Soil Forming Processes vs Factors

A. Additions
B. Losses
C. Translocation
D. Transformation

Source material for this lecture from www.soils.umn.edu/.../ soil2125/doc/s4chp1.htm

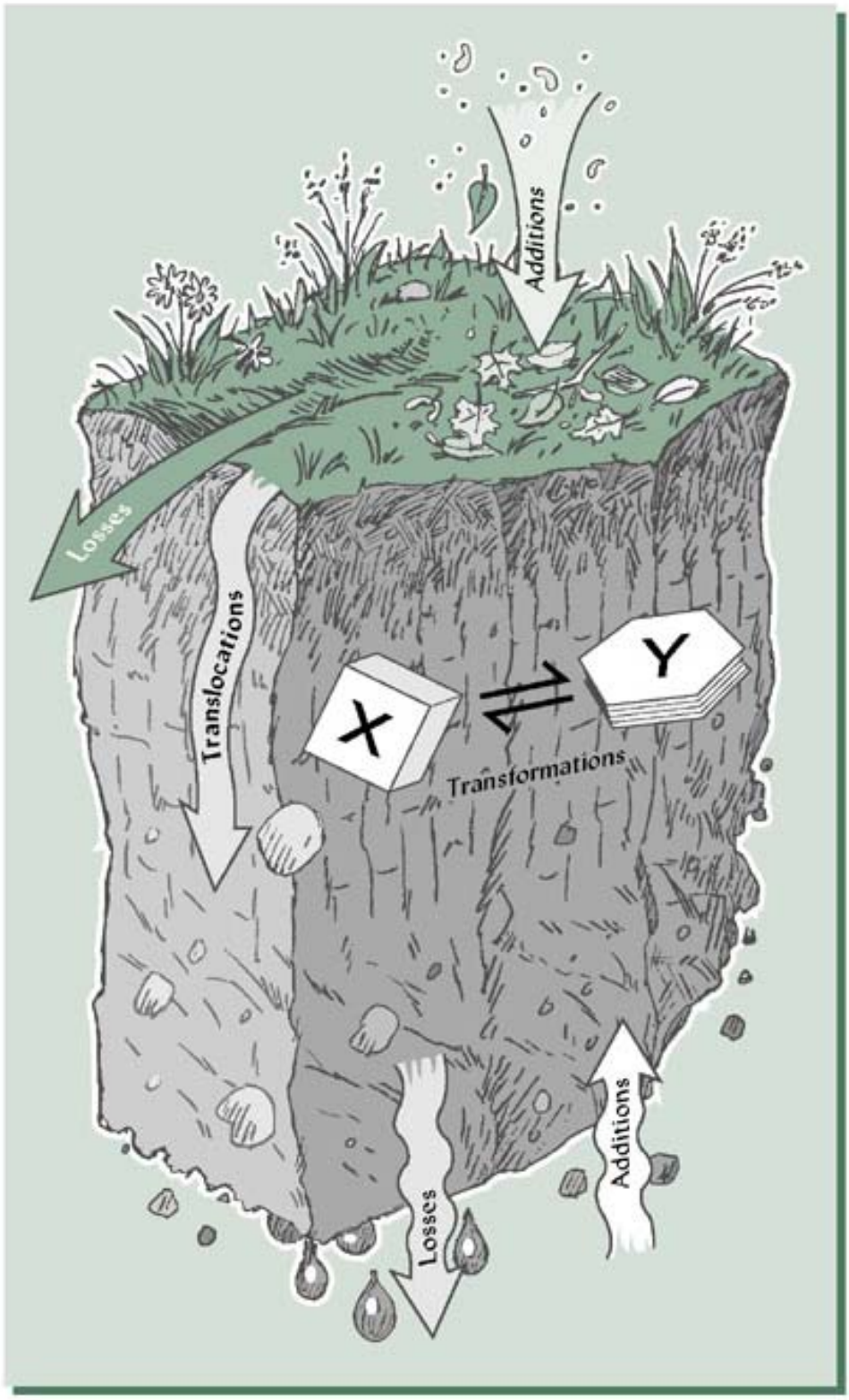

Additions
Losses
Translocations
X
Y
Transformations
Additions
Losses

Figure 2.32

http://www.plc.vic.edu.au/Library/outdust/images/road1.jpg

http://www.buffalocommons.org/docs/smenu2/images2/dustbowl.jpg

A. Additions

e.g.: Organic matter -- deposition of plant material

Solutes -- salts introduced by groundwater

Sediment -- aerial and fluvial deposits

water (from the surface, and by ground water discharge)

suspended and dissolved materials carried by water

solids transported by wind and gravity

gases from the air

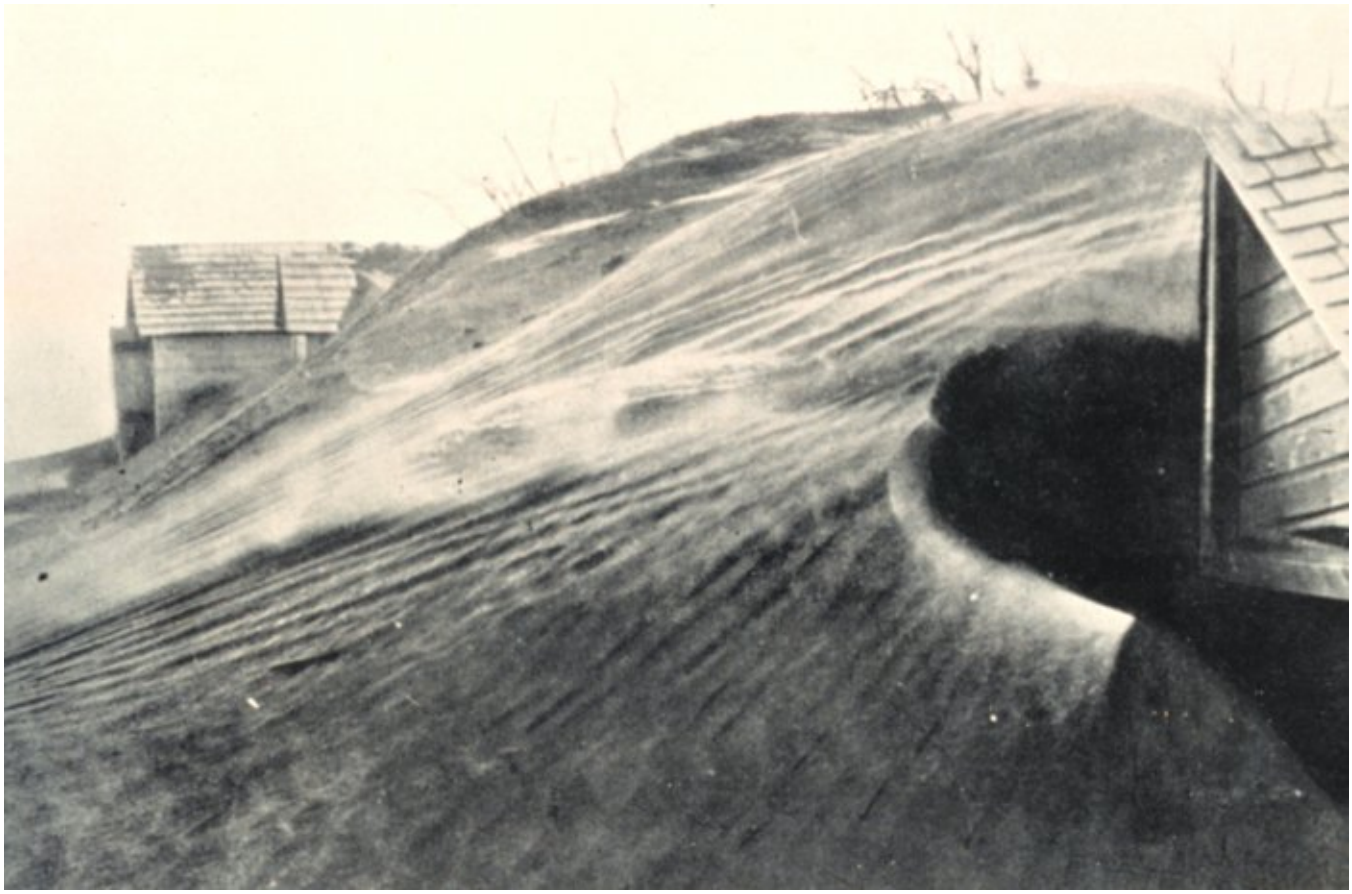
energy from the sun

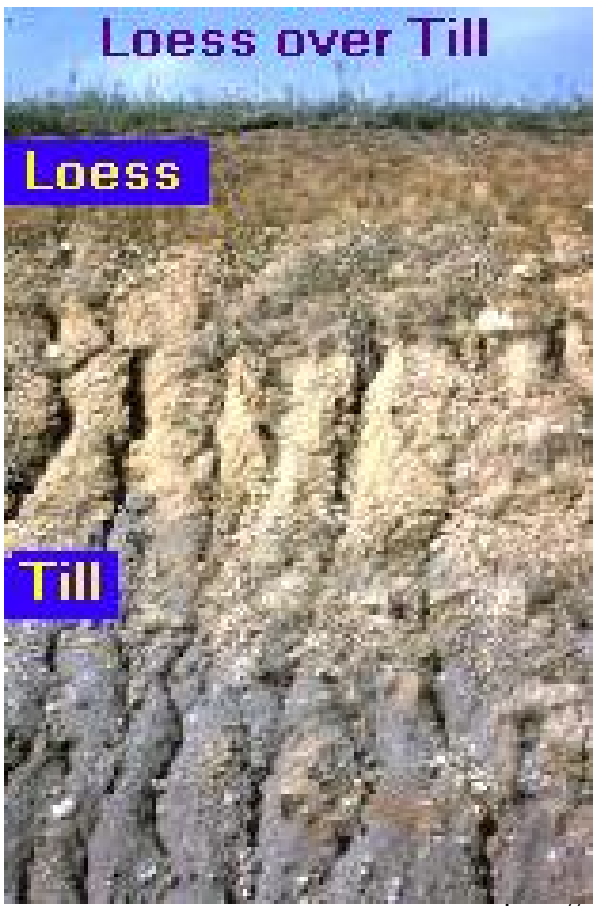
organic carbon by plants in form of roots and root-derived material

organic carbon by photoautotrophic bacteria

organic nitrogen by nitrogen-fixing bacteria

plant and animal remains on and in the soil.





www.photolib.noaa.gov/ historic/nws/wea01407.htm

http://www.soils.umn.edu/academics/classes/soil2125/img/2lsotil.jpg

B. Losses

e.g.: Sediment -- lost by erosion

Solutes -- leaching to groundwater

Organic Matter -- lost by oxidation

materials removed by wind erosion

materials removed by gravity

material removed by water erosion

dissolved and suspended material may be leached out from the bottom of a soil profile

uptake of nutrients from the soil by plants

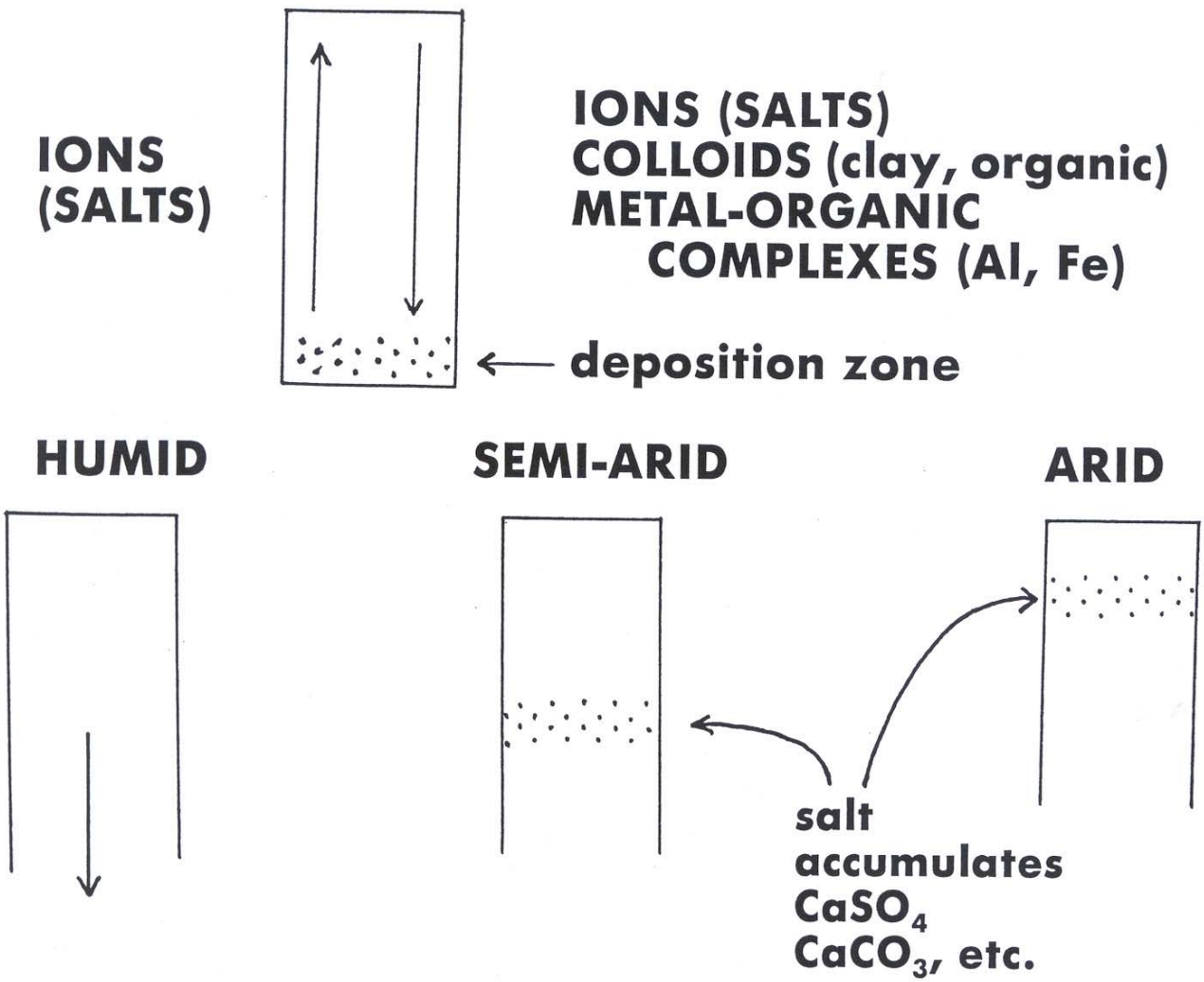
carbon dioxide gas produced by plant root, microbial and faunal respiration

other gases such as nitric oxide, nitrous oxide and nitrogen produced by denitrifying bacteria

other gases such as methane which are produced under anaerobic conditions

http://www.ecology.uga.edu/courses/international/Brazil/media/brejo8.jpg

C. Translocations

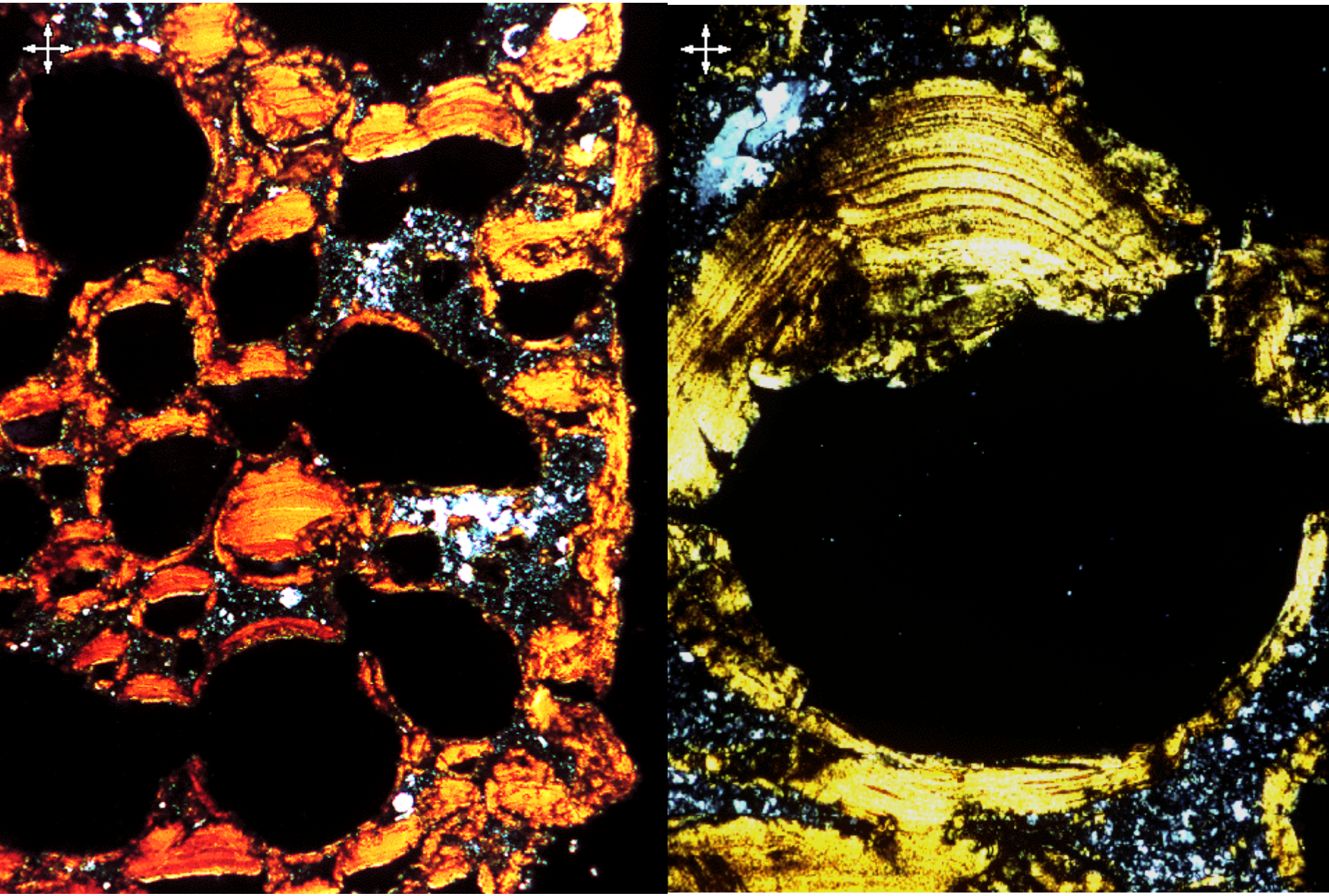


Translocation of materials within the soil profile is primarily due to gradients in water potential and chemical concentrations within the soil pores.

Soluble minerals, colloidal material, organic compounds, and iron may move up or down the profile, between horizons, with water movement.

Biological activity may cause gradient in the chemical composition of the water and air-filled pores of the soil.

http://www.dawsoninfo.org/theo/acts/salt.JPG



http://edafologia.ugr.es/Miclogia/media/arcagrg.gif

D. Transformations

Clay formation

1. **In place, from mineral alteration**
2. **After translocation, recrystallizing from weathering products.**

Soil components are transformed by chemical and biological reaction.

Organic compounds decay, some minerals dissolve, other minerals precipitate.

These transformation result in the development of soil structure, and in changes in color, relative to the parent material.

http://www.jplife.co.jp/recycle/kounetu/sankou02.html