



# USDA-APHIS-Animal Care



ANIMAL WELFARE COMPLAINT			
Complaint No. AC19 407	Date Entered: 17-Jun-19	Processed By: GCA	
Referred To: Navarro/Sabala		Reply Due: 19-Jul-19	
<b>Facility or Person Complaint Filed Against</b>			
Name: University of Puerto Rico		Customer No.: 960	License No.: 94-R-0109
Address: Medical Science Campus		Email Address: (b) (6), (b) (7)(C)	
City: San Juan	State: PR	Phone No.: 787-758-2525	
<b>Complainant Information</b>			
Name: (b) (6), (b) (7)(C), (b) (7)(D)		Organization:	
Address: (b) (6), (b) (7)(C), (b) (7)(D)		Email Address: (b) (6), (b) (7)(C), (b) (7)(D)	
City: (b) (6), (b) (7)(C), (b) (7)(D)	State: (b) (6)	Phone No.: (b) (6), (b) (7)(C), (b) (7)(D)	
How was the Complaint received? Email			
Details of Complaint: SEE ATTACHED			
<b>Results:</b> <p>In response to this complaint, from July 9-11, 2019, this inspector conducted visits/inspections at all three sites under the registrant's certificate (Monkey Island/Cayo Santiago, Medical Sciences Campus and Sabana Seca Research Station). I conducted extensive interviews with both, the Director at the University of Puerto Rico's Caribbean Primate Research Center (CPRC), and their Attending Veterinarian (AV).</p> <p>The complainant alleges that management at the CPRC have used unnecessary, cruel, inhumane and highly unethical contraception/sterilization methods and "killed" (by euthanizing) healthy animals in lieu of other humane options/methods. I reviewed approximately 3 years of the CPRC's IACUC minutes and correspondence from their current External Advisory Board, and found that all contraception/sterilization methods used in bringing down the population within two social groups of animals at Cayo Santiago (facility's site 004), were approved by both academic entities; all practices found to be humane and following guidelines of AWA regulations.</p> <p>The complainant mentions he/she and other staff objectors believed the CPRC scientific staff should have used other more humane methods in bringing down the animal population, and that staff that voiced their opinions were removed/exiled from job areas/positions. Also, the complainant states that the original External Advisory Board was disbanded by the CPRC; this inspector couldn't comment on internal/business personnel issues because these are out of the inspection's scope.</p>			



## USDA-APHIS-Animal Care



The complainant mentions that on May 30, 2019, the CPRC fired another staff member (veterinarian) who was opposed to the established population control measures, and commenced euthanizing animals at another of CPRC' locations (site 002). All euthanasia methods used by CPRC staff were found to be in compliance with AVMA guidelines and in compliance with AWA regulations; this inspector couldn't comment on internal/business personnel issues because these are out of the inspection's scope.

Finally, the complainant provides for comparison a New Your Times article, dated May 14, 2019, titled "Primal Fear: Can Monkeys Help Unlock the Secrets of Trauma?" The article focuses of trauma suffered by the rhesus monkey population on Cayo Santiago (Site 004) post Hurricane Maria devastation in the year 2017; this inspector couldn't comment on internal/business personnel issues because these are out of the inspection's scope.

No non-compliances were identified during the inspections at the University of Puerto Rico's three AWA-regulated sites.

Application Kit Provided:

Yes: ☐

No: ☒

Inspector:

Mario Mercado, DVM, VMO

Date:

Reviewed By:

Kathy Campitelli, DVM, SACS (acting)

Date:

06 MAR 2020



Animal and Plant  
Health Inspection  
Service

June 17, 2019

Animal Care  
4700 River Road  
Riverdale, MD 20737

(b) (6), (b) (7)(C), (b) (7)(D)

Dear Complainant,

Thank you for your correspondence dated 17-Jun-19. We are reviewing your concerns and assigned tracking number AC19-407. Please allow us enough time (30 to 60 days) to thoroughly look into your concerns. You may submit a request to the Animal and Plant Health Inspection Service (APHIS) Freedom of Information Act (FOIA) office to obtain any publically available information regarding our review.

FOIA Requests can be submitted three ways:

1. Web Request Form: <https://efoia-pal.usda.gov/App/Home.aspx>
2. Fax: 301-734-5941
3. US Mail:  
USDA- APHIS- FOIA  
4700 River Road, Unit 50  
Riverdale, MD 20737

Should you have any questions regarding the APHIS FOIA process or need assistance using the Web Request Form **please contact the APHIS FOIA office at 301-851-4102.**

Animal Care is a program within the U.S. Department of Agriculture (USDA) that directs activities to ensure compliance with and enforcement of the Animal Welfare Act and the Horse Protection Act. Animal Care establishes standards of humane treatment for regulated animals and monitors and achieves compliance through inspections, enforcement, education, and cooperative efforts under the Acts.

Please be assured that we will look into your concern(s) and take appropriate action(s).

Thank you for your interest into the humane treatment of these animals.

Sincerely,

Betty Goldentyer  
Associate Deputy Administrator  
Animal Care

## Allums, Gina - APHIS

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**From:** noreply@aphis.usda.gov  
**Sent:** Saturday, June 1, 2019 4:09 PM  
**To:** ACEAST  
**Subject:** USDA APHIS ANIMAL CARE - Animal Welfare Complaint Submission

### Details of complaint:

- Name of USDA licensee/registrant: University of Puerto Rico, Medical Sciences Campus
- USDA license/registration number:
- City/State: Pan Juan, PR
- Complaint details: I have included below a link to a recent (14 May) New York Times article on the UPR Caribbean Primate Research Center (CPRC) and the slaughter of hundreds of rhesus macaques.

The real news, buried near the end of the article, is that the current management at the University of Puerto Rico decided to slaughter two entire social groups quite unnecessarily, and the slaughter continues.

According to the article:

"In the last months of 2018, 124 members of Troop KK were transported from Cayo Santiago to Sabana Seca, where they were euthanized before having their brains removed."  
and

"They already have the brains of another troop, HH, which was culled in 2016, ..."

For the past several years the UPR CPRC management, (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) have had multiple humane options like contraception and sterilization easily available to them, but instead, they silenced the voices of reason from within their own organization and chose to kill healthy animals - an option that was unnecessary, cruel, inhumane and highly unethical.

Today (30 May 2019) they fired another veterinarian who objected to this atrocity and began slaughtering another social group.

Since 2013 the looming population growth was known and could have been avoided. The CPRC scientific staff and the External Advisory Board advocated humane measures like contraception for females and vasectomies for males. The population modelling was done, and reversible control of population growth would have been completely effective.

Although these humane options were easily available to them, the UPR management, (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) chose instead to silence the voices of reason from within their own organization and kill healthy animals - an option that was unnecessary, cruel, inhumane and highly unethical. Staff who voiced opposition to these practices have been exiled or fired or harassed in other ways. (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) was physically removed by the (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) and exiled to a cubicle at a remote location at the (b) (6), (b) (7)(C) and the (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) disbanded the External Advisory Board was disbanded.

On Thursday 30 May the UPR (b) (6), (b) (7)(C) fired another staff member (b) (6), (b) (7)(C)



(b) (6), (b) (7)(C) who was opposed to these atrocities, and they began another slaughter at the Sabana Seca facility.

We now know that the UPR used the premise of overpopulation to intentionally breed monkeys, specifically to kill them and harvest organs for sale (it looks like about 300 animals, so far). Sick or injured animals no longer receive treatment but instead are killed. The UPR RCM IACUC did nothing but pretend it did not know. The USDA Animal Welfare Act inspectors have done nothing, and NIH OLAW has done nothing either.

It is shocking to see that NIH allows, in fact encourages such atrocities, and on such a massive scale. The supposed value to research of these atrocities cannot possibly outweigh the ethical compromises and unnecessary cruelty being committed.

<https://www.nytimes.com/interactive/2019/05/14/magazine/monkeys-puerto-rico-trauma.html?fbclid=IwAR2wlg159wuNVXc2gQ5fLj5QZseluhwjxq5qYEwnIKLqeWMgqBIsiMh5neM>

While we will continue to do all that irritating, tedious compliance paperwork, incidents like this show us that the Federal compliance apparatus has deteriorated to become hardly more than an absurd, hypocritical farce. We are witnessing the demise of ethics in animal research.

Regards,

(b) (6), (b) (7)(C)

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CPRC Web Page (key people and this issue are missing)  
<https://onlinelibrary.wiley.com/toc/10982345/78/1>

American Journal of Primatology  
Special Issue on Cayo Santiago  
<https://onlinelibrary.wiley.com/toc/10982345/78/1>

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New Your Times, 14 May 2019  
Primal Fear: Can Monkeys Help Unlock the Secrets of Trauma?  
By LUKE DITTRICH MAY 14, 2019  
Hurricane Maria devastated Puerto Rico's "monkey island." The surviving primates could help scientists learn about the psychological response to traumatizing events.

Cayo Santiago's rhesus macaques at feeding time. Glenna Gordon for The New York Times  
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By LUKE DITTRICH MAY 14, 2019  
On Valentine's Day, 2018, five months after Hurricane Maria made landfall, Daniel Phillips

stood at the edge of a denuded forest on the eastern half of a 38-acre island known as Cayo Santiago, a clipboard in his hand, his eyes on the monkeys. The island sits about a half-mile off the southeast coast of Puerto Rico, near a village called Punta Santiago. Phillips and his co-workers left the mainland shortly after dawn, and the monkeys had already begun to gather by the time they arrived, their screams and oddly birdlike chirps louder than the low rumble of the motorboat that ferried the humans.

The monkeys were everywhere. Some were drinking from a large pool of stagnant rainwater; some were grooming each other, nit-picking; some were still gnawing on the plum-size pellets of chow that Phillips hurled into the crowd a half-hour before. Two sat on the naked branch of a tree, sporadically mating. They were all rhesus macaques, a species that grows to a maximum height of about two and a half feet and a weight of about 30 pounds. They have long, flexible tails; dark, expressive eyes; and fur ranging from blond to dark brown.

Phillips's notebook was full of empty tables. There were places for the monkeys' ID numbers, which were tattooed on their chests and inner thighs, places for a description of their behavior, places for the time of day. There was a place for his own name, too, and he wrote it at the top of each page. Daniel Phillips is not a Puerto Rican name, whatever that means, but he was born here, in a big hospital in Fajardo. He arrived more than a month early and spent his first weeks in an incubator, but grew up to be a high school and college wrestler; as a biology major, he became interested in monkeys, and was invited by a primatologist from Duke University to take a job as a research assistant here on Cayo Santiago.

Like humans, rhesus macaques possess advanced problem-solving skills and opposable thumbs and have been known to use tools. They have complex emotional and social lives. Although chimpanzees and a few other ape species are closer cousins to humans — we share approximately 93 percent of our DNA with macaques and 98 percent with chimps — macaques are easier to manage and less protected by regulations, which is partly why they account for 65 percent of research on nonhuman primate subjects funded by the National Institutes of Health.

Healthy ones cost thousands of dollars today and fetched a similarly high price in 1938, when a Columbia University primatologist named Clarence Carpenter devised a plan to help meet the growing scientific demand for the species. The University of Puerto Rico arranged to lease this island — at the time it was being used by a sugar-cane magnate as a grazing ground for goats — and then Carpenter mounted an expedition to India, where (after concluding that the animal trade was “a racketeering proposition with few exceptions”) he inked a contract with a monkey dealer in Kolkata and acquired 500 individuals, mostly females. He chaperoned the animals via cargo ships to Puerto Rico and ferried them to Cayo Santiago, where the 409 that survived the long passage were released from their cages. Though they roamed free, they were not independent, and they would rely on their human stewards for food to supplement the island's scant edible plant life, as well as on rainwater-collection systems to keep them hydrated.

From the start, Carpenter hoped the island would become more than just a monkey farm. His passion was field research, and he envisioned Cayo Santiago as having “enormous possibilities” for, among other things, the “study of parasites, study of disease, study of reproductive cycles, social organization and anthropological studies. ... I began to dream about these unique resources and how they would be used by different people.” He imagined a sort of Goldilocks zone: not too wild, not too tame, just right. What eventually made Cayo Santiago truly unique, however, was the breadth and continuity of its record-keeping. This was in large part thanks to Stuart Altmann, a Harvard biologist who arrived two decades after Carpenter and stressed the importance of two crucial practices that have been followed ever since. First, he had the monkeys tattooed with their ID codes, making it easy to identify them from a distance. Second, he tried to take a daily census of their behavior, charting out their intricate ongoing inter- and intratroup dramas. Altmann's diligent data-collection, which his successors



have maintained and improved upon, transformed Cayo Santiago from a useful place to an indispensable one.

Each monkey that Phillips observed, like all of the approximately 1,700 macaques that reside on Cayo Santiago, was a descendant of the original 409; each one now just the tip of an iceberg of behavioral and biological data that encompasses many generations of its ancestors, allowing researchers to seek out answers to questions they wouldn't even bother posing anywhere else. There is no other nonhuman primate population about which so much intimate longitudinal data exists, and it is quite possible that no equivalent human data set exists, either. The island, which is owned and managed by a division of the University of Puerto Rico called the Caribbean Primate Research Center, has taught us much of what we know about how macaque societies work, illuminating the patterns and systems beneath the apparent chaos. Outside researchers from more than 100 universities have chronicled everything from tiny intrafamilial soap operas to epic intertroop wars to unsolved murders. Occasionally they witness genius. A macaque named Pinocchio — he had a broken, misshapen nose — once figured out how to crack open coconuts by tossing them as high as he could and watching them dash on the rocks. His epiphany was not rewarded for long: The stronger macaques learned to watch and wait and steal, exploiting his brilliance and leaving him with nothing. Phillips pointed out some of the individual monkeys, identifying them by their numbers, though he also knew them by their faces. There was the fearless one that sauntered by and squatted right in front of him, ostentatiously ignoring him. There was the one that carried a pebble constantly, licking it like a lollipop. Another crouched under the meager shade of a stripped bush and pushed on his stomach until he regurgitated. He did this all the time, and nobody knew why. It may have been some sort of eating or anxiety disorder. Since Maria, researchers had observed that the behavior had spread to a couple of the monkey's companions.

Cayo Santiago is home to around 1,700 monkeys. Glenna Gordon for The New York Times

The monkeys are tattooed with ID numbers so researchers can observe and record their behavior. Glenna Gordon for The New York Times

At the time the storm hit, in September 2017, Phillips and his younger brother and their parents lived in a ramshackle house a verdant hillside full of fruit trees, many of which his father planted himself. Their mother was away visiting relatives in New York. The house was sturdy: lots of concrete, heavy doors, wooden shutters. It had been through storms before. But it had never been through anything like Maria. The three planned to ride out the hurricane in the living room, but the shutters were ripped away, and the walls started shaking, and Phillips thought the whole house might slide down the hillside.

Phillips's father had dementia, and his brother was just a teenager. Phillips, then 27, had to decide what to do. He decided on the garage. This meant going outside, into the howl, and down a steep metal staircase, wet and slick, holding his father to him with one arm, holding the railing with the other, through a rain so thick and hard that it almost felt as if they were swimming. The garage door was hard to open, but when it shut behind them, it held. They lay together on the floor at the bottom of a canyon of stacked boxes and garbage bags and paint cans and old tools.

After the storm, Phillips walked four miles to a friend's home, borrowed a chain saw and walked back. His phone's battery died after a couple of days, but there wasn't any cell service anyway. They slept in the dark, wondering whether or when outside help might come. Phillips had thought of his father's dementia as a slow slide. The grasped-for words, the stories he'd retell too soon, the moments of frozen confusion. Sometimes the progression of the disease would seem to pause, as if his father had found temporary shelter on a ledge above the abyss. Sometimes he even seemed to be getting better, climbing back out. But those fluctuations were just noise, like when you zoom in too tight on a graph. If you watched him



over weeks and months, as Phillips did, his trajectory was clear. Now, after Maria, the decline became steeper, faster. Now his father didn't remember the storm at all. He kept asking what had happened to their home.

Phillips wanted to go to medical school in the mainland United States. He most likely could get in. He had good grades, worked hard. A shelf in his room held wrestling medals and spelling-bee trophies. But his father was only getting worse, and his brother was young, and Phillips thought he was needed at home, at least for a while longer, especially in the slow-rolling aftermath of Maria. He didn't cry at all for weeks after the storm, and then he met up with a friend he hadn't seen since before it, and as the two of them told their stories, Phillips suddenly felt tears on his cheeks, and once he started he found it hard to stop.

Disaster-relief operations tend to follow a standard triage. The thirsty receive water, the injured receive medical attention, the homeless receive shelter. And the neediest among them — the most injured, the most bereft — are relatively easy to pick out and prioritize. Psychological damage is harder to see. It can gestate for days or weeks or months before symptoms begin to show. By then the aid workers have usually left, and the emergency crews have moved on. In the immediate aftermath of a traumatic event, it would be helpful to know which survivors are most likely — for social or biological or circumstantial reasons — to develop psychological problems, so that they can be provided with the necessary resources. For now, though, that knowledge doesn't really exist. What does something like Hurricane Maria actually do to a community, beyond the initial, obvious physical effects?

As it turns out, one of the best places to begin looking for answers may be a small, strange island full of monkeys.

Workers at Cayo Santiago get around the island on A.T.V.s. Glenna Gordon for The New York Times

At a superficial level, most of us are familiar with what happens when we encounter something that makes us fear for our lives: Our hearts beat faster, our palms sweat, our minds race.

These are the easily observable aftereffects of neuroendocrine processes that are harder to see. If a strange dog leaps at you, your brain leaps into action within milliseconds, your hypothalamus and pituitary gland acting in concert to send chemical messages to your adrenal glands, just above your kidneys, which respond by flooding your bloodstream with adrenaline, cortisol and other stress-related hormones. It is these hormones that create the aforementioned superficial changes, which then ideally help your body make one more quick leap — out of range of the dog's jaws. But while these hormones help us stay alive, they can also make living more difficult. Cortisol, for example, provides numerous short-term benefits, like increased vigilance for potential threats, but it has long-term corrosive effects, making it difficult to sleep, elevating baseline anxiety levels, increasing the risk of heart disease and impairing memory function.

Over the last several decades, as we have deepened our understanding of the physiological consequences of life-threatening and potentially traumatizing experiences, we have also gained insight into the social impact of these experiences. Early childhood psychological trauma has clear effects on the individual, elevating rates of suicide attempts and depression, and those effects ripple out through intimate networks of families and loved ones. Studies find that traumatized animals of various species exhibit long-term increases in hostile and aggressive behavior, and among humans, this correlation translates into a higher likelihood of criminality and incarceration. A traumatized individual, in other words, may become more likely to traumatize other individuals, sparking a vicious cycle that spirals through generations.

Scientists have long used rhesus macaques in psychological research. In the 1950s, a University of Wisconsin comparative psychologist named Harry Harlow performed a series of sometimes-shocking studies on the monkeys. In one, he took newborn macaques and placed them in cages occupied by two artificial mothers. The first mother was made of chicken wire



and was painful to hug; the other was covered with a soft cloth. Harlow attached a bottle of warm milk to the chicken-wire mother and left the fuzzy one milkless. He observed that some infant macaques preferred cuddling with the furry mother even if it meant denying themselves milk. In another experiment, he placed macaques in a device he called the Pit of Despair, which extinguished virtually all external stimuli, including light. Then, after weeks or months or even years inside, he released them back into the company of their peers. He found that the longer they'd stayed in the pit, the more socially maladjusted they had become. Many of the formerly isolated female monkeys had lost all desire to mate, which was a problem for Harlow, as he wanted to see if their mothering instincts had also been affected. His solution was to build another device, which he chose to call the Rape Rack. He found that the females who had endured the trauma of both the Pit of Despair and the Rape Rack tended to become neglectful or even severely abusive mothers.

Harlow was a controversial figure even in his day, and current United States laws and institutional guidelines governing animal research would almost certainly prevent his most brutal experiments from being repeated. Today, much trauma research still takes place in laboratories, but some is conducted in the field. Natural disasters, which traumatize many individuals at the same time, have become an important source of data. It's not uncommon for researchers to descend on communities in the aftermath of tornadoes and floods and hurricanes, interviewing survivors and trying to determine the psychological contours of their damage. In New Orleans and other areas affected by Hurricane Katrina, teams of university researchers determined that almost half of the hurricane survivors they interviewed displayed some sort of anxiety or mood disorder, while more than 30 percent were suffering from PTSD. Nonhuman primates in disaster zones have also been scrutinized. In 2013, a graduate student from the University of Calgary examined a Belizean troop of spider monkeys that survived the double punch of a hurricane followed shortly by a forest fire. The limited scope of data in these sorts of studies, however, is usually an issue. The spider monkeys, for example, had been studied before, but the researchers' knowledge of their social networks and lineages was limited. And as for the humans in these studies, they almost never become experimental subjects until after the traumatic events in question, which makes it hard to gauge how the events actually changed them.

If a researcher interested in how trauma affects individuals and societies were to dream up an ideal natural laboratory, she might imagine a discrete landmass populated by a multigenerational community that has been extensively and meticulously studied for many decades before the traumatizing event. Even better, it would be a population to which researchers would have unfettered access — not only to their minds, but also to their bodies, and even to their brains.

Lauren Brent, a researcher, outside one of the few structures left standing by Hurricane Maria. Glenna Gordon for The New York Times

Five months after Maria struck, Lauren Brent, an assistant professor at the University of Exeter, in England, and two research assistants, Josué Negrón and Bonn Aure, followed a troop called KK through the ruins of the forest. The monkeys were quick and agile, parkouring over tangles of deadwood that slowed the humans. Maria had felled most of the trees but not all of them, and when Brent and Negrón and Aure ducked underneath the lower branches of an almost-leafless bay-rum tree, they moved quickly and didn't look up, in case a monkey were to urinate on them. Most of the macaques on Cayo Santiago carry the herpes B virus, which does them no harm but can kill human beings, which is why all the researchers wear long pants, hats and safety glasses.

This was the second day of Brent's first trip back to Cayo Santiago since the hurricane, and she was struggling to find her bearings. For a long stretch of her graduate work, she would come here almost daily, developing an encyclopedic knowledge of the monkeys' habits, quirks,



alliances, affairs. Friends would ask if she got bored watching the same monkeys over and over, a question that made her scoff. Every visit was a new episode of a private soap opera, its dozens of story lines unfolding all around her. Boredom was impossible. But now, after Maria, it was as if she had missed whole seasons of the show, and was in danger of losing the plot altogether. Earlier that day, she watched a medium-size female macaque charge two other females from the same troop, screaming and swatting at them a few times before beating a retreat. This was odd and puzzling behavior. What's up with that one? she wondered. What's that about?

When she was little, she used to ask herself those same kinds of questions in her backyard, watching birds, bugs, squirrels. "I was always a nature nerd," she says. Her passion became a profession. She pursued a Ph.D. in evolutionary anthropology at Roehampton University in London, and it was during this period that she made her first trip to Cayo Santiago. It was a little odd, at first, doing research in a place integral to the history of her field. To take just one example, Brent had often read in textbooks about a trip Stuart Altmann, the island's former scientist in charge, made here in the 1950s in the company of his mentor, the famous naturalist E.O. Wilson. While strolling the island, the men made observations that sparked conversations that led them to establish a whole new science, sociobiology, based on the idea that every living creature, from ants (Wilson's specialty) to macaques (Altmann's specialty) might obey the same fundamental rules of social organization. Cayo Santiago had been a distant constellation in Brent's intellectual firmament for years before it suddenly became tangible, present. Brent would sometimes find herself wondering whether she might be standing in the exact spot where Wilson and Altmann had one of their famous epiphanies. While Brent has been trained not to anthropomorphize nonhuman primates, the similarities between her subjects and her own species are inescapable. It's hard to observe Cayo Santiago's continuing saga of courtship and competition and fear and curiosity and play and goofiness and sneakiness — all those familiar expressions of relatable appetites and instincts — and not see ourselves. But there are crucial differences beyond the obvious. For example, macaques are less "confounded" than we are, to use the term that primatologists use, which means they lack the complex layers of culture and politics and economics that make human societies, and human individuals, so infinitely varied. While our diversity is dazzling, it can be, for a scientist, blinding. The relative simplicity and uniformity of monkeys, combined with their close kinship to us, arguably makes them better proxies for interrogating human nature. Maria, after all, hit every monkey on Cayo Santiago with the same force. When Maria arrived, the monkeys were all outdoors, naked, exposed, equally vulnerable. None had basements to hide in or planes to flee in. And when Maria moved on, the monkeys were left equally bereft. None had made stockpiles of food, or had bank accounts that could finance the purchase of tickets for the next flight out of San Juan. They endured the storm in unison, together, and endured its aftermath the same way. Which meant that if Maria affected individual monkeys differently, it was very likely that these monkeys were differently equipped — socially or psychologically or genetically — to process the blow.

Josué Negrón, a research assistant on Cayo Santiago, Puerto Rico, with his subjects. Glenna Gordon for The New York Times

Negrón told Brent about a recent case that he had observed in which a Troop KK female, after mating with a Troop F male, moved back to his troop with him and remained there. This violated a fundamental organizing principle of macaque society: matrilinearity. It's the males that usually migrate into other groups, not the females.

"It was 53A," Negrón told Brent. "She went down to F with the alpha, mated with him two weeks, then followed him around and just stayed there."

"That's so weird," Brent said. "That's not supposed to happen."

Brent wondered whether the unusual behavior could have something to do with how Troop KK



was itself formed, a few decades before, by a fissioning of Troop F, meaning that there were still genetic ties between them. Or could it have had something to do with the tumult and social upheaval that followed Maria?

In physical, immediate terms, Maria's impact on Cayo Santiago seemed straightforward. The hurricane uprooted much of the island's flora, destroyed its feeding corrals and water-delivery systems and ruined the laboratory and other buildings used by humans. The precise number of monkeys Maria killed was unknown, and will remain so. Partly this is because the storm hit just before "capture season," the annual tattooing and blood-typing of yearlings, meaning that the monkeys born in the previous year had yet to be officially counted. But it's also because the toll of the devastation went far beyond what actually transpired during the hurricane itself. In the earliest rough census after the storm, it seemed that surprisingly few — perhaps three or four — of the island's approximately 530 adults had died. But when the C.P.R.C. continued to watch during the month following the storm, they saw a clear and statistically significant uptick in fatalities on the island, despite how, thanks to their caretakers, there was no shortage of food or potable water. There weren't any known outbreaks of disease. The monkeys were just dying, for unknown reasons, at far higher rates than usual. The researchers noted that a similar spike occurred among Puerto Rico's humans, whose mortality rate, according to one study, may have risen by as much as 62 percent in the months immediately following the storm.

And it wasn't just the number of deaths that was significant; it was also the specific monkeys that were dying. Two of the island's seven alpha males, each the head of one of Cayo Santiago's troops, died in the month following Maria. That amount of political turmoil during such a short period of time was highly unusual. Did the physical upheaval that Maria caused during the 16 hours it raked the island create the conditions for an equivalent social upheaval in the months that followed?

Brent and the other researchers on Cayo Santiago had begun grappling with these ideas. These early visits were critical, a fleeting opportunity to nab snapshots of a society in flux. Five months in, this was just the second full day of data collection on the island. Brent and the others were racing to collect as much as possible, aware that a great deal had already slipped through their fingers.

Aure had wandered off, following a cluster of individuals from Troop KK. He was holding a clipboard with a printout of a few pages of a previous census, listing the ages, parents and ID numbers of all 230 or so members. He was trying to learn to identify them from memory. Sometimes he made notes.

Hourglass face

Walks with a limp

Short ears

Brent walked back down the hill toward the dock and met with James Higham, an evolutionary biologist at N.Y.U. whom she had known since they began their careers as graduate students. Higham told her about something strange he had just seen, a young female with two infants. Twins are extremely rare among macaques, and Higham was pretty sure that one of the infants was the victim of kidnapping, which is itself unusual. Their conversation moved on to musing about possible future field experiments, and Brent brought up the idea of blaring a recording of hurricane-decibel wind through hidden loudspeakers and observing how the monkeys reacted. Giselle Caraballo-Cruz, the Cayo Santiago colony manager, walked by holding two red-plastic biohazard bags, each containing the body of a young macaque. James asked her which troop the monkeys had belonged to. She wasn't sure.

"With tissue we should be able to work out the mom and dad," Brent said.

Caretakers on Cayo Santiago taking food pellets and other supplies to the main clearing where the monkeys hang out. Glenna Gordon for The New York Times



It took us about 15 minutes to get back to the main island after my first visit to Cayo Santiago. Omar Rivera, a boat captain, handyman and monkey tender, nosed the skiff toward the dock just west of a high ridge known as Punta Lima. Thirteen 1.8-megawatt wind turbines stood atop the ridge, an \$82 million installation. The turbines, designed to reap the wind, were destroyed by it instead, their propellers shredded like paper or torn off entirely. One of Rivera's co-workers had backed the boat trailer down the ramp and into the water, and Rivera lined the boat up perfectly, gunned the motor and coasted up onto the trailer, ready to be locked into place. The sun was rising, and the morning haze was burning off. He had spent the previous couple of hours on Cayo Santiago, emptying bags of chow into the hungry mob and clearing a little debris. He wiped the sweat off his forehead and hopped down onto the concrete ramp and up into the cab of the pickup.

After crossing a silt-choked river on a concrete bridge, Rivera was on the outskirts of Punta Santiago. The damage didn't shock anymore: the way this bright, cheery beachside town had turned into something else; the piles of moldering debris — mattresses, clothes, furniture, televisions, toiletries, toilets, Bibles — stacked up outside houses, so many possessions taken and broken by the floods. The homes themselves carried wounds ranging from broken windows to missing roofs. He drove past spray-painted signs outside the few businesses that remained open. He heard the drone of the diesel generators and saw the people themselves, their clothes sweat-stained, their movements sapped and sluggish, doing what they could to clean their streets or repair their homes or find water or just wait one more interminable day for inspectors from the Federal Emergency Management Agency.

He drove by the turnoff to his own street, a few blocks from the coast. Rivera had spent the time since Maria juggling the twin tasks of keeping his family fed and hydrated while doing the same for the monkeys. He was exhausted and hadn't been getting much sleep, in part because his three children had suffered from nightmares since the storm, waking up constantly and reliving the day when their windows exploded and the sea invaded their home.

He turned left onto Calle Jurel, in the middle of town. A woman on the northwest corner of the intersection was rooting around in her yard stacking the downed pieces of a flower arbor, carefully avoiding the nails. Doña Carmen spent the storm huddled alone on top of her washing machine in her one-story home, the highest ground she could find. Next to hers was a bigger house, with a large backyard that used to be full of pigpens until the storm surge washed them away. Pigs can swim, and now they were roaming free, rooting around in the muck and ruins of the backyard. The pig smell bothered Carmen and some of the other neighbors, but in general there were so many new bad smells that it just got lost in the noise. The next home was Wanda's. She was tall and thin and smiled easily and worked at the Social Security Administration in New York until a few years ago, when she retired and took her savings and bought this little house in her hometown. She had chosen one made of concrete elevated on pylons, which was a good call. Her brother was a bus driver in Brooklyn, and he had promised her that he would come down soon, and that he'd bring a generator. Wanda's Hyundai Accent still worked, and she thanked God for that. There was a mechanic a little farther down the street, with a bog of a yard filled with vehicles he hadn't had time to get to. They had almost all been flooded over the tops of their roofs. He could fix the older cars, he said, but the newer ones, the ones with computerized everything, he couldn't do a thing with. Rivera slowed down, turned into the open gate of the local offices of the C.P.R.C. and brought the boat into the muddy parking lot in the rear of the sturdy concrete structure. A little later, Rivera and Caraballo-Cruz and Negrón and Phillips walked across the street from the offices to what was left of Don Alfonso's house. In their off hours, researchers and the C.P.R.C. staff had been helping neighbors like Alfonso, and now they wanted to install a blue tarp across his decapitated home. He was tidying when they arrived, straightening cups on a shelf. Alfonso was slender, tall, graceful, elegant, with rough brown hands and soft brown eyes. He was wearing bluejeans, a button-down shirt with pink stripes, a white newsboy cap and thick-



framed glasses. He looked improbably well put together, an oasis of order in a desert of chaos. Alfonso was 13 when he dropped out of school and began working as a harvester. He learned the physics of the machete, the weaknesses of the stalks, the perfect swing. Puerto Rico almost seemed like one big sugar cane plantation back when Alfonso was a boy, seven decades ago: millions of green acres, a quilt draped over the island. Most of the plantations were owned by white Americans from the mainland, and most of the people cutting the cane were darker-skinned islanders like Alfonso. That was just how the island had worked, literally and metaphorically, ever since the Americans seized it from the Spaniards in 1898. Alfonso grew bigger, and his hands grew rougher.

This house had been his home for 48 years, Alfonso said. Then he corrected himself. He lived here with his wife, Isabel, for 48 years. Isabel died two years before. He had lived here alone since then, meaning he had lived here a total of 50 years. He made the same mistake several times during the course of a conversation, as if those first 48 were the only years that mattered.

The front room, which was a dining room and a kitchen combined, had only one wall and no roof. The other rooms — the two bedrooms, the hallway, the bathroom — were more intact, but only by comparison. Some walls were caved in, all the windows were broken, most of the roof was gone. He showed us one of his closets. Nice clothes on hangers, nice shoes lined up below, but everything reeked of mildew, and of something else, the stench that pervaded the whole town. Hard to describe, a mix of rotting cold cuts and wet dog. There had been dead fish in the street, Alfonso said.

During the 48-plus-two years Alfonso had been living in this house, it weathered a lot of hurricanes. Beulah. David. Frederic. Allen. Gilbert. Hugo. Luis. Marilyn. Bertha. Hortense. Georges. Lenny. Debby. Frances. Jeanne. Dean. Irene. Another Bertha. It was not the first time the roof had been damaged. But the storms hit more frequently and violently now. Just two weeks before Maria, there was Irma, a Category 5 storm that nobody remembers because of how much bigger and fiercer her sister turned out to be. Alfonso lost power during Irma and still hadn't gotten it back, and it was unclear when he would. The government makes promises, and the government breaks promises. A prominent geomorphologist visited the area recently and recommended that the entire population of Punta Santiago be moved permanently, relocated to higher ground farther from the encroaching sea.

Alfonso became a construction worker after he stopped cutting cane. He was good with his hands, but he was 78 and not as strong as he once was. He survived on a small Social Security check, couldn't afford to fix his home or replace his belongings, which never seemed to have time to dry out before it started raining again.

A group of Chicago firefighters assisting in post-Maria recovery efforts in Punta Santiago.  
Glenna Gordon for The New York Times

In October 2018, Lauren Brent began analyzing some of the preliminary poststorm observational data and began to notice unexpected patterns. There seemed to be two things going on. One, the monkeys seemed to be expanding their social networks, increasing the number of individuals that they had meaningful relationships with. Two, the monkeys appeared to become more tolerant of one another. They were living under radically diminished circumstances, competing for resources that had never been in such short supply, like edible leaves and the temperature-reducing shade that those leaves produced, but the amount of inter- and intratroup violence had seemed to taper off significantly. It was as if the hurricane had bonded even former foes against a common enemy and made the monkeys much more tolerant of life's everyday frustrations, at least in the early days.

When Angelina Ruiz Lambides, the evolutionary biologist who is Cayo Santiago's scientist in charge and acts as the principal liaison between the C.P.R.C. and the investigators from 11 institutions who have ongoing projects on the island, heard about these preliminary findings,



she thought of her own experiences in the days immediately following the storm. She was seven months pregnant, and the islandwide power-and-network outage made it impossible to reach most of the people she knew, including her obstetrician. Those were desperate times, with one emergency always bleeding into the next, but what stood out to Ruiz, thinking back on the tumult of those early days, was how the widespread chaos and devastation were leavened by an equally widespread camaraderie. Around San Juan, a dense city with a population of nearly 450,000, the roads were clogged with debris and downed trees, and even the traffic lights that were still standing didn't work at all. In the best of times, the city could be a nightmare to get around, a brier patch of congestion and honking and rudeness. But in the worst times she could remember, something unexpected happened: People became nicer. They'd pause at the lightless intersections, they'd wait, they'd wave one another through. Police on patrol, post-Maria, girded for a crime wave that never came. There was some looting, of course, and plenty of frayed nerves, but all in all Puerto Rico's dire straits seemed to pull people together rather than push them apart.

Angelina had actually captured one of the most indelible images of Puerto Rico's post-Maria desperation, a photograph she snapped from a helicopter during a reconnaissance flight over Punta Santiago a few days after the storm. The photograph showed people in the intersection next to Carmen's house on Calle Jurel. They'd scrawled a message in the street, in white paint, in letters three feet tall:

"S.O.S. Necesitamos Agua/Comida!!"

S.O.S. We Need Water/Food!!

Later, back in San Juan, she managed to email the picture to James Higham at N.Y.U., who posted it on Twitter, where it was picked up by news outlets and retweeted by Kim Kardashian. Ruiz wouldn't learn about its virality until days later, by which time she had already thrown herself into doing what she could do on the ground for the people she had photographed from the air, helping to organize the C.P.R.C.'s ongoing efforts to bring aid and assistance to Punta Santiago. They provided their longtime neighbors manual labor, new appliances, food, bottled water. Reconstruction was progressing, and that was a good thing, but Ruiz couldn't help but feel a little nostalgic for those brutal, halcyon days when everyone put aside differences and pulled together in the face of a common enemy. Driving had resumed its familiar stress, and the price-gouging contractors — bidding, say, to replace a few hurricane-obiterated monkey-feeding corrals — were siphoning off a lot more capital than the looters ever did.

Incidentally, researchers had observed that the absence of the corrals affected some of the social dynamics on Cayo Santiago in interesting ways. The monkeys used to receive their meals within these enclosed spaces, and the forced proximity caused collisions and frictions that weren't as prevalent when pellets were simply thrown into an unpenned throng. But the lack of corrals had also made it much more difficult to trap particular monkeys or groups of monkeys, which slowed the carrying-out of perhaps the saddest post-Maria task that the C.P.R.C. has had to undertake: the trapping and removal of Troop KK.

When monkeys on Cayo Santiago die, their skeletons are preserved and added to the Laboratory of Primate Morphology's bone library at the University of Puerto Rico. Glenna Gordon for The New York Times

Glenna Gordon for The New York Times

Forty miles northwest of Cayo Santiago, on a decommissioned United States naval base near San Juan, there is another C.P.R.C. facility, the Sabana Seca Field Station. Sabana Seca maintains its own colony of monkeys, all of them descended from the Cayo Santiago colony. Unlike their free-roaming cousins, however, the Sabana Seca macaques exist under less idyllic, more standard laboratory conditions. Some are sold to universities, while others are subjected to experiments on-site. Sabana Seca is also where, since the early 1970s, the



C.P.R.C. has “macerated” the bodies of most of the monkeys that die on Cayo Santiago, skinning them, placing them in vats and allowing bacteria to eat away their soft tissues, leaving just their skeletons behind. These skeletons form the nucleus of the C.P.R.C.’s Laboratory of Primate Morphology, which contains more than 3,600 individuals, making it one of the world’s most valuable bone libraries.

In the last months of 2018, 124 members of Troop KK were transported from Cayo Santiago to Sabana Seca, where they were euthanized before having their brains removed. The C.P.R.C. began planning the cull before Maria, for reasons of population control, and decided that removing a low-ranking troop would be less disruptive to the social dynamic of the island than removing select individuals from across multiple troops. There were simply too many animals on Cayo Santiago, and the swelling numbers endangered the health of the entire colony. Nobody was happy about the culling, but researchers realized that the unfortunate necessity had provided them a unique opportunity. Observations in the field can provide extraordinary insights, but there are things that only a body can tell you.

The brains were cut in two — the left hemispheres fixed in formalin and the right hemispheres cryopreserved — before they were packed and shipped off the island. A University of Pennsylvania neuroscientist named Michael Platt heads the consortium of researchers who will be probing the brains in the years to come. They already have the brains of another troop, HH, which was culled in 2016, meaning they now possess an unprecedented neurological archive of two communities of macaques, one that lived through Maria and one that didn’t, offering unique means of comparison. They also, of course, have access to the data collected in the field — the behavioral chronicles, the hormonal assays, the family trees — providing full-spectrum insight into the individuals behind the brains. For example, the Oxford neuroscientist Jérôme Sallet, who in previous laboratory-based research found that changes in social environment can affect areas of the macaque brain, will assess how socially integrated the hurricane survivors were and compare their brains against those from Troop HH for indications of which areas gave them the ability to cope with the hurricane. Four thousand seven hundred miles away, at the University of Washington, the evolutionary biologist Noah Snyder-Mackler might look deeper still, conducting genomic analyses to see how the function of brain cells was altered by the experience of a hurricane and how that differed between resilient and vulnerable individuals. The work ahead, a multidisciplinary, international collaboration, will lean on everything from notes scrawled in pen while dodging spritzes of biohazardous pee to the latest in neuroimaging technologies.

Punta Santiago about a month after Hurricane Maria. Glenna Gordon for The New York Times  
Meanwhile, back on Cayo Santiago, the rebuilding has continued. One new corral is complete; the others will be soon. In some ways, the island’s infrastructure is in better shape than it was before the storm. Solar panels are being installed, and there’s talk of eventually having permanent high-speed Wi-Fi on Cayo, which will make the collection and transmission of data easier and allow for things like 24-hour video surveillance, a field biologist’s dream come true. Some changes on Cayo have been designed to make the site better able to weather the next crisis, whenever it hits. There is now a small seawater-desalination plant that should help ensure no monkeys go thirsty the next time water supplies are disrupted.

As for the monkeys, they appear, at least on the surface, to have fallen back into their old routines, their raucous battles, their tender grooming, their constant pursuit of status and sustenance and companionship. Familiar and mysterious at once, they’ll continue to intrigue and puzzle a new generation of curious humans, just as their ancestors once sparked the imaginations of scientific titans like E.O. Wilson. (I called Wilson after one of my reporting trips to Cayo Santiago, and he told me in vivid detail about the trip made there more than 60 years before, when he and Stuart Altmann mused the field of sociobiology into being. He has long considered islands to be “the best of all natural laboratories,” and when I informed him of the

efforts underway to use Hurricane Maria as a natural experiment, he grew animated. "I love that!" he said. "I love that a lot. Wonderful!" And then he started asking questions.) Punta Santiago is almost back to normal, too, though some residents have moved away for good. There's clean water, electricity, cell service. The nights no longer thrum with the dull rumble of diesel generators, and a lot of the houses have been rebuilt, including the home of Alfonso, who was grateful to the many researchers and C.P.R.C. employees who volunteered their time to help with the rebuilding. He knew they had other things to do, that they spent their days on the little island off the coast, the one full of monkeys, though he didn't know that they hoped what they learned there might someday help people like him, survivors of catastrophic environmental events. Alfonso has been making his way through this confounded, confounding world for eight decades now. His home has walls and a roof again, and it keeps him dry when the rain falls, and that, he hopes, won't change when the next storm comes. Luke Dittrich is the author of "Patient H.M.: A Story of Memory, Madness and Family Secrets," which was adapted for an article in the magazine.

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Submitted on: Jun 1, 2019 8:08:30 PM UTC



## Allums, Gina - APHIS

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**From:** (b) (6), (b) (7)(C), (b) (7)(D)  
**Sent:** Monday, June 17, 2019 7:07 PM  
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Thank you

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