

**WEATHERING, SOIL & SEDIMENT**  
Interlude B, p. 168

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**BIG IDEA**

- The Earth is a complex system of interacting rock, water, air, and life!



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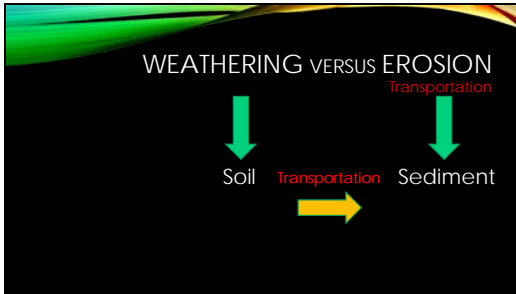
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**WEATHERING**

- Mechanical
- Chemical
- Biological

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**MECHANICAL / PHYSICAL**

- Jointing
- Frost wedging
- Root wedging (+biology)
- Salt wedging
- Thermal expansion
- Attack of the animals (+biology)

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**SECONDARY CRYSTAL GROWTH**

- Salt growth

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### CHEMICAL WEATHERING

- Dissolution
- Hydrolysis
- Oxidation
- Hydration

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**Weathering**

Chemical weathering weakens rock and it breaks apart. The increase in surface area allows chemical weathering to happen faster.

**Erosion**

A current washes clay away; tumbling quartz grains become rounded.

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Fastest Weathering		Least Stable
↑	Halite	↓
	Calcite	
	Olivine	
	Ca-plagioclase	
	Pyroxene	
	Amphibole	
	Na-plagioclase	
	Biotite	
	Orthoclase (potassium feldspar)	
	Muscovite	
	Clay (various types)	
	Quartz	
Gibbsite (aluminum hydroxide)		
Hematite (iron oxide)		
Slowest Weathering	Most Stable	

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### Dissolution

- $\text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{H}_2\text{CO}_3$
- As rain falls it dissolves Carbon dioxide **AND** as it moves through organic debris it forms...
- Carbonic acid ( $\text{H}_2\text{CO}_3$ )




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### HYDROLYSIS

- The most important chemical weathering reaction (soil)
- $2\text{KAlSi}_3\text{O}_8 + 2\text{H}_2\text{CO}_3 + 9\text{H}_2\text{O} \leftrightarrow \text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4 + 4\text{H}_4\text{SiO}_4 + 2\text{K} + 2\text{HCO}_3$
- Orthoclase + carbonic acid + water  $\leftrightarrow$  Kaolinite + silicic acid + potassium + bicarbonate

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### ORTHOCLASE TO KAOLINITE (CLAY)




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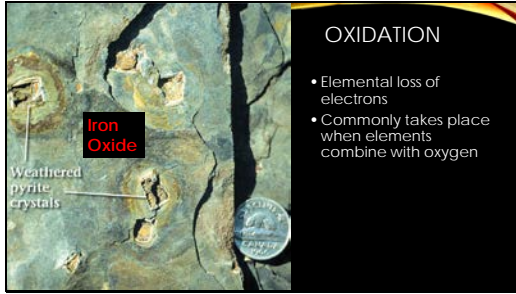
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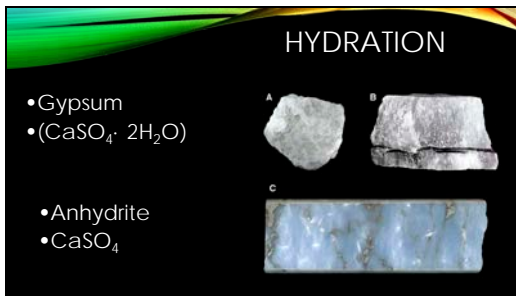
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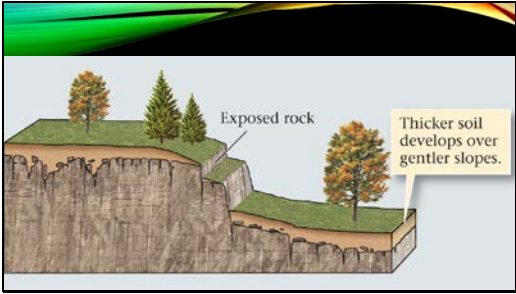


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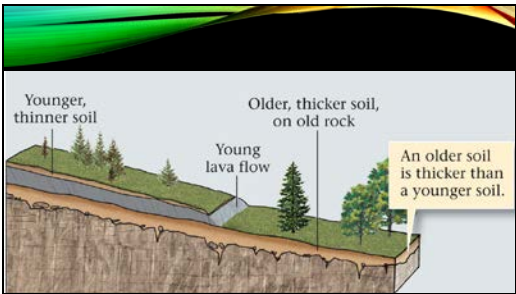
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SOIL CLASSIFICATION (NAMING)

- Pedologists
- Why classify/name soil?

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## SOIL TAXONOMY

- Order 12
- Suborder 63
- Great Group 319
- Sub Group 2,484
- Family 8,000
- Series 19,000+

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**THE  
TWELVE ORDERS  
OF  
SOIL TAXONOMY**

[National Resources Conservation Service \(NRCS\)](#)

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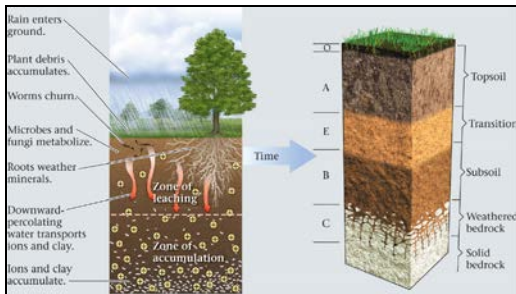
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IOWA'S OFFICIAL STATE SOIL

- The Tama series

Fine-silty, mixed, superactive, mesic Typic Argiudolls



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ORDER: MOLLISOL

- Temperate Grasslands
- Thick A-horizon



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THE SUSTAINABILITY OF SOIL

- Intensive agriculture
- Erosion
- Salinization
- Urbanization

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