I. A researcher was interested in the investment of resources into reproduction. He worked on a species of acorn barnacle in Australia, which is much like our local barnacle *Semibalanus balanoides*. The first thing to do was to estimate mating group size, which was the number of barnacles in a patch. Then each barnacle was dissected and the eggs were weighed for each individual. Finally, testes, sperm and seminal vesicles were dissected, weighed and defined as female function. Please answer the questions below. Hint: You will NOT be able to answer questions without knowing or learning something about the biology of acorn barnacles.

The researcher got the following relationships:

Here are the questions:

1. How would you figure out what proportion of a group of barnacles can be mated by a given male? (Hint: You have to know how they mate!)
2. To what taxonomic group do barnacles belong?
3. Just look at the two graphs. What are they telling us?
4. Why do you think female allocation goes the way it does?
II. Researchers were interested in whether green turtles used the magnetic field to navigate over long distances. To study this they attached powerful magnets to the turtles and tracked their movements.

The results are in a figure on the next page.

Here are the questions:

1. Where is Ascension Island?
2. Between what two types of habitat do green turtles migrate?
3. What do the results show?
4. How could you know where the turtles are, so that you could make such a map?
III. A researcher made observations on the feeding of a bivalve named *Macoma tenta* that feeds by means of a siphon that the clam extends to the surface of the sediment and sucks organic matter from the surface like a vacuum cleaner. The shell of the animal is buried beneath the surface. These animals live in shallow depths. Here is a diagram showing its feeding.

![Diagram of Macoma tenta feeding](image)

The researcher used an underwater movie camera to estimate the proportion feeding over a couple of days. The shaded area below indicates darkness.
Here are the questions:

1. To what phylum do clams belong?
2. Why would such a clam feed only at night?
3. Under what circumstances might the clams start feeding during the day?

IV. An investigator was interested in the reproductive behavior of a fiddler crab. Males have a reproductive display, where they wave their claws to attract females. The investigators looked at the proportion of time that the males waved their claws. Here is the difference they got in different localities, for males living on an open area of sediment as compared to an adjacent spot that was within vegetated areas of marsh grass (they wave in the intertidal zone when it is low tide, and females can see the males waving in air):
The investigators then looked at the food content of the sediment in the open areas and the grassy (= vegetated areas). Here are the results they got at two different localities:

1. How do fiddler crabs feed?
2. What does the first figure tell us about the allocation of time to reproductive activity as a function of microhabitat?
3. Why do you think there is a difference?
4. What does the second figure tell you about the possible advantage of staying in the vegetated area?