Gli Anfibi e l'origine dei Rettili

Anfibi attuali

Circa 4000 specie

Il ciclo vitale comprende uno stadio larvale solitamente acquatico ed uno adulto semiacquatico o terrestre

Quasi tutti gli anfibi devono tornare all' acqua per la deposizione delle uova.

La maggior parte degli adulti ha pelle umida che contribuisce allo scambio respiratorio supplendo ad un sistema polmonare inefficiente

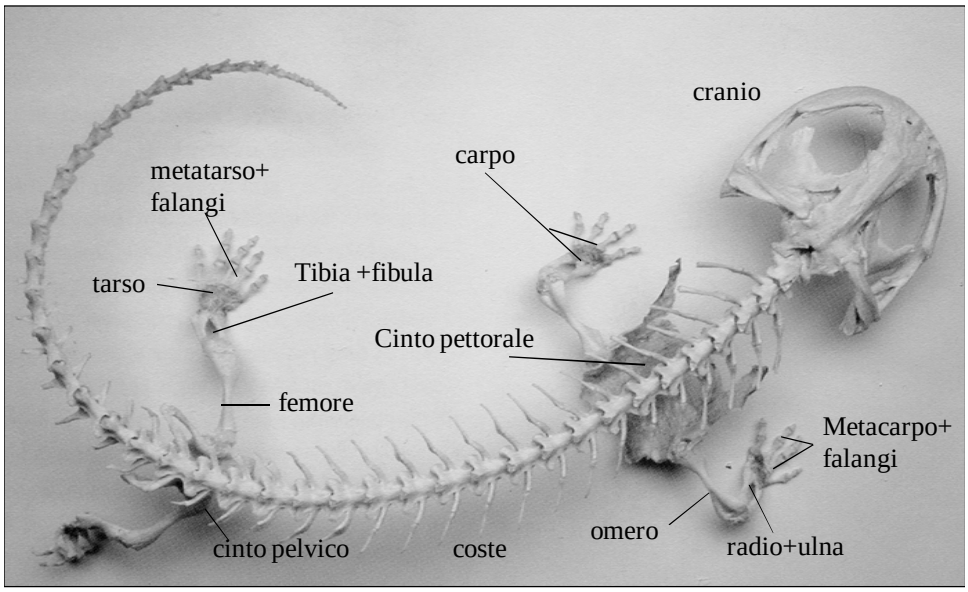
Gli anfibi sono ectotermi, come i pesci cioè dipendono dalla temperatura dell'ambiente, se questa scende divengono inattivi

Gli anfibi attuali sono suddivisi in Anuri, Urodeli e Gimnofioni

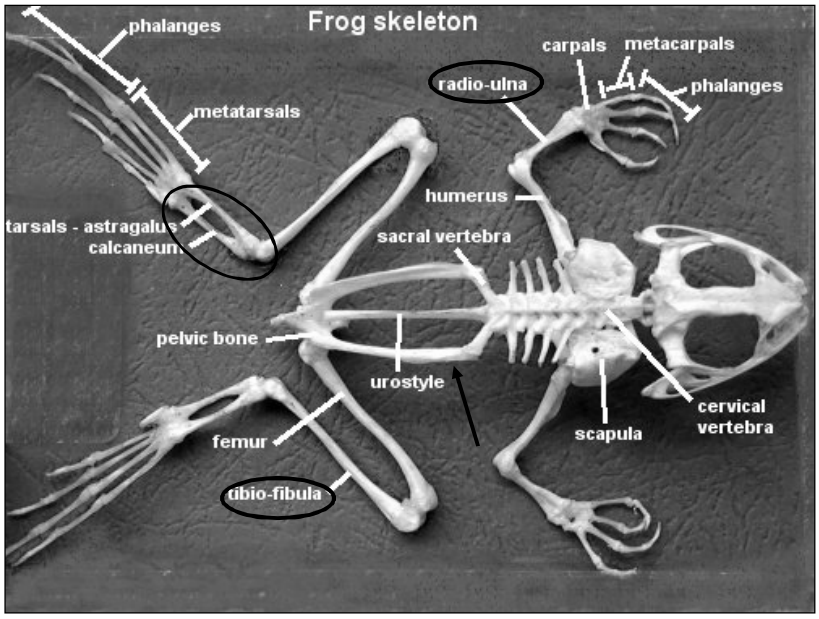
Rispetto ai pesci ossei gli Anfibi si distinguono per

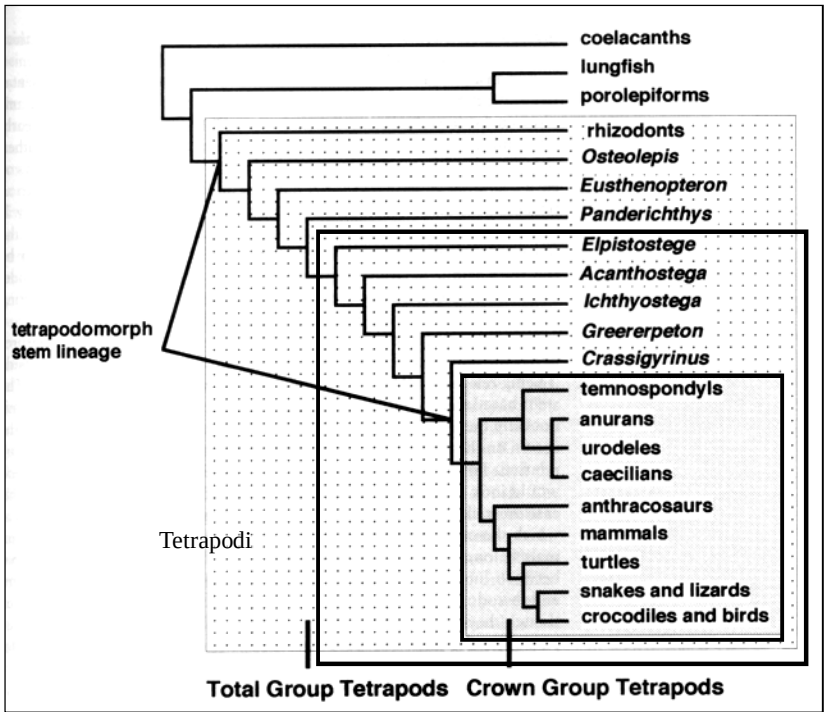
- **Arti e cinti adattati alla locomozione terrestre**
- **Lingua usata sia per catturare la preda ed ingerirla, sia come organo di senso**
- **Palpebre per proteggere l'occhio dall'essiccamento**
- **Orecchi adattati a percepire le onde sonore nel mezzo aereo**
- **Laringe adattata a vocalizzare**

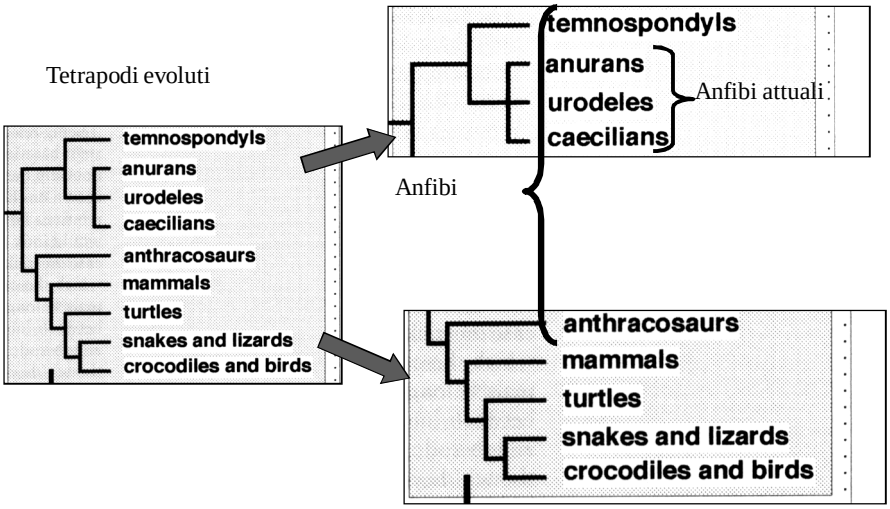
Urodeli



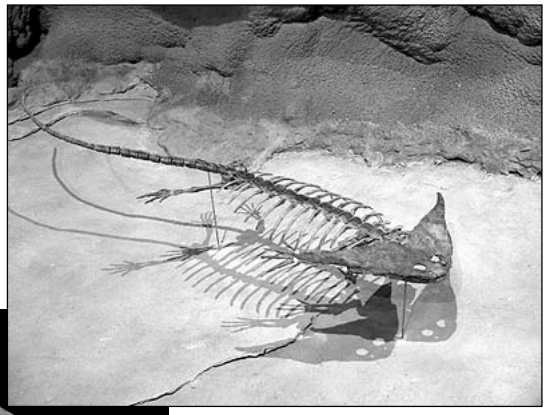
Anuri

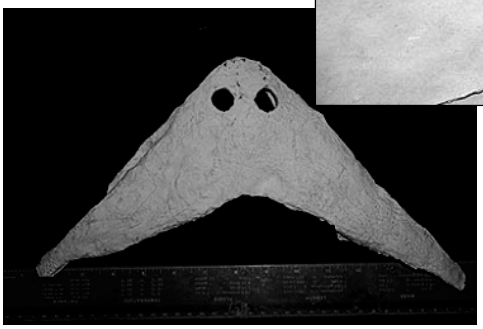



coelacanths
lungfish
porolepiforms
rhizodonts
Osteolepis
Eusthenopteron
Panderichthys
Elpistostege
Acanthostega
Ichthyostega
Greererpeton
Crassigyrinus
tetrapodomorph
stem lineage
temnospondyls
anurans
urodeles
caecilians
anthracosaurs
mammals
turtles
snakes and lizards
crocodiles and birds
Tetrapodi
Total Group Tetrapods
Crown Group Tetrapods

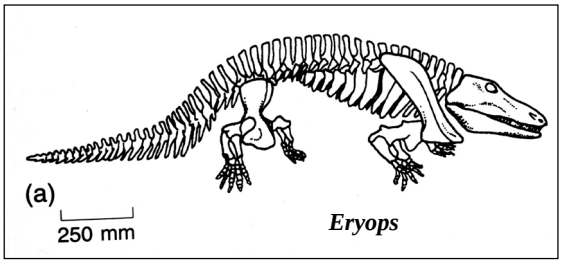

Tetrapodi evoluti
temnospondyls
anurans
urodeles
caecilians
anthracosaurs
mammals
turtles
snakes and lizards
crocodiles and birds
Anfibi
Anfibi attuali

Nectridea,
Carbonifero
Coda piatta con spine neurali ed emali sviluppate, simmetriche (nuoto)

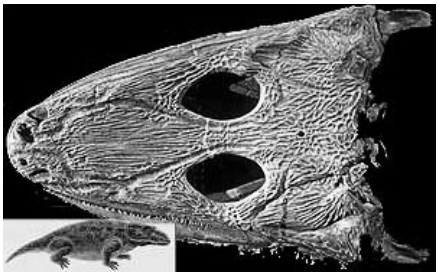


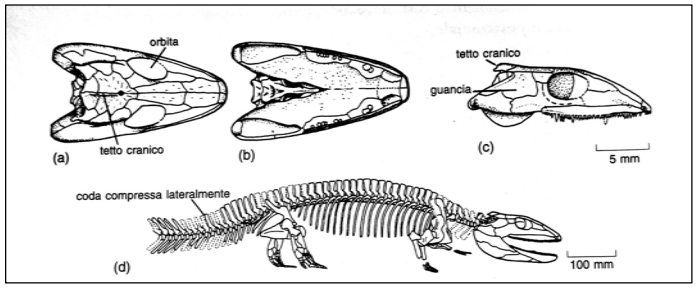


"Corna" tabulari



Temnospondili
Permiano Cretacico
Arti robusti, scheletro massiccio
Predatori semiacquatici
Nel Triassico forme gigantesche

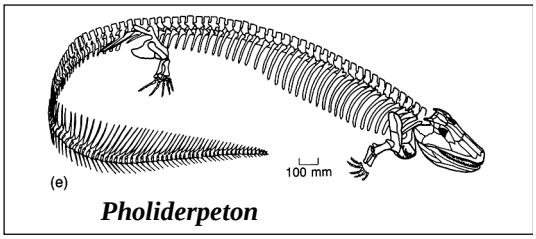




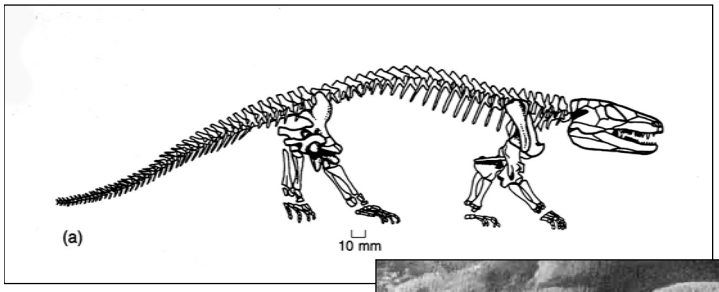
Proterogyrinus

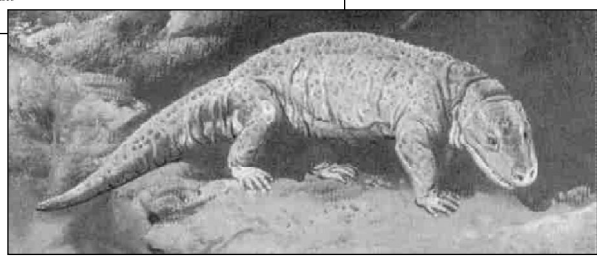
Antracosauri

Carbonifero-Permiano
Alcuni terrestri, altri più acquatici
Mobilità elementi del cranio
***Proterogyrinus* più terrestre (arti sviluppati)**
ma mantiene coda appiattita.
***Pholiderpeton* più acquatico**



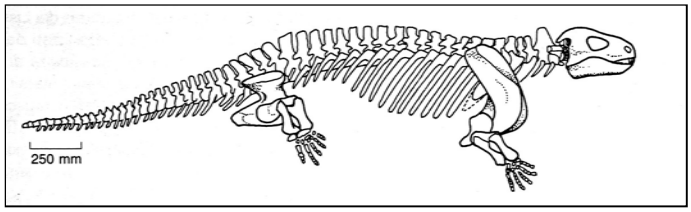
Pholiderpeton



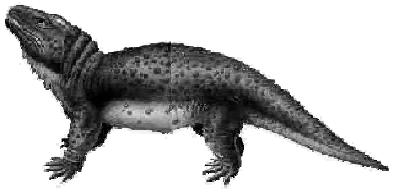


Seymouriamorpha

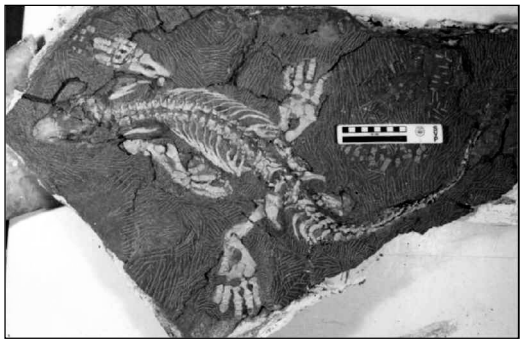
Rettiliomorfi
Permiano
Zampe robuste (poteva tenere il corpo sollevato da terra)

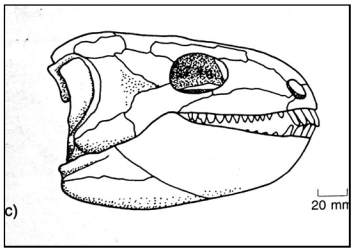


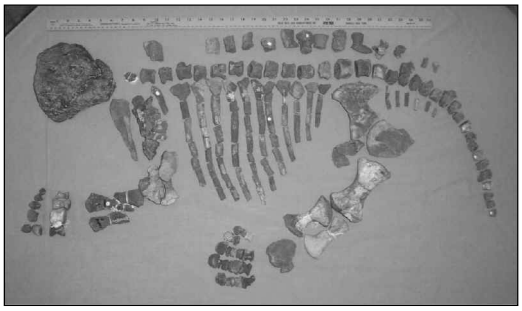
Diadectomorfi

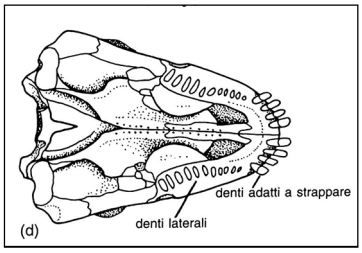


Rettiliomorfi
Carb. Sup-Permiano Inf.
Cinti robusti,
Zampe tozze
Coste ampie
Denti a piolo anteriori e trituranti posteriori
Tra i primi tetrapodi terrestri ad aver adottato una dieta vegetariana.





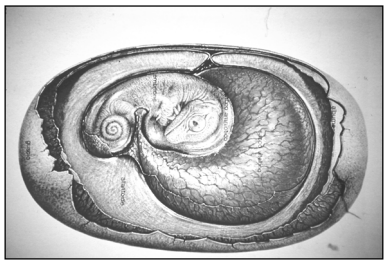




AMNIOTI

AMNIOTA → RETTILI, UCCELLI, MAMMIFERI → RIPRODUZIONE

ANFIBI: UOVA E FORME LARVALI CHE DIPENDONO DALL' ACQUA NELLA MAGGIOR PARTE DEI CASI
UOVA PRIVE DI INVOLUCRI PROTETTIVI



ALTRI **TETRAPODI** — **MEMBRANE EXTRAEMBRIONALI**

AMNIOS

CHORION

ALLANTOIDE

M. EXTRAEMBRIONALI → TRATTENGONO ACQUA; SCAMBIANO GAS; SOSTEGNO; PROTEZIONE

CONSENTONO DI RAGGIUNGERE UNO STADIO DI SVILUPPO PIU' AVANZATO PRIMA DEL PARTO O DELLA SCHIUSA

AMNIOTI PRIMITIVI

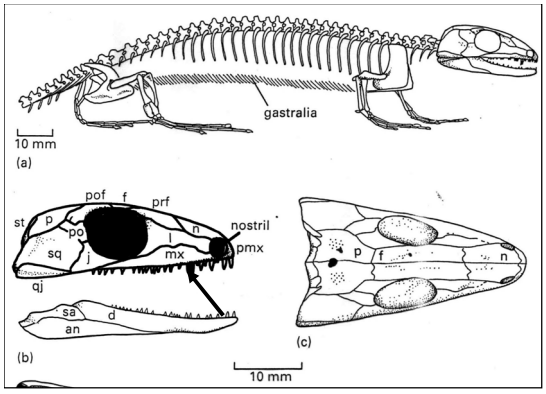
CARBONIFERO SUPERIORE Dominato da TEMNOSPONDILI e ANTRACOSAURI

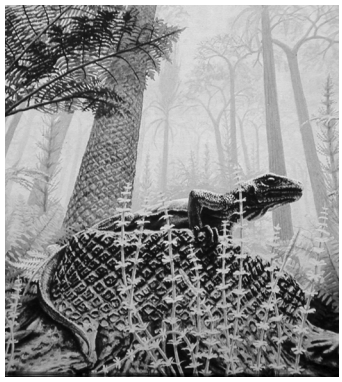
Sono già presenti i primi AMNIOTI

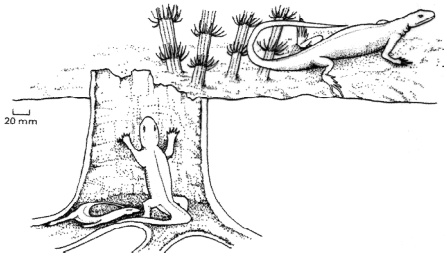
I più antichi conosciuti: ***Palaeothyris*** e ***Hylonomus***

Caratteristiche

- Corpo agile
- Lunghi circa 20 cm
- Testa piccola rispetto al corpo
- Mancano zanne ma vi sono molti piccoli denti (si cibavano di Invertebrati)







ANAPSIDA

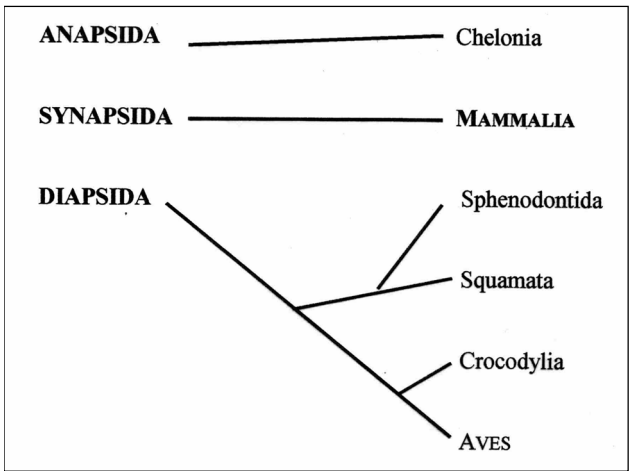
SYNAPSIDA

DIAPSIDA

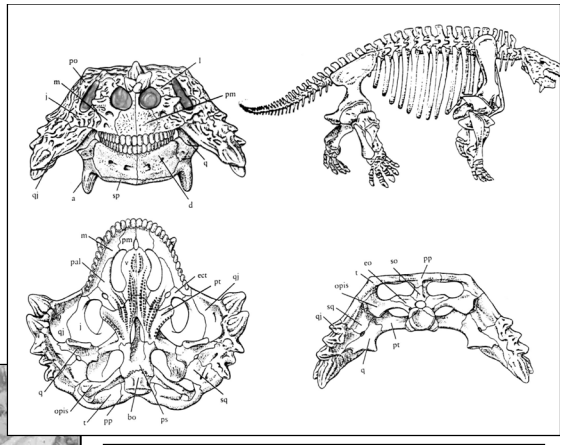
EURYAPSIDA (PARAPSIDA) (probabile derivazione dai DIAPSIDA)

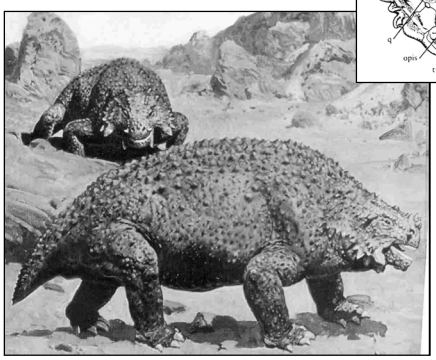
IL TERMINE RETTILE E' PERCIO' RIFERIBILE A

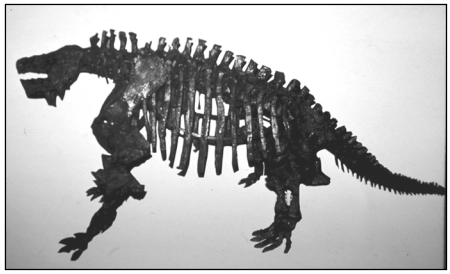
- TARTARUGHE
- COCCODRILLI
- LEPIDOSAURI
- FORME ANCESTRALI O AFFINI
- AMNIOTI PRIMITIVI

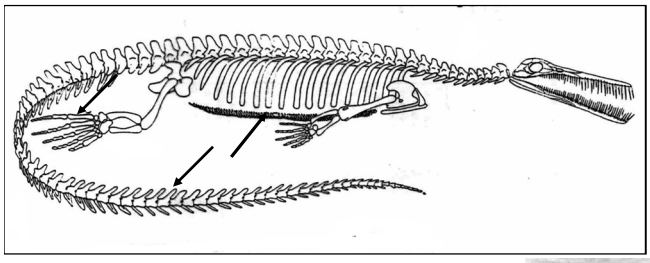


Paraiesauri

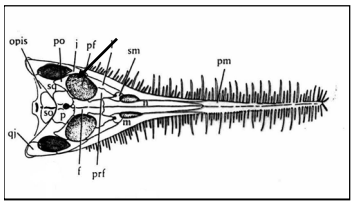


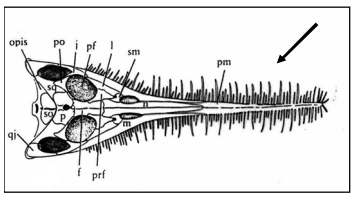


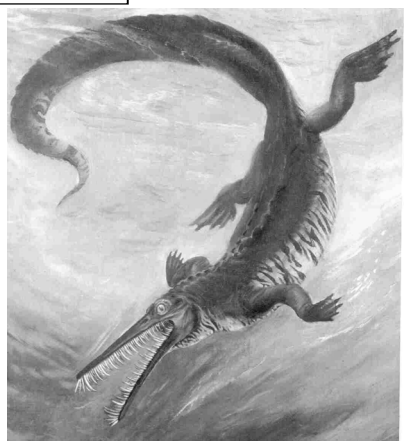


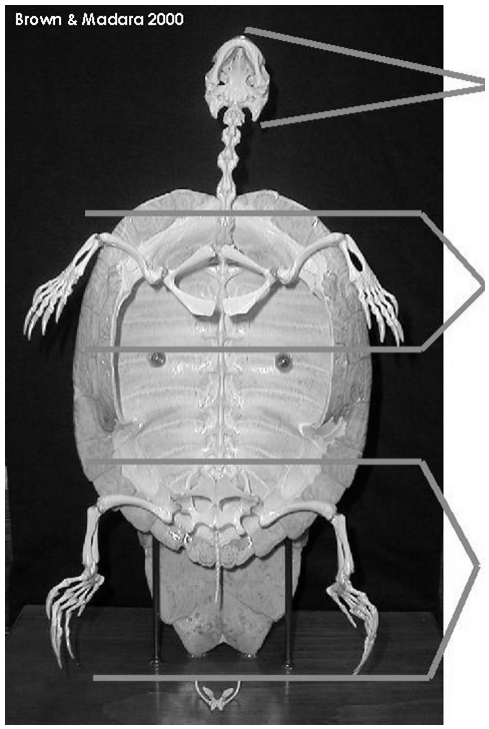


Mesosauri





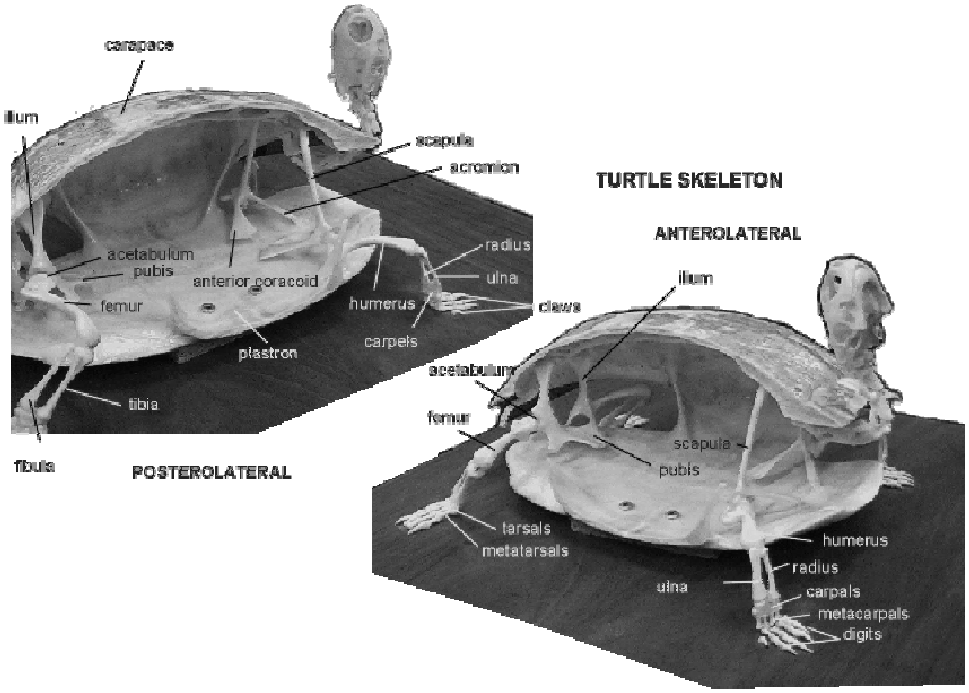


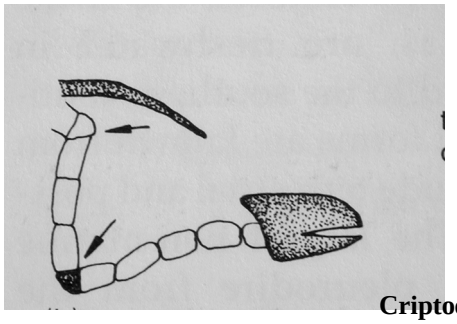


Cranio e mandibola

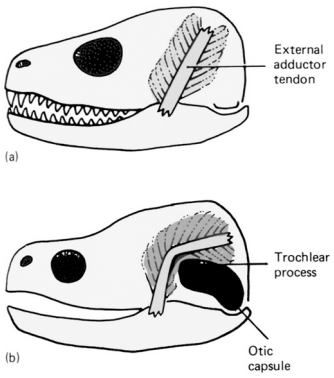
Cinto pettorale ed arti anteriori

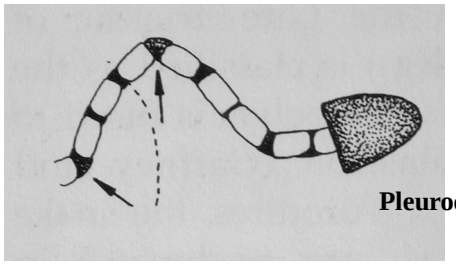
Cinto pelvico ed arti posteriori





Criptodiro

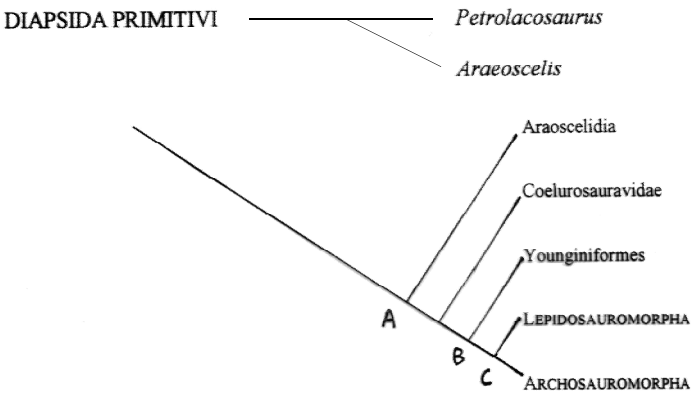




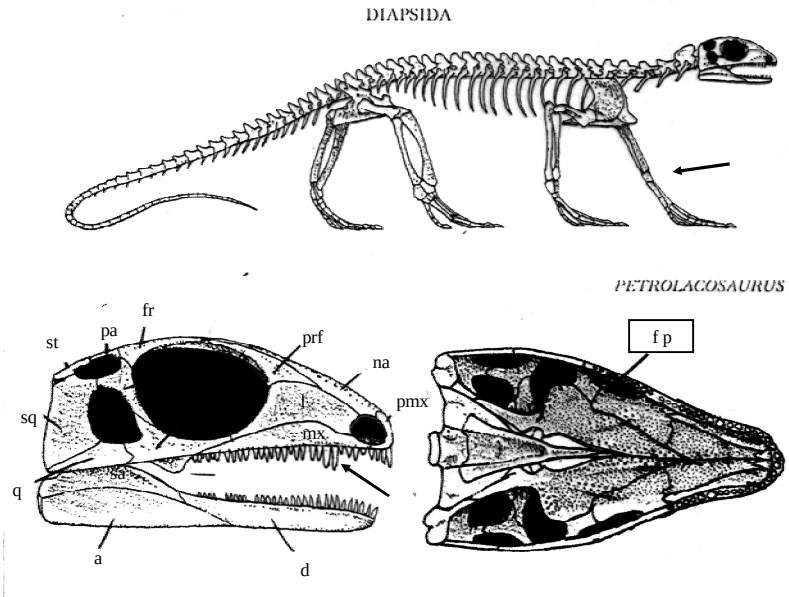
Pleurodiro

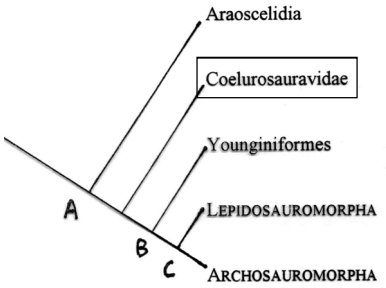
DIAPSIDA

TUTTI I RETTILI OGGI VIVENTI A PARTE LE TARTARUGHE SONO DIAPSIDI

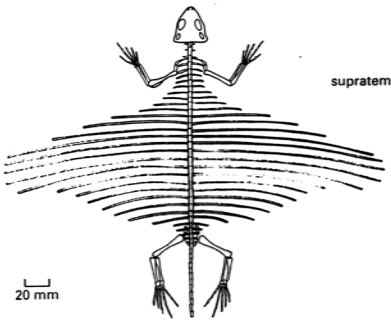


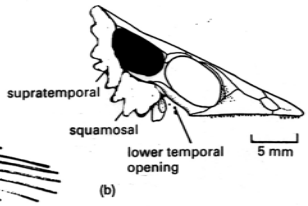
A = DIAPSIDA B = NEODIAPSIDA C = [SAURIA]

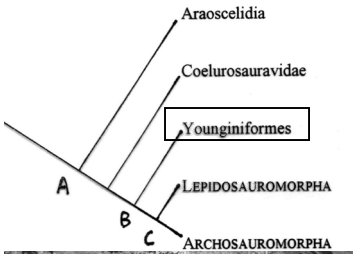


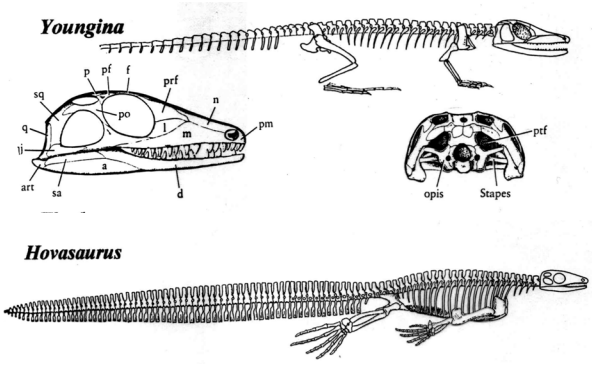


Permiano

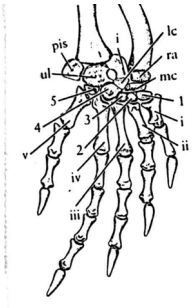


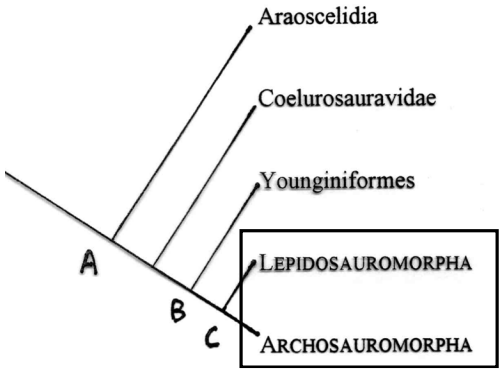






Younginiformes
Permiano





CROWN GROUP

LEPIDOSAUROMORPHA = Lucertole, serpenti, *Sphenodon*, (gruppi affini estinti) Euryapsida,

ARCHOSAUROMORPHA = Alcuni gruppi permotriassici e gli ARCHOSAURIA

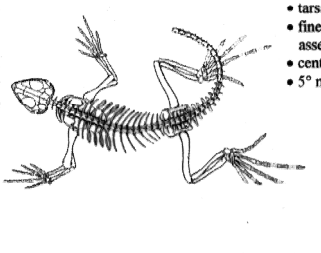
ARCHOSAURIA = Coccodrilli, gruppi affini estinti, Dinosauri, Pterosauri.

"**EOLACERTILIA**" (grab bag) Permo-Trias

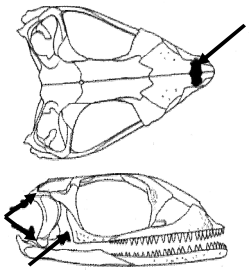
"Paliguanidae"

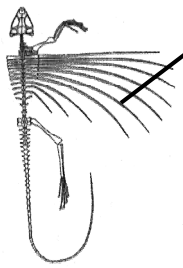
Somiglianza superficiale con gli Squamata ma:

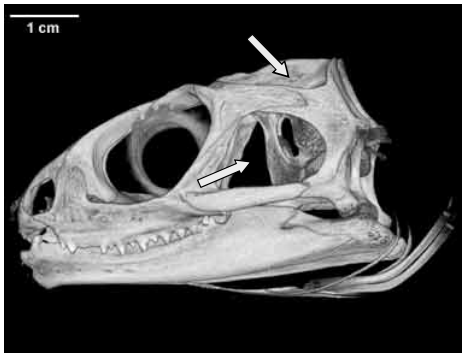
- tarsali prossimali non fusi
- finestra thyroidea ridotta o assente
- centra anficeli
- 5° metatarsale diritto



KUEHENEOSAURIDAE (Triassico Superiore)



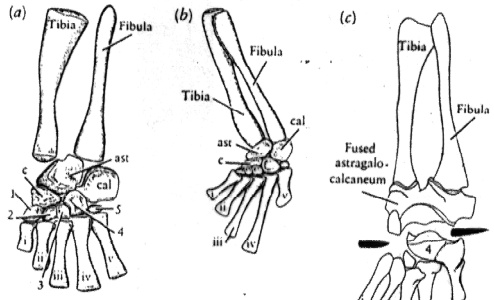


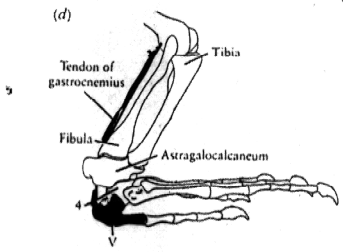


Caratteri dei Sauria (Squamata + Rhyncocephalia)

Organo di Jacobson (chemiocettore)

Bulbi olfattori cerebrali ben sviluppati





Epifisi (articolazioni più efficienti - crescita definita)

Sutura paroccipitale – quadrato

Staffa sottile (udito)

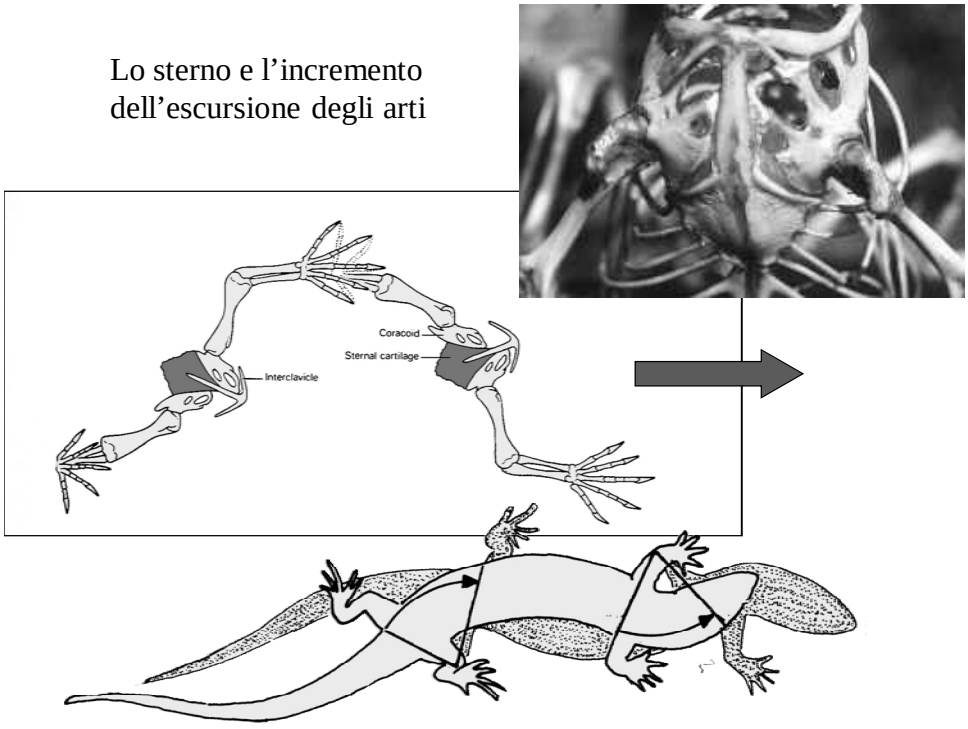
Finestra thyroidea

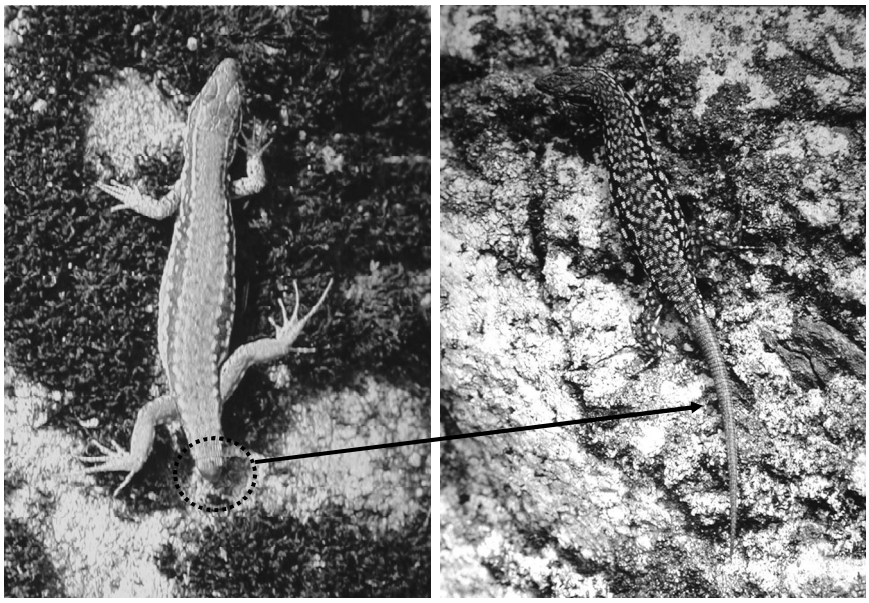
Autotomia coda

Fusione tarsali prossimali

5° metatarsale uncinato

Lo sterno e l'incremento dell'escursione degli arti

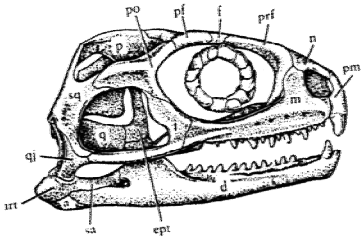




SPHENODONTIDA

Dentatura acrodonte

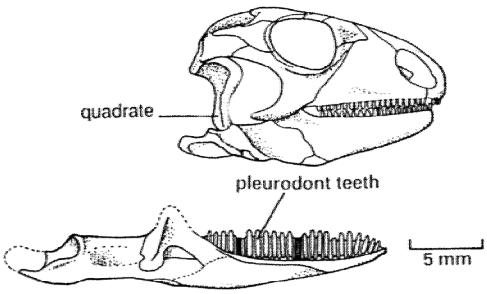
Quadrato rigido



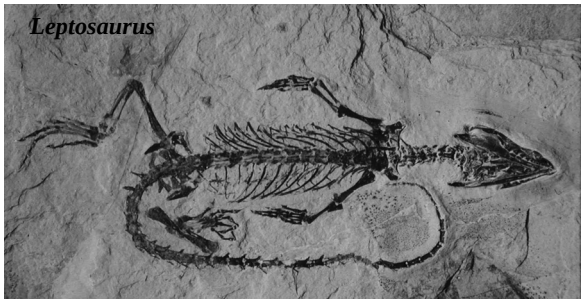
SQUAMATA

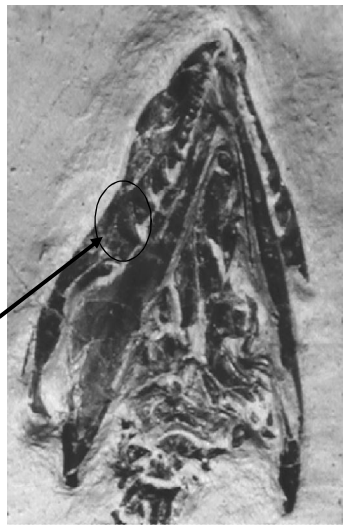
pleurodonte (con varianti)

quadrato mobile



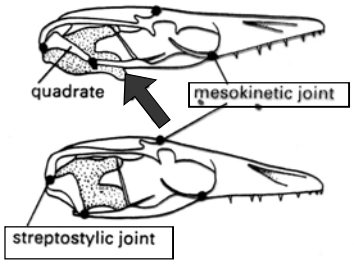
SPHENODONTIA (dal Triassico Superiore)

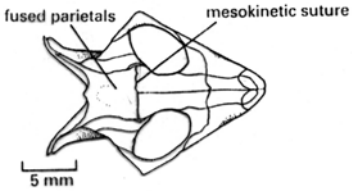


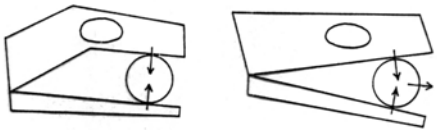


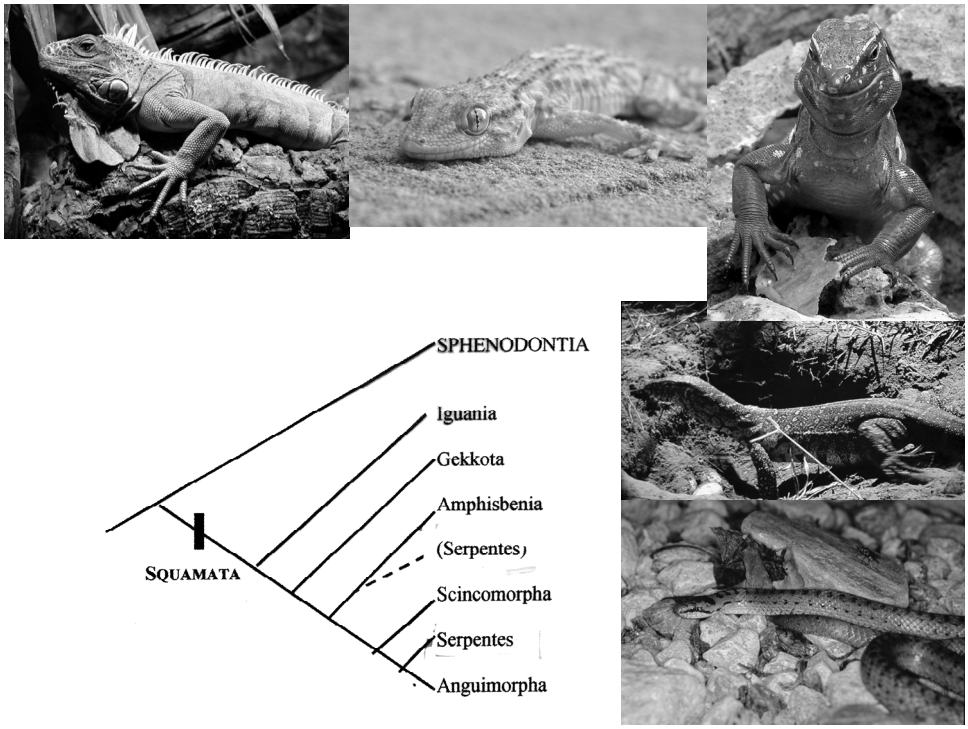
SQUAMATA (dal Giurassico?)

SQUAMATA
- Cranio cinetico
- F. temp. inf. incompleta
- (dentatura spesso pleurodonte)
- Vertebre proceli (eccezioni)
- (zigosfene – zigantro)



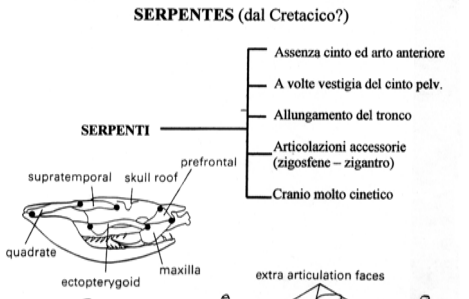


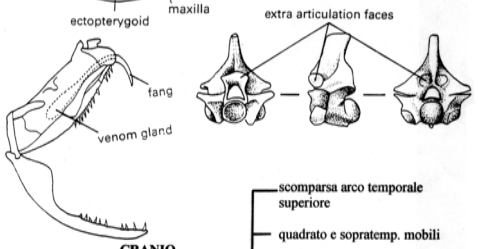




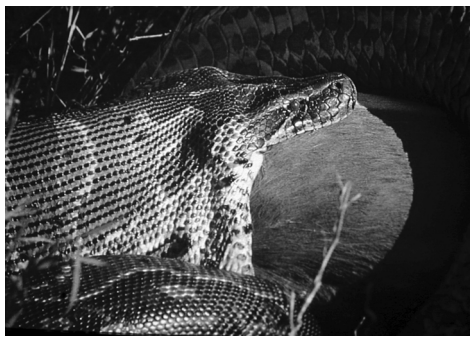
SERPENTES (dal Cretacico?)

SERPENTI
- Assenza cinto ed arto anteriore
- A volte vestigia del cinto pelv.
- Allungamento del tronco
- Articolazioni accessorie (zigosfene – zigantro)
- Cranio molto cinetico





CRANIO
- scomparsa arco temporale superiore
- quadrato e sopratemp. mobili
- denti su pterigoidi e palatini
- emimandibole non saldate
- scatola cranica protetta

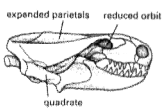


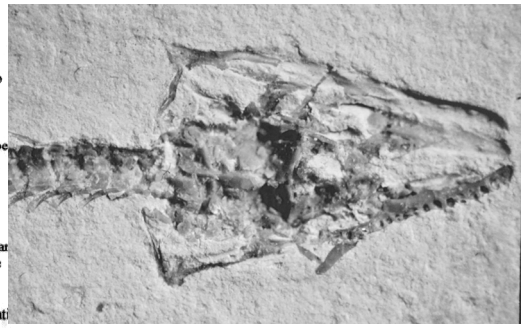
EVOLUZIONE DEI SERPENTI

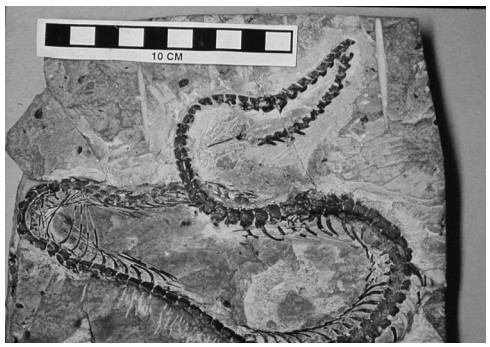
ANTENATO FOSSORIO

PRO
- Allungamento del tronco
- Riduzione degli arti
- Modificazione delle palpe
- Perdita del timpano

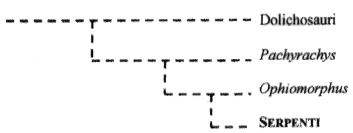
CONTRO
- Cranio sottile e cinetico a nelle forme più primitive
- gli adattamenti sopra citati sono plausibili anche in ambiente acquatico
- L' organo di Jacobson è presente in alcuni Varanoidea







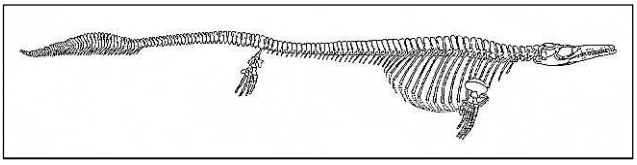
LINEA EVOLUTIVA IDEALE

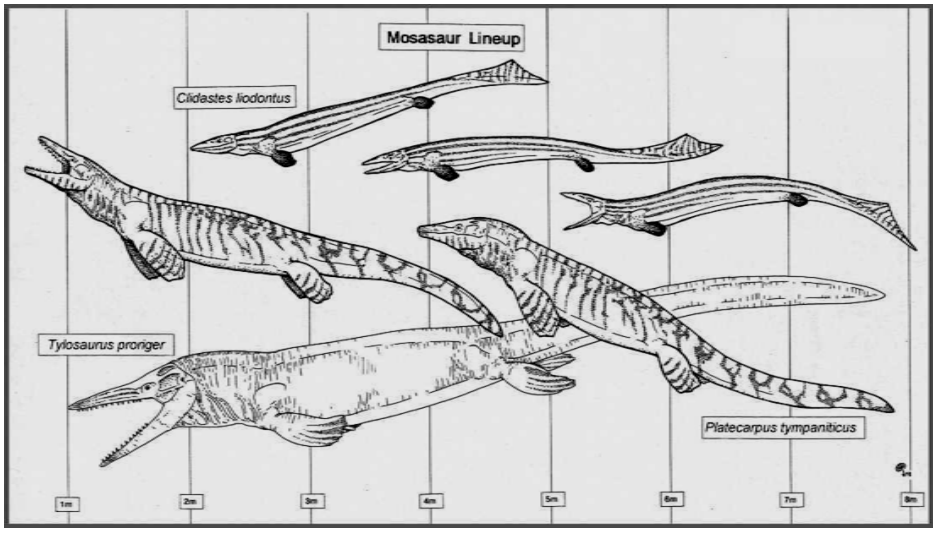


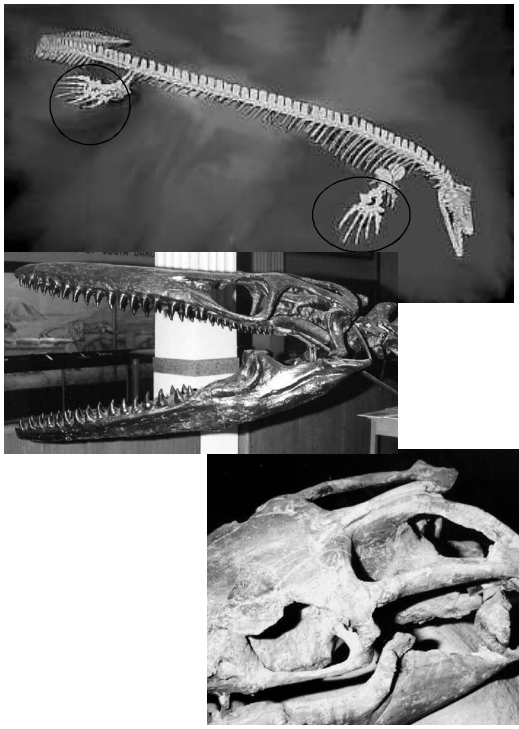
Mosasauri

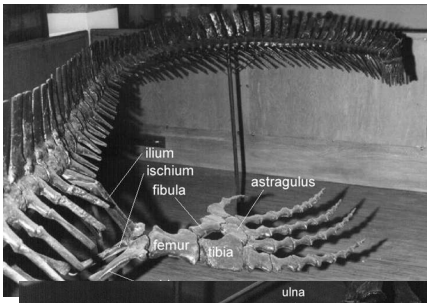
Cretacico Superiore

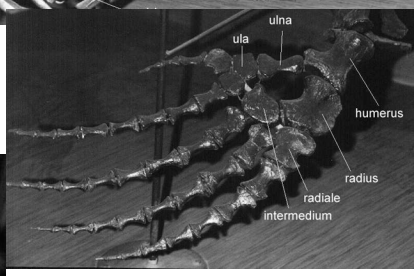
•Canio cinetico, denti conici a base larga, che perforano e frantumano
•Tronco allungato (quasi serpentiforme), nuoto assiale. Nuoto non molto veloce (anguilliforme). Forse per questo tipici di acque costiere, predatori di superficie (scheletro non "pachiostotico").
•Arti modificati per il nuoto, ma con funzione solitamente di direzione più che di spinta
•Dimensioni da medie (2-3m) a molto grandi (10m)
•Estinzione per competizione con i grossi squali Cretacico-Eocenici?








ilium
ischium
fibula
astragulus
femur
tibia


ulna
ula
humerus
radius
radiale
intermedium