Giardia Myth-Buster: How Delusion Created a False Industry Standard

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Etiology

There are many things backpackers agree on. A warm meal feels great at the end of the day. Cotton fabric takes forever to dry and should thus be avoided. Mosquitoes and black flies come straight from hell. And all backcountry water must be treated due to the presence of Giardia, a protozoan that has infested sources throughout the United States and causes the gastrointestinal illness giardiasis. Now, there's no denying hot meals are soothing, cotton kills, and camping during bug season is cruel and unusual punishment. But has Giardia really infested backcountry water? Ask nearly any backpacker, land manager, outdoor educator, or trail club leader and you will receive a frantic, "Oh, yes it has!"

I calmly report, "No, it has not." Why do I veer from those who believe they are well-informed and the outdoor educators who teach an "industry standard" of treating literally every drop of water? Because I have done my homework. Qualitative and quantitative evidence within this paper show that when it comes to remaining healthy, treating water is superfluous, and addressing hygiene is vital.

But first, where did this whole "treat your water" thing come from? Amazingly, this myth has been traced to its origin. In 1976 a group of 54 backpackers camped in Utah's Uintah Mountains of Wasatch-Cache National Forest and drank straight from a stream, as everyone did back then. Thirty-four of them had diarrhea during or shortly after this trip. When 32 were tested for disease, it was revealed that 26 had Giardia cysts in their stools. These results marked the beginning of speculation that morphed into dire warnings about untreated backcountry water.

Three doctors – Alan Barbour, Taira Fukushima, and Craig Nichols – wrote of the campers' misfortune in a May 1976 *American Journal of Tropical Medicine and Hygiene* article titled "An Outbreak of Giardiasis in a Group of Campers." The authors concluded the campers got sick from the water despite admitting, "Giardia lamblia cysts were not recovered from stream water nor were they found in intestines or feces of sampled mammals living in the drainage area." The U.S. Forest Service heard about the incident, never investigated the matter itself, and started proclaiming backcountry water "hazardous."

The authors' conclusion and Forest Service's reaction are plagued by three flaws. One, the near-immediate onset of diarrhea wasn't consistent with giardiasis symptoms. It takes one to two weeks, not one to two days, for symptoms to manifest. Two, other groups camped at the same spot and drank from the same stream but didn't get sick. Three, an infection rate of 63 percent is too high for water to have been the vector. In 1976 the epidemiology of giardiasis infections in people was only crudely understood. Decades' worth of research have shown water to be a lousy vector for this illness.

As Tom Welch, MD, personally communicated to me, the authors "attributed the outbreak to drinking water at a campsite, although they admitted that they had been unable to prove this and that many others who camped in the same area were unaffected. Today, it is clear this epidemic was caused by food or poor hygiene." Yet this discredited half-century-old study is still being cited to justify water treatment.

As Robert Rockwell, Ph.D., wrote of this Wasatch-Cache National Forest fable in March 2002 within "Giardia Lamblia and Giardiasis" published in *Yosemite Association Newsletter*, "To indict a particular stream or lake under such circumstances, without being able to at least verify that cysts are indeed there at all, is illogical at best." What the authors of the 1976 paper and Forest Service did in one fell swoop was create a fear of backcountry water not based in reality. The rest, as they say, is history.

Cysts

Contrary to popular myth, sources are not crawling with Giardia. This has been proven as far back as 1984 when nearly seventy Sierra Nevada sources were analyzed. This research project performed by the United States Geological Survey and California Department of Public Health drew two conclusions. First, data showed that 55 percent of high-use sources and 85 percent of low-use sources had no cysts whatsoever. Second, of those in which cysts were present, the amount was ridiculously low, nowhere near enough to make you sick. As a portion of this study, nearly 1,000 gallons were filtered from ten sources. Fewer than 150 cysts were found. The highest concentration was 0.11 per liter. During that same era San Francisco's treated drinking water averaged 0.12 per liter.

To develop giardiasis you must ingest approximately twenty viable cysts. To consume twenty cysts from those Sierra Nevada sources, you would have to drink 181 liters of untreated water in one sitting. To get sick, all cysts would also need to be viable, and that is impossible.

If you demand additional data, look no further than *Backpacker's* December 2003 "What's in the Water?" Using the services of Biovir Laboratories, *Backpacker* staff collected three samples each from seven U.S. sources during that spring and summer. Seventy-one percent of samples had no Giardia cysts. When cysts were present the highest concentration was 0.8 per liter. The author of this article, Peter Jaret, concluded, "Cleaning eating utensils and washing hands regularly with soap and water proved more effective at reducing the risk of diarrhea than treating water." But more on prevention later.

The New York City Department of Environmental Protection (DEP) maintains trends presented by the 1984 and 2003 studies. As part of its Cryptosporidium and Giardia Monitoring Program, the DEP annually publishes results of searches for cysts. During a 360-day test period in 2008, the DEP collected 164 fifty-liter samples from six outlets of its Kensico and New Croton reservoirs that hold untreated water. Thirty percent of samples had no Giardia cysts. When cysts were present the average concentration was 0.3 per liter. If you demand more recent data, the DEP analyzed fourteen fifty-liter samples from February to May 2023. Total cysts detected per fifty liters were 0 (eleven times), 2 (once), 3 (once), and 6 (once) for an average concentration of 0.2 per liter.

When most backpackers, land managers, outdoor educators, and trail club leaders face such robust data, cognitive dissonance engages, and they fire back with, "Sure, these studies didn't find Giardia, but what about Cryptosporidium?!" Cryptosporidium is a microscopic parasite that causes cryptosporidiosis. Some people believe it's prevalent in backcountry water, but it's not. When the DEP searched for Giardia cysts from February to May 2023, it also looked for cryptosporidium cysts. This agency collected and analyzed 700 quarts of water and were unable to find a single cyst.

Myth busted: Giardia (and cryptosporidium) cysts are ubiquitous in backcountry water

Prophets

Backpackers often tell dubious stories of how they acquired giardiasis on trips by drinking untreated water. With such self-diagnosis I always ask, "A doctor told you that you had giardiasis?" The answer invariably is, "No… I mean… uh... I didn't get tested. But I know it was giardiasis, and I know I got it from the water." A fair but unanswerable follow-up I ask is, "How do you know these to be true?"

Self-diagnosis perpetuates the giardiasis myth. Steven Zell, MD, wrote in his August 1992 *Journal of Wilderness Medicine* article "Epidemiology of Wilderness-acquired Diarrhea" that the medical community chronically misdiagnoses by "empirically treating [wilderness-acquired diarrhea] cases for giardiasis without demanding laboratory confirmation."

In his 2002 "Giardia Lamblia and Giardiasis" article mentioned above, Rockwell agreed with Zell. "The diarrhea being blamed on Giardia from that climbing trip a week ago may instead be due to some spoiled food eaten last night or [bacteria] in undercooked chicken four days ago."

Famed long-distance hiker and mountaineer Chris Townsend revealed in *The Backpacker's Handbook* from 2005, "People who tend to get a gut disorder tend to blame Giardia in the water because they've been warned about it, even though the cause is probably not either Giardia nor the water."

Welch agreed with Zell, Rockwell, and Townsend. He explained to me, "Most non-specialist physicians who have been out of training for a long time don't know much more about giardiasis than your average outdoor educator. To them it's straightforward. Diarrhea after a camping trip means giardiasis. The treatment is easy, so they give it. However, most cases of diarrhea go away after several days anyway, so the patient would get better no matter what treatment." Welch concluded, "In this case, however, when the patient gets better after taking anti-Giardia medication everyone assumes the 'disease' has been 'treated.' It is a self-fulfilling prophecy."

Myth busted: If you get sick after a backpacking trip, you have giardiasis

Bias

One water filter advertisement warns, "No water sources should be considered safe to drink without treatment." Water treatment product companies and those associated with them are biased. Since they have an interest in selling their wares, they will not hesitate to deceive.

I experienced this firsthand. During an appearance on a popular hiking podcast that shall remain nameless, I was asked why I don't treat my water. I presented facts shared within this paper, which made the hosts' defense of needing to treat water untenable. When the episode aired a week later, I discovered this entire part of our conversation had been edited out. The sponsor of this podcast is Sawyer Products, a water treatment product company.

Early into his June 2011 "What's in the Water" article, Ray Brooks assured readers he was unbiased. He then immediately went off the deep end, figuratively, by attempting to scare outdoor enthusiasts about Giardia and Cryptosporidium. He then discussed the lethal bacterium Campylobacter, E. Coli, Plesiomonas shigelloides, Shigella, Salmonella typhi, Vibrio cholerae, and Yersinia enterocolitica; the protozoan Entamoeba histololytica; the parasites Faciola hepatica, Isospora belli, Microsporidia, and Plasmodium; and the viruses Hepatitis A, Hepatitis E, Norovirus, and Rotavirus in addition to deadly algae blooms and mineral and chemical contaminations. This begs the question, Where is Mr. Brooks getting his drinking water?

Brooks warned you shouldn't believe writers like me because we don't "have science degrees." We are mere "nay-sayers" spreading "misinformation." But Brooks's bachelor's in Forestry earned almost fifty years before he wrote his article would disqualify him from commenting as well. What's most problematic is that when Brooks wrote his article he was working for the water treatment product company Katadyn. His job was to hold Katadyn clinics in retail stores to persuade merchants to stock water treatment products. His article was published by one outlet. That was NRS, a gear company that sells Katadyn products.

Welch is suspicious of such feigned objectivity. He concluded on his website, "There is ample evidence that the risk of acquiring disease from North American backcountry waters is nil, and that the real way in which disease is spread on treks is within the group from poor hygiene. Sometimes this entire thing seems like a conspiracy by the manufacturers of those silly filters."

Meanwhile, state and federal agencies and private organizations fear liability. In 2005 within *The Backpacker's Handbook* Townsend reported, "To cover themselves, land managers generally advise people that all water needs treating." Trail clubs have followed suit by telling

everyone that the water will make you sick. From the Appalachian Trail Conservancy: "Water in the backcountry... may look, smell, and taste good, but can still be contaminated by microorganisms, including Giardia lamblia and others...." From the Green Mountain Club: "Even if the water looks clean, it can carry bacteria, viruses, and protozoa. Giardia is one of the best-known risks from drinking untreated or poorly treated water, but it's far from the only one." From the Colorado Trail Foundation: "No water source along the Colorado Trail should be considered safe to drink...."

The Pacific Crest Trail Association offers the darkest predictions, the nastiest shaming, and the least sensible explanations when it comes to treating backcountry water. This club's prediction is, "Be warned, a drink of untreated contaminated water could land you in a hospital intensive care unit with a potentially lethal infection." You read that right. One drink. Lethal. The association didn't hesitate shaming a specific demographic within its 2024 Pacific Crest Trail Hiker Survey. The club wrote that those who don't treat their water only do so to look cool. "Everyone wants to look cool in front of their friends by not filtering water (note: not filtering your water does not make you cool)." Despite hiking since 1985, working in the outdoors since 1999, and meeting and leading hundreds of hikers along the way, I have never heard of this strange journey toward coolness. The club somehow also concluded that hikers who don't treat their water actually are getting sick but won't "readily admit to becoming sick" because it would make them look uncool.

Within James Wilkerson's *Medicine for Mountaineering* from 2001, Fred Darvill Jr., MD, agreed with Townsend about public warnings. "Frantic alarms about the perils of giardiasis have aroused exaggerated concern about this infestation. Governmental agencies, particularly the National Park Service and Forest Service, have filtered hundreds of gallons of water, found one or two organisms (far less than enough to be infective), and erected garish signs proclaiming the water 'hazardous.'"

Like Townsend and Darvill, Welch loathes these baseless warnings. Within "Hazards in the High Peaks" published in the June/July issue of *Adirondac* he wrote, "Upon passing any of the busy entrances to the [Adirondack] High Peaks on a summer day, one could easily get the idea he or she was coming into an area whose water quality approximates that of Bangladesh."

What evidence are these warnings based upon? Though I've been looking since 2006, I haven't found a study that supports the supposition that backcountry water is uniquely unsafe for

consumption. To the contrary. To quote Rockwell, "The bad news: Giardia lamblia is almost everywhere." Giardiasis infections have been traced to public swimming pools, day care centers, cruise ships, public restrooms, facilities that cater to intellectually disabled persons, unsafe sexual practices, municipal water sources, and food sources. Welch offered the final word on disease vector. He wrote to me, "In the United States, the vast majority of cases of giardiasis are caused by hand-to-mouth spread.... No studies have shown that consumption of backcountry water in North America is an important cause of this disease."

Myth busted: Biased parties report facts

Culprits

Roland Mueser, author of *Long Distance Hiking*, completed a 1989 study that became the core of his book. He hiked the entire Appalachian Trail that year, and during his pilgrimage he asked thru-hikers an array of questions, from how many miles they hiked each day to if they smoked. He interviewed 136 of the 208 hikers who traversed the trail that year. Two seemingly unrelated questions later revealed an intriguing correlation. Mueser asked thru-hikers how often they treated their water. He also asked if they experienced gastrointestinal illnesses during their treks. Some boiled their water, some used a chemical treatment, some used a filter, and some didn't treat their water at all. No matter their choice, approximately one-quarter experienced gastrointestinal illnesses. In other words, it wasn't the water. Here's Mueser's data.

How often they treated their water	*Percent who became ill*
Always	21
Usually	28
Sometimes	29
Never	20

Results are similar on the West Coast. Within its 2024 Pacific Crest Trail Hiker Survey, the Pacific Crest Trail Association asked respondents how often they treated their water and if they experienced "three or more days of digestive issues or diagnosed giardia." First, we don't

know how many hikers actually had giardiasis. Second, the survey confirms that treating water doesn't prevent illness. The association's 2024 data follows.

How often they treated their water	*Percent who became ill*
Always	9
Usually	11
Sometimes	19
Never	9

This trail club's previous year survey results were more damning. Instead of noticing that treating water doesn't prevent illness, the association again concluded that hikers who didn't treat their water actually got sick but lied about it, even though responses were anonymous. The association's 2023 data follows.

How often they treated their water	*Percent who became ill*
Always	5
Usually	9
Sometimes	12
Never	0

How can this be? As Mueser correctly deduced, "It seems probable that some systematic explanation for gastrointestinal illness [lies] beyond the simple water-purification process...." The Appalachian and Pacific Crest thru-hikers didn't get sick from the water. They suffered from food-borne illnesses by eating spoiled food and not properly washing their utensils and dishes, and they became infected with protozoans and bacterium by not washing their hands.

Rockwell put a bow on it in 2002 by writing, "If you contract giardiasis in the backcountry, blame your friends, not the water." By the time he got done drafting his 5,800-word paper built upon 42 citations, he recommended backpackers "drink freely and confidently" because "personal hygiene is far more important." Rockwell walked the walk. He never treated water in his beloved Sierra Nevada Mountains, which he began exploring in the 1950s. The range's Rockwell Pass is named for him.

Addressing hikers who suffer from food-borne illnesses, ditch the multiple pots, pans, mugs, and utensils and adopt what I call "the one pot system." When I taught outdoor education, my students each carried one pot, one lid, and one spoon into the field. That's it, and they weren't allowed to share. Students then chose meals that required boiling water. By boiling water in their pots each day and eating out of them rather than out of anything else they ensured their pots were perpetually disinfected. To ensure you and your campmates don't become victims of food-borne illnesses, employ these practices.

1. Adopt the one pot system
2. Cook food thoroughly
3. Choose meals that require boiling water
4. Don't eat leftovers and dispose of spoiled food
5. Don't use a pot scrubby or sponge
6. Clean the threads of your water bottles
7. Choose foods with long shelf lives
8. Educate yourself on food-borne illnesses

Addressing hikers who don't wash their hands well or often, our hands are the most common vector for spreading disease. In the March 2012 *American Journal of Infection Control* article "High Fecal Hand Contamination Among Wilderness Hikers," authors Welch, et al., discovered that among 72 Adirondack hikers studied, 22 "had hands colonized with fecal bacteria." To ensure you don't spread or become a victim of sickness in the backcountry, employ these practices.

1. If you're sick, stay out of the kitchen
2. If you're very sick, camp alone
3. If you're wicked sick, go home
4. Don't reach into others' food bags
5. Don't share utensils, pots, bowls, water bottles, or mugs
6. Avoid outhouses
7. Keep your fingers out of your mouth

8. Use hand sanitizer after using the bathroom and before preparing food

Myth busted: Untreated water causes illnesses

Data

By this point perhaps you're daring, "Well, if the water's so safe, Schlimmer, why don't you go out there and drink a hundred quarts of untreated water yourself?" I'm way ahead of you. In 2006 I read the bulk of the publications cited within this chapter and haven't treated any water since. Here's my field data that spans 2006 to 2025.

Location	*Quarts consumed*
Adirondack Park, NY	660
Catskill Park, NY	150
Great Smoky Mtns. National Park, NC	105
San Isabel National Forest, CO	50
Pike National Forest, CO	50
Lake Tahoe Basin, CA/NV	30
Tonto National Forest, AZ	25
Chugach National Forest, AK	20
Coronado National Forest, AZ	20
Denali State Park, AK	20
White Mountain National Forest, NH	20
Paper company lands, ME	15
Arapaho National Forest, CO	10

That's 1,175 quarts consumed. I have shown no signs of giardiasis. Incredibly, some say this is "luck" – that I randomly chose scores of Giardia-free sources across nine states. If this is luck, it is the most remarkable case of luck in the history of mankind.

By my fiftieth quart I was convinced of Giardia's absence. I then empowered outdoor education students and trail crew members I led by letting them decide if they wanted to treat their water during our trips. Between May 2008 and July 2012, 76 students and trail crew

members decided to not treat their water. Good hygiene was not optional, though. Here's the field data.

Date	*Location*	*Participants*	*Quarts consumed*
May 2008	Adirondack Park, NY	7	105
Sept. 2008	Adirondack Park, NY	10	110
May 2009	Adirondack Park, NY	6	60
July 2009	Denali State Park, AK	12	220
Aug. 2009	Adirondack Park, NY	10	505
May 2010	Adirondack Park, NY	3	45
May 2010	Adirondack Park, NY	8	165
Oct. 2010	Adirondack Park, NY	7	110
May 2011	Adirondack Park, NY	8	90
July 2012	Great Smoky Mtns. NP, NC	5	90

That's 1,500 total quarts consumed and an average of 20. No one showed signs of giardiasis. After recording these participants I moved toward the backpacking community at large and posted an announcement on two popular Internet hiking forums, asking people if they treated their water. There was great interest. One forum logged 1,600 views and 40 responses. The other forum doubled that. Combining these responses with the experiences of the above outdoor education students and trail crew members, I recorded the experiences of 200 participants who collectively consumed 10,000 quarts and remained perfectly healthy. If anyone maintains this is luck, it is an amazing stroke of luck, year-round, across the nation, mountain springs to lakes, sea level to timberline, children to senior citizens. No one's that lucky.

Myth busted: If you drink untreated water, you'll get giardiasis

Compulsion

The final question is, Why? Why do most backpackers, land managers, outdoor educators, and trail club leaders not embrace an evidence-based assessment of backcountry water and hygiene? First, most people simply don't know better. From the Forest Service to the Appalachian

Mountain Club, the National Park Service to the Arizona Trail Association, we've been told that all backcountry water must be treated, and water treatment product companies are more than happy to echo this. Two, old habits die hard. But to be honest, I'm amazed the "treat your water" debate is still a thing. Three, cognitive dissonance is a raw feeling that demonstrates being wrong is an uncomfortable emotion. Lastly, confirmation bias is a satisfying feeling that demonstrates being right is a comfortable emotion. Yet the time has come to put emotions aside and terminate this flawed industry standard. Since we already agree that hot meals are welcome and cotton and antagonistic insects make for bad times, let us discuss our commonalities over a quart of untreated water without concern for giardiasis.

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