

# Traveling Bugs

[MUSIC PLAYING]

CASSIE: So my name's Cassie and I'm with Global Campus Connection. And tonight we have our webinar on traveling bugs. If you guys have any problem seeing or hearing any part of the presentation at any time, just go ahead and type in the chat box, and I'll go ahead and help you out.

So, to introduce our presenter tonight, we have Dr. Rich Zach. He has been a professor of entomology at WSU for 15 years. His favorite aspect of being an entomology professor is working with students and insects. He began his career with a general interest in biology, which developed into entomology. So I'll go ahead and hand it over to Dr. Zach.

DR. RICH ZACH: OK. Good afternoon, good evening, whatever time it is. And, again, my name is Rich Zach. I'm an entomologist here at Washington State University. And I'm going to spend some time with you this evening talking a little bit about insects and other types of arthropods that you might encounter as you take some travels this summer, or really any time.

So we can get started-- I think. OK. Technology was causing me some problems, as some of you that know me would well understand.

So. If we look at insects-- and what is that insects can do that may cause us some problems. Well, certainly, most of you are familiar with insects that sting, bees and wasps. Everyone's been bitten by some type of insect-- a mosquito, no-see-um flies, black flies, sandflies-- all different types of biting flies. Some of you may have had an encounter with lice once or twice. True bugs, bed bugs-- we'll talk a little bit later about bed bugs. But bed bugs are making a comeback. So you may encounter them as you take a trip.

Bugs that vector pathogens. These are the ones that we'll spend a little bit of time on. And these are the ones that really can cause us the most serious types of problems. And these would be various mosquitoes, certain types of flies, kissing bugs, ticks.

We have insects that are just plain nuisances-- things like cockroaches and flies. Anyone that's ever visited a tropical country realizes that cockroaches are just a part of life in a lot of places.

And then I'll spend a couple minutes on an insect that you might encounter if you head down to Mexico or Central or South America. And these are bot flies. And this is actually kind of just a plain gross insect.

So the point of my talk, and what I really want to leave you with today, is that a little bit of prevention on your part before you go anyplace can really solve a lot of problems that you may encounter when you get there. You really need to be aware of any possible concerns.

So you know where you're going. You know what you're going to do when you get there. So what might be some insect problems that you'd run into through those various activities.

And the way you can find out is-- probably the most efficient way today is just explore available information sources.

So, for most of you, that's going to be some type of web search. And there really is a lot of good information on the web. You may want to discuss any concerns that you have with your medical provider. But a lot of times I think what you're going to find is the medical provider, really doesn't know much more than you're going to know after you do a nice web search.

What you want to talk with your medical provider in case you need any inoculations, malaria pills, or something along those lines. And they'll certainly help you out there. Before you go obtain the proper medicines and repellents. Don't rely on an idea that, well, when I get to Guatemala, I'm going to be able to get these malaria pills, or when I get someplace, I'm going to be able to find the repellents and things that I need.

You may, but you may not. So make sure you have whatever you need. And take it with you before you go. And something that I always tell people is, prepare yourself psychologically.

In the United States, especially in Washington, we don't really have a lot of problems with insects. We don't encounter them very often. But in some of these places, you're going to see a lot of insects. You're going to be face-to-face with a lot of insects.

And so if you realize that-- especially if you're getting out into areas that aren't so much urban. If you know that's going to happen, then you can prepare for it. And you'll be much better off for that.

So let's spend a couple minutes and start out with insects that are just plain nuisances. On the right-hand side of the screen, we have-- some of you may remember a baseball game that took place in Cleveland, Ohio, many years ago where there's a type of midge fly that lives in Lake Erie, and these insects just happened to be coming out of Lake Erie.

On the bottom of the screen, you can see what one of those flies looks like. They were attracted to the lights of the stadium. And there were literally hundreds of thousands if not millions of these midges flying around in the stadium.

This is an insect that you're going to see a lot. You take a walk at night someplace-- the street lamps, the lights of shops and things, will attract these midges if you're anywhere near water. They don't bite. They don't do anything bad.

But they can be a real nuisance. On the left hand side there, you see a cockroach. And cockroaches are something that if you visit any tropical, semi-tropical area-- even if you stay in

some of the nicest hotels, you're probably going to encounter cockroaches. They're just a part of life in areas where it's humid and where it's moist.

But the good thing about cockroaches, they don't vector any diseases. If you kind of take care of your food, keep your personal items under control, then you may not have many problems with cockroaches. But you will probably see a lot of cockroaches.

And these illustrations just kind of give you an idea of some of the different types of cockroaches that you're going to encounter out there. Anybody that's ever visited-- I'll pick on this place-- the Miami airport. You've gotten your luggage. You've probably seen some inch-and-a-half or 2-inch-long cockroaches running around the luggage area.

I know when I go to Guatemala, in the airport, you just see a lot of cockroaches there. And it's not a sign of uncleanness. It's just a sign of where you are and some of the types of insects that you're going to find.

So, again, these are really nuisances-- nothing to worry about. But be aware and know that you're going to see these. Let's get to some other types of insects. And these are ones that bite. And you'll see there, I have "(just) bite," because indeed that's what they do. They don't vector any diseases.

On the top at the left, we have what's called a black fly. Black flies occur-- their larvae occur in running water. And so any place that you're camping, or you're out and there are streams there-- whether it be in the United States or Central America, Africa-- you're probably going to run into a lot of black flies.

Black flies have mouth parts that actually cut a small hole into the skin. We call these hole feeders. And then they just literally kind of suck-- sponge the blood up that fills that little pool. On the bottom left there, you can see what black-fly bites would look like on the ankle of a person. Actually that person happens to be one of my friends that does a lot of entomological work with me in Central America. And that's how he reacts to black-fly bites.

On the right hand side there, you see what's called a deer fly, and you can see the mouth parts hanging down there. They're a lot larger than black flies. They can get to be an inch or even two inches in length. But, again, they cut a small hole in the skin, allow that hole to bleed, and then they literally kind of just sponge that blood up.

So these would be two biting insects that you're going to find, especially if you're out of doors, if you're doing some camping; if you're anywhere where water is, you're probably going to run into these insects.

No-see-ums-- you can see on the top right-- that's actually a sand fly. But sand flies and no-see-ums-- the no-see-ums are on the hand, on the left-- are very small insects, about the same size.

They bite much like the black flies do. They cut a small hole into the skin and allow that to bleed.

But they often have a saliva-- what causes the reaction in the skin is the saliva. And so you can see on the bottom, a reaction to sand fly bites-- much like we saw with the black flies. And, on the left-hand side there, you can see a lot of no-see-ums-- gives you the size of those insects. And you can see where they've been biting. And those little red areas that are developing, where a small amount of bleeding has taken place.

So there are some problems with sand flies, and actually they vector a relatively serious disease. But that disease is primarily confined to the Middle East. So we're not going to worry about that too much. But if you're spending any time in North Carolina or Florida and you're going on the beaches a lot, you may very well run into sand flies. Luckily, they don't vector any diseases in the United States. But they can be a real nuisance-type of insect.

Lice. Lice are an insect that I think most of you are familiar with, and some of you may have actually had lice at one time another. Lice are cosmopolitan. Lice are found everywhere in the world where humans are found.

Lice are transmitted through some type of contact. That contact can be direct-- so person-to-person contact. Or it can also be indirect contact, through clothing. And we'll talk about that in a second.

There are some louse-borne diseases. But in today's world, they're not really a significant concern. So we're not going to address those too much.

But anyplace that you go visit, and especially if you're in an urban area, or you're getting out of that urban area, you may run into lice. Head lice are very common in all parts of the world. In the middle there, you see what's called a pubic, or a crab, louse. And on the right-hand side, we have a body louse. These are the three types of lice that feed primarily on humans. And, as I think most of you know, all of these lice actually feed on blood.

So let's look at the head lice. Head lice are the most common type of lice that you're going to encounter. They confine themselves to the scalp, to the head. They never leave the host. So they never leave the person. They actually have a little behavior where they glue their eggs, as you can see in the illustration, on hair shafts.

And those eggs then will remain on the host-- remain attached-- so the life cycle just continues on the host of the person. Luckily head lice are not a medical concern. But they do remain on a host.

The way that you get head lice-- or the way that children get head lice, or anyone gets headlice-- is by sharing something that has come into contact with the head of a person that has lice-- a scarf, a brush, a comb, a hat. And some of those lice get caught in that scarf or whatever it is,

and then when that scarf is used by a second person, they're actually moved to that second person.

So really the best way to avoid head lice is just not to share articles of clothing or brushes with people. Another way to get head lice, though, is if you're staying in certain types of motels or hotels-- and this is, really, you're out in the country and maybe they're not changing those sheets very frequently, or they're not changing the covers on those pillows. Then, again, someone uses that pillow. Some of the head lice actually get on that pillow. You're the next person to use that pillow and, before you know it, you've got a case of head lice.

So a common concern that I have when I stay in any hotels-- no matter how expensive or how inexpensive they are-- is I do look around. I usually brush the pillow off. I look at the sheets. I look for certain types of insects. And one of the insects that I would look for would be lice, and a couple others that we'll talk about in a few more minutes.

The body louse is the second type of louse that occurs on humans. This one's a little different because it doesn't remain on the host. So this is a type of louse that you can encounter in everything from a hotel room to a theater to a bus. These are lice that live in furniture. They live in bedding. In carpets, they can actually live.

What they do is they leave from that area when a person is there. They will go and feed on that person for 5 or 10 minutes. And then they go back to the bed, the furniture, whatever it is where they were going to stay.

This is the only type of louse that actually vectors a disease. But luckily that disease is not a serious concern in most of the world today. So unless you're going to a country where there's an epidemic or an outbreak of louse-borne typhus-- and we'll talk later on how to find that out-- I would not be worried about diseases. But I would be worried about-- well, I shouldn't say "worried." I don't want to make anybody more nervous than they need be if you're going someplace. But this would be an insect you may want to be familiar with and watch out for.

Third type of louse that occurs on humans that we need to be concerned about is what's called the crab louse. Like the head louse, this one remains on the host. So the eggs are actually laid on the host. They're nits as we saw with head lice. This louse does not vector any diseases. It can cause severe itching and reddening of the skin, but it does not vector any diseases.

It's transmitted primarily through intimate contact. So if you're out and about, and you happen to be getting a little more, say, in contact with locals than you should be. This is a louse that you might actually find. OK.

But it is not only transmitted through intimate contact. This is a louse that you can get by sitting on a toilet seat that someone sat on previously that had crab lice. So probably another take-home message is, before I sit on any unfamiliar toilet seats, I wipe those toilet seats off, just to make sure there are no crab lice on there.

Crab lice are kind of interesting in that we think of crab lice as occurring in the genital area, which they do, but crab lice can be on any part of the body where you actually have heavy or coarse body hair. So on the bottom, on the right hand side there, you see an infestation of crab lice in someone's eyelash hairs. You can have crab lice in underarm hairs. You can have crab lice in beards and mustaches. So it's not just confined to the genital area. So the thing with lice is-- you just want to be careful who you associate with when you go to places. Borrowing clothing, et cetera, would be something you'd want to avoid.

Let's move to an insect that is probably the most familiar to travelers. And this is one that I do want you to be concerned about a little bit. And these are called bed bugs.

And you may remember when you were a small child, somebody said to you, goodnight, sleep tight, and don't let the bed bugs bite. Well, 75 years ago or so, bed bugs were a very common occurrence in most parts of the world, including the United States. They are an insect that, at least in the United States, we pretty much eliminated. In other parts of the world-- at that, Europe-- in areas, they don't worry about bed bugs as much as we do here. OK.

The thing about bed bugs is, as I say, we pretty much eliminated them at one time. But a lot of the pesticides that we used to control, the bed bugs have actually developed resistance to those pesticides. So they just don't kill the bed bugs anymore.

So since we never totally eliminated bed bugs, the pesticides don't kill them anymore-- or I should say it's very difficult to kill them. And we don't think about bed bugs any longer. Bed bugs, as many of you may know, have been making a real strong comeback over the last couple years.

So what you've got here is, on the left hand side, you've got a picture of a typical bed bug. On the right-hand side, you can see that the bed bugs are down in the fold of a sheet in this area. So bed bugs actually live off of the host.

So they will live in the bedding. They they'll live in dresser drawers. That they'll live in a lamp shade. They'll live between the pages of the Bible that's inside the dresser drawer. OK. They do not stay on the host.

At night-- they are nocturnal feeders-- they will then leave those protected areas. They will go to the person that's in the bed. Or you can have bed-bug infestations in theaters. You can have been investigations in dressing rooms of clothing stores, et cetera.

They will come out. They will feed on the person for anywhere between 5, 10, maybe 15 minutes. And then they actually leave that person and go back and hide again. The good thing about bed bugs is, they don't vector any diseases. So you're not going to get a disease from these.

The bad thing about bed bugs is they occur every place that you're going to visit. If a four-, five-star hotel gets an infestation of bed bugs, which can happen-- we'll talk about that in a second-- that is just as much of a common occurrence as a \$1.50-a-night hotel room in Guatemala, as having bed bugs.

They are cosmopolitan-- again occur every place that humans occur. So here's our bed bug feeding. Again, this bed bug was maybe up in the lamp shade. And at night it crawled out of that lampshade. It came down into the bed. It found you, and you were in that bed. And it began to feed. When it left you, what it did, is it started to walk away, back to the lampshade or the dresser drawer. And, as it was leaving, it was dropping little pellets of fecal material-- bed-bug poop.

So when you wake up, you notice that you have what look like mosquito bites on your body. And on the sheet, you notice some small, little red droplets. OK, one of the first things I do whenever I go to a hotel, before I get in the bed, is I look in various places. And one of the things, I look on the sheet to see if I see any little red droplets. OK.

And these can just be of the memories of droplets. So these are sheets that have been washed, but you still have the little red stains in there. I look in the lamp shade to see if I see any bed bugs or little red stains. I open the dresser drawers. I look underneath the mattress, especially if it's one of these pillow-tops or something, where you get folds in there. I look in those folds. If I don't see any little red droplets, or I don't see anything that looks suspicious to me, then that's probably a very clean place-- no problems with bed bugs. But if I see any of those indications, then I may even do a little more work, or I would probably ask to have my room changed.

This is what a bed-bug bite looks like-- something like a mosquito bite. You get the small, little reddened area there. But usually you get them in a place where if you're wearing some type of night clothing-- pajamas or something, and you've got maybe a little bit of a tightening around the wrist or around the waist where there's some type of elastic material-- the bed bugs like to get into those areas. That's where they bite. And we often get what's called a characteristic bite line, where you see these bed bugs, or at least you see the bites when you wake up in the morning.

So how do you avoid bed bugs? OK. The first thing you do-- no matter what hotel I check into, I look around. And I'm not trying to make this overly dramatic. But I do-- I look on the mattress. I look underneath the mattress, as far as possible. I look on the sheets. I look behind items, in items. As I say, I look for those signs.

If I find the signs, I try to find a new hotel room. If I don't find the signs, then the odds are very, very good that that's a clean room-- you're not going to have any problem. One of the things I always do to keep bed bugs from coming back to my house is, when I come back from someplace where I think there might even be the smallest possibility that I'm bringing bed bugs back with me-- remember, you check into the hotel room, you put your luggage on the floor,

you unload your luggage-- the bed bugs come out at night, they feed on you; then they're going to go to find some hiding places.

So what they're going to do-- your luggage is a great hiding place. You stay in that hotel for three or four days. You load up your luggage. You come back home. You take your luggage into the bedroom of your house. You unload it, and the bed bugs crawl out. And now you've got a bed-bug infestation.

So, as I say, if I ever going anyplace where I think there's even the smallest possibility of bed bugs, what I do is, when I get home, I unload my luggage in the garage or someplace, where if there are already bed bugs in there, then those bed bugs are going to come out, but they're not going to find anything to feed on for a couple days. So they're going to die.

So bed bugs can be found anywhere. OK. But if you take some very simple precautions, you're probably not going to have a problem with bed bugs, and you're not going to bring any home with you.

Insects that we encounter more often, no matter where we go, and this is especially true for those of you that like to do a lot of hiking, some camping-- so you're going to go someplace and you're going to sleep on the beach, or you're going to tent-- whatever you're going to do-- are insects that sting.

And we've got a variety of those insects here. We've got a yellow jacket on the top left. We've got a honey bee, found throughout the world, on the bottom left there.

On the right-hand side, we've got what's called a fire ant. And that is an ant that actually bites and stings at the same time. We'll see some images of that in a second.

And on the bottom right, we've got the business end of one of these stinging insects. And that is the stinger itself. So that white ball is actually what's called the poison sack. The poison is mixed and is set down into the middle structure, which is just a muscle that pumps that poison then down through the stinger, as you see, into the skin.

So, as I say, anytime you're spending a considerable amount of your vacation out of doors, you're probably going to run into stinging insects of one type or another. Bees, wasps, ants-- all of these are very, very common. I spend quite a bit of time in Micronesia, in Guam, and the Mariana Islands. And they have a number of different types of stinging insects there.

But what's interesting is that if you're going to do any hiking, you're going to do any camping-- you just ask the locals-- what they call it there is the boonie bee-- and they have three or four different things that are boonie bees-- where the boonie bees are. And they'll tell you. And you either avoid those areas, or when you go out there, you make sure that you're looking. You're stepping in the right place. You're keeping your eyes open a little bit.

One thing about stinging insects that need to be aware of-- if you're going to go anyplace, but you have some type of medical concerns with stinging insects-- you're allergic to stings of honey bees, or you're allergic to some type of wasp sting-- remember, what you need to do is check with your medical practitioner. And if you need to take some type of sting kit with you, if you need to take some type of medicine with you-- get that before you go. OK.

Because you're doing a lot of hiking. You never know when you're going to run into one of these. And to try to find that specific medicine, or to get some type of aid when you're a lot of miles away from the local hospital or clinic, can be very difficult. So make sure you take what you need.

These are wasps. These happen to be yellow jackets up on the left there. On the right, we have what's called a paper wasp; in the middle, a mud dauber; on the left, a sand wasp. Any of you that have ever spent any time in sandy areas-- along beaches or sand-dune types-- you're very familiar with sand wasps. On the right-hand side on the bottom, we have what's called a tarantula-hunting wasp.

There are literally hundreds, if not thousands, of different types of wasps that can sting. So, again, when you're doing a lot of outdoor activities, you want to make sure that you're familiar with what might be there-- the habitat that you're going to be in-- and you're watching out for them.

OK. So this is the business end of that yellow jacket, in this case. Wasps can be found in colonies, or they can be solitary. Solitary just means you find them as individuals. Colony means you come onto a nest that may have hundreds, if not thousands, of wasps in it.

Generally, they sting for defense. So you're getting too close. They're perceiving that there's something wrong. They're going to sting. When I'm out hiking, and I've been stung enough times to know better, I watch above me. I watch at eye level. And I try to watch below. So I'm just scanning a little bit.

And, again, this is not something I do all the time. But you'll see these wasps. Wasps like to fly along paths. Wasps are predators. They're flying along paths, looking for flies and caterpillars that they're going to eat.

And so you're walking along that path. The wasps are flying along that path. So if I'm in an area where I'm seeing a lot of wasps, I pay a little more attention.

If I don't see any wasps for the first minute or two, I don't worry about it at all. Wasps are predators, for the most part. So you're out having a picnic lunch, or you're eating outdoors and the wasps are coming around. They're cutting little pieces out of your fish or whatever. Or you've got some fruit.

Wasps will come to fruit, especially as that fruit starts to get a little more sugary. Then the wasps will come to that. And you literally just shoo the wasp away. You use your hand and get it to move away. And usually they will.

So kind of slow and deliberate actions work very well when you and the wasp are on the same terms. Another take-home message-- you're walking along a path, your arm brushes against a tree, and five or six wasps fly out of that tree. You brushed against the nest, and they begin to sting you.

Then what you want to do is you want to run as fast as you can for about 50 yards. When those wasps begin to sting, they actually release a chemical that's going to attract other wasps to where those wasps are stinging. And there's nothing you can do to be nice to them. They're going to sting. You run about 50 yards or so. And that's going to solve all of your problems-- so, you know, take-home message.

This is an insect that I've encountered quite a bit. And any of you that are visiting the Southern United States, Texas, Louisiana, Mississippi, Central America, South America-- these are called fire ants. You can see on the bottom there, this is actually one of my colleague's boots, and that is covered with fire ants.

And what looks like some sand that he's stepping on is actually a fire-ant mound. So he's out there. He's taking a walk. He's actually standing here. He's probably collecting some insects off a bush. And the fire ants are crawling out of their mound. They're crawling up his shoe. They're crawling inside his sock, or inside his pant leg.

And what they're going to do is they're going to go up there, and then as you can see on the top, that ant is going to grab on with its jaws. And it is going to sting. They are called fire ants, because when they sting, it's a very burning type of sensation. And on the right-hand side of the top, you can see my colleague's foot. So, in this case, those happen to be fire-ant stings.

You learn very quickly if you're in an area with fire ants and spend any time out of doors, to always look down. Whenever you see those little mounds-- like you can see on the bottom-- you just avoid those. You don't stop there. You don't stand near those.

There's not much you can do about fire ants when they get on you. If you're taking a hike and you notice three people in front of you, all of a sudden, drop their pants and start to slap their legs, you can be pretty darn sure that they hit a fire-ant mound.

You can develop allergies to fire ants. And, again, what you're developing an allergy to is that toxin that they're putting in. So that's something that you want to be careful to-- you can see my friend's leg. That is a relatively severe reaction to the stings. Now, he'll get swelling. And there's been once or twice where he's gotten some very minor breathing problems. OK.

But, again, like you can to yellow jackets, like you can to honeybees, you can develop allergies to these. So you want to be careful. They're easy enough to avoid. The first time you stand on a fire-ant mound, you'll learn very quickly to avoid those.

Bees are something that are found everywhere. In the United States, for the most part, we don't worry about bees. Bees are very non-aggressive. They can live in colonies. They can be solitary like the wasps were. But bees are vegetarians, so they're going to visit plants.

And I think we get stung a lot because we like to visit the same plants that they visit. The main concern with these is just like it was with wasps. If you have an allergy to the toxin that they're going to put in, you want to make sure that if you're going on a trip, you've got your sting kit with you-- you've got what you need.

With bees, slow and deliberate usually works very, very well. OK. So honey bees are flying around you. You're at the flowers. They're at the flowers. They're not going to bother you for the most part.

You're in Central America or you're in South America or you're in parts of sub-Saharan Africa-- this is where there is a special version of the honey bee, called an Africanized bee. This bee is very aggressive. It looks exactly like a honey bee. but the honey bees in the United States are very docile. This one is very aggressive. Once they start to sting, they release that same pheromone that we talked about with wasps, and more bees will come and sting.

So, again, what you want to do here is you want to run. The problem with Africanized bees is you have to run a long way. They'll actually run after you for a quarter of a mile or so. They'll fly after you.

So the best thing to do with these-- and again this doesn't happen very often, but it can-- is to get in some type of vehicle or some type of structure if you can, to keep those bees from getting at you.

OK, now I want to spend a couple of minutes on, really, perhaps the more serious aspect of the presentation, but one that we probably don't have to worry about as much as maybe some people would make us believe-- and maybe I'll make you believe-- although I hope I don't do that.

We've got a series of insects here that vector pathogens. So we've got a kissing bug, up on the top left. We've got an Aedes mosquito that vectors yellow fever on the bottom left. We've got an Anopheles mosquito up on the top right that vectors malaria. And we have what's called a black-legged tick, on the bottom right, that vectors Lyme disease.

So these are insects that actually take a pathogen, a germ, into their body. And then they move that germ, that pathogen, from person to person, or animal to person. And when that pathogen gets into our body, it causes some type of disease.

OK, again, excuse me. There are many, many hundreds of types of arthropod vector diseases, or what we call arboviruses. Most of these are very minor.

You may take a trip to Puerto Rico, Central America, Mexico, Africa, the Middle East. You come back with some flu-like symptoms. You know it's not the flu. What you've probably encountered is some type of viral arbovirus. Three or four days of flu-like symptoms, you heal up, and it's just like nothing happened.

The only way you will ever know if you actually had an arbovirus is you can have a blood test conducted where they will look at your blood. And what they're going to look for is some types of signs of that disease. Major diseases include malaria; Chagas disease; yellow fever; dengue; several to many types of encephalitis diseases; and in certain parts of the United States, Lyme disease.

So let's spend a couple minutes and just talk about some of these, and how you can do your best to avoid them. Most of these diseases, but certainly not all, are found in subtropical and tropical areas of the world, and what I mean by that is pretty much warm, humid areas. If you're going to a warm, humid area-- and it is not the United States, it's not Canada, it's not Europe-- there are, I guarantee you, at least one to several of these diseases that occur in that part of the world.

But they are not spread equally throughout the area where they do occur. If you're going to go to Peru, and you're going to spend most of your time in Lima, a large metropolis, you are probably not going to encounter any of these diseases. But if you're going to go to Peru, spend a lot of your time in Lima, but you're going to visit the archaeological sites out in the other parts of the country, then indeed you may run into the diseases.

So what you want to do before you go, is you want to know what diseases occur in the area that you're going to visit, and not only in the country that you're going to visit, but where in that country. And this information is pretty easy to get. We'll talk about some sources a little later on.

And, again, I tried to emphasize this, and I probably will several times more throughout this presentation, is make your plans before you go. You want to avoid areas that might have problems. And maybe you don't want to avoid those areas, but you want to know that there are going to be problems there or there could be, and if there are any prophylactic treatments.

What this is-- this is something that you take-- a medicine-- before you go-- this is primarily with something like malaria-- or inoculations-- you want to do that before you go. And that's where the websites and your medical practitioner are going to be very helpful to you.

So, as I said, I just want to spend a couple minutes, and really not go into any deep details on any of these diseases. But the most common disease that people think about is malaria. And, as you can see from the red on these maps, malaria occurs throughout much of the world. So, if

you're visiting any areas in the Middle East, in parts of Asia, South America, Central America, or Africa, there is a good possibility that that country has malaria.

But remember what I told you. Malaria is a disease that occurs in hot and humid and moist areas of the country. So if you're going to go to Guatemala, and you're going to spend most of your time up in the mountains, Guatemala City, then you are never going to encounter malaria.

If you're going to go out into the lowlands, then there is a good chance that you're going to be in an area that has malaria. so you want to do the things that you need to do.

On the left-hand side there, on the top, we have what's called an Anopheles mosquito. You can see, it looks a little odd in the way that it feeds. Its body is at an angle to the skin. And that is very characteristic of this group of mosquitoes that vectors malaria.

On the bottom, there is a typical type of warning that you're going to see. This is one that I took a picture of in Guatemala, where this area does have malaria. So what they're recommending is you use bed netting.

Anopheles mosquitoes bite very early in the morning and just as the sun's going down, the time most people are going to sleep. So bed-netting is very common. A lot of the hotels that you stay in, when you're out in the country, they'll provide you with bed-netting. Use it. It's really good to use it, because what it does is it just keeps the mosquitoes from biting you. The mosquitoes don't bite you, there's no chance you're going to get malaria.

You go someplace where malaria is relatively common, you come back, you suffer flu-like symptoms-- you can see on the right-hand side there, some of the different symptoms that you might have-- fever, headache, fatigue, pain-- what you're going to want to do is go see a doctor as soon as possible.

And that holds for anything. Any time you come back from someplace where there is the possibility of one of these diseases and you're not feeling good-- it's not just jet lag, but you're not feeling good-- you're suffering flu-like symptoms-- you want to see a medical practitioner. And they'll figure out what needs to happen.

Malaria is caused by a one-celled organism. As I said, it's transmitted by this mosquito. We talk a lot about malaria, but some of the latest data that I can find-- in 2010, of people returning to the United States, there were only 1,700 documented cases of malaria. So you think of all the people that go on trips, that's not a lot. Now, that doesn't include military. If we had the military in there, there'd be a lot more.

So this is just the common person that's taking a trip someplace. And most of those people-- 65%-- encounter it in Africa. Asia, the Caribbean, the Americas-- not nearly so much. But you come back, you're suffering these fever-like symptoms-- chills, headache-- and often this occurs at intervals of four or five days-- you're going to want to seek medical attention.

Before you go, you want to conduct that risk assessment. And, no matter where you go, you want to avoid mosquitoes. Use repellents, use bed netting, use any specific medications that might be used in that country so that if you are bitten by a mosquito that's vectoring malaria, you're not going to get the disease-- so very important.

Risk assessment, those prophylactic materials-- I know I keep saying this, but I want to really drum it into your heads. Avoid mosquito bites. And if you're doing activities at dusk and dawn, when these mosquitoes are out-- during the day, you're not going to have any problems-- they don't bite-- you're out at night, you're out early in the morning-- wear that mosquito repellent.

Let's spend a couple minutes on a disease that's relatively common, especially among hikers and backpackers and campers in the United States-- in certain parts of the United States-- and this is Lyme disease. Lyme disease is named for the town in which it was first found-- Lyme, Connecticut.

And you can see on the map here, the red areas are where Lyme disease is more common. The gold areas are where it does occur. So, even if your vacation this summer is going to be hiking in the Cascades, or Olympic mountains, or Western Washington or the Sierra Mountains of California, there is a chance that you can get Lyme disease.

The tick that vectors Lyme disease is a very small tick. You can see it on a fingertip there. It's called the black-legged tick. That is as big as they get. They don't grow any larger than that.

So those of you that are familiar with ticks from Eastern Washington, you know you've got ticks that you spread legs out and they're about the size of a dime, maybe a little smaller. That tick does not vector Lyme disease-- so no problems with that.

So you're doing some hiking in the Cascades. Or you're in Connecticut, or New York-- you're hiking out there. You're spending some time out. You notice on your body someplace, you have-- on the right-hand side, on the bottom there, that little rash-like area. We call that a bullseye rash. That is very distinctive of an individual that was bitten by one of these black-legged ticks. And that is one of the first signs that you may be developing Lyme disease.

Lyme disease is relatively easy to treat. It is caused by a bacteria vectored through the bite of that tick. Symptoms-- these fever-like symptoms. The good thing about Lyme disease, or the good thing about the ticks is, often they'll be on your body, they'll be walking around, they don't cause any problems for a while. So if you have ticks on your body, just basically take them off.

If you develop any of these fever-like symptoms, visit a medical facility. This disease is relatively easy to diagnose in the beginning. And once it's diagnosed early, it is very easy to treat.

But if it's not treated early, then you can have problems in the long run. So this is something that I think a lot of people that hike these areas is familiar with. If you do hike these areas and you're not familiar with Lyme disease, then you probably want to become familiar with it.

A disease that's relatively common-- now, this isn't a disease that occurs in tropical areas, but occurs in higher, more temperate areas, not in the wet and humid. And this is called Chagas disease. And, again, we have an illustration there of a roadside sign that I took when I was in Guatemala, talking about the presence of kissing bugs that vector Chagas disease.

This is a big bug. You can see it on the bottom there. The insects that vector Chagas disease are about an inch, an inch and a half in length.

So you're spending some time with local people, up in the mountains in Guatemala, Colombia, Peru. These are insects that live in the thatching of the local huts. They come down at night. They're nocturnal. They take a blood meal.

Believe it or not, that inch and a half long insect feeds on your face someplace. They call them kissing bugs. You wake up in the morning and you have a swelling like that young boy does on the right. That is a sign that you were bitten by a kissing bug. It is not necessarily a sign that you have Chagas disease, but it does mean that you were bitten by a kissing bug.

So Chagas disease is caused by another parasite. And we're not going to worry about that too much-- these large bugs that you'll find in the thatching of huts-- the kissing bugs. There are forms of Chagas disease. There's what we call an acute form, which means basically you suffer some type of symptoms right away-- and this is the swelling at the bite site, fever, fatigue, body aches, rash-- can be mild. But those are early symptoms that you may be suffering from Chagas disease. You suffer any of those symptoms, again, you want to see a medical practitioner.

Chagas disease is very interesting-- or at least I find it interesting-- in that when the bug bites you, it does not place the pathogen into you through the bite. When it's biting you, it is actually defecating. So it's pooping next to where it's biting.

When you wake up in the morning, you are itching. So you scratch your itch, and what you do is you literally scratch the pathogen through the bite of the bug into your body. That's how you get it.

So a very simple way to keep from getting this disease-- and actually a really good thing to do-- is carry-- today, I always carry some of these little bottles of an antibiotic. When I wake up in the morning and I've got bug bites, or I've got whatever-- and, believe me, I scratch as much as anybody else-- but the first thing that I do is I actually clean those with an antibiotic. So I either wash them good, or use one of these antibiotics. And that will take care of a lot of these problems.

It's very simple to do, but it's something that, as I say, when I'm out in these areas, I do all the time. A disease that I have had is dengue fever. And, again, another Guatemalan sign here. Guatemala has a lot of diseases-- talking about dengue. You can see the distribution. Dengue is vectored by a Aedes mosquito-- a very beautiful mosquito, but a very persistent biter. OK.

Dengue is a viral disease. And there are several forms of it that can be either more or less benign. Dengue is a disease that often occurs in outbreaks. So there may be many years were very few people get dengue. But then all of a sudden, something changes in the environment, the weather, and we start to see numerous people getting that disease. Again, the locals are going to know about that and certain websites are going to know about that.

The way to avoid dengue is always sleep in rooms with mosquito barriers-- bed-netting. You think, I'm in the tropics-- I want to be in this open area when I'm sleeping. And that's great. It's beautiful to sleep on a hammock out someplace. But that's an open sign for mosquitoes to come in and bite.

So you really want to try not to let those mosquitoes get you. Use your repellents. Please, use your repellents anytime you go to any of these places.

Or today a lot of you may be familiar with insecticide-treated clothing that you can buy-- clothing that has a permethrin insecticide in it that will keep mosquitoes, other biting insects, from biting you. Works very well-- you buy some socks-- I buy impregnated socks all the time now.

Oh, another little trick that I forgot with things like fire ants, when I'm walking through a pasture, when I'm walking through any type of area, what I do is I wear long socks and I place my pant legs into the sock. So as those ants or whatever are walking up my shoe, walking up my sock, they don't curl under and go under my pants, they just keep walking. So always stick the bottom of those pants into your socks when you're out there hiking.

Dengue-- severe headache, eye pain, joint pain-- they call it breakbone fever, because it's, like, in the bones. It feels like your bones are breaking. Seek medical attention if you have any of these circumstances. And, again, most of these diseases are relatively easy to treat if you seek that medical attention up front.

Let's move from kind of the serious, perhaps, to the not-so-serious now, but something that more people worry about than the serious. And this would be spiders.

Spiders are everywhere. Spiders do a lot of good things. Many spiders are very beautiful. When you're out hiking and things, look for spiders, take pictures of spiders-- lot of good things going on with spiders. But there are a few spiders that you want to avoid. The good thing about the spiders that you want to avoid is they want to avoid you.

This is a representation of a black widow spider. So very common-- even if you've never seen one, I think you all know what they look like. This would be our Pacific Northwest version of the widow. But throughout the United States and other parts of the world, there are many other widow spiders. They all do about the same thing. They are very secretive. They are not aggressive. They usually live under something. So if you're out, you're moving firewood around, you're picking up things off the ground to move someplace-- this is where the spiders would be. The spider is going to bite, but only when that spider is caught between your hand and whatever it is that you're moving. Again, they are not aggressive.

They cause a neurological damage. So they're going to cause fever-like symptoms, headaches, perhaps some vomiting, some muscle aches. For the normal, healthy person, that'll last a day or two, a couple days at the most. And then you're going to come around. There would be no problems from this type of spider. You would have to have some underlying circumstances-- heart conditions, or a very young child, an older child-- that would cause problems with this type of spider.

The second type of spider that we worry about is what's called the recluse spiders. And, again, this is a group of spiders. The most well known is the brown recluse, or the violin or fiddle-back spider. And you can see on the right-hand side there, that little pattern on the back of its, what we call a cephalothorax, that looks a little bit like a violin or a fiddle.

The spider-- as you can see on the bottom, it's a relatively small-bodied spider. But it has very long legs. So we've got a comparison there with a quarter. Found in the lower Midwest, to the middle Southern states, Rocky Mountains in the United States. There are various other recluse spiders in other parts of the world.

Again, relatively common, but not aggressive. These produce what's called a necrotic poison. So what this does, this actually kills the skin. It causes a blister-like situation. That blister breaks open. And left on its own, it may take six months to a year for that blister to actually heal.

I've seen individuals with blisters the size of a baseball because they never got any medical attention. With spiders, if you believe you were bitten by a spider, and you're going to seek some medical attention, you want to tell the physician that I believe I was bitten by a spider. That's not the first thing that they're going to look for. That's probably not a question they're going to ask you.

So, if you think you were, then you want to tell them that. And then that opens up for them some other possibilities. And, again, any of these types of things we've talked about today, when you go see a medical practitioner and you've just come back from someplace, or you've been hiking, let them know that, because Lyme disease is not something that they're normally going to look for.

They're going to start to treat you for the flu or some type of infection. And they may treat you for that infection for a very long time until finally they realize, whoa, that's Lyme disease-- we need to do something very different.

So you always want to let them know that, OK, I've been out. I do a lot of hiking. I came back. I've been gone for three or four days in this area. If at all possible, if you're bitten by a spider or a tick and you can capture it, bring it with you. That's going to make a very, very big difference.

So how do you avoid spiders? Again, most spiders are not a threat. They're kind of fun to look at. Check and see if there are any dangerous spiders where you're going. But be very careful where you place your hands, where you're reaching and stuff.

You get a spider bite, some insect bite-- any type of bite-- a cold compress is good. It'll keep the swelling down, keep the toxin from moving. And if you have any type of serious-- or what you consider serious-- reaction, then seek medical attention.

So I want to finish up with one last insect. And this is what I call just plain gross. And this happens to be an insect called the human bot fly. And you can see on the map there-- Central America, down into South America.

This is an insect that the fly is about the size of a house fly. It lays its eggs on a mosquito. The mosquito bites you. When the mosquito bites you, the egg of the bot-fly hatches. That small maggot goes down into your skin where the mosquito bit. And that maggot lives underneath your skin for about three to four weeks. And the right-hand side there, you can see this little blister-like area-- where, on the top, there's one maggot-- on the bottom there are two fly maggots living underneath the skin. That maggot's going to feed on muscle tissue for, as they say, about three weeks. And then it will eventually pop itself out.

There are a lot of ways to get rid of bot-fly maggots. What I usually tell people to do-- and this is not uncommon. I've never had one. I've had several graduate students that have. And we usually just send them to a physician, and they just cut the thing out. So it's not a problem.

And if you're really scientific-oriented-- one of my graduate students was. He just let the thing develop inside of him, because he wanted to see what it was like and what it felt like, et cetera.

So that is a bot fly. They can be removed, as I say. There's no permanent damage from them. So if you're the type of person that likes to experiment, and you ever get one of these, go ahead and leave it there. If you're not, then go ahead and take it out.

So how do you avoid problems. Well, we talked about this. Know the potential problems before you go. Conduct your assessment. Take any precautions that you need to take. Plan before you travel. Talk to a doctor. Look at some sites that I'm going to give you in a second.

If you need medicines, take those medicines with you. Receive any inoculations that you may need before you go to those places. Take a good repellent or repellent clothing. Your repellent should contain a material called DEET. D-E-E-T. It's the best repellent we've got out there.

And know the risks before you go anyplace. This is a book that you can purchase. It comes out every year. This is the 2012 version called the Yellow Book. And this book is a fantastic reference. It'll go through every country, every disease. Anything that you can think of, this book is going to tell you about. It's going to update you on any medicines. It's going to give you everything you need to have before you go.

If you don't want to spend the money on the book-- and that's fine-- then you do want to visit what's called the Centers for Disease Control, the CDC, website-- and if you just plug in CDC, or Centers for Disease Control-- again, a fantastic resource. Very authoritative. It will give you all the information you need for any place that you're going to visit in the world.

If you buy any of the guide books, they're usually going to tell you about problems that occur in that country, what you might need to do, and how to avoid them. Again, you want to visit a medical practitioner if you're going someplace where indeed serious problems occur. But their knowledge is probably going to be more limited than yours once you visit the CDC site.

So make sure that you're looking at up-to-date information. For malaria, mosquitoes become resistant to a lot of the prophylactic materials that we use. So that constantly changes. So you want to look at the latest information. What is recommended for that area where you're going? What inoculations are recommended?

The odds are that any place you go, you're going to have no problems at all. But what do they say? An ounce of prevention is worth a pound of cure. And that's really the most important thing, I think, with some of these diseases.

So I wanted to end-- I've got a bed-bug video that, if you'll indulge me for a minute, kind of will give you an idea of the size of bed bugs and what they look like.

OK, so here on my hand, you can see an adult bed bug. This would be the normal size of an adult. So even though they're small, they are certainly visible and should you see these in the bed, in the sheets, in the lamp shade, et cetera, you should be able to recognize them without any trouble.

So this shows you a large group of bed bugs. The larger ones-- the darker ones are adults. Most of the smaller ones that you see in there, the lighter-brown ones, or the cream-color ones, are actually immatures. So, in the normal situation, you would find both adults and immatures in the bedding or in the hotel room, in your house.

So thank you very much. Have a wonderful evening and a wonderful mom's weekend.

CASSIE: Thank you guys for coming. If you have time, fill out that quick survey I sent. Otherwise, have a good night.