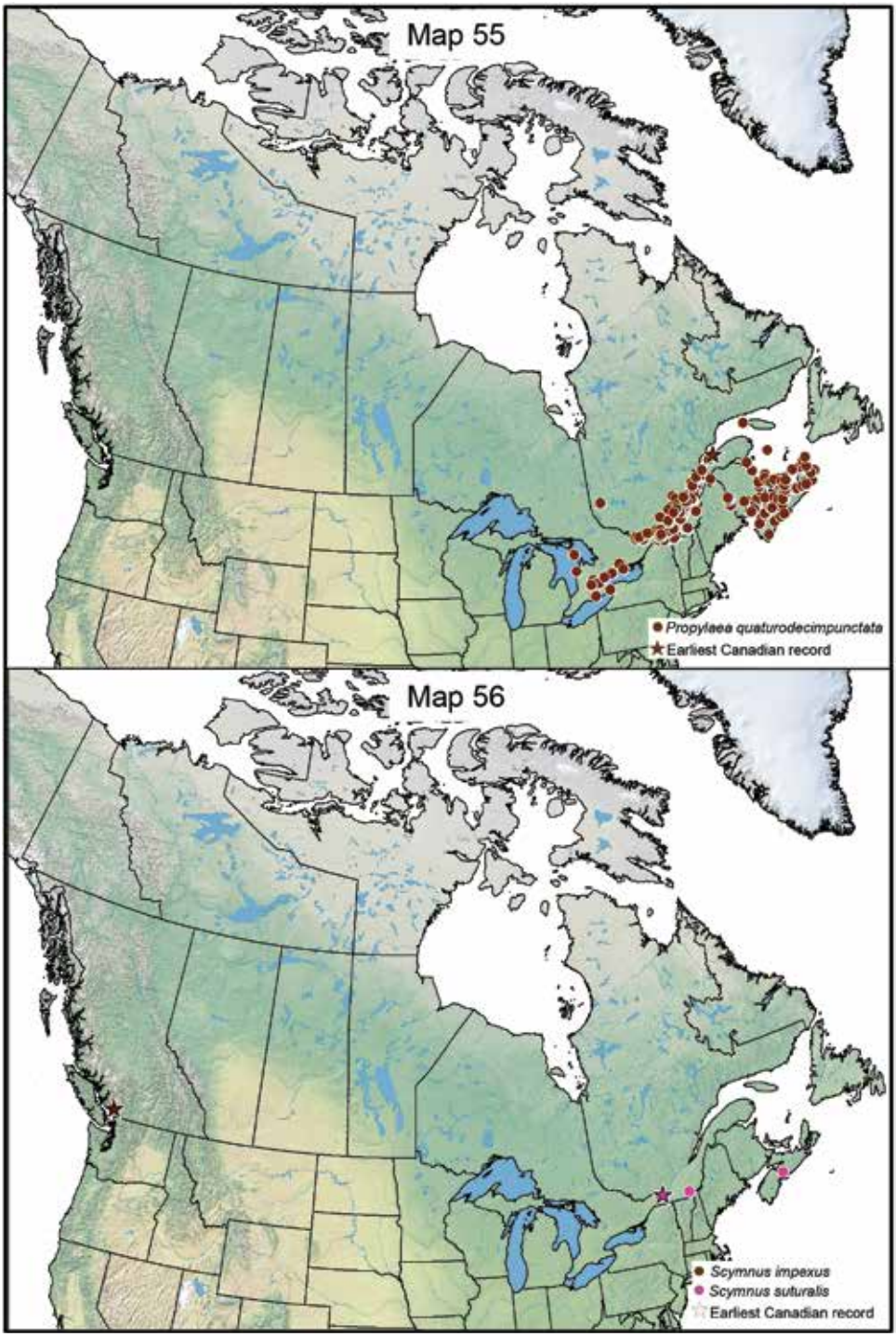

Map 45
Nitidula rufipes
Earliest Canadian record
Map 46
Omosita colon
Earliest Canadian record

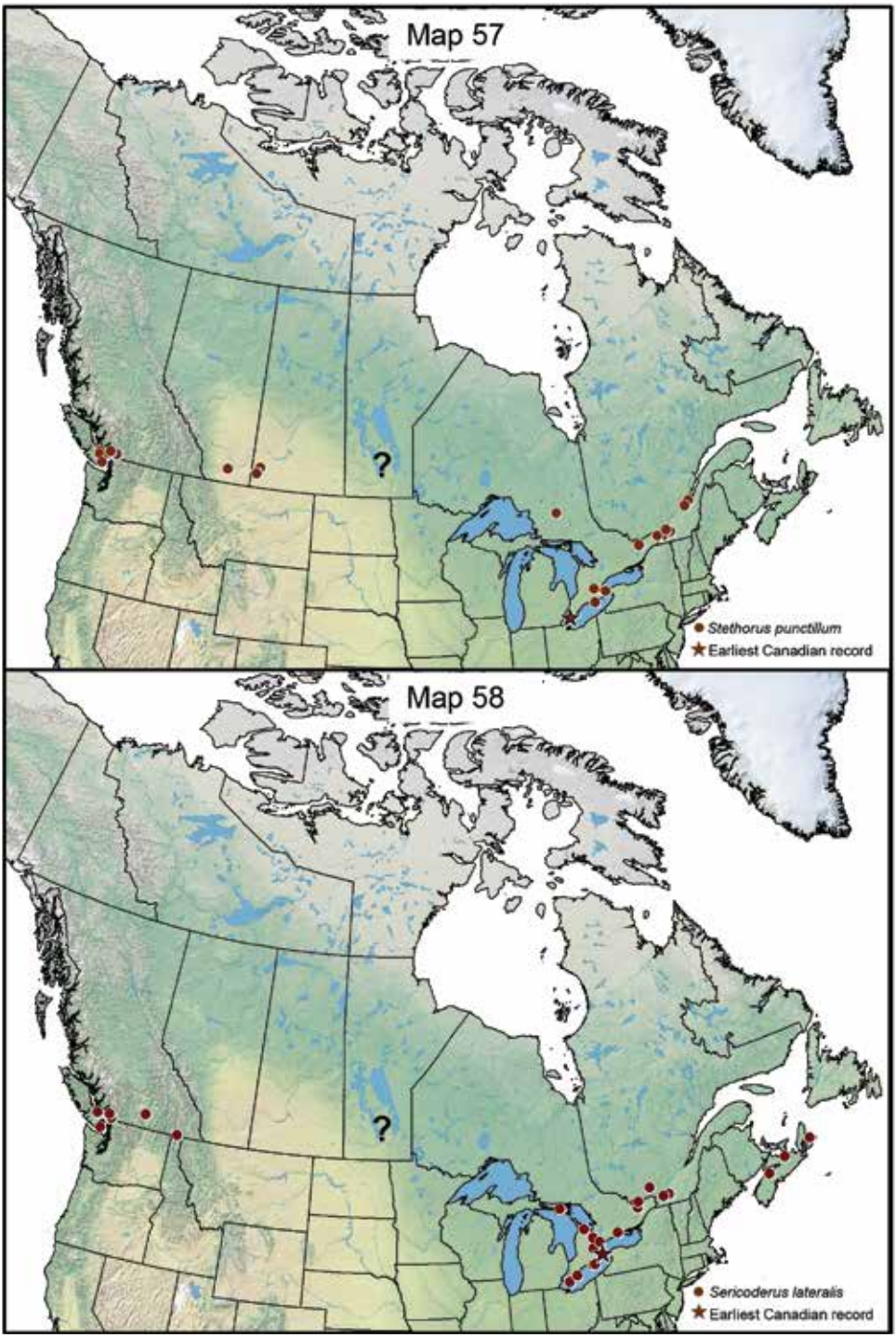

Map 47
Omosita discoidea
Earliest Canadian record
Map 48
Soronia grisea
Murmidius ovalis
Symbiotes gibberosus
Earliest Canadian record

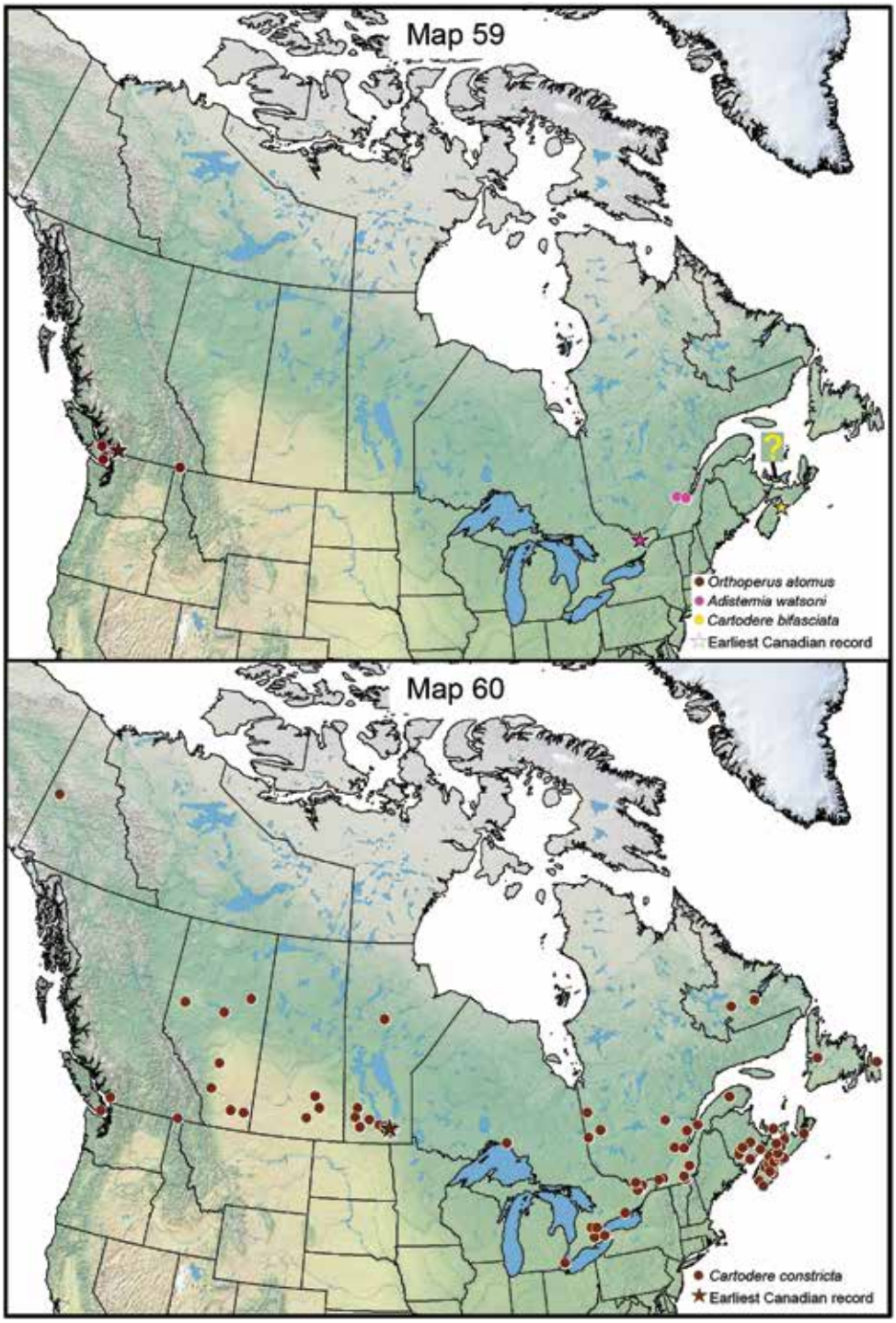

Map 49
Mycetaea subterranea
Rhyzobius lophantae
Earliest Canadian record
Map 50
Adalia bipunctata
Earliest Canadian record

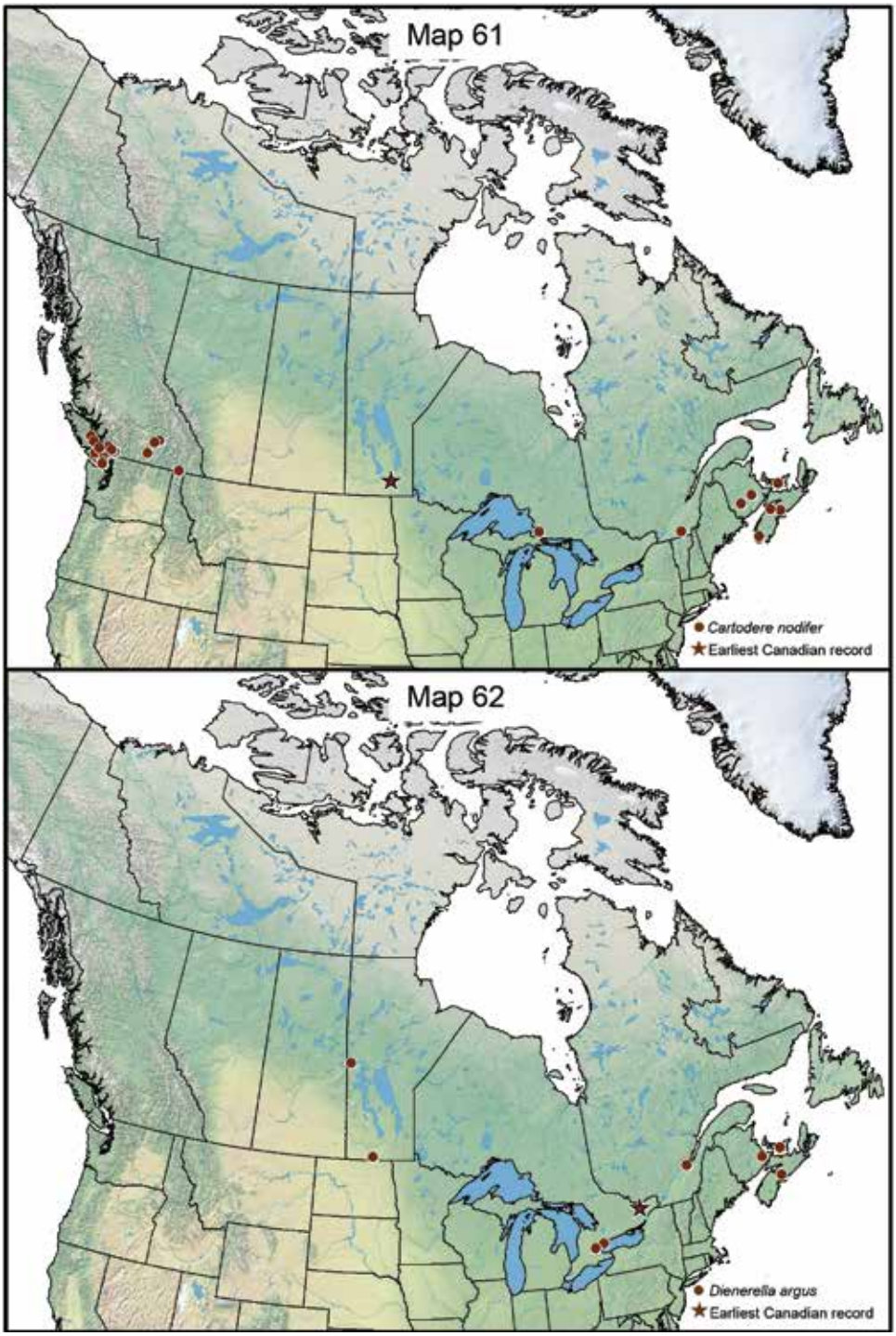

Map 51
Coccinella septempunctata
Earliest Canadian record
Map 52
Coccinella undecimpunctata
Earliest Canadian record

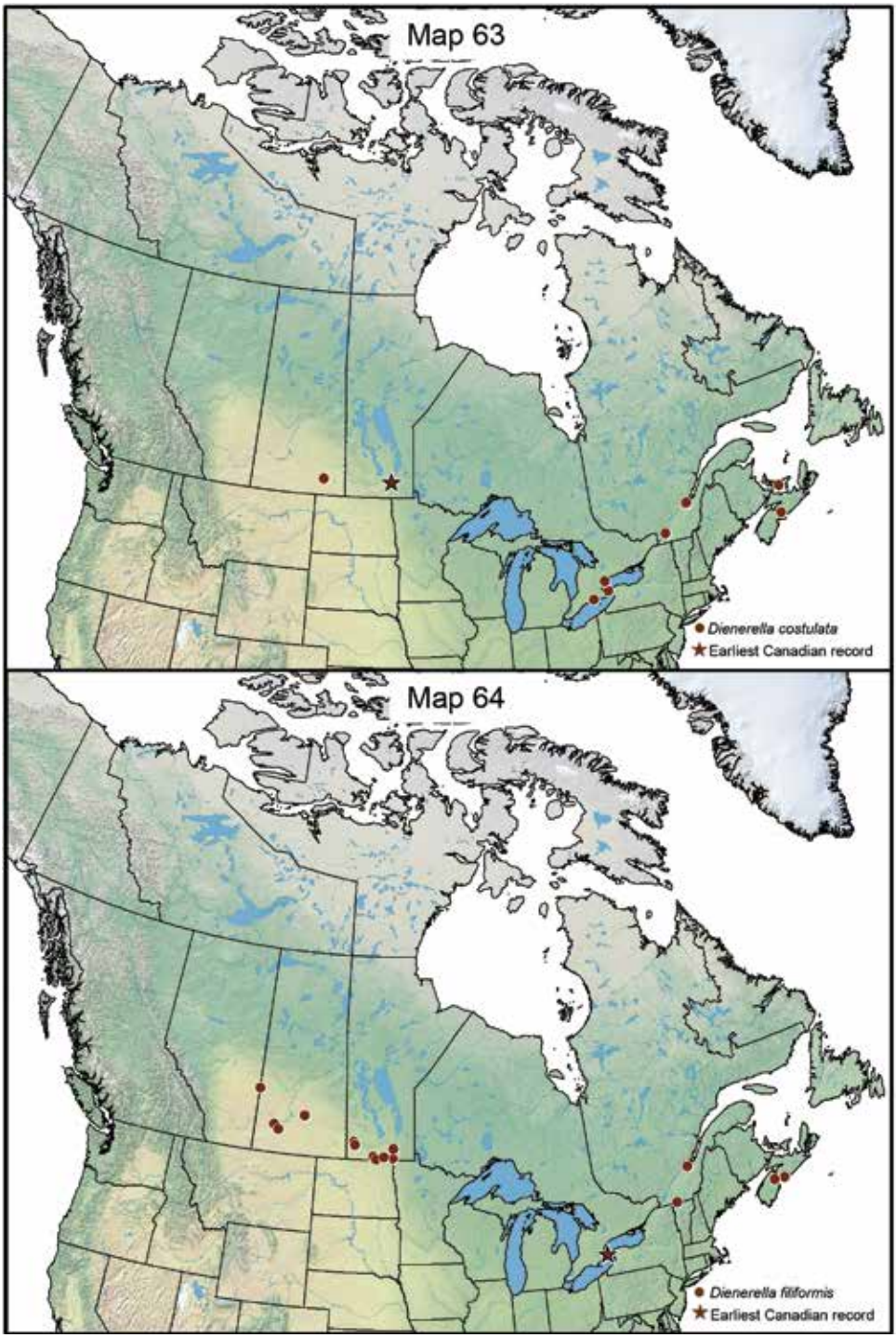

Map 53
Harmonia axyridis
Earliest Canadian record
Map 54
Hippodamia variegata
Aphidecta obliterata
Earliest Canadian record

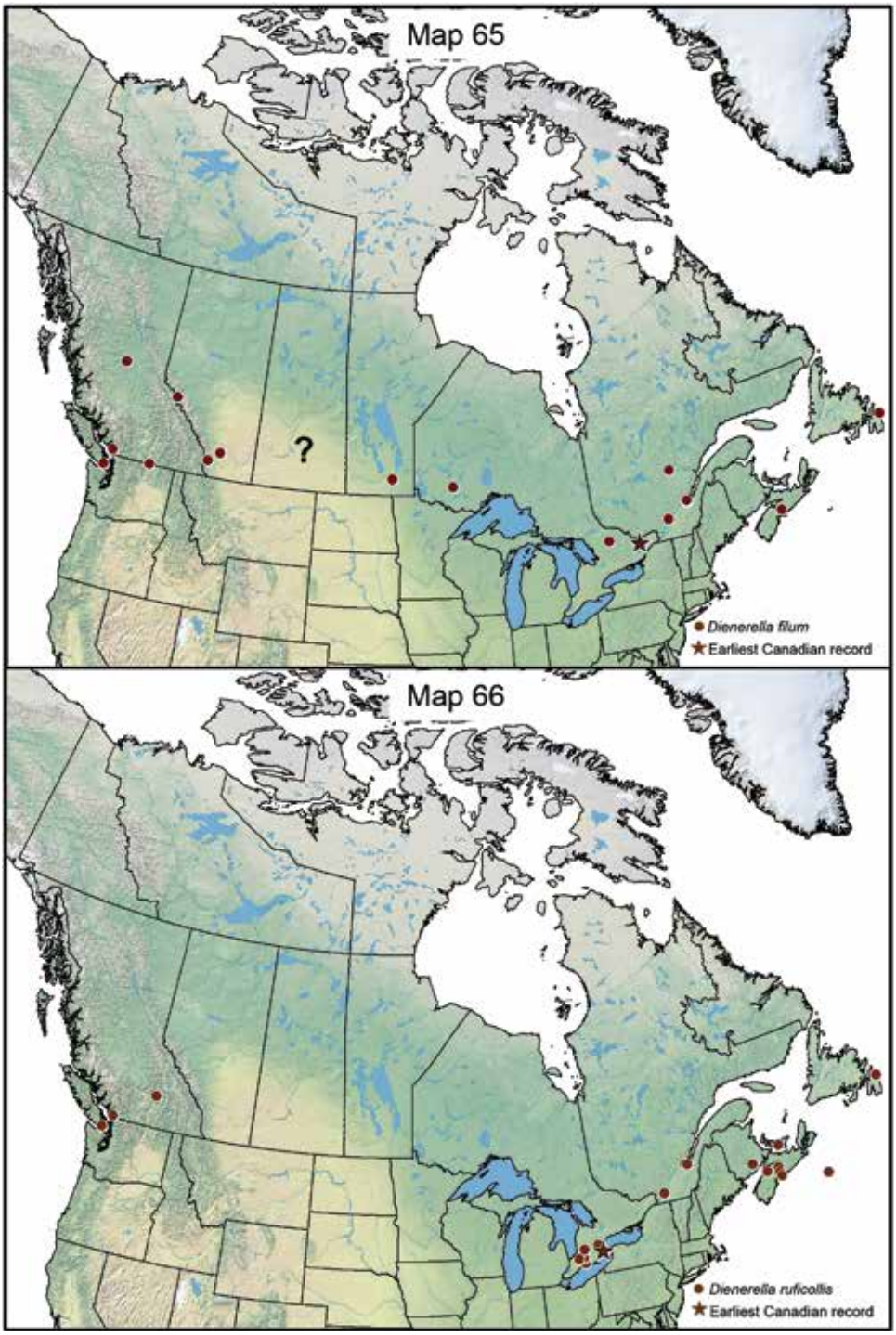

Map 55
Propylaea quaturodecimpunctata
Earliest Canadian record
Map 56
Scymnus impexus
Scymnus suturalis
Earliest Canadian record

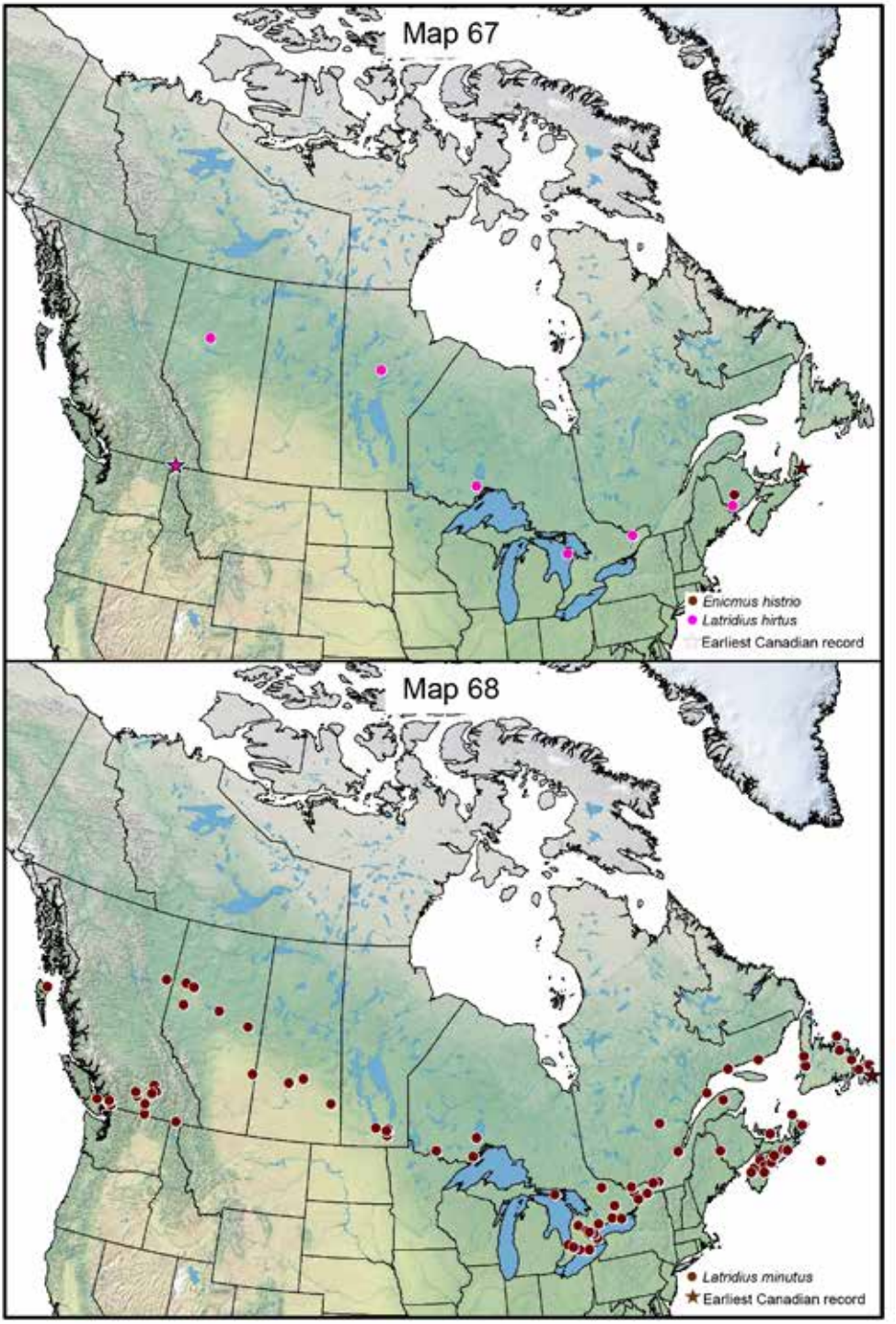

Map 57
?
Stethorus punctillum
Earliest Canadian record
Map 58
?
Sericoderus lateralis
Earliest Canadian record

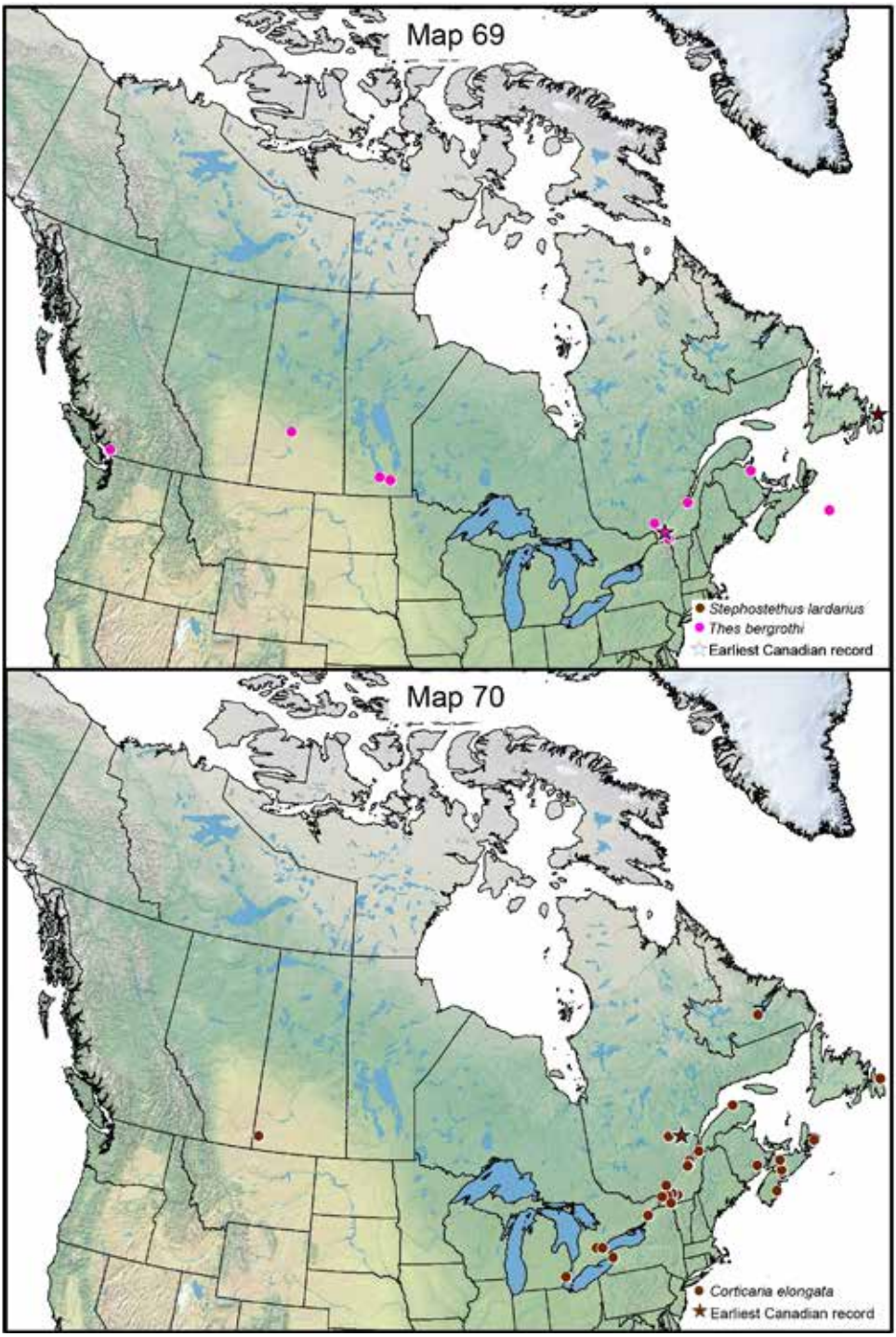

Map 59
Orthoperus atomus
Adistemia watsoni
Cartodere bifasciata
Earliest Canadian record
Map 60
Cartodere constricta
Earliest Canadian record

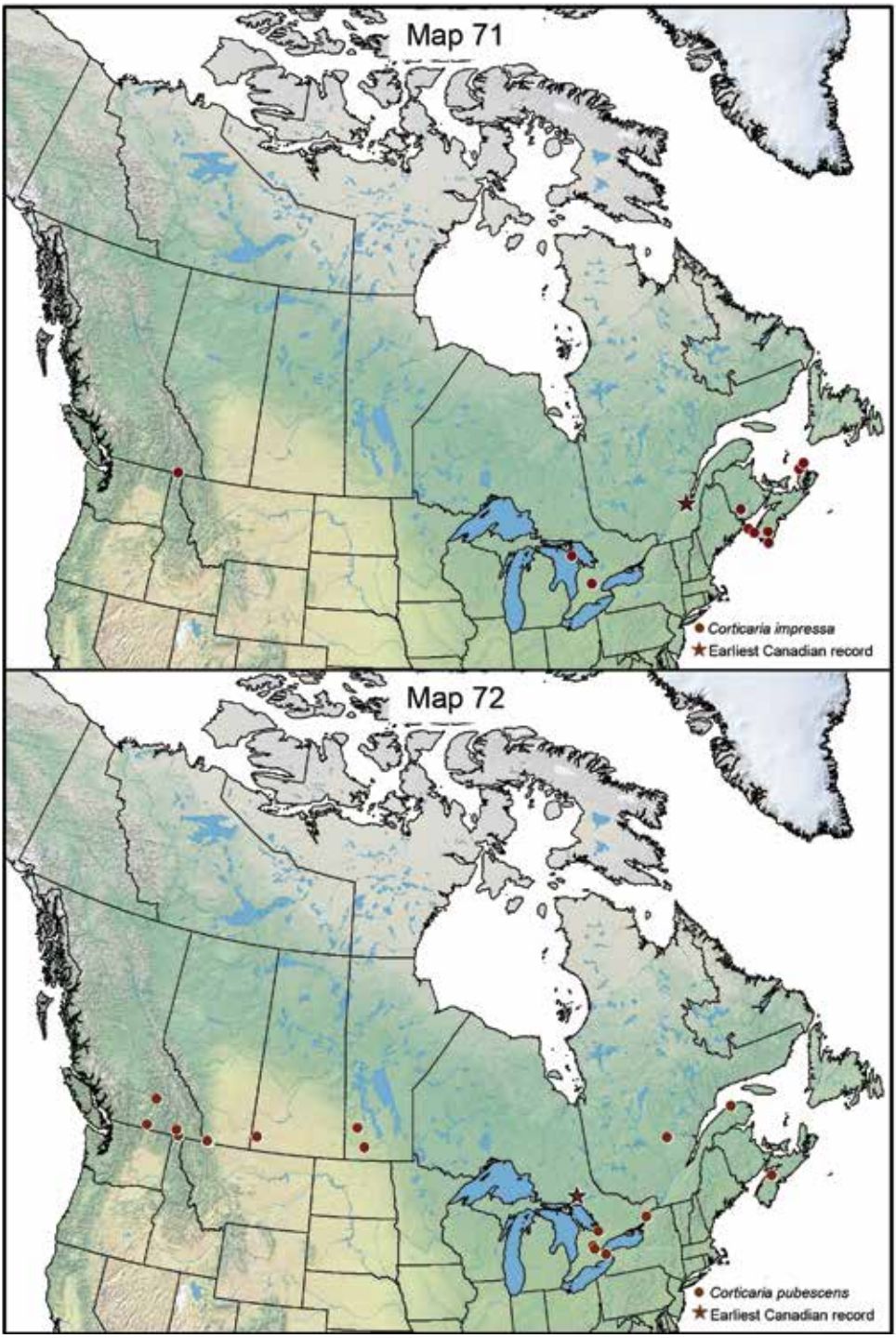

Map 61
Cartodere nodifer
Earliest Canadian record
Map 62
Dienerella argus
Earliest Canadian record

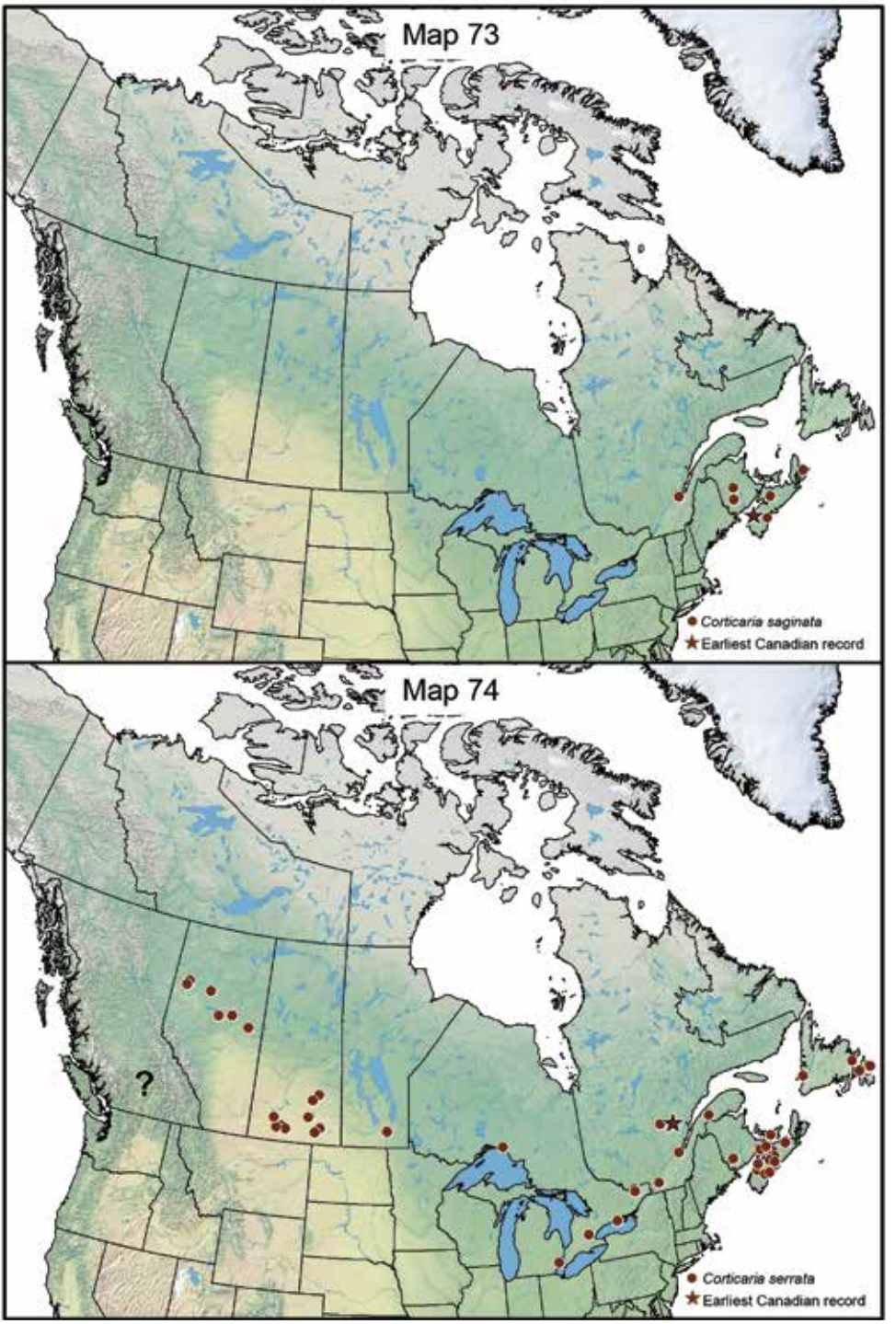

Map 63
Dienerella costulata
Earliest Canadian record
Map 64
Dienerella filiformis
Earliest Canadian record

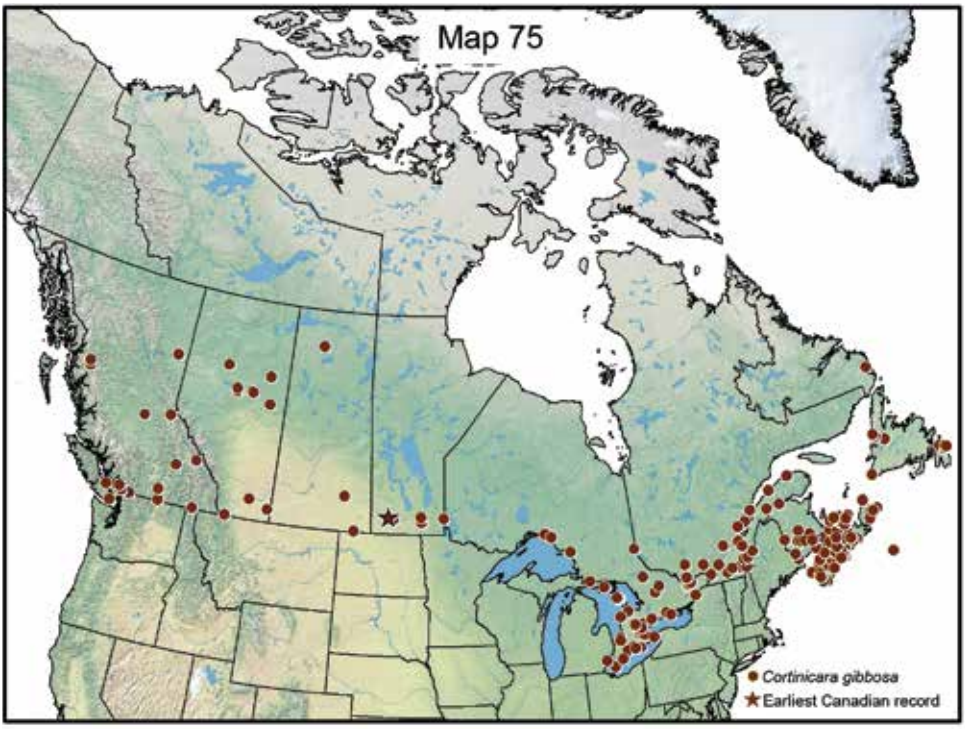

Map 65
?
Dienerella filum
Earliest Canadian record
Map 66
Dienerella ruficollis
Earliest Canadian record


Map 67
Enicmus histrio
Latridius hirtus
Earliest Canadian record
Map 68
Latridius minutus
Earliest Canadian record


Map 69
Stephostethus lardarius
Thes bergrothi
Earliest Canadian record
Map 70
Corticaria elongata
Earliest Canadian record


Map 71
Corticaria impressa
Earliest Canadian record
Map 72
Corticaria pubescens
Earliest Canadian record


Map 73
Corticaria saginata
Earliest Canadian record
Map 74
?
Corticaria serrata
Earliest Canadian record


Map 75
Cortinicara gibbosa
Earliest Canadian record

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