



Weathering

is the breaking down of rocks/minerals at the earth's surface to make...

1. **sediments** (may form sedimentary rocks)
2. **soil**

Review of SEDIMENTS

- Sediments form when rocks/minerals or living material (like shells) are weathered into smaller pieces.
- examples of sediments:
 - shells, bones
 - mud, gravel
 - sand, clay, silt



It's time to do PT#2...



WEATHERING

- There are 2 types:
 1. mechanical (physical)
 2. chemical



Mechanical Weathering

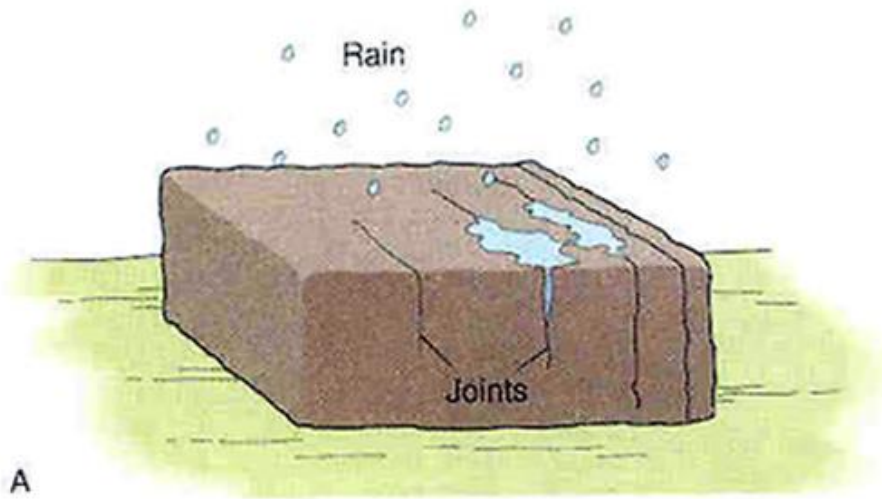
- ❑ the type of weathering where rock is broken down into smaller pieces **without** changing the **chemical** properties of the rock (by physical means only)
- ❑ How does this happen? (**will explain each**)
 - ❑ **1**-by **temperature** change
 - ❑ **2**-**abrasion** (wind, waves, gravity)
 - ❑ **3**-growth of plants (**root** wedging)
 - ❑ **4**-actions of **animals** (including humans)

1. Temperature Changes

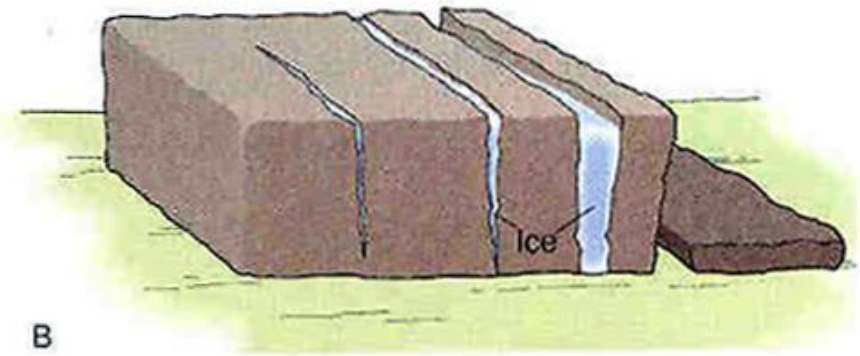
- Rocks get hot (expand), then cool down (contract)
- Freezing & thawing of water:
 - Water seeps into a crack in a rock
 - When the water freezes at night and expands
 - The force of the water expanding causes the rock to crack more
 - This is called frost action (or ice wedging)



(Ice Wedging)



Frost Wedging



- This is how "pot holes" form.



2. Abrasion



- Abrasion is the grinding and wearing away of rock by other pieces or rock.
- These particles scrape away at other rocks like sandpaper on wood as they rub or roll against the surface.



Abrasion is caused by sediment bumping into each other:

- a—**WATER**
(rivers and waves)
 - Becomes smaller and rounder with time
- b--**WIND**
- c—**GRAVITY**
(falling down hills and mountains)



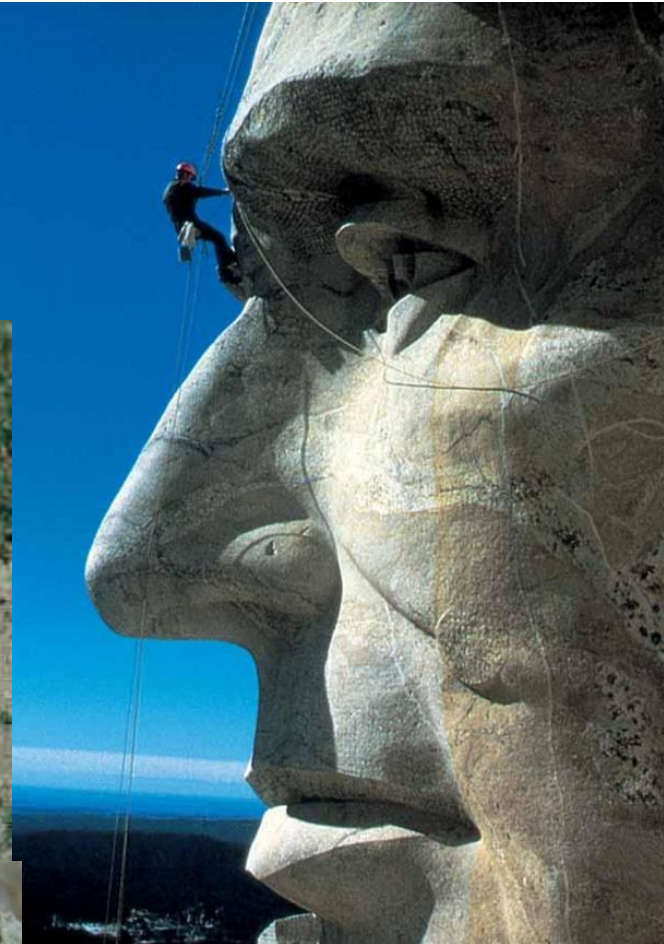
3. Plant Growth

- Roots of trees and other plants enter into cracks of rocks.
- As the plants get bigger, so do the roots.
- The growing roots force the cracks further apart.
- **“root wedging”**



4. Animals

(including humans)



Chemical Weathering

- Chemical weathering is the processes of **breaking down** rock through **chemical changes**.
- 3 things that cause chemical weathering:
 - 1--Water
 - 2--Weak acids
 - 3--Air (oxygen)—rust or oxidation





1. Water

- dissolves minerals into a solution (like salt water)
- Ex: limestone dissolves in acidic groundwater (this is how we get caves)

2. Weak Acids

- a. acid **precipitation**—
sulfuric and nitric acids
from
 - volcanoes
 - burning fossil fuels
- b. acid in **groundwater**
 - carbonic acid eats away at rocks and can form caves
- c. acids in **living things**
 - tips of some roots
 - lichen



3. Air

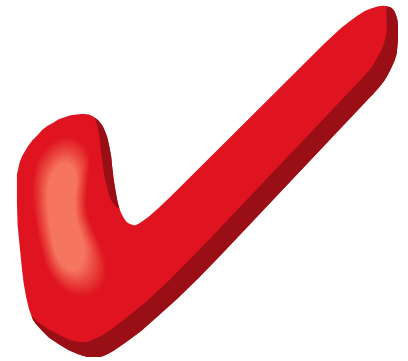
- iron reacts with oxygen (in air and in water) to make **rust**
- called **oxidation**



Rust leaching



CHECK- UP



What type of weathering do each example cause?

1. The roots of a plant **C**
2. An animal scratching **B**
3. Oxygen **A**
4. Water freezing **B**
5. Acid rain **A**
6. Wind **B**
7. Water **C**

- A. Chemical Weathering
- B. Mechanical Weathering
- C. Both types of weathering

What type of weathering?

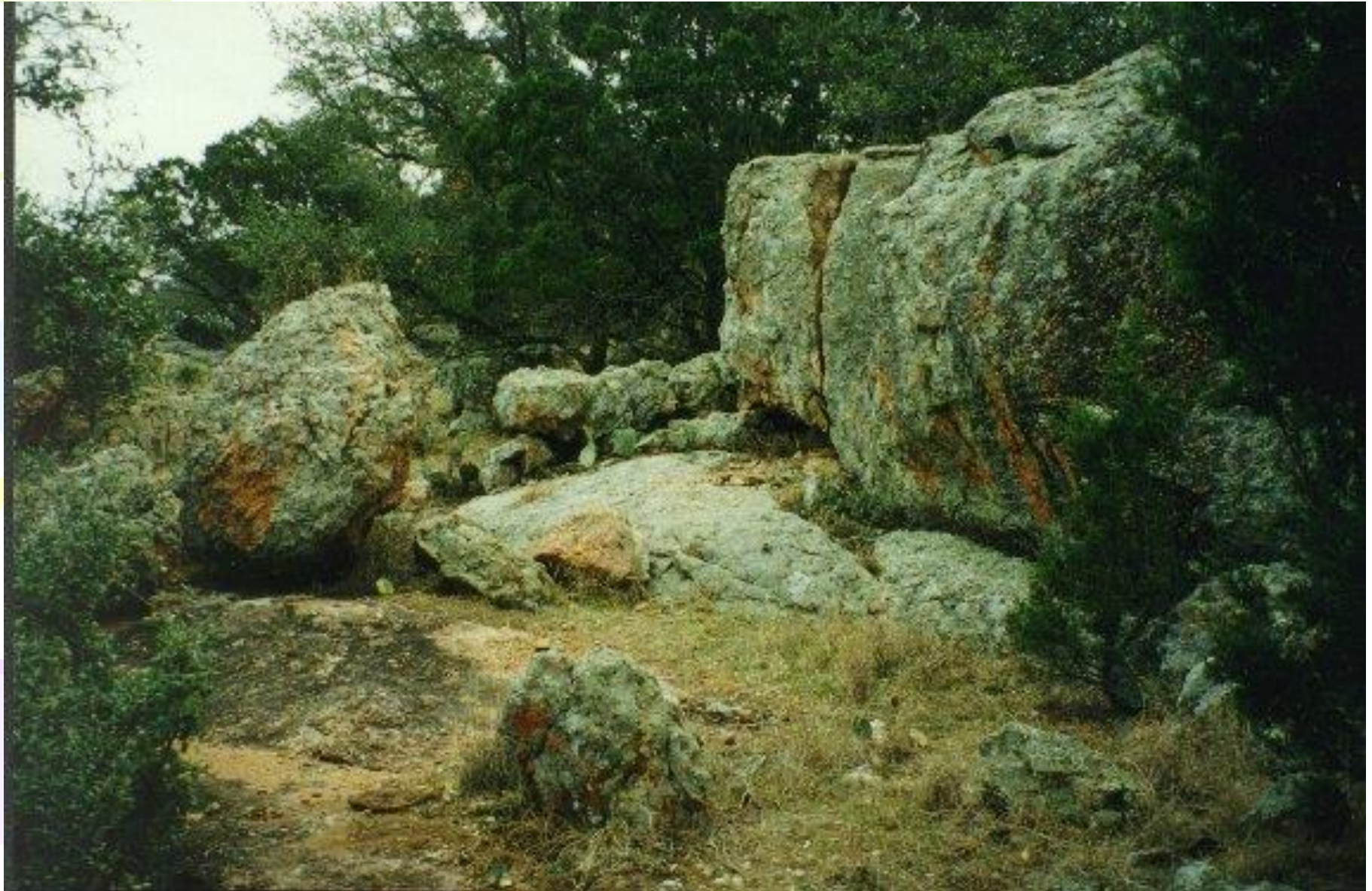
Probably some chemical (dissolving minerals and maybe oxidation)

Mechanical
(water abrasion)



What type of weathering?

Chemical (rust
and lichen)



What type of weathering? Mechanical — freezing and thawing

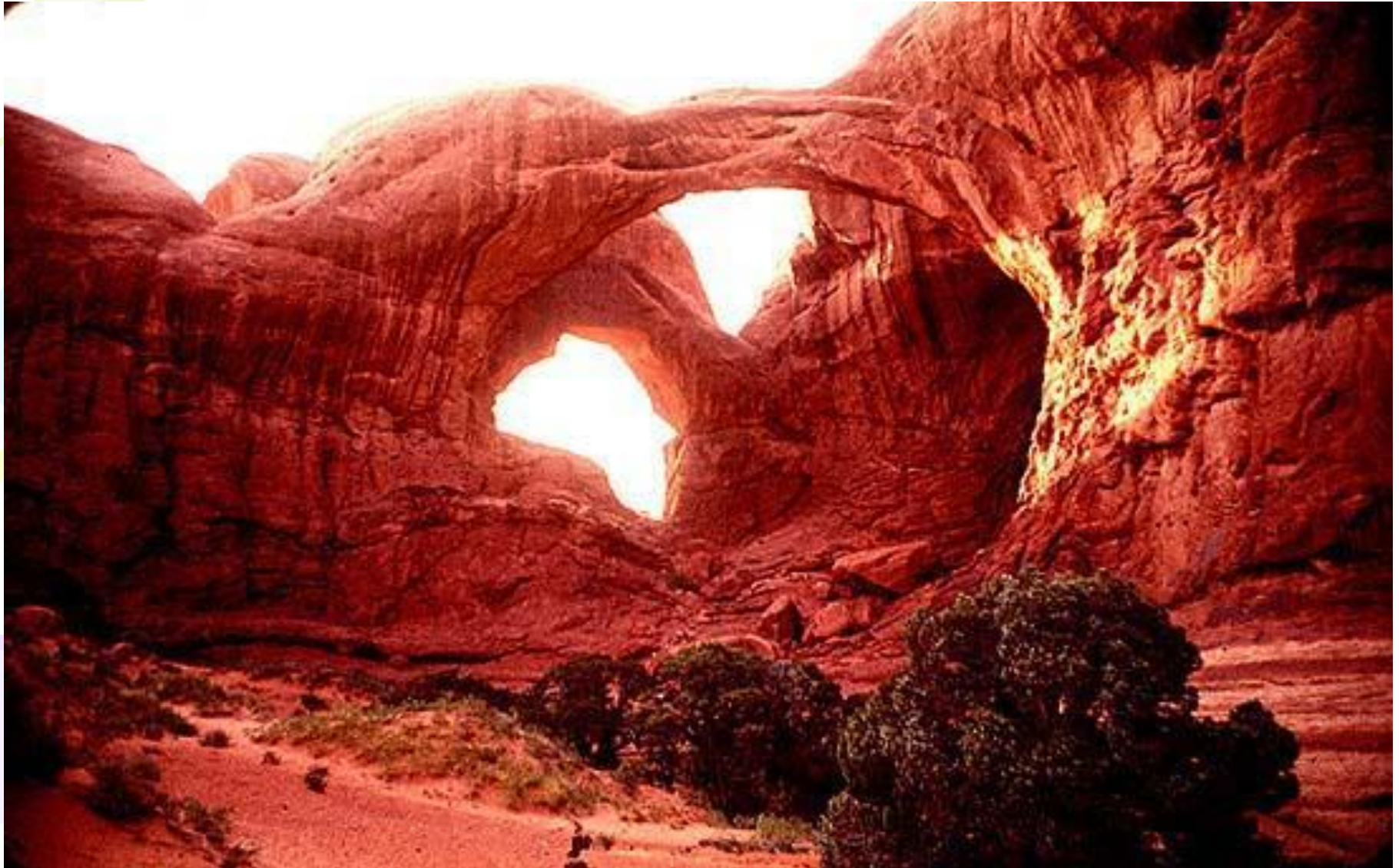


Pamela Goren 1996

What type of weathering?

(maybe oxidation/rusting)

Mechanical– wind
(abrasion)



It's time to do PT #3 and #4



What makes rocks weather FASTER?

- 1--**softer** rock (limestone, for example, weathers faster than granite)
- 2--rocks with more **surface** area (think of our sugar cube lab)
- 3--warm, **humid** climates
- 4--areas with a lot of **moving water**, **steep** slopes, or windy
- 5--areas where the **temperature** difference between night and day is large

Mountains tend to have a lot of weathering because:

- steep slopes
- more wind
- more rain (on windward side)
- icy



Any questions????

