# Records of adventive aleocharine beetles (Coleoptera: Staphylinidae: Aleocharinae) found in Canada

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**Abstract**—Eight additional adventive aleocharine beetles, native to the Palaearctic region, are reported from Canada, five of them for the first time. They belong to three tribes: *Crataraea suturalis* (Mannerheim) (Nova Scotia, Saskatchewan, British Columbia) and "*Meotica pallens* (Redtenbacher)" (Ontario, British Columbia) belong to Oxypodini; *Atheta* (*Chaetida*) *longicornis* (Gravenhorst) (Nova Scotia, Quebec), *Atheta* (*Thinobaena*) *vestita* (Gravenhorst) (New Brunswick), *Dalotia coriaria* (Kraatz) (Alberta), *Dinaraea angustula* (Gyllenhal) (Nova Scotia, Prince Edward Island, Quebec, Alberta), and *Nehemitropia lividipennis* (Mannerheim) (New Brunswick, Nova Scotia, Prince Edward Island, Quebec, Ontario) belong to Athetini; and *Homalota plana* (Gyllenhal) (Nova Scotia, New Brunswick) belongs to Homalotini. These species have likely been introduced into Canada from Europe by various anthropogenic activities, and their bionomics and possible modes of introduction are discussed. For each species, a short diagnosis and habitus and genital images are provided to assist with identification. The habitus and genital images are presented here for the first time for these species in North America. New United States records are not included in the abstract.

**Résumé**—Huit espèces additionnelles de coléoptères aleocharines, originaires de la région Paléarctique, sont rapportées pour le Canada, parmi lesquelles cinq sont mentionnées pour la première fois. Elles appartiennent aux trois tribus suivantes : Oxypodini (2 espèces) — *Crataraea suturalis* (Mannerheim) (Nouvelle-Écosse, Saskatchewan, Colombie-Britannique), « *Meotica pallens* (Redtenbacher) » (Ontario, Colombie-Britannique); Athetini (5 espèces) — *Atheta* (*Chaetida*) *longicornis* (Gravenhorst) (Nouvelle-Écosse, Québec), *Atheta* (*Thinobaena*) *vestita* (Gravenhorst) (Nouveau-Brunswick), *Dalotia coriaria* (Kraatz) (Alberta), *Dinaraea angustula* (Gyllenhal) (Nouvelle-Écosse, Île-du-Prince-Édouard, Québec, Alberta), *Nehemitropia lividipennis* (Mannerheim) (Nouvelle-Écosse, Île-du-Prince-Édouard, Nouveau-Brunswick, Québec, Ontario); and Homalotini (1 espèce) — *Homalota plana* (Gyllenhal) (Nouvelle-Écosse, Nouveau-

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Brunswick). Ces espèces ont probablement été introduites au Canada depuis l'Europe au travers d'activités anthropiques. Leur bionomique et les différents modes d'introduction possibles sont discutés. Pour chaque espèce, une courte diagnose ainsi que des images de l'habitus et des parties génitales de l'insecte sont fournies pour faciliter l'identification. Ces images sont présentées pour la premières fois pour ces espèces en Amérique du Nord. Les nouvelles mentions pour les États-Unis ne sont pas incluses dans ce résumé.

## Introduction

Rove beetles are mainly litter-dwelling creatures, and they are abundant and diverse in most terrestrial habitats. These characteristics make them prone to accidental introductions into other regions (Klimaszewski *et al.* 2002*a*). The predominantly predatory aleocharines constitute at least 30% of the total number of rove beetle species, depending on the region. They are small, highly mobile, and common in organic litters. Humans often inadvertently introduce them into other regions of the world with imported domestic livestock, plants, and soil (Klimaszewski *et al.* 2002*a*). The introduced and highly competitive predatory species may threaten native species and cause imbalances in previously established predator–prey relationships (Klimaszewski *et al.* 2002*a*). This, in turn, may promote expansion of some insect pests. The devastating effects of predatory species on native fauna are illustrated by two introduced vespid wasps in New Zealand (Beggs *et al.* 1996). These vespids have devastating effects on native arthropods and some species of birds (Beggs 2001). At high density they may restructure insect communities within native forests, causing flow-on effects throughout the food chain, including insectivorous birds (Beggs 2001). Even as prey items, adventive species can effect important changes in natural ecosystems. For instance, the adventive weevil *Barypeithes pellucidus* (Boheman) (Curculionidae) has become a major component of the diet of red-backed salamanders, *Plethodon cinereus* (Green), in forests in New York and Pennsylvania (Maerz *et al.* 2005).

The species-rich tribe Athetini Casey is known to have many adventive species all over the world (Muona 1984; Klimaszewski and Peck 1986; Sivasubramaniam *et al.* 1997; Klimaszewski *et al.* 2002*a*; Gusarov 2003). Muona (1984) recorded 22 Palaearctic aleocharine species occurring in North America, including 17 athetines, but only 7 of these species were recorded from Canada (*Gnypeta caerula* (Sahlberg), *Dochmonota rudiventris* (Eppelsheim), *Geostiba circellaris* (Gravenhorst), *Philhygra botanicarum* (Muona) (we now regard *P. botanicarum* as a Holarctic species, hence it is not included in the list of adventive species in Appendix A), *Mocyta fungi* (Gravenhorst), *Boreophilia islandica* (Kraatz), and *Amischa analis* (Gravenhorst)), and the rest were recorded from the United States. Gusarov (2003) revised some types of North American aleocharines and provided new records of three adventive species in Canada (*Atheta* (*Datomicra*) *dadopora* Thomson, *Aloconota sulcifrons* (Stephens), and *Drusilla canaliculata* (Fabr.)). In this paper we provide records of eight additional adventive aleocharines in Canada, including two oxypodines, five athetines, and one homalotine. Klimaszewski *et al.* (2006) provided three records for introduced *Oxypoda* Mannerheim species discovered in Canada. A detailed list of 39 adventive aleocharine species in Canada, with references, is provided in Appendix A. Some additional data on recently introduced species of Coleoptera, including the rove beetle *Phloeocharis subtilissima* Mannerheim, which arrived at the port of Halifax, were published and discussed by Majka and Klimaszewski (2004). Majka *et al.* (2006) newly reported the Palaearctic species *Atheta celata* (Erichson) in North America from specimens collected in Nova Scotia.

Knowledge should help us in the future to monitor range expansions and the potential negative effects of introduced species on native fauna. It is of crucial importance to closely monitor species introductions and to understand the very nature of these species' colonization ability, impact on native species, and mechanism of introduction.

## Material and methods

About 210 adult aleocharine specimens from Canada were examined. Beetles were sampled by sifting forest litter and by using pitfall traps, intercept traps, pitfall-light traps, and other unspecified collecting methods. Almost all

specimens were dissected to study genital characters. The genital structures were dehydrated in absolute alcohol, transferred to xylene, mounted in Canada balsam on celluloid microslides, and pinned with the specimens from which they originated. The images were obtained from an image processing system (Nikon SMZ1500 stereoscopic microscope, Nikon DXM 1200F digital camera, Nikon View 5 COOLPIX NSA, version 5.1.2, and Adobe Photoshop software).

Terminology mainly follows that used by Seevers (1978), Klimaszewski (1984), and Ashe (2001). The ventral part of the median lobe of the aedeagus is considered that with the foramen mediale of the bulbus with ductus ejaculatorius, and the opposite side is referred to as the dorsal part.

**Collection abbreviations**

CGMC Christopher G. Majka collection, Halifax, Nova Scotia, Canada
LFC Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, Québec, Quebec, Canada
NoFC Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, Edmonton, Alberta, Canada
NSMC Nova Scotia Museum collection, Halifax, Nova Scotia, Canada
NSNR Nova Scotia Department of Natural Resources Insectary, Shubenacadie, Nova Scotia, Canada
RPWC Reginald P. Webster private collection, Fredericton, New Brunswick, Canada

## New Canadian records of adventive aleocharine rove beetles

## I. Tribe Oxypodini Thomson

### *Crataraea suturalis* (Mannerheim)

(Figs. 1, 9–15)

*Bolitochara suturalis* Mannerheim 1830: 82; Fenyes 1920: 30.

As *Crataraea*: Horion 1967: 361; Benick and Lohse 1974: 289; Moore and Legner 1975: 391; Seevers 1978: 69; Downie and Arnett 1996: 508; Ashe 2001: 361; Smetana 2004: 471.

**Material examined**

**CANADA. Nova Scotia:** Sable Island, West end, 6.vii.1967, H.F. Howden (CNC) 1 male. **Saskatchewan:** Tp. 7, Rge. 2, W. 3, Mer., 23.vii.1980, lot 2, B.F. and J.L. Carr (LFC) 2 males. **British Columbia:** Creston, 12.v.1956, G. Stace Smith (CNC) 1 female.

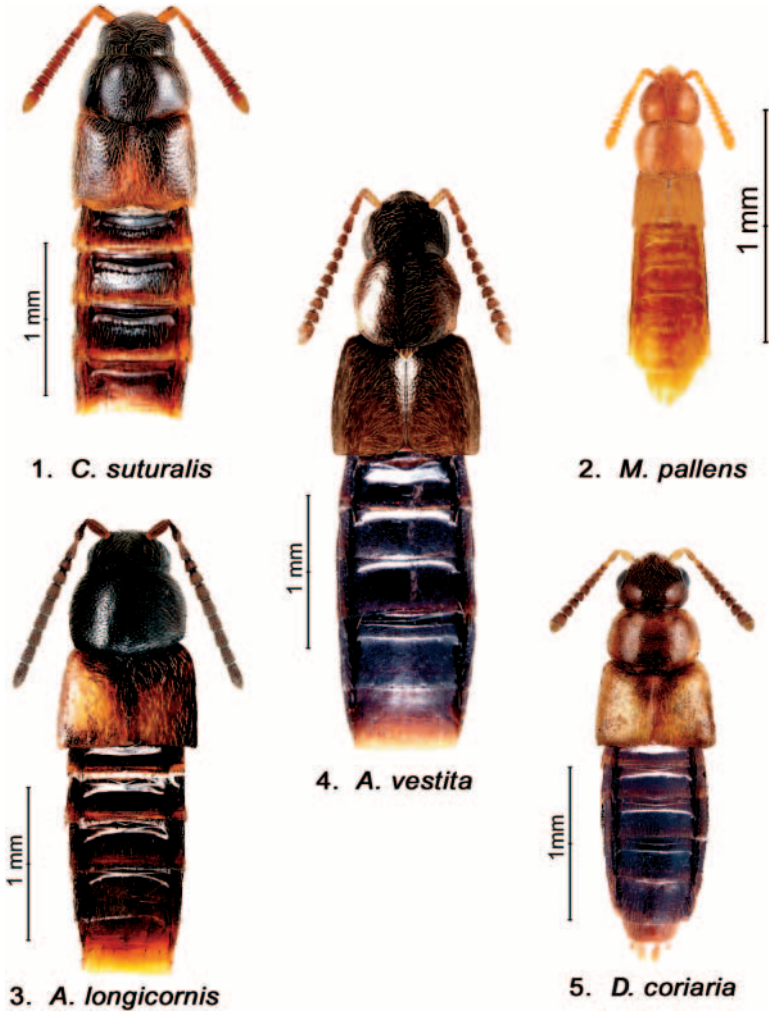
**Diagnosis**

*Crataraea suturalis* may be distinguished from other Nearctic aleocharines by the following combination of characters: length 2.3–3.0 mm; body robust; integument dark brown with rust-brown antennae, legs, posterior region of elytra and suture (Fig. 1); pubescence long and sparse, yellowish brown, punctation fine but slightly coarser on elytra (Fig. 1); head flattened medially; antennal segments 6–10 strongly transverse (Fig. 1); pronotum strongly transverse and bisinuate basally (Fig. 1); elytra transverse, subparallel, and strongly sinuate apically (Fig. 1); abdomen with deeply impressed basal tergites (Fig. 1); median lobe of aedeagus with strongly arched tubus in lateral view, apical part narrowly elongate, base with strong triangular projection (Fig. 9); apical lobe of paramere small (Fig. 10); male tergite eight transverse and truncate apically, antecostal suture approximately straight (Fig. 11); male sternite eight transverse with rounded apicomedian projection, antecostal suture sinuate (Fig. 12); spermatheca with club-shaped capsule and sinuate stem (Fig. 13); female tergite eight transverse and truncate apically, antecostal suture pointed medially (Fig. 14); sternite eight transverse and broadly rounded apically, antecostal suture sinuate and pointed medially (Fig. 15).

**Distribution**

*Crataraea suturalis* is a Palaearctic species recorded from Europe, Asia, North Africa, Iceland, and North America (Benick and Lohse 1974; Horion 1967; Smetana 2004). Moore and Legner (1975) provided records of this species from Virginia, South Carolina, and Missouri and an unspecified record from Canada. Seevers (1978) reported this species as widely distributed in North America: Vermont, Massachusetts, Pennsylvania, Illinois, Iowa, and California. Downie and Arnett (1996) provided an additional record from Indiana. In this paper, we record this species for the first time from several localities in Canada ranging from Nova

**Figs. 1–5.** Aleocharine beetles: 1, *Crataraea suturalis*; 2, "*Meotica pallens*"; 3, *Atheta longicornis*; 4, *Atheta vestita*; and 5, *Dalotia coriaria*. Apical part of abdomen (Figs. 1, 3, 4) and legs removed.



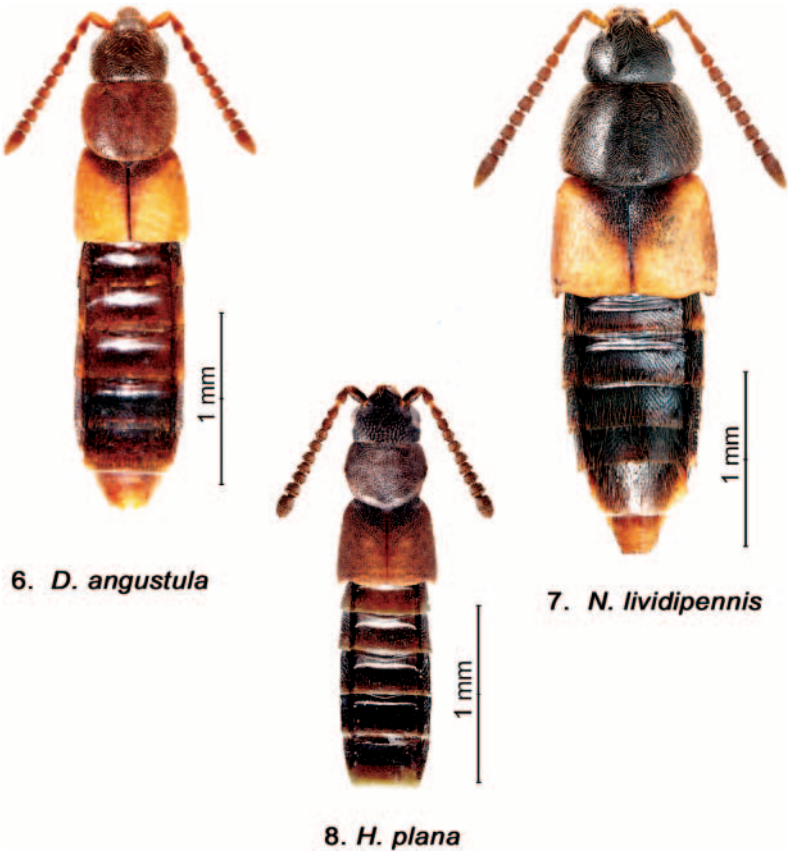

Scotia to Saskatchewan and British Columbia. The British Columbia and Nova Scotia records may represent independent introductions.

## Bionomics

The species is capable of flight and has been reported from a wide range of habitats, most of them synanthropic or related to nests, such as heaps of straw, haystacks, stables, barns, pigeon dung, rotting mushrooms, rotting tree trunks with ants, and occasionally forest leaf litter and other natural habitats (Horion 1967).

Sable Island, where this species has been found, is a 45 km long sand bar located near the edge of the continental shelf, 160 km from the nearest point of land. Its fauna includes a very large suite of adventive insects. Forty-five of the 148 species of Coleoptera recorded there (30%) are of Palaearctic origin, including 13 species of Staphylinidae (Howden *et al.* 1970; Wright 1989). Agricultural activity commenced there in 1553 when Portuguese fishermen arrived with cattle and pigs, and there has been much deliberate and accidental importation of plants and livestock, particularly since permanent habitation began in 1801. Consequently, many synanthropic beetles have been introduced there, including *Ptinus fur* (L.) and *P. ocellus* Brown (Anobiidae); *Cryptophagus fallax* Balfour-Browne (Cryptophagidae); *Otiorhynchus ovatus* (L.) and *O. sulcatus* (Fabr.) (Curculionidae); *Dermestes lardarius* L. (Dermestidae);

**Figs. 6–8.** Aleocharine beetles: 6, *Dinaraea angustula*; 7, *Nehemitropia lividipennis*; and 8, *Homalota plana*. Apical part of abdomen (Fig. 8) and legs removed.




*Mycetaea subterranea* (Fabr.) (Endomychidae); *Cercyon haemorrhoidalis* (Fabr.), *C. pygmaeus* (Illiger), and *Cryptopleurum minutum* (Fabr.) (Hydrophilidae); *Dienerella ruficollis* (Marsham) and *Thes bergrothi* (Reitter) (Latridiidae); *Aphodius fimentarius* (L.), *A. subterraneus* (L.) (Scarabaeidae), and *Orzaephilus mercator* (Fauvel) (Silvanidae); and *Creophilus maxillosus* (L.), *Quedius mesomelinus* (Marsham), *Bisnius sordidus* (Gravenhorst), *Philonthus cruentatus* (Gmelin), *P. debilis* (Gravenhorst), *P. politus* (L.), and *P. varians* (Paykull) (Staphylinidae). *Crataraea suturalis* appears to be another member of this suite of insects, possibly introduced directly from Europe because the species is not otherwise present in Atlantic Canada.

The principal habitats for *C. suturalis* are decaying organic matter such as horse dung and carrion (dead fish, seabirds, sea mammals, and horses), which can be found in abundance on Sable Island.

## "*Meotica pallens* (Redtenbacher)"

(Figs. 2, 16–22)

*Homalota pallens* Redtenbacher 1849: 662.
As *Meotica*: Bernhauer and Scheerpeltz 1926: 741; Benick and Lohse 1974: 249; Gusarov 2002: 85; Smetana 2004: 469.

### Material examined

**CANADA. Ontario:** East Ottawa, Mer Bleue bog, 15.xi.1981, *ex* muskrat nest, A. Davies and J. Klimaszewski (LFC) 1 male, 1 female, 5 sex?. **British Columbia:** Vancouver Island, 21 km SW Campbell River, 49°51′55″N, 125°27′51″W, 29.vi–9.vii.1996, Balsam Cr. LT 1-M 31 (LFC) 1 male.

### Diagnosis

"*Meotica pallens*" is externally similar to the Palaearctic *M. exilis* (Gravenhorst) and other congeners from which it can be readily distinguished by the differently shaped median lobe of the aedeagus (Figs. 16, 23) and the shape of

the spermatheca (Figs. 20, 24). It may be distinguished from other Nearctic aleocharines by the following combination of characters: length 1.3–1.6 mm, body minute, narrowly subparallel with abdomen broadening apically (Fig. 2); light rust-brown (Fig. 2); pubescence fine and sparse, yellowish brown, punctation fine (Fig. 2); head convex with small eyes, almost as wide and as large as pronotum; antennal segments 5–10 extremely transverse (Fig. 2); pronotum approximately as wide as long, broadest in apical third (Fig. 2); elytra subparallel and truncate posteriorly (Fig. 2); abdomen with moderately deeply impressed basal tergites (Fig. 2); median lobe of aedeagus with almost straight tubus in lateral view, apical part broadly triangular (Fig. 16); apical lobe of paramere small and heavily sclerotized (Fig. 17); male tergite eight slightly transverse and truncate apically, antecostal suture arcuate (Fig. 18); male sternite eight slightly transverse and truncate apically, antecostal suture approximately straight (Fig. 19); spermatheca U-shaped, capsule and duct without distinct separation (Fig. 20); female tergite eight elongate and truncate apically, antecostal suture arcuate (Fig. 21); sternite eight elongate and truncate apically, antecostal suture approximately straight (Fig. 22).

**Distribution**

There is considerable confusion about the concept of "*Meotica pallens* (Redtenbacher)" in Europe among various authors (Benick and Lohse 1974; Muona 1991; Smetana 2004). We have followed the concept of this species *sensu* Benick and Lohse (1974) (see discussion under Remarks). Gusarov (2002) provided the first records of *M. palens* (*sensu* Muona 1991) in North America, from Rhode Island and New Jersey. Ours is the first record of this genus and species in Canada. We report this species from Ontario, near Ottawa, and from the vicinity of Campbell River, Vancouver Island, British Columbia.

**Bionomics**

The Ontario specimens were captured from a muskrat nest near a *Sphagnum* bog in mid-October.

**Remarks**

There is a serious problem regarding the concept of "*Meotica pallens* (Redtenbacher)" in Europe; therefore, we have cited the name of this species within quotation marks. The Canadian specimens listed under this name are conspecific with the central European specimens cited as "*M. pallens* (Redtenbacher)" *sensu* Benick and Lohse (1974). According to Muona (1991), "*M. pallens* (Redtenbacher)" is synonymous with *M. lohsei* Benick, *M. hanseni* Scheerpeltz, *M. strandi* Scheerpeltz, and *M. strandi sensu* Muona (1979) but is different from the species listed from central Europe by Benick and Lohse (1974) under the same name. We have retained a tentative name of "*M. pallens* (Redtenbacher)" *sensu* Benick and Lohse for the Canadian specimens pending further studies in Europe.

In North America there are records of another Palaearctic species, *Meotica exilis*, from Maine (Moore and Legner 1975; Seevers 1978; Ashe 2001). According to Muona (1984), the Nearctic specimens identified as *M. exilis* represent a misidentification of *Thecturota* sp., and Muona (personal communication) believes that Ashe's (2001) record was not based on any specimens of *M. exilis* and Smetana's (2004) record is an error. All these records need to be verified in the future to avoid further confusion. Muona (1984) reported *Meotica apicalis* Benick, now a junior synonym of *M. filiformis* (Motschulsky), from California. *Meotica bistrigata* Bernhauer (Bernhauer 1909), described from Pennsylvania, was transferred by Seevers (1978) to the genus *Alisalia* Casey (Casey 1911).

## II. Tribe Athetini Casey

### *Atheta* (*Chaetida*) *longicornis* (Gravenhorst)

(Figs. 3, 25–31)

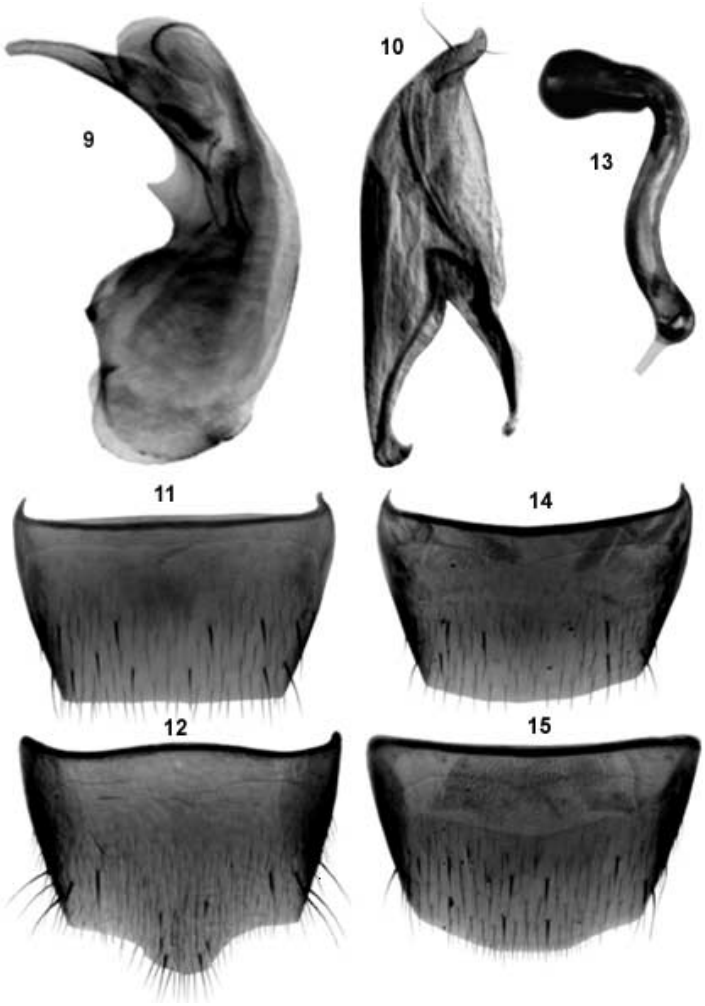
*Aleochara longicornis* Gravenhorst 1802: 87.

As *Atheta* (*Chaetida*): Bernhauer and Scheerpeltz 1926: 669; Benick and Lohse 1974: 215; Muona 1984: 229; Smetana 2004: 378.

**Material examined**

**CANADA. Nova Scotia:** Halifax Co., Burnside, 5.vi.2003, on dead pig, mixed forest, C. Cormier (NSMC) 1 female; Colchester Co., Debert, 18.vii.1995, J. Ogden (NSNR) 1 male. **Quebec:** Saint-Augustin, 3.vii.2002, *ex* cow dung, J. Klimaszewski (LFC) 2 males, 2 females. **UNITED STATES. Minnesota:** Washington Co., Dellwood Grant Twp., 13.vii.1984,

**Figs. 9–15.** Genital structures of *Crataraea suturalis*: 9, median lobe of aedeagus in lateral view; 10, paramere; 11, male tergite eight; 12, male sternite eight; 13, spermatheca; 14, female tergite eight; 15, female sternite eight.

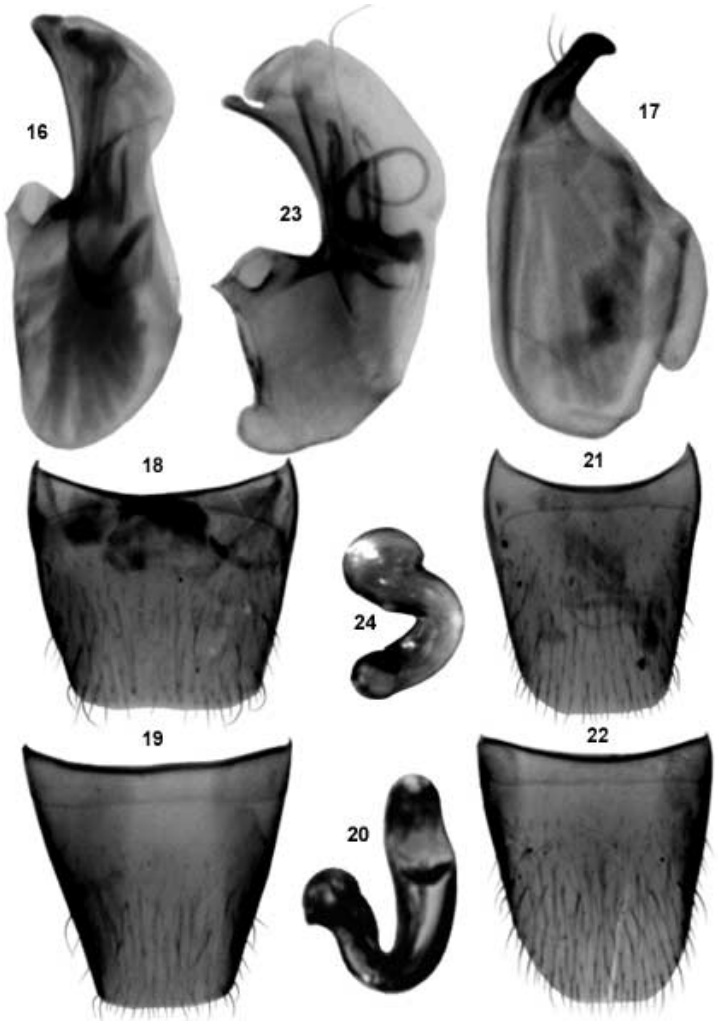



*ex* bovine dung, sample No. 15, V. Cervenka (LFC) 2 sex?.

## Diagnosis

*Atheta longicornis* is externally somewhat similar to some species of the subgenus *Dimetrota* by virtue of body shape and the long setae on the entire body. It may be distinguished from other Nearctic aleocharines by the following combination of characters: body subparallel (Fig. 3), with strong abdominal macrosetae; dark brown to black with yellow-brown or reddish-brown elytra and often apex of abdomen (Fig. 3); pubescence fine and sparse, dark brown to yellowish brown, punctation fine; head convex with moderately sized eyes, about two thirds as wide as pronotum (Fig. 3); elytra subparallel and truncate posteriorly (Fig. 3); abdomen with deeply impressed basal tergites and bearing strong macrosetae; median lobe of aedeagus with short, almost straight tubus in lateral view, apical part broadly rounded (Fig. 25); apical lobe of paramere short and broad (Fig. 26); male tergite eight about as long as wide and truncate apically, with more or less visible shallow emargination, antecostal suture arcuate (Fig. 27); male sternite eight slightly elongate and rounded apically, antecostal suture approximately straight (Fig. 28); spermatheca with club-shaped capsule and long and sinuate stem (Fig. 29); female tergite eight about as wide as long, antecostal suture arcuate (Fig. 30);

**Figs. 16–24.** Genital structures of *Meotica* species. "*Meotica pallens*": 16, median lobe of aedeagus in lateral view; 17, paramere; 18, male tergite eight; 19, male sternite eight; 20, spermatheca; 21, female tergite eight; 22, female sternite eight. *Meotica exilis*: 23, median lobe of aedeagus in lateral view; 24, spermatheca.




sternite eight elongate and truncate apically with small median emargination, antecostal suture arcuate (Fig. 31); male and female tergites and sternites eight bearing strong and long macrosetae. The main external characters that may help in the identification of this species are as follows: *Dimetrota*-shaped body; forebody glossy; elytra yellowish and distinctly contrasting with the blackish remainder of the body; long and massive antennae; and extremely long setae on abdomen, pronotum, elytra, and meso- and metatibia.

## Distribution

*Atheta longicornis* is a Palaearctic species known from Europe, Asia, North Africa, and the Oriental region (Benick and Lohse 1974; Smetana 2004). Muona (1984) recorded this species for the first time in North America from California. We report this species for the first time from Canada (Nova Scotia and Quebec) as an adventive species. It is also recorded from Minnesota in the United States.

## Bionomics

The species is usually found associated with dung and other rotting organic substrates. The North American specimens were captured in cow dung and on carrion. In Burnside, Nova Scotia, a specimen was collected on a dead pig buried within a mixed forest as part of a forensic entomology study (C. Cormier, unpublished

data). This site is immediately adjacent to an industrial park and harbour port facilities. The adventive Palaearctic carabid *Amara communis* (Panzer) was also collected from the same site and the same pig (Majka 2005). The precise mechanism of introduction of these species is unknown, but activities associated with shipping traffic through the harbour are indicated. Mikkola and Lafontaine (1994) proposed that grass turf associated with shipping practices and adhering to shipping containers may have been responsible for the introduction of Palaearctic species of Lepidoptera. Possibly such mechanisms could apply to this introduction of *A. longicornis*, since this site is only 4 km from a major transatlantic container terminal.

## *Atheta* (*Thinobaena*) *vestita* (Gravenhorst)

(Figs. 4, 32–38)

*Aleochara vestita* Gravenhorst 1806: 140.
As *Atheta* (*Thinobaena*): Bernhauer and Scheerpeltz 1926: 660; Benick and Lohse 1974: 217; Smetana 2004: 394.

### Material examined

**CANADA. Nova Scotia:** Digby Co., Brier Island, Pond Cove, 22.vi.2003, rocky shore pitfall trap, J. Ogden, K. Goodwin (NSNR) 1 female. **New Brunswick:** Albert Co., Shepody N.W.A., 45°72′50″N, 64°66′51″W, 31.v.2004, in drift material (grass litter), on upper margin of sea beach, R.P. Webster (LFC) 1 male, 1 female, (RPWC) 1 male; Saint John, Dipper Harbour, Chance Harbour, decaying sea wrack on beaches (RPWC) 4 sex?.

### Diagnosis

*Atheta vestita* may be distinguished from other Nearctic aleocharines by the following combination of characters: length 3.5–4.0 mm, body narrowly elongate (Fig. 4), head and pronotum distinctly narrower than elytra and abdomen, abdomen broadly arcuate laterally and broadest at mid-length (Fig. 4); uniformly dark brown with paler legs and basal antennal segment (Fig. 4); pubescence fine and sparse, dark brown to light brown, punctation fine; integument with strong isodiametric microsculpture; head convex with moderately sized eyes, about as wide as pronotum; antennal segments 5–10 moderately transverse (Fig. 4); pronotum two thirds as wide as elytra (Fig. 4); elytra subparallel and truncate posteriorly (Fig. 4); abdomen with deeply impressed basal tergites; median lobe of aedeagus with broadly arcuate tubus in lateral view, apical part narrow and rounded (Fig. 32); apical lobe of paramere short and moderately broad (Fig. 33); male tergite eight transverse, truncate apically, antecostal suture approximately straight (Fig. 34); male sternite eight transverse and rounded apically, antecostal suture arcuate (Fig. 35); spermatheca with short capsule and long and sinuate stem (Fig. 36); female tergite eight transverse, apex broadly rounded, antecostal suture approximately straight (Fig. 37); sternite eight transverse with median emargination, antecostal suture arcuate (Fig. 38).

### Distribution

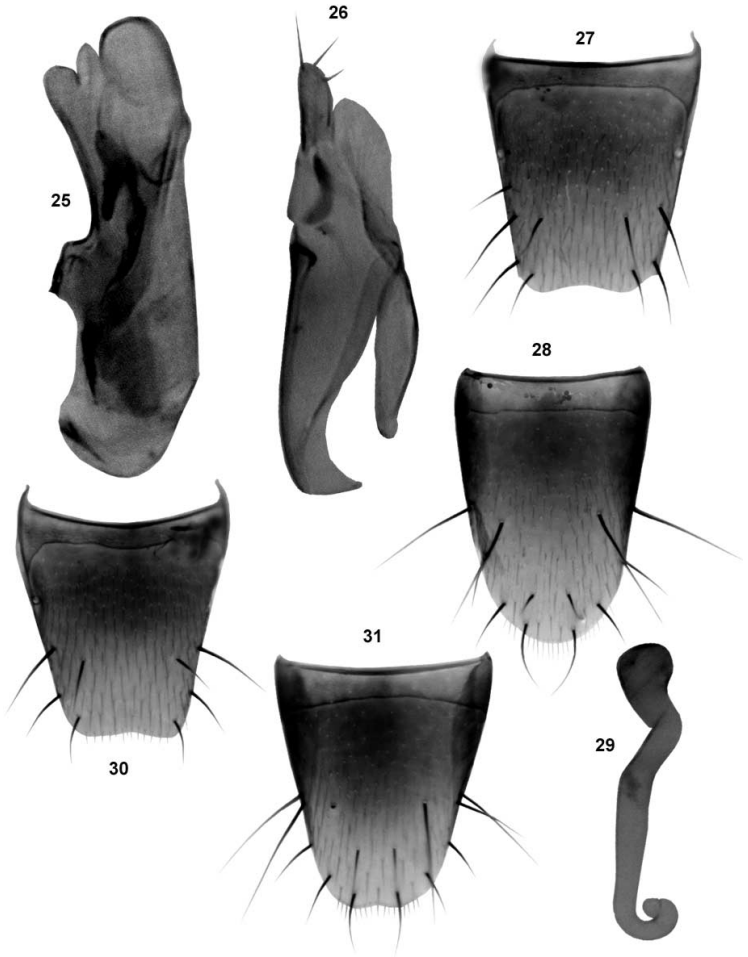
*Atheta vestita* is a Palaearctic species known from Western Europe (Benick and Lohse 1974; Smetana 2004). It is here reported for the first time from North America, from New Brunswick (Mary's Point) and Nova Scotia (Brier Island), Canada. It is an adventive species in North America that may have been introduced with drift material.

### Bionomics

*Atheta vestita* was captured in decaying sea wrack on beaches and in drift material consisting of grass litter and amongst cobbles on the upper margin of an ocean beach. These are the same sites and the same habitat occupied by the recently described native species *Atheta* (*Datomicra*) *acadiensis* Klimaszewski and Majka (Klimaszewski and Majka 2007). Brier Island and the Shepody National Wildlife Area are located on the Bay of Fundy. This beach-drift microenvironment will be discussed later in some detail by Klimaszewski and Majka. While the preponderance of beetles that occupy this specialized microenvironment are native, adventive species such as the staphylinid *Leptacinus intermedius* Donisthorpe are found in this environment at the New Brunswick site.

The Shepody National Wildlife Area in New Brunswick, which includes the Mary's Point peninsula, was first settled by Acadians in the 1740s and later by British Loyalists in the 1780s. It was the location of an important stone quarry throughout the 19th century, with stone being shipped to many localities, and was adjacent to a shipbuilding site from the 1850s until 1899. These successive waves of settlement and

**Figs. 25–31.** Genital structures of *Atheta longicornis*: 25, median lobe of aedeagus in lateral view; 26, paramere; 27, male tergite eight; 28, male sternite eight; 29, spermatheca; 30, female tergite eight; 31, female sternite eight.




the extensive maritime traffic at the locality could have provided many opportunities for the introduction of *A. vestita*. Similar factors may apply to Brier Island (7 km × 3 km), which was first visited and described by Champlain and DeMonts in 1604. Westport, the only town on the island, has an excellent harbour and in the 19th century was one of the foremost fishing stations in western Nova Scotia (Wilson 1900). Commercial fishing traffic to this area could have been responsible for the introduction of this species.

## *Dalotia coriaria* (Kraatz)

(Figs. 5, 39–45)

*Homalota coriaria* Kraatz 1856: 282.

As *Atheta* (s. str.): Bernhauer and Scheerpeltz 1926: 640; Strand and Vik 1964: 330; Moore and Legner 1975: 357; Muona 1984: 230; Klimaszewski and Peck 1986: 239.

As *Atheta* ("Mischgruppe I"): Benick and Lohse 1974: 202.

As *Atheta*: Sivasubramaniam *et al.* 1997: 208.

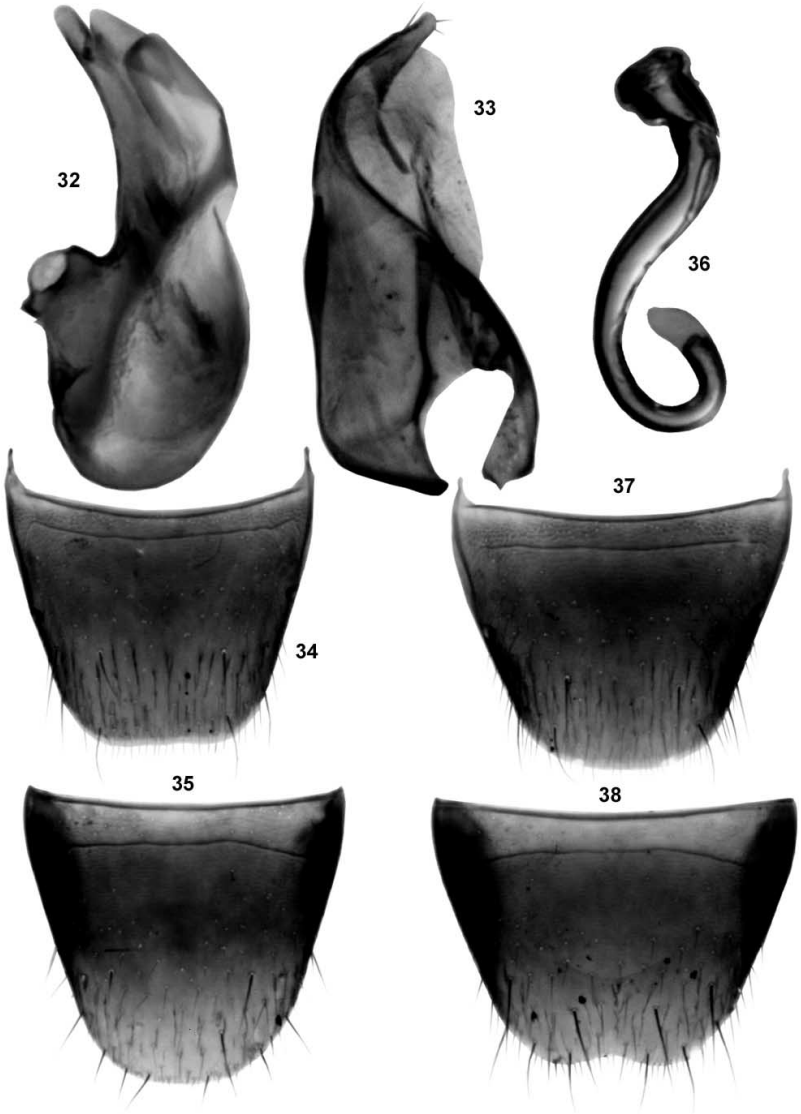
As *Xenota*: Seevers 1978: 247.

As *Dalotia*: Gusarov 2003: 89 (extended list of synonyms).

### Material examined

**CANADA. Alberta:** F.I.S. [Forest Insect Survey] 45 mi. SW Grande Prairie, 3.ix.1965, *Larix laricina*, 65A 1222–01 (NoFC) 1 male; same locality data, 24.viii.1965, 65A 1222–01 (NoFC) 1 male, 3 females; same locality data, 26.viii.1965, 65A 1222–01 (NoFC) 1 sex?.

**Figs. 32–38.** Genital structures of *Atheta vestita*: 32, median lobe of aedeagus in lateral view; 33, paramere; 34, male tergite eight; 35, male sternite eight; 36, spermatheca; 37, female tergite eight; 38, female sternite eight.




## Diagnosis

*Dalotia coriaria* may be distinguished from other Nearctic aleocharines by the following combination of characters: length 2.1–2.8 mm, body compact, narrowly oval (Fig. 5), head slightly narrower than pronotum (Fig. 5); antennal segments 7–8 strongly transverse (Fig. 5); pronotum glossy, with shallow central impression, transverse and slightly narrower than elytra (Fig. 5); abdomen broadly arcuate laterally and broadest at mid-length (Fig. 5); head and abdomen dark brown and appendages, pronotum, and elytra light reddish brown (Fig. 5); pubescence fine and sparse, dark brown to light brown, punctation fine; head and pronotum with isodiametric microsculpture; abdomen with deeply impressed basal tergites (Fig. 5); median lobe of aedeagus with short and straight tubus in lateral view, apical part broad and rounded (Fig. 39); apical lobe of paramere short and moderately broad (Fig. 40); male tergite eight transverse and with distinct pattern of apical dentation, antecostal suture approximately straight (Fig. 41); male sternite eight transverse and rounded apically, antecostal suture approximately straight (Fig. 42);

spermatheca with spherical capsule subdivided medially, stem short and sinuate (Fig. 43); female tergite eight transverse, apex broadly truncated, antecostal suture approximately straight (Fig. 44); sternite eight transverse with apex broadly rounded, antecostal suture arcuate (Fig. 45).

**Distribution**

*Dalotia coriaria* is a cosmopolitan species that is adventive in many parts of the world, including North America. Sivasubramaniam *et al.* (1997) reported it in carrot fields in New Zealand. Klimaszewski and Peck (1986) recorded it from the Galapagos Islands, and Pace (1999) recorded it from Madagascar. Muona (1984) and Frank (1980) published records of this species from California and Florida. Gusarov (2003) recorded *D. coriaria* from Louisiana, New Jersey, and New York. We report this species for the first time from Canada in Alberta.

**Bionomics**

The species is common in various types of forest leaf litter and rotting organic materials (grass heaps, carrion, mushrooms, under bark, *etc.*). It is frequently collected while on the wing by flight-intercept traps and car nets.

## *Dinaraea angustula* (Gyllenhal)

(Figs. 6, 46–52)

*Aleochara angustula* Gyllenhal 1810: 393.
As *Atheta* (*Dinaraea*): Bernhauer and Scheerpeltz 1926: 623; Moore and Legner 1975: 354.
As *Dinaraea*: Benick and Lohse 1974: 116; Smetana 2004: 398.

**Material examined**

**CANADA. Nova Scotia:** Kings Co., Sheffield Mills, 22.vii.2002, pitfall trap, K. Neal (NSMC) 1 male. **Prince Edward Island:** Harrington, 25.viii.2000, pitfall trap in potato plot, M.E.M. Smith (NSMC) 1 female. **Quebec:** P. Downey, 23.v.1996 and 27.vi.1996, Luminoc 1 (LFC) 1 male, 1 female; Compton Co., Cookshire, SAB, Luminoc 2, 3.vi.1996, 96-3-0242, Downey R. Plantation (LFC) 1 female; same locality data: 13.v.1996, Luminoc 1 (LFC) 1 sex?; 23.v.1996, Luminoc 4 (LFC) 1 sex?; 8.vii.1996, Luminoc 5 (LFC) 1 sex?. **Alberta:** Lacombe, Agriculture Canada Station, 52°28′N, 113°44′W, 20.vii.2001, pitfall group experiment 53, Canada plots, harvested in 2001, July 20-107/119, J. Broatch (LFC) 2 females.

**Diagnosis**

*Dinaraea angustula* may be distinguished from other Nearctic aleocharines by the following combination of characters: length 3.0–3.7 mm, body narrowly subparallel (Fig. 6), head slightly narrower than pronotum (Fig. 6); antennal segments 7–10 moderately transverse (Fig. 6); pronotum transverse, about one fifth wider than long and slightly narrower than elytra (Fig. 6); abdomen subparallel (Fig. 6); head, pronotum, and abdomen dark brown, elytra yellow – light brown and appendages light brown (Fig. 6); punctation on forebody fine and dense (Fig. 6); pubescence fine, moderately dense, dark brown to light brown (Fig. 6); integument with distinct isodiametric microsculpture; abdomen with deeply impressed basal tergites (Fig. 6); median lobe of aedeagus with short and straight tubus in lateral view, apical part broad and apex slightly projecting ventrad (Fig. 46); apical lobe of paramere short and moderately broad (Fig. 47); male tergite eight transverse and with distinct pattern of apical dentation, antecostal suture approximately straight (Fig. 48); male sternite eight transverse and rounded apically, antecostal suture approximately straight (Fig. 49); spermatheca with club-shaped capsule and elongate stem, slightly sinuate and looped posteriorly (Fig. 50); female tergite eight transverse, apex broadly truncated, antecostal suture approximately straight (Fig. 51); sternite eight transverse with apex broadly rounded, antecostal suture arcuate (Fig. 52).

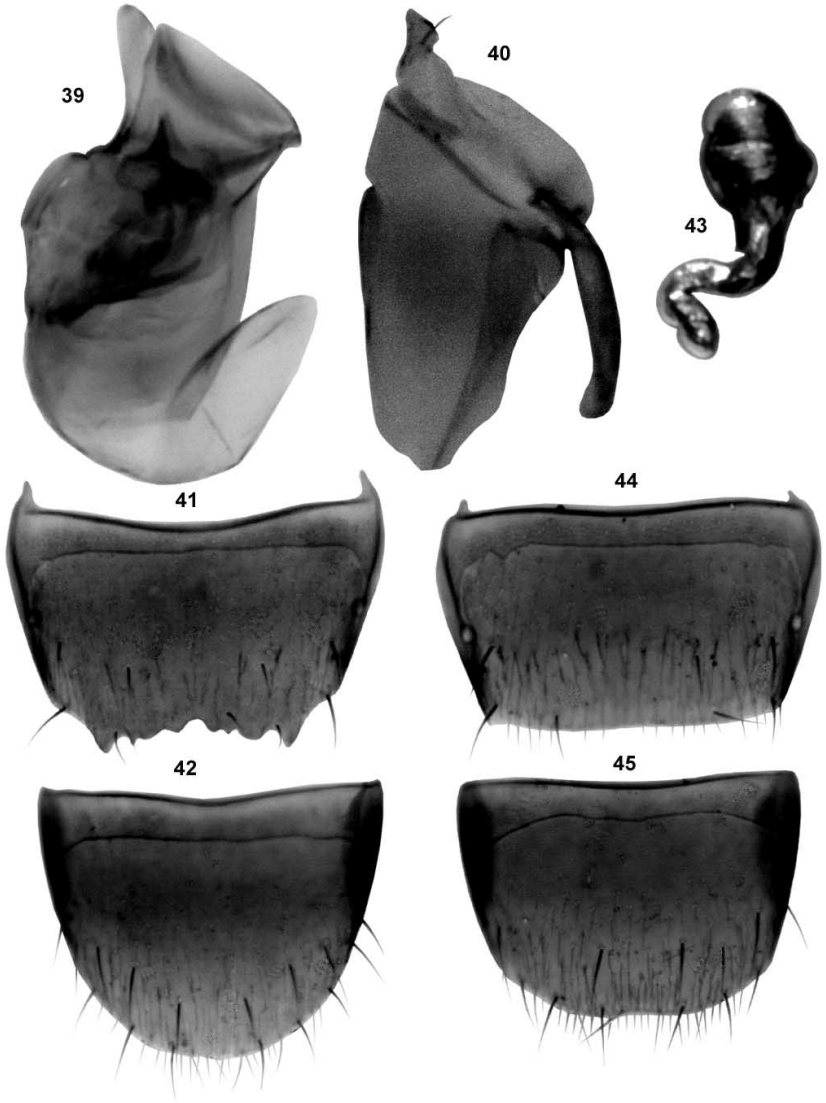
**Distribution**

*Dinaraea angustula* is a Palaearctic species known from Europe and Asia (eastern and western Siberia) (Smetana 2004). Moore and Legner (1975) recorded *D. angustula* from New York, and Muona (1984) recorded it from California. We report this species for the first time from Canada in Nova Scotia, Prince Edward Island, Quebec, and Alberta.

**Bionomics**

In Canada, adults were captured in pitfall and Luminoc® pitfall-light traps. In contrast to most other species of the genus, *D. angustula* is usually not corticolous but is epigeic in mostly unforested habitats, especially arable land. The

**Figs. 39–45.** Genital structures of *Dalotia coriaria*: 39, median lobe of aedeagus in lateral view; 40, paramere; 41, male tergite eight; 42, male sternite eight; 43, spermatheca; 44, female tergite eight; 45, female sternite eight.




specimen from Prince Edward Island was collected in a potato field, while the Nova Scotia record is from a site adjacent to agricultural land. Both sites are situated in areas of intensive agriculture.

**Comments**

Lohse (*in* Lohse *et al.* 1990) described *D. borealis* from a single female in northern Quebec. Females of this genus have less distinctive genital features than males and are less reliable for specific identification. It is possible that *D. borealis* is synonymous with the adventive *D. angustula,* but without males from the type locality it would be difficult to arrive at a definitive conclusion.

## *Nehemitropia lividipennis* (Mannerheim)

(Figs. 7, 53–59)

*Oxypoda lividipennis* Mannerheim 1830: 79.

As *Acrotona sordida* (Marsham): Muona 1984: 230.

As *Nehemitropia sordida* (Mannerheim): Benick and Lohse 1974: 103.

As *Coprothassa sordida* (Marsham): Moore and Legner 1975: 374.

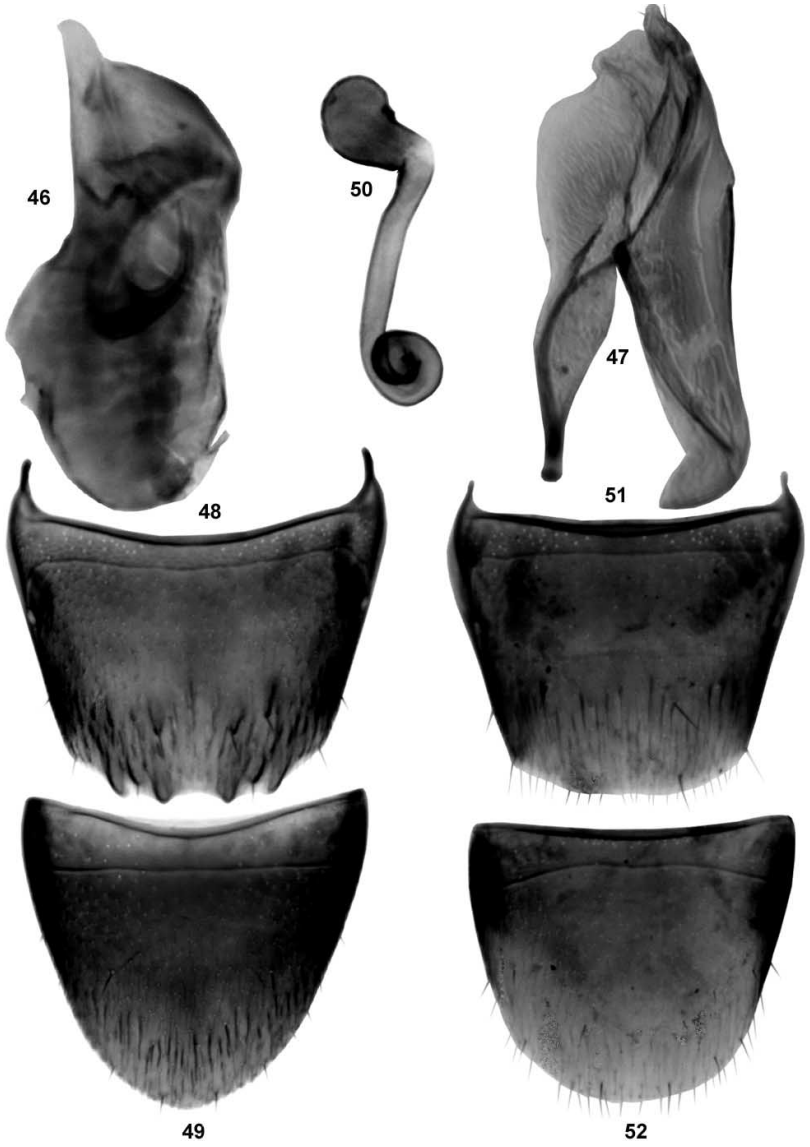
As *Atheta sordida*: Sivasubramaniam *et al.* 1997: 208.

As *Nehemitropia lividipennis*: Smetana 2004: 412 (list of synonyms).

**Material examined**

**CANADA. New Brunswick:** Kouchibouguac N.P. (46°51′30″N, 64°58′30″W), 21.ix.1977, Campbell and Smetana, Code 6013G (CNC) 1 male, 1 female, 5 sex?. **Nova Scotia:** Cumberland Co., Oxford, 13.viii.1988, UV light trap, E. Georgeson (NSPM) 1 sex?. **Prince Edward Island:** Queens Co., Trout River, 28.vi.2003, horse dung, C.G. Majka (CGMC) 1 sex?. **Quebec:** Bergeronnes, sag. (48°20′00″N, 69°35′00″W), 30.ix.1981, Claude Chantal (CNC) 1 male; Cap-Rouge, Portneuf (46°45′05″N, 71°20′40″W), 6.v.1959, J.C. Aubé (CNC) 4 sex?; 3.ix.1973, Claude Chantal (CNC) 1 sex?; Dorval (45°26′50″N, 73°45′15″W), 11–26.ix.1985, abandoned field, baited with rotting artificial insect diet, L. LeSage (CNC) 1 sex?; Gaspé, Mont Jacques-Cartier (48°59′26″N, 65°56′33″W), 24.vii.1985, caribou dung, Génier and Klimaszewski (CNC) 11 sex?; Île Madame, Mont. [?], 16.viii.1960, J.C. Aubé (CNC) 1 sex?; Champlain, Lac Normand [?], 3.ix.1969, Claude Chantal (CNC) 1 female; Montréal (45°31′00″N, 73°39′00″W), 27.viii.1968, 30.ix.1968, 13.x.1968, E.J. Kiteley No. 582 (CNC) 4 sex?; same data except 21.viii.1966, E.J. Kiteley No. 476 (CNC) 1 sex?; 22.vii.1976, horse droppings, E.J. Kiteley (CNC) 1 female; 29.vii.1977, UV light trap, E.J. Kiteley (CNC) 1 sex?; Montréal, Côte-des-Neiges (45°29′00″N, 73°37′00″W), 23.ix.1987, cemetery, A. Smetana (CNC) 7 sex?; Montréal, Mont-Royal (45°31′00″N, 73°39′00″W), 23.ix.1987, rotting vegetation, L. LeSage (CNC) 2 sex?; same data except *ex* detritus, 3 sex?; Sainte-Croix (46°37′00″N, 71°44′00″W), 22.viii.1964, J.C. Aubé (CNC) 1 sex?; Saint-Gédéon (48°30′00″N, 71°46′00″W), 19.x.1968, Claude Chantal (CNC) 1 male, 2 females; Venise P.O., 45°45′N, 73°08′W, ix.1972, Dondale and Redner (CNC) 1 sex?. **Ontario:** Britannia Hts. (45°21′00″N, 75°48′00″W), 17.ix.1957, S.D. Hicks (CNC) 2 sex?; Hamilton (44°03′00″N, 78°14′00″W), 18.vi.1980, 1.vi–28.vii.1981, M. Sanborne (CNC) 2 sex?; Marmora (44°32′00″N, 77°40′00″W), 31.vii.1952, J.R. Vockeroth (CNC) 1 sex?; Ottawa (45°16′00″N, 75°45′00″W), 12.ix.1912, (CNC) 1 sex?; vi.1970, E.C. Becker (CNC) 1 sex?; 2.vii.1982, cattle dung, L. LeSage (CNC) 4 sex?; Ottawa-Beaulieu (44°22′00″N, 75°57′00″W), 7.vii.1912, 15.viii.1912, (CNC) 2 sex?; Ottawa-Kanata (45°18′00″N, 75°55′00″W), 25.v.1979, A. and Z. Smetana (CNC) 13 sex?; Prince Edward Co. (44°00′00″N, 77°15′00″W), 6.iv.1919, 3.x.1921, 24.x.1926, 30.iii.1952, J.F. Brimley (CNC) 10 sex?; Rondeau Pk. (42°19′00″N, 81°51′00″W), 2–13.vii.1985, in open marsh, Int. Trap 1, L. LeSage and A. Woodliffe (CNC) 2 sex?; same data except 7–19.viii.1985, 1 sex?; 14.vi–2.vii.1985, 1–9.viii.1985, in maple beech forest, Int. Trap 2, 1 female, 2 sex?; 13–22.vii.1985, 9.viii.1985, at edge of oak forest, Int. Trap 3, 2 sex?; 2–13.vii.1985, 6–14.vi.1985, 13–22.vii.1985, 22–31.vii.1985, 1–9.viii.1985, 9–17.viii.1985, 1–5.ix.1985, on sandy beach at edge of oak forest, Int. Trap 5, 3 males, 3 females, 23 sex?; 15.vii.1985, P.A. Woodliffe (CNC) 1 sex?. **UNITED STATES. Massachusetts** (bounding coordinates: long –73.68 lat 41.06; long –69.75 lat 43.07): Northampton, 7.vi.1969, 30.vi.1971, G.J. Kiteley, Nos. 582, 655 (CNC) 2 sex?; same data except 7.viii.1973, E.J. Kiteley, 1 sex?; 1.ix.1980, sifting pile of dead grass, E.J. Kiteley, No. 829, 1 sex?. **Minnesota:** Elk River (long –93.5669 lat 45.3039), 15.viii.1959, E.J. Kiteley, No. 217 (CNC) 1 sex?. **New Mexico:** Alomogordo [?], 6 mi. E, 6000′, 23.vii.1973, J.M. Campbell (CNC) 1 sex?. **Nebraska:** Colfax Co. (bounding coordinates: long –97.27 lat 41.36; long –96.88 lat 41.76), 4 mi. W, 4 mi. S of Schuyler, 28.ii.1992, under board in pasture close to water's edge, D. Schmidt (CNC) 1 sex?. **New York:** Chautauqua Co. (bounding coordinates: long –79.8 lat 41.96; long –79.02 lat 42.75), iii.1968, 17.iv.1969, *ex* nest of *Microtus pennsylvanicus*, A.H. Benton (CNC) 10 sex?; Chautauqua Co., Lake Shore, Sheriden [?], ii.1968, *ex* nest of *Microtus pennsylvanicus*, A.H. Benton (CNC) 5 sex?; Lake Shore [?], 1.iv.1968, *ex* nest, *M. pennsylvanicus*, A.H. Benton (CNC) 1 sex?; same data except Rt. 5, 13 sex?. **Pennsylvania:** Fulton Co. (bounding coordinates: long –78.41 lat 39.7; long –77.84 lat 40.19), Cowan Gap St. Pk., 26–28.v.1981, oak forest, UV trap, S. Peck (CNC) 1 sex?. **Vermont:** Westmore (long –72.0553 lat 44.7714), 18.viii.1964, E.J.

**Figs. 46–52.** Genital structures of *Dinaraea angustula*: 46, median lobe of aedeagus in lateral view; 47, paramere; 48, male tergite eight; 49, male sternite eight; 50, spermatheca; 51, female tergite eight; 52, female sternite eight.




Kiteley, No. 98 (CNC) 1 sex ?; Nos. 261, 262 (CNC) 2 sex?.

## Diagnosis

*Nehemitropia lividipennis* may be distinguished from other Nearctic aleocharines by the following combination of characters: length 3.0–3.8 mm, body narrowly oval (Fig. 7), head nearly half as wide as pronotum (Fig. 7); antennal segments 5–10 quadrate or slightly elongate (Fig. 7); pronotum transverse, about one third wider than long and slightly narrower than elytra (Fig. 7); abdomen tapering posteriorly (Fig. 7); head, pronotum, and abdomen dark brown, elytra yellow – light brown with dark brown area near scutellum, appendages light brown (Fig. 7); punctation on forebody fine and dense (Fig. 7); pubescence fine, moderately dense, dark brown to light brown (Fig. 7); integument of forebody with indistinct microsculpture; abdomen with deeply impressed basal tergites (Fig. 7); median lobe of aedeagus with long and sinuate tubus in lateral view, apical part rounded (Fig. 53); apical lobe of

paramere moderately long and narrowed apically, bearing long apical macrosetae (Fig. 54); male tergite eight about as long as wide, apex slightly emarginated, antecostal suture approximately straight (Fig. 55); male sternite eight elongate and rounded apically, antecostal suture slightly sinuate (Fig. 56); spermatheca with small, irregularly shaped capsule and broad, S-shaped stem (Fig. 57); female tergite eight about as long as wide, apex slightly emarginate, antecostal suture approximately straight (Fig. 58); sternite eight slightly elongate with apex emarginated, antecostal suture sinuate (Fig. 59). Tergites and sternites eight of both sexes bearing strong macrosetae. *Nehemitropia lividipennis* bears superficial resemblance to some species of *Oxypoda*, *e.g.*, *O. convergens* Casey, but it may be readily separated from this and other species especially by its yellowish-brown and very compact antennae with almost contiguous and cylindrical segments and by the relatively shorter metatarsomere I, which is shorter than the combined length of metatarsomeres I and II in other species.

**Distribution**

*Nehemitropia lividipennis* is a cosmopolitan species known from the Palaearctic region: Europe, North Africa, Asia (Smetana 2004), New Zealand (Sivasubramaniam *et al.* 1997), and North America (New York, Michigan, Louisiana, Texas, California, and an unspecified record from Canada) (Moore and Legner 1975). We report this species for the first time from New Brunswick, Nova Scotia, Prince Edward Island, Quebec, and Ontario in Canada, and from Massachusetts, Pennsylvania, Vermont, Minnesota, Nebraska, and New Mexico in the United States.

**Bionomics**

In North America, adults of *N. lividipennis* were captured in an open abandoned field using traps baited with artificial insect diet, in unspecified organic debris, in dead grass, in caribou, horse, and cattle dung, in intercept traps set in open marsh, maple–beech forest, and the edge of oak forest, under a board in open pasture, in a nest of *Microtus pennsylvanicus* (Ord), and in a UV trap.

## III. Tribe Homalotini Heer

### *Homalota plana* (Gyllenhal)

(Figs. 8, 60–68)

*Aleochara plana* Gyllenhal 1810: 402.
As *Homalota*: Benick and Lohse 1974: 38; Moore and Legner 1975: 434; Seevers 1978: 167; Smetana 2004: 448.

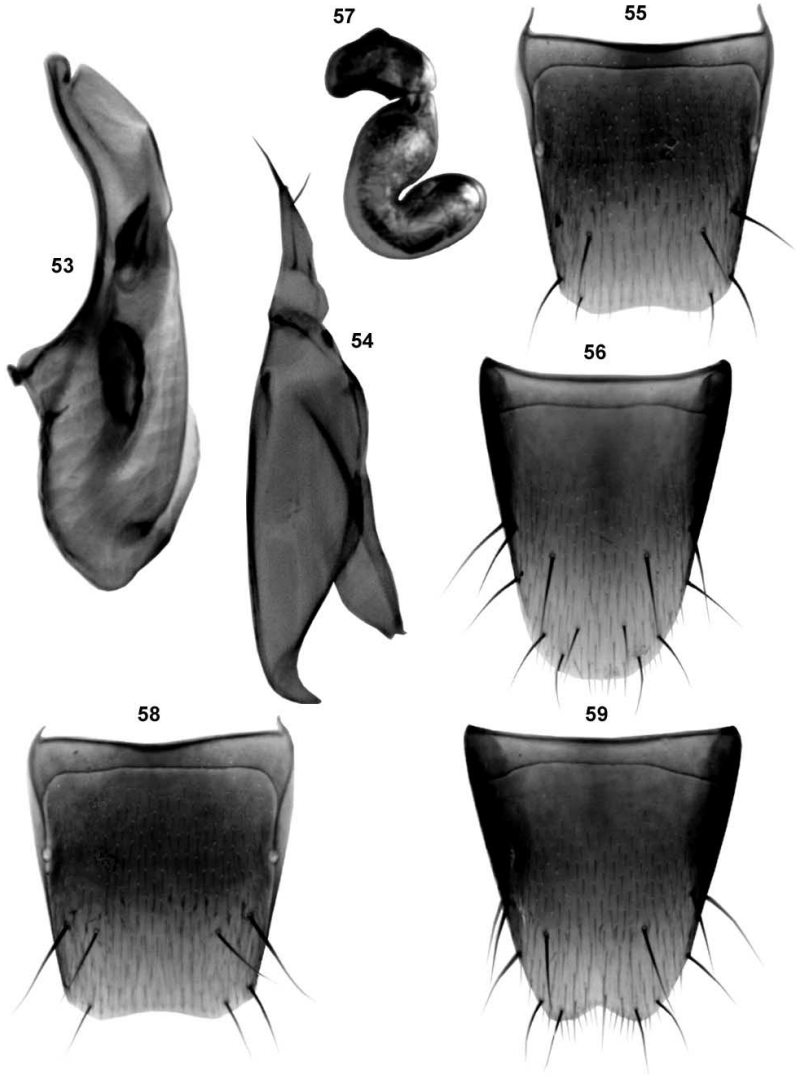
**Material examined**

**CANADA. Nova Scotia:** Point Pleasant Park, Halifax Co., 27.iii.2002, 20.iv.2002, 4.v.2002, 1.xii.2002, 30.iii.2003 (3 specimens), under bark: *Pinus strobus*, C.G. Majka, CGMC; Point Pleasant Park, Halifax Co., 4.v.2002, under bark: *Picea rubens*, C.G. Majka, CGMC. **New Brunswick:** Carleton Co., Richmond, near Hovey Hill Protected Area, 46.1155°N, 67.7631°W, 10.v.2005, clear-cut (mixed forest), under bark of *Populus* sp., R.P. Webster (LFC) 1 male.

**Diagnosis**

*Homalota plana* may be distinguished from other Nearctic aleocharines by the following combination of characters: length 3.0–3.3 mm, body flattened, narrowly subparallel (Fig. 8), head almost as wide as pronotum (Fig. 8); antennal segments 5–10 transverse (Fig. 8); pronotum transverse, broadest in apical third, slightly narrower than elytra (Fig. 8); abdomen broadly arcuate laterally (Fig. 8); body uniformly dark brown with appendages and central part of elytra slightly paler and appearing rust-brown; punctation on forebody coarse and dense (Fig. 8); pubescence fine, dense, dark brown to light brown (Fig. 8); integument of forebody with strong isodiametric microsculpture; abdomen with deeply impressed basal tergites (Fig. 8); median lobe of aedeagus with moderately long and almost straight tubus in lateral view, apex slightly hooked (Fig. 60); apical lobe of paramere broad and bearing two long subapical macrosetae (Figs. 61, 62); male tergite eight transverse, apex slightly emarginated, subapical part weakly sclerotized and forming lighter area, antecostal suture approximately straight (Fig. 63); male sternite eight transverse and rounded apically, antecostal suture slightly sinuate (Fig. 64); spermatheca with tubular, sac-shaped capsule (Figs. 65, 66); female tergite eight transverse, apex truncate, antecostal suture approximately straight

**Figs. 53–59.** Genital structures of *Nehemitropia lividipennis*: 53, median lobe of aedeagus in lateral view; 54, paramere; 55, male tergite eight; 56, male sternite eight; 57, spermatheca; 58, female tergite eight; 59, female sternite eight.




(Fig. 67); sternite eight transverse with apex rounded, antecostal suture sinuate and pointed medially (Fig. 68).

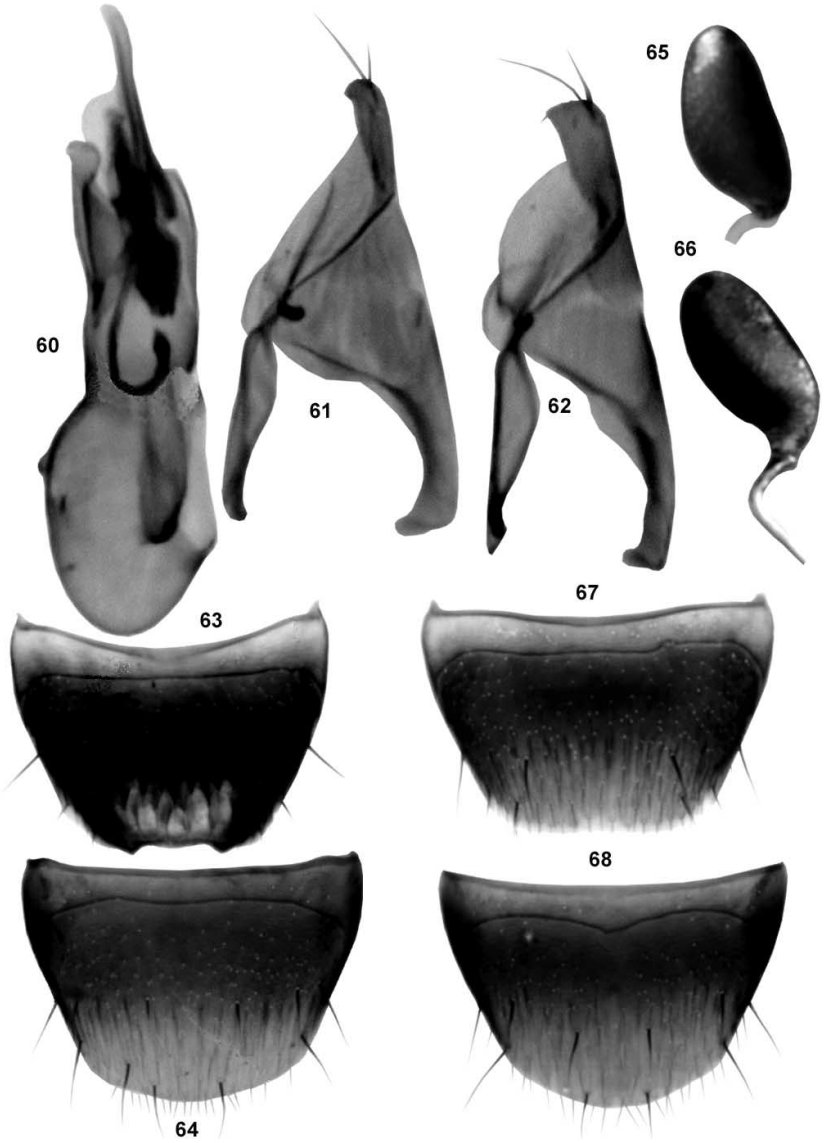
## Distribution

*Homalota plana* is a Palaearctic species recorded from Europe, North Africa, Asia (including eastern and western Siberia), and North America (Smetana 2004). Moore and Legner (1975) reported it from the following states in the United States: Alaska, Washington, Idaho, California, Arizona, New York, Florida, Indiana, and Texas. Majka and Klimaszewski (2004) and Klimaszewski *et al.* (2004) reported it from Nova Scotia without drawing attention to the fact that these specimens represented the first records for Canada. We also report this species from New Brunswick.

## Bionomics

*Homalota plana* regularly co-occurs under the bark of white pine, *Pinus strobus* L., with the rove beetles *Leptusa jucunda* Klimaszewski and Majka and *Phloeocharis subtilissima* in Point Pleasant Park, Nova Scotia. Adults are present in the subcortical environment during late fall, winter, and early spring (1 December to 4 May). On sunny days during the winter this

**Figs. 60–68.** Genital structures of *Homalota plana*: 60, median lobe of aedeagus in lateral view; 61, 62, paramere; 63, male tergite eight; 64, male sternite eight; 65, 66, spermatheca; 67, female tergite eight; 68, female sternite eight.




environment rapidly warms, and adults are active under the bark. The suite of co-occurring beetles and the bionomics of this group are discussed more fully in Majka and Klimaszewski (2004) and Klimaszewski *et al.* (2004).

It is also worth noting, in relation to possible modes of introduction, that *H. plana* is found in Point Pleasant Park in the company of *P. subtilissima*, *Cephennium gallicum* Ganglbauer (Scydmaenidae), *Dromius fenestratus* (Fabr.) (Carabidae), *Tetropium fuscum* (Fabr.) (Cerambycidae), and *Scymnus suturalis* Thunberg (Coccinellidae); all are adventive Palaearctic species associated with conifers and (or) subcortical coniferous environments. All of these species, with the possible exception of *S. suturalis*, are known to have been introduced into North America through the port of Halifax. Majka and Klimaszewski (2004) proposed that they may have been introduced to the continent in association with the planting of tree-nursery stock. Prior to 1965, quarantine restrictions on the import of soil into Canada were not in effect, so nursery stock imported from Europe

could have had insects in the soil (Spence and Spence 1988). *Homalota plana* may have arrived in Nova Scotia in this way.

In New Brunswick, one specimen was captured from under the bark of *Populus* sp. in a clear-cut of mixed forest.

## Discussion

Atlantic Canada, where many of these new records originate, has long been recognized as a point of entry for many exotic species of beetles into North America. Brown (1940, 1950, 1967) reported 76 Palaearctic species from Atlantic Canada and Lindroth (1954, 1955, 1957, 1963) treated this topic extensively and reported many species of Palaearctic Carabidae. Hoebeke and Wheeler (1996*a*, 1996*b*, 2000, 2003), Wheeler and Hoebeke (1994), Johnson (1990), Majka and Klimaszewski (2004), and Majka *et al.* (2006) have reported many additional adventive species and new ones continue to be found.

Despite the extensive interest in exotic species, relatively little attention has been paid to adventive Staphylinidae, and even less to the Aleocharinae. Consequently the present work seeks in some measure to address this imbalance. It is becoming increasingly clear that, as is the case with better-investigated groups (Carabidae, Coccinellidae, Chrysomelidae, Curculionidae), there are many adventive aleocharines that have been introduced into Canada, particularly in the Atlantic region. Recent concerns and eradication programs with respect to invasive, adventive Coleoptera such as *T. fuscum*, *Popillia japonica* Newman (Scarabaeidae), and *Meligethes viridescens* (Fabr.) (Nitidulidae) in the Maritime Provinces indicate the need for ongoing monitoring programs to ensure that adventive species can be recognized and detected and that their spread can be monitored.

The impact of exotic aleocharines on native biota has not been investigated. However, there is the possibility of competition with native species resulting in negative consequences. In general, the environmental impact of non-native arthropods has received little attention compared with the economic impact of plant pests. The presence of at least 300 species of arthropods (mainly Coleoptera) and spiders in epigeic communities in Canada suggests that the chances of negative consequences for native fauna are high. Assessment of the environmental impact of non-native biota, especially arthropods, requires some focused attention in Canada to understand the implications for native biodiversity.

Finally, we stress the importance of taxonomic research for addressing issues concerning exotic species. As many species inadvertently introduced into Canada have close relatives within our native fauna, it is difficult or impossible for non-specialists to identify exotic introductions as such because appropriate identification tools, *e.g.*, keys and illustrations, are not available or are difficult to obtain. Detection and identification of exotic species require the expertise of professional taxonomists with specialized knowledge of our native fauna and some familiarity with related taxa in other regions of the world. The accurate and rapid identification of exotic biota to species level allows one to readily tap into the available global information resources to retrieve information that is relevant to assessing the risk to Canadian resources.

## Acknowledgements

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## Appendix A

Table A1 lists adventive or presumably adventive aleocharine beetles recorded from Canada, with references to the relevant provinces. Species newly reported in Canada in this paper are listed in bold. The United States records are not included in this table. Records of *Atheta sodalis* (Erichson) from North America need verification and are probably a misidentification of native *Atheta ventricosa* Bernhauer. Species marked with [?] may be either Palaearctic and adventive in Canada or Holarctic in distribution; they represent unsolved cases at the moment owing to insufficient distribution records in Canada. Species status in Canada: uncertain means that isolated records have not been confirmed by subsequent citations and the species was not examined by the authors of this paper; established means that the species has been confirmed in Canada by several citations or that it was examined by the authors of this paper from several localities in sufficient numbers.

Appendix continues on the following page.

**Table A1.** List of adventive or presumably adventive aleocharine beetles recorded from Canada.

| Tribe and species | Province | Region of origin |
|---|---|---|
| **Gymnusini Heer** | | |
| *Gymnusa brevicollis* (Paykull) | Que., Newfoundland | Palaearctic |
| **Aleocharini Fleming** | | |
| *Aleochara* (*Coprochara*) *bilineata* Gyllenhal | Newfoundland, P.E.I., N.S., N.B., Que., Ont., Man., Alta., B.C. | Palaearctic |
| *Aleochara* (*Xenochara*) *fumata* Gravenhorst | N.S., N.B., P.E.I., Que., Ont., Man., Alta., Y.T., B.C. | Palaearctic |
| *Aleochara* (s. str.) *curtula* (Goeze) | N.S., Newfoundland, N.B., Que., Ont., B.C. | Palaearctic |
| *Aleochara* (*Xenochara*) *lanuginosa* (Gravenhorst) | Newfoundland, Que., Ont., Alta., B.C. | Palaearctic |
| *Aleochara* (s. str.) *lata* Gravenhorst | Ont., Man., Sask., Y.T., B.C. | Palaearctic |
| *Aleochara* (*Xenochara*) *tristis* Gravenhorst | N.B., Que. | Palaearctic |
| *Aleochara* (*Calochara*) *villosa* Mannerheim | Alta., B.C. | Palaearctic |
| *Tinotus morion* Gravenhorst | N.B., Que., Ont., Alta., B.C. | Palaearctic |
| **Oxypodini Thomson** | | |
| *Crataraea suturalis* (Mannerheim) | N.S., Sask., B.C. | |
| *Ilyobates bennetti* Donistorphe | Que. | Palaearctic |
| ***"Meotica pallens* (Redtenbacher)"** | Ont., B.C. | Palaearctic |
| *Devia prospera* (Erichson) [?] | Labrador, Ont., Man., Alta., B.C. | Uncertain (Holarctic or Palaearctic and adventive in Canada) |
| *Oxypoda opaca* (Gravenhorst) | N.S., Ont. | Palaearctic |
| *Oxypoda operta* Sjöberg | N.S., Que., Ont., Alta | Palaearctic |
| *Oxypoda brachyptera* (Stephens) | N.B., Que., Ont. | Palaearctic |
| **Athetini Casey** | | |
| *Acrotona aterrima* Gravenhorst | Canada (no specified locality or province) | Palaearctic |
| *Amischa analis* (Gravenhorst) | Newfoundland, N.B. | Palaearctic |
| ***Dalotia coriaria* (Kraatz)** | Alta. | Palaearctic |
| *Atheta* (*Datomicra*) *celata* (Erichson) | N.S. | Palaearctic |
| *Atheta* (*Datomicra*) *dadopora* Thomson [?] | Newfoundland, N.B. | Uncertain (Holarctic or Palaearctic and adventive in Canada) |
| *Atheta euryptera* (Stephens) | Canada (no specified locality or province) | Palaearctic |
| ***Atheta* (*Chaetida*) *longicornis* (Gravenhorst)** | N.S., Que. | Palaearctic |
| *Atheta* (*Dimetrota*) *picipennis* (Mannerheim) | B.C. | Nearctic or Palaearctic (adventive or Holarctic) |
| *Atheta* (*Dimetrota*) *subrugosa* Märkel and Kiesenwetter | B.C. | Palaearctic (record unconfirmed) |

| Status in Canada | References |
|---|---|
| Uncertain | Klimaszewski 1979, 2000; Campbell and Davies 1991 |
| Established | Klimaszewski 1984, 2000; Campbell and Davies 1991; Hemachandra *et al.* 2005; Klimaszewski *et al.* 2005 |
| Established | Klimaszewski 1984, 2000; Campbell and Davies 1991; Klimaszewski *et al.* 2005 |
| Established | Klimaszewski 1984, 2000; Campbell and Davies 1991; Klimaszewski *et al.* 2005 |
| Established | Klimaszewski 1984, 2000; Campbell and Davies 1991 |
| Established | Klimaszewski 1984, 2000; Campbell and Davies 1991 |
| Established | Klimaszewski 1984, 2000; Campbell and Davies 1991; Klimaszewski *et al.* 2005 |
| Established | Klimaszewski 1984; Campbell and Davies 1991 |
| Established | Klimaszewski *et al.* 2002*b*, 2005 |
| Established | Canadian records: this paper. US records: Seevers 1978; Moore and Legner 1975; Downie and Arnett 1996 |
| Established | Assing 1999 |
| Established | Benick and Lohse 1974; Gusarov 2002; this paper |
| Established | Muona 1984 (US records, as Palaearctic species in North America); Gusarov 2003 (Canadian and US records, considers it a Holarctic species) |
| Established | Klimaszewski et al. 2006 |
| Established | Klimaszewski et al. 2006 |
| Established | Klimaszewski et al. 2006 |
| Uncertain | Moore and Legner 1975; Klimaszewski 2000 |
| Established | Muona 1984; Klimaszewski 2000; Klimaszewski *et al.* 2005 |
| Established in US and probably established in Canada | Muona 1984 (US records); Gusarov 2003 (US records); this paper |
| Established | Majka *et al.* 2006 |
| Established | Gusarov 2003; Klimaszewski *et al.* 2005 |
| Uncertain | Moore and Legner 1975; Klimaszewski 2000 |
| Established | Muona 1984 (US records); this paper |
| Established | Muona 1984 (as Palaearctic species introduced into North America); Lohse and Smetana 1985; Klimaszewski and Winchester 2002 (BC records); Gusarov 2003 |
| Uncertain | Moore and Legner 1975; Klimaszewski 2000 |

**Table A1** (*concluded*).

| Tribe and species | Province | Region of origin |
|---|---|---|
| ***Atheta* (*Thinobaena*) *vestita* (Gravenhorst)** | N.B., N.S. | Palaearctic |
| ***Dinaraea angustula* (Gyllenhal)** | N.S., P.E.I., Que., Alta. | Palaearctic |
| *Dochmonota rudiventris* (Eppelsheim) | Newfoundland, Y.T., N.W.T. | Uncertain (Holarctic or Palaearctic and adventive in Canada) |
| *Geostiba circellaris* (Gravenhorst) | Newfoundland | Palaearctic |
| *Mocyta fungi* (Gravenhorst) | Newfoundland, N.B., Que., Ont. | Palaearctic |
| *Nehemitropia lividipennis* (Mannerheim) | N.B., N.S., P.E.I., Que., Ont. | Palaearctic |
| **Lomechusini Fleming** | | |
| *Drusilla canaliculata* (Fabr.) | Ont., Que. | Palaearctic |
| **Falagriini Mulsant and Rey** | | |
| *Cordalia obscura* (Gravenhorst) | Ont., Que. | Palaearctic |
| *Falagria sulcata* (Paykull) | Que., Ont., Alta. | Palaearctic |
| *Gyrophaena affinis* (Sahlberg) | N.B., Que., Ont., Man., B.C. | Palaearctic |
| **Autaliini Thomson** | | |
| *Autalia rivularis* (Gravenhorst) | N.B., Que., Ont., Alta., B.C. | Palaearctic |
| **Homalotini Heer** | | |
| *Homalota plana* (Gyllenhal) | N.S., N.B. | Palaearctic |
| **Placusini Fenyes** | | |
| *Placusa incompleta* Sjöberg | N.S., Que., B.C. | Uncertain (adventive or Holarctic) |
| *Placusa tachyporoides* (Waltl) | N.B., Que., Ont., B.C. | Uncertain (adventive or Holarctic) |

| Status in Canada | References |
|---|---|
| Established | This paper |
| Established | Muona 1984 (US records); this paper |
| Established | Muona 1984; Gusarov 2003 |
| Established | Muona 1984; Gusarov 2002 |
| Established | Muona 1984; Gusarov 2003; Klimaszewski *et al.* 2005 |
| Established | Moore and Legner 1975 (as *Nehemitropia sordida* (Marsham) from unspecified locality in Canada, and US records); Muona 1984 (as *Acrotona sordida* (Marsham)); this paper |
| Established | Seevers 1978; Muona 1984; Gusarov 2003 |
| Established | Muona 1984; Hoebeke 1985; Klimaszewski 2000 |
| Established | Hoebeke 1985; Klimaszewski 2000 |
| Established | Seevers 1951 (US records); Campbell and Davies 1991; Klimaszewski 2000 |
| Established | Klimaszewski *et al.* 2005 |
| Established | Majka and Klimaszewski 2004 |
| Established | Klimaszewski *et al.* 2001 |
| Established | Moore and Legner 1975 (US records); Klimaszewski *et al.* 2001 |