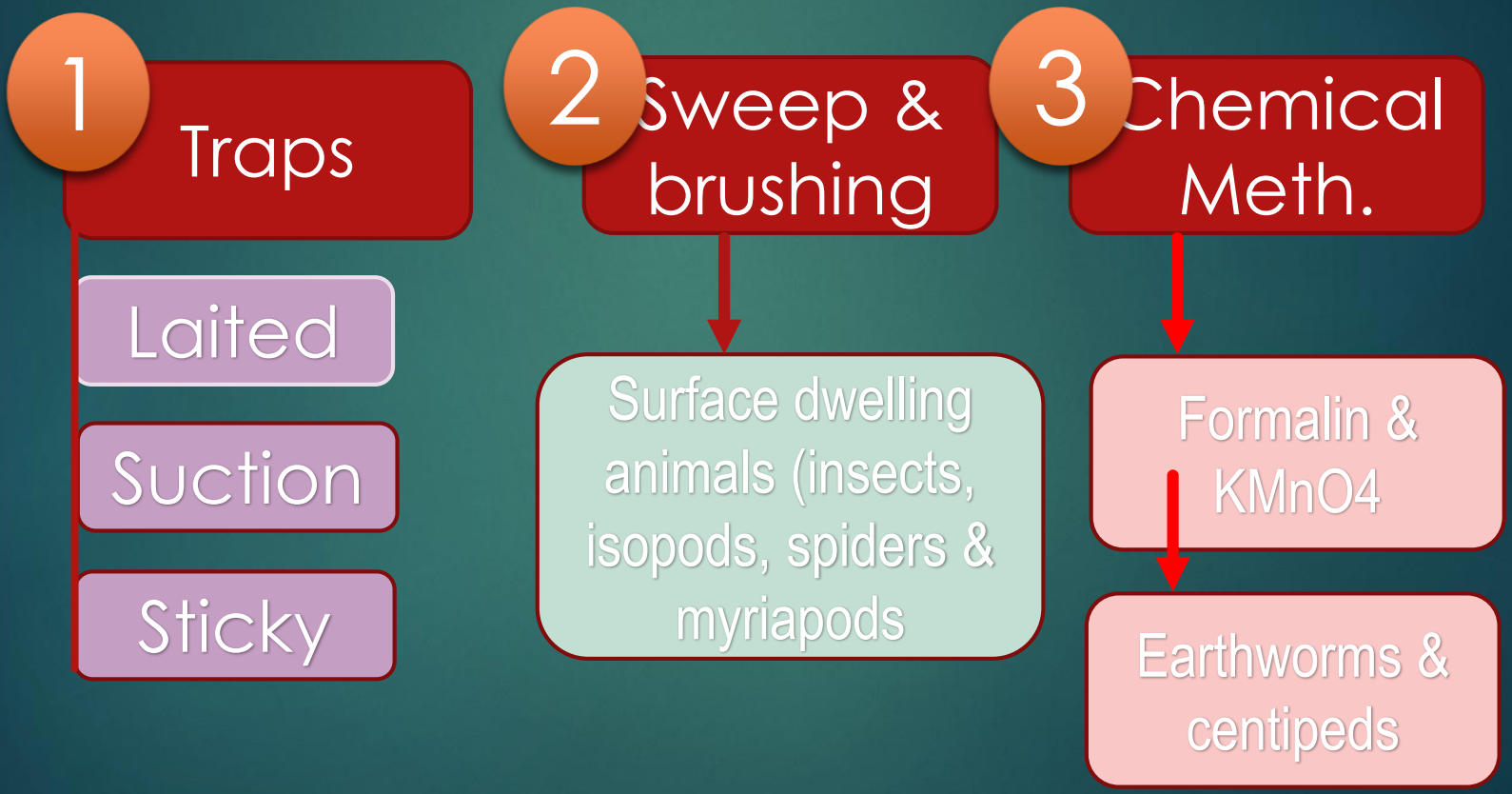
Special Environments

Lect. #3

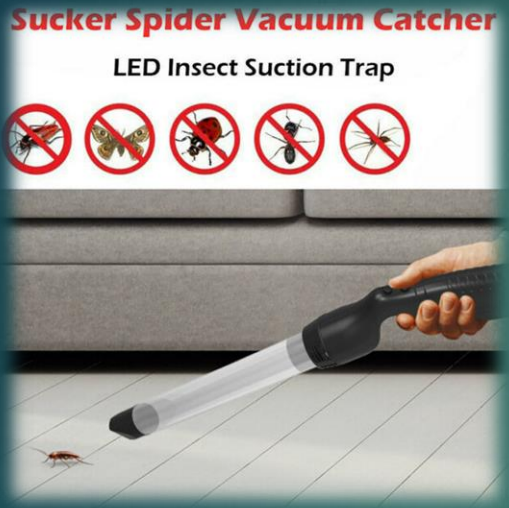
4th Chemistry-Zoology Group

Collecting Animals in The Field

- There are Many methods for collecting animals in the Field:



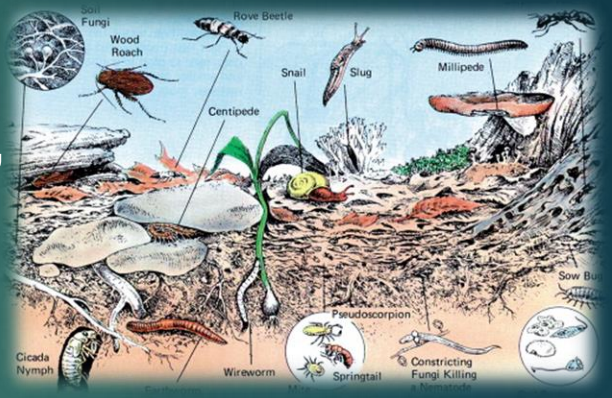
Collecting Animals in The Field



Earthworm coll. By Formalin

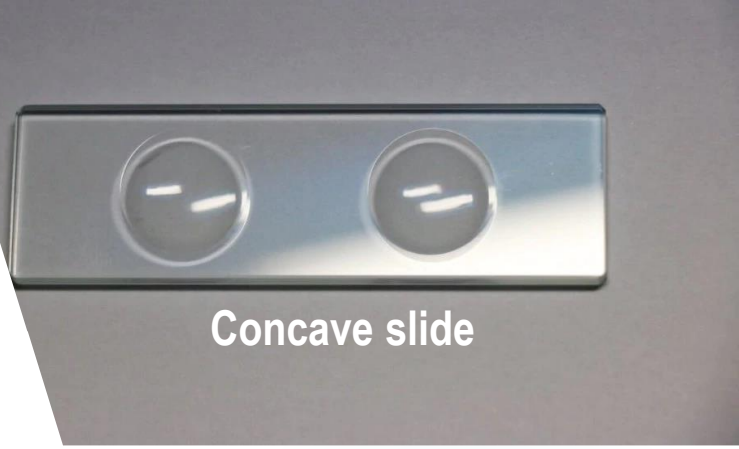
Preserving Soil Fauna

- After Collecting, extracting and separating animals from Soil or Field, they should be preserved:
  - For latter identification & study in Lab.
- For long preservation Put animals in Glass Vials containing:
  - 70-80% Ethanol+ Glycerin drops.
  - 5-10% Formalin.
  - **Don't Preserve as Permanent mounts?????**



Temporary Preservations

Preserving Soil Fauna

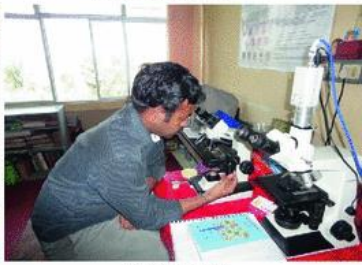

Concave slide

- Small soil fauna as nematodes studied in Concave slide contains drop of 60% Lactic acid (clearing agent).
- To stretch the animal, warm gently, orient, apply coverslip.
- After examination, return the animal to its Vial.
- Clearing agent makes the cuticle more transparent, but brittle leading to its fragmentation.


Phytoplankton net


Sample collection

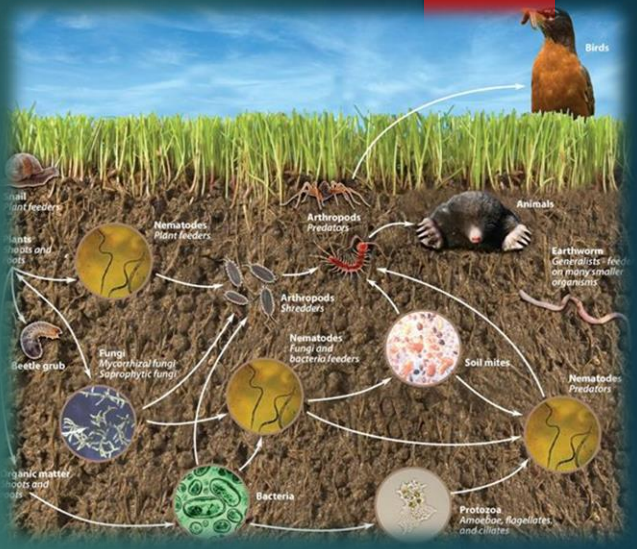

'e Preservation


Identification


Mite

Soil Biology

- Why We do all of the previous Steps??
  - To study the Soil Fauna, this is called Soil Biology.



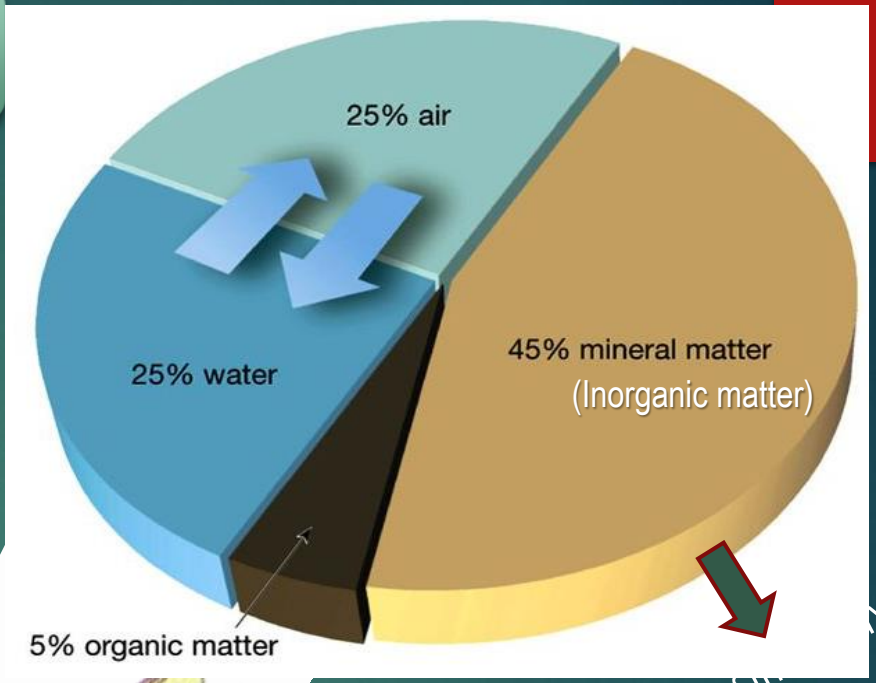
- Since soil animals live within the soil, Its important to Know the SOIL COMPOSITION. (Why?)
  - Because animals distribution depend plant distribution and growth, on the chemical composition of the soil, the topography (regional surface features) and the presence of living organisms.

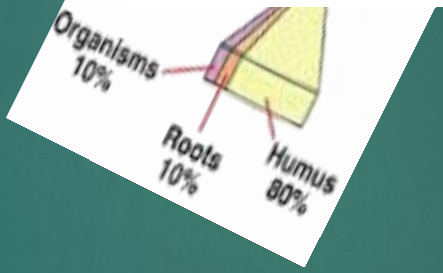
Soil Biology

- Soil is a Major part of the natural environment.
- Soil is the outer loose layer that covers the surface of Earth.
- Plants from the seed stage depend on Soil to grow (nutrients via soil e.g. phosphate, nitrates…).
- Soil is the entry point for most materials into terrestrial food webs.
- Soil is the shelter for many animals.

Soil composition

4 Components





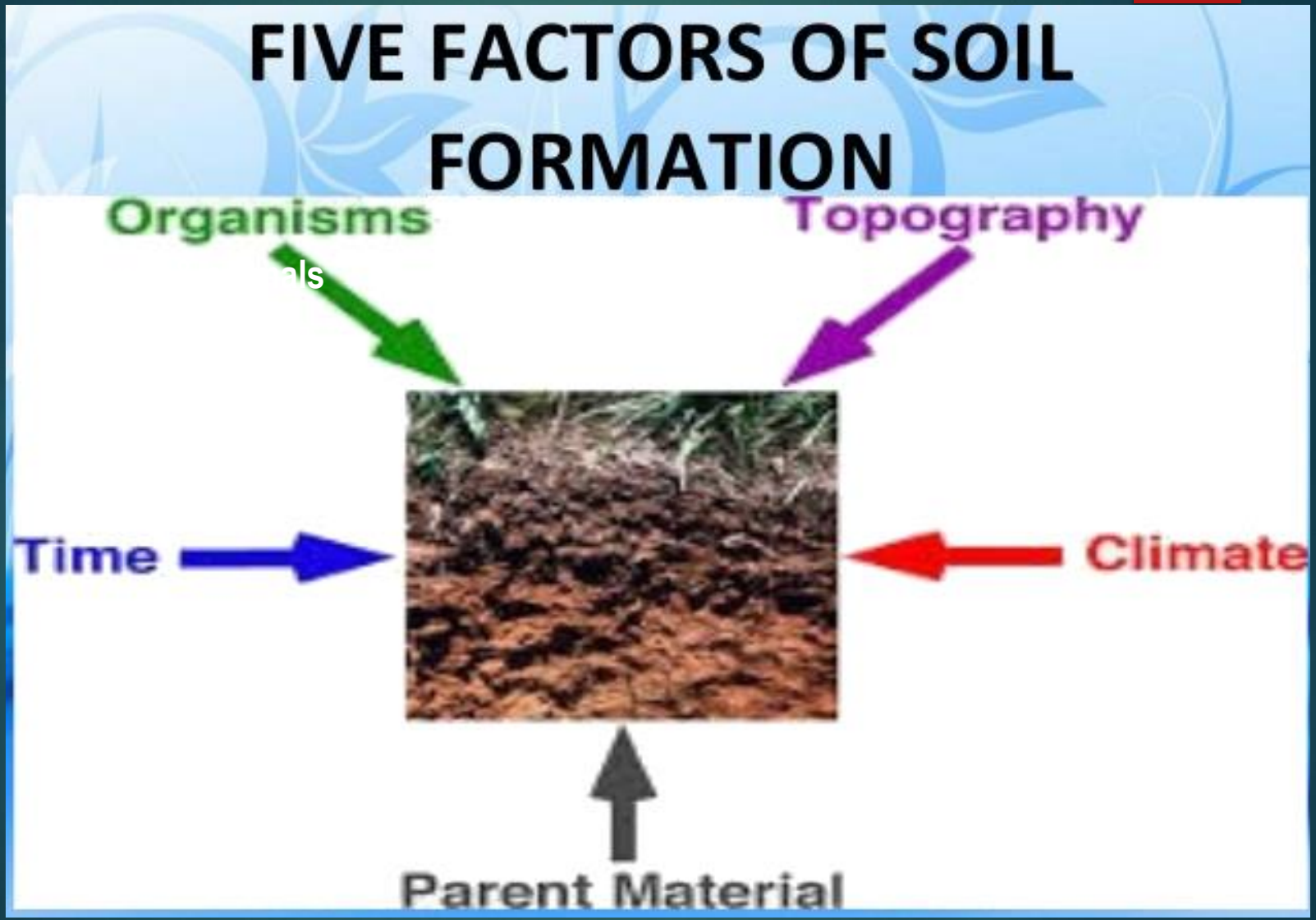
- These components Interact and changed Through: **Decomposition, Transformation & Climatic effects.**

(rocks, sl… …y & sand

Come from other places (parent material) by **wind or water**

- **The result produces the structural & textural qualities of the soils called Soil Profile.**

Soil Profile



Soil Profile

Surface
Fallen litters

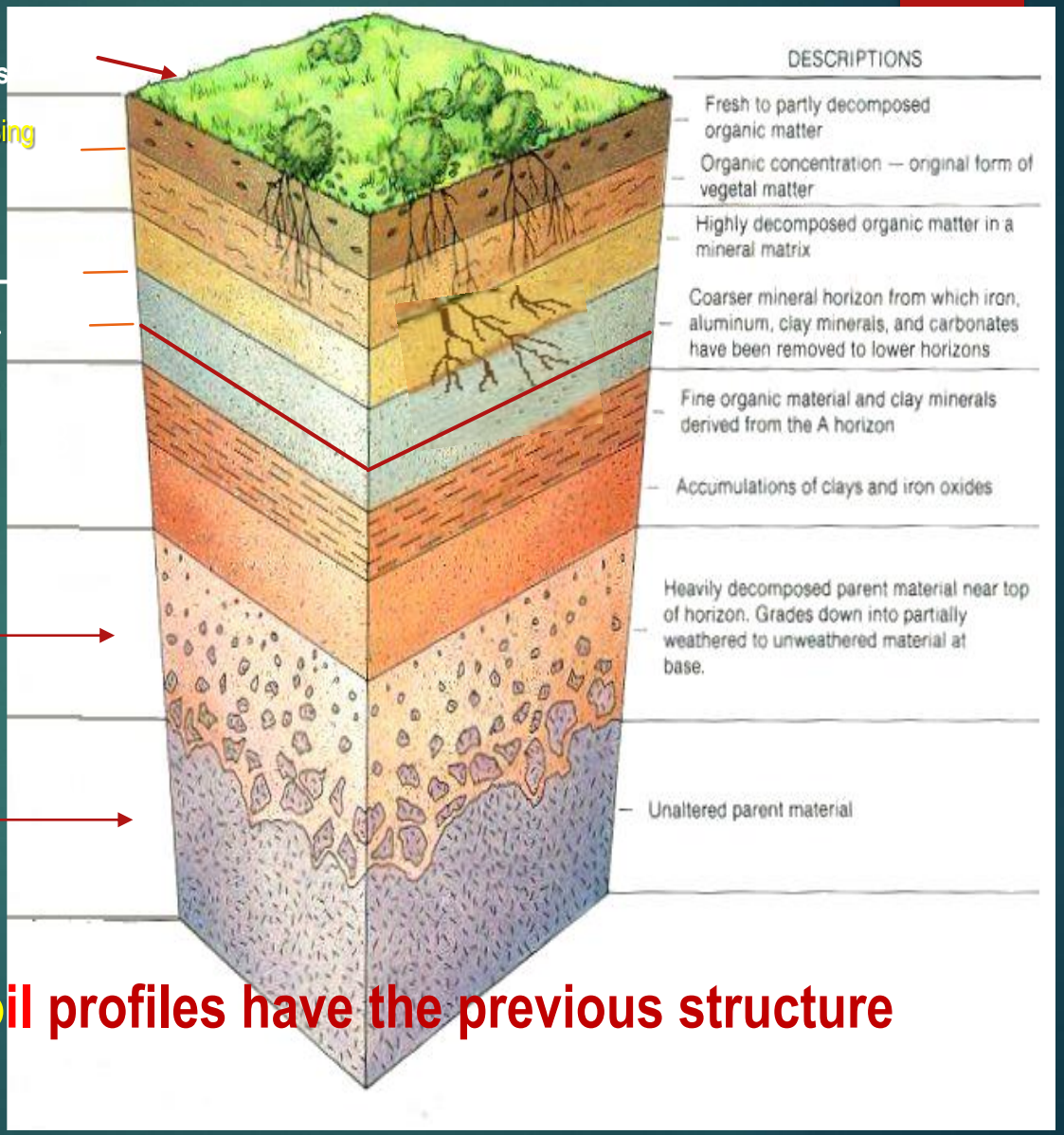
F layer (fragmentation) Decomposing
H layer (humus) layer

Organo-mineral layer Leached
Mineral layer layer
Transitional layer

Clay & humus
Leached from A
Deposition layer

Little or no
Plant or animal
Parent material layer

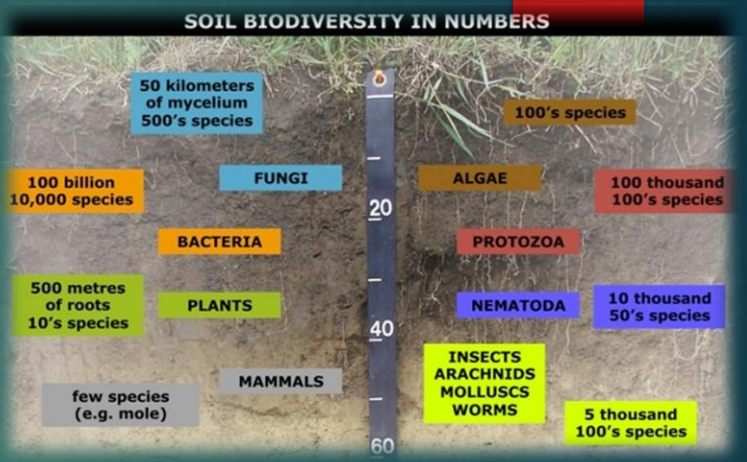
Rock, Sand & Clay
Unidentified layer



Note: Not all soil profiles have the previous structure

Classification of soil fauna

- Not all animals found above (dwellers) and inside the soil are true soil animals.
- Some birds just nested for a while in soil burrows.



- Some arthropods refuge temporary in soil burrows.
- Some other animals search for food in soil.
- However, These TEMPORARY organisms have their contributions to the Soil.

Classification of soil fauna

- Therefore, soil organisms are classified according to 4 bases :

1- body size

1 Micro-organisms	• 20 – 200 μm • Protozoa, small mites, rotifers, copepods.
2 Meso-organisms	• 200 μm – 10mm. • Collembola, mites, spiders, insect's larvae, rotiferal, nematodes.
3 Macro-organisms	• > 10mm. • Mollusca, large insects, earthworms, soil dwelling vertebrates.

Classification of soil fauna

2- Presence in Soil

A- Temporary soil animals

i- Inactive Geophiles

- Species use soil as refuge for protection from climates.
- Sheltered by loose leaves, decaying logs.
- Lying on or partially embed in soil.
- As, adult hibernating Coleoptera & plant bugs.
- Have slight contribution to the soil due to their inactivity.

ii- Active Geophiles

- Species spend part of their life cycle in the soil.
- Pupae have little/no role == inactive stage.
- As, Diptera, Lepidoptera & Coleoptera
- Larvae are important detritus or carnivores.
- Larvae body form adapt for living in soil & feeding habits.

Classification of soil fauna

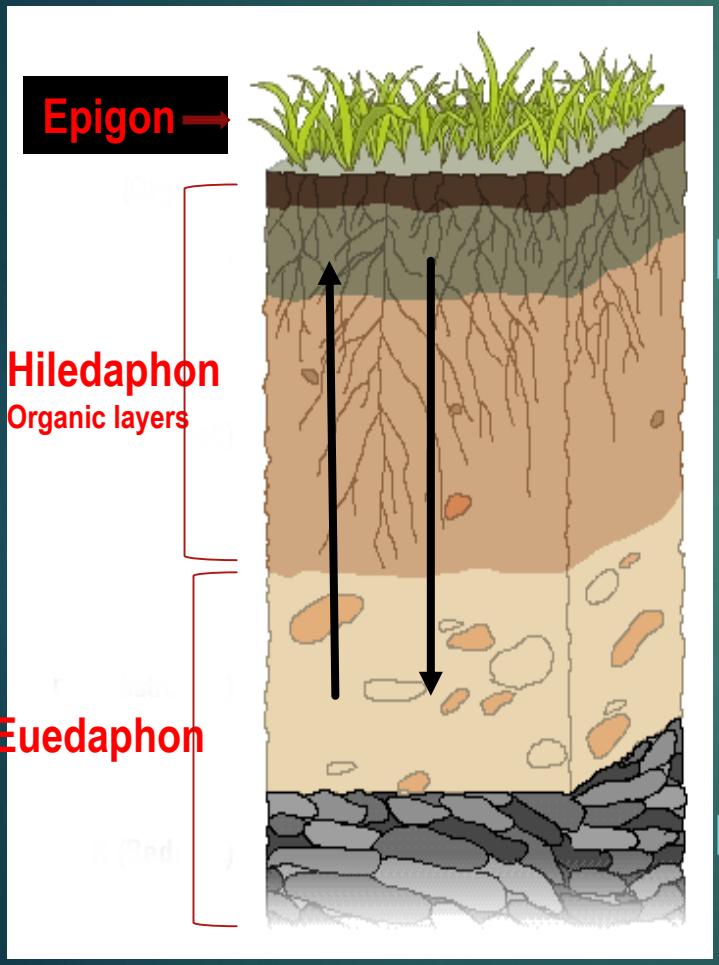
2- Presence in Soil

B- Permanent soil animals

- Animals present form egg stage to adult stages in the Soil (Entire life cycle).
- Usually known as "Geobionts"
- As, protozoans, nematodes, annelids, myriapods, isopods, mites, collembola & molluscans.

Classification of soil fauna

3- Habitat preference



- Habitat preference refers to the habitat used by an organism within the whole available habitat.
- Usually resources and conditions present in an area that produce occupancy, survival and reproduction, is preferred by an organism.
- In soil, the result yields stratification.
- Seasonal / diurnal vertical

Classification of soil fauna

4- Activity of soil Fauna

1 **Feeding**

2 **Locomotion**

1- Carnivores

- **a- Predators** (spiders, centipedes, some mollusks)
- **b- Parasites** (dipterans, some nematodes)

2- Phytophages (herbivores)

- **a- green plant parts** (Molluscs)
- **b- roots** (nematodes, larvae of coleoptera, lepidoptera)
- **c- woody** (termites, beetle larvae)

Classification of soil fauna

4- Activity of soil Fauna

1 Feeding

3- Saprophages

Animals that feed on decomposing dead plant or animal biomass.

Isopods, millipedes, some mites, some insects

4- Micropholyic

Animals that feed on fungal hypha, spores, algae, bacteria.

some mites, some nematodes, ants, some protozoans

5- Miscllaneous

Animals that feed on wide range of food (fresh/dead, ani./pla.)

some mites, some nematodes, collembola, some beetle larvae

Classification of soil fauna

4- Activity of soil Fauna

2 Locomotion

Burrowing is the most notable type of locomotion for soil organisms.

1- Burrowing organisms.

- Large in size.
- Move in the soil using existing pores, burrows, cavities or channels.

Coleoptera, Orthoptera, millipedes, burrowing vertebrates

2- Non-Burrowing organisms.

- Small in size.
- Move using existing spaces by squeezing their bodies.

Millipedes, centipedes, some lumbricids

Soil fauna

- Examples for animals live different types of soils can be reed in "Notes on Ecology" pp. 36-54.
- All these examples were studied before, So, you just need to refresh your mind about them.