A Vermiform Appendix in the Domestic Cat.

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The appearance of the vermiform appendix seems to be associated with the enlargement of the caecum which is found in animals that live on a vegetal diet. In flesh-eating animals the appendix does not appear. The rabbit, whose diet is herbivorous, has a large caecum and an appendix. In man a medium sized appendix is present.

The purpose of this paper is to describe the apparently very rare occurrence of a vermiform appendix in the domestic cat. Standard reference works on the anatomy of the cat such as Davidson and Stromsen and Reighard and Jennings state that the appendix is absent in the cat, and cite no exceptions to this rule.

The material discussed was found during dissection in one of the classes in the Zoological Laboratories at Dalhousie University.

During embryonic development of man in the posterior half of the intestinal loop in the 7.5 mm. embryo there is an abrupt enlargement of the entodermal tube which marks the junction of the large and small intestines. This enlargement takes place wholly from the ventral side of the tube. The lumen of the large intestine extends slightly forward into the ventral swelling, forming a shallow blind pouch. This structure is considered to be the beginning of the caecum. The distal end of the caecum early lags in development and in the 65 mm. embryo the distal end is easily distinguished from the rest of the caecal pouch by its difference in diameter and is termed the vermiform appendix. The appendix is relatively long in the embryo and relatively short in the adult.

In the cat there is normally no appendix and embryonic stages fail to indicate any.

The specimen under discussion exhibits an apparently true vermiform appendix forming a tubular projection on the distal end of the caecum. It is 15mm. long and 3.5 mm. in

diameter at its widest point tapering slightly at its distal end. There is a distinct lumen which extends throughout its entire length. The wall of the appendix is 2.5 mm. in thickness. The appendix receives its blood supply from the vessels that supply the caecum, namely the *arteria iliocolica* and the *vena iliocolica*.

The wall of the appendix is found when sectioned to be made up of several layers which are roughly comparable to those which make up the wall of the digestive tract.

There is on the outside a thin serosa underlying which is the muscular coat consisting of a peripheral longitudinal muscle layer and a more mesial circular muscle layer. The longitudinal muscle layer is 40μ in thickness. The circular muscle coat is 110μ in thickness and consists of spindleshaped involuntary muscle cells with greatly elongated nuclei.

Beneath the muscular coat there is a wide region of densely nucleated diffuse lymphatic nodules. These form a broken ring of this tissue, occupying the larger part of the sub-mucosa which is reduced to a thin peripheral layer beneath the muscles through which a large number of blood vessels run. A thin layer, the muscularis mucosa, separates the mucosa from the lymphoid tissue.

The mucosa, which is approximately 380μ in thickness, is invaded by numerous glands which are similar to those in the mucous coat of the colon and probably arise in the same way, that is by the growing together of the villus-like projections of the surface of the mucosa.

The walls of the appendix and colon when compared are found to be similar except that the lymphoid tissue present in the appendix is absent in the colon and that the glands of the appendix are more rounded and consequently shorter in the appendix than in the colon.

When the wall of the appendix of man and that of the cat are compared the most striking difference is in the sub-mucosa. In man the lymphoid tissue forms definite rounded nodules which are disseparate and are embeded in the submucosa.

From the point of view of comparative anatomy the appearance in man, anthropoid apes, and a few other forms, of

that vestigial organ, the vermiform appendix, is of high interest. In man it is not only apparently useless but is often the site of serious morbid changes.

As has been stated there is a marked correlation evident between the appendix and the caecum and between the caecum and diet. In carnivores where great reduction of the caecum has occurred the appendix has been stated to be absent.

According to the observations of Dexter on the cat, in stages earlier than the 24 mm. embryo certain portions of the digestive trace are extralimital to the abdominal cavity and are developed in the cavity of the umbilical cord which is continuous with the body coelom. The explanation of this fact is that at this stage in development the liver is of enormous size, and practically fills the body cavity, thus forcing the intestine to develop outside the coelom and in the cavity of the umbilical cord. After the 38 mm. stage these parts of the intestine leave the cavity of the umbilical cord and enter the coelom. This entrance takes place in a regular and definite order. It is of interest here to state that in the cat the caecum enters the body coelom early and in man it is the last part of the intestine to enter. This difference in the order of the entrance of the intestine is explicable, since in man the transverse colon is ventral to the small intestines and in the cat it is dorsal to them.

Whether or not the earlier migration of the caecum into the body cavity is a causal factor in the reduction of this organ and the absence of the appendix is not clear.

In the preparation of this paper I am greatly indebted to Professor James Nelson Gowanloch for his assistance and kindly criticism.

LITERATURE.

Dexter, Franklin. 1900: Additional Observations on the MORPHOLOGY of the Digestive Tract of the Cat. The Journal of the Boston Society of Medical Sciences, Vol. 4.

Keibal and Mall. 1912: *Manual of Human Embryology.* Philadelphia and London.

Reighard and Jennings. 1901: *Anatomy of the Cat.* New York.

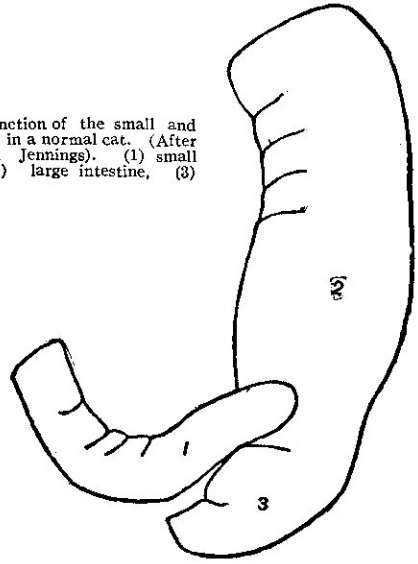

Fig. 1. Junction of the small and large intestine in a normal cat. (After Reighard and Jennings). (1) small intestine, (2) large intestine, (3) caecum.

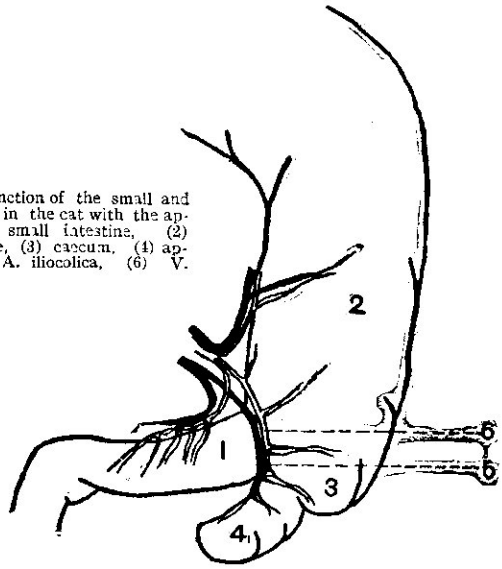

Fig. 2. Junction of the small and large intesting in the cat with the appendix. (1) small intestine, (2) large intestine, (3) caecum, (4) appendix, (5) A. iliocolica, (6) V. iliocolica.

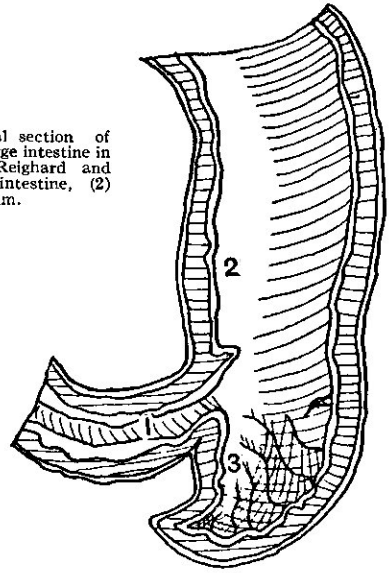

Fig. 3. Longitudinal section of junction of small and large intestine in normal cat. (After Reighard and Jennings). (1) small intestine, (2) large intestine, (3) caecum.

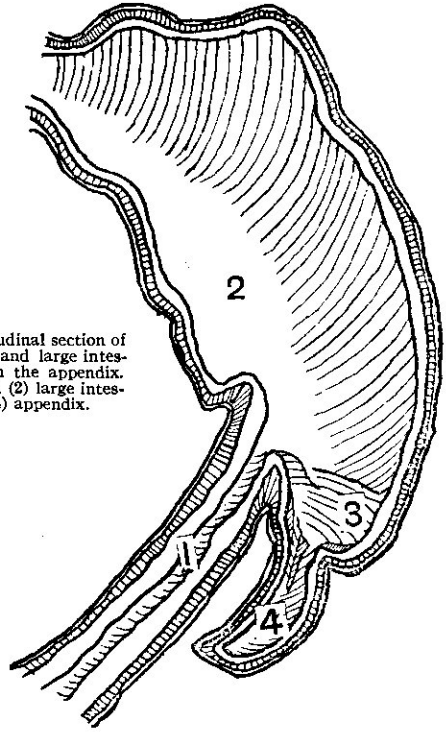

Fig. 4. Longitudinal section of junction of small and large intestine in the cat with the appendix. (1) small intestine, (2) large intestine (2) caecum, (4) appendix.

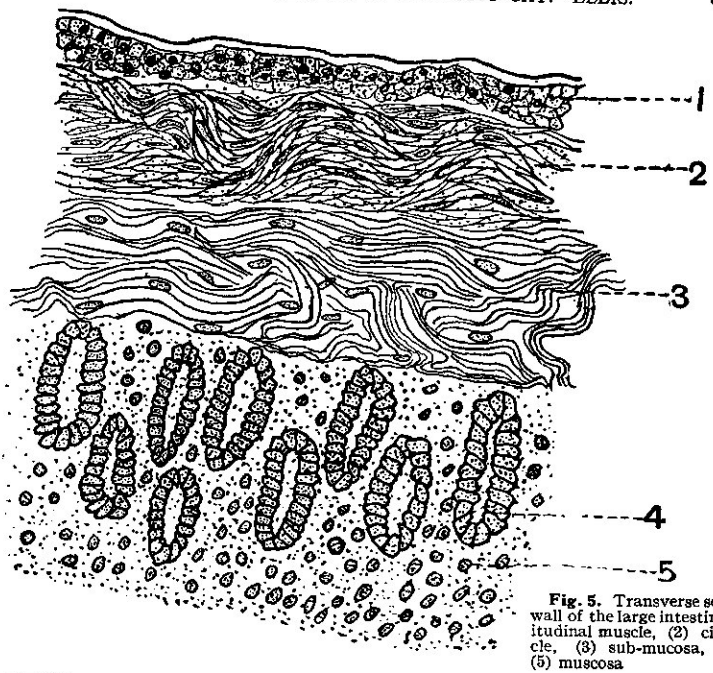

Fig. 5. Transverse section of the wall of the large intestine. (1) longitudinal muscle, (2) circular muscle, (3) sub-mucosa, (4) gland, (5) muscosa

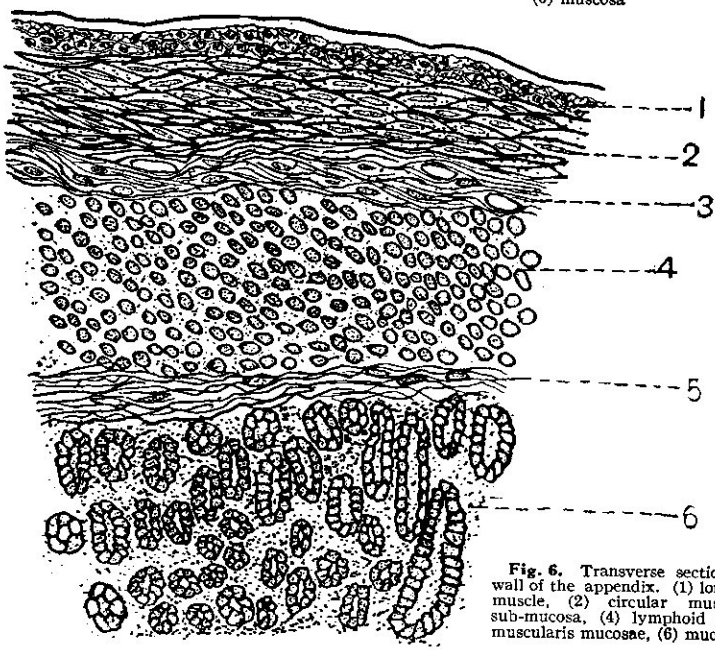

Fig. 6. Transverse section of the wall of the appendix. (1) longitudinal muscle, (2) circular muscle, (3) sub-mucosa, (4) lymphoid tissue, (5) muscularis mucosae, (6) mucosa.