

**Kenozoik  
PALEOGEN**

- ~ **podjela kenozoika:**
  - 3. kvartar (gornji pliocen, pleistocen, holocen)
  - 2. neogen (miocen, donji i srednji pliocen)
  - 1. paleogen (paleocen, eocen, oligocen)
  
- ~ **holocen (recentno doba)** - ne zna se je li to samo jedan interglacijal unutar pleistocena ili početak novoga geološkog razdoblja

**Paleogen**

- ~ **podjela**
  - . paleocen (dan, salendan, tanet): 65,5 - 56 mil. god.
  - . eocen (ipres, lutet, barton, priabon): 56 - 34 mil. god.
  - . oligocen (rupel, hat): 34 - 23 mil. god.

## Paleogen

- ~ važniji biološki događaji
  - . d. eocen: prvi primati i trave; ubrzana diverzifikacija sisavaca
  - . sr. eocen: značajan razvoj glodavaca
  - . g. eocen: prvi slonovi
  - . na granici s neogenom nema masovnog izumiranja
- ~ važniji paleogeografski događaji
  - . d. eocen: širenje oceanske kore između Grenlanda i Norveške, početak kolizije Azije i Indije
  - . g. eocen: početak zatvaranja Istočnog Tethysa

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## Život u moru



Stanley, 2005, Freeman

- ~ krajem krede izumrli:
  - . amoniti, belemniti, rudisti, morski gmazovi
- ~ obnova nakon krednog izumiranja
  - . obnovili se započeli novi razvoj: bentičke foraminifere, ježinci, briozoji, rakovi, puževi, bivalve
  - . vapnenački nanoplankton se rediverzificirao - formirao pisaču kredu samo početkom paleogena
  - . nove životinje
- ~ heksakorajli tek u oligocenu

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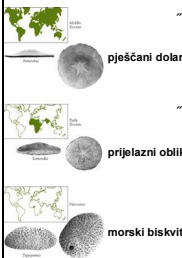
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## Paleogeni život



Stanley, 2005, Freeman

- ~ pješčane obale formirale nove niše
  - . pješčani dolari (jedini ježinci koji su živjeli na pijesku) razvili se iz morskih biskvita
- ~ na kopnu:
  - . sisavci zamijenili gmazove
  - . male promjene u biljnom svijetu

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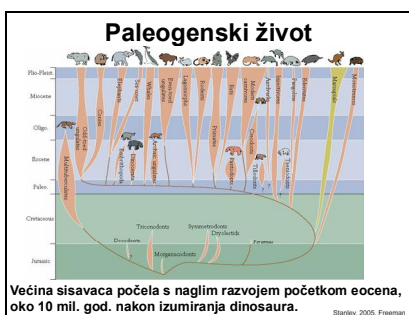
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## Paleogenski život

~ diverzifikacija sisavaca

~ paleocenski:  
• šišmiši, kitovi, tobočari, insektivora, primati



Većina sisavaca počela s naglim razvojem početkom eocena, oko 10 mil. god. nakon izumiranja dinosaura.

## Paleogenski život



~ šišmiši u paleocenu

Stanley 2005, Freeman

**Paleogenski život**



~ primati se razvili u paleocenu

Stanley, 2005, Freeman

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**Paleogenski život**



~ sisavci mesojedi se počeli razvijati sredinom paleogena

Rekonstrukcija srednjepaleocenskog okoliša u Novom Meksiku.

Stanley, 2005, Freeman

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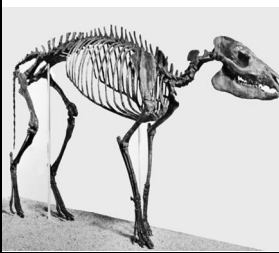
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**Paleogenski život**



~ najraniji konji se pojavili koncem paleocena

**Hyracotherium, najraniji konj.**

Stanley, 2005, Freeman

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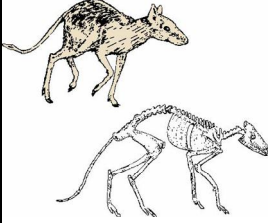
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### Paleogenski život

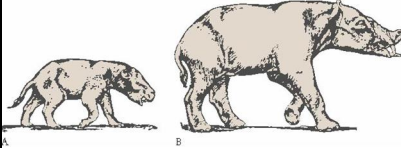


- ~ vrste sisavaca udvostručene
- ~ kopitari
  - . neparnih prstiju
  - . parnih prstiju

Starley, 2005, Freeman

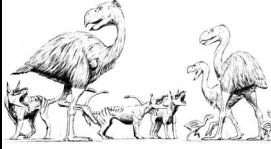
### Paleogenski život

- ~ donjoeocenski slonovi
  - . *Moerithium*



Starley, 2005, Freeman

### Paleogenski život



- ~ mesonhidi
- ~ krodonti
- ~ djatrimaji

Starley, 2005, Freeman

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**Paleogenski život**



“ nekoliko ptica koje su mogle letjeti

Starley, 2005, Freeman

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**Paleogenski život**



“ oligocenski sisavci  
· konji nestali u Euroaziji u eocenu  
· nove vrste konja u Sj. Americi

Starley, 2005, Freeman

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**Paleogenski život**



“ mesojedi se razvili u eocenu

Starley, 2005, Freeman

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**Paleogenski život**



" primati napredovali u oligocenu  
" *egiptopitekus*

Stanley, 2005, Freeman

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**Paleogenski život**

" gmazovi i vodozemci rijetki  
- ranide (prave žabe)

" insekti slični današnjima

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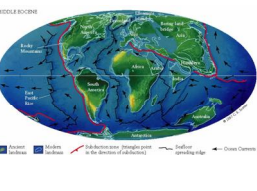
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**Paleogeografija**



" kontinenti bili u današnjoj konfiguraciji ali bliži jedni drugima  
" donji paleogen - naglo toplo klima  
" u eocenu hladnije iako počinje toplim pulsom

Stanley, 2005, Freeman

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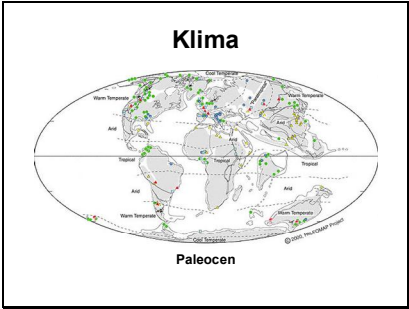
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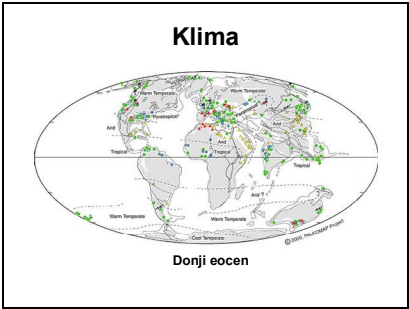
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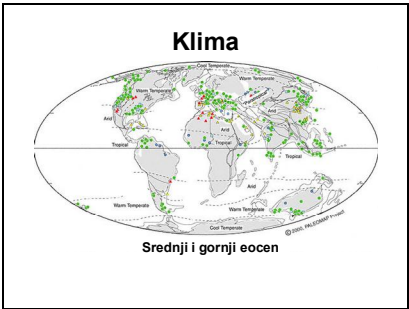
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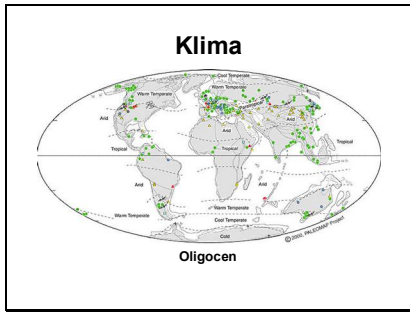
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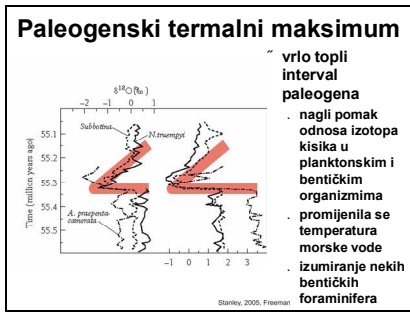
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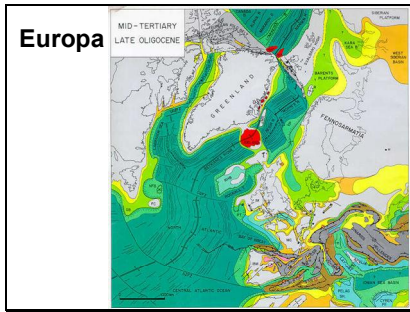
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**Hrvatska**

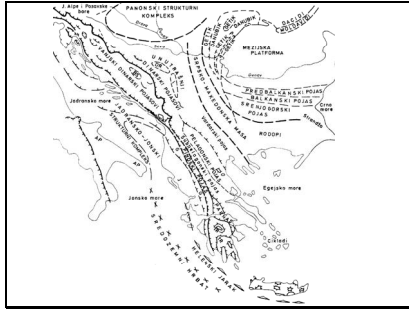
~ Dinaridi

- . laramijska faza
  - ~ destrukcija karbonatne platforme
  - ~ izdizanje Dinarida
  - ~ emerzija - boksiti

**Hrvatska**

~ paleocen

- . Dinaridi: *Vanjski Dinaridi*  
*Unutarnji Dinaridi*
- . središnja Dalmacija: foraminiferski vapnenci
- . Istra: breče, slatkovodni i brakični vapnenci
  - ~ Kozinske naslage ili Liburnijska formacija



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**Hrvatska**

- ~ donji - srednji eocen
  - . foraminiferski vapnenci
- ~ srednji eocen
  - . lapori s rakovicama
- ~ taloženje turbiditnih naslaga ("fliš")
  - . dijakrono
    - ~ sj. Istra: donji-srednji eocen
    - ~ središnja Dalmacija: gornji oligocen - donji miocen

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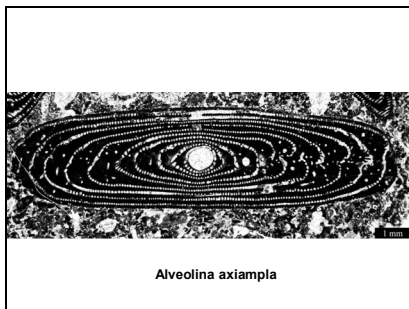
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### Hrvatska

- ~ Prominske naslage
  - . eocen - oligocen
  - . konglomerati, kalkareniti, turbiditi, vapnenci, lapor, ugljen - "molasa"
  - . Jelarske breče
- ~ oligocen: početak formiranja slatkovodnih bazena u Dinaridima

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### Hrvatska

- ~ središnja Hrvatska (i sjeverna Bosna)
  - . kompresijske tektonika
  - . paleocen - eocen: taloženje fliša na sjevernom rubu Dinarida, a zatim vapnenci
  - . gornji eocen - oligocen: pirinejska faza

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### Hrvatska

- ~ sjeverozapadna Hrvatska
  - . početak eocena: prestanak taloženja fliša i izdizanje blokova na površinu
  - . srednji eocen: marinska transgresija
  - . oligocen: lapor

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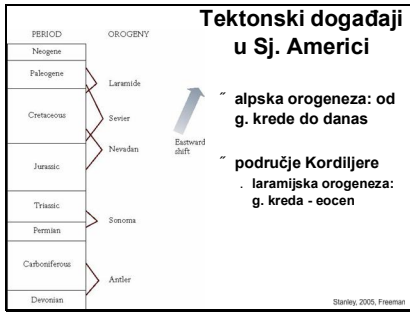
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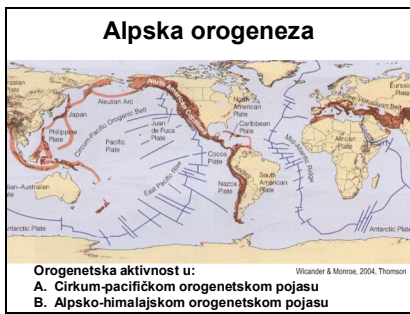
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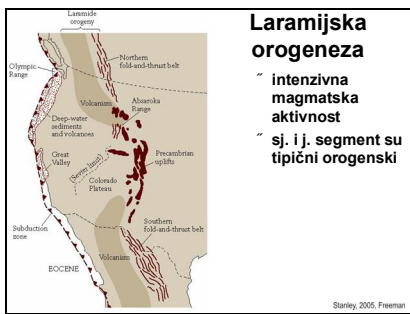
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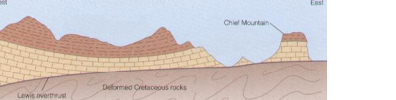
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### Laramijska orogeneza

– navlake u Rocky Mts

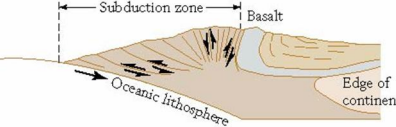
Stanley, 2005, Freeman

Wander & Monroe, 2004, Thomson

**Navlaka proterozojskih stijena na krednima (Montana).**

### Laramijska orogeneza



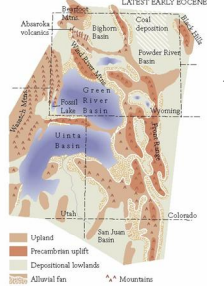
– počeo se formirati Olympic Range  
– subdukcija poremetila sedimentne stijene nasuprot bazalta

Stanley, 2005, Freeman

### Laramijska orogeneza

– bazeni se formiraju u istočnom pojasu u izdizanju

– izdizanje antiklinala



LATEST EARLY EOCENE

Stanley, 2005, Freeman

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### Laramijska orogeneza

“ fronta Rocky Mts  
erozija  
izjednačena s  
izdizanjem

Stanley, 2005, Freeman

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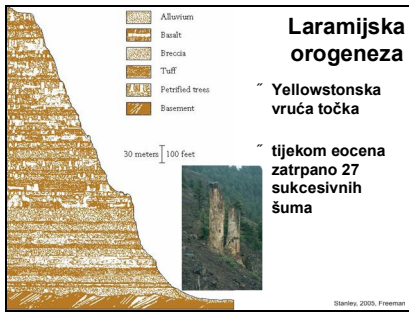
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### Laramijska orogeneza

“ Yellowstoneka  
vruća točka

“ tijekom eocena  
zatrpano 27  
sukcesivnih  
šuma

Stanley, 2005, Freeman

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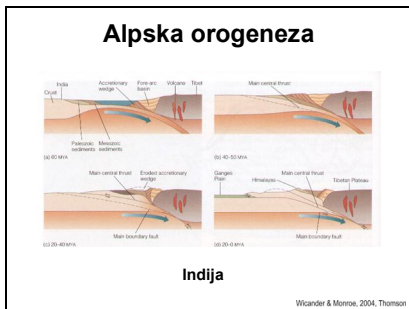
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### Alpska orogeneza

#### Indija

Wickander & Morrice, 2004, Thomson

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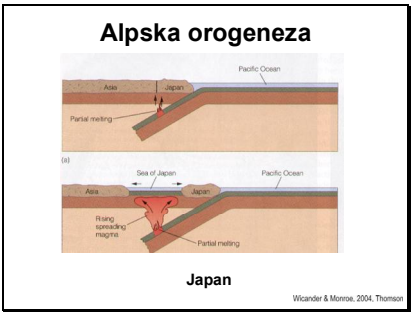
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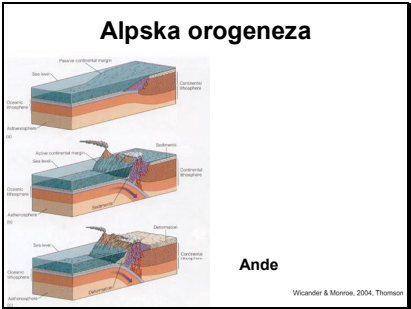
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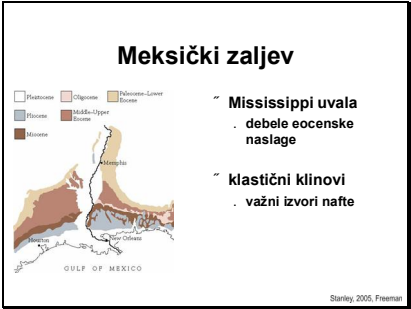
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## Chesapeake zaljev



- ~ najveći estuarij u svijetu
- ~ kršje nađeno ispod fosila starih 36 mil. god.
- ~ impakt krater

Stanley, 2005, Freeman

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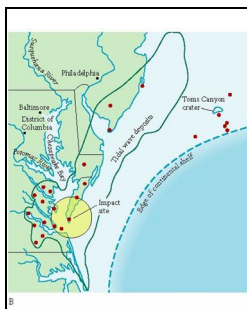
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## Chesapeake zaljev



- ~ Toms Canyon slične strukture kao i Chasepeake zaljev
- ~ Zaključak: serije meteorida pogodile ovo područje

Stanley, 2005, Freeman

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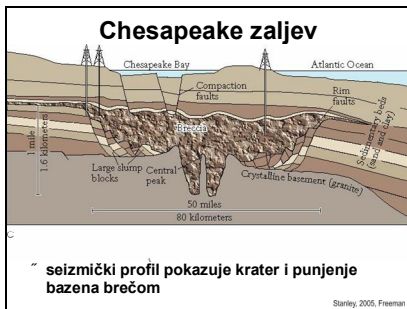
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## Chesapeake zaljev



- ~ seizmički profil pokazuje krater i punjenje bazena brečom

Stanley, 2005, Freeman

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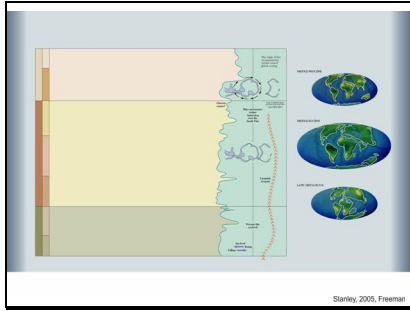
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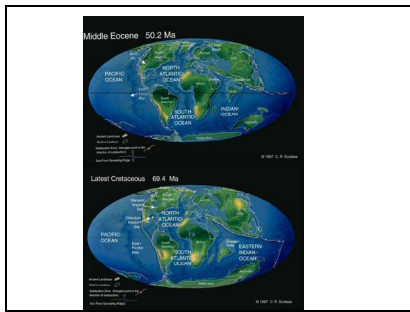
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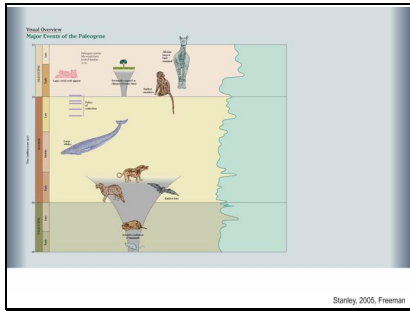
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