

Bees of the Genus *Dufourea* Lepeletier (Hymenoptera: Halictidae: Rophitinae) of Canada*

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Abstract

Dufourea Lepeletier is the only representative of the subfamily Rophitinae in Canada. An illustrated key to females and males of the eight Canadian species is provided, and each is described; the male of *D. fimbriata*, and females of *D. holocyanea* and *D. maura* are described for the first time. Most *Dufourea* are floral specialists, so their presence within habitats is determined by that of their host. Floral hosts and known distributions of *Dufourea* in Canada are provided.

Introduction

Rophitine bees (Rophitinae) are a relatively small (214 species, as per Michener (2007); 257 species listed by Ascher and Pickering (2012)), basal subfamily of the Halictidae (Pesenko 1999) containing four tribes: the Rophitini (Old and New World members), Penapini (South America), Conanthalictini and Xeralictini (both restricted to south-western North America) (Patiny *et al.* 2007). The Rophitinae are primarily Holarctic in distribution (Michener 1965; Rozen 1997; Niu *et al.* 2005) with about a dozen species occurring in the Southern Hemisphere: five in South America (Rozen 1997) and six or seven in Africa (Patiny and Michez 2006, 2007a, 2007b). Rophitinae is the only subfamily of Halictidae in which all members are solitary (Pesenko and Astafurova 2006; Patiny *et al.* 2007; Danforth *et al.* 2008; Richards and Packer 2010). Despite the paucity of species in the Southern Hemisphere, Patiny *et al.* (2007) suggest that the strictly South American tribe Penapini forms the sister group to the remaining Northern Hemisphere tribes, with all the Old World taxa having arisen from among the New World Rophitini. The genus *Dufourea* Lepeletier in North America represents a dispersal event back from the Old World (Patiny *et al.* 2007). As such, it is the only holarctic genus of Rophitinae (Michener 1965), and also the only one occurring in Canada.

Disagreements in higher level classification exist within the Rophitinae, particularly between classifications used in the Old and New World. For instance, Niu *et al.* (2005) and Pesenko and Astafurova (2006) recognize 16 genera of Rophitinae, while Michener (2007) and Patiny *et al.* (2007) recognize 13, the latter two studies maintain *Trilia* Vachal as a subgenus of *Dufourea*, and *Rhopitoides* Schenck as a subgenus of *Rophites* Spinola, and place

Flavodufourea Ebmer as a subgenus of *Rophites* Spinola. Although *Flavodufourea* was originally described as a subgenus of *Dufourea*, a position supported by Patiny (2003), Michener (2007) believes its placement is still not decisive. Michener (2007) also does not recognize subgenera within *Dufourea*.

Six genera of Rophitinae occur in North America (Michener 2007). The largest genus is *Dufourea* (ca. 70 species), followed by *Conanthalictus* Cockerell (13 species), *Micralictoides* Timberlake (8 species), *Protodufourea* Timberlake (5 species), *Sphecodosoma* Crawford (3 species), and *Xeralictus* Cockerell (2 species). Michener (1965) reviewed the Rophitinae of the Western Hemisphere; Snelling and Stage (1995) clarified the placement of the Xeralictini within the Rophitinae.

Dufourea are relatively uncommon bees in Canada, and no comprehensive account of the species has been published. Morphologically, *Dufourea* is distinctive among the Canadian bee fauna, having antennae that arise low on the face, usually just above the upper margin of the clypeus. *Dufourea* differs from other non-cleptoparasitic Halictidae in Canada in having the scopa restricted to the hind tibia (not present also on the hind femur as in other halictids), and in having a short clypeus which seldom is any longer than the labrum (Michener 1965). *Dufourea* is also the only genus of Halictidae in Canada with two submarginal cells (the exceptions being a few species of *Lasioglossum* (*Dialictus*) and *Sphecodes*). Keys in Mitchell (1960), Stephen *et al.* (1969); Michener *et al.* (1994), and Michener (2000; 2007) can be used to identify this genus in North America; Packer *et al.* (2007) provide an interactive web-based key for bee genera in eastern Canada. Mitchell (1960) published keys to the four species found in the eastern Canada.

All Rophitinae, including *Dufourea*, nest in soil (Pesenko and Astafurova 2006), and construct a single nesting tunnel with lateral burrows which end in single cells, or a series of multiple cells (Michener 2007). Rozen and McGinley (1976), Kukuk *et al.* (1985), and Rozen (1993) summarize the nesting biology of Rophitinae. The nesting biology of three of the eight Canadian *Dufourea* have previously been studied: *D. trochantera* Bohart (Torchio *et al.* 1967); *D. novaeangliae* (Robertson) (Eickwort *et al.* 1983), *D. holocyanea* (Cockerell), including the description of the mature larvae (Rozen and Ozbek (2008).

Dufourea species are well known for their floral specialization (Lincoln 1981; Patiny *et al.* 2008). Floral specialization has led to morphological adaptations in many bees, including *Dufourea*; Alves-dos-Santos (2003) found that mouthparts of bees specializing on Pontederiaceae, including *D. novaeangliae*, are covered with hairs to remove pollen from the concealed anthers. Each species of *Dufourea* in Canada specializes on a different plant family (Table 1). Although Lincoln (1981) reported *D. dilatipes* Bohart on both *Calochortus* (Liliaceae) and *Campanula* (Campanulaceae) in Canada, it seems the latter floral record may actually be based on misidentification of specimens of *D. maura* (Cresson) as one of the two pollen samples examined was from Ontario (see Lincoln 1981), far outside the known range of *D. dilatipes* (Plate 1, Figure E). *Calochortus* has a Canadian distribution restricted to southern AB and BC; only one species, *C. apiculatus*, is recorded from Waterton Lakes National Park, one of only a few known collections site of *D. dilatipes* in Canada (and one of the localities for the type series). Most of the other species of *Dufourea* in Canada are also found in the west; *D. holocyanea* occurs in southern BC (Plate 3, Figure E), and *D. trochantera* occurs in BC and AB (Plate 8, Figure E). *Dufourea fimbriata* (Cresson) has only been collected a few times in Canada, in AB (Edmonton), in NT (Yellowknife), the most northern record for this genus in North America, and in northern ON (Plate 2, Figure E). *Dufourea maura* is the most widespread species, occurring from southern BC to ON (Plate 5, Figure E). *Dufourea marginata* (Cresson) is also widespread in Canada, occurring in southern BC-ON. Two species, *D. monardae* (Cresson) and *D. novaeangliae* occur in eastern Canada; *D. monardae* is known only from southern ON (Richards *et al.* 2011) (Plate 6, Figure E) and the adjacent United States (Bouseman 1976), *D. novaeangliae* has been collected in ON, QC (Payette 2001) and NS (Sheffield *et al.* 2003) (Plate 7, Figure E).

Our objectives are to provide an illustrated key to the eight species of *Dufourea* occurring in Canada,

full species descriptions, images of male genitalia, distributional notes, and a general summary of floral relations.

Materials and Methods

Specimens examined were from the following institutions: **Canada:** Packer Collection York University, Toronto, ON; Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON; Royal British Columbia Museum, Victoria, BC; Beaty Biodiversity Museum, University of British Columbia, Vancouver, BC; Royal Alberta Museum, Edmonton, AB; E.H. Strickland Entomological Museum, University of Alberta, Edmonton, AB; Brock University, St. Catharines, ON; Wallis-Roughley Museum of Entomology (formerly J.B. Wallis Museum), University of Manitoba, Winnipeg, MB; **United States:** United States Department of Agriculture Bee Biology and Systematics Laboratory, Logan, Utah; KU Biodiversity Institute, University of Kansas, Lawrence, Kansas.

Terminology used for the species descriptions includes: **pd** (puncture diameter); **MOD** (median ocellar diameter); **IAD** (interantennal distance); **AOD** (antennal-ocular distance); **OVD** ([median] ocellar-vertexal distance); **OOD** (ocellar-ocular distance); **IOD** (inter-ocular distance); **Tx** (tergum x); **Sx** (sternum x).

Head breadth was measured as the greatest distance between outer most margins of compound eyes; head length was measured as the distance from the apex of the clypeus to the summit of the vertexal area. In the descriptions, head breadth to length is given as a ratio (b:l).

Images were taken using a Visionary Digital BK Plus imaging system using a Canon EOS 40D digital SLR camera and processed with Adobe Photoshop.

Table 1. Floral hosts of *Dufourea* (Halictidae) species occurring in Canada.

<i>Dufourea</i> species	Floral Host	Floral Host Family	Reference
<i>D. dilatipes</i>	<i>Calochortus</i>	Liliaceae	Lincoln 1981
<i>D. fimbriata</i>	<i>Potentilla</i>	Rosaceae	Lincoln 1981
<i>D. holocyanea</i>	<i>Symphoricarpos</i>	Caprifoliaceae	Lincoln 1981
<i>D. maura</i>	<i>Campanula</i>	Campanulaceae	Lincoln 1981
<i>D. marginata</i>	<i>Helianthus</i>	Compositae	Lincoln 1981
<i>D. trochantera</i>	<i>Phacelia</i>	Hydrophyllaceae	Lincoln 1981
<i>D. novaeangliae</i>	<i>Pontedereria</i>	Pontederiaceae	Bouseman 1986
<i>D. monardae</i>	<i>Monarda</i>	Labiatae	Bouseman 1976

Key to bees of the genus *Dufourea* in Canada

- 1 Females: scopa present on hind tibia (Figure 1a); antenna 12 segmented (Figure 2a)2
- Males: scopa absent (Figure 1b); antenna 13 segmented (Figure 2b).....9



Figure 1a. Female hind leg, with scopa (*Dufourea dilatipes* Bohart). **Figure 1b.** Male hind leg, without scopa (*Dufourea maura* (Cresson)). **Figure 2a.** Female antenna, 12 segmented (*Dufourea novaeangliae* (Robertson)). **Figure 2b.** Male antenna, 13 segmented (*Dufourea novaeangliae* (Robertson)).

- 2 (1) Body colour metallic blue-green (Figure 3a); mandible tri-dentate (Figure 4a) *Dufourea holocyanea* (Cockerell)
- Body colour (at least of mesosoma and metasoma) non-metallic, brown to black (Figure 3b); mandible bi-dentate (Figure 4b) 3



Figure 3a. Female *Dufourea holocyanea* (Cockerell), lateral view. **Figure 3b.** Female *Dufourea dilatipes* Bohart lateral view. **Figure 4a.** Female mandible, tri-dentate (*Dufourea holocyanea* (Cockerell)). **Figure 4b.** Female mandible, bi-dentate (*Dufourea dilatipes* Bohart).

- 3 (2) Head longer than broad (Figure 5a) 4
- Head broader than long (Figure 5b) 5



Figure 5a. Female head longer than broader (*Dufourea novaengliae* (Robertson)). **Figure 5b.** Female head broader than long (*Dufourea dilatipes* Bohart).

- 4 (3) 1st and 2nd recurrent veins entering 2nd submarginal cell about equally distant from base and apex respectively (Figure 6a); mid basitarsus with posterior margin convex, segment thus broadest medially (Figure 7a); stipes, prementum and first segment of labial palpus with numerous suberect bristles (Figure 8a)..... *Dufourea novaeangliae* (Robertson)
- 2nd recurrent vein entering 2nd submarginal cell usually considerably nearer apex of cell than 1st recurrent vein is to its base (Figure 6b); mid basitarsus parallel sided, posterior margin not convex (Figure 7b); mouthparts without suberect bristles (Figure 8b)..... *Dufourea monardae* (Viereck)

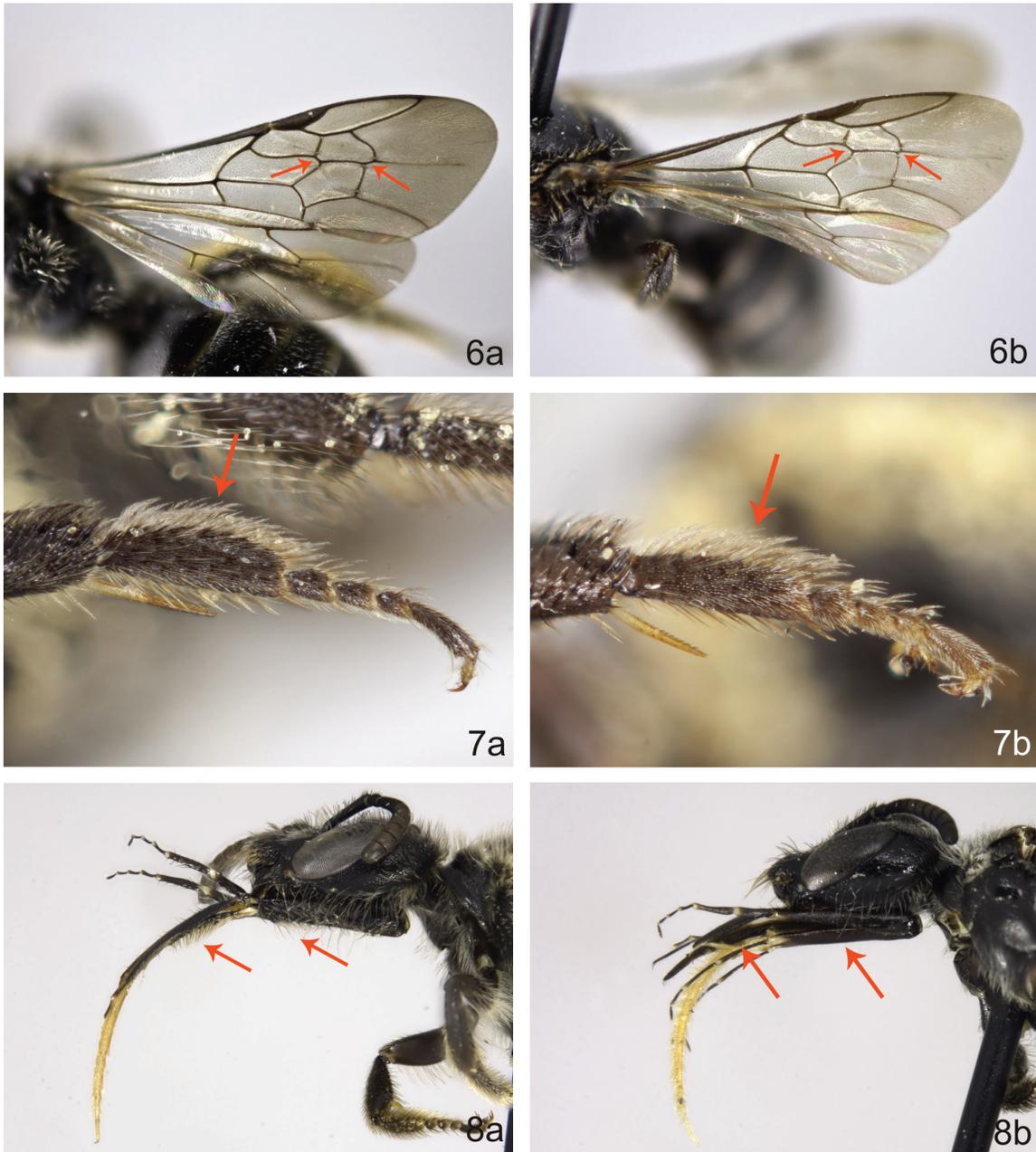


Figure 6a. Forewing (*Dufourea novaeangliae* (Robertson)). **Figure 6b.** Forewing (*Dufourea monardae* (Viereck)). **Figure 7a.** Mid basitarsus (*Dufourea novaeangliae* (Robertson)). **Figure 7b.** Mid basitarsus (*Dufourea monardae* (Viereck)). **Figure 8a.** Tongue with bristles (*Dufourea novaeangliae* (Robertson)). **Figure 8b.** Tongue without bristles (*Dufourea monardae* (Viereck)).

- 5 (3) Tibial scopa dark brown to black; pubescence of body largely dark (Figure 9a).....6
- Tibial scopa pale; pubescence of body light (Figure 9b).....7



Figure 9a. Scopal hairs dark (*Dufourea dilatipes* Bohart). **Figure 9b.** Scopal hairs pale (*Dufourea fimbriata* (Cresson)).

- 6 (5) Propodeal triangle dull, weakly striate (Figure 10a); mesoscutellum moderately to densely punctate throughout (Figure 11a).....*Dufourea dilatipes* Bohart
- Propodeal triangle shiny, with deep striations (Figure 10b); mesoscutellum almost impunctate anteromedially (Figure 11b).....*Dufourea maura* (Cresson)

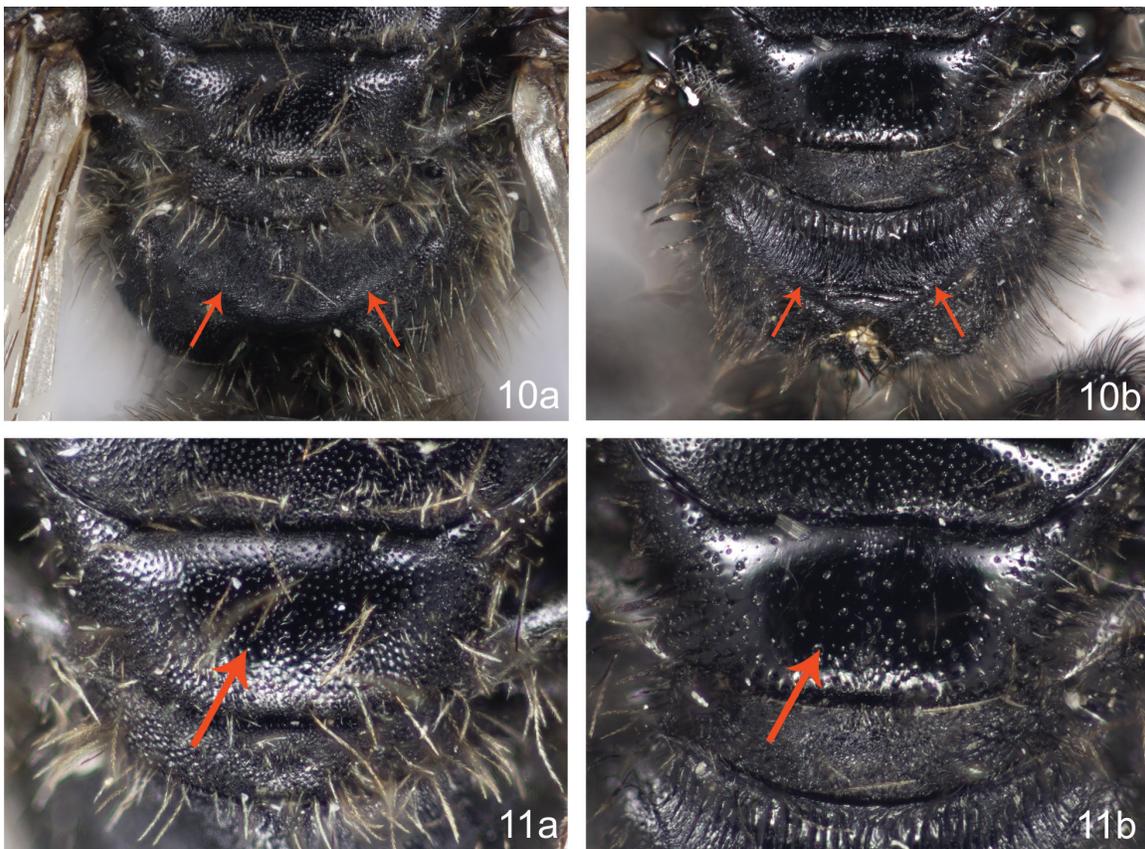


Figure 10a. Propodeal triangle (*Dufourea dilatipes* Bohart). **Figure 10b.** Propodeal triangle (*Dufourea maura* (Cresson)). **Figure 11a.** Mesoscutellum (*Dufourea dilatipes* Bohart). **Figure 11b.** Mesoscutellum (*Dufourea maura* (Cresson)).

7 (5) Mid tibial spur short, about a third as long as mid basitarsus (Figure 12a); face flattened between antennae, clypeus finely and closely punctate, with an impunctate triangular area in apical 1/3 (Figure 13a) *Dufourea marginata* (Cresson)

- Mid tibial spur long, over half as long as mid basitarsus (Figure 12b); face not flattened between antennae, supraclypeal area and clypeus convex, clypeus deeply and more coarsely punctate, punctures evenly distributed without impunctate area (Figure 13b).....8

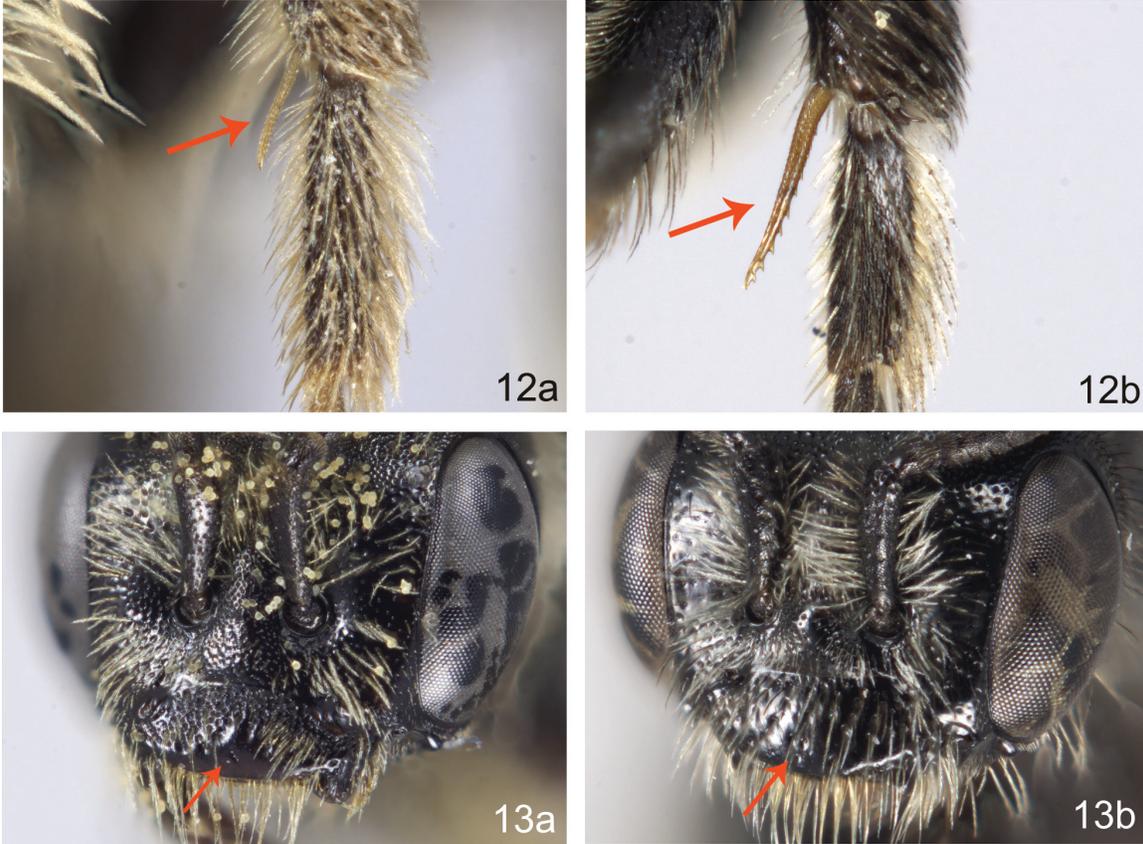


Figure 12a. Mid tibial spur short (*Dufourea marginata* (Cresson)). **Figure 12b.** Mid tibial spur long (*Dufourea trochantera* Bohart). **Figure 13a.** Female clypeus (*Dufourea marginata* (Cresson)). **Figure 13b.** Female clypeus (*Dufourea fimbriata* (Cresson)).

- 8 (7) Mid tibial spur with few, distinct, well-separated teeth (Figure 14a); propodeal triangle densely striate (Figure 15a); vertexal area with faint but distinct metallic blue coloration (Figure 16a).. *Dufourea trochantera* Bohart
- Mid tibial spur with minute, contiguous teeth (Figure 14b); propodeal triangle rugosostriate (Figure 15b); vertexal area black, without metallic blue coloration (Figure 16b)..... *Dufourea fimbriata* (Cresson)

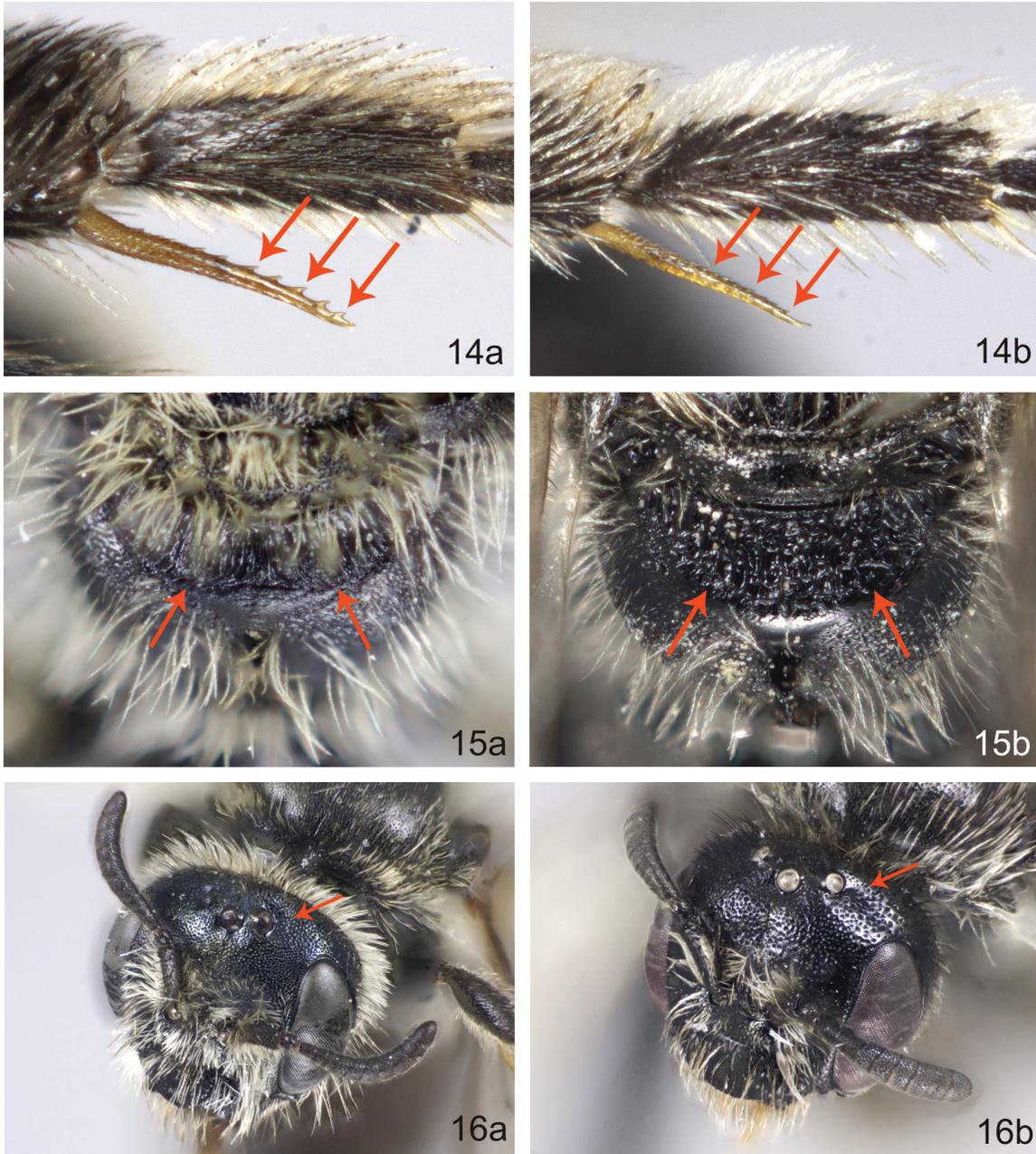


Figure 14a. Mid tibial spur (*Dufourea trochantera* Bohart). **Figure 14b.** Mid tibial spur (*Dufourea fimbriata* (Cresson)). **Figure 15a.** Propodeal triangle (*Dufourea trochantera* Bohart). **Figure 15b.** Propodeal triangle (*Dufourea fimbriata* (Cresson)). **Figure 16a.** Vertexal area (*Dufourea trochantera* Bohart). **Figure 16b.** Vertexal area (*Dufourea fimbriata* (Cresson)).

- 9 (1) Body colour metallic blue-green (Figure 17a) *Dufourea holocyanea* (Cockerell)
- Body colour of at least mesosoma and metasoma non-metallic, brown to black (Figure 17b)..... 10



Figure 17a. Male *Dufourea holocyanea* (Cockerell), lateral view. Figure 17b. Male *Dufourea fimbriata* (Cresson), lateral view.

- 10 (9) Head longer than broad (Figure 18a)..... 11
- Head broader than long (Figure 18b) 12



Figure 18a. Male head (*Dufourea novaeangliae* (Robertson)). Figure 18b. Male head (*Dufourea Maura* (Cresson)).

- 11 (10) Hind trochanter with ventral projection forming high acute cone (Figure 19a); S6 with sublateral swellings carinate (Figure 20a); propodeal triangle shiny and coarsely rugose over entire surface (Figure 21a).....
 *Dufourea novaeangliae* (Robertson)
- Hind trochanter with ventral projection forming low, obtuse knob (Figure 19b); S6 with sublateral swellings not carinate (Figure 20b); propodeal triangle dull and finely rugose (Figure 21b).....
 *Dufourea monardae* (Viereck)

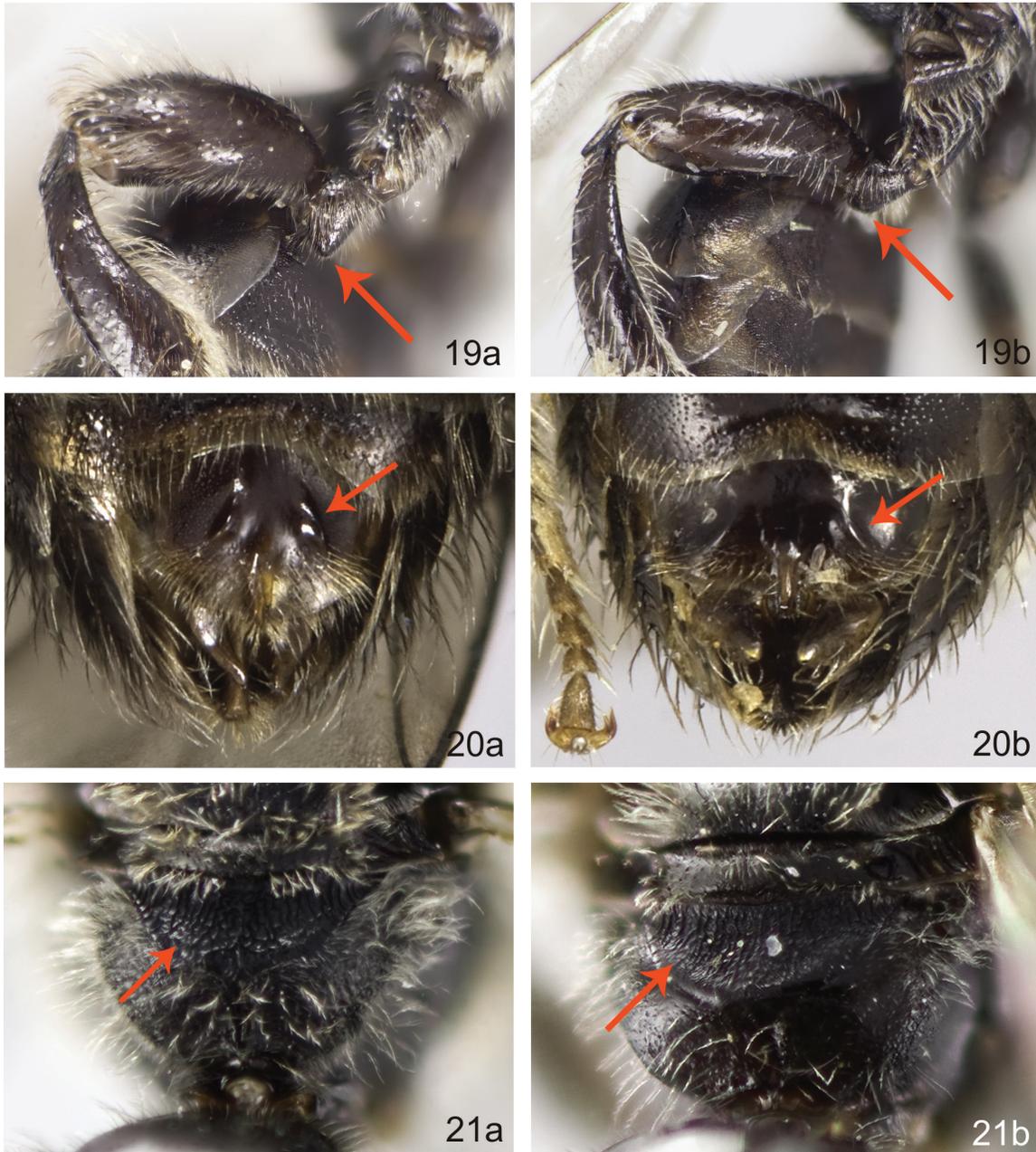


Figure 19a. Hind trochanter (*Dufourea novaeangliae* (Robertson)). **Figure 19b.** Hind trochanter (*Dufourea monardae* (Viereck)). **Figure 20a.** Sternum 6 (*Dufourea novaeangliae* (Robertson)). **Figure 20b.** Sternum 6 (*Dufourea monardae* (Viereck)). **Figure 21a.** Propodeal triangle (*Dufourea novaeangliae* (Robertson)). **Figure 21b.** Propodeal triangle (*Dufourea monardae* (Viereck)).

- 12 (10) Pubescence of body largely dark (Figure 22a)13
- Pubescence of body pale (Figure 22b)14



Figure 22a. Pubescence dark (*Dufourea maura* (Cresson)). **Figure 22b.** Pubescence pale (*Dufourea novaeangliae* (Robertson)).

- 13 (12) Hind femur much longer than greatest breadth, with distinct basal spine, hind tibia broadest subapically, expansion smoothly rounded (Figure 23a)..... ***Dufourea maura* (Cresson)**
- Hind femur robust, half as broad as long, without basal spine, hind tibia greatly expanded to apex, triangular (Figure 23b)..... ***Dufourea dilatipes* Bohart**



Figure 23a. Hind leg (*Dufourea maura* (Cresson)). **Figure 23b.** Hind leg (*Dufourea dilatipes* Bohart).

- 14 (12) Fore and hind trochanter with angulate process broad and rounded (Figure 24a); S5 with apical process, disc of S5 bare (Figure 25a); metasomal terga with apical margins strongly hyaline, the pale basal fasciae of underlying segment clearly visible (Figure 26a)..... *Dufourea trochantera* Bohart
- Fore and hind trochanter unmodified (Figure 24b); S5 without apical process, disc of S5 finely pubescent (Figure 25b); metasomal terga with apical margins not hyaline (Figure 26b).....15



Figure 24a. Fore and hind trochanters (*Dufourea trochantera* Bohart). **Figure 24b.** Fore and hind trochanters (*Dufourea marginata* (Cresson)). **Figure 25a.** Sternum 5 (*Dufourea trochantera* Bohart). **Figure 25b.** Sternum 5 (*Dufourea fimbriata* (Cresson)). **Figure 26a.** Metasomal terga (*Dufourea trochantera* Bohart). **Figure 26b.** Metasomal terga (*Dufourea fimbriata* (Cresson)).

- 15 (14) S3-S6 simple, without lateral foveae or swellings (Figure 27a); S5 with apical margin straight (Figure 28a) *Dufourea marginata* (Cresson)
- S3-S6 with lateral foveae or swellings (Figure 27b); S5 with apical margin concave (Figure 28b)..... *Dufourea fimbriata* (Cresson)



Figure 27a. Sterna 3-6 (*Dufourea marginata* (Cresson)). **Figure 27b.** Sterna 3-6 (*Dufourea fimbriata* (Cresson)). **Figure 28a.** Sternum 5 (*Dufourea marginata* (Cresson)). **Figure 28b.** Sternum 5 (*Dufourea fimbriata* (Cresson)).

Species Descriptions

Dufourea dilatipes Bohart (Plate 1)

Dufourea dilatipes Bohart, 1948: 135 (♂, ♀ description).

DIAGNOSIS. The main diagnostic characteristics of this species are brown body pubescence, longer clypeus, dull propodeal triangle and densely punctate mesoscutellum. Those observed only in the male are the robust hind femur and triangular hind tibia, S4 with medial process on apical margin, S6 with medial process gradually curved. This species is similar to *D. maura* in its robust body and wide head (*D. maura* generally larger), however the latter has black body pubescence, shorter clypeus, shiny propodeal triangle, and sparsely mesoscutellum; the male has simple hind legs and S6 with process angulate.

Description. FEMALE. Length 9 mm; black. **Head.** **1)** head considerably broader than long, 1.24:1; inner margin of compound eyes subparallel; OVD = 4.5MOD, OOD = 3MOD, IOD = 2MOD. **2)** supraclypeal area shiny, nearly flat in lateral view, with slightly elevated midline; clypeus mostly shiny, nearly twice as broad as long, its apical margin convex, strongly protuberant in lateral view; labrum slightly broader than long, partly hidden when mandibles are closed. **3)** mandible bi-dentate. **4)** genal area nearly as wide as compound eye in lateral view. **5)** pubescence brown, long and moderately thick, hairs longest and most dense on vertexal area, scape, between antennal bases, and on clypeus, though never obscuring surface below; vertex with a row of yellow hairs along posterior vertexal area; supraclypeal area nearly bare on apical half. **6)** clypeus with punctures of two sizes, larger punctures coarse, deep and well separated (<2pd), small punctures fine, shallow, and sparser than large punctures (<4pd); punctures coarse and close basally on the supraclypeal area (<1pd), becoming fine and much reduced apicomediaally; lower paraocular area less densely punctate (<2pd) than upper part of face below ocelli (<1pd), where punctures are deep, distinct, and rather fine becoming very sparse with shiny interspaces between antenna and compound eye (1-2pd); punctures small and dense over most of vertexal area (<1pd), with impunctate shiny areas along outer margin of lateral ocelli and anterior to median ocellus; punctures more obscure on upper part of genal area (1-2pd), lower surface of genal area lateral to hypostomal carina shiny, sparsely punctate (3-4pd). **7)** IAD subequal to AOD; antennal socket separated from upper margin of clypeus by slightly less than its diameter; antennal flagellomeres wider than long except F1 nearly as wide as long, F10 slightly longer than wide. **Mesosoma.** **8)** mesoscutum

with pubescence long, thin, and pale brown, longest on mesopleuron, mesoscutellum, and lateral propodeum. **9)** mesoscutum somewhat shiny, punctures of two sizes: smaller punctures fine, close laterally (≤ 1 pd), finer and crowded along extreme anterior and lateral margins; larger punctures less dense (2-3pd), becoming sparser on disc around admedian line; mesoscutellum shiny, punctures similar to those of mesoscutum, very fine and crowded apically and laterally, even and sparse on disc; mesopleuron somewhat dull, punctures minute, close and obscure anteriorly, more distinct posteriorly (1-2pd); hypoepimeral area strongly imbricate on upper $\frac{3}{4}$, punctures dense but becoming sparse toward lower margin; propodeal triangle $\frac{2}{3}$ as long as mesoscutellum, imbricate with dense and fine striae, adjacent dorsolateral surface densely punctate (1-2pd), punctures of two sizes, lateral propodeal surface anteriorly shiny becoming dull and imbricate posteriorly, punctures separated by 2-4pd. **10)** legs dark brown basally, apical tarsomeres somewhat reddened; tibial spurs, especially the mid and hind, long and slender, yellowish, slightly reddened apically, mid tibial spur about $\frac{2}{3}$ as long as mid basitarsus. **11)** tegula dark brown, dull, obscurely punctate with a few thick brownish hairs anteriorly, becoming shiny and impunctate posteriorly, with sparse hairs on anterior half. **12)** wings lightly infuscated, veins and stigma brownish-red, 1st recurrent vein entering 2nd submarginal cell about half as far from base than distance of 2nd recurrent vein to apex. **Metasoma.** **13)** terga smooth and shiny, punctures well separated (>3pd), denser basally (<1pd); T1-T4 with small punctures dispersed among large ones; T4-T5 with coarser, dense, evenly distributed punctures; apical impressed areas smooth and impunctate; pubescence on disc very short, sub-erect, dark brown-black. **14)** sterna with dark, erect apical pubescence, becoming denser on more apical sterna; S1 with sparse pubescence basally, S2 and S3 with long pubescence laterally, medially short, S5 densely pubescent at apex, with a raised carinate ridge.

MALE. Length 8.5 mm; black. **Head.** **1)** head much broader than long, 1.23:1; compound eyes very slightly divergent below; OVD = 4.5MOD, OOD = 3MOD, IOD = 2MOD; **2)** supraclypeal area nearly flat in lateral view, with slightly elevated midline; clypeus imbricate, slightly protuberant, nearly twice as broad as long; labrum much broader than long. **3)** mandible bi-dentate. **4)** genal area slightly wider than compound eye, slightly narrowed below. **5)** pubescence largely brown between antennae and on scape, clypeus with sparse, thin, erect, brown hairs basally, pale hairs apically, apical margin with dense, long, pale hairs; vertex with a row of yellow hairs along posterior vertexal area; supraclypeal area nearly bare on apical half. **6)** punctures of vertexal area fine, less dense medially than on face, with impunctate shiny

areas along outer margin of lateral ocelli and anterior to median ocellus, genal area closely and obscurely punctate above, becoming shiny and nearly impunctate below and around compound eye margin; punctures below ocelli fine and densely crowded (<1pd), becoming coarser and less dense (1-2pd) on lower paraocular area, most sparse lateral to antenna (>2pd); supraclypeal area densely pubescent between antennae (<1pd), largely hidden beneath the dense pubescence, punctures becoming finer and sparser apically and laterally (<2pd); clypeus with shallow, dense punctures on apical 2/3 (1pd), beneath the dense pale pubescence, punctures more sparse on the largely bare basal third (2-3pd). **7)** IAD subequal to AOD, antennal socket separated from margin of clypeus by a space only slightly smaller than its diameter, F1 about as broad as long, slightly longer than pedicel and half as long as F2, F2 slightly longer than broad, F3-F10 about as long as broad, F11 longer than broad; F6-F11 with basal depression. **Mesosoma.** **8)** pubescence pale brown, with a few pale hairs on mesopleuron and lateral propodeum, largely brown on mesoscutum and mesoscutellum, longest on mesopleuron, lateral mesoscutellum, and lateral propodeum. **9)** mesoscutum and mesoscutellum somewhat shiny, very finely and closely punctate, punctures somewhat separated on discs (2-3pd), becoming denser, but not crowded, at extreme sides (1pd); mesoscutellum with a median depression most strongly pronounced anteriorly; mesopleuron dull, mostly smooth, punctures minute and rather vague, hypoepimeral area strongly imbricate on upper ¾, punctures dense but becoming sparse toward lower margin; propodeal triangle 2/3 as long as mesoscutellum, imbricate, finely rugosostriate, adjacent dorsolateral surface densely punctate (1-2pd); lateral propodeal surface anteriorly shiny becoming dull and imbricate posteriorly, punctures separated by 2-4pd. **10)** legs dark brown, hind trochanter triangularly produced ventrally; hind femur robust, greatest width about ¾ length; hind tibia robust, apical width subequal to length, triangular; hind basitarsus parallel-sided, slightly narrowed basally, outer surface slightly concave; mid tibial spur about 0.7 times as long as mid basitarsus. **11)** tegula brownish-hyaline, anterior third densely punctate becoming shiny and nearly impunctate posteriorly, with sparse hairs on anterior half. **12)** wings lightly infuscated, veins and stigma brownish-red; 1st recurrent vein entering 2nd submarginal cell about half as far from base than distance of 2nd recurrent vein to apex. **Metasoma.** **13)** terga somewhat shiny, minutely punctate, punctures more dense and fine on basal area (2-3pd) becoming more sparse apically; T1-T4 with small punctures dispersed among large ones; apical impressed areas entirely impunctate, more or less reddened, becoming slightly yellowish hyaline on apices; discal pubescence suberect, thin and

obscure, largely pale on the more basal terga, becoming more erect, conspicuous and dark brown-black on T5-T7. **14)** S1-S5 relatively simple, S3 medially depressed with a lateral spine, S4 with ventrally directed triangular flange on apical margin medially, with lateral spine as in S3, S5 medially depressed, apical margin broadly and deeply concave, S6 with medial subtriangular area flattened and shiny, with large medial process gradually curved and densely pubescent. **15)** genitalia: see **Plate 1, Figures F-G.**

DISTRIBUTION: In Canada, this species is known from Waterton Lakes National Park in southwestern Alberta and adjacent British Columbia (**Plate 1, Figure E**).

Dufourea fimbriata (Cresson) (Plate 2)

Panurgus fimbriatus Cresson, 1878: 63 (♀ description).
Halictoides harveyi Cockerell, 1906: 223 (♀ description).
Halictoides harveyi sierrae Michener, 1937: 397 (♀ description).

DIAGNOSIS. The main diagnostic characters of this species are the rugosostriate propodeal triangle and the nearly opaque apical impressed areas of the terga. Those observed only in the male: the simple and slender hind legs, S3-S5 with lateral depressions, S5 with concave margin. This species is similar to *D. marginata* and *D. trochantera* in its small size and wide head, however these two species tend to be larger in size and have rather strongly hyaline apical impressed areas of the terga.

Description. FEMALE. Length 6 mm; black. **Head.** **1)** head much broader than long, 1.24:1; compound eyes subparallel; OVD = 1.5MOD, OOD = 2.3MOD, IOD = 2.3MOD. **2)** supraclypeal area protuberant in lateral view with elevated vertical midline between antennae; clypeus entirely shiny, strongly protuberant, considerably broader than long, twice as broad as long; labrum slightly triangular, broader than long, mandibles fitting beneath the large labral process when closed. **3)** mandible bi-dentate. **4)** genal area somewhat narrower than compound eyes, becoming very narrow below. **5)** pubescence rather short, quite thin and inconspicuous, pale in general, but some dark brown-black hairs on face; pale hairs present on vertexal area, scape, postgenal area, and below apical clypeal margin, dark hairs present on genal area, area between vertexal area and antennae, and area between compound eyes and antennae. **6)** punctures deep, distinct, close and rather fine on upper part of face below ocelli (<2pd), becoming very sparse on paraocular area, where the surface is shiny (>3pd);

very fine and close on the markedly convex supraclypeal area, becoming very dense laterally, somewhat sparse centrally; coarse, deep and well separated over most of clypeus, more dense near basal margin (1-2pd); punctures minute and slightly separated over most of vertexal area, becoming somewhat closer and more obscure on upper part of genal area; with impunctate shiny areas along outer margin of lateral ocelli. **7)** IAD subequal to AOD, antennal socket separated from upper margin of clypeus by its diameter; antennae quite short, flagellar segments considerably broader than long, breadth increasing apically. **Mesosoma. 8)** pubescence largely pale and short, hairs thin and sparse, longest on mesopleuron and lateral mesoscutellum; mesoscutum with disc nearly bare posteriorly. **9)** mesoscutum shiny, punctures fine, well separated in general (>2pd), becoming slightly sparse in center of disc posteriorly (>4pd), dense at extreme sides but not crowded even between notaulice and tegula; mesoscutellum shiny, very faintly impressed medially, punctures sparse, becoming more dense apically (<1pd); mesopleuron shiny, punctures fine and close (1-2pd), hypoepimeral area mostly shiny, posteriorly imbricate, with punctures evenly distributed throughout (2-3pd); propodeal triangle subequal in length to mesoscutellum, shiny and rugosostriate; lateral and posterior propodeal surface dull and imbricate, punctures somewhat obscure, separated by 2-4pd anteriorly, posteriorly impunctate. **10)** legs dark brown; spurs, especially the mid and hind pair, very long and slender, yellowish, mid tibial spur about 3/4 as long as mid basitarsus; scopal hairs white and fine. **11)** tegula dark brown in large part, becoming somewhat yellowish-hyaline along margin, with pale hairs on anterior half. **12)** wings lightly infuscated, veins and stigma more brownish-red, 1st recurrent vein entering 2nd submarginal cell about half as far from base than distance of 2nd recurrent vein to apex. **Metasoma. 13)** T1-T3 quite smooth and shiny, with minute and rather close punctures basally (2-3pd), well separated throughout most of tergum (>4pd), T4-T5 with somewhat coarser and rather close, evenly distributed punctures (2-3pd), apical impressed areas smooth and impunctate, more or less yellowish, discal pubescence very short and obscure, suberect, pale, becoming somewhat dark brown-black on the more apical terga. **14)** sterna with pale, erect apical pubescence; S1 with sparse pubescence basally, S2-S5 with long, pale pubescence apically and short to bare centrally.

MALE. Length 5.5 mm; black. **Head. 1)** head much broader than long, 1.22:1; compound eyes slightly convergent below; OVD = 1.5MOD, OOD = 2.5MOD, IOD = 2.3MOD. **2)** supraclypeal area slightly protuberant in lateral view, with elevated vertical midline; clypeus strongly protuberant, broader than long; labrum broader

than long, entirely exposed by the closed mandibles. **3)** mandible bi-dentate. **4)** genal area narrower than compound eyes, very much narrowed below. **5)** pubescence entirely pale, whitish on face, densely covering supraclypeal area and clypeus, obscuring surface beneath, long pale pubescence around scape. **6)** punctures of vertexal area fine, somewhat more separated medially than on face (2-3pd), becoming well separated on each side; genal area above closely and rather obscurely punctate, the lower part becoming shiny and impunctate; punctures below ocelli fine and dense (<1.5pd), becoming much more coarse and relatively sparse toward antennae on each side (2-4pd), the strongly convex supraclypeal area densely pubescent, with close punctures (1-3pd), largely hidden beneath the pubescence, clypeus with shallow and rather close punctures beneath the dense pubescence. **7)** IAD subequal to AOD, antennal socket separated from margin of clypeus by slightly more than its diameter; F1 about as broad as long, slightly longer than pedicel and half as long as F2, F2 twice as long as broad, median and apical segments longer than broad, not quite as long as F2; F5-F11 with basal depression. **Mesosoma. 8)** pubescence largely whitish, longest on mesopleuron; mesoscutum and mesoscutellum with sparse, thin, whitish pubescence, legs, especially hind, with long white pubescence. **9)** mesoscutum and mesoscutellum shiny, very finely and somewhat irregularly punctate, punctures somewhat separated in center of discs (>3pd), becoming closer, but not crowded, at extreme sides (<2pd); mesopleuron smooth, shiny, punctures well separated (>4pd) becoming minute and dense posteriorly (1-2pd); hypoepimeral area smooth and shiny, punctures dense above (1pd) but becoming sparse below (3-4pd); propodeal triangle 2/3 as long as mesoscutellum, shiny and rugosostriate; lateral propodeal surface imbricate, densely punctate anteriorly (1-2pd), punctures becoming obscure posteriorly (2-4pd), posterior propodeal surface imbricate and rough, punctures somewhat obscure (3-4pd). **10)** legs black; hind femur relatively slender but somewhat curved, lower surface flattened and smooth; hind tibia slender basally, mid tibial spur about 1/3 as long as mid basitarsus; hind basitarsus slender, parallel-sided, about 4 times as long as broad, much shorter than tibia. **11)** tegula brownish and shiny, anterior half densely punctate, posterior half impunctate, dark erect hairs on disc, pale hairs anterolaterally. **12)** wings lightly infuscated, veins and stigma brownish-red; 1st recurrent vein entering 2nd submarginal cell about half as far from base than distance of 2nd recurrent vein to apex. **Metasoma. 13)** terga shiny, minutely punctate, punctures more dense basally (2-3pd) becoming sparse apically (>4pd); apical impressed areas entirely impunctate, more or less hyaline yellow, discal pubescence suberect, thin and obscure, largely pale on the more basal terga,

becoming more erect, conspicuous and dark brown-black on the more apical terga (T5 and T6). **14**) S3-S5 with lateral depressions, sometimes elevated or carinate, S5 with apical margin concave, S6 with a median apical process with an elevated lobe on each side. **15**) genitalia: see Plate 2, **Figures F-G**.

DISTRIBUTION: In Canada, this species is known from very few specimens; Alberta (Edmonton), northern Ontario and Northwest Territories (Yellowknife) (**Plate 2, Figure E**).

Dufourea holocyanea (Cockerell) (**Plate 3**)

Halictoides holocyaneus Cockerell, 1925: 199 (♂ description).

DIAGNOSIS: The main diagnostic characters of this species are the metallic blue integument and the tri-dentate mandible (mandible bi-dentate in all other species) for both sexes. These characters are unique to this species among the Canadian species of *Dufourea*.

Description. FEMALE. Length 10 mm; metallic blue-green. **Head.** **1**) head slightly broader than long, 1.13:1; compound eyes subparallel; OVD = 1.5MOD, OOD = 3MOD, IOD = 2.5MOD. **2**) supraclypeal area strongly protuberant, especially between antennae, with short depression between antennal sockets (1MOD) tapering to frontal line above; clypeus protuberant, considerably broader than long; labrum broader than long, somewhat triangular, almost fully exposed, mandibles fitting beneath the large labral process when closed. **3**) mandible tri-dentate. **4**) genal area above subequal to eyes, becoming very slightly narrowed below. **5**) pubescence dark in general, except somewhat pale on vertexal area, lower clypeus, and lower genal area; hairs longest on apical margin of clypeus, scape, and genal area. **6**) punctures deep, distinct, close and rather fine on upper part of face below ocelli (<1pd), becoming very sparse just below, on upper supraclypeal area and paraocular area, where the surface is shiny (1-2pd); supraclypeal area nearly impunctate medially and sparsely punctate apically, punctures dense laterally and basally towards antennal sockets (≤1pd); clypeus metallic and shiny along basal margin, with coarse and deep punctures (1-2pd), disc black, imbricate and nearly impunctate; punctures deep and slightly separated over most of vertexal area (1-3pd), with impunctate shiny areas along outer margin of lateral ocelli and anterior to median ocellus; punctures closer and more obscure on upper part of genal area (<2pd), lower surface of genal area lateral to hypostomal carina shiny and sparsely punctate (>3pd). **7**) IAD subequal to

AOD, antennal socket separated from upper margin of clypeus by more than its diameter; antenna quite short, F1-F4 smaller, considerably broader than long, F5-F10 larger, nearly as wide as long. **Mesosoma.** **8**) pubescence rather long and copious on mesosoma laterally, dorsally shorter, thin, dark brown-black, and quite dense, central area of mesoscutum not as densely pubescent, hairs mostly mixed dark and pale on dorsal surfaces, but pale, long, and highly branched on lateral surfaces, especially on lateral and posterior areas of propodeum. **9**) mesoscutum somewhat shiny, punctures fine, quite closely spaced (1-2pd), becoming rather sparse in center of disc posteriorly (>3pd), but not crowded even between notaulice and tegula; mesoscutellum shiny, very faintly impressed medially, punctures of two sizes, smaller punctures very fine, dense near margins (1-2pd) and sparse in central disc (>3pd), and larger punctures sparsely distributed throughout (>2pd); metanotum densely punctate (1-2pd); mesopleuron shiny with larger punctures evenly distributed and somewhat obscure (3-4pd) and minute shallow punctures unevenly distributed; hypoepimeral area entirely shiny, punctures fine above (2-3pd) becoming sparse to impunctate on lower ¼; propodeal triangle 2/3 as long as mesoscutellum, shiny and completely rugosostriate; lateral and posterior propodeal surfaces smooth but rather dull, with only very minute and obscure punctures at all evident. **10**) legs black, metallic reflections most evident on fore and mid legs; spurs, especially the mid and hind pair, very long and slender, entirely dark; mid tibial spur about 2/3 as long as mid basitarsus. **11**) tegula shiny, metallic blue anteriorly, becoming dark brown; punctures sparse on anterior 1/3 (>4pd), becoming impunctate posteriorly. **12**) wings lightly infuscated, veins and stigma more brownish-red, recurrent veins entering 2nd submarginal cell about equally distant from base and apex. **Metasoma.** **13**) terga quite smooth and shiny, with minute and rather close punctures separated by 1-2pd basally, becoming slightly more sparse apically (~3pd), and larger punctures present throughout apical ¾ separated by 1-2pd, apical impressed areas entirely impunctate; T4-T5 with somewhat coarser and rather close punctures, apical impressed areas smooth and impunctate, somewhat dulled, metallic greenish brown, with very short, pale apical fasciae, discal pubescence very short and obscure, sub-erect, entirely dark, becoming longer and more dense on the more apical terga. **14**) sterna shiny, punctures minute and well separated on apical half (>2pd), basal half with very shallow obscure punctures separated by 1-2pd; S5 with basal half dull, non-metallic brown, entirely impunctate, with a slightly raised apical margin; dark, erect pubescence present on apical half.

MALE. Length 10-10.5 mm; metallic blue-green. **Head.** **1)** head slightly broader than long, 1.17:1; compound eyes slightly convergent below; OVD = 2MOD, OOD = 2.5MOD, IOD = 2.5MOD. **2)** supraclypeal area protuberant in lateral view, most strongly between antennae; clypeus protuberant, broader than long; labrum broader than long, somewhat apically rounded. **3)** mandible tri-dentate. **4)** genal area nearly as wide as compound eye. **5)** pubescence largely pale, with black erect hairs among the pale ones on vertexal area, genal area, paraocular area, and between antennae; the strongly convex supraclypeal area densely pubescent with white vertical fringe of hairs extending to bare impunctate area above antenna. **6)** punctures below ocelli fine and densely crowded (<1pd), becoming slightly more coarse and relatively sparse along inner margin of compound eye on each side (1-3pd); area directly above antenna concave, entirely bare, impunctate and dull; supraclypeal area nearly impunctate apically, becoming densely punctate basally, punctures largely hidden beneath the dense pubescence; clypeus with coarse punctures crowded beneath the dense pubescence (<1pd); vertexal area with punctures fine, somewhat more separated medially than on face, becoming well separated on each side towards compound eyes (3-4pd); genal area above closely and rather obscurely punctate (1-2pd), the lower part becoming shiny and sparsely punctate (>4pd). **7)** IAD slightly smaller than AOD, antennal socket separated from upper margin of clypeus by more than its diameter, all segments longer than broad, F1 about twice as long as pedicel and less than half as long as F2, the following segments longer, F2 about three times as long as broad, median and apical segments not quite so long, about 2 times as long as broad; F2-F11 with basal depression. **Mesosoma.** **8)** pubescence whitish laterally and dorsally, longer laterally; mesoscutum and mesoscutellum with sparse, dark, erect hairs among the dense pale ones. **9)** mesoscutum and mesoscutellum shiny, very finely punctate, punctures more separated in center of mesoscutum (3-4pd), becoming very close, but not crowded, near margins (<2pd); mesoscutellum sparsely punctate basally (>3pd), becoming more densely punctate apically (<2pd); mesopleuron smooth, shiny, larger punctures separated by >2pd, minute punctures unevenly distributed throughout; propodeal triangle coarsely rugosostriate, slightly depressed on either side of the carinate median line, almost as long as mesoscutellum; hypoeimeral area shiny, punctures well separated (2-4pd); propodeal triangle 1.3 times as long as mesoscutellum, shiny and rugosostriate, adjacent lateral areas densely and coarsely punctate; lateral and posterior propodeal surfaces minutely imbricate, anterior lateral and upper posterior areas somewhat shiny. **10)** legs dark, hind trochanter triangularly produced beneath, hind

femur slightly robust, somewhat curved, lower surface flattened and smooth, hind tibia slender basally, becoming somewhat flattened and club-shaped apically, mid tibial spur less than 1/3 as long as mid basitarsus; mid and hind basitarsus slender, parallel-sided, much shorter than tibia, spurs entirely dark. **11)** tegula metallic blue anteriorly, becoming brown-hyaline posteriorly, anterior third sparsely punctate (3pd), nearly impunctate posteriorly, with sparse pale hairs anteriorly and along inner margin. **12)** wings lightly infuscated, veins and stigma brownish-red, recurrent veins entering 2nd submarginal cell about equally distant from base and apex. **Metasoma.** **13)** terga shiny, minutely punctate, punctures well separated on basal areas (~1pd), becoming slightly larger and more separated in apical 3/4 (<3pd), minute punctures sparsely distributed throughout; apical impressed areas shiny, entirely impunctate, somewhat brownish with faint metallic reflections; discal pubescence suberect, thin and obscure, largely pale on the more basal terga, becoming darker and more erect and somewhat conspicuous on the more apical terga. **14)** S1-S5 relatively simple, S2 and S3 and with slightly raised areas laterally, S4 with lateral spine pointed, S5 with lateral spine less produced, S6 with pale basal triangular area flattened and somewhat translucent, ventral process, shiny and bare, slightly curved apically. **15)** genitalia: see **Plate 3, Figures F-G.**

DISTRIBUTION: In Canada, this species is known from southern British Columbia (**Plate 3, Figure E**).

Dufourea marginata (Cresson) (Plate 4)

Panurgus marginatus Cresson, 1878: 62 (♀ description).

Panurgus halictulus Cresson, 1878: 63 (♂ description).

Preoccupied.

Panurgus autumnalis Robertson, 1895: 121 (♀ description).

Dufourea (Halictoides) marginata halictella Michener, 1951: 1132.

DIAGNOSIS: The main diagnostic characters of this species are the presence of yellowish body pubescence, the nearly bare supraclypeal area, impunctate apical triangular area on clypeus, and the dull terga. Those observed in the male: flagellar segments longer than broad and yellow-orange below, and fore and hind trochanters simple. This species is similar to *D. trochantera* in its small size and broad head, however the latter has the male with dark antenna and produced trochanter, and the female with a densely pubescent supraclypeal area and the absence of an impunctate area on clypeus.

Description. FEMALE. Length 7.5-8 mm; black. **Head.** **1)** head slightly broader than long, 1.11:1; compound eyes subparallel; OVD = 1.5MOD, OOD = 2.5MOD, IOD = 2MOD. **2)** supraclypeal area mostly shiny, nearly flat in lateral view, with slightly elevated midline, carinate between antennae; clypeus short and very broad, not markedly convex nor protuberant, rather flattened; paraocular lobe slightly protuberant, shiny and impunctate; labrum much broader than long, largely occupied by the truncate labral process. **3)** mandible bi-dentate. **4)** genal area narrower than compound eye, much narrowed below. **5)** pubescence largely yellow, longest on apical clypeal margin, mandible, lower genal area; supraclypeal area nearly bare. **6)** punctures on upper part of face very fine and close, densely crowded medially (<1pd), becoming shallower and sparser on paraocular area (2-4pd); supraclypeal area covered with minute dense punctures (<1.5pd), with transverse impunctate line; basal half of clypeus with punctures fine and very densely crowded, becoming somewhat coarser below with apical third largely impunctate forming an impunctate triangle; punctures of vertexal area uniformly very fine and densely crowded, with small impunctate shiny areas along outer margin of lateral ocelli; punctures becoming finer on genal area above, separated by 1-2pd anteriorly and 3-4pd posteriorly, lower part of genal area shiny with punctures becoming sparse (>3pd). **7)** IAD slightly smaller than AOD; antennal socket separated from upper margin of clypeus by slightly more than its diameter; antenna dark brown, becoming orange laterally, F1 nearly as long as broad, shorter than pedicel which is slightly elongate, remaining segments broader than long, except apical segment which is slightly longer than broad. **Mesosoma.** **8)** pubescence largely yellow on dorsal mesosoma, whitish-yellow on lateral mesosoma, legs, longest on fore and hind femur, hind tibia, and mesopleuron; mesoscutum with long sparse hairs among dense short hairs covering surface, mesoscutellum and metanotum with long branched hairs, longer than those on mesoscutum. **9)** mesoscutum dull, densely tessellate, punctures extremely crowded, separated by <1pd throughout; punctures on mesoscutellum similar to those of mesoscutum but slightly more separated (1-2pd) becoming crowded medially, slightly depressed medioapically; mesopleuron shiny, finely and quite closely punctate, punctures separated by <1pd posteriorly, becoming slightly obscure centrally and sparse anteriorly; hypopimeral area strongly imbricate on upper ¼, punctures dense (<1pd), becoming sparser apically (1-2pd); propodeal triangle ¾ as long as mesoscutellum, minutely imbricate, very finely rugosostriate, striations most obvious laterally, but becoming smooth along apical and lateral margins; lateral and posterior propodeal surfaces somewhat shiny, with minute but very obscure

punctures. **10)** legs brown, basitarsus hyaline yellow, more apical tarsal segments somewhat reddened, mid tibial spur about 1/3 as long as mid basitarsus. **11)** tegula dull brownish-yellow to hyaline with long hairs covering surface, anteriorly dull and sparsely punctate, becoming shiny and impunctate posteriorly. **12)** wings whitish, veins and stigma pale brownish-yellow, recurrent veins entering 2nd submarginal cell subequally distant from base and apex. **Metasoma.** **13)** terga shiny with minute imbrications, minutely and quite closely punctate, especially on T1 and T2 where punctures are deep and distinct (2-4pd), becoming shallow on the more apical terga (>3pd), becoming sparser and somewhat obscure on T4-T5; apical impressed areas yellowish-hyaline and impunctate; discal pubescence very short, suberect, entirely pale, becoming longer and denser laterally on apical impressed areas, more copious on T4-T5. **14)** sterna dull, closely punctate (1-2pd) in apical half, with basal areas yellowish-hyaline and impunctate, widest medially, narrowing laterally.

MALE. Length 8-8.5 mm; black. **Head.** **1)** head broader than long; compound eyes short, subparallel; OVD = 1.5MOD, OOD = 2MOD, IOD = 2.5MOD. **2)** supraclypeal area dull and nearly flattened in lateral view; clypeus somewhat protuberant, very broad and short, densely pubescent; labrum shiny, much broader than long. **3)** mandible bi-dentate. **4)** genal area above narrower than compound eye and much narrowed below. **5)** pubescence pale yellowish, quite copious, longest on lower genal area and vertexal area; supraclypeal area and clypeus densely covered in golden-white hairs, lower paraocular area with dense hairs only lowermost area; long dark hairs among pale ones on scape and vertexal area. **6)** face between ocelli and antennae with very fine and densely crowded punctures (<1pd), becoming larger and somewhat more coarse between antenna and compound eye (~1pd); supraclypeal area coarsely and densely punctate (1pd), punctures obscured by dense pubescence except for impunctate transverse line; clypeus with coarse, deep and close punctures mainly hidden beneath the dense pubescence, punctures separated by <1pd basally and laterally, becoming more sparse medioapically (~2pd); punctures of vertexal area very fine, medially separated by 1-3pd, becoming deeper and closer laterally (<2pd), with small impunctate shiny areas along outer margin of lateral ocelli; genal area above with minute and very close punctures (1-2pd), becoming somewhat more sparse below (>2pd). **7)** IAD much smaller than AOD (1.5X), antennal socket separated from upper margin of clypeus by more than its diameter; F1 very slightly longer than broad, slightly longer than pedicel and half as long as F2, F2 about twice as long, following segments somewhat shorter, dark

brown above, golden yellow beneath. **Mesosoma. 8)** pubescence pale yellowish-white, quite copious; longest near basal margin of mesoscutum, mesopleuron, and mesoscutellum. **9)** mesoscutum rather dull, punctures very fine, densely crowded (<1pd), punctures becoming more separated laterally past parapsidal line (2-3pd); mesoscutellum with a very shallow, median depression, punctures very fine and dense throughout, separated by ~1pd; mesopleuron shiny, punctures minute and well separated (>2pd); hypoeimeral area strongly imbricate on upper ¼, punctures dense but becoming sparse apically; propodeal triangle subequal in length to mesoscutellum, minutely imbricate, very finely and irregularly striate, lateral striations distinct and well separated, margin rounded and smooth; lateral and posterior propodeal surfaces smooth and somewhat shiny, punctures quite close, shallow and rather indefinite, separated by 1-2pd. **10)** legs mostly brown, apical tarsal segments becoming yellowish hyaline; hind femur and tibia slender and simple, mid tibial spur about 1/3 as long as mid basitarsus; hind basitarsus slender, about 4 times as long as broad. **11)** tegula slightly reddened, outer margin more yellowish-hyaline; anterior half imbricate with fine punctures (2-4pd), becoming sparse posteriorly where surface is shiny; with long white hairs along surface. **12)** wings whitish, veins and stigma pale golden brown, recurrent veins entering 2nd submarginal cell subequally distant from base and apex. **Metasoma. 13)** metasomal terga smooth but dull, minutely and closely punctate (<1pd), apical depressed margins hyaline, slightly brownish basally becoming yellow at apical margin, slightly dulled and not entirely translucent, entirely impunctate; discal pubescence thin, short and obscure, entirely pale even on the more apical terga, becoming rather elongate and dense on T6. **14)** sterna dulled and roughly punctate throughout; S1-S5 simple and unmodified; S6 somewhat narrowed apically, with a narrow, elongate, median process, with wider projections laterally, densely pubescent, apical margin with a fringe of long pubescence. **15)** genitalia: see **Plate 4, Figures F-G.**

DISTRIBUTION: In Canada, this species is known from southern British Columbia to Ontario (**Plate 4, Figure E**).

***Dufourea maura* (Cresson) (Plate 5)**

Panurgus maurus Cresson, 1878: 61 (“♀” = ♂ description).

DIAGNOSIS: The main diagnostic characters of this species are black body pubescence, shorter clypeus, shiny

propodeal triangle, and sparsely punctate mesoscutellum. Those observed only in the male: simple hind femur and hind tibia, hind femur with basoventral spine, and the central process in S6 is angulate. This species is similar to *D. dilatipes* in its large size and broad head, however the latter has brown body pubescence, longer clypeus, dull propodeal triangle, and densely punctate mesoscutellum; the male has expanded hind legs and the central process in S6 is gradually curved.

Description. FEMALE. Length 9.5 - 10mm; black. **Head. 1)** head considerably broader than long, 1.27:1; compound eyes subparallel; OVD = 2.5MOD, OOD = 3MOD, IOD = 2MOD. **2)** supraclypeal area markedly convex and protuberant, somewhat dulled medially, lower margin rounded; clypeus mostly shiny, slightly dulled laterally, apically protuberant, considerably broader than long (2.5 times), apical margin horizontally straightened; epistomal sutures extending to compound eye; labrum much broader than long, almost fully exposed, mandibles fitting beneath the large labral process when closed. **3)** mandible bi-dentate. **4)** genal area above subequal in breadth to compound eye in lateral view, becoming very narrow below. **5)** pubescence rather short, quite thin and inconspicuous, dark in general; black erect pubescence covering supraclypeal area above level of lower margin of antennal sockets; area between lower margins of antennal sockets and upper margin of clypeus largely bare. **6)** punctures coarse, deep and well separated over most of clypeus (1-3pd); apically deep and well separated (~1pd) on the markedly convex supraclypeal area, becoming fine and extremely dense basally; distinct, dense and rather fine on upper part of face below ocelli (<1pd), becoming less dense just below, between antennae and eyes where the surface is shiny (<2pd); punctures minute and slightly separated over most of vertexal area (<1pd), upper part of genal area similar in punctuation to vertexal area, punctures becoming finer and sparse (2-3pd) on shiny lower surface of genal area lateral to hypostomal carina. **7)** IAD greater than AOD, antennal socket separated from upper margin of clypeus by slightly less than its diameter, flagellomeres wider than long except F1 nearly as wide as long, F10 slightly longer than wide. **Mesosoma. 8)** pubescence rather long, dark and erect, quite thin and inconspicuous, well separated throughout mesoscutum, not obscuring surface below; lateral pronotal areas and pronotal lobes covered in shorter more dense pubescence. **9)** mesoscutum somewhat shiny, punctures of two sizes, smaller punctures fine and close laterally (≤ 1pd), becoming finer and crowded along extreme anterior and lateral edges, larger punctures separated by 2-3pd, becoming sparse in center of disc, especially posteriorly (~3pd), but not crowded even between notaulice and tegula; mesoscutellum mostly shiny, very faintly

impressed medially, punctures large more dense apically and laterally where the surface is somewhat dulled (1-2pd), basally shiny and impunctate; mesopleuron mostly shiny becoming dull anteriorly, with punctures minute and rather close (1-2pd), larger punctures separated by 2-4pd; hypoepimeral area shiny, punctures dense (1-2pd) becoming sparse on lower 1/3; propodeal triangle 2/3 as long as mesoscutellum, shiny, rather finely and completely striate or reticulate, adjacent dorsolateral surface densely punctate (1-2pd), punctures of two sizes, lateral propodeal surface anteriorly shiny becoming dull and imbricate posteriorly, punctures separated by 4-5pd. **10)** legs black basally, becoming somewhat reddened on the more apical tarsal segments; spurs, especially the mid and hind pair, very long and slender, entirely dark, becoming slightly reddened apically; mid tibial spur $\frac{3}{4}$ as long as mid basitarsus. **11)** tegula black in large part, becoming somewhat yellowish-hyaline along margin, dull and obscurely punctate anteriorly, becoming shiny and impunctate posteriorly, with a few dark thin hairs near anterior margin. **12)** wings lightly infuscated, veins and stigma more brownish-red, recurrent veins entering 2nd submarginal cell about equally distant from base and apex. **Metasoma. 13)** terga smooth, the more basal terga shiny, T1-T3 with small well separated punctures (>3 pd), T4-T5 with somewhat coarser and denser, evenly distributed punctures (>1.5 pd); apical impressed areas smooth and impunctate, dark brown, nearly uniform in colour to basal areas, slightly reddish, discal pubescence very short and obscure, suberect, dark, becoming somewhat dark brown-black on the more apical terga. **14)** sterna with dark, erect apical pubescence, becoming more dense on apical sterna; S1 with sparse pubescence basally, S2 and S3 with long pubescence laterally and short to bare centrally, S5 with dense pubescence, becoming longer apically.

MALE. Length 10 mm; black. **Head. 1)** head much broader than long, 1.33:1; compound eyes very slightly convergent below; distance from lateral ocellus to vertex = 2.5MOD, distance from lateral ocellus to compound eye = 3.5MOD, distance between lateral ocelli = 2.5MOD. **2)** clypeus flattened, nearly 3 times as broad as long; labrum much broader than long, entirely exposed by the closed mandibles. **3)** mandible bi-dentate. **4)** genal area slightly broader than compound eye, slightly narrowed below. **5)** pubescence largely dark black, some pale hairs on genal area; longest hairs on mandible, lower genal area, and apical clypeal margin, most dense on supraclypeal area between antennae. **6)** punctures below ocelli fine and densely crowded (<1 pd), becoming much more coarse and relatively sparse toward antenna on each side (<2 pd), the strongly convex supraclypeal area with very close punctures, clypeus with shallow and rather close

punctures (<2 pd) becoming crowded laterally; punctures of vertexal area fine, somewhat more separated medially than on face, becoming well separated on each side, genal area above closely and rather obscurely punctate, the lower part becoming shiny and impunctate. **7)** IAD slightly larger than AOD, antennal socket separated from margin of clypeus by much less than its diameter; F1 about as broad as long, slightly longer than pedicel and as long as F2, F2 fully twice as long as broad, median and apical segments only slightly longer than broad, F6-F11 laterally rounded, giving a bumpy appearance to the apical half of antenna. **Mesosoma. 8)** pubescence dark laterally, largely dark brown-black on dorsum of mesosoma, less dense centrally, mesopleuron entirely bare. **9)** mesoscutum and mesoscutellum shiny, very finely and rather irregularly punctate, punctures somewhat separated in center of discs (2-4pd), becoming very close but not crowded at extreme sides (<2 pd); mesopleuron angulate anteriorly, shiny and smooth, punctures fine (2-3pd), hypoepimeral area shiny and smooth, punctures dense (1-2pd), lower 1/3 impunctate; propodeal triangle 2/3 as long as mesoscutellum, shiny, finely and completely striate or reticulate, adjacent dorsolateral surface densely punctate (1-2pd), punctures of two sizes, lateral propodeal surface anteriorly shiny becoming dull and imbricate posteriorly, punctures separated by 4-5pd. **10)** legs black, hind femur relatively slender but somewhat curved, lower surface flattened and smooth, length about 2 times greatest width, possessing a basal spine near margin with trochanter; hind tibia slender basally with a slight widening in apical half, becoming somewhat club-shaped apically, lower surface flattened and smooth; hind basitarsus slender, parallel-sided, much shorter than tibia; mid tibial spur about 0.7 times as long as mid basitarsus. **11)** tegula brownish-hyaline centrally, dark and dull anteriorly, becoming shiny posteriorly. **12)** wings lightly infuscated, veins and stigma brownish-red, recurrent veins entering 2nd submarginal cell about equally distant from base and apex. **Metasoma. 13)** terga somewhat shiny, minutely punctate, punctures more dense and fine near basal margin (2-3pd) becoming more sparse apically; apical impressed areas entirely impunctate, more or less reddened; discal pubescence, suberect, thin and obscure, largely pale on the more basal terga, becoming more erect, conspicuous and dark brown-black on the more apical terga. **14)** S1-S5 relatively simple, S3 flattened with a lateral spine, S4 with slightly protruding lateral areas, centrally flattened with lateral spine as in S3, S5 with apical margin rather broadly concave, concavity not as deep as in *D. dilatipes*, S6 with central protrusion angulate, with a pair of short, oblique, subapical carinae and a median, apical process, on each side of which the margin is slightly produced, yellowish-hyaline, pubescence dark, long and well separated. **15)** genitalia: see **Plate 5, Figures F-G.**

DISTRIBUTION: In Canada, this species is known from southern British Columbia to Ontario (**Plate 5, Figure E**).

***Dufourea monardae* (Viereck) (Plate 6)**

Conohalictoides monardae Viereck, 1924: 14 (♂, ♀ description).

DIAGNOSIS: The main diagnostic characters of this species are the longer head, parallel sided mid basitarsus, mid tibial spur less than half as long as mid basitarsus, and absence of erect bristles on tongue. Those observed in the male: hind trochanter ventrally convex, S5 with apical margin straight, and S6 with non-carinate sublateral swellings. This species is most similar to *D. novaengliae* in its small size and long head, however the latter has a convex outer margin on mid basitarsus, mid tibial spur more than ¾ as long as mid basitarsus, and presence of erect bristles on the tongue; the male has S5 with apical margin deeply concave and S6 with carinate sublateral swellings.

Description. FEMALE: Length 6.5-7 mm; black. **Head. 1)** head longer than broad, 0.88:1; compound eyes subparallel; OVD = 1.5MOD, OOD = 2.5MOD, IOD = 2.5MOD. **2)** supraclypeal area protuberant, especially between antennae; clypeus about twice as broad as long, strongly protuberant; labrum much broader than long, largely exposed by the closed mandibles. **3)** mandible bi-dentate. **4)** genal area above narrower than compound eye, becoming very narrowed below. **5)** pubescence white, and sparse on supraclypeal, paraocular, vertexal, and genal areas, longest on genal area; dark erect hairs short on frontal area and long on clypeus; mixed pale and dark hairs on scape. **6)** head shiny, area just below ocelli very finely and closely punctate (1-2pd); punctures very sparse on paraocular area (3-5pd), becoming more densely and finely punctate on lower paraocular area, especially around antennal socket; supraclypeal area shiny, strongly protuberant, with dense fine punctures laterally and basally between antennae (1-2pd), becoming sparse medially and apically; punctures of clypeus considerably coarser and rather sparse (>2pd) becoming nearly impunctate apically, surface shiny; punctures of vertexal area close, but considerably deeper and more distinct than those below ocelli (1-2pd), becoming minute, rather vague and obscure on upper part of genal area (>2pd), lower part smooth, shiny and nearly impunctate. **7)** IAD subequal to AOD, antennal socket separated from upper margin of clypeus by no more than its diameter, segments of flagellum slightly broader than

long or about as broad as long except for F1 and F10, longer than broad. **Mesosoma. 8)** pubescence very thin, short, entirely white, longest on mesopleuron, lateral and posterior propodeal areas, and lateral mesoscutellum. **9)** mesoscutum shiny with punctures of two sizes, smaller punctures more dense (1-2pd), larger punctures separated by >2pd, punctuation dense apically and laterally between parapsidal line and tegula, separated by <2pd, punctures somewhat more sparse in central disc; mesoscutellum with punctures deep, sparse, smaller and more dense medially (1-2pd), surface smooth; mesopleuron smooth and shiny, with minute, well separated punctures (<3pd), larger punctures anteriorly, smaller punctures posteriorly; hypoepimeral area minutely imbricate on upper ¼ where punctures are dense but somewhat obscure, becoming shiny and sparsely punctate below; propodeal triangle ¾ as long as mesoscutellum, imbricate and rugose, adjacent lateral surface shiny, finely and sparsely punctate; lateral and posterior propodeal surfaces shiny but minutely imbricate, punctures fine and dense. **10)** legs entirely blackish to dark brown; mid basitarsus parallel sided, about 2 times as long as tibial spur. **11)** tegula dark brown on anterior third and along inner margin, with dense punctures, becoming brownish-hyaline posteriorly where surface is shiny and impunctate. **12)** wings subhyaline, slightly darker apically, veins and stigma brownish-red; 2nd recurrent vein entering 2nd submarginal cell considerably nearer its tip than 1st recurrent vein is to base. **Metasoma. 13)** terga smooth and shiny; T1 finely and sparsely punctate; T2-T3 with punctures of two sizes, minute punctures more dense than larger ones, larger punctures well separated laterally (>4pd) becoming more dense medially (2-3pd), apical impressed areas impunctate; T4-T5 more coarsely punctate, punctures only of larger size; discal pubescence short on T1-T3, mostly pale, becoming dark and dense on T4-T5, entire disc of T5 with long hairs. **14)** sterna somewhat imbricate, basally impunctate, punctures on apical third separated by 1-2pd, apical margin medially impunctate on S1-S5; apical pubescence pale, thin, and erect.

MALE: Length 6-7 mm; black. **Head. 1)** head longer than broad, 0.87:1; compound eyes short relative to head length, very slightly convergent below; OVD = 1.5MOD, OOD = 2MOD, IOD = 2MOD. **2)** supraclypeal area protuberant, especially between antennae; clypeus strongly protuberant, broader than long, entire length below level of compound eyes; labrum broader than long. **3)** genal area slightly narrower than compound eye, much narrowed below. **4)** mandible bi-dentate. **5)** pubescence white and long on clypeus, supraclypeal area, and vertex; short and dark erect hairs on frontal area and paraocular area; mixed pale and dark hairs on scape; supraclypeal area densely pubescent with vertical fringe between

antennae, extending to bare depressed area above antenna. **6)** face shiny, punctures deep and distinct, fine and close medially below ocelli (<1pd), becoming more sparse on paraocular area (>2pd); area above antennae centrally depressed, dull and impunctate; supraclypeal area with dense punctures beneath dense pubescence (\leq 1pd), becoming impunctate near apical margin and on lateral corners; punctures on clypeus coarser and larger than those on supraclypeal area, quite close basally (\leq 1pd) becoming sparser toward apical margin (>2pd); vertexal area shiny, punctures minute and well separated medially (2-3pd), becoming deeper, more distinct and close laterally (<2pd); genal area shiny, minutely punctate above (1-2pd), becoming nearly impunctate below lateral to hypostomal carina; **7)** IAD subequal to AOD, antennal socket separated from upper margin of clypeus by slightly more than its diameter; F1 covered in short, appressed, dark hairs, as long as broad, slightly shorter than pedicel, and about a third as long as F2, remaining segments much longer than broad (~2X), F5-F11 with basal depression. **Mesosoma.** **8)** pubescence entirely pale and thin, longest on mesoscutellum and mesopleuron; metanotum and lateral propodeal surface bare. **9)** mesoscutum shiny, punctures separated by 1-2pd, becoming slightly sparser apically; mesoscutellum convex, medially depressed, punctures deep and coarse (1-2pd); mesopleuron shiny, puncture of two sizes, small punctures very fine and quite sparse (>3pd), dense on posterior margin (~1pd), larger punctures deeper and most evident anteriorly (<2pd); hypoepimeral area minutely imbricate on upper $\frac{1}{4}$ where punctures are dense but somewhat obscure, becoming shiny and sparsely punctate below; propodeal triangle $\frac{3}{4}$ as long as scutellum, finely rugose, adjacent dorsolateral surface shiny, finely and minutely punctate; lateral and posterior propodeal surfaces imbricate, anterior lateral area somewhat shiny with shallow sparse punctures, punctures becoming dense and somewhat obscure posteriorly. **10)** legs dark brown, hind leg quite slender and unmodified except for trochanter ventrally convex; mid tibial spur less than half as long as mid basitarsus. **11)** tegula brown and shiny, anterior third punctate (2-3pd), somewhat hyaline posteriorly and impunctate, with pale hairs anteriorly. **12)** wings lightly infuscated, veins and stigma brownish, 2nd recurrent vein entering 2nd submarginal cell considerably nearer its tip than 1st recurrent vein is to base. **Metasoma.** **13)** terga smooth and shiny, punctures of two sizes, small punctures extremely fine and well separated basally (3-5pd), becoming largely absent apically, larger punctures deeper and more separated on T1-T3 (>4pd) but denser on T4-T6 (2-3pd); impressed apical areas entirely impunctate, somewhat reddened and hyaline; discal pubescence short, more conspicuous laterally, mostly pale with some erect dark hairs on T4-T6, especially on apical areas.

14) S1-S4 simple and unmodified, apical margin of S5 very slightly concave, S6 with a sublateral swellings and a short, medioapical process. **15)** genitalia: see **Plate 6, Figures F-G.**

DISTRIBUTION: In Canada, this species is known from only a few specimens in southern Ontario (Caledon, St. Catharines, St. Lawrence Islands National Park) (**Plate 6, Figure E**).

Dufourea novaeangliae (Robertson) (Plate 7)

Panurgus novae-angliae Robertson, 1897: 339 (♂ description).

Conohalictoides lovelli Viereck, 1904: 245 (♀, ♂ description).

DIAGNOSIS: The main diagnostic characters of this species are the longer head, convex outer margin of mid basitarsus, mid tibial spur less more than $\frac{3}{4}$ as long as mid basitarsus, and presence of erect bristles on tongue. Those observed in the male: hind trochanter ventral acute cone, S5 with apical margin deeply concave, and S6 with carinate sublateral swellings. This species is most similar to *D. monardae* in its small size and long head, however the latter has a parallel sided mid basitarsus, mid tibial spur less than half as long as mid basitarsus, and absence of bristles on the tongue; the male has S5 with apical margin nearly straight and S6 with non-carinate sublateral swellings.

Description. FEMALE: Length 7.5-8 mm; black. **Head.** **1)** head longer than broad, 0.93:1; compound eyes subparallel; OVD = 1.7MOD, OOD = 2.3MOD, IOD = 2.7MOD. **2)** supraclypeal area protuberant, with frontal line terminating above antenna, but appearing again as a suture extending to lower margin of antennal socket (1.2MOD); clypeus strongly protuberant, broader than long, breadth about 1.5X length; labrum broader than long, mandibles fitting beneath the large labral process when closed. **3)** mandible bi-dentate. **4)** genal area narrower than compound eye, much narrowed below. **5)** pubescence rather short, quite thin and inconspicuous, pale on clypeus, supraclypeal area, scape, lower paraocular area, and vertexal area, dark hairs on frontal area and clypeus; longest hairs on clypeal apical margin, genal and vertexal areas; stipes, prementum and first segment of labial palpus with numerous suberect bristles. **6)** punctures deep, distinct, close and rather fine on upper part of face below ocelli (\leq 1pd), becoming very sparse on paraocular area, where surface is very shiny and smooth; supraclypeal area markedly convex with very fine and close punctures, dense laterally and basally

between antennal sockets (≤ 1 pd) becoming larger and more sparse medioapically (> 1 pd); coarse, deep and well separated over most of clypeus becoming sparse apically (> 3 pd); vertexal area with punctures minute, separated by 2-4pd above ocelli, becoming somewhat closer and more obscure laterally (< 1.5 pd); upper part of genal area with punctures separated by 1-2pd, becoming more sparse in lower surface lateral to hypostomal carina (> 3 pd). **7)** IAD subequal to AOD, antennal socket separated from upper margin of clypeus by slightly more than its diameter; flagellar segments considerably broader than long, except F10 nearly as long as broad. **Mesosoma. 8)** pubescence pale, hairs of two sizes, short erect hairs with scattered longer branched hairs most dense near margins and laterally, longest on pronotum, pronotal lobe, lateral mesoscutellum and on mesopleuron. **9)** mesoscutum shiny, punctures of two sizes, smaller punctures fine and dense throughout (≤ 2 pd), larger punctures deeper and well separated, punctures becoming sparse in center of disc, but not crowded even between parapsidal line and tegula; mesoscutellum shiny, very faintly medially impressed, punctures sparse on disc (3-5pd), denser laterally (1-2pd); mesopleuron shiny, punctures of two sizes, larger punctures deep and sparse (≥ 2 pd), smaller punctures shallow and more dense, especially near posterior margin; hypoepimeral area very slightly imbricate on upper $\frac{1}{4}$, otherwise completely shiny, punctures dense (1-2pd); propodeal triangle 0.7 times length of mesoscutellum, shiny and rugose, with a median carinate line, adjacent dorsolateral surface imbricate and minutely punctate (2pd); lateral and posterior propodeal surfaces imbricate, lateral surface anteriorly impunctate, posterior $\frac{2}{3}$ with sparse punctures (3-5pd), posterior surface with punctures denser above (2-3pd), somewhat obscure below. **10)** legs dark, spurs, especially the mid and hind, very long and slender, yellowish at base, somewhat reddened apically. **11)** tegula dark and shiny in large part, slightly dulled anteriorly. **12)** wings lightly infuscated, veins and stigma more brownish-red, recurrent veins entering 2nd submarginal cell about equally distant from base and apex. **Metasoma. 13)** terga quite smooth and shiny, T1-T3 with minute and well separated punctures (> 4 pd), T2-T3 with punctures denser basally, becoming more sparse apically, T4-T5 with larger, coarser and rather close, evenly distributed punctures (2-3pd); apical impressed areas smooth and impunctate, brown becoming more or less yellowish apically; discal pubescence very short and obscure, suberect and pale, becoming darker on the more apical terga. **14)** sterna shiny, coarsely punctate, similar to punctation of T4-T5, apical hyaline areas narrowed laterally becoming widened medially, pubescence pale and erect, S5 with pubescence darker and thicker than S1-S4.

MALE: Length 7 mm; black. **Head. 1)** head longer than broad, 0.93:1; compound eyes slightly convergent below; OVD = 1.2MOD, OOD = 2.2MOD, IOD = 2.2MOD. **2)** supraclypeal area protuberant, strongly between antennae; clypeus strongly protuberant, broader than long; labrum much broader than long, entirely exposed by the closed mandibles. **3)** mandible bi-dentate. **4)** genal area narrower than compound eye, very much narrowed below. **5)** pubescence largely dark above antenna, pale on clypeus, supraclypeal area and between antennae. **6)** punctures below ocelli fine and densely crowded, becoming more widely separated laterally (≥ 1 pd), larger on paraocular area; the strongly convex supraclypeal area imbricate, densely and coarsely punctate (≤ 1 pd), punctures largely hidden beneath the pubescence; clypeus shiny with large, shallow, and rather coarse punctures beneath the dense pubescence, punctures separated by 1-2pd basally slightly more sparse apically; vertexal area with punctures fine, sparse medially above ocelli (> 2 pd) becoming more dense laterally (1-2pd), well separated toward inner margin of compound eye on each side (3-4pd); genal area shiny, closely punctate above (1-2pd), sparsely punctate below (> 3 pd). **7)** IAD subequal to AOD, antennal socket separated from margin of clypeus by more than its diameter; F1 covered in short, appressed, dark hairs, about as broad as long, slightly longer than pedicel and less than half as long as F2, F2 twice as long as broad, median and apical segments not quite so long, F2-F11 laterally curved, F5-F11 with basal depression. **Mesosoma. 8)** pubescence yellowish-white, longest on pronotum, pronotal lobe, mesoscutellum, mesopleuron, lateral and posterior propodeum. **9)** mesoscutum shiny, punctures of two sizes, smaller punctures fine and dense throughout (≤ 2 pd), larger punctures deeper and well separated in general, punctures becoming sparse in center of disc, but not crowded even between parapsidal line and tegula; mesoscutellum shiny, very faintly impressed medially, punctation similar to central area of mesoscutum, punctures sparsely distributed; mesopleuron somewhat shiny, punctures of two sizes, larger punctures deep and sparse (≥ 2 pd), smaller punctures shallow and dense, especially near posterior margin; hypoepimeral area very slightly imbricate on upper $\frac{1}{4}$, otherwise completely shiny, punctures dense (1-2pd); propodeal triangle 0.6 times length of mesoscutellum, shiny and coarsely rugose, adjacent dorsolateral area densely punctate (1pd); posterior and lateral propodeal surfaces minutely imbricate, with sparse punctures (3-5pd), except anterior $\frac{1}{3}$ of lateral surface impunctate. **10)** legs dark, hind trochanter triangularly produced ventrally, forming acute cone; hind femur slightly rounded, lower surface flattened and smooth, hind tibia slender basally, becoming somewhat club-shaped apically, hind basitarsus slender, shorter than tibia. **11)** tegula brownish,

slightly dulled anteriorly, with sparse dark erect hairs, posteriorly shiny and impunctate. **12)** wings infuscated, veins and stigma brownish, 1st and 2nd recurrent veins entering 2nd submarginal cell about equally distant from base and apex. **Metasoma.** **13)** terga shiny, minutely punctate, T1-T3 with dense minute punctures basally (1-2pd), becoming more sparse apically (>3pd); T4-T6 more coarsely and sparsely punctate (2-4pd); apical impressed areas entirely impunctate, opaque, uniform in colour to rest of disc; discal pubescence suberect, most evident laterally, central area of discs nearly bare, largely pale on T1-T3, becoming denser, erect, conspicuous and dark on T4-T6, especially apically. **14)** sterna with minute and close punctures basally, becoming larger and more sparse apically; S1-S5 relatively simple, apical margin of S5 deeply concave, S6 with sublateral swellings carinate, and a medioapical process. **15)** genitalia: see **Plate 7, Figures F-G.**

DISTRIBUTION: In Canada, this species is known from Ontario, Quebec, and Nova Scotia (**Plate 7, Figure E**).

***Dufourea trochantera* Bohart (Plate 8)**

Dufourea trochantera Bohart, 1948: 121 (♂, ♀ description).

DIAGNOSIS: The main diagnostic characters of this species are the presence of whitish body pubescence, densely pubescent supraclypeal area, convex and punctate clypeus, and the shiny terga. Those observed in the male: flagellar segments black-brown and produced fore and hind trochanters. This species is similar to *D. marginata* in its small size and wide head, however the latter has a bare supraclypeal area and an apical impunctate area on clypeus; the male has the antenna pale below and simple fore and hind trochanters.

Description. FEMALE: Length 7.5-8 mm; mostly black, except head above antennae usually with metallic blue tint. **Head.** **1)** head slightly broader than long, 1.13:1; compound eyes subparallel; OVD = 1MOD, OOD = 2MOD, IOD = 2.4MOD. **2)** supraclypeal area slightly protuberant between antennae; clypeus strongly protuberant, considerably broader than long, with apical margin curved; labrum much broader than long, almost fully exposed, mandibles fitting beneath the large labral process when closed. **3)** mandible bidentate. **4)** genal area above narrower than compound eye, slightly narrower below. **5)** pubescence quite thin and inconspicuous, largely whitish, but some dark erect hairs on vertexal area, frontal area below ocelli, and on

antennal scape, longest on genal area, lower paraocular area, antennal scape, and apical margin of clypeus. **6)** punctures deep, distinct and close on upper part of face below ocelli ($\leq 1\text{pd}$), becoming more sparse on paraocular area where the surface is shiny (1-2pd); very fine and close ($\leq 1\text{pd}$) on the slightly convex supraclypeal area, becoming smaller and crowded laterally, slightly more sparse medially ($> 2\text{pd}$); clypeus with punctures coarse and deep, separated by 1-3pd; punctures minute and slightly separated over most of vertexal area (1-2pd), coarser medially; upper part of genal area with punctures fine and separated by 1-2pd, lower surface of genal area lateral to hypostomal carina shiny with punctures much more sparse ($> 2\text{pd}$). **7)** IAD subequal to AOD, antennal socket separated from upper margin of clypeus by its diameter; flagellar segments considerably broader than long except for F10, as broad as long. **Mesosoma.** **8)** pubescence short and copious on mesoscutum laterally and apically, otherwise quite thin and inconspicuous, largely pale, longest on metanotum, mesopleuron, and on lateral propodeum. **9)** mesoscutum shiny, punctures fine, and dense ($\sim 1\text{pd}$), becoming sparser in center of disc posteriorly (2-3pd), but not crowded even between parapsidal line and tegula; mesoscutellum shiny, punctures large and well separated (2-3pd), with a dense medial line of smaller fine punctures, these also dense near basal margin ($\leq 1\text{pd}$); mesopleuron somewhat shiny, punctures of two sizes, larger punctures deep and sparse ($\geq 2\text{pd}$), smaller punctures shallow and more dense, especially near posterior margin; hypoepimeral area shiny, punctures denser above (2-3pd) becoming sparse toward lower margin, lowermost area nearly impunctate; propodeal triangle about half as long as mesoscutellum, shiny and finely striate or reticulate; lateral and posterior propodeal minutely imbricate, becoming coarser posterolaterally, anterior third of lateral surface with punctures very minute, otherwise with sparse coarse punctures (2-3pd), denser on upper posterior surface (1-2pd). **10)** legs dark basally, becoming somewhat reddened on the more apical tarsal segments; spurs, especially the mid and hind pair, very long and slender, yellowish at base, becoming reddened apically; mid tibial spur with few distinct and well separated teeth. **11)** tegula dark in large part, shiny, densely and finely punctate on anterior third, becoming posteriorly impunctate; long pale yellow hairs on anterior and inner margins. **12)** wings lightly infuscated, veins and stigma more brownish-red, 1st recurrent vein entering 2nd submarginal cell closer to base than distance of 2nd recurrent vein to apex. **Metasoma.** **13)** terga quite smooth and shiny, with minute and dense punctures; T1-T3 with dense punctures basally ($\sim 1\text{pd}$) becoming sparser apically ($> 2\text{pd}$); T4-T5 with punctures somewhat coarser, separated by 1-3pd; apical impressed areas yellowish-hyaline, with minute and

sparse punctures; T2-T5 with white basal hair bands, T4-T5 with dense hairs on apical impressed area, these also present on T2-T3 only laterally; discal pubescence very short and obscure, suberect, pale, longest on lateral T4 and disc of T5. **14**) sterna with basal half impunctate, apical half punctate (1-3pd; S2 slightly depressed beyond basal margin, forming a ridge centrally.

MALE: Length 7 mm; mostly black, except head above antennae usually with metallic blue tint. **Head.** **1)** head slightly broader than long, 1.14:1; compound eyes very slightly convergent below; OVD = 1.5MOD, OOD = 2.3MOD, IOD = 2MOD. **2)** supraclypeal area strongly protuberant between antennae, flat below; clypeus strongly protuberant, broader than long; labrum broader than long, shiny and apically rounded, entirely exposed by the closed mandibles. **3)** mandible bi-dentate. **4)** genal area narrower than compound eye and very much narrowed below. **5)** pubescence whitish on face, only few dark hairs evident on antennal scape; dense on clypeus and supraclypeal area, entirely covering surface below, slightly less dense on paraocular area and scape; longest on genal area, scape, and vertexal area. **6)** punctures deep, distinct and densely crowded on upper part of face below ocelli (≤ 1 pd), sparser on paraocular area (1-3pd); the strongly convex supraclypeal area densely pubescent below antennae, punctures fine and dense (≤ 1 pd), largely hidden beneath the pale pubescence, slightly more separated between antennae and directly above; clypeus with coarse and close punctures beneath the dense pubescence (< 1 pd); punctures of vertexal area coarse, somewhat more obscure medially than on face and separated by 1-2pd, with impunctate area along outer margin of lateral ocelli larger than in female; genal area shiny, punctures fine and well separated posteriorly (1-2pd), becoming very sparsely punctate anteriorly (> 3 pd). **7)** IAD subequal to AOD, antennal socket separated from margin of clypeus by more than its diameter (1.5X); F1 slightly longer than broad, nearly twice as long as pedicel and as long as F2, F2 slightly longer than broad, median segments with breadth subequal to length, apical segments slightly longer, F1-F5 with ventral fringe of short, bent hairs, F4-F11 with smooth basal depression. **Mesosoma.** **8)** pubescence pale whitish throughout, longest on mesopleuron, pronotal lobe, and posterior metanotum; short dense hairs on apical mesoscutum; mesoscutellum with hairs short and sparse

basally, becoming dense and long apically and laterally. **9)** mesoscutum shiny, closely punctate (1-2pd) becoming somewhat sparser on disc (2-3pd); mesopleuron smooth and shiny, punctures minute posteriorly, but coarser anteriorly; hypoepimeral area shiny, punctures fine and dense (1-3pd), becoming sparser toward lower margin where surface is impunctate; propodeal triangle 0.6 times length of mesoscutellum, shiny and rugosostriate; lateral propodeal surface anteriorly shiny becoming strongly imbricate posteriorly, punctures sparse and obscure, posterior propodeal surface shiny becoming minutely imbricate below, punctures well separated (2-4pd). **10)** legs black-black; fore and hind trochanter produced beneath, wedge-shaped; hind femur robust and rounded; hind tibia basally slender, becoming somewhat club-shaped apically, mid tibial spur about half as long as mid basitarsus; hind basitarsus apically widened, about 1.5 times as long as apical breadth, much shorter than tibia. **11)** tegula shiny brown; finely punctate on inner anterior half (2-3pd), punctures becoming sparse posteriorly and towards outer edge; with long white hairs on outer anterior half and some short hairs on posterior edge. **12)** wings lightly infuscated, veins and stigma brownish-red, recurrent veins entering 2nd submarginal cell about equally distant from base and apex. **Metasoma.** **13)** terga shiny, punctures of two sizes, smaller punctures minute and extremely fine, larger punctures deeper, dense basally (< 2 pd) becoming well separated in apical 2/3 (2-4pd); apical depressed area impunctate, hyaline-yellow; discal pubescence suberect, entirely pale whitish, forming apical fasciae, sometimes medially interrupted on T2-T3, entirely absent on T1. **14)** sterna shiny, punctures fine medially becoming deeper and more distinct laterally where punctures are evenly distributed by ≤ 2 pd; S1-S5 relatively simple, S2-S4 with lateral swellings, very weak on S2, S4 with a medial depression, apical margin of S5 with a medial process with long, thin, white pubescence on apex, S6 with a medioapical process, ventrally concave, with apex pointed. **15)** genitalia: see **Plate 8, Figures F-G.**

DISTRIBUTION: In Canada, this species is known from southern British Columbia (and probably Alberta) (**Plate 8, Figure E**).

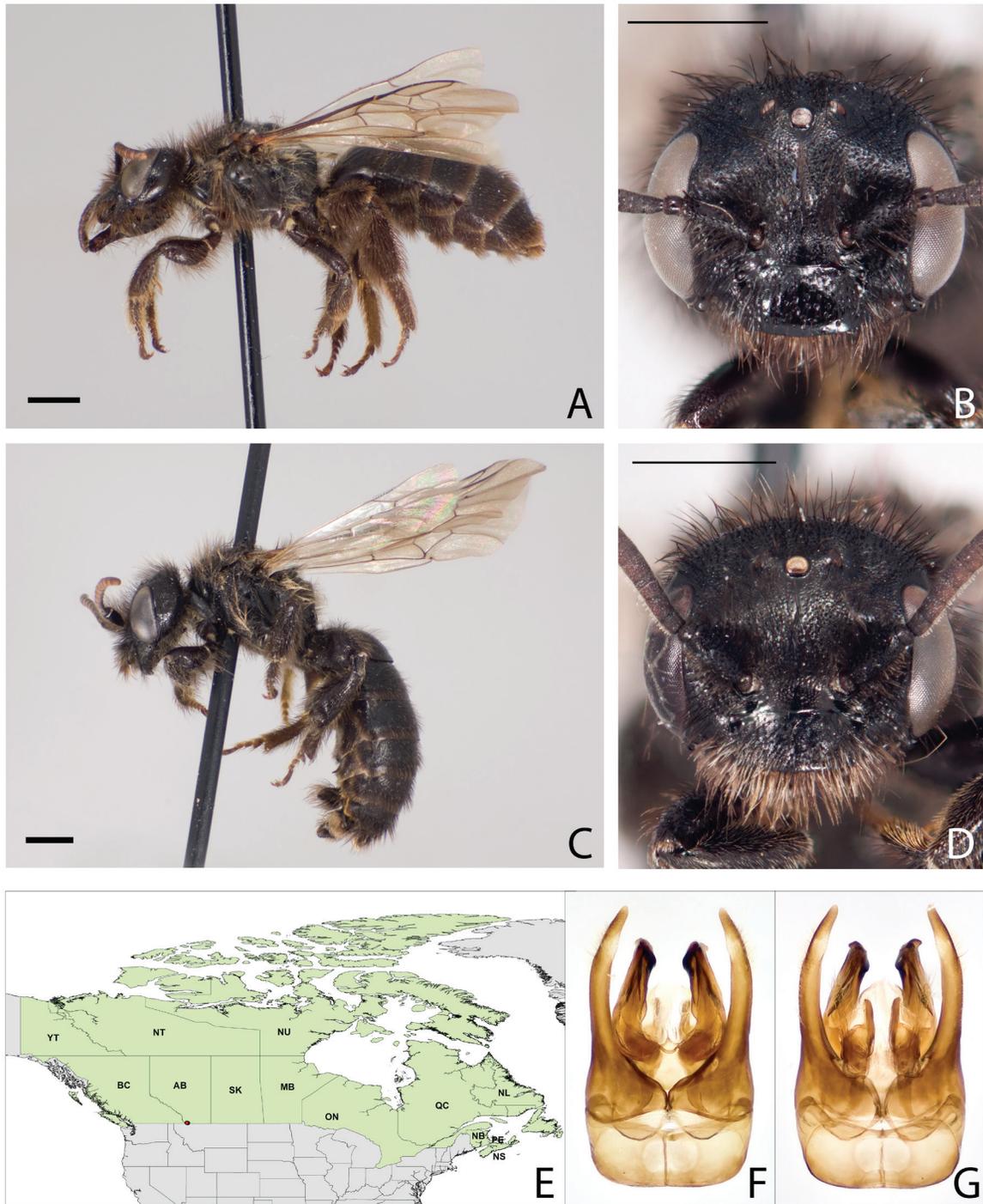


Plate 1. *Dufourea dilatipes* Bohart (scale bar = 1mm): A) female lateral view, B) female face, C) male lateral view, D) male face, E) distribution in Canada, F) genitalia dorsal view, G) genitalia ventral view.

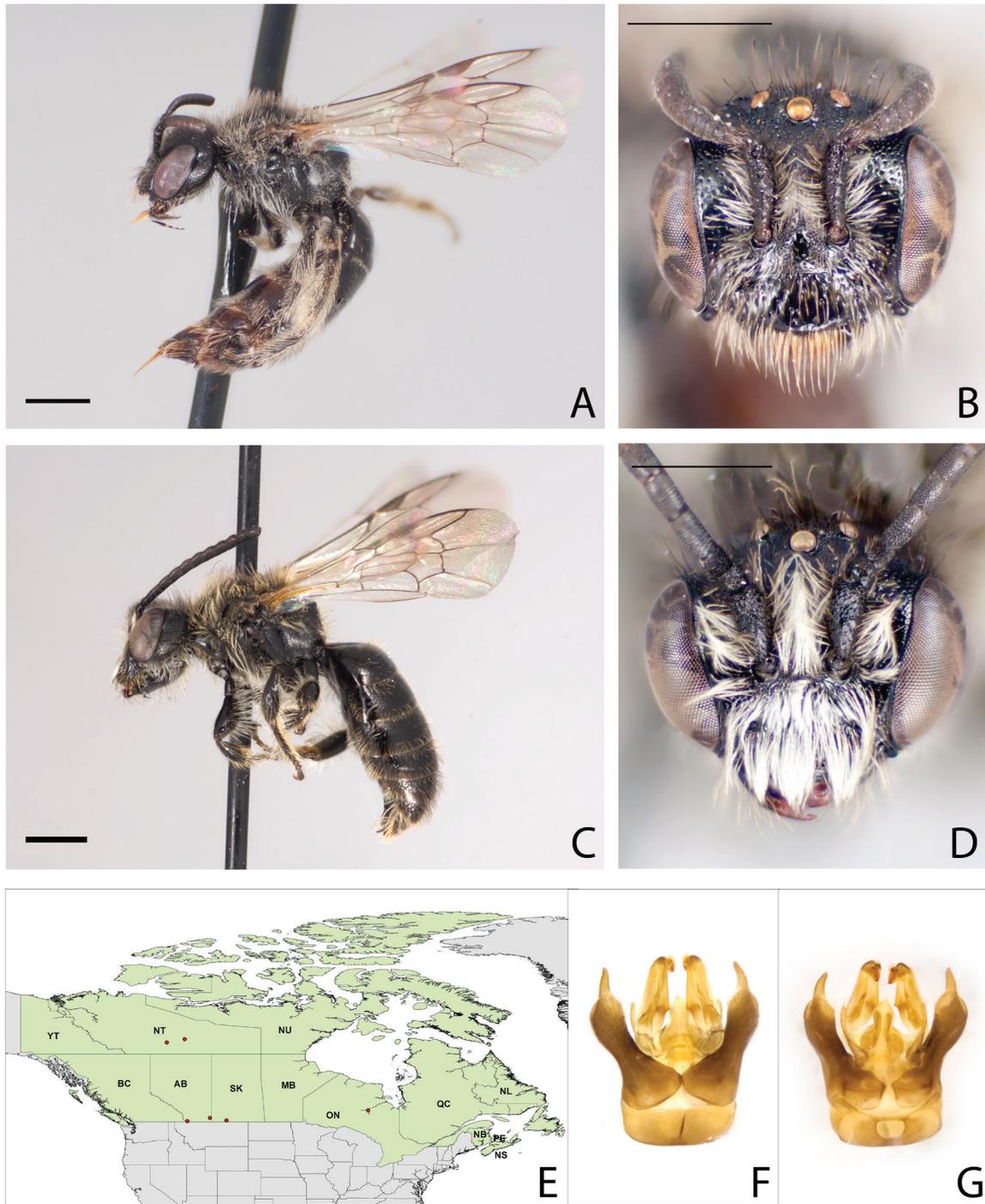


Plate 2. *Dufourea fimbriata* (Cresson) (scale bar = 1mm): A) female lateral view, B) female face, C) male lateral view, D) male face, E) distribution in Canada, F) genitalia dorsal view, G) genitalia ventral view.

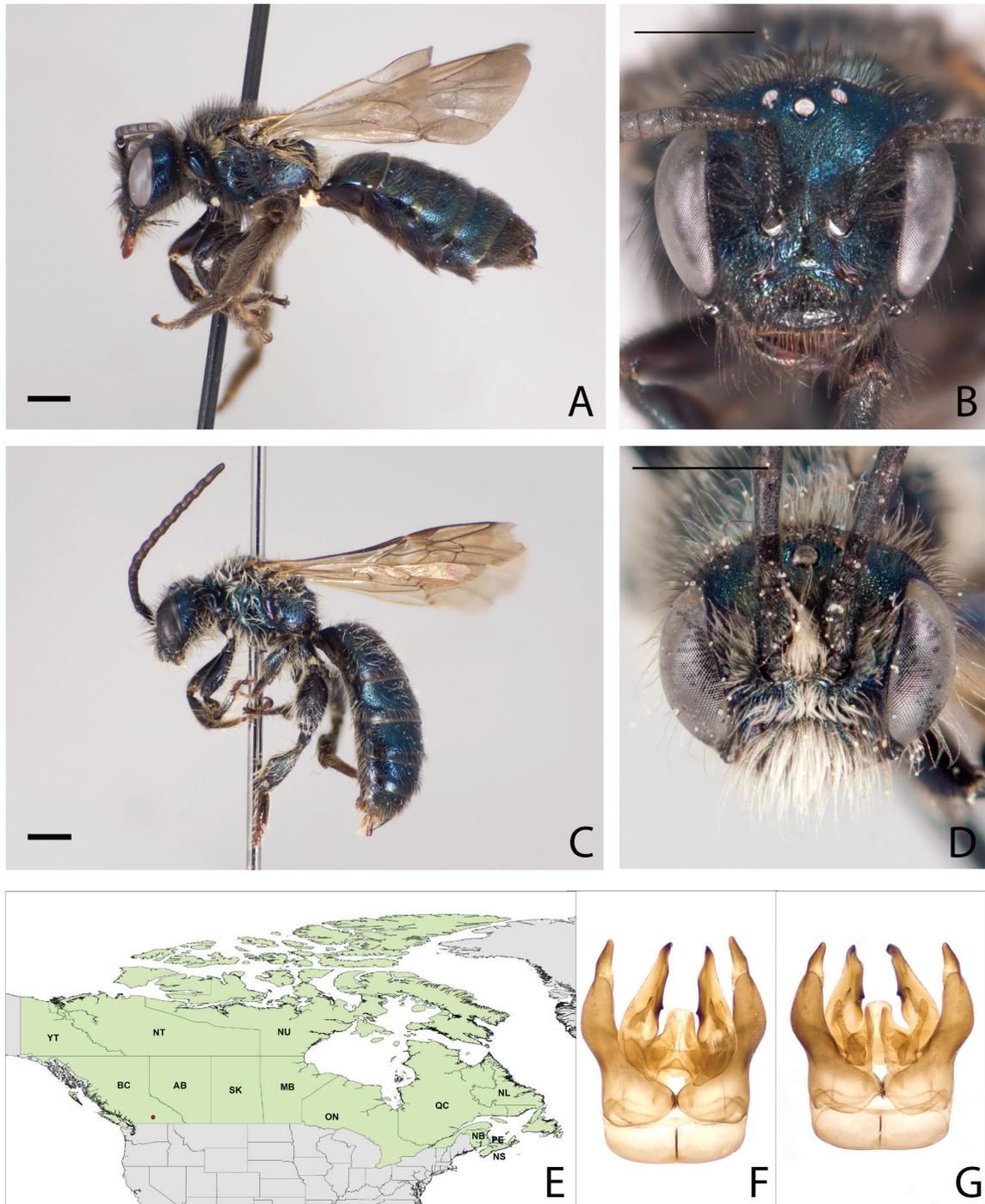


Plate 3. *Dufourea holocyanea* (Cockerell) (scale bar = 1mm): A) female lateral view, B) female face, C) male lateral view, D) male face, E) distribution in Canada, F) genitalia dorsal view, G) genitalia ventral view.

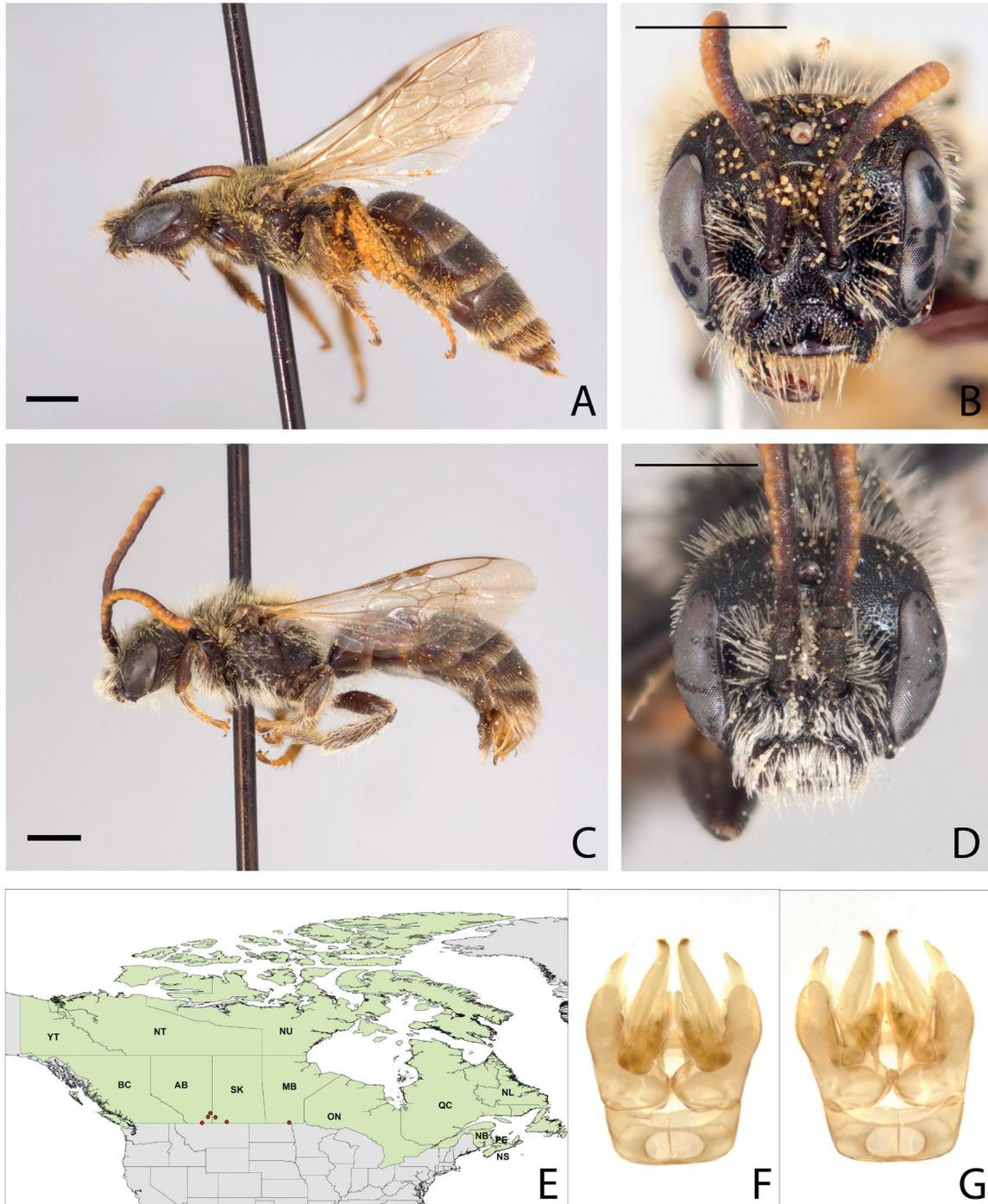


Plate 4. *Dufourea marginata* (Cresson) (scale bar = 1mm): A) female lateral view, B) female face, C) male lateral view, D) male face, E) distribution in Canada, F) genitalia dorsal view, G) genitalia ventral view.

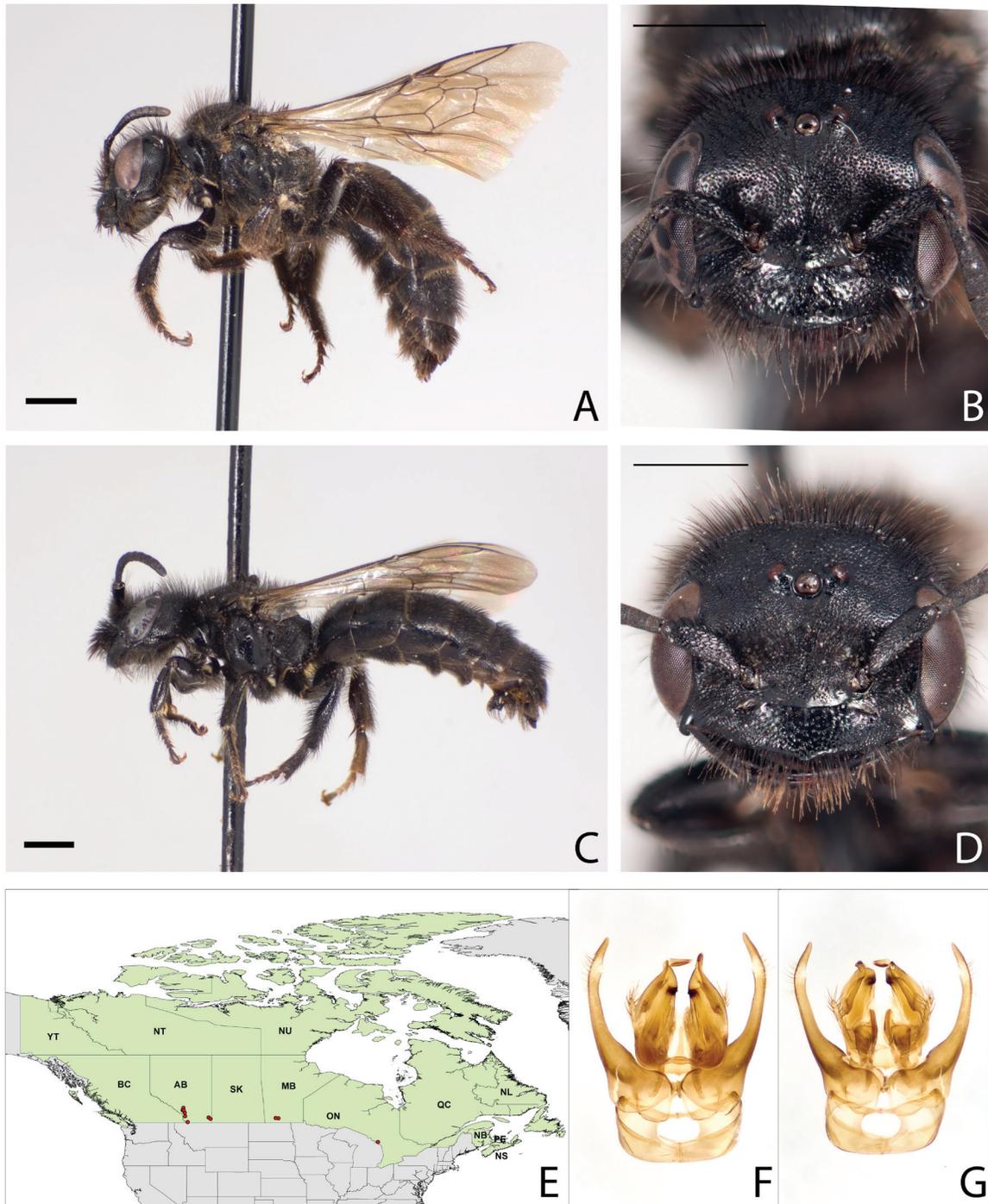


Plate 5. *Dufourea maura* (Cresson) (scale bar = 1mm): A) female lateral view, B) female face, C) male lateral view, D) male face, E) distribution in Canada, F) genitalia dorsal view, G) genitalia ventral view.

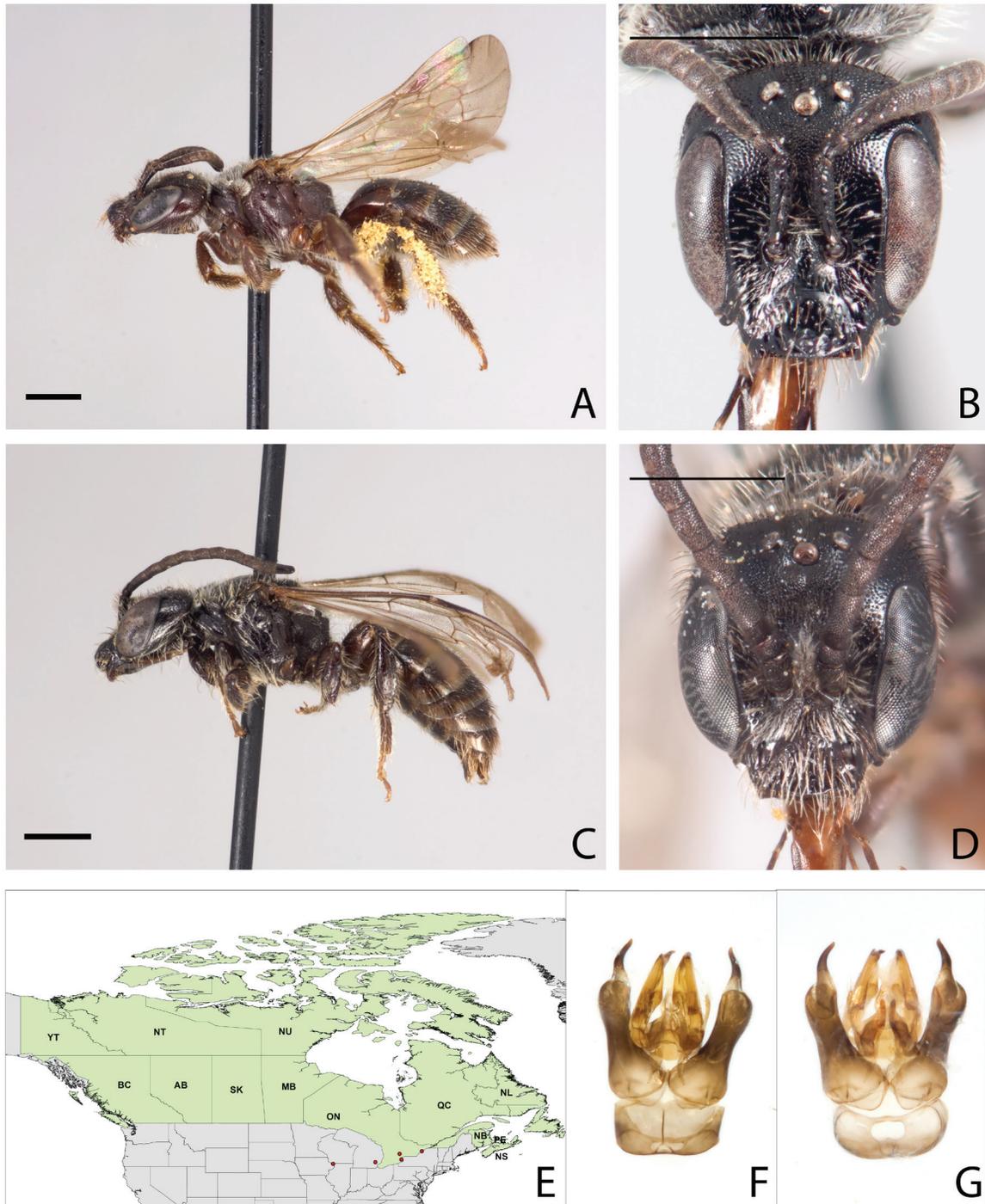


Plate 6. *Dufourea monardae* (Viereck) (scale bar = 1mm): A) female lateral view, B) female face, C) male lateral view, D) male face, E) distribution in Canada, F) genitalia dorsal view, G) genitalia ventral view.

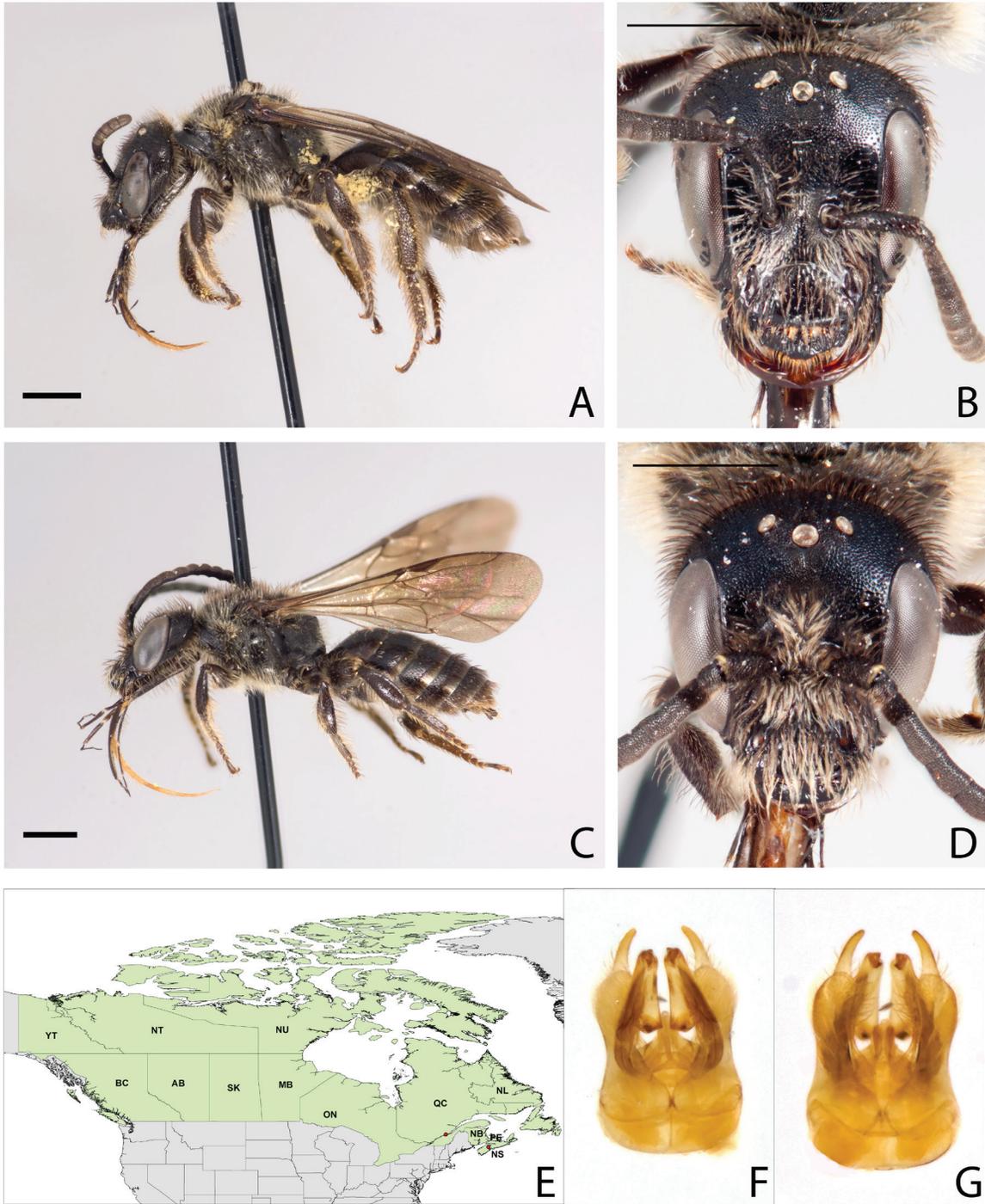


Plate 7. *Dufourea novaeangliae* (Robertson) (scale bar = 1mm): A) female lateral view, B) female face, C) male lateral view, D) male face, E) distribution in Canada, F) genitalia dorsal view, G) genitalia ventral view.

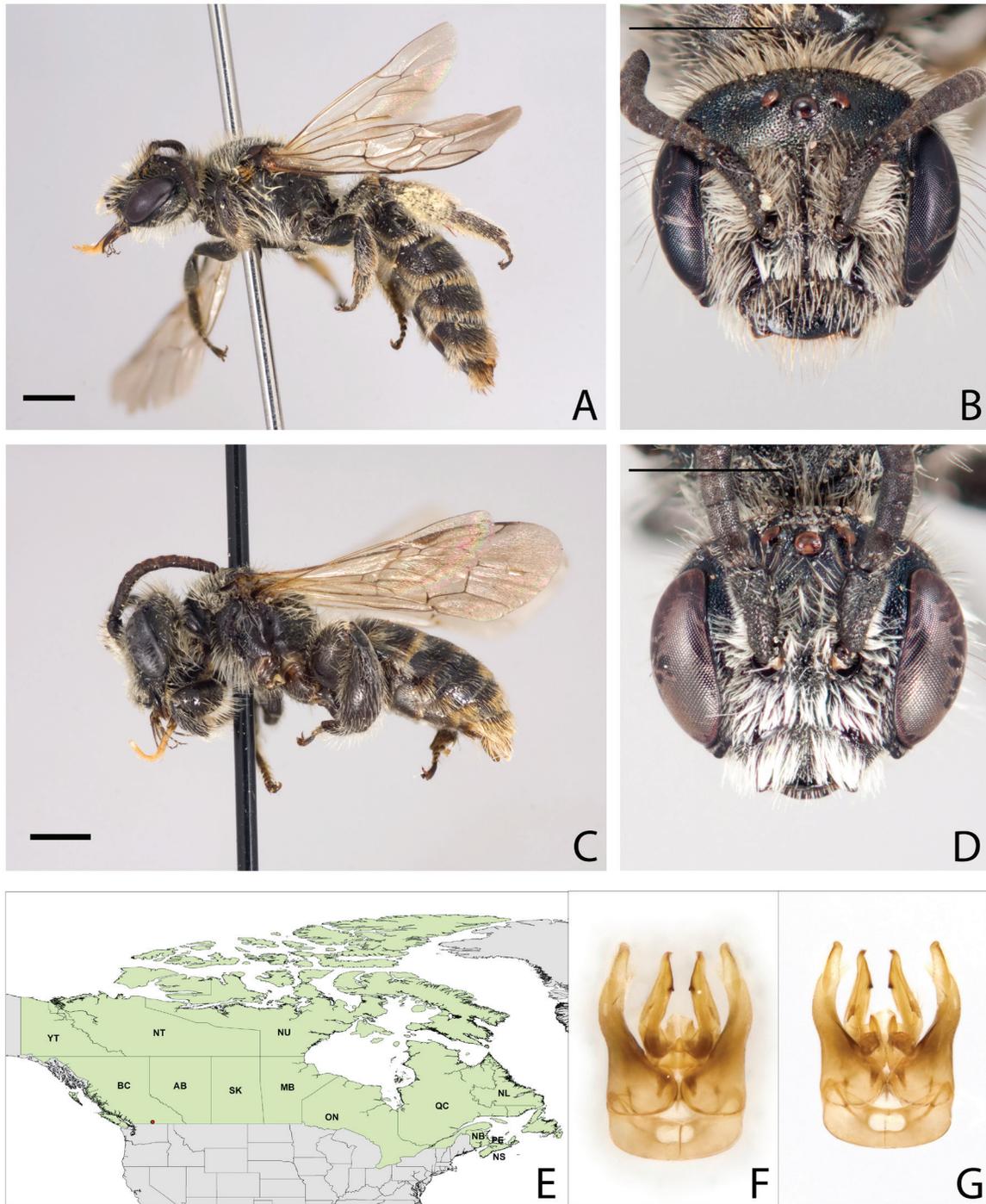


Plate 8. *Dufourea trochantera* Bohart (scale bar = 1mm): A) female lateral view, B) female face, C) male lateral view, D) male face, E) distribution in Canada, F) genitalia dorsal view, G) genitalia ventral view.

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