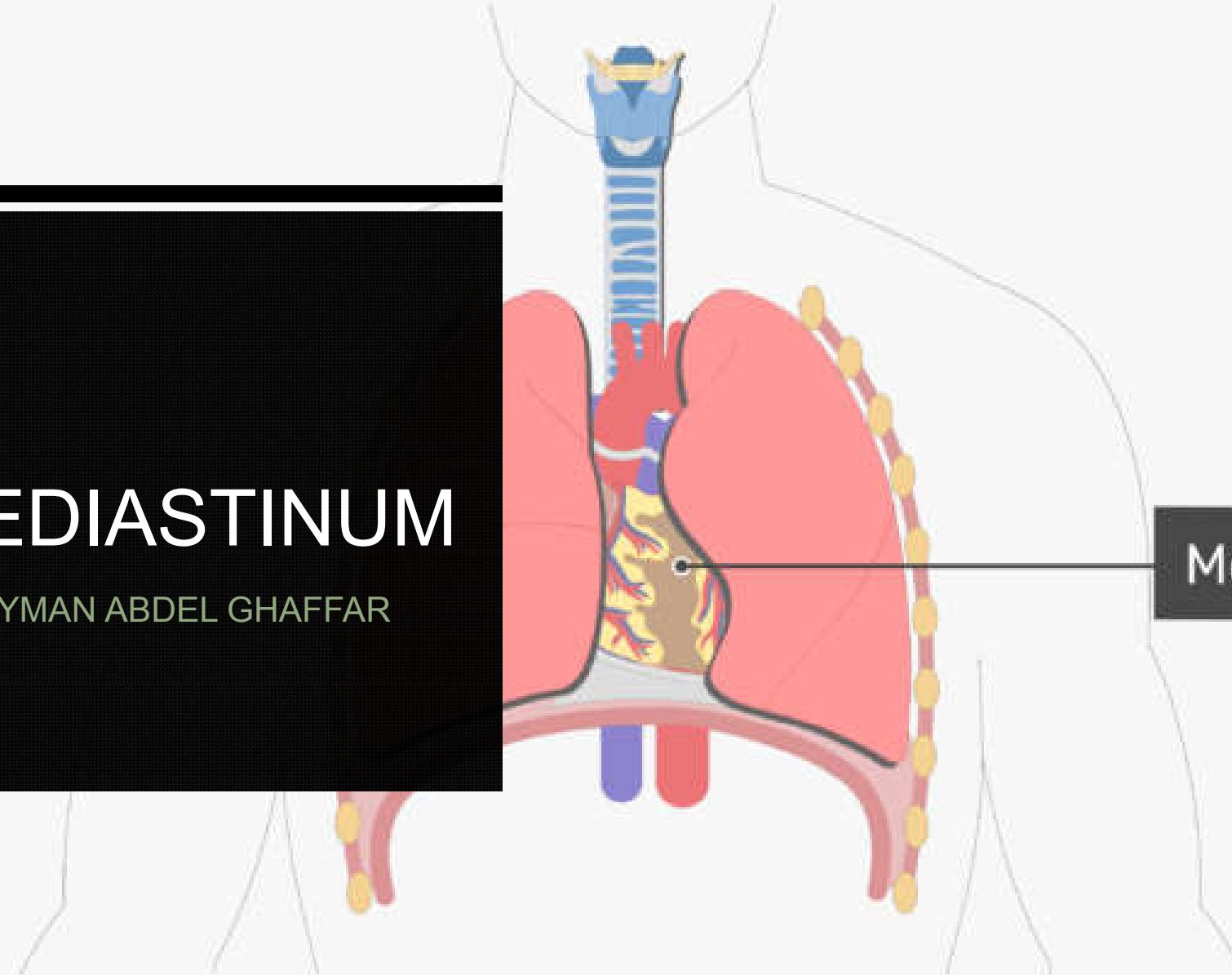
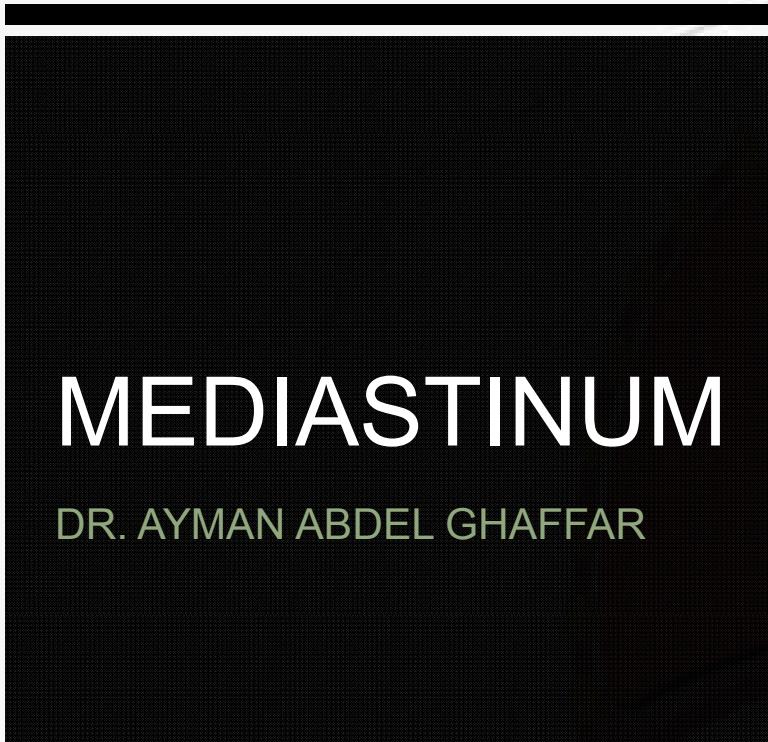


# MEDIASTINUM

DR. AYMAN ABDEL GHAFFAR

Mediastinum



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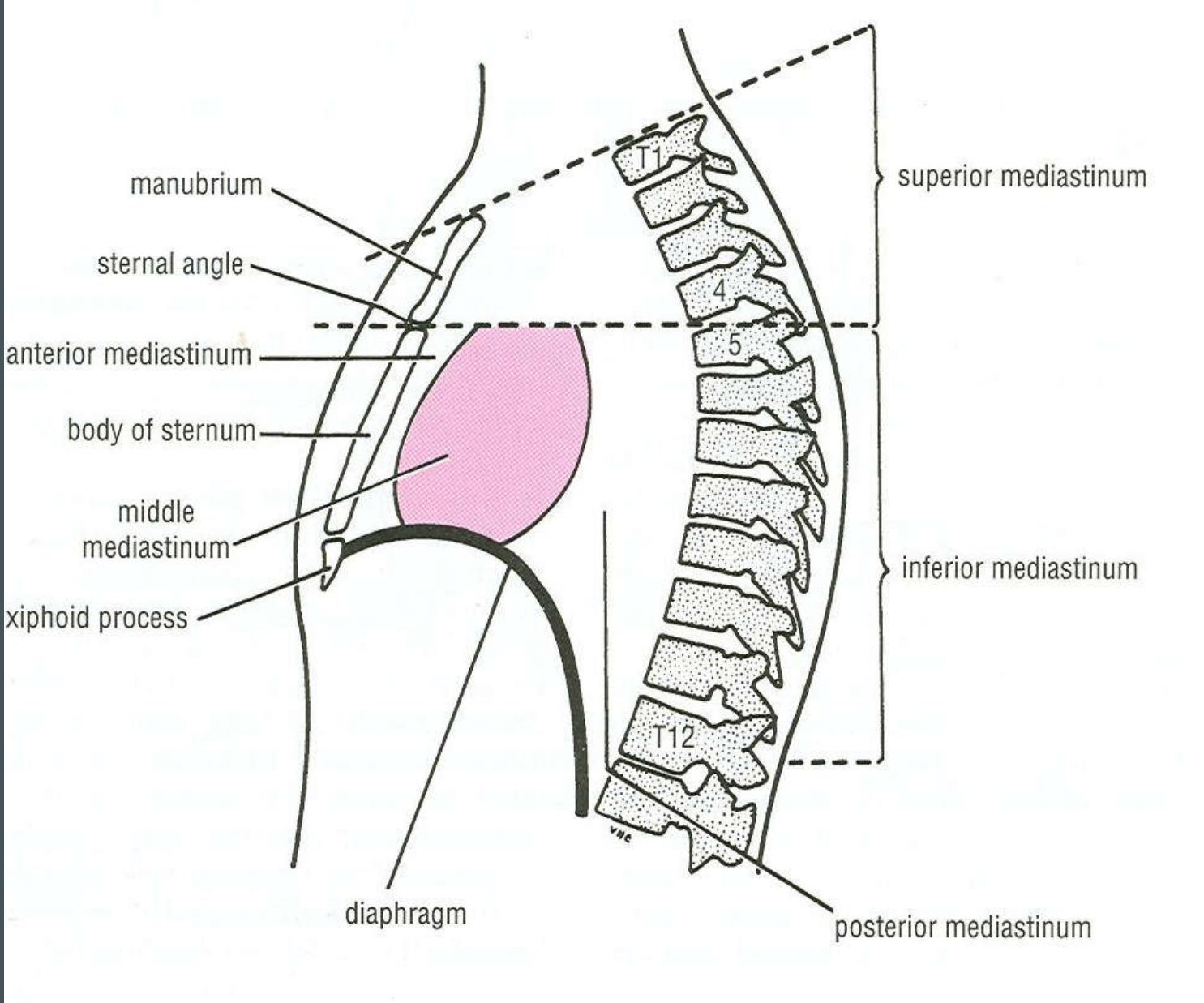
# DEFINITION

It is a partition between the right & left pleural sacs. It includes all the structures which lie in the intermediate compartments of the thoracic cavity.

# DIVISIONS OF MEDIASTINUM

- It is divided by a horizontal plane extending from sternal angle to lower border of 4<sup>th</sup> thoracic vertebra into:
  1. Superior mediastinum: above the plane
  2. Inferior mediastinum: below the plane, it is subdivided into:
    - Anterior mediastinum: in front of pericardium
    - Middle mediastinum: contains heart & pericardium
    - Posterior mediastinum: behind pericardium

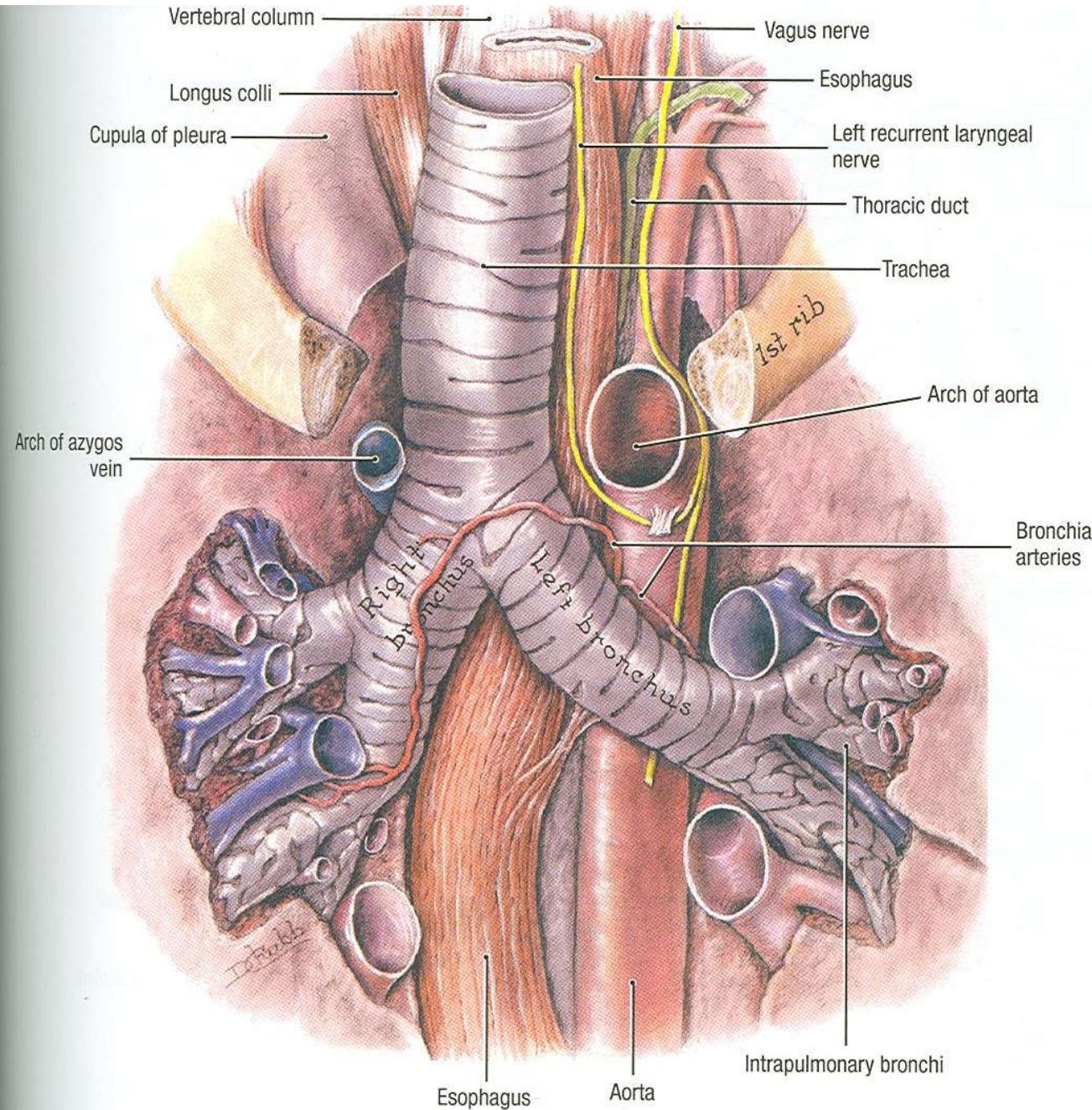
# DIVISIONS OF MEDIASTIN UM



# SUPERIOR MEDIASTINUM

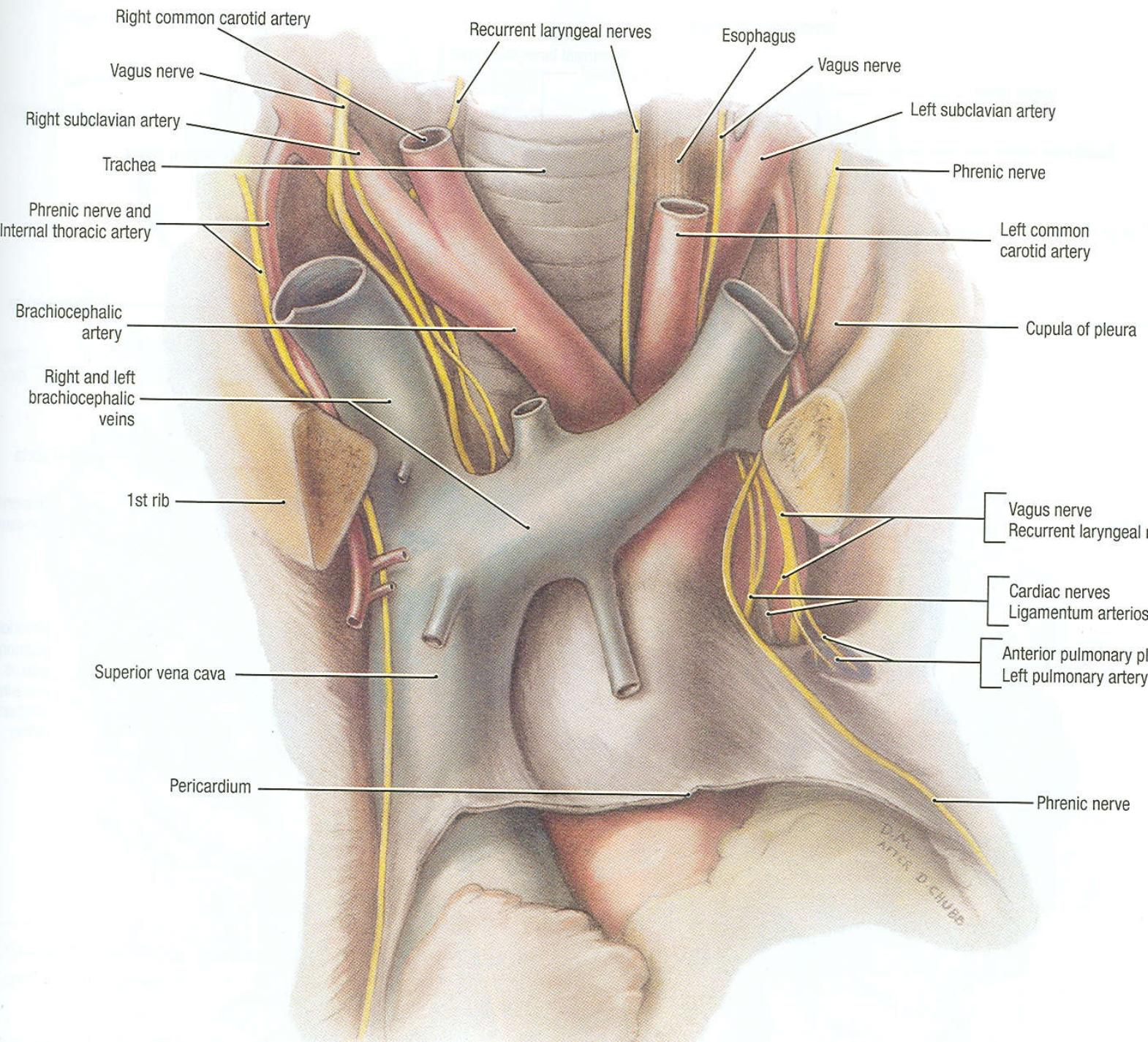
## BOUNDARIES:

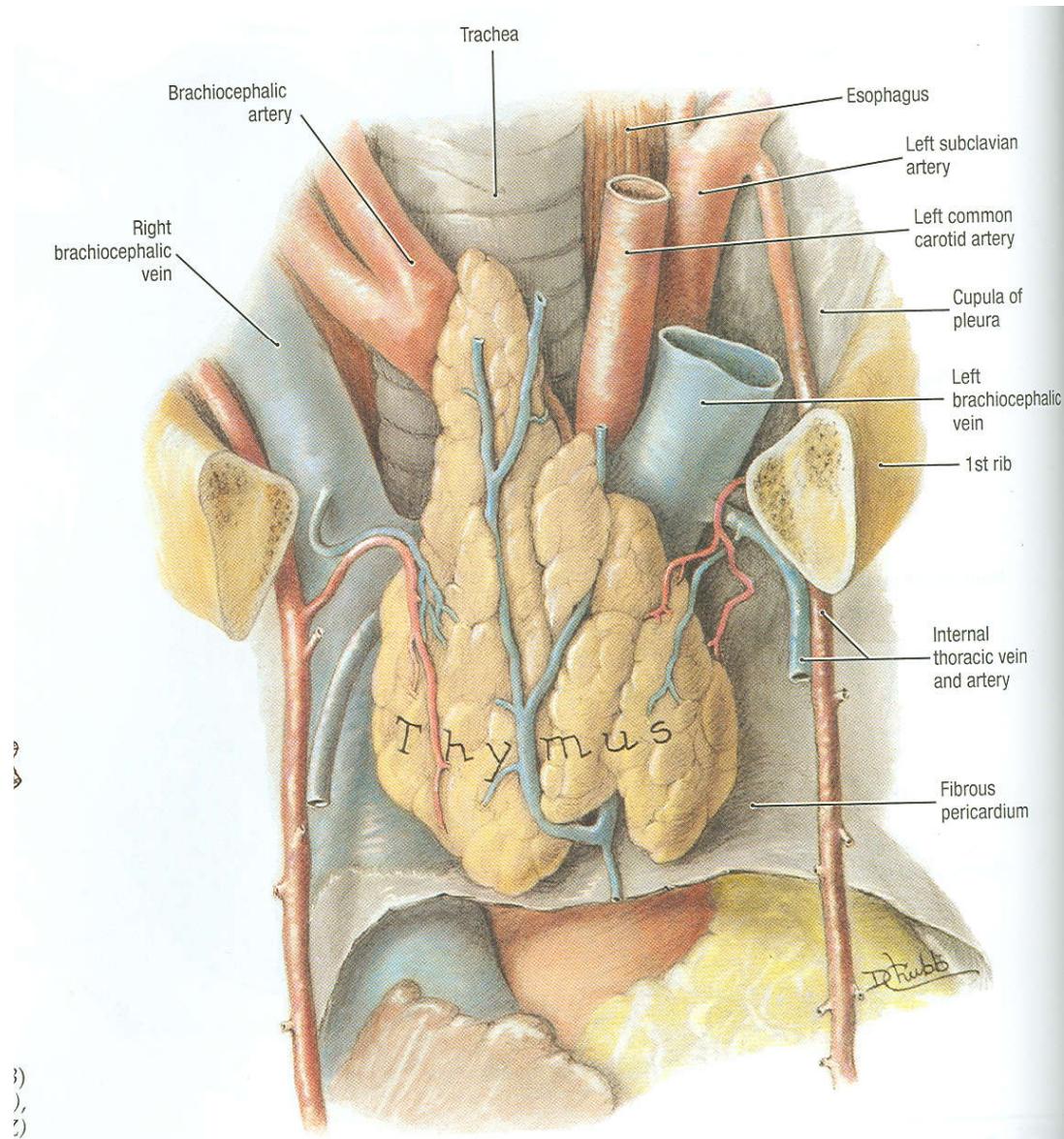
- *Anterior:* manubrium sterni
- *Posterior:* Upper 4 thoracic vertebrae
- *Superior:* Plane of thoracic inlet
- *Inferior:* Horizontal plane
- *On each side:* Pleura



# SUPERIOR MEDIASTINU M

# SUPERIOR MEDIASTINUM





# SUPERIOR MEDIASTINUM

# SUPERIOR MEDIASTINUM

## CONTENTS:

- ***FROM BEHIND FORWARD:***

1. Esophagus
2. Trachea
3. Arch of aorta & its 3 branches: brachiocephalic, left common carotid & left subclavian arteries
4. Right & left brachiocephalic veins & superior vena cava
5. Thymus gland

# SUPERIOR MEDIASTINUM

## OTHER CONTENTS:

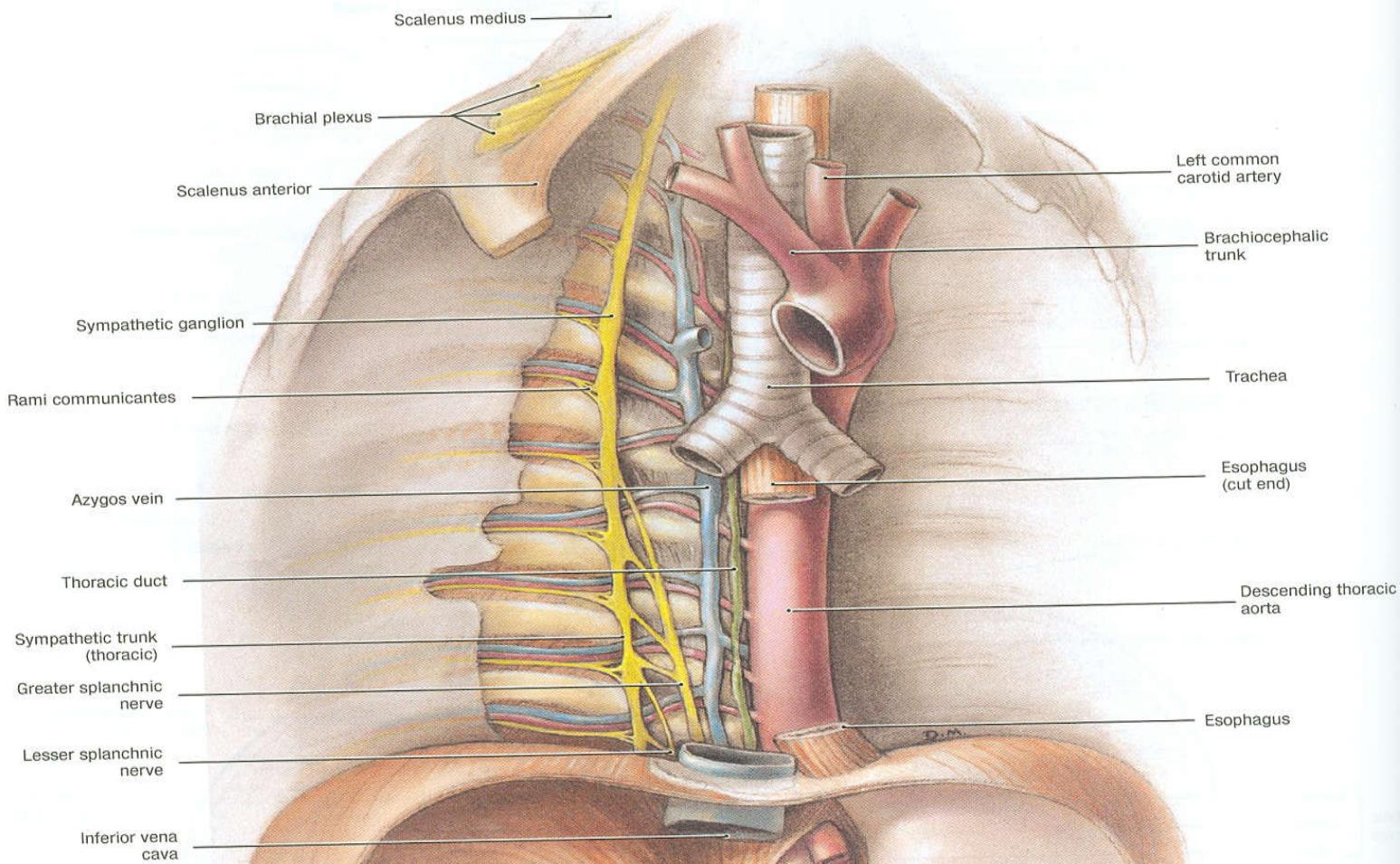
- **Nerves:**
  1. Right & left vagus
  2. Right & left phrenic
  3. Right & left sympathetic trunks
  4. Left recurrent laryngeal
- **Lymphatic structures:**
  1. Thoracic duct
  2. Lymph nodes

# POSTERIOR MEDIASTINUM

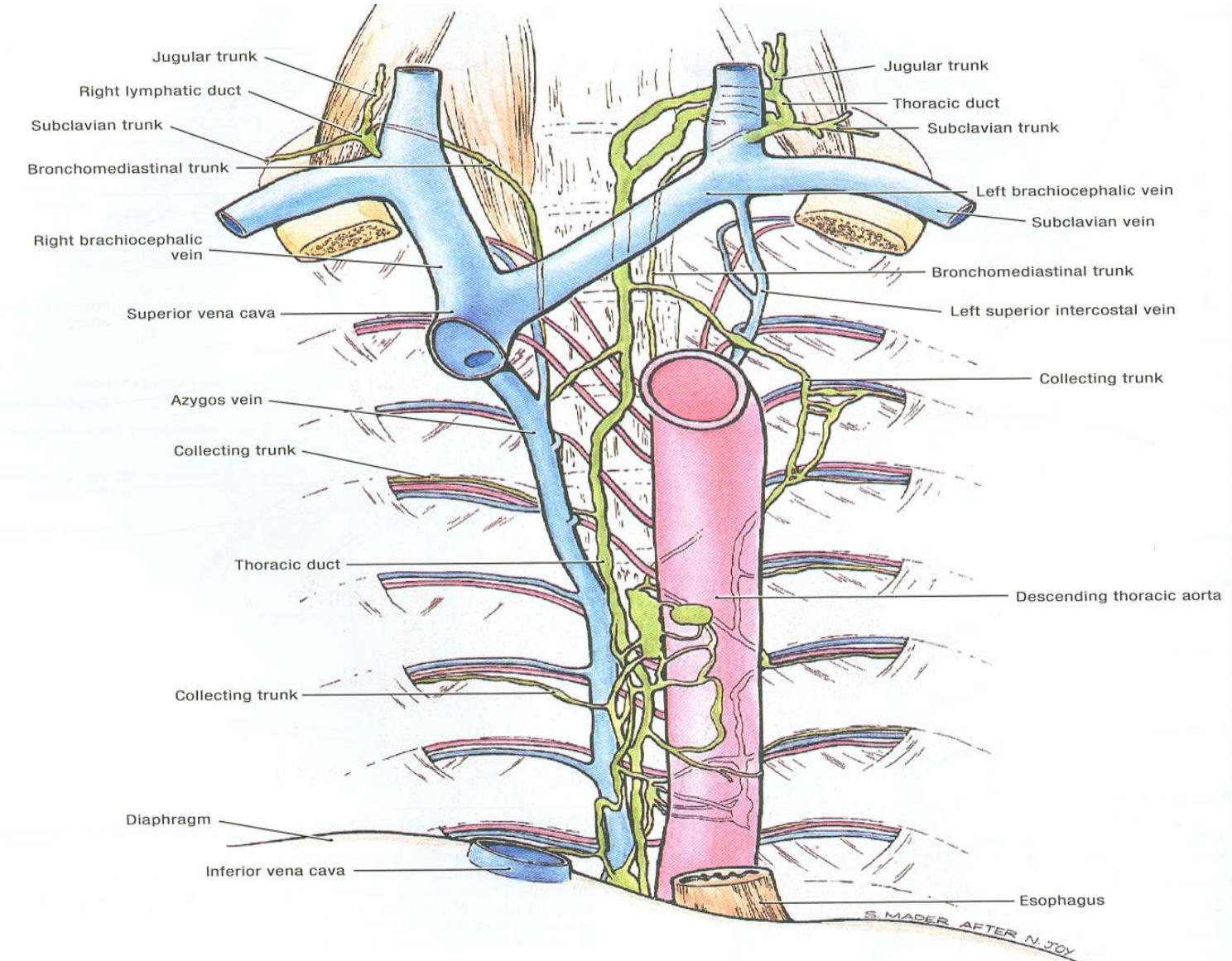
## BOUNDARIES:

- *Anterior:* Pericardium & diaphragm
- *Posterior:* Lower 8 thoracic vertebrae
- *Superior:* Horizontal plane
- *Inferior:* Diaphragm
- *On each side:* Pleura

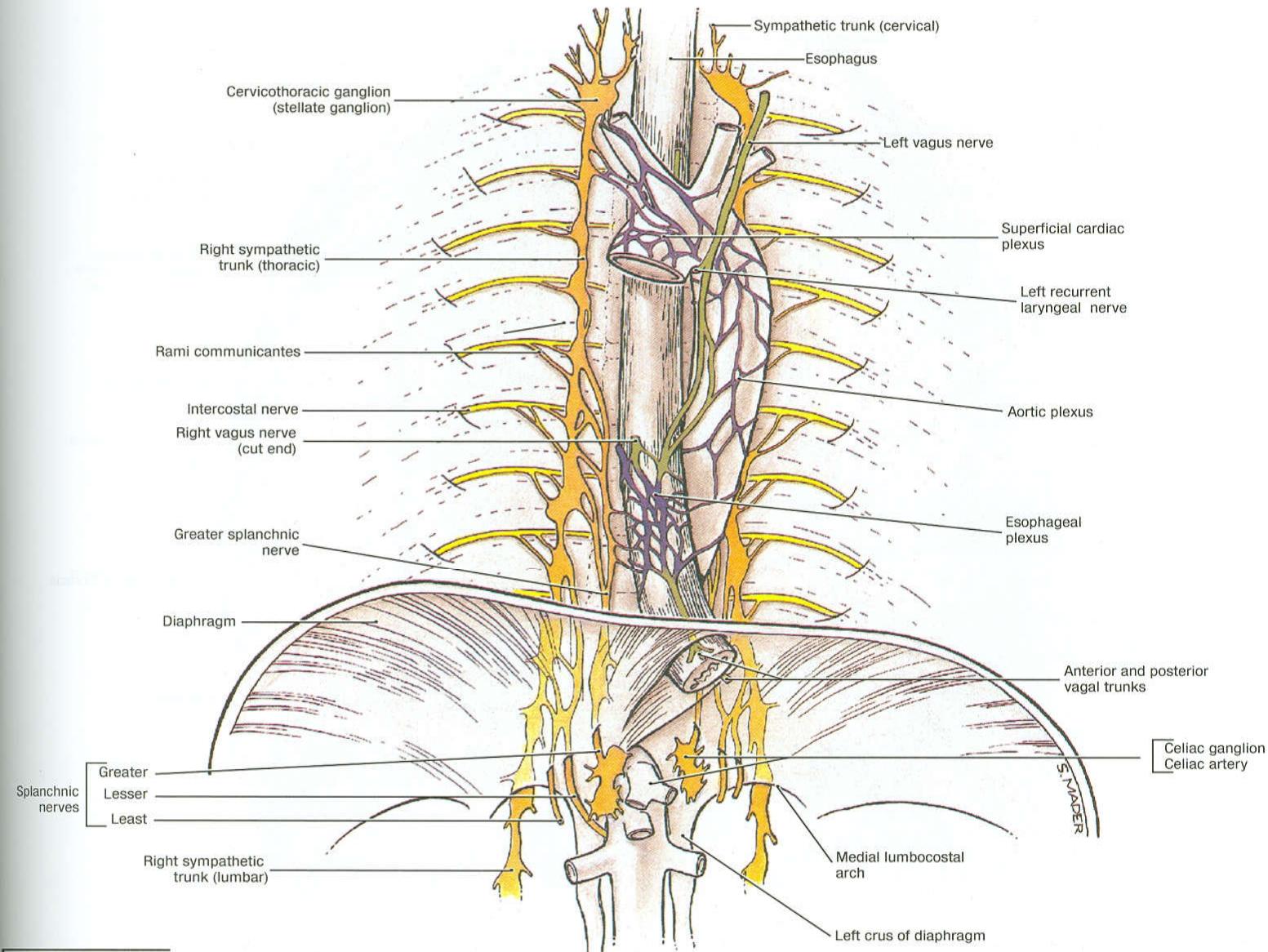
# POSTERIOR MEDIASTINUM



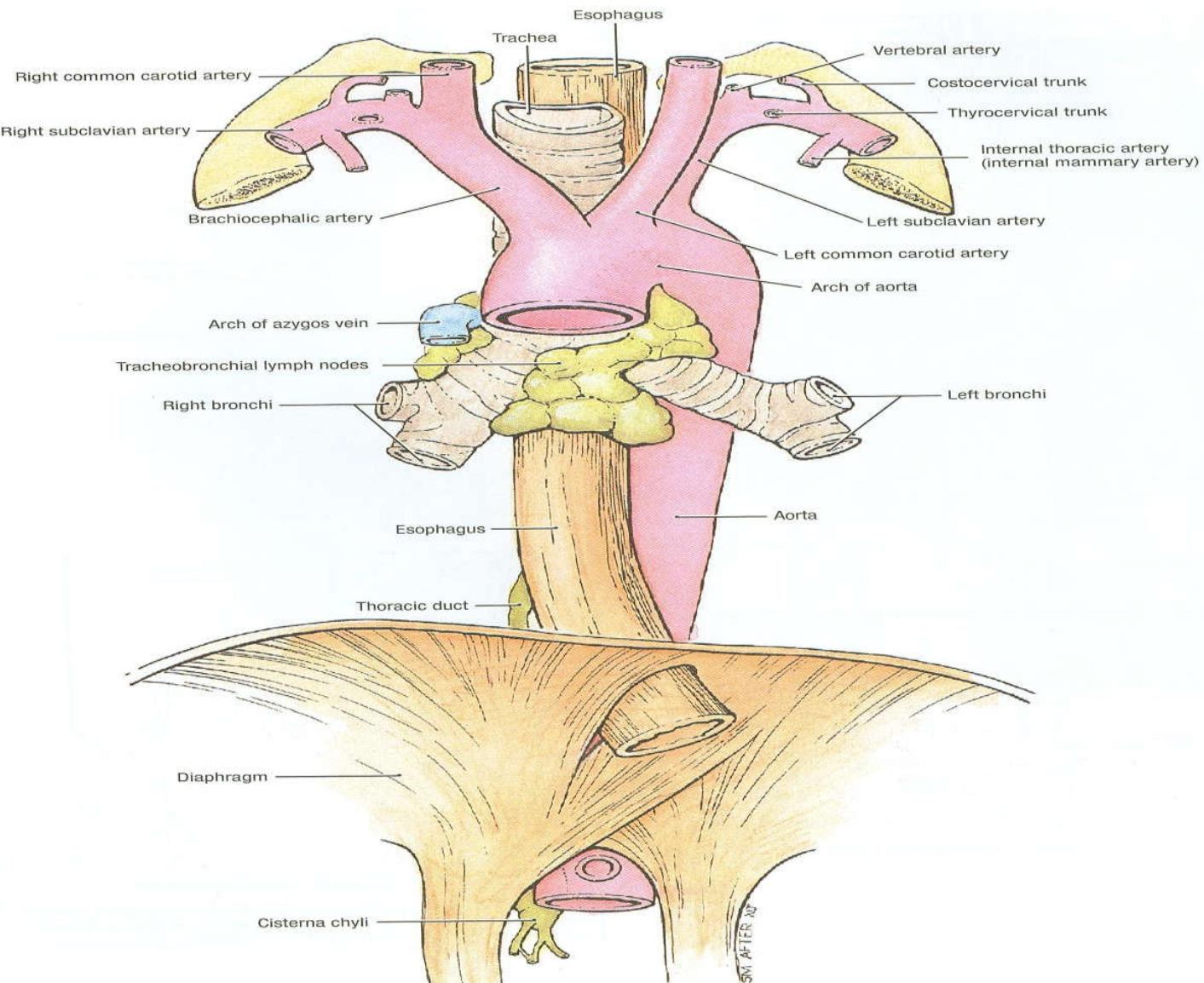
# POSTERIOR MEDIASTINUM



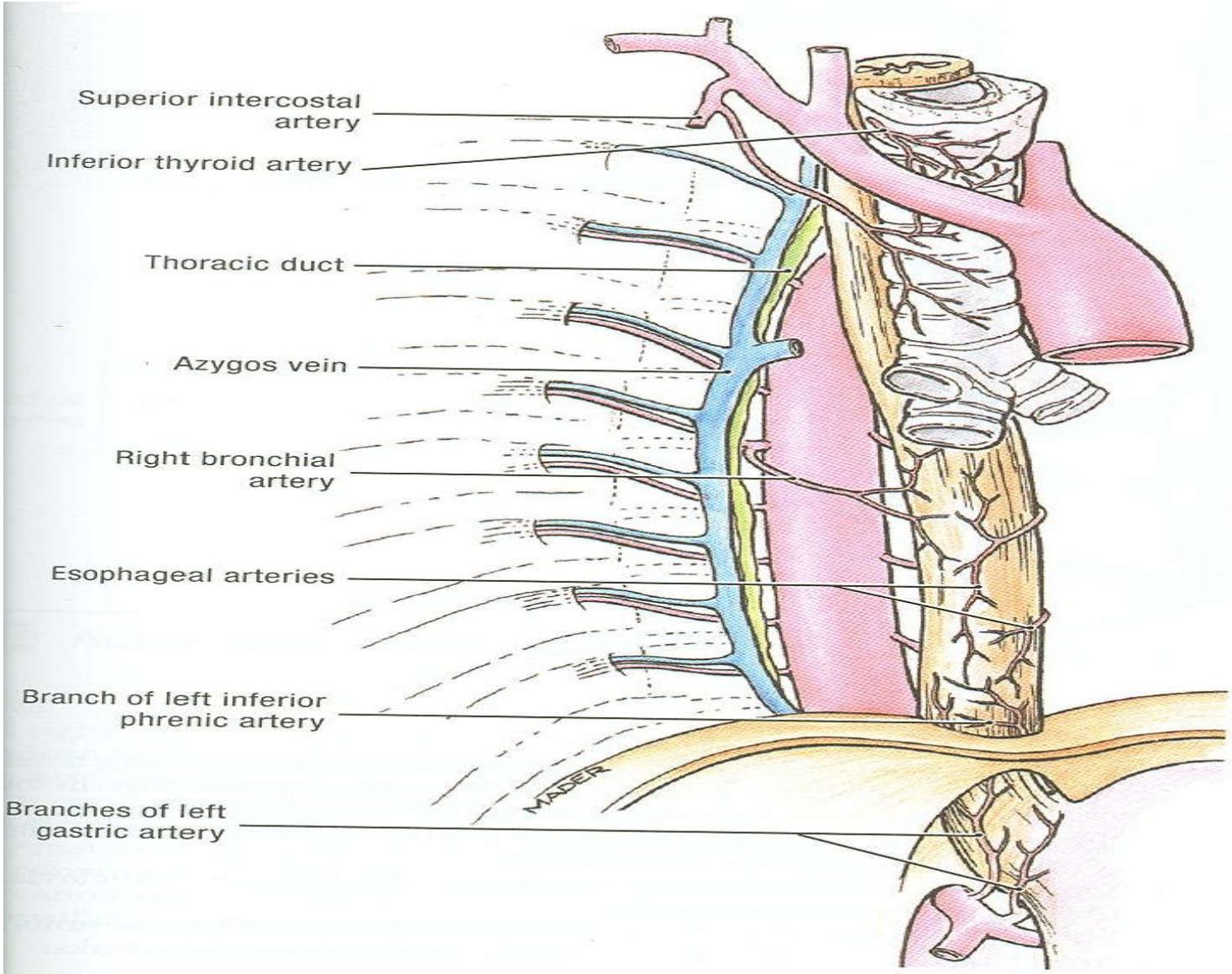
# POSTERIOR MEDIASTINUM



# POSTERIOR MEDIASTINUM



# POSTERIOR MEDIASTINUM



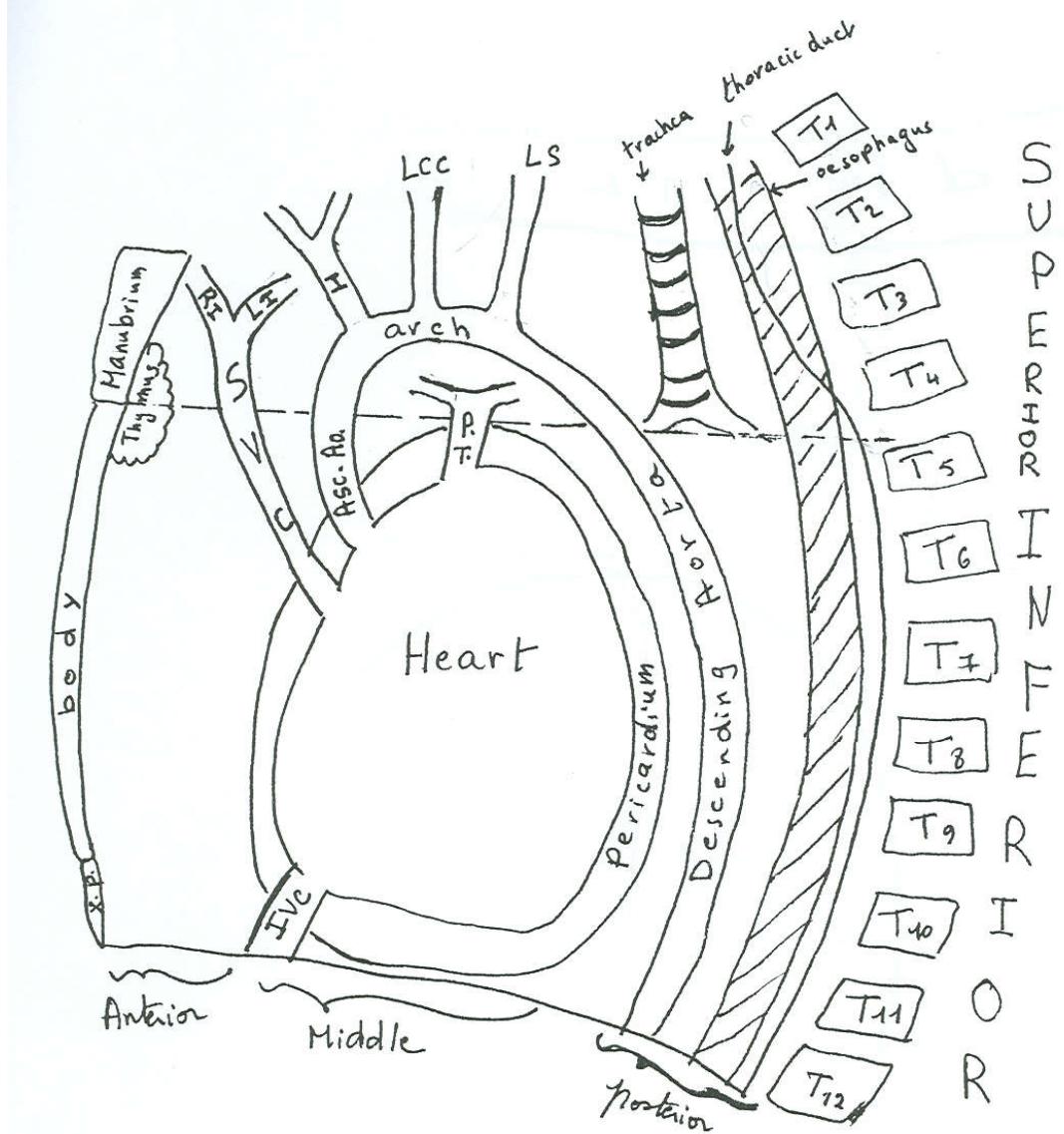
# POSTERIOR MEDIASTINUM

- **CONTENTS:**
  1. **Esophagus (most anterior structure)**
  2. **Thoracic duct**
  3. **Right & left vagus**
  4. **Descending aorta**
  5. **Azygos & hemiazygos veins**
  6. **Right & left sympathetic trunks & their branches (splanchnic nerves)**
  7. **Lymph nodes**

# MIDDLE MEDIASTINUM

- CONTENTS:
  1. Pericardium & heart
  2. Arteries: *ascending aorta, pulmonary trunk*
  3. Veins: *lower half of superior vena cava, terminations of inferior vena cava & pulmonary veins*
  4. Nerves: *phrenic*
  5. Lymph nodes

# MIDDLE MEDIASTINUM



# VEINS

## BRACHIOCEPHALIC: (Superior mediastinum)

- **FORMATION:** by union of internal jugular & subclavian vein (behind medial end of clavicle)
- **END:** Both veins unite to form S.V.C.
- **RIGHT VEIN:** shorter & has a vertical course, related laterally to right phrenic nerve & right pleura & lung, its tributaries in thorax: right 1<sup>st</sup> posterior intercostal vein, right internal thoracic vein, right lymphatic duct
- **LEFT VEIN:** longer & has an oblique course, related anteriorly to manubrium & thymus gland, & posteriorly to branches of arch of aorta, its tributaries in thorax: left 1<sup>st</sup> posterior intercostal vein, left superior intercostal vein, left internal thoracic vein, thoracic duct

# VEINS

## SUPERIOR VENA CAVA: (Superior & middle mediastinum)

- FORMATION: by union of brachiocephalic veins, behind lower border of right 1<sup>st</sup> costal cartilage
- END: opens into right atrium behind right 3<sup>rd</sup> costal cartilage
- TRIBUTARIES: azygos vein

# VEINS

## AZYGOS VEIN: (Posterior mediastinum)

- ORIGIN: by union of right ascending lumbar & subcostal veins (passes through aortic opening of diaphragm)
- END: forms an arch above the root of right lung & ends in S.V.C. opposite lower border of T4
- RELATIONS:
  1. Anterior: esophagus
  2. Posterior: thoracic vertebra
  3. Right: right pleura & lung
  4. Left: thoracic duct
- TRIBUTARIES: superior & inferior hemiazygos veins, right superior intercostal vein, right posterior intercostal veins (from 4<sup>th</sup> to 11<sup>th</sup>), right bronchial veins, esophageal & pericardial veins

# VEINS

## **INFERIOR HEMIAZYGOS: (Posterior mediastinum)**

- **ORIGIN:** by union of left ascending lumbar & subcostal veins (**passes through left crus of diaphragm**)
- **END:** into azygos vein, opposite T8
- **TRIBUTARIES:** left posterior intercostal veins (9<sup>th</sup> to 11<sup>th</sup>), esophageal veins

# VEINS

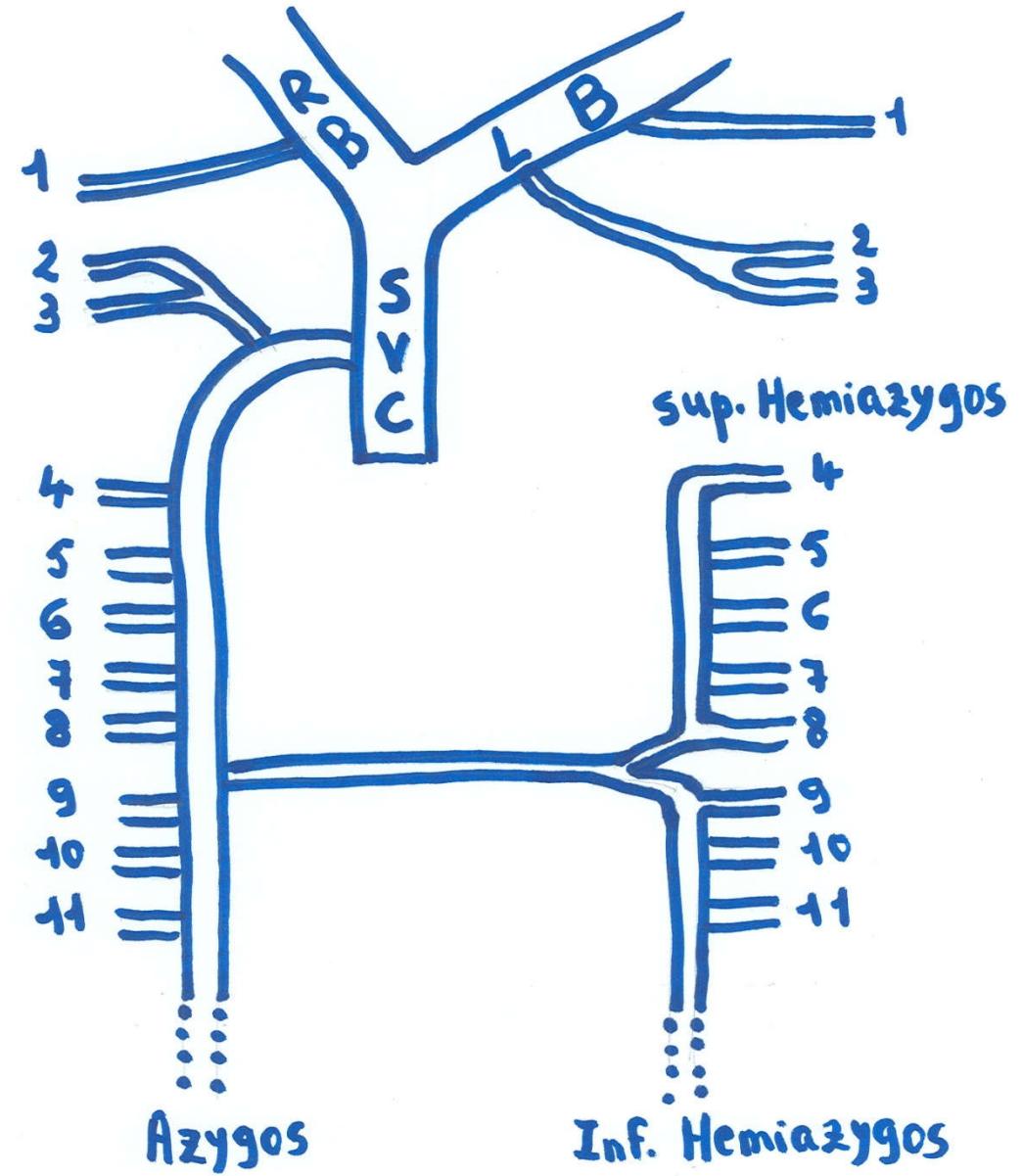
## SUPERIOR HEMIAZYGOS: (Posterior mediastinum)

- ORIGIN: by left posterior intercostal veins (4<sup>th</sup> to 8<sup>th</sup>)
- END: into azygos vein, opposite T7
- TRIBUTARIES: left bronchial veins

## INFERIOR VENA CAVA: (Posterior mediastinum)

- END: passes through vena caval opening of diaphragm & opens into right atrium behind right 6<sup>th</sup> costal cartilage

# AZYGOS & HEMIAZYGOS VEINS



# ARTERIES

## AORTA:

- **ASCENDING AORTA: (Middle mediastinum)**
  1. **ORIGIN: at the base of left ventricle opposite lower border of left 3<sup>rd</sup> costal cartilage**
  2. **END: ascends upward, forward & to the right & continues as arch of aorta**
  3. **BRANCHES: right & left coronary arteries**

# ARTERIES

- **ARCH OF AORTA: (Superior mediastinum)**
  1. **ORIGIN:** continuation of ascending aorta, opposite upper border of right 2<sup>nd</sup> costal cartilage
  2. **COURSE & RELATIONS:** ascends *upward backward & to the left* (behind manubrium & in front of trachea) then *curves backward* (to the left of trachea) then finally *curves downward*
  3. **TERMINATION:** continues as descending aorta, opposite lower border of T4

# ARTERIES

- BRANCHES OF ARCH OF AORTA: (**Superior mediastinum**)
  1. BRACHIOCEPHALIC: ascends *upward & to the right* (**behind left brachiocephalic vein & in front of trachea**) & divides into right common carotid & right subclavian arteries (**behind right sternoclavicular joint**)
  2. LEFT COMMON CAROTID: ascends *upward & to the left* (**to the left side of brachiocephalic artery**) & enters the neck (**behind left sternoclavicular joint**)
  3. LEFT SUBCLAVIAN: ascends *upward* (**behind left common carotid artery, in front of esophagus, to the left side of trachea**), arches over apex of left lung to enter neck

# ARTERIES

## DESCENDING AORTA: (Posterior mediastinum)

- ORIGIN: continuation of arch of aorta
- TERMINATION: passes through aortic opening of diaphragm (opposite T12) & continues as abdominal aorta
- RELATIONS:
  1. Anterior: esophagus
  2. Posterior: thoracic vertebrae
  3. Right: thoracic duct
  4. Left: left pleura & lung
- BRANCHES: posterior intercostal (from 3<sup>rd</sup> to 11<sup>th</sup>), subcostal, bronchial, esophageal, pericardial arteries

# ARTERIES

## PULMONARY TRUNK (**Middle mediastinum**)

- **ORIGIN:** from upper part of right ventricle, behind sternal end of left 3<sup>rd</sup> costal cartilage
- **COURSE:** ascends *upward & to the left* & divides (at lower border of T4) into:
  1. **Right pulmonary:** runs **behind ascending aorta & S.V.C** to enter root of right lung
  2. **Left pulmonary:** runs **in front of descending aorta** to enter root of left lung

# TRACHEA

- **BEGINNING:** continuation of larynx, opposite C6
- **TERMINATION:** bifurcates into 2 bronchi, opposite lower border of T4
- **RELATIONS:** (in superior mediastinum)
  1. **Anterior:** arch of aorta, brachiocephalic & left common carotid arteries
  2. **Posterior:** left recurrent laryngeal nerve, esophagus
  3. **Right:** right vagus nerve
  4. **Left:** arch of aorta, left subclavian artery
- **NERVE SUPPLY:** sympathetic trunks & vagus
- **BLOOD SUPPLY:** inferior thyroid vessels
- **LYMPHATIC DRAINAGE:** pretracheal & paratracheal

# ESOPHAGUS

- **BEGINNING:** continuation of pharynx, opposite C6
- **TERMINATION:** passes through esophageal opening of diaphragm (opposite T10) & joins stomach
- **RELATIONS:** (in superior mediastinum)
  1. **Anterior:** left recurrent laryngeal nerve, trachea, left subclavian artery
  2. **Posterior:** thoracic vertebrae
  3. **Right:** right pleura & lung
  4. **Left:** thoracic duct, left pleura & lung

# ESOPHAGUS

- **RELATIONS:** (in posterior mediastinum)
  1. **Anterior:** pericardium, separating it from left atrium
  2. **Posterior:** thoracic duct, descending aorta, azygos vein
  3. **Right:** right pleura & lung
  4. **Left:** descending aorta, left pleura & lung
- **NERVE SUPPLY:** as trachea
- **ARTERIAL SUPPLY:** descending aorta
- **VENOUS DRAINAGE:** azygos & hemiazygos
- **LYMPHATIC DRAINAGE:** posterior mediastinal lymph nodes

# THORACIC DUCT

- **ORIGIN:** from upper end of cysterna chyli (opposite L1 & L2)
- **COURSE:** passes through aortic opening of diaphragm, ascends in posterior mediastinum (behind esophagus) & in superior mediastinum (to the left of esophagus) to enter root of neck
- **END:** in left brachiocephalic vein
- **RELATIONS:** ( in posterior mediastinum)
  1. **Anterior:** esophagus
  2. **Posterior:** thoracic vertebrae
  3. **Right:** azygos vein
  4. **Left:** descending aorta

# THORACIC DUCT

## TRIBUTARIES:

- It drains lymph from both sides of the body below the diaphragm through cysterna chyli
- It drains lymph from left half of the body above diaphragm through:
  1. Left jugular lymph trunk: drains left side of head & neck
  2. Left subclavian lymph trunk: drains left upper limb
  3. Left bronchomediastinal lymph trunk: drains left side of thorax

# RIGHT LYMPHATIC DUCT

- **ORIGIN:** formed by union of:
  1. Right jugular lymph trunk: **drains right side of head & neck**
  2. Right subclavian lymph trunk: **drains right upper limb**
  3. Right bronchomediastinal lymph trunk: **drains right side of thorax**
- **END:** in right brachiocephalic vein

# NERVES

## PHRENIC NERVES: (Superior & middle mediastinum)

- ORIGIN: anterior rami of C3,4,5
- COURSE & RELATIONS IN THORAX:
  1. RIGHT: descends to the right side of: right brachiocephalic vein, S.V.C., pericardium, I.V.C.
  2. LEFT: descends to the left side of: arch aorta, pericardium
- BRANCHES:
  1. Motor branches to: diaphragm
  2. Sensory branches from:
    - Mediastinal & central part of diaphragmatic pleura
    - Fibrous pericardium & parietal layer of serous pericardium
    - Peritoneum covering central part of undersurface of diaphragm

# NERVES

- **VAGUS NERVES:** (Superior & posterior mediastinum)
- **ORIGIN:** 10<sup>th</sup> cranial nerve
- **COURSE & RELATIONS IN THORAX:**
  1. **RIGHT:** descends to the right side of: trachea, behind root of right lung (pulmonary plexus), behind esophagus (esophageal plexus), passes through esophageal opening of diaphragm to reach posterior surface of stomach
  2. **LEFT:** descends to the left side of: arch aorta, behind root of left lung (pulmonary plexus), in front of esophagus (esophageal plexus), passes through esophageal opening of diaphragm to reach anterior surface of stomach

# NERVES

## BRANCHES IN THORAX:

- BOTH VAGI: to lungs & esophagus
- RIGHT VAGUS: to heart
- LEFT VAGUS: **left recurrent laryngeal nerve: curves below arch of aorta, behind ligamentum arteriosum, ascends in groove between trachea & esophagus to reach the neck. It supplies: heart, trachea, esophagus (in thorax) & larynx (in neck)**

# NERVES

## THORACIC PART OF SYMPATHETIC TRUNKS: (Superior & posterior mediastinum)

- **BEGINNING:** the cervical part continues as thoracic part by passing in front of neck of first rib
- **TERMINATION:** the thoracic part continues as lumbar part by passing behind medial arcuate ligament
- **COURSE:**
  1. **In upper part of thorax:** descend in front of heads of ribs
  2. **In lower part of thorax:** descend on the sides of bodies of vertebrae
- **GANGLIA:** usually 11 (1<sup>st</sup> thoracic ganglion fuses with inferior cervical ganglion forming stellate ganglion)

# NERVES

- **BRANCHES:**
  1. **Rami communicants:** each ganglion receives a white ramus (**preganglionic**) & gives a grey ramus (**postganglionic**) to corresponding thoracic spinal nerve
  2. **Visceral branches (postganglionic)** to thoracic organs (from upper 5 ganglia): to heart, lungs, esophagus, descending aorta
  3. **Visceral branches (preganglionic)** to abdominal organs:
    - **Greater splanchnic nerve (from 5<sup>th</sup> to 9<sup>th</sup> ganglia)**
    - **Lesser splanchnic nerve (from 10<sup>th</sup> 7 11<sup>th</sup> ganglia)**
    - **Lowest splanchnic nerve (from 12<sup>th</sup> ganglion)**

THANK  
YOU