VI. *An anatomical Description of a male Rhinoceros. By Mr.* H. Leigh Thomas, *Surgeon. Communicated by* George Fordyce, *M. D. F. R. S.*

Read January 29, 1801.

Our knowledge of this animal has hitherto been extremely limited, both with regard to its natural history, and also its internal structure. A paper by James Parsons, M. D. giving a very accurate description of a young rhinoceros, was read before the Royal Society, in June, 1743; but, as the Doctor does not attempt to describe more of it than the external figure and coverings, (which are delineated,) we may presume that he never had any opportunity of examining the internal parts: his account, however, as far as it goes, is in every respect correct; I shall not, therefore, take up the time of this learned Society by a useless recapitulation, but proceed to describe such appearances as have not yet been noticed.

The subject of the following observations was brought from the East Indies to England, where it was intended he should remain, until a favourable opportunity should offer of sending him to Vienna. During the passage from India, he appeared to enjoy a good state of health, which continued uninterrupted, until a few days before his death; at which time, he was attacked with difficulty of breathing, and died before he had attained his third year. In the course of this time, he had become perfectly docile and tame; but never, by

actions or otherwise, expressed the smallest regard or affection for his keeper, or for any of the people who occasionally fed him; neither was he easily irritated, but preserved, on all occasions, the most perfect indifference and stupidity. He was fed chiefly upon hay and oats, also potatoes, and other fresh vegetables; his consumption of which was prodigious, exceeding that of two or three working horses. It would appear, that this animal had not arrived to near its full growth: he was scarcely so high as a two year old heifer; but the bulk of his body, by measurement, considerably exceeded the length. The horn, which is affixed to the upper lip of the adult rhinoceros, was here just beginning to sprout. The hoofs were divided into three obtuse parts: the soles of the feet were well defended, by a large mass of elastic matter, covered by a strong horn-like substance.

It will not be necessary to give a minute detail of the anatomy of this animal; it is only requisite to remark appearances which are peculiar to it, and such as are not commonly met with in other quadrupeds: in general, the structure may be said to correspond to that of the horse; the peculiarities, however, shall be briefly noticed.

The skin, it is well known, is extremely hard and tuberculated; though smoother, and easily cut through by a common knife, on the under parts of the body: a considerable degree of sliding motion was observable between it and the surface underneath; this arose from the great quantity of loose cellular membrane, deposited between them, for the purpose of allowing the hard skin a power of accommodating itself to the body, when in a recumbent position. I could not observe any fibres corresponding to the panniculus carnosus, generally

found in quadrupeds: indeed this muscle would have been useless here; for, from the structure of the skin, the animal could not be sensible to the bites of insects; nor could so weak a power act upon a substance so strong and inelastic. The abdominal muscles were exceedingly strong, and well marked: the tendinous fasciæ were much thicker than I had ever observed in any other animal; obviously to give a sufficient support to the great weight of the viscera. The incisor teeth were only four in number; two situated in each jaw; these are placed a considerable distance from each other: besides them, I observed in the head of another rhinoceros, five years old, and where the soft parts had been removed, two smaller teeth, placed one on each side those of the lower jaw; these were not pointed. There were only eight of the molares, in each jaw: this number, of course, would be increased, as the growth of the maxillary bones advanced; their form may be considered as peculiar, and has been already noticed by Mr. HOME, in the Philosophical Transactions for 1799, Tab. XXI. The inside of the mouth presented nothing unusual; the membranes covering it were not thicker than those found in other graminivorous animals. The pharynx and œsophagus were large and capacious. The stomach, with the whole of the alimentary canal, was, in external appearance, very similar to that of the horse, only that the cæcum was considerably larger; which variety accounts for the great size of the abdomen, already noticed. The stomach, upon its inside, was in every part covered by a secreting surface; whereas, in the horse it is partly cuticular. The small intestines were extremely short; but the surface upon the inside was considerably extended, by the internal coat being thrown into processes of an oblong form; these, after the

mesenteric vessels were injected, put on a beautiful villous appearance: it would appear, that they answer the same purposes as the valvulæ conniventes in the human subject; they differ only in the mode of arrangement, and are unlike what I have ever observed in any other animal.

The liver was of a dark black colour, very soft, giving as little resistance to pressure as the human spleen generally does: it was divided into several lobes. The gall bladder was wanting. The spleen and pancreas were very similar to those of the ox. The kidnies were large, and considerably flattened: they were lobulated, but their lobes did not appear so distinct as those of the same gland belonging to the bear; probably, as the animal advances in life, this appearance may be altogether lost, as takes place in the human body, and a variety of other animals. Upon throwing some size, coloured with vermillion, into the emulgent artery, I was surprised to perceive the coloured matter escape by the ureter, without any considerable pressure of the piston: this circumstance induced me to insert the pipe into the excretory duct of the other kidney; when the injection escaped, with the same ease, by both artery and vein. I should not have noticed these circumstances, which have occasionally occurred to me when injecting the human kidneys, and also those of other animals; but, in these instances, the great facility with which the injection passed, surprised me, and at the same time proved, in a remarkable manner, the simple structure of this gland. The organs of generation had not arrived to maturity: the testes were small, and situated without the abdomen; the vasa deferentia did not allow quicksilver to pass along them; and, upon the whole, it was evident the testes never had secreted. The vesiculæ seminales were cellular;

and in shape and structure like those in the human subject: they contained only a small quantity of a ropy fluid. Upon throwing some coloured wax into the corpora cavernosa of the penis, the extremity became expanded, with the meatus urinarius placed in the centre; this expansion was not so considerable as is observed in the horse: about three inches below, a second enlargement took place, though not so compleat and perfect as the first. The penis was curved in its form, with the convex side towards the body; which proves that this animal must be a retro-coient: indeed his general structure might have suggested this idea, had not these parts been particularly attended to. The contents of the thorax presented nothing worthy of remark. The lungs every where adhered to the inside of the thorax, and were in a high state of inflammation; which latter circumstance was probably the cause of the animal's death.

Whilst the animal was living, the eyes always appeared dull and watery; the upper and under palpebræ were scarcely ever observed to come together; the palpebra tertia was frequently carried over the cornea, and corresponded in shape and structure to that of the ox. The muscles of the eye-ball were exactly similar to those of other graminivorous animals: the globe of the eye was not larger than that of the sheep; and the cornea was much smaller. Upon cutting through the sclerotic coat, it was found somewhat harder and thicker than what is observed in the sheep; and, upon endeavouring to separate it from the choroid, I found an uncommon resistance at the posterior part of the eye; though in other parts, the adhesion between the coats appeared less than what takes place in the human body. This unusual connection, naturally directed my attention more particularly towards it; when I readily discovered four

processes, arising by distinct tendons from the internal and posterior portion of the sclerotica, and at equal distances from the optic nerve. These processes passed forwards between the coats, gradually becoming broader, and being insensibly lost in, and forming a part of, the choroid, at the broadest diameter of the eye: the connexion between the coats around the outer circle of the cornea, was the same as is observed in the eye of other animals. The processes had a muscular appearance; the fibres running forward, in a radiated direction; they were detached from the coats with the greatest facility, except at their origins and insertions, where it required considerable force to tear them from the sclerotica; and, at their terminations, they became so intimately connected with the choroid, as to form only one substance. On neither of their surfaces was there any thing similar to the nigrum pigmentum; the pigment was confined to the inside of the choroid coat, without any structure similar to the tapetum lucidum. The ciliary processes were affixed to the crystalline lens; they were extremely short, and indistinct; not having that beautiful arrangement commonly seen in the eye of other quadrupeds. The iris was circular, and of a dark brown colour. The crystalline lens was somewhat remarkable with respect to its form, being nearly spherical; this was very strongly marked, when compared with the lenses of several other animals; the anterior surface was a little flattened.

The peculiarities already observed in the structure of the eye, in different animals, are very numerous; but I do not know that the variety above stated has hitherto been noticed by any one: the structure of the processes, as far as the sight can determine, appears to be muscular; and, what more particularly tends to confirm this notion, is the very distinct tendons con-

necting them with the sclerotic coat. It is well known that the iris, and also other parts of the body, possess to a great degree the power of contraction, without our being able to demonstrate muscular fibres; allowing, therefore, these processes to have the common properties of muscles, we shall be better enabled to form some idea of their uses.

It is related by naturalists, that the rhinoceros does not enjoy a very quick sight; and that he can only distinguish objects which are placed immediately before him. This notion most probably has arisen from the apparent dullness of his eyes, and the great difficulty he must meet with in turning the head from side to side, encased as the neck is by its strong unyielding coverings. I conclude, however, that if we should ever become acquainted with the natural habits of this animal, his vision will be found to be as perfect as that of any other of the same class. In the muscles, I have already remarked, that there is no difference; of course, the eye-ball, with those powers, must enjoy the common motions. With respect to his ability for seeing near objects, it is not probable that nature should have denied to this creature, a faculty which has been granted to every other, viz. a power of minutely examining their food before it is taken into the stomach; now, as his eyes are placed nearer the mouth than in any other quadruped we are yet acquainted with, it is but reasonable to suppose, that his powers for accommodating vision to very near objects must be equal, if not superior, to theirs. In the easy and natural state of the eye, it is probably so adjusted as to view with perspicuity very near objects, requiring some change to adapt it for distinguishing distant ones. This change, most likely, is effected by the four processes acting conjointly: at their terminations they completely encircle the eye

at its broadest diameter; therefore, upon their contracting, the axis of vision will be shortened, and the retina brought nearer to the crystalline lens; consequently, the eye will be better fitted for seeing objects at a distance. In birds, there is placed at the posterior part of the eye, a muscular process, called by HALLER, pecten avium, by others, marsupium: this answers the same purposes as these processes, the arrangement of its fibres only differing. In the chameleon, and also in many fishes, a similar structure is found, calculated to produce the same effects; and probably something of the same nature may be seen in the eyes of many other animals, which has hitherto escaped observation.

As it is impossible for language to convey a just idea of the relative situation of these processes, I have subjoined sketches, shewing them in three different points of view: the parts represented are of the natural size.

Plate X. Fig. 1, Represents a longitudinal section of the globe of the eye; the vitreous humor is removed, and the choroid coat detached and brought forward: a bristle is introduced between the two processes and the sclerotic coat.

Fig. 2, Represents the internal and posterior portion of the sclerotic coat; the foramen for the passage of the optic nerve in the centre; and the four processes arising at equal distances from it.

Fig. 3, Represents an outside view of the processes, losing themselves in the choroid coat: portions of folded paper are placed under each, to render them more distinct.

Fig. 4. A portion of the jejunum inverted, to shew the foldings of its internal membrane.

Fig. 1.

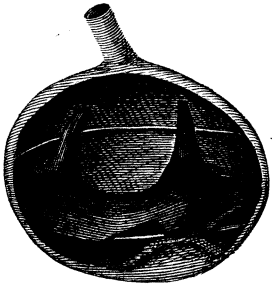

Fig. 2.

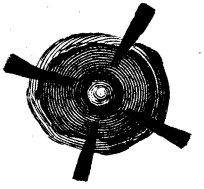

Fig. 3.

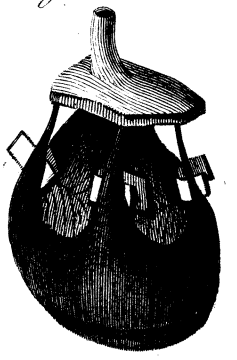

Fig. 4.