



# 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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