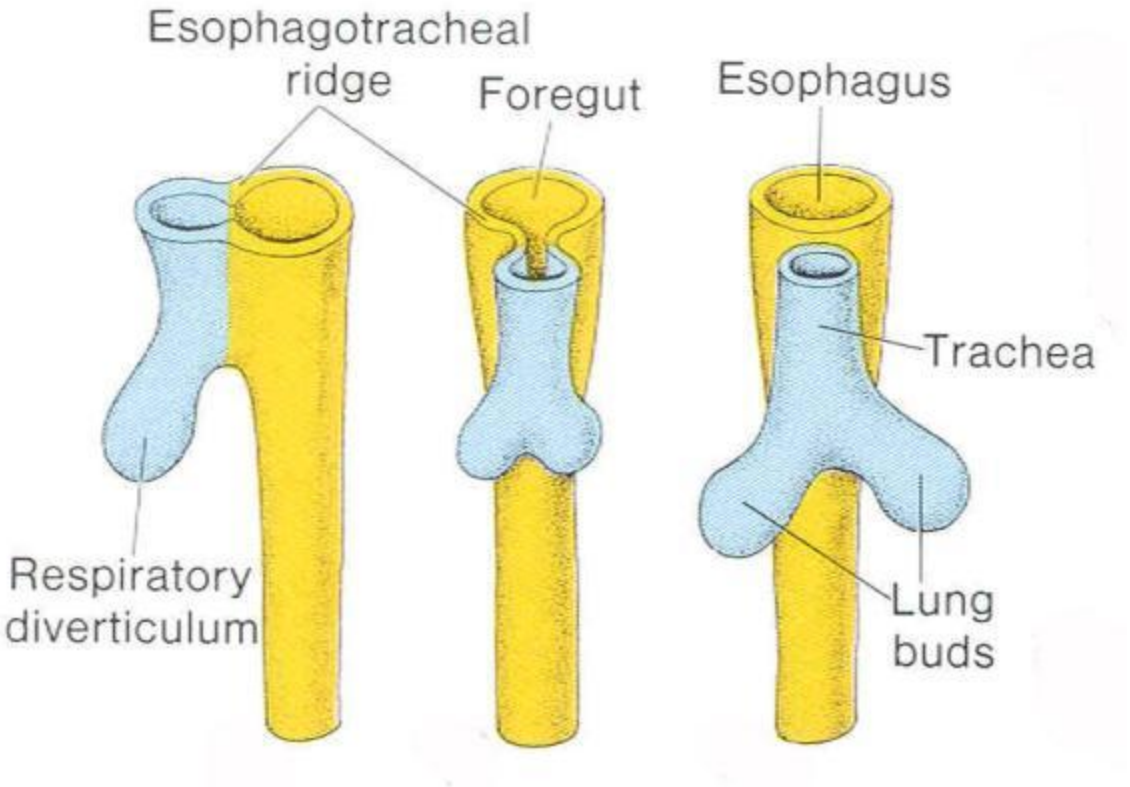
Biology 323
Human Anatomy for Biology Majors
Lecture 12
Dr. Stuart S. Sumida

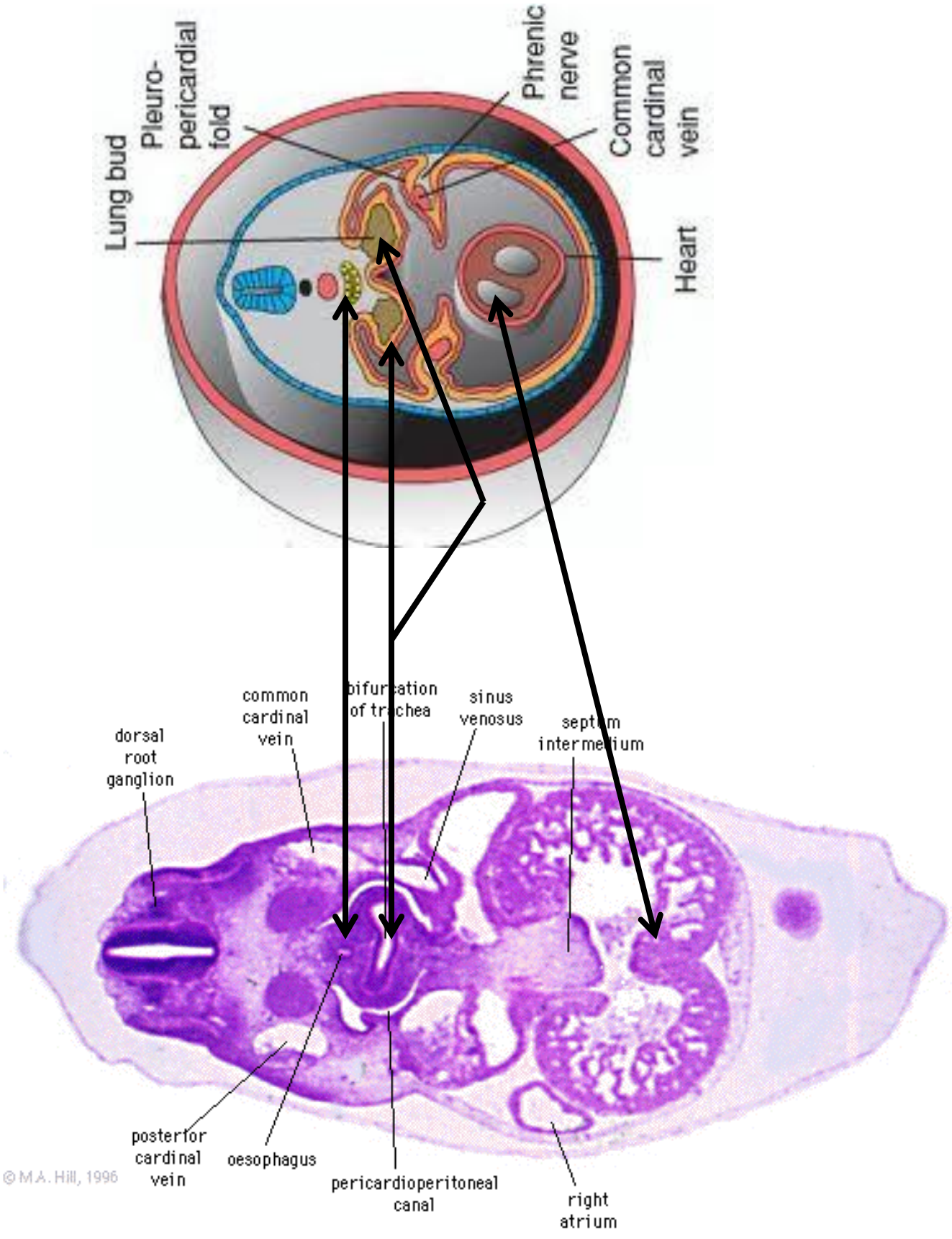
Respiratory System: Development, Structure, Mechanics



Trachea is a tubular outgrowth of the embryonic gut.

Begins as a bud in pharynx floor.

Each fork is called a primary bronchus.


Lung bud
Pleuro-pericardial fold
Phrenic nerve
Common cardinal vein
Heart
dorsal root ganglion
common cardinal vein
bifurcation of trachea
sinus venosus
septum intermedium
posterior cardinal vein
oesophagus
pericardioperitoneal canal
right atrium
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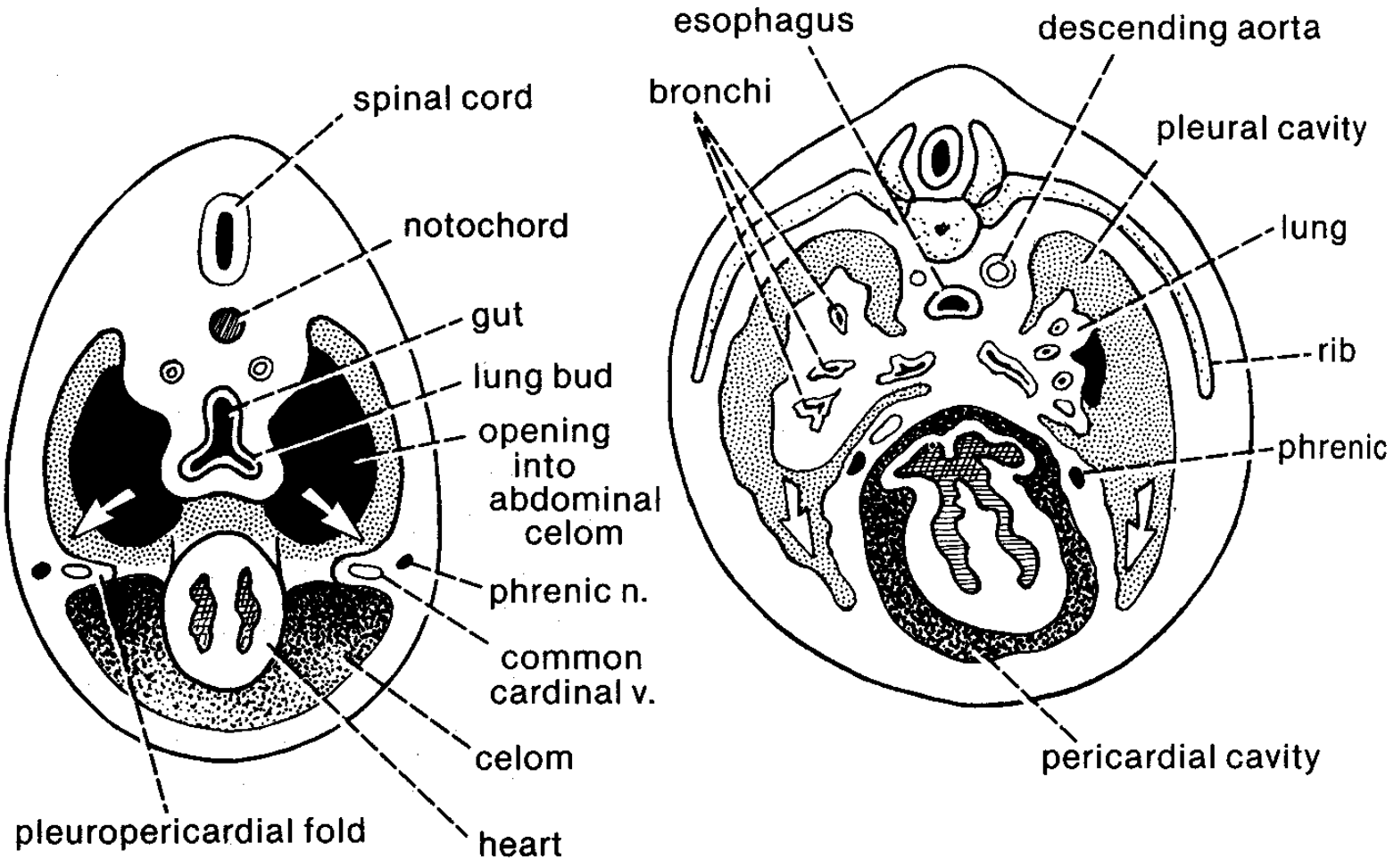
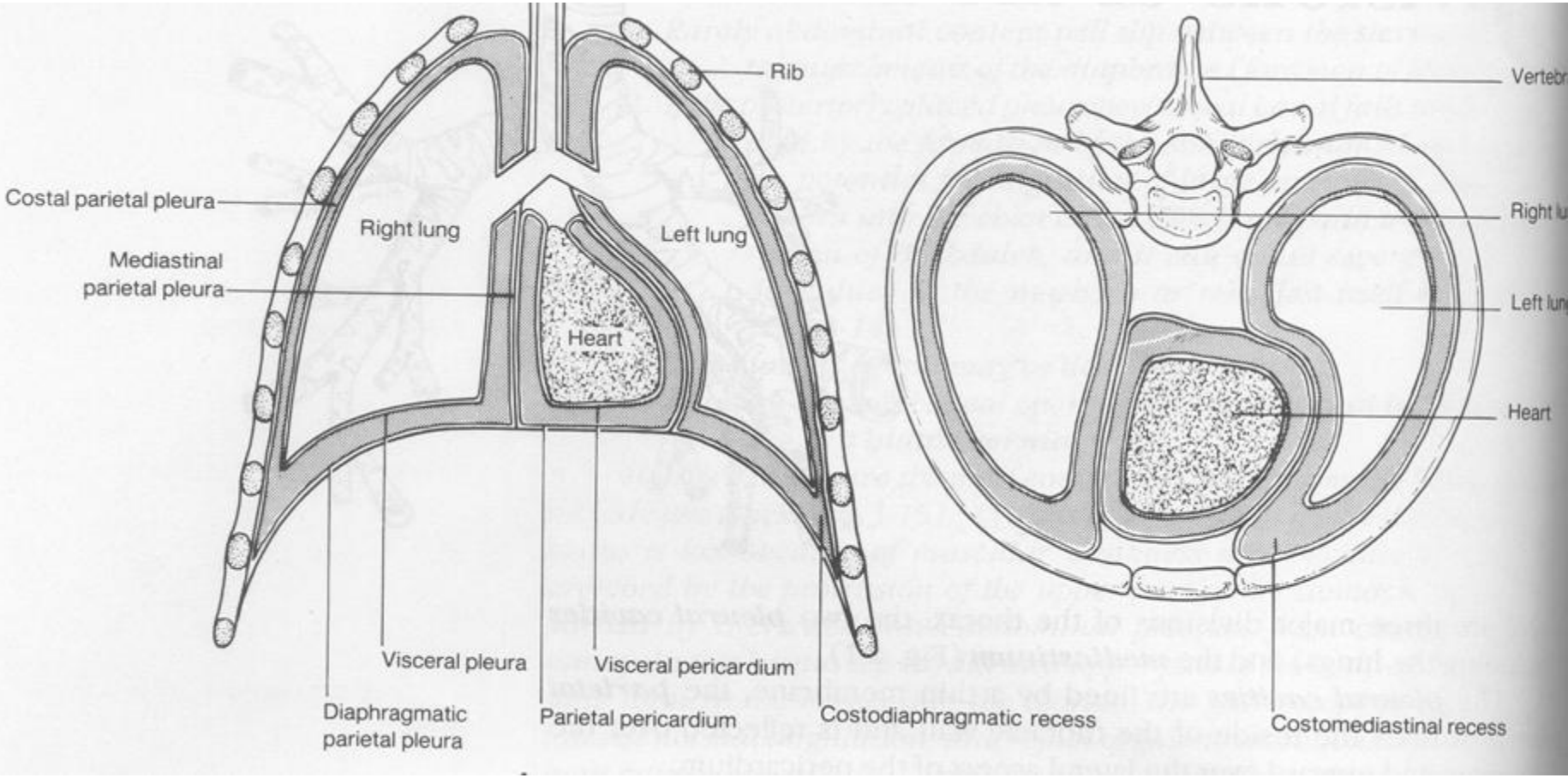
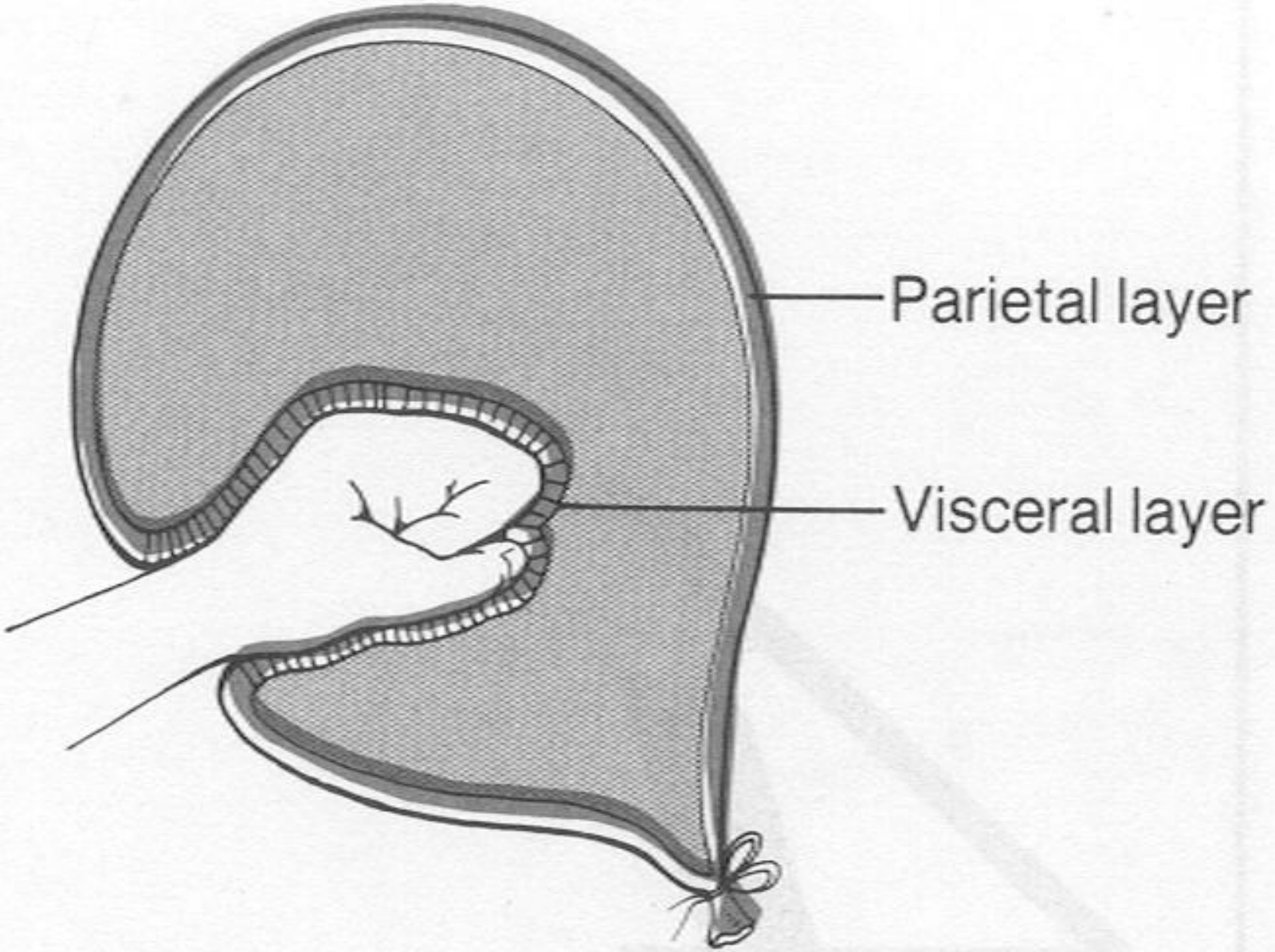

spinal cord
notochord
gut
lung bud
opening into abdominal celom
phrenic n.
common cardinal v.
celom
heart
pleuropericardial fold
esophagus
bronchi
descending aorta
pleural cavity
lung
rib
phrenic
pericardial cavity

GERM LAYER DERIVATIONS

As outgrowths of pharynx, lung lining is derived from endoderm.

Cartilagenous support of bronchi is derived from visceral arch skeleton. Therefore, from NEURAL CREST.


Rib
Costal parietal pleura
Right lung
Left lung
Mediastinal
parietal pleura
Heart
Visceral pleura
Visceral pericardium
Diaphragmatic
parietal pleura
Parietal pericardium
Costodiaphragmatic recess
Costomediastinal recess
Heart

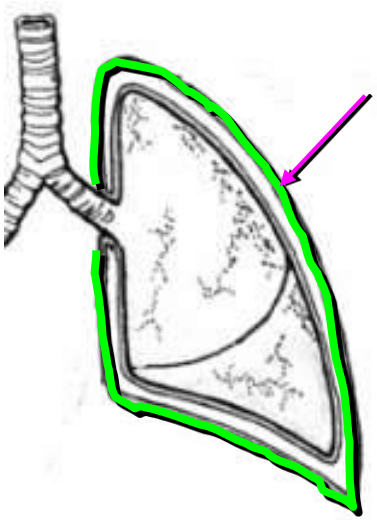

Parietal layer
Visceral layer

Parietal pleura lines the structures which surround the pleural sacs.

Each part of the parietal pleura is named for its association

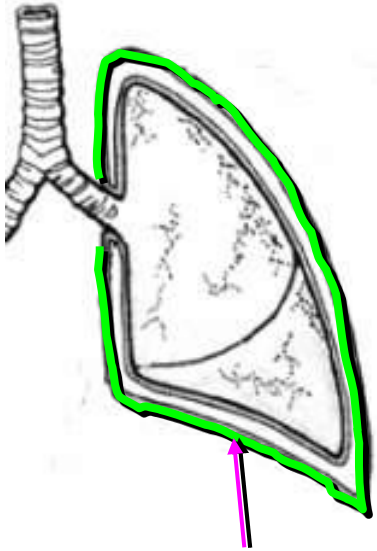
<u>costal</u>

- lies against ribs



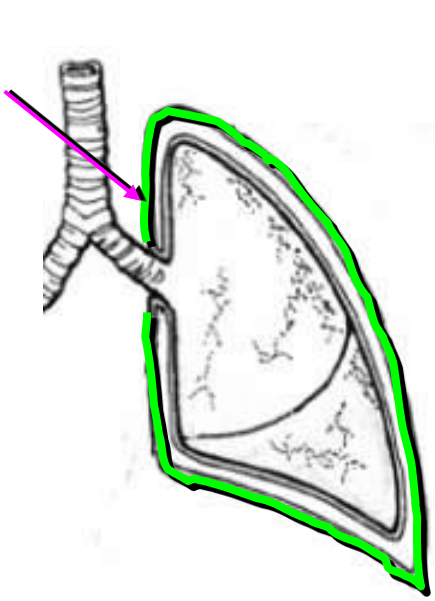
<u>diaphragmatic</u>

- lies against diaphragm.



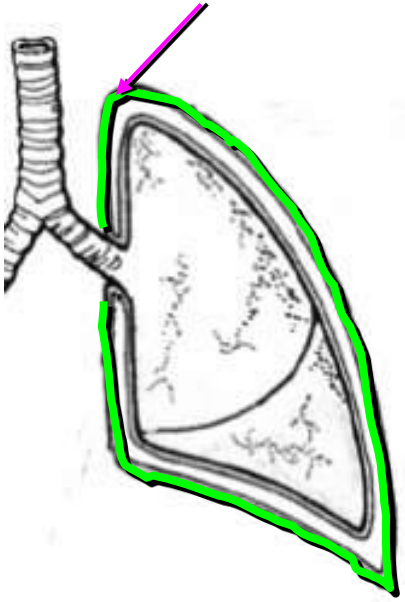
<u>mediastinal</u>

- lies against mediastinum

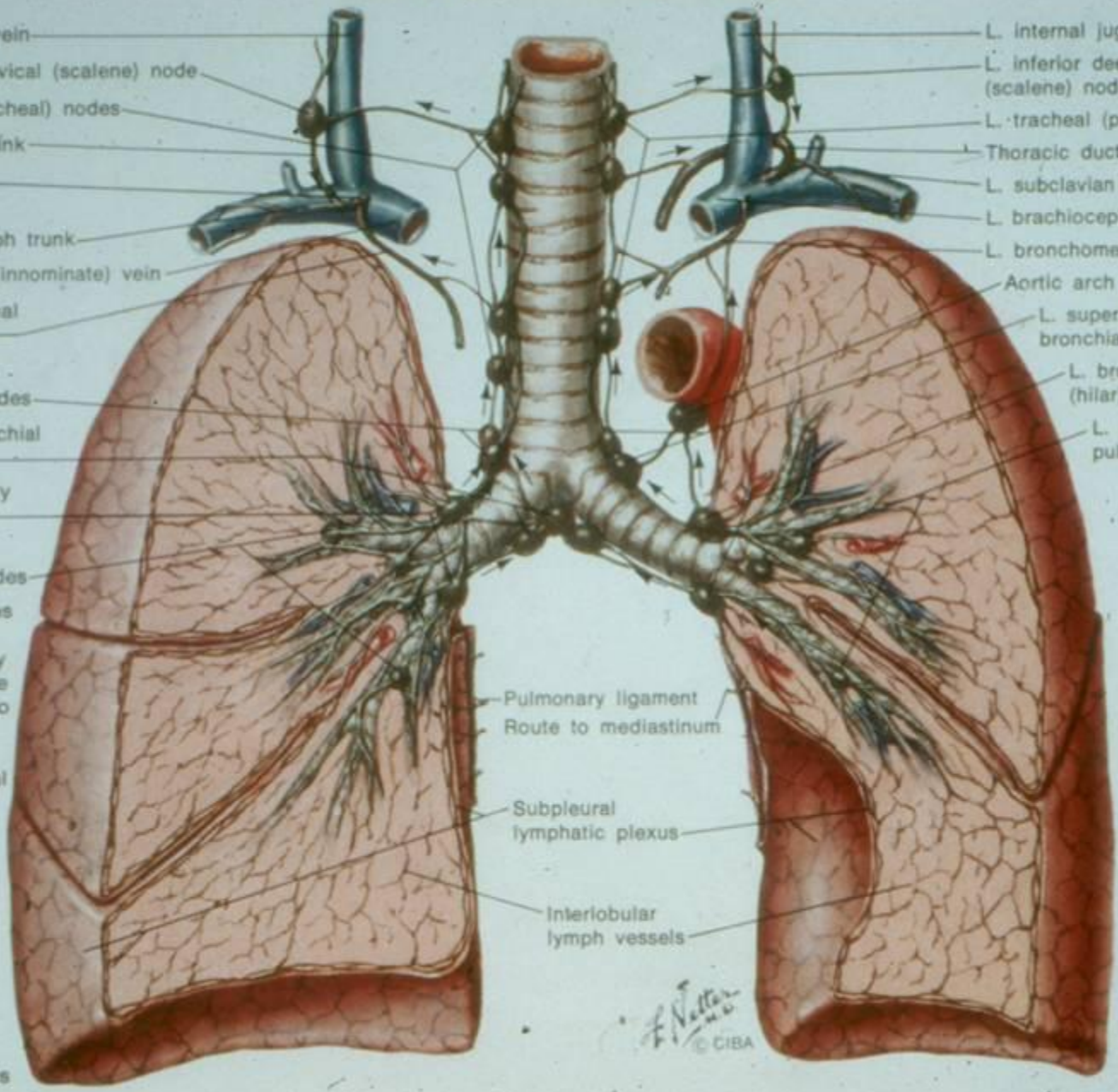


<u>cervical</u>

- lies against root of neck

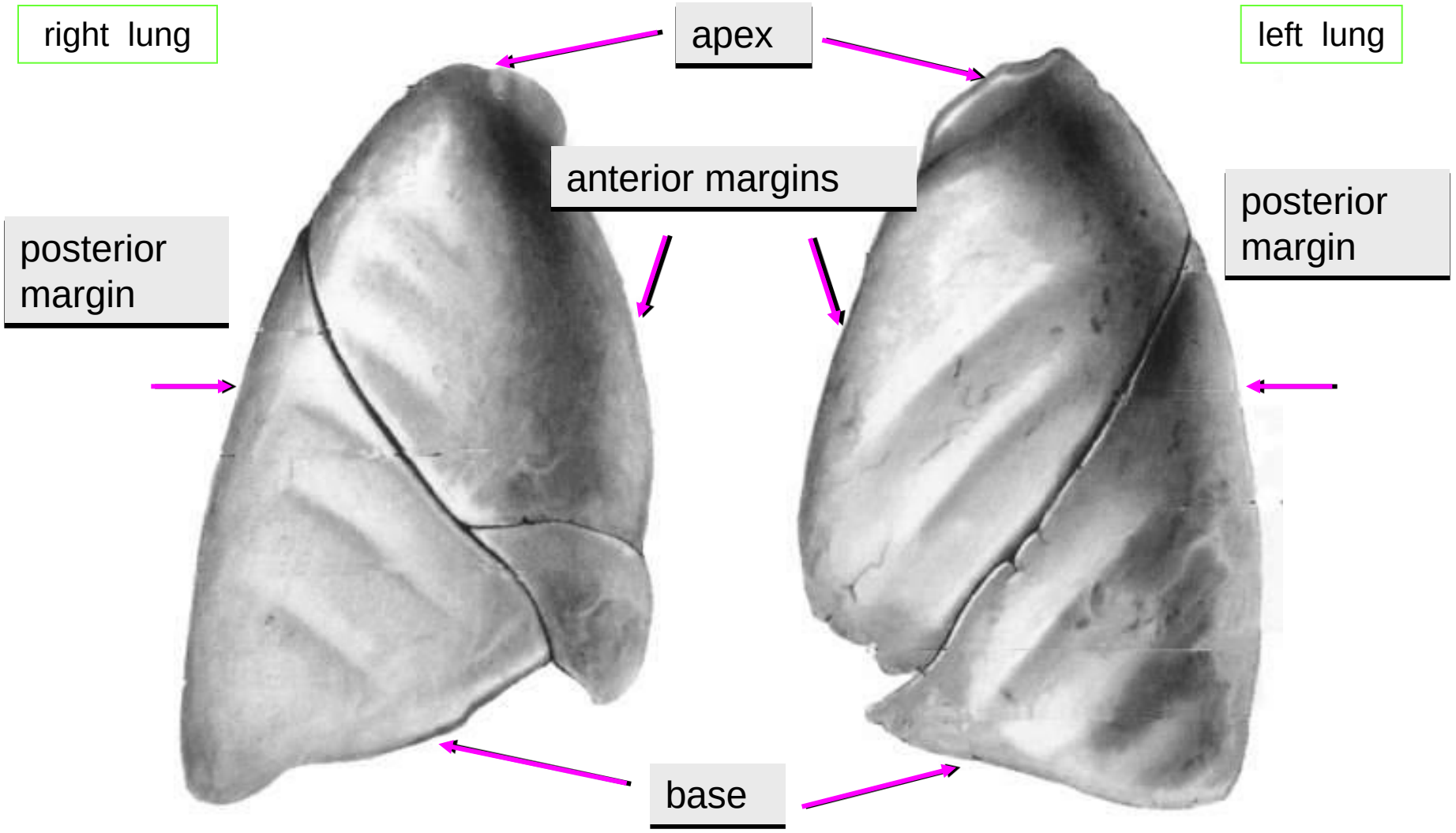


Routes of Lymphatic Drainage of Lungs



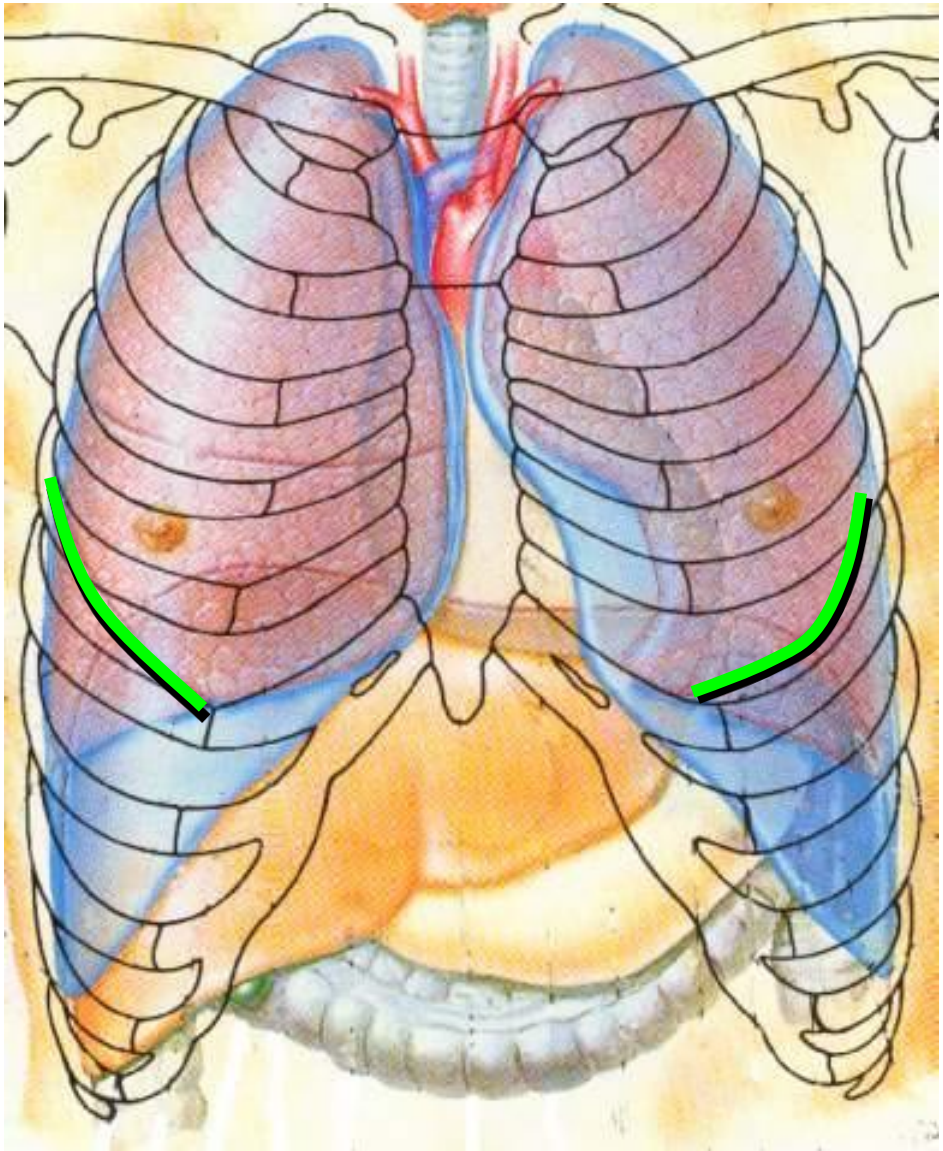
Each lung has rounded (blunt) posterior and sharp anterior margins

Each lung has a base and apex.



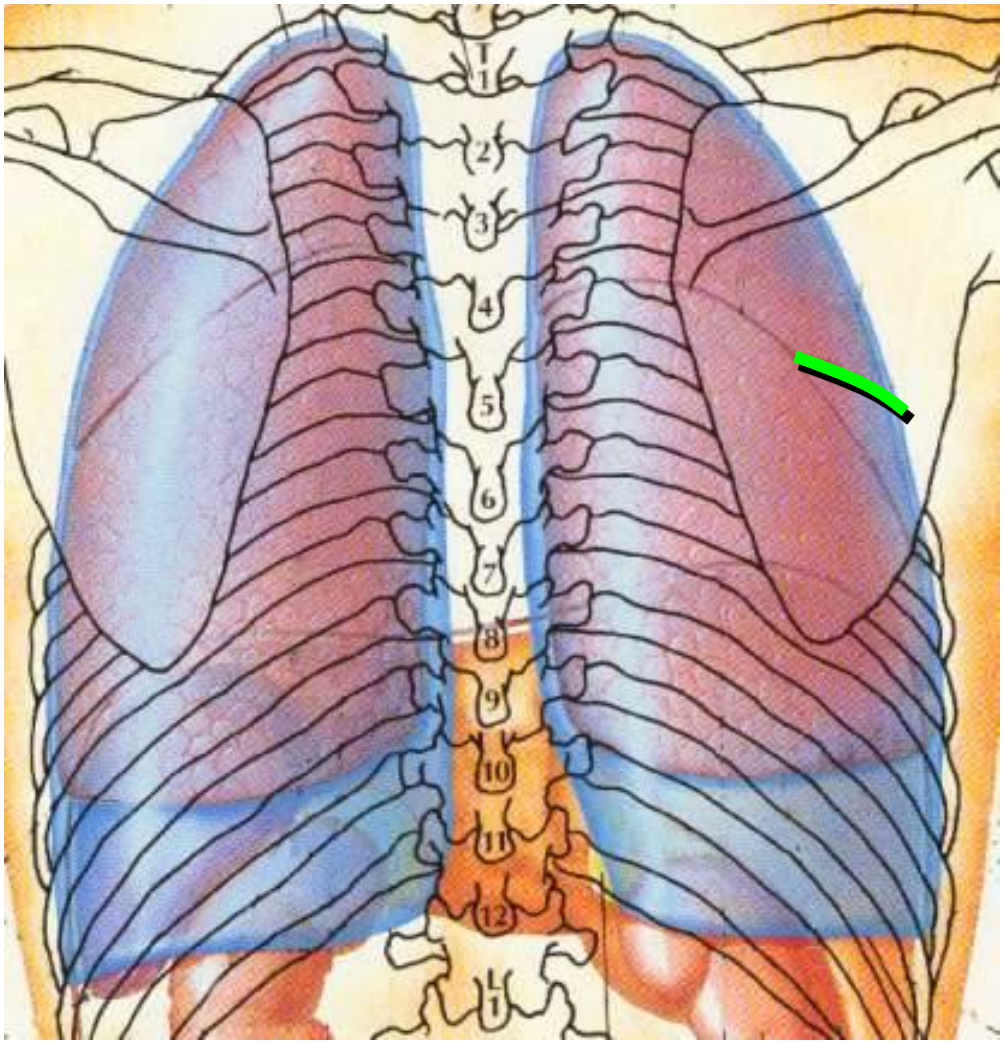
The oblique fissure crosses the 5th interspace and ends at 6th costochondral junction

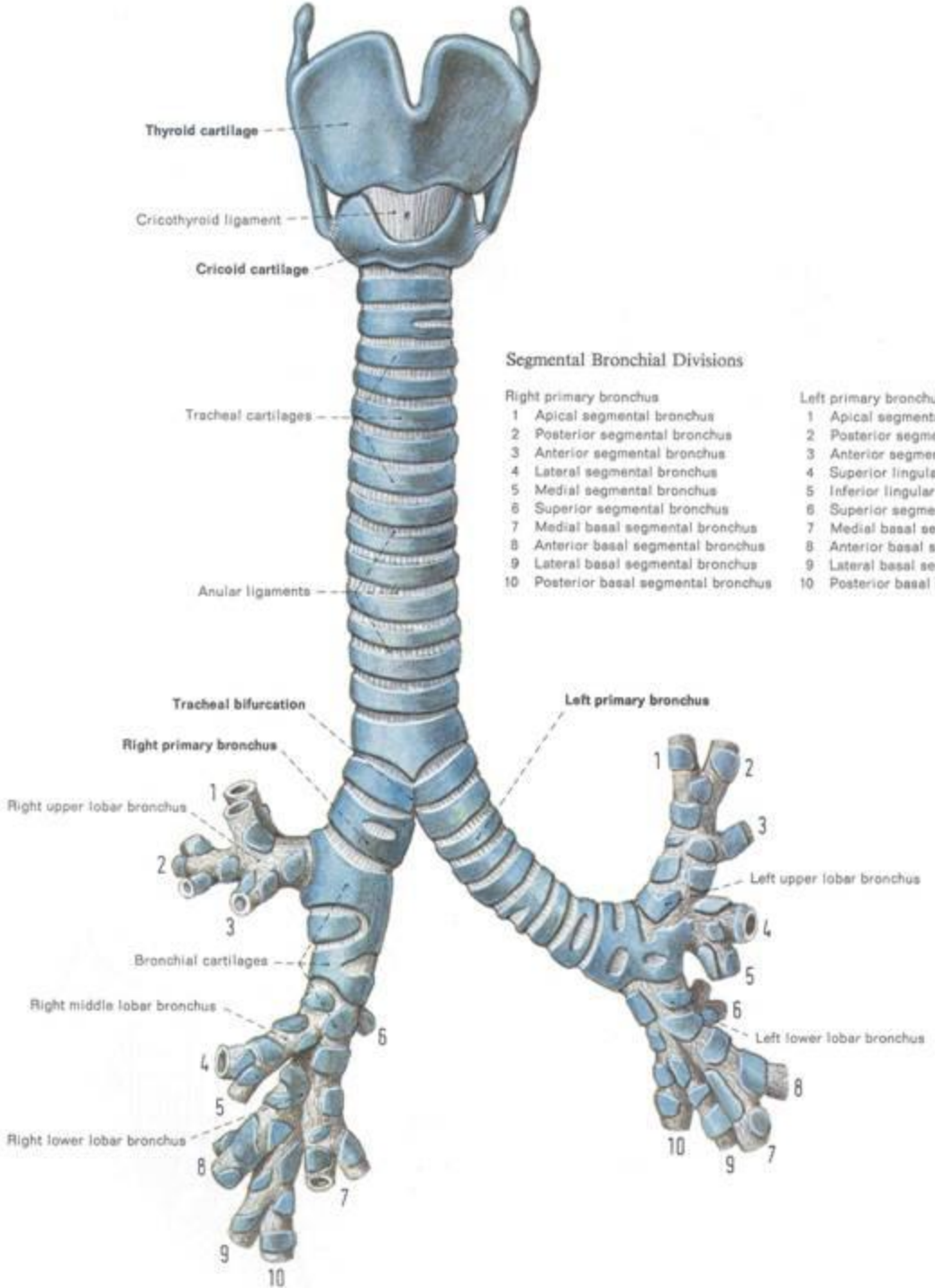
Note positions of clavicles and ribs relative to lungs.



The horizontal fissure begins posterolaterally at the oblique fissure and passes deep to the 5th rib.

Note positions of scapulae and costal recess relative to lungs.





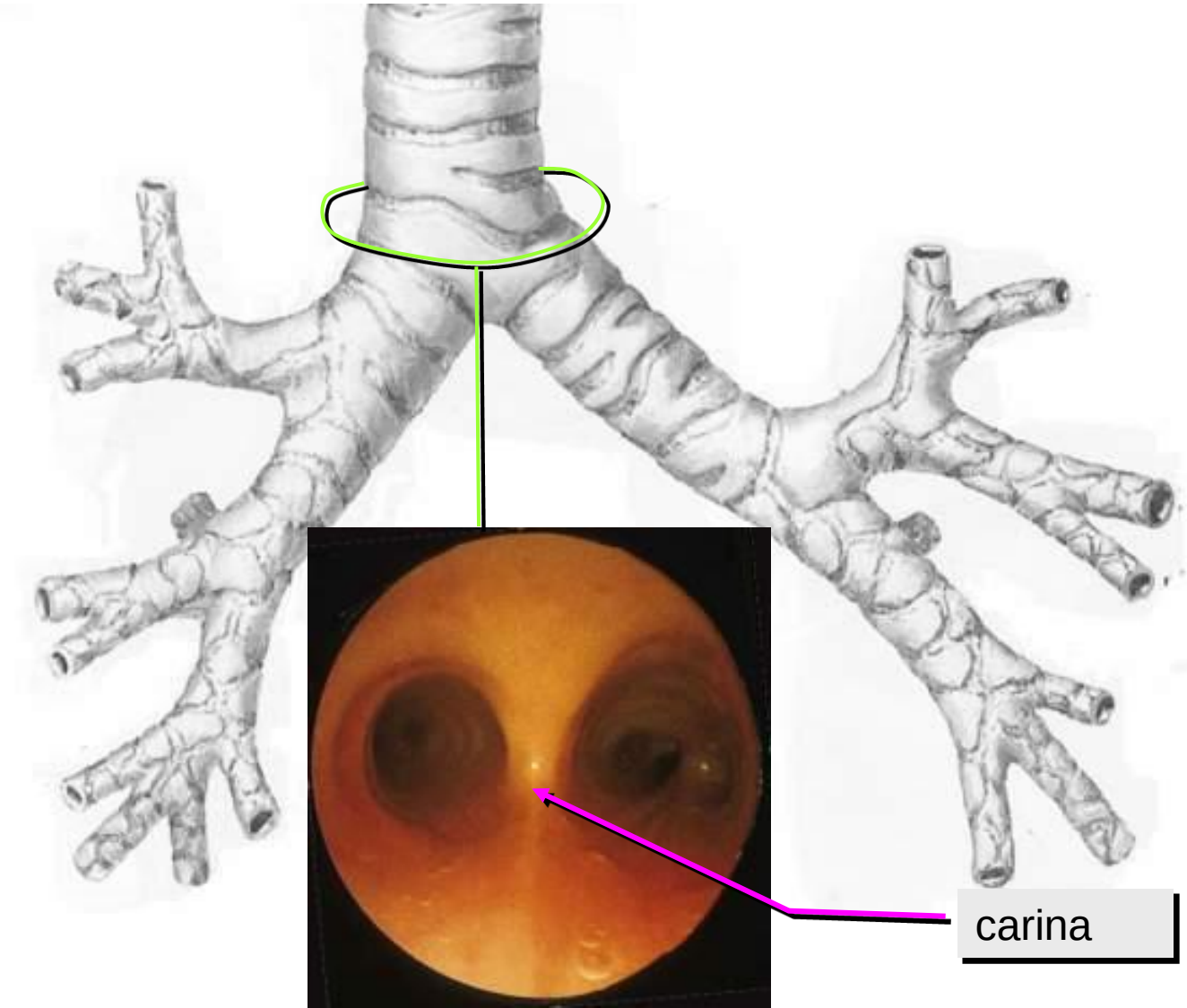
Segmental Bronchial Divisions

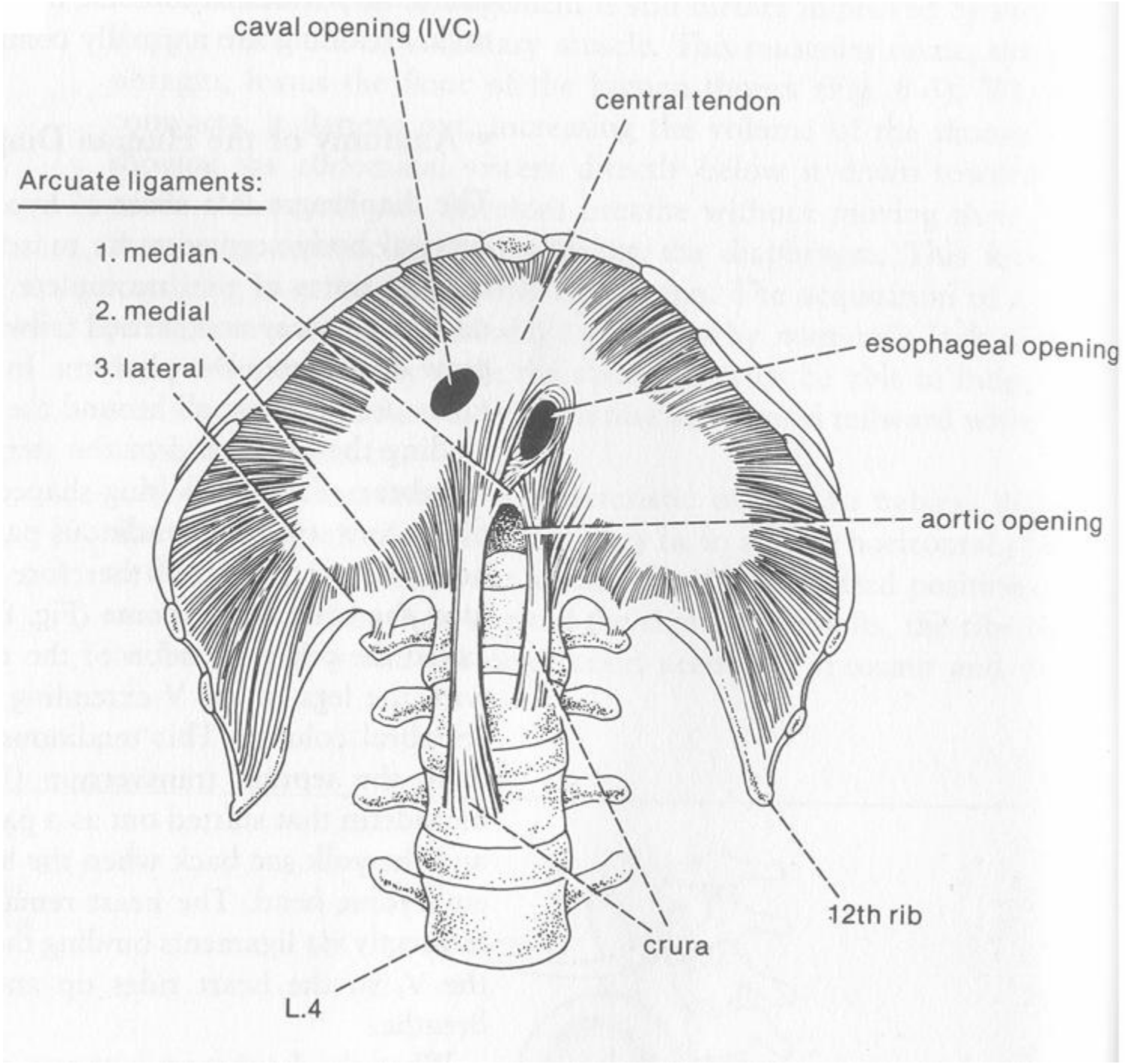
Right primary bronchus	Left primary bronchus
1 Apical segmental bronchus	1 Apical segmental bronchus
2 Posterior segmental bronchus	2 Posterior segmental bronchus
3 Anterior segmental bronchus	3 Anterior segmental bronchus
4 Lateral segmental bronchus	4 Superior lingular segmental bronchus
5 Medial segmental bronchus	5 Inferior lingular segmental bronchus
6 Superior segmental bronchus	6 Superior segmental bronchus
7 Medial basal segmental bronchus	7 Medial basal segmental bronchus
8 Anterior basal segmental bronchus	8 Anterior basal segmental bronchus
9 Lateral basal segmental bronchus	9 Lateral basal segmental bronchus
10 Posterior basal segmental bronchus	10 Posterior basal segmental bronchus

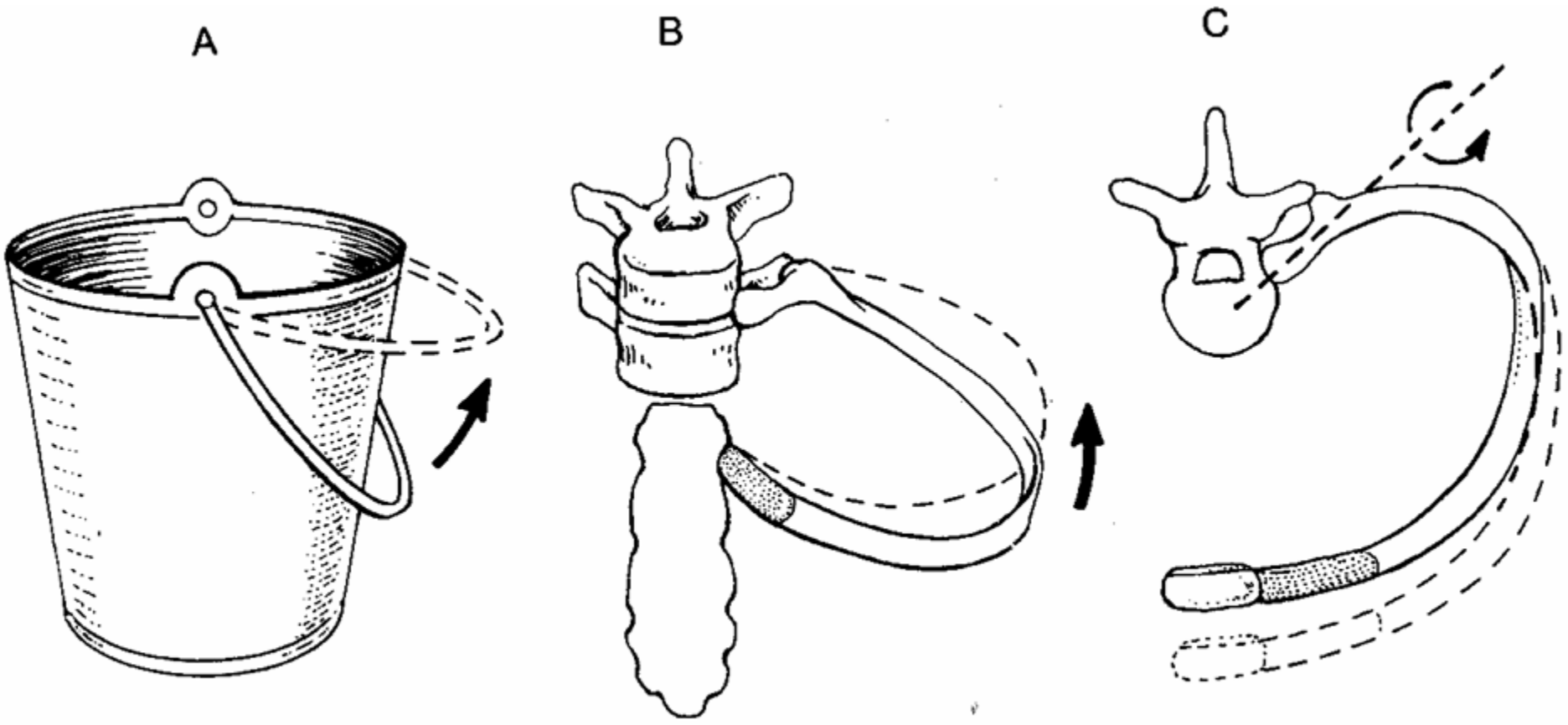
The bronchial tree can be visualized on x-ray by allowing a constrast medium to spread along the bronchial walls

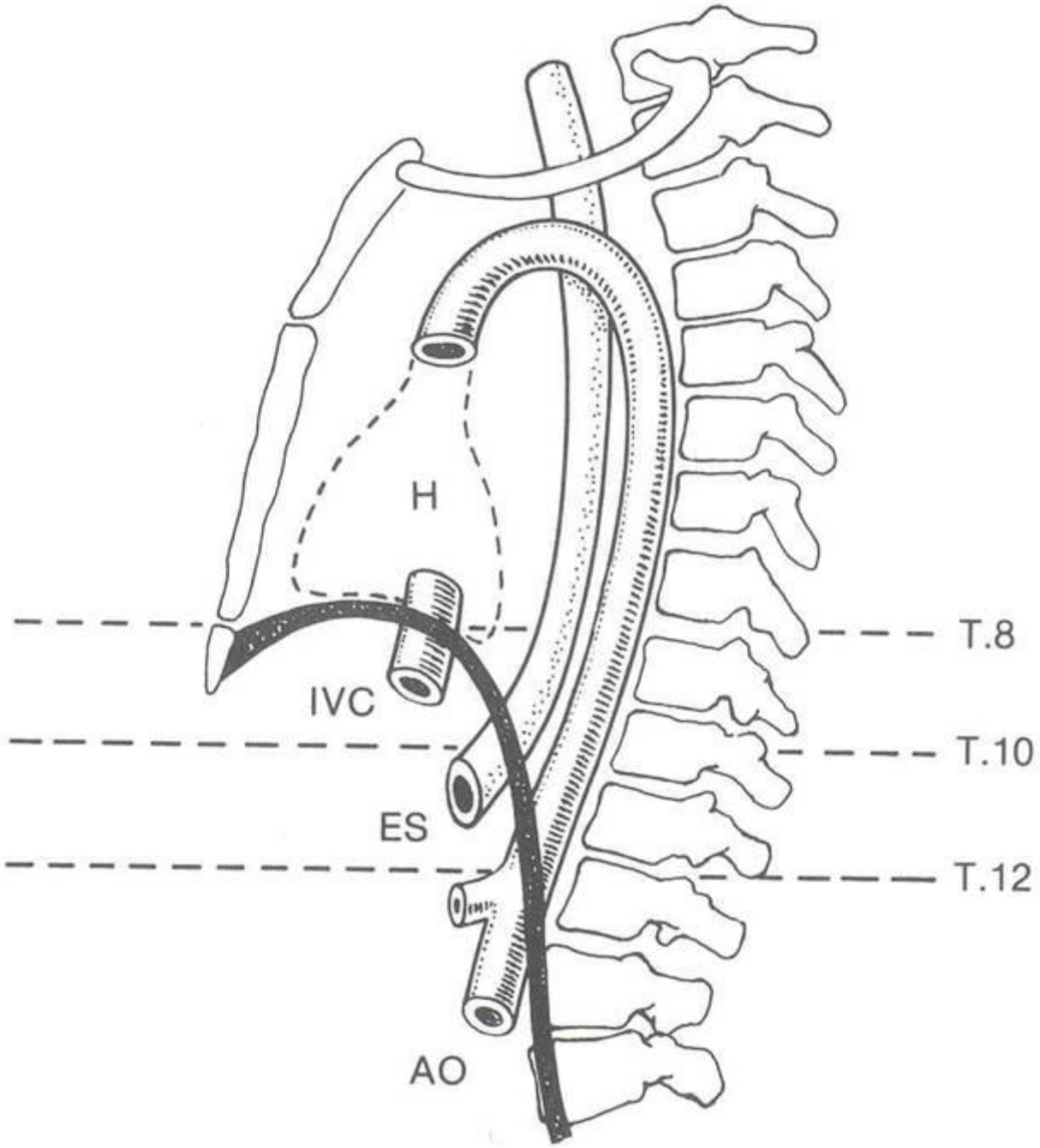
The trachea bifurcates into main bronchi at about the level of T4

A midline upward-projecting cartilage (carina) is a good endoscopic landmark




caval opening (IVC)
central tendon
Arcuate ligaments:
1. median
2. medial
3. lateral
esophageal opening
aortic opening
12th rib
crura
L.4


A
B
C


H
IVC
ES
AO
T.8
T.10
T.12

INNERVATION OF THE LUNG:

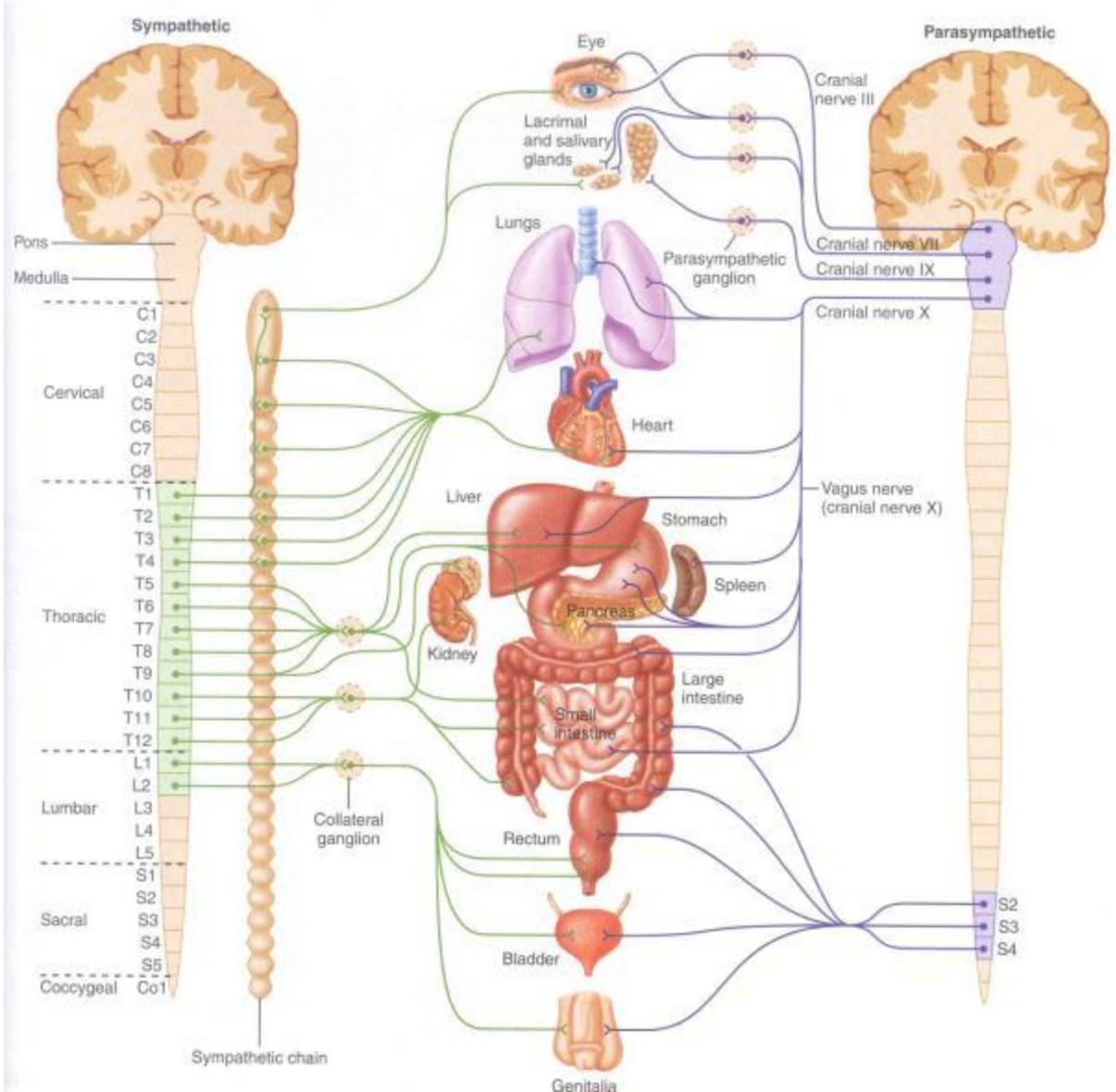
Sympathetic: from sympathetic levels T1-6 with synapse between preganglionic and postganglionic neurons in paravertebral ganglia T2-5; dilation of bronchi and blood vessels.

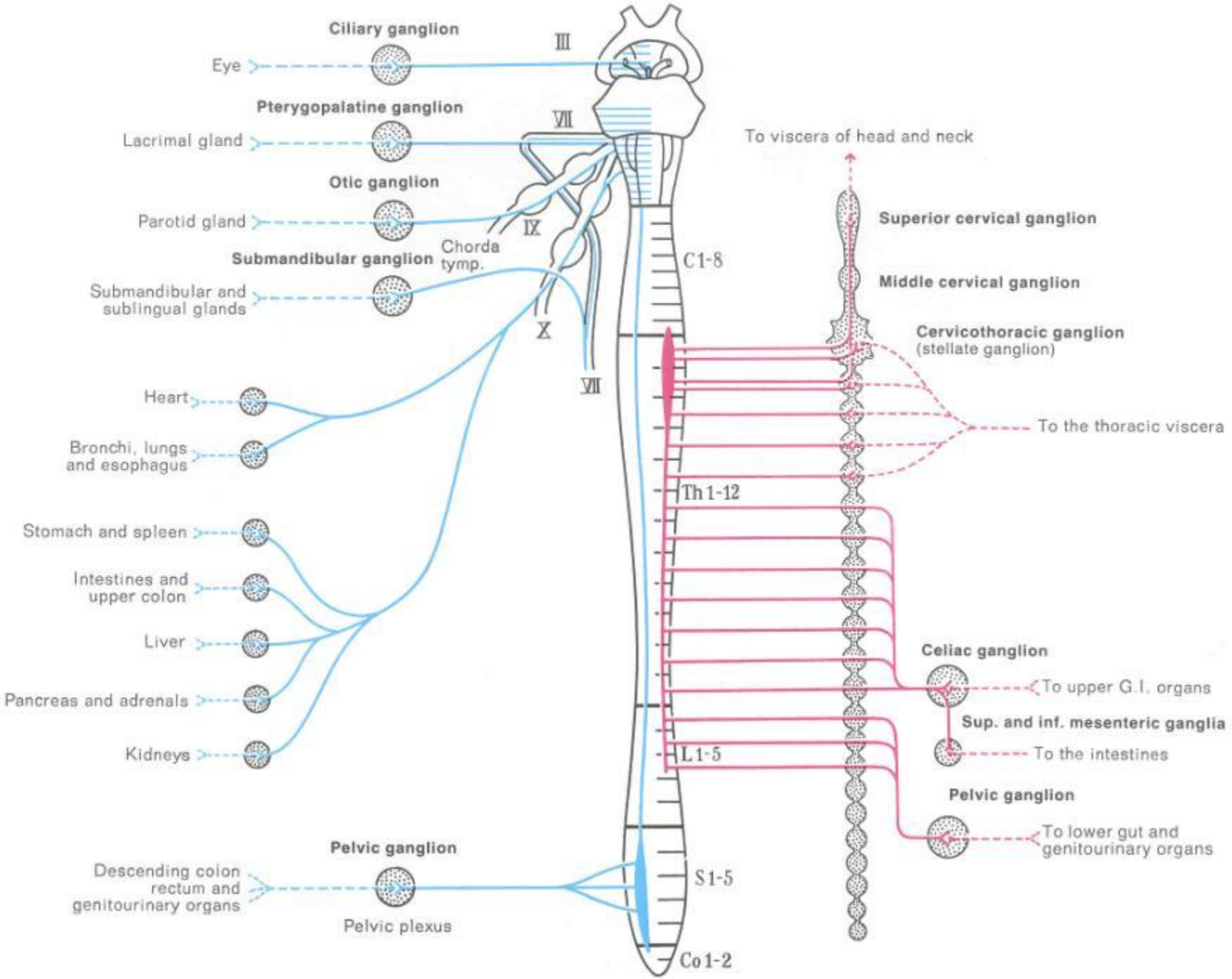
Parasympathetic: Vagus Nerve (X); constriction of bronchi and blood vessels.

AUTONOMIC FIBER PLACEMENT:

Sympathetic – "Thoracolumbar" (T1-L2)

Parasympathetic = "Cranio-sacral" (Cnn III, VII, IX, X; S2-4




Ciliary ganglion
Eye
III
Pterygopalatine ganglion
Lacrimal gland
VII
Otic ganglion
Parotid gland
IX
Chorda tymp.
Submandibular ganglion
Submandibular and sublingual glands
X
VII
Heart
Bronchi, lungs and esophagus
Stomach and spleen
Intestines and upper colon
Liver
Pancreas and adrenals
Kidneys
Pelvic ganglion
Descending colon rectum and genitourinary organs
Pelvic plexus
C1-8
Th 1-12
L 1-5
S 1-5
Co 1-2
To viscera of head and neck
Superior cervical ganglion
Middle cervical ganglion
Cervicothoracic ganglion
(stellate ganglion)
To the thoracic viscera
Celiac ganglion
To upper G.I. organs
Sup. and inf. mesenteric ganglia
To the intestines
Pelvic ganglion
To lower gut and genitourinary organs