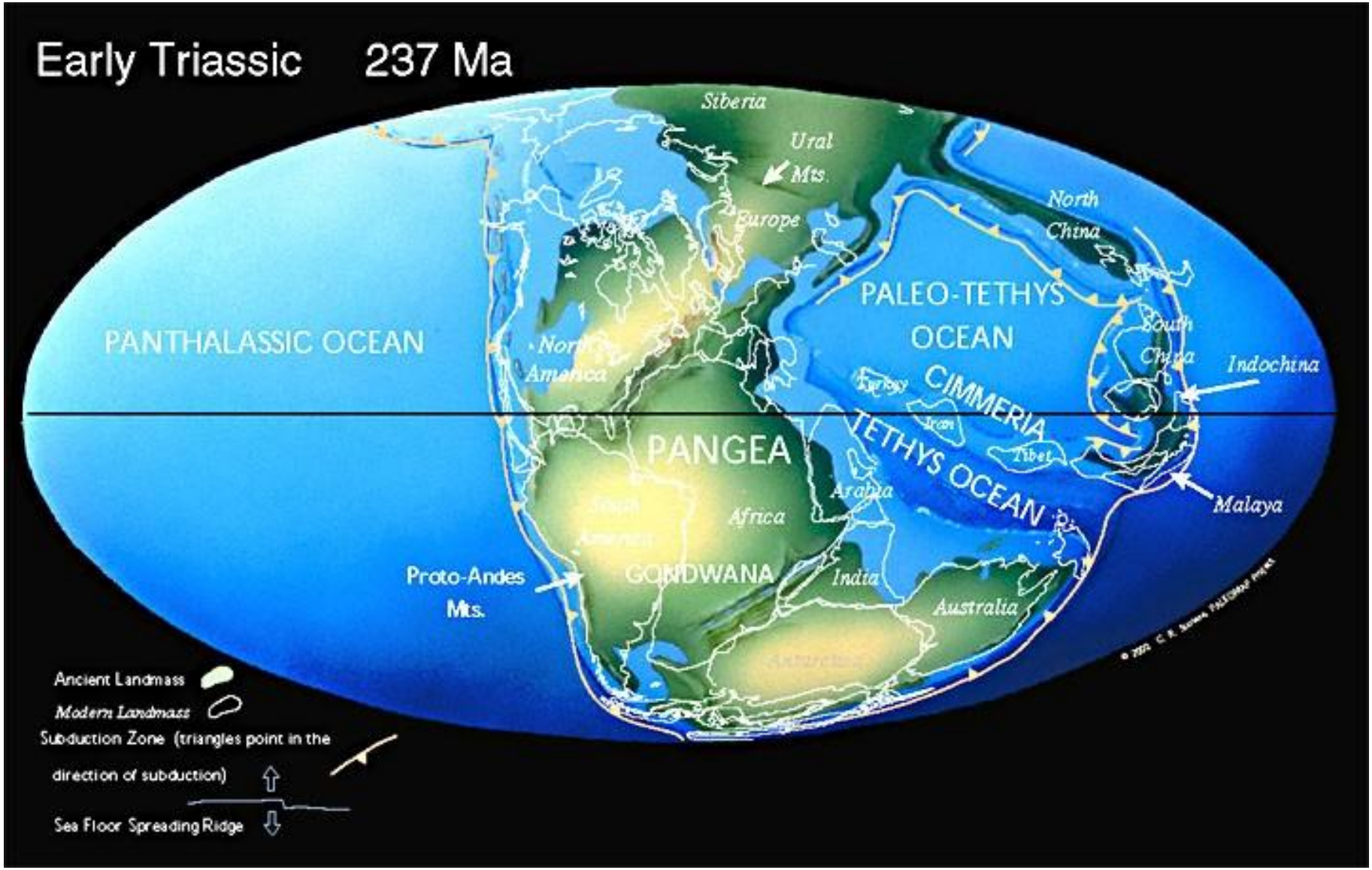
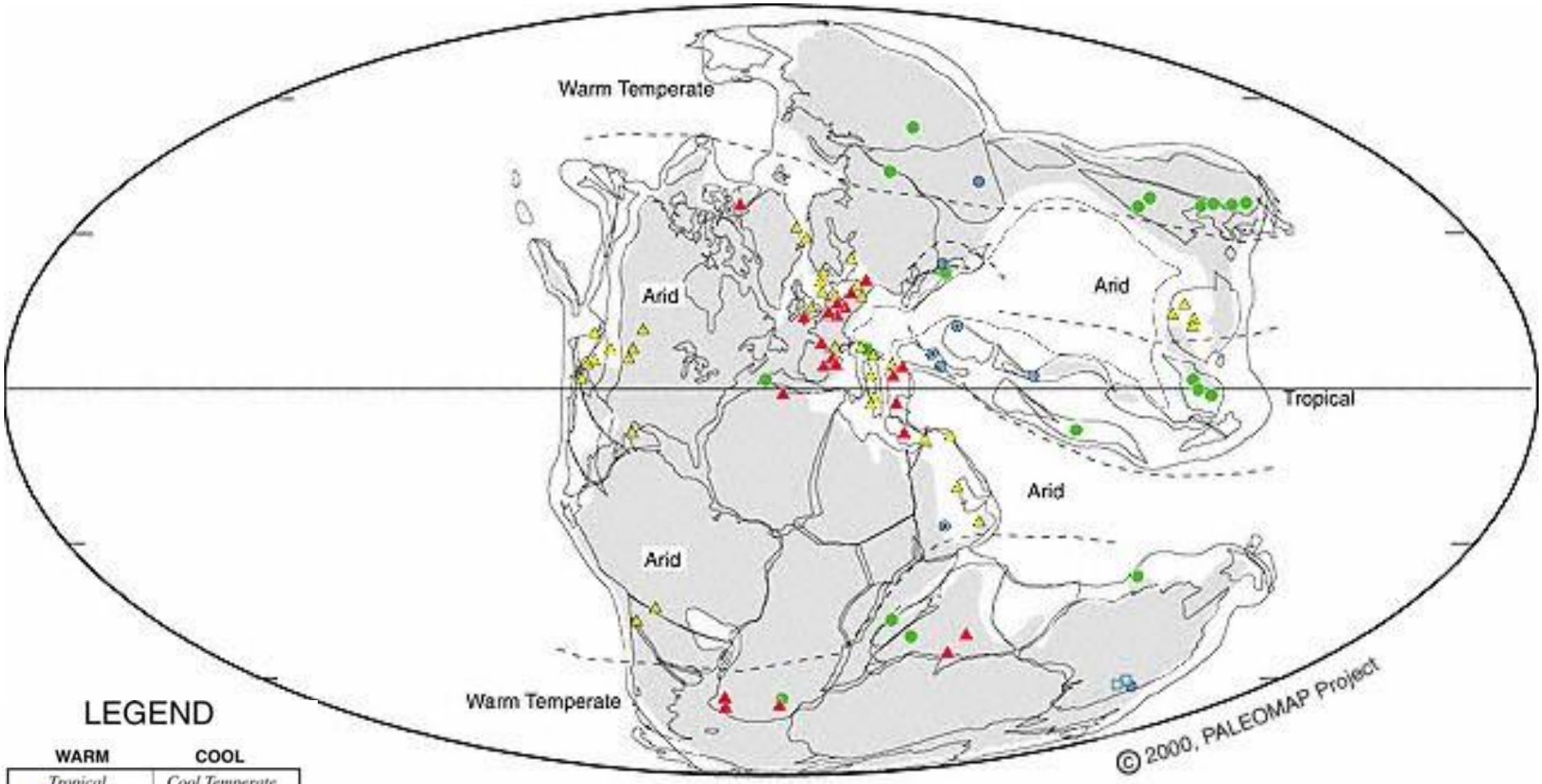
ИСТОРИЧЕСКАЯ ГЕОЛОГИЯ

Триасовый период



Палеотектоническая реконструкция Земли

Климат



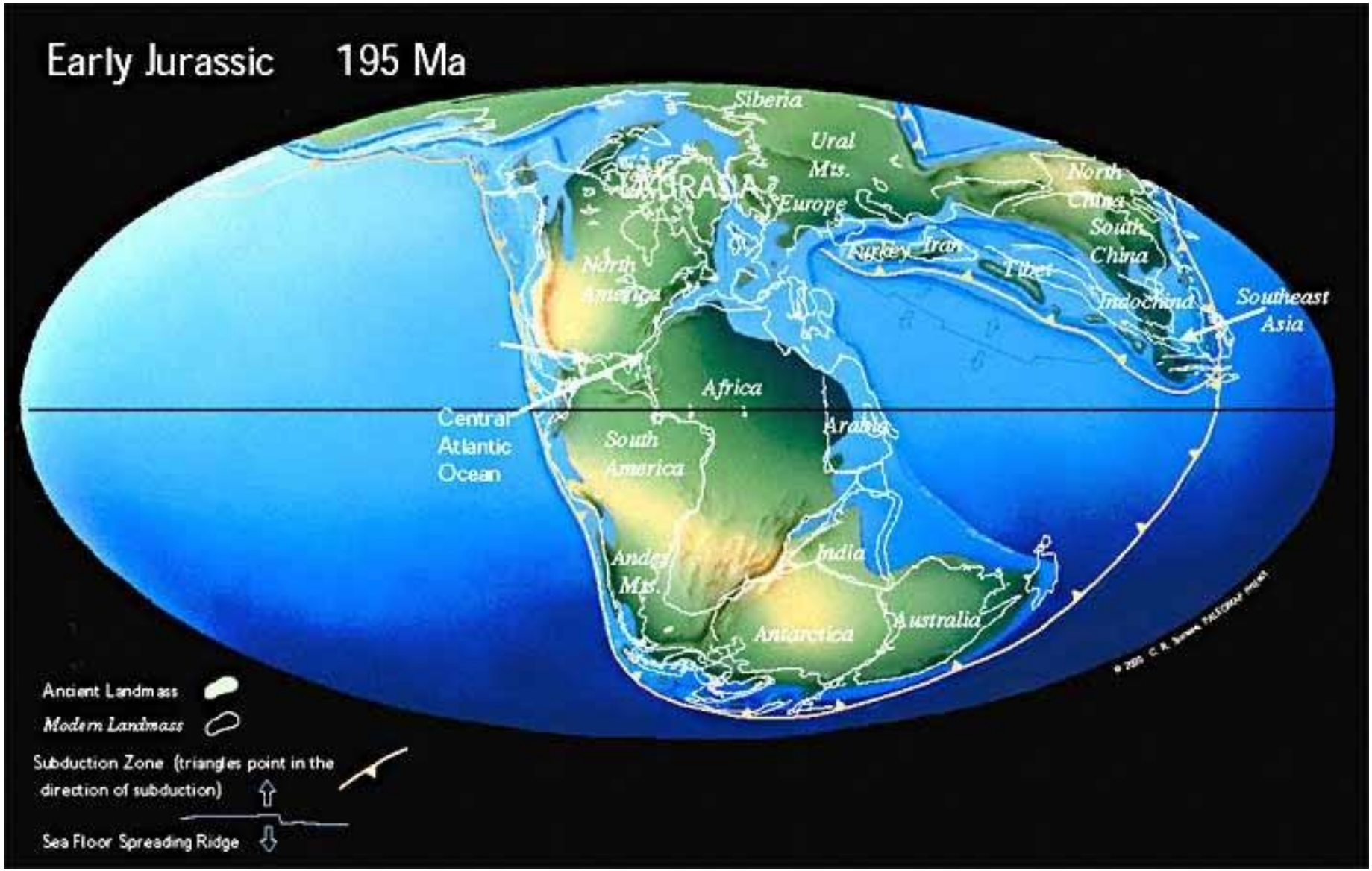
Lower Triassic

LEGEND

	WARM	COOL
WET	*Tropical*: Coal, Bauxite, Laterite	*Cool Temperate*: Coal & Tillites
	Warm Temperate: Kaolinite (& coal & evaporite), Crocodiles, Palms & Mangroves	
DRY	*Arid*: Evaporite, Calcrete	*Cold*: Tillite, Dropstone, Glendonite

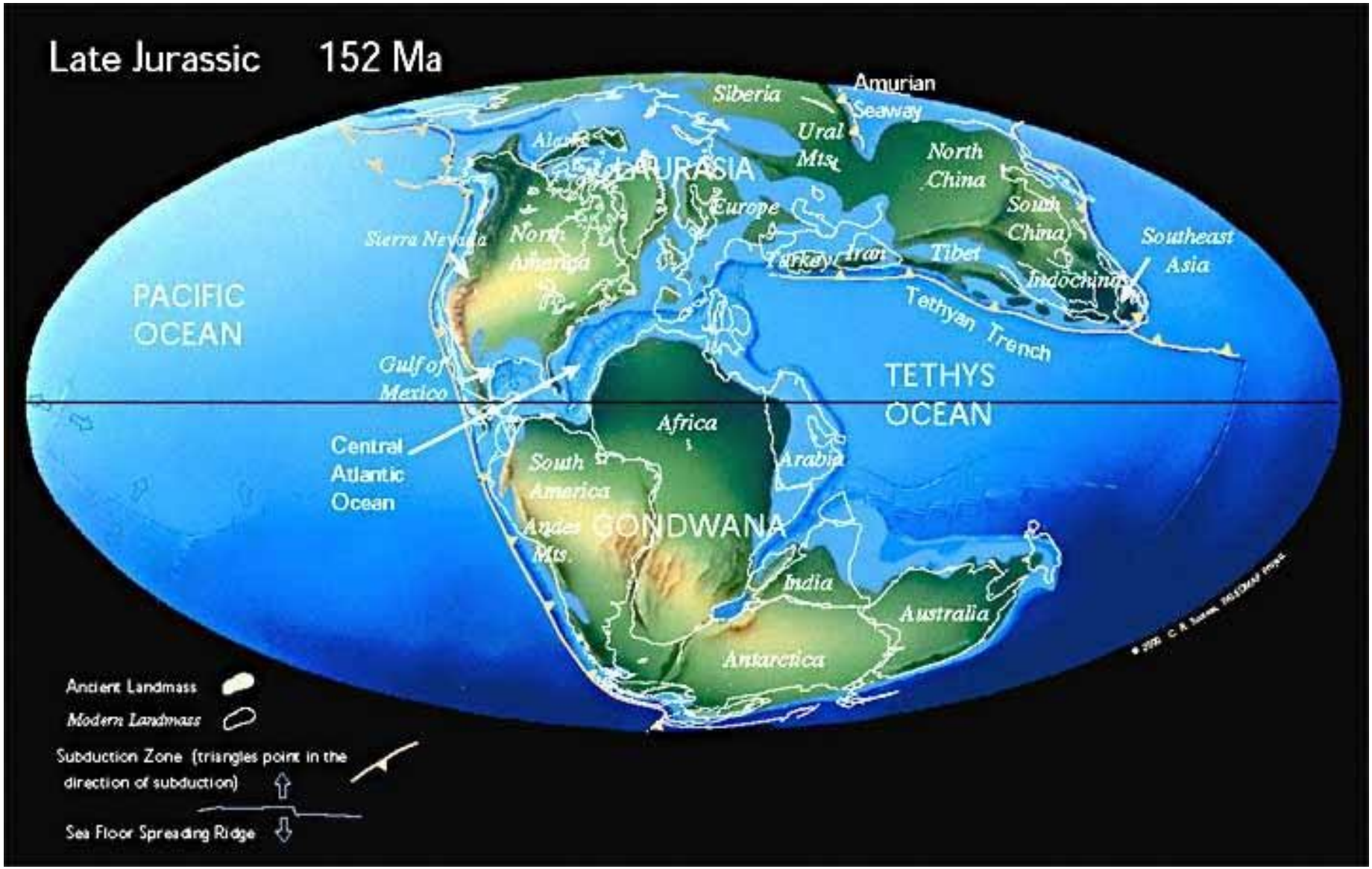
"Paratropical" = High Latitude Bauxites

Юрский период



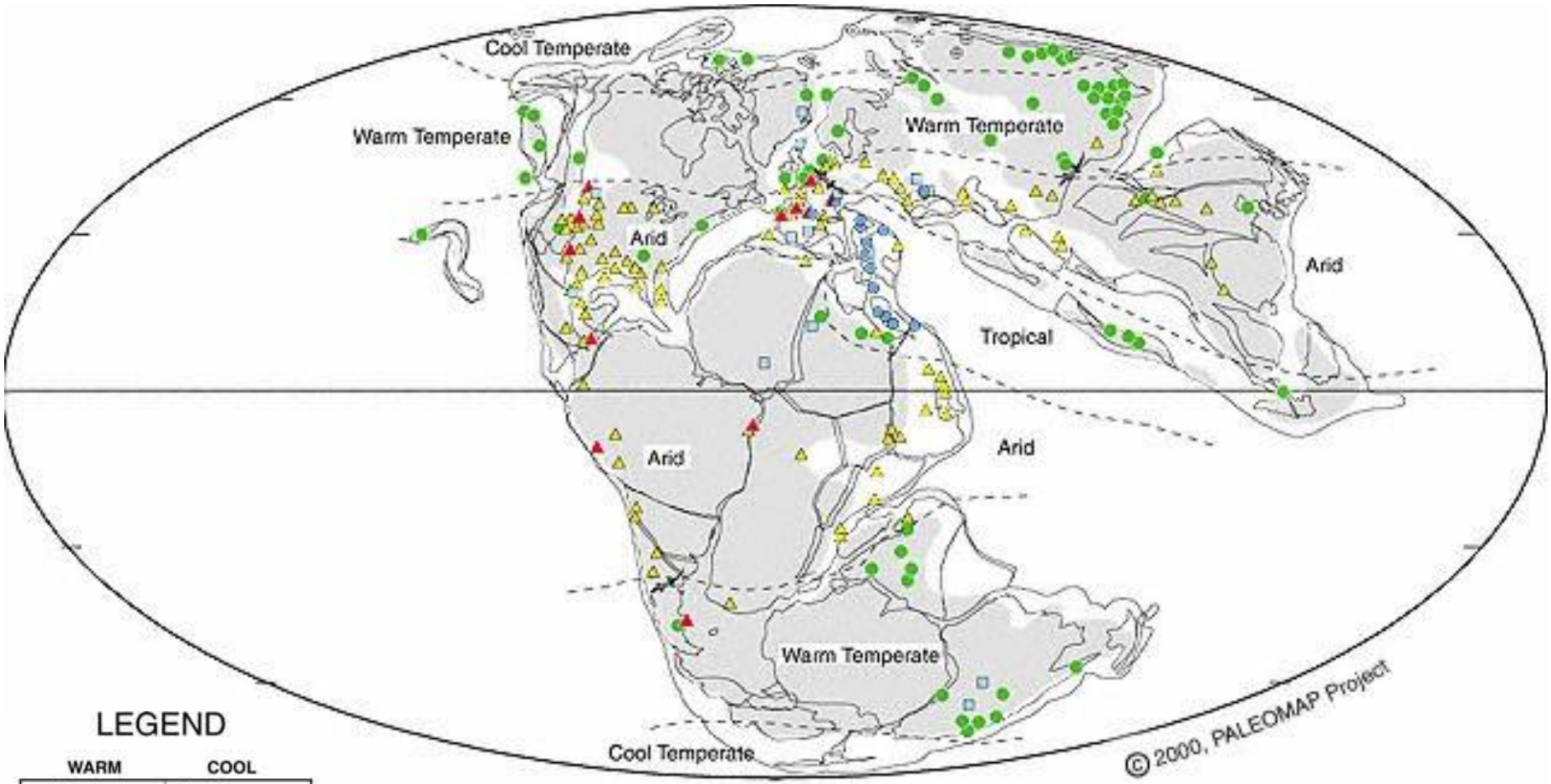
Палеотектоническая реконструкция Земли

Юрский период



Палеотектоническая реконструкция Земли

Климат

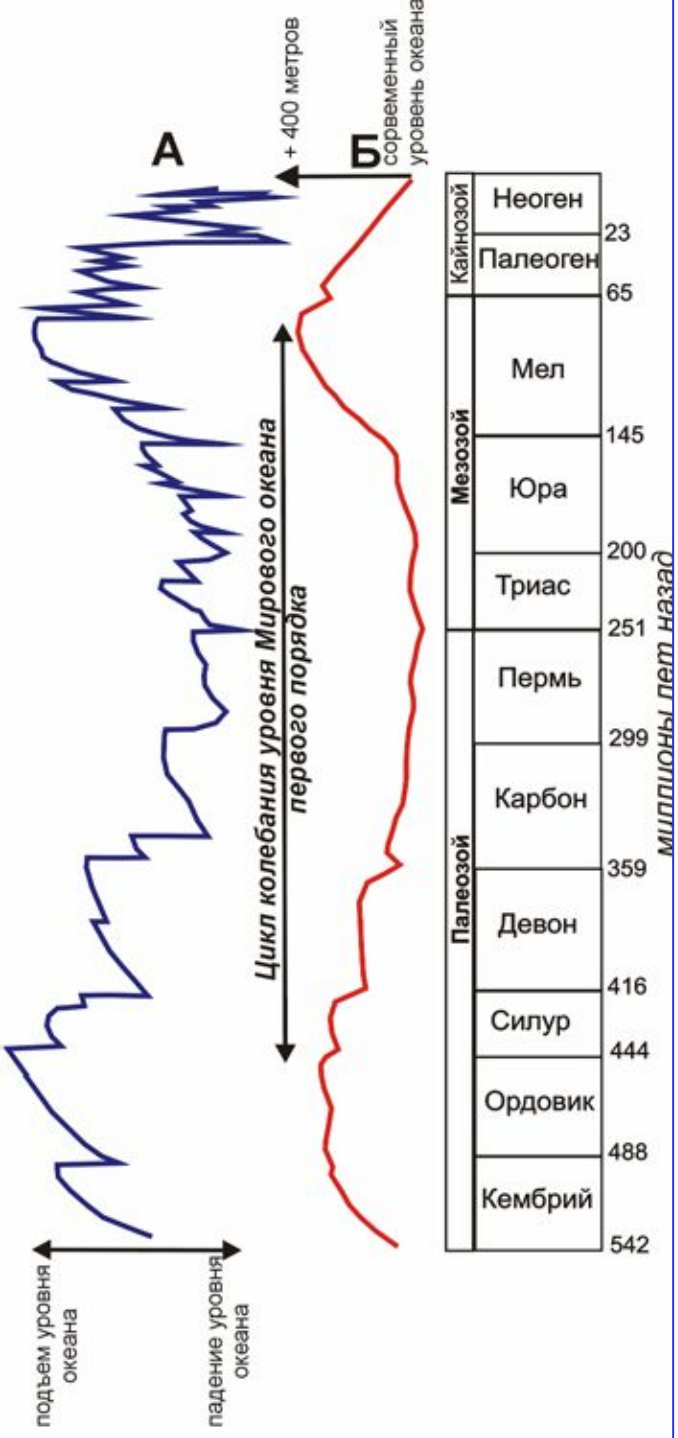


LEGEND

	WARM	COOL
WET	*Tropical* Coal Bauxite Laterite	*Cool Temperate* Coal & Tillites
	Warm Temperate Kaolinite (& coal & evaporite) Crocodiles Palms & Mangroves	
DRY	*Arid* Evaporite Calcrete	*Cold* Tillite Dropstone Glendonite

"Paratropical" = High Latitude Bauxites

Upper Jurassic

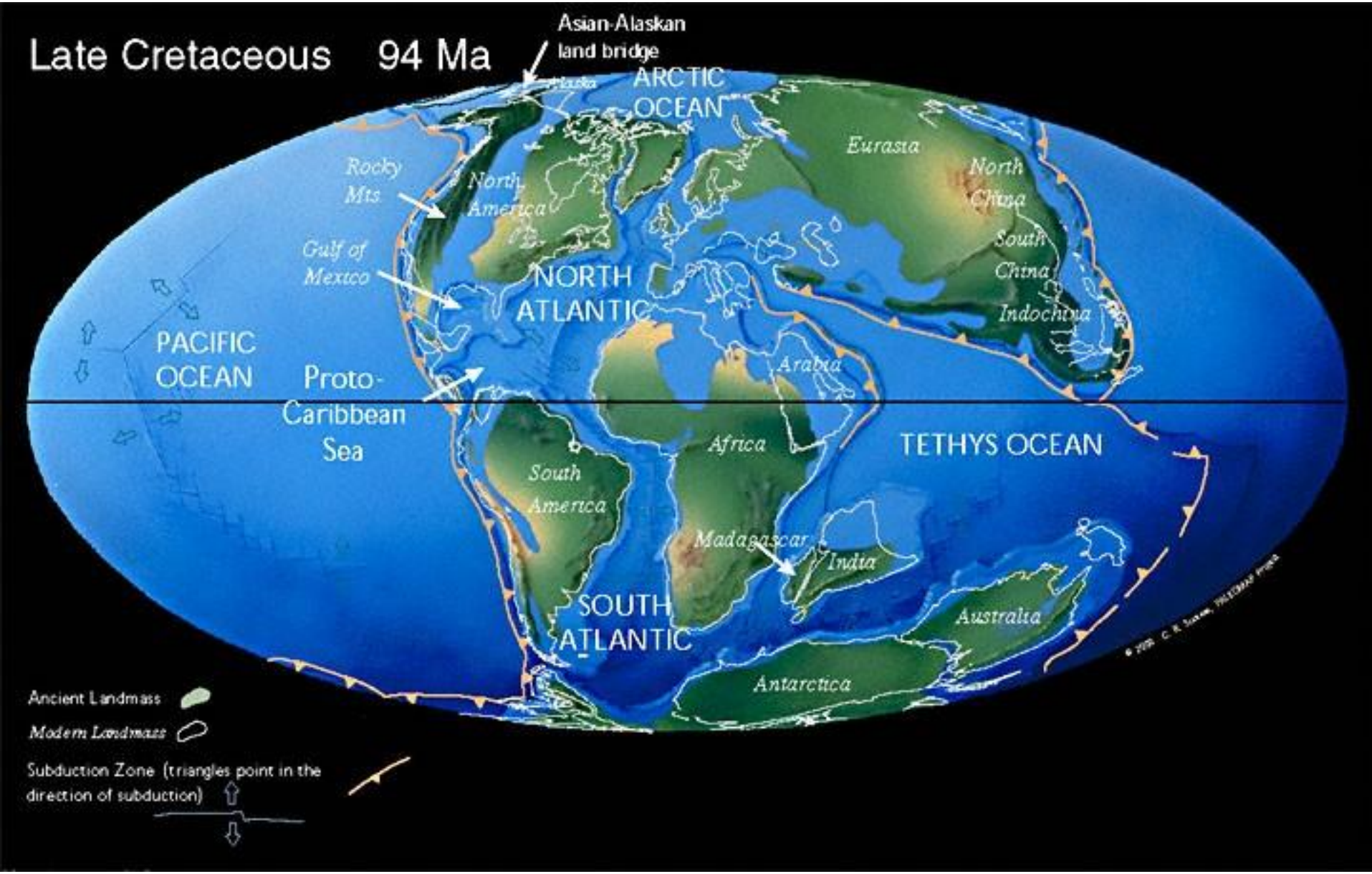


Меловой период. Палеогеографические события

- **Талассократия, огромные эпиконтинентальные бассейны**
- **Накопление писчего мела**
- **Аридный климат – в начале, смена на гумидный теплый - в конце**
- **Резкое уменьшение эрозии в связи с появлением травы**
- **Развитие карбонатных шельфов**

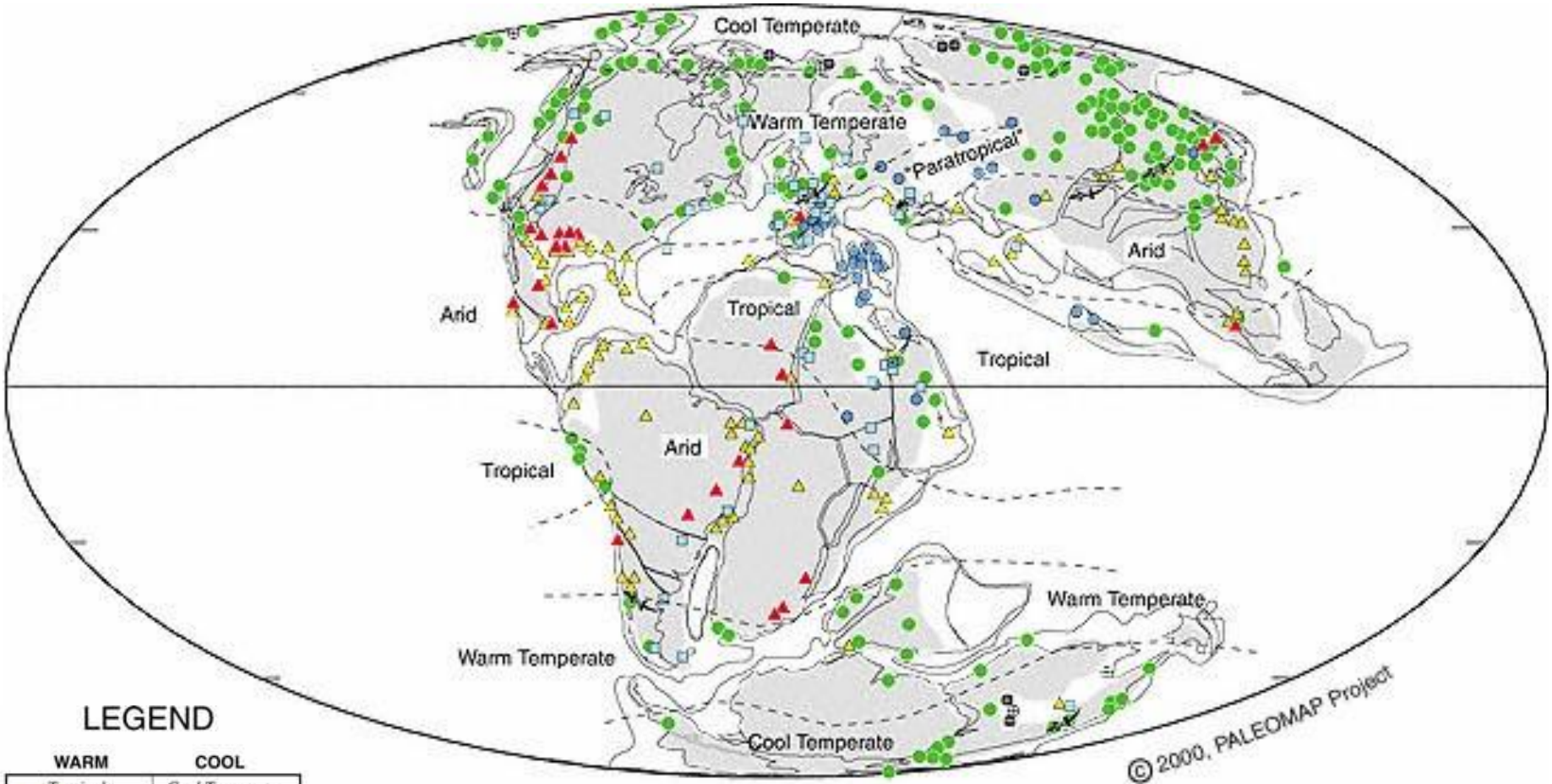
«Событие» на рубеже мела и палеогена: ? метеоритная бомбардировка или вулканизм

Меловой период



Палеотектоническая реконструкция Земли

Климат

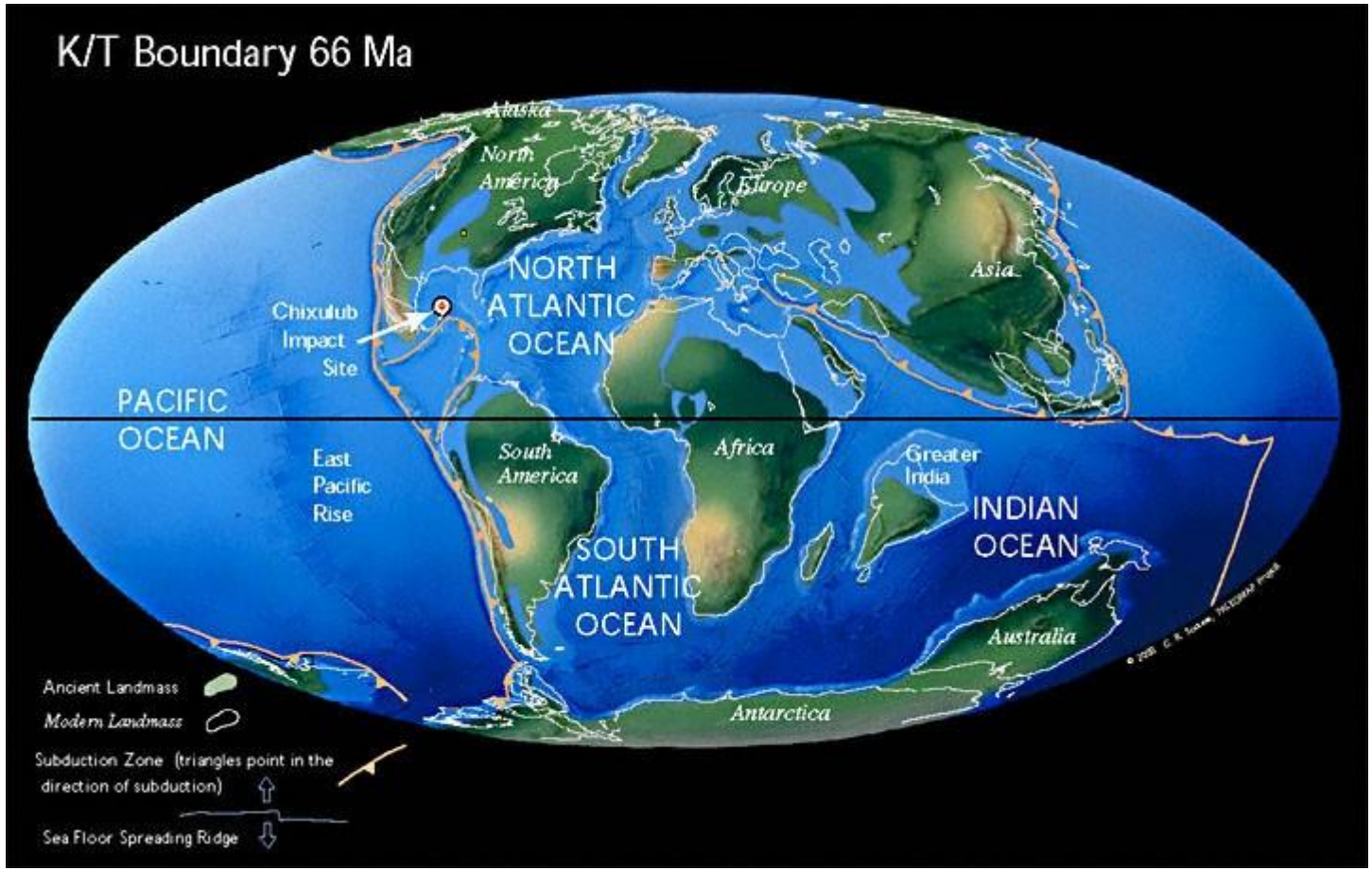


Lower Cretaceous

LEGEND

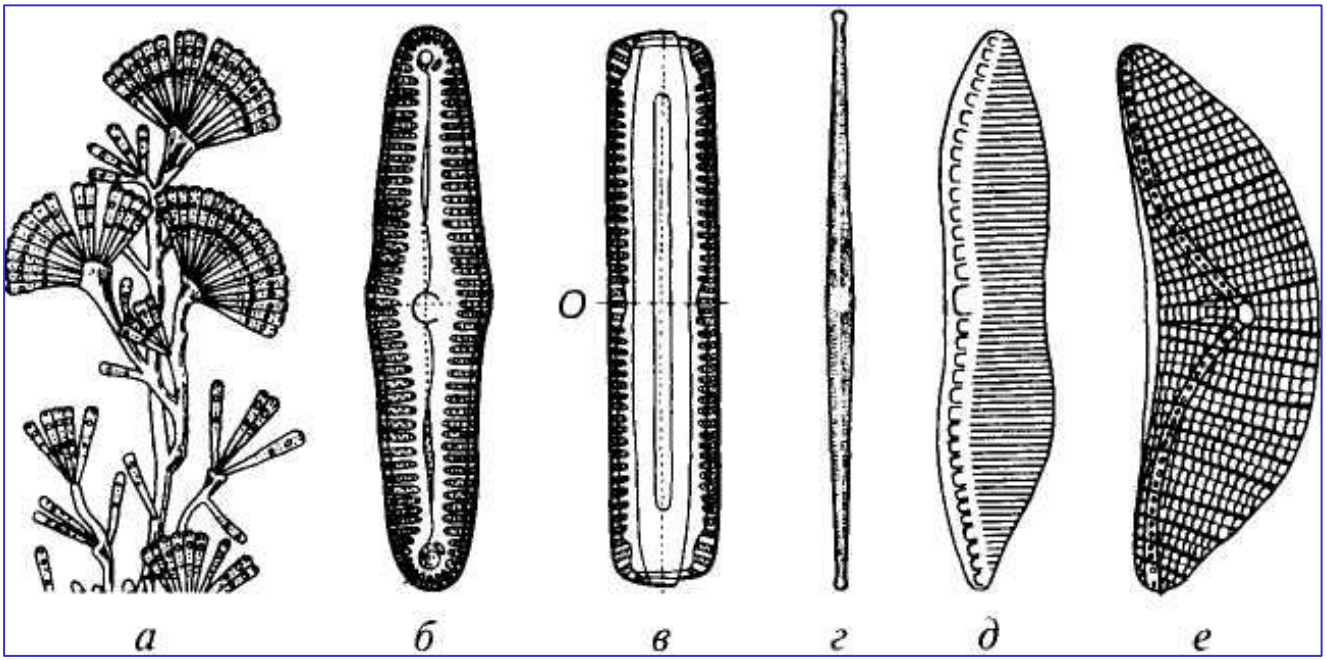
	WARM	COOL
WET	*Tropical*: Coal, Bauxite, Laterite	*Cool Temperate*: Coal & Tillites
	Warm Temperate: Kaolinite (& coal & evaporite), Crocodiles, Palms & Mangroves	
DRY	*Arid*: Evaporite, Calcrete	*Cold*: Tillite, Dropstone, Glendonite

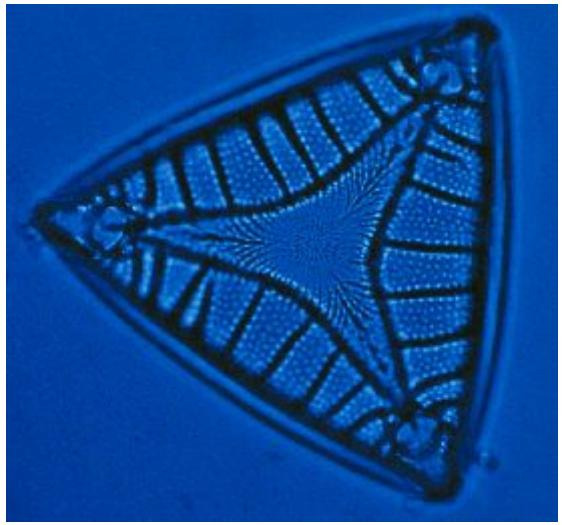
"Paratropical" = High Latitude Bauxites

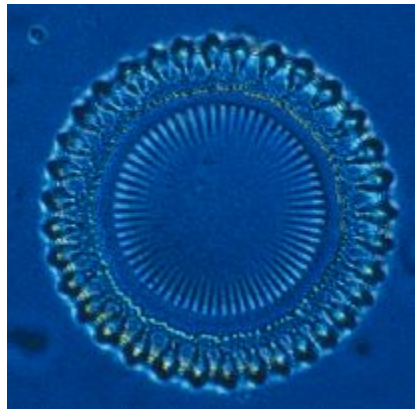


Палеотектоническая реконструкция Земли

Развитие флоры в мезозое

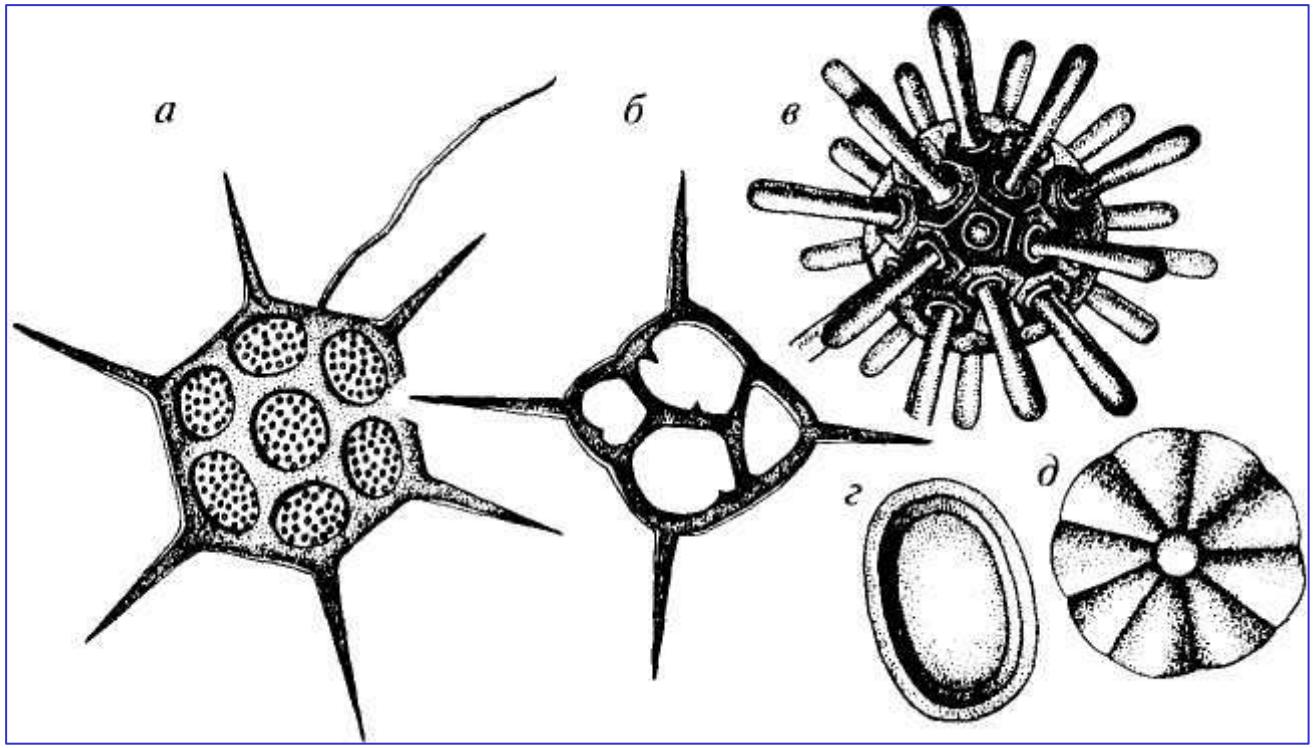


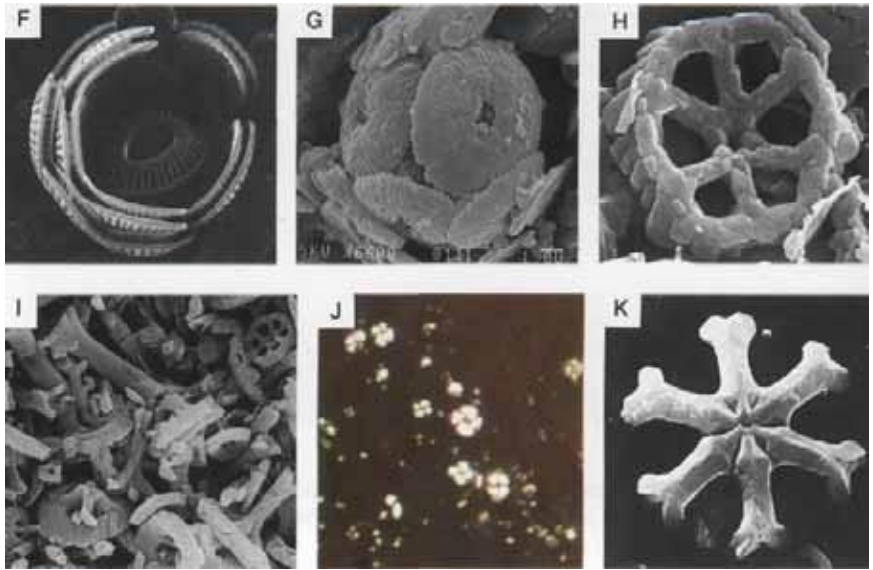




Диатомовые Водоросли, Diatomeae (P-Q)

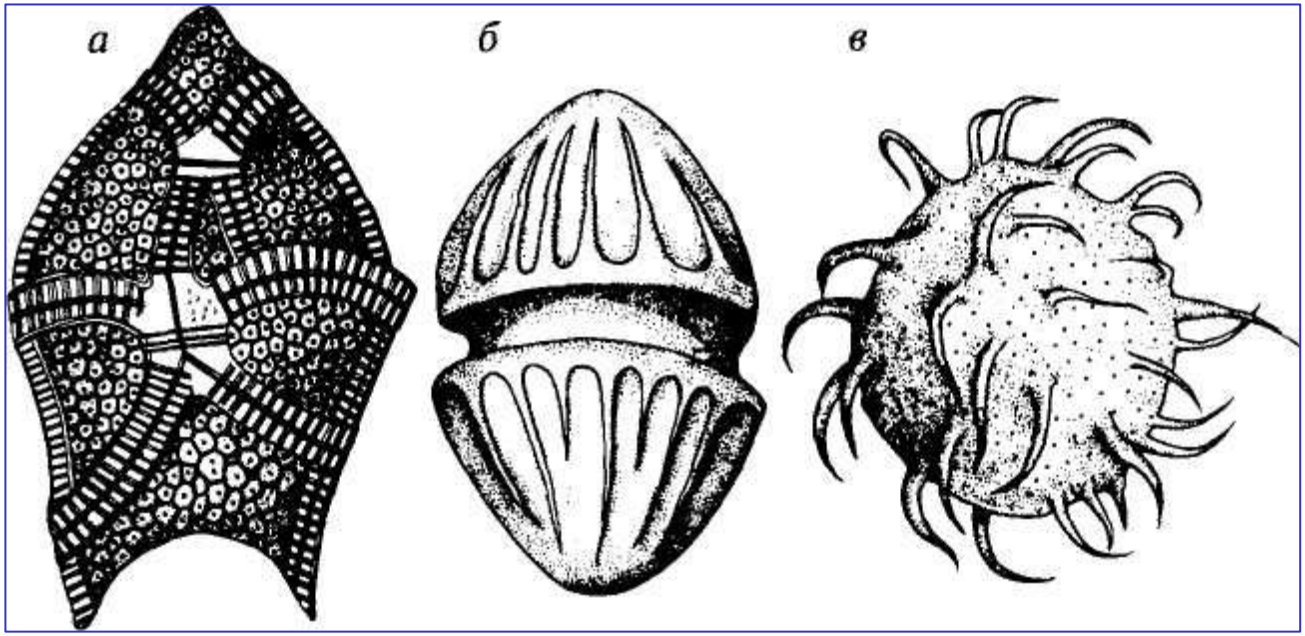
Развитие флоры в мезозое

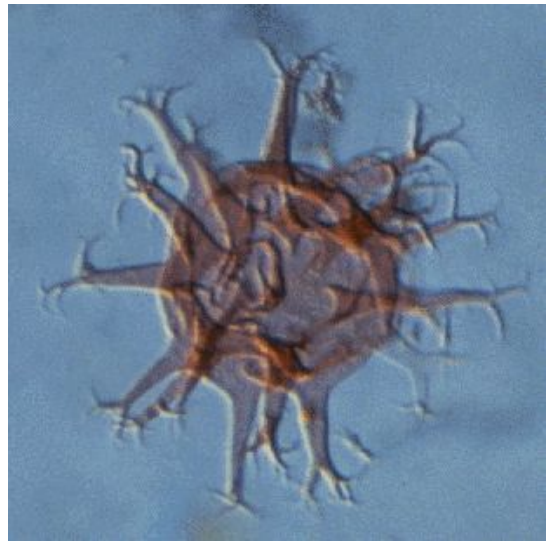


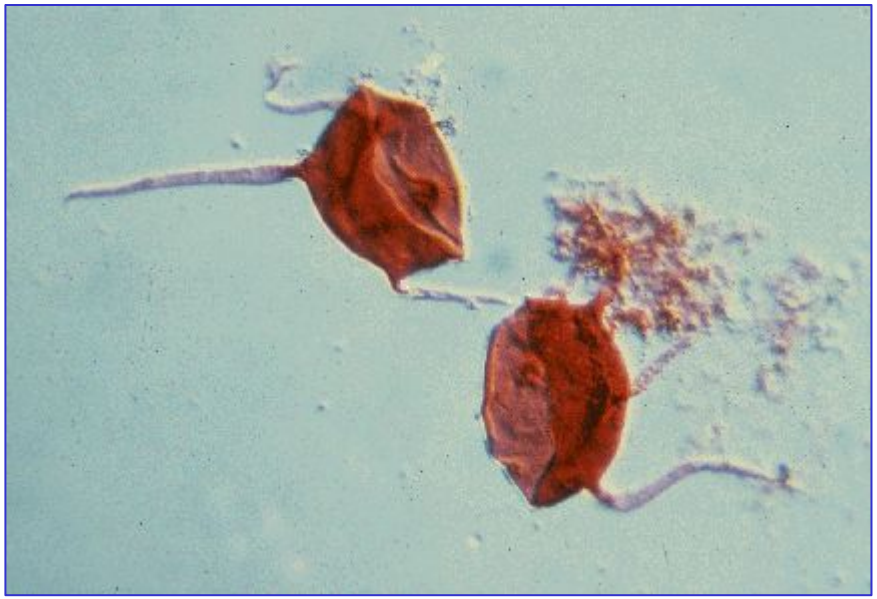


Золотистые Водоросли, Chrysophyta (T-Q)

Развитие флоры в мезозое

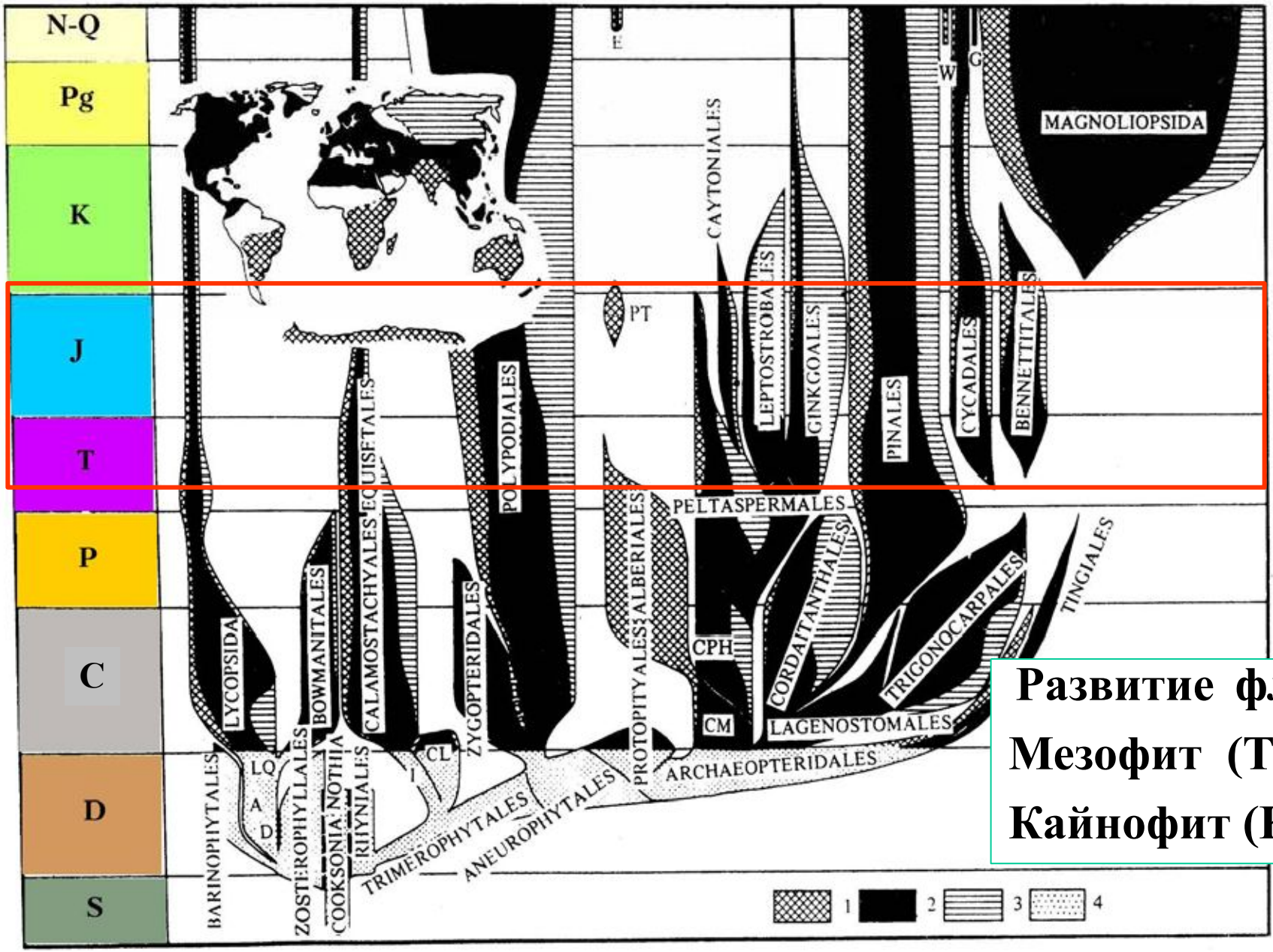






Динофитовые Водоросли, Dinophyta (P-Q)

Развитие флоры в мезозое

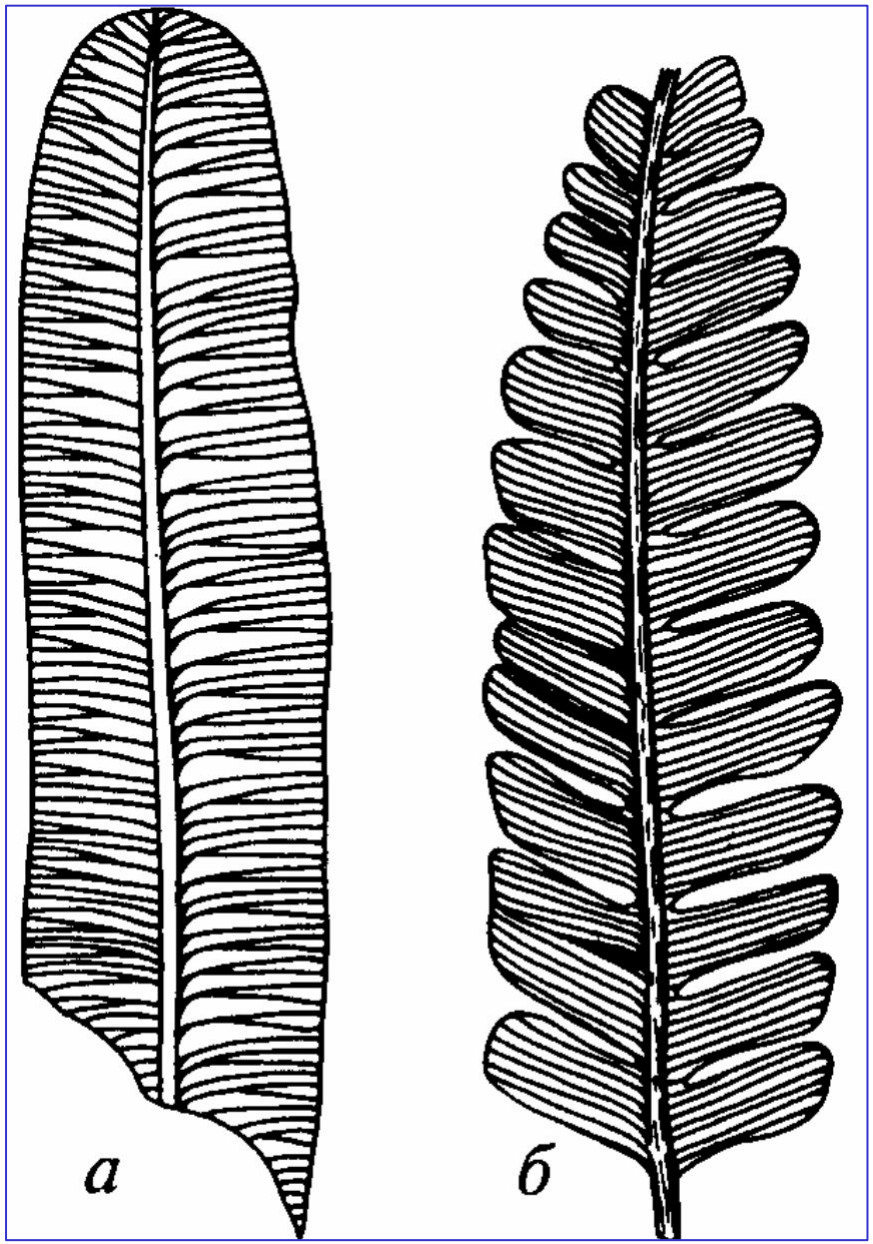


Развитие флоры

Мезофит (T_2-K_1)

Кайнофит (K_1-Q)

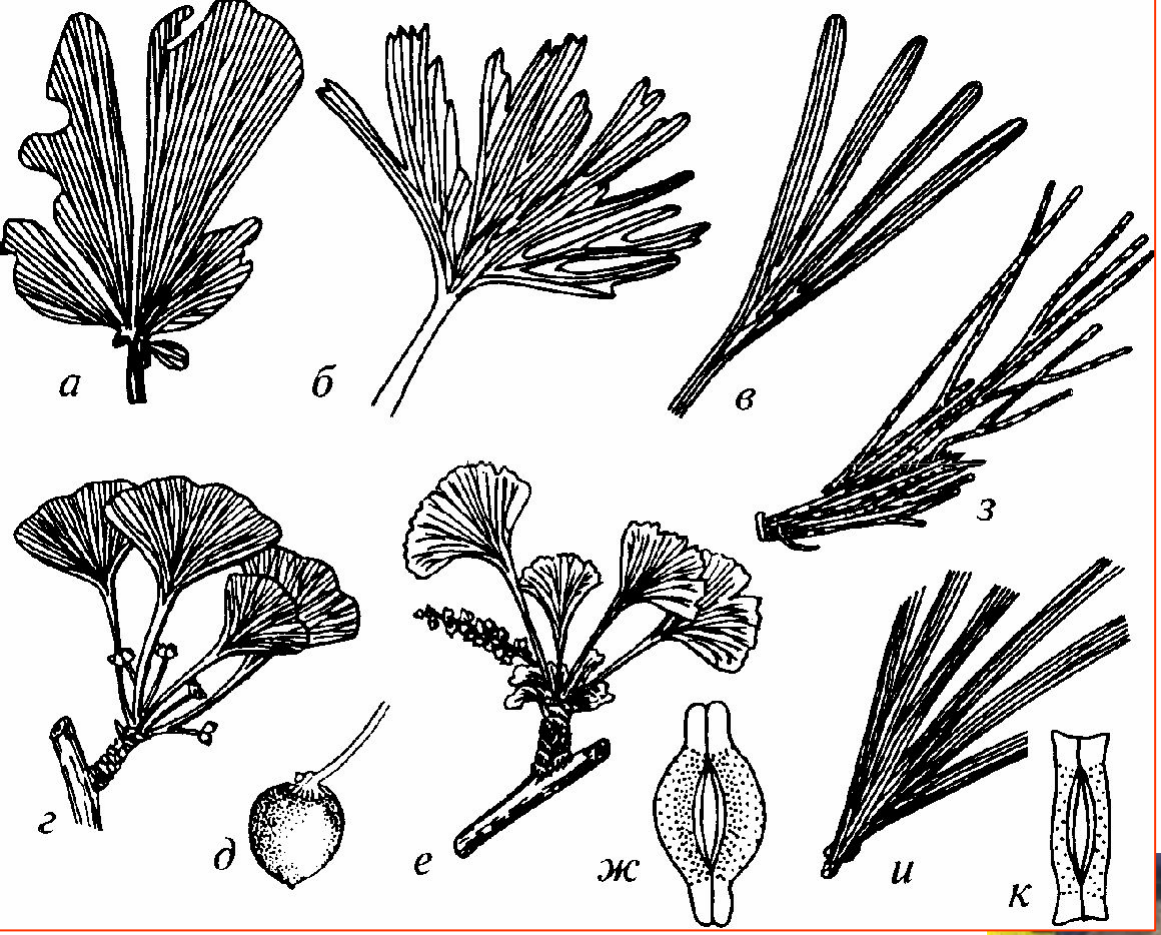
Развитие флоры в мезозое



Порядок Cycadales (P_2-Q)

а **— лист типа *Taeniopteris* (Сз-$К_1$); *б* — *Nilssonia* (Т-К)**

Развитие флоры в мезозое

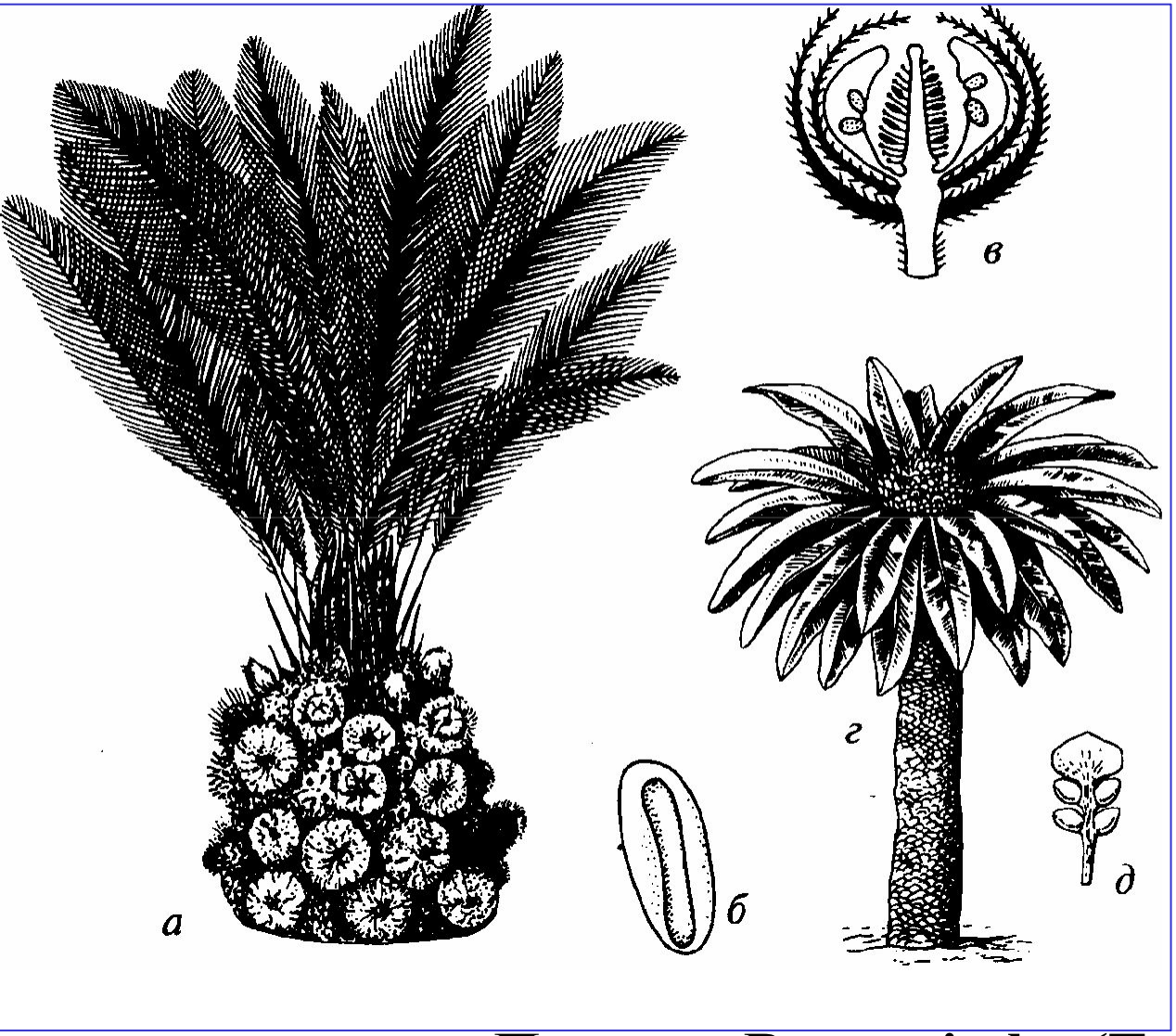


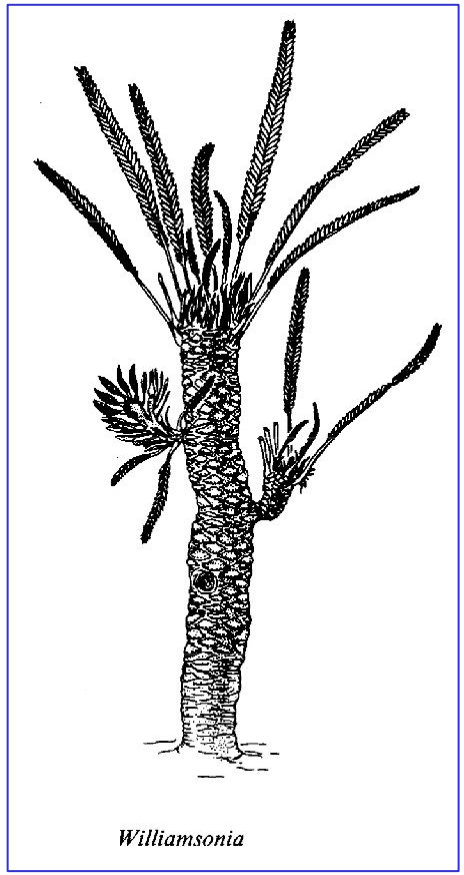
Порядки

Ginkgoales (P-Q),

Czekanowskiales (T_3-K)

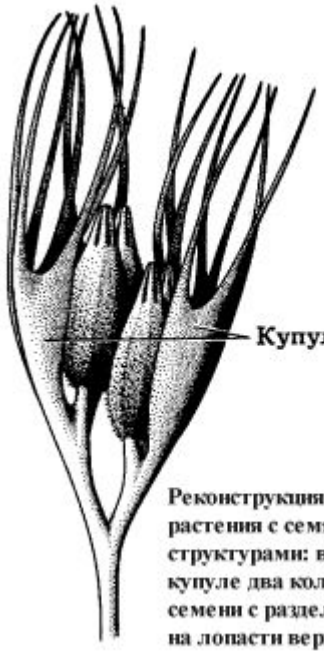
Развитие флоры в мезозое



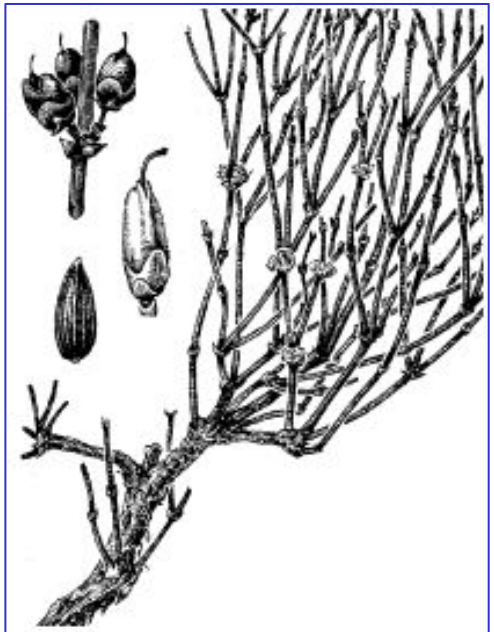


Порядок Bennettitales (T_2-K)

а, *б* — Cycadoidea (J-K): а — реконструкция, *б* — пыльцевое зерно; в — *Williamsoniella* (J), реконструкция обоеполого стробила; г — реконструкция дерева с листьями типа Bjuvia (T_3); *д* — мегаспорофилл с четырьмя семязачатками (*Palaeocycas*, T_3)



Реконструкция ветви растения с семяподобными структурами: в каждой купуле два колбовидных семени с разделенными на лопасти верхушками

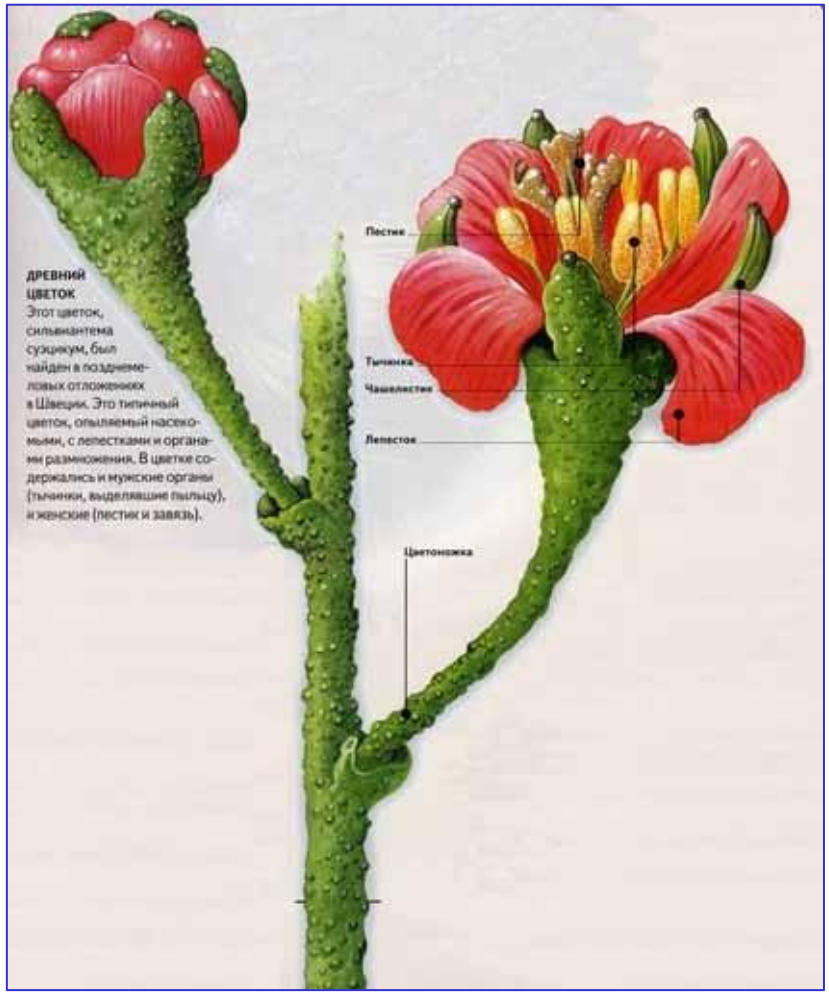


Эфедра хвощевая – современная форма предполагаемого предка цветковых растений

Развитие флоры в мезозое Происхождение покрытосеменных (Magnoliophyta, Angiospermae)

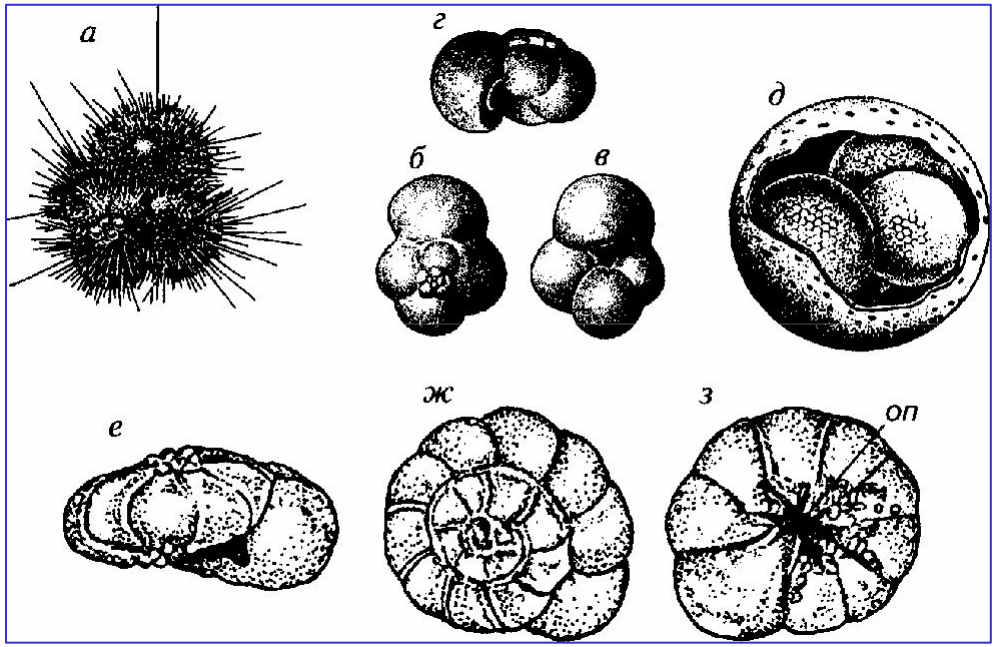
- **“Проклятая тайна” (Ч.Дарвин)**
- **Первое появление - средние широты Северного и Южного полушарий 120–115 млн лет назад (готеривский век раннего мела)**
- **Несколько крупных центров параллельного развития**
- **? связь с рифтами и насекомыми**
- **Проангиоспермы – вымершие гнетовые (*Eoantha*) ?**
- **? произошли от беннеттитовых**

Развитие флоры в мезозое. Покрытосеменные

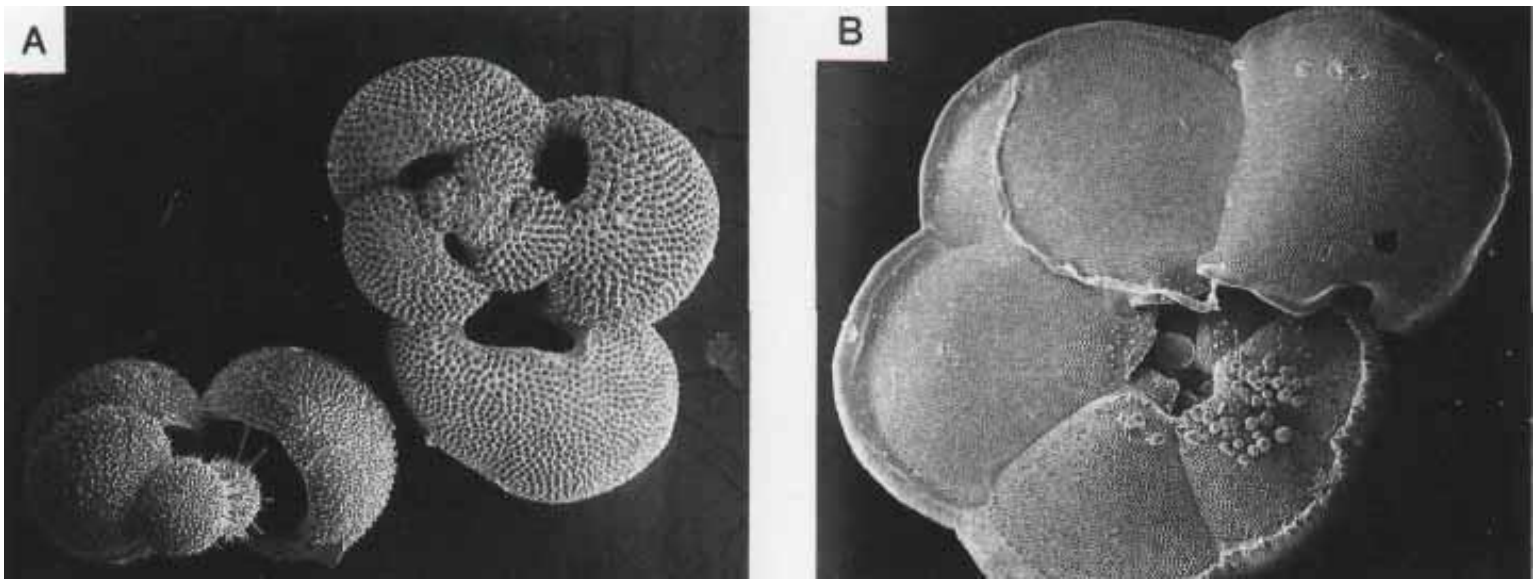


- ***Archefructus***, K_1, **Китай**
- ***Sylviantema***, K_2, **Швеция**

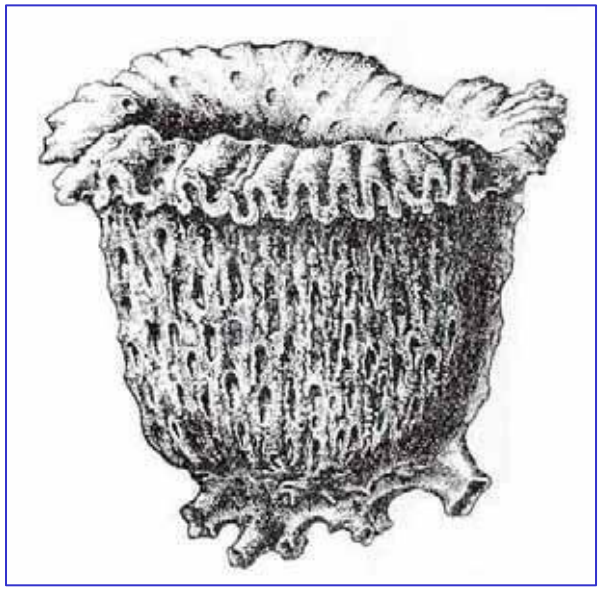
Развитие жизни в мезозое

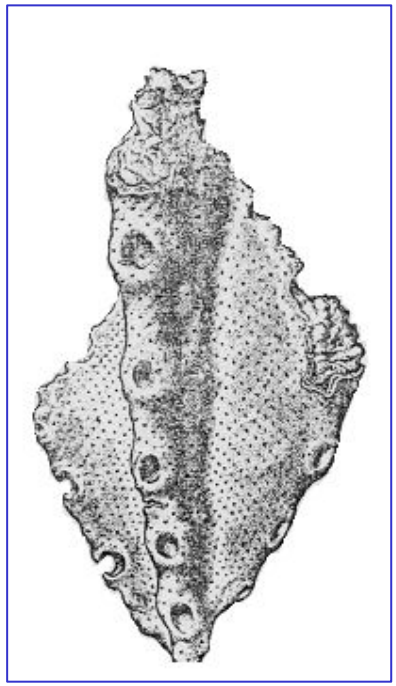


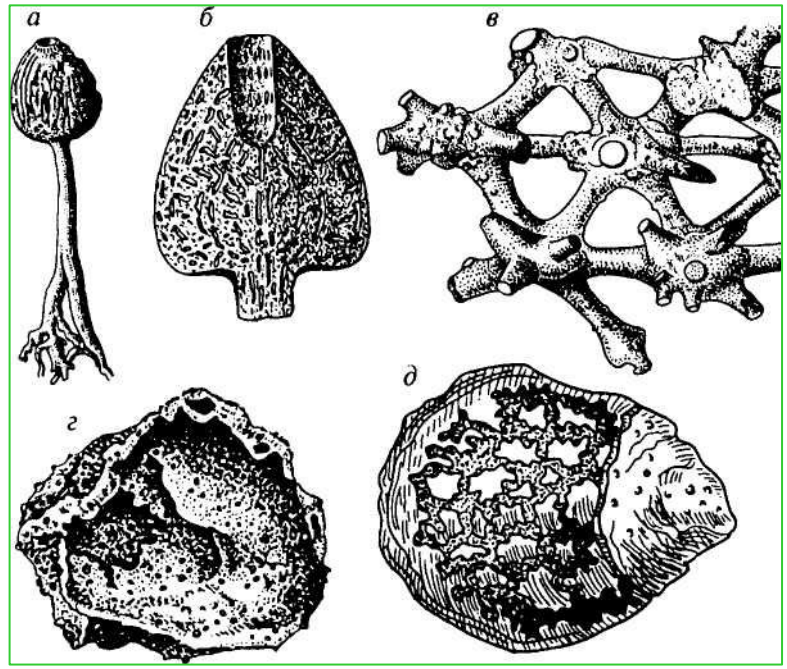
- **Появление планктонных фораминифер в J_1**
- **Кризис на рубеже мезозоя и кайнозоя**

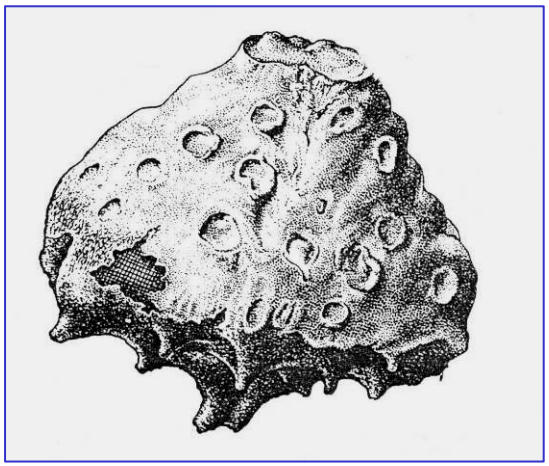


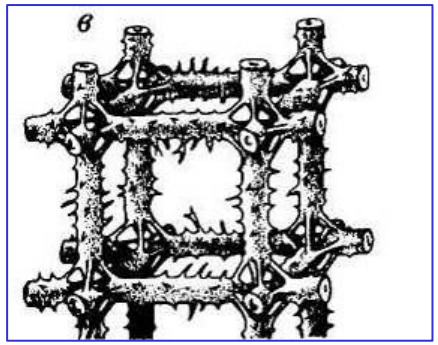
Развитие жизни в мезозое





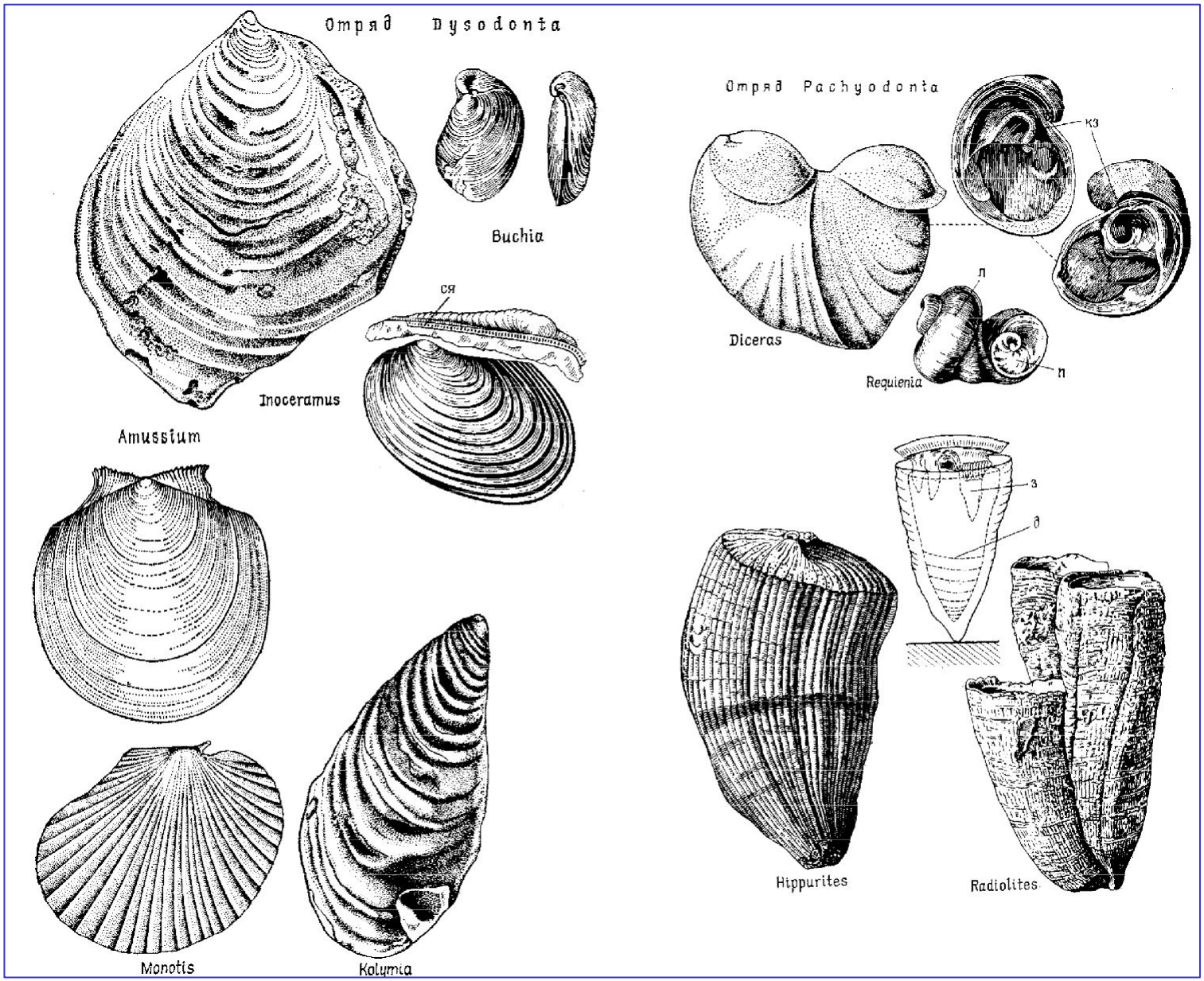






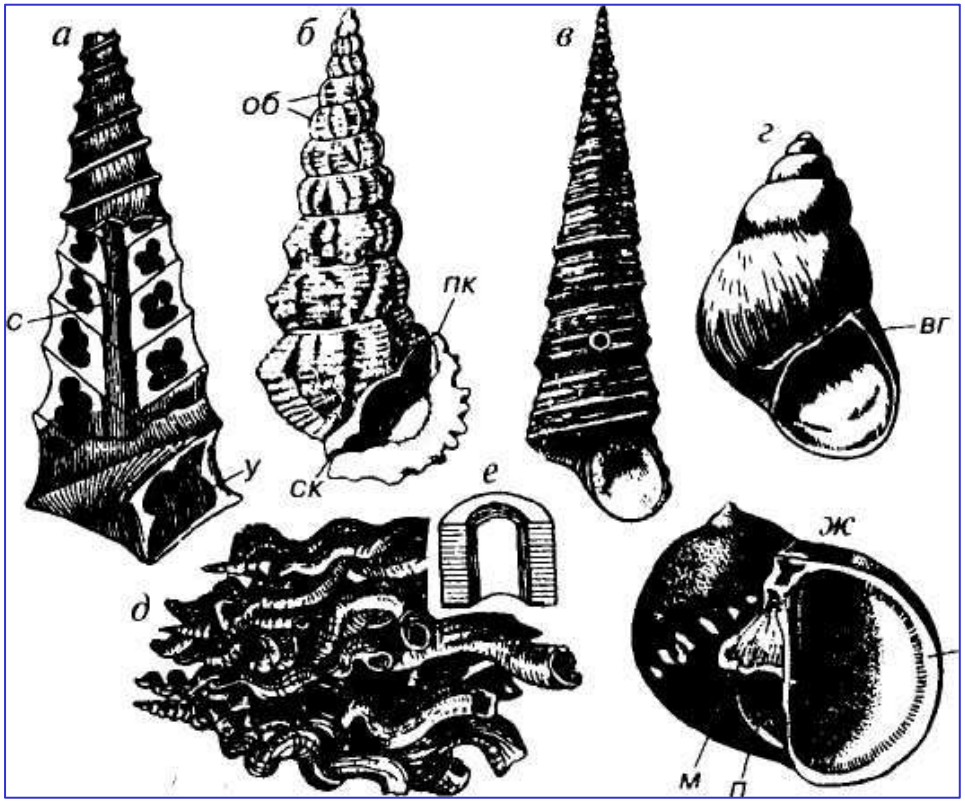
- Кремневые губки
- Образование «губковых полей»

Развитие жизни в мезозое

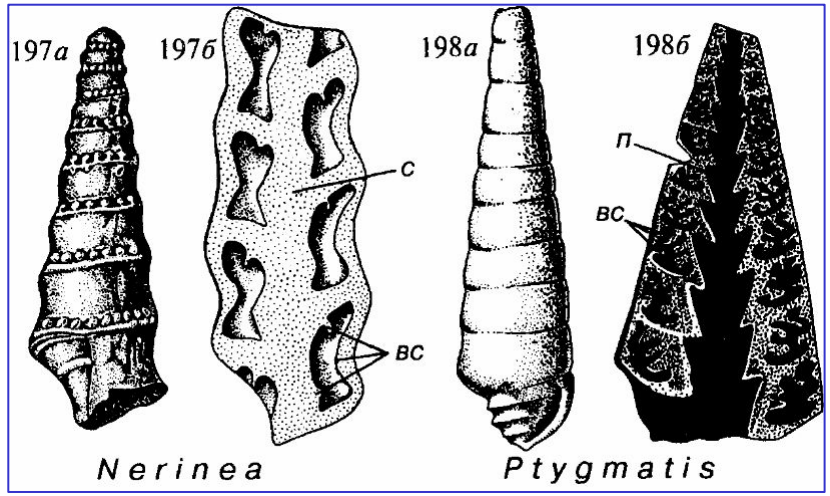


Двустворки

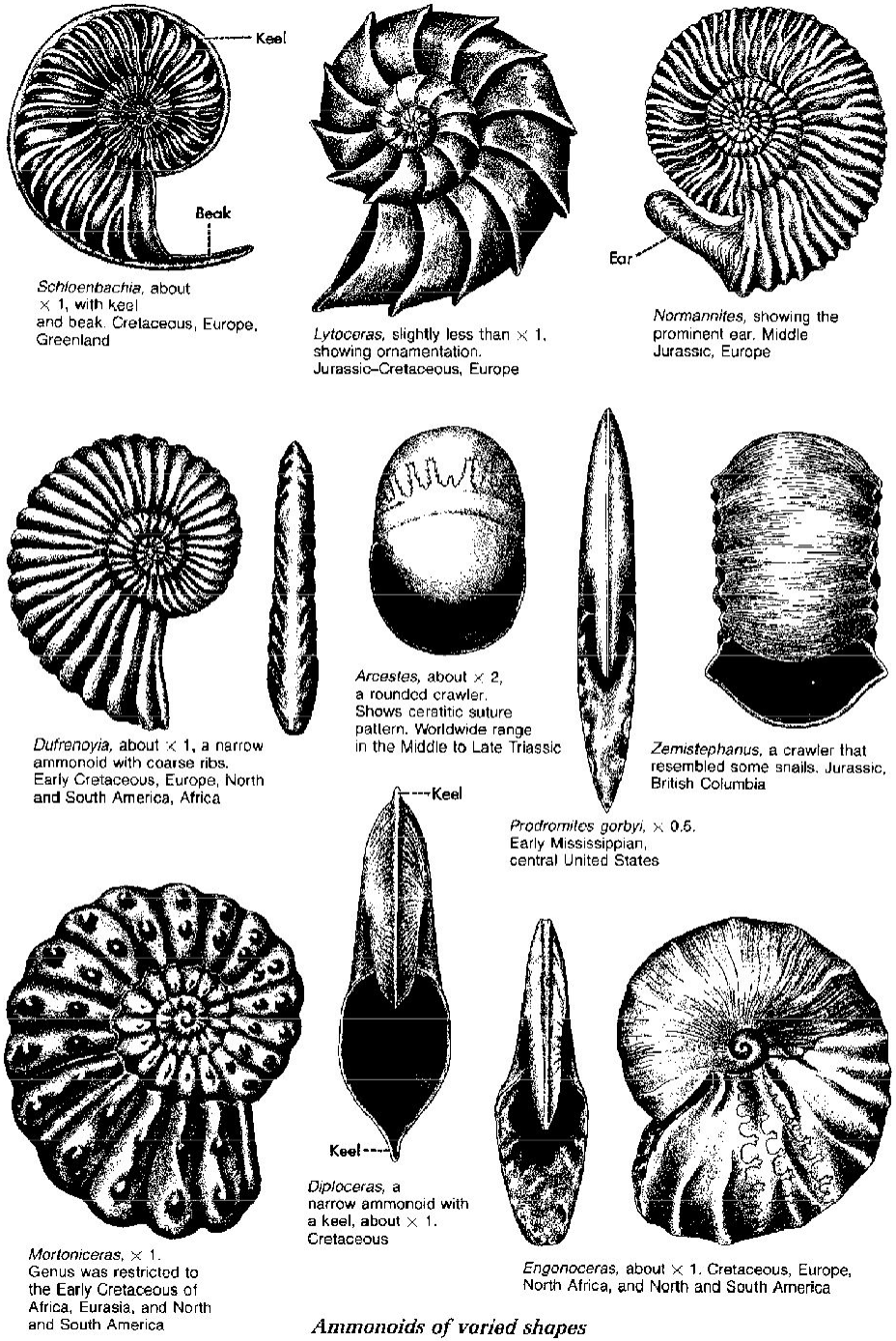
Развитие жизни в мезозое. Гастроподы



Отряд Mesogastropoda (O-Q)



Nerinea (J-K)



Schloenbachia, about × 1, with keel and beak. Cretaceous, Europe, Greenland

Lytoceras, slightly less than × 1, showing ornamentation. Jurassic–Cretaceous, Europe

Normannites, showing the prominent ear. Middle Jurassic, Europe

Dufrenoyia, about × 1, a narrow ammonoid with coarse ribs. Early Cretaceous, Europe, North and South America, Africa

Arcestes, about × 2, a rounded crawler. Shows ceratitic suture pattern. Worldwide range in the Middle to Late Triassic

Prodromites gorbyi, × 0.5. Early Mississippian, central United States

Zemistephanus, a crawler that resembled some snails. Jurassic, British Columbia

Mortoniceras, × 1. Genus was restricted to the Early Cretaceous of Africa, Eurasia, and North and South America

Diploceras, a narrow ammonoid with a keel, about × 1. Cretaceous

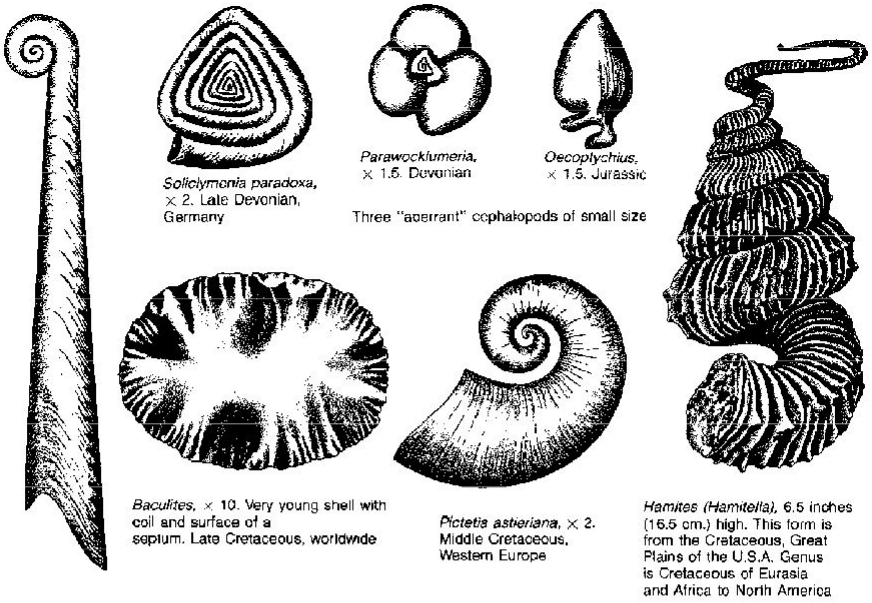
Engonoceras, about × 1. Cretaceous, Europe, North Africa, and North and South America

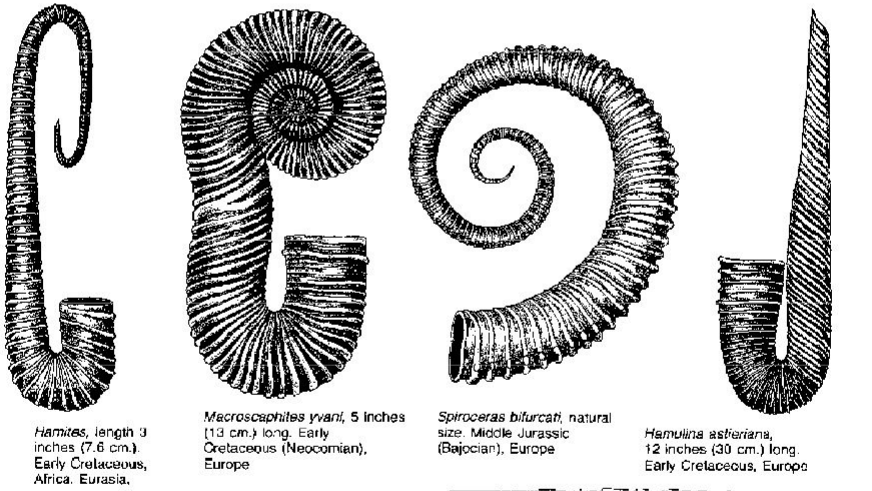
Ammonoids of varied shapes

Развитие жизни в мезозое

Аммониты

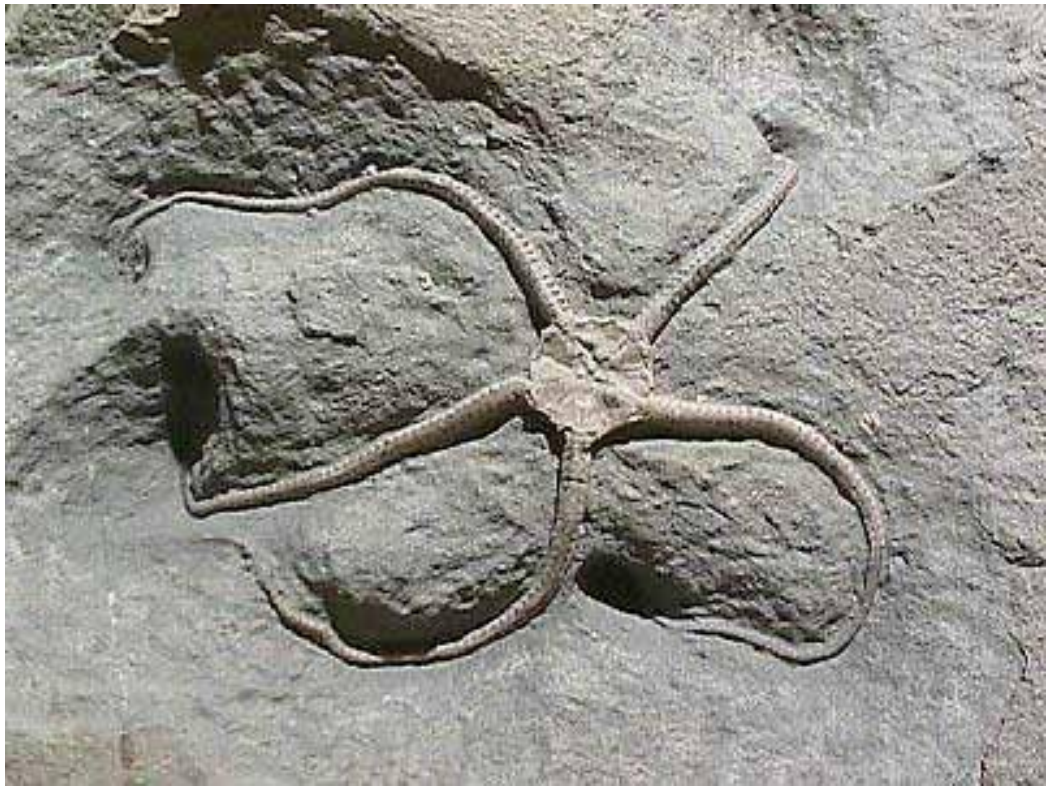
Развитие жизни в мезозое





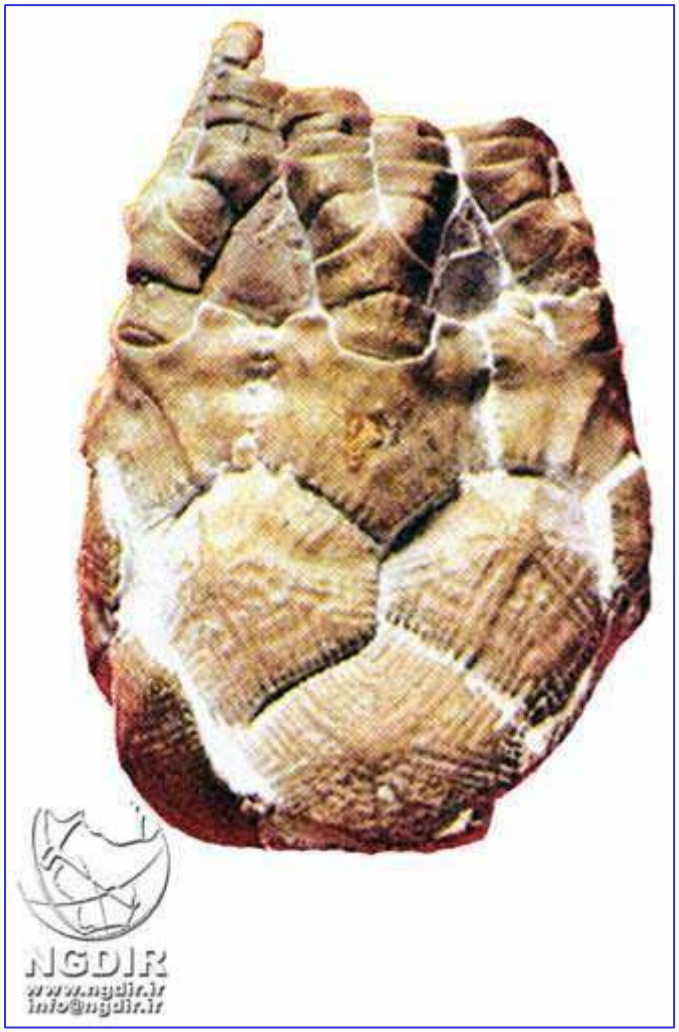
Аммониты, белемниты

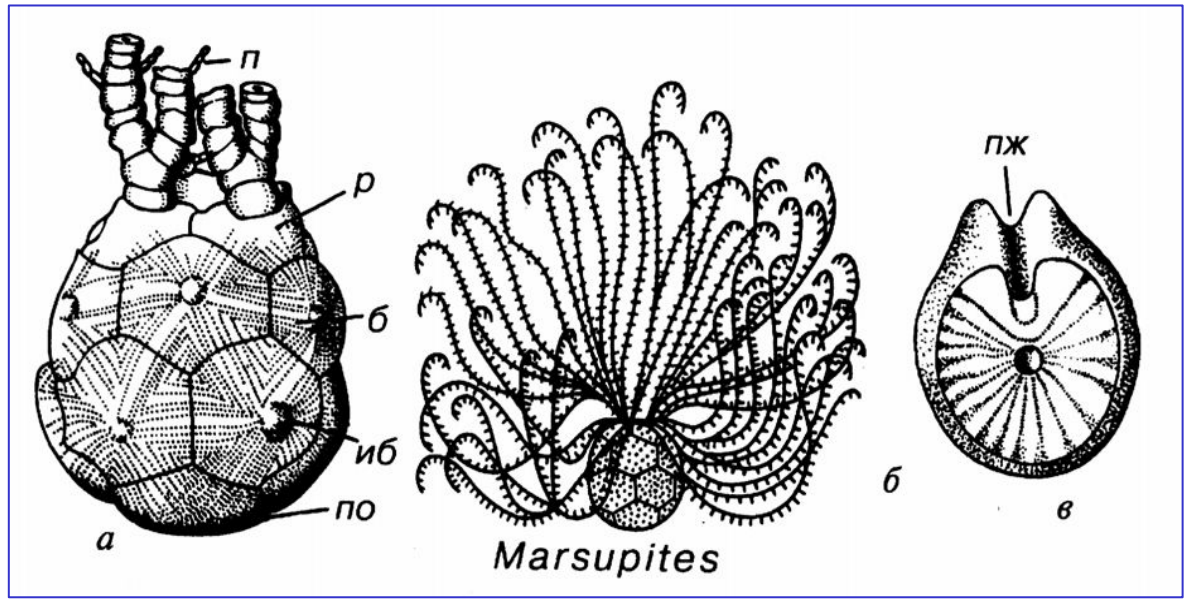
Развитие жизни в мезозое



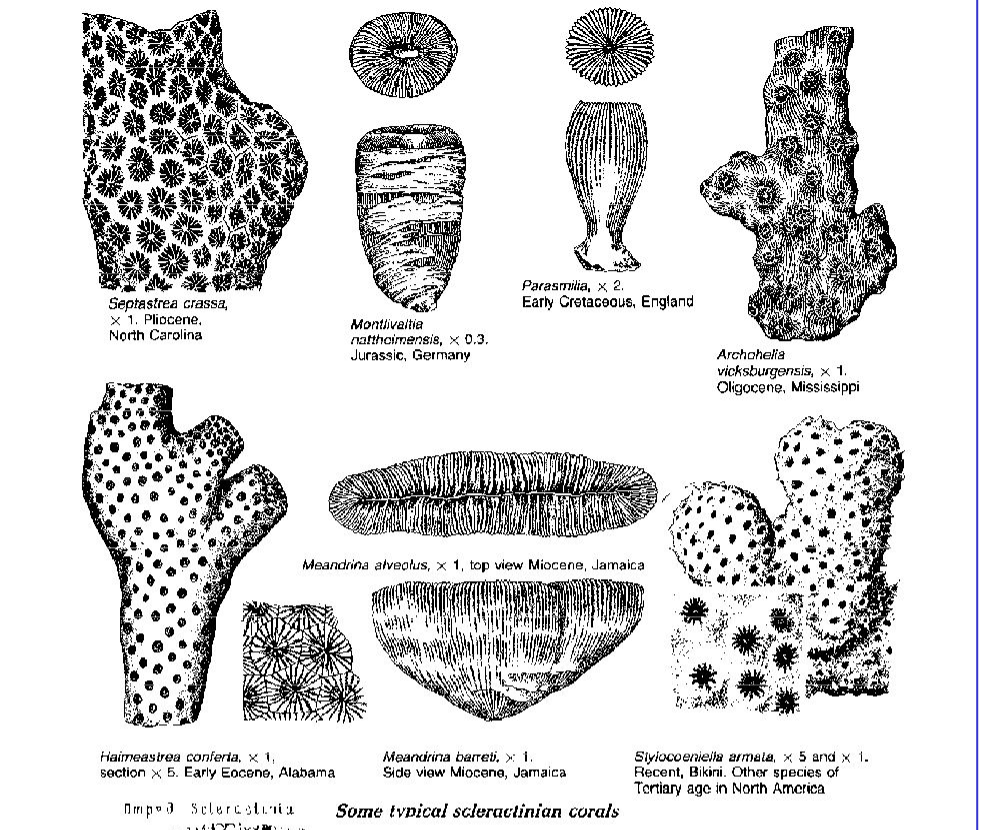
Иглокожие

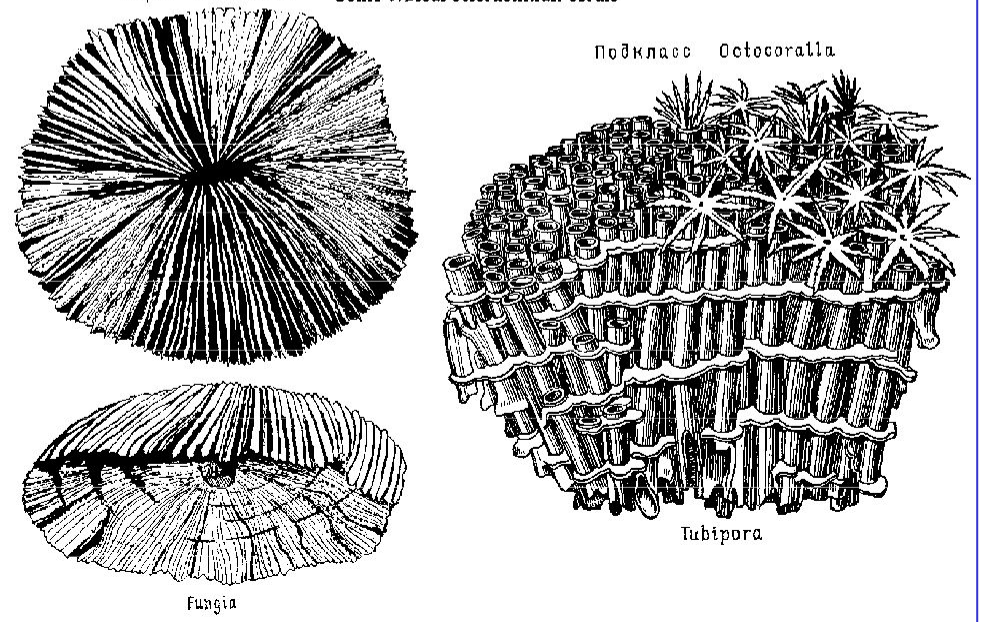
Развитие жизни в мезозое





Бесстебельчатые морские лилии: *Marsupites*



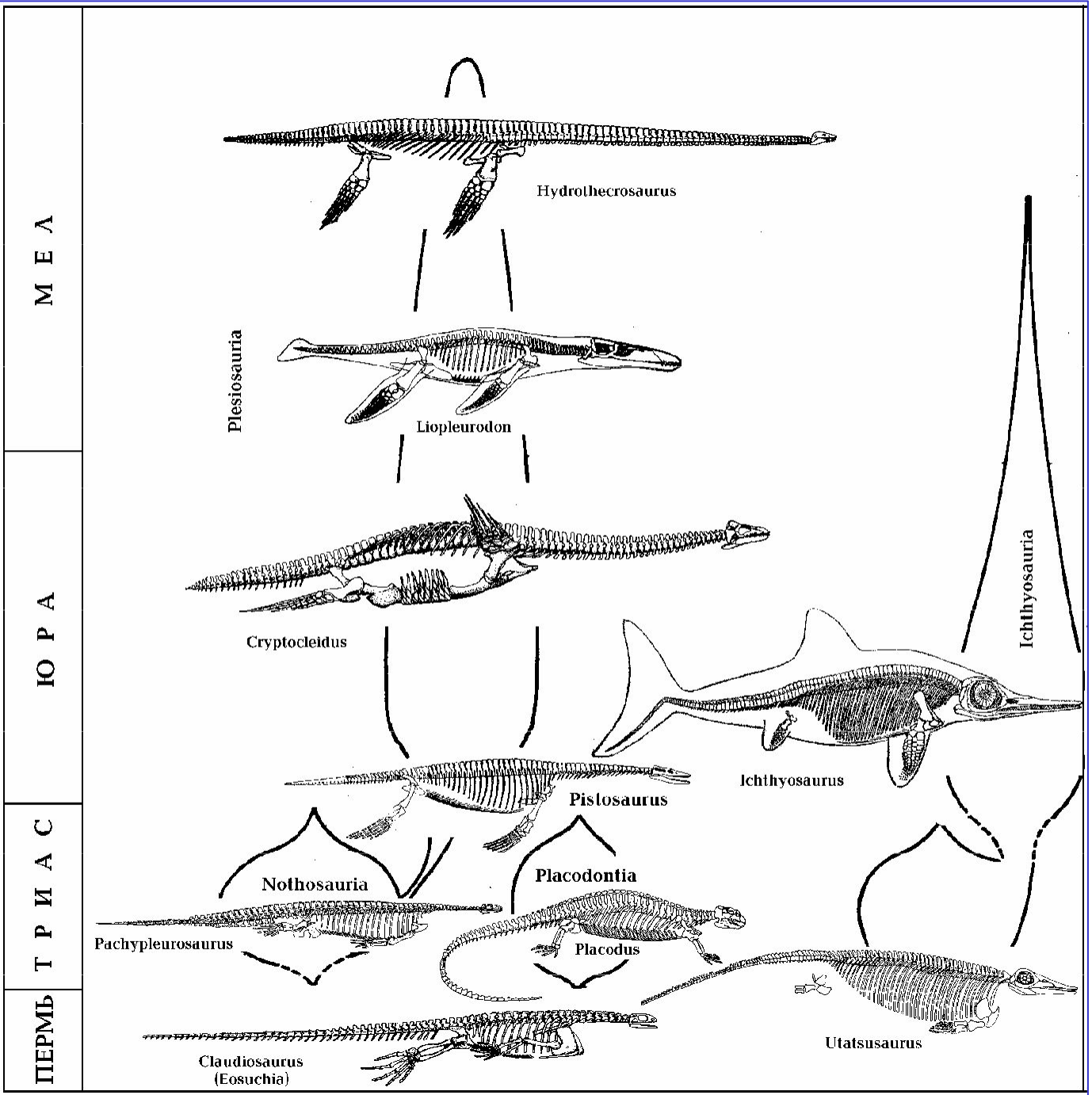


Развитие жизни в мезозое

Кораллы:

Hexacoralla (T-Q)

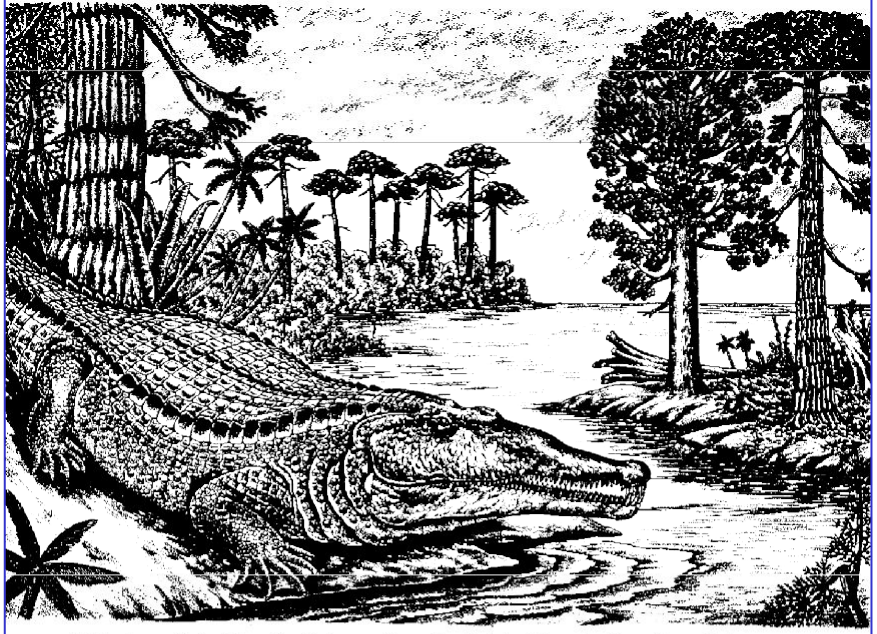
Octocoralla (V?, O-S, K-Q)



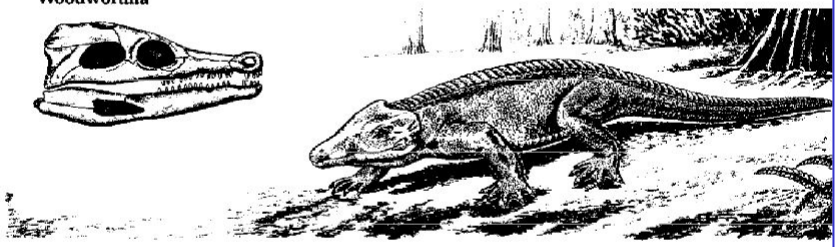
Развитие рептилий

Морские рептилии: Sauropterygia, Placodontia, Ichtyosauria

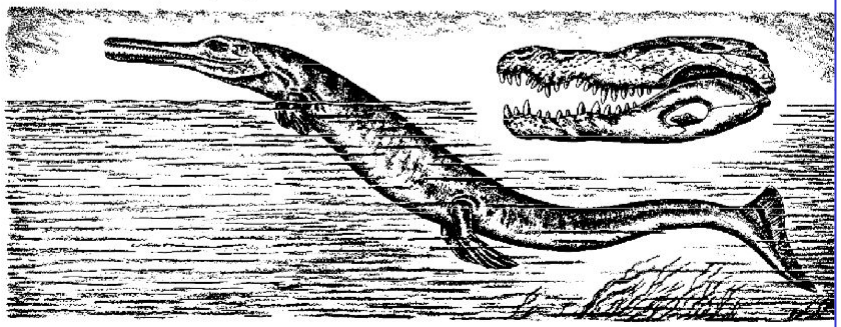
Развитие рептилий



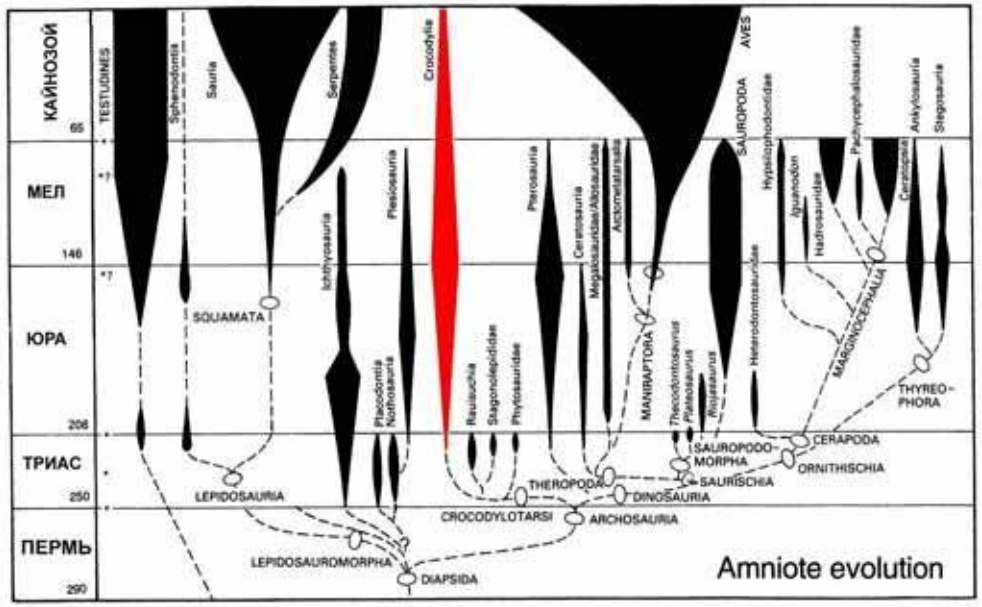
Rutiodon, *a Late Triassic phytosaur from the Painted Desert, of northern Arizona; skull 42 inches (107 cm.) long. The plants include cycads, calamites, ferns, and araucarians. The tree at the extreme right is* Araucarioxylon; *to the left of it is* Woodworthia



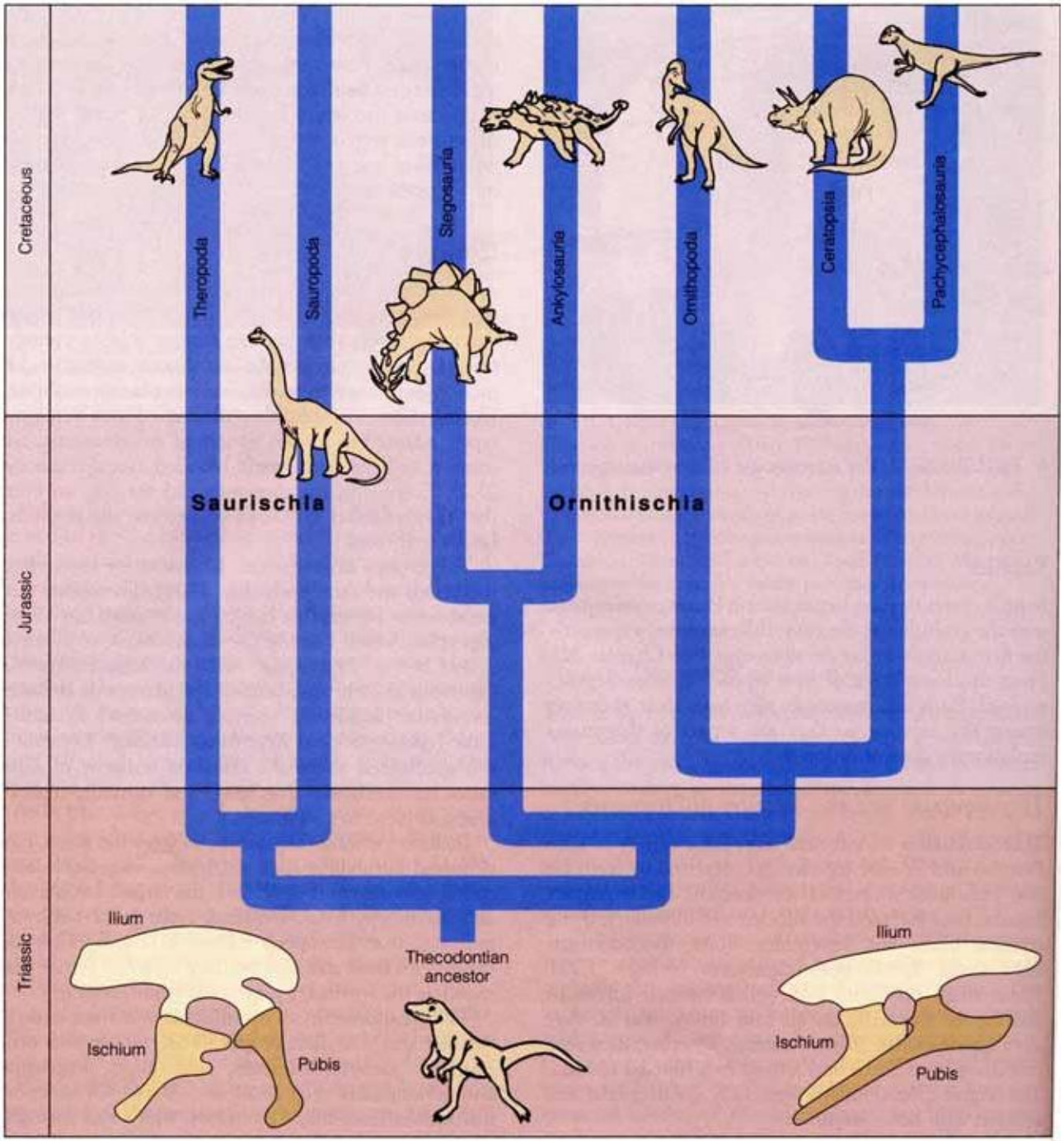
Protosuchus, *an ancestral crocodile from the Early Jurassic of Arizona, about 30 inches (76 cm.) long*



Geosaurus, *a Late Jurassic marine mesosuchian crocodile (metriorhynchid) from Central Europe and Argentina with paddles and shark-like tail. Length 5 feet 8 inches (1.7 m.). At the right, skull of* Alligator mississippiensis, *a freshwater reptile from the Late Miocene of western Nebraska. Length 14 inches (36 cm.)*

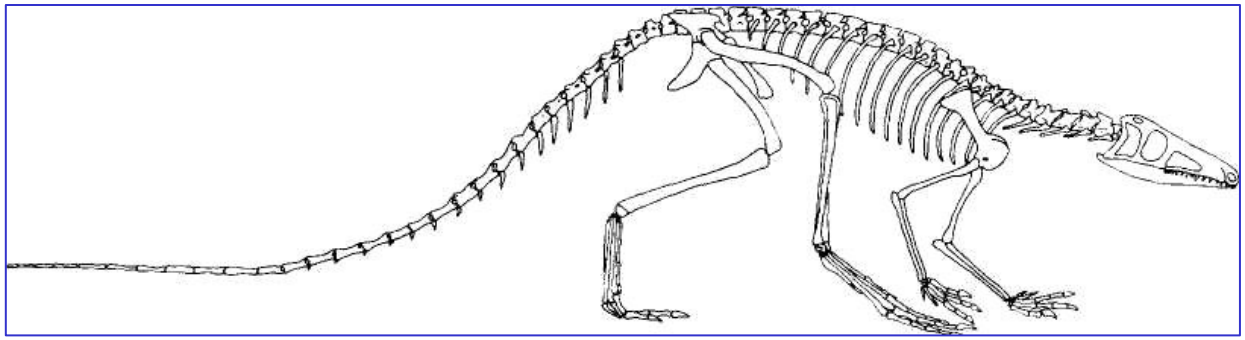


Примитивные архозавры: Crocodylia



Эволюция динозавров

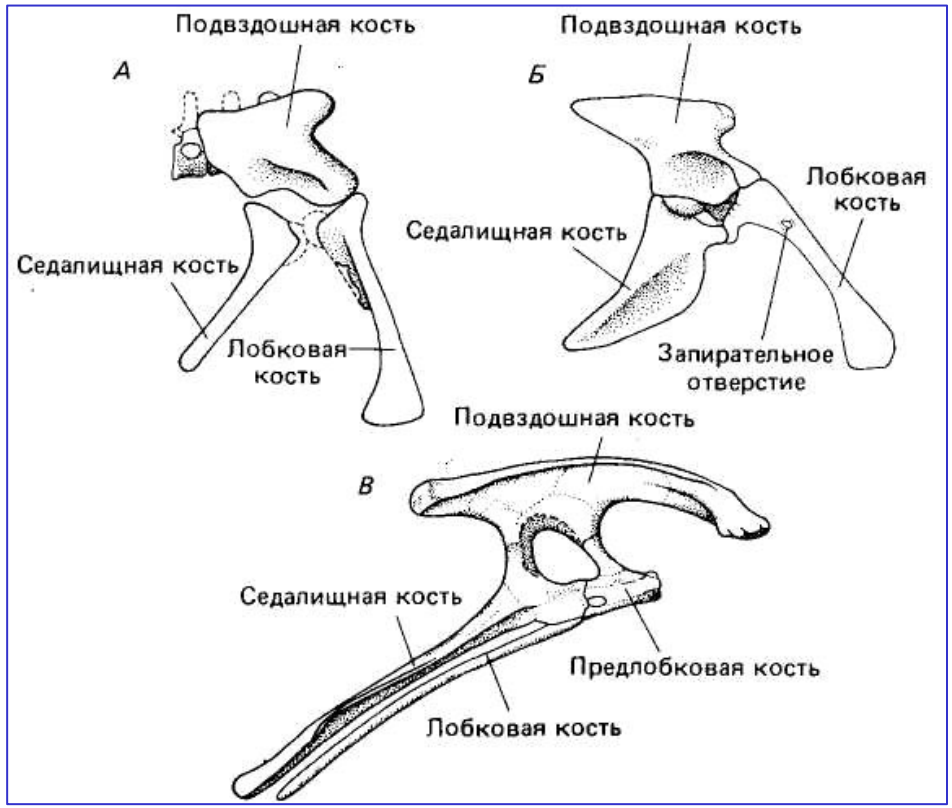
Динозавры



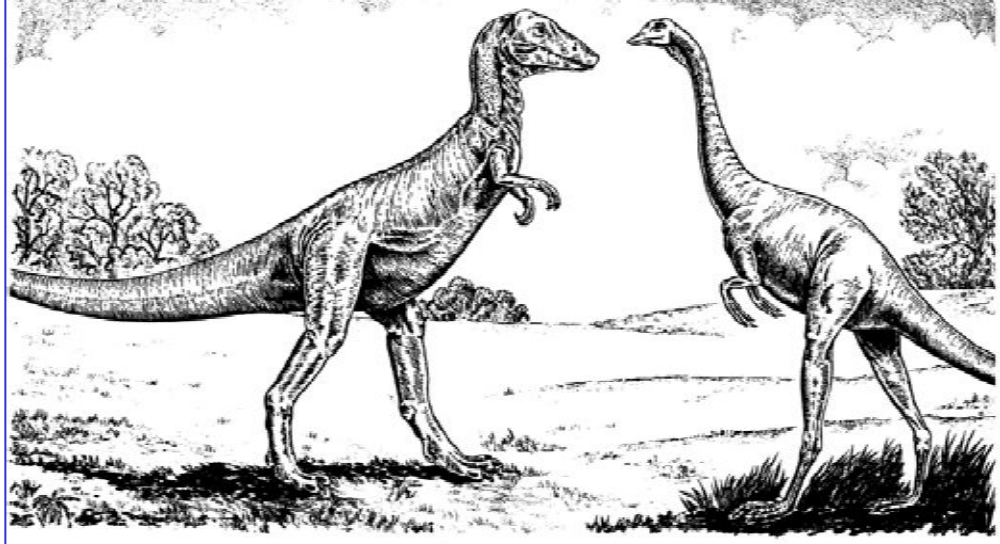
Текодонт *Lagosuchus*, T_2 Ю. Америки

Saurischia – ящеротазовые динозавры - род *Staurikosaurus* (А), таз похож на таз текодонтов типа *Lagosuchus* (Б)

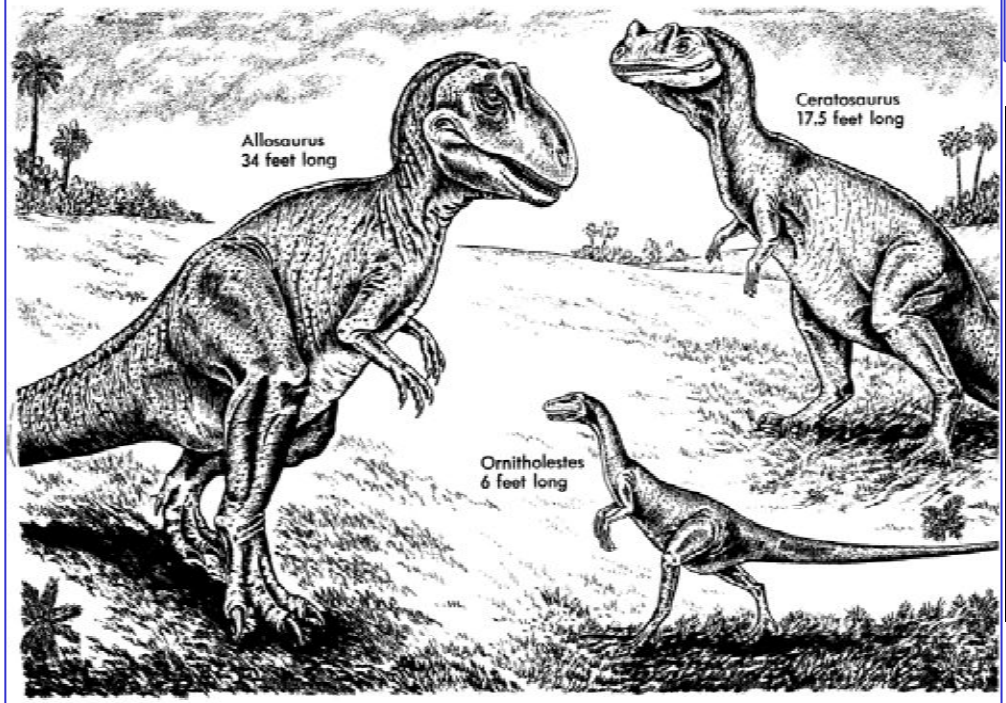
Ornithischia – птицетазовые динозавры - род *Heterodontosaurus* (В)



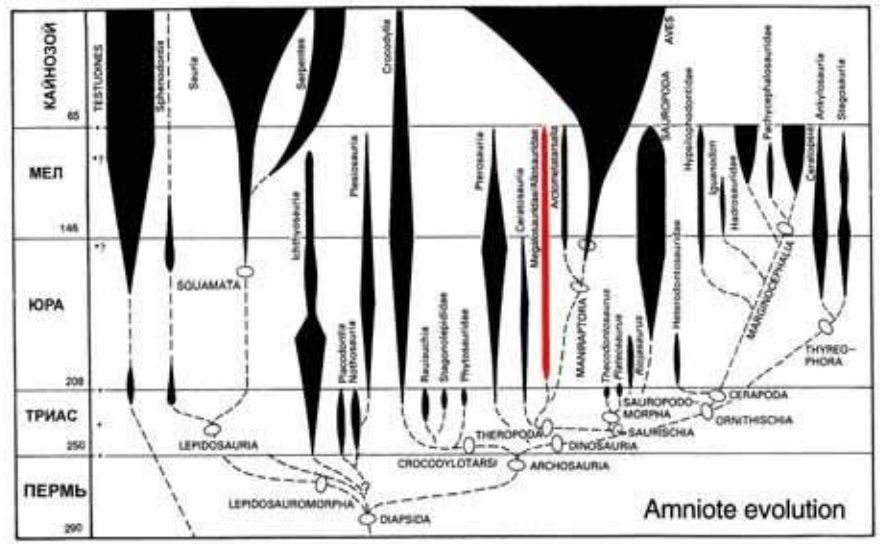
Saurischia

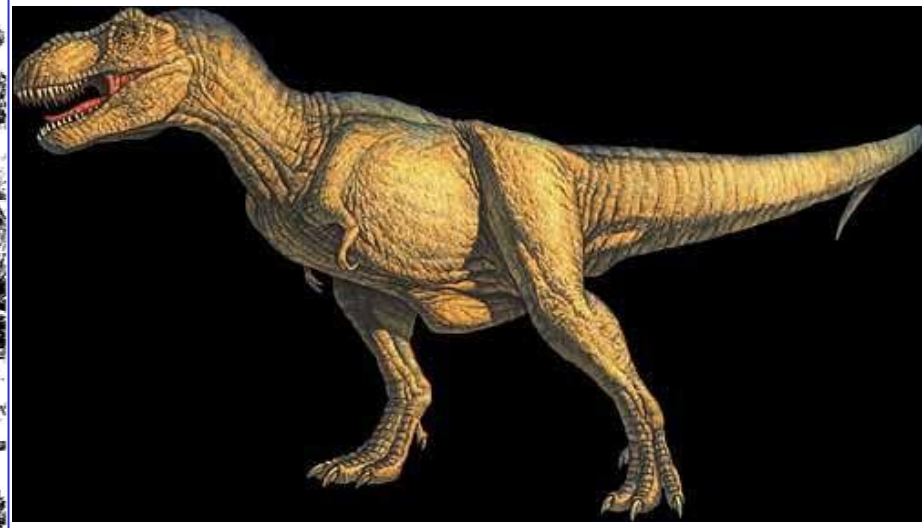


(Right) Struthiomimus, *the "ostrich mimic," of Cretaceous Alberta, Canada. Height 8 to 9 feet (2.4–2.7 m.). (Left) an early species of* Gorgosaurus, *7 feet (2.1 m.) high at the hips. Cretaceous of Alberta*



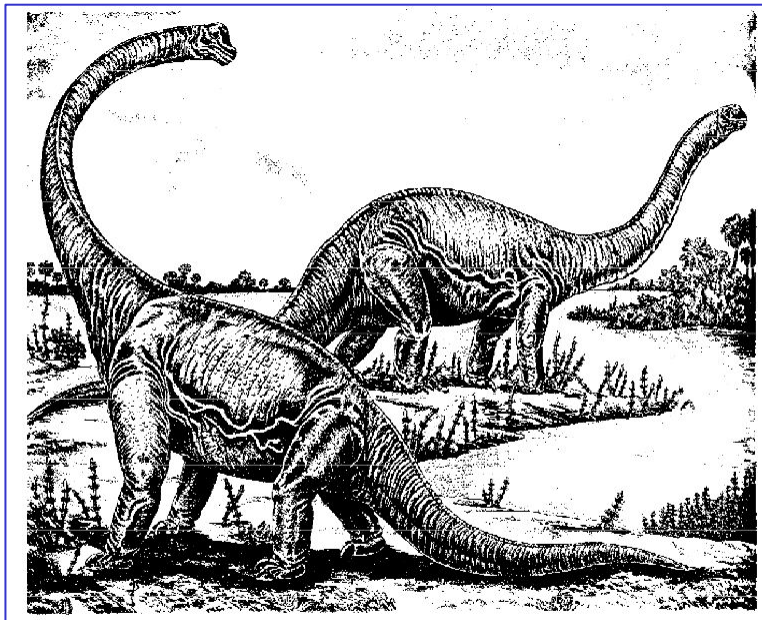
Three carnivorous dinosaurs of Late Jurassic age. They lived in what now is the Rocky Mountains region of the western United States. The largest, Allosaurus, *was 34 feet (10.4 m.) long;* Ceratosaurus *was 17.5 feet (5.3 m.) long; and the smallest,* Ornitholestes, *was 6 feet (1.8 m.) long*





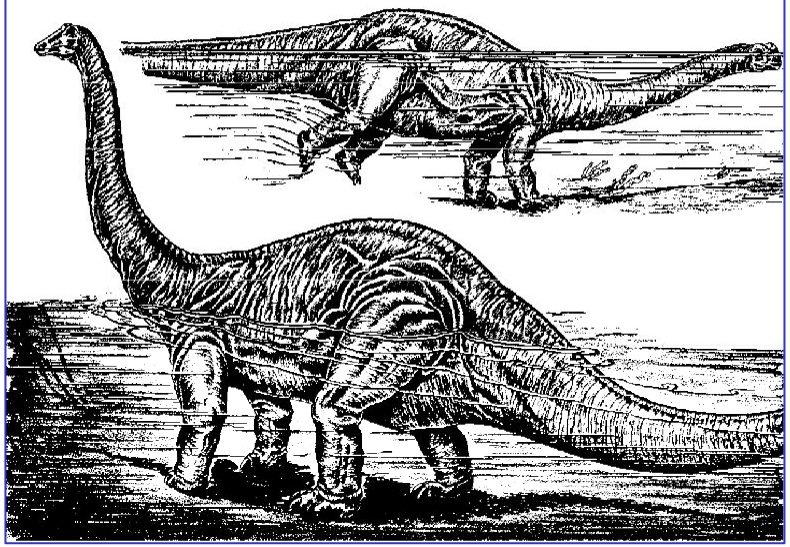
Megalosauridae и др.

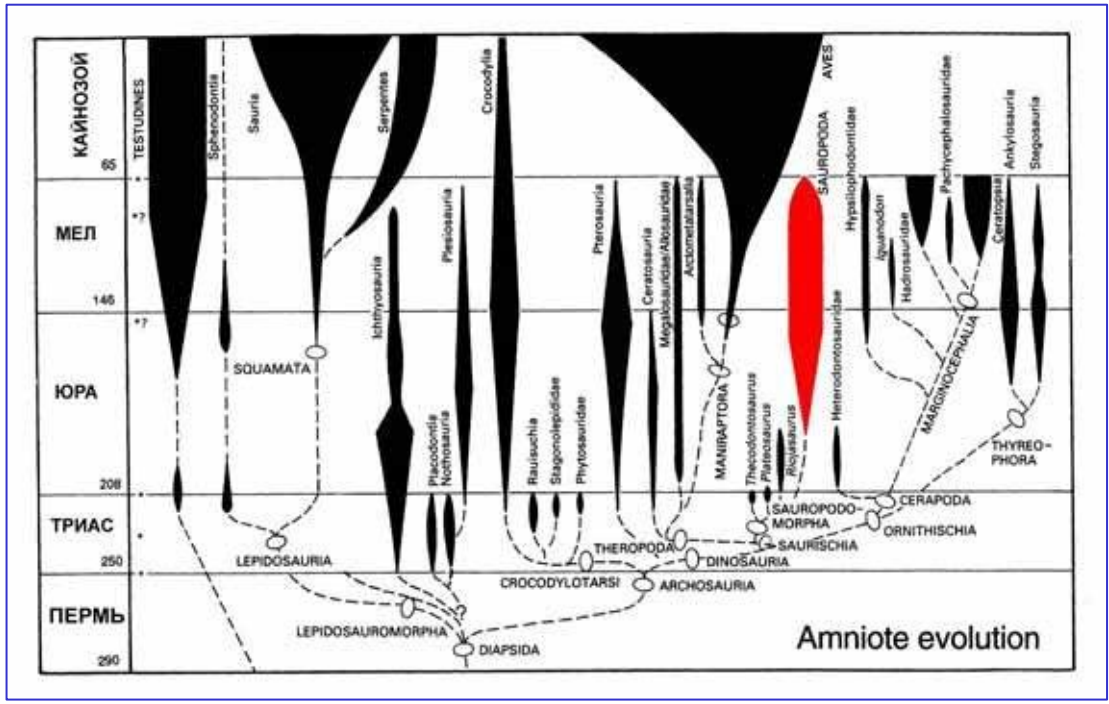
Saurischia

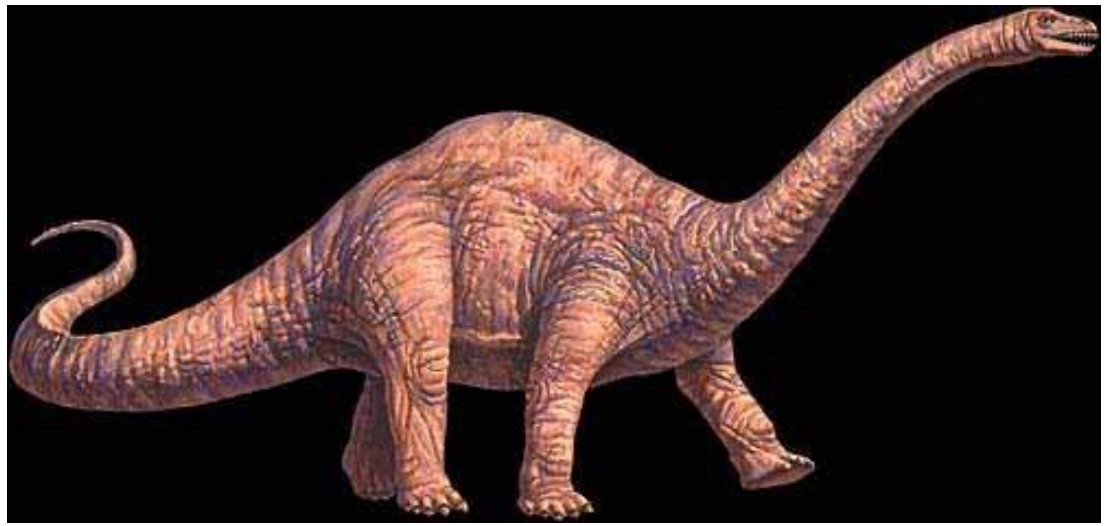


Brachiosaurus *(left) and* Apatosaurus, *the brontosaur (right), were two of the largest "lizard-hipped" dinosaurs. Both lived in Colorado and adjacent regions during Morrison times.* Brachiosaurus *also inhabited central Africa. Since this restoration was drawn, it has been learned that the skull of* Apatosaurus *was actually quite similar to that of* Diplodocus, *and not* Camarasaurus *as shown here*

Apatosaurus *wading with its forelegs but swimming with its hind legs. Below* Apatosaurus *is* Diplodocus *wading in shallow water; its tail is half afloat*

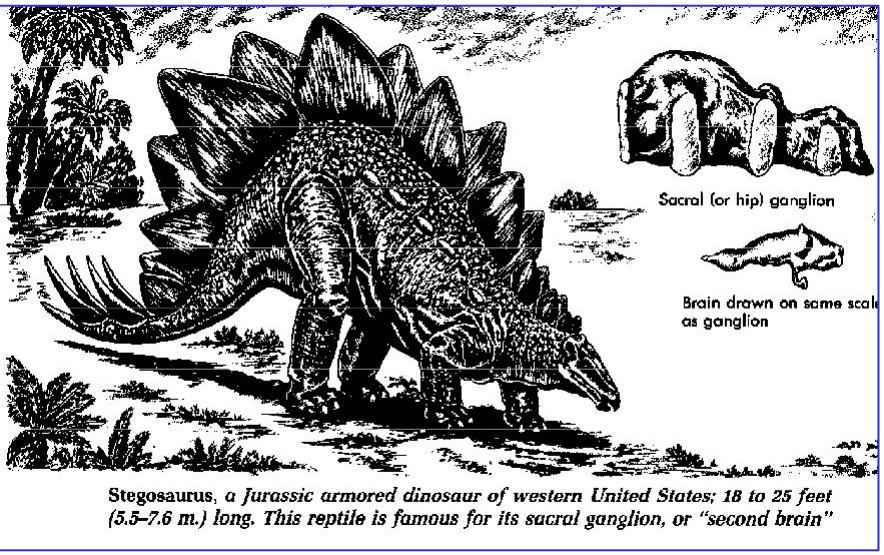




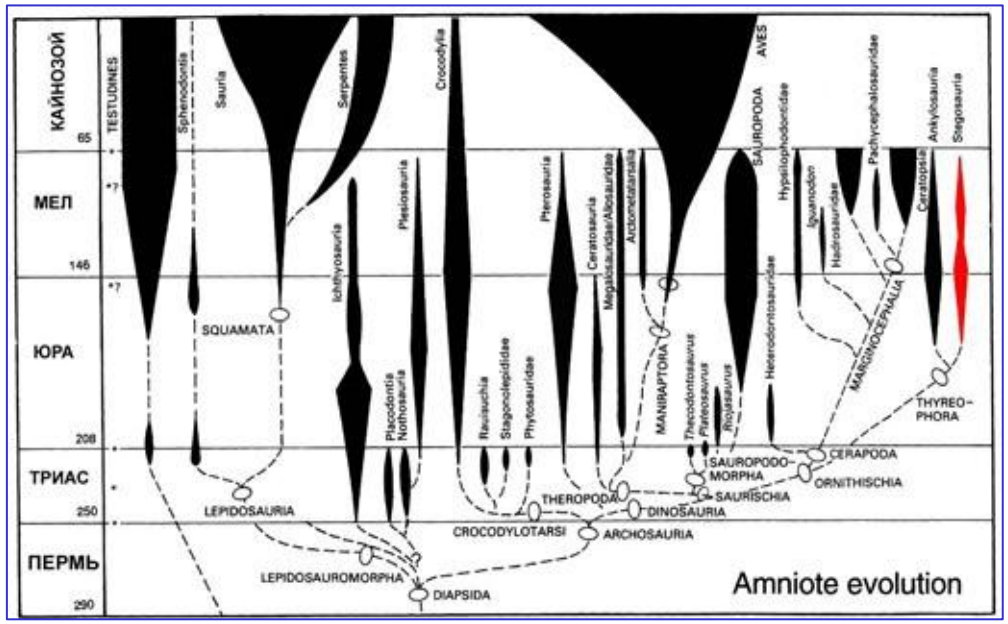


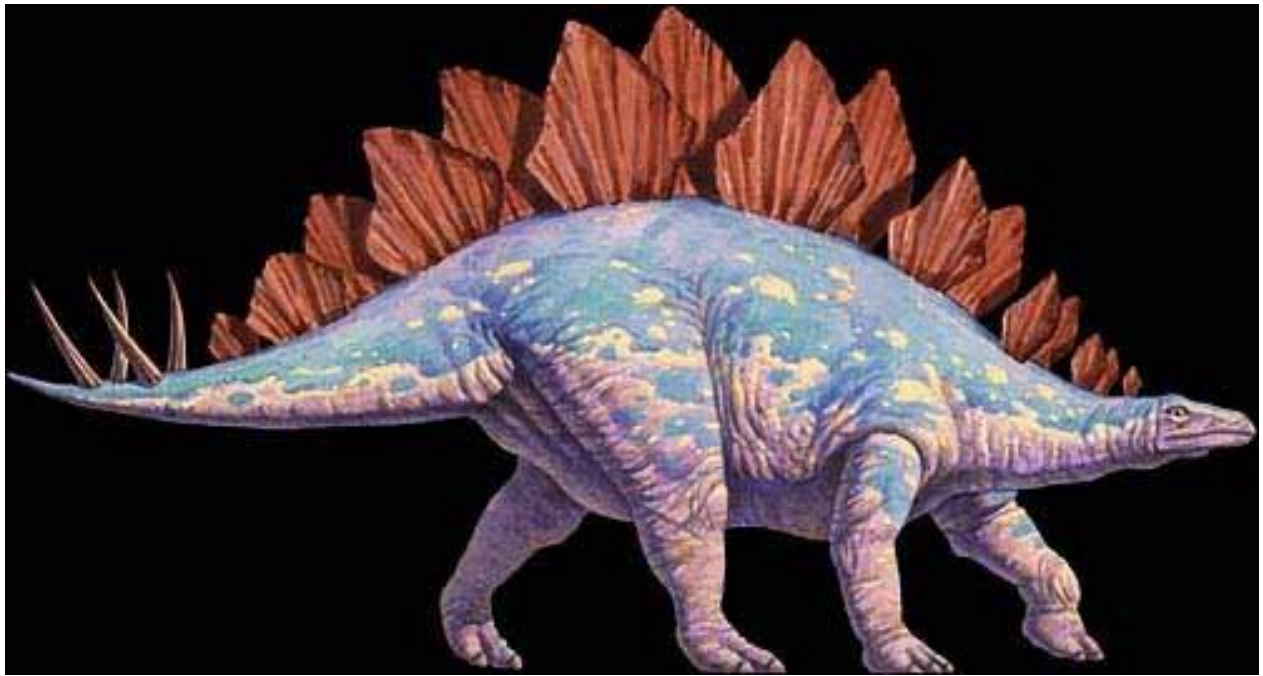
Sauropoda

Ornithischia



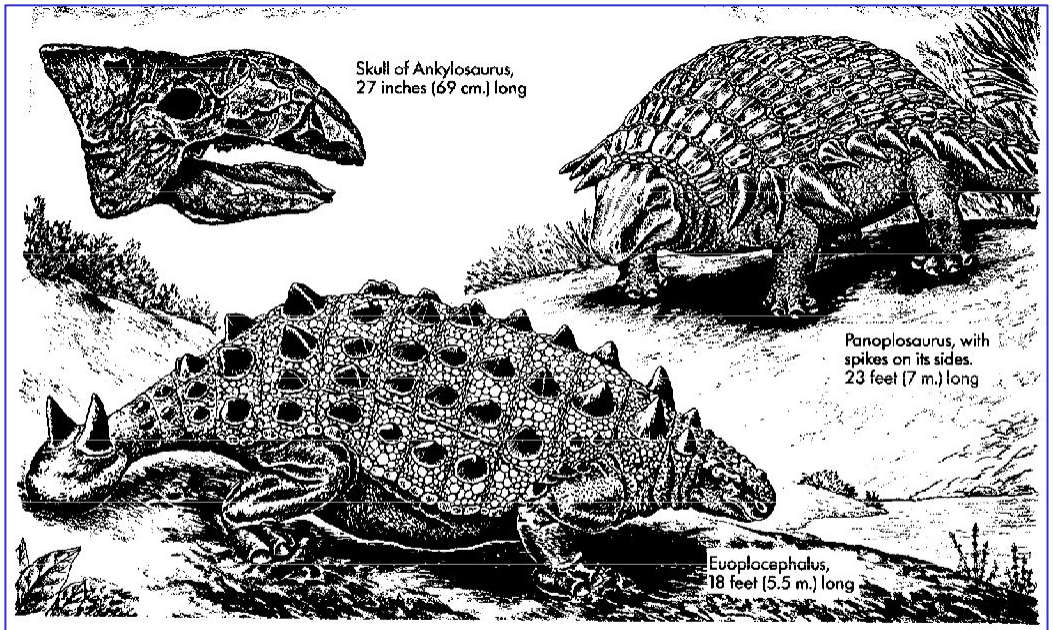
Stegosaurus, *a Jurassic armored dinosaur of western United States; 18 to 25 feet (5.5–7.6 m.) long. This reptile is famous for its sacral ganglion, or "second brain"*



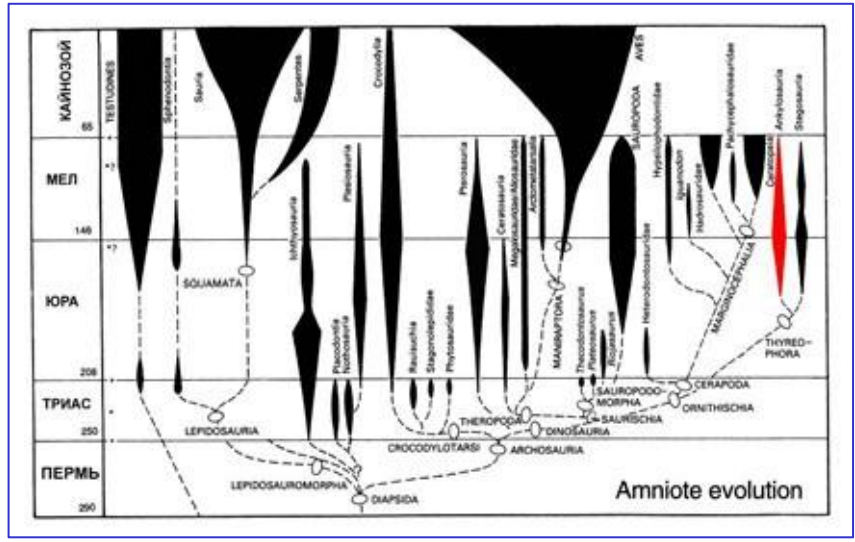


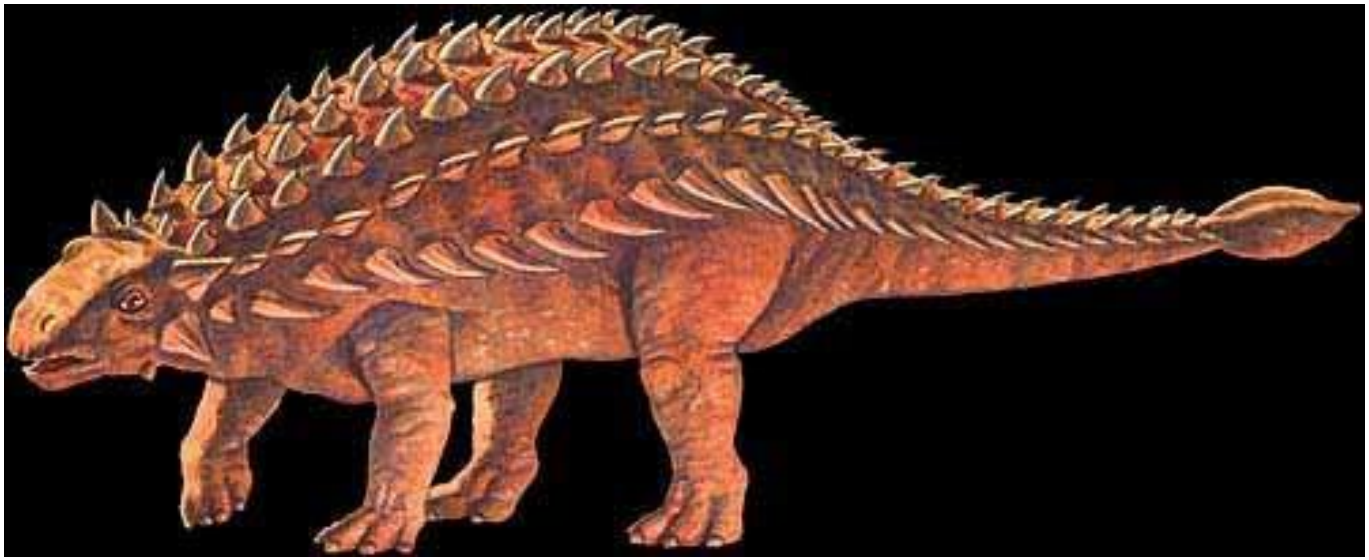
Stegosauria

Ornithischia



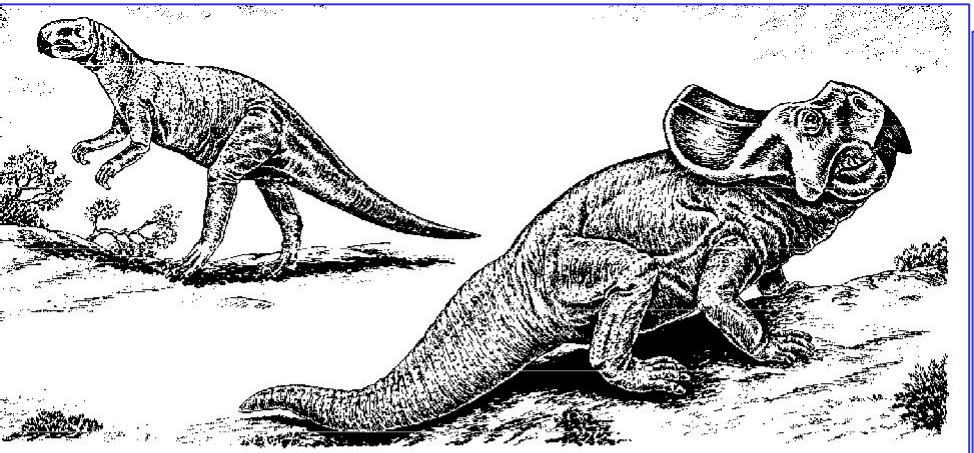
Three armored dinosaurs of Cretaceous age, from western United States and Canada



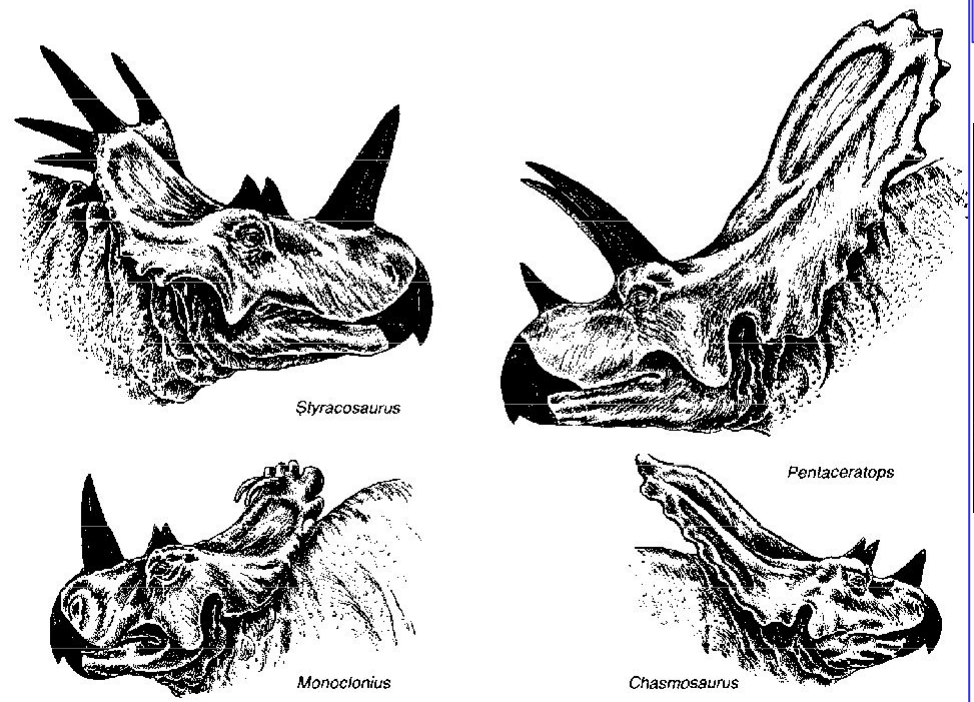


Ankylosauria

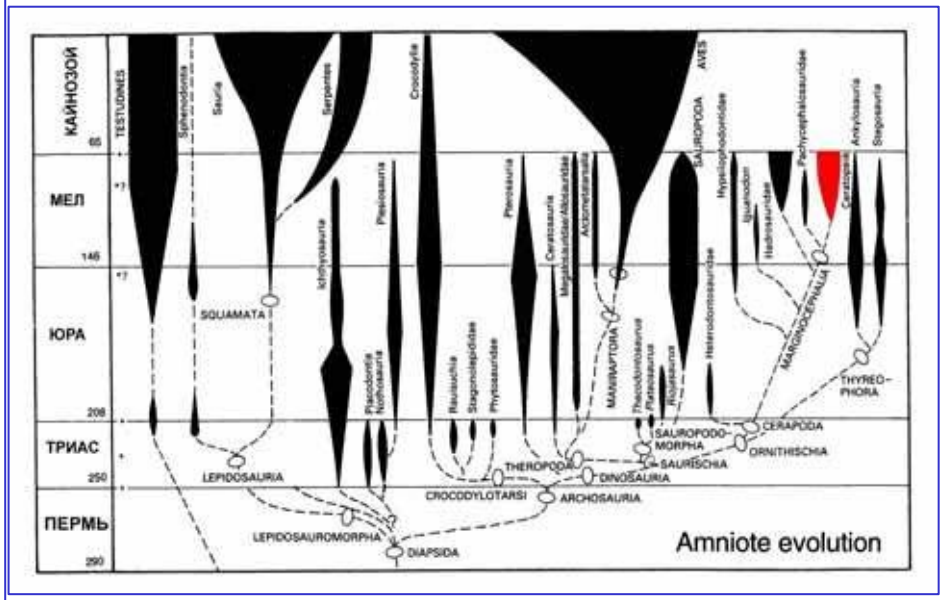
Ornithischia

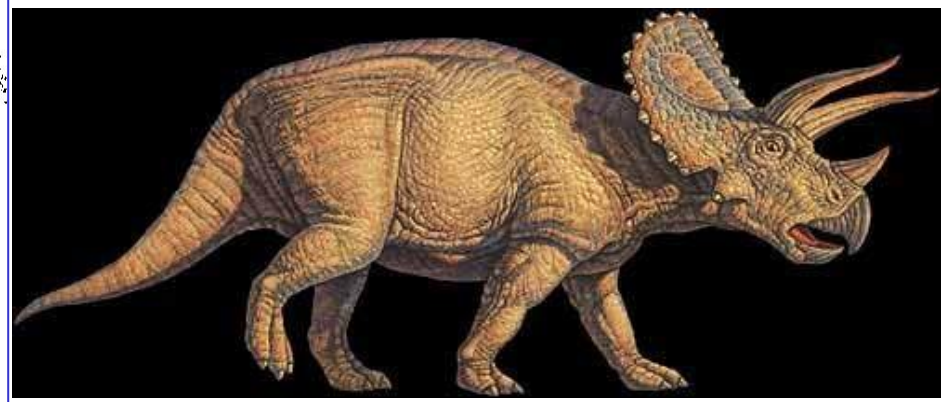


(Left) **Psittacosaurus**, *4 feet (1.2 m.) long, was a very primitive frilled dinosaur.*
(Right) **Protoceratops**, *5 to 6 feet (1.5–1.8 m.) long, had a frill but almost no horn*



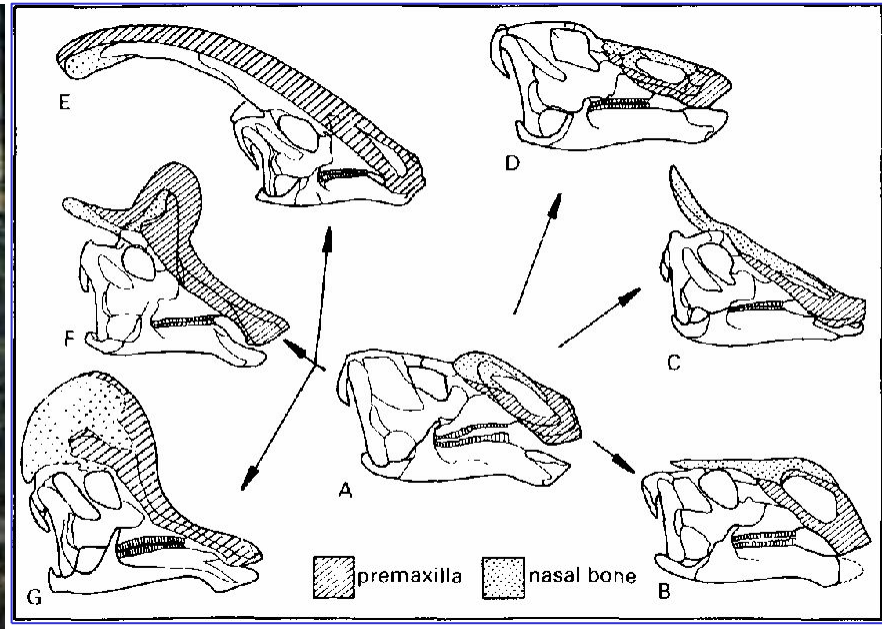
Head of four large ceratopsians, or dinosaurs with beaks, neck frills, and horns. Late Cretaceous of North America. All about × 1/30

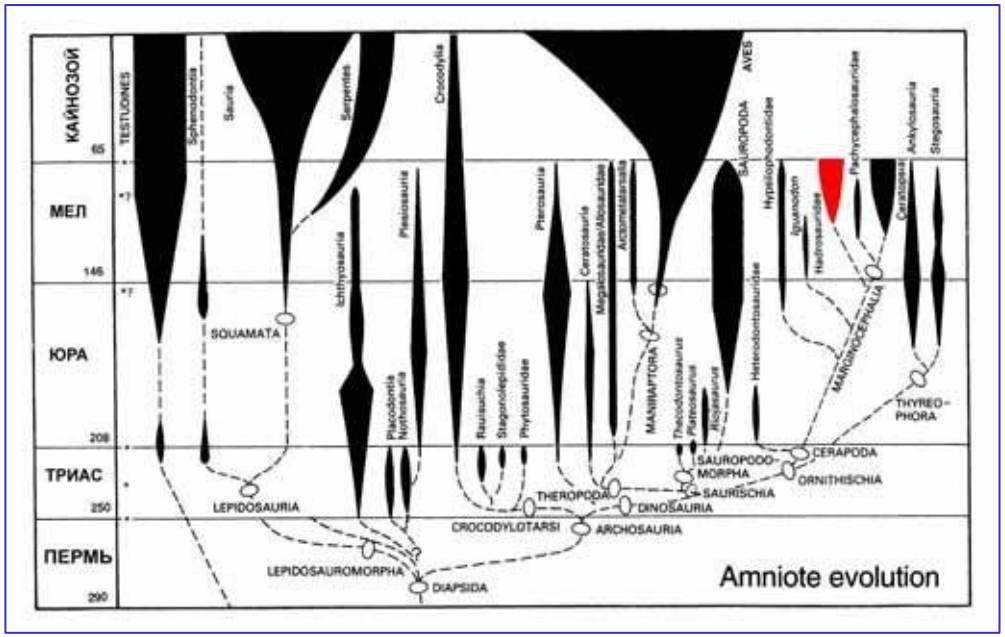


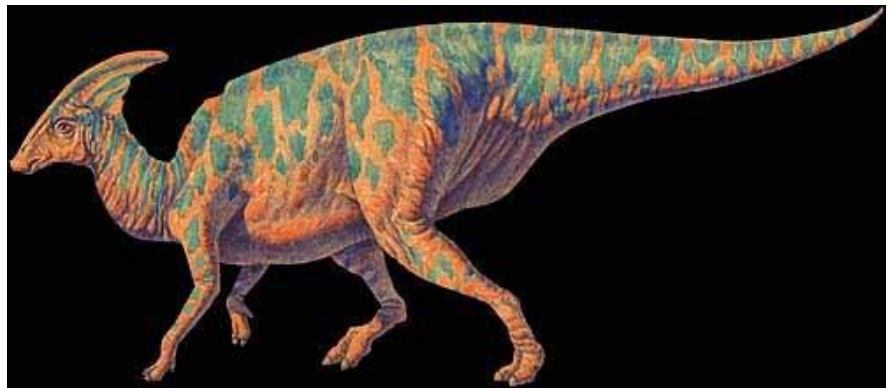


Ceratopsia

Ornithischia

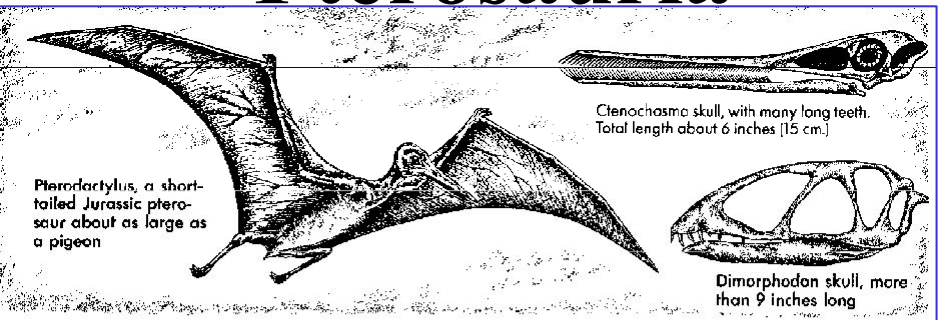




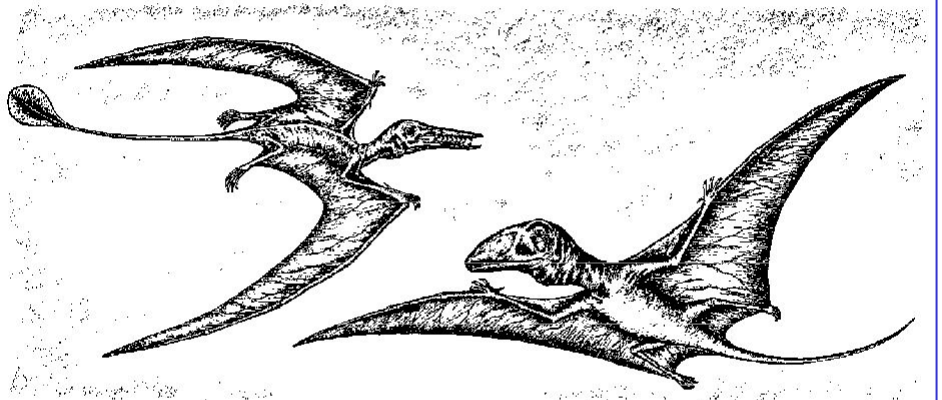


Hadrosauridae

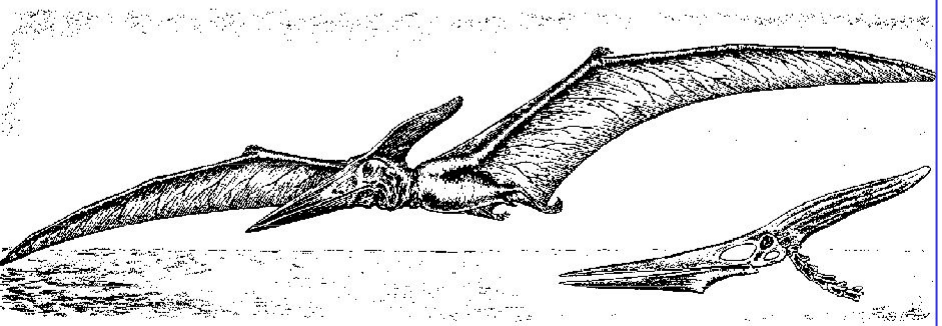
Pterosauria



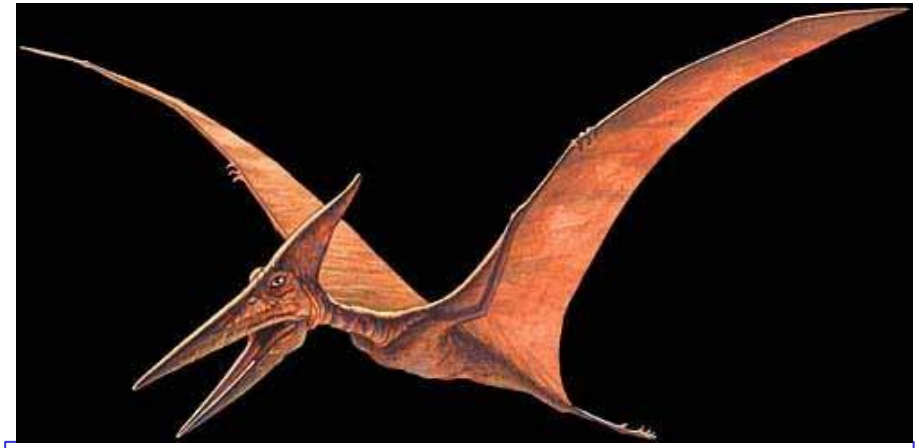
Flying reptiles with a variety of tooth types

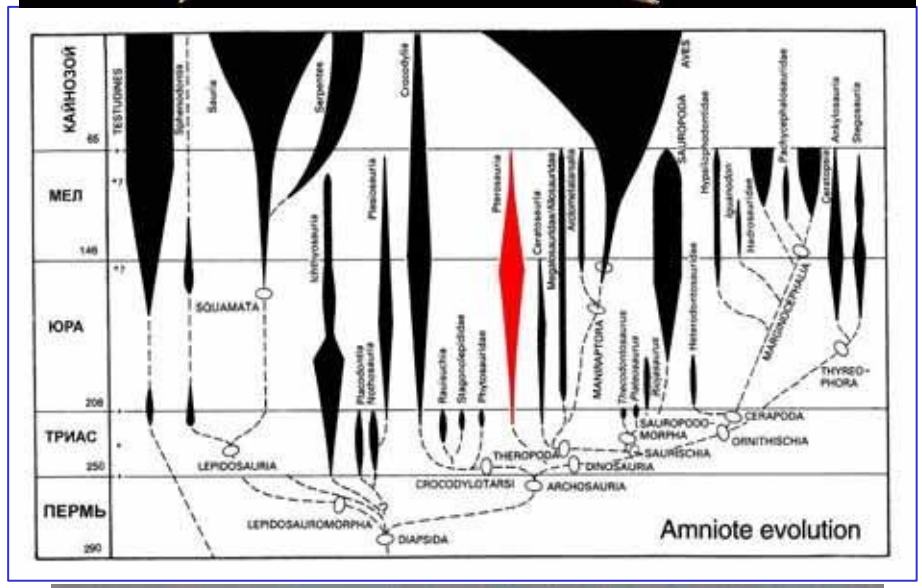


Rhamphorhynchus *(left) was an advanced long-tailed pterosaur about 24 inches (61 cm.) long.* **Dimorphodon** *(right) had a deep but very light skull and reached a length of 42 inches (107 cm.). Both lived in Europe during the Jurassic Period*

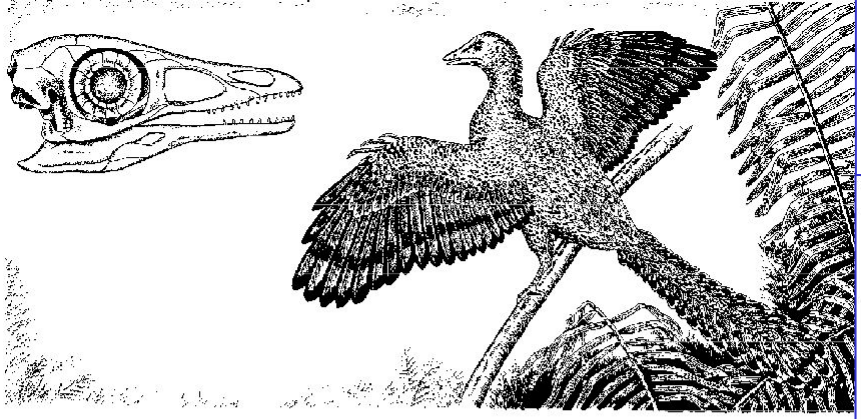


Pteranodon *and its skull. This short-tailed, toothless Cretaceous pterosaur from Kansas had a wingspread of 22 to 27 feet (6.7–8.2 m.)*

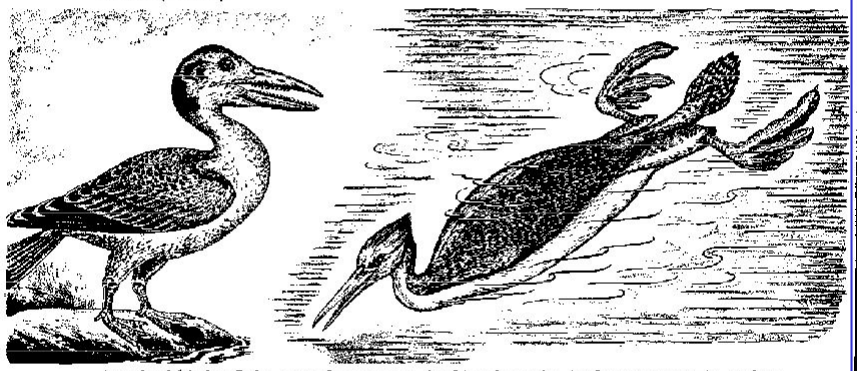




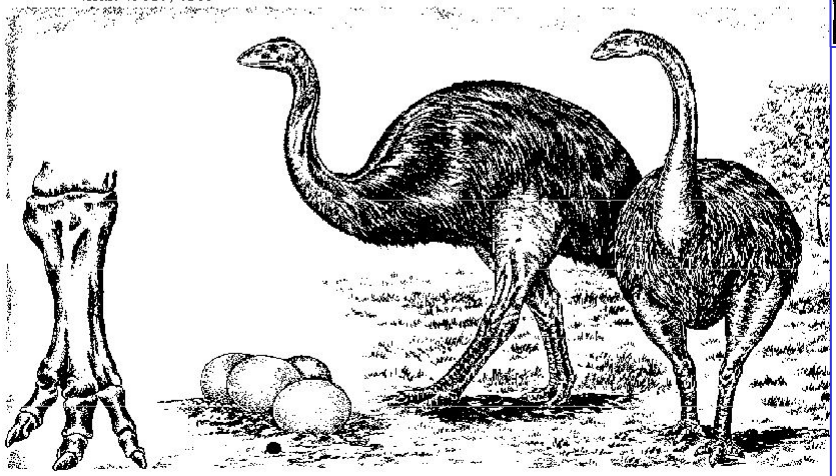
Развитие жизни в мезозое



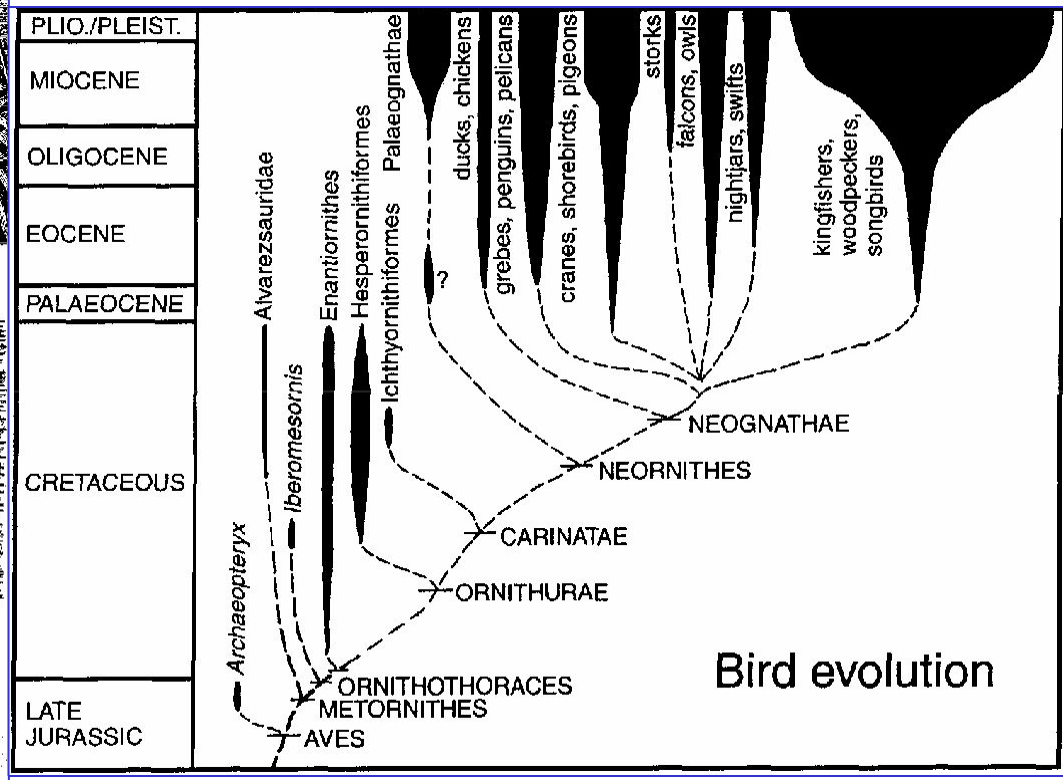
Archaeopteryx *preparing to flap its wings and glide from a cycad. Length about 18 inches (46 cm.)*



Toothed birds of the Late Cretaceous. (Left) Ichthyornis; *(right)* Hesperornis. *Other restorations of* Hesperornis *depict it as a noncrested form with webbed, rather than lobed, toes*

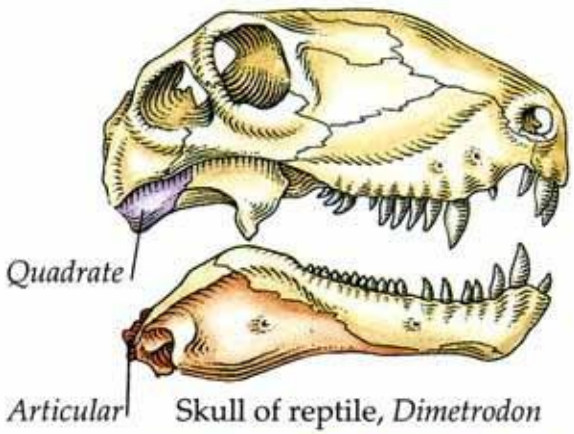


Two species of Aepyornis, *9 to 10 feet (2.7–3 m.) or more high. At the left are foot bones and eggs of the larger species. The black dot is a hen's egg on the same scale.*

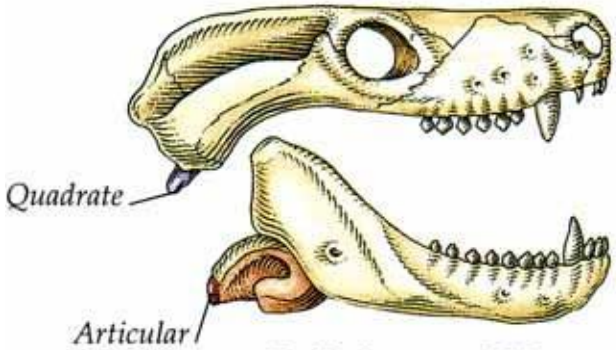


Птицы

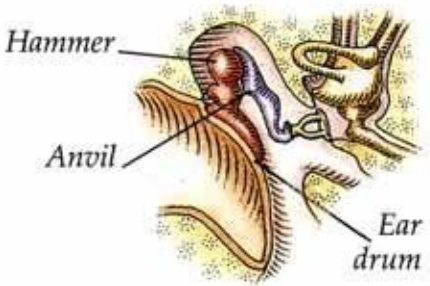
Развитие жизни в Мезозое



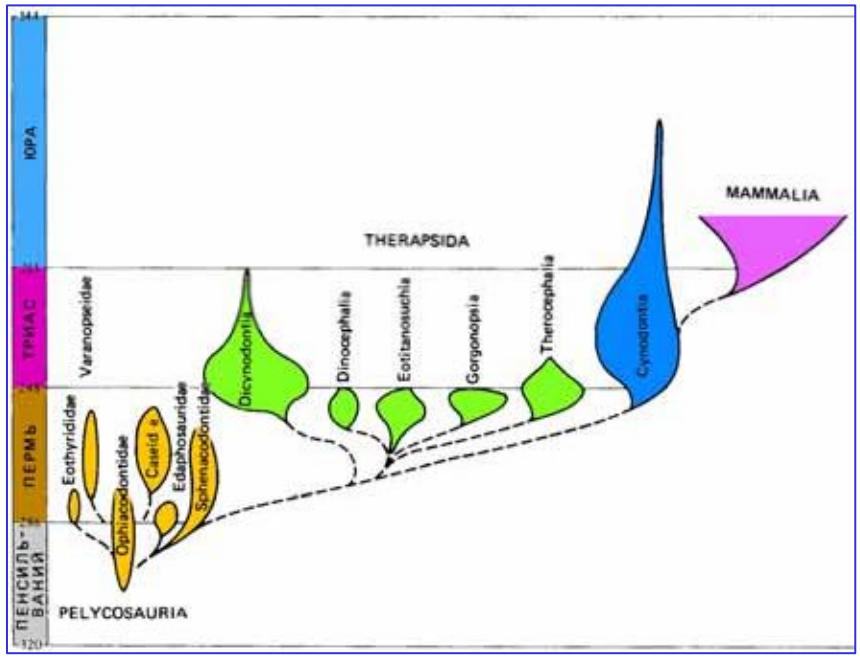
Skull of reptile, *Dimetrodon*



Skull of mammal-like reptile, *Thrinaxodon*

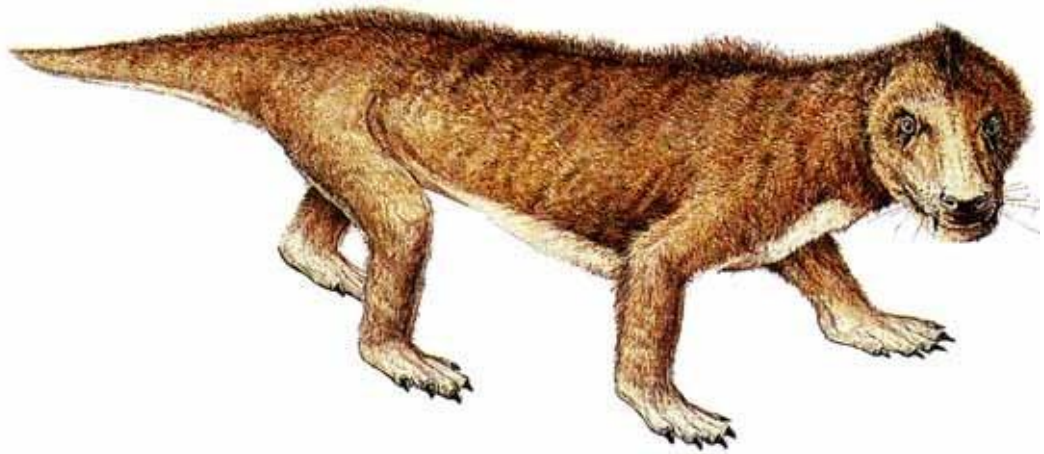


Mammal ear



Cynodontia (P-T)

***Thrinaxodon*, T_1, Ю.Африка**



Массовые вымирания