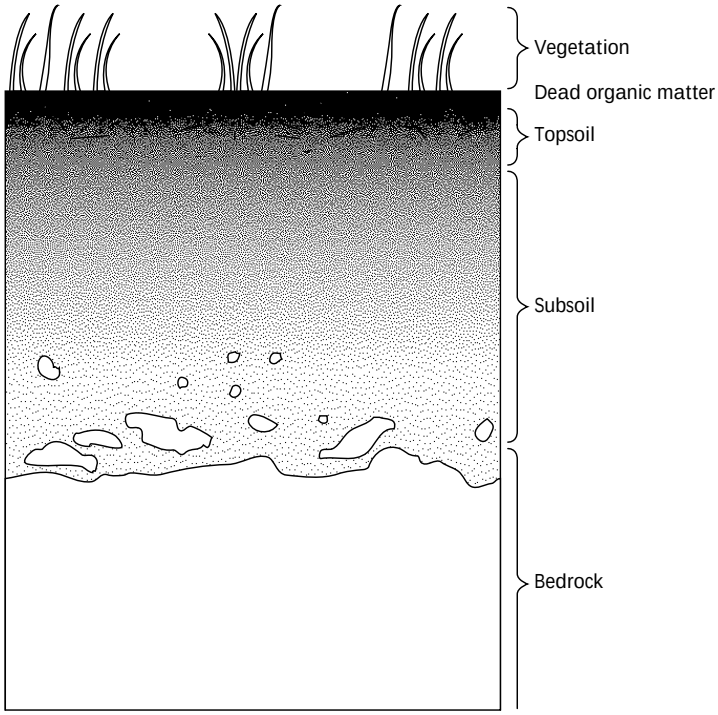
Soil

Soil type will have a major affect on the type of plants that can grow in any area. Different plants live in chalk soils than in clay soils.



Soil experiments

The nature of soil is extremely complex and the details of its structure and formation should be obtained from a good science textbook. In ecological investigations we are mainly concerned with the following characteristics, all of which can be determined with the use of simple laboratory apparatus.

Particle analysis

1 Place 10 cms of soil into a gas jar.

2 Top up with water.

3 Cover open end of gas jar and invert several times.

4 Leave standing for several days.

5 Measure depth of layers and produce scale drawing.

Determination of water content

1 Weigh an evaporating basin.

2 Half-fill with fresh soil and re-weigh.

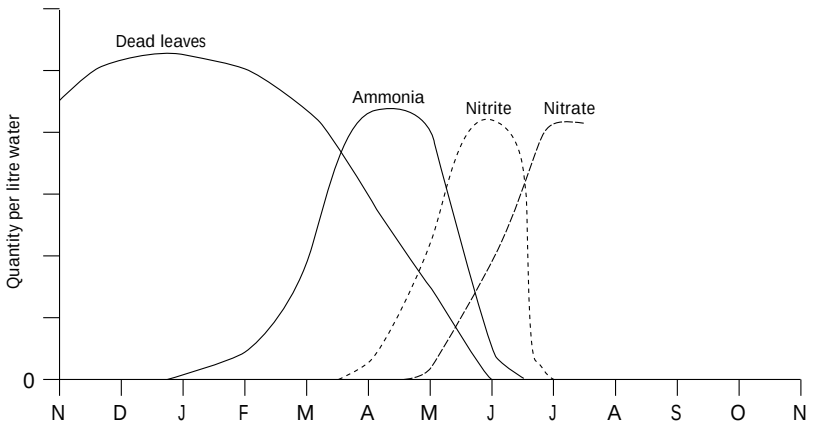
3 Place basin over a beaker of boiling water, reweigh every 5 minutes until no further weight loss is detected.

4 Use following formula to calculate percentage water content:

$$\frac{\text{Loss in weight after drying x 100}}{\text{Weight of fresh soil}} = \text{\% water content}$$

Natural cycles

A disused pond is surrounded by trees. In the autumn many leaves fall into the pond. Over the following year there are marked changes in the levels of three chemicals in the pond. These are shown in the graph.



Questions

1 What material in the leaves is being broken down to release these chemicals?

.....

2 In the late summer (July and August) the pond becomes covered with duckweed. How has this affected the levels of chemicals in the pond? Sketch on the graph the effect of the nitrate.

3 Why is breakdown of the leaves very slow until March?

.....

.....

4 In early spring the pond looks lifeless. When the water is tested for oxygen its concentration is low. Why does the breakdown of leaves affect oxygen levels in the water?

.....

.....

.....

5 Some years the pond is full of tadpoles which eat any plant material that is present in the pond. Describe how this would affect the graphs and the appearance of the pond in late summer.

.....

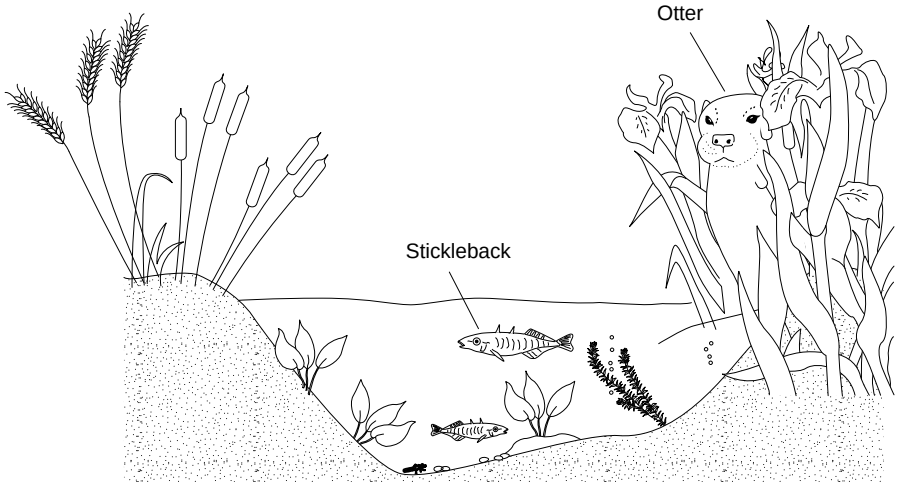
.....

.....

.....

A problem of long lasting pesticides

Sometimes chemicals that do not break down are used by farmers because their effect lasts. For example, a pesticide that does not break down may have an an affect for many months. DDT is an example of this type of pesticide. If a chemical does not break down it can pass into the natural environment via the food chains.



Complete the food chain for this diagram.

Pond plants → ..... → ..... → Otter

On land the DDT passes into voles which are eaten by kestrels.

As the DDT passes along the food chain it becomes concentrated. Why?.....
.....
.....
.....
.....

This means that it can have a poisonous affect on the birds without having an affect on other animals in the food chain. For this reason DDT is now banned in Europe. This type of process can affect humans.

?

Questions

1 Where do all river pollutants end up eventually? .....

2 Why does this pose a threat to humans? .....

3 Give an example of a food chain ending in humans that shows how poisons could end up in us.

.....
.....
.....