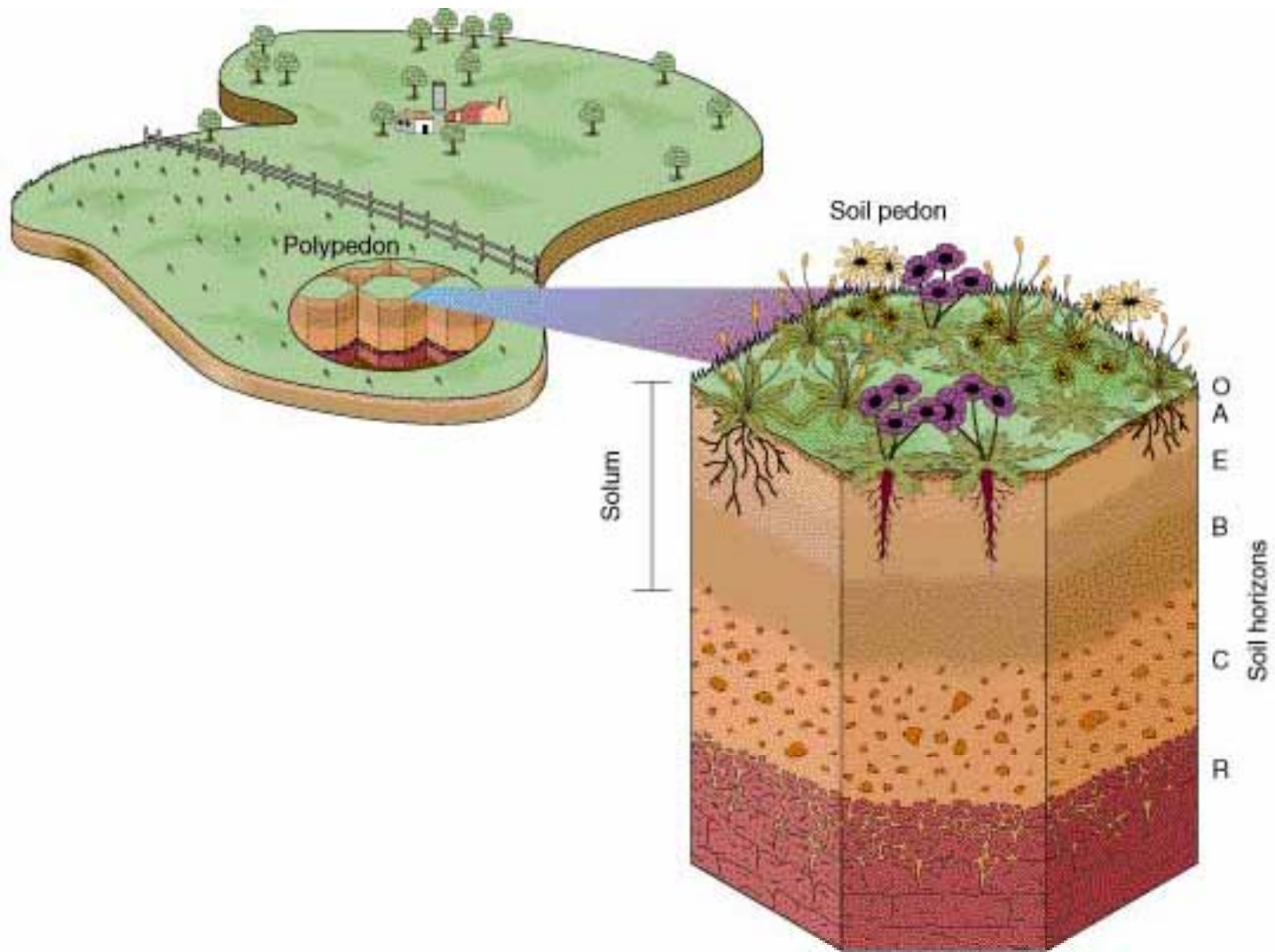


# Soil

The outermost covering of the earth's surface consisting of both organic and inorganic materials.



## Hans Jenny Helped Systematize Soil Science

Soil = function (Climate, Biota, Parent Material, Topography, & Time)

This is not a mathematical function but simply a recognition that that the properties that a particular soils if determined by these factors operating a given site.

# Climate

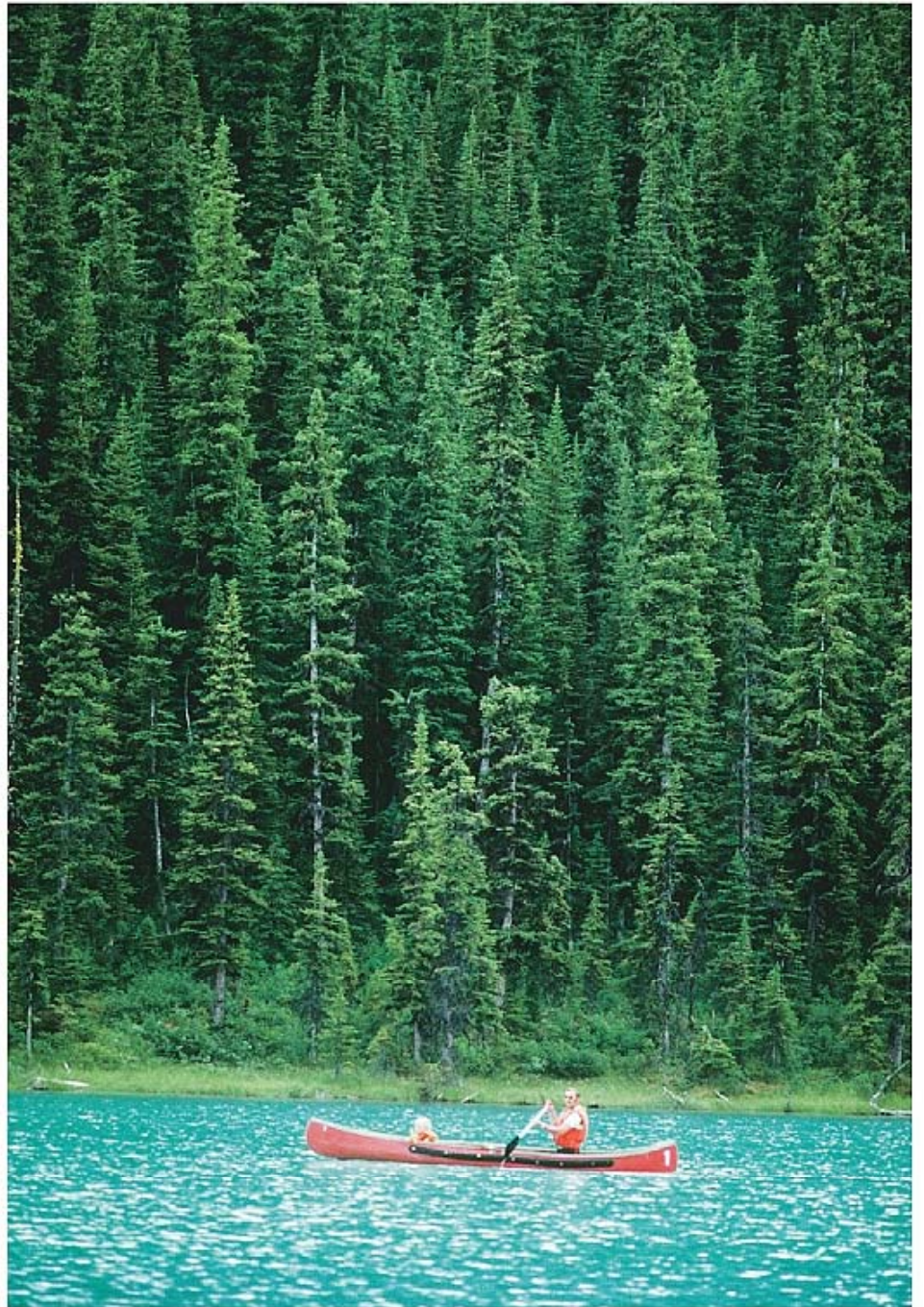
Naturally , soils that form in a humid environment will have very different chemistry from soils formed in an arid environment. One important difference is the rate of *Leaching*. This refers to the rate at which nutrients are removed from the soil as water percolates through it.

# Tropical Rainforest



(b)

# Needle leaf forest of cold climates



# Climate and Soil Formation

Some of these relationships can be summed up by *Van Hoff's Rule* which states that the rate of biochemical action doubles with each 10° C. increase in temperature.

Chemical reactions of growth and decomposition occur much faster in hot, wet environments than cold, dry ones.

# Cold Slows Biological Processes Including Growth and Decomposition



(a)



# Biota

Biota is mostly the vegetation that grows on the soil. However it includes anything organic activity from micro-organisms in the soil, to insects, worms and grazing animals.

For example, pine needles decompose and add acid to the soil.

Grasses tend to conserve calcium and magnesium adding bases to the soil.

Both forest and grassland soils tend to have a lot of organic material.

# Desert Soils Have Low Organic Content



(b)

# Parent Material

This is closely tied to the size of particles that comprises the soil.

Sand = big

Silt = medium

Clay = small

Usually parent material is the type of rock that weathered down to form the soil.

Sandstone weathers in to grains of sand so it creates a sandy soil.

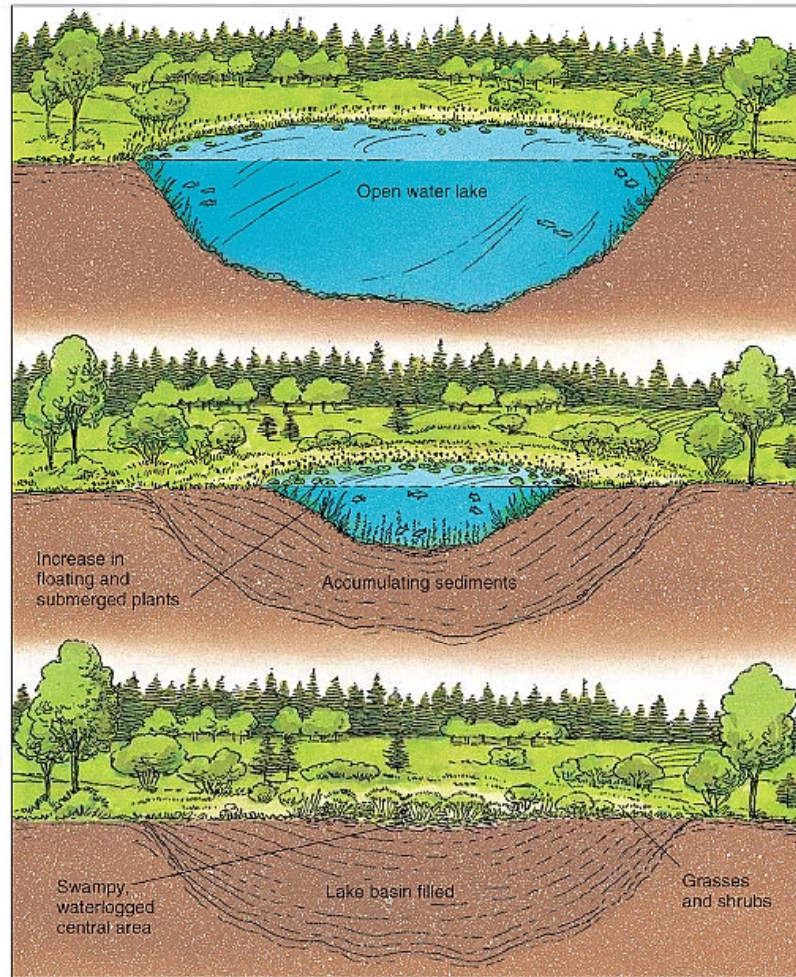
Granite weathers into grains of silicon dioxide (sand) and the feldspars in granite weather into clay.

Mudstone weathers into silt.

Red (Rust) Color of these Soils  
Indicate Iron Oxides



# Histosols are Soils that Have Organic Parent Material. The Best example is the Peat Bog Filled with Peat Moss



(b)



(c)



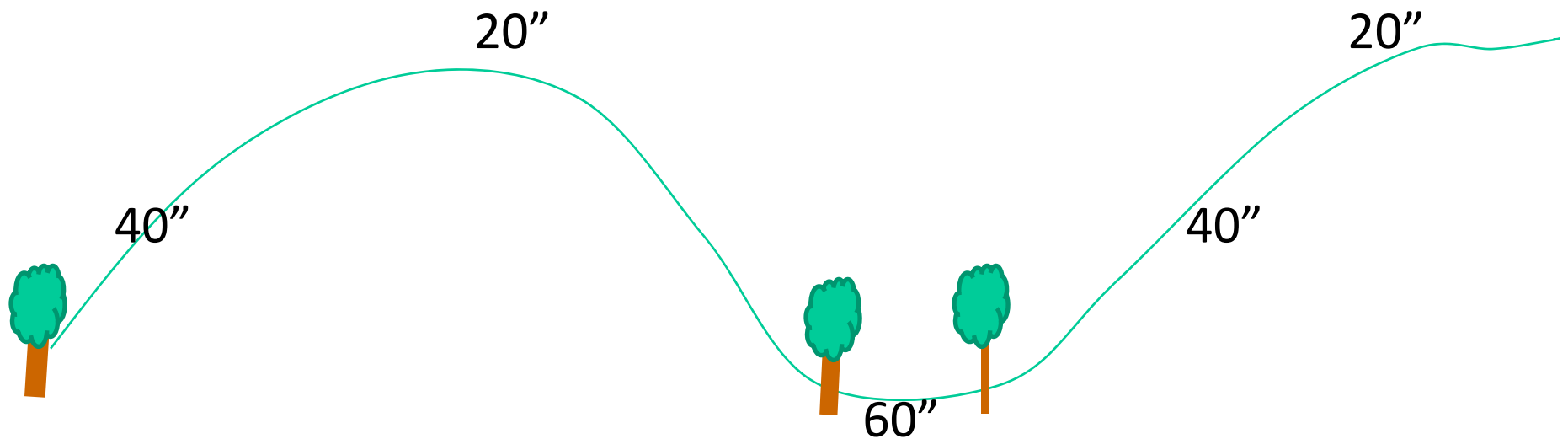
(d)

(a)

# Topography

Topography affects how wet a soil is and the amount of organic material it has. Iowa, with its low, rolling hills is a good example.

While the average annual precipitation is about 40", Topographic site can change this value. The tops of hills might have only 20" effective precip while the valleys might have 60" effective precip: the mid-slope would have about the average.



# Falkland Islands



(d)

# Time

In general, young soils, if fully formed have high fertility.  
Old soils tend to be highly leached which removes the nutrients.

The tropical rainforest is one of the oldest terrestrial biomes.  
They have been there for millions of years and are highly leached.

In contrast, the soils of the mid-west were formed after the last glacier retreated about 20,000 years ago. These soils have had just enough time to fully form and are very fertile.



# Soils of Midwest Formed During Last 20,000 Years After the Last Continental Glacier Melted



# Typical Landscape of Midwest Is Fields of Corn and Soybeans

