

MASON WASPS IN OUR BACK YARD

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For over 40 years my husband, Doug, and I have lived in a suburb of Lethbridge, Alberta. Our back yard has a variety of trees and shrubs, many perennial flowers and a garden, so it was a logical decision to buy and erect a bee house in order to attract native pollinators such as mason bees and leafcutter bees. The box we chose has holes of different diameters, and, in late 2014, we attached it to a trellis on the east-facing wall of our unheated garage.

Spring 2015 came and went, with no bees taking up residence. But in 2016 we noticed some wasps entering the cavities. They turned out not to be social wasps such as yellowjackets (*Vespa* spp.) but rather solitary wasps in the family Vespidae, subfamily Eumeninae.¹ Some species in this subfamily build freestanding gourd or pot nests made of mud, and they are generally referred to as potter wasps. Other species use existing cavities such as hollow stems or beetle borings, and they are referred to as mason wasps. The wasps attracted to our box fit the latter category. It should be noted that, in the literature, the descriptors "potter" and "mason" are often used interchangeably. I posted photos of the wasps on iNaturalist.ca and on BugGuide.net.² From those photos and others, Matthias Buck, Assistant Curator of Invertebrate Zoology at the Royal Alberta Museum, identified our wasp as *Ancistrocerus antilope* ssp. *spenceri*.

We learned^{3,4} that the female mason wasp stings and paralyzes prey such as moth caterpillars and beetle larvae and takes them to a brood cell she has prepared and

in which she has already laid an egg. She then seals the chamber with mud made by mixing soil with regurgitated water or saliva (hence the name "mason"). If there is room in the linear nest she prepares another brood cell. In such linear nests with multiple cells, female eggs are laid in the inner chambers while male eggs are laid in the outer chambers. The eggs hatch and the larvae feed on the paralyzed prey, grow to mature size and then overwinter. In spring they pupate and shortly thereafter emerge as winged adults. Males, which are smaller and have a shorter development time, emerge first to await females with which they will mate. Males apparently outnumber females by a ratio of 2:1.

We watched with interest that summer as most of the bee box tubes were filled and capped. The wasps seemed to take little notice of us as they were flying to and from the nest box. Although they do have a venomous sting, mason wasps are apparently very tolerant of humans. Even though we weren't attracting our desired bees, these adult wasps feed on nectar and pollen, and in so doing perform valuable pollinating services. In addition, if one assumes that they fly only as far as they have to in order to capture prey, then they might also be helping to control insect pests in our back yard. All nesting activity occurred during June and July; by early August the majority of adult mason wasps had disappeared.

During the winter of 2016-17, Doug built a nest box from a solid block of wood into which he drilled holes 15 cm deep by 1 cm in diameter. The box was designed for mason or leafcutter bees, which we still had hopes of attracting. The holes were lined

with parchment paper, allowing for easy cleanout and also allowing for collection of bee pupae. The larvae of mason and leafcutter bees pupate in late summer and are often removed in the fall to limit mortality due to predators or low winter temperatures, and to clean them of any mites.

Our hope of attracting pollinating bees was dashed again in spring 2017 when the mason wasps returned and showed interest in both boxes. Over the summer all cavities they could enter were provisioned and sealed. Figure 1 shows a wasp bringing in a paralyzed caterpillar, ferrying in a load of soil and constructing a cap over the entrance of the hole. When the female's head was imbedded in the mud, I could hear a very high frequency whine. Could that be her mouthparts vibrating rapidly to render the soil-saliva mixture into a liquid slurry of the proper consistency?

In early June 2018 we decided to clean the homemade nest box and so pulled out the parchment paper cylinders. There were multiple brood cells in each cylinder, some empty and some with adults ready to burst forth. We had obviously interrupted the natural emergence process. Doug inserted fresh parchment into each tube and re-attached the box to the trellis. Soon female wasps began entering the cavities to begin another nesting season. All cavities of acceptable diameter in both boxes were provisioned and capped by late summer. That autumn we bought a much larger bee house with bamboo cylinders of various sizes and positioned it close to the other two boxes in anticipation of the next nesting season.

We cleaned out the homemade nest box in early June 2019 and, once more, wasps were emerging

as we did so. Figure 2 shows a parchment cylinder with six brood cells, an adult wasp wriggling out of a cell and a mating pair. After a short period, nesting activity commenced. By the end of July the majority of holes, roughly 215, were capped (Figure 3). Those too large or too small in diameter remained empty. If each capped cylinder produces two adults (a conservative estimate for reasons explained below), more than 400 adults could be added to the local population in 2020.

Not every egg laid by female mason wasps survives. In winter we have seen Northern Flickers (*Colaptes auratus*) and Black-capped Chickadees (*Poecile atricapillus*) tearing open capped cells. In mid-July 2019, I watched an ichneumon wasp (Hymenoptera: Ichneumonidae) probe several mud caps with its antennae. When it detected something within, it inserted its ovipositor to lay an egg on the mason wasp. The ichneumon larva will feed on and eventually kill the mason wasp larva. I have also seen a variety of flies and small species of wasps entering uncapped nest holes to, I suspect, lay their eggs on either mason wasp larvae or stored food items.

One final observation concerns mites. It has long been known that mason wasps are hosts of mites, carrying them in either specialized pouches or simple depressions on their exoskeleton.³ The male wasp seen in Figure 2 is carrying a large load of mites on its thorax. In the adult stage, it is only males that carry mites, as female wasp larvae kill any mites prior to spinning their cocoons.⁴ During mating some mites will move from the male to the female. As the female subsequently provisions brood chambers, up to 20 of her mites are transferred to each cell. The mites complete their life cycle on the wasp larva, feeding on it but not

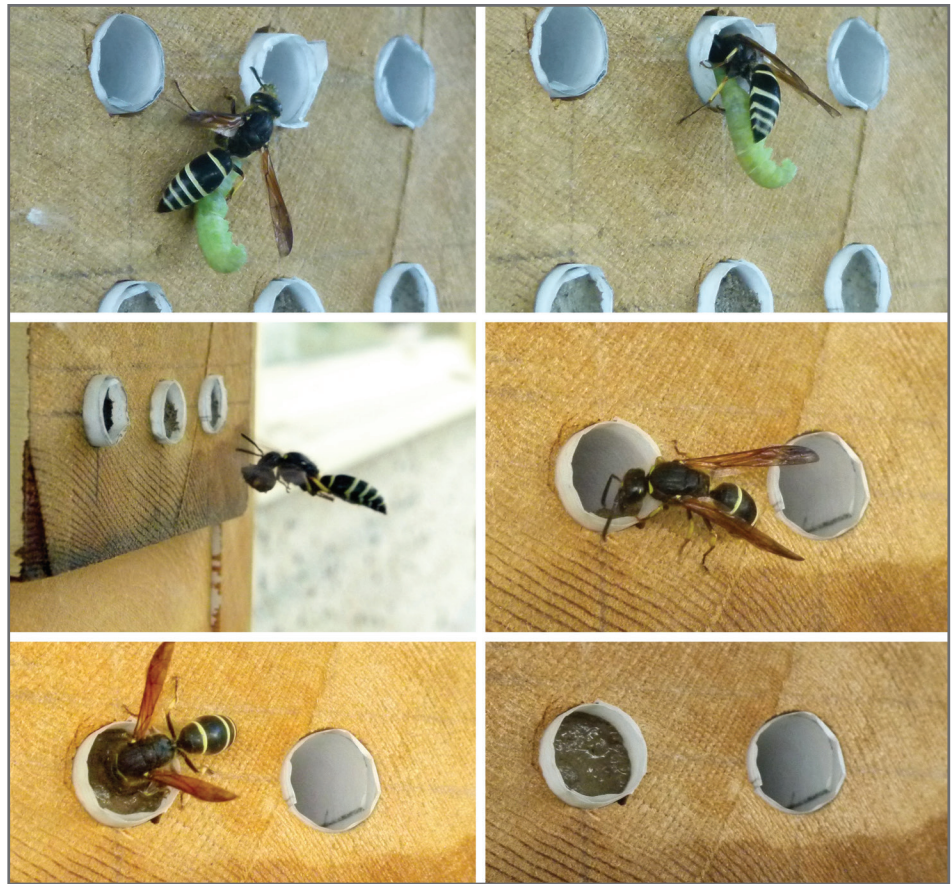


FIGURE 1: A paralyzed caterpillar is brought into one of the nest box holes. When the tube is full of provisioned cells, the wasp brings in more soil to seal the entrance. All photos courtesy of Teresa Dolman.



FIGURE 2: Brood cells fill a parchment cylinder. One wasp is emerging from a cell. Mating takes place immediately after emergence.



FIGURE 3: Original round bee house at lower left, homemade box at upper left and the newest, largest, bee house at right. Most of the tubes have been capped.

killing it. Researchers often wondered if the mason wasp received any benefit from this seemingly parasitic association. This was answered in 2008 by a study in Japan^{5,6} where it was revealed that if a predator happened to gain access to a brood cell, the mites would swarm and bite it. If six mites were present, there was a 70 per cent chance that the predator would be killed; if 10 or more were present, the predator was always killed. By protecting their food source the mites are thereby ensuring their own survival.

Although no bees accepted our boxes, that disappointment has been more than offset by the marvelous opportunities we've had to 'sneak a peek' into the nesting behaviour

and life cycle of a native wasp that provides important back yard and ecosystem services of pollination and pest control.

Acknowledgements

Thanks to reviewers Matthias Buck and Terry Galloway for very helpful comments and suggestions on drafts of the article.

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