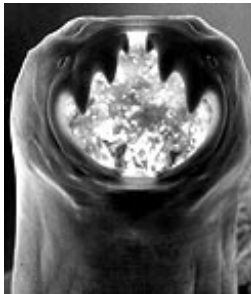


- Common Parasites of the Intestinal Tract

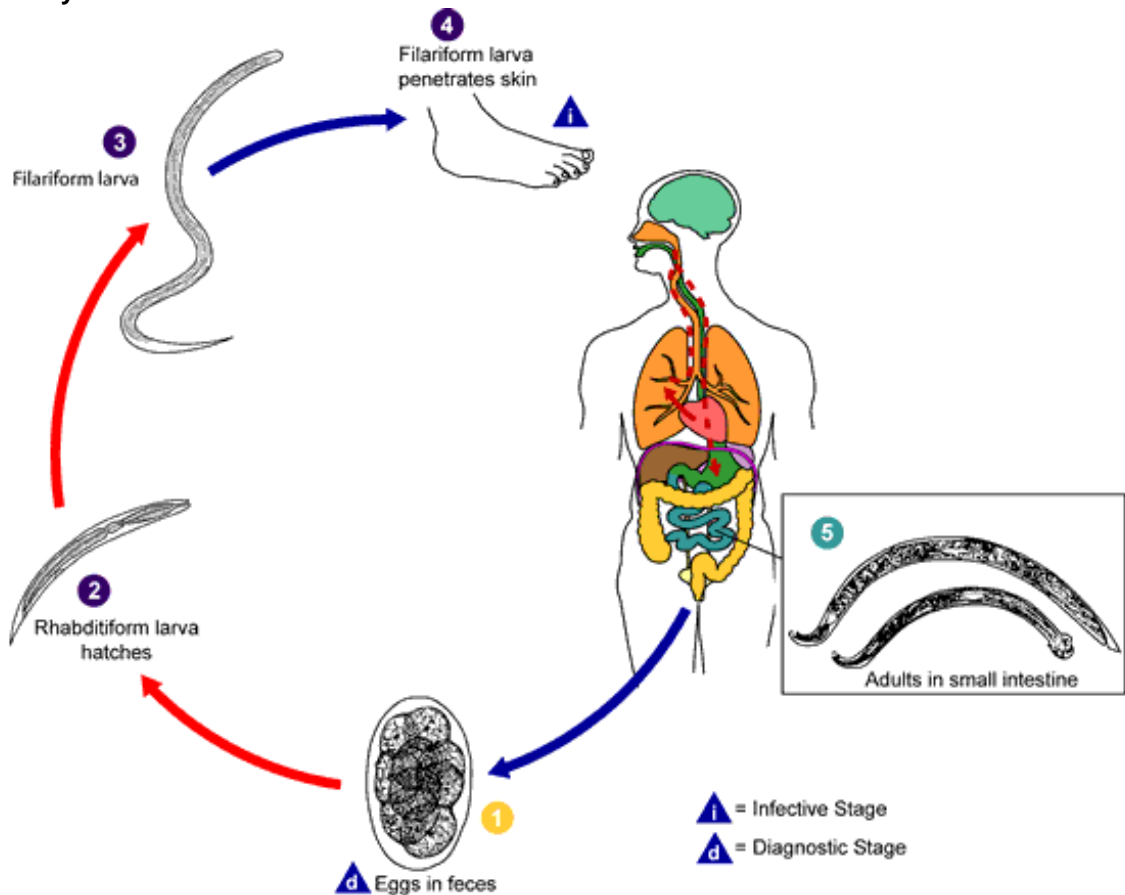
[Hookworm](#) | [Roundworm](#) | [Pinworm](#) | [Schistosoma](#) | [Tapeworm](#) | [Whipworm](#)



Hookworm (*Ancylostoma duodenale*)

The human hookworms include two nematode (roundworm) species, *Ancylostoma duodenale* and *Necator americanus*. (Adult females: 10 to 13 mm (*A. duodenale*), 9 to 11 mm (*N. americanus*); adult males: 8 to 11 mm (*A. duodenale*), 7 to 9 mm (*N. americanus*). A smaller group of hookworms infecting animals can invade and parasitize humans (*A. ceylanicum*) or can penetrate the human skin (causing cutaneous larva migrans), but do not develop any further (*A. braziliense*, *Uncinaria stenocephala*).

Life Cycle:



Eggs are passed in the stool **1**, and under favorable conditions (moisture, warmth, shade), larvae hatch in 1 to 2 days. The released rhabditiform larvae grow in the feces and/or the soil **2**, and after 5 to 10 days (and two molts) they become become filariform (third-stage) larvae that are infective **3**. These infective larvae can survive 3 to 4 weeks in favorable environmental conditions. On contact with the human host, the larvae penetrate the skin and are carried through the veins to the heart and then to the lungs. They penetrate into the pulmonary alveoli, ascend the bronchial tree to the pharynx, and are swallowed **4**. The larvae reach the small intestine, where they reside and mature into adults. Adult worms live in the lumen of the small intestine, where they attach to the intestinal wall with resultant blood loss by the host **5**. Most adult worms are eliminated in 1 to 2 years, but longevity records can reach several years.

Some *A. duodenale* larvae, following penetration of the host skin, can become dormant (in the intestine or muscle). In addition, infection by *A. duodenale* may probably also occur by the oral and transmammary route. *N. americanus*, however, requires a transpulmonary migration phase.

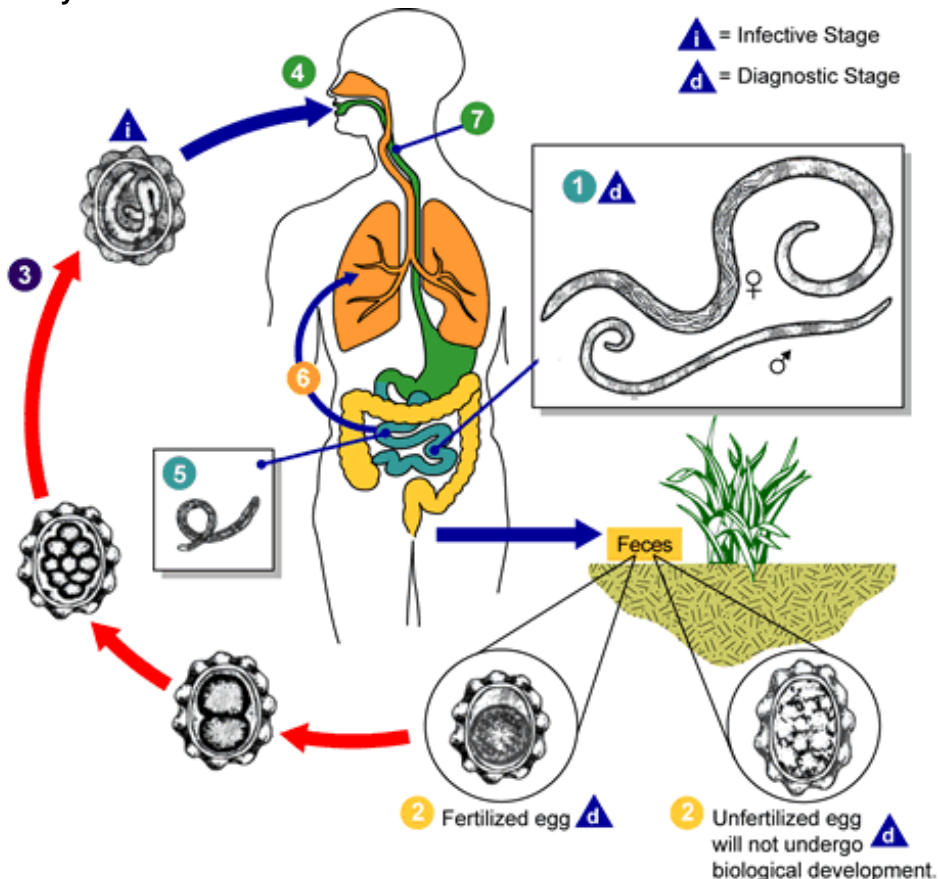
Geographic Distribution: The second most common human helminthic infection (after ascariasis). Worldwide distribution, mostly in areas with moist, warm climate. Both *N. americanus* and *A. duodenale* are found in Africa, Asia and the Americas. *Necator americanus* predominates in the Americas and Australia, while only *A. duodenale* is found in the Middle East, North Africa and southern Europe.



Roundworm (*Ascaris lumbricoides*)

Ascaris lumbricoides is the largest nematode (roundworm) parasitizing the human intestine. Immature or adult *A. lumbricoides* are sometimes passed in stools. Adult males measure 15-30 cm in length by 0.3-0.8 cm in diameter and have a ventrally curved tail; adult females measure 20-35 cm in length by 0.5 cm in diameter.

Life Cycle:



Adult worms **1** live in the lumen of the small intestine. A female may produce approximately 200,000 eggs per day, which are passed with the feces **2**. Unfertilized eggs may be ingested but are not infective. Fertile eggs embryonate and become infective after 18 days to several weeks **3**, depending on the environmental conditions (optimum: moist, warm, shaded soil). After infective eggs are swallowed **4**, the larvae hatch **5**, invade the intestinal mucosa, and are carried via the portal, then systemic circulation to the lungs **6**. The larvae mature further in the lungs (10 to 14 days), penetrate the alveolar walls, ascend the bronchial tree to the throat, and are swallowed **7**. Upon reaching the small intestine, they develop into adult worms **1**. Between 2 and 3 months are required from ingestion of the infective eggs to oviposition by the adult female. Adult worms can live 1 to 2 years.

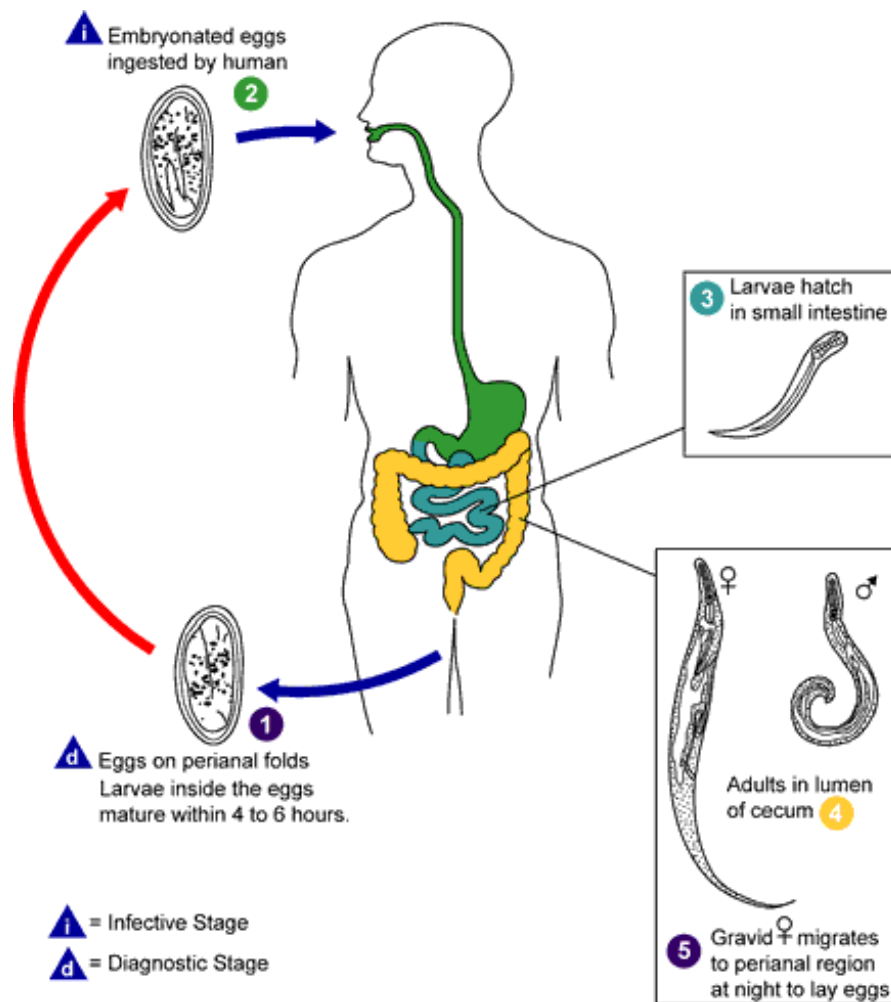
Geographic Distribution: The most common human helminthic infection. Worldwide distribution. Highest prevalence in tropical and subtropical regions, and areas with inadequate sanitation. Occurs in rural areas of the southeastern United States.



Pinworm (Enterobius vermicularis)

The nematode *Enterobius vermicularis* (previously *Oxyuris vermicularis*) also called human pinworm. (Adult females: 8 to 13 mm, adult male: 2 to 5 mm.) Humans are considered to be the only hosts of *E. vermicularis*. A second species, *Enterobius gregorii*, has been described and reported from Europe, Africa, and Asia. For all practical purposes, the morphology, life cycle, clinical presentation, and treatment of *E. gregorii* is identical to *E. vermicularis*.

Life Cycle:



Eggs are deposited on perianal folds **1**. Self-infection occurs by transferring infective eggs to the mouth with hands that have scratched the perianal area **2**. Person-to-person transmission can also occur through handling of contaminated clothes or bed linens. Enterobiasis may also be acquired through surfaces in the environment that are contaminated with pinworm eggs (e.g., curtains, carpeting). Some small number of eggs may become airborne and inhaled. These would be swallowed and follow the same development as ingested eggs. Following ingestion of infective eggs, the larvae hatch in the small intestine **3** and the adults establish themselves in the colon **4**. The time interval from ingestion of infective eggs to oviposition by the adult females is about one month. The life span of the adults is about two months. Gravid females migrate nocturnally outside the anus and oviposit while crawling on the skin of the perianal area **5**. The larvae contained inside the eggs develop (the eggs become infective) in 4 to 6 hours under optimal conditions **1**. Retroinfection, or the migration of newly hatched larvae from the anal skin back into the rectum, may occur but the frequency with which this happens is unknown.

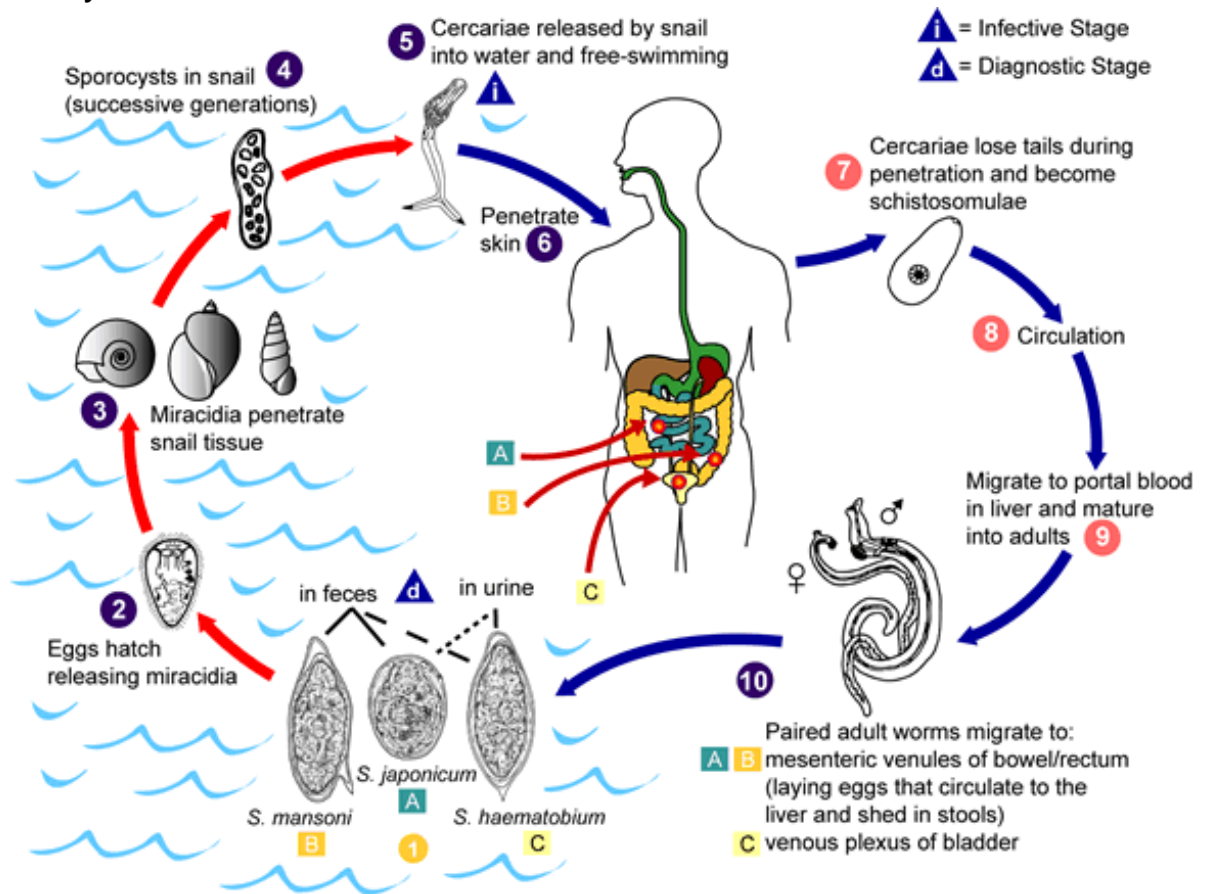
Geographic Distribution: Worldwide, with infections more frequent in school- or preschool- children and in crowded conditions. Enterobiasis appears to be more common in temperate than tropical countries. The most common helminthic infection in the United States (an estimated 40 million persons infected).



Schistosoma

Schistosomiasis is caused by digenetic blood trematodes. The three main species infecting humans are *Schistosoma haematobium*, *S. japonicum*, and *S. mansoni*. Two other species, more localized geographically, are *S. mekongi* and *S. intercalatum*. In addition, other species of schistosomes, which parasitize birds and mammals, can cause cercarial dermatitis in humans.

Life Cycle:



Eggs are eliminated with feces or urine (1). Under optimal conditions the eggs hatch and release miracidia (2), which swim and penetrate specific snail intermediate hosts (3). The stages in the snail include 2 generations of sporocysts (4) and the production of cercariae (5). Upon release from the snail, the infective cercariae swim, penetrate the skin of the human host (6), and shed their forked tail, becoming schistosomulae (7). The schistosomulae migrate through several tissues and stages to their residence in the veins (8, 9). Adult worms in humans reside in the mesenteric venules in various locations, which at times seem to be specific for each species (10). For instance, *S. japonicum* is more frequently found in the superior mesenteric veins draining the small intestine (A), and *S. mansoni* occurs more often in the superior mesenteric veins draining the large intestine (B). However, both species can occupy either location, and they are capable of moving between sites, so it is not possible to state unequivocally that one species only occurs in one location. *S. haematobium* most often occurs in the venous plexus of bladder (C), but it can also be found in the rectal venules. The females (size 7 to 20 mm; males slightly smaller) deposit eggs in the small venules of the portal and perivesical systems. The eggs are moved progressively toward the lumen of the intestine (*S. mansoni* and *S. japonicum*) and of the bladder and ureters (*S. haematobium*), and are eliminated with feces or urine, respectively (1). Pathology of *S. mansoni* and *S. japonicum* schistosomiasis includes: Katayama fever, hepatic perisinusoidal egg granulomas, Symmers' pipe stem periportal fibrosis, portal hypertension, and occasional embolic egg granulomas in brain or spinal cord. Pathology of *S.*

haematobium schistosomiasis includes: hematuria, scarring, calcification, squamous cell carcinoma, and occasional embolic egg granulomas in brain or spinal cord.

Human contact with water is thus necessary for infection by schistosomes. Various animals, such as dogs, cats, rodents, pigs, horses and goats, serve as reservoirs for *S. japonicum*, and dogs for *S. mekongi*.

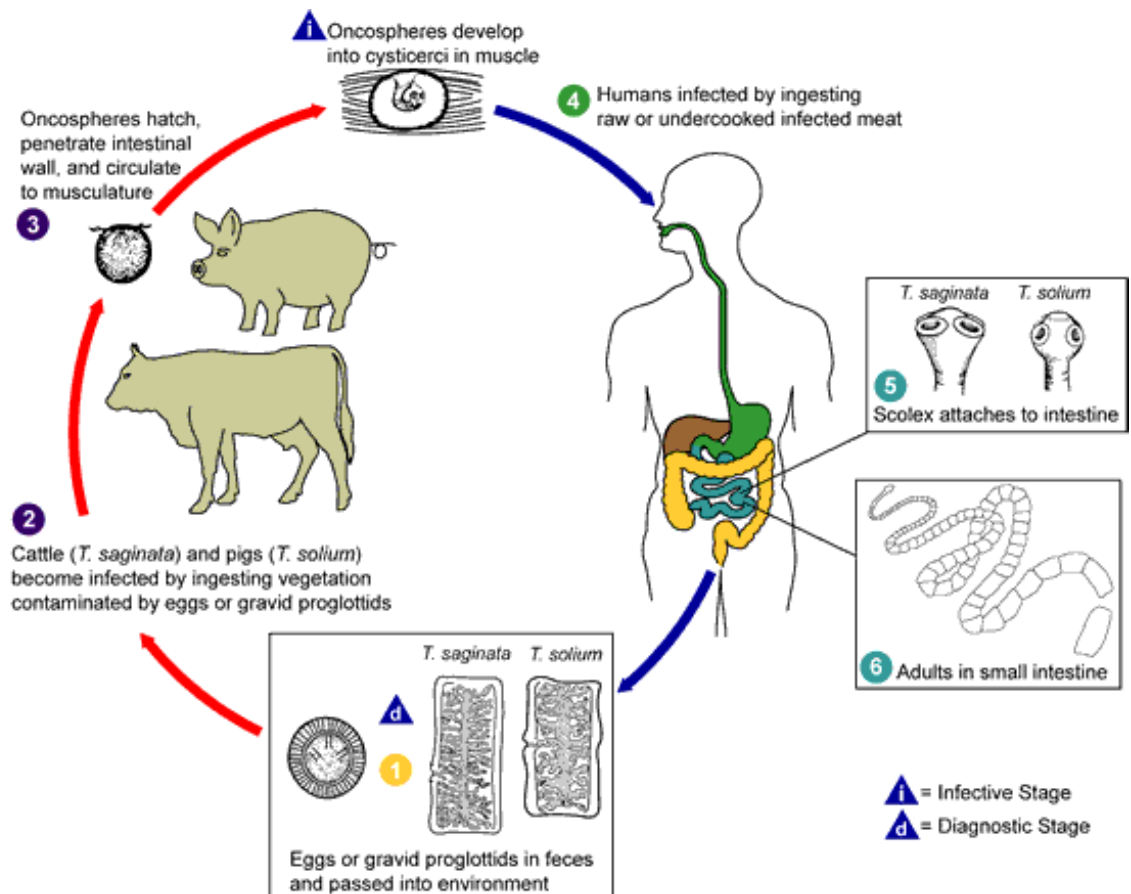
Geographic Distribution: *Schistosoma mansoni* is found in parts of South America and the Caribbean, Africa, and the Middle East; *S. haematobium* in Africa and the Middle East; and *S. japonicum* in the Far East. *Schistosoma mekongi* and *S. intercalatum* are found focally in Southeast Asia and central West Africa, respectively.



Tapeworm

The cestodes (tapeworms) *Taenia saginata* (beef tapeworm) and *Taenia solium* (pork tapeworm). *T. saginata* may measure 9 m (27 ft), whereas *T. solium* may reach 6 m (18 ft). Taeniasis occurs when raw or undercooked unfrozen beef (*T. saginata*) or pork (*T. solium*) are eaten. *T. solium* can also cause cysticercosis.

Life cycle of *Taenia saginata* and *Taenia solium*:



Humans are the only definitive hosts for *Taenia saginata* and *Taenia solium*. Eggs or gravid proglottids are passed with feces **1**; the eggs can survive for days to months in the environment. Cattle (*T. saginata*) and pigs (*T. solium*) become infected by ingesting vegetation contaminated with eggs or gravid proglottids **2**. In the animal's intestine, the oncospheres hatch **3**, invade the intestinal wall, and migrate to the striated muscles, where they develop into cysticerci. A cysticercus can survive for several years in the animal.

Humans become infected by ingesting raw or undercooked infected meat **4**. In the human intestine, the cysticercus develops over 2 months into an adult tapeworm, which can survive for years. The adult tapeworms attach to the small intestine by their scolex **5** and reside in the small intestine **6**. Length of adult worms is usually 5 m or less for *T. saginata* (however it may reach up to 25 m) and 2 to 7 m for *T. solium*. The adults produce proglottids which mature, become gravid, detach from the tapeworm, and migrate to the anus or are passed in the stool (approximately 6 per day). *T. saginata* adults usually have 1,000 to 2,000 proglottids, while *T. solium* adults have an average of 1,000 proglottids. The eggs contained in the gravid proglottids are released after the proglottids are passed with the feces. *T. saginata* may produce up to 100,000 and *T. solium* may produce 50,000 eggs per proglottid respectively.

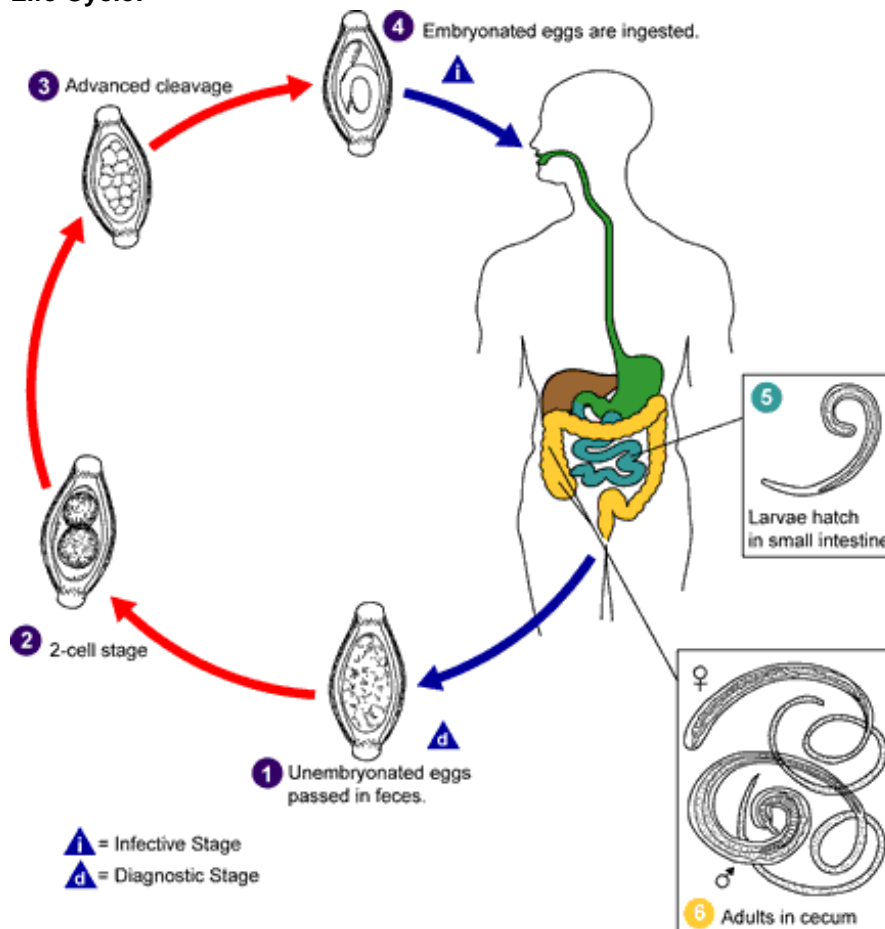
Geographic Distribution: Both species are worldwide in distribution. *Taenia solium* is more prevalent in poorer communities where humans live in close contact with pigs and eat undercooked pork, and is very rare in Muslim countries.



Whipworm (*Trichuris trichiura*)

The nematode *Trichuris trichiura*, also called the human whipworm. The adult female measures about 35-50 mm in length, and the male about 30-45 mm.

Life Cycle:



The unembryonated eggs are passed with the stool **1**. In the soil, the eggs develop into a 2-cell stage **2**, an advanced cleavage stage **3**, and then they embryonate **4**; eggs become infective in 15 to 30 days. After ingestion (soil-contaminated hands or food), the eggs hatch in the small intestine, and release larvae **5** that mature and establish themselves as adults in the colon **6**. The adult worms (approximately 4 cm in length) live in the cecum and ascending colon. The adult worms are fixed in that location, with the anterior portions threaded into the mucosa. The females begin to oviposit 60 to 70 days after infection. Female worms in the cecum shed between 3,000 and 20,000 eggs per day. The life span of the adults is about 1 year.

Geographic Distribution: The third most common roundworm of humans. Worldwide, with infections more frequent in areas with tropical weather and poor sanitation practices, and among children. It is estimated that 800 million people are infected worldwide. Trichuriasis occurs in the southern United States.



NATURE'S SUNSHINE®



PARA-CLEANSE (20 PACKETS)

Product Guide

Benefits:

- Provide natural, gentle, effective nutrients.
- Encourage the elimination of several types of parasites.

Para-Cleanse [Intestinal] is a 10-day program designed to **support the efforts of the intestinal system in cleansing**. This carefully formulated herbal combination supports a healthy intestinal environment.

Each packet contains 6 capsules total, consisting of the following:

1 capsule of **Paw Paw Cell-Reg™**,

1 capsule of **Herbal Pumpkin combination** (a blend of pumpkin seeds, black walnut hulls, cascara sagrada bark, violet leaf, chamomile flowers, mullein leaves, marshmallow root and slippery elm bark),

2 capsules of **Yeast/Fungal Detox** (oregano, caprylic acid, propionic acid, sorbic acid, Echinacea angustifolia root, garlic, pau d'arco, selenium and zinc)

2 capsules of **Artemisia Combination** (two species of artemisia, wormwood and mugwort, along with elecampane root, clove flower buds, garlic bulb root, ginger root, spearmint herb and turmeric root).

NOTE: See your health care provider prior to use if: pregnant or nursing, any medical condition exists or when taking any medication. Read and follow recommendation carefully. Not intended for prolonged use. Do not use if diarrhea, loose stools, or abdominal pain are present or develop. Use of this product may worsen these conditions and be harmful to your health. Chronic diarrhea can result in serious illness.

Adults: Take 2 packets each day, one 15 minutes before breakfast and one 15 minutes before dinner. Drink at least 8 oz. of pure water with the capsules. Continue the program for 10 days.

Eat lots of fresh fruits and vegetables (especially leafy greens) and whole grains. Avoid red meats, coffee, alcohol, sugar and fried foods. You may wait 10 days and repeat the program as needed.

Product Information

Stock Number:	4081-0
Retail Cost:	\$26.05
Member Cost:	\$17.35