

Bee Tracheal Systems: A great activity for high school students

**SBI 3U/3C** Grade 10: Tissues, Organs and Living Systems

**SBI 3U** Grade 11: Animals: Structure and Function

**SVN 3M** Grade 12: Forestry and Agriculture

**Choosing an insect:** While insect tracheal ducts are generally very small, those located where the muscle activity is intense are considerably larger. Choose an appropriate flying insect, one that is easy to obtain and is abundant. Choose an insect that has important environmental issues connected to it, and it will make for a deeper experience.

**Bees:** It is very easy to obtain bees, that have recently died, from a local bee keeper. (Thanks Mark). A friend of mine (Thanks Geoff) collected 50 specimens in 2 minutes, from the snow banks around the hive. Bees have an interesting life style, are important pollinators, and have had many negative environmental factors affecting their populations. These include tracheal mites (biotic factor) and neonicotinoid use (abiotic factor).

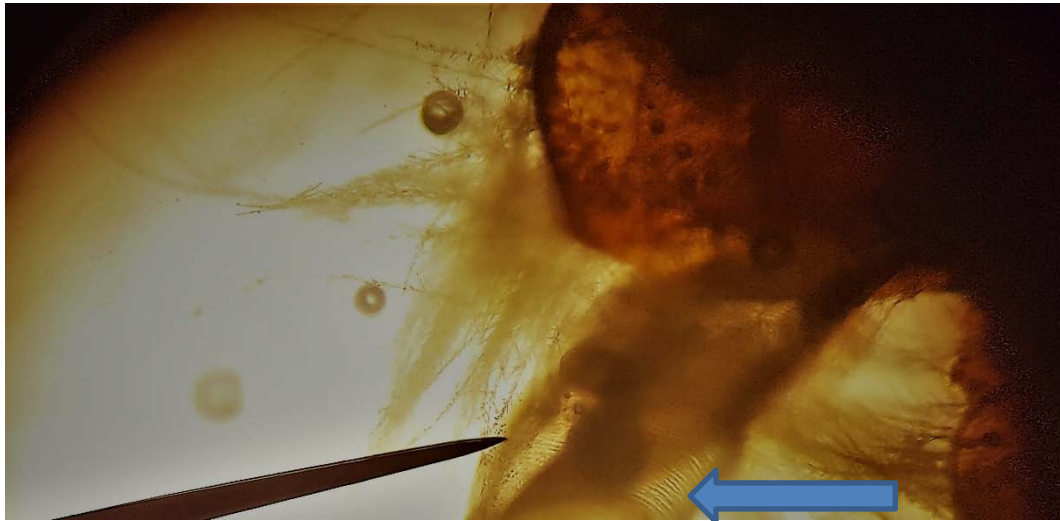
**Preparation:** The thorax is the site of attachment for the wings and legs. As the cells in the tissues in the thorax will have the greatest requirement for oxygen, the trachea in this region will be the largest. Remove the head, abdomen, legs and wings from 10 bees, leaving only the 10 thoraxes. Place these in 5 ml of 1 molar potassium hydroxide over night. This will dissolve the tissues that surround the trachea.

Using two exacto knives, pull one bee thorax apart. Prepare a wet mount slide and really squish the bee thorax onto the slide. Examine under low power initially to find a potential site and then move to medium power to look for the tell-tale rings on the trachea.

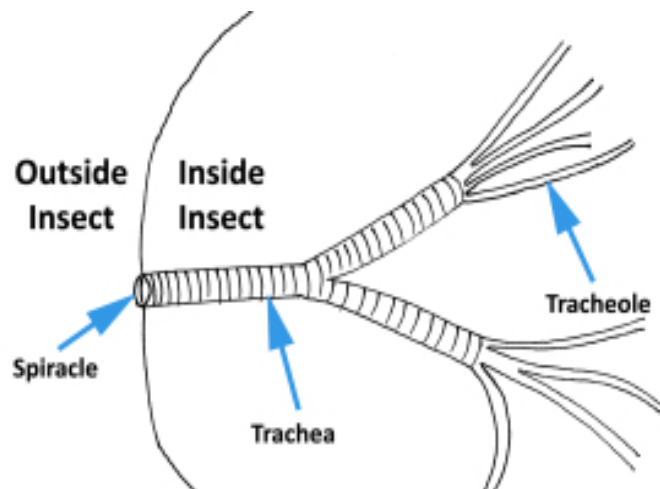
**Record:** As a record of the successful finding of a tracheal duct, use a standard cell phone camera and snap a few pictures. Download these. Crop the pictures, and try a variety of filters to get the best image.



**Figure 1:** Unfiltered, uncropped image of a bee tracheal duct. This image can be magnified in a word document (390%) so that the rings are obvious.



**Figure 2:** Filtered, magnified and cropped picture of a bee tracheal duct. The blue arrow points to the clearly visible rings. Tracheal mites (spider-like) can actually fit inside these ducts. None were observed in any of these bees.



**Figure 3:** Typical textbook illustration of insect trachea.

Students could be assigned a report on the anatomy of bees, incorporating the pictures that they took in this lab activity. They could also add an ecology section to the report describing their role as pollinators, or describing environmental factors that adversely affect their population levels.

For more of these science activities be sure to attend the STAO Conference 2020. Dave Gervais will be presenting activities for biology as a conference speaker and as a co-presenter in the conference playground.

Dave Gervais

STAO Safety Committee Chair