

New Staphylinidae (Coleoptera) records with new collection data from New Brunswick, Canada: Scaphidiinae, Piestinae, Osorinae, and Oxytelinae

Reginald P. Webster¹, Jon D. Sweeney¹, Ian DeMerchant¹

¹ Natural Resources Canada, Canadian Forest Service - Atlantic Forestry Centre, 1350 Regent St., P.O. Box 4000, Fredericton, NB, Canada E3B 5P7

Corresponding author: *Reginald P. Webster* (reginaldwebster@rogers.com)

Academic editor: *J. Klimaszewski* | Received 6 December 2011 | Accepted 5 January 2012 | Published 26 April 2012

Citation: Webster RP, Sweeney JD, DeMerchant I (2012) New Staphylinidae (Coleoptera) records with new collection data from New Brunswick, Canada: Scaphidiinae, Piestinae, Osorinae, and Oxytelinae. In: Klimaszewski J, Anderson R (Eds) Biosystematics and Ecology of Canadian Staphylinidae (Coleoptera) II. ZooKeys 186: 239–262. doi: 10.3897/zookeys.186.2506

Abstract

Nine species of Scaphidiinae are newly reported for New Brunswick, Canada, bringing the total number of species known from the province to 12. *Scaphium castanipes* Kirby, *Baeocera inexpectata* Löbl and Stephen, *Baeocera securiforma* (Cornell), *Scaphisoma repandum* Casey, and *Toxidium gammaroides* LeConte are reported for the first time from the Maritime provinces. *Siagonum punctatum* LeConte and *Siagonum stacesmithi* Hatch, and the subfamily Piestinae are reported for the first time from New Brunswick. The subfamily Osoriinae is reported for the first time from New Brunswick and the Maritime provinces based on the collection of three species: *Clavilispinus prolixus* (LeConte), *Thoracophorus costalis* (Erichson), and a *Lispinodes* species. The *Lispinodes* species is also newly recorded for Canada. Six species of Oxytelinae are newly recorded from New Brunswick, bringing the total number of species of this subfamily known to the province to 20. *Apocellus sphaericollis* (Say) and *Platystethus americanus* Erichson are new to the Maritime provinces. Additional locality and bionomic data are presented for *Mitosynum vockerothi* Campbell, and the male genitalia are illustrated for the first time. Collection and bionomic data are presented for all included species.

Keywords

Staphylinidae, Scaphidiinae, Piestinae, *Siagonium*, Osorinae, *Clavispinus*, Oxytelinae, *Mitosynum*, new distributional records, Canada, New Brunswick

Introduction

Intensive collecting of Staphylinidae in New Brunswick by the first author since 2003 and records obtained from by-catch samples during a study to develop a general attractant for the detection of invasive species of Cerambycidae have yielded many new provincial records. These are being published in a series of papers, each focusing on one or more subfamilies. This paper treats staphylinids of the subfamilies Scaphidiinae, Piestinae, Osorinae, and Oxytelinae. A brief synopsis of each subfamily is included in the results below.

Methods and conventions

Collection methods

A variety of collection methods were employed to collect the species reported in this study. Details are outlined in Campbell (1973) and Webster et al. (2009, Appendix). See Webster et al. (2012) for details of the methods used for deployment of Lindgren 12-funnel traps and sample collection. A description of the habitat was recorded for all specimens collected during this survey. Locality and habitat data are presented exactly as on labels for each record. This information, as well as additional collecting notes, is summarized and discussed in the collection and habitat data section for each species.

Specimen preparation

Males of some species (all Scaphidiinae) were dissected to confirm their identity. The genital structures were dehydrated in absolute alcohol and mounted in Canada balsam on celluloid microslides and pinned with the specimens from which they originated.

Distribution

Distribution maps, created using ArcMap and ArcGIS, are presented for each species in New Brunswick. Every species is cited with current distribution in Canada and Alaska, using abbreviations for the state, provinces, and territories. New provincial records are indicated in bold under Distribution in Canada and Alaska. The following abbreviations are used in the text:

AK	Alaska	MB	Manitoba
YT	Yukon Territory	ON	Ontario
NT	Northwest Territories	QC	Quebec
NU	Nunavut	NB	New Brunswick
BC	British Columbia	PE	Prince Edward Island
AB	Alberta	NS	Nova Scotia
SK	Saskatchewan	NF & LB	Newfoundland and Labrador*

* Newfoundland and Labrador are each treated separately under the current Distribution in Canada and Alaska.

Acronyms of collections examined and referred to in this study are as follows:

- AFC** Atlantic Forestry Centre, Natural Resources Canada, Canadian Forest Service, Fredericton, New Brunswick
CNC Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Ontario
NBM New Brunswick Museum, Saint John, New Brunswick
RWC Reginald P. Webster Collection, Charters Settlement, New Brunswick

Species accounts

All records below are species newly recorded for New Brunswick, Canada, unless noted otherwise (additional records). Species followed by ** are newly recorded from the Maritime provinces (New Brunswick, Nova Scotia, Prince Edward Island) of Canada; species followed by *** are newly recorded from Canada. A list of species of Scaphidiinae, Piestinae, Osoriinae, and Oxytelinae currently known from New Brunswick is given in Table 1.

The classification of the Scaphidiinae, Piestinae, Osoriinae, and Oxytelinae follows Bouchard et al. (2011).

Table 1. Species of Scaphidiinae, Piestinae, Osoriinae, and Oxytelinae (Staphylinidae) recorded from New Brunswick, Canada.

Family Staphylinidae Latreille	Subfamily Oxytelinae Fleming
Subfamily Scaphidiinae Latreille	Tribe Euphaniini Reitter
Tribe Scaphidiini Latreille	<i>Deleaster dichrous</i> (Gravenhorst)
<i>Scaphidium quadriguttatum</i> Say*	<i>Mitosynum vockerothi</i> Campbell
Tribe Scaphiini Achard	<i>Syntomium grabami</i> Hatch
<i>Scaphium castanipes</i> Kirby**	Tribe Coprophilini Heer
Tribe Scaphisomatini Casey	<i>Coprophilus castoris</i> Campbell
<i>Baeocera apicalis</i> LeConte	<i>Coprophilus striatulus</i> (Fabricius)*
<i>Baeocera deflexa</i> Casey	Tribe Blediini Ádám
<i>Baeocera indistincta</i> Löbl and Stephan	<i>Bledius annularis</i> LeConte
<i>Baeocera inexpectata</i> Löbl and Stephan**	<i>Bledius basalis</i> LeConte
<i>Baeocera securiforma</i> (Cornell)**	<i>Bledius neglectus</i> Casey
<i>Baeocera youngi</i> (Cornell)*	<i>Bledius nitidicollis</i> LeConte
<i>Scaphisoma convexum</i> Say*	<i>Bledius philadelphicus</i> Fall
<i>Scaphisoma repandum</i> Casey**	<i>Bledius politus</i> Erichson
<i>Scaphisoma rubens</i> Casey*	<i>Bledius tau</i> LeConte
<i>Toxidium gammaroides</i> LeConte**	Tribe Oxytelini Fleming
Subfamily Piestinae Erichson	<i>Carpelimus obesus</i> (Kiesenwetter)
<i>Siagonum punctatum</i> LeConte*	<i>Anotylus rugosus</i> (Fabricius)
<i>Siagonum stacesmithi</i> Hatch**	<i>Anotylus insecatus</i> (Gravenhorst)*
Subfamily Osoriinae Erichson	<i>Anotylus tetracarinated</i> (Block)*
Tribe Thoracophorini Reitter	<i>Apocellus sphaericollis</i> (Say)**
<i>Clavilispinus prolixus</i> (LeConte)**	<i>Oxytelus sculptus</i> Gravenhorst*
<i>Lispinodes</i> sp.***	<i>Oxytelus laqueatus</i> (Marsham)
<i>Thoracophorus costalis</i> (Erichson)**	<i>Platystethus americanus</i> Erichson**

Notes: *New to province; **New to Maritime provinces; ***New to Canada.

Family Staphylinidae Latreille, 1802**Subfamily Scaphiini Achard, 1924**

Cornell (1967) and Löbl and Stephan (1993) reviewed the *Baeocera* of North America. Leschen et al. (1990) provided a review and keys of the nine species of *Scaphisoma* from the Ozark Highland (in Oklahoma, Arkansas, and Missouri). However, the genera *Scaphidium* and *Scaphisoma* are in need of revision. Species in this subfamily are mycophagous on many fungi species, including polypore fungi and on slime molds (Newton 1984; Leschen 1988; Newton et al. 2001; Brunke et al. 2011). Adults inhabit decaying wood, fungi, and leaf litter and also occur under bark and in compost. Campbell (1991) reported no species of Scaphidiinae for New Brunswick. Later, Löbl and Stephan (1993) in their review of the *Baeocera* of North America reported *B. apicalis* LeConte, *B. indistincta* Löbl and Stephan, and *B. deflexa* Casey from New Brunswick. Here, we report nine species of Scaphidiinae new to the province (Table 1).

Tribe Scaphidiinae Latreille, 1806***Scaphidium quadriguttatum* Say, 1823**

http://species-id.net/wiki/Scaphidium_quadriguttatum

Map 1

Material examined. **New Brunswick, Queens Co.,** Cranberry Lake P.N.A. (Protected Natural Area), 46.1125°N, 65.6075°W, 22–29.VI.2009, M. Roy & V. Webster, old red oak forest, Lindgren funnel trap (1 ♂, RWC). **Restigouche, Co.,** Dionne Brook P.N.A., 47.9064°N, 68.3441°W, 27.VI–14.VII.2011, M. Roy & V. Webster, old-growth white spruce and balsam fir forest, Lindgren funnel trap (1, NBM). **York Co.,** Charters Settlement, 45.8406°N, 66.7321°W, 8.VI.2003, R. P. Webster, mixed forest, on foliage (1, RWC); 14 km WSW of Tracy, S of Rt. 645, 45.6741°N, 66.8661°W, 10–26.V.2010, R. Webster & C. MacKay, old mixed forest with red and white spruce, red and white pine, balsam fir, eastern white cedar, red maple, and *Populus* sp., Lindgren funnel trap (1, AFC).

Collection and habitat data. *Scaphidium* spp. are associated with old logs and polypore fungi (Newton et al. 2000). In New Brunswick, one individual of *S. quadriguttatum* was collected from foliage (beating) in a mixed forest, and others were captured in Lindgren funnel traps deployed in an old (180-year-old trees) mixed forest, an old red oak (*Quercus rubra* L.) forest, and an old-growth balsam fir (*Abies balsamea* (L.) Mill.) and white spruce (*Picea glauca* (Moench) Voss) forest. Adults were collected during May, June, and July.

Distribution in Canada and Alaska. ON, QC, NB, NS (Campbell 1991; Bishop et al. 2009).

Tribe Scaphidiini Latreille, 1806***Scaphium castanipes* Kirby, 1837****

http://species-id.net/wiki/Scaphium_castanipes

Map 2

Material examined. New Brunswick, Restigouche Co. Mount Carleton Provincial Park, Mount Sagamook, 625 m elev., 47.4112°N, 66.8599°W, 2.IX.2006, R. P. Webster, mixed forest, on decaying gilled mushroom (1, RWC); Dionne Brook P.N.A., 47.9064°N, 68.3441°W, 28.VII.2011, R. P. Webster, old-growth white spruce and balsam fir forest, in gilled mushrooms (4, RWC).

Collection and habitat data. The larvae of this species feed on mushrooms (Ashe 1984). The New Brunswick specimens were collected from a decaying gilled mushroom on a mountain side (625 m elev.) and from gilled mushrooms in an old-growth white spruce and balsam fir forest. Adults were collected during June and August.

Distribution in Canada and Alaska. AK, YK, NT, BC, AB, MB, ON, QC, NB (Campbell 1991).

Tribe Scaphisomatini Casey, 1893***Baeocera inexpectata* Löbl and Stephan, 1993****

http://species-id.net/wiki/Baeocera_inexpectata

Map 3

Material examined. New Brunswick, Charlotte Co., S of Little Pocologan River, 45.1546°N, 66.6254°W, 7.V.2007, R. P. Webster, mature eastern white cedar swamp/forest, in moss and leaf litter (1 ♂, RWC). Sunbury Co., Acadia Research Forest, 46.0188°N, 66.3765°W, 18.VI.2007, R. P. Webster, mature red spruce and red maple forest, sifting leaf litter and moss (2 ♂, RWC).

Collection and habitat data. *Baeocera inexpectata* adults were sifted from moss and leaf litter in a mature eastern white cedar (*Thuja occidentalis* L.) swamp/forest and in a mature red spruce (*Picea rubens* Sarg.) and red maple (*Acer rubrum* L.) forest. Adults were captured during May and June. Nothing was previously known about the habitat associations of this species.

Distribution in Canada and Alaska. SK, NB (Löbl and Stephan 1993). Additional sampling in appropriate habitats will probably show this species occurs in intervening areas between New Brunswick and Saskatchewan.

Baeocera securiforma* (Cornell, 1967)*

http://species-id.net/wiki/Baeocera_securiforma

Map 4

Material examined. **New Brunswick, Queens Co.**, Upper Gagetown, bog adjacent to Hwy 2, 45.8316°N, 66.2346°W, 12.IV.2006, R. P. Webster, tamarack bog, in sphagnum hummock and litter on bog margin (1 ♂, RWC); Rees, near Grand Lake, 46.0016°N, 65.9466°W, 29.V.2007, S. Makepeace & R. Webster, in nest contents of barred owl in artificial nest box (1 ♂, RWC). **Restigouche Co.**, near MacFarlane Brook, 47.6018°N, 67.6263°W, 25.V.2007, R. P. Webster, old growth eastern white cedar swamp, in moss (2 ♂, RWC).

Collection and habitat data. Löbl and Stephan (1993) reported that *Baeocera securiforma* occurred in similar habitats as *B. congener* Casey, namely in a variety of forest litter. The New Brunswick specimens were collected from moss in an eastern white cedar swamp, in litter and sphagnum in a sphagnum hummock on the margin of a *Carex* marsh and a tamarack (*Larix laricina* (Du Roi) K. Koch) bog, and from the nest contents of a barred owl (*Strix varia* Barton). The adults were collected during April and May.

Distribution in Canada and Alaska. MB, ON, QC, NB (Löbl and Stephan 1993).

***Baeocera youngi* (Cornell, 1967)**

http://species-id.net/wiki/Baeocera_youngi

Map 5

Material examined. **New Brunswick, Queens Co.**, Cranberry Lake P.N.A., 46.1125°N, 65.6075°W, 11–18.VI.2009, R. Webster & M.-A. Giguère, old red oak forest, Lindgren funnel trap (1 ♂, RWC).

Collection and habitat data. Löbl and Stephan (1993) reported this species from moist hardwood litter. The specimen from New Brunswick was captured during June in a Lindgren funnel trap deployed in an old red oak forest.

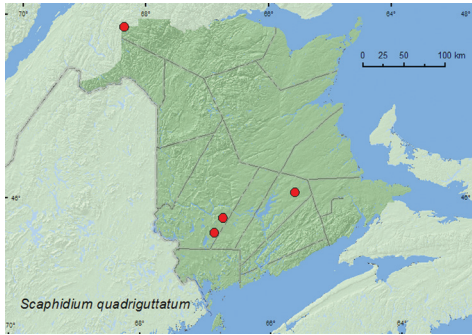
Distribution in Canada and Alaska. SK, MB, ON, QC, NB, NS (Löbl and Stephan 1993).

***Scaphisoma convexum* Say, 1825**

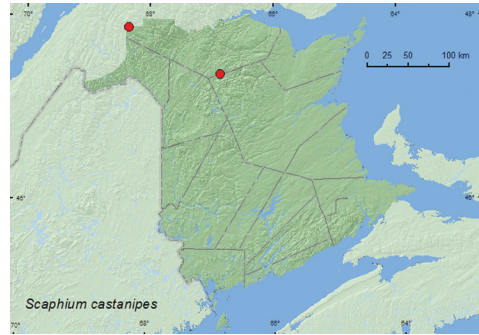
http://species-id.net/wiki/Scaphisoma_convexum

Map 6

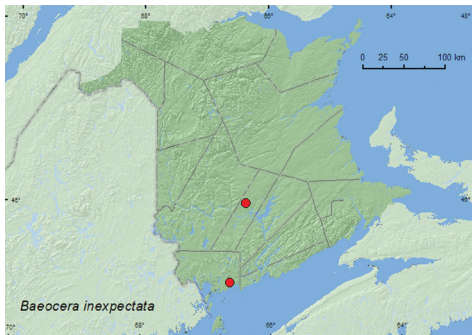
Material examined. **New Brunswick, Carleton Co.**, Meduxnekeag Valley Nature Preserve, 46.1907°N, 67.6740°W, 6.VII.2006, 12.IX.2008, R. P. Webster, hardwood forest, on gilled mushroom (1 ♂, 1 ♀, RWC). **Restigouche, Co.**, Dionne



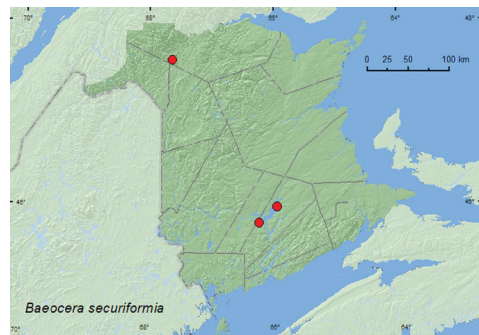
Map 1. Collection localities in New Brunswick, Canada of *Scaphidium quadriguttatum*.



Map 2. Collection localities in New Brunswick, Canada of *Scaphium castanipes*.



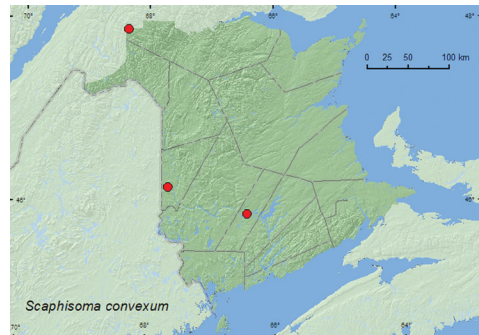
Map 3. Collection localities in New Brunswick, Canada of *Baeocera inexpectata*.



Map 4. Collection localities in New Brunswick, Canada of *Baeocera securiforma*.



Map 5. Collection localities in New Brunswick, Canada of *Baeocera youngi*.



Map 6. Collection localities in New Brunswick, Canada of *Scaphisoma convexum*.

Brook P.N.A., 47.9064°N, 68.3441°W, 27.VI–14.VII.2011, M. Roy & V. Webster, old-growth white spruce and balsam fir forest, Lindgren funnel traps (1 ♀, RWC). **Sunbury Co.**, Maugerville, Portobello Creek N.W.A., 45.9031°N, 66.4268°W,

11.IX.2006, R. P. Webster, red oak and red maple forest, on stalked polypore mushroom on forest floor (3 ♂, RWC).

Collection and habitat data. *Scaphisoma convexum* was reported from a variety of Agaricales and Polyporales fungi in the Ozark Highland and was reared from the polypore *Tyromyces* (Leschen et al. 1990). In New Brunswick, this species was collected from gilled mushrooms and from stalked polypore mushrooms on the forest floor. Adults were found in hardwood forests. One individual was captured in a Lindgren funnel trap in an old-growth white spruce and balsam fir forest. This species was collected during June, July, and September.

Distribution in Canada and Alaska. MB, ON, QC, NB (Campbell 1991).

Scaphisoma repandum Casey, 1894

http://species-id.net/wiki/Scaphisoma_repandum

Map 7

Material examined. **New Brunswick, Carleton Co.**, near Hovey Hill P.N.A., 46.1152°N, 67.7632°W, 10.V.2005, R. P. Webster, mixed forest with cedar, vernal pond margin, in moist leaf litter on muddy soil (1, RWC). **Sunbury Co.**, Sheffield, Portobello Creek N.W.A., 45.8950°N, 66.2725°W, 12.V.2004, silver maple forest (swamp), in leaf litter (1, RWC). **York Co.** Charters Settlement, 45.8342°N, 66.7450°W, 10.VI.2004, R.P. Webster, mixed forest, wood pile, under bark (3, RWC).

Collection and habitat data. In New Brunswick, *S. repandum* was collected from moist leaf litter on a vernal pond margin in a mixed forest, in moist leaves in a silver maple (*Acer saccharinum* L.) swamp and under loose bark of wood in a wood pile in a mixed forest. Adults were collected during May and June.

Distribution in Canada and Alaska. ON, NB (Campbell 1991).

Scaphisoma rubens Casey, 1894

http://species-id.net/wiki/Scaphisoma_rubens

Map 8

Material examined. **New Brunswick, Albert Co.**, Caledonia Gorge P.N.A., 45.8257°N, 64.7791°W, 6.VII.2011, R. P. Webster, old hardwood forest (sugar maple and beech), on *Polyporus varius* (1, NBM); same locality and collector but 45.8175°N, 64.7770°W, 6.VII.2011, old hardwood forest (sugar maple and beech), under bark of sugar maple (1, NBM). **Carleton Co.**, Meduxnekeag Valley Nature Preserve, 46.1940°N, 67.6801°W, 12.VIII.2004, R. P. Webster, hardwood forest, in fleshy fungi in various stages of decay (2, RWC); Jackson Falls, Bell Forest, 46.2200°N, 67.7231°W, 18.VIII.2006, R. P. Webster, mature hardwood forest, in fleshy polypore fungi on dead standing beech (1 ♂, RWC); same locality, forest

type and collector, 12–19.VI.2008, Lindgren funnel trap (1, AFC); same locality and forest type, 16–21.VI.2009, 14–19.VII.2009, R. Webster & M.-A. Giguère, Lindgren funnel traps (2, AFC). **Charlotte Co.**, 10 km NW of New River Beach, 45.2110°N, 66.6170°W, 15–29.VI.2010, R. Webster & C. MacKay, old growth eastern white cedar forest, Lindgren funnel trap (1, AFC). **Queens Co.**, Cranberry Lake P.N.A., 46.1125°N, 65.6075°W, 2.IX.2009, R. P. Webster, old red oak forest, in small stalked polypore fungus on forest floor (1, AFC). **Restigouche Co.**, Jacquet River Gorge P.N.A., 47.8201°N, 65.9992°W, 12.VIII.2010, R. P. Webster, black spruce, balsam fir & old eastern white cedar forest, in decaying mushrooms (1, NBM); Dionne Brook P.N.A., 47.9064°N, 68.3441°W, 31.V–15.VI.2011, M. Roy & V. Webster, old-growth white spruce and balsam fir forest, Lindgren funnel trap (1, NBM). **Saint John Co.**, Dipper Harbour, 45.1176°N, 66.3806°W, 12.IX.2006, R. P. Webster, red spruce forest, on gilled mushroom (2 ♂, RWC). **Sunbury Co.**, Maugerville, Portobello Creek N.W.A., 45.9031°N, 66.4268°W, 11.IX.2006, R. P. Webster, red oak and red maple forest, on stalked polypore mushroom on forest floor (1 ♂, RWC); Acadia Research Forest, 46.0173°N, 66.3741°W, 17.VII.2007, R. P. Webster, 8.5 year-old regenerating mixed forest, in gilled mushroom on stump (1, AFC); same locality data, forest type, and collector, 14.V.2007, sifting leaf litter (1, AFC); same locality and collector but 45.9799°N, 66.3394°W, 18.VII.2007, 17.VIII.2007, 18.IX.2007, mature red spruce and red maple forest, in gilled mushrooms (2, AFC). **York Co.** Canterbury, Browns Mountain Fen, 45.8965°N, 67.6344°W, 5.VIII.2004, R. P. Webster, mixed forest, in decaying fleshy fungi (1, RWC); Charters Settlement, 45.8395°N, 66.7391°W, 1.VIII.2004, R. P. Webster, mixed forest, u.v. light (1, RWC); same locality but 45.8286°N, 66.7365°W, 15.VIII.2004, old red spruce and cedar forest, in decaying mushrooms (1, RWC); 15 km W of Tracy off Rt. 645, 45.6848°N, 66.8821°W, 25.V–1.VI.2009, R. Webster & M.-A. Giguère, old red pine forest, Lindgren funnel trap (1, AFC).

Collection and habitat data. *Scaphisoma rubens* was found in a variety of forest types in New Brunswick. These included mature hardwood forests (sugar maple and American beech (*Fagus grandifolia* Ehrh.)), mixed forests, a regenerating mixed forest, old eastern white cedar forests, an old red oak forest, a red oak and red maple forest, an old red pine (*Pinus resinosa* Ait.) forest, a mature red spruce and red maple forest, an old-growth white spruce and balsam fir forest, and a conifer forest with black spruce (*Picea mariana* (Mill.) B.S.P.), balsam fir, and eastern white cedar. Adults were taken from fleshy fungi, gilled mushrooms, decaying fleshy fungi, decaying mushrooms, fleshy polypore fungi on dead standing American beech, small stalked polypore fungi on forest floor, *Polyporus varius* Fr. on rotten logs and standing dead sugar maples, under bark of sugar maple, and from leaf litter. Several adults were captured in Lindgren funnel traps. Adults were collected during May, June, July, August, and September.

Distribution in Canada and Alaska. QC, NB, NS (Campbell 1991, Dollin et al. 2008).

Toxidium gammaroides* LeConte, 1860*

http://species-id.net/wiki/Toxidium_gammaroides

Map 9

Material examined. **New Brunswick, Carleton Co.,** Meduxnekeag Valley Nature Preserve, 46.1896°N, 67.6700°W, 26.IX.2007, R. P. Webster, hardwood forest, on *Pholiota* sp. on base of dead standing beech (1 ♂, RWC); Jackson Falls, Bell Forest, 46.2200°N, 67.7231°W, 1–8.VI.2009, 19–31.VII.2009, M.-A. Giguère & R. Webster, mature hardwood forest, Lindgren funnel traps (2, RWC). **York Co.,** (Canterbury) near Browns Mountain, 45.8874°N, 66.6274°W, 8.IX.2007, R. P. Webster, hardwood forest, in polypore fungi under bark (1, RWC); Charters Settlement, 45.8286°N, 66.7365°W, 13–17.VII.2008, R. P. Webster, mature mixed forest, Lindgren funnel trap (1, RWC).

Collection and habitat data. Members of this genus are associated with polypore species on old logs (Newton et al. 2001). In New Brunswick, *T. gammaroides* was found in mature hardwood forests and in a mixed forest. Adults were collected from a group of *Pholiota* sp. on the base of a dead standing American beech and in polypore fungi under bark. Adults were also captured in Lindgren funnel traps. This species was collected during June, July, and September.

Distribution in Canada and Alaska. ON, QC, NB (Campbell 1991).

Subfamily Piestinae Erichson, 1839

In Canada, the subfamily Piestinae is represented by the genus *Siagonium* with three species (See Moore (1975) for key to species). Members of this genus occur under bark of dead trees, but very little is known about their biology (Brunke et al. 2011). Here, we report *S. stacesmithi* Hatch, *S. punctatum* LeConte, and this subfamily for the first time from New Brunswick.

***Siagonium punctatum* LeConte, 1866**

http://species-id.net/wiki/Siagonium_punctatum

Map 10

Material examined. **New Brunswick, Albert Co.,** Caledonia Gorge P.N.A. near Turtle Creek, 45.8380°N, 64.8484°W, 6.VII.2011, R. P. Webster, old-growth hardwood forest (sugar maple and yellow birch), under bark of sugar maple log (1, NBM). **Carleton Co.,** Meduxnekeag Valley Nature Preserve, 46.1907°N, 67.6740°W, 7.VI.2007, R. P. Webster, hardwood forest, under bark of sugar maple (2, RWC); Jackson Falls, Bell Forest, 46.2210°N, 67.7210°W, 26.VI.2007, R. P. Webster, mature hardwood forest, u.v. light (1, RWC). **Charlotte Co.,** 10 km NW of New River Beach, 45.2110°N, 66.6170°W, 16–26.VII.2010, R. Webster & V. Webster, old growth eastern white cedar forest, Lindgren funnel trap (1, AFC). **Queens Co.,** Cranberry Lake P.N.A, 46.1125°N, 65.6075°W, 10–15.

VII.2009, R. Webster & M.-A. Giguère, old red oak forest, Lindgren funnel trap (1 ♂, RWC); same locality data and forest type, 13–25.V.2011, 7–22.VI.2011, M. Roy & V. Webster, Lindgren funnel traps (3, RWC). **York Co.**, Charters Settlement, 45.8395°N, 66.7391°W, 23–27.V.2009, R. P. Webster, mature mixed forest, Lindgren funnel trap (1, RWC); 15 km W of Tracy off Rt. 645, 45.6848°N, 66.8821°W, 19–25.V.2009, R. Webster & M.-A. Giguère, old red pine forest, Lindgren funnel trap (1, RWC); same locality data and forest type, 8–20.VI.2011, M. Roy & V. Webster, Lindgren funnel trap (1, RWC); 14 km WSW of Tracy, S of Rt. 645, 45.6741°N, 66.8661°W, 26.IV–10.V.2010, R. Webster & C. MacKay, old mixed forest with red and white spruce, red and white pine, balsam fir, eastern white cedar, red maple, and *Populus* sp., Lindgren funnel trap (1, RWC).

Collection and habitat data. Members of this genus occur under bark of dead trees and sometimes at light (Brunke et al. 2011). In New Brunswick, this species was captured in Lindgren funnel traps deployed in an old-growth eastern white cedar forest, an old red oak forest, an old-growth northern hardwood forest (sugar maple and yellow birch (*Betula alleghaniensis* Britt.)), an old red pine forest, and an old mixed forest. Adults were also collected from under tight bark of sugar maple and at an ultraviolet light in hardwood forests. Adults were captured during April, May, June, and July.

Distribution in Canada and Alaska. ON, QC, NB, NS (Campbell and Davies 1991; Dollin et al. 2008).

Siagonium stacesmithi Hatch, 1957**

http://species-id.net/wiki/Siagonium_stacesmithi

Map 11

Material examined. **New Brunswick, Restigouche Co.**, Dionne Brook P.N.A., 47.9030°N, 68.3503°W, 30.V–15.VI.2011, M. Roy & V. Webster, old-growth northern hardwood forest, Lindgren funnel trap (1, RWC).

Collection and habitat data. The specimen from New Brunswick was captured during June in a Lindgren funnel trap deployed in an old-growth northern hardwood forest with sugar maple and yellow birch. Hatch (1957) reported this species in the West from under bark of ponderosa pine (*Pinus ponderosa* Douglas ex Lawson & C. Lawson), on newly cut wood after sundown, and taken during evening flight.

Distribution in Canada and Alaska. YT, BC, AB, SK, MB, ON, QC, NB (Hatch 1957). Distribution is based on Hatch's (1957) types of *S. stacesmithi* and specimens in the CNC.

Subfamily Osoriinae Erichson, 1839

In Canada, the Osoriinae is represented by three genera, *Clavilispinus*, *Thoracophorus*, and *Renardia*, with six species (Campbell and Davies 1991). Representatives of all four genera occur in eastern Canada. Members of this subfamily are taxonomically poorly known, and

little is known about their biology (Brunke et al. 2011). Species from eastern Canada have been found under bark, in leaf litter, and in ant nests in decaying wood and are probably saprophagous or mycophagous (Newton et al. 2000; Brunke et al. 2011). Most members of this subfamily appear to be rare in eastern Canada (Brunke et al. 2011). Campbell and Davies (1991) did not report any members of this subfamily for New Brunswick or the Maritime provinces. Here, we report *Clavilispinus prolixus* (LeConte), *Thoracophorus costalis* (Erichson), and a *Lispinodes* species, which is a new genus for Canada (Table 1).

Tribe Thoracophorini Reitter, 1909

Clavilispinus prolixus (LeConte, 1877)**

http://species-id.net/wiki/Clavilispinus_prolixus

Map 12

Material examined. New Brunswick, Charlotte Co., 10 km NW of New River Beach, 45.2110°N, 66.6170°W, 30.IV-17.V.2010, R. Webster & V. Webster, old growth eastern white cedar forest, Lindgren funnel trap (1, RWC). Queens Co., Cranberry Lake P.N.A., 46.1125°N, 65.6075°W, 25.V-7.VI.2011, 7-22.VI.2011, 7-13.VII.2011, M. Roy & V. Webster, mature (old) red oak forest, Lindgren funnel traps (1, AFC, 1, NBM, 7, RWC).

Collection and habitat data. Some members of this genus are found under bark or in ant nests (*Formica* and *Camponotus*) in rotting logs (Newton et al. 2001). Specimens from New Brunswick were captured in Lindgren funnel traps deployed in an old eastern white cedar forest/swamp and an old red oak forest. Adults were captured during May, June, and July.

Distribution in Canada and Alaska. MB, QC, NB (Campbell and Davies 1991).

Lispinodes undescribed species ***

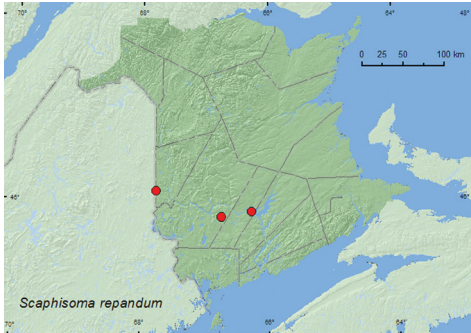
Map 13

Material examined. Canada, New Brunswick, Queens Co., Grand Lake Meadows P.N.A., 45.8227°N, 66.1209°W, 15-29.VI.2010, 29.VI-12.VII.2010, R. Webster, M. Laity, R. Johns, & C. MacKay, old silver maple forest with green ash and seasonally flooded marsh, Lindgren funnel traps (14, AFC, RWC).

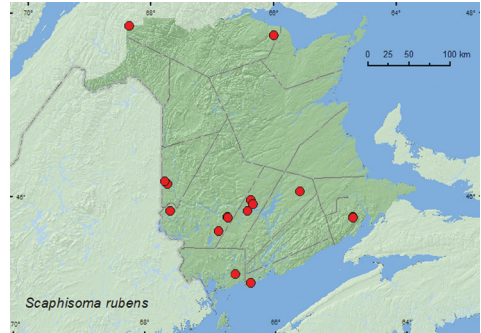
Collection and habitat data. Adults of this species were reported from leaf litter (Newton et al. (2000), otherwise little is known about the biology of this species. The New Brunswick specimens were captured in Lindgren funnel traps deployed in an old silver maple swamp. Adults were collected during June and July.

Comment. This is probably the same undescribed species that was reported by Newton et al. (2000) from Michigan and Illinois.

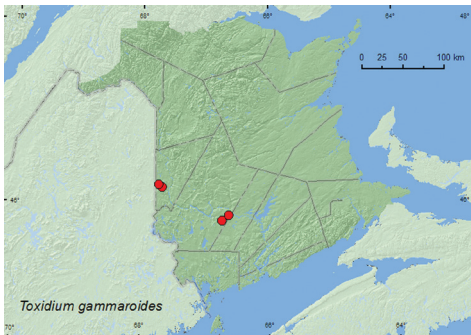
Distribution in Canada and Alaska. NB (First Canadian record of this genus).



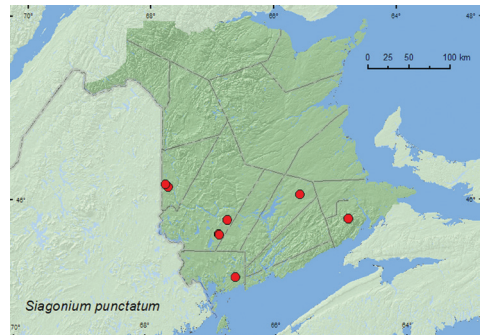
Map 7. Collection localities in New Brunswick, Canada of *Scaphisoma repandum*.



Map 8. Collection localities in New Brunswick, Canada of *Scaphisoma rubens*.



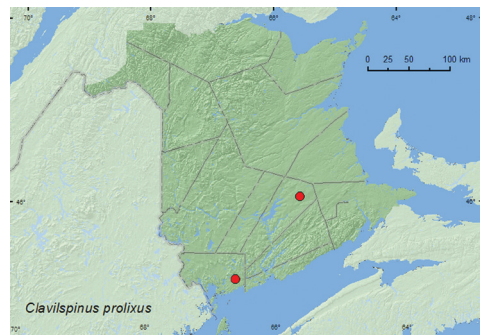
Map 9. Collection localities in New Brunswick, Canada of *Toxidium gammaroides*.



Map 10. Collection localities in New Brunswick, Canada of *Siagonium punctatum*.



Map 11. Collection localities in New Brunswick, Canada of *Siagonium stacesmithi*.



Map 12. Collection localities in New Brunswick, Canada of *Clavilispinus prolixus*.

Thoracophorus costalis* (Erichson, 1840)*

http://species-id.net/wiki/Thoracophorus_costalis

Map 14

Material examined. **New Brunswick, Queens Co.,** Cranberry Lake P.N.A., 46.1125°N, 65.6075°W, 11–18.VI.2009, 1–10.VII.2009, 10–15.VII.2009, 15–21.VII.2009, 21–28.VII.2009, 14–19.VIII.2009, R. Webster & M.-A. Giguère, mature (old) red oak forest, Lindgren funnel traps (19, AFC, RWC); same locality data and forest type, 7–22.VI.2011, M. Roy & V. Webster, Lindgren funnel traps (5, AFC, NBM); Grand Lake Meadows P.N.A., 45.8227°N, 66.1209°W, 5–19.VII.2011, M. Roy & V. Webster, old silver maple forest and seasonally flooded marsh, Lindgren funnel trap (1, NBM). **York Co.,** 15 km W of Tracy off Rt. 645, 45.6848°N, 66.8821°W, 13–17.VII.2008, R. P. Webster, old red pine forest, Lindgren funnel trap (1, RWC); same locality data and forest type, 8–20.VI.2011, M. Roy & V. Webster, Lindgren funnel traps (2, NBM, RWC).

Collection and habitat data. Brunke et al. (2011) reported this species from under bark, especially large beech logs, and occasionally in leaf litter. In New Brunswick, adults were captured in Lindgren funnel traps deployed in an old red oak forest, an old silver maple swamp, and an old red pine forest. Adults were captured during June, July, and August.

Distribution in Canada and Alaska. MB, ON, QC, NB (Campbell and Davies 1991).

Subfamily Oxytelinae Fleming, 1821

Members of this subfamily occur in a variety of habitats. The Blediini (*Bledius* species) live in tunnels along sun-exposed, sparsely vegetated, freshwater and marine shorelines and feed on algae (Herman 1986). Many members of the Oxytelinae in eastern Canada are usually associated with decaying organic matter, leaf litter, and moss (Brunke et al. 2011). Other species occur along river, stream, and pond margins and in litter. Members of this subfamily are predators, algivores, coprophages, omnivores, or saprophages (Brunke et al. 2011). The *Bledius* were reviewed by Herman (1972, 1976, 1983, 1986), but some genera of Oxytelinae occurring in eastern Canada, such as the large genus *Carpelimus*, are poorly known and in need of revision.

Nine species of Oxytelinae were reported as occurring in New Brunswick by Campbell and Davies (1991). Klimaszewski et al. (2005) added *Syntomium grabami* Hatch, *Carpelimus obesus* (Kiesenwetter), and *Oxytelus laqueatus* (Marsham). *Deleaster dichrous* (Gravenhorst) was added by Majka and Klimaszewski (2008a) and *Bledius basalis* LeConte by Majka and Klimaszewski (2008c). Here, we report six additional species of Oxytelinae for New Brunswick, bringing the total number of species known from the province to 20 (Table 1).

Tribe Euphaniini Reitter, 1909***Mitosynum vockerothi* Campbell, 1982**

http://species-id.net/wiki/Mitosynum_vockerothi

Map 15, Figures 1, 2

Material examined. Additional New Brunswick records, Charlotte Co., near New River, 45.21176°N, 66.61790°W, 2.VI.2006, 7.VII.2006, 7.V.2007, R. P. Webster, small pond/marsh, sifting sphagnum and *Polytrichum commune* on hummock near margin of pond (1 ♂, 8 sex undetermined, RWC). **Sunbury Co.,** Acadia Research Forest, 45.9816°N, 66.3374°W, 17.VIII.2007, R. P. Webster, 8.5 year-old regenerating mixed forest, in sphagnum and leaf litter at bottom of old tire depression (1, AFC).

Collection and habitat data. The only previously known adults from the type series of *M. vockerothi* from Kouchibouguac National Park, New Brunswick were collected from pan traps set at the edge of a sphagnum bog (Campbell 1982). Campbell (1982) suggested that this species, which has reduced eyes and wings, might live in deep layers of leaf litter or in clumps of moss. The recently collected adults of this species were sifted from a large sphagnum and *Polytrichum commune* Hedw. (common haircap moss) hummock near the margin of a small pond and from a layer of sphagnum and leaf litter in the bottom of a deep old tire depression in an 8.5-year-old regenerating mixed forest, supporting Campbell's suggested habitat association. Adults were collected during June, July, and August.

Comments. *Mitosynum vockerothi* was described from two female specimens (Campbell 1982). Here, we provide an illustration of the dorsal habitus (Fig. 1) and illustrate the male genitalia of this species for the first time (Fig. 2.).

Distribution in Canada and Alaska. NB (Campbell and Davies 1991).

Tribe Coprophilini Heer, 1839***Coprophilus castoris* Campbell, 1979**

http://species-id.net/wiki/Coprophilus_castoris

Map 16

Material examined. Additional New Brunswick records, Albert Co., Caledonia Gorge P.N.A. at Caledonia Creek, 45.7935°N, 64.7760°W, 1.VII.2011, R. P. Webster, shaded, rocky, cold, clear brook, splashing gravel (1, RWC). **Restigouche Co.,** Jacquet River Gorge P.N.A., 47.8257°N, 66.0779°W, 24.V.2010, R. P. Webster, partially shaded cobblestone bar near outflow of brook into Jacquet River, under cobblestones and gravel on sand (1, RWC). **York Co.,** Charters Settlement, 45.8395°N, 66.7391°W, 23.IV.2008, R. P. Webster, mature mixed forest, in flight, collected with aerial net between 15:00 and 18:00 h (1, RWC).

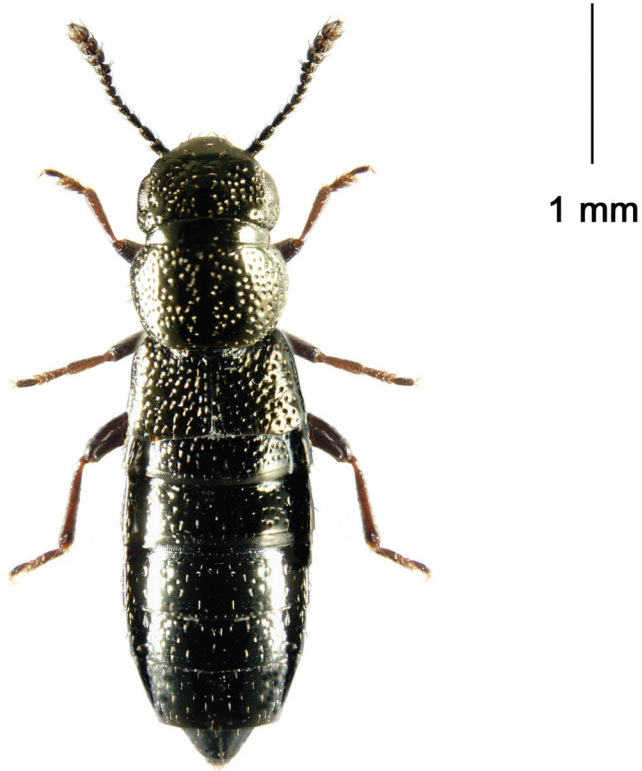


Figure 1. Adult *Mitosynum vockerothi*. Scale = 1 mm

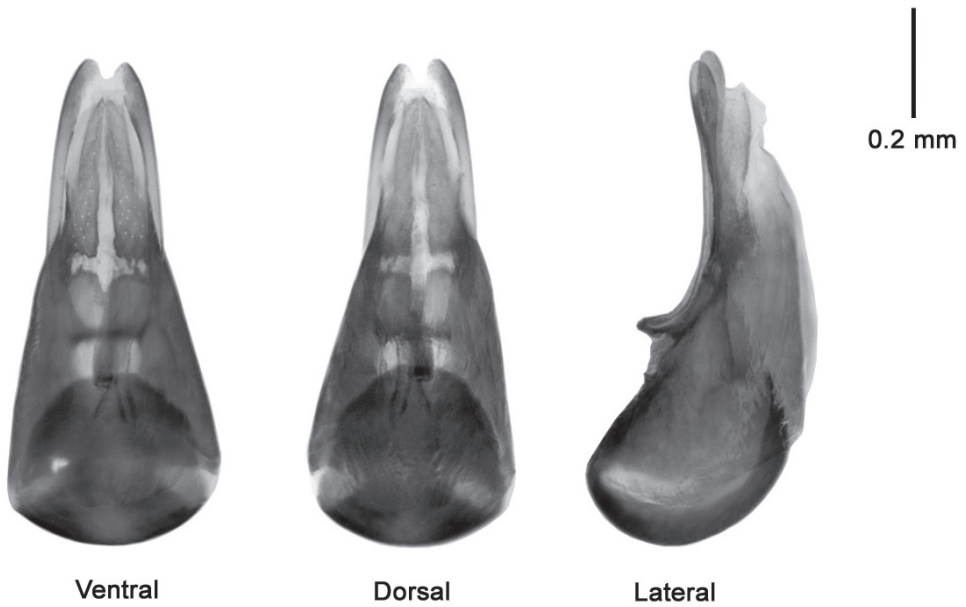


Figure 2. Median lobe of aedeagus *Mitosynum vockerothi*; dorsal, ventral and lateral view.

Collection and habitat notes. *Coprophilus castoris* was reported from inside beaver (*Castor canadensis* Kuhl) lodges and collected during an evening flight (St. Andrews, N.B.) (Campbell 1979). The recent New Brunswick specimens of this rare species were found among cobblestones and gravel on sand on a partially shaded cobblestone bar near the outflow of a brook into a river, and among gravel in a cold-shaded brook, and were collected with an aerial net during a late afternoon (15:00–18:00 h) flight. Adults were collected during April, May, and July.

Distribution in Canada and Alaska. ON, QC, NB (Campbell and Davies 1991).

***Coprophilus striatulus* (Fabricius, 1792)**

http://species-id.net/wiki/Coprophilus_striatulus

Map 17

Material examined. **New Brunswick, Carleton Co.,** Meduxnekeag Valley Nature Preserve, 46.1931°N, 67.6825°W, 31.V.2005, M.-A. Giguère & R. Webster, river margin, under drift material (2, NBM, RWC); Jackson Falls, Bell Forest, 46.2200°N, 67.7231°W, 4–12.VI.2008, R. P. Webster, mature hardwood forest, Lindgren funnel trap (1, AFC). **Restigouche Co.,** Little Tobique River near Red Brook, 47.4465°N, 67.0689°W, 13.VI.2006, R. P. Webster, river margin, under debris on sand clay mix (1, RWC). **York Co.,** Charters Settlement, 45.8395°N, 66.7391°W, 20.IV.2004, 14.V.2005, 23.IV.2006, 14.V.2006, 27.IV.2008, R. P. Webster, mixed forest, in compost (decaying vegetables) (5, NBM, RWC); same locality data, forest type and collector, 27.VIII.2008, in decaying (moldy) corncobs and cornhusks (1, RWC); same locality data, forest type and collector, 23.IV.2008, 6.V.2008, in flight, collected with aerial net between 15:00 and 18:00 h (4, RWC); Canterbury, near Browns Mountain Fen, 45.8977°N, 67.6335°W, 1.VI.2005, R. Webster & M.-A. Giguère, mixed forest, in flight along forest trail (1, NBM).

Collection and habitat data. This adventive species is often found in decaying plant material, decaying vegetables, cow dung, and decaying leaves (Hoebeke 1995). In New Brunswick, this species was collected from under drift material along river margins, in compost (decaying vegetables), and among decaying corncobs and cornhusks. Adults were also collected in flight with an aerial net during a late afternoon (15:00–18:00 h) flight near a mixed forest and along a trail in a mixed forest. One adult was captured in a Lindgren funnel trap in a mature hardwood forest. Adults were captured during April, May, June, and August.

Distribution in Canada and Alaska. ON, QC, NB, NS (Hoebeke 1995; Majka and Klimaszewski 2008a).

Tribe Oxytelini Fleming, 1821***Anotylus insecatus* (Gravenhorst, 1806)**

http://species-id.net/wiki/Anotylus_insecatus

Map 18

Material examined. **New Brunswick, Carleton Co.**, Jackson Falls, 46.2257°N, 67.7420°W, 22.V.2010, R. P. Webster, river margin, in gravel on gravel bar (1, RWC). **York Co.**, Fredericton at Saint John River, 45.9588°N, 66.6254°W, 7.VI.2005, R. P. Webster, margin of river, in flood debris (1 ♀, RWC); Keswick River at Rt. 105, 45.9938°N, 66.8344°W, 3.VI.2008, R. P. Webster, upper river margin, in flood debris on sand clay mix (1 ♂, RWC).

Collection and habitat data. *A. insecatus* is probably a predator of Diptera larvae in bulbs of onions, tulips, and radishes (Campbell and Tomlin 1983; Majka and Klimaszewski 2008b). This adventive species has also been found at sap flows and in decaying plant debris (Campbell and Tomlin 1983) but may also be saprophagous or a scavenger (Hammond 1976). The New Brunswick specimens were found along river margins in flood debris or in gravel. Adults were captured during May and June.

Distribution in Canada and Alaska. AB, SK, MB, ON, QC, **NB**, NS (Campbell and Davies 1991; Majka and Klimaszewski 2008b). Distribution is based on Campbell and Davies (1991), Majka and Klimaszewski (2008b) and specimens from AB, SK, and MB in the CNC (Anthony Davies, personal communication).

***Anotylus tetracarinatus* (Block, 1799)**

http://species-id.net/wiki/Anotylus_tetracarinatus

Map 19

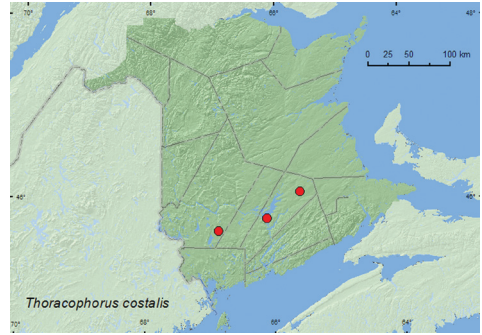
Material examined. **New Brunswick, Carleton Co.**, Meduxnekeag Valley Nature Preserve, 46.1931°N, 67.6825°W, 8.VI.2005, R. P. Webster, hardwood forest (flood plain forest with butternut), under dog scat (1, RWC); same locality and forest type but 20.VI.2005, M.-A. Giguère & R. Webster, entrance to animal den, in dung (2, RWC). **York Co.**, Douglas, Keswick River at Rt. 105, 45.9922°N, 66.8326°W, 9.V.2006, R. P. Webster, upper river margin, in deer dung on sandy soil (1, RWC).

Collection and habitat data. This adventive species occurs in dung, mammal nests, and decomposing fungi (Herman 2001). In New Brunswick, this species was found under dog scat, in dung in an entrance to an animal den, and under deer dung. Adults were captured during May and June.

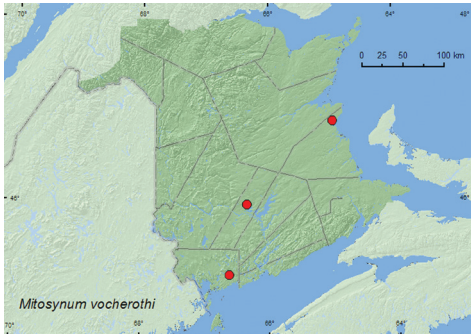
Distribution in Canada and Alaska. BC, ON, QC, **NB**, NS (Campbell and Davies 1991; Majka and Klimaszewski 2008b). Distribution is based on Campbell and Davies (1991), Majka and Klimaszewski (2008b) and specimens from ON in the CNC (Anthony Davies, personal communication).



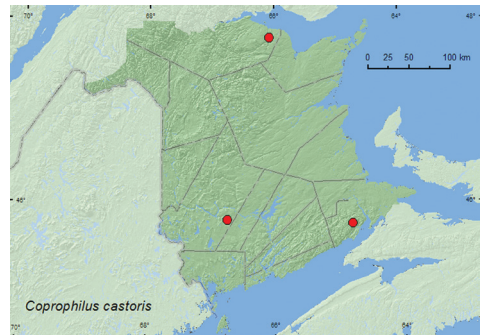
Map 13. Collection localities in New Brunswick, Canada of *Lispinodes* sp.



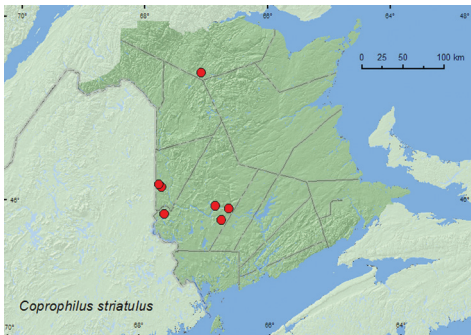
Map 14. Collection localities in New Brunswick, Canada of *Thoracophorus costalis*.



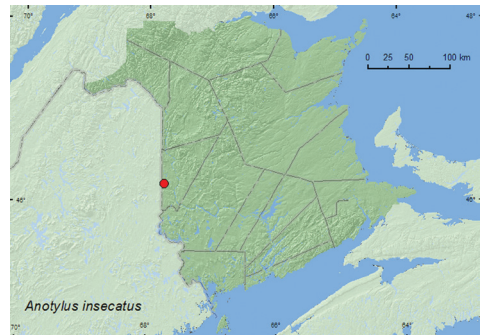
Map 15. Collection localities in New Brunswick, Canada of *Mitosynum vockerothi*.



Map 16. Collection localities in New Brunswick, Canada of *Coprophilus castoris*.



Map 17. Collection localities in New Brunswick, Canada of *Coprophilus striatulus*.



Map 18. Collection localities in New Brunswick, Canada of *Anotylus insecatus*.

Apocellus sphaericollis* (Say)*

http://species-id.net/wiki/Apocellus_sphaericollis

Map 20

Material examined. **New Brunswick, New Brunswick, Albert Co.**, Caledonia Gorge P.N.A. at Crooked Creek, 45.7930°N, 64.7764°W, 1.VII.2011, R. P. Webster, sun-exposed, rocky, cold, clear stream, in drift material (1, NBM). **Mada-waska Co.**, Loon Lake, 236 m elev., 47.7839°N, 68.3943°W, 21.VI.2010, R. P. Webster, boreal forest, small lake surrounded by sedges, treading sedges and grasses (1, RWC). **York Co.**, Charters Settlement, 45.8395°N, 66.7391°W, 24.X.2005, 20.IX.2007, 30.VI.2008, R. P. Webster, residential lawn, on bare soil among lawn grass (9, RWC).

Collection and habitat data. *Apocellus* has been found along streams near moss and in open grassy areas (Brunke et al. 2011). Most adults of *A. sphaericollis* (Say) from New Brunswick were collected on bare soil among lawn grasses. One individual was collected by treading sedges and grasses on the margin of a small lake and another from drift material (tree bud material) along a cold sun-exposed stream. Adults were captured during June, July, September, and October.

Distribution in Canada and Alaska. AB, MB, ON, QC, NB (Campbell and Davies 1991).

***Oxytelus sculptus* Gravenhorst, 1806**

http://species-id.net/wiki/Oxytelus_sculptus

Map 21

Material examined. **New Brunswick, York Co.**, Charters Settlement, 45.8395°N, 66.7391°W, 21.VI.2004, 16.X.2004, 10.VII.2005, 27.VIII.2005, 6.IX.2005, 16.IX.2005, 26.IX.2005, 28.IX.2005, R. P. Webster, mixed forest, in compost (decaying vegetables) (1 ♂, 1 ♀, 8 sex undetermined, NBM, RWC); same locality data, forest type, and collector but 29.VI.2005, u.v. light (1 ♂, RWC).

Collection and habitat data. This adventive species occurs in compost and manure of cattle, horses, and poultry. Most adults from New Brunswick were collected from compost (decaying vegetables). One individual was captured at an ultraviolet light. Adults were collected during June, July, August, September, and October.

Distribution in Canada and Alaska. BC, MB, ON, QC, NB, NS (Campbell and Davies 1991; Majka and Klimaszewski 2008b). There are specimens of this species from MB (NIS lot (1994) determined by Anthony Davies (Anthony Davies, personal communication)).

Platystethus americanus* Erichson*

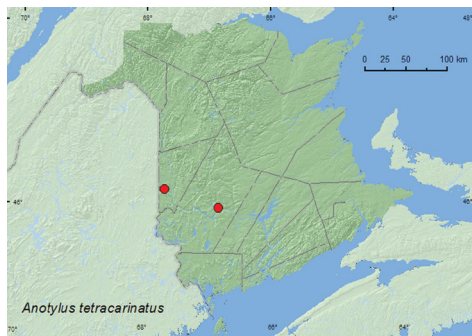
http://species-id.net/wiki/Platystethus_americanus

Map 22

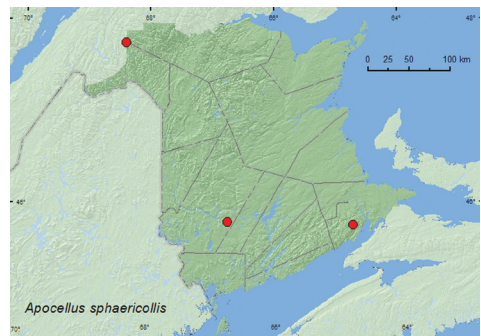
Material examined. New Brunswick, York Co., Charters Settlement, 45.8430°N, 66.7275°W, 25.IX.2004, 6.X.2005, R. P. Webster, regenerating mixed forest, baited with pile of decaying mushrooms (2, RWC); same locality and collector but 45.8395°N, 66.7391°W, 23.IV.2008, mixed forest, in flight, collected with aerial net between 15:00 and 18:00 h (1, RWC).

Collection and habitat data. Newton et al. (2001) reported this species as common in cattle dung. In New Brunswick, adults of this species were sifted from decaying mushrooms and collected with an aerial net during a late afternoon flight. Adults were collected during April and September.

Distribution in Canada and Alaska. BC, AB, SK, MB, ON, QC, NB (Campbell and Davies 1991).



Map 19. Collection localities in New Brunswick, Canada of *Anotylus tetracarinitus*.



Map 20. Collection localities in New Brunswick, Canada of *Apocellus sphaericollis*.



Map 21. Collection localities in New Brunswick, Canada of *Oxytelus sculptus*.



Map 22. Collection localities in New Brunswick, Canada of *Platystethus americanus*

Acknowledgments

We thank Caroline Simpson for editing this manuscript and Caroline Bourdon (LFC) for taking the habitus and genitalia images. Adam Brunke and Benoit Godin provided constructive comments that helped improve the manuscript. Anthony Davies (Agriculture and Agri-Food Canada (CNC), Ottawa) is thanked for determining specimens and other assistance. David Malloch (NBM) is thanked for assistance determining fungi. Nichole Brawn, Katie Burgess, Marie-Andrée Giguère, Jim Edsall, Nancy Harn, Cory Hughes, Rob Johns, Marsell Laity, Colin MacKay, Wayne MacKay, Scott Makepeace, Jessica Price, Michelle Roy, and Vincent Webster are thanked for technical assistance and collecting specimens. Natural Resources Canada Canadian Forest Service; the Canadian Food Inspection Agency; and the USDA APHIS funded the study on early detection of invasive cerambycids, which provided the records from specimens captured in Lindgren funnel traps. The Canadian Wildlife Service is thanked for funding insect surveys at the Portobello Creek National Wildlife Area, the New Brunswick Environmental Trust Fund and New Brunswick Wildlife Trust Fund are thanked for funding various insect surveys over the past 7 years, and the Meduxnekeag River Association is thanked for permission to sample beetles at the Meduxnekeag Valley Nature Preserve (which includes the Bell Forest). The New Brunswick Department of Natural Resources (Fish and Wildlife Branch) is thanked for issuing permits for sampling in the Protected Natural Areas and for providing logistical support. Survey work in the Jacquet River Gorge and Caledonia Gorge Protected Natural Areas was organized through the New Brunswick Museum with external funding from the New Brunswick Environmental Trust Fund, Salamander Foundation, and the New Brunswick Wildlife Trust Fund.

References

- Ashe JS (1984) Description of the larva and pupa of *Scaphisoma terminata* Melsh. and the larva of *Scaphium castanipes* Kirby with notes on their natural history (Coleoptera: Scaphidiidae). *The Coleopterists Bulletin* 38: 361–373.
- Bishop DJ, Majka CG, Bondrup-Nielsen S, Peck SB (2009) Deadwood and saproxylic beetle diversity in naturally disturbed and managed spruce forests in Nova Scotia. In: Majka CG, Klimaszewski J (Eds) *Biodiversity, biosystematics, and ecology of Canadian Coleoptera II*. *ZooKeys* 22: 309–340. doi: 10.3897/zookeys.22.144
- Bouchard P, Bousquet Y, Davies AE, Alonso-Zarazaga MA, Lawrence JF, Lyal CHC, Newton AF, Reid CAM, Schmitt M, Ślipiński SA, Smith ABT (2011) Family- group names in Coleoptera (Insecta). *ZooKeys* 88: 1–972. doi: 10.3897/zookeys.88.807
- Brunke A, Newton A, Klimaszewski J, Majka C, Marshall S (2011) Staphylinidae of eastern Canada and adjacent United States. Key to subfamilies: Staphylininae: tribes and subtribes, and species of Staphylinina. *Canadian Journal of Arthropod Identification* 12: 1–110.

- Campbell JM (1973) A revision of the genus *Tachinus* (Coleoptera: Staphylinidae) of North and Central America. *Memoirs of the Entomological Society of Canada* 90: 1–137.
- Campbell JM (1979) *Coprophilus castoris*, a new species of Staphylinidae (Coleoptera) from beaver lodges in eastern Canada. *The Coleopterists Bulletin* 33: 223–228.
- Campbell JM (1982) *Mitosynum vockerothi*, a new genus and new species of Coleoptera (Staphylinidae: Oxytelinae) from eastern Canada. *The Canadian Entomologist*. 114: 687–691.
- Campbell JM (1991) Family Scaphidiidae: shining fungus beetles. In: Bousquet Y (Ed) Checklist of Beetles of Canada and Alaska. Agriculture Canada, Research Branch, Ottawa, Ontario, Publication 1861/E, 124–125.
- Campbell JM, Davies A (1991) Family Staphylinidae: rove beetles beetles. In: Bousquet Y (Ed) Checklist of Beetles of Canada and Alaska. Agriculture Canada, Research Branch, Ottawa, Ontario, Publication 1861/E, 86–124.
- Campbell JM, Tomlin D (1983) The first record of the Palearctic species *Anotylus insecatus* (Gravenhorst) (Coleoptera: Staphylinidae) from North America. *The Coleopterists Bulletin* 37(4): 309–313.
- Cornell Jr. JF (1967) A taxonomic study of *Eubaecera* new Genus (Coleoptera: Scaphidiidae) in North America north of Mexico. *The Coleopterists Bulletin* 21(1): 1–17.
- Dollin PE, Majka CG, Diunker PN (2008) Saproxyllic beetle (Coleoptera) communities and forest management practices in coniferous stands in southwestern Nova Scotia, Canada. In: Majka CG, Klimaszewski J (Eds) Biodiversity, biosystematics, and ecology of Canadian Coleoptera. *ZooKeys* 2: 291–336. doi: 10.3897/zookeys.2.15
- Hammond PM (1976) A review of the genus *Anotylus* C. G. Thomson (Coleoptera: Staphylinidae). *Bulletin of the British Museum (Natural History) Entomology* 33(2): 141–187.
- Hatch MH (1957) The beetles of the Pacific Northwest. Part II. Staphyliniformia. University of Washington Publications in Biology, 16, ix + 384 pp.
- Herman LH (1972) Revision of *Bledius* and related genera. Part I. The *aequatorialis*, *mandibularis*, and *semiferrugineus* groups and two new genera (Coleoptera, Staphylinidae, Oxytelinae). *Bulletin of the American Museum of Natural History* 149: 111–254.
- Herman LH (1976) Revision of *Bledius* and related genera. Part II. The *armatus*, *basalis*, and *melanocephalus* groups (Coleoptera, Staphylinidae, Oxytelinae). *Bulletin of the American Museum of Natural History* 157: 71–172.
- Herman LH (1983) Revision of *Bledius* and related genera. Part III. The *annularis* and *emarginatus* groups (Coleoptera, Staphylinidae, Oxytelinae). *Bulletin of the American Museum of Natural History* 175: 11–45.
- Herman LH. (1986) Revision of *Bledius*, Part IV. Classification of species groups, phylogeny, natural history, and catalogue (Coleoptera, Staphylinidae, Oxytelinae). *Bulletin of the American Museum of Natural History* 184: 1–367.
- Herman LH. (2001) Catalog of the Staphylinidae (Insecta: Coleoptera): 1758 to the end of the Second Millennium. *Bulletin of the American Museum of Natural History* 265: 1–4218.
- Hoebeke ER (1995) *Coprophilus striatulus* (Coleoptera: Staphylinidae): confirmation of establishment of a Palearctic oxytelinae rove beetle in North America. *Entomological News* 106: 15.

- Klimaszewski J, Sweeney J, Price J, Pelletier G (2005) Rove beetles (Coleoptera: Staphylinidae) in red spruce stands, eastern Canada: diversity, abundance, and descriptions of new species. *The Canadian Entomologist* 137: 1–48.
- Leschen RAB (1988) The natural history and immatures of *Scaphisoma impuctatum* (Coleoptera: Scaphidiidae). *Entomological News* 99: 225–232.
- Leschen RAB, Löbl I, Stephan K (1990) Review of the Ozark Highland *Scaphisoma* (Coleoptera: Scaphidiidae). *The Coleopterists Bulletin* 44(3): 274–294.
- Löbl I, Stephan K (1993) A review of the species of *Baeocera* Erichson (Coleoptera, Staphylinidae, Scaphidiinae) of America north of Mexico. *Revue Suisse de Zoologie* 100(3): 675–733.
- Majka CG, Klimaszewski J (2008a) Introduced Staphylinidae (Coleoptera) in the Maritime provinces of Canada. *The Canadian Entomologist* 140: 48–72.
- Majka CG, Klimaszewski J (2008b) Adventive Staphylinidae (Coleoptera) of the Maritime provinces of Canada: further contributions. *ZooKeys* 2: 151–174. doi: 10.3897/zookeys.2.5
- Majka CG, Klimaszewski J (2008c) The coastal rove beetles (Coleoptera, Staphylinidae) of Atlantic Canada: a survey and new records. *ZooKeys* 2: 115–150. doi: 10.3897/zookeys.2.2
- Moore I (1975) The distribution of *Siagonium* (Coleoptera: Staphylinidae) in North America. *Journal of the Kansas Entomological Society* 48(1): 96–100.
- Newton AF (1984) Mycophagy in Staphylinoida (Coleoptera). In: Wheeler G, Blackwell M (Eds), *Fungus–insect relationships: perspectives in ecology and evolution*. Columbia University Press, New York, 302–353.
- Newton AF, Thayer MK, Ashe JS, Chandler DS (2000) [2001] Family 22. Staphylinidae Latreille, 1802. In: Arnett RH, Thomas MC (Eds) *American Beetles*. Volume 1. Archostemata, Myxophaga, Adepaga, Polyphaga. CRC Press, Boca Raton, Florida, 272–418.
- Webster RP, Klimaszewski J, Pelletier G, Savard K (2009) New Staphylinidae (Coleoptera) records with new collection data from New Brunswick, Canada. I. Aleocharinae. In: Majka CG, Klimaszewski J (Eds) *Biodiversity, biosystematics, and ecology of Canadian Coleoptera* II. *ZooKeys* 22: 171–248. doi: 10.3897/zookeys.22.152
- Webster RP, Smetana A, Sweeney JD, DeMerchant I (2012) New Staphylinidae (Coleoptera) records with new collection data from New Brunswick and an addition to the fauna of Quebec: Staphylininae. In: Klimaszewski J, Anderson R (Eds) *Biosystematics and Ecology of Canadian Staphylinidae (Coleoptera) II*. *ZooKeys* 186: 293–348. doi: 10.3897/zookeys.186.2469