

**Giardia Myth-Buster: How Rumor and Paranoia Have
Created a False Industry Standard**

By Erik Schlimmer

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There are many things outdoor educators agree on. For example, a warm meal feels great at the end of the day. Cotton fabrics take forever to dry in the field and should thus be avoided. Most small groups generate less impact than large groups do. 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 water sources throughout the United States, causing the debilitating gastrointestinal illness giardiasis.

Now, there is no denying hot meals are soothing, cotton kills, good things come in small packages, and camping during bug season is cruel and unusual punishment. But, has Giardia really infested our water sources? Ask this question to nearly any outdoor educator and you will receive a harried, "Oh, yes it has!" However, to the above question I calmly answer, "No, it has not." I teach an evidence-based curriculum that embraces drinking straight from the source.

Why do I veer from the educators that teach an "industry standard" of treating literally every drop of water? Because I've done my homework. The supporting evidence for not treating backcountry water is presented in five logical, myth-busting arguments that will encourage educators to rewrite unproven curriculum.

Safety in (lack of) numbers

Despite popular belief in professional circles, water sources are not crawling with Giardia, as proven by a 1984 examination of nearly seventy Sierra Nevada water sources. This research project performed by the United States Geological Survey and California Department of Public Health drew two interesting conclusions.

First, data showed that more than 55 percent of high-use sources and nearly 85 percent of low-use sources had zero Giardia cysts.

Secondly, of those sources that had cysts present, the amount was ridiculously low – nowhere near enough to make you sick, considering you must ingest approximately twenty viable cysts to develop giardiasis. As a portion of this study nearly 1,000 gallons of water

were filtered from ten different sources. Fewer than 150 Giardia cysts were found. Therefore, on average, you would have to drink 132 gallons of untreated Sierra Nevada water in 24 hours to get giardiasis (assuming every cyst was viable, which is highly unlikely).

If you demand more recent research, look no further than *Backpacker's* "What's in the Water?" This nine-page assessment of backcountry sources appeared in their December 2003 issue. Using the services of Biovir Laboratories, *Backpacker* staff collected three samples from seven sources during the spring and summer of that same year. Their results follow.

<u>Source</u>	<u>Giardia found?</u>	<u>Viable cysts found?</u>
Greenwater River, WA	No	No
Renard Lake, WI	No	No
White Pine Lake, UT	No	No
Neversink River, NY	Yes, one sample	No
West Beaver Creek, AZ	Yes, one sample	No
Merced River, CA	Yes, two samples	No
Chattooga River, NC	Yes, two samples	Undetermined

Seventy-one percent of their samples were void of any Giardia cysts and the most polluted had only 0.8 per liter. Even in the extreme unlikelihood of all cysts being viable in this most-polluted sample, you would still have to drink more than one liter per hour for 24 hours to become a victim of giardiasis.

The New York City Department of Environmental Protection (DEP) maintains trends presented by these 1984 and 2003 studies. As part of their comprehensive Cryptosporidium and Giardia Monitoring Program, the DEP annually publishes results of their searches for Giardia. During a recent testing period, January 7, 2008 to December 29, 2008, the DEP collected 164 fifty-liter samples of untreated water from six locations: the outlets of their Kensico and New Croton Reservoirs. Their results are below.

<u>Collection point</u>	<u>Average Giardia cysts per fifty liters</u>
Kensico CATLEFF	2.1
Kensico DEL18	1.7
New Croton CRO1B	2.5
New Croton CRO1T	1.2

New Croton CRO183	4.0
New Croton CROGH	0.2

Thirty percent of the DEP samples had no *Giardia* cysts. When cysts were present, there were fewer than two per fifty liters. Consuming this average, you would have to drink 128 gallons to get giardiasis. Additionally, the DEP cautions that cysts were not necessarily viable. Referencing the *Backpacker* study above, it is likely that very few, if any, cysts were viable in the DEP samples.

Myth busted: *Giardia* is prevalent in backcountry water.

Are you sure it wasn't the sushi?

Leaders often tell how they acquired giardiasis on a backpacking trip. A fellow faculty member drank one cup of untreated water and attributed these scant eight ounces to her severe cramps. Another colleague drank one quart of untreated water and blamed this for his nausea. With such self-diagnosis I usually ask, "So, your doctor told you you had giardiasis?"

The answer invariably is, "No... I mean, I didn't get tested – but I'm sure it was *Giardia*!" However, these people have no grounds for assuming they had giardiasis.

Time and time again self-diagnosis perpetuates the *Giardia* myth. Chris Townsend, famed European long-distance hiker and mountaineer, reveals in *The Backpacker's Handbook*, "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* or the water."

In his "*Giardia Lamblia and Giardiasis*," Robert Rockwell, Ph.D., agrees: "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."

Steven Zell, MD, FACP, feels the medical community is chronically misdiagnosing by "empirically treating [wilderness-acquired diarrhea] cases for giardiasis without demanding laboratory confirmation."

Thomas Welch, MD, a Wilderness Education Association instructor and *Giardia* expert, agrees with his above colleagues: "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 = giardiasis. The treatment is easy, so they just give it. However, most cases of diarrhea go away after several

days anyway, so the patient would get better no matter what treatment." Dr. Welch concludes, "In this case, however, when the patient gets better after taking anti-Giardia medication everyone assumes the 'disease' has been 'treated' – a self-fulfilling prophecy."

Myth busted: If you get sick after a backpacking trip, it's because you have giardiasis.

Disregard nonobjective parties

One water filter advertisement warns, "No water sources should be considered safe to drink without treatment." Water treatment companies have a vested interest in selling their products and only benefit from spreading unfounded rumor.

Federal and state agencies fear the L word: lawsuit. Townsend, in *The Backpacker's Handbook*, reports, "To cover themselves, land managers generally advise people that all water needs treating."

Dr. Welch feels aggressive trailhead postings are uncalled for. In a 1997 issue of *Adirondack*, he writes, "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."

In *Medicine for Mountaineering*, Fred Darvill Jr., MD, agrees: "Frantic alarms about the perils of giardiasis have aroused exaggerated concern about this infestation. Governmental agencies, particularly the U.S. Park Service and [U.S.] 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.'"

From coast-to-coast, hiking clubs have been duped by land managers, proclaiming drinking untreated water as dangerous as sword swallowing. With only five words the Finger Lakes Trail Association makes their warning clear as a mountain stream: "Purify all water you use." Terrifyingly fit for a horror movie, the Adirondack Mountain Club foretells, "It's a disease you won't ever forget if you contract it, and, if you have, you won't want to undergo it a second time." The Tahoe Rim Trail Association recommends treating water that was proven safe by the 1984 study: "Be sure to avoid drinking any untreated water in the Sierra Nevada" because "water sources are not fit for human consumption..."

Outdoor education programs across the country blindly "manage risk" by preaching familiar caution: treat all your water or suffer the (gastrointestinal) consequences. However, an important question remains: what are they basing these warnings on? Surely not evidence.

Though I have been looking since June 2006, I have been unable to find a single study that proves backcountry water is unsafe for consumption.

Myth busted: Interested parties report the facts about Giardia.

The real culprits

Roland Mueser, author of *Long Distance Hiking*, completed a study that became the core of his book in 1989. He hiked the Appalachian Trail and during his pilgrimage he asked thru-hikers a smattering of questions, from how many miles-per-day they averaged to if they smoked. Two questions he asked that most pertain to this article were if the thru-hikers treated their water and if they experienced gastrointestinal illness during their hike.

Mueser made contact with 136 thru-hikers. Some of them boiled their water, some used a chemical treatment, some used a filter, and some did not treat their water at all. In each of these four groups, approximately one-quarter suffered gastrointestinal illness, no matter their treatment of choice. Mueser's data follows.

<u>How often they treated their water</u>	<u>Percent who became ill</u>
Always	21%
Usually	28%
Sometimes	29%
Never	20%

As Mueser deduces in *Long Distance Hiking*, "It seems probable that some systematic explanation for gastrointestinal illness [lies] beyond the simple water-purification process..." Mueser was right: the thru-hikers were not getting sick from the water. Further literature reveals these backpackers suffered food-borne illnesses due to not properly washing their utensils and dishes. They also became infected with protozoan and bacterium by not washing their hands often.

Addressing hikers who suffer food-borne illnesses, I recommend backpackers wash all utensils, pots, bowls, water bottles, and mugs often with boiling water. Better yet, outdoor programs should adopt the "one pot system." My students each carry one pot, one lid, and one spoon into the field. That's it. Students choose meals that require boiling water. By boiling water in their pot each day and eating out of it rather than a bowl, they ensure their pot is

disinfected most of the time.

To ensure you and your students do not become victims of a food-borne illness, adhere to the following golden rules of the backcountry kitchen.

1. Institute the one pot system.
2. Cook food thoroughly.
3. Choose meals that require boiling water.
4. Do not eat leftovers.
5. Dispose of spoiled food.
6. Wash all utensils, pots, bowls, and mugs often.
7. Let all in #6 air-dry completely.
8. Clean the threads of your water bottles.
9. Choose foods with long shelf lives.
10. Further educate yourself on food-borne illnesses.

Addressing hikers who do not wash their hands often, our hands are perhaps the most common vector for spreading disease in the backcountry. In *The Backcountry Classroom*, author Jack Drury, former director of North Country Community College's Wilderness Leadership program, cites Dr. Thomas Welch: "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."

Contributing authors of *The Backcountry Classroom* offer a reminder in bold print as part of their Water Treatment chapter, announcing, "The number one priority in maintaining health in the outdoors (in case we haven't made it clear yet): **WASH YOUR HANDS – WASH YOUR HANDS – WASH YOUR HANDS.**" To remain disease-free in the backcountry, a bottle of hand sanitizer will always go further than a filter.

To ensure you do not spread – or become a victim of – sickness in the backcountry, employ the following golden rules of hygiene.

1. If you are sick, let your campmates know.
2. If you are sick, stay out of the kitchen.
3. If you are very sick, tent alone.
4. If you are wicked sick, go home.

5. If you cough or sneeze, do so into your elbow.
6. Do not reach into others' food bags.
7. Do not share utensils, pots, bowls, water bottles, or mugs.
8. Avoid outhouses when possible.
9. Keep your fingers out of your mouth.
10. Use an alcohol-based hand sanitizer after using the bathroom and before food preparation.

Myth busted: Untreated water is the primary source of illness in the backcountry.

Lab rats don't lie

Now let's get down to the nitty-gritty. Perhaps many of you are daring, "Well, Schlimmer, if the water is so safe, why don't you go out there and drink a hundred quarts of untreated water?" I'm way ahead of you (and so are a lot of other hikers). In June 2006 I read the studies mentioned throughout this article. Since then I have not treated my water. Here is a chronicle of my experiences.

<u>Location</u>	<u>Quarts consumed</u>
Adirondack Forest Preserve, NY	230
Catskill Forest Preserve, NY	75
Lake Tahoe Basin, CA/NV	30
Chugach National Forest, AK	20
Denali State Park, AK	20
White Mountain National Forest, NH	20
Paper company lands, ME	15
Great Smoky Mtns. National Park, NC	10

That's 420 quarts (and counting) of untreated backcountry water. I have shown no signs of giardiasis. A correspondent with the hiking club Adirondack Forty-Sixers affirms I am just "extremely lucky;" by chance, picking scores of Giardia-free sources across seven states. If it is luck, it is extreme indeed.

Others claim I possess a different form of luck. After reading I drank hundreds of quarts of untreated water, Tony Goodwin, editor of *Adirondack Trails: High Peaks Region*, theorized I was "one of the lucky ones," assuming I was asymptomatic. His assumption was

incorrect. In the mid-1990's I was debilitated by giardiasis, confirmed by my doctor. Ironically, this was when I was treating all my water per industry standard (I was an impressionable outdoor education student at the time).

"So," you may ask, "how did Erik Schlimmer contract giardiasis in the 1990's?" To quote Dr. Rockwell: "The bad news: Giardia Lamblia is almost everywhere." Giardiasis infections have been traced to public swimming pools, day care centers, public restrooms, facilities that cater to mentally handicapped persons, unsafe sexual practices, municipal water sources, and food sources, among other sites and practices. Again, no evidence suggests giardiasis blossoms from backcountry water.

Lastly, some claim that since I contracted giardiasis I have become "immune" to this illness. No study has proven hikers able to build post-infection immunity.

By my 200th quart I was wholly convinced of Giardia's absence in backcountry water and decided to empower outdoor education students and instructors. Since May 2008 I have distributed articles cited above and let them decide: to treat or not to treat? No one who has chosen to drink their water straight has contracted giardiasis. Here is my field data.

<u>Date</u>	<u>Location</u>	<u>Participants</u>	<u>Total quarts consumed</u>
May 2008	Adirondack Forest Preserve, NY	7	105
Sept. 2008	Adirondack Forest Preserve, NY	10	110
May 2009	Adirondack Forest Preserve, NY	6	60
July 2009	Denali State Park, AK	12	220
Aug. 2009	Adirondack Forest Preserve, NY	10	505
May 2010	Adirondack Forest Preserve, NY	3	45
May 2010	Adirondack Forest Preserve, NY	8	155

Beyond witnessing participants drink hundreds of quarts unscathed, I moved towards our outdoor community and posted an announcement on two popular Internet hiking forums that I was "seeking people who usually do not treat their backcountry water." There was no shortage of interest. One forum logged more than 1,600 views with 42 responses. The other forum recorded more than 3,100 views with 83 responses. I received no shortage of mail from hikers who drink untreated water yet remain perfectly healthy.

The first respondent was Tyler, a 20-year-old outdoor recreation student from Schenectady, NY. Tyler presented an organized list of more than thirty water sources

throughout the Adirondack Forest Preserve that he drank from with no ill effects. "At least fifty gallons overall," he said, taken "from lowland lakes to high mountain springs."

Tyler's no-treat approach started as an experiment he and his father took on. "We were talking about how we thought it was B.S.; all the talk of Giardia," he recalled. Their experiment started by drinking "an entire [quart] of untreated water." Neither fell ill. They decided to continue their experiment and "haven't treated any water for the last two years." Tyler and his father feel just fine.

Bill, a 45-year-old hiker from Southwick, MA, reported, "I've been hunting and backpacking all over New England since I was old enough to tag along with my father. I have never treated my drinking water and never suffered any ill effects."

Ryman, a 31-year-old peakbagger from Jackson, NH, is a former U.S. Forest Service trail crew leader who finds the idea of not treating water "brilliant." In 2008 and 2009 Ryman completed more than a dozen day hikes and a half dozen camping trips in New England. He drank straight from streams and has shown no giardiasis symptoms.

New York City resident, Paul, wrote, "I've been hiking and backpacking in the Catskills regularly for more than 35 years and have never treated my water, nor do my three kids. And, we have never been sick."

Sue, from Colorado, feels Giardia has not infested American waters. She revealed, "Having hiked and backpacked lots over the past twenty years, including thru-hikes of the Appalachian Trail, Long Trail, Colorado Trail, John Muir Trail, Wonderland Trail, and New Hampshire's 48 4,000-footers twelve times, I've not been sick due to drinking untreated water."

34-year-old Paul, also from Colorado, figures he drank "at least 500 gallons" of untreated water during thru-hikes of the Appalachian, Continental Divide, and Pacific Crest National Scenic Trails. He did not contract giardiasis.

Lastly, when a brief version of this article appeared I received an unsolicited note from Ray, a 58-year-old resident of Otsego County, New York. Ray reported, "In all the hiking I did in the Catskills, I drank loads and loads of water from the mountain springs and I never got ill even once." In the township of Springfield, Ray had visited Crystal Spring most often. "I hauled about eight gallons a week for three years from that spring. I drank or cooked with all of it," he recalled. To spare you the calculation, Ray gathered 1,248 gallons (nearly 5,000 quarts!) and never got sick.

To summarize, I have chronicled the experiences of more than 65 individuals who have collectively drank approximately 10,000 quarts of untreated water and have not acquired

giardiasis. If this is all luck, as some claim, it is an amazing stroke of luck, year-round, from Maine to California, mountain springs to enormous lakes, the 1960's to present day, sea level to timberline, in individuals ranging from children to senior citizens who have, combined, covered literally tens of thousands of miles of terrain.

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

The final issue is "Why?" Why should we rewrite curriculums that teach water sources are permeated with Giardia?

First and most importantly, presenting rumor as fact undermines education. We faculty are supposed to know our stuff – through this we serve as mentors. If we teach students that water needs to be treated, and then they read articles that suggest otherwise, we have done them a disservice. Plus, we don't want to look like fools, now do we?

Secondly, we can do better things with our classroom time. Instead of taking an entire period to discuss water treatment in paranoid tones, we can discuss effective communication, for example, the most important skill a leader needs but the number one skill students lack.

Third, we can do better things with our field time. Instead of filtering gallons of water each day, we can take that time to discuss local flora and fauna, complete a map check, or care for our feet, all the while enjoying clean water straight from the source.

Lastly, as educators we must stay up-to-date. We used to teach students to suck venom from snakebites. Now we teach them to wash the wound and seek medical care. We used to teach students to build trails straight uphill. Now we teach them to keep trails below a ten percent grade. The time has come to teach our students that drinking untreated water is not a gamble if they drink from admirable sources.

Students should seek springs as well as clear streams, lakes, and ponds in the backcountry. Though it may sound too simple, any backcountry source that looks, tastes, and smells good it is good. They should avoid sources that look questionable. Excessive algae, discolored water, discolored shorelines, bad smells, completely stagnant water, a lack of aquatic growth and insects, or any combination thereof, are bad signs.

As educators we have the power to finally terminate this false industry standard. The evidence is in your hands. With our community agreeing that hot meals are welcome and small groups preferred, and cotton and antagonistic insects come from Lucifer himself, let us discuss our commonalities over a tall glass of untreated water, without concern for giardiasis.