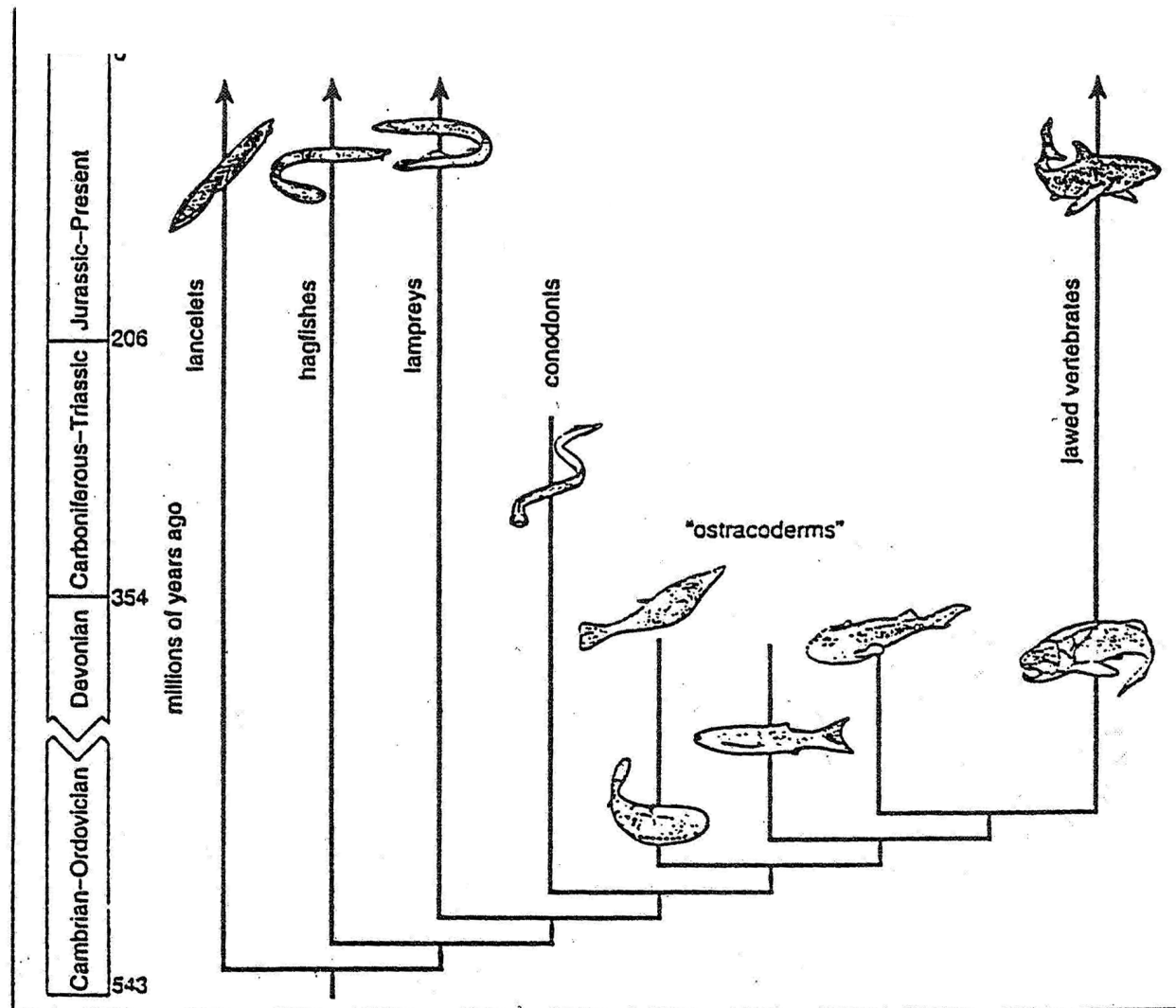
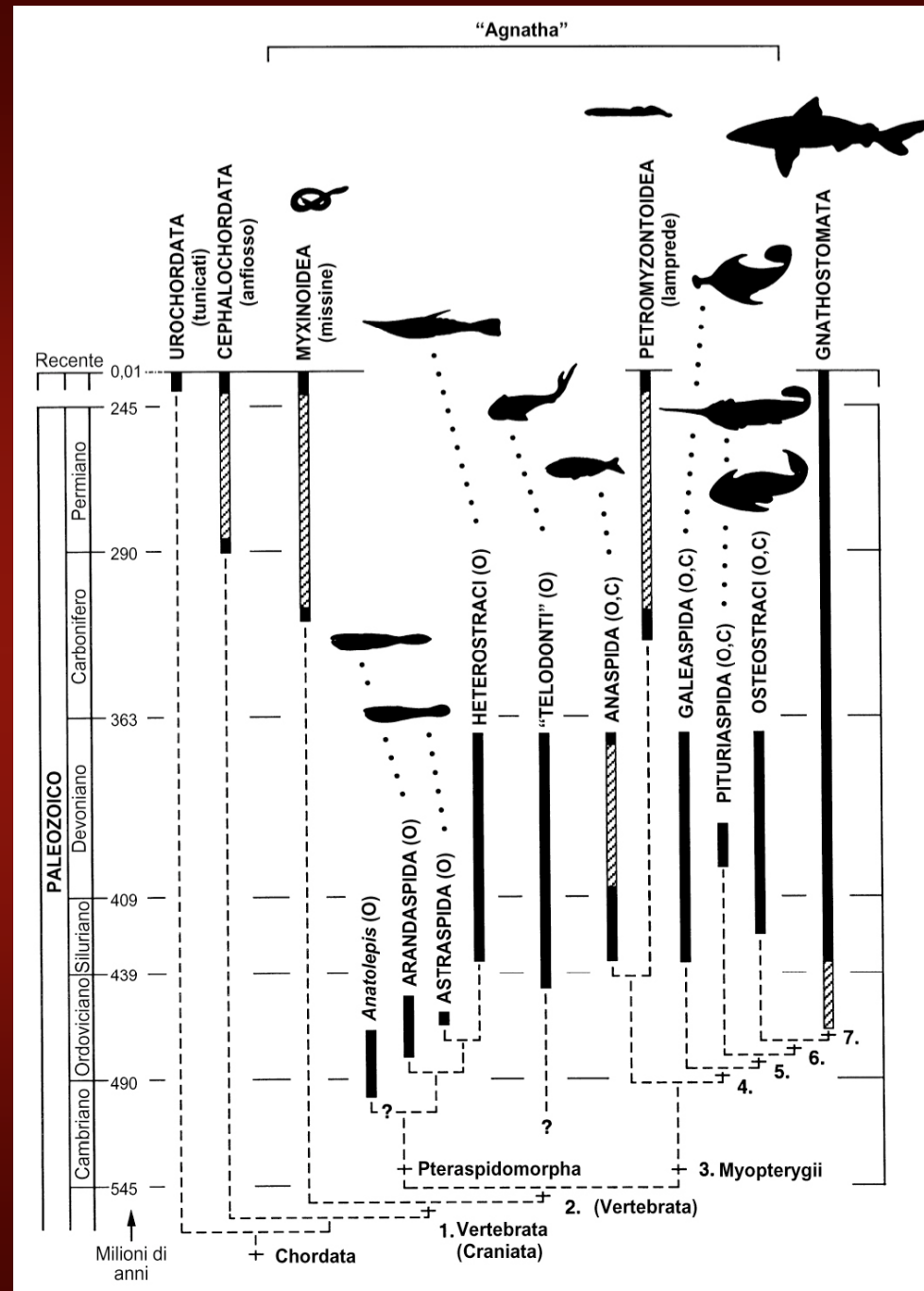
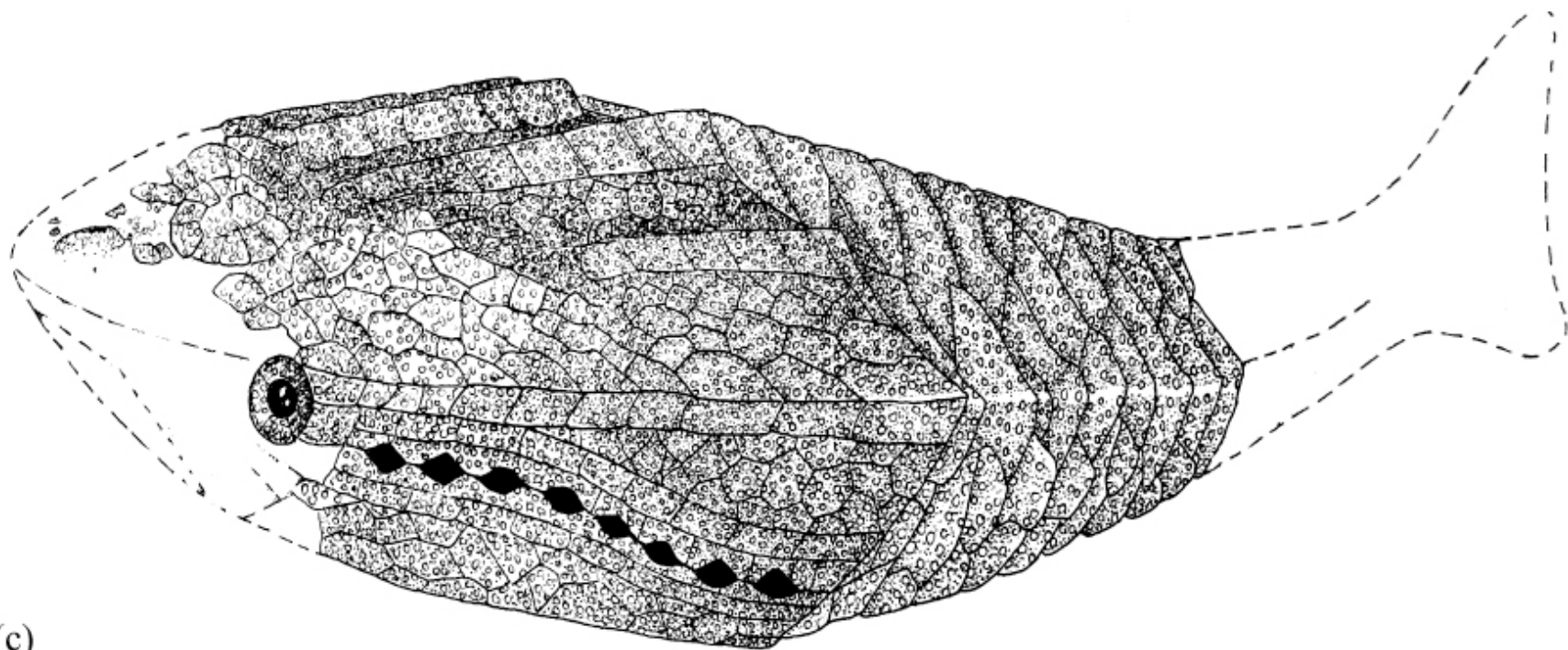




Shaking the vertebrate tree. A new analysis finds conodonts to be full-fledged vertebrates, whereas hagfish are primitive members of the group.





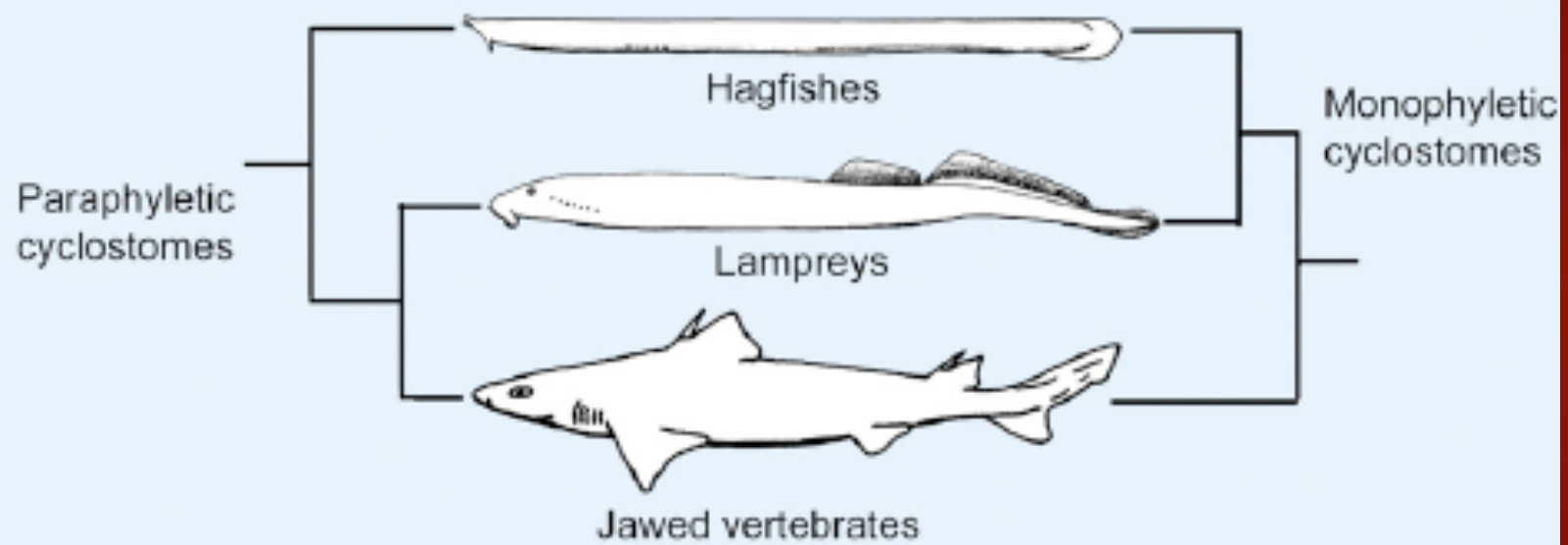
(c)

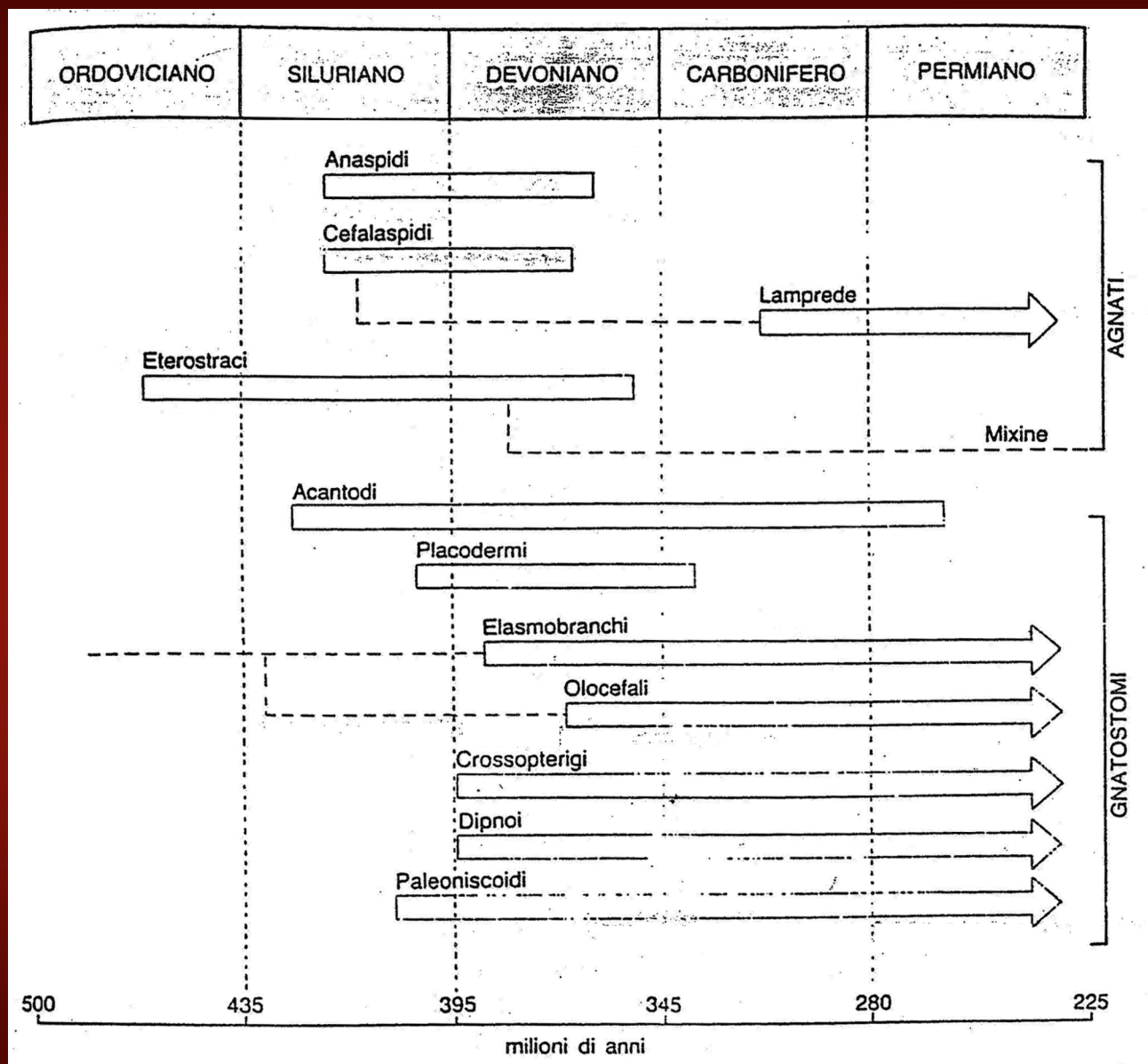
PTERASPIDI
(ETEROSTRACI-MISSINE)

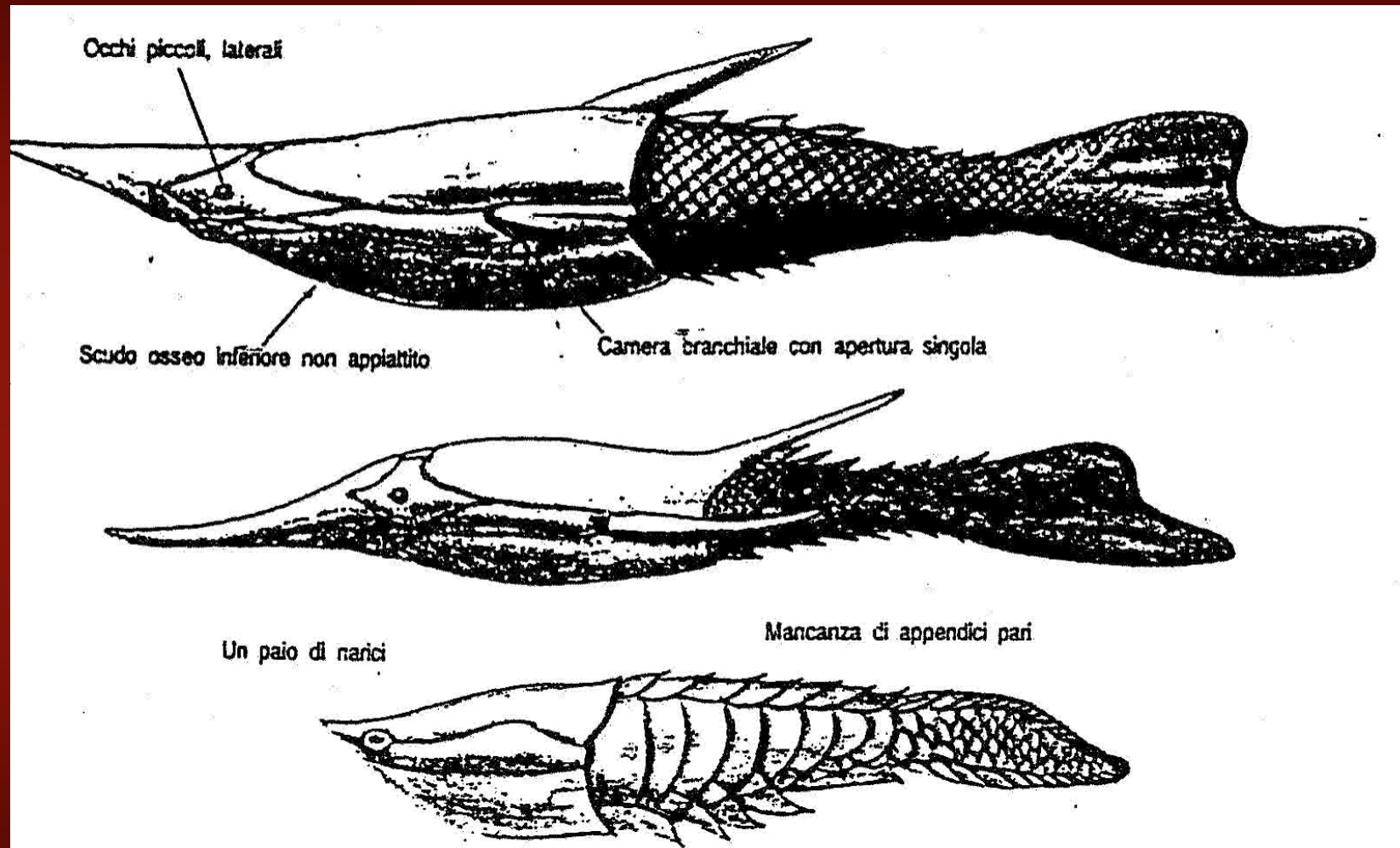
AGNATI ANASPIDI

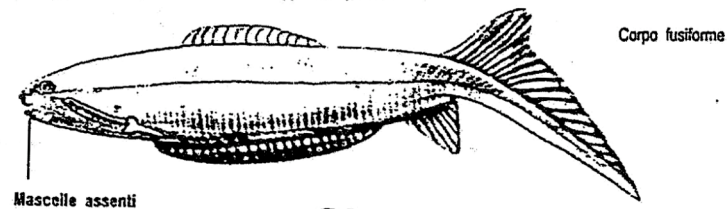
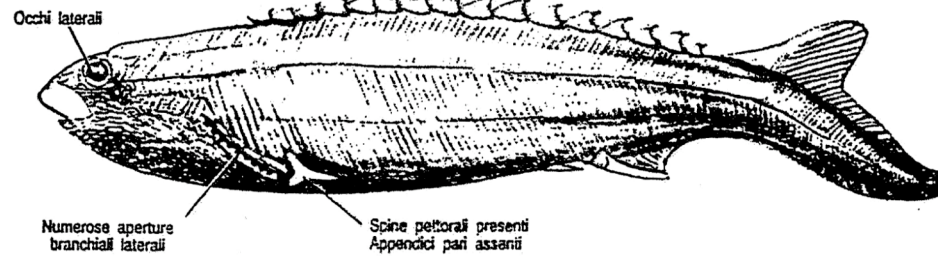
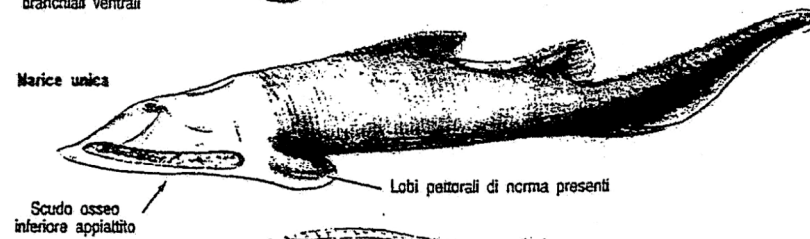
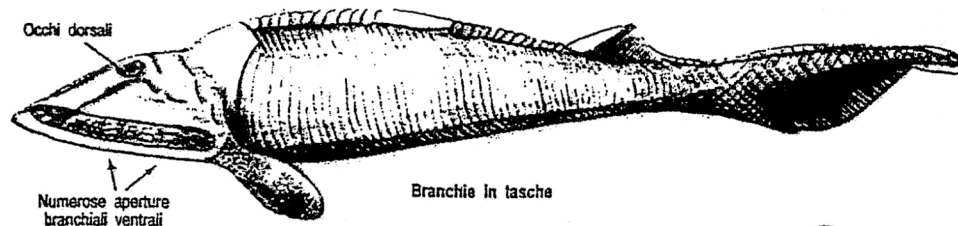
CEFALASPIDI
(LAMPREDE)

A

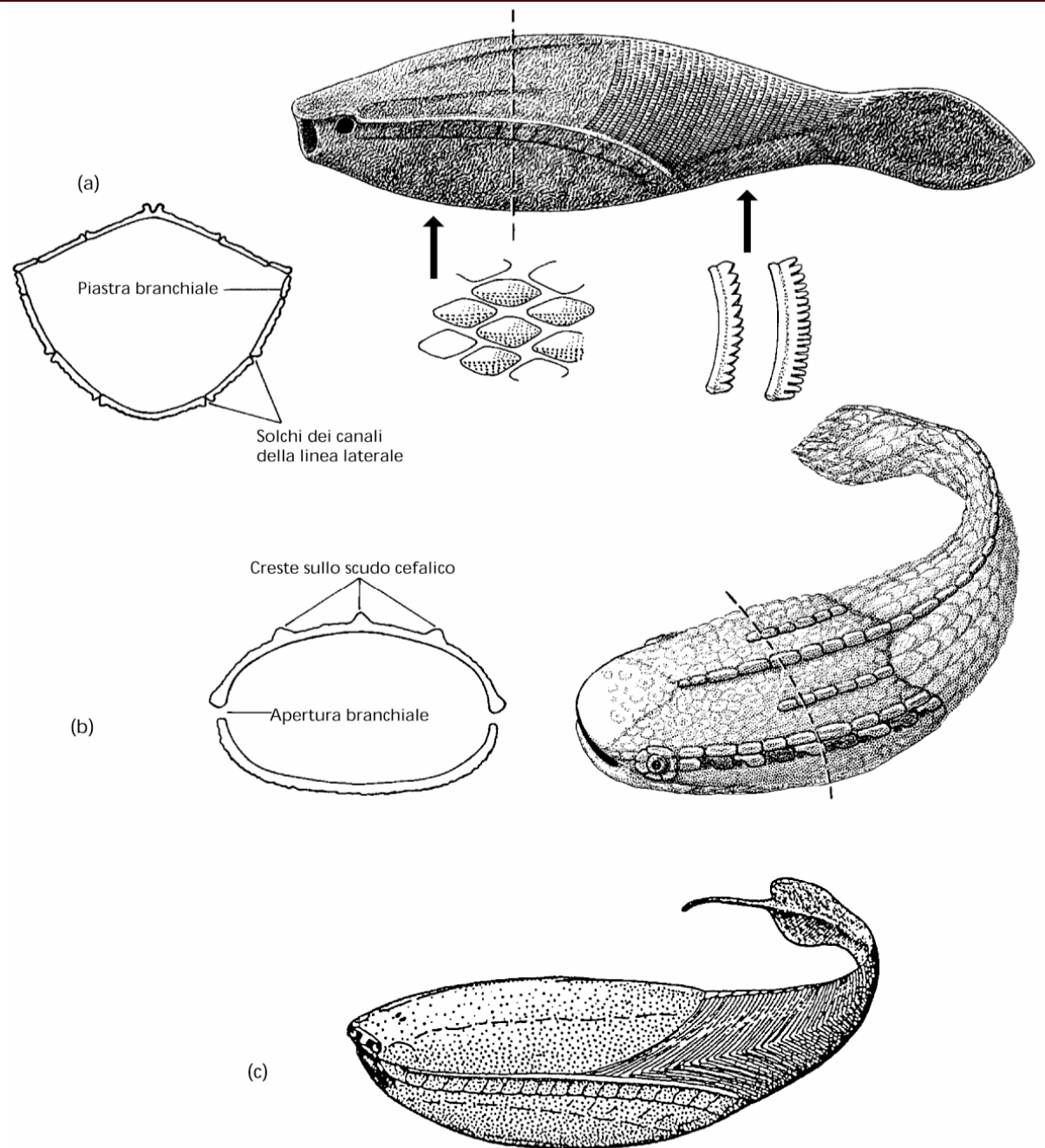


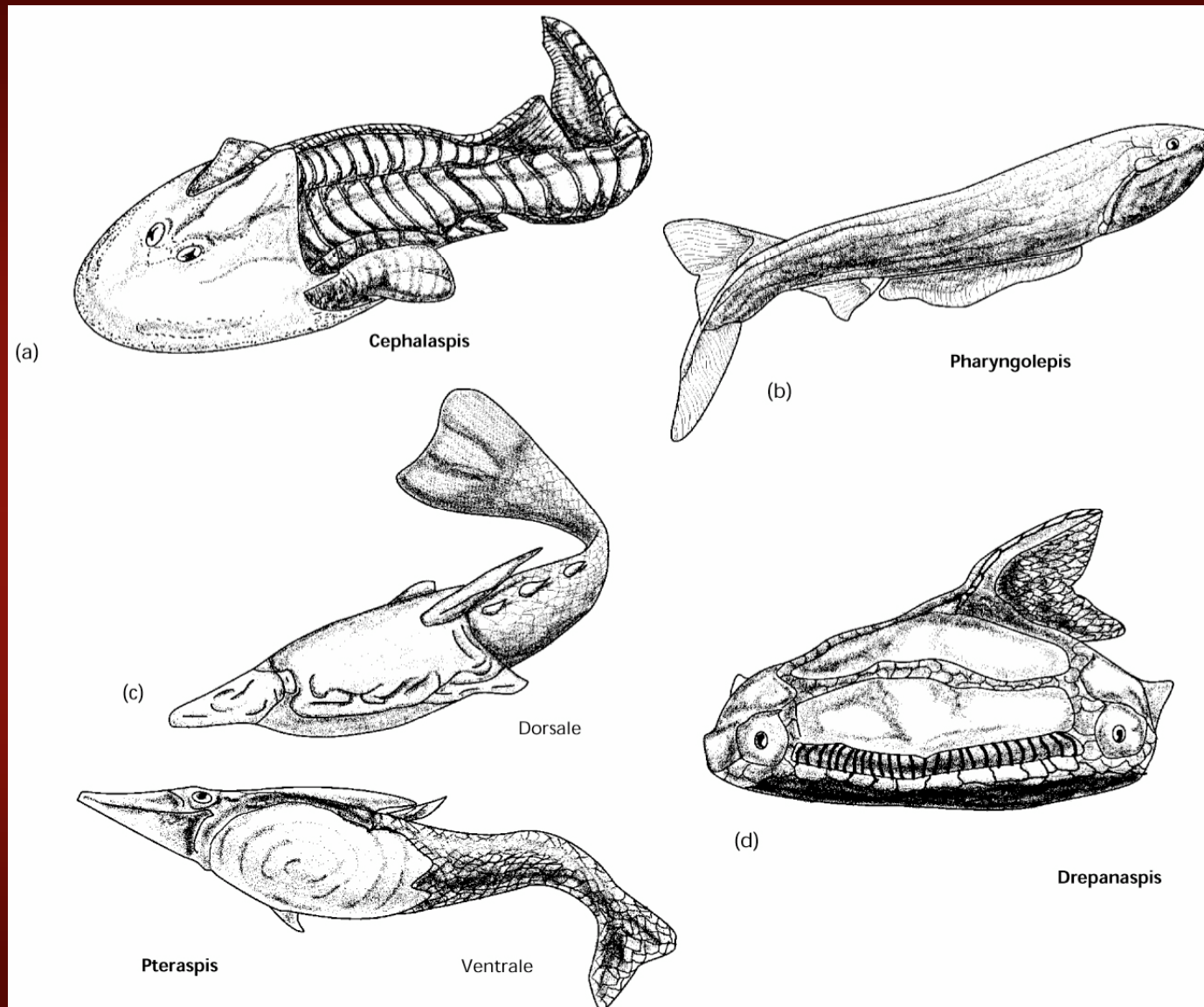






ANASPIDA



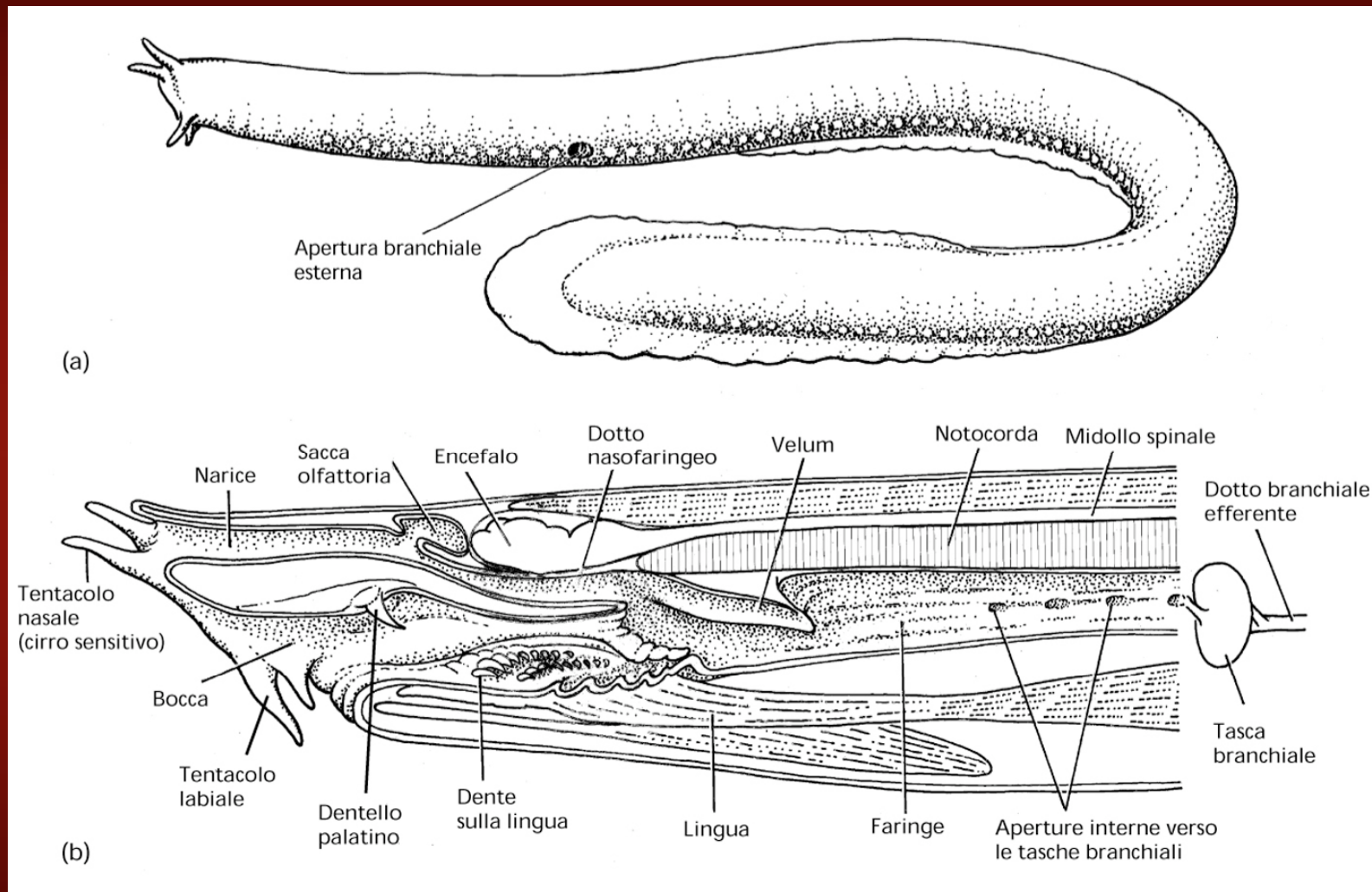


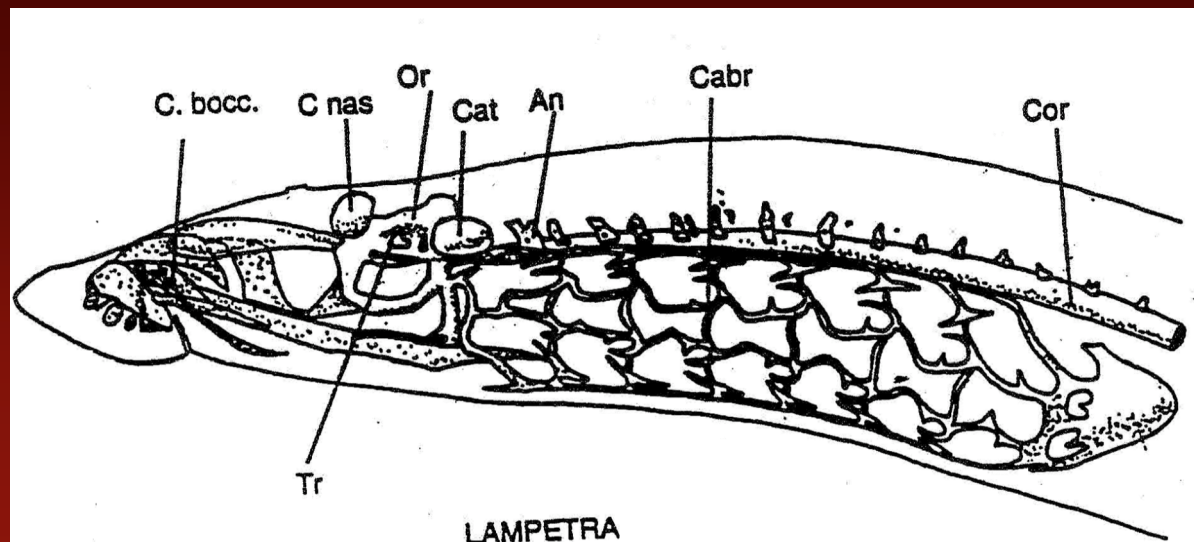
MISSINE

- OCCHI ASSENTI O MOLTO PICCOLI
- SI CIBANO DI POLICHETI O PESCI MORIBONDI
- DA 1 A 15 BRANCIE
- 1 CANALE SEMICIRCOLARE
- CUORE ANEURALE
- NOTOCORDA NUDA

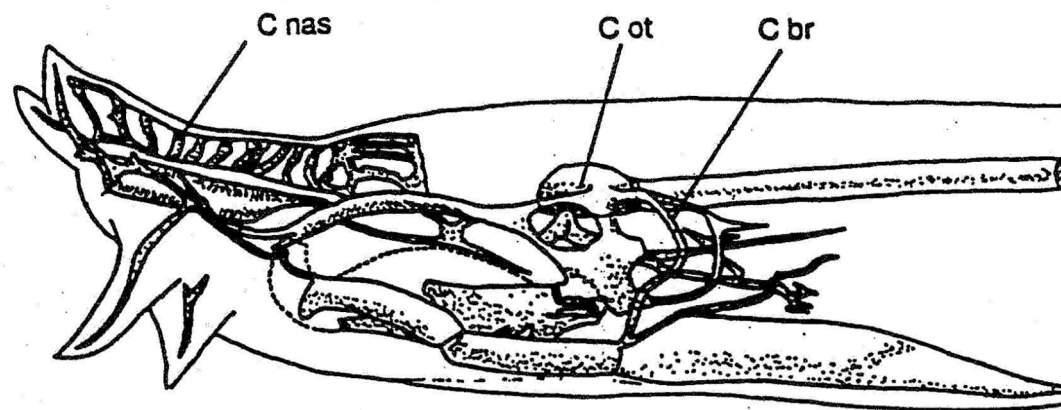
Eptatretus stoutii







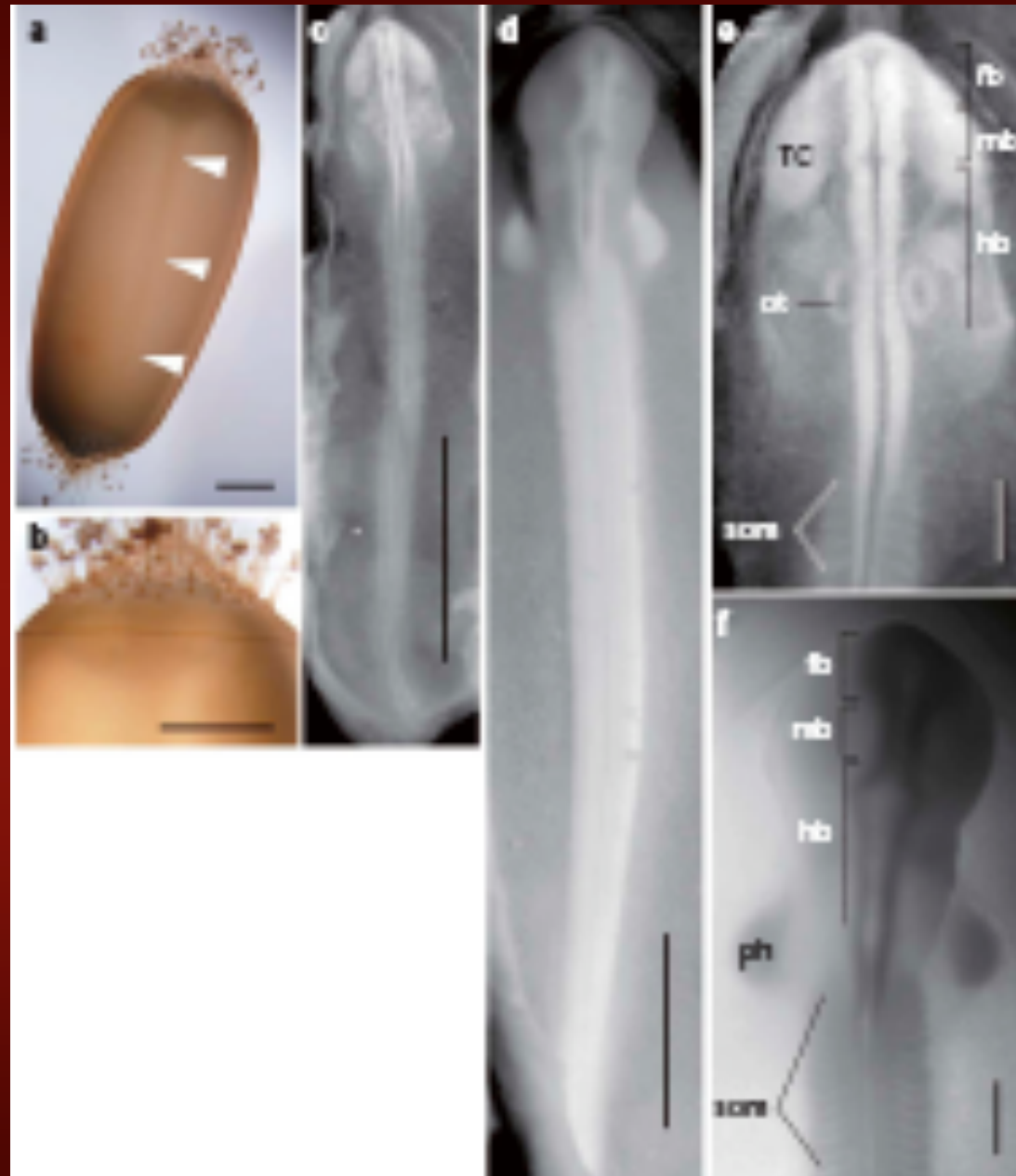
LAMPETRA

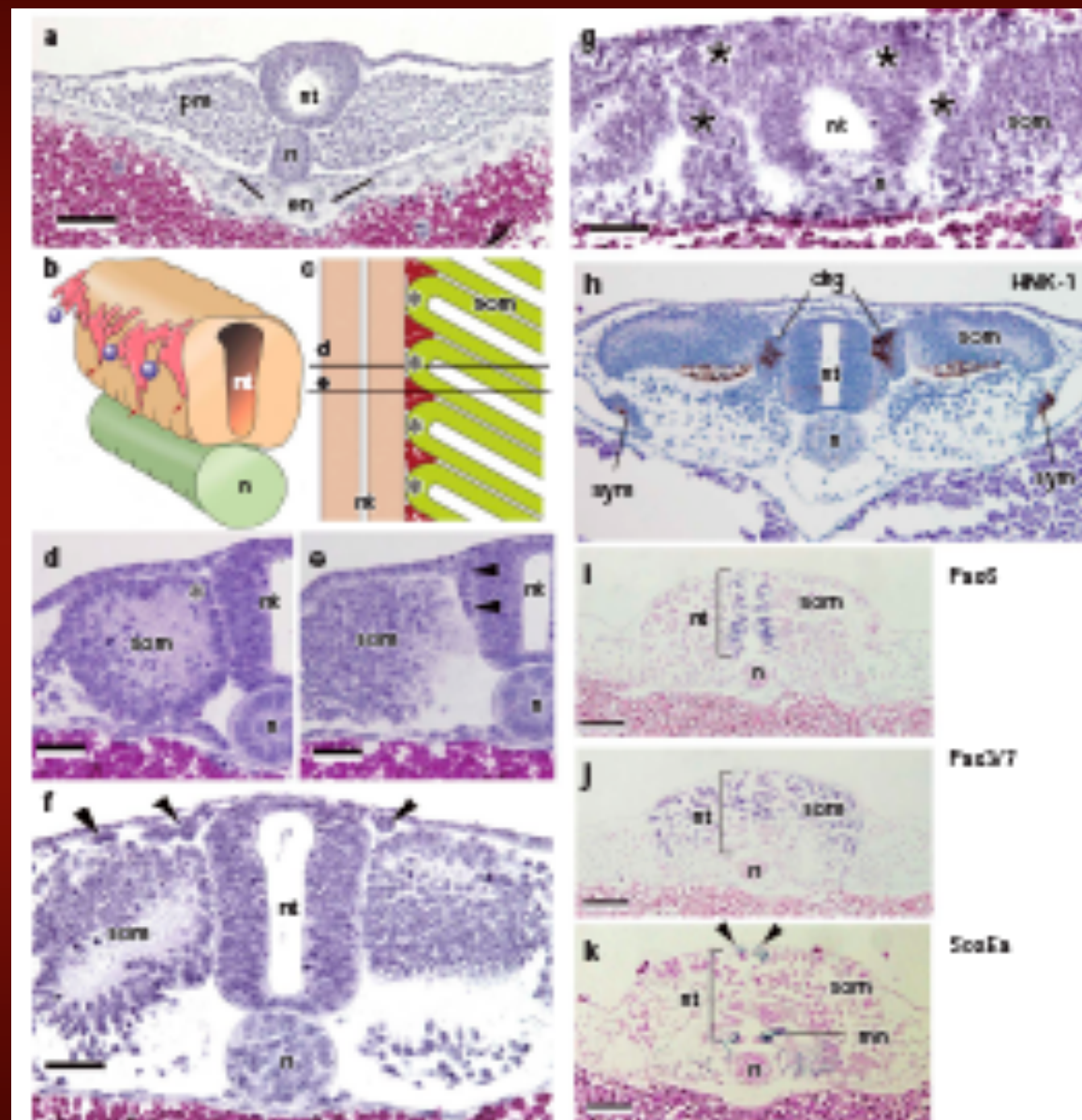


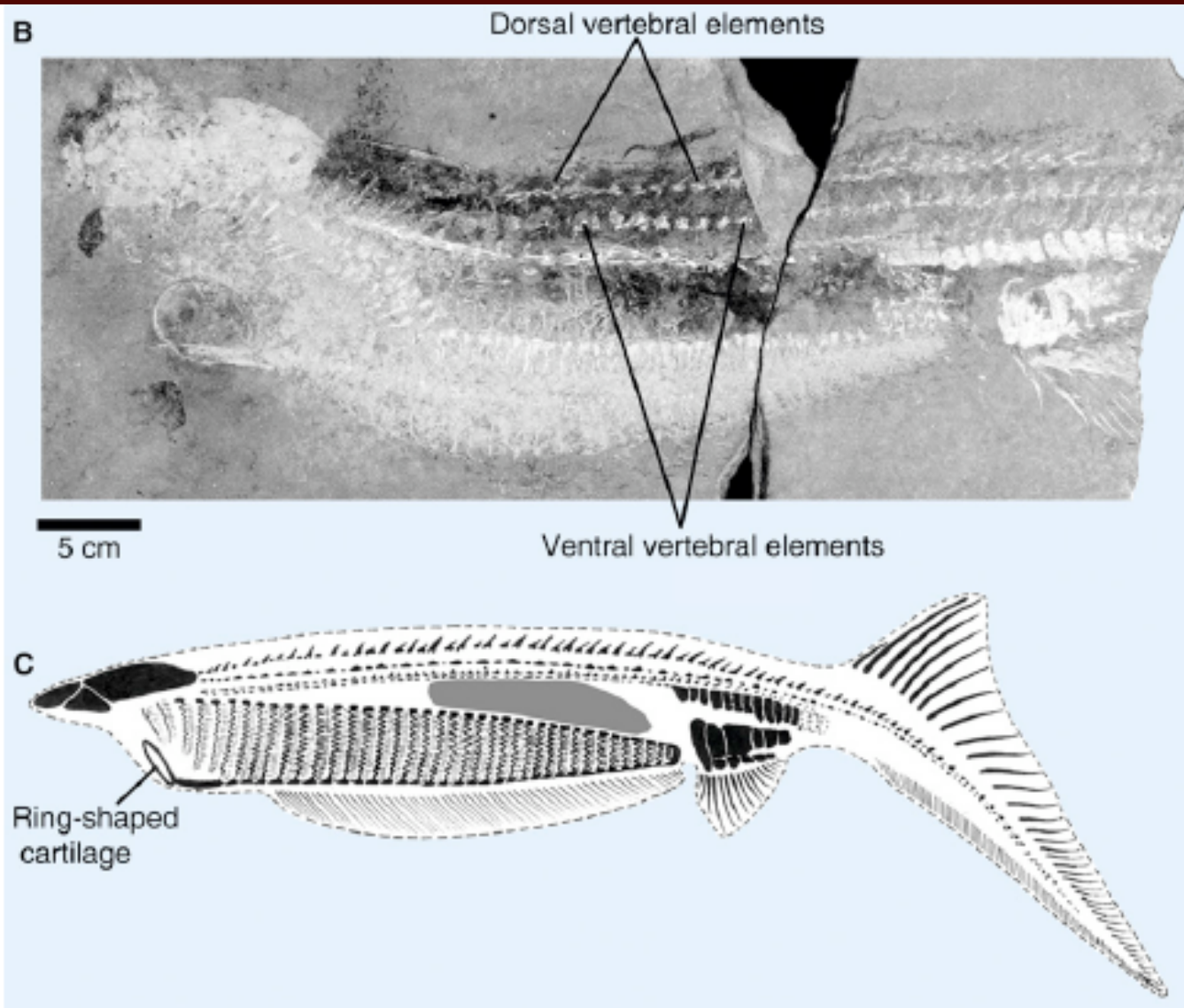
MYXINE

Caratteristiche delle missine che sono più primitive della condizione delle lamprede e degli gnatostomi

1. Hanno occhi pari molto piccoli, mancano muscoli estrinseci dell'occhio e nervi craniali associati per muovere gli occhi (ma si veda discussione nel testo).
2. Cranio fatto di strati di tessuto fibroso piuttosto che di cartilagine.
3. Mancanza di occhio pineale.
4. Mancanza di capacità di elettrorecezione.
5. Apparente mancanza di sistema sensorio laterale, ma canali privi di neuromasti sono presenti nella testa di alcune specie (Wicht e Northcutt 1995).
6. Hanno un singolo canale semicircolare (organi di equilibrio, uno su ciascun lato della testa) nell'orecchio interno (al contrario di due nelle lamprede e negli ostracodermi e di tre negli gnatostomi).
7. Il sistema circolatorio mantiene "cuori" accessori.
8. Hanno solamente un tipo di globuli bianchi granulociti del sangue (tre tipi nelle lamprede e negli gnatostomi).
9. Mancanza di innervazione autonoma del cuore, ma un'innervazione vagale che accelera il cuore, piuttosto che rallentarlo, può essersi evoluta nelle lamprede per convergenza con la condizione degli gnatostomi.
10. Mancanza di qualsiasi tipo di milza o di un suo precursore.
11. Mancanza di muscoli sulle pinne impari.
12. Mancanza di elementi vertebrali cartilaginei.
13. Mancanza di dotti renali collettori nel rene.
14. Hanno una connessione aperta tra la cavità pericardica e il celoma (chiusa nelle lamprede e negli gnatostomi).
15. Hanno fluidi corporei isoosmotici con l'acqua di mare (si veda il testo).

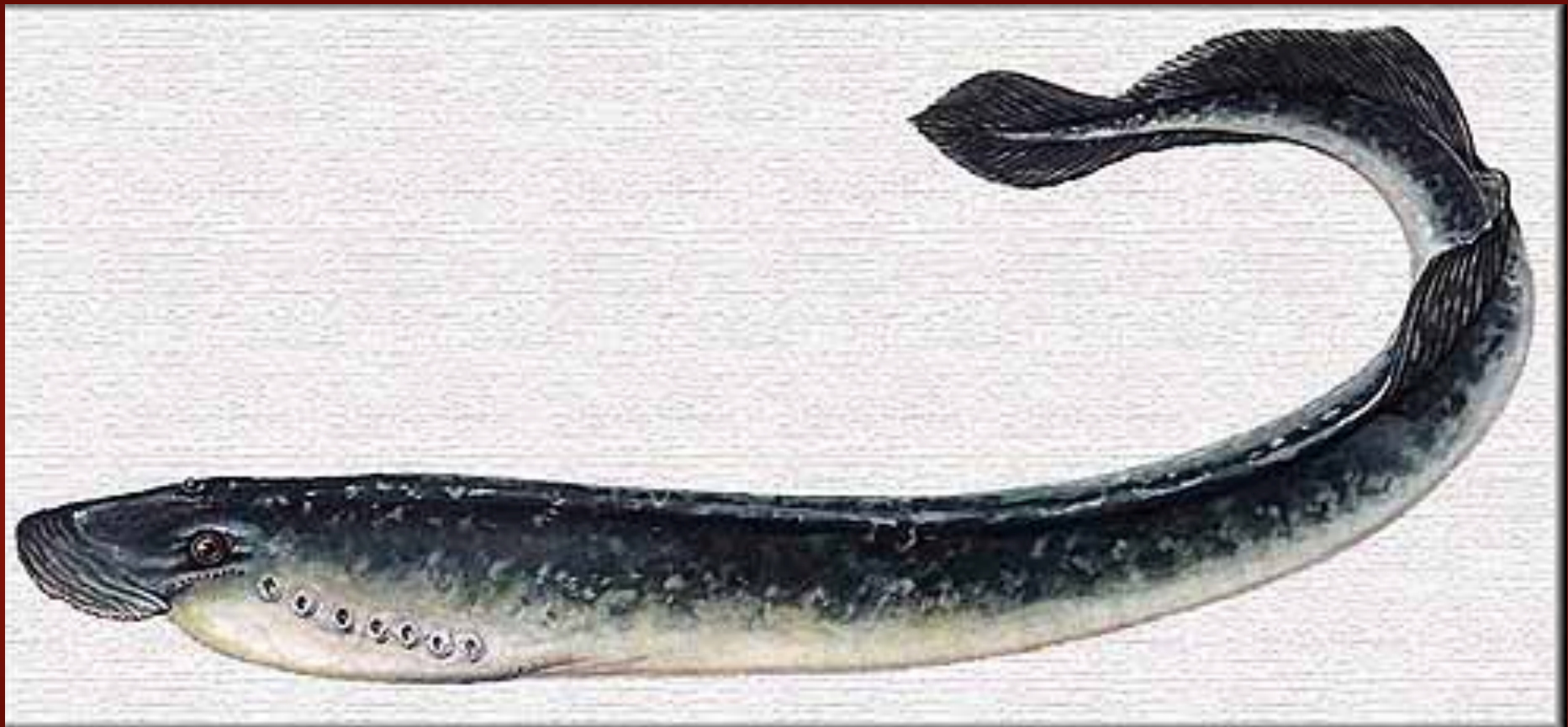






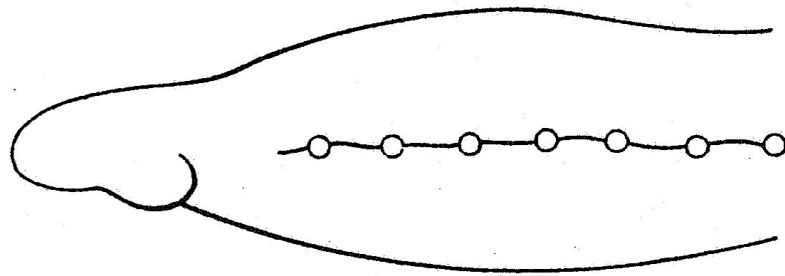
LAMPREDE

- DUE OCCHI LATERALI
- ECTOPARASSITI DI PESCI
- 7 BRANCHIE
- 2 CANALI SEMICIRCOLARI
- ARCHI NEURALI PRESENTI
- ANADROME

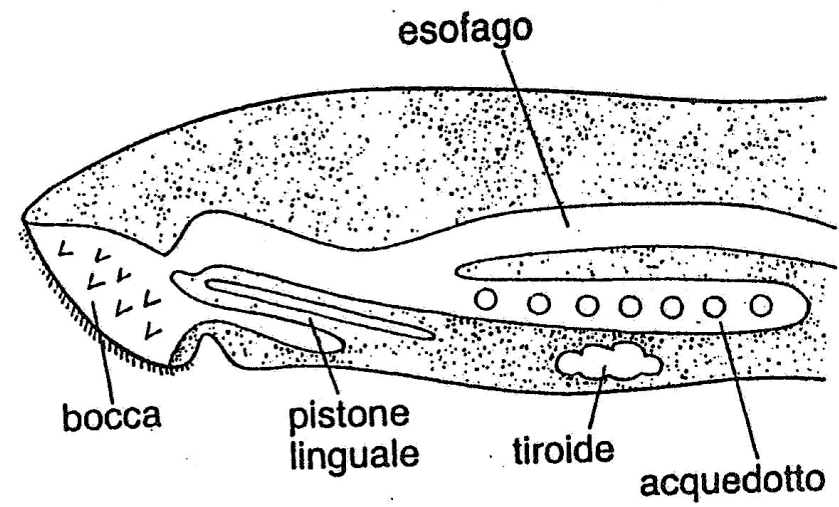
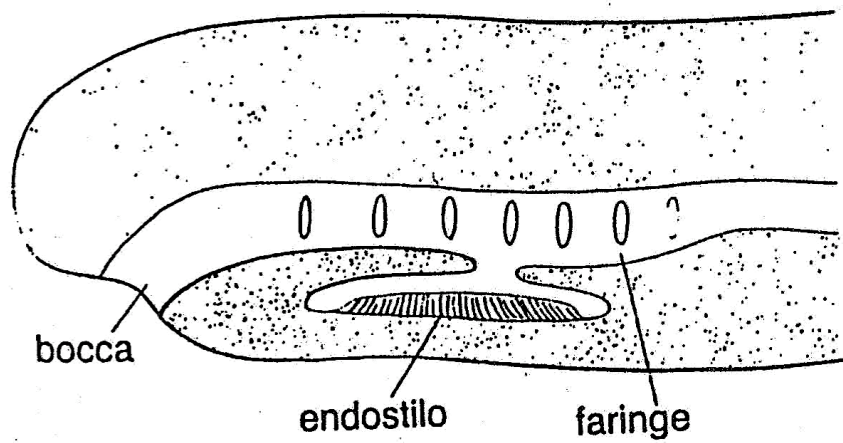
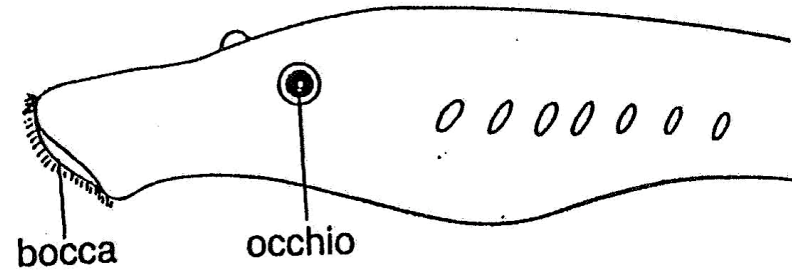


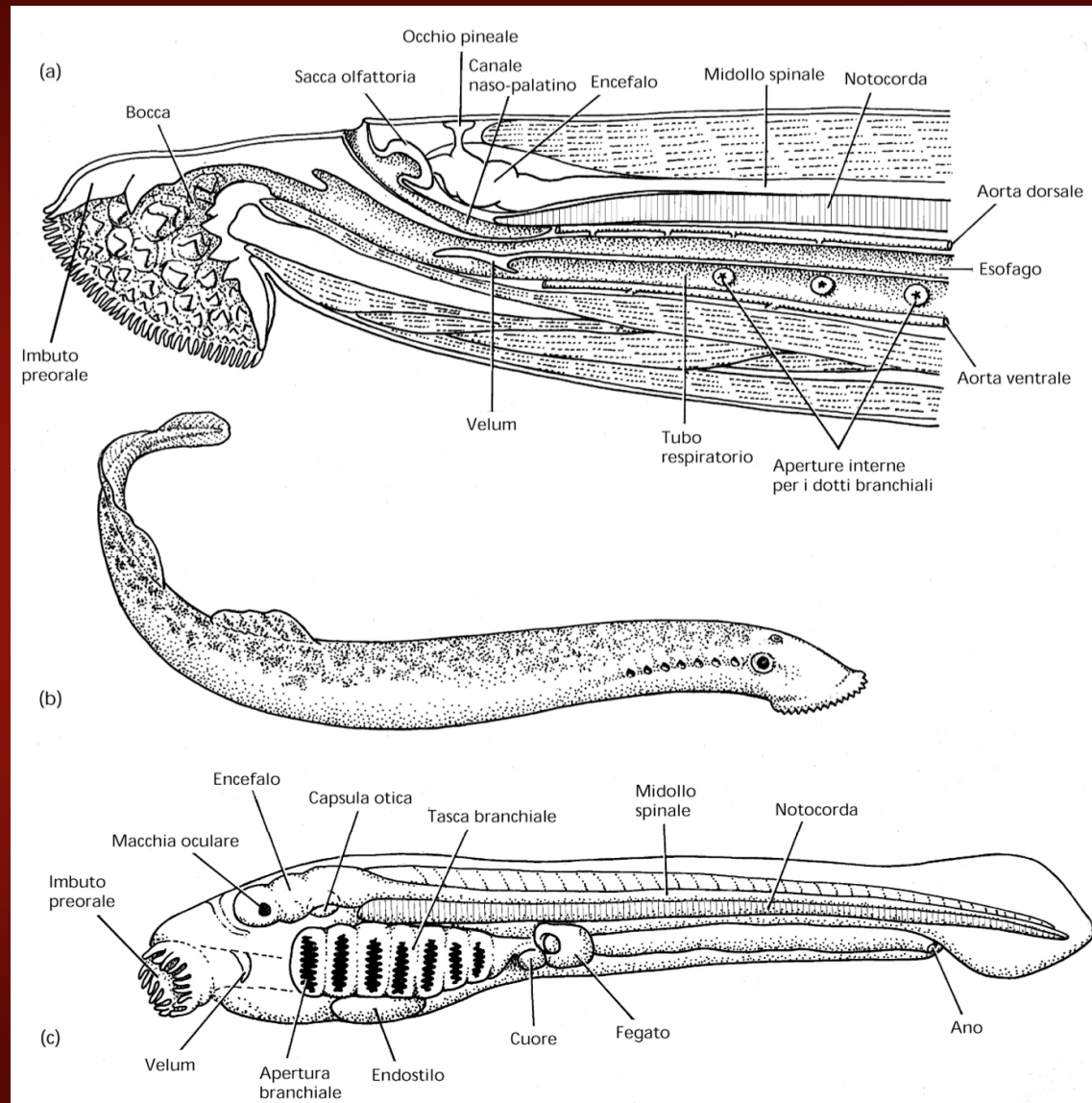


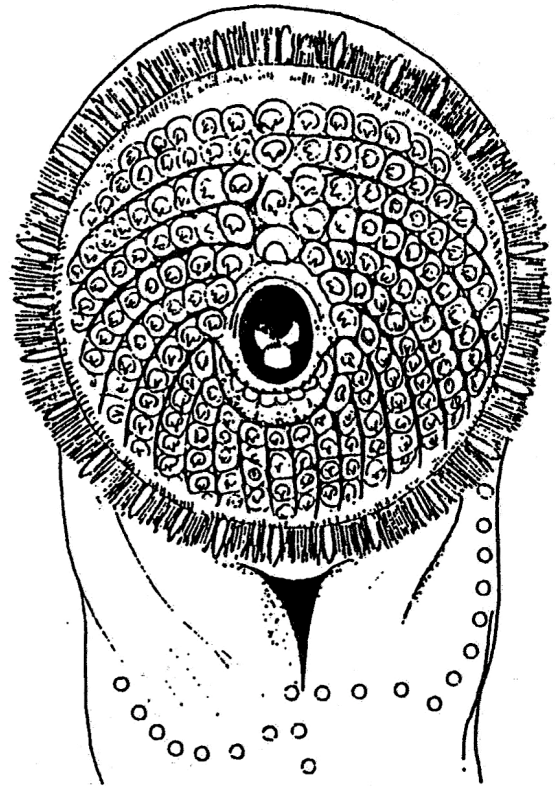
Ammocete



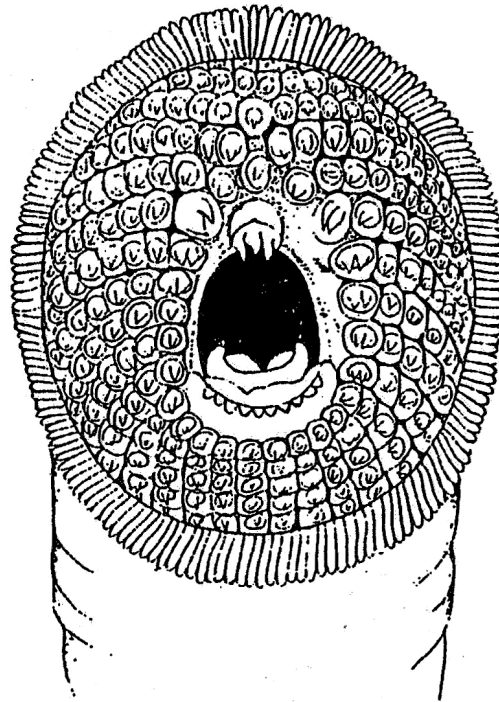
adulto



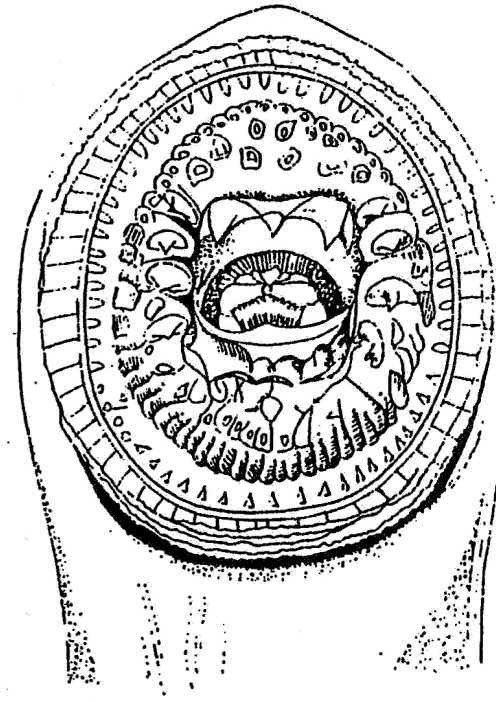




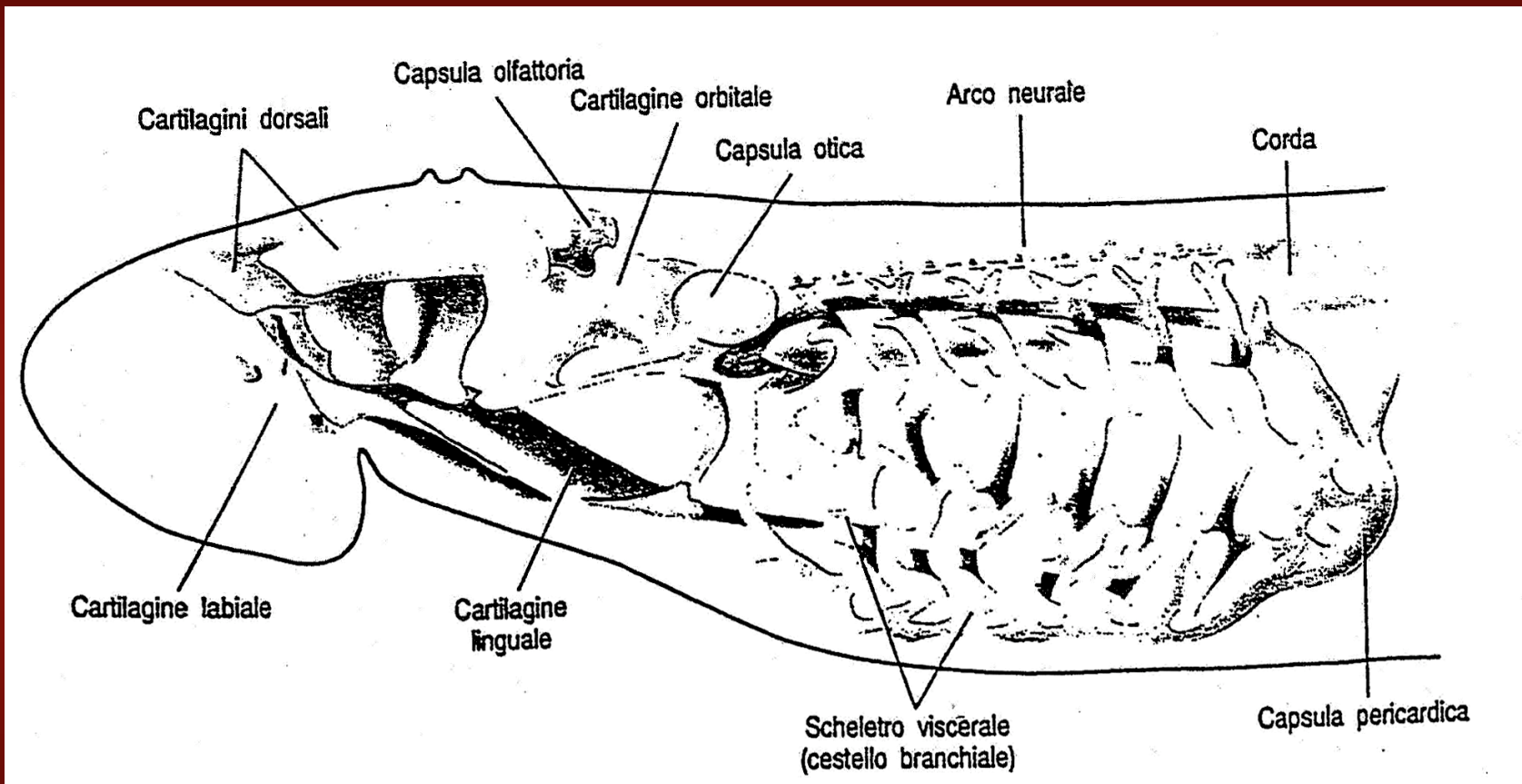
Petromyzon

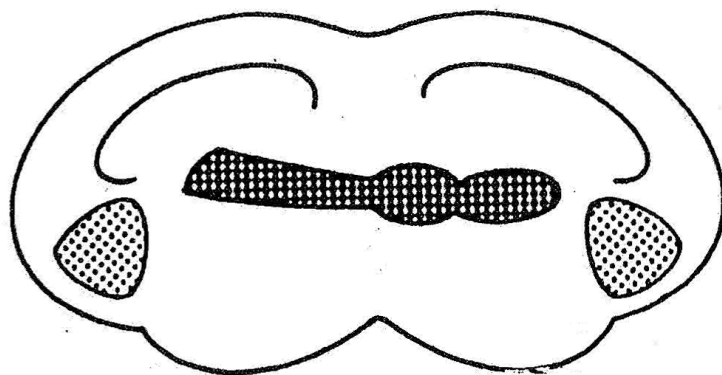


Ichthyomyzon

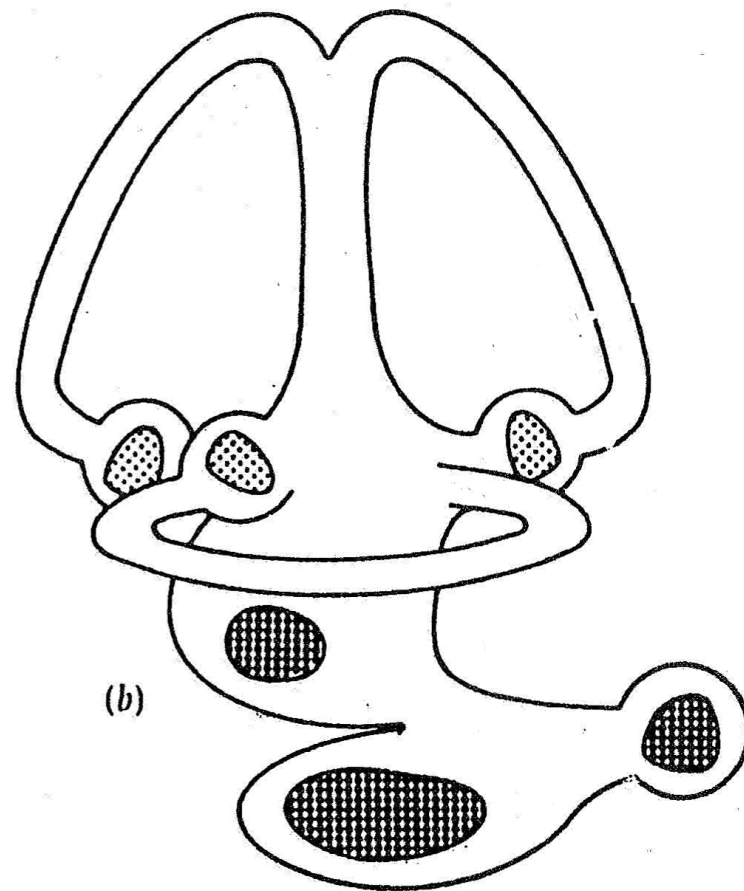


Lampetra





(a)



(b)

