

***Achillurbainia ratti* sp. n. found from swamp giant rats,
Rattus muelleri in Malaysia**

(Trematoda: Achillurbainiidae)*

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(Received for publication; June 25, 1969)

Dollfus (1939) found a curious new fluke from a palpebro-orbital abscess of a Malaysian leopard, *Felis pardus* L. and named it *Achillurbainia nouveli*, establishing this new genus and a new family Achillurbainiidae. Chen (1965) reported the same fluke from a retro-auricular abscess of a 10-year-old girl in China, showing some medical importance of this worm. The second species of the genus was discovered by Travassos (1942) from the maxillary sinus of an opossum, *Didelphis marsupialis* L. in Brazil, and was described by him as *Achillurbainia recondita*.

In Africa, on the other hand, Fain & Vandepitte (1957 a, b) described another new fluke, *Poikilorchis congolensis* from a subcutaneous cyst in the retro-auricular region of a native from Belgian Congo. They proposed the new generic name stated above and placed it in the family Achillurbainiidae Dollfus, 1939. Vandepitte *et al.* (1957) reported from Central Africa four human cases of retro-auricular cysts containing *Paragonimus*-like but a little smaller eggs; besides they obtained a full-grown worm from one of the four cases, which was described as the type specimen of *P. congolensis*

mentioned above.

In Malaysia, Lie *et al.* (1962) found numerous operculated eggs in the wall of retro-auricular abscess of a 8-year-old Dyak boy residing in Sarawak. They noticed that the eggs were similar to, but smaller than *Paragonimus* eggs, and regarded them as those of *Poikilorchis* sp. Then, Wong & Lie (1965) reported the second case of peri-auricular abscess in a 10-year-old Dyak boy also in Sarawak. The authors found numerous eggs in the pus and in the wall of the abscess, and they assumed that the eggs were identical with those of *Poikilorchis* or a related trematode. Unfortunately, however, no adult worms were obtained in both cases. Kwo & Lim (1968) recently obtained adults of *Achillurbainia* sp. from the lungs of *Rattus muelleri* (Jentink) for the first time in West Malaysia, and tentatively identified them as *A. nouveli* Dollfus, 1939.

During joint researches on paragonimiasis in Malaysia, the present authors collected many adults of *Achillurbainia* sp. from the trachea and bronchi of *R. muelleri*. In the present paper the fluke from the rat is described as a new species called *A. ratti*.

* Supported in part by the U. S. Army Research and Development Group (Far East), Department of the Army under Contract No. DAJB17-67-C-0044, and in part by the University of California International Center for Medical Research and Training (UC ICMRT, Hooper Foundation, San Francisco School of Medicine) with Research Grant TW 00144 from the Institute of Allergy and Infectious Diseases, NIH, US Public Health Service.

Materials and Methods

Rattus muelleri was trapped along mountain streams in three localities of Selangor and Kedah State. As shown in Table 1, 14 or 28.6% of 49 rats examined were positive for *A. ratti*. All worms were parasitic freely in the trachea or bronchi without making the worm cyst, the number of which amounted to 26 in all, ranging from one to five per host. Most of living worms were flattened in alcohol, stained with carmine and mounted in balsam for morphological investigation, of which ten worms were used for the present description. Some worms were kept in saline solution to get fertilized eggs, which were partly brought to Japan in formalin and partly used to get mature miracidia. Some other species of rats

Table 1 Natural infection of *Rattus muelleri* with *Achillurbainia ratti*

Locality (State)	Rats examined	Rats positive	Worms per host
Kepong (Selangor)	21	9	1, 1, 1, 1, 1, 2, 2, 2, 5
Gombak (Selangor)	25	3	1, 1, 2
Baling (Kedah)	3	2	3, 3
Total	49	14(28.6%)	26

were abundantly examined in the above-mentioned localities, but they were all negative for *A. ratti*. Measurements, in millimeters unless otherwise indicated, were made on stained and mounted adults and on eggs preserved in 10% formalin. Drawing of the holotype was made by projecting method.

Description

Achillurbainia ratti sp. n.

Holotype (Fig. 1, Table 2)

Body thin and flat except acetabular part, measuring 11.8 in length and 5.0 in width. Cuticle aspinose. Oral sucker subventral, 0.87 by 0.80 in diameter. Pharynx 0.40 by 0.35, followed by a short esophagus. Intestine long, highly twisted, reaching to posterior end of body. Ventral sucker situated about one-third of body length from anterior extremity, measuring 1.29 in diameter, which is about 1.5 times as long as that of oral sucker. Testicles distributed ventrally under intestine, reaching to the level of midway between two suckers; spherical in shape and 0.19 to 0.39 in diameter, amounting to 202 in all, 98 on the left and 104 on the right side. Seminal vesicle winds anterior to ventral sucker, lacking cirrus pouch. Genital pore opens just behind pharynx, i.e. on the level of esophagus. Ovary almost spherical in

Table 2 Measurements of the holotype and nine paratypes (in mm)

Specimen	Body		Oral sucker		Ventral sucker		Ratio of suckers*		Ovary		Total no. of testicles
	leng.	wid.	max.	min.	max.	min.	o.s.	: v.s.	max.	min.(side)	
Holotype	11.8	5.0	0.87	0.80	1.29	1.29	1	: 1.49	0.85	0.73 (R)	202
Paratype 1	9.0	4.8	0.87	0.82	1.26	1.21	1	: 1.45	0.82	0.68 (L)	196
" 2	8.7	4.9	0.88	0.77	1.45	1.38	1	: 1.63	0.78	0.68 (R)	196
" 3	9.1	4.4	0.92	0.77	1.38	1.36	1	: 1.50	0.77	0.68 (R)	181
" 4	10.8	5.0	0.80	0.70	1.39	1.38	1	: 1.74	0.77	0.68 (R)	**
" 5	10.5	4.7	0.75	0.70	1.26	1.26	1	: 1.68	0.73	0.68 (L)	201
" 6	9.4	4.2	0.71	0.63	1.17	1.14	1	: 1.64	0.71	0.66 (R)	212
" 7	9.5	4.1	0.77	0.61	1.12	1.09	1	: 1.47	**	(R)	**
" 8	9.0	4.2	0.70	0.61	1.14	1.09	1	: 1.63	0.71	0.65 (L)	203
" 9	9.0	4.0	0.70	0.63	1.16	1.05	1	: 1.66	0.71	0.61 (R)	196
Average	9.7	4.5	0.80	0.70	1.26	1.22	1	: 1.58	0.76	0.67	198

* Comparison of maximum diameter, ** Partly broken, R: right, L: left

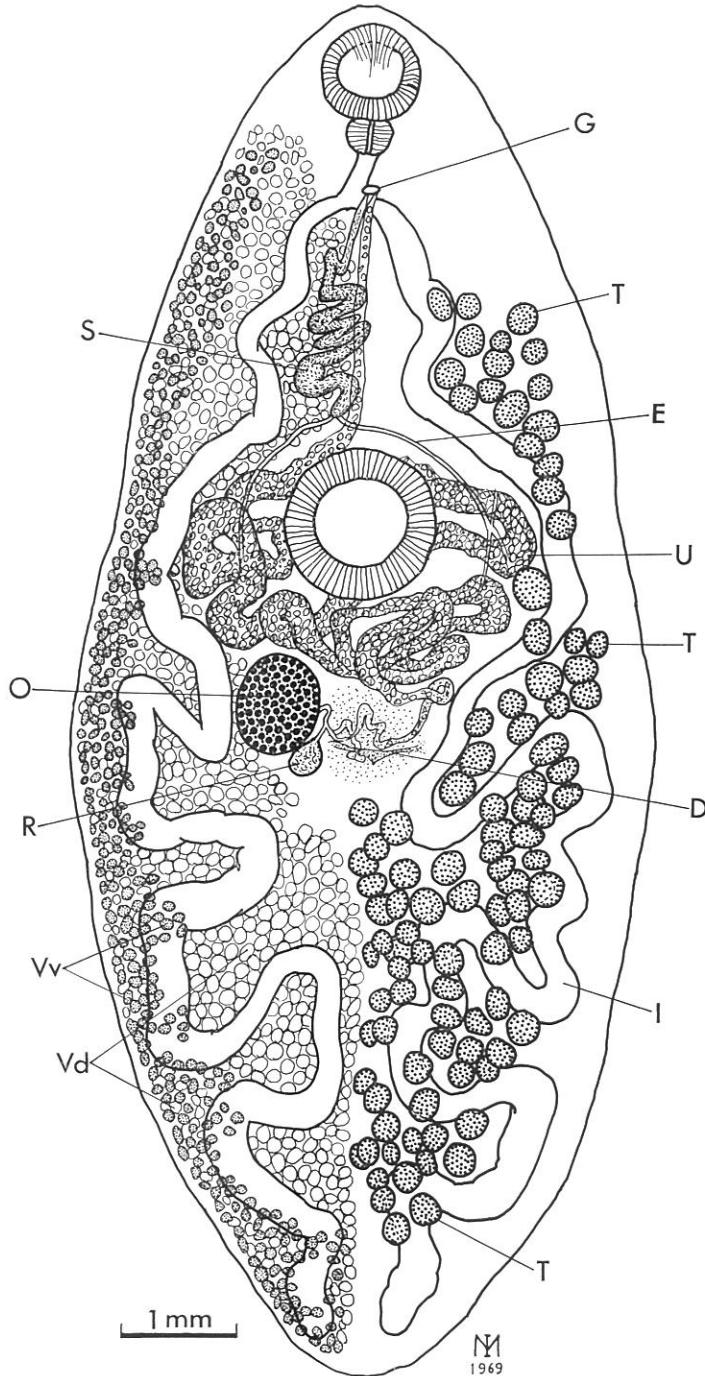


Fig. 1. Holotype of *Achillurbainia ratti* sp. n. Ventralview. Testicles on the right side and vitellaria on the left side are omitted. D: vitelline duct, E: vas efferens, G: genital pore, I: intestine, O: ovary, R: seminal receptacle, S: seminal vesicle, T: testicle, U: uterus, Vd: dorsal vitellaria (granules omitted), Vv: ventral vitellaria.

shape, located on the right side, measuring 0.85 by 0.73 in diameter. Seminal receptacle spherical, 0.30 by 0.25, situated posterior to the ovary. Laurer's canal present. Uterus highly coils around ventral sucker, containing numerous eggs. Vitellaria widely and densely distributed on the dorsal side except anterior and central part, but extremely limited to marginal part on the ventral side.

Paratypes (Figs. 2-5, Table 2)

Nine specimens are all similar to the holotype in morphology except that the ovary is situated on the left side in three specimens and that in one specimen testicles are slightly irregular in shape and intestinal wall has some folds. Pharynx 0.31 to 0.42 wide and 0.26 to 0.36 long. Seminal receptacle almost spherical, 0.26 to 0.46 in maximum diameter and 0.22 to 0.43 in minimum one, showing some variation in size. Genital pore located immediately behind pharynx in all specimens. Other measurements summarized in Table 2.

Eggs (Figs. 6 and 7)

Oval in shape, yellowish in color, containing one unsegmented embryo and several vitelline cells. Fifty eggs measured 50.8 to 62.0 μ long by 32.0 to 41.4 μ wide, averaging 57.7 by 38.2, when free from pressure; the ratio of length to width 0.66 on the average, ranging from 0.59 to 0.71. Eggshell uniform in thickness and provided with a small operculum at one pole, about 12 μ in diameter. In side view, the operculated end shows slight hollow in most eggs.

Host: Rattus muelleri (Jentink)

Habitat: Trachea and bronchi

Locality: Kepong, Selangor State, Malaysia

Type specimens: Department of Parasitology, Faculty of Medicine, Kyushu University, Fukuoka, Japan

Discussion

The family Achillurbainiidae Dollfus, 1939 known to be somewhat significant in medical science is represented by three species belonging to two genera, i.e. *Achillurbainia noveli* Dollfus, 1939 from a Malaysian leopard and a Chinese girl, *A. recondita* Travassos, 1942 from a Brazilian opossum, and *Poikilorchis congolensis* Fain et Vandepitte, 1957 from an African native.

As mentioned previously, the fluke from Malaysian rats was tentatively identified as *A. noveli* by Kwo & Lim (1968). But, the present authors are inclined to think that they are different species by the following reasons: 1) In the type specimens of *A. noveli* the ratio of the oral to the ventral sucker is 1.17 and 1.33, while in *A. rattii* it is 1.45 to 1.74 (aver. 1.58); in other words, the ventral sucker is bigger in the latter. 2) The number of testicles (ca. 380) in *A. noveli* is almost twice as many as that of *A. rattii* (see Table 2). 3) The egg of *A. noveli* (55-60 by 32-34 μ) is more slender than that of *A. rattii*. 4) Clear-cut difference is recognized in the position of genital pore, which opens in *A. noveli* behind the bifurcation of intestine, namely more pos-

Explanation of Figures

Figs. 2-4. Anterior and central part of paratypes under the same magnification (scale: 0.5 mm). Ventral view. A: ventral sucker, G: genital pore, O: ovary, T: testicle, U: uterus.

Fig. 5. Detail of the squared section of figure 4 (scale: 0.2 mm). R: seminal receptacle, T: testicle.

Fig. 6. Seven eggs of *A. rattii* laid in saline solution and then preserved in formalin. Photographed under the same magnification, free from pressure (scale: 50 μ). Operculum located at the upper end in all eggs except one which is shown by an arrow.

Fig. 7. Egg of *A. rattii* under high cover-glass pressure; partly broken. Operculum indicated by an arrow. Magnification is the same as figure 6.

Fig. 8. Eggs of *Poikilorchis congolensis* found in a retroauricular cyst of an African; demonstrated by Fain and Vandepitte (1957 a).

Fig. 9. Egg from a retroauricular cyst of a Chinese reported as *Achillurbainia noveli* by Chen (1965).

teriorly than *A. ratti*. Concerning a single specimen of *A. nouveli* reported from man by Chen (1965), the ratio of two suckers (1.20) is apparently smaller than *A. ratti*. Although the number of testicles (ca. 240) is close to that of *A. ratti*, the egg (65.25 by 33.87 μ in aver.) is remarkably elongated as compared with *A. ratti* (see Fig. 9). In addition, the genital pore is situated midway between the two suckers, i.e. more posteriorly than the type specimen of *A. nouveli*.

Another known species of the genus, *A. recondita* is easily distinguished from *A. ratti* by the following points: In the former, testicles are much smaller in size and more plentiful (500-700) in number, and the genital pore opens midway between the oral and the ventral sucker.

Comparing with *Poikilorchis congolensis*, the present new species, *A. ratti*, is very similar to this fluke in the shape and size of eggs (see Fig. 8), in the ratio of two suckers, and in the number of testicles. But they differ from each other in the distribution of testicles, the position of genital pore, the shape of testicles and the folds of intestinal wall, of which the third and the fourth point were emphasized by Fain & Vandepitte (1957) as important difference from the genus *Achillurbainia*.

Both *A. nouveli* and *P. congolensis* were found from subcutaneous abscess of a leopard and human bodies; in other words, these cases are all accidental and their natural host and habitat have been entirely unknown. The case of *A. recondita* parasitic in the maxillary sinus of an opossum also seems to be accidental. Accordingly, the present paper clarified one of natural hosts and habitats of the family Achilurbainiidae for the first time. From medical point of view, it is noticed that the eggs of this family are so similar to those of *Paragonimus* that they are easily confused with each other. In order to avoid misidentification, the size and the operculated end of eggs must be investigated carefully.

Summary

Achillurbainia ratti sp. n. (Trematoda: Achilurbainiidae) is described from the trachea and

bronchi of swamp giant rats, *Rattus muelleri* captured in Selangor and Kedah State, Malaysia. Fourteen or 28.6% of 49 rats examined were infected, and the fluke amounted to 26 in all, ranging from one to five per rat. The egg of the new species closely resembles that of *Paragonimus* spp., but differs in the size of eggs and in the shape of their operculated end. Medical attention must be paid to the new species, because other two species of the same family—*A. nouveli* and *P. congolensis*—were removed from retroauricular abscess of human bodies.

Acknowledgement

The authors express their appreciation to the late Dr. Ungku Omar-Ahmad, Director of the Institute for Medical Research for his encouragement and support to this study and to Mr. Lim Boo Liat of the same Institute for his help in collecting wild rats. Thanks are also due to Dr. Yoichi Ishii, Assistant Professor of the Faculty of Medicine, Kyushu University for his supplying literatures.

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マレーシアのネズミ *Rattus muelleri* から発見された *Achillurbainia ratti* sp. n. (ネズミキカンキュウチュウ, 新称)について (特別掲載)

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マレーシアでの肺吸虫研究に際し、各種のネズミを調べてきたが、溪流にそつて棲息する *R. muelleri* から、1種の吸虫をみつけた。寄生部位は気管および気管支の内腔で、虫は自由に移動でき、肺吸虫のようなフクロは見られない。卵は管腔内に産みだされ、ネズミの大便に現われる。Kwo & Lim (1968)は、これを *A. noveli* Dollfus, 1939として報告したが、われわれは別種として、上記の学名と和名を提唱する。Dollfus (1939)によつて設けられた科 *Achillurbainiidae* に属する既知種は、最初にマレーシアのヒョウウから、ついで中国の少女からえられた *A. noveli*、ブラジル産フクロネズミからの *A. recondita* Travassos, 1942、およびアフリカ原住民からみつげられた *Poikilorchis congolensis* Fain et Vandepitte, 1957の2属3種にすぎない。このうち *A. recondita* だけは上顎トクからえられたが、他はすべて皮下の膿瘍からで、どの例も、本来の寄生部位とは考えにくい。このほか、Vandepitte *et al.* (1957)は *P. congolensis* が発見された地方で、これと全く同じ虫卵を他の3原住民の皮下膿瘍からも見つけて、この虫の医学的意義を明らかにした。その後、ボルネオのサラワク

で、Lie *et al.* (1962)および Wong & Lie (1965)が、1例ずつ、ダイヤク族少年の皮下膿瘍から虫卵だけを見つけて、おそらく *Poikilorchis* だろうと報告した。

われわれの新種は上記のどの虫とも一致しないが、とくに、生殖孔が咽頭の直後に開く点を重視したい。卵は *A. noveli* よりも、むしろ *P. congolensis* のものに似ている。しかし、これまでの報告はすべて異所寄生で、成虫数がきわめて少なく、また卵の記載もくわしくないので、十分な比較ができない。この科の虫卵は肺吸虫のものに似ているために、アフリカでも混同されており、宮崎も文献6の卵が、やや小さくはあつたが、一応、肺吸虫の皮下寄生をうたがつたほどである。この新種の卵が、今後、人体皮下などからえられたとしても、その大きさ、形、フタの部分をくわしく観察すれば、区別は困難ではあるまい。われわれの研究で、この科の吸虫の本来の終宿主と寄生部位の一つが、はじめて明らかになつたが、發育史は全くわからない。数種のネズミを調べた中で、溪流にそつてすむ *R. muelleri* だけに、この虫が寄生していた事実は、發育のナゾをとくカギになりそうである。