

**Bad
Bug
Book**

U.S. Food & Drug Administration
Center for Food Safety & Applied Nutrition
Foodborne Pathogenic Microorganisms
and Natural Toxins Handbook

Ascaris lumbricoides and *Trichuris trichiura*

1. Name of the Organisms:
Ascaris lumbricoides
and *Trichuris trichiura*

Humans worldwide are infected with *Ascaris lumbricoides* and *Trichuris trichiura*; the eggs of these roundworms ([nematode](#)) are "sticky" and may be carried to the mouth by hands, other body parts, fomites (inanimate objects), or foods.

2. Name of Acute Disease:

Ascariasis and trichuriasis are the scientific names of these infections. Ascariasis is also known commonly as the "large roundworm" infection and trichuriasis as "whip worm" infection.

3. Nature of the Acute Disease:

Infection with one or a few *Ascaris* sp. may be inapparent unless noticed when passed in the feces, or, on occasion, crawling up into the throat and trying to exit through the mouth or nose. Infection with numerous worms may result in a pneumonitis during the migratory phase when larvae that have hatched from the ingested eggs in the lumen of the small intestine penetrate into the tissues and by way of the lymph and blood systems reach the lungs. In the lungs, the larvae break out of the pulmonary capillaries into the air sacs, ascend into the throat and descend to the small intestine again where they grow, becoming as large as 31 X 4 cm. Molting (ecdysis) occurs at various points along this path and, typically for roundworms, the male and female adults in the intestine are 5th-stage nematodes. Vague digestive tract discomfort sometimes accompanies the intestinal infection, but in small children with more than a few worms there may be intestinal blockage because of the worms' large size. Not all larval or adult worms stay on the path that is optimal for their development; those that wander may locate in diverse sites throughout the body and cause complications. Chemotherapy with anthelmintics is particularly likely to cause the adult worms in the intestinal lumen to wander; a not unusual escape route for them is into the bile duct which they may occlude. The larvae of ascarid species that mature in hosts other than humans may hatch in the human intestine and are especially prone to wander; they may penetrate into tissues and locate in various organ systems of the human body, perhaps eliciting a fever and diverse complications.

Trichuris sp. larvae do not migrate after hatching but molt and mature in the intestine. Adults are not as large as *A. lumbricoides*. Symptoms

range from inapparent through vague digestive tract distress to emaciation with dry skin and diarrhea (usually mucoid). Toxic or allergic symptoms may also occur.

4. Diagnosis of Human Illness:

Both infections are diagnosed by finding the typical eggs in the patient's feces; on occasion the larval or adult worms are found in the feces or, especially for *Ascaris* sp., in the throat, mouth, or nose.

5. Associated Foods:

The eggs of these worms are found in insufficiently treated sewage-fertilizer and in soils where they embryonate (i.e., larvae develop in fertilized eggs). The eggs may contaminate crops grown in soil or fertilized with sewage that has received nonlethal treatment; humans are infected when such produce is consumed raw. Infected foodhandlers may contaminate a wide variety of foods.

6. Relative Frequency of Disease:

These infections are cosmopolitan, but ascariasis is more common in North America and trichuriasis in Europe. Relative infection rates on other continents are not available.

7. Usual Course of Disease and Complications:

Both infections may self-cure after the larvae have matured into adults or may require anthelmintic treatment. In severe cases, surgical removal may be necessary. Allergic symptoms (especially but not exclusively of the asthmatic sort) are common in long-lasting infections or upon reinfection in ascariasis.

8. Target Populations:

Particularly consumers of uncooked vegetables and fruits grown in or near soil fertilized with sewage.

9. Analysis of Foods:

Eggs of *Ascaris* spp. have been detected on fresh vegetables (cabbage) sampled by FDA. Methods for the detection of *Ascaris* spp. and *Trichuris* spp. eggs are detailed in the FDA's [Bacteriological Analytical Manual](#).

10. Selected Outbreaks:

Although no major outbreaks have occurred, there are many individual cases. The occurrence of large numbers of eggs in domestic municipal sewage implies that the infection rate, especially with *A. lumbricoides*, is high in the U.S.

For more information on recent outbreaks see the [Morbidity and Mortality Weekly Reports](#) from CDC.

11. FDA Activity and Regulations:

Ascarids and trichurids are considered pathogens and foods eaten without further cooking should not be contaminated with viable embryonated eggs of either genus.

The CDC/MMWR link will provide a list of Morbidity and Mortality Weekly Reports at CDC relating to this organism or toxin. The date shown is the date the item was posted on the Web, not the date of the MMWR. The summary statement shown are the initial words of the overall document. The specific article of interest may be just one article or item within the overall report.

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April 1991 with periodic updates

[Bad Bug Book](#)

[Home](#)

Hypertext last updated by mow/xxz/ear 2000-MAR-08