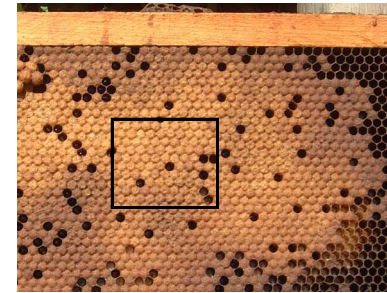
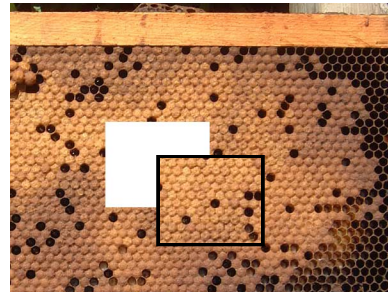


# Testing for Hygienic Behavior

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[www.extension.umn.edu/honeybees](http://www.extension.umn.edu/honeybees)



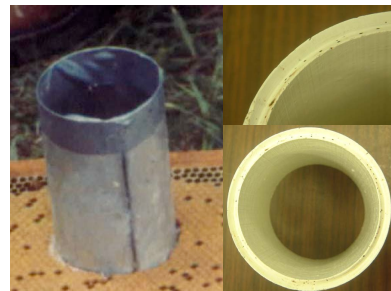
1. Hygienic behavior is a genetic trait of honey bees. It is the main defense against American foulbrood and chalkbrood, and is one defense against varroa mites. Testing for this trait is simple. It involves freezing a section of sealed pupae and recording how many dead pupae the bees remove within 24 hours.

2. There are two methods to perform this test. One is the freezer-killed brood test (FKB). The other is the liquid nitrogen-killed brood test (LNKB). With either method use 3 - 10 day old pupae (just pupating to light tan color).

3. **For the FKB test:** Cut out a section of sealed brood containing about 100 cells on each side that contain the correct age pupae.

4. **FKB** - Freeze the section of brood in a freezer at least  $-10^{\circ}\text{F}$  for 24-48 hours.

5. **FKB** - Count and record the number of sealed cells in the section. Put the section back in frame and return the frame to the colony. Hold the section on the edges; do not damage the cell cappings. Skip to step 10.



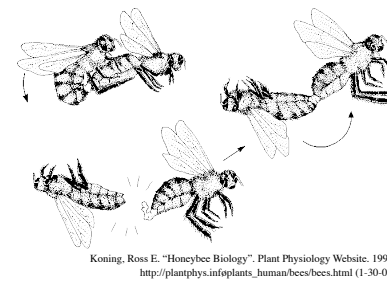
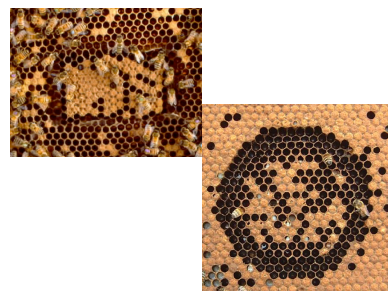
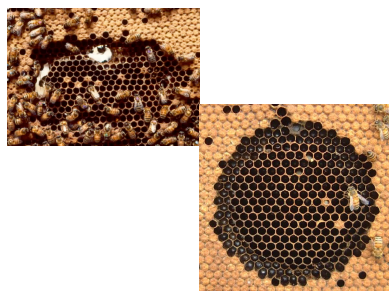
6. **For the LNKB test:** Make a 3" diameter tube to pour the liquid nitrogen directly on the comb. You can use metal vent pipe or PVC plumbing pipe. If you use PVC it helps to route a "v" into the bottom edge. Obtain a supply of liquid nitrogen from a gas supply (welding or medical) or a veterinarian.

7. **LNKB** - Find a section of sealed brood of the proper age pupae and place the tube over it. Press the tube down to the midrib of the comb with a twisting motion until it seals.

8. **LNKB** - Start with a 10 oz. (300ml) cup of liquid nitrogen. Pour about 1/4" of the liquid nitrogen in the tube. When it evaporates pour the rest of the liquid nitrogen in the tube.

9. **LNKB** - Wait for the liquid nitrogen to evaporate and the tube to thaw before trying to remove it. Count and record the number of sealed cells in the tube.

10. **Both Tests:** Put a tack or some other mark on the top of the frame to make it easier to find when you return. Return frame to the colony within the brood nest and wait 24 hours to check the results.



Koenig, Ross E. "Honeybee Biology". Plant Physiology Website. 1994.  
[http://plantphys.info/plants\\_human/bee/bee.html](http://plantphys.info/plants_human/bee/bee.html) (1-30-08)

11. **Both Tests:** After 24 hours return to the colony and remove the frame with the frozen brood and evaluate the results.

12. **Both Tests:** Count the cells with dead pupae that are still not cleaned out. The colony is hygienic if it completely removed at least 95% of the frozen pupae within 24 hours.

13. **Both Tests:** These are examples of tests where the bees are not hygienic. They did not remove the dead pupae from very many cells.

14. If you want to breed bees for hygienic behavior, it is very important to first select colonies with desirable traits, such as high honey production, gentleness, good wintering ability and queen longevity. Test only the best of these colonies for hygienic behavior.

15. A good hygienic queen will need to mate with >50% drones from other hygienic colonies for her colony to be hygienic. That is, over 50% of the workers in a colony need to have hygienic genes from both the queen and drones for the colony to be hygienic!