

Comparative anatomy of heart structure

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Circulatory System

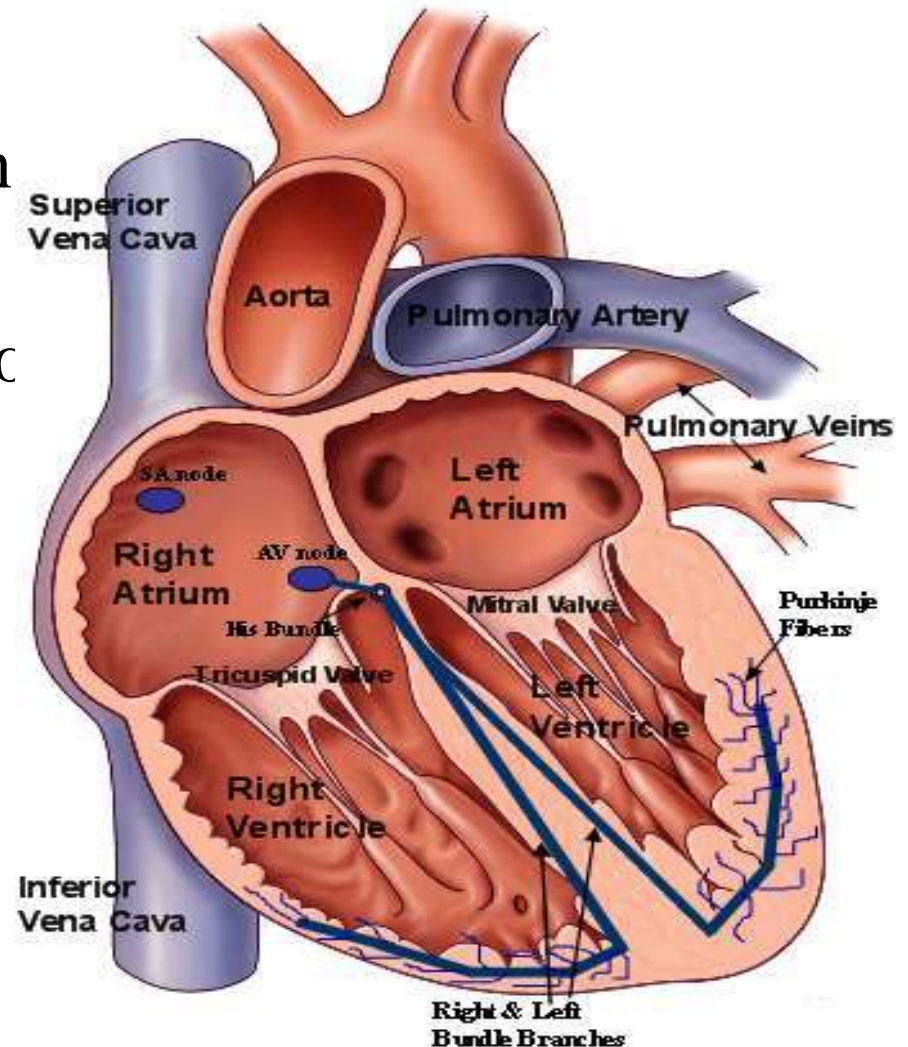
- All chordates have a circulatory or vascular system comprising a system of vessels and channels through which 2 kinds of fluids travel in separate, yet interconnected vessels.
- The fluids are **the blood** and **the lymph**

Blood vascular system

- The blood vascular system is a closed system in vertebrates.
- It has a **contractile heart** and continuous tube called **vessels**.

HEART

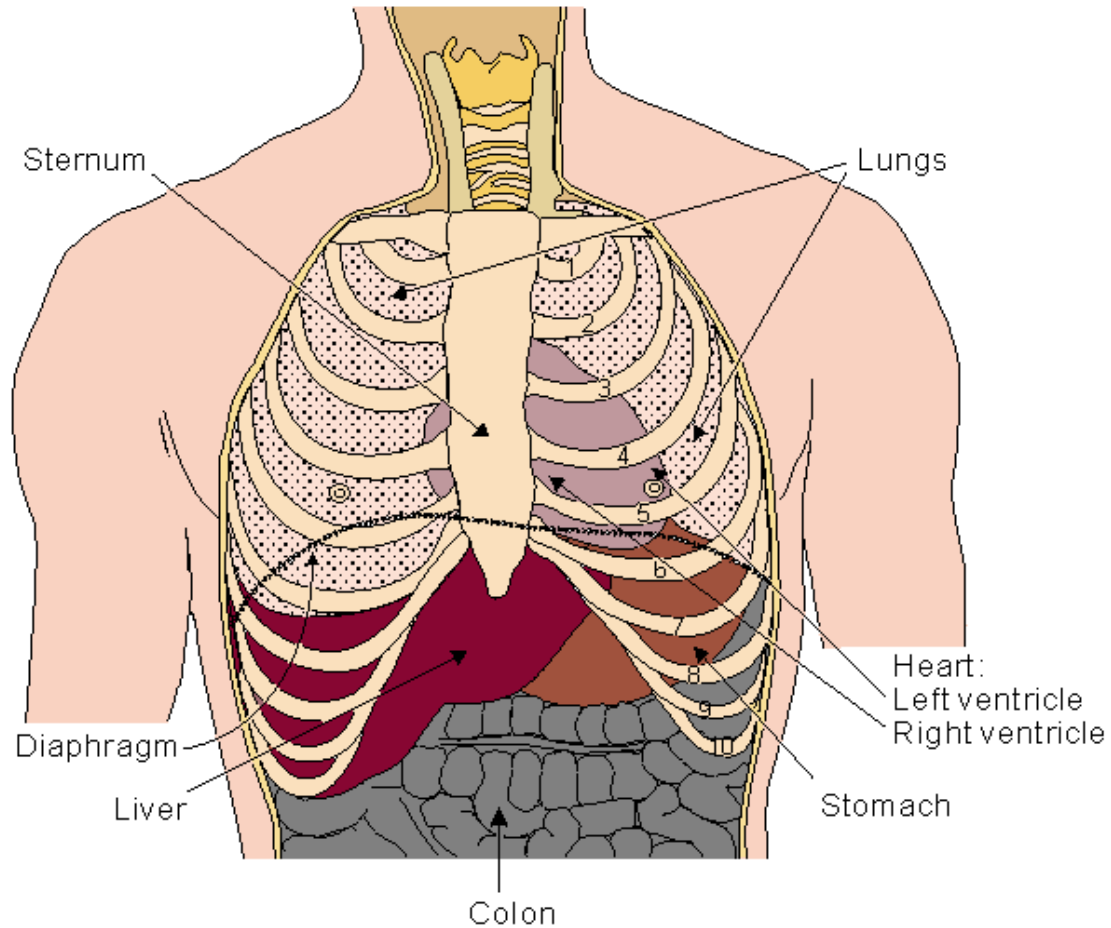
- Heart is a hollow **muscular pumping** organ
- It is **conical** in shape.
- Heart is always **ventral** to the gut, lying in a specialized coelomic compartment, the **pericardium**.



Vertebrate heart

- Vertebrates have a **pulsating heart**
- It receives blood from various parts of the body at the posterior end by means of **veins** and pumps it **into arteries** at the **anterior end**, which carry the blood to various organs including the breathing organs.

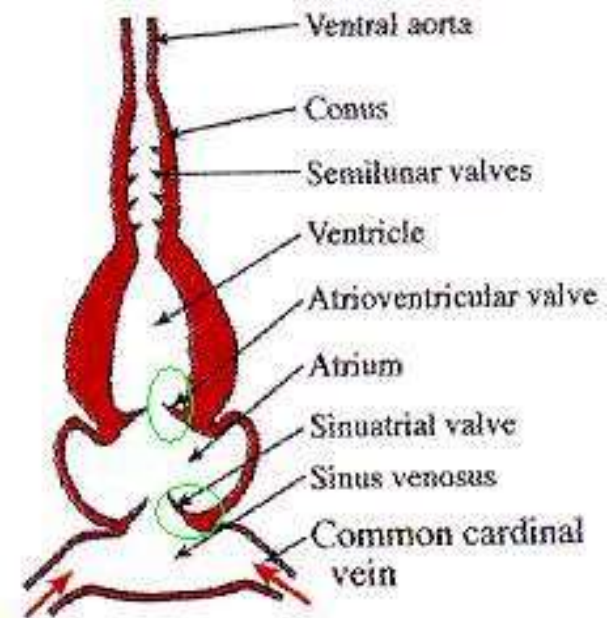
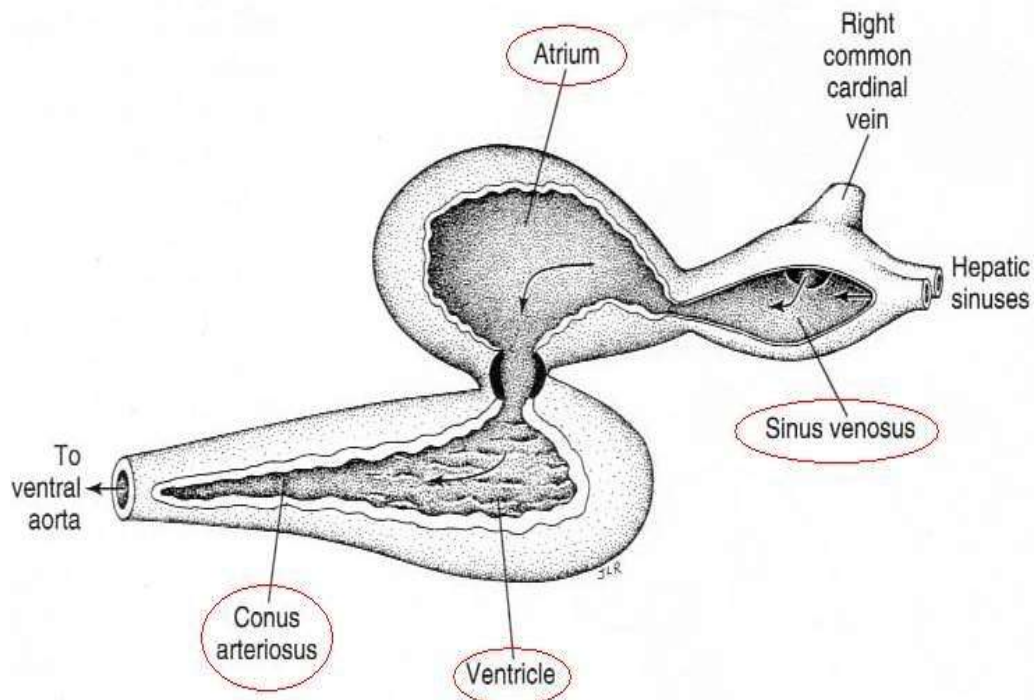
Location of Heart



Pisces- Scoliodon(dogfish)

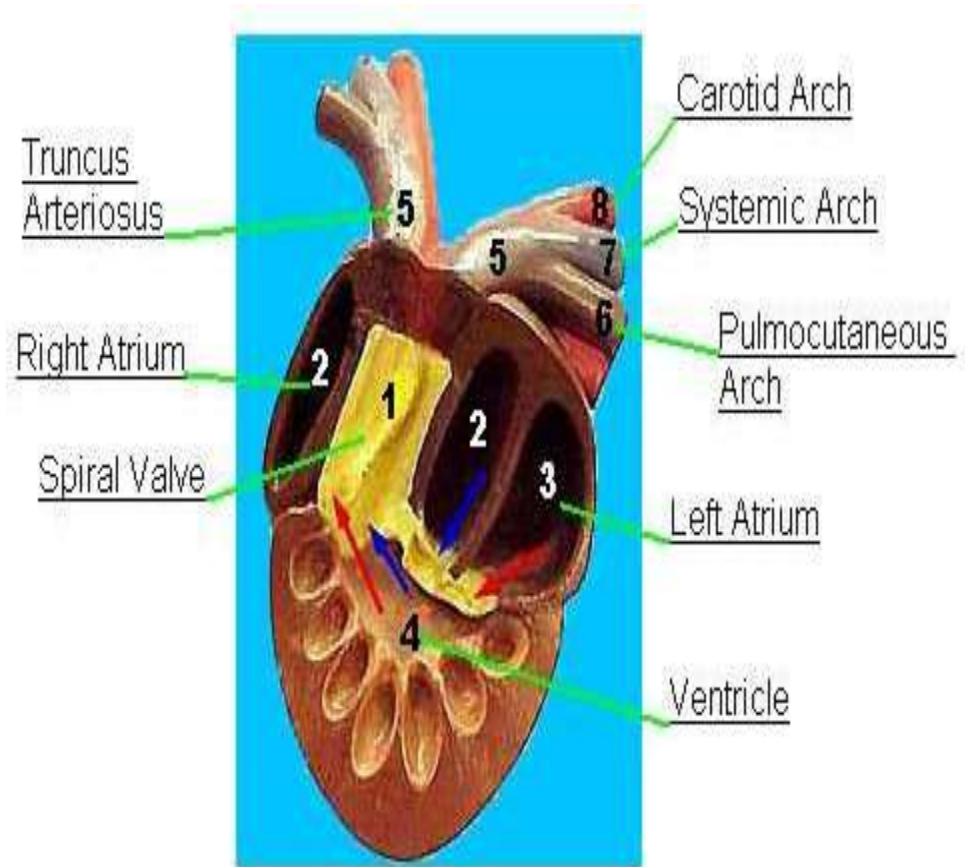
- The heart of shark has **only two chambers**, namely an auricle and a ventricle.
- On the dorsal side of the auricle there is a sac-like **sinous** which receives blood from all parts of the body.
- This opens into the auricle by an aperture.
- Auricle communicate with the ventricle.
- Ventricle is continued ventrally and forward by another swollen part called **conus arteriosus**.
- Conus extend forward **as ventral aorta**
- Heart of shark deals with **only deoxygenated blood**.

Fish-Heart



Amphibia Rana(Frog)

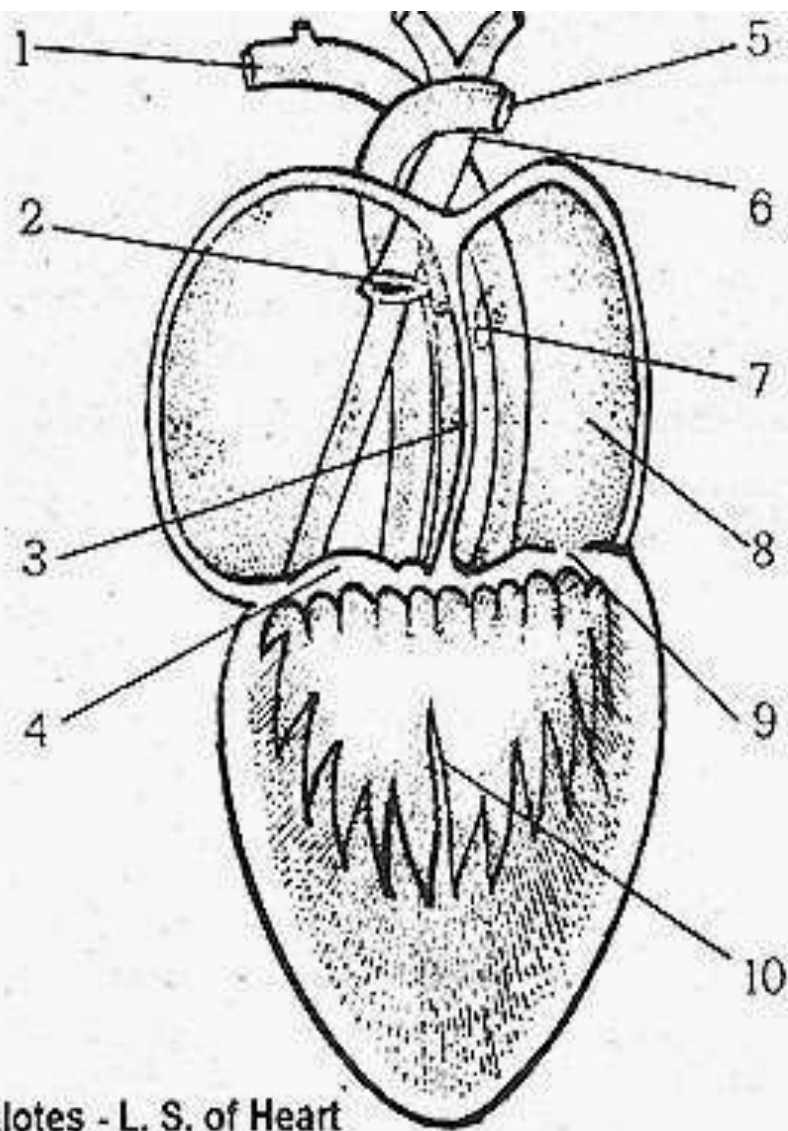
- ❑ The heart of frog has **2 auricles and one ventricle.**
- ❑ 2 auricles are separated by an interauricular septum.
- ❑ Sinus venosus on the dorsal side, opens into the right auricle through sinu-auricular aperture.
- ❑ Left auricle- oxygenated blood.
- ❑ The 2 auricles open into the ventricle by a common aperture which is guarded by the auriculo-ventricular valve.



Reptilia-Calotes (Lizard)

- The heart of reptiles show improvement over the amphibians.
- Sinus venosus merged with the right auricle.
- Right and left auricles are completely separated by interauricular septum.
- **The ventricle is also divided imperfectly into two halves.**
- Conus split upto the base into 2 vessels namely, pulmonary artery and aorta, that cross each other.

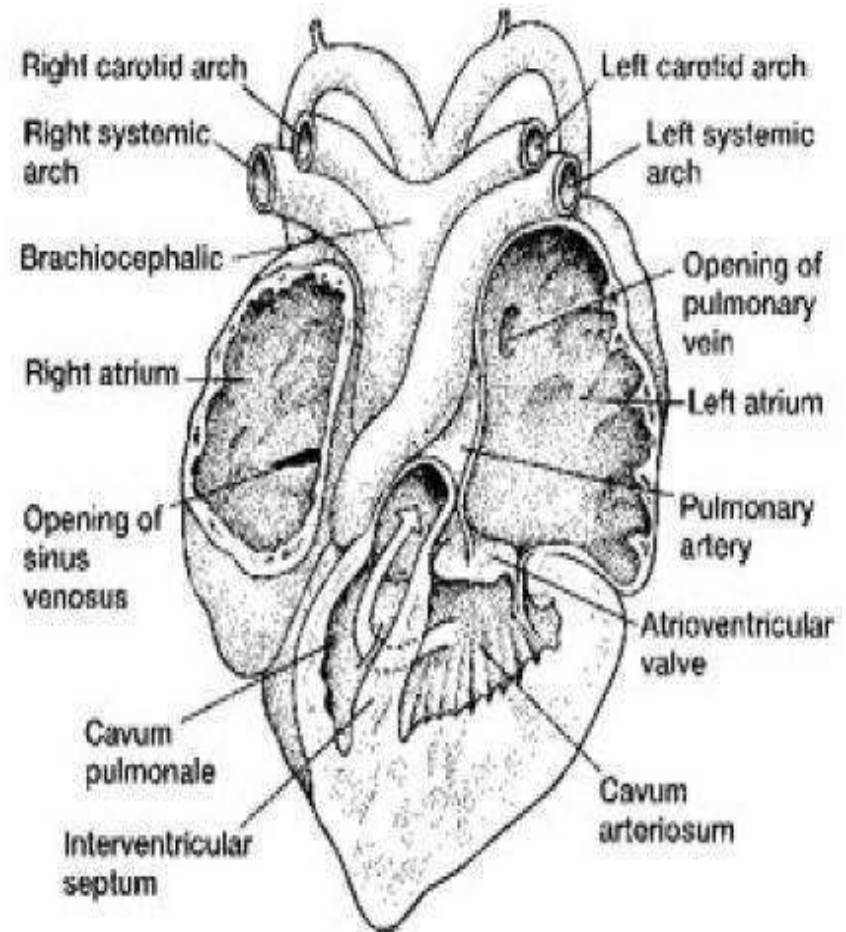




- 1) Right systemic arch
- 2) Sinu-arterial aperture
- 3) Inter-auricular septum
- 4) Right auriculo-ventricular valve
- 5) Left systemic arch
- 6) Pulmonary trunk
- 7) Pulmonary veins aperture
- 8) Left auricle septum
- 9) Left auriculo-ventricular valve
- 10) Interventricular septum

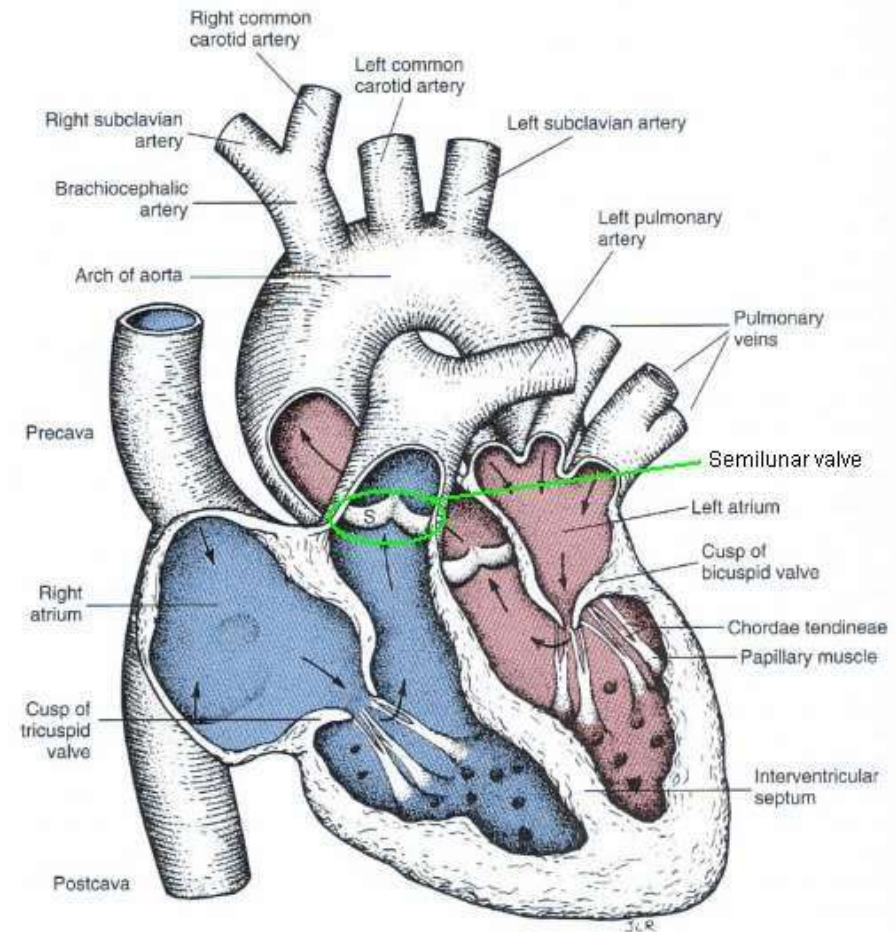
Aves- Columba (Pigeon)

- The first land vertebrates to have achieved **complete separation of pulmonary and systemic circulation.**
- Heart- large and 4 –chambered,
- **Sinus venosus and conus are absent.**
- RA- deoxygenated blood, 2 postcaval and 1 precaval vein
- LA- oxygenated blood, pulmonary vein.
- RA opens into RV by monocuspid valve.
- **LA opens into LV by bicuspid valve.**



Mammals- Oryctolagus (Rabbit)

- Heart- 4 chambered, completely divided auricle and ventricle.
- RA opens into RV by tricuspid valve.
- LA opens into LV by bicuspid valve.
- Wall of heart supplied by coronary arteries.



separation pulmonary and systemic
circulation and the complex
nature of the heart anatomy, over
the course of evolution shows
better division of labour.