Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Second year)

Subject: Zoology

Course Code: ZOC 103

Course Title: Anatomy of animal body systems

Unit: 5 Circulatory System

Module Name: Evolution of heart – Part 2

Module No: 40

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Notes

Heart of Amniotes in general

Amniotes include reptiles, birds and mammals.

Amniote hearts have two atria and two ventricles. The ventricles are not completely divided in some reptiles

The left atrium receives blood from the pulmonary veins and the right atrium receives blood from the sinus venosus (in reptiles) or directly from the superior and inferior vena cava (in birds and mammals).

Sinus venosus present in most reptiles, is reduced in crocodilians and is absent in birds and mammals.

Pulmonary artery takes deoxygenated blood to the lungs.

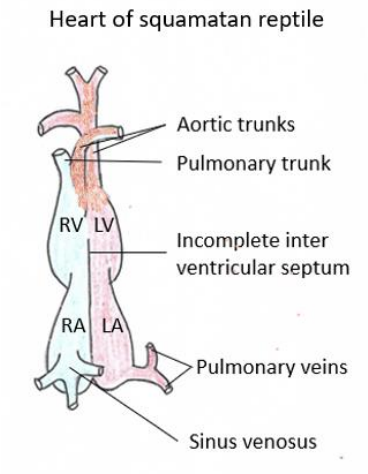
Heart of Reptiles

The heart is further advanced from amphibian heart.

Atrium is always completely divided into left and right atria.

Ventricle is partially divided by the interventricular septum in reptiles with the exception of crocodiles and alligators.

Oxygenated and deoxygenated blood is more effectively separated.

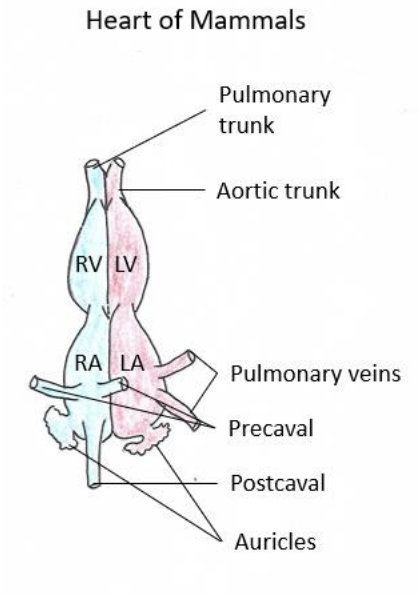


Embryonic conus arteriosus is split into three vessels – the pulmonary trunk and the left and right systemic trunk.
In turtles and squamates, a unique third chamber, the cavum venosum is present.
It functions to shunt oxygen-rich blood and oxygen-poor blood into specific arteries that leave the heart.

Heart of Crocodilians

In Crocodilians, the sinus venosus is partially embedded in the right atrial wall.
The ventricles are completely separated into left and right ventricles by the interventricular septum.
Oxygenated blood from the left side thus cannot mix with the deoxygenated blood from the right side. Thus a complete separation of oxygenated and deoxygenated blood happens within the heart.

Heart of Birds and Mammals



The heart is further advanced from reptilian heart.
The hearts of birds and mammals are anatomically similar and so are discussed together.
The atrium and the ventricle are completely divided. Thus four chambers are present, two atria and two ventricles.
There is a complete separation of venous and arterial blood.
The right atrium receives blood from the precaval and postcaval veins.
Sinus venosus is present in early development but later is indistinguishable from the right atrium. The veins directly enter the atrium.
The location of sinus venosus is marked by sinoatrial (SA) node.
This node plays a very important role in the innervation of the heart.
Blood from the right atrium then passes through the cuspid valve (tricuspid in mammals) into the right ventricle.
The cusps of the valve are held together in place by chordae tendineae. This prevents the backflow of blood.
From the right ventricle, the blood passes through semilunar valves and enters the pulmonary artery.
The conus arteriosus is absent

Oxygenated blood enters the left atrium through the pulmonary veins.
From the left atrium the blood enters the left ventricle through the bicuspid or mitral valve.
Oxygenated blood leaves the left ventricle through a single systemic aorta to supply blood to the various parts of the body. The backflow of blood is prevented by the semilunar valves.
Interatrial septum gets completed in late embryonic stage. In embryos, a interatrial foramen or foramen ovale is present. The site of this foramen is marked by a scar in the atrial wall, called fossa ovalis
In mammals, each atrium has a ear-like flap within which is a blind chamber, the auricle.

Thus we see how the heart has evolved from a simple modified vessel to a powerful four chambered heart.
The evolution of the heart goes hand-in-hand with the mode of respiration undertaken by the organism to make it better suited to its environment.