

# Giardiasis Confirmed At Olympic NP

In response to the confirmed presence in Olympic NP of *Giardia lamblia*, the organism that causes giardiasis in mammals, an information synthesis on the subject has been prepared by Research Biologist Richard Starr of Olympic. A condensed version follows.

**Biology:** *Giardia lamblia* is a flagellated protozoan infecting the upper part of the small intestine and may parasitize virtually any mammal. It has two life cycle phases — a trophozoite or active stage and an infective stage, consisting of cysts which are passed in the feces of infected animals. The cysts may remain viable for up to three months even in very cold water. Upon ingestion, they hatch out into trophozoites, which attach themselves to the intestinal walls.

**Transmission and Vectors:** *Giardia* has worldwide distribution. The disease giardiasis is most commonly contracted from drinking water contaminated with fecal materials. In the backcountry, it may be carried by any mammal, but aquatic mammals such as beaver and muskrat are the most important vectors. Slight evidence also points to river otters.

Giardiasis has been confirmed at Ozette and is strongly suspected in the Hoh area and all westside valleys of Olympic NP. Outside, it has been found at the Clearwater Corrections Center and near the Snyder work camp, where a drinking water tank for a work crew was filled from a beaver pond.

All low to middle elevation areas in the western and northern parts of the peninsula are suspect, particularly where aquatic mammals are present. Eastern and southern peninsula have not yet had reported incidents. Subalpine and alpine areas are least likely to be contaminated, but there is no guaranty.

**Symptoms:** Many cases of giardiasis, perhaps the majority, are without symptoms, and acquired immunity is a possibility. Most common symptom is explosive, foul diarrhea, or less commonly, loose, mushy stools; the stools often are greasy due to malabsorption of fats in the diet. Other major symptoms include extreme flatulence accompanied by abdominal distention and pain, loss of appetite and weight loss. Less commonly occurring symptoms are nausea and vomiting, belching foul gas, headache, chills and low fever.

**Diagnosis:** Diagnosis is most common by detection of cysts in stool samples — a method not always effective. The cysts appear to be released on a periodic, cyclical basis rather than steadily, so that a given specimen may not contain cysts even though the disease is present. Another diagnostic method involves swallowing a capsule affixed to a length of string and retraction through the mouth (an uncom-

fortable process), after which the string is scraped for microscopic examination. This method also is not 100 percent effective. Most effective is examination of a biopsy from the upper small intestine for trophozoites.

**Treatment:** Simple, effective treatment involves medications such as quinacrine hydrochloride (Atabrine), metronidazole (Flagyl) and furazolidone.

**Prevention:** *Giardia* infection may be prevented either by removal of the cysts from drinking water, or by their destruction. Appropriate filters for removing cysts rarely are available in the backcountry. Heat is the only 100 percent sure method of destroying the cysts. All cysts will be killed at 140°–160° but bringing water to a boil will guarantee its being cyst-free. It is not necessary to boil the water for any length of time. The evening meal is a good time to boil the next day's drinking water.

A number of chemical methods are available for purification of drinking water. They include halizone (5 tablets per liter for 30 minutes), bleach (0.2ml, or 4 drops, per liter for 30 minutes in cloudy water and 0.1ml, or 2 drops, per liter for 30 minutes in clear water; globaline (tetraglycine hydropyridide; e.g. army surplus iodine water purification tablets, 2 tablets per liter for 20 minutes in cloudy water and 1 tablet per liter for 20 minutes in clear water; emergency drinking water germicidal tablets (tetraglycine hydropyridide slightly stronger than globaline, e.g., Potable Aqua (2 tablets per liter for 20 minutes for all water; iodine (2% tincture), 0.5ml, or 10 drops, per liter for 30 minutes in all water; and iodine (saturated), which involves placing a few grams of iodine crystals in a small bottle and filling with water. After a few minutes, with occasional shaking, the supernatant solution can be used as a purifying agent. The iodine crystals may be used repeatedly.

For fuller discussion of these purification methods, see Jarroll, E.L. Jr., A.K. Bingham, and E.A. Meyer. 190 *Giardia* cyst destruction: Effectiveness of six small-quantity water disinfection methods. *Am. J. Trop. Med. Hyg.* 9:8-11.

The complete paper may be requested from the author at Olympic NP, 600 E. Park Ave., Port Angeles, WA 98362. Information sources for the paper are Edwin C. Lippy, Health Effects Research Lab, U.S. Environmental Protection Agency, 26 St. Clair St., Cincinnati, Ohio 45268 (8-684-7226) and Karen Fukutaki, research microbiologist, State Dept. of Social and Health Services, Floor 13, Smith Tower, Seattle, WA 98104.

