SCIENTIFIC NOTE

Coexistence of *Cerceris fumipennis* and *Cerceris nigrescens* colonies in Merritt, BC

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ABSTRACT

Cerceris fumipennis Say (Hymenoptera: Crabronidae) is a solitary ground-nesting wasp that provisions its subterranean nests with paralyzed jewel beetles (Coleoptera: Buprestidae). The first BC colony of *C. fumipennis* was discovered in 2012 at Central Park in Merritt. At the same location, in 2014, five female *Cerceris nigrescens* Smith were collected; one had captured a clover root weevil, *Sitona hispidulus* Fabricius (Coleoptera: Curculionidae). Single *C. nigrescens* and *C. fumipennis* nests were excavated; the former constructed brood cells from 3.8 to 7.6 cm underground, whereas the latter dug cells 8 to 15.3 cm deep.

Cerceris fumipennis Say (Hymenoptera: Crabronidae) is a solitary ground-nesting wasp that occurs primarily east of the Rockies (Scullen 1965). Female wasps dig underground nests comprised of cells containing wasp larvae; only females provision these cells with paralyzed buprestid beetles, upon which the larvae feed and develop (Hook and Evans 1991; Marshall *et al.* 2005). As these wasps are adept at finding uncommon and arboreal species, *C. fumipennis* has been used as a biosurveillance tool to detect emerald ash borer, *Agrilus planipennis* Fairmare (Coleoptera: Buprestidae), and to discover new jurisdictional records for other species (Marshall *et al*. 2005; Rutledge *et al*. 2013).

In 2012, a *C. fumipennis* colony was discovered in compact soil next to the gravel parking lot at Central Park in Merritt, BC (Figure 1; Kimoto and Buck 2015). It had been 77 years since these wasps were identified in BC, and this record represented the first known nesting colony in the province (Kimoto and Buck 2015). The discovery of this and two other colonies in BC (Kimoto *et al*. in press) indicates the potential to utilize *C. fumipennis* as a survey detection tool for non-indigenous jewel beetles. Unlike *C. fumipennis* in eastern North America, no data currently exist regarding the prey captured by *C. fumipennis* in BC. In order to determine if BC *C. fumipennis* could be successfully used as a detection tool, data on the size and diversity of prey was collected in 2014 (Kimoto *et al. in press*). Here, we present observations of the coexistence of *C. fumipennis* colonies with those of another wasp species, *Cerceris nigrescens* Smith.

During July and August, 2014, clear plastic cups were placed over various nest entrances at the *C. fumipennis* colony in Central Park. Upon returning to her nest, a female *C. fumipennis* will circle the blocked nest entrance, and she and her prey can be readily captured with a net. On 7 August 2014, five female *Cerceris nigrescens* were netted; one grasped a clover root weevil, *Sitona hispidulus* Fabricius (Coleoptera: Curculionidae).

Cerceris nigrescens is widely distributed throughout North America. Females provision their nests with weevils including species of *Sitona*, *Hyperodes* and *Rhinusa* (=*Gymnaetron*) (Scullen 1965). The clover root weevil is indigenous to Europe; the first North American record is from New Jersey in 1875 (Campbell *et al*. 1989). It is known across Canada (except for Manitoba) (Bousquet *et al*. 2013). The larvae feed on the roots and adults feed on the foliage of clover,

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alfalfa, and vetch (Campbell *et al*. 1989). *Sitona hispidulus* is a major prey species of *C. nigrescens* in many different locations (Scullen 1965; Evans 1971). The *C. nigrescens* specimens collected from Merritt have been deposited at the Royal Alberta Museum, Edmonton, Alberta, Canada. The *Sitona hispidulus* specimen is archived at the Pacific Forestry Centre Arthropod Collection (Victoria, BC).

Cerceris fumipennis entrance holes are approximately 5–7 mm in diameter. Although the primary focus of our study was *C. fumipennis*, by August we observed smaller nest entrances among those belonging to *C. fumipennis*. The *C. nigrescens* carrying the clover root weevil was captured in a sweep net while it approached one of these smaller nest entrances.

On 7 August 2014, a *C. fumipennis* nest at least two feet from any other *C. fumipennis* nest was excavated; a hammer and chisel was used to dig a 35 x 30 x 20 cm deep hole (Figure 2). The hard, compact soil was broken into small pieces and examined for beetle prey. Upon discovering a cell containing insects, we measured its depth below the surface with a tape measure. At 3.8 cm below the surface, we found one small, black unidentifiable weevil. At 7.3 and 7.6 cm beneath the surface, many black elytra similar to those associated with the first buried weevil were uncovered. Neither the weevil nor the elytra were observed to occur within distinct cells, but as the primary focus was collecting data on *C. fumipennis*, these may have been overlooked. No cells containing buprestids were discovered down to 7.6 cm, but from 8 to 15.3 cm beneath the surface, the absence of weevils and the presence of buprestids within larger jellybean-shaped cells suggest that *C. nigrescens* and *C. fumipennis* cells are vertically segregated.

The presence of *C. nigrescens* nests with *C. fumipennis* or even other *Cerceris* species is not unique. In southern Ontario, eleven other *Cerceris* species were observed nesting at nine *C. fumipennis* colonies, but *C. nigrescens* nests were only found at one site (unpublished data). Similar to *C. fumipennis*, *C. californica* Cresson also preys upon buprestid beetles, but is restricted to western North America from Texas through New Mexico, Arizona, California, and northward into BC (Scullen 1965). *Cerceris californica* colonies were recently discovered in Washington State, and various wasps and bees occurred at these colonies (Looney *et al*. 2014). *Cerceris nigrescens* was recorded at a *C. californica* colony in Yakima, WA, but the presence of

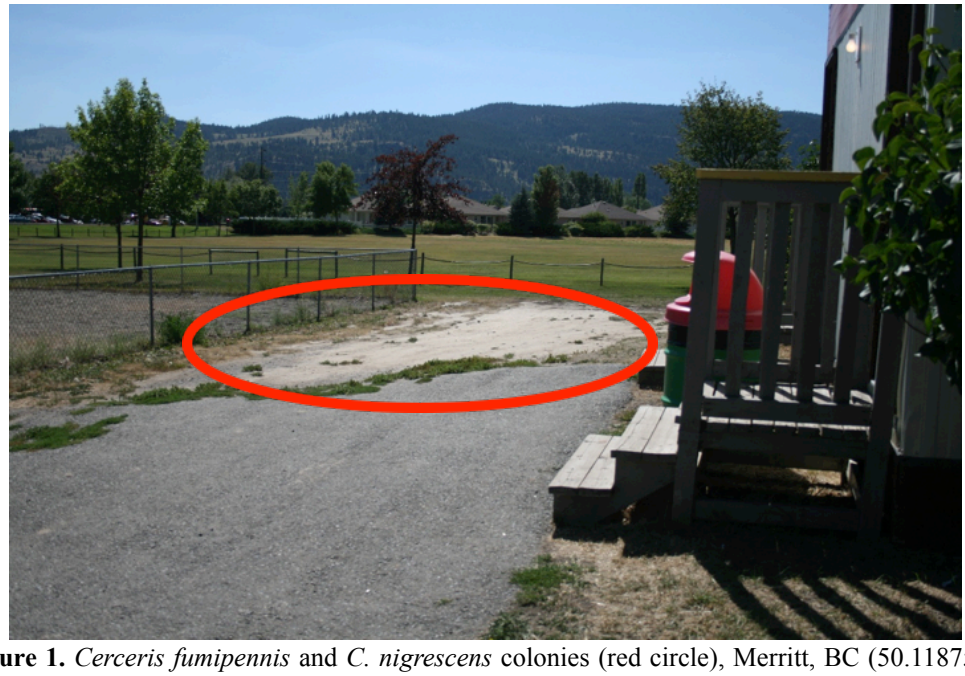

Figure 1. *Cerceris fumipennis* and *C. nigrescens* colonies (red circle), Merritt, BC (50.11875°N, 120.78348°W).

Figure 2. Excavation of *Cerceris fumipennis* and *C. nigrescens* nests, Merritt, BC.

C. nigrescens nests is unconfirmed, because adults were not observed flying toward burrows (C. Looney, Washington State Department of Agriculture, personal communication).

The *C. nigrescens* and *C. fumipennis* colonies in Merritt represent the first records of these two species nesting together in BC. The presence of *C. nigrescens* should not affect the use of *C. fumipennis* as a bio-surveillance tool, because the former strictly provisions their nests with weevils. In fact, the occurrence of these two *Cerceris* species at a given site would allow an observer to monitor the area for both jewel beetles and weevils.

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