

A CASE OF HUMAN INFECTION WITH *DIPLOGONOPORUS GRANDIS* (CESTODA) IN EHIME PREFECTURE

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**Abstract**

An immature strobila without scolex was spontaneously discharged from 41-year-old male in Ehime Prefecture.

The body was comparatively thick (0.1-1.1 mm), but the other morphological features were comparable to characteristics of *Diplogonoporus grandis* Blanchard, 1894.

The detailed morphological description of strobila was given with some photographs. This is the record of the third case from Ehime Prefecture.

**INTRODUCTION**

Human infection of the diplogonadic tapeworm, *Diplogonoporus grandis* Blanchard, 1894 was first described by Ijima et Kurimoto<sup>1)</sup> in Nagasaki Prefecture. Since then about 80 cases have been reported, but the life-cycle and the infection route of this parasite are not clarified as yet.

In this paper, a human case of *D. grandis* infection was reported as the third case in Ehime Prefecture.

**CASE NOTE**

Patient: F. N. 41-year-old male, living in Sanbe-Cho, Nishi-Uwa County, Ehime Prefecture, Shikoku.

Past history: The patient has had frequent diarrhea and general fatigue for several months.

Family history: Nothing remarkable.

Present history: He had discharged spontaneously a fragmented

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strobila of the tapeworm on the 9th of June 1971, and on the following day he consulted with the Yawatahama General-Hospital about flat parasite.

Findings of blood examination: Erythrocytes  $455 \times 10^4$ , leucocytes 5600, hemoglobin 14.3 g/dl, hematocrit 46.4 %, and no eosinophilia.

He likes to eat the raw marine-fishes such as yellow-tail, horse-mackerel, and squid in the form of "Sashimi".

#### DESCRIPTION OF WORM AND DISCUSSION

The immature fragmented strobila of the tapeworm without scolex measured 130 cm in length and the maximum width was about 7 mm. All of the segments were much wider than its length (Figs. 1-2). Detailed morphological study was made on the proglottides. The proglottides were observed in the whole mount preparations stained with Semichon's carmine, and also observation was made on the serial sections in each direction (transverse, sagittal and horizontal) stained with Trichrome solution.

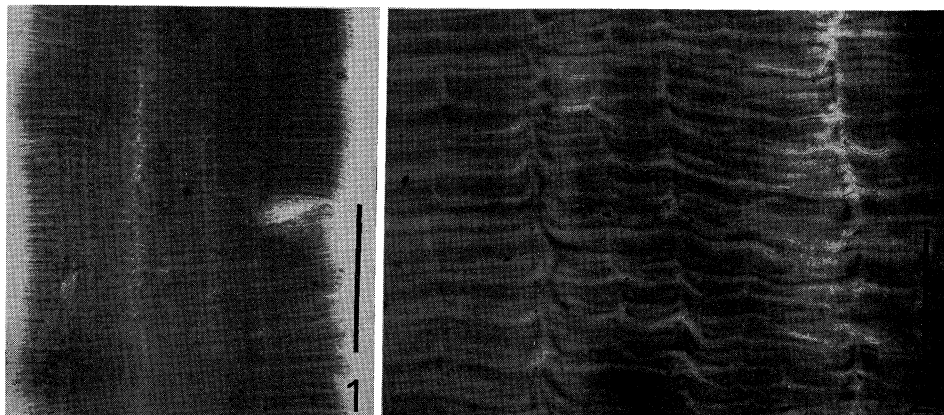


Fig. 1. Strobila. (Scale=3 mm)

Fig. 2. Proglottides from posterior part of strobila. (Scale=0.2 mm)

Measurements of each part of the strobila are given in Table 1.

On the surface of strobila there are 5 or 6 conspicuous longitudinal folds (Fig. 1), and the double sets of undeveloped genital organs are barely recognizable externally in each proglottid of the staining preparations (Fig. 2).

TABLE 1. Morphological data of specimen

Strobila	
length .....	130 cm
maximum width .....	7 mm
Segment	
length .....	0.1-0.23 mm
width .....	5.5-7.0 mm
thickness .....	0.1-1.1 mm
Arrangement of testes .....	single layer
Thickness of muscle layer	
longitudinal .....	40-120 $\mu$
transverse .....	20- 50 $\mu$
Diameter of nerve trunk .....	90 $\times$ 50 $\mu$
Thickness of	
cortical parenchyma .....	130-420 $\mu$
medullary parenchyma .....	100-200 $\mu$

The proglottides measure 0.1-0.23 mm in length and 0.1-1.1 mm in thick. In the transverse section of a proglottid, the cuticle layer is about 3.0-6.0  $\mu$  thick (Figs. 3-4).

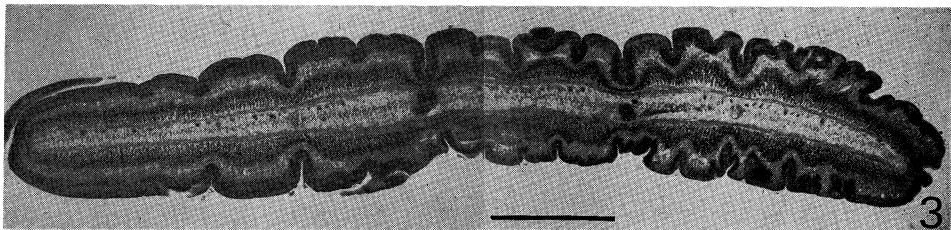


Fig. 3. Transverse section of the posterior part of segment. (Scale=0.6 mm)

A layer of longitudinal muscle fiber is about 40-120  $\mu$  thick, and a layer of circular muscle fiber is 20-50  $\mu$  in thickness. The cortical parenchyma is 130-420  $\mu$  thick, but vitelline gland cells have not fully developed (Fig. 4). The medullary parenchyma is about 100-200  $\mu$  thick, embedding the two sets of genital rudiments, small follicle of the testes, nerve trunks, and excretory canals (Fig. 3).

The testes are arranged in a single layer, which are situated in the medullary parenchyma, dorsal region. There are about 20 testes between two genital rudiments, and also are 18-20 testes, one on each side of the medulla between the genital rudiments and the lateral margins of the proglottid.

The longitudinal nerve trunks lie in the medullary parenchyma, one on each side, close to the genital organs. The nerve trunks are about  $90 \mu$  in dorso-ventral diameter and  $50 \mu$  in transverse diameter.

The main excretory canals are recognized between the nerve trunks and the genital organs (Figs. 3-4).

The cirrus-pouch and seminal vesicle have not developed as yet (Figs. 3 & 5).

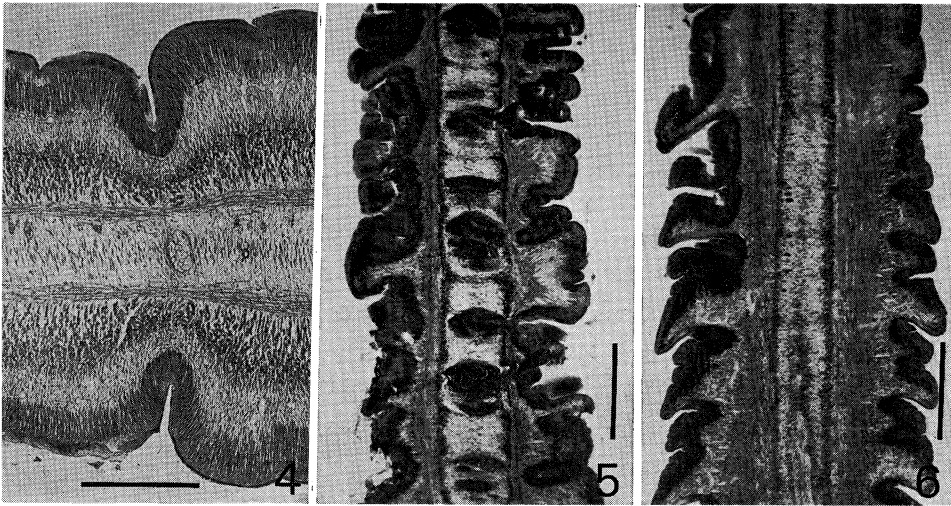


Fig. 4. Portion of a transverse section to show details of the lateral field. (Scale=0.2 mm)

Fig. 5. Sagittal section passing through the genital area. (Scale=0.3 mm)

Fig. 6. Sagittal section passing through the lateral field. (Scale=0.3 mm)

As stated in the introduction the human infection with *Diplogonoporus grandis* hitherto reported in literature amounts to about 80 cases in Japan. This parasite is thought to be peculiar to the Japanese because there is no definite case reported in foreign countries. The higher incidence of infection with this parasite is seen mainly in the coastal areas of Japan; namely, in Tokai-district, Nihonkai-district and Kyushu-district (Kamo *et al.*<sup>2)</sup>), but the route of infection has not been clarified as yet.

On the other hand, the morphological features of *D. grandis* resemble very closely those of *Diplogonoporus balaenopterae* (Lönnerberg, 1892), Lühe, 1899 which is the intestinal tapeworm in whales, but it is difficult

to draw a sharp line between these two species at the present stage of our knowledge. On the morphological distinctions of these two species there are various opinions presented (Iwata<sup>3)</sup>, Kamo<sup>4)</sup>, Morishita<sup>5)</sup>).

Iwata<sup>3)</sup> concluded that *D. grandis* should be reduced to synonym of *D. balaenopterae* because these two species are not different in morphological structure. Kamo<sup>4)</sup> stressed the followings as detailed comparative studies on these two species, such as distance between two sets of genital organs, arrangement of testes, form of seminal vesicle and cirrus-sac, nature of longitudinal muscle fiber, and characteristics of general papillae.

The worm described in this paper was discharged spontaneously, appearing still in an immature form, but on the transverse and sagittal sections the double sets of genital organs were recognized in all of the segments. Furthermore, the arrangement of longitudinal and transverse muscle fibers suggested of the morphological characteristics of *D. grandis*.

Therefore, it is concluded that this tapeworm is to be identified as *Diplogonoporus grandis*. The peculiar quality of present worm is broadly thick (0.1-1.1 mm) according to the sectioning preparations of proglottides. It may be that the proglottides of present worm covered in longitudinal directions.

TABLE 2. Cases of *Diplogonoporus* infection in Ehime Prefecture

Case No.	Patient			Detected date	Worm size		Scolex	Author
	age	sex	residence		length	width		
1	66	♂	uncertainty	?	857 cm	20 mm	—	Katsurada (1910)
2	28	♂	Higashi-Uwa-Gun Uwa-Cho	1966	64	14	—	Nishida et al. (1968)
3	41	♂	Nishi-Uwa-Gun Sanbe-Cho	1971	130	7	—	Present authors

As shown in Table 2, two cases have been so far reported by Katsurada<sup>6)</sup> and Nishida *et al.*<sup>7)</sup> in Ehime Prefecture. The present case is the third case from Ehime Prefecture, Japan.

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