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Bumblebees, *Bombus* spp., Foraging on Red Oak, *Quercus rubra*, Acorn Galls in Southern Ontario

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Bumblebees and other aculeate Hymenoptera were observed collecting a secretion associated with galls of *Callirhytis operator* (Cynipidae) on acorns of Red Oak (*Quercus rubra*) at Lake Matchedash, Ontario, in August 1996. This is the first record of bumblebees collecting gall secretions, which may be a locally important sugar source during mast years.

Key Words: Bumblebees, *Bombus*, cynipid wasp, *Callirhytis operator*, Cynipidae, Hymenoptera, Red Oak, *Quercus rubra*, acorn, galls, Ontario.

The phytophagous larvae of many insects induce production of galls on their plant hosts (reviewed in Shorthouse and Rohfritsch 1992). This interaction has received much attention because it is often detrimental to the host (Collins et al. 1983; Crawley and Long 1995) and because the galls support a diverse community of parasitoid and inquiline insects (Wiebes-Rijks and Shorthouse 1992; Schönrogge et al. 1995). Here, I report new observations concerning an additional interaction supported by gall insects that has not been discussed in the recent literature.

During early August 1996, I observed bumblebees (*Bombus* spp.) and other aculeate Hymenoptera (Table 1) collecting a secretion associated with galls on acorns of Red Oak (*Quercus rubra*). The *Q. rubra* trees were located along the shore of Lake Matchedash (also called Long Lake), Simcoe County, Ontario (79°30'45"W, 44°47'00"N). The galls were yellow in colour and located on the outside of the acorn near its junction with the cup (Figure 1), and were identified as the pip galls of the agamic generation of the cynipid wasp *Callirhytis operator* (Weld 1922; Felt 1940). The foraging bees and wasps assiduously walked and flew around the acorns, probing the edges of the galls with their proboscides. A steady humming sound produced by the large numbers of Hymenoptera foraging on the galled trees indicated that the secretion, which was sweet to human taste, was quite attractive to them. The year 1996 was apparently a mast year for *Q. rubra* at Lake Matchedash, and galls were present on most acorns. During August 1997, however, acorns and galls were much less frequent, and foraging Hymenoptera were rarely seen.

A variety of galls secrete a sugary liquid that is attractive to foraging Hymenoptera, including various bees, wasps and ants (reviewed in Bequaert 1924), but this is the first record of secretions associated with the galls of *C. operator*. Foraging wasps and honeybees have also been observed collecting secretions from bacterially-induced twig lesions on

Gambel's Oak (*Q. gambelii*) and twig galls of Bur Oak (*Q. macrocarpa*) in Colorado (Kevan et al. 1983 and Eckberg and Cranshaw 1994, respectively). Bumblebees are known to collect homopteran honeydew, but they have not previously been reported collecting gall secretions (Morse 1982).

These observations draw further attention to the diverse ecological interactions centered around galls.



FIGURE 1. *Bombus terricola* foraging on galls on Red Oak at Lake Matchedash, Simcoe County, Ontario.

TABLE 1. Species of aculeate Hymenoptera found foraging on *Q. rubra* acorns at Lake Matchedash, Ontario, during August 1996. Voucher specimens are located in the Royal Ontario Museum, Toronto.

Apidae:

Apis mellifera L.
Bombus affinis Cresson
Bombus bimaculatus Cresson
Bombus ternarius Say
Bombus terricola Kirby

Eumenidae:

Eumenidae sp.

Vespidae:

Dolichovespula maculata (L.)
Vespula vidua (Saussure)

Q. rubra trees produce mast every two to five years (Sander 1990), and in these years galls may be an important sugar source for bumblebees and other Hymenoptera. This suggestion is supported by the commonness of acorn galls produced by *Callirhytis* species, including *C. operator*, which were present in 39% of *Q. rubra* populations sampled in eastern North America and infested an average of 3.7% (SE = 1.2%) of the crop ($N = 92$ populations; data from Gibson 1982). The secretions may also provide nutrients that are uncommon in the nectar of co-occurring flowers, but further analysis would be required to explore this possibility.

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