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STRUCTURAL DIVERSITY OF THE PLACENTA IN DOMESTIC MAMMALS: A COMPARATIVE ANATOMICAL, HISTOLOGICAL AND EMBRYOLOGICAL REVIEW

Beatrice Ana-Maria SÎRBU[1], Liliana Petculescu Ciochină[1], Cătălin Bogdan SÎRBU[1*], Paul Florin PAVEN[1], Maria Alexandra Iepan (Ferencz)[1], Gabi Dumitrescu[1]

[1] University of Life Sciences "King Mihai I" from Timișoara, Faculty of Bioengineering of Animal Resources, 300645, Calea Aradului, no. 119, Timișoara, Romania

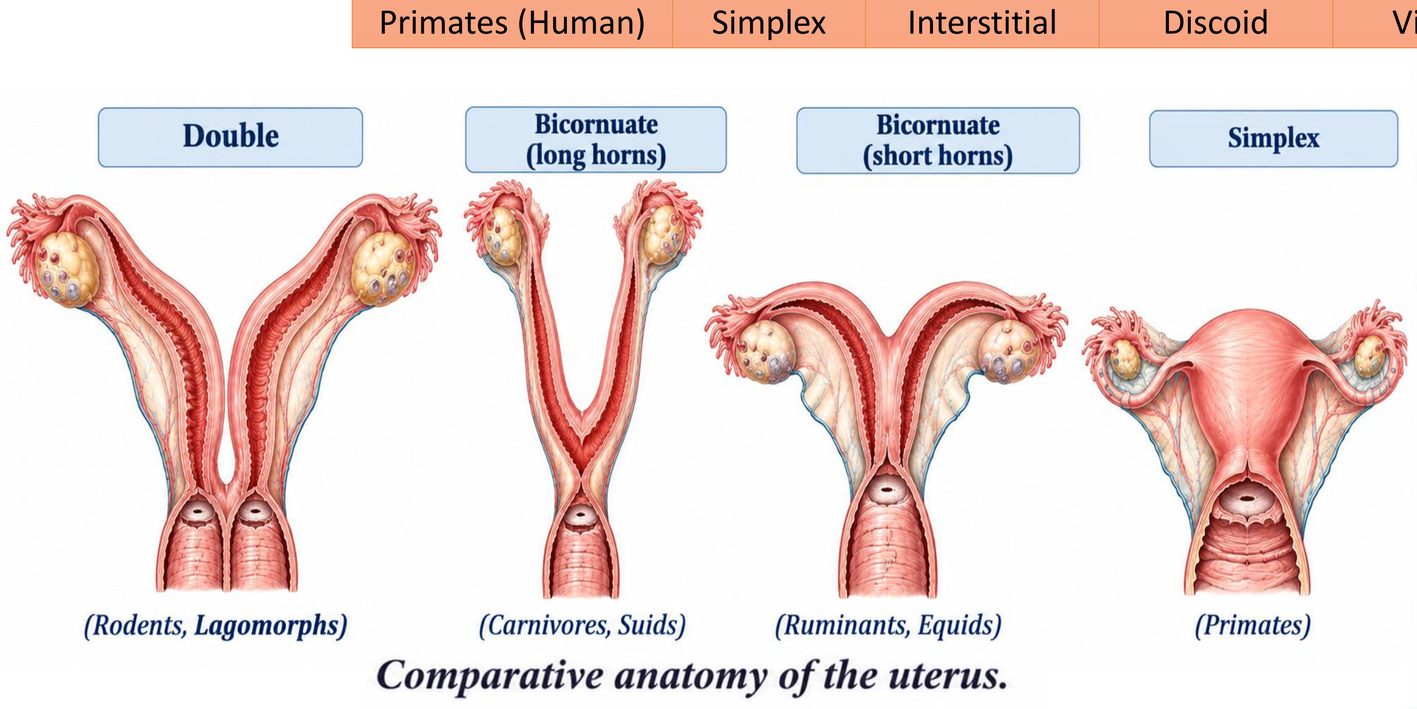
Abstract: *The placenta is a transient organ essential for embryonic and fetal development, facilitating maternal–fetal exchanges and performing endocrine, metabolic, and immunological functions. Although its fundamental roles are shared among placental mammals, its anatomical and histological organization exhibits considerable interspecific variation, reflecting differences in implantation, placentation, and fetal development. The aim of this review is to comparatively analyze the structural diversity of the placenta in cattle, sheep, pigs, horses, and domestic carnivores, highlighting the relationships between embryological origin, the organization of the maternal–fetal interface, and species-specific functional adaptations. This study is designed as a narrative review based on the analysis and synthesis of scientific publications addressing placental morphology, histology, development, and evolution in mammals. From a morphological perspective, cattle and sheep exhibit a cotyledonary placenta characterized by the formation of placentomes, whereas pigs and horses possess a diffuse placenta with distinct microstructural features of the maternal–fetal contact surfaces. In domestic carnivores, the placenta is zonary, with a specialized region responsible for maternal–fetal exchange. Histologically, the placenta is epitheliochorial in pigs and horses, synepitheliochorial in ruminants, and endotheliochorial in carnivores. These differences reflect distinct patterns of placental barrier organization and interactions between maternal and fetal tissues. The comparative analysis highlights that placental structural diversity results from evolutionary and reproductive adaptations. Understanding these variations contributes to a better comprehension of species-specific gestational characteristics and the mechanisms supporting fetal development in domestic mammals.*

• Introduction

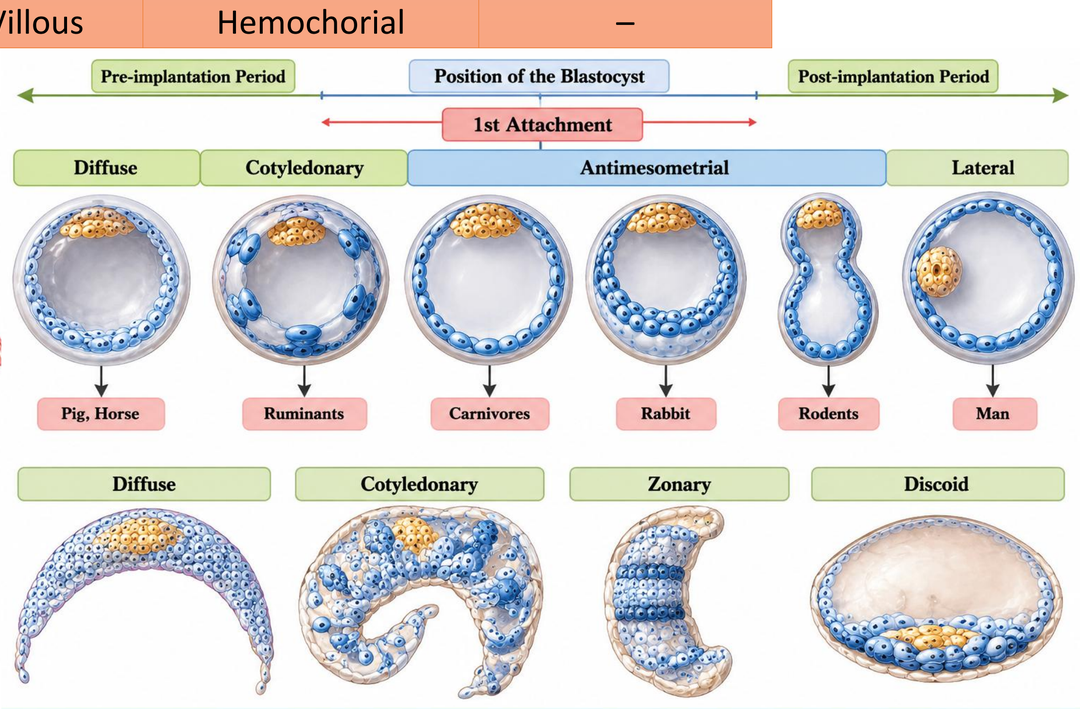
The implantation of the embryo into the uterus is an evolutionary process associated with viviparity and placentation. Embryo implantation is a crucial reproductive process that ensures embryonic protection, nutrition, and survival. Although it follows common biological stages in placental mammals, its timing and mechanisms vary among species depending on uterine morphology, endocrine regulation, and molecular interactions.

Table 1. Principal characteristics of mammalian placentas

Order	Uterine anatomy	Implantation	Morphology	Structure	Histology	Placental annexes
Cetaceans	Bicornuate	Superficial	Diffuse	Villous	Epitheliochorial	–
Suids	Bicornuate	Superficial	Diffuse	Villous	Epitheliochorial	Allantois
Equids	Bicornuate	Superficial	Diffuse	Villous	Epitheliochorial	Allantois
Ruminants	Bicornuate	Superficial	Cotyledonary	Villous	Synepitheliochorial	Allantois
Carnivores	Bicornuate	Superficial	Zonal	Labyrinthic	Endotheliochorial	Allantois
Lagomorphs	Double	Superficial	Discoid	Labyrinthic	Hemodichorial	–
Rodents	Double	Interstitial	Discoid	Labyrinthic	Hemochorial	Inverted yolk sack
Primates (Human)	Simplex	Interstitial	Discoid	Villous	Hemochorial	–



Comparative anatomy of the uterus.



Stages and morphological types of the blastocyst in domestic species and man.

• Conclusions

The placenta is a complex and essential organ that supports embryonic and fetal development through nutrient exchange, gas transfer, and waste elimination. Understanding the anatomical, histological, and physiological differences among mammalian species is crucial for advancing reproductive biology and ensuring the appropriate use of animal models in studies of human pregnancy and maternal–fetal health.