

# Stomate Lab Activity

## Materials:

Clear plastic (cellophane) tape  
microscope slides  
clear nail polish  
microscopes

## Procedure:

1. Collect your leaves. These can be dried or the leaves can actually be left on the tree and sampled live. We record the tree's identity, and also number the leaves tested.
2. Paint a 1 x 2 cm oval of clear fingernail polish on the leaf, avoiding ribbed veins. We test both the top of the leaves and the undersides, where most of the stomata are. We usually paint the top and bottom at the same time to speed up the process. Often we will paint 10 leaves at a time.
3. After the polish has dried it can be peeled off quite easily. Use clear cellophane tape to make a quick and foolproof mount as follows: Simply place the tape on the polish still on the leaf and lift the polish replica off of the leaf and tape to the slide. By placing the taped replicas perpendicular to the long axis of the slide we have been able to place up to 4 replicas on one slide. This greatly speeds the counting. It is surprising, but the tape's adhesive and obvious optical limitations don't seem to make much of a difference. Every teacher and most students express quite a bit of pure joy and amazement at their first view of stomata replicas.
4. We have been counting all of the stomata visible in one field of view at a magnification of 400x. We find that for most plants counting at 100x yields a count of about 100 to 200 stomata per view. This is too high a number for kids to keep track of by silent counting without a grid. By going to the higher magnification the counts are more manageable at about 12 to 30 stomata per field of view. We have been making 5 counts per replica but have found that 3 would be adequate. There is not a lot of variation on one replica. All counts should be converted to number of stomata per square mm to account for variation in microscopes.
5. In trying to determine the average count on a tree we have found that at least ten leaves need to be sampled because of the large amount of variation even in one tree. Of course this alone could make an excellent project. We have also tried to count the stomata on at least 10 trees in a given area to deal with the variation between trees.

Alfalfa might be an excellent indicator species since it has nearly global distribution. A study in Israel involving alfalfa demonstrated seasonal differences in stomatal counts as well as differences between irrigated and non-irrigated fields.