



NEW RECORDS

New ground beetle (Coleoptera: Carabidae) records in New Brunswick, Canada

Reginald P. Webster and Yves Bousquet

ABSTRACT

We report 50 species of Carabidae, including one *Cicindela* species, as new to New Brunswick, Canada, bringing the total number of species known from the province to 328. Twenty-seven of these species are recorded from the Maritime Provinces for the first time. The records of *Pterostichus corrusculus* LeConte and *Harpalus megacephalus* LeConte represent significant eastward range extensions.

RÉSUMÉ

Nous faisons état que 50 espèces de Carabidae, dont une espèce de *Cicindela*, s'ajoute à la liste des insectes présent au Nouveau-Brunswick, Canada, faisant croître le nombre total des espèces de cette famille à 328. De plus, vingt sept de ces espèces sont répertoriées pour la première fois dans les provinces maritimes. Avec ces mentions, l'aire de distribution de *Pterostichus corrusculus* LeConte et *Harpalus megacephalus* LeConte s'étend considérablement vers l'est.

INTRODUCTION

Lindroth's (1961-1969) treatment of the Carabidae of Canada and Alaska reported 103 species from New Brunswick. Additional species were recorded by Liard (1979) and Bousquet (1987). Larochelle and Larivière (1990) conducted a survey of the Carabidae of Maine and the Maritime Provinces in 1987 and 1988 and reported 64 species new to New Brunswick. Bousquet and Larochelle (1993) catalogue of the Geadephaga of North America included 254 species of Carabidae for New Brunswick.

Since the publication of Bousquet and Larochelle (1993), a number of additional species of Carabidae have been reported from the province as a result of taxonomic changes and the publication of new records. A revision by Hieke (2000) showed that the earlier concept of *Amara angustata* (Say) actually consists of three species: *A. flebilis* Casey, *A. angustatoides* Hieke, and *A. angustata*. *Amara angustatoides* and *A. flebilis* were reported from New Brunswick in Hieke (2000). Later, Hieke (2003) showed that *A. neoscotica* Casey, which had previously been synonymized with *A. cupreolata* Putzeys by Lindroth (1954), was a distinct species. *Amara neoscotica* was later reported from New Brunswick in Majka et al. (2007). *Mioptachys flavicada* (Say), *Elaphropus granarius* (Dejean), *Poecilus chalcites* (Say), and *Platynus opaculus* LeConte were reported in a study on the vertical and temporal distribution of Carabidae and Elateridae in flight above agricultural fields near Fredericton, New Brunswick (Boiteau et al. 2000). *Cicindela marginipennis* Dejean was newly reported from Canada and New Brunswick by Sabine (2004). *Patrobus foveocollis* (Eschscholtz), *Trechus crassiscapus* Lindroth, and *Harpalus solitaris* Dejean were reported by Bertrand (2005) from northwestern New Brunswick in a study of potential indicators of biological integrity in managed forests. *Bembidion iridipenne* Bousquet & Webster and *B.*

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Reginald P. Webster¹: 24 Millstream Drive, Charters Settlement, New Brunswick E3C 1X1, Canada.

Yves Bousquet: Canadian National Collection of Insects, Arachnids, and Nematodes, Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa, Ontario K1A 0C6, Canada.

Corresponding author¹ (email rwebster@nb.sympatico.ca).

nigrivestis Bousquet were recently described, in part from specimens collected in New Brunswick (Bousquet and Webster 2006). Most recently in a review of the ground beetles of the Maritime Provinces by Majka et al. (2007), six additional species of Carabidae (*Notiophilus semistriatus* Say, *A. neoscotica*, *Diplocheila striatopunctata* (LeConte), *Agonum crenistriatum* (LeConte), *Cymindis limbata* Dejean, *Lebia tricolor* Say) were reported. Additional details on the history of collecting and origins of the Maritime carabid fauna were discussed in their paper.

Studies of the carabid fauna in New Brunswick by the senior author over the past 13 years has resulted in the discovery of a number of species not previously recorded from the province. Ecological information was recorded for many species of Carabidae for which little data were previously available. The objective of this paper is to report on these new discoveries and present habitat information on these species. Additional localities and bionomic information are also presented for species recently reported from New Brunswick by Majka et al. (2007).

Conventions

Acronyms of collections referred to in this study are:

ANCS	Agriculture and Agri-Food Canada, Kentville, NS
CNC	Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON
NBM	New Brunswick Museum, Saint John, NB
NSMC	Nova Scotia Museum, Halifax, NS
RWC	Reginald Webster Collection, Charters Settlement, NB
UVC	University of Vermont Collection, Burlington, VT

METHODS

The following records are based on specimens collected between 1994 and 2008 by the senior author, Marie-Andrée Giguère, Vincent Webster, Dwayne Sabine, Robert Capozzi, Kate Bredin, Jim Edsall, Denis Doucet, and Graham Forbes, and material contained in the collections listed above.

A variety of methods were employed by the senior author to collect Carabidae, depending on the habitat that was being sampled. Treading was used in wetland habitats, such as marshes, fens and wetter bogs. Vegetation,

saturated muddy or peaty soils were pressed under water and beetles that floated to surface were collected. Splashing was often used along shores of ponds, lakes, and streams. Water was splashed onto various substrates such as sand, gravel, cobblestones, or clay. Many Carabidae appear on the surface of the substrate within a short time, while others such as *Dyschirius* take longer to move to the surface. This method was particularly effective for collecting *Bembidion* and *Dyschirius* species that otherwise might have been missed. Many Carabidae, especially *Bembidion* species, are diurnal and were collected directly from bare substrates during the day in various riparian and other open habitats. In drier habitats leaf litter was carefully examined for beetles or removed and sifted using a modified method described in Smetana (1971). Leaf litter, moss, or other debris was placed in a large plastic box and concentrated by removing the larger debris. Most Carabidae move to the bottom of the container and are easily collected. This method was very effective for collecting species from forest litter, grass and mosses in drier sections of marshes and bogs, patches of debris in sandy areas, flood debris along river margins, and drift material along sea beaches. Many Carabidae were collected from a sheet lighted by a mercury vapor (m.v.) light or an ultraviolet (u.v.) light. This method was especially effective for collecting small species of Carabidae that were often lost among the many other taxa (Lepidoptera) caught in light traps. Pitfall traps were employed in a few studies, but proved to be relatively ineffective for collecting Carabidae from wetland habitats where this family is best represented in New Brunswick. Habitat data was recorded for all species collected by the senior author.

RESULTS

Species with an * are newly reported for New Brunswick. Species with an ** are newly recorded for the Maritime Provinces. Species without an * or ** have been previously reported, but include additional locality and bionomic information.

Notiophilus semistriatus Say, 1823

Records: Northumberland Co., 1-2 km N jct. Hwy 8 & Blueberry Rd., 5.VI.2000, R. Webster (1 ♀, RWC). **York Co.**, 4.0 km SW jct. Hwy 101 & Charters Settlement Rd., 27.IV.2001, 30.IV.2001, 2.VI.2001, 29.VII.2001, 30.VIII.2002, 5.IX.2002, R. Webster (6 ♂, 3 ♀, RWC).

Adults were typically among leaf and grass litter in open sun-exposed sites in mixed forests and forests

dominated with *Picea* sp. and *Abies balsamea* (L.) Mill. All sites were on well drained soils, either rocky or sandy. *Notiophilus semistriatus* was first reported from New Brunswick (Albert Co.) by Majka et al. (2007).

Calosoma scrutator Fabricius, 1775*

Record: Kings Co., Sagwa, no date or collector, hand written label in India ink (1 ♀, NBM).

This specimen appears to be a relatively old one (probably pre-1940), based on the type and condition of the pin. This species was recorded once from Cape Sable Island, Nova Scotia in Majka et al. (2007). These individuals probably represent strays from the south and it is doubtful this is a resident species in New Brunswick or the Maritime Provinces.

Cicindela ancocisconensis Harris, 1852**

Records: Carleton Co., Florenceville, Green Island, Saint John River, 46.4624°N, 67.6014°W, 18.VIII.2005, R. Capozzi & R.P. Webster (1 ♀, RWC); Hartland, Becaguimec Island, Saint John River, 46.3073°N, 67.5376°W, 23.VIII.2005, R. Capozzi & R.P. Webster (1 ♂, 1 ♀, RWC). **Northumberland Co.**, Shinnickburn, Cains River, 46.5423°N, 65.8303°W, J. Edsall & D. Doucet (3, NBM).

Adults occurred on sand/clay banks with scattered grasses and on adjacent patches of bare gravel along the upper margin of the Saint John River. At Shinnickburn, adults occurred on a steep sandy bank with scattered cobblestones.

Dyschirius politus (Dejean, 1825)**

Record: York Co., Fredericton, Keswick R. at Rt. 105, 45.9943°N, 66.8337°W, 18.VI.2004, R. Webster (8, RWC).

Adults occurred on steep clay banks and were collected after splashing water onto the banks.

Dyschirius erythrocerus LeConte, 1857**

Records: Queens Co., Welsford at the Nerepis River, 45.4441°N, 66.3300°W, 27.VI.2006, R. Webster (1, RWC). **York Co.**, Fredericton, Keswick R. at Rt. 105, 45.9943°N, 66.8337°W, 18.VI.2004, R. Webster (2, RWC).

Adults occurred on steep clay or fine sand mixed clay banks and were collected after splashing water onto the banks.

Dyschirius pilosus LeConte, 1857**

Record: Queens Co., Near Jemseg R off Hwy

105, at "Trout Creek", 45.8227°N, 66.1240°W, 8.VI.2003, 26.IV.2004, R. Webster (7, RWC).

Dyschirius pilosus adults were on small bare patches of moist clay among short grasses on the upper margin of an oxbow in an alluvial bottomland forest dominated by *Acer saccharinum* L. The site was partially shaded.

Schizogenius lineolatus (Say, 1823)**

Record: Carleton Co., Belleville, Meduxnekeag Valley Nature Preserve, near the Meduxnekeag River, 46.1931°N, 67.6825°W, 13.VII.2004, R. Webster (2, RWC). **Sunbury Co.**, S. Branch Oromocto River, 45.5996°N, 66.5604°W, 5.VII.2006, R. Webster (1, RWC).

Adults were under cobblestones and coarse gravel near the margin of rivers.

Bembidion americanum Dejean, 1831**

Record: York Co., Fredericton, St. John R. near mouth of Nashwaak R., 26.VII.1999, R. Webster (9 ♂, 6 ♀, RWC).

Adults were common on mud flats adjacent to the Saint John River. Adults flew rapidly when approached and an aerial net was required to collect them.

Bembidion nitidum (Kirby, 1837)*

Record: Gloucester Co., 3 km S. jct. Hwy 134 & Hwy 8 at airstrip, 30.VII.2000, R. Webster (1 ♂, RWC).

The adult was under leaves and dried grass on sand in a large open sandy area within a *Picea mariana* (Mill.) B.S.P. and *Pinus banksiana* Lamb forest.

Bembidion semistriatum (Haldeman, 1843)*

Records: Northumberland Co., Grainfield, bridge at Renous R., 46.8050°N, 65.8750°W, 30.VI.2004, D. Sabine (1, NBM).

York Co., Charters Settlement, 45.8395°N, 66.7391°W, 10.IX., 29.IX.1998, 4.V., 11.V.1999, R. Webster (4 ♂, 1 ♀, RWC).

Adults of *B. semistriatum* occurred among gravel at the margin of a small fast flowing clear stream shaded by *Alnus incana* (L.) Moench.

Bembidion grapii Gyllenhal, 1827

Records: Restigouche Co., 10-11 km. N of Kedgwick, 22.VI.1999, 20.VI.2000, R. Webster (4 ♂, 4 ♀, NBM, RWC). 9 km N of Kedgwick, 29.VII.1999, R. Webster (1 ♂, NBM).

Bembidion grapii were common on bare patches of

somewhat dried black organic soil along moose trails through *Alnus* swamps. Adults were usually in cracks in the soil, or under scattered leaves on the surface of the dried soil. This differs from the habitat reported for this species in Lindroth (1963: 321); "rather dry gravel mixed with very fine sand, where the vegetation is sparse". Possibly this boreal species occurs in cooler shaded habitats at the southern limit of its range. This species was reported as occurring in New Brunswick by Larochelle and Larivière (1990), but not by Bousquet and Larochelle (1993).

Bembidion lacunarium (Zimmerman, 1869)**

Records: **Carleton Co.**, "Bell Forest", 46.2210°N, 67.7210°W, 12.VII.2004, K. Bredin & R. Webster (1 ♂, 2 ♀, RWC). **Restigouche Co.**, N. of Kedgwick along Stillwater Rd., 47.7300°N, 67.3300°W, 22.VI.1999, R. Webster (1 ♂, RWC). **Saint John Co.**, Saint John at Taylors Island, 14.VI.2002, R. Webster (1 ♂, NBM).

The individual from Kedgwick was in leaf litter under a *Salix* bush adjacent to a roadside vernal pool, the individual from Saint John was under drift material (seaweed) on a sea beach, and those from the Bell Forest were in moist leaves adjacent to a brook.

Bembidion mutatum Gemminger & Harold, 1868*

Records: **Gloucester Co.**, 3 km S jct. Hwy 134 & Hwy 8 at airstrip, 6.IX.1999, R. Webster (1 ♂, NBM). **Northumberland Co.**, 1-2 km N jct. Hwy 8 & Blueberry Rd., 5.VI.2000, R. Webster (1 ♀, RWC). **Restigouche Co.**, 15.8 km. N of Kedgwick, 47.79°N, 67.32°W, 10.V.2000, R. Webster (1 ♂, RWC). **Saint John Co.**, Saint John, V.1900, W. McIntosh (1 ♀, NBM). **York Co.**, 3.5 km. S jct. Hwy 3 & 4, 2.V.2000, R. Webster (4 ♂, 3 ♀, RWC).

Most individuals of *B. mutatum* were under small patches of dried short grass and dead leaves on sand or fine gravel on open sun exposed trails in *P. banksiana* forests.

Bembidion pseudocautum Lindroth, 1963**

Records: **Sunbury Co.**, Acadia Research Forest, 45.9816°N, 66.3374°W, 14.V.2007, R. Webster (1 ♀, RWC). **York Co.**, Fredericton near Devon at Nashwaak R., 6.VIII.1999, R. Webster (1 ♀, RWC); Charters Settlement, 45.8395°N, 66.7391°W, 4.V.2000, R. Webster (1 ♂, 2 ♀, RWC).

Bembidion pseudocautum adults were under moist leaves or in moss along the margin of a small intermittent stream under *Alnus* bushes in a swampy forest with

Thuja occidentalis L., *A. balsamea* and *Acer rubrum* L.

Mioptachys flavicauda (Say, 1823)

Record: **Queens Co.**, Scotchtown near Grand Lake, 25.IV.2003, R. Webster & M.-A. Giguère (2 ♀, RWC).

Adults were under bark of a standing dead oak. *Mioptachys flavicauda* was first reported from New Brunswick by Boiteau et al. (2000).

Paratachys rhodeanus (Casey, 1918)**

Record: **York Co.**, University of New Brunswick Woodlot, 45.9116°N, 66.6698°W, 26.V.2008, R. Webster, M.-A. Giguère & G. Forbes (4 ♂, 4 ♀, RWC).

Adults of *P. rhodeanus* were within the outer wall of an abandoned beaver lodge occupied by muskrats. *Atranus pubescens* (Dejean) was also common within the outer wall of the same beaver lodge. Landry (1975) collected this species from under small deep set rocks along the margin of a stream near St-Romuald, Quebec. Further sampling of beaver lodges should be conducted to determine if this species typically occurs in this habitat in New Brunswick.

Elaphropus granarius (Dejean, 1831)

Records: **Northumberland Co.**, 1-2 km N jct. Hwy 8 & Blueberry Rd., 5.VI.2000, R. Webster (1 ♀, RWC).

York Co., 3.5 km. S jct. Hwy 3 & 4, 2.V.2000, R. Webster (4 ♂, 2 ♀, RWC); 4.0 km SW jct. Hwy 101 & Charters Settlement Rd, 2.VI.2000, R. Webster (1 ♂, 2 ♀, RWC).

Most individuals were among small patches of dried short grass on sand or fine gravel on open sun exposed sites. This beetle appeared to be most common in *P. banksiana* forests, but was also found in open areas in mixed forests on patches of sandy soil near ant nests. *Elaphropus granarius* was first reported from New Brunswick by Boiteau et al. (2000).

Polyderis laevis (Say, 1823)*

Records: **Carleton Co.**, Belleville, Meduxnekeag Valley Nature Preserve, 46.1931°N, 67.6825°W, 20.VI.2004, 14.IX.2004, 10.VI.2008, R. Webster (12 ♂ 7 ♀ (many others observed), RWC). **York Co.**, Charters Settlement, 45.8405°N, 66.7321°W, 16.IV., 28.VI., 9.V.2004, R. Webster (3 ♂, RWC).

Adults of this tiny species were abundant under cobblestones among grasses on a fairly steep river bank at the Meduxnekeag Valley Nature Preserve. Other individuals occurred in moist litter in a small

Carex marsh, and under a rock on a forest road.

Patrobis septentrionis Dejean, 1828**

Record: Kings Co., Nerepsis R., 20.VIII.1987, R. Miller (3 ♂, 1 ♀, NBM); **Queens Co.,** Near jct. Jemseg R. & Hwy 105, 6.IX.1999, R. Webster (1 ♂, RWC). **Sunbury Co.,** Portobello Creek NWA, 45.8992°N, 66.4248°W, 24.VI.2004, R. Webster (1, NBM).

The individual near the Jemseg River was under a log on moist clay on the margin of a vernal pond in an alluvial bottomland forest dominated by *A. saccharinum*.

Pterostichus corruscus LeConte, 1873**

Records: Charlotte Co., near New River, 45.2118°N, 66.6179°W, 2.VI.2006, R. Webster (1 ♂). **Sunbury Co.,** near Sunpoke Lake, 45.7575°N, 66.5736°W, 17.IV.2005, R. Webster (1 ♂, RPW). **York Co.,** Charters Settlement, 45.8428°N, 66.7279°W, 30.IV., 1.V., 7.VI.2001, 4.V., 9.V., 11.V. 2002, 19.IV., 23.VI.2004, R. Webster (20+ adults, CNC, NBM, RWC); near Mazerolle Settlement, 45.8987°N, 66.7903°W, 9.IV.2006, R. Webster (1 ♂, RPW).

This species was previously known in Canada from Quebec (Gatineau Park) and Ontario (Dwight, Muskoka District and Ottawa) (Lindroth 1966, Bousquet 1987).

Pterostichus corruscus occurred in *Carex* marshes. At one site adults were in *Carex* hummocks at the interface of a 10–15 cm layer of moist grass litter and moist clay mixed with gravel. Adults were active and often found in small tunnels made by rodents on the soil surface. In another *Carex* marsh adults were sifted from sphagnum surrounding large *Carex* hummocks. *Pterostichus corruscus* was most common in early May and became difficult to find after late May. *Stenolophus fuscatus* Dejean, *Agonum canadense* Goulet, and *A. superioris* Lindroth often occurred with this species.

Amara gibba (LeConte, 1855)*

Records: Gloucester Co., 3 km S jct. Hwy 134 & Hwy 8 at airstrip, 6.IX.1999, R. Webster (2 ♂, 1 ♀, RWC). **York Co.,** Upper Brockway S of airstrip (sand pit), 2.V.2000, 29.VIII.2001, R. Webster (3 ♂, 3 ♀, RWC).

Most adults were under patches of dead grass and leaves on sand in open sun-exposed sandy areas (sand pits, abandoned air strips) in *P. banksiana* forests.

Amara musculus (Say, 1823)*

Record: York Co., Charters Settlement, 45.8395°N, 66.7391°W, 15.VIII.2002, [m.v. light], R. Webster (2 ♂, 2 ♀, RWC).

Amara rubrica Haldeman, 1843*

Records: York Co., 4.0 km. SW jct. Hwy 101 & Charters Settlement Rd., 10.VII., 29.VII.2001, R. Webster (4 ♂, RWC); Upper Brockway S of airstrip, 29.VIII.2001, R. Webster (2 ♂, 4 ♀, RWC).

Most adults were under leaf litter (usually under small *Salix* bushes) on clay-mixed gravel soil in open areas along the margin of a forest trail through a regenerating mixed forest.

Amara neoscotica Casey, 1924

Records: Carleton Co., Meduxnekeag Valley Nature Preserve near the Meduxnekeag River, 46.1931°N, 67.6825°W, 20.VI.2005, M.-A. Giguère & R. Webster (1 ♀, RWC). **Gloucester Co.,** Caraquet Island, 6-16.VI.2000 [pitfall trap], C. Comeau, I. Dugas, & D. Lanteigne (RWC) (1 ♀); **Restigouche Co.,** 10.5 km. N of Kedgwick, margin of Stillwater Rd, 7.V.2001, R. Webster (RWC) (1 ♂, 3 ♀).

Amara neoscotica adults at Stillwater Rd. were among dried grass on gravel along the margin of this gravel road through a *P. mariana* and *A. balsamea* forest. The adult on Caraquet Island was collected in a pitfall trap behind a sand dune adjacent to a *P. mariana* bog. This species was first reported from New Brunswick by Majka et al. (2007).

Amara ellipsis (Casey, 1918)**

Record: Gloucester Co., Bathurst at the Daly Point Reserve, 16-27. V., 10-27.VI, 1-4.VII.1994 [pitfall trap], 26.VII.2001, R. Webster (4 ♂, 3 ♀, RWC). **Kent Co.,** Kouchibouguac National Park, 19.VI.1977, G. A. Calderwood (9, det. H. Goulet, CNC).

Adults were commonly caught in pitfall traps on small sand dunes bordering Bathurst Harbour and in sandy soil areas on the inland side of an adjacent salt marsh. One teneral male was collected under grass litter on a small sand dune on 26 July 2001.

Amara ovata (Fabricius, 1792)*

Record: Carleton Co., “Bell Forest” near the Meduxnekeag River, 46.2152°N, 67.7190°W, 11.V.2005, M.-A. Giguère & R. Webster (1 ♀, RWC).

The single adult of this adventive species was sifted from flood debris along the margin of a river.

Amphasia sericea (Harris, 1828)*

Records: **Queens Co.**, Grand Lake near Scotchtown, 45.8762°N, 66.1816°W, 9.VII.2006, [m.v. light], R. Webster (1 ♀, RWC). **Saint John Co.**, Saint John at Taylors Island, 29.VI.1999, R. Webster (1 ♂, RWC). **York Co.** Charters Settlement, 45.8395°N, 66.7391°N, 24.VI.2005, [m.v. light], R. Webster (1 ♀, NBM).

The individual at Taylors Island was under drift material (seaweed) on a sea beach.

Anisodactylus verticalis (LeConte, 1848)**

Records: **York Co.**, South Devon (Fredericton) at Nashwaak River, 30.VI.2001, Eric Webster & R. Webster (1 ♂, RWC); Douglas, Keswick River at Rt. 105, 45.9943°N, 66.8337°W, 18.VI.2004, R. Webster (1 ♂, RWC).

Each adult occurred under a log on moist sand/clay soil near the margin of a river.

Anisodactylus harrisii LeConte, 1863*

Records: **Alberta Co.**, Shepody NWA, Mary's Point Section, 45.7250°N, 64.6765°W, 12.IX.2004, R. Webster (1 ♂, NBM). **Queens Co.**, Gagetown, 8.VII.1999, [apple orchard], Sue Rigby (1, ACNS), **York Co.**, 4.0 km SW jct. Hwy 101 & Charters Settlement Rd., 29.IV., 3.V.2000, R. Webster (1 ♂, 1 ♀, RWC); Upper Brockway S of airstrip, 2.V.2000, R. Webster (1, CNC).

The adults at the Charters Settlement Rd. locality were under leaf litter on a gravel forest road. Near Upper Brockway the adult was under a patch of dried grass and leaf litter on sand in a sand pit. At the Shepody National Wildlife Area, the adult was under drift material along a sea beach.

Stenolophus fuscatus Dejean, 1829**

Records: **York Co.**, 4.0 km SW jct. Hwy 101 & Charters Settlement Rd., 29.IV., 5.V.2000, 17.V.2001, R. Webster (1 ♂, 3 ♀, RWC); Upper Brockway S of airstrip, 29.VIII.2001, R. Webster (1 ♂, NBM).

Adults from Charters Settlement Rd. were under litter on moist gravel/clay soil at the margin of a small *Carex* marsh under *Salix* bushes. Near Upper Brockway, adults were under grass litter on sandy soil in a small *Typha* marsh at the bottom of a sand pit.

Bradycellus badipennis (Haldeman, 1843)**

Record: **York Co.**, Charters Settlement, 45.8286°N, 66.7365°W, 5.V.2005, R. Webster (1 ♀, RWC); Near Magaguadavic Lake, 45.7283°N, 67.1816°W, 24.IV.2004, D. Sabine & R. Webster (1 ♀, RWC).

The adult at Charters Settlement was collected among leaf litter and moss on the margin of a vernal pool in a mature *P. rubens* Sarg. and *T. occidentalis* forest near a marsh.

Bradycellus kirbyi (Horn, 1883)**

Records: **York Co.**, Charters Settlement, 45.8260°N, 66.7376°W, 8.V.2004, R. Webster (1 ♀, RWC); 8.5 km W of Tracy off Rt. 645, 45.6821°N, 66.7894°W, 6.V.2008, R. Webster (5 ♂, 4 ♀, RWC).

The single adult at Charters Settlement was in litter along the grassy margin of a small spring-fed brook. The individuals west of Tracy were in leaf litter and moss in an *Alnus* swamp near a brook.

Selenophorus opalinus (LeConte, 1863)**

Record: **Carleton Co.**, Jackson Falls, "Bell Forest", 46.2210°N, 67.7210°W, 25.VII.2007 [m.v. light], R. Webster (1 ♀, RWC).

Trichotichnus vulpeculus (Say, 1823)**

Record: **Carleton Co.**, Jackson Falls, "Bell Forest", 46.2210°N, 67.7210°W, 5-12.VII.2008 [Lindgren funnel trap], R. Webster (1 ♀, RWC).

Harpalus rubripes (Duftschmid, 1812)*

Records: **Albert Co.**, Shepody NWA, Mary's Point Section, 45.7250°N, 64.6765°W, 16.VI., 29.VI.2004, R. Webster (2, NBM). **Carleton Co.**, Near Lakeville, 46.3600°N, 67.6815°W, 8.VI.2005, R. Webster (1 ♂, NBM); Belleville, Meduxnekeag Valley Nature Preserve, 46.1888°N, 67.6762°W, 20.V.2004, R. Webster (1 ♂, NBM). **Gloucester Co.**, Caraquet Island, 8.VII.2000 (1 ♂, NBM). **Saint John Co.**, Saint John at Taylors Island, 14.VI.2002, 23.VI.2003 (1 ♂, 1 ♀, RWC). **Sunbury Co.**, 2.5 km. SW of Lakeville Corner, 28.VI.1997, [pitfall trap] R. Webster (1 ♀, NBM); **York Co.**, 4.0 km SW jct. Hwy 101 & Charters Settlement Rd., 12.VI.1997, R. Webster (1 ♀, NBM); Upper Brockway S of airstrip, 2.V., 29.VIII.2001, R. Webster (2 ♂, 1 ♀, RWC).

Adults of this adventive species were first reported in North America from New Hampshire in 1981 (Bell and Davidson

1987). This species is now common and widespread in New Brunswick. Adults are typically found among grasses and leaf litter on clay/sand soils in sun-exposed areas such as sand pits, gardens, lawns, and on sand dunes. At the Shepody National Wildlife Area (NWA) adults were found under drift material along a sea beach. This species was reported from New Brunswick in Majka et al. (2007), but no details are given regarding the source of the record.

Harpalus laevipes Zetterstedt, 1828*

Records: **Saint John Co.**, Saint John, VIII.1900, W. McIntosh (1 ♂, NBM). **York Co.**, 4.0 km SW jct. Hwy 101 & Charters Settlement Rd., 7.VI., 10.VII.2001, 13.VI., 13.VIII., 30.VIII.2002., 18.V.2003, [pitfall trap] R. Webster (20+ adults, CNC, RWC).

Adults of *H. laevipes* at the Charters Settlement locality were collected from pitfall traps in a regenerating mixed forest that had recently burned. The area was rocky with *Vaccinium angustifolium* Ait., and scattered grasses among the rocks.

Harpalus megacephalus LeConte, 1848**

Record: **Restigouche Co.**, 10.5 km. N of Kedgwick, margin of Stillwater Rd., 14-20.VII.2000 [pitfall trap], 4.IX.2000, 9.VII.2001, 24.VII.2001, 7.IX.2001, 22.V.2003, R. Webster (1 ♂, 5 ♀, CNC, RWC, UVC).

This is the easternmost record of *H. megacephalus*. The previous easternmost record for this insect was Wawa, along the north shore of Lake Superior in Ontario (Bousquet, 1987).

All adults were found along a 50 metre section of a gravel road (Stillwater Rd.) through a forest of *P. mariana* and *A. balsamea*, about 100 m from a stream. Adults were under small rocks in areas with sparse vegetation on a southwest facing roadside bank that consisted of gravel, coarse sand, and sparse vegetation. This was the only section along the 18 km road that cut through soils with gravel mixed with sand. Other areas along the road had much higher clay content. Several *Harpalus solitaris* Dejean and one *Scaphinotus bilobus* (Say) were found under stones at this site.

Diplocheila striatopunctata (LeConte, 1844)

Records: **Queens Co.**, 3.5 km. SW of Scotchtown near Back Lake, 8.VI.1997, R. Webster (1 ♂, 1 ♀, RWC); Near jct. Jemseg R. & Hwy 105, 2.IX.1999, 12.VII.2000, 8.V.2002, R. Webster (2 ♂, 2 ♀, RWC).

Adults occurred under logs on moist clay soil near the margin of vernal ponds in an alluvial bottomland forest

dominated by *A. saccharinum*, but were found under drift material on a lake margin when the adjacent marshes and alluvial forests were flooded. None of these individuals exhibited the striped form (even intervals brown to rufous) referred to in Lindroth, 1968. This species was first reported from New Brunswick in Majka et al. (2007).

Diplocheila assimilis (LeConte, 1844)**

Records: **Charlotte Co.**, 3 km SW of King Brook Lake, 45.3194°N, 67.4414°W, 27.V.2007, R. Webster (1 ♂, RWC). **Queens Co.**, Near jct. Jemseg R. & Hwy 105, 45.8227°N, 66.1240°W, 6.IX.1999, 12.VII.2000, 9.V.2002, 1.IX.2004, R. Webster (4 ♂, 3 ♀, RWC).

Adults were under logs on moist clay soil and within well rotted logs (6.IX.1999) near the margin of vernal ponds in an alluvial bottomland forest dominated by *A. saccharinum*.

Badister notatus Haldeman, 1843**

Record: **York Co.** Charters Settlement, 45.8395°N, 66.7391°W, 5.VIII.2006, R. Webster (1 ♀, RWC).

This individual was collected from well decomposed and slightly dried vegetable compost.

Badister transversus Casey, 1920**

Records: **Carleton Co.**, near Hovey Hill Protected Area, 46.1152°N, 67.7632°W, 10.V.2005, R. Webster (1 ♂, RWC). **Sunbury Co.**, 2.5 km. SW of Lakeville Corner, 29.VI.1997 [m.v. light], R. Webster (1 ♀, RWC).

The adult near Lakeville Corner was collected at a mercury vapor light (from a white sheet) in an alluvial bottomland forest dominated by *A. saccharinum*. The adult near the Hovey Hill Protected Area was among leaf litter on the margin of a shaded vernal pond in a mixed forest.

Badister grandiceps Casey, 1920*

Records: **Charlotte Co.**, near Clark Ridge, 45.3059°N, 67.4343°W 5.VI.2008, R. Webster (3 ♂, 4 ♀, RWC). **Gloucester Co.**, Bathurst at the Daly Point Reserve, 21.VIII.1999 [treading], R. Webster (1 ♂, NBM). **Queens Co.**, 3.5 km. SW of Scotchtown near Back Lake, 30.VI.1997 [m.v. light], R. Webster (1 ♂, 2 ♀, RWC); Near jct. Jemseg R. & Hwy 105, 6.IX.1999, 12.VII.2000 [treading], R. Webster (3 ♂, RWC). **Sunbury Co.**, Portobello Creek NWA, 45.8992°N, 66.4248°W, 18.VI.2004 [u.v. light trap], R. Webster (1 ♂, 1 ♀, NBM). **York Co.**,

Charters Settlement, 45.8395°N, 66.7391°W, 26.VI.1999, 26.VI.2003 [m.v. light], R. Webster (1 ♂, 1 ♀, RWC).

Adults were abundant (100's) at mercury vapor light at the Scotchtown locality on 30 June 1997. This site is adjacent to a large seasonally flooded marsh and fen complex near a lake. Adults were hand collected among moist leaf litter in an alluvial bottomland forest, among vegetation in cattail marshes, sedge marshes, and in seasonally flooded fens.

Badister reflexus LeConte, 1880**

Record: Charlotte Co., near Clark Ridge, 45.3059°N, 67.4343°W 5.VI.2008, R. Webster (1 ♀, RWC).

The single individual was sifted from moist leaves on the margin of a small vernal pool in a *T. occidentalis* and *A. rubrum* forested swamp. The only other record of this species from Canada is a specimen reported in Lindroth (1969) from Long Point on the shore of Lake Erie.

Badister neopulchellus Lindroth, 1954*

Records: Queens Co., 3.5 km. SW of Scotchtown near Back Lake, 30.VI.1997 [m.v. light], R. Webster (1 ♂, RWC). **York Co.**, Charters Settlement, 45.8395°N, 66.7391°W, 6.VI.1999, 26.VI.2003 [m.v. light], R. Webster (3 ♀, RWC).

Badister obtusus LeConte, 1878*

Record: Restigouche Co., 4.5 km. NE of Kedgwick, 20.VII.2000 [pitfall trap], R. Webster (1 ♂, RWC).

The adult was captured in a pitfall trap near a small *Typha* and *Carex* marsh.

Chlaenius impunctifrons Say, 1823**

Records: Queens Co., W. of Jemseg at "Trout Creek", 45.8227°N, 66.1240°W, 1.IX.2004, R. Webster (1 ♂, NBM). **Kings Co.**, Evandale near margin of Saint John R., 3.IX.1997, R. Webster (1 ♂, 1 ♀, RWC). **York Co.**, Fredericton, Saint John R. near mouth of Nashwaak R., 25.VII.1999, R. Webster (1 ♀, RWC).

The adults were under rocks and small logs on clay (under trees) near margin of a large river adjacent to an alluvial bottomland forest dominated by *A. saccharinum*.

Chlaenius tricolor Dejean, 1826*

Records: Carleton Co., Belleville, Meduxnekeag Valley Nature Preserve, 46.1931°N, 67.6825°W, 14.IX.2005, R.

Webster (1 ♂, NBM); Lower Presque Isle Island, 46.3588°N, 67.5592°W, 18.VIII.2005, R. Capozzi & R. Webster (1 ♂, NBM). **Queens Co.**, Near Minto at Grand Lake, between Flowers Cove and Stony Point, 20.VIII.2003, R. Webster, D. Sabine & A. Thomas (1 ♂, RWC). **Restigouche Co.** Restigouche R. near mouth of Stillwater Br., 47.770°N, 67.370°W, 19.VIII.1999, R. Webster (2 ♂, 2 ♀, RWC). **Saint John Co.**, Saint John, VII.1900, W. McIntosh (1 ♂, NBM). **York Co.**, Fredericton, Saint John R. near mouth of Nashwaak R., 6.VIII.1999, R. Webster (1 ♂, CNC).

Adults were common under rocks along the upper margin of the Restigouche River. At other sites adults were typically under rocks or pieces of wood along the margins of larger rivers.

Lachnocrepis parallela (Say, 1830)*

Record: Albert Co., Shepody NWA, Mary's Point Section, 45.7320°N, 64.6765°W, 17.V.2004, R. Webster (1, NSMNH). **Queens Co.**, 3.5 km. SW of Scotchtown near Back Lake, 14.VI.1997 [treading], 27.V.2001, R. Webster (3 ♂, 3 ♀, RWC). **Sunbury Co.**, near Sunpoke Lake, 45.7662°N, 66.5526°W, 20.VI.2007 [treading], R. Webster (1 ♀, RWC).

Most individuals collected on 27 May 2001, were under drift material close to the margin of a lake when the adjacent marshes and alluvial forests were flooded. The individual collected on 14 June 1997 was among dense marsh vegetation. The individual at the Shepody NWA was on a gravel road adjacent to a *Typha* marsh. The individual near Sunpoke Lake was collected by treading emergent vegetation into water in a seasonally flooded marsh. *Lachnocrepis parallela* (Say) was recently reported from Nova Scotia (Majka et al. 2007).

Olisthopus parmatus (Say, 1823)*

Records: Carleton Co. Belleville, Meduxnekeag Valley Nature Preserve, 46.1935°N, 67.6825°W, 19.IV.2005, R. Webster (1 ♀, RWC). **Restigouche Co.**, 10.5 km. N of Kedgwick, 47.73°N, 67.34°W, 7.V.2001, R. Webster (1 ♂, 1 ♀, RWC); MacFarlane Brook Protected Area, 47.6018°N, 67.6263°W, 27.V.2007, R. Webster (1 ♀, RWC). **Sunbury Co.** Portobello Creek NWA, 45.8952°N, 66.2726°W, 7.V.2004, R. Webster (1 ♂, RWC). **York Co.**, New Maryland, off Hwy 2 at Baker Brook, 45.8760°N, 66.6252°W, 4.VI.2005, R. Webster (1 ♂, RWC).

Adults were typically in moist leaf litter along the margin of vernal ponds in mixed forests or alluvial bottomland forests dominated by *A. saccharinum*.

Oxypselaphus pusillus (LeConte, 1854)*

Records: **Carleton Co.**, “Bell Forest” near the Meduxnekeag River, 46.2152°N, 67.7190°W, 15.IX.2004, R. Webster (1 ♂, RWC). **Charlotte Co.**, near Clark Ridge, 45.3059°N, 67.4343°W 5.VI.2008, R. Webster (2 ♂, RWC). **Queens Co.**, W. of Jemseg at “Trout Creek”, 45.8227°N, 66.1240°W, 26.IV.2004, R. Webster (1 ♀, RWC). **Sunbury Co.**, Near Sunpoke Lake, 45.7575°N, 66.5736°W, 30.IV.2004, R. Webster (1 ♂, RWC); Portobello Creek NWA, 45.8992°N, 66.2726°W, 7.V.2004, R. Webster (1 ♂, 1 ♀, RWC). **York Co.**, Fredericton, Devon at Nashwaak R., 25.VII.1999, 30.VI.2001, R. Webster (2 ♂, CNC, RWC); Douglas at Nashwaaksis R., 4.VI.2003, R. Webster (1 ♂, CNC); Charters Settlement, 45.8380°N, 66.7309°W, 23.VI.2004, R. Webster, (1 ♂, NBM).

The adults were most common in moist leaf litter in alluvial bottomland forests dominated by *A. saccharinum*, particularly near river margins. However adults were also found among moist leaf litter along the margin of vernal ponds and brooks in upland hardwood and mixed forests.

Agonum crenistriatum (LeConte, 1863)

Record: **Albert Co.**, Fundy National Park, 30.IX, 28.X.1994, 29.IX.1995, J. Edsall (3 ♂, 7 ♀, NBM). **Gloucester Co.**, 3 km S jct. Hwy 134 & Hwy 8 at airstrip, 30.VII.2000, 26.VII., 6.IX.2001, 2.VIII.2002, R. Webster (5 ♂, 4 ♀, RWC).

The *A. crenistriatum* adults near Hwy 8 were under leaves and dried grass on sand in a large open sandy area within a forest with *P. mariana* and *P. banksiana*. This species was first reported from New Brunswick by Majka et al. (2007).

Agonum palustre Goulet, 1969**

Records: **Carleton Co.**, Jackson Falls, “Bell Forest”, 46.2152°N, 67.7190°W, 15.IX.2004, 11.V.2005, R. Webster (2 ♂, 2 ♀, NBM, RWC); near Hovey Hill Protected Area, 46.1152°N, 67.7632°W, 10.V.2005, R. Webster, (1 ♂, NBM). **York Co.**, Douglas near Nashwaaksis River, 1.VI., 4.VI.2003, R. Webster (2 ♂, 5 ♀, RWC); Fredericton, Odell Park, 45.9570°N, 66.6695°W, 19.VI.2005, R. Webster (1 ♂, NBM).

Adults occurred on the margin of partially shaded vernal ponds and in seepage areas near rivers. At most sites adults occurred among grasses and dead grass litter on rich organic mud/clay soil.

Platynus indecentis Liebherr & Will, 1996*

Records: **Charlotte Co.**, 3 km SW of King Brook

Lake, 45.3194°N, 67.4414°W, 27.V.2007, R. Webster (1 ♀, RWC). **Northumberland Co.**, Goodfellow Brook Protected Area, 46.8943°N, 65.3796°W, 7.VI.2006, 23.V.2007, R. Webster (4 ♂, RWC).

Adults were found in old-growth *T. occidentalis* swamps in moss and leaf litter on hummocks and under bark of logs with one end resting in water. *Platynus indecentis* was recently reported from several localities in Nova Scotia (Majka et al. 2007).

Platynus opaculus LeConte, 1863

Record: **York Co.**, Charters Settlement, 45.8395°N, 66.7391°N, 20.V.2003 [m.v. light], R. Webster (1 ♀, RWC).

This species was first reported from New Brunswick in Boiteau et al. (2000). *Platynus opaculus* was previously known from a few localities in Quebec and Ontario (Lindroth 1966, Larochelle 1975, Bousquet 1987).

Perigona nigriceps (Dejean, 1831)*

Record: **York Co.**, Charters Settlement, 45.8395°N, 66.7391°N, 21.VI.2006 [m.v. light], 22.X.2007, R. Webster (1 ♂, 2 ♀, RWC).

Two adults of *P. nigriceps* were collected from well decomposed and somewhat dried compost.

Cymindis limbata Dejean, 1831

Records: **Albert Co.**, Shepody NWA, Mary’s Point Section, 45.7250°N, 64.6651°W, 6.VII.2004, R. Webster (3 ♂, 1 ♀, RWC). **Carleton Co.**, Jackson Falls, “Bell Forest”, 46.2210°N, 67.7210°W, 28.VI.2005 [m.v. light], R. Webster (1 ♂, RWC).

The adults of *C. limbata* at the Shepody NWA were under drift material on a sea beach. The adult at the Bell Forest Nature Preserve was collected at a mercury vapor light in a rich Appalachian hardwood forest. This species was first reported from New Brunswick by Majka et al. (2007).

Lebia tricolor Say, 1823

Records: **Carleton Co.**, Jackson Falls, “Bell Forest”, 46.2208°N, 67.7211°W, 13.VII.2004 [u.v. light], K. Bredin, J. Edsall & R. Webster (1 ♀, RWC). **Queens Co.**, 3.5 km SW of Scotchtown near Back Lake, 30.VI.1997 [m.v. light], 27.V.2001, R. Webster (1 ♂, 1 ♀, RWC). **Sunbury Co.** Portobello Creek NWA, 45.8992°N, 66.4248°W, 18.VI.2004, 16.VII.2004 [u.v. light], R. Webster (3 ♂, 3 ♀, RWC). **York Co.**, Charters Settlement, 45.8395°N, 66.7391°W, 10.VI.2007, [m.v. light], R. Webster (1 ♀, RWC).

The individual collected on 27 May 2001 near Scotchtown was under drift material near the margin of a lake. Others were captured at light in a rich Appalachian hardwood forest (Bell Forest), in alluvial *A. saccharinum* forests at light, and on flowers. This species was reported from New Brunswick in Majka et al. (2007).

Apristus latens (LeConte, 1848)*

Records: Queens Co., Grand Lake near Flowers Cove, 45.0195°N, 66.0245°W, 23.VI., 11.VII.2004, R. Webster & D. Sabine (5♂, 4♀, RWC); Grand Lake at Stony Point, 46.0031°N, 66.0337°W, 17.VIII.2004, R. Webster & D. Sabine (1♀, RWC).

Adults were typically under small pieces of debris in areas with dry clean sand on dunes along the margin of a large lake. They were frequently observed running over the surface of the bare sand. In contrast, *Apristus subsulcatus* (Dejean) which occurred at the same sites were almost always found among dry cobblestones and gravel.

Brachinus cyanochroaticus Erwin, 1969**

Record: York Co., 5.5 km SW jct. Hwy 101 & Charters Settlement Rd., 10.VI.2000, 29.V.2001, 4.VIII.2002 [head lamp], R. Webster (3♂, 4♀, RWC).

All individuals were collected on a beaver dam, most under dense grass litter on moist clay soil. One adult was found on a bare patch of soil on the beaver dam at night (4.VIII.2002).

Brachinus fumans (Fabricius, 1781)**

Record: Carleton Co., Belleville, Meduxnekeag Valley Nature Preserve near the margin of the Meduxnekeag River, 46.1931°N, 67.6825°W, 25.VI.2007, R. Webster (1♂, RWC).

The single individual was under a cobblestone near the margin of a river.

DISCUSSION

This publication includes records for 50 species of carabid beetles new to New Brunswick. This brings the total number of species known from the province to 328. Twenty-seven of these species are recorded from the Maritime Provinces for the first time.

Most of the new carabid occurrences were scattered throughout New Brunswick from a variety of habitats and forest types. However, 14 species new to the province were associated with the lower Saint John River Valley and the Grand Lake lowlands of south central New Brunswick. This

region consists of alluvial bottomland forest and marsh complexes and riparian habitats associated with the Grand Lake and the Saint John River and its tributaries. The flora of the lowlands is unusual for the Maritimes and many plant species occur nowhere else in this region (Hinds 2000). A number of plants are at the northeastern limit of their ranges and are disjunct from populations to the southwest. This characteristic flora is reflected by the distinctive ground beetle fauna from this area. These include *Dychirius politus*, *D. erythrocerus*, *D. pilosus*, *Schizogenius lineolatus*, *Patrobus septentrionis*, *Bembidion americanum*, *Chlaenius impunctifrons*, *Diplocheila striatopunctata*, *D. assimilis*, *Badister transversus*, *Anisodactylus verticalis*, *Agonum palustre*, and *Brachinus fumans*, many of which are at the northeastern limits of their ranges. Further sampling in this region will undoubtedly result in additional discoveries.

The ground beetle fauna of New Brunswick is now fairly well known. However, 29 species of Carabidae occur in Nova Scotia, which are not known from New Brunswick (Majka et al. 2007). Some of these species may be found in New Brunswick with additional sampling. Species like *Ophonus puncticeps* Stephens occur in Nova Scotia very close to the border with New Brunswick (Majka et al. 2006), for example. Thirty-nine species not known from Nova Scotia but recorded from New Brunswick were reported in Majka et al. (2007). Another 29 species are recorded in this study, bringing the total number of species known from New Brunswick and not yet found in Nova Scotia to 68. Many of these species may be found in Nova Scotia with additional sampling.

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REFERENCES

- Bell, R.T., and Davidson, R.L. 1987. *Harpalus rubripes* Duftschmid, a European ground beetle new to North America (Coleoptera: Carabidae). *The Coleopterists Bulletin* **41**: 56.
- Bertrand, A.-S. 2005. Ground beetles (Coleoptera: Carabidae) from northwestern New Brunswick, Canada: notes on uncommonly reported species and new provincial records. *Northeastern Naturalist* **12**: 287-295.
- Boiteau, G., Bousquet, Y., and Osborn, W. 2000. Vertical and temporal distribution of Carabidae and Elateridae in flight above an agricultural landscape. *Environmental Entomology* **29**: 1157-1163.
- Bousquet, Y. 1987. The carabid fauna of Canada and Alaska: range extensions, additions and descriptions of two new species of *Dyschirius* (Coleoptera: Carabidae). *The Coleopterists Bulletin* **41**: 111-135.
- Bousquet, Y., and Larochelle, A. 1993. Catalogue of the Geadephaga (Coleoptera: Trachypachidae, Rhysodidae, Carabidae including Cicindelini) of America north of Mexico. *Memoirs of the Entomological Society of Canada* **167**: 1-397.
- Bousquet, Y., and Webster, R. 2006. Descriptions of three new species of *Bembidion* Latreille (Coleoptera: Carabidae) occurring in Canada. *Zootaxa*, **1297**: 23-35.
- Hieke, F. 2000. Revision einiger Gruppen und neue Arten der Gattung *Amara* Bonelli, 1810 (Coleoptera: Carabidae). *Annales Historico-Naturales Musei Nationalis Hungarici* **92**: 47-143.
- Hieke, F. 2003. Die Gruppe der *Amara* (*Amara*) *cupreolata* Putzeys 1866 (Coleoptera: Carabidae). *Linzer Biologische Beiträge* **35**: 201-216.
- Hinds, H. R. 2000. Flora of New Brunswick. 2nd Edition. Biology Department, University of New Brunswick. 699 pp.
- Landry, J.-F. 1975. Notes sur la distribution et l'habitat de *Tachys rhodeanus* (Coleoptera: Carabidae). *Cordulia* **1**: 115.
- Larochelle, A., and Larivière, M.-C. 1990. Premières mentions de Carabidae (Coleoptera) pour le Maine, le Nouveau-Brunswick, la Nouvelle-Écosse et l'Île-du-Prince-Édouard. *Fabriques*, **15**: 25-37.
- Liard, F. 1979. Inventaire des Carabidae du Nouveau-Brunswick. *Cordulia*, **5**: 8-9.
- Lindroth, C.H. 1954. Carabid beetles from Nova Scotia. *The Canadian Entomologist* **86**: 299-310.
- Lindroth, C.H. 1961-1969. The ground-beetles (Carabidae, excl. Cicindelinae) of Canada and Alaska. *Opuscula Entomologica Supplementum*: **20**: 1-200 (1961); **24**: 201-408 (1963); **29**: 409-648 (1966); **32**: 649-944 (1968); **34**: 945-1192 (1969).
- Majka, C.G., Bousquet, Y., and Westby, S. 2006. Introduced Carabidae (Coleoptera) from Nova Scotia and Prince Edward Island: new records and ecological perspectives. *The Canadian Entomologist* **138**: 602-609.
- Majka, C.G., Bousquet, Y., and Westby, S. 2007. The ground beetles (Coleoptera: Carabidae) of the Maritime Provinces of Canada: review of collecting, new records, and observations on composition, zoogeography, and historical origins. *Zootaxa*, **1590**: 1-36.
- Sabine, D.L. 2004. First record of *Cicindela marginipennis* Dejean from Canada. *Cicindela*, **36**: 53-56.
- Smetana, A. 1971. Revision of the tribe Quediini of America north of Mexico (Coleoptera: Staphylinidae). *Memoirs of the Entomological Society of Canada* **79**.