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Migration Route of *Spirocerca Sanguinolenta* in its Definitive Host.

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Five years ago the writer found larval nematodes encysted on the mesentery of the hedgehog, *Erinaceus dealbatus*, secured in the vicinity of Peking. On morphological grounds Schwartz¹ determined these larvae to be *Spirocerca sanguinolenta*. Subsequent examination of specimens of this host revealed the fact that it was commonly infected with these larvae, encysted in the mesentery, in the omentum, and on the peritoneal wall of the stomach. Since living material was readily obtained during the entire year, an opportunity was offered to further study this problem. The dogs and cats used in the experimental series were born and reared in the laboratory. Although the cat is not a natural host of the infection, it has been found to be an appropriate one for experimental work and has proved to be as satisfactory in all respects as the dog.†

Mesentery and omentum containing the encapsulated larvae were fed to the animals immediately after the removal of these tissues from anesthetized hedgehogs. A half hour to an hour after feeding, the experimental host invariably attempted to vomit the meal. In the vomitus were active excysted and excysting larvae, the delicate adventitious capsule having been digested off almost immediately after coming in contact with the gastric juice. The vomitus was refed, the mouth was tied and digestion proceeded during forced retention. The animals were autopsied from 2 hours to 6 months after the feeding as indicated in Table I. After exposing the abdominal and thoracic viscera from its ventral aspect, the stomach was tied off from the esophagus and the duodenum, and the following vessels clamped:

* Contribution No. 90.

† Rabbits have been found to be inappropriate hosts.

subclavian vein, and the pulmonary veins. The entire viscera were then removed, the several portions of the venous circulation separated from one another, and immediately irrigated with citrated saline. The stomach and esophagus were then opened along the midventral aspect, contents removed, and the walls carefully searched for lesions or larvae.

The lungs, heart, and aorta with adjacent arteries were then examined for lesions or worms. Within the period of observation, worms were recovered successively from the lumen of the stomach (2-5 hrs.), the stomach wall (3-7 hrs.), the gastro-epiploic veins (7-48 hrs.), the main portal veins (7-48 hrs.), the right heart and lungs (24 hrs. to 4 days), the left heart (7-14 days), the arch of the aorta (4 days to 6 months), the thoracic aorta (7 days to 6 months), the abdominal aorta (14-30 days), the gastric arteries (14-43 days), and the splenic and anterior mesenteric arteries (14 days). Although no worms were recovered from the carotid or subclavian arteries, in four kittens and two dogs paralysis of the hind legs,[‡] beginning about the fifth day and continuing until autopsy, suggested that the spinal arteries had been blocked by larvae. Petechial lesions were prominent in the stomach wall from the second to the seventh hour after feeding (*i. e.*, during the period of migration of the larvae through the wall) but disappeared soon afterward. Lesions were commonly found in the arterial system wherever worms had lodged and penetrated. In no other part of the viscera were *Spirocerca* larvae ever recovered, nor were lesions ever found except those indicated.

Analysis of the data indicates that none of the larvae excyst in the esophagus and that not even the excysted larvae in the vomitus become attached to or penetrate the esophageal mucosa. The evidence accumulated in this experimental work is overwhelmingly opposed to the theory that the larvae penetrate directly from the lumen into the wall of the esophagus. At the same time, it constitutes positive proof that the route of migration through the stomach wall into the portal system and thence through the capillaries of the lungs into the arterial system is the usual one, and that the primary lesion is developed in the wall of the arterial system. The preponderance of lesions along the arch and the thoracic aorta in the experimental series, and in the corresponding region of the esophagus in natural infections suggests that some of the immature larvae migrate from the primary foci outward to the esophageal wall, finding there a favorable habitat in which to mature, mate,

[‡] This condition was observed by Manson² in naturally infected dogs.

and produce embryonated eggs. These reach the lumen of the intestine only when an opening into the lumen is later developed. This is the only known means by which the eggs may reach the outside world and continue their development. This phase of the life cycle of *Spirocerca sanguinolenta* within its definite host is strikingly different from that of all other nematodes for which this part of the life cycle is known.

¹ Schwartz, B., *Proc. U. S. Nat. Museum*, 1926, lxviii, 5.

² Manson, P., *China Customs Med. Reports*, 1877, xiii, 24.

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Specific Dynamic Action of Food and Blood Coagulability.

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There occurs a marked shortening of the blood clotting time during the absorption of mixed meals. We have found this to be due only to the protein fraction of the foods, and to be intimately associated in time and degree with the specific dynamic action of this type of foodstuff.* Pure carbohydrate or fat meals produce little or no change in either the blood coagulability or basal metabolism. Glycocoll taken *per os* causes the same changes as does a protein meal. Strenuous exercise acts similarly.

The increased coagulability of the blood is evident in plasma divested of all platelets, but is more striking when platelets are present. We believe the change to be an increased reactivity of the clotting factors in both platelets and plasma, probably correlated with the greater cellular activity occurring throughout the body, which constitutes one part of the specific dynamic action of proteins.

The important clinical application of these facts lies in their relation to thrombosis—post operative, post partum, and following such inflammatory diseases as pneumonia, typhoid fever, etc. In all these conditions the tendency to thrombosis appears during convalescence, usually shortly after the patient has begun to partake of a full diet. Also during this convalescent stage the blood platelets are considerably increased in number, so that the coagulative phase

* Full details of the work will appear in the *Chinese Journal of Physiology*.