牛糞小生境大揭秘
Big secret of the cow dung micro-habitat

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. 明白牛糞乃快速演替的小生境 Understand the rapid succession in cow dung microhabitat;
3. 探索牛糞小生境的技巧 Acquire the skill in exploration of cow dung microhabitat;
4. 辨別棲息於牛糞中的動物及認識其適應特徵 Identify the animals found in cow dung micro-habitat and learn 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.

儀器和工具 Equipment and tools:

1	寫字夾板 Clipboard		5	膠袋、小鏟、鑷子 Plastic bag, trowel, forceps	
2	平板電腦/ 數碼相機 Tablet computer/Digital camera		6	土壤溫度計 Soil thermometer	
3	放大鏡 /微距望遠鏡 Magnifying glass /Macroscope		7	30厘米鐵尺 Steel ruler 30cm	
4	圖鑑 Pictorial Guides				

考察工作 Field Work:

在可觀中心生態徑，找尋牛糞/枯枝落葉堆，檢視及量度一些現場數據，並記錄在以下表格中。
At Ho Koon Nature Trail, search for cow dungs/ litters, examine and record the following data.

情況 Status	牛糞 Cow Dung
完整性 Completeness	
最大直徑 Largest diameter	
牛糞溫度 Cow dung temperature	
表面顏色和堅硬度 Surface colour and hardness	
內部顏色和堅硬度 Inner colour and hardness	
新鮮程度 Freshness (1最新New –5 最舊Old)	
在牛糞表面的動物 Animals found on the surface of the cow dung	

特質 Characteristics	枯枝落葉 Litter
附近植物 Vegetation nearby	
葉堆下的基質 The substratum	
葉堆深度 The depth	
枯葉大小、形狀和顏色 Litter size, shape and colour	
葉堆表面溫度 Surface temp. of litter	
葉堆內裡溫度 Inner temp. of litter	
枯枝落葉堆表面的動物 Animals found on the surface of the litter	

收集牛糞/枯枝落葉堆 Collect cow dung/ litter

收集時，將牛糞/枯枝落葉迅速放進一個大膠箱，蓋好以防小生物飛走。拿回實驗室進行詳細記錄和分析。

Swiftly put the cow dung/ litter into a big plastic box and covered it to prevent the escape of small organisms. Return to the laboratory for more details observations and records.

A. 量度水份含量 Measure the water content

抽取小部份牛糞/枯葉，先量度重量，再放入焗爐30分鐘，再次度量，便可得出牛糞/枯葉的水份含量。

Extract a small portion of cow dung/ litter and measure its weight, put into the oven for 30mins, weigh again to calculate the water content in the cow dung/ litter.

錶面玻璃(克) Watch glass (g)	濕牛糞/枯葉(克) Wet cow dung/ litter (g)	乾牛糞/枯葉(克) Dry cow dung/ litter (g)	（濕- 乾）／濕x100%= (Wet– dry)/ wet x 100%=

B. 檢視牛糞/枯枝落葉中的生物 Check for the organisms in the cow dung/ litter

利用工具仔細分散，撿出當中的各樣生物，太細小的生物可放於解剖顯微鏡中觀察。嘗試分類及點算各種的數量，並可拍下照片或影片。

Find out the organisms carefully with appropriate tools. If the organisms are too small, put it under the dissecting microscope for observation. Try to identify and count their numbers of different species, and even take photos or videos of them.

樣本中的動物物種 Animals species in the sample	生命史階段（幼蟲、蛹（糞室）等）和 性別 Life history stages (larvae, pupae (dung case) etc.) and sex	個體數量* No. of individuals*	進食模式（肉食、食腐植等）# Diet (Carnivorous, Detritivorous etc.)#

* 超過20以上的，可估算最接近的十位數；超過50以上，可估算為 “>50”。If over 20, estimate its number to the nearest ten. If over 50, estimate and record as “>50”.

1. 自養 Autotroph 2. 植食 Herbivore 3. 肉食 Carnivore 4. 雜食 Omnivore 5. 食腐植 Detritivore 6. 食腐肉 Scavenger

分析和討論 Analysis and Discussion

1. 試描述在樣本中的生物多樣性 Describe the biodiversity of your sample.
2. 介紹其中兩種在牛糞/枯葉堆中小生境所找的動物，描述牠們的外貌特徵與小生境特質的關係。Introduce 2 animals that found in the cow dung/ litter microhabitats. Describe their external features in relation to their characteristics of that particular microhabitat.
3. 從個體數量和進食模式的數據，嘗試繪製出相關小生境的食物網 According to their number of individuals and diet, try to construct the food web in the microhabitats.