



考察淡水溪流生態系統 (大橋 / 川龍) Study of Freshwater Stream Ecosystem (Tai Kiu/Chuen Lung)

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. 辨認本港常見的淡水溪流生物，並將其分類 Classify and identify living organisms commonly found in a local freshwater stream habitat;
2. 觀察生物如何適應環境 Observe how living organisms adapt to the environment;
3. 識別生態系統中生物與生物之間的關係 Identify interrelationships between living organisms in an ecosystem;
4. 在淡水溪流量度和記錄非生物因子 Record and measure abiotic factors in a freshwater stream ecosystem;
5. 使用簡單取樣工具 Use simple sampling tools;
6. 在實驗室執行簡單水質測試 Do simple chemical analysis of water sample in the laboratory;
7. 組織和分析數據作簡報之用 Analyze and organize data for presentation;
8. 與他人合作進行科學探究 Cooperate with others and work together in a scientific investigation;
9. 欣賞自然，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 - 12:30	考察 Field work
12:30 - 13:30	午膳 lunch
13:30 - 14:15	實驗工作 Laboratory work
14:15 - 15:15	資料整理 Data processing
15:15 - 16:15	分組匯報 Group presentation
16:15 - 16:30	討論及總結 Discussion & summary

儀器和工具 Equipment and tools

1	寫字夾板 (x1) Clipboard	8	小膠瓶 (x1) Vials
2	光強度計 (x1) Light meter	9	樣方0.5 x 0.5米 (x1) Quadrat 0.5m x 0.5m
3	流速計 (x1) Water flow meter	10	膠整理盤 (x1) Plastic sorting tray
4	電子溫度計 (x1) Digital thermometer	11	取水樣瓶 (x2) Water sampling bottles
5	毛筆 (x2) Writing brush	12	《生物圖錄》(x1) Wildlife Pictorial Guide
6	金屬篩 (x1) Metal sieve	13	平板電腦 (x1) Tablet computer
7	鑷子 (x1) Forceps		

你知道嗎？ Do You Know?

擁有約1,500條流域面積超過1,000平方公里的河流，中國是世界上最多河流的國家之一！這些河流除了供水給河岸兩旁的人民使用外，還為中國大鯢（娃娃魚）、揚子鱷、江豚等水生生物提供棲息地和食物。

With approximately 1,500 river having a basin area exceeding 1,000 square kilometers, China is one of the countries with the highest number of rivers in the world! These rivers not only provide water for the people living along their banks, but also serve as habitats and sources of food for aquatic species such as the Chinese giant salamander, Yangtze alligator, and finless porpoise.



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。小心河底的玻璃碎和其他尖銳物件。
Avoid stepping on steep and wet rock surfaces. Beware of broken glasses and other sharp objects at the bottom.
2. 勿涉入深水區，避免直接觸及污水。
Never getting into deep water. Avoid direct contact with polluted water.



1. 取水樣 Water sampling

在兩個將會進行動物調查的位置，分別小心地將溪水完全注滿水樣瓶。

At the two locations for animal sampling, carefully fill up the water sample bottle with stream water respectively.

2. 目測調查動物 Sighting survey of animals

搜尋生活在不同微生境的動物 — 水面上、水中和水底石塊的表面，並拍照記錄各種動物的外貌和行為特徵。

Search for animals living in different micro-habitats - on the water surface, in the water and on the submerged rock surfaces. Record the external features and behaviour of the animals species.

水面動物 Animals on water surface	
水中動物 Animals in the water	
水底動物 Animals at the bottom	

3. 樣方動物調查 Quadrat survey of animals

a. 在安全的位置放下一個 0.5 x 0.5米的樣方。在不干擾物理環境的情況下，仔細辨認和點算生活在水面和水底石塊表面的動物，然後記錄樣方內的非生物因子。每項參數量度三次，取其平均值。

b. 輕柔地拿起水底石塊，找出棲於石塊底下和縫隙的動物。辨認和點算樣方內找到的全部動物。拍攝每種動物的外貌特徵，隨後全部放歸原處。

c. 找另一處環境特性相近但水流速度不同的位置，重覆上述工作。

a. Choose a safe area and place a 0.5 m x 0.5 m quadrat. Identify and count animals living on the water surface and the underwater rock surfaces without interfering with the physical environment. Record the abiotic factors of the area sampled. For each parameter, take 3 measurements and calculate the mean.

b. Gently pick up small rocks from the bottom. Look for animals living under the rocks and in rock crevices. Identify and count all animals found within the quadrat. Take photos of each animals species and return them to the original place.

c. Search for another place with similar abiotic features but different water flow rate and repeat the above steps.

動物名稱和分類 Name of the animal	樣方一內個體數目 No. of individuals in quadrat 1	樣方二內個體數目 No. of individuals in quadrat 2	適應水流方式 Adaptation to fast-running water
			1. 流線形或扁平身軀 Streamlined or flattened body 2. 身體表面平滑 Smooth body surface 3. 肌肉發達的身軀或魚鰭 Muscular body or fins 4. 具吸盤狀結構 With sucker-like structure 5. 具鉤狀結構 Equipped with hooks 6. 用絲線固定 Fixed by fibres 7. 匿藏於遮蔽物 Hiding under shelters

	水流速度(m/s) Water flow rate			光強度(Lux) Light intensity			空氣溫度(°C) Air temperature			水溫度(°C) Water temperature		
樣方一 Quadrat 1												
樣方二 Quadrat 2												



4. 主動搜尋動物 Active searching for animals

- a. 在有根或莖伸入水中的位置，利用一金屬篩收集生活在水底根莖之間或依附在根莖表面的動物。
 - b. 用金屬篩撈起水底的枯枝落葉，細心找尋匿藏當中的動物。
 - c. 輕柔地拿起水底石塊，找出棲於石塊底下和石塊縫隙的動物。
 - d. 將所有動物置於整理盤辨認、觀察和拍照，隨後全部放歸原處。
- a. In the regions with considerable amount of submerged plant roots or stems, use a metal sieve to collect animals attaching on or hiding amongst the submerged plant roots or stems.
 - b. Use a metal sieve to scoop up the litter from the bottom. Search carefully for animals hiding inside.
 - c. Gently pick up small rocks from the bottom. Look at animals living under the rocks and in rock crevices.
 - d. Put all the animals onto the sorting tray. Identify, observe and take photos. Then release all of them to their original micro-habitats.

動物名稱 Name of the animal	微生境 Micro-habitat	抵抗捕食者方式 Anti-predation method
	1. 水底根莖 Submerged plant roots or stems	1. 具硬殼 Bearing hard shell
	2. 水底枯枝落葉 Submerged litter	2. 建造保護罩 Constructing protective case
	3. 水底石塊 Submerged rocks	3. 偽裝 Camouflage
		4. 警戒色 Warning colour
		5. 製造毒素 Producing toxin
		6. 反應迅速 Quick reaction
		7. 匿藏於遮蔽物 Hiding under shelters

5. 記錄環境因素 Recording environmental factors

- 記下近日的降雨、雲量、氣溫等天氣資料。
Note down recent weather conditions such as rainfall, cloudiness and air temperature.

- 描述河溪周邊的環境，包括附近生境類型、土地用途、村落位置和各種可能的人為干擾等，並繪製一幅簡圖，以顯示相關資料。
Describe the physical environment near the stream habitat, such as nearby habitat types, land use, location of villages and possible human impacts. Draw a sketch map to show the relevant information.



6. 記錄植物 Recording plants

記錄考察地區的各种植物及其生長位置和生態功能。

Record the plants in the study area. Note their growing position in the water body and their ecological functions.

植物名稱 Name of the plant	生長位置 Growing position 1. 挺水性 Emergent 2. 沉水性 Submerged 3. 浮葉性 Floating leaf 4. 漂浮性 Free floating	生態功能 Ecological function 1. 提供食物 Providing food 2. 提供庇護 Providing shelter 3. 減慢水流 Reducing water current 4. 減低光照度 Reducing light intensity 5. 固定河道 Stabilizing water channel

實驗室工作 Laboratory work

7. 水質測試 Water test

- 用溶解氧計、酸鹼值計、總溶解物計分別量度兩個水樣本的溶解氧、酸鹼值和總溶解物。
- 用過濾法找出懸浮物的量。
- 比較兩組數據。

- Use a dissolved oxygen meter, a pH meter, and a total dissolved solids meter to measure the dissolved oxygen, pH and total dissolved solids of the two water samples respectively.
- Apply filtration to find out the amount of suspended solids.
- Compare the results.

溶解氧 Dissolved oxygen (mg/L)		酸鹼值 pH		總溶解物 Total Dissolved Solids (ppm)		總懸浮物 Total Suspended Solids (mg/L)	
水樣本一 Water sample A	水樣本二 Water sample B	水樣本一 Water sample A	水樣本二 Water sample B	水樣本一 Water sample A	水樣本二 Water sample B	水樣本一 Water sample A	水樣本二 Water sample B

8. 觀察微生物（延伸活動） Observation on microorganisms (Extended activity)

收集少量絲狀水藻，將絲狀水藻樣本置於玻片上，用複式顯微鏡觀察，辨認及記錄各種微生物。

Collect a few samples of filamentous algae. Place the samples of filamentous algae on glass slides and observe under a compound microscope. Identify and take records of the microorganisms observed.

微生物名稱 Name of the microorganism	形狀 Shape	身體特徵 Physical characteristic	移動方法 Locomotion	行為 Behaviour