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A New Trematode, *Poikilorchis nagahanai* sp. n. Found from the Weasel in Japan (Trematoda : Achillurbainiidae)

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For the epidemiological study of paragonimiasis in Okayama Prefecture the author had been collecting the fresh water crabs, *Potamon dehaani* at several places in the prefecture for several years. During this survey the feces of weasels were collected near the mountain-stream in Mitsu-Cho, and in which the *Paragonimus*-like eggs were found by the microscopic examination. Later the weasels in this area and its neighborhood were collected, and dissected in order to unmask the true adult worm that excreted the identical eggs. Eight weasels, *Mustela sibirica itatsi* were captured in these areas and examined for this curious trematode. The fecal examinations of these animals revealed the identical eggs as the previous one in two animals which were captured in Takebe-Cho and Mitsu-Cho, and on dissection of the animals 13 worms in total were found in the paranasal cavity of the animals, of which ten were adults and three likely to be immature ones of the same species. By the morphological observation of the staining preparations, these worms were found to be an unrecorded trematode belonging to the family Achillurbainiidae in Japan. As trematode of the family Achillurbainiidae up to now four species have been reported, and these flukes are : 1) *Achillurbainia nouveli* Dollfus, 1939 from a palpebro-orbital abscess of a Malaysian leopard and a retroauricular abscess of a Chinese girl, 2) *A. recondita* Travassos, 1942 from the maxillary sinus of a Brazilian opossum, 3) *A. ratti* Miyazaki *et* Kwo, 1969 from the trachea of Malaysian swamp giant rats, and 4) *Poikilorchis congolensis* Fain *et* Vandepitte, 1957 from a subcutaneous cyst in the retroauricular region of African natives.

After a careful comparison between the present specimens and the original descriptions of these four species mentioned above, the author concluded that the present specimens differ from these four species in some morphological features as described below. The specific name, *nagahanai*, is dedicated to Prof. Misao Nagahana, the Department of Parasitology, Kawasaki Medical School, who confidentially anticipated the habitat of the worm in the animal host, and offered kind suggestions and advice.

Materials and Methods

The weasels were collected during the winter season in Takebe-Cho, Okayama Prefecture. The worms removed from the paranasal cavity of animals were flattened in 70% alcohol, and stained with Alum carmine or Delafield's haematoxylin and mounted in balsam. Seven specimens were used for the present description except for the immature and damaged worms. The eggs in the intestinal contents were also examined. The measurements are in millimeters unless otherwise stated and mean

values are enclosed in parentheses.

Description

Poikilorchis nagahanai sp. n.
(Fig. 1 and Table 1)

Live worms slightly reddish in color, thin and foliated in shape except for acetabular region. Measurements of various parts of the worms are given in Table 1. Body leaf-shaped, aspinose, 5.0 to 7.5 by 1.7 to 2.7 (av. 6.2 by 2.2), widest at midbody. Oral sucker subterminal, measuring 0.34 to 0.38 by 0.18 to 0.34 (av. 0.36 by 0.27) in diameter. Prepharynx absent. Pharynx 0.20 by 0.21 in diameter followed by a short esophagus. The bifurcated intestinal cecae showing four to five curves on each side generously, and reaching to near posterior end of body. Acetabulum situated about one-fourth of body length from anterior extremity, measuring 0.39 to 0.47 by 0.34 to 0.45 (av. 0.43 by 0.39) in diameter ; sucker ratio 1 : 1.11 to 1.35.

Testicles spherical to ovoid in shape, and are divided into numerous follicles, measuring 0.25 in diameter. They are distributed not only in the intracecal field of the hind body, but also on the extracecal fields from the anterior level of the ovary to near the posterior extremity of body. The testicles are 76 to 95 (av. 84) in number, and almost equal number on each side. Seminal vesicle appears stout tubular in shape, winding two or three times anterior to acetabulum, and lacking cirrus pouch. Genital pore opens a little posterior to cecal bifurcation. Ovary spherical, situated submedian on right side of midbody, measuring 0.44 to 0.71 by 0.35 to 0.60 (av. 0.53 by 0.47) in diameter, which is about 1.2 times as large as the acetabulum. Seminal receptacle ovoid, postovarian, measuring 0.44 by 0.24 in diameter. Laurer's canal opens on the dorsal surface near the seminal receptacle. Uterus highly coils around the acetabulum containing numerous eggs, and opens to genital pore. Vitellaria consisting of small follicles, distributing almost whole of body from level of pharynx to near posterior extremity of body except for acetabulo-ovarian region and the median narrow field of hind body. They distributed in the left and right sides make contact at the level of the cecal bifurcation.

Eggs thin-shelled, operculated, oval, yellowish in color, containing one unsegmented embryo and several vitelline cells.

Fifty eggs in life measure 58.5 μm in length and 36.9 μm in width under the pressure of a microcover slip. The greatest width was obtained at the middle of the egg.

Host : *Mustela sibirica itatsi*
Habitat : Paranasal cavity
Locality : Takebe-Cho, Okayama Prefecture, Japan
Date : February 10, 1978

Table 1 Measurements of the mature worms found from weasels (in mm)

Specimens no.	Body		Oral sucker		Acetabulum		Ovary		No. of testicles		
	length	width	length	width	length	width	max.	min.	L	R	total
1	7.5	2.7	0.37	0.34	0.47	0.45	0.59	0.52	38	39	77
2	6.7	2.5	0.38	0.28	0.45	0.44	0.55	0.53	39	41	80
3	6.3	2.5	0.38	0.27	0.45	0.39	0.71	0.60	42	53	65
4	6.3	2.1	0.34	0.28	0.46	0.42	0.49	0.39	38	38	76
5	5.7	2.2	0.34	0.28	0.46	0.37	0.48	0.46	39	38	77
6	5.0	1.7	0.34	0.27	0.39	0.35	0.45	0.43	47	44	91
7	5.6	2.0	0.35	0.18	0.39	0.34	0.44	0.35	52	39	91
average	6.2	2.2	0.36	0.27	0.43	0.39	0.53	0.47	42	42	84

Holotype : specimen no. 5, Paratypes : Six specimens except for the holotype.
L : left side, R : right side

Table 2 Comparison of the size of the mature worms and the eggs of known species of the family Achillurbainiidae (in mm)

Species (Author)	Body		Oral sucker		Acetabulum		Ovary		Testicle		Egg	
	length	width	length	width	length	width	max.	min.	number	size	length	width
A. nouveli (Dollfus, 1939)	9.5 ~ 11.0	4.5 ~ 6.0	0.75		1.00	0.75	0.92	0.63	380	0.12 ~ 0.28	0.055 ~ 0.060	0.032 ~ 0.034
A. nouveli (Chen, 1956)	11.0	5.0	0.74		0.89	0.84	0.67	0.65	240	0.09 ~ 0.39	0.051 ~ 0.074	0.030 ~ 0.038
A. recondita (Travassos,1942)	11.2	5.2	0.74	0.64	0.99	0.84	0.88	0.68	500 ~ 700	0.08 ~ 0.09	0.064 ~ 0.072	0.038 ~ 0.045
A. ratti (Miyazaki *et* Kwo, 1969)	11.8	5.0	0.92	0.61	1.45	1.05	0.85	0.61	181 ~ 212	0.19 ~ 0.39	0.051 ~ 0.062	0.032 ~ 0.041
P. congolensis (Fain *et* Vandepitte, 1957)	7.6	3.9	0.67	0.59	1.0	0.95	0.64	0.49	200 ~ 220	0.10 ~ 0.18	0.060 ~ 0.068	0.038 ~ 0.041
P. nagahanai (Present author)	7.5	2.7	0.37	0.34	0.47	0.45	0.59	0.52	76 ~ 95	0.16 ~ 0.33	0.051 ~ 0.063	0.031 ~ 0.042

Type specimens: Department of Parasitology, Kawasaki Medical School, Kurashiki City, Japan

Discussion

The worm described here has some morphological and ecological characteristics such as the adult worm inhabits the nasal cavity of animal host, the testicles are follicular and numerous but less than 100 in number. Judging from these points, the present worms seem to be included in the family Achillurbainiidae or the family Orchipedidae. The distribution of testicles and vitellaria in the present worms, however, differ very markedly from those of the family Orchipedidae. Thus, the present worms should be considered as the trematode in the family Achillurbainiidae.

The important morphological features of the present worms may be summarized as follows: 1) The body length is apparently small. 2) The acetabulum is situated about one fourth of the body length from the anterior extremity. 3) The testicles are spherical in shape, and divided into numerous follicles and distributed mostly or entirely in the hind body from the anterior level of the ovary to the posterior extremity. 4) The testicles are less than 100 in number. 5) The vitellarium is spherical in shape, and is smaller than the testicle. Moreover, the vitellaria extend almost the entire body from the level of pharynx to posterior extremity except for the acetabulo-ovarian region and the median part of hind body, and they distributed in the left and the right sides make contact at the level of the cecal bifurcation. 6) The ovary is slightly larger than the acetabulum, so that there is an observable tendency in three measurements covering ovary > acetabulum > oral sucker. 7) Intestinal cecae have gentle winding, reaching near the posterior extremity.

Comparing the morphological features of the present worms with those of two genera in the family Achillurbainiidae, the present worm very closely resembles the genus *Achillurbainia*, but it differs sharply from the genus *Achillurbainia* in the distribution and the number of testicles, in the size of body, two suckers as well as ovary (Table 2). The distribution of the testicles in the genus *Achillurbainia* reach to the midway level of the two suckers. The testicles in the pre-

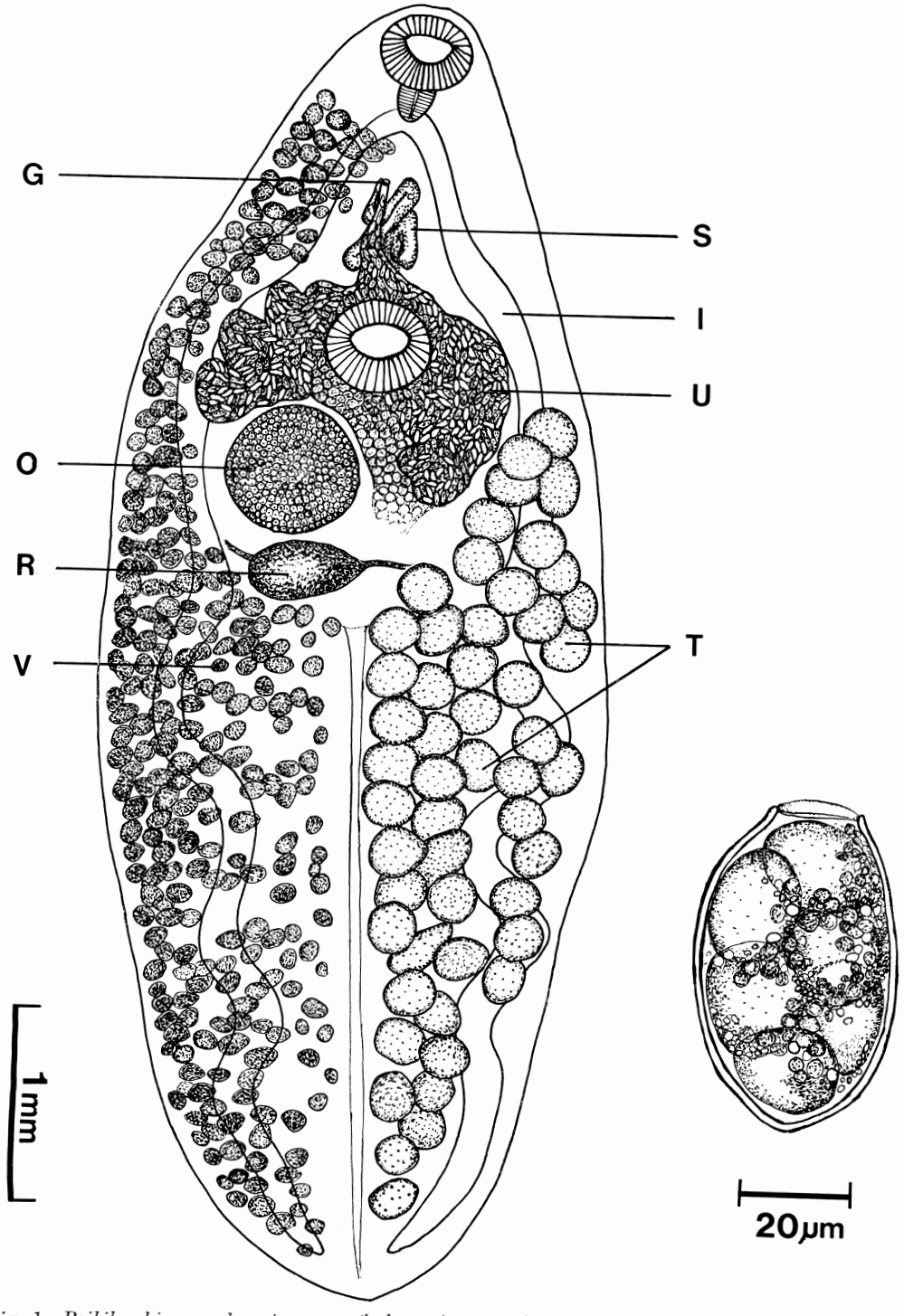

Fig. 1 *Poikilorchis nagahanai* sp. n. (holotype), ventral view. Testicles and vitellaria on the lateral fields of the worm body are shown single side only, respectively.
G: genital pore, I: intestinal ceca, O: ovary, R: seminal receptacle, S: seminal vescle, T: testicle, U: uterus, V: vitellarium.

sent worms, on the other hand, do not reach the level of acetabulum in the same as the genus *Poikilorchis*. The testicles in the genus *Poikilorchis* is situated on each side of ceca from level of the posterior end of acetabulum to cecal ends (Fain *et* Vandepitte, 1957).

Therefore, the present worms should be included in the genus *Poikilorchis*. As stated in the introduction the trematode of the genus *Poikilorchis* has been newly established by Fain *et* Vandepitte (1957) based on the specimen from African natives. *Poikilorchis congolensis* is the only species of the genus *Poikilorchis* hitherto reported. The present worms, however, differ from *P. congolensis* in some morphological aspects such as the shape of testicle and vitellarium, and the folds of intestinal wall as emphasized by Fain *et* Vandepitte (1957 a, b) to be important differences from the genus *Achillurbainia*. The testicle and vitellarium in the present worms are spherical in shape, and the ceca without sinuous walls although the size of body is so similar to each other (Fig. 1 and Table 2). The total number of testicles in the present worms is apparently fewer than *P. congolensis*. The diameter of two suckers in the present worms is distinctly smaller than those of *P. congolensis*. Moreover, the vitellarium in the present worms seems to be slightly larger than those of *P. congolensis*. Comparing the maximum diameter of the acetabulum with that of ovary, the former is larger than latter in *P. congolensis*, while the contrary correlations are obtained in the present worms.

As shown in Table 2, the size of eggs in the family Achillurbainiidae resembles well with each other. These eggs are often mistaken as *Paragonimus* eggs in foreign countries (Lie *et al.*, 1962; Chen, 1965; Kwo *et* Lim, 1968; Miyazaki *et* Kwo, 1969).

The shape of the present eggs is very similar to those of *Paragonimus miyazakii*. Therefore, an extreme care is required with these eggs in the future.

The life history of these trematodes has been entirely unknown, although recently Miyazaki *et* Kannangara (1970) first found metacercariae of *Achillurbainia* sp. from the fresh water crabs, *Parathelphusa rugosa*, in Ceylon. Shimazu (1978), on the other hand, reported the occurence of new metacercariae probably belonging to this family the fresh water crabs, *Geothelphusa dehaani*, in Japan. Therefore, the crabs may be considered to become the intermediate host of these parasites. As described in the introduction, the trematodes of this family have a very strong possibility of the human infection, because of both *P. congolensis* and *A. nouveli* had been found in the human bodies in foreign countries (Fain *et* Vandepitte, 1957 a; Vandepitte *et al.*, 1957; Lie *et al.*, 1962; Wong *et* Lie, 1965; Chen, 1965).

Summary

Poikilorchis nagahanai sp. n. (Trematoda: Achillurbainiidae) is described on the basis of seven materials obtained from the paranasal cavity of the weasels, *Mustela sibirica itatsi*, captured in Takebe-Cho, Okayama Prefecture, Japan.

Comparing it with *P. congolensis* Fain *et* Vandepitte, 1957, which is the only one species in the genus *Poikilorchis*, the present new species differs markedly in the diameter of two suckers, in the shape of testicle and vitellarium, in the number of testicles, in the difference of the size between acetabulum and ovary as well as in the states of intestinal walls. The present paper is the first description of the family Achillurbainiidae in Japan.

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岡山県産ホンドイタチから得た一新吸虫 *Poikilorchis nagahanai* sp. n.

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岡山県における肺吸虫に関する調査の一環として，各地のサワガニを採集中に，県中部の御津町の山間渓流付近で，たまたま採集したイタチの糞便を検査したところ，宮崎肺吸虫卵に酷似する虫卵が認められた．その後，この虫卵を排出する寄生虫の正体を究明する為，この付近に生息するイタチ8頭を捕獲，剖検したところ，建部町と御津町で捕獲された2頭の副鼻腔内に，上記の虫卵を排出する虫体の寄生を認めた．1頭から10個体の成熟虫体が，他の1頭からは恐らく同じ種類の未熟型と思われる3個体がそれぞれ見出された．これらの虫体について染色標本作成後，その形態を詳細に観察した結果，この虫体は睾丸濾胞が腹吸盤のかなり後方から，換言すれば，卵巣の前縁付近から体の後端近くまで，ほぼ後体部全域に分布しており，蛇行しながら下向する2本の腸管に囲まれた領域にとどまらず，その両外側まで拡がつている．このため，本種は本邦未記録の Achillurbainiidae 科，*Poikilorchis* 属吸虫であることが明らかになつた．現在，この属のものとしては，アフリカの原住民から得られた *Poikilorchis congolensis* Fain *et* Vandepitte, 1957 の1種だけが記録されているに過ぎない．今回，イタチから得た成熟虫体を，*P. congolensis* の原記載と比較すると，1) 口吸盤および腹吸盤の直径が小さいこと，2) 睾丸および卵黄濾胞が球形を呈すること，3) 睾丸の数が100個以下であること，4) 卵巣の直径が腹吸盤の直径より大きいこと，5) 腸管壁に褶(folds) の認められないこと等の形態的特徴より，明らかに *P. congolensis* と区別されるとの結論に達した．よつて，本種を *Poikilorchis nagahanai* と命名し，記載した．この科の吸虫は外国でヒト寄生例の報告があるうえ，その虫卵は肺吸虫卵としばしば見誤られている．従つて，今後は日本でも充分注意する必要がある．尚，和名としては「ナガハナキュウチュウ」を提唱したい．