

## Chordata

**Amphioxus** \*(Brookes 1998; Prentiss and Arey 1917)

**Cyclostomes** \*(Prentiss and Arey 1917)

## Craniata

**Cephalaspidomorphi** (Jawless fish) ‡(Fraser 1950)

- Petromyzon (Sea lamprey) ‡ (Prentiss and Arey 1917)

## Vertebrata

**Chondrichthyes** §(Balfour 1881; Chimenti and Accordi 2011; Goodrich 1930; Kerr 1919)

- Elasmobranchii (Sharks, Rays, Skates (Batoidea)) ¶(Fraser 1950)

## Teleostomi

**Osteichthyes** (bony fish) ‡(Chimenti and Accordi 2011; Gilbert 2010; Hiruma and Nakamura 2003; Nishinakamura 2003; Prentiss and Arey 1917; Raciti and others 2008; Szebenyi 1977)

**Actinopterygii** (ray-finned fishes) ‡(Goodrich 1930)

- Chondrostei (Primarily cartilaginous fish showing some ossification)‡(Goodrich 1930)
  - Acipenseriformes (Sturgeons) ‡(Fraser 1928; Goodrich 1930; Jungersen 1893; Maschkowzeff 1926; Vize and others 2003)
  - Polypteriformes (Reedfishes and Bichirs) ‡(Goodrich 1930; Kerr 1919)
- Teleostei ‡(Vize and others 1997; Vize and others 2003) \*(Guitel 1906; Prentiss and Arey 1917)
  - Leuciscus (Eurasian daces) ‡(Goodrich 1930)
  - Salmo (Salmon family) ‡(Goodrich 1930; Vize and others 2003)
  - Fierasfer \*(Emery 1880)
  - Zoarces (Eelpouts) \*(Emery 1880)
  - Lepadogaster (Shore clingfish) \*(ADULT (Guitel 1906))
  - Amia (Bowfins, primitive ray-finned fish) ‡(Dean 1897; Felix 1912; Goodrich 1930; Jungersen 1893)
  - Lepidosteus (Gars) ‡(Balfour and Sedgwick 1876; Beard 1894; Felix 1912; Goodrich 1930)
  - Heterandria Formosa (Dwarf live bearer) ‡(Fraser 1940)
  - Clupea (Herring) ‡(Tytler 1996; Vize and others 1997)
  - Fundulidae
    - Fundulus ‡(Vize and others 1997)
  - Batrachoidae (Toadfish) ‡(Vize and others 1997)
  - Syngnathiformes (Pipefish) ‡(Vize and others 1997)
  - Oxudercinae (Mudskippers) ‡(Safer 1982; Vize and others 1997)
  - Pleuronectiformes (Turbot) ‡(Vize and others 1997)
  - Cypriniformes
    - Danio rerio (Zebrafish)(Drummond and others 1998; Kuure and others 2000; Vize and others 1997; Vize and others 2003)
  - Belonidae (Needlefish)
    - Tylosurus marinus ‡(Armstrong 1932; Vize and others 1997)
  - Gadiformes
    - Microgades tomcod ‡(Vize and others 1997)

**Sarcopterygii** (lobe-finned fish)

- **Dipnoi** (Lungfish/Salamanderfish) ‡(Goodrich 1930; Kerr 1919; Vize and others 2003) \*(Prentiss and Arey 1917)
  - Lepidosiren (South American Lungfish) ‡(Goodrich 1930)
- **Tetrapoda**
  - Amphibia/Anamnia (Frogs, salamanders, and caecilians) ‡(Chimenti and Accordi 2011; Fraser 1950; Gilbert 2010; Goodrich 1930; Hiruma and Nakamura 2003; Nishinakamura 2003; Prentiss and Arey 1917; Rabl 1896; Raciti and others 2008; Sedgwick 1880; Vize and others 1997; Vize and others 2003; Wrobel and Suss 2000)
    - Apoda (All extant caecilians closest fossil relatives)
      - Gymnophiona ‡(Fraser 1950; Goodrich 1930)
      - Caecilians, (Earthworms, snakes) ‡(Vize and others 1997)
        - Hypogeophis ‡(Brauer 1902; Goodrich 1930)
    - Anura (Frogs) ‡(Fraser 1950; Huettner 1968; Vize and others 1997; Vize and others 2003)
      - Xenopus laevis ‡(Kuure and others 2000; Nieuwkoop and Faber 1994; Nishinakamura 2003; Vize and others 1997; Vize and others 2003; Wessely and Tran 2011)
      - Rana temporaria (Common frog) ‡(Fraser 1950; Huettner 1968)
    - Caudata (All fossils and extinct salamander species)
      - Urodela (Salamanders) ‡(Fraser 1950 ; Holtfreter 1944 ; Kerr 1919; Vize and others 1997 ; Vize and others 2003 )
        - Ambystoma punctatum ‡(Fraser 1950; Howland 1921)
  - Amniota (synapsids (Mammals) & Sauropsids (reptiles and birds)) §(Chimenti and Accordi 2011; Fraser 1950; Gilbert 2010; Vize and others 2003)
    - Sauropsida (Reptiles and Birds)
      - Reptilia ‡(Vize and others 2003) §(Chimenti and Accordi 2011; Fraser 1950; Goodrich 1930; Vize and others 1997)
        - Anapsida §(Chimenti and Accordi 2011; Vize and others 2003)
          - Chelonians (Green sea turtle) (Davies 1950; Wiedersheim 1890)
            - Caretta Caretta §(Chimenti and Accordi 2011)
            - Testudo Hermannii (Turtle) §(Chimenti and Accordi 2011)
        - Diapsida
          - Crocodylians (Alligator, Caiman, Crocodile, Gharial families) ‡(Davies 1950; Vize and others 2003; Wiedersheim 1890)
          - Lizards §(Chimenti and Accordi 2011; Goodrich 1930; Vize and others 2003)
          - Snakes §(Chimenti and Accordi 2011; Goodrich 1930; Vize and others 2003)
          - Sphenodontia (Lizard-like)
            - Sphenodon punctatus §(Chimenti and Accordi 2011)

- Aves (Birds) §(Goodrich 1930; Hiruma and Nakamura 2003; Vize and others 1997) ‡(Balfour and Sedgwick 1878; 1879; Davies 1950; Gasser 1879; Sedgwick 1880; 1881)
  - Chick ‡(Davies 1950; Kerr 1919; Sedgwick, 1880 #43; Sedgwick 1881; Szebenyi 1977; Vize and others 2003) §(Davies 1950; Hiruma and Nakamura 2003; Huettner 1968; Patten and Carlson 1974)
  - Duck ‡(Davies 1950; Mihalkovics 1885; Sedgwick 1880) §(Davies 1950)
- Synapsida (Mammals)
  - Mammalia §(Goodrich 1930; Vize and others 1997; Vize and others 2003)
    - Theria: Live bearing mammals
      - Metatheria: Marsupiala ‡(Fraser 1920)
    - Eutheria: Placentals
      - Ruminantia (Herkauwers) ¶(Davies 1951; Vize and others 2003)
        - Deer ¶(Bremer 1915)
        - Cow ¶(Bremer 1915)
        - Sheep ¶(Davies 1951)
      - Rodents §(Pole and others 2002)
        - Mouse §(Kobayashi and others 2007; Kuure and others 2000; Nishinakamura 2003; Vize and others 2003)
        - Rat (Renson 1883)
        - Marmot(Janosik 1904) §(Fraser 1920)
      - Lagomorpha
        - Rabbit(Janosik 1885 ; Kerens 1907; Renson 1883), §(Fraser 1920; Vize and others 2003)
      - Primates
        - Human \*(Felix 1912; Kuure and others 2000; Solhaug and others 2004; Tuchmann-Duplessis and Haegel 1974; Vize and others 2003) ‡(Fraser 1920) §(Carev and others 2006; Hamilton and others 1972; Prentiss and Arey 1917; Sadler 2004; Solhaug and others 2004) ¶(Larsen 1993; O'Rahilly and Müller 1987; Torrey 1954)
      - Carnivora
        - Cat §(Vize and others 2003)
      - Eutheria
        - Mole(Kerens 1907) §(Fraser 1920; Vize and others 2003)
        - Bat(van der Stricht 1913) §(Vize and others 2003)

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The appearance of a pronephros in species can be tabulated as follows; \*: pronephros functioning as adult kidney, ‡: pronephros functioning in the larval stage, §: either functional pronephros or rudimental signs of a non-functional pronephros in the embryonic stage, ¶: no pronephros during embryology.

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