

## My first draft broke up Census into separate sections:

**[Census Scene Part 1]** “I think this is insane right now,” says graduate student Noelle Machnicki as she plucks a huge spine out of the back of her knee. Her nylon quick-dry pants are no match for the Bolivian Chaco. The forest understory is a bed of thorns: at her feet, a snake-like cactus slithers among impenetrable thickets of spiny ground bromeliads, Acacia shrubs, and—every so often—the bulbous stem of the devil nettle. According to botanist Mike Nee, one colleague became so sensitive to the plant’s sting he was compelled to urinate every time he touched it.

We had camped on a low plateau overlooking the Paraguayan border and were several miles from the Parapeti, also known as the “waters of death.” The river winds its way to the Bañados de Izozog, a labyrinthine swamp that has foiled the most ardent explorers since the 17th century. From the relative safety of our vantage, we woke to blue sky and the raucous chorus of the Chaco chachalaca. Our breakfast—and the last of our food supplies—consisted of a thimbleful of cold coffee, a boxed juice drink, and a modest bag of trail mix. By the time noon rolled around, we were still miles from civilization and sustenance. Tewksbury was stringing a measuring tape through the woods for an impromptu chile census. After two years of laboratory work, Machnicki, a fungus expert, is finally getting a chance to see the natural habitat where her seed-killing fungus thrives. Presently, she would rather be eating lunch. “Everything with him is ‘by the seat of your pants,’” she told me later, “He’s not much of a planner.” **[End Census Scene Part 1]**

It has been just three days since we departed the sweaty city of Santa Cruz and drove south along a freshly paved highway that stretches to Argentina. Owing to a slight miscalculation on Tewksbury’s part, a journalist was forced to sit in the bed of the truck propping up the gear, while the rest of the team—driver Uco Sapag, Puerto Rican ecologist Tomas Carlo, along with Machnicki and Manchego—conversed in the front. We had just encountered our first setback of the three-week expedition. The ultimate test of Tewksbury’s ideas was to transplant non-pungent chiles into a pungent population and measure the survival rate of their fruits. To this end, he had hired a Guaraní native to grow a thousand chile plants at his remote ranch. After a year, only three survived. The rest had died from Don Udon’s enthusiastic watering regime. If Tewksbury was discouraged, he didn’t show it. He placed the three spindly seedlings at his feet in the front seat of the car. They might just prove useful.

About two hours south of the city, a serranilla, or a group of small mountains, appears to the west. Disjunct from the rest of the Andes, these peaks are the last bit of topographic relief between the eastern Andes and Brazil’s Atlantic coast. Stretching out to the east is the Gran Chaco, a wilderness that covers approximately four hundred thousand square miles and bridges the Amazon to the Pampas, spanning the borders of Paraguay, Bolivia, Argentina, and Brazil. This is ground zero for chile hunting.

Biological diversity in the dry forest cannot compare to the Amazon, but what lacks in numbers it makes up for with a striking plant and animal community about which surprisingly little is known. The region, for instance, represents the center of armadillo diversity, home to 18 species ranging from the 5 inch-long greater fairy armadillo to the giant armadillo, which is 3 feet in

length and weighs up to 60 pounds. Other Chaco endemics include the nearly extinct Chaco guanaco and the Chaco peccary, which in 1979 became one of the last large mammals recognized by western science. The thorn scrub is broken by a few massive trees, like the bottle-shaped Toborochi, which stores water in its trunk, and the Soto, whose seedpods hang from its extensive canopy like a family of clams. Although thousands of North American biologists have flocked to the Amazon, only a handful have ventured into the remote Chaco.

Indeed, it takes a special kind of perseverance to conduct field work in the Bolivian Chaco. The region is not especially beautiful and travel is never easy in a region where pavement covers 6% of the nation's roads. Gas is hard to come by and accurate maps are even harder. Tewksbury says the military map he once used, "includes a bunch of roads that don't exist and doesn't include a bunch that do." Navigation is further complicated by weather that fluctuates between oppressive heat and torrential rain showers—a recipe for turning roads into mud wallows. Chiva, the team's Toyota Hi-Lux, is outfitted with two spare tires, but the team was once stopped dead by a third flat. In the course of their research, they've lost a wheel (loose lugnuts), snapped an axle (inexperienced driver), and cracked the engine block (crossing a river). Even the sturdiest vehicle is never safe on Bolivia's treacherous roads. On the day after we drove through the town of Aiquille, a local newspaper reported that an overloaded bus on the same route had plunged into a 200 foot canyon, leaving 9 dead and 57 injured. When we narrowly averted a head-end collision with a double-decker bus, our driver merely chuckled, pulled his side mirror in, and allowed the bus to pass.

Tewksbury likes to say that the project runs on three botanical compounds: "coca, caffeine, and capsaicin," but in truth it ran on his boyish fervor for science. His father, Peter Tewksbury was the enigmatic director of the 1950s sitcoms *My Three Sons* and *Father Knows Best*, who chucked his Emmy award into a Los Angeles trash can one day and dragged his family to Vermont to become a renown cheese expert. His son, too, can be reckless in his passions. In the mornings, he was in such a rush to get out to the field, his shirts were often inside out or backwards, and one afternoon I noticed that his T-shirt had been tucked into his striped boxer shorts for several hours. He rarely stopped talking about science, and he certainly never stopped thinking about it. Hanging off the back of Chiva, Tewksbury yelled to the team in the front about a new experiment he was contemplating. Mancho and Carlo spent the next hour hashing it out with him as they hung out the windows, clutching the roof rack. Whenever Tewksbury has a great idea—and he has a surfeit of them—he gets a distant look in his eyes and says, "That would be slick."

Some days are slicker than others, and Tewksbury's zealotry can occasionally backfire. One scientist I spoke with felt Tewksbury's experiments—and his interpretations of them—are not always as meticulous as they could be. In fact, Tewksbury would be the first to admit that his excitement sometimes gets the better of him. Seven years ago, he and fruit expert Doug Levey were visiting Ilha de Cardoso off the coast of Brazil. "There are so many friggin' endemics out there, it's ridiculous," says Tewksbury, "There's a flycatcher out there that has a range of six football fields!" In fact, the duo were convinced they had uncovered a biological novelty: a fungus whose spores were dispersed by a *Euphonia*, a flamboyant bird in the finch family. They spent several days frantically taking observations and collecting samples of bird poop with hopes of culturing the fungus back in the lab. They hoped to submit their findings to a prestigious

journal. But when they finally got around to examining the ostensible fungus under a microscope, they noticed it had legs. Their fungus was a cluster of scale insects, unique but not unprecedented. Their prestigious paper evaporated. Still, Levey points out that Tewksbury's infectious enthusiasms—even his misguided ones—may prove more fruitful than the plodding approach of his more rigorous peers, “There's a long history in science of the most important discoveries being made by accident or by following a whim.”

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**[Census Scene Part 2]** After Tewksbury demarcates the census plot, the team spreads out and begins scouting for chiles. Tomas Carlo stands at the center line and points a laser range finder at Tewksbury's shoulder so he can map the spatial layout of the plants and estimate their density. Tewksbury approaches his first plant and begins scanning for fruit-sucking bugs before they scurry off the plant. These are “true” bugs, which have a long tubular proboscis that they use to pierce the thick flesh of the chile and suck its nutritious juices. An entomologist at the Smithsonian has identified some of these insects to the species level, but the team relies heavily on a crack taxonomy they've cooked up via trial and error. “Red-shouldered beetle mimic,” yells Tewksbury, “One, two, three—oh—and red butts! I've got four red-shouldered beetle mimics, already. Five red-shouldered beetle mimics.” His tally and his corrections go on for another minute or so, before he counts fruits, both ripe and unripe, and lastly must assess the pungency. “I think it's going to hurt,” he says before popping a fruit in his mouth, “Ah!”

### **Final Story**

“I think this is insane right now,” says Machnicki as she plucks a huge spine out of the back of her knee. Her nylon quick-dry pants are no match for the Bolivian forest. At her feet, a snake-like cactus winds among thickets of spiny ground bromeliads (“my nemesis,” she calls them), thorny shrubs and the bulbous stem of the devil nettle.

We had camped the night before on a low plateau overlooking the Paraguayan border. Our breakfast—and the last of our food supplies—consisted of a thimbleful of cold coffee, a boxed juice drink and a modest bag of trail mix. Instead of moving on as planned, Tewksbury's wandering legs took him to an unexpected patch of chilies. He was soon stringing a measuring tape through the woods to count every one of them in a plot some 200 yards on each side. After two years of laboratory work, Machnicki, a fungus expert, is finally getting a chance to see the natural habitat where her seed-killing fungus thrives. At the moment, though, she would rather be eating lunch. “Everything with him is by the seat of your pants,” she would tell me later.

After Tewksbury paces off the census plot, the team spreads out and begins scouting chilies. Carlo points a laser rangefinder at Tewksbury, who is hovering over a chili plant, so that Carlo can add the plant to a map he's drawing. Tewksbury counts fruits, both ripe and unripe, and assesses their pungency, which is a bit like playing Russian roulette. “I think it's going to hurt,” the human capsaicin meter says as he pops a fruit in his mouth. “Ah!” he yelps. (They will test samples more rigorously back in the lab in Seattle.)

Tewksbury scans the plants for fruit-sucking bugs, using his own nicknames. "Red-shouldered beetle mimic," Tewksbury yells, referring to a true bug (order Hemiptera) he once thought was a beetle (order Coleoptera) until an entomologist set him straight. "One, two, three—oh—and red butts!" he says, noticing another insect species that hangs out on the underside of the chili leaves.