

## Short Communication

# A case of *Diphyllobothrium latum* infection in Dalian and a brief review of diphyllobothriasis in China

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**Abstract.** *Diphyllobothrium latum* infection in human is not common in China and only 15 cases have been reported since 1927. We document a case of *Diphyllobothrium latum* infection caused by the ingestion of raw fish in a 23-year-old woman in Dalian (Liaoning Province), and *diphyllobothriasis latum* in China is briefly reviewed. The patient experienced abdominal discomfort for about 6 months with a history of discharging proglottids in the feces. The morphologic characteristic of the gravid proglottids and eggs were identified as that of *Diphyllobothrium latum*. The patient was treated with pumpkin seed powder (100g) and betel nut(100g) on an empty stomach. The majority of reported human cases occurred due to the ingestion of raw or uncooked fish, such as pikes, burbot, trouts, perch and salmon. The patient is the first case reported in Dalian (Liaoning Province).

## INTRODUCTION

Diphyllobothriasis is an ichthyic zoonosis accidentally acquired by humans, with worldwide distribution and sporadic outbreaks. Several species of diphyllobothriids have been reported in humans: *Diphyllobothrium latum*, *Diphyllobothrium pacificum* and *Diphyllobothrium nihonkaiense* and have been commonly associated with human cases, generally infecting the small intestine. *D. latum* is the longest of the tapeworms that infect humans. The infection of *D. latum* in humans is common in regions with cold water lakes, such as Europe (Jackson *et al.*, 2007; Esteban *et al.*, 2014), North America (Church & Neill, 2010) and South America (Llaguno *et al.*, 2008). *D. latum* in Asia has been mainly reported in Japan (Izuka *et al.*, 2009; Maki *et al.*, 2009), Korea (Youn, 2009; Lee *et al.*, 2007), and China (Guo *et al.*, 2012). *D. latum* infection

in humans is not common in China. 15 cases have been documented in China since the first report in 1927 (Wu, 2013). These cases are mainly reported from the places like Beijing, Heilongjiang Province, and Fujian Province. We report here the first case of *D. latum* infection in Dalian (a city in Liaoning Province in China) with a brief review of diphyllobothriasis in China.

## CASE REPORT

A 23-year-old woman reported to the outpatient clinic at the Maternal and Child Health Hospital of Dalian with a segment of a tapeworm that was discharged in her feces the previous day. The specimen was sent to our department to be identified. The patient experienced abdominal discomfort and incompetence for about 6 months. She suffered from nausea, dizziness, emaciation

and hypoglycemia for 2 months. A white segment of tapeworm with 50cm in length was expelled on 6<sup>th</sup> April 2016.

The patient was born in Dalian. She studied in Seattle of USA from September 2014 to March 2016, and came back in April 2016. She admitted to like eating sashimi during the two years in USA. In physical examination, no specific signs, such as abdominal distension or tenderness and jaundice were observed. Blood routine examination and blood chemistry were all within normal ranges (Hb: 138g/l, RBC: 4.61/l, WBC: 6.99/l, neutrophils: 50.7%, eosinophil: 1.9%, lymphocytes: 38.2% ). No abnormalities were found in heart, lung and intestine in X-ray. Eggs were detected in faecal specimens.

The patient was treated with an empty stomach: oral pumpkin seed powder 100g at first, then followed by 150ml betel juice (100g betel nut), 150ml 30% magnesium sulfate 2 hours later. An intact tapeworm was discharged with scolex 5 hours later. There was no evidence of recurrent *D. latum* infection during the following 2 months.

## IDENTIFICATION

1. Morphologic characteristics of an adult  
The worm is creamy-white and 2.2m in length (Figure 1A). The scolex is small (2.0mm×1.0mm), with a ventral and a dorsal bothrium(Figure 1B). The breadth of the mature and gravid proglottids is larger than length (Figure 1C). Some gravid proglottids were selected and stained with acetocarmine (eosin) for microscopic observations. It was shown a rosette-shape uterus with 4-5 times piled-up uterine loops in the middle of segment (Figure 1D). The genital pore is located at the anterior part of ventral surface of proglottid. And the uterine pore opened slightly posterior to the genital pore.

2. Morphologic characteristics of an egg  
The egg is oval, light yellow-brown in color. Average size of eggs is 55~72µm×41~50µm. The eggshell is thick with an operculum at the anterior end and a small protuberance

at the posterior end. There is a embryonic cell and some yolk cells in it (Figure 2).

The specimen was identified as *D. latum* according rosette-like central uterus and typically operculated eggs which described above.

## DISCUSSION

*Diphyllobothrium latum* (linna, 1758), commonly called “broad tapeworms” or “fish tapeworms”, belongs to a group of tapeworms known as the pseudophyllideans. Many infections with *D. latum* are reported to be asymptomatic. In about one out of five infections, diarrhoea, abdominal pain, or discomfort occurs. This case experienced abdominal discomfort for about 6 months and nausea, dizziness, emaciation and hypoglycemia for 2 months, with a history of natural discharge of proglottids in the feces. She ate raw fish many times during the period of studying in the USA. She didn't know the exact species of fish, and only knew the fish archived from the local Lakes. *D. latum* transmitted by salmonid fish was put to question, especially in Korea, human-infecting salmonid fish such as salmon, mullets, and trout seem to be commonly consumed to cause *Diphyllobothrium nihonkaiense* (Lee *et al.*, 2007). It was reported that *D. latum* was known to distribute in Siberia, North America and Japan. *D. Pacificum* distributes in South America and *D. Nihonkaiense* in Japan (Arizono *et al.*, 2009; Lee *et al.*, 2001). According to this analysis, the source of the patient's infection might be some unknown fish from North America. This is the first reason that we speculated this case was the infection of *D. latum* . Next, *D. latum* is the longest tapeworm found in man, ranging from 3-10m with 3,000-4,000 proglottids. Other *Diphyllobothrium* species are smaller, rarely more than 1 m long (Lee *et al.*, 2001). The scolex is shaped like a spoon and has a pair of bothria. Mature proglottids are similar with gravid proglottids with a rosette-shape uterus. The egg is oval with an operculum at the anterior end and a small protuberance

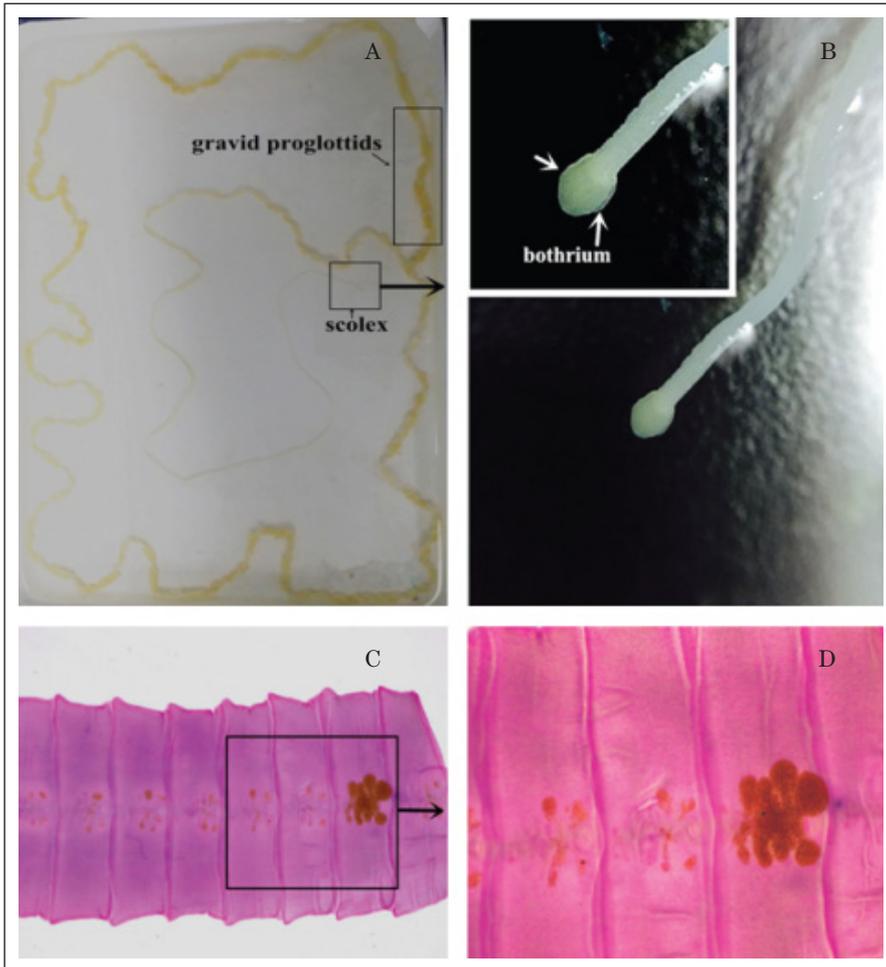


Figure 1. A: An intact adult worm with scolex. B: Scolex with bothria. C: Gravid proglottids. D: Typical rosette form uterus.



Figure 2. An egg discharged from the gravid proglottid.

at the posterior end. So we identified this case a *D. latum* infection according to these characteristic features.

In our *D. latum* case, pumpkin seed powder and betel nut were used to expel the worm. This is the Chinese traditional method of expelling tapeworms with few side effects compared with western medicine. And we can get the whole worm include scolex with this treatment. Up to now, there were more than 10 cases of tapeworm infection to be cured in our department. Successful acquisition of scolex was achieved in 100% with this method. In this study, no further sign of infection has been shown during the following 2 months after treatment.

In China the first case report of *D. latum* infection came from Harbin (Heilongjiang Province) in 1927 by Lin and Wu. Until till now, a total of 15 cases have been documented (Table 1). There were 6 cases from the former Soviet Union, the USA, Argentina and Japan. Other 10 cases were local infections in China. The highest incidence area is Heilongjing Province in China (Tang *et al.*, 2012). All cases had the history of eating raw or poor-cooked freshwater fish.

There is the first *D. latum* case in Dalian (Liaoning Province). So it should be

worthy of highest attention to the health administrative department for this invasion of imported food-borne parasitic diseases and possibility of potential transmission. Furthermore, younger generations tend to visit abroad and to have more chance to be infected with *D. latum* just like the case presented in this study.

With the rapid improvement of dietary conditions and life quality in Dalian (Liaoning Province), even in China, people tend to consume expensive raw fish, such as sashimi and sushis. This factor may contribute to an increase in the incidence

Table 1. Cases of human *D. Latum* infections in China

Number	Number of cases	Sex	Age	Suspected source of infection	Source country	Residence	Year	Author
1	1					Beijing	1924	Chen, Y. (Wu, 2013)
2	4					Heilongjiang	1927	Wang, J.S. (Zhao, 1983)
3	1	Male	26		former Soviet Union	Beijing	1951	Wu, J.M. (Wu <i>et al.</i> , 1988)
4	1	Male	22		former Soviet Union	Shanghai	1952	Wu, J.M. (Wu <i>et al.</i> , 1988)
5	1	Male	26	Sashimi	USA	Beijing	1953	Wu, J.M. (Wu <i>et al.</i> , 1988)
6	1	Male				Taiwan	1967	Catar (Paul <i>et al.</i> , 1984)
7	1	Male	20	Sashimi	Argentina	Guangdong	1988	Wu, J.M. (Wu <i>et al.</i> , 1988)
8	1	Male	37	Raw fish		Heilongjiang	1995	Fan, S.Q. (Fan <i>et al.</i> , 1995)
9	1	Female	46	Raw fish		Tianjin	1996	Zhang, Y.R. (Zhang <i>et al.</i> , 1996)
10	1	Male	37	Raw fish	Japan	Fujian	2005	Chen, B.J. (Chen <i>et al.</i> , 2005)
11	1	Male	45	Raw fish		Heilongjiang	2009	Li, Y.H. (Li <i>et al.</i> , 2009)
12	1	Male	52	Raw salmon and tuna	USA	Fujian	2013	Li, Y.R. (Li <i>et al.</i> , 2013)
13	1	Female	23	Raw salmon and tuna		Dalian (Liaoning)	2016	

of *D. latum* infections in China. Thus, it is necessary for the public health administrative department, especially health and quarantine authorities, to control the fish and fish products quality, provide some information about the risk associated with eating habits, and increase awareness of general public. Epidemiological studies of diphyllbothriosis should be carried out followed by thorough investigations and analysis to find out effective ways to prevent the further spread of this infection.

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