

The checkered beetles (Coleoptera: Cleridae) of the Maritime Provinces of Canada

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Abstract

The beetles of the family Cleridae in the Maritime Provinces of Canada are reviewed and new provincial records are reported. As a result, 16 taxa (15 species and one additional subspecies) are now known to occur in the region. A total of 19 new provincial records are reported; seven from Prince Edward Island, nine from Nova Scotia, and three from New Brunswick. Three species, *Zenodosus sanguineus* (Say), *Necrobia rufipes* (DeGeer), and *Necrobia violacea* (Linnaeus) are newly recorded in the Maritime Provinces. The bionomics of the fauna is briefly reviewed; species found in the region fall into one of five ecological groups. The composition of the fauna is also examined in relation to subjects such as island faunas, the northeastern North American regional fauna, and adventive species.

Key words: Coleoptera, Cleridae, Maritime Provinces, new records, biodiversity

Introduction

The checkered beetles (Cleridae) are predaceous beetles found in a variety of ecological circumstances. Many species are predators on various wood and bark-boring insects (particularly Scolytinae) and are part of the broad saproxylic invertebrate community associated with the decay and decomposition of wood. Others are typically found on flowers where they feed on pollen. Species in the genus *Necrobia* are both saprophagous and predaceous and are found associated with carrion and dried stored products (Opitz 2002). Marske & Ivie (2003) recorded 243 species in North America and McNamara (1991) recorded 50 species in Canada, 12 of which were reported from the Maritime Provinces. Nonetheless, comparatively little attention to the family has been paid in this region and published records and studies have been few. The present study examines specimen records from collections throughout the region and reports new records from

New Brunswick, Nova Scotia, and Prince Edward Island as well as the Maritime Provinces as a whole. An online photographic guide to the species of the region is provided by Majka (2006) and is available at <http://www.chebucto.ns.ca/Environment/NHR/Cleridae.html>.

Conventions

In the course of on-going research on the biodiversity of Coleoptera in the Maritime Provinces, specimens of Cleridae were examined. Abbreviations of collections (as per Evenhuis & Samuelson (2006)) referred to in this study are:

- ACNS Agriculture and Agri-food Canada, Kentville, Nova Scotia
CBU Cape Breton University, Sydney, Nova Scotia
CGMC Christopher G. Majka Collection, Halifax, Nova Scotia
CNC Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Ontario
DHWC David H. Webster Collection, Kentville, Nova Scotia
JOC Jeffrey Ogden Collection, Truro, Nova Scotia
NBM New Brunswick Museum, Saint John, New Brunswick
NSMC Nova Scotia Museum, Halifax, Nova Scotia
RPWC Reginald P. Webster Collection, Charter's Settlement, New Brunswick
STFX Saint Francis Xavier University, Antigonish, Nova Scotia
UMNB Université de Moncton, Moncton, New Brunswick

New records for each jurisdiction are reported. The number of specimens is noted in parentheses. If not specified, it is assumed to be one. Where fewer than 20 specimens were examined, all records are given. Where more than 20 specimens were examined, a summary is provided and data for the earliest collected specimen is given.

Results

In the course of the study 660 specimens of Cleridae from the Maritime Provinces were examined, 16 from Prince Edward Island, 38 from New Brunswick, and 607 from Nova Scotia. As a result 16 taxa (15 species and one additional subspecies) are now known to occur in the region. Seven of these are newly recorded on Prince Edward Island, nine in Nova Scotia, and three in New Brunswick. Three species, *Zenodosus sanguineus* (Say), *Necrobia rufipes* (DeGeer), and *Necrobia violacea* (Linnaeus) are now recorded in the Maritime Provinces.

The region's fauna is summarized in Table 1. The distribution of each species is briefly

summarized within northeastern North America and in the continent. This information is compiled primarily from Chandler (2001), Dearborn and Donahue (1993), Downie and Arnett (1996), McNamara (1991), and Sikes (2003). For the purposes of this study New Brunswick (NB), Newfoundland and Labrador (NF), Nova Scotia (NS), Ontario (ON), Prince Edward Island (PE), Québec (QC), Connecticut (CT), Maine (ME), Massachusetts (MA), New Hampshire (NH), New York (NY), Rhode Island (RI), and Vermont (VE) were considered to comprise northeastern North America. Specific accounts follow.

Thaneroclerinae

***Zenodosus sanguineus* (Say, 1835)**

NEW BRUNSWICK: York Co.: Fredericton, 14.ix.1987, N. Albert, UMN; New Brunswick (no further data), NBM. **NOVA SCOTIA:** 75 specimens examined from Annapolis, Antigonish, Cape Breton, Colchester, Cumberland, Guysborough, Halifax, Hants, Inverness, Kings, Pictou, Queens, and Richmond counties. The earliest record is from 1967 (**Inverness Co.:** Bras d'Or Lake, 17.v.1967, J. Gilhen, NSMC). **PRINCE EDWARD ISLAND: Queens Co.:** St. Patricks, 17.viii.2002, C.G. Majka, CGMC; St. Patricks, 25.vi.2003, C.G. Majka, CGMC.

Newly recorded in New Brunswick, Nova Scotia, and Prince Edward Island. Widely distributed in the region (Figure 1). In Nova Scotia observed in association with the galleries of scolytines (Curculionidae) “feeding” on red spruce (*Picea rubens* Sarg.) (Pinaceae); also in white pine (*Pinus strobus* L.) (Pinaceae) and eastern hemlock (*Tsuga canadensis* (L.) Carr.) (Pinaceae) forests. Knull (1951) reported it as diurnal and found under the bark of trees infested with lignicolous boring insects.

Tillinae

***Cymatodera bicolor* (Say, 1825)**

NOVA SCOTIA: Kings Co.: Kentville, 10.vii.1948, CNC.

Only one specimen of this species has been collected in the Maritime Provinces (Figure 5). Further research is required to determine if this specimen represents an isolated population in the Annapolis Valley of Nova Scotia (a relatively warmer portion of the province) or if this individual was a wind-blown stray. *Cymatodera bicolor* is known from Maine (Chandler 2001). *Cymatodera* favours immature stages of prey such as larvae of cynipoid wasps and other larvae associated with galls, fruit tree caterpillars, and larvae of bark beetles, cerambycids, and buprestids (Opitz 2002).

TABLE 1. Maritime Provinces of Canada Cleridae.

Regional Distribution: CT, Connecticut; MA, Massachusetts; ME, Maine; NB, New Brunswick; NF, Newfoundland; NH, New Hampshire; NS, Nova Scotia; NY, New York; ON, Ontario; QC, Québec; PE, Prince Edward Island; RI, Rhode Island; VT, Vermont.

Continental Distribution: 1, Northeastern; 2, Southeastern; 3, Southwestern; 4, Northwestern; 5, Central.

	Regional Distribution					Continental Distribution
	Province NB	NS	PE	Northeastern North America	North America	
Thaneroclerinae						
<i>Zenodosus sanguineus</i> (Say)	1	1	1	ME, NB, NH, NS, NY, ON, PE, QC		1,2,5
Tillinae						
<i>Cymatodera bicolor</i> (Say)		1		ME, NH, NS, ON, QC, RI		1,2,3,5
Hydnocerinae						
<i>Phyllobaenus humeralis</i> (Say)	1	1	1	MA, ME, NB, NH, NS, NY, ON, PE, QC, RI	1,2,3,4,5	
<i>Phyllobaenus lecontei</i> (Wolcott)	1		1	ME, NB, NH, NY, ON, PE, QC, VT		1,2,4,5
<i>Phyllobaenus pallipennis</i> (Say)	1	1	1	ME, NB, NH, NS, NY, ON, PE, QC, RI		1,2,3,5
<i>Phyllobaenus verticalis</i> (Say)	1	1	1	ME, NB, NH, NS, NY, ON, PE, QC, RI		1,2,3,5
<i>Isohydnocera curtippennis</i> (Newman)	1	1		CT, ME, NB, NH, NS, NY, ON, QC, RI		1,2,5
Clerinae						
<i>Trichodes nutalli</i> (Kirby)	1			CT, MA, ME, NB, NH, NY, ON, QC, RI, VT	1,5	
<i>Thanasimus dubius</i> (Fabricius)	1	1		ME, NB, NF, NH, NS, NY, ON, QC		1,2,3,4,5
<i>Thanasimus undatulus</i> (Say)	1	1	1	ME, NB, NF, NH, NS, ON, PE, QC		1,4,5
<i>Enoclerus muttkowskii</i> (Wolcott)	1			ME, NB, NH, NY, ON, QC, VT		1
<i>Enoclerus nigripes nigripes</i> (Say)	1	1		ME, NB, NH, NS, NY, ON, QC		1,2,4,5
<i>Enoclerus nigripes rufiventris</i> (Spinola)	1	1		ME, NB, NH, NS, ON, QC		1
Epiphloeinae						
<i>Madoniella dislocata</i> (Say)	1	1	1	ME, NB, NH, NS, NY, ON, PE, QC, RI		1,2,3,5
Korynetinae						
<i>Necrobia rufipes</i> (DeGeer) †		1		ME, NF, NH, NS, ON, PE, QC		1,4,5
<i>Necrobia violacea</i> (Linnaeus) †	1	1		MA, NB, NF, NH, NS, ON, QC		1,4,5
Total species	14	13	7			
New provincial records	3	9	7			

† = introduced species. Boldface entries indicate new provincial records.

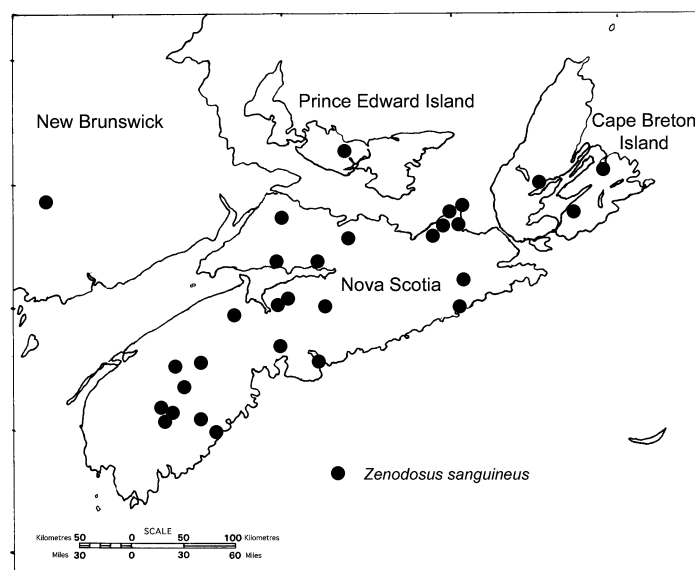


FIGURE 1. Distribution of *Zenodosus sanguineus* in the Maritime Provinces.

Hydnocerinae

Phyllobaenus humeralis (Say, 1823)

NEW BRUNSWICK: Kent Co.: Kouchibouquac National Park: 12.vii.1978, S.J. Miller, CNC; 16.vi.1978, D.B. Lyons, CNC; 11.vii.1978, H. Goulet, CNC; 4.viii.1977, G.A. Calderwood, CNC; 2.vii.1977, J.R. Vockeroth, CNC. **NOVA SCOTIA:** 47 specimens examined from Cape Breton, Colchester, Halifax, Kings, Pictou, Queens, Richmond, Shelburne, and Victoria counties. The earliest record is from 1945 (**Halifax Co.:** French Village, 9.viii.1945, D.C. Ferguson, NSMC). **PRINCE EDWARD ISLAND: Kings Co.:** Greenwich, 2.viii.1997, D.B. McCorquodale, (2), CBU; **Queens Co.:** Wood Islands, 16.vii.2002, C.G. Majka, CGMC; Wood Islands, 30.vi.2003, C.G. Majka, CGMC; North Rustico, 26.vi.2003, C.G. Majka, (2), CGMC.

Newly recorded in Nova Scotia and Prince Edward Island. Widely distributed in the region (Figure 2). Collected in many habitats (coastal heath barrens, coastal dunes, pine barrens, along rivers, ravines, deciduous forests), often on the foliage or blossoms of trees or shrubs such as *Betula papyrifera* Marshall (Betulaceae), *Diervilla lonicera* P. Mill (Caprifoliaceae), *Viburnum nudum* L. (Caprifoliaceae), and *Spiraea alba* Duroi (Rosaceae). The form *difficilis* (LeConte, 1849) is also found in the region.

Species of *Phyllobaenus* are commonly collected by sweeping grass or beating live and dead branches with or without foliage. They have been reared from insect galls and cotton bolls and are known to prey on small wood borers, immature weevils, and hymenopterous larvae (Opitz 2002).

Phyllobaenus lecontei (Wolcott, 1912)

NEW BRUNSWICK: Kent Co.: Kouchibouquac National Park, 16.vi.1978, D.B. Lyons, CNC; Kouchibouquac National Park, 17.vi.1977, S.J. Miller (2), CNC; **Kings Co.:** Penobsquis, 29.vii, 1926, C.A. Frost, (2), CNC. **PRINCE EDWARD ISLAND: Queens Co.:** Wood Islands, 23.vii.2001, C.G. Majka, on *Pinus* sp., CGMC.

Newly recorded on Prince Edward Island (Figure 2). On PEI found on pine (*Pinus*). In New York associated with pine (Downie & Arnett 1996).

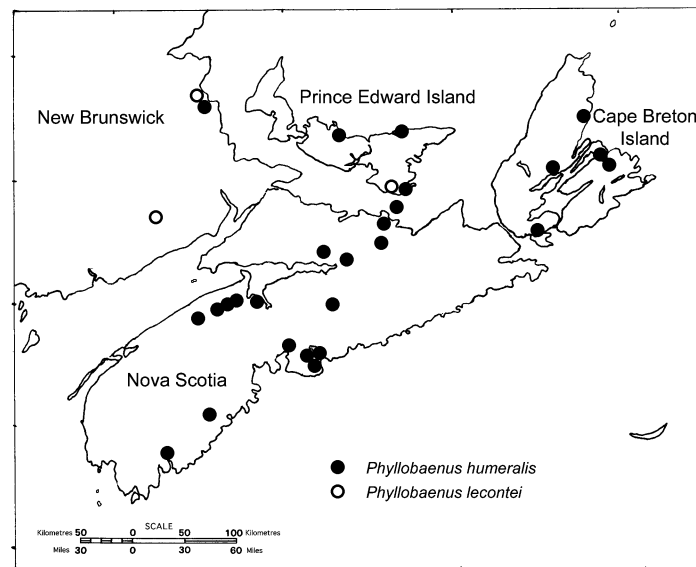


FIGURE 2. Distribution of *Phyllobaenus humeralis* and *P. lecontei* in the Maritime Provinces.

Phyllobaenus pallipennis (Say, 1825)

NEW BRUNSWICK: Kings Co.: Penobsquis, 27.vii.1926, 22.vii.1927, & 23.vii.1927, C.A. Frost, (3), CNC. **NOVA SCOTIA: Kings Co.:** Kentville, 1.viii.1957, H.T. Stultz, ACNS; Cambridge, 7.ix.1968, ACNS. **PRINCE EDWARD ISLAND: Kings Co.:** Launching, 23.vii.2001, C.G. Majka, old field CGMC.

Newly recorded on Prince Edward Island (Figure 3). Recorded on oak (*Quercus*) (Fagaceae) and as a predator of the boll weevil (*Anthonomus grandis* Boheman) (Curculionidae) (Knull 1951).

Phyllobaenus verticalis (Say, 1835)

NOVA SCOTIA: Kings Co.: Canard, 24.vii.1956 & 10.vii.1959, H.T. Stultz, (3), ACNS;

Canard, 5.iii.1959, H.T. Stultz, emerged, ACNS; Coldbrook, 21.viii.1956, C.D. Dondale, ACNS; Nictaux, 8.vii.1946, H.T. Stultz, ACNS; **Lunenburg Co.:** Bridgewater, 30.vi.1965, B. Wright, (4), NSMC; **Pictou Co.:** Salt Springs, 16.vii.2002, C.G. Majka, along river, CGMC. **PRINCE EDWARD ISLAND: Kings Co.:** Woodville Mills, 30.vi.2003, C.G. Majka, shore of pond, (2), CGMC; **Queens Co.:** Millvale, 13.vii.2002, C.G. Majka, brackish marsh, CGMC.

Newly recorded in Nova Scotia and Prince Edward Island. Scattered records from across the region except for Cape Breton Island (Figure 3). Several records from wet habitats. Knull (1951) records it on dead bittersweet (*Celastrus scandens* L.) (Celastraceae) infested with cerambycid larvae; grape (*Vitis*) (Vitaceae) infested with *Phymatodes amoenus* (Say) (Cerambycidae); birch (*Betula*) (Betulaceae) infested with *Agrilus betulae* Fisher (Buprestidae); linden (*Tilia*) (Tiliaceae) infested with *Eupogonius pubescens* LeConte and *Grammoptera exigua* (Newman) (Cerambycidae); black oak (*Quercus velutina* Lam.) infested with *Agrilus geminatus* (Say); and on hickory (*Carya*) (Juglandaceae) infested with wood-borers. Also recorded from a cynipid gall on white oak (*Quercus alba* L.).

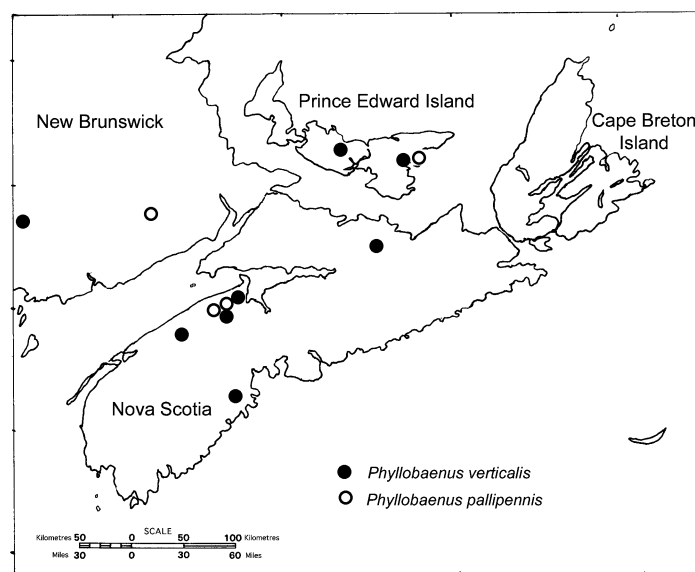


FIGURE 3. Distribution of *Phyllobaenus verticalis* and *P. pallipennis* in the Maritime Provinces.

Isohydnocera curtipennis (Newman, 1840)

NEW BRUNSWICK: Albert Co.: Crooked Creek, 22.viii.2003, C.G. Majka, CGMC; **Kent Co.:** Kouchibouquac National Park, 23.vi.1977, 6.vii.1977, & 23.viii.1977, S.J. Miller, (3), CNC; Kouchibouquac National Park, 21.ix.1977, A. Smetana, CNC; **York Co.:** Fredericton, 9.vii.1928, W.J. Brown, CNC. **NOVA SCOTIA:** 23 specimens

examined from Annapolis, Colchester, Cumberland, Halifax, Kings, Pictou, and Victoria counties. The earliest record is from 1948 (**Kings Co.:** Berwick, 10.vii.1948, H.T. Stultz, ACNS).

Recorded by McNamara (1991) in New Brunswick and Nova Scotia: scattered records including Cape Breton Island (Figure 7). Knull (1951) reported it from galls of *Euura salacis-nodus* Walsh (Hymenoptera: Tenthredinidae), on willow (*Salix*) (Salicaceae), and *Gnorimoschema gallaesolidaginis* Riley (Lepidoptera: Gelechiidae) on goldenrod (*Solidago*) (Asteraceae).

Clerinae

Trichodes nutalli (Kirby, 1818)

NEW BRUNSWICK: Northumberland Co.: Portage Island, 5.viii.2004, S. Blaney, shoreline on *Solidago sempervirens* L., CGMC. **NOVA SCOTIA: Kings Co.:** Kentville, 15.v.1999, C. Sheffield, intercepted from Saskatchewan, ACNS.

Newly recorded in New Brunswick (Figure 7). In Nova Scotia intercepted in association with Palearctic alfalfa leafcutter bees (*Megachile rotundata* (Fabricius)) (Hymenoptera: Megachilidae) imported from Saskatchewan. *Trichodes nutalli* does not appear to be established in Nova Scotia. Adults of *Trichodes* are often found on a variety of flowers where they feed, mate, and oviposit; the larvae are predators in nests of bees and wasps (Knull 1951, Opitz 2002).

Thanasimus dubius (Fabricius, 1776)

NEW BRUNSWICK: Kings Co.: Grand Bay, 28.vii.1990, D.F. McAlpine, NBM; **Saint John Co.:** Saint John, 19.vi.1902, W. McIntosh, NBM. **NOVA SCOTIA:** 177 specimens examined from Annapolis, Antigonish, Colchester, Halifax, Hants, Inverness, Kings, Pictou, Queens, and Yarmouth counties. The earliest record is from 1953 (**Queens Co.:** White Point Beach, 27.vi.1957, J.H. McDunnough, NSMC).

Newly recorded in Nova Scotia: widely distributed in the province (Figure 4). In Point Pleasant Park, Nova Scotia, found in association with the galleries of Scolytinae (Curculionidae) feeding on red spruce (*Picea rubens*) and white pine (*Pinus strobus*). The most abundant scolytines found in these galleries (75% of individuals) are *Hylurgops rugipennis pinifex* (Fitch), *Trypodendron lineatum* (Olivier), and *Polygraphus rufipennis* (Kirby) in spruce, and *Ips pini* (Say) and *Pityogenes hopkinsi* Swaine in pine (C. Majka, unpublished data). Also noted from elm (*Ulmus*) (Ulmaceae) by Knull (1951).

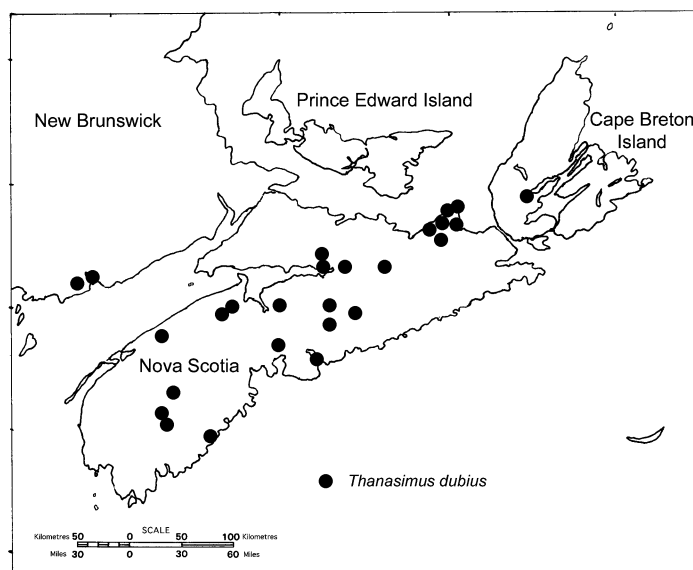


FIGURE 4. Distribution of *Thanasimus dubius* in the Maritime Provinces.

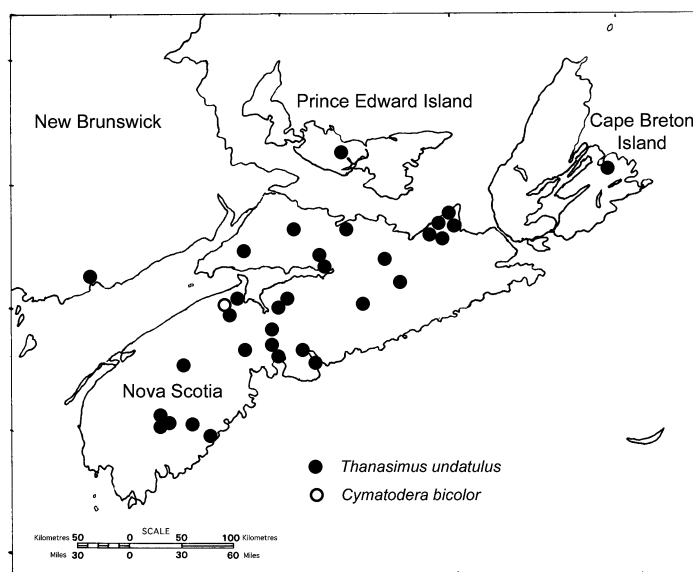


FIGURE 5. Distribution of *Thanasimus undatulus* and *Cymatodera bicolor* in the Maritime Provinces.

Thanasimus undatulus (Say, 1835)

NEW BRUNSWICK: Saint John Co.: Saint John, 2.vii.1907, A.G. Leavitt, NBM; Saint John, vii.190X, (3), W. McIntosh, NBM. **NOVA SCOTIA:** 159 specimens examined from Annapolis, Antigonish, Cape Breton, Colchester, Cumberland, Guysborough, Halifax,

Hants, Kings, Lunenburg, Pictou, and Queens counties. The earliest record is from 1897 (**Halifax Co.:** Halifax, 1897, Evans (1899)). **PRINCE EDWARD ISLAND:** **Queens Co.:** St. Patricks, 27.vi.2003, C.G. Majka, coniferous forest, CGMC.

Newly recorded on Prince Edward Island. Widely distributed in the region (Figure 5). In Point Pleasant Park, Nova Scotia, found in association with the galleries of Scolytinae feeding on red spruce (*Picea rubens*) and white pine (*Pinus strobus*). The most abundant scolytines found in these galleries (75% of individuals) are *Hylurgops rugipennis pinifex*, *Trypodendron lineatum*, and *Polygraphus rufipennis* in spruce, and *Ips pini* and *Pityogenes hopkinsi* in pine (C. Majka, unpublished data).

***Enoclerus muttkowskii* (Wolcott, 1909)**

NEW BRUNSWICK: Saint John Co.: Salmon River, 9.vii.1938, C.C. Smith, beaten from *Pinus banksiana* Lamb., CNC.

Recorded by McNamara (1991) in New Brunswick (Figure 6). In NB collected from *Pinus banksiana*. In Ohio recorded from shortleaf pine (*Pinus echinata* P. Mill.) infested with the bark beetle, *Dendroctonus frontalis* Zimmerman (Curculionidae: Scolytinae) (Knull 1951).

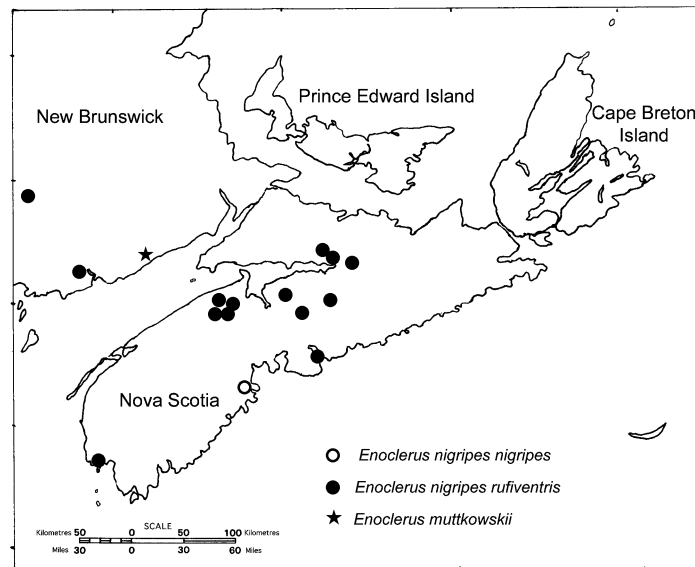


FIGURE 6. Distribution of *Enoclerus n. nigripes*, *E. n. rufiventris*, and *E. muttkowskii* in the Maritime Provinces.

***Enoclerus nigripes nigripes* (Say, 1823)**

NOVA SCOTIA: Lunenburg Co.: Bridgewater, 28.v.1965, B. Wright, NSMC; Bridgewater, 30.vi.1965, B. Wright, NSMC.

Newly recorded in Nova Scotia (Figure 6) [Specimens of *E. n nigripes* from NB were not available for examination; consequently they are not plotted on the distribution map.]. Recorded as a predator on larvae and adults of Scolytinae and *Pissodes* sp. (Curculionidae) in pine (*Pinus*), spruce (*Picea*), and juniper (*Juniperus*) (Cupressaceae); on Scolytinae, Curculionidae, and small lignicolous insects in deciduous trees; also as a predator of *Hygluopinus rufipes* Eichhoff (Curculionidae: Scolytinae) in elm (*Ulmus*) (Knull 1951).

***Enoclerus nigripes rufiventris* (Spinola, 1844)**

NEW BRUNSWICK: Kings Co.: Grand Bay, 26.v.2001, D.F. McAlpine, NBM; **York Co.:** Charters Settlement, 26.vi.1999, R.P. Webster, RPWC. **NOVA SCOTIA:** 29 specimens examined from Colchester, Halifax, Hants, Kings, and Yarmouth counties. The earliest record is from 1950 (**Kings Co.:** Aldershot, 15.v.1950, H.T. Stultz, (2), ACNS).

Newly recorded in Nova Scotia: scattered distribution in New Brunswick and Nova Scotia except for Cape Breton Island (Figure 6). In Point Pleasant Park, Nova Scotia, found in association with the galleries of Scolytinae feeding on red spruce (*Picea rubens*) and white pine (*Pinus strobus*). The most abundant scolytines found in these galleries (75% of individuals) are *Hylurgops rugipennis pinifex*, *Trypodendron lineatum*, and *Polygraphus rufipennis* in spruce, and *Ips pini* and *Pityogenes hopkinsi* in pine (C. Majka, unpublished data). Bionomics as per *E. n. nigripes* (above) (Knull 1951).

Epiphloeinae

***Madoniella dislocata* (Say, 1825)**

NOVA SCOTIA: 54 specimens examined from Antigonish, Cape Breton, Halifax, Kings, Pictou, and Queens counties. The earliest record is from 1962 (**Kings Co.:** Berwick, 28.viii.1962, H.T. Stultz, ACNS). **PRINCE EDWARD ISLAND: Queens Co.:** St. Patricks, 14.vii.2002, C.G. Majka, red spruce forest, CGMC.

Newly recorded in Nova Scotia and Prince Edward Island. Scattered records from across the region (Figure 7) [Specimens of *M. dislocata* from NB were not available for examination; consequently they are not plotted on the distribution map.]. In Point Pleasant Park, Nova Scotia, found in association with the galleries of Scolytinae feeding on red spruce (*Picea rubens*) and white pine (*Pinus strobus*). The most abundant scolytines found in these galleries (75% of individuals) are *Hylurgops rugipennis pinifex*, *Trypodendron lineatum*, and *Polygraphus rufipennis* in spruce, and *Ips pini*, and *Pityogenes hopkinsi* in pine (C. Majka, unpublished data).

Associated with bark beetles in oak (*Quercus*), juniper (*Juniperus*), cedar (*Thuja*) (Cupressaceae), hickory (*Carya*), pine (*Pinus*), hackberry (*Celtis occidentalis* L.)

(Ulmaceae), black spruce (*Picea mariana* (Mill.) BSP.), butternut (*Juglans cinerea* L.) (Juglandaceae), redbud (*Cercis*) (Brassicaceae), and other hardwoods (Opitz 2002). Knull (1951) reported it as predaceous on *Anelaphus villosus* (Fabricius) (Cerambycidae), *Bitoma carinata* (LeConte) (Colydiidae), *Chramesus hicoriae* LeConte (Curculionidae), *Hylocurus* sp., *Scolytus muticus* Say, *S. rugulosus* Ratz., *Pityophthorus dentifrons* Blackman, *P. consimilis* LeConte, and *Polygraphus rufipennis* (Kirby) (all Scolytinae).

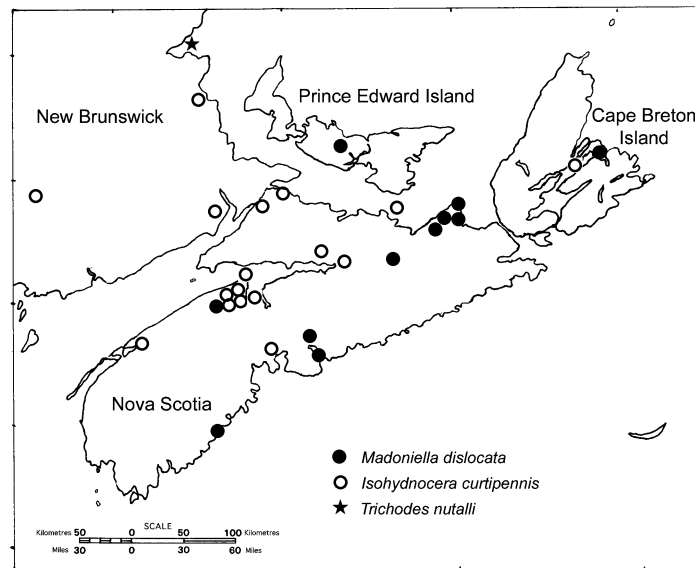


FIGURE 7. Distribution of *Madoniella dislocata*, *Isohydnocera curtipennis*, and *Trichodes nutalli* in the Maritime Provinces.

Korynetinae

Necrobia rufipes (DeGeer, 1775)

NOVA SCOTIA: Halifax Co.: Halifax, 5.v.2006, C.G. Majka, CGMC; Halifax, 12.v.2006, C.G. Majka, CGMC; **Kings Co.:** Berwick, 5.i.2003, F. Languard, JOC. **PRINCE EDWARD ISLAND: Queens Co.:** Millvale, 13.vii.2002, C.G. Majka, brackish marsh, CGMC.

Newly recorded in Nova Scotia (Figure 8). Associated with carrion, they are saprophagous and predaceous (Opitz 2002). Found on the skins and bones of dead animals, a predator of dermestid larvae; a pest on grain, silk, and food (Knull 1951). This originally Palearctic species is now cosmopolitan. Known in Canada (Ontario and Québec) since at least 1895 (Wickham 1895).

NEW BRUNSWICK: Albert Co.: Caledonia Mt., 1965-71, C.G. Majka, CGMC; Saint John Co.: Saint John, vii.1900-07, W. McIntosh, NBM; York Co.: Charter's Settlement, 6.v.2000, R.P. Webster, on dead fish, RPWC; **NOVA SCOTIA:** Antigonish Co.: Pomquet, 9.v.1997, J.N. Sampson, K.C. Leuscher, & D.O. Keefe, on dead cow, (3), STFX; Cape Breton Co.: Boisdale, 31.viii.1995, J.M. Francis, CBU; Colchester Co.: Londonderry, 26.ix.1988, J. Gilhen, on skull of *Odocoileus virginianus* (Zimmerman), (9), NSMC; Halifax Co.: Armdale, 9.v.1945, D.C. Ferguson, NSMC; Kings Co.: (locality not recorded), 22.vi.1948, K.D. Archibald, NSMC; Kentville, 7.v.1961 & 1.vii.1961, D.H. Webster, on decaying *Vulpes vulpes* (Linnaeus), (3), DHWC; Kentville, 12.vii.1961, D.H. Webster, on cow bone, DHWC; Wolfville, 3.iv.1976, K. Strong, on horse skull, (2), ACNS.

Newly recorded in New Brunswick and Nova Scotia (Figure 8). Associated with carrion, they are saprophagous and predaceous (Opitz 2002). Found on the skins and bones of dead animals and dried fish; a predator of dermestid larvae (Knull 1951). This Palearctic species has now become cosmopolitan in distribution. In Canada, it was reported from British Columbia as early as 1875-76 and from Ontario in 1880-82 (Harrington 1890). In the Maritime Provinces known from 1900-1907 (above).

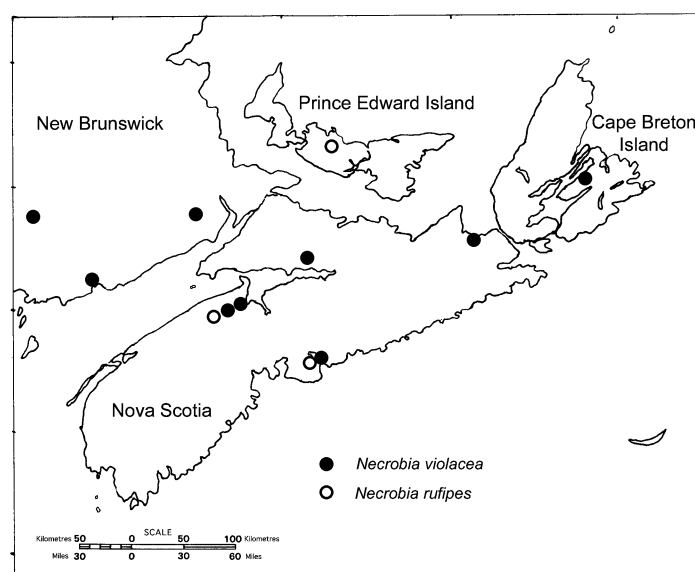


FIGURE 8. Distribution of *Necrobia violacea* and *N. rufipes* in the Maritime Provinces.

Discussion

The results of this study indicate that the Maritime Provinces support a more diverse fauna of clerids than previously known and that many species are widely distributed in the region. Nineteen new provincial records are reported and three species are newly recorded

in the Maritime Provinces. The clerid fauna is also composed of several distinct trophic groups that occupy different ecological niches in the region. These include:

1) Bark beetle predators associated with coniferous forests including *Zenodosus sanguineus*, *Phyllobaenus lecontei*, *Thanasimus dubius*, *T. undatulus*, *Enoclerus muttkowskii*, *E. n. nigripes*, *E. n. rufiventris*, and *Madoniella dislocata*. This group is particularly diverse and abundant in this region, reflecting the substantial coniferous component of the region's forests and the abundant and diverse bark and wood-boring beetle community. Species in the genera *Enoclerus* and *Thanasimus* are considered to be important in the natural control of bark beetles in such forests (Opitz 2002).

2) Bark beetle predators associated with deciduous forests including *Phyllobaenus verticalis* and, possibly, *Cymatodera bicolor*.

3) Foliage dwelling species associated with gall insects including *Phyllobaenus humeralis*, *Isohydnocera curtippennis*, and *Cymatodera bicolor*. The former two species are widely distributed and abundant in the region. There has been no research to determine what galls insects they are associated with here and what role they may play in terms of the biocontrol of such species.

4) Predaceous species associated with nests of bees and wasps including *Trichodes nutalli*. Although only one specimen has been collected in the region it was found on the eastern shore of New Brunswick in an area where very little collecting of Coleoptera has been done. Consequently further fieldwork would be desirable to ascertain both the status of this species in the region and what species of Hymenoptera it is associated with.

5) Saprophagous and predaceous species associated with the skin and bones on animals including *Necrobia rufipes* and *N. violacea*. These species feed on the larvae of Diptera found on carrion (Blatchley 1910) and may be of utility in forensic entomology (Smith 1986).

As predators of wood and bark-boring beetles, species of the first two groups are members of the saproxylic fauna, a functional group of insects and invertebrates dependent during some portion of their life cycle upon dead or dying wood or other saproxylics (Speight 1989). Many groups of saproxylic beetles have been hitherto little investigated in the Maritime Provinces (Majka & Pollock 2006).

The comparatively small number of records from New Brunswick means that species distributions in that province are still quite imperfectly known in comparison to those in Nova Scotia. Further collecting in New Brunswick would be desirable to form a better understanding of its clerid fauna. Although the number of specimens collected on Prince Edward Island is also rather small, seven species have been found comprising 44% of the fauna of the neighbouring mainland. This is similar to the proportion of native Coccinellidae (39%) found on Prince Edward Island (Majka & McCorquodale 2006), a group that has been much more extensively collected than the Cleridae. Similarly seven species of clerids have been found on Cape Breton Island. With a land area slightly more than twice the size of PEI (10,311 km² vs. 5,660 km²), and separated from the mainland by

only 1.5 km (in contrast to the 13 km which separate NB and PEI), Cape Breton has an almost identically-sized, native coccinellid fauna; 41% that of the mainland fauna.

The composition of the region's fauna is broadly consistent with that of the northeastern North America. All the species found in the Maritime Provinces have also been recorded in Ontario, Québec, and many of the New England states (Table 1). There are, however, other species that might also occur in the region. *Placopterus thoracicus* (Olivier), *Enoclerus nigrifrons* (Say), and *Phyllobaenus subaeneus* Spinola have all been recorded in neighbouring areas of Maine (Dearborne & Donahue 1993) and should be looked for in northern or western areas of New Brunswick. Several other species also occur in Québec including *Cymatodera inornata* (Say), *Isohydnocera tabida* (LeConte) *Thanasimus trifasciatus* (Say), *Neorthopleura thoracica* (Say), *Chariessa pilosa* (Forster), and *Necrobia ruficollis* (Fabricius) (Laplante *et al.* 1991), all of which could potentially occur in the Maritime Provinces.

Three species in the region — *Cymatodera bicolor*, *Enoclerus muttkowskii*, and *Trichodes nutalli* — are known from single records. These records could represent disjunct populations, stray individuals, rare species, or species that have been inadequately sampled. It would be desirable to further investigate all three species to determine their status within the region.

Two species (12.5% of the fauna) are adventive, Palearctic species, a proportion similar to the overall 14.5% of introduced Coleoptera found in Nova Scotia (C.G. Majka, unpublished data). *Necrobia violacea* has been found in the region for over a century, however, *N. rufipes* was only first collected in 2002.

Given concerns about the purportedly invasive wood-boring beetle *Tetropium fuscum* (Fabricius) (Cerambycidae) in the region (Anonymous 2006), it might be worthwhile investigating the biocontrol potential of lignicolous species of Cleridae in regard to such potential pests.

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