

# STUDIES ON THE PARASITIC HELMINTHS OF KOREA II. PARASITES OF THE RAT, *RATTUS* *NORVEGICUS* ERXL. IN SEOUL, WITH THE DESCRIPTION OF *CAPILLARIA HEPATICA* (BANCROFT, 1893) TRAVASSOS, (1915)

Byong Seol Seo, Han Jong Rim, Chan Wuk Lee, and Joo Soo Yoon.

Department of Parasitology and Institute of Endemic Diseases,  
College of Medicine, Seoul National University.

Many studies of rat parasites have been made in different parts of the world. Balfour (1922) reported the occurrence of parasites in 478 rats in England. Fielding (1927) reported the parasites of 222 rats in Townsville, Australia; Cram (1928) and Price and Chitwood (1931) contributed to the information of the wormburdens in the *Rattus norvegicus* and *R. rattus* of Washington, D.C. U.S.A. Luttermoser (1936) conducted a similar study on 2,636 Baltimore house rats, *R. norvegicus*. In Asia, Tubangui (1931) reported the parasites of almost, 1,000 rats in Manila, Philippine Islands; and Wu (1930), of 69 rats in Soochow and Chen (1933) of 89 rats in Canton, China. Recently Ash (1962) reported helminth parasites of 75 rats in Hawaii.

Oldham (1931) compiled his work which gives an excellent summary of work on rat parasites in different parts of the world up to date. According to him, total number of helminths reported in his paper from common rat is 109 species, comprised of 27 trematodes, 41 cestodes, 40 nematodes and 1 acanthocephalid. Out of 109 species, 69 species were found from *Rattus norvegicus*.

There have been several previous reports of rat parasites in Korea. Nakamura and Kobashi (1935) found *Cysticercus fasciolaris* and *Capillaria hepatica* on the liver of 1,251 house rats, and also Ogura (1936) found *Hymenolepis diminuta* and *H. nana* from 70 rats examined in Seoul. On the other hand, Park (1938) reported the trematode, *Echinostoma hortense* Asada 1926 from *R. norvegicus* in Seoul. In the most recent, Seo et al (1964) reported several trematodes of rodents. They found *Echinostoma*

*hortense* and *E. cinetorchis* from *R. norvegicus* and other rodents in Seoul and other localities of Korea, and also they reported a new species of *Fibricola seoulensis* from *R. norvegicus* in Seoul.

An investigation of the helminth parasites of house rats in the Seoul has been carried in October to December 1956, January to May 1958 and July 1963 to March of 1964. A total of 325 rats were examined.

This study was carried out for the purpose of securing information on the helminths of Korean house rats and more additional informations on *Capillaria hepatica* which is the most common parasite of the brown rat in Korea.

## MATERIALS AND METHODS

The rats were trapped from the Campus, in Seoul and its vicinity, and a total of 325 rats were secured for examinations during the survey. All the rats were autopsied in the laboratory. The organs were opened separately and helminths were isolated in normal saline solution. Trematodes and cestodes were fixed in hot alcohol-formol-acetic solution and stained in Semichon's aceto-carmin, and permanent mounts were prepared. Nematodes were fixed in hot Travassos fixative and cleared in lactophenol or glycerine and studied unmounted.

To obtain the adult worms of *Capillaria hepatica*, embryonated eggs cultured in laboratory, fed to white rats experimentally. Infected animals were examined at several day intervals. The resulting infections from the series of animals were examined in gross and then samples of the livers were pressed between slides and examined

microscopically. The liver were next washed and placed in petri dishes and covered with normal saline solution at 37°C. After several hours, the worms recovered were examined for their stage of development, then fixed in hot Travassos fixative, and cleared in glycerine.

## RESULTS

Helminths were found in 304(93.4 per cent) of 325 house rats. A list of the different parasites encountered and their incidence are given in Table 1. Each species is discussed with the incidence of other investigators in different parts of the world.

**Table 1.** Parasites encountered in 325 house rats.

Name of Parasites.	Infestation	
	Number.	Per cent.
Trematoda:		
<i>Echinostoma hortense</i>	4	1.2
<i>Fibricola seoulensis</i>	2	0.6
Cestoda:		
<i>Taenia taeniaformis</i> (Larval for m)	65	20.0
<i>Hymenolepis diminuta</i>	52	16.0
<i>Hymenolepis nana</i>	4	1.2
Nematoda:		
<i>Heterakis spumosa</i>	162	49.9
<i>Syphacia obvelata</i>	55	17.0
<i>Nippostrongylus muris</i>	160	49.2
<i>Trichosomoides crassicauda</i>	79	24.3
<i>Capillaria hepatica</i>	286	88.0

## TREMATODA

Genus *Echinostoma* Rudolphi, 1809

*Echinostoma hortense* Asada, 1926

This species was collected from 4 (1.2 per cent) of the 325 brown rats. Asada (1926) found this parasite experimentally in white rats fed with cysts from tadpoles which had been infected with cercariae from *Lymnaea japonica* and *L. pervia*. Yamaguti (1933) found in the small intestine of a naturally infected *Rattus norvegicus* in Japan. The first report of this parasite from Korea was reported by Park (1938) in the area of Seoul. Seo et al (1964) have found this species from small intestine of *R. norvegicus*, *R. r. alexandrinus*, *Mus musculus yamashinai*, and *Microtus fortis pelliceus* in several districts in Korea.

Genus *Fibricola* Dubois, 1932

*Fibricola seoulensis* Seo, Rim and Lee, 1964

This species was collected from 2 (0.6 per cent) of the 325 *Rattus norvegicus* in the present survey. This was reported by Seo et al (1964) as a new species in their studies of trematodes of rodents. The occurrence of the species of Diplostomatidae is very rare from rats. The only one previous report of *Fibricola caballeroi* have found by Zerecero (1943) from *Rattus norvegicus* in Mexico.

## CESTODA

Genus *Taenia* Linnaeus, 1758

*Taenia taeniaformis* (Batsch, 1784)

Wulffügel, 1911

The larval stage of this tapeworm is commonly known as *Cysticercus fasciolaris* Rudolphi, 1808. It is practically cosmopolitan in distribution and one of the common parasite of the brown rat. *C. fasciolaris* was found on the liver of 65 (20 per cent) of 325 rats examined. The adult stage has been found only in cats.

Tubangui (1931) found it in 94 per cent of 950 brown rats examined at Philippine Islands, while Wu (1930) and Chen (1933) found 44.8 per cent and 41.7 per cent in Soochow and Canton, China respectively. In Korea, Nakamura and Kobashi (1935) found 41.3 per cent of 1,251 rats from Seoul.

Genus *Hymenolepis* Weinland, 1858

*Hymenolepis diminuta* (Rudolphi, 1819)

Blanchard, 1891

This species was found 16.0 per cent in the present survey. This is the tapeworm occurring most frequently in rats all over the the world. It has been reported rather infrequently from man. Ogura (1936) found 10(14.9 per cent) instances from 70 rats examined in Seoul. Tubangui (1931) reported a 64.0 per cent infestation of rats examined in the Philippine, and in China, Chen (1933) reported it 1.19 per cent of Canton rats and Wu (1930), 16.8 per cent of Soochow rats. Luttermoser (1936), 16.6 per cent of Baltimore house rats in United States.

*Hymenolepis nana*(Siebold, 1852)

Blanchard, 1891

This, the dwarf tapeworm, is common parasite of rats

and of human beings in many parts of the world, especially in tropical and subtropical countries. Chandler (1927) concluded from his observations that rats are an important epidemiological factor in the dissemination of *H. nana*. Ogura (1936) reported that rat strain of *H. nana* found to be transmissible to children through his experimental infection of two children, and also human strain of *H. nana* found to be transmissible to albino rats and mice. Otherwise Shorb (1933) found that mice and rat strains were physiologically different from the human strain. Stoll (1947) estimated the world incidence to be 20.2 millions mostly in the U.S.S.R. and Asia. The occurrence of this parasite in human beings in Korea has been recorded by Ogura (1936) who found 2 cases from 3,000 school children in Seoul, and by Soh et al (1961), who found 32 (0.2 per cent) *H. nana* infections from 14,682 fecal samples obtained from Severance Hospital outpatients. Rim (1963) reported 0.6 per cent of its infection from 1963 fecal samples from Korean army soldiers.

*H. nana* was found in only 1.2 per cent of the series of 325 rats in the present survey. Ogura (1936) found 3 (4.3 per cent) instances of *H. nana* from 70 rats examined in Seoul. Tubangui (1931) found also the worm in 1.7 per cent of rats examined in Philippine. Wu (1930) and Chen (1933) found 6.0 and 4.76 per cent of rats examined in China respectively. In the United States, Luttermoser (1936) found 11.4 per cent of Baltimore rats, Harkema (1936) found 28 per cent of 55 North Carolina's brown rats.

## NEMATODA

### Genus *Heterakis* Dujardin, 1845

#### *Heterakis spumosa* Schneider, 1866

This nematode parasite of the cecum of the rats is cosmopolitan in distribution. A rather high incidence of 49.9 per cent of this parasite were found in the present survey. While in Philippine and China, it was found very low incidence 0.4 and 1.19 per cent respectively. In the United States, Luttermoser (1931) found 1.6 per cent, but in Hawaii Ash (1962) reported 46 per cent of his 75 house rats examined.

### Genus *Syphacia* Seurat, 1916 *Syphacia obvelata* (Rudolphi, 1802) Seurat, 1918

The nematode, which occurs in the cecum and large

intestines of rats and mice, is cosmopolitan in distribution (Hall, 1916). Its occurrence in the house rats from Seoul is 17.0 per cent. Chen (1933) found this parasite 2.38 per cent of Canton rats, Luttermoser (1936) reported 1.6 per cent of Baltimore house rats, Ash (1962), on the other hand found 44 per cent of 75 house rats from Hawaii.

### Genus *Nippostrongylus* Lane, 1923

#### *Nippostrongylus muris* (Yokogawa, 1920)

#### Lane, 1923

This worm was usually in great abundance, and was found especially in the upper part of the intestine. In the present survey, it was found 49.2 per cent. Tubangui (1931) found it 58.0 per cent from Philippine house rats and Chen (1933) found 23.8 per cent of Canton rats. While in the Baltimore and Hawaii rats show 16.8 and 17.0 per cent of its incidence respectively.

### Genus *Trichosomoides* Railliet, 1895

#### *Trichosomoides crassicauda* (Bellingham, 1840) Railliet, 1896

This nematode occurs in the urinary bladder of the rat, and is cosmopolitan in distribution. The incidence of this worm is 24.3 per cent. Luttermoser (1936) found the parasite in 90.4 per cent of Baltimore house rats. Tubangui (1931) reported 57.0 per cent of brown rats from Philippine. Chen (1933) reported 11.9 per cent of Canton rats. Ash found 17.0 per cent of Hawaii house rats.

### Genus *Capillaria* Zeder, 1800

#### *Capillaria hepatica* (Bancroft, 1893) Travassos, 1915

This worm appears to be one of the commonest parasites of the brown rat in Korea, it could be recognized easily by the presence of irregular white or yellowish 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. Worms or ova of this species have been recorded from a variety of mammals, chiefly rodents. In the present survey heavy infestations with the eggs of this parasite were found 283 rats, *Rattus norvegicus*, of 325 examined, an incidence of 88.0 per cent in Seoul. Nakamura and Kobashi (1935) found this worm 36.0 per cent of house rats from Seoul. Tubangui (1931) reported 90.0 per cent of

the brown rats in Philippines. Luttermoser (1936) reported 85.6 per cent of the Baltimore house rats. In the China, Wu (1930) and Chen (1933) found 30.4 and 7.1 per cent in Soochow and Canton respectively. Momma (1930) found 1,272 (57.2 per cent) out of 2,222 house rats examined in Osaka, Japan.

In the human beings, up to present time, eleven cases were reported in several parts of the world; the first case was reported by MacArthur (1924) the British soldier who died after three years of service in India, five cases were reported from United States (McQuown, 1950; Otto et al, 1954; Ewing et al, 1956; Ward et al, 1959; and Calle, 1961), two cases from South Africa (Cochrane et al, 1957; Kallichurum, 1961), and each one case from Turkey (Turham, 1954), Mexico (Romero garcia et al, 1962) and Brazil (Piazza et al, 1963).

*Capillaria hepatica* was formerly placed in a separate genus *Hepaticola* (Hall, 1916), because it was believed to lack bacillary bands and a copulatory spicule, but Baylis (1931) showed that both structures are present and hence the species belongs in *Capillaria*, and also he described in detail on the structure of *C. hepatica* obtained from woodmice (*Apodemus sylvaticus*) in England. However, he measured with only the fragments of the worm, therefore it seems desirable to provide a more complete description of this worm based on Baylis.

**Description:** Body capillary divided into anterior esophageal and posterior portions. Esophageal portion apparently shorter than the posterior portion, which is only slightly thicker. The length of the anterior portion of esophagus free of surrounding cells, is 0.43 to 0.46 mm long; the rest passes through a chain of 27 to 28 large esophageal cells. Cuticle delicately striated, dorsal and ventral bacillary bands are present especially conspicuous in the esophageal portion, these are longitudinal tracts of minute projections that constitute the outlets of subcuticular glands. The mouth is simple, without lips; the arrangement of the head papillae is not known.

Male: 23.2 to 35.9 mm long and 0.046 to 0.063 mm thick at esophago-intestinal junction; esophagus, 5.18 to 7.00 mm long, which is equal to one-third of total body length. A quite well developed spicule is present, it appears to be rather slightly chitinized; 0.336 to 0.396 mm length, and slightly expanded at the root, cylindrical for the greater part of its length; and lightly fusiform

thickening towards its distal end. Its tip tapers to a fine point. The spicule is contained in a protrusible membranous sheath (0.231 to 0.297 mm by 0.050 to 0.066 mm), the distal end of this sheath is capable of expansion to form a large funnel-shaped dilatation. The cloacal aperture is subterminal, and is overhung posteriorly by a very short projection, showing a faint indication of division into a pair of lobes and bearing a pair of papillae on its ventral surface.

Female: 74.5 to 81.1 mm long and 0.116 to 0.154 mm thick at esophago-intestinal junction; esophagus 6.72 to 7.84 mm, which is equal to between one-ninth and one-tenth of total body length. The vulva is provided with a protrusible, membranous, funnel like structure at closely behind the esophago-intestinal junction. Tail very short, blunt and conical. Eggs lemon-shaped, with polar opercula, 0.053 to 0.059 mm by 0.030 to 0.033 mm in size, double walled, outer eggshell pitted, inner shell homogeneous.

## DISCUSSION

Ten species of helminths have recorded from house rat, *Rattus norvegicus* in Seoul; viz. *Echinostoma hortense*, *Fibricola seoulensis*, larval form of *Taenia taeniaformis*, *Hymenolepis diminuta*, *H. nana*, *Heterakis spumosa*, *Syphacia obveluta*, *Nippostrongylus muris*, *Trichosomoides crassicauda* and *Capillaria hepatica*. All the species except two of the trematode are practically cosmopolitan in distribution and common parasites of the brown rat.

Several workers have mentioned the occurrence of *Clonorchis sinensis* and *Paragonimus sp.* in the common rats. However those parasites are not found in this survey. Muto (1920) and Ando (1922) found a specimen of *C. sinensis* from *R. norvegicus* captured on the shores of Lake Biwa. Wu (1930) reported 5.2 per cent of *C. sinensis* from 69 rats in Soochow, and Chen (1933) found a single individual of *C. sinensis* from Canton rats. On the other hand Chen (1933) found two of immature form of *Paragonimus sp.* from lungs of two rats, however the species was not determined at that time. Chen (1935, 1936) has made several reports on the life history of *Paragonimus* from rats, and then he established *Paragonimus iloktsuensis* as a new species. (Chen, 1940)

The three species of *Euparyphium* were reported in the Philippines by Tubangui (1931), but Seo et al (1964) found *E. murinum* from wild rat, *Apodemus agrarius* at

Kumwha district of Korea.

An attempt to find *Trichinella spiralis* and *Angiostrongylus cantonensis* in the rats, examination of diaphragm and lungs were made during the present survey. All the examinations persistently show negative results. Luttermoser (1936) found 1.2 per cent of *T. spiralis* larvae encysted in striated muscles of brown rat, however Balfour (1922) had never found it in any of 444 brown rats examined in England. (1933) Chen also had never found the parasite after the thorough examination of all diaphragms of collected Canton rats.

*Angiostrongylus cantonensis* was originally described under the genus *Pulmonema* by Chen (1935) but Dougherty (1946) placed in synonym with *Angiostrongylus*. The species has been reported from China, Formosa, Australia and Hawaii (cited from Ash, 1963).

*Strongyloides ratti*, which is quite common parasite of rats, has previously been recorded in 74 per cent of Manila, 11.9 per cent of Canton, 20.2 per cent of Baltimore, and 59 per cent of Hawaii, but we could not find this worm in the present survey.

In order to find *C. sinensis*, *Paragonimus* sp., *A. cantonensis*, *S. ratti*, and others, the further studies are required from various localities particularly in rural areas.

## SUMMARY

An investigation of the helminth parasites of house rat, *R. norvegicus* Erxl. in Seoul has been carried on four years. A total of 325 rats was examined. Ten species of helminths were considered, of which 4 species were recorded for the first time from Korea.

The adult worms of *Capillaria hepatica*, the most common parasite of house rats in Seoul, was observed experimentally, and provided a more complete description of this worm.

## REFERENCES

1. Ando, A. (1922) : Studies on the intestinal trematodes as that find the final host in the rat. Aichi Igakkwai Zasshi, **29** (4)
2. Asada, J. (1926) : On a new echinostomatid trematode and its life history. Trans. Jap. Path. Soc. **16**, 293~294. (in Japanese).
3. Ash, L.R. (1962) : The helminth parasites of rats in Hawaii and the descriptions of *Capillaria traveræ*, sp.n. Jour. Parasitol. **48** (1), 64~68.
4. Balfour, A. (1922) : Observations on wild rats in England and an account of their ecto and endo-parasites. Parasitology, **14**, 282~298.
5. Baylis, H.A. (1931) : On the structure and relationships of the nematode *Caillaria (Hepaticola) hepatica* Bancroft. Parasitology, **23** (4), 533~543.
6. Calle, S. (1961) : Parasitism by *Capillaria hepatica*. Pediatrics, **27** (4), 648~655.
7. Chandler, A. (1927) : The distribution of *Hymenolepis* infections in India, with a discussion of its epidemiological significance. Indian J. Med. Research, **14** (4), 973~994.
8. Chen, H.T. (1933) : A preliminary report on a survey of animal parasites of Canton, China, rats. Lingnan Sc. Jour. **12** (1), 65~74.
9. Chen H.T. (1935) : Un nouveau nematode pulmonaire, *Pulmonema cantonensis*, n.g., n. sp. des rats de Canton. Ann Parasitol. **13** (4), 312~317.
10. Chen, H.T. (1935) : A preliminary note on the life history of *Paragonimus* China. Lingnan Sc. Jour. **14**(1), 143~144.
11. Chen, H.T. (1936) : Further notes on the life history of *Paragonimus* from rats. Chines Med. Jour. Supplement **1**, 368~378.
12. Chen, H.T. (1940) : *Paragonimus iloktsuensis* sp. nov. for the lung fluke from rats (class: Trematoda: Family Troglotremitidae) Lingnan Sc. Jour. **19** (2), 191~196.
13. Cochrane, J.C., L. Sagorin, and M.C. Wilcocks: (1957) : *Capillaria hepatica* infection in man. A syndrom of extreme eosinophilia, hepatomegaly, hyperglobulinemia. South Africa Med. J. **31** (30), 751~755.
14. Cram, E.B. (1928) : A note on parasites of rats. Jour. Parasit. **15**, 72.
15. Dougherty, (1946) : The genus *Aelurostrongylus* Cameron, 1927 (Nematoda: Metastrongylidae) and its relations; with descriptions of *Parafilaroides* gen. nov., and *Angiostrongylus gubernaculatus* sp. nov. Proc. Helm. Soc. Wash. **13**, 16~25.
16. Ewing, G.M. and I.L. Tilden (1956) : *Capillaria hepatica*. Report of fourth case of true human infestation. J. Pediatrics. **48** (3), 314~348.
17. Fielding, J.W. (1927) : Observations on rodents and their parasites. Jour. and Proc. Roy. Soc. New South Wales. **61**, 123~129.

18. Hall, M.C. (1916) : Nematode parasites of mammals of the orders Rodentia, Lagomorpha and Hyracoidea. Proc. U.S. Nat. Mus. (2131) **50**, 1~258.
19. Harkema, R. (2136): The parasites of some North Carolina rodents, Ecol. Monogr. **6** (2), 153~232.
20. Kallichurum, S. and R. Elsdon-Dew (1961): *Capillaria* in man. A case report. South African Med. J. **35** (41), 860~861.
21. Luttermoser, G.W. (1936): A helminthological survey of Baltimore house rats (*Rattus norvegicus*) Amer. J. Hyg. **24** (2), 350~360.
22. MacArthur, W.P. (1924): A case of infestation of human liver with *Hepaticola hepatica* (Bancroft, 1893) Hall, 1916, with sections from the liver. Proc. Roy. Soc. Med. (1923-24) **17** (3), 83~84.
23. McQuown, A.L. (1950): *Capillaria hepatica*: Report of genuine and spurious cases. Amer. J. Trop. Med. **30** (5), 761~767.
24. Momma K. (1930): Notes on modes of rat infestation with *Hepaticola hepatica*. Ann. Trop. Med. and Parasitol. **24** (1), 109~113.
25. Muto, M. (1920): Examination of domestic and wild animals in the districts where clonorchiasis prevails. Tokyo Iji Shinshi (2188), 1443~1452.
26. Nakamura, K. and S. Kobashi (1935): Die Arten der Ratten in Chosen (insbesondere in Keijo und Jinsen) und die bei ihnen gefundenen Ekto-sowie Ento parasiten. Jour. Chosen Med. Assoc. **25** (5), 183~184.
27. Ogura, K. (1936): Studies on the *Hymenolepis nana* in Korea. Chosen Igakkwai Zasshi, **26** (7), 649~668. (English summary 35~36)
28. Oldham, J.N. (1931) : The helminth parasites of common rats. Jour. Helminth. **9** (2), 47~90.
29. Otto, G.F., M. Berthrong, R.E. Appleby, J.C. Rawlins and Wilbur (1954): Eosinophilia and hepatomegaly due to *Capillaria hepatica* infection. Bull. Johns Hopkins Hosp. **94**, 319.
30. Park, J.T. (1938): A rat trematode, *Echinostoma hortense* Asada from Korea. Keijo Jour. Med. Assoc. **25** (5), 183~184.
31. Piazza, R., M.O.A. Correa, and R.N. Fleury (1963): Human infection by *Capillaria hepatica*. Rev. Inst. Med. Trop. Sao Paulo. **5** (1), 37~41.
32. Price, E. and B.G. Chitwood (1931): Incidence of internal parasites in wild rats in Washington, D.C. Jour. Parasit. **18**, 55.
33. Rim, H.J (1963): The incidence of intestinal parasites in ROK Army soldiers. Korean Jour. Parasit. **1** (1), 91~92.
34. Romero garcia, F., J. Mendiola, and F.F. Biagi (1962): High eosinophilia with visceral manifestations. 4. First case of *Capillaria hepatica* infection reported in Mexico. Bol. Med. Hosp. Infantil Mexico. **3** (3), 185~190.
35. Seo, B.S., H.J., Rim, and C.W. Lee (1964): Studies on the parasitic helminths of Korea I. Trematodes of rodents. Korean Jour. Parasit. **2** (1), 20~26.
36. Shorb, D.A. (1933): Host-parasite relations of *Hymenolepis fraterna* in the rat and the mouse. Am. J. Hyg. **18** (1), 74~113.
37. Soh, C.T., K.T. Lee, E.W. Shin and T.C. Kang (1961): Incidence of parasites in Seoul area based on an examination of the Severance Hospital Out-patient. Yonsei Med. Jour. **2**, 31~42.
38. Stoll, N.R. (1947): This wormy world. Jour. Parasit. **33**, 1~18.
39. Tubangui, M.A. (1931): Worm parasites of the brown rat (*Mus norvegicus* in the Philippine Islands, with special reference to these forms that may be transmitted to human beings. Philippine Jour. Sc. **6**, 637~587.
40. Turhan, B. et al. (1954): Insan karacigerinde: *Capillaria hepatica* (Bancroft, 1893), travassos, 1915, Mikrobiol. Bergisi, **7**: 149.
41. Ward, R.L., and J.H. Dent. (1959): *Capillaria hepatica* infection in a child. Bull Tulane Med. Fac. **19**, 27~33.
42. Wu, X. (1930): A study of the common rat and its parasites. Lignan Sc. Jour, **9**, 51~64.
43. Yamaguti, S. (1933): Studies on the helminth fauna of Japan. Part 1. Trmatodes of birds, Reptiles, and Mammals. Jap. Jour. Zool. **5** (1), 1~134.
44. Zerecero D.M.C. (1943): Algunos helmintos de las ratas domesticas y silvestres de Mexico con descripcion de dos nuevos especies. Tesis. 97 pp. (cited from Yamaguti, 1958).

=抄 錄=

## 韓國의 寄生蠕蟲類에 關한 研究 II.

서울市內의 家鼠, *Rattus norvegicus* Erxl. 의 寄生蠕蟲,  
및 *Capillaria hepatica* (Bancroft, 1893)  
Travassos (1915)의 形態學的 補遺

서울大學校 醫科大學 寄生蟲學敎室 및 風土病研究所

徐丙高 · 林漢鍾 · 李燦旭 · 尹周燧

韓國의 寄生蠕蟲類研究의 一部로서 서울市內에 棲息하는 家鼠의 蠕蟲類를 調査 하였다. 家鼠는 1956 年부터 1964 年 3 月까지 捕獲한 325 匹를 調査對象으로 하였다.

蠕蟲感染率은 93.4% (304 匹)이고 發見된 蠕蟲類는 다음과 같다.

吸蟲類: *Echinostoma hortense* (1.2%), *Fibricola seoulensis* (0.6%)

條蟲類: *Taenia taeniaformis* 의 幼蟲(*Cysticercus fasciolaris*) (20.0%), *Hymenolepis diminuta* (16.0); *Hymenolepis nana* (1.2%)

線蟲類: *Heterakis spumosa* (49.9%), *Syphacia obvelata* (17.0%) *Nippostrongylus muris* (49.2%), *Trichosomoides crassicauda* (24.3%); *Capillaria hepatica* (88.0%),

以上發見된 10 種의 蠕蟲中 4 種 (*H. spumosa*, *S. obvelata*, *N. muris*, 및 *T. crassicauda*)은 韓國에서 처음으로 記錄되는것이다.

서울市內의 家鼠에 가장 많이 寄生하고 있는 *Capillaria hepatica* 는 그 細長한 成蟲이 肝組織內에 埋沒되어 있어 完全한 成蟲蟲體를 分離하기 困難하다. 蟲體의 길이 및 完全한 形態學的 記載가 되어있지 않은 故로 著者들은 實驗的으로 *C. hepatica* 의 仔蟲包藏卵을 白鼠에 感染시켜 完全한 雌雄成蟲을 肝組織으로 부터 分離하였다. 蟲體길이 및 食道周圍細胞 交接刺 및 雌蟲陰門에 對하여 詳細한 形態學的 檢討를 하여 過去에 報告된 Baylis 의 記載를 補遺하였다.

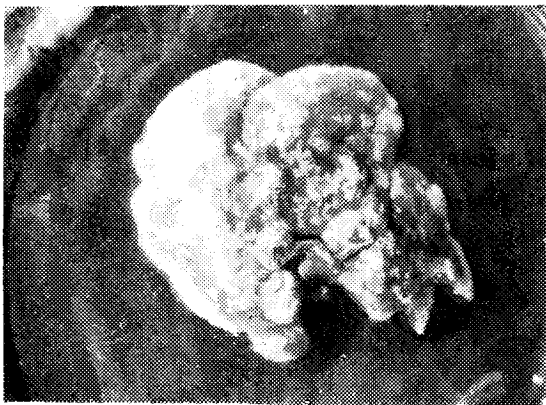


Fig. 1

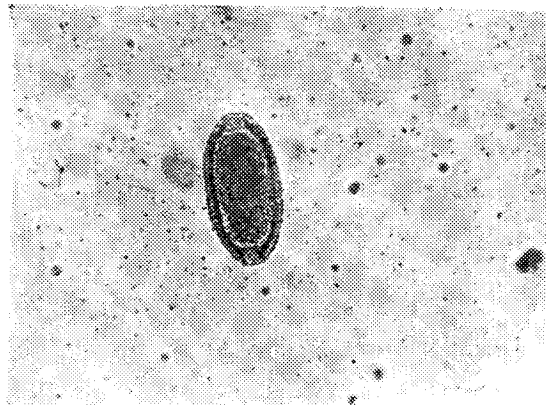


Fig. 2

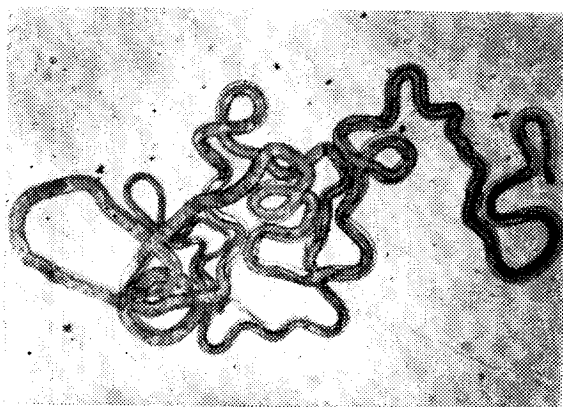


Fig. 3

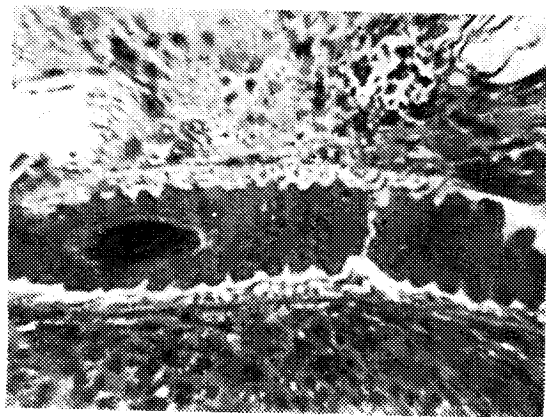


Fig. 4

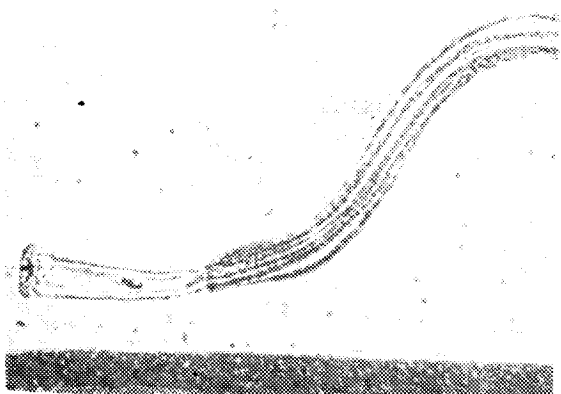


Fig. 5

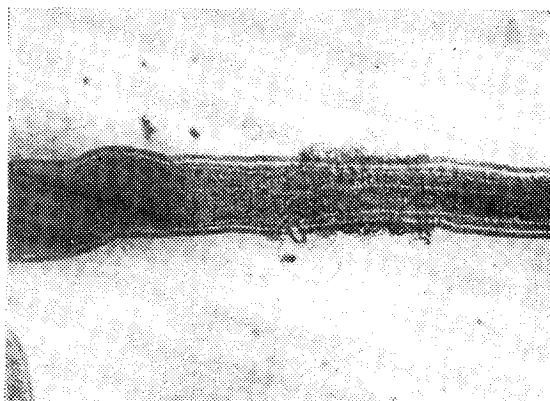


Fig. 6

#### EXPLANATION OF PLATE

Fig. 1. Infected rat liver with *Capillaria hepatica*, showing the presence of the adults in the liver.

Fig. 2. Egg of *C. hepatica*. (360 $\times$ )

Fig. 3. A complete female specimen of 20 days old. (32 $\times$ )

Fig. 4. A oesophageal cell of worm embedded in liver from stained section. (400 $\times$ )

Fig. 5. Posterior part of a male worm showing a spicule and spicule sheath. (100 $\times$ )

Fig. 6. Oesophago-intestinal junction of a female worm showing a vulva provided with a protrusible membranous funnel like structure and eggs in a uterine tubule. (100 $\times$ )