

## Observation Hive Experiment

The challenge is to manage the observation hive at Science North to survive the winter to the following season. Normally, the colony would dwindle and the last bees would die sometime in February or March. (Fig. 1)



Figure 1 Observatin Hive in Feb. 2 2020

Because of the ongoing pandemic, no efforts were directed towards the observation hive until September, when it was decided to re-populate the observation hive using a colony from the adjacent yard.

To that effect, four frames of bees (Brood, stores AND the Queen were installed in a four frame nuc. box and moved to Manitoulin Island for about 12 days.

This time interval was used to examine the functioning of the observation hive structure to try and improve the environment for the bees; a few considerations came to light:

- 1)-The geometry of the space does not allow the bees to cluster (As they would normally do)
- 2)-The surface to volume ratio is very high, making the bees work very hard to maintain brood rearing temperature (September is when winter bees are raised)
- 3)-The feeding system in place does not work well.
- 4)-A close examination of ventilation needs (Availability of oxygen and control of humidity and carbon dioxide)
- 5)-Provide a way to remove dead bees.

With these in mind, a few modifications were made to the structure:

- a) -To control heat loss, the sides of the hive are covered with insulation for the night, and removed for observation during the day (Figs 5 and 6).
- b) -The ventilation slots on the sides (There were many) were all sealed with wax except the lowest ones.
- c) - A port to feed pollen supplements was made.



Figure 2 Feeder arrangement

d) –The syrup feeding port was modified to make it more accessible to the bees, and at the same time provide a way for excess water vapour to be vented in a way that the bees would be able to control if they wanted to. (Fig. 2)

e) –Drainage holes for carbon dioxide were drilled in the bottom, and a mechanism added to allow the use of those holes to remove dead bees.

f) –The feeding syrup was adjusted to 1.3parts water to 1 part sugar, to provide extra water for metabolism.

Because the bees cannot cluster, the cluster condition of low oxygen, high carbon dioxide is not possible for the bees to attain; therefore they would consume more syrup and fall into a loose or no cluster condition at a higher metabolic rate than their cousins outside. The results so far are very encouraging (Figs. 3 and 4), and we hope it will make it to the spring.





Figure 3 February 11 2021



Figure 4 February 11 2021

Anybody that would have any questions or like to have any further explanations for the logic behind the modifications, I will be glad to answer.

Note that this wintering dynamic for the bees is not normal here since the geometric shape of the hive does not allow them to form a cluster. The winter cluster is an adaptation the bees have to survive winter; and within it, the bees control a very different environment than what can be accomplished in the observation hive. The challenge is to provide an environment that the bees can adapt to survive.

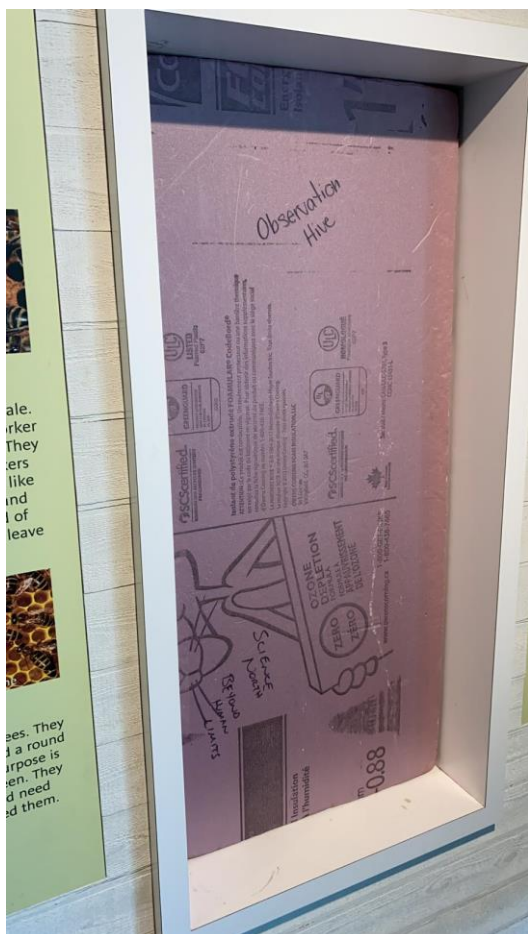


Fig. 5 Insulation cover

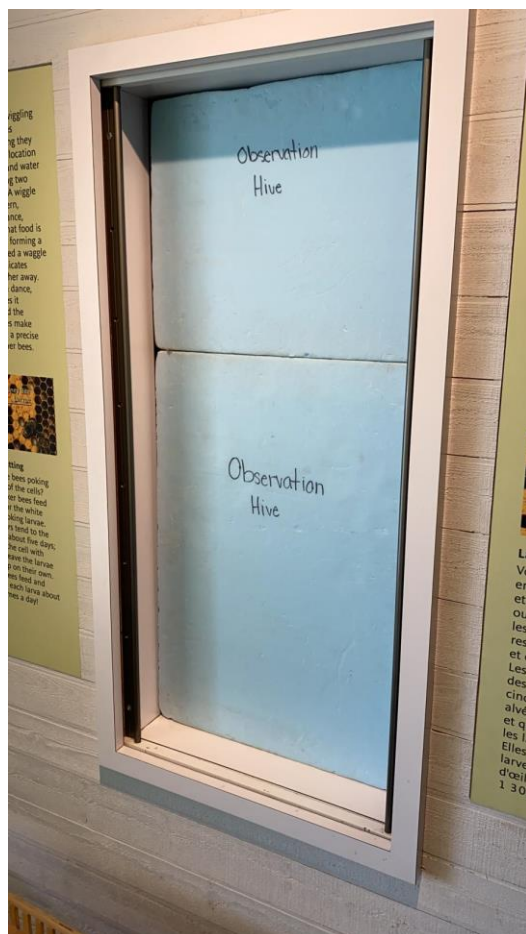


Fig. 6 Insulation cover





Of course, here's the queen.