

More That Matters: Mosquito-Borne Diseases

With Jennifer Breaux

Clay (00:01):

Mosquitoes can bring more than just a bite with them. Find out what else on Vax Matters.

Diane (00:14):

So what are mosquitoes infamous for? Aside from the bites, these insects have, have notoriously been disease carriers throughout history, creating epidemics in many areas of the world.

Diane (00:26):

In this episode, research entomologist, Jennifer Breaux, joins us to talk about the disease threat of mosquitoes over the years and whether we still need to be concerned. Thank you so much for taking the time to be on our show today, Jennifer.

Jennifer (00:40):

Thank you for having me. It's gonna be fun.

Diane (00:42):

It's our pleasure. So, okay, let's start from the very beginning. How do mosquitoes become infected with diseases and then transfer them to humans?

Jennifer (00:53):

Great question. Uh, mosquitoes become infected with diseases when they bite an infected individual. That pathogen then enters their body and goes through a development or growth phase inside of that mosquito, that can take anywhere from, roughly, eight to 15 days for that to occur. And then, they transmit it to a new host when they take their next blood meal.

Clay (01:15):

You know, I know that (laughs), I know that, uh, this episode is gonna be so important to people. Because living in Louisiana, mosquitoes are a part of our routine of moving around. It's like traffic and weather.

Diane (01:28):

Yes.

Clay (01:29):

We think about-

Diane (01:29):

(laughs).

Clay (01:30):
... mosquitoes-

Diane (01:30):
Yeah.

Clay (01:31):
... and doing a family function outside. You're working out, if you're doing... Mosquitoes are a big part of that. And a few years ago, West Nile was a big part of our dialogue as it related to mosquitoes, but outside of that, what are some other common diseases that mosquitoes carry?

Jennifer (01:48):
So we have, uh, a global, uh, vector-borne disease burden, um, that accounts for about 17% of all infectious diseases.

Clay (01:57):
Okay.

Jennifer (01:57):
And so, that's not just mosquitoes, but also ticks and other organisms, uh, that are considered vectors, um, with about 700,000 deaths, annually, if you put them all together. Um, here in the United States, uh, we have a lower vector-borne disease and mosquito-borne disease burden, than in other areas of the world, mostly due to, uh, climate and, uh, vector suitability.

Jennifer (02:20):
So, here in the U.S., uh, we have the West Nile virus, absolutely being the most common of the, uh, mosquito-borne diseases.

Clay (02:27):
Mm-hmm.

Jennifer (02:28):
We also have, uh, St. Louis encephalitis, Triple E, also called Eastern equine encephalitis and Western equine encephalitis.

Clay (02:36):
Hm.

Jennifer (02:37):
There is another encephalitic virus that's mostly in the North, um, and Midwest regions called La Crosse encephalitis. So those are, sort of, the big ones here. Um, globally, uh, the ones you're probably more familiar with or that most people have heard of, are dengue, yellow fever, malaria, uh, the Zika virus, which became-

Clay (02:54):
Right.

Jennifer (02:54):
... all over the news-

Clay (02:55):
Mm-hmm.

Jennifer (02:55):
... in, uh-

Clay (02:55):
Right.

Jennifer (02:56):
... 2014, with the outbreak-

Clay (02:57):
Right.

Jennifer (02:57):
... in Brazil.

Clay (02:58):
Yeah.

Jennifer (02:58):
And then a few others that are, uh, less common, overall.

Clay (03:02):
I'd never heard of... The only one in there I never heard of was dengue.

Diane (03:05):
Mm-hmm.

Clay (03:05):
Yes.

Diane (03:05):
Mm-hmm.

Clay (03:07):

What, what... tell... Can you tell us about that one? Well, with that, that one's gonna come up later up in the interview, but, what... Tell us about that. Let's jump to that.

Jennifer (03:13):

Sure. Uh, so dengue is native to the Americas, Asia, and Africa, at this point. It is transmitted, uh, primarily by *Aedes Aegypti*, but *Aedes Albopictus* is now a, uh, global secondary vector. So, dengue is actually the most common mosquito-borne disease in the world. Half the world's population is at risk of dengue, because it has a huge geographic area of occurrence. Uh, luckily only one in 20 develop severe case of dengue, uh, which is called, uh, dengue shock syndrome, or dengue hemorrhage fever. So while, severe illness is not very, very common, uh, it definitely can, can kill you. Uh, it's a very painful, uh, long, febrile illness that causes a lot of joint pain.

Jennifer (03:58):

Um, luckily here in the U.S., we only get about 2,000 cases a year, mostly travel cases. Although, with increasing, uh, climate change, global warming, increased distribution of the vectors, we are starting to see, locally, acquired cases here in the U.S., particularly in Southern Florida. I believe we had about so-, 57 or 58, uh, locally acquired cases in 2022.

Diane (04:22):

And that was in Southern Florida?

Jennifer (04:24):

Mm-hmm, correct.

Diane (04:25):

Hm, not far from home, huh?

Clay (04:27):

I know, right.

Jennifer (04:27):

Not far from home. (laughs).

Clay (04:28):

I can almost, almost-

Diane (04:28):

Yeah.

Clay (04:29):

...hear people locking their doors now.

Diane (04:30):
Well, a- and you know-

Jennifer (04:31):
But that's right.

Diane (04:32):
And the, the, the point that Clay was making, too, you, we know about mosquitoes, they're a part of our life. Or, you know, everything kind of revolves around that, sometimes, in the spring and summer, even into the fall. But you don't realize what damage that they can do to the human body. Now, are there vaccines for some of these or no, or? How, how does that work, Jennifer?

Jennifer (04:54):
There has been a huge push for a very long time to develop effective vaccines for all of these mosquito-borne diseases. Uh, some we've been able to, to make effective vaccines for. Some, we've been trying for years and years and, uh, either the effectiveness wasn't high enough or they just couldn't quite figure out the formulation.

Jennifer (05:14):
So, for dengue in particular, there has been a vaccine, I want to say since 2015 or 2016, but it was not approved for use in the United States until last year. So, the name of that vaccine is Dengvaxia, and it actually has fairly good results. It's about 80% effective in preventing illness.

Diane (05:34):
Wow, that's really good.

Jennifer (05:35):
Uh, it's very good-

Diane (05:36):
Uh-huh.

Jennifer (05:36):
Uh, and in previous versions and different versions of the Dengue vaccine, were not so effective. Um, one, uh, sort of restriction, of taking this vaccine is only available and licensed for 9- to 16-year-olds with clinical evidence of previous infection. So, unfortunately that rules out, um-

Clay (05:54):
Well, I, oh-

Jennifer (05:54):
... a whole lot of people in the U.S.-

Clay (05:55):

Oh.

Jennifer (05:55):

... from being able to take it. (laughs).

Clay (05:57):

Why such a constricted-

Diane (05:58):

Why? Yeah.

Clay (05:58):

... window?

Jennifer (06:01):

So, dengue is one of these viruses that, your first infection is, i- it, you know, it can be bad, and they have statistics to describe that. But your second infection in, uh, is the most... it has the highest threat of being a severe infection, essentially.

Jennifer (06:17):

And so, what they don't want to do, is give somebody the vaccine that will cause that immune response, and then if they do get infected the second time, then it's going to be a much more serious infection. So they're trying to avoid that. So, it's the younger folks that are eligible for this, with clinical evidence of previous infection. That way that, uh, immune system that the vaccine will stimulate, is essentially the second infection, and then in future infections it will not be as serious. So that's the, sort of, the idea behind that.

Diane (06:51):

What do we have to be concerned with, here in Louisiana? I knew we were talking, initially, and Clay made the point about West Nile. That was all over the news and I, uh, well, it still is, obviously. And-

Jennifer (07:01):

Sure.

Diane (07:01):

... with mosquito abatement and all the things, we have to do, and we're always cautioned to be aware of... You, you know you're talking about the most common in the world, the dengue, I've never heard... and we were... we've never heard of it-

Clay (07:13):

Right.

Diane (07:13):

And yet-

Clay (07:13):

Right.

Diane (07:13):

... it's the most common-

Jennifer (07:13):

Right.

Diane (07:14):

... in the world. Not just in the, you know, in the Southern or the Southern/Northern Hemisphere, it's in the world.

Jennifer (07:21):

Sure.

Diane (07:21):

Wh- what, what do we need to be aware of? How do we... What do we need to do?

Jennifer (07:26):

Here in Louisiana?

Diane (07:26):

Yes, ma'am. Yes

Jennifer (07:28):

So here, uh, I can tell you we have super robust mosquito control, here in Louisiana, for the most part. Uh, what we are monitoring for, here, most districts, would be West Nile virus, St. Louis encephalitis, and Triple E, which is Eastern equine encephalitis. These are all, uh, mosquito-borne viruses that occur, almost throughout the U.S., uh, West Nile, in particular.

Jennifer (07:52):

Um, entered through New York. It was first characterized in New York, in '99. Um, of course, originates from elsewhere in the world. But, quickly spread throughout the United States. And so, we have issues with West Nile, everywhere.

Jennifer (08:05):

Here, in Louisiana, um, it is the one that we are the most worried about.

Diane (08:09):

Mm-hmm.

Jennifer (08:09):

It is the one that is the most common. What's really interesting about West Nile, though, is that 80% of human cases are asymptomatic.

Diane (08:17):

Um, so you don't know you have it?

Jennifer (08:19):

Only about one...

Diane (08:19):

If you-

Jennifer (08:19):

That's right.

Diane (08:19):

Oh.

Jennifer (08:19):

That's right. You have no symptoms. Uh, you don't know you have it, at all. And in, in some cases, this is a good thing, because when you get West Nile virus, you are... at least, it's thought, you're immune to it, for the rest of your life. So, one infection is enough to prime your immune system for the rest of your life.

Jennifer (08:37):

So, if you're one of the lucky ones that has asymptomatic infection, that's really wonderful. If you are one of the unlucky ones, which is about 1% of cases-

Diane (08:45):

Mm.

Jennifer (08:46):

... where you develop severe West Nile, uh, disease, uh, or neuro invasive disease. NID, is what they call it, uh, it's, it's really not a great virus to have. So, the concern is not necessarily, uh, how frequent people become infected, or how frequently they are severely affected by West Nile, but just how severe and deadly it can be for people who do develop severe illness.

Diane (09:12):

So this has only been around... it... You said, in New York, in 1999?

Jennifer (09:17):

That was when we first detected West Nile, in the continental United States-

Diane (09:21):

Gee.

Jennifer (09:21):

... in 1999.

Diane (09:21):

It's less than five years.

Jennifer (09:23):

Right.

Diane (09:23):

It seems like it's been around forever.

Clay (09:24):

I know.

Diane (09:24):

I mean, I, I feel like we've been talking about this for a long time. And that surprised me.

Clay (09:28):

Mm-hmm.

Diane (09:29):

Right?

Clay (09:29):

What about, what Louisiana has done to deal with mosquitoes, as an issue here? We've got so much water and dormant water, around our State and areas-

Diane (09:37):

Mm-hmm.

Clay (09:38):

... where these mosquitoes breed and multiply. And we've talked a lot about-

Diane (09:41):

Mm-hmm.

Clay (09:42):

... how you, you, you prevent having them multiply around. But, what has the State done to address this?

Jennifer (09:47):

So we have our State Health Department, our local City Health Departments and Parish Health Departments, all, I think work together really well, work together with the CDC and other, uh, federal and national entities, our, uh, Health Control Associations-

Clay (10:03):

Mm-hmm.

Jennifer (10:04):

... and Public Health and Environmental Health. So, there's a whole lot of collaboration going on, to prevent the incidents of vector-borne disease, in Louisiana.

Jennifer (10:12):

Um, I think the really important thing, and the message that we always try to get out, is step one, is prevention. So-

Diane (10:18):

Absolutely. Yeah.

Jennifer (10:19):

Some of these things may have, uh, medical intervention. Some may have vaccines. But for us here, there's no vaccine for West Nile. So we start by educating our community, educating our, uh, Public Health officials. Uh, and so, that's really important, to make sure that people are performing source reduction, making sure they're not accidentally breeding mosquitoes in their backyards.

Jennifer (10:42):

Um, and then, just sort of, being supportive and cooperating with your local Abatement District-

Clay (10:46):

So-

Jennifer (10:47):

... to make sure you're reducing your mosquito populations and your risk of bites.

Clay (10:51):

What you just said and, and that's a thing. It's like, people don't know they're accidentally breeding them.

Diane (10:55):

Yes. Yeah.

Clay (10:56):

They've got buckets in places, and they don't know, and that water is in it. Because it rains and you don't think about it.

Diane (11:01):

Absolutely. And then you've got your fl-, your flowerpots-

Clay (11:03):

Yeah.

Diane (11:03):

And you have the little lips underneath. You've got-

Clay (11:05):

That's right. (laughs).

Diane (11:05):

They're all kinds of places-

Clay (11:07):

That's right.

Diane (11:07):

... where this could happen, and unintentionally. But obviously, Jennifer, this is a never-ending, ongoing, educational point-

Clay (11:15):

Mm-hmm.

Diane (11:16):

... that you're trying to make, here, that we always need to be aware of.

Clay (11:19):

Right.

Diane (11:19):

Because, as Clay said, where we live.

Jennifer (11:22):

Absolutely. Uh, you know, we're, we are a very wet State. (laughs).

Diane (11:25):
Mm-hmm.

Jennifer (11:26):
We have water-

Clay (11:27):
Right.

Diane (11:27):
Yeah.

Jennifer (11:27):
We have heavy rains.

Clay (11:28):
Yeah.

Jennifer (11:28):
We have flooding.

Clay (11:29):
Right.

Jennifer (11:30):
Especially, here in New Orleans. You know, we have flooding in the streets all the time. Or your containers in your backyard. And so, even the, the best plans that an Abatement District can possibly put forward, we can't really control those populations-

Diane (11:42):
Right.

Jennifer (11:43):
... and incidents of disease, if someone has, for example, an above ground swimming pool in their backyard-

Clay (11:49):
Right.

Diane (11:49):
Mm-hmm.

Jennifer (11:49):

... that's not circulating, and is breeding mosquitoes, that can have neighborhood level effect.

Diane (11:53):

Hm.

Jennifer (11:53):

That's just one yard. So, we try to get that across to people. And then, the other thing we always try to get across, is how you can take measures for personal and home protection. In addition to the source reduction and making sure you're not a source of breeding, for these mosquitoes, you can do things like make sure you're wearing mosquito repellent, when you're outdoors at night. Make sure you're wearing clothes that are, uh, less attractive to mosquitoes. Make sure that you're-

Clay (12:18):

Oh, and, wait, wait, wait, wait.

Jennifer (12:19):

... following all the guidance.

Clay (12:23):

(laughs). Hang, hang on a second.

Jennifer (12:23):

Sure.

Clay (12:23):

What clothes are attractive to mosquitoes? I must know this.

Diane (12:25):

(laughs).

Jennifer (12:25):

Those... Uh, yeah, so mosquitoes have been-

Diane (12:25):

It's really a thing, huh? (laughs).

Jennifer (12:29):

It is. It is. Well, you know, i- it is a thing.

Diane (12:30):

Uh-huh.

Jennifer (12:32):

They are attracted to, to dark-colored clothing.

Clay (12:35):

Okay.

Diane (12:35):

Huh.

Clay (12:35):

All right.

Jennifer (12:36):

So you want to wear light-colored, loose fitting clothing-

Clay (12:38):

Okay.

Jennifer (12:38):

Another thing is that mosquitoes can bite through your clothing.

Clay (12:41):

Yes.

Jennifer (12:42):

So if you're gonna be outside in the afternoons, doing your gardening, or doing your picnic, you want to wear light-colored, loose-fitting clothing. You want to cover as much skin as you can. Uh, that advice is very hard to follow, in Southern Louisiana-

Diane (12:55):

Oh, gosh.

Jennifer (12:55):

... because in the summers, it's extremely hot. (laughs).

Diane (12:57):

Yeah.

Jennifer (12:57):

So, if you're gonna have exposed skin-

Clay (13:00):

Yeah.

Jennifer (13:00):

... because it's just intolerable to have long sleeves and pants on, then you need to look at the CDC website-

Diane (13:04):

Yeah.

Jennifer (13:05):

And use EPA registered and CDC recommended repellents on your skin.

Diane (13:10):

I don't think I've ever heard-

Clay (13:10):

No-

Diane (13:11):

That they can bite through clothes.

Clay (13:12):

Blessed. Oh, well, uh, (laughs)-

Diane (13:12):

You know, I've heard... I've ne-, I didn't know that.

Clay (13:16):

I've had the experience, but that was by far, the most fascinating answer in the history of Vax Matters.

Jennifer (13:19):

(laughing).

Clay (13:19):

Thank you so much, for that, it's-

Jennifer (13:21):

They, they absolutely, will-

Diane (13:22):

(laughs).

Clay (13:22):
That was awesome.

Jennifer (13:23):
... I, I can tell you I've, I've got a lot of experience with that, personally.

Clay (13:25):
(laughs).

Diane (13:27):
But, you know, I've heard about, like, hairspray, cologne, perfume, that things like that attract or not, mosquitoes. Is that true? Or, is that just, you know, an old, old wives' tale?

Jennifer (13:37):
So, there's a ton of, of myths and urban legends-

Diane (13:41):
Right. Yeah.

Jennifer (13:42):
... surrounding, what mosquitoes like.

Diane (13:43):
Yeah.

Jennifer (13:43):
Um, largely, most of those pieces of information are false.

Diane (13:47):
Okay, okay.

Clay (13:47):
Shocker-

Jennifer (13:48):
So, what must-

Diane (13:49):
(laughs).

Jennifer (13:50):

(laughs). Right. There is a lot of evidence suggesting that mosquitoes do, sort of, preferentially like certain people.

Diane (13:57):

Oh.

Jennifer (13:57):

Now, what are mosquitoes attracted to? How do they find you? They like carbon dioxide, from your breath.

Diane (14:03):

Mm-hmm.

Jennifer (14:03):

They like, uh, some component of your skin, your skin chemistry. Um, and they also go for body heat. So, skin chemistry is really important. And we're all unique in that. That's, that's largely dependent on genetics.

Jennifer (14:16):

And so, scientists, recently, have been trying to figure out, exactly what the thing is in human skin, that they are most attracted to, uh, so that they can develop more, uh, effective repellents-

Diane (14:28):

Mm-hmm.

Jennifer (14:28):

... and things like that. And just last year, a paper came out, uh, that identified, I think, carboxylic acid, or, or one of these skin components, as the thing that they were really attracted to. And we all, have naturally, different occurring levels of that. So, that's been kind of interesting to learn.

Clay (14:42):

See, I knew it. I knew there's a reason.

Diane (14:45):

Wow.

Clay (14:45):

I knew that, that, yeah.

Diane (14:45):

That, that is fascinating. You mean, 'cause I, uh-

Jennifer (14:47):

It is fascinating.

Diane (14:48):

'Cause I remember thinking about, um, you know, when you see the commercials about a new kind of mosquito repellent?

Clay (14:54):

Yeah.

Diane (14:55):

And they, the, the person puts their arm in the box-

Clay (14:58):

Yeah.

Diane (14:58):

And the mosquitoes, just-

Jennifer (14:59):

That's right.

Diane (14:59):

... you know, flock to it. And then, they do, they put something and then the mosquitoes are repelled. It's just like, holy cow, you know. With the, with the, just, the unprotected arm.

Clay (15:12):

Yeah.

Diane (15:12):

And how, oh, gosh, it's... it really is something-

Clay (15:13):

Absolutely. (laughs).

Diane (15:14):

It really is an interesting education that we all need to remember.

Clay (15:18):

Right.

Diane (15:18):

And we all need to take seriously, and not just say, oh it's no big deal, it's where we live, it's what we do, as part of our every day, you know, in the summer. But this is serious. You know, this has-

Clay (15:28):

Yeah.

Diane (15:28):

You know, we're talking about West Nile, let's talk a little bit... You know, we've heard about Yellow Fever.

Clay (15:32):

Mm-hmm.

Diane (15:33):

So, exactly-

Jennifer (15:33):

Sure-

Diane (15:34):

What, what is that? And we're not trying to scare anybody, we're just trying to educate folks.

Clay (15:39):

(laughs). Ha-

Diane (15:39):

So, you ta-

Clay (15:40):

To, to, too late for that warning, right?

Diane (15:41):

Uh, well... (laughs).

Clay (15:41):

(laughs).

Diane (15:43):

Did that, did that... Ship already sailed, huh?

Clay (15:44):

(laughs).

Diane (15:45):

But anyhow, we just need to educate people, so they know what we're talking about here.

Clay (15:49):

Yeah. Yep.

Jennifer (15:50):

Yeah, absolutely. You know, knowledge is prevention.

Diane (15:52):

Yes.

Jennifer (15:54):

And, and, understanding how these disease cycles work. Certainly, we don't want to have people go into panic or fear. You know, I, I lived in Brazil for four years-

Diane (16:02):

Oh, my.

Jennifer (16:02):

Where the instance of-

Diane (16:03):

Wow.

Jennifer (16:03):

... vector-borne disease is much higher than the U.S. and so, you kinda have to come to terms with living in higher risk areas or visiting higher risk areas. But, you know, how... Do you understand how the disease cycles work and how to protect yourself? I think that's the information people need.

Diane (16:17):

Mm-hmm.

Jennifer (16:17):

Um, and that should take that fear away. So, uh, Yellow Fever, is another mosquito-borne virus, that, uh, is very common in Africa and parts of the Americas. Central and South America, mostly. Uh, it's vectored by *Aedes Aegypti*, our Yellow Fever mosquito, that's its common name. Um, and so, again, Yellow Fever is one, where severe cases are not that common, I think only about 10 to 12%.

Jennifer (16:43):

However, if you develop severe cases of Yellow Fever, you do have a 30 to 50% chance of dying.

Clay (16:50):

Wow.

Jennifer (16:50):

So again, it's one of those where it's not common, that people are severely ill from this disease. But when they are severely ill, that's where you really have to worry.

Jennifer (16:59):

So, it causes about 30,000 deaths a year. But the great thing about Yellow Fever, is that there is a highly, highly effective, uh, vaccine available for it-

Diane (17:06):

Thank goodness. Gosh.

Clay (17:08):

Yeah.

Diane (17:08):

Okay.

Clay (17:08):

Yeah. What about, um, Japanese encephalitis?

Jennifer (17:14):

Japanese encephalitis, um, uh, here in the U.S., we don't, don't pay a whole lot of attention to that. It's not something that circulates here, locally.

Diane (17:22):

Thank goodness. Uh-

Clay (17:23):

Right.

Diane (17:23):

One that we can cross off the list.

Clay (17:26):

Right. Right.

Jennifer (17:26):

That's right. So, actually, this one, you can sort of, cross off the list for a few reasons. So it, it was called that, because it originated in Japan, or was first characterized in Japan, uh, in the late 1800s. Um, but now, at this point, it spread through all of Asia. Uh, which tends to be the trend with these

vector-borne diseases. They emerge, and then, if the vectors are available, they spread, very rapidly.

Jennifer (17:47):

Uh, the great thing about the Japanese encephalitic virus is, is that, uh, it's, you're very low risk, if you travel to areas where it's endemic. It mostly occurs in agricultural areas, sort of out in rural areas. And also, there is a vaccine available for that one, as well.

Clay (18:03):

Uh, just, um, connected to that question, is it the fact that Louisiana is, uh, so lush and green, and that so many trees and everything, here. Is, is that a bigger contributing factor to our mosquito population, than say, versus, uh, Los Angeles or a State of California, that may, uh, temperature wise, or landscape wise, be different? I don't know if that is a crazy question. But like, why are some areas more prone to a, a larger mosquito population than others?

Jennifer (18:33):

It, it's a fantastic question, eh, with a very-

Clay (18:36):

Well, well-

Jennifer (18:37):

... complicated answer. (laughing).

Clay (18:39):

Well, I, hah, as I sit up in my chair-

Diane (18:40):

(laughs).

Clay (18:41):

... there you go.

Jennifer (18:42):

There... (laughs). There is a complicated answer. So, uh, I'll, I'll take you down this, this rabbit hole, just a little.

Clay (18:48):

Let's go.

Jennifer (18:48):

S- so, for myself, as a, as mosquito biologist, that's really what my training is. Uh, what you have to understand about mosquitoes and the vectors of all of these diseases, is that many of them have

environmental requirements, uh, that have to be met for their populations to flourish. Some of the viruses and parasites they spread, also have their own environmental requirements. Um, habitat, is absolutely, key.

Clay (19:14):

Mm-hmm.

Jennifer (19:14):

Places have to have the suitable habitat to, uh... for the biology of that vector, essentially. And so, what you see and, and for us, those of us in mosquito control, this creates a really tough challenge, for control. Because no two places are the same. There is no cookie cutter approach to this.

Clay (19:33):

Right.

Jennifer (19:33):

So you mentioned California, somewhere, where, it might be a little bit drier-

Clay (19:37):

Right.

Jennifer (19:37):

... a little less water, and maybe a little hotter in some areas.

Clay (19:40):

Mm-hmm.

Jennifer (19:41):

Or, cooler in some areas. That's, absolutely, going to affect, not only, how large your mosquito populations are, but what your species' composition is, in that area.

Clay (19:50):

Huh.

Jennifer (19:50):

So, the different types of mosquitoes that are able to live there. So, as you can imagine, here in Southern Louisiana, we have all of these swamps. We have a completely different species pool of mosquitoes, than even St. Tammany Parish, which is right across the lake.

Jennifer (20:04):

What we also have, and what I would like to argue, is one of the even larger problems, is very different, uh, sort of, anthropogenic filters, within these areas. So, here in New Orleans, for example, we have a lot of containers, tires, and people with-

Diane (20:23):

Mm.

Jennifer (20:23):

... lots of plants and toys, and wheel barrels and tarps in their backyards, and construction sites, and sort of, all these things.

Jennifer (20:31):

And, for us, that really is, where we prioritize, when we're looking for treatments. Because *Culex quinquefasciatus*, our local West Nile vector, is a very opportunistic breeder that loves to breed in larger containers.

Clay (20:45):

Wow.

Jennifer (20:45):

However, in St. Tammany Parish, right across, they have a lot of septic ditches. They have, I think, 400 plus miles of septic ditches. And *Culex*, the same exact species that transmits West Nile around here, is notorious for loving that super rich sewage water, that really, really funky water. They love high organic matter, content, in their water. So, they're going after the drainage ditches and the sewage ditches. And we're going after the containers, here.

Jennifer (21:13):

So, there's lots of different factors that influence where mosquitoes are, which species are there. And then also, which diseases are gonna be around as a result of that.

Clay (21:22):

Wow.

Diane (21:22):

Thank you for explaining that, because I don't think that I've ever heard it-

Clay (21:26):

About super rich sewage water?

Diane (21:27):

Well... (laughs).

Clay (21:27):

(laughs).

Jennifer (21:28):

That's right.

Diane (21:29):

Okay, well there you have that. But, my point being-

Jennifer (21:30):

(laughs).

Diane (21:32):

When you said, there's really no cookie cutter approach. And even, in a relatively short-

Clay (21:37):

Right.

Diane (21:38):

... or small area, you know, geographically, when you're talking about St. Tammany Parish, New Orleans, Baton Rouge, and all that, it, it, it can be night and day.

Clay (21:47):

Mm-hmm.

Diane (21:47):

So, that's what-

Jennifer (21:47):

Absolutely

Diane (21:47):

And that's, that's really hard for you all, (laughs), to try to figure out and try to know, okay, this is the hotspot, that's the hotspot. This is okay. This is what we need to pay attention to. And I believe that, probably, just the citizens-

Clay (22:00):

Right.

Diane (22:00):

Just, those of us in these areas, you know, we're, we're.... You know, not that we want to be, you know, stupid-

Clay (22:07):

Sure.

Diane (22:08):

... or not know what we should do, it, it's a completely different, kind of, complexion-

Clay (22:13):

Well-

Diane (22:13):

... to what we have here.

Clay (22:14):

But what's so fascinating about the information she's sharing... And, and, and that's a... Uh, your point is so great, Di... It's like, you don't know, what you don't know.

Diane (22:21):

Mm-mm. Exactly.

Clay (22:22):

And, and, and-

Diane (22:22):

Yeah.

Clay (22:22):

Obviously, y-, the average person doesn't think about mosquitoes as having varied species, you know, like they're, they're variations of them, size and what they may carry. And that's one of the reasons why this information is just so fascinating-

Diane (22:37):

Yeah.

Clay (22:37):

... uh, for the average person. You know, before we go on, if, if someone is wondering, hey, how can I learn more, especially someone with young kids who are outside. Whether they're in sports, or playing out in the yard, is there a resource that you would recommend that someone engage to find out about how they can prevent, and what may be in their area, depending on where they are?

Jennifer (22:59):

Absolutely. Uh, I mean, the number one resource that is, is a really great resource. There's lots of downloadable materials and graphs, and all the information you can possibly need, is on the CDC website.

Clay (23:11):

Okay.

Jennifer (23:12):

So, if you go the Centers for Disease Control and Prevention, and go straight to their, uh, mosquito-borne diseases and vector-borne diseases pages, you will find a wealth of information.

Jennifer (23:22):

The other, uh, local, sort of, areas where you can get really good information. Find your local Mosquito Abatement District-

Clay (23:30):

Yeah.

Jennifer (23:31):

In New Orleans, we are the City of New Orleans Mosquito, Termite and Rodent Control Board. Most parishes in Louisiana have their own mosquito abatement. If they don't, you can go to the Mosquito Control Association. So here we have the, uh, Louisiana Mosquito Control Association, LMCA.US, is their website. And, you can reach out to them and get, pretty much, anything you need, through there.

Diane (23:53):

You know, earlier you mentioned that you lived in Brazil, for a while.

Jennifer (23:56):

Yes.

Diane (23:57):

How fabulous. I'm sure that was-

Clay (23:59):

(laughs).

Diane (23:59):

... wonderful and interesting, and just terrific. And all the other adjectives that would go along with that. But I'm curious, for those people, you know, now that, um, COVID is... Well, it's still around, but not to the degree that it was. More people-

Clay (24:13):

Right.

Diane (24:14):

... are traveling.

Jennifer (24:14):

Mm-hmm.

Diane (24:15):

So, if you're prone to go, you know, eh, to Europe or to South America, or wherever you might be going, Central America, are there certain shots, are there certain things, uh, that we need to take into consideration, depending on where we're going, in relationship to this, to, m-, to mosquitoes? 'Cause, you don't want to have something like that, impact, you know, your travel or staying over. You know, students on a Visa, or whatever.

Diane (24:41):

Well, what are your thoughts about that, Jennifer?

Jennifer (24:44):

You know, I, I wish the guidance was a little bit more clear. The CDC does have some really great websites that describe, uh, which vector-borne diseases are really circulating in that area. They even have, for diseases like malaria, a malaria, by country, table.

Diane (25:01):

Oh, okay.

Jennifer (25:01):

That tells you, exactly what's going on in the region you're traveling to, which even, drugs, that the malaria parasites might be resistant to, there. So that it can help you guide your, uh, choice of, whether you're going to take anti-malarial prophylaxis, and which type you should take, based on where you're going.

Jennifer (25:18):

So, the materials are out there. Um, but you know, I think it has to be, sort of, an individual, uh, choice that you make between, you know, your healthcare provider and, and after-

Diane (25:29):

Hm.

Jennifer (25:29):

... looking at what the risk really is-

Clay (25:31):

Yeah.

Jennifer (25:31):

... based on where you're traveling. Uh, you know, in, in Brazil, uh, Yellow Fever, to my knowledge, is the only vector-borne disease for which they have a vaccine. Um, I don't believe they require you to be, uh, vaccinated-

Diane (25:43):

Okay.

Jennifer (25:43):

... to enter the country.

Diane (25:44):

So you didn't have to have proof of vaccination. Uh, in some countries, is that case, where it's-

Jennifer (25:49):

I do think-

Diane (25:49):

... those who'd have some vectors?

Jennifer (25:50):

Yes. There, there are some you have to prove to the local government that you're vaccinated against something-

Diane (25:57):

Oh, okay.

Jennifer (25:58):

... before you come in. But that's very variable. And so that's... You kinda have to do your research before you start traveling.

Clay (26:04):

You know, you referenced malaria, and the fact that it kills about, one child, uh, every 40 seconds, which is extremely jarring to know. But-

Diane (26:14):

Mm-hmm.

Clay (26:15):

Let's talk the serious nature of malaria.

Jennifer (26:19):

Malaria, was, for a long time, considered to be the most deadly of all of the mosquito-borne diseases. Uh, it is very common and Africa and parts of the Americas. What, sort of, complicates malaria, and how common it is, is that Anopheles, which is a genus mosquito, um, are the ones that transmit malaria. But there are lots and lots of different species of Anopheles, and there are lots and lots of different strains of the malaria parasite. And so, you have these multiple transmission cycles going on, simultaneously.

Clay (26:52):

What about anti-malarial pills or vaccines, or something that a person could do, or know about, especially as Di, referenced earlier, if you travel abroad, regularly?

Jennifer (27:03):

Sure. Uh, so there's currently, no-

Jennifer (27:06):

... uh, vaccine approved for malaria. I know several different labs and entities, and universities, uh, have tried over the years. Uh, currently, there's not one available. You can take pro- prophylactic pills. Uh, they're various different types of anti-malarial pills.

Jennifer (27:23):

And typically, what you'll do, is if you're going to an area where you know the transmission rates are fairly high, and that the virus circulates at, at high rates, you would begin a prophylactic, uh, ahead of going there, to make sure it gets in your system. You would continue throughout your time there. And then, uh, in some cases, your, your physician will ask you to continue taking it for three or four weeks, after you return home.

Jennifer (27:45):

So, um... But again, there is, uh, lots of evidence that some of these malaria parasites are developing drug resistance to some of these prophylactics-

Diane (27:55):

Of course. But, you know what's-

Jennifer (27:55):

... so, for, for this.

Diane (27:55):

Yeah.

Jennifer (27:55):

I know, it's a never-ending battle. So, what you really should be doing, if you think you might be going somewhere, where malaria's a problem, is look at the CDC guidelines, check out their, uh, malaria by country charts. And then, obviously, discuss with your medical professional, before you do anything. Some of these prophylactics, um, although they are, fairly, efficacious, they do have some pretty nasty side effects, sometimes.

Diane (28:20):

You know, I've gotta tell you, Jennifer, I'm just a little surprised, when you're talking about malaria being the most deadly of all of the, uh, mosquito-borne diseases, why, there's not more of an aggressive, um... Well, trying to come up with a va-, something, a vaccine, something that is, the efficacy is better?

Clay (28:40):
Right.

Diane (28:41):
You know, I'm just, I'm just surprised that there's not, when you're talking about the millions that you were saying, that are impacted, not just, again-

Jennifer (28:48):
Mm-hmm.

Diane (28:48):
... you know, the state, worldwide. What? Why?

Jennifer (28:51):
Right.

Diane (28:51):
I mean that, just, that, just, is, yeah.

Jennifer (28:54):
Well, uh, you know, I'm not 100% sure how the, sort of, effort is divided-

Diane (29:01):
Yeah.

Jennifer (29:01):
... among these major global mosquito-borne diseases. But, to my knowledge, malaria is actually one of the, the best funded, um, research programs, on the planet.

Diane (29:12):
Okay.

Jennifer (29:12):
There's a lot of resources, and a lot of money-

Clay (29:15):
No, there's, uh, there's effort going into it, at least.

Jennifer (29:15):
And a lot of people-

Diane (29:16):

Right.

Jennifer (29:16):
... are working on this.

Diane (29:17):
Yeah.

Jennifer (29:19):
Yeah. So, eh, I don't think that it's... there's not the emphasis there and, and people are really working on it. It's very hard, because the malaria transmission cycle is a really complicated cycle. These plasmodium parasites undergo lots of different life stages and, and all of them, you know, are in different organs, inside of the, the body, inside of the mosquito, inside of the human body. And so, I think they've just had a really hard time, uh, figuring out the right approach to, to do something like a vaccine.

Jennifer (29:47):
Uh, you know, there's a lot of smart people-

Diane (29:48):
Oh, yes.

Jennifer (29:49):
... and a ton of resources going into this.

Diane (29:50):
Yeah.

Jennifer (29:51):
And, in fact, the Bill and Melinda Gates Foundation, um, s-, was, sort of, the primary goal, was to deal with malaria in the African nations.

Diane (29:59):
And that's, that's a lot of money-

Clay (30:00):
Yeah.

Diane (30:00):
... that's going into that.

Clay (30:01):
Yeah.

Jennifer (30:02):
That's a lot of money.

Diane (30:03):
And as you see it-

Jennifer (30:03):
That's a lot of money.

Diane (30:03):
Yeah.

Jennifer (30:03):
It's, it's just-

Diane (30:03):
Yeah.

Jennifer (30:03):
I mean, I-

Diane (30:03):
Yeah.

Jennifer (30:04):
It's a, it's a super complicated disease. I think-

Diane (30:07):
Yeah.

Jennifer (30:07):
... you know, I think we'll get there. Um, but it's gonna require a lot more research and a little more time.

Diane (30:12):
And that probably wasn't a terribly fair question to ask you. Because, as you said, there is, and Clay mentioned, there is a lot of effort going into it.

Jennifer (30:19):
Mm-hmm.

Diane (30:19):

It's not like they're just saying, you know, the, y-, the scientists and, and the medical professionals, not saying, oh well, yeah, we're doing this, we're doing that. That, it's very proactive, about everything.

Jennifer (30:29):

Very much-

Diane (30:30):

You're trying to do this, because of, of the demand and, what, you know... You don't want... What was the statistic, the children... One-

Jennifer (30:36):

Yeah.

Diane (30:37):

... child, every 40 seconds.

Clay (30:38):

Yeah.

Diane (30:38):

Is that what you said?

Jennifer (30:38):

That's right.

Diane (30:38):

I mean, that is just unheard of.

Clay (30:38):

Yeah.

Jennifer (30:38):

It really is.

Diane (30:38):

Mm.

Jennifer (30:43):

Yeah, and I, I think the effort is, is ongoing-

Diane (30:46):

Right.

Jennifer (30:46):

I think that, of, they're aggressively, the scientific community's aggressively-

Diane (30:50):

Yeah.

Jennifer (30:50):

... trying to find a solution for this, um, because it is so deadly. But, um, unfortunately, it's just, it's a hard one to work with.

Diane (30:56):

Yeah.

Clay (30:57):

You know, we- we are, um, coming to an end of this episode of Vax Matters. But we cannot end without asking you about chikungunya.

Jennifer (31:04):

Chikungunya.

Clay (31:05):

Because, before we started, uh, recording this episode, you dropped that little pearl.

Jennifer (31:10):

(laughs).

Clay (31:10):

And by the way-

Jennifer (31:10):

That's it-

Clay (31:11):

I think you've broken the polysyllabic record, for one episode-

Diane (31:14):

(laughs). Whew, man! (laughs).

Clay (31:14):

... with all of the, wow.

Diane (31:15):

Good words.

Clay (31:16):

But, um-

Diane (31:17):

Uh-huh. (laughs).

Clay (31:17):

But let's talk about chikungunya.

Jennifer (31:19):

Yes.

Clay (31:19):

And, no-

Jennifer (31:19):

Chikungunya.

Clay (31:22):

... ladies and gentlemen, it's not on the menu at Ruth's Chris-

Jennifer (31:24):

(laughs).

Clay (31:24):

It's something that you should know about.

Jennifer (31:26):

It's definitely, not. Uh, so, chikungunya, is another, uh, mosquito transmitted virus, that is common in Asia, Africa, uh, parts of Europe, and then, most recently, the Americas. It is also vectored by our container, Aedes, which are Albopictus and Aegypti. Um, so it was first isolated in Tanzania, in the 1950s, and the word, itself, is the African Maskandi language, and it means, bent over in pain. So-

Clay (31:54):

Nice.

Jennifer (31:55):

... not a great visual. (laughs).

Diane (31:56):

Yeah.

Jennifer (31:56):

For sure.

Diane (31:56):

So that gives you the rest of that story, doesn't it. Right. Yeah.

Jennifer (32:00):

It really, really, does. (laughs).

Diane (32:00):

Yeah.

Jennifer (32:01):

Um, so, yes, it causes really extreme joint pain, high fever, malaise, uh, a lot of, of the same symptoms that some of the other mosquito-borne viruses cause. Thankfully, serious complications are not very common, for this one. Um, so, most people just recover, fine. It's not fun, but you will recover. Uh, but, for the rare cases, where you do have severe illness, it can cause long term symptoms, um, and even death. Especially-

Diane (32:29):

Mm.

Jennifer (32:29):

... in older populations.

Diane (32:31):

You know, something that... Before we close, again.

Clay (32:33):

Mm-hmm.

Diane (32:33):

We have not talked about heartworm.

Clay (32:35):

Ah.

Diane (32:36):

Our dog.

Jennifer (32:36):

Yes.

Clay (32:37):

Yeah. Yeah.

Jennifer (32:37):

Oh, yes.

Diane (32:38):

Could you... You know, and that's, that's critical down here.

Clay (32:41):

Yep, yes it is.

Diane (32:41):

So could you just, before we close, could you just talk a little bit about that, too?

Jennifer (32:45):

Absolutely. Yes. Uh, you know it's funny, I, uh, partner with a few of the local, uh, veterinary organizations, uh, to, to, sort of, get educational campaigns out there, about heartworm. A lot of people don't realize that heartworms are, uh, a mosquito-borne disease.

Diane (32:59):

Mm-hmm.

Jennifer (33:00):

Um, and also, in the United States, alone, and I think they're 40 or 50 different mosquito species, that can vector heartworms to dogs. So, there are multiple species that can do this. Um, it's a little tiny worm, that your dog can get infected when a mosquito bites them.

Diane (33:18):

Mm.

Jennifer (33:18):

Um, it's extremely common. It is most common in the U.S. in the Southeast, around the Gulf Coast Region. And I think last time I checked, Louisiana had the highest incidents in the United States.

Diane (33:27):

Yeah.

Clay (33:28):

Wow.

Jennifer (33:29):

So, it is preventable. Uh, those little chewables, or-

Diane (33:30):

Yep, those little chewables.

Jennifer (33:32):

... shots, or, yeah-

Diane (33:33):

Mm-hmm.

Jennifer (33:34):

There's heartworm pre- prevention, is, I, pretty much, 100%, um, effective. But you have to, really stay on top of it, with your veterinary care.

Diane (33:44):

And, that's again, that goes back to being a responsible pet owner.

Clay (33:47):

That's right.

Diane (33:47):

Bo- bottom line, be responsible.

Clay (33:49):

Which is very important.

Diane (33:49):

Yeah, it is.

Clay (33:49):

Yeah.

Jennifer (33:49):

Absolutely.

Clay (33:49):

Yeah.

Diane (33:50):

And, you know, Jennifer, thank you. When you were talking about, the mosquitoes, I guess I didn't realize you're... there are so many varieties. I just think of a mosquito, as a nasty mosquito.

Clay (34:01):

Mm-hmm.

Diane (34:01):

I had no idea-

Jennifer (34:02):

That's right.

Diane (34:03):

... that there were so many varieties out there that cause damage, harm, to the human body, to our animals. So, this is really, this has been, just a, a very enlightening podcast. And that's what we love to do here, you know, on Vax Matters, to explain to folks that are listening what they need to know.

Diane (34:22):

Now, is there anything that you can think of, that... We've talked about a lot of things, you know, Clay-

Clay (34:26):

Yes.

Diane (34:27):

... we had, and Jennifer, we've, we've, got, run, kind of, the gamut.

Clay (34:30):

Yep.

Diane (34:30):

But is there anything that, kinda, stands out, that you would like, you know, the closing minutes, to just make sure that the folks listening are aware of, or they need to know?

Jennifer (34:40):

Sure. Um, I, I guess, it's important for people to know that they don't have to be freaked out by the presence of mosquitoes, they're ubiquitous, they're everywhere. Uh, and as you mentioned, yes, they're about 3,500 species of mosquitoes-

Diane (34:54):

Geez.

Jennifer (34:54):

... on the planet. Just over-

Diane (34:55):

It's like, humans don't stand a chance, (laughs), you know.

Jennifer (34:56):

They don't. They don't.

Diane (34:56):

Oh, my gosh.

Jennifer (34:56):

And we have over 200-

Diane (34:56):

Yeah.

Jennifer (35:01):

... in the U.S. and, about 80-something, 85-ish, in Louisiana.

Diane (35:04):

Yeah.

Jennifer (35:04):

However-

Diane (35:05):

What?

Jennifer (35:05):

It's important to remember that less than 10% of all mosquito species, are responsible for any sort of human or veterinary pathogen transmission.

Clay (35:15):

Wow.

Diane (35:15):

Let's see if they pers-... Okay.

Jennifer (35:15):

The vast majority-

Diane (35:15):

Yeah.

Jennifer (35:16):

... do not cause a problem. Um, and so, I think it's really important, and that, those of us who are, are in the world of mosquito biology and control, we want to make sure that we get those messages out-

Diane (35:27):

Mm-hmm.

Jennifer (35:27):

That hey, we're trying to control a very small portion of them, uh, that are important for, for medical reasons. And so, understanding the biology, understanding the preventative measures you can take, how the community can work together with your local abatement districts and public health partners, this is all really, really important information. And it's very available, if you just, kinda, hop online and start doing the digging.

Diane (35:49):

And it's also encouraging. Thank you.

Jennifer (35:51):

Absolutely.

Diane (35:52):

Thank you, Jennifer, that sounded good.

Clay (35:53):

The best.

Diane (35:54):

Yeah.

Clay (35:54):

Research edomodel- an entomologist, Jennifer Breaux. So, if you came into this with a lacking of knowledge on mosquitoes, you're welcome.

Diane (36:05):

(laughs).

Clay (36:05):

That's what we do on Vax Matters. See ya' next time.