

Trichuris trichiura

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The **human whipworm** (*Trichuris trichiura* or *Trichocephalus trichiuris*) is a round worm (a type of helminth) that causes trichuriasis (a type of helminthiasis which is one of the neglected tropical diseases) when it infects a human large intestine. It is commonly known as the *whipworm* which refers to the shape of the worm; it looks like a whip with wider "handles" at the posterior end.

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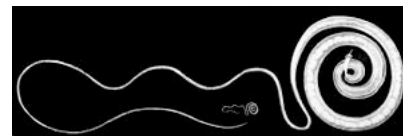
Life cycle

The female *T. trichiura* produces 2,000–10,000 single-celled eggs per day.^[1] Eggs are deposited from human feces to soil where, after two to three weeks, they become embryonated and enter the “infective” stage. These embryonated infective eggs are ingested and hatch in the human small intestine exploiting the intestinal microflora as hatching stimulus.^[2] This is the location of growth and molting. The infective larvae penetrate the villi and continue to develop in the small intestine. The young worms move to the caecum and penetrate the mucosa and there they complete development to adult worms in the large intestine. The life cycle from time of ingestion of eggs to development of mature worms takes approximately three months. During this time, there may be limited signs of infection in stool samples due to lack of egg production and shedding. The female *T. trichiura* begin to lay eggs after three months of maturity. Worms can live up to five years, during which time females can lay up to 20,000 eggs per day.

Recent studies using genome-wide scan revealed two quantitative trait loci on chromosome 9 and chromosome 18 may be responsible for genetic predisposition or susceptibility to infection of *T. trichiura* by some individuals.

Morphology

Whipworm(s)



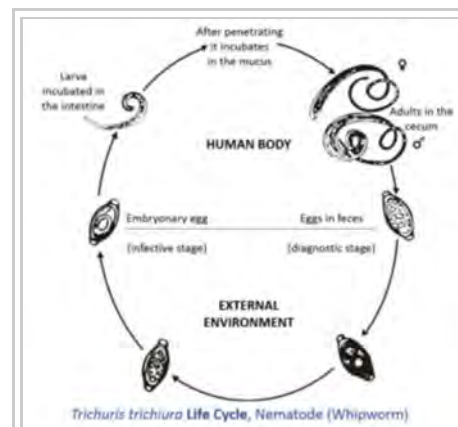
Scientific classification

Kingdom:	Animalia
Phylum:	Nematoda
Class:	Enoplea
Order:	Trichocephalida
Family:	Trichuridae
Genus:	<i>Trichuris</i>
Species:	<i>T. trichiura</i>

Binomial name

Trichuris trichiura

(Linnaeus, 1771)



Life cycle of *Trichuris trichiura* inside and outside the human body

Trichuris trichiura has a narrow anterior esophageal end and shorter and thicker posterior anus. These pinkish-white worms are threaded through the mucosa. They attach to the host through their slender anterior end and feed on tissue secretions instead of blood. Females are larger than males; approximately 35–50 mm long compared to 30–45 mm.^[3] The females have a bluntly round posterior end compared to their male counterparts with a coiled posterior end. Their characteristic eggs are barrel-shaped and brown, and have bipolar protuberances..

Infection

Infection occurs through ingestion of eggs and is more common in warmer areas. Whipworms eggs are passed in the feces of infected persons, and if an infected person defecates outside or if untreated human feces as used as fertilizer, eggs are deposited on soil where they can mature into an infective stage. Ingestion of these eggs "can happen when hands or fingers that have contaminated dirt on them are put in the mouth or by consuming vegetables or fruits that have not been carefully cooked, washed or peeled."^[4] The eggs hatch in the small intestine, and then move into the wall of the small intestine and develop. On reaching adulthood, the thinner end (the front of the worm) burrows into the large intestine and the thicker end hangs into the lumen and mates with nearby worms. The females can grow to 50 mm (2.0 in) long. Neither the male nor the female has much of a visible tail past the anus.^[1]

Whipworm commonly infects patients also infected with *Giardia*, *Entamoeba histolytica*, *Ascaris lumbricoides*, and hookworms.

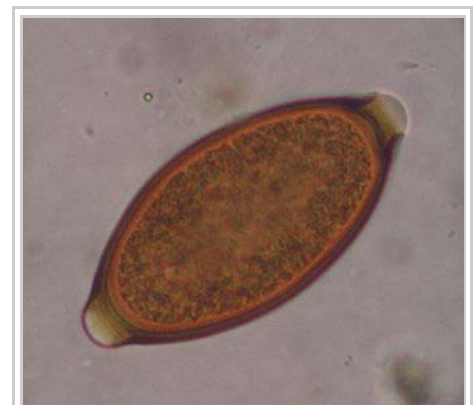
Epidemiology

There is a worldwide distribution of *Trichuris trichiura*, with an estimated 1 billion human infections.^{[5][6][7]} However, it is chiefly tropical, especially in Asia and, to a lesser degree, in Africa and South America. Within the United States, infection is rare overall but may be common in the rural Southeast, where 2.2 million people are thought to be infected. Poor hygiene is associated with trichuriasis as well as the consumption of shaded moist soil, or food that may have been fecally contaminated. Children are especially vulnerable to infection due to their high exposure risk. Eggs are infective about 2–3 weeks after they are deposited in the soil under proper conditions of warmth and moisture, hence its tropical distribution.

Other animals

Whipworms develop when a dog swallows whipworm eggs, passed from an infected dog. Symptoms may include diarrhea, anemia, and dehydration. The **dog whipworm** (*Trichuris vulpis*) is commonly found in the U.S. It is hard to detect at times, because the numbers of eggs shed are low, and they are shed in waves. Centrifugation is the preferred method. There are several preventives available by prescription from a veterinarian to prevent dogs from getting whipworm.

The **cat whipworm** is a rare parasite. In Europe, it is represented mostly by *Trichuris campanula*, and in North America it is *Trichuris serrata* more often.^{[8][9]} Whipworm eggs found in cats in North America must be differentiated from lungworms, and from mouse



Egg of *Trichuris vulpis*

whipworm eggs just passing through.

Treatment of inflammatory disorders

The hygiene hypothesis suggests that various immunological disorders that have been observed in humans only within the last 100 years, such as Crohn's disease, or that have become more common during that period as hygienic practices have become more widespread, may result from a lack of exposure to parasitic worms (also called helminths) during childhood. The use of *Trichuris suis* ova (TSO, or pig whipworm eggs) by Weinstock, et al., as a therapy for treating Crohn's disease^{[10][11][12]} and to a lesser extent ulcerative colitis^[13] are two examples that support this hypothesis. There is also anecdotal evidence that treatment of inflammatory bowel disease (IBD) with TSO decreases the incidence of asthma,^[14] allergy,^[15] and other inflammatory disorders. Some scientific evidence suggests that the course of multiple sclerosis may be very favorably altered by helminth infection;^[16] TSO is being studied as a treatment for this disease.^{[17][18]}

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External links

- *Trichuris Trichiura* (<http://emedicine.medscape.com/article/788570-overview>) at eMedicine
- Man finds extreme healing eating parasitic worms, By Elizabeth Cohen, CNN Senior Medical Correspondent December 9, 2010 (<http://edition.cnn.com/2010/HEALTH/12/09/worms.health/index.html>)
- Potential Disease Treatment: Swallow Some Worms (https://web.archive.org/web/20080904220158/http://www.livescience.com/humanbiology/060610_worms.html)
- Globe and Mail: Sometimes having worms is good (<http://www.theglobeandmail.com/servlet/story/RTGAM.20060609.worms0609/BNStory/specialScienceandHealth/home>)
- BBC article mentions the Iceman had Whipworm (<http://news.bbc.co.uk/2/hi/science/nature/6727665.stm>)
- Video of Live Trichuris trichiura "Whip Worm" (https://www.youtube.com/watch?v=FU3bGh6_e0g)



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