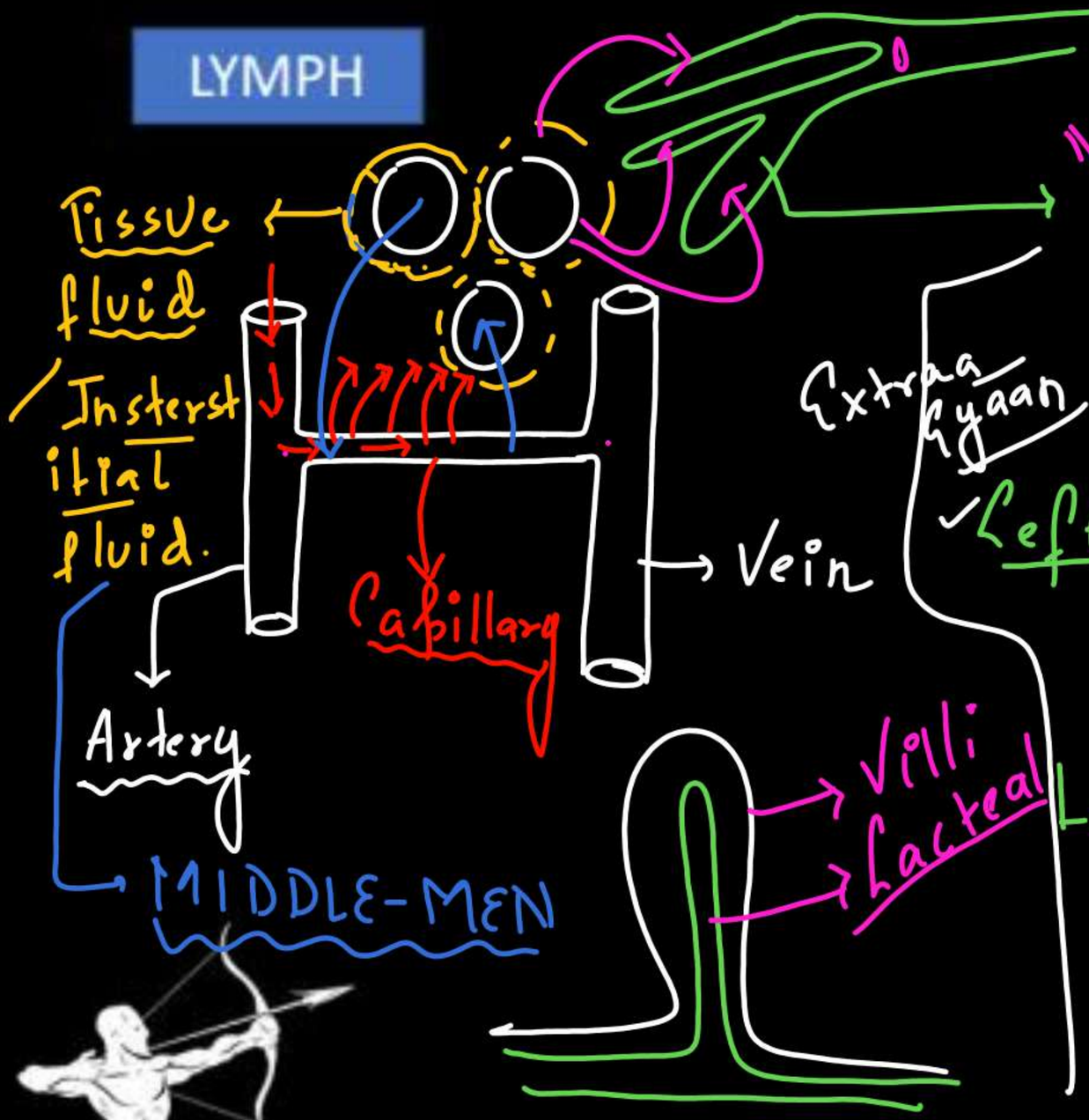
ARJUNA NEET BATCH

BODY FLUIDS AND ITS CIRCULATION-LECTURE -04

Objective of today's class

HUMAN CIRCULATORY SYSTEM – PART 1

LYMPH



→ Tissue fluid enters & now kla Lymph

Lymphatic capillary

Lymphatic vessel

→ acts as a filter for LYMPH.

Left thoracic duct

Lymph Nodes

Right Lymphatic vessel

Left Subclavian Vein

Right Subclavian vein

Superior Vena Cava

↓

HEART

Blood

→ Plasma + RBC + WBC + Platelets

→ All plasma protein present

→ Coagulate very fast.

→ WBC less

Lymph

→ Plasma + WBC

→ Larger proteins not found.

→ Slow Clotting

↳ Platelets absent

→ WBC ↑↑↑ (Lymph Nodes)

18.2 Lymph (Tissue Fluid)

As the blood passes through the capillaries in tissues, some water along with many small water soluble substances move out into the spaces between the cells of tissues leaving the larger proteins and most of the formed elements in the blood vessels. This fluid released out is called the interstitial fluid or tissue fluid. It has the same mineral distribution as that in plasma. Exchange of nutrients, gases, etc., between the blood and the cells always occur through this fluid. An elaborate network of vessels called the lymphatic system collects this fluid and drains it back to the major veins. The fluid present in the lymphatic system is called the lymph. Lymph is a colourless fluid containing specialised lymphocytes which are responsible for the immune responses of the body. Lymph is also an important carrier for nutrients, hormones, etc. Fats are absorbed through lymph in the lacteals present in the intestinal villi.

Middle Man

CIRCULATORY PATHWAYS

OPEN

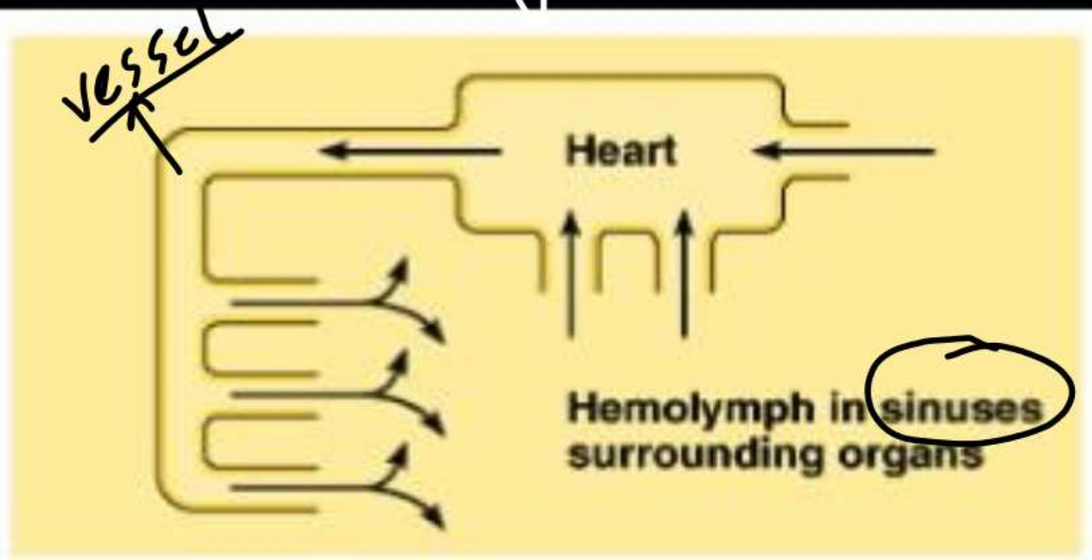
→ Blood passes through Large vessels into the open SPACES called SINUS.

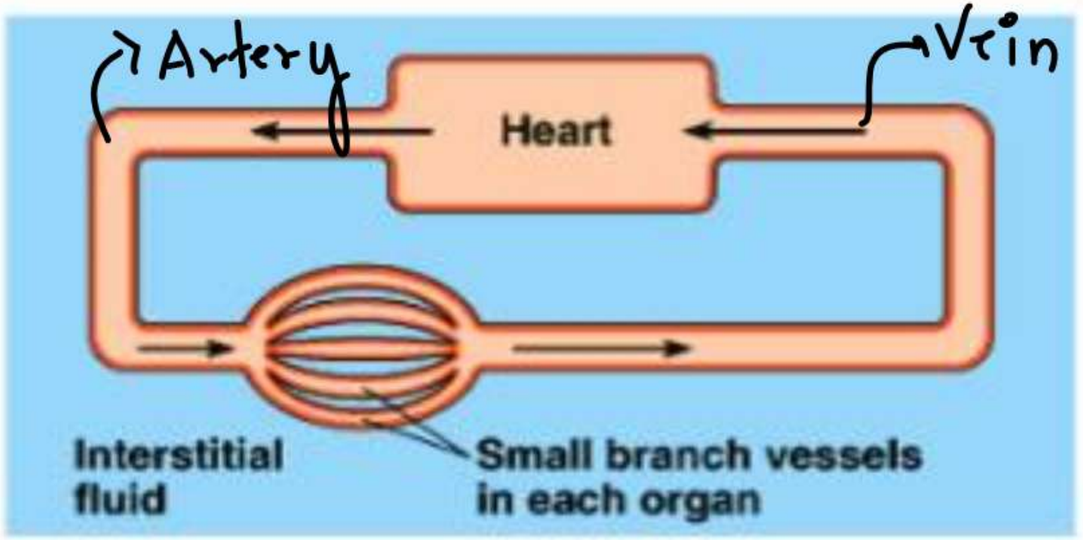
→ No capillary.

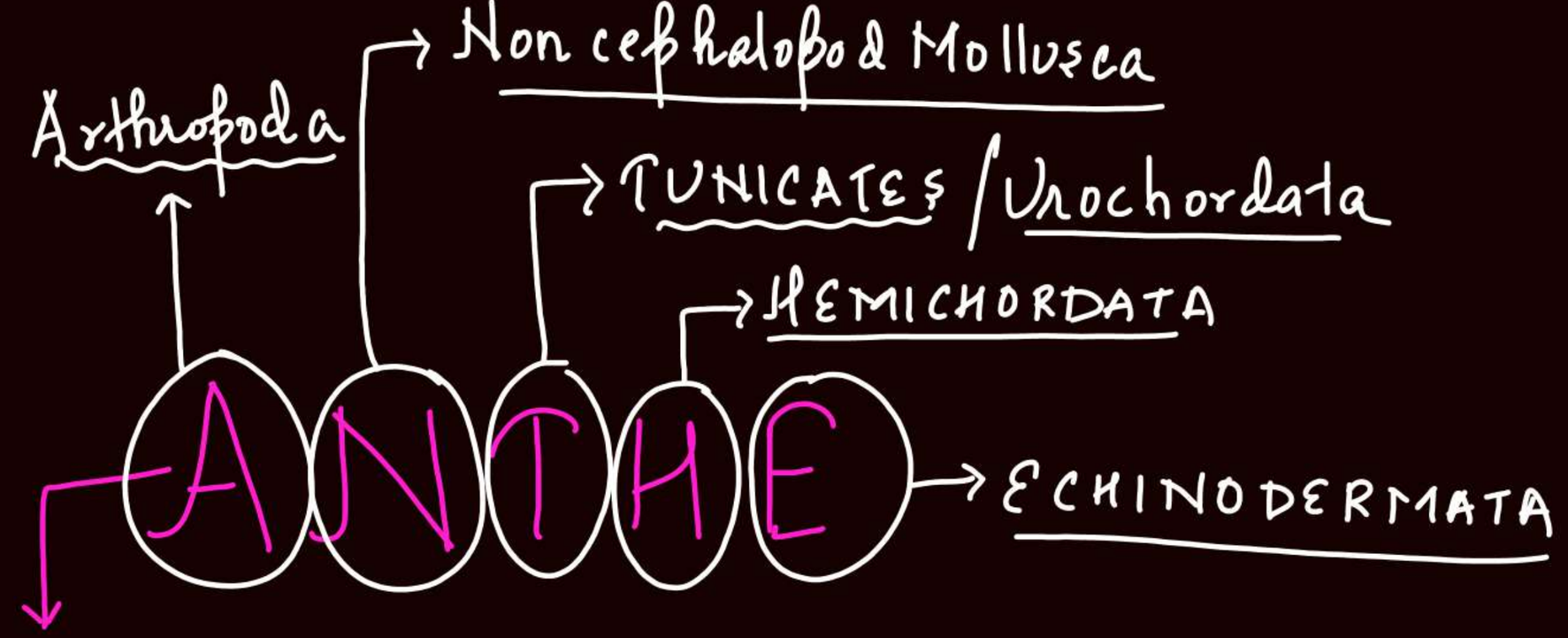
CLOSED

→ There is a closed network of Blood vessel.

→ Capillary present.







OPEN-CIRCULATORY SYSTEM

- Fishes
- Amphibian
- Reptiles
- Aves
- Mammal
- Annelida

} Closed

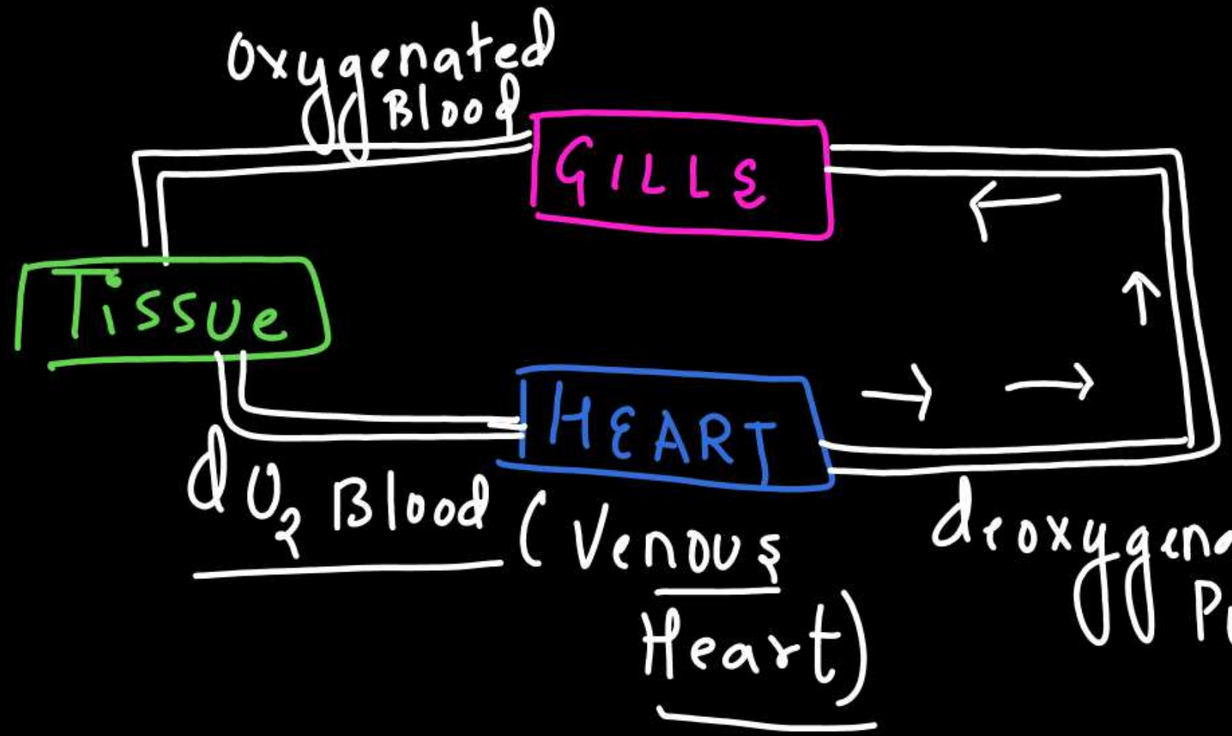
18.3 Circulatory Pathways

The circulatory patterns are of two types – open or closed. **Open circulatory system** is present in arthropods and molluscs in which blood pumped by the heart passes through large vessels into open spaces or body cavities called sinuses. Annelids and chordates have a **closed circulatory system** in which the blood pumped by the heart is always circulated through a closed network of blood vessels. This pattern is considered to be more advantageous as the flow of fluid can be more precisely regulated.

VERTEBRATE'S HEART

① FISH → 2 chambered Heart → 1 ATRIUM, 1 VENTRICLE

→ SINGLE CIRCULATION



PHYLUM CHORDATA

Note → Sub-Phylum Vertebrates

CLASS
- Fish
- Amphibia
- Reptiles
- Aves
- Mammal

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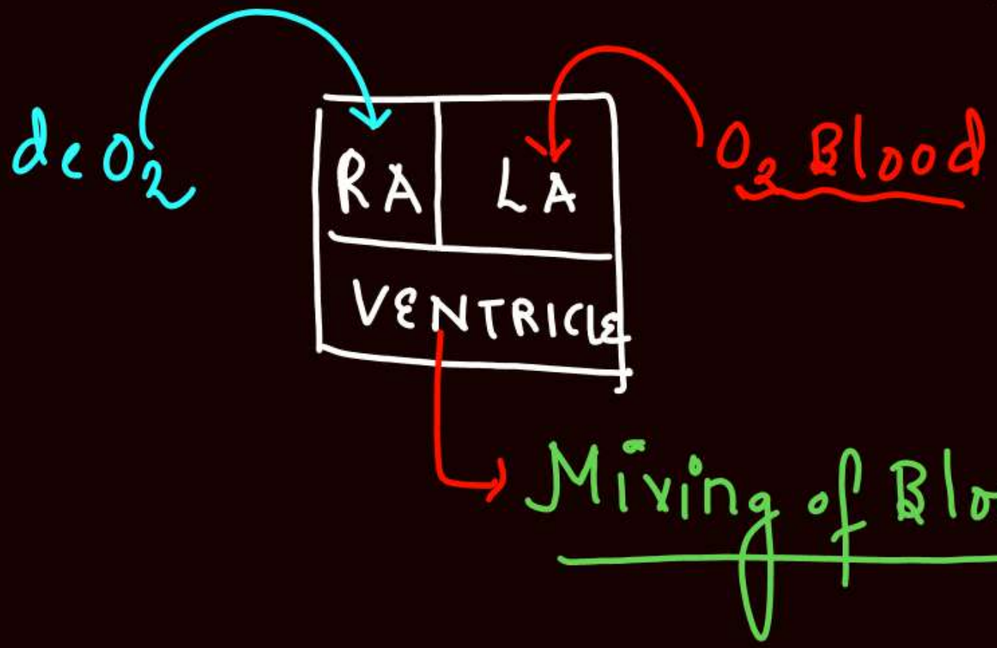
② Amphibian & Reptiles → 3 Chambered Heart

MIXED-CIRCULATION / INCOMPLETE Double Circ^{n}

2 Atrium

1 Ventricle



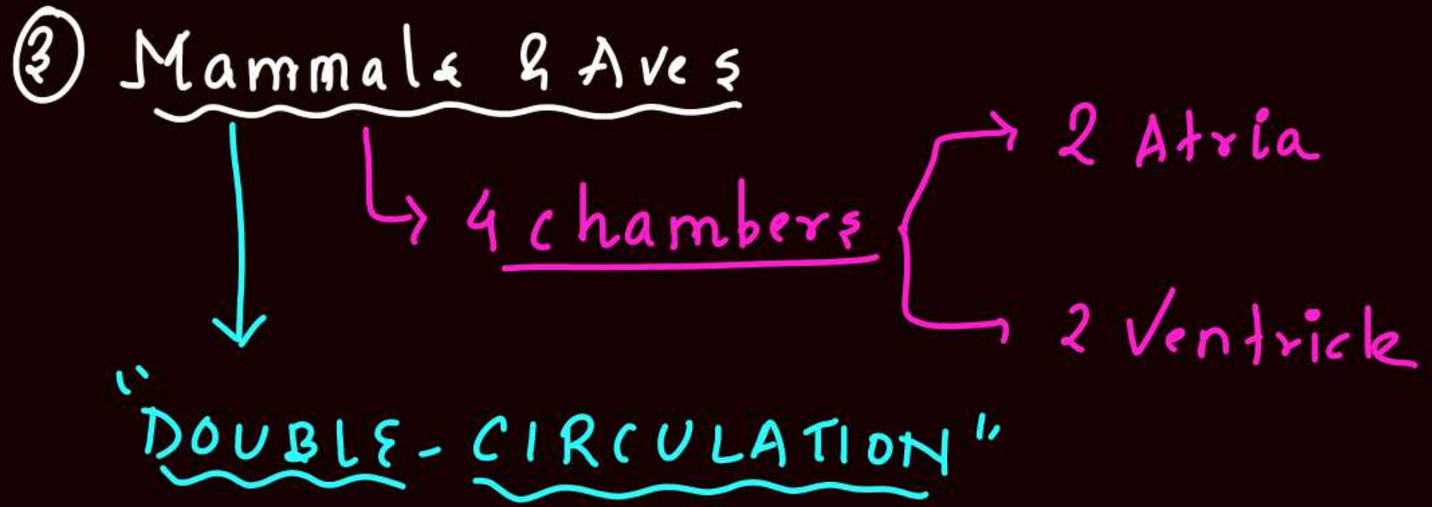
(Reptiles exception

≀

(Crocodile | Alligators)

↓

4 chamber


③ Mammals & Aves
4 chambers
2 Atria
2 Ventricle
"DOUBLE-CIRCULATION"

VERTEBRATE'S HEART

All vertebrates possess a muscular chambered heart. Fishes have a 2-chambered heart with an atrium and a ventricle. Amphibians and the reptiles (except crocodiles) have a 3-chambered heart with two atria and a single ventricle, whereas crocodiles, birds and mammals possess a 4-chambered heart with two atria and two ventricles. In fishes the heart pumps out deoxygenated blood which is oxygenated by the gills and supplied to the body parts from where deoxygenated blood is returned to the heart (single circulation). In amphibians and reptiles, the left atrium receives oxygenated blood from the gills/lungs/skin and the right atrium gets the deoxygenated blood from other body parts. However, they get mixed up in the single ventricle which pumps out mixed blood (incomplete double circulation). In birds and mammals, oxygenated and deoxygenated blood received by the left and right atria respectively passes on to the ventricles of the same sides. The ventricles pump it out without any mixing up, i.e., two separate circulatory pathways are present in these organisms, hence, these animals have double circulation. Let us study the human circulatory system.

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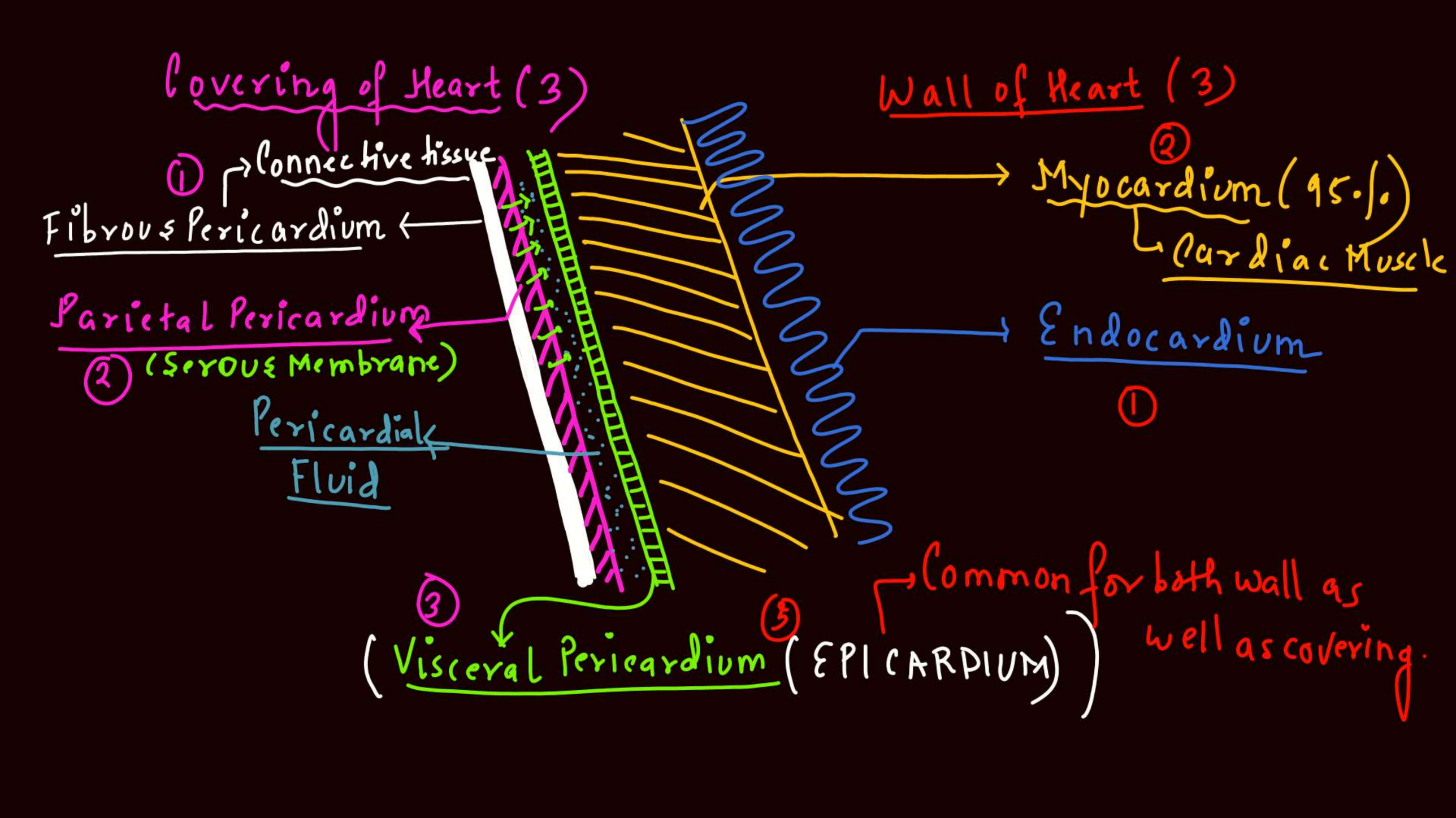
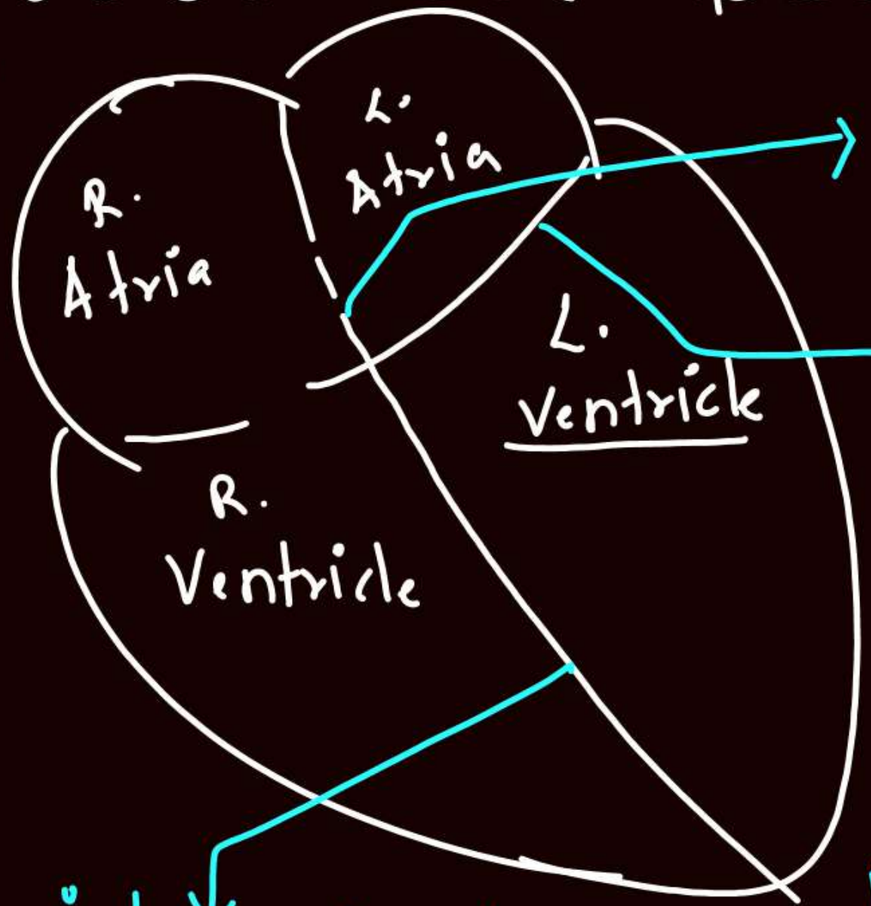
STRUCTURE OF HUMAN HEART

- Human Heart → MESODERMAL origin
- Human heart is MYOGENIC → Special Muscle in heart can initiate the Heart Beat on its own.
  - Arthropods → NEUROGENIC
- Heart is slightly tilted towards Left (Cardiac Notch is present in Left Lung), in the Mediastenum which is the space b/w the 2 Lungs.


Covering of Heart (3)
① Connective tissue
Fibrous Pericardium
Parietal Pericardium
② (Serous Membrane)
Pericardial Fluid
③
(Visceral Pericardium ④ (EPICARDIUM))
Common for both wall as well as covering.
Wall of Heart (3)
② Myocardium (95%)
Cardiac Muscle
Endocardium
①

External Structure of Heart:



→ inter-atrial Sulcus → is a external boundary

→ Atrio-ventricular Sulcus / Coronary Sulcus

Internal Structure of HEART