

## Heterophyid trematodes (*Heterophyopsis continua*, *Pygidiopsis summa* and *Heterophyes heterophyes nocens*) from domestic cats in Korea

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### INTRODUCTION

In Korea, *Metagonimus yokogawai* (Cho *et al.*, 1981; Min, 1981) and *Heterophyes heterophyes nocens* (Lee, 1979) are all the heterophyid trematodes found in domestic cats and dogs as natural infections. There were only a few epidemiological or taxonomic studies performed especially in domestic cats, and the trematodes found were *Clonorchis sinensis* and *Paragonimus westermani* (Kang, 1964) and *Pharyngostomum cordatum* (Cho and Lee, 1981). In experimental studies with dogs, *Heterophyopsis continua* (Chun, 1960; Seo *et al.*, 1984; Cho and Kim, 1985) was reported. In the piscine hosts, metacercariae of *Pygidiopsis* (Chun, 1963), *Centrocestus* (Choi *et al.*, 1964), *Stellantchasmus* (Seo *et al.*, 1979) and *Heterophyes* (Seo *et al.*, 1980) were reported and as natural human infections, *H. heterophyes nocens* and *Pygidiopsis summa* (Seo *et al.*, 1981), *H. heterophyes nocens* (Chai *et al.*, 1984), *Heterophyopsis continua* (Seo *et al.*, 1984) and *Stellantchasmus falcatus* (Seo *et al.*, 1984) were also reported. In the present study, *Heterophyopsis continua*, *Pygidiopsis summa* and *H. heterophyes nocens* were found from domestic cats (*Felis catus domesticus*). Among them, *Heterophyopsis continua* and *Pygidiopsis summa* were recorded for the first time as natural infections of cats in Korea.

### MATERIALS AND METHOD

A total of 181 domestic cats of unknown localities were purchased at Seoul Chung-ang market during 8 April 1983 to 9 April 1985. The internal organs (esophagus, stomach, intestine, trachea, lung, heart and liver) were cut open in physiological saline and examined carefully for parasites by naked eyes and with dissecting microscope. Through examination the results of necropsy were recorded on each host and the number or kinds of parasites found were also recorded. Freshly collected living parasites were washed several times with saline to avoid the congelation of mucus, and pressed with light coverslip and fixed by pouring hot A.F.A. solution. The fixed specimens were stained with Semichon's acetocarmine and permanent mounts were prepared.

### RESULTS

***Heterophyopsis*** Tubangui *et Africa*, 1938

*Heterophyopsis continua* (Onji *et Nishio*, 1916)

Five specimens of *Heterophyopsis continua* (Family: Heterophyidae Ohdner, 1914) were collected from small intestine of three domestic cats. Description and measurements of this trematode were based on two stained specimens.

Description: Body elongate, cylindrical, flattened dorsoventrally and rounded at both extremities, 1.81~2.25 mm in length and 0.26~0.28

mm in width; cuticular spines covered the body surface over anterior half of body; oral sucker subterminal, 0.069~0.085 mm in maximum diameter; prepharynx long, measured 0.18 mm in length; pharynx oval, 0.069×0.051 mm; esophagus very short, measured 0.023 mm in length; intestinal bifurcation just behind the pharynx; ceca reached the extremity of body; ventral sucker, measured 0.023~0.028 mm in maximum diameter, lied on the median line of the body and well developed; genital sucker nearly round and disc shape, measured 0.099~0.131×0.099~0.124 mm, anteroventrally protruded and did not overlap the ventral sucker; a row of chitinous rodlets on the border of gonotyl, 89~95 in number, and not interrupted; testes oval or globular and a little obliquely tandem, situated posterior one fourth of the body, anterior testis 0.108~0.126 mm and posterior testis 0.126~0.144 mm in maximum diameter; seminal vesicle consisted of two parts junctioned by a constriction, 0.069~0.085×0.064~0.067 mm in anterior part and 0.074~0.108×0.071~0.083 mm in posterior part; cirrus pouch absent; seminal receptacle lied behind the ovary, measured 0.060~0.083×0.051~0.064 mm and slightly overlaped the ovary; ovary globular, measured 0.106~0.113×0.069~0.115 mm, lied on the median line of the body and located one third of posterior end between seminal vesicle and testes; vitelline follicles distributed between seminal vesicle and posterior testis, lateral fields of ceca; uterus filled posterior part of genital sucker; intrauterine eggs yellowish, 0.025~0.026 mm in length and 0.015~0.016 mm in width.

Host: *Felis catus domestica* Linnaeus

Habitat: Small intestine

Locality: Southern Korea

*Heterophyopsis continua* was firstly described by Onji *et* Nishio(1916) in the cats experimentally fed with the mullets (*Mugil cephalus*) as a name of *Heterophyes continus*. Africa and Garcia (1935) described of this genus, *Heterophyes expectans*. Tubangui and Africa (1938) later placed it in a new genus *Heterophyopsis* for valid reasons. The natural or experimental definitive hosts

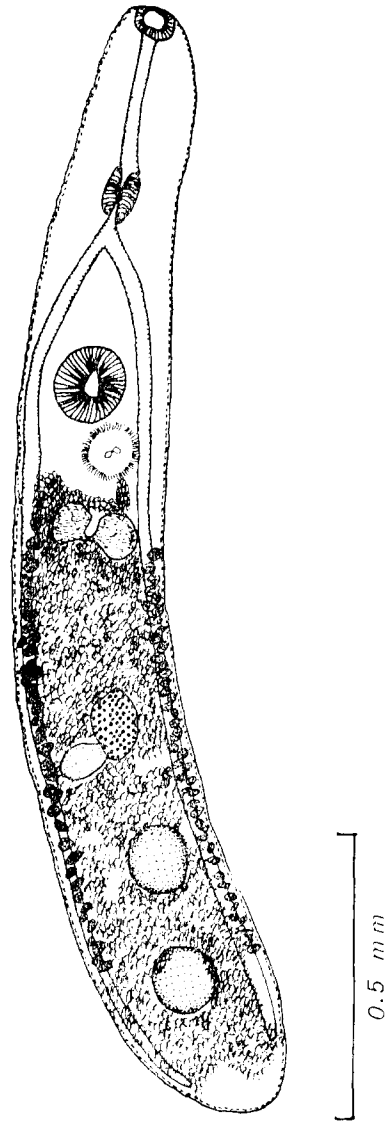


Fig. 1. *Heterophyopsis continua* Onji *et* Nishio, 1916 (ventral view).

of *H. continua* are cats(Onji *et* Nishio, 1916), dogs (Chun, 1960; Seo *et al.*, 1984), ducks (Onji *et* Nishio, 1916) and man (Yamaguti, 1939; Seo *et al.*, 1984). In Korea, the fish intermediate hosts of this trematode are known as perches (*Lateolabrax japonicus*), gobies (*Acanthogobius flavimanus*) and *Clupanodon punctatus* (Chun, 1960). Chun (1960) and Seo *et al.* (1984) experimentally proved the infection of this worm in dog. With this regard, there might be more

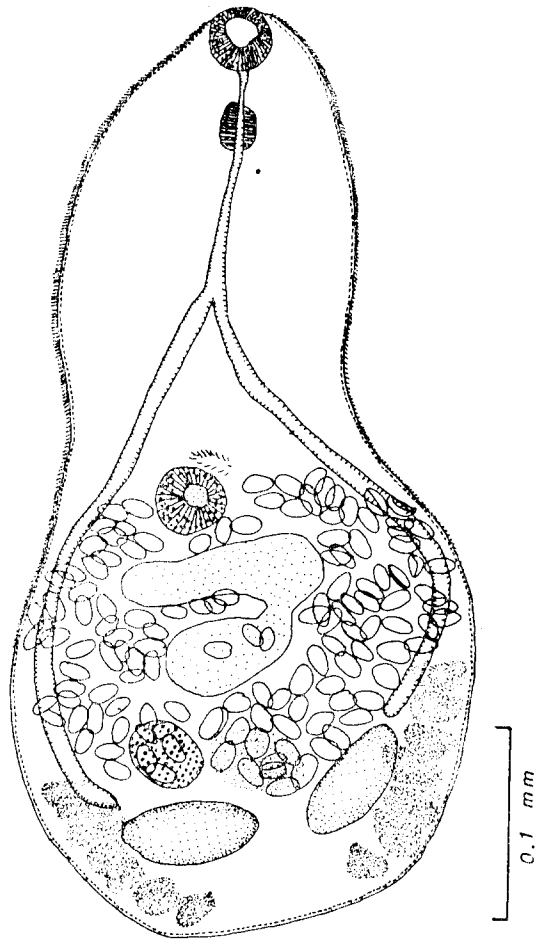
infections in animals susceptible to this trematode where these fish intermediate hosts are eaten raw. Recently Seo *et al.* (1984) proved two cases of human infection of *H. continua* and Cho and Kim (1985) recovered this worm from a dog experimentally infected with metacercariae from sweet fish (*Plecoglossus altivelis*). Although the present specimens are a little smaller than those previously described from man and dog, characteristics of other details agreed well to them. This is the first record of natural infection in domestic cats in Korea.

***Pygidiopsis* Looss, 1907**

***Pygidiopsis summa* Onji *et* Nishio, 1916**

Total 223 specimens of *Pygidiopsis summa* (Family: Heterophyidae Ohdner, 1914) were collected from small intestine of 7 cats. Description and measurements of this trematode were based on 10 stained specimens.

Description: Body very small, measured 0.295~0.515 mm in length and 0.198~0.248 mm in width, pear shaped, more or less pointed in front, broad at about middle of hind body; minute spines covered the body except at posterior extremity; oral sucker subterminal, 0.030~0.035 mm in diameter; prepharynx 0.002~0.022 mm in length; pharynx 0.027~0.030×0.022~0.025 mm, with pigment granules scattered; esophagus slender, measured 0.037~0.062 mm in length; ceca terminated in front of testes; acetabulum 0.035~0.057×0.040~0.050 mm in diameter, embedded in body parenchyme a little behind middle of the body; genital apparatus located left anteroventrally; testes transversely elongated oval, measured 0.047~0.082×0.032~0.045 mm, located near posterior end of body; seminal vesicle behind acetabulum, divided into two transversely elongated portions; ovary rounded, 0.042~0.045 mm in diameter in front of right testis; seminal receptacle rounded and located between the ovary and testes; vitellaria scattered along lateral margins of the body between ovary and behind testes; uterus filled entire available space between testes and ventral sucker; intrauterine egg yellowish, oval, with opercular line, 0.018~0.020 mm in length and 0.009~0.011 mm in width.



**Fig. 2.** *Pygidiopsis summa* Onji *et* Nishio, 1916 (ventral view).

Host: *Felis catus domestica* Linnaeus

Habitat: Small intestine

Locality: Southern Korea

*Pygidiopsis summa* was named by Onji *et* Nishio, 1916 when they obtained adult worms after feeding dogs with metacercariae from *Mugil cephalus*. The final hosts reported are dogs (Asada, 1927), cats, *Milvus migrans lineatus* and *Nycticorax nycticorax* (Komiya, 1965). In Korea, Seo *et al.* (1981) reported human infections of this trematode with the patient's history of eating raw flesh of brackish water fishes. Although there is no report on natural infection of *P. summa* in animals it seems that infections are not infrequently distributed in Korea. In the present specimens, the intrauterine eggs showed

markedly smaller size than those of *Clonorchis sinensis* eggs. The egg shell was relatively thick as compared to egg size and the opercular margin did not show such a remarkable thickening as in *C. sinensis*. The present specimen was considered to be the same with those described by Yamaguti (1938) although more or less small in size. This is the first record of natural infection in domestic cat in Korea.

***Heterophyes* Cobbold, 1886**

*Heterophyes heterophyes nocens* (Onji et Nishio, 1916)

Total 26 specimens of *Heterophyes heterophyes nocens* (Family: Heterophyidae Ohdner, 1914) were collected from small intestine of 3 domestic cats. Description and measurements of this trematode were based on 10 stained specimens.

Description: Body small, tongue shaped, flattened dorsoventrally and rounded at both extremities, 1.20~1.35 mm in length, 0.44~0.51 mm in width; integument with spines from anterior to the level of testes; oral sucker subterminal, 0.078~0.088 mm in maximum diameter; pharynx oval 0.046~0.055 mm in maximum diameter; slender and muscular esophagus measured 0.032~0.033 mm in length; intestinal bifurcation lied on the boundary between the anterior and a third of body, in front of ventral sucker; ceca widest at the level sucker, reached the extremity of body at mid or post-testicular level and one cecum was often a little longer than the other; ventral sucker, measured 0.198~0.225×0.225~0.243 mm, well developed and lied on the middle of the body; genital sucker oval disc shape, lied on and behind the left side of the ventral sucker; measured 0.108~0.153 mm in maximum diameter, anteroventrally protruded and slightly overlaped the ventral sucker; a row of chitinous rodlets on the border of gonotyl, 49~56 in number, interrupted in the part in contact with ventral sucker, 0.009~0.012 mm in length, and each had 4~5 small sharp dents; testes oval or globular, situated in the extreme hind part of body side by side, left testis 0.131~0.135 mm in diameter and right testis 0.117~0.126 mm with a little posterior to the left one; seminal

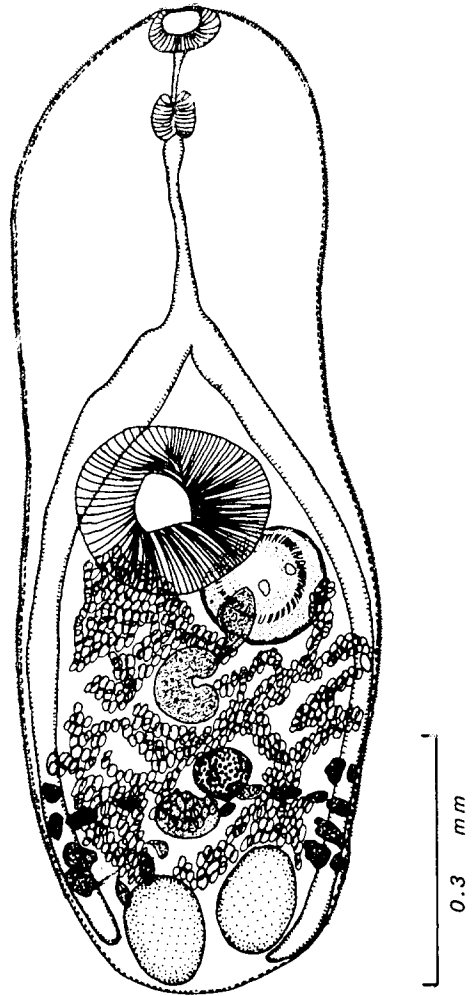


Fig. 3. *Heterophyes heterophyes nocens* Onji et Nishio, 1916 (ventral view).

vesicle retort shaped, lied between ventral sucker and ovary, measure 0.063~0.135×0.072~0.108 mm; cirrus pouch absent; seminal receptacle lied behind the ovary, not well seen; ovary globular, 0.072~0.090 mm in diameter, lied in the middle line in front of the testes and behind the seminal vesicle; vitellaria with two bunches of irregular pear-shaped dense follicles on both sides, located between the levels of ovary and testes; uterus filled the space between the ventral sucker and testes; yellowish brown intrauterine eggs, 0.025~0.028 mm in length and 0.013~0.017 mm in width.

Host: *Felis catus domestica* Linnaeus  
Habitat: Small intestine

Locality: Southern Korea

*H. h. nocens* was firstly described by Onji et Nishio (1916) in dogs and cats fed with encysted metacercariae from *Mugil cephalus* in Japan. This heterophyid trematode has animal carriers such as dogs, cats and others, and also can infect human (Ito, 1964). In Korea, the morphology of adult worm of this species was firstly described by Lee (1979), and experimentally by Seo et al. (1980). Afterward, Chai et al. (1984) reported two cases of human infection with the history of eating raw brackish water fish such as mullets (*Mugil cephalus*), perches (*Lateolabrax japonicus*) and gobies (*Acanthogobius flavimanus*) which are the intermediate hosts of *H. h. nocens* in Korea.

### SUMMARY

During 8 April 1983 to 9 April 1985, a total of 181 domestic cats (*Felis catus domestica* Linnaeus) of unknown localities in Korea were purchased at Seoul Chung-ang market, and the internal organs were dissected for helminth infections. In the results, three kinds of trematodes of family Heterophyidae (Ohndner, 1914) were obtained from small intestine of domestic cats and identified as follows; five adult worms of *Heterophyopsis continua* (Onji et Nishio, 1916) from three hosts, two hundreds and twenty three adult worms of *Pygidiopsis summa* Onji et Nishio, 1916 from seven hosts and twenty six adult worms of *Heterophyes heterophyes nocens* (Onji et Nishio, 1916) from three hosts. Among them, *Heterophyopsis continua* and *Pygidiopsis summa* had not been proved as natural infections of cats in Korea.

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＝國文抄録＝

### 고양이에 自然感染된 3種의 異形吸蟲類 : *Heterophyopsis continua*, *Pygidiopsis summa* 및 *Heterophyes heterophyes nocens*

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Family Heterophyidae에 속하는 吸蟲類 3種의 成蟲을 고양이에서 檢出함으로써 自然感染을 確認하였다. 1983年 4月 8일부터 1985年 4月 9日 사이에 서울 中央市場에서 購入한 고양이 181마리의 小腸 및 內部腸器를 剖檢한 結果 3마리의 고양이에서 *Heterophyopsis continua* Onji et Nishio, 1916 成蟲 5마리(1~3마리), 7마리의 고양이에서 *Pygidiopsis summa* Onji et Nishio, 1916 成蟲 223마리(1~200마리), 3마리의 고양이에서 *Heterophyes heterophyes nocens* Onji et Nishio, 1916 成蟲 26마리(7~11마리)를 각각 얻을 수 있었다. 이들 중 *H. heterophyes nocens*를 제외한 2種의 異形吸蟲類 *H. continua* 및 *P. summa*는 國內에서 고양이의 自然感染으로 처음 보고되는 것이다.