Biogeografía y Diversidad de Teleostomi

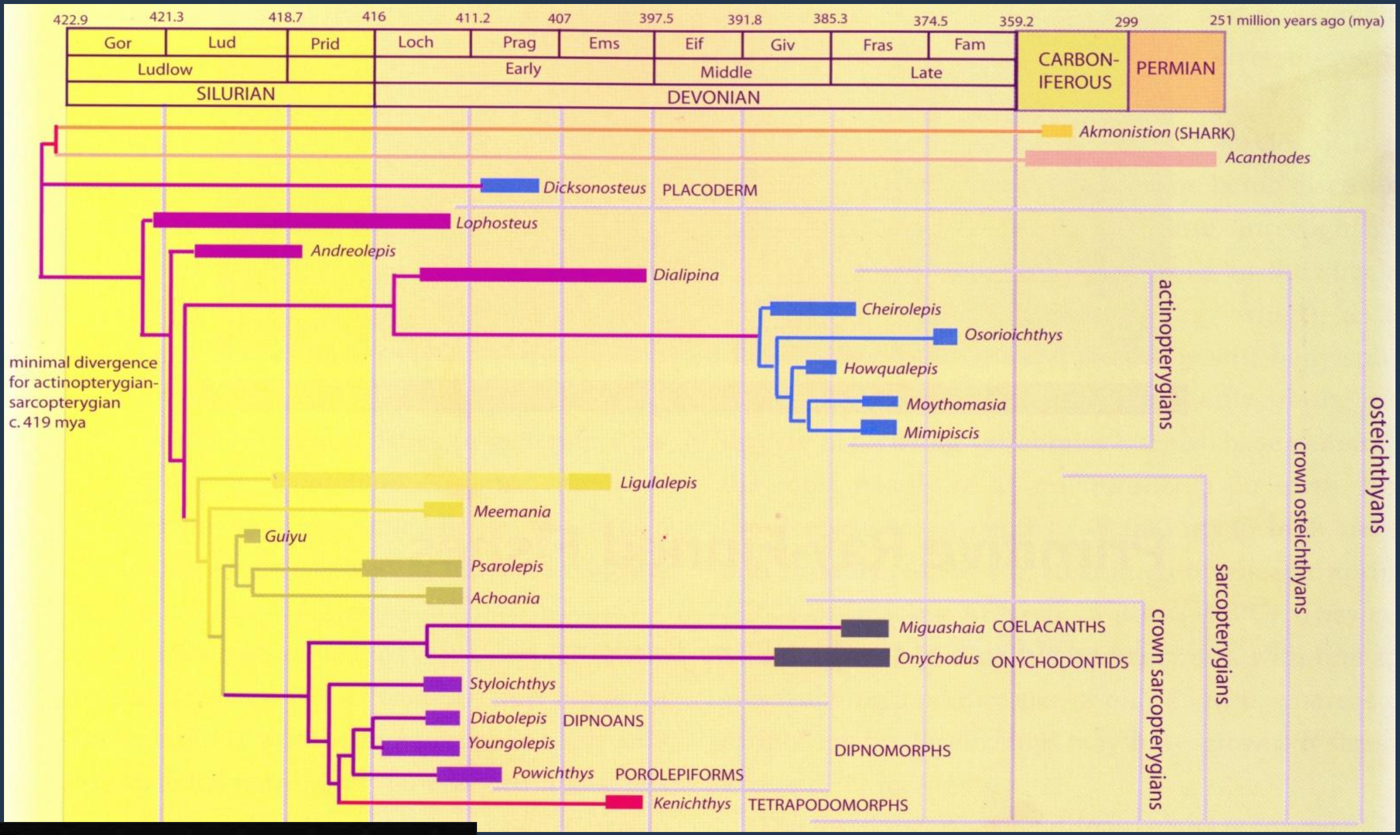
Patrones biogeográficos y la diversidad de peces en el Neotrópico

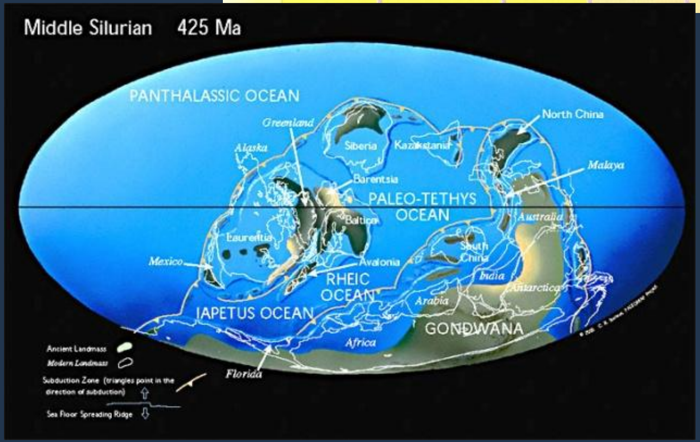
Marcelo Loureiro
Laboratorio Zoología de Vertebrados
Depto. Ecología y Evolución

Teleostomi

Origen de los Teleostomi (=Osteichthyes):

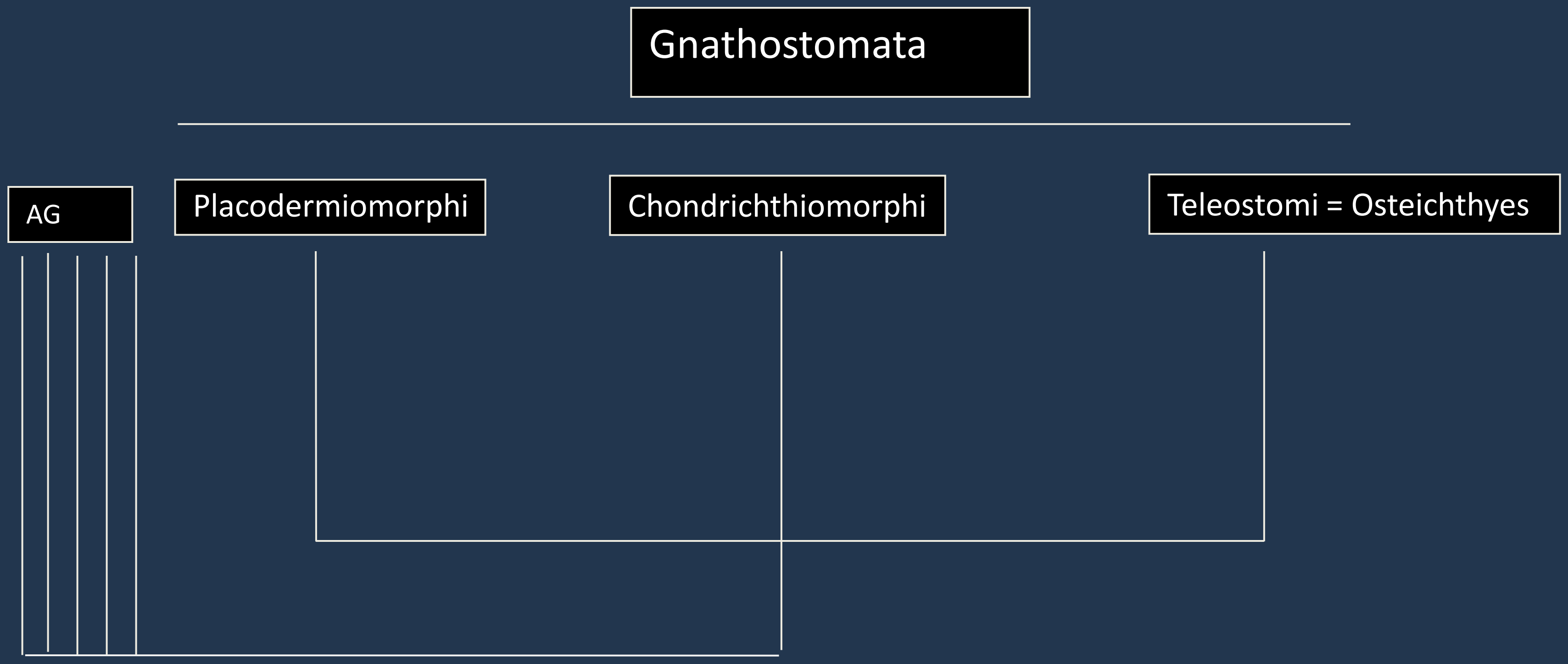
Grupo muy antiguo: primeros restos fósiles Silúrico tardío





Teleostomi: el gran éxito de los Gnatostomata

- Las relaciones entre los grandes grupos de peces son poco claras ya que los principales grupos aparecen ya diferenciados cuando se presentan por primera vez en el registro fósil. De acuerdo a Nelson (2006) los Gnatostomados consisten de tres taxa (grados) monofiléticos. Los que forman una tricotomía no resuelta.

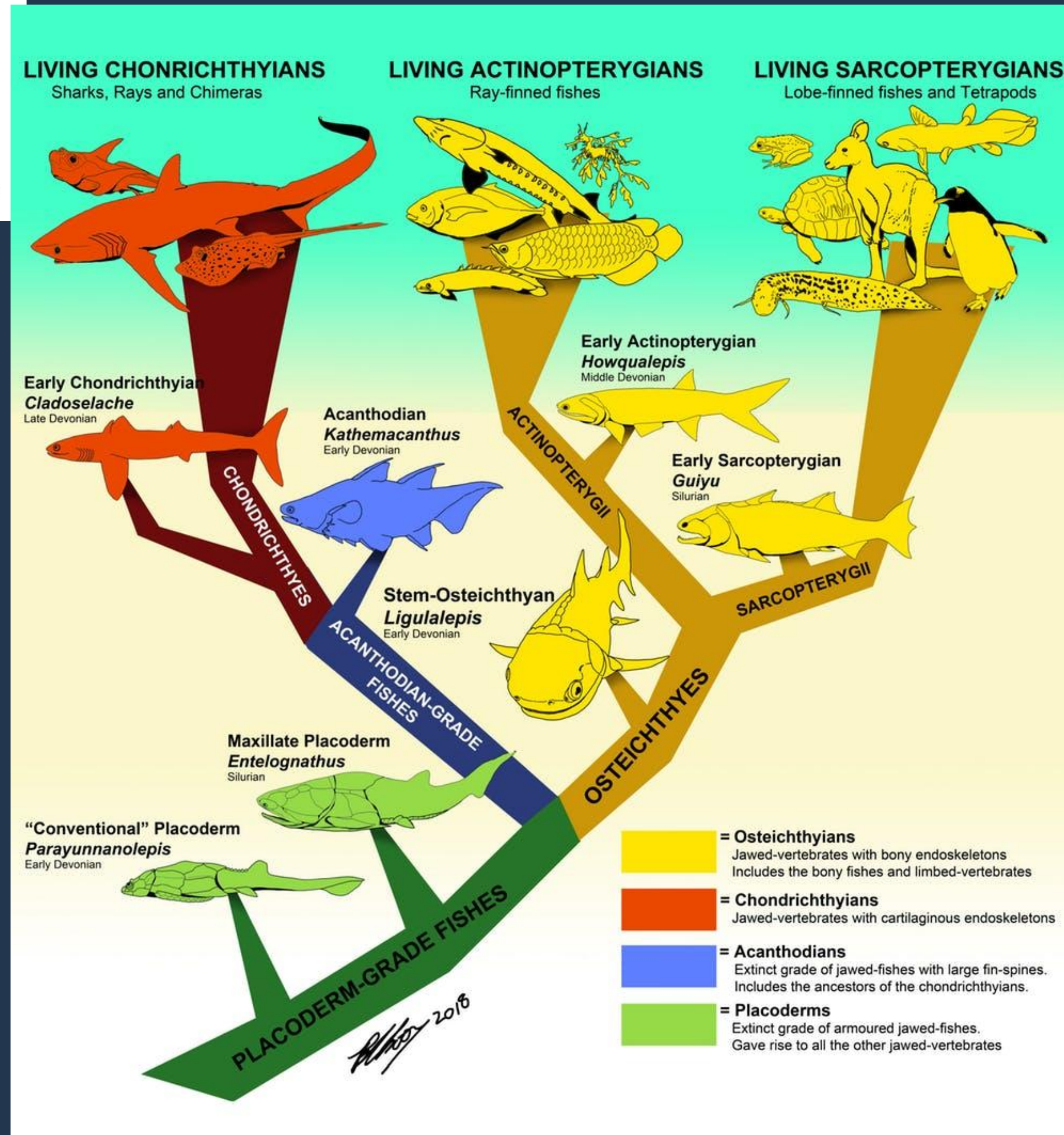


eLIFE
elifesciences.org
RESEARCH ARTICLE

Neurocranial anatomy of an enigmatic Early Devonian fish sheds light on early osteichthyan evolution

Alice M Clement[1,2,3†*], Benedict King[1,4†], Sam Giles[5†], Brian Choo[1], Per E Ahlberg[2], Gavin C Young[6,7], John A Long[1,3]

[1]College of Science and Engineering, Flinders University, Adelaide, Australia; [2]Department of Organismal Biology, Evolutionary Biology Centre, Uppsala University, Uppsala, Sweden; [3]Department of Sciences, Museum Victoria, Melbourne, Australia; [4]Naturalis Biodiversity Center, Leiden, Netherlands; [5]Department of Earth Sciences, University of Oxford, Oxford, United Kingdom; [6]Department of Applied Mathematics, Research School of Physics & Engineering, Australian National University, Canberra, Australia; [7]Australian Museum Research Institute, Sydney, Australia



Actinopterygii


ES52CH20_Near ARjats.cls August 25, 2021 16:48

ANNUAL REVIEWS

Annual Review of Ecology, Evolution, and Systematics

The Emerging Phylogenetic Perspective on the Evolution of Actinopterygian Fishes

Alex Dornburg[1] and Thomas J. Near[2]

[1]Department of Bioinformatics and Genomics, University of North Carolina, Charlotte, North Carolina 28223, USA; email: adornbur@uncc.edu

[2]Department of Ecology and Evolutionary Biology and Peabody Museum of Natural History, Yale University, New Haven, Connecticut 06511, USA; email: thomas.near@yale.edu

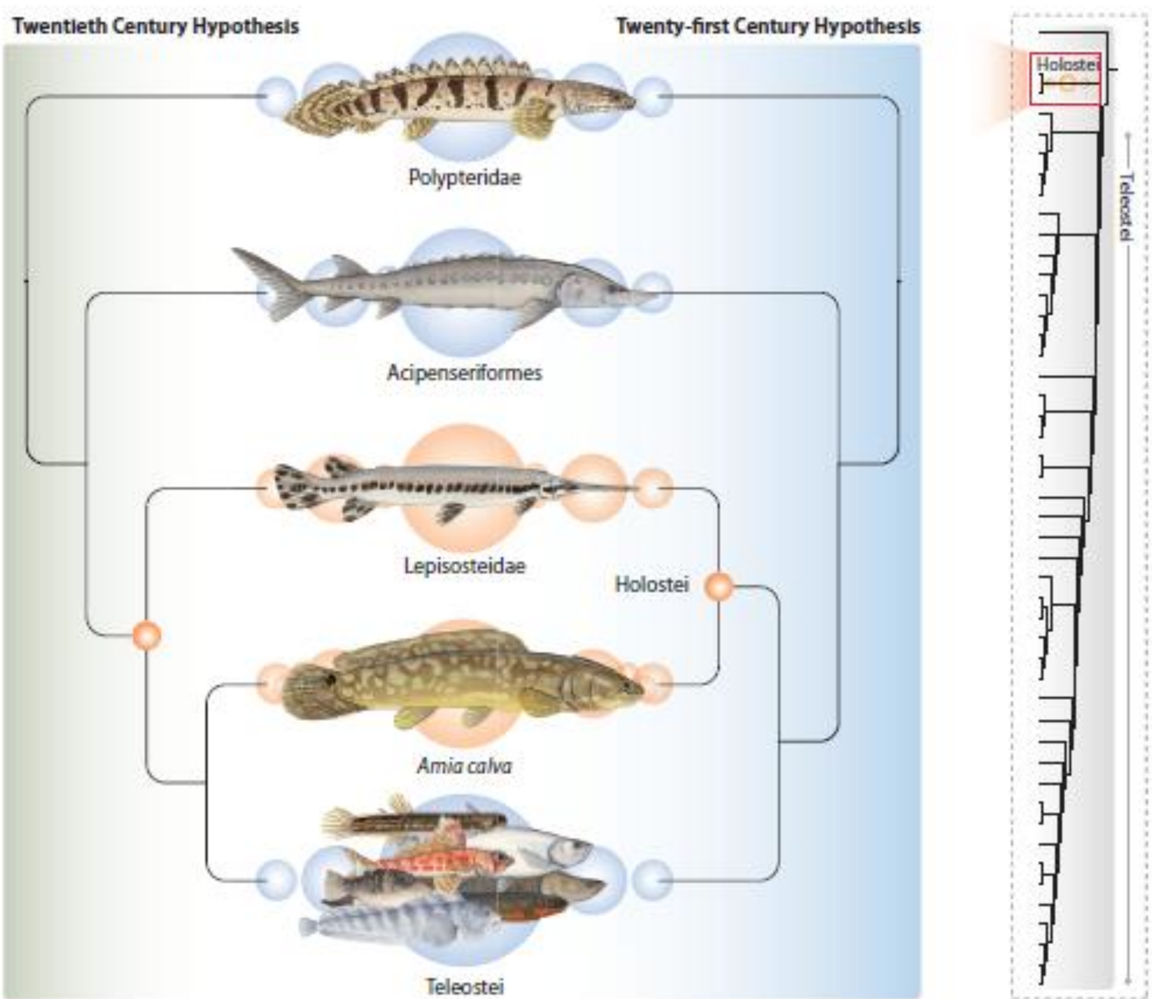
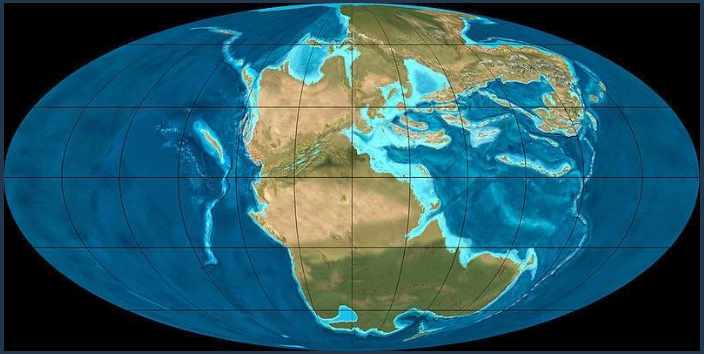


Figure 2

Contrasting phylogenetic hypotheses of neopterygian fishes. The prevailing twentieth century hypothesis based on morphology places *Amia calva* as the sister lineage of Teleostei (*left*). In contrast, the twenty-first century phylogenetic hypothesis resulting from analyses of both morphological and molecular analyses resolves a monophyletic Holostei (*Amia* and Lepisosteidae) as sister lineage of Teleostei (*right*). The inset box indicates the scope of the focal nodes relative to the emerging ray-finned fish tree of life (**Figure 1**). Orange shaded bubbles highlight changes in the delimitation of Holostei between the twentieth century and twenty-first century phylogenies. Blue shaded bubbles indicate congruence between the twentieth century and twenty-first century phylogenies.

Actinopterygii: Teleósteos



División Teleostei

Origen marino: 220-200 millones de años (Triásico medio o tardío)

Fines del cretácico reemplazaron a la mayoría de los Neopterigios ancestrales

La mayor radiación de los vertebrados: 40 órdenes, 448 familias, 4278 géneros y 26840 especies

Synapomorfías

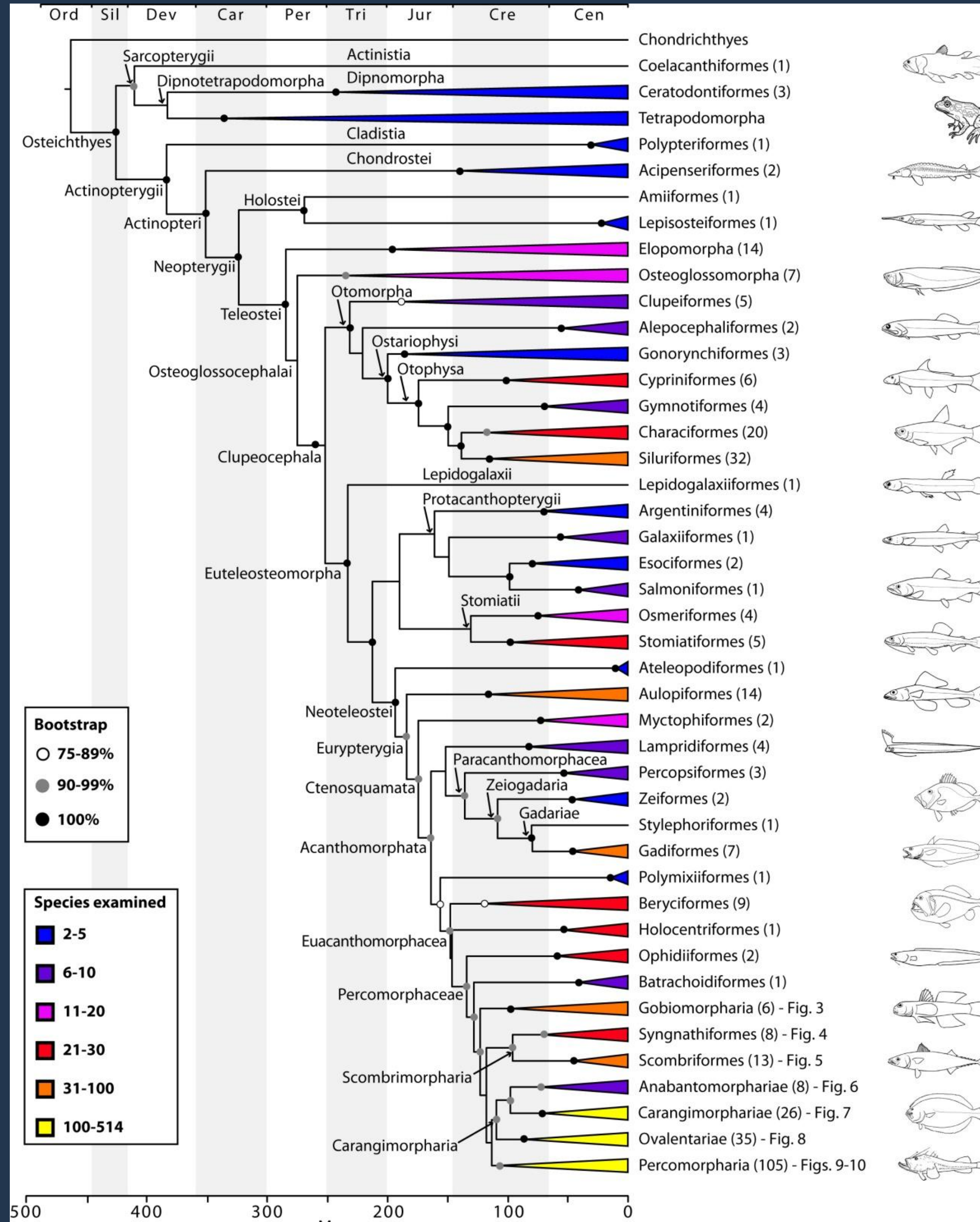
- Arcos neurales posteriores alargados (uroneurales)
- Aleta caudal externamente simétrica (Homocerca)
- Huesos basibranquiales impares
- Mandíbula carece de articulaciones óseas con mejilla y huesos infraorbitales
- Escamas Elasmoides (cicloides y/o ctenoides)

PLOS | CURRENTS TREE OF LIFE

The Tree of Life and a New Classification of Bony Fishes

April 18, 2013 · Tree of Life

Ricardo Betancur-R.[1], Richard E. Broughton[2], Edward O. Wiley[3], Kent Carpenter[4], J. Andrés López[5], Chenhong Li[6], Nancy I. Holcroft[7], Dahiana Arcila[1], Millicent Sanciangco[4], James C Cureton II[2], Feifei Zhang[2], Thaddaeus Buser, Matthew A. Campbell[5], Jesus A Ballesteros[1], Adela Roa-Varon[8], Stuart Willis[9], W. Calvin Borden[10], Thaine Rowley[11], Paulette C. Reneau[12], Daniel J. Hough[2], Guoqing Lu[13], Terry Grande[10], Gloria Arratia[3], Guillermo Ortí[1]



ANNUAL REVIEWS

Annual Review of Ecology, Evolution, and Systematics

The Emerging Phylogenetic Perspective on the Evolution of Actinopterygian Fishes

Alex Dornburg[1] and Thomas J. Near[2]

[1]Department of Bioinformatics and Genomics, University of North Carolina, Charlotte, North Carolina 28223, USA; email: adornbur@uncc.edu

[2]Department of Ecology and Evolutionary Biology and Peabody Museum of Natural History, Yale University, New Haven, Connecticut 06511, USA; email: thomas.near@yale.edu

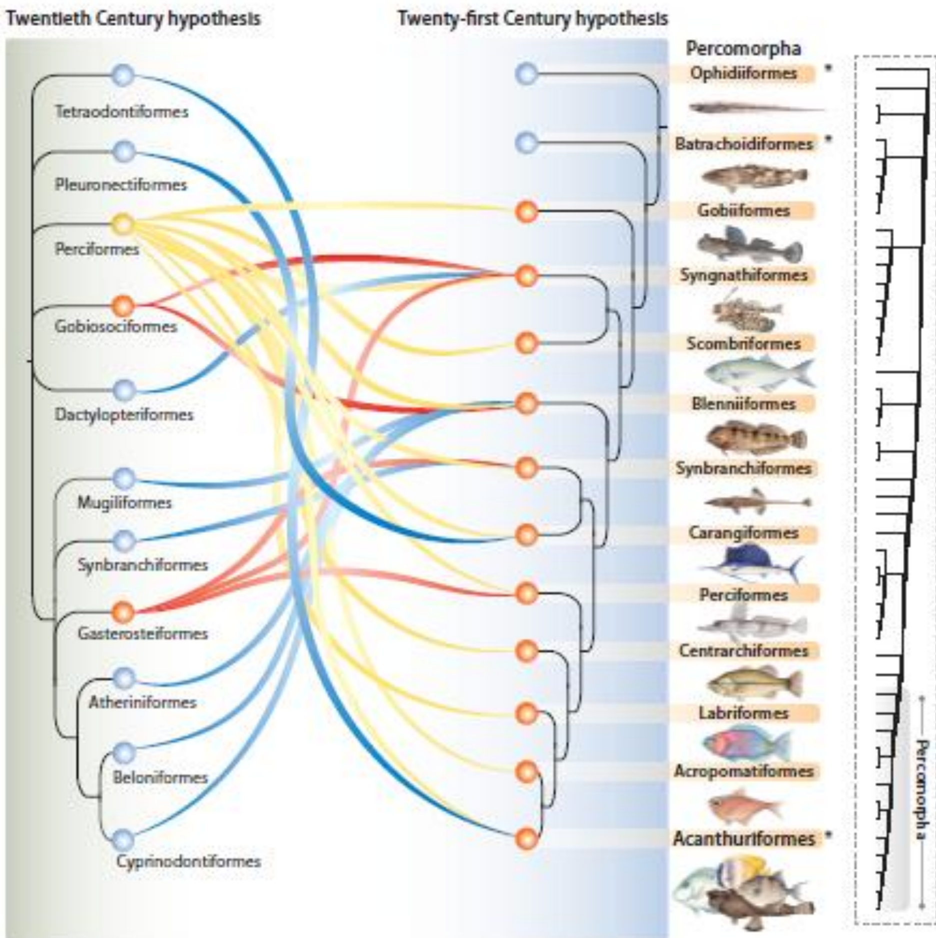


Figure 7

Contrasting changes in the phylogenetic resolution of major lineages of Percomorpha between the consensus twentieth century phylogeny (*left*) and the emerging twenty-first century phylogenetic perspective (*right*). Blue ribbons connect major lineages that have the same delimitation in the two phylogenies, with blue dots on the left indicating clades that have remained unchanged. Red ribbons connect major clades in the twentieth century phylogeny where delimitation has changed in the twenty-first century, with red circles indicating major clades that were not resolved prior to this century. Yellow ribbons connect the twentieth century delimitation of Perciformes to almost every major lineage of Percomorpha in the twenty-first century phylogeny. Names indicated with an asterisk indicate lineages or the inclusion of lineages hypothesized to represent early diverging acanthomorphs in the twentieth century delimitation (see **Figure 6**). The inset box indicates the scope of the focal nodes relative to the emerging ray-finned fish tree of life (**Figure 1**).

Diversidad Neotropical

Diversidad Neotropical

Región Neotropical: una de las mayores concentraciones de diversidad orgánica del planeta: plantas vasculares, macrófitas acuáticas, insectos, anuros, aves, mamíferos y peces.

Diversidad Neotropical

- >5600 especies de peces: 10% de todos los vertebrados, 20% del total de las especies de peces del mundo; 43 familias endémicas

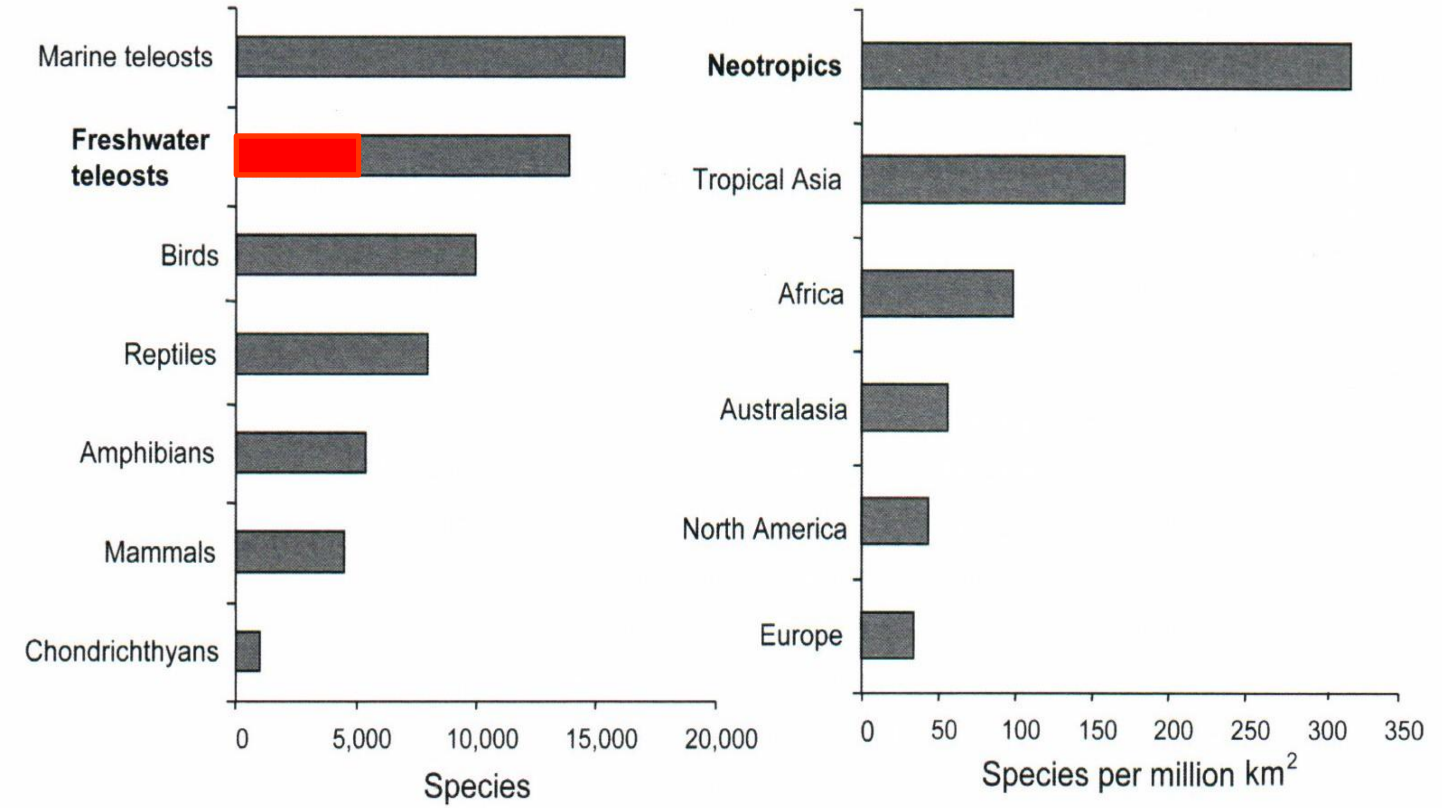
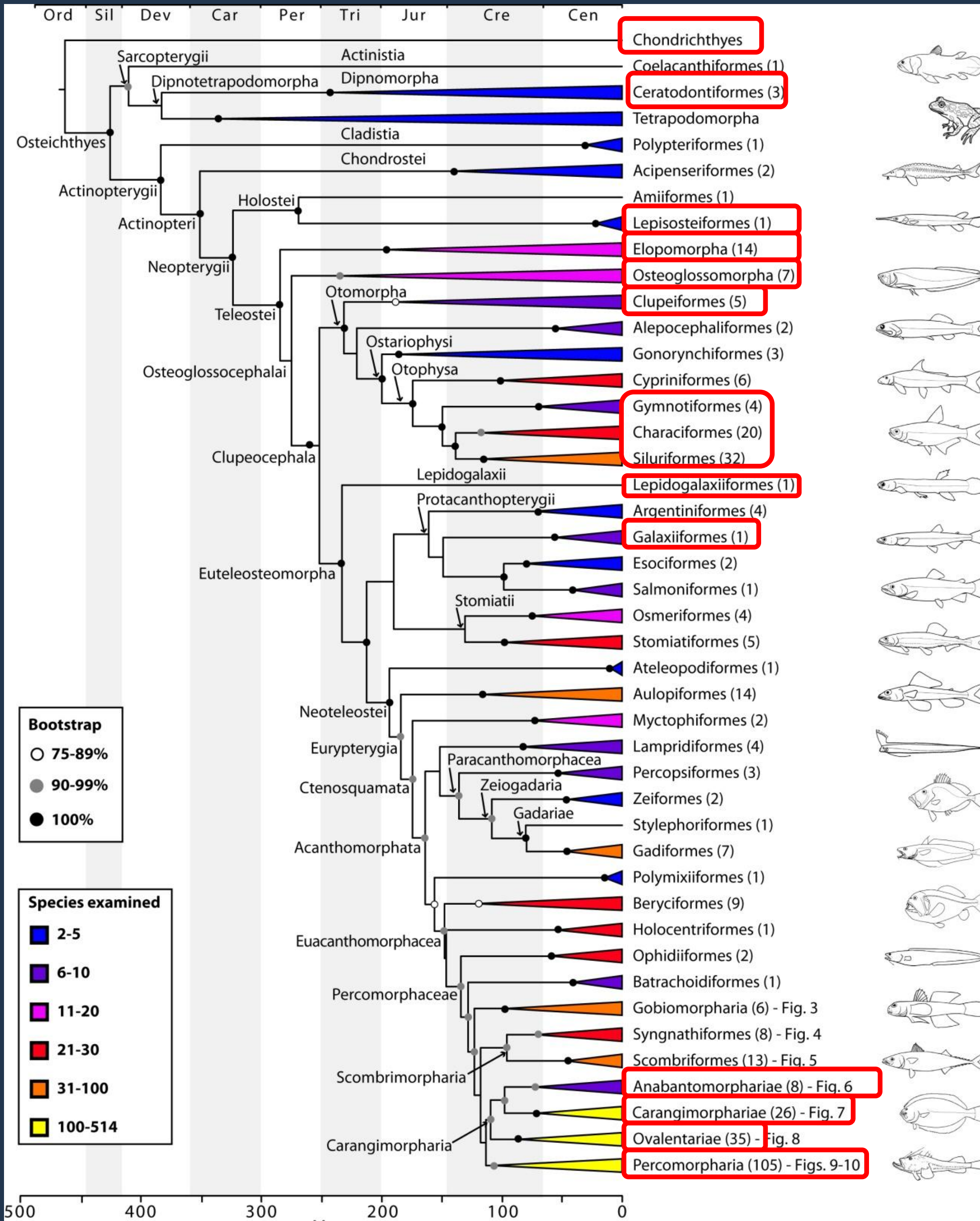


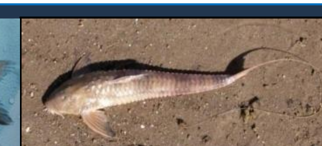
FIGURE 1.1 Species richness of Neotropical freshwater fishes among the vertebrates. *Left:* Comparisons with other major vertebrate groups. Note that many of these groups are not monophyletic. *Right:* Comparisons with freshwater fish faunas of other global biogeographic regions. Diversity estimates as species per million km^2.

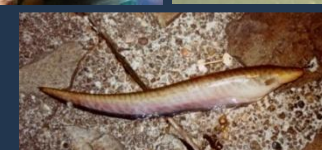


•Characiformes (13) y Siluriformes (14) los dominantes.
•Cyprinodontiformes y Cichliformes siguen en diversidad.
•Gymnotiformes endémicos de esta Región.

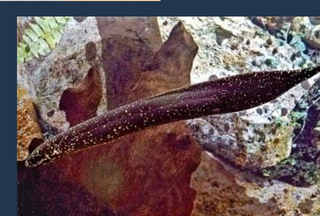
•También característicos algunos grupos derivados de ancestros marinos: Potamotrygonidae, Anablepidae y Atherinopsidae.

•Grupos relictuales muy antiguos: Sarcopterygii-Lepidosirenidae, Teleostei-Osteoglossidae.






Diversidad Neotropical

¿De donde surge esta diversidad?
Patrón Macroecológico ampliamente documentado para muchos organismos:
Gradiente Latitudinal de la Diversidad

Factores **Ecológicos**:
- Amplias regiones tropicales estables a lo largo del tiempo
- Sistema Hídrico muy desarrollado
- Heterogeneidad de hábitat (gradientes altitudinales)

Factores **Históricos**:
- Compleja historia geológica.
- Cambios en los niveles del Mar

Hindawi Publishing Corporation
International Journal of Ecology
Volume 2011, Article ID 967631, 12 pages
doi:10.1155/2011/967631

Research Article

Global and Regional Patterns in Riverine Fish Species Richness: A Review

Thierry Oberdorff,[1] Pablo A. Tedesco,[1] Bernard Hugueny,[1] Fabien Leprieur,[2] Olivier Beauchard,[3] Sébastien Brosse,[4] and Hans H. Dürr[5]

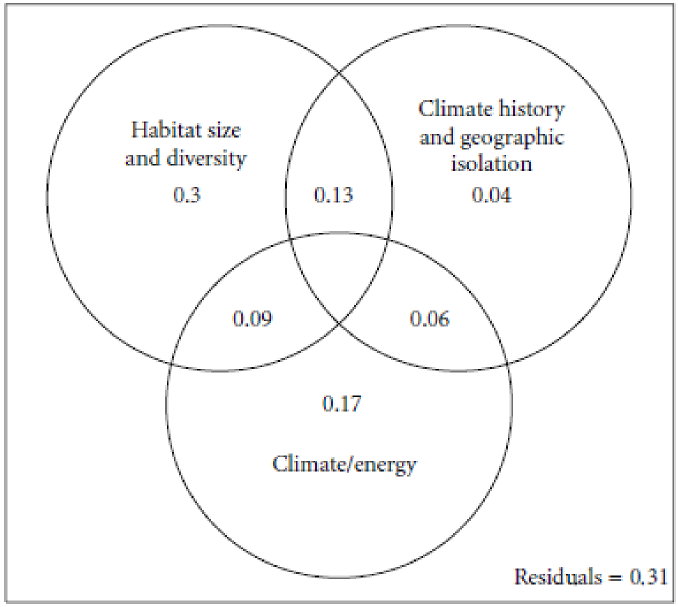


FIGURE 3: Variance partitioning in explaining species richness gradients between area-related, climate-related, and historical variables. The analysis was performed using the "varpart" function from the *vegan* R package [64] and grouping variables as in Table 1.

Diversidad Neotropical

Hindawi Publishing Corporation
International Journal of Ecology
Volume 2011, Article ID 967631, 12 pages
doi:10.1155/2011/967631

Research Article

Global and Regional Patterns in Riverine Fish Species Richness: A Review

Thierry Oberdorff,[1] Pablo A. Tedesco,[1] Bernard Hugueny,[1] Fabien Leprieur,[2] Olivier Beauchard,[3] Sébastien Brosse,[4] and Hans H. Dürr[5]

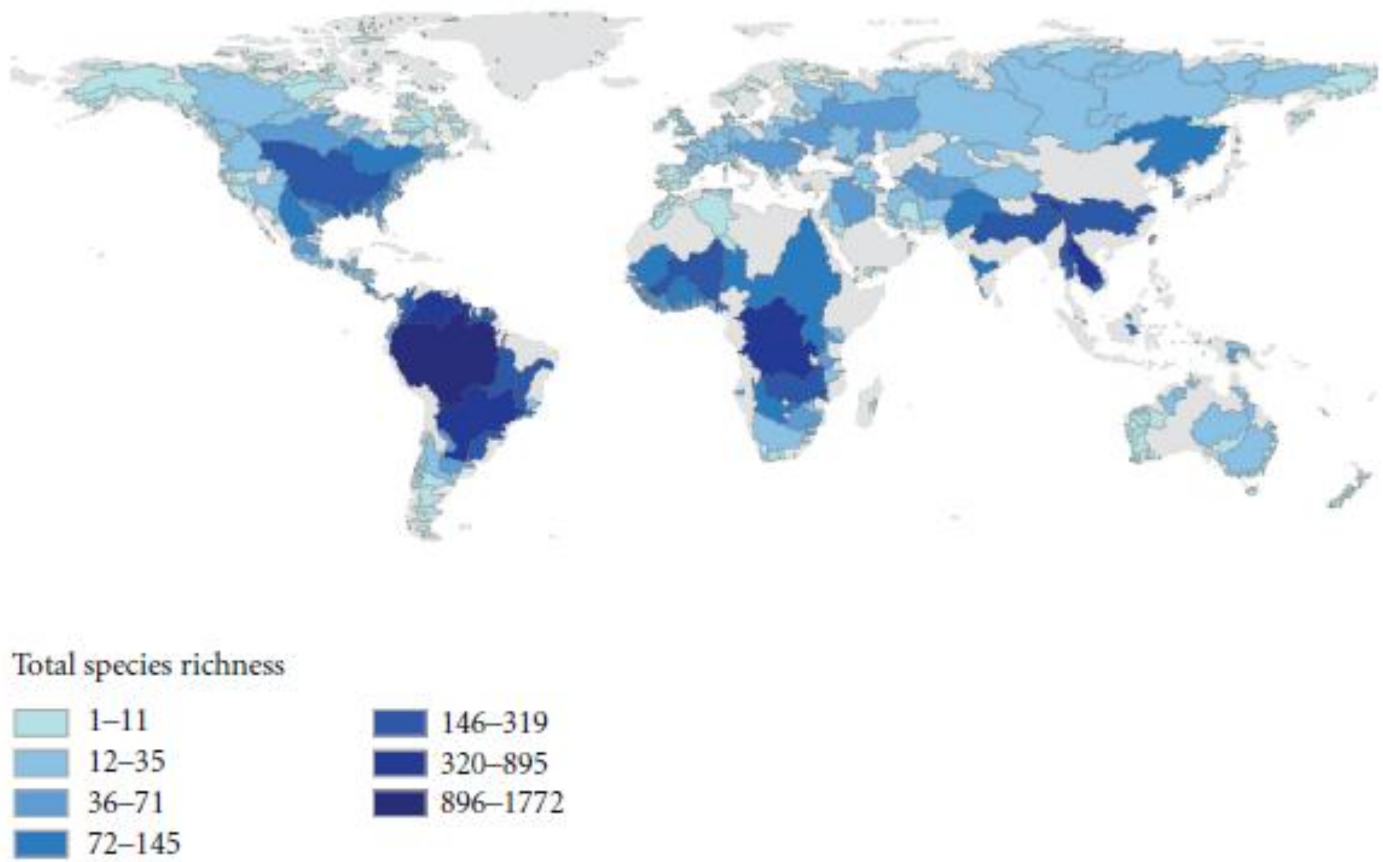


Figure 1: Global freshwater fish species richness patterns at the drainage basin grain.

Diversidad Neotropical

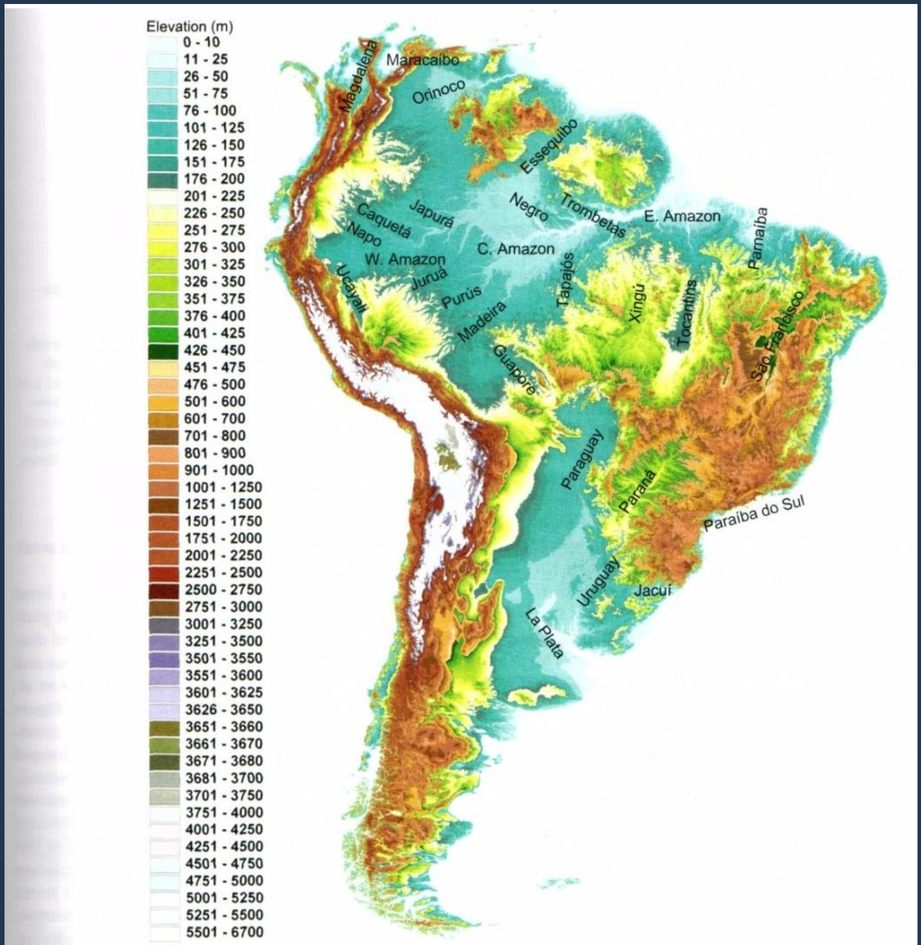


FIGURE 1.3 Principal drainage basins of modern South America. Base map created by Paulo Petry from Shuttle Radar Topograph (SRTM) data in a Digital Elevation Model (DEM).

Cuenca del Amazonas:

7 millones de km^2

175mil m^3/sec.

20% del agua dulce vertida al O. Atlántico.

Además:

- **Paraná: 5ta en extensión en el planeta**
- **Casiquiare: conexión Amazonas-Orinoco**
- **Titicaca: Lago endoreico**
- **Magdalena: trasandina**
- **Cuencas costeras Atlánticas**

Diversidad Neotropical

Ecorregiones de los organismos de agua dulce (Abell et al. 2008):

ℝE 2.14 Geographic partitions of the freshwater ecoregions of tropical South America. A. Ecoregions grouped by major river basin and ɣofaunal province. B (on next page). Ecoregions grouped into the Amazon-Orinoco-Guiana (AOG) Core (species-rich, low endemism) and ɔntinental Periphery (species-poor, high endemism).

FIGURE 2.1 Freshwater ecoregions of tropical South America (after Abell et al. 2008). Ecoregion limits delineated primarily by watershed boundaries (hydrogeographic basins). Ecoregions and associated geographic data are listed in Table 2.1.

Diversidad Neotropical

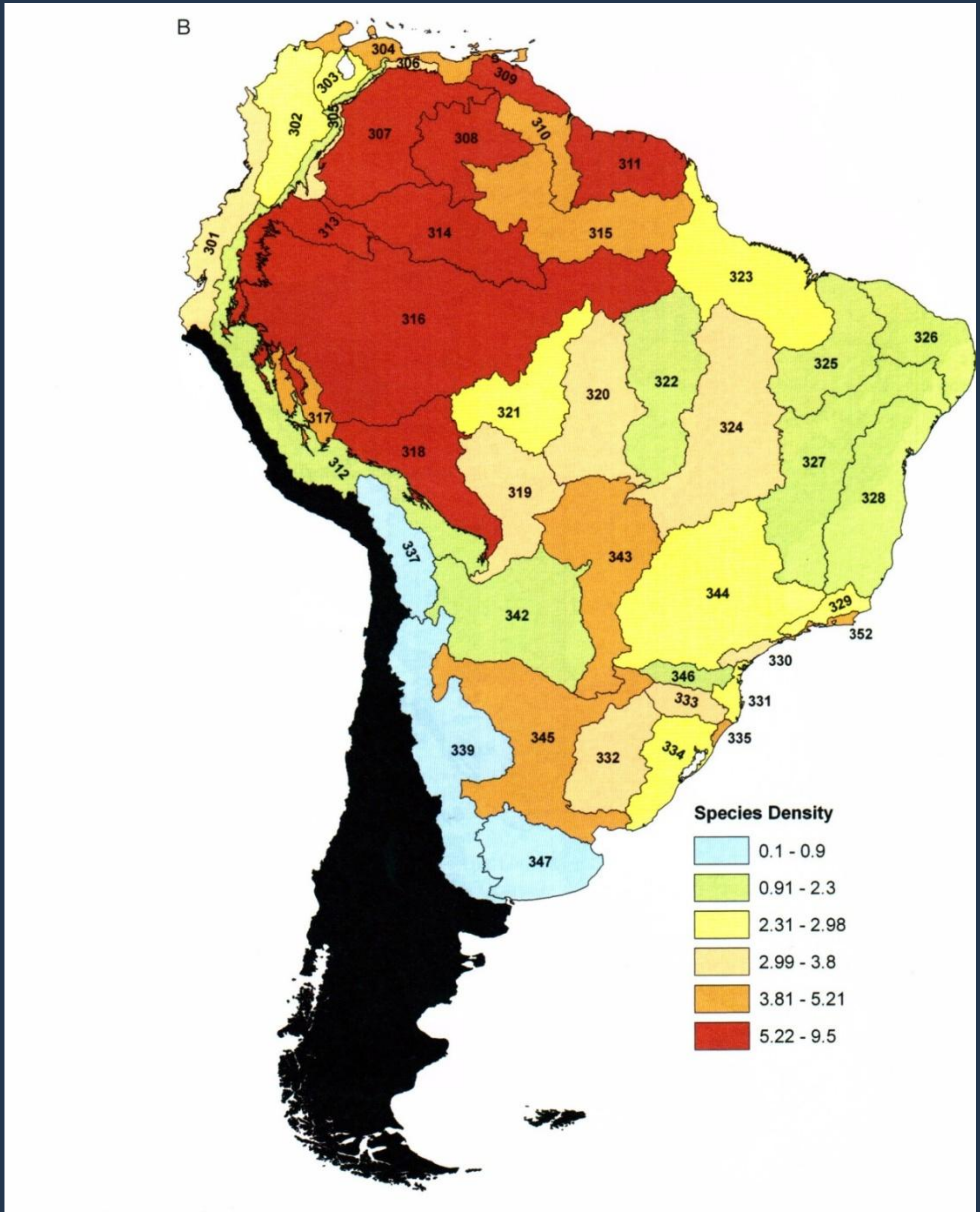


FIGURE 2.7 Continued.

Diversidad Neotropical

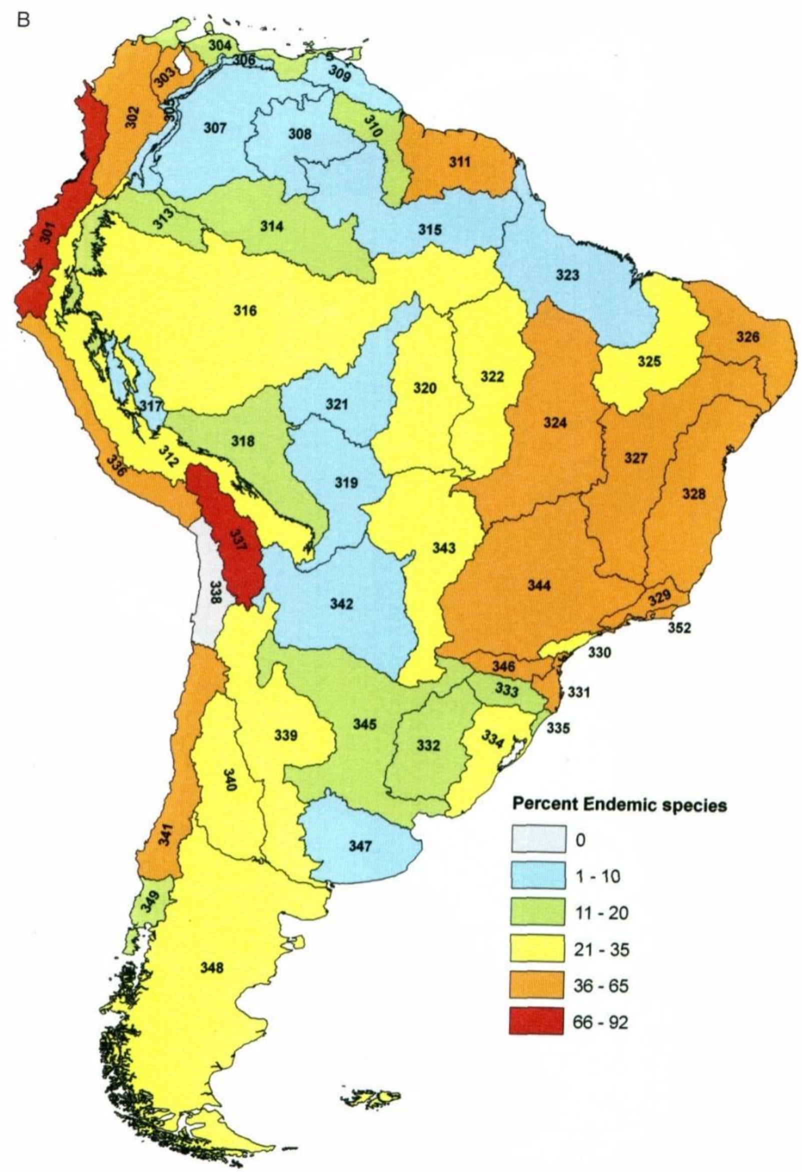


FIGURE 2.8 Continued.

Diversidad Neotropical: Factores Históricos

1. Diversificación de organismos acuáticos Neotropicales en los dinámicos y cambiantes ríos y cuencas de drenaje durante el Cretácico tardío y el Cenozoico (90 millones de años AP).
2. Vicarianza, divergencia alopátrica y por tanto la diferenciación biótica favorecidas.

Factores Históricos:

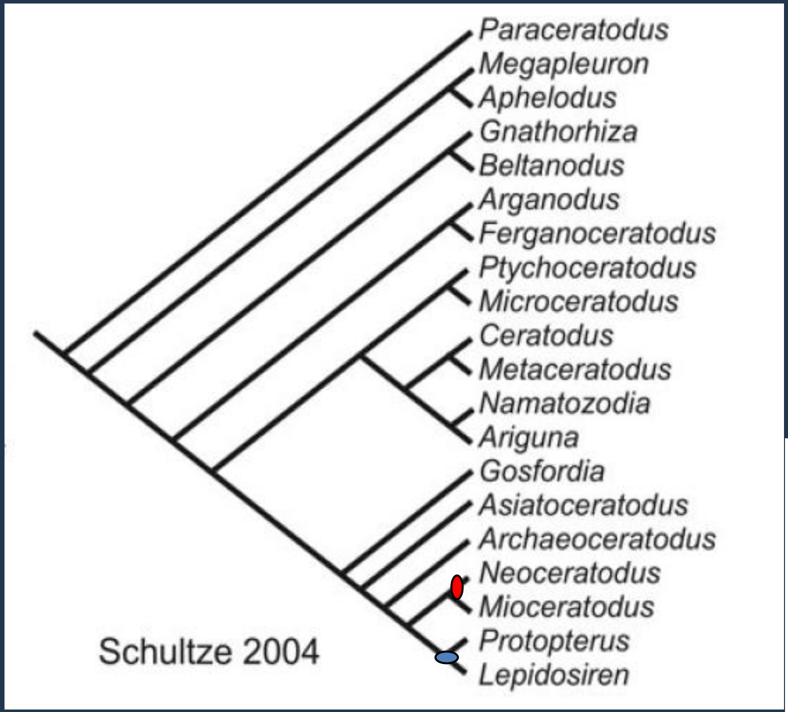
- Aislamiento creciente de Africa
- **Formación de los Andes**: La mayor fuerza activa formadora de patrones de drenaje.
- Unión con Centroamérica
- Escudos
- Arcos estructurales (barreras subsuperficiales)
- Cambios Climáticos y Cambios en los niveles del mar

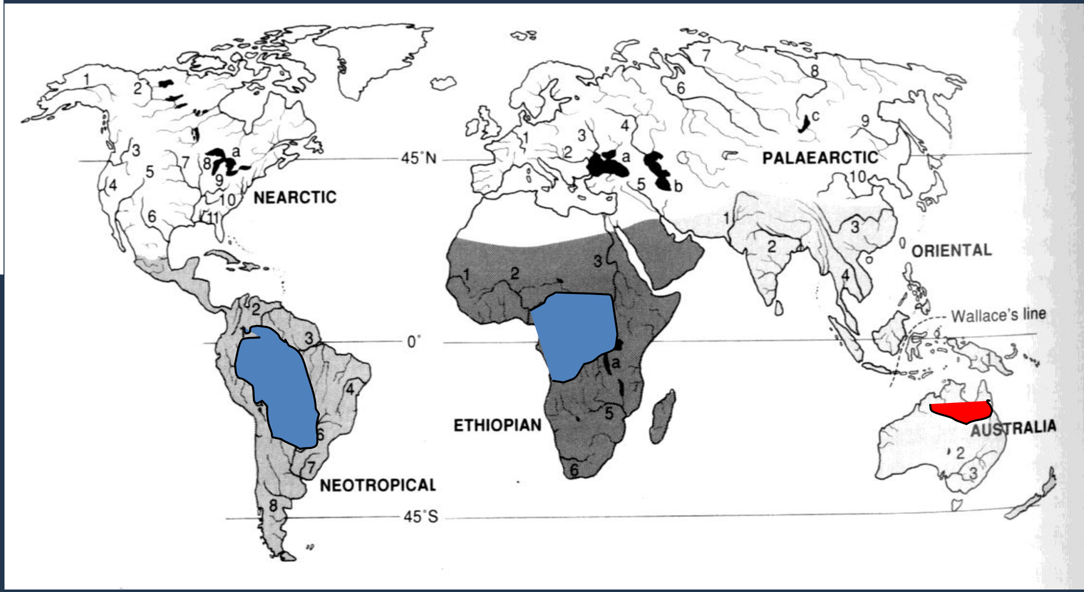
Afinidades de la Ictiofauna Neotropical con otras Grandes Áreas de Endemismo

Clase Sarcopterygii; Orden Ceratodontiformes; Familia Lepidosirenidae

Lepidosiren paradoxa, distribuída en las cuencas del Amazonas y Paraná-Paraguay (hasta 35º lat S).

Registro Fósil: Cretácico tardío (70 ma)

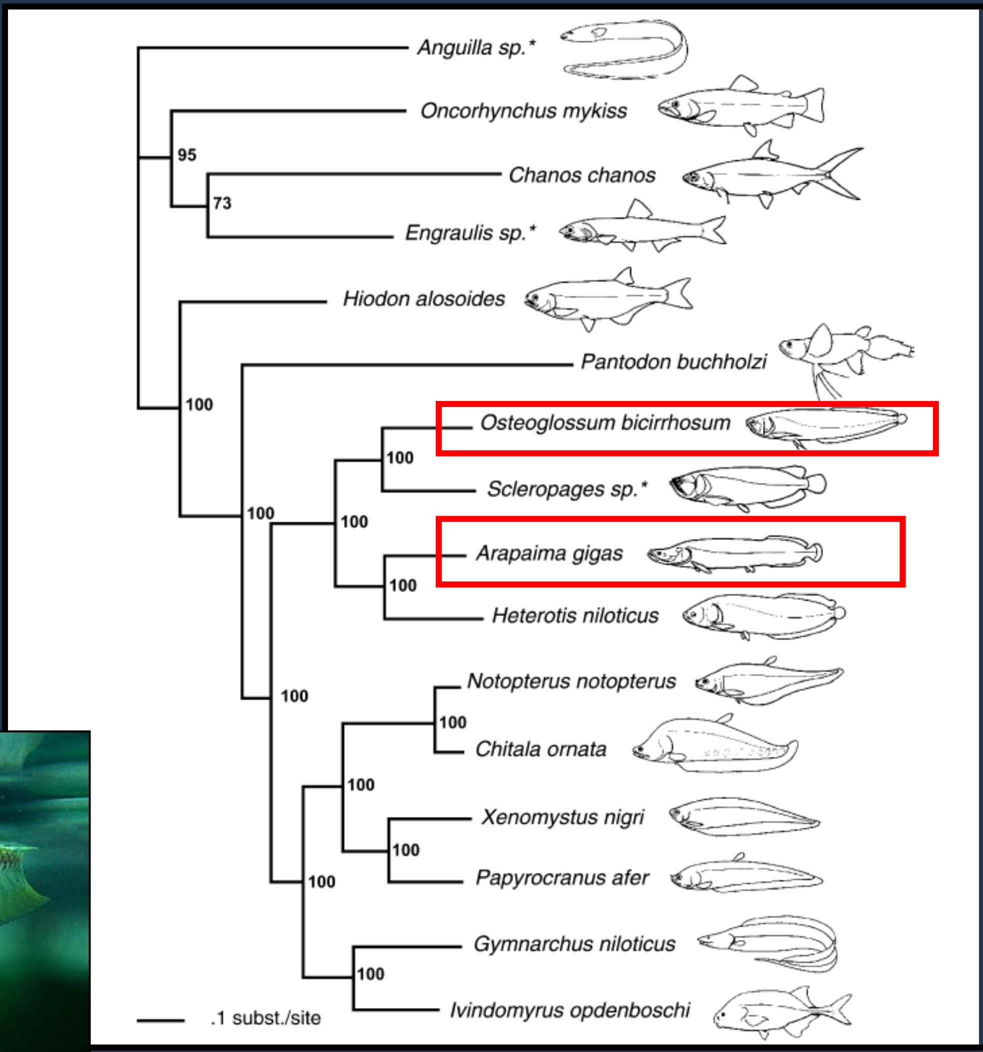




Division Teleostei; Orden Osteoglossiformes; Familia Osteoglossidae (4 géneros y 7 especies)

Cretácico tardío (70 ma)

2 especies del género *Osteoglossum y Arapaima gigas* (pirarucú)



Orden Characiformes: 18 familias, 237 géneros y al menos 1343 especies de las cuales 208 (4 familias) están en África; el resto en la región Neotropical y Sur de Norteamérica. También restos fósiles en Europa.

Origen?: Cretácico tardío (70 ma)

Restos fósiles de grupos vivientes: Paleoceno-Oligoceno (60-30 ma): Cheirodontinae, Curimatidae.

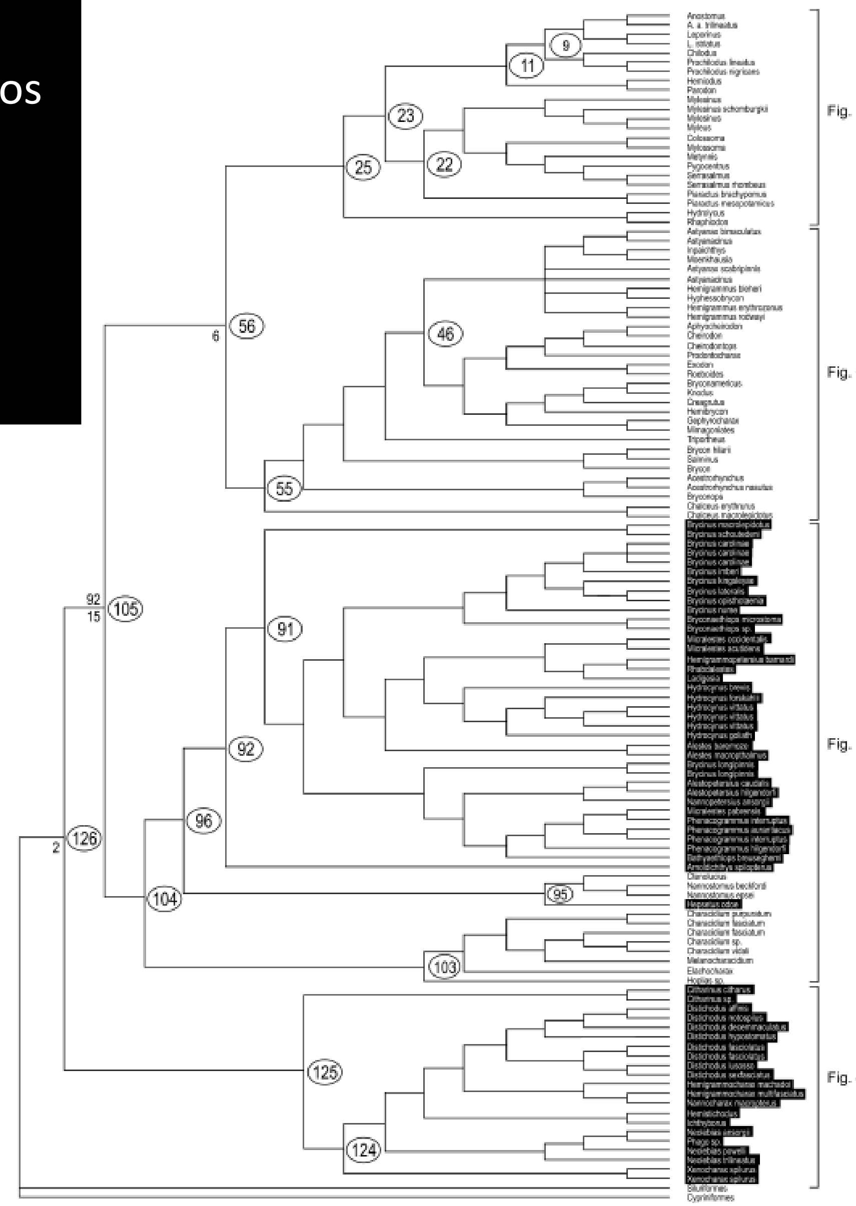


Fig. 1. Strict consensus of 18 equally most-parsimonious trees based on the combined analysis of six data partitions. African taxa are denoted in black. Clades designated at far right are examined in detail in subsequent figures, respectively. Nodes are numbered where referenced in the text; bootstrap (≥ 50%) and Bremer support values are shown above and below the node, respectively, for those nodes not represented in subsequent figures.

Orden: Cyprinodontiformes; Subroden: Aplocheiloidei

10 familias, 109 géneros, 1013 especies

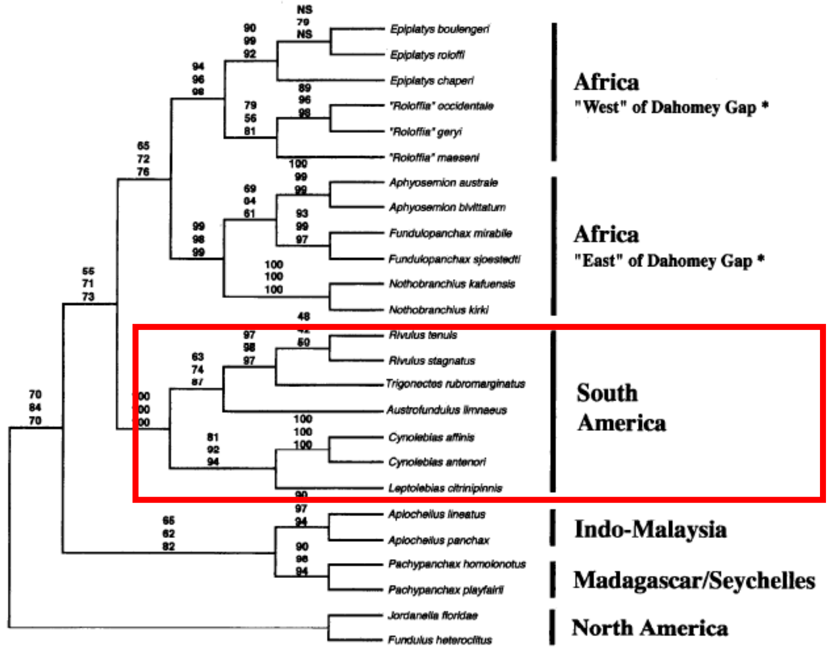
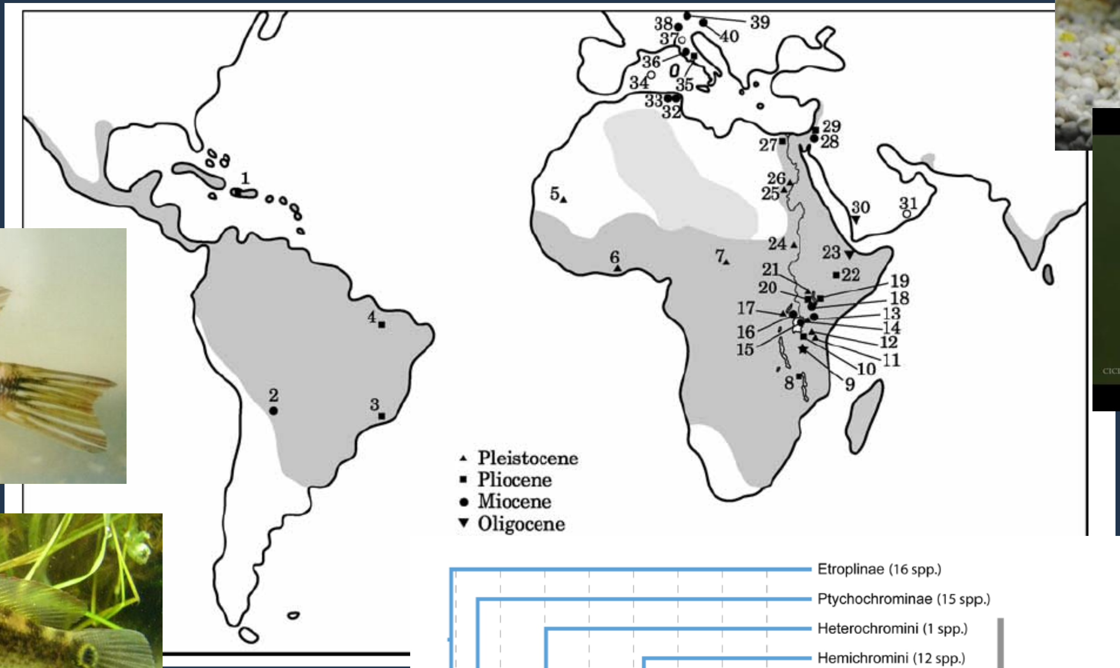


FIG. 4.—Phylogenetic hypothesis for the Aplocheiloidei based on parsimony analysis of the total data set. Bootstrap values (500 replicates) are listed above the branches in descending order for: equal-weighted MP, MP using conservative substitutions for cyt*b* (see *Materials and Methods*) and all sites for the 12S and 16S rRNAs, and MP with Tv weighted three times Ts. The latter analysis did not support the shown relationships within *Epiplatys*, instead grouping *E. boulengeri* and *E. chaperi* (78% of replicates). Asterisks marking the labels "West" and "East" of the Dahomey Gap indicate general distributions of sampled taxa, but note exceptions to these definitions in the *Discussion*.

Rivulidae

Aplocheilidae

Orden Cichliformes: 1300 especies



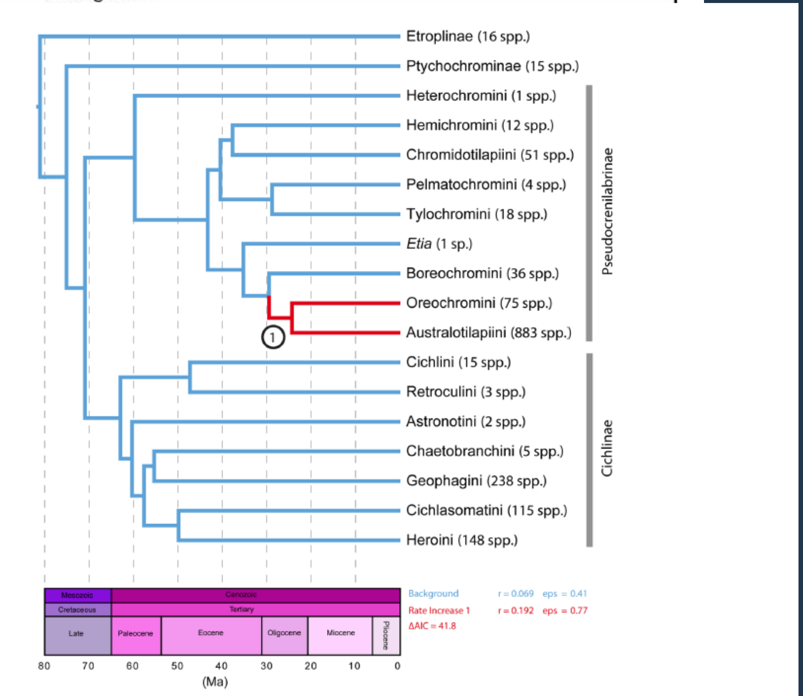
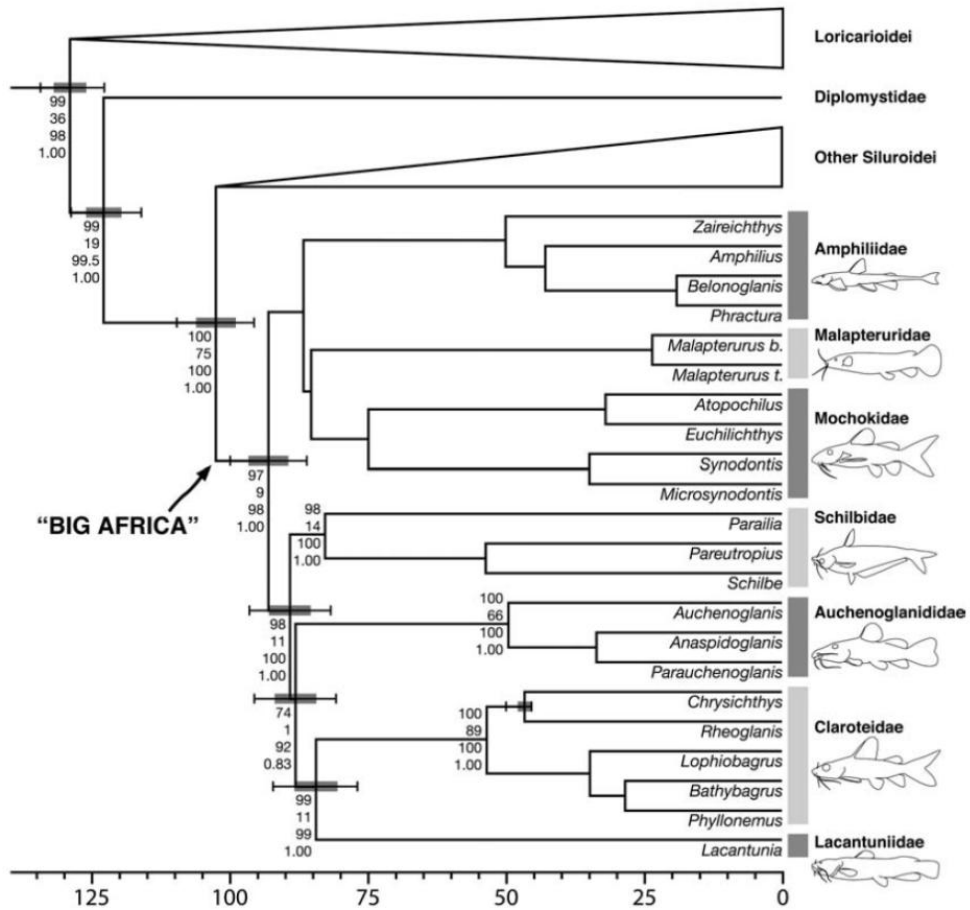


Figure 2. Temporal phylogeny of cichlids pruned to subfamily for Ptychochrominae, Etroplinae, tribes for Pseudocrenilabrinae, Cichlinae. Red clades indicate rate shifts in diversification, with lineages in blue undergoing a background rate of diversification.
doi:10.1371/journal.pone.0071162.g002

Proceedings of the Academy of Natural Sciences of Philadelphia 156: 39-53 June 2007

Discovery of African roots for the Mesoamerican Chiapas catfish, *Lacantunia enigmatica*, requires an ancient intercontinental passage

John G. Lundberg, John P. Sullivan



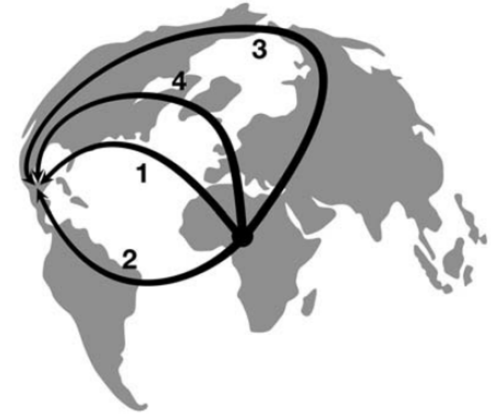


Fig. 4. Schematic alternative hypotheses for freshwater dispersion from Africa to Mesoamerica. 1) Pangean: Africa to North America before opening of the Central Atlantic and then to Mesoamerica, 2) Gondwana: Africa to South America before opening of the South Atlantic and then to Mesoamerica, 3) Bering land bridge: Africa to Asia to North America during Late Cretaceous to Late Miocene warm climate and then to Mesoamerica, 4) North Atlantic land bridge: Africa to Europe to North America during Late Cretaceous to Late Paleogene warm climate and then to Mesoamerica. Freshened surface waters of the Arctic and adjacent northern oceans during the middle Eocene raises a possibility of direct open–water dispersion from Europe or Asia to North America.

Orden: Cyprinodontiformes; *Orestias* spp

10 familias, 109 géneros, 1013 especies

Copeia, 1995(1), pp. 8–21

Molecular Perspective on Evolution and Zoogeography of Cyprinodontid Killifishes (Teleostei; Atherinomorpha)

Alex Parker and Irv Kornfield

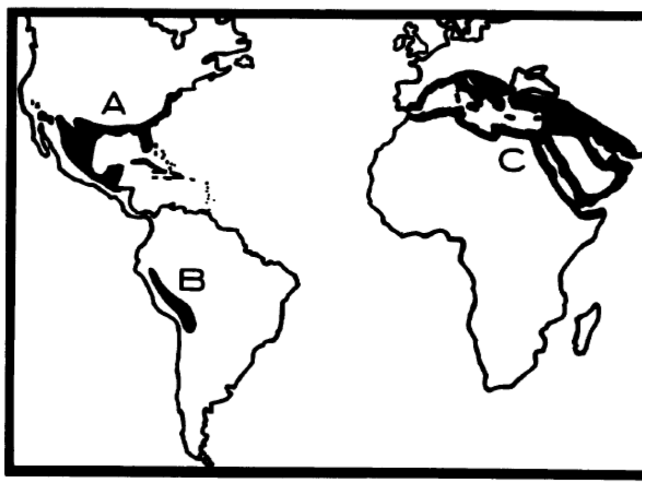


Fig. 1. Distribution of the three groups (sens Parenti, 1981) comprising Cyprinodontidae: (A) Ca ribbean cyprinodontids; (B) *Orestias*; and (C) Anato lian cyprinodontids.

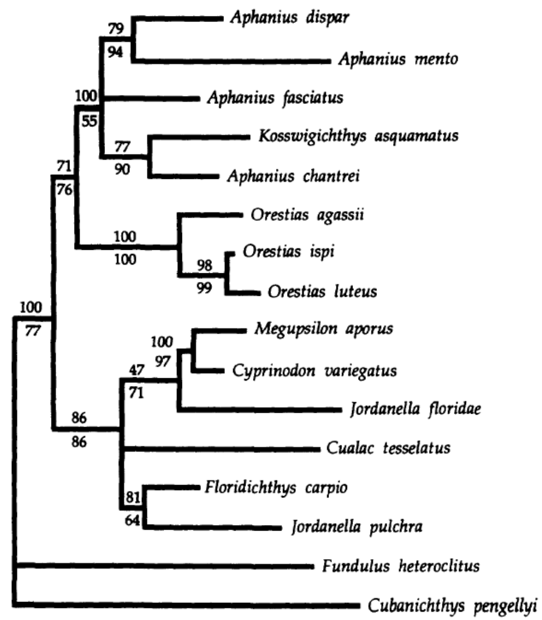


Fig. 2. Consensus (50% majority-rule) tree for 16 cyprinodontid taxa, based on 16s rRNA sequences (102 informative characters). Numbers at nodes indicate percentage of 2000 bootstrap replicates that support each node: maximum-parsimony values are above; neighbor-joining values are below. Branch lengths are proportional to estimated genetic distances. The two shortest trees found by PAUP were 294 steps long (CI = 0.56, RC = 0.33). The g_1 value of the length distribution of 1000 random trees was −0.750 ($P < 0.01$). The same topology was found in maximum-likelihood analysis, where all branch lengths were significant ($P < 0.01$). Compatibility analysis was uninformative (81 equally parsimonious trees). When rearranged to fit Parenti's (1981) hypothesis, the resulting tree was 326 steps long (CI = 0.50, RC = 0.24).

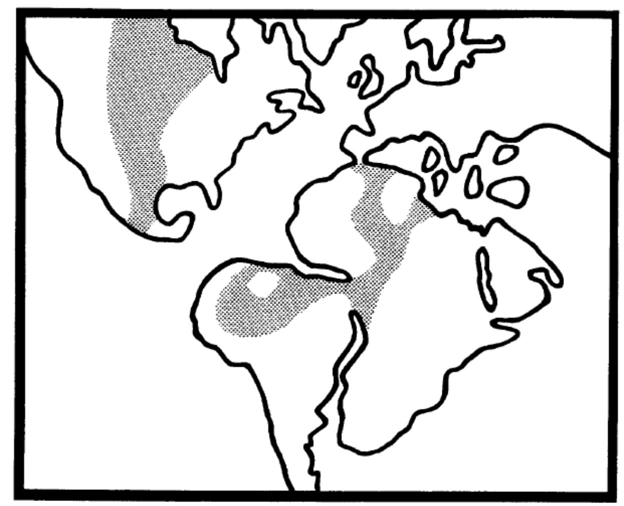
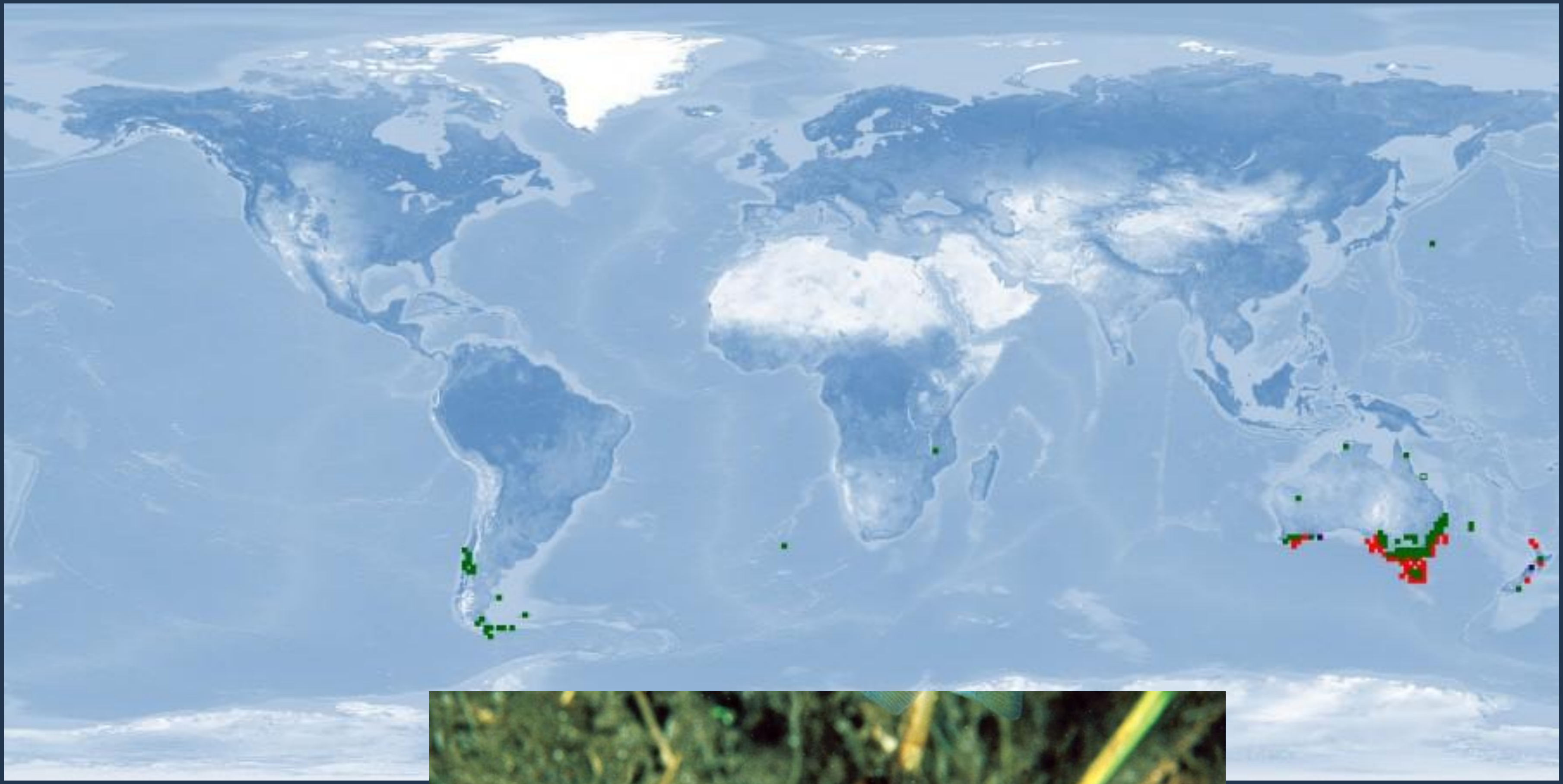


Fig. 5. Hypothesized habitat continuity and range of ancestors to *Orestias* and *Aphanius*. Diagram illustrates position of the South American continent relative to the North American and Eurasian continents and the proto-Atlantic Ocean at the beginning of the Cretaceous eustasic maximum. Shading indicates areas thought to have been covered by epicontinental seas during part or all of this period (adapted from Briggs, 1987; Van der Voo, 1993; and Hallam, 1992).

Orden Galaxiformes; Familia Galaxidae; *Galaxias maculatus* (Distribución Circumpolar)



Procesos Históricos del Neotrópico: Geología y Clima

Procesos geológicos y geomorfológicos: Deriva Continental y Formación de los Andes.

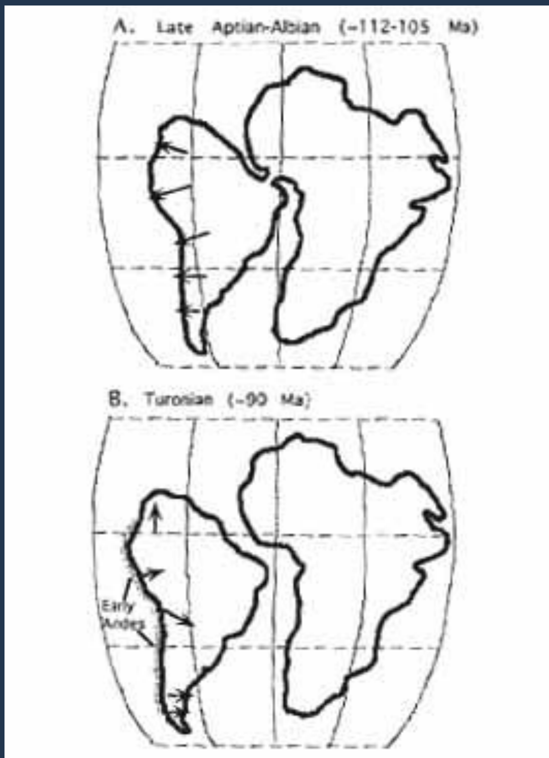


Figure 10. A. South America and Africa at about the time of final separation of the continents in late Aptian-Albian (~112-105 Ma, after Map 16 in Smith *et al.*, 1994). **B.** South America and Africa in the Turonian (~ 90 Ma) following complete separation (after Map 14 in Smith *et al.*, 1994).

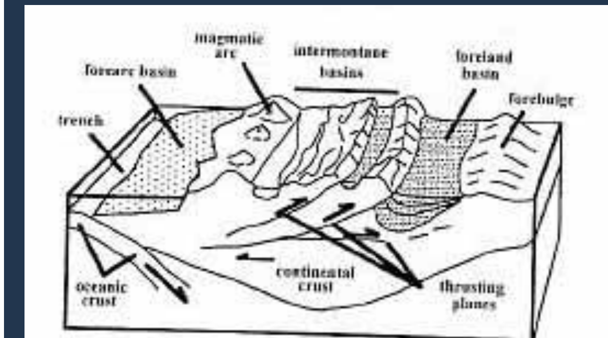


Figure 4. West (left) to east (right) schematic section of the Andes showing geological features associated with mountain building and foreland basin development (modified after Fig. 1 in Marocco *et al.*, 1995 and Fig. 2 in Horton & DeCelles, 1997).

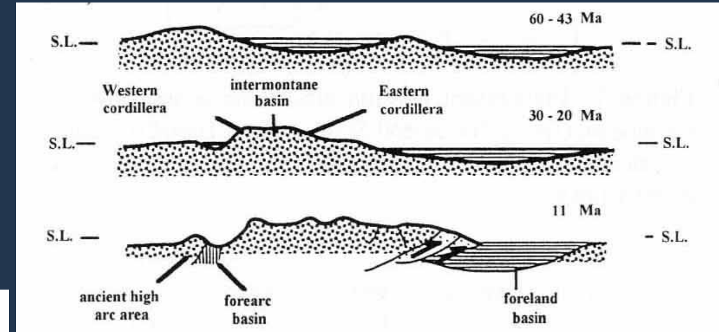
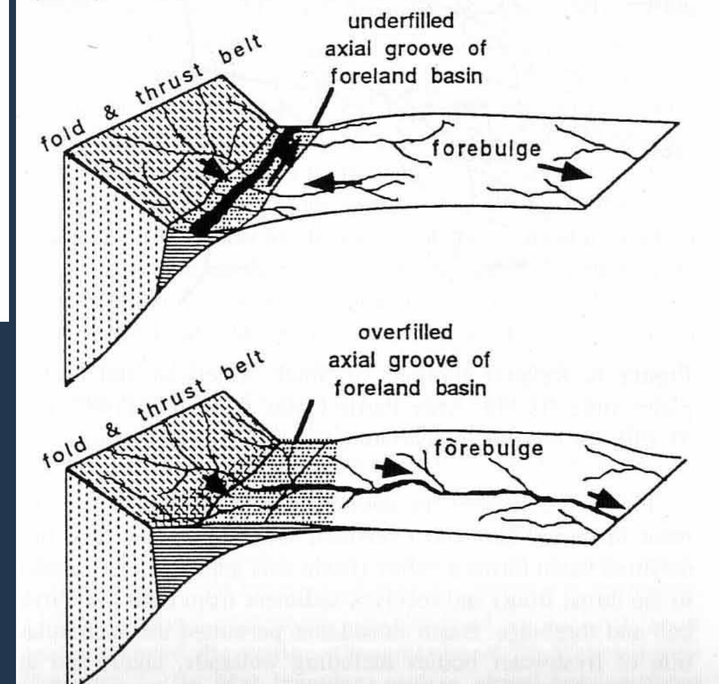
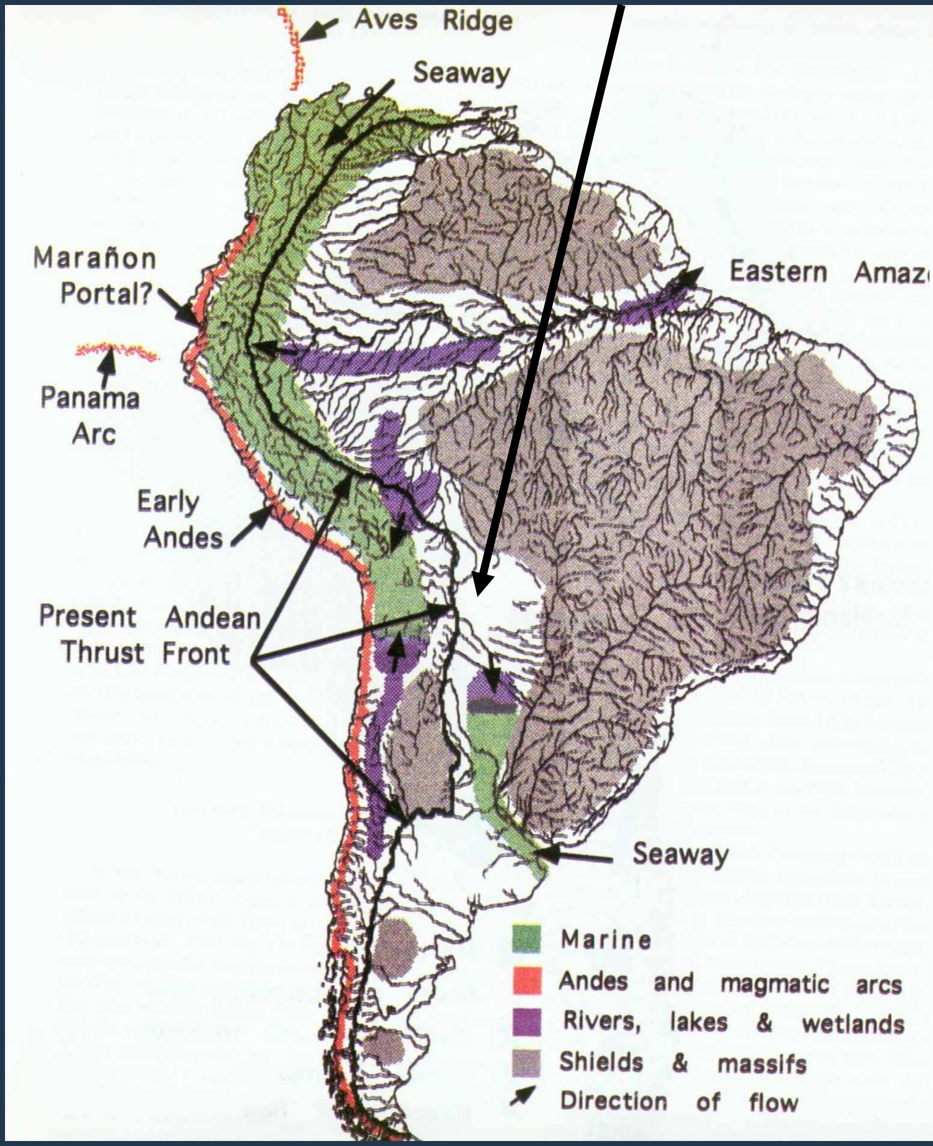


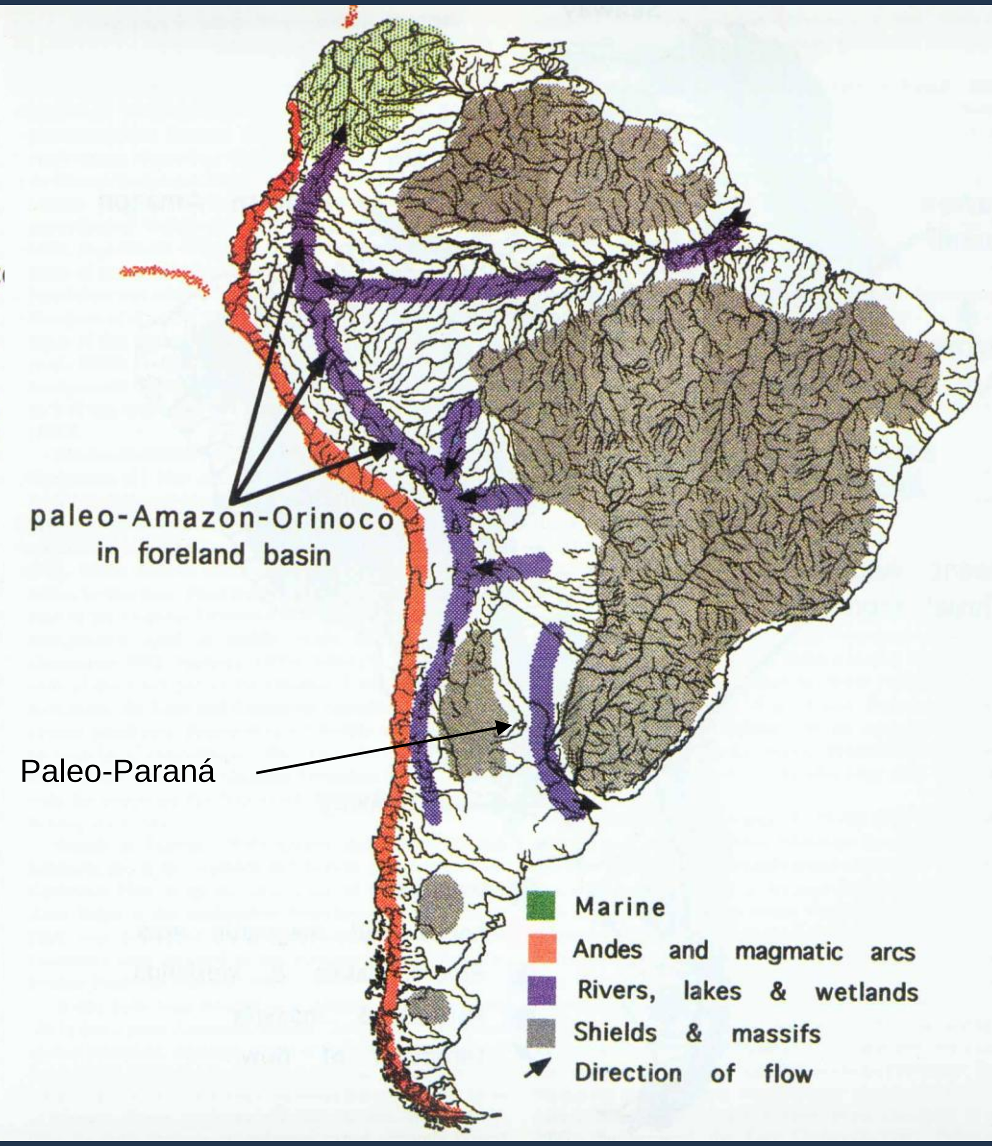
Figure 5. Eastward growth of the orogenic belt, foreland basin and forebulge. Modified after Fig. 7 in Jordan & Alonso (1987). S.L., sea level.



Fósiles de peces marinos o estuarinos (Gayet et al, 2001)

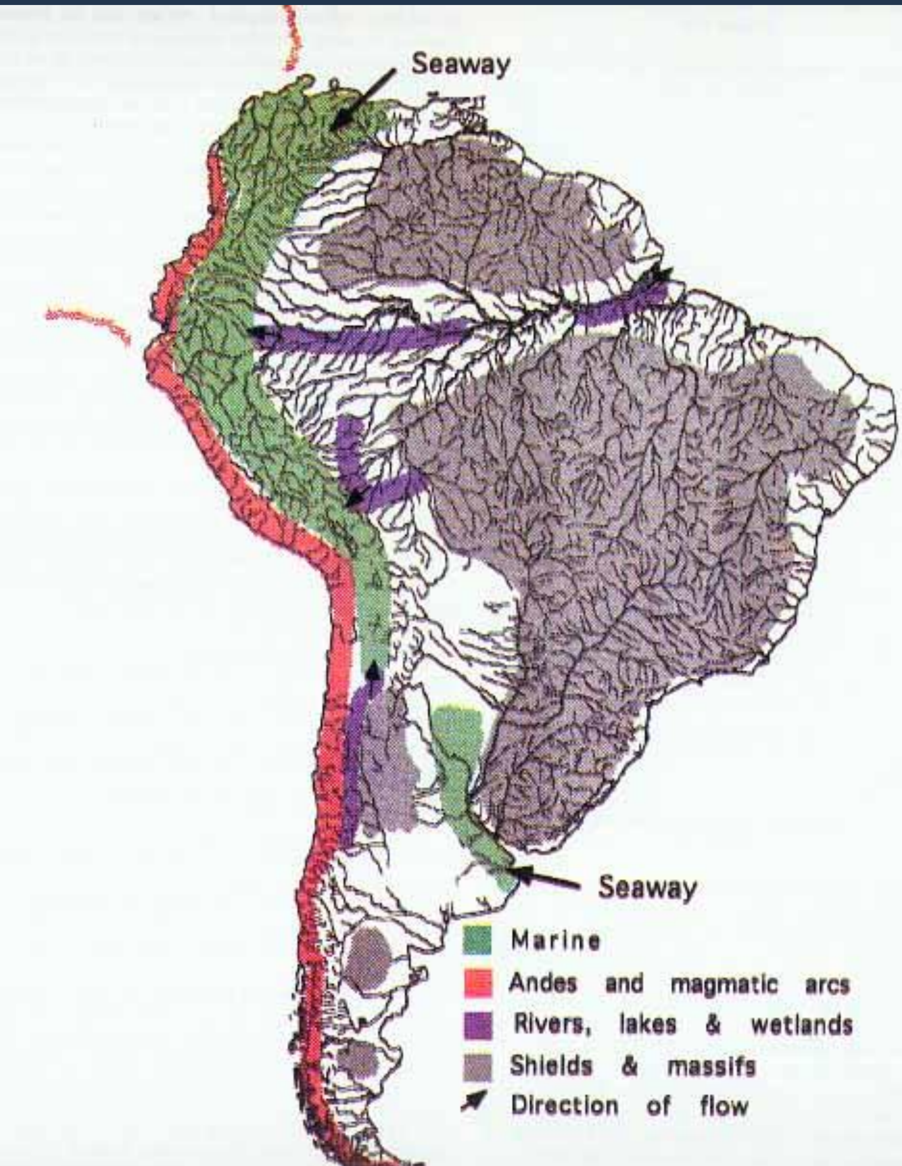


83-73 ma

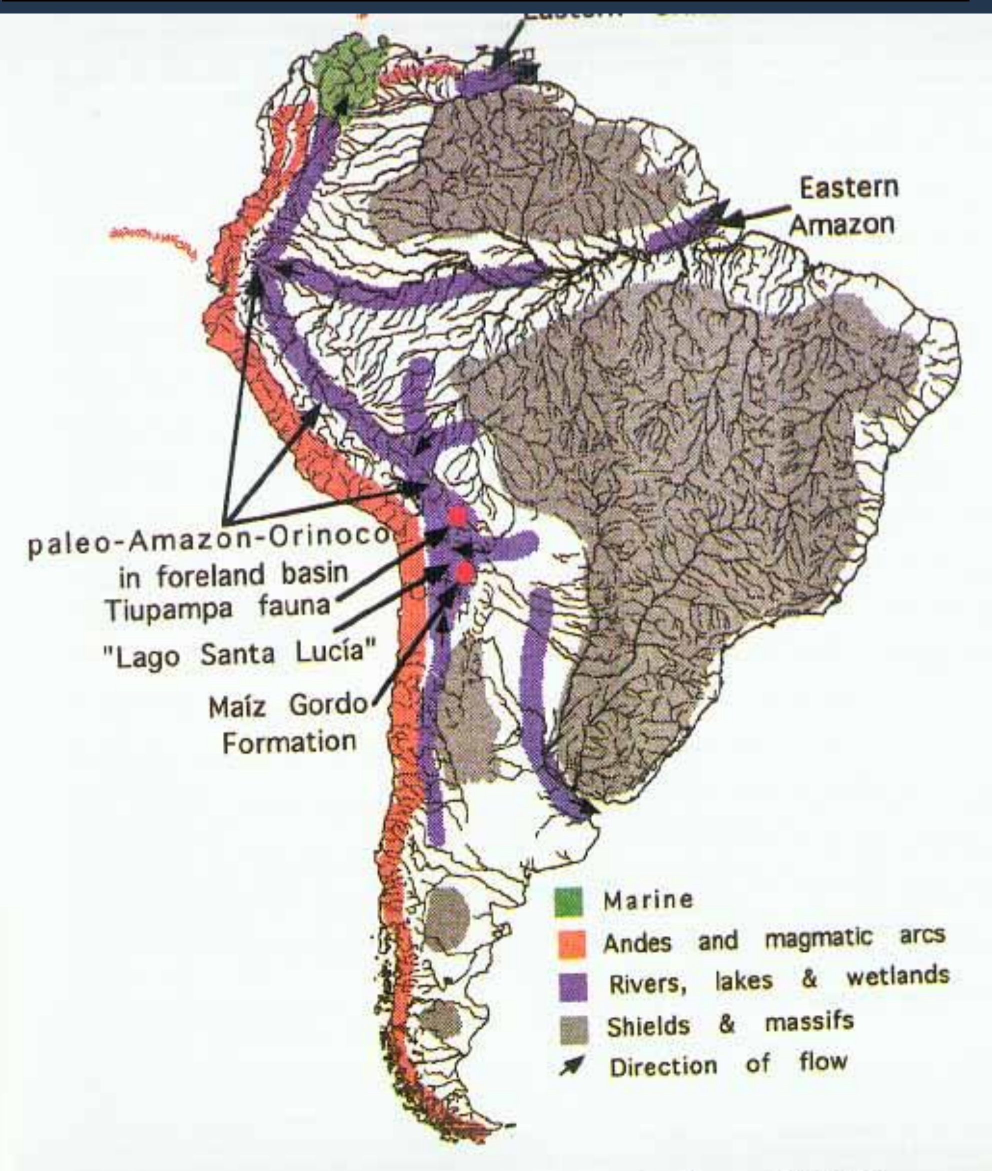


67-61 ma

Fósiles de género actual: *Corydoras*



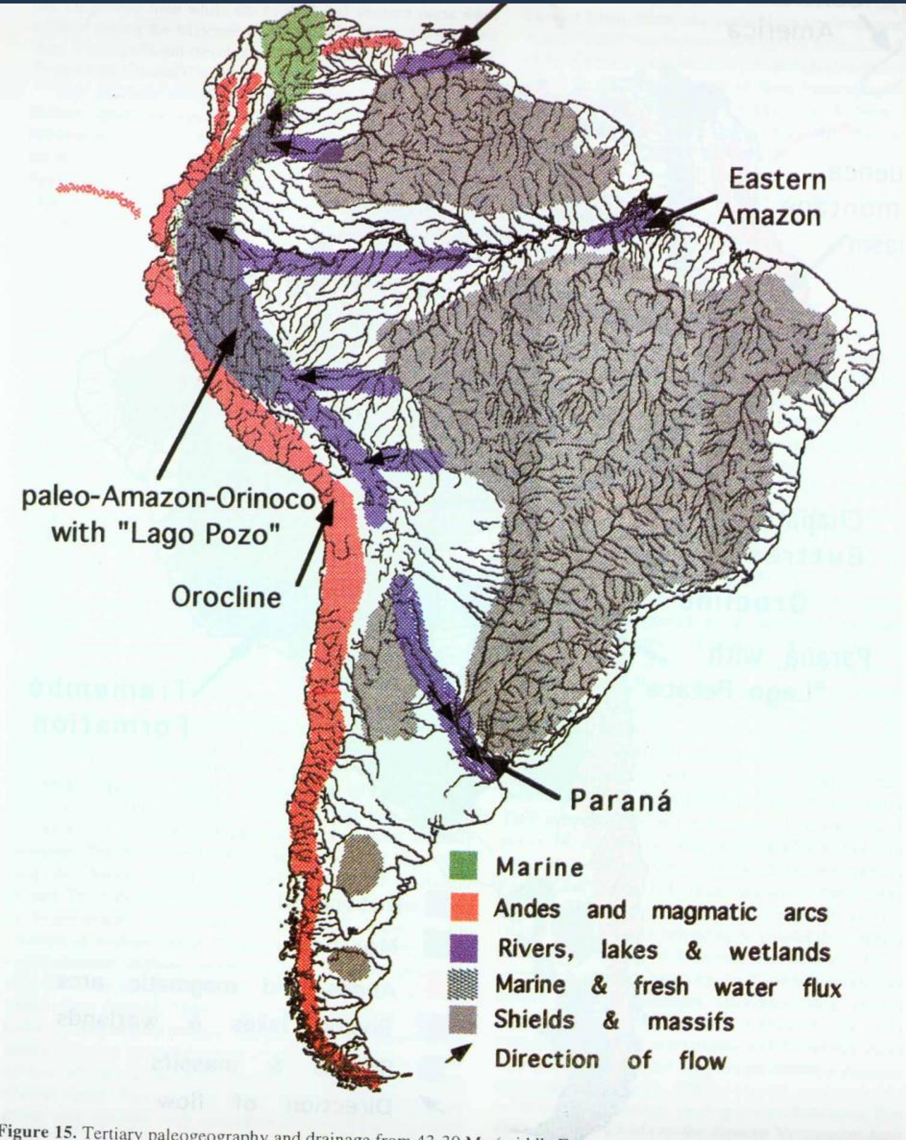
61-60 ma

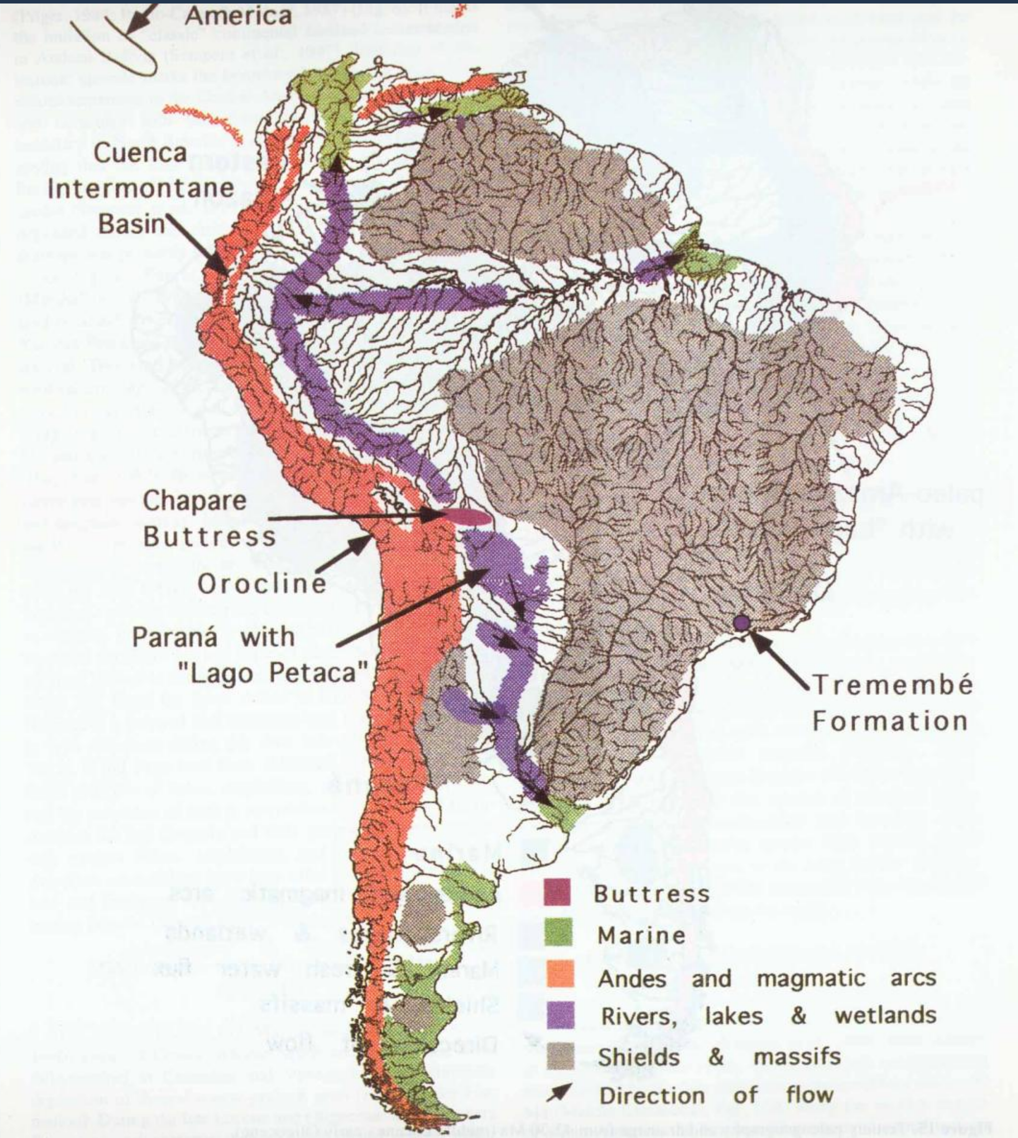


60-43 ma

Paraná captura Amazonas

Locura andina

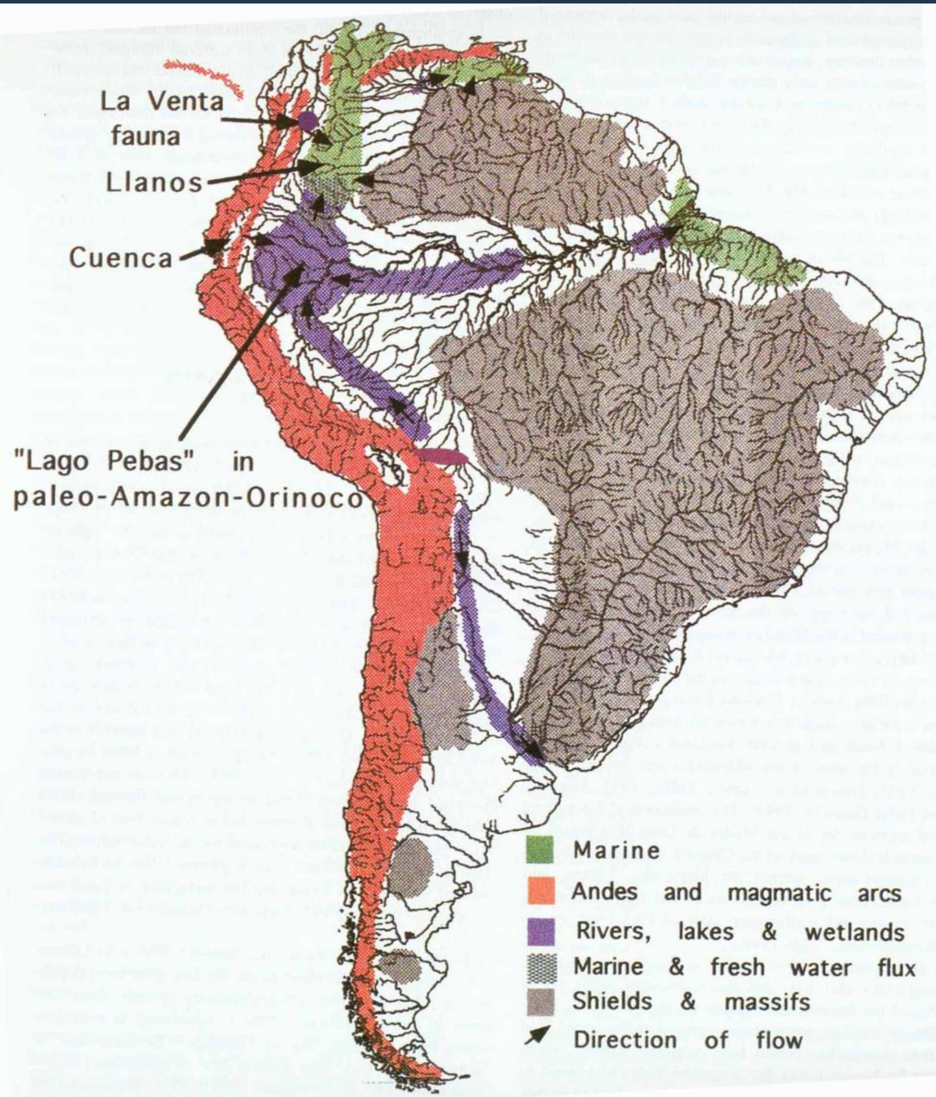


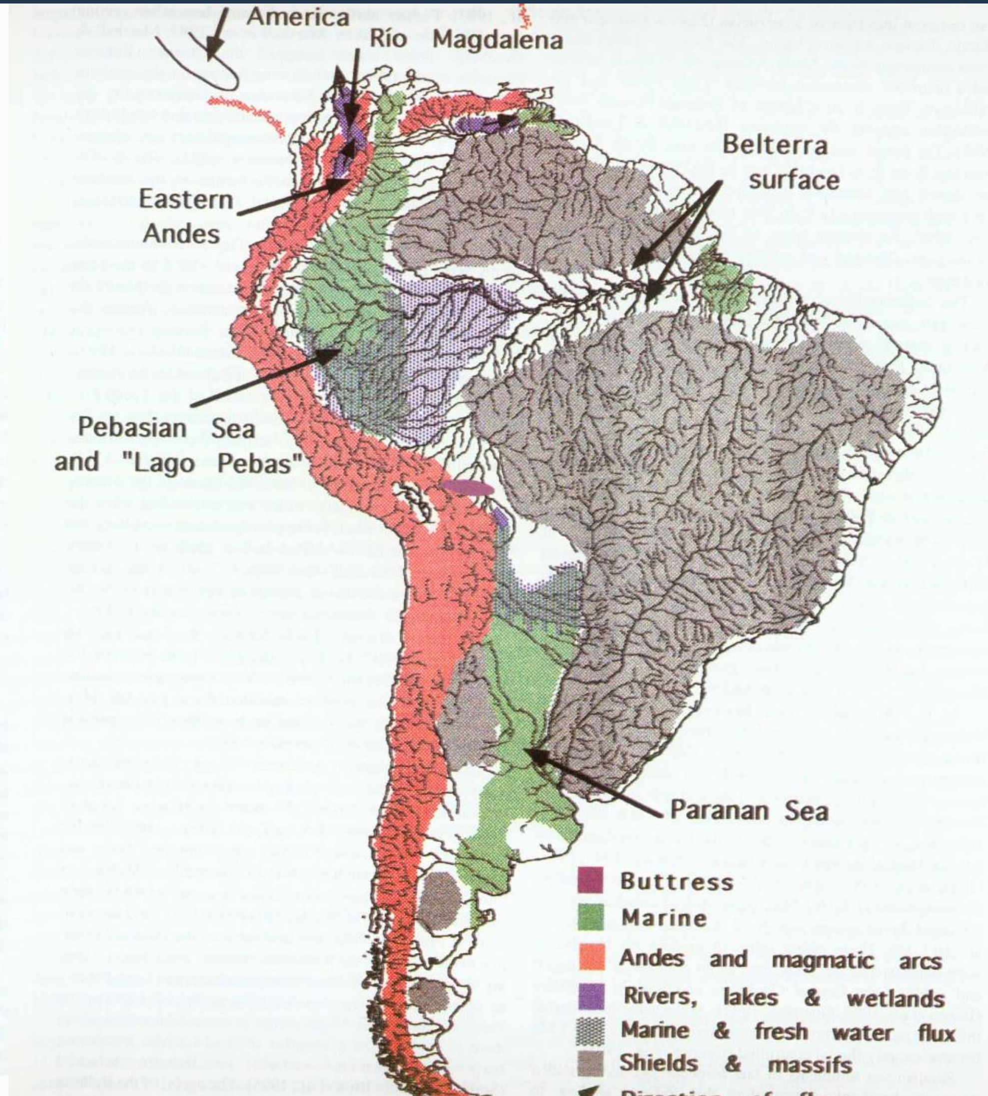


43-30 ma

30-20 ma

Amazonas captura Paraná





20-11.8 ma

11.8-10 ma

El Lago Pebas

FIGURE 3.1 Paleogeography of northwestern South America during the Oligocene (33–24 Ma). Mountains, river courses, and shorelines are approximate, with conjectural details.

FIGURE 3.2 Paleogeography of northwestern South America during the Early and Middle Miocene (24–11 Ma). This model depicts a sea-level high stand at about 15 Ma. Mountains, river courses, and lake shores are approximate. The shape and connectivity of the Pebas system were very dynamic. Possibly every 20–40 Ka, base-level cycles occurred that increased or decreased the continuity of lacustrine and riverine habitats within this system. The blue stars south of the Maracaibo Basin depict possible lowland aquatic corridors

FIGURE 3.3 Paleogeography of northwestern South America during the Late Miocene (7–11 Ma). Mountains, river courses, and lake shores are approximate. Landscape structuring and marine connections during deposition of the upper Solimões Formation in the Acre system are poorly understood. The system captured sediments from the emergent Andes, included tides, and was connected at the same time with the present-day Amazon mouth (Figuereido et al. 2009, 2010). There are no indications for marine influence in Amazonia after 7 Ma.

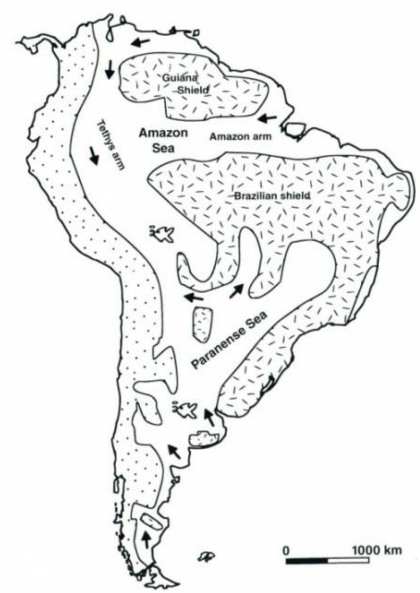
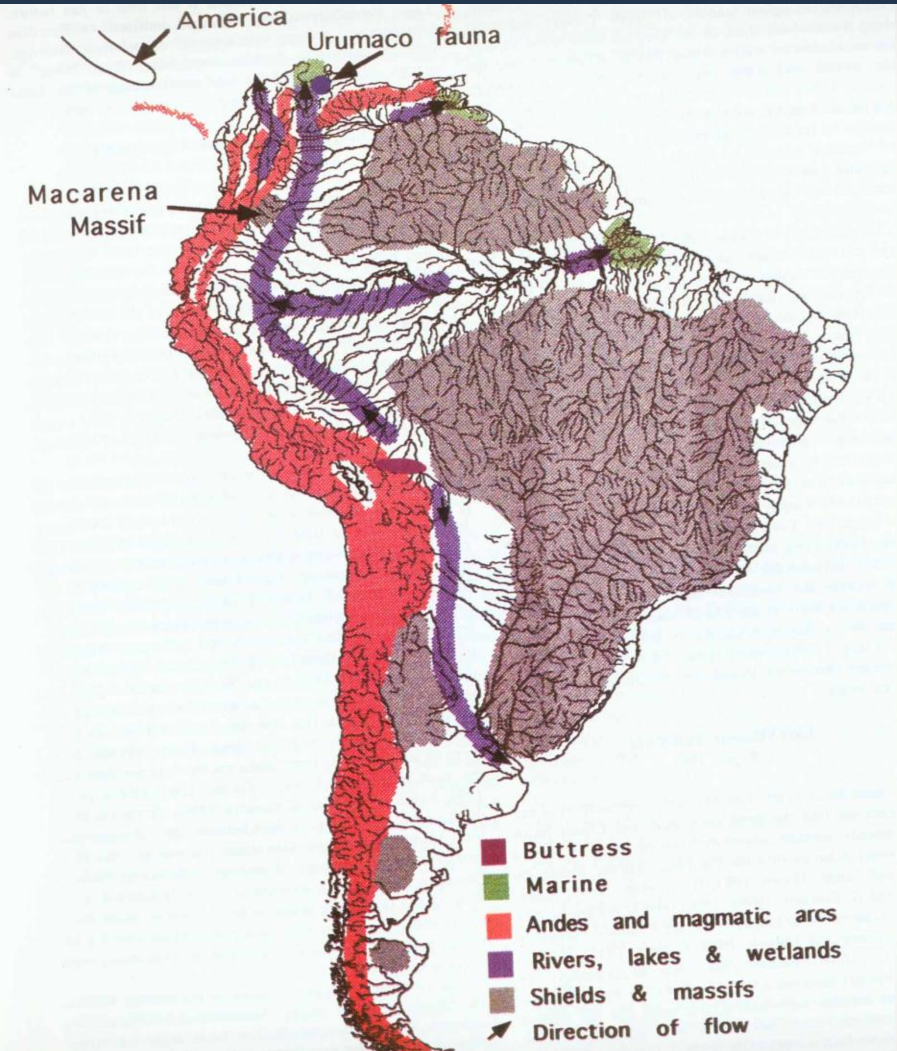
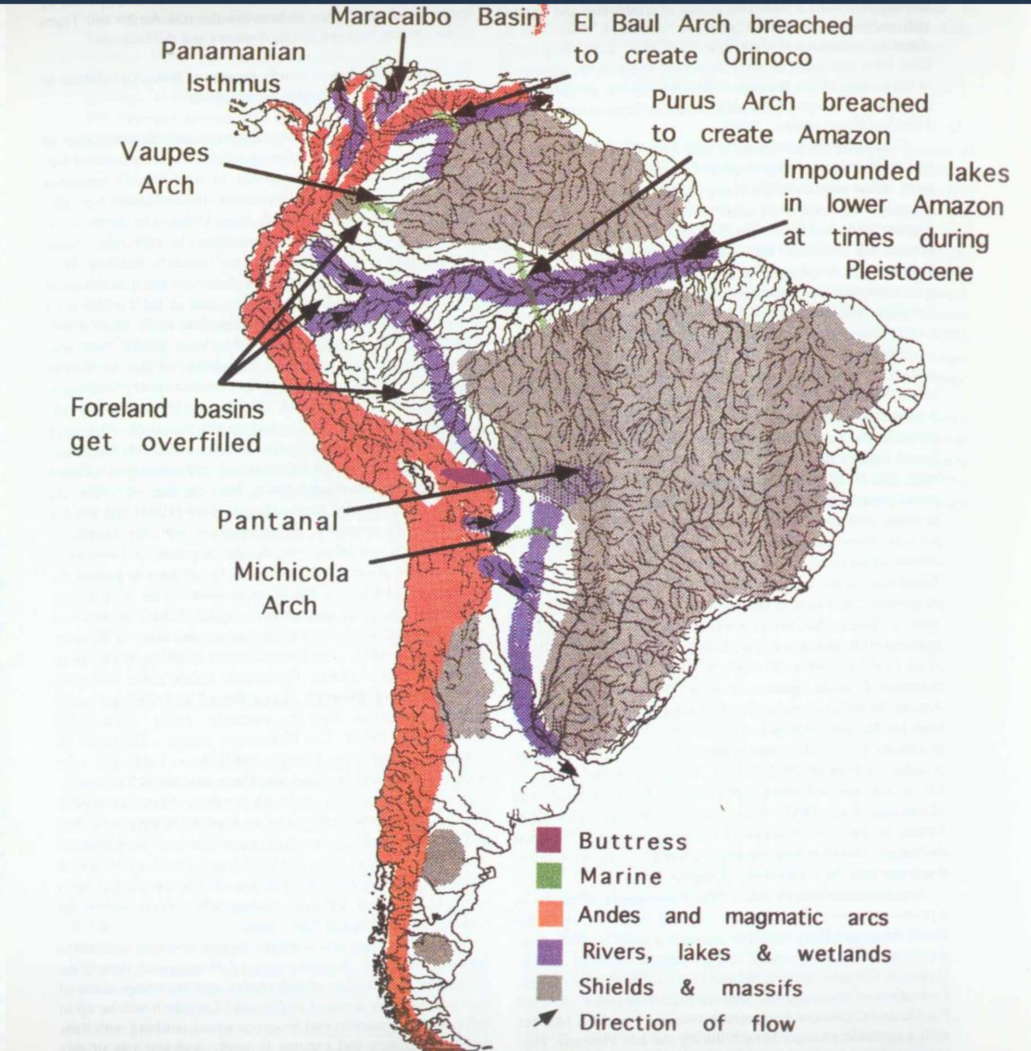


FIGURE 9.4 Possible extension of the Miocene (12 MY) transgression of the Paranense Sea (modified from V. Ramos and Aleman 2000).

Dirección actual del Río Amazonas



10-8 ma



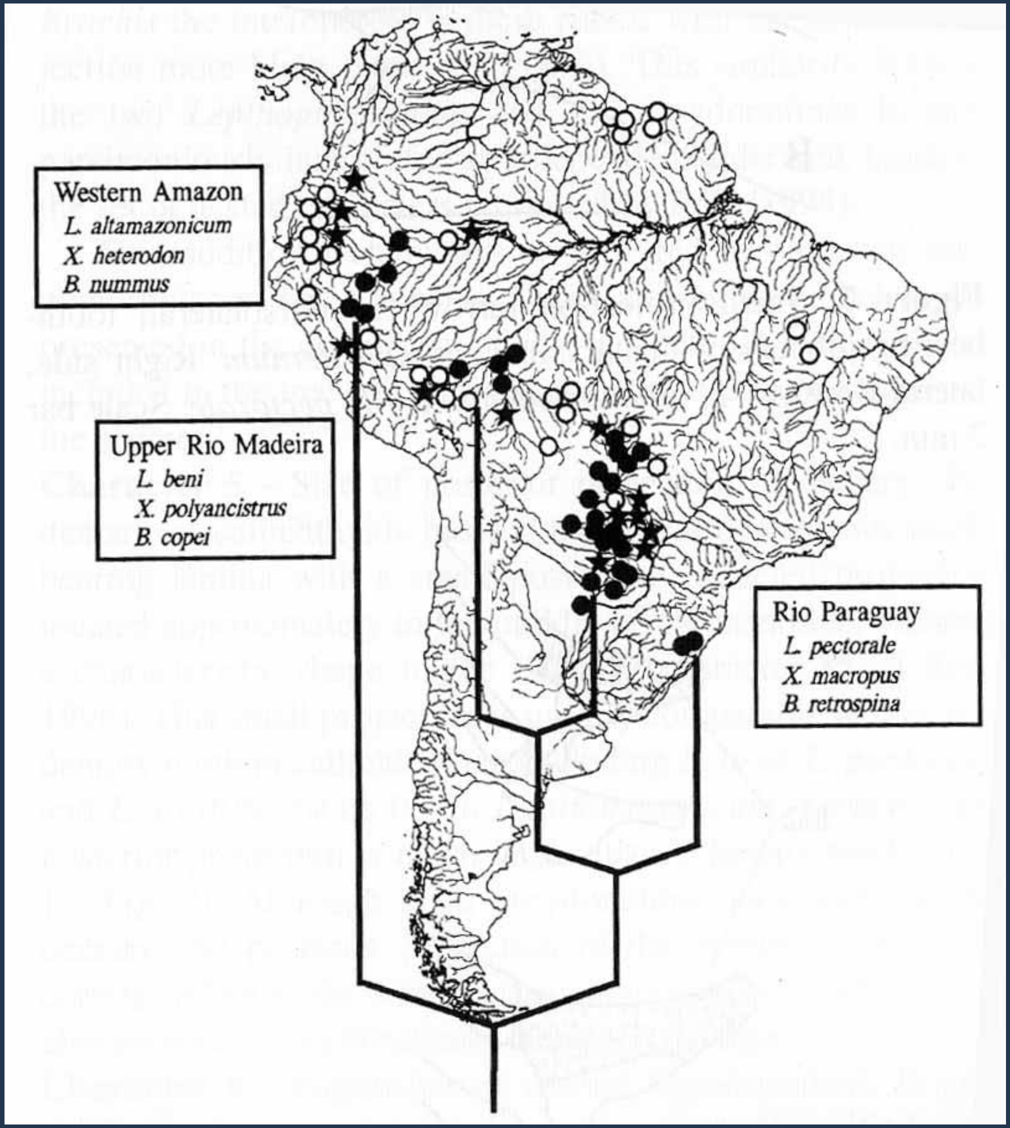
8-0 ma

Evidencia filogenética de los procesos históricos : Cladograma de Areas

Siluriformes: Callichthiydae: *Lepthoplosternum*

Characiformes: Characidae *Xenurobrycon*

Characiformes: Charcidae: *Brycochalcinus*



Evidencia filogenética de los procesos históricos : *Hypostomus*

Molecular Ecology (2003) **12**, 1855–1867 doi: 10.1046/j.1365-294X.2003.01857.x

Historical biogeography of the catfish genus *Hypostomus* (Siluriformes: Loricariidae), with implications on the diversification of Neotropical ichthyofauna

J. I. MONTOYA-BURGOS*†
*Museum of Natural History, 1 rte de Malagnou, CP 6434, 1211 Geneva 6, Switzerland, †Department of Zoology and Animal Biology, University of Geneva, 154 rte. de Malagnou, 1224 Chêne-Bougeries, Switzerland

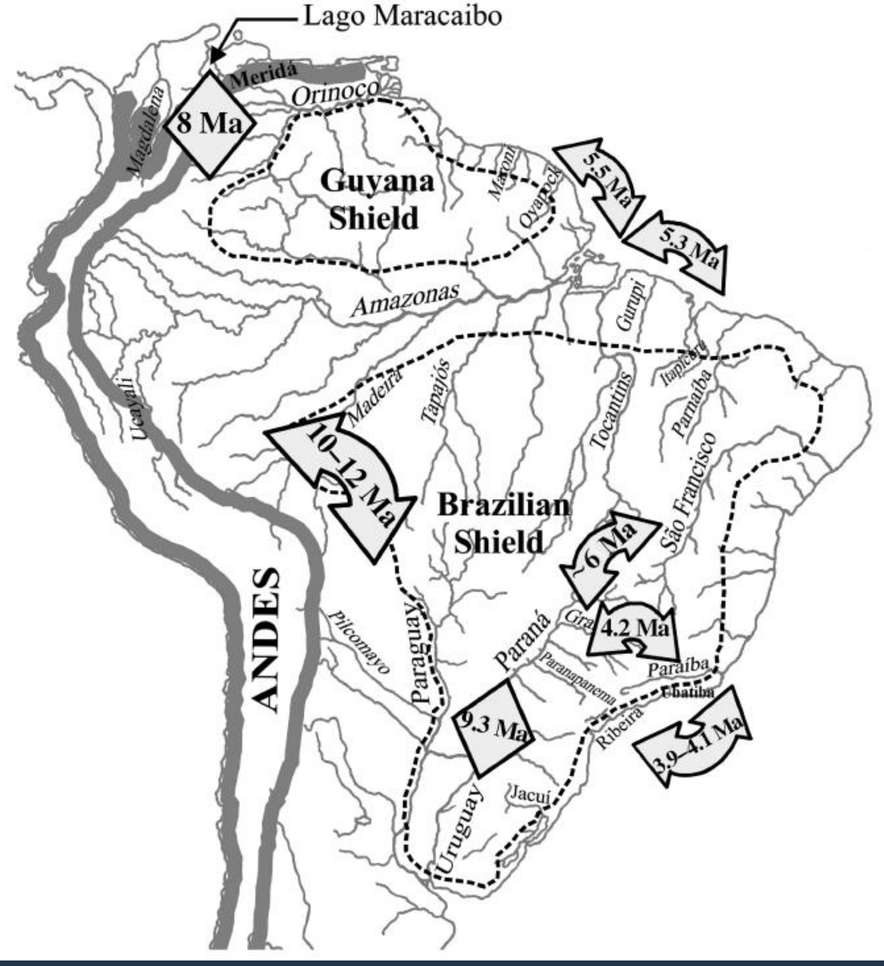


Fig. 5 Reconstructed vicariant and dispersal events in eastern Andean South America during the late Tertiary. Many of these hypothetical events are linked to documented geological changes (see text). Date estimations were inferred using the *Hypostomus* D-loop and, when possible, the ITS molecular clocks. Diamonds indicate probable vicariant events, while double arrows indicate dispersal events followed by allopatric divergence.

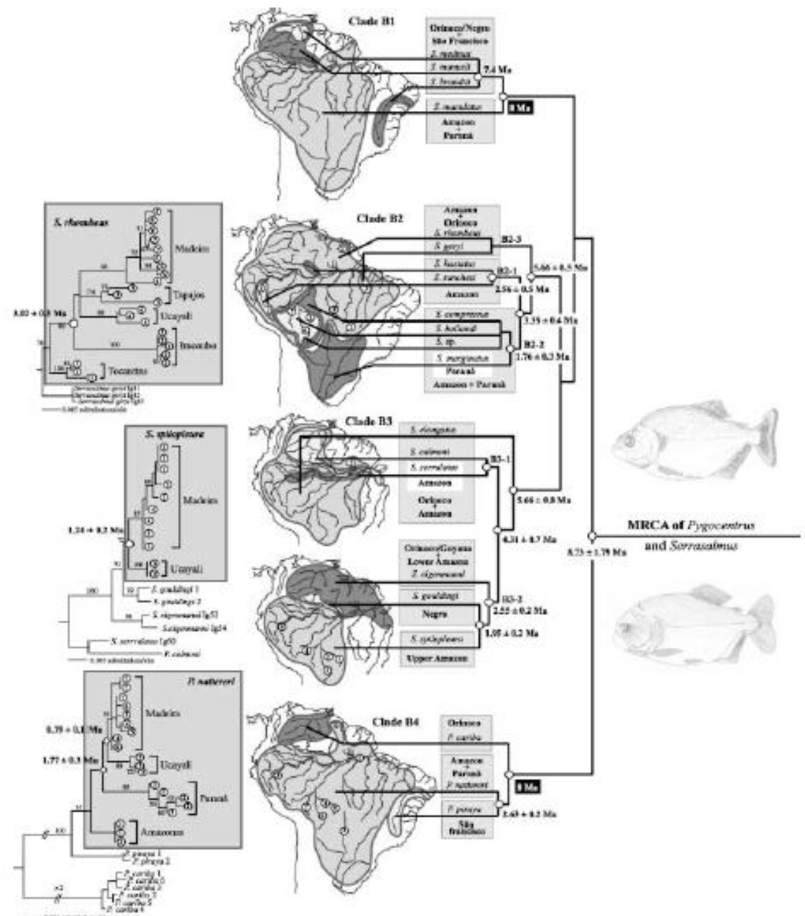
Arcos Estructurales: Filogeografía de las pirañas

Molecular Ecology (2007) 16, 2115–2136 doi: 10.1111/j.1365-294X.2007.03267.x

Phylogeography of the piranha genera *Serrasalmus* and *Pygocentrus*: implications for the diversification of the Neotropical ichthyofauna

NICOLAS HUBERT,*¶ FABRICE DUPONCHELLE,*** JESUS NUÑEZ,*¶ CARMEN GARCIA-DAVILA,§ DIDIER PAUGY†‡ and JEAN-FRANÇOIS RENNO*¶

Fig. 3 Map of the South American hydrologic systems and collection localities of the 91 *Serrasalmus* and *Pygocentrus* specimens. Dashed lines delimit the Precambrian shields and bold lines indicate the palaeoarches (a, Barinas-Apuré; b, Arauca; c, Vaupes; d, Iquitos; e, Marañon; f, Serra do Moa; g, Contaya; h, Jutaí; i, Fitzcaraldo; j, Michicola; k, Caravari; l, Purus; m, Monte Alegre; n, Gurupa). One point may represent more than one locality.



Cambios en los niveles del Mar: Invasores Marinos

Familia Potamotrygonidae

Tres géneros: *Paratrygon*, *Plesiotrygon*, *Potamotrygon*; apróx. 20 especies.
Distribución: Cuencas Atlánticas y Caribe, aunque ausentes de la cuenca
San Francisco, ríos costeros Atlánticos, Cuenca alta del Paraná y ríos al Sur de la cuenca del Plata.

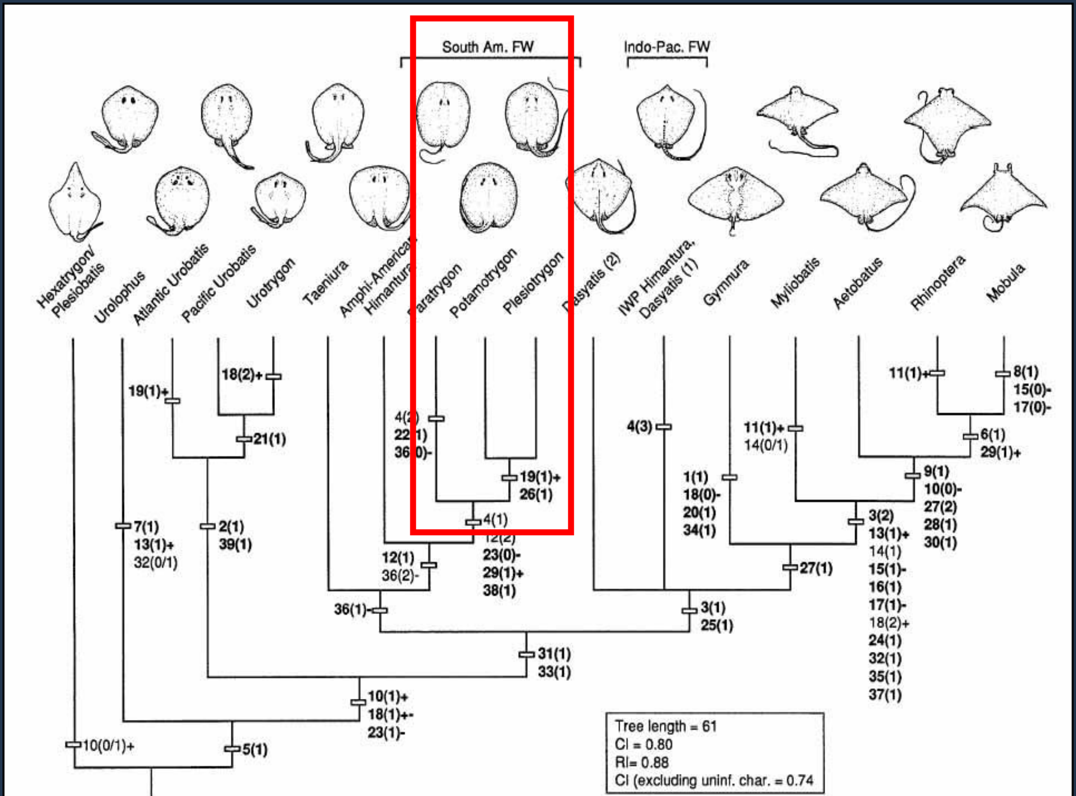
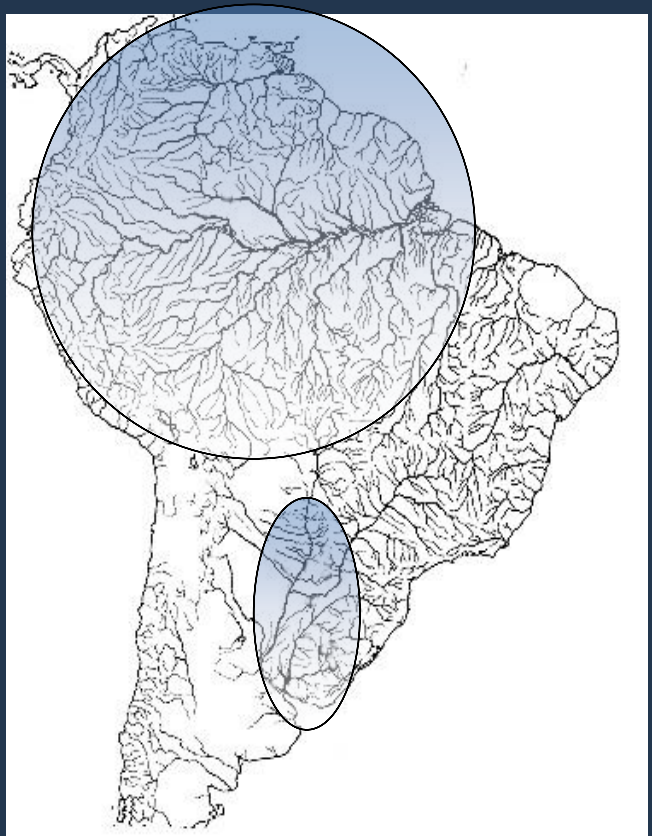
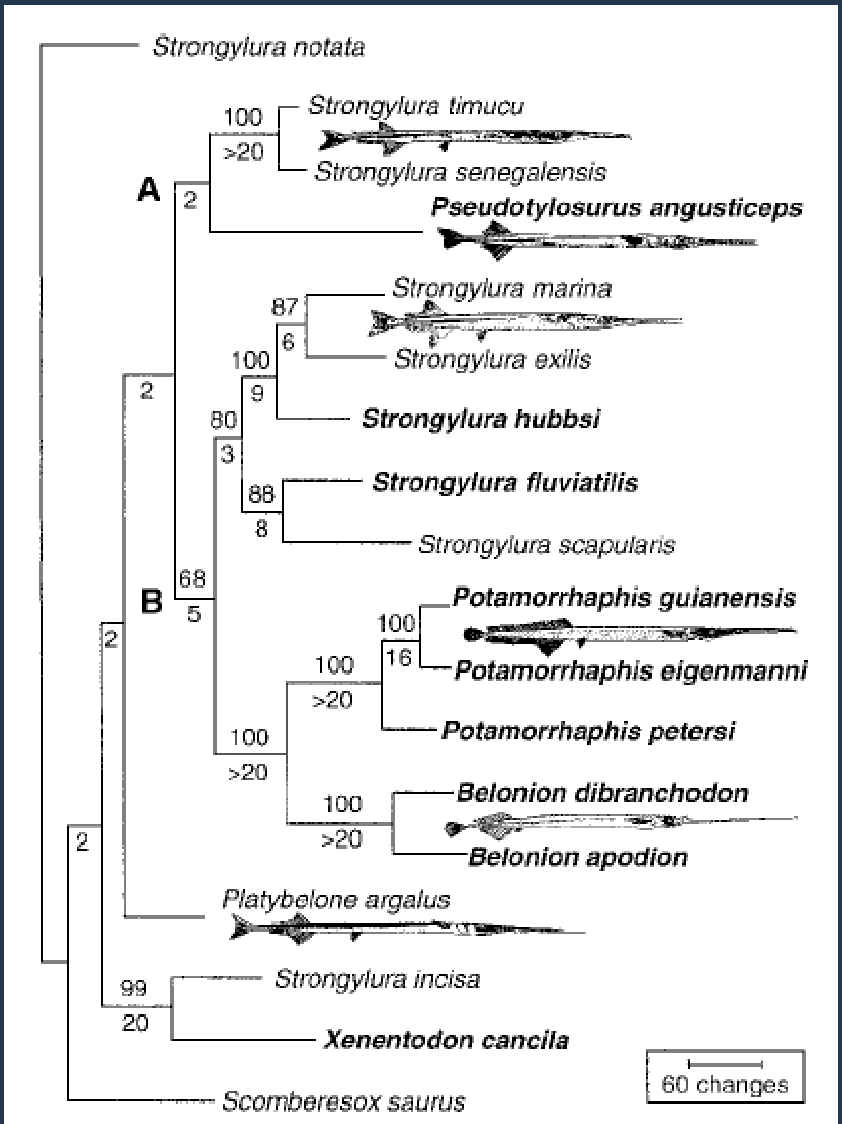


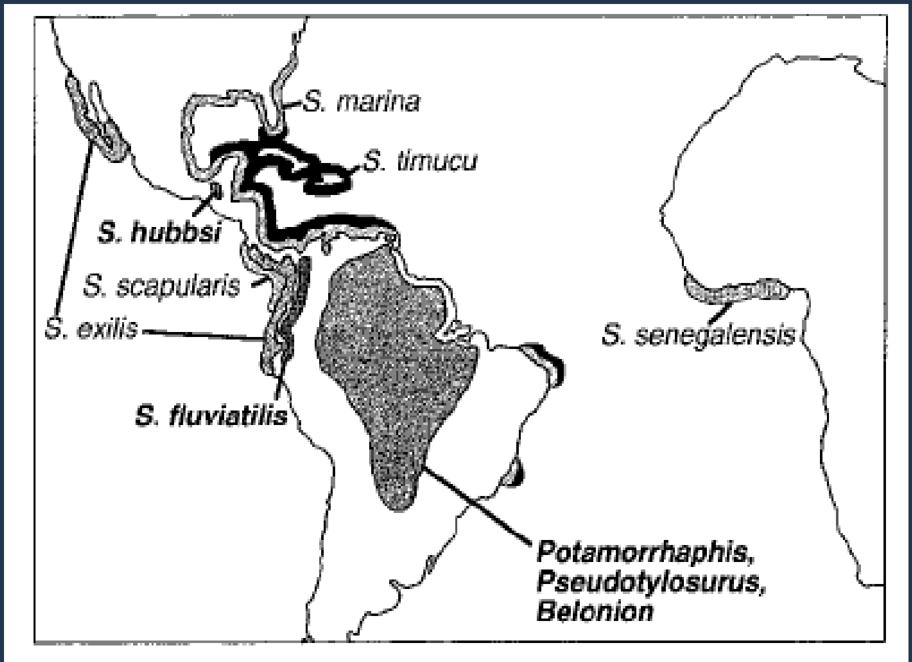
Figure 15. Single most parsimonious tree produced by phylogenetic analysis of stingray taxa. Homoplasy indicated by '+' (independent gain) or '–' (reversal). Some ray silhouettes after Castello & Yagolkowski (1969); Compagno (1977); Heemstra & Smith (1980); McEachran & Capapé (1984).



Cambios en los niveles del Mar: Invasores Marinos

Teleostei: Belonidae





Transgresiones Marinas: Dispersión y especiación reciente de especie marina

Copeia, 2000(2), pp. 441–447

Population Genetics of the Silverside *Odontesthes argentinensis* (Teleostei, Atherinopsidae): Evidence for Speciation in an Estuary of Southern Brazil

LUCIANO B. BEHEREGARAY AND JOSÉ A. LEVY

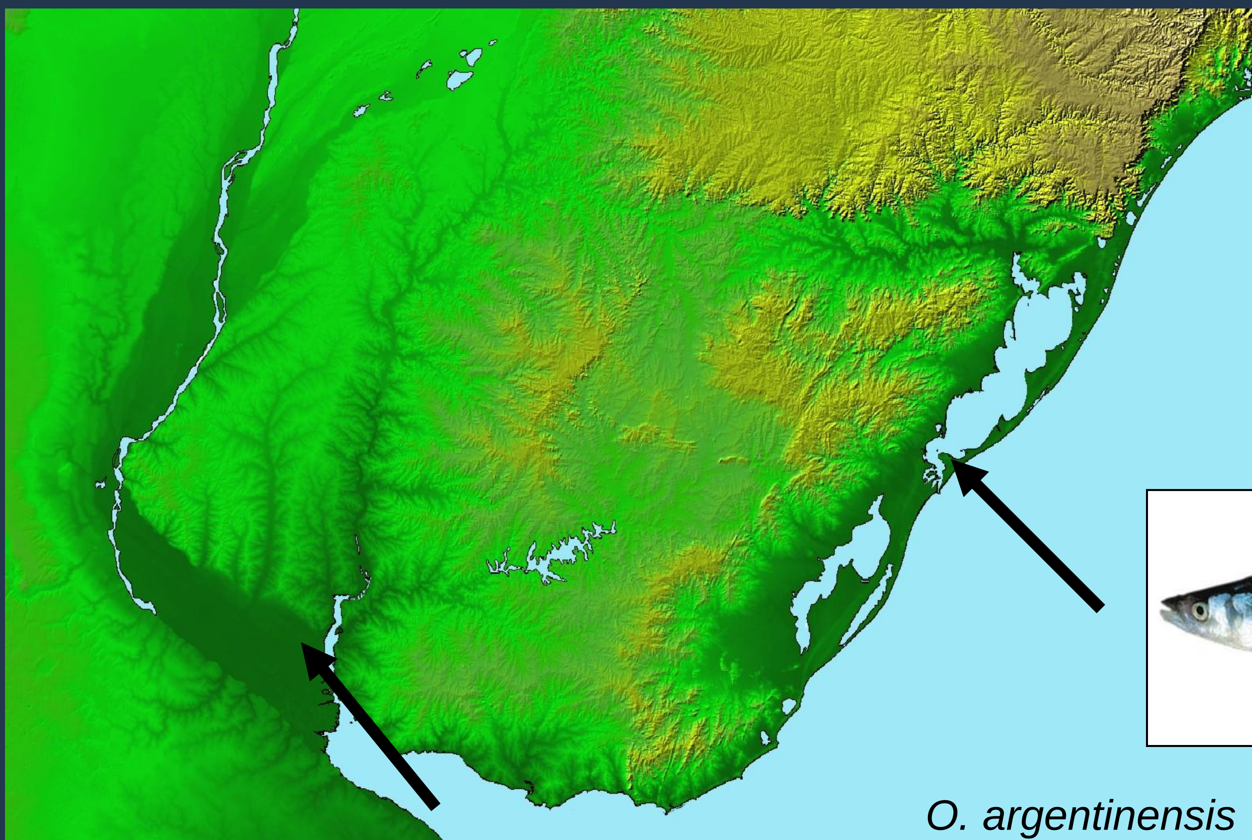
THE ROYAL SOCIETY

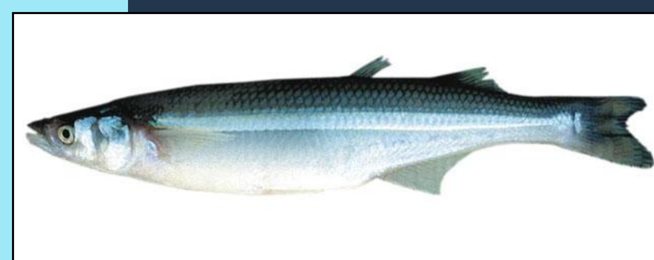
Received 14 May 20[…]
Accepted 10 August 20[…]
Published online 10 December 20[…]

A rapid fish radiation associated with the last sea-level changes in southern Brazil: the silverside *Odontesthes perugiae* complex

Luciano B. Beheregaray[1*], Paul Sunnucks[2] and David A. Briscoe[1]

[1]*Department of Biological Sciences, Macquarie University, Sydney, NSW 2109, Australia*
[2]*Department of Genetics, La Trobe University, Melbourne, VIC 3086, Australia*





Sistemas costeros del E de Sudamérica: margen continental pasivo

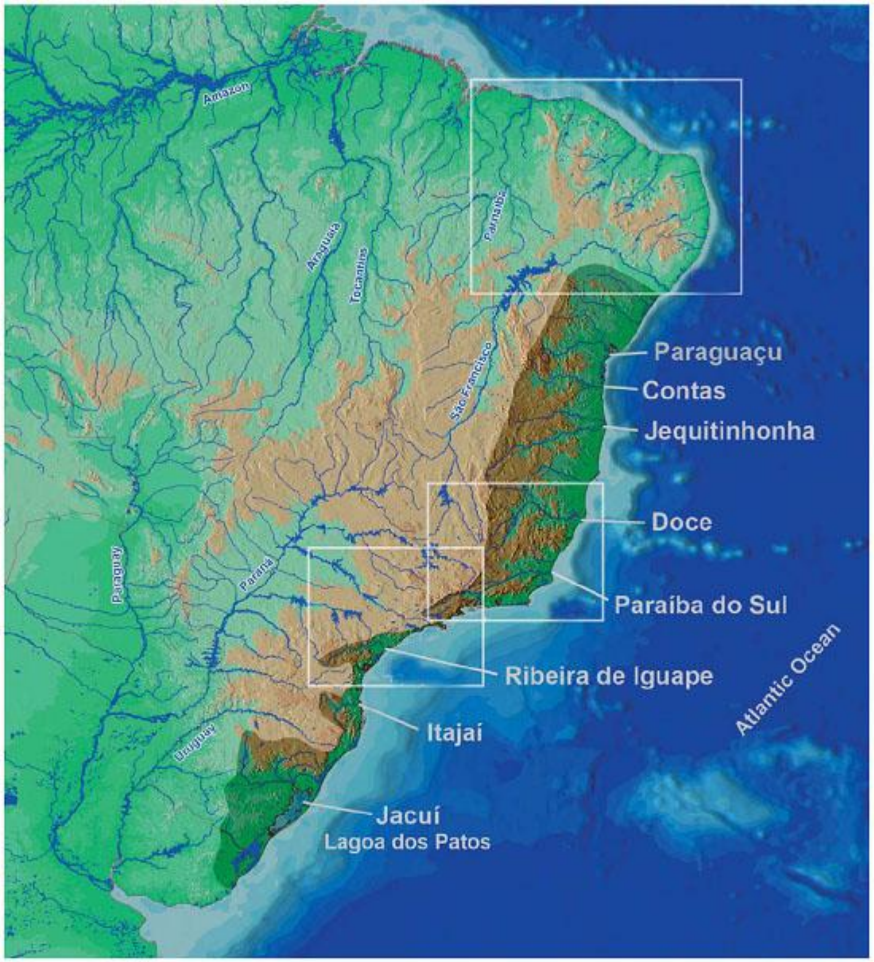


Fig. 4. Geographic location of the Brazilian Atlantic continental margin and of the coastal drainages of eastern Brazil (shaded area) and areas showed in figures 6, 7 and 8 (modified from Hearn *et al*., 2000).

Área con componente biogeográfico antiguo (taxa basales a clados altamente diversificados en restantes las cuencas).

•Eventos cladogenéticos tempranos, asociados al estado inicial de la evolución geomorfológica del este de Sudamerica (procesos tectónicos y erosivos). Procesos activos en la actualidad (litósfera débil en la región).

Ictiofauna con alto grado de endemismos, de un total de 285 especies de peces listadas por Bizerril (1994) para los cursos del sudeste de Brasil: 95% endémicos con 23.4% de géneros endémicos.

- Ruptura con Africa: Megadomos que determinan el patrón de flujo de los cursos de agua.

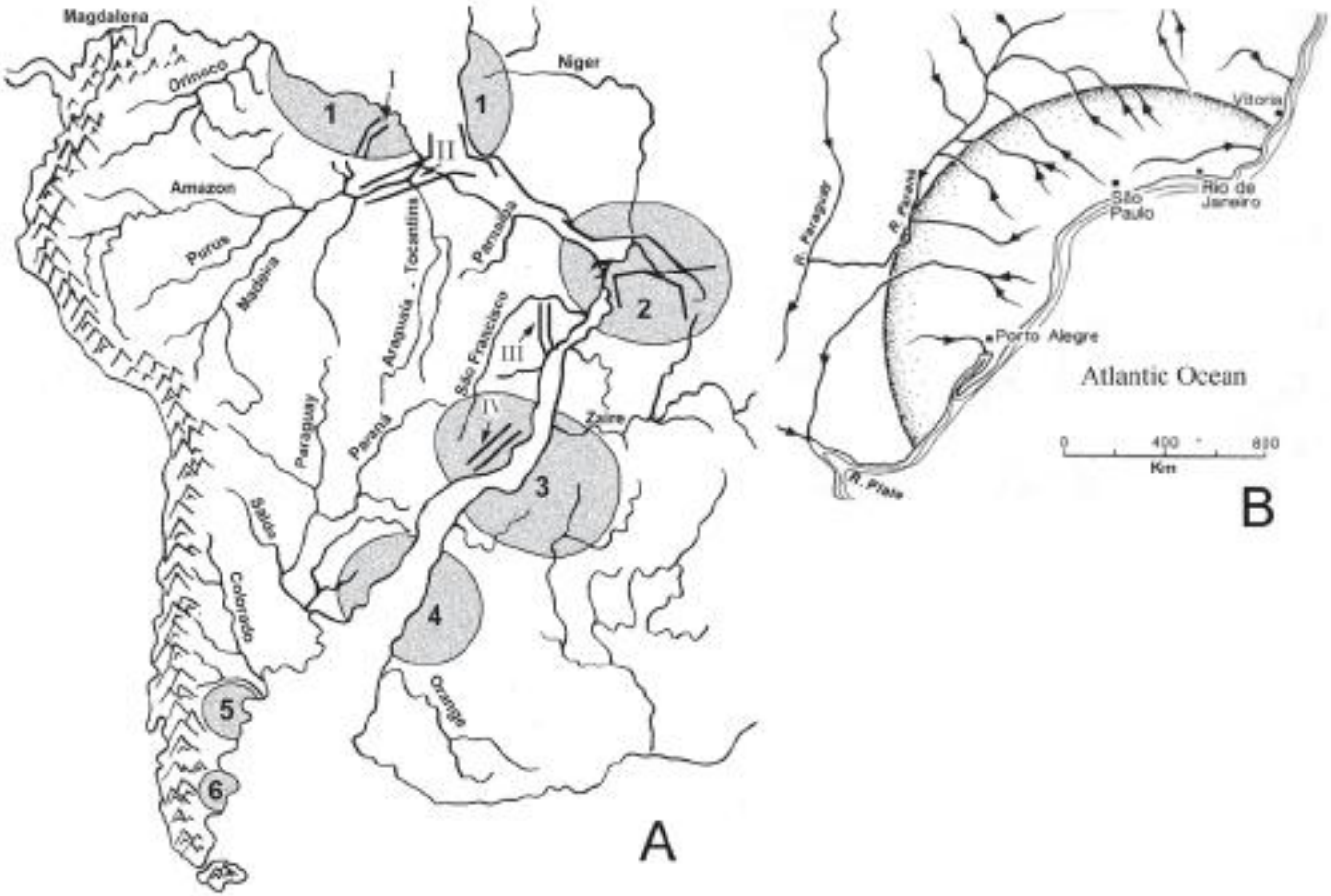
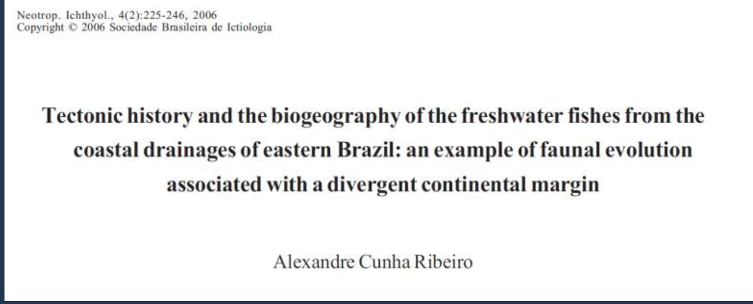


Fig. 3. Rivers and uplifts of Atlantic South America. A) break-up uplifts (megadomes) and associated principal rifts. Megadomes: Guyana/Guinea (1), NE Brazil/Niger (2), Mantiqueira/Angola (3), Uruguay/SW Africa (4), Somuncurá (5) and Deseado (6). Break-up rifts: Tacutu (I), Foz do Amazonas (II), Reconcavo Tucano-Jatobá (III) and Taubaté (IV). B) detail of the uplift from the Southeastern Brazil (from Cox, 1989 and Potter, 1997).


Neotrop. Ichthyol., 4(2):225-246, 2006
Copyright © 2006 Sociedade Brasileira de Ictiologia

Tectonic history and the biogeography of the freshwater fishes from the coastal drainages of eastern Brazil: an example of faunal evolution associated with a divergent continental margin

Alexandre Cunha Ribeiro

- La acción erosiva continua desde el E provocó la captura de varios ríos del escudo cristalino, haciéndolos parte de las cuencas oceánicas (incluso algunos tan recientes como el cuaternario)

- También movimiento entre fallas dió lugar a cuencas resultantes de capturas de nacientes circundantes, originando una hidrografía compleja, a veces representadas por sistemas lacustres interconectados (Cretácico-Terciario): captura de las nacientes entre sistemas hidrográficos adyacentes.

- Procesos iniciados en el Cretácico y que se continuaron hasta la actualidad. Actividad de faulting en el Holoceno de la mayoría de las provincias geológicas de Brasil.

Siluriformes; Trichomycteridae.

Trichogeninae (*Trichogenes*) SE Brasil

Copionodontinae (*Glaphyropoma*, and *Copionodon*) NE Brasil

Grupos hermanos, basales al resto de la familia.

Taxas reminiscentes de historia biogeográfica antigua (Cretácico)

Siluriformes; Callichthyidae; Aspidoradini.

Scleromystax: cuatro especies endémicas de SE y S de Brazil, grupo hermano del más diverso *Aspidoras* ampliamente distribuído tanto en ríos del escudo como en varios sistemas costeros (Reis, 2003).
Antigüedad relativa de Callichthyidae corroborada por registo fósil.

Characiformes: Characidae: Glandulocaudinae.

Mimagoniates: seis especies ampliamente distribuídas en los sistemas costeros cuyo grupo hermano, *Glandulocauda* (dos species con carácteres ancestrales), es endémico del escudo cristalino (rios Tietê e Iguaçu).

Copeia, 2001(3), pp. 726–736

New Species of *Jenynsia* (Teleostei: Cyprinodontiformes) from Southern Brazil and Its Phylogenetic Relationships

Michael J. Ghedotti, Amy Downing Meisner, and Paulo H. F. Lucinda

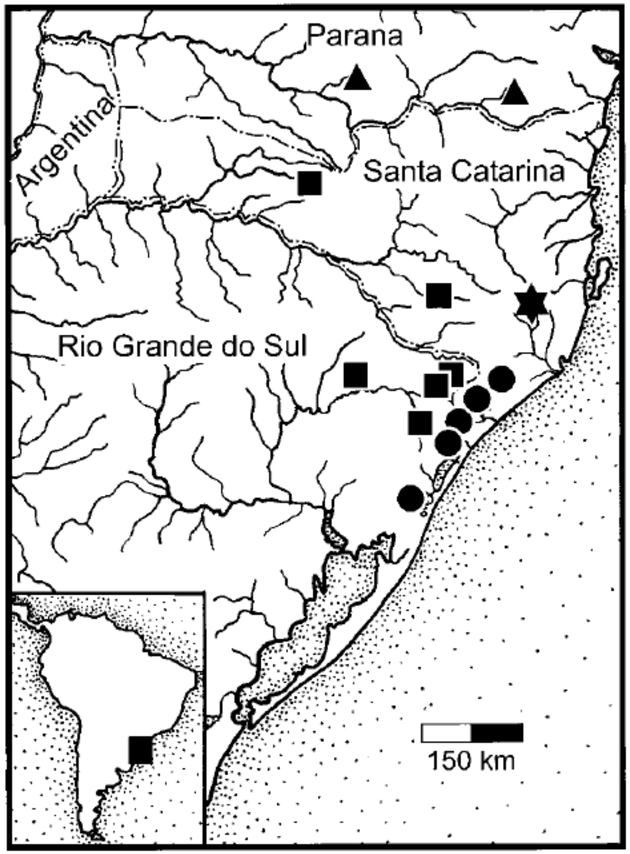


Fig. 4. Distributions of species in the subgenus *Plesiojenynsia*. The type locality of *Jenynsia weitzmani* is indicated by a star. Known distribution of *Jenynsia eigenmanni* shown as triangles. Known distribution of *Jenynsia eirmostigma* shown as squares. Known distribution of *Jenynsia unitaenia* shown as circles.

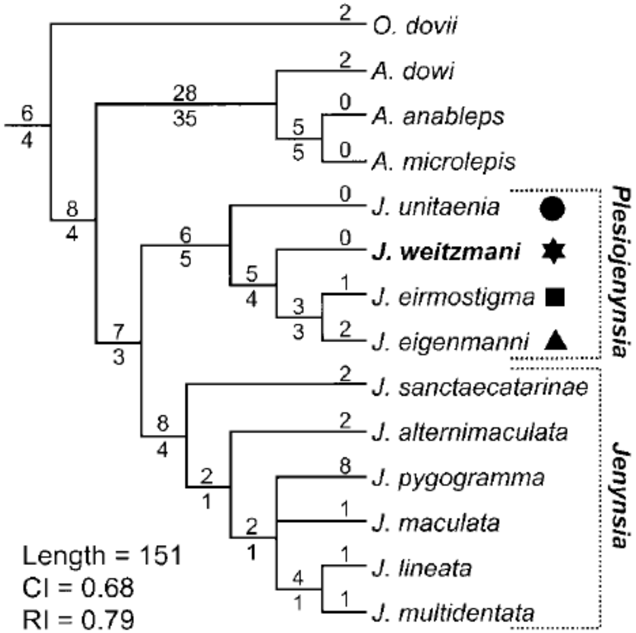


Fig. 3. Strict consensus of three equally most-parsimonious phylogenetic trees. Outgroups not included. Tree statistics based on fundamental trees from the analysis using the outgroup topology proposed by Parenti (1981). Statistics from all analyses presented in text. Branch lengths based on ACCTRAN optimization above branches, Bremer (1988) decay indices below branches. Symbols associated with *Plesiojenynsia* species correspond to those in Figure 4.

Neotropical Ichthyology, 16(3): e180007, 2018
DOI: 10.1590/1982-0224-20180007

Journal homepage: www.scielo.br/ni
Published online: 18 October 2018 (ISSN 1982-0224)
Printed: 30 September 2018 (ISSN 1679-6225)

Original article

Review of the family Rivulidae (Cyprinodontiformes, Aplocheiloidei) and a molecular and morphological phylogeny of the annual fish genus *Austrolebias* Costa 1998

Marcelo Loureiro[1], Rafael de Sá[2], Sebastián W. Serra[3], Felipe Alonso[4,7],
Luis Esteban Krause Lanés[5,6], Matheus Vieira Volcan[6], Pablo Calviño[7], Dalton Nielsen[8],
Alejandro Duarte[9] and Graciela Garcia[10]

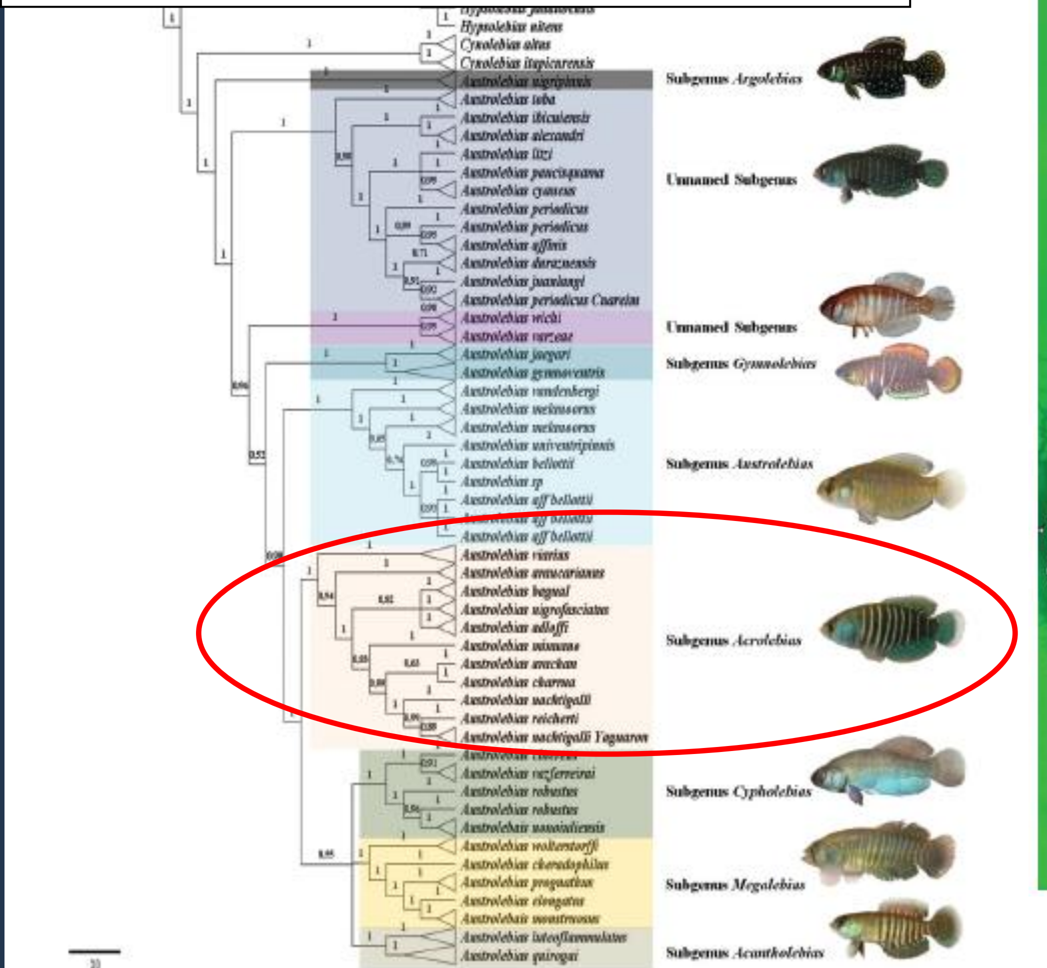
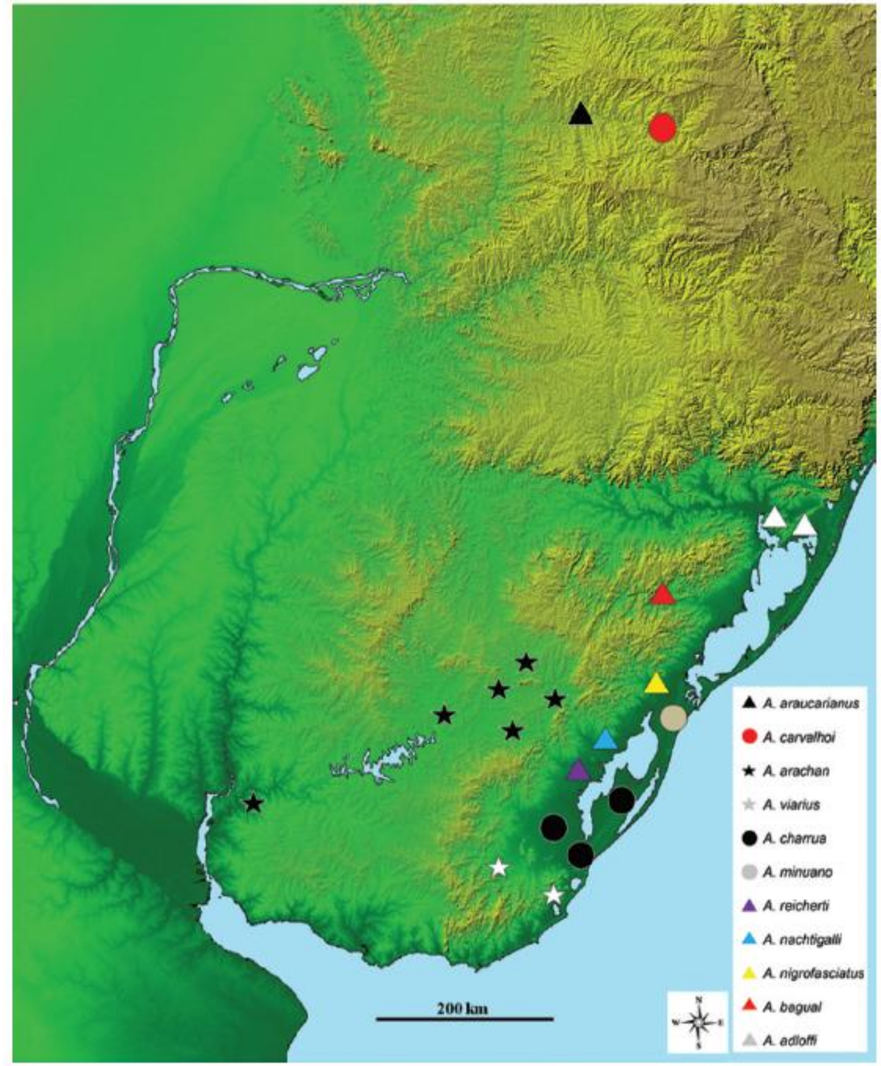


Fig. 12. Bayesian phylogenetic tree of *Austrolebias*, based on molecular (ribosomal unit 16s, Cytochrome b, RAG1, Glyt) and morphological characters. Values above branches are posterior probabilities.



Además: 8% de especies en común entre Patos Merín y cuenca del Río Uruguay

Zootaxa 4138 (3): 401–440
http://www.mapress.com/j/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://doi.org/10.11646/zootaxa.4138.3.1
http://zoobank.org/urn:lsid:zoobank.org:pub:14F318A9-0DCB-4DA9-BB99-65BD71E946D1

Inventory of the freshwater fishes from a densely collected area in South America —a case study of the current knowledge of Neotropical fish diversity

VINICIUS A. BERTACO[1], JULIANO FERRER[2], FERNANDO R. CARVALHO[3] & LUIZ R. MALABARBA[2]

[1]*Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul. Av. Dr. Salvador França, 1427, 90690-000 Porto Alegre, RS, Brazil. E-mail: vbertaco@gmail.com*

[2]*Departamento de Zoologia and Programa de Pós-Graduação em Biologia Animal, Universidade Federal do Rio Grande do Sul. Av. Bento Gonçalves 9500, 90470-430 Porto Alegre, RS, Brazil. E-mail: julianoferrer@bol.com.br [JF]; malabarb@ufrgs.br [LRM]*

[3]*Universidade Federal de Mato Grosso do Sul. Cidade Universitária, 79070-900 Campo Grande, MS, Brazil. E-mail: carvalhofr@gmail.com*

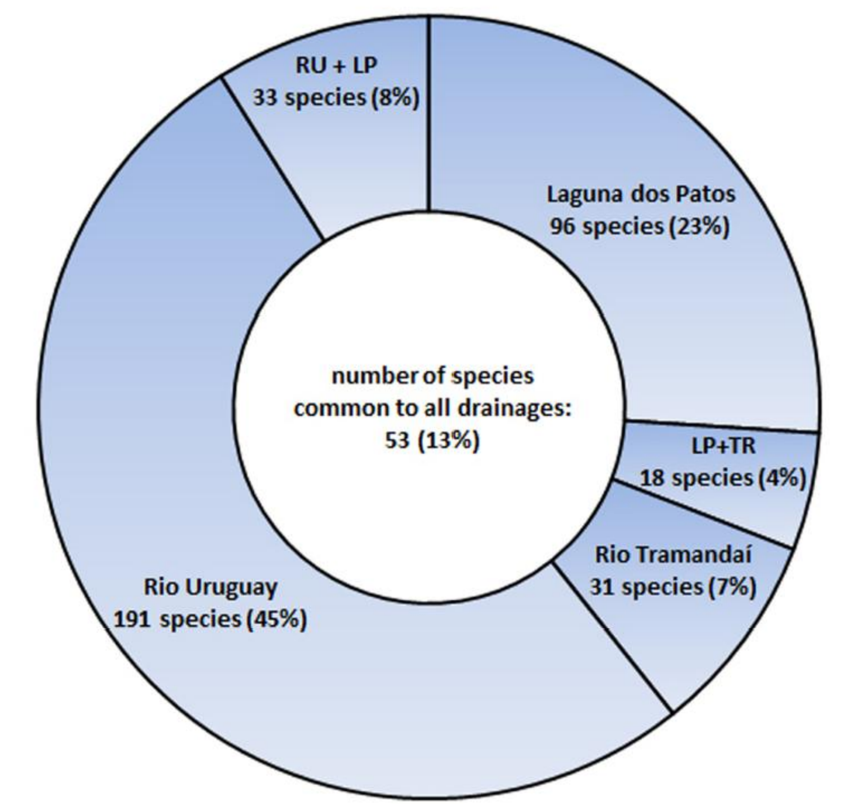
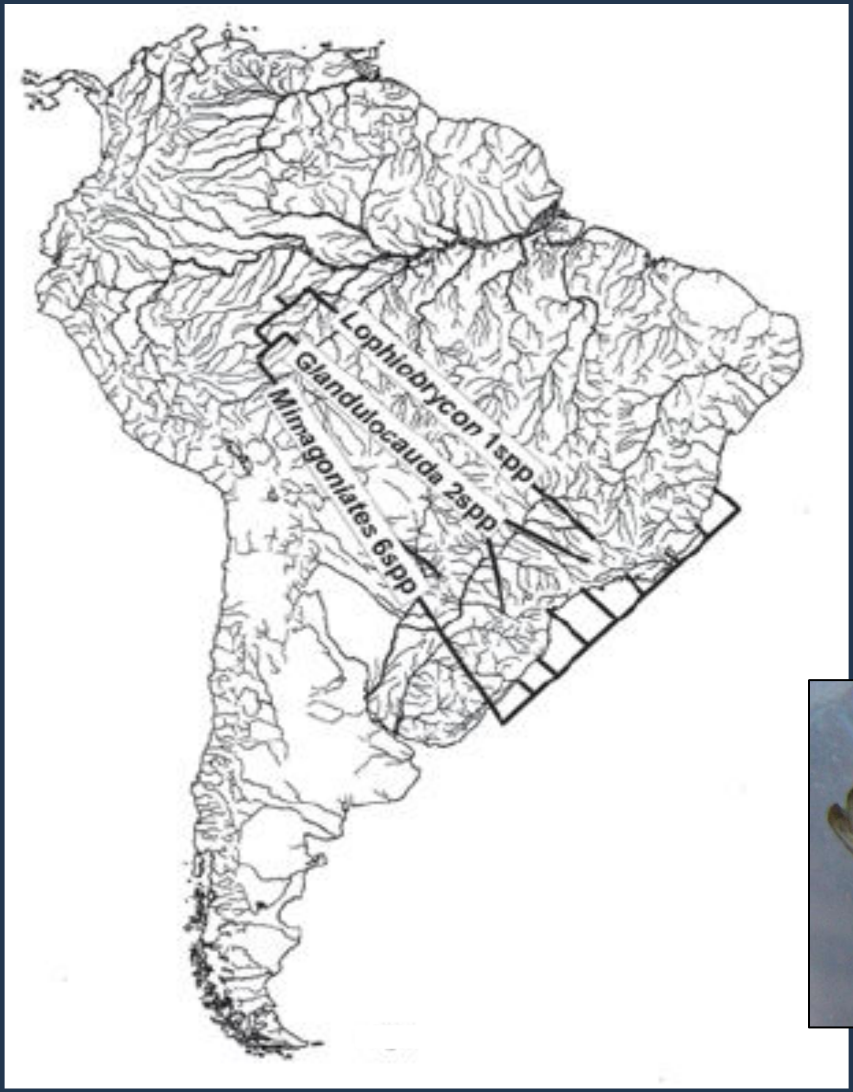


FIGURE 8. Number of species by hydrographic basin, Rio Grande do Sul State. RU = rio Uruguay and rio Negro, LP = Laguna dos Patos system, TR = rio Tramandaí and rio Mampituba. Species that occur concomitantly in the rio Uruguay and Laguna dos Patos (RU+LP), Laguna dos Patos and rio Tramandaí (LP+TR) or in all three drainages are counted separately.

Los cambios en el nivel del mar y las Conexiones Costeras



Patos Merin - Drenajes costeros del SE de Brazil

Characidae: *Mimagoniates spp*

Los cambios en el nivel del mar y las Conexiones Costeras

Neotropical Ichthyology, 3(3):373-382, 2005

Systematics and biogeography of the genus *Phalloptychus* Eigenmann, 1907 (Cyprinodontiformes: Poeciliidae: Poeciliinae)

Paulo H. F. Lucinda

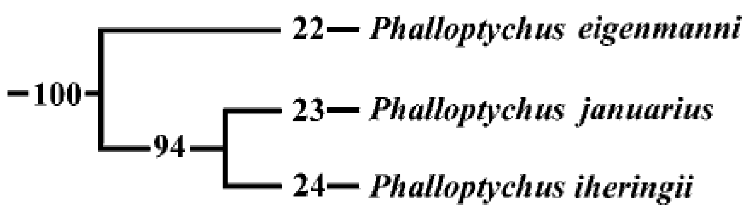


Fig. 2. Intrageneric relationships of *Phalloptychus*. The numbers on the branches refer to the character state transformations series listed by Lucinda & Reis (2005).

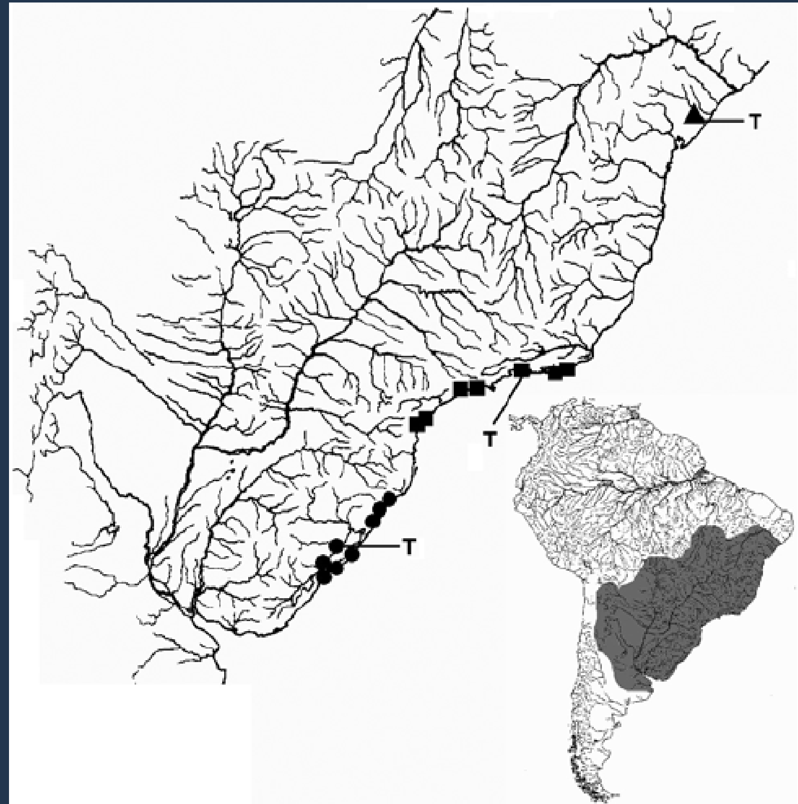


Fig. 1. Coastal drainages from Bahia to Rio Grande do Sul, and Uruguay showing distribution of *Phalloptychus eigenmanni* (triangle), *P. januarius* (squares), and *P. iheringii* (circles). Each symbol may represent more than one lot and/or locality. T = type locality.

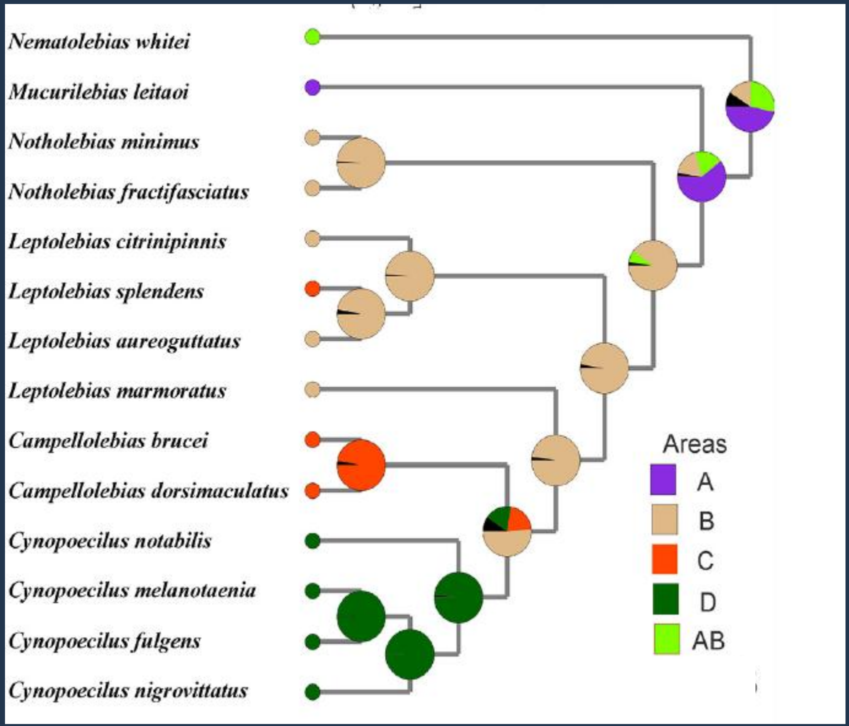
Los cambios en el nivel del mar y las Conexiones Costeras

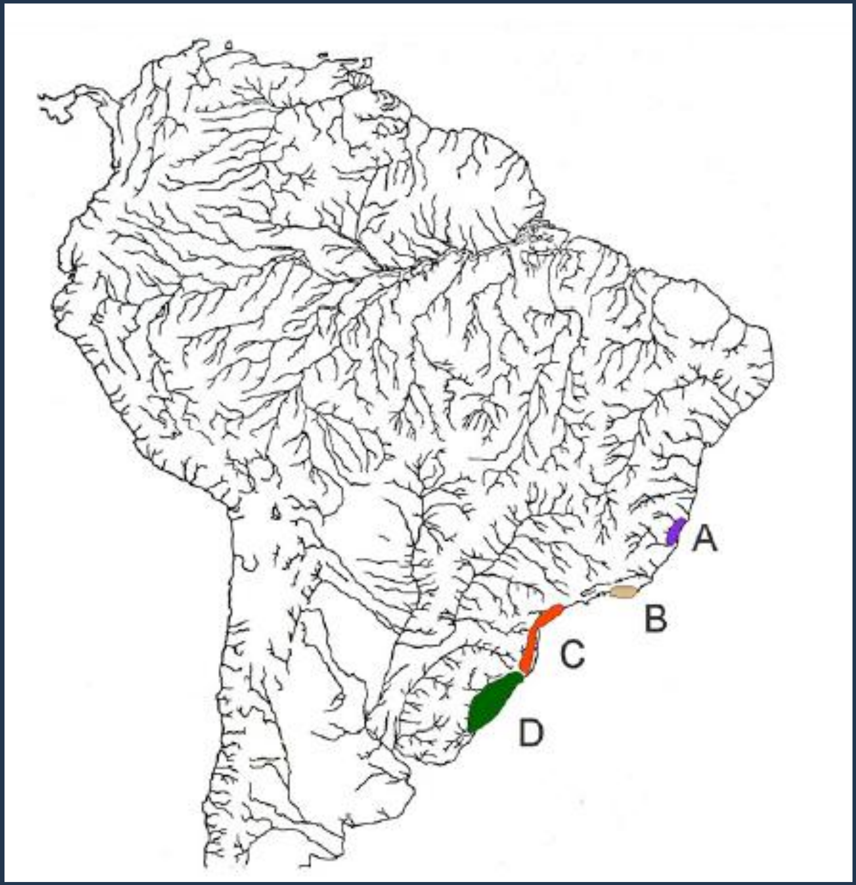
RESEARCH ARTICLE

Inferring Evolution of Habitat Usage and Body Size in Endangered, Seasonal Cynopoeciline Killifishes from the South American Atlantic Forest through an Integrative Approach (Cyprinodontiformes: Rivulidae)

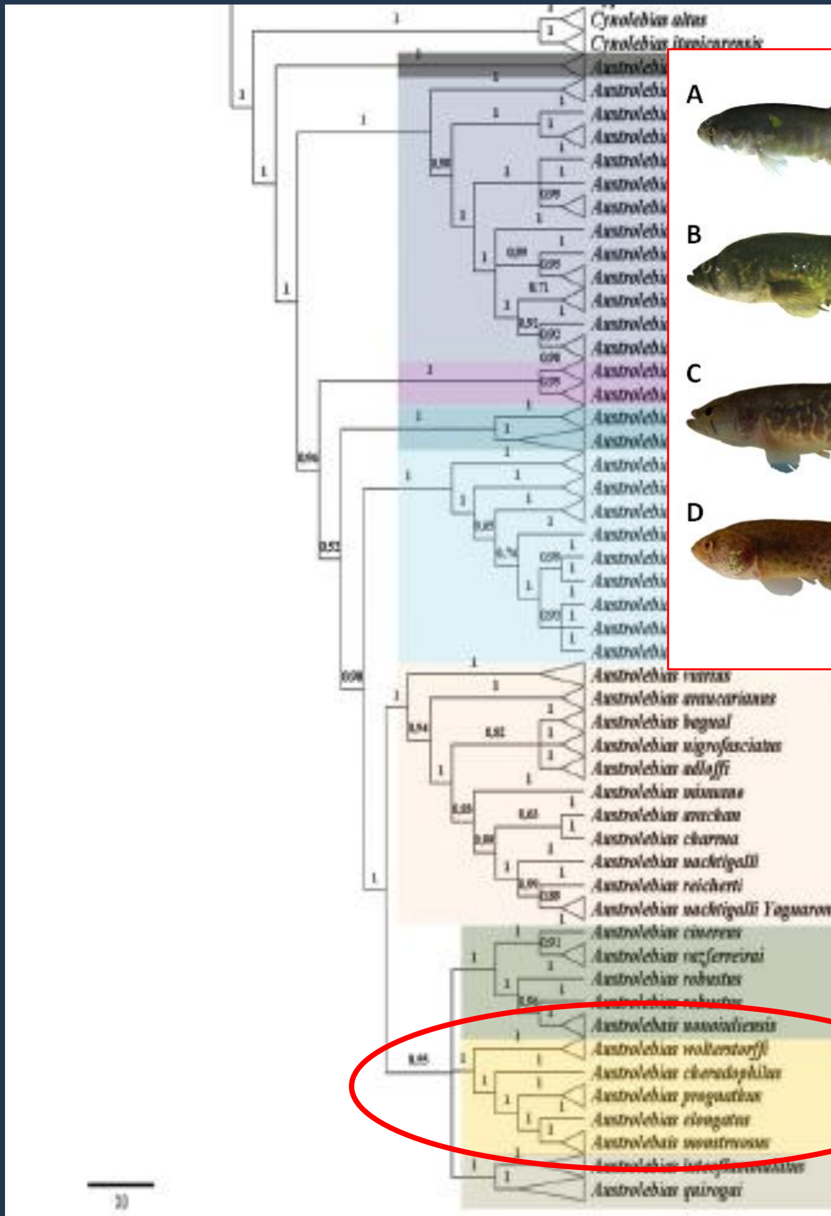
Wilson J. E. M. Costa*

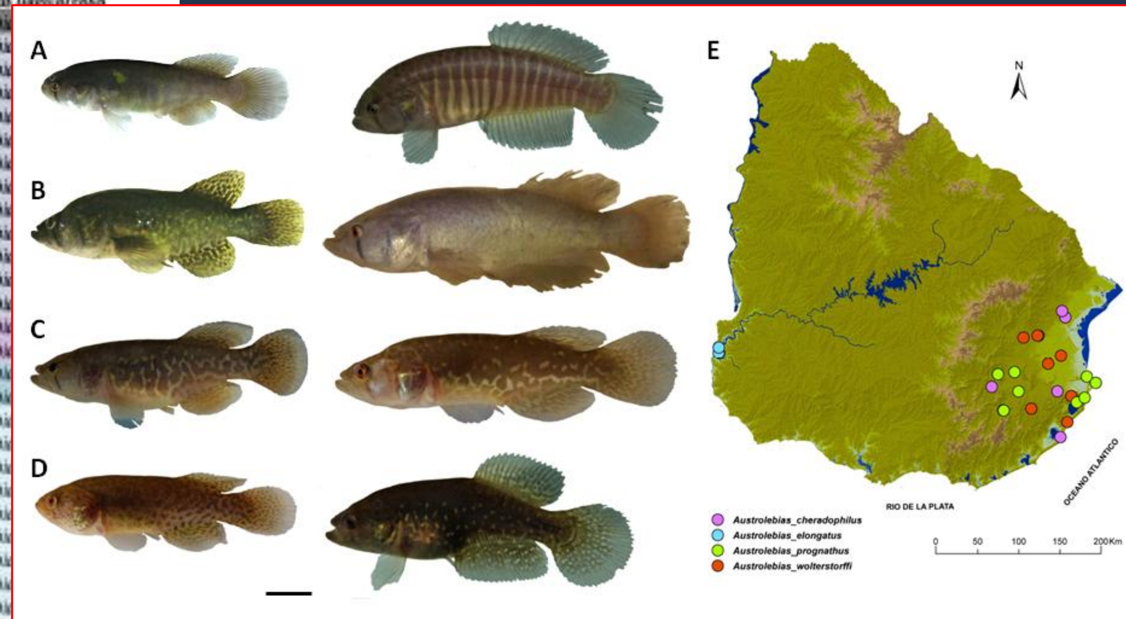
Laboratory of Systematics and Evolution of Teleost Fishes, Institute of Biology, Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brasil





Los cambios en el nivel del mar y las Conexiones Costeras





Especies del género *Austrolebias* subgénero Megalebias

Los cambios en el nivel del mar y las Conexiones Costeras

Neotropical Ichthyology, 14(1): e150082, 2016
DOI: 10.1590/1982-0224-20150082
Journal homepage: www.scielo.br/ni
Published online: 07 April 2016 (ISSN 1982-0224)

A new species of *Gymnogeophagus* Miranda Ribeiro from Uruguay (Teleostei: Cichliformes)

Marcelo Loureiro[1,2], Matías Zarucki[1], Luiz R. Malabarba[3] and Iván González-Bergonzoni[1]

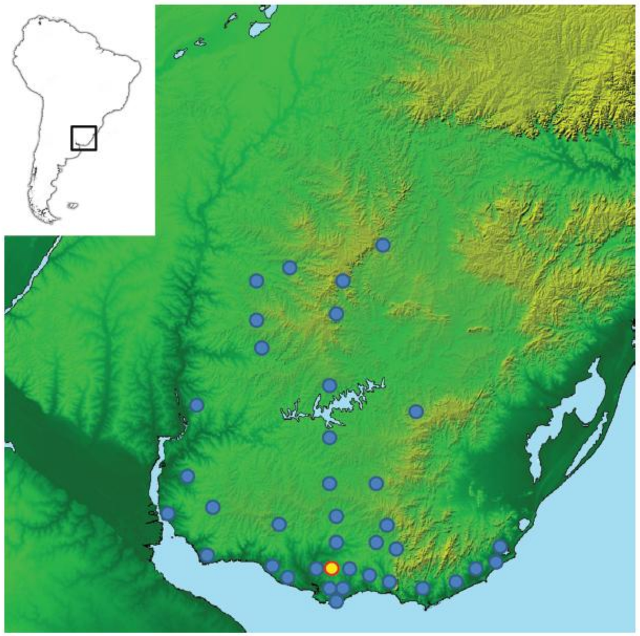
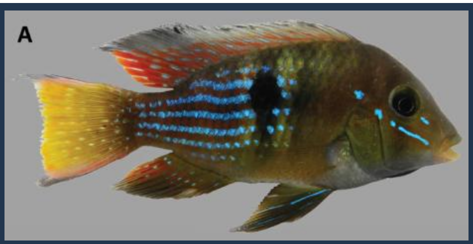


Fig. 6. Distribution of *Gymnogeophagus terrapurpura*. Yellow dot indicates type locality. Map modified from Shuttle Radar Topography Mission (SRTM), Courtesy NASA/JPL-Caltech.

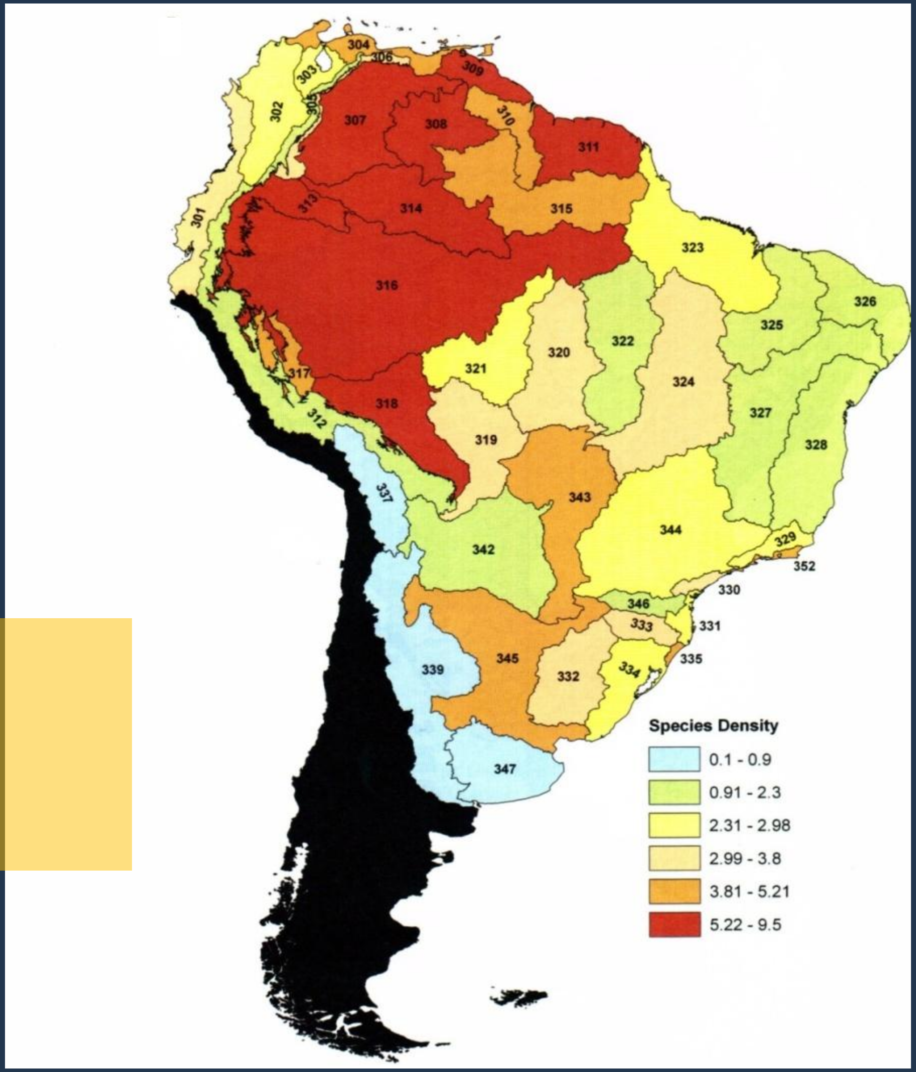


Patos Merin – Paraná Bajo

Cuencas Laguna de Rocha, Castillos y Negra zonas de transición?

Patos-Merín: Patrones Macro

Contrariamente a lo que ocurre a nivel general, donde la densidad total de peces es menor que en áreas adyacentes como el Uruguay bajo y el Paraná bajo, esta región presenta un mayor número de especies de peces anuales (*Austrolebias* + *Cynopoecilus*).



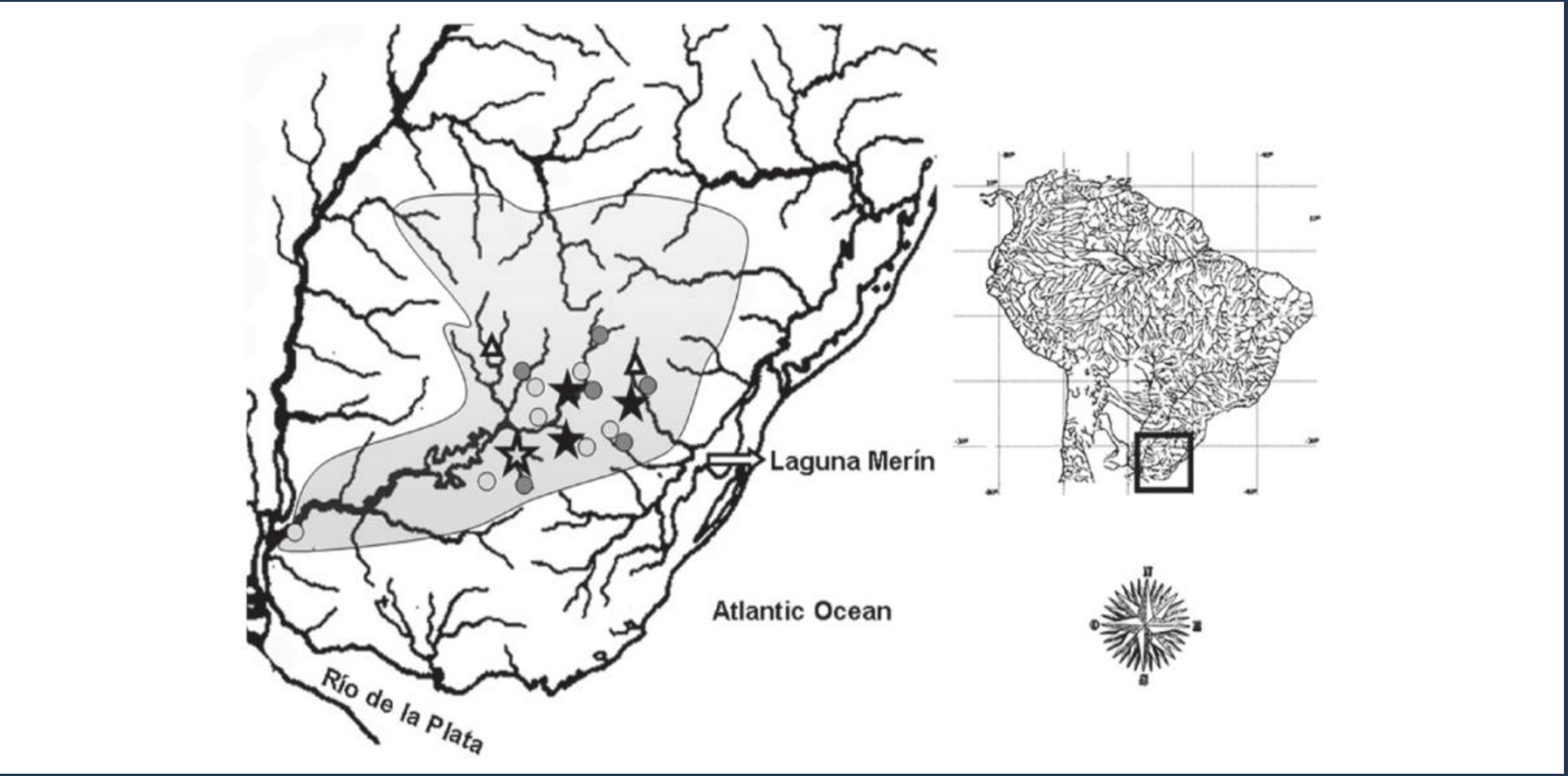
Austrolebias:

- Eje Potámico Subtropical = 10 especies
- Río Uruguay bajo = 14-15 especies
- Patos-Merín = 21 especies

Figura: Albert & Reis (2011)

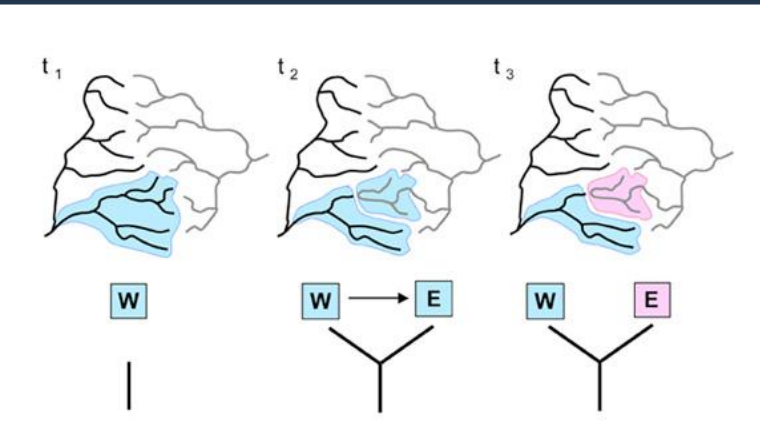
Patos-Merin y Uruguay medio: Conexiones más sutiles

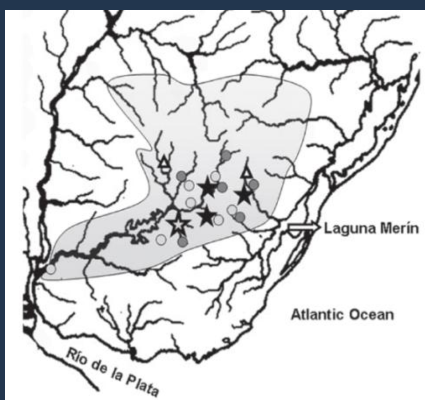
Distribución de 5 taxa del género *Austrolebias*

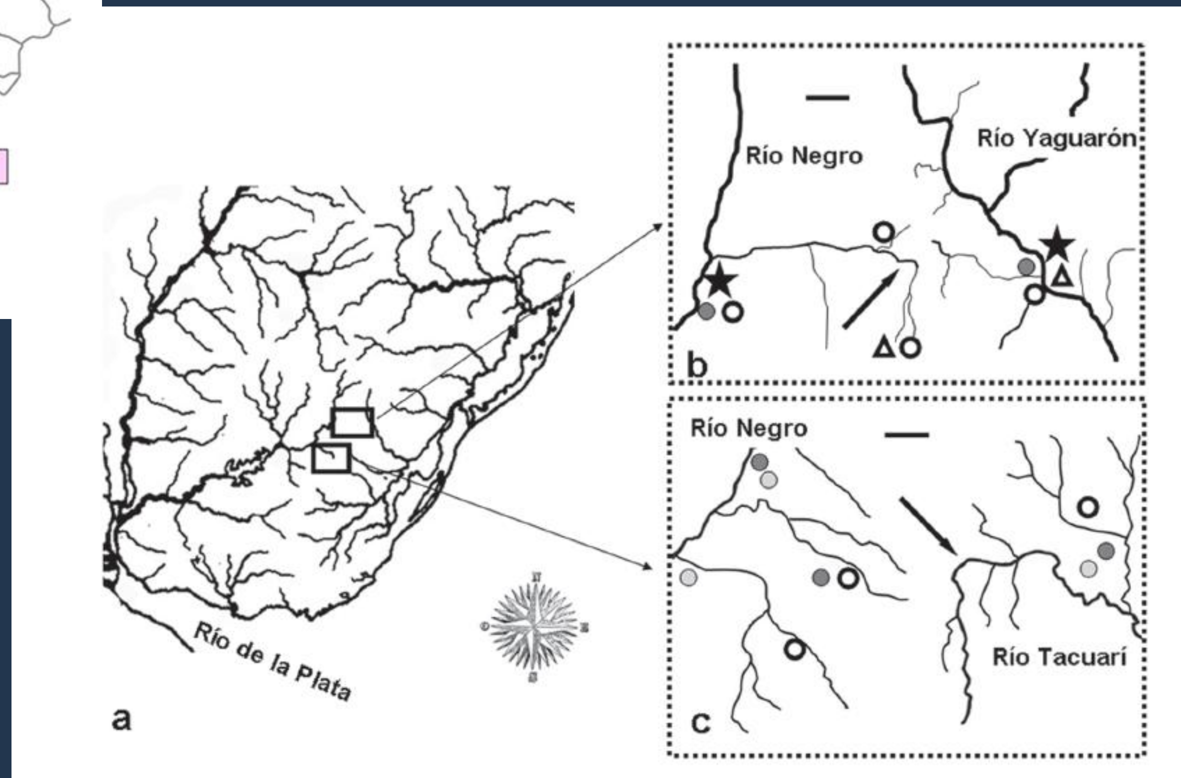


Loureiro, Duarte, Zarucki 2011

Reordenamiento de los sistemas de drenaje







Evidencias biogeográficas, filogenéticas y filogeográficas en el género *Austrolebias* que apuntan a los reordenamientos de los sistemas de drenaje, asociados al margen pasivo de la placa Sudamericana, como responsables de elevar la diversidad en Patos-Merin, y a la cuenca alta del Río Negro (Uruguay medio) como fuente de esa diversidad.