Weathering

Chemical and Mechanical Processes

Mechanical Weathering

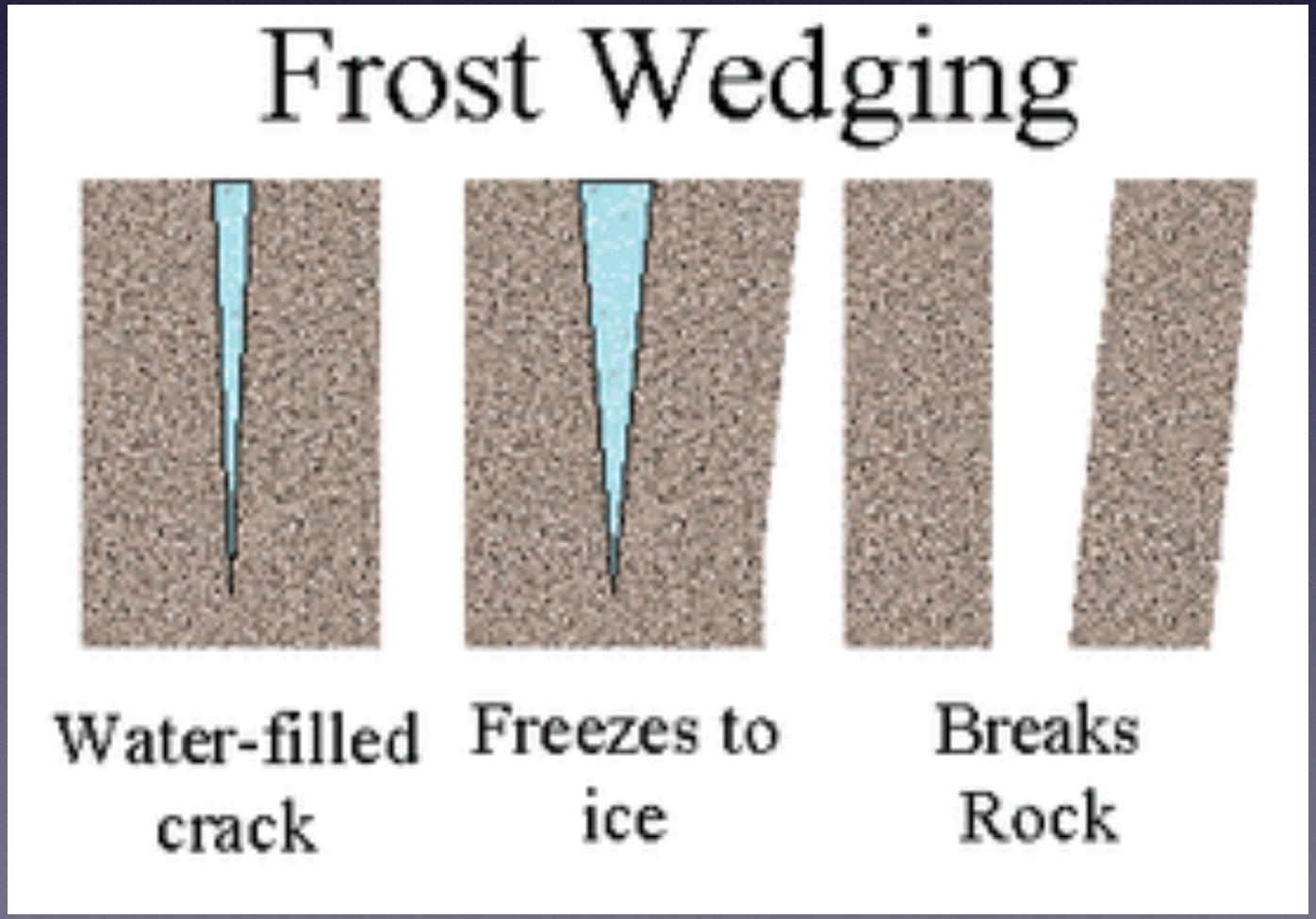
- Breaking down the physical structure (disintegration)
- Increased surface area allows greater chemical weathering to occur as a result

Fragmentation

- Frost Wedging
- Unloading/Exfoliation
- Biological Activity

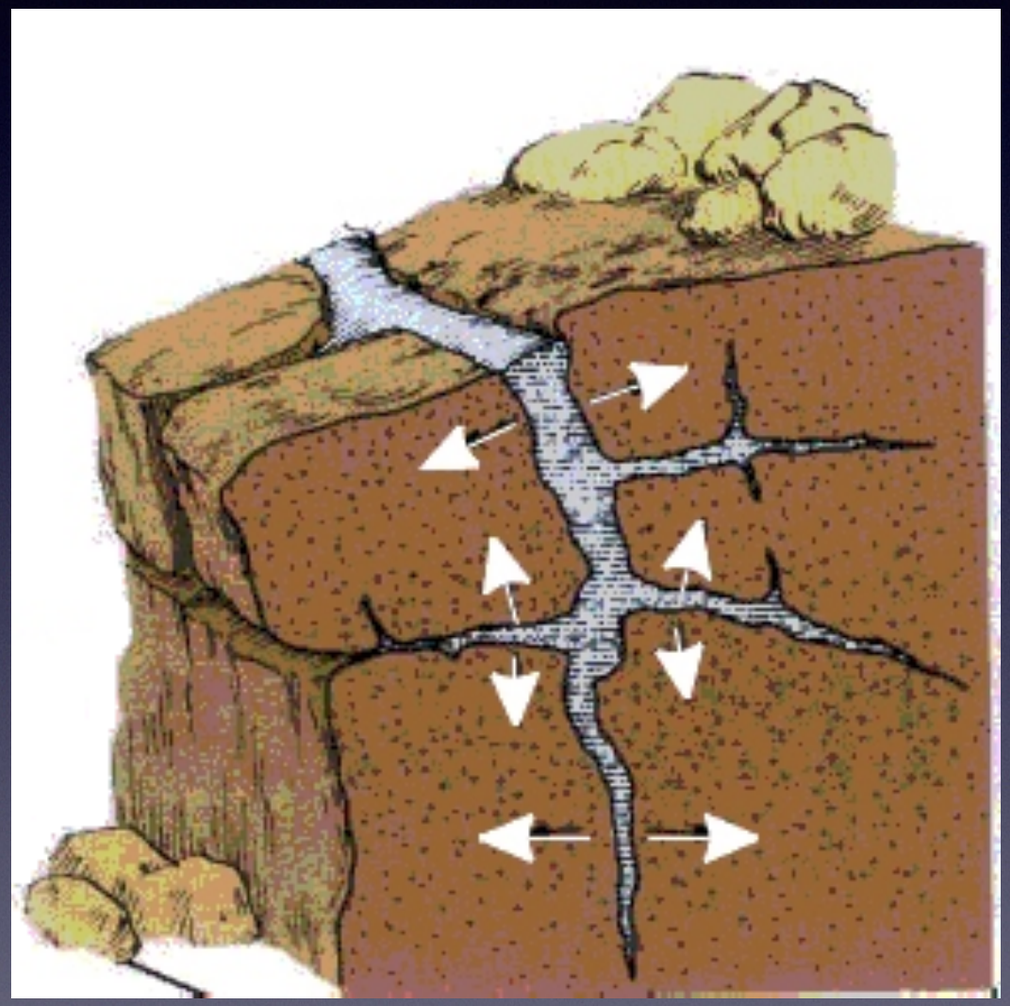
Frost Wedging

- Repeated freeze - thaw results in tremendous outward pressure on surrounding rocks
- Water freezes at a size 9% greater than the volume of its liquid counterpart



Frost Wedging

- Very common in mountainous areas with daily freeze - thaw cycles
- Also a number one cause of potholes



Unloading

- when large igneous rock plutons become exposed (likely due to erosion), Slavs begin to break off

- This is referred to as “sheeting” or exfoliation

- Caused by a great reduction in the pressure put on a rock body

Figure 16-10
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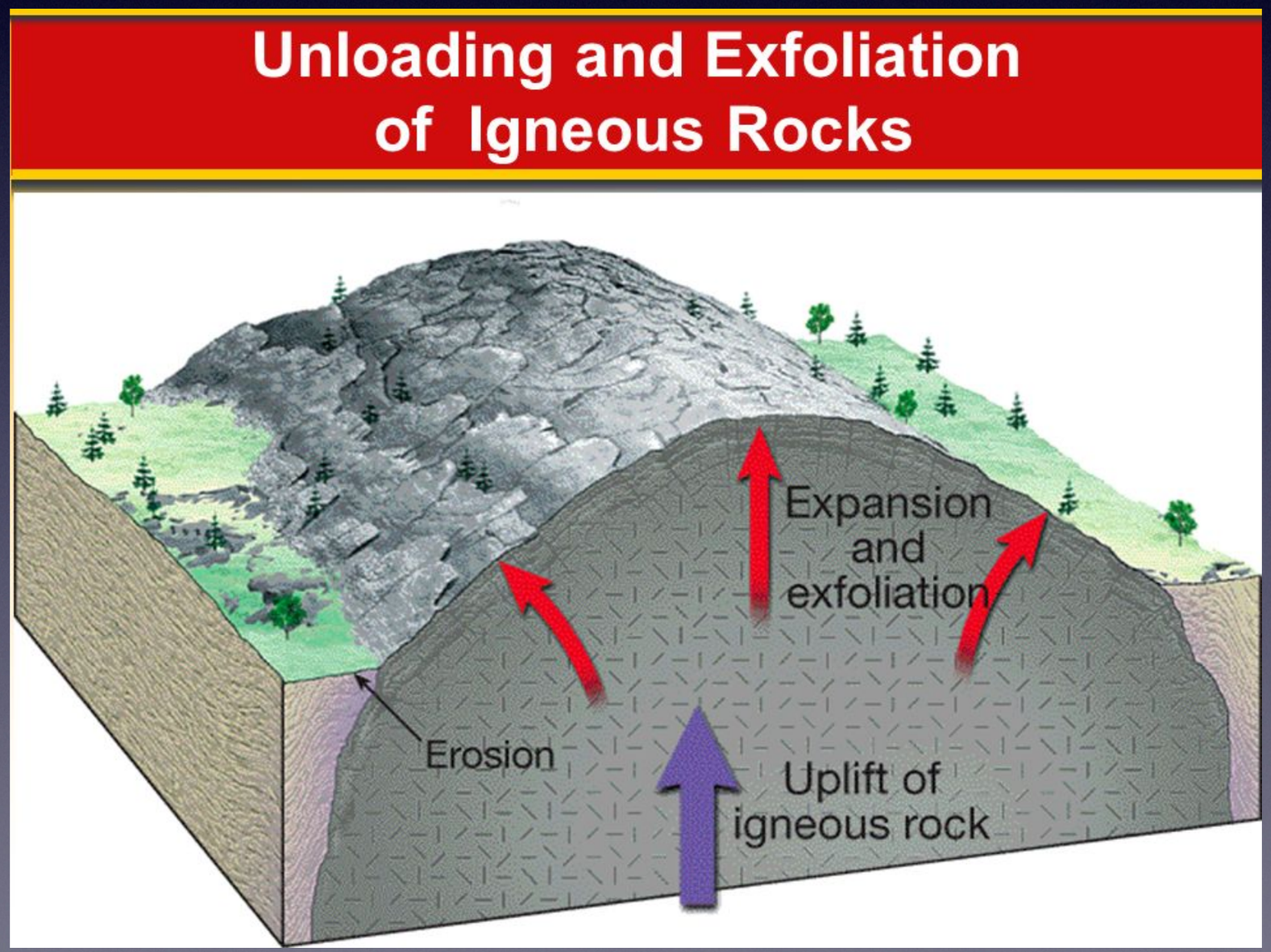
Unloading

- As unloading continues, more slabs break away creating exfoliation domes



Biological Activity

- Plant roots grow and expand inside of rocks
- Burrowing organisms help remove and mechanically weather rock strata

Chemical Weathering

- Breaking down and changing the chemical structure

- Water is the number 1 cause of chemical weathering

- 3 methods:

    - Dissolution, Oxidation, Hydrolysis

Dissolution

- Just as sugar dissolves in water, so can some minerals like halite
- Water is a polar molecule (oppositely charged ends), which will dissolve other polar molecules into their ionic components

Dissolution

- Acid rain readily decomposes most rocks to produce a more water soluble mineral
- $H_2CO_3 + CaCO_3 \rightarrow Ca + 2HCO_3$
- Carbonic acid (acid rain) + Calcium carbonate —> Calcium + Bicarbonate
- Common occurrence in limestone

Oxidation

- Rusting process
- occurs in rocks with high iron content
- $4Fe + 3O_2 \longrightarrow 2Fe_2O_3$
- Mafic minerals are quite susceptible (olivine, amphibole, pyroxene)

Hydrolysis

- Effects primarily silicate minerals
- Free floating Hydrogen ions attach the crystalline structures and chemically alter the composition of silicate minerals like quartz and feldspar