

## Mezozoik JURA

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### Jura

#### „ podjela:

- . donja jura (hetangij, sinemurij, plinsbah, toarcij): 200 - 176 mil. god.
- . srednja jura (alen, bajocij, bat, kalovij): 176 - 161 mil. god.
- . gornja jura (oksford, kimeridž, titon): 161 - 145 mil. god.

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### Jura

#### „ važniji biološki događaji

- . sr. jura: prve globigerine
- . konac jure: prvi rudisti, prve ptice, napredne koštane ribe

#### „ važniji paleogeografski događaji

- . nastavak dezintegracije Pangee
- . donja jura: početak riftanja između istočne i zapadne Gondvane; početak riftanja između Afrike i Sj. Amerike, i u Meksičkom zaljevu
- . srednja jura: anoksičan događaj u Tethysu
- . gornja jura: odvajanje istočne od zapadne Gondvane, otvaranje Atlanskog oceana

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## Život u moru

" heksakoralji  
počinju  
formirati velike  
grebene



Stanley, 2005, Freeman

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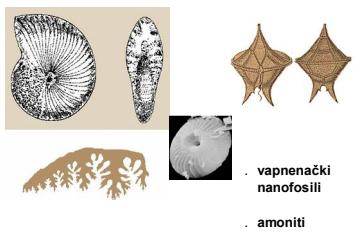
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## Život u moru

" pelagičko područje  
dinoflagelati



Stanley, 2005, Freeman

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## Život u moru

" belemniti  
" amoniti važni  
vodeći fosili



Stanley, 2005, Freeman

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## Život u moru



### " ribe

- . ljuške prekrivaju tijelo
- . skelet djelomično od hrskavica
- . jednostavna čeljust

Stanley, 2005, Freeman

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## Život u moru

### " plesiosaur



Stanley, 2005, Freeman

### ". značajan razvoj

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## Život u moru



### " Ichthyosaurus

- . "riba-gušter"
- . rođanje živih mlađih
- . neki krokodili prešli u more

Stanley, 2005, Freeman

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### Život na kopnu



„šume sličnije  
današnjima nego  
paleozojskim“



Stanley, 2005, Freeman

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### Život na kopnu



„ginko sudjelovao u izgradnji  
šuma“



Stanley, 2005, Freeman

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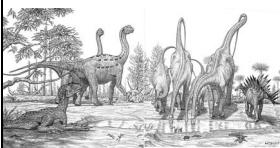
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### Život na kopnu



„početak  
doba  
dinosaura  
sauropodi  
„Morrison fm.“

Stanley, 2005, Freeman

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## Život na kopnu



- ~ **Allosaurus**
  - . najveći mesožed
- ~ **Brachiosaurus**
  - . dug do 30 m



Stanley, 2005, Freeman

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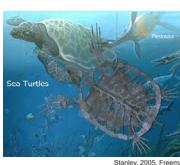
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## Život na kopnu



- ~ razvoj žaba
- ~ razvoj kornjača
- ~ **Pterosaurus**



Stanley, 2005, Freeman

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## Život na kopnu



- ~ spor razvoj sisavaca
  - . i dalje malih dimenzija
- ~ **Protoarcheopteryx**



Stanley, 2005, Freeman

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### Život na kopnu



*protoarchaeopteryx*  
· fosilizirano perje  
repa

Stanley, 2005, Freeman

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### Život na kopnu



*Archaeopteryx*  
· osobine  
gmazova  
· osobine ptica

Stanley, 2005, Freeman

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### Život na kopnu



Archaeopteryx

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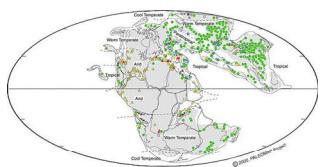
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### Klima



Donja jura

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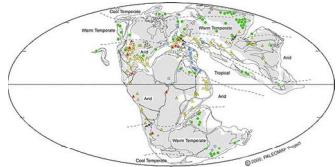
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### Klima



Srednja jura

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### Dezintegracija Pangee

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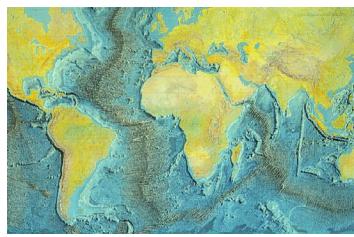
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### Kako se to dogodilo?



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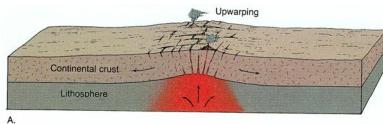
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### Domiranje superkontinenta



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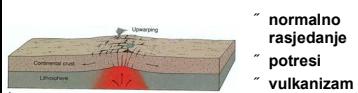
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### Procesi uduženi s domiranjem



„ normalno  
rasjedanje  
„ potresi  
„ vulkanizam

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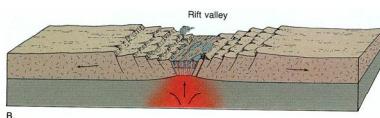
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### Urušavanje doma – riftne doline, horstovi, grabe i polugrabe



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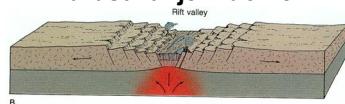
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### Procesi udrženi s urušavanjem dome



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### Širenje litosfere

- " litosfera se stanjuje
- " intruzija i efuzija mafitne magme

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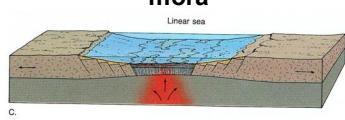
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### Litosfera se spušta ispod razine mora



„ Suvremena linearna mora: Crveno more, Mrtvo more, Perzijski zaljev

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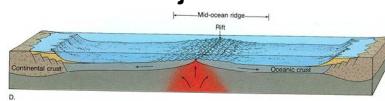
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### Od riftanja do oceana



- „ pasivni rubovi kontinenata se udaljavaju od osi tektonske aktivnosti - srednjeoceanskog hrbta (MOR)
- „ kako se udaljenost od MOR-a povećava, kontinentalni rubovi se hlade, postaju gušći i spuštaju se - kontinentalni šelfovi

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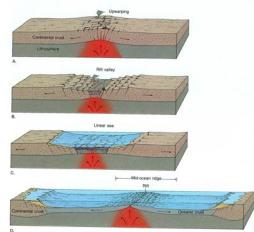
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### Od domiranja do oceana



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### Kada se to dogodilo?

- “ riftanje počeo u g. trijasu
- “ prva potpuno oceanska kora (linearno more do rani oceanski bazen) je jurska

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### Koji dokazi podupiru ovaj model?

- “ Starost najstarije oceanske litosfere u Atlantiku nasuprot kontinenata
- “ Krustalna struktura kontinentalnih šelfova iz seizmičkih profila: normalni rasjedi i nagnuti blokovi
- “ Magmatski i sedimentni zapisi u riftnim bazenima

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### Paleogeografija



- “ spor nastavak riftanja
- “ formiran cijelovit tjesnac Tethysa
- “ spajao Tethys i Pacific

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## Paleogeografija



- " riftanje prvo počelo na sjeveru, zatim na jugu
- " odvajanje Sj. Amerike od Afrike u sr. juri

Wicander & Monroe, 2004, Thomson

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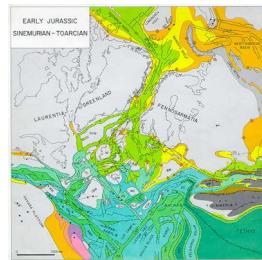
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## Europa



Donja jura

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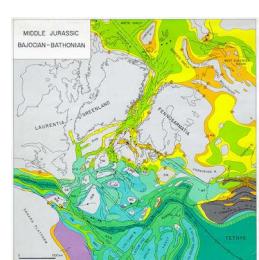
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## Europa



Srednja jura

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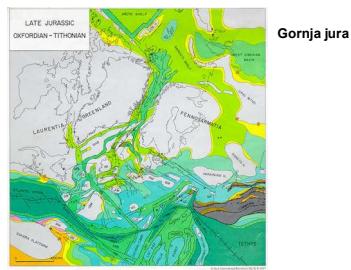
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## Europa



## Europa

### “mobilni prostori

#### . Sjeverne vapnenačke Alpe

- ~ d. jura: transgresivni klastiti (grestenski facijes), krinoidno-brachiopodni vapnenac, cefalopodni vapnenac
- ~ sr. jura: lapori, te vapnenci s pelagičkim utjecajem
- ~ g. jura: grebenski vapnenci, vapnenci s rožnjacima

## Europa

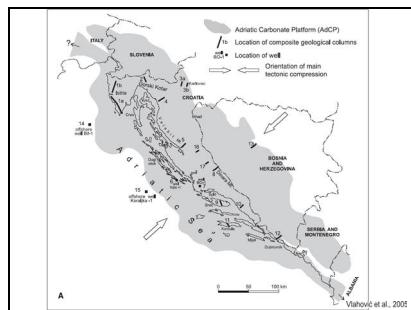
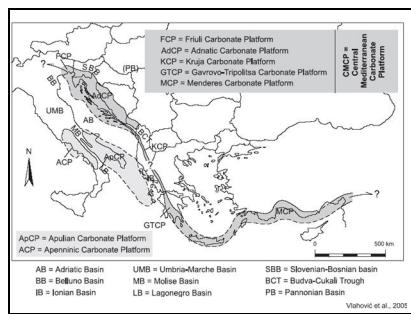
#### . Južne vapnenačke alpe

- ~ d. jura: amonitni vapnenci i crni škriljavci, oolitni i krinoidni vapnenci
- ~ sr. jura: aptiški vapnenci
- ~ g. jura: vapnenci, rožnjaci

## Hrvatska

### Dinaridi

- . Jadranska karbonatna platforma (JKP): donja jura - gornja kreda
- . nastala dezintegracijom megaplatforme kao dijela nekadašnje Gondvane
- . dinamičan razvoj s čestim emerzijama



## Hrvatska

### " donja jura

- . vapnenci s algama i foraminiferama
- . Lithiotis vapnenac
- . mrljasti (bioturbirani) vapnenac
  - " na rubovima oolitični vapnenac

### " srednja jura

- . na ŠZ masivni vapnenci s ulošcima dolomita
- . na JI oolitični vapnenci
- . na SI emerzija
- . lokalna tektonika proizvela mjestimične emerzije
  - " Istra - breča

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## Hrvatska

### " gornja jura

- . u početku uglavnom lagunarni vapnenci, kasnije lokalna izdizanja i produbljavanja
- . Sl dio koji je bio u emerziji je potopljen, u središnjem dijelu produbljavanje : vapnenci s rožnjacima (radiolarije, amoniti) - Lemeške naslage
- . konac jure: tektonika formirala male bazene koji su zatim zatravani - gotovo cijela platforma ponovo plitkovodna

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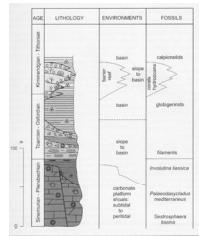
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## Hrvatska



Razvoj jure na Žumberku.

Dragičević & Velič, 2002

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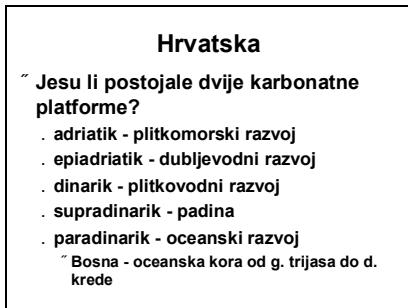
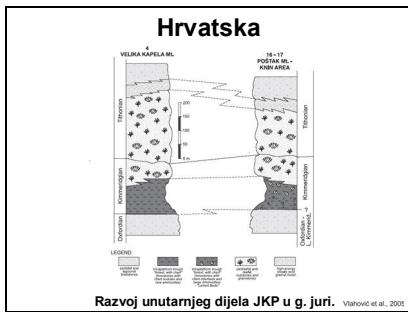
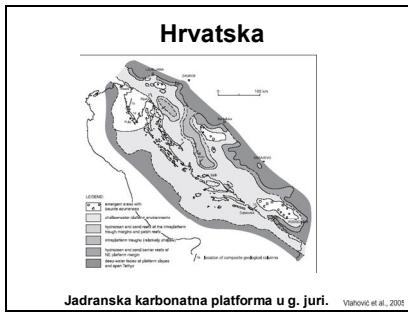
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## Hrvatska

“ sjeverna Hrvatska

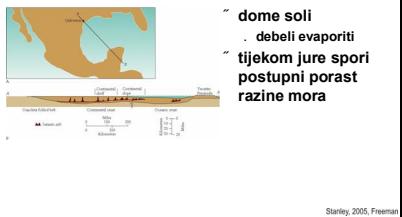
- oceanska sedimentacija: radiolariti, šejlovi, siliti, vapnenački olistoliti
- od sr. jure do d. krede: subdukcija oceanske pod oceansku koru unutar Tethysa
- Medvednica: ofiolitni melanž i plavi škriňavci

## Paleogeografija



## Paleogeografija

- “ dome soli
- debeli evaporiti
- “ tijekom jure spori postupni porast razine mora



### Tektonski događaji - istočna Sj. Amerika



" Palisade silovi  
- mafitna intruzija udružena s riftanjem

Stanley, 2005, Freeman

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### Tektonski događaji - zapadna Sj. Amerika



" Sundance more  
- globalni porast razine mora

Stanley, 2005, Freeman

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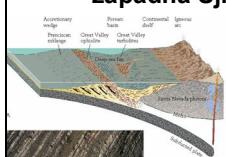
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### Tektonski događaji - zapadna Sj. Amerika



" početak kordiljerske orogeneze  
" dodatni prirast

Stanley, 2005, Freeman

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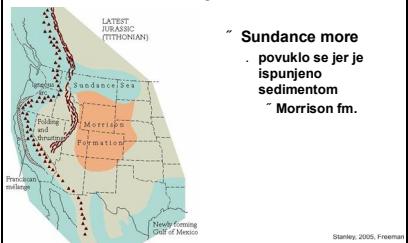
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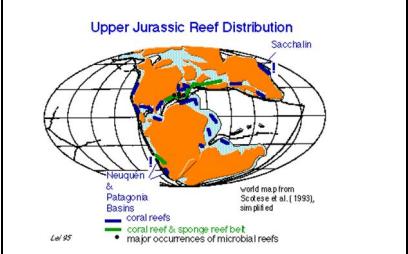
## Tektonski događaji - zapadna Sj. Amerika

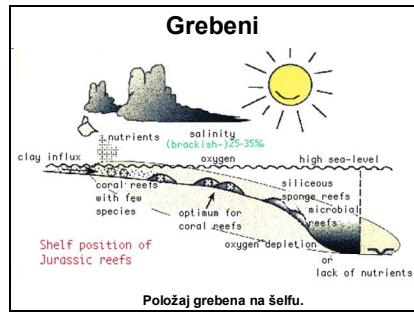


## Dinosauri



## Grebni





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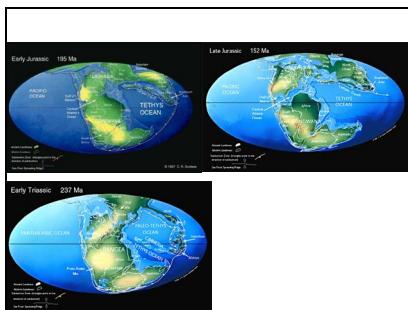
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### Masovno izumiranje

„ umjereni izumiranje  
. velik broj dinosaura



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## Mineralne sirovine

- " sedimentno željezo: zapadna Europa, Ural, Ruska platforma
- " nafta: Ruska platforma, Sj. Amerika, Bliski Istok
- " boksit: Ural, Kazahstan, Istra
- " ugljen: Kazahstan, sj. Kina, Indija, i. Australija, J. Amerika
- " zlato, željezo, volfram, olovo: i. Azija, Kordilijera
- " mangan: Bosna
- " Hrvatska: ukrasni i građevni kamen

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