Ant Investigations

Course Objectives

- To learn the ecology of ants and the interactions between ants and abiotic factors in the ecosystem.
- To familiarize with the process and skills of scientific investigations.
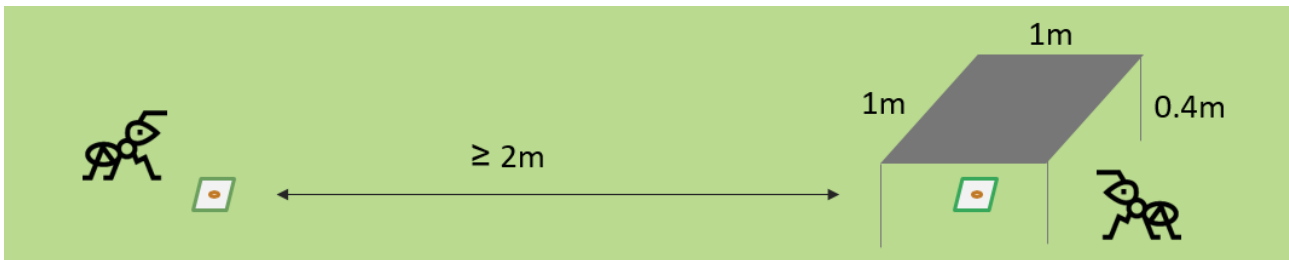- To cultivate scientific inquiry thinking skills.

Personal Information

Name: _____	Group: _____

Weather Information

Please go to the Hong Kong Observatory website to get the weather information.

Air temperature: _____	Weather condition: Sunny / Cloudy / Rainy

Investigation 1

Background

In an ant colony, some ants are responsible for leaving the nest to search for food for the whole colony. A researcher noticed that he seldom saw ants foraging on hot days. He wanted to test whether ants don't like to forage under high temperatures. Ants are small in size, compared to air temperature, ground surface temperature has larger effects on them. Thus, the researcher designed an investigation to see how ground surface temperature would affect the foraging behaviours of ants.

Predictions

Please propose the predicted results of this investigation.

_____

_____

_____

Variables

Please identify the different variables in this investigation.

Independent variable	
Dependent variable	
Control variables	

Assumptions

What are the assumptions of this investigation?

_____

_____

_____

Equipment and Apparatus (For Each Group)

Equipment/Apparatus	Quantity	Equipment/Apparatus	Quantity
Infrared thermometer	1	Zip-lock bags	4
Shade setup	1	Measuring tape	1
Baiting cards	4	Microscopic camera	1
Baits (sausage slides)	4	Field guide set	1
Blunt forceps	2	Clipboard	1
Featherweight forceps	2		

Investigation procedures

1. Prepare a 0.4m tall shade setup with a shade net (1m x 1m) and PVC pipes. Put it in the study site at least 0.5 hours in advance.
   (If there is shaded areas in the study site, then there is no need to prepare shade setup.)
2. Put a bait station (a bait put at the centre of a baiting card) under the shade setup and another bait station in open area. The two bait stations should keep a distance with at least 2 meters.
3. Measure the mean ground surface temperatures near each bait station with an infrared thermometer.
4. Check the bait stations every 10-15 minutes. Measure the mean ground temperatures and use a camera to record the abundance and activities of ants each time.
5. After at least 30 minutes, use forceps to put the bait stations and ants (if any) into the zip-lock bags.

A bait station
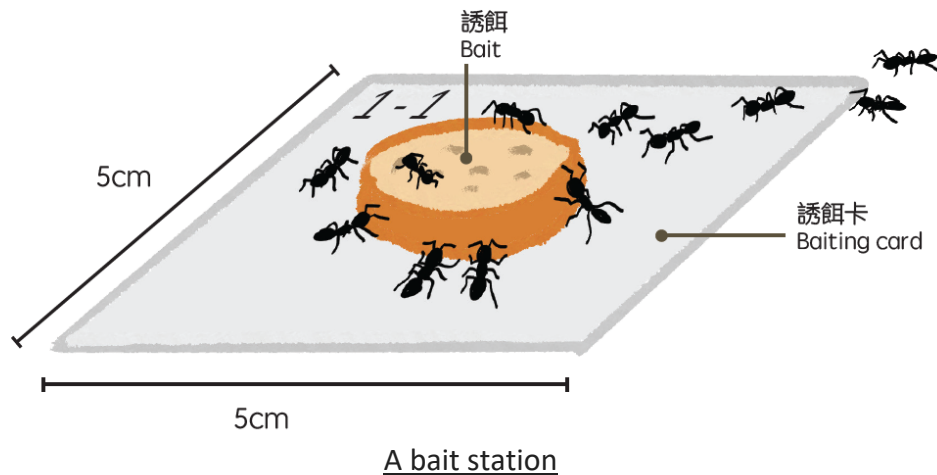
Investigation 2
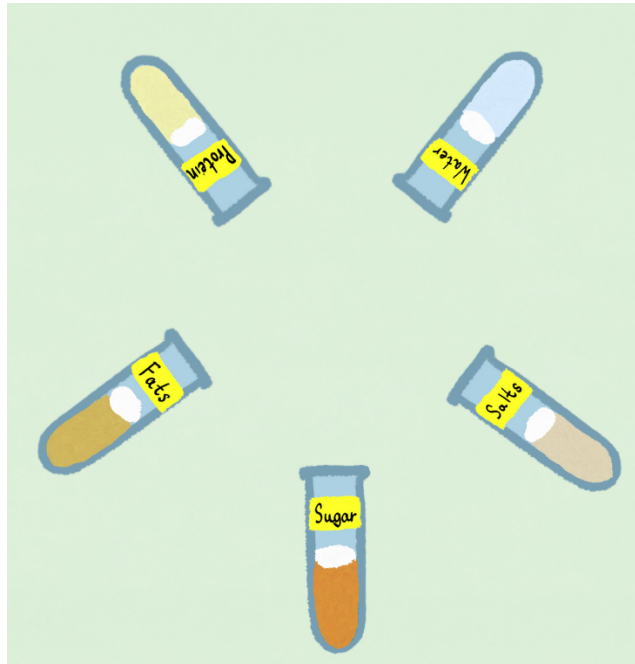
Background
A student dropped some boiled egg pieces onto the ground when she was having lunch. Later, she found some ants surrounding the egg pieces. She knew that ants like to eat sugary food. She suspected they would take protein as their food as well. She wanted to know the food preferences of ants so she designed an investigation.

Predictions
Please propose the predicted results of this investigation.

_____

_____

_____

Variables
Please identify the different variables in this investigation.

Independent variable	
Dependent variable	
Control variables	

Assumptions

What are the assumptions of this investigation?

_____

_____

Equipment and Apparatus (For Each Group)

Equipment/Apparatus	Quantity	Equipment/Apparatus	Quantity
Distilled water	10ml	Cotton balls	5
20% sugary water	10ml	Zip-lock bag	1
1% salty water	10ml	Latex gloves (in pair)	1
Peanut oil	10ml	Microscopic camera	1
50% egg white and water	10ml	Field guide set	1
Test tubes	5	Clipboard	1

Investigation procedures

1. Fill test tubes with various food fluid by half.
2. Soak a cotton ball into a test tube with food fluid until it's fully filled with the food. Then, pull it to a position at a distance of 1cm from the test tube opening.
3. Arrange the test tubes in a circle and keep several centimetres among test tubes. The opening of test tubes should direct inwards.
4. Observe and record the abundance of ants inside each test tubes after at least 30 minutes.

Site Profile

Draw a sketch map from the top view of the surrounding area, indicating
- Your position in the study site (with a compass)
- Locations of main road, pathways, boulders, trees, walls, buildings, etc
- Other particulars of interest

Data Record Sheets

After setting up the bait stations, please record the ant activities on the bait stations about every 10-15 minutes. After at least 30 minutes, use forceps to put the bait station and ants (if any) into the zip-lock bags.

* Please observe carefully and describe the appearance of ants, such as body size (<2mm / 3-5mm / 6-10mm / >10mm), colors (eg. black, brown, yellow), special body parts (eg. big heads, spines, hairs) and so on.

Investigation 1: Effects of Ground Surface Temperature on Foraging of Ants

Start time: _____   End time: _____   Habitat / Ground substrate: _____

Bait Stations		Time	Ground temperature	Ants				
No.	With Shade?			Abundance	Appearance Description *	Suspected Species	Special Behaviours / Findings	

比例尺 Scale bar

cm   0   1

Start time: _____   End time: _____   Habitat / Ground substrate: _____

Bait Stations		Time	Ground temperature	Ants			
No.	With Shade?			Abundance	Appearance Description *	Suspected Species	Special Behaviours / Findings

比例尺 Scale bar

cm   0   1

Investigation 2: Food Preferences of Ants

Start time: _____   End time: _____   Habitat / Ground substrate: _____

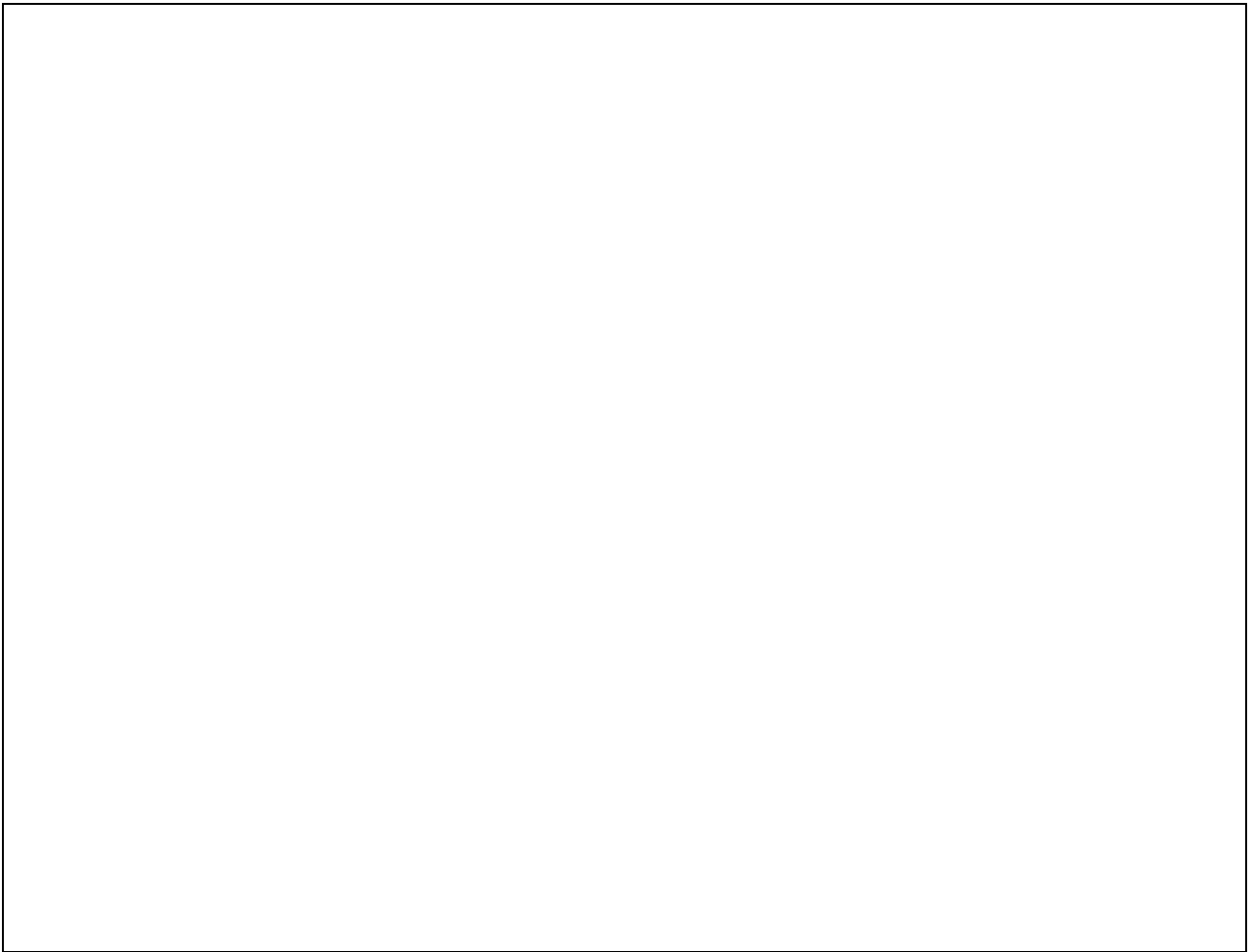| Bait Stations	Ants			
Food Type	Abundance	Appearance Description *	Suspected Species	Special Behaviours / Findings

比例尺 Scale bar

cm   0   1

Data analysis

Please draw suitable graph(s) to present the data (with title).

Biological drawing

Observe one of the ant samples under a microscope and then make a biological drawing of it.
(Remember to add proper labels of the body structures of the ant and a title.)

Conclusions

1. According to the data and graph(s), what results can you get? Any relationship found between the independent variable and the dependent variable?

_____

2. Are the results consistent with your predictions? If not, then any possible reasons?

_____

3. Are there any errors or limitations in these investigation? Any improvement methods can you think of?

_____

4. Are there any needs for further experiments or investigations?

_____