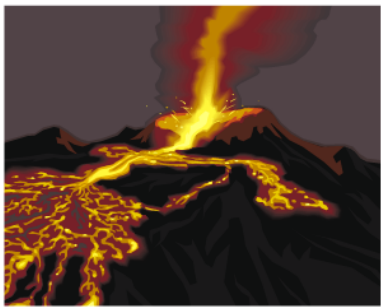


3 Principal Types of Rocks

Igneous – Rocks formed from molten, liquid magma or lava.

Sedimentary – Rocks formed after being deposited by running water. These sediments often occur in horizontal beds and are cemented together as other sediments pile on top.

Metamorphic – Either Igneous or sedimentary rocks subjected to enough heat and pressure to alter their form, but not enough to melt.



The Rock Cycle

Cooling and
Solidification

Magma

Heating and
Melting

Heating and
Melting

Metamorphic Rock

Heating, Pressure
and Chemical Action

Igneous
Rock

Heating,
Pressure and
Chemical Action

Weathering
And Erosion

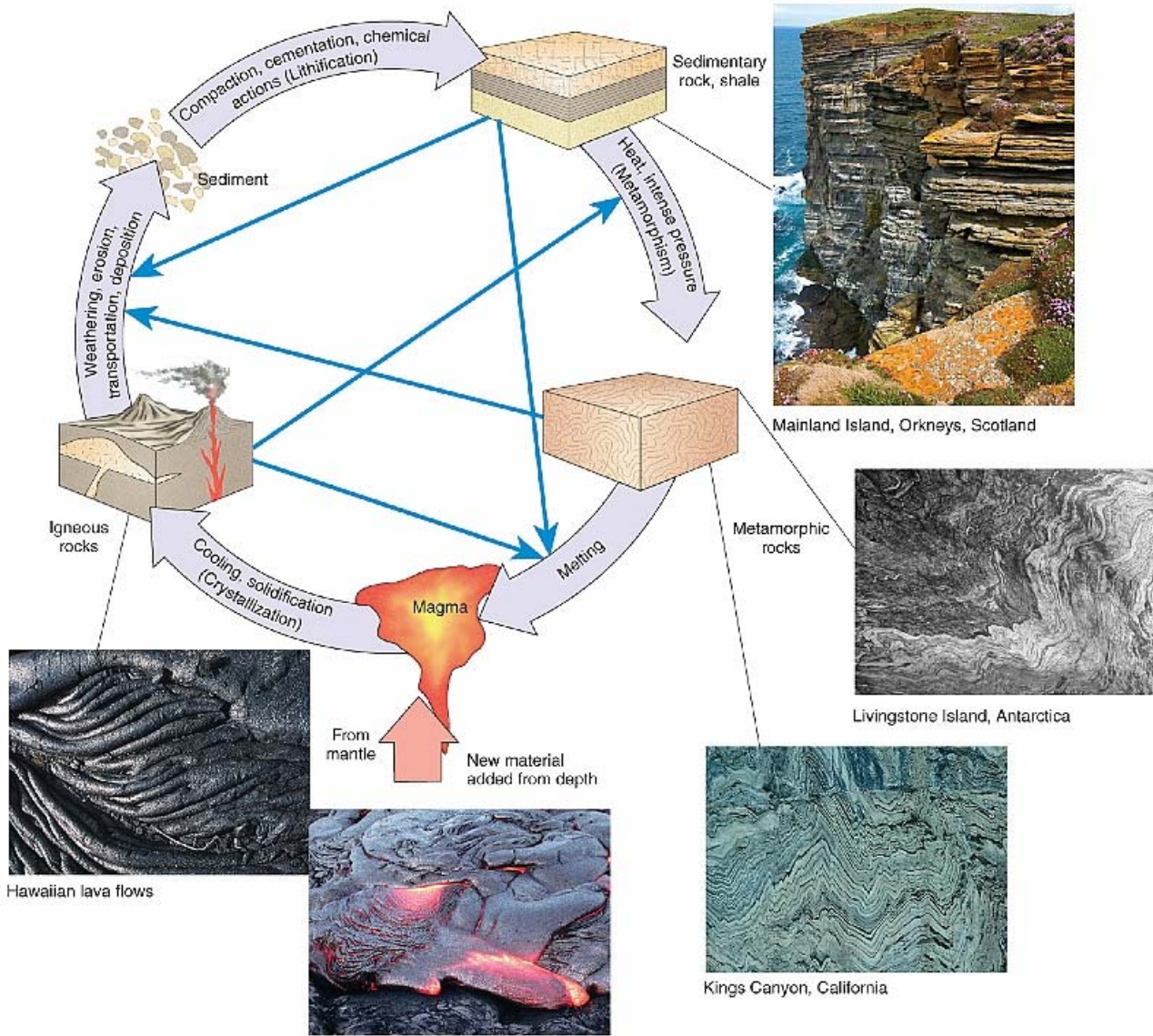
Sedimentary
Rock

Solid Load (Alluvium) and
Dissolved Stream Load

Consolidation,
Compaction
and
Cementation

Deposition

The Rock Cycle



Active flows, 2002

Sedimentary Cycle is Subcycle Within Rock Cycle

Weathering -- Parent rock breaks apart into smaller rocks.

Erosion -- Rocks become individual grains.

Transportation – Material is transported by wind, water or gravity.

Deposition – Material comes to rest in new location and often additional material piles on top.

Necessary Attributes of a Mineral

- Must be found in Nature.
- Must have same chemical composition everywhere.
- Must be totally inorganic.
- Must have atoms arranged in a regular pattern and form crystals.

Rock Forming Minerals

1. Silicates: Ferromagnesian have iron and magnesium.
non-ferromagnesian do not have iron.

Quartz Sand – SiO_2 .
Granite Quartz and Feldspars.

2. Oxides: Very few elements combine with Oxygen.
Iron is best known. FeO_2 , FeO_3 .

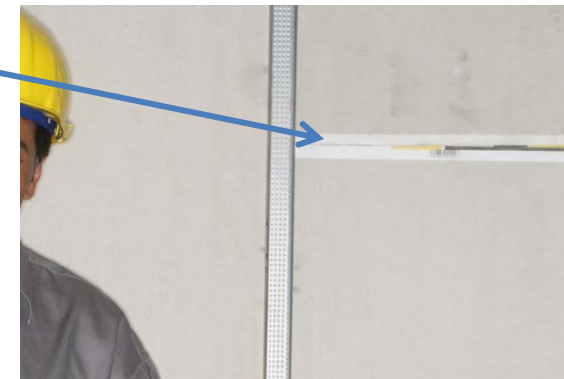
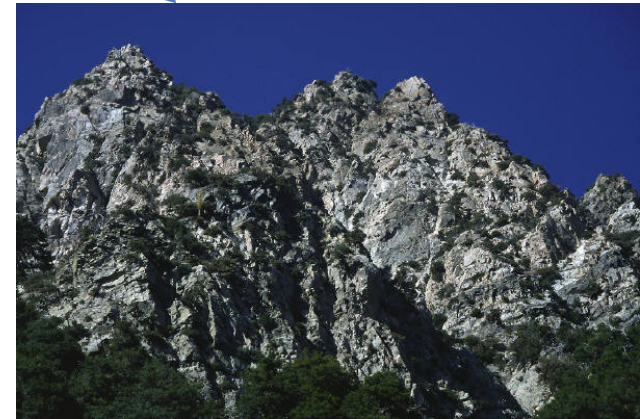
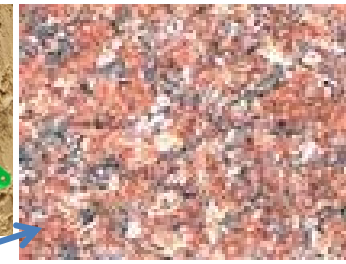
3. Carbonates: Carbon and Oxygen, Calcite – CaCO_3 .
Dolomite – $\text{CaMg}(\text{CO}_3)_2$.

4. Sulfides: Sulfur and something else.
Galena – PbS .
Pyrite – FeS_2 .

5. Sulfates: Sulfur, Oxygen and something else.
Gypsum – $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

6. Halides: Salts – Halite – NaCl .

7. Native Elements: Copper – Cu
Silver – Ag
Gold – Au
Diamond – C



Sulfides

Sulfur (S)



Pyrite (FeS_2)



Galena (PbS)



Carbonate Rocks Weather Easily



Native Elements Are Valuable Metals and Diamond



Weathering

Physical

Frost Action

Temperature Changes

Wind-blown Sand

Mass Wasting (Mass Movement)

Chemical

Salt Action - crystals grow causing grain by grain disintegration

Oxidation - dissolved oxygen in water attacks metals (Fe)

Hydrolysis - soaking until a chemical change occurs

Carbonic Acid - rain water is acidic, so dissolves carbonates

Biological - lichens

Marble, a Metamorphic Rock, Shatters Due to Freeze and Thaw Cycle



Boulder Broke Apart Due to Freezing of Water. Roots of Tree Wedging Rock Apart



(b)

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(a)

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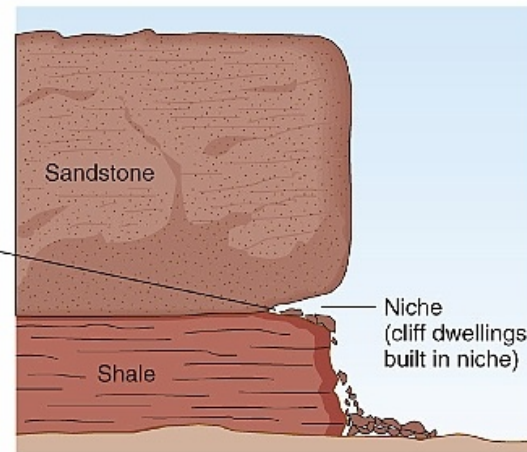
This Arch Formed by Both Water Erosion and Wind Erosion, Sandblasting



Cliff Dwellings Built in Niche Where Rock Strata Meet But Have Different Rates of Erosion



(a)



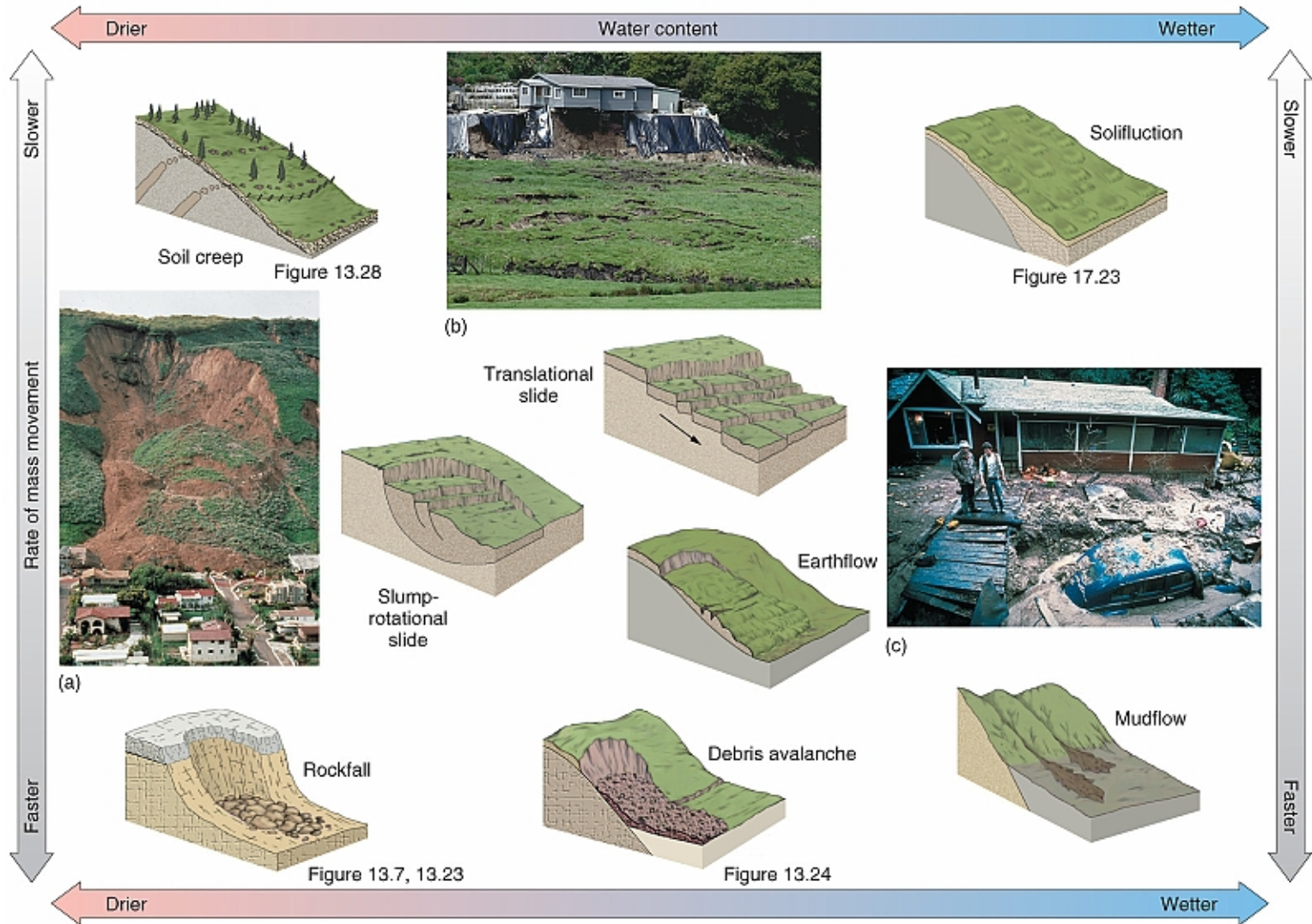
(b)

Red Soils Indicate Presence of Iron Oxide, Rust.



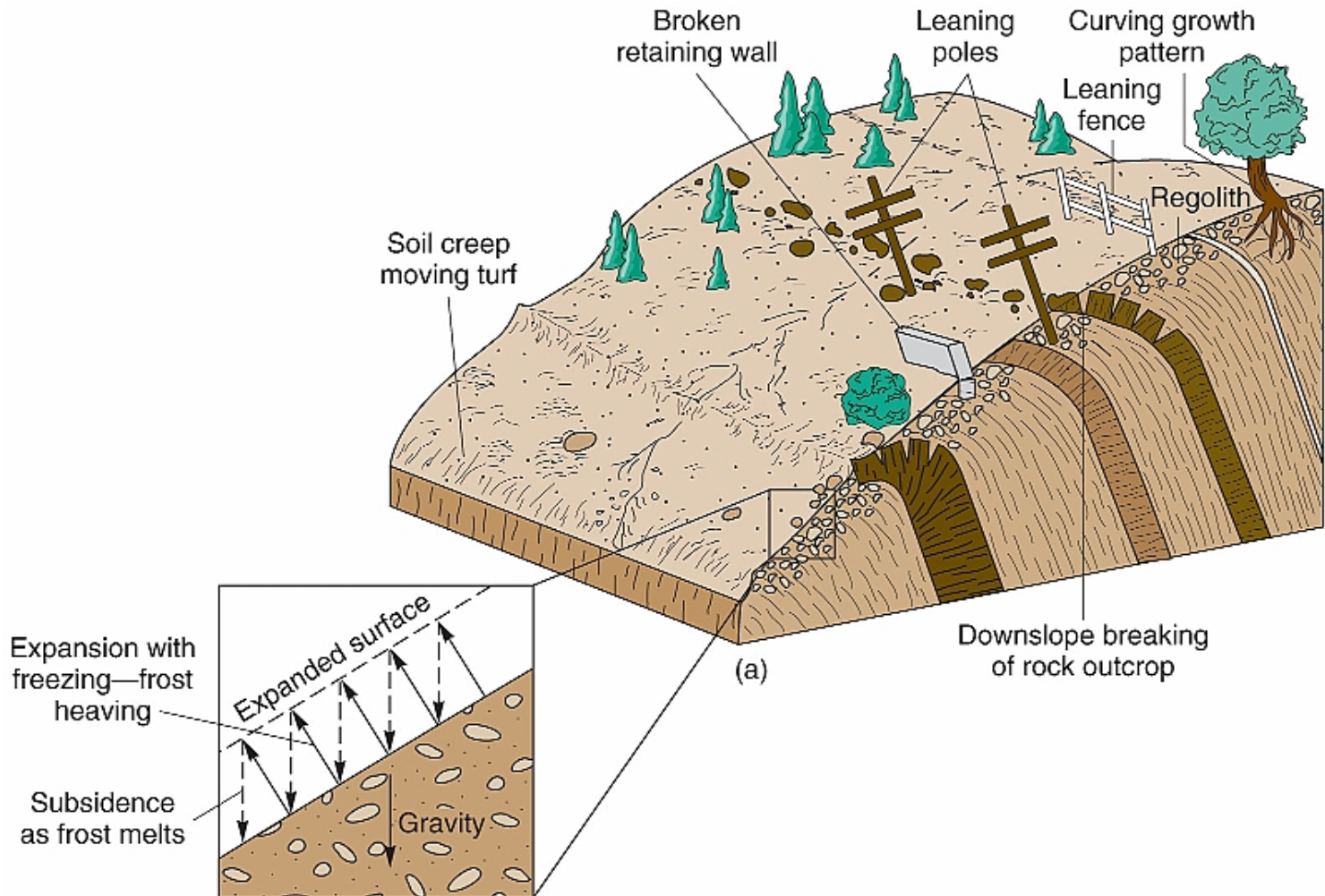
(b)

Mass Wasting or Mass Movement Is Any Down Slope Movement Due to Gravity



Soil Creep Is a Form of Mass Movement Down Slope.

Since the Top Moves Faster than the Bottom, Objects Lean

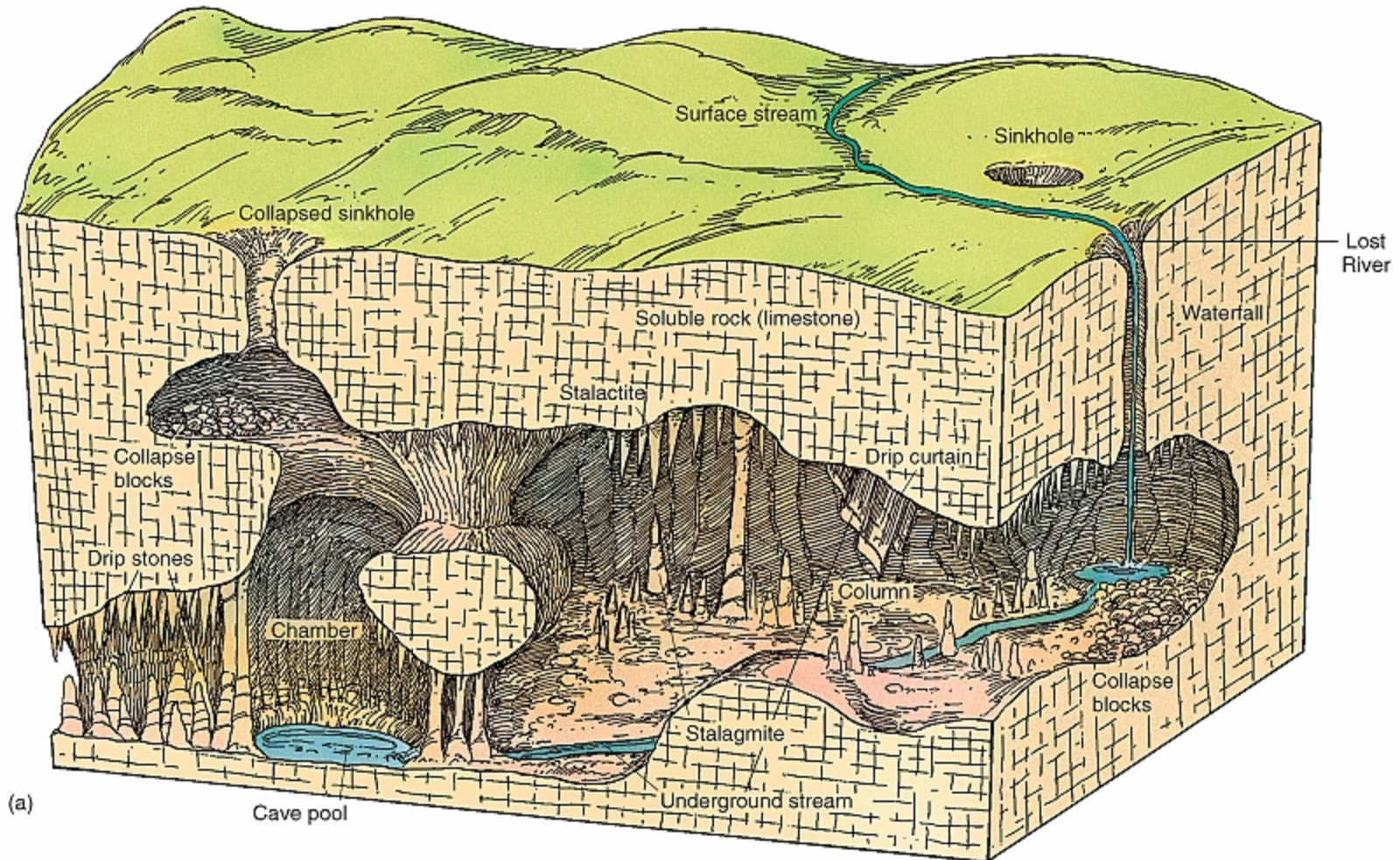


Hill Slope Gave Way



(a)

Karst Topography is a Collection of Both Surface and Subsurface Features in Limestone Rock.



Stalagmites Form in Solution Caverns (Caves) Where Calcium Carbonate is Redeposited



(b)

Sinkhole in Florida Where Roof Caved In.



(a)

