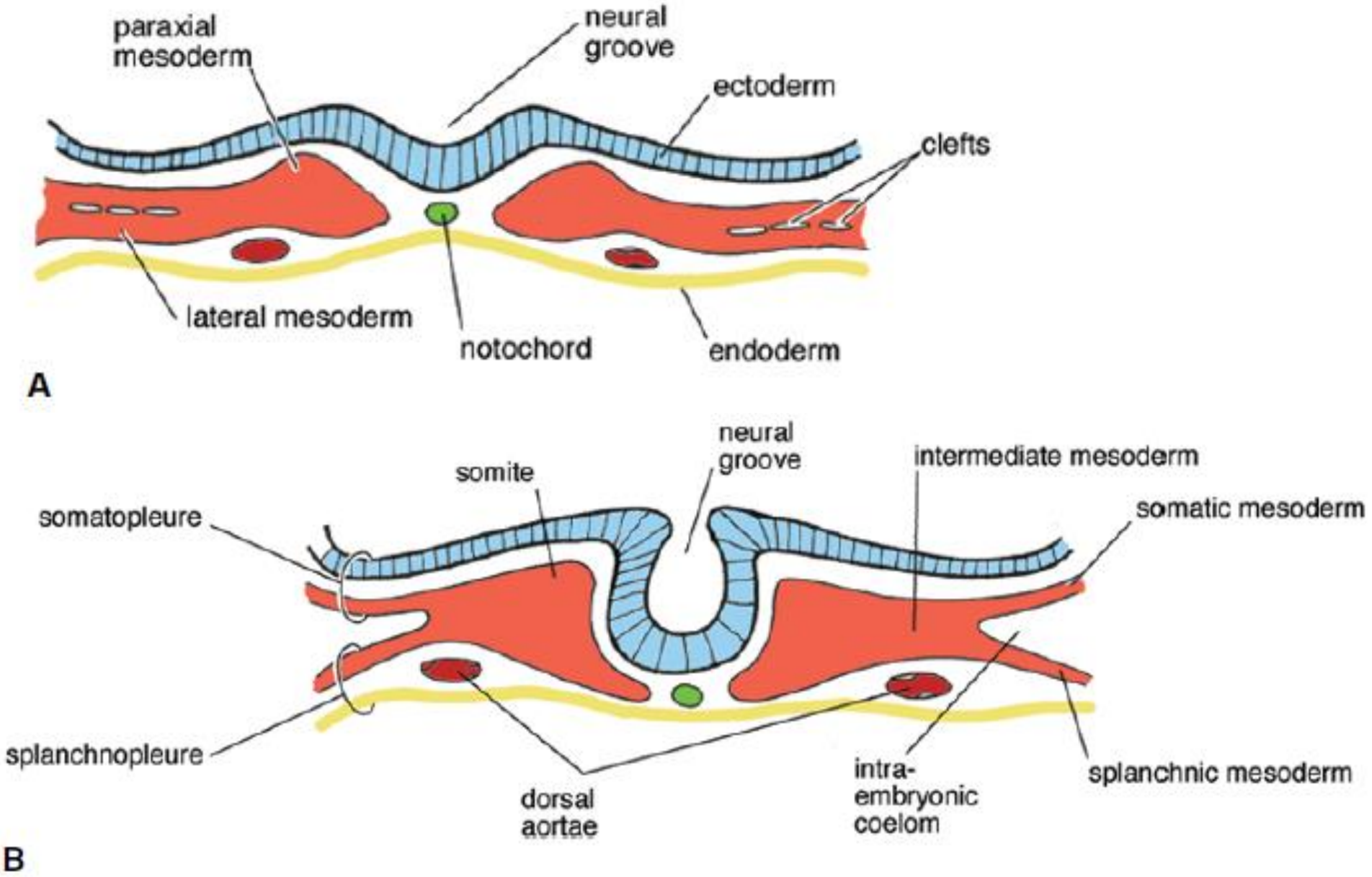
# Embryology

Dr. Ramzi

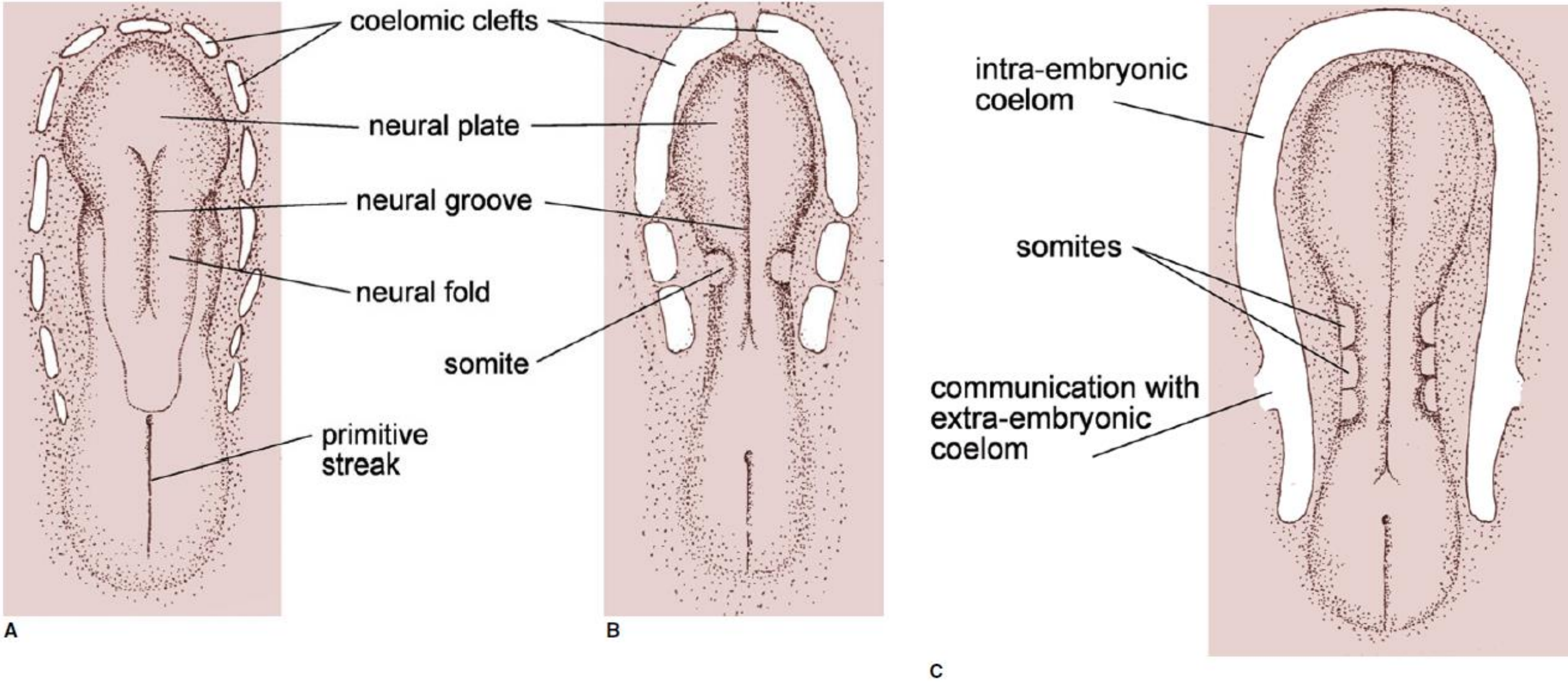
## Year 2

## Coelomic cavities

- Differentiation of the mesoderm leads to formation of a cavity (coelom) between the two layers of lateral plate mesoderm.
- Lateral folding of the embryo divides the developing embryonic coelom into intra-embryonic and extraembryonic regions.
- The intra-embryonic coelom extends from the thoracic to the pelvic regions and develops into the pericardial, pleural and peritoneal cavities.
- The extra-embryonic coelom is associated with the developing foetal membranes. The intraembryonic and extra-embryonic coelomic cavities, which are initially continuous at the umbilicus, subsequently become separated from each other.
- A mesodermal structure, the septum transversum, partly separates the developing thoracic and abdominal cavities, which communicate with each other via the pleuro-peritoneal canals.
- Development of the musculotendinous diaphragm, which is unique to mammals, leads to complete separation of the thoracic and abdominal cavities.

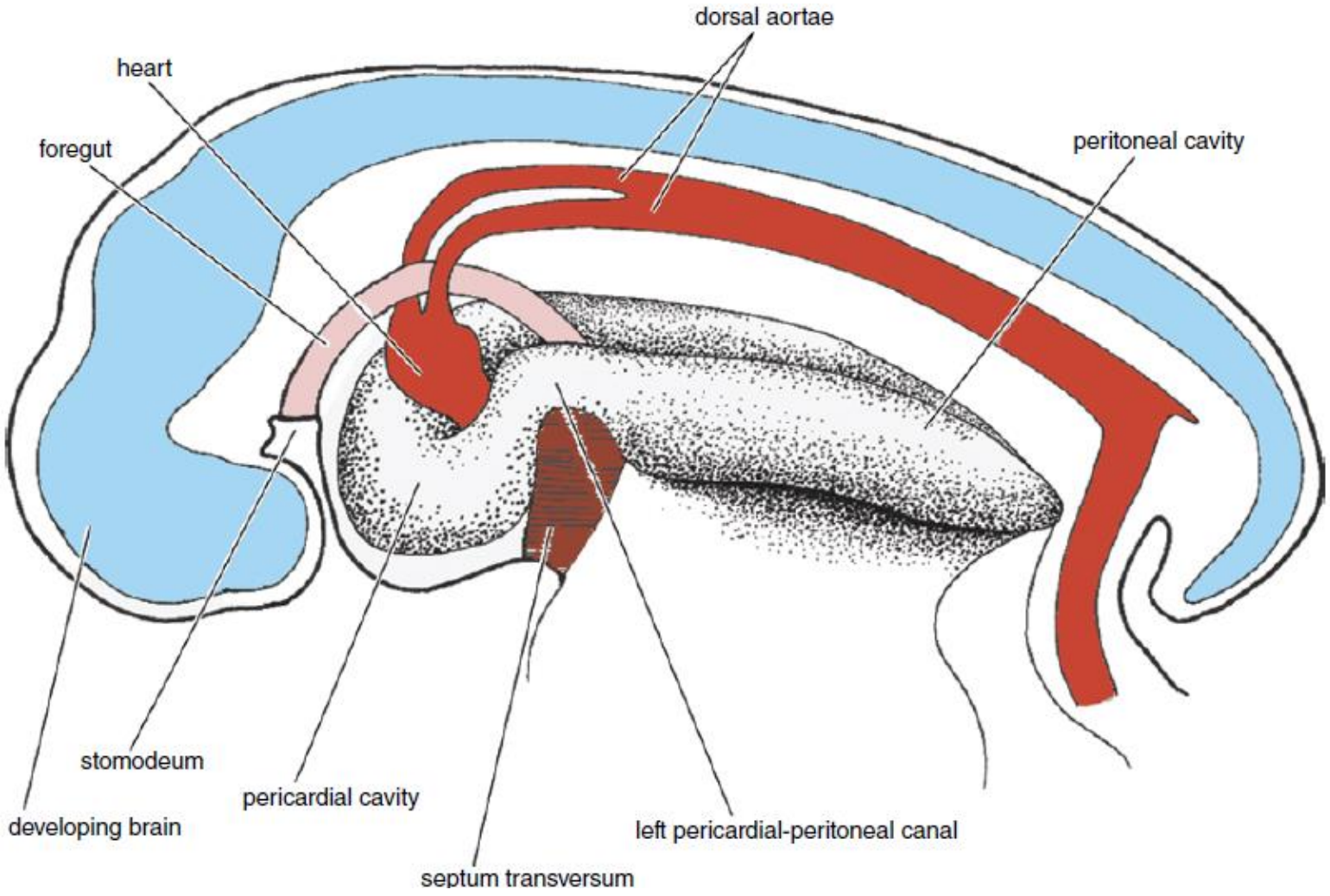



**Cross-sections through an embryo at an early stage of development showing formation of the intra-embryonic coelom (A and B).**



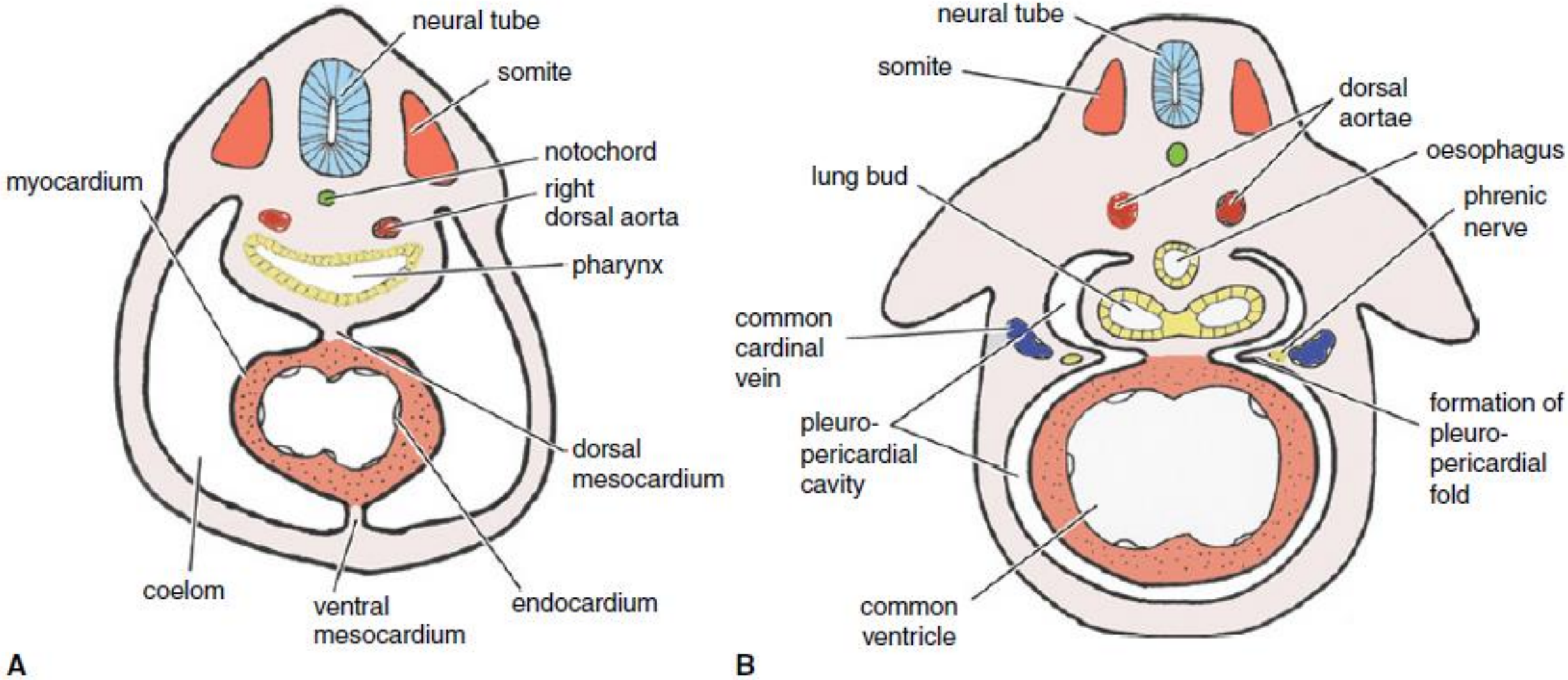

**Dorsal views of a mammalian embryo at an early stage of development showing formation of the coelomic cavity (A to C).**

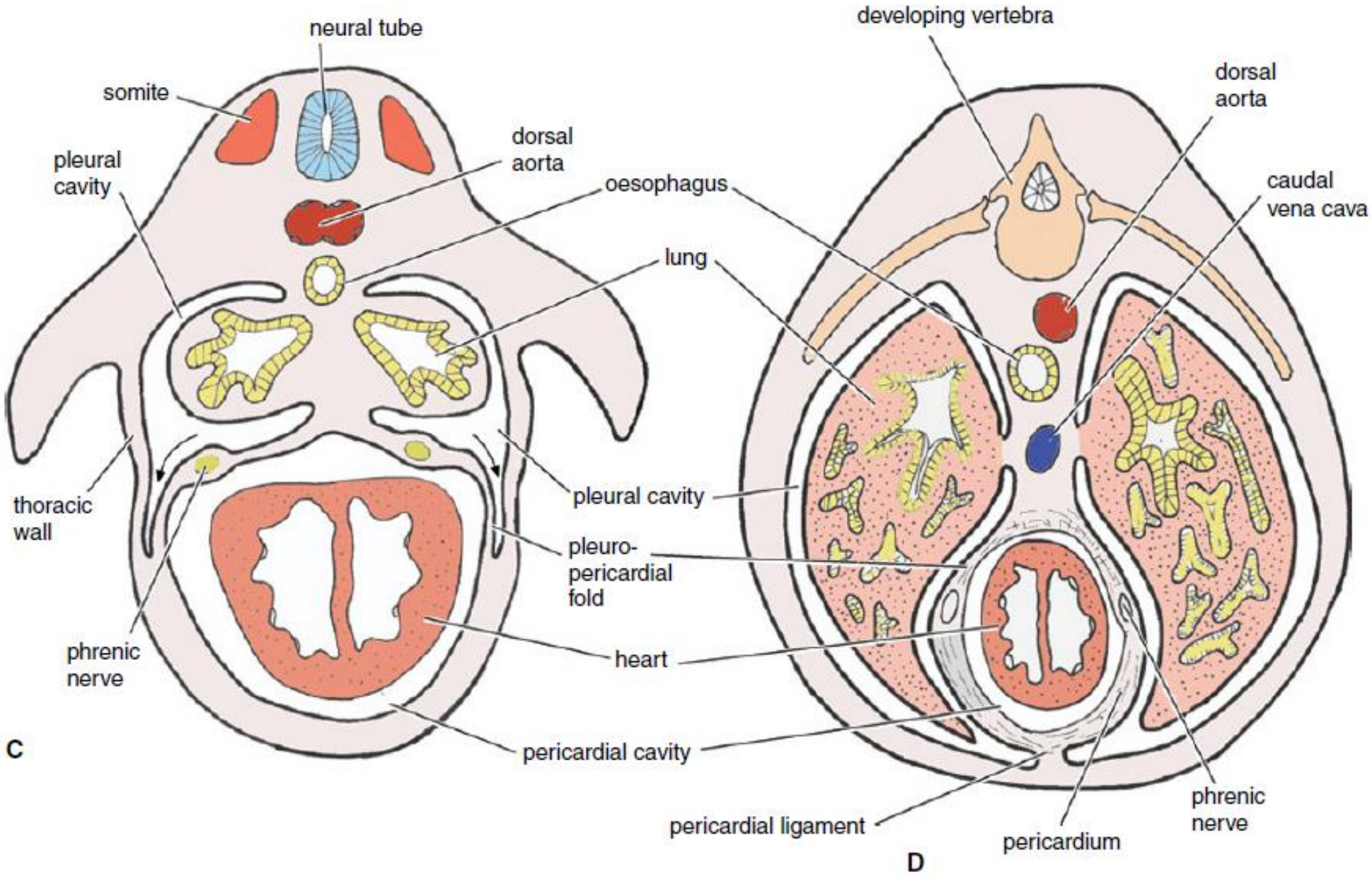
- Following cranial, caudal and lateral folding of the embryo, the convex region of the horseshoe-shaped coelom occupies a position ventral to the foregut and the developing heart, and gives rise to the primordium of the pericardial cavity.
- The right and left limbs of the coelomic cavity are connected to the pericardial cavity by the pericardial–peritoneal canals




Left lateral view of an embryo showing the arrangement of the pericardial and peritoneal cavities and the pericardial–peritoneal canal

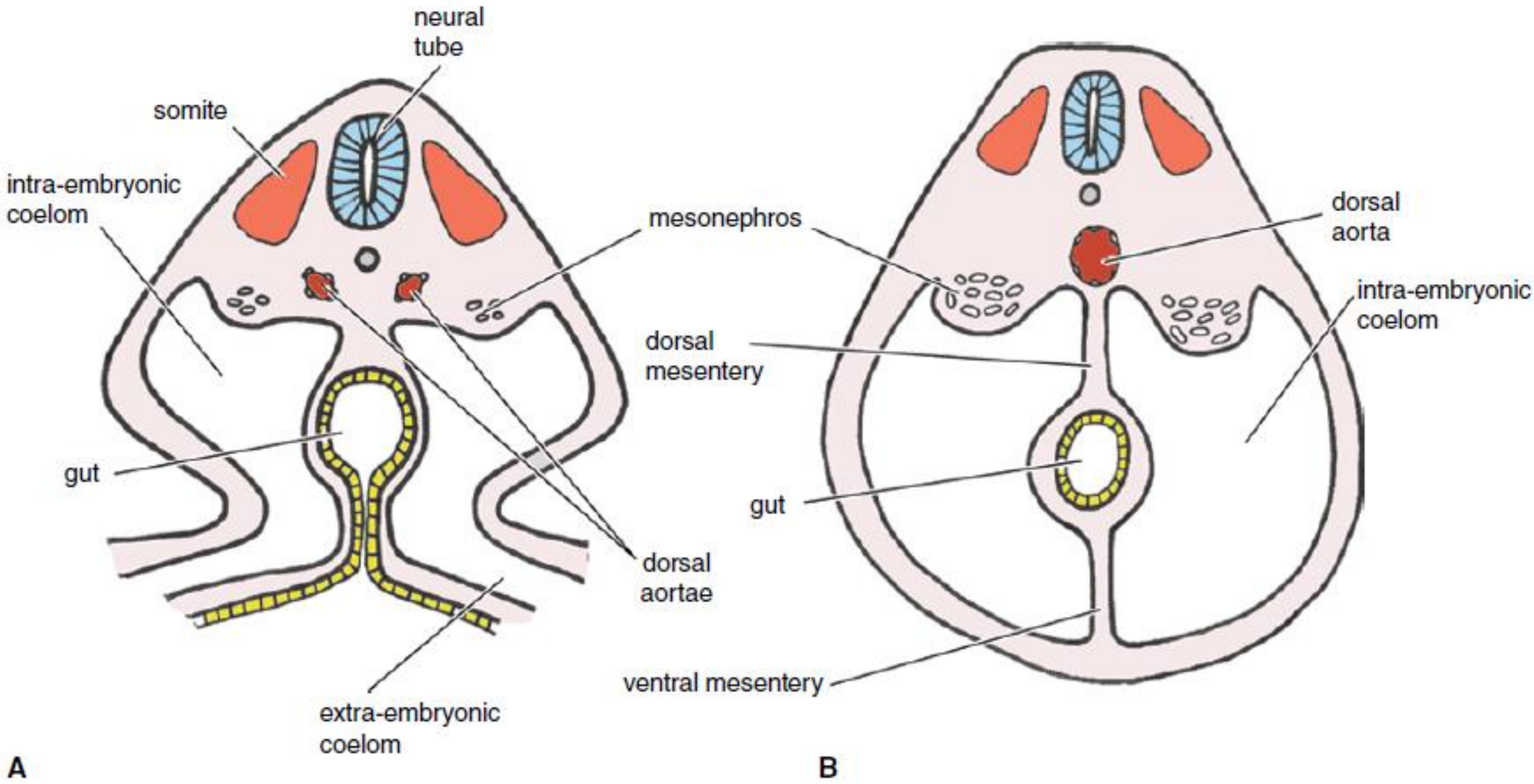
- The heart is initially suspended by a double dorsal fold of mesothelium, the dorsal mesocardium, and anchored by a double ventral fold, the ventral mesocardium.
- The ventral mesocardium atrophies soon after its formation and this change is followed later by atrophy of the dorsal mesocardium, resulting in the formation of a single pericardial cavity.
- At this stage, the heart is suspended within the pericardial cavity solely by the blood vessels entering and leaving the heart.
- The pericardial sac thus formed consists of an inner visceral layer surrounding the heart and an outer parietal layer lining the thoracic wall.
- The inner layers of the developing body wall, which are continuous with the pleuro-pericardial folds, extend ventrally around the parietal layer lining the pericardial cavity and fuse, forming the fibrous layer of the pericardium.
- This fibrous layer, which anchors the pericardium either to the developing diaphragm or to the sternum, depending on the species, encloses the left and right phrenic nerves.

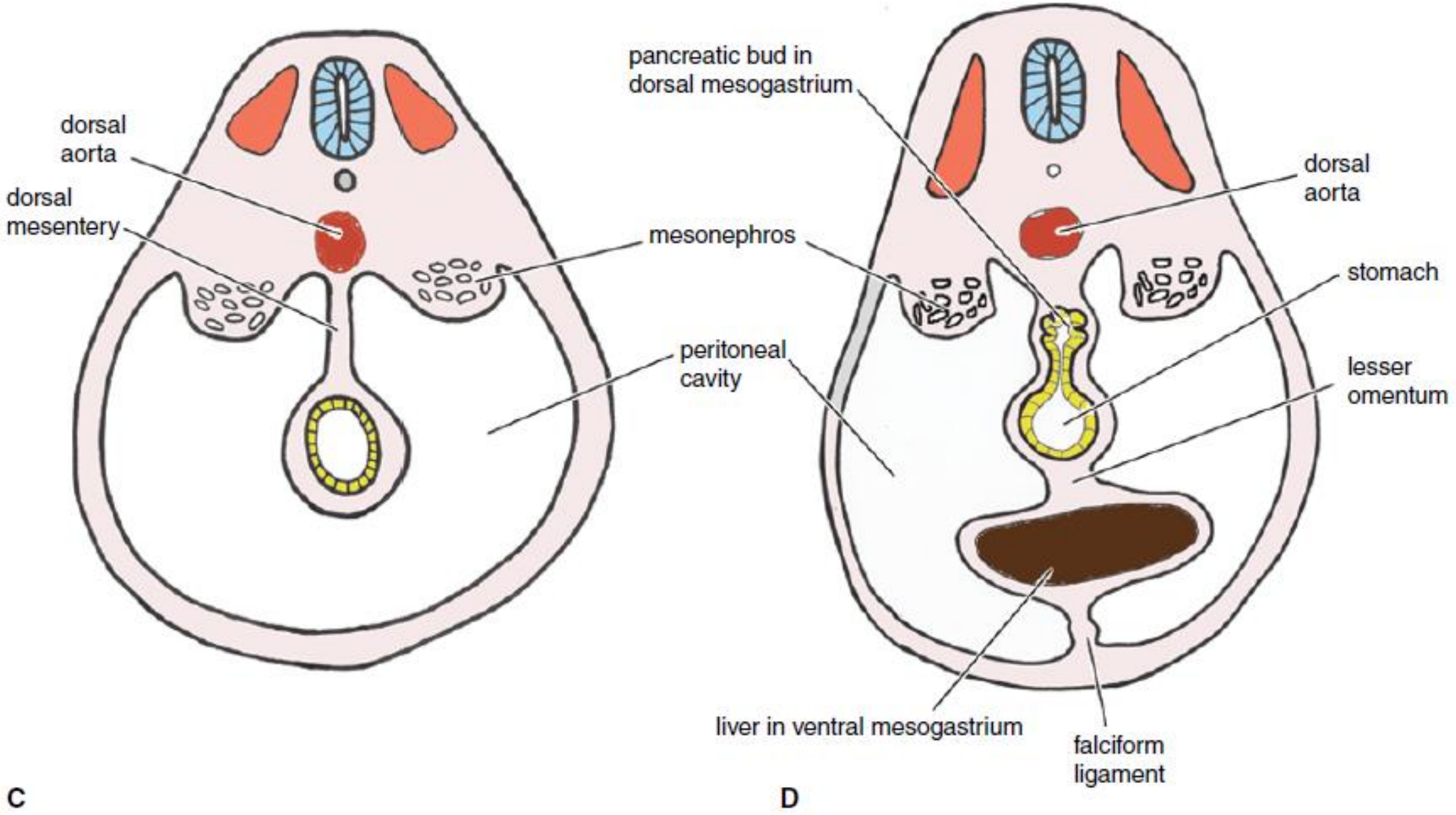

neural tube
somite
notochord
myocardium
right
dorsal aorta
pharynx
dorsal
mesocardium
coelom
ventral
mesocardium
endocardium
A
neural tube
somite
dorsal
aortae
oesophagus
lung bud
phrenic
nerve
common
cardinal
vein
pleuro-
pericardial
cavity
formation of
pleuro-
pericardial
fold
common
ventricle
B




**Sections through the thoracic region of an embryo at different stages of development, showing the formation of the pleural and pericardial cavities. In C, arrows indicate extension of pleural cavities into the body wall (A to D).**

- In the developing abdominal cavity, the gut is suspended by folds of splanchnic mesoderm between the left and right coelomic cavities.
- Initially, the primordial digestive tract and its derivatives in the abdominal cavity are suspended from the dorsal body wall and anchored to the ventral body wall by a double layer of peritoneum.
- Folds of peritoneum which surround the intestine and connect it to the body wall are referred to as mesenteries.
- The folds of peritoneum which attach organs to each other, or attach organs to the body wall, are referred to as ligaments.
- Early in its development, the gut is a relatively straight tube and is attached to the wall of the abdominal cavity by both dorsal and ventral mesenteries


neural tube
somite
intra-embryonic coelom
mesonephros
gut
dorsal aortae
extra-embryonic coelom
A
dorsal aorta
intra-embryonic coelom
dorsal mesentery
gut
ventral mesentery
B




**Cross-sections through the abdominal region of embryos at different stages of development, at the level of the gut, A, B and C, and at the level of the stomach, D.**