A PRELIMINARY REPORT ON A SURVEY OF ANIMAL PARASITES OF CANTON, CHINA, RATS[1]

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The relation between certain parasitic infections of man and those of rats has been well established. Rats may transmit diseases to man not only through intermediate hosts, but also by contaminating food, lodgings, etc. The fact that they are also reservoir hosts of many important parasites of both domestic animals and man adds to the importance of a careful and thorough study of the parasites found in them. Among the more well known parasites in man which have also been reported in rats are *Hymenolepis nana* Siebold, *Clonorchis sinensis* Cobbold (Dollfus, 1925; Wu, 1930), *Schistosoma japonicum,* Katsurada, (Dollfus, 1925; Wu, 1930), *Enterobius vermicularis* Linn. (Wu, 1930), *Trichinella spiralis* Owen, etc., to say nothing of some of their ectoparasites which may carry the horrible plague to man.

A survey of literature on the investigations of rat parasites in China reveals only a few scattered records, namely, Fawcett's (1929) and Minnet's (1930) study on rat fleas in Hongkong, Hick's (1927) survey of Shanghai rat fleas, Hertig and Huang's (1929) study on Peiping fleas, and Wu's (1930) study of rat parasites found in Soochow. Among them, Wu's study is the only one that covers a general field, but his work does not extend to any place outside of the Soochow area.

So little, then, is being done on the rat parasites in China, and especially in Canton and vicinity, and so ideally is it located as a sub-tropical city, that the findings of animal parasites in the rat ought to furnish a key to some of the problems in veterinary medicine as well as in public health in this region and probably in the southern part of the country at large. It is for this reason that the study was undertaken, although we have always borne in mind the fact that a knowledge of animal parasites in any given locality furnishes an indispensable tool to many other problems which will inevitably arise.

The study was started in collaboration with Dr. W. A. Riley, the Chief of the Division of Entomology, University of Minnesota, Minneapolis, U. S. A., who was with us during the academic year,

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1931-32. The writer wishes to take this opportunity to express his thanks for the many valuable suggestions and encouragement during the study.

The Rats

The rats were trapped from the campus and villages near by, and a total of 84 were secured for examinations during the survey, which extended over a period from October of 1931 to November of 1932. Two species were involved in the examinations, namely, *Mus rattus* Linn. and *M. norvegicus* Erxleben, the proportion being about 9 to 4; some of them were not identified to species at the beginning of the survey.

Ectoparasites

The rat in each trap was placed in a closed cloth bag, and chloroformed. The escaped ectoparasites were found either attached to the inside of the bag or still on the body of the chloroformed host. These were picked up or combed from the hair and preserved in alcohol. A preliminary report of the examinations of the ectoparasites has already been published (Riley and Chen, 1932a).

Of the total catch there were 129 mites, 6 lice, 2 undetermined pupae of Diptera, 7 undetermined ticks, and one undetermined small Hemipteron. The mites were of 2 different species, namely, *Echinolaelaps echidninus* and *Dermanyssus* sp. The six lice were the cosmopolitan *Polyplax spinulosa*. The pupae of the Diptera and the small Hemipterous nymph might have been accidentally found attached to the hairs of the rats. The Hemipteron was in a late nymphal stage. The ticks were undoubtedly parasites of the rats, as their anterior ends were found burrowed deep in the skin. In fact any attempt to pull the parasites would result in getting incomplete specimens. The total catch of the fleas was 264, of which 120 were *Xenopsylla cheopis* Rothschild, 116 *Leptopsylla segnis* and 28 *Ceratophyllus* sp.

The preliminary report has already pointed out the potential danger of *Xenopsylla cheopis*, which is the most efficient carrier of bubonic plague, of which there have been devastating outbreaks in Canton. The outbreaks of the plague were definitely recorded by Rennie (1894), and the numerous subsequent outbreaks are probably still fresh in the minds of some of the Cantonese. Some records earlier than that of Rennie undoubtedly pointed to the existence of the epidemic in this region. The findings of the great number of this species of fleas in Canton rats in the present survey plus sporadic outbreaks of the plague in other regions of the country give us sufficient warning that potential danger of bubonic plague in Canton is not removed, although no cases have been reported for this region since 1924.

Leptopsylla segnis rarely attacks man, but experimental work of various workers indicates, however, that it may play a role in the maintenance of the disease among rodents. *Ceratophyllus* readily attacks man, as pointed out in our previous paper, and it not only carries the disease from rat to rat, but it also infects man.

We might call attention to the fact that the result of our present survey shows a comparatively low flea population in rats in Canton. We might also add that practically all fleas which infested the rats examined were carefully collected, and the chance of overlooking an appreciable number of them was reduced to a minimum.

Endoparasites

Protozoa.—No effort was made to discover protozoan parasites in the digestive tract during the examinations. The blood, however, was examined regularly for blood parasites. Of all the 84 rats examined four were found to be positive for *Trypanosoma lewisi.*

Trematoda.—The population of flukes in rats is apparently very rare. After long search only 11 individuals were recovered representing five different species. A single specimen of *Paragonimus* sp. was recovered in the lungs of two rats. Both of them are in immature stages, being recovered from the lungs after they were teased apart in water. A single individual of *Clonorchis sinensis* was recovered in the intestine of one rat. This well-known fluke shows all the important characteristics of the species, except that it is somewhat smaller, measuring only 8.5 mm. in length and less than 2 mm. in its greatest width. Two specimens of *Echinochasmus* sp. were found, and five other members of the family *Echinostomatidae* were found in three other rats. A single specimen of an undetermined fluke was recovered from the intestine of one rat.

Cestoda.—Five different species of tapeworms were found, one of which was a cystic stage very common in the liver of rats. This is the well-known *Taenia crassicollis* Rud., the adult of which is passed in the cat. The liver of the rat, when infected, was usually filled with these creamy-colored cysts usually protruding on the surface of the organ. Thirty-five rats were found so infected.

Four adult forms were found in the intestine, namely *Hymenolepis nana, H. diminuta* Rud., *Raillietina garrisoni* Tubangui, *R.* sp. For some reason the collections of these parasites were not all preserved; although 24 of the 84 rats were found to have tapeworms, material from only 18 rats was on hand for examination. The distribution of the eighteen positive findings is as follows: 1 *H.*

diminuta, 5 *H. nana*, 4 *Raillietina garrisoni*, and 8 *R.* sp. Tapeworms from one of the rats were too young for identification, but from the structure of scolex and type and number of hooks we believe that they may be a species of *Raillietina*.

Nematoda.—Nematodes play a very important role in the parasitic infections of the rat, not only in the number of species represented, but also in the varieties of places in which they were found. The latter were represented in the bronchus, liver, stomach, throughout the intestine, caecum, and urinary bladder.

Nine species were represented, far more species being found in the digestive tract than anywhere else. These nine species were, in the order of their abundance, *Nippostrongylus muris* Yokogawa in the intestine, *Trichosomoides crassicauda* Bellingham in the urinary bladder, nematodes of the sub-family *Metastrongylinae* in the bronchi, *Hepaticola hepatica* Bancroft in the liver, *Syphacea obvelata* Rud. in the caecum, *Protospirura muricola* Geddelst in the stomach, *Heterakis spumosa* Schneider, *Rictularia* sp., and a member of *Strongylinae* in the intestine. There was only one rat found positive for each of the last four named parasites.

Nippostrongylus muris was usually in great abundance, and was found especially in the upper part of the intestine. Nineteen rats showed positive examinations. *Trichosomoides crassicauda* was found in 10 rats, while nematodes belonging to the sub-family *Metastrongylinae* were present in eight rats. With the absence of suitable literature, we are not able at present to determine these nematodes, but hope to be able to publish their specific names when identified. *Hepaticola hepatica* could be recognized easily by the presence of brownish spotty appearances on the surface of the liver, which is due to the presence of eggs deposited by the adults which live inside of the liver. There was only a single specimen of a female *Strongylid* found. Since the identification of these worms depends a great deal on the male characteristics, no attempt has been made to get the specific identity. Apparently worms belonging to this family have never been reported in rats, and it will be of great interest if more specimens of this species can be obtained in the future.

Two females of *Rictularia* sp. were recovered from the intestine of one rat. The general characteristics fit into the description of *R. whartoni* Tubangui, very well (Tubangui, 1931) except that the ventro-lateral flanges were apparently absent. Hoeppli has described a new species from Amoy, which he called *R. tani*.[1] Since his description of that new species is not at present available to us, we would rather refrain from specifying the two individuals

[1] Zbl. Bakt., Bd. CX, IAbt., Originale, pp. 75-78, 1929.

which we found, but we would not be surprised if this species is the same as either Tubangui's or Hoeppli's.

An attempt to find *Trichinella spiralis* Owen in the rats has been constantly borne in mind during the survey of the rat parasites, and of not a single one have we missed examining the muscles, especially the diaphragm. Our preliminary report of the findings has already been published in an earlier number of this journal (Riley and Chen, 1932b). All the examinations persistently show negative results. These together with the negative results in the examinations of samples from 313 pigs from one of the Canton Municipal Slaughter Houses confirm the earlier work of other investigators that Trichina is very rare in China.

Acanthocephala.—Moniliformis moniliformis Bremser was found in two instances. In one there was only one worm found, while in the other the infection was massive.

Table I gives a bird's eye view of the species of hosts in which the parasites were found.

Discussion.—Among the parasites listed at least four species were found to be new in the rat hosts, namely, *Paragonimus* sp. *Metastrongylid, Strongylid* and an undetermined fluke. A review of the more recent literature of the rat parasites shows that Wu (1930) has not reported them in Soochow rats, Tubangui (1931) did not record the findings of these parasites in rats of the Philippine Islands. The compiled work of Oldham (1931) which gives an excellent summary of work on rat parasites in different parts of the world up to date has not revealed the findings of these parasites in any of the earlier works.

The finding of *Paragonimus* in rats is especially interesting. It immediately raises the following questions: (1) Is *Paragonimus* in rat an accidental parasite? (2) Is *Paragonimus* in rat the same species as that which is found in higher animals? (3) Can immature forms of *Paragonimus* be frequently found in lungs of rats, or of other animals? These questions can be answered only by further morphological study of specimens, and experimental work. We do not attempt to answer them at the present time.

The findings of these four members constitute a unique record for the helminths of rats in this region. As soon as the identity is made, we shall make known their names.

The work of Wu and Tubangui is quite comparable to our present survey, especially for the reason that the work has all been done in the East. Canton being located in the subtropical region, the comparison ought to give a very interesting picture of the fauna found between this city, and Soochow and the Philippines, the latter two places can be reached from Canton in about two days.

TABLE 1

Showing rat host with its parasites

Total 84	**Mus** (unidentified) 29	**Mus Norvegicus** 17	**Mus rattus** 38		
4	4			T. lewisi	PROTOZOA
2		1	1	Paragonimus sp.	TREMATODES
1		1		C. sinensis	
2			2	Echinochasmus	
5	1		4	Echinostomatidae	
1			1	Undetermined	
35	10	10	15	T. crassicollis	CESTODES
1	1			H. diminuta	
4		2	2	H. nana	
4	2	2		Raillietina garrisoni	
10	5	1	4	Raillietina (?)	
20	1	10	9	Nippostrongylus muris	NEMATODES
1	1			Heterakis spumosa	
2	1		1	Syphacia obvelata	
6	1	1	4	Hepaticola hepatica	
10	4	6		Trichosomoides crassicauda	
1			1	Rictularia sp.	
9	2	6	1	Metastrongylinae	
1			1	Strongylinae	
1			1	Protospirura muricola	
2	1	1		Moniliformis moniliformis	ACANTHOCEPHALA
120	120			Xenopsylla cheopis	FLEAS
116	116			Leptosylla segnis	
28	28			Ceratophyllus sp.	
129	22	92	15	Echinolaelaps echidninus and Dermanyssus sp.	MITES
7		5	2	Undetermined	TICKS
6	1	3	2	Polyplax Spinulosa	LICE
2		2		Pupae	DIPTERA
1			1	Nymph	HEMIPTERA

TABLE 2

A comparison of helminths of rats (M. rattus and M. norvegius) in three different localities

Name of Parasite	Soochow (Wu)	Philippines, (Tubangui)	Canton (Present Survey)
Protozoa Trypanosoma lewisi	8.4		4.76
Taematoda			
Euparyphium ilocanum		0.5	
Euparyphium guerreroi		0.1	
Euparyphium murinum		0.1	
Clonorchis sinensis	5.2		1.19
Echinostoma macrorchis	3.2		
Echinochasmus sp.			1.19
Schistosoma japonicum	0.4		
Notocotylus sp.	0.8		
Paragonimus sp.			2.38
Echinostomatidae			3.57
Undetermined			1.19
Cestoda			
Taenia crassicollis	44.8	94.0	41.65
Raillietina garrisoni		86.0	11.9
Hymenolepis diminuta	16.8	64.0	1.19
Hymenolepis nana	6.0	1.7	4.76
R. sp.			7.14
Nematoda			
Gongylonema neoplasticum		44.0	
Hepaticola hepatica	30.4	90.0	7.14
Heterakis spumosa		0.4	1.19
Nippostrongylus muris		58.0	23.80
Protospirura muricola		1.3	1.19
Rictularia whartoni		0.4	
Rictuloria sp.			1.19
Strongyloides ratti		74	
Trichosomoides crassicauda		57	11.9
Enterobius vermicularis	2.0		
Heligmosomum muris	0.4		
Syphacea obvelata			2.38
Metastrongylinae			10.71
Strongylinae			1.19
Acanthocephala			
Moniliformis moniliformis		4.2	2.38

From table 2 we notice that the comparison is not based on the species of rat, but the combination of the two species, *Mus rattus*, and *M. norvegicus*. Tubangui (1931), as we know, worked on only the worm parasites of *M. norvegicus* alone., while Wu (1930) considers both the protozoa and the helminths of both species of rats, the ectoparasites not being studied from quantitative standpoint. Such comparison is then necessarily limited to worm parasites of *Mus norvegicus* particularly.

The three species of *Euparyphium* reported in the Philippines were not found in our Chinese survey. Those flukes which Wu and the present survey reported were entirely absent in all the 950 rats which Tubangui examined. It is without question that the fluke population is low in rats at least in all these three surveys. As seen from Table I, there was often only one specimen available for each species.

The tapeworm infections are practically the same, although the percentage varies somewhat. Two things are worth noting: (1) The low incidence of *Hymenolepis diminuta* in the present survey and (2) the entire absence of *Raillietina* in the Soochow investigation.

In nematodes we note the scanty number of species reported in Soochow rats, and that certain species which are reported in the present survey are not found in the Philippine rats. There is only one species, *Hepaticola hepatica*, that is common to the three regions, but the incidence of infection is apparently very different. There is also a high incidence of *Trichosomoides crassicauda* infection in the Philippines, and it is less common in the Canton rats. *Strongyloides ratti* is apparently not found in the Chinese rats.

While the number of species in Protozoa, Trematodes and Cestodes in the three surveys vary considerably, the number of species of Nematodes is surely more surprisingly different, especially between Soochow and Canton. In the present survey we found nine different species, while Wu found only three, two of which, *Enterobius vermicularis* and *Heligmosomum muris*, are not reported in this paper. In other words we have here eight species of nematodes not represented in Central China.

In short, although only a small number of rats were examined in the present survey the comparison tends to show that the number of species of parasites found in the Canton rats, is much greater, while the number in each species is apparently very much lower. This peculiar situation seems hard to explain, especially when we consider that the rats obtained for examination by Wu were from different sources, such as restaurants, houses, etc., and

that those obtained by Tubangui "were trapped in the different sections of the city of Manila." Our own rats, as we stated in the beginning of this paper, were obtained from the University campus and villages near by. Of course we must bear in mind that Tubangui's examinations were limited to one species only.

It might be of interest to mention that the maximum multiple infection of all the rats examined in the present survey contained five different kinds of worm parasites at the same time, namely, *Taenia crassicollis, Trichosomoides crassicauda, Hepaticola hepatica, Metastrongylid,* and *Syphacia obvelata,* the infection having involved four different organs, namely, liver, lungs, urinary bladder, and caecum. And then many contained four different kinds of infection at one time.

Of the helminths found in the rats during the present survey at least seven species are or have been recorded as parasites in man:

1. *Moniliformis moniliformis*—Human infections have been reported from Italy, the Sudan, and British Honduras.

2. *Syphacea obvelata*—One human case has been reported from an American child in the Philippines.

3. *Hepaticola hepatica*—One case has been reported from man, a British soldier in India.

4. *Hymenolepis nana*—Common in man.

5. *Hymenolepis diminuta*—Reported in India, Italy, U.S.A., Brazil, Argentina, Spain, etc.

6. *Paragonimus* sp.—Species closely related is common in man.

7. *Clonorchis sinensis*—Common in man in the Orient.

Summary

1. A survey of animal parasites of rats in Canton was made between October of 1931 and November of 1932, in which eighty-four rats were examined. Two common species were involved in these examinations namely, *Mus norvegicus* and *M. rattus.*

2. The total catch of the ectoparasites was 129 mites of *Echinolaelaps echidninus* and *Dermanyssus* sp., 6 lice of *Polyplax spinulosa,* 2 pupae of certain Diptera, a small nymph (Hemipteron), 7 undetermined ticks, 120 *Xenopsylla cheopis,* 116 *Leptopsylla segnis* and 28 *Ceratophyllus* sp.

(*a*) PROTOZOA: *Trypanosoma lewisi.*

(*b*) TREMATODA: *Paragonimus* sp., *Clonorchis sinensis*, members of *Echinostomatidae* including *Echinochasmus* sp. and one undetermined intestinal fluke.

(*c*) CESTODA: *Taenia crassicollis, Hymenolepis diminuta, H. nana, Raillietina garrisoni, Raillietina* sp.

(*d*) NEMATODA: *Nippostrongylus muris, Heterakis spumosa, Syphacea obvelata, Hepaticola hepatica, Trichosomoides crassicauda, Rictularia* sp., *Metastrongylid, Strongylid* and *Protospirura muricola. Moniliformis moniliformis* (Acanthocephala) was also found.

(*a*) A comparison between the parasitic fauna of three different regions in the East, namely, Soochow (Wu, 1930), the Philippines (Tubangui, 1931) and Canton, is made. The result shows that there are more species of parasites in the Canton rats than Soochow and the Philippines, but the incidence is much lower.

4. Those parasites found in the present survey which have been reported as parasites, accidental or otherwise, of man have been listed.

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UN NOUVEAU NEMATODE PULMONAIRE, *PULMONEMA CANTONENSIS*, N. G., N. SP. DES RATS DE CANTON

Par **H.-T. CHEN**

Au cours de recherches sur les parasites animaux des rats de Canton, nous avons trouvé, dans les bronches de deux espèces, *Mus rattus* et *M. norvegicus*, quelques nématodes filiformes appartenant à la sous-famille des *Metastrongylinæ* et non encore décrits. Cette découverte a été faite chez environ 11 pour cent du nombre total des rats examinés ; nous créerons pour ce ver le genre *Pulmonema*, avec pour type l'espèce *Pulmonema cantonensis*.

Pulmonema n. g.

Diagnose du genre : *Metastrongylinæ ;* ver allongé, sans capsule buccale ; bouche simple, entourée par des lèvres difficiles à voir, avec deux cercles de papilles ; œsophage légèrement élargi à l'extrémité postérieure. Bourse petite : le système ventral se divise à un tiers de distance pour former une côte ventro-ventrale et une plus grande latéro-ventrale ; l'externo-latérale et les autres latérales naissent d'un tronc commun ; la médio-latérale et la postéro-latérale sont fusionnées sur à peu près la moitié de leur longueur ; l'externo-dorsale est simple ; la côte dorsale est simple, courte et épaisse, se terminant en quelques courtes digitations ; pas de gubernaculum ; spicules longs et à peu près égaux ; vulve située dans la partie postérieure du corps ; extrémité caudale de la femelle terminée en corne.

Espèce type : *Pulmonema cantonensis*, n. sp.

A plusieurs égards, ce nouveau genre *Pulmonema* est étroitement apparenté au genre *Angiostrongylus* Kamensky 1905 et au genre *Bronchostrongylus* Cameron 1931. Ce dernier genre a été établi par Cameron en 1931 pour y placer *Bronchostrongylus subcrenatus*, qui avait été originairement décrit comme *Angiostrongylus subcrenatus*. Le nouveau genre est différent de ces deux précédents en ce qu'il possède des spicules plus longs et par la pré-

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sence de huit papilles additionnelles, dont deux en un groupe submédian, entourant les lèvres. En outre, dans *Pneumonema,* la vulve est située près de l'extrémité postérieure et il n'y a pas d'élargissement cuticulaire céphalique. Ces différences sont si nettes et si constantes qu'elles nous semblent justifier la création d'un nouveau genre pour l'espèce en question.

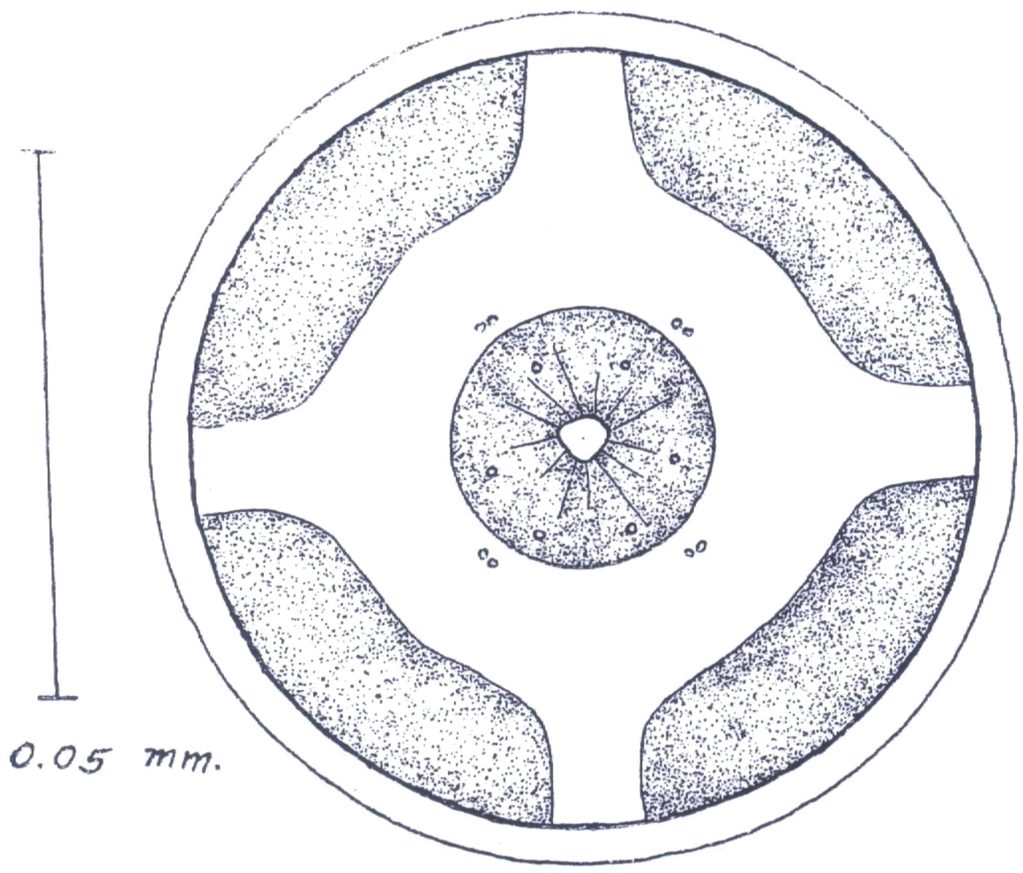


FIG. 1. — *Pulmonema cantonensis* n. g. n. sp. Bouche vue d'en haut.

Pulmonema cantonensis n. sp.

MORPHOLOGIE. — C'est un ver mince, filiforme, s'effilant insensiblement aux deux extrémités ; il mesure de 15 mm., 7 à 25 mm. de long et de 260 à 360 μ dans son plus grand diamètre. A l'état vivant, il est de couleur pâle ; la cuticule est lisse et peut montrer de légers épaississements annulaires à l'extrémité antérieure ou aux deux extrémités. La tête est simple et paraît posséder trois lèvres très difficiles à voir. La lèvre dorsale présente deux papilles submédianes et chacune des lèvres latérales, une submédiane et une latérale ; on a donc en tout un total de six papilles. Dans un spécimen, il a été rencontré en plus deux papilles latérales supplémentaires, mais les observations subséquentes sur d'autres individus n'ont pas confirmé leur présence. Outre les six papilles que nous venons de mentionner, il y en a huit autres sur le bord externe, près de la base des lèvres, groupées par deux suivant les quatre angles submédians, juste en dehors des lèvres (fig. 1). Il n'y

a pas de capsule buccale, la bouche s'ouvrant directement dans l'œsophage qui s'élargit légèrement avant d'atteindre l'intestin (fig. 2). La proportion des sexes est d'environ deux femelles pour un mâle.

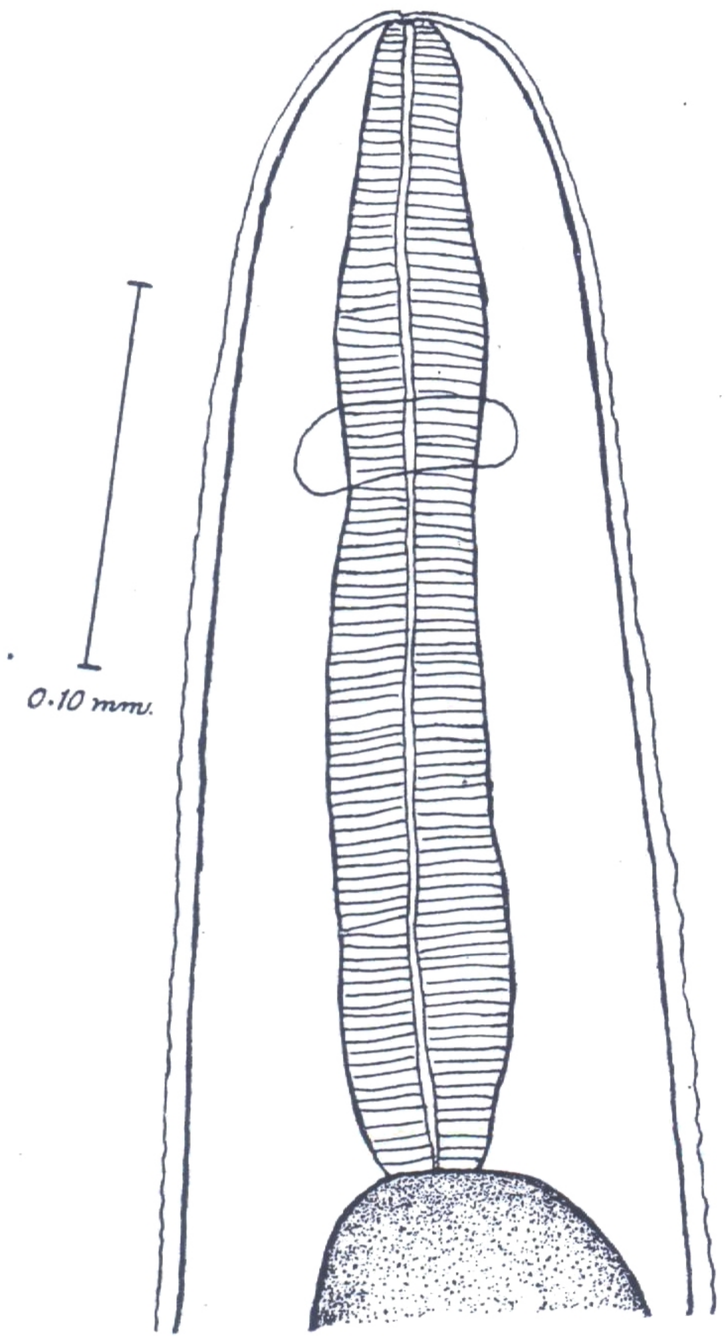


FIG. 2. — *Pulmonema cantonensis* n. g. n. sp. Extrémité antérieure.

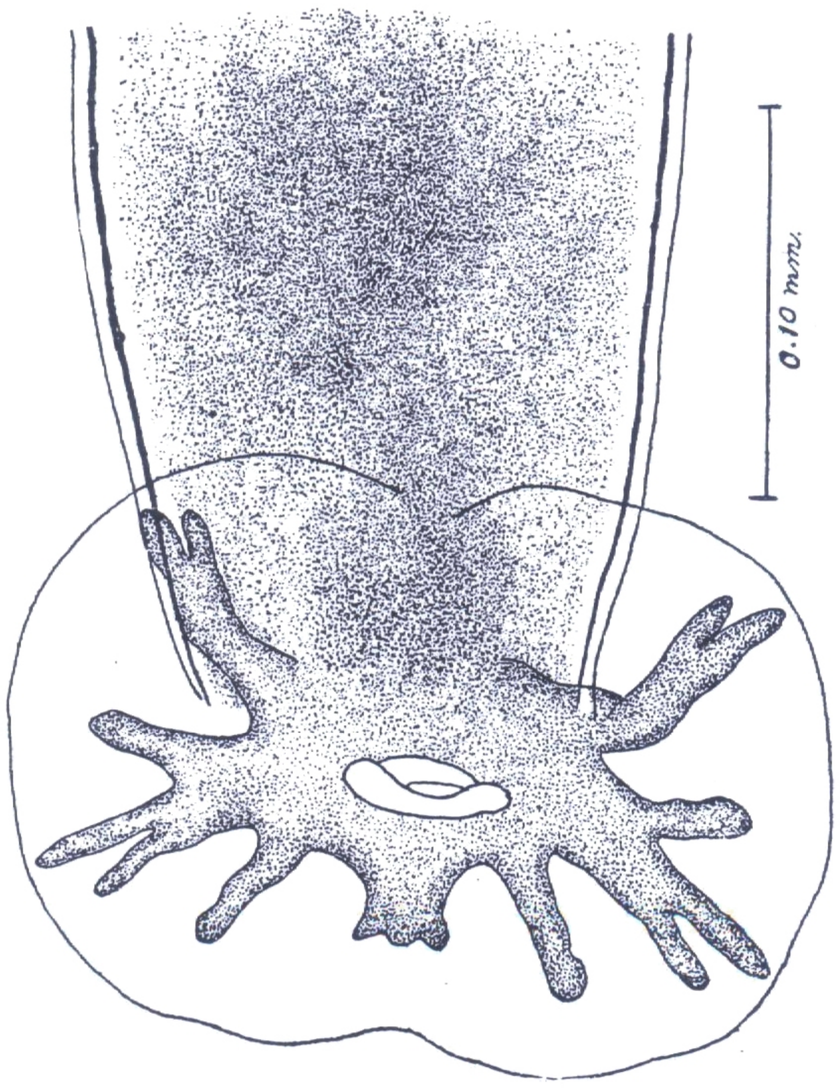


FIG. 3. — *Pulmonema cantonensis* n. g. n. sp. Bourse caudale.

Mâle : Le mâle mesure 18 mm. de long et 252 μ dans son plus grand diamètre. La mensuration de six vers a donné les résultats suivants :

	Longueur en millimètres	Diamètre maximun en μ
N° 1	19	288
N° 2	17	245
N° 3	18	250
N° 4	18,5	252
N° 5	17	230
N° 6	15,7	260

La moyenne de ces mensurations donne 17 mm., 5 sur 254 μ. Dans l'alcool glycériné, les individus sont souvent recourbés dor-

salement, mais l'extrémité postérieure avec la bourse est toujours dirigée ventralement. L'œsophage mesure 288 μ de long et sa plus grande largeur est de 45 μ. Des six spécimens étudiés, l'œsophage du plus petit mesurait 273 μ sur 50 μ, ou 288 μ sur 43 μ, et celui du plus grand 295 μ sur 58 μ, avec une moyenne de 286 μ sur 50 μ. L'anneau nerveux est à 91 μ de l'extrémité antérieure et le pore excréteur à 468 μ. La largeur du corps à l'extrémité postérieure de l'œsophage est de 130 μ. La bourse est petite (fig. 3), le diamètre transversal des deux lobes étant de 210 μ ; elle est dirigée ventralement, presque à angle droit de l'axe du corps. Le système ventral se divise à un tiers de la distance pour former la côte ventro-ventrale et une plus grande latéro-ventrale ; l'externo-latérale et les autres latérales naissent d'un tronc commun ; la médio-latérale et la postéro-latérale sont fusionnées sur environ la moitié de leur longueur ; la dorsale externe est simple et naît séparément de la dorsale et des latérales ; elle a généralement un léger épaississement du côté latéral à environ un tiers de l'extrémité distale. Cet épaississement peut quelquefois faire saillie dans quelques spécimens et, dans d'autres, peut être seulement ébauché. La nervure dorsale est courte et épaisse, se terminant en deux courtes branches. Certains spécimens montrent à chacune de ces deux branches d'une à trois petites digitations ; d'autres encore peuvent montrer trois saillies à l'extrémité de la côte dorsale. Il n'y a

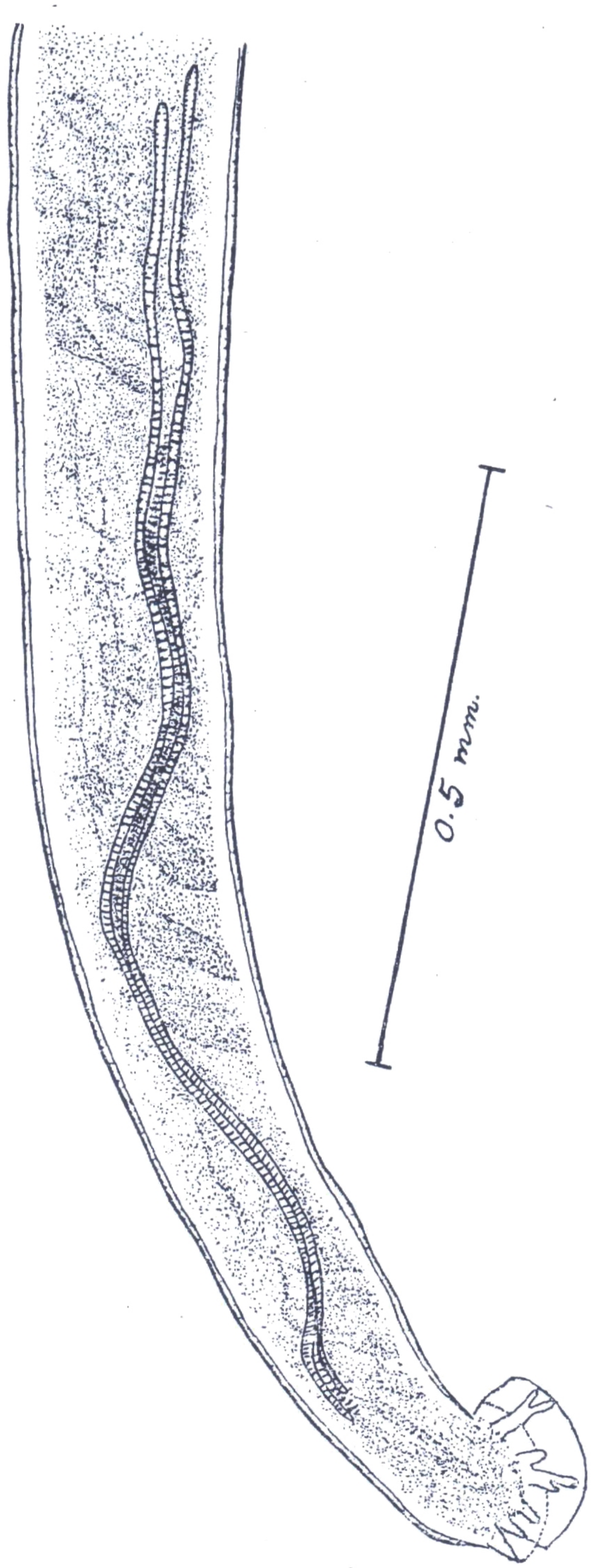


FIG. 4. — *Pulmonema cantonensis* n. g. n. sp. Extrémité postérieure du mâle.

pas de gubernaculum ; les spicules sont longs et sensiblement égaux, mesurant 1 mm., 2 de long ; ils sont striés de façon caractéristique sur toute leur longueur, excepté aux extrémités antérieures (fig. 4). On peut quelquefois les trouver saillants, mais ils sont le plus souvent rétractés.

Femelle : La femelle mesure de 21 à 25 mm. de long et de 309 à 381 μ de largeur maxima. La mensuration de six vers a donné les résultats suivants :

	Longueur en millimètre	Largeur maxima en μ
	—	—
N° 1	25	367
N° 2	23	352
N° 3	21	352
N° 4	25	381
N° 5	22	309
N° 6	23	351

La moyenne de ces mensurations donne 23 mm., 2 sur 352 μ. Les individus tendent souvent à se rouler en spires avec un tour et demi ou quelquefois deux tours complets. La longueur de l'œsophage est de 302 μ et sa largeur maxima de 70 μ près de la base. Le plus long œsophage des six vers mesurés atteint 460 μ et le plus court 122 μ ; la plus grande largeur étant de 72 μ et la plus petite de 50 μ, avec une moyenne de 293 μ sur 64 μ. La distance de l'extrémité antérieure à l'anneau nerveux est de 123 μ, et au pore excréteur de 460 μ. La largeur du corps à l'extrémité postérieure de l'œsophage est de 137 μ. Le corps est en forme de corne à l'extrémité postérieure dont le début contient le pore génital (fig. 5) ; celui-ci est situé à 280 μ de l'extrémité postérieure. L'anus n'est pas très visible ; il est situé en arrière du pore génital, à 64 μ de l'extrémité postérieure ; la largeur du corps à la région anale est de 86 μ et, au niveau du pore génital, de 180 μ ; le vagin est dirigé antérieurement. De l'extrémité postérieure du corps partent de fines striations circulaires qui se terminent au niveau de l'orifice anal. Les femelles peuvent être distinguées des mâles par leur plus grande taille, leur tendance à s'enrouler, et particulièrement par la présence de bandes obliques rouge sombre, formées par les spirales intestinales remplies de sang. Les œufs sont ovales, à parois minces, non segmentés à la ponte ; ils mesurent 46 μ sur 74 μ, avec une moyenne de 48 μ sur 74 μ (fig. 6).

HÔTE. — *Mus norvegicus* et occasionnellement *M. rattus.*

EVOLUTION. — Inconnue.

LOCALISATION. — Bronches et leurs ramifications dans le parenchyme pulmonaire ; trouvé une fois dans le cœur.

DISTRIBUTION GÉOGRAPHIQUE. — Canton (Chine).

TYPES ET PARA-TYPES. — Département de Biologie, Lingnan University, Canton (Chine).

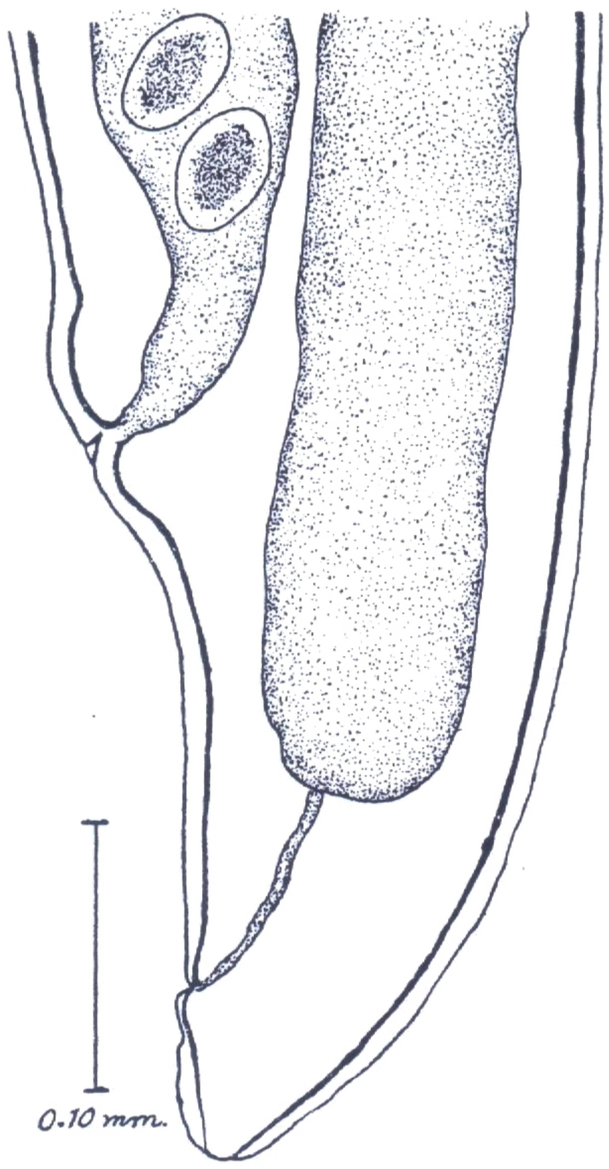
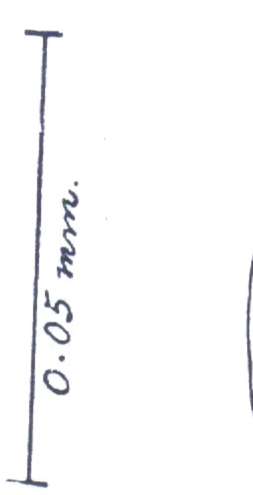


FIG. 5. — *Pulmonema cantonensis* n. g. n. sp. Extrémité postérieure de la femelle.



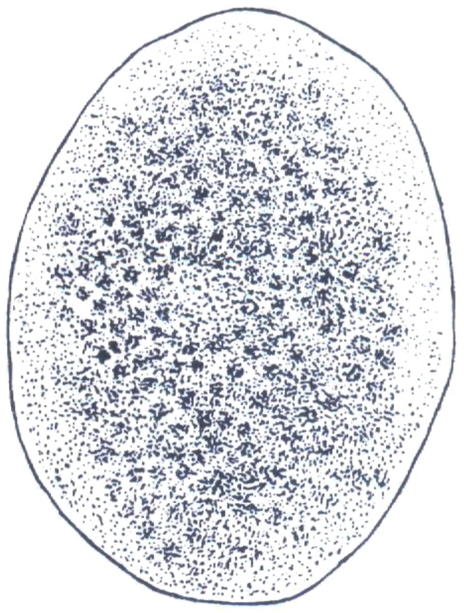


FIG. 6. — *Pulmonema cantonensis* n. g. n. sp. Œuf.

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