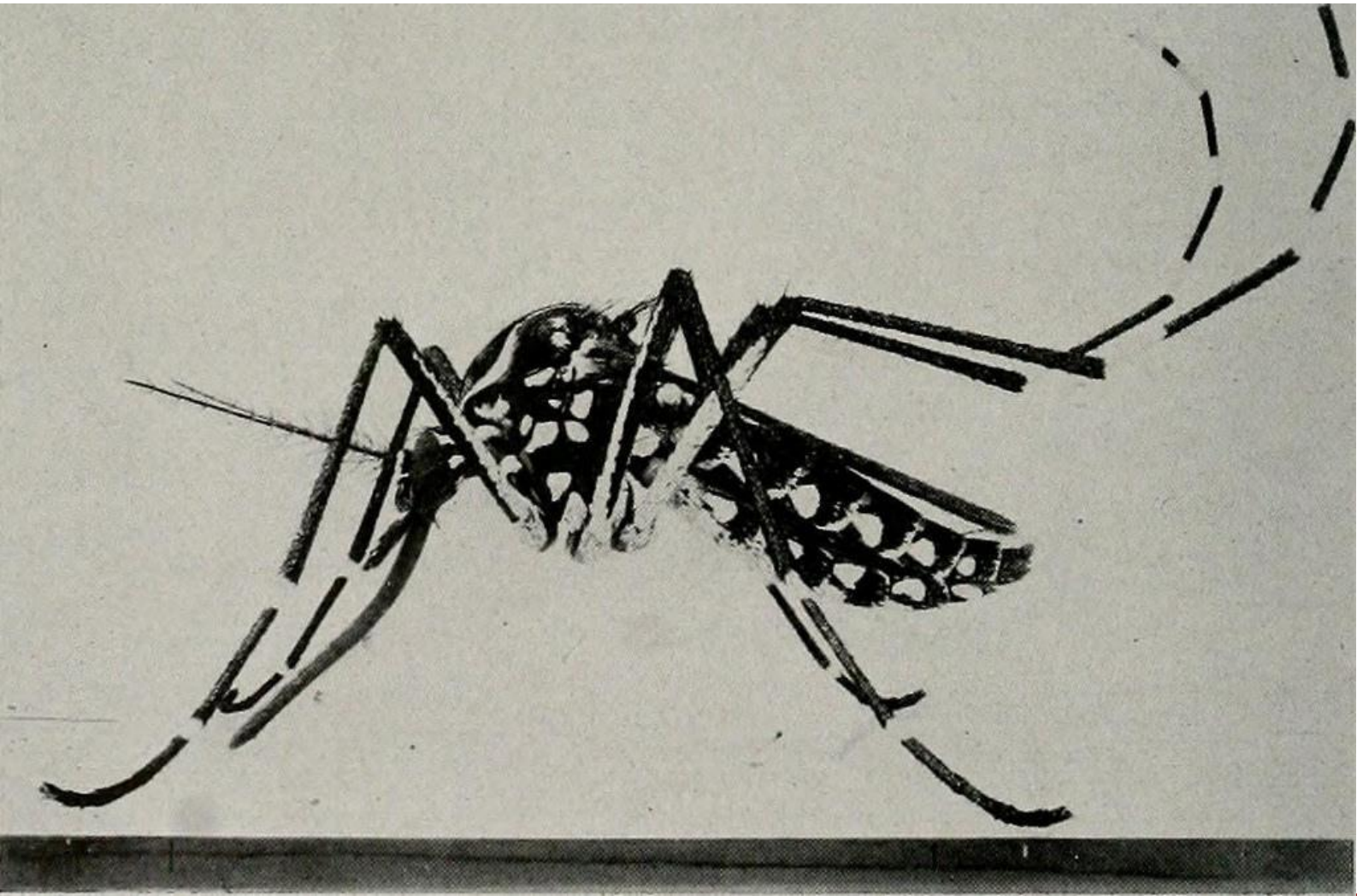


UNDER THE MACROSCOPE



T4

While Brazil Was Eradicating Zika Mosquitoes, America Made Them Into Weapons

W7

'Black Mirror' Is Back, Reflecting Our Technological Fears

While Brazil Was Eradicating Zika Mosquitoes, America Made Them Into Weapons

Most of the Western hemisphere was trying to eliminate Aedes aegypti. Why not the U.S.?

The exact moment when one of the world's most dangerous mosquitoes arrived in the Americas is unknown. It's clear that they came from Africa, and they may have crossed the Atlantic as early as 1495, on some of the first European ships to reach Hispanola. By 1648, when yellow fever broke out on the Yucatan peninsula, *Aedes aegypti* had definitely arrived.

Their behavior upon arrival, though, was unusual. Most of the world's 3,500-plus mosquito species are innocent of lust for human blood but on these long journeys across the sea, the mosquitoes that survived were the ones willing to bite humans. Female mosquitoes need blood to lay eggs. En route to America, *A. aegypti* learned to love ours.

Now, *A. aegypti* is one of our boon companions, an unwanted, constant domestic creature that house-broke itself. By the 1930s, this species was found in every country in South and Central America, throughout the Caribbean and across the American southeast. Along with it came the viruses it spread—yellow fever, which once killed a third of the people it infected; dengue, also called breakbone fever because its aches were so painful; and now, Zika.

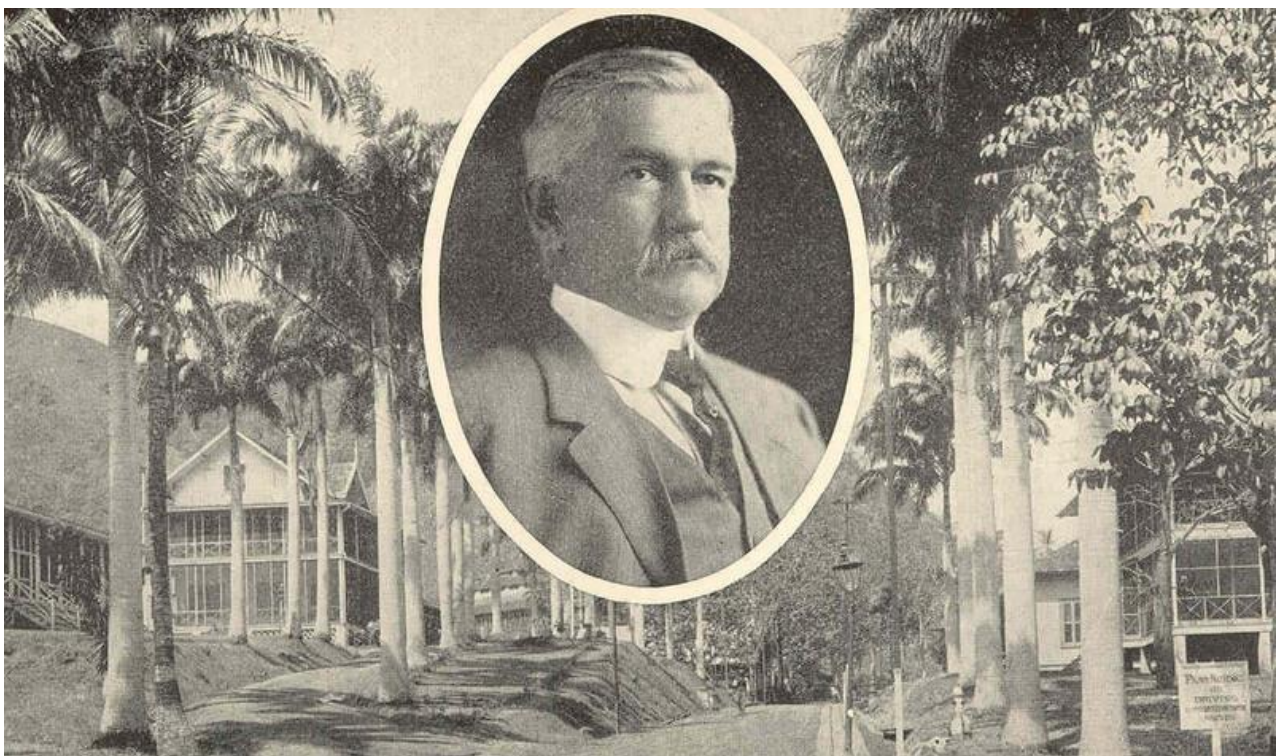
Its growth, though, was not inevitable. Half a century ago, it would not have been possible for *A. aegypti* to spread Zika in Brazil. In 1958, Brazil was declared free of the mosquito and was leading an effort to eradicate it from this hemisphere. Eradication was to be the culmination of decades of work, by scientists who let themselves be infected with yellow fever, by an Alabama soldier determined to clean up Cuba, and by a fanatical epidemiologist with an authoritarian streak, to beat both *Aedes aegypti* and the diseases it carried.

The United States has had a complicated relationship with *A. aegypti*. Today's Congress has been reluctant to allocate funds to fight Zika: President Obama asked for emergency funding in

February, and it's taken until June to get close to an acceptable deal. This hesitation is in keeping with the American government's history with the *A. aegypti* mosquito. Even while American money was funding eradication efforts, led by Americans, in countries further south, the American government was one of the last holdouts in the hemisphere-wide effort to destroy *A. aegypti*. At the same time as the U.S. Public Health Service at last started trying to eradicate *Aedes aegypti* from the southeast, another branch of the U.S. government was planning to raise colonies of millions of *A. aegypti* mosquitos, to use as biological weapons.

The *Aedes aegypti* mosquito's first sworn enemy was stationed in Havana, Cuba, after the Spanish-American War. Just before the turn of the 20th century, the island had enlisted American help to wrench its independence from Spain. By 1900, Havana's city wall had come down, and the city, with its cobbled streets and wealth grown from sugar cane, was on its way to becoming the Paris of the Caribbean.

One of its dangers, though, was yellow fever, which had infected 2,000 soldiers fighting in the Caribbean and 20,000 more training in the American southeast. William Gorgas' job was to help stop it.



William Gorgas. (Photo: Frederick Haskin/Public domain)

Gorgas was born in Mobile, Alabama, in 1854. His family spent the Civil War in the Confederate capital at Richmond, where his father was chief of ordnance for the Confederate Army. Like his father, Gorgas became a soldier, in the U.S. Army Medical Corps. Before he came to Cuba, he had lived in Texas, where he contracted and survived a mild case of yellow fever, making him a prime candidate for jobs controlling yellow fever epidemics.

In Havana, Gorgas cleansed the city of filth, believed to be the cause of disease. But he could not beat it back. At the turn of the century, when germ theory was still relatively new and viruses a recent discovery, only a couple of people believed that yellow fever might be carried by mosquitoes. One was Jesse Lazear, a young worker on the U.S. Yellow Fever Commission.

Lazear had borrowed the idea—and a set of mosquito eggs—from a Cuban scientist, Carlos Finlay, who was widely regarded as a crank. But Lazear was a discipline of bacteriology, and he believed Finlay's theory that *A. aegypti* could transmit yellow fever. Lazear and his colleagues had not yet discovered that yellow fever needed to incubate for more than a week inside a mosquito before it was truly infectious, and their first attempts to prove mosquitos could infect men failed.

One day, Lazear showed his colleague a test tube-bound mosquito, that had fed on a yellow fever blood and that looked like it might die. The colleague coaxed the mosquito onto his arm: he held the mouth of the test tube to his skin, and let the mosquito eat. This wasn't the first time the scientists had let infected mosquitos bite them, but it was the first time it worked. Three days later, he was sick with yellow fever. He recovered.

A second confirmation of the mosquito's transmission came when Lazear allowed a mosquito in a yellow fever ward to bite him. He died from the disease less than two weeks later, on September 25, 1900, at age 35.

Lazear provided enough evidence for the commission to launch a controlled experiment that proved *A. aegypti* mosquito carried and transmitted yellow fever from person to person. That was all the information Gorgas needed. At first, he tried to inoculate soldiers with bites from

infected mosquitoes, but after a number of fatalities, he decided on a new strategy: he would destroy the insects instead.



Havana, circa 1900. (Photo: William Henry Jackson/Public domain)

Aedes aegypti once laid their eggs in watery tree holes (and will still, given the opportunity) but now, after biting, they tend to choose containers of standing water left by humans. Plant pots, watering cans, forgotten milk jugs, tubs, bottle caps, toys, discarded appliances, old wrappers, used tires, a soda can, a plastic wading pool meant for children—these are all perfect places for *A. aegypti* mosquitos to lay their eggs. These mosquitos are not great flyers, and they will stay close to where they are born. Humans give them everything they need: a source of blood, and convenient containers of water in which to lay their eggs.

Using his military authority, Gorgas sent out soldiers to look for any mosquito breeding ground, no matter how small. They sought out standing water, rid the city of every container they found, oiled natural water sources to keep larvae from growing on their surface, and punished anyone who did not comply.

It worked. Gorgas' anti-mosquito crusade began in 1900, and by 1901, no one was dying from yellow fever in all of Cuba.

That same year, Brazil started a similar program to rid Sao Paolo of mosquitos; Gorgas was soon dispatched to do the same work in Panama, where the U.S. had begun to build a canal. Late in his life, in 1920, King George V knighted him for his work as the world's greatest killer of *A. aegypti*. At the time, he had done more than anyone else in the world to try to break up the love affair mosquitoes had with humans. That was before Fred Soper came to Brazil, though.

Fred Soper was from Kansas, and at some point, growing up on those empty plains, he developed a striking intensity. Infectious disease specialists who knew him say he had “tunnel vision” or “an evangelical view of the world.” Malcolm Gladwell once described him as the “General Patton of entomology.” In all accounts, he is extremely driven, extremely organized and extremely uninterested in human weakness.

The Rockefeller Foundation, which had pledged to rid the world of yellow fever, recruited him when he was young, and sent him to Brazil to work on the disease there. By 1920, Rio de Janeiro had grown to a million people, and though earlier a campaign using Gorgas’ techniques had rid the city of yellow fever, it came back in 1928. A strain had been hiding in the jungle, kept alive in mosquitoes and monkeys. Fred Soper went to work.



Fred Soper. (Photo: National Library of Medicine/Public domain)

Soper’s strategy divided Rio into small zones, each with a brigade of inspectors, who were tasked with going into every building and inspecting every household, including cisterns and gutters. They would remove all potential breeding grounds, and they would also use insecticides, like the arsenic-laced Paris Green to kill mosquitoes. A supervisor would follow,

and re-inspect. If he found any leftover mosquitoes or larvae, he would get a bonus. No one was allowed to turn the inspectors away. Soper had the backing of Brazil's authoritarian government, and people who did not comply with his regime would be punished.

Soper also held his inspectors strictly to the regime he created. In one story, he learns that an armory has exploded, checks the strict schedules for inspection, and finds that one of his men was at the site. He sends condolences to the man's widow. When the inspectors shows up for work the next day, Soper fires him, for being alive.

Eradicating *A. aegypti* became Soper's legacy, but at the time, it wasn't his goal. He wanted only to ensure that under him, unlike under his predecessor, all inspectors' work could be verified. In 1932, satisfied with the system he had set up, he went home for a leave. When he came back to Brazil, in April, *A. aegypti* had disappeared from eight cities in northern Brazil.

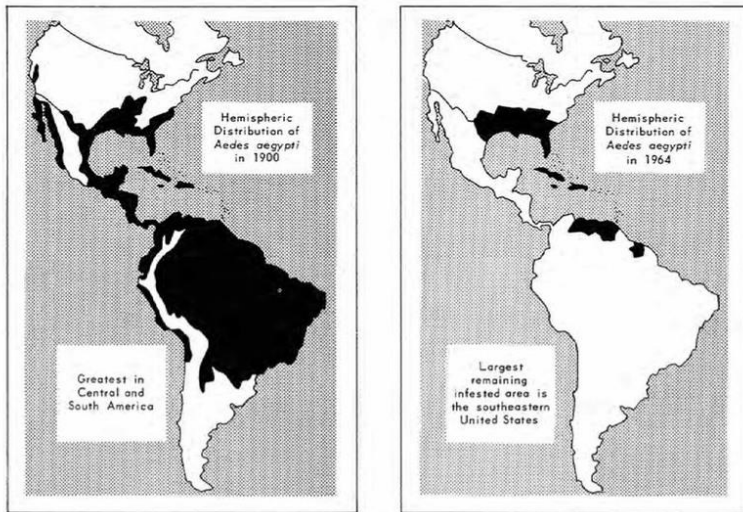
"I would like to be able to say that we planned this, but we did not," he wrote later. "It happened."

It happened. But how do you just destroy every mosquito in a city? After previous Rockefeller attempts to eradicate mosquitos from even smaller places, it was thought an impossible task.

"He did it because he was Fred Soper, and no one else had ever been like him," says Scott Halstead, one of the world's top mosquito-borne virus experts.

The secret of eliminating *A. aegypti* was that you couldn't miss anything. Soper had the discipline to maintain that level of detailed scrutiny, and the drive to keep pushing for more. In 1934, he proposed eradicating *A. aegypti* from the entire country. In 1947, the year Zika was discovered, he had convinced enough people that eradication was possible that a consortium of American countries endorsed a plan to rid the entire hemisphere of the mosquito.

Most of the countries succeeded. By 1962, there were no *A. aegypti* to be found in 18 continental countries and a number of Caribbean islands. Only a few hold outs had failed to start programs to destroy these mosquitos. The one that made Soper the most frustrated was his own.



How A. aegypti was beat back. (Image: U.S. Public Health Service)

In the 1950s, while in South America military-like brigades were hunting down *Aedes aegypti*, in the United States, the Army was falling in love with the same mosquito.

At Fort Detrick, the military's biological weapons base in Maryland, in great secret, Army scientists were considering how fleas, grasshoppers, and mosquitoes might be deployed against the Communist threat. These insects were harder to protect against than gas— masks wouldn't help. The threat they posed would last, as long as a population of insects remained alive. Plus, it would be very difficult to pin an insect-borne attack on the U.S.

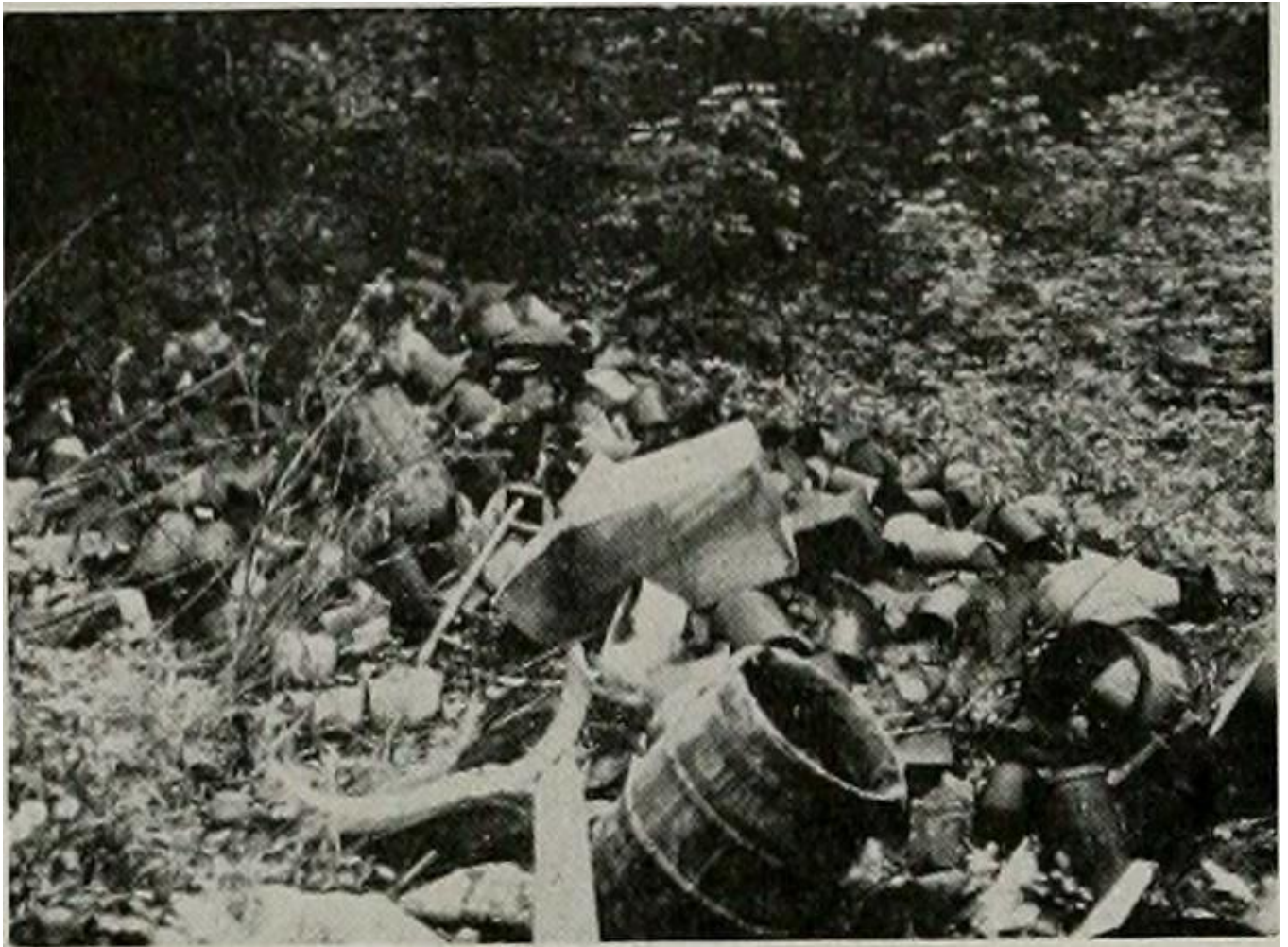
Among these possible insect soldiers, *A. aegypti* was "the golden child," writes Jeffrey A. Lockwood, in *Six-Legged Soldiers*, because the disease it carried, yellow fever was so terrible. The Army Chemical Corps, in a 1959 report, notes that yellow fever is "highly dangerous" and that "since 1900, one-third of patients have died." There were parts of the Soviet Union that had never been exposed to the disease, which made them vulnerable, but which had the right climate to support mosquitoes. The Chemical Corps started to experiment with how a brigade of *A. aegypti* might be deployed and what sort of damage they might do.

Even now, there's a limited amount of public information about these experiments, and much of what's known comes from one Chemical Corps report published in 1960. Mostly, though, it seems that Army mosquito researchers were raising hordes of insects and releasing them in different situations. In 1956, looking to see how quickly and how well *A. aegypti* could

penetrate houses and spread through the area, the Chemical Corps released a fleet of uninfected female mosquitos in a residential area of Savannah, Georgia, and collected data from locals on how often they had been bitten. (There's no information about which neighborhood was afflicted; apparently the Corps had the "co-operation of people in the neighborhood," although it's not clear they knew they were part of an experiment.) That same year, the Corps started experiments in Avon Park, in Florida. They would load hundreds of thousands of mosquitos into planes and, later, helicopters, then drop them over the field and see how far they could spread.

The mosquitoes apparently performed well enough: By 1960, the Chemical Corps was producing 500,000 *A. aegypti* every month, rearing them on sugar water and blood and letting them lay their eggs on paper towels. Scientists had found they could infect a new generation of mosquitoes with yellow fever by mixing the virus in the solution in which the mosquito eggs grew. Hundreds of thousands of mosquitoes were not enough to start a real epidemic, though. The corps proposed constructing a facility in Arkansas that could produce 100 million *A. aegypti* mosquitoes each week.

It's unlikely that the Public Health Service knew what the Army was doing—the Army's program was a closely held secret, and details did not start becoming public until the 1980s. But at the end of the 1950s, the two branches of government were working directly at odds to one another. As the Chemical Corps reports details, in 1957 and 1958, the Army was releasing *A. aegypti* in Avon Park, in the middle of the Florida peninsula. In those same years, in the Panhandle, the Public Health Service had finally started a pilot program to eradicate *A. aegypti* in Pensacola, Florida.



Mosquito-friendly habitat. (Photo: Illinois Natural History Survey/Public domain)

America's reluctance to join his eradication effort drove Soper crazy. He called the example set by the U.S. "deplorable." The program's success "depends on the participation of all countries," he wrote. He blamed America's poor organization for its feet-dragging: the country lacked "administrative machinery adapted to eradication programs."

He was right about that. Even after Congress did fund eradication in the U.S., the way the public health service did the work here was nowhere near as effective as Soper's work in South America.

American public health officials did have some good reasons for opting out of Soper's program. Public health dollars were hard to come by, and yellow fever and dengue had not been a problem in the U.S. for decades. Through a combination of vaccines and water drainage projects, Americans had beaten back the threat of epidemics. In the U.S., too, it would be hard to implement the same program that Soper had pioneered in South America. No one was going

to give mosquito inspectors unlimited authority to enter private property and destroy anything they thought was a threat.

In 1963, not long before President Kennedy's death, Congress did allocate the public health service \$3 million a year for *A. aegypti* eradication. The program was given five years to kill all the mosquitos. From the beginning, it was set up to fail: the director of the program estimated that, in fact, it would take three times as long to eradicate the mosquito from places it had been found—ten southeastern states, Hawaii, which had only just entered the Union, the Virgin Islands and Puerto Rico—and cost \$100 million.

A year into the program, the health service reported that progress already “has been hampered” by the logistics of “the procurement of equipment and recruitment of personnel.” Part of the logistical problem was lack of money: Because the funding was so low, the health service had trouble hiring qualified people for the hundreds of jobs involved.

Even if the program had been well funded and its workers eager and qualified, though, there was a fundamental difference with the U.S. eradication program. In Cuba, in Brazil, and in many of the other South American countries, no one was allowed to deny mosquito inspectors entry, and if the inspectors found mosquitoes, a family could face substantial fines. In America, that wasn't going to fly. If just one household in a neighborhood hosted *Aedes aegypti*, it would be enough for the mosquitoes to survive and spread disease. But if that household wanted to keep water-collecting trash in the yard and breed *A. aegypti*, the government wasn't going to stop them.

“When you can declare martial law, to come in at the point of the gun to control *Aedes aegypti*, you can get in the person's house,” says Walter Tabachnick, a professor at Florida Medical Entomology Laboratory, who's spent years studying *A. aegypti*. “The United States never approached that.”

By the time Congress did fund *Aedes aegypti* eradication, people had good reason to turn mosquito hunters away, too. Since World War II, one of the most powerful tools that eradicators had against mosquitoes was an efficient and effective insecticide—DDT. Just a trace

could kill bugs dead, and mosquito eradicators used it to eliminate any mosquitoes they found, and any that would come later.

Rachel Carson's polemical *Silent Spring* had come out in 1962. By the time inspectors were making their rounds, in 1964 (also the year in which the first human case of Zika was documented), plenty of families no longer wanted anything to do with DDT or the men who loved it. They turned the inspectors away. After four years, Congress defunded the program.



The mosquitoes won. (Photo: James Gathany/CC BY 2.0)

When *A. aegypti* attack, they prefer to bite at dusk. They come at their target silently. They go for our ankles. They're skittish. Twitch a muscle, and the mosquito will withdraw its proboscis, wait, and reinsert. That's part of what makes them so dangerous. Every time the mosquito tries again to draw blood, the viruses it harbors have another chance to squirm into a person's bloodstream.

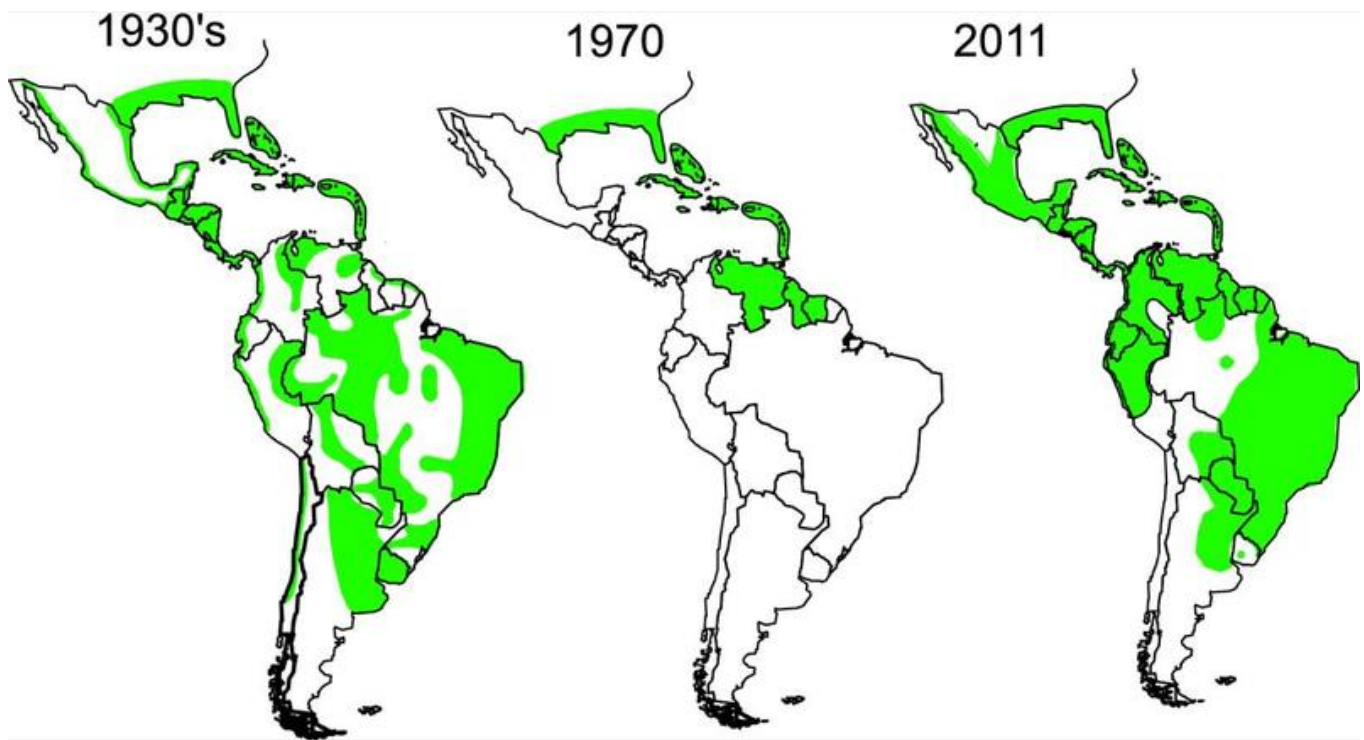
Not to anthropomorphize too much, but these bugs are sneaky.

Was it ever really possible, then, to eliminate these domesticated insects from our homes? Peter Hotez, the dean of the National School of Tropical Medicine at Baylor School of Medicine, says a better American eradication campaign could have been "a game changer." But most of the infectious disease specialists I asked about the eradication program believed that *A. aegypti*

would have survived, anyways—a thought shared by the head of the Centers for Disease Control, David Sencer, during the '60s. Paul Reiter, a leading medical entomologist, once called mosquito eradication one of the “great myths of science.”

“Whether they achieved true eradication or not—and perhaps there were places they actually did—clearly they knocked it back, pretty substantially,” says Tabachnick. But even that had required years of work and a huge investment. To keep mosquitoes from returning to areas of eradication would require keeping up the same level of vigilance, for as long as *A. aegypti* lived in the world. But that’s not how politicians think: once the problem disappears, why spend money on it?

When people who worked for decades to eradicate *A. aegypti* started retiring, they weren’t replaced. “The governments sat back and said, well, *Aedes aegypti* is gone. That’s a problem solved,” says Halstead, the mosquito-borne virus expert. “Everyone just let down their guard.” Another infectious disease stalwart, Philip Russell, who directed the Walter Reed Army Institute of Research, remembers going to policy meetings in the late 1970s where Brazil was still pushing eradication, with no success. “The Brazilians were pounding on the table to continue the eradication campaign, and the U.S. was saying, nope, can’t do it, not going to do it, forget it,” he says. Soon, meetings on pan-American public health would involve maps of Brazil showing how fast *Aedes aegypti* was moving back into previously eradicated territory, taking back hundreds of miles, month after month.



The resurgence of A. aegypti. (Image: Duane Gubler, Tropical Medicine and Health)

Today, the mosquito has taken over more of the Americans than ever before, in cities that have grown enormously. The metropolitan area of Rio de Janeiro is now home to more than 13 million people. Airplanes move disease across continents. More than ever before, the human world is a dream for mosquitos. Since the 1970s, disposable plastic containers and other bits of mosquito-ready trash have multiplied.

Like the monsters in any good horror movie, A.aegypti are getting better and stronger. One scientist found a population that had survived four winters underground in Washington, D.C. A couple of scientists at the University of Washington are collecting evidence that A. aegypti can learn—and that they may be “more sophisticated, individually complex, and formidable than anyone imagined,” according to *The Stranger*. If humanity ever had a chance of tossing *Aedes aegypti* out of our cast of domesticated creatures, it’s gone now. We’re stuck with them.

Back it, join it



SOUTH AFRICA'S decision to stomp out of the International Criminal Court (ICC) is deplorable. It is inconceivable that Nelson Mandela would have done such a thing. Virtually all right-thinking liberals and lawyers in his country have condemned the move. In the name of standing up against the supposed anti-African bias of the court, South Africa has aligned itself with the autocrats of the continent and given succour to those who have committed appalling human-rights abuses. Its announcement on October 21st followed that of Burundi, which is under "preliminary examination" by the ICC for its president's bloody suppression of dissent; the Gambia, another nasty regime, followed suit this week. It would be tragic if South Africa set in motion a domino effect that prompted ever more African countries to leave the court. A wave of withdrawals would reverse the progress towards greater rule of law across the continent and beyond.

The charge of anti-African bias laid against the court, mainly by a clutch of governments whose leaders are vulnerable to its vigilance, is understandable—but wrong. True, eight of the nine countries about which cases have been heard, or are under way, are African. And all those so far convicted have been African. But that is because African governments, mindful of the horrors of apartheid and the genocide in Rwanda, have been keenest to sign up to the court and have actively initiated cases. Indeed, most of the ICC's cases were referred to it by African

governments themselves, while two (Libya and Sudan) were brought by the UN Security Council. The only exceptions to this pattern involve Kenya. The ICC indicted the current president and deputy president after at least 1,300 people were killed in post-election violence in early 2008. It was Kofi Annan, the UN's former head, a Ghanaian, who recommended that the ICC bring charges. After the cases against President Uhuru Kenyatta and his deputy were dropped a year ago, the court issued a "finding of non-co-operation", a polite term that included accusations of witness-tampering.

Jacob Zuma, South Africa's dire president, has already tarnished his country's reputation as a beacon of morality by his own entanglements with the law at home. Now he has added to the damage by disdaining the ICC abroad. He thinks it should, among other things, grant immunity to incumbent leaders. Leaving the international court may, Mr Zuma hopes, make it easier for him to fend off the remonstrations of his own courts, which may yet punish him for inviting Sudan's president, Omar al-Bashir, to cosy meetings in South Africa, despite his indictment by the ICC for mass murder in Darfur.

African leaders who seek to play the populist, anti-Western card to fend off the long arm of the law, whether domestic or international, are—so far, at least—the minority. They belong to the bad old Africa of the past. The good Africa, still happily in the ascendant, has rallied to the ICC. All the same, the ICC and its admirable chief prosecutor, Fatou Bensouda (a Gambian woman), do need to reassure African countries that it is impartial. Even governments that take human rights seriously jib at the way non-Africans seem to get away with murder.

Syria, a non-signatory along with most Arab countries, should obviously be in the ICC's sights, but Russia would block its referral in the UN Security Council. Last year's addition of Georgia to the list of places where war crimes are being investigated was timely. Of the ten other countries where "preliminary examinations" are under way but not yet close to a trial, half are outside Africa, namely Afghanistan, Colombia, Iraq, Palestine and Ukraine. It would be better still if big countries signed up to the court. But the United States has refused to do so, as have Russia and China.

The wheels of justice move slowly

International justice is plainly imperfect, but is worth pursuing. Patience is in order. Tribunals for Yugoslavia, Rwanda and Sierra Leone, whose experience led to the creation of the ICC's permanent court, all took time to bear fruit. The ICC, though underfunded, has begun to speed up, and has established important new principles, including convictions for rape and destroying historic monuments in conflict, both now deemed potential war crimes. In any event, the ICC's purpose is to bring justice to voiceless victims, not to let the powerful off the hook, be they from Africa or any other part of the world.

'Smart' home devices used as weapons in website attack



Net-connected cameras are helping attackers in large-scale attacks

Hackers used internet-connected home devices, such as CCTV cameras and printers, to attack popular websites on Friday, security analysts say.

Twitter, Spotify, and Reddit were among the sites taken offline on Friday.

Each uses a company called Dyn, which was the target of the attack, to direct users to its website.

Security analysts now believe the attack used the "internet of things" - web-connected home devices - to launch the assault.

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Media captionTechnology explained: What is the internet of things?

Dyn is a DNS service - an internet "phone book" which directs users to the internet address where the website is stored. Such services are a crucial part of web infrastructure.

On Friday, it came under attack - a distributed denial of service (DDoS) - which relies on thousands of machines sending co-ordinated messages to overwhelm the service.

The "global event" involved "tens of millions" of internet addresses.

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Media captionEXPLAINED: What is a DDoS attack?

Security firm Flashpoint said it had confirmed that the attack used "botnets" infected with the "Mirai" malware.

Many of the devices involved come from Chinese manufacturers, with easy-to-guess usernames and passwords that cannot be changed by the user - a vulnerability which the malware exploits.

"Mirai scours the Web for IoT (Internet of Things) devices protected by little more than factory-default usernames and passwords," explained cybersecurity expert Brian Krebs, "and then enlists the devices in attacks that hurl junk traffic at an online target until it can no longer accommodate legitimate visitors or users."

The owner of the device would generally have no way of knowing that it had been compromised to use in an attack, he wrote.

Mr Krebs is intimately familiar with this type of incident, after his website was targeted by a similar assault in September, in one of the biggest web attacks ever seen.

Have hackers turned my printer into an offensive weapon?

Do smart devices mean dumb security?

Media affected by attack - Leo Kelion, technology desk editor

It has emerged that the BBC's website was also briefly caught up in Friday's attack. The BBC is not a customer of Dyn itself, but it does use third-party services that rely on the domain name system hosting facilities provided by Dyn.

I understand that these include Amazon Web Services - the retail giant's cloud computing division - and Fastly - a San Francisco-based firm that helps optimise page download times.

Both companies have acknowledged being disrupted by the DDoS assault. Only some BBC users, in certain locations, would have experienced problems and they did not last long.

But there are reports that other leading media providers also experienced similar disruption.

It serves as a reminder that despite the internet being a hugely robust communications system, there are still some pinch points that mean a targeted attack can cause widespread damage.

The incidents mark a change in tactics for online attackers.

DDoS attacks are typically aimed at a single website. Friday's attack on Dyn, which acts as a directory service for huge numbers of firms, affected several of the world's most popular websites at once.

The use of internet-connected home devices to send the attacking messages is also a relatively new phenomenon, but may become more common.

The Mirai software used in these attacks was released publicly in September - which means anyone with the skill could build their own attacking botnet.



Any number of home devices could be used in such attacks - so long as they're connected to the internet

On social media, many researchers and analysts expressed frustration with the security gap being exploited by attackers.

"Today we answered the question 'what would happen if we connected a vast number of cheap, crummy embedded devices to broadband networks?'" wrote Matthew Green, an assistant professor at the Johns Hopkins Information Security Institute.

Jeff Jarmoc, head of security for global business service Salesforce, pointed out that internet infrastructure is supposed to be more robust.

"In a relatively short time we've taken a system built to resist destruction by nuclear weapons and made it vulnerable to toasters," he tweeted.

'Black Mirror' Is Back, Reflecting Our Technological Fears



In the new season of Black Mirror, Bryce Dallas Howard plays a young woman in a future just a little ahead of our own, where everyone uses a smartphone to rate the people they encounter.

David Dettmann/Netflix

It's tough to find a more bubbly, positive person than Lacie Pound.

She always has a kind word for the baristas and café workers who serve her morning coffee. She drinks a smoothie offered by a co-worker even when it doesn't taste so good. And she's determined to give an award-winning toast as the maid of honor at her oldest friend's wedding.

Lacie, played by Jurassic World co-star Bryce Dallas Howard, is the central character in "Nosedive" — a new episode in the third season of the British anthology drama, Black Mirror, which debuts on Netflix today.

In Lacie's world, set in a future just a little ahead of our own, everyone uses a smartphone to rate everyone else they encounter, using a scale of one-to-five stars. It's like getting an Uber review for every social interaction in your life.

Good ratings produce a percolating, electronic sound, like nailing the high score on a Super Mario Bros. game. And people who have high personal scores get lots of perks, as Lacie learns from a realtor at a high-end condo complex.

"You know our Prime Influencers program?" the realtor asks.

"Do I qualify for that?" Lacie asks hopefully.

"No," the realtor answers curtly. "No. You don't. We'd need you around a 4.5 ... hit 4.5 and there's a 20 percent discount."

The problem is that Lacie's at a 4.2. And the plan she hatches to get to 4.5 only highlights the punishing, unhealthy environment of living in a status-conscious world where the slightest sign of unhappiness can cost you dearly.

It's a place where looking happy and successful is more important than actually feeling that way. And it's a perceptive yet oblique commentary on the spaces we create like that in real life (yes, Facebook, we're kinda talking about you). This is where Black Mirror excels, like The Twilight Zone for the modern media age.

As an anthology show, every episode stands alone; a new story with new characters. This new season offers six different stories centered on technology — from virtual reality video games to online surveillance — with telling plot twists that redefine and deepen each narrative toward the end.

The stars range from Howard and Malachi Kirby (Roots), to Gugu Mbatha-Raw, Cherry Jones and Alice Eve. And even though the show began on British television, this season is exclusive to Netflix, featuring more American settings and characters.

One episode, "Shut Up and Dance," shows various people blackmailed by hackers who hold devastating information on each person. The victims get text messages pushing them to commit increasingly desperate acts, including a young man who was captured on video in a sensitive act, alone in his bedroom.

"They filmed me ... though my computer camera ... you know, doing it," he says, telling another hapless hacking victim with whom he has been forced to work on a shocking task. "They're going to put it everywhere ... they're going to send it to everyone." You might think that's bad, but not the worst thing to have on video. But the episode's final twist puts his actions in a new, more sinister light.

Black Mirror won a 2014 Peabody Award for the way it taps modern anxieties and obsessions about technology in smart, compelling episodes. Creator Charlie Brooker, a former columnist for The Guardian newspaper and writer for several satirical English TV shows, was even credited for predicting the candidacy of Donald Trump.

That was courtesy of a 2013 episode called "The Waldo Moment," in which an insulting, yet popular TV cartoon bear nearly wins an election with populist rhetoric that skewers traditional politicians.

Anthology series are difficult beasts. There's no continuing cast for viewers to bond with; every episode has to earn your attention with new characters and a new story.

This season's batch of Black Mirror episodes are more consistently compelling than ever. It's tough to say exactly why, because so much of the shocking energy in each episode comes from plot twists it would be criminal to reveal in advance.

But Brooker and his collaborators have raised their game this season, aided by the bigger budgets and creative leeway of Netflix. The result is a half-dozen new episodes which poke at our dependence on and fascination with technology in bold new ways.



Under the Macroscopic is a weekly summary of what's happening around the world and what's worth pondering. Stay on top of international and local news with this bulletin produced by the Raffles Economics and Current Affairs Society.

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