



## 小生境探奇 Exploring Microhabitats

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. 鞏固對營養循環的認知 Consolidate the knowledge of nutrient cycle;
2. 明白不同小生境的物理特質 Understand the physical characteristics of different microhabitats;
3. 掌握探索不同小生境的技巧 Acquire the skill in exploration of different microhabitats;
4. 辨別棲息於不同小生境的動物及認識其適應特徵 Identify the animals found in these microhabitats and understand their adaptation features;
5. 與他人合作進行考察和資料整理工作 Cooperate with others to do field investigation and data processing;
6. 製作簡單科學報告 Make simple scientific report;
7. 欣賞大自然之美和尊重生物 Appreciate the wonder of nature and respect living things.

### 程序 Schedule

|               |                                              |
|---------------|----------------------------------------------|
| 09:00 - 10:00 | 簡介 Briefing                                  |
| 10:00 - 12:00 | 考察工作 & 實驗室工作<br>Field work & laboratory work |
| 12:00 - 13:00 | 午膳 Lunch                                     |
| 13:00 - 14:30 | 考察工作 & 實驗室工作<br>Field work & laboratory work |
| 14:30 - 15:15 | 資料整理 Data processing                         |
| 15:15 - 16:15 | 分組匯報 Group presentation                      |
| 16:15 - 16:30 | 討論 & 總結<br>Discussion & summary              |

### 考察儀器和工具 Field equipment and tools

|   |                                     |    |                                |
|---|-------------------------------------|----|--------------------------------|
| 1 | 寫字夾板 (x1)<br>Clipboard              | 6  | 滴管 (x2)<br>Droppers            |
| 2 | 圖鑑 (x1)<br>Wildlife Pictorial Guide | 7  | 溫度濕度計 (x1)<br>Thermohygrometer |
| 3 | 小瓶 (x2)<br>Vials                    | 8  | 光強度計 (x1)<br>Light meter       |
| 4 | 鑷子 (x1)<br>Forceps                  | 9  | 土壤溫度計 (x1)<br>Soil thermometer |
| 5 | 剪刀 (x1)<br>Scissors                 | 10 | 鏟 (x1)<br>Shovel               |

### 你知道嗎？ Do You Know?

生境類型複雜多變的中國是地球上其中一個生物多樣性最高的國家。根據中國科學院發佈的《中國生物物種名錄2023版》，中國有超過47,000種植物和69,000種動物。

China, with its complex and diverse habitats, is one of the most biodiverse countries on Earth. According to the "Catalogue of Life China 2023" published by the Chinese Academy of Sciences, China has over 47,000 plant species and 69,000 animal species.

### 衣著 Clothing

1. 不應穿著短褲。穿著長袖上衣和長褲能更有效防止蚊蟲叮咬，亦可減低被太陽曬傷的機會。  
Shorts are not recommended. Long-sleeved shirt and trousers for better protection against mosquito and insect bites, as well as preventing sunburn.
2. 不應穿著拖鞋或涼鞋，而應穿著運動布鞋，以減低腳部受傷的機會。  
A pair of plimsolls for preventing injuries. Slippers and sandals are not recommended.

### 安全 Safety

1. 避免踏足陡斜和濕滑的岩石表面。  
Avoid stepping on steep and wet rock surfaces.
2. 切勿闖入植物生長茂密的地方，以免觸及蜂巢或被植物割傷。  
To prevent being attacked by wasps from disturbed wasp nests or being injured by plant leaves and thorns, do not get into places with dense vegetation.





## A. 檢視小生境的特質 Examine the characteristics of microhabitats

記錄你們將要檢視的小生境的物理特質。

Record the physical characteristics of the microhabitats that you would examine.

| 小生境<br>Microhabitat<br><br>物理特質<br>Characteristic | 水中 Aquatic                                       |                                                  | 陸地 Terrestrial             |
|---------------------------------------------------|--------------------------------------------------|--------------------------------------------------|----------------------------|
|                                                   | 生態池 Eco-pond /<br>沙井 Manhole /<br>魚桶 Fish bucket | 生態池 Eco-pond /<br>沙井 Manhole /<br>魚桶 Fish bucket | 枯枝落葉 Leaf litter / 泥土 Soil |
| 水/基質的顏色<br>Colour of water/<br>substrate          |                                                  |                                                  |                            |
| 組成物質<br>Substrate<br>composition                  |                                                  |                                                  |                            |
| 光強度<br>Light Intensity                            |                                                  |                                                  |                            |
| 水溫<br>Water temperature                           |                                                  |                                                  | N/A                        |
| 空氣溫度<br>Air temperature                           |                                                  |                                                  |                            |
| 基質內部溫度<br>Inner temperature                       | N/A                                              | N/A                                              |                            |
| 濕度<br>Humidity                                    | N/A                                              | N/A                                              |                            |
| 小生境肉眼可見的生物<br>Organism observed<br>by naked eyes  |                                                  |                                                  |                            |
| 溶解氧<br>Dissolved Oxygen                           |                                                  |                                                  | N/A                        |

## B. 收集小生境樣本 Collect the microhabitat sample

1. 枯枝落葉：利用收集器迅速將枯枝落葉收集，然後放進一個大膠箱內。

Leaf litter: Use the tailor-made device to collect the litter as fast as possible. Put them into the large plastic box.

2. 泥土：利用大剷子挖出約5厘米深的泥土，然後放進一個大膠箱內。

Soil: Use a large spade to dig into the soil for about 5cm depth. Put them into the large plastic box.

3. 生態池：在生態池邊緣尋找綠色或褐色並浮於水中的絲狀水藻，利用鑷子和小瓶收集。利用滴管和小瓶於生態池底收集沉積物。

Eco-pond: Search for the green or brown filamentous algae at the edge of the pond. Collect them by a pair of forceps and a small vial. Use a dropper and a small vial to collect the sediment on the bottom of the eco-pond.

4. 沙井：利用滴管和小瓶於沙井底部收集沉積物。

Use a dropper and a small vial to collect the sediment on the bottom of the manhole.

5. 魚桶：利用滴管和小瓶於魚桶底部收集沉積物。

Fish bucket: Use a dropper and a small vial to collect the sediment on the bottom of the fish bucket.



## A. 處理和詳細檢視樣本 Handle and examine samples in details

### 1. 枯枝落葉 / 泥土：

- 在大膠箱內，利用工具仔細分散樣本。
- 尋找並收集當中的生物，放於立體顯微鏡中觀察。
- 分類及點算各種生物的數量。

#### Leaf litter / Soil:

- In the plastic box, spread the samples carefully with appropriate tools.
- Search the organisms and collect them. If the organisms are too small, put them under the stereomicroscope for observation.
- Identify and count the number of different species.

### 2. 生態池 / 沙井 / 魚桶：

- 製作臨時載玻片，然後在複式顯微鏡下觀察。
- 辨認顯微鏡下觀察到的各種微生物，並在記錄表內記錄每種微生物的形狀、身體特徵、行為、移動方法等資料。

#### Eco-pond / Manhole / Fish bucket:

- Prepare the temporary mount and observe under the compound microscope.
- Identify the microorganisms observed. Note the shape, physical characteristics, behaviour, locomotion, mode of feeding and other features of each species in the record sheet.

## B. 小生境中的物種記錄 Organisms recorded in the microhabitats

陸地小生境 Terrestrial microhabitat : \_\_\_\_\_

| 生物名稱<br>Name of the organism | 個體數量<br>No. of individuals<br>(如超過20，估算最接近<br>的十位數 If over 20,<br>estimate its number to<br>the nearest tens digit) | 營養模式<br>Mode of nutrition<br>1. 自養 Autotroph<br>2. 植食 Herbivore<br>3. 肉食 Carnivore<br>4. 雜食 Omnivore<br>5. 食腐植 Detritivore<br>6. 食腐肉 Scavenger | 外貌特徵<br>Physical characteristics |
|------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|                              |                                                                                                                     |                                                                                                                                                |                                  |
|                              |                                                                                                                     |                                                                                                                                                |                                  |
|                              |                                                                                                                     |                                                                                                                                                |                                  |
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|                              |                                                                                                                     |                                                                                                                                                |                                  |
|                              |                                                                                                                     |                                                                                                                                                |                                  |



## B. 小生境中的物種記錄 Organisms recorded in the microhabitats

水中小生境一 Aquatic microhabitat 1: \_\_\_\_\_

|   | 微生物名稱<br>Name of the<br>microorganism | 形狀<br>Shape | 身體特徵<br>Physical characteristic | 移動方法<br>Locomotion | 營養模式<br>Mode of nutrition | 其他<br>Others |
|---|---------------------------------------|-------------|---------------------------------|--------------------|---------------------------|--------------|
| 1 |                                       |             |                                 |                    |                           |              |
| 2 |                                       |             |                                 |                    |                           |              |
| 3 |                                       |             |                                 |                    |                           |              |
| 4 |                                       |             |                                 |                    |                           |              |
| 5 |                                       |             |                                 |                    |                           |              |
| 6 |                                       |             |                                 |                    |                           |              |

水中小生境二 Aquatic microhabitat 2: \_\_\_\_\_

|   | 微生物名稱<br>Name of the<br>microorganism | 形狀<br>Shape | 身體特徵<br>Physical characteristic | 移動方法<br>Locomotion | 營養模式<br>Mode of nutrition | 其他<br>Others |
|---|---------------------------------------|-------------|---------------------------------|--------------------|---------------------------|--------------|
| 1 |                                       |             |                                 |                    |                           |              |
| 2 |                                       |             |                                 |                    |                           |              |
| 3 |                                       |             |                                 |                    |                           |              |
| 4 |                                       |             |                                 |                    |                           |              |
| 5 |                                       |             |                                 |                    |                           |              |
| 6 |                                       |             |                                 |                    |                           |              |

## C. 分析和討論 Analysis and Discussion

1. 在你們研究的陸地小生境內，共找到多少種動物？哪一種動物是優勢種？哪種營養模式的動物豐度相對較多？  
Within the terrestrial microhabitat that you studied, how many species of organisms are found? Which one is the dominant species? Which type (mode of nutrition) of animals is relatively richer in the microhabitat?
2. 介紹兩種你們在陸地小生境內找到的動物，描述牠們的外貌特徵與小生境特質的關係。  
Introduce 2 animals found in the terrestrial microhabitat you studied. Describe their external features in relation to their characteristics of that particular microhabitat.
3. 在你們研究的水生小生境內，分別共找到多少種自養生物和多少種異養生物？  
How many species of autotrophs and heterotrophs are found in the aquatic microhabitat that you studied respectively?
4. 介紹兩種你們在水生小生境內找到的微生物，描述牠們的外貌或行為特徵。  
Introduce 2 microorganisms found in the aquatic microhabitat you studied. Describe their external features or other behavioural characteristics.