Giardiasis is known by its commonly called name, "Beaver Fever". It is known by this name because of the occurrences of campers getting the disease from drinking contaminated water that was inhabited by beavers. In all actuality it is not only the beaver that carries the parasite, but all animals, including humans (Nebraska Health and Human Services System). So, what is Giardiasis?

The disease, Giardiasis is caused by ingesting the parasite Giardia lamblia (Annual Review of Microbiology 1996). Giardia lamblia is a very simple eukaryote that is a unicellular protozoan (Clinical Microbiology Reviews). The parasite has two stages in its lifecycle, the cyst and the trophozoite (Cash 2005).

Van Leeuwenhoek first saw Giardia through a microscope in 1681 (Clinical Microbiology Reviews). He described it being rather slow moving, but making quick motions with their "paws", moving in a helical motion, which we now know are the flagella (Gillin 1996). When Van Leeuwenhoek saw these parasites, they were in their trophozoite stage and the paws were the flagella with four pairs of these little tails per parasite (CDC, 2004). It took until 1880 for the scientific community to realize that there was another stage that did not contain flagella; this is when it is in the cyst form (Gillin 1996).

Van Leeuwenhoek was first to see it, but a scientist by the name of Lambl did more extensive research in 1859. In honor of his work, it was named after him (Clinical Microbiology Reviews). The name has been through a lot of controversy and at different times, has been called G. duodenalis and G. intestinalis, but G. lamblia has been the name most accepted (Clinical Microbiology Reviews). Although, the scientific community was aware of Giardia, they did not realize it was the cause of diarrhea outbreaks until the 1970's. Until that time, they had thought Giardia was a harmless inhabitant of the intestines (Cash 2005).

EPIDEMIOLOGY

Of Giardia's two different stages, there is the cyst stage, which is basically the latent stage, or resting stage and there is the trophozoite stage (CDC 2004). When Giardia is in the cyst form, it is much like a bacterial endospore in it's ability to survive in somewhat hostile environments for longer periods of time (Rose2001). The cysts have been known to survive for months in cold water of eight degrees Celsius (Rose 2001). So, this is why it is streams, creeks, and lakes that are harboring these parasites.

The disease, Giardiasis is worldwide, but more prevalent in third world countries where sanitation, or lack of, is a problem (Clinical Microbiology Reviews). In the United States, Giardia is the greatest cause of the gastrointestinal illness called, Giardiasis (Nebraska Health and Human Services System). Giardiasis is likely in daycare situations where there are many children in diapers. It is also a common ailment among campers, overseas travelers and is also seen in the male homosexual community (McKesson Health Solutions LLC 2004). All of these situations have the same link-fecal to oral
contamination (CDC 2004). In the case of campers and travelers, they are ingesting water that has been contaminated by, usually animal, but possibly human waste (Nebraska Health and Human Services System). It is hard to track the number of people worldwide that have Giardiasis, for many people that contract the disease have no symptoms, and for the people that do have symptoms, it may be up to three weeks for them to develop (Clinical Reference Systems 2004). It has been estimated that the rate of the disease varies from 4-42% (Cash 2005). Death caused by Giardiasis is rare, and if it happens, it is because the person who contracted the disease, either had a compromised immune system, or they were a malnourished child. The disease shows no favoritism towards race or sex, but it is more prevalent in children (Cash 2005).

CAUSATIVE AGENT

The causative agent of Giardiasis, a severe infection in the small intestines of humans, called gastroenteritis, is a water-borne microscopic parasite, known as Giardia intestinalis. Giardia intestinalis is in the Genus Giardia, a species that is pathogenic to humans and other mammals. This parasite is a multicellular eukaryotic protozoan flagellate organism that lives in a cyst phase in a free-living environment until ingested by a suitable host who will serve as a reservoir for the parasite to live, multiply and continue their life cycle. The cysts can be ingested by drinking contaminated water, passed from person to person by fecal-mouth mechanism, or by eating contaminated food. It is then transported through the digestive tract of the host and into the small intestines. Giardia intestinalis transforms from cyst phase into two trophozoites, by excystation, the releasing of internal contents. Trophozoites, a growing form of protozoan, are the feeding stage of the parasite, usually found in the duodenum where it is attached to the surface of the intestinal villi, feeding on mucosal secretions (Gardner et al., 2001). Trophozoites are 9-21 um long, 5-15 um wide and 2-4 um thick. They are pear-shaped with a rounded anterior end, two well-defined nuclei, two slender median rods, and eight flagellate in four pairs per cell (multicellular). The ventral part of the body has a sucking adhesive disc for attachment. Colonization by binary fission, asexual reproduction, occurs approximately every five hours. Some trophozoites detach from the mucosal and enter the fecal stream, where they assume a round shape, secrete a wall and enter the infectious cyst stage that is excreted in the feces. The cyst Giardia can survive outside the host for months, as long as its environment is cool and moist, where it waits for a new host.

PATHOLOGY

Giardiasis is caused by a unicellular, protozoan flagellate, called Giardia intestinalis. Giardia intestinalis is also a eukaryote. This eukaryote most commonly causes the symptoms of a gastrointestinal flu; abdominal cramps, diarrhea, nausea and weight loss. This usually occurs one to three weeks after infection and lasts from two to six weeks. The disease is not life threatening to generally healthy people. Those with chronic illnesses, infants and children, can find this parasite to be potentially deadly, causing severe dehydration.
According to the CDC, *Giardia* is contracted from consuming contaminated food or water, or from person-to-person contact. The parasite is transferred to the body as a cyst from the contamination source. This is when it is considered the infective stage. Then, it travels to the digestive system and in the small intestine the cysts replicate to create two trophozoites, (Trophozoite: A sporozoan nourished by its hosts during its growth stage. Taber's Cyclopedic Medical Dictionary. Copyright 2001 by F. A. Davis Company). This process is called excystation. After being exposed to certain environmental factors in the intestine, like pH and bile, the trophozoites then multiply by binary fission and live in the gut "where they can be free or attached to the mucosa by a ventral sucking disk"(CDC Fact Sheet 2004). The main source of nutrients for *Giardia* is glucose that is provided by the intestinal epithelium and is ingested via diffusion. They attach to the intestinal epithelium and mucous layers where they propagate. This does not, however cause inflammation of the mucosa. After propagation, the trophozoites differentiate to become cysts; this is called excystation. Both the trophozoites and cysts are expelled in the feces; this is when *Giardiasis* can be diagnosed (Eckmann, L. 260). After excretion, the trophozoites cannot survive outside the body. They cysts however, can.

The cysts have been found to live for long periods of time outside the body. They can live for months in lower temperatures and only a few days in warmer temperatures. Cysts often contaminate river, pond or lake water because they have been known to live in these conditions for up to fifty-six days (Ministry of Health by ESR Ltd., 1). This is why it is commonly "picked up" by hikers, swimmers and children. It is often found in natural pools of water, in remote areas and in daycare centers where children do not properly wash their hands after eliminating. It can be difficult to diagnose *Giardia* because it does not produce a significant amount of visible damage to the intestines. If a patient has a form of gastrointestinitis and has no mucosal inflammation, specific testing for *Giardia* should be started. The forms of damage that ensue include a shortening of the brush-border microvilli in the intestine and evidence of digestive enzymes in the brush-border. This may be due to the immune system response involving Killer T-cells and B-cells (Eckmann, L. 261). These cells may "eat" the brush-border microvilli in order to stop the spread of the infection. A toxin is not produced by this parasite.

**RESPONSE and TREATMENT**

The standard treatment for *Giardiasis* can involve one of the following medications that a physician can prescribe: Metronidazole, tinidazole, quinacrine hydrochloride or furazolidone. Children can be treated with the drug, Nitazoxanide.

The best measure for preventing the infection of *Giardiasis*, is to follow proper hygiene rules regularly, taking special care when in a potentially infectious area like a daycare center, campground or river. The moral of the infection is to wash, wash, wash your hands. It is also very important when hiking or camping to boil all water before ingestion, since boiling will kill the *Giardia* cysts (Sorenson, 2).
SOCIO-POLITICO-ECONOMIC

There are a number of social, political and economic aspects to the infectious agent, Giardiasis. Giardiasis is a worldwide problem. In the United States, Giardiasis is typically contracted by the ingestion of contaminated water; Water that is commonly considered "recreational", i.e., lakes, rivers, swimming pools and water parks (Beach, 2002).

While considered a serious, sometimes "nuisance" problem in the United States, it is a deadly problem in third-world countries. James Gamble, in his article in Medical Science of Oxford University, U. informs us that Giardiasis is much more than a contaminant of "recreational waters". Many diseases in the third-world are related to poor water supply, poor sanitation and unsafe hygiene practices which, beyond Giardiasis also include cholera, hepatitis A, dysentery, polio, E. Coli, typhoid, salmonella, bilharzia, guinea-worm, intestinal parasites and trachoma.

Poverty also, is an absolute killer. Gamble tells us that in third-world countries, people live on under $1 a day, and that given the gap between income and healthcare costs, it is not enough to buy sufficient food, let alone healthcare.

Politically speaking, according to Gamble, many third-world problems are probably the fault of first-world countries. He speaks of how theorists have explained the development of the third-world in terms of depending upon the first-world-the "dependency paradigm". This dependency initially took a "colonial form", but is now economic. The economic dominance of the first-world appears to maintain an unequal power relationship via the capitalist system.

It goes without saying, that we are a fortunate bunch of first-world inhabitants! We have the daily blessing of clean, sanitary, disease-free water, piped into our sinks, tubs and backyards. It is seldom that we Americans need to concern ourselves with what disease may be lurking in our water or food supply, Giardiasis or otherwise! It is generally, only in our recreational water ventures, that we even need to think twice about the water we hope not to accidentally swallow!
Works Cited


