



Periwinkles

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Can sea snails communicate with their peers through tracks of mucus?

Objectives:

Through observations and manipulative studies examine if snails can communicate through their mucous track.

Subjects: biology⇒ ethology, (mathematics), (language arts), (chemistry), (social studies),

Application: This lesson can be done using any species of snail that leaves a mucus track.

Duration of experiment: 1-2 hour

Group Size: practical work preferably in small groups

Key words: ethology, ecology, reproduction, mating, foodsearch

Procedure according to the scientific protocol (go to: “How we do it”)

Observation:

When periwinkles follow in each other's mucus tracks they often follow those made by individuals of the same species.

Explanation model:

Periwinkles are stimulated by mucous tracks,x and more stimulated by tracks from individuals of their own species.

Hypothesis:

If presented with mucous tracks from different species, individuals will more often follow in the mucous tracks of individuals from the same species than from other species.

Null hypothesis:

If presented with mucous tracks from different species, the periwinkles will just as often, or more often follow tracks from other species as from their own species

Experiment:

Periwinkles are observed while moving over a transparent surface where there are mucous tracks from their own species as well as from other species. (For details, see point 7 under procedure)

Interpretation:

If we get:

⇒Support for the hypothesis: We have shown that the test snails are stimulated more by tracks from their own species

⇒Support for the null hypothesis: We have shown that tracks from the snails own species do not stimulate more than tracks from other species.

(See Extension for discussions on arguments for the results.)

Equipment:

Plexi- or glass trays, pen (to mark mucous tracks on tray), several individuals from one species of snail and some from other (close/less close) species. Containers to keep animals in. (if using saltwater organisms: sea water or artificial seawater ⇒ find the formula on the net or buy the mineral medium “instant ocean” in zoo shops)

Procedure:

1. Establish comprehension for the term “ethology”. Discuss different kinds of communication in animals and why animals communicate. What makes a mucous track a signal?
2. In the field: Try and observe different ways animals could use to communicate with peers.
3. Prepare for your specific investigation by thinking about all the steps in the *Scientific protocol* above.
4. Forming a hypothesis for the study according to the *Scientific protocol* above.
5. Discussion on how to conduct the experiment and what equipment to use. How do you solve the problem when the snail that follows a track also leaves a track? How many individuals of the same species should try and follow tracks? With several individuals you will get a stronger, more general result. Test mucous tracks from one species on several different species, closely and less closely related.
6. Collection in the field: Be sure to use organisms that are allowed to be picked, non-toxic and non-allergic. (keep animals in good conditions)
7. Implementation of experiment:
 - a) Let one snail move over a transparent surface and if necessary mark the path from underneath.
 - b) Let another individual move over the surface and observe the path. Mark or film
 - c) Repeat from the beginning using only individuals from one species as “markers”.
 - d) Test other species as “trackers”.
8. Discussion on how to report the results.
9. Discussion on the meaning of our results. What conclusions can you draw if you find support for the hypothesis or for the null hypothesis? (see *protocol Interpretation*)

Extension:

The study will or will not give an indication of snails ability to identify tracks from their own species. Try to strengthen the argumentation and search for information in the library, on the web and through articles.

An extension of this study could be to:

⇒ If an association is observed:

1. Try to observe the pattern in the animal’s natural environment.
2. Repeat the experiments using two sexes of snails in order to investigate a mating behaviour.
3. Let a snail move over a tray where several snails (of the same and other species) have left tracks. The test snail should have equal opportunity to find all tracks.

⇒ If no association is observed: Questions to ask: Was our observation relevant? Could the results be because of bad experimental design /implementation? Does scientific research support the null-hypothesis? Try to find alternative explanations for the observation.

Assessment:

1. Show your result from the experiment in a table or in a figure. You can also use drawings, photos and video. Make a presentation (ppt)
2. Why could it be important for an animal to be able to identify tracks from its’ own species.
3. Tracking is one way to communicate. Write about other communication strategies.

Background information:

Animals need to be able to communicate with individuals from their own species for many reasons. Communication can be used to help foraging (finding food), warn when danger occurs, create safe environment as a few examples. One very important aspect of animal communication is its role in reproduction. Males need to find a suitable female at the right time for mating and females need to show males some signal when they are ready to be mated with.

The ways animals communicate are different. They can use sound, colour, texture and many other ways. One important way is to produce species-specific pheromones (scents that attract).

References:

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- ⇒ *How do snails and slugs communicate?*
<http://www.madsci.org/posts/archives/1998-02/887302435.Zo.r.html>
- ⇒ *How Snails Move*
<http://animals.about.com/od/mollusks/ig/World-of-Snails/Snail-5.htm>
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