**Using a light microscope to examine lung tissue STUDENT**

**Introduction**

Histology is the study of tissues and organs using microscopy. Linking histological observations of lung tissue to your knowledge of the theory of lung function is a great way to consolidate your understanding. It is also a good opportunity to practise and demonstrate the microscopy and scientific drawing skills that form part of your

A Level practical endorsement.

**Aim**

* To study the microscopic structure of the mammalian lung and relate structure to function.

**Intended class time**

* 1 hour

**Equipment**

* Light microscope with x10 and x40 objective lenses and an eyepiece graticule
* Stage micrometer
* Pre-prepared slides of sections of mammalian lung tissue

**Method**

In lung slides under the microscope you should be able to see the ends of the smallest bronchioles opening into alveolar ducts. These ducts then open into numerous alveolar sacs which then open into the smallest structures, the alveoli.

Owing to the presence of numerous alveolar sacs and alveoli, lung tissue is spongy in appearance. The walls of the alveoli are very thin. There are also numerous tiny blood capillaries, which are very difficult to observe unless they have been injected with coloured dye.

A number of tubular structures cut in a variety of planes are also seen in a thin section. You will see branches of the pulmonary blood vessels. It is hard to tell which are arterioles and which are venules because the arteriole walls are much thinner than arteriole walls in the rest of the body, so that there is little difference between the two types of blood vessels in lung tissue. These blood vessels can be recognised because they contain large numbers of red blood cells (erythrocytes).

You will also see large numbers of bronchioles. These have thin walls with two layers of cells, and no red blood cells inside. If you look carefully you may be able to see bronchioles connected to alveolar sacs.

1. Using the information above identify blood vessels, bronchioles, alveolar sacs and alveoli in your slide.
2. Use the stage micrometer to calibrate the eyepiece graticule with the x10 objective.
3. Use the x10 objective to draw a low power plan showing the appearance of:  
   a) a bronchiole.  
   b) an alveolar sac and its alveoli.  
   In both cases add labels, annotations and a scale bar.
4. Use the stage micrometer to calibrate the eyepiece graticule with the x40 objective.
5. Use the x40 objective to make a high power drawing to show the cellular detail of three alveoli.  
   Add labels, annotations and a scale bar to your drawing.
6. Calculate the diameter of a typical alveolus from your slide.

**Questions to consider while carrying out practical work**

1. Using a calibrated eyepiece graticule the mean diameter of an alveolus was calculated to be 170 µm. Do you think this sounds too small, too large or about right? What is the reasoning behind your answer? Hint: even before you have completed your own detailed measurements, how do you know roughly how large an alveolus must be based on your knowledge and what you can see in your specimen?
2. Why is it difficult to see blood capillaries?
3. Why are bronchioles so numerous? Why are capillaries so numerous?
4. Why are lung arterioles relatively thin-walled?
5. Explain how the features of lung structure seen on these slides account for efficient gas exchange in the lungs.

**To submit**

For this piece of work to count towards Practical Activity Group 1 of the Practical Endorsement, you need to have evidence showing your low power and high power drawing complete with labels, annotations and scale bars. You also need to have considered the above questions as the answers will aid you in preparation for your written examinations.