Weathering

B.A/ B. Sc. (H): SEMESTER-I

PAPER: CC-1

Course Title: Geotectonic and Geomorphology(Theo)

Dr. Surajit Let, Asst. Professor ,
Department of Geography
Krishna Chandra College, Hetampur

Weathering

- Is the process by which rock is broken into smaller pieces.
- Weathering is simply the chemical and/or physical breakdown of a rock material--weathering involves specific processes acting on rock materials at or near the surface of the Earth

Types of Weathering

- Physical Weathering(mechanical)
- Chemical Weathering (decomposition)
- Biological Weathering

Physical Weathering Processes

- **Weathering Processes**

  Frost Action

  Salt Weathering

  Sheeting

  Thermal Expansion

- **Associated Weathering Landforms**

  Talus Slopes

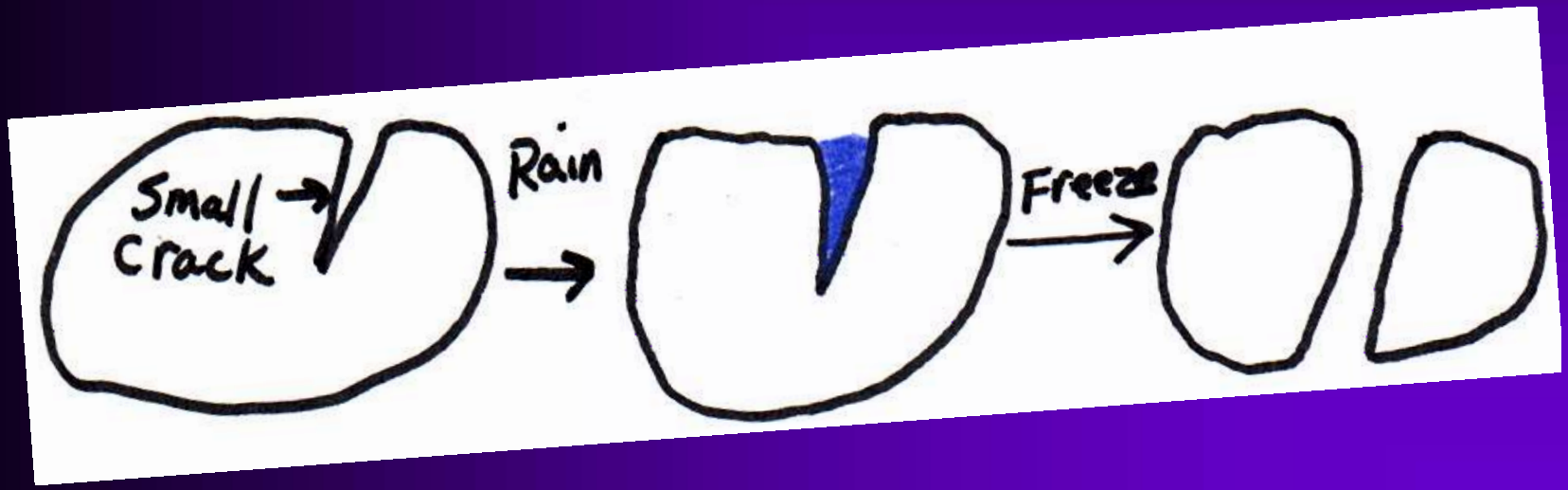
  Exfoliation Domes

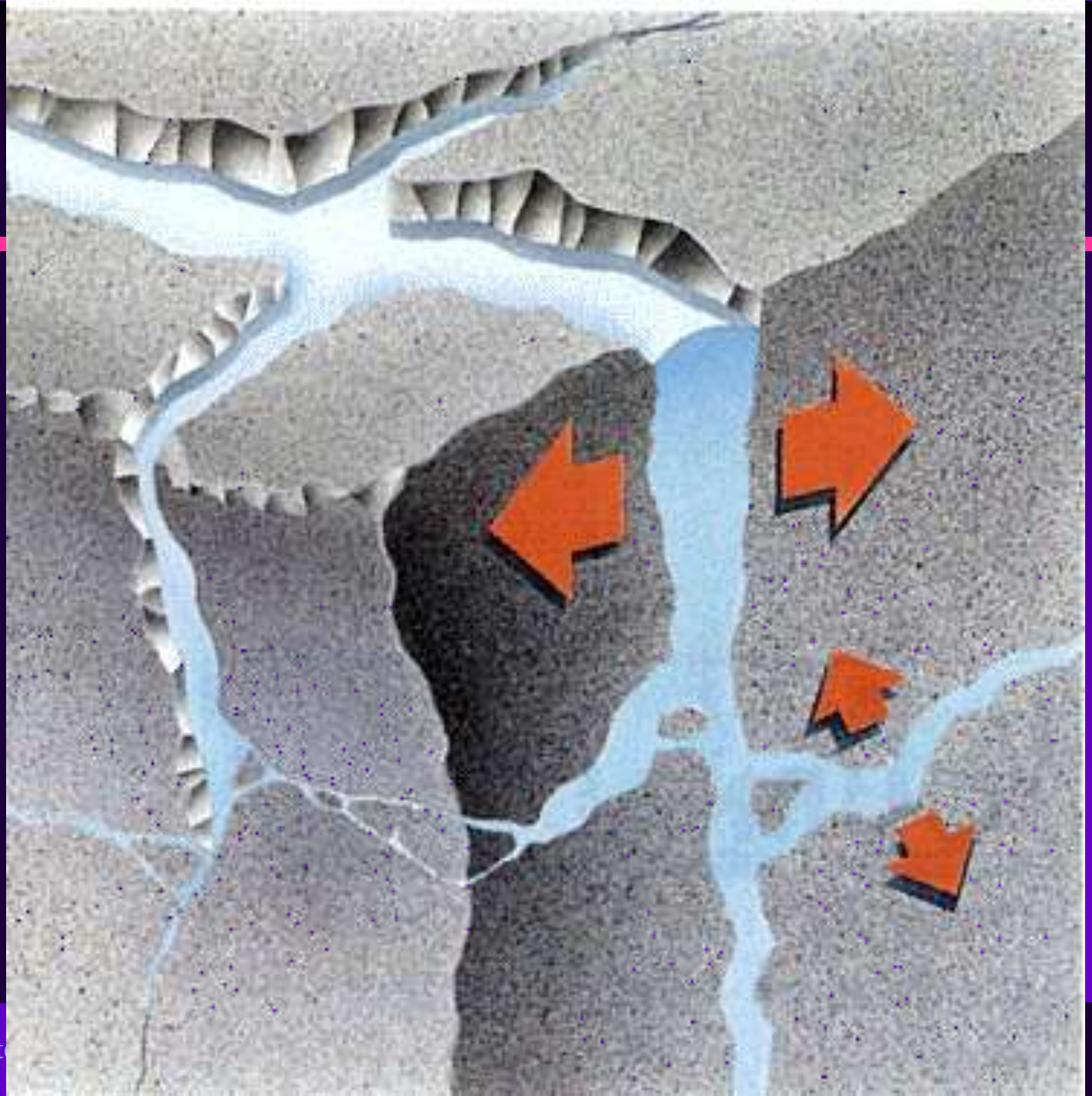
Physical (Mechanical) Weathering

- The breakdown of rock into smaller pieces
  - Does not involve a chemical change in the rock

Physical (Mechanical) Weathering

- Frost action
  - Due to the expansion of freezing water



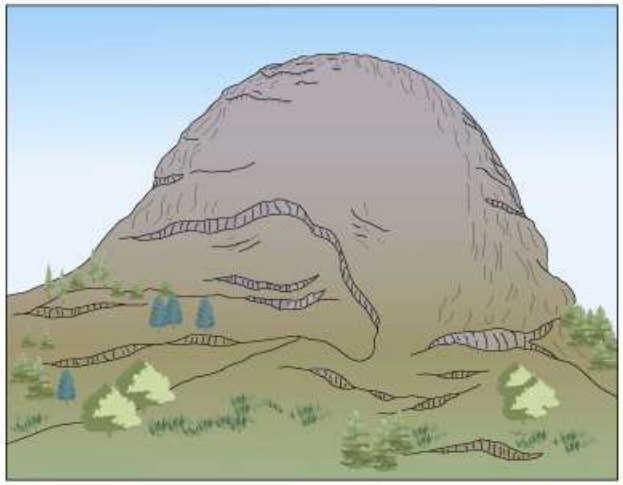


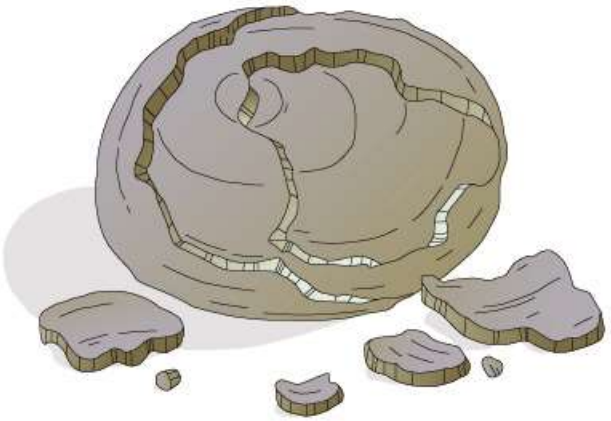
ROCKS ARE CRACKED BY WATER FREEZING

EXAMPLES: POT HOLES AND FROST HEAVES

EXFOLIATION – PEELING AWAY OF ROCK

due to **unloading** (reduced pressure at earth's surface) or **fluctuations in temperature**. Rocks expand and crack





PHYSICAL WEATHERING - EXFOLIATION

Physical (Mechanical) Weathering

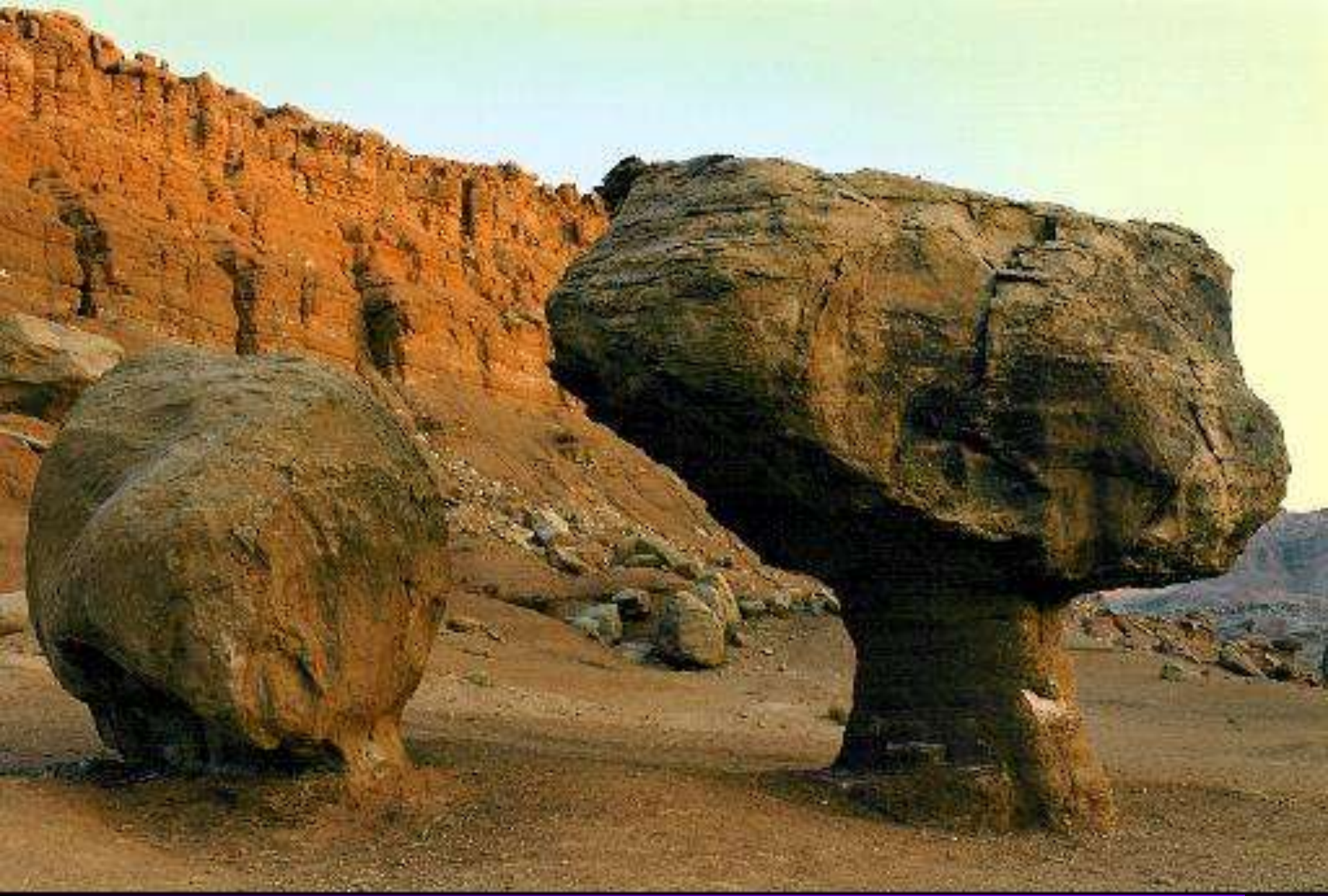
- Abrasion
  - Caused by rocks colliding against each other
- Agents that move rock include
  - Wind
  - Liquid water (streams, rivers)
  - Solid water (glaciers)
  - Gravity alone (along a cliff face)

PHYSICAL WEATHERING - ABRASION

SCRAPE, GRIND AND WEAR AWAY ROCK DURING EROSION

WATER

WIND



Physical (Mechanical) Weathering

- Plants and animals are also important agents of physical weathering (Biological)
  - Expanding seeds and growing roots push outward with tremendous force
  - Soil burrowing creatures abrade small rock particles
    - earthworms are especially important

Biological weathering

PHYSICAL WEATHERING – ROOT ACTION

PLANT ROOTS UPLIFT AND FRACTURE ROCK

Chemical Weathering Processes

- **Weathering Processes**
  Carbonation
  Hydrolysis
  Oxidation
  Hydration
  Solution

- **Associated Weathering Landforms**
  Spheriodal Weathering
  Karst Topography
  Gnama Pits

Chemical Weathering
1. Hydration

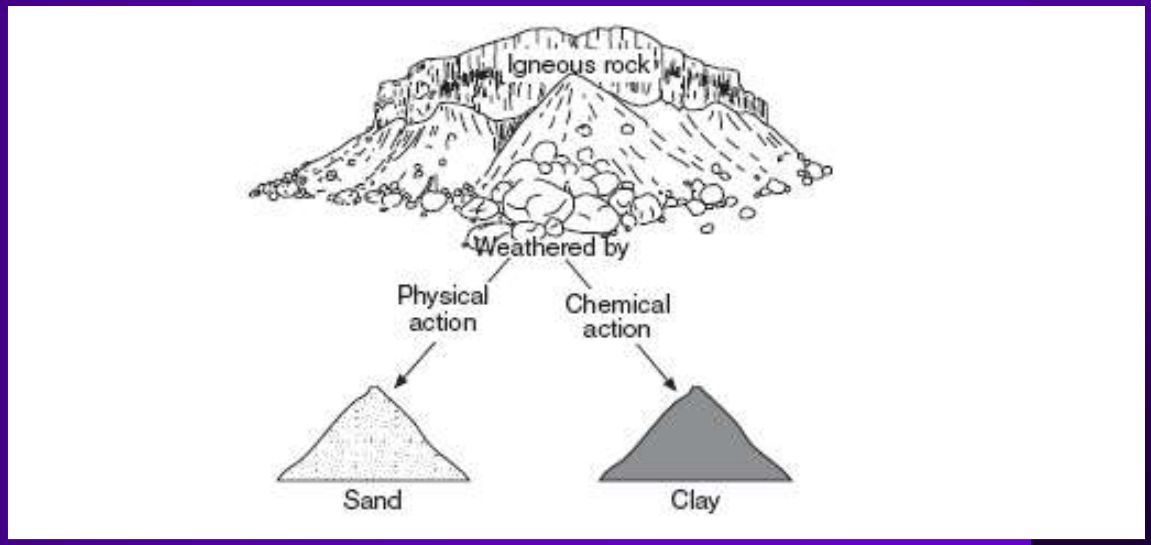
- The breakdown of rock due to a chemical change in the rock. Examples:

Feldspar $\longrightarrow$ Clay

Fe (iron) + O_2 $\longrightarrow$ Fe_3O_3 (iron oxide, commonly called rust)

CHEMICAL WEATHERING HYDRATION

- OCCURS WHEN **Water** combines with minerals – most often in granite (mica and feldspars) to form **CLAY**



2. Carbonation

Example 1 Carbon Dioxide

- Carbon dioxide mixes with water and produces Carbonic Acid (a weak acid).

$$CO_2 + H_2O \longrightarrow H_2CO_3$$

- Carbonic acid will slowly dissolve rocks and minerals.

Example of carbonation

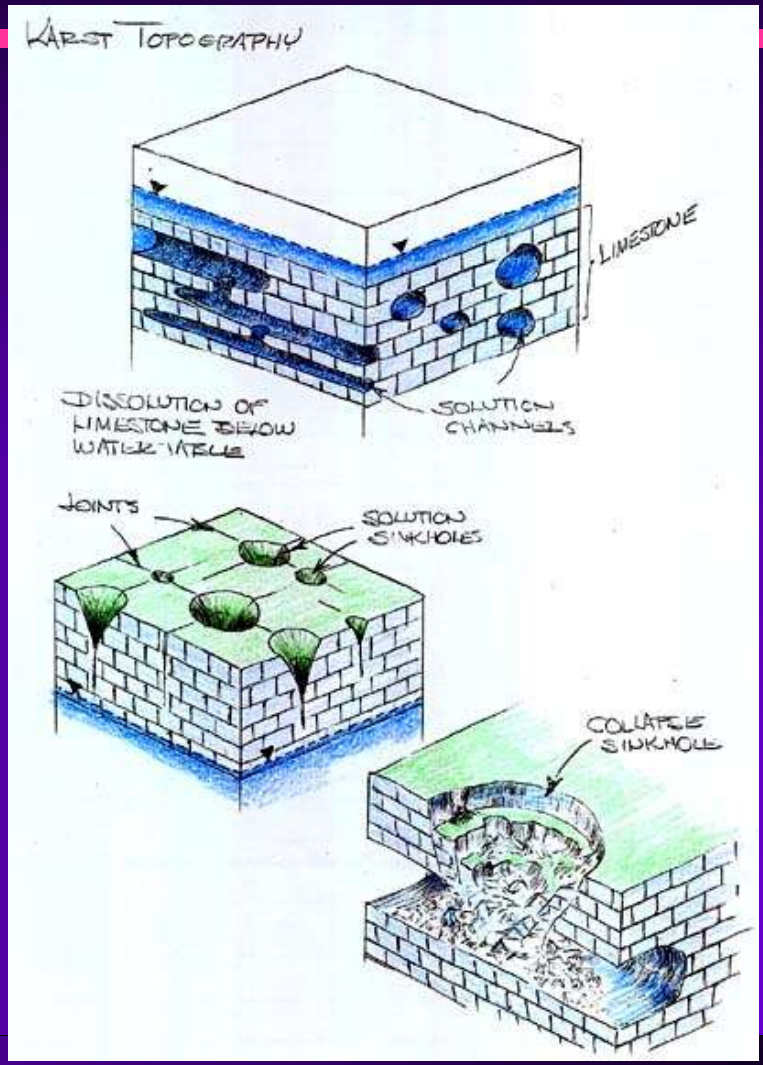
- Limestone is a hard rock that is weathered by weak acids

$H_2O + CO_2 \longrightarrow$ Carbonic acid H_2CO_3

This is how most caves are formed

CARBONATION – SINK HOLES

- **Karst Topography forms caves, caverns, and sinkholes**



CAVES AND SINK HOLES

4. Oxidation

- Oxygen is added to other elements
  - Rusting of magnetite into hematite

Thank you