

PLACENTA

Defination :Placenta is an organic physiological connection between wall of embryo & wall of uterus for purpose of physiological exchanges.

Need of Placenta (Function) :

Placenta is broadly needed for the development of embryo during justation period. It is having following functions

- i) Helps in diffusion of O₂ from maternal to foetal blood.
- ii) Helps in diffusion of CO₂ from foetal blood to maternal blood.
- iii) Transportation of nutrition from maternal blood into foetal blood through placenta.
- iv) Transportation of nitrogenous waste from foetal blood to maternal blood.
- v) Placenta stores glycogen & thus act as a liver in foetus
- vi) It acts as temporary endocrine gland that secretes hormones like projesteron, human chorionic gonadotropin.

Characteristic of Placenta :

- i) Placenta is a special kind of tissue connection between mother & foetus.
- ii) It is formed by fusion of uterine tissues & foetal membrane.
- iii) It forms a placental barrier & prevents direct mixing of foetal & maternal blood cells.

Mammals are classified into 3 groups

- a) Protheria
 - b) Marsupials or Metatheria
 - c) Autotheria
- a) Protheria** : Where there is absence of Placenta Ex. Monotremes (Egg laying mammals)
- b) Marsupials or Metatherians** :Marsupials are the mammals called pouched mammals which are provided with very primitive placenta. In Kangaroo & other marsupials there is yolk sac placenta & primitive allantoic this indicates yolk sac & allantoic established temporary connection for short period in uterus in mother. In these animals parturation take place in maturation & hence immature young ones are cared by special pouch.
- c) Autotherians** : There is true placenta. In true placenta there is extraembryonic membranes. Allantois & chorions are employed. Allantochorionic placenta is the true placenta.

Types of PLACENTA

➤ **According to type of foetal membranes involved :**

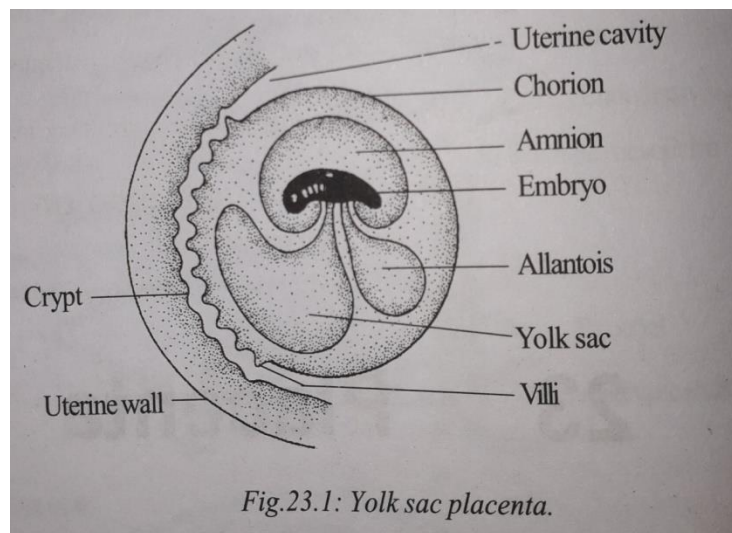
The embryonic tissues which are involved in the formation of placenta are the foetal membranes. From the four membranes (amnion, chorion, yolk sac & allantois), the amnion does not participate in the formation of placenta. According to foetal membranes, placenta is classified into two types

i) Yolk sac placenta ii) Chorio-allantoic placenta

i) Yolk sac placenta : It is formed from yolk sac & chorion. It is also called as chorio-vitelline placenta. It is a primitive type of placenta.

The chorion develops small wrinkles & corrugations on its outer surface where it comes in contact with the uterine wall. These wrinkles hold the blastocyst to the uterine wall & thus reduce the possibility of its premature exit.

In addition, the uterine milk, secreted by uterine glands, is freely absorbed by the chorion & is transported to the embryo through vitelline circulation. Ex. Primitive marsupials like opossum & Dasyurus etc.



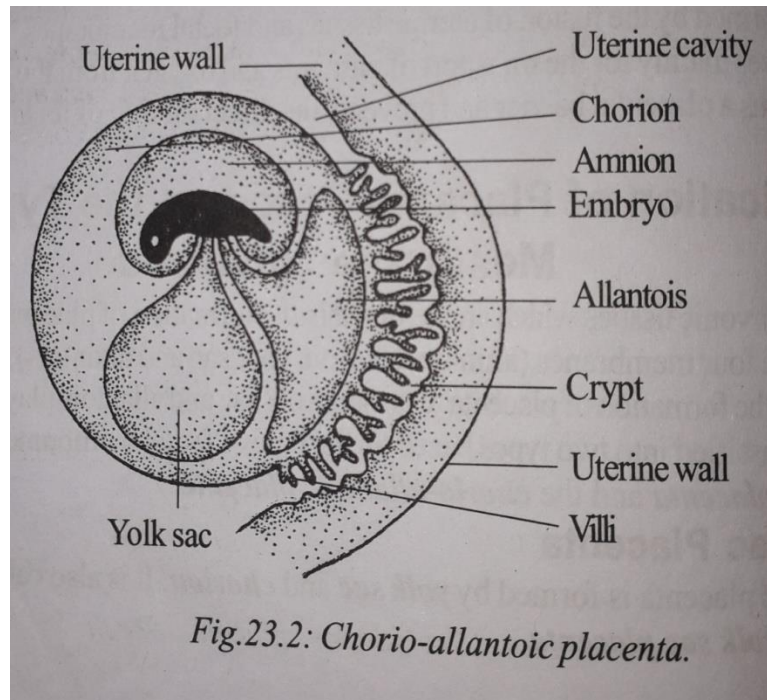
ii) Chorio-allantoic Placenta : It is formed from chorion & allantois. The allantois & chorion fuse together to form a membrane called chorio-allantoic membrane. This membrane is well vascularized by allantoic arteries & veins.

It develops on the outer surface as branched or unbranched finger-like outgrowths called **villi**.

The uterine wall develops depressions called **crypts**.

The villi dip into crypts. This facilitates the absorption of nutrients from the maternal side.

Ex. All eutherians (Man, Cow & dog etc), some marsupials



➤ **According to Maternal & Foetal connection at the time of Parturation**

i) **Indeciduate Placenta :**

This is placenta where maternal part of placenta does not come out at the time of parturation. Here no injury to mother & no bleeding.

Ex. Pig, Cattles

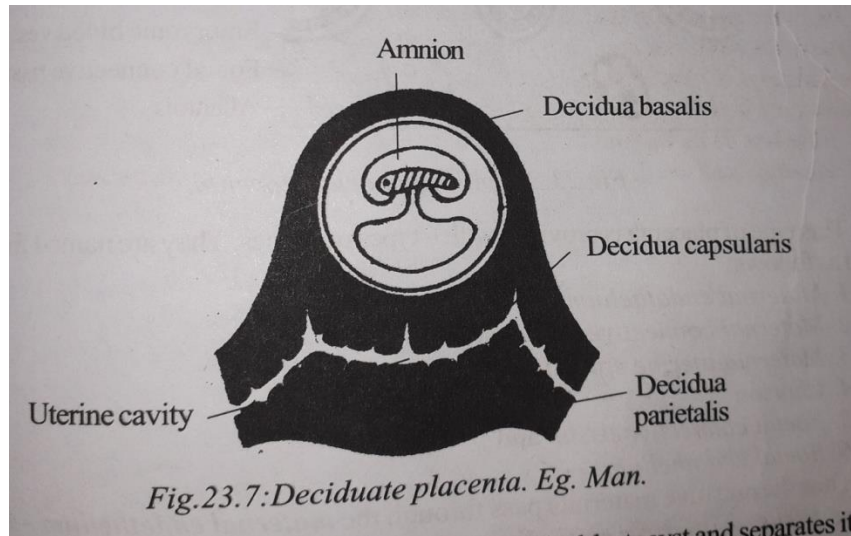
ii) **Deciduate Placenta :**

In this type of placenta vascular part of placenta come out at parturation & bleeding occurs. It is because of most maternal layer is eroded. The lost part of uterine wall is called **decidua**

Ex. Man, Monkey & Bats

The decidua has three imp. Parts

- a) **Decidua basalis :** The upper part of uterine wall to which the embryo becomes attached is **Decidua basalis**
- b) **Decidua capsularis :** the part which surrounds the blastocyst & seperates it from the cavity of uterus is called **Decidua capsularis**
- c) **Decidua parietalis :** Part which forms the inner lining of the uterine wall is called **Decidua parietalis**



- iii) **Contradeciduate** : In this type of placenta the connection between foetal villi & uterus is so intimate, that at the time of birth portion of allantoic placenta is left behind.

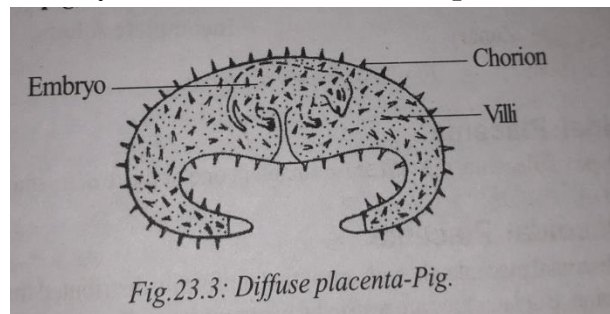
➤ **According to Villi arrangement**

A) Indeciduate :

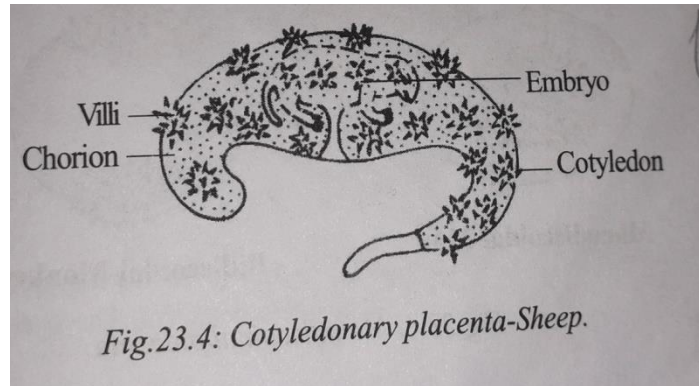
According to distribution of villi on the chorionic surface, indeciduate placenta classified into 3 types

- a) **Diffused** b) **Cotyledonary** c) **Intermediate**

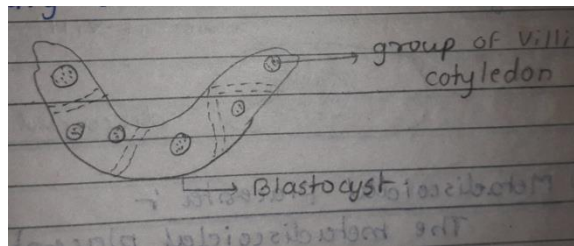
a) **Diffused** : The villi are uniformly distributed throughout the surface of blastocyst. It is a **chorio-allantoic placenta**. **Ex. Pig & Horse**



b) **Cotyledonary** : In this type villi are found in the group or patches, while rest of chorion is smooth. It is a **chorio-allantoic placenta**. **Ex. Sheep, Cow & deer.**



- c) **Intermediate** : In this type of placenta villi are found both diffuse as well as cotyledonary distribution. **Ex. Camel & Giraffe**



B) Deciduate Placenta :

In this type villi are branched & deeply embaded at the time of birth or parturation.

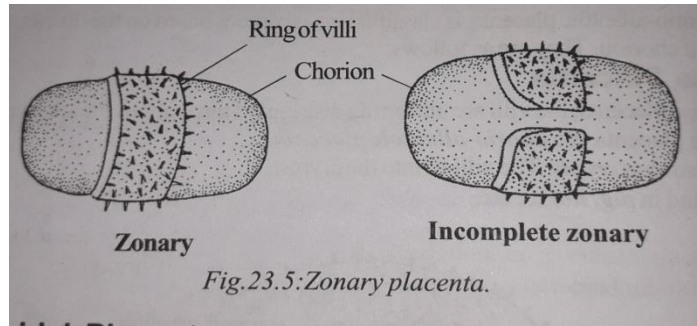
According to distribution of villi, deciduate placenta are of 3 types

- a) **Zonary** b) **Discoidal** c) **Metadiscoidal**

- a) **Zonary** : The villi are arranged in the form of belt (circles) around the middle blastocyst (Embryo). The villi establish close contact with maternal blood & at the time of birth much of superficial layer of uterus is eroded. **Ex. Carnivores such as Cat, dog, tiger & fox etc**

Zonary placenta is classified into 3 types

- 1) **Complete** : Single grdle of villi **Ex. Dog**
- 2) **Incomplete** : Single incomplete girdle of villi **Ex. Raccoon**
- 3) **Double zonary** : Two circles of villi **Ex. Fox**

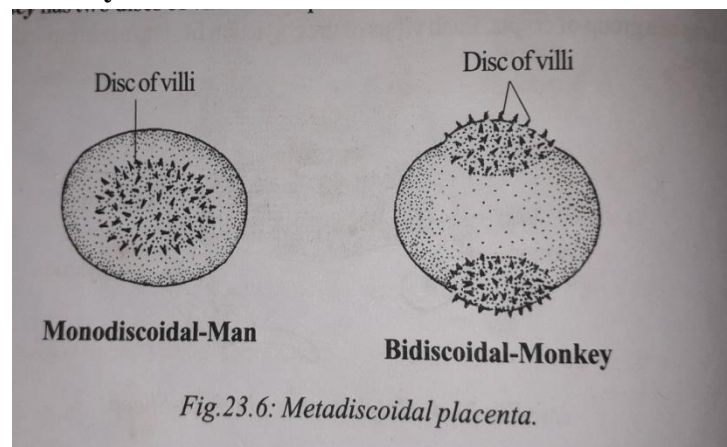


b) **Discoidal** : In this type of placenta, the villi arranged in one or more disc – shaped areas on dorsal surface of embryo. **Ex. Bat & Rodents (Rat & Rabbit)**

c) **Metadiscoidal** : In this type of placenta, villi are at first uniformly distributed but later they are restricted to one or more disc- shaped areas. **Ex. Primates**

Man has single disc of villi – monodiscoidal

Monkey has two discs of villi – bidiscoidal



➤ **According to histological relation between the maternal & foetal tissue :**

The thickness of the partition between the foetal & maternal tissue. Blood may be decrease by removal of some of the layers of tissue or barrier living between depending on wchich layers have disappear, several types of placenta maybe distinguish. The name given to the various histological types indicate two tissues, one foetal & other maternal which are in contact with each other.

Based on the histology, placenta is classified into 5 types –

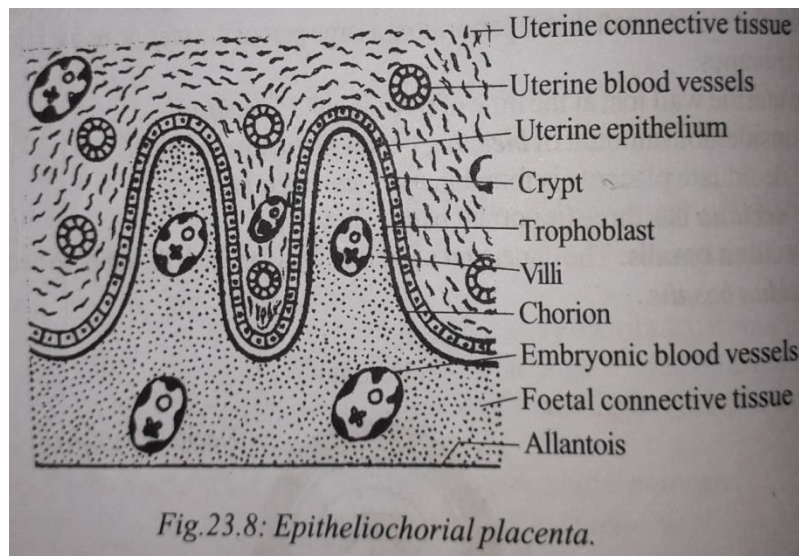
- 1) Epitheliochorial Placenta
- 2) Syndesmochorial placenta
- 3) Endotheliochorial placenta
- 4) Haemochorial placenta
- 5) Haemoendothelial placenta

1) **Epitheliochorial placenta** : Uterine epithelium makes contact with chorion of embryo. Ex. Pig & Horse

This type of placenta is provided with 6 types tissues or barriers

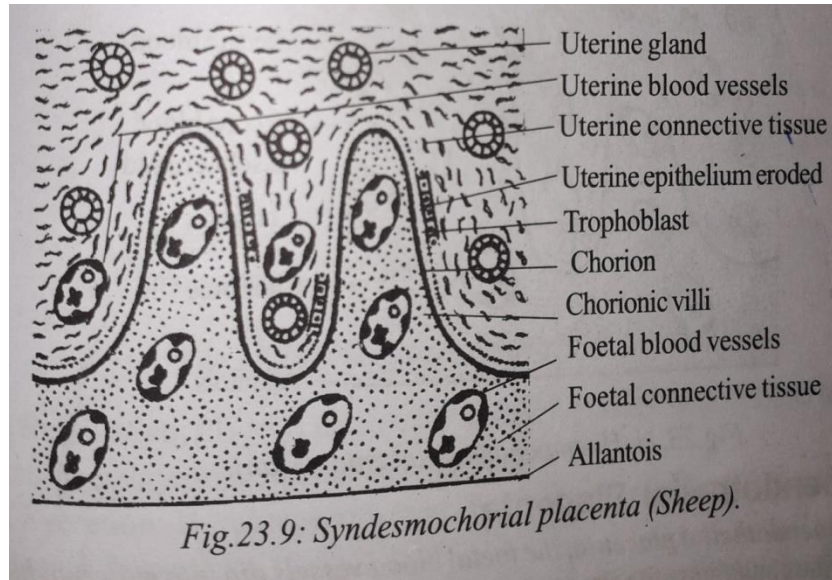
- a) The endothelial wall of maternal blood vessels
- b) Connective tissue around maternal blood vessels (syndesmos)
- c) Uterine epithelium
- d) Epithelium of chorion
- e) Connective tissue of chorion
- f) Endothelial wall of chorion

Thus the nutritive materials pass through the maternal endothelium
⇒ maternal connective tissue ⇒ uterine epithelium ⇒ epithelium of chorion
⇒ connective tissue of chorion ⇒ endothelial wall of chorion



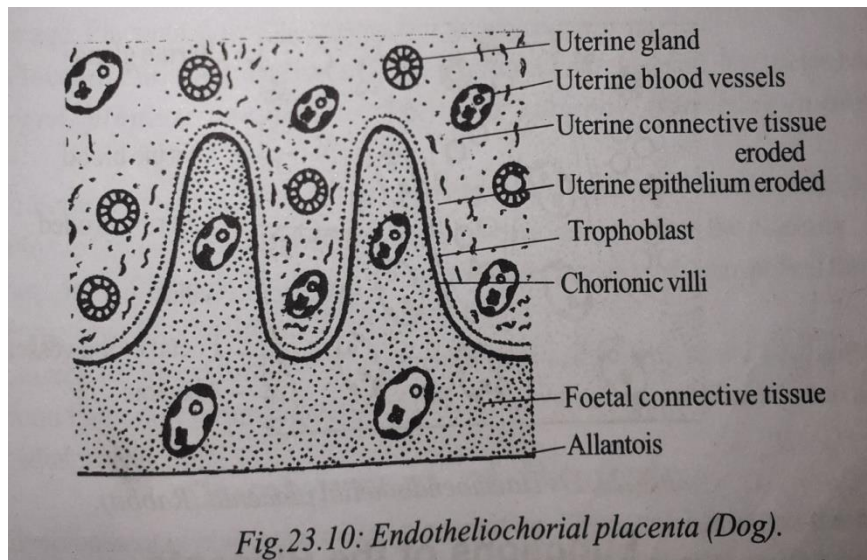
2) **Syndesmochorial placenta** : Maternal connective tissue (syndesmos) makes contact with chorion. In this type uterine epithelium is eroded Ex. Sheep, Goat, Camel, Cow & Buffelo etc.

Thus the nutritive materials pass through the maternal endothelium
⇒ maternal connective tissue ⇒ epithelium of chorion ⇒ connective tissue of chorion ⇒ endothelial wall of chorion

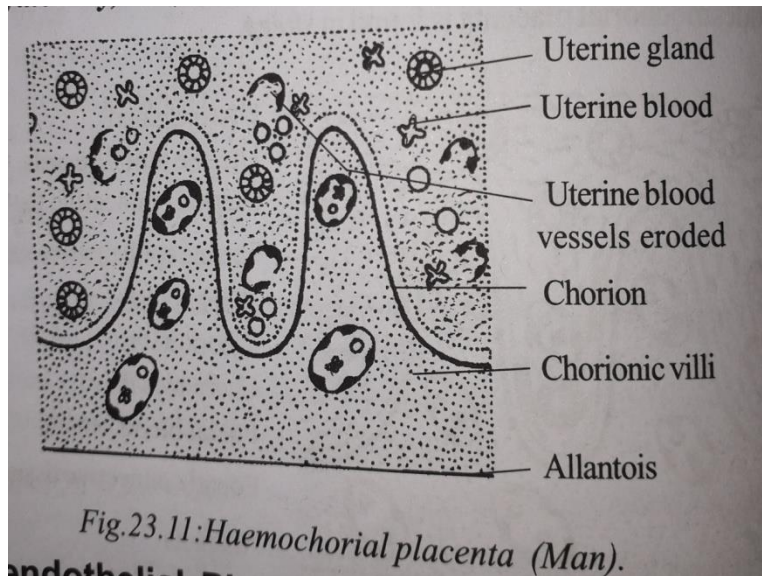


- 3) **Endotheliochorial placenta** : Endothelium of mother makes direct contact with chorion. In this type uterine epithelium & maternal connective tissues are eroded.
Ex. All cats, Dog, Lion & Tiger etc.

Thus the nutritive materials pass through the maternal endothelium
 ⇒ epithelium of chorion ⇒ connective tissue of chorion ⇒ endothelial wall of chorion



- 4) **Haemochorial placenta** : Chorion of embryo directly dip into maternal blood sinuses. In this type uterine epithelium, maternal connective tissue & maternal endothelium is eroded. **Ex. Man, Monkey & bats etc**



- 5) **Haemoendothelial placenta : Foetal blood vessels dip into maternal blood pools.**
 In this type uterine epithelium, maternal connective tissue, maternal endothelium & chorion is eroded. **Ex. Rat, Rabbit & pig etc.**

The maternal blood has only one barrier, the foetal endothelium to reach embryo.

