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Placentation in the Rock Cavy, *Kerodon rupestris* (Wied)

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Rock cavies are rodents found in the semi-arid caatinga of Brazil. We studied the structure of the rock cavy placenta by light and transmission electron microscopy. The exchange area of the labyrinth was organized in lobes separated by interlobular areas. The interhaemal barrier was syncytial haemomonochorial. The syncytiotrophoblast had recesses in the basal membrane and some invaginations of the apical membrane, but transtrophoblastic channels could not be found. The interlobular regions comprised syncytiotrophoblast, enclosing maternal venous blood channels, and cytotrophoblast. There was a prominent subplacenta composed of cytotrophoblast and syncytiotrophoblast. Microvilli projected into spaces between the cytotrophoblasts and into lacunae within the syncytiotrophoblast. The yolk sac epithelium exhibited coated pits, endocytotic vesicles and larger vacuoles, consistent with a role in protein uptake from the uterine lumen. Tight junctions between these cells provided a barrier to diffusion by the intercellular route. The reproductive biology of the rock cavy differs from other members of the family, including the guinea pig, but the architecture of the placenta remains remarkably constant.
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INTRODUCTION

The rock cavy, *Kerodon rupestris* (Wied), lives in the semi-arid caatinga of northeast Brazil. Its local name is the mocó. It belongs to the same family as the guinea pig (Caviidae), but although similar in size to the guinea pig, it differs in general appearance and way of life. Rock cavies are gregarious and crepuscular, passing the day in burrows under rocks or stones. They leave their shelters in the late afternoon or evening and run on the ground or climb trees looking for food, mainly tender leaves. They are especially partial to some species of creeper [1,2].

The rock cavy is an extreme habitat specialist, having adapted to the near arid conditions of the caatinga [3,4]. It is currently under threat due to destruction of this habitat as well as hunting. Elsewhere, efforts are underway to raise rock cavies under controlled conditions as a potential source of food [5]. It is therefore important to understand the reproductive biology of this species.

The placentae of hystricomorph rodents have a number of distinguishing features [6–8]. These include a varying amount of lobulation of the exchange area and the presence of a subplacenta. As in many rodents, an inverted yolk sac placenta is present until term. The present study was undertaken to describe the morphology of the rock cavy placenta at the light microscopical and ultrastructural level and to compare it with the placentae of other hystricomorph rodents [9].

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MATERIALS AND METHODS

Tissue collection

Placentae, fetal membranes and parts of the uteri were collected from 15 rock cavies bred in captivity at the Center for Breeding of Wild Animals, Mossoró. The research was authorized by the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA). The experimental protocol was approved by the Bioethics Committee of the School of Veterinary Medicine, University of Sao Paulo.

The animals were premedicated with midazolam (Dormine, Cristália, Itapira, S.P., Brazil; 1 mg/kg) and ketamine (Cristália, Itapira, S.P., Brazil; 15 mg/kg I.M.). Hemihysterectomy was performed under aseptic conditions during inhalation anesthesia with isoflurane (Cristália, Itapira, S.P., Brazil) in 100% oxygen. Postoperative treatment included antibiotic coverage with amoxicillin (Bactrosina, Bayer, Sao Paulo, S.P., Brazil; 22 mg/kg).

Histology

Tissues collected for histology were immersion-fixed in 4% paraformaldehyde in 70 mM phosphate buffer for 48 h, and

Table 1. Morphometric data for fetus and placenta of the rock cavy in early, middle and late gestation

Sex	Fetus		Placenta		Cord Length	Fetal: placental weight ratio
	Weight	Length	Weight	Diameter		
Female	2.5	3.0	1.8	1.9	1.5	0.72
Female	3.0	2.0	1.6	1.8	1.5	0.53
Male	2.0	2.5	1.8	2.0	1.0	0.90
Male	1.4	2.5	2.0	2.0	1.5	1.47
Male	3.0	2.0	2.5	2.0	1.2	0.83
Male[a]	17.8	7.0	4.2	3.0	2.5	0.24
Male[a]	16.5	4.5	4.3	2.5	2.5	0.26
Male	19.2	7.5	4.1	2.5	3.0	0.21
Female	20.0	6.0	4.5	2.0	3.0	0.23
Female	19.6	6.0	4.3	2.0	3.0	0.22
Male	42.7	9.5	4.2	3.5	3.0	0.10
Male	42.7	9.5	4.2	3.5	3.0	0.10
Male	48.2	9.0	5.2	3.0	3.0	0.11
Male[a]	84.0	10.0	5.8	3.0	4.0	0.07
Male[a]	70.0	9.0	5.4	2.6	3.5	0.08
Female	65.0	9.0	5.0	2.5	3.0	0.08
Female	68.5	8.7	5.6	2.8	3.1	0.08

[a] Twins.

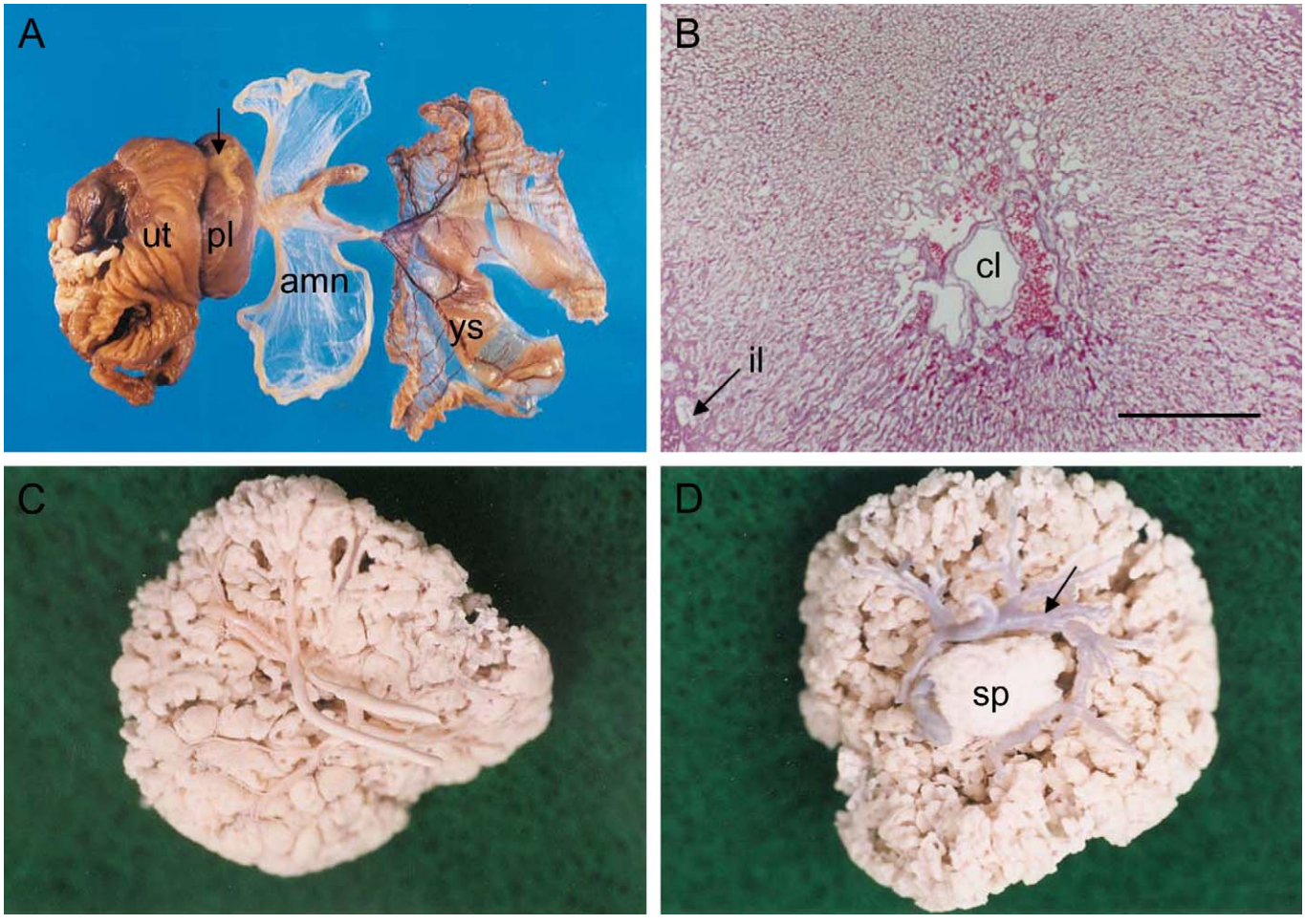

Figure 1. (A) Placenta and fetal membranes of the rock cavy at mid-gestation. The uterine wall (ut) has retracted, exposing the placental disk (pl). The fetus has been removed to show the amnion (amn) and yolk sac (ys). Some maternal tissue adheres to the lateral surface of the placenta (arrow). (B) Photomicrograph of rock cavy placenta in mid-gestation, showing one lobe and part of an interlobular area (il). Maternal blood channels radiate from the centre of the lobe (cl) to the periphery, whilst fetal capillaries pass in the opposite direction, from the interlobular regions to the centre of the lobe. Haematoxylin and eosin. Scale bar: 200 μm. (C) Vascular cast of rock cavy placenta in late gestation made by injecting Mercox into an umbilical artery (pink) and a maternal vein (blue). Fetal aspect of the placenta, showing the lobular arrangement of the blood vessels. (D) Maternal aspect of the same cast, showing the venous ring (arrow) encompassing the subplacenta (sp).