# Novel Hendra Virus Variant in Black, and Grey-Headed, Flying Foxes, Australia

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[Sarah Gregory] Hello, I'm Sarah Gregory, and today I'm talking with Dr. Alison Peel, a senior research fellow at Griffith University in Queensland, Australia. We'll be discussing a novel Hendra virus variant in Australia.

Welcome to the EID podcast, Dr. Peel.

[Alison Peel] Thank you very much, Sarah. It's great to talk to you.

[Sarah Gregory] Hendra virus is pretty new. Tell us about it.

[Alison Peel] So Hendra virus is a virus that is circulating naturally in flying fox or fruit bat populations in Australia. And actually it's not so new in itself. Other than rabies virus, it was one of the...really first of these emerging bat viruses that we've been focused on over the last little while. It came before Nipah virus and coronaviruses and many filoviruses, if that. It was actually first discovered 28 years ago in 1994. So we've been studying it for a little while now here in Brisbane. So it became very well-known very quickly at that time because it caused an outbreak in some stables here in Brisbane, actually in the suburb of Hendra, and that's how it became known as Hendra virus. And in that outbreak, there were 20 horses that either died or were euthanized with this really mysterious illness. And then, unfortunately also a stablehand and a trainer became infected from those horses and died. And so, there was a lot of attention on it initially. It was obviously a very scary new virus at the time, and so we've been working hard since that time to understand what it is, where it comes from, and how it circulates. And it took a couple of years to identify that the natural host of that virus was the flying foxes that are present within this area of Australia.

[Sarah Gregory] I see, okay. So what are the signs and symptoms and how serious is it?

[Alison Peel] So in the flying foxes themselves (those are the natural hosts), they don't seem to have any signs or symptoms at all that we can observe. So they tend to coexist with the virus quite easily. But in horses, it can cause quite serious disease. So it can cause a range of signs that can be difficult to distinguish from other horse ailments. But generally, the main signs are the neurological nervous system signs (the staggering, unstableness, or collapse) or respiratory signs—so, whether they have nasal discharge, difficulty breathing, and things like that. Some of the key findings often are that there can be a fever and a very acute or rapid progression to very serious disease that often either ends up in death of the horse or by euthanasia on welfare grounds. And about 75% of the horses that are infected end up dying. In humans (in people), the symptoms can be similar to what we see in horses in the neurological signs. And again, it's highly fatal. Four of the seven people that are known to have been infected have died from the virus.

[Sarah Gregory] Okay. So as you said, we first became aware of it when horses started getting it, and then these seven people got it, presumably from the horses. So where did the horses get it?

[Alison Peel] So the horses contract the virus from flying foxes, and we haven't directly observed transmission. It's generally very difficult to observe that actual transmission event. It could be a number of routes, but we think that the most likely route is from flying fox urine, because when

we test flying foxes and look where the virus is excreted, urine is the most commonly detected route of excretion from flying foxes. So flying foxes are naturally distributed within this part of Australia, and they will feed on native or...as well as introduced fruit trees that occur in horse paddocks. And so we think that flying foxes are feeding in these trees, urinating onto the ground and contaminating the pastures or into food troughs for the horses that might be underneath the trees, or potentially then with direct contact—directly urinating on top of a curious horse that might be also in the area at the same time. So we think that the horses breathe in aerosols of the virus from the pasture as they're sniffing around, and that's how the virus gets into their system.

[Sarah Gregory] So respiratory rather than gastronomically?

[Alison Peel] Yes. Yeah, we think that's most likely. Horses have a really large tidal volume. They have large airways and breathe in and out a lot of air in every given breath. And so, that's a good route of entry for the virus, I think.

[Sarah Gregory] So your study is specifically about a new variant of Hendra virus. A few years ago, most people would not have even heard of the word variant. But now it's a pretty common word with COVID. How is this strain different from the previous Hendra virus?

[Alison Peel] Yeah, that's a good point about the differences between variants and strains and some of the complicated terminology sometimes. And sometimes there can be very much grey areas in terms of what's considered a strain and what's considered a variant. But we talk about this new Hendra variant as...so there's a variant, it is close enough to the Hendra that we have known about for decades that we can consider it part of the same viral species, just like the different variants of SARS-Coronavirus-2 that causes COVID are all part of the same species. But between the original Hendra and this new variant of Hendra, when we look across the whole genome of the virus and all the individual base pairs, there's about an 83% similarity of the individual bases, which doesn't sound super similar. But when you look at how these sequences come together to create the viral protein, which is how they interact with the infected animal's immune system and viral entry and things, they're actually much more similar.

So between the original and the new variant, there's about 93% similarity. And so, work by some of my collaborators and the coauthors on our recent study has shown that the crucial sites for interaction with the immune system...the two variants are virtually indistinguishable. So we think that both the bat immune system and the horse or the immune system of people sees these two variants in much the same way.

[Sarah Gregory] So is the geographic range different in this variant and where is it as opposed to the original one?

[Alison Peel] So this is a big question of what we've been trying to investigate, and I think there is still some work to be done here. So a lot of our understanding of Hendra comes from a very big study that was conducted by the Australian state governments here between about 2012 and about 2015, where there was a very large sampling effort looking to sample flying fox roosts across much of the east coast of Australia from Sydney up further north up to Cairns, and sampling flying fox roosts every month or every couple of months over a number of years. And from that, we got a really good indication of when and where Hendra virus is circulating, that it tends to circulate most commonly in wintertime in the lower parts of that range (in the subtropical) whereas it could be present anytime of the year, particularly further north.

But it seems like there wasn't any detection of the Hendra virus south of Sydney, and that seemed to correlate with the extent of the range of a particular species of flying fox (the black flying fox). And from some other studies, it was presumed or deducted that black flying foxes were a key reservoir for Hendra virus. And so much of our understanding about the distribution of Hendra virus then became, I guess, limited to the extent of the range of the black flying fox. And there have been very few studies for the south than Sydney. There was one study, however, down on the south coast of Australia down near Melbourne in Victoria, which did study a population of a different species of flying fox (the grey-headed flying fox). And for, again, over a number of years, they did not find Hendra virus at any time down there in that roost. So that seemed to confirm our understanding that the distribution was further north in Australia.

But the recent findings of this new variant includes some detections in flying foxes (in tissue samples from flying foxes), that it was detected down in this southern area—down in Victoria and also south Australia. And so, that really, I guess, caused us to reexamine our previous findings of the original strain and look more carefully for this new variant across other areas. So we had started to sample across a broader distribution, but we still have a lot more sampling to do to really have a conclusive understanding about the full extent of the range.

[Sarah Gregory] Oh, okay. You said something about across all seasons. Is it seasonal? Or is it year-round?

[Alison Peel] So, again, that's a... it’s not easy to answer definitively. Absolutely, in the range where we see most of the Hendra virus spillovers, and particularly in the last decade or so, in subtropical areas of Australia (so around Brisbane where I am, and a little bit further south and north) the spillovers are much more prominent in wintertime. I think probably about 19 plus within the spillovers occur in wintertime in this region. But the virus is circulating occasionally at other times. And so, for horse owners and veterinarians, there certainly should be an awareness that the virus can be around at any time of the year. But certainly there are conditions that really drive the spillover from flying foxes to horses predominant in this area in wintertime.

Now, further north in Australia, up around (I guess listeners might have heard of Cairns up in the northern parts of the Great Barrier Reef area), the climate up there is...it's closer to the equator, it's more of a wet/dry season type of climate compared to down here in Brisbane. And we see that the seasonality there is less clearly defined. There's no strong seasonality in either the excretion of Hendra virus in flying foxes up there or the detection of the spillovers themselves. And then as for the new variant itself, that's something that we're just beginning to look into.

The detection in flying fox tissues have come from various times of the year, including in the peak of summertime. And in our study, where we also looked at detection of the new variant around Queensland and New South Wales, we did find most of the detections occurring around wintertime, but also some detections at other times of the year as well. So that seems, I guess, in some ways consistent with the original variant.

[Sarah Gregory] You mentioned a couple of different kinds of flying foxes which, for the listeners, are bats. Clarify for us which flying foxes are we talking about?

[Alison Peel] Sure, yes. So Australia has four flying fox species present on the mainland of Australia, so that's the little red flying fox, the grey-headed flying fox, the black flying fox, and the spectacled flying fox. And they're all beautiful creatures that play critical roles in pollinating and dispersing seeds of our native forests and conducting that on a long distant pollination and

seed dispersing, and much further than birds or insects would do. So they're really important to our ecosystem. And so they each have a particular range and ecological niche that...and specializing in different areas.

Now, the original Hendra virus strain and the new variant.... well, across the two, have been detected in tissue samples from all of those four species. As I mentioned earlier, the urine is the pathway where we expect the transmission to horses occurs. And so, when we actually look at which species have been detected to be excreting virus in the urine, then the black flying fox and the spectacled flying fox, as I said, in the more northern parts of the range have appeared to be the main reservoir host. But for the new variant, we can see that also the grey-headed flying fox appears to be excreting the virus as well, and their distribution extends much further south than the other species. So that is a consideration when we're thinking about risk, as well.

[Sarah Gregory] So there was a fourth flying fox that does not carry it, as far as you know. Which one was that?

[Alison Peel] Sure. Yeah, so the spectacled flying fox...it's actually a critically endangered species or currently listed as endangered, but it qualifies as critically endangered. Its populations have declined rapidly over the last few years. And there's been fewer studies in that species because it's a much smaller population, but it does appear that it can excrete the original Hendra virus in its urine. But it hasn't been studied for the new variant yet.

[Sarah Gregory] So would any bat be able to carry it, any flying fox, anywhere? Like, spread to India and those bats be able to carry it, do you think?

[Alison Peel] Sure. So the pteropid virus (the Hendra virus) is classified as a *Henipavirus*, and the word "Henipa" comes from the combination of Hendra virus and Nipah virus, which are two, I guess, flagship species of the group and were first detected. And so, both those two species come from flying foxes (which are pteropid species bats), and we know that there's been a number of different related viruses within that group of viruses. And we think that they're probably predominantly restricted to that pteropid species group.

Now one of the questions is how much of what we call "species specificity". Does each bat species have its own virus species that it tends to be associated with and tends to circulate independently? Or is there cross-species transmission, where a particular virus can circulate amongst multiple species of bats? Now for Hendra virus, that does seem to be the case. As I've just discussed, we've detected Hendra virus across the different pteropid species here in Australia. But we do think that there are some geographical limits to that because of the presence of Nipah virus in Bangladesh and Malaysia, and then some serological findings in, for example, Papua, New Guinea and Indonesia, indicating that there are probably other similar viruses in those regions. And so, I think there's probably some immunological barriers as well as the geographical barriers for these viruses to be spreading across continents. But if you were to attempt to infect any of these bats with any of these given viruses in a laboratory setting, then yeah, I'm sure that they could be infected.

There have been some studies that have tried to infect Australian bats with Nipah virus, for example, and we can learn a lot from those infections. But really what we're talking about is natural infections and natural spread. And I think there are some barriers to that. These viruses have co-evolved with these bats over a long period of time, and to some extent, settled into their routine sort of thing.

[Sarah Gregory] Why don’t the bats get sick from the virus?

[Alison Peel] So that also links to the co-evolution over a long period of time. So all animals, including people, we have viruses that we carry around every day that we don't even know that we're infected with and have little impact on us. And those...that is because we have co-evolved with the viruses over a long period of time, and our immune system and the virus can exist within our bodies without causing too much detriment that our immune system needs to get rid of them immediately. And so, it's just the same way about viruses have co-evolved with the bats over long periods of time, and there is no illness created from them by that battle with the immune system.

[Sarah Gregory] What was the event that brought about this study?

[Alison Peel] As I mentioned earlier, these bats and these viruses have been a focus of study over a number of years since Hendra virus was first detected. They're also increasingly living in urban areas in Australia, and so there are studies associated with that. And one of the impacts that they can suffer, partially as a result of that increasing urbanization, is an effect of extreme heat that is becoming increasing with climate change and also with the heat islands of cities and urban areas. And so in 2015 (I think it was) in Adelaide in south Australia and the southern part of Australia, there was an extreme heat event with temperatures over 42 degrees, and a large number of bats died in that event because they just are not evolved to cope with those extreme temperatures.

And as part of a follow up to that event, a number of bats were submitted to one of our national laboratories for some broad surveillance testing. And as part of that, an interesting finding was that one of these bats seemed to be testing negative with one of the main test assays for Hendra virus, but positive on another version of that test, which was an unusual finding and that caused some follow ups. And some follow up with that individual result identified that it seemed to be a virus that was closely related to Hendra virus, but it was different. But the amount of genetic material...the length of the sequence that could be obtained was quite short. And so it was difficult to place that finding into context and really understand what it means.

So that finding sat there for a number of years. And then more recently, a group who I know you've spoken to—Dr. Ed Annand, who is one of the members of the Horses as Sentinels group here in Australia, who is a research group that is investigating horses that have died with symptoms that appear to be consistent with Hendra virus but were testing negative on the Hendra virus assay—and so that group was interested in understanding what other viruses were circulating in horses that might be causing these signs. And as part of that investigation, they found a horse that had died in 2015 that had tested negative to the Hendra virus using the Hendra virus assay. But when they did some more advanced sequencing from samples from that horse, they found a whole genome sequence of this new Hendra virus variant. And then that would be able to determine that this sequence was, in fact, a variant of Hendra virus and very closely related and almost identical to that sequence that had been identified in the flying fox years earlier. And so that was, I guess, a really important finding to help us understand that there was this other type of Hendra that was circulating within that population. And that would have been missed by the common diagnostic assays that were being used at the time. And so the diagnostic assays needed to be revised so that we could start to look more broadly for what other variants were out there, and that really prompted our study.

[Sarah Gregory] So tell us about your study. What you were looking for within all that stuff you just said, and how did you conduct it?

[Alison Peel] So as I said, this finding that those two groups had come up with really, I guess, identified that yes, there was another variant that was causing deaths (or at least one death) in horses, and that it appeared to be in tissue samples from flying fox in a region of Australia that we would not usually consider to be high risk for Hendra virus spillover. And so, from my perspective, there was, I guess, an epidemiological gap between those two findings that was whether the flying foxes were actually excreting the viruses in urine and creating that opportunity for spillover to horses. Now, it's something that we would expect, but it's something that needed to be tested to be certain.

And so, our study was looking to screen large numbers of flying fox urine samples from mainly two different species (the black flying fox and grey-headed flying fox) to see if we could see whether that new variant was being excreted in urine. And then also to answer a broader question about is this variant acting in the same ways as the original variant? Can we apply all of our understanding that we have about Hendra virus over the last 28 years to this new variant as well, or is it something quite different that we need to consider differently?

[Sarah Gregory] What were your conclusions?

[Alison Peel] So we ended up screening over 6,000 urine samples from flying foxes over a number of years, and the main findings from our paper were that both the species that we studied (the black flying fox and the grey-headed flying fox) do excrete the Hendra virus variant in their urine and posing that risk to horses. And so, this study expanded the known distribution of this new variant in flying foxes. The previous detections had been in the southern parts of Australia (in Victoria and south Australia), and we extended that to include Queensland and New South Wales. And it provided that epidemiological link for me with those previous findings.

The other conclusion was related to the prevalence of detection. So in our classic original Hendra virus strain work, we typically...across all of our samples, across different phases, on average have been getting detections at about 7% of our samples. So the really surprising component of this work was that we only detected 10 positive samples out of about 6,000 that we tested. So that's a prevalence of about 0.1%. So that was a much lower prevalence than we were expecting, and we need to do some further work to understand what that means. It may be that this variant, it truly is circulating at a much lower rate or prevalence within the population compared to the original Hendra and it's just a rarer variant and it's circulating but it's not dominant in the circulation, or it may be a byproduct of some biases in our sampling structure. Our sampling was conducted as part of a much broader long-term study, and that long-term study had a predominant focus on the black flying fox as they're considered the main host of the original variant, and we had included very few grey-headed flying foxes within our study. And so, it may be that this new variant is...actually circulates at high prevalence within grey-headed flying foxes, and that would require separate studies specifically on that species to identify that.

[Sarah Gregory] Okay. Were there any other surprises?

[Alison Peel] So I think overall, the low prevalence was a big surprise to me. And the detection in the black flying fox, I guess, was not necessarily a surprise, but an interesting finding. As in the previous work, a lot of people have worked very hard to look for the classic variant in grey-headed flying foxes and not found it, and so there was thought that there may had been some species-specific view of that particular variant. And so, there was potentially some expectation that we might have seen the same thing with this new variant, but that turned out not to be the case.

[Sarah Gregory] What about challenges in doing this study? Were there any? Many? None?

[Alison Peel] Oh, there's always plenty of challenges, yes. Lots of challenges. I mean, I think that we were fortunate in that with the timing of when this variant was detected was towards the end of a large four-year study that we had been conducting, collecting samples from flying foxes across southeast Queensland and northeast New South Wales. And so, there were many, many challenges in obtaining those samples in the first hand and collecting them from the fields. Lots of fun out in the field and fieldwork, but of course, many challenges along the way as well. But we were fortunate with this particular study that we had that sample bank ready to go sitting in the lab, the RNA had already been extracted in the samples. And so, then when our collaborators came to us with this new viral assay for the new Hendra virus variant, they were ready to go. And with my collaborators at the Rocky Mountain Laboratories in the US in Montana, screened that very large number of samples very rapidly so that we could get these results.

[Sarah Gregory] Do you think the virus is more widespread than is currently known? I think you're saying that. So further studies are needed, and what do you think is going to be found? Any guesses?

[Alison Peel] I think it would definitely be more widespread than that has currently been detected. We would expect that it would be circulating within the range of the species that we have detected it in. So flying foxes are highly mobile, nomadic animals. They can travel hundreds of kilometers in the night if they're moving from one roost or one feeding area to another. And so, the mixing of the population across their distribution is significant. And so, I think if we detected it in a particular species in one part of the range, then I think that could be expected across all of the range. So across the species that the variant has been detected in to date includes basically all of the east coast of Australia, part of the south coast, and across the north part of...north coast of Australia as well.

The original paper that detected the variant in flying fox tissues also got one low positive detection in the other species (in the little red flying fox), which is distributed across much of central Australia, as well. But that detection was a low positive and it wasn't able to be confirmed, and so we need to do more studies in that species.

[Sarah Gregory] You mentioned further studies. What would you recommend?

[Alison Peel] So I think one of the big questions that remains still is what the prevalence is of this virus in other sample sets and other parts of Australia. And so, I think the next step would be to undertake a similar study, a similar surveillance of samples from southern parts of Australia looking for the Hendra variant in urine from grey-headed flying foxes. And that will really help shape our understanding of the risk of Hendra virus spillover to people in those areas and including a better understanding of the seasonality in those lower latitudes. Because we just can't assume that our understanding about the seasonality of Hendra virus in Brisbane is going to be the same about the seasonality of the Hendra virus in those other parts of Australia. And so, that would be a key recommendation from me.

[Sarah Gregory] And this is pretty terrible virus. Is there a way to contain the spread of it?

[Alison Peel] So thankfully, there tends to be fairly limited ongoing transmission between horses now, although the original outbreak of Hendra virus was in a stable setting and resulted in that rapid transmission and a large number of horses dying. Otherwise, outbreaks have been confined to small numbers of horses, often only one, sometimes two or three. Thankfully, it's not a case of

one outbreak becoming a major epidemic. The way to prevent the infections in horses, and then also by proxy into people as well, is through vaccination of horses, that there is a Hendra virus vaccine that has been available since 2012. And although there....as with any vaccine, there are some people who are not convinced on their safety. It is used widely, and this is very safe and there have been no Hendra virus cases in vaccinated horses. And so, it really is the most effective (single most effective) action that people can take to protect their horses and themselves and their families and their veterinarians from this nasty virus.

For people who have been exposed to a horse that has been Hendra virus-infected and are likely to be at risk of infection, there are also monoclonal antibodies that are available to treat those people...to try and prevent infection. And since those have been in use, there haven't been any further human cases.

[Sarah Gregory] Alright. So we have vaccinated horses with a great vaccine. But there are some horses that aren't vaccinated. And I guess an antiviral if you know you've been exposed. But maybe you don't know you've been exposed. So just basically, how should vets protect themselves from catching it?

[Alison Peel] Yes. So ideally, the best point of prevention would be to stop horses from becoming infected in the first place. But if there is a horse where a vet considers Hendra virus to be a risk—so that would be an unvaccinated horse showing many vague signs and neurological or respiratory signs or fever or even colic-like signs—the best precautions that can be taken to protect themselves would be wearing full PPE (masks, eye shields, and Tyvek suits, for example) and taking general hygiene precautions when dealing with that horse. Now, that can be challenging. Horses can be spooked by that kind of equipment, and sometimes vets are wary of donning that equipment in front of owners. But it really is a case of talking with owners and communicating the potential seriousness of Hendra virus, and that they are precautions that need to be taken for the vet's safety for them to be able to adequately assess and treat their horse.

[Sarah Gregory] There is apparently a group called Bat One Health. Tell us about that.

[Alison Peel] Yes. There is indeed a group called Bat One Health. That's a group that I'm a member of. It's an international group of researchers, bringing in people from a range of different disciplines. We study pathogen emergence specific from bats, and the transmission of those pathogens between bats themselves and also, as I said, that spillover transmission or cross-species transmission into other bridging hosts and into people. So a lot of our work brings in that One Health framework, and One Health is a recognition that the health of wild animals and domestic animals, the environment, and people is all intertwined. And so, we can't only focus on human health, problems within the world, without a recognition that it is heavily driven by the health of our environment and the animals that we interact with.

So our work, we understand that for pathogens to cross from wildlife hosts into people, there are a number of barriers that must be crossed for that to occur. And so, for example, we need to understand the wildlife host, where it is circulating, and their ecology and what viruses they host. The virus needs to be excreted or released from that wildlife host, and then it needs to survive in the environment for a period of time and come into contact with a new host and evade that new host's immune system for a successful spillover to occur. I guess our philosophy is that if we can understand the processes happening at each of those layers or each of those barriers in that process so we can identify the best points to intervene. Because if you can stop that process at any part of the way, we can stop that spillover of new pathogens from wildlife into people. And

so, to do that, we have field-based studies and laboratory-based studies, and mathematical modeling and statistical modeling approaches, bringing all those components together to understand those processes and ultimately aim to prevent spillover from occurring and take actions that have the sustainability of wildlife and the environment in mind, and have both win-wins for the environment and for people.

[Sarah Gregory] Tell us about your job, how you became involved in this study, and your work in general and in Bat One Health.

[Alison Peel] So I'm a veterinarian by training. I worked in practice for a few years before turning to research. I've always been interested in wildlife, and when I did my PhD at the University of Cambridge in England, I was lucky to be in the right place at the right time to be given the opportunity to study viruses in the bat species in Africa. And it was around the time that interest in bat viruses was just emerging. So I came to that field of study with an interest, I guess, in the viruses and the general wildlife virus component of it. But since working with fruit bats in that case and flying foxes since then (so this has been since about 2008 now), I've really developed a wonderful appreciation what fascinating and critical species that bats are in our environment, and I really enjoyed the ongoing learning about the ecology and the behavior and the movement ecology and feeding ecology of the species, as well. And so, my involvement in this piece of study came when I moved back to Australia in about 2013 and started working with some key collaborators here (Dr. Peggy Eby and Dr. Raina Plowright and Professor Hamish McCallum) who were working on our study species and Hendra virus at the time. And I have been working with those people ever since.

So right now, I guess my role is a senior research fellow. I guess my discipline is in disease ecology, understanding how diseases or pathogens circulate or change dynamically within populations and understanding the drivers of that dynamic. And I really enjoy that. I aim for that deep understanding of the mechanism, because I think that is crucial to interventions and making predictions of what's going to happen moving forward. So I've been a lead PI on our large Bat One Health program for the Australia team, leading a large field program over the last four years or so. And we're in the process of analyzing all the wonderful data that we've been collecting over that time. So there's more information to come.

[Sarah Gregory] Well, that's good to hear, because we need it.

So on a personal level, Australia is obviously a huge country with a lot of different areas and climates, as we discussed. Where do you live and what do you enjoy most about living there?

[Alison Peel] So I live in Brisbane, which is about halfway down the east coast of Australia. I actually grew up in Sydney, so that's a bit further south, but living in Brisbane is about 1,000 kilometers further north. So it's a bit more of a humid, subtropical climate compared to where I grew up in. But our winter often hovers around 20 degrees during the day in winter (it's often about 68 Fahrenheit or so), so it's a pretty pleasant place to live. And one of the...I think, the really most parts that I've enjoyed about since living here for the last 8 years or so is the amount of wildlife that's present around the city. And I live not too far from the city, but I'm actually looking out my window at the moment, and a rainbow lorikeet is feeding on one of the native bushes that I've got in my backyard. There's...we've got possums and snakes and frogs and all sorts of creatures that are integrated within the urban environment here. And flying foxes, of course.

[Sarah Gregory] Of course. Well, thank you for taking the time to talk with me today, Dr. Peel.

[Alison Peel] Thank you, Sarah. It has been a pleasure.

[Sarah Gregory] And I want to mention here, as Dr. Peel mentioned, Dr. Edward Annand, we did a podcast with him a couple of weeks ago called Sentinel Surveillance Shows Novel Hendra Virus in Horses in Australia. So listeners might want to look for that, also.

And you can read the May 2022 article, Novel Hendra Virus Variant Circulating in Black Flying Foxes and Grey-Headed Flying Foxes, Australia, online at cdc.gov/eid.

I'm Sarah Gregory for *Emerging Infectious Diseases*.

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