



高中生物科野外考察課程 Senior Secondary Biology Field Study Course



顯微鏡生態探索 Microscope Eco Exploration

姓名 Name

組別 Group

日期 Date:

學習目標 Learning goals:

完成課程後，學生應能 After the course, students should be able to:

1. 有效收集水生微生物樣本 Effectively collect aquatic micro-organism samples;
2. 製作裝載水生微生物的玻片 Prepare temporary mounts of aquatic micro-organism samples;
3. 適當地調節和選取顯微鏡的光強度、光圍、聚光器和濾片 Suitably adjust and select the light intensity, aperture diaphragm, condenser and filters of a light microscope;
4. 正確地選擇和使用目鏡和物鏡 Correctly choose and properly use of eyepieces and objectives;
5. 正確地應用光場、暗場和相位差 Properly apply bright field, dark field and phase contrast microscopy;
6. 準確地繪畫顯微鏡下看見的生物 Make accurate biological drawing of specimens observed under light microscope;
7. 製作簡單科學報告 Prepare simple scientific report;

程序 Schedule

9:00 - 09:40	簡介 Briefing
09:40 - 11:00	野外搜集樣本 Collecting samples in the field
11:00 - 11:30	操作示範 Operation demonstration
11:30 - 12:00	初步觀察 Preliminary observation
12:00 - 13:00	午膳 Lunch
13:00 - 15:00	詳細觀察及繪圖 Thorough observation and drawing
15:00 - 15:30	製作報告 Report writing
15:30 - 16:00	分組匯報 Group presentation
16:00 - 16:30	討論及總結 Discussion & summary

儀器和工具 Equipment and tools

1	鑷子 Forceps	
2	剪刀 Scissors	
3	樣本小瓶 Vials	
4	滴管 Droppers	
5	載玻片和蓋玻片 Slides & cover slips	
6	複式顯微鏡 Compound microscope	

1. 絲狀藻和相關微生物 Filamentous algae and associated micro-organisms

在淡水生境中，用鑷子收集積聚的絲狀藻，並置於小樣本瓶內。Use a pair of forceps to collect samples of algal aggregates in the aquatic habitat and place them in vials.

2. 污水中的微生物 Micro-organisms in polluted water

在受家居廢水污染的河流中，用鑷子收集污水真菌的樣本，再用滴管收集漂浮有機物和沉澱有機物，將樣本置於密封的樣本瓶內。Use a pair of forceps to collect samples of sewage fungi from a stream polluted by domestic wastes; use a dropper to collect samples of floating and submerged organic matters. Keep the samples in a well-sealed sample bottle.

載玻片製作 Slide preparation

1. 絲狀藻和相關微生物 Filamentous algae and associated micro-organisms

用滴管攪拌樣本，抽取少量水樣，加一滴於載玻片上；用鑷子抽取極少量絲狀藻，置於同一載玻片上，用蓋玻片覆蓋。每個樣本準備3張載玻片。Use a dropper to stir and then suck small amount of water, add 1 drop onto the glass slide. Use a pair of forcep to collect very small amount filamentous algae and add it onto the same glass slide. Cover with cover slip. Prepare 3 slides for each sample.

2. 污水中的微生物 Micro-organisms in polluted water

用滴管抽取少量水樣，加一滴於載玻片上；用鑷子抽取極少量污水真菌，置於同一載玻片上，用蓋玻片覆蓋。每個樣本準備3張載玻片。Use a dropper to suck small amount of water, add 1 drop onto the glass slide. Use a pair of forcep to collect very small amount of sewage fungi and add it onto the same glass slide. Cover with cover slip. Prepare 3 slides for each sample.

調節顯微鏡 Microscope adjustment

1. 光強度與光圈大小 Light intensity and diaphragm

調節光強度和聚光器上的光圈大小，以獲取最理想反差和光亮度的影像。Adjust the light intensity and the aperture diaphragm of the condenser to get the image with best balance of brightness and contrast.

2. 顯像模式 Imaging modes

用明視野、暗視野和相位差模式觀察同一個樣本。Use bright field, dark field and phase contrast to observe the same sample.

生態觀察 Ecological observation

辨認和分類顯微鏡下觀察到的各種微生物，並記下每種微生物的食性層次。Identify and classify the micro-organisms observed under microscope. Note the trophic level of each species.

微生物繪圖 Microscopic drawings

繪畫一種水藻的細胞和一種原生生物細胞，清晰標示每個可辨認的細胞結構。Draw an algal cell and a protozoan cell, clearly indicate all the identifiable cell structure.



問題討論 Questions for discussion

1. 簡單描述不同顯像模式的特點和效果 Briefly describe the characteristics and effects of different imaging modes.
2. 比較和對比兩個不同來源的樣本中的微生物 Compare and contrast the micro-organisms found in the 2 different sample sources.

1. 絲狀藻和相關微生物 Filamentous algae and associated micro-organisms

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2. 污水中的微生物 Micro-organisms in polluted water

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