



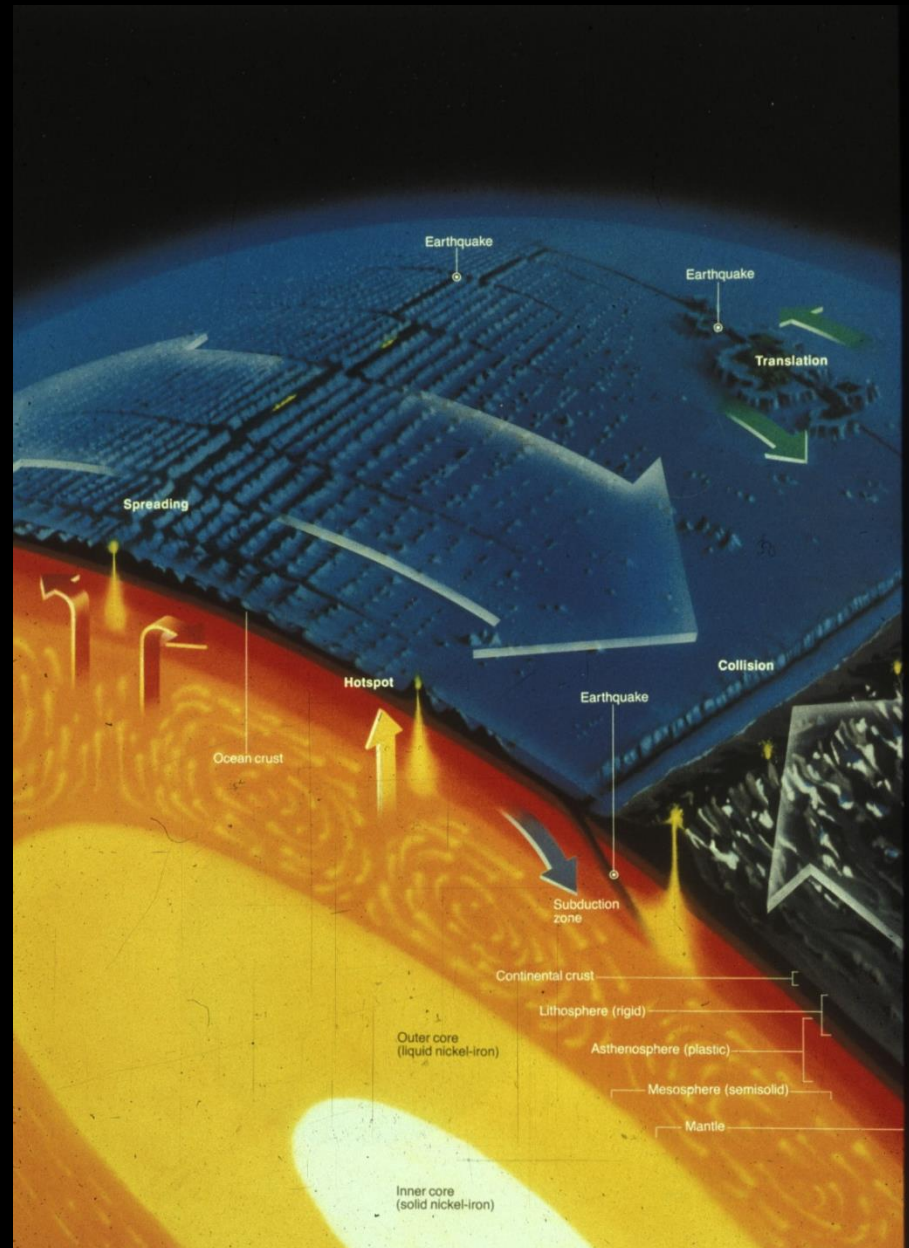
Decay of radioactive isotopes in Earth's core generates heat.

The flow of this heat is the driving force behind Plate Tectonics.

Tectonic activity has produced 3 major rock types that comprise Earth's crust:

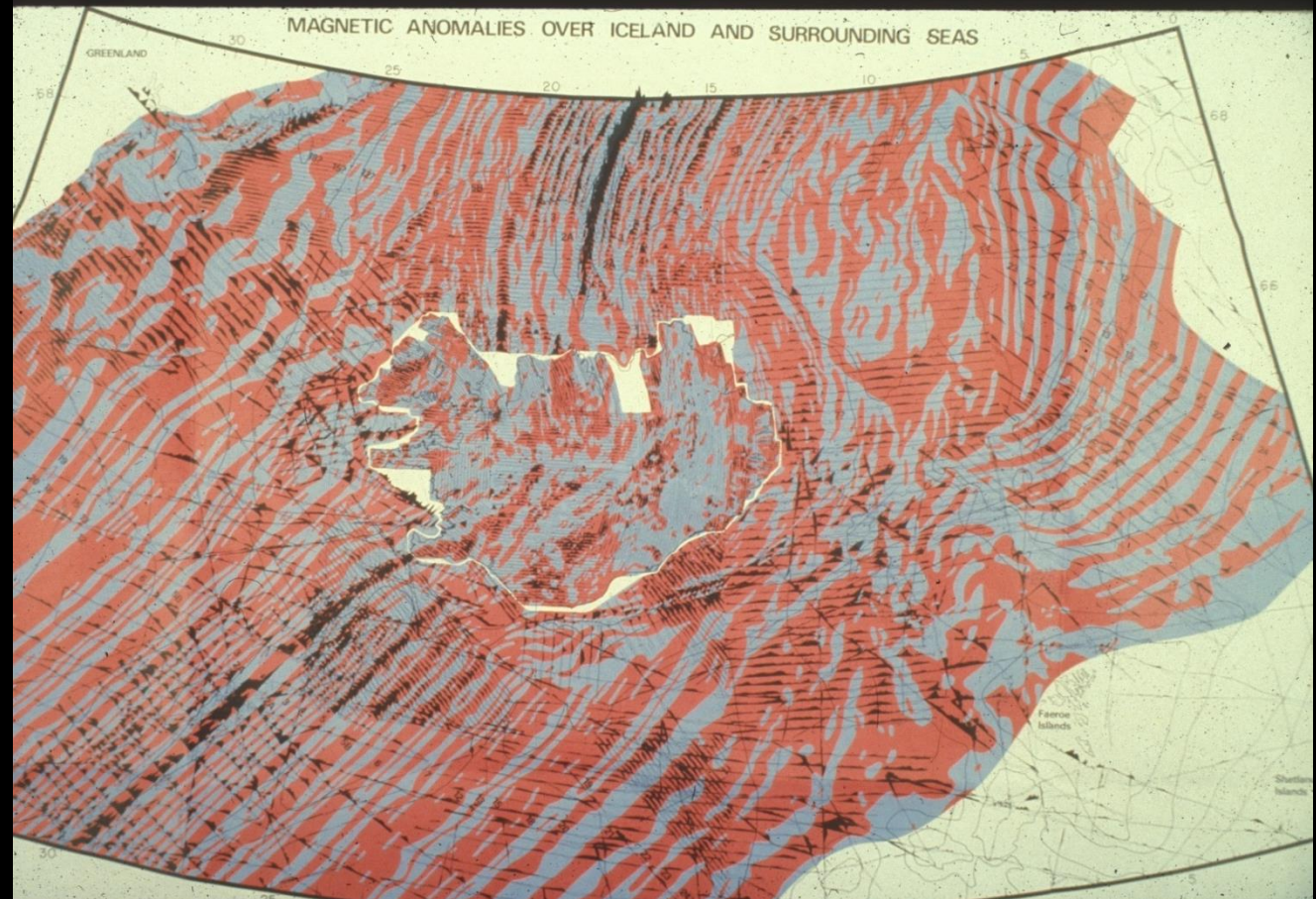
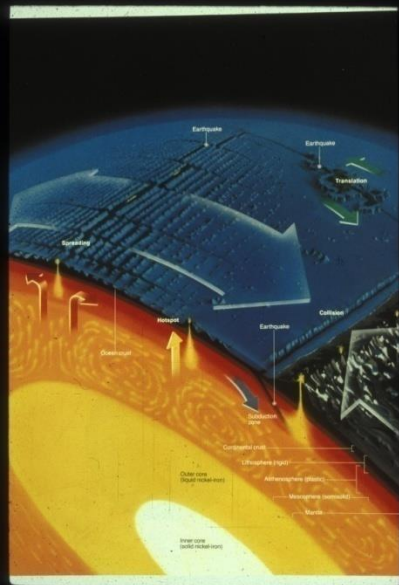
- Igneous (including volcanic)
- Sedimentary
- Metamorphic

Tectonic activity is also responsible for fossilization.





Igneous rocks solidify from a molten state – at temperatures too high to preserve life forms.



- Seafloor Spreading
- Magnetic reversals may be recorded as paleomagnetism, which gives us one kind of geological clock.



Volcanic activity rarely promotes fossilization (but the exceptions to this rule can be spectacular).

Volcanic rocks are easy to date, radiometrically, and are very important in establishing the chronology of the fossil record.



Volcanic terranes like this are poor places to look for fossils.



Metamorphic Rocks are transformed from pre-existing rocks, via heat and pressure.

They might have once contained fossils, but the process of metamorphism usually destroys all evidence of life.

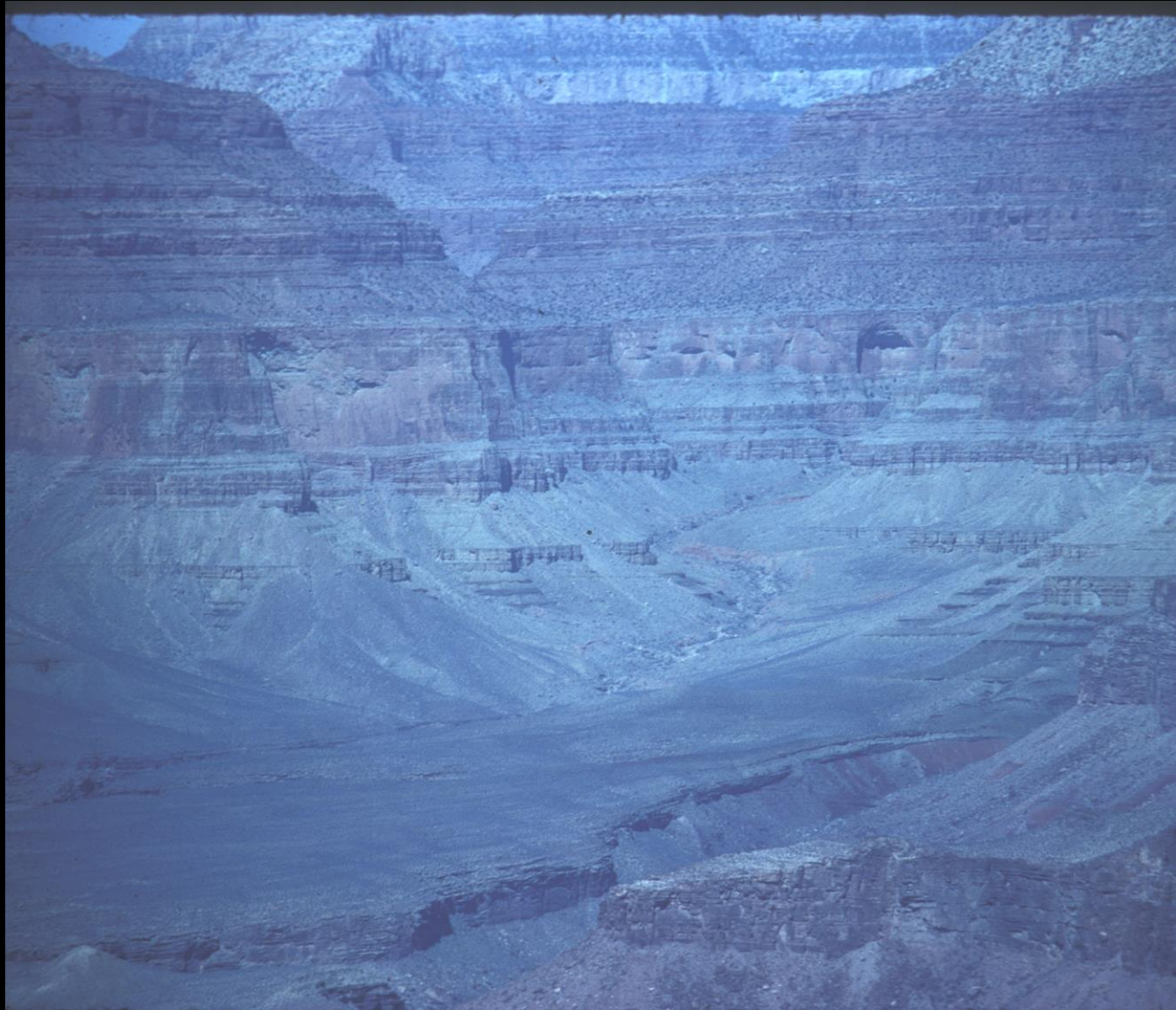




Sedimentary rocks are the major sources of fossils.

Gravity and water combine as the two major agents of erosion to produce sediments

Sedimentary rocks are layered, and mostly laid down as beds, which can contain fossils.



Tectonic activity returns deeply buried fossils to the surface, where they can be found with an eyeball-ometer and a pair of feet.







Mt. Everest,  
29,002 ft.  
(8840m)



# Folded sedimentary beds (California)



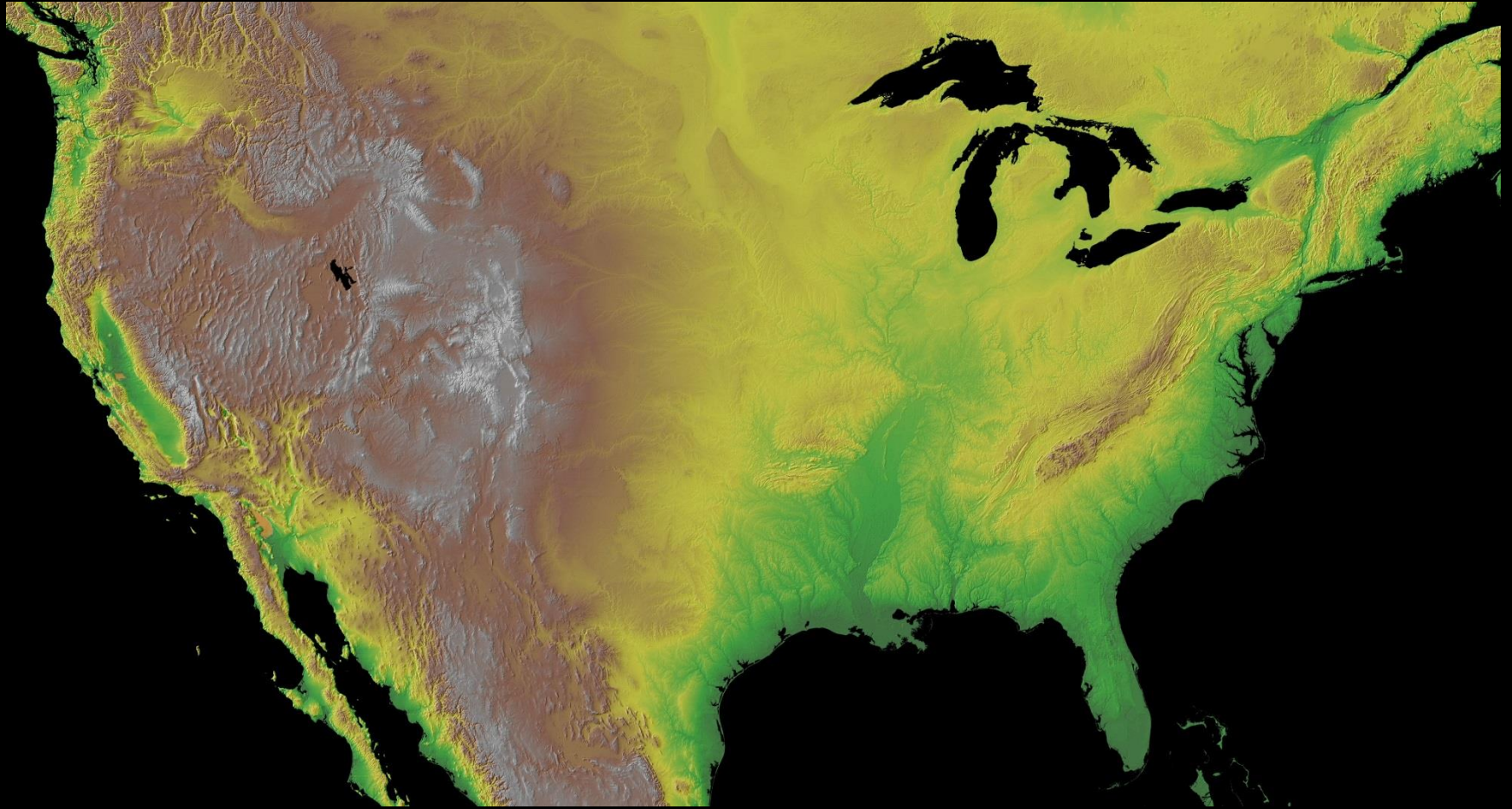


In mountainous regions and high desert plateaus, tectonic activity has returned fossils to the surface.





Erosion also cuts into the crust and exposes ancient rocks and their fossils.

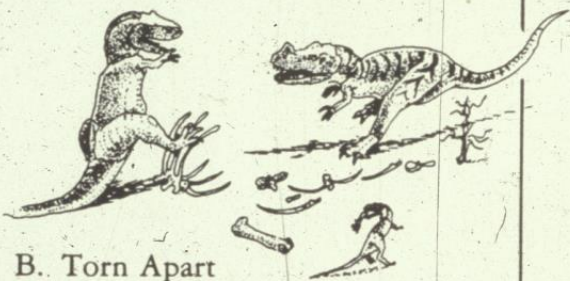




Vegetation obscures fossils.



A. Killed



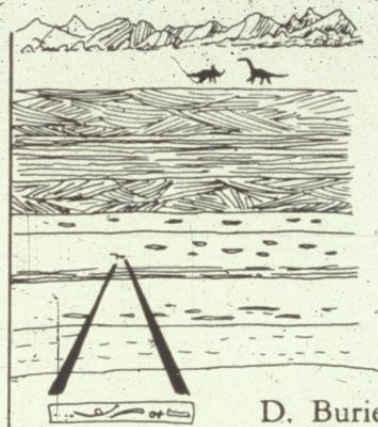
B. Torn Apart



New layer covering bones, with lime lumps

Old soil with lime lumps (kunkar)

C. Buried

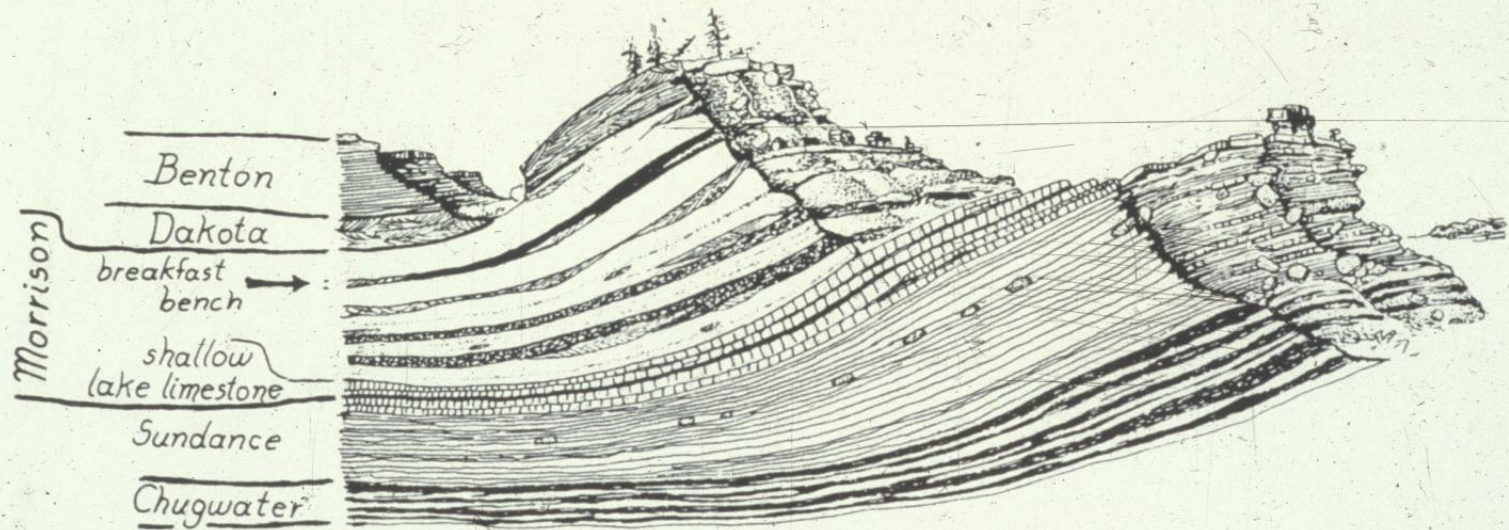


D. Buried More Deeply



E. Sediment Layers Folded

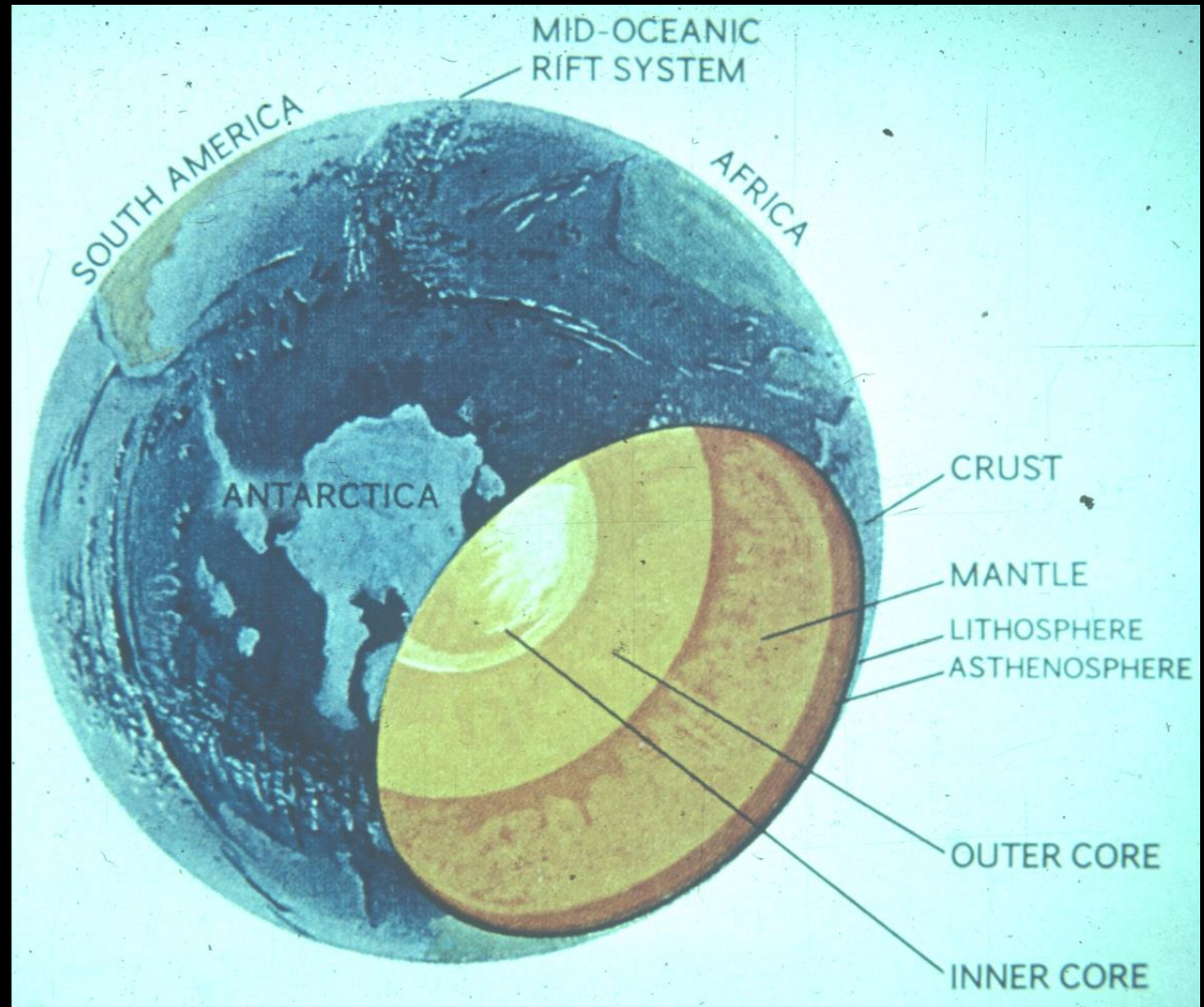




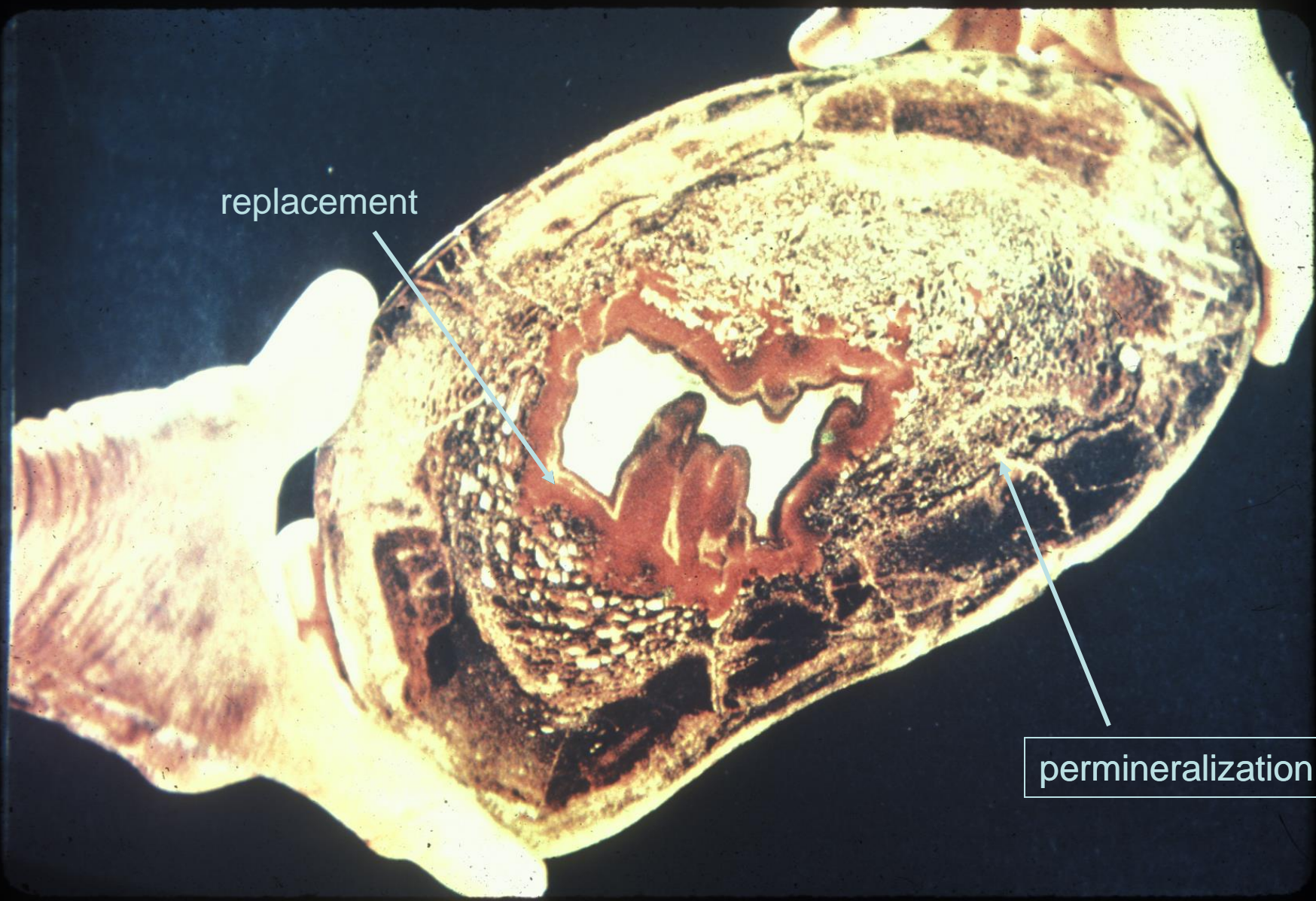
Our camp at Como Bluff and how the rock layers would look if cut through vertically

There is a natural connection between:

radioactive decay  
heat production  
tectonic activity  
burial of fossils  
fossilization  
uplift  
discovery



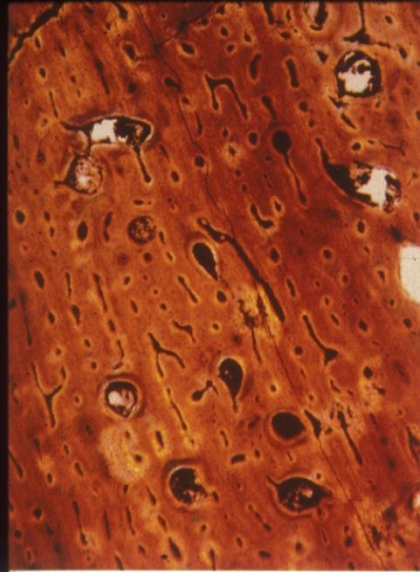




replacement

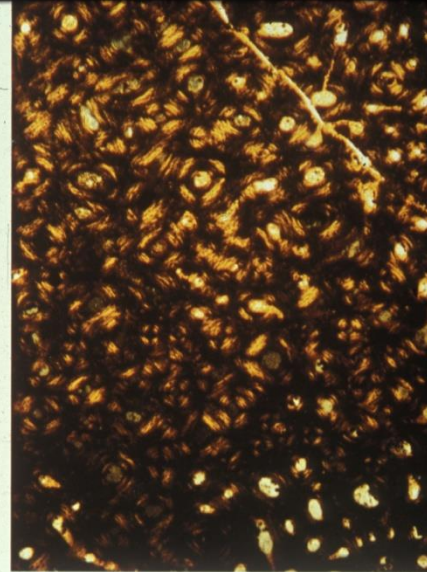
permineralization

Microscopic detail can be preserved, possibly even ancient molecules.



*Paleoistologia:*

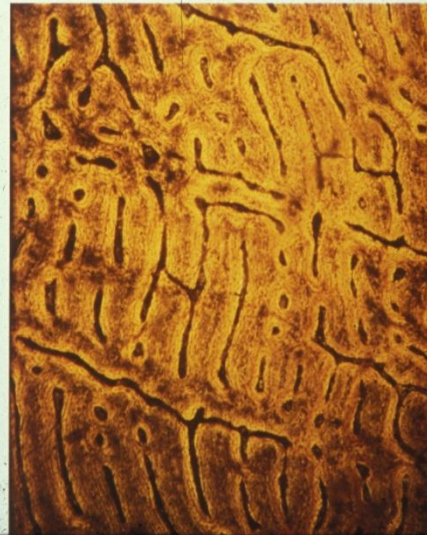
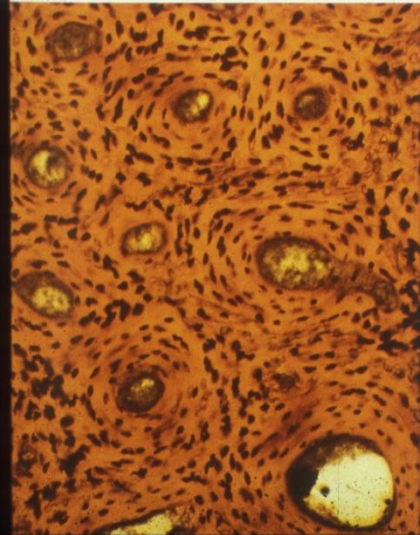
Sezione trasversale di osso lungo degli arti di un Prosauroside adulto del Triassico superiore di Lesotho (Sud Africa); l'*Euskelosaurus*.



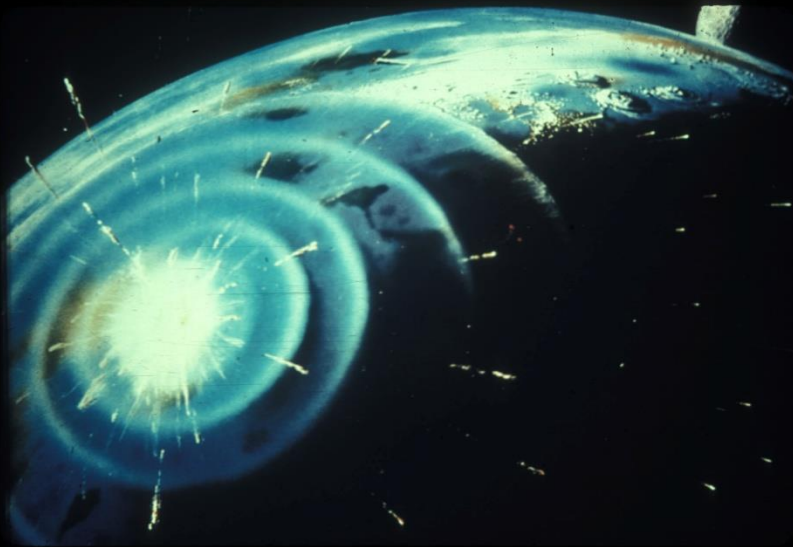
Sezione trasversale di osso lungo degli arti di un Adrosauride del Cretaceo superiore del Canada.

Sezione trasversale di osso lungo degli arti di un Adrosauride del Canada, in via di sviluppo.

Sezione trasversale di osso lungo degli arti di un *Bothriospondylus*, sauroside del Giurassico medio del Madagascar.







Fossil record is highly incomplete, which makes testing both extinction hypotheses challenging....



Deserts, for example,  
abound in Life....



and potential fossils...





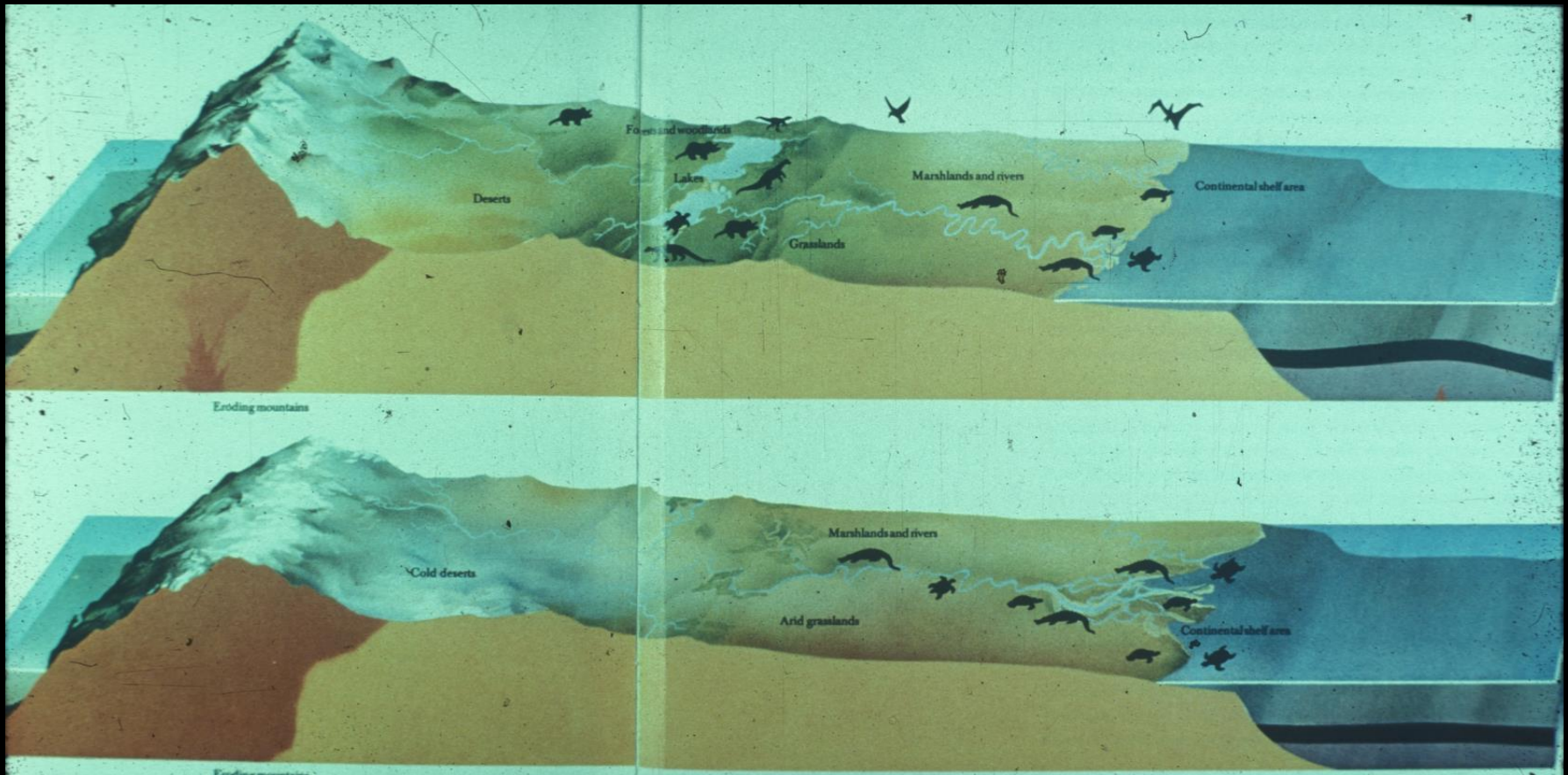




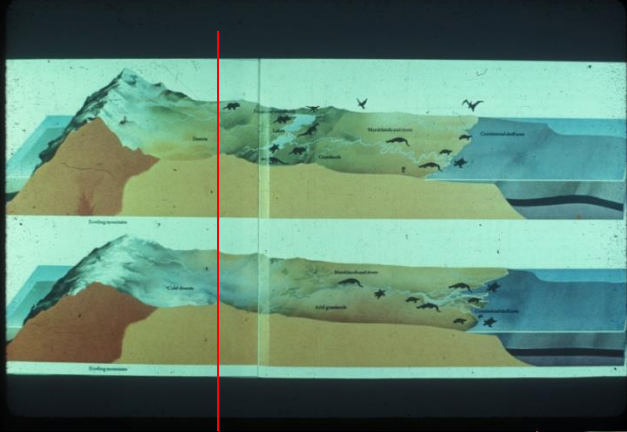




Water for Life, water for erosion, water to carry sediments for burial....sometimes blowing sand, sometimes ash....







Steep slopes =  
fast water, high-  
energy streams

—

carcasses  
tumble apart as  
they are carried  
to final resting  
ground

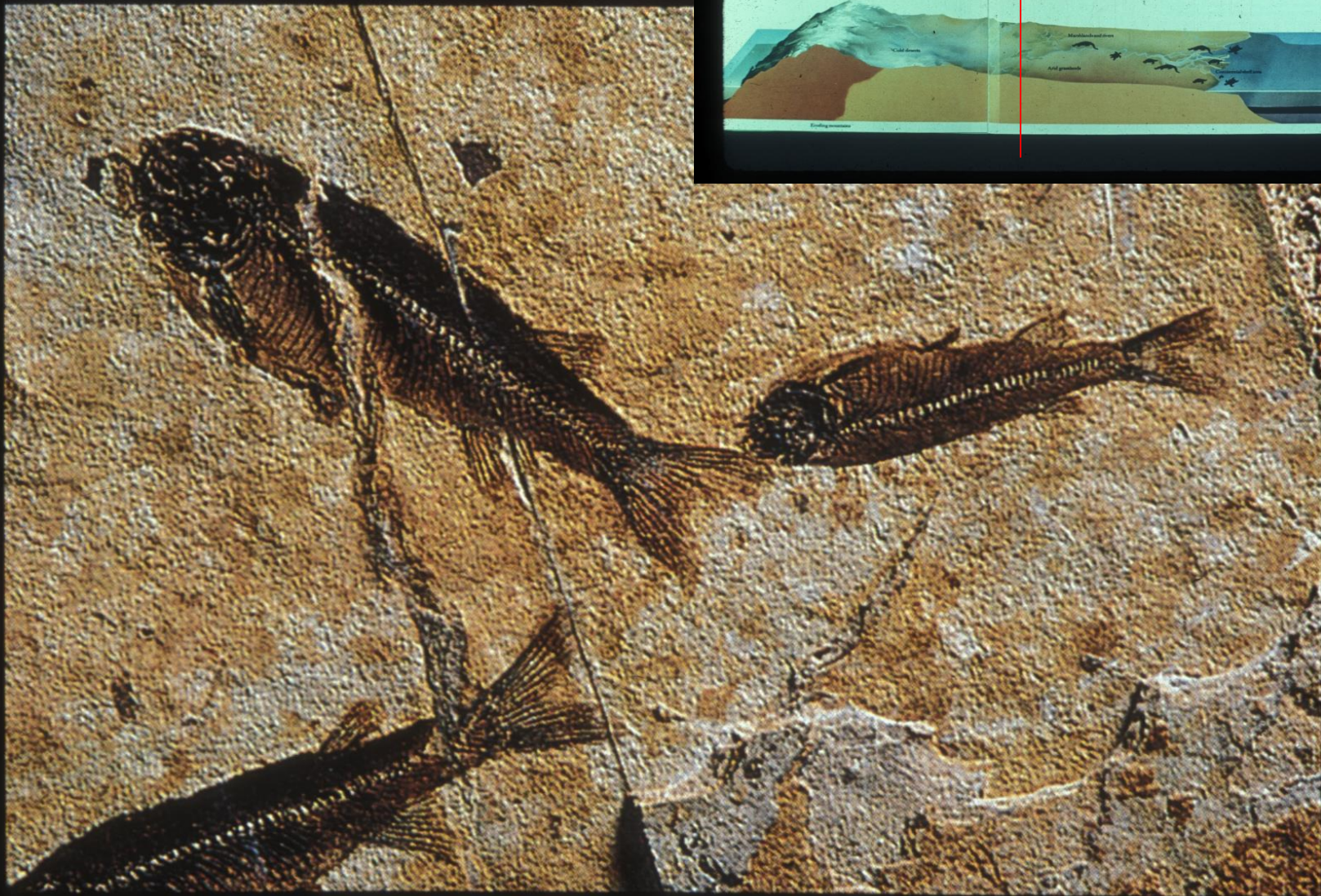




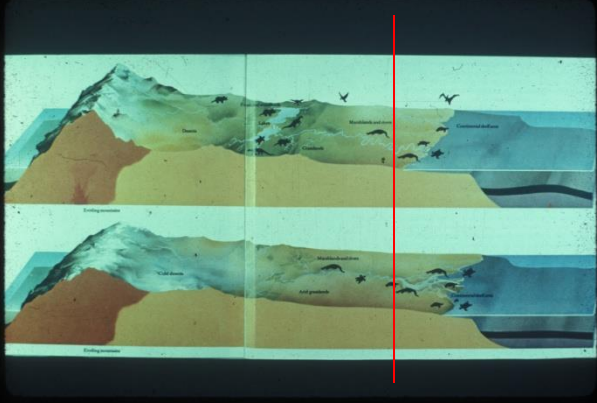




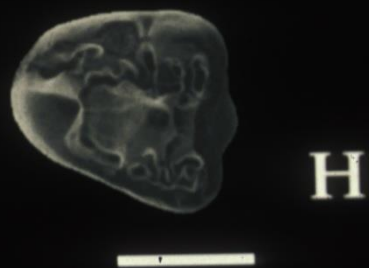
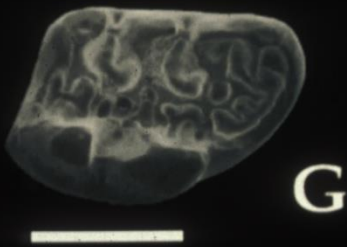
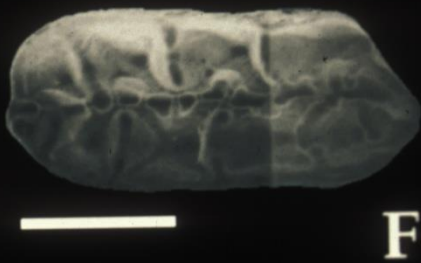
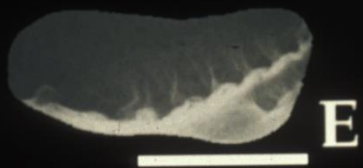
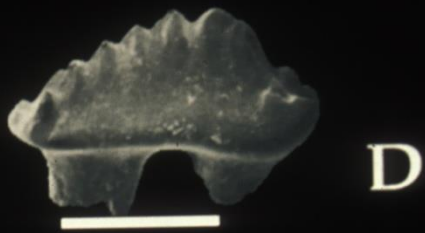
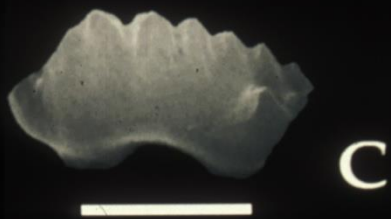
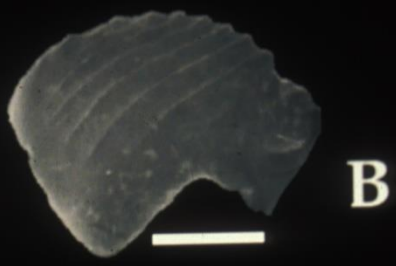
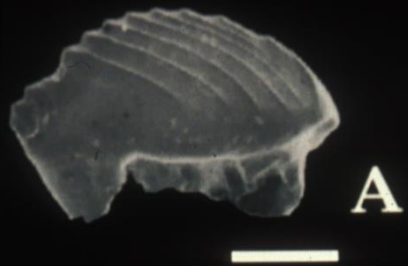
# Lake bed fossils

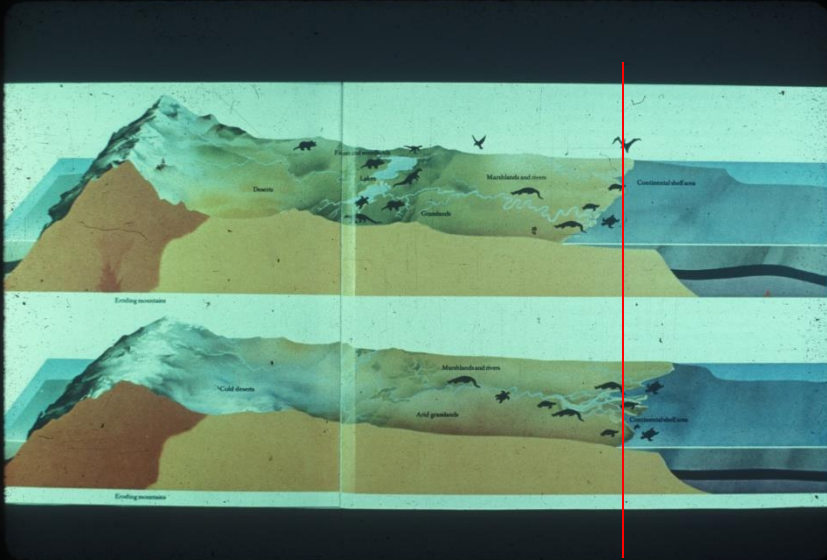






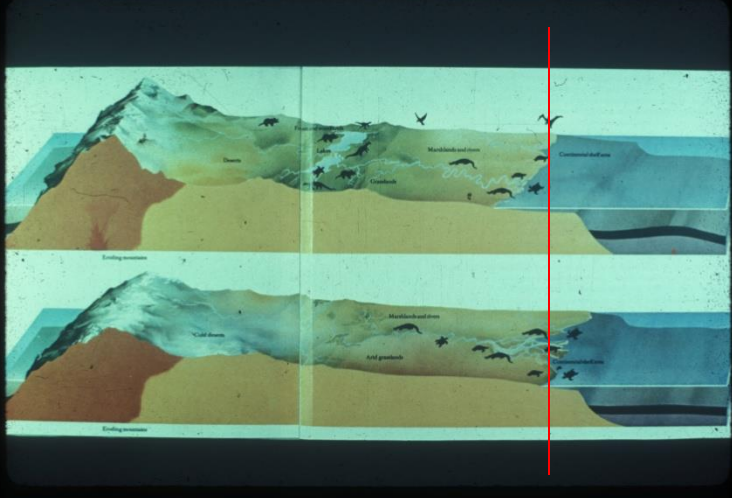




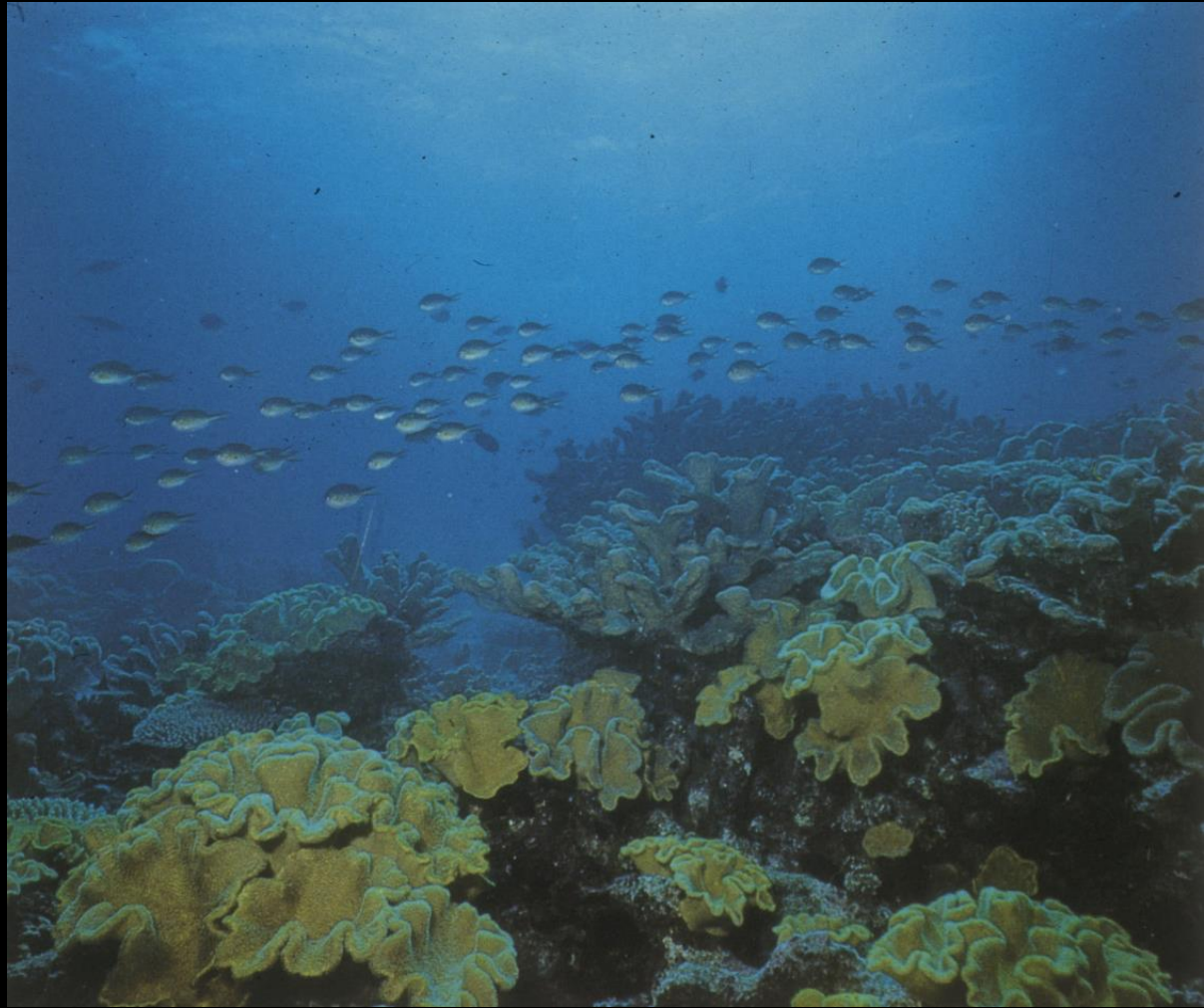


The shorelines of Cretaceous Texas preserve thousands of dinosaur tracks, but few bones.

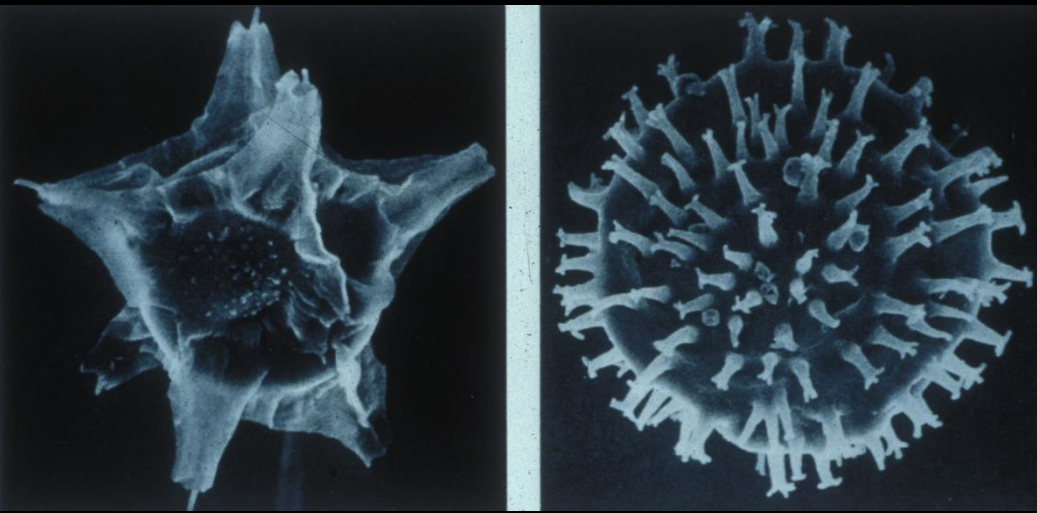
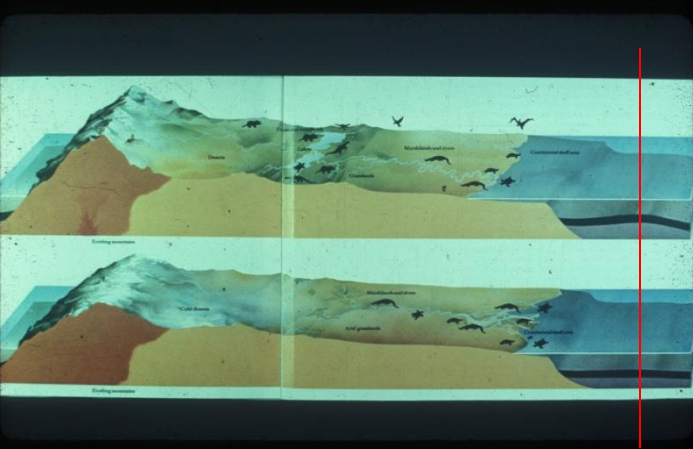




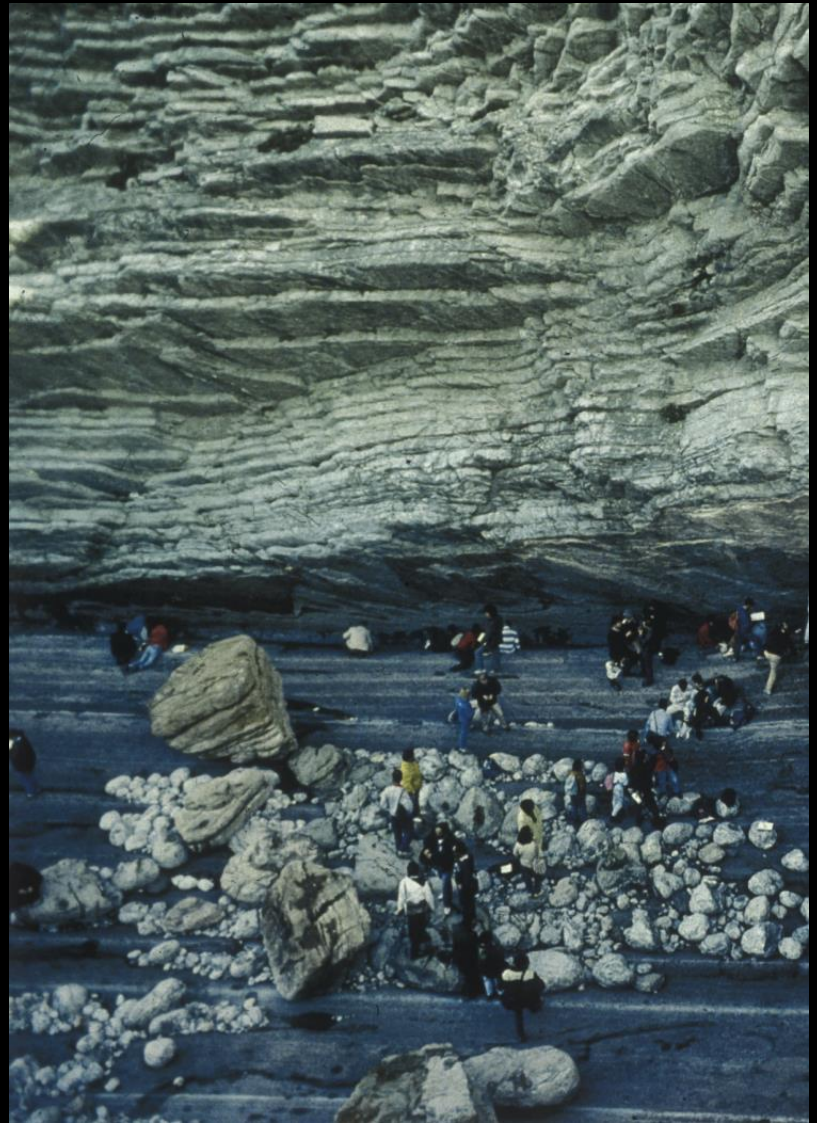
Wave zones will break bones and shells....







Microfossils in marine sediments





# Amber





Blowing sand occasionally works....





Ash clouds sometimes work too...



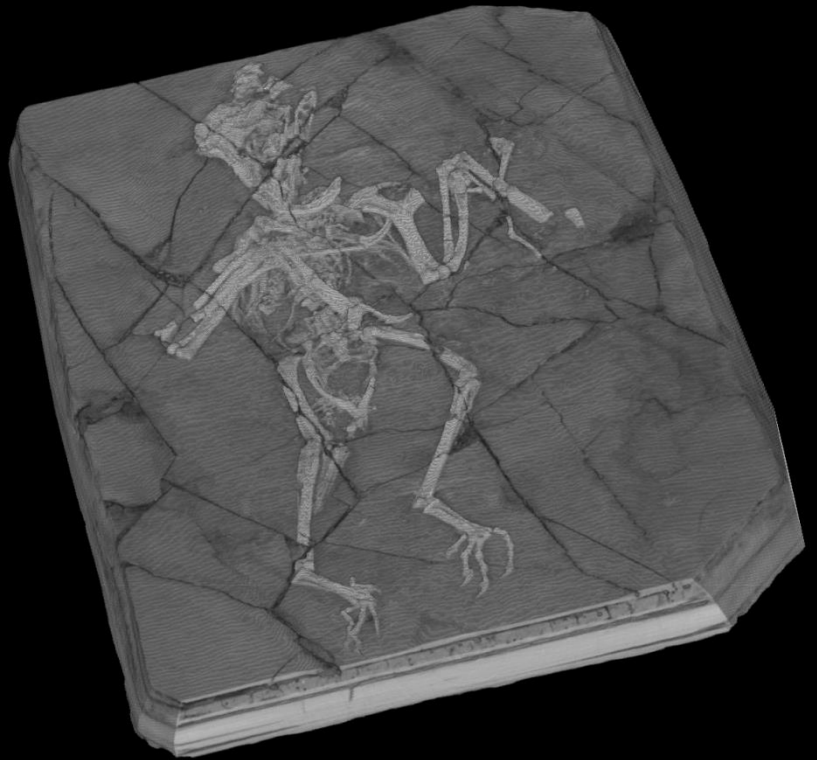


# Liaoning, China

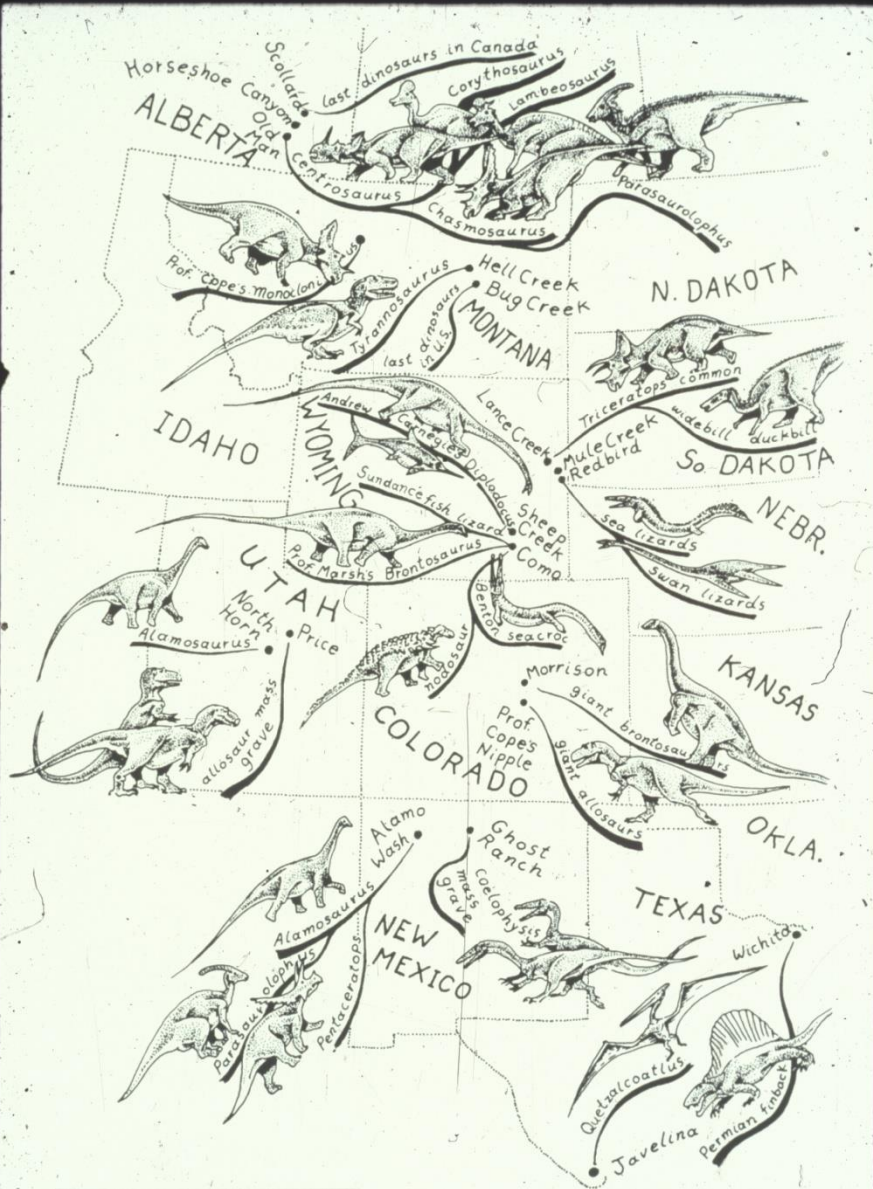


With surgical precision, technician Kevin Aulenback prepares a newfound fossil from Sihetun called *Caudipteryx zoui* (diagram at left), a curious creature that has further blurred the line between dinosaurs and birds.

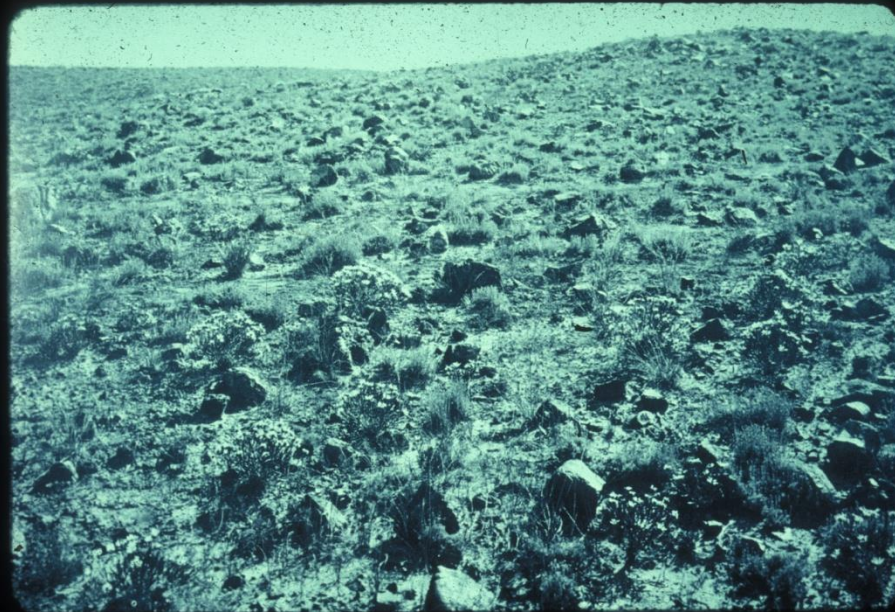








The great dinosaur graveyards of the American West



What's in the photo?

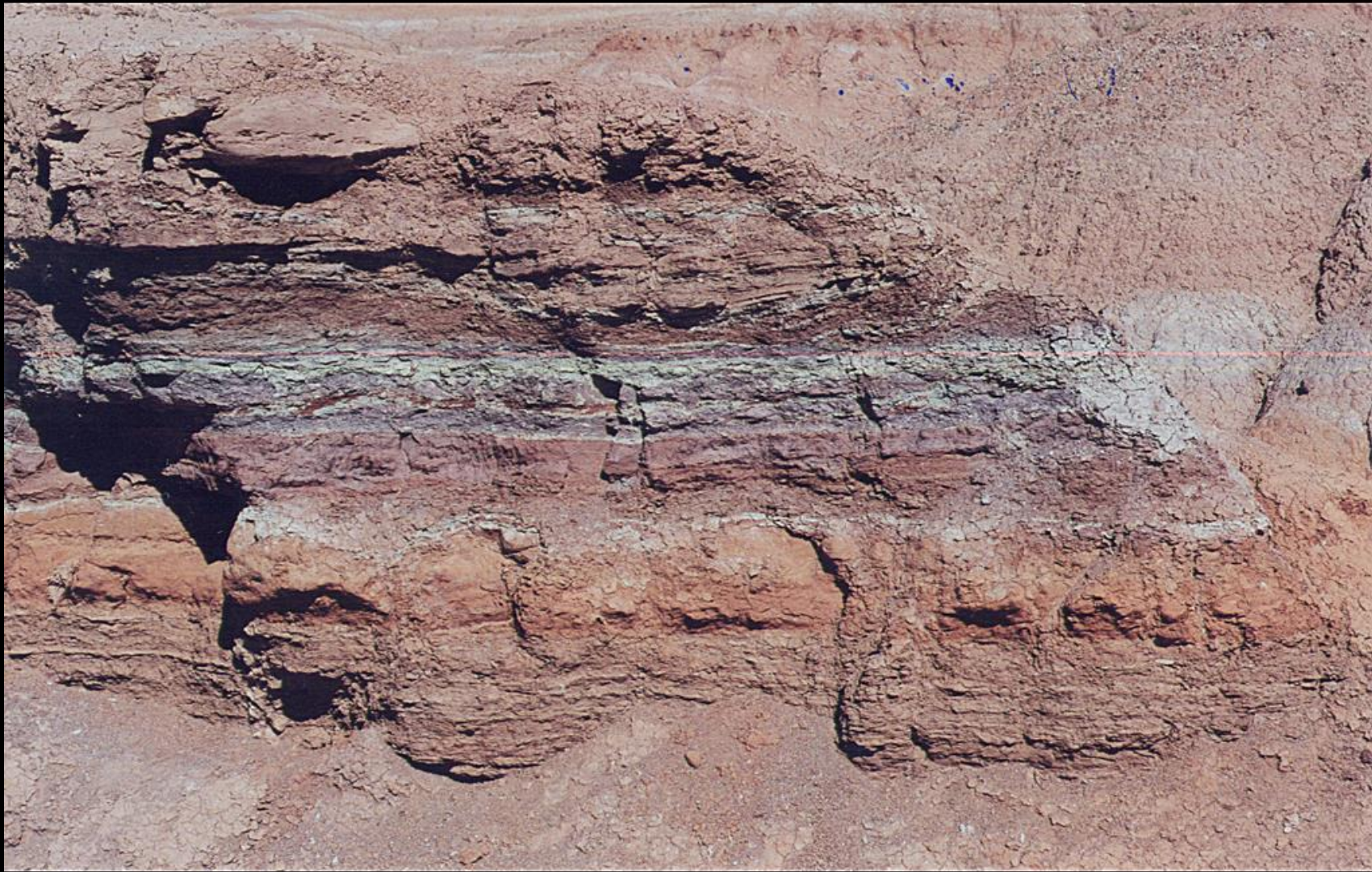




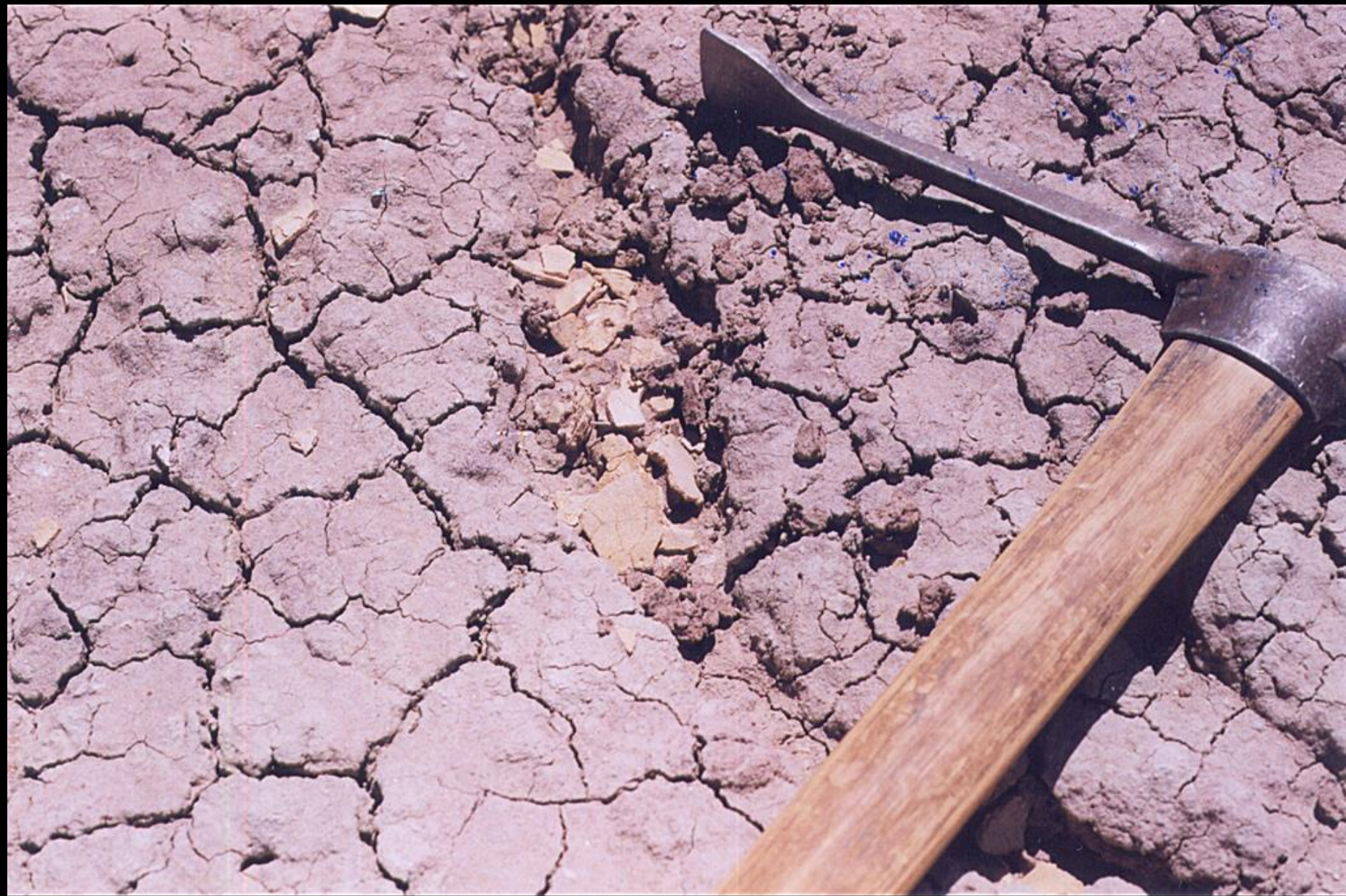














Late Cretaceous rocks of western North America are an important source of fossil evidence of the great extinction, owing to the tectonic history of the plate.

Late Cretaceous brontosaurus avoided swampy forests. The Alberta delta was wet year-round most years, and brontosaurus weren't there. But in North Horn, Utah, there was a distinct dry season (producing kunkar) and the brontosaurus *Alamosaurus* enjoyed the climate.

