

1

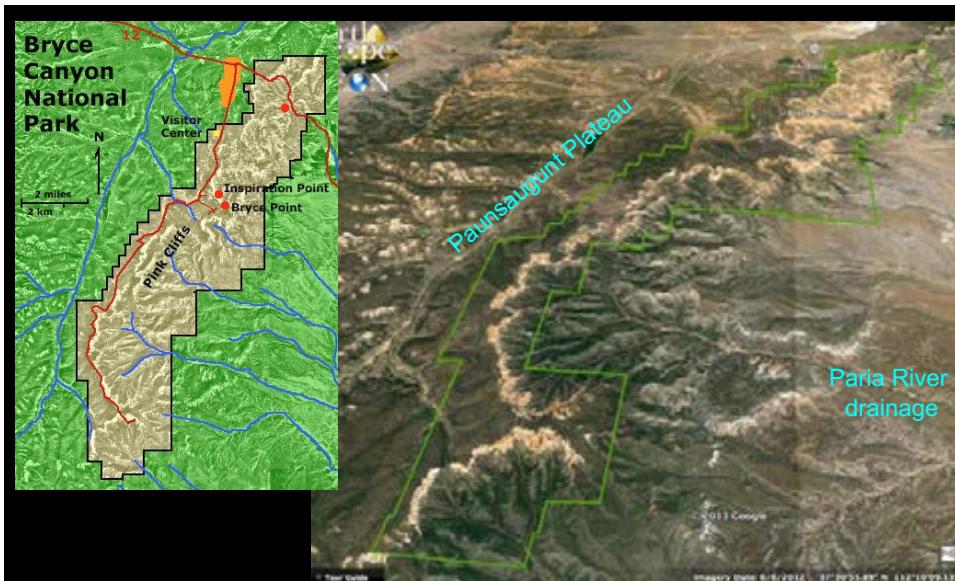


2



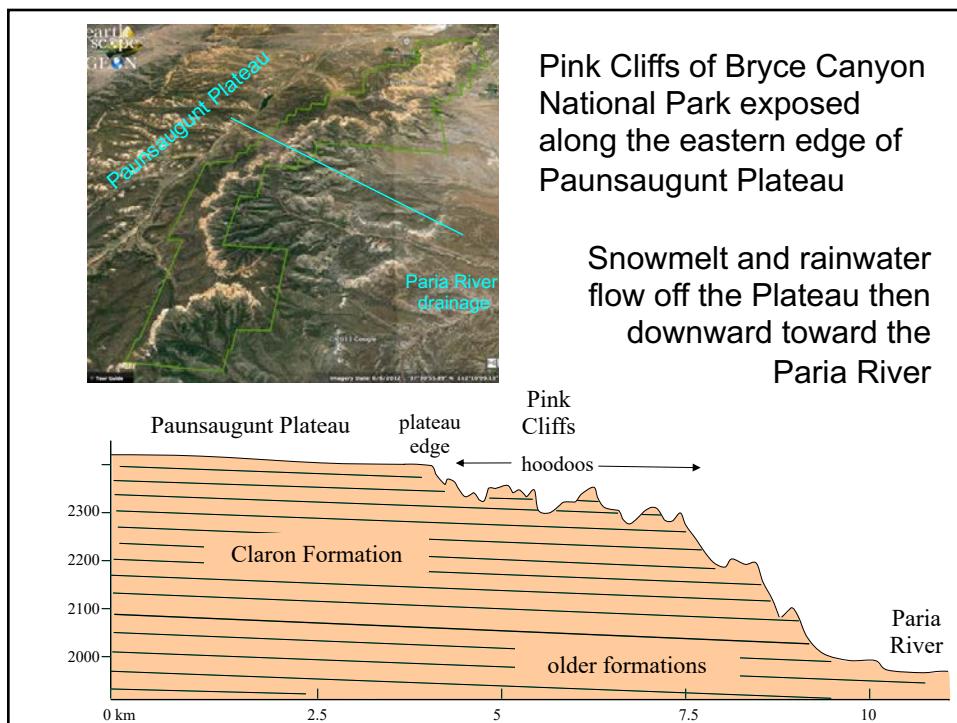
**hoodoos** - ornate pillars formed by weathering  
and erosion of bedded sedimentary rock  
– form the Pink Cliffs escarpment

3

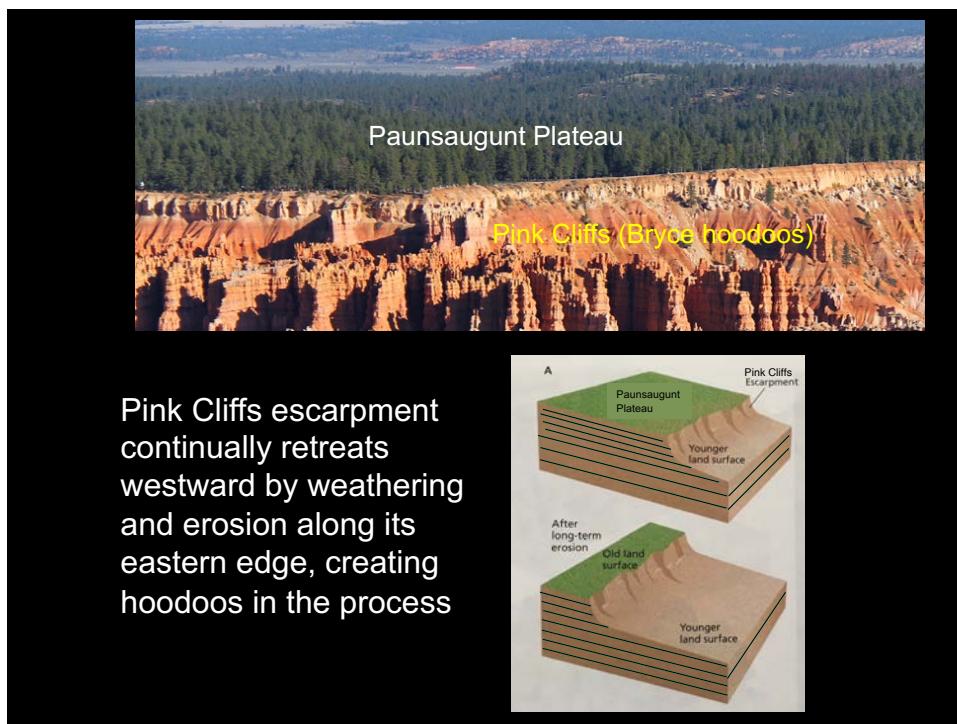


Pink Cliffs of Bryce Canyon National Park exposed  
along the eastern edge of Paunsaugunt Plateau

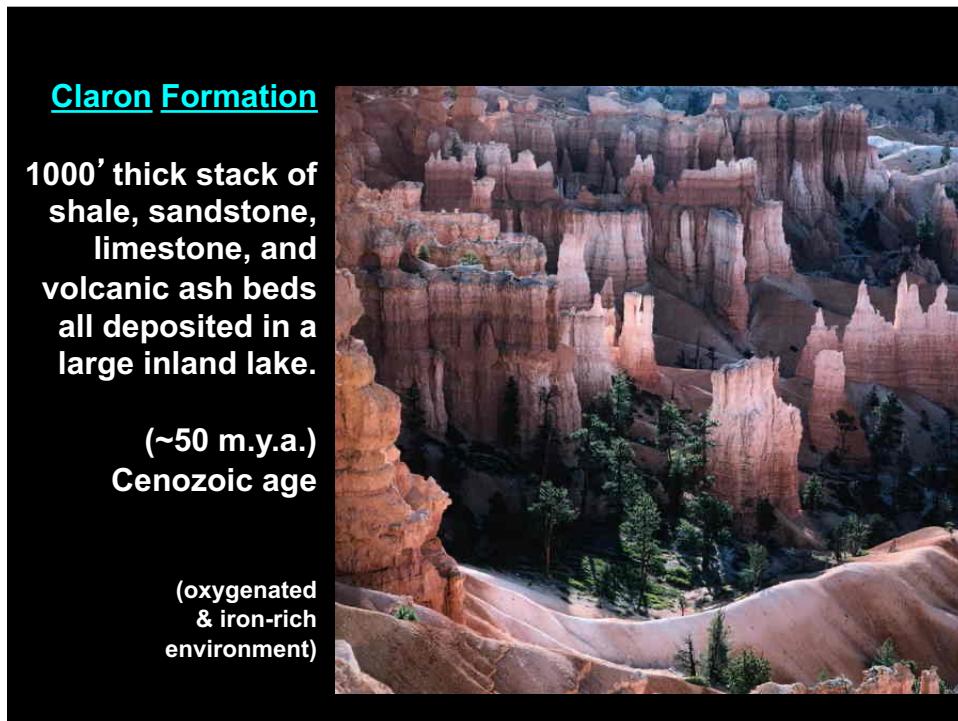
4



5



6



7



8

**Paleogeography  
during early  
Cenozoic  
(~50 m.y.a.)**

- lake  
reconstruction  
based on lateral  
extent and  
characteristics of  
Claron Fm

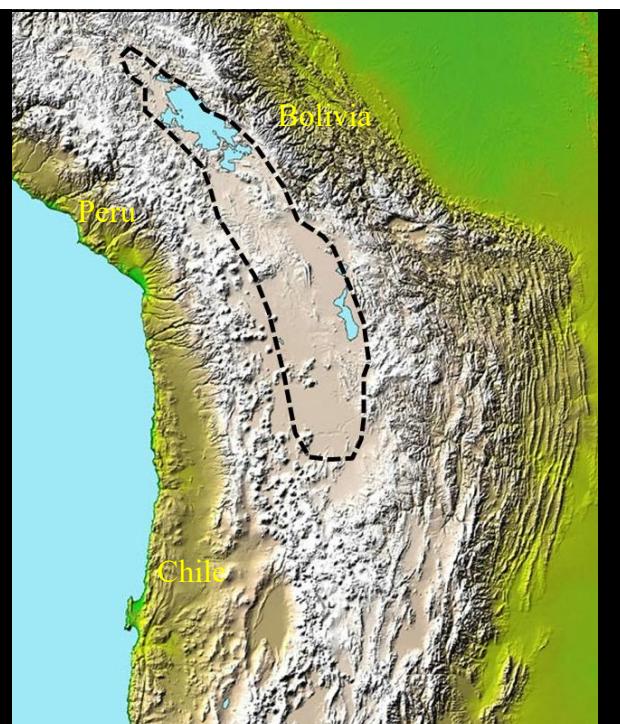
Colorado Plateau  
raised to ~3000-  
6000' in elevation  
during the late  
Mesozoic / early  
Cenozoic



9

A modern analog  
of the Colorado  
Plateau during the  
early Cenozoic is  
the Altiplano  
Plateau of the  
Andes Mtns of  
South America

The Altiplano is a  
high-elevation  
plateau with large  
lakes, surrounded  
by higher  
mountains of the  
Andes



10



Lake deposits of the early Cenozoic Claron Formation

- shale = clay particles falling to the bottom of the lake
- sandstone = sand grains along a shoreline
- limestone = lime sediment precipitated by algae
- volcanic ash = from surrounding mountains
- shoreline transgressed & regressed w/ climate change

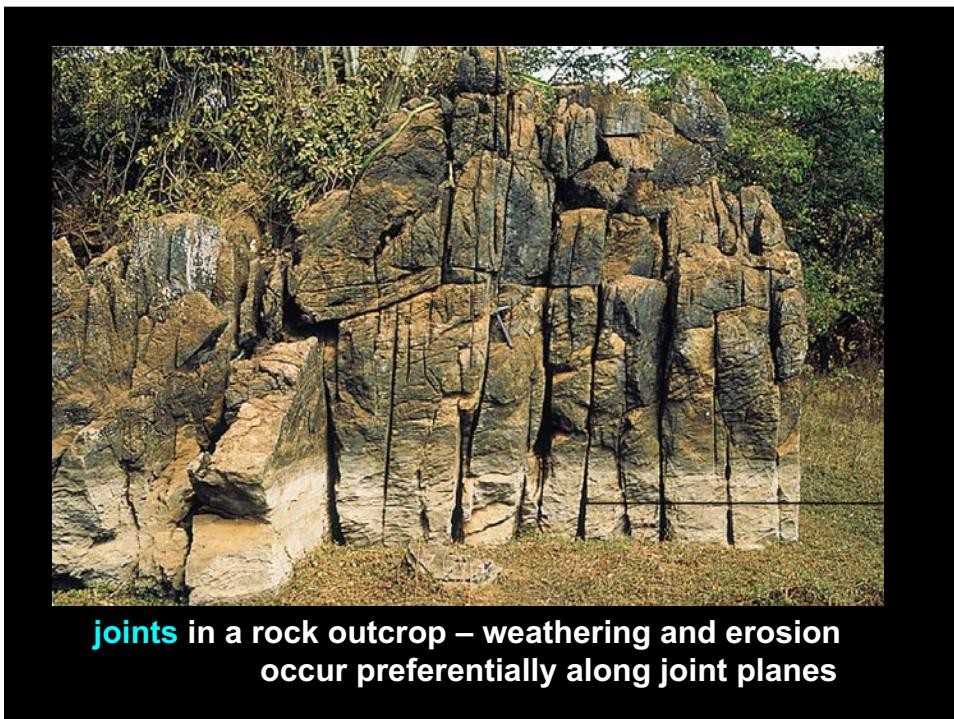
11

### *Evolution of the Bryce Canyon landscape*



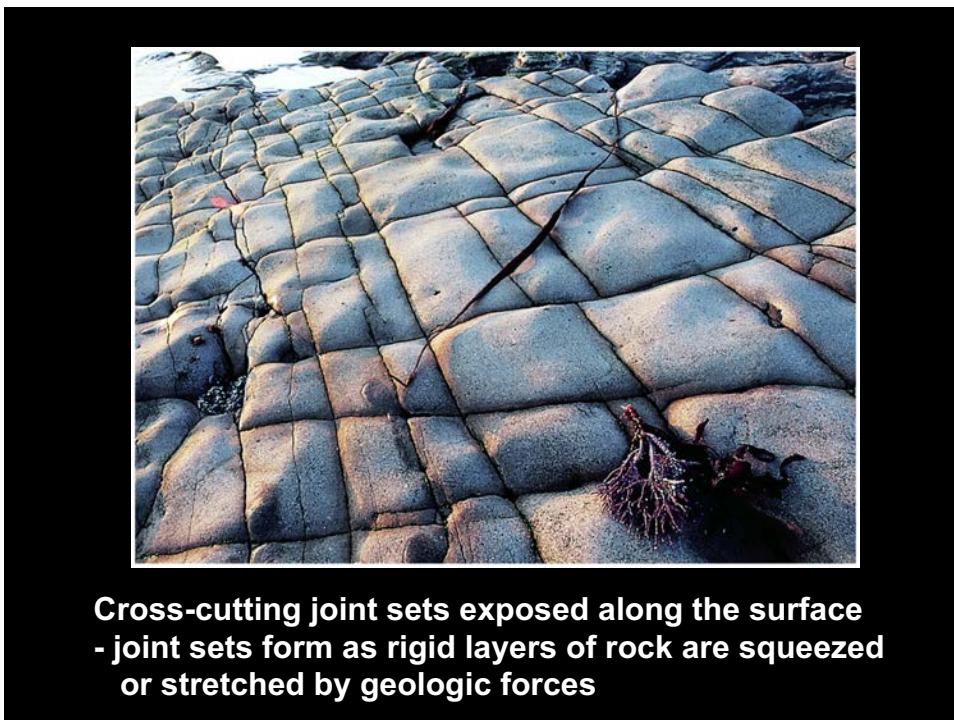
- younger rocks at Bryce are more easily eroded than the older rocks of Zion or the Grand Canyon
- **weathering** (in-place breakdown) & **erosion** (movement of particles) along the edge of a plateau  
(weathering vs erosion)

12



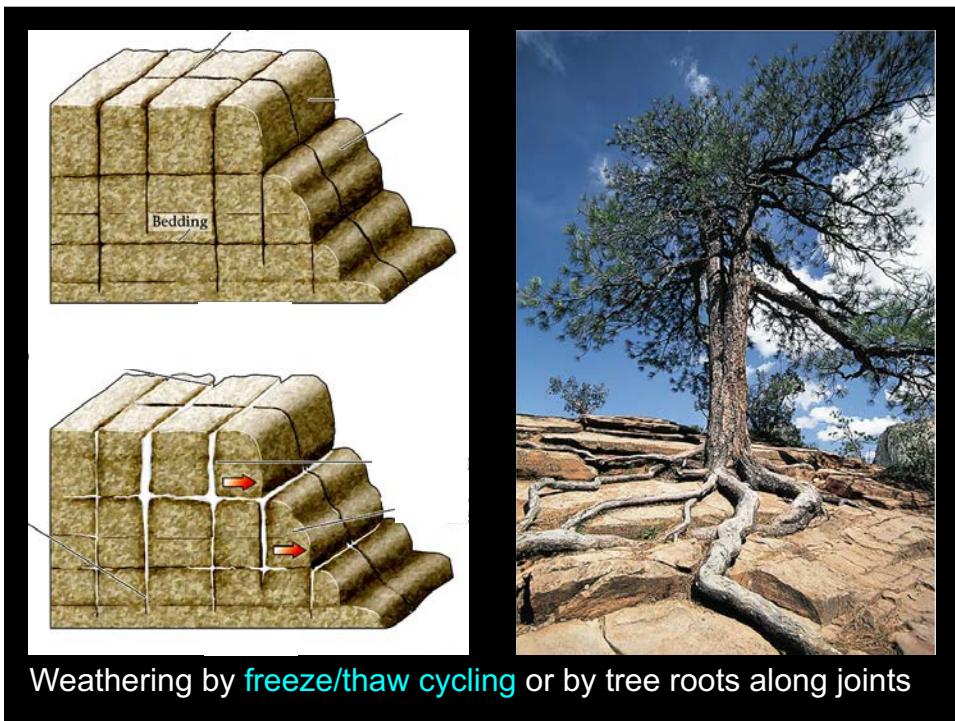
**joints** in a rock outcrop – weathering and erosion  
occur preferentially along joint planes

13

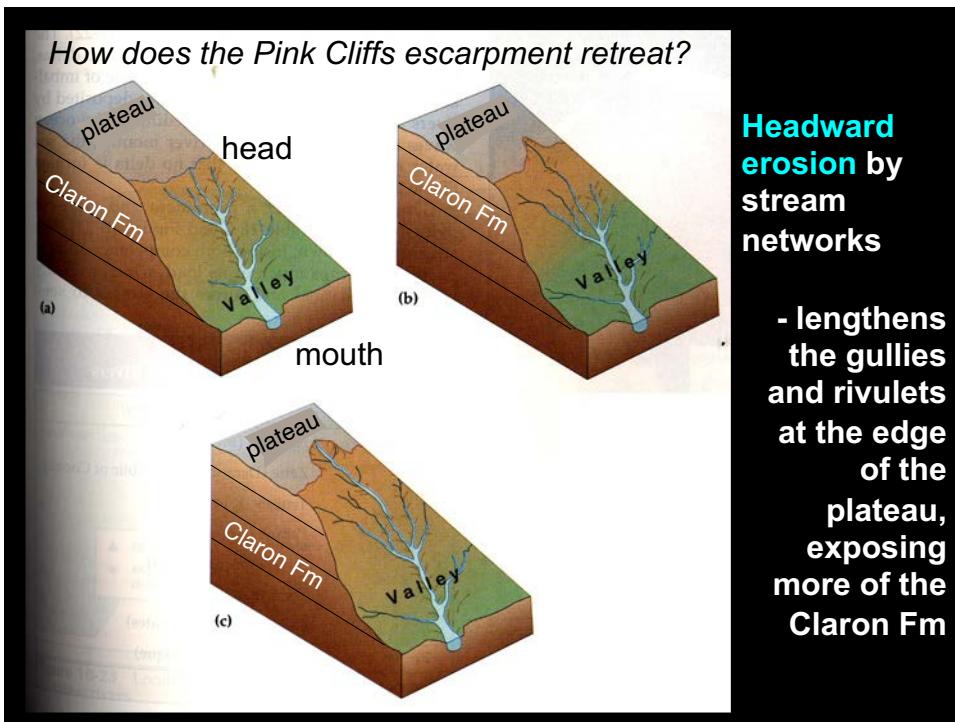


Cross-cutting joint sets exposed along the surface  
- joint sets form as rigid layers of rock are squeezed  
or stretched by geologic forces

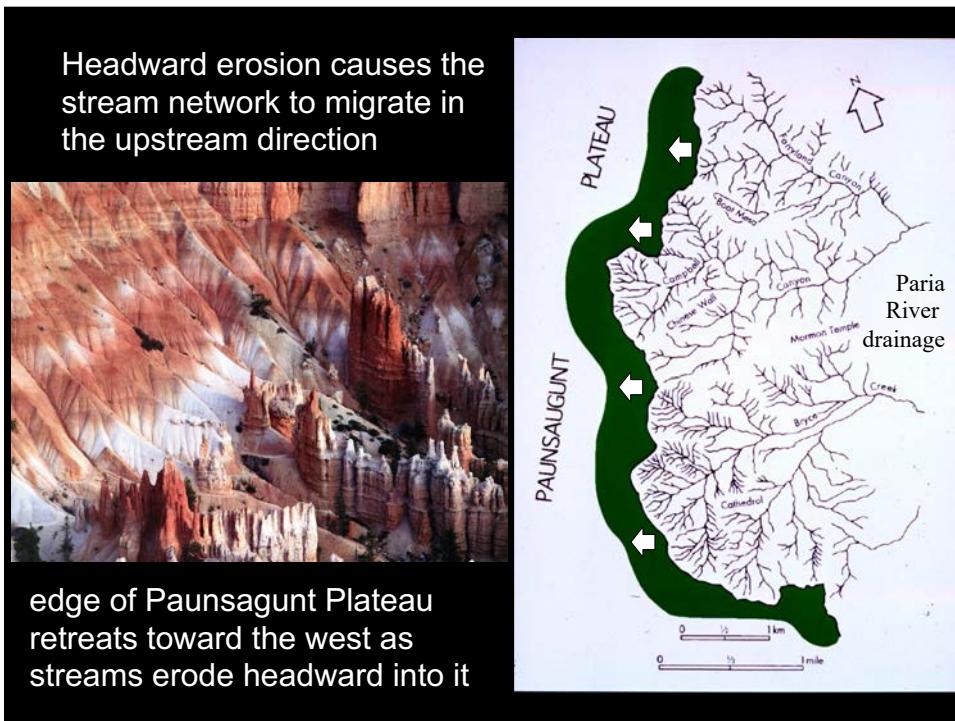
14



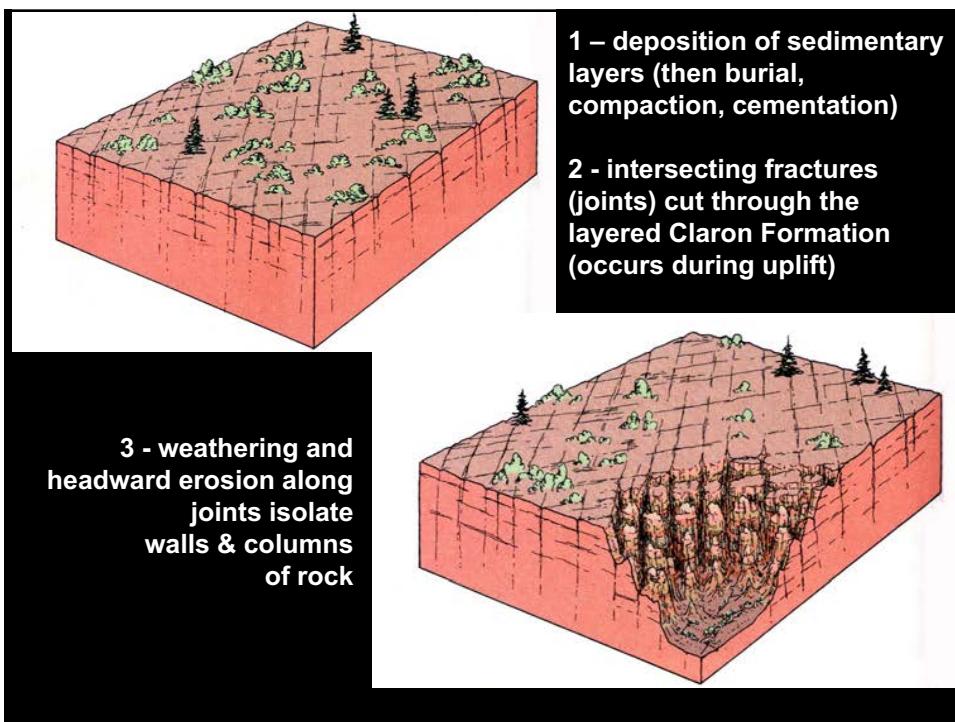
15



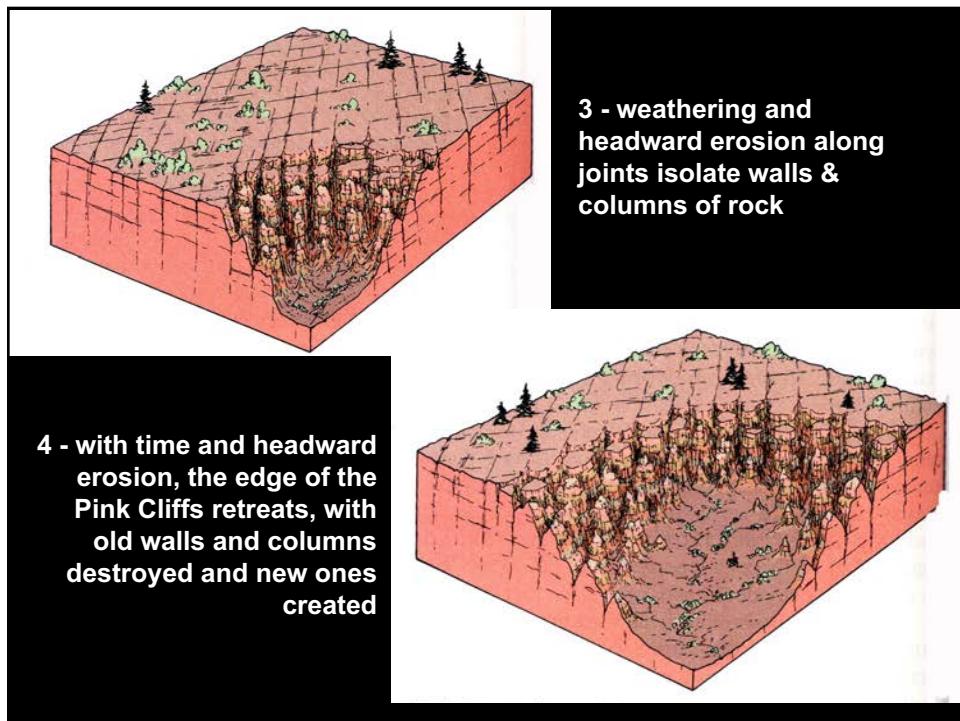
16



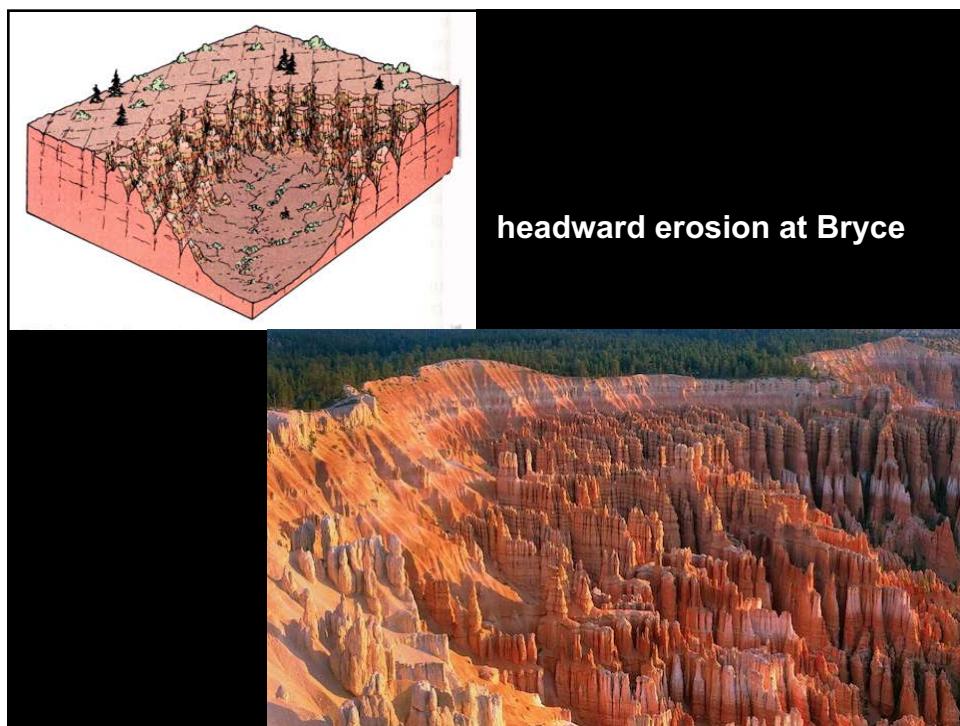
17



18



19



20

Joints control the orientation of walls of hoodoos and aligned spires of rock because weathering and erosion preferentially occur along joints



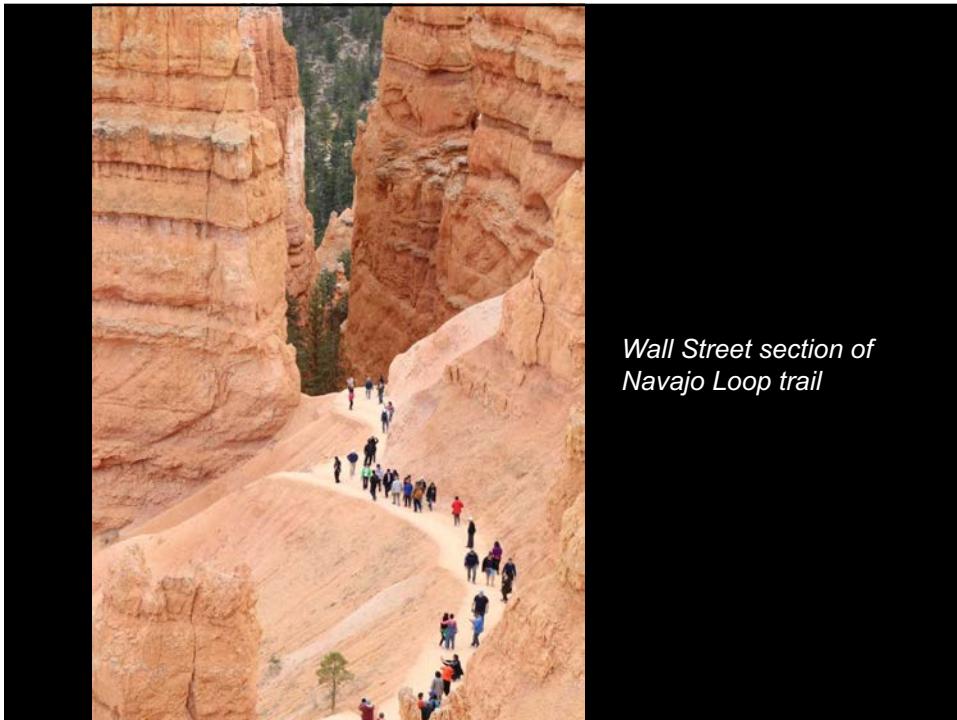
21

The image consists of two parts. On the left, a photograph of a tall, narrow hoodoo labeled "Thor's Hammer" standing prominently against a backdrop of a vast, layered rock landscape. On the right, a larger area contains a cross-section diagram of a hoodoo's formation. The diagram shows a vertical column of rock with horizontal dashed lines representing "Bedding". Blue arrows point downwards from the top of the column, labeled "Vertical Joints". A yellow label "Hoodoos" points to the top of the column. A black text box on the left side of the diagram area contains the following text:

**Differential erosion of beds of mudstone, volcanic ash, sandstone & limestone**

*Why do individual hoodoos have such variable shapes?*

22

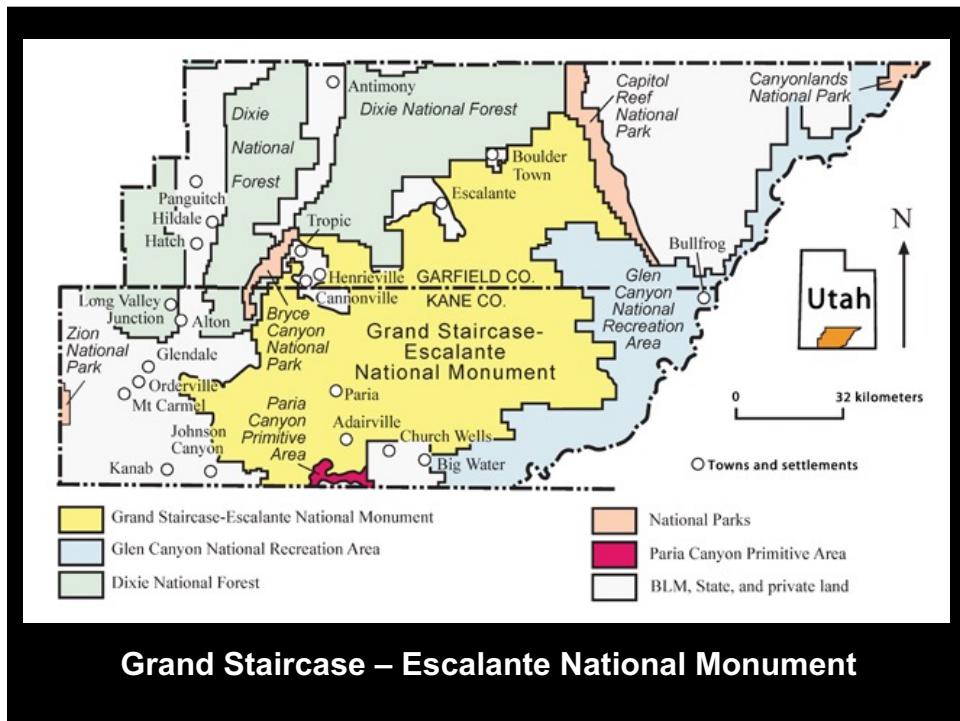


23

### *How do the rocks at Zion and Bryce Canyon relate to rocks at Grand Canyon?*

**Grand Staircase - Escalante National Monument**

24



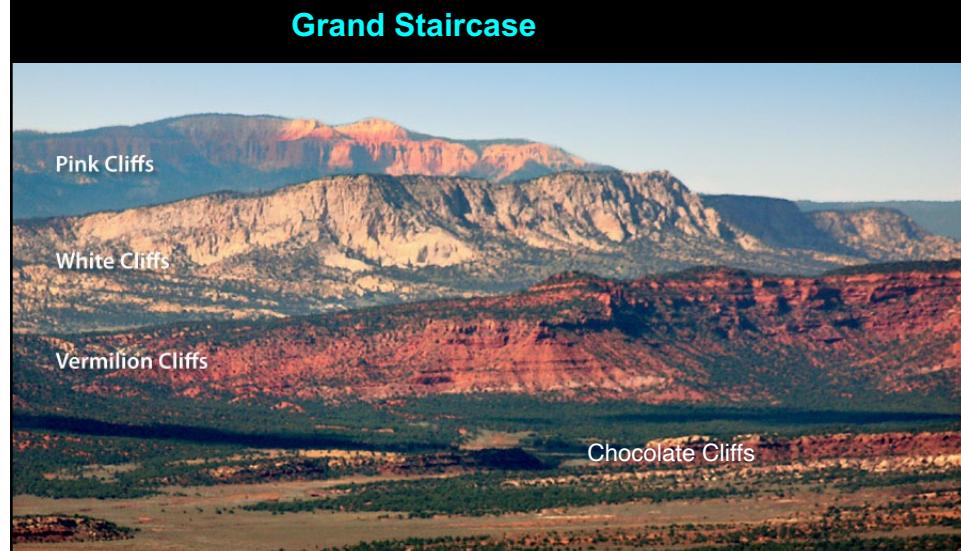
25



26

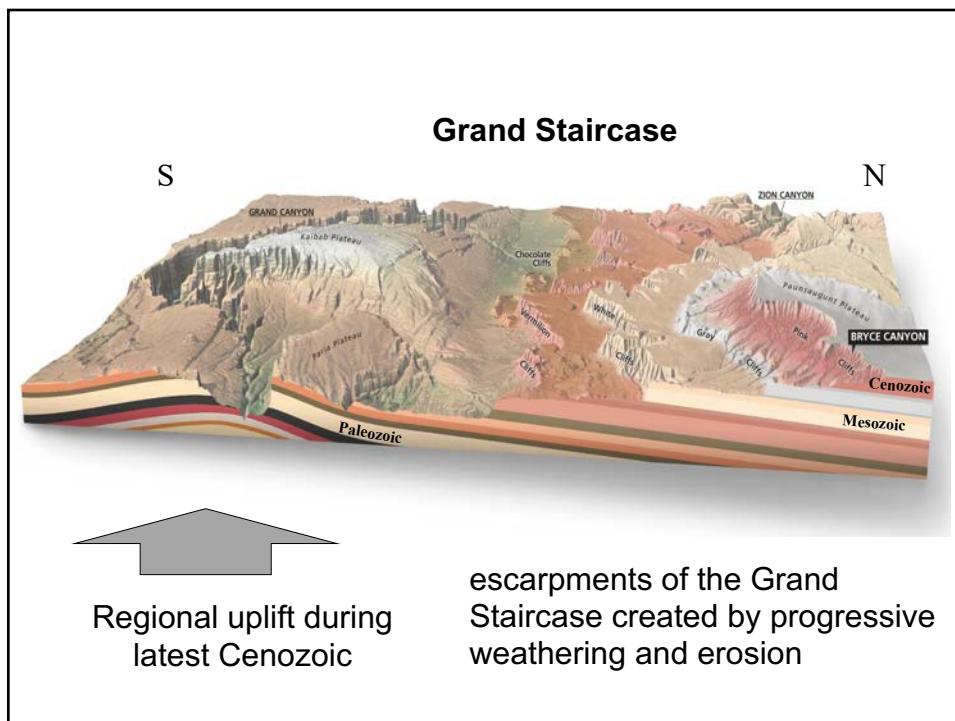
**Willis Creek slot canyon, Grand Staircase – Escalante NM**

27

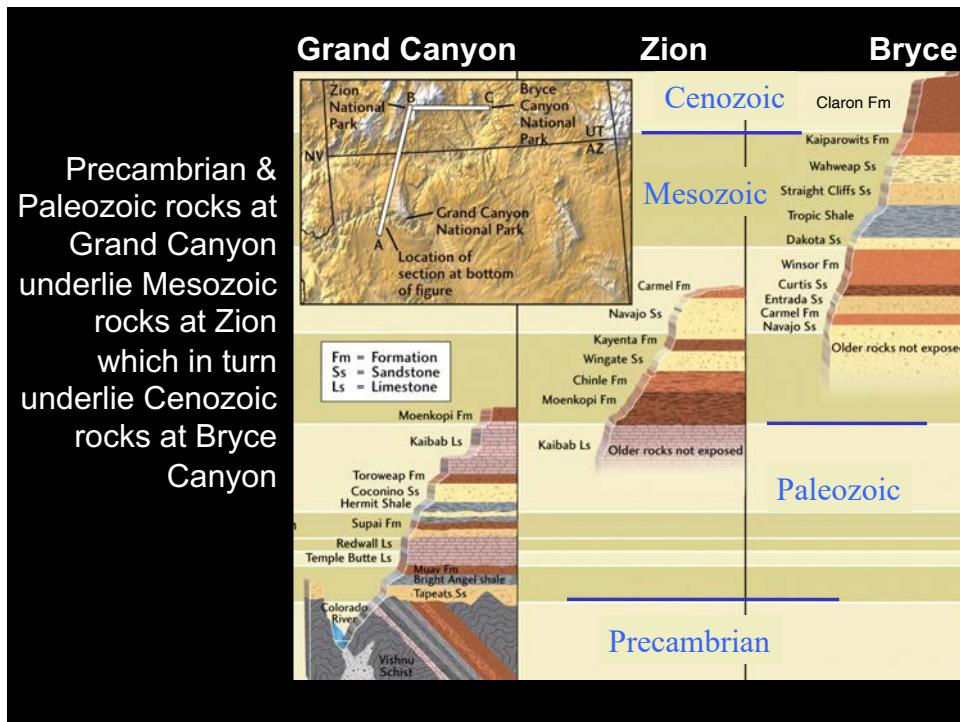
**Grand Staircase**

**Stepped erosional escarpments of Mesozoic and early Cenozoic sedimentary rock north of Grand Canyon**

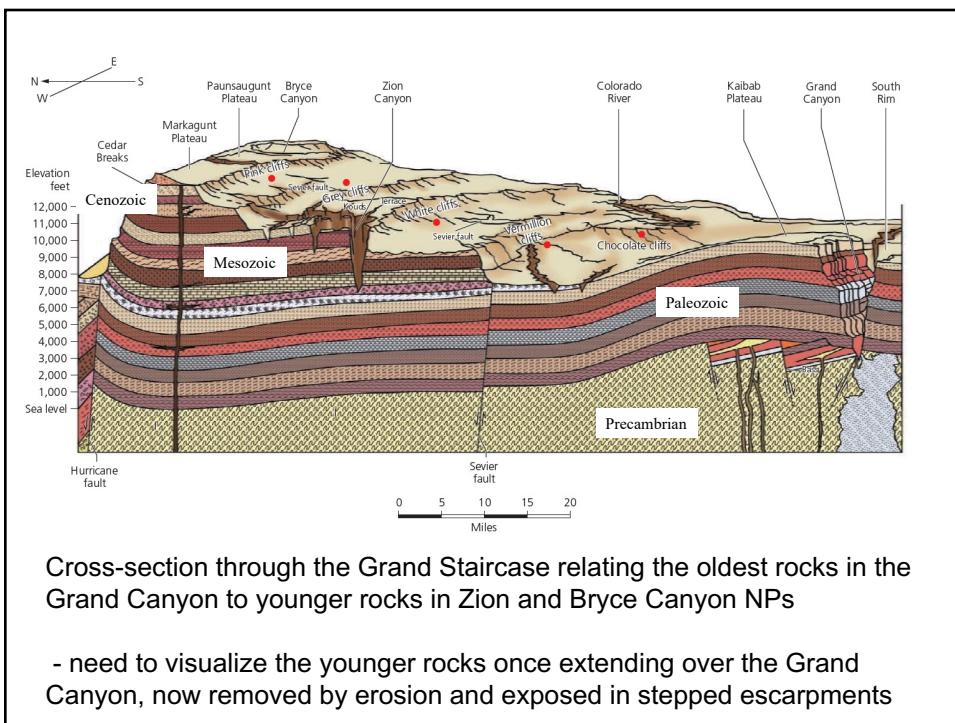
28



29



30



31