

## **Scientific drawing of low power plan of a prepared slide of T.S. leaf, including calculation of actual size and magnification of drawing**

**Specification reference:** 2.3

**Adaptations for gas exchange**

### **Introduction**

This practical requires you to observe and draw a prepared slide of a dicotyledonous leaf. You should draw in proportion as described in the guidance notes.

### **Apparatus**

Microscope  
Slide of TS leaf (dicotyledon)

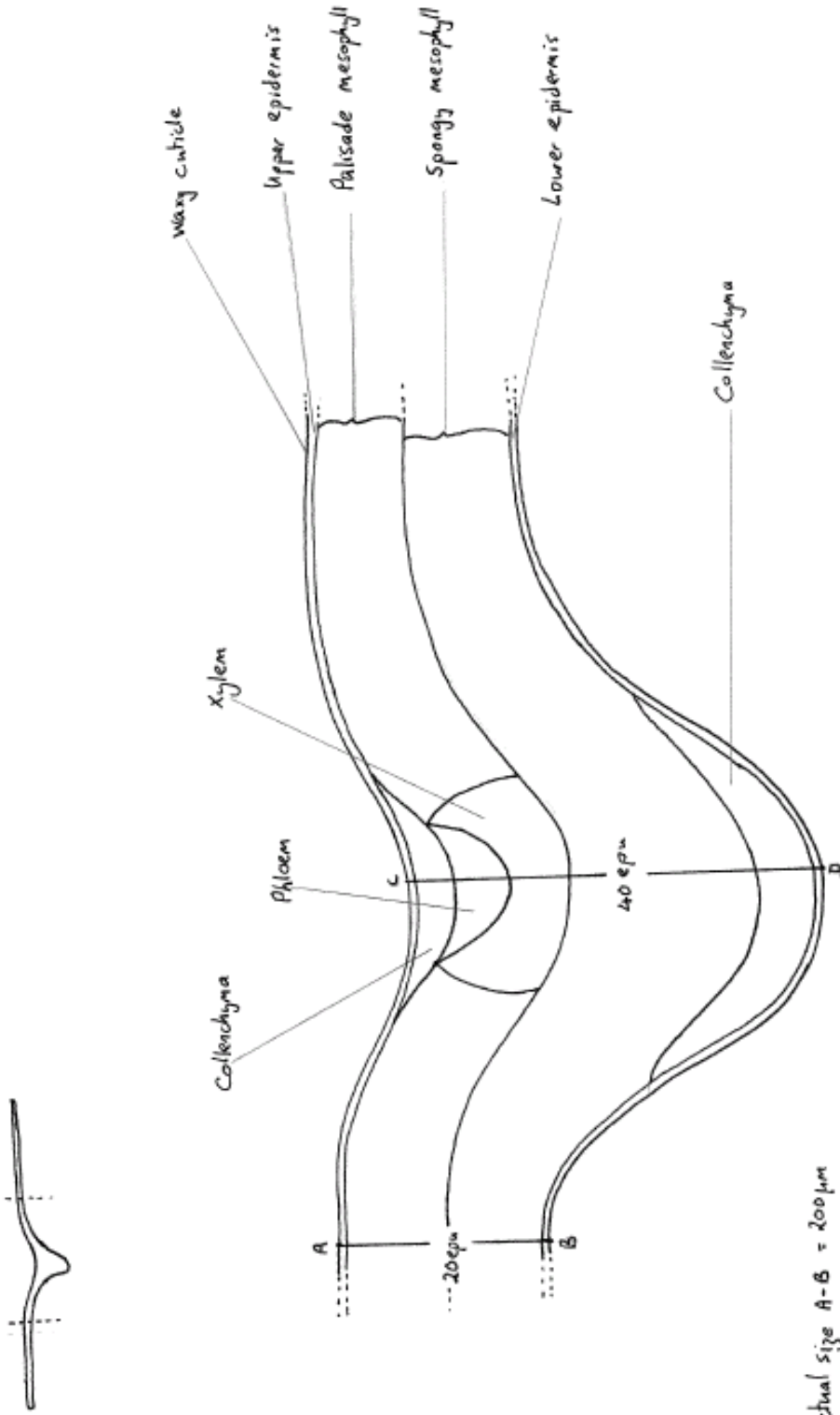
### **Method**

Examine the slide using the x10 objective lens.

1. Draw a small outline of the leaf.
2. Position the slide to include the mid rib.
3. Show on the outline drawing the position of the section which will be shown as a plan.
4. Draw a plan to show the distribution of tissues in the correct proportion.
5. You may need to use the x40 objective to identify some of the tissue layers.
6. Identify and label the following: upper and lower epidermis; palisade mesophyll; spongy mesophyll; xylem; phloem; cuticle; collenchyma; sclerenchyma (if present); guard cells
7. Draw 2 lines, measured in eye piece units, on the plan.
8. Calculate the actual size of one dimension of the leaf and the magnification of your drawing.

### **Teacher/ technician notes**

An example of the expected diagram is shown

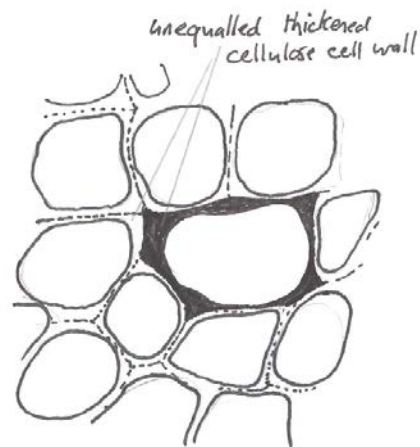
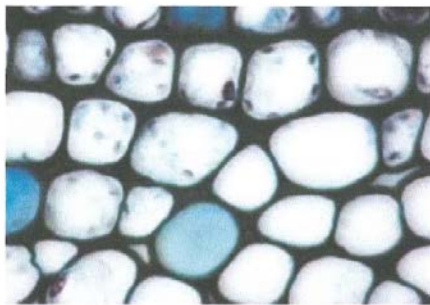


Actual size A-B = 200  $\mu$ m  
 " " C-D = 400  $\mu$ m  
 Magnification =  $\times 200$   
 epu = eye piece unit.  
 lep = 10  $\mu$ m

In a T.S. of a leaf students may observe a leaf vein seen in L.S. the spiral lignin thickening of the xylem vessels gives it away!

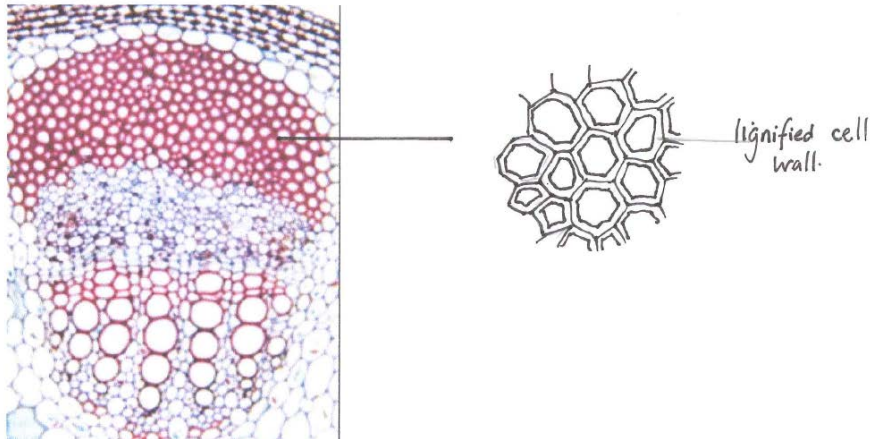
The most difficulty students will find is in the identification of collenchyma and sclerenchyma. Collenchyma is a tissue often associated with leaves, it gives support to short lived structures. Collenchyma cells have an unequal thickening of cellulose in their walls, commonly at the corners. Collenchyma is best identified by looking for 'star shaped' structures between adjacent cells ( the cells look rather like the polystyrene boxes used for the transport of bottles and electrical goods).The thinner areas of the cell walls in collenchyma tissue often breaks as the cells are dehydrated in the process leading to preparation for sectioning. The thickening material made entirely of cellulose and contains no lignin. Lignin needs nitrate ions for its production, and so in metabolic terms, it is expensive to make.

Collenchyma



Sclerenchyma is a tissue which is used for long term support and protection. Sclerenchyma cells have lignin added to the walls and in most stains used for biological material will stain red.

Sclerenchyma. Fibres *transverse section*



### **Further work**

- Drawing of some of the individual cells in the section
- Comparison with monocotyledon leaf or leaf showing adaptations to habitat, e.g. nymphaea or marram grass

### **Practical techniques**

- use of light microscope at high power and low power, including use of a graticule
- produce scientific drawing from observation with annotations