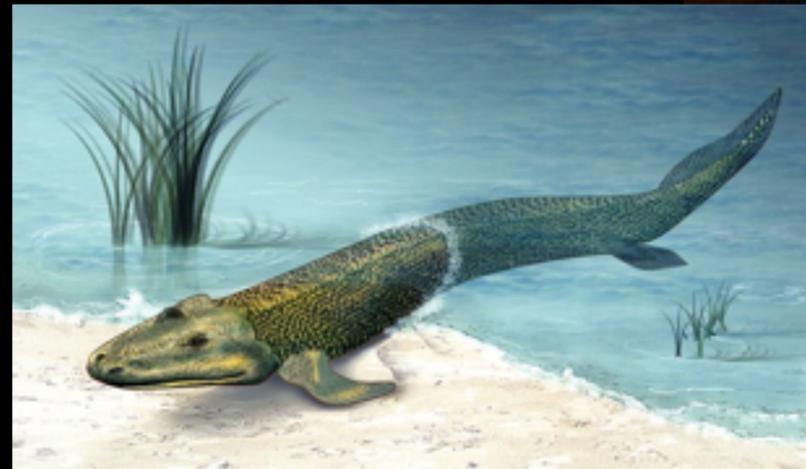
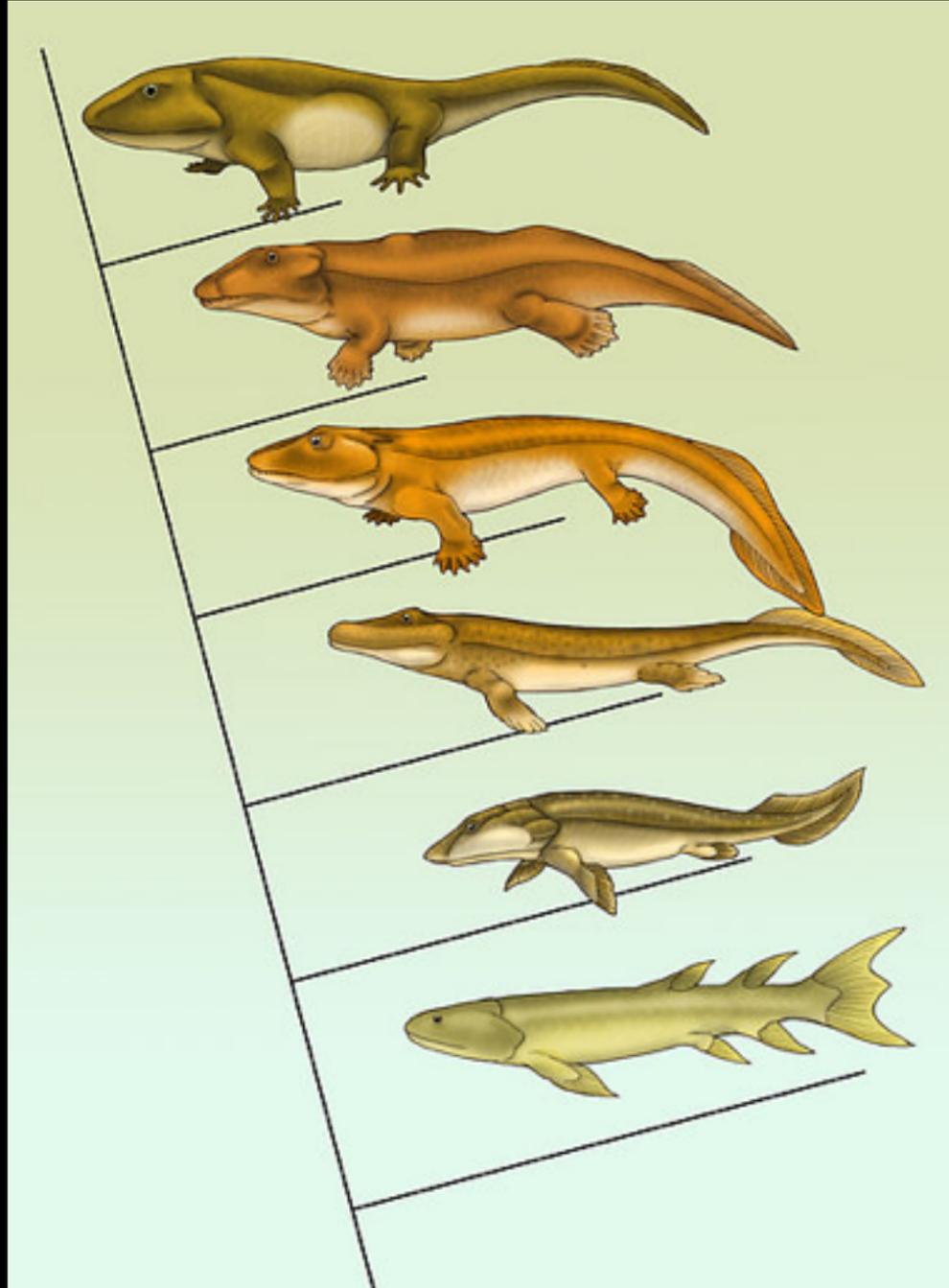


Biology Essentials - 021



Neil Shubin and Tiktaalik

Homeostatic Mechanisms Reflect Evolution

Homeostatic Mechanisms

Continuity

Changes

Common Ancestry

Environmental Conditions

Excretory System

Respiratory System

Flatworms

Earthworms

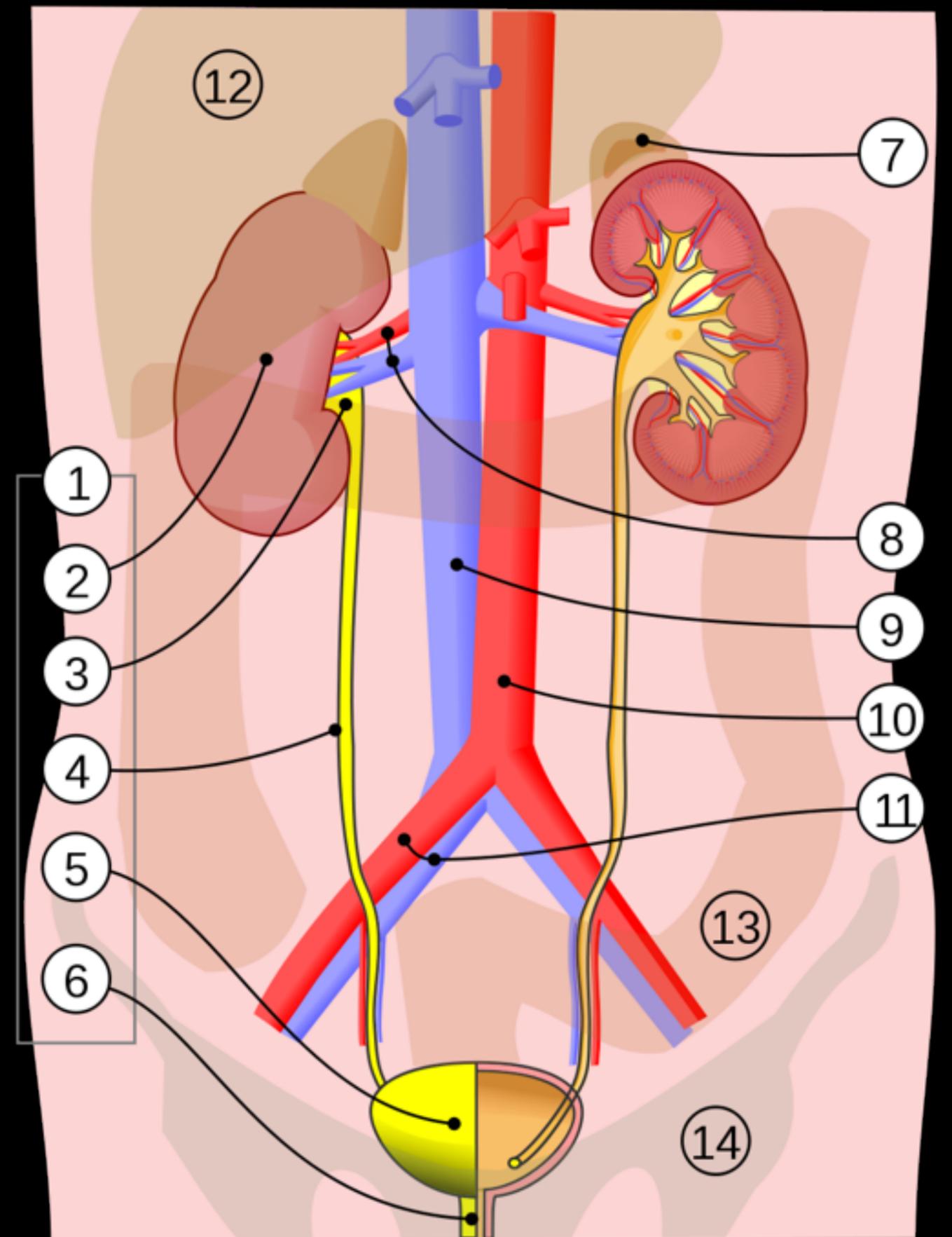
Vertebrates

Aquatic animals

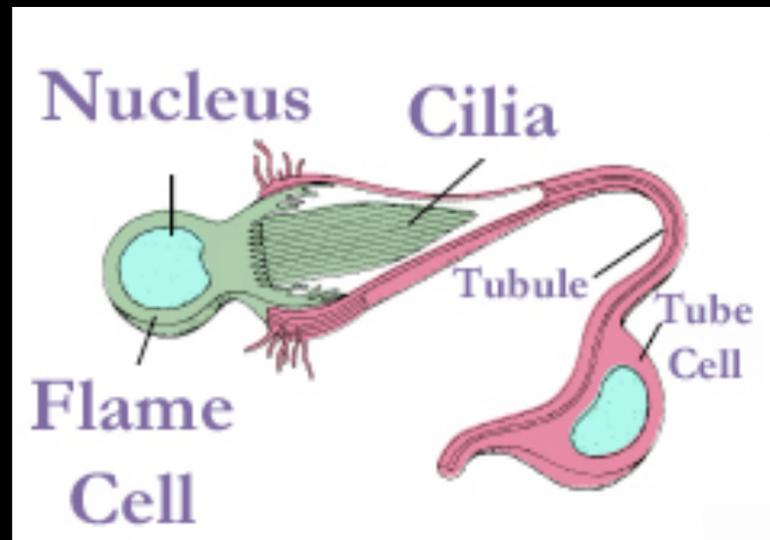
Terrestrial animals

Continuity

Excretory System



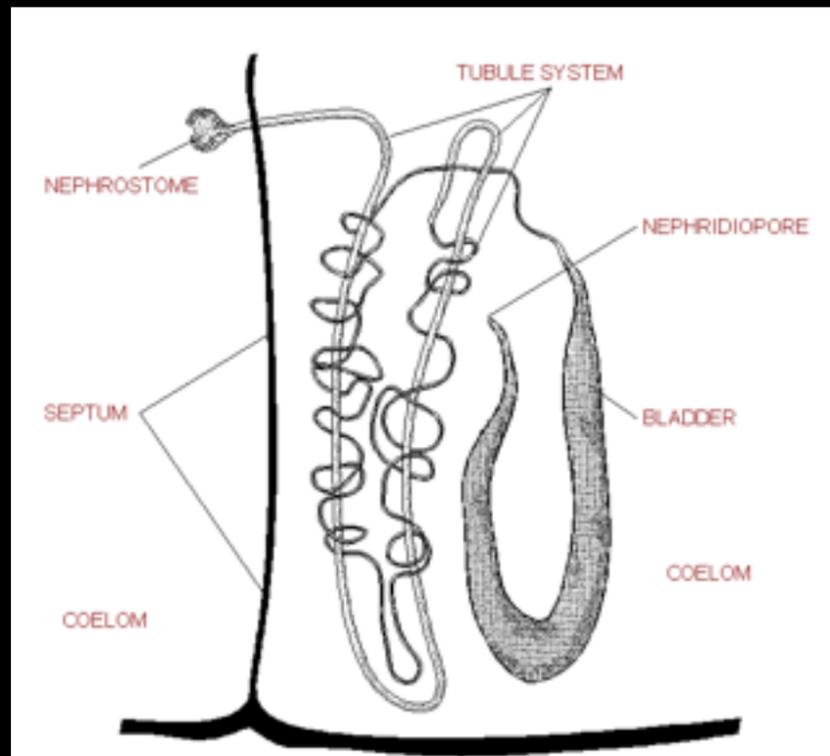
Flatworms



Protonephridia



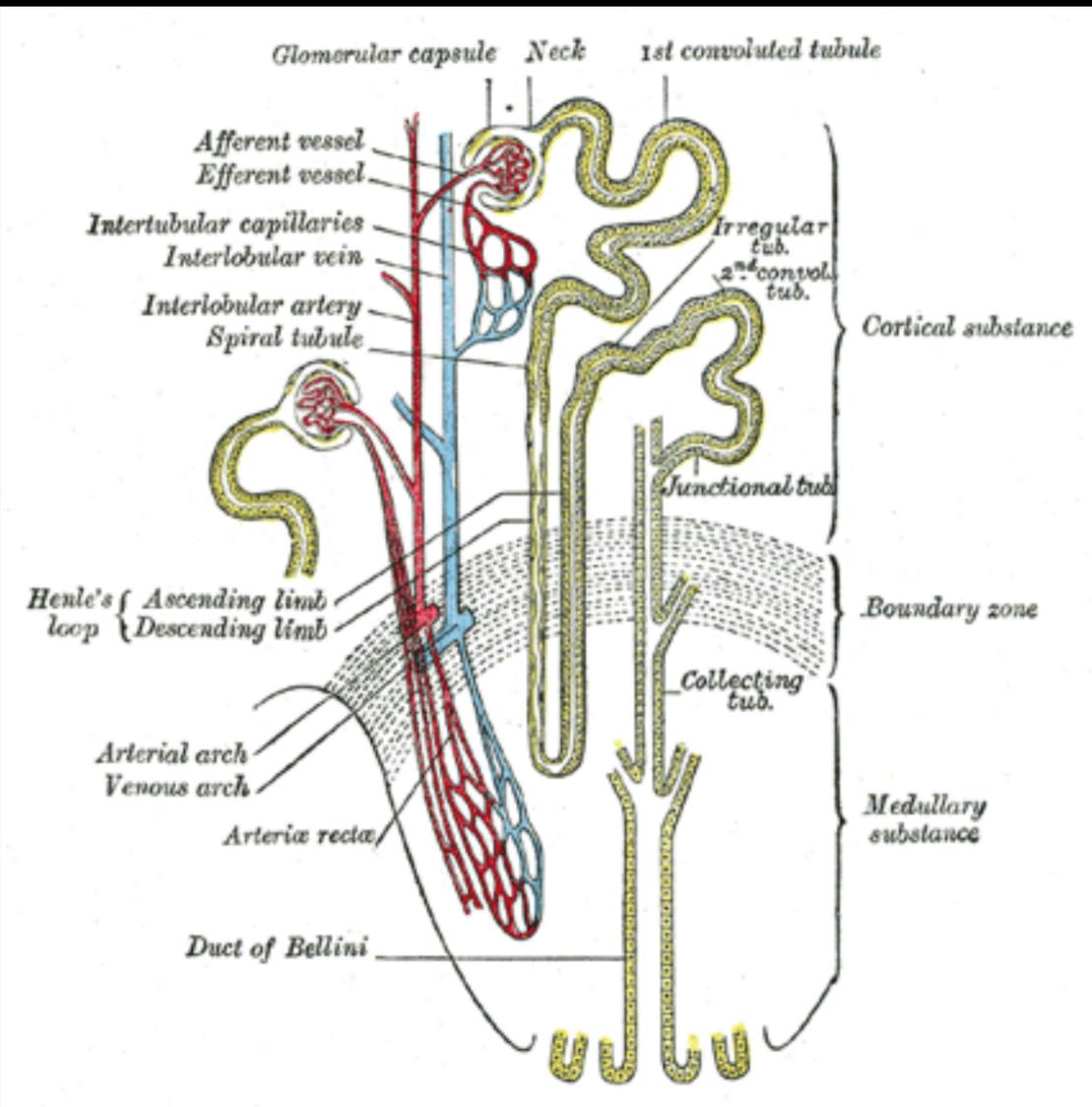
Earthworms



Metanephridia



Vertebrates



Nephron



Changes

Water



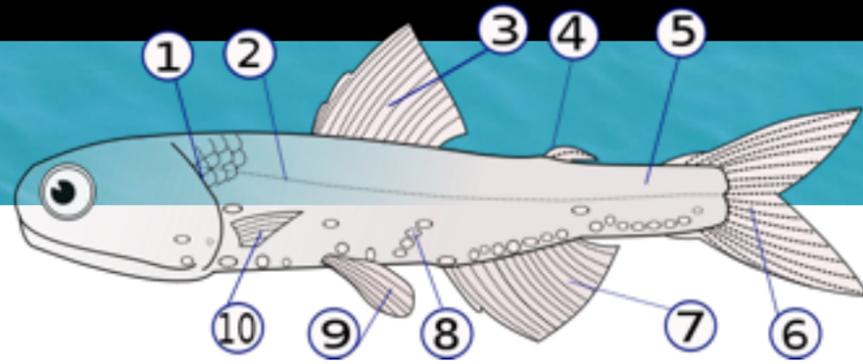
Land



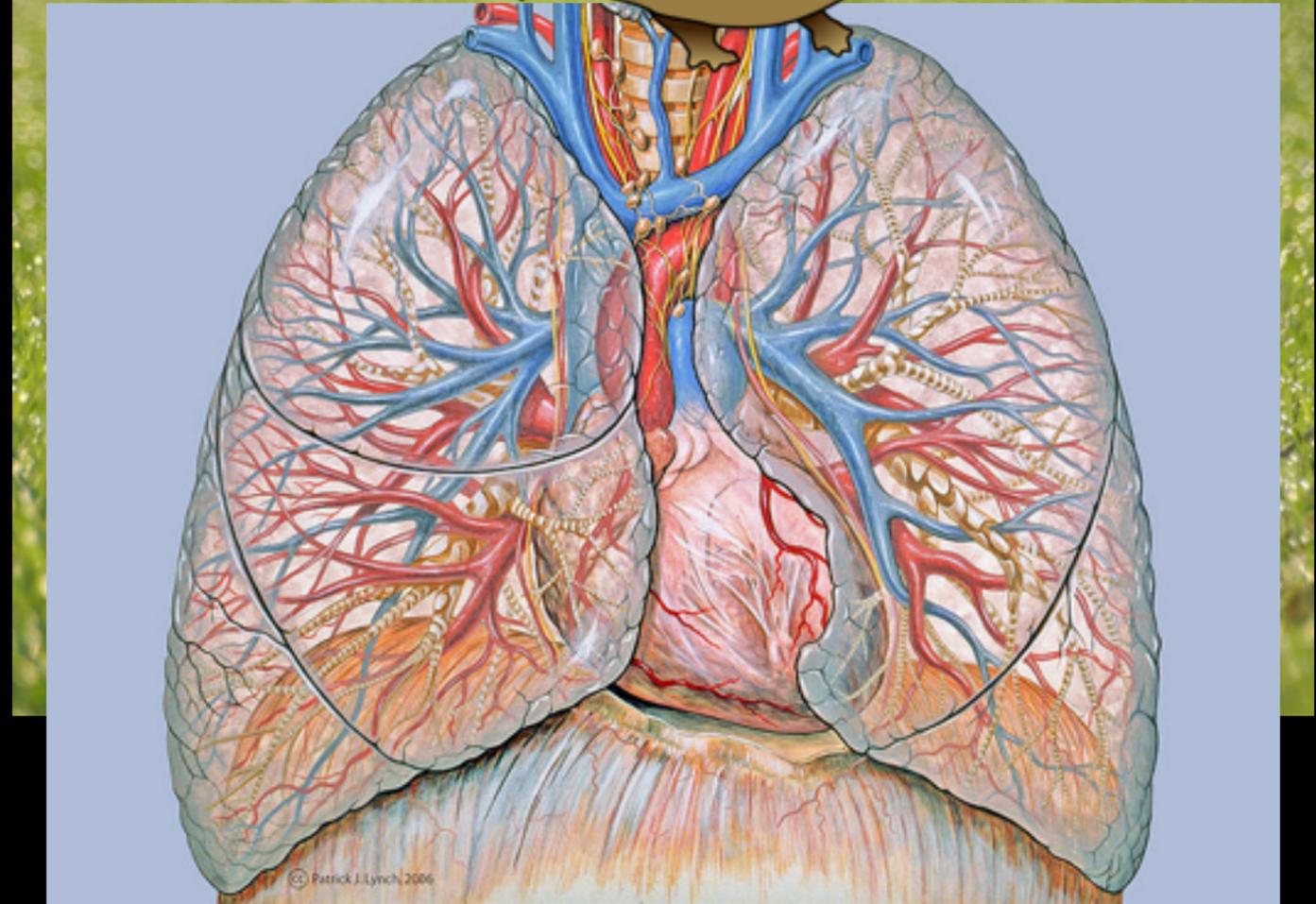
Respiratory System

Changes

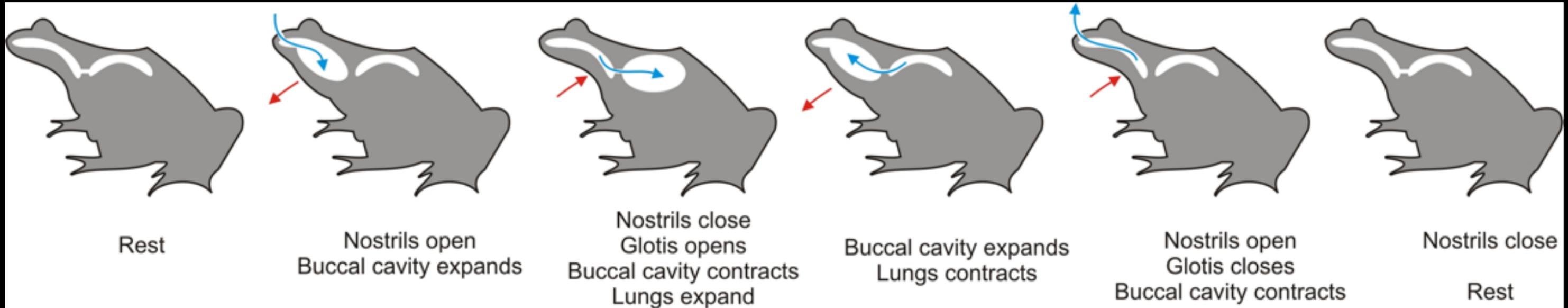
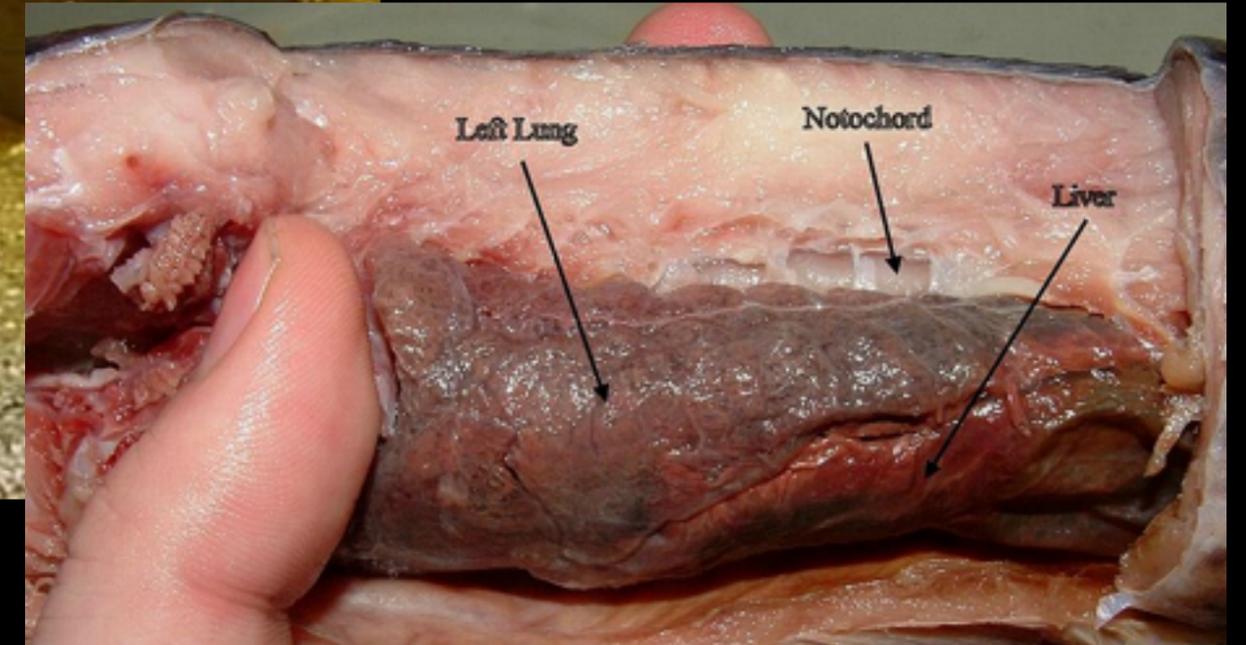
Water



Land



Respiratory System



Acknowledgements

Buhl, Vera. *English: Grass, 55130 Laubenheim, Germany*, September 15, 2008. Own work. [http://commons.wikimedia.org/wiki/File:2008-09-15_\(14\)_Grass,_Gras.JPG](http://commons.wikimedia.org/wiki/File:2008-09-15_(14)_Grass,_Gras.JPG).

Cronodon.com. *Earthworm - Excretion & Osmoregulations*, n.d. http://cronodon.com/BioTech/Earthworm_excretion.html.

en.wikipedia, Anilocra at. *English: A Flame Cell and Tube Cell, the Excretory System of Flatworms*, (original upload date). Transferred from en.wikipedia Transfer was stated to be made by User:Vojtech.dostal.

<http://commons.wikimedia.org/wiki/File:Flamecell.jpg>.

en.wikipedia, Mokele at. *English: Diagram of Buccal Pumping in a Frog*, April 12, 2009. Transferred from en.wikipedia by SreeBot. http://commons.wikimedia.org/wiki/File:Buccal_pumping.jpg.

“File:Fishapod Evolution.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 19, 2013. http://en.wikipedia.org/wiki/File:Fishapod_evolution.jpg.

“File:Gray1128.png.” *Wikipedia, the Free Encyclopedia*. Accessed November 19, 2013. <http://en.wikipedia.org/wiki/File:Gray1128.png>.

File:Lampanyctodes Hectoris (Hector’s lanternfish)2.png, n.d. [http://commons.wikimedia.org/wiki/File:Lampanyctodes_hectoris_\(Hector’s_lanternfish\)2.png](http://commons.wikimedia.org/wiki/File:Lampanyctodes_hectoris_(Hector’s_lanternfish)2.png).

File:Mouse.svg, n.d. <http://commons.wikimedia.org/wiki/File:Mouse.svg>.

“File:Neil Shubin.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 19, 2013. http://en.wikipedia.org/wiki/File:Neil_Shubin.jpg.

“File:Pseudoceros Dimidiatus.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 19, 2013. http://en.wikipedia.org/wiki/File:Pseudoceros_dimidiatus.jpg.

“File:Thoracic Anatomy.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 19, 2013. http://en.wikipedia.org/wiki/File:Thoracic_anatomy.jpg.

“File:Tuna Gills in Situ Cut.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 19, 2013. http://en.wikipedia.org/wiki/File:Tuna_Gills_in_Situ_cut.jpg.

“File:Urinary System.svg.” *Wikipedia, the Free Encyclopedia*. Accessed November 19, 2013. http://en.wikipedia.org/wiki/File:Urinary_system.svg.

Foundation, Zina Deretsky, National Science. *English: Life Restoration of Tiktaalik Roseae, a Transitional Fossil (“missing Link”) between Sarcopterygian Fishes and Tetrapods from the Late Devonian Period of North America. Original Description: “Fossil Fish Bridges Evolutionary Gap between Animals of Land and Sea.”* Unknown. National Science Foundation. http://commons.wikimedia.org/wiki/File:Tiktaalik_roseae_life_restor.jpg.

Mokele. *English: Lateral View of Lungs of a Dissected Protopterus Dolloi*, February 15, 2009. Transferred from en.wikipedia. http://commons.wikimedia.org/wiki/File:Lungs_of_Protopterus_dolloi.JPG.

Schneider, Kenneth Cole. *Earthworm Macro 20100515*, May 15, 2010. <http://www.flickr.com/photos/rosyfinch/4612063657/>.

User:Tannin. *English: Australian Lungfish (Neoceratodus Forsteri)*, [object HTMLTableCellElement]. Picture taken by Tannin (from English wikipedia). <http://commons.wikimedia.org/wiki/File:Australian-Lungfish.jpg>.

Wknight94. *Still Water in Tracy Arm, Southeast of Juneau, Alaska.*, August 4, 2009. Own work. http://commons.wikimedia.org/wiki/File:Tracy_Arm_calm_water_closeup.jpg.

“Αρχείο:2 Panthera leo.jpg.” *Βικιπαίδεια*. Accessed November 19, 2013. http://el.wikipedia.org/wiki/%CE%91%CF%81%CF%87%CE%B5%CE%AF%CE%BF:2_Panthera_leo.jpg.



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