

One Case Report of *Diphyllobothrium latum* infection in Korea

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The existence of *Diphyllobothrium latum* infection in Korea has been thought with high possibility because of some earlier reports on the recovery of ova from the fecal examination of the inhabitants in Southern Korea (Kojima & Ko, 1919; Hara & Himeno, 1923). However, the existence itself has been dealt with only a possible occurrence without any further informations on the cases from whom the adult specimen were collected (Mills, 1927; Seo, 1960, 1968).

Many studies and reports on the sparganosis (Weistein et al., 1954; Seo et al., 1963; and others), limnological observations on the copepods which may serve as intermediate host, inhabiting in fresh-water streams and ponds in Korea (Cho, 1968; Kang, 1969; Cho & Park 1969; Kim & Park, 1969). and the reports on the occurrence of the known fish hosts (Chung, 1954) should indicate that the infection of *D. latum* might be endemic in some parts of Korea.

Recently authors found a case of indigenous infection of *Diphyllobothrium latum*. This is the first record on the collection of an adult worm of *D. latum* from human host in Korea.

Case presentation

The patient Y.C., a 50-year-old healthy

Korean male visited our laboratory on July, 1968 since he found some pieces of worm in his stool. He observed them at first about 3 weeks ago and experienced the appearance again. There were neither abdominal discomfort, defecation problems nor any other general symptoms such as fatiguability or inertia.

For the identification of the species, the patient was advised to collect the worm fragments under the impression of *Taenia* sp. infection which is frequently seen here in Korea. On the basis of the genital pores on the median portion of proglottids and other characteristics of the collected worms, the tentative diagnosis was made as the *Diphyllobothrium* species.

The patient was treated with 0.9 gm of atabrine orally followed with magnesium sulfate purge. Only the strobila from immature to gravid proglottids was collected and the neck and scolex parts have failed to be found. The relapse was not observed during the next two months.

The haematological examination of the patient could not be done. The stool examination undertaken after treatment revealed the ova of *T. trichiurus* without any other parasitic cysts or ova.

In the past history the patient has never been abroad and habitat has been limited to

Seoul except 3-year living in Pusan during the Korean War. He has been a moderate drinker with favorite eating of raw fishes as an hors-d'oeuvre. According to him he almost always ate the raw fishes in the restaurant in downtown Seoul. However, denied the history of eating raw snakes or frogs.

Description of worm

The specimen was yellow-tinged, 198cm long strobila without scolex and neck part (Fig. 1). The number of proglottids in the collected strobila was approximately 1,280. The strobila was fixed with 10% formalin and some of the terminal gravid proglottids were stained with Semichon's acetocarmine (Fig. 2) and some of them were sectioned through the midline (Fig. 5 & 6). The morphological data on the worm were presented in Table 1.

Table 1. Morphological data of the collected strobila

Scolex & Neck:	Not recovered
Length of strobila:	198cm in fixed state
Number of proglottids:	approximately 1,280
Gravid proglottids:	width: 7.2—9.8mm length: 1.9—2.5mm thickness: 0.9—1.2mm
Cirrus pouch:	width: 551 μ (489—585 μ) length: 690 μ (599—748 μ)
Position of cirrovaginal aperture:	21.9% from anterior border
Dorso-ventral dimensions of internal structures (%)	cuticle: 1.36 subcuticle: 4.66 cortex: 15.04 vitellaria: 14.52 muscle: 17.98 medulla: 24.37 testes: 18.12
Number of uterine loop:	3—5
Dimensions of ova:	length: 66.5 \pm 1.9 μ width: 41.2 \pm 1.4 μ percentage of operculum: 6.2%

The outer uterine coils were in forms of rosette (Fig. 2) and the uterine loop count were 3 to 5. The ovary was dumbbell-shaped and the vitellaria and testes distributed laterally. The position of cirrovaginal aperture was 21.9% of segment length measured from its center to the anterior border of the segment (Fig. 2). The ventral view of gravid proglottids was presented in Fig. 3. The arrangement of pores and cirrus were showed in Fig. 5 & 6. The cirrus and vagina opened their pores in a common sinus together. The uterine pore separate and posterior. The seminal vesicle was lying posterior of the muscular cirrus and not included to the cirrus. The dorso-ventral dimensions of internal structures, showed as percentage of segment thickness are; cuticle, 1.36; subcuticle, 4.66; cortex, 15.04; vitelline follicles, 14.52; muscle, 17.98; medulla, 24.37; testes, 18.12. The ova collected from proglottids were oval in shape with operculum and rounded end, grayish brown in colour and dimensions 66.5 μ in length and 41.2 μ in width (Fig. 4).

From the above characteristics, the strobila was identified as a *Diphyllbothrium latum* (Linnaeus, 1758) Lühe, 1910.

Discussion

The distribution of *Diphyllbothrium latum* infection is world wide with higher endemic areas in Circum-Baltic Countries, Siberia, Japan and Great Lakes Region of U.S.A. (Wardle & McLeod, 1952). On the second intermediate hosts of *D. latum*, Petrushevsky (1931) in Russia reported that some kinds of favoured fresh-water fishes such as *Acerina cernua*, *Lota lota*, *Esox lucius*, *Perca fluviatilis* and fresh water eel, *Anguilla anguilla* were relatively heavily infected with plerocercoids of *D. latum*. In North America, the

plerocercoids were found infected in 4 kinds of fresh-water fishes (pikes and perches). In Japan, Eguchi (1964) reviewed the studies on *D. latum* infection in Japan and listed 4 salmon species known as naturally infected with plerocercoids. Those were *Onchorhynchus masou*, *O. gorbusha*, *O. keta* and *O. nerka*.

According to the studies of Vogel(1930) in Europe, the copepod hosts, such as *Cyclops strenuus*, *Diaptomus gracilis*, *D. vulgaris* were found to serve as the first intermediate hosts of *D. latum*. Essex(1927) reported that *D. oregonensis*, *C. brevispidatus*, *C. prasinus* were playing the role of first intermediate host in North America. And Eguchi(1964) stressed the *C. strenuus* as an effective copepod host in Japan.

In some of the earlier surveys of the stool examinations, there were some reports on the recoveries of *D. latum* ova in inhabitants of South Kyongsang Do. Kojima & Ko (1919) reported 2 egg positive cases in Jinchu and Hara & Himeno (1923) also found 14 egg positive cases in islands of south sea, Keoche and Namhae. The latter authors commented that much amount of the *Onchorhynchus* species were available at those areas although those places were not known as the original habitats of the fish host of this tapeworm. Since that time no more informations on infection cases or ova recoveries were presented in this country. Brooke et al. (1956) and Chyu et al. (1965) reported the recoveries of ova of *Dipyllobothrium* species from stool examinations respectively. But both authors did not specify the species of ova as *Dipyllobothrium latum*.

Although the authors failed to observe the characteristic scolex, the tapeworm was apparently *Dipyllobothrium latum* because of the morphological characteristics such as rosette form of uterine loops, arrangement of genital

pores and the shape of ova. Through the cross section of the midline of the strobila, it was revealed that the arrangement of genital pores and relevant structures of the worm coincided with the Mueller's description on *D. latum*. (1937).

The exact source of infection in this case is hardly traced out, however, it is apparent that this infection was autochthonous because of the patient's past history. But it is not clear whether he was infected in a rural village along the Kum River where he recently visited, or infected in the restaurants in downtown Seoul, where he has often been and ate the raw fishes. And there are some possibilities that he might be infected through the imported fishes favouring the plerocercoids. However, it seems that the latter assumption has only negligible possibility because almost all of the imported salmon fishes from Northern Pacific were deeply refrigerated ($-10^{\circ}\text{C}\sim-40^{\circ}\text{C}$) or heavily salted. Actually the amount of fisheries import has been extremely limited by the policy of Korean Government. Considering the main sources of raw fishes in Seoul restaurants are limited to indigenous, such as from Pusan, Yosoo and Incheon, the infection in this case is most likely resulted from the intake of *Onchorhynchus masou* or other fishes which were common in Korea.

According to the description of Chyung on "Korean Fishes"(1954), *O. masou*, *O. keta*, and *O. gorbusha* were distributed in southern, eastern and northeastern coastal streams in Korea. The *Lota lota* was distributed rarely in northern Yalu River.

Some of the limnological reports deals with the distribution of zooplankters in some parts of ponds and streams in Korea. In reports of Cho(1968), Cho & Park(1969), Kang(1969) and Kim & Park(1969), *Cyclops strenuus*,

Cyclops leuckarti and other unidentified *Cyclops* sp. were recorded to be present but no description on the *Diaptomus* species. There are many case reports of human sparganosis (Weinstein et al., 1954; Seo et al., 1963) in Korea and some kinds of copepods would play a role of the first intermediate hosts. It is necessary to determine the species of copepod hosts to serve as a first intermediate host of human and animal *Diphyllobothrium* species.

Summary

A case of *Diphyllobothrium latum* infection was recorded. A 50-year-old healthy Korean male was infected with this tape worm and treated with atabrine orally. An incomplete strobila without scolex and neck parts was collected. On the basis of morphological characteristics, it was identified as *D. latum*.

It is the most probable that the infection is autochthonous, because of past history of the patient the distribution of possible intermediate hosts and commercial status of fisheries imports in Korea.

This is the first record of *Diphyllobothrium latum* infection in Korea which was verified with the recovery of the adult worm.

—國文抄錄—

廣節裂頭條虫 感染의 一例

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韓國에서 廣節裂頭條虫에 對한 感染報告는 解放前 慶尙南道 地方民들의 大便檢査中에서 虫卵을 보고 發表된 바 있었으나 成虫을 얻어 報告한 例는 아직 없었다. 近來 著者들은 韓國人 一例에서 成虫을 驅除한 바 있어 報告한다.

患者는 50歲의 健康한 韓國人 男子로서 數週日 前부터 數 cm에 達하는 벌레를 便所에서 發見하여 治療를

받게 되었다. Atabrine 으로 治療한 結果 198cm의 頭節없는 虫體를 얻었다. 虫體를 形態學的으로 檢討한바 *Diphyllobothrium latum*(Linnaeus, 1758) Lühe 1910으로 同定되었다.

患者는 外國을 旅行한 經驗이 전혀 없었으며 술안주로 生鮮膾를 즐겨하여 主로 서울市內 中心街에서 生食한 일이있고 其他 特異한 經驗은 없다고 한다.

患者의 過去歷과 韓國內에서도 中間宿主의 役割을 할 수 있다고 생각되는 甲殼類 및 魚類에 對한 報告 및 韓國의 魚類 輸入狀況을 考慮할때 本例는 우리나라 土着性 感染으로 認定된다.

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Explanation of Figures

- Fig. 1:** The collected strobila from the patient, without the scolex part. Fixed with 10% formalin.
- Fig. 2:** The median portion of gravid proglottid. Acetocarmine stained. Note the rosette form of uterine coil.
- Fig. 3:** Gross ventral view of gravid proglottids. Note the median arrangements of genital pores.
- Fig. 4:** Ova from the gravid proglottid. (Arrow indicates the portion of operculum).
- Fig. 5:** Median section of gravid proglottid.
- Fig. 6:** Magnified view of Fig. 5, on the portion of cirrus pouch (CP), seminal vesicle (SV), vaginal route (V) and terminal portion of uterus (UP).

