

Knepp Field Season Report 2017
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Observations of *Lasioglossum malachurum*

We studied the ground nesting sweat bee *Lasioglossum malachurum* during spring/summer 2017 at Knepp (See Fig. 1). Founding females of the species mate with males during the reproductive phase in August, after which they overwinter with stored sperm until spring. The 2017 season began early, with founding females emerging at the beginning of April. Each female builds a nest by burrowing into the soil (see Fig. 2). Females then collect pollen, which is used to form pollen balls. An individual pollen ball is placed into a cell and a single egg is laid onto each pollen ball. We observed founding females provisioning offspring with pollen from 8th April. This behaviour continued until 14th May (a 5 week provisioning period). On a single day, most females emerged from their burrows at 10:00 and had finished provisioning by 13:30. In inclement weather, females were not seen provisioning. By 20th May almost all nests had closed entrances.

We focussed our observations on a subset of nests (across 58 plastic containers that had been filled with soil and placed into the ground). In total, we observed 169 females provisioning during the spring phase (equating to 169 nests). If only plastic containers containing nests were considered, there was an average of 5 nests per container. There were hundreds (and possibly thousands) of nests in the soil surrounding our containers; however, they were not included in our observations.

Our observation nests remained closed from 20th May until the beginning of June. During the time when nests are closed, the offspring provisioned during the spring phase develop into adults. These offspring are female and become workers during the summer phase. First workers were seen emerging from nests on 5th June. Most nests that survived the spring phase had at least 1 worker emerged by 10th June. In total, 106/169 nests survived the spring phase and produced at least 1 worker. After the first worker emerges, subsequent workers continue to emerge over the summer phase. Each worker forgoes reproduction and forages for pollen to provision eggs laid by the founding female (Fig. 3). The founding female rarely leaves the nest during this phase, but can be seen making trips for nectar. On average, the period of worker foraging lasted for 19 days per nest. During this time, foraging did not occur during inclement weather. The weather during this season was very hot and dry, meaning there were few days when foraging was not observed. There was an average of 17 offspring produced per nest during this time. A total of 84/169 nests survived to produce reproductive offspring. After the foraging period, nest entrances were closed again and the offspring laid by the founding female during the summer phase then develop into reproductive adults of both sexes. Reproductive individuals began emerging from nests on 15th July and this continued into August.

Throughout the season, we filmed individual nests using camcorders attached to tripods. We were able to record 50 nests per day, with each camera pointing

towards the entrance of an individual nest. We recorded on almost every foraging day during the summer worker phase. Our recordings last from 9:00 until 18:00 for each day, reflecting the time when workers are actively foraging. We are subsequently able to collect fine-scale data on each nest, such as the total number of foraging trips made by workers, and the success rate of foraging trips (e.g. the amount of pollen brought back to the nest). We are also able to calculate the number of workers belonging to each nest. Using this data, we can follow foraging rate/success and the emergence/disappearance of workers from each nest over time. This data also provides a valuable comparison between nests. We are currently collecting this data from the video recordings, and have several project students at the University working on this. We aim to conduct the same observations during the 2018 season to make a comparison between years at this site.

During our time at Knepp, we also interacted with members of the public on a daily basis. This included the Knepp group tours that passed through our site. During these interactions, we explained scientific concepts and described the ecology of *L. malachurum* to members of the public who had varied scientific backgrounds and interests. This inspired lots of interest and questions from the public about our work, the life of the bees, and Knepp in general.

Fig 1 – An *L. malachurum* female with paint marks for individual identification



Fig. 2 – Structure of an *L. malachurum* nest beneath the soil during the spring phase

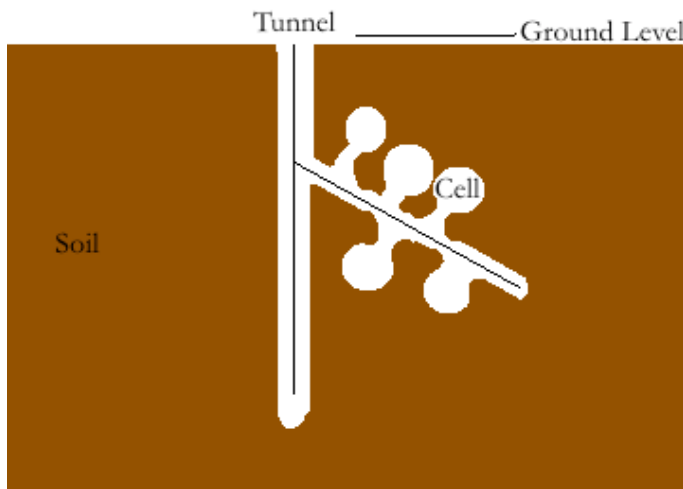


Fig 3 – A worker returning to the nest entrance with pollen

