

Buprestid sampling at nests of *Cerceris fumipennis* (Hymenoptera: Crabronidae) in southern Ontario: the first Canadian records of three buprestids (Coleoptera: Buprestidae)

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Abstract—Three buprestid species, *Actenodes acornis* (Say, 1836), *Dicerca asperata* (Laporte et Gory, 1837), and *Dicerca lepida* LeConte, 1857, are newly recorded from Canada on the basis of a collection of 57 buprestid specimens taken from females of the crabronid wasp *Cerceris fumipennis* Say, 1837 in Rondeau Provincial Park, Chatham-Kent region, Ontario, in July 2004. Nine additional buprestid species were taken from wasps that were intercepted as they approached their nests, demonstrating the effectiveness of *C. fumipennis* nest sites as sampling stations for buprestid beetles. We suggest that this sampling method could be applied to efficiently monitor the spread of the emerald ash borer (*Agrilus planipennis* Fairmaire) (Coleoptera: Buprestidae) in eastern North America.

Résumé—Trois espèces de buprestidés, *Actenodes acornis* (Say, 1836), *Dicerca asperata* (Laporte et Gory, 1837) et *Dicerca lepida* LeConte, 1857, sont signalées pour la première fois au Canada et elles proviennent d'une récolte de 57 spécimens de buprestidés récupérés de guêpes femelles, *Cerceris fumipennis* Say, 1837, de la famille des crabronidés, dans le parc provincial Rondeau, région de Chatham-Kent, Ontario, en juillet 2004. Neuf autres espèces de buprestidés ont été récupérées des guêpes interceptées alors qu'elles s'approchaient de leurs nids, ce qui montre l'intérêt des nids de *C. fumipennis* comme sites d'échantillonnage des coléoptères buprestidés. Nous croyons que cette méthode d'échantillonnage pourrait être utilisée pour suivre efficacement la dissémination de l'agrile du frêne, *Agrilus planipennis* Fairmaire (Coleoptera : Buprestidae), dans l'est de l'Amérique du Nord.

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Cerceris fumipennis Say, 1837 (Fig. 1) (Hymenoptera: Crabronidae) is a widespread beetle-hunting wasp that stocks its nests almost exclusively with adult Buprestidae. Sixty-four prey species in 13 genera and 5 subfamilies of Buprestidae have been reported by previous authors (Hook and Evans 1991; Mueller *et al.* 1992). The broad prey spectrum is reflected by a wide size range of beetles brought to the nest (*cf.* Figs. 1, 2), with large prey items weighing up to 10 times as much as small ones (Kurzewski and Miller 1984). The number of beetles per brood cell is inversely related to prey size, and in extreme cases up to 51 specimens of *Agrilus* have been recovered from a single cell (Hook and Evans 1991). Beetles of

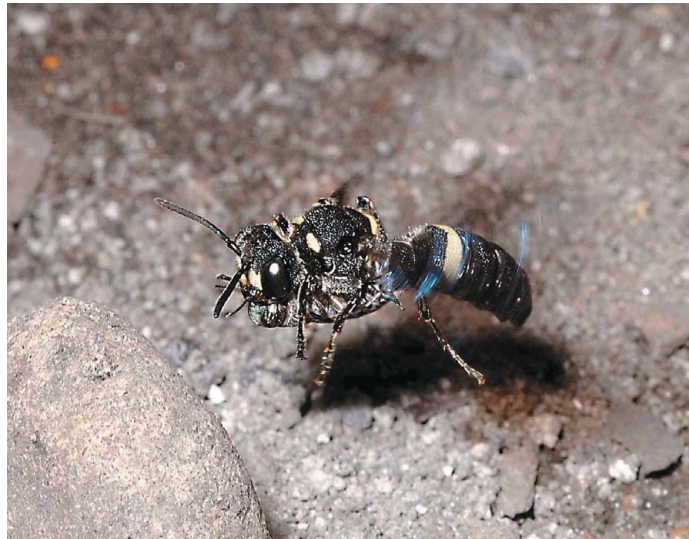
the genus *Agrilus* account for 31% of the buprestid species recorded as prey of *C. fumipennis* (see Appendix A) and make up 50%–78% of the prey items retrieved from excavated nests (Evans 1971; Kurzewski and Miller 1984; Hook and Evans 1991). The high number of *Agrilus* prey is of current interest because, as we argue below, *C. fumipennis* could serve as a useful tool for monitoring the spread of the recently introduced emerald ash borer, *Agrilus planipennis* Fairmaire, 1888.

Five Nearctic species of *Cerceris* prey on buprestids, but *C. fumipennis* is the only such species in the eastern half of North America, where it occurs from the New England states south to Florida and west to Wyoming and New Mexico (Scullen 1965). Despite its relatively wide range in southern Ontario (from Essex County to Leeds and Grenville County), *C. fumipennis* was only recently recorded from Ontario (Buck 2004). Eighteen other species of

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Fig. 1. *Cerceris fumipennis* female arriving at her nest with a captured buprestid.



Cerceris occur in Ontario (Buck 2004), but *C. fumipennis* is easily recognised by its large size (♂, 10–12 mm; ♀, 12–15 mm), the absence of a clypeal process in the female, very dark wings, and a single broad, pale yellow abdominal band on tergite 2 (Figs. 1, 2).

As part of an ongoing insect survey, we visited Rondeau Provincial Park on 20 July 2004 and noted the presence of several nesting *C. fumipennis* females on a patch of open, disturbed ground with hard-packed soil. About 15–20 wasps could be seen on the site at any given time, some of which were returning to their nest with buprestid beetles. Over the following 3 days, we watched the activity of the colony and periodically knocked the slow-flying incoming females to the ground with our hands. The wasps always dropped their prey in response to disturbance, and we recovered 57 prey items in this fashion. This appeared to have little or no effect on the influx of new prey, but since we made no attempt to track the “robbed” wasps, we do not know when or if they returned with new prey items. No nests were excavated. The 57 prey items obtained included 11–12 species in five genera (Table 1). This is close to half of the 116 specimens and 23 species of Buprestidae taken by various sampling methods during our Rondeau Provincial Park insect survey over the previous 2 years, and included taxa not only new to the Park but also new to Canada. The record of *Actenodes acornis* (Say, 1839) (Fig. 2) is a new Canadian record at the generic level, and the *Dicerca*

Fig. 2. Female of *Cerceris fumipennis* with prey, *Actenodes acornis*, a new buprestid record for Canada.



asperata (Laporte *et* Gory, 1837) and *Dicerca lepida* LeConte, 1857 records are new species records for Canada. *Spectralia gracilipes*

Table 1. Buprestid species and specimens taken from prey-carrying *Cerceris fumipennis* females in Rondeau Provincial Park, Ontario (42°17'35"N, 81°50'52"W), 20–22 July 2004.

Species	No. of specimens
<i>Actenodes acornis</i> (Say)	11
<i>Agrilus arcuatus</i> (Say)	10
<i>Agrilus bilineatus</i> (Weber)	2
<i>Agrilus obsoletoguttatus</i> Gory	2
<i>Chrysobothris femorata</i> (Olivier)	2
<i>Chrysobothris sexsignata</i> (Say)	14
<i>Chrysobothris</i> sp.* (<i>femorata</i> complex)	3
<i>Dicerca asperata</i> (Laporte <i>et</i> Gory)	1
<i>Dicerca divaricata</i> (Say)	2
<i>Dicerca lepida</i> LeConte	1
<i>Dicerca lurida</i> (Fabr.)	7
<i>Spectralia gracilipes</i> (Melsheimer)	2

Note: All specimens are deposited in the University of Guelph Insect Collection.

*Either *C. femorata* or another species.

(Melsheimer, 1845) was already known from Ontario, but it is uncommon and rarely collected. The observation that *Cerceris* species can efficiently locate beetle species that elude human collectors is not a new one. For example, large numbers of undescribed Madagascan buprestid species are known only from excavated *Cerceris* nests (Bellamy 2001). To our knowledge, however, no one has tried to monitor buprestid populations using *Cerceris* colonies, especially using the nondestructive approach of taking beetles from prey-laden females before they reach their nests.

A significant proportion of the specimens and species in our samples were *Agrilus* species, suggesting that nest sites of *C. fumipennis* could be used as efficient sampling stations for species of *Agrilus* in eastern North America, probably including the pest species *A. planipennis* (not yet recorded from Rondeau Provincial Park). This is a potentially significant idea, since it addresses some of the obstacles facing current efforts to track the spread of this extremely serious forest pest. Emerald ash borers can occur high in trees where they are not easily detected, and they leave few obvious external indications of their presence on infested trees. Current sampling programs for *A. planipennis* are thus costly and arguably less effective than a few foraging *C. fumipennis*. The emerald ash borer is currently the target of intensive monitoring in Ontario and north-central United States as it spreads from the

Windsor–Detroit area, where it was first detected in 2002; Rondeau Provincial Park is about 25 km east of the easternmost extent of its Canadian range in 2004 (Canadian Food Inspection Agency 2004). The distribution of *A. planipennis* is centred on the Windsor–Detroit area and mostly contiguous areas of southwestern Ontario, southern Michigan, northern Indiana, and northern Ohio, with one isolated and probably contained outbreak in Maryland and Virginia (USDA Forest Service 2004).

To document the spread of *A. planipennis*, nest sites of *C. fumipennis* within or near the expanding range of the emerald ash borer should be carefully documented, protected, and studied. Females usually nest gregariously in areas where expanses of bare, hard-packed (usually disturbed) soil occur in the vicinity of trees or bushes, the preferred habitat of the prey (Evans 1971; Kurczewski and Miller 1984). In Ontario *C. fumipennis* has only one generation during the summer (Buck 2004). Nests are established in early July and remain active until the onset of colder weather in September. The active periods of adult wasps and adult *A. planipennis* overlap throughout the month of July in Ontario, during which time nest sites could serve as useful monitoring tools.

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Appendix A

List of 20 *Agrilus* species recorded as prey of *Cerceris fumipennis* (from Evans 1971; Kurczewski and Miller 1984; Hook and Evans 1991; Mueller *et al.* 1992).

- A. abjectus* Horn
- A. addendus* Crotch
- A. anxius* Gory
- A. near arbutii* Fisher
- A. arcuatus arcuatus* (Say), also ssp. *fulgens* LeConte and ssp. *torquatus* LeConte
- A. bilineatus bilineatus* (Weber) and ssp. *carpini* Knull
- A. cephalicus* LeConte
- A. exiguellus* Fisher
- A. fallax* Say
- A. granulatus* (Say)
- A. lecontei celticola* Fisher
- A. limpiae* Knull
- A. macer* LeConte
- A. obsoletoguttatus* Gory
- A. obtusus* Horn
- A. paracelti* Knull
- A. politus* (Say)
- A. pulchellus* Bland
- A. ruficollis* (Fabr.)
- A. sayi* Saunders (recorded as *A. lateralis* (Say))