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Miracle on Ice

WHY ARE SCIENTISTS WILLING TO SCALE GLACIERS TO STUDY MINUSCULE WORMS?

BY ROMAN DIAL AS TOLD TO JED LIPINSKI

BHUTAN, AUGUST 2012. At 16,000 feet above sea level, the air is shockingly clear. Fields of rock and herds of Himalayan blue sheep stand in sharp relief against distant white peaks. Our team—two Bhutanese cooks, two horsemen, a guide, and my 25-year-old son and part-time research assistant, Roman Jr.—has set up base camp on Gangla Karchung mountain beneath a receding glacier. As night falls, a few of us strap on our crampons and headlamps, grab our ice axes, and head up the mountain. The temperature is hovering around the freezing point: perfect for an ice worm sighting.

These worms aren't easy to find. They look like black threads a few centimeters long, and they spend much of their lives buried in glacial ice. The best time to find them is monsoon season, when they thrive in the glacier's meltwater pools.

I'm a biology professor at Alaska Pacific University. I became interested in ice worms while hiking and skiing in the Alaskan wilderness, and I noticed these tiny worms living on the ice. Technically, nothing should survive there. "How did they adapt to



At above 41°F, the ice worm's body literally melts.

such an unforgiving environment?" I wondered. It seemed like a simple question. But ice worm research moves slowly—at a glacial pace, you might say! Although an American geologist first documented them on Alaska's Muir Glacier in 1887, there's a lot we don't know about them.

Here's what we do know: They only come out at night because they're susceptible to UV rays. They feed on pink-colored snow algae and pollen grains that collect on a glacier's surface. We think they get around by using tiny bristles on their sides to cling to ice crystals and propel themselves forward. And they're very temperature-sensitive but also rugged. At temperatures above 41°F, their bodies melt, but they can survive temperatures as low as 20°F.

It's this ability to live at subfreezing temperatures that makes ice worms valuable to science. Harnessing the mechanisms that

enable them to survive could allow us to keep donated organs alive for longer periods or even help NASA understand how life could exist on colder planets. But before we can do that, we need to know the basics. Almost nothing is known about their reproductive biology, overwintering behavior, or geographic range.

Looking for ice worms is risky. A few years ago, I was searching for them with my two kids on the Harding Icefield, a featureless expanse of ice on Alaska's Kenai Peninsula. One night, a winter storm blew in, flattening our tent with howling 100-mile-per-hour winds. Another time, after poring over Google Earth for potential ice worm habitats, I visited the Yunnan Valley in southwestern China. While hiking up a forested hillside alone, I stumbled across a rotten wooden bow with a rawhide string. "Cool bow," I thought. Then I saw the bones: three fleshless human skeletons splayed out beneath the boulders. Apparently, they'd been hunting when a rock slide hit them. I quickly hiked back down the mountain.

Bhutan is similarly spooky. Most of the glaciers are unstable and full of crevasses. Each morning, our Buddhist guide burns incense

and prays for our safety. As far as I know, no one has ever found ice worms here. In the 1970s, a Chinese taxonomist described an Asian ice worm species from Tibet's Yarlung Tsangpo Valley, whose sacred waterfalls are thought to have inspired the fictional paradise Shangri-la. But the original sample was lost, and the Chinese won't let foreign scientists look around. Rumors abound that the valley conceals a secret military base or a downed World War II plane full of gold or a criminally vast logging operation. Regardless, we're not invited. Northern Bhutan, which sits on the edge of the Tibetan plateau, is as close as we can get. So that's where we go.

As soon as we step onto the ice, my son halts. "These look like worms," he says, bending down to examine a meltwater pool. It's one of dozens spread across the glacier, and it's writhing with activity. Thirty seconds on the glacier and we've found the fabled Tibetan ice worm? I crouch down for a closer look. My son scoops the tiny creatures into his hand.

Then he frowns. "I don't think these are annelids, Dad," he says, referring to the phylum ice worms belong to. "They look like ... midges."

He flips his binoculars around, using them as a microscope. He's right. What looked like ice worms are in fact the larvae of glacier midges, a kind of wingless fly. As adults, they crawl up the glacier, mate, and crawl back down to lay eggs in the pools. They're fascinating insects—but not what we're here for.

THESE TINY WORMS LIVE IN PLACES WHERE TECHNICALLY NOTHING SHOULD SURVIVE.

Over the next two weeks, we come across other glacial biota, including snow fleas and a mite that looks like a daddy longlegs. But there's no sign of ice worms. Without Asian ice worm samples, we can't do genetic analysis to determine

whether they differ from the North American worms. Are they more durable? Less? How do they live inside the Himalayan ice?

So much of the natural world has been explored and demystified. The elusive ice worm? It's one of the planet's enduring secrets—which is what keeps me on its trail. ☹