

Downside Up

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What if we got rid of all mosquitoes?



Speakers

Chris Cillizza, Tanya Latty, Lawrence Reeves, Clio from The Lion King, Clip from Jurassic Park, Clip from a 1946 Commerical, Clip from The Bee Movie, Allison Cobb

00:00:03

Chris Cillizza

The sun is setting. You're sitting in your backyard, huddled around the grill and having a beer with your buddies when suddenly you start to get the wrong kind of buzz. It starts with just one. A mosquito flies around your head, lands in your arm, and you swat it before it can do any damage. You grab a bottle of repellent, you go full deet and start spraying yourself all over while your friend hastily lights citronella candles. You hold your breath. Maybe you'll be okay. But then they're everywhere. Everyone is swatting at the sky, spilling their drinks, darting toward the house. You're pretty sure you're able to get them all before they got you. But already your legs are starting to itch. And he can't help but think to yourself "Damn these mosquitoes! Why can't we just kill them all?" Well, what if we could? What would happen?

00:00:57

Chris Cillizza

I'm Chris Cillizza. And you're listening to Downside Up, a podcast from CNN that searches for answers to some of the world's big what if questions. This week we're asking what would happen if we eliminated all the mosquitoes in the world. So join us as we turn our ecosystems downside up.

00:01:18

Chris Cillizza

Most people don't like bugs. Sure, butterflies are pretty and some of us may like honeybees because of that sweet stuff they make. And there are a few other exceptions. But for mosquitoes, wasps, flies, centipedes and other things with lots of legs. No, thanks. But when you start to ask questions about mosquitoes, you quickly find yourself speaking with people who are obsessed with insects. People like Dr. Tanya Latty, an insect ecologist at the University of Sydney in Australia.

00:01:46

Tanya Latty

I mean, in general, I think it's sort of an unfortunate reality that Western culture in particular tends to associate insects with disease and with decay and rot. And those associations go really deep. And so when we see something covered in flies, we start thinking, Oh my gosh, that's horrible. That's gross. That's going to make me sick. As opposed to thinking that- that's nature recycling waste. That's how we take dying something and put that back into the soil so you can have flowers and all the things that we like. Insects are amazing. First of all, they are ultra diverse. So there are millions of species of insects. There are so many species of insects on the planet that we don't actually even know how many there are. We have named about a million, but we reckon that that's maybe 20% of the actual number of insects on the planet. So insects make up more than 75% of animal life. They are by far the biggest group of critters of animals on the planet. And they do all the things our pollination, our waste management, they're food for all the three things and flappy things that people tend to like. I don't understand why everyone doesn't love insects.

00:02:52

Chris Cillizza

So why do you think, and this is more of a psychological question than a scientific one, but why do insects- why do they get such a bad rap? There aren't a lot of people who are like, yes, mosquitoes. They're great. What? Why is that?

00:03:04

Tanya Latty

I think our dislike of mosquitoes is kind of legit. I mean, some species do bite us. That's uncomfortable. We can get itchy from them. And unfortunately, mosquitoes are historically one of our biggest enemies. Mosquitoes kill more people than any other animals on the planet, not directly, but because of the diseases they vector, things like malaria and dengue fever and Zika, yellow fever, a whole range of diseases. So I think our dislike of mosquitoes is kind of legitimate. It's unfortunate that that dislike spreads to kind of all the insects out there.

00:03:37

Chris Cillizza

Now is probably a good time to warn you you're going to hear some gross things in this episode. Brace yourself for terms like blood meal and some scientific phrases like vector pathogens. When you hear our guest say things like mosquitoes vector diseases or mosquitoes vector pathogens, it's basically just a fancy sciencey way of saying mosquitoes transmit diseases. But that's not something every mosquito does, actually. Most mosquitoes don't even drink human blood.

00:04:06

Tanya Latty

Only a tiny chunk of them really do even bite humans. There's about 3500 mosquito species in the world. Most of those are blood feeders when they need to develop their eggs. So the reason a mosquito bites you- it's always a female that bites you. And she bites because she needs the protein from our blood to help her mature her eggs for the rest of her life when she's not reproductive, she feeds on plant nectars and males are vegetarian, they're always drinking plant nectar.

00:04:33

Chris Cillizza

Let that sink in for a minute. Mosquitoes, the animal synonymous with sucking our blood are actually vegetarian. Only the females drink our blood and they only do it to help with reproduction. And they don't necessarily even have to drink human blood.

00:04:49

Tanya Latty

Once they're ready to take a blood meal, mosquitoes depending on the species, may prefer blood from a particular mammal species. They may prefer from birds. Some even feed on things like reptiles. But roughly 6% of them will bite humans. And of that 6%, maybe half of them actually carry disease. So we kind of make a distinction between the species that bite, which we call nuisance biters, and they're annoying but don't spread diseases and the ones that bite us are actually a medical threat potentially.

00:05:16

Chris Cillizza

I know nuisance spiders may be a literal pain in the butt when you're trying to grill burgers in your backyard. But I think that's an important point that we need to highlight of all the mosquitoes in the world, only about 3% of them transmit diseases to humans. But let's be clear that 3% does a lot of damage. Diseases spread by mosquitoes have killed more human beings than all the wars in history combined. They may be small, but they're mankind's biggest predator.

00:05:48

Tanya Latty

Malaria is a really nasty disease. It still kills half a million people every year. Most of those are kids under the age of five. That's terrible. This untold amounts to human suffering, and so it's hard to weigh those things up. I think when we think of what we want to do going forward, it's finding ways to reduce that disease burden without causing huge amounts of environmental damage because that comes back on us in the end anyway.

00:06:12

Chris Cillizza

All right. So I want to go even further, because the episode is aimed at, you know, what would it mean if we got rid of all mosquitoes. And I want you to, you know, from your expertise, even though 90 plus percent aren't the ones that bite us. If I walk down the street of the United States, any city in the United States, I said, would you, you know, Thanos going to snap my fingers and get rid of get rid of all mosquitoes. Would you do it? Most people would say yes. Would you say yes?

00:06:39

Tanya Latty

Oh, no.

00:06:40

Chris Cillizza

Because you you you know a lot more about this subject than 99.99% of the people who I would ask on the street in in say where I live in Northern Virginia.

00:06:49

Tanya Latty

Look, I mean, as I said, most of the species are not going to be the ones that vector disease. So getting rid of them ethically feels very uncomfortable and wrong. We shouldn't be knocking out species just because they're related to a species that causes that. I think that's not a great approach to management. I also think that there's a lot of unknowns about what would happen if we remove all mosquitoes from the ecosystem. So they are a major food source for some animals. The question is, if those mosquitoes disappeared with those animals, be able to switch to another food source? I don't really know. Probably, but maybe not. So it's hard to say.

00:07:26

Tanya Latty

There's also all these very subtle things mosquitoes do in the environment. So in places that have very high numbers of mosquitoes, their presence changes where animals will actually forage. So large herbivores may avoid areas that have very high amounts of mosquitoes at particular times of the day. And that means there's less pressure on the plants from getting constantly browsed. If we took all mosquitoes out of that system, what would happen with those plants get overgrazed and disappear or without nature find a new balance? Again, we don't know. So I'm very uncomfortable with that number of unknowns. You know, nature is complex. We don't know that much about it, really. But the reason I'm like that is, again, a lot of people die from mosquito vector diseases, often in poorer countries and often children. I don't think any reasonable human would be like, Oh, we want that to continue. That's horrible. That's one thing if we want to change if we can so it's an impossible choice.

00:08:22

Chris Cillizza

One thing that surprised me when putting together this episode is that we don't really know the extent of what mosquitoes do for and in the world. So we're taking a little bit of a stab in the dark here. If we killed all the mosquitoes, yes, we'd stop the spread of a lot of diseases. But there could also be unknown consequences to the environment. Best case scenario, some animals have to find new food sources, and some plants have to rely on other pollinators. Worst case scenario? Well, we don't exactly know. We know mosquitoes play some role in their ecosystems, as Dr. Latty just described. But scientists have spent so much of their time focused on the bad things mosquitoes do, like spread disease, that there hasn't been a ton of research on the ways they may benefit their ecosystems. I asked Dr. Latty if she had a theory as to why that is.

00:09:12

Tanya Latty

I think there's a few reasons. They're small. I feel like humans tend to focus on the big things and we tend to focus on things that at least we can kind of see ourselves in, you know, big eyes and very bodies and just things that, they don't look human, but there's something we're familiar with. They're not alien, whereas insects, they've got lots away. Some of them move in erratic and strange ways. They're often too small for us to notice. And so we just kind of ignore them. Even though they're everywhere. In almost every environment that humans are in, we still tend to ignore them, which is unfortunate and it's no different with mosquitoes. We are hyper focused on the species that cause disease, and I mean, there's good reasons for that, but it does mean that we tend to neglect all the other species that are doing other roles. The extent that we're not entirely sure what they do.

00:09:58

Chris Cillizza

It takes a certain kind of person to dedicate their life to tiny bloodsuckers. A person like Dr. Lawrence Reeves, who runs a lab at the University of Florida dedicated exclusively to mosquitoes. Dr. Reeves is unlike anyone I've ever met. He'll stand in swamps for hours just trying to get the perfect photo of a mosquito. And he actually became interested in mosquitoes because one gave him dengue fever.

00:10:25

Lawrence Reeves

I was in the Philippines studying butterflies and moths when I was bitten by an aedes aegypti mosquito that would have been infected with the dengue virus. And that was one of the events that really put mosquitoes onto my radar and helped me to kind of have firsthand experience recognizing the importance and the potential impacts of mosquitoes. I was kind of surprised to learn that we know almost nothing about the broader mosquito diversity that's out there. So I like mosquitoes and I study mosquitoes because there's just so much to learn about this very important group that interacts very profoundly with ecosystems and biodiversity more broadly.

- Chris Cillizza** 00:11:00 Biodiversity is another sciency term that just means the variety of plant and animal species in a given habitat. Any time we eliminate a species or let's say all 3600 known species of mosquito, that has an impact on the other species that interact with them.
- Lawrence Reeves** 00:11:18 So if you've ever been to the Everglades or up to northern Minnesota in the summertime, there are just swarms of mosquitoes, and they are likely the most abundant insects that are in these systems. And so if we were to knock out the most abundant species there, we might be knocking down pollination. You can think of mosquitoes a little bit as sea turtles. So people like to throw around this idea that sea turtles, when a female sea turtle lays her eggs, only one or maybe two of those baby sea turtles is going to survive to adulthood. That's the case also for mosquitoes. Mosquitoes have tons of predators out there. There are a lot of organisms that would love to snap up a mosquito larva or an adult mosquito. And so, again, in these systems where mosquitoes are super abundant, they are certainly serving as meals for many of these animals in these systems. And, of course, they're not going to serve as dinner for a large mouth bass, but they will be the dinner of the smaller fish that the largemouth bass needs to eat in order to grow.
- Chris Cillizza** 00:12:14 I'll admit it. I'm going to have a hard time thinking of mosquitoes like sea turtles. Everyone loves turtles. But it's an interesting idea that we shouldn't kill all the mosquitoes because we need to keep them alive in order for other animals to kill them and eat them. To put it in terms you may recognize from The Lion King:
- Clio from The Lion King** 00:12:32 Everything you see exists together in a delicate balance. And so we are all connected in the great circle of life.
- Chris Cillizza** 00:12:43 But some of Dr. Reeves's arguments in favor of mosquitoes are a little more unconventional. Those female mosquitoes that drink our blood and give us diseases, he actually says they're victims here, too.
- Lawrence Reeves** 00:12:54 Mosquitoes don't want to vector these pathogens. These pathogens kind of take advantage of this system, like the need for these female mosquitoes to take blood meals from vertebrate animals in order to develop their eggs. And in some cases, these pathogens can make the mosquitoes themselves sick or they can have fitness costs for the mosquitoes. So the mosquitoes are kind of not so much willing participants in all of this. They just want to get their blood meal and move on. They don't think about moving pathogens from one animal to another or anything like that.
- Chris Cillizza** 00:13:23 It's so funny because we blame them for everything, but in some ways they're blameless. The female mosquitoes are just trying to get what they need to lay their eggs.
- Lawrence Reeves** 00:13:31 Mosquitoes are just trying to be good mothers. They risk their lives like it's dangerous for a mosquito to interact with the host. So they are essentially risking their lives for their children.
- Chris Cillizza** 00:13:41 That's an interesting argument. But it sure would be nice to be able to go for a jog in the evening without getting swarmed by mosquitoes or to travel without worrying that we're going to bring home malaria or dengue fever, especially for a little bug that may not actually do all that much for the world. So what if we decided to just throw caution to the wind and kill all the mosquitoes on the planet? How would we do it? After the break, Dr. Latty and Dr. Reeves offer suggestions for how they would eliminate the bugs that they love and they give us a cautionary tale of what happened the last time Americans tried to wipe out mosquitoes.
- Chris Cillizza** 00:14:31 Welcome back to Downside Up. I'm Chris Cillizza. And today, I'm trying to understand what would happen if we killed every last mosquito on earth. Dr. Tanya Latty loves bugs and mosquitoes, but that doesn't mean she hasn't thought about ways to kill them. And this first approach sounds like something straight out of a sci fi movie. Basically, we modify the genes of male mosquitoes in order to kill the females.

00:14:56

Tanya Latty

There's at least one company working on a genetically modified mosquito. And the way that works is that the males carry a gene that is lethal in their female offspring. So that male goes out, he meets with a wild female, she lays her eggs as normally the male offspring mature, but the females all die before they reach adulthood. And so, in theory, that will drive populations down over time.

00:15:19

Chris Cillizza

You still have a lot of males, but they just wouldn't be biting you.

00:15:22

Tanya Latty

Well, eventually, if you have no females, though, you don't have anybody. But it's unclear if that would work in the long run. I mean, pull a Jurassic Park here, that means your finds away.

00:15:31

Clip from Jurassic Park

If there's one thing the history of evolution has taught us is that life will not be contained. Life breaks free, it expands to new territories, and it crashes through barriers painfully, maybe even dangerously. But, uh well...there it is. Life, uh, finds a way.

00:15:49

Tanya Latty

Animals are very good at evolving around our solutions, and so whether that would ultimately result in that mosquito being wiped out, I doubt it.

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Chris Cillizza

I know that's all a little bit sciencey. I get it. But essentially what we'd be doing is forcing mosquitoes to mate themselves to death, which is admittedly pretty morbid. A more humane approach may be to not actually kill the mosquitoes, but just to eliminate the diseases they carry. We'll still need our screened-in porches to keep out the nuisance biters, but we wouldn't have to worry about them giving us a deadly illness.

00:16:21

Tanya Latty

So there's a program in some parts of the world using a bacteria called Wolbachia. Wolbachia is a bacteria naturally found in lots of different insects and in mosquitoes, it has this weird side effect that when a mosquito is infected by this particular type of Wolbachia, the bacteria out-competes the viruses. And so the mosquito becomes a kind of bad vector of those viruses. And so there's programs releasing Wolbachia-infected mosquitoes in the hopes that kind of prevent the mosquitoes from transmitting the disease. And as an ecologist, I kind of feel those sorts of approaches are what we want to do. We're getting rid of the disease, not the animal that's vectoring the disease.

00:16:59

Chris Cillizza

One solution we haven't talked about yet is insecticide. Many of us have sprayed our homes for bugs like ants and cockroaches and wasps and things like that. So could we try that approach to mosquitoes, too? Well, in the first half of the 20th century, we tried to kill all the mosquitoes in the US that carried malaria, and the results to that were mixed, to say the least.

00:17:21

Tanya Latty

So the U.S. had malaria at one point, so not naturally, but it was brought in. Two types of malaria were brought into the U.S., one form from Britain with British settlers. The other came in from Africa via enslaved people. And so those two types of malaria that established and became a problem in the southern U.S. and it was a very concerted effort in the forties to eliminate that particular mosquito from the United States using DDT, which at the time was all the rage, but the combination of using that insecticide and managing wetlands and unfortunately draining a lot of wetlands, it was kind of a very crude way of doing it, but it works. Except that now malaria isn't endemic in the US anymore.

00:18:01

Chris Cillizza

We've virtually wiped out malaria in the United States. That's the good news. The bad news: well, let's just say there's a reason we don't use DDT anymore.

00:18:10

Tanya Latty

Before the 1930s-ish, most of the insecticides on the market were toxic to mammals as well, that's us. And so DDT in the late thirties, it was sort of discovered that DDT actually was an insecticide and it targets a part of the insect nervous system that means it's specific to arthropods. So things like insects and to a lesser extent, crustaceans and other critters. So you could use DDT and it wouldn't kill you or make you particularly sick, at least not immediately, as far as we know. But it would have a negative impact on the insects. It would knock them out very quickly. I mean, there's really kind of scary old funny videos of people saying just drinking DDT to show how safe it was. Do not do that. I feel like that's a bad idea. But they survive. And compared to like all the insecticides before that, it was a huge benefit.

00:19:04

Chris Cillizza

We tracked down some of these videos and they're truly bizarre. There's footage of kids just being doused with fire hoses of DDT. It was everywhere and people put it on everything.

00:19:15

Clip from a 1946 Commercial

With the war-discovered DDT and special sprayers, sections of the city are blanketed with the insecticide and the fight to stop the spread of the dread poliomyelitis. Every suspected spot is sprayed.

00:19:29

Chris Cillizza

We weren't just targeting malaria and mosquitoes either. We thought DDT would eradicate body lice, polio, typhus and other illnesses, and a lot of those things were wiped out. But then we started to understand the consequences.

00:19:42

Tanya Latty

Unfortunately, DDT has a number of traits that make it really nasty environmentally. One is that it concentrates up the food chain. So you may spray a little bit of it that gets in the water and gets taken up by teeny tiny little crustaceans, then get eaten by a fish which gets eaten by a bigger fish. Each of those steps is getting more and more concentrated doses of DDT. So by the time you get to top predators like in the US, things like bald eagles, they're getting pretty big doses compared to what was sprayed in the environment and that started to have an impact on their ability to reproduce in birds.

00:20:15

Chris Cillizza

At one point, the bald eagle, our national bird and one of the most iconic animals in North America was on the verge of extinction because of the widespread use of DDT.

00:20:25

Tanya Latty

It's also a broad spectrum, so it kills basically all insects. It doesn't discriminate. It doesn't target anything in particular. It can last a long time. So it tends to hang around in the environment for longer than we would like. And so all of those things in the end meant that DDT was essentially too environmentally damaging to continue using. Most places, as far as I know, stopped using it well before the nineties and 2004, I think in the Stockholm Convention was sort of a big global ban on the agricultural use of DDT, although it's still, in some places, allowed emergency use for vector control of things like malarial mosquitoes and outbreak situations.

00:21:01

Chris Cillizza

Maybe we'll have better luck with options like gene editing or the use of bacteria. But the story of DDT offers a real warning. If we were to kill all mosquitoes, yes, we might eradicate some diseases that are deadly to humans. But the collateral damage to other species might also be devastating. We don't know exactly every role that mosquitoes play in the environment, but we know some animals rely on them as a food source and some plants need them as a source of pollination. And we know that steps for individual protection also work.

00:21:34

Tanya Latty

As individuals, we can do all the things to just prevent ourselves from getting bitten. And that's everything from using repellents, so things that have deet or picaridin in particular, are pretty great at repelling mosquitoes and can be used by a lot of people. There's mechanical disruption, so just literally wearing a mosquito net, you can sleep under bed nets in tropical countries. There's all sorts of ways of just preventing those mistakes from biting you. And all of those are just part of the big picture of how we deal with mosquitoes and mosquito borne illness.

00:22:03

Chris Cillizza

The solutions we have to protect ourselves today definitely aren't perfect. I still get bit even when I cover myself in deet, and I definitely do dream about a day when I can hang out in my backyard without the constant buzzing of bugs in my ear. But the biggest threat mosquitoes pose to our world is the spread of disease. And we're getting closer and closer to solutions that could stop the spread of malaria. We just have to be careful. We don't knock out other species we like in that process. And in the meantime, we can keep a can of bug spray nearby or be prepared to put up with a whole lot of swatting and slapping.

00:22:48

Chris Cillizza

And now it's time for Dr. Lawrence Reeves to join us for our weekly round of trivia.

00:22:56

Chris Cillizza

This is not outside your expertise. I do this beforehand and I don't look at the answers because, you know, that would be cheating. And I usually get two of these right. So if you get two, you're smarter than me. All right. So are you ready?

00:23:08

Lawrence Reeves

Yes.

00:23:08

Chris Cillizza

All right. Here we go. The word mosquito first appeared sometime in the 1500s. It's a Spanish word meaning what in English? What does mosquito mean in English?

00:23:19

Lawrence Reeves

Little fly.

00:23:21

Chris Cillizza

This is too easy for you. You didn't- he didn't even pause. He just- he knew that right off the bat. Okay. One for one. In the 1993 film Jurassic Park, which, by the way, I just watched with my kids, it still holds up, in the 1993 film Jurassic Park, scientists are able to clone dinosaurs because their blood was found in mosquitoes that had been fossilized in this precious gemstone name the stone, which is actually a form of fossilized tree resin.

00:23:48

Lawrence Reeves

Amber.

00:23:51

Chris Cillizza

If you don't remember the movie. Basically it went like this: mosquitoes bit dinosaurs and then got stuck in tree sap. Over time, they were fossilized in little golden stones of amber, and then doctors pulled those mosquitoes out and voila: dinosaur DNA. I had to ask, is that at all possible?

00:24:11

Lawrence Reeves

Unfortunately, probably not. But, so if you don't mind, I'll get I'll give a quick Jurassic Park spiel. When I was a kid, I was the biggest nerd for that movie, and I would not be doing what I do now if it were not for that for a Jurassic Park. When I was a graduate student and I learned of-learned about this thing called blood meal analysis, that was my spark and light bulb turning on. So- so one of the things I do is I go out and I collect blood-fed mosquitoes and I extract DNA from their blood meals to learn what those mosquitoes had fed from. So, like I mentioned, each mosquito species feeds from different kinds of animals. If we learn about what each mosquito species feeds from, we can see how, how pathogens might move through ecosystems. We can also use it to detect vertebrate animals in a complex landscape so we could go out to the rainforest, collect mosquitoes, and from their blood meals, we could look at the DNA that's there and have a snapshot of the vertebrate species that occur in that rainforest.

00:25:07

Chris Cillizza

And also bring back dinosaurs.

00:25:09

Lawrence Reeves

I mean, I wish it were possible. It does not seem like DNA has holds up that well. There are some paleontologists that think it's just a matter of finding the right bone, though.

00:25:19

Clip from Jurassic Park

Hold on to your butts.

00:25:20

Chris Cillizza

Oh, man. I love it. Okay, you're two for two with extra credit for an amazing Jurassic Park sidebar. Okay, third question. During World War II, one country studied the potential for using malarial mosquitoes as a biological weapon. What country did that?

00:25:38

Lawrence Reeves

I don't know that one. I'm going to say Germany, but it's probably the United States.

Chris Cillizza 00:25:43
It's Germany. Three for three, good guess.

Lawrence Reeves 00:25:47
Oh man. Thanks.

Chris Cillizza 00:25:47
He's hot today, folks. Okay, question number four. This cocktail was invented in the 1700s by British Army officers as a way to encourage troops to drink quinine, which was thought to be an effective anti-malarial medication. Name the drink which is now one of the most popular cocktails in the world.

Lawrence Reeves 00:26:06
Gin and tonic.

Chris Cillizza 00:26:08
Correct. And this is a fun fact. Most tonic water that is in gin and tonics today does not, in fact, have enough quinine to actually ward off mosquitoes. So you don't get the added bonus there when you order G&T at the bar. Okay, last one. As we've talked about, mosquitoes don't get a lot of positive publicity in a lot of movies. But one rare example of a Hollywood star voicing a mosquito comes in the 2007 DreamWorks film "Bee Movie." A mosquito named MooseBlood is played by this stand up comedian and actor.

Clip from The Bee Movie 00:26:35
Trouble? You're a mosquito, you in trouble. Nobody likes you, they just all smacking. People see a mosquito? Smack smack.

Lawrence Reeves 00:26:40
Chris Rock.

Chris Cillizza 00:26:44
Oh! 5 for 5! Well done. Of course, I'll note here that we learned today that only female mosquitoes drink blood. So having a male as the mosquito drinking blood is not scientifically accurate. But I mean, that's just me. Congratulations to Dr. Lawrence Reeves. The first DownsideUp guest to go five for five in our weekly trivia. And thank you to Dr. Tanya Latty for joining us today as well.

Chris Cillizza 00:27:14
As much as I may hate mosquitoes, it sounds like any effort to eliminate them could have terrible and unknown consequences on everything else. Yes, we might be able to wipe out some diseases that are deadly to humans, but we don't know the full extent of what we lose in the process. Thankfully, the efforts to target and eliminate mosquito borne diseases sound promising, and scientists are getting closer and closer to a vaccine for malaria, which would go a long way toward reducing the threat mosquitos pose to society. What about you? Would you want a world without mosquitoes, no matter the costs? Shoot me a tweet at Chris C-I-L-L-I-Z-Z-A and let me know your thoughts. And if you've got ideas for future topics, send those to me there too. Also, if you like our show, share it with your friends and make sure you rate review and subscribe.

Chris Cillizza 00:28:01
Next time on Downside Up: What if we had a world without plastic?

Allison Cobb 00:28:05
There's been an estimate that people eat and breathe as much as a credit card's weight of plastic every week. it's like eating a credit card.

Lawrence Reeves 00:28:18
Downside Up is hosted by me, Chris Cillizza It's a production of CNN in collaboration with Pod People. At CNN our Producer is Lori Galarreta and our Executive Producer is Abbie Fentress Swanson. Alexander McCall leads audience strategy for the show. Tameeka Ballance-Kolasny is our Production Manager and Jamus Andrest and Nichole Pesaru designed our artwork.

Chris Cillizza 00:28:38
The team from Pod People includes Rachael Kang, Matt Sav, Aimee Machado, John Hammontree, Madison Lusby, Regina de Heer and Morgane Fouse.

Chris Cillizza 00:28:46
Theme and original music composed by Casey Holford. Additional music came from epidemic sound.

Chris Cillizza 00:28:55
Special thanks to Lindsay Abrams, Fuzz Hogan, Drew Shankman, Lisa Namerow, Jon Dianora, Katie Hinman, Robert Mathers, and Sarina Singh.

