STAT

In the dark of night, a hunt for a deadly bug in the name of science

By Eric Boodman

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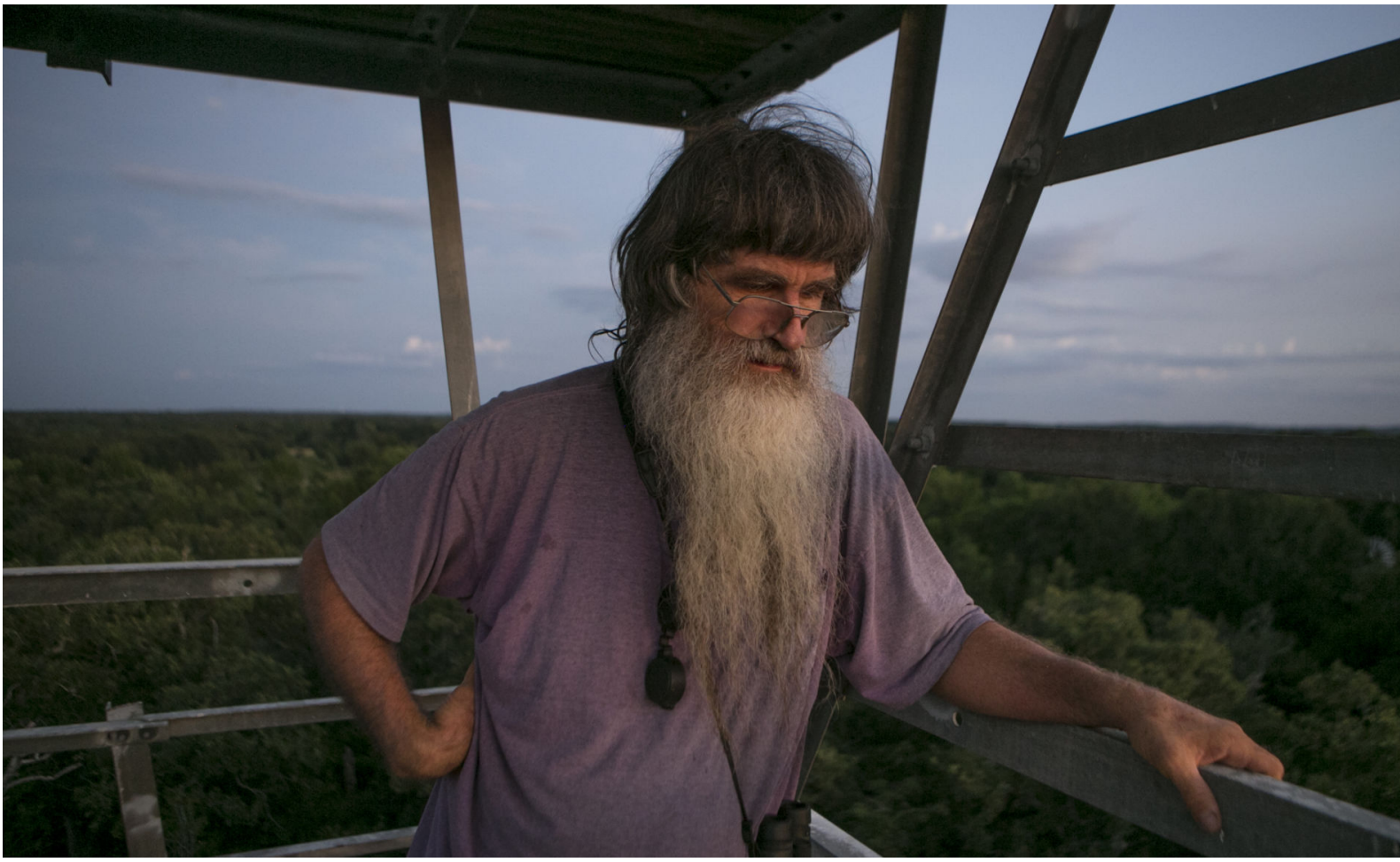
Photos by Ilana Panich-Linsman for STAT



Citizen scientist Hugh Brown prepares to hunt for kissing bugs on his homemade radio tower.

LEE COUNTY, Texas — The hunt took place after dark, on a rickety homemade radio tower high above the post oak savanna.

The hunter sat in a folding chair encrusted with vulture droppings, waiting for his quarry. He listened to the yipping of coyotes, the lowing of cows, the ghostly trilling of a nearby screech owl.

Then he froze. And with a guttural frog-like sound — a kind of primal predatory yelp — he lunged forward, his hand darting toward something at his feet.

“Bingo,” he said. “We scored.”

The animal didn’t look like much: a blackish bug with orange markings on the back. Trapped between Hugh Brown’s fingers, it looked about as threatening as a butterfly in a net.

Yet this insect — known as a kissing bug — is responsible for killing 12,000 people a year worldwide.

The bug itself isn't toxic, but it likes to crawl onto mammals' faces to suck their blood — and it often defecates at the dinner table. Its feces can contain a worm-like parasite called Trypanosoma cruzi, and if you scratch the bite and brush a speck of poo into your eye, mouth, or even the bite wound itself, you can get infected. That's how you get Chagas disease.

Untreated, the parasite can lodge itself in your heart, spewing toxic enzymes and killing muscle cells, which harden into scar tissue. Slowly, cell by infected cell, the heart loses its ability to pump blood. The parasite can also destroy tissues in your gut and your brain.

These bugs and their microscopic stowaways sound too dangerous to play around with. And that's exactly why Brown had one wriggling between his fingers.

He is a citizen scientist. He isn't employed by a university or a lab, but he's an essential part of researching Chagas disease in the United States.

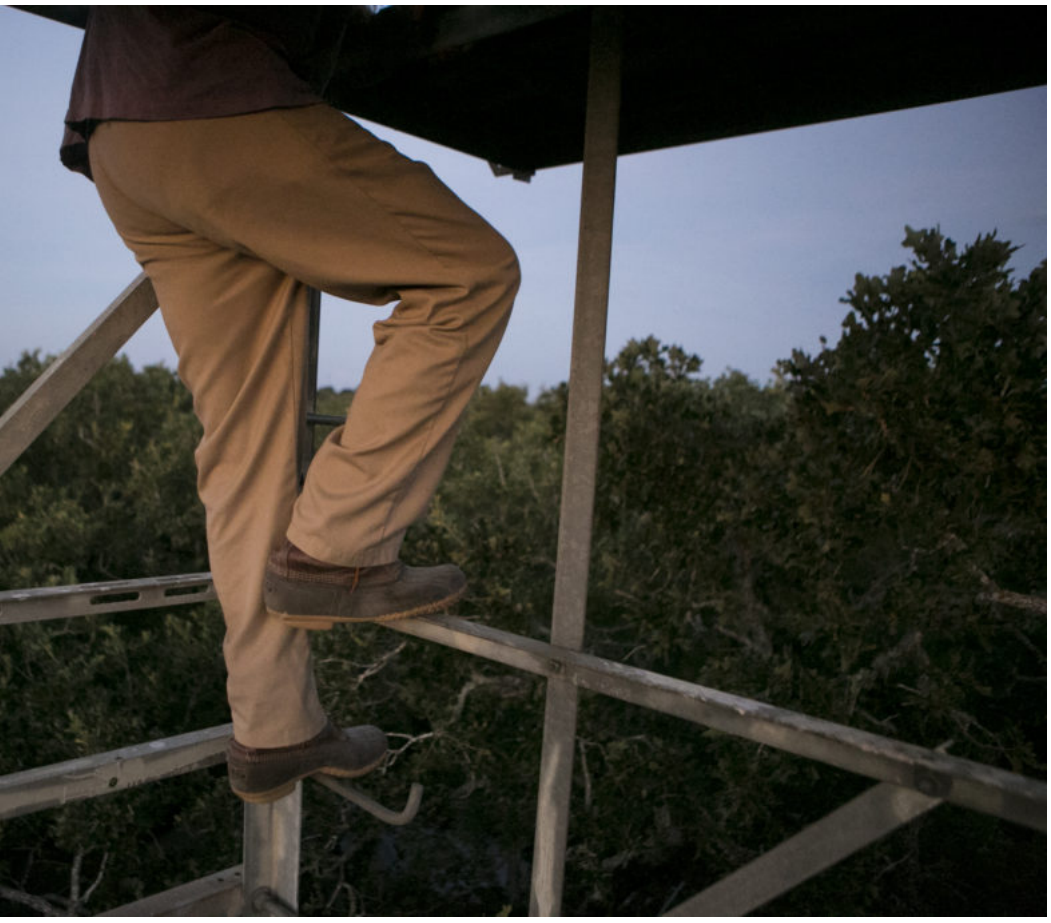
In Latin America, Chagas is a public health crisis: millions have the disease, and only 1 percent of them get adequate treatment. In the United States, the illness is rare, and transmission even more so: Most of the estimated 300,000 people who are infected caught the parasite from a kissing bug in Latin America.

Yet those official statistics may be low, because Chagas is often overlooked and misdiagnosed by American doctors. And the most basic facts about its local transmission — including which strains of parasites are transmitted by which species of kissing bug in which parts of the southern US — remain largely unknown.

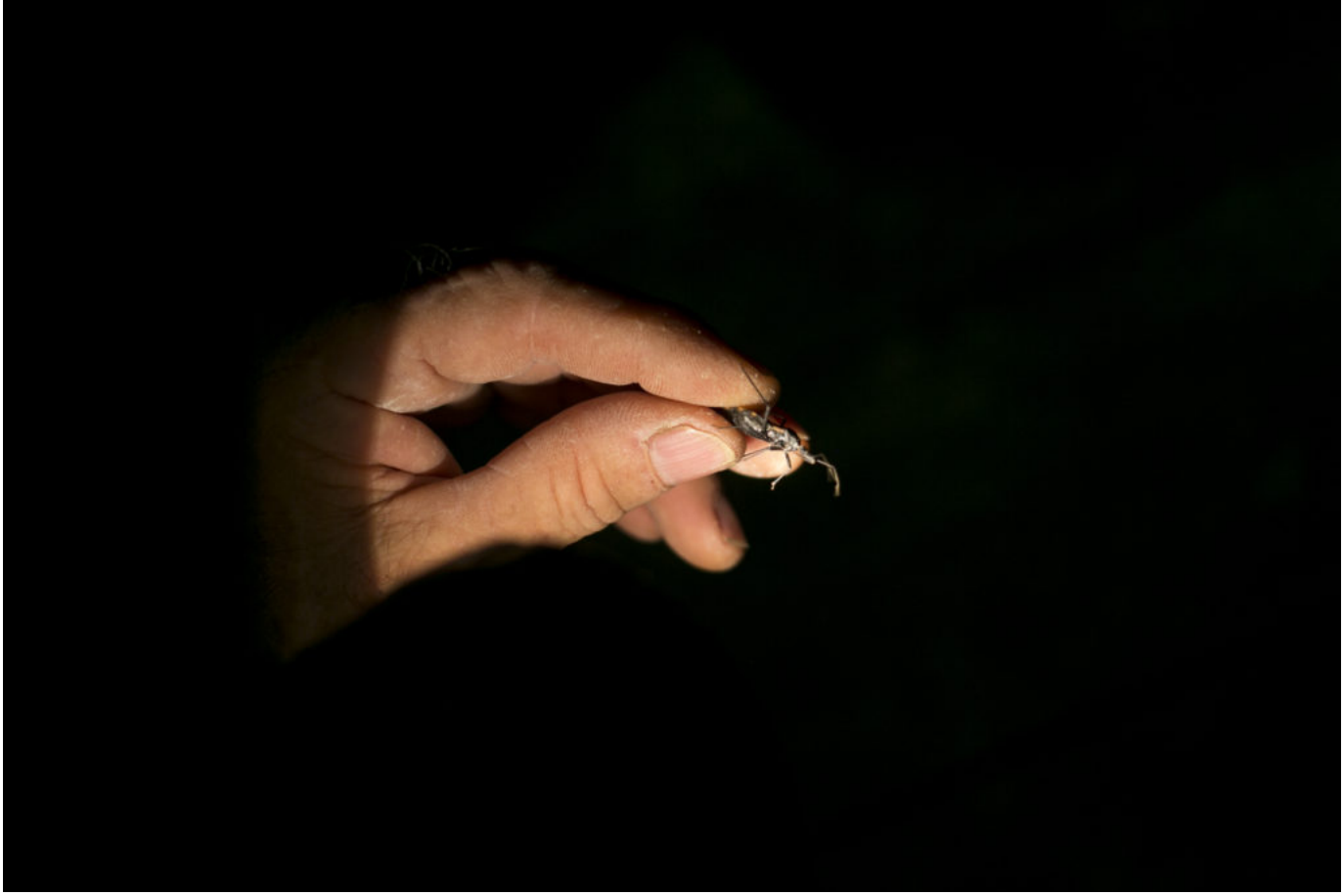
"Chagas definitely is acquired in the US, and the more we investigate, the more we will find," said Dr. Sheba Meymandi, director of the Center of Excellence for Chagas Disease at Olive View-UCLA Medical Center.

Investigating isn't easy, though. Unlike the species in Latin America, which swarm houses by the hundreds or thousands, the kissing bugs in the southern US are solitary, secretive creatures.

So researchers in Texas asked for help. They wanted ordinary citizens to look for kissing bugs and send them to a lab at Texas A&M University. But who was going to spend hours hunting for blood-sucking, disease-transmitting bugs?



adio tower to collect kissing bugs.



Brown holds a live kissing bug he caught before putting it in a pill bottle.

Winnie the Pooh, naked swims, and blood-sucking bugs

Brown is 68 and and lives about an hour's drive from Austin, 10 miles west of Lexington, Texas — or, as he calls it, "Dislexington." On Saturdays, the local entertainment is the cattle auction, where steers and heifers are prodded, kicking, into a half-moon of dirt, to be bid on by local ranchers. The big ones go for about $1.35 a pound.

Brown doesn't exactly fit in with that crowd. They look like cowboys; he looks more like a Byzantine monk. He hasn't trimmed his beard since 1971, and his hair, which he cuts himself, is reminiscent of Chewbacca. He owns 150 acres, but he has no cows to graze. Instead, he's let the post oaks and cedar elms grow wild. Now, it's a scrubby forest, full of feral hogs and nine-banded armadillos, with copperheads hiding in the fallen leaves.

He wanders his land, cataloging every bird he spots, eating the new shoots off the greenbrier before the thorns appear. He ties his shoes with a knot of his own devising: It has no loops to get caught in the brush and holds up his socks when their elastic is shot.

His diet, too, is unlike anyone else's. He eats one full meal a day — usually Sugary Sam canned sweet potato with skim milk powder, water, a sprinkling of almonds, and some rolled oats "to add a bit of chew."

Brown also skinny-dips in a muddy pond, eats watermelon in bed, and works on his sequel to Winnie the Pooh.

He hasn't always lived out in cattle country. He grew up in Houston, and studied physics at Rice. Even now, his wife lives in Austin, and he goes there from time to time. But he doesn't like the city much.

"When you're in the city, everything you see is something that somebody sold and somebody bought. That tends to suggest to your mind limits of thought," he said. "Wild is conducive to original thought."

When he first saw a pamphlet inviting Texans to hunt for kissing bugs, Brown knew exactly what the researchers were looking for — because he'd been bitten by them. He lives in a stucco house that dates to 1932; the bugs come in all the time. He finds them crawling across his floor and his walls. He finds them in his bed sheets.

Brown tends to turn commitments down, preferring to think and stroll, read and write without interruption. But for the kissing bug project, he made an exception.

Partially, it was for financial reasons. If he spent 100 hours participating in scientific research on his land, he could reduce his property taxes by more than half.

But there was another reason.

“I bear a certain grudge against them,” he said of kissing bugs. “They’re not my favorite animals. Biting me is a capital offense. You think about biting me, you die.”

Brown cools off by skinny-dipping in the pond on his property.

Baggies of bugs

Enlisting citizens to monitor kissing bugs is hardly new. In 1941, a professor from Los Angeles put out a can in Arizona mining camps with a sign: “Nab that bug at one cent each for Dr. Wood at City College to keep.”

In South America, residents of remote villages are asked to keep watch after their houses are sprayed with insecticide, to see if the bugs come back. The results have been mixed. “The problem is complicated,” explained Antonieta Rojas de Arias of the Center for Development of Scientific Research in Asuncion, Paraguay. “Chagas disease is not a priority for them. The priority is food, water, better houses.”

In the US, the biologists working on Chagas disease at Texas A&M didn’t think they’d need volunteer help. After all, they’re pros at finding bugs that everyone else would rather avoid. They’ve dragged weighted squares of cloth through long grass, so that ticks will think it’s a passing deer — or pant leg — and grab on. They’ve designed traps to nab mosquitoes as they wriggle out from their stagnant-water nurseries.

Yet doctoral student Rachel Curtis-Robles had little luck with kissing bugs when she started looking in 2012.

It wasn’t for lack of trying.

She has crawled into dog kennels with a flashlight, lifting up bedding to look for the bugs. She has shoveled into wood rat nests at the base of cacti, picking through the knots of grass. She has strapped on “rattlers” — leg covers that protect from snakebites — and waded into mesquite-filled scrubland.

She has even appeared at predator hunts, where ranchers band together to shoot pests like coyotes. She comes equipped with a knife, so she can cut out the animals’ hearts, looking for signs of infection.

Most collecting trips yielded only a handful of bugs — if any at all.

But in the spring of 2013, she got an email out of the blue from some dog owners near the Texas-Mexico border who had lost a number of pets to Chagas disease.

“They knew they had kissing bugs and that it was a problem,” said Curtis-Robles. “They wanted to get their bugs tested. That was the turning point — when I realized people would be able to send us these bugs.”

So she made pamphlets and distributed them at feed stores and gardening shops and dog shows (dogs are especially vulnerable to Chagas disease, as they’ll eat almost anything, including kissing bugs). Brown saw one of the pamphlets and started collecting. He was one of hundreds.

A philosophy professor came to the lab, excitedly brandishing an insect he'd found. Students brought bugs into class. Packages poured into the post office: bugs in baggies, their legs brittle from a stint in the freezer.

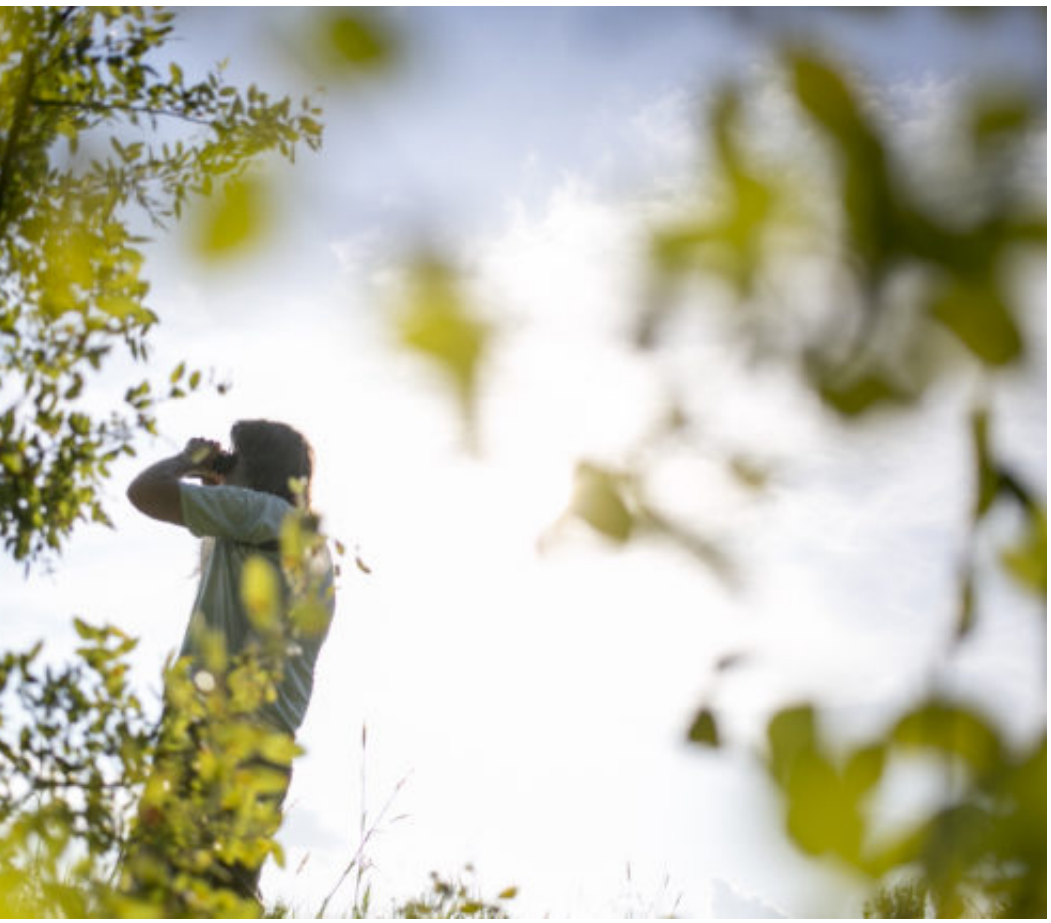
"Initially, there were a lot of Not Kissing Bugs," said Curtis-Robles, opening a file drawer packed with sandwich bags of harmless wheel bugs, leaf-footed bugs, stink bugs, and assassin bugs.

But 3,000 of the bugs she has received in the last three years were indeed kissing bugs. Of the 700 she's tested for parasites, 63.3 percent came back positive.

The research shows that people are living in close proximity to these bugs — and to the parasites that cause Chagas.

To other Chagas researchers, the project isn't just about mapping the disease, but also raising its profile in the US. "It engages people and increases awareness of the risks," said Dr. Susan Montgomery, an epidemiologist at the Centers for Disease Control and Prevention.

They don't want people to freak out, given that the disease is so rarely transmitted in the US. But the more doctors test for it, the more cases they'll catch, and the more heart failure they'll prevent.



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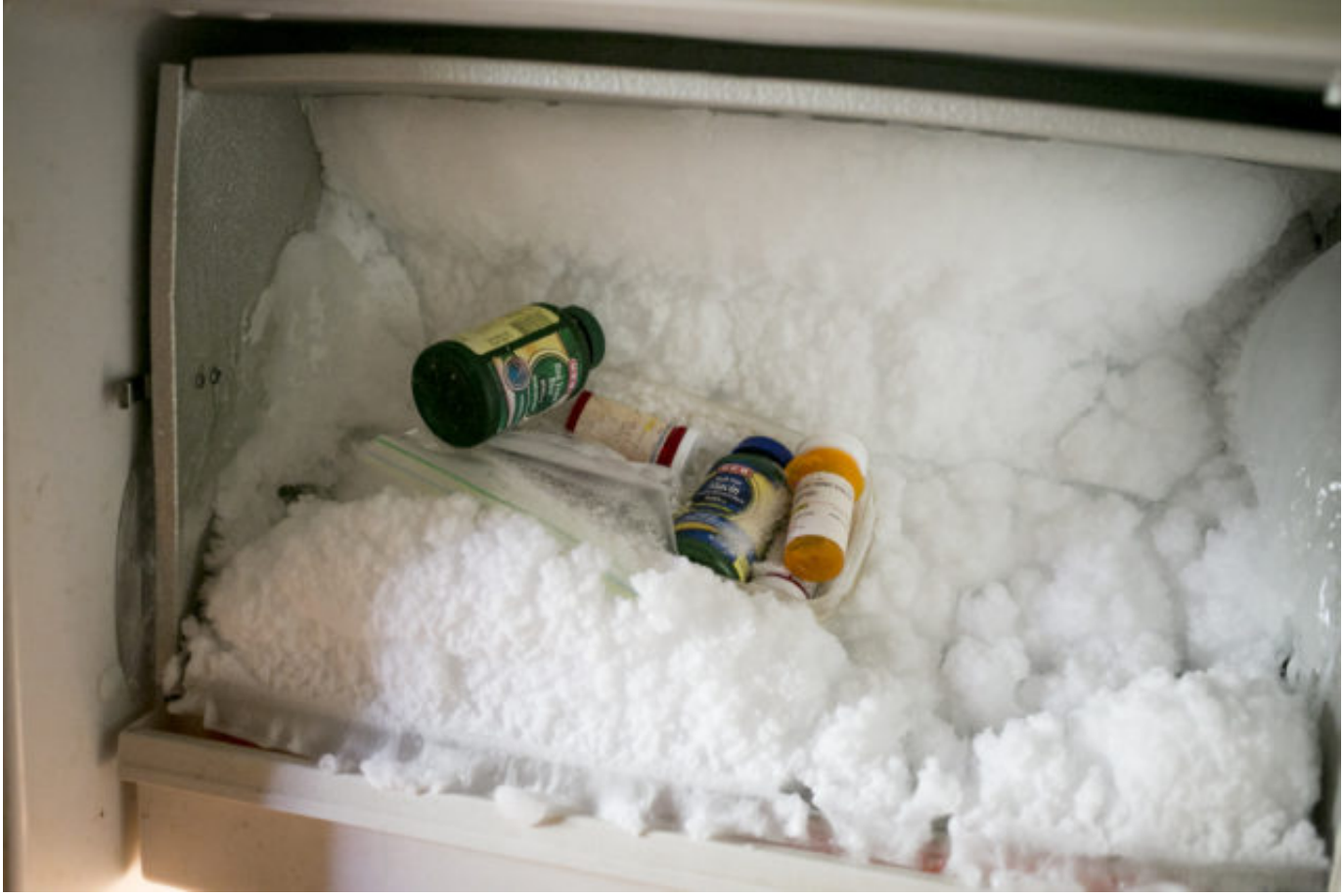
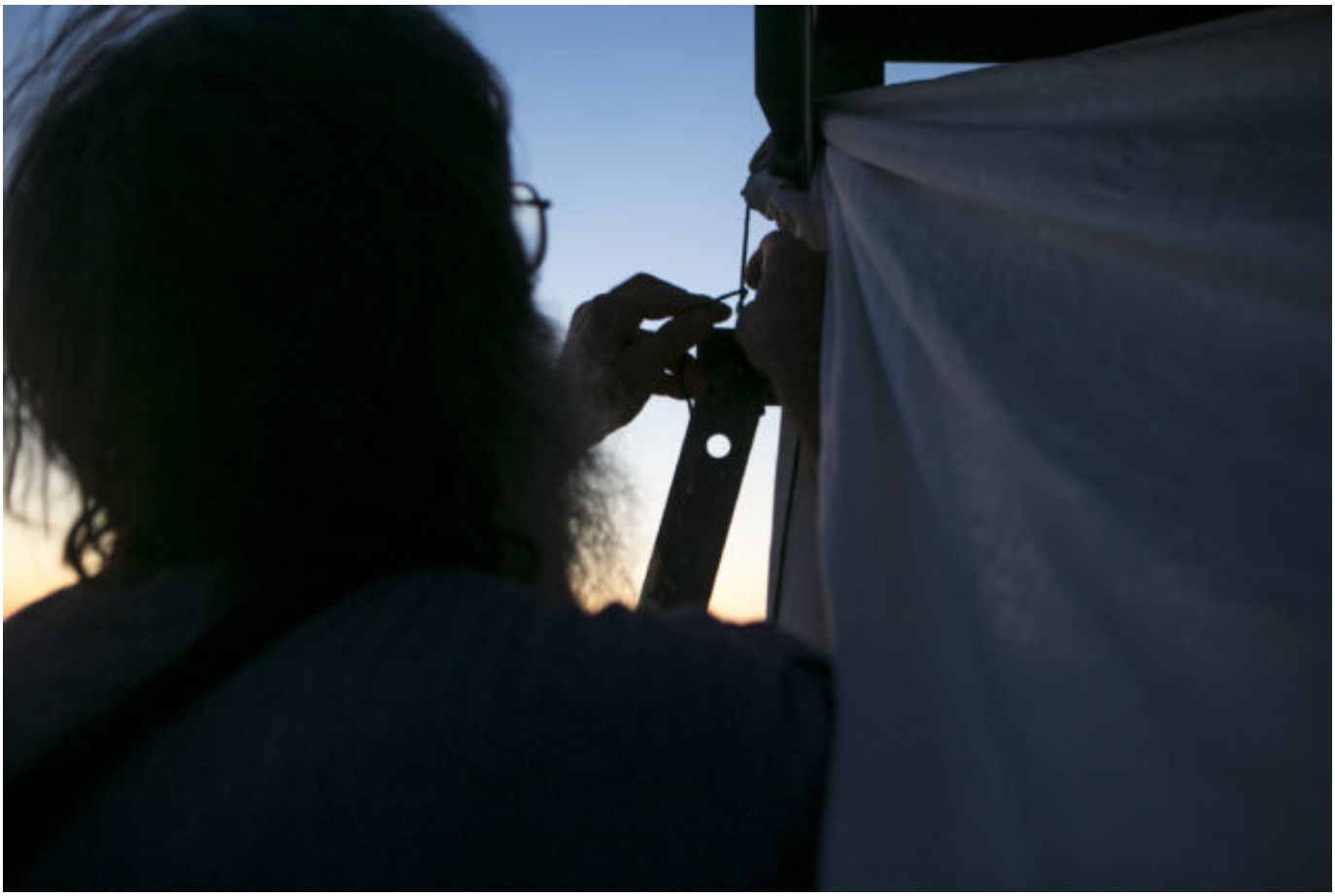


Brown keeps the bugs he’s caught in recycled pill bottles in his freezer.



On the seventh platform of the tower, Brown hangs a white bed sheet to help attract kissing bugs.

Above the treetops, lying in wait

To collect kissing bugs, Brown walks out to the base of the radio tower behind his house. The first two stories were built for an offshore oil rig; he bought them to hold his water tank. Then he just kept building. He uses the tower for his amateur radio broadcasting, conversing with far-off strangers in Morse code. And, of course, for bug-collecting.

From the base, he climbs six ladders, squeezing through the holes in each wooden floor as the drop gets more and more dizzying.

Soon, he's above the treetops. The tower sways with every breath of wind, with every move he makes. He hoists up a yellow bucket of tools that he's tied to the end of a rope.

Black vultures like to roost at the top of his tower. He doesn't mind them sitting above him as he plugs a lightbulb into an extension cord, doesn't mind their stink as he ties up a bedsheet to create a landing pad for bugs.

Then, Brown sits down with Time magazine and waits.

There is little official evidence that collecting high above the forest is any better than collecting anywhere else.

But after a hundred hours of kissing bug hunting, Brown has come to know their habits. They tend to appear less often when he collects on the forest floor. And they tend not to land on the sheet he's strung up. "They like the light, but they don't like the brightest part," he said. So he scans the cracks in the floorboards, the shadowy edges. He clambers down a level, peers upwards with a flashlight.

When he finds a bug, he maps its movements, predicting where it will crawl next.

Though the risk of transmission is low, Curtis-Robles asks her volunteers to use gloves or sandwich bags when catching bugs, lest they get infected by a particle of feces. Brown doesn't bother.

"I tend to grab 'em around the sides, mostly bare-handed," he said. Then he pops the bug into an old pill bottle clutched between his knees.

These bugs end up in Curtis-Robles's lab in College Station. There, each insect will get as much scrutiny as any weapon collected at the scene of a murder. It will be put under the microscope. Its hairs will be counted to identify its species. It will be doused for 15 to 30 seconds in bleach and water. Its abdomen will be peeled open, with forceps and scissors, and its hindgut scraped out.

Analyzing those tiny intestines is like reading the bug's diary. With DNA sequencing, the researchers can tell what kinds of animals the bug has been feeding on, whether it's harboring the parasite, and if so, what strain of trypanosome it is.

In one of Brown's bugs, for instance, researchers found not only traces of human blood — but also the parasite.

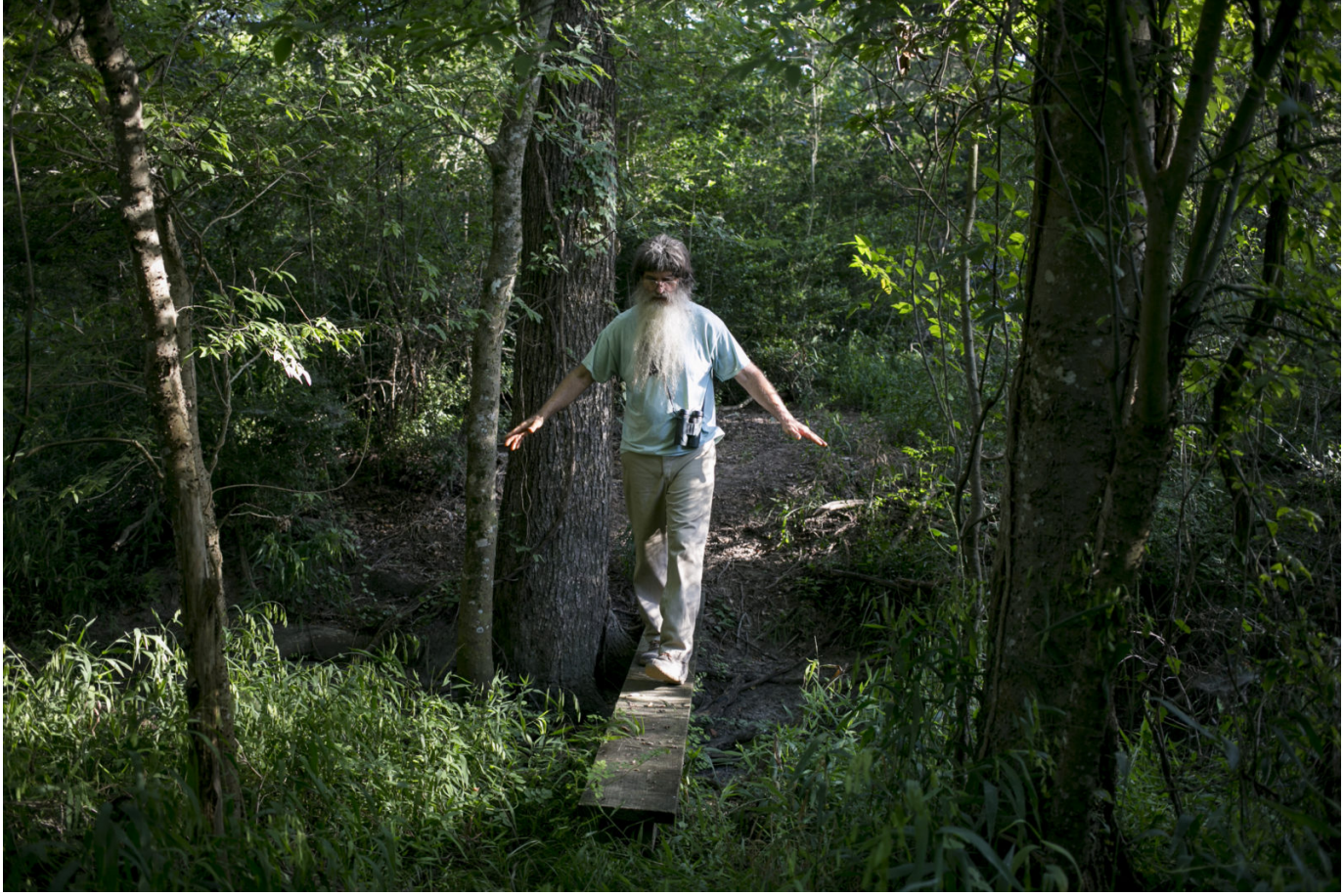
He decided he should see the doctor.

"I said, 'I should probably be tested for Chagas disease,'" Brown recalled. "He looked at me and said, 'For what?' He wasn't real familiar with it. I could tell because he had to look it up right then and there."

That kind of reaction isn't rare in the United States. Last September, the Centers for Disease Control and Prevention awarded a research team more than $500,000 to raise awareness of the disease, including among doctors. Chagas often causes no symptoms at first. But the earlier it's caught, the more effective the two existing drugs will be.

Brown turned out not to need the drugs: He tested negative.

Now that he's done enough research to get his tax break, Brown no longer spends from 9 p.m. to 1 a.m. up on his radio tower every summer night, waiting for bugs. But he still nabs them whenever he sees them, and puts them in his freezer for Curtis-Robles. And he's still interested in her findings, just as he's interested in the myriad unanswered questions that will come to you if you look closely at cypress trees or insect galls or almost anything else.



Brown walks across a plank bridge over a dry creek bed on his property.

“What she found out about the infection rate — nobody knew that,” he said one night in late July. He had just clambered down from his tower, that night’s haul of kissing bugs crawling around in old pill bottles, soon to be frozen and ready for dissecting. Now, he was standing in his overgrown driveway, his flashlight clicked off so he could see more stars. He looked up toward the greenish white mist of the Milky Way.

“I’ve been around for 68 years. That’s over 2 billion seconds. And every second you’re alive, you can be learning stuff,” he said.

The forest hummed with crickets. There were more kissing bugs out there, he knew, lurking just beyond where he could see them, attracted by his lights and his body heat and his breathing.

“Behind all of that knowledge is a basic principle,” he said. “The closer you look, the weirder it gets.”

After a while, he clicked on his flashlight and followed its beam back toward his house.

About the Author

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Eric focuses on narrative features, exploring the startling ways that science and medicine affect people's lives.

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