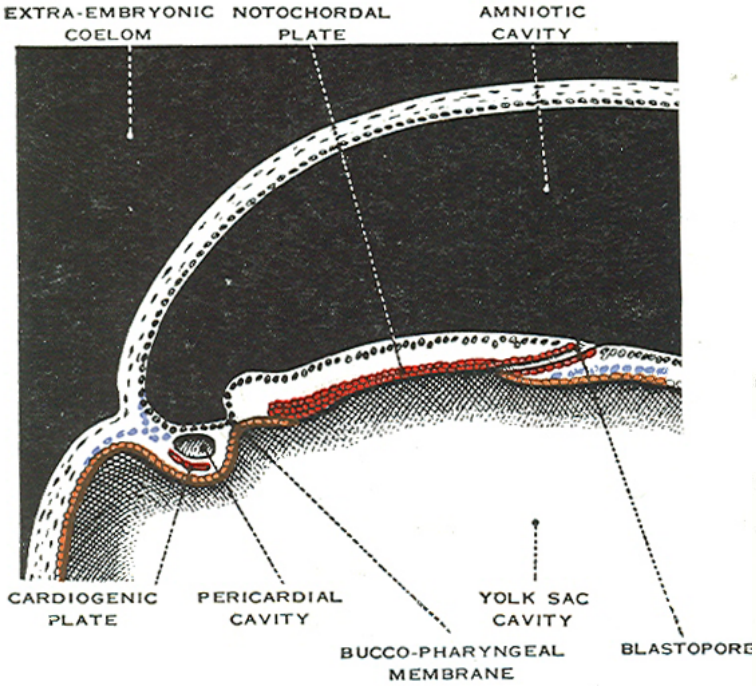
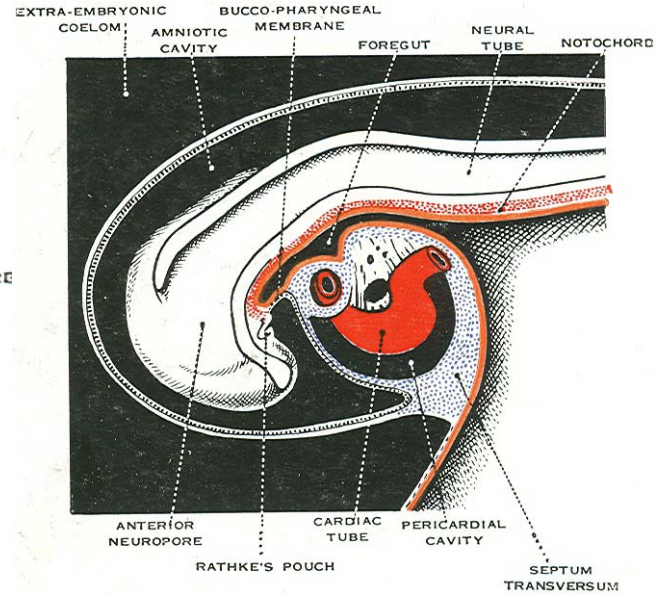

EXTRA-EMBRYONIC COELOM
NOTOCHORDAL PLATE
AMNIOTIC CAVITY
CARDIOGENIC PLATE
PERICARDIAL CAVITY
BUCCO-PHARYNGEAL MEMBRANE
YOLK SAC CAVITY
BLASTOPORE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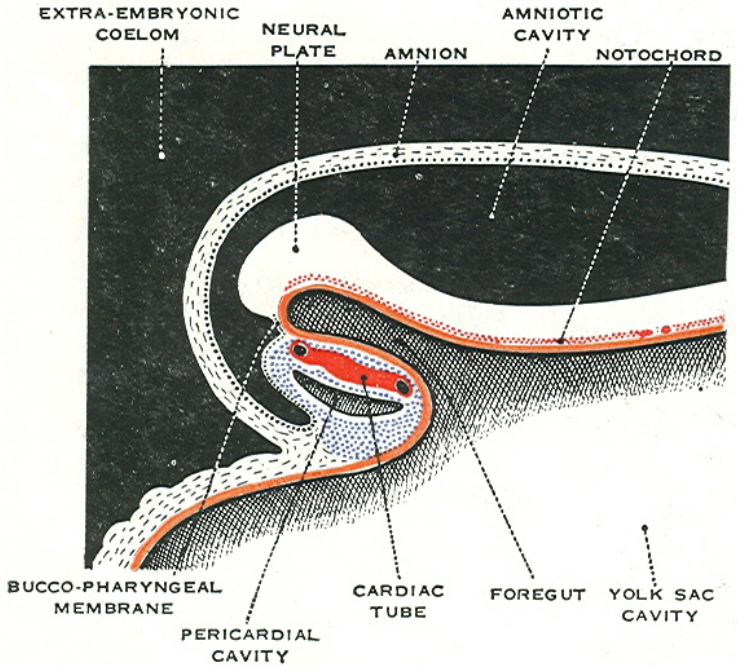
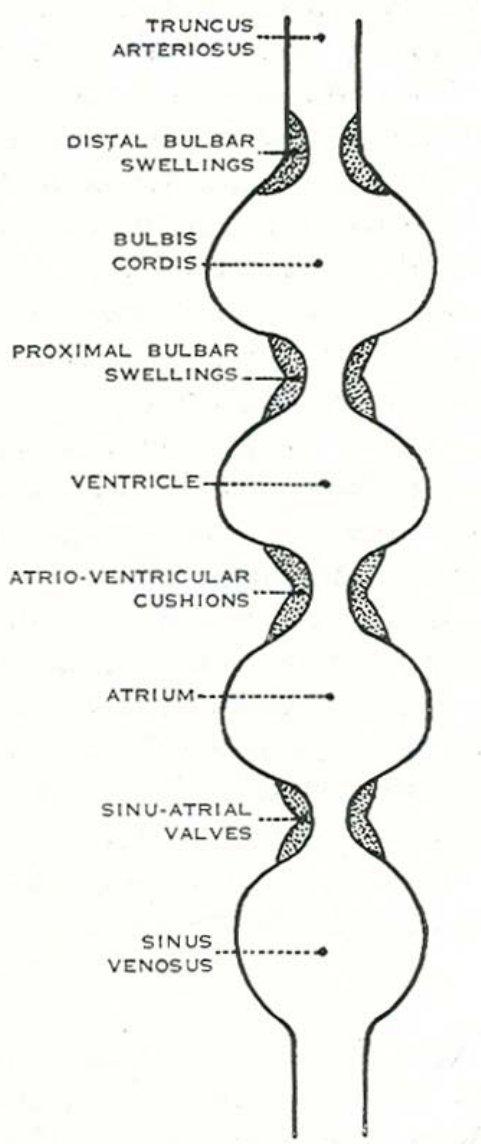
AMNIOTIC CAVITY
BUCCO-PHARYNGEAL MEMBRANE
FOREGUT
NEURAL TUBE
NOTOCHORD
ANTERIOR NEUROPORE
RATHKE'S POUCH
CARDIAC TUBE
PERICARDIAL CAVITY
SEPTUM TRANSVERSUM


EXTRA-EMBRYONIC COELOM
NEURAL PLATE
AMNION
AMNIOTIC CAVITY
NOTOCHORD
BUCCO-PHARYNGEAL MEMBRANE
PERICARDIAL CAVITY
CARDIAC TUBE
FOREGUT
YOLK SAC CAVITY


TRUNCUS ARTERIOSUS
DISTAL BULBAR SWELLINGS
BULBIS CORDIS
PROXIMAL BULBAR SWELLINGS
VENTRICLE
ATRIO-VENTRICULAR CUSHIONS
ATRIUM
SINU-ATRIAL VALVES
SINUS VENOSUS

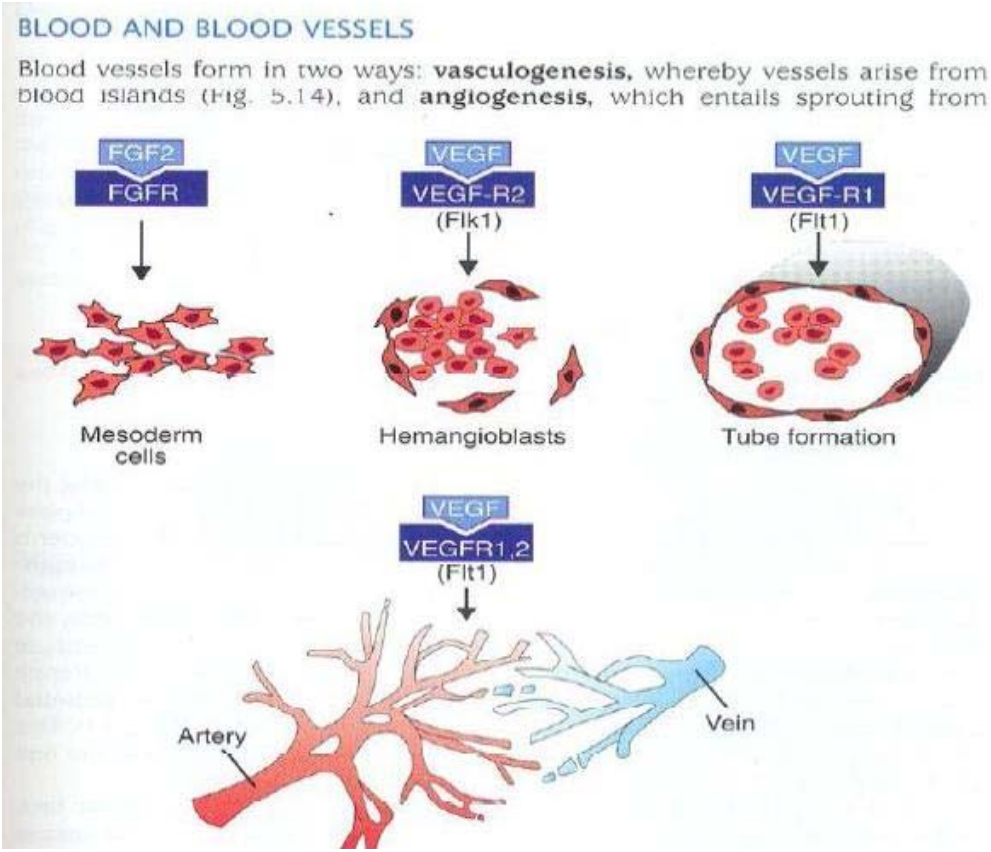
- Blood Vessels Formed By :

Vasculogenesis

– vessels arise from blood islands

Angiogenesis

– sprouting from existing vessels



- First arch arteries to appear in the embryo are Rt & Lt primitive aorta
- Each primitive aorta consists of
  1. a portion lying ventral to the foregut ( ventral aorta)
  2. an arched portion lying in the first pharyngeal arch
  3. and a dorsal portion lying dorsal to the gut (dorsal aorta)

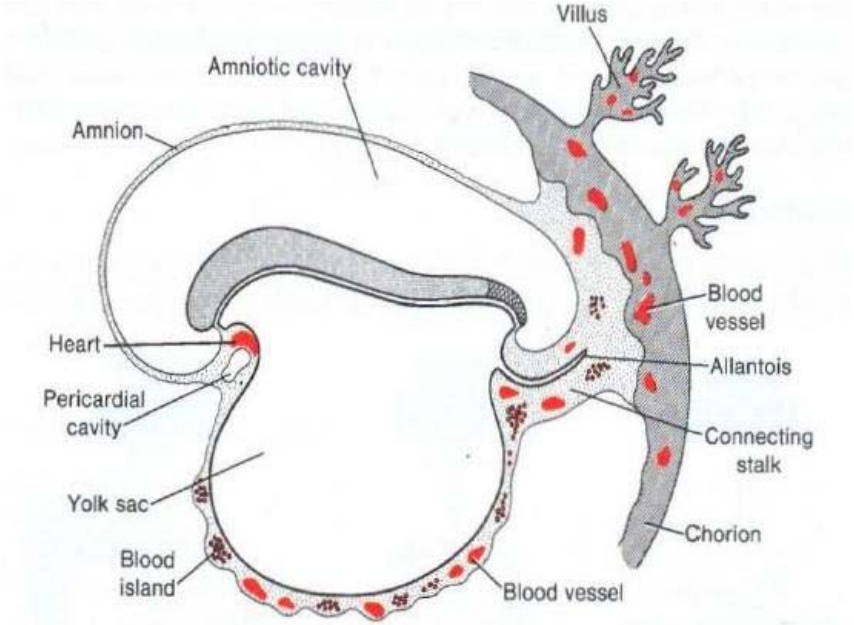
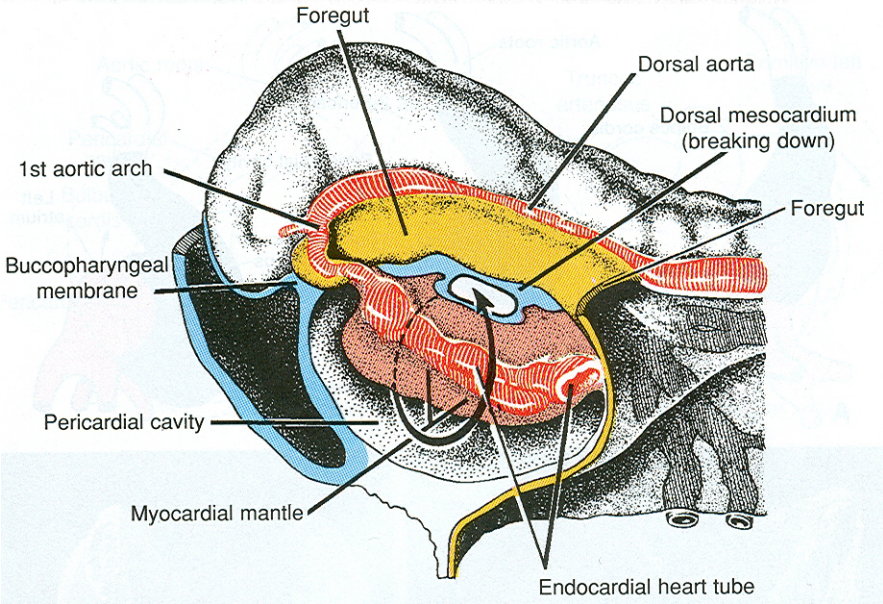
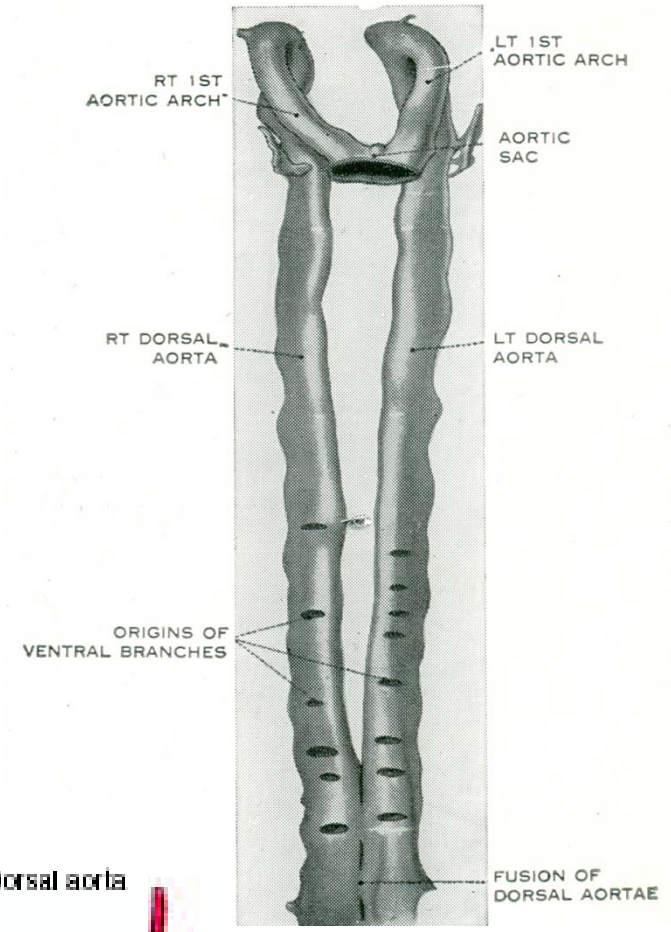
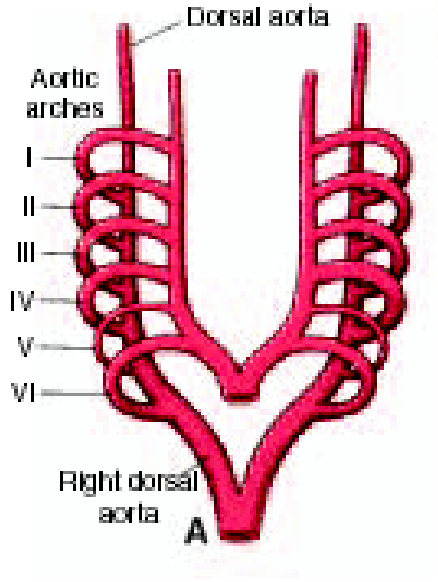



**Figure 5.15** Extraembryonic blood vessel formation in the villi, chorion, connecting stalk, and wall of the yolk sac in a presomite embryo of approximately 19 days.

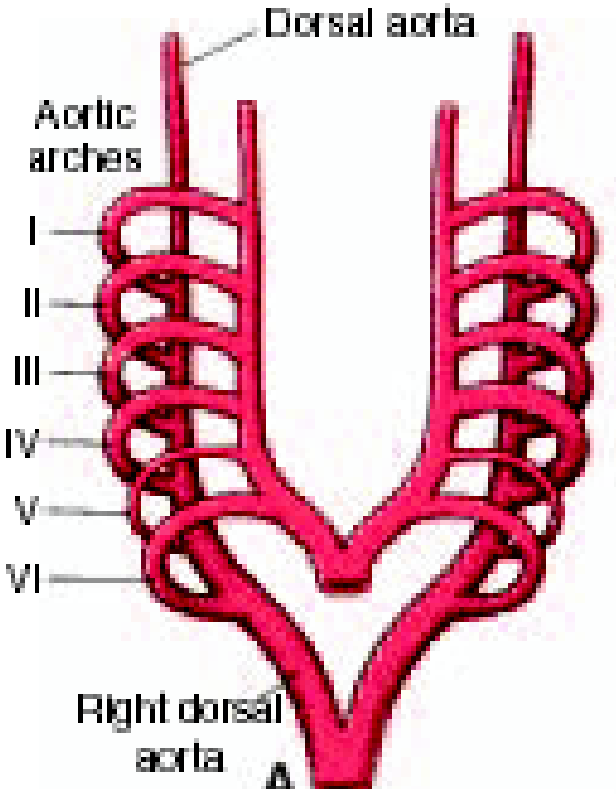


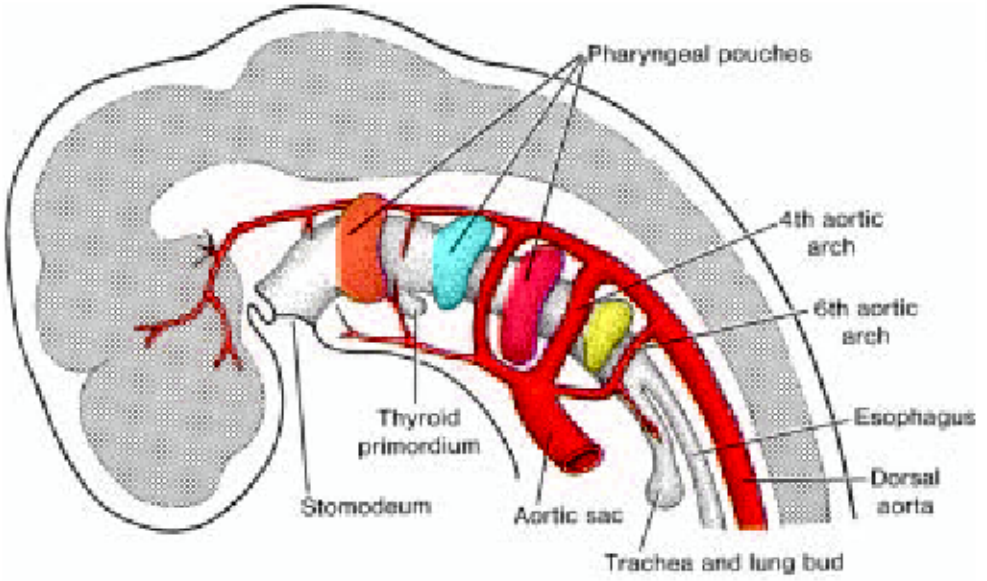
- ventral aorta develops ventral to foregut .
- dorsal aorta is formed dorsal to the foregut
- After fusion of two endocardial heart tubes , two ventral aorta partially fuse to form aortic sac
- unfused part remain as right & left horns of the sac ( some define aortic sac as the most distal part of the truncus arteriosus)

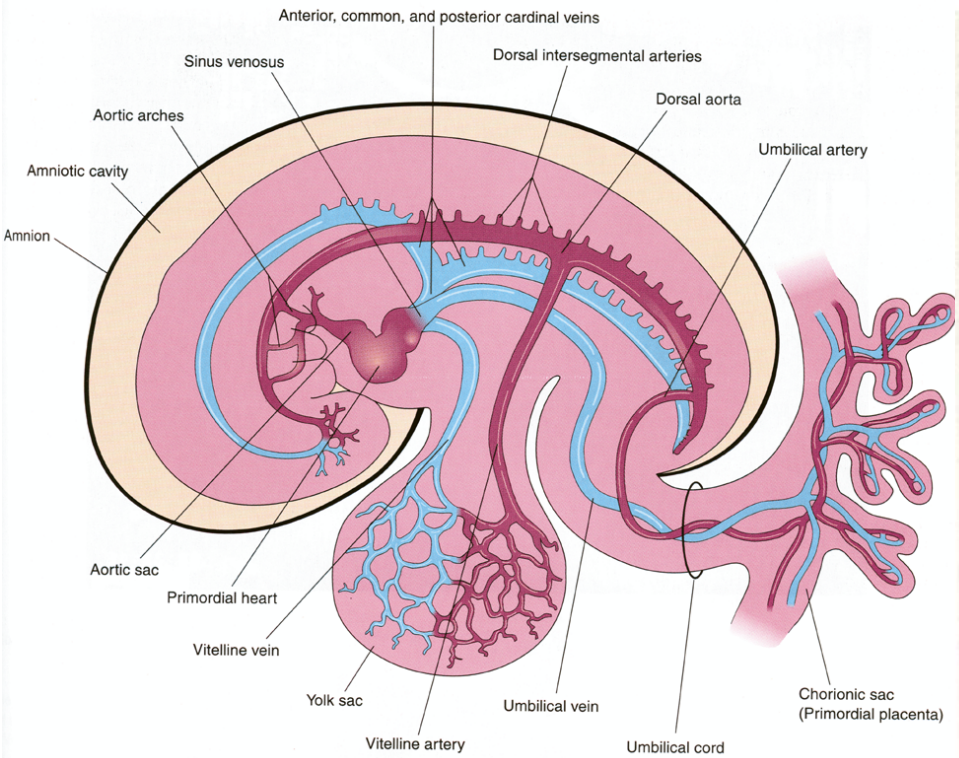


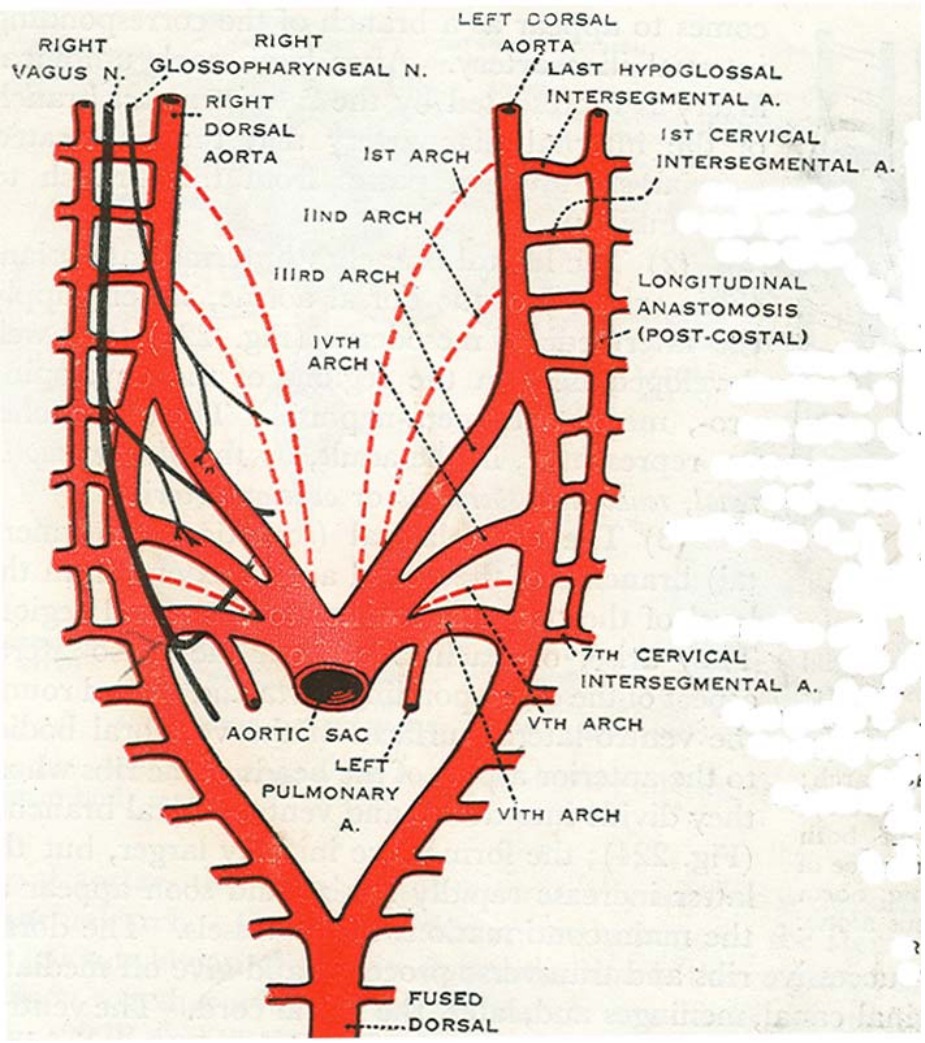



- Successive arterial arches now appear in the second to sixth pharyngeal arches , each connected ventrally to right & left horn of aortic sac & dorsally to dorsal aorta
- One such arterial arch lies in each pharyngeal arch
- In subsequent development , the arrangement of these arteries become modified
- Major arteries of the head & neck and thorax are derived from these arches as follows :





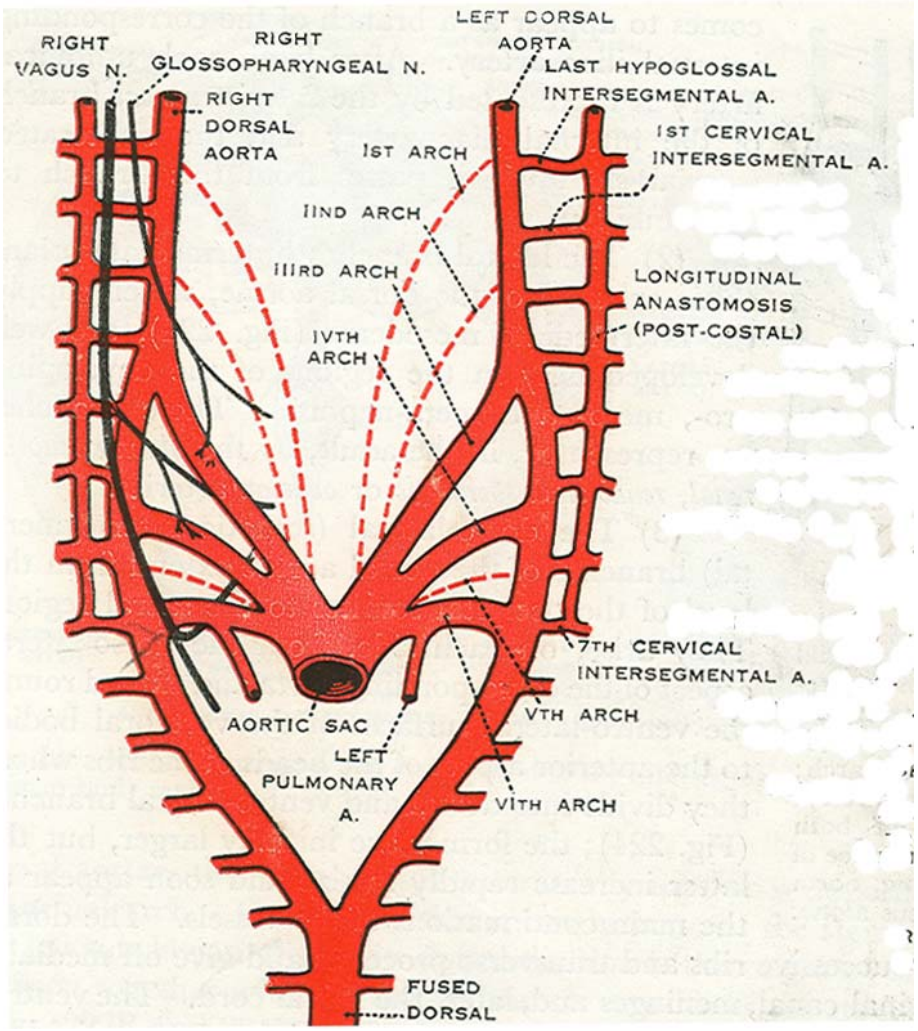



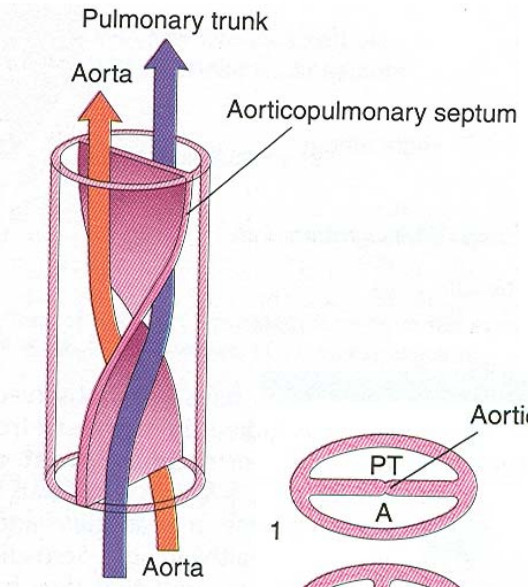

The dorsal aortae gives off a series of lateral inter-segmental branches to the body wall

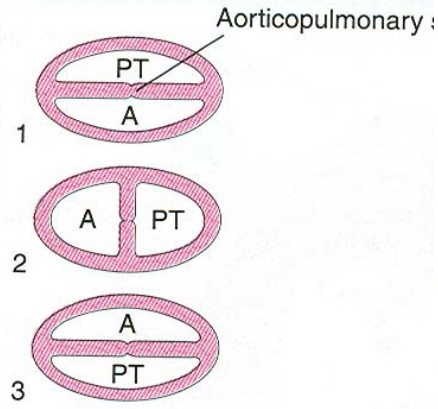
One of these , the 7th intersegmental artery supplies the upper limb bud. It comes to be attached to the dorsal aorta near the attachment of the 4th arch artery

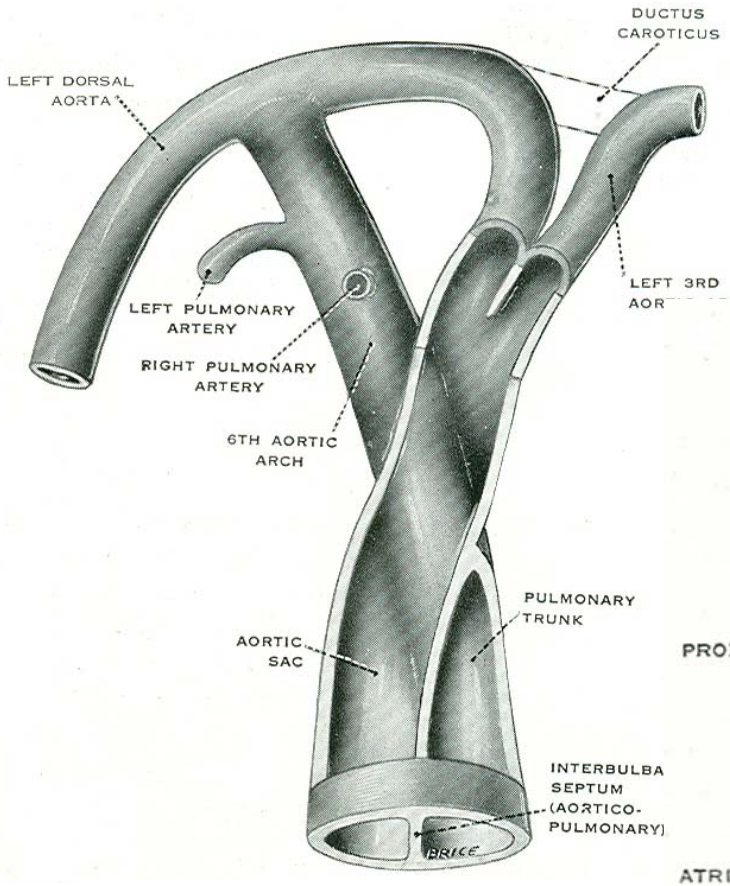
# Fate of arch arteries

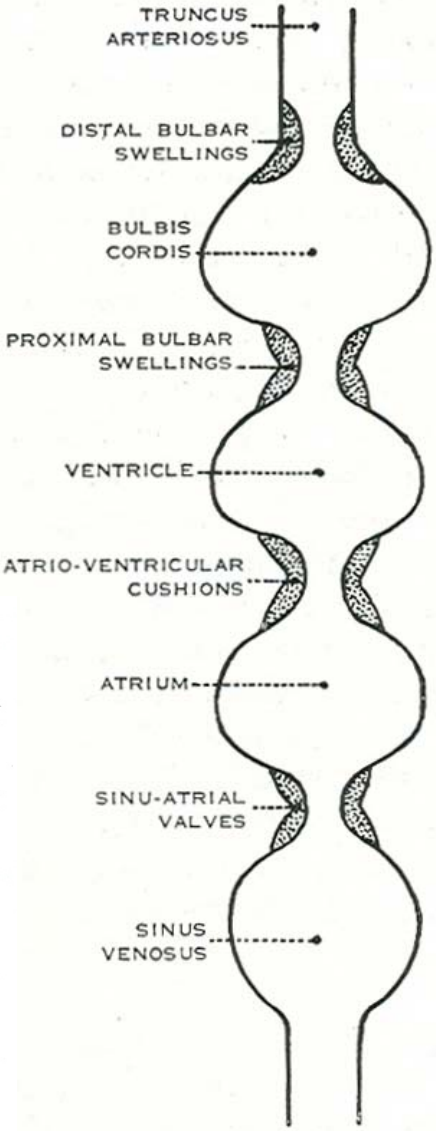
- The majority part of the first & second arch artery disappear
- In adult life – the first arch artery is represented by maxillary artery
- The second arch artery – persist for some part of fetal life as the stapedial artery
- The fifth arch artery also disappears
- Only 3rd ,4th & 6th arch artery remains

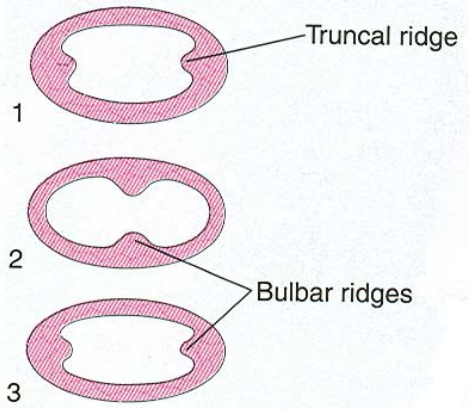


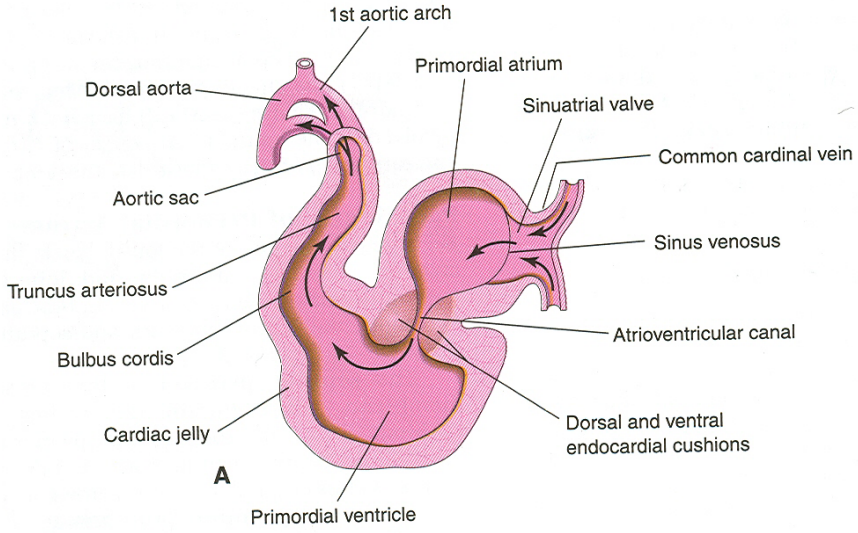

Pulmonary trunk
Aorta
Aorticopulmonary septum
Aorta


Aorticopulmonary
PT
A
1
A
PT
2
A
PT
3


DUCTUS CAROTICUS
LEFT DORSAL AORTA
LEFT 3RD AOR
LEFT PULMONARY ARTERY
RIGHT PULMONARY ARTERY
6TH AORTIC ARCH
PULMONARY TRUNK
AORTIC SAC
INTERBULBA SEPTUM (AORTICO-PULMONARY)
BRICE

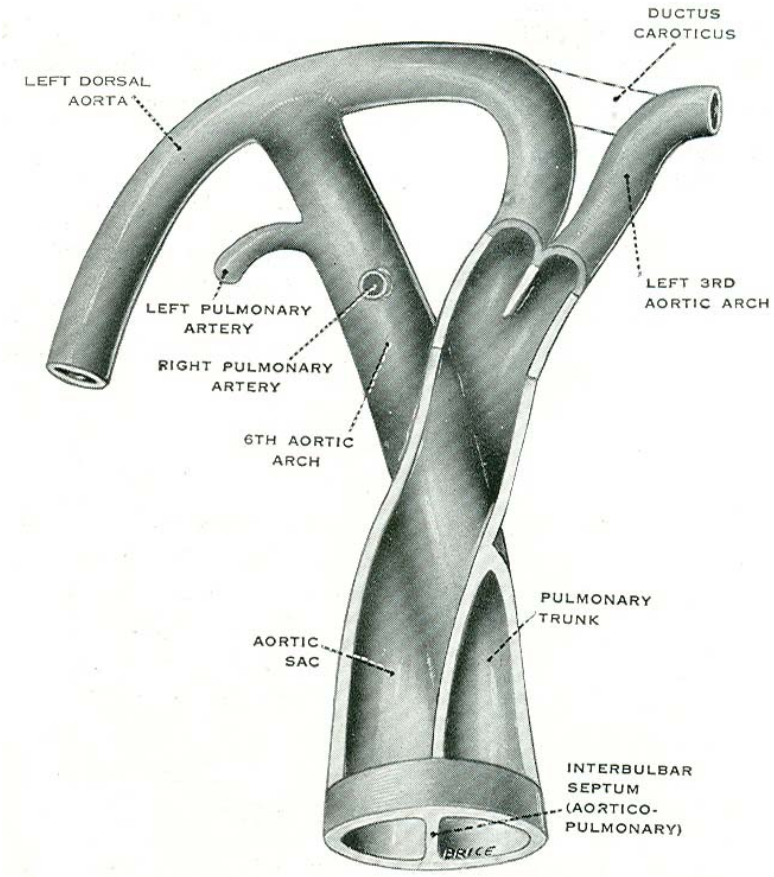

TRUNCUS ARTERIOSUS
DISTAL BULBAR SWELLINGS
BULBIS CORDIS
PROXIMAL BULBAR SWELLINGS
VENTRICLE
ATRIO-VENTRICULAR CUSHIONS
ATRIUM
SINU-ATRIAL VALVES
SINUS VENOSUS


Truncal ridge
1
2
Bulbar ridges
3


1st aortic arch
Primordial atrium
Dorsal aorta
Sinuatrial valve
Common cardinal vein
Aortic sac
Sinus venosus
Truncus arteriosus
Atrioventricular canal
Bulbus cordis
Dorsal and ventral endocardial cushions
Cardiac jelly
A
Primordial ventricle

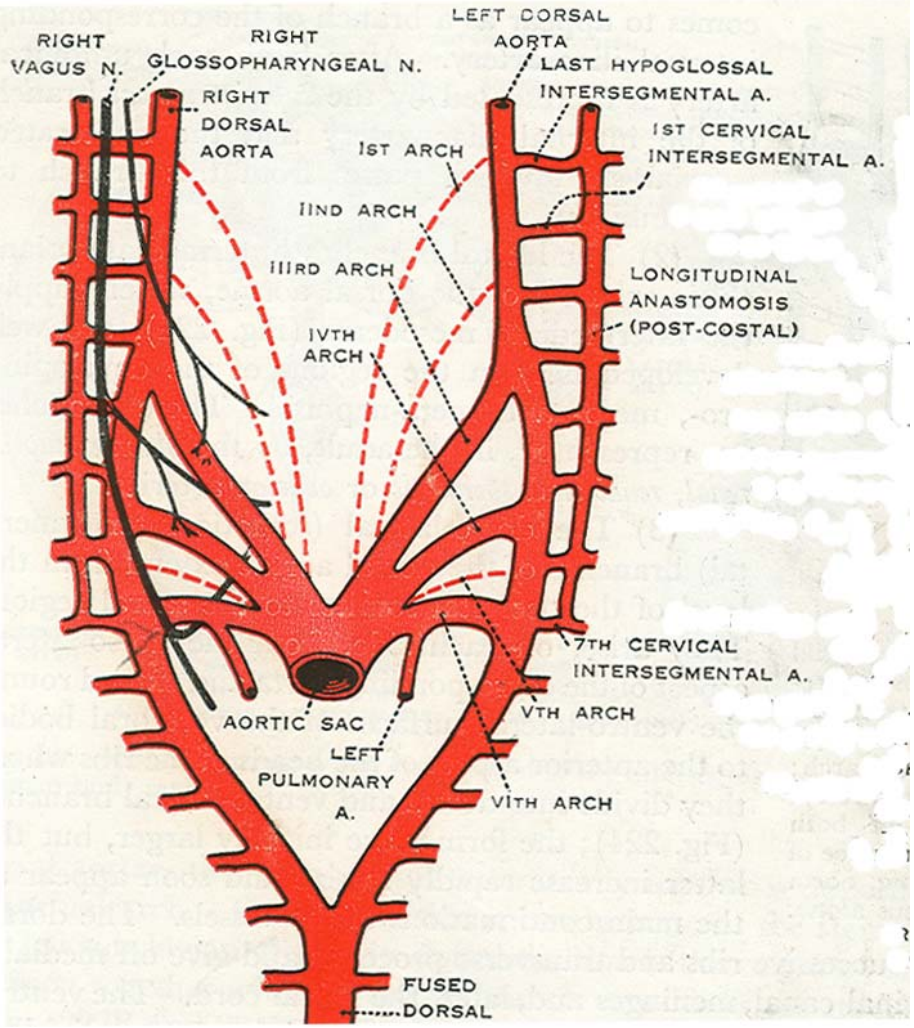
# Division -Aortic sac

- is now connected only with the arteries of the 3rd , 4th & 6th arches.
- The 3rd & 4th arch arteries open into the ventral part ,
- 6th arch artery into the dorsal part of aortic sac.
- The spiral septum, that is formed in the truncus arteriosus , extend into the aortic sac & fuses with its post wall
- in such a way that blood from the pulmonary trunk passes only into the 6th arch artery , while that from the ascending aorta passes into the 3rd & 4th arch arteries
- The ascending aorta & pulmonary trunk are formed from the truncus arteriosus

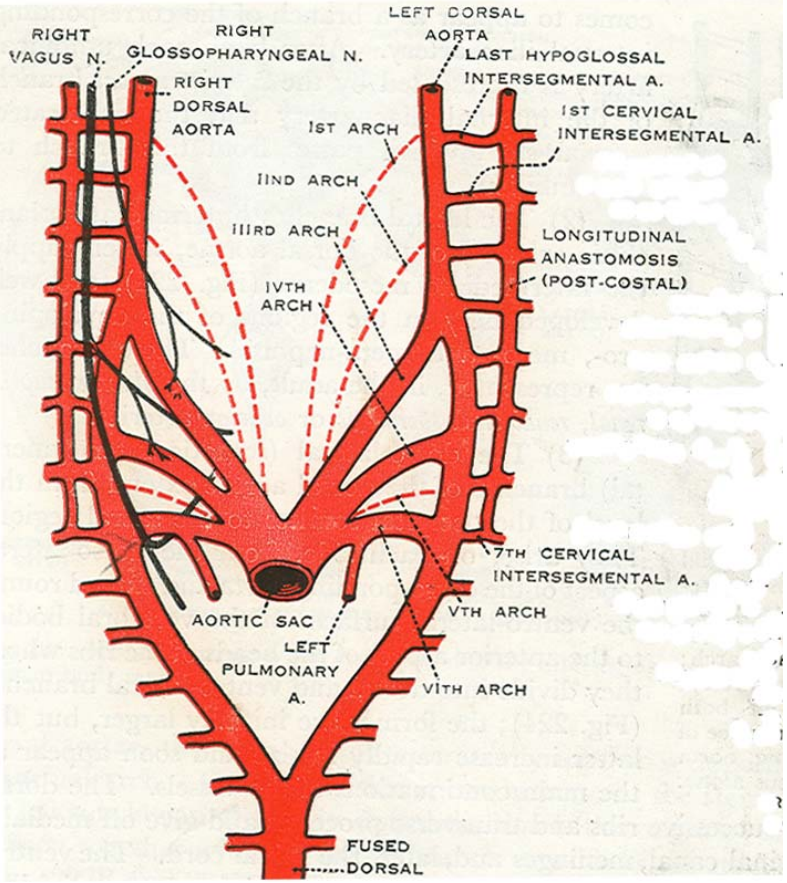


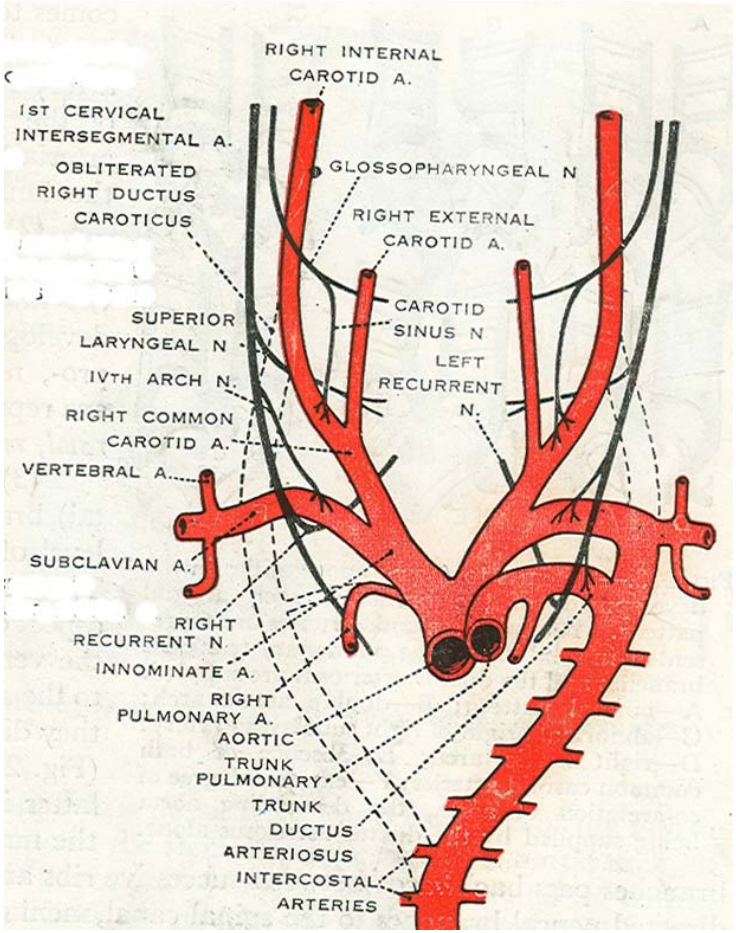
# Changes taking place

1 .Two dorsal aortae grow cranially , beyond the point of attachment of first arch artery

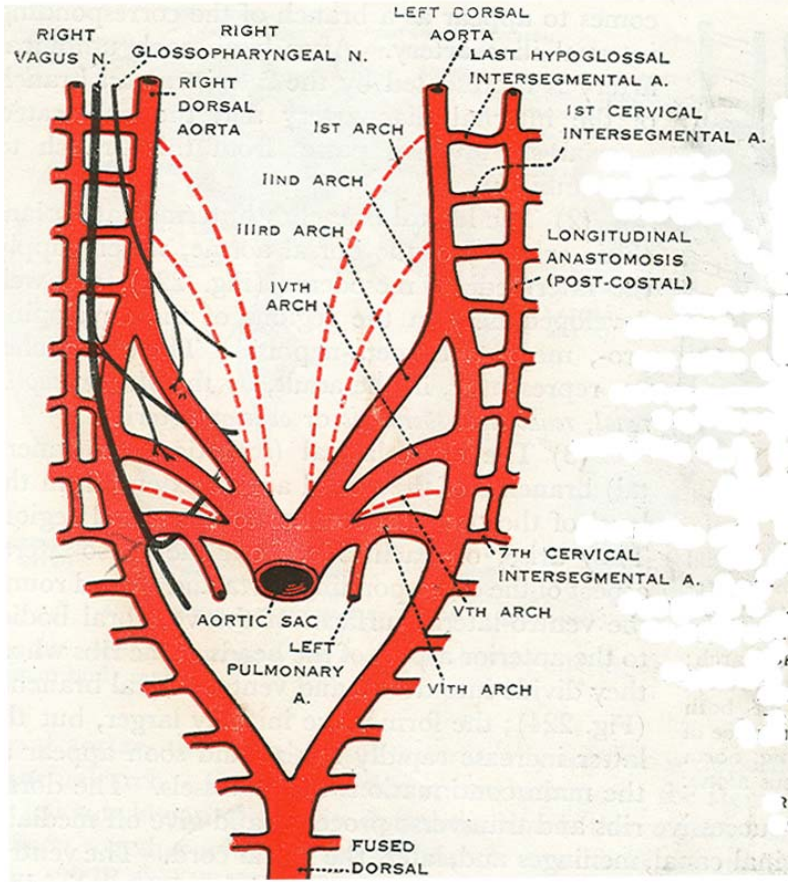


- 2. The portion of dorsal aorta , between the attachment of the 3rd & 4th arch arteries (ductus caroticus) , disappear on both sides
- 3. The portion of the Rt dorsal aorta , between the point of attachment of the 4th arch artery and the point of fusion of the two dorsal aortae disappears

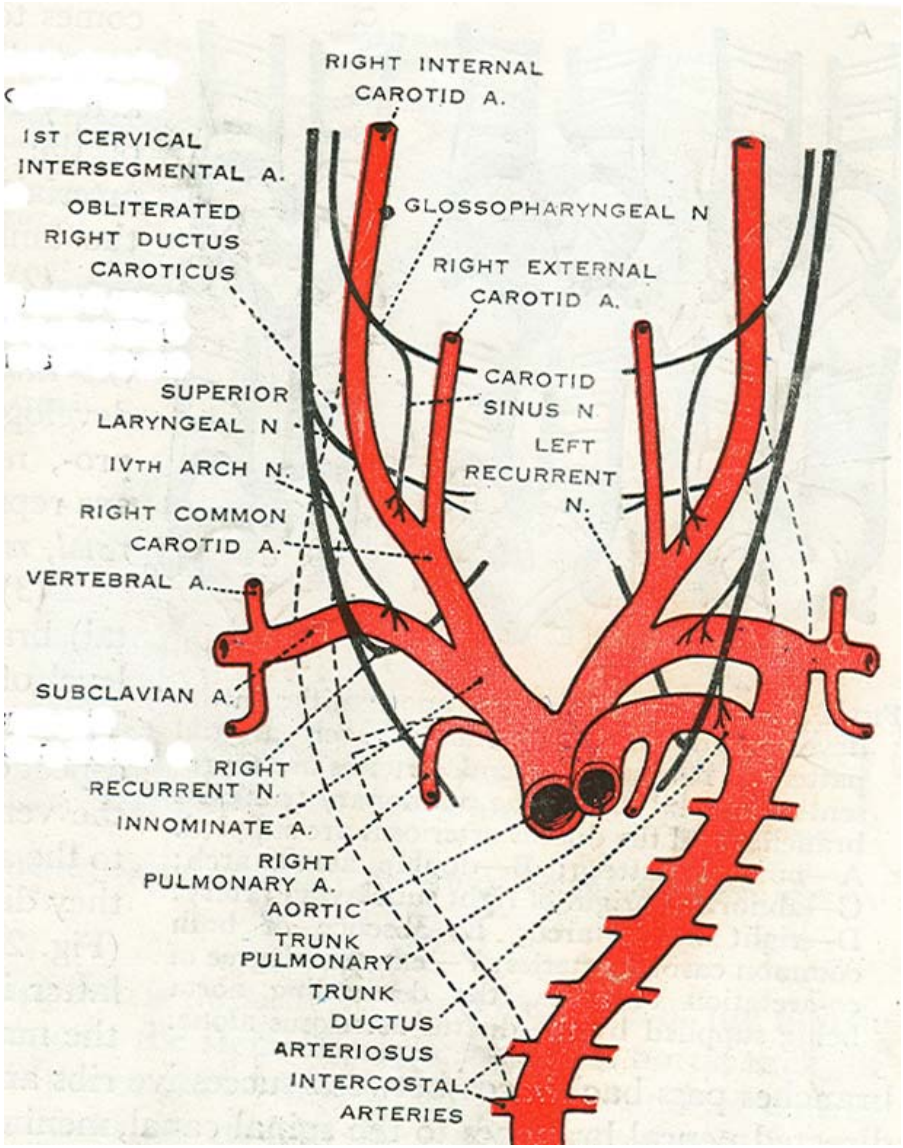


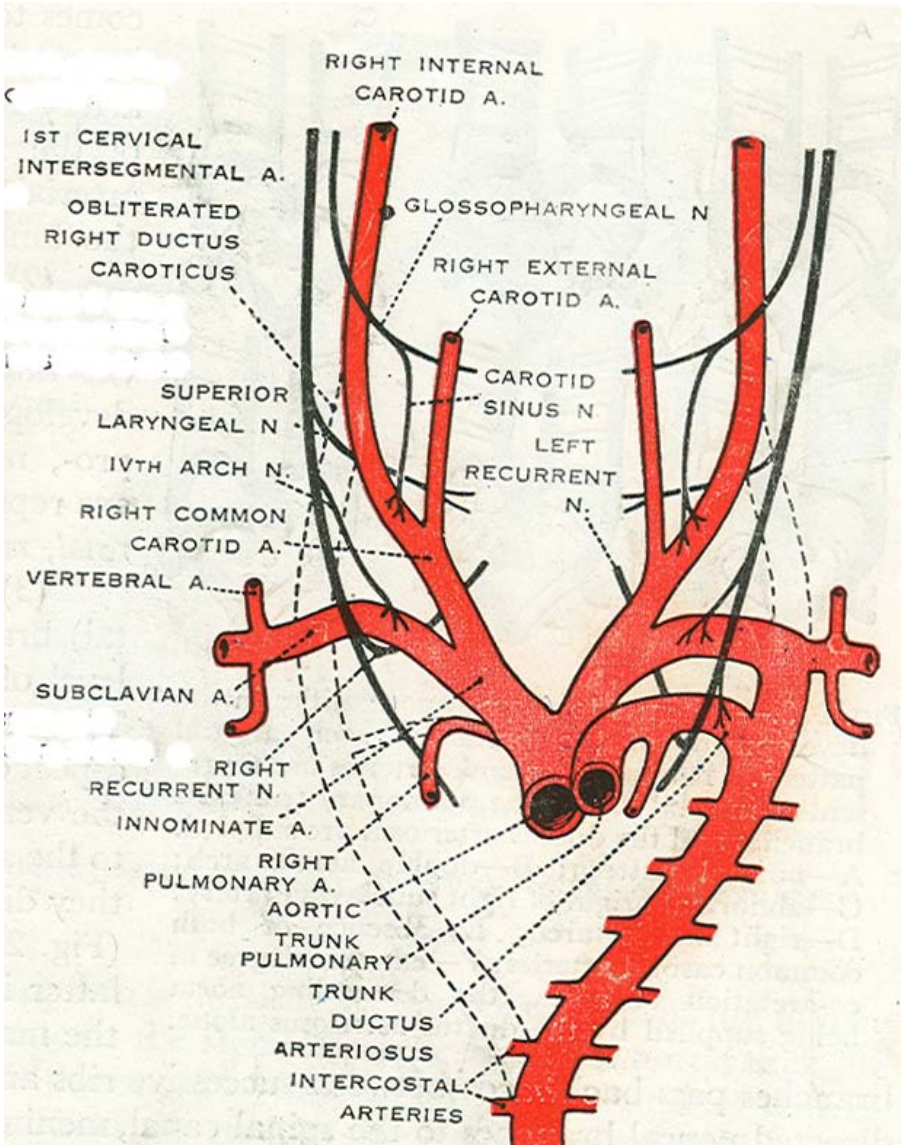
- 4. Each sixth arch artery gives off an artery to the developing lung bud



- 5. On the Rt side , the portion of the 6th arch artery between this bud and the dorsal aorta disappears
- 6. On Lt side , this part remains patent & forms the ductus arteriosus .
- The duct arteriosus carries most of the blood from the right ventricle to the dorsal aorta. It is obliterated after birth and is seen as the ligamentum arteriosum



- 7. Each third arch artery gives off a bud that grows cranially to form the external carotid artery

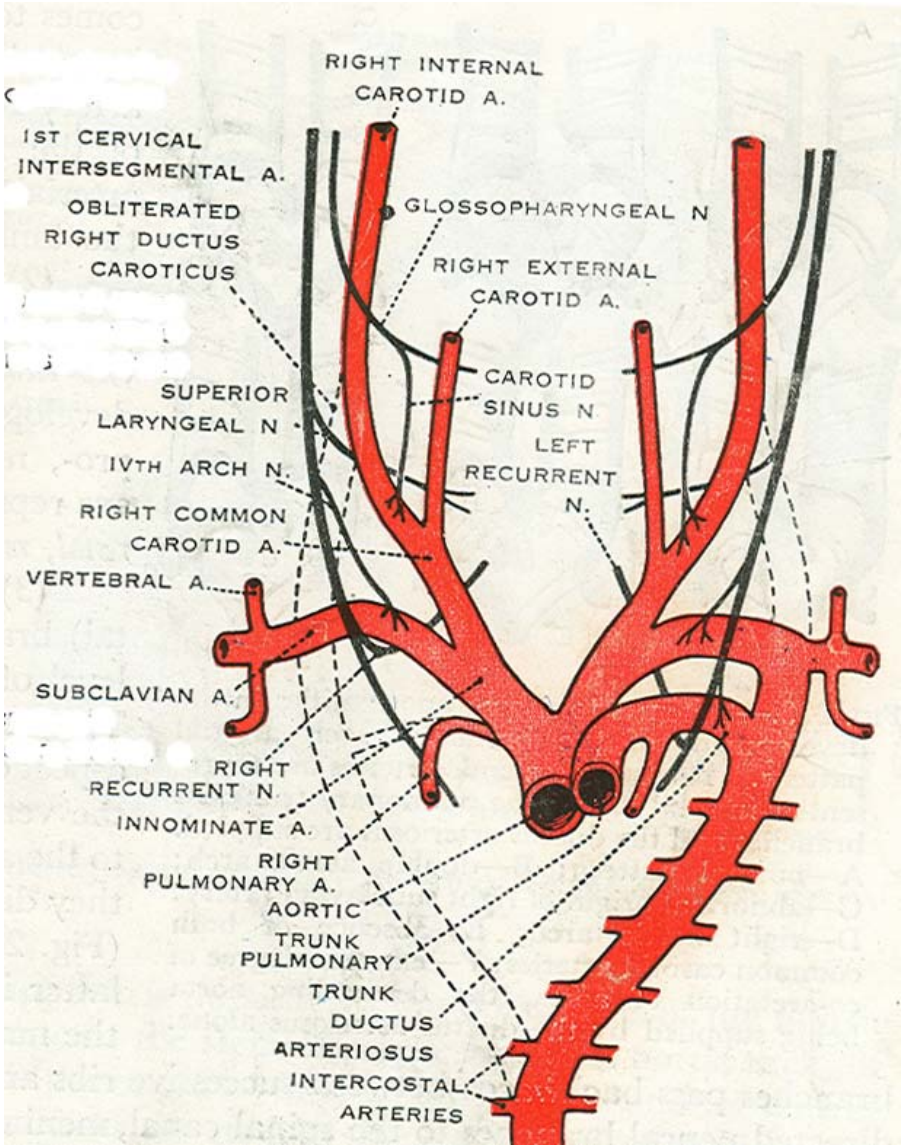


# FATE OF AORTIC ARCHES

1. First aortic arch - disappears (except a small portion which forms part of maxillary artery).
2. Second arch artery - disappears (except the stapedial artery which also disappears after birth).
3. Third aortic arch forms :

   a. Common carotid artery from its proximal part.

   b. Internal carotid artery from its distal part.



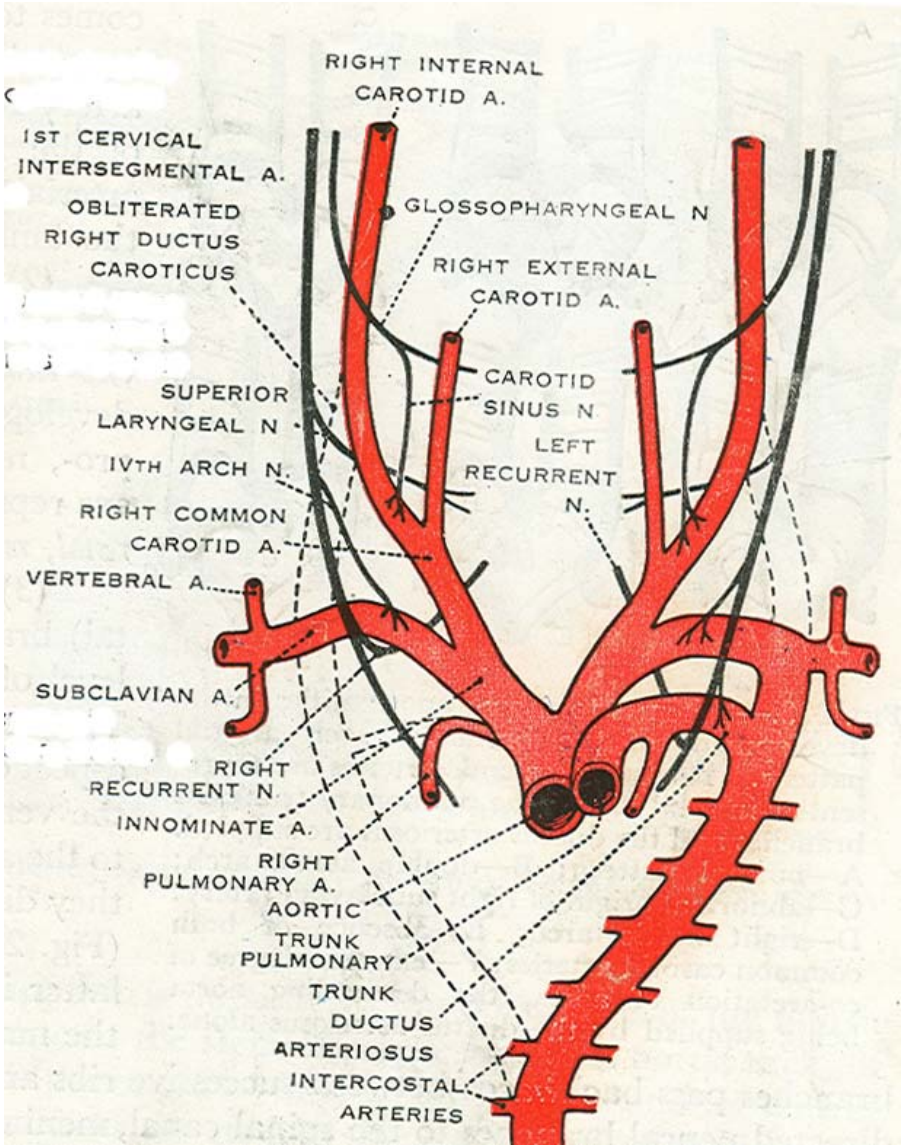
4. Fourth aortic arch :

- a. On the right side forms proximal part of right subclavian artery.
- b. On the left side forms part of arch of aorta

5. Firth aortic arch - disappears.

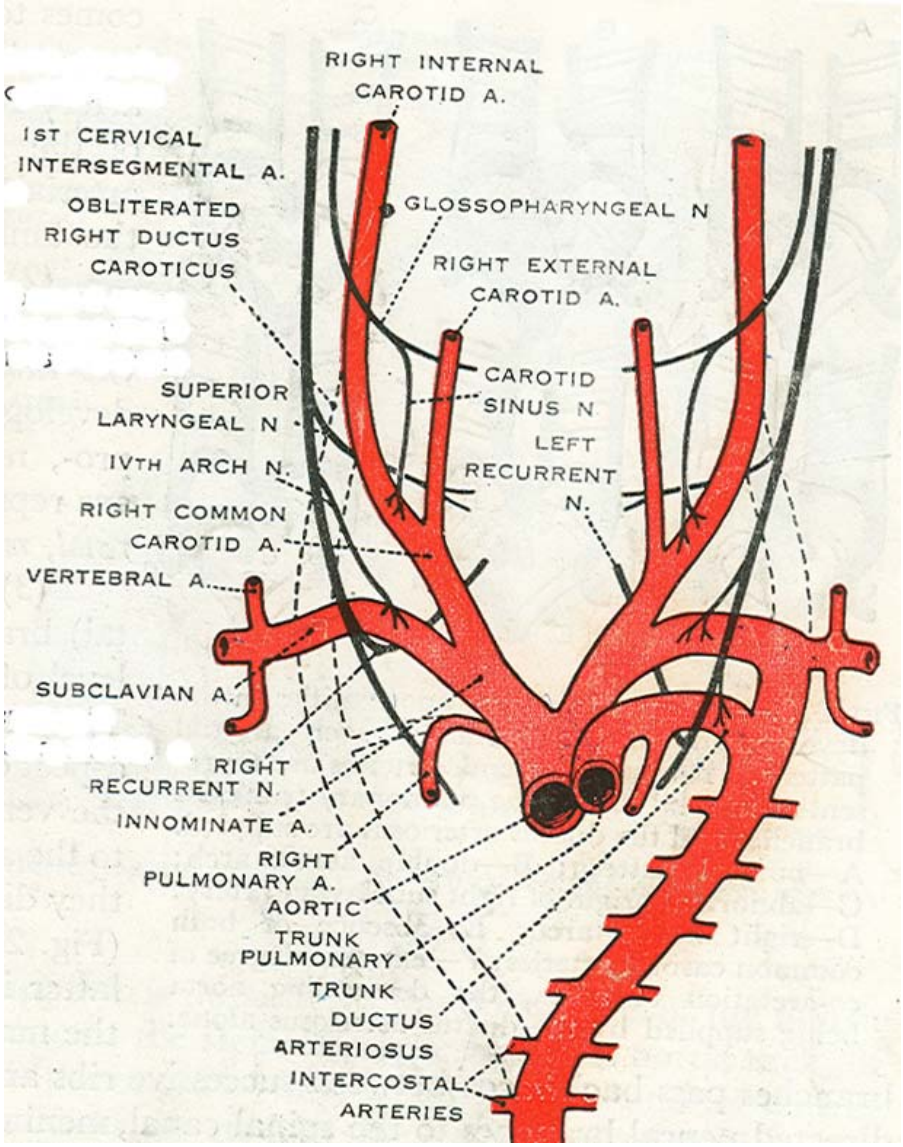
6. Sixth aortic arch:

- a. Proximal part forms pulmonary artery
- b. Distal part –
  - i) Disappears on right side.
  - ii) Forms ductus arteriosus



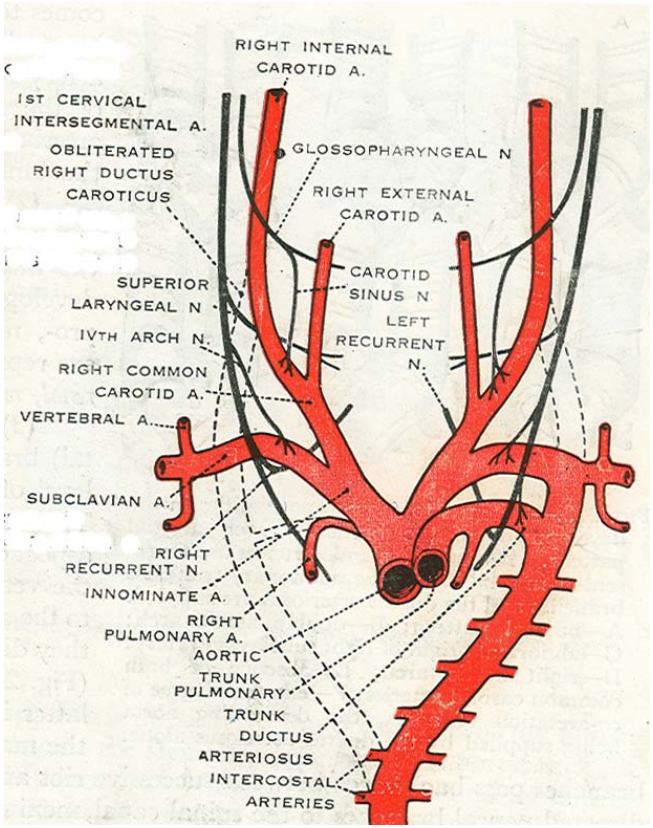
# DEVELOPMENT OF AORTA

- Ascending aorta is formed by aortic sac.
- The Rt horn of the aortic sac forms the brachio-cephalic artery



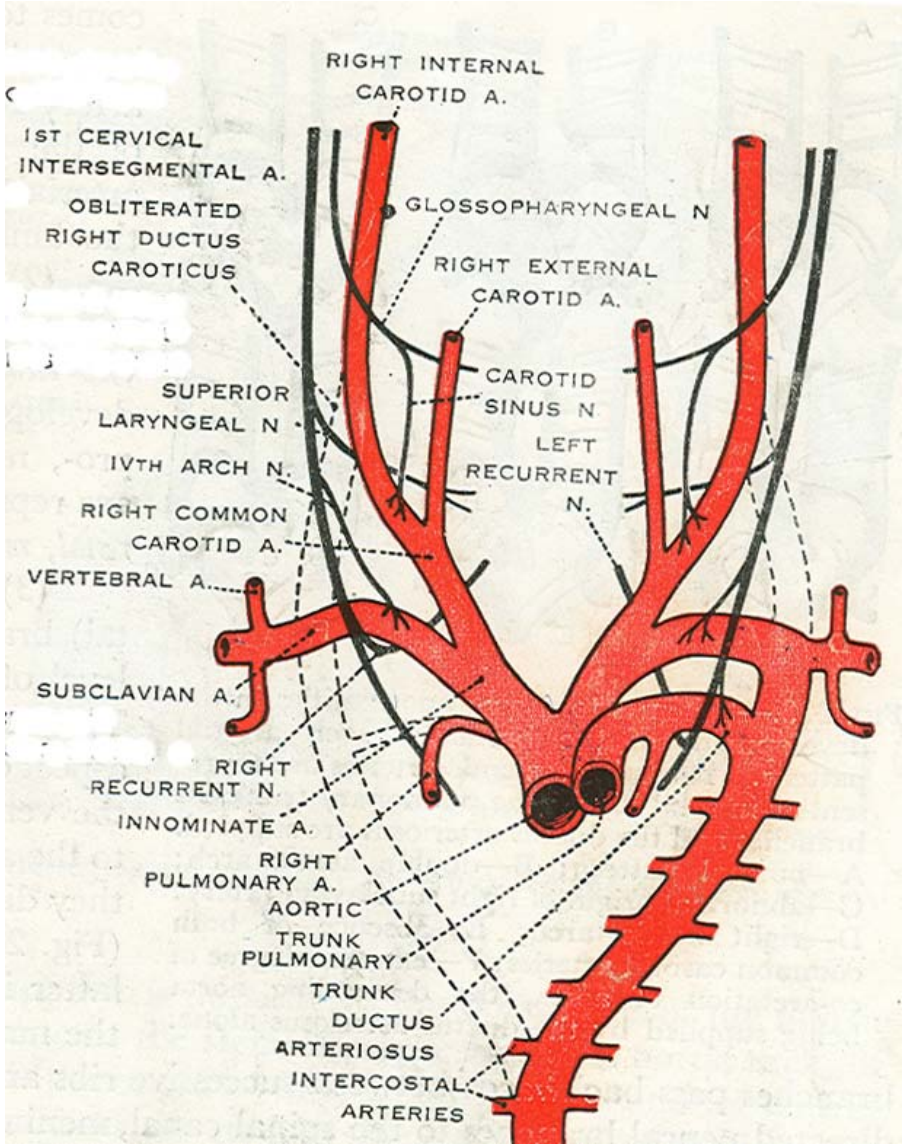
# Arch of aorta

2. Part of arch of aorta between brachiocephalic and left common carotid arteries is formed by left horn of aortic sac.
3. Part of arch of aorta between left common carotid and left subclavian arteries is formed by left 4$^{th}$ aortic arch.
4. Remaining part is formed by left dorsal aorta up to the level of the future lower border of 4$^{th}$ thoracic vertebra.



# descending aorta

- 1. The left dorsal aorta below the attachment of 4th arch artery
- 2. along with fused median vessels

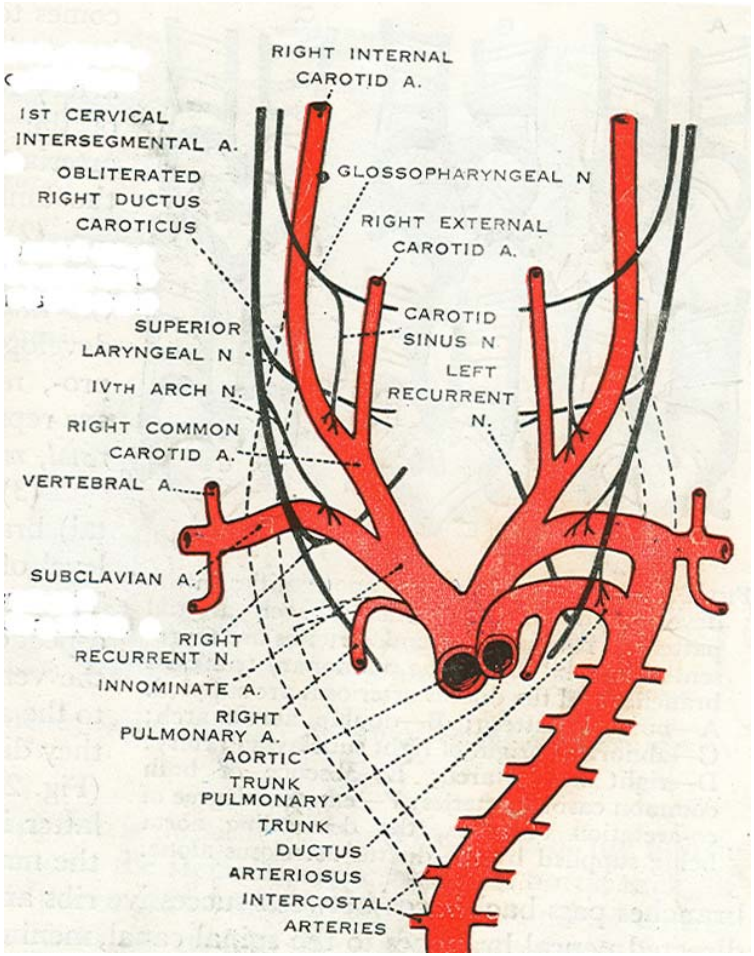


## Development of common carotid artery

1. Formed by proximal part of 3rd aortic arches.

## Development of internal carotid artery

1. Proximal part is formed by distal part of 3rd aortic arch
2. Distal part is formed by cranial part of dorsal aorta.



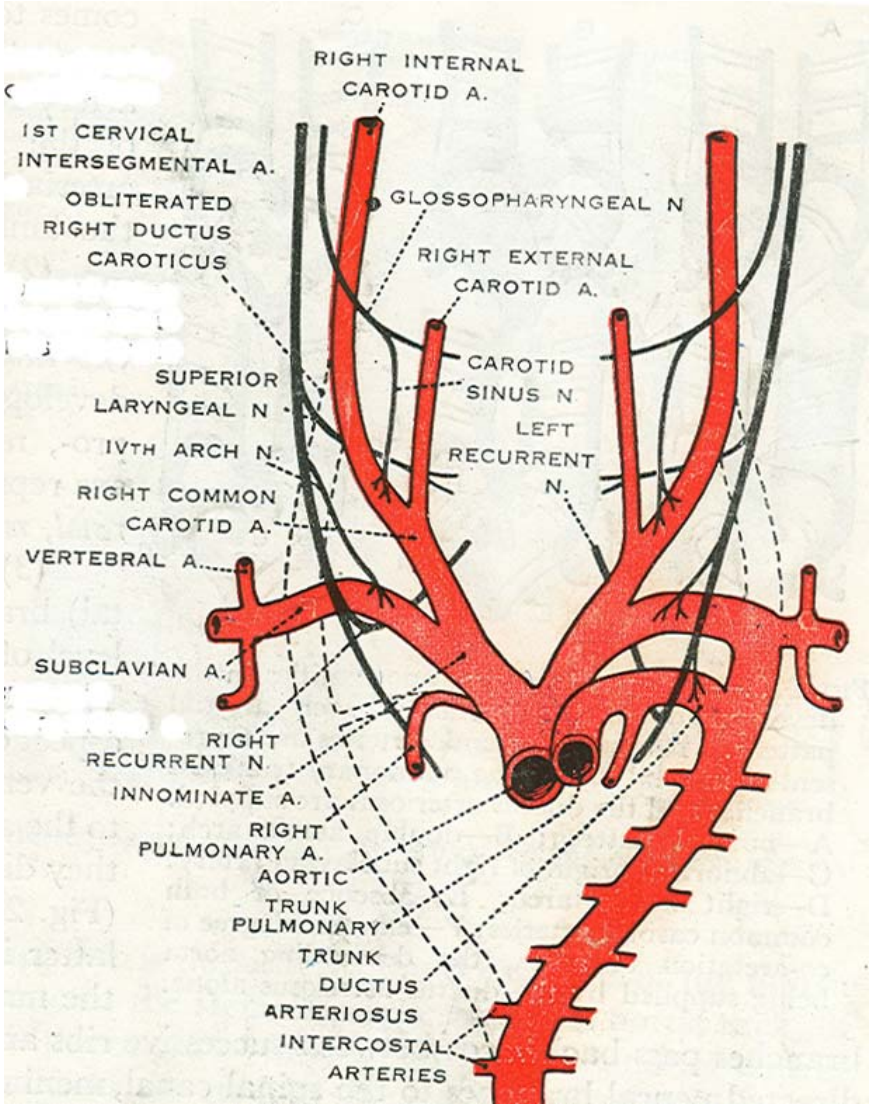
# subclavian artery

Rt side

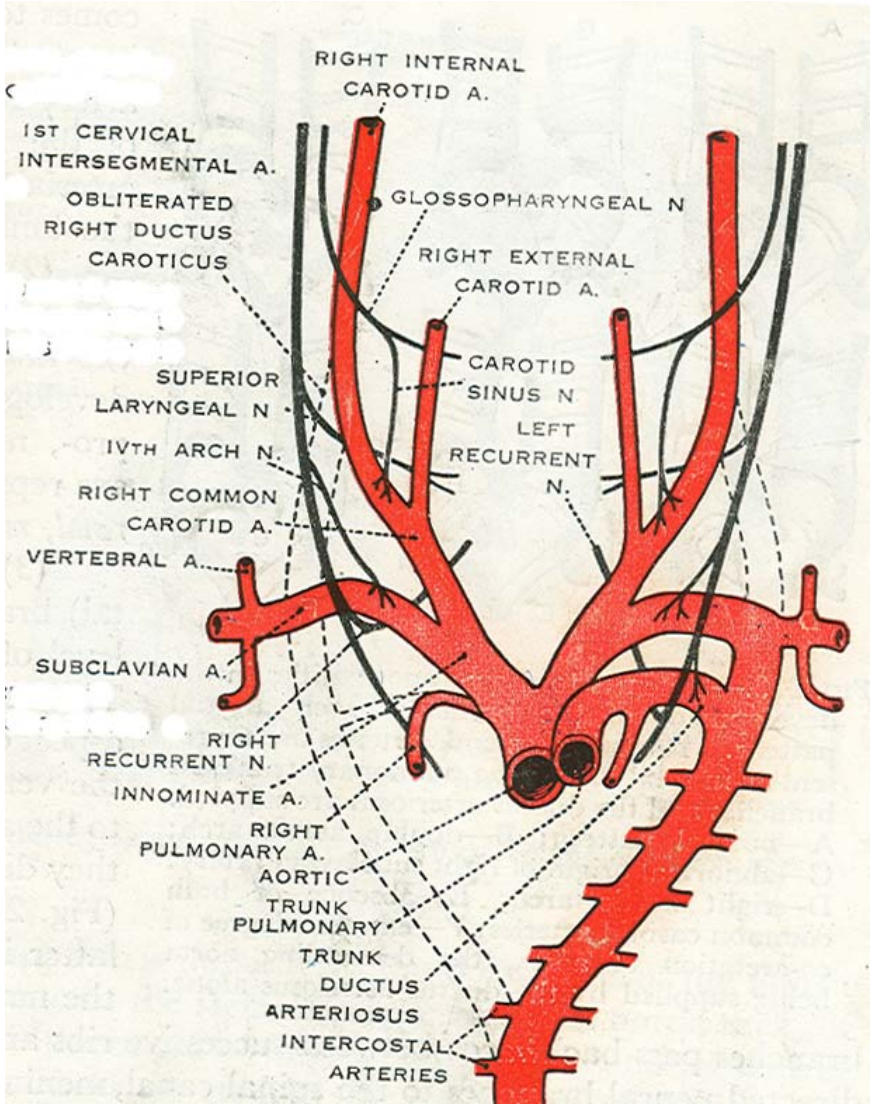
- The Rt 4th arch artery forms the proximal part of the Rt subclavian artery
- The remaining part of the artery being derived from the seventh cervical intersegmental artery

Lt side ,

- the subclavian artery is derived entirely from the 7th cervical intersegmental artery , which arises from the dorsal aorta opposite the attachment of 4th arch artery

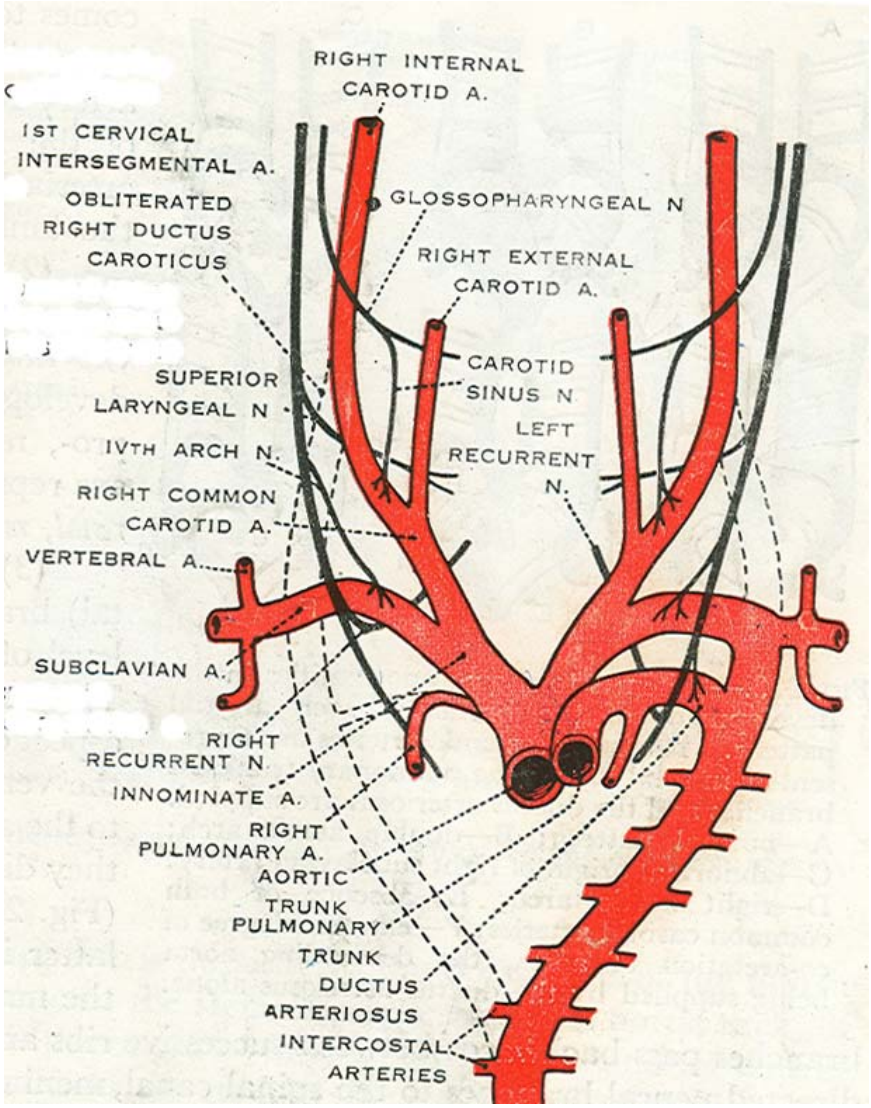


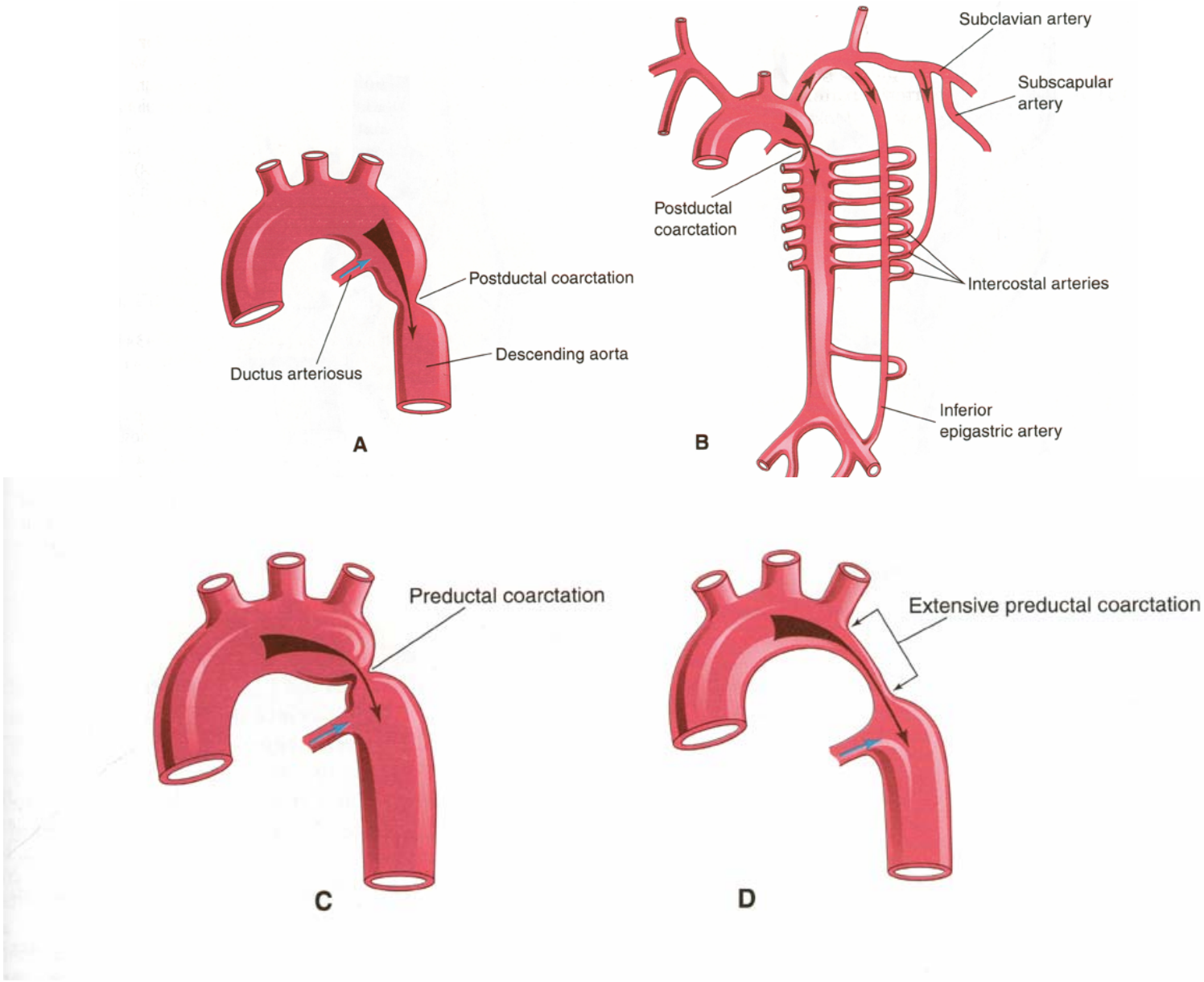
- With the formation of the neck , and the descent of the heart into the thoracic cavity ,
- the point of origin of the subclavian artery from the aorta gradually shifts upwards and comes to lie close to the origin of the Lt common carotid artery



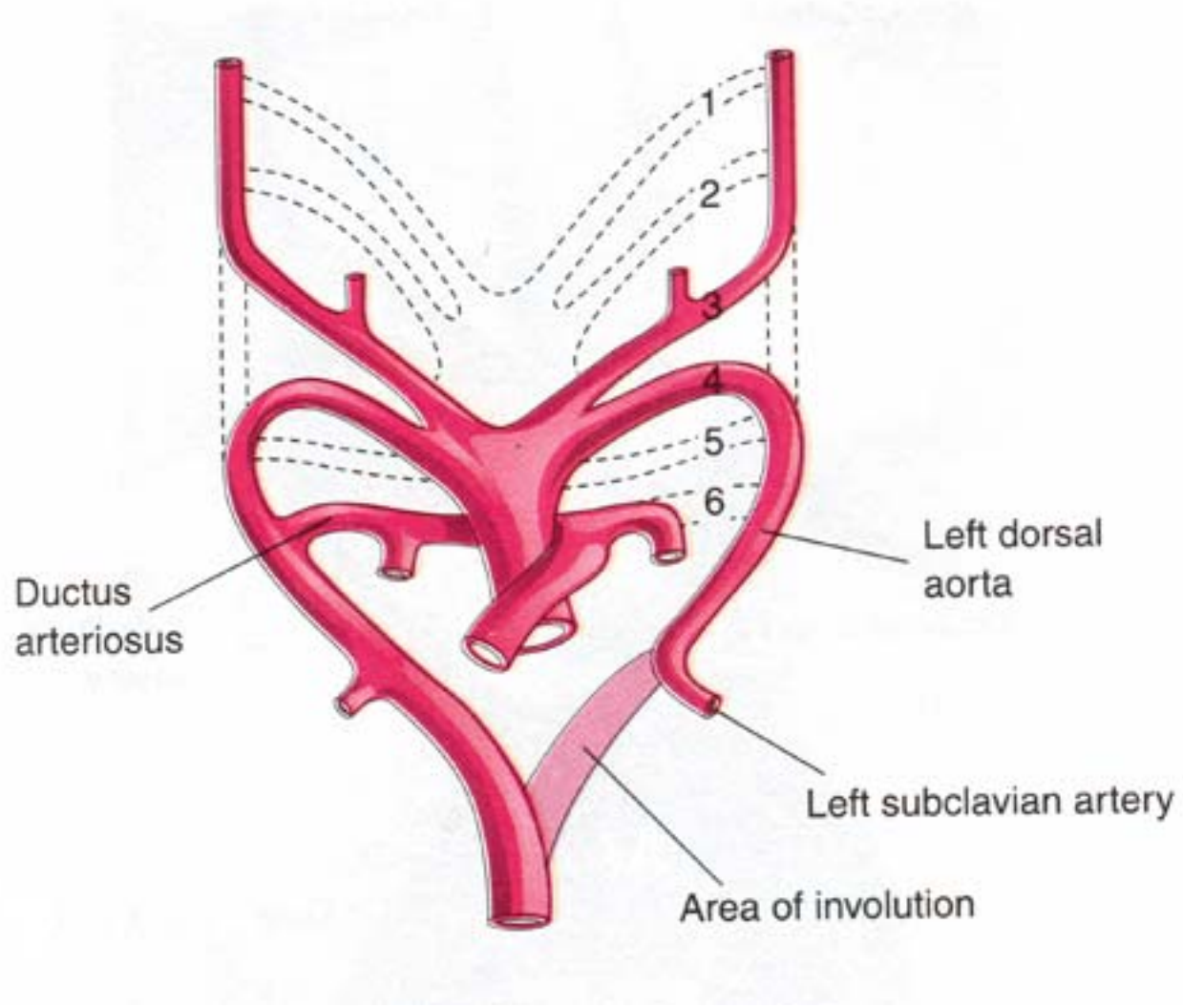
## CONGENITAL ANOMALIES

1. Persistence of ductus arteriosus.
2. Coarction (constriction) of aorta:
   i) Preductal
   ii) Postductal
3. Right sided arch of aorta
4. Double arches of aorta
5. Abnormal origin of right subclavian artery.

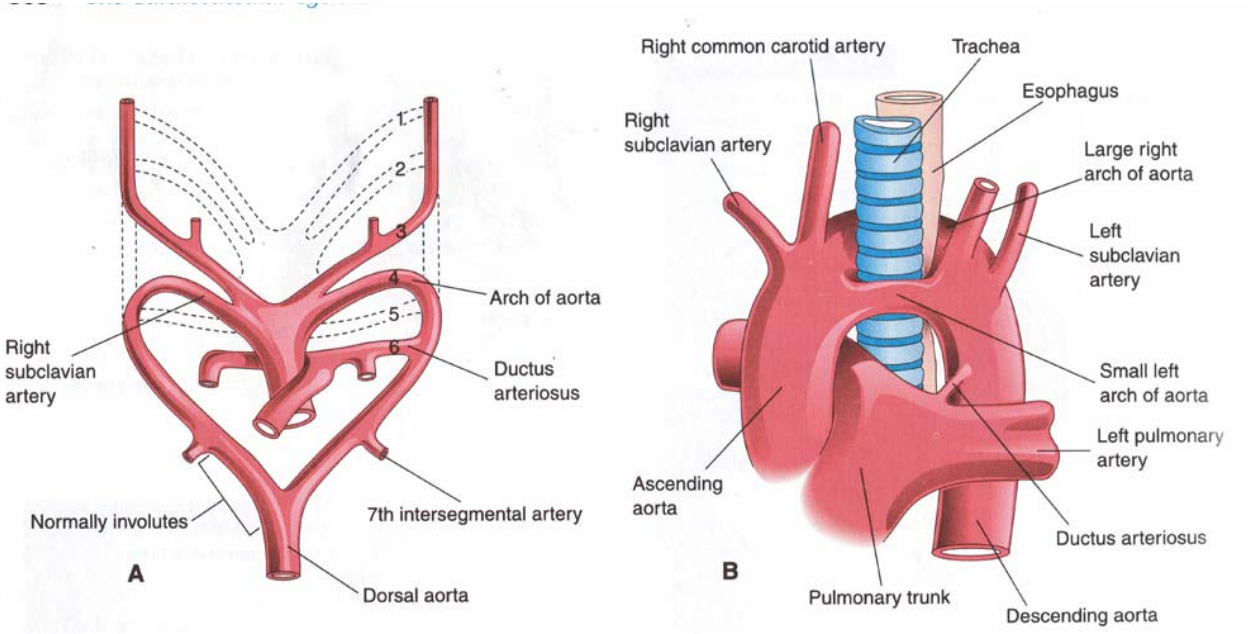




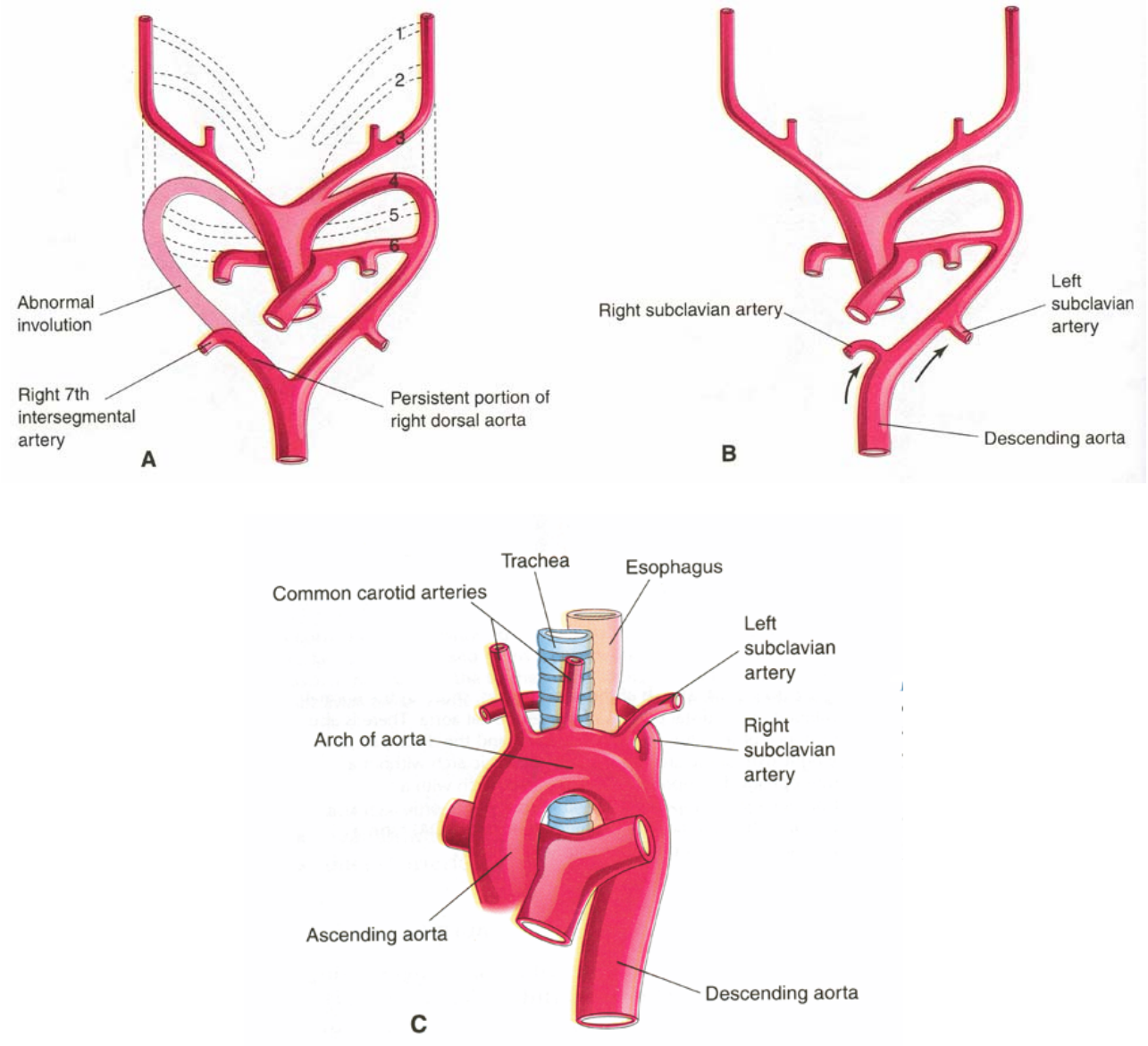

COARCTATION OF AORTA




RIGHT SIDED ARCH OF AORTA



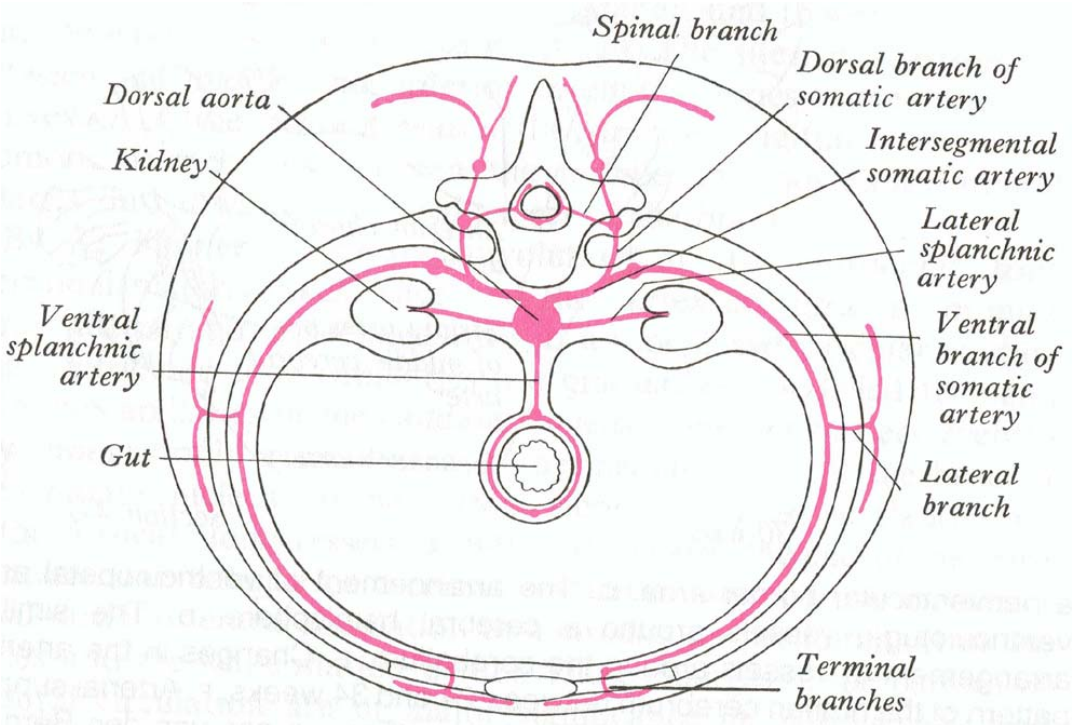

DOUBLE ARCH OF AORTA




ABNORMAL ORIGIN OF RIGHT SUBCLAVIAN ARTERY

# Other arteries - Primitive dorsal aorta

- three group of branches
- Ventral splanchnic arteries
- Lateral ( intermediate splanchnic ) arteries
- Dorso – lateral (somatic intersegmental )branches



## Ventral splanchnic _

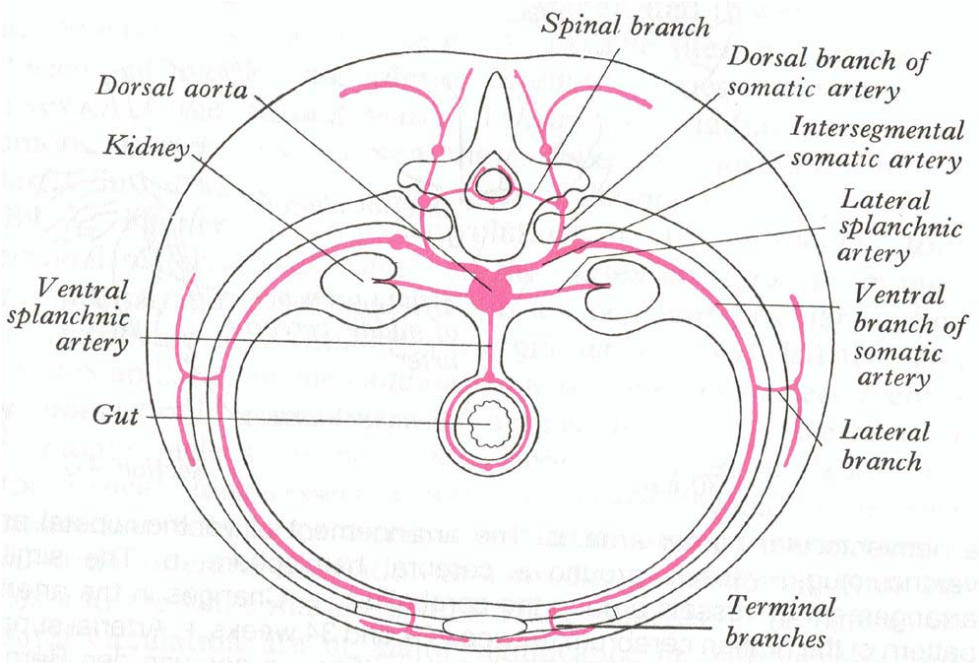
- Coelial , Superior & inferior mesenteric
- Bronchial , oesopageal

## Lateral splanchnic –

- Renal , suprarenal , phrenic , spermatic & ovarian

## Dorso- lateral –

- Intercostal , lumbar arteries



# Arteries of Limb

- Limbs supplied by lateral branches of somatic intersegmental arteries

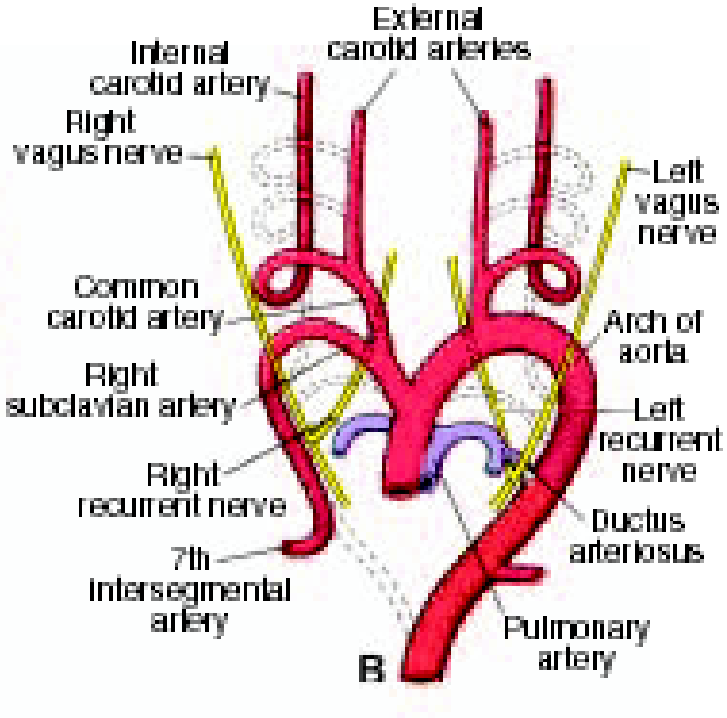
Axis artery – upper limb – 7th cervical intersegmental artery

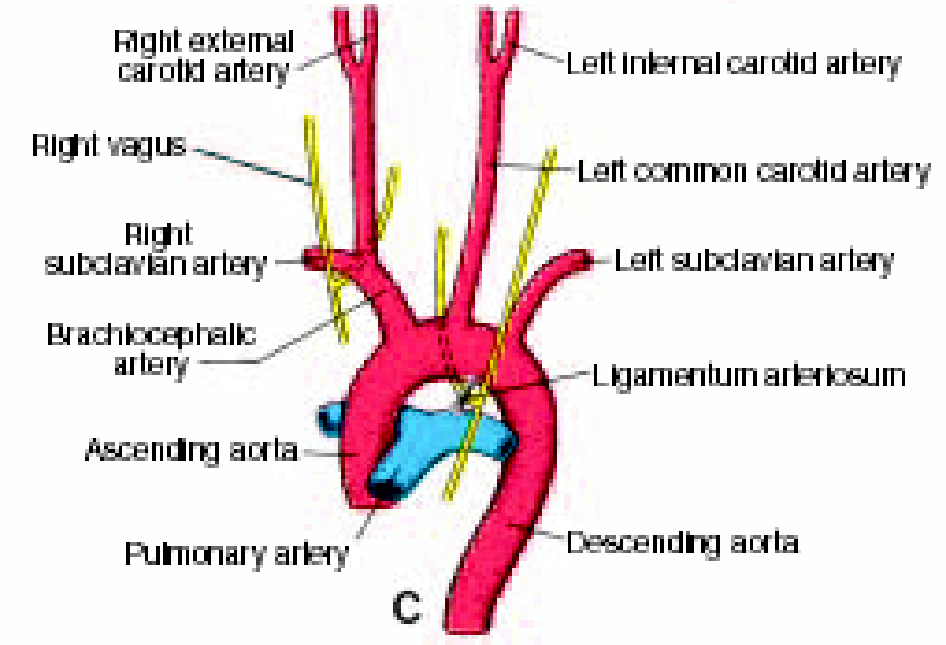
- Persist as – axillary , brachial , ant interro artery

Axis artery – lower limb - - 5th lumbar intersegmental artery

- Seen as branch of Internal iliac artery
- Original axis artery –
- inf gluteal ,
- small artery near gluteal n ,

  Part of popliteal , peroneal , planter arch


External carotid arteries
Internal carotid artery
Right vagus nerve
Left vagus nerve
Common carotid artery
Arch of aorta
Right subclavian artery
Left recurrent nerve
Right recurrent nerve
Ductus arteriosus
7th intersegmental artery
Pulmonary artery
B


Right external carotid artery
Left internal carotid artery
Right vagus
Left common carotid artery
Right subclavian artery
Left subclavian artery
Brachiocephalic artery
Ligamentum arteriosum
Ascending aorta
Pulmonary artery
Descending aorta
C

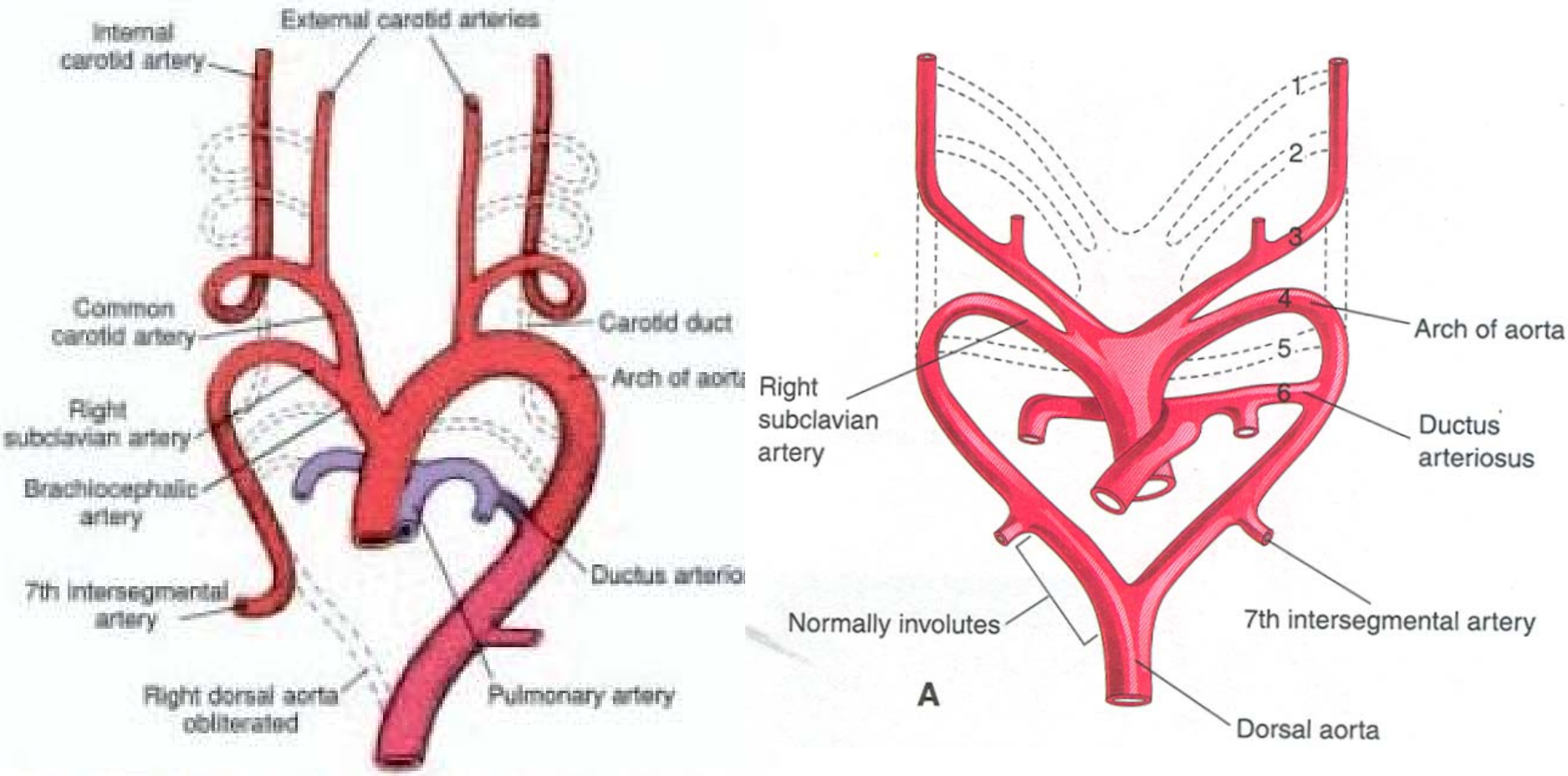



**Figure 11.36** Changes from the original aortic arch system.