



實驗有關作業 - 野外生態考察

Practical Related Task- Ecology Field Work



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.

程序 Schedule

9:15 - 09:45	簡介 Briefing
09:45 - 12:00	考察 Field work
12:00 - 13:00	午膳 Lunch
13:00 - 14:00	實驗室工作 Laboratory work
14:00 - 15:00	資料整理 Data processing
15:00 - 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

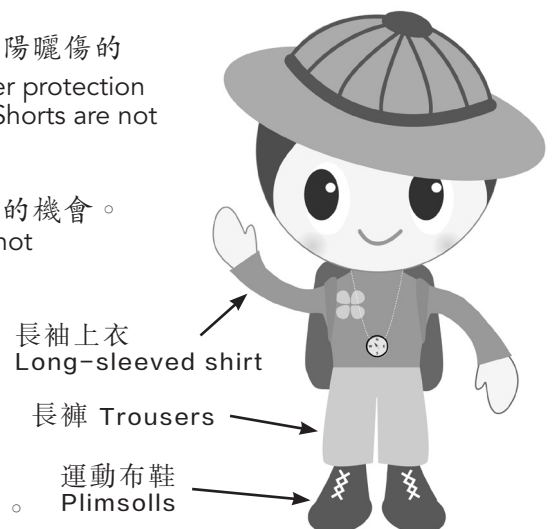
1	寫字夾板 Clipboard	
2	平板電腦/數碼相機 Tablet computer/Digital camera	
3	放大鏡 / 微距望遠鏡 Magnifying glass / Macroscopic	
4	圖鑑 Pictorial Guides	
5	膠袋、小鏟、鑷子 Plastic bag, trowel, forceps	
6	土壤溫度計 Soil thermometer	
7	30厘米鐵尺 Steel ruler 30cm	

衣著 Clothing:

1. 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，不應穿著短褲。 Long-sleeved shirt and trousers for better protection against mosquito and insect bites, as well as preventing sunburn. Shorts are not recommended.
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和泥土表面。
Avoid stepping on steep and wet rock surfaces and soil 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. 檢視牛糞 Check the cow dungs

在下花山考察地點，檢視不同狀況的牛糞，並記錄以下的一些數據。

At Ha Fa Shan field study site, check for the status of cow dungs and record the following data.

情況 Status	樣本一 Sample 1	樣本二 Sample 2	樣本三 Sample 3	樣本四 Sample 4	樣本五 Sample 5	樣本六 Sample 6
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 sur- face of the cow dung						

B. 收集牛糞 Collect cow dung

在考察現場收集一個完好的牛糞，新鮮程度要在2-4之間。收集時，將牛糞放進一個膠袋，該牛糞下的落葉／泥土用小鏟挖進另一個膠袋。把兩個膠袋封好，並拿回實驗室進行更詳細記錄和分析。

Collect a complete cow dung with the freshness between 2-4. During the collection, also dig out the wilted leaves and soil beneath the cow dung with a trowel, and place into a different bag. Bring the two bags to laboratory for further record and analysis.

1. 量度牛糞水份含量 Measure the water content in the cow dung

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

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

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

2. 檢視牛糞和泥土中的生物 Check for the organisms in the cow dung and soil

把牛糞和泥土分別放在白色膠盤中，利用工具仔細分散，檢出當中的各樣生物，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。

Place the cow dung and soil in sorting trays separately, 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.

牛糞／泥土中的動物品種 Animals species in cow dung /soil	生命史階段（幼蟲、蛹（糞 室）等） Life history stages (larvae, pupae (dung case) etc.)	性別 Sex	進食模式（肉食、食腐植等） Diet (Carnivorous, Detritivorous etc.)

分析討論 *Analysis and Discussion*

1. 牛糞的演替 Cow dung succession

利用考察所得資料，就著生糞不同的新鮮程度，以及生物品種和階段的變化，製作一幅牛糞演替圖。

Use the data collected from the field survey, referring to the freshness of cow dung and the change of animals with different stages, construct a cow dung succession annotated diagram.

2. 牛糞與土壤的關係 Relationship between cow dung and soil

牛糞中的生物和土壤中的生物有甚麼相同與不同呢？當中有任何關連嗎？

Is there any similarities and differences between the cow dung and the soil beneath? Any relationship between them?

3. 糞金龜適應特徵 Adaptation features of dung beetles

糞金龜有甚麼形態特徵有利於適應牛糞小生境中的獨特挑戰？

What special features do the dung beetles have to adapt the challenges in the cow dung microhabitat?