Geologic Wonders of Central Texas

Dr. Leon Long
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along an S-shape line that passes through Austin.
Average Precipitation (inches / year)
Trans-Pecos

Austin
Ages of rocks in the Llano Uplift

Sedimentary cover
Igneous and metamorphic basement

Billion years ago

Precambrian

Million years ago
Cenozoic
Tertiary
Cretaceous

Mesozoic
Jurassic
Triassic
Permian
Pennsylvanian

Paleozoic
Mississippian
Devonian
Silurian
Ordovician
Cambrian
Major minerals in granite:

- K feldspar
- Na plagioclase feldspar
- Biotite mica
- Quartz
[schematic cross section]

Earth's surface 1.08 billion years ago

Volcanic field (?)

Several kilometers

Feeder dike

Metamorphic host rock

Enchanted Rock
batholith

Earth's surface today

Profile of Enchanted Rock landform

origin of granite
Edge: attack from 2 directions
Corner: attack from 3 directions
Flat face: attack from 1 direction
Vertical aerial photo of rounded exfoliation domes at Enchanted Rock
View to the south

Cretaceous sedimentary rocks

Nonconformity (buried erosion surface)

Precambrian metamorphic basement

Elevation of top of Enchanted Rock

Enchanted Rock granite
Map showing all 3 types of geologic contact: depositional (Cretaceous escarpment), fault (Riley Mountains), and igneous intrusive (Enchanted Rock batholith).
Stage 1: form the rocks

erosion surface

deposition of strata

nonconformity

[cross sections]
Stage 2: deform the rocks
faulting

Stage 3: erode the rocks
inversion of topography
Braided stream: Sandy Creek (schematic)

Meandering stream: Onion Creek near Austin

floodplain
Older Cretaceous strata (Younger strata eroded)

Younger Cretaceous strata (Older strata buried)
PILOT KNOB VOLCANO

Fluidized jet

Altered volcanic material

Mudflow

Explosion "chamber"

Magma feeder

Beachrock

Soft-sediment slump

Limestone

Vertical exaggeration: 4.5x  [schematic cross section]
Pilot Knob then and now

[schematic cross sections]

80 million years ago

Pilot Knob
active volcano

profile of former
Pilot Knob volcano

Today

Pilot Knob
hill

"moat"
Ammonite: *Parapuzosia americana* Scott and Moore, 1928
stream terraces

[schematic cross sections]

Stage 1

Bedrock

Stage 2

Alluvium (stream terrace)

Stage 3

Stage 4
[schematic cross sections]

Stage 1: initial condition

Stage 2: fault offset, long profile interrupted

Stage 3: entrenchment, long profile regained
Colorado River

Fossil (entrenched) meanders

Barton Creek

Active meanders

Kilometers

Miles
Dr. Leon Long
Professor and The Second Mr. and Mrs. Charles E. Yager Professorship and member of the Academy of Distinguished Teachers

Dr. Leon Long is a geology professor at the University of Texas at Austin whose research interests include isotope geology, especially to use naturally occurring radioactivity and its daughter products as a geologic clock, and as a geochemical tracer. He is also interested in applying the Rb-Sr isotopic age method to clay minerals with a possibility of dating when weathering had produced an ancient soil zone. As the department’s generalist, Dr. Long has also written the textbook for the introductory course.