ON THE PLACENTA OF THE HOG-DEER (*Cervus porcinus*). By PROFESSOR TURNER, M.B., F.R.S.

IN the month of September I received from Professor A. H. Garrod the gravid uterus and fœtal membranes of a hog-deer. The amniotic cavity had been opened and the fœtus removed; one of the fœtal caruncules was still attached to a maternal cotyledon, though the others were detached from their corresponding cotyledons. The right horn of the uterus had contained the fœtus and was much more capacious than the left.

The right and left uterine cornua each contained only two large cotyledons, whilst a fifth of small size was situated on the free crescentic border of the septum between the two cornua. The small cotyledon was $\frac{8}{10}$ths inch long, and about $\frac{3}{10}$ths inch broad; the large cotyledons were between 2 and 3 inches long, and from $\frac{3}{4}$ inch to $1\frac{1}{4}$ inch in breadth. The uterus furnishes a striking example of the paucity of cotyledons in a member of the deer tribe, and is an additional illustration of the accuracy of Professor Garrod's classification of the Cervidæ as Oligo-cotyledontophora.[1]

The cotyledons were attached to the concave aspect of the uterine cornua by broad peduncles, and possessed a succulent aspect. In each cornu one large cotyledon was situated close to the opening of the Fallopian tube, whilst the other was in proximity to the uterine septum. An injection was thrown into the uterine vessels, and not only were the cotyledons richly injected, but the vessels of the inter-cotyledonary part of the mucous membrane.

Each cotyledon formed a convex mass, and its free surface was closely studded with small openings, visible with a pocket lens, from which the villi of the chorion had been drawn. When a vertical section was made through the cotyledon the surface of section was seen to be marked by striæ which represented generally the direction of elongated tubular pits, of which the above-named openings were the mouths. The

[1] *Proc. Zool. Soc.* Jan 2, 1877.

longest pits were in the middle portion of the cotyledon, where they measured about half an inch, When these vertical sections through the cotyledon were more highly magnified the pits could be traced for some distance, but as they ran somewhat obliquely they were cut across, so that their entire length could not be traced in a single section. The pits were simple or unbranched in the greater part of their length, and did not have a series of small crypt-like depressions opening from their lateral walls such as I have elsewhere described in connection with the pits in the cotyledons of the cow.[1] To a large extent the epithelial lining of the pits had been shed, but in some places patches of cells were present, either lying loose in the pits or attached to the wall. The cells were mostly irregularly polygonal in shape, but sometimes a cell of a columnar form could be seen. The absence of the epithelial lining in so many cases was probably due to the circumstance that it had been shed along with the fœtal villi, a process which, as I have elsewhere explained, takes place during parturition both in the sheep and cow.

The pits rested on a firm basis of connective tissue, in which blood-vessels were situated before they entered the walls of the pits. In the mucosa forming the peduncle of the cotyledons some elongated tubular glands, with their contained epithelium, were readily recognised, but I did not see any of these glands penetrating the mass of connective tissue forming the basis of the cotyledon, or having any communication with the pits in the cotyledon. Blood-vessels of comparatively large size were situated in the submucous tissue of the peduncle, which gave origin to the vessels which passed into the cotyledon to form the vascular arrangements in the wall of the pits.

The mucous membrane between the cotyledons was glandular. When dissected off the submucous coat, branched and tortuous tubular glands could be seen in it with the naked eye. Under a low power of the microscope their mouths, separated from each other by well-marked intervals, could be seen to open on the smooth surface of the membrane.

The bicornuated form of the chorion was very distinct, and the left cornu was not expanded like the right. The amnion

[1] *Lectures on the Comparative Anatomy of the Placenta*, 1876, p. 63.

was limited to the right or gravid horn, but did not reach to within two inches of its free end. The allantoic sac extended from the tip of one cornu to that of the other. The allantois was not prolonged beyond the chorion into diverticula allantoidis, as in the sheep and cow. In this respect it agreed with what I saw in the rain-deer described in the last number of this *Journal;* and it is not unlikely that this may be another character, to that furnished by the difference in the number of cotyledons, between the placenta of the Cervidæ and of the hollow-horned Ruminants. The general relations of the amnion and allantois to each other in the gravid side resembled what I have described in the rain-deer.

The chorion gave origin to caruncules corresponding in number and adapted to the maternal cotyledons. Each caruncle consisted of multitudes of villi closely crowded together. They were characterised by their elongated, filamentous, cylindriform shape, and by their length, which not unfrequently exceeded half an inch. As a rule each villus gave off no branches until near its free end, when it bifurcated, and these branches in their turn often bifurcated. The villi gave off no lateral branches; but the surface of the main stem and of the branches of bifurcation was marked by a delicate fringe-like elevation of the surface of the villus, which formed an irregular network. In their filamentous form, absence of collateral branches, and close aggregation on the surface of the caruncule, the villi in the hog-deer contrasted strongly with those of the rain-deer, sheep, and cow. Their form admirably adapted them for lodgment in the elongated tubular pits in the maternal cotyledon.

As I had injected the umbilical vessels, the vessels of the villi were injected. Each villus contained an artery and a vein lying parallel to each other. Although the injection had penetrated those vessels for a considerable distance, it had not filled their entire length, so that I cannot say whether in the terminal branches of the villus they were connected together by a simple loop or by a capillary network. In several specimens, however, I saw a partially injected network of capillaries immediately subjacent to the stem of the villus.

The intercaruncular part of the chorion was highly vascular. Not only did it contain numerous branches of the umbilical

vessels, but a closely-arranged capillary plexus was situated immediately beneath the free surface. In this respect it corresponded with what I have seen in the cow, sheep, giraffe, and rain-deer, but I did not recognise polygonal areas or pocket-like depressions such as I have described in those animals.

Situated on the amniotic membrane, and projecting into the sac of the amnion, were numbers of roundish or ovoid bodies, usually smaller in size than a very small shot. They appeared to be situated on the free surface of the membrane, for they could easily be scraped off with the knife, though sometimes they seemed as if the polished membrane of the amnion were prolonged over them. They were irregularly distributed, and reached up to the amniotic covering of the cord, but were not situated on the cord. Examined microscopically, they were seen to consist of collections of squamous cells, bearing a general resemblance to the tessellated epithelium of the mouth. They were apparently due to a local hyperplasia of the epithelial cells of the amnion. They had no relation to the blood-vessels of the chorion. Both in their structure and relation to the surface of the amnion they corresponded to the well-known whitish bodies found on the amnion of the cow.

Placed in the loose tissue between the wall of the sac of the allantois and the chorion were some irregularly elongated flattened bodies, some of which were as much as $\frac{7}{10}$ths inch long. They were opaque white, hard and gritty to the touch, and could be broken up into granular particles and thin plates. When acetic acid was added, scarcely any appreciable action took place; but on the addition of hydrochloric acid, bubbles of gas were evolved with great activity. The gritty material was, without doubt, carbonate of lime; and when the earthy matter was dissolved away, the soft material left was seen to be connective tissue. These bodies had no relation to the blood-vessels of the chorion, and, owing to their flattened form, occasioned scarcely any elevation of the allantoic membrane towards the sac. These bodies are obviously homologous in position to the hippomanes in the mare (before the latter have caused absorption of the allantoic membrane, and have become free in the sac of the allantois), to the white spherical bodies described by Professor Rolleston and by myself between the chorion and allantois of the pig, and to

the flattened, oval, or subcircular bodies which Professor Owen saw in the elephant, and respecting the structure of which I have given some additional particulars on p. 27 of my *Lectures on the Comparative Anatomy of the Placenta.* The presence of earthy matter in such abundance in these bodies in the hog-deer showed that they were in process of calcareous degeneration.