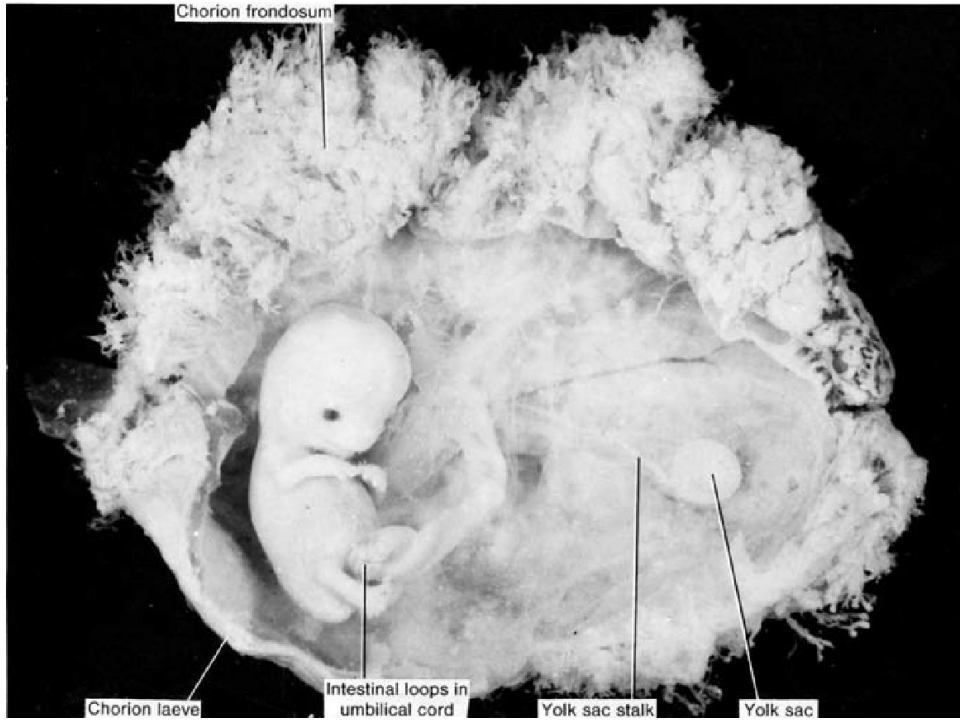
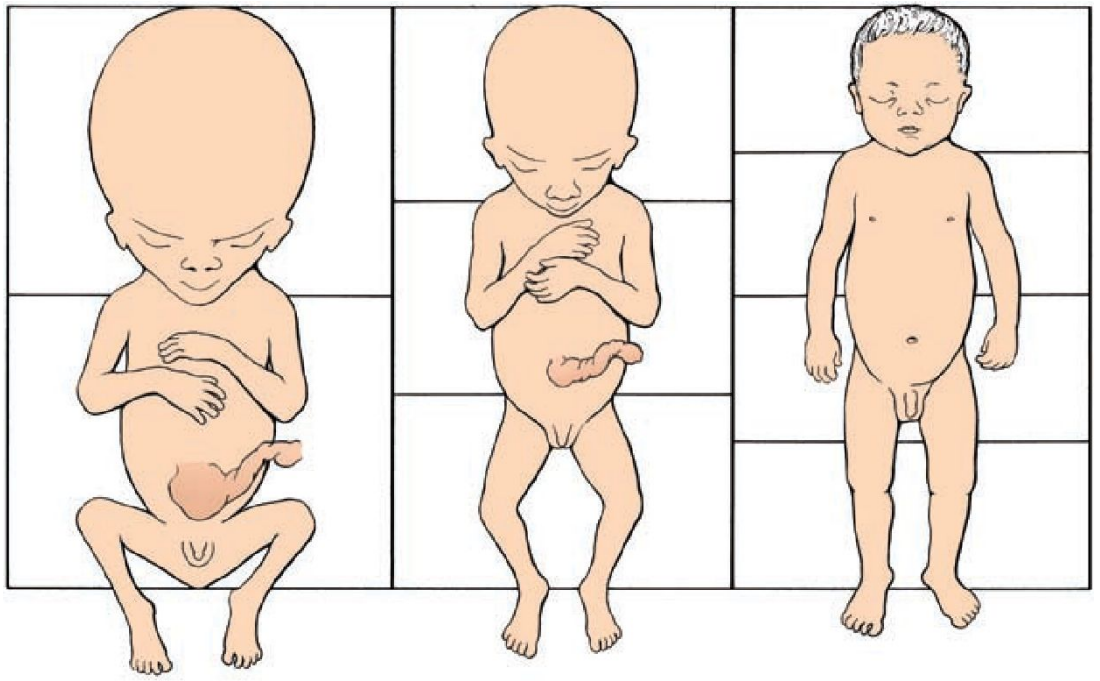
Third Month to Birth: The Fetus and Placenta

Monthly Changes



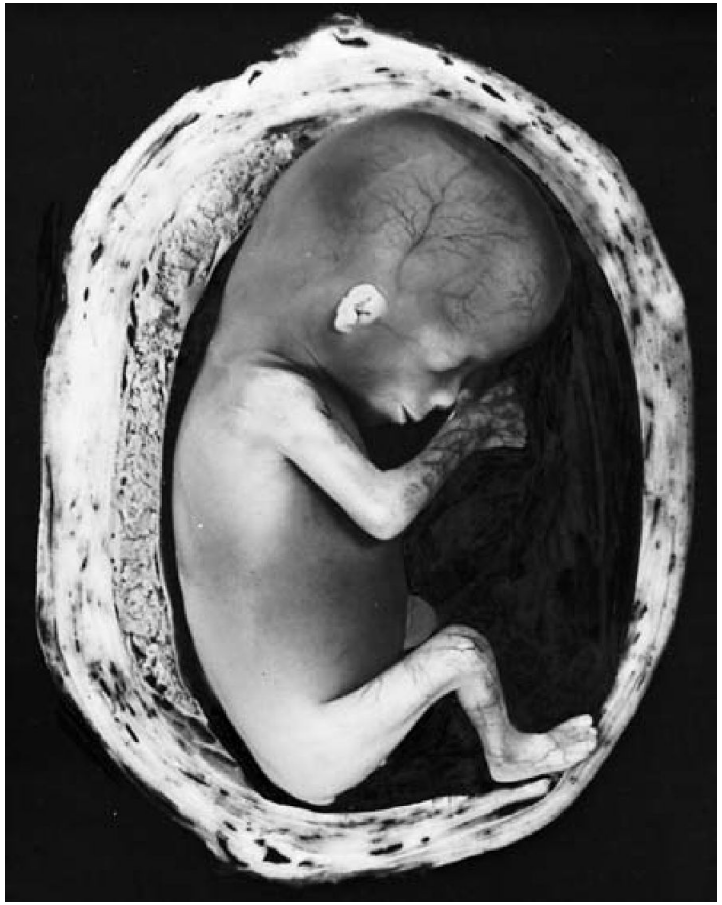
A 9-week fetus. Note the large head size compared with that of the rest of the body. The yolk sac and long vitelline duct are visible in the chorionic cavity. Note the umbilical cord and herniation of intestinal loops. One side of the chorion has many villi (chorion frondosum), while the other side is almost smooth (chorion laeve).



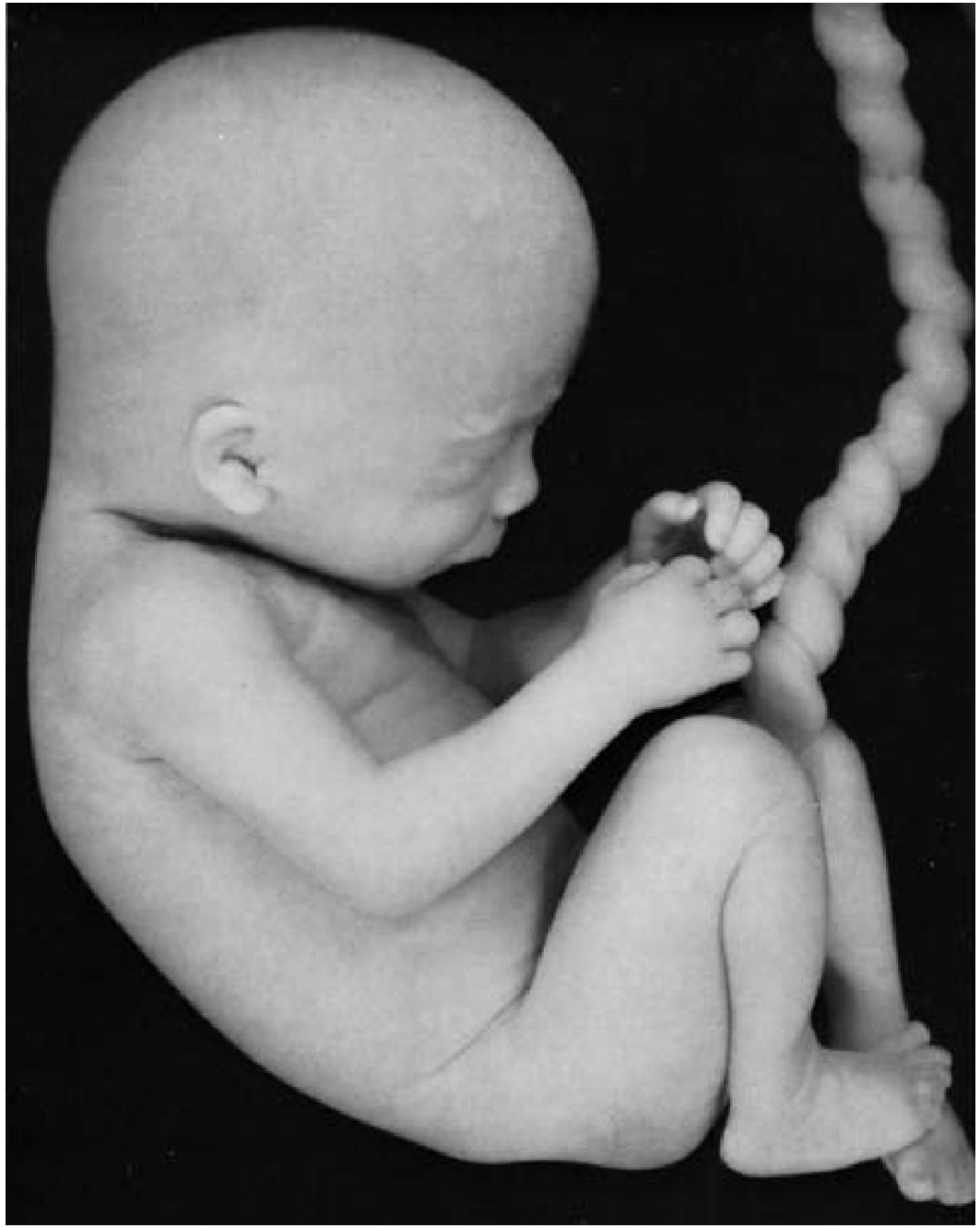
Size of the head in relation to the rest of the body at various stages of development.

An 11-week fetus. The umbilical cord still shows a swelling at its base, caused by herniated intestinal loops. The skull of this fetus lacks the normal smooth contours. Fingers and toes are well developed.

A 12-week fetus in utero. Note the extremely thin skin and underlying blood vessels. The face has all of the human characteristics, but the ears are still primitive. Movements begin at this time but are usually not felt by the mother.



An 18-week fetus connected to the placenta by its umbilical cord. The skin of the fetus is thin because of lack of subcutaneous fat. Note the placenta with its cotyledons and the amnion.

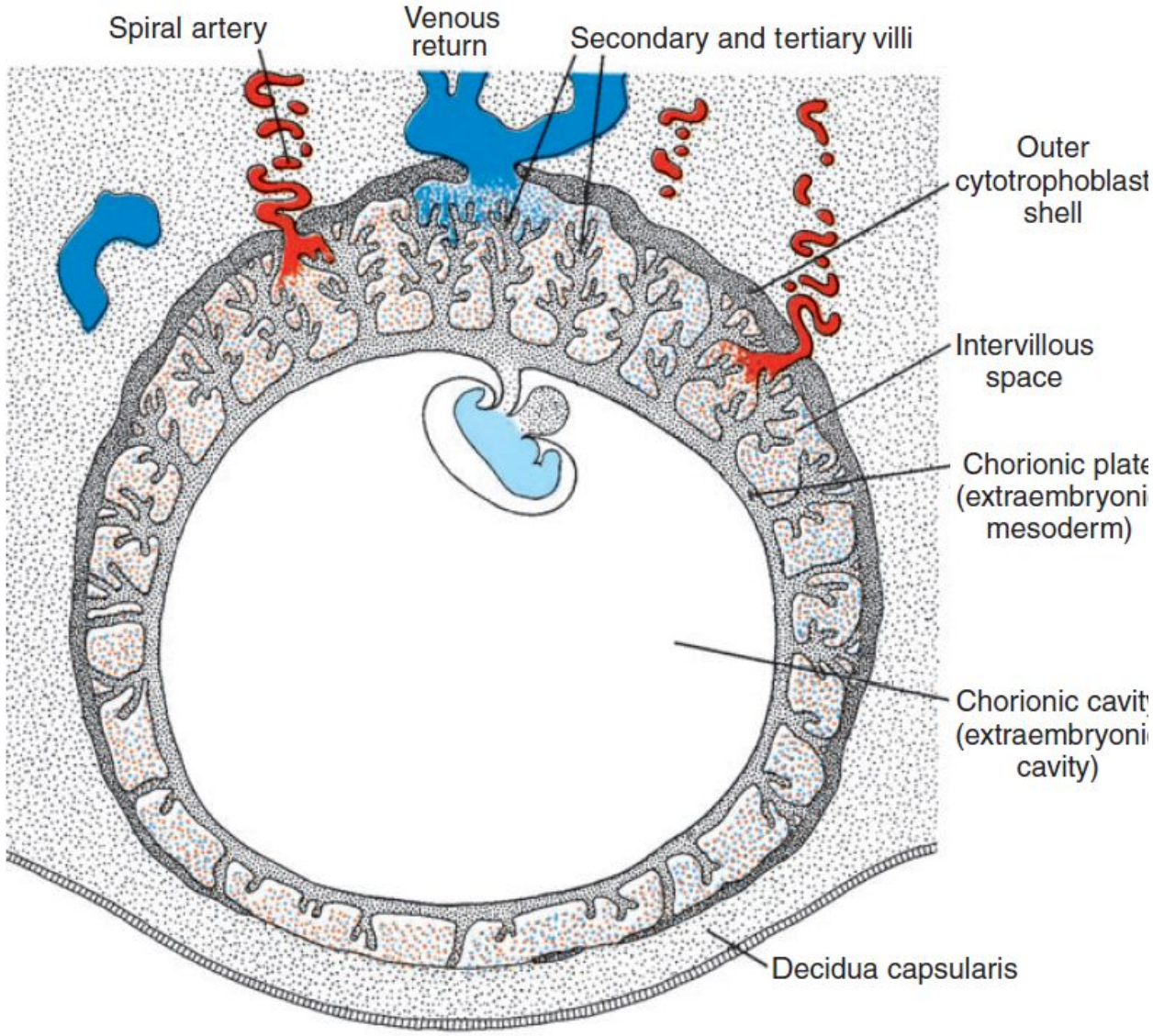


A 7-month fetus. This fetus would be able to survive. It has well-rounded contours as a result of deposition of subcutaneous fat. Note the twisting of the umbilical cord.

Changes of the trophoblast

Human embryo at the beginning of the second month of development.

At the embryonic pole, villi are numerous and well formed; at the abembryonic pole, they are few in number and poorly developed.



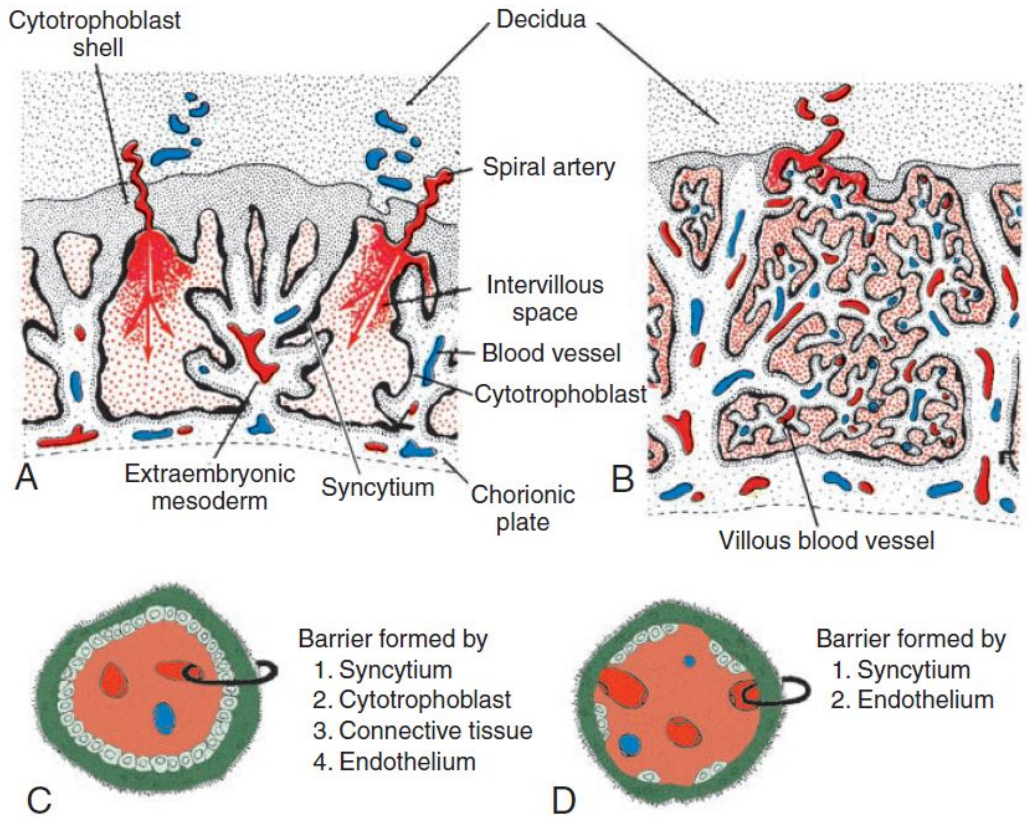
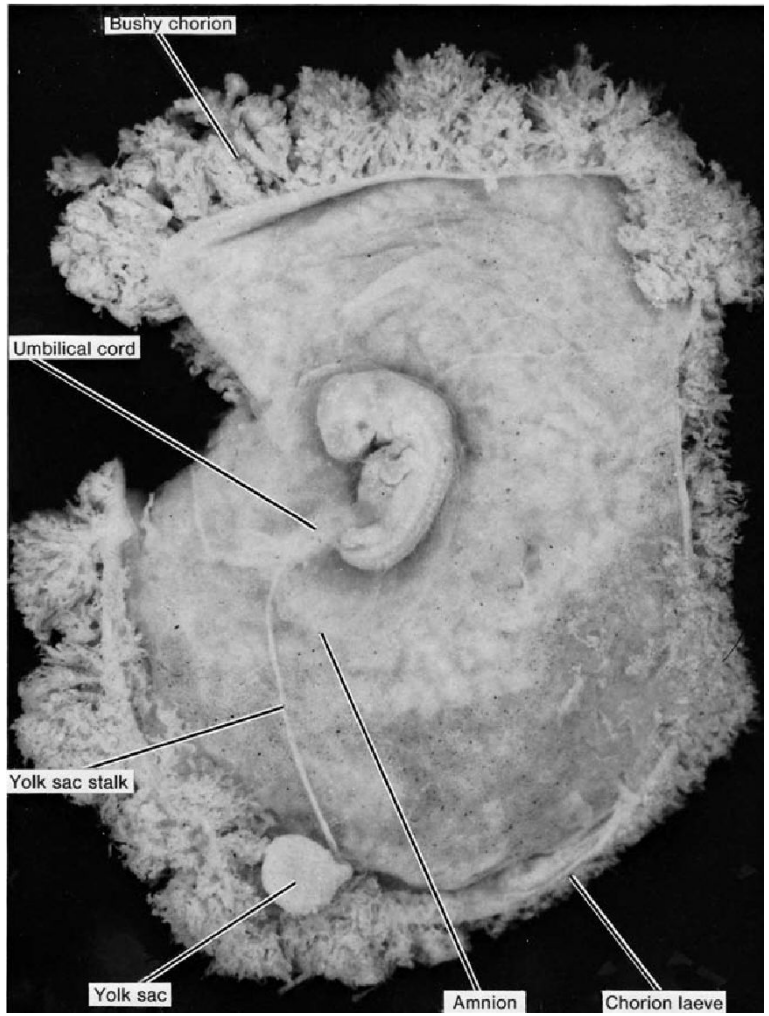


Figure 7.8 Structure of villi at various stages of development. **A.** During the fourth week. The extraembryonic mesoderm penetrates the stem villi in the direction of the decidual plate. **B.** During the fourth month. In many small villi, the wall of the capillaries is in direct contact with the syncytium. **C,D.** Enlargement of the villus as shown in Figures 7.8*A*,*B*.

Chorion Frondosum and Decidua Basalis

A 6-week embryo. The amniotic sac and chorionic cavity have been opened to expose the embryo, showing the bushy appearance of the trophoblast at the embryonic pole in contrast to small villi at the abembryonic pole. Note the connecting stalk and yolk sac with its extremely long vitelline duct.

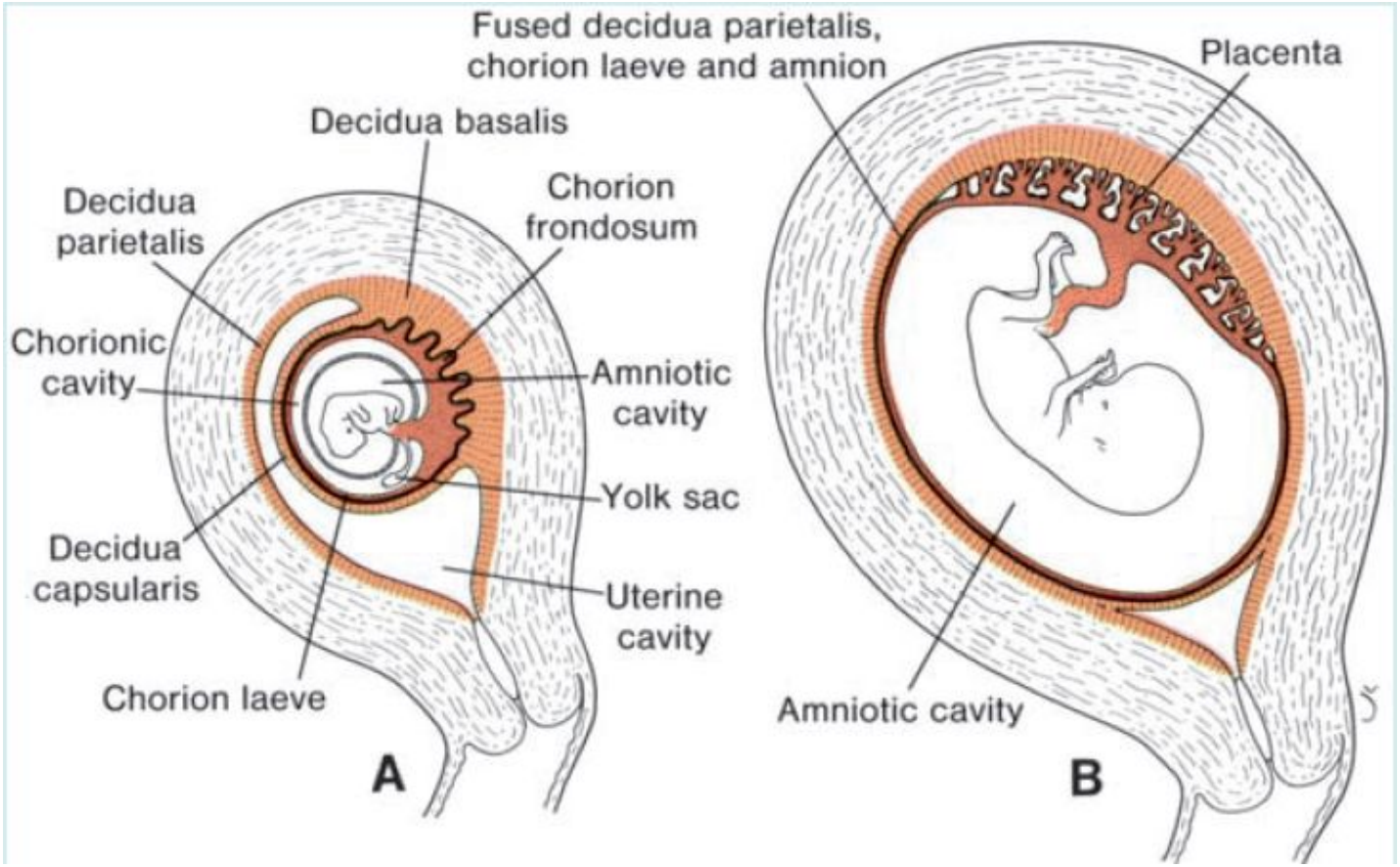


Chorion Frondosum and Decidua Basalis

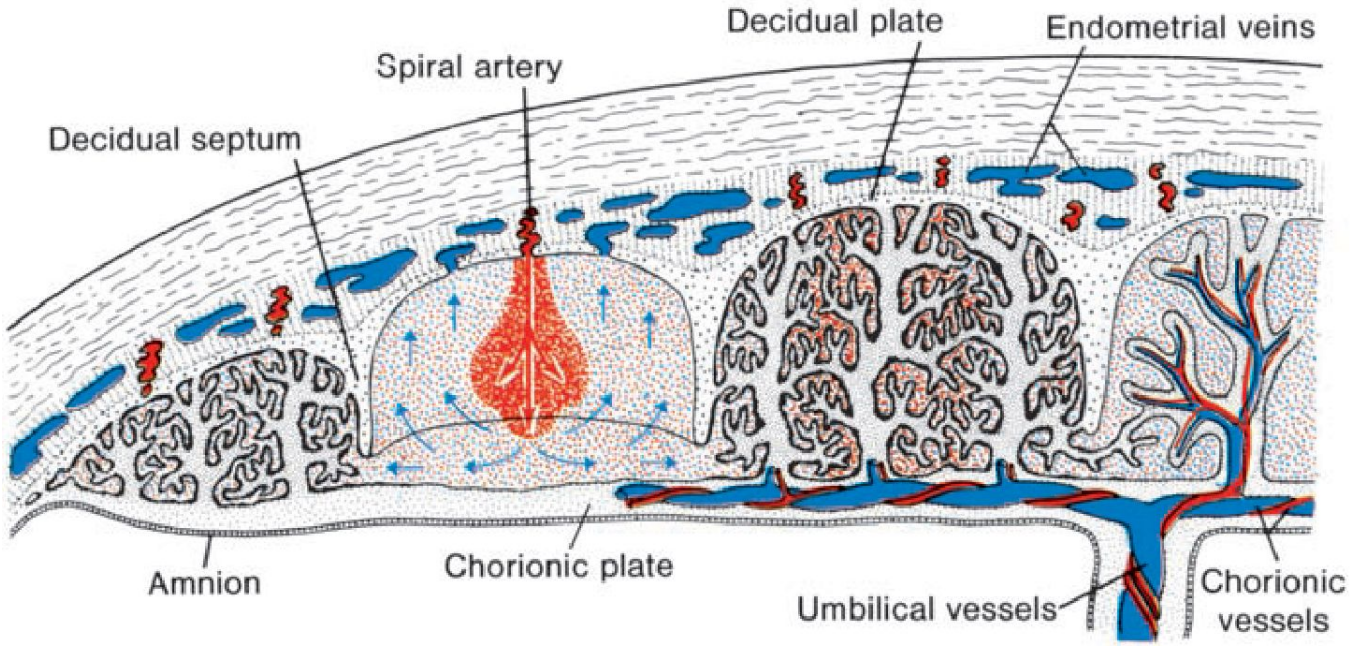
Relation of fetal membranes to wall of the uterus.

A. End of the second month. Note the yolk sac in the chorionic cavity between the amnion and chorion. At the abembryonic pole, villi have disappeared (chorion laeve).

B. End of the third month. The amnion and chorion have fused, and the uterine cavity is obliterated by fusion of the chorion laeve and the decidua parietalis.

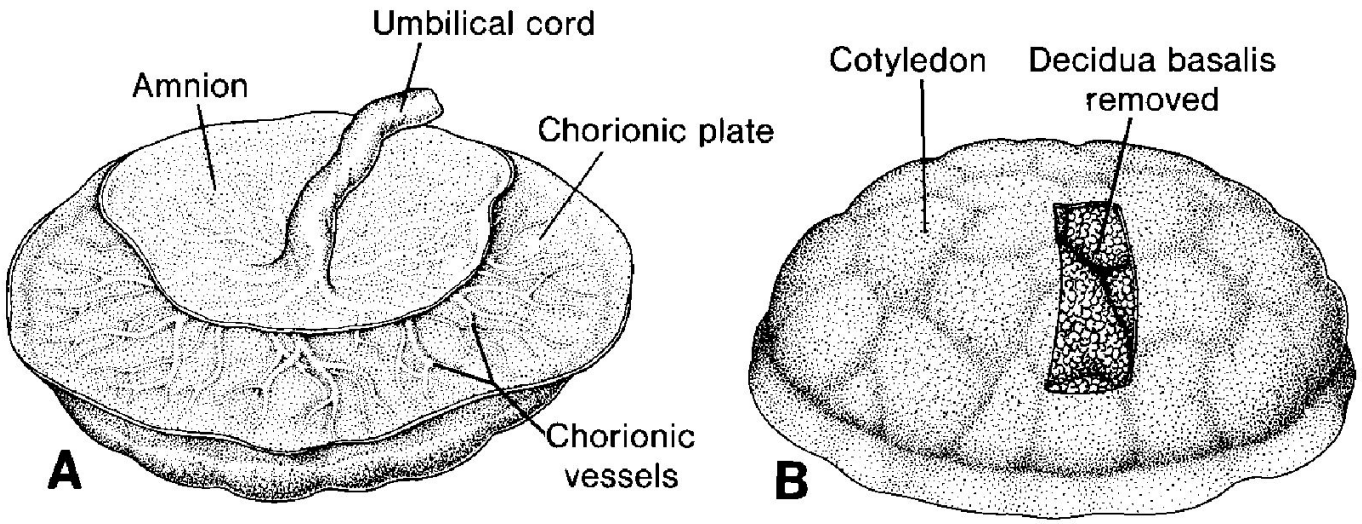


STRUCTURE OF THE PLACENTA



The placenta in the second half of pregnancy. The cotyledons are partially separated by the decidual (maternal) septa. Most of the intervillous blood returns to the maternal circulation by way of the endometrial veins. A small portion enters neighboring cotyledons. The intervillous spaces are lined by syncytium.

Full-Term Placenta

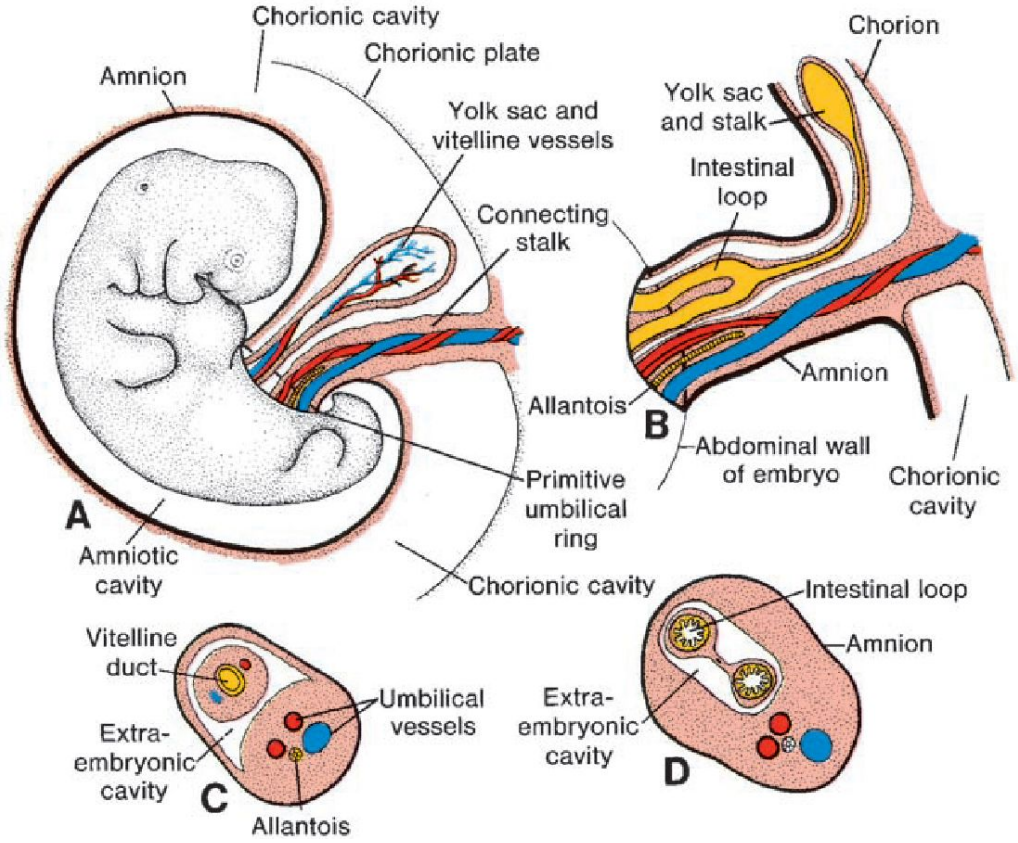


A full-term placenta.
A. Fetal side. The chorionic plate and umbilical cord are covered by amnion.
B. Maternal side showing the cotyledons. In one area, the decidua has been removed. The maternal side of the placenta is always carefully inspected at birth, and frequently one or more cotyledons with a whitish appearance are present because of excessive fibrinoid formation and infarction of a group of intervillous lakes.

- Circulation of the Placenta
- Function of the Placenta
  - *Exchange of Gases*
  - *Exchange of Nutrients and Electrolytes*
  - *Transmission of Maternal Antibodies*
- Hormone Production

AMNION AND UMBILICAL CORD

A. A 5-week embryo showing structures passing through the primitive umbilical ring. **B.** The primitive umbilical cord of a 10-week embryo. **C.** Transverse section through the structures at the level of the umbilical ring.
D. Transverse section through the primitive umbilical cord showing intestinal loops protruding in the cord.



PLACENTAL CHANGES AT THE END OF PREGNANCY

(1) An increase in fibrous tissue in the core of the villus,

(2) Thickening of basement membranes in fetal capillaries,

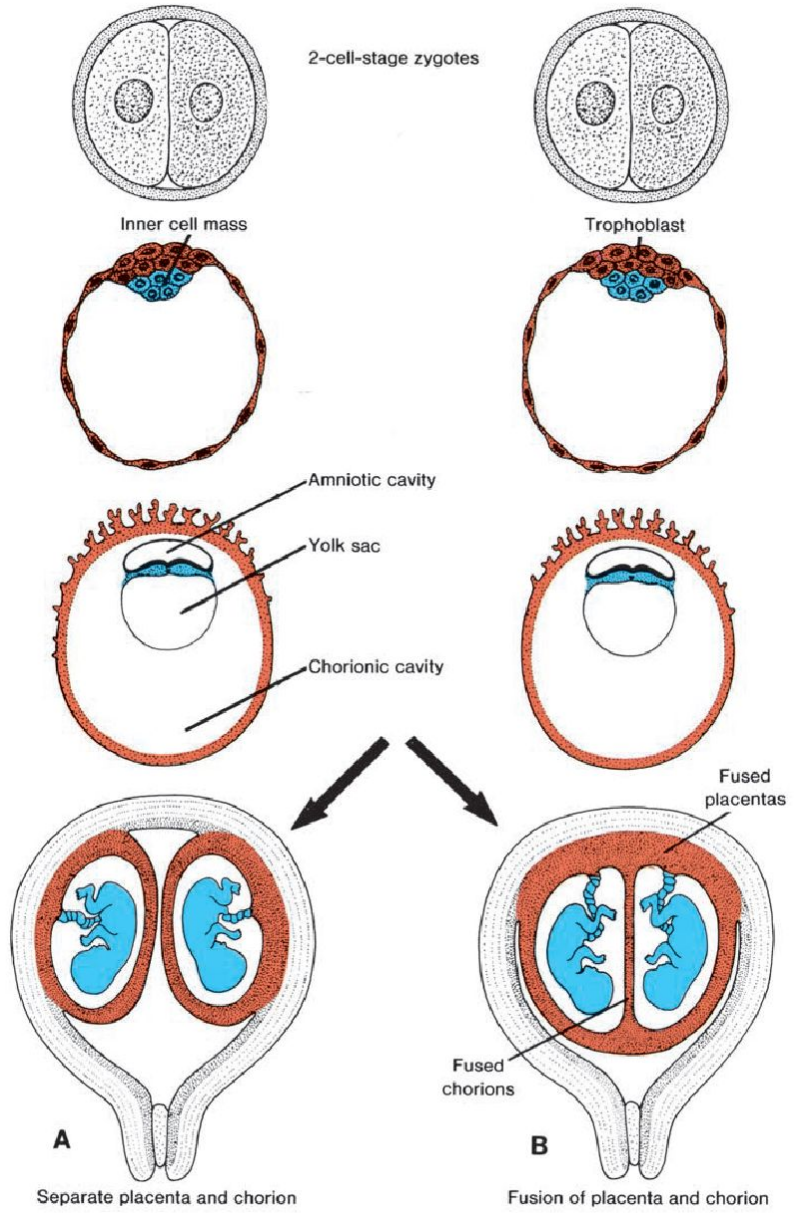
(3) Obliterative changes in small capillaries of the villi

(4) Deposition of fibrinoid on the surface of the villi in the junctional zone and in the chorionic plate.

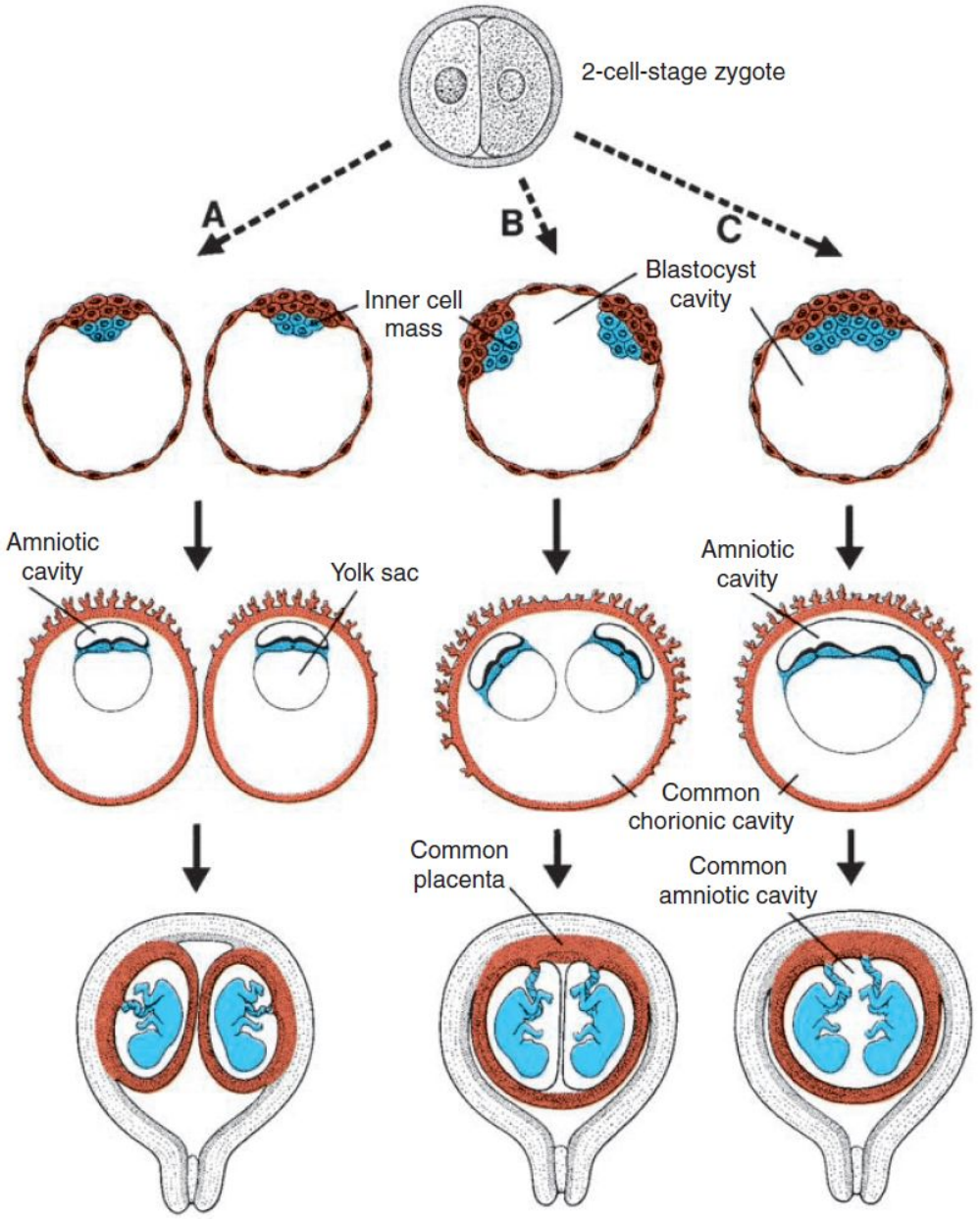
AMNIOTIC FLUID

FETAL MEMBRANES IN TWINS
Dizygotic Twins and Monozygotic Twins

Development of dizygotic twins. Normally, each embryo has its own amnion, chorion, and placenta (A), but sometimes the placentas are fused (B). Each embryo usually receives the appropriate amount of blood, but on occasion, large anastomoses shunt more blood to one of the partners than to the other.



Possible relations of fetal membranes in monozygotic twins. **A.** Splitting occurs at the two-cell stage, and each embryo has its own placenta, amniotic cavity, and chorionic cavity. **B.** Splitting of the inner cell mass into two completely separated groups. The two embryos have a common placenta and a common chorionic sac but separate amniotic cavities. **C.** Splitting of the inner cell mass at a late stage of development. The embryos have a common placenta, a common amniotic cavity, and a common chorionic cavity.



Clinical Correlates

- Preeclampsia
- **Umbilical Cord Abnormalities**
- **Amniotic Bands**

Twin Defects

- **Vanishing twin**
- **Conjoined twins**
- **Preterm Birth**

Figure 7.20 Fetus papyraceus. One twin is larger, and the other has been compressed and mummified, hence the term *papyraceus*.

Figure 7.21 Monozygotic twins with twin transfusion syndrome. Placental vascular anastomoses produced unbalanced blood flow to the two fetuses.

Figure 7.22 Thoracopagus, pygopagus, and craniopagus twins (*pagus;* fastened). Conjoined twins can be separated only if they have no vital parts in common.