

Chapter 18

The Paleogene World

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Paleogene Life



- Paleogene
 - Paleocene
 - Eocene
 - Oligocene

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Paleogene Life



- Recovery from Cretaceous extinctions
 - Modern life forms
 - New animals
 - Whales
 - Sharks

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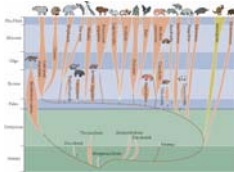
Paleogene Life



- Sandy coasts offer new niches
 - Sand dollars evolved from sea biscuits
- Flowering plants expanded
 - Grasses originated

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Paleogene Life



- Mammals diversified
 - Most modern orders present by Early Eocene

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Paleogene Life



- Bats present by early Eocene

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Paleogene Life



- Primates evolved in Paleocene
 - Climbing by Early Eocene

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Paleogene Life



- Mammalian carnivores evolved by mid-Paleogene

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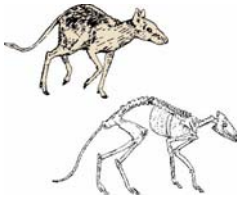
Paleogene Life



- Earliest horses by end of Paleocene
 - Size of small dogs

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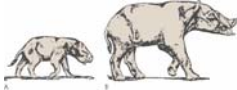
Paleogene Life



- Mammalian species doubled
- Ungulates
 - Odd -toed
 - Horses, tapirs, rhinos
 - Even- toed
 - Cloven-hooved goats, sheep, pigs, cattle

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Paleogene Life



- Early Eocene elephants
 - *Moerithium*
 - Earliest
 - Pig sized

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Paleogene Life



- Mesonychids
 - doglike
- Creodonts
 - doglike
- *Diatrymas*
 - Huge flightless birds
 - Clawed feet and slicing beaks

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Paleogene Life



- Few birds with flight
 - Most waded
 - No songbirds

Paleogene Life



- Oligocene mammals
 - A few horses in No. America
 - Rhinos
 - Largest land mammal of all time

Paleogene Life



- Brontotheres
 - Rhino- like

Paleogene Life

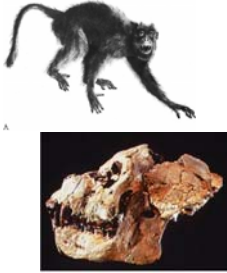
- Carnivores evolved in Eocene
 - Saber tooth tiger
 - Bearlike dogs
 - Wolflike animals



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Paleogene Life

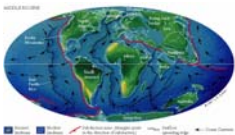
- Primates modernized in Oligocene
 - Monkeys
 - Apelike primates
- *Aegyptopithecus*



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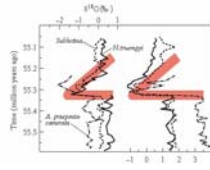
Paleogeography

- Continents were in modern configuration but closer together
- Early Paleogene
 - Warm climate
- Later cooled



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Paleogene Thermal Maximum



- Very warm interval of Paleogene
 - Abrupt shift in oxygen isotope ratios in planktonic and benthic organisms
 - Rapid temperature increase
 - Antarctic waters warmed to 18°C in 3000 years
 - Carbon isotopes shift to low levels
 - Melting of frozen methane

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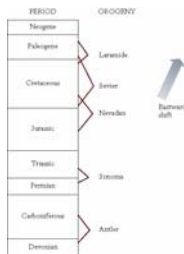
Paleogene Thermal Maximum



- Also reflected in the flora and fauna
 - Green River Basin flora shifted
 - Mammals migrated
 - Bering Strait
- Followed by Eocene ice age

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Tectonic Events



- Cordilleran region
 - Laramide orogeny
 - New tectonic style

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Laramide Orogeny



- Northern segment
- Active igneous activity
 - Active fold and thrust belt inland
 - Quiescent from Great Valley to Colorado Plateau
 - Low angle of subduction

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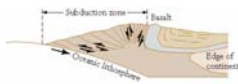
Laramide Orogeny



- Thrust sheets exposed in Rockies

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Laramide Orogeny



- Olympic Range began to form

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Laramide Orogeny



- Basins form on eastern belt of uplifts
 - Anticline uplifts

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Laramide Orogeny



- Easternmost uplift formed Black Hills

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Laramide Orogeny



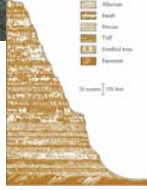
- Front Range of the Rocky Mountains
 - High elevation
 - Some from post-Laramide uplift
- Erosion kept pace with uplift
 - Broad erosional surface

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Laramide Orogeny

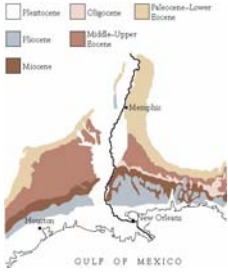


- Yellowstone hot spot
 - Buried trees in lavas
- Over 20 successive forests buried



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Gulf of Mexico



- Mississippi Embayment
 - Thick Eocene segments
 - Oligocene regression
- Clastic wedge
 - Important petroleum resource

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Chesapeake Bay



- Largest estuary in world
- Rubble found just below 36 Ma fossils
- Sits within circular depression
 - Impact crater
 - Shocked grains

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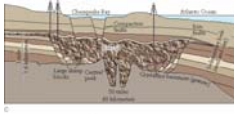
Chesapeake Bay



- Toms Canyon
 - Created by meteor
 - Associated with tidal wave and microtektite

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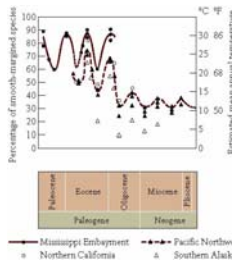
Chesapeake Bay



- Seismic profiling reveals basin in-filled with breccia
- Faults create geologic hazard

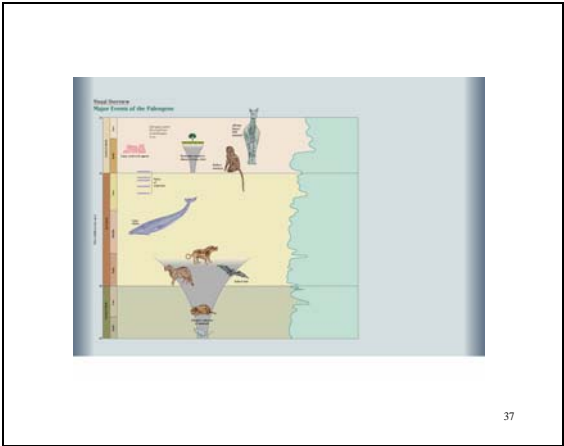
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Late Eocene Glaciation

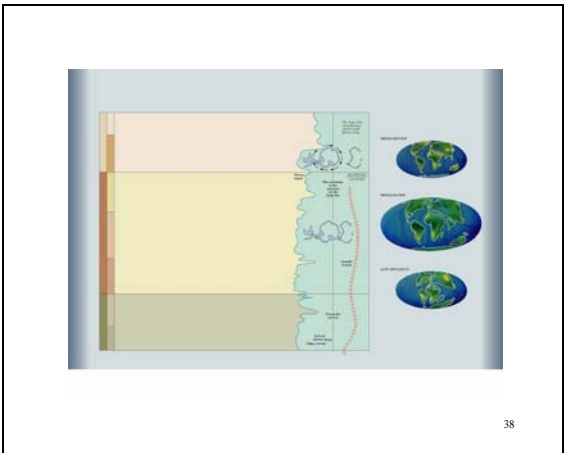


- Temperature inferred from leaf margins

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