CURSO de Educación Permanente
Historia natural de anfibios y reptiles: diversidad y métodos de estudio en herpetología

Origen y generalidades de los anfibios

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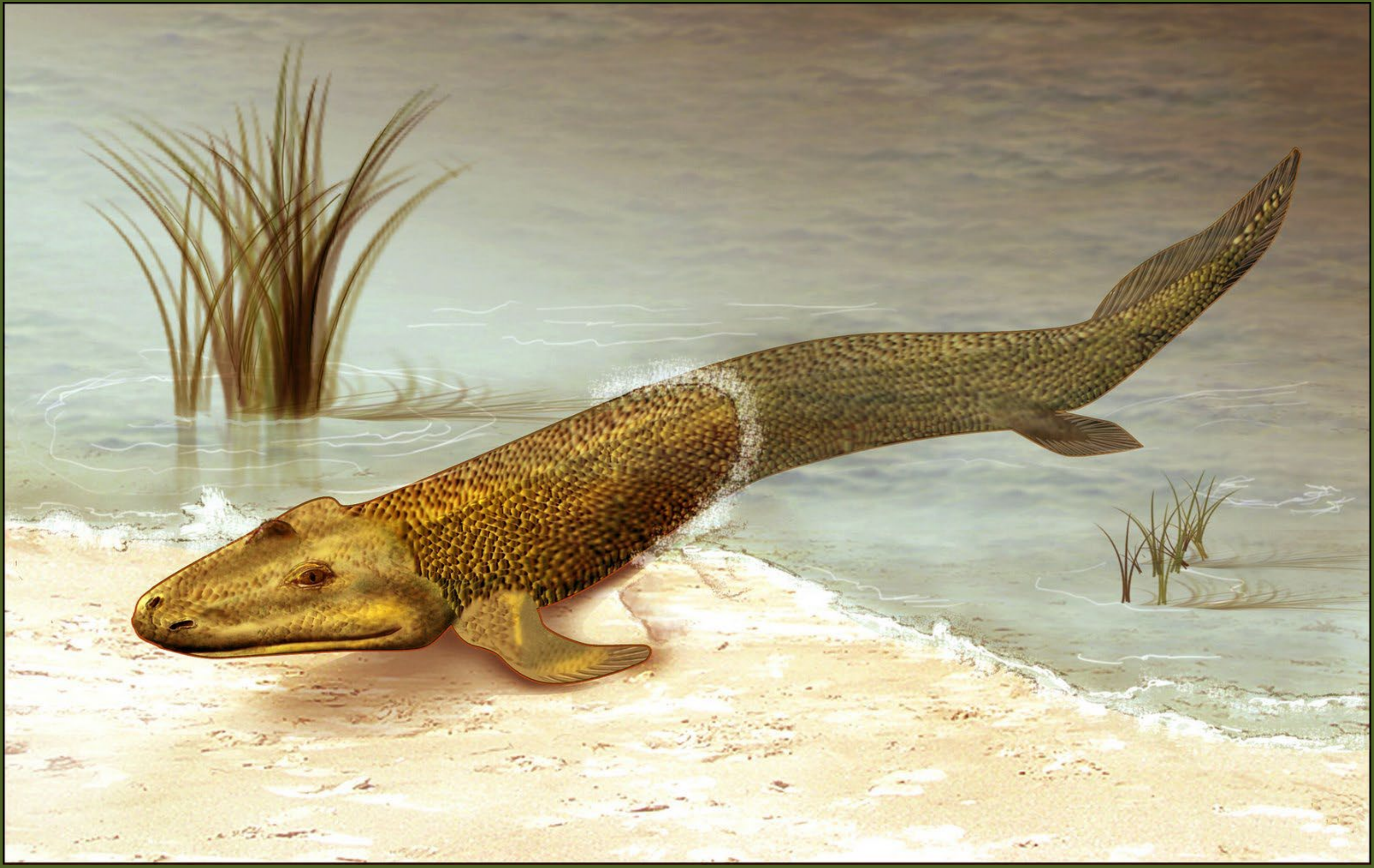
Origen de los Anfibios



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Origen de los Anfibios

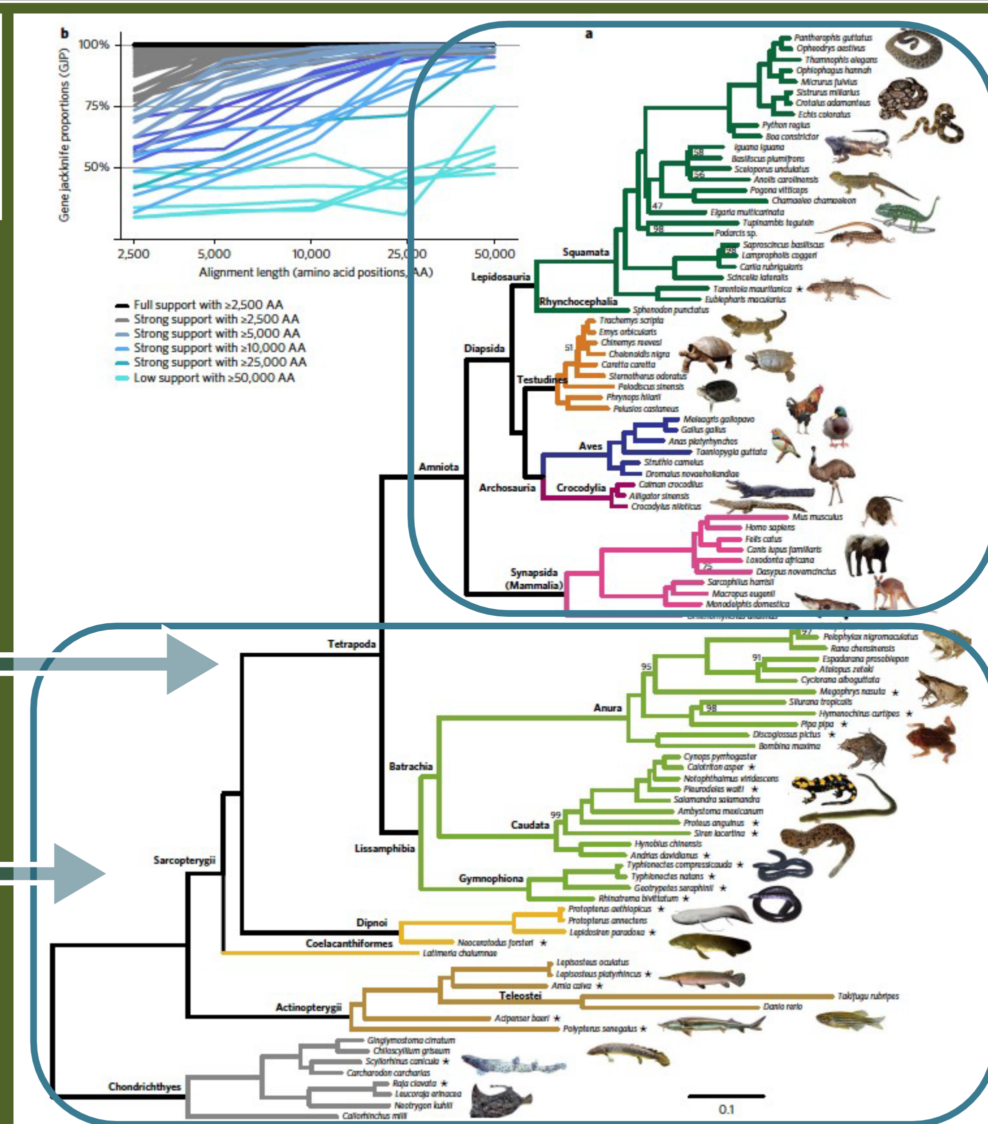

nature ecology & evolution

ARTICLES

DOI: 10.1038/s41559-017-0240-5

Phylotranscriptomic consolidation of the jawed vertebrate timetree

Iker Irisarri[1,11]*, Denis Baurain[2], Henner Brinkmann[3], Frédéric Delsuc[4], Jean-Yves Sire[5], Alexander Kupfer[6], Jörn Petersen[3], Michael Jarek[7], Axel Meyer[1], Miguel Vences[8] and Hervé Philippe[9,10]*

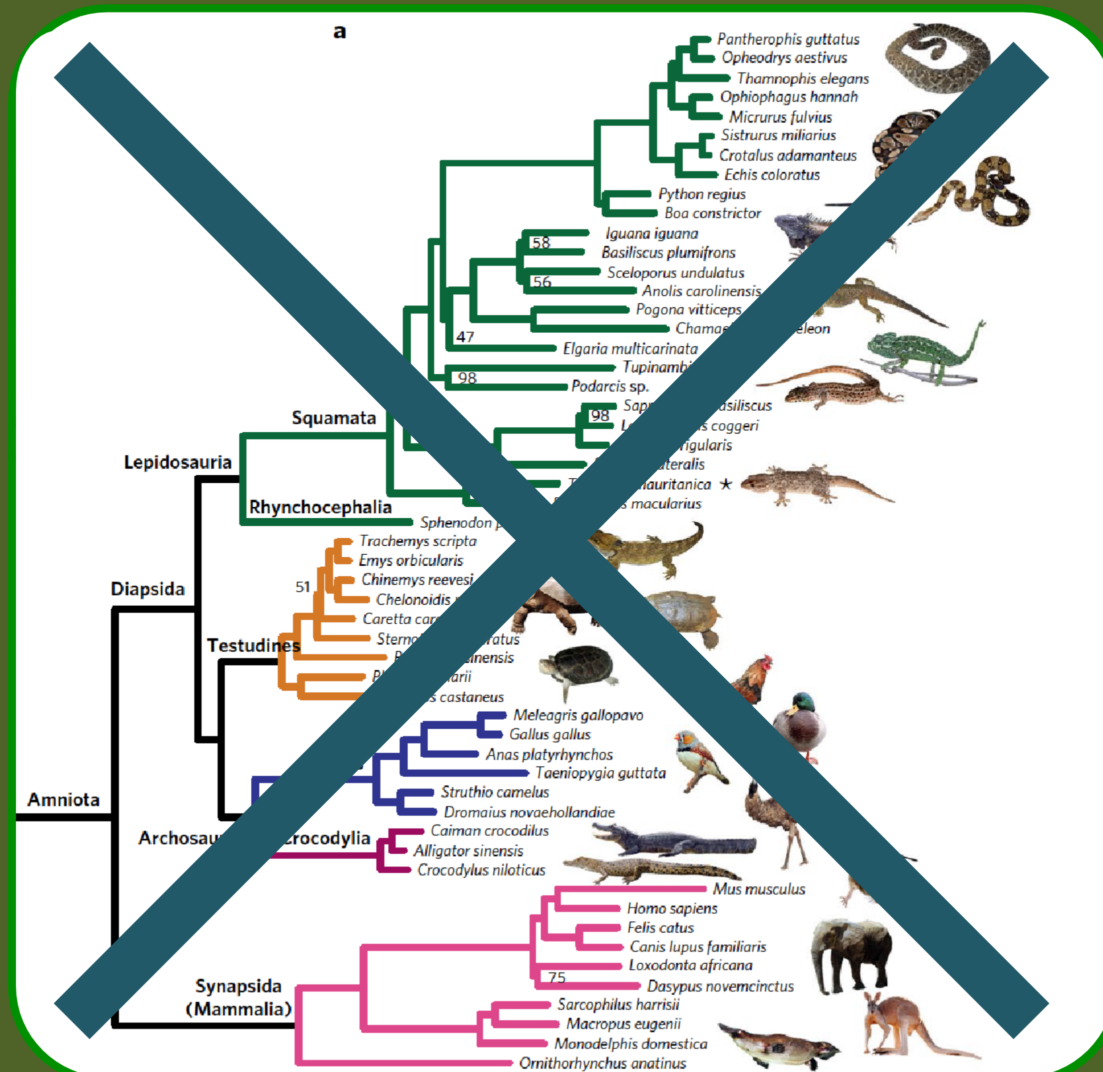


Tetrapoda

Sarcopterigios

Origen de los Anfibios

Amniotas



Irisarri et al. 2017. DOI: 10.1038/s41559–017–0240–5

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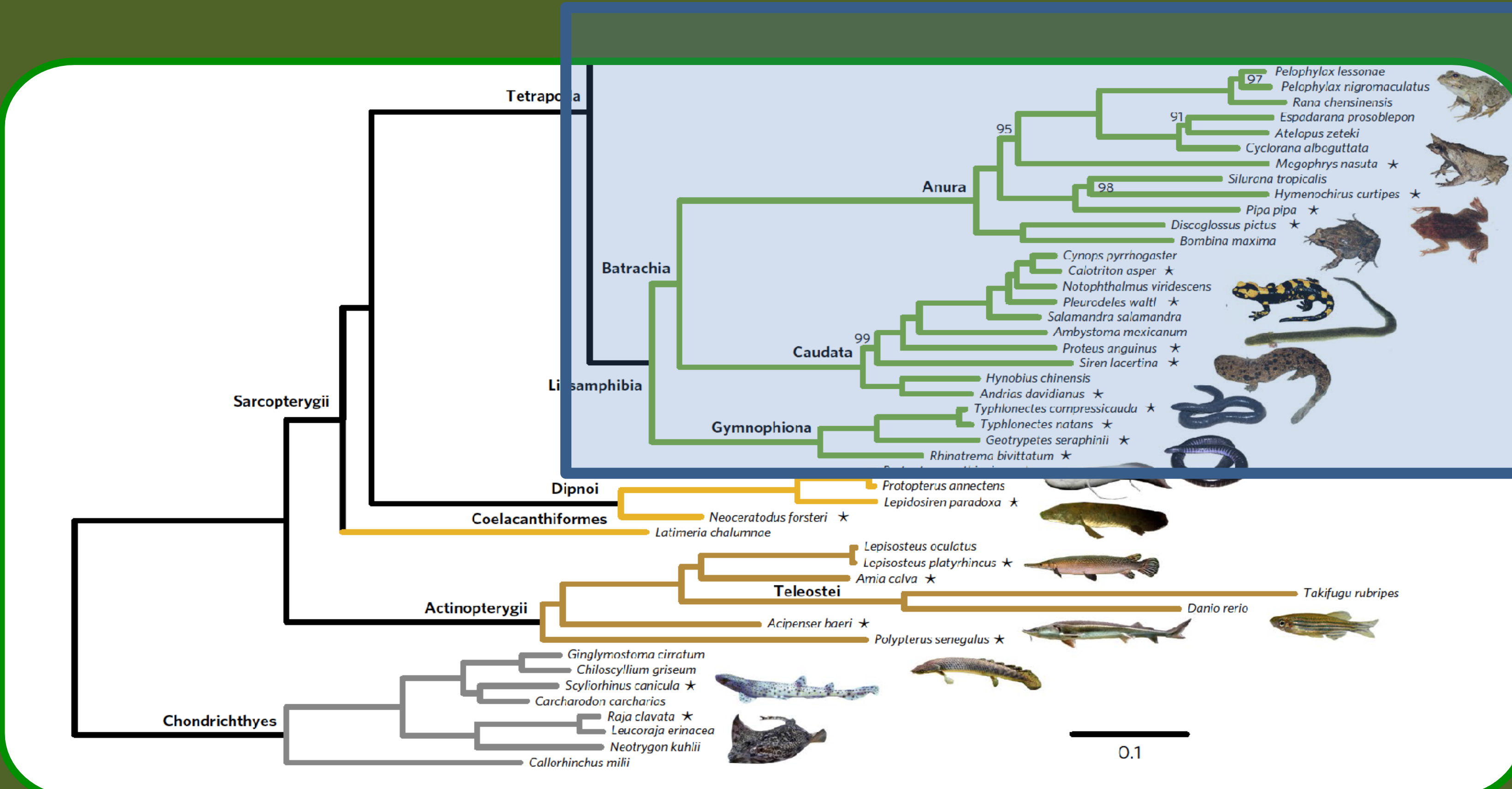
Origen de los Anfibios

"Anamniotas" Clase: AMPHIBIA



Irisarri et al. 2017. DOI: 10.1038/s41559–017–0240–5

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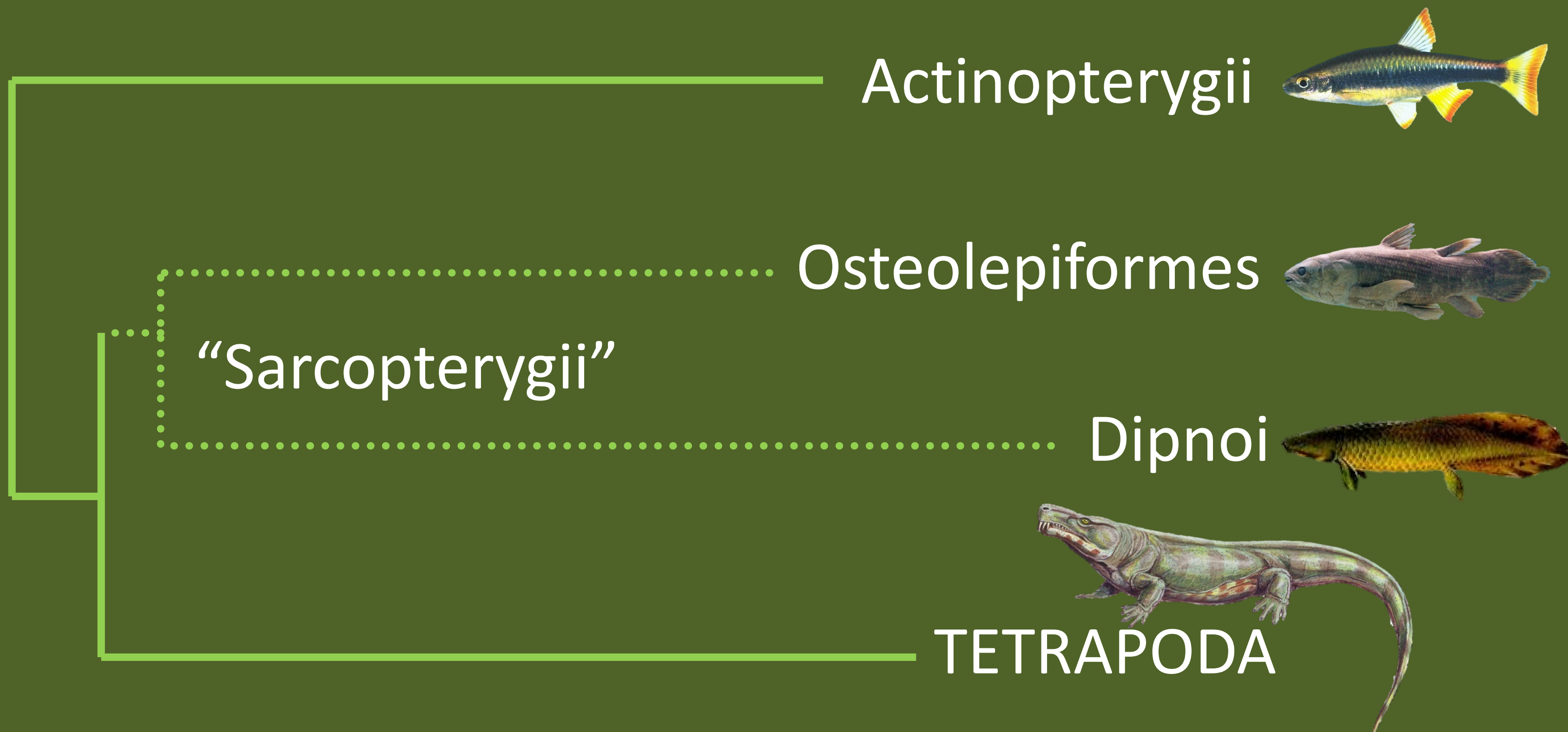
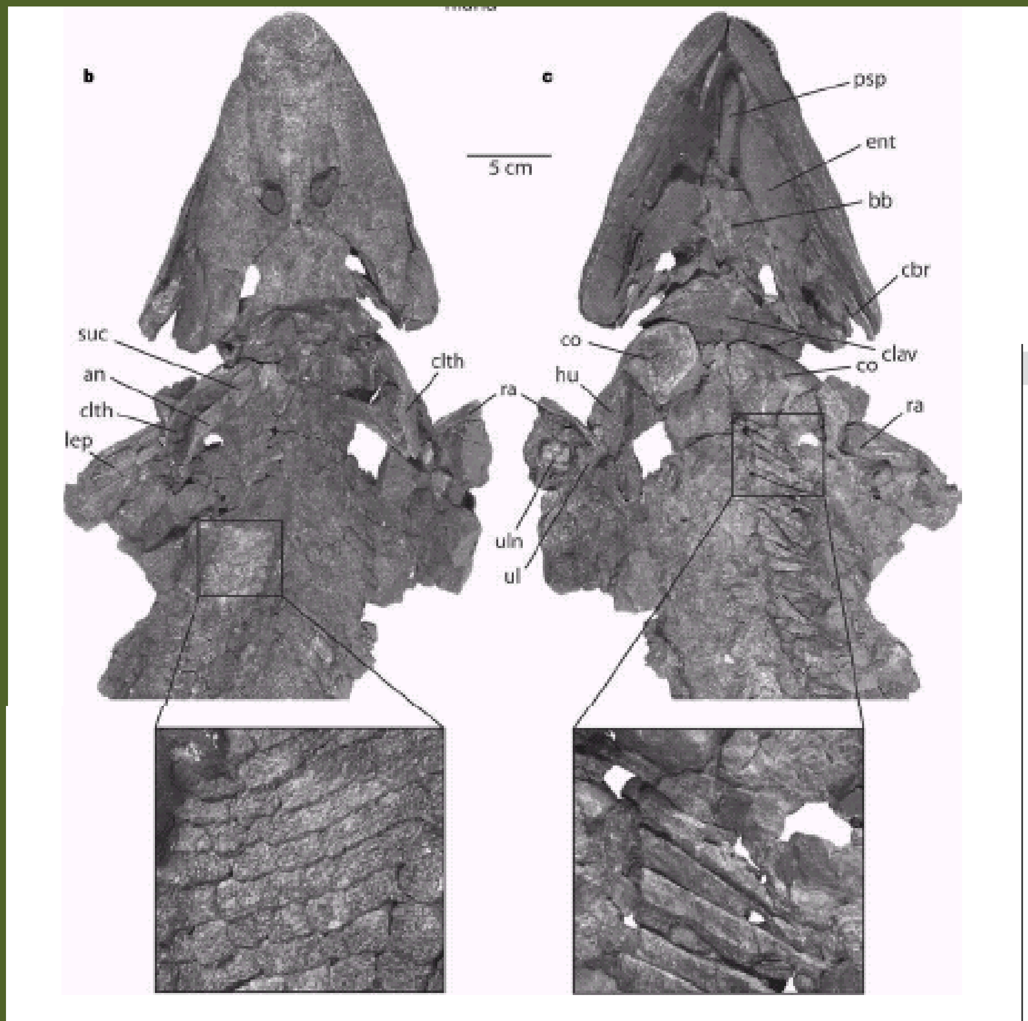
Relaciones de los Tetrapoda

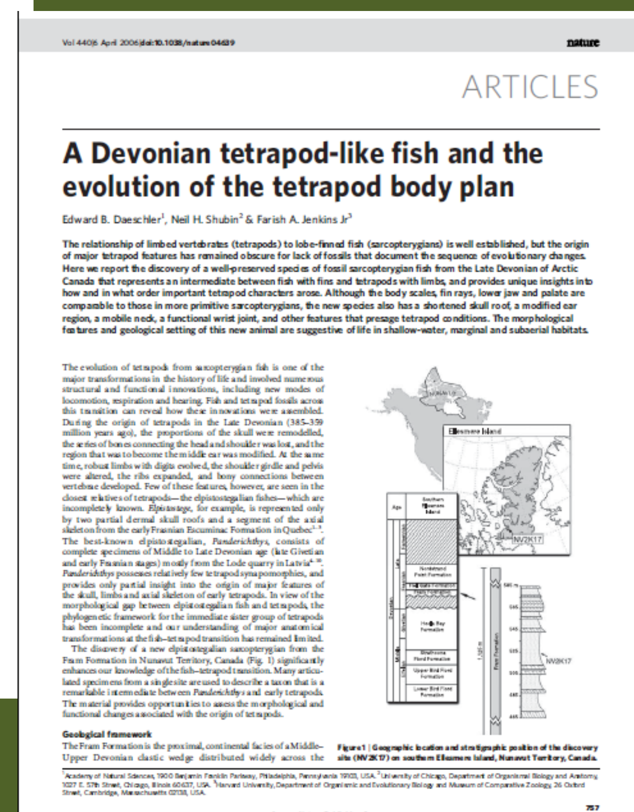


Laurin & Reisz, 1995

Relaciones de los Tetrapoda

Tiktaalik roseae




Vol 440|6 April 2006|doi:10.1038/nature04639 nature

ARTICLES

A Devonian tetrapod-like fish and the evolution of the tetrapod body plan

Edward B. Daeschler[1], Neil H. Shubin[2] & Farish A. Jenkins Jr[3]

The relationship of limbed vertebrates (tetrapods) to lobe-finned fish (sarcopterygians) is well established, but the origin of major tetrapod features has remained obscure for lack of fossils that document the sequence of evolutionary changes. Here we report the discovery of a well-preserved species of fossil sarcopterygian fish from the Late Devonian of Arctic Canada that represents an intermediate between fish with fins and tetrapods with limbs, and provides unique insights into how and in what order important tetrapod characters arose. Although the body scales, fin rays, lower jaw and palate are comparable to those in more primitive sarcopterygians, the new species also has a shortened skull roof, a modified ear region, a mobile neck, a functional wrist joint, and other features that presage tetrapod conditions. The morphological features and geological setting of this new animal are suggestive of life in shallow-water, marginal and subaerial habitats.

The evolution of tetrapods from sarcopterygian fish is one of the major transformations in the history of life and involved numerous structural and functional innovations, including new modes of locomotion, respiration and hearing. Fish and tetrapod fossils across this transition can reveal how these innovations were assembled. During the origin of tetrapods in the Late Devonian (385–359 million years ago), the proportions of the skull were remodelled, the series of bones connecting the head and shoulder was lost, and the region that was to become the middle ear was modified. At the same time, robust limbs with digits evolved, the shoulder girdle and pelvis were altered, the ribs expanded, and bony connections between vertebrae developed. Few of these features, however, are seen in the closest relatives of tetrapods—the elpistostegalian fishes—which are incompletely known. *Elpistostege*, for example, is represented only by two partial dermal skull roofs and a segment of the axial skeleton from the early Frasnian Escuminac Formation in Quebec[1–3]. The best-known elpistostegalian, *Panderichthys*, consists of complete specimens of Middle to Late Devonian age (late Givetian and early Frasnian stages) mostly from the Lode quarry in Latvia[4–10]. *Panderichthys* possesses relatively few tetrapod synapomorphies, and provides only partial insight into the origin of major features of the skull, limbs and axial skeleton of early tetrapods. In view of the morphological gap between elpistostegalian fish and tetrapods, the phylogenetic framework for the immediate sister group of tetrapods has been incomplete and our understanding of major anatomical transformations at the fish–tetrapod transition has remained limited.

The discovery of a new elpistostegalian sarcopterygian from the Fram Formation in Nunavut Territory, Canada (Fig. 1) significantly enhances our knowledge of the fish–tetrapod transition. Many articulated specimens from a single site are used to describe a taxon that is a remarkable intermediate between *Panderichthys* and early tetrapods. The material provides opportunities to assess the morphological and functional changes associated with the origin of tetrapods.

Geological framework

The Fram Formation is the proximal, continental facies of a Middle–Upper Devonian clastic wedge distributed widely across the

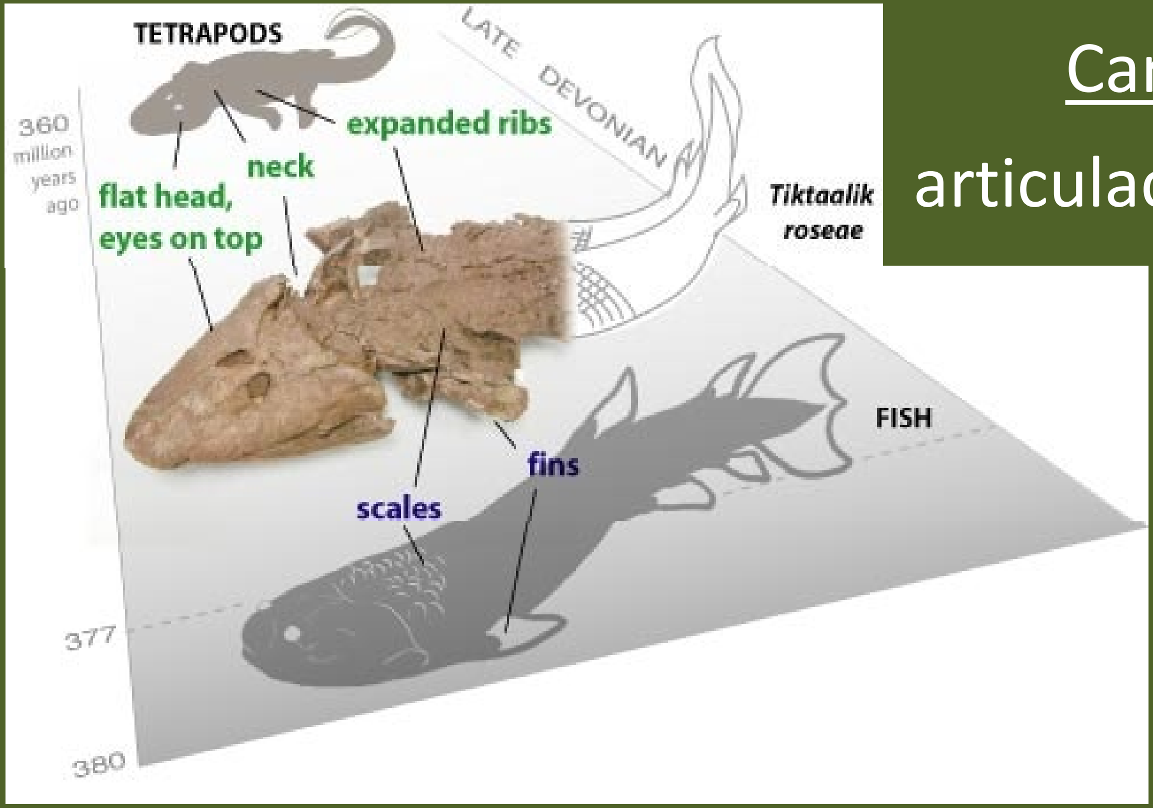
Figure 1 | Geographic location and stratigraphic position of the discovery site (NV2K17) on southern Ellesmere Island, Nunavut Territory, Canada.

[1]Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, Pennsylvania 19103, USA. [2]University of Chicago, Department of Organismal Biology and Anatomy, 1027 E. 57th Street, Chicago, Illinois 60637, USA. [3]Harvard University, Department of Organismic and Evolutionary Biology and Museum of Comparative Zoology, 26 Oxford Street, Cambridge, Massachusetts 02138, USA.

Tiktaalik roseae

Caracteres ancestrales: branquias

escamas



Caracteres derivados:

articulaciones modificadas

muñeca funcional

costillas

cuello móvil

pulmones

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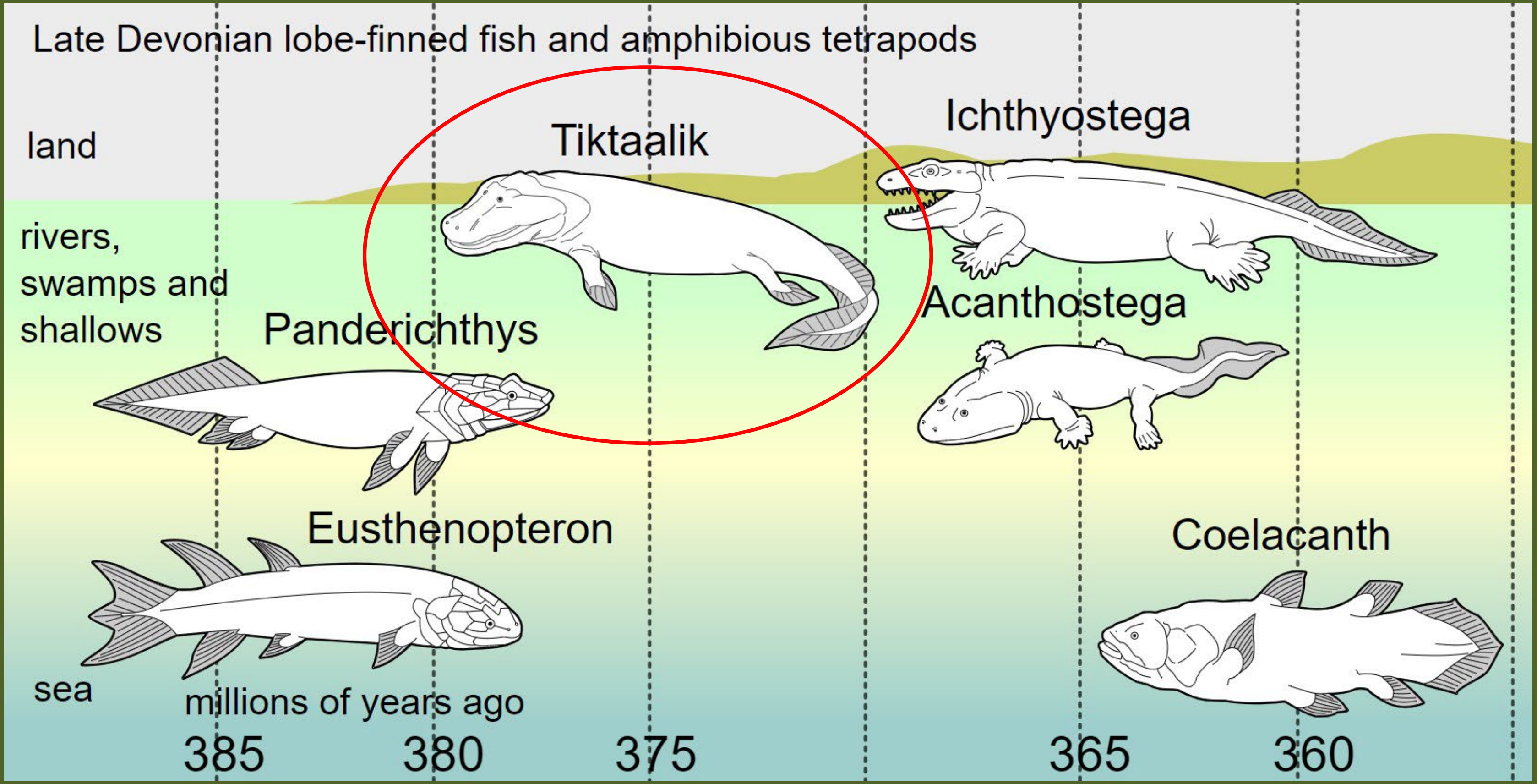
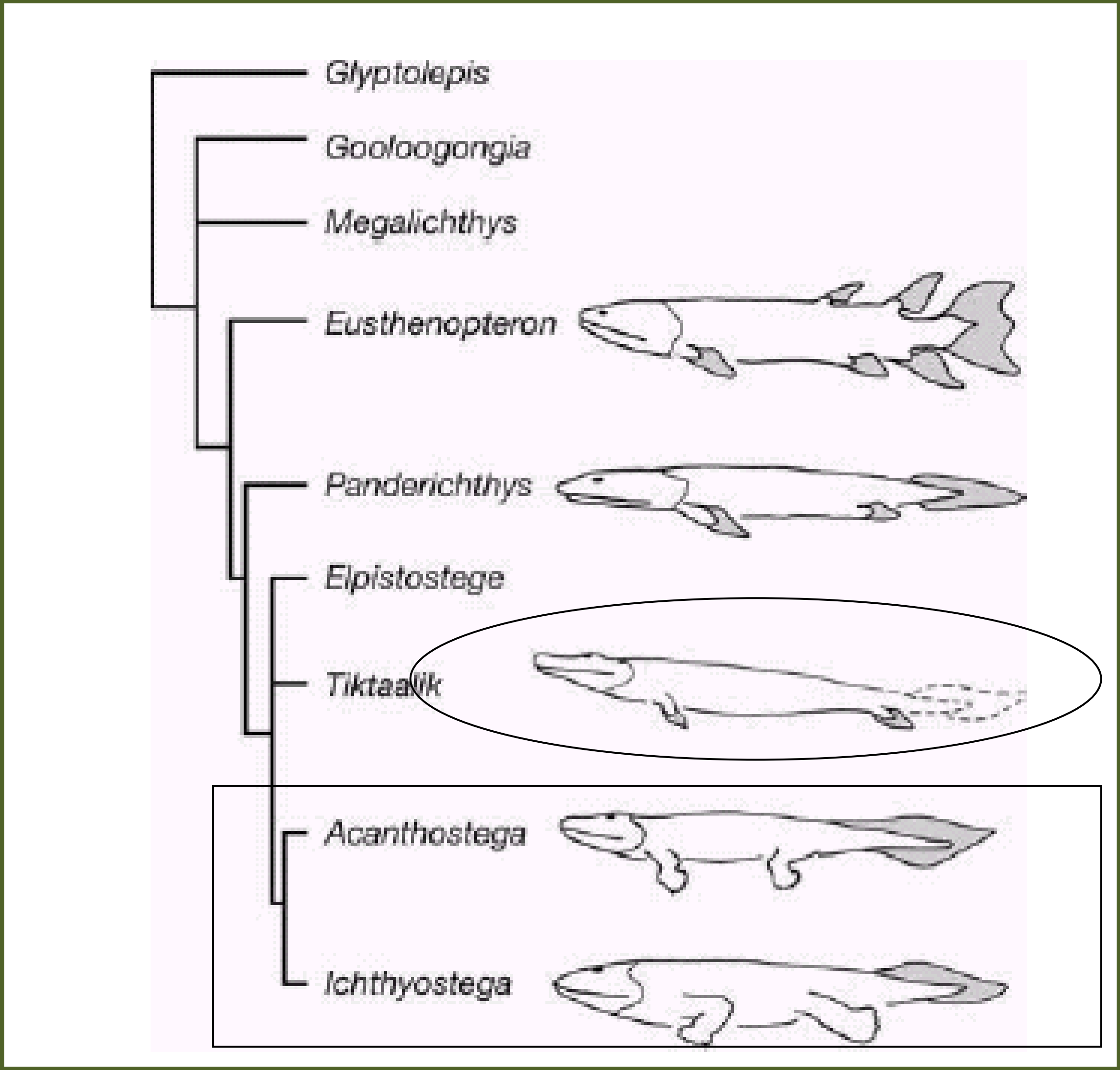
Tiktaalik roseae



Relaciones de los Tetrapoda



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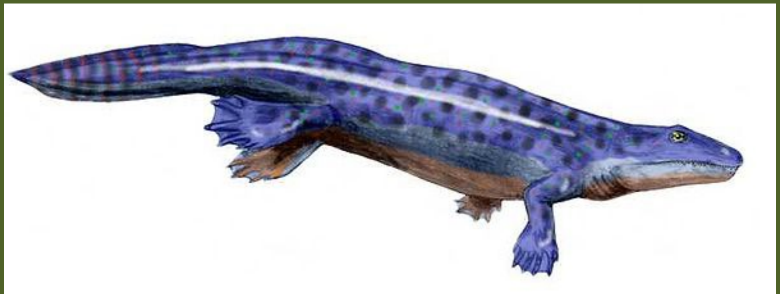
Relaciones de los Tetrapoda

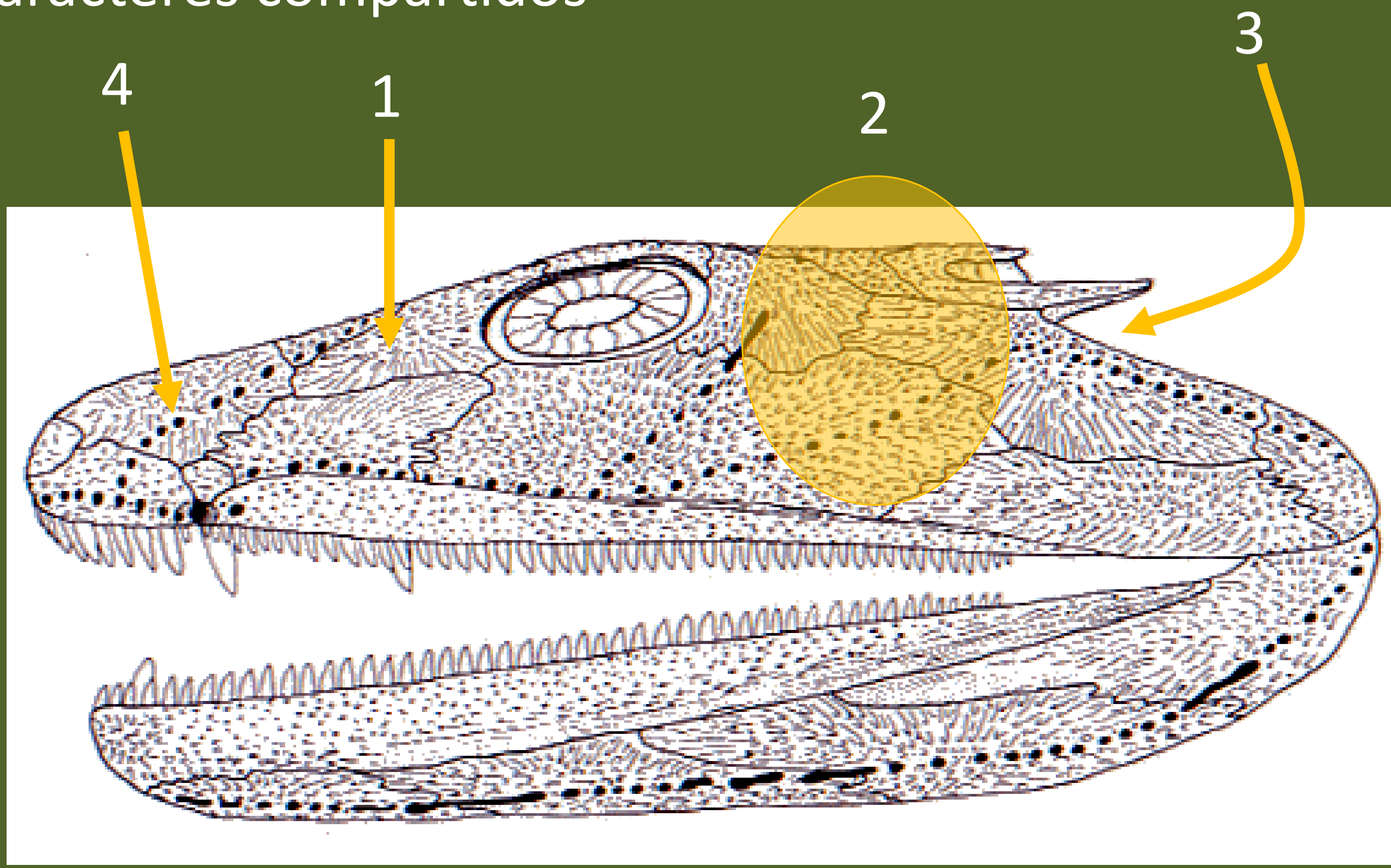
Oferta en el medio terrestre	Presiones de depredación	Dinámica del medio acuático

Devónico (365 ma)



Relaciones de los Tetrapoda

Caracteres compartidos



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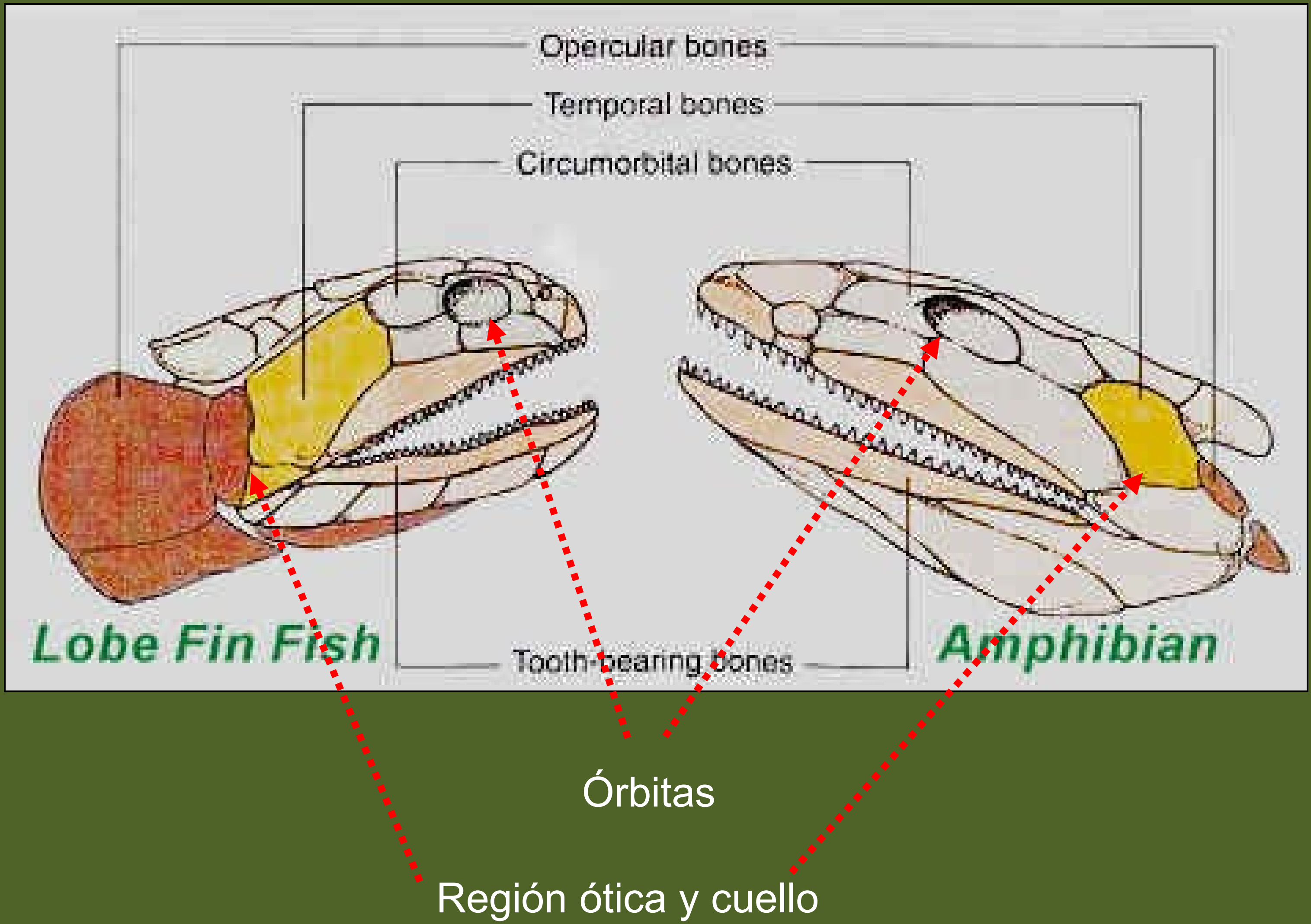
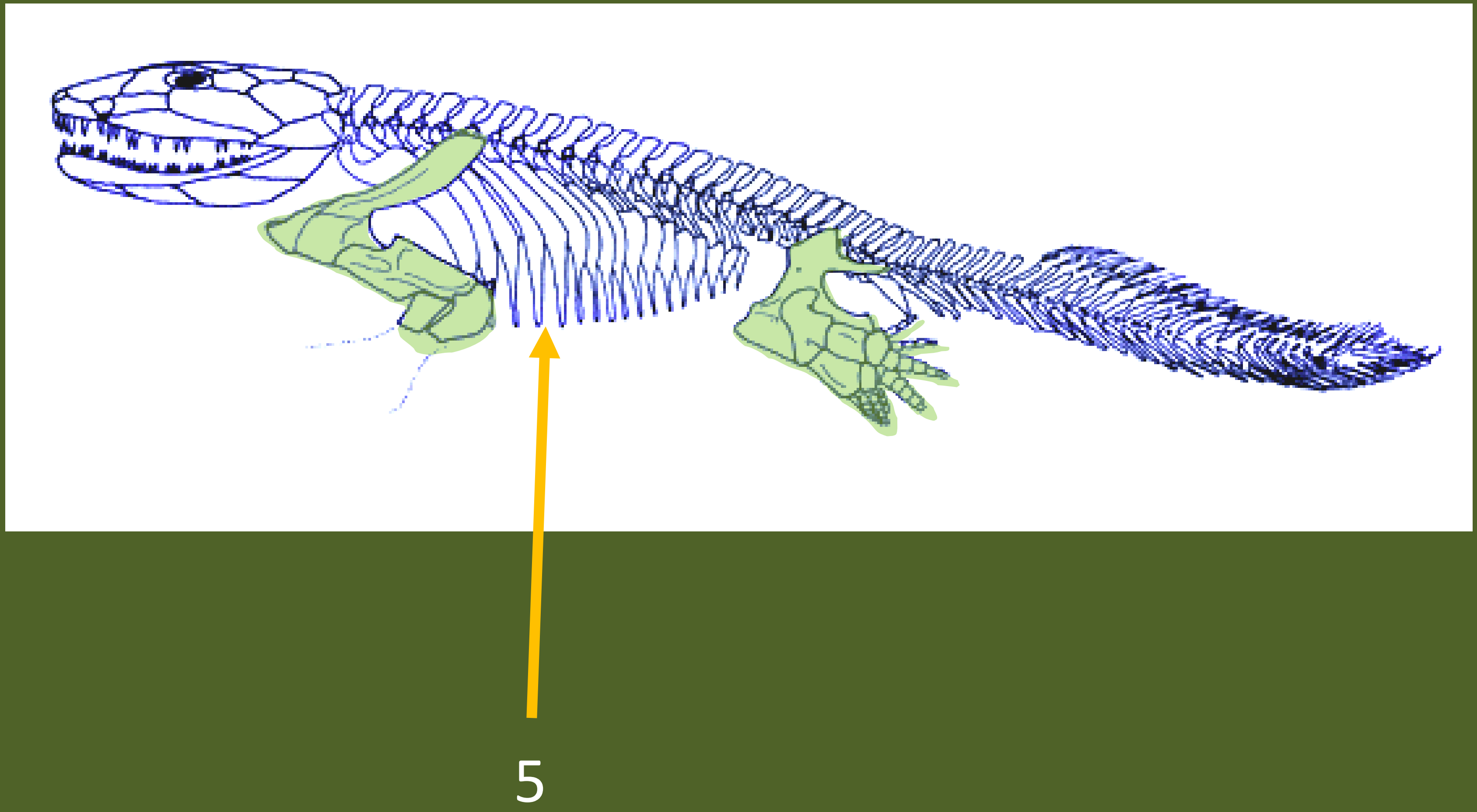
Relaciones de los Tetrapoda



Relaciones de los Tetrapoda



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Relaciones de los Tetrapoda

AMNIOTA

Lisanfibios

Lepospondilos

Anthracosauria

Temnospondylii

Laberintodontes

Relaciones de los Tetrapoda

Sub- Clase Lepospondylii

Duellman & Trueb, 1994

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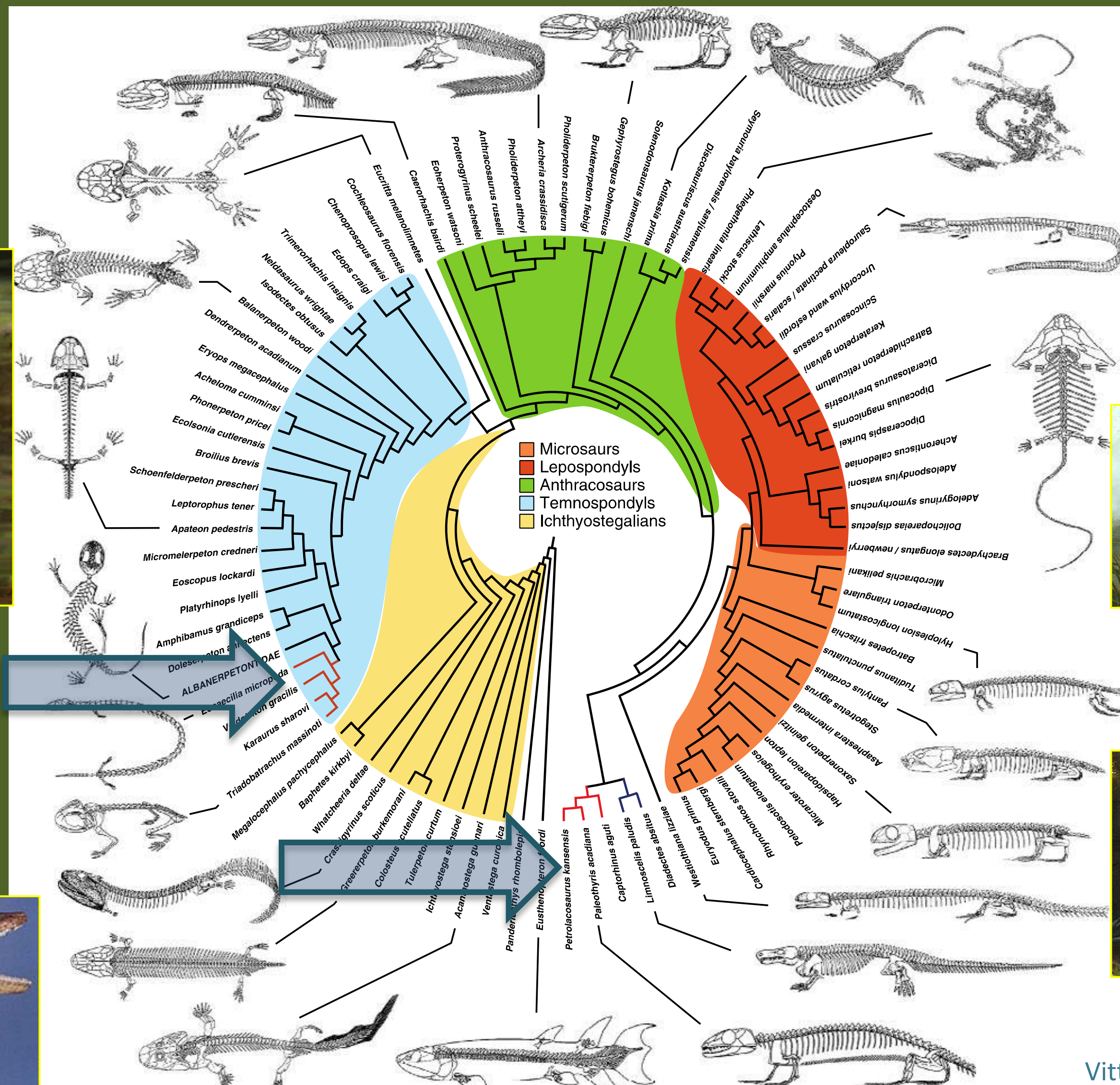
Relaciones de los Tetrapoda



Vitt & Caldwell, 2013

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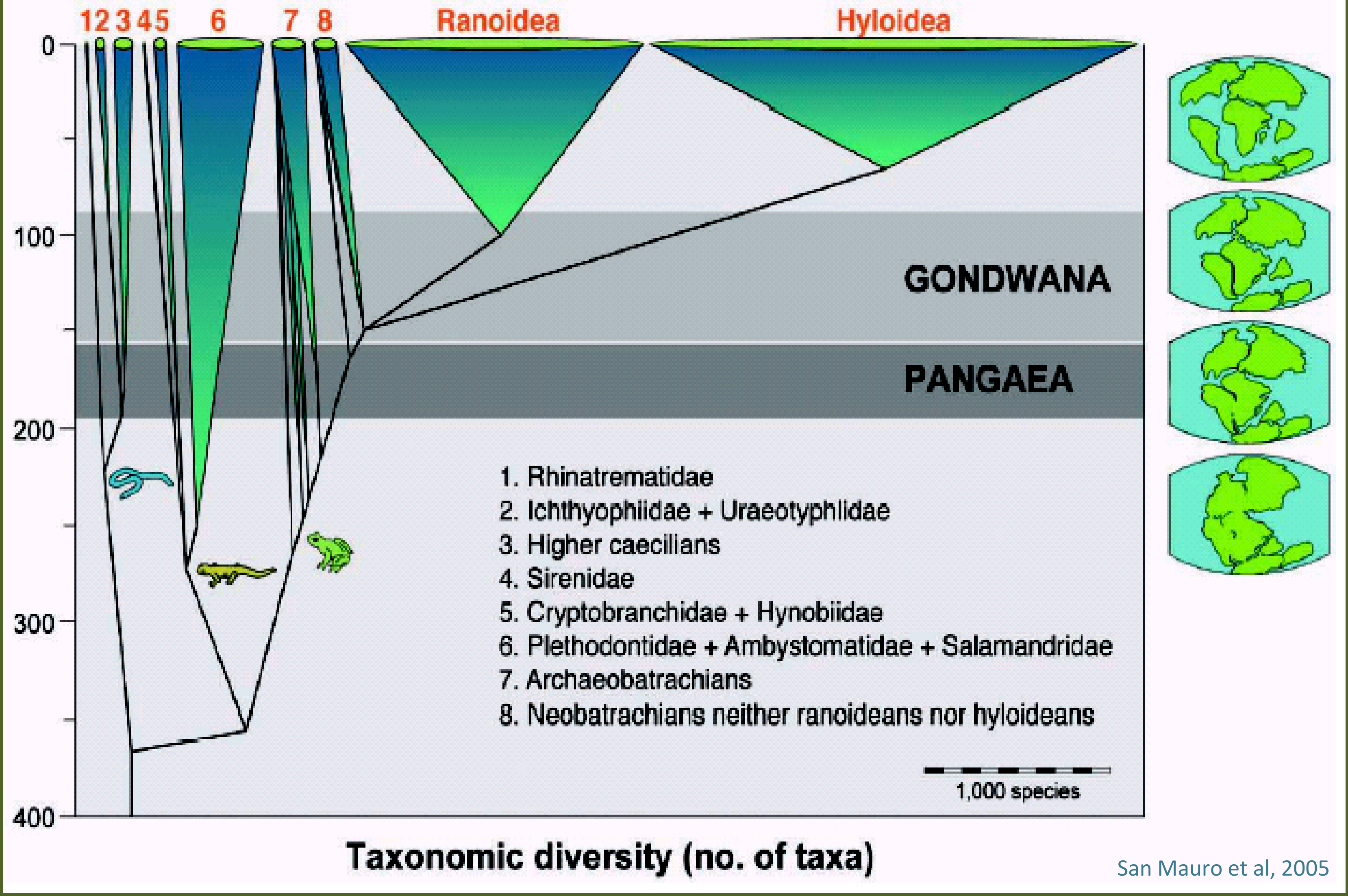
Relaciones de los Tetrapoda



San Mauro et al, 2005

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Generalidades

Foto: Santiago Cruces

Vertebrados

Gnatostomados

Anamniotas

Tetrápodos

Ectotermos

Poecilotermos

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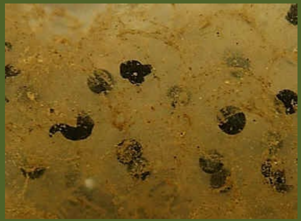
Amphi + bios = doble vida

Etapa larvaria - Metamorfosis





Dependencia del medio acuático (respiración, reproducción)


Piel

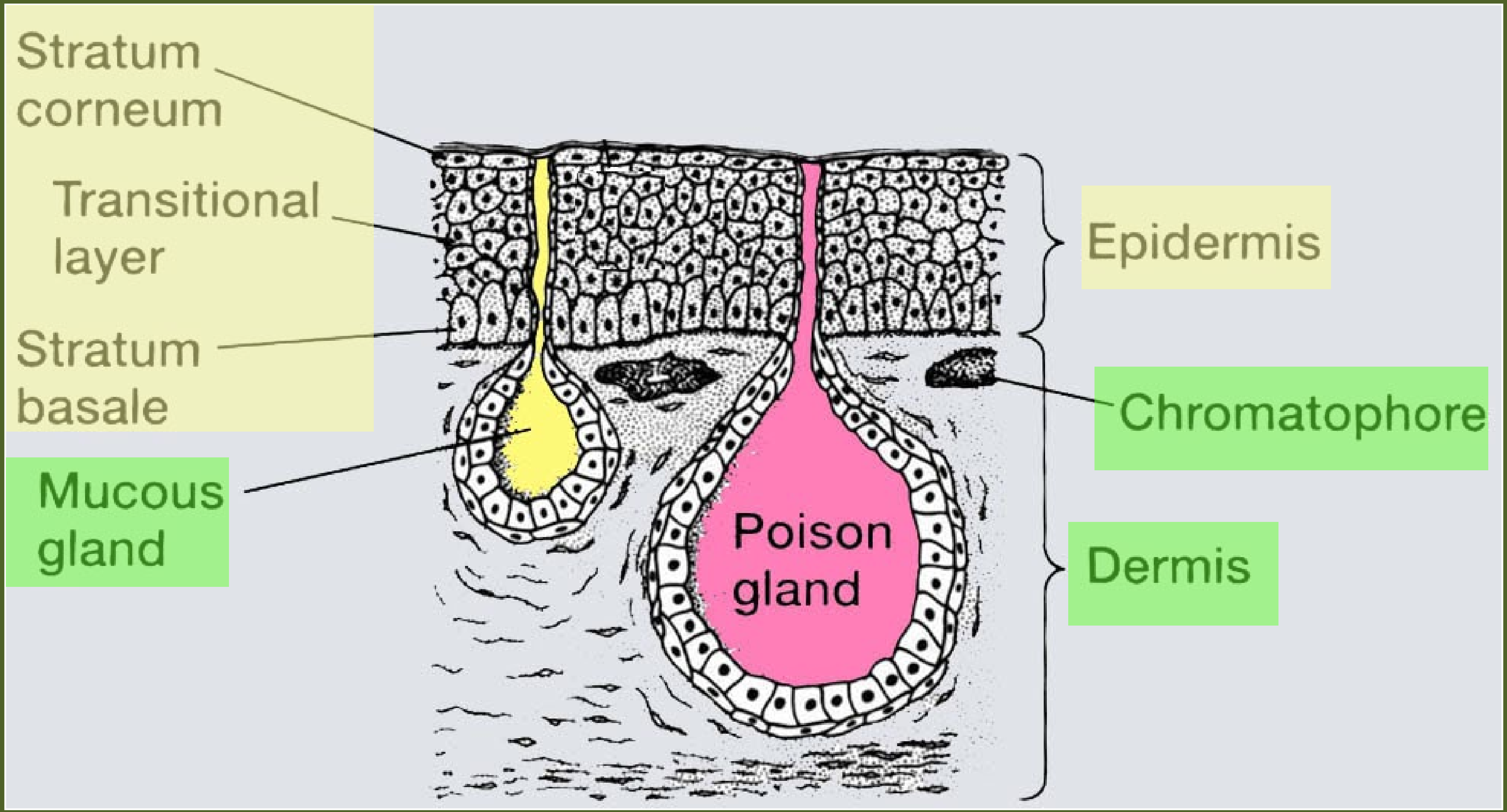


Imagen modificada de Duellman & Trueb (1994)

Epidermis: Muda
Dermis: Glándulas y cromatóforos

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Piel

Osificaciones dérmicas

Callos nupciales

Membranas

Crestas

“Pelos”

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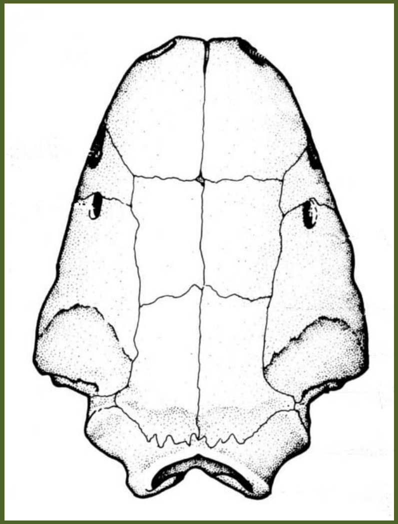
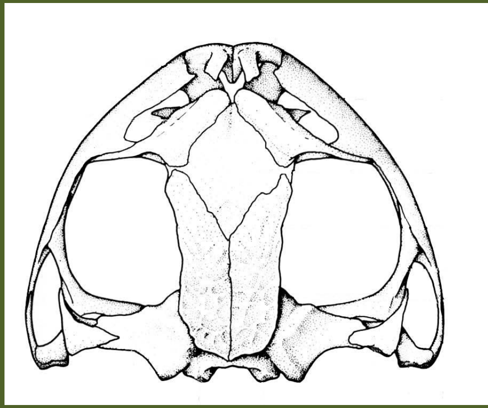
Esqueleto

Estegocrotafia



Zigocrotafia



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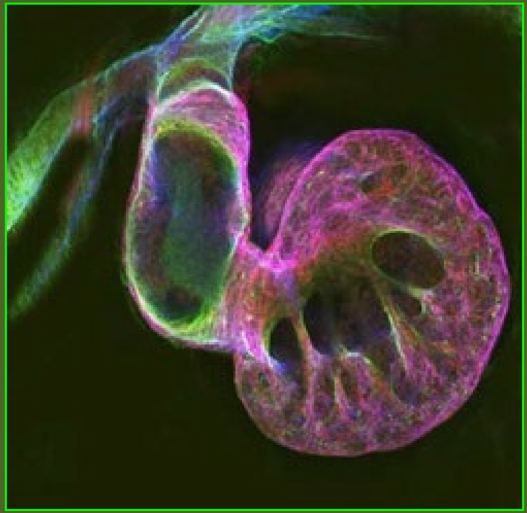
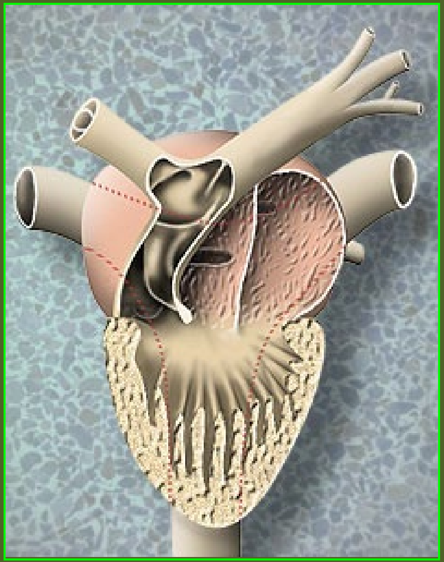
Circulación





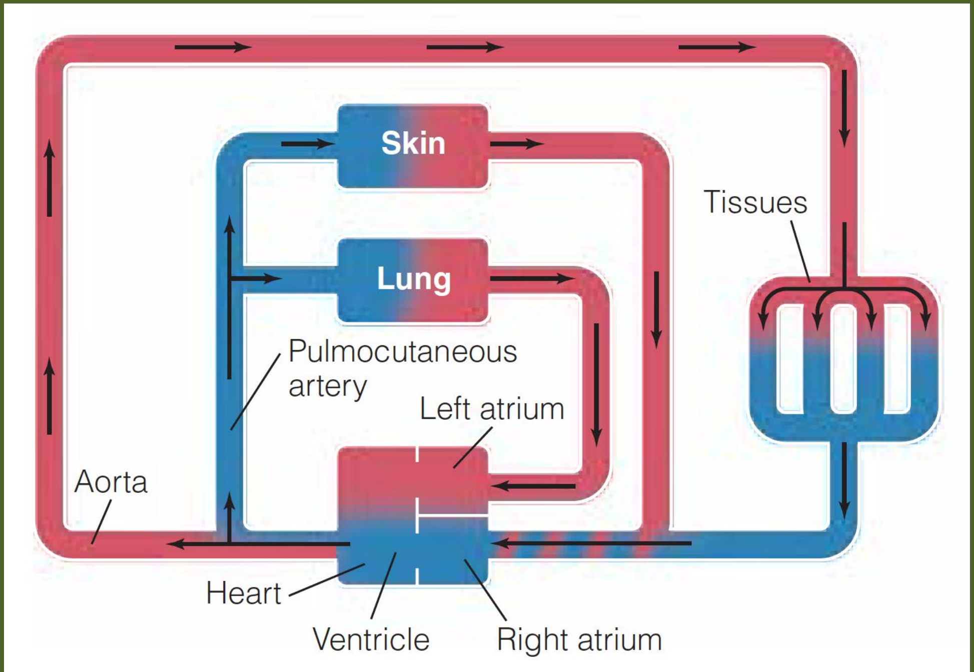


Imagen tomada de Moyes *et al*. (2014)

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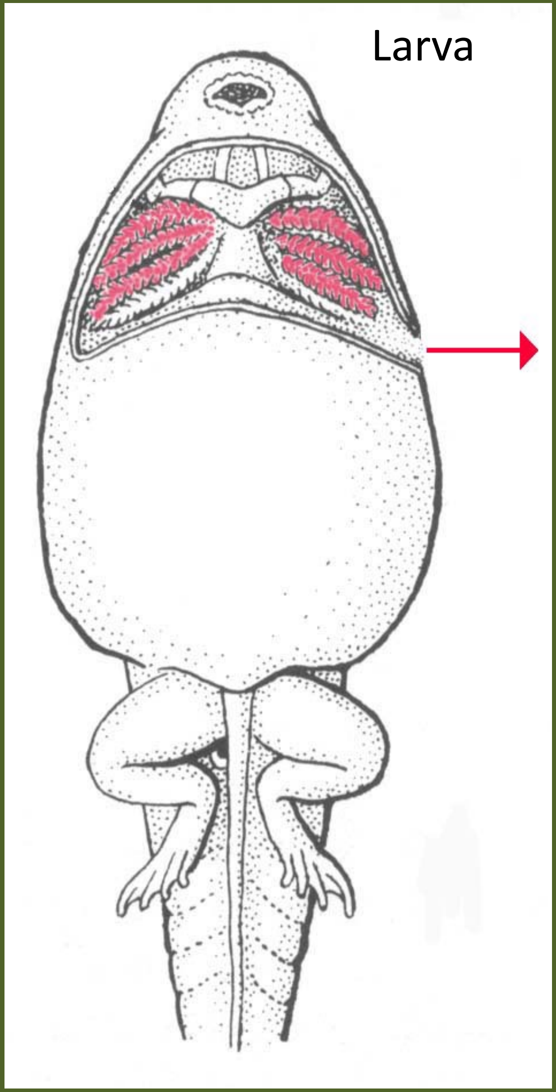
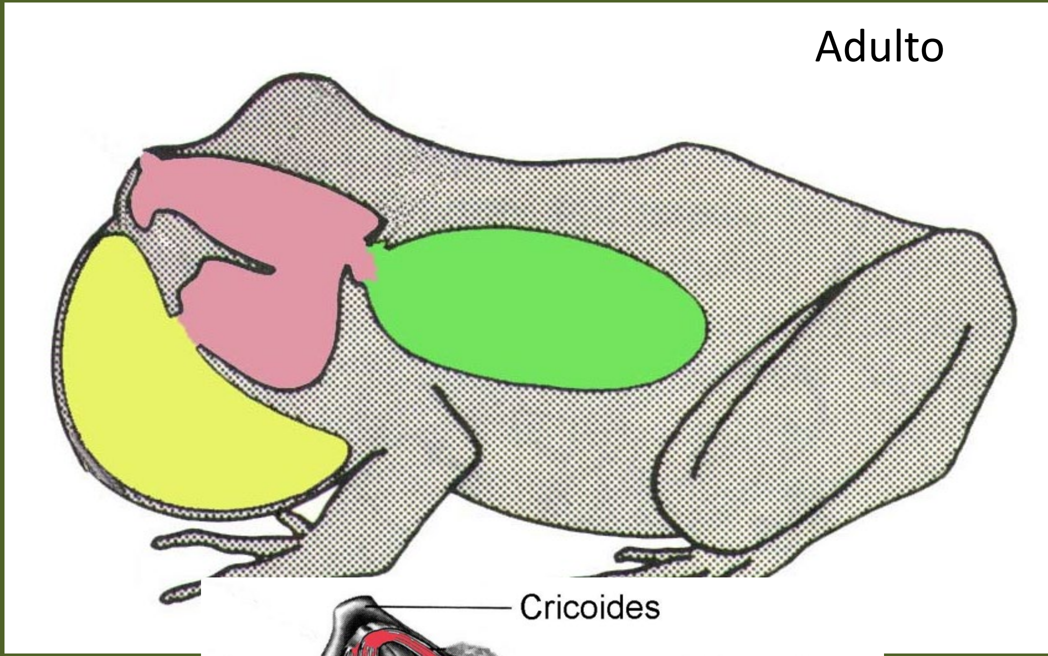
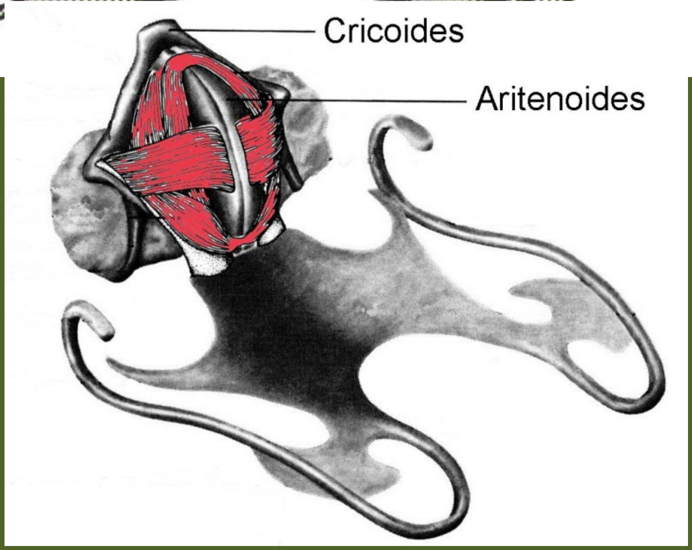
Respiración







Imágenes modificadas de Duellman & Trueb (1994)

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Oído medio

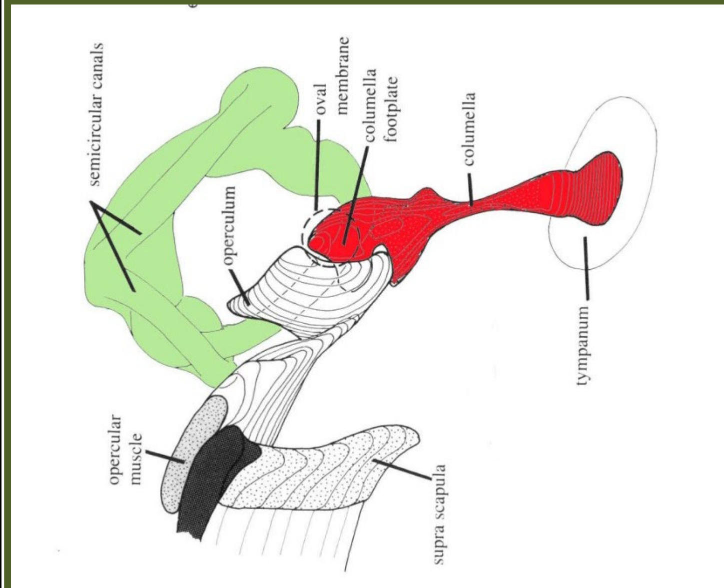

Imagen modificada de
Stebbins & Cohen (1997)

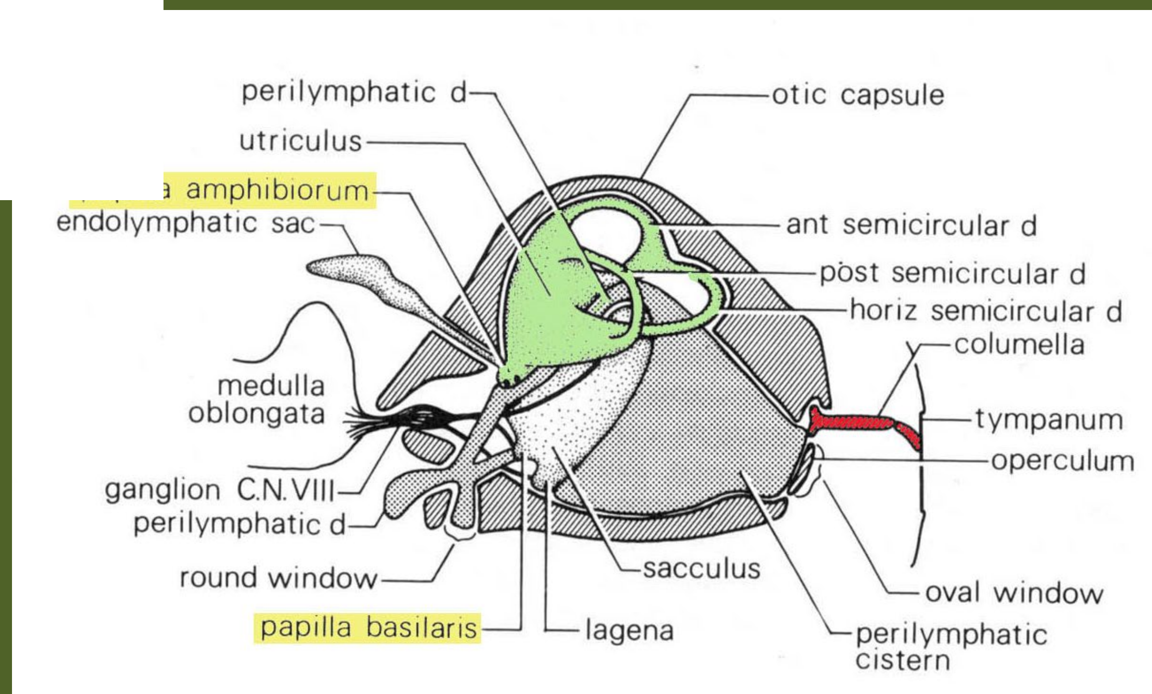

Imagen modificada de Duellman & Trueb (1994)

Los grupos vivientes

AMPHIBIA

Anuros – 7699 sps

Apodos – 222 sps

Urodelos – 823 sps

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