

**DISCOVERY OF THE WESTERN PALEARCTIC BEE,
MEGACHILE (PSEUDOMEGACHILE) ERICETORUM
(HYMENOPTERA: MEGACHILIDAE), IN ONTARIO, CANADA**

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Scientific Note

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The indigenous bee fauna of North America north of Mexico contains approximately 3500 described species (Ascher and Pickering 2010), but nearly 30 exotic species of Old World origin are published as established (Cane 2003; Committee on the Status of Pollinators in North America 2007). A few of these introduced species have a long history in North America. The first was the honey bee, *Apis mellifera* L., brought with European settlers in the 1620's (Crane 1999; Horn 2005) for honey and wax production, roles now overshadowed in importance by pollination services (Free 1993; Delaplane and Mayer 2000). Other, albeit very few, bee species have been purposely introduced into North America for evaluation as crop pollinators (e.g., Torchio and Asensio 1985; Batra 2003), though none of these species are used commercially. Most bee introductions have been accidental. Brown (1950) and Lindroth (1957) theorized that many introduced insect species may have arrived in the New World through the importation of dry ballast (e.g., rock, sand, soil). The earliest bee introductions likely included the ground-nesting species *Andrena wilkella* (Kirby), which has been in eastern North America since the 1800's (Malloch 1918), and *Lasioglossum leucozonium* (Schrank). *Lasioglossum leucozonium* was only recently determined to be an introduced species (Giles and Ascher 2006; Zayed et al. 2007), and not naturally Holarctic in distribution as previously assumed (McGinley 1986). The North American population(s) may have established from a single mated female (Zayed et al. 2007). These and the few other introduced ground-nesting bee species may have been introduced via ballast from ships in eastern North America (Giles and Ascher 2006).

Most successful introductions of bees (ca. 80%) have involved cavity-nesting species (Cane 2003; Committee on the Status of Pollinators in North America 2007), those nesting in pre-existing or easily excavated cavities, such as in hollow or pithy plant stems or beetle burrows in wood (Michener 2007). The alfalfa leafcutter bee, *Megachile rotundata*

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(F.), has been in North America since at least the 1930's (Cane 2003) and is now widespread across the United States and southern Canada, as far east as Nova Scotia (Sheffield et al. 2008), and two additional species of the subgenus *Eutricharaea* Thomson are also widely established. Three additional cavity-nesting megachilid bees, *Megachile sculpturalis* Smith, *Anthidium manicatum* L., and *A. oblongatum* (Illiger) are rapidly spreading in North America (Paiero and Buck 2004; Hinojosa-Díaz 2008; Zavortink and Shanks 2008; Gibbs and Sheffield 2009; ToniETTO and Ascher 2009). Several species only recently detected in North America, such as *M. sculpturalis* (Magnum and Brooks 1997) and *Hylaeus hyalinatus* Smith (Ascher 2001), are now widely distributed and locally abundant members of the North American fauna. Many introduced cavity-nesting species do very well in urban settings (Matteson et al. 2008). For example, *Chelostoma campanularum* (Kirby), a recent arrival in Canada (Buck et al. 2006), is now relatively common in Ontario in the cities of Guelph, St. Catharines, and Toronto. Urban settings can support introduced bee species due to the presence of introduced plant species including floral hosts also visited in their native ranges (Hanley and Goulson 2003; Matteson et al. 2008; Gibbs and Sheffield 2009).

Invasive species are one of the biggest threats to regional biodiversity (Wilson 1999; Chivian and Bernstein 2008). Although introduced bee species account for less than 1% of the species in North America, they often constitute much larger proportions of surveyed faunas (calculations exclude *Apis*): 15% in Grixti and Packer (2006); 29% in Sheffield (2006); 27% in Matteson et al. (2008); and 8% in Tuell et al. (2009). Additionally, a recent survey in Guelph, ON found 12.5% of all bees captured in pan traps to be introduced species (M. Horn, unpublished data).

Considering that some introduced bee species are thought to disrupt local indigenous bee populations, and potentially pollination, through competition for floral (e.g. Paine 2004; Paine and Roberts 2005) and/or nesting resources (Barthell et al. 1998), it is especially important to note their presence and monitor their establishment (Cane 2003). It is also important to establish patterns of floral use, since many introduced species share floral resources with native species, especially in urban settings (Matteson et al. 2008) and agricultural settings that may have limited native floral resources.

The purpose of this note is to report the discovery in southern Ontario of *Megachile ericetorum* Lepeletier, a Western Palearctic bee species new to the Western Hemisphere. Its biology and diagnostic characters are briefly summarized, and methods for monitoring its potential establishment are discussed.

***Megachile (Pseudomegachile) ericetorum* Lepeletier, 1841**

Megachile ericetorum is wide-ranging in the Old World, occurring throughout most of Europe (excluding western Scandinavia), Asia Minor, the Caucasus, Central Asia, western North Africa, and Syria (Westrich 1989; Özbek and van der Zanden 1994; Banaszak and Romasenko 1998). Like many members of the genus *Megachile* Latreille, this species nests in pre-existing cavities in canes or wood (Westrich 1989; Banaszak and Romasenko 1998). Females lack beveled cutting edges in the interspaces of the mandibular teeth (Fig. 1), as *Pseudomegachile* Friese and other members of *Chalicodoma sensu lato* (*Megachile* Group 2, as per Michener 2007) do not cut leaf sections for nest construction but instead use other materials such as plant resins, sand, and pebbles to construct nest partitions (Mitchell 1980; Westrich 1989; Snelling 1990; Banaszak and Romasenko 1998; Michener 2007).



FIGURE 1. Face of specimen of female *Megachile ericetorum* Lepeletier collected in St. Catharines, ON, Canada, showing 4-dentate mandibles without cutting edges.

Westrich (1989) indicates that this species is oligolectic on Fabaceae, mainly *Lotus* and *Lathyrus*; males have been collected on *Stachys*.

Although the subgenus *Pseudomegachile* is indigenous to the Old World, another introduced species, *M. (Pseudomegachile) lanata* (F.), is commonly collected in Florida (Leavenwood and Serrano 2005) and the West Indies (Genaro 1997). Sheffield et al. (in press) provide keys and full descriptions to distinguish *M. ericetorum* from other leafcutter bees in Canada, although at this time, evidence is lacking as to whether this species has established successfully. The female of *M. ericetorum* can be distinguished from most *Megachile* in Canada by the lack of cutting edges between the mandibular teeth (Fig. 1), excluding *M. sculpturalis* which is much larger (≥ 20 mm) with much orange pubescence, and *M. angelarum* Cockerell and *M. campanulae* (Robertson), which are both slightly smaller than *M. ericetorum* and lack the single median apical tubercle on the clypeus of *M. ericetorum* (Fig. 1). Although the male has not yet been observed in Canada, males of *M. ericetorum* are distinguishable from all other *Megachile* in Canada, except *M. coquilletti* Cockerell, by the unmodified yellowish front tarsomeres; it differs from that species by lacking a lower triangular process on the mandible (Sheffield et al. in press).

Megachile ericetorum is currently only known in North America from a single female specimen (Fig. 2) collected on the Niagara Escarpment in St. Catharines, Ontario in 2003 (14.vii.2003; coll. Amy Rutgers) in a former farm field east of, and contiguous with, the Glenridge Quarry Naturalization Site (43.124, -79.237; elev. 170m), and bordered on the west by Highway 406. The Naturalization Site was formerly a limestone quarry and then a landfill, which was closed in 2001 and completely replanted by 2003, whereas the field in which the specimen was found belongs to Brock University and has remained more or less undisturbed for almost 50 years. Westrich (1989) indicated similar habitat use (i.e., calcareous grasslands) by this species in Europe. The habitat in which the specimen was

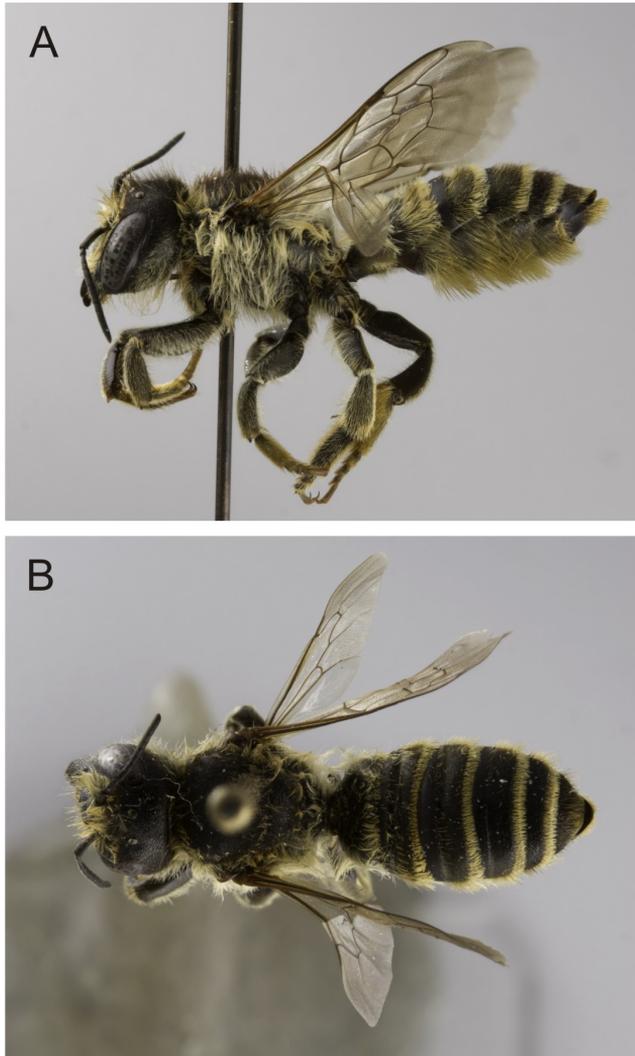


FIGURE 2. Female *Megachile ericetorum* Lepeletier, A) lateral and B) dorsal view. Specimen collected in St. Catharines, ON, Canada.

found and the method by which it was collected (pan-trapping) suggest that this species may have had the opportunity to establish in the area because the site is directly adjacent to a former landfill. This bee species could have been transported to the area in discarded lumber, for instance in wooden skids commonly used in international shipping. St. Catharines is part of the major shipping route for international materials arriving into Canada and the United States, and is < 20 km north of the United States border. Major seaports offer many opportunities for introduced species (Majka and LeSage 2006), and this region has a long history of commercial sea traffic. Several cavity-nesting species have been intercepted at

such ports of entry (Cane 2003), although they may not always have the opportunity to establish.

Since *M. ericetorum* has been in Canada at least since 2003, monitoring its establishment and spread should be done (Cane 2003). Ultimately, modeling its potential range in North America based on habitat suitability (e.g., Hinojosa-Díaz et al. 2005) may indicate if it has the ability to become widespread across many ecozones, as in its native range. Trap-nest surveys (e.g., Fye 1965; Krombein 1967; Sheffield et al. 2008) would provide a means of monitoring the establishment of this species in North America, as well as the possible displacement of native species (Barthell et al. 1998). Males of *M. ericetorum*, like those of the introduced *Anthidium manicatum* (Severinghaus et al. 1981; Wirtz et al. 1988), aggressively defend territories (Hass 1960). This behaviour should make the species stand out among the native *Megachile* species, potentially assisting in documenting its spread.

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