The First Human Case of *Thelazia callipaeda* Infection in Vietnam

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Abstract: A 26-year-old man residing in a village of Thai Nguyen Province, North Vietnam, visited the Thai Nguyen Provincial Hospital in July 2008. He felt a bulge-sticking pain in his left eye and extracted 5 small nematode worms by himself half a day before visiting the hospital. Two more worms were extracted from his left eye by a medical doctor, and they were morphologically observed and genetically analyzed on the mitochondrial cytochrome c oxidase 1 gene. The worms were 1 male and 1 female, and genetically identical with those of *Thelazia callipaeda*. By the present study, the presence of human *T. callipaeda* infection is first reported in Vietnam.

Key words: *Thelazia callipaeda*, oriental eyeworm, eye, human case, Vietnam

INTRODUCTION

Zoonotic parasites are widespread in the world, especially in Asian countries, including Vietnam. *Thelazia callipaeda* Railliet and Henry, 1910 (Nematoda: Thelaziidae) is a nematode parasite in the genus *Thelazia* [1]. This nematode is zoonotic and parasitic in the eyes as implied by its name "oriental eyeworm" or "eyeworm". It was reported for the first time from a dog in Pakistan in 1910, and later shown to be widespread in China, France, Germany, India, Indonesia, Italy, Japan, Korea, the Netherlands, Russia, Switzerland, Taiwan, Myanmar, and Thailand [2]. The final hosts include dogs and cats, but occasionally rabbits, monkeys, raccoons, dogs, foxes, wolves, and humans can also serve as the final host [3]. Intermediate hosts are insects, such as flies. It is relatively well recognized that drosophilid flies but not *Musca domestica* are the vector hosts for *T. callipaeda* [4-6]. Also in Japan, 3 species of the genus *Amiota* (Drosophilidae), namely, *Amiota okaidai*, *A. magna*, and *A. nagatai*, have been identified [3].

The adult worm is parasitic in the conjunctival sac of a final host, and gives larvae continually by ovoviviparity. When a fly licks the tear in the eye of a final host, including humans, the larvae enter the conjunctival sac, and become adults in 1 month after 2 molts [1,3]. Symptoms of *T. callipaeda* infection include conjunctivitis, excessive watering, visual impairment, and ulcers or scarring of the cornea [7]. In some cases, the only symptom is the presence of worms obscuring the host’s vision as a floater [7].

With regard to the nematode infection in the human eyes in Vietnam, *Dirofilaria repens* was recently reported from the human conjunctiva [8]. However, *T. callipaeda* infection has never been reported in Vietnam. In this study, we report for the first time a case of human *T. callipaeda* infection in Vietnam which was verified by both morphology and molecular analysis using the mitochondrial cytochrome c oxidase 1 (cox1) gene.

CASE RECORD

The patient was a 26-year-old male residing in the Cao Phong village, Hop Tien commune, Dong Hy district, Thai Nguyen Province of mountainous North Vietnam. In July 2008, he felt a bulge-sticking pain in his left eye and extracted 5 small nematode worms by himself but he did not keep them. This symptom did not disappear after collection of worms himself. Then, half a day later, he visited the Thai Nguyen Provincial Hospital and a medical doctor collected 2 more worms. These worms were identified morphologically and also by a molecular method. The morphology of the worms was not so good, but they
were thin, long, and cylindrical with milkish-white color. One
was a male, 10 mm in length and 0.4 mm in width, with a curled
tail end, and the other was a female, 15 mm in length and
0.5 mm in width, with a slender tail end. The female worm
had a scalariform buccal cavity, a long muscular esophagus
and a conical tail, and the vulva opening at the anterior por-
tion of the esophago-intestinal junction. Comparison with the
figure described as T. callipaeda in Miyazaki [3] showed that
these worms were T. callipaeda (Nematoda: Thelaziidae).

To support the morphological diagnosis, PCR analysis was
performed on the cox1 gene with the primer of THELF-THELR
for the Vietnamese Thelazia. Total 627 nucleotide and 209 ami-
no acid sequences of the cox1 gene were compared with those
of the previously known strains or isolates reported in Gen-
Bank (Table 1). There were 7 nucleotide differences in the Viet-
namese T. callipaeda, but no changes in the amino acids at the
changed places. The Vietnamese isolate had high homologies
(98-99%) with 8 T. callipaeda isolates from China in GenBank
(No. AM042549-AM042556) and 1 from Italy (No. AJ544882)
[9]. However, the homology of our isolate with Thelazia gulosa
(No. AJ544881) from Italy was low, 86% (Table 1). A phylo-
genetic analysis between the Vietnamese T. callipaeda and stan-
dard strains or isolates in the world showed that T. callipaeda
from Vietnam and T. callipaeda from China and Italy is an iden-
tical group (Fig. 1).

**DISCUSSION**

The first human case of thelaziasis was reported in China in
1917, and later from India, Thailand, Korea, Russia, and Japan
[3]. In Japan, there were 30 cases until 1981 [3]. In Korea, 39
human cases were reported until 2011, and a total of 146 adult
worms were collected from the patients [10]. However, in Viet-
nam, this is the first time when T. callipaeda infection is report-
ed from a human patient. The worms were parasitic in the con-
junctival sac of an eye of a 26-year-old man. He felt a bulge-
sticking pain in his left eye and no other symptoms. A total of
7 worms were extracted, but 5 worms collected by the patient
himself were lost and only 2 were available. Although the worm
morphology was not so good, they were identified as 1 male
(with a curled tail end) and 1 female (with a straight, slender
tail end), and could be identified as T. callipaeda. The flies of
the family Drosophilidae, intermediate hosts for T. callipaeda,
are very common in Vietnam. This zoonotic disease can be
transmitted from animals to humans.

In order to support the morphological diagnosis, the nucleo-
otide and amino acid sequences of the cox1 gene of our Viet-
namese worms were compared with those of 9 isolates of T.
callipaeda reported in GenBank (8 from China and 1 from Ita-

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**Table 1.** The results of cox1 gene analysis on the Vietnamese isolate of Thelazia callipaeda compared with other known isolates in GenBank

| GenBank No. | Item                                    | Detected point | % Comparison | Homology (%) |
|------------|-----------------------------------------|----------------|--------------|--------------|
| AM042552.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I, haplotype h4 | 1,125          | 100          | 99           |
| AM042552.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I, haplotype h7 | 1,114          | 100          | 98           |
| AM042552.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I, haplotype h3 | 1,114          | 100          | 98           |
| AM042549.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I, haplotype h1 | 1,114          | 100          | 98           |
| AJ544882.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I | 1,114          | 100          | 98           |
| AM042550.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I, haplotype h2 | 1,109          | 100          | 98           |
| AM042556.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I, haplotype h8 | 1,107          | 99           | 98           |
| AM042554.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I, haplotype h6 | 1,107          | 99           | 98           |
| AM042553.1 | Thelazia callipaeda mitochondrial partial CO1 gene for cytochrome oxidase subunit I, haplotype h5 | 1,108          | 100          | 99           |
| AJ544881.1 | Thelazia gulosa mitochondrial partial CO1 gene for cytochrome oxidase subunit I | 699            | 100          | 86           |
ly]. The results showed that there were 7 places of nucleotide differences in our isolate but no changes in the amino acid sequence at the changed places. Thus, the amino acid homology between the Vietnamese isolate and 8 other isolates in the world was 100%, and only 1 isolate, number 4 (GenBank no. AM042552), revealed 99% homology with our isolate (difference in 1 amino acid, i.e., phenylalanine). Therefore, our worms were identified by morphology and molecular methods as *T. callipaeda*.

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