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Plant associations for three sawfly species (Hymenoptera, Tenthredinidae) in the Pacific Northwest

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Abstract

Plant associations are newly recorded for three tenthredinid species in the Pacific Northwest. A single *Monardis pulla* D.R. Smith, 1969 emerged from a chamber inside a cynipid gall on *Rosa nutkana* C. Presl. (Rosaceae). This is the first plant association record for *M. pulla*. Two *Aphilodyctium fidum* (Cresson, 1880) emerged from a stem and cynipid gall of *Rosa rugibinosa* Linnaeus, 1758, respectively. Several *Rhogogaster lateraria* (Cresson, 1880) eggs were discovered on *Castilleja* sp., which has no previously recorded sawfly associations.

Keywords

Allantinae, Blennocampinae, Tenthredininae, Symphyta, host plant, *Rosa*, *Castilleja*

Introduction

Tenthredinidae is the most species-rich family of Symphyta, found on every continent excluding Antarctica. The family comprises a prominent group of herbivorous insects that can inflict negligible to significant damage on their host plants, and as such there is value in recording plant association data. Host plant associations and feeding approaches within the group are diverse (eg. gall induction, leaf mining, external defoliation), but are unknown for many taxa. This paper presents host plant associations for three species of sawfly, each collected incidentally while conducting research on other insect groups.

Methods and results

All adult sawflies were mounted and identified using keys in Goulet (1992) and Smith (1969, 1979). Molecular data were used to identify one series of larval specimens. All specimens and two associated galls are deposited in the Washington State Department of Agriculture Collection in Olympia, WA.

Tenthredinidae
Blennocampinae

***Monardis pulla* D.R. Smith, 1969**

Notes. A single female was reared from a *Periclistus*-modified gall of *Diplolepis oregonensis* (Beutenmüller, 1918) (Hymenoptera: Cynipidae) on *Rosa nutkana* C. Presl. hand-collected in February, 2017. Galls were collected by visually searching *R. nutkana* stands, taken to the lab, and held at room temperature until insects emerged. Galls were checked several times a week and insects were pinned or transferred to vials of 70% EtOH as they emerged. This specimen emerged from a smooth, spherical gall, measuring about 15 mm in diameter and attached to the stem near the point of the spine node (Fig. 1). The adult emerged from the gall, at the point farthest from the stem, on 1–2 March, 2017. The emergence hole measured 1.5 mm in diameter and led to a gallery about 5 mm in length. At the end of the gallery was the discarded pupal case of the sawfly. The gallery does not lead into the center of the gall, and there was no evidence of feeding activity in the gall, suggesting that the gall may only have served as an overwintering site. Two specimens of *Periclistus* (Hymenoptera: Cynipidae) also emerged from the gall.

Specimen data. United States; 1♀; Oregon, Lane County, 10 km N of Corvallis; 44°38.66'N, 122°19.39'W; 12 Feb. 2017, em. 1–2 Mar. 2017; C. Looney & R. Chappel leg.; ex: *Rosa nutkana*.

Tenthredinidae
Allantinae
Empriini

***Aphilodyctium fidum* (Cresson, 1880)**

Notes. One male *A. fidum* was reared from a stem of *Rosa rubiginosa* Linnaeus, 1758, hand-collected in March 2018 and connected to a *Diplolepis rosae* (Linnaeus, 1758) gall measuring about 29 mm in diameter. The gall was from a previous season, and all gall wasps and the associated component community had already emerged. The

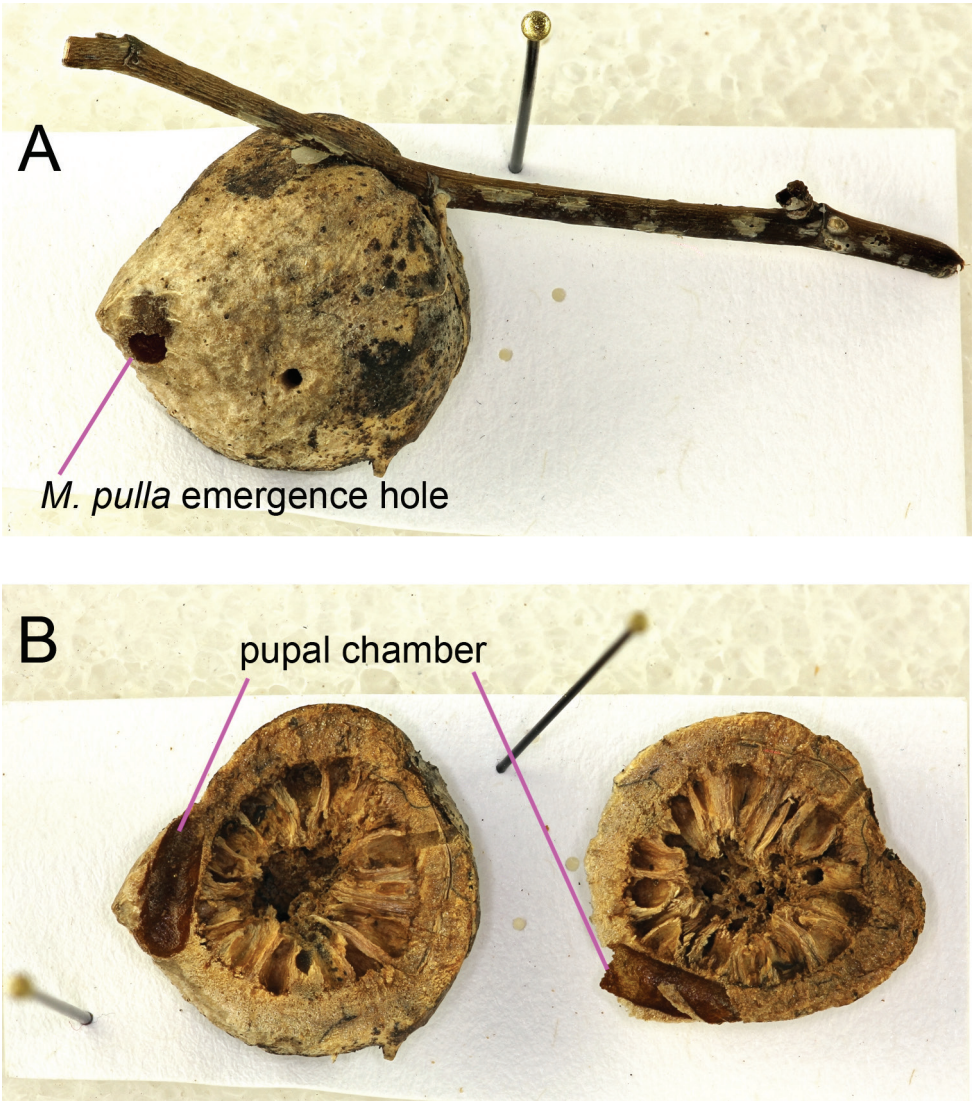

Figure 1. *Periclistus*-modified gall of *Diplolepis oregonensis* (**A**), dissected to reveal the pupal chamber of *Monardis pulla* (**B**).

sawfly emerged from the apex of the cut stem, leaving a hole that measured about 3.5 mm in diameter leading to a frass-filled gallery through the stem pith, about 23 mm in length. The discarded larval skin of the sawfly was discovered at the end of this gallery, as well as a partial adult head and some exoskeletal remnants of a different unidentified hymenopteran.

One male *A. fidum* was reared from a gall of *D. rosae* also collected from *R. rubiginosa*. The gall was collected in the fall and stored at 0 °C for 90 days to simulate

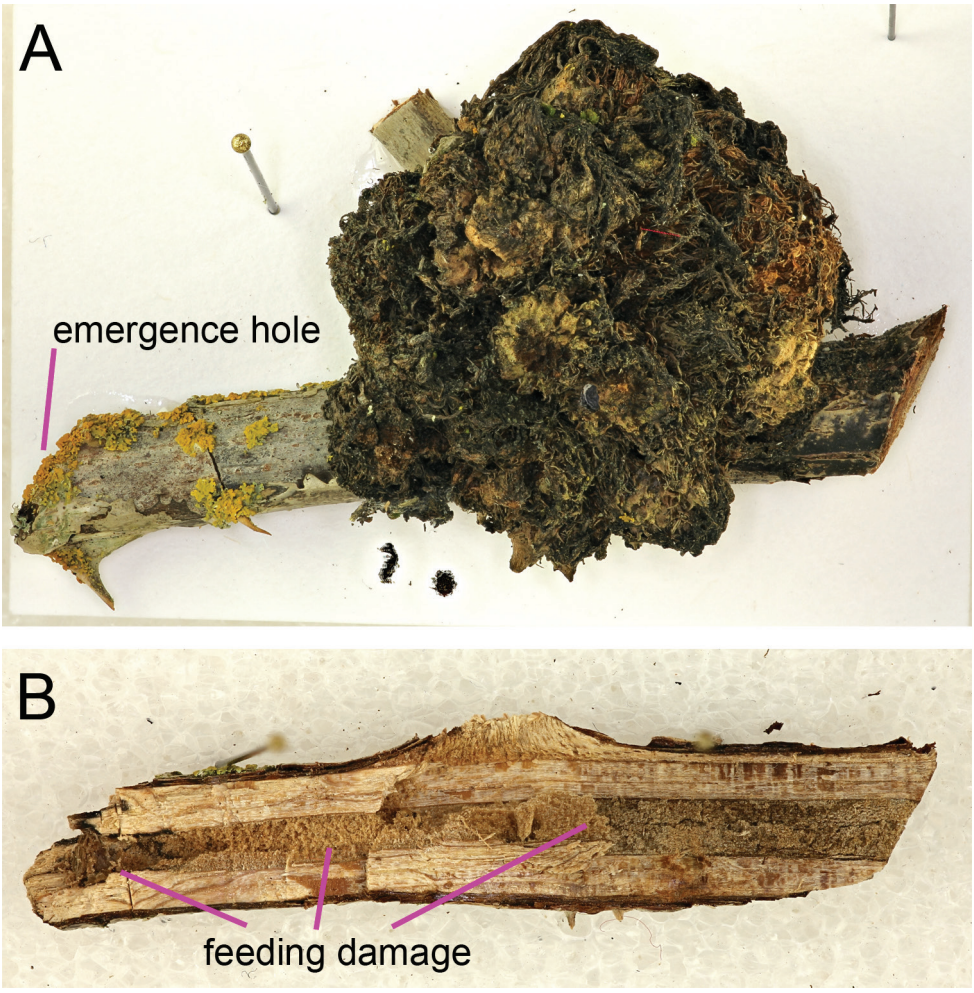

Figure 2. *Diplolepis rosae* gall (**A**), and dissected stem showing feeding damage of *Aphilodyctium fidum* (**B**).

overwintering conditions (Williams et al. 2003). After this the gall was transferred to room temperature to allow insects to emerge. Galls were checked several times a week, with insects pinned or transferred to vials of 70% EtOH as they emerged. This gall was not retained, but was instead dissected as part of a different research project. It therefore isn't clear if the insect was feeding within the gall or if, like the *M. pulla* specimen from Oregon, it was feeding or overwintering in other associated plant tissue.

Specimen data. United States; 1♂; Washington, Clark County, Port of Vancouver; 45°38.60'N, 122°42.33'W; Mar. 2018, em. unknown; C. Looney leg.; ex: *Rosa rubiginosa*. United States; 1♂; Idaho, Ada County, Boise; 43°34.36'N, 116°8.78'W; 26 Dec. 2006, em. Feb. 2007; E. Poor leg.; ex: *Rosa rubiginosa*.

Tenthredinidae
Tenthredininae
Tenthredinini

***Rhogogaster lateraria* (Cresson, 1880)**

Notes. During a Bioblitz on property adjacent to the North Cascades National Park, what were thought to be insect mines were observed on four individual *Castilleja* sp. near the Stehekin Landing Strip. No damage was observed other than the putative mines on any of the plants nearby. Leaves from two plants were collected and taken to the lab in Olympia, WA, in hopes of rearing the associated insects. Upon examination in the lab we determined that the supposed mines were actually small groups of insect eggs (Fig. 3), from which multiple sawfly larvae hatched on 23 and 24 May, 2016. The first instar sawfly larvae did not commence feeding upon their natal leaves, instead began crawling about the container. The larvae were provided with fresh *C. levisecta* Greenm. leaves from surplus greenhouse material provided by the Center for Natural Lands Management, in Olympia, WA. None of the larvae fed upon these leaves, and all died within a few days after emerging. DNA was extracted from two larvae, and the COI "barcode" region was sequenced and compared with data in the Barcode of Life

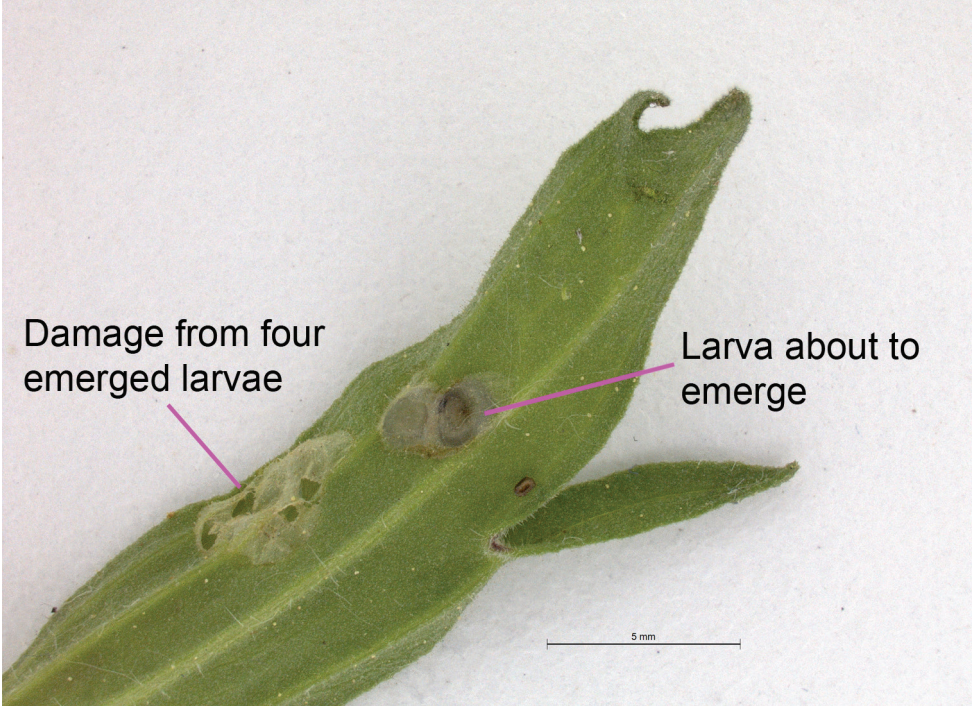

Figure 3. *Rhogogaster lateraria* eggs in *Castilleja* sp. leaf.

Data System and on Genbank. DNA from one of the larvae was successfully amplified and sequenced, and was a 99.85% match with three sequences of *R. lateraria* from adult specimens identified by D.R. Smith, all collected from Washington State. The sequence derived from the larvae was submitted to GenBank (accession number MN545964).

Specimen data. United States; 9 1st instar larvae; Washington, Chelan County, Stehekin State Airport, Lake Chelan National Recreation Area; 48°20.86'N, 120°43.38'W; 20 May 2016, em. 23–23 May 2016; C. Looney leg.; ex: *Castilleja* sp.

Discussion

Monardis is represented in North America only by *M. pulla*, which is broadly distributed in western states and provinces. No host plants have been previously recorded for this species (Smith 1969). Several species of *Monardis* in Asia and Europe feed on *Rosa* (Smith 1969; Scheibelreiter 1972). *Monardis plana* (Klug, 1817) larvae in Europe have been observed feeding on *Rosa* leaves and boring into flower stalks and soft shoots, subsequently pupating in the soil (Scheibelreiter 1972; Gibbs 2006). The species is occasionally a pest, and is known as the "rose bud sawfly" in parts of Europe (Scheibelreiter 1972; Gibbs 2006).

Aphilodyctium is monotypic in North America, and has been previously associated with unidentified *Rosa* (described only as "prairie rose") and galls of *Diplolepis* (=*Rhodites*) *arefacta* (Gillette, 1894), although Smith (1979) posited that the latter was likely an overwintering site. *Aphildyctium fidum* has also been reared from *Rosa californica* Cham. & Schldl. in California (https://bugguide.net/node/view/576002; also P. Bryant in litt. 2019). Other plant associations include *Quercus* and *Sambucus*, although Smith (1979) again suggests that these only represent overwintering sites.

The genus *Rhogogaster* in North America is associated with many plant genera in several families, including *Populus* (cottonwood), *Filipendula* (meadowsweet), *Alnus* (alder), *Stellaria* (chickweed), *Circaea* (evening primrose) and *Ranunculus* (buttercup) (Goulet 1992). However, no other *Rhogogaster*, and in fact no other sawfly to our knowledge, has been previously associated with *Castilleja*. *Rhogogaster* may, like the closely related genus *Tenthredo*, oviposit in plants that are not actually food sources. For example, *Tenthredo koehleri* Klug, 1817 is known to oviposit in *Myosotis*, but has not been observed feeding on the plant (Beneš 2008). The absence of feeding observed in the field and on the provided plant material suggests this is similarly the case with the *R. lateraria* larvae we encountered.

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