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Habitat of *Giardia* in the Intestine.

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Authorities on intestinal protozoa (Hegner,¹ Wenyon,² Lynch³) state that *Giardia* lives in the upper part of the small intestine, mainly in the duodenum rather than in the cecum which is a common habitat for *Trichomonas* and *Chilomastix*. Hegner⁴ has described *Giardia canis* as the species present in the dog, but has not recorded the level of the intestine in which this organism has been found. In connection with our Tulane Strain A of *Endamoeba histolytica* in dogs we have encountered *Giardia canis* as a contamination. In maintaining the ameba *in vivo* by continuously subinoculating one dog from another *per rectum* (Faust), we have had an opportunity to study in life and at autopsy dogs which have received the *Giardia* as an experimental infection. These observations we have compared with data obtained from naturally infected dogs.

In the majority of our cases harboring a natural *Giardia* infection the primary seat of the organism is in the cecum and appendix; frequently it is also in the colon and the rectum; occasionally it is found in the distal 10 cm. of the ileum; it has never been seen by us in the higher levels of the small intestine. In experimental infections of our dogs, previously found by repeated fecal examination to be negative for intestinal protozoa, we have encountered a somewhat different situation. The active *Giardia* trophozoites were in-

¹ Hegner, R. W., *Animal Parasitology*, by Hegner, Root and Augustine, 1929, 119.

² Wenyon, C. M., *Protozool.*, 1926, 1, 702.

³ Lynch, K. M., *Protozoan Parasitism of the Alimentary Tract*, 1930, 187.

⁴ Hegner, R. W., *Am. J. Hyg.*, 1922, 2, 448.

roduced by rectal tube into the upper levels of the large bowel and usually expelled there. In some cases the tube passed the ileo-cecal valve and the inoculum was discharged anterior to the valve. In nearly 50 cases available for analysis an infection of 100% has been obtained. In most of the animals the active *Giardias* were consistently present in the feces from the second day; in 4 instances they

TABLE I.
Autopsy findings in dogs previously negative for intestinal protozoa, experimentally infected with *Giardia canis*.

Dog No.	Incubation period	Death in days after inoculation	Motile <i>Giardias</i> found in							
			rectum	colon	cecum	appendix	post. ileum	ant. ileum	jejunum	duodenum
1	2 days	14 days	+	+	++	++	++	++	-	+
2	2 "	14 "	+	+	++	++	++	+	-	-
3	2 "	32 "	++	++	++	++	++	-	-	-
4	1 "	55 "	+	+	+	+	+	-	-	-
5	1 "	27 "	+	-	+	+	++	+	+	+
6	1 "	18 "	+	-	++	+	++	+	+	+
7	3 "	50 "	++	-	++	++	+	-	-	-
8	2 "	20 "	++	+	++	++	-	-	-	-
9	3 "	17 "	+	++	++	++	+	-	-	-
10	1 "	15 "	-	+	++	+	+	-	-	-
11	7 "	21 "	+	-	+	+	+	-	-	-

were recorded as early as 24 hours after inoculation. In 11 of these cases autopsies were performed immediately *post mortem*, while the animals were still warm. The autopsy findings are recorded in Table I.

The data demonstrate the preponderance of foci in the cecum, appendix and rectum. However, in 7 cases the organisms were found in the lower ileum; in 3 cases in the upper ileum, in one case in the jejunum, and twice in the duodenum. In the 2 instances in which colonies were found in the duodenum (in one case in and around the ampulla of Vater) we may conclude that the organisms migrated to this level against the peristaltic waves of the intestine, since only trophozoites were passed in the stools, thus eliminating the possibility of oral infection from ingestion of cysts.

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Effect of Carbon Dioxide on Ether Anesthesia.

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In anesthesia, more especially where there is any significant amount of rebreathing, it is evident that the patient is inhaling a gas mixture containing considerable amounts of CO_2 . As was established long ago and as has again been shown by Leake and Waters,¹ 30 to 40% of CO_2 has distinct anesthetic properties. It, therefore, seems possible that in anesthesia where the patient is breathing fairly high percentages of CO_2 , this gas may be acting synergistically or additively with the anesthetic given, and exerting an appreciable anesthetic action. It also seems reasonable that if such be the case, CO_2 might be administered simultaneously with other anesthetics with the object not only of stimulating the respiration but also to act as an adjuvant to them.

To test these views we have studied the effect of CO_2 on ether anesthesia in some 50 experiments on 11 full grown white rats with the following results:

Moderately deep anesthesia* almost invariably resulted from the

¹ Leake, C. D., and Waters, R. M., *Anesthesia and Analgesia*, Feb., 1929, 8, 17.

* The criterion for depth of anesthesia was the response in the fore legs and the neck to stimulation of the hind legs by alternating current with secondary coil at different distances. Response to the stimulation by squealing was also used but found to be very irregular and consequently less reliable.