This Week in Virology

TWiV 1238 Clinical Update

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Guest: Daniel Griffin

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Vincent Racaniello: *This Week in Virology*, the podcast about viruses, the kind that make you sick.

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From *MicrobeTV*, this is *TWiV*. *This Week in Virology*, Episode 1238, recorded on July 23, 2025. I'm Vincent Racaniello, and you're listening to the podcast all about viruses. Joining me today from New York, Daniel Griffin.

Daniel Griffin: Hello, everyone.

VR: With a very florid bow tie. What's on it, Daniel?

DG: This is supposed to be hepatitis. I was listening to that Charlie Rice episode, and it made me think that would be very appropriate.

VR: Is that like a slice of liver or something like that?

DG: If people look closely, they'll be zooming in, you can see the Döhle bodies, and then the proper virions. You can see the -

VR: Dane particles.

DG: Dane. Dane, yes.

VR: Döhle is either a fruit company or a former politician in the U.S.

DG: A type of body that you see on red blood cell smears.

VR: Really?

DG: I get all my medicine and virology, and hematology confused there.

VR: That's hepatitis B virus, right?

DG: Yes. Unfortunately, I didn't have a hepatitis C bow tie, but I have to -

VR: I tell you, if folks are interested, you should listen to the Charlie Rice episode, because the story of making hepatitis C, an infectious virus in the laboratory, is really interesting. He was so persistent. He and his lab were so persistent. They didn't give up. Others too, which is just great.

DG: Yes, no, it's a great story about just finding harder and harder things to pursue. Then, really, the success that we've seen so far with hepatitis C is tremendous.

VR: Oh, the infectious virus was used to validate the antivirals, which are now so successful.

DG: Yes. Incredibly successful. We got to get more people tested, more people identified, more people treated. A lot of work ahead of us. We've got the tools, but we need the public will.

VR: Yes.

DG: All right. Yes, it was nice to - He and I both have that connection with Stephen Goff. Yes, that was a nice connection there. All right, let's jump in. We're recording on a Wednesday instead of our usual Thursday, because tomorrow morning, I will be starting a race right under the eyes of the Statue of Liberty. It's the Around Long Island Race, where we start the race in New York Harbor, go south, the opposite way that immigrants might come into our country, under the Verrazzano Bridge, the Verrazzano-Narrows there, out into the Atlantic. Then, a couple of 100 miles later, we circle pretty much all the way back. You were saying maybe we could record Friday. I don't think my boat is that fast.

[laughter]

I thought it was very appropriate to read the poem *The New Colossus* by Emma Lazarus. This is on the Statue of Liberty. Maybe to remind us of some of what a lot of us think it means to be an American. Let me read.

"Not like the brazen giant of Greek fame,

With conquering limbs astride from land to land;

Here at our sea-washed,

sunset gates shall stand

A mighty woman with a torch,

whose flame is the imprisoned lightning,

and her name Mother of Exiles.

From her beacon-hand Glows world-wide welcome;

Her mild eyes command The air-bridged harbor that twin cities frame.

'Keep, ancient lands, your storied pomp,'

cries she with silent lips.

'Give me your tired, your poor,

Your huddled masses yearning to breathe free,

The wretched refuse of your teeming shore.

Send these, the homeless, tempest-tost to me,

I lift my lamp beside the golden door.'"

VR: That's where that famous line comes from, "Your huddled masses yearning to breathe free"?

DG: Yes. It is interesting, the air-bridged harbor that twin cities frame. What are the twin cities? Brooklyn and Manhattan really were two cities. This is what America is supposed to be about. For those that have lost sight of what it means for America to be great, this is our vision. This is the vision of America. I just want to remind folks of that. We're a land of immigrants. We're a land of welcoming immigrants.

All right. Let's move into bird flu. I love this headline. This headline really caught my attention. It was a SIDRAP headline: “Flies, 'Milk Snatching' among H5N1 Transmission Contributors in Dairy Cattle.” Now, I don't know if you knew what milk snatching was before.

VR: Never heard of it. No.

DG: I had never heard of it either. The flies are, actually, contaminated fomites. I think we're familiar with that, flies landing on stuff, and you're like, "You know where those flies' feet have been before they landed on whatever?" We're thinking of that. What about this milk snatching? I'm going to reference the article. H5N1 virus invades the mammary glands of dairy cattle through mouth-to-teat transmission, published in the *National Science Review*.

Apparently, lactating cattle, and we should put in a link to the actual *National Science Review* article, but apparently, lactating cows engage in these activities where they swing their heads around and they actually drink milk from their own udders or they go drink milk from other lactating cows. It appears that the H5N1 replicating in their mouths then infect the udders through engaging in this activity.

VR: This is supposedly from a report in 2006 out of Japan. I don't know how widespread it is.

DG: Yes, I had never heard of this before.

VR: In the heyday of polio, they looked to see if flies would transmit it, and they didn't. That's between humans and humans. In a closed quarters of a dairy barn with a lot of cows right next to each other, maybe it could happen. I think it needs to be re-examined.

DG: That's an interesting issue because I don't know if our listeners have ever been to where these industrialized dairy cattle production facilities, I think I'll call them, where the cows are slotted in. Really, I don't know how they would get their head back around to engage in this activity, in a lot of these industrial farming operations.

VR: It's true when they're in a stall that's very narrow, right?

DG: Yes. My daughter Eloise, she's doing her master's to become an elementary school teacher. She calls and, through FaceTime, is having me listen to her read as if I'm a - I think I was a second grader in the most recent scenario. The book was actually about a cow that was eating ice cream, which, I was like, "Eloise, this reminds me of milk snatching behavior." Anyway. [laughs]

VR: This article appears to be all about the cows drinking their own milk or drinking another cow's milk, and that's transmitting the virus from their mouths to the mammary gland. What do the flies have to do with this?

DG: I think that was just, "by the way, how is it infecting the cattle," because we normally would think of like, oh, you get the flu, you're breathing it in. They're somehow will move past the flies, which maybe have it on their little feet there. In the H5N1 virus invades the mammary glands of dairy cattle through mouth-to-teat transmission, published first July in *National Science Review*. Here, what they're doing is they're finding that the oral tissues support the H5N1 virus binding, replication.

They're suggesting that maybe that's part of the transmission here, that they're not necessarily breathing it in and having it go to the mammary glands, but they're actually from the mouth, directly infecting the mammary glands. We have whooping cough. Mississippi warns of steep increase in pertussis cases. Want to keep this on people's radar here, vaccine-preventable illnesses. We've been talking a bunch about what's going on here, but the Mississippi State Department of Health issued a health alert about an increase in pertussis cases this year.

As of July 10, about 80 cases have been reported. We saw 49 in all of 2024. We're on banner here about four times what we saw before. Just to remind people that it's not just, oh my gosh, this whooping cough. Of these 80 cases, 10 patients have been hospitalized. Most of these, 76% of these cases, occurred in little children, children less than 18 years of age, including seven cases in infants less than 2 months old. Just keep reminding, infants should get the diphtheria, tetanus, acellular pertussis vaccinations at 2, 4, and 6 months. Then they get boosters at 15 to 18 months and 4 to 6. Also, pregnant women are recommended to get a single dose of the Tdap in the 27th to 36th week of pregnancy, so that third trimester. Then we also encourage this sort of ring vaccination, grandparents, extended family, trying to protect these young children from other people unknowingly passing the disease on to the child.

VR: I should point out that RFK Jr. has never mentioned this outbreak, nor is he advocating vaccination, which would be a way to stop it.

DG: I think that's the problem. That's part of what we're seeing here is historically, maybe nobody paid much attention to this. When you had outbreaks, when we had issues like this, you had public health people step in and set up vaccination sites, encourage people to do these things that can make a difference. We're not seeing that. I don't even know if he's even aware of this. It brings me back to that cabinet meeting when you had the first death in a childhood in Texas, and he wasn't even aware, thought it was maybe two, didn't even know.

This stuff really matters. Here we have little children ending up in the hospital. That brings us right into measles. Total cases in the U.S. I was a little worried, they did not update this until, later today on Wednesday. I checked it first thing in the morning. It was not done. I don't know if that person didn't come into work until a little bit later. We got our update as of July 22, 2025, a total of 1,319 confirmed measles cases reported by 40 jurisdictions.

Numbers still going up. We're supposed to be getting into the summer lull, where just the natural cycle itself should help us here. We already blew past that, more measles cases since measles was declared eliminated in the United States in 2000. Canada, not going well.

Another 158 new measles cases, really approaching 4,000 measles cases up there in Canada.

VR: It's interesting, Paul Offit always says measles stops in May. It's not stopping here, and we're almost in August.

DG: Yes. Osterholm was saying it doesn't stop in the summer. Let's see who's right. We'll keep track. [laughs] Paul or Mike, we'll see who's got it. The only thing I want to say about flu is that we're still tallying the number of pediatric deaths and another child's confirmed death from influenza this last season. We're up to 261 influenza-associated pediatric deaths, the highest number of pediatric deaths in a non-pandemic flu season since the condition became reportable.

Remember, majority of these were completely healthy prior, unvaccinated. These are, largely vaccine-preventable deaths. RSV was sort of a nice article here, looking at something that I'm very curious that we keep an eye on. The article, "Respiratory Syncytial Virus Strain Evolution and Mutations in Western Australia in the Context of Nirsevimab Prophylaxis," published in *Open Form Infectious Diseases*. This is, a reminder, listeners. This is you get that monoclonal antibody, the passive immunization, passive protection.

If we do this, are we going to get ourselves into trouble? Is there going to be some evolution? Is there going to be resistance? Nirsevimab, long-acting monoclonal antibody given to infants, high-risk children. During the 2024 RSV season in Western Australia, 21,922 doses were administered to infants entering the first season, 1,221 doses to at-risk children. In this context, this selection and spread of escape variants is what we're concerned about.

This study aimed to investigate their nirsevimab-binding site mutations using both clinical and wastewater data. They performed whole-genome sequencing on 382 clinical RSV samples, 12 wastewater samples collected from September 2023, October 2024. RSV subtypes, genetic diversity, mutations within the nirsevimab-binding region of the F protein that result in amino acid changes were analyzed. Phenotypic analysis was conducted to assess lineage dynamics and the potential emergence of escape variants.

RSV-A was the dominant subtype, 61.8%, RSV-B, 38.2%. No lineage shifts were observed following nirsevimab introduction. None of the known mutations associated with nirsevimab resistance were detected. Really, basically, I'm going to say, reassuring. Wastewater sampling covering approximately 2 million people from Perth metropolitan area, confirmed findings from clinical sequences, reinforcing the absence of resistance mutations.

VR: The actual study in kids were 382 clinical RSV samples. It's not very much.

DG: Yes, it's true.

VR: I wouldn't say mutations or amino acid changes are not going to happen because it's not very much, but we should keep looking for sure.

DG: Yes, I think that's - I'm glad they're starting to do this work because I think this is key to follow this. All right. Vincent, COVID, things are going in the wrong direction here, right?

VR: Yes, it doesn't look good, Daniel.

DG: Yes, the upward trend in the last 21 days is concerning. I broke our multicolored chart

down into basic different zooms. We zoom in, and you can really see that in a lot of the country, those trajectories are headed right up. In the West, we're already up into the moderate zone. The South is well on its way there. Really, nationally, we're headed in the wrong direction. If you look over time, you can really see that nice - not nice, the not-nice rise.

I was sort of trying to look over the last several years, it looks a bit like the summer of 2023, where we had a little bit of a plateau there. We got reassured. Then just as we headed into August, really was on the way up. It wasn't as bad a rise that time. Maybe we're going to rise, come back down. I'm hoping the peak isn't quite so.

VR: The peak, if you take wastewater levels as indicative of what's going on, and many people think they do, they are, the peak in this past winter was less than the peak last summer. That's weird. It's a winter respiratory disease. Apparently, it's breaking the rules as if there are any rules, but we make up the rules.

DG: Yes, we talked about this the last time. Some viruses have a double peak pattern. Coronaviruses tend to fall into a winter peak. I really think, fingers crossed, hopefully, it's a matter of time. It will make a lot more sense with a yearly vaccine if we only have a winter peak. This whole idea of vaccination boost the last six months. With two peaks, I don't really see how that - Yes.

VR: Yes. Two peaks makes it difficult because in the summer, people like to travel, and it's a problem. It could be this is a very small peak. I'm still holding out. Let's say it's a small peak.

DG: I hope it's a small peak. Hospitalizations are on the rise. I think pediatric hospitalizations are already as high as they were back in March. Starting to see things go in the wrong direction.

VR: Nobody's wearing masks. I'm one of the few people in the train station, so people are just relaxed about it. They're not thinking about it.

DG: Yes. Yes. They're too busy talking about some Jeffrey guy and not really following this. All right. Let's talk about COVID active vaccination. The article, “Real-world Evaluation of the Effectiveness of Sinopharm COVID-19 Vaccine against Symptomatic COVID-19 in an Omicron-Dominant Setting in Mozambique: A Test-Negative, Case-Control Study,” published in *CID*. I like this. Just a little bit of background. What is this Sinopharm COVID-19 vaccine? We're all we're all familiar with the mRNA vaccines, Moderna, the Pfizer.

Now people are starting to learn about something called Novavax, that they'd "more traditional protein-based" vaccine. Now we've got the WHO has endorsed this inactivated Sinopharm vaccine. Here's our inactivated vaccine. It's manufactured by the Beijing Institute of Biological Products in China. This got endorsed by the WHO based on some pretty robust data, large multi-country phase 3 trial demonstrating 79% efficacy against symptomatic infection and hospitalization.

What about doing some real-world evaluations of this vaccine, like we have seen for Pfizer, Moderna, the ChAdOx, AstraZeneca? A little bit scarce here. Here we have a prospective cohort nested test design study where we're going to look at the efficacy of the Sinopharm vaccine in preventing PCR-confirmed symptomatic SARS-CoV-2 infection. They're going to perform this study in seven healthcare facilities, including mobile testing stations in

Mozambique, between March 2022 and December 2023. Participants were individuals aged 2 years or older, COVID-19 symptoms for less than 10 days. Cases were those with PCR-confirmed COVID-19. For each case, they're going to match, so we're going to have this case control.

Vaccine protection was assessed according to the association between complete vaccination and SARS-CoV-2 disease onset 14 or more days after vaccination. What did they find? A couple of issues. The study did not reach the targeted sample size. Only a third were analyzed; some limitations here. A total of, I'm going to throw in the word, only 253 cases were matched to 759 test-negative controls. The adjusted vaccine effectiveness was 18% with huge confidence intervals.

VR: That's not much of an effect, Daniel, right?

DG: Not much of an effect, yes. Really not particularly impressive. We've talked about this a little bit in the past, where a lot of people, "Oh, why didn't we just use an inactivated vaccine? Why don't we just use an inactivated vaccine?" There seems to be some people pushing for that. Here's an inactivated vaccine, and not really seeing the same real-world data we see for the mRNA or the protein-based Novavax vaccines.

VR: Yes. I think we have heard in other studies that these inactivated COVID vaccines, anyway, are not very good. This simply confirms that.

DG: Yes. I'm glad we've got these other approaches out there. All right. COVID early viral phase. I'm realizing I probably need to not just run through this so quickly. I was on call the other night, and I got a call from a doc, and his father was in the hospital. He was asking me about COVID management. Never miss an opportunity to vaccinate, never miss an opportunity to educate your colleagues. The poor guy was on the phone probably longer than he thought, as I discussed the different studies and how we treat COVID early phase and late phase.

We have NIH and IDSA, ID Society of American Guidance. Number one, early antiviral therapy. The number one recommended oral antiviral, the nirmatrelvir/ritonavir, the Paxlovid, in people that are at risk of progression. Not only do we see that we're going to reduce their risk of ending up in hospital, not only going to see a reduce in the risk of death, but remember, we have the real world studies showing we're going to reduce their risk of post-acute sequelae of COVID as well. We're doing a lot right up front here.

Remdesivir, IV, so that's a little limited in that first seven days. Molnupiravir, data not as impressive, convalescent plasma in certain circumstances. Then the second week, this is when we think about steroids in the right patient at the right time, not really during that first week. Second week, starting to get those oxygen saturations less than 94%. Then we're looking at that dexamethasone or equivalent, 6 milligrams per day times six days. We have some anticoagulation guidelines, pulmonary support, maybe still a window for remdesivir if within the first 10 days, and immune modulation.

All right. I touched a little bit on Long COVID, how we can prevent post-acute sequelae of COVID right up front. We also have an article that I wanted to spend a little time on. I realize I'm going to have to give a little context for this. Among the phenotypes of Long COVID, there's a group that actually meets criteria for MCAS or response to MCAS. This is this mast cell activation syndrome. It's a mast cell activation syndrome type of post-acute sequelae of

COVID, challenging to treat.

I was delighted to see the article, “Utility of Glucagon-Like-Peptide-1-Receptor Agonists in Mast Cell Activation Syndrome,” published in the *American Journal of Medical Sciences*. Part of why I like this, I've actually had a number of patients who ended up on these medicines for other reasons, but then were actually saying, "Hey, by the way, I'm getting some benefit here." Mast cell activation syndrome, it's a collection of illnesses rooted in inappropriate mast cell activation with little or no neoplastic mast cell proliferation.

It's different than mastocytosis. These GLP-1 receptor agonists engage with GLP-1 receptors present on many types of cells, including mast cells. These drugs are already approved for management of a few chronic inflammatory diseases. It's also being increasingly appreciated that they might help with even more diseases than they've already been approved for. Here, we ended up with a retrospective case series describing the use of a variety of GLP-1 IRAs for managing refractory MCAS in a diverse assortment of 47 patients.

These 47 subjects were selected by the authors from their panel of patients for having been definitively diagnosed with MCAS per consensus-2 criteria. A little pause here. Definitively diagnosed. What are these criteria for diagnosing MCAS? We have consensus-1 criteria and consensus-2. Consensus-1, a little stricter. This is the consensus criteria published by specialists in mast cell disorders, such as the American Academy of Allergy, Asthma, and Immunology, focuses on biomarker-based diagnosis.

The idea here is to really ensure diagnostic certainty, really strict criteria. Let's try to minimize overdiagnosis. The testing approach relies on measurable biomarkers, such as an increase in tryptase levels during an episode, so at 20% to more than 2 nanograms per milliliter over baseline. They actually recommend invasive tests to verify, so bone marrow biopsies, genetic testing, ruling out clonal disorders, really emphasizing specificity here.

Now there's consensus-2, and that's what we're using here, and really is what I think a lot of providers are using when they start looking at this presentation in the post-COVID folks. An alternative group of clinicians have adopted this more symptom-based, what they refer to as patient-focused approach, and the goal here is to really improve access to diagnosis and treatment for folks that don't meet that stringent biomarker threshold set by consensus-1.

Here, you focus on clinical symptoms, patient's response to treatment. You don't need that definitive biomarker confirmation, allows diagnosis without significant elevations in tryptase, and prioritizes early and symptom-driven treatment. Using this criteria, not the more strict one, among 47 cases, 89% demonstrated clinical benefit with the GLP-1 receptor agonist for a broad range of problems associated with MCAS. Pretty good response rate.

VR: Yes. This is getting very popular for obesity, isn't it?

DG: It's really amazing the number of people that are finding uses of these GLP-1 drugs. Using for a number of different things.

VR: Are they safe, or are there other problems associated with them?

DG: They are relatively safe, but there's a reason they're prescription drugs. There have been issues, people taking these before surgery and having issues with aspiration. There can be loss of muscle if a person isn't using them properly. Overwhelmingly, the great impacts

they're having on diabetes type 2, obesity, obstructive sleep apnea, and some ongoing studies, Alzheimer's disease, several substance abuse issues, maybe the cravings being actually helped by these medicines.

VR: Is the mechanism for all these diverse effects known?

DG: I would say across the board, not completely. A lot of it is a little bit of a surprise, like say, "Oh, it gets rid of that food noise, but how?" I think we're still trying to sort out the mechanism. All right. As we've been saying for the last five years, no one is safe until everyone is safe. I encourage everyone to pause the recording right here, go to parasiteswithoutborders.com, and click Donate. Even a small amount helps. We're getting near the end of our FIMRC, Foundation International Medical Relief of Children, fundraiser.

The rules are supposed to be that we double your donations up to a maximum donation of $20,000, but I'm updating that to $40,000 because people have just been incredibly generous lately. I want to encourage you to get your donations in by the deadline because that really helps us, not only do the work we do, but it helps us support these great organizations and all the work that they're doing on the ground.

VR: It's time for your questions for Daniel. You can send yours to danielatmicrobe.tv. Anthony writes, "My wife and I are expecting a baby in early December, and have had multiple conversations about our views on vaccines for people who want to see the baby, especially within those first six months. We agree that we want everyone to be updated with flu, COVID, and Tdap vaccines. After listening to *TWiV*, I've learned that Tdap doesn't fully protect against whooping cough for the whole 10 years. Would you advise that I request people to get their Tdap updated if it was more than five years ago? Should we consider asking people about the RSV vaccine as well?"

DG: This is great stuff, Anthony. Yes, your baby's going to be born in December, so heading right into, or may even be in the midst of that respiratory pathogen season. You got a bunch of the things you're appropriately thinking about, flu, COVID, yes, I would think about RSV as well. Maybe a good talking point for folks that are eligible. Yes, with the Tdap, we don't think of it as, oh, has it been 10 years? We encourage the folks that are going to be around the baby to go ahead and get that updated, to get that pertussis, that whooping cough protection to help protect that baby.

VR: Mike writes, "Maybe I missed it, but I'm curious if you have ever spoken about the low-dose naltrexone studies for Long COVID. Based upon my layman's reading, the data seem mixed. However, given the other options are fairly invasive, time-consuming, expensive, transfusions, et cetera, I was wondering if this is worth exploring. Also, are they ever going to rerun this webinar, Long COVID: The Answers? Hope you find an AC repairman.

DG: All right, thanks, Mike. We have actually talked a little bit over the years about low-dose naltrexone. This is a medicine where usually if you're going to be trying this, or if we're going to be trying this in folks with post-acute sequelae of COVID, with Long COVID, you have to work with a compounding pharmacy, because you're starting off with 0.5 milligrams per day, you're doing that for a couple of weeks, and then going to 1 milligram and then doing that.

It's a whole slow titration up. It seems like there might be certain subsets who seem to get benefit, and I do all this qualified because there are ongoing studies looking at, does this

really make a difference? Are people just getting better while we're doing it, or is there a placebo impact here? No, low-dose naltrexone is certainly one of the things that folks taking care of people with Long COVID are trying.

VR: All right, the next one is not a question, so you can just sit back and enjoy. This is from Jennifer. "I want to reach out and thank you for all you do with *TWiV* and beyond, but especially for the most recent episode of clinical update. As one of the authors of the apparently poorly marketed John Snow Memorandum, your recounting of those surreal days back in October 2020 meant a lot to me amid all of the COVID revisionist history as of late.

It's hard to remember such an innocent time, but I remember how earnestly we approached the response to the Great Barrington Declaration, because we, at least I, thought it was meant to be a good-faith scientific and policy discussion about the best way forward. I admit I am prone to thinking the best of people. Of course, it didn't take too long to realize that the GBD authors were not looking to initiate an evidence-based discussion, and in fact, outright avoided it, particularly when pressed on basic assumptions or details of their plan.

My turning point may have been a Christmastime Twitter exchange with Martin Kulldorff, where he didn't think the arrival of vaccines had any implications for their strategy. You prompted me to go back to read our memo for the first time in a long time, and I'm quite proud of how it held up. As you said, we evidenced each claim as best we could, but also acknowledged the limits to what we could know at that early stage. The GBD and its aftermath really was the turning point of the pandemic for me as a scientist.

Up to that point, it felt like we were all in it together, but when the GBD folks chose ideology over good-faith science, things took a dark turn that we clearly haven't recovered from. The irony of people not hearing much about the John Snow memo is that people like Bhattacharya and Prasad nonetheless pointed to us as an example of their views being silenced. Daniel, thanks so much for your candid and refreshing take on the GBD, which was extremely validating for those of us who lived through it.

I am growing increasingly fed up with all of the COVID gaslighting, and we need to speak up to set the record straight whenever we can. You managed to do so extremely effectively without any hint of meanness, which I can't say for the likes of Vinay Prasad. Thanks for being such an inspiring and steadfast example of what science, for the sake of good, can and should be. I've listened to every clinical update every week for five years now, so I really can't thank you enough, and I'm in awe of the consistently high quality you put out no matter where you're traveling in the world.

Your guys' voices feel like old friends, so hopefully I can stop by and say hello at Columbia someday, and would love to invite either of you to lunch or coffee in London or Oxford if that appeals. I usually listen to episodes on Saturday, but was a bit behind this week, so only got to it yesterday after I had written this post on the RSV vaccine and dementia paper. I'm not surprised we had quite similar takes, but I still wish I'd listened to your summary first. Best wishes to you guys and the whole *TWiV* team. Please know I'm very, very grateful for you." Jennifer is Professor of Demography and Population Health at the University of Oxford and a co-author of the John Snow Declaration.

DG: Yes, thank you. That was a very nice email.

VR: I think this is a great point that the COVID gaslighting continues, which is absurd. It's not based on science, and also, some people are very mean.

DG: I think that's one of the most upsetting things that has happened, and you always have to be careful now because there's this meanness that entered into science, and science was supposed to be about criticism and challenge, and now this, "Oh, we've been gaslighted, we've been silenced." I don't think these people have been silenced. If anything, the Great Barrington Declaration got a lot of attention, and the evidence-based, what do we actually know, John Snow memorandum, that did not get much. I'm not sure who was silenced. I really think that, yes, we're the victim here, is not proper from the GBD people.

VR: The GBD got way more attention for the piece of garbage that it is, and the John Snow got nothing because it's truth, and that's the problem with this country. People are not interested in truth, at least scientific truth. All right, another long one from Chris. I put two long ones in here, but I think they need to be read. "I want you to know there are a large number of practicing food-animal veterinarians who listen to *TWiV*. My *TWiV* donation to Parasites Without Borders was in memory of one of those veterinarians, Dr. Hunter Lang, who passed away suddenly in January.

I'm a veterinary immunologist and virologist, but I'm also active in organized veterinary medicine. Hunter and I represented different organizations at the American Veterinary Medical Association Health of Delegates. Still, it never failed when we would meet and get around to talking, the subject of one of the recent episodes of *TWiV* would come up. There are a number of veterinarians that I know who also speak to the importance of *TWiV*. Hunter's family went one step further by asking that donations in his memory be given to the American Heart Association or *TWiV*. I think it would be awesome if on the donation site you could have a place to comment if the *TWiV* donation is to memorialize or honor others

Second part of my email concerns content related to One Health on *TWiV*. My concern was made more poignant in your June 6tepisode by Dr. Griffin's comments about H5N1 high-path avian influenza in regard to depopulation of poultry facility in Arizona. When the popular press is used as your source, Arizona Republic, and then a quote from an animal rights group from the article is used, the organization was misidentified in the podcast. It is Animal Outlook, not Animal Outbreak. The accuracy of the popular press information needs to be verified.

Emergency depopulation is an issue that has caused veterinarians and the organization that represents veterinary medicine, the American Veterinary Medical Association, much anguish between animal well-being and public health. I've included the link to the AVMA policy for your reference. It seems a bit hypocritical to lambast the human anti-vax groups and their misinformation, rightfully so, and push for the best science and professional judgment, as in the case of vaccination recommendations, and then turn around and discuss humane euthanasia with a quote from an animal rights group whose agenda is base as the anti-vaxxers.

Veterinarians are, unfortunately, the only medical profession in the life and death business. Not only are we responsible for health and well-being, but also a humane death by euthanasia. As outlined in the preamble to the policy statement, this is not a simple solution, and is a responsibility veterinarians take seriously. The suggestion in the podcast that we can use CO2 for mass depopulation and we are not using it because of cost demonstrates a lack of understanding of the logistics of depopulation euthanasia and

worker safety versus depopulation to prevent HPAI and neighboring flocks. There have been a few times that *TWiV* has hit a nerve for me as a veterinarian, but the misinformation was not up to the standards that *TWiV* holds itself to be for science-based information. To continue on this One Health vein and *TWiV*, I appreciate that you included a veterinarian who is studying to be a virologist on the panel. Still, the panel lacks the expertise of a veterinary virologist, "an experienced person" familiar with the situation in the field, for example, dairy industry and H5N1, and veterinary diagnostics.

One faux pas in this area was the *TWiV* panel discussing rabies diagnostics and assuming it is PCR-based, which it is not, for good reason. *TWiV* is missing that boots-on-the-ground veterinary virology and immunology. I did not write this to promote myself, but if it comes to the point that you see this expertise as of value, I would be happy to share my background as well as that of other veterinary virologists. I appreciate when *TWiV* goes out to meetings. I have attended a couple of *TWiV* sessions at ASV.

One of the major infectious disease meetings in the veterinary world is the Conference for Research Workers in Animal Disease held in January in Chicago. This brings virologists, immunologists, and epidemiologists together for an exciting meeting. I think a *TWiV* event would be highly attended.

Finally, I want to thank you for your fond recollections of the late Dr. Ann Palmenberg. I was fortunate to know Ann well when she began as an assistant professor in the Department of Veterinary Science at University of Wisconsin, before she moved back to molecular virology, and I was a graduate student. She was a phenomenal mentor to many and a great cook who made it her mission that being a graduate student was more than just living in the lab. She was the queen of ASV hospitality whenever ASV was in Madison. Thank you for all your dedication to microbiology through your many online efforts." Chris is a professor emeritus at South Dakota State University.

DG: Thank you, Chris. Vincent, I appreciate the fact that you read this because we make mistakes, and I will take this as correction. I did spend some time reading the avma.org guidelines on depopulation of animals. It's very extensive, very well thought through, so I appreciate that link. Yes, I appreciate the correction as well. We need more expertise. I appreciate the fact that our writers can be part of our population.

VR: Finally, an email from Richard, who is a retired virologist. "In *TWiV* 1232, I was listening to your discussion of thimerosal in vaccines and kept hearing the word being pronounced as “thimersal” instead of “thī-ˈmer-o-sal” as I have always heard it pronounced and said it myself. Is this a case of "potatoes–potahtoes?" Just curious."

DG: What do you think, Vincent? How should we be pronouncing that?

VR: I asked Paul Offit the other day, and he says thimerosal because I asked him if it was thī-ˈmer-o-sal or thimerosal. He said thī-ˈmer-o-sal. What do you pronounce it as?

DG: I think I pronounce it thī-ˈmer-o-sal as well. It's one of those interesting things when I was recently on the wards at Columbia. I was saying that you can tell who's like an avid reader by the mispronunciation of what we think of as common words, because they read them as opposed to hearing them in conversation. Yes, as long as thimerosal, thī-ˈmer-o-sal, I'm good with it either way, as long as we know what we're talking about. Some people seem not to.

VR: Speaking of pronunciation, Daniel, how do you say the word that means programmed cell death?

DG: Oh, that's so funny. I say apoptosis, but I know that is not *TWiV*-preferred.

VR: I used to say apoptosis all the time. Helicopter, right?

DG: The coiner, right? The person who coined it did not pronounce it that way.

VR: There's a helicopter, right? Anyway, the textbook, my co-authors lambasted me for using apoptosis. They say it should be a-pop-toh-sis, and now I say apoptosis.

DG: It should be if you think about the ptosis. We always say ptosis. Oh, they've got ptosis, Horner syndrome. It should be apoptosis.

VR: OK. This is not resolved, then. That's *TWiV* weekly clinical update with Dr. Daniel Griffin. Thank you, Daniel.

DG: Oh, thank you. Everyone, be safe.

[music]

[00:44:47] [END OF AUDIO]