ON THE COTYLEDONARY AND DIFFUSED LACENTA OF THE MEXICAN DEER—(*Cervus Mexicanus*). By PROFESSOR TURNER, M.B., F.R.S.

IN the month of November, my friend Professor A. H. Garrod kindly forwarded to me the gravid uterus of a *Cervus Mexicanus* which had died in the gardens of the Zoological Society, London. The uterus was in the earlier stage of pregnancy, and contained twin fœtuses, one in each horn. Each fœtus measured $3\frac{1}{2}$ inches from the vertex to the root of the tail.

The uterine cornua possessed the well-known form one is familiar with in the Ruminantia, and owing to the presence of twin fœtuses the horns were of equal size. About one inch from the Fallopian tube, each cornu curved suddenly backwards, and a fold of mucous membrane projected into the cavity at the spot where this bend took place. A well marked septum which separated the cavities of the two horns was situated in the corpus uteri, and terminated close to the os uteri in a free crescentic border.

The chorion formed a continuous membrane, extending from the tip of one cornu to that of the other, and measured 21 inches in length. Its uterine surface presented a very remarkable appearance owing to the presence, not only of large and small cotyledons, but of a diffused distribution of villi over various parts of the surface.

Each horn of the chorion possessed three elongated caruncules (cotyledons), the largest of which was 5 inches, the shortest $3\frac{1}{2}$ inches, whilst the greatest breadth was about $\frac{3}{4}$ of an inch. Each of these caruncules was indented by transverse or oblique furrows which gave the appearance of a division into smaller segments. But each horn possessed in addition several dozen tuft-like patches of villi, which formed small caruncules varying in diameter from $\frac{1}{10}$th to $\frac{5}{10}$ths of an inch. These caruncules were often in close proximity to each other, at other times separated by narrow intervals. They were not distributed generally over the chorion, but were found more especially in proximity to the larger caruncules, and were quite absent from the chorion in the

neighbourhood of the os uteri, and over a considerable area at the free end of each horn.

In the intervals between the large and small caruncules, on the surface of a portion of the chorion in the neighbourhood of the os, and over a large part of the surface at the free ends of the horns, villi were diffused in extensive patches, irregular both in form and size. These patches were just visible to the naked eye and required the use of a pocket lens to follow out their distribution. They did not, however, cover the entire surface of the membrane in the regions where the caruncules were absent, as smooth areas, perfectly free from villi, were present in the regions of the os and Fallopian tubes and some other parts of the chorion. Owing to a constriction in the chorion opposite the fold of the mucous membrane, which projected into the uterine cavity near its free end, it at first sight appeared as if the terminal part of the bag of membrane was a diverticulum allantoidis, but on more careful inspection it was seen that the surface of this part of the membrane was for the most part covered with a diffused patch of villi, which proved it to be the chorion proper. Hence, the arrangement of the membranes in *Cervus Mexicanus* supports the opinion which I expressed in my account of the placenta of the hog-deer,[1] that the placenta of the Cervidæ may be distinguished from that of the hollow-horned ruminants by the absence of the diverticula allantoidis.

The villi composing the large caruncules were elongated and arborescent. Each possessed a main stem from which branches arose that again divided into smaller off-shoots, which were filamentous and cylindriform. These villi had a general resemblance to those of the rain-deer,[2] but the practised eye could distinguish the villi of one animal from those of the other; for in the *Rangifer tarandus* the branches arising from the main stem of the villus were more numerous, more slender, and more closely clustered together than in the *Cervus Mexicanus*.

In the smaller caruncules of the Mexican deer the villi were not only much shorter than in the larger caruncules, but had broader bases of attachment to the chorion. Their branches also were very short and had more of a leaf-like than a filamentous form.

[1] This *Journal*, October 1878.

[2] Described by me in this *Journal*, July 1878.

In the diffused villous patches the villi were arranged, not in tufts as in the mare, cetacean and *Hyomoschus*, but as shallow ridges, having a general resemblance to those which I have described in the pig.[1] These ridges, though often running parallel to each other for some distance, usually at length converged and became continuous with each other, and sometimes indeed formed a reticulated arrangement.

The sac of the allantois extended from the free end of the horn of each chorion to the region in relation to the os uteri, where it terminated, and the walls of the two allantoic sacs came in contact with each other in this locality; the sacs themselves, however, were quite distinct, as fluid injected into one sac did not pass into the other.

The sac of the amnion in relation to each fœtus was comparatively small, and restricted to about the middle of each horn of the chorion. The amniotic investment of the umbilical cord, and the surface of the amnion over a great part of the wall of the sac were studded with minute semi-translucent corpuscles; so minute indeed were they as to be scarcely visible to the naked eye. On microscopic examination they were seen to consist of crowds of polygonal scaly cells, with distinct nuclei, and corresponded, therefore, in structure with the similarly situated but larger and more opaque corpuscles I have described in the rain-deer and hog-deer. Sparingly scattered over the free surface of the allantois, and projecting into its sac, were opaque yellowish corpuscles, about twice the size of the corpuscles of the amnion. They were sometimes attached to the allantois by a slender pedicle of that membrane. They were much tougher than the amniotic corpuscles and their structure was more difficult to determine. When digested in glycerine and when magnified 300 diameters they had an ill-defined fibrous aspect, but, on the subsequent addition of acetic acid the fibrillated character disappeared, and a small proportion of ovoid, polygonal, and fusiform cells, like the corpuscles of embryonic connective tissue, came into view. They differed from the corresponding bodies in the hog-deer in projecting into the sac of the allantois, and in not having undergone calcareous degeneration, so that their resemblance to the hippomanes in the mare was more clearly marked.

[1] Lectures on Comparative Anatomy of Placenta, 1st series. Edinburgh, 1876.

The free surface of the uterine mucous membrane was adapted to the outer surface of the chorion. In each cornu were three elongated cotyledons corresponding in size and form to the fœtal caruncules. Each cotyledon projected for from $\frac{2}{10}$ths to $\frac{3}{10}$ths of an inch beyond the surface of the surrounding mucous membrane, and was indented by transverse and oblique furrows. The surface of each cotyledon was studded with the mouths of numerous pits in the cotyledon, in which the villi of the chorion had been lodged. Opening into each of these pits were secondary pits or crypts, in which the branches of the villi, with their terminal and lateral off-shoots, had been contained. As the uterine arteries had been injected with gelatine and carmine, the walls of the crypts and pits were seen to be very vascular. The epithelial lining of the pits and crypts was for the most part shed, but patches of cells were occasionally seen in position on their walls, and loose cells were floating about in the fluid in which the sections made through the cotyledon were mounted.

But in addition to these large cotyledons there were numerous patches of crypts for the lodgment of the short villi of the smaller caruncules of the chorion. These patches were not elevated into well-defined cotyledons, above the general plane of the surrounding mucous membrane, but, in conformity with the structure of the villi they had contained, they presented a crypt-like character, having a general resemblance to the crypts in the uterine mucosa of a gravid cetacean.

In correspondence with the regions where the patches of diffused villous ridges of the chorion had been situated, the free surface of the uterine mucosa presented narrow furrows in which the shallow villous ridges had been lodged. The walls of these furrows, as well as the walls of the crypts for the reception of the villi of the smaller caruncules, were very vascular, and were readily distinguished by their deeper red colour in the injected uterus from the smooth portions of the mucous membrane in apposition with the non-villous areas of the chorion. The crypts were lined by an epithelium, which had, however, been shed from the general surface of the mucosa, probably from the soaking in warm water to which the uterus had been subjected in the process of injection.

Elongated, branched, and tortuous tubular glands were readily

seen in the deeper layer of the mucosa. They extended in a large part of their length almost parallel to the free surface, but ultimately inclined to that surface to open by very obliquely directed mouths. Many of these orifices were seen on the smooth areas of the mucous membrane. The glands contained an epithelium, the cells of which had for the most part indistinct outlines, as if they were in process of disintegration, though occasionally cells having an elongated columnar form were seen.

In the presence of a small number of large cotyledons in each uterine cornu, the Mexican deer corresponds with the other Cervidæ that have been described. But it possesses, in addition, numbers of small cotyledons and patches of diffused villi, so that in these particulars it presents an exceptional arrangement to the Cervidæ generally, so far as their placentation has been studied.

Many years ago Professor Owen pointed out[1] that on the chorion of the giraffe not only were many large cotyledons, but in the inter-spaces between them numerous smaller cotyledons, varying in diameter from 2 inches to 2 lines, were situated. Subsequently I showed[2] that short club-shaped villi also arose, either singly or in rows and clusters, from the surface of the chorion of this animal, so that the giraffe in this particular approximated to the type of the diffused placenta.

The placenta of the Mexican deer, however, possessed a combination of the cotyledonary with the diffused type of placenta much more strikingly marked than was the case in the giraffe, the areas of diffused villi being proportionally more extensive, so that they, without doubt, played a more important part in the nutrition of the fœtus. The occurrence of this combination of the diffused and cotyledonary types in the same placenta strengthens the argument I have previously advanced[3] of the relation which subsists between these two forms, and of the possibility, on the theory of evolution, of the cotyledonary placenta being evolved out of a diffused form "through the

[1] *Trans. Zool. Soc.* vol. iii.

[2] *Lectures on Comparative Anatomy of Placenta*, p. 67. Edinburgh, 1876.

[3] Some general observations on the placenta, with special reference to the theory of evolution. This *Journal*, vol. xi. p. 33.

atrophy of villi and crypts on some portions of the chorionic and uterine surfaces and their increased development on others." Owing to the retention of a diffused distribution of the villi on the surface of so large an area of the chorion, it will be a matter of interest, for those who may have opportunities of dissecting *Cervus Mexicanus*, to observe, if in other features of its anatomy it approaches more closely than do the other Cervidæ, to the Perissodactyla, or to those Artiodactyles, as the Tragulidæ and Camelidæ, which retain the diffused type of placenta.

The existence in the genus *Cervus* of a species which is not purely cotyledonary in its placentation, whilst the other members of this genus, so far as we are acquainted with them, are purely cotyledonary, furnishes us with an additional argument to those which I have advanced in previous memoirs, that the placenta should not be accepted as a dominant organ in the Classification of the Mammalia.

ON EXOSTOSES WITHIN THE EXTERNAL AUDITORY MEATUS.—By Professor TURNER, M.B., F.R.S.

IN 1864 Professor Seligmann directed attention to the presence[1] of exostoses in the external auditory meatus of some specimens of American crania, which had undergone artificial elongation. He had seen these skulls in various collections, where they were described as "Titicaca's, Huanka's, and Aymara's," and of six such crania, five possessed exostoses in this locality.

In the first volume of the *Archiv für Ohrenheilkunde*,[2] Professor Welcker, of Halle, described the presence of exostoses in the external meatus in the crania of two natives of the Marquesas islands, which he had received from the collection of Dr J. Barnard Davis. In one specimen (No. 784), a man aged about 36, three small exostoses were situated in the left auditory meatus, one of which grew from the upper part of the anterior wall, and the

[1] Cited by Welcker as contained in the *Sitzungsberichte der Kais. Acad. in Wien*, 1864, p. 55, but I cannot find it in the Proceedings of the Academy for that year.

[2] Ueber Knöcherne Verengerung und Verschliessung des äusseren Gehörganges.