

PLACENTATION

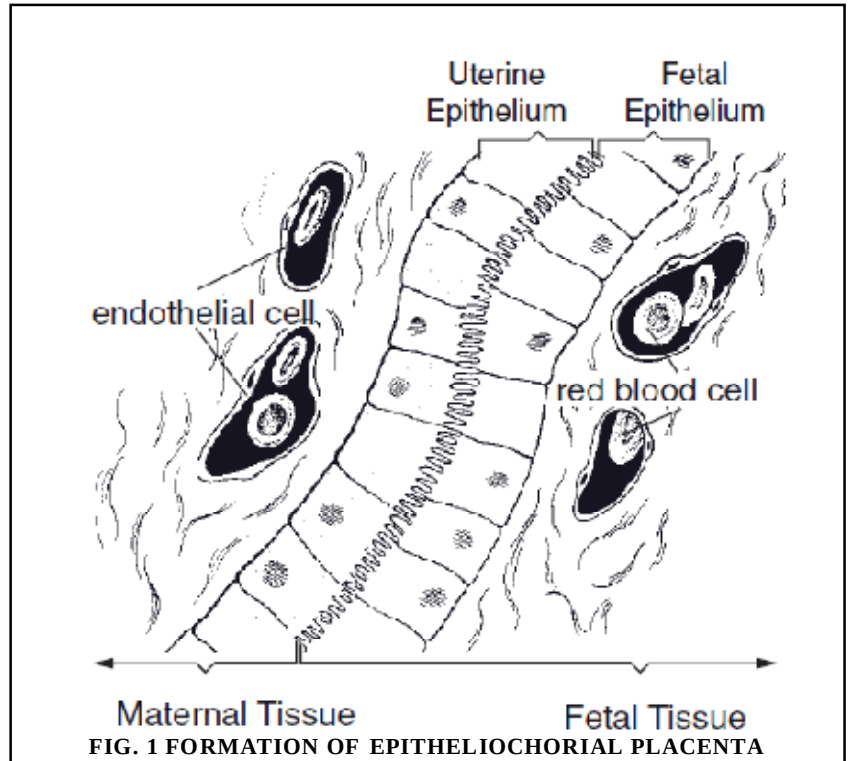
It is the process of development of the extraembryonic membranes or placenta.

Placenta: is the region of apposition between uterine lining and fetal membranes where metabolites are exchanged for sustaining pregnancy. Has 2 parts: fetal part and maternal part

- Fetal membranes are called fetal placenta
- Endometrium that is shed at parturition is called maternal placenta or decidua.

Grossly, Placenta are 4 types:

- Diffuse (Pig)
- Zonary (carnivore)
- Discoid (Primates and rodents)
- Cotyledonary/placentomes (ruminants)



A placentome is a discrete area of interdigitation between a maternal caruncle and a fetal cotyledon. Equine placentas are microcotyledonary (microplacentomes are distributed diffusely). Ruminant placentas consist of rows of relatively large placentomes.

- Diffuse placenta (epitheliochorial): extension of the chorion project into the crypts scattered over the entire endometrium. e.g., mare and sow
- Cotyledonary placenta: involves placentomes; exchange takes place at placentomes. e.g. cow, ewe, doe
- Discoidal placenta (Hemochorial): attached to the uterus in a disk-shaped area only. e.g., rodent
- Zonary and discoidal types of placental attachment are deciduate (shed at parturition)

Histologically: Placentas classified according to the tissue layers separating fetal and maternal blood. Uterine epithelium, uterine connective tissue and uterine endothelium may be eroded, giving rise to three placental types:

1. Epitheliochorial (swine, equine, cattle)-chorion of fetus is in direct contact with the epithelium of uterus.
2. Endotheliochorial (carnivores): chorion is in direct contact with the endothelium of blood vessels of dam.
3. Hemochorial (primates & rodents)- fetal vessels and chorion are invaginated into pools of maternal blood

Fetal membranes:

Four fetal membranes develop in a conceptus. Two arise from the trophoblast layer of the blastocyst (and are continuous with the somatopleure of the embryo). Two arise from the inner cell mass of the blastocyst (and are continuous with splanchnopleure of the embryo); these two splanchnopleure

membranes are vascular. The four fetal membranes are:

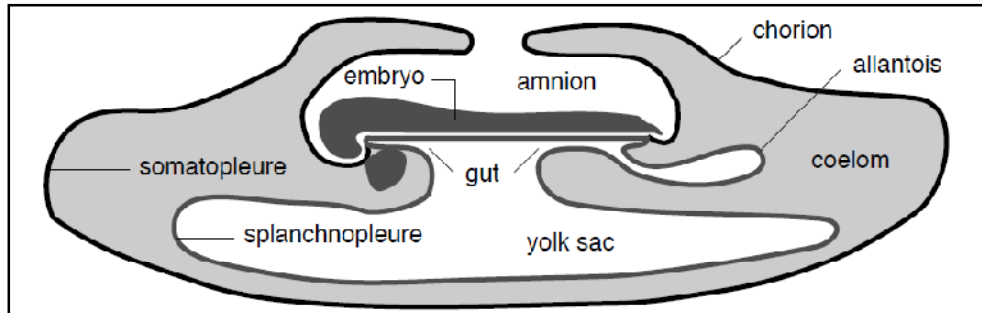


FIG. 1 FETAL MEMBRANES (DIAGRAMATIC)

1. **Chorion** - forms the outer boundary of the entire conceptus (from trophoblast)
2. **Amnion** - encloses the embryo within a fluid-filled amniotic cavity; formed by folds of chorion in domestic mammals
3. **Allantois** - develops as an outgrowth of hindgut splanchnopleure (originates from inner cell mass). Allantois grows to fill the entire extra-embryonic coelom, with fluid-filled allantoic cavity in domestic mammals. The outer surface of allantois binds to the inner surface of chorion (and the outer surface of amnion).

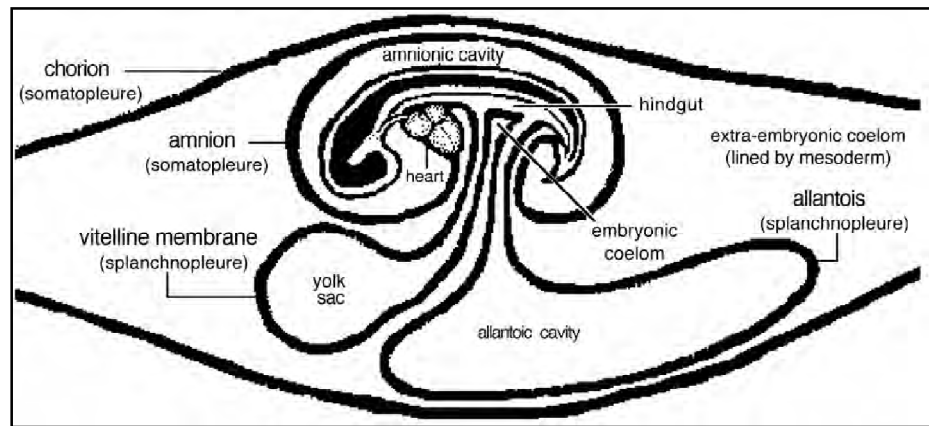


FIG. 3 FETAL MEMBRANES

The allantois is highly vascular and provides the functional vessels of the placenta, via umbilical vessels.

4. **Yolk sac** — continuous with midgut splanchnopleure (develops early with hypoblast formation from inner cell mass). Supplied by vitelline vessels, it forms an early temporary placenta in the horse and dog. Yolk sac is most important in egg laying vertebrates.

Note: The term *conceptus* refers to the embryo or fetus plus its fetal membranes.

Implantation

The blastocyst is initially free in the uterine lumen (nourished by uterine glands). Implantation of the blastocyst is a gradual process, beginning with apposition, leading to adhesion (or invasion in the case of the human & Guinea Pig). Approximate implantation times are: one week (human); two weeks (dog, cat, sheep), 3-5 weeks (cattle), 3-8 weeks horse; or delayed up to 4 months (deer, bears).