

Preparatory Notes Unit 1

(Please go over these before our visit and have them at hand during our visit)

Adaptations and Evolutionary Success

The evolution of the peppered moth over the last two hundred years has been studied in detail. Originally, the vast majority of peppered moths had light colouration, which effectively camouflaged them against the light-coloured trees and lichens, which they rested upon. However, because of widespread pollution during the Industrial Revolution in England, many of the lichens died out, and the trees that peppered moths rested on became blackened by soot,

causing most of the light-coloured moths, or typica, to die off from predation. At the same time, the dark-coloured, or melanic, moths, carbonaria, flourished because of their ability to hide on the darkened trees.

Since then, with improved environmental standards, light-coloured peppered moths have again become common, but the dramatic change in the peppered moth's population has remained a subject of much interest and study, and has led to the coining of the term industrial melanism to refer to the genetic darkening of species in response to pollutants. As a result of the relatively simple and easy-to-understand circumstances of the adaptation, the peppered moth has become a common example used in explaining or demonstrating natural selection.



Variation exists within all populations of

organisms. This occurs partly because random mutations occur in the genome of an individual organism, and these mutations can be passed to offspring. Throughout the individuals' lives, their genomes interact with their environments to cause variations in traits (adaptations). Individuals with certain variants of the trait may survive and reproduce more than individuals with other variants. This is known as Natural Selection and leads to evolution.

Ecology

Biosphere - Biomes - Ecosystem - Community - Population - Individual

The biosphere is made up of several types of biome. These are classified due to their major vegetation types, for example TUNDRA or TROPICAL RAINFOREST. An Ecosystem is a part of a biome. Biomes themselves are far too large to study so ecology work tends to be based around a particular ecosystem. Each ecosystem has a characteristic set of plants, animals and microbes. The organisms in an ecosystem form a self-sufficient unit in balance with their environment. A community is a group of species that occurs at the same place at the same time. The word is often used to refer to organisms of a particular kind, such as the plant community on a lawn.

Ecosystems and communities contain populations of species. A population is made up of all the members of a species living together in the same place at the same time.

Finally each population is made up of many individuals. The genetic- and physiological adaptations of an individual organism to its environment are an important aspect of ecology.



The main components of a pond ecosystem (with acknowledgement to Chris Clegg)

Biotic and Abiotic factors

Colour the biotic factors green and the abiotic factors blue.



Temperature regulation

Endotherms



Temperature regulation

Ectotherms



Venom Production (snake anatomy)

To most people venom and snakes go hand in hand. It is commonly believed that all snakes are venomous, but this is an erroneous belief. Of the 2.700 known species of snake only 300 are venomous.

Venom itself is a poison secreted by animals for either defensive or offensive purposes. Venom originated from digestive enzymes that were originally located in the stomach. Throughout the millions of years it has progressed quite a lot and in some animals has become quite different from it's origin. The type of venom depends on the type of

animal. In spiders venom is kept rather simple. It is pretty much just digestive enzymes. Spiders use their venom to turn their hard-shelled insect meals into nice and nutritious goo. So in a sense one can think of this type of venom as a form of starting the digestive process before you even start to eat the meal.

In insects venom is used predominantly as a defensive weapon. Wasps, bees and ants use formic acid in their stings to cause a painful burning sensation that will either kill or injure their enemy enough to make them think twice about attacking them again. Amphibians all use their venom for defence. In amphibians the venom is secreted through glands in the skin to make the animals unpalatable.



So as we can see venom is a predominantly defensive adaptation. An adaptation that has found it's way into every class of vertebrates except one. The birds; the only class to forego any venom. In mammals we have platypi with venomous claws, then there are the fish, which comprise too many venomous species to count and finally we have the reptiles.

All venomous reptiles are squamates and of them snakes make up the bulk. There are only two species of venomous squamates that are not snakes, the lizards of the genus: Heloderma. These lizards use their venom for defence as well and can deliver powerful and painful bites.

In snakes venom has found a new use, for offense. Since snake prey generally has the advantage of speed (not to say that snakes can't be speedy- black mamba can travel at 17), snakes had to find a new way to take down their prey without running the risk of losing them or getting too hurt in the process. Enter venom, a fast and effective mode of subduing prey items with minimal risk to the snake.

Symbiosis

A long-term relationship between two different species.



Commensalism

A form of symbiosis between two organisms of different species in which one of them benefits from the association whereas the other is largely unaffected or not significantly harmed or benefiting from the relationship.

Mutualism

A symbiotic relationship between individuals of different species in which both individuals benefit from the association. In this type of symbiosis, both organisms of different species rely on one another for nutrients, protection and other life functions, hence, they are usually found living in close proximity. The relationship between the clown fish and the anemone is an example.

Parasitism

A form of symbiosis in which one organism (called parasite) benefits at the expense of another organism usually of different species (called host). The association may also lead to the injury of the host. An example of parasitism is the association between the parasitic tapeworms and the vertebrate hosts.