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Assignment

M.Sc. Zoology
Semester-II

Title of Assignment: Comparative anatomy of Heart

4/5

17/8/19

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Roll Number: 04

- Summary :-

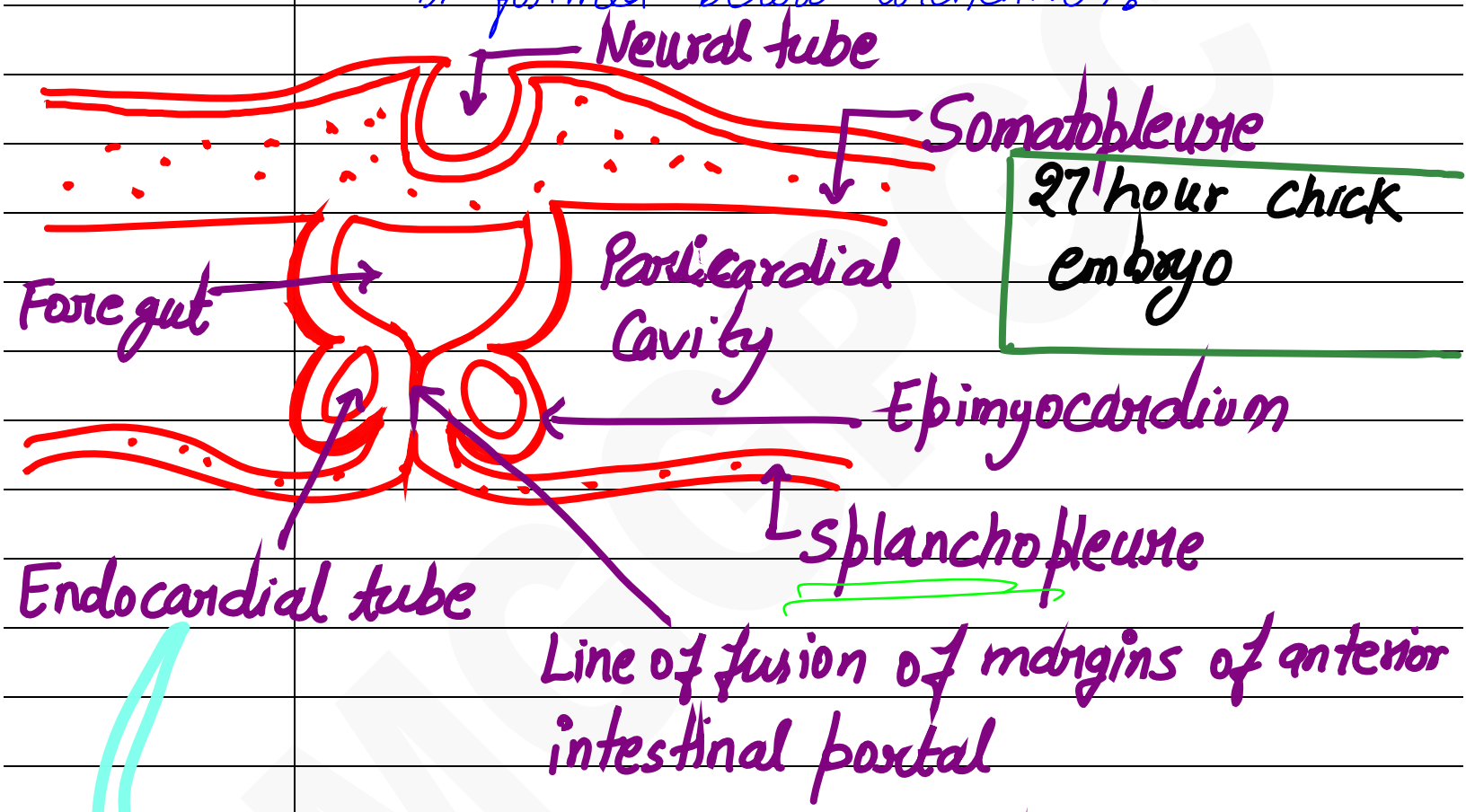
- Origin of heart
- Heart Introduction
- Details
- Comparative anatomy of hearts
- Internal structure of human heart
- Function of heart

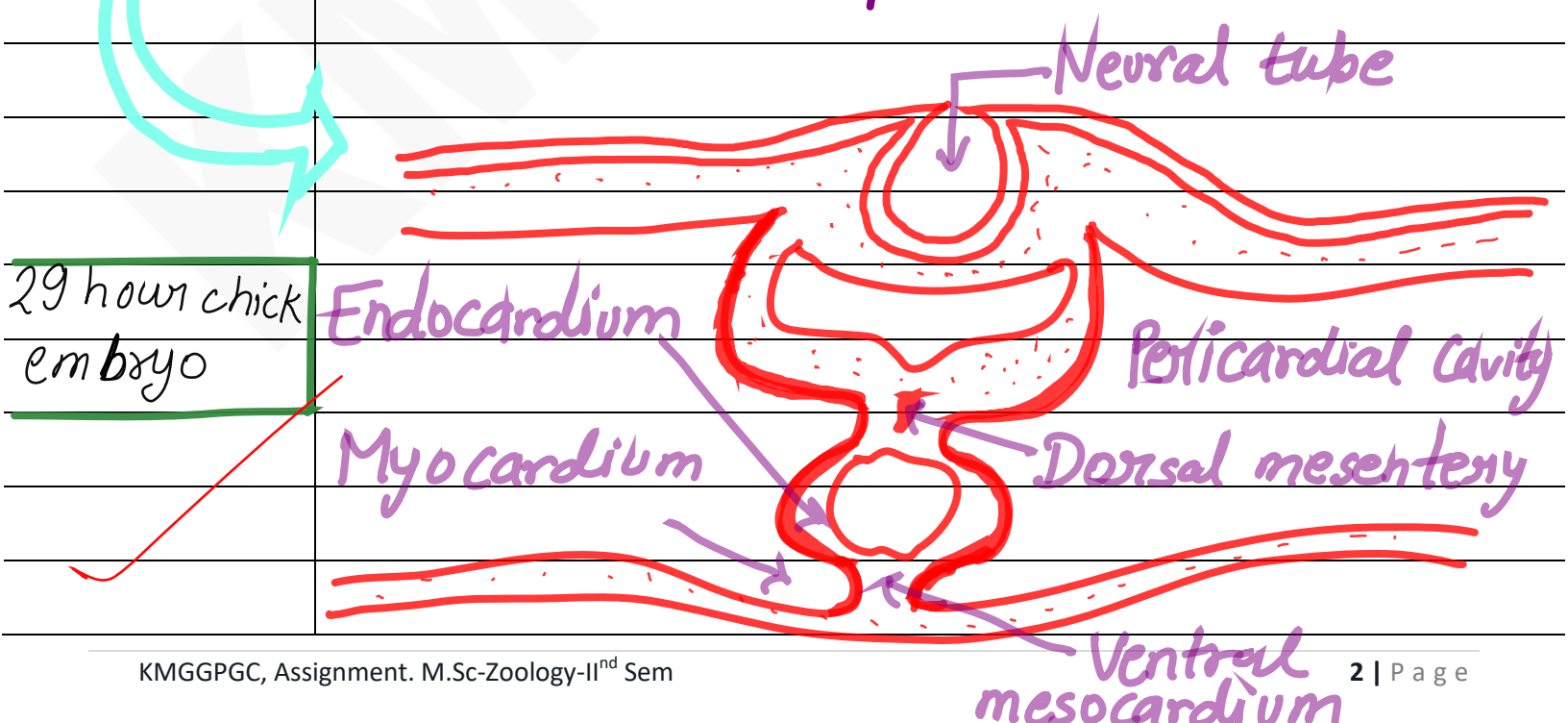
Origin is not required

Evolutionary aspect is missing

Origin of Heart :-

- Heart is a mesenchymal organ.
- Mesenchyme forms two endothelial tubes.
- The tubes fuse together & form heart. It is formed below archentron.





Heart :-

The heart is a muscular organ in most animals, which pumps blood through the blood vessels of the circulatory system. Blood provides the body with oxygen and nutrients.

- **Location :-** In humans, the heart is located between the lungs, in the middle compartement of the chest.

compartment

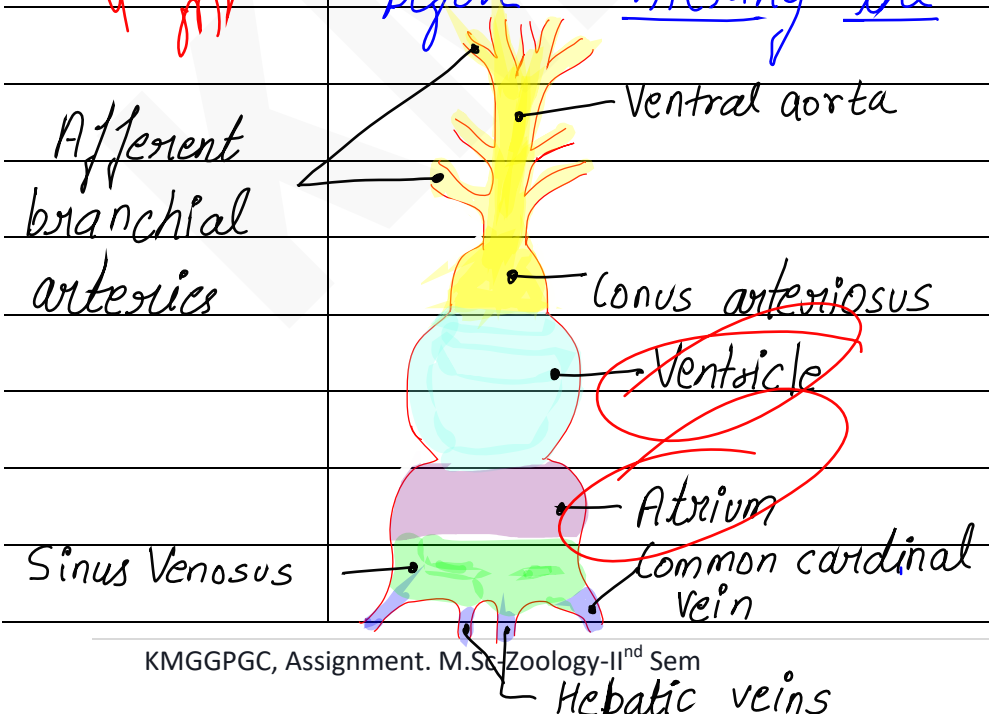
left

Details

System	Circulatory
Artery	Aorta, pulmonary trunk and right and left pulmonary arteries, right coronary artery, left main coronary artery
Vein	Superior vena cava, Inferior vena cava, right & left pulmonary veins, great cardiac vein, small cardiac vein, anterior cardiac vein
Nerve	Accelerans nerve, Vagus nerve

Comparative Anatomy of Hearts :-

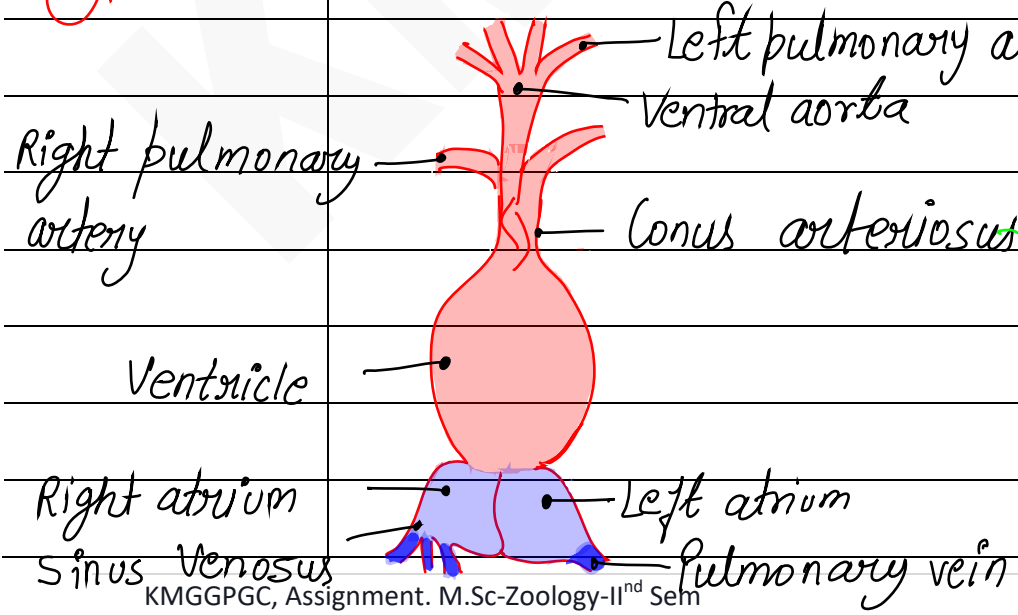
Two chambered heart :- The heart of fishes are two chambered heart, they have only one atrium and one ventricle. In that respect the fishes heart resembles the embryonic condition of all other vertebrate animal. Afferent branchial arteries develop from aortic arches 3, 4, 5 and 6 to supply blood to the gills. The conus arteriosus is a muscular extension of the ventrical which leads into the gills. The conus arterious is a muscular extension of the ventricle which leads into the ventral aorta. At the posterior end of the heart is the sinus venosus, a thin walled space where blood from the veins gathers before entering the atrium.

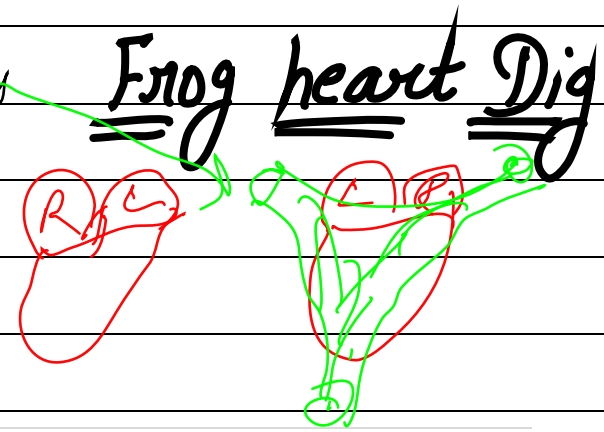


Fish heart Dig

Three Chambered heart :- The frog and other amphibians have three chambered heart. The heart has a divided atrium segment. The right atrium receives blood from systemic circulation, while the left atrium receives blood from the lungs. Oxygenated blood from the left atrium is then moved to the single ventricle where it is allowed to partially mix with deoxygenated blood from the right atrium. Blood from the right side of the ventricle is shifted by the spiral valve to the left and dorsal aspect of the conus arteriosus in order to pass into the pulmonary arteries. Blood from the left side of the ventricle is directed by the spiral valve to the ventral aorta in order to send higher oxygen blood to the systemic circulation.

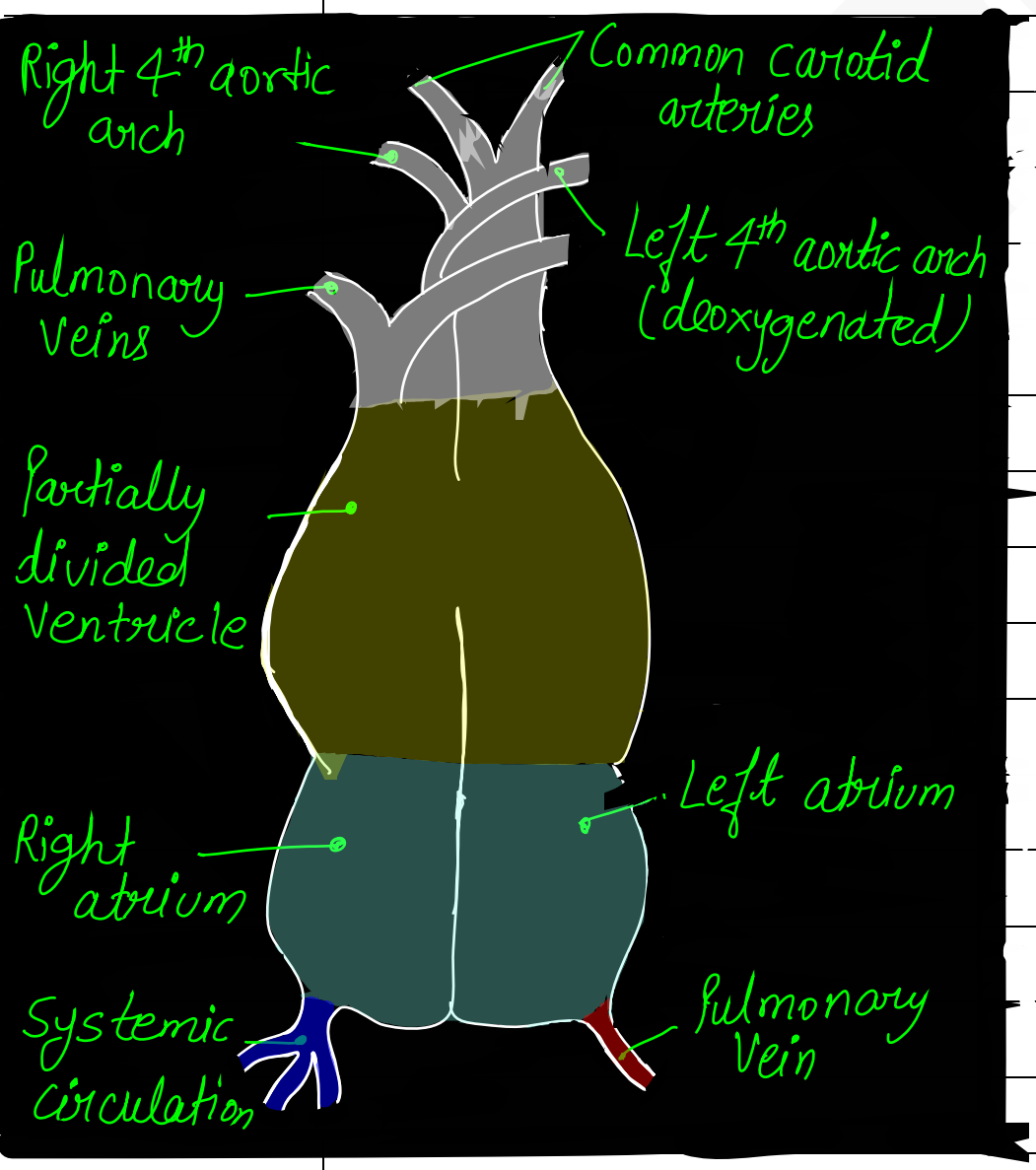
RA atrium of Bony fishes partially divided & for 2½ chamber

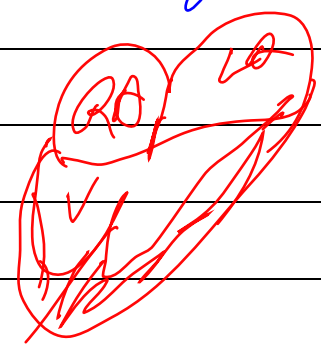




Three and half (3 ½) Chambered heart :-

Reptiles have 3½ cha heart. In the 3½ Cha. heart the ventricle is partially divided. This separation decreases the mixing of left side oxygenated blood with deoxygenated blood of the right Ventricle. Both the right fourth arch & left fourth arch supply blood to the dorsal aorta (as in fish & Amphibians). Left arch blood is deoxygenated & dilutes the oxygen saturation in the dorsal aorta when the lungs are used. This mixing can be beneficial in aquatic reptiles when submerged by not concentrating deoxygenated blood in one part of the system.

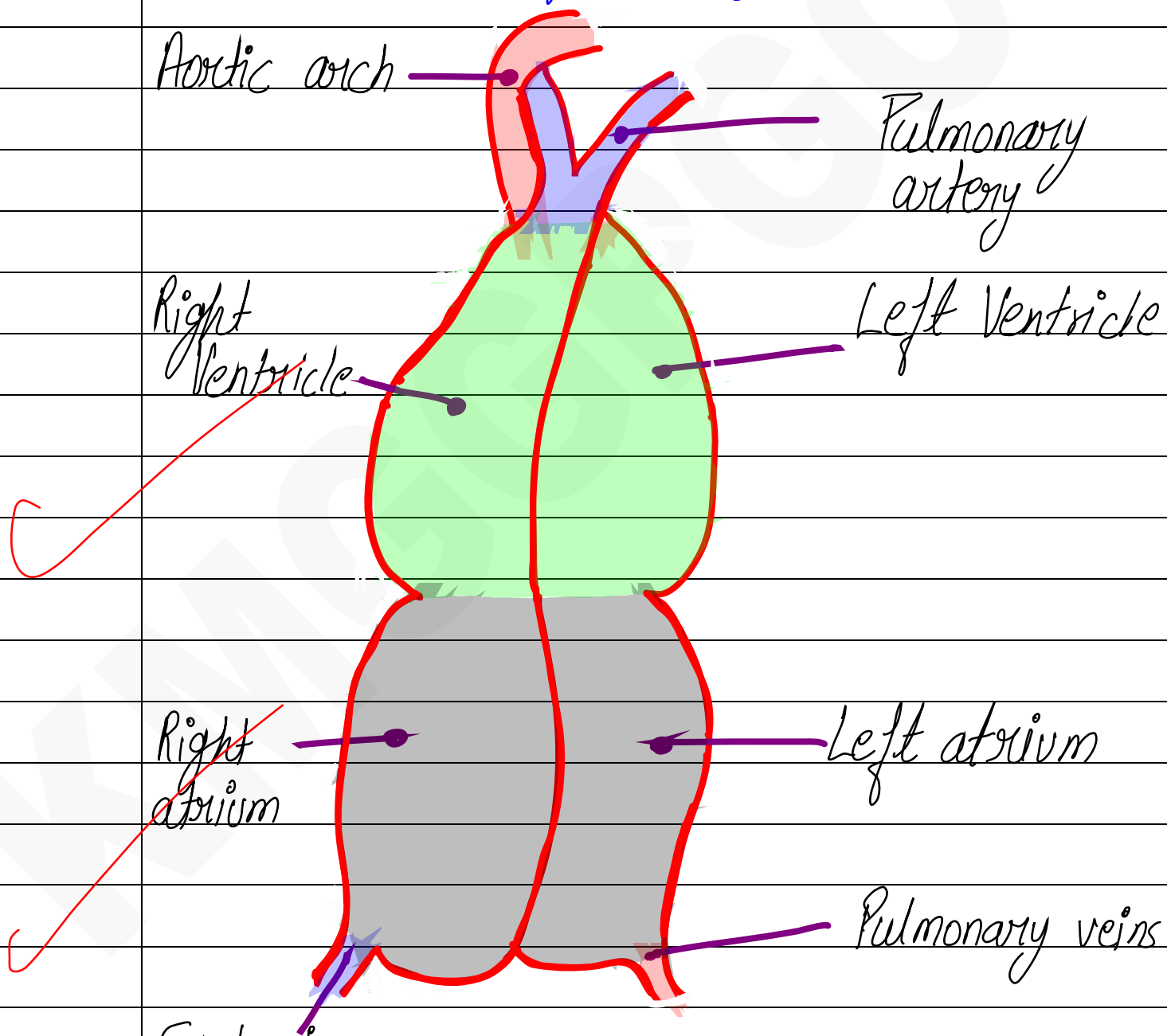




Fourth Chambered heart :- Both bird & mammals have 4 Chambered heart. Both the arterial and Ventricular regions of the heart are devided. The allows complete separation of the pulmonary circuit from the systemic circuit. Only a single aortic arch is involved in supplying the dorsal aorta, the left fourth arch in mammals and the right fourth arch in birds.

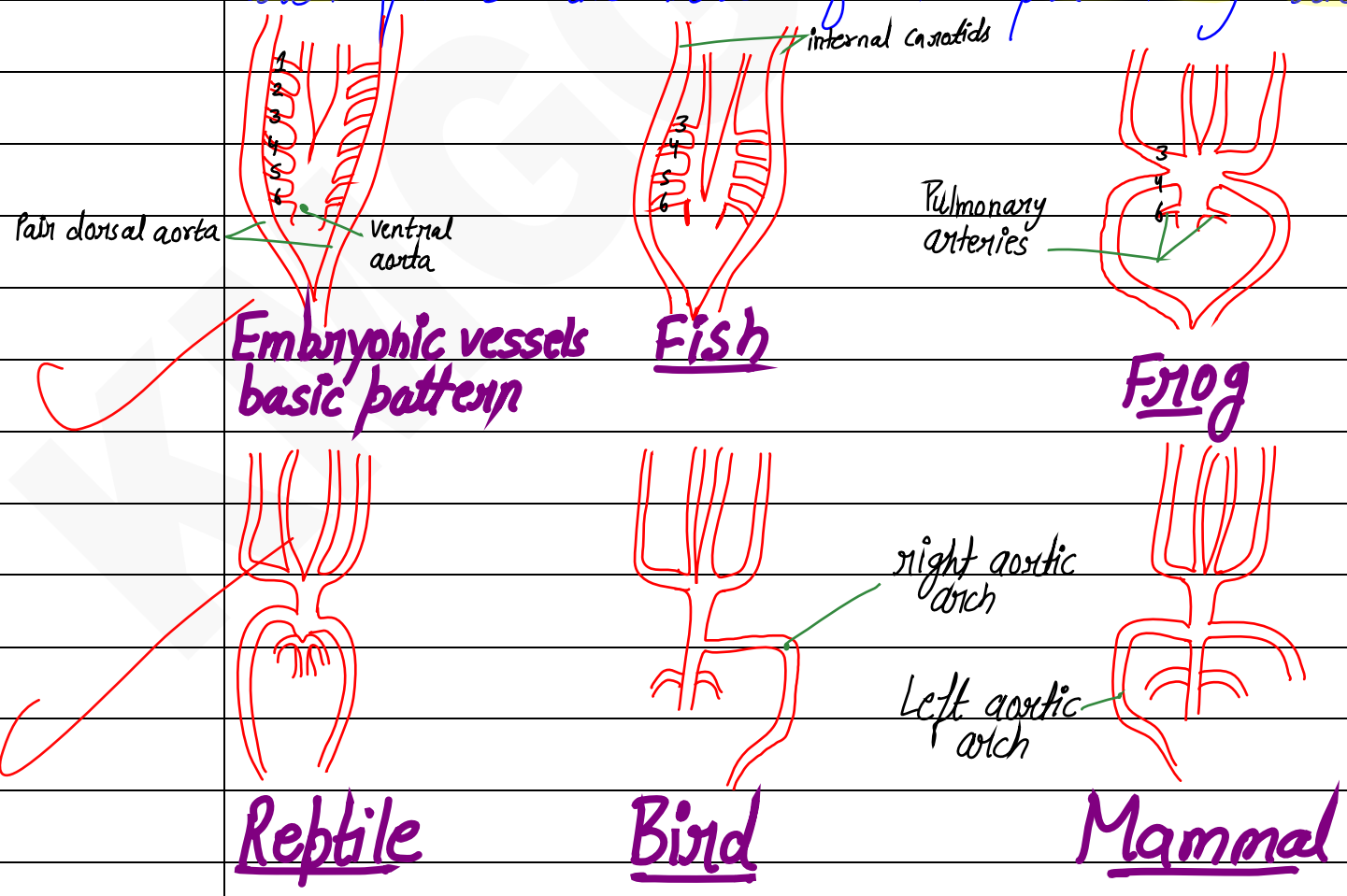
The aortic arches of vertebrate animals from the arterial supply route to the tissue. In the embryo aortic arches develop in associate with each of the developing pharyngeal arches. Typically a total of six arches come into being in the developmental process, although some are also lost early in their development. In the illustration below, the basic embryonic pattern of aortic circulation is shown, and the fates of those arches in several representative of the major vertebrate groups. Note that the ventral aorta extension remains as the external carotid in all groups, and the anterior extension of the dorsal aorta becomes cut off from the posterior reaches in most tetrapods to become the isolated internal

carioted (may remain connected in some amphibia-ns, but not frogs). Also the fourth arch becomes the primary supply to the dorsal aorta in all tetrapods, while the sixth aortic arch forms the base of the pulmonary arteries.

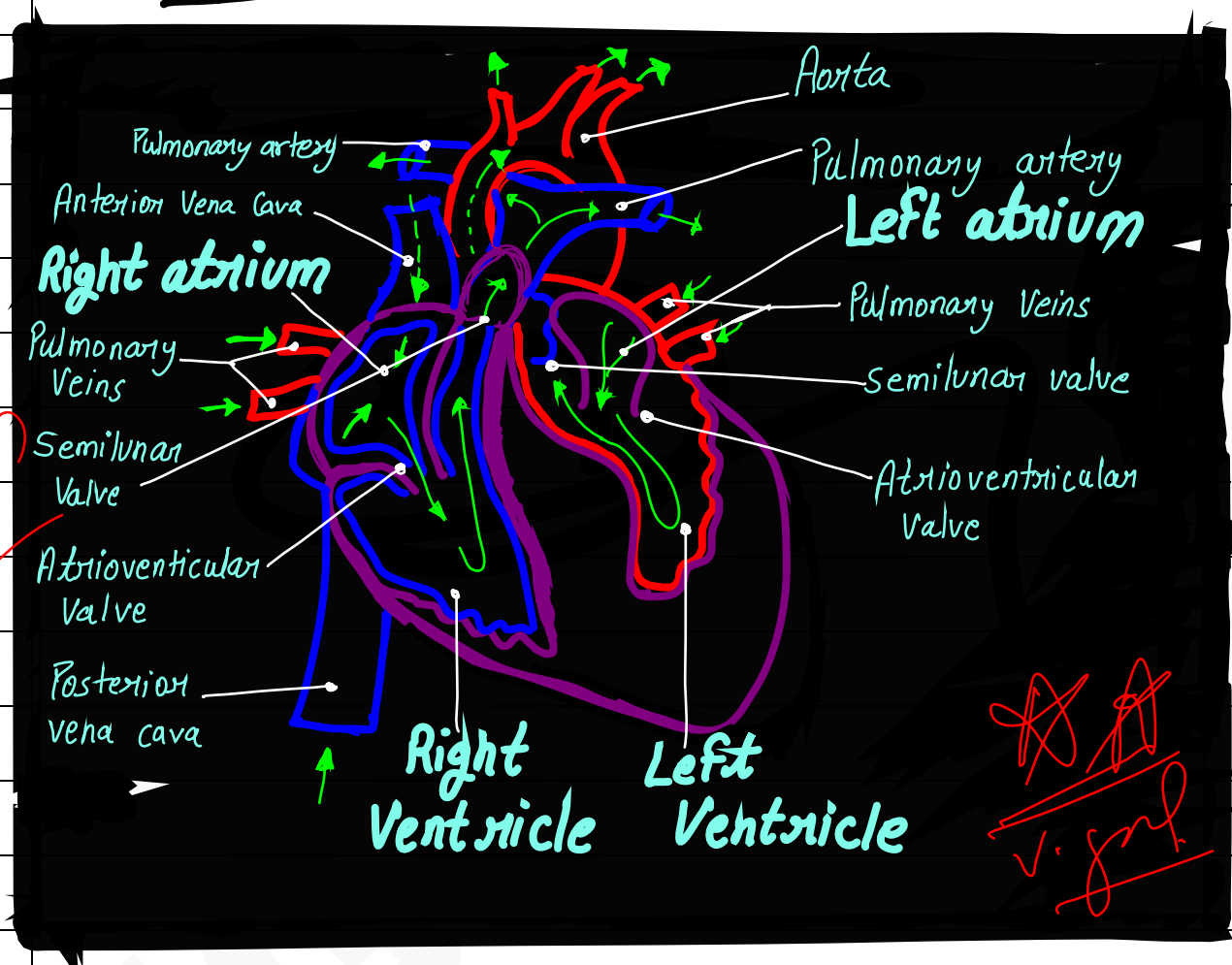


Mammalian heart

illustration below, the basic embryonic pattern of aortic circulation is shown, and the fates of those arches in several representatives of the major vertebrates groups. Note that the ventral aorta extension remains as the external carotid in all groups, and the anterior extension of the dorsal aorta becomes cut off from the posterior reaches in most tetrapods to become the isolated internal carotid. Also the fourth arch becomes the primary supply to the dorsal aorta in all tetrapods, while the sixth aortic arch forms the base of the pulmonary arteries.



Internal structure of Human heart :-



Double circulation

V. Imp

Functions of the heart :-

- Generating blood pressure
- Routing blood: heart separates pulmonary & systamic circulation
- Ensuring one-way blood flow
  Heart valves ensure one-way flow
- Regulation blood supply
  Changes in conc. rate & force match blood delivery to changing metabolic needs